

MULTIMEDIA

C-123

Self Learning Material



Directorate of Distance Education

**SWAMI VIVEKANAND SUBHARTI UNIVERSITY
MEERUT-250005
UTTAR PRADESH**

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SYLLABUS

MULTIMEDIA

C-123

Unit - I

Introduction and Hardware: Definition of Multimedia, CD-ROMs and Multimedia applications, Multimedia requirements-Hardware, Software, Creativity and organization, Multimedia skills and training Macintosh versus PC, the Macintosh platform, PC platform, Connections, Memory and storage devices, input devices, output hardware, Communication devices.

Unit - II

Multimedia Software: Basic tools, painting and drawing tools, OCR software, Sound editing programs, Animation devices and digital movies and other accessories, Linking multimedia objects, office suites, word processor, spreadsheets presentation tools, Types of Authoring tools card and page based, icon based and time based authoring tools, object oriented tools.

Unit - III

Production Building Blocks: Test-using test in Multimedia, Computers and Text, Font editing and Design tools, Hyper media and Hyper text, Sounds-multimedia system sounds MIDI versus Digital Audio, Audio file formats, Working with sound in Windows, Notation interchange file format (NIFF), Adding sound.

Unit - IV

Production Tips: Image-creation, making still images, images colors, Image, File format, Animation-principles of animation, making workable animations Video, using video, Broadcast video, Standard, Integrating Computer and TVs, shooting and editing Video, using Recording formats, Video tips, Video Compression.

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4. Describe the following video recording and tape formats:

Ampex	VERA
U-matic	Betamax
Betacam	Video 2000
Compact Video Cassette	Camcorder
Video 8	
5. How would you capture, digitize and import the various video files?
6. How would you create DVDs?
7. What is video compression?
8. What is MPEG-1?
9. Describe the followings:

I-frames	P-frames
B-frames	D-frames
10. What do you know of the following:

MPEG-2	MPEG-4
MPEG-7	MPEG-21
11. What do you understand by animation? How are they created?
12. Describe the following:

Keyframes	Tweening
-----------	----------
13. What is cel animation
14. What do you understand by Computer Animation?
15. Describe Morphing.

FURTHER READINGS

1. **Multimedia and Web Technology** : *Ramesh Bangia*, Laxmi Pub, 2007
2. **Computer Graphics and Multimedia** : *Ehtiram Raza Khan and Huma Anwar*, Laxmi Pub, 2008
3. **Multimedia Applications and Web Deisgning**: *Dinesh Maidasani*, Laxmi Pub, 2008
4. **Computer Graphics With Multimedia** : *A. Rajaraman*, Narosa, 2009
5. **Computer Graphics, Multimedia And Animation** : *Malay K. Pakhira*, PHI Learning, Second Edition
6. **Computer, Internet and Multimedia Dictionary** : *S. Verma*, Universities Press, 1998

chrominance details. The 4:2:2 chrominance format indicates that half the chrominance values have been deleted. The 4:2:0 chrominance format indicates that three quarters of the chrominance values have been deleted. If no chrominance values have been deleted, the chrominance format is 4:4:4. MPEG-2 allows all three options.

MPEG-2 specifies that the raw frames be compressed into three kinds of frames: intra-coded frames (I-frame), predictive-coded frames (P-frames), and bidirectionally-predictive-coded frames (B-frames).

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SUMMARY

- Video standards and formats are still being refined as transport, storage, compression and display technologies take shape in laboratories and in the market place.
- If you shoot your own video for a project, make sure you have releases from all persons who appear or speak and permission to use the audio effects and music you wave into it.
- Four broadcast and video standards and recording formats commonly in use around the world are: NTSC, PAL, SECAM and HDTV.
- As specified by the NTSC standard, a single frame of video is made up of 525 horizontal scan lines drawn onto the inside face of a phosphor-coated picture tube every 1/30th of a second by a fast-moving electron beam.
- PAL is an integrated method of adding colour to a black-and-white television signal that paints 625 lines at a frame rate of 25 frames per second.
- Although SECAM is a 625-line, 50 Hz system, it differs greatly from both the NTSC and the PAL colour systems in its basic technology and broadcast method.
- There are six video formats in the ATSCDTV standard that are "High Definition Television." These are the 1080-line by 1920-pixels formats at all picture rates (24, 40 and 60 pictures per second) and the 720-line by 1280-pixel formats at the same picture rates.
- Analog signals are continuous in nature whereas digital signals are discontinuous.
- A digital video architecture is made up of a format for encoding and playing back video files by a computer and includes a player that can recognize and play files created for that format.
- You capture digital video files from tape. That is, you transfer them from the source videotape to the hard drive
- Describe the various colour modes.
- What is Dithering?
- Describe the various types of image compression and file formats.
- Describe the following:

GIF	JPEG
JPEG 2000	PNG
TIFF	EXIF
PS	PDF

REVIEW QUESTIONS

1. Describe the basics of video.
2. How does video works?
3. Describe the following broadcasting video standards:

NTSC	PAL
SECAM	HDTV
Digital video	Analog video

once the shooting is over. Not allowing for the pre and post roll can make editing difficult, resulting in amateurish videos. If you are filming yourself then start the camcorder recording with the remote control, wait six seconds before you start talking and at the end let the camcorder run on six seconds before stopping. This will give you plenty of time to play with when editing.

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6. Remember It's A Small Screen. When shooting videos to add to your web site, normally the player will be 320 x 240 so avoid wide scenes, keep it close to see the detail. Typically you will be shooting close or very close shots. If you are filming yourself talking then you will be within two metres of the camera and shown from the waist up. Keep the content simple and uncomplicated, do not have much happening in the video and keep movement to a minimum. Watching action from a football game in a 320 x 240 player is not great. So keep it close, keep it simple and keep it quiet.

7. Think Like a Photographer. When shooting a video see it like a photographer taking individual shots. Compose your shoot, take a few seconds from one position. Stop the camera and reposition yourself then shoot again. Do not have too much camera movement in your video. Using these tips will ensure that you can shoot and produce quality website videos of a better quality than most people. As with many things in life, practice makes perfect and it will not be long before you are getting good results on the first take.

4.15 VIDEO COMPRESSION

An HDTV camera generates a raw video stream of 149,299,200 bytes per second for 24fps video. This stream must be compressed if digital TV is to fit in the bandwidth of available TV channels and if movies are to fit on DVDs. Fortunately, video compression is practical because the data in pictures is often redundant in space and time. For example, the sky can be blue across the top of a picture and that blue sky can persist for frame after frame. Also, because of the way the eye works, it is possible to delete some data from video pictures with almost no noticeable degradation in image quality.

TV cameras used in broadcasting usually generate 25 pictures a second (in Europe) or 29.97 pictures a second (in North America). Digital television requires that these pictures be digitized so that they can be processed by computer hardware. Each picture element (a pixel) is then represented by one luma number and two chrominance numbers. These describe the brightness and the color of the pixel (see YCbCr). Thus, each digitized picture is initially represented by three rectangular arrays of numbers.

A common (and old) trick to reduce the amount of data is to separate each picture into two fields upon broadcast/encoding: the "top field," which is the odd numbered horizontal lines, and the "bottom field," which is the even numbered lines. Upon reception/decoding, the two fields are displayed alternately with the lines of one field interleaving between the lines of the previous field. This format is called interlaced video; two successive fields are called a frame. The typical field rate is then 50 (Europe/PAL) or 59.94 (US/NTSC) fields per second. If the video is not interlaced, then it is called progressive video and each picture is a frame. MPEG-2 supports both options.

Another common practice to reduce the data rate is to "thin out" or subsample the two chrominance planes. In effect, the remaining chrominance values represent the nearby values that are deleted. Thinning works because the eye better resolves brightness details than

and recording as its primary function. All tape-based camcorders use removable media in form of video cassettes. Camcorders that permit using more than one type of media, like built-in hard disk drive and memory, are often called hybrid camcoders.

Video 8: It is a video cassette recorder system used with video cameras. The tapes were 8 mm thick and recorded video in analog format. The tapes were the size of audio cassettes making them portable and popular for use with cameras. The video quality is better than VHS and is one of the dominant formats for video cameras.

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4.14 VIDEO TIPS

Following are the tips for creating good videos.

1. Good Lighting. The main difference between amateur and professional videos is the quality of the lighting. With poor lighting comes graininess which results in poor quality video. In film and television studios, you must have seen them on TV, there is always an excess of lights and the cameras can be adjusted down to suit the amount of light. It is not so easy or successful to adjust the camera up when there is not enough light. This will lead to noise and graininess and a low quality video. For your home studio make use of fluorescent light bulbs. These bulbs have several advantages over tungsten and halogen lights, namely no heat output, low energy consumption and a nice soft light with not so harsh shadows. You can buy fluorescent light kits or you can save a lot of money and make your own fluorescent light box as we show you elsewhere in this web site. It is best to use a three point lighting system which is fairly standard in most studios and again we will show you how to do this elsewhere on the website.

2. Tripod. Use a tripod for shake free shooting. Tripods come in all sizes and quality but don't go overboard to start with. The camcorder that we use on this site is only small and weighs in at just over 500 grams (1.1lbs) so there is no need to buy a tripod to suit a heavy professional video camera.

3. Microphone. The built in microphone on your camcorder is not the best to use if you can avoid it. Typically the quality is not good enough and it has a wide pattern picking up lots of other noises, even the running camcorder noises. Don't scrimp on buying a microphone, buy a uni-directional one that preferably can be mounted on the shoe on top of your camcorder. Otherwise mount the microphone on a boom or support just out of view of the camcorder but close to the subject. Another option is to use a lavalier microphone, the sort that clips onto your lapel and as used by newsreaders on television. These are very effective and decent quality ones can be purchased for less than \$50. No need to buy a wireless unit, but you need enough cable to run from the camcorder remote microphone, up the inside of your shirt and to your lapel. Bear in mind that you will normally be seated within two metres of the camcorder so the microphone should have plenty of cable.

4. Avoid Zooming and Panning. Another amateurish trait, avoid these actions as much as possible. If you are videoing yourself or a subject in the garden for instance and want to 'set the scene' for your viewers then by all means zoom out, pan a little if necessary and then return to the subject and continue with the recording. This should be as much zooming and panning that you need.

5. Pre Roll and Post Roll. This is the time from starting and stopping the camcorder and the actual start and finish of the action you want to record. This allows for better editing

For best results, make sure that you capture or record following these specifications:

Frame size NTSC standard 720 x 480 or PAL standard 720 x 576. If your project uses a different frame size, Adobe Premiere Pro scales it automatically.

Frame rate 29.97 fps (NTSC) or 25 fps (PAL). All footage in a single project must be of the same frame rate.

Aspect ratio 4:3 or 16:9 (widescreen).

Audio bit depth 16 bits.

Audio sample rate 48 kHz.

4.13 USING RECORDING AND TAPE FORMATS

There are various video recording formats available, mostly by the companies which deal with them. Each one of them has its own to support its hardware. Some of them are listed below.

Ampex: A format owned by Ampex Corporation. In 1950s, it was the most popular one for recording audio and video. In 1970, Ampex introduced the first robotic library system which enabled TV stations to re-sequence TV commercials instantaneously. It is obsolete now.

VERA: In 1952 it was introduced by BBC. It used very high tape speed of about 200 inches/second to record the high frequencies recorded by video signals. It has also become obsolete now.

U-matic: It was introduced by Sony Corporation of Japan. It was among the first video formats to contain the videotape inside a cassette, as opposed to the various open-reel formats of the time. In 1990's, it was made obsolete by Sony betacam-SP. U-matic is no longer used in mainstream production but would be remembered as a cheap and robust facility processed by almost all TV stations in the world.

Betamax: This format was used in the hand held video recorder. The cassettes contain half inch wide videotape in a design similar to the earlier, professional 3/4 inch U-matic format. The former is generally considered obsolete, though it is still used in specialist applications by a small minority of people.

Betacam: It was developed in 1982 by Sony Corporation. It belongs to the family of half-inch professional videotape products. The cassettes come in two sizes S and L. Betacam cameras can only load S tapes, while VTRs can play both S and L tapes. The cassette is coloured differently depending on the format, allowing for easy visual identification.

Video 2000: This was introduced in the year 1979 and stopped in 1988. It uses double sided cassettes. The cassette was slightly larger than VHS and could record four hours of video on each side.

Compact Video Cassette (CVC): It was the one of the first videocassette formats to use a tape smaller than its earlier predecessors of VHS and Betamax. The system, which included the VCR and a handheld camera, was very small and lightweight for its time. This format used a cassette slightly larger than an audio cassette and was loaded with 1/4 inch videotape.

Camcorder: This one became very popular in early 2000's. In order to differentiate a camcorder from other devices that are capable of recording video, like cell phones and compact digital cameras, a camcorder is generally identified as a portable device having video capture

auto-play DVDs that allow your viewers to skip forward or back through the movie using the Next and Previous buttons on a DVD player's remote control.

Menu-based DVD with scene selection submenu: Displays a submenu of scenes that you specify with markers. These DVDs are best for long movies that play from start to finish, but that also contain scenes that the viewer might want to access from a submenu. On the main menu, the viewer can choose to play the movie or go to a scene selection submenu.

Menu-based DVD with movie selections: Divides a sequence into separate movies that viewers can access from the main menu. Using DVD main menu and stop markers, you can divide a sequence into individual movies. When you build the DVD, each movie corresponds to either the Play Movie or movie buttons on the main menu. You can also include scene markers that provide viewers with a scene selection submenu. The scene selection menu is for the entire sequence—you can't divide individual movies in your sequence into separate scene menus.

DVD Creation Workflow

Adobe Premiere Pro can burn a single sequence to DVD, but each sequence in your project can be burned to a separate DVD. Add all the content you want to include on DVD into a sequence. After you prepare the sequence, perform the following basic tasks:

1. **Add scene, main menu, and stop markers.** Adobe Premiere Pro creates DVD menus dynamically based on DVD markers you place in the sequence. DVD markers are separate from sequence markers, but you apply them from the Timeline panel in a similar way.

If you are creating an auto-play DVD you can add scene markers so that the viewer can use a DVD player's remote control to move from scene to scene.

2. **Choose a menu template.** Adobe Premiere Pro templates are predesigned menus that come in several styles. Buttons on the templates automatically link to DVD markers placed in the sequence. Adobe Premiere Pro creates additional submenus as necessary to accommodate all the DVD markers in a sequence. You choose a template from the DVD Layout panel.

Auto-play DVDs don't have menus, so you don't need to choose a template.

3. **Customize the menu template.** Edit titles, change graphics, or add video for backgrounds. You can also use video in button thumbnails by specifying a section of a clip to play in the button.
4. **Preview the DVD.** Check the functionality and the look of your DVD menus in the Preview DVD window.
5. **Burn the DVD.** Attach a write-capable DVD drive to your computer and burn your DVD content to disc. You can save the compressed files to a folder for playback from a computer hard drive. You can also save a DVD ISO image and distribute it or burn it later using other DVD-burning software.

Preparing Content for DVD

DVD content is compressed according to DVD specifications so that it will play reliably on a wide range of players. When preparing content for a DVD project pay attention to frame size and frame rate, so that content retains its quality in the transition to DVD.

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with a camera or deck that writes timecode. You can then log or capture the video from that device.

For best results, timecode should run continuously from the beginning to the end of the tape; it shouldn't restart from zero anywhere in the middle. In editing, if you log a capture in point such as 00:00:01:09 but that number occurs on the tape two or three times because of timecode restarts, Adobe Premiere Pro can't be certain which 00:00:01:09 is the place to start its capture. It can easily capture the wrong clips from tapes with discontinuous timecode. To ensure unbroken timecode, you need to either shoot it continuously or stripe your tape with it before shooting.

Striping or Replacing Timecode

You can ensure continuous timecode by recording timecode onto the tape before you use it. This process is called striping the tape. Striping is not necessary if you follow recommended shooting practices, but it can protect you from accidentally breaking timecode by miscuing a tape in your camera.

To Stripe a Tape with Timecode

1. Put an unused tape in the camera. It should have no timecode.
2. If you're using a camera for striping, attach the lens cap and disable audio recording.
3. Ensure that all camera settings (particularly the audio sample rate) are exactly the same as the settings you will use when you shoot. Use all these same settings whenever shooting on that tape.
4. Begin recording. Let the camera or deck run until the entire tape has been recorded.
5. Before you record video on a striped tape, play about 30 seconds of it from the beginning. Verify that the camcorder is reading the timecode you striped before you start shooting. The 30-second empty lead on the tape also helps in batch capturing.

Creating DVDs

You can burn a sequence to DVD directly from Adobe Premiere Pro, or save encoded files to a folder or as an ISO image that you can burn later with other DVD-burning software. You can create auto-play DVDs or menu-based DVDs. Adobe Premiere Pro provides several DVD menu templates that you can use as designed, or customize them to create a DVD. Adobe Premiere Pro creates DVDs that conform to DVD-video format. It doesn't create data or audio DVDs.

If you are creating a DVD using Adobe Encore DVD, you can export a sequence as an AVI or MPEG-2. You can export a sequence containing sequence markers, which are recognized by Adobe Encore DVD as chapter points.

Types of DVDs

In Adobe Premiere Pro, you can create auto-play DVDs with no menus, or menu-based DVDs that provide navigation options for your viewers.

Auto-play DVD: Begins playing when the disc is inserted into a DVD player. Auto-play DVDs work best for short movies, or movies that you want to play continuously in a loop playback mode. Auto-play DVDs contain no menus. You can add DVD markers to

6. Test the input levels by speaking into the microphone.
7. When you finish testing, deselect Meter Input(s) Only to meter the project's audio tracks also.
8. Speak into the microphone again. Watch the Audio Mixer level meters to ensure that the input levels for record-enabled tracks are high but not clipping.
9. Click the Play button in the Audio Mixer, and then start speaking your voice-over.

To Record an Analog Source

You can record audio from an analog source device, such as a cassette deck or turntable.

1. Connect the analog source to the appropriate input jack on your computer or sound card. If necessary, choose Edit > Preferences > Audio Hardware to configure the input device.
2. If you want to preview the Timeline panel as you record, position the current-time indicator in the Timeline panel a few seconds before the time when you want the recording to begin.
3. In the Audio Mixer, click the Record Enable button for any tracks on which you want to record audio.
4. In the Audio Mixer, click the Record button for the sequence. Adobe Premiere Pro prepares the sequence for recording but moves the playhead only when you press the Play button.
5. Select Meter Input(s) Only in the Audio Mixer panel menu to meter only your sound card's inputs.
6. Test the input levels by playing a selection from the analog source.
7. When you finish testing, deselect Meter Input(s) Only in the Audio Mixer panel menu to meter the project's audio tracks also.
8. Play a selection from the analog source again. Watch the Audio Mixer level meters to ensure that the input levels for record-enabled tracks are high but not clipping.
9. Click the Play button in the Audio Mixer, and then press Play on the source device.

About Timecode

Many camcorders and high-end video decks record timecode, which marks specific frames with unique addresses. Timecode is important whenever you want to capture exactly the same frames that were identified or captured previously, as in the following tasks:

- You want to log clips before you capture them.
- You plan to capture clips using batch (automated) capture.
- You want to recapture clips because the original files became corrupted or were deleted.
- You plan to export sequences to another system by using AAF or EDL.
- You're using a system in which you edit quickly with low-resolution captures, and later recapture the clips at full resolution and quality for the final version.
- You plan to synchronize captured video with audio recorded separately.

Unlike the numbers on time counters found in home VCRs, timecode is recorded onto videotape as part of the video signal. If footage lacks timecode, you can add it by copying it

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manufacturer's plug-in software, not by Adobe Premiere Pro, and vary according to the analog capture card's brand and model. See the documentation for the software driver provided by the manufacturer of the capture card.)

12. Do one of the following:

- If the digital device offers no device control, cue up your source using the analog device's own controls. Press Play on the analog device and click the Record button in the Capture panel.
- If the digital device offers device control, capture or log footage using the Capture panel's controls, as you would with a digital source.

Digitizing Analog Audio

If you want to use audio that is not yet in digital form (for example, from an analog cassette or a live microphone), you need to digitize it through an audio or audio/video digitizer/capture card.

The quality of digitized audio and the size of the audio file depend on the sample rate (the number of samples per second) and bit depth (the number of bits per sample) of the digitized audio. Also, stereo audio requires twice as much disk space as mono audio. These parameters, controlled in the Capture Settings section of the Project Settings dialog box, determine how precisely the analog audio signal is represented in digital form. Higher sample rates and bit depths reproduce sound at higher levels of quality, but with correspondingly larger file sizes. Capture audio at the highest quality settings your computer can handle, even if those settings are higher than the settings you'll specify for final export or playback. This provides headroom, or extra data, that helps preserve quality when you adjust audio gain or apply audio effects such as equalization or dynamic range compression/expansion. Although the DV format can record two independent stereo audio pairs, Adobe Premiere Pro can capture only one stereo pair. It may be possible to select either stereo pair 1, stereo pair 2, or a mix of both stereo pairs, depending on the DV hardware you are using. Consult your DV equipment guide.

To Set the Location for Captured Audio

1. Choose Edit > Preferences > Scratch Disks.
2. For Captured Audio, select a location and click OK.

To record a voice-over

1. Connect the microphone to the mic-level input jack on your computer or sound card. If necessary, choose Edit > Preferences > Audio Hardware to configure the input device.
2. If you want to preview the Timeline panel as you record, position the current-time indicator in the Timeline panel a few seconds before the time when you want the voice-over to begin.
3. In the Audio Mixer, click the Record Enable button for any tracks on which you want to record audio.
4. In the Audio Mixer, click the Record button for the sequence. Adobe Premiere Pro prepares the sequence for recording but moves the playhead only when you press the Play button.
5. Select Meter Input(s) Only in the Audio Mixer menu to meter only your sound card's inputs.

digitizing device installed in your computer. Alternatively, you can dub the analog footage to a digital format, and then capture the video from a digital device through a capture card as any other digital source. Depending on your equipment, you may be able to digitize analog video from any of several signal types, including component video, composite video, and S-video. Some digitizers provide device control. They connect to your source device through RS-232, RS-422, LANC, or Control-M jacks, enabling you to control the device through Adobe Premiere Pro's Capture panel and to perform batch capturing. Refer to the instructions included with your camcorder and digitizer/capture card.

About Capture Card Settings

Some of the capture settings you see in Adobe Premiere Pro may be from the plug-in software that came with your digitizer/capture card. Because of the differences among brands of cards, specific options and supported formats can vary. This complex relationship between video-capture cards and Adobe Premiere Pro can make it difficult to identify which part of the system is responsible for a particular option or problem. Adobe, as well as most capture card manufacturers, provides troubleshooting documents online that can help you determine whether an option or problem is related to the video-capture card and its software or to Adobe Premiere Pro. Check the Adobe Premiere Pro website and the capture card manufacturer's website for troubleshooting resources.

Most of the supported capture cards install a settings file (preset) that you can select in the Adobe Premiere Pro New Project dialog box, in the Load Preset pane. This preset automatically sets all capture settings for optimal support of your capture card. For best results, use your capture card's preset, if provided, and don't change the capture settings in the Custom Settings pane.

To Digitize Analog Video

1. Quit Adobe Premiere Pro.
2. Connect your analog device's video and audio outputs to your digital device's (digitizer, digital camcorder or digital deck) analog inputs.
3. If the digital device is an external digitizer, deck, or camcorder, connect its digital output (IEEE 1394 or SDI) to the computer's digital port of the same type.
4. If the digital device is a digitizer with device controls, connect its device control port (RS-232, RS-422, LANC, or Control-M) with the analog device's port.
5. Turn on both devices.
6. If the digital device is a camcorder, put it into VTR or VCR (not Camera) mode.
7. Set the input selection control on the digital device to the correct analog input.
8. Start Adobe Premiere Pro.
9. When the Welcome screen appears, do one of the following:
 - Click New Project, select the capture card's preset (if available) from the Load Preset pane, and click OK.
 - Select an existing project that was set up with the capture card's preset.
10. Select File > Capture.
11. In the Capture panel, carefully check the settings on the Settings pane. If you need to change them, click Edit. (The settings in this dialog box are provided by the card

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desirable, this convergence is not inevitable. Some of the worst use of computers is in television engineering. Some of the worst television is "desktop video." The full power of a new medium based on the well considered unification of computer and television technology is distant and elusive. The design challenge is not technologically difficult. It requires only a commitment to excellence and a willingness to accept change. This New Television could make the tools of production available to every individual. The New Media Literacy could grant people a significant power over the technology of the Information Age. The New Television could perhaps be the most important for of communication ever invented.

4.12 SHOOTING AND EDITING VIDEO

Capturing, digitizing, and importing

To bring media files (assets) into an Adobe Premiere Pro project, you can capture, digitize, or import them, depending on the type of source material:

Capture: You capture digital video files from tape. That is, you transfer them from the source videotape to the hard drive. All digital camcorders and decks record video in digital formats, but it must be captured (transferred to disk) before Adobe Premiere Pro can use it in a project. Adobe Premiere Pro's capture function, in conjunction with a digital port or capture card (for example, IEEE 1394 or SDI), can capture digital video from tape and save it to disk as files that you can then add to your project.

Digitize: You digitize analog video. Analog video is recorded by analog camcorders and decks. The data must be digitized (converted to digital form) before a computer can store and process it. Adobe Premiere Pro's capture function, in conjunction with a digitizer card—or a device that can convert analog video to digital—can convert analog video to digital files readable by Adobe Premiere Pro.

Import: Use the Import command to bring files—for example, still images or audio you've downloaded—that are already on your hard drive into your Adobe Premiere Pro project. Adobe Premiere Pro lets you import numerous types of digital files.

To Set the Capture Format

1. With a project open, choose Project > Project Settings > Capture.
2. From the Capture Format menu, choose the settings that match your source material.

To Set Capture Preferences

1. Choose Edit > Preferences > Capture.
2. Specify whether you want to cancel capture on dropped frames, report dropped frames, or generate a batch log file.
3. Select whether to use device control timecode. If a device controller is in use (for example, for RS-422/232 or LANC-controlled devices), the last selection enables Adobe Premiere Pro to record the timecode supplied by the controller instead of attempting to record any timecode that might be written to the source tape.

Digitizing Analog Video

In order to edit video shot in an analog format, you must first digitize it. You can digitize it by routing the video signal through either a digital camcorder that can digitize on the fly or a

lose of detail and clarity. *Field dominance*, as mentioned above, is the convention of deciding what a frame is: an odd field followed by an even, or an even followed by an odd. There are two possible ways to do it; neither is better than the other, and neither is generally agreed upon. Some equipment is even, some is odd, some is random. This can be critical when dealing with frames as discrete objects, as in collections of stills. If the field dominance is wrong, instead of getting the two fields of a single image, you will get a field each of two different images, which looks sort of like a superimposition, except that it flickers like crazy.

Color: RCA Laboratories came up with an ingenious method for inserting color into a television channel that could still be viewed by unmodified black and white sets. But it didn't come for free. The placing of all of the luminance and color information into a single composite signal causes some special problems. The color space of television is not the same as that in a computer RGB system. A computer can display colors that television can't, and trying to encode those colors into a composite television signal can cause aliasing. (*Aliasing* means "something you don't want.") Television cannot change colors as quickly as a computer display can. This can also cause aliasing and detail loss in computer-generated pictures on television. There are other problems, such as chroma crawl and cross-color, which are beyond the scope of this article. But they're there.

Videotape: In the Golden Age, there was no good way to save programs, so all programs were produced live. Videotape was developed years later. Our problems with videotape are due to two sources: First, the design of television gave no thought to videotape or videodisc, which results in the generation loss problem. Second, the control aspects of interactive television require greater precision than broadcasters require, which creates the frame accuracy problem. *Generation loss* is the degradation in the quality of a program every time it is copied. Because videotape is not spliced, the only way to assemble material is by copying it, and with each copy it gets worse. This problem is being corrected by the application of digital technology, and can be considered solved, at least at some locations. It remains to make digital video recording cheap and widely available. The frame accuracy problem is another story. A computer storage device that, when requested to deliver a particular sector, instead delivered a different sector would be considered defective. In the world of videotape editing, no one can notice that an edit is off by 1/29.97 seconds, so precise, accurate-to-the-frame behavior is not always demanded of professional video gear. This can make the production of computer interactive video material extremely difficult, because if your interest is in a particular frame, the off-by-one frame is totally wrong.

Other Television: This chapter has mostly concentrated on the NTSC system used in the United States. Other countries use the PAL and SECAM systems, which have their own worlds of problems. These are compounded for the designer who wants to make programs that work in all nations. A number of new television systems are being proposed to replace or enhance the existing systems. To the extent these have progressive scan (noninterlaced), component color (not composite), a frame rate that can be expressed as a whole number (60 fps, not 59.94 fps), and digital encoding (not analog), then computers and television can be integrated successfully, and the limitations listed above will be techno-historical trivia. The convergence of television and computer media is extremely desirable. Computer technology would benefit from animated displays and high-bandwidth digital video storage. Camcorders would be wonderful computer input devices. Television technology would benefit from being less mysterious and more straightforward, eliminating the video priesthood in much the same way that good interface design will eliminate the computer priesthood. Although

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rectangular. It was decided that the picture should fill every bit of the face of the screen, even if that meant that viewers would be unable to see the portions of the images that were near the edges, particularly in the corners. This was well suited to the distant viewing assumption, but the uncertainty of what is visible on a viewer's screen (it can vary from set to set) causes problems even for the producers of television programs. They had to accept conventions of Safe Action Area and Safe Title Area, which are smaller rounded rectangles within the television frame. Most actions that happen within the Safe Action Area will be visible on most sets. All text should be confined to the Safe Title Area, which is visible on virtually all sets.

30 fps: Many computer systems have displays that run 30 or 60 frames per second, because it is commonly believed that television runs at a rate of 30 frames per second. This is incorrect for two reasons:

- Television doesn't really have frames, it has fields. A field is a half of a picture, every other line of a picture (sort of like looking through blinds). There is no guarantee that two fields make a coherent picture, or even which fields (this one and that one, or that one and the next one) make up a frame. This is the field dominance problem, and it makes television hostile to treating individual frames as discrete units of information.
- If television did have a frame rate, it would be 29.97 frames per second. The original black and white system was 30, but it was changed when color was introduced. This can make synchronization difficult. Movies transferred to television play a little longer, and the pitch in the sound track is lowered slightly. It also causes problems with timecode.

Timecode is a scheme for identifying every frame with a unique number, in the form hour:minute:second:frame, similar in function to the sector and track numbers on computer disk drives. For television, there are assumed to be 30 frames per second, but because the true rate is 29.97, over the course of a half hour you would go over by a couple of seconds. There is a special form of timecode called Drop Frame Timecode, which skips every thousandth frame number, so that the final time comes out right. However, it can be madness dealing with a noncontinuous number system in a linear medium, particularly if frame accuracy is required.

Interlace: Computers want to be able to deal with images as units. Television doesn't, because it interlaces. *Interlace* is a scheme for doubling the apparent frame rate at the price of a loss of vertical resolution and a lot of other problems. Pictures are transmitted as alternating fields of even lines and fields of odd lines. Images coming from a television camera produce 59.94 fields per second. Each field is taken from a different instant in time. If there is any motion in the scene, it is not possible to do a freeze frame, because the image will be made up of two fields, forcing the image to flutter forward and backward in time. A still can be made by taking a single field and doubling it to make a frame, with a loss of image quality.

Twitter is a disturbing flicker caused by the content of one line being significantly different than its interfield neighbors. In extreme cases, it can cause the fields to separate visibly. Twitter can be a big problem for computer generated graphics, because twitter patterns are extremely common, particularly in text, boxes, and line drawings. The horizontal stripes in the Macintosh title bar cause terrible twitter. Twitter can be removed by filtering, but with a

requiring of the viewer only the right time and the right channel, or for the nondiscriminating viewer, any time and any channel (except channel one). Computer presentation of information could certainly benefit from the color, motion, and sound that television offers. Television viewers could similarly benefit from the control and personalization that is promised by computer technology. Combining the two seems irresistible. They already seem to have much in common, such as CRT screens and programs and power cords. But they are different in significant ways, and those differences are barriers to reasonable integration. The problems on the computer side will get fixed in the course of technical evolution, which should continue into the next century. We've been fortunate so far that not one of the early computer systems has been so popular that it couldn't be obsoleted (although we are dangerously close to having that happen with UNIX, and there is now some doubt as to whether even IBM can displace the PC). The worst features of computers, that they are underpowered and designed to be used by nerds, will improve over the long haul. Television, unfortunately, has been spectacularly successful, and so is still crippled by the limitations of the electronics industry of 40 years ago. There are many new television systems on the horizon, a few of which promise to solve the integration problem, but for the time being we are stuck with what we've got. These limitations are not noticed by audiences, and could be completely ignored if they were merely the esoterica of television engineers. Unfortunately, the television medium is far more specialized than you might suppose. Interface designers who ignore its limitations do so at their own peril.

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Venue: Computer displays are generally designed for close viewing, usually in an office environment—most often as a solitary activity. The display is sharp and precise. Displays strongly emphasize text, sometimes exclusively so. Graphics and color are sometimes available. Displays are generally static. Only recently have computers been given interesting sound capabilities. There is still little understanding of how to use sound effectively beyond BEEPs, which usually indicate when the machine wants a human to perform an immediate action. Television, on the other hand, was designed for distant viewing, usually in a living room environment, often as a group activity. The screen is alive with people, places, and products. The screen can present text, but viewers are not expected to receive much information by reading. The sound track is an essential part of the viewing experience. Indeed, most of the information is carried audibly. (You can prove this yourself. Try this demonstration: Watch a program with the sound turned all the way down. Then watch another program with the sound on, but with the picture brightness turned all the way down. Then stop and think.)

Television was designed for distant viewing because the electronics of the 1940s couldn't handle the additional information required to provide sufficient detail for close viewing. Television has lower resolution than most computer displays, so you have to get some distance from it to look good. The correct viewing distance for a television viewer is as much as ten times what it is for a computer user. Where is the best place to sit in order to enjoy fully integrated interactive television, the arm chair or the desk chair? Many of the current generation of multimedia products, such as Compact Disc-Interactive, suffer from this ambiguity. The color images are best viewed from a distance, but the cursor-oriented interface wants to be close.

Overscan: Every pixel on a computer display is precious. Because the visible window is a rectangle, and the corners of CRTs are curved, the visible rectangle is inset, with sufficient black border to assure that even the corner pixels will be visible. Television, unfortunately, does not use such a border. The first picture tubes used in television were more oval than

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the inside face of a phosphor-coated picture tube every 1/30th of a second by a fast-moving electron beam. The drawing occurs so fast that your eye perceives the image as stable. The electron beam actually makes two passes as it draws a single video frame, first laying down all the odd-numbered lines, then all the even-numbered lines.

Each of these passes (which happen at a rate of 60 per second, or 60 Hz) paints a field. The process of building a single frame from two fields is called interlacing, a technique that helps to prevent flicker on television screens. Remember that computer monitors use progressive-scan technology and draw the lines of an entire frame in a single pass, without interlacing them.

PAL: The Phase Alternate Line (PAL) system is used in the United Kingdom, Europe, Australia and South Africa and most of Asia. PAL is an integrated method of adding colour to a black-and-white television signal that paints 625 lines at a frame rate of 25 frames per second. Like NTSC, the even and odd lines are interlaced, each field taking 1/50th of a second to draw (50 Hz).

SECAM: The Sequential Colour and Memory (SECAM) system is used in France, Russia and few other countries. Although SECAM is a 625-line, 50 Hz system, it differs greatly from both the NTSC and the PAL colour systems in its basic technology and broadcast method. Often, however, TV sets sold in Europe utilize dual components and can handle both PAL and SECAM systems.

HDTV: There are six video formats in the ATSCDTV standard that are "High Definition Television." These are the 1080-line by 1920-pixels formats at all picture rates (24, 40 and 60 pictures per second) and the 720-line by 1280-pixel formats at the same picture rates. All of these formats have a 16:9 aspect ratio. High Definition Television (HDTV) provides high resolution in a 16:9 aspect ratio. This aspect ratio allows the viewing of Cinemascope and Panavision movies. There is contention between the broadcast and computer industries about whether to use interlacing or progressive-scan technologies.

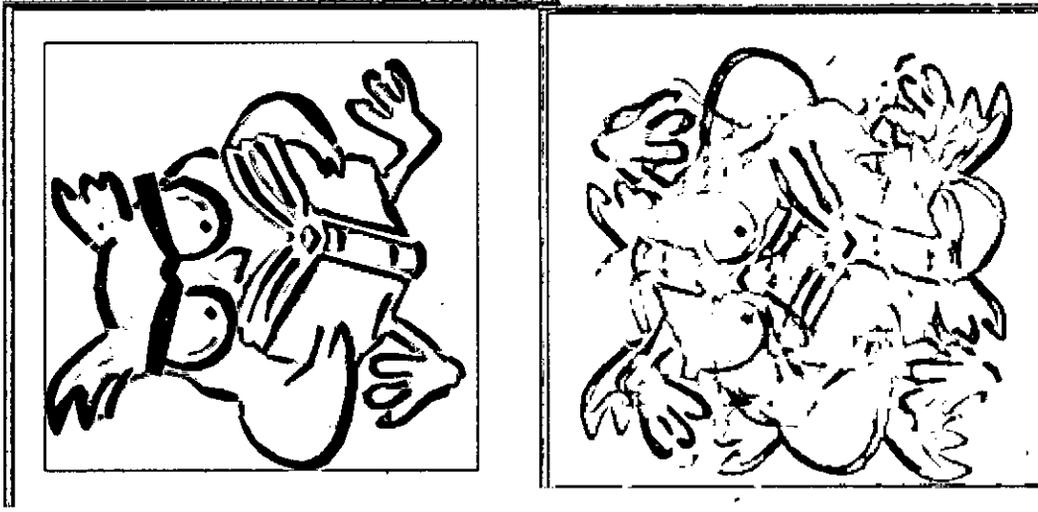
The broadcast industry has promulgated an ultra-high-resolution, 1920 x 1080 interlaced format to become the cornerstone of a new generation of high-end entertainment centers, but the computer industry would like to settle on a 1280 x 720 progressive-scan system for HDTV. While the 1920 x 1080 format provides more pixels than the 1280 x 720 standard, the refresh rates are quite different. The higher-resolution interlaced format delivers only half the picture every 1/60 of a second and because of the interlacing, on highly detailed images there is a great deal of screen flicker at 30 Hz.

The computer people argue that the picture quality at 1280 x 720 is superior and steady. Both formats have been included in the HDTV standard by the Advanced Television Systems Committee. Today's multimedia monitors typically use a screen pixel ratio of 4:3 (640 x 480), but the new HDTV standard specifies a ratio of 16:9 (1280 x 720), much wider than tall. There is no easy way to stretch and shrink existing graphics material to fit this new aspect ratio, so new multimedia design and interface principles will be needed to be developed for HDTV presentations.

4.11 INTEGRATING COMPUTER AND TVS

Television is perhaps the most important form of communication ever invented. It is certainly the most popular and influential in our society. It is an effortless window on the world,

3. Flash displays dimmed images from the surrounding frames and places onion-skin markers at the top of the Timeline.
4. To turn off onion-skinning, you can click the onion icon again.



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4.9 VIDEO: USING VIDEO

Video is incorporated into multimedia projects, for many reasons:

- The project has certain relevant sequences/material that can be videographed.
- The project has certain sequences/material that cannot be produced with the help of animation.
- The project has to be made attractive with video.
- The project has live lectures or demonstration or other pre-recorded material to be incorporated.

4.10 BROADCAST VIDEO STANDARDS

Four broadcast and video standards and recording formats commonly in use around the world are: NTSC, PAL, SECAM and HDTV. Because these standards and formats are not easily interchangeable, it is important to know where your multimedia project will be used.

A video cassette recorded in the United States will not play on a television set in any European country, even though the recording method and style of the cassette is "VHS." Likewise, tapes recorded in European PAL or SECAM formats will not playback on an NTSC video cassette recorder. Each system is based on a different standard that defines the way information is encoded to produce the electronic signal that ultimately creates a television picture.

Multiformat VCRs can playback all three standards but typically cannot dub from one standard to another. Dubbing between standards still requires high-end, specialized equipment.

NTSC: The United States, Japan and many other countries use a system for broadcasting and displaying video that is based upon the specifications set forth by the 1952 National Television Standards Committee. These standards define a method for encoding information into the electronic signal that ultimately creates a television picture. As specified by the NTSC standard, a single frame of video is made up of 525 horizontal scan lines drawn onto

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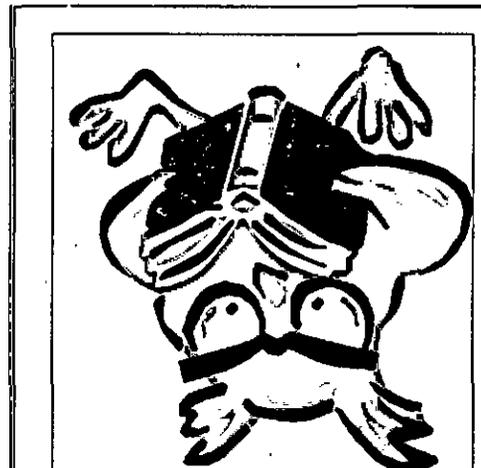
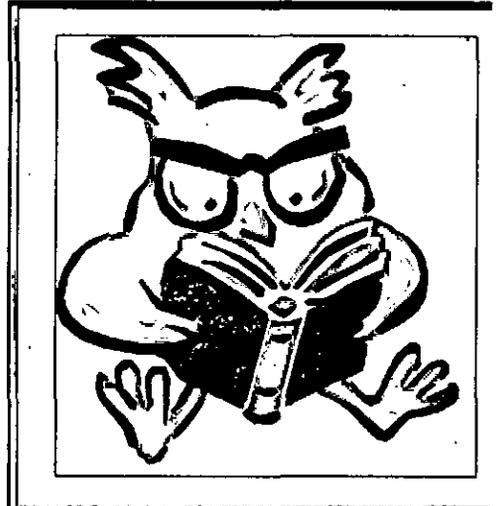
3. Morphing can be used to illustrate evolution in interesting ways. For example, a morph can show how early simple arthropods developed into the diverse insects that exists today.
4. Many interesting effects can be created using morphing technique. It is increasingly being used as a special effect on TV and in motion pictures.

4.8 MAKING WORKABLE ANIMATIONS

Follow the following steps to create a movie frame by frame in Flash.

Add Content to the First Frame

1. Click the first frame in the layer you want to frame.
2. Place the object you want to animate or just insert an image from the clipart.
3. Click the next frame in the Timeline.
4. Add a keyframe. Flash inserts a keyframe that duplicates the previous frame's contents.
5. Change the object slightly. I have changed it to 90° to the right, as can be seen below.
6. Repeat the steps 4 and 5. This time the image will turn face down, as shown on next page.
7. Now again repeat the same steps, making the figure turn to 270° so that now it faces to the left, as shown on next page.
8. This way you can change the angle to a smaller degree and make more frames if you want to have real fun.
9. Click at first keyframe in the layer and press Enter.
10. You animation will be shown on the screen.



Onion-skinning an Animation

1. Click a frame.
2. Click Onion icon at the bottom of the Flash Timeline.

1. Flat, such as drawings or cut-out pieces of paper.
2. Dimensional, such as clay, puppets, household objects, or even people.

Cel Animation

Cel animation is a traditional form of animation used in the production of cartoons or animated movies where each frame of the scene is drawn by hand. In a cel or frame animation, the entire animation sequence is split into different frames. The traditional cel animation process became obsolete by the beginning of the 21st century.

Today, animator's drawings and the backgrounds are either scanned into or drawn directly into a computer system. Various software programs are used to colour the drawings and simulate camera movement and effects. The final animated piece is output to one of several delivery media, including traditional 35 mm film and newer media such as digital video.

Computer Animation

The term 'Computer Animation' categories 2D (two dimensional) and 3D (three dimensional) animation. It is also called 'Vector Animation' and is typically created using programs like Adobe Flash and Macromedia Director, both are covered in the next chapter.

We had read earlier that 2D animation was all cartoons in the form of drawings, which are shown one after the another to give the effect of walking cartoons. 2D animation, is rendered in a two-dimensional space, 3D animation, however, is rendered in a virtual three-dimensional space, using polygons captured by various virtual cameras to film the animation.

For 3D animations, all frames must be rendered after modeling is complete. For 2D vector animations, the rendering process is the keyframe illustration process, while tweened frames are rendered as needed.

For pre-recorded presentations, the rendered frames are transferred to a different format or medium such as film or digital video. The frames may also be rendered in real time as they are presented to the end-user audience. Low bandwidth animations transmitted via the internet (e.g., 2D Flash, X3D) often use software on the end-users computer to render in real time as an alternative to streaming or pre-loaded high bandwidth animations.

Morphing

Short for metamorphosing; a revolutionary animation technique used to "fill in the blanks" between dissimilar figures so that one seems to melt into another, such as changing a man to a werewolf, a bat to a vampire or a rock singer to a panther.

Morphing, a common film industry special effects technique is related closely to another, more prosaic animation technique called tweening (short for in-betweening) which refers to the computer's capability to calculate and draw frames that are intermediate between the "key" frames hand-drawn by the artist.

Morphing is the process of tweening to a different object. It has the following applications:

1. Development (of any object) can be simulated (shown artificially) by first obtaining still images at successive stages and then morphing into a child can be shown as a movie using the technique of morphing.
2. Similarly, movement of objects (of animals, humans or cartoon characters) can be simulated. For example, if you take still images at different stages of movement and then apply tweening (using a multimedia software), you can create motion in the object.

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PS (Postscript): Page description language from Adobe Systems, Inc., used in a wide variety of printers, image setters and display systems. PostScript Commands do not drive the printer directly. They are language statements (ASCII text) that are translated into the printer's machine language by a PostScript interpreter built into the printer. Fonts are scaled to size by the interpreter, thus eliminating the need to store a variety of font sizes on disk. PostScript fonts come in Type 1 and Type 3 formats and Adobe makes only Type 1. Type 1 fonts are widely used and are made by other companies as Adobe later made the format public. Type 1 fonts are encrypted and compressed and also allow for hints which improve the appearance of text, especially at desktop laser printer resolutions. Type 1 fonts use a simpler, more efficient command language than Type 3. With Adobe Type Manager, Type 1 fonts can also be used on non PostScripts printers. Type 3 fonts do not use encryption or hints, but can use the entire PostScript language to create complex designs that include fills and patterns. Type 3 fonts can also be bitmaps. In order to speed up printing small fonts on PostScript printers, Windows 3.1 creates Type 3 bitmaps from its TrueType outlines. Originally developed as a device-independent imaging language, PostScript is used extensively on Macs and PCs. It has also migrated to workstations, minis and mainframes.

PDF

A richly formatted document which may contain graphics as well as text that can be transferred to another type of computer system without losing the rich formatting. To create portable documents, you need portable document software (PDS), such as Adobe Acrobat that is designed to save the formatting information to a file that can be easily transferred to a different type of computer system. To read the document, you need a file viewer program that is specifically designed to work on the type of computer you are using. For example, you can create an Adobe Acrobat document on a Macintosh and give the file to somebody using a Sun workstation. To read the file, the Sun user needs a copy of the Adobe Acrobat reader program.

4.7 ANIMATIONS: PRINCIPLES OF ANIMATION

Animation is the process of making an object appear to move by rapidly displaying a series of pictures of it, each one in it is slightly in different position; a techniques used in producing Computer-generated movies. An animation is created by recording a series of still images of drawings, objects, people, etc., in various positions of incremental movement. It may not be necessary to move the objects to create the illusion of movement — colours and the background can be changed from frame to frame so that there is a perception of a moving object. Before we go further into animation, we must understand the two main topics of animation, viz., Keyframes and Tweening.

Keyframes and Tweening

Frankly speaking, keyframes are the first and the last frames of an action. Tweening, is the process of generating intermediate frames between two images to give the appearance that the first image evolves smoothly into the second image. Tweening is a key process in all types of animation, including computer animation. For example, for showing the motion of the square moving from lower left corner to the upper right corner of the frames, the initial and final positions provide the keyframes, while the middle frames are intermediate frames. There are many ways of creating an animation, depending on the materials used. The material can be one of the following two types:

JPEG: The primary programs for lossless editing of JPEGs are jpegtran, and the derived exiftran (which also preserves Exif information), and Jpegcrop (which provides a Windows interface).

These allow the image to be

- cropped,
- rotated, flipped, and flopped, or
- converted to grayscale (by dropping the chrominance channel).

While unwanted information is destroyed, the quality of the remaining portion is unchanged.

JPEGjoin allows different JPEG images which have the same encoding to be joined without re-encoding.

Some changes can be made to the compression without re-encoding:

- optimize the compression (to reduce size without change to the decoded image),
- convert between progressive and non-progressive encoding,

The freeware Windows-only IrfanView has some lossless JPEG operations in its JPG_TRANSFORM plugin.

JPEG 2000: It is a format that provides greater flexibility than the standard JPEG format. Using JPEG 2000, you can produce images with better compression and quality for both web and print publishing. Unlike traditional JPEG files, which are lossy. The JPEG 2000 format supports optional lossless compression. The JPEG 2000 format also supports using a region of interest (ROI) to minimize file size and preserve quality in critical regions of an image.

PNG: It handles 1 to 48 bit images, and is a lossless, well-compressed format like GIF. However, it is still not very popular format. It supports a large set of technical features; including superior lossless compression feature. Compression in PNG is called the ZIP method. PNG comes in two formats, PNG-8 and PNG-24.

PNG-8: It is similar to the GIF format. The difference is that in the PNG format, images can be stored with a maximum of 256 colours and brilliantly supports 1-bit transparency. It is because of efficient colour data saving of PNG format.

PNG-24: It comes with 24-bit colour support and is much efficient to JPEG because, PNG-24 is a lossless compression format and is more suitable for the creations of larger files in comparison to JPEG. The files of PNG format have .png extension.

TIFF: Tagged Image File Format – Widely-used raster graphics file format developed by Aldus and Microsoft that handles monochrome, gray scale, 8-and 24-bit color. It uses several compression methods: LZW provides ratios of about 1.5:1 to 2:1. Ratios of 10:1 to 20:1 are possible for documents with lots of white space using CCITT Group III SIV compression methods (fax). It is widely used for transferring bitmap images between application programs. TIFF images have .tiff and .tif extension. It is used in desktop publishing, faxing, 3-D applications and medical imaging applications. It is a file format designed by Microsoft.

EXIF (Exchangeable Image File Format): It is a standard for storing interchange information in image files, especially those using JPEG compression. Most digital cameras now use the EXIF format. The format is part of the DCF standard created by JEITA to encourage interoperability between imaging devices.

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- CYMK (Cyan, Yellow, Magenta and Black)
- HSB (Hue, Saturation and Brightness)
- CIE Lab

Let us study them one by one.

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RGB Model: This is made up of three primary colours, i.e., Red, Green and Blue. Most of the colours are the mixture of all these. For example a pure Red will be 255, maximum for a colour, of Red and 0 of Green and Blue each. While the White would be 255 of each and Black would be 0 of each.

CYMK Model: As said earlier CYMK stands for Cyan, Yellow, Magenta and Black. These 4 also make a set of combinations to form different colours. Here you have to add them according to percentages of each one of them. This set of colours are used by the high-end laser printers and are mostly used by commercial printers.

HSB Model: This is another colour combination where H stands for Hue, S for Saturation and B for Brightness. Here Hue is the basic colour from the colour wheel, which is expressed in terms of degrees from 0 to 360. It represents the position of the colour on the colour wheel. Saturation is the strength of the colour. It is measured in percentage of colour minus the amount of gray in it. Brightness is also measured in terms of percentage. It varies from 0 where it is black and to 100 where it is white.

CIE Lab: Photoshop uses the CIE mode, because its gamut is so broad, to convert from one colour model to another.

Bitmap and Grayscale Mode: The Bitmap mode uses only two colour values to display images—black and white, while the Grayscale mode offers 256 shades of gray that range from white to black. Whenever a picture is printed in black and white or Grayscale, for instance, as part of a newsletter or brochure, it makes sense for you to work on it in Grayscale mode. To convert a color image to Grayscale, simply choose Image; Mode, Grayscale. You will be asked for permission to discard the colour information. Click Ok to confirm, and picture is converted to grays.

Indexed Colours: Indexed Colour is a palette or rather a collection of palettes—256 to be exact. With this mode, you know exactly what you are getting, and you do not like any of the palettes Photoshop supplies, you can build your own. This type of colours are perfect for World Wide Web. Dithering means that certain colours are combined, that is, adjacent pixels are interspersed, visually blending onscreen to create a new colour although they retain their original colour—or the closest index equivalent—when viewed at a large magnification.

4.6 IMAGE FILE FORMAT

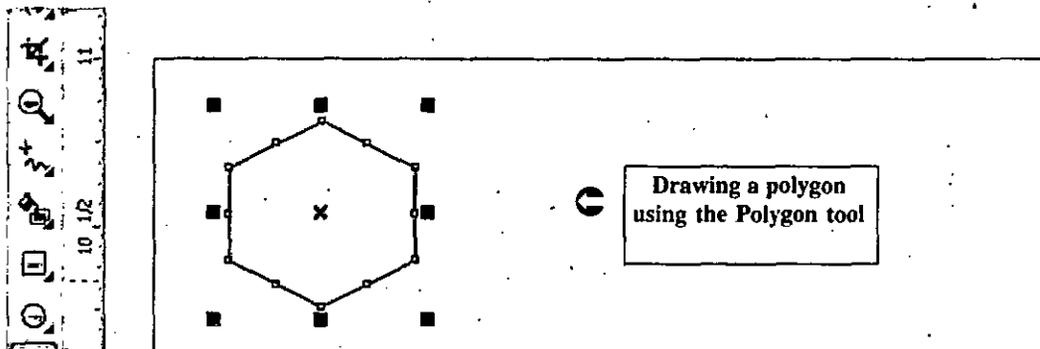
Various formats used for image files are given here.

GIF: GIF stands for Graphics Interchange Format. It is another format that is widely used for picture displayed on the World Wide Web. GIF file format is commonly used to display indexed colour graphics and images in hypertext markup language (HTML) documents over the World Wide Web. GIF files have .gif extension.

GIF graphics file format developed by CompuServe and used for transmitting raster images on the Internet. An image may contain up to 256 colors, including a transparent color. The size of the file depends on the number of colors actually used. The LZW compression method is used to reduce the file size still further.

- Place the mouse pointer on the **Number of Points of Polygon** text box and type the number of sides you like for your polygon.

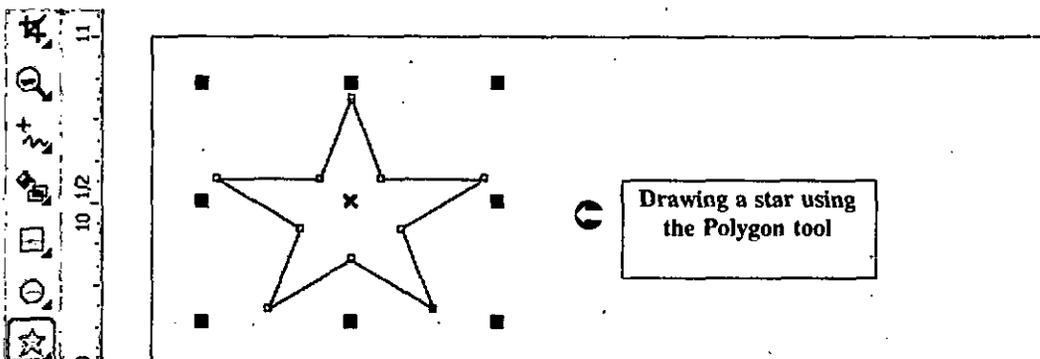
You can also set the number of sides for your polygon and then draw it. In the figure shown next, I have selected polygon with 6 sides.



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Creating Stars

- Right click on the Polygon tool. A pop-up menu will appear. Click on **Properties**. This will give rise to the Options menu.
- Select Polygon Tool from the Toolbox. Now, choose the **Star** button in the Polygon tool area of the Options dialog box.
- Enter the number of sides in the Number of points/sides spin box.
- Click on Ok.
- Click anywhere in the drawing area and drag the mouse pointer.
- Release the mouse button where you would like the end of the Star.
- In the figure shown next, I have chosen, a star with 5 sides.



4.5 IMAGES COLOURS

Colours are everywhere around us. But, how does one colour differ from another. There are a number of colour libraries and each one of them have different shades. There is so much to colours that it may need one book to study each one of them. Let us concentrate on what is available under Photoshop.

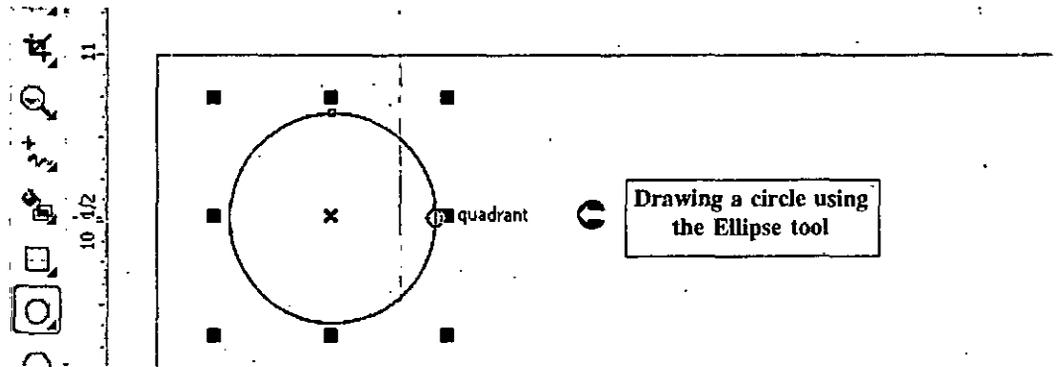
We would be talking about 4 different type of colour modes:

- RGB (Red, Green and Blue)

Creating Circles and Ellipses

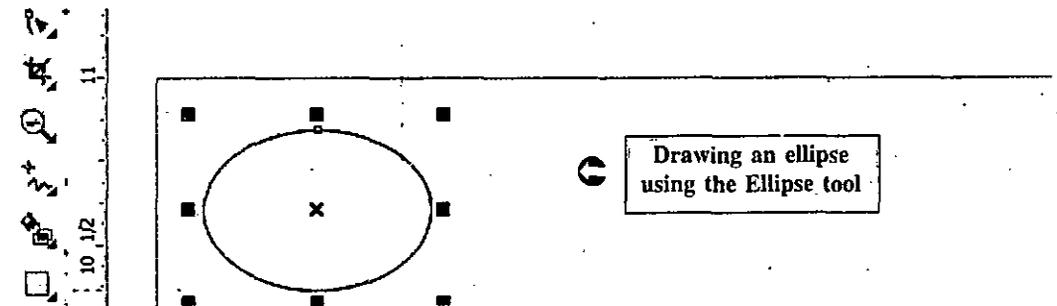
To Draw a Circle:

- ❶ To draw a circle, select the **Ellipse** tool in the toolbox. The mouse pointer changes to a crosshair with a small ellipse underneath it.
- ❷ Click anywhere in the drawing area and hold down the **Ctrl** key while dragging the mouse pointer.
- ❸ Release the mouse button where you like the end of the circle.



To Draw an Ellipse:

- ❶ To draw an ellipse (also known as an oval), select the **Ellipse** tool in the toolbox. The mouse pointer changes to a crosshair with a small ellipse underneath it.
- ❷ Click anywhere in the drawing area and drag the mouse pointer.
- ❸ Release the mouse button where you like the end of the ellipse.
- ❹ You can see the drawn ellipse next.



Drawing Polygons

Clicking on the black arrow on **Polygon** tool opens a flyout menu which contains two more tools used for drawing symmetric or logarithmic **spirals** and **grids**.

- ❶ To draw a polygon, select the Polygon tool in the toolbox. The mouse pointer changes to a crosshair with a small ellipse underneath it.
- ❷ Click anywhere in the drawing area and drag the mouse pointer.
- ❸ Release the mouse button where you like to end the polygon.
- ❹ To increase the number of sides of your polygon, select the polygon you have drawn using the Pick tool.

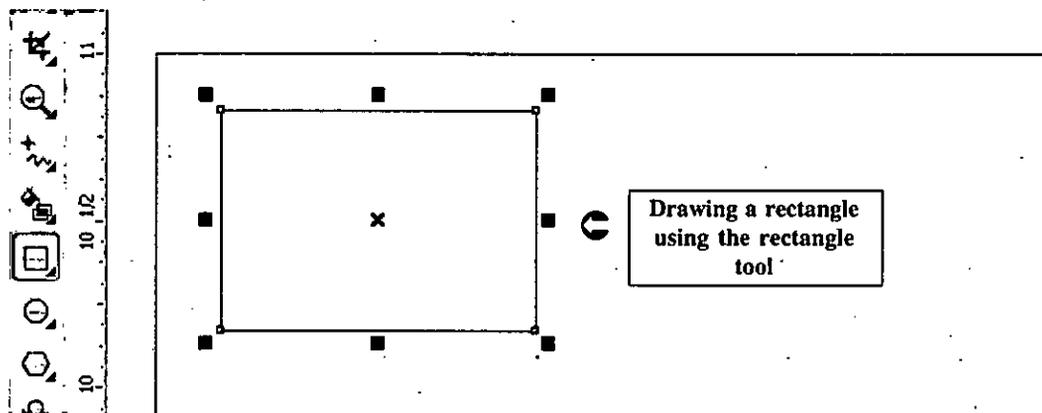
4.4 MAKING STILL IMAGES

CorelDRAW has 3 different shape tools that can create **ellipses** (including circles), **rectangles** (including squares), **polygons** and **stars**. You can combine artistic text with these shapes to create impressive and attractive graphics/images.

Creating Rectangles and Squares

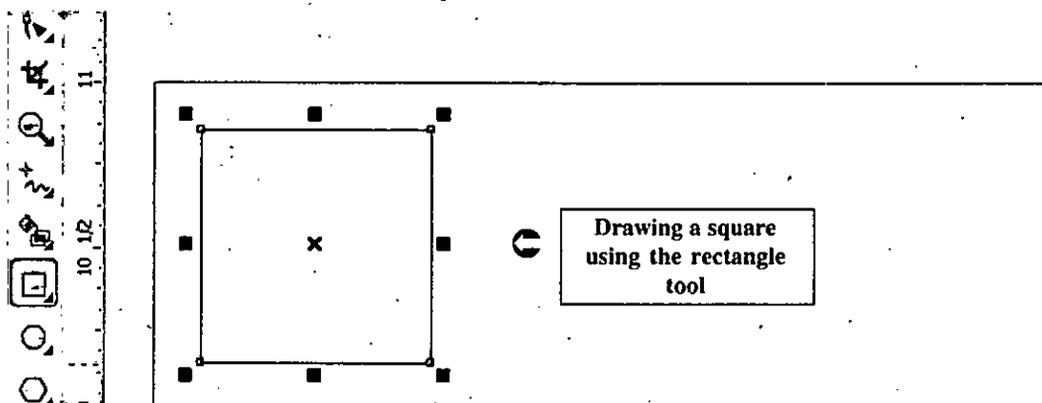
To Draw a Rectangle:

- ❶ To draw a rectangle, select the **Rectangle** tool in the toolbox. The mouse pointer changes to a crosshair with a small rectangle beneath it.
- ❷ Click anywhere in the drawing area and drag the mouse pointer.
- ❸ Release the mouse button where you like the end of the rectangle.



To Draw a Square:

- ❶ To draw a square, select the Rectangle tool in the tool box. The mouse pointer changes to a crosshair with a small rectangle beneath it.
- ❷ Click anywhere in the drawing area and hold down the **Ctrl** key while dragging the mouse pointer.
- ❸ Release the mouse button where you like the end of the square.



NOTES

- to learn about Broadcast Video Standards
- to learn about Integrating Computer and TVs
- to learn about Shooting and Editing Video
- to learn about Using Recording Formats
- to learn about Video Tips
- to learn about Video Compression

4.2 INTRODUCTION

In this unit, you will learn about Image-creation using the various methods of making still images. You will also learn about various colours of the images. Also, you will learn about Image File Formats.

You will learn about animations and its principles. You will be guided to make workable animations. You will learn how to use video in multimedia. You will be introduced to various Broadcast Video Standards. Also you will learn about Integrating Computer and TVs.

You will be exposed to Shooting and Editing Video. Learn about using Recording Formats. Finally you will learn about Video Tips and Video Compression.

4.3 IMAGE-CREATION

During the late 1970s, personal computers became more powerful, capable of drawing both basic and complex shapes and designs. In the 1980s, artists and graphic designers began to see the personal computer, particularly the Commodore Amiga and Macintosh, as a serious design tool, one that could save time and draw more accurately than other methods.

3D computer graphics became possible in the late 1980s with the powerful SGI computers, which were later used to create some of the first fully computer-generated short films at Pixar.

The Macintosh remains one of the most popular tools for computer graphics in graphic design studios and businesses.

Colour Science

Modern computer systems, dating from the 1980s and onwards, often use a graphical user interface (GUI) to present data and information with symbols, icons and pictures, rather than text. Graphics are one of the five key elements of multimedia technology.

3D graphics became more popular in the 1990s in gaming, multimedia and animation. In 1996, Quake, one of the first fully 3D games, was released. In 1995, Toy Story, the first full-length computer-generated animation film, was released in cinemas worldwide.

Since then, computer graphics have become more accurate and detailed, due to more advanced computers and better 3D modelling software applications, such as Cinéma 4D.

UNIT—4

PRODUCTION TIPS

NOTES

STRUCTURE

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Image-creation
- 4.4 Making still images
- 4.5 Images colours
- 4.6 Image File Format
- 4.7 Animations: Principles of Animation
- 4.8 Making Workable Animations
- 4.9 Video: Using Video
- 4.10 Broadcast Video Standards
- 4.11 Integrating Computer and TVs
- 4.12 Shooting and Editing Video
- 4.13 Using Recording Formats
- 4.14 Video Tips
- 4.15 Video Compression
 - Summary
 - Review Questions
 - Further Readings

4.1 OBJECTIVES

The objectives of this unit can be summarized as followings:

- to learn about Image-creation
- to learn about Making still images
- to learn about Images colours
- to learn about Image File Format
- to learn about Animations: Principles of Animation
- to learn about Making Workable Animations
- to learn about Video: Using Video

REVIEW QUESTIONS

NOTES

1. How is text used in the Multimedia?
2. Define the terms: Plain Text, Formatted Text, and Hypertext.
3. Define the following terms:

Length units	Absolute units
Relative units	Pixel units
Type 1 and Type 3 fonts	TrueType fonts
OpenType font	Metafont
4. Define Outline fonts.
5. What are Bitmap fonts?
6. In the context of bitmap fonts, define the following:

Scaling	Font formats
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7. What are International Character Sets?
8. What are digital fonts?
9. What do you understand by Sound?
10. Define the various types of sound.
11. How is sound digitized?
12. Define Frequency and Bandwidth
13. What is Decibel System?
14. Define the followings:

Audio Interchange File Format	Musical Instruments Digital Interface
Wave Form	MP3
Advanced Streaming Format	Audio Video Interleave
15. Describe the various types of sound synthesis.
16. How would you add sound to your multimedia project?
17. Describe the various software used for multimedia.
18. Describe how would you do the following:

Play MIDI files using Media Player	Play Sound files using Sound Recorder
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FURTHER READINGS

1. **Multimedia and Web Technology** : Ramesh Bangia, Laxmi Pub, 2007
2. **Computer Graphics and Multimedia** : Ehtiram Raza Khan and Huma Anwar, Laxmi Pub, 2008
3. **Multimedia Applications and Web Designing**: Dinesh Maidasani, Laxmi Pub, 2008
4. **Computer Graphics With Multimedia** : A. Rajaraman, Narosa, 2009
5. **Computer Graphics, Multimedia And Animation** : Malay K. Pakhira, PHI Learning, Second Edition
6. **Computer, Internet and Multimedia Dictionary** : S. Verma, Universities Press, 1998

recording. As you record, the green line expands to indicate sound levels. You can see how much time has elapsed. The maximum recording length is 60 seconds.

4. When you finish the recording, click the Stop button.
5. To save the recording as a file, open the File menu, and choose Save and then name the file if you have not already given.

NOTES

SUMMARY

- Alphanumeric characters are used to present information in the text form.
- Plain text is the unformatted text.
- Hypertext has a link to other text.
- Fonts are typically measured in a unit specific to the printing industry called the point.
- The point unit is the traditional measurement of length in typography.
- An absolute unit is a unit of measure that specifies a fixed length – a length which can be measured with a measuring band.
- A relative unit is a unit of measure that specifies a value that is relative to the font size.
- The term pixel is derived from Picture Element.
- TrueType is a font system originally developed by Apple, Inc.
- OpenType is a smartfont system designed by Adobe and Microsoft.
- Outline fonts or vector fonts are collections of vector images, *i.e.*, a set of lines and curves to define the border of glyphs.
- Bitmap fonts consist of a series of dots or pixels representing the image of each glyph in each face and size.
- Sound is perhaps the most important part of the multimedia project.
- Acoustics is the branch of science that studies sound.
- Any recorded sound is known as analog sound as it is represented by the fluctuations in the amplitude.
- Digital sound is a term applied to sound that has been digitized into binary code.
- When you create multimedia, it is likely that you will deal with file formats and translators for text, sounds, images, animations or digital video clips.
- Audio Interchange File Format (AIFF) is an audio file format standard used for storing sound data for personal computers and other electronic audio devices.
- MIDI (Musical Instrument Digital Interface), is an industry-standard protocol that enables electronic musical instruments such as keyboard controllers, computers, and other electronic equipment to communicate, control, and synchronize with each other.
- The process by which a sound card creates music is called the sound synthesis or audio synthesis.
- Wavetable synthesis is used in certain digital music synthesizers to implement a restricted form of real-time additive synthesis.
- Accurate, high quality sound reproduction is possible with both analog and digital systems.
- QuickTime has become a standard file format for displaying digitized motion video from hard disk or CD-ROM without special hardware.
- Scripting languages such as OpenScript (ToolBook), Lingo (Director) and ActionScript (Flash) provide a greater level of control over audio playback, but you'll need to know about the programming language and environment.

NOTES

1. Decide what kind of sound is needed (such as background music, special sound effects and spoken dialog). Decide where these audio events will occur in the flow of your project. Fit the sound cues into your storyboard or make up a cue sheet.
2. Decide where and when you want to use either digital audio or MIDI data.
3. Acquire source material by creating it from scratch or purchasing it.
4. Edit the sounds to fit your project.
5. Test the sounds to be sure they are timed properly with the project's images. This may involve repeating steps 1 through 4 until everything is in sync.

When it's time to import your compiled and edited sounds into your project, you'll need to know how your particular multimedia software environment handles sound data. Each program handles it a bit differently, but the process is usually fairly straightforward: just tell your software which file you want to play and when to play it. This is usually handled by an importing or "linking" process during which you identify the files.

Scripting languages such as OpenScript (ToolBook), Lingo (Director) and ActionScript (Flash) provide a greater level of control over audio playback, but you'll need to know about the programming language and environment. In authoring environments, it is usually a simple matter to play a sound when the user clicks a button, but this may not be enough.

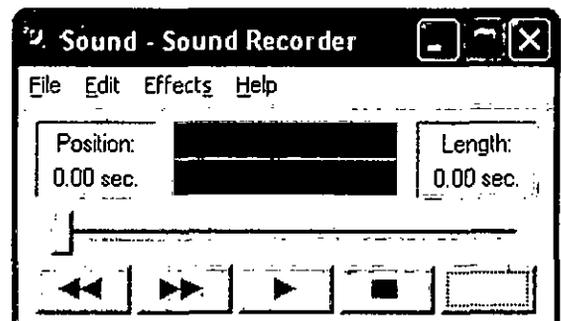
If the user changes screens while a long file is playing, for example, you may need to program the sound to stop before leaving the current screen. If the file to be played cannot be found on the hard disk, you may need to code an entire section for error handling and file location. Sample code is generally provided in both printed and online documentation for software that includes sound playback.

Recording Sound using Sound Recorder

If you have a microphone attached to sound card in your PC, you can use Sound Recorder available in Windows to make voice recordings, which can then be added to other documents. And if your sound card has a Line in Connector, then you can connect a stereo receiver or other sound source to it and use Sound Recorder to make recordings from that source. Sound stimulates the sense of hearing. In humans, hearing takes place whenever vibrations of frequencies from 15 hertz to about 20,000 hertz reach the inner ear. Such vibrations reach the inner ear when they are transmitted through air. The speed of sound varies, but at sea level it travels through cool, dry air at about 1,190 km/h (740 mph).

To make sound recording, do this:

1. To Open Sound Recorder, click Start, and then highlight Programs, Accessories, Entertainment and then Sound Recorder.
2. Choose Properties from the File menu. In the Properties dialog box that appears, click Convert Now... to display the Sound Selection dialog box, choose the file format and attributes, *i.e.*, sampling rates you want. Click to close the Sound Selection dialog box and then click Ok to close the properties dialog box.
3. Click the Record button and start



to record a bit of audio, then copy and paste the sample, repeating the process until the file reached the desired length.

Like other programs that ship with Microsoft Windows – such as Notepad – freeware and shareware programs are available that can replace Sound Recorder. These third-party programs often have more features, such as voice activated recording, automatic songs splitting and tagging, multi-track recording), but care must be exercised to ensure that these programs are obtained from a trusted source to be certain that malicious code is not executed when running such programs.

To record sound in Windows Vista and Windows 7, users need to enable Wave-Out Mix. As an alternative, it is possible to use software that doesn't need Wave-Out Mix for recording sound.

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3.10 NOTATION INTERCHANGE FILE FORMAT (NIFF)

Notation Interchange File Format (NIFF) is a music notation file format used primarily for transferring music notation between different scorewriters.

The NIFF project was started in February 1994 to create an open format that would allow exchange of music between various scanning / Music OCR, editing and typesetting programs. The project was sponsored by several music notation software publishers.

The NIFF format itself is based upon RIFF (Resource Interchange File Format), a file structure provided by Microsoft, in which data is divided into Lists, Chunks and Tags. Almost all data in a NIFF file are optional. The level of detail contained can range from just the pitch and timing (akin to MIDI) to a precise page layout, embedded graphics and embedded MIDI information.

Though detailed and comprehensive, the standard never really caught on except for limited interchange between music OCR software and scorewriting software. Three of the music OCR programs in widespread use – PhotoScore, SharpEye, and SmartScore – export NIFF files. NIFF is now considered obsolete mainly due to the MusicXML format. As of February 2006 the NIFF project web site has been closed. The NIFF SDK is available at the The NIFF SDK Archive for educational usage.

3.11 ADDING SOUND

Apple was the first company to have sound and video interleaved into the computer. It outpaced Microsoft's Audio/Video Interleaved technology, with the release of QuickTime. QuickTime has become a standard file format for displaying digitized motion video from hard disk or CD-ROM without special hardware.

Digital audio data is interleaved with video information in the file and when it is played back the audio stays synchronized to the motion picture. You can use QuickTime just to play stereo sounds and MIDI; the video part of QuickTime is not required. QuickTime will display many graphic image formats as well.

Whether you're working on a Macintosh or in Windows, you will need to follow certain steps to bring an audio recording into your multimedia project. Here is a brief overview of the process:

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- Inserting and/or mixing in audio from other files.
- Splitting out parts of the current audio clip.
- Increasing or decreasing volume in 25% increments.
- Increase or decrease playback speed in 100% increments.
- Adding an echo (without reverberation).
- Reversing the current audio clip.

Command line switches are needed as it will not auto-play a file referenced in a batch file, startup folder, or task scheduler event. Use the /PLAY switch to launch the playback automatically. (SNDREC32.exe /PLAY "C:\Path\File.wav") Use the /CLOSE switch at the end of the string to close the application. (SNDREC32.exe /PLAY "C:\Path\File.wav" /CLOSE) In Vista, Sound Recorder is instead called SoundRecorder.exe and has different command-line switches. Vista's SoundRecorder.exe can be started at the command line by using the /DURATION switch (example: SoundRecorder.exe /duration 1000:20:30 will record for 1000 hours, 20 minutes, and 30 seconds) and is automatically terminated after the duration.^[1] The SoundRecorder icon will be displayed in the task bar during recording.^[2] Using the /FILE switch (examples: /file filename.wav /file filename.wma) allows you to name the file and select a file type.

In editions before Windows Vista, on computers with more than 2 GB of RAM, after recording (but not when playing), Sound Recorder will return an error message indicating that there is not enough memory. This is a design flaw of older versions of *Sound Recorder* and officially cannot be resolved except by reducing the amount of available physical memory. There does, however, exist an unofficial patch that resolves this problem.

Under some circumstances, *Sound Recorder* will not default to the Windows default recording device (set in Control Panel, Sounds and Audio Devices, Audio tab, Sound recording, Default device). In this case, one must manually select it by clicking Edit, Audio Properties.

The new version of *Sound Recorder* included in Windows Vista uses the hard disk for recording audio and can therefore record audio up to any length as long as there is free space on the hard disk drive. Also, tags such as *Artist*, *Album*, *Title*, and *Genre* can be added to the sound file directly from the *Save dialog*. However, *Sound Recorder* lacks several features that were present in the earlier version of the program. It cannot open existing WAV or WMA files, and by default, it only allows saving to the lossy WMA format at 96 kbit/s. (Windows Vista N only allows saving as WAV; on other editions, to force Sound Recorder to save as WAV, the user must start *Sound Recorder* with the command line "soundrecorder /file outputfile.wav".) *Sound Recorder* has been stripped of all basic audio processing features, foremost the ability to play an audio file, but also lacks sample rate conversion, adding echo, reversing the audio, changing volume and playback speed, splitting, and inserting and mixing audio. The overhaul of the user interface resulted in the removal of the sound wave graphic display.

Versions of *Sound Recorder* before Windows Vista recorded audio to memory, rather than to the hard disk, and the length of recording was by default limited to 60 seconds. Microsoft recommends recording 60 seconds and pressing the *Record* button again to record another minute. Alternatively, it was possible to open a previously existing blank file of the desired length and record over it. Also, the user could implement the Decrease Speed function several times to extend the length of the recording. The most sensible solution, however, was

- Type 2: Like type 1, but audio is also saved as an additional audio stream into the file.
- Supported by VFW applications, at the price of little increased file size.

Type 1 is actually the newer of the two types. Microsoft made the “type” designations, and decided to name their older VFW-compatible version “Type 2”, which only furthered confusion about the two types. In the late 1990s through early 2000s, most professional-level DV software, including non-linear editing programs, only supported Type 1. One notable exception was Adobe Premiere, which only supported Type 2. High-end FireWire controllers usually captured to Type 1 only, while “consumer” level controllers usually captured to Type 2 only. Software is and was available for converting Type 1 AVIs to Type 2, and vice-versa, but this is a time-consuming process.

Many current FireWire controllers still only capture to one or the other type. However, almost all current DV software supports both Type 1 and Type 2 editing and rendering, including Adobe Premiere. Thus, many of today’s users are unaware of the fact that there are two types of DV AVI files. In any event, the debate continues as to which – Type 1 or Type 2 – if either, is better.

3.9 WORKING WITH SOUND IN WINDOWS

Sound Recorder is an audio recording program included in Microsoft Windows. The Vista version can record for longer durations but contains fewer options, and cannot play back recorded sound.

Many alternative utilities are available for download, including the open source tool Audacity.

Features

Sound Recorder can record audio from a microphone or headset. In addition, many modern sound cards allow their output channels to be recorded through a loopback channel is typically called *Wave-Out Mix*, *Stereo Mix* or similar. The recorded audio can be saved in .wav. Sound Recorder can also open existing uncompressed or compressed .wav files. To successfully open compressed .WAV files in Sound Recorder, the audio codec used by the file must be installed in the Audio Compression Manager (ACM).

In all versions of Windows prior to Windows Vista, Sound Recorder was based on Audio Compression Manager. It could open and save audio in 8-bit or 16-bit uncompressed PCM format (.wav) from 8 kHz to 48 kHz, including CD Quality audio (44,100 Hz, 16-bit, stereo PCM).

Although Sound Recorder only saved in the .wav format, it could use any of the installed ACM codecs to compress the audio; typically several voice codecs and the MPEG Layer III (MP3) codec were installed by default. As ACM supported only Constant bitrate (CBR) stereo audio files, Sound Recorder also had these limitations and did not support Variable bitrate (VBR) files or multichannel audio.

All versions prior to the Windows Vista version of *Sound Recorder* could apply some simple audio transformations:

- Convert the bitrate, bit depth and sampling rate of the audio file
- Use Audio Compression Manager (ACM) to compress the audio using installed ACM codecs or convert it to a different codec format.

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The first sub-chunk is identified by the "hdrl" tag. This sub-chunk is the file header and contains metadata about the video, such as its width, height and frame rate. The second sub-chunk is identified by the "movi" tag. This chunk contains the actual audio/visual data that make up the AVI movie. The third optional sub-chunk is identified by the "idx1" tag which indexes the offsets of the data chunks within the file.

By way of the RIFF format, the audio/visual data contained in the "movi" chunk can be encoded or decoded by software called a codec, which is an abbreviation for (en)coder/decoder. Upon creation of the file, the codec translates between raw data and the (compressed) data format used inside the chunk. An AVI file may carry audio/visual data inside the chunks in virtually any compression scheme, including Full Frame (Uncompressed), Intel Real Time (Indeo), Cinepak, Motion JPEG, Editable MPEG, VDOWave, ClearVideo / RealVideo, QPEG, and MPEG-4 Video.

Since its introduction in the early 90s, new computer video techniques have been introduced which the original AVI specification did not anticipate.

- AVI does not provide a standardised way to encode aspect ratio information, with the result that players cannot select the right one automatically (though it may be possible to do so manually).
- There are several competing approaches to including timecode in AVI files, which affects usability of the format in film and television postproduction (although it is widely used). An equivalent of the Broadcast Wave extensions, designed to standardise postproduction metadata for wave audio files, has not emerged.
- AVI is not intended to contain variable frame rate material. Workarounds for this limitation increase overhead dramatically.
- AVI was not intended to contain video using any compression technique which requires access to future video frame data beyond the current frame. Approaches exist to support modern video compression techniques (e.g. MPEG-4) which rely on this functionality, although this is beyond the intent of the original specification and may cause problems with playback software which does not anticipate this use.
- AVI cannot contain some specific types of VBR data (such as MP3 audio at sample rates below 32KHz) reliably.
- Overhead for AVI files at the resolutions and frame rates normally used to encode feature films is about 5 MB per hour of video, the significance of which varies with the application.

More recent container formats (such as Matroska, Ogg and MP4) solve all these problems, although software is freely available to both create and correctly replay AVI files which use these more recent techniques.

DV AVI

DV AVI (aka DV-AVI) is a type of AVI file where the video has been compressed to conform with DV standards. There are two types of DV-AVI files:

- Type 1: The multiplexed Audio-Video is kept in its original multiplexing and saved together into the Video section of the AVI file
- Does not waste much space (audio is saved uncompressed, but even uncompressed audio is tiny compared to the video part of DV), but Windows applications based on the Vfw API do not support it.

The format does not specify how (*i.e.*, with which codec) the video or audio should be encoded; it just specifies the structure of the video/audio stream. This is similar to the function performed by the QuickTime, AVI, or Ogg container formats. One of the objectives of ASF was to support playback from digital media servers, HTTP servers, and local storage devices such as hard disk drives.

The most common filetypes contained within an ASF file are Windows Media Audio (WMA) and Windows Media Video (WMV). Note that the file extension abbreviations are different from the codecs which have the same name. Files containing only WMA audio can be named using a .WMA extension, and files of audio and video content may have the extension .WMV. Both may use the .ASF extension if desired.

ASF files can also contain objects representing metadata, such as the artist, title, album and genre for an audio track, or the director of a video track, much like the ID3 tags of MP3 files. It supports scalable media types and stream prioritization; as such, it is a format optimized for streaming.

The ASF container provides the framework for digital rights management in Windows Media Audio and Windows Media Video. An analysis of an older scheme used in WMA reveals that it is using a combination of elliptic curve cryptography key exchange, DES block cipher, a custom block cipher, RC4 stream cipher and the SHA-1 hashing function.

ASF container-based media is usually streamed on the internet either through the MMS protocol or the RTSP protocol.

Real Media (RM)

RealMedia is a multimedia container format created by RealNetworks. Its extension is “.rm”. It is typically used in conjunction with RealVideo and RealAudio and is used for streaming content over the Internet.

Typically these streams are in CBR (constant bitrate).

Recently, RealNetworks has developed a new container for VBR (variable bitrate) streams, named RMVB (RealMedia variable bitrate).

Support of RealMedia is available in a wide variety of multimedia players for different architectures/platforms, including RealPlayer and the Real Alternative codec pack. The open source DAP firmware Rockbox has added support for reading RM containers as of 6 July 2009, although only certain codecs contained in RM files are playable.

Audio Video Interleave

Audio Video Interleave, known by its acronym AVI, is a multimedia container format introduced by Microsoft in November 1992 as part of its Video for Windows technology. AVI files can contain both audio and video data in a file container that allows synchronous audio-with-video playback. Like the DVD video format, AVI files support multiple streaming audio and video, although these features are seldom used. Most AVI files also use the file format extensions developed by the Matrox OpenDML group in February 1996. These files are supported by Microsoft, and are unofficially called “AVI 2.0”.

AVI is a derivative of the Resource Interchange File Format (RIFF), which divides a file’s data into blocks, or “chunks.” Each “chunk” is identified by a FourCC tag. An AVI file takes the form of a single chunk in a RIFF formatted file, which is then subdivided into two mandatory “chunks” and one optional “chunk”.

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comparison of decoders is usually based on how computationally efficient they are (i.e., how much memory or CPU time they use in the decoding process).

Audio quality

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When performing lossy audio encoding, such as creating an MP3 file, there is a trade-off between the amount of space used and the sound quality of the result. Typically, the creator is allowed to set a bit rate, which specifies how many kilobits the file may use per second of audio. The higher the bit rate, the larger the compressed file will be, and, generally, the closer it will sound to the original file.

With too low a bit rate, compression artifacts (i.e. sounds that were not present in the original recording) may be audible in the reproduction. Some audio is hard to compress because of its randomness and sharp attacks. When this type of audio is compressed, artifacts such as ringing or pre-echo are usually heard. A sample of applause compressed with a relatively low bit rate provides a good example of compression artifacts.

Besides the bit rate of an encoded piece of audio, the quality of MP3 files also depends on the quality of the encoder itself, and the difficulty of the signal being encoded. As the MP3 standard allows quite a bit of freedom with encoding algorithms, different encoders may feature quite different quality, even with identical bit rates. As an example, in a public listening test featuring two different MP3 encoders at about 128 kbit/s, one scored 3.66 on a 1–5 scale, while the other scored only 2.22.

Quality is dependent on the choice of encoder and encoding parameters. However, in 1998, MP3 at 128 kbit/s was providing quality only equivalent to AAC at 64 kbit/s and MP2 at 192 kbit/s.

The simplest type of MP3 file uses one bit rate for the entire file — this is known as Constant Bit Rate (CBR) encoding. Using a constant bit rate makes encoding simpler and faster. However, it is also possible to create files where the bit rate changes throughout the file. These are known as Variable Bit Rate (VBR) files. The idea behind this is that, in any piece of audio, some parts will be much easier to compress, such as silence or music containing only a few instruments, while others will be more difficult to compress. So, the overall quality of the file may be increased by using a lower bit rate for the less complex passages and a higher one for the more complex parts. With some encoders, it is possible to specify a given quality, and the encoder will vary the bit rate accordingly. Users who know a particular “quality setting” that is transparent to their ears can use this value when encoding all of their music, and not need to worry about performing personal listening tests on each piece of music to determine the correct bit rate.

Perceived quality can be influenced by listening environment (ambient noise), listener attention, and listener training and in most cases by listener audio equipment (such as sound cards, speakers and headphones).

Advanced Streaming Format (ASF)

Advanced Systems Format (formerly **Advanced Streaming Format**, **Active Streaming Format**) is Microsoft’s proprietary digital audio/digital video container format, especially meant for streaming media. ASF is part of the Windows Media framework.

ASF is based on serialized *objects* which are essentially byte sequences identified by a GUID marker.

From the first half of 1994 through the late 1990s, MP3 files began to spread on the Internet. The popularity of MP3s began to rise rapidly with the advent of Nullsoft's audio player Winamp, released in 1997. In 1998, the Rio PMP300, one of the first portable MP3 players was released, despite legal suppression efforts by the RIAA.

In November 1997, the website mp3.com was offering thousands of MP3s created by independent artists for free. The small size of MP3 files enabled widespread peer-to-peer file sharing of music ripped from CDs, which would have previously been nearly impossible. The first large peer-to-peer filesharing network, Napster, was launched in 1999.

In 1996, the song 'Until it sleeps' by Metallica became the first track to be illegally copied from CD, encoded as an MP3, and made available on the Internet by a user operating under the nickname 'NetFrack'. The ease of creating and sharing MP3s resulted in widespread copyright infringement. Major record companies argue that this free sharing of music reduces sales, and call it "music piracy". They reacted by pursuing lawsuits against Napster and against individual users who engaged in file sharing.

Despite the popularity of the MP3 format, online music retailers often use other proprietary formats that are encrypted or obfuscated in order to make it difficult to use purchased music files in ways not specifically authorized by the record companies. Attempting to control the use of files in this way is known as Digital Rights Management. Record companies argue that this is necessary to prevent the files from being made available on peer-to-peer file sharing networks. This has other side effects, though, such as preventing users from playing back their purchased music on different types of devices. However, the audio content of these files can usually be converted into an unencrypted format. For instance, users are often allowed to burn files to audio CD, which requires conversion to an unencrypted audio format.

Unauthorized MP3 file sharing continues on next-generation peer-to-peer networks. Some authorized services, such as Beatport, Bleep, Juno Records, eMusic, Zune Marketplace, Walmart.com, and Amazon.com sell unrestricted music in the MP3 format.

Encoding audio

The MPEG-1 standard does not include a precise specification for an MP3 encoder, but does provide example psychoacoustic models, rate loop, and the like in the non-normative part of the original standard. At the present, these suggested implementations are quite dated. Implementers of the standard were supposed to devise their own algorithms suitable for removing parts of the information from the audio input. As a result, there are many different MP3 encoders available, each producing files of differing quality. Comparisons are widely available, so it is easy for a prospective user of an encoder to research the best choice. It must be kept in mind that an encoder that is proficient at encoding at higher bit rates (such as LAME) is not necessarily as good at lower bit rates.

During encoding, 576 time-domain samples are taken and are transformed to 576 frequency-domain samples. If there is a transient, 192 samples are taken instead of 576. This is done to limit the temporal spread of quantization noise accompanying the transient.

Decoding audio

Decoding, on the other hand, is carefully defined in the standard. Most decoders are "bitstream compliant", which means that the decompressed output – that they produce from a given MP3 file – will be the same, within a specified degree of rounding tolerance, as the output specified mathematically in the ISO/IEC standard document (ISO/IEC 11172-3). Therefore,

Musepack and WMA are used to store and transfer audio. Their small file sizes allow faster Internet transmission, as well as lower consumption of space on memory media. However, lossy formats trade off smaller file size against loss of audio quality, as all such compression algorithms compromise available signal detail. There are also lossless codecs, such as FLAC, Shorten, Monkey's Audio, ATRAC Advanced Lossless, Apple Lossless, WMA Lossless, TTA, and WavPack, but none of these is yet a ubiquitous standard for either professional or home audio.

The usage of the WAV format has more to do with its familiarity, its simplicity and simple structure, which is heavily based on the RIFF file format. Because of this, it continues to enjoy widespread use with a variety of software applications, often functioning as a 'lowest common denominator' when it comes to exchanging sound files between different programs. In spite of their large size, uncompressed WAV (though that format can be different from the Microsoft WAV) files are sometimes used by some radio broadcasters, especially those that have adopted the tapeless system. BBC Radio in the UK uses 44.1 kHz 16 bit two channel .wav audio as standard in their VCS system. The ABC "D-Cart" system, which was developed by the Australian broadcaster, uses 48 kHz 16 bit two channel .wav files, which is identical to that of Digital Audio Tape.

This is a reference to compare the monophonic (not stereophonic) audio quality and compression bitrates of the different codecs available for .wav files including PCM, ADPCM, Microsoft GSM 06.10, CELP, SBC, Truespeech and MPEG Layer-3.

The above are WAV files; even those that use the MP3 codec have the ".wav" extension.

Moving Pictures Expert Group Layer 3 (MP3)

MPEG-1 Audio Layer 3, more commonly referred to as **MP3**, is a patented digital audio encoding format using a form of lossy data compression. It is a common audio format for consumer audio storage, as well as a de facto standard of digital audio compression for the transfer and playback of music on digital audio players.

MP3 is an audio-specific format that was designed by the Moving Picture Experts Group as part of its MPEG-1 standard. The group was formed by several teams of engineers at Fraunhofer IIS, AT&T-Bell Labs, Thomson-Brandt, CCETT, and others. It was approved as an ISO/IEC standard in 1991.

The use in MP3 of a lossy compression algorithm is designed to greatly reduce the amount of data required to represent the audio recording and still sound like a faithful reproduction of the original uncompressed audio for most listeners. An MP3 file that is created using the setting of 128 kbit/s will result in a file that is about 11 times smaller than the CD file created from the original audio source. An MP3 file can also be constructed at higher or lower bit rates, with higher or lower resulting quality.

The compression works by reducing accuracy of certain parts of sound that are deemed beyond the auditory resolution ability of most people. This method is commonly referred to as perceptual coding. It uses psychoacoustic models to discard or reduce precision of components less audible to human hearing, and then records the remaining information in an efficient manner.

This technique is often presented as relatively conceptually similar to the principles used by JPEG, an image compression format. The specific algorithms, however, are rather different: JPEG uses a built-in vision model that is very widely tuned (as is necessary for images), while MP3 uses a complex, precise masking model that is much more signal dependent.

RIFF-RMID chunk, the result will be a regular Standard MIDI File. RIFF-RMID is not an official MMA/AMEI MIDI standard.

Extended RMID File Format: In recommended practice RP-29, the MMA defined a method for bundling one Standard MIDI file (SMF) image with one Downloadable Sounds (DLS) image using the RIFF container technology. However, this method was deprecated when the MMA introduced the Extensible Music Format (XMF), which because of its many additional features is generally preferred for MIDI-related resource bundling purposes going forwards.

Extended MIDI File (.XMI) Format: The XMI format is a proprietary extension of the SMF format introduced by the Miles Sound System, a middleware driver library targeted at PC games. XMI is not an official MMA/AMEI MIDI standard.

Wave Form (WAV)

WAVE or **WAV**, short for **Waveform Audio File Format**, is a Microsoft and IBM audio file format standard for storing an audio bitstream on PCs. It is an application of the RIFF bitstream format method for storing data in “chunks”, and thus is also close to the 8SVX and the AIFF format used on Amiga and Macintosh computers, respectively. It is the main format used on Windows systems for raw and typically uncompressed audio. The usual bitstream encoding is the Linear Pulse Code Modulation (LPCM) format. Both WAVs and AIFFs are compatible with Windows, Macintosh, and Linux operating systems. The format takes into account some differences of the Intel CPU such as little-endian byte order. The RIFF format acts as a “wrapper” for various audio compression codecs.

Though a WAV file can hold compressed audio, the most common WAV format contains uncompressed audio in the linear pulse code modulation (LPCM) format. The standard audio file format for CDs, for example, is LPCM-encoded, containing two channels of 44,100 samples per second, 16 bits per sample. Since LPCM uses an uncompressed storage method which keeps all the samples of an audio track, professional users or audio experts may use the WAV format for maximum audio quality. WAV audio can also be edited and manipulated with relative ease using software. The WAV format supports compressed audio, using, on Windows, the Audio Compression Manager. Any ACM codec can be used to compress a WAV file. The UI for Audio Compression Manager may be accessed through various programs that use it, including Sound Recorder in some versions of Windows.

Beginning with Windows 2000, a `WAVE_FORMAT_EXTENSIBLE` header was defined which specifies multiple audio channel data along with speaker positions, eliminates ambiguity regarding sample types and container sizes in the standard WAV format and supports defining custom extensions to the format chunk.

There have been some WAVE format inconsistencies reported, for example how 8-bit data is unsigned, but 16-bit data is signed; and many chunks duplicate the same information found in other chunks. WAV file can contain embedded IFF “List”s, that may contain several “sub-chunks”.

Uncompressed WAV files are quite large in size, so, as file sharing over the Internet has become popular, the WAV format has declined in popularity. However, it is still a commonly used file type, suitable for retaining “first generation” archived files of high quality, for use on a system where disk space is not a constraint, or in applications such as audio editing, where the time involved in compressing and uncompressing data is a concern. More frequently, the smaller file sizes of compressed but lossy formats such as Ogg Vorbis, MP3, ATRAC, AAC,

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or by MADI (RME standard). MIDI connectors are defined by the MIDI standard. In the 2000s, as computer equipment increasingly used USB connectors, companies began making USB-to-MIDI audio interfaces which can transfer MIDI channels to USB-equipped computers. As well, due to the increasing use of computers for music-making and composition, some MIDI keyboard controllers were equipped with USB jacks, so that they can be plugged into computers that are running “software synths” or other music software.

File formats

Standard MIDI File (SMF) Format: MIDI messages (along with timing information) can be collected and stored in a computer file system, in what is commonly called a MIDI file, or more formally, a Standard MIDI File (SMF). The SMF specification was developed by, and is maintained by, the MIDI Manufacturers Association (MMA). MIDI files are typically created using computer-based sequencing software (or sometimes a hardware-based MIDI instrument or workstation) that organizes MIDI messages into one or more parallel “tracks” for independent recording and editing. In most sequencers, each track is assigned to a specific MIDI channel and/or a specific instrument *patch*; if the attached music synthesizer has a known instrument palette (for example because it conforms to the General MIDI standard), then the instrument for each track may be selected by name. Although most current MIDI sequencer software uses proprietary “session file” formats rather than SMF, almost all sequencers provide export or “Save As...” support for the SMF format.

An SMF consists of one header chunk and one or more track chunks. There exist three different SMF formats; the format of a given SMF is specified in its file header. A Format 0 file contains a single track and represents a single song performance. Format 1 may contain any number of tracks, enabling preservation of the sequencer track structure, and also represents a single song performance. Format 2 may have any number of tracks, each representing a separate song performance. Sequencers do not commonly support Format 2. Large collections of SMFs can be found on the web, most commonly with the extension .mid but occasionally with the .smf. These files are most frequently authored with the (rather dubious) assumption that they will be only ever be played on General MIDI players.

MIDI Karaoke File (.KAR) Format: MIDI-Karaoke (which uses the “.kar” file extension) files are an “unofficial” extension of MIDI files, used to add synchronized lyrics to standard MIDI files. SMF players play the music as they would a .mid file but do not display these lyrics unless they have specific support for .kar messages. These often display the lyrics synchronized with the music in “follow-the-bouncing-ball” fashion, essentially turning any PC into a karaoke machine. None of the MIDI-Karaoke file formats are maintained by any standardization body.

XMF File Formats: The MMA has also defined (and AMEI has approved) a new family of file formats, XMF (eXtensible Music File), some of which package SMF chunks with instrument data in DLS format (Downloadable Sounds, also an MMA/AMEI specification), to much the same effect as the MOD file format. The XMF container is a binary format (not XML-based, although the file extensions are similar).

RIFF-RMID File Format: On Microsoft Windows, the system itself uses proprietary RIFF-based MIDI files with the “.rmi” extension. Note, Standard MIDI Files are not RIFF-compliant. A RIFF-RMID file, however, is simply a Standard MIDI File wrapped in a RIFF (Resource Interchange File Format) chunk. For compatibility reasons many digital musicians overlook this format. One solution to this incompatibility is to extract the data part of the

Musical Instruments Digital Interface (MIDI)

MIDI (Musical Instrument Digital Interface), is an industry-standard protocol that enables electronic musical instruments such as keyboard controllers, computers, and other electronic equipment to communicate, control, and synchronize with each other. MIDI allows computers, synthesizers, MIDI controllers, sound cards, samplers and drum machines to control one another, and to exchange system data. MIDI does not transmit an audio signal or media — it transmits event messages such as the pitch and intensity of musical notes to play, control signals for parameters such as volume, vibrato and panning, cues, and clock signals to set the tempo. As an electronic protocol, it is notable for its widespread adoption throughout the music industry.

All MIDI compatible controllers, musical instruments, and MIDI-compatible software follow the same MIDI 1.0 specification, and thus interpret any given MIDI message the same way, and so can communicate with and understand each other. MIDI composition and arrangement takes advantage of MIDI 1.0 and General MIDI (GM) technology to allow musical data files to be shared among many different files due to some incompatibility with various electronic instruments by using a standard, portable set of commands and parameters. Because the music is stored as instructions rather than recorded audio waveforms, the data size of the files is quite small by comparison. Individual MIDI files can be traced through their own individual key code. This key code was established in early 1994 to combat piracy within the sharing of .mid files.

The original physical MIDI connection uses DIN 5/180° connectors. Opto-isolating connections are used, to prevent ground loops occurring among connected MIDI devices.

Logically, MIDI is based on a ring network topology, with a transceiver inside each device. The transceivers physically and logically separate the input and output lines, meaning that MIDI messages received by a device in the network not intended for that device must be re-transmitted on the output line (MIDI-OUT) by means of a “soft through”. This can introduce a delay, one that is long enough to become musically significant on larger MIDI rings.

MIDI-THRU ports started to be added to MIDI-compatible equipment soon after the introduction of MIDI, in order to improve performance. The MIDI-THRU port avoids the aforementioned retransmission delay by linking the MIDI-THRU port to the MIDI-IN socket almost directly. The difference between the MIDI-OUT and MIDI-THRU ports is that data coming from the MIDI-OUT port has been generated on the device containing that port. Data that comes out of a device’s MIDI-THRU port, however, is an exact duplicate of the data received at the MIDI-IN port.

Such chaining together of instruments via MIDI-THRU ports is unnecessary with the use of MIDI “patch bay,” “mult” or “Thru” modules consisting of a MIDI-IN connector and multiple MIDI-OUT connectors to which multiple instruments are connected. Some equipment has the ability to merge MIDI messages into one stream, but this is a specialized function and is not universal to all equipment. MIDI Thru Boxes clean up any skewing of MIDI data bits that might occur at the input stage. MIDI Merger boxes merge all MIDI messages appearing at either of its two inputs to its output, which allows a musician to plug in several MIDI controllers (e.g., two musical keyboards and a pedal keyboard) to a single synth voice device such as an EMU or Proteus.

All MIDI compatible instruments have a built-in MIDI. Some computers’ sound cards have a built-in MIDI, whereas others require an external MIDI which is connected to the computer via the newer D-subminiature DA-15 game port, a USB connector or by FireWire, ethernet

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Disadvantages of audio files

They are HUGE! They can take up 10MB or more per minute of sound. Even a simple one can take several minutes to download and play. This is why most audio files on the web are quick snippets of 1 second or less.

On the web, audio files are best used as “streaming” media, where the user clicks to hear a selection as it comes down, saving the trouble of waiting for a long download.

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3.8 AUDIO FILE FORMATS

When you create multimedia, it is likely that you will deal with file formats and translators for text, sounds, images, animations or digital video clips. A sound file's format is simply a recognized methodology for organizing the digitized sound's data bits and bytes into a data file. The structure of the file must be known, of course, before the data can be saved or later loaded into a computer to be edited and/or played as sound. The following table shows some of the common sound formats used for multimedia.

In Windows, digitized sounds are most commonly stored as WAV files. For the Internet, new formats are emerging as companies develop solutions for streaming and playing sound on the Web. There are many ways to store the bits and bytes that describe a sampled waveform sound. The method used for Red Book Audio data files on consumer-grade music CDs is Linear Pulse Code Modulation.

The wave format (WAV) was introduced by Microsoft and IBM with the introduction of Windows. Windows make use of MIDI files. A MIDI interface is built into many sound boards on the PC.

AIFF (Audio Interchange File Format)

Audio Interchange File Format (AIFF) is an audio file format standard used for storing sound data for personal computers and other electronic audio devices. The format was co-developed by Apple Computer in 1988 based on Electronic Arts' Interchange File Format (IFF, widely used on Amiga systems) and is most commonly used on Apple Macintosh computer systems.

The audio data in a standard AIFF file is uncompressed pulse-code modulation (PCM). There is also a compressed variant of AIFF known as AIFF-C or AIFC, with various defined compression codecs.

Standard AIFF is a leading format (along with SDII and WAV) used by professional-level audio and video applications, and unlike the better-known lossy MP3 format, it is non-compressed (which aids rapid streaming of multiple audio files from disk to the application), and lossless. Like any non-compressed, lossless format, it uses much more disk space than MP3—about 10MB for one minute of stereo audio at a sample rate of 44.1 kHz and a sample size of 16 bits. In addition to audio data, AIFF can include loop point data and the musical note of a sample, for use by hardware samplers and musical applications.

The file extension for the standard AIFF format is .aiff or .aif. For the compressed variants it is supposed to be .aifc, but .aiff or .aif are accepted as well by audio applications supporting the format.

detect limited numbers of digital errors, figure out which digital symbols (numbers) were changed, and change them back. When playing back a digital recording, the digital information is converted back into a continuous, analog signal by a digital-to-analog converter. This electronic signal is then amplified and converted back into a sound wave by a loudspeaker (just as would be done with the analog signal produced by an analog machine from an analog recording).

MIDI Vs Digital Audio

MIDI files contain no sound. Repeat, MIDI files contain no sound! They contain only performance data.

In years gone by, player pianos played music by “reading” holes punched in a roll of paper. You could hold that paper to your ear all day long and never hear any sound from it. That’s because the paper was only a conveyor of information. It told the piano what notes to play, but the piano did the actual playing.

MIDI files are the piano rolls of the electronic age. They contain no sound, but tell the computer or electronic keyboard what to play.

For Example:

Imagine a guy playing your favorite song on a keyboard. By pressing the keys, he’s “telling” the keyboard what notes to play and how long to play them.

Now imagine the guy being replaced by a computer. The computer sends signals to the keyboard that tell it what notes to play and how long to play them. These are MIDI signals.

Now imagine the keyboard being replaced by your computer’s sound card. When playing MIDI, a sound card is acting like a little keyboard in your computer. The MIDI file is “telling” it what to play.

Now imagine someone taking the guy’s keyboard away and replacing it with a different model. This new one might have a better or worse sound than the first one. Likewise, a MIDI file will sound a little bit different when played on another person’s sound card. It just depends on what kind of card he or she has.

Advantages of MIDI files

MIDI files are tiny, often 10K or less. They download from a web page in no time and fit easily on a floppy disk. MIDI files are ideal any time you want music to start playing immediately.

Disadvantages of MIDI files

Because they sound a little different when played on different sound cards, there is no guarantee that those lush horns won’t sound like blaring trumpets on the next guy’s machine. Making universal MIDI files is a combination of art, skill, and experience.

Digital Audio

Digital audio files are like tape recordings. They store every yelp, screech and caterwaul exactly as you make it, then reproduce them on playback, no matter what kind of machine they are played on.

Advantages of audio files

They can reproduce exact sounds with better-than-CD quality, including all yelps, screeches and caterwauls.

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output power, there is only a 6 dB increase; when you make the sound 100 times more intense, the increase in dB is not hundredfold, but only 20 dB.

For your knowledge some decibel scale examples are given below:

Categories of Sound

To reproduce sound you need to record it so that the recorded sound can be played back when required. The two categories of sound are:

- Analog Sound
- Digital Sound

Analog Sound

Any recorded sound is known as analog sound as it is represented by the fluctuations in the amplitude. Amplitude of a wave is the maximum displacement of a particle in the path of a wave and is a measure of the peak-to-peak height of the wave. In analog sound recording, the fluctuations in the amplitude are recorded continuously on a recording media. The continuously recording of the amplitude fluctuations on a recording media provides the information necessary for the reproduction of the sound waves.

Digital Sound

Digital sound is a term applied to sound that has been digitized into binary code. The representation of sound waves in the binary format, which means representation using only zeros and ones, enables the computers to use digital sound. Sound waves are converted to digital form by means of a circuit that assigns a value or binary set of numbers that correspond to the shape of the incoming electrical wave or current. As computer cannot understand analog data, it must be converted to digital. When analog sound is converted to digital, it is generally saved as a wave file.

Digitization of Sound

A digital recorder firstly requires the input of an analog signal; this signal may come directly from a microphone pre-amp, but any analog audio signal can be converted. Measurements of the signal intensity are then made at regular intervals (sampling) by the analog-to-digital converter. At each sampling point, the signal must be assigned a specific intensity from a set range of values (quantization). For doing this, the original sound wave can now be described using only numbers—as digital information. Each sample can be given an ordinal number which signifies the point in relative time that it represents, and the magnitude of the sample is an analog of pressure at the microphone (Watkinson 1994) (or, for an artificial sound signal, the pressure that would be at the microphone to correspond to that sound.) When the original signal is converted into numbers (usually binary numbers, 1's and 0's, called 'bits') further additions of noise and distortion, provided they are not great enough to cause digital errors, can be rejected at every stage of processing; this is what is referred to as the regenerative nature of digital signals. Digital errors, called bit errors in binary digital systems, are events of noise and/or distortion which cause one number (or bit) to appear more like another number than like the number they started out as. As long as a digital symbol appears closer to being what it began as than to anything else, it can be regenerated. When raw digital errors cannot be avoided, error correction coding can allow some of them to be detected and fixed. Error correction, essential when transferring digital audio over noisy channels, helps to eliminate bit errors by comparing extra data against the main data to

easier-to-use alternative to FontLab Studio, though without as many of the high-end features needed by professional type designers, and given it a price intermediate between FontLab Studio and their more introductory font editing program TypeTool.

3.6 HYPER MEDIA AND HYPER TEXT

How do you read a book, for example, this one. Chapter by chapter, page by page. While you are on page 43, do you have any idea what is there on page 28. No. The solution to this lies in linkage which is provided by Hypertext. Thus, Hypertext is a process which puts links or anchors, as they are called, for easy accessing to another page while reading one page.

It may not be very clear here, since these things do not happen in the printed book like this one, which you are reading. But, it is very common in web pages. There while on a page, you can refer to any other page by just a click, using so called Anchors.

Let us see how it is done. While publishing material on the web site page, the information is divided into various small "chunks". These are called nodes. Then links are put into these nodes. These links in the language of the web are called Hyperlinks. The process of finding a node among other nodes is called Browsing, which is sometimes referred for searching on the net. What are you doing? Browsing the Internet. That is you are searching something on the Internet. The World Wide Web (WWW) is a hypertext system accepted throughout the World.

Hypertext applications are particularly useful while working with massive amounts of text such as encyclopaedias and multi volume case law reports .

3.7 SOUNDS – MULTIMEDIA SYSTEM SOUNDS MIDI V/S DIGITAL AUDIO

Sound is perhaps the most important part of the multimedia project. It is one of the basics of the project. Well, sound can be very distinctive. Any sound can make a pleasant listening or it can sound disturbing too if made at a little higher pitch. So while making the multimedia project it is imperative that the sound should be perfect. It should not disturb but should give pleasant listening.

Sound is like waves. When something vibrates in the air by moving back and forth, it creates waves of pressure. These waves are spread like the ripples tossed into a still pool, and when they reach your eardrums, you experience the changes of pressure, or vibrations, as sound. Sound is defined as the auditory sensation produced by the mechanical vibrations of objects. Sound is usually represented as waves, periodic waves corresponding to musical sound and a periodic waves corresponds to noise. Acoustics is the branch of science dealing with the study of sound and is concerned with the generation, transmission and reception of sound waves. There are different methods to produce mechanical vibrations, such as beating a drum, ringing a bell and breaking a glass on the floor.

Acoustics is the branch of science that studies sound. Sound pressure levels are measured in decibels. A decibel measurement is actually the ratio between a chosen reference point on a logarithmic scale and the level that is actually experienced. When you increase the sound

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Fontographer

Fontographer (sometimes abbreviated **FOG**), is a software application used to create digital fonts, available for both Microsoft Windows and Apple Macintosh platforms. It was originally developed by Altsys but is now owned by FontLab Ltd.

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Fontastic

In December 1984, James R. Von Ehr founded the Altsys Corporation to develop graphics applications for personal computers. The first foray by Altsys into commercial font editing software was a bitmap font editor called Fontastic, released in the mid-1980s for the Apple Macintosh. The program, developed by Altsys founder Jim von Ehr, was able to edit the native bitmap font format of the Mac. It introduced many of the interface elements that would carry over into Fontographer. Fontastic Plus was later introduced with new editing tools and kerning pairs.

Fontographer

Fontographer, developed by von Ehr for the Mac and released in January 1986—before Adobe Illustrator—was the first commercially available Bézier curve editing software for a personal computer. High quality fonts in the PostScript format could be developed for a fraction of the cost of all other existing methods (URW's Ikarus required systems costing over \$100,000), leading to what has been called “the democratization of type design”: for the first time in history, numerous self-taught type designers without substantial capital investment produced fonts for professional use. Fontographer 2.0 was released eight months later in the Fall of 1986.

With the PostScript background established with Fontographer, Altsys developed FreeHand in 1988 as a Macintosh Postscript-based illustration program using Bezier curves for drawing and editing. In 1989, Fontographer 3.0 was released, featuring an auto-trace tool and automatic generation of hints for Postscript printer fonts.

In January 1995, Altsys was acquired by Macromedia and both Fontographer and FreeHand were incorporated into the Macromedia product lineup. A new version of Fontographer was included in the Macromedia Graphics Suite, which helped its wider adoption. Although development of the font editor was frozen from 1998, when version 4.1 was released, until 2006, many font and graphics designers continued to use it. The only serious competitor at the time, FontLab (later FontLab Studio), was generally considered more difficult to use, although by 2005 it had overwhelmingly replaced Fontographer for most professional font development.

RoboFog was a version of Fontographer 3.5 with an embedded Python interpreter, developed by Just van Rossum, Petr van Blokland and Erik van Blokland.

FontLab Ltd. acquires rights to Fontographer

In May 2005, FontLab Ltd. announced that they had licensed distribution rights from Macromedia, and resumed development. They are currently selling Fontographer along with their other products. In December 2005 FontLab shipped a new version of Fontographer for Mac OS, running natively on OS X and featuring numerous bug fixes. They have since exercised their option to buy all rights to Fontographer, so it is now fully owned by FontLab Ltd.

In June 2010, Fontographer version 5.0 was released by FontLab. This represents the first major features added to the product since 1996. FontLab has positioned the product as an

Key Features

- Create and edit TrueType and OpenType fonts
- Redesign existing characters
- Add missing characters
- Add up to 65,535 glyphs per font
- Import vector files (EPS, AI, PDF, etc) and bitmap images (BMP, GIF, PNG, etc)
- Edit and regenerate font names
- Fix character mappings
- Correct fonts that display incorrectly
- Convert OpenType fonts to TrueType fonts
- Generate, modify, import, export, and clean up kerning pairs
- Add or correct over two thousand composite glyphs
- Transform individual glyphs or an entire font (e.g., to make a bold version)
- Extract TrueType fonts from TrueType Collections
- Unicode support (including the private use area and supplementary planes)
- All popular encodings and code pages supported (ANSI, ASCII, Unicode, Symbol, Big5, PRC, Wansung, etc)
- Preview fonts before installing
- Install fonts in Windows.

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DTL OTMaster 2.3

DTL OTMaster 2.3 for Mac OS X and Windows is a technical font viewer and editor for examining, editing and fixing of OpenType and TrueType fonts. Developed by Dutch Type Library and URW++, this application allows fine low-level tuning of any OpenType font, TrueType font or TrueType font collection. Because of its “non-invasive” nature, DTL OTMaster can help you make small important changes to any .otf or .ttf font without risking any changes in the parts of the font that you don’t touch. Read more...

Create a font with Fontlab Font Software

Fontlab is the world leader in font software. Companies like Microsoft, Apple, Adobe, IBM, Linotype, and many others use Fontlab software to create and edit fonts. Our font editor tools let you do almost anything that is possible to do with a font. From TypeTool, our basic font editor, to Fontlab Studio, used by professional type designers around the world, to AsiaFont Studio, the worldwide font creator, Fontlab has a font editor product that suits your needs.

Convert Any Font

Our universal font converter, TransType, can convert most any font to any platform or font format. Our other font converter products can convert to and from and between bitmap font formats and photofont format.

Font Utilities

Fontlab font utilities help you do special things with fonts that otherwise would take unusual time and effort.

TrueType font

TrueType is a font system originally developed by Apple, Inc. It was intended to replace Type 1 fonts, which many felt were too expensive. Unlike Type 1 fonts, TrueType glyphs are described with quadratic Bezier curves. It is currently very popular and implementations exist for all major operating systems.

OpenType font

OpenType is a smartfont system designed by Adobe and Microsoft. OpenType fonts contain outlines in either the TrueType or Type 1 (actually CFF) format together with a wide range of metadata.

METAFONT

METAFONT uses a different sort of glyph description. Like TrueType, it is a vector font description system. It draws glyphs using strokes produced by moving a polygonal or elliptical pen approximated by a polygon along a path made from cubic Bézier splines and straight line segments, or by filling such paths. Although when stroking a path the envelope of the stroke is never actually generated, the method causes no loss of accuracy or resolution.

3.5 FONT EDITING AND DESIGN TOOLS

Here I covered few of the font editing software available in the market.

FontCreator - the most popular font editor!

With more than 2.5 million downloads, FontCreator is the world's most popular font editing software. It has an intuitive interface that allows beginners to become productive immediately and it contains the powerful drawing tools that font designers require to create and edit high-quality TrueType and OpenType fonts.

When you create or open a font, FontCreator displays an overview of all available characters. You can simply add missing characters, or select an existing character, and modify its appearance. You can import (scanned) images of your signature or company logo, or make a font from your own handwriting. With FontCreator you can also fix character mappings, font names, kerning pairs, and at all times you can preview your fonts before installing.

In the Professional Edition, font validation features enable you to improve the quality of your fonts. Tools to join contours simplify and speed up the glyph design process. Powerful transformation scripts let you create hundreds of additional characters in seconds. FontCreator's intelligent generation of composites allows you to automatically generate outlines for more than 2,200 (mostly accented) characters.

Whether you're a type designer or graphic artist who needs a font creation powerhouse, or a hobbyist who wants to have fun creating new fonts, FontCreator has the tools you need.

What's New

FontCreator version 6 contains many new features and improvements that will benefit type designers, font foundries, and power-users. The most impressive new feature that makes designing fonts so much faster is direct import of vector based images. This is the most reliable way to get illustrations made in vector based image editing software (like Adobe Illustrator) into FontCreator.

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advantages over outline fonts include reducing number of vertices needed to define a glyph, allowing the same vertices to be used to generate a font with a different weight, glyph width, or serifs using different stroke rules, and the associated size savings.

For a font developer, editing a glyph by stroke is easier and less prone to error than editing outlines. A stroke-based system also allows scaling glyphs in height or width without altering stroke thickness of the base glyphs. Stroke-based fonts are heavily marketed for East Asian markets for use on embedded devices, but the technology is not limited to ideograms.

Commercial developers included Agfa Monotype (iType), Type Solutions, Inc. (owned by Bitstream Inc.) (Font Fusion (FFS), btX2), Fontworks (Gaiji Master), which have independently developed stroke-based font types and font engines.

Although Monotype and Bitstream have claimed tremendous space saving using stroke-based fonts on East Asian character sets, most of the space saving comes from building composite glyphs, which is part of the TrueType specification and does not require stroke-based approach.

The various formats supported by are:

Bold

Italics

Underline

These are the main styles and we had earlier used them in our letter. But, if you go deep into the working of the software, you would see that it allow you to convert the character to:

Strikethrough

Double strikethrough

Superscript

Subscript

Shadow

Outline

Emboss

Engrave

Small Caps

All Caps

Hidden

Font formats

Type 1 and Type 3 fonts

Type 1 and Type 3 fonts were developed by Adobe for professional digital typesetting. Using PostScript, the glyphs are outline fonts described with cubic Bezier curves. Type 1 fonts were restricted to a subset of the PostScript language, and used Adobe's hinting system, which used to be very expensive. Type 3 allowed unrestricted use of the PostScript language, but didn't include any hint information, which could lead to visible rendering artifacts on low-resolution devices (such as computer screens and dot-matrix printers).

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choose a different font, all properties that were expressed in em or ex don't have to be changed. The em unit was heavily promoted earlier and we will not repeat all the good arguments for using the em unit here, but merely state the facts. In CSS, the em is exactly equal to the font size (*i.e.*, the height of the font). For example, in a 12pt font, the em is 12pt wide, while in a 15pt font the em is 15pt wide.

The ex unit is also relative to the font size but in a different way. It is called "ex" because it is defined as the x-height. The em can be set explicitly in CSS1, but the ex is a characteristic of the font, so it cannot be set explicitly. This means you can determine how big it is only by inspecting the font. For example, Times Roman has a relatively large ex (x-height) compared to Baskerville. So even though a 12pt Times Roman and a 12 pt Baskerville both have an em of 12pt, their ex values will vary because their x-heights vary. Times Roman's will be somewhat larger than Baskerville's.

The pixel unit

The term pixel is derived from Picture Element. The pixel is the smallest element on a video display screen, such as a computer monitor or a television. It also applies to the output from certain types of printers, such as laser printers. The pixel unit in CSS is based on pixels, but is slightly more refined than the name implies. On computer screen, the pixel unit behaves as you expect it to. Consider these two rules:

```
H1 { border-width: 4px }
```

```
H2 { border-width: 3px }
```

In the example above, the width of the border surrounding H1 element is set to four pixels and the border around H2 elements is set to three pixels. On a normal computer screen, these values will be used as specified. That is the border around H1 elements will actually be four pixels wide and the border around H2 elements will be three pixels wide. Another seemingly obvious fact is that the H1 border will be exactly one pixel thicker than the H2 border.

Stroke-based fonts

A glyph's outline is defined by the vertices of individual strokes and stroke's profile. Its

This is a Proportional font

This is a courier font

This is an Ornamental font

This is Sans serif font

This is Serif font

Length units

The point unit is the traditional measurement of length in typography, but not always the best for Web design. CSS accepts a range of different units which fall into three categories.

- **absolute units** – this category includes the point unit described above as well as other units (mm, cm, in, pc) which describe physical distances that can be measured with a measuring band.
- **relative units** – these units describe distances relative to other distances. The “em” unit, is the foremost member of this group which also includes the “;ex” unit.
- **the pixel unit** – the pixel unit as defined in CSS, forms a group of its own since it has some unique characteristics. On normal computer screens, the pixel unit will do what you expect. On printers and other high-resolution devices it will do what you hope!

The three groups their units are described in more detail below. Common for all the units is the way they are combined with numbers to form values.

Absolute units

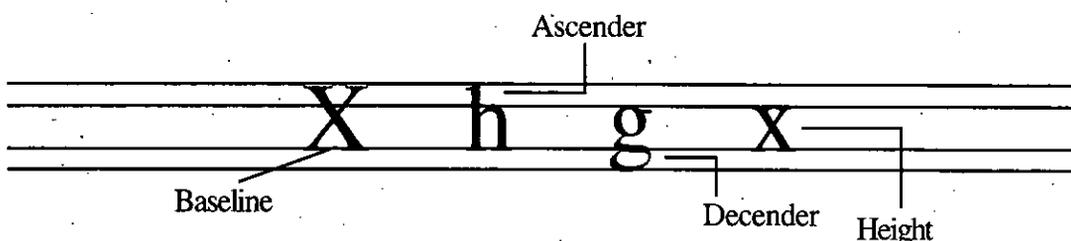
An absolute unit is a unit of measure that specifies a fixed length – a length which can be measured with a measuring band. The units are:

- **millimeter: mm**
- **centimeter: command (1cm = 10 mm)**
- **inch: in (1in = 25.4mm)**
- **point: pt (72pt = 1 in)**
- **pica: pc (1pc = 12pt)**

The mm and command units come from the metric system of measurements. The other units are all defined as fraction of an inch. A pica is 12 pints. Six picas equal one inch. Absolute units have limited usefulness because they cannot be scaled. In general, they should only be used if you know the physical properties of the output medium. For example, if you write a style sheet for a document you know will only be printed on A4-sized paper, absolute units may be the right choice. In most cases, however, you will be better off using relative units.

Relative units

A relative unit is a unit of measure that specifies a value that is relative to the font size. There are two relative units in CSS: “em” and “ex”. Usually the font size they refer to is the font size of the element itself. (The only exception is the font-size property, which we discuss later in the chapter where the value scales to the font size of the element’s parent.) Relative units have the advantage over absolute unit sin that they scale automatically. When you



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3.2 INTRODUCTION

In this unit, you would Test as how to use text in Multimedia. You would learn how the text is handled in computer. Various types of font editing and design tools are also explained. Complete definition of Hyper media and Hyper text. You will learn about various sound systems and how does MIDI compare with Digital Audio. You will also learn as to how to use Sound in Windows. You will learn about Notation Interchange File Format (NIFF). Finally, you will learn how the sound is added to the multimedia.

3.3 TEST-USING TEXT IN MULTIMEDIA

Alphanumeric characters are used to present information in the text form. By alphanumeric I mean that characters are either Alpha (i.e., from a to z) or Numeric (i.e., from 1 to 9). In computer most of the files are text files or graphic files. Multimedia uses both and sometimes even combines them to make the presentation look more attractive. Text can be of various types such as plaintext, formatted text, and hypertext.

Plain Text: It is the unformatted text, consisting of fixed sized characters from a limited character set, all having the same type of appearance.

Formatted Text: It is the text where appearance of text can be changed using font parameters, i.e., bold, italics, underlined varying shapes, sizes and coolurs, etc. The text of the book for example.

3.4 COMPUTERS AND TEXT

Fonts are typically measured in a unit specific to the printing industry called the point. A point (abbreviated "pt") is the traditional printer's typographer's unit for specifying the size of fonts, the spacing between adjacent lines and the thickness of rules – among other things. It is still used a log, although some countries and some publishers now prefer to use the metric system (specifically the millimeter – mm – and centimeter – cm). CSS uses only the Anglo-American point. It does so because that point's value is in between the other two values. Also, it conforms to the point size used in PostScript printers, the most common type of printer.

To understand how type is sized, you first need some information about what makes up a letter. The x-height is the size of the body or main part of the letter and is approximately equal to the height of the x of the font. The ascender is that part of the lowercase letter that extends above the x-height. The descender is that part of the lowercase letter that extends below the x-height.

The size of type is usually obtained by measuring from roughly the top of its ascenders to the bottom of its descenders. (In the days of metal type, the font size was the size of the letter body). The measurement is expressed in points. The difference of a point is more noticeable in smaller sizes than in larger sizes. Text type, used for running text, is generally 14pt or less. Common sizes are 10 pt and 12 pt. Display type, type used for headings, is generally bigger than 14pt.

UNIT—3

PRODUCTION BUILDING BLOCKS

NOTES

STRUCTURE

- 3.1 Objectives
- 3.2 Introduction
- 3.3 Test-using text in Multimedia
- 3.4 Computers and Text
- 3.5 Font editing and Design tools
- 3.6 Hyper Media and Hyper Text
- 3.7 Sounds – Multimedia system sounds MIDI v/s Digital Audio
- 3.8 Audio File Formats
- 3.9 Working with Sound in Windows
- 3.10 Notation Interchange File Format (NIFF)
- 3.11 Adding sound
 - Summary
 - Review Questions
 - Further Readings

3.1 OBJECTIVES

The objectives of this unit can be summarized as followings:

- to learn about Test-using text in Multimedia
- to learn about Computers and Text
- to learn about Font editing and Design tools
- to learn about Hyper Media and Hyper Text
- to learn about Sounds – Multimedia system sounds MIDI v/s Digital Audio
- to learn about Audio File Formats
- to learn about Working with Sound in Windows
- to learn about Notation Interchange File Format (NIFF)
- to learn about Adding sound.

NOTES

10. Describe the process of opening an existing document.
11. Describe various methods of starting Excel?
12. Describe the various components of the Excel worksheet window.
13. Describe the method of copying formula.
14. Describe the process of saving a worksheet.
15. Describe the process of creating a presentation using AutoContent Wizard.
16. Describe the method of creating a presentation using Templates.
17. How would you create a presentation using the various slide options?
18. Describe the various views of looking at presentations in PowerPoint.
19. Describe the process of entering text into slides.
20. What is the function of Collapse?
21. Describe the various type of backgrounds which you can have in your slides.
22. How would you change the alignment of the text of the slides?
23. How would you make sure that there is no misspelled word in your text.
24. How would you set the various options of AutoCorrect?
25. Describe the process of adding an audio clip to the slide.
26. How is a video clip added to the slide?
27. What is a Note Page?
28. What is a Handout?
29. How are actions and animations added to the slides?
30. How is a chart added to the slide?
31. Describe the process of changing the chart style.
32. Describe the process of adding graphics, pictures, etc., in the slide.
33. What is an organization chart?
34. What is a text box?
35. How would you create a slide show?
36. Describe the use of rehearsing the slide show.
37. Describe the process of duplicating the slides.
38. How would you change the background colour of a slide?
39. How would you insert text created from WordArt into a slide?
40. What happens when you delete a slide?

FURTHER READINGS

1. **Multimedia and Web Technology** : Ramesh Bangia, Laxmi Pub, 2007
2. **Computer Graphics and Multimedia** : Ehtiram Raza Khan and Huma Anwar, Laxmi Pub, 2008
3. **Multimedia Applications and Web Designing**: Dinesh Maidasani, Laxmi Pub, 2008
4. **Computer Graphics With Multimedia** : A. Rajaraman, Narosa, 2009
5. **Computer Graphics, Multimedia And Animation** : Malay K. Pakhira, PHI Learning, Second Edition
6. **Computer, Internet and Multimedia Dictionary** : S. Verma, Universities Press, 1998

- You can enter your text in the slides of your presentation.
- Using Collapse you can change the view of the slides.
- You can move the text up and down in the slide.
- You can change colours of the slides.
- You can have a pattered background of the slide.
- A slide with textured background can also be created.
- You can have picture in the background of a slide.
- You can format text paragraphs for Alignment, Tabs, Indents and Line Spacing.
- Like Word processing, you can check spelling of your text.
- Using Autocorrect, you can preset corrections for your wrongly spelled words.
- You can have charts in your presentations.
- You can various types of charts like bar charts, pie charts, etc.
- You can change the various elements of the charts.
- Organization charts are used to represent organizations.
- You can have pictures in the background of slide.
- You can draw various shapes to put in the presentation slides.
- You can add a text box in your slide.
- You can add text from Word Art in your presentation slide.
- You can change the order of the slides.
- You can duplicate a particular slide.
- You can delete a slide.
- You can make a slide show to show all the slides one by one.
- Audio clips can be added to the slides.
- Video clips can also be added to the slides.
- You can add actions in your slides.
- Even animations can be added to the slides.
- Notes Pages are used to have the text on the slides but it is not shown.
- Handouts can be printed for all your slides.
- You can create your own animation and add to the slide.

NOTES

REVIEW QUESTIONS

1. What is word processing?
2. What are the various features of word processing?
3. Define the following terms:
Text Document
Fonts
Arrow keys
Tabs
Cursor
Space bar
Backspace
4. Describe the various methods of starting Microsoft Word.
5. Describe the various items on the screen of Word.
6. How would you create a new document?
7. Describe the process of saving a document.
8. How would you set the timing for AutoSave?
9. If you do not save before closing, what will happen?

with these templates, businesses and schools can rapidly assemble multimedia training materials without needing to hire a full-fledged programmer. Intuitively-named dialog boxes take care of input and output. The flow chart model makes the re-use of lesson elements extremely straightforward. Being both AICC- and SCORM-compliant, Authorware can be used to deliver content via any AICC or SCORM Learning Management System.

NOTES

Moving beyond the templates, however, requires either the importing of interactive Flash or Director movies, or scripting, which can be done in Authorware's native scripting language or in JavaScript.

SUMMARY

- Word processing programs allow you to manipulate text consisting of words.
- In a word processing program, you can change the various aspects of the text.
- Among the various features of Word Processing are: Alignment, Deleting Mistakes, Line Spacing, MailMerging, Moving the Cursor, Naming a Document, Overwriting Mistakes, Page Breaks, Page Numbers, Search and Replace, Spell Checking.
- Text is the matter which you type.
- Document is whole text matter which you create, like a letter, or a chapter, etc.,
- Fonts are the various styles which you can use for your text.
- Cursor is the blinking point which tells you where to start typing or what your current position is.
- Space bar is used for giving space between the words.
- Tabs are used to set the text into tabular form.
- Backspace is used to delete the wrongly typed character in your text.
- You can start Microsoft Word from the Start button and Programs.
- You can also start Word from its icon.
- Opening screen of Word is like a blank screen.
- Click at New from the File menu to create a document.
- You can save your Word document file with a name.
- Excel can be started from the Start button, Microsoft Office Bar or from Windows Explorer.
- Excel has like other software, Toolbar, Formatting bar, Standard toolbar, etc.
- Scroll button allows you to scroll through the whole worksheet.
- Formula bar shows you the formula being applied.
- Using Font bar you can set the font for text in the cell.
- You can make the text in cell, bold by using B at the formatting bar.
- You can align the text in any alignment of your choice using the icons on the formatting bar.
- You can use short menu available at right click of the mouse for Cut and Paste.
- You can save your worksheet using Save command available under the File menu.
- You can print your worksheet using Print command.
- AutoContent Wizard creates presentation by asking you just few questions.
- You can even create a presentation using the Templates given with the software.
- You can create a presentation using the various optional slides given.
- You can save your presentation.
- Various views in PowerPoint are: Outline view, Normal view, Slide sorter view, Slide show view and Notes page view.

3. It should enable developers to build a part of a project and then test it immediately.

Delivery, Cross-Platform, and Internet Playability Features

1. Delivering the project may require building a run-time version of the project, using the multimedia authoring software.
2. Run-time version or standalone
allows a project to play back without the complete authoring software and all its tools and editors.
3. Across platforms
4. Authoring systems provide a means for converting their output to be delivered within the context of HTML or DHTML.

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2.18 OBJECT ORIENTED TOOLS

Macromedia Authorware (now part of Adobe Systems) was an interpreted, flowchart based, graphical programming language. Authorware is used for creating interactive programs that can integrate a range of multimedia content, particularly e-learning applications. The flowchart model differentiates Authorware from other authoring tools, such as Flash and Director, which rely on a visual stage, time-line and script structure.

Usage & Features

Authorware's distinctive style revolves around a central icon: the Interaction Icon. The structure of the authoring environment encourages rich interaction; complex user feedback is not only possible but somewhat suggested by the software, rather than suggesting the usual media diffusion. This Interaction Icon allows various forms of user feedback (move object to, along a line, click an object or hot-spot; plus the usual text-entry, keypress, etc.)

The original strength in education of Authorware could be linked to its roots in pedagogical models based on constructivist views.

Authorware programs start by creating a flowline, which is a flowchart showing the structure of the developer's program. The developer can add and manage text, graphics, animation, sound and video; develop interactivity and add navigational elements such as links, buttons, and menus. Macromedia Flash and Macromedia Director movies can also be integrated into an Authorware project. Xtras, or add-ins, can also be used to extend the functionality of Authorware, which is similar to HyperCard's XCMDs. Authorware's power can be even better utilized with the use of variables, functions and expressions. Authorware can interpret both its built-in proprietary scripting language and JavaScript version 1.5.

Over time, Authorware has lost its specificity. More power was gained as more scripting added graphical design, interaction and integration features, but Authorware's special interaction-centred, clean, simple design was lost along the way. However, there are still many Fortune 500 companies that use Authorware as their main platform.

Authorware programs can be distributed as stand-alone executable files, or over the web which requires a proprietary Authorware Web Player.

Use in E-Learning

Authorware is particularly well suited to creating e-learning content, as it includes highly customizable templates for CBT and WBT, including student assessment tools. Working

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2. Time-based tools
3. Best to use when you have a message with a beginning and an end.
4. Played back at a speed that you can set
5. Other elements (such as audio events) are triggered at a given time or location in the sequence of events.
6. Jumps to any location in a sequence

Common Features for all Authoring Tools:

1. Editing and organizing features.
2. Programming features.
3. Interactivity features.
4. Performance tuning and playback features.
5. Delivery, cross-platform, and Internet playability features.

Editing and Organizing Features

1. Editing tools
to create, edit, and convert multimedia elements such as animation and video clips.
2. The organization, design, and production process for multimedia involves storyboarding and flowcharting.
Visual flowcharting or overview facility illustrates project structure at a macro level.

Programming Features

1. Visual programming with icons or objects
the simplest and easiest authoring process.
Authorware and IconAuthor
suitable for slide shows and presentations.
2. Authoring tools offer 'very high level language' (VHLL) or interpreted scripting environment.

Interactivity Features

1. Interactivity
the end user control over the content and flow of information
Simple branching
 go to
Conditional branching
 IF-THEN decisions or events.
2. Structured language
complex programming logic, subroutines, event tracking, and message passing among objects and elements.

Performance Tuning and Playback Features

1. Synchronization is difficult
2. Authoring system should facilitate precise timing of events.

2.14 TYPES OF AUTHORIZING TOOLS

The integration of audio, video, graphics and text on the desktop promises to fundamentally challenge the centuries-old model of the printed document as the basis for information exchange. Before this potential can be realized, however, systems must be devised that enable the production and presentation of complex, inter-related media objects. These systems are generically called multimedia authoring tools.

Here, we consider the development of multimedia authoring tools, examine the current state of the art, and then discuss a set of research challenges that need to be addressed before the full potential of multimedia output technology can be effectively utilized to share information.

Types of Authoring Tools:

1. Card- or page-based tools.
2. Icon-based, event-driven tools.
3. Time-based tools.

2.15 CARD AND PAGE BASED

Features of Card and Page Based Authoring Tools:

1. The elements are organized as pages of a book or a stack of cards.
2. Card-or page-based authoring systems
3. Best used when the bulk of your content consists of elements that can be viewed individually
4. The pages of a book or cards in a card file.
5. Link these pages or cards into organized sequences.
6. Jump, on command, to any page
7. Play sound elements and launch animations and digital video.

2.16 ICON BASED AUTHORIZING TOOLS

Features of Icon Based Authoring Tools:

1. Multimedia elements and interaction cues (events) are organized as objects in a structural framework or process.
2. Simplify the organization of your project
3. Display flow diagrams of activities along branching paths.

2.17 TIME BASED AUTHORIZING TOOLS

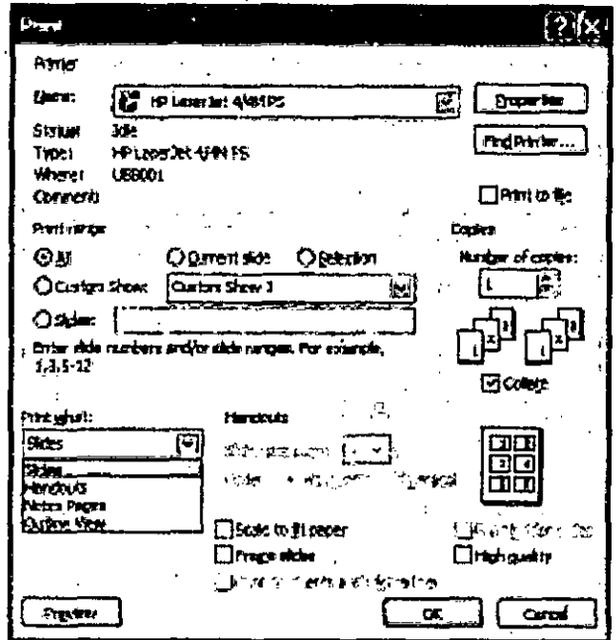
Features of Time Based Authoring Tools:

1. Elements and events are organized along a timeline with resolutions as high as or higher than 1/30 second.

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2. In the Handout Master view, you can select the two slide per page, three slides per page or the six slides per page formats by clicking on the Handout Master toolbar as shown.
3. To apply any changes to the Handout Master, just follow the procedure as for the Notes master.
4. Save the presentation file to save any changes you make to the Handout Master.
5. You cannot change the position of the slide images on the Handout Master.
6. There is no notes text placeholder on the Handout Master.



Packing Presentations to Go

Many people use their laptops to display their PowerPoint presentations, but occasionally, you may need to use a different computer to run your presentation. Because that other computer may not have a copy of PowerPoint, you can store your entire PowerPoint presentation on a CD that you can run on another computer.

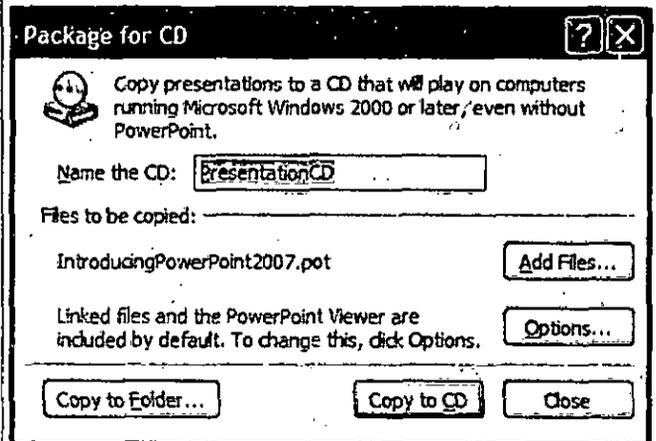
To package up your presentation, follow these steps:

1. Click the Office button and choose Publish > Publish for CD.

The Package for CD dialog box appears.

Rather than save a presentation to a CD, you can click the Copy to Folder button and specify a different drive and folder, such as a USB removable drive.

2. Click in the Name the CD text box and type a descriptive name for your presentation.
3. Insert a blank CD in your rewritable CD drives.
4. Click Copy to CD.



If your presentation includes hyperlinks to other programs, PowerPoint displays a dialog box to alert you. This dialog box is meant to keep you from accidentally creating a presentation that could spread viruses or Trojan Horses.

5. Click Close.

2. Click the Slide Show tab.
3. Click the Hide Show icon in the Set Up group.

PowerPoint dims your selected slide.

To unhide a slide, just repeat the above three steps.

Notes, Handouts and Masters for Presentation

There are three important tools for your presentation. These tools are:

Notes Pages

These pages are like the script for your presentation. In this script you have an image of slides along with the words you want to deliver for the specific slide.

Handouts

These printed pages are the hard copies of the presentation slides which you can distribute to your audience.

Master

These are control elements of a slide like the title master which controls appearance of the title on all the slides.

Using Notes Pages

Notes Pages act like a cheat sheet for your presentation. You would write the text you want to read without letting the audience know that you are reading during the course of a presentation for each slide.

Printing Handouts

You can print your entire presentation in the form of handouts. These handouts are used to distribute among the audience in advance. You can also print specific slides, notes pages or outline pages.

For this do the following:

1. Open the presentation you want to print.
2. Click the Office button and Print.
3. The Print dialog box appears.
4. In the Print what: box, click the item you want to print.
5. If you select Handouts, you can then select a number of slides per page and whether the order should be horizontal or vertical,
6. Select any other options you want to apply.
7. After applying the option in the handouts section, click OK.

Handouts Master

The Handouts Master can be used to modify your Handout format.

For this do the following:

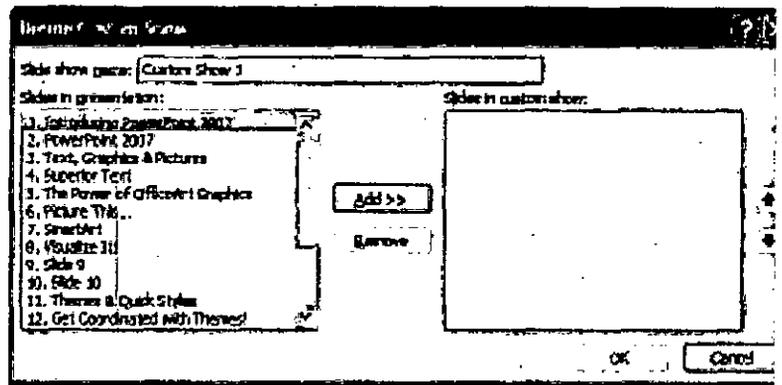
1. Click the View menu, highlight Master and choose Handout Master. The Handout Master appears.

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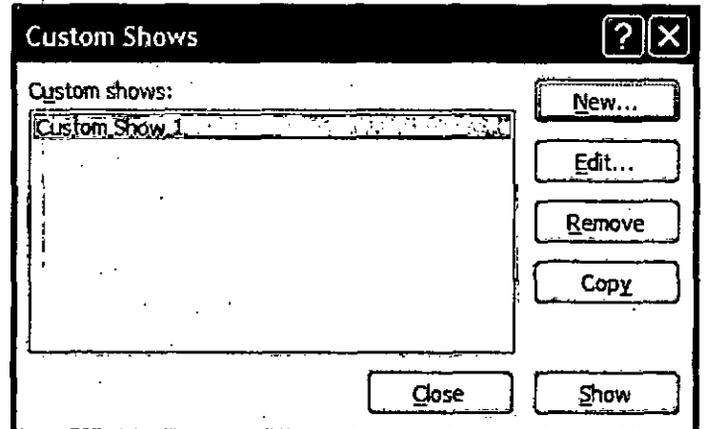
This tells PowerPoint which existing slides you want to reuse in your custom slide show.

- Repeat Step 6 for each slide you want to include in your custom slide show.



- Click a slide in the Slides in Custom Show list box and click the Up or Down arrow button to rearrange their order.

- Repeat Step 8 for each slide you want to rearrange in your custom slide show.



- Click Ok.

The Custom Shows dialog box appears again.

- Click the name of your custom slide show and then click Show.

PowerPoint shows your new, customized presentation.

To present a custom slide show, follow these steps:

- Click the Slide Show tab.
- Click the Custom Slide Show icon in the Start Slide Show group.

A pull-down menu appears that lists the names of all the custom slide shows you have created.

- Click the name of the custom slide show you want to view.
- Choose one of the following:
 - Click the mouse or press the spacebar to view the next slide.
 - Press Esc to exit your presentation.

Hiding a Slide

PowerPoint can hide a slide, which lets you keep your slide but not display it during a presentation. Hiding a slide can be especially handy when you need to create a custom slide show and need a slide show but not the original presentation (or vice versa).

To hide a slide, follow these steps:

- Click the slide that you want to hide (in Slide or Outline view).

2. Click the From Beginning icon in the Start Slide Show group.

PowerPoint displays the first slide of your presentation.

3. Choose one of the following:

- Click the mouse or press the spacebar to view the next slide.
- Press Esc to exit your presentation.

If you have a large presentation consisting of 300 slides, you may not want to view the first 290 slides just to test how your last 10 slides look. To avoid this problem, PowerPoint lets you choose to view your presentation starting with any slide.

To view your presentation starting with a slide other than the first one, follow these steps:

1. Click the Slide Show tab.
2. Click the From Current Slide icon in the Start Slide Show group. PowerPoint displays the currently displayed slide.
3. Choose one of the following:
 - Click the mouse or press the spacebar to view the next slide.
 - Press Esc to exit your presentation.

Making Slide Shows

This effect shows all the hard work you have put in making the slides. It shows one slide after another, stopping in between for a set time on either the monitor of your screen or on the projector which may have been attached to your computer. It is also possible to add animated effects on the slides and show them in a sophisticated manner. It is also possible to add audio, video, narration, music, etc., to your slides.

To arrange the order of a custom slide show, follow these steps:

1. Click the Slide Show tab.
2. Click the Custom Slide Show icon in the Start Slide Show group.

A pull down menu appears.

3. Choose Custom Shows.

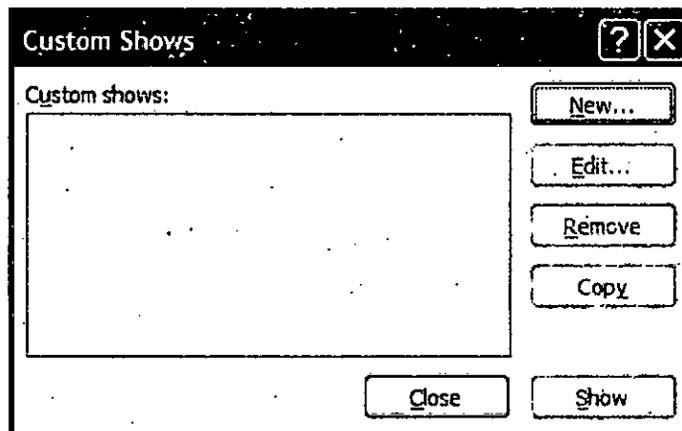
The Custom Shows dialog box appears.

4. Click New.

The Define Custom Show dialog box appears.

5. Click in the Slide Show Name text box and type a name for your custom slide show.

6. Click a slide in the Slides in Presentation list box and then click the Add button.



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To Add a Transition View

1. Click a slide (in the Slide or Outline view pane).
Any transition you choose will end by displaying the slide you choose in this step.
2. Click the Animations tab.
PowerPoint displays the different animation.
3. Click the More button of the Transition To This Slide group.
A pull-down menu appears listing all the different transitions available. If you move the mouse over the a transition, PowerPoint shows you what that transition will look like on your chosen slide.
4. Click the transition you want.
5. Click in the Transition Sound list box and choose a sound, such as Cash Register or Drum Roll.
6. Click in the Transition Speed list box and choose a speed (Slow, Medium, or Fast).
7. Select the Automatically After or the On Mouse Click check box.
If you select the Automatically After check box, you have to specify a time in the Automatically After text box for the slide to wait before running the transition.
You can select both the On Mouse Click and Automatically After check boxes, so the slide transition waits until you click the mouse or until a certain amount of time passes.
8. Click Apply to All to apply your transition to every slide in your presentation.

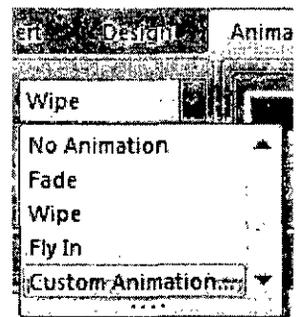
Adding Text Transitions

Besides animating how your slides appear and disappear you can also add transitions to your text boxes or graphics so they fly or drop into place across a slide.

Use text transitions sparingly because the transitions can get distracting when people just want to read your presentation without having to watch letters zoom around the screen.

To Create a simple text transition, follow these steps:

1. Click a text box or picture on a slide.
PowerPoint displays handles around your chosen item.
2. Click the Animations tab.
3. Click the Animate list box in the Animations group.
A list of different animation schemes appear.
4. Click an animation, such as Fly In or Wipe.
PowerPoint animates your text so you can see how it looks.

**Viewing a Presentation**

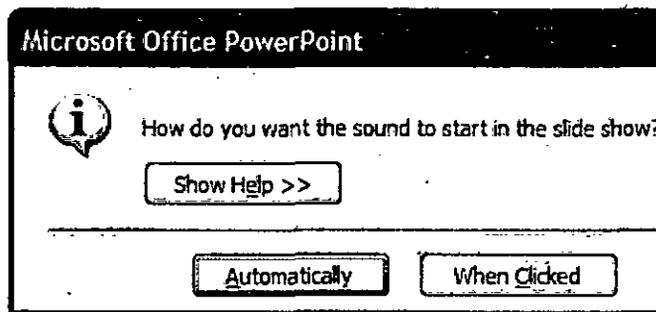
After you finish arranging your slides, adding transitions, and adding hyper links, you are ready to test how your entire presentation looks. To view your entire presentation, follow these steps:

1. Click the Slide Show tab.

NOTES

5. Click the audio file you want to add and then click Ok.

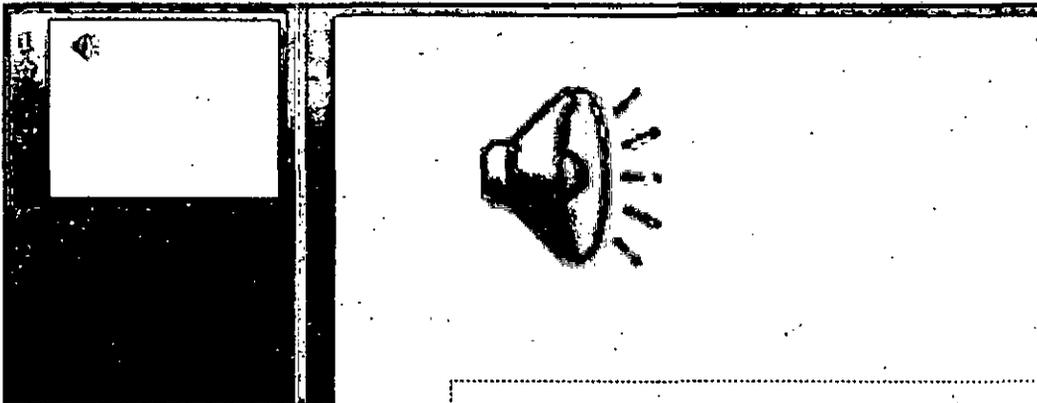
PowerPoint adds your audio file to the currently displayed slide (represented as a horn icon) and displays a dialog box, asking whether you want the sound to play automatically or when you click the mouse.



NOTES

6. Click Automatically or When Clicked.

PowerPoint displays your audio file as a sound icon on your slide. You may want to move the sound icon on your slide so it doesn't obscure part of your slide.

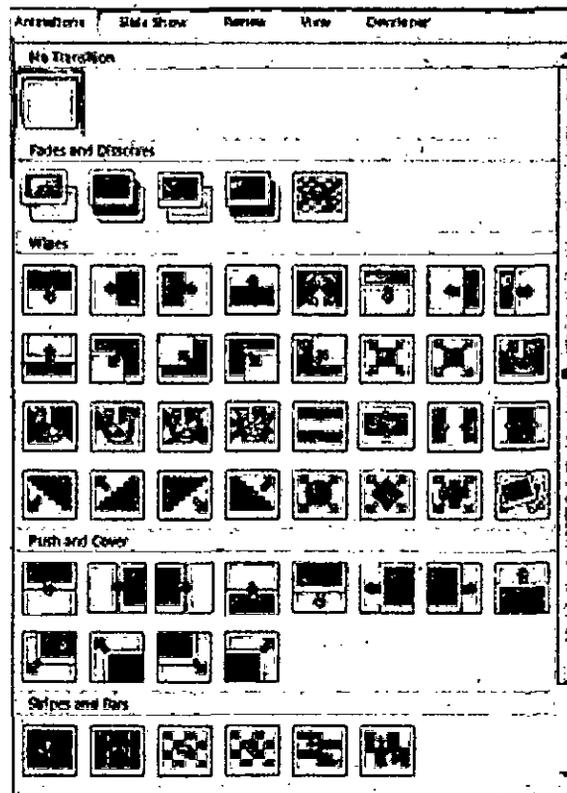


Adding Slide Transitions

These effects can be of the form of wipes, splits, dissolves, etc., which you usually see in the film show. For this you have to work in the Slide Sorter view.

When creating a transition, you need to define the following:

- The actual visual appearance of the transition.
- The speed of the transition (Slow, Medium, or Fast).
- Any sound effects you want to play during the transition (these can get really annoying, so use them sparingly)
- When to display the transition (after a certain time period or when you click the mouse).



NOTES

2. Click the Insert tab.

3. Click the Movie icon in the Media Clips group.

The Insert Movie dialog box appears.

4. Click the movie file you want to add and then click Ok.

PowerPoint displays a box on your slide where your movie will appear along with a dialog box, asking whether you want the movie to

play automatically or when you click the mouse.

5. Click Automatically or When clicked.

6. Move the mouse pointer over the movie.

The mouse pointer turns into a long-way pointing arrow.

7. Hold down the left mouse button and drag (move) the mouse to place the movie where you want it to appear on the slide.

8. Move the mouse pointer over one corner of the movie until the mouse pointer turns into a two-way pointing arrow.

9. Hold down the left mouse button and drag (move) the mouse to resize the movie.

Adding Sound

You can add sounds to the transition effects and to the preset animation. You can also add audio to your presentation by inserting files from the Clip Art Gallery or from other folders available to you.

PowerPoint can use audio files stored in common formats such as AIFF, MIDI, MP3, and WAV file. If your audio file is stored in a different file format, such as Real Audio, you will have to convert the file first before you can add it to a PowerPoint presentation.

To Add an Audio File

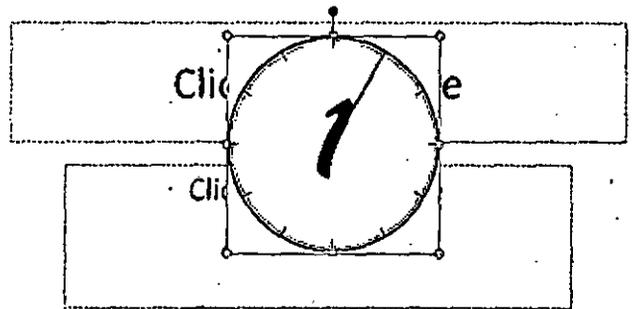
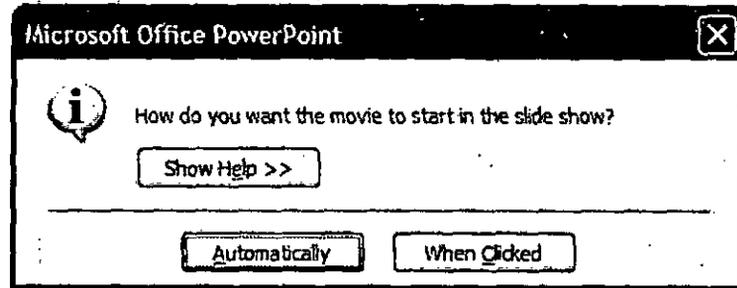
1. Select the slide where you want to put this audio.

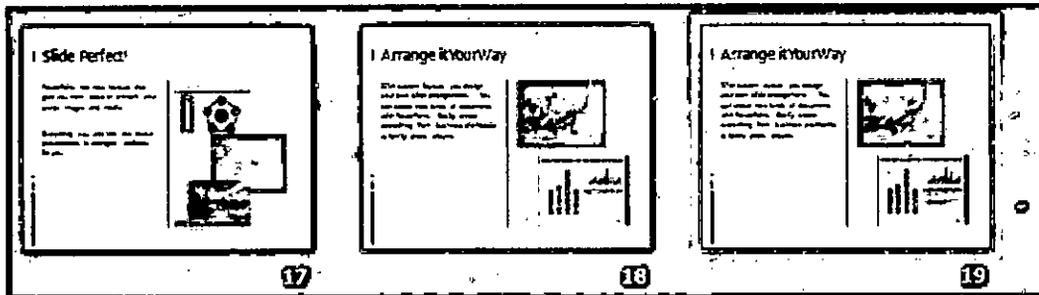
2. Click the Insert tab.

3. Click the downward-pointing arrow underneath the Sound icon to the Media Clips group.

4. Choose Sound from File

The Insert Sound dialog box appears.

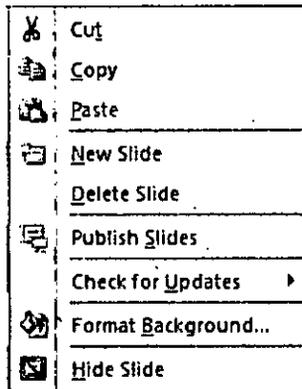




NOTES

To delete a slide or slides:

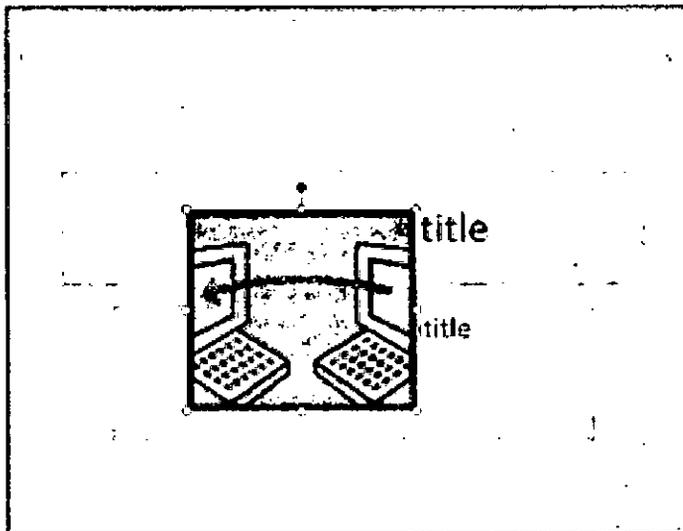
1. Select the slide or slides you want to delete.
2. Press right mouse button to get the sub menu.
3. Select Delete slide to delete the slide.



Adding an Animated Cartoon to a Slide

PowerPoint includes a library of simple animated cartoons that you can place on a slide for added visual emphasis. To include one of these animate cartoons on a slide, follow these steps.

1. Click the slide to which you want to add an animated cartoons,
2. Click the Insert tab.
3. Click the downward pointing arrow underneath the Movie icon in the Media Clips group.
4. Choose Movie from Clip Organizer.
5. Click a cartoon.



You won't see the animate cartoon in action until you view your presentation by pressing F5.

Adding a Movie to a Slide

PowerPoint slides can also display a movie. When you store a movie on a slide, you can resize its size and move it anywhere on your slide. As soon as your slide appears, you have the option of having the movie play automatically or wait until you click the mouse first.

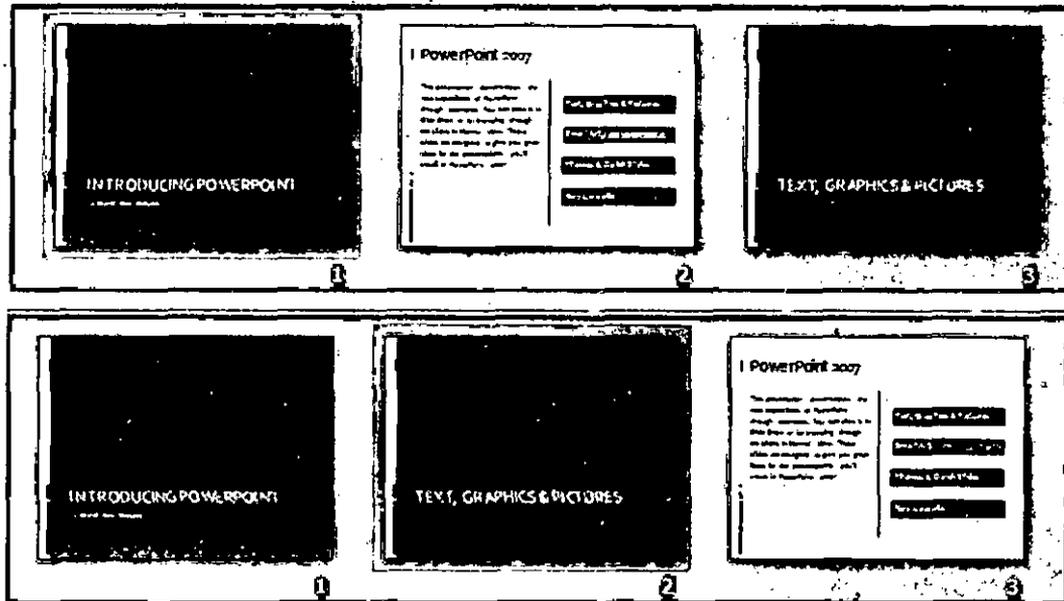
PowerPoint can use movies stored in common Windows view formats such as AVI, MPEG, ASF (streaming video), and WMV files. If your movie is stored in a different file format, such as QuickTime, you have to convert the file first before you can add it to a PowerPoint presentation.

To add a movie to a slide, follow these steps:

1. Click the slide to which you want to add a movie.

NOTES

3. A vertical line appears to indicate where the slide will drop when you release the mouse button.
4. Releasing the mouse button will drop the slide at the right place.
5. In the figure below, you will see that the slide 3 has been placed between the number 1 and 2. The numbering of all the slides has been changed subsequently.
6. Both original and after change figures are shown here.



Points to Remember

1. You can select several slides to move by drawing a selection box around the group of slides and then dragging the group to the new position.
2. You can also select several slides by holding down the Shift key and selecting the first and last slides in the series.
3. To gather slides from different parts of a presentation, hold down the Ctrl key as you click each slide. Drag any one slide in the group to a new point in the presentation. All the selected slides will appear in sequence and in the same relative order at new position.

Duplicating Slides

You can duplicate selected slides in Slide Sorter view and see the effect on the flow of slides immediately.

To Duplicate a slide or slides:

1. Select the slide or slides you want to duplicate.
2. Press Ctrl + D to duplicate the slide.
3. Slide would be duplicated.
4. In the following figure slide 18 has been duplicated as slide 19.

Deleting Slides

You can delete the selected slides in Slide Sorter view and see that the numbering of other slides change immediately.

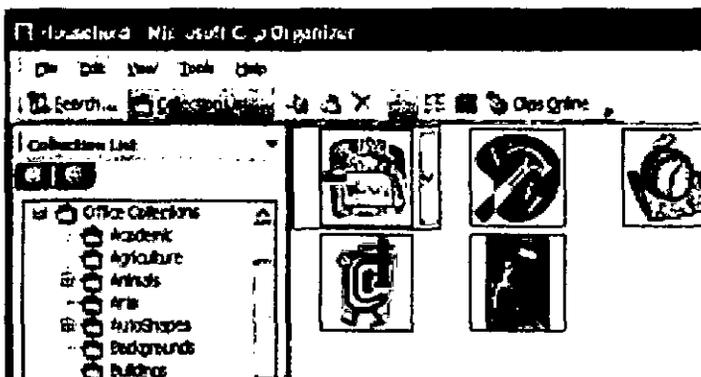
Adding Picture to the Presentation

1. Click a slide to which you want to add a picture.
2. Click the Insert tab.
3. Click the Picture icon in the Illustrations group.
4. Click the picture file you want and then click Open.

Adding Clip Art on a Slide

Clip Art consists of drawings that come with PowerPoint. To add a clip art image to a slide, follow these steps.:

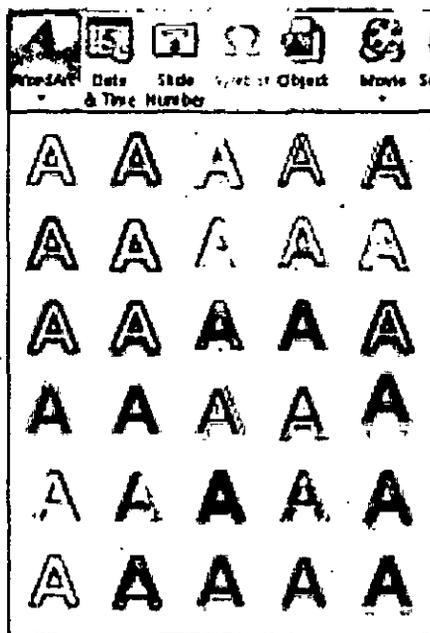
1. Click a slide to which you want to add a click art.
2. Click the Insert tab.
3. Click the Clip ART icon in the Illustrations group.
4. Click in the Search For text box and type a word that describes the type of image you want to find.
5. Click Ok.
6. Click the clip art image you want to use.



Adding from WordArt

WordArt is an independent program which allows you to create text in a presentable form and this text can be used in slides then. This is how it is done.

1. Click the slide to which you want to add WordArt.
2. Click the Insert Tab.
3. Click the WordArt icon in the Text group.
4. Click a WordArt style to use.
5. Click in the WordArt text box and type text.



Reordering Slides

As you see from the view, each slide is numbered. These number belong to their order of display. This order can be changed at any point of time in the presentation.

To Change the Order of the Slides:

1. Click with the mouse the slide whose position you want to change.
2. Pressing the mouse button drag the slide to a new position.

NOTES

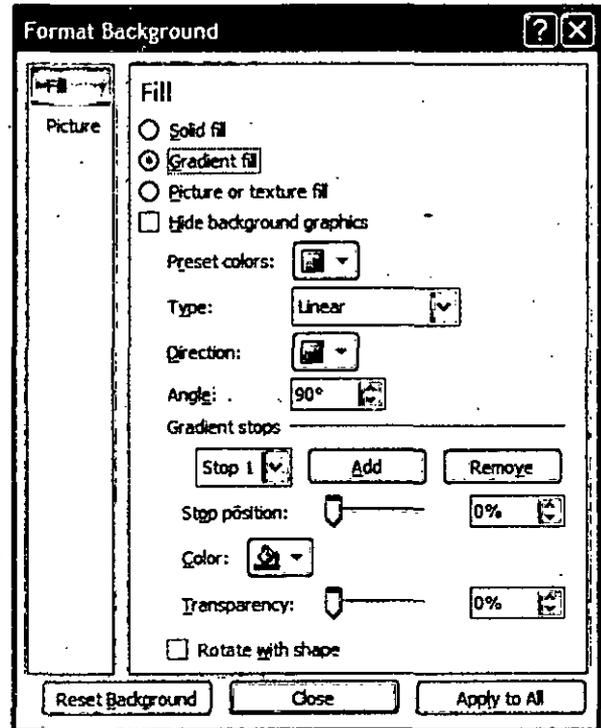
NOTES

7. In the meanwhile the same colour combination would be applied to the slide and can be seen at the background.

8. Click Ok to make the changes in the slide, as shown below.

To change a slide background picture

1. From the Design menu, choose background styles option.
2. The Format Background dialog box is displayed.
3. Under Picture, select the picture you want to have as background.
4. Click Apply button to apply the change to the current slide or click Apply to All to apply change to all the slides.

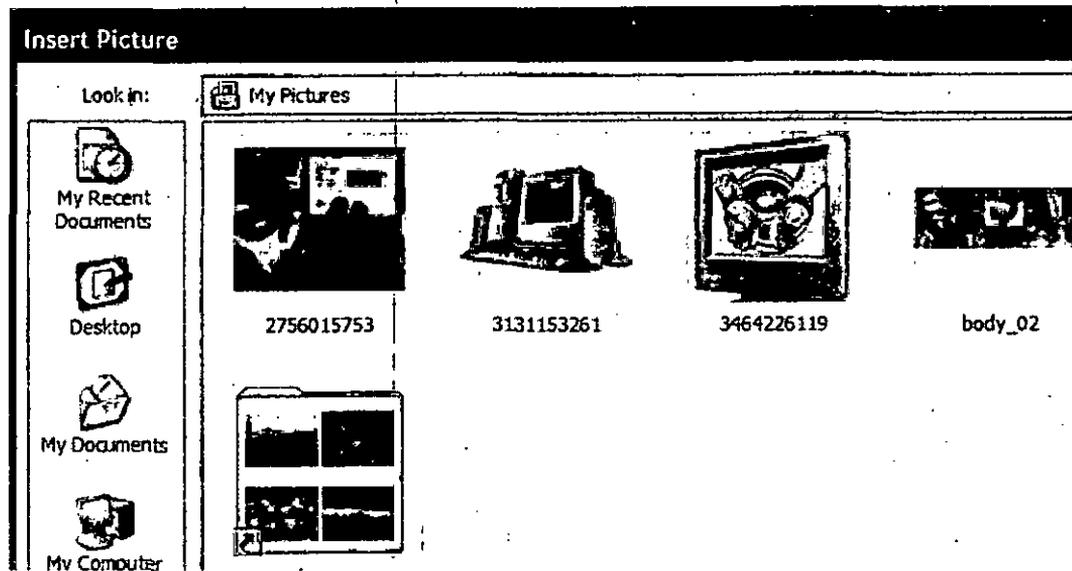


Adding Graphics to a Slide

You can add effects to your slide by adding the various types of graphics to it. Such graphics can be informative, such as a chart that displays sales results; or they can be decorative, such as a cartoon smiley face that emphasizes the presentation's good news.

The three common types of graphics you can add to a PowerPoint slide include:

- **Picture files:** Includes clip art images as well as images you may have stored on your hard disk, such as photographs from your digital camera.
- **Charts:** Displays bar, column, line, pie, and other types of charts.
- **WordArt:** Displays text as colourful text.



4. Pressing enter would lead you to another sub heading.

5. Type here the next heading, Photoshop CS 2.

6. Similarly press enter and type Illustrator CS 2.

7. Now we come to adding text in between the main headings, *i.e.*, sub-headings.

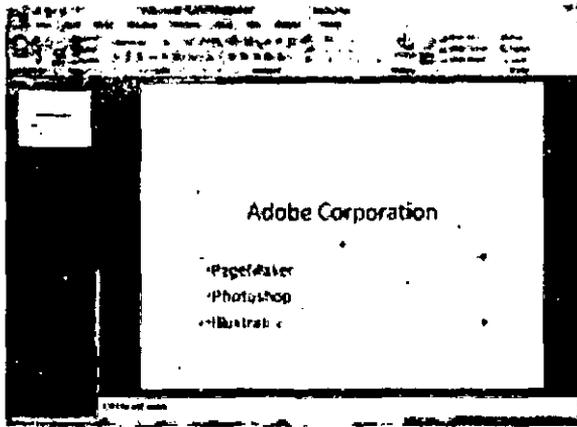
8. Place your cursor at the end of the first heading, *i.e.*, after PageMaker and press Enter. A new heading with 2 will appear. Just press Tab to get the bulleted text format. Type here the first line of your tabbed matter, which is Version 6.5.

9. Press enter again to get the new line and type version 7.0.

10. You can thus type the date in the steps required by you.

11. All these slides are shown on the next pages.

12. Next obvious step would be change the data, read on.



NOTES

Moving the Text

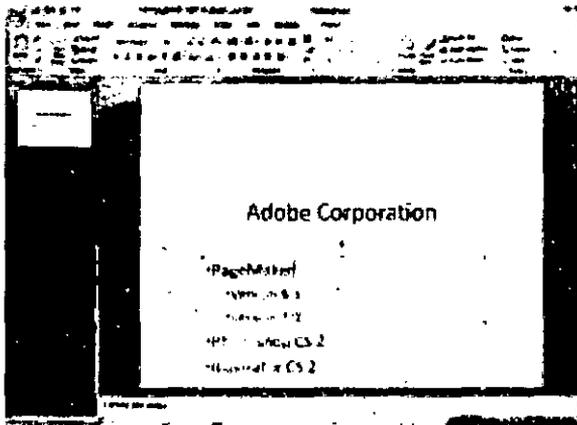
You can move up or down a particular heading for reorganizing. For this do the following:

1. Highlight the text you want to move.

2. With text highlighted drag the text up or down.

3. Leave the mouse button at the place where you feel like placing the text.

4. The text will be moved there.



Changing the Colour

The colour schemes are always used to suit the atmosphere. So it depends where the presentation is going to be. Depending upon that the colour of the presentations are selected.

To Change the Colours

1. Select Background Styles from Design menu.

2. Background dialog box appears, as shown next.

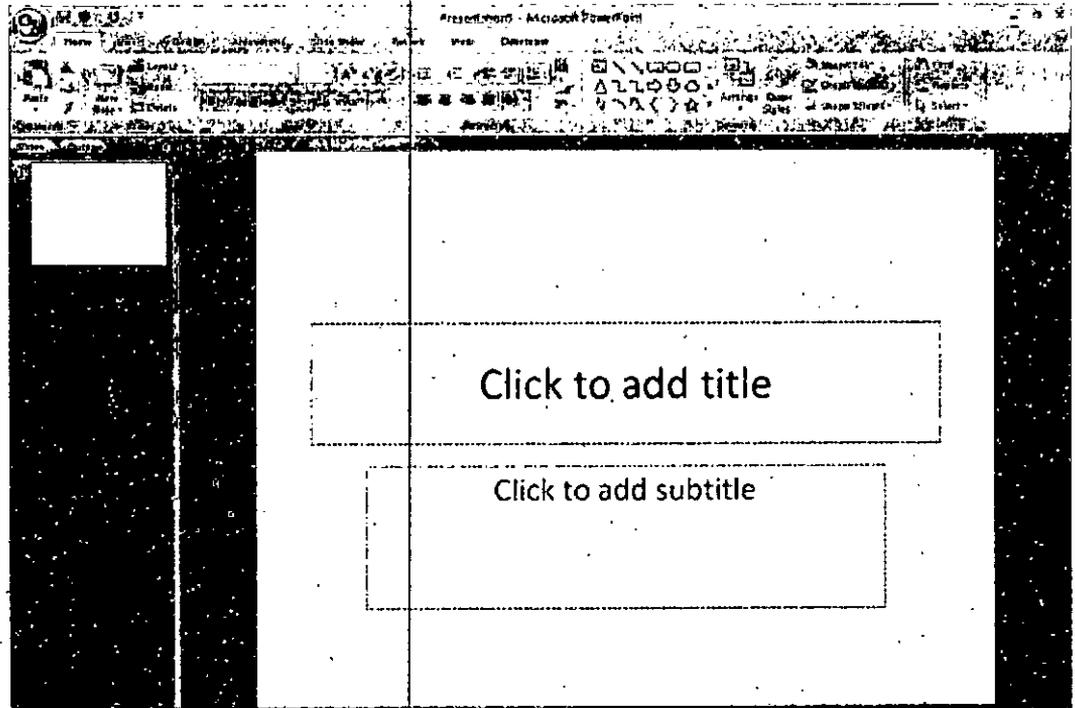
3. Select whether you want to Fill slide with colours or have a picture as the background.

4. Under Fill, select Gradient fill.

5. Click at Preset colors, it will show you the various options of gradients.

6. Select one of them.

NOTES



Slide Show view: It displays the presentation one slide at a time in sequence as an automatic slide show.

Notes Page view: It is available only from the view menu, lets you enter and edit speaker's notes for the presenter.

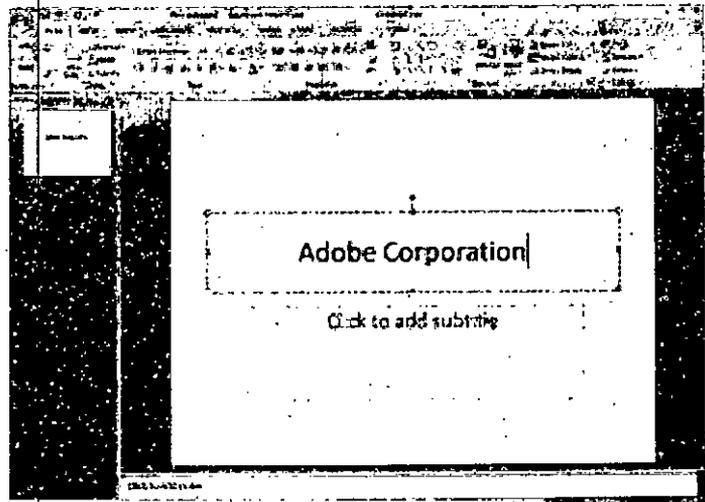
Points to Remember

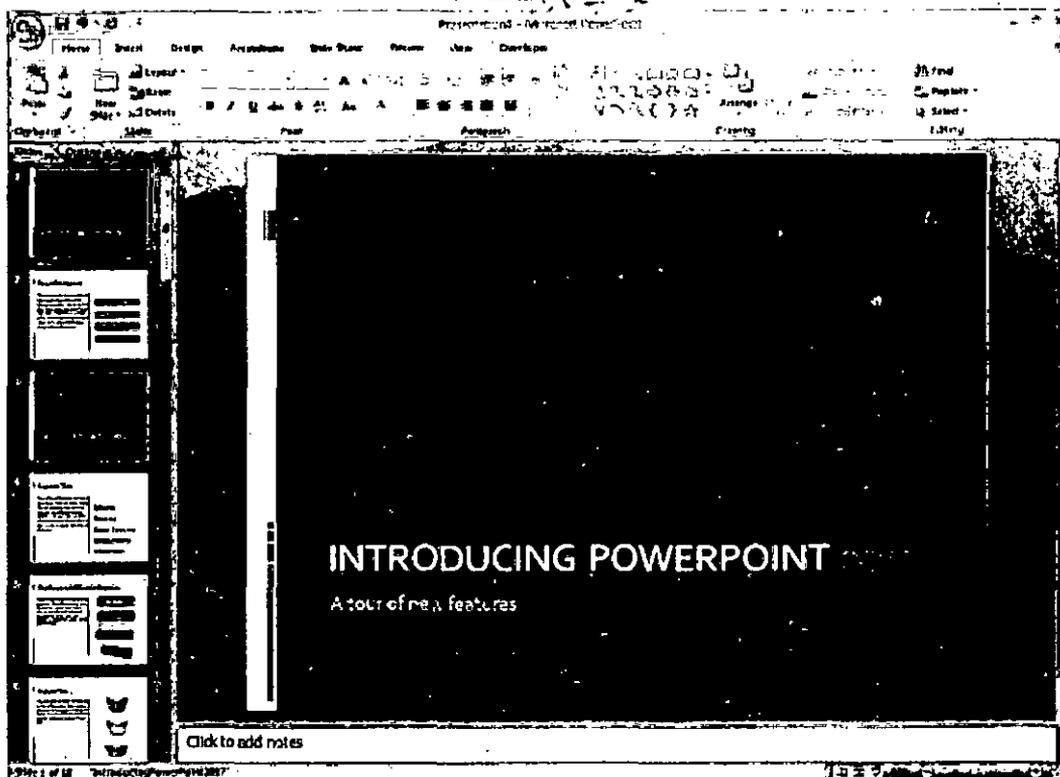
1. Each view shows a different aspect of the same presentation.
2. You can switch from one view to another at any time.
3. Right-click in Slide Sorter view or click the button at lower left corner of the current slide to display the Slide Show shortcut menu.

Entering the Text

Let us create another presentation which has more of text. Here, we will add the text as per the following:

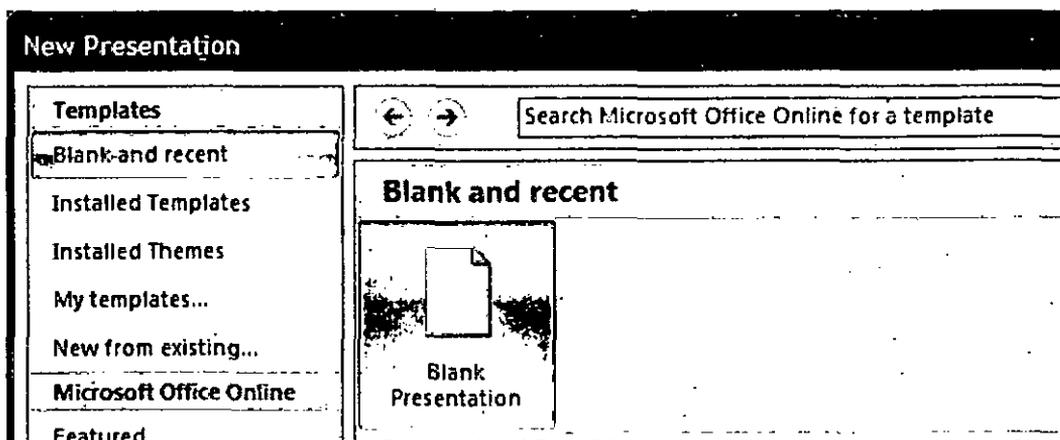
1. Create a new presentation which has only text in the slide.
2. Type the name Adobe Corporation in the title bar.
3. In the next box, type the name of the famous software of the company called PageMaker.





NOTES

3. A new slide is shown on the screen.



PowerPoint Views

There are different ways of looking at the presentations. These are called the views. There are as many as 5 different views in which you can see your presentation. They are:

Outline view: It displays only the text of the presentation in the outline form, allowing you to work easily with the content.

Normal view: It displays 3 panes that show the outline, the slide, and an area which you can enter speaker's notes.

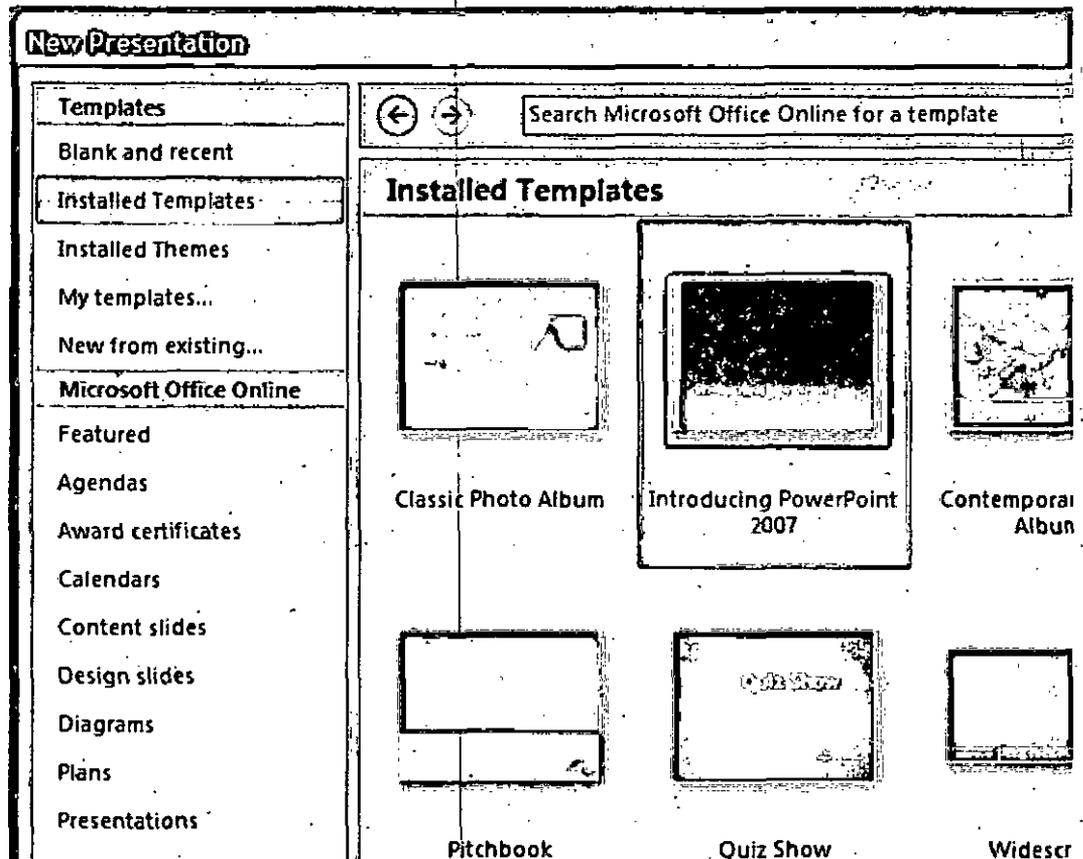
Slide Sorter view: It displays thumbnail views of your slides so that you can reorganize the slides and change the overall look of the presentation. In this view you can also add and edit the transition effects for the slide show.

2.13 PRESENTATION TOOLS

Most of the office 2007 software have ready made outputs called Templates. This is true in the case of PowerPoint 2007 too. Let us see how it can be used to create a presentation.

NOTES

1. Select New from the Office button.
2. Select Installed Themes and then select any one of the available templates. I have chosen Introduction to PowerPoint 2007.
3. Click at Create to start with the presentation.
4. The first slide with the Introduction to PowerPoint 2007 appears on the screen.
5. As you will that on the left panel 18 slides have been created and are thus numbered from 1 to 18.
6. You can see any one of them by just clicking at it. I am showing here the slide numbers 5, 9 and 18.



Creating a New Presentation

Another method of creating presentation is by using the option of New presentation using the Blank presentation option. You can select an option of text and graphics to make show on the screen.

1. Select New from the Office button.
2. Select Blank presentation and click Create.

number. For example, you would enter it as `C4:C9`. You could then copy formula that contained this reference anywhere on the worksheet and it would always refer to the range C4:C9.

Mixed references

References can also be partially relative and partially absolute. For example, `$C3` has an absolute column reference and a relative row reference and `C$3` has a relative column reference and an absolute row reference.

NOTES

Sum Function

The Sum function is perhaps the most commonly used of the Excel functions that carry out mathematical, statistical, financial, date, time, and other calculations:

1. Click the destination cell for the formula.
2. Type an equal sign to start the formula and then type the word SUM and a left parenthesis.
3. Drag down the column of numbers to sum.
4. Press Enter.

Points to Remember

1. You do not need to type the close (right) parenthesis before you press Enter—Excel will do it for you.
2. Use this technique instead of AutoSum to sum ranges of cells that contain blanks.

Average Function

You can use the Average function to calculate the average of values in cells.

1. Click the cell where you want to place the average function.
2. Type an equal sign (=) and then type the word AVERAGE and a left parenthesis.
3. Drag across the cells whose values you want to average.
4. Press Enter.
5. Blank cells are not counted in average.

B12 Σ fx =AVERAGE(B2:B9)						
	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9200.00	1380.00	7820.00	938.40	6881.60
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00
10		81200.00	12180.00	69020.00	8282.40	60737.60
11						
12		10150.00				

NOTES

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	TRUE	0.15	0.85	0.10	9.75
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00

For this perform the following steps.

1. Click at any entry in E and select to insert a column from Insert Menu.
2. Use the Cut, Paste and Format buttons to restore the entries now in E2:E9 to F2:F9.
3. Click at F2 and apply the formula

=IF(E2>1000, E2, 1000)

This means that you are asking the system to check if it is above 1000, One of the two possibilities will arise:

TRUE This means that the figure in cell is more than 1000, then the column will be replaced by the figure in **E2**, which means that it is not changed.

FALSE This means that the figure in the cell **E2** is less than 1000, then the second condition will be met, *i.e.*, figure in cell **F2** will be replaced with the figure of 1000.

Repeat this for all the other cells of column **F**. The easiest way out to repeat the formula in each column.

References

By default, Excel uses relative references in its formulae. Relative references refer to cells by their position in relation to the cell containing the formula. So when you copy the formula in cell F5 to cell F6, Excel changes the reference from E5 to E6.

Absolute references

When you don't want a reference to be copied as a relative reference, you need to use an absolute reference. Absolute references refer to cells by their fixed position in the worksheet. To make a reference absolute, you add dollar signs before its column letter and now

How the IF function works

In its simplest form, the IF function tests the value of a cell and does one thing if the test is positive (**TRUE**) and another if the test is negative (**FALSE**). It requires three arguments: the test data, the action to perform if the test is TRUE and the action to perform if the test is FALSE. You supply the arguments one after the other within the function's parentheses, separating them with commas (no spaces are to be given). The text which you want to appear as it is, *i.e.*, TRUE or FALSE should be given under quotes, reference of cells like **C5**, etc., should be as it is.

Apply this formula in cell **B6** and see the result:

1. Select cell B6, type the following in place of formula and press Enter:

= IF(B2=0, TRUE, FALSE)

Excel checks whether the value in cell B2 is zero (the test), and because it isn't zero, it ignores TRUE (the action to perform if the test is TRUE) and displays FALSE (the action to perform if the test is FALSE) in cell B6.

2. Double-click cell B6, change formula to

= IF(B2>1000, TRUE, FALSE)

and press Enter. The entry in cell B6 instantly changes from FALSE to TRUE because the value in cell B2 is greater than one thousand; that is, the test is TRUE.

Both the options can be seen next.

The screenshot shows the Microsoft Excel interface. The formula bar at the top displays the formula `=IF(B2=0, TRUE, FALSE)` in cell B6. Below the formula bar is a table with the following data:

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	FALSE	0.00	0.00	0.00	0.00
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00

Now this was very simple. Isn't it. However, you can also build tests that involve other functions. Suppose that in our Finance worksheet, we say that the Tax has to be a minimum of 1000, which means that if the Tax is less than 1000 it has to be put as 1000 and if it more than 1000, then the figure will stand as it is.

NOTES

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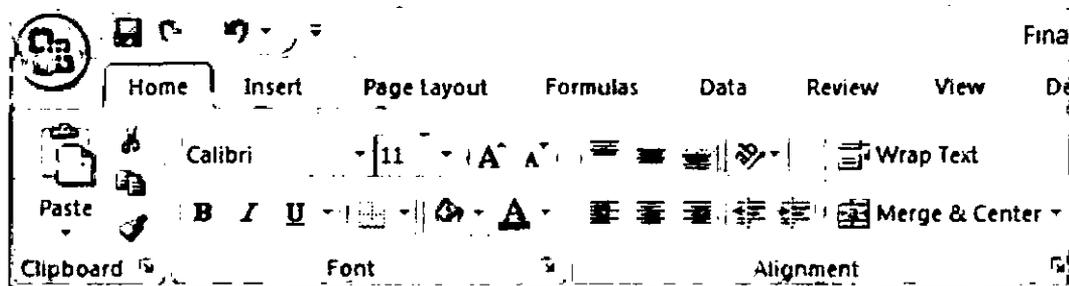
	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9200.00	1380.00	7820.00	938.40	6881.60
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00
10		81200.00	12180.00	69020.00	8282.40	60737.60

Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
1999	4500.00	675.00	3825.00	459.00	3366.00
2000	5500.00	825.00	4675.00	561.00	4114.00
2001	7000.00	1050.00	5950.00	714.00	5236.00
2002	8000.00	1200.00	6800.00	816.00	5984.00
2003	9200.00	1380.00	7820.00	938.40	6881.60
2004	12000.00	1800.00	10200.00	1224.00	8976.00
2005	15000.00	2250.00	12750.00	1530.00	11220.00
2006	20000.00	3000.00	17000.00	2040.00	14960.00
	81200.00	12180.00	69020.00	8282.40	60737.60

Copies: You can print number of copies of the worksheet and even collate the various pages of the worksheet.

Formulas That Make Decisions

There will be a time when you want Excel to carry out one task under certain circumstances and another task if those circumstances don't apply. If you are familiar with any programming language, it is the case of IF, WHEN or IF, THEN. You have a similar IF function in Excel.



NOTES

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9200.00	1380.00	7820.00	938.40	6881.60
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00
10		81200.00	12180.00	69020.00	8282.40	60737.60

Coming back to our worksheet. There are 3 things more to be done. Firstly, we will decorate it using the options available in Excel 2007. After seeing a preview of our worksheet and we will print it on our printer.

For decorating in Excel 2007, we have the command called Conditional Formatting, which is on the Home menu. It has various options which can be used. I have gone for the one which is of color scales and have applied one of them. See the result next.

You are free to choose any one of them and decorate your worksheet as you wish. As you move your mouse over the options the resultant effect on the worksheet is also shown, which helps you in making the decisions.

Now that you have to print it on your printer to see the final result. But, before that we would like to see its **Preview**. This command is part of the **Print** command which is available under the **Options button**.

The preview of the worksheet is shown next.

There are various other options in the print dialog box, shown above, alongwith the print preview of the worksheet.

Printer: You have to specify the various options of your printer. It is usually the printer installed in your Windows.

Print range: You specify whether you want to print the whole file or few selected pages.

Print what: You can choose to print a selected portion of the worksheet, or a full worksheet or even few selected worksheet.

Preview: As said earlier, this gives you the preview of the worksheet which you can see before printing.

NOTES

The screenshot shows the Microsoft Excel interface. The formula bar displays the formula $=SUM(B2:B9)$ for cell B10. The spreadsheet contains the following data:

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9000.00	1350.00	7650.00	918.00	6732.00
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00
10		81000.00				

The screenshot shows the Microsoft Excel interface. The formula bar displays the formula $=SUM(D10:E10)$ for cell F10. The spreadsheet contains the following data:

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9000.00	1350.00	7650.00	918.00	6732.00
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00
10		81000.00	12150.00	68850.00	8262.00	60588.00

Now if you apply this to the accounting department and assume that these figures relate to actual working of the finance department. Try changing the figures of one voucher and the poor accountant would have to sit probably the whole night to recalculate all the totals in the Balance Sheet. But, now with this kind of spreadsheet, this can be done in a flash.

Tax= (Profit x 12)/100

If we put this in Cell **E2**, it will become:

E2 = SUM(D2*12/100)

Let us apply this formula in **E2** and see what happens. It gives you the result as 459. Copying this formula to the other cells, i.e., from **E3** to **E9**, you can fill up the whole column and make the worksheet look like the one shown next.

The last column in this case is the "Profit After Tax", which can be calculated after subtracting "Tax" from the "Profit". This calculation I am not showing here, since I assume that you should be able to do this easily. However, your resultant worksheet should look like the one shown next.

You think the worksheet is complete. No. You still have to do the column totals without which the whole worksheet looks incomplete.

For this follow the following steps.

1. Click at cell B10 to get the total of figures from B2 to B9.
2. Now click at Σ symbol in the Home menu.
3. It will search for the numeric cells above and put the formula for the same and highlight the cells it has selected.
4. It will wait for your Ok in the form of Enter to put the result.
5. Press Enter to get the total in the cell B10, as shown below.

Similarly all the other columns can be summed up showing the result as shown next.

Now you can say that your worksheet is complete. But, supposing we want to make any change. This is done deliberately to show you the main advantage of Excel software.

Supposing, we change the figure of the year 2003 from 9,000 to 9,200, which we can assume that it was wrongly given to us or was a typing mistake. It is shown next. Try changing this figure in the cell **B6** and see the resultant effect.

What have you noticed? Well since all the figures are mostly inter-linked, if you change one figure all the relative figures change automatically. This is the main advantage of Excel or for that an electronic spreadsheet.

<div style="display: flex; justify-content: space-between; align-items: center;"> Paste B <i>I</i> <u>U</u> Merge & Center </div> <div style="display: flex; justify-content: space-between; align-items: center; border-top: 1px solid black;"> Clipboard Font Alignment </div>						
F2		fx =SUM(D2-E2)				
	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	3366.00
3	2000	5500.00	825.00	4675.00	561.00	4114.00
4	2001	7000.00	1050.00	5950.00	714.00	5236.00
5	2002	8000.00	1200.00	6800.00	816.00	5984.00
6	2003	9000.00	1350.00	7650.00	918.00	6732.00
7	2004	12000.00	1800.00	10200.00	1224.00	8976.00
8	2005	15000.00	2250.00	12750.00	1530.00	11220.00
9	2006	20000.00	3000.00	17000.00	2040.00	14960.00

NOTES

worksheet would look like the one shown below. These figures have been corrected to 2 places of decimals as was done in the earlier case.

Next in line is the column called Tax. This is as said earlier, 12% of the Profit. So this can be calculated as below:

NOTES

$$\text{Tax} = \frac{\text{Profit} \times 12}{100}$$

Transformed to the computer language it will become:

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00		
3	2000	5500.00	825.00	4675.00		
4	2001	7000.00	1050.00	5950.00		
5	2002	8000.00	1200.00	6800.00		
6	2003	9000.00	1350.00	7650.00		
7	2004	12000.00	1800.00	10200.00		
8	2005	15000.00	2250.00	12750.00		
9	2006	20000.00	3000.00	17000.00		

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500.00	675.00	3825.00	459.00	
3	2000	5500.00	825.00	4675.00	561.00	
4	2001	7000.00	1050.00	5950.00	714.00	
5	2002	8000.00	1200.00	6800.00	816.00	
6	2003	9000.00	1350.00	7650.00	918.00	
7	2004	12000.00	1800.00	10200.00	1224.00	

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500	675			
3	2000	5500	825			
4	2001	7000	1050			
5	2002	8000	1200			
6	2003	9000	1350			
7	2004	12000	1800			
8	2005	15000	2250			
9	2006	20000	3000			

NOTES

	A	B	C
1	Year	Total Income	Interest Paid
2	1999	4500.00	675.00
3	2000	5500.00	825.00
4	2001	7000.00	1050.00
5	2002	8000.00	1200.00
6	2003	9000.00	1350.00
7	2004	12000.00	1800.00
8	2005	15000.00	2250.00
9	2006	20000.00	3000.00

Microsoft Excel

Format Cells

Number

4500.00

- General: No specific format
- Number: 4500.00
- Currency: \$4,500.00
- Accounting: \$4,500.00
- Short Date: 4/26/1912
- Long Date: Friday, April 26, 1912
- Time: 4:00:00 AM

This will give you the figure for **D2**. Calculate it manually to make sure that the formula is right.

Now, as we had done in the earlier case of Interest Paid, we will copy the formula and paste it in other cell, as shown below. One by one you would be able to calculate all the figures of Profit and would be able to fill up the whole column **D**. After you have done so, your

NOTES

5. Next step now is to paste the formula in their respective cells.
6. Now click at cell C3 with the mouse (left button).
7. Click the right button again to get the dialog box.
8. This time click at Paste instead, as shown next.
9. Immediately you will get the figure in cell C3.

This calculation has been based on B3 (see the formula bar) and not B2 which had been copied in our formula. Is it not great? Excel has changed the cell address for you. This is called relative addressing and is a very useful feature of Excel.

10. Similar pasting in the cells from C4 to C9 can also be done.
11. Once done your worksheet should look like the one shown next.

	A	B	C
1	Year	Total Income	Interest Paid
2	1999	4500	6000
3	2000	5500	8000
4	2001	7000	
5	2002	8000	
6	2003	9000	

Remember

1. You can take out the dotted lines blinking around the cell C2 by pressing the Esc key. One look at the worksheet and you will notice that something is wrong. Some figures have no decimals and some have one. This does not look good. So what will you do? You will make them uniform. This is how:

1. Highlight all the cells from C2 to C9.
2. From the Home menu, click at General in Number panel.
3. Choose the category of Number to make all the cell data into 2 digits of numbers.
4. All your cells now have 2 places of decimals, as shown below.

Now that we have all the figures of Column **C** ready, we can proceed ahead to the next column, *i.e.*, **D**. This column has "Profit", which is nothing but the difference of "Income" and "Interest". So let us calculate that.

Click at cell **D2** and put the formula

=SUM(B2 - C2)

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500				
3	2000	5500				
4	2001	7000				
5	2002	8000				
6	2003	9000				
7	2004	12000				
8	2005	15000				
9	2006	20000				

NOTES

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax
2	1999	4500	675			
3	2000	5500				
4	2001	7000				

3. You will get a dialog box, as shown below, which has various commands at your disposal.

4. Choose copy, as shown here, to copy the formula.

	A	B	C
1	Year	Total Income	Interest Paid
2	1999	4500	675
3	2000	5500	
4	2001	7000	

any other software. Now all you have to do it to give it a name and decide where you want to save this worksheet. Let us give the name **Finance** to it.

Now we come to the interesting part of this worksheet. So far we have typed whatever was available. Now we have to generate the figures. The column **C** is of Interest Paid which is to be calculated by using the formula.

NOTES

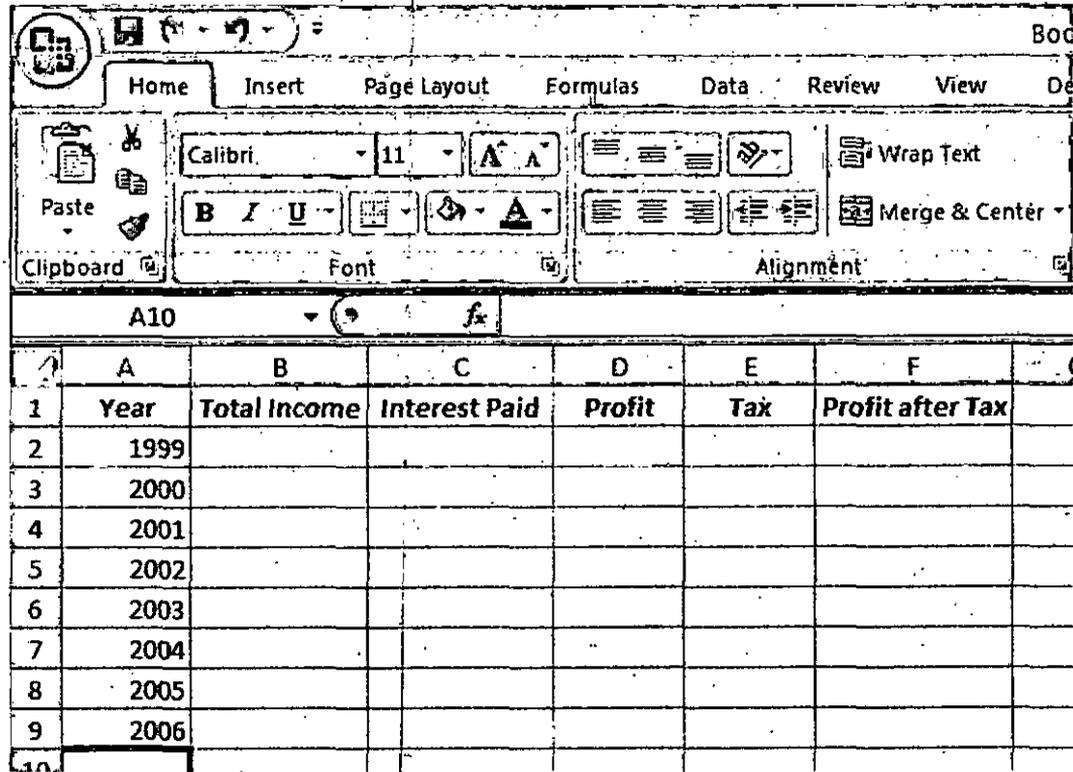
$$\text{Interest Paid} = \frac{\text{Total Income} \times 15}{100}$$

Transformed to the computer language it will become:

$$\text{Interest Paid} = (\text{Total Income} \times 15) / 100$$

If we put this in Cell **C2**, it will become:

$$\mathbf{C2 = SUM(B2*15/100)}$$



Try putting this in the cell **C2** and see the result. It will be as shown below. It has given a figure of 675. Calculate the amount manually to see whether the result is Ok or not. It is correct, isn't it? Now we have to apply this formula to all the cells from **C3** to **C9**. Do you have to put the formula for each cell or there is a method in Excel which allows you to copy the formula in each of the cell.

Well, fortunately there is. So this is how you will do it.

Copying Formula

1. Click at cell **C2** to have the formula displayed in the formula bar.
2. Now with your mouse having clicked at cell **C2**, press the right button of the mouse.

Home Insert Page Layout Formulas Data Review View De

Clipboard Font Alignment

Calibri 11 A A

Paste B I U Merge & Center

C8 fx

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax

NOTES

So now we have the headings ready. It was not very difficult, was it? Now all we have is the numeric data. Let us type them too. First of all we will type the various years.

By using the arrow keys, reach the cell **A2**. This is here that we have to type the first year, i.e., **1992**. Type it and press **Enter** to see the data getting aligned to the right. Remember, Excel aligns the numeric data to the right as a default. By pressing **Enter** you must have reached **A3** and this is where you wanted to be for typing the next year, i.e., **1993**.

Home Insert Page Layout Formulas Data Review View De

Clipboard Font Alignment

Calibri 11 A A

Paste B I U Merge & Center

E6 fx

	A	B	C	D	E	F
1	Year	Total Income	Interest Paid	Profit	Tax	Profit after Tax

So now type one year and press **Enter** to reach the next cell for typing the next year, till you reach the last year, i.e., **1999**. At this stage your worksheet will look like the one shown on the next page. Next step is also easy. You have to just type the numbers in the cells **B2** to **B9**. All these figures are available with you. Just type one figure and press **Enter** to reach the next cell and so on till you reach the last cell in the column. After doing this your worksheet will look like the one shown next.

It would not be a bad idea to save this worksheet at this stage. For god forbid, if something happens, like power cut or so. So just press **Ctrl+S** to give the save command, as you would give in

Save As

Save in:

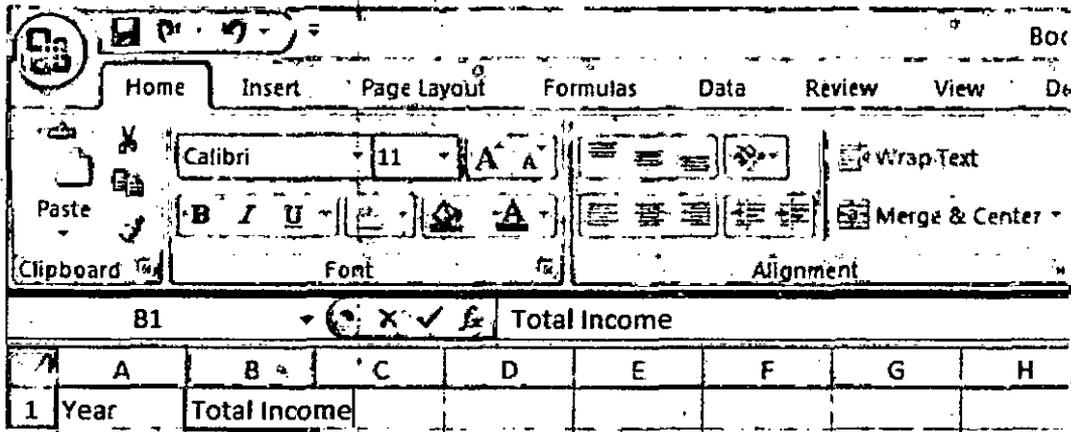
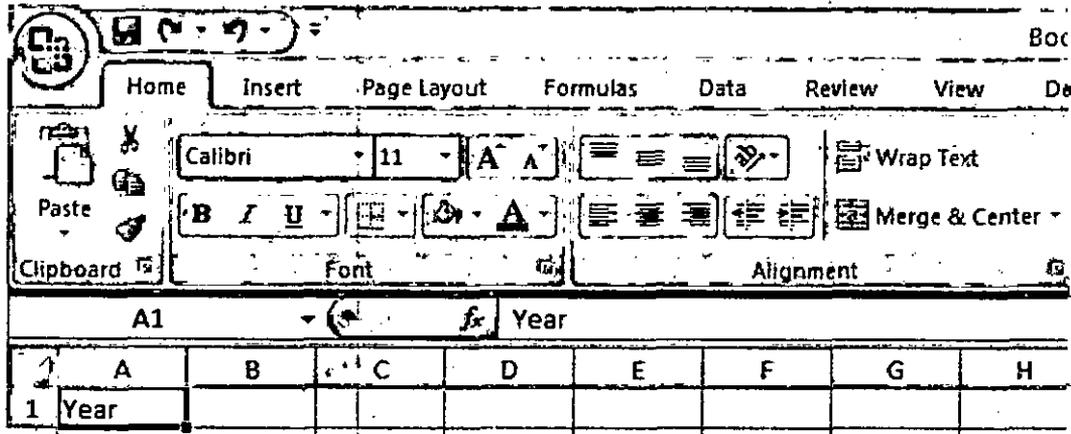
- My Recent Documents
- Desktop
- My Documents
- My Computer
- My Network Places

- My Documents
- Bluetooth
- Conal User Files
- CyberLink
- ICA SPORTS (TM) Cricket 07
- IFA 07
- GTA Vice City User Files
- My Data Sources
- My eBooks
- My Music
- My Pictures
- OneNote Workbooks
- Tiger Woods PGA TOUR 2003
- UEFA EURO 2004
- Walmart

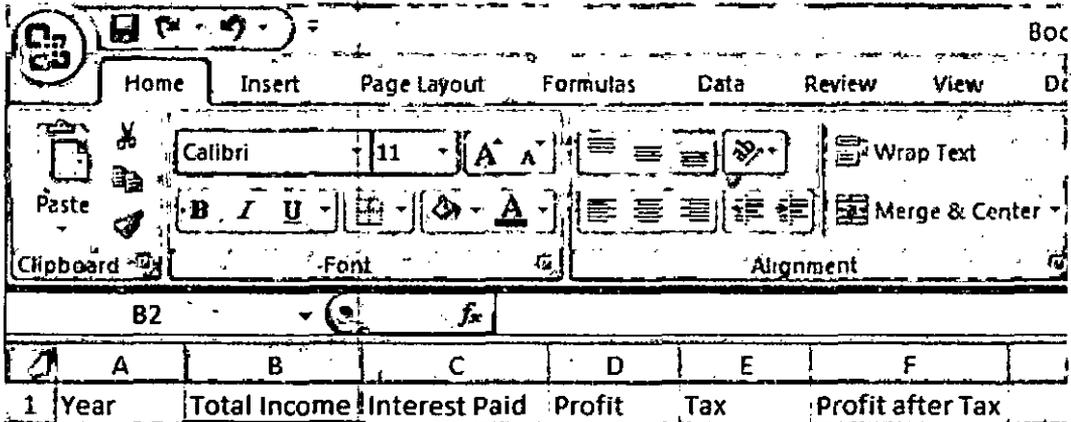
File name: France

Save as type: Excel Workbook

NOTES



This way now we will type the complete headings, *i.e.*, all of them, as shown next.



But, since these are headings, and are to be highlighted. We will make them **Bold** and put them in the centre of the cells. This way they will look good.

Highlight all the cells by just clicking at cell **A1** and then while pressing **Shift** key click mouse in the cell **F1**, the whole row gets highlighted.

Now click at B in the formatting bar to make the whole text as Bold.

With the text in the cells remaining highlighted, click at  in the alignment panel of Home menu. This will make the text in the cells centralized in all the cells. This is shown in the figure shown next.

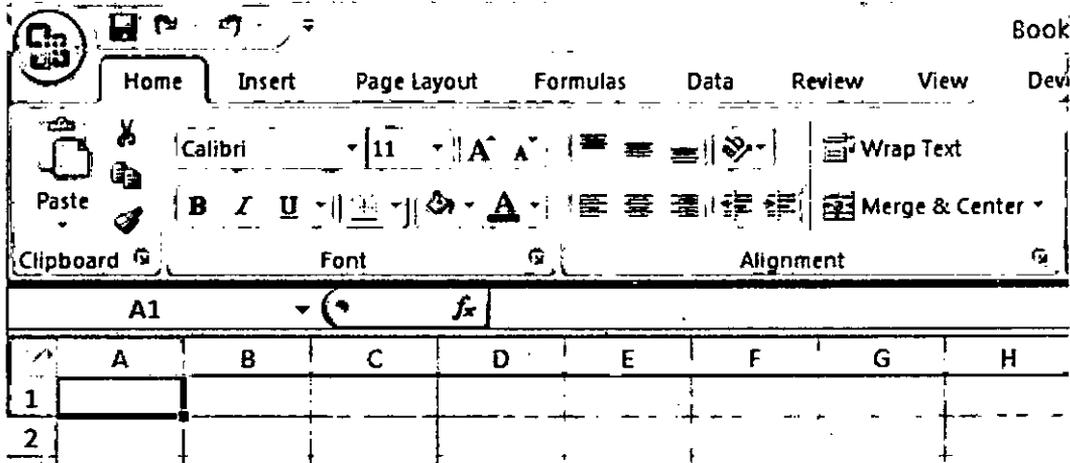
they work out. Supposing we have the financial highlights of a company as given below:

Year	Total Income (A)	Interest Paid (B)	Profit (C)	Tax (D)	Profit After Tax (E)
1999	4,500	To be	To be	To be	To be
2000	5,500	Calculated	Calculated	Calculated	Calculated
2001	7,000	as 15%	as Income	as 12% of	as Profit
2002	8,000	of the	minus	the Profit	minus Tax
2003	9,000	Total	Interest		(C) – (D)
2004	12,000	Income	(A) – (B)		
2005	15,000				
2006	20,000				

NOTES

As you can see that there are quite a number of fields which have to be calculated. This will act as a good exercise for you to do. Let us start from the very beginning, *i.e.*, start the software Microsoft Excel 2003. You will end up with a blank worksheet, ready for you to take action, with the first cell **A1**, totally at your command to do something, as shown in the figure below.

So what we have to do here. We have to type "Year". So just type the word Year and press



Enter. You will see the word being shown in the formula bar too. This will also take you to the cell **A2**. But, for typing the next heading, you have to go to the cell **B1**. So use the arrow keys right and up to reach **B1**.

Next we have to type "Total Income". (Please note that for the sake of convenience I had shown this heading in 2 lines, but, if permitted we will type it in one line. Also (A), (B), etc., in the table are just symbolic and are not to be typed).

So for type the next heading, "Total Income" in the cell **B1**, as shown next.

Did you notice anything wrong here? Well, the cell is not big enough to carry your heading. So what will we do? We will increase the width of the column **B**, by using one of the methods mentioned earlier in the chapter, *i.e.*, by using the Cells command under Tools.

- Rows** These are the horizontal cells which can contain any information.
- Columns** These are vertical cells which can also contain information.
- Cell** It is the interaction of a row with a column. Each cell is identified with its position.

NOTES

Naming Conventions

It is not that I have named rows from 1 onwards and columns A onwards on my own but they are so numbered by the software itself. These are the standard way of expressing these columns and rows.

If we have to name a large number of cell or columns, for that too we have the convention which asks us to call them with starting cell address and last cell address with colon in between. For example, see the following addressed cells, shown below.

	A	B	C	D	E
1					
2					
3					
4					

C1:D3

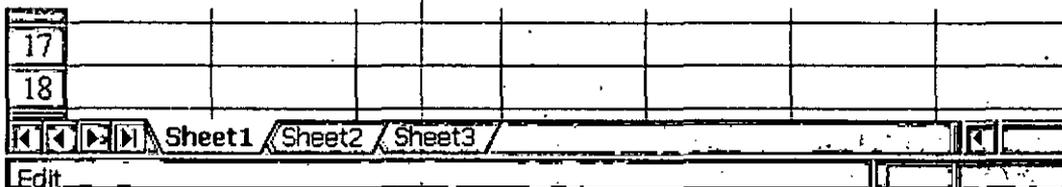
A4:E5

Another convention is of the sheets in the worksheet.

Sheets

These are like pages in a book. Initially there are 16 worksheets in the file. But, you can add more. However, there may be only 6 of them visible on the screen. These sheets are independent but you can transfer data from one sheet to another. These sheets are very helpful. For example, for a salary spreadsheet, one sheet may belong to one month and there may be a sheet for the total of the year.

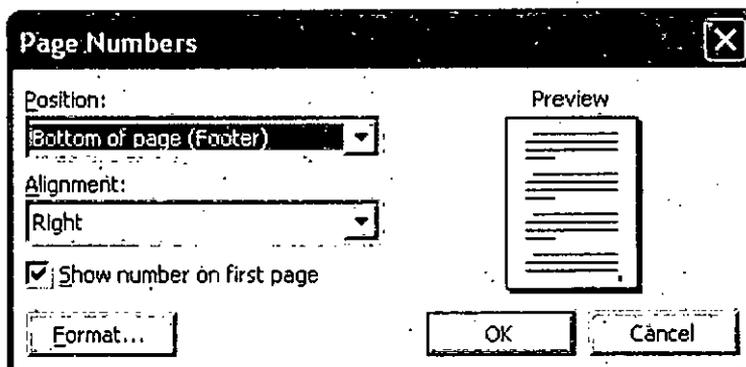
To understand the software better, let us create a worksheet in Excel 2007 and apply the various options/commands on it to see the working of the software. This will give you an idea about creating a worksheet and applying the commands.



CREATING A WORKSHEET IN EXCEL 2007

We have learnt quite a number of commands and naturally would like to use them in a worksheet. So let us create a worksheet and use these commands side-by-side to see how

1. Click the Insert menu and select Page Numbers to open the Page Numbers dialog box.



2. From the Position drop-down list, select the position on the page

where you want your page numbers to appear. The options are:

Top of the Page (Header)

Bottom of the Page (Footer)

3. From the alignment drop-down list, select Left, Center, or Right to specify the horizontal position of the page number in relation to the right or left margins.

4. If you want the page number to appear on the first page, Show number on first page to place check mark there. Deselecting this option creates a separate header or footer for the first page.

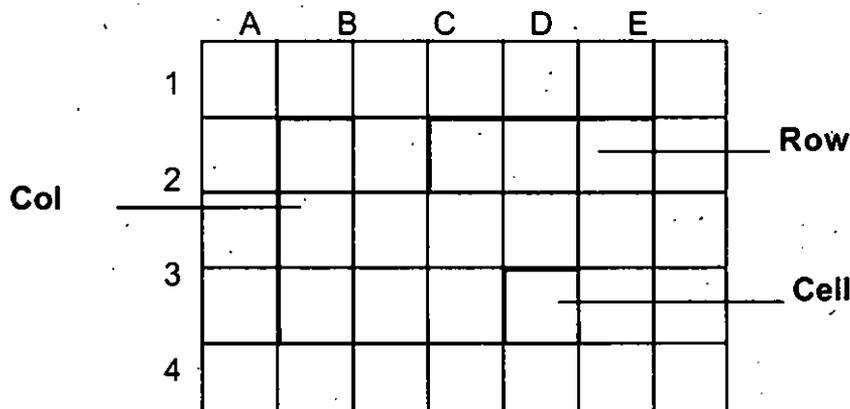
5. Click Ok.

When you insert a page number, Word automatically switches you to Print Layout view so you can scroll to the portion of the page where the page number appears to check its appearance.

2.12 SPREADSHEET

Before we go into understanding the various commands of Excel, let us first understand the working of a spreadsheet. A spreadsheet as the name suggests is a sheet which is spread in such a way that it divides itself into the various horizontal rows and vertical columns. Rows are numbered from 1 onwards and Columns are numbered from A onwards. Graphically they can be represented as:

When we take this to the computer and see it electronically using our software Excel, this becomes Electronic Spreadsheet, also called Worksheet. The main features of the worksheets are:



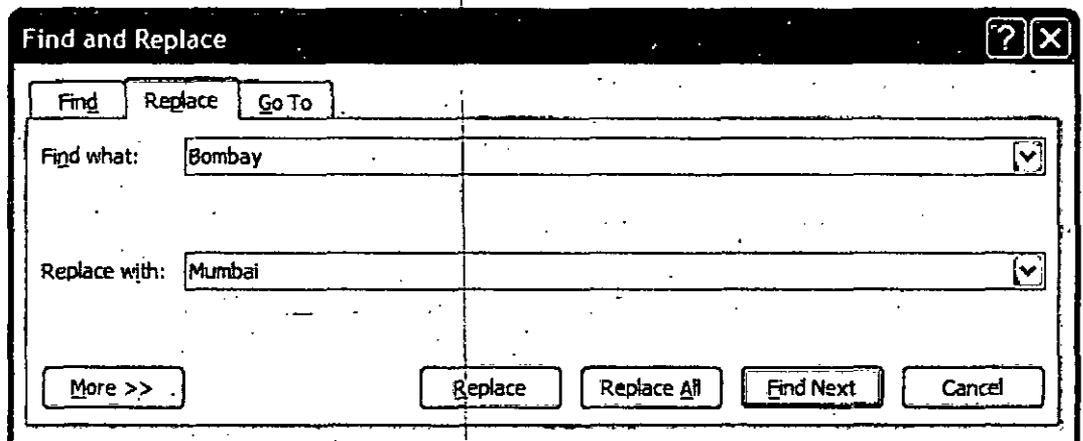
Replace Text

Next step after finding the required text is to replace it with some other text. For this we would call the command called Replace. To get the replace command click at Replace in the Home menu.

NOTES

Now on the Find and Replace dialog box click at the Replace panel and do the following:

1. Type the text you want to replace in the Find What text box (in this case, *Bombay*). You can leave this field blank if you have to search for a formatting only. However, you have to search for something.
2. Type the text you want to replace it with in the Replace With text box (in this case, *Mumbai*). If you search for text and leave this field blank, you are in effect telling Word to delete all instances of the search strings, because they would be replaced by a blank.
3. Choose the More button (if necessary) to specify search options.
4. Choose Find Next to locate and highlight the first occurrence of text that matches your search string.
5. Then do one of the following:
 - Choose Replace to replace the text matching the search string with the replacement text and then locate the next occurrence of the search string in your document.
 - Choose Find Next to leave the text matching the search string unchanged and to locate the next occurrence of the search string.
 - Choose Replace All to replace text in the entire document that matches the search string with the replacement text.



6. Choose Cancel. Alternatively, press Esc to close the Find and Replace dialog box and return to your document.

When Word has finished searching through the document and has replaced all occurrences of the search text or can't find any further occurrences, a message box appears. Click Ok to return to your document.

Page Numbering

Printed documents longer than one page should have page numbers. You can set up page numbering in two ways. Either insert a page number code while editing headers and footers, or insert page numbers from the Insert menu. Both methods insert a page number code in your documents' header or footer, but there are two differences.

Formatting: Font formatting options, such as underlining and bold, that are not necessarily associated with words or text.

Styles: Find all instances of a named style or replace one named style with another.

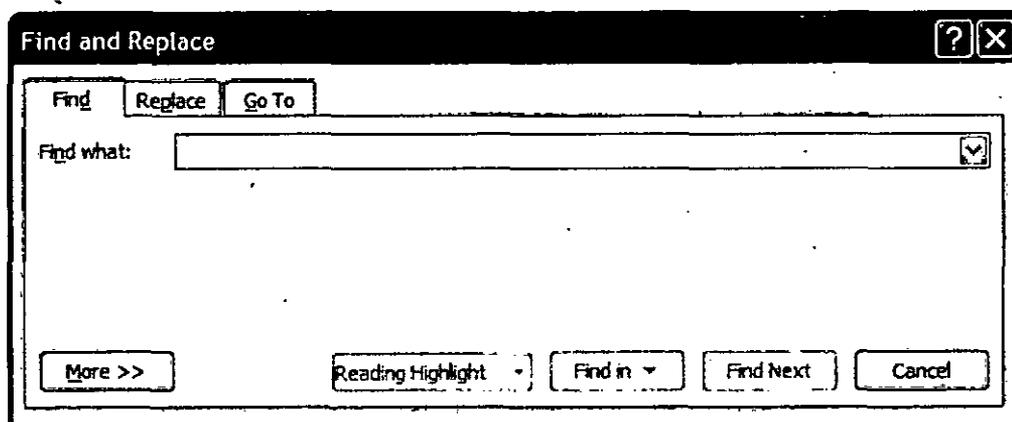
Special characters: Tab markers, forced line breaks, non-breaking spaces, non-breaking hyphens, whitespace, and so on.

This command is actually divided into 2 parts, Find and Replace. Let us see how the find command works first.

Find

This command will find for you the exact text which is mentioned in its box and will stop for further action. Normally the finding of the text starts from the position where the cursor is. If you have selected some text, the finding will be restricted to that block of text only. So if you have to select the entire text, then it is advised to put the cursor at the beginning of the text in the document.

To start the Find command, click at Find in the Home menu.



Find and Replace dialog box, as shown here will appear.

This is how you will use the Find command.

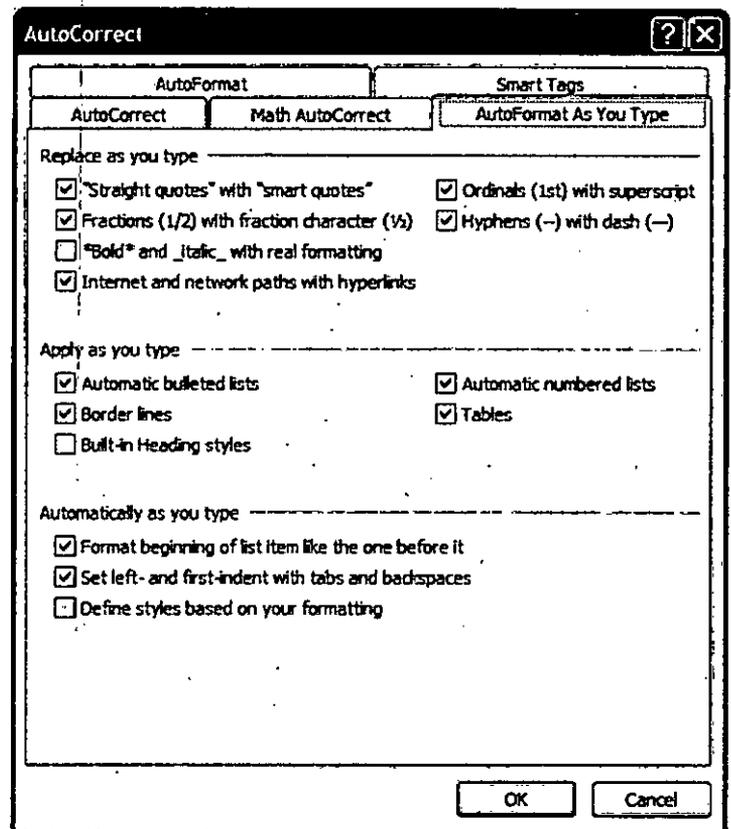
1. Type the text that you are seeking in the Find What? text box. This word or phrase is also referred to as the search string.
2. Choose the More button (if necessary) to specify search options.
3. Choose Find Next. Find looks through the document for text that matches your search strings. When it finds matching text, Word highlights the text in the document and stops. The Find and Replace dialog box remains on screen.
4. Choose Find Next if you want to continue the search for another instance of the search string. Click Cancel or press Esc to close the dialog box and return to the document. The text in the document is still highlighted.

When Word finishes the entire document, or if it could not find the search string in the document, a dialog box displays a message to that effect. Choose Ok to continue working in the document.

NOTES

NOTES

2. From the Office button, select Word Options followed by Proofing options. From here click at AutoCorrect options to get the dialog box.
3. Click AutoFormat.
4. Click AutoFormat and Review Each Change if you want the opportunity to accept or reject each change proposed by Word.
5. Choose the type of document you have created in the drop-down list labelled Please Select a Document Type to Help Improve the Formatting Process. This helps Word to AutoFormat the document properly.
6. If you want to limit the types of formatting Word does, choose the Options button to display the AutoFormat panel of the AutoCorrect dialog box. Make your selections and then click Ok to return to the AutoFormat dialog box.
7. Click Ok to begin the AutoFormat process.



If you choose AutoFormat Now, Word 2007 formats the document, and that's that. If you choose AutoFormat and Review Each Change, Word 2007 formats the document and then presents a new AutoFormat dialog box. This version of the document looks very different from the first version.

Find and Replace

Supposing you had prepared a thesis on the working of middle level managers in the city of Bombay. Naturally the word Bombay must have come in it quite a number of times. Then you hear that the Government of that State has decided to change the name of city from **Bombay** to **Mumbai**. What will you do? Will you be able to locate each occurrence of Bombay and physically change it to Mumbai? No! For this Word 2007 has an excellent option called Find and Replace. Once you give this command, Word 2007 will automatically search for Bombay and replace it with Mumbai.

You can use Find and Replace to do the following:

Text strings: Either strings of text embedded in words, or discrete words or whole phrases.

Text strings with formatting: Strings of text that are formatted a particular way, such as Bold.

3. From the Office button, select Word Options and AutoCorrect AutoCorrect. The AutoCorrect dialog box appears.
4. In the Replace text box, type a name for the AutoCorrect entry (an abbreviation, or the entire word or phrase).
5. Click Formatted Text.
6. To save the entry and close the dialog box, click Add.

NOTES

Here you have an option for Math AutoCorrect tool, which allows you to create mathematical characters, by just writing the english word for it.

AutoFormat

Word 2007 has automated a lot of small, tedious chores that we had to do manually in older word processing programs. Many of these are formatting chores, and Word collects them under the term AutoFormat. You can control what formatting chores Word 2007 performs automatically in the AutoFormat panels of the AutoCorrect dialog box. The benefit of using AutoFormat is that you can concentrate more on the content of your document and less on the details of formatting.

AutoFormat works on two different ways—as you type or on command.

AutoFormat as You Type

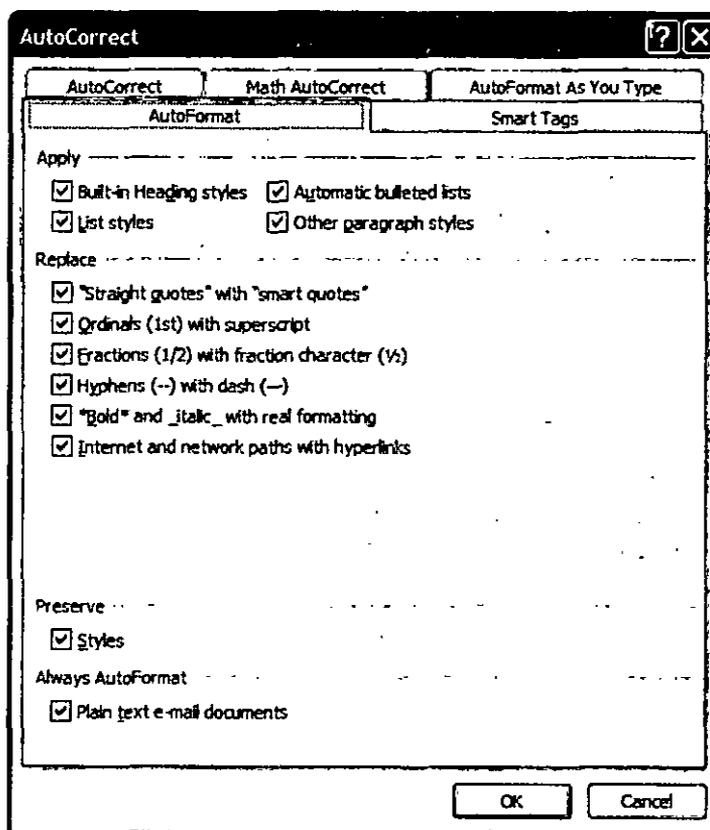
Automatically formats headings, bulleted and numbered lists, borders, numbers, symbols, and so on, as you type.

AutoFormat on Command

Automatically formats selected text or the entire document in one pass. You don't have to do anything to activate AutoFormat. By default, AutoFormat as You Type is enabled—you just enter text and Word formats it as you go. You can change the default to AutoFormat on Command, which allows you to manually run AutoFormat. This is similar to the way in which you can spell check a document—as you type, or manually, using the menu commands or toolbar icons.

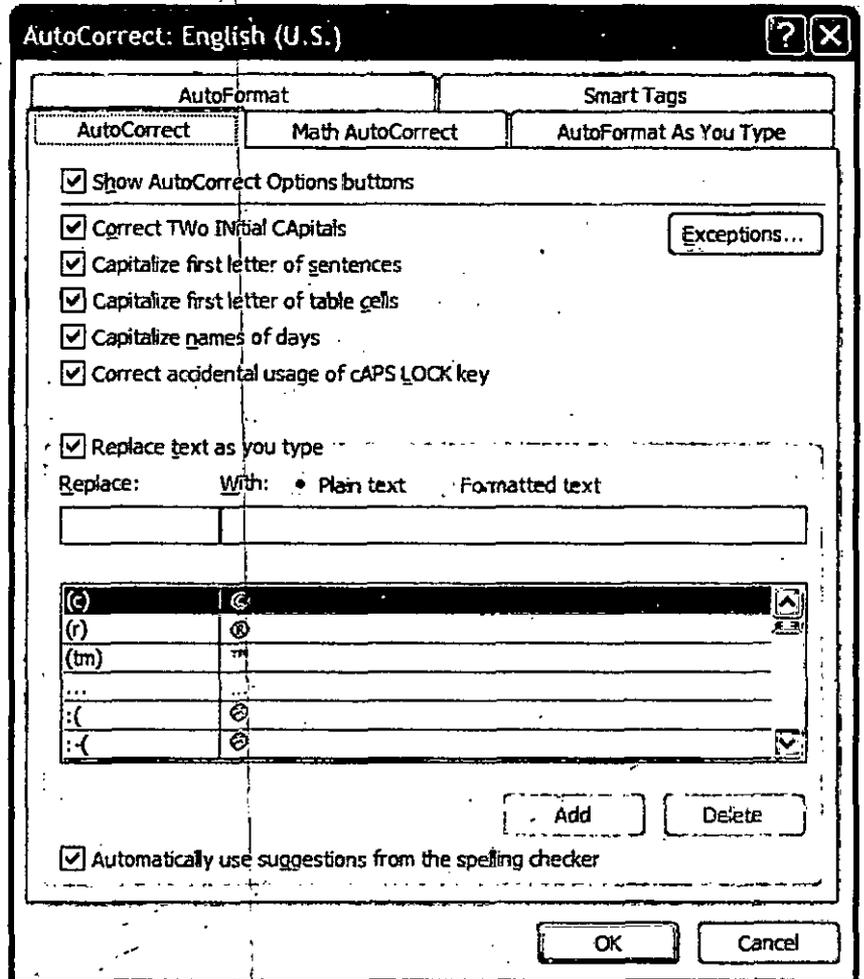
AutoFormatting Text

1. To AutoFormat a block of text, select it. To AutoFormat the entire document, make sure that no text is selected.



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also useful tool for applying formatting options. In a business letter, for example, you might want your company name to always appear in a certain font and size, regardless of the font you are using for the letter. By creating an AutoCorrect entry of your company name with formatting options, you eliminate the need to format while you type, or to run search and replace when you are finished with the letter.



Add AutoCorrect Entries Without Formatting

1. From the Office button, select Word Options, and then AutoCorrect options.
2. Click Replace Text as You Type to place a check mark there, if it isn't already checked.
3. In the replace box, enter the text you want AutoCorrect to automatically replace for you, such as your initials or a word you commonly misspell.
4. Click Plain Text if it is not selected to insert text without formatting options.
5. Choose Add. If the text in the Replace box is already listed, choose Replace to replace the existing replacement text with the text you entered in the With box.
6. Click Ok.

Text your new AutoCorrect entry by typing the word in a document and pressing the Spacebar.

Add New AutoCorrect Entries with Formatting

1. Type the text in your document and format it.
2. Select the text. To store paragraph formatting with your entry, include the paragraph mark at the end of the text, in your selection.

Options: This will lead to the print options, already described under **Options** and select the option of your choice.

Once you are sure that you have selected all the options required by you, just click Ok to for document to start printing. However, do not forget to have the Printer ON before giving the final print command.

Editing the Document

Now that you have printed the document, you may want to either correct few words which you have realized that they do not look good in the letter. Even otherwise you may want to enhance the overall look of the letter. Besides this you would also learn how to do the tailor's job, *i.e.*, Cut, Copy and Paste. There are other options too which may not be used in this letter but are quite useful overall for editing. Let us start with the proofing tools.

Editing Tools

Many editing functions are performed on selected text, such as cut, copy, move, and delete. There are various tools provided by Word to help you edit text:

Cut, Copy: Cutting and copying items places them on the Clipboard and you can paste these items anywhere in the document, wherever required. These items can be text, graphics, tables and any other object which is there in the word document. Cut and Copy can be performed using mouse and key strokes.

Paste: It is the command used to paste whatever is available on the Clipboard to paste it in the document. This is also done by the use of mouse and key strokes.

Move: It is an action associated with the mouse. However, if you cut and paste from one place to another, it can also be called move.

Insert Mode: It is the feature that adjusts spacing when you add new text to the document.

Overtyping Mode: This option replaces the existing text with your new text.

Delete: It is an action you should reserve for text you want to permanently remove. Deleted text is not placed in the Clipboard. You can delete text with either mouse or key strokes.

Undo and Redo: Using these commands you can reverse the tasks performed earlier.

All these commands are available on the toolbar in the Home menu. For either cutting or copying, you have to highlight the part of the text on which you want to perform this operation. All these commands have their keyboard strokes associated with them too. Let us now learn few options of Word 2007 which help us in correcting our document with minimum efforts.

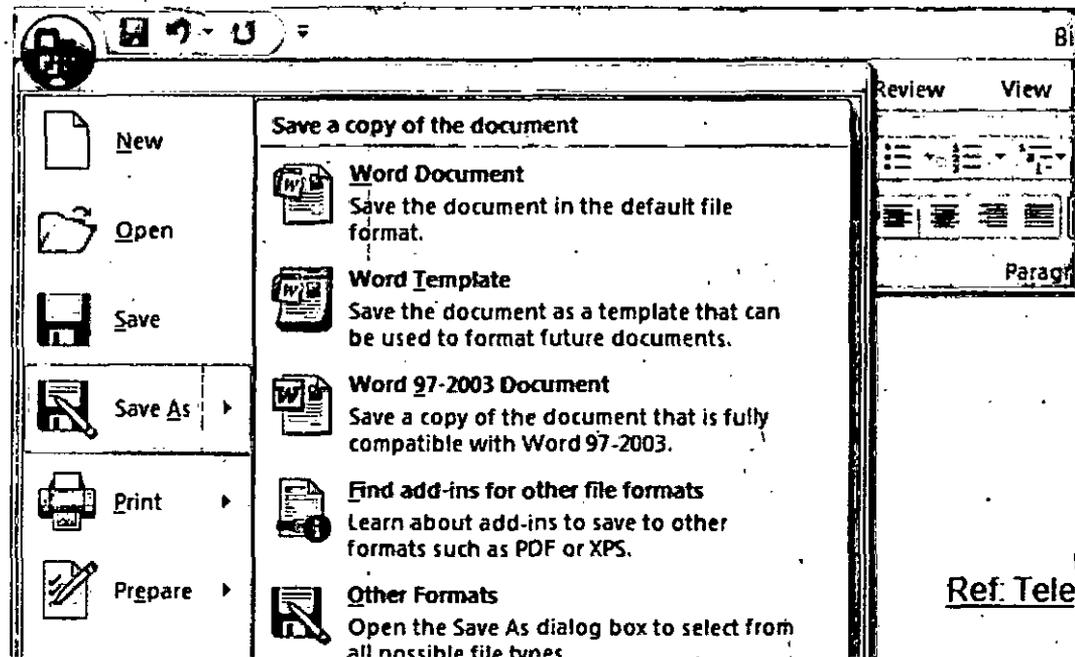
AutoCorrect

It is a handy feature of Word 2007 which automatically corrects common typing, capitalization, and spelling errors for you, as you type. It also enables you to type shortcuts that AutoCorrect replaces with the full text, such as typing BOMBAY and having AutoCorrect replace it with MUMBAI. This has been necessitated due to the fact that the name of the city has been changed as thus. Although Word 2007 has a number of default AutoCorrect entries, you can add your own common misspellings and shortcuts.

It only checks whole words, so if you type TEH, Word won't replace it with THE until your press the spacebar, period, or some other key that indicates that the word is complete. It is

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Template, Word 97-2003 Document, Find add-ins for other file formats, and Other Formats. These are self-explanatory.

Printing Your Document

As mentioned earlier, no document preparation process is complete without printing it. For this we have the Print option under the File menu.

Once clicked it gives rise to a dialog box as shown here. The various options, which can differ depending upon the printer, which you are working on, of the dialog box are as follows:

Printer Select the printer to which you want to send the printing. From the drop-down list, you can select one of the many printers which you may have installed under Windows.

Properties Clicking at it would lead to a dialog box having the properties of the selected printer. If some adjustments are to be made in the properties of the selected printer, they can be done here.

Print to file Sometimes it is possible that you may like to print the document to the printer which is not installed in your computer. In this case you will select this option and create a print file for that particular printer and copy the file and then print on that printer where it is installed.

Print range: You may like to print few selective pages instead of printing the whole document. So either click **All**, for printing all pages of the document or **Pages**, for defining the pages you want to print. You can even print the current page, *i.e.*, page on the screen.

Copies: Word 2007 allows you to print multiple copies of the pages in the document. You can mention here the number of copies you want. What's more you can have the copies collated for you, if you select the **collate** option.

Print what: Various options available here are Document, Document properties, Comments, Styles, AutoText entries, Key assignments. But, most of the time you would be printing with Document option.

Print: You have the option of printing all pages or all **odd pages** or all **even pages**.

Zoom: Pages per sheet allows you to print 1 to 16 pages of the document on one sheet. Scaling allows you to scale your document to the various sizes of the paper.

- In the Preview box, click the individual border lines or use the border line buttons to apply or remove borders or change the attributes of a particular border (select the attributes first and then add the border).
 - From the Apply To drop-down list, select whether to apply the border to just the selected text or to the whole paragraph(s).
4. Select Shading to choose shading options.
- Under Fill, select the colour or shade of gray with which you want to fill the selection. Click More Colors to see a larger selection of colours.
 - From the Patterns Style drop-down list, choose a shading percentage for the colour you selected under Fill or a pattern of lines such as Lt Horizontal or Dk Trellis.
 - If you selected a pattern of lines, select the Color of the lines from the drop-down list. The Fill colour then becomes the background colour for the pattern.
 - From the Apply To drop-down list select whether to apply the shading options to just the selected text or to the whole paragraph(s).
5. Click Ok.

You can use all these options of Borders and Shading from the Tables and Border toolbar, which can be called from toolbar options.

This will allow you to select shading colours, border line styles, border line colours, and border line widths, etc.

Following are the button on the toolbar that apply to borders and shading.

<i>Button</i>	<i>Description</i>
Line Style	Sets the style of the border lines (dotted, dashed, wavy, double, and so on)
Line Weight	Sets the thickness of the border lines
Border Color	Sets the colour of the border lines
Borders	Specifies where the border appears (top, bottom, left, right, or box)
Shading Color	Sets the colour of the background shading for the paragraph (you cannot specify the percentage)

Since our letter is a formal one, we would not like to use any of these decorations. They have been told here so that they can be used at a later stage in another document.

Now that our letter is final. What we would do now is that we will close the file and then reopen and finally print. This is deliberately done so as to learn the concept of closing and opening of the file. If you want you can print the file as it is.

Closing of the File

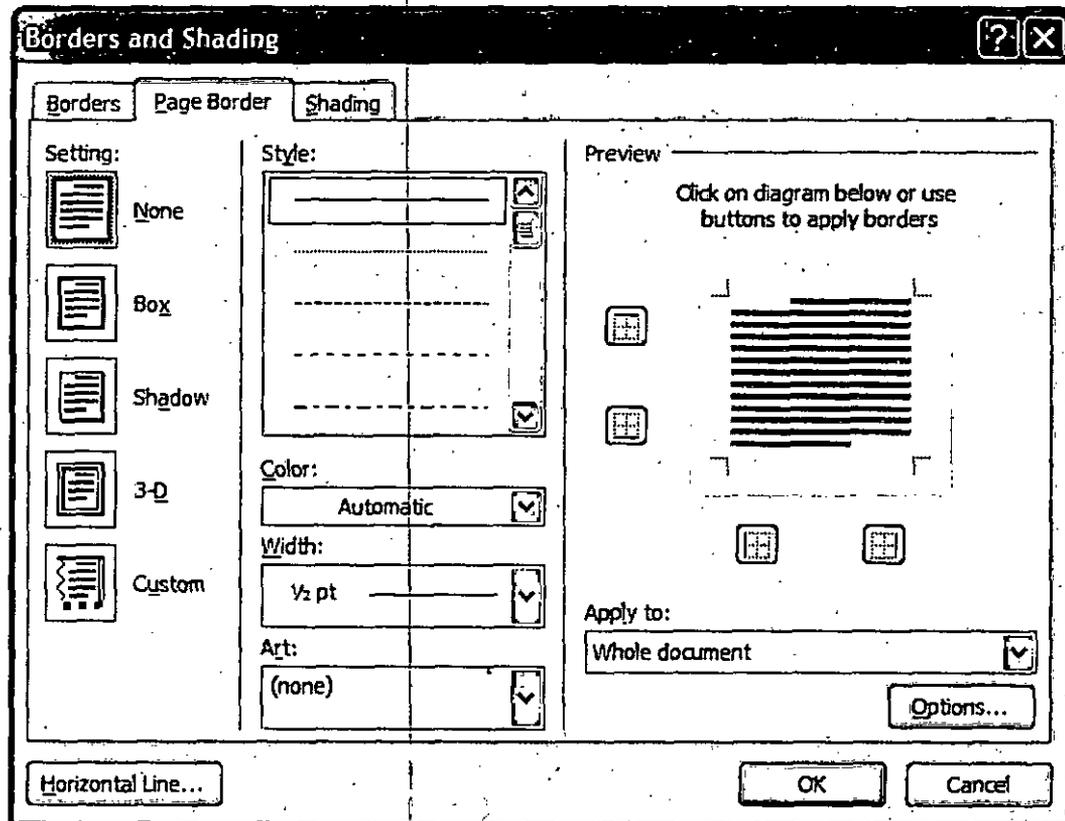
As you would have noticed that there is no Close command in File menu. All you have to do is close the file using the  button on the extreme right top of the word document. But don't forget to save the file before closing else the software will ask you to do so.

Save as option

Unlike the earlier options of Save As, this time in Word 2007 has different options for Save As. These can be seen here in the dialog box. The options are: Word Document, Word

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- If no text is selected, the paragraph where the cursor is, will be taken as the starting point.
 - If you select text within a single paragraph, but the paragraph mark itself is not included in the selection, the results affect only the selected text.
 - If you select text included in more than one paragraph (so that at least one paragraph mark is included in the selection), the results affect all the paragraphs in which any of the selected text resides.
2. Open the Page Layout menu, and select Page Border.
 3. Click Borders to work with options available under it.
 - Under Setting, click one of the preset border options.
 - Select None to remove all borders from the selected paragraph(s), Box to insert a box border around the selected paragraph(s), and Shadow to insert a box border around the selected paragraph(s) and apply preset shadow formatting to the border.
 - Select 3-D to insert a box border around the selection and apply preset 3D border formatting. Choose Custom to create a border using the options you click in the Preview window. When you choose any of these settings, the current selections in Style, Colour, and Width apply to the borders.
 - From the Style list, select the type of line you want to use for the border, including *dotted*, *dashed*, and *wavy lines*.
 - Click the Color drop-down list to select a colour to apply to the border.
 - From the Width drop-down list, choose the thickness of the border line from 1/4 point to 6 points.



3. Click the name of the style you want to use to apply the style to the selected text.

When you want to remove the character style from selected text, apply the character style Default Paragraph Font. The text reverts to the formatting defined in the paragraph style assigned to the paragraph in which the selected text is located.

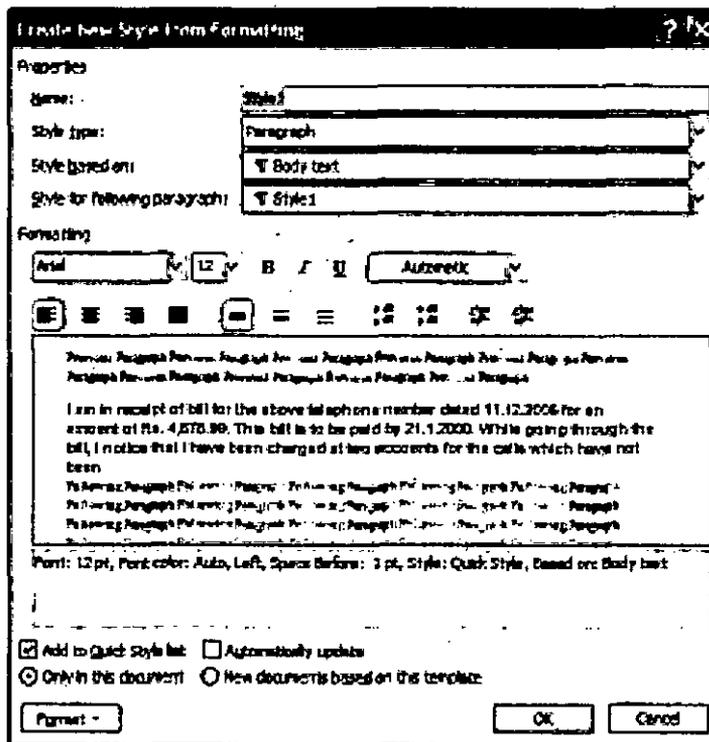
Create a Character Style

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1. Open the Home panel and choose Styles. Click at the bottom right hand corner.

2. Choose New Style icon at the left hand bottom.

3. This will give you a dialog box, as shown here.



4. Type a name for the new style in the Name box.

5. Choose Paragraph from the Style Type box.

6. Choose Format then Font to set the style's attributes from the Font dialog box. Choose Ok.

7. To add a border or shading to the new character font, choose Format and then Border to open the Borders and Shading dialog box. Make your selections and then choose OK.

8. Choose Ok to close the New Style dialog box.

9. Choose Apply to apply the new style to current text. Choose Close to save the new style definition without assigning it to any text.

Creating a character style is easiest when you select text first, apply the font attributes you want in the new style, and then follow steps 1–5 above. You won't have to select any formatting, so skip to steps 7–8 to finish creating the style.

Borders and Shading

Word 2007 allows you to highlight headlines, captions, and other text of importance by applying a border or shading to that text. You can apply it to a piece of text or to the full text.

Apply Borders and Shading

1. Select the text on which you want to apply Borders or Shading. Basically the rules to follow this are:

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In our case it will select *Mahanagar* of **Mahanagar Telephones Nigam Limited**. As was mentioned before it is a proper *Hindi* word, so it cannot be corrected. Ignore it to proceed further. Other words in the document are also correct. So keep clicking Ignore for all of them till you reach the end of the document and it stops checking the spelling of the document. After this there is no other word to correct and the spell checking ends with a dialog box, saying that the spelling checking is complete.

Remember, you can spell check a portion of the text or a word by just highlighting it and then clicking at Spell Checking Icon.

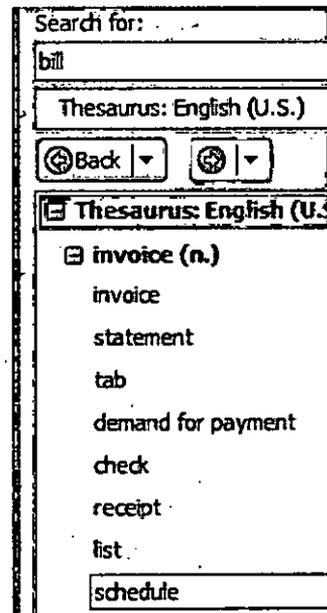
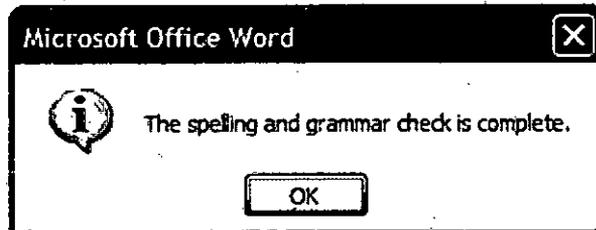
Then there is another option called Thesaurus.

Consulting Thesaurus

Thesaurus is there to help you find Synonym, words with similar meanings and Antonym, words with opposite meanings. Using the thesaurus not only helps your vocabulary, but gives you alternatives to using the same word over and over again throughout your text.

Let us try to use this option in our text. We would like to see the alternatives to the word **Bill**. For this we do the following:

1. Select the word **bill** in the second line of the paragraph.
2. Now select Thesaurus from the Proofing panel.
3. You will get the dialog box as shown here.
4. The options given here are Invoice as the main. But there are others too like statement, check, etc.
5. You have the option to select a new word Invoice or other or let the **bill** remain as it is.



Assign Character Styles

Styles are sets of formatting attributes that you can apply to text in your document. Typically styles are applied to whole paragraphs and allow you to use preset formatting for headings, captions, numbered paragraphs, and so forth. However, Character styles are useful when you find yourself using the Format Painter over and over again to apply character formatting.

Character styles add to the current formatting of text. For example, if the text is 12 point Arial italics and your character style applies **bold** and ~~strikethrough~~, the text to which you apply the character style will be 12 point Arial **bold**, *italic*.

Assign a Character Style

1. To apply a style to existing text, select the text to which you want to assign the style. If you want to apply a style as you are entering new text, place your insertion point where you want the newly styled text to appear.
2. Choose a style from the Style panel on the Home menu. When you click the Style box, you see each style name displayed in the style's font. An underlined "a" indicates a character style.

to the dictionary. For example, you may have the bad habit of typing *the* as *teh*. You can add this to AutoCorrect to correct *teh* to *the* always without even telling you.

Language You feel that this particular word which has been pointed as wrong by the current dictionary would be available in other language dictionary. So mention here the name of the other dictionary where this word could be found. If you do not have a second dictionary loaded, just ignore this.

Spelling By clicking at this, you can start the spell checking of the whole document from this point onward.

Look Up It looks for an alternative word in the Thesaurus.

Cut, Copy and Paste These can be used for transferring the word to some other place in the document by cutting or copying it at this place and pasting it there.

5. In our case we will accept entries as the correct substitute for the wrong word entries.

Since there is no other word which is to be corrected here. The corrected text would now look like the one shown next. Now we come to the second way of spell checking which is checking the whole document.

In this case place the cursor at the beginning of the text in the document. In our case we will place the cursor at the left of 1 of 11th January.

From here do either of the following to start the spell checking.

1. Select Spelling and Grammar from the Review Panel.

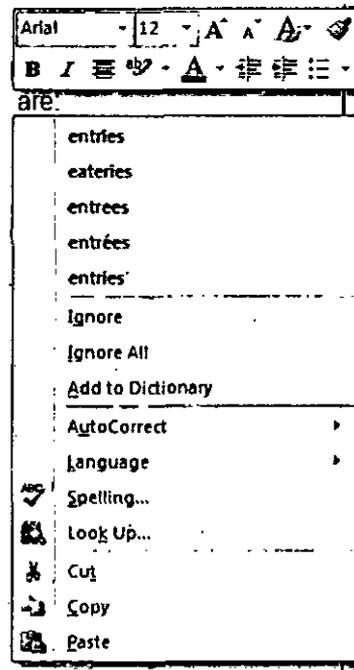
Or

2. Press F7

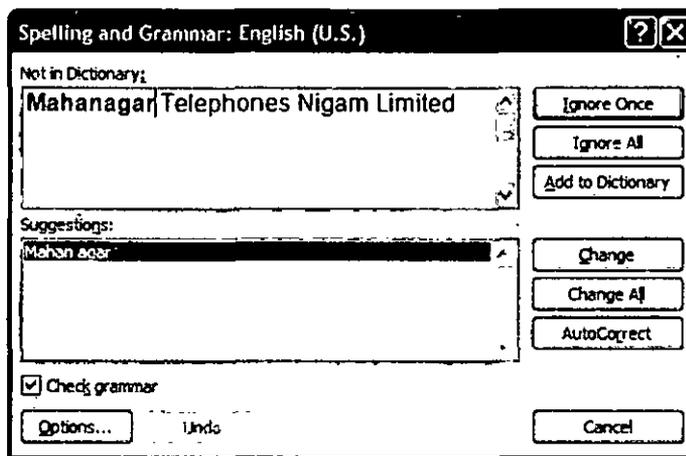
Or

3. Click at Spell Grammar in Proofing panel of Review.

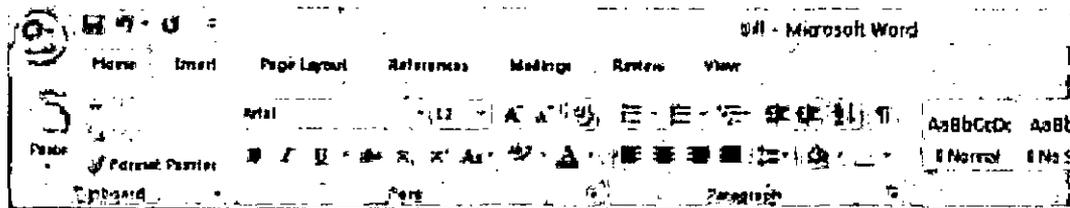
This will initiate the spell checking process and will start the spell checking of the document with each word of the document being searched with the similar word with the words available in the dictionary. If not found it will point out.



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11th January, 2007

To,

The General Manager
Mahanager Telephones Nigam Limited
Khushid Lal Bhawan,
New Delhi - 110 001

Ref. Telephone No. 4611098

Sir,

I am in receipt of bill for the above telephone number dated 11.12.2006 for an amount of Rs. 4,678.80. Through the bill, I notice that I have been charged at two accounts for the calls which have not been made from my phone.

Called Id	Duration	Amount
0017249873789	120	1,008.00
0013245934234	60	675.80

As you can notice that both these entries pertain to international calls and since my phone does not have international calling facility, I hope that you would look into and send me the revised bill, so that I can make the payment in time.

I hope that you would look into and send me the revised bill, so that I can make the payment in time.

Hoping for an early action,

Thanking you,

Yours faithfully,

Shah Rukh Khan
3695 Bahadur, Delhi - 110 006

2007 and that is why it has been shown as an error. Similar is the case with enteries which is wrong and needs to be corrected. For this follow the following procedure:

1. Click with the mouse at any place within the word to be corrected, in this case enteries.
2. Now right click the mouse button.
3. A pop-menu will pop-up as shown next.
4. Among the various options are:

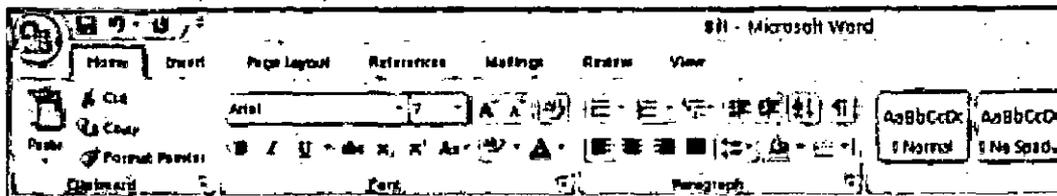
Alternative words Word 2007 displays few words which are similar to the word in question with a hope that these may had been word in your mind while typing this word wrongly. You can choose any one of them, which you feel is the right word by just clicking and selecting that and leaving the mouse. The word will stand corrected with the new word and will replace the wrong word.

Ignore It is like over ruling the dictionary and saying that whatever you have typed is right and would like the dictionary to ignore this not only at this place but also at all other places within the document.

Ignore All This will allow you to ignore this error throughout the document.

Add to Dictionary You feel that this word is right and would like this word to be added to the dictionary so that it is not shown as an error in the future.

AutoCorrect You will learn about AutoCorrect later. But, only thing to understand here is that it is a list of mostly misplaced word which can be corrected without referring



11th January, 2007

To,
The General Manager
Maharaja Telephones Nigam Limited
Khandid Lal Bazaar
New Delhi - 110 001

Ref. Telephone No. 4611099

Sir,

I am in receipt of bill for the above telephone number dated 11.12.2006 for an amount of Rs. 4,678.90. This bill is to be paid by 21.12.2006. I have enclosed herewith the bill for the same which has not been made by me. Please refer to the same.

Next, let us try to put some fancy things on the text. First among them is Font.

Applying Fonts

It is upto you to select the same font for the whole text or have different fonts for different paragraphs.

Let us see how it is done.

1. Click at any place in the text with the mouse.
2. Click at Select All in the Edit menu or simply press Ctrl and then A. This will highlight the whole text in the document.
3. Now you can select the font of your liking in the whole text. You can also change the size of the font too.
4. Select Arial for font and size 12 for the whole text in the Formatting toolbar.
5. This will make the whole text 12 points and will have Arial as the font.
6. The previous changes made by you in terms of **Bold**, *Italics* will remain intact and will not be disturbed by doing this.
7. Now if you want you can change the font of particular items like address, etc., to make it more decorative.

Now that our letter is ready, we can just print it, but before that we must check the spelling in the document so as no typographical errors remain in the document.

Spell Checking

As was mentioned in the options, Word 2007 points out the spelling errors by underling the word/words with red wavy line. Since our document is just one page long. It is not difficult to pin point the errors.

There are two methods of correcting these errors. One method is to correct these errors one by one, picking them up. Secondly, you spell check the whole document. Let us do both on our document.

Looking from top to bottom of the text in the document file Bill, you will see few of the words underlined by wavy red line. Few of them are the proper words and thus cannot be corrected.

Words like Mahanagar is basically a *Hindi* word, so it cannot be in the dictionary of Word

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3. With the mouse, click at U in the formatting toolbar to make the highlighted text **Underlined**.

4. You can see the text underlined below.

Coming down now you see the line containing the telephone number. This line has to be underlined and centralized. I am not describing here the method to underline this line since it is similar to the one followed by you in the above case. I am sure you can do it yourself. Let us now concentrate on alignment. Let us see how it is done in Word 2007.



11th January, 2007

To,

The General Manager

Mahanagar Telephones Nigam Limited

Khurshid Lal Bhawan

New Delhi - 110 001

Ref: Telephone No. 4611098

Alignment of Text

Word 2007 gives you the option of placing the text in four different alignments. These are:

Left aligned This line is left aligned.

Right aligned

This line is right aligned.

Centralized

This line is centrally aligned.

Justified

This line has been justified.

You will not notice much of a difference here in left aligned text and justified text. This is so because the matter is small. Just notice the whole text of this book, it is justified, i.e., it aligns to the left and right both. Whereas this particular paragraph is left aligned and see the difference for yourself.

All the four alignments are there on the formatting toolbar. You can choose any one of them. (If you do not have all 4 of them, click at Add and Remove button on the right of the toolbar to add the missing alignment to the formatting toolbar.

Coming back to our text. We have to centrally align the line containing the telephone number.

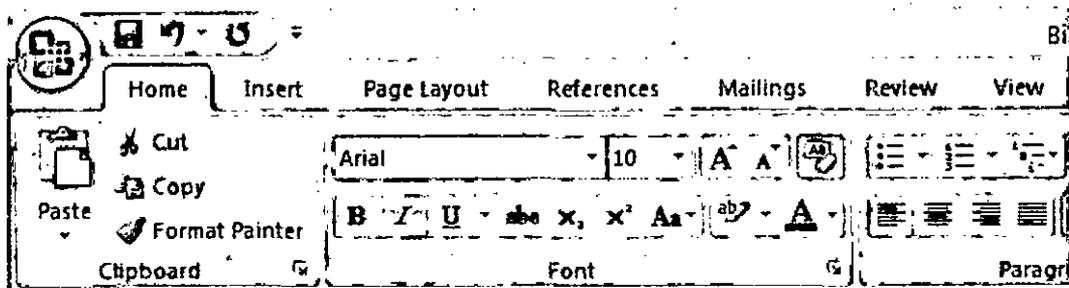
For that do the following:

1. Click the mouse button at the left of R of Reference: Telephone No. 4611098.
2. Click at the icon which shows the centralized alignment.
3. Notice here that you do not have to highlight the text for alignment. This is so since the whole matter of the paragraph has to be aligned to the same alignment. It is not possible to align one word to one alignment and another word to another alignment.
4. You can see the text underlined and centralized aligned in the figure below.

Now that the next lines have nothing much to be done, expect that International calls and Shah Rukh Khan have to be made bold. This I presume you will be able to do without any difficulty.

It is time to save the document again so as to make sure that the changes made by you are stored in the hard disk.

3. Now leave the mouse with To highlighted.
4. With the mouse, click at I in the formatting toolbar to make To as *To*.
5. See how To looks in the next figure.



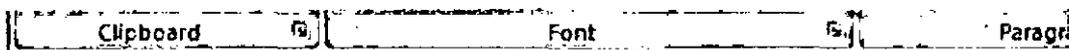
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11th January, 2007

To,
The General Manager
Mahanagar Telephones Nigam Limited

Now we come to the line having The General Manager. This line has to be made bold. This is how we do it.

1. Click the mouse button at the left of T of The General Manager.
2. Since we had highlighted the matter using mouse in the case of To, we will use a different approach here. Press Shift key and start pressing right arrow key \Rightarrow . You will see that as the right arrow key is pressed the matter on the right gets highlighted. So highlight the matter till the point you want it to highlight. In this case highlight till r of Manager.
3. Now leave the shift key.
4. With the mouse, click at B in the formatting toolbar to make the highlighted text as **Bold**.
5. In the figure below, see how the text looks now.



11th January, 2007

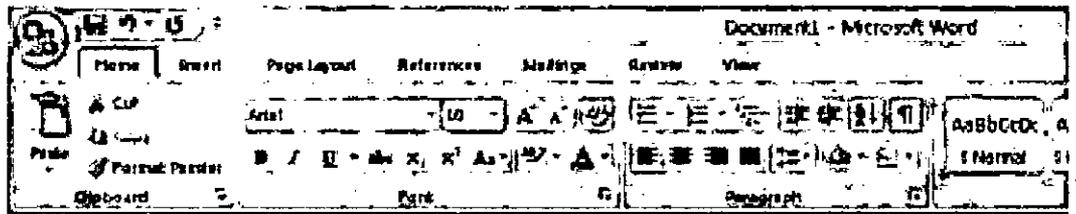
To,
The General Manager
Mahanagar Telephones Nigam Limited
Khurshid Lal Bhawan
New Delhi - 110 001
Ref: Telephone No. 4611098

Next in the line is the address, whose last line New Delhi - 110 001 has to be underlined. Word 2007 allows you the option of underlining the word with one or more lines. This option is available under Font. But for the time being, we will stick to single underline.

For this do the following:

1. Click the mouse button at the left of N of New Delhi - 110 001.
2. Using any of the two methods described above, highlight the text to be underlined.

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11th January, 2007
 To,
 The General Manager
 Mahanagar Telephones Nigam Limited
 Khursheed Lal Bazaar
 New Delhi - 110 001
 Ref: Telephone No. 4511038

Sr,

I am in receipt of bill for the above telephone number dated 11.12.2006 for an amount of Rs. 4,678.90. This bill is to be paid by me. I am sorry to inform you that I have not been charged at two accounts for the calls which have not been made by me. These calls are:

Called Id	Duration	Amount
0017243873763	120	1,008.00
001324534234	60	675.90

As you can notice that both these entries pertain to International calls and since my phone does not have this facility, the I hope that you would look into and send me the revised bill, so that I can make the payment in time.

Hoping for an early action.

Thanking you.

Yours faithfully,
 Shah Rukh Khan
 3695 Barakhamba, Delhi - 110 005

* This letter has few errors, which will be corrected in Word 2007

This is just the raw text which has been typed. Now we have to do the formatting. But, before that, lest the file gets tangled in power failure or something, we must save the file.

Saving the File

It is the process by which you give the name to the file and save under that name. Since our letter pertains to the inflated bill, we will call our file as Bill. For saving, just select the Save option under Office button. You will get the following dialog box. Just type the name Bill in the space provided for typing the filename and click Save. Your file will be saved under this name and automatically the title bar will show the name of the file on the top of the Word 2007 screen.

Now we come to other formatting tools.

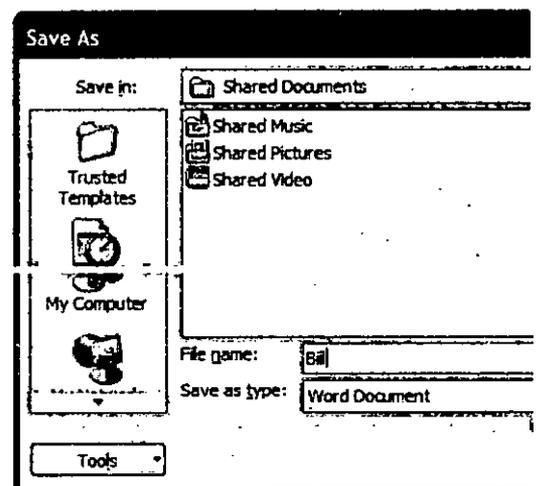
Formatting the Text

Let us now start our formatting from the top. The first line containing address has nothing to be done.

The second line containing To, has to be *italized*.

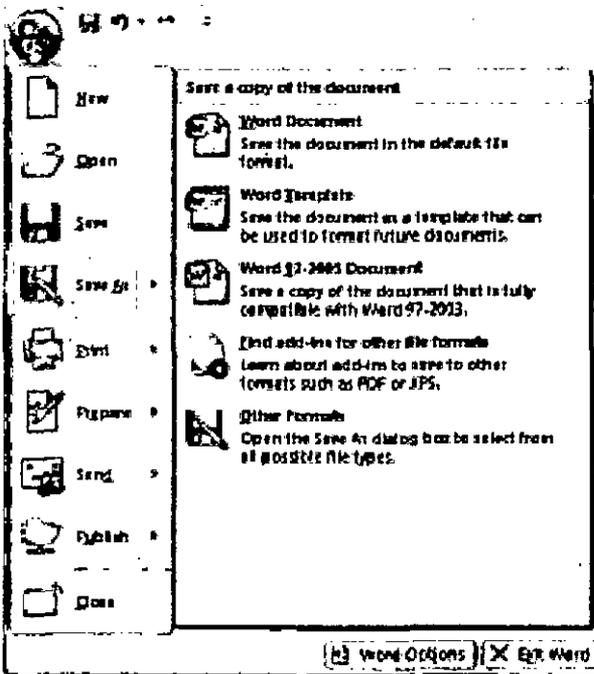
For this do the following:

1. Click the mouse button at the left of T of To.
2. Now drag the mouse, still having it pressed to the right so that the next character o also gets highlighted. At this stage both T and o are highlighted.



Supposing we have to create a document in the form of a letter written to the General Manager of Telephones complaining him of the inflated bills. The text of the letter is shown next. Now that you have opened a new document, do not worry about any typing mistakes or any formatting, just type the text as it is.

As you may notice that there are few red and green wavy lines. The red lines, show that the word is incorrectly typed as per the dictionary available with the system and the word/words under whom the green line is, show that the words are grammatically wrong. This is the opinion of the software, you may beg to differ from it. Since most of the proper names like Shah Rukh Khan, are shown as wrong.



NOTES

11th January, 2007

To,

The General Manager
 Mahanagar Telephones Nigam Limited
 Khurshid Lal Bhawan
 New Delhi - 110 001

Ref: Telephone No. 4611098

Sir,

I am in receipt of bill for the above telephone number dated 11.12.2006 for an amount of Rs. 4,678.90. This bill is to be paid by 21.1.2000. While going through the bill, I notice that I have been charged at two accounts for the calls which have not been made by me. These entries are:

<i>Called Id</i>	<i>Duration</i>	<i>Amount</i>
0017249873769	120	1,008.00
0013245934234	60	675.90

As you can notice that both these entries pertain to **International calls** and since my phone does not have this facility, these calls could not have been made from my phone.

I hope that you would look into and send me the revised bill, so that I can make the payment in time.

Hoping for an early action,

Thanking you,

Yours faithfully,

Shah Rukh Khan

3695 Ballimaran, Delhi - 110 006

* This letter has few errors, which will be corrected in Word 2007

Shift + F1	Use the What's This? Button
Ctrl + F6	Switch between open documents
Ctrl + Z	Undo an action
Ctrl + Y	Redo an action

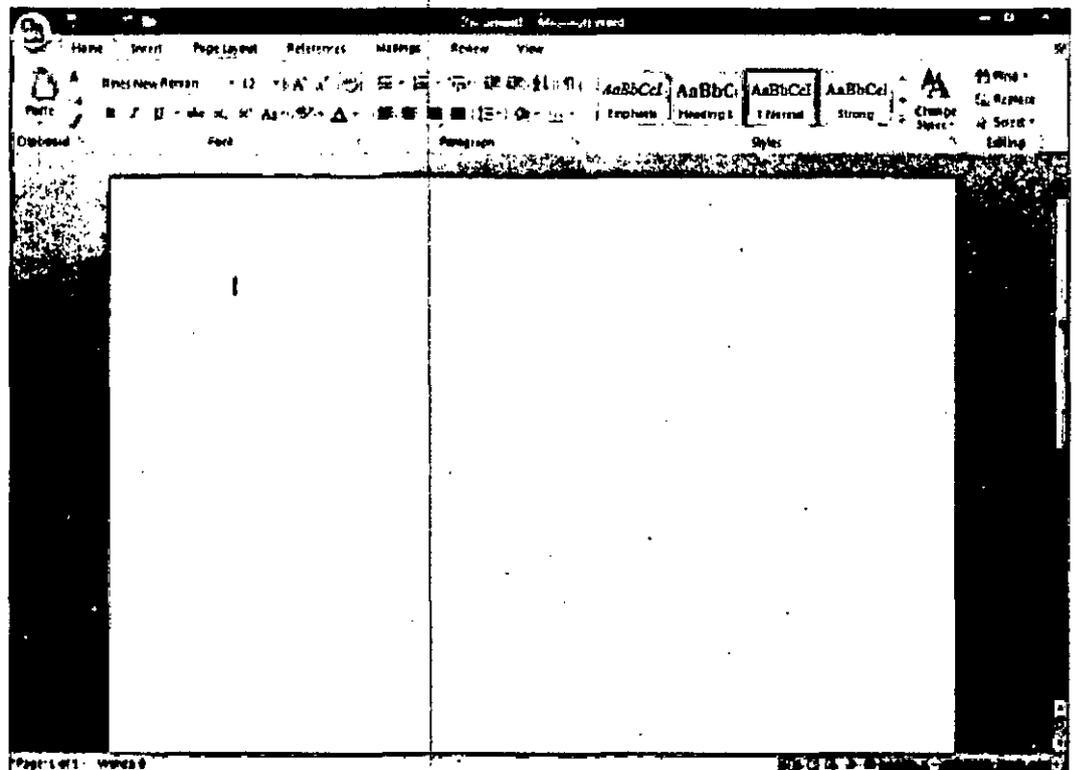
NOTES

2.11 WORD PROCESSOR

Word processor is a computer program for processing of words, very similar to a food processor (*mixie*) which processes food. Most of the word processors would start from a blank screen assumed to be a blank page with a blinking starting point known as **Cursor**. For all practical purposes it is like a typewriter, but it is much more than that.

You can type the text (even enter graphics) in the word processor, save it under a name to recall it again and again. Spell check it for errors, format it to look good, and then if needed print it too.

This makes it much easier for writing the text since you can make as many mistakes as you like since you can correct them by just pressing a key. This way you save a lot of paper and make the document look more neat and clean.



Creating Documents in Word

The best way to learn about a new software is to use it. It is like jumping into the swimming pool to learn swimming. What we will do here is that we will type our document and learn the various commands side by side. Starting Word 2007 is easy so I am not discussing that here. Let us start a new document here. This can again be done from the Start button. After you have opened Word 2007 you can either click at New from the Office button.

To resize a window

Position the pointer on the window's corner and, when you see the diagonal pointer, drag to resize the window.

To minimize a window

Click the Minimize button.

To restore a minimized window

Click the button for the window on the taskbar.

To maximize a window

Click the Maximize button.

To switch windows

Click any visible part of the window

Or

Click the button for the window on the taskbar.

To close a window

Click the Close button on the window

Or

Right click the button for the window on the taskbar and choose Close from the shortcut menu.

Remember

1. Menus in Office programs might be collapsed to show only frequently used items. To view the complete menu, click the More icon at the bottom of the menu or pause with the pointer on any menu option.
2. Menu items that are grayed out are not currently available.
3. To display a tooltip, which is a description of a toolbar button, position the pointer on the button and pause for a moment without clicking.
4. To minimize all windows, you can rightclick the taskbar and then click Minimize All Windows from the shortcut menu.
5. If one window fills the screen, you might have to click its Restore button to return it to a partial-screen window. You will then be able to see and click other windows.

Common Keyboard Commands

Ctrl + N	Open a new document
Ctrl + O	Opens a existing document
Ctrl + S	Saves the current document
Ctrl + W	Close the current document
Ctrl + P	Prints the current document
Ctrl + C	Copies the highlighted matter to store it in clipboard
Ctrl + X	Cuts the highlighted matter to store it in clipboard
Ctrl + V	Pastes the matter available on the clipboard
F1	Call for help

NOTES

From Start Button

Click at Start button to access the various commands. Click on Programs to get the various programs. From here click at the program called Microsoft Office 2007 group and then the required program.

NOTES

From Icon of Word

You can choose to have an icon of the software on your desktop. This icon can be created by using the feature of Creating Shortcut.

Using the Mouse

Since most of the activities in Microsoft Office are done using the mouse, it is very important to have the complete knowledge of working of mouse while using the constituents of Microsoft Office.

To click

Position the pointer on a menu, a button, or an icon and click the left mouse once.

To double-click

Position the pointer on an item and click the left mouse button twice in quick succession.

To select

1. Position the pointer on the first item to select.
2. Click and hold down the mouse button.
3. Move the mouse pointer across the items to select.
4. Release the mouse button.

To drag

1. Position the pointer on an item.
2. Click and hold down the left mouse button.
3. Move the mouse.
4. Release the mouse button.

To scroll

Drag the scroll button in the scroll bar up or down.

Or

Click a scroll arrow at either end of the scroll bar.

To choose from a menu

1. Click a menu name.
2. Click an item on a menu.

Or

If the item is followed by an arrow, position the mouse pointer on the item to open the submenu and then click an item on the submenu.

To move a window

Position the pointer on the window's title bar and press and hold the mouse button as you drag the window.

Microsoft Office PowerPoint 2007

Want to make a presentation in a hurry! This is an ideal program of the same. Make sophisticated slide shows and professional looking electronic presentations. It also allows you to add charts, tables and pictures for make the presentation look alive.



Microsoft Office PowerPoint
2007
Shortcut

Microsoft Office Outlook 2007

It is an electronic tool for managing appointments, addresses, e-mail, and notes. With lots of stress being given to the e-mail these days, it is an ideal software for sending and receiving e-mail.



Microsoft Office Outlook 2007
Shortcut
3 KB

Microsoft Office Publisher 2007

It is Microsoft's answer to the various other publishing software available in the market like PageMaker. It allows you to create invitations, design business-cards, and letter-heads, make your own calendars, produce newsletter, etc.



Microsoft Office Publisher 2007
Shortcut
3 KB

Microsoft Office OneNote 2007

It is used to gather information during meetings, brainstorming sessions, interviews, and more. The notes you create can include text, drawings, images, and audio recordings. OneNote uses a freeform page layout, so you can place and move information wherever you want.



Microsoft Office OneNote 2007
Shortcut
3 KB

Microsoft Office InfoPath 2007

It helps you collect and work with data by using dynamic, online forms that have a familiar Office interface. Based on the Extensible Markup Language (XML), InfoPath makes it easy to create and use robust forms to more effectively gather and share information throughout your organization.



Microsoft Office InfoPath 2007
Shortcut
3 KB

Microsoft Office Groove 2007

Microsoft Office Groove 2007 is Internet software for making direct connections with the people who are important to you. With Office Groove 2007, you can bring together team members from both inside and outside your company, with no IT assistance required and no need to waste time thinking about firewalls, servers, security, or network access. Additionally, you can enjoy the efficiency of always knowing each other's virtual location, or online presence, thus allowing for organic and quick conversation and collaboration.



Microsoft Office Groove 2007
Shortcut
3 KB

Starting Above Software

You can start any of the above mentioned software by one of the following methods:

NOTES

NOTES

The 'Ribbon User Interface' is a task-orientated Graphical User Interface (GUI). It features a central menu button, widely known as the 'Office Button'. The Ribbon Interface has been rumoured to be introduced into Microsoft Office 14.

Office 2007 also includes new applications and server-side tools. Chief among these is Groove, a collaboration and communication suite for smaller businesses, which was originally developed by Groove Networks before being acquired by Microsoft in 2005. Also included is Office SharePoint Server 2007, a major revision to the server platform for Office applications, which supports "Excel Services", a client-server architecture for supporting Excel workbooks that are shared in real time between multiple machines, and are also viewable and editable through a web page.

Microsoft FrontPage has been removed from the Office suite entirely. It has been replaced by Microsoft Office SharePoint Designer, which is aimed towards development of SharePoint portals. Its designer-oriented counterpart Microsoft Expression Web is targeted for general web development. However, neither application is included in any of the Office suites.

Speech recognition and handwriting recognition are now part of Windows Vista. Speech and ink components have been removed from Office 2007. Handwriting and speech recognition work with Office 2007 only on Windows Vista or Windows XP Tablet PC Edition. However, XP users can use an earlier version of Office to use speech recognition.

Let us take a look at the various constituents which are there in Microsoft Office 2007.

Microsoft Office Word 2007

A word processing software which allows you to write letters, edit them and print them after formatting it according to your needs. It has all the possible options of a word processor in the form of font style and size; indents; line spacing; margins; spell checking and grammar checkers to name a few.



Microsoft Office Word 2007
Shortcut
3 KB

Microsoft Office Excel 2007

This spreadsheet program allows you to manipulate and present your data in almost any way you choose. It allows you to work on a tabular pad consisting of columns and rows where you can perform all your mathematical, financial and statistical calculations. These calculations can be as simple as totalling a row or column of values or as complex as figuring the rate of return on an investment under varying circumstances. It also allows you to make a graphical representation of all your data in the form of 2-dimensional or 3-dimensional graph or pie chart.



Microsoft Office Excel 2007
Shortcut
3 KB

Microsoft Office Access 2007

A software to take care of most of your database requirements. It allows you to store and organize information in sets of tables, which can be displayed in the form of columns and rows to look like a table or an index card. What's more it allows you to perform calculations and find for you simple statistics like totals and averages. It allows you to sort the data in any form and extract the required information based on the key given by you.



Microsoft Office Access 2007
Shortcut
3 KB

WIDTH

This gives the suggested width of a box enclosing the visible area of the object. The width is specified in standard units. User agents may use this value to scale an object to match the requested width *if appropriate*.

HEIGHT

This gives the suggested height of a box enclosing the visible area of the object. The height is specified in standard units. User agents may use this value to scale an object to match the requested height *if appropriate*.

BORDER

This attribute applies to the border shown when the object forms part of a hypertext link, as specified by an enclosing anchor element. The attribute specifies the suggested width of this border around the visible area of the object. The width is specified in standard units. For **BORDER=0** no border should be shown. This is normally used when such a border would interfere with the visual affordances presented by the object itself. For instance, the object could render itself as a number of bevelled buttons.

HSPACE

The suggested width of the space to the left and right of the box enclosing the visible area of the object. The width is specified in standard units. This attribute is used to alter the separation of preceding and following text from the object.

VSPACE

The suggested height of the space to the top and bottom of the box enclosing the visible area of the object. The height is specified in standard units.

USEMAP

This specifies a universal resource identifier for a client-side image map in the format proposed by Spyglass Inc. This is normally appropriate only for static images.

ISMAP

When the **INSERT** element appears within a hypertext link, this attribute indicates that the server provides an image map, so that mouse clicks should be sent to the server in the same manner as for the **IMG** element. This is normally appropriate only for static images.

NOTES

2.10 OFFICE SUITES

There are software and software. But, when you come to using the computer and a single software which can do everything for you, the choice mostly is Microsoft Office. This is not a software but a combination of software which can perform various aspects of your office routines. It can be writing letters, maintaining accounts, keeping databases, making a presentation, etc. This Microsoft Office has a solution for everything.

Office 2007 contains a number of new features, the most notable of which is the entirely new graphical user interface called the Fluent User Interface, replacing the menus and toolbars that have been the cornerstone of Office since its inception with a tabbed toolbar, known as the Ribbon. Office 2007 requires Windows XP with Service Pack 2 or 3, Windows Server 2003 with Service Pack 1 or higher, or Windows Vista.

tspecials = <one of the set> () < > @ , ; \ " / [] ? =

Parameters may follow the type/subtype in the form of attribute/value pairs.

parameter = attribute "=" value

attribute = token

value = token | quoted-string

NOTES

The type, subtype, and parameter attribute names are case-insensitive. Parameter values may or may not be case-sensitive, depending on the semantics of the parameter name. White space characters must not be included between the type and subtype, nor between an attribute and its value.

If a given media-type value has been registered by the IANA, any use of that value must be indicative of the registered data format. Although HTML allows the use of non-registered media types, such usage must not conflict with the IANA registry. Data providers are strongly encouraged to register their media types with IANA via the procedures outlined in RFC 1590.

All media-type's registered by IANA must be preferred over extension tokens. However, HTML does not limit applications to the use of officially registered media types, nor does it encourage the use of an "x-" prefix for unofficial types outside of explicitly short experimental use between consenting applications.

ALIGN

This determines where to place the object. The ALIGN attribute allows objects to be placed as part of the current text line, or as a distinct unit, aligned to the left, center or right.

The following values are chosen for their ease of implementation, and their independence of other graphics occurring earlier on the same line:

For ALIGN=TEXTTOP, the top of the object is vertically aligned with the top of the current font.

For ALIGN=MIDDLE, the middle of the object is vertically aligned with the baseline.

For ALIGN=TEXTMIDDLE, the middle of the object is vertically aligned with the position midway between the baseline and the x-height for the current font. The x-height is defined as the top of a lower case x in western writing systems. If the text font is an all-caps style then use the height of a capital X. For other writing systems, align the middle of the object with the middle of the text.

For ALIGN=BASELINE, the bottom of the object is vertically aligned with the baseline of the text line in which the object appears.

For ALIGN=TEXTBOTTOM, the bottom of the object is vertically aligned with the bottom of the current font.

The following alignment values allow the object to float rather than being treated as part of the current line:

For ALIGN=LEFT, the object is floated down and over to the current left margin. Subsequent text is flowed past the right hand side of the visible area of the object.

For ALIGN=CENTER, the object is floated to after the end of the current line and centered between the left and right margins. Subsequent text starts at the beginning of the next line.

For ALIGN=RIGHT, the object is floated down and over to the current right margin. Subsequent text is flowed past the left hand side of the visible area of the object.

tree giving further details on this resolution procedure appears later on in this specification. In the absence of CLASSID a value for the class identifier may be derivable from the CODE or DATA attributes, for instance the Internet media type for the DATA may sufficient, e.g., when the data is for a GIF encoded image.

CODE

This specifies a URL referencing where to find the code which implements the object's behaviour. If this URL is insufficient to locate the intended object, when for instance, a file contains the implementations for several classes, the CLASSID may be used to supply a disambiguating class identifier.

DATA

Specifies a URL referencing the object's data. This could be a GIF file or the pickled data representing an object's state. In many cases the media type or the data itself contains sufficient information to identify what code is needed to initialize the object. Note that an object's data can even be included inline for super efficient loading. This specification proposes a new URL scheme "data:". The rest of the URL is a base64 encoded character string that specifies the object's data as an opaque byte stream.

On its own, this would be meaningless. If the DATA attribute appears without a CODE or CLASSID attribute, then a TYPE attribute may be sufficient to interpret the data. For instance a Microsoft COM object can be asked to write its state using the WriteClassStream procedure. This inserts the object's class id as the first 16 bytes of the stream. If the TYPE attribute indicates that the data is in the COM persistent stream format, then the class id can be retrieved from the DATA attribute and used to find the code implementing the object's behaviour.

The CLASSID or CODE attributes can be used to override the default implementation as implied by the DATA attribute. For example, you may have the pickled data for an Excel spreadsheet but want to view it with the "SuperGraph" package: You would then use the DATA attribute to point to the Excel spreadsheet data, and the CLASSID or CODE attribute to point to the SuperGraph plug-in.

The CLASSID, CODE and DATA attributes specify URLs. Any fragment identifier included as part of these URLs should be passed to the object, either directly, or by callback:

TYPE

This specifies an Internet Media Type (see RFC 1590) for the object's data. The attribute can be used to allow user agents to quickly skip media they don't support, and instead to render the contents of the INSERT element. It is also useful when loading objects off local drives as it allows the media type to be specified explicitly rather than being derived from the file extension.

The following grammar for media types is a superset of that for MIME because it does not restrict itself to the official IANA and x-token types.

media-type = type "/" subtype *((";" parameter))

type = token

subtype = token

where token is defined by:

token = 1*<any (ASCII) CHAR except SPACE, CTLs, or tspecials>

NOTES

CLASS

A space separated list of SGML NAME tokens. CLASS names specify that the element belongs to the corresponding named classes. These may be used by style sheets to provide class dependent renderings.

LANG

A LANG attribute identifies the natural language used by the content of the associated element. The syntax and registry of language values are defined by RFC 1766. In summary the language is given as a primary tag followed by zero or more subtags, separated by "-". White space is not allowed and all tags are case insensitive. The name space of tags is administered by IANA. The two letter primary tag is an ISO 639 language abbreviation, while the initial subtag is a two letter ISO 3166 country code. Example values for LANG include:

en, en-US, en-uk, i-cherokee, x-pig-latin.

DIR

Human writing systems are grouped into scripts; which determine amongst other things, the direction the characters are written. Elements of the Latin script are nominally left to right, while those of the Arabic script are nominally right to left. These characters have what is called strong directionality. Other characters can be directionally neutral (spaces) or weak (punctuation).

The DIR attribute specifies an encapsulation boundary which governs the interpretation of neutral and weakly directional characters. It does not override the directionality of strongly directional characters. The DIR attribute value is one of LTR for left to right, or RTL for right to left, *e.g.*, DIR=RTL.

STYLE

The STYLE attribute allows you to include rendering information. W3C has produced a separate specification on how to associate HTML documents with rendering information in different notations, see W3C-style.

CLASSID

This can be used to specify a class identifier for an object. This could be a DCE universally unique object identifier (uuid), or another type of class name as appropriate to the object system, *e.g.*, Java or Corba. This allows effective use of caching, as the user agent can use simple string comparison to check whether two objects are the same independent of their location.

The CLASSID attribute value takes the form of a URL scheme prefix separated by a colon from the character string defining the class identifier. The prefix is used to identify the object system for the class identifier, for example classid="uuid:{663C8FEF-1EF9-11CF-A3DB-080036F12502}" gives the uuid for a Microsoft COM object, using the UUID name space, while classid="java:Animator.class" gives the class name for Java applet.

CLASSID may be sufficient for the user agent to locate the code implementing the object. However, the CODE attribute can also be used with CLASSID to provide a hint as to where to look for this code. The search mechanism will in general depend on the object system the identifier belongs to. Note that the value specified with CLASSID takes precedence over a class identifier derived from the object's data stream.

When searching for the implementation of an object, the CLASSID attribute takes precedence over the CODE attribute which in turn takes precedence over the DATA attribute. A decision

```
<param name=text value="This is the Applet Viewer">
</insert>
```

In the absence of the CLASSID, user agents may obtain the Java class name from information supplied with the code itself or from the URL used to retrieve the code. The other attributes on the INSERT element define rendering properties of the container for the applet viewer. The PARAM element specifies a named property which is used to initialize the class. PARAM elements can be combined with data streams for greater control.

NOTES

A walk through the DTD

The document type definition provides the formal definition of the allowed syntax for HTML inserts. The following is an annotated listing of the DTD defining the semantics of the elements and their attributes. The complete listing appears at the end of this document.

Standard Units for Lengths

Length values can be specified as an integer representing the number of screen pixels, or as a percentage of the current displayable region, for widths, this is the space between the current left and right margins, while for heights, this is the height of the current window or table cell etc.

Additional units may be added in the future to give designers greater control over the size of objects relative to fonts specified in fixed units such as points, picas, inches and centimeters.

Shouldn't we add these now for consistency with HTML3 tables? The additional implementation effort would be minimal - with **pt** for points, **pi** for picas, **in** for inches, and **cm** for centimeters, where $72\text{pt} = 6\text{pi} = 1\text{in} = 2.54\text{cm}$.

An opposing position is to use a style sheet language to specify the width and height, e.g., with the STYLE attribute or indirectly via the ID attribute. Perhaps the WIDTH and HEIGHT attributes should be considered as forming part of the style sheet? In which case, it would make sense to add the desired units (CSS uses the same notation as proposed above).

The INSERT element is used to insert an object into an HTML document. It requires both start and end tags. The INSERT element has the same content model as the HTML BODY element, except that one or more optional PARAM or ALIAS elements can be placed immediately after the INSERT start tag and used to initialize the inserted object. The content of the INSERT element is rendered if the object specified by the data, code or classid attributes can't be rendered. This provides for backwards compatibility with existing browsers, and allows authors to specify alternative media via nested INSERT elements.

In general, all attribute names and values in this specification are case insensitive, except where noted otherwise. INSERT has the following attributes:

ID

Used to define a document-wide identifier. This can be used for naming positions within documents as the destination of a hypertext link. It may also be used by style sheets for rendering an element in a unique style. An ID attribute value is an SGML NAME token. NAME tokens are formed by an initial letter followed by letters, digits, "-" and "." characters. The letters are restricted to A-Z and a-z. It may also be used by the user agent or other objects in the document to find and communicate with objects on the document.

For speedy loading of objects you can inline the object's state data using the new URL scheme "data:", e.g.,

```
<insert
  id=clock1
      classid="uuid:{663C8FEF-1EF9-11CF-A3DB-
080036F12502}"
  data="data:34hqi6n3gs9c3hdish2h568fhsb3uds7b4jawk15h"
  type="application/x-oleobject; clsid=no"
>
</insert>
```

NOTES

The data is expressed as a Base64 encoded byte stream. The interpretation of this stream is class dependent. If the CLASSID attribute is missing or is insufficient to disambiguate the precise format of this stream then the TYPE attribute may be used to resolve matters. In the example, the Internet media type for COM streams takes a parameter that indicates that the stream doesn't start with a class identifier.

The next example is a Java applet:

```
<insert code="BounceItem.class" width=500 height=300>
</insert>
```

This is the bouncing heads demo. The implementation is specified by a relative URL and dereferenced with respect to the document URL. The images for the heads are loaded by the Java program as follows:

```
bounceimages[i-1] = getImage(getCodeBase(), "images/
jon/T" + i + ".gif");
```

The getCodebase() function returns the URL used to retrieve the Java program, and is used here to dereference the relative URL (e.g., "images/jon/T1.gif") used for each image.

The semantics of the CLASSID attribute and the Java name space are still under discussion. The following is therefore liable to change. The previous example could have used the CLASSID attribute to specify the class name, e.g., CLASSID="java:BounceItem.class". The user agent would then use the Java specific mechanism to locate the code for this class, in this case, to first check if *BounceItem.class* is already installed, and if not to treat it as a relative URL, which is dereferenced with respect to the URL supplied by the CODE attribute if present, otherwise with respect to the document URL.

```
<insert
  classid="java:NervousText.class"
      code="http://java.acme.com/applets/
NervousText.class"
  width=400
  height=75
  align=baseline
>
```

that don't support a particular media. A simple example of using INSERT is:

```
<insert data=TheEarth.avi
type="application/avi">
<param name=loop value=infinite>
<img src=TheEarth.gif alt="The Earth">
</insert>
```

Here the user agent would show an animation if it supports the AVI format, otherwise it would show a GIF image. The IMG element is used for the latter as it provides for backwards compatibility with existing browsers. The TYPE attribute allows the user agent to quickly detect that it doesn't support a particular format, and hence avoid wasting time downloading the object. Another motivation for using the TYPE attribute is when the object is loaded off a CD-ROM, as it allows the format to be specified directly rather than being inferred from the file extension.

The next example inserts an OLE control for a clock:

```
<insert
id=clock1
type="application/x-oleobject"
data="http://www.foo.bar/test.stm"
code="http://www.foo.bar/controls"
>
</insert>
```

The ID attribute allows other controls on the same page to locate the clock. The DATA attribute points to the persistent stream data used to initialize the object's state. It includes a class identifier. The CODE attribute points to a file containing the implementation for this object. The file may contain the code for several classes, but this can be resolved by the class id from the object's data stream.

In the absence of the CODE attribute, the class identifier may be sufficient to locate the code implementing this object. User agents may provide a range of mechanisms for locating and downloading such code. For some formats such as image files, the Internet media type returned with the data is sufficient.

The class identifier can be specified explicitly using the CLASSID attribute. This value takes precedence over a class identifier included as part of the object's data, e.g.,

```
<insert
id=clock1
type="application/x-oleobject"
classid="uuid:{663C8FEF-1EF9-11CF-A3DB-
080036F12502}"
data="http://www.acme.com/ole/clock.stm"
>
</insert>
```

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times the number of pixels of 2K projection. Included in the system is a playback server (LMT-300) along with the ability to show alternative content through the system's 2 input options. Sources could be anything from a Blu-ray player to satellite feeds, yet Sony's systems are priced competitively with the lower resolution 2048x1080 (2K) or 2.2 MP (megapixels) DLP projectors.

Other manufacturers have been developing digital projector technology, but these have not yet been deployed into cinemas and are not commercially available in versions that conform to the DCI specification.

2.9 LINKING MULTIMEDIA OBJECTS

HTML 2.0 defined only a single mechanism for inserting media into HTML documents: the IMG tag. While this tag has certainly proved worthwhile, the fact that it is restricted to image media severely limits its usefulness as richer and richer media finds its way onto the Web.

Developers have been experimenting with ideas for dealing with new media: Microsoft's DYNASRC attribute for video and audio, Netscape's EMBED tag for compound document embedding, and Sun's APP and APPLLET tags for executable code.

Each of these proposed solutions attacks the problem from a slightly different perspective, and on the surface are each very different. In addition, each of these proposals falls short, in one way or another, of meeting the requirements of the Web community as a whole. However, we believe that this problem can be addressed with a single extension that addresses all of the current needs, and is fully extensible for the future.

This specification defines a new tag <INSERT> which subsumes the role of the IMG tag, and provides a general solution for dealing with new media, while providing for effective backwards compatibility with existing browsers. INSERT allows the HTML author to specify the data, including persistent data and/or properties/parameters for initializing objects to be inserted into HTML documents, as well as the code that can be used to display/manipulate that data. Here, the term object is used to describe the things that people want to place in HTML documents, but other terms for these things are: components, applets, plug-ins, media handlers, etc.

The data can be specified in one of several ways: via a universally unique object identifier (uuid) (<<REFERENCE OSF/DCE RPC Specification>>), a file specified by a URL, in-line data, or as a set of named properties. In addition, there are a number of attributes that allow authors to specify standard properties such as width, and height. The code for the object is specified in several ways: indirectly by the object's uuid, by information included as part of the object's data, and the combination of an object class name and a network address.

This specification covers the syntax and semantics for inserting such objects into HTML documents, but leaves out the architectural and application programming interface issues for how objects communicate with the document and other objects on the same page. It is anticipated that future specifications will cover these topics, including scripting languages and interfaces.

An introduction to the INSERT tag

This section is intended to help readers get the feel of the insertion mechanism, and is not a normative part of the specification. The INSERT tag provides a richer alternative to the IMG tag. It may be used when the author wishes to provide an alternative for user agents

digital cinemas is over 98%. Currently in development are other cameras capable of recording 4K RAW, such as Dalsa Corporation's *Origin* and Canon's 4K "Multipurpose", and cameras capable of recording 5K, such as the RED EPIC, and cameras capable of recording 3K (for budget filmmakers) such as the RED SCARLET. The Dalsa Origin was terminated by Dalsa in 2008.

Digital post-production

In the post-production process, camera-original film negatives (the film that physically ran through the camera) are scanned into a digital format on a scanner or high-resolution telecine. Data from digital motion picture cameras may be converted to a convenient image file format for work in a facility. All of the files are 'conformed' to match an edit list created by the film editor, and are then color corrected under the direction of the film's staff. The end result of post-production is a digital intermediate used to record the motion picture to film and/or for the digital cinema release.

Digital mastering

When all of the sound, picture, and data elements of a production have been completed, they may be assembled into a *Digital Cinema Distribution Master* (DCDM) which contains all of the digital material needed for projection. The images and sound are then compressed, encrypted, and packaged to form the *Digital Cinema Package* (DCP).

Digital projection

There are currently two types of projectors for digital cinema: Early DLP projectors, which were deployed primarily in the U.S., used limited 1280×1024 resolution or the equivalent of 1.3 MP (megapixels). They are still widely used for pre-show advertising but not usually for feature presentations. The DCI specification for digital projectors calls for two levels of playback to be supported: 2K (2048 × 1080) or 2.2 MP at 24 or 48 frames per second, and 4K (4096 × 2160) or 8.85 MP at 24 frames per second.

Three manufacturers have licensed the DLP Cinema technology developed by Texas Instruments (TI): Christie Digital Systems, Barco, and NEC. Christie, long established in traditional film projector technology, is the maker of the CP2000 line of projectors—the most widely deployed platform globally (approximately 5,500 units in total). Barco launched the DP-series of 2K DCI-compliant Digital cinema projectors; next to this Barco designs and develops visualization products for a variety of selected professional markets. NEC currently manufactures the Series II NC1200C, NC2000C and NC3200S 2K projectors for large, medium and small screen respectively, and the NC3240 in 2011 to represent the first generation 4k NEC DCI projector. Starus Digital Cinema Server system, as well as other equipment to connect PCs, analog/digital tape decks and satellite receivers, DVD, and off-air broadcast, etc. for pre-show and special presentations. While NEC is a relative newcomer to Digital Cinema, Christie is the main player in the U.S. and Barco takes the lead in Europe and Asia. In addition Digital Projection Incorporated (DPI) designed and sold a few DLP Cinema units when TI's 2K technology first debuted but then abandoned the D-Cinema market while continuing to offer DLP-based projectors for non-cinema purposes. Although based on the same 2K TI "light engine" as those of the major players they are so rare as to be virtually unknown in the industry. As of January, 2009, there are more than 6,000 DLP-based Digital Cinema systems installed worldwide, of which 80% are located in North America.

The other technology is made by Sony and is labeled "SXRD" (LCOS) technology. The projectors, SRXR220 and SRXR320, offer 4096x2160 (4K) resolution and produce four

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point when making a flipbook is this: keep your drawings bold and simple. A black fine-point felt tipped pen is best for your sketches. If you prefer the correctability of a pencil, go over the pencil sketches with ink when you have them finished.

A **Phenakistoscope** is another simple animation device. The word comes from the Greek words *phainen*, to show; *kinein*, to move; and *skopos*, to aim or target ("scope" is now used to mean a viewing device like a telescope or microscope).

A phenakistoscope consists of a flat disk painted black on one side, with radial slots cut into the outer edge. It is mounted to a wooden handle with a thumbtack through its center so it spins freely. On the unpainted side between the slots are drawn a series of sketches having slight changes from one to the next. The disk is spun and you look through the slots at a mirror so you can see the side with the sketches. The major difference between the type of animation that can be done with a phenakistoscope and a flipbook is that the phenakistoscope has only a small number of drawings (usually eight or 12), and the movement of the sketch has to begin and end in the same position to form a smooth repeating cyclic motion.

Zoetropes (from Greek *zoion*, living being; and *trop e*, to turn) are very similar to phenakistoscopes except that you make a slotted cylinder rather than a slotted disk. The figures to be animated are drawn on the inside wall of the cylinder. The outside is painted black.

The zoetrope cylinder sits in some sort of round shallow tray. A large film can works well; the best ones I have made have used movie reel cans. What about making a zoetrope out of a lazy Susan? Pie tins or even cardboard pizza package bottoms work. A hole is punched through the round pan or disk, and attached to a wooden handle or base. The slotted cylinder, with completed cartoon drawings on the inside, is attached to the disk or inserted into the can. The whole thing is spun, and you look through the slots to the opposite inside wall, where you see the animated action.

A word of warning when making phenakistoscopes and zoetropes. Don't forget to paint the side you look through black or to make it from black paper. It is essential for the device to work well! If the outside is left white, then the cartoon image has to compete with a full white after-image, which completely washes it out.

2.8 DIGITAL MOVIES AND OTHER ACCESSORIES

Digital cinema refers to the use of digital technology to distribute and project motion pictures. A movie can be distributed via hard drives, optical disks (such as DVDs) or satellite and projected using a digital projector instead of a conventional film projector. Digital cinema is distinct from high-definition television and, in particular, is not dependent on using television or HDTV standards, aspect ratios, or frame rates. Digital projectors capable of 2K resolution began deploying in 2005, and since 2006, the pace has accelerated (2K refers to images with 2,048 pixels of horizontal resolution).

Digital capture

As of 2009, the most common acquisition medium for digitally projected features is 35 mm film scanned and processed at 2K (2048 × 1556) or 4K (4096 × 2160) resolution via digital intermediate. Most digital features to date have been shot at 1920 x 1080 HD resolution using cameras such as the Sony CineAlta, Panavision Genesis or Thomson Viper. New cameras such as the Arri Alexa can capture 2K resolution images, and the Red Digital Cinema Camera Company's Red One can record 4K. The marketshare of 2K projection in

2.6 SOUND EDITING PROGRAMS

A **sound editor** is a creative professional responsible for selecting and assembling sound recordings in preparation for the final sound mixing or mastering of a television program, motion picture, video game, or any production involving recorded or synthetic sound. Sound editing developed out of the need to fix the incomplete, undramatic, or technically inferior sound recordings of early talkies, and over the decades has become a respected filmmaking craft, with sound editors implementing the aesthetic goals of motion picture sound design.

The Academy of Motion Picture Arts and Sciences recognizes the artistic contribution of exceptional sound editing with the Academy Award for Best Sound Editing.

There are primarily 3 divisions of sound that are combined to create a final mix, these being dialogue, effects, and music. In larger markets such as New York and Los Angeles, sound editors often specialize in only one of these areas, thus a show will have separate dialogue, effects, and music editors. In smaller markets, sound editors are expected to know how to handle it all, often crossing over into the mixing realm as well. Editing effects is likened to creating the sonic world from scratch, while dialogue editing is likened to taking the existing sonic world and fixing it. Dialogue editing is more accurately thought of as "production sound editing", where the editor takes the original sound recorded on the set, and using a variety of techniques, makes the dialogue more understandable, as well as smoother, so the listener doesn't hear the transitions from shot to shot (often the background sounds underneath the words change dramatically from take to take). Among the challenges that effects editors face are creatively adding together various elements to create believable sounds for everything you see on screen, as well as memorizing their sound effects library.

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2.7 ANIMATION DEVICES

Persistence of vision is what we call the behaviour of our eyes when an image is flashed on them and taken away suddenly. Our eyes retain the image for a fraction of a second, or even longer. If we quickly replace the first image with a second one, the eye blends the two together. If it weren't for this "defect" in our vision, movies and television would always have a jerky look to them that would probably make them difficult to watch.

A variety of simple devices can be made that allow you to explore persistence of vision, while you experiment with primitive animation techniques. I will discuss four of these devices: Thaumatrope, Flipbooks, Phenakistoscopes and Zoetropes.

Thaumatrope from Greek *thauma*, wonder; and *trop e*, to turn. are the simplest of all animation devices. They are made from a cardboard disk with two small holes in opposite edges. A simple scene is drawn on one side of the disk, and a corresponding element of the scene is drawn on the reverse side, in the correct orientation and placement. Threads are attached to the holes, and the threads are pulled tight and twirled between the thumb and forefinger of each hand. The disk spins and the images on the two sides blend into one.

Flipbooks are the next simplest animation device to make. They consist of a stack of blank pieces of paper or thin cardstock stapled to form a book. A slightly different picture is sketched on each page, and as the book is rapidly flipped, the sketches appear to move. This is a good starting point for classroom or home investigation of the technique of animation, as it demonstrates the need to make small changes from one drawing to the next. An important

Interactive Fill Tool

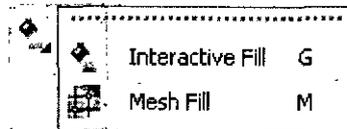
It has the options shown next. As shown, this tool has two different tools under it. They are:

Interactive Fill tool

It allows you to fill the object or closed paths in different styles.

Mash Fill tool

It allows you to apply solid colour to the object.



NOTES

2.5 OCR SOFTWARE

Optical character recognition, usually abbreviated to **OCR**, is the mechanical or electronic translation of scanned images of handwritten, typewritten or printed text into machine-encoded text. It is widely used to convert books and documents into electronic files, to computerize a record-keeping system in an office, or to publish the text on a website. OCR makes it possible to edit the text, search for a word or phrase, store it more compactly, display or print a copy free of scanning artifacts, and apply techniques such as machine translation, text-to-speech and text mining to it. OCR is a field of research in pattern recognition, artificial intelligence and computer vision.

OCR systems require calibration to read a specific font; early versions needed to be programmed with images of each character, and worked on one font at a time. "Intelligent" systems with a high degree of recognition accuracy for most fonts are now common. Some systems are capable of reproducing formatted output that closely approximates the original scanned page including images, columns and other non-textual components.

OCR software

Desktop and Server OCR Software

OCR software and ICR software technology are analytical artificial intelligence systems that consider sequences of characters rather than whole words or phrases. Based on the analysis of sequential lines and curves, OCR and ICR make 'best guesses' at characters using database look-up tables to closely associate or match the strings of characters that form words.

WebOCR and OnlineOCR

With IT technology development, the platform for people to use software has been changed from single PC platform to multi-platforms such as PC + Web-based + Cloud Computing + Mobile equipments. After 30 years development, OCR software started to adapt to new application requirements. WebOCR also known as OnlineOCR or Web-based OCR service, has been a new trend to meet larger volume and larger group of users after 30 years development of the desktop OCR. Internet and broad band technologies have made WebOCR and OnlineOCR practically available to both individual users and enterprise customers. Since 2000, some major OCR vendors began offering WebOCR and Online software, a number of new entrants companies to seize the opportunity to develop innovative Web-based OCR service, some of which are free of charge services.

1/2 pt tool

It allows you to create the 1/2 point thick outline.

1 pt tool

It allows you to create the 1 point thick outline.

2 pt tool

It allows you to create the 2 point thick outline.

8 pt tool

It allows you to create the 8 point thick outline.

16 pt tool

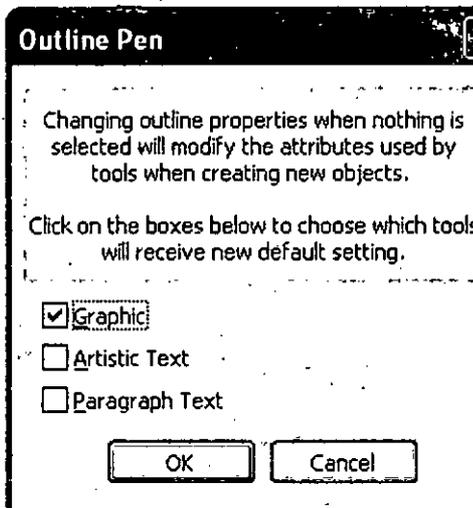
It allows you to create the 16 point thick outline.

24 pt tool

It allows you to create the 24 point thick outline.

Color tool

It allows you to set the colour model and colour values while filling the object or applying colour to outline from the Color Docker that appears after clicking this tool.



Fill Tool

It has the options shown next. As shown, this tool has eight different tools under it. They are:

Fill tool

It allows you to fill the object or closed paths in different styles.

Uniform Fill tool

It allows you to apply solid colour to the object.

Fountain Fill tool

This tool is smooth progression of two or more colours that adds depth to objects.

Pattern Fill tool

It allows you fill object with 2-colour, Full colour, or Bitmap colour.

Texture Fill tool

It allows you to give your objects a natural appearance. CoreIDRAW provides preset textures and each texture has a set of options that you can change as per your requirement.

PostScript Fill tool

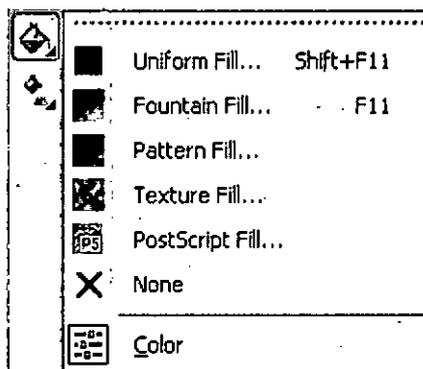
It is used to apply PostScript texture fills to objects. A PostScript texture fill is created by using the PostScript language.

None tool

It is used to give no colour to the object.

Color tool

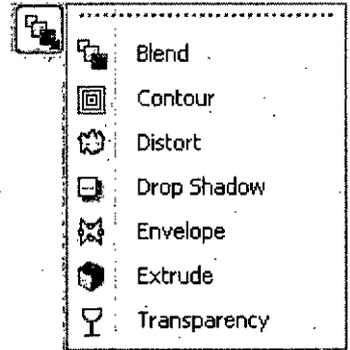
It allows you to set the colour model and colour values while filling the object or applying colour to outline from the Color Docker that appears after clicking this tool.



NOTES

Contour tool

It allows you to apply a contour to an object.



Distort tool

It allows you to apply a push or pull distortion, a zipper distortion, or a twister distortion.

Drop Shadow tool

It is used to apply a drop shadow to an object.

Envelop tool

It allows you to distort an object by dragging the nodes of envelop.

Extrude tool

It is used to apply an effect which gives impression to the viewer as if object is originating from a certain or specified point.

Transparency tool

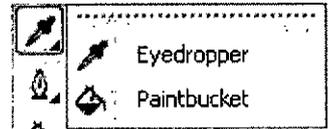
It allows you to apply transparency to objects.

Eyedropper Tools

It has the options shown next. As shown, this tool has two different tools under it. They are:

Eyedropper tool

It allows you to select and copy the object properties, such as fill, line thickness, size, and effects, from an object on the Draing window.



Paintbucket tool

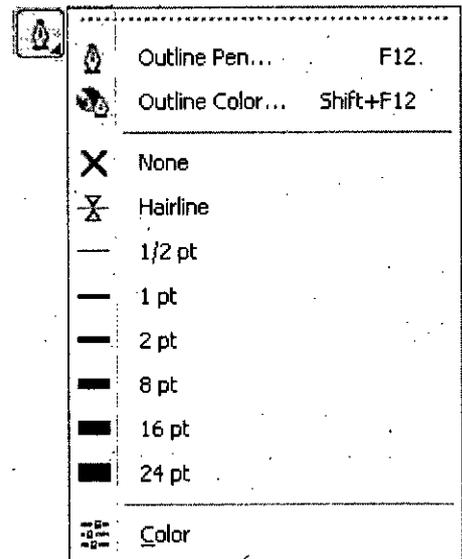
It allows you to apply object properties, such as fill, link thickness, size and effects, to other objects.

Outline Tool

It has the options shown next. As shown, this tool has eleven different tools under it. They are:

Outline Pen tool

It allows you change the appearance of outlines by using the controls present in the dialog box appeared after clicking this tool. For example, you can specify the colour, width, and style of outlines.



Outline Color tool

It allows you to set the options to defin the outline colour of the object from the dialog box appeared after clicking this tool.

None tool

The outline of the shape will be disappeared after clicking this tool.

3-Point Ellipse tool It is used to draw ellipse at a rotation angle.

Polygon Tools

It has the options shown next. As shown, this tool has five different tools under it. They are:

Polygon tool

It is used to draw symmetrical polygons.

Star tool

It is used to draw perfect star.

Complex Star tool

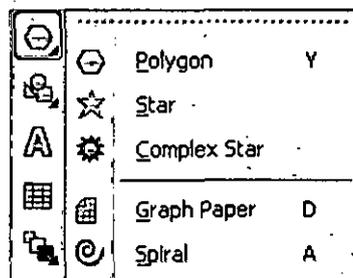
It is used to draw complex stars that have intersecting sides.

Graph Paper tool

It is used to draw a grid of lines.

Spiral tool

It is used to draw symmetrical and logarithmic spirals.



NOTES

Basic Shape Tools

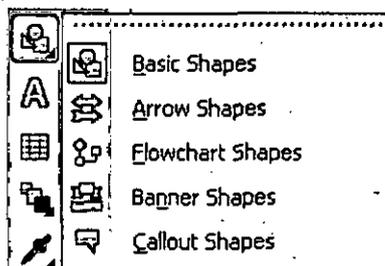
It has the options shown next. As shown, this tool has two different tools under it. They are:

Basic Shapes tool

It allows you to choose from a full set of shapes, including hexagram, a smiley face, and a right-angle triangle.

Arrow Shapes tool

It allows you to draw arrows of different shape, direction, and add arrow-heads at the starting and ending points.



Flowchart Shapes tool It allows you to draw the flow chart symbols.

Banner Shapes tool It allows you to draw the ribbon objects and exposition shapes.

Callout Shapes tool It is used to draw the callouts and labels.

Text Tool

It has only one option under it. It is:

Text tool

It allows you to type words instantly on the Document page as Artistic or Paragraph Text.

Table Tool

It has only one option under it. It is:

Table tool

It allows you to draw and edit the table.

Interactive Blend Tools

It has the options shown next. As shown, this tool has seven different tools under it. They are:

Interactive Blend tool It allows you to blend two objects.

2.4 PAINTING AND DRAWING TOOLS

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Freehand Tools

It has the options shown next. As shown, this tool has seven different tools under it. They are:

Freehand tool

It allows you to draw the single line segments and the curves.

Bezier tool

It allows you to draw curved line segments.

Artistic Media tool

It provides access to Brush, Sprayer, Calligraphic and Pressure tools.

Pen tool

It lets you draw straight as well as curved line segments.

Polyline tool

It allows you to draw lines and curves in preview mode.

3 Point Curve tool

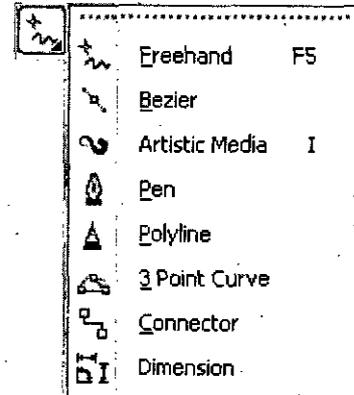
It is used to draw curves at a rotational angle.

Connector tool

It is used to join the two objects with a line.

Dimensional tool

It is used to draw vertical, horizontal, slanted or angular dimensional lines.



Smart Fill Tools

It has the options shown next. As shown, this tool has two different tools under it. They are:

Smart Fill tool

It helps to identify the enclosed area when one object overlaps the other one and fill the enclosed areas.



Smart Drawing tool It is used to convert your freehand strokes to basic shapes and smoothed curves.

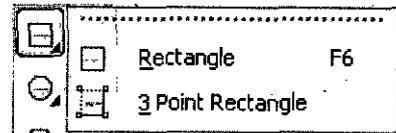
Rectangle Tools

It has the options shown next. As shown, this tool has two different tools under it. They are:

Rectangle tool

It is used to draw a rectangle.

3-Point Rectangle tool It is used to draw rectangles at a rotational angle.

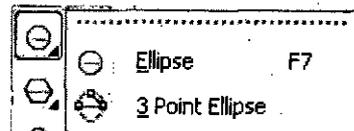


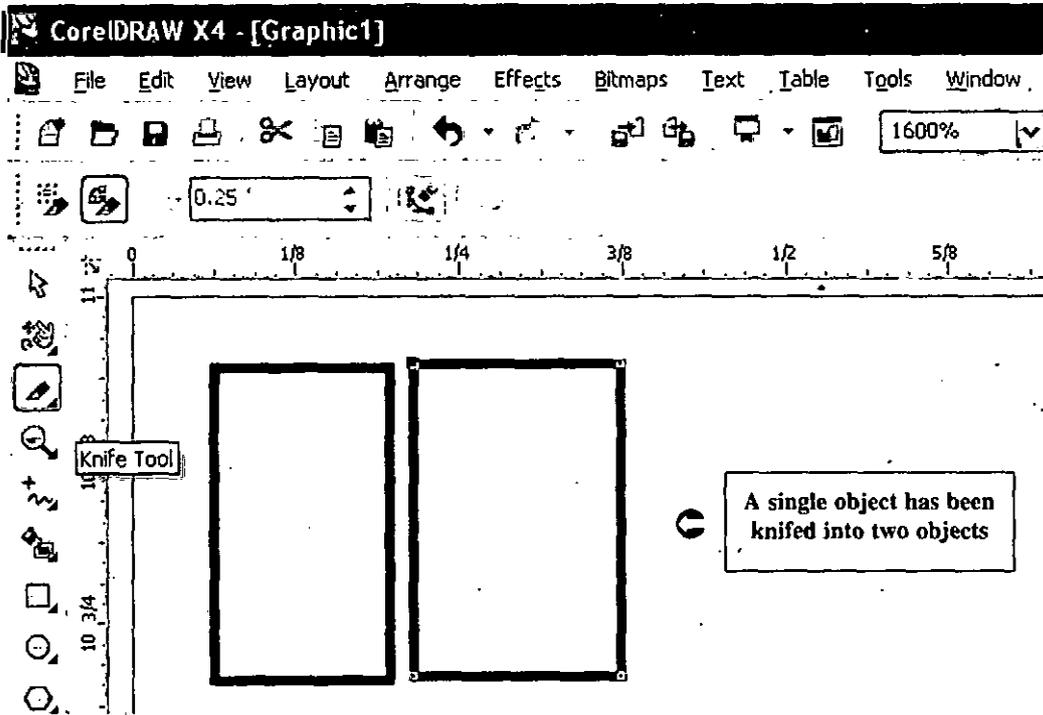
Ellipse Tools

It has the options shown next. As shown, this tool has two different tools under it. They are:

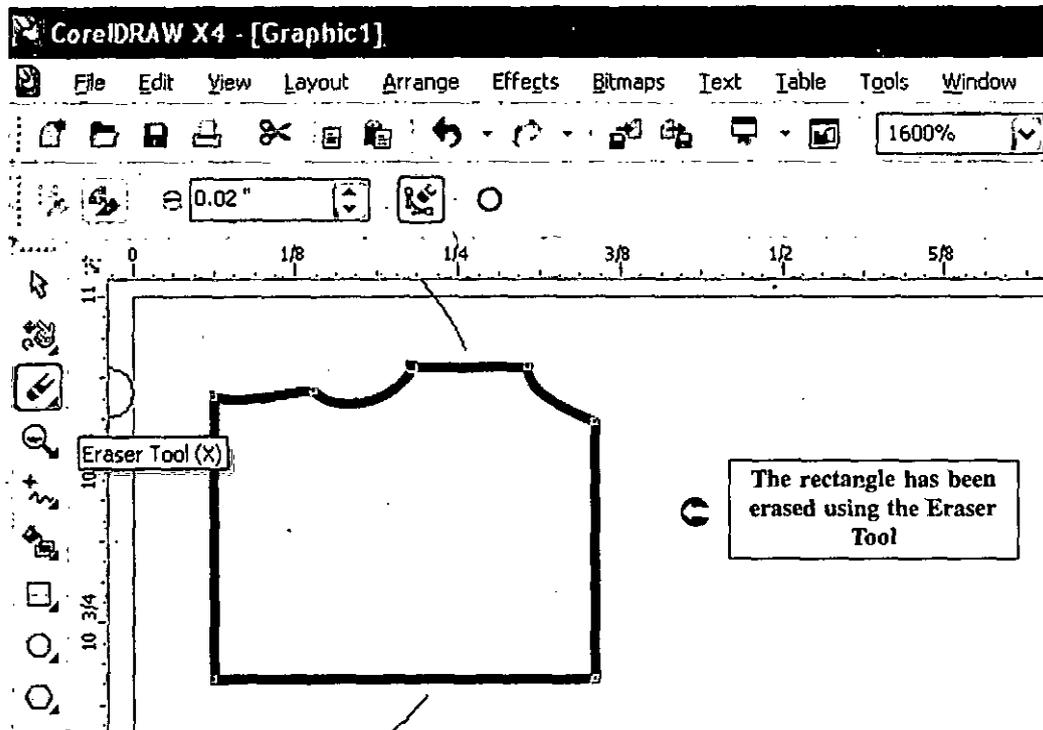
Ellipse tool

It is used to draw an ellipse.





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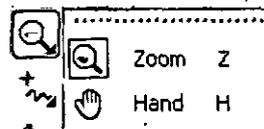


Zoom Tools

It has the options shown next. As shown, this tool has two different tools under it. They are:

Zoom tool

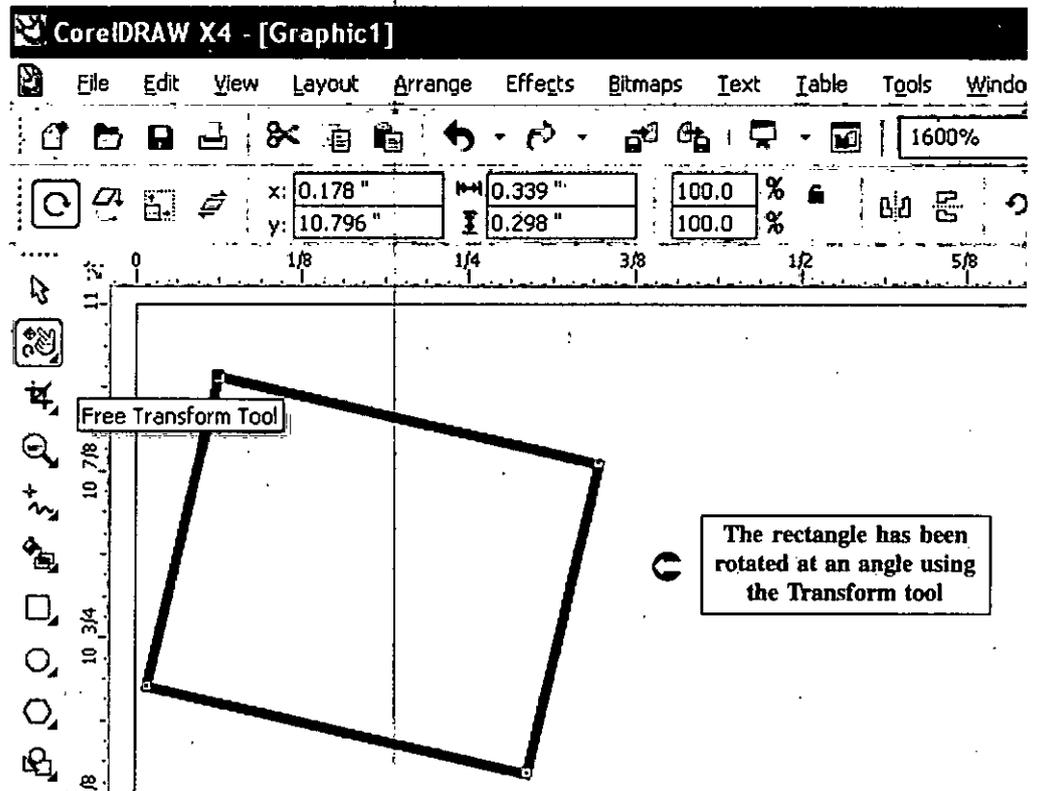
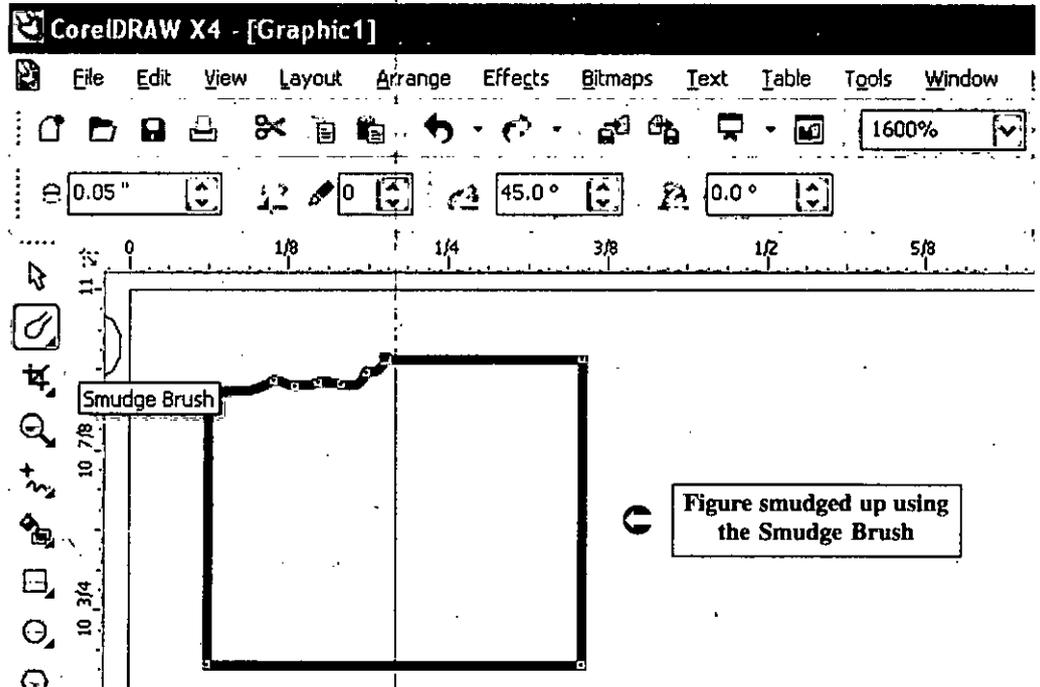
It allows you to change the magnification level in the drawing window.



Hand tool

It lets you view that area of a drawing that is not exhibited.

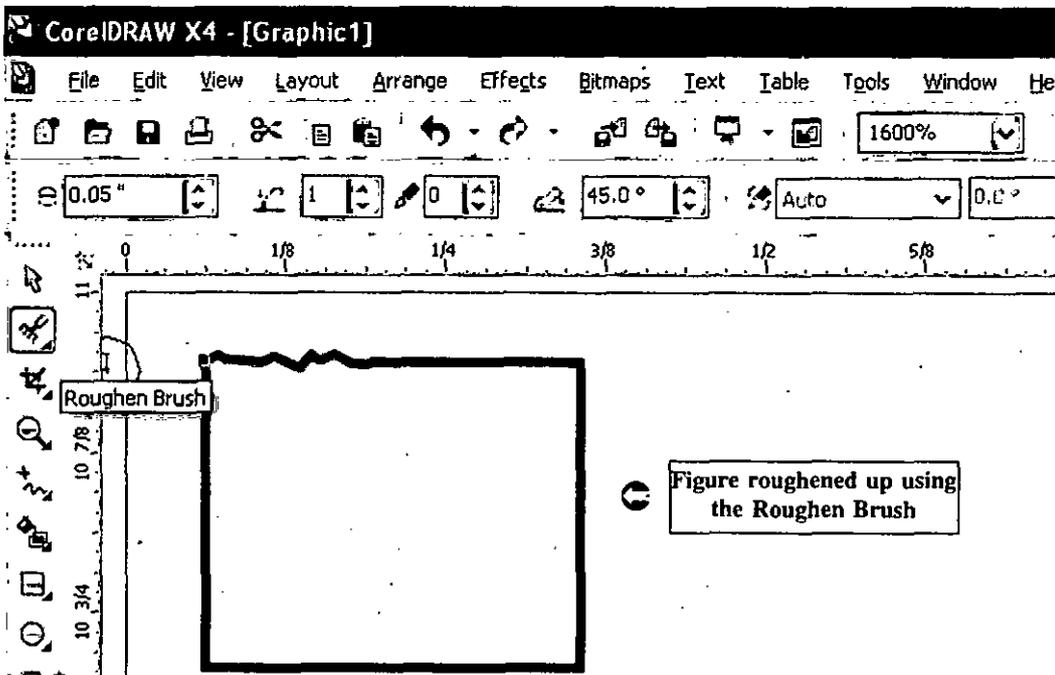
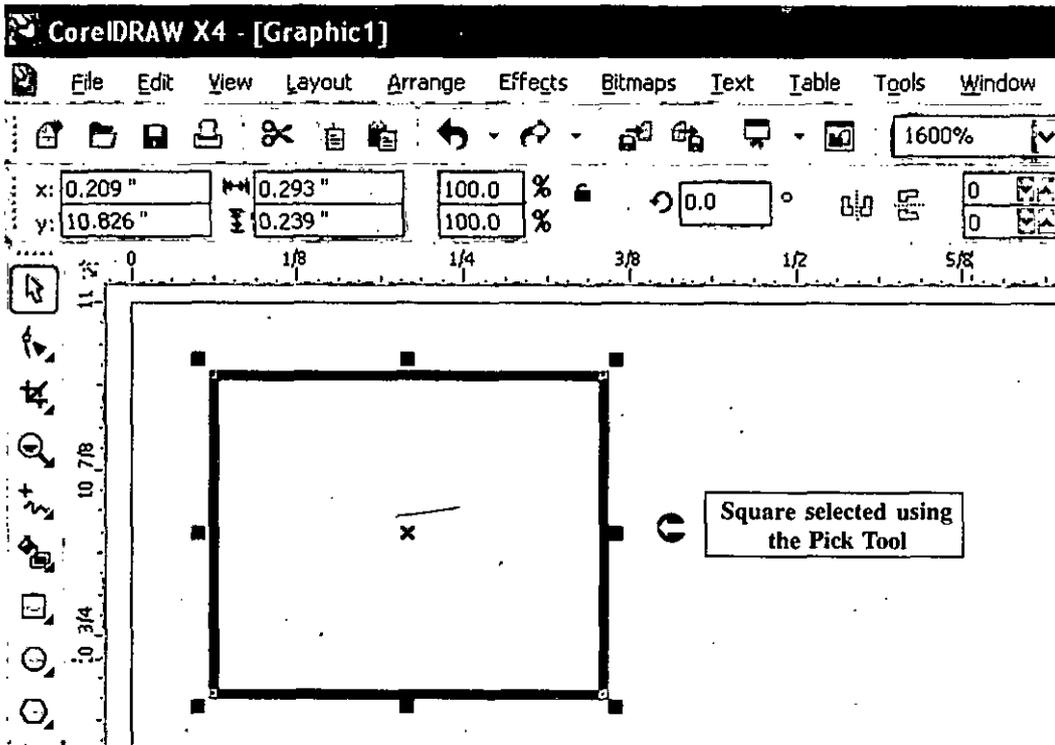
NOTES



- Eraser tool** It allows you to remove or erase the areas of your drawing.
- Virtual Segment Delete tool** It allows you to delete the portion of the objects that are between intersections.

In the following figures each one of them have been used and the object changed using the tool, mentioned there. In the case of Virtual Segment Delete, the whole of the object has been deleted.

NOTES



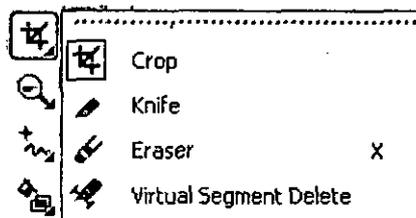
In the following figures each one of them have been used and the object changed using the tool, mentioned there.

Crop Tools

It has the options shown next. As shown, this tool has three different tools under it. They are:

Knife tool

It helps you to create two separate objects by cutting them.



NOTES

- to learn about Animation Devices
- to learn about Digital Movies and Other Accessories
- to learn about Linking Multimedia Objects
- to learn about Office Suites: Word processor, Spreadsheet, Presentation Tools
- to learn about Types of Authoring tools
- to learn about Card and Page based
- to learn about Icon Based and Time Based Authoring Tools
- to learn about Object Oriented Tools

2.2 INTRODUCTION

In this unit, you will learn about Basic tools of drawing and painting. You will learn about OCR software. Learn about the various Sound Editing Programs. You will also be introduced to Animation Devices. You will be introduced to Digital Movies and Other Accessories. Learn about the various steps involved in Linking Multimedia Objects. Learn about the various Office Suites components such as Word processor, Spreadsheet, and Presentation Tools. Learn about the various multimedia authoring tools. You will be introduced to Card and Page based multimedia tools. You will also learn about various Icon based and Time based authoring tools. Finally you would learn about various Object Oriented Tools

2.3 BASIC TOOLS

Following are some of the basic tools which can be used in multimedia. Here I am giving them reference to CorelDRAW. You can find them in other software like Photoshop too. The working of the tools remain more or less similar.

Pick Tools

This tool is used to select, resize, skew, and rotate the objects or images on the document page. In the following figure the rectangle has been picked by the Pick tool.

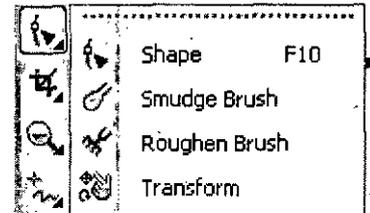
Shape Tools

It has the options shown next. As shown, this tool has three different tools under it. They are:

Smudge Brush tool It allows you to distort a vector object by dragging along its outline.

Roughen Brush tool It allows you to distort the outline of a vector object by dragging along the outline of the object.

Transform tool It allows you to transform an object by rotating it around a fix point, miroring it, scaling it, and skewing it.



UNIT—2

MULTIMEDIA SOFTWARE

NOTES

STRUCTURE

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Basic tools
- 2.4 Painting and Drawing Tools
- 2.5 OCR software
- 2.6 Sound Editing Programs
- 2.7 Animation Devices
- 2.8 Digital Movies and Other Accessories
- 2.9 Linking Multimedia Objects
- 2.10 Office Suites
- 2.11 Word processor
- 2.12 Spreadsheet
- 2.13 Presentation Tools
- 2.14 Types of Authoring tools
- 2.15 Card and Page based
- 2.16 Icon based Authoring Tools
- 2.17 Time based Authoring Tools
- 2.18 Object Oriented Tools
 - Summary
 - Review Questions
 - Further Readings

2.1 OBJECTIVES

The objectives of this unit can be summarized as followings:

- to learn about Basic tools
- to learn about Painting and Drawing Tools
- to learn about OCR software
- to learn about Sound Editing Programs

NOTES

11. Write down the different types of Mouse?
12. Write down the steps to use the Mouse?
13. How Mouse Works?
14. Write down the use of button of the mouse and also how it is connected to the computer?
15. Write down the advantages and disadvantages of mouse.
16. What is Joystick and how it works?
17. What is Optical Recognition?
18. What are the advantages and disadvantages of Optical Mark Reading (OMR)?
19. What are the drawbacks of Optical Mark Reading (OMR)?
20. What is a Scanner?
21. Define different types of Scanners?
22. What is a Digital Camera?
23. What are the uses of Digital Camera?
24. What is MICR (Magnetic-Ink Character Recognition)?
25. Write down the advantages and disadvantages of MICR (Magnetic-Ink Character Recognition).
26. What is a Light Pen? How does it work?
27. What are the drawbacks of Light Pen?
28. What is a Trackball? What are the uses of Trackball?
29. What is a Touch Screen?
30. What is the use of Touch Pad?
31. What is Voice Recognisers?
32. What are the drawbacks of Voice Recogniser?
33. What is Voice Input device?
34. What are Output Devices?
35. Categorise the Input Devices?
36. What is a Printer? Define different kind of printers?
37. What is a Dot Matrix Printer? Write down the drawbacks of a Dot Matrix Printer.
38. Write down the characteristics of Daisywheel Printers.
39. Write down the drawbacks of Daisywheel Printers.
40. What is a Laser printer? What are the characteristics of Laser printer?
41. What is Speech Synthesizers?
42. What is Monitor? What are the terms associated with Monitor?
43. What are the Terminals? Explain different types of Terminals.
44. What are the uses of Terminals?
45. What is a Floppy disk? Define different types of Floppy disk.
46. What is a Floppy disk drive? Define different types of Floppy disk drive.
47. How do you take care of your Floppy Disks?

FURTHER READINGS

1. **Multimedia and Web Technology** : *Ramesh Bangia*, Laxmi Pub, 2007
2. **Computer Graphics and Multimedia** : *Ehtiram Raza Khan and Huma Anwar*, Laxmi Pub, 2008
3. **Multimedia Applications and Web Designing**: *Dinesh Maidasani*, Laxmi Pub, 2008
4. **Computer Graphics With Multimedia** : *A. Rajaraman*, Narosa, 2009
5. **Computer Graphics, Multimedia And Animation** : *Malay K. Pakhira*, PHI Learning, Second Edition
6. **Computer, Internet and Multimedia Dictionary** : *S. Verma*, Universities Press, 1998.

Using Reading Technologies

Speech output from a computer may be used for all reading and communication, as well as for all written assignments and in e-learning situations.

The more complex screen readers can be adapted (via macros, scripts and mapping) to work with course-specific programs such as statistics software, databases and programming languages.

It is possible to network these programs so that they are accessible to all, but ensure students are still able to customise settings, such as the voice type, speed, pitch and volume, to their preferences.

Be aware that extra time may be needed. It is not possible to skim read or scan with audio, and reading has to occur in a linear format. Picking out key points takes longer. Try to reduce the reading load if possible.

Material without informative headings or a clear layout that can be captured by the screen reader takes longer to navigate.

Braille and speech output note takers use similar software to that found on the computer, and this may be audible at times, so headphones may be required for use in open access areas.

SUMMARY

- Input device is used to input data into computer.
- Output device is used to get result from the computer.
- Keyboard has 101 keys.
- Alpha keys are there for typing alphabets A to Z.
- Numeric keys are there for typing numerals 0 to 9.
- Function keys are used in programming.
- Arrow keys are used for moving the cursor on the screen.
- Special keys are used for special purposes.
- Numeric pad has other keys too besides the numeric ones.
- Mouse is basically a pointing device.
- There are three basic types of Mouse: Mechanical Mouse; Optomechanical Mouse and Optical Mouse.
- Joystick is used for playing games.
- There are two types of optical recognition input devices: Optical Character Recognition (OCR) and Optical Mark Reading (OMR).
- A scanner reads text, photographs and graphics from paper which are then converted into bit patterns for processing, storage or output.
- A digital camera can store many more pictures than an ordinary camera.
- MICR is a technology related to the recording of information on document by means of magnetized ink characters.
- A light pen is a small pen-shaped wand, which contains light sensors.
- Trackball is a pointing device that works like an upside-down mouse.
- Voice recognizers accept the spoken word through a microphone and convert it into binary code.
- Monitor is like a TV and is used to display output.
- The printers can be divided into two distinct categories: Impact Printers and Non-impact Printers.
- Dot matrix printers use hammers to print characters.
- Line printer prints an entire line in a single operation without necessarily printing one character at a time.

Electronic note takers

Electronic note takers include those held as a pen that scans in text from books or journals for use by students who have specific learning difficulties including dyslexia, or by those with coordination difficulties who find hand writing difficult. In this case, the text is transferred directly from the pen to the computer, whereas with a note-taking pen using electronic paper the student actually writes notes and can draw diagrams that are then be transcribed as typed text or as a graphic to the computer.

The other types of electronic note takers tend to be linked to the use of laptops, with specialist software such as SpeedText or Stereotype for note taking by students who are deaf or have a hearing impairment.

Small, battery-operated portable keyboards can also be very useful for students who prefer to type rather than hand write notes. They produce simple text files without formatting, but are easy to use.

Using Electronic Note Takers

Pen note takers can be very useful for private study, in the library and for noting citations. Electronic ink versions are best for transferring diagrams for science and art subjects as well as for mind mapping.

The programs used by specialists to support deaf students in lectures speed the note-taking process. They give the student a chance to join any discussion and get an instant copy of the notes. Note takers working with SpeedText and Stereotype offer a summary, so the specialist taking notes needs to have an understanding of the lecture. A specialist working with Palantype takes word-for-word notes, so does not have to have an understanding of the subject discussed.

Portable keyboards, tablet PCs and even some personal digital assistants (PDA) can be very useful for taking notes in any situation. They are less cumbersome than a laptop and the portable keyboards tend to be more robust, which is useful on field trips.

Pen scanners are slow for large amounts of data and there are times when the downloaded text has to be corrected. This is also true for the electronic ink versions, where unclear writing may not be recognised when transcription takes place.

Specialist note takers do need to take breaks during long lectures and it is important to discuss this, and the use of other aids, before a teaching session. Give the note taker an opportunity to clarify items if necessary, and remember to leave any complex or specialised information you display, such as numbers, formulas or specialised terms, on show for longer.

Reading Technologies

There are many items that help with reading, either on paper or a screen, including magnification and Braille, which can be found under their own headings.

For computer-based work you will generally find that students who are blind or visually impaired may use screen reading technology, while those with specific learning difficulties are helped by text to speech. The former includes speech output for every action and navigational element, while the latter has speech output just of the text in the reading window.

Other reading technologies may include very complex electronic page turners for those with mobility difficulties, or simple devices like a tracking ruler, or acetate coloured overlays to aid reading skills or reduce glare when reading black text on white paper.

NOTES

5. Terminals extend the use of the computer to various places of work. They are widely used for such tasks as control, entering orders, updating accounts and seat reservations. They can be sited at various points on a factory floor to record and receive information on different stages of an industrial process.

NOTES

Disadvantages of Terminals

1. Terminal dependency on the main server. If the main server goes down the connected terminals are useless.
2. Long hour work at visual display terminals are unhealthy *i.e.*; can cause strain in eyes, pain in wrist and back.
3. Terminals can not store data or create backup copies of data input, thereby forcing the user to rekey the original input data if it is lost.

1.15 COMMUNICATION DEVICES

Communication devices may be simple and designed just to enhance speech output, such as amplifiers. Or they may be more complex, such as communication aids or laptops using communication software, which are designed to augment independent speech for students with severe general mobility difficulties such as in cerebral palsy. A user of augmentative and Alternative Communication Aids (AAC) works through a series of pictures, symbols and words to produce sentences of synthesised speech.

Mobile or adapted telephones can also help communication. A deaf student might use text messaging to confirm appointments or to receive information from you.

E-mail is one of the most effective methods for communicating information to students and has a valuable role in an inclusive policy. Much of the equipment available to aid communication is electronic and uses synthesised speech. However non-electric boards or books that use pictures, symbols and words may also be used.

Using Communications

Speech amplification may be useful in students' presentations, or to answer questions in large halls. Communication aids, as specialist devices or as part of a laptop set up, can provide a student with total oral language support. Vocabulary can be adapted to suit chosen courses and even particular occasions, such as a viva voce, although this may involve specialist support. Mobile technology, text messaging and e-mailing are relevant to the online support offered to students whether the course has distance learning elements, is based on an e-learning paradigm or involves face-to-face tuition.

It may be easier to adapt a learning situation to support a quietly spoken student or one who has voice problems rather than set up special equipment. Amplification or the use of a microphone can help but some students feel embarrassed taking this action. A smaller room or a particular seating position may be all that is needed.

On average we speak at between 140–160 words per minute, whereas those using communication aids can manage around 12–50 words per minute. So allow extra time in question and answer sessions as well as for presentations.

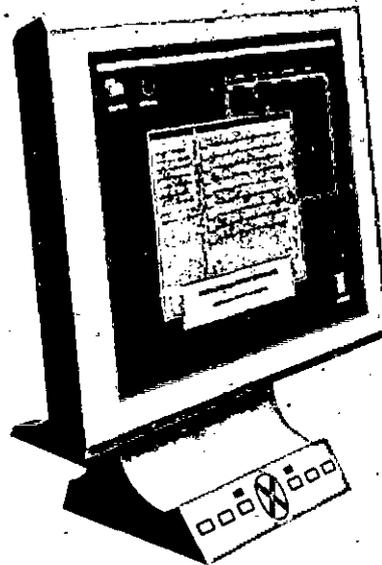
Text tends to be more concise than face-to-face conversations, which also include a considerable amount of non-verbal information. Be aware that some meaning may be lost in SMS or e-mail and misunderstandings can occur.

Flat-Panel Displays

These are thinner than CRTs and are used in small TV monitors, calculators, pocket Video games, laptop computers, armrest viewing of movies on airlines etc. We can separate flat-panel displays into two categories:

1. emissive displays
2. non-emissive displays

The emissive displays are devices that convert electrical energy into light *e.g.*, light-emitting diodes. Non-emissive displays use optical effects to convert sunlight or light from some other source into graphic patterns. For example; Liquid-crystal device.



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Plasma Display

A visual display which creates an image by causing a series of gas filled cells to be illuminated by means of an electric current. Each cell represents a picture element. It is an oldest flat screen technology. It uses neon gas and electrodes above and below the gas. Depending on the mixture of gases the colour displayed ranges from orange to red.

Advantages

1. Resolution is good
2. Glare is less
3. Flickering is absent
4. Images are brighter than CRT

Disadvantages

1. Uses lot of power
2. The technology is costly
3. Only a single colour is available (reddish orange)

TERMINALS

Terminals that use video screens are commonly called Visual Display Terminals or VDTs. The most common visual display terminals use Cathode Ray Tube (CRTs). Other technologies include Liquid Crystal Displays (LCDs), Electroluminescent (EL) displays and Plasma displays. The cathode ray tubes used in CRT terminals are similar to those used in TV and depend upon an electron gun aimed at a silvered screen.

Advantages of Terminals

1. They are relatively inexpensive.
2. Terminals are usually connected on line to a mainframe. This enables users to enter data directly into a processing system, thereby increasing the timeliness of data input and eliminating the need for intermediary storage media *viz.*, floppy disks.
3. User's ability to correct errors or to alter data that has already been typed.
4. Its ability to enter data to computer system from remote sites.

Two basic types of monitors are used with microcomputers.

The first is the typical monitor that you see on a desktop computer, which looks like a TV screen and work in same way. This type uses a large vacuum tube called a Cathode Ray Tube (CRT).

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The second type, known as a flat panel monitor is commonly used with notebook computers. Most of these employ Liquid Crystal Displays (LCDs) to render images.

Either of these types can be

Monochrome: Displaying only one colour against a contrasting background

Colour The most common technique for forming a characters on video screen in the dot matrix consisting of 35 dots as shown below

A screen usually displays between 500 to 2000 characters.

Colour CRT Monitor

A CRT monitor displays colour pictures by using a combination of phosphors that emit different coloured light. By combining the emitted light from the different phosphors a range of colours can be generated. The two basic techniques for producing colour displays with a CRT are:

1. Beam-penetration method and
2. Shadow-mask method

Beam-Penetration Method: It is used with random-scan monitors. Two layers of phosphor, usually red and green are coated onto the inside of the CRT screen and the displayed colour depends on how far the electron beam penetrates into the phosphor layers. A beam of slow electrons excites only the outer red layer. A beam of very fast electrons penetrates through the red layer and excites the inner green layer. At intermediate speeds combinations of red and green light are emitted to show two additional colours orange and yellow. At intermediate speed combinations of red and green light are emitted to show two additional colours orange and yellow. The speed of electrons and hence the screen colours at any point is controlled by the beam-acceleration voltage.

Shadow-Mask Methods: These methods are commonly used in raster-scan systems (including colour TV) because they produce a much wider range of colours than the beam penetration method. It has 3-phosphor colour dots at each pixel position. One phosphor dot emits red light, another emits a green light and the third emits a blue light. This type of CRT has three electron guns one for each colour. The 3-electron beams are deflected and focused as a group onto the shadow mask, which contains a series of holes aligned with the phosphor dot patterns. When the three beams pass through a hole in the shadow mask they activate a dot triangle which appears as a small colour spot on the screen. We obtain colour variations in a shadow-mask CRT by varying the intensity levels of the three electrons beams. By turning off the red and green guns, we get only the colour coming from the blue phosphor. The colour we see depends on the amount of excitation of the three phosphorus. When all the three phosphors are activated by equal intensity of beam we get grey or white colour. Colour CRTs in graphics systems are designed as RGB monitors. These monitors use shadow-mask methods & take the intensity level for each electron gun (red, green & blue) directly from the computer system without any intermediate processing.

directly to a computer to record output information. The process uses CRT and is called Computer Output on Microfilm (COM). In this process computer output is read onto magnetic tape and then in an off line operation, entered on film by a micro film recorder. The recorder can also receive information directly from the computer. Most recorders project the characters of output information onto the screen of CRT. A high speed camera then photographs the displayed information at speeds of up to 32000 lines per minute.

Advantages

1. It is easy to use and reliable to operate
2. The film used in microfilming is inexpensive, compared to paper copying costs per page. COM equipment can produce on a printer. But the real advantage of COM is the elimination of cumbersome volumes of printed output.
3. It reduces the amount of physical storage required for archival documents.

Disadvantages

1. It is permanent and therefore nonreusable
2. Once encoded in a particular sequence, can not be changed.
3. It can not be read without the assistance of a special reader device.

AUDIO-RESPONSE: VOICE OUTPUT

There are two types of voice-response units:

1. the first type, uses a reproduction of a human voice and other sounds, and
2. the second type, uses a speech synthesizer.

Like monitors, audio-response units provide a temporary, soft-copy output.

The first type of audio-response unit selects output from user-recorded words, phrases, music alarms, or anything you might record on audiotape. In these recorded audio-response units, the actual analog recordings of sounds are converted into digital data, then permanently stored on a memory chip. When output, a particular sound is converted back into analog before being routed to a speaker.

These chips are mass-produced for specific applications, viz., smoke detectors, microwave ovens, elevators, alarm clocks, automobile warning system, video games, telephones and banking, to mention only a few.

SPEECH SYNTHESIZERS

Speech Synthesizers, which convert the raw data into electronically produced speech, are more popular in the microcomputer environment. A speech synthesizer is capable of producing at least 64 unique sounds. Even with its limitations, the number of speech synthesizer application is growing. For example, a person who is visually impaired can use the speech synthesizer to translate printed words into spoken words.

In another application, speech synthesizers are used by people unable to communicate through speech.

THE MONITOR

These are perhaps the most important output devices because they are the output devices that people interact with most intensively.

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PLOTTERS

It is an output unit that directly produces a hardcopy record of data on a removable medium, in the form of a two-dimensional graphic representation. Plotters are designed to produce large drawings or images such as construction plans for buildings or blueprints for mechanical objects.

There are two major types of pen plotters:

1. Flatbed plotters
2. Drum plotters

FLATBED PLOTTERS

It uses a bed or tray to hold paper in a fixed position. A movable pen is usually held by a single arm that can move the pen both horizontally and vertically. The computer instructs the flatbed plotter by directing the pen to x-y position on the page.

Drawback

1. It limits picture sizes to the page dimensions of their tray.
2. Slow output device : can take hours to complete a complex drawing.

DRUM PLOTTERS

It has a single arm that can only move across the drum horizontally. The drum itself moves the paper forward or backward to enable the pen to draw in any vertical direction. Any type of diagonal line is drawn by combining a horizontal movement of the pen arm with a vertical page movement via the drum.

Drum plotters are used to produce continuous output, such as plotting earthquake activity, or for long graphic output, such as the structural view of a 'skyscraper'.

COMPUTER OUTPUT MICROFILM (COM) SYSTEM

Microfilm means "miniature film". It requires only 2 percent of the space required by paper documents. Computerized microfilming can be accomplished in these ways:

1. a photographic process
2. microfiche plate process
3. non-photographic techniques

Photographic Process: It is the oldest method, which develops a permanent microfilm slide negative. In this technique information on a source document is reduced in size, much like an object's picture is reduced in size through a camera lens.

Microfiche Plate Process: Microfilm can also be created with high speed cameras using rolls of microfilm or alternatively. On film plates called microfiche. The high-speed camera takes the photographs of the information displayed on the CRT. This process is very fast 10 to 20 times faster than high speed printers. The photographs can be taken at speeds up to 32000 lines per minute.

Non Photographic Techniques: It enables the user to avoid the film developing stage entirely. In one technique a silver-plated film is exposed and the microfilm becomes encoded with the use of an electron-beam recorder. It is now possible to couple a microfilm machine

LASER PRINTERS

The physical properties of LASERS (Light Amplification by Stimulate Emission of Radiation) allows for the very precise positioning of narrow beam of light, transferring a high energy source to a very small area. This property is used to control printing, *i.e.*, laser printers, to read information from bar codes and to read and write information in optical storage devices.

Laser printer is a non-impact printer that creates, by means of a laser beam directed on a photosensitive surface, a latent image which is then made visible by a toner and transferred and fixed on paper. A separate computer is built into the printer to interpret the data that it receives from the computer and to control the laser.

Just as electron gun in a graphic monitor can target any pixel, the laser in a laser printer can aim at any point on a drum creating an electrical charge.

Just as electron gun in a graphic monitor can target any pixel, the laser in a laser printer can aim at any point on a drum creating an electrical charge. Toner which is a composed of tiny particles of oppositely charged ink, sticks to the drum in the places the laser has charged. Thus, with pressure and heat, the toner is transferred off the drum to paper. Also laser printers contain special memory to store the images they print.

The resolution of laser printers is 600 DPI both horizontally and vertically; some high-end models have resolution of 1200 DPI.

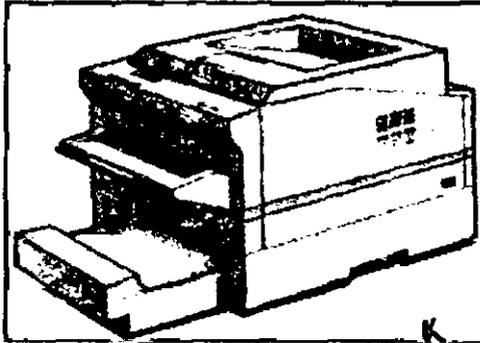
Advantages

1. Very high speed
2. Low noise level
3. Very high image quality
4. Excellent graphics capabilities
5. A variety of type sizes and styles
6. Uses standard, inexpensive copy paper which is loaded into a paper tray.

GRAPHICS OUTPUT DEVICES

Business people have found that sophisticated and colourful graphics add an aura of professionalism to any report or presentation. This demand for presentation graphics has created a need for corresponding output devices.

Computer-generated graphic images can be re-created on paper and transparency acetates with printers and plotters. Graphic images also can be captured on 35-mm slides, or they can be displayed on a monitor or projected onto a large screen. The main popular graphic output device is the plotter, which can draw hard-copy graphics output in the form of maps, bar charts, engineering drawings and even two or three-dimensional illustration. Plotters often come with a set of four pens in four different colours. Most plotters also offer shading features.



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It is a line printer that uses band of type characters as its printing mechanism.

Drum printers or (barrel Printers): A printer in which all the characters for printing are placed round the surface of a cylinder (the barrel) the entire character set being placed round the cylinder at each print position. Print hammers opposite each print position can be activated by the computer striking the paper and bringing it in contact with a continuous ink ribbon between the paper and the surface of the barrel. The barrel rotates at high speed, the appropriate character being selected as it reaches a position immediately opposite the print hammers. A complete line of output is printed for each revolution of the drum since all the characters in each set pass their print stations during revolution.

NON-IMPACT PRINTERS

Printers that do not strike characters against ribbon or paper when they print, are non-impact printers. Example of non-impact printers include

1. Ink-jet printers
2. Laser printers

These printers makes much less noise than impact printers.

If you are using a non-impact printer, do not try to print on multiple-part carbon forms: because no impact is being made on the paper you will end up with no copies.

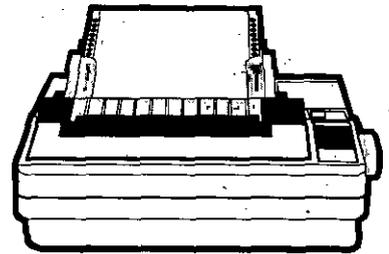
A drum printer uses 80 or more character sets embossed on a cylindrical drum. A separate hammer for each character set forces the print page into an inked ribbon and the character when the character aligns at the print position.

Advantages of Non-impact Printers

1. They are faster and quieter
2. They have got the ability to change typefaces automatically and their ability to produce high-quality graphics.

INK-JET PRINTERS

It uses a technique of projecting droplets of ink at paper to form the required image. Ink-jet printer create an image directly on paper by spraying ink through as many as 64 tiny nozzles. It provides a print resolution of around 360 dots per inch.



Advantages

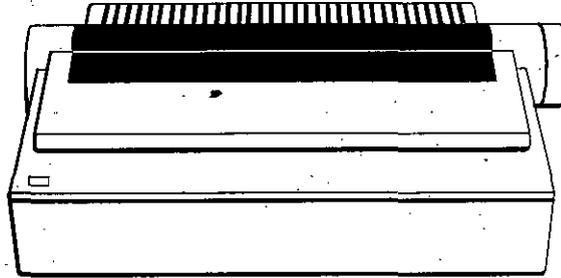
1. Many of ink-jet printers can also be programmed to print unusual symbols e.g., Japanese or Chinese characters.
2. It provide an excellent middle ground between dot-matrix and laser printers.
3. Multiple-nozzle print heads enables them to print in several colours.

Disadvantages

1. They can only create one character at a time and therefore can not match the print speed of line printers.
2. They are expensive

DAISYWHEEL PRINTERS

A serial impact printer in which the printing element is a plastic hub that has a large number of flexible radial spokes, each spoke having one or more different raised printing characters, the wheel is rotated as it is moved horizontally step by step under computer control, and stops when a desired character is in a desired print position so a hammer can drive that character against an inked ribbon.



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Daisy Wheel Printers are slower than dot-matrix printers, but they produce a high-resolution output. This high-resolution output is often called letter quality printing because it is suitable for business letters and memos. You can print in as many type fonts or foreign languages on a daisywheel printer as there are print wheels to fit your particular model of machine.

It is also called as a smart printer because of its bi-directional printing and built-in microprocessor control features.

Disadvantages

1. They are noisy
2. They are still too slow for many large volume output situations.
3. To change the typeface style, machine has to be stopped and then the print wheel is changed.
4. They cannot produce graphic output.

LINE PRINTERS

It prints an entire line in a single operation without necessarily printing one character at a time. These are generally electro-mechanical devices which print complete lines of print, up to 160 characters in width, at speeds about 300 to 2000 lines per minute. Line printers are used primarily in the mini/mainframe processing environment.

Examples of line-at-a-time impact printers are:

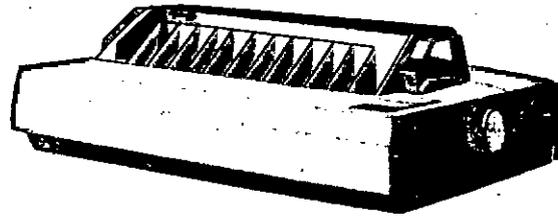
1. Chain Printers
2. Band Printers, and
3. Drum Printers

Chain Printers: It is a high-speed printer in which the type are carried by the links of a revolving chain. As the characters on the print chain revolve in a horizontal loop, a desired character eventually aligns in a given column. At this instant, the hammer strikes the paper forcing the page into the inked ribbon and the ribbon against the character thus creating the desired symbol on the print page. The chain is cycled continuously until a complete print line has been formed. The print page is then advanced one line and the process is repeated.

Band Printers: On a band printer, several similar sets of fully formed characters are embossed on a horizontal band that is continuously moving in front of the print hammers. In band printer, the paper is momentarily stopped and, as the desired character passes over a given column, the hammer activates, pressing the ribbon against the paper to form the image.

DOT-MATRIX PRINTER

In it the individual characters are formed by a matrix of wires or styluses. Dot-matrix printers are also called serial printers. The images are formed by a print head that is composed of a series of little print hammers that look like the heads of pins. The print head usually has nine pins or 24 pins. The bottom 2 pins are used to form the descenders of lower case letters viz., p, q, g and y. Many expensive dot-matrix printers do not provide descenders, but print quality is improved when they are used.



However, high-quality dot-matrix printers have print heads with as many as 24 pins which allows much more precise image to be produced - about 360 dpi (dots per (square) inch). Dot matrix printers can be either 80 column printers depending on the maximum number of characters that can be printed in a line. Some of dot-matrix printers in India include EPSON EX-1000 EPSON LQ 1050 etc. The size of the matrix in a dot-matrix printer varies from manufacturer to manufacturer. Typical grid sizes are 5x7 dots, 7x9 dots and 9x13 dots. The larger the grid size, the more dots in the matrix and the higher the print resolution or clarity of the printed character.

Some dot-matrix printers use a heat process to create characters. These thermal printers use print wires that "burn" dots into the print page. The resulting characters are about the same print quality as inked characters, but some thermal printers require special heat sensitive paper that many people find "greasy". The print resolution of dot-matrix printer is usually not as clear as that of typewriter because dot-matrix printers depend upon the human eye to connect the dots and recognizable symbols.

One way to make dot-matrix characters clearer is with a double pass. In the first-pass the dot-matrix printer types the character as usual. This is sometimes called as draft-quality printing. In the second-pass, the paper in the carriage is advanced slightly and the printer "fills in between the dots". The resultant characters come closer to resembling complete typewriter characters and output clarity is thereby enhanced. On dot-matrix printers this is called as correspondence-quality printing because it closely resembles the printing of a typewritten letter.

Features common to most dot-matrix printers include boldface, underline, subscript and superscript and compressed print (narrowed letters). Optional features include proportional spacing (using more or less space, depending on the width of the character) and italics. Dot-matrix printers are very versatile since the character set can be changed by software or firmware such as a PROM for different styles, alphabets or graphic symbols. Dot-matrix printers are comparatively inexpensive and one of the fastest types of character-at-a-time printers available. The speed ranges from 50 cps to 400 cps (character per second).

Their abilities to use different type fonts, different line densities and different types of paper are also important.

Drawbacks

1. Their speed limitation is slow as compared to line printers.
2. Their print resolutions are inferior to the daisywheel printers.
3. These printers may not be able to print graphic objects adequately but can handle applications such as accounting, personnel and payroll very well.

1.14 OUTPUT HARDWARE

The success of business today can depend to a large extent on how meaningful and timely the information a computer can produce *i.e.*, the output. So the two most important requirements of computer output are that it is meaningful and convenient to use.

Categorization of Output

There are two basic categories of computer-produced output:

1. output for immediate use by people and
2. output that is stored in computer usable form for later use by the computer

Output can be of two forms Hardcopy and Softcopy

Hardcopy: Information output on to paper, often produced at the same time that information is output in machine-readable form or produced as a transient display on a visual display unit (VDU). Hardcopy is a permanent copy of a display image generated on an output device such as printer or plotter and which can be carried away.

Softcopy: Information that is displayed on a screen, given by voice, or stored in a form that can't be read directly by a person as on magnetic tape, disk or microfilm.

Let us now read about various Output devices in details.

PRINTERS

They are hardcopy output devices and can be divided into two distinct categories:

1. Impact Printers
2. Non-impact Printers

Impact Printers

A printer in which printing is the result of mechanically striking the printing medium. An impact printer makes contact with the paper to produce an image. The impact may be produced by a print hammer character, like that of a typewriter key striking a ribbon against the paper or by a print hammer hitting paper and ribbon against a character.

An impact printer must be used if printing a multiple copy report so that the duplicate copies will receive the imprint.

Advantage

1. The advantage of a solid-font over non-solid is that they give the best quality formed character images.

Disadvantage

2. Solid-font print heads are usually slower than other types.

On the basis of speed printers can further be classified as:

Serial or Character Printers

It is the slowest printer. The two major types of character-at-a-time impact printer are:

1. Dot-matrix printers and
2. Daisy wheel printer

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coordinates can be marked on the screen. Light pens and digitizers are often used in the mechanical and architectural fields for drawing. The drawings are not made on the tablets directly but normally a sketch of drawing is traced on a pen kept on tablet by this pen, to transmit to the computer.

Digitizers are also called Digitizing Tablets, Graphics Tablets, Touch Tablets or simply Tablets.

Advantages

1. The sketches displayed on the screen are neater and more precise than that on paper.
2. Digitizers provide a capability of interactive graphics.
3. The drawings can easily be changed and their effects can quickly be analyzed, thus saving user time.

Disadvantages

1. They are costly
2. They are suitable for applications which require high resolution graphics only.

VOICE INPUT

Speaking to a computer, known as voice input or speech recognition, is another form of source input. Voice recognizers accept the spoken word through a microphone and convert it into binary code (0s and 1s) that can be understood by the computer. Most voice recognizer systems are speaker dependent - that is, they must be separately trained for each individual users. Therefore, a data base of words must be created for each person using the system. To create this database, each person using the system must repeat - as many as 20 times - each word to be interpreted by the system. This training is necessary because we seldom say a word the same way each time.

GRAPHICS TABLET

A graphics tablets consists of a flat surface and a pen, or stylus, which can be used to produce freehand drawings or trace around shapes. When the special pen touches the surface of the graphics tablet data about its position is sent to the computer. This data is used to produced on the screen an exact copy of what is being drawn on the surface of the graphic tablet.

MICROPHONE

A microphone is used to input sound into a computer system, Microphone are often used for voice recognition systems which convert sounds made by a user into commands that the computer can carry out. Systems like this are useful for people who can't use ordinary input devices such as the mouse and keyboard. As computers become more powerful in the future, voice recognition will be a much more common input method for all computer users.

VOICE INPUT DEVICES

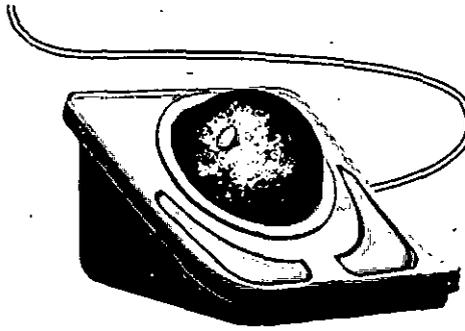
It is the latest input device about which the computer users are very happy. It not types the data which you speak but also is capable of obeying the commands which you give to the computer. Through the process of voice synthesis the spoken words are converted into digital input for the computer and stored as such.

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TRACKBALL

A trackball is a pointing device that works like an upside-down mouse. You rest your thumb on the exposed ball and your fingers on the buttons. To move the cursor around the screen, you roll the ball with your thumb. Because you do not move the whole device, a trackball requires less space than a mouse.

It is particularly used in notebook computers.

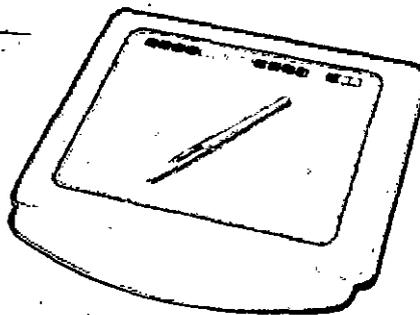
**TOUCH SCREENS**

Similar in use to the light pen is the touch-screen, which enables users to input instructions by merely touching on-screen prompts. The edges of the monitor of a touch-screen emit horizontal and vertical beams of light that criss-cross the screen. When a finger touches the screen, the interrupted light beams can pinpoint the location selected on the screen. Such screens are especially helpful when people are unfamiliar with computers. Information systems in shopping malls, airports, and amusement parks are now being developed using touch-sensitive screens as the only input hardware.

A touch screen can detect exactly where on its surface it has been touched. There are several ways in which this can be done. One common type of touch screen uses beams of invisible infra-red light which shine from top-to-bottom and side-to-side just in front of the screen. The beams of light form a grid that divides up the screen. When the screen is touched some of the beams are blocked and the exact position where the screen has been touched can be worked out by the computer. Touch screens are used in a lot of fast food chains and restaurants because they are easy to keep clean and re-program if changes need to be made to the menu.

TOUCH PAD

A small, touch-sensitive pad is used as a pointing device on some portable computers. By moving a finger or other object along the pad, we can move the pointer on the display screen. The touch pad is related to the touch screen, but activated by different means. The touch pad uses pressure sensitive materials to record data at the point where the pad is touched. Many appliances around the home, such as microwave ovens, use touch pads for programming time or temperature.

**DIGITIZER**

A digitizer, or graphics tablet, is similar to a light pen, however, instead of drawing on the screen, a separate tablet is used on which a special stylus is moved. Input tablets or digitizer tablet are typically found in CAD terminals or engineering workstations etc. These tablets are work surfaces that contain hundreds of copper wires in the form of a grid, which are connected to the computer. Each copper wire receives electric pulses.

A stylus or pen, which is sensitive to these pulses and signals to the computer to form drawings. By selecting commands on the digitizer, objects can be drawn or erased and

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3. The standard MICR code is readable by humans. Thus both individuals and MICR reading devices are able to interpret the number and symbols in the code, thereby making it easier to detect and correct across.
4. Cheques with magnetic ink character can be read even when these are over-stamped, folded or roughly handled.
5. It reduces or eliminates the amount of encoding necessary to prepare a document for computer processing.

Disadvantage of MICR

1. The magnetic strength, *i.e.*, magnetic flux, of MICR characters tends to diminish over time, thus making MICR documents unreliable as input media when repeated processing is required.

LIGHT PENS

A light pen is a small pen-shaped wand, which contains light sensors. The light pen is used to choose objects or commands on the screen either by pressing it against the surface of the screen or by pressing a small switch on its side. This sends a signal to the computer, which then works out the light pen's exact location on the screen. The advantage of a light pen is that pen is that unlike a touch screen it doesn't need a special screen on screen coating.

Light pens were developed early in the history of interactive computer graphics. It detects light pulses, rather than emitting light as its name implies. Light pens are sensitive to the short burst of light emitted from the phosphor coating at the instant the electron beam strikes a particular point. Other light source, such as the background light in the room, are usually not detected by a light pen.

The pen consists of a photocell placed in a small tube. As the user moves the tip of the pen over the screen surface, it is able to detect the light coming from a limited field of view. The light from the screen causes the photocell to respond when the pen is pointed directly at a lighted area. By reading the saved values, the graphic package can determine the coordinates of the pixel seen by the light pen.

Used like an ordinary writing pen, this electronic pen is used to enter data by writing on the screen. The data you write is displayed on the monitor.

Drawbacks

1. When a light pen is pointed at the screen part of the screen image is obscured by the hand and pen.
2. When used over several hours, a light pen can be tiring for inexperienced users, because it must be picked up, pointed and set down for each use.
3. Light pens require special implementation for some applications because they can't detect position within black area.
4. To be able to select positions in any screen area with a light pen we must have some non zero intensity assigned to each screen pixel.
5. The light pen is an aging technology with limited use. Unless properly adjusted, light pens sometimes detect false targets, such as fluorescent lights (*i.e.*, background high timing in a room) or other nearby graphics primitives (*e.g.*, adjacent characters) and fails to detect intended targets.

image. That is, the hard-copy image is translated into an electronic format that can be interpreted by and stored on computers. The electronic version of the image can then be stored, probably on disk, and reproduced on the screen when needed.

The image to be stored can be handwritten notes, a photograph, a drawing, an insurance form - anything that can be digitized. Once an image has been digitized and entered to the computer system, it can be retrieved, displayed, altered, merged with text, stored, and sent via data communications to one or several remote locations. Businesses find imaging particularly useful for documents, since they can view an exact replica of the original document at any time. Professional photo agencies are the another area where imaging is useful. Here the film that was shot with a conventional camera is processed onto optical disk instead of prints or slides. Professional photo agencies keep thousands of images on file, ready to be leased for a fee. Typically a couple of dozen small-size images can be displayed on the screen at one time; a particular image can be enlarged to full screen size with a click of a mouse button.

A digital camera can store many more pictures than an ordinary camera. Pictures taken using a digital camera are stored inside its memory and can be transferred to a computer by connecting the camera to it. A digital camera takes pictures by converting the light passing through the lens at the front into a digital image.

It does not by using a grid of tiny light sensors which concert the light that is falling on them into binary patterns of 0s and 1s. Different binary patterns are used to represent the different colours and shades of light that make up a picture. Pictures taken using a digital camera can be easily saved and transferred from one computer to another where they can be edited using special graphics software. Some digital camera can also capture short clips of moving images but for longer video clips a digital video camera is needed. However both of these types of camera are still quite expensive.

MICR (MAGNETIC-INK CHARACTER RECOGNITION)

This process is used by a special machine which reads coded numbers you see on your bank cheques. These days most cheques issued and used bear MICR numbers to speed up clearing of cheques.

It is a technology related to the recording of information on document by means of magnetized ink characters and automatic recognition of such characters by means of machines. In this technology the magnetic ink contains particle of magnetizable material (viz., iron oxide), which can be energized to facilitate automatic reading of printed characters. Magnetic ink document reader helps in translating the information read into a coded format usually for direct insertion into an input area of a computer's core storage in an order according to the digits recorded in a specified field, *i.e.*, account number, etc.

When document having magnetic ink character are passed through a strong magnetic field the ink coded characters become magnetized and are recognized by the magnetic ink document reader.

Advantages of MICR

1. Since the magnetic ink characters are machine-readable, so they can be used directly for computer input.
2. Thickness, width or size of magnetic ink character has no side effects on processing or storing capability of the equipment.

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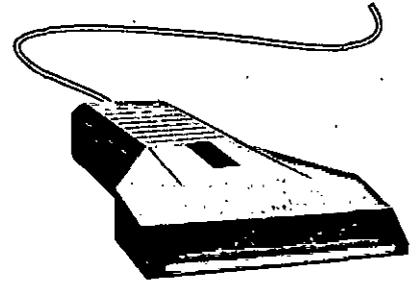
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Hand-Held Scanner

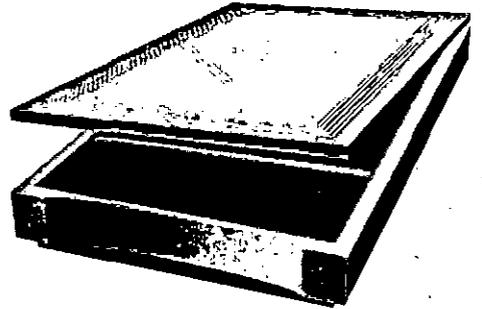
These devices read data on price tags, shipping labels, inventory part number, book ISBNs, and the like. Hand-held scanner, sometimes called wand scanners, use either contact or laser technology.

It has a set of light emitting diodes. It is placed over the material to be scanned and slowly dragged from the top to the bottom. The light emitted by the diodes are not reflected by black lines and are reflected by whole areas. The material is converted and stored in a bitmap.

Typical applications are to store images and reproduce them in publications.

**Flat-bed Scanner**

It consists of a box with glass plate on top, which is used for placing the document to be scanned. The light beam is situated below the glass plate and is moved from left to right horizontally. After scanning one line the beam moves up little and scans the next line.



The scanner can also store colour images.

BAR CODES

Bar Codes represent alphanumeric data by varying the width and combination of adjacent vertical lines. These zebra strips can be sensed and read by a bar code reader, a photoelectric device that reads the code by means of reflected light. When a bar code is scanned, the light source is reflected off the spaces between the marked bars. This returned light is then converted into bit patterns. A decoder in the scanning system translates the bit patterns into meaningful letters and numbers.

The bar code reader in a bookstore or grocery store is a part of a point-of-sale terminal. When you buy, say, a book at a bookstore, the checker moves it past the bar code reader. The bar code merely identifies the product to the store's computer; the code does not contain the price, which may vary. The price is stored in a file that can be accessed by the computer. This is because of the reason that it is easier to change the price once in the computer than to have to restamp the price on each book. The computer automatically tells the point-of-sale terminal what the price is; a printer prints the item description and price on a paper tape for the customer.

Bar coding has been described as an inexpensive and remarkably reliable way to get data into a computer. The advantage of bar codes over characters is that the position or orientation of the code being read is not a critical to the scanner.

Digital Camera

In recent years, source-data automation has expanded to allow the direct entry of graphic information, as well as text-based information via scanners. In a process called imaging, a scanner converts a drawing, a picture, or any document into computer-recognizable form by shining a light on the image and sensing the intensity of the reflection at each point of the

computer. This reduction in effort can improve data accuracy and can increase the timeliness of the information processed.

Disadvantages of OCR

1. When document to be read is poorly typed or have strikes or erasures over it makes difficult for OCR to recognize the characters.
2. It is expensive.

Optical Mark Recognition

It is an automatic optical sensing of marks recorded on a data medium. In this method special preprinted forms are designed with boxes which can be marked with a dark pencil or ink. These documents are applicable in areas where responses are one out of a small number of alternatives and the volume of data to be processed is large. Thus they are used for

1. Objective type answer papers in examinations (*e.g.*, in UPSC) in which large number of candidates appear.
2. Market surveys, population survey s etc., where responses can be restricted to one or more out of a few possibilities.
3. Order forms containing a small choice of items.

Advantages of OMR

1. Information is entered at its source and no further transcription is required.
2. It minimizes the unreliability of data.

Disadvantages of OMR

1. They are read very slowly.
2. Documents use a forced-answer format that leaves no opportunity for additional information.
3. The data filled can be changed erased or double-coded (more than one box filled).
4. It requires accurate alignment of printing on forms and need good quality of expensive paper

SCANNERS

Whereas a keyboard, mouse or trackball requires manual input of data, scanners allow input of printed data. A scanner reads text, photographs and graphics from paper which are then converted into bit patterns for processing, storage or output.

Scanner is a device that examines a spatial pattern one part after another and generate analog or digital signals corresponding to the pattern. Scanners are often used in mark sensing, pattern recognition or character recognition. Practically scanner uses light for examining the spatial patterns.

In a scanner, as the image is scanned, it is converted into light and dark picture elements, or pixels, similar to newspaper photo. Colour scanners can assign a specific colour to a pixel. The pixel are then stored as bit patterns. This technique makes the images usable by word processing, desktop publishing, and graphic packages.

There are two types of scanners, Hand-held scanner and Flat-bed scanner

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4. It requires space on tabletop or other hard surface to roll.
5. It requires serial port for connection with computer system.

A recent development in the wireless mouse or remote mouse, which works on transmission of infrared or radio waves.

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JOYSTICKS (OR PADDLE)

It consists of a small, vertical lever (called the stick) mounted on a base that is used to steer the screen cursor around. Some joysticks are mounted on a keyboard, others function as stand-alone units. The joystick can be moved left or right, forward or backward, springs are often used to return the joystick to its home center position.

The distance that the stick is moved in any direction from its center position corresponds to screen cursor movement in that direction. Potentiometers mounted at the base of the joystick measure the amount of movement and springs return the stick to the center position when it is released. One or more buttons can be programmed to act as input switches to signal certain actions once a screen position has been selected.

It is difficult to use a joystick to control the absolute position of a screen cursor directly, because a slight movement of the shaft is amplified 5 to 10 times in the movement of the cursor. This makes the screen cursor's movement quite jerky and does not allow quick and accurate fine positioning. Thus, the joystick is often used to control the velocity of the cursor movement rather than the absolute cursor position.



Some joysticks have a third degree of freedom, the stick can be twisted clockwise and counter clockwise. Isometric Joystick is rigid strain gauges on the shaft and it measures slight deflections caused by force applied to the shaft.

OPTICAL RECOGNITION

There are two types of optical recognition devices.

1. Optical Character Recognition (OCR) and
2. Optical Mark Reading (OMR)

Optical Character Recognition (OCR)

A special kind of devices called scanners use the principle of OCR to input the printed matter on the paper or any other object. This matter can be in the coded form (bar codes) or simple text/ graphics (pictures). Bar Code Readers and Scanners come into this category of devices. OCR is a technique which permits the direct reading of printed character. Optical character recognition readers or scanners typically examine each character as if it were made up of a collection of minute spots. Once the whole character has been scanned, the pattern detected is matched against a set of patterns stored in the computer. Whichever pattern it matches, or nearly matches is considered to be the character read. Patterns which can not be identified are rejected.

Advantages of OCR

1. It eliminates some of the duplication of human efforts required to get data into the

1. Mechanical Mouse
2. Optomechanical Mouse
3. Optical Mouse

Mechanical Mouse: A mechanical mouse has a rubber or metal ball on its underside that can roll in all directions. Mechanical sensors within the mouse detect the direction of the rolling ball and make a movement of the screen pointer accordingly.

Optomechanical Mouse: Optomechanical mouse is also similar to a mechanical mouse except that it uses optical sensors to detect the movement of the ball on the Mouse Pad.

Optical Mouse: Optical mouse uses a laser beam to detect the movement of mouse on specially designed Mouse Pad. We must move the mouse along a special mat with a grid so that optical mechanism has a frame of reference. This type of mouse has no mechanical moving parts. Optical mouse respond more quickly and precisely than any other mouse. These are very expensive.

A mouse can be used for many applications ranging from games to designing products with graphics. It provides an alternative for people who are uncomfortable with a keyboard or it can be used in combination with a keyboard to enhance input operations.

The mouse is also used to draw sketches, diagram, etc., on the CRT screen. It is also moved on graphic tablet for drawing work and the same is also used to edit text. For editing text on the screen the cursor is quickly moved to the desired point of the screen by moving the mouse.

How to use the mouse

There are three simple techniques - clicking, double-clicking and dragging

Clicking: To click on something with the mouse means to move the pointer or cursor to the item on the screen and to press the release the mouse button once.

Double-Clicking: Press and release the mouse button twice in rapid succession.

Dragging: After positioning the mouse pointer over the item, then depress the button and hold it down as you move the mouse.

Buttons on the Mouse

A mouse can have one, two or three buttons with a two or three- button mouse the primary or main button is the one on the left because most people are right-handed. We can reconfigure mouse device to make another button primary.

Advantages of a Mouse

1. It is simple device and very easy to use.
2. It is not that very expensive.
3. It moves the cursor faster than the arrow keys of keyboard do.

Drawbacks of a Mouse

1. The movement of the cursor is not very sensitive to movement of mouse.
2. If the contact between wheels and mouse pad is lost, the cursor does not move.
3. It is not useful in word-processing or in computer programming applications.

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of the numeric keypad moves the cursor in the direction shown on each key. Otherwise, this portion is used to enter numbers.

Special Keys including Spacebar

There are several other keys which serve some definite purposes. Some of these keys are available on the typewriter too. The special keys are:

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	Shift Key	It is used for typing capital letters and special characters. In combination with both Control and Alternate keys, it is sometimes used to execute a particular command too.
	Control Key	On its own, this key does not have any purpose. However, combined with different keys, it performs some useful operations. For example, in WordStar software, Control if pressed alongwith B, will make the character Bold.
	Backspace	It allows the cursor to go back by one character. Some types of computer programs allow the backspace to delete the last character. A cursor is usually a blinking line (_), on the screen, which shows where the character you type on your keyboard will appear.
	Spacebar	As in the typewriter, the Spacebar is used to leave space between words.
	Enter Key	It informs the computer that the line of the matter, you are typing, has come to an end. After that you begin typing from a new line. It is also used, while programming, to tell the computer to execute certain commands which you give. Thus, while writing a computer program, you can also use this key to indicate the end of a given command.
	Del Key	If, by mistake, you have typed in something which you did not want to, you can erase the wrong character by pressing the DEL (short for Delete) key.

Various other types of keyboards which are available but very much in use are:

MOUSE

Don't be afraid, it is not a real one. It is so called since it resembling a "Rat". In fact, it is a pointing device. These days it is almost essential for personal computers. Click at any place on the monitor with mouse to point out the location where you want to input the information. All Windows-based programs use mouse, making working with computers easier as you are not required to type commands.

It is a pointing device that lets you move a cursor or pointer on the screen just by moving the mouse around on a flat surface. A mouse also allows you to create graphic elements on the screen, such as lines, curves and freehand shapes and makes using menus and message boxes easier.



Types of Mouse

There are three basic types of Mouse

Keyboard Keys

There are more keys on computer keyboard than on typewriter. Most commonly used keyboards has **101 keys** and more. With XT, 84 key keyboard was used but it has now become obsolete. The 101 key keyboard has the important keys:

Alphabetic Keys

These are alphabet keys from **A** to **Z**. As in typewriter, you can use **SHIFT** to make them capital, i.e., ABCDE, etc. So if you press a b c d e etc. With **SHIFT** key already pressed, you will get A B C D E etc. Similar results can be obtained by putting CAPS LOCK key ON.

a = **A**
SHIFT + **A** = A

For typing **A**, you press **SHIFT** key and then while keeping **SHIFT** key pressed, press the "a". Otherwise for typing a, you don't need to press the **SHIFT** key, just press the a key.

Numeric Keys

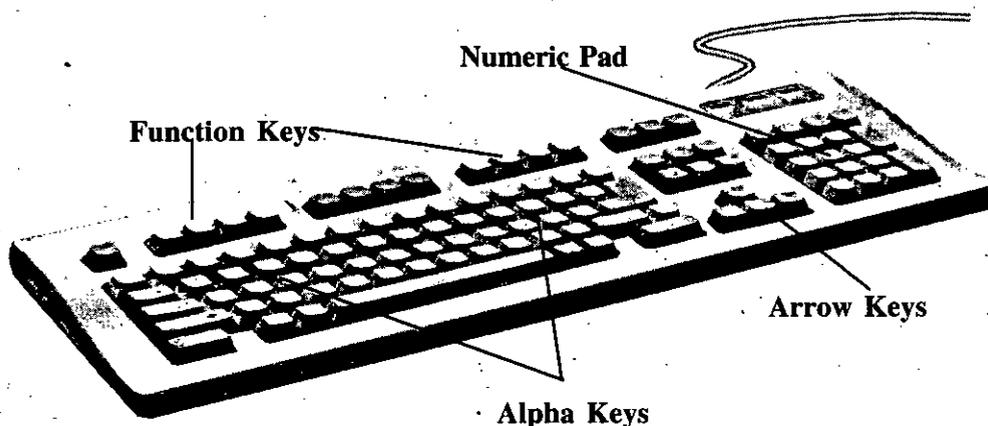
The numeric keys (with the characters 0 to 9) are located on the computer's keyboard at two places. You can see them in the top row above the alpha keys (as in typewriter). A second set of these keys is provided on the right-hand side of the keyboard. The numeric keys in the top row can be used straightaway to type in numeric characters. By simultaneously holding down the Shift key (as in the typewriter), you can also type in special upper characters like ! % \$ *, etc. However, to type numeric characters by using the keys on the right side, you will need to press the Num Lock key ON.

Function Keys

These keys are marked **F1** to **F10** in the 84 key format and to **F12** in the 101 format. These keys are used for-specific purposes as defined in the computer (a computer program is a set of instructions given to a computer to perform a specific task) which you may be using. For example, in BASIC programming (BASIC is a computer language used for writing programs) **F2** will load the program, **F1** will list the program after loading and **F3** will run the program.

Arrow Keys

On 101 keys keyboard these are placed at two places. The first is called the cursor pad which works independently. The other is the numeric-cum-cursor pad. It is similar to the one on the 84 key keyboard. When the Num Lock key is not in the ON position, pressing the key



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is input continuously. Whenever the data of voltage or current is below or above the danger mark, *i.e.*, data is also processed simultaneously, alarm gets on and whole system is shut down.

Accuracy: Data must be accurate to save the informational needs of the alarm to get on. For example, alarm should not run on any other which are not equivalent to the specified value.

Potential Usefulness: Data as such is raw and is of no use unless it is logical, *i.e.*, related to the requirement. When this data is processed it becomes an information which helps in making decision. So the preparation of computerized input is the first step in the creation of useful information.

Source Document

In most business information systems, source documents are prepared manually. Examples of source documents include employee application forms, deposit slips, invoices and sales tickets.

Advantages

1. As it can be prepared manually so it needs no computer background or training.
2. Source documents can serve as backup for computer files. This is because of usage of source document to create a computer file, so the source document could also be used to re-create the file in the event it is accidentally damaged or destroyed.
3. Source document helps in providing evidence to authenticity.
4. Source documents establish an audit trail. An audit trail is the data in the form of logical path linking a sequence of events, used for tracing the transactions that have affected the contents of a record.

Disadvantages

1. Source documents are rarely machine readable. So, for processing the source document data, the data must be transferred to binary form.

Inputting the Data

Input devices are used to put data and instructions into a computer. There are two main types of input device - **Direct** and **Manual**.

Direct Input devices can input large amounts of data quickly and accurately without any need for human intervention. **Bar code readers** and **optical mark** readers are both examples of direct input devices.

Manual input devices are used by people to enter data by hand. The most commonly used manual input devices are the **mouse** and **keyboard**.

Let us now talk about the various input devices in details.

KEYBOARD

The most common input medium in computer is Keyboard. Without it many consider the computer as incomplete.

Recording Data on Disk

Data can be recorded on disk tracks with or without the use of keys. A key is a label that is used to identify a particular record. A key is required whenever the location of the record can't be specified exactly. Layout of the fields on a track in disk storage when data is recorded without the use of keys can be as given below:

BT : beginning of track

G : fields are separated by a gap

HA : home address consists of 4 fields

TC : track condition signals as to whether the track is operative or defective

CY : cylinder number

HD : Head number

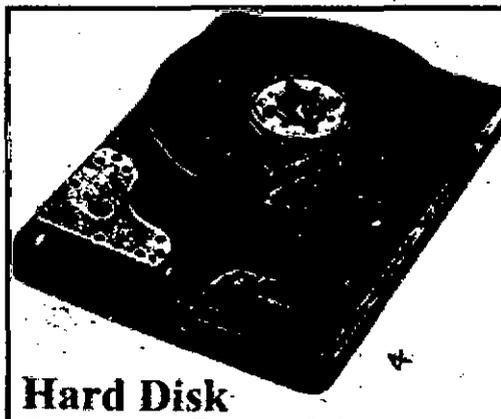
EC : Error checking code which tells whether the data is read/write correctly or not.

TDR : Track descriptor record, serves to indicate an alternative track if the given track is defective.

Many disk systems contain spare tracks that are used as alternates whenever a track becomes defective; this avoids the necessity of terminating a job in the middle or re creating an entire file because of difficulty with one or two tracks.

Record

The data are often consists of hundreds of characters, and thus is much longer than the identification and control fields which preceded it on the track. Data is recorded with associated keys. In many disk systems the length of the key is limited to 255 bytes. Key field makes it possible to check the identification of a record in the disk control unit before it is transferred to the central processor, thus conserving central processor time.



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1.13 INPUT DEVICES

On the basis of input, computer gives an output. Clerical kind of mistakes occasionally occur during the inputting of data, e.g., if Student Identification Number 6346 is wrongly inputted as 6364 can lead to the wrong result. Input phase is an excellent place to detect and correct errors. A right input protects computer files, i.e., inputted data which is stored in file on disks can be used later in some task. Accurate input is therefore vital to protect these files from "contamination".

Data preparation is often labour intensive. This makes data preparation comparatively costly and therefore an important site for cost control.

There are 3 important characteristics for a good data input

1. Timeliness
2. Accuracy and
3. Potential Usefulness

Timeliness: Timely data is data that is collected and processed fast enough for action to be taken. For example, in on-line system in electricity department data of voltage and current

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the more closely the iron-oxide particles are packed and the more data the disk can store. The disk itself is made of soft flexible mylar plastic with a magnetically sensitive iron oxide coating. The coating is present on both sides, even for single-sided disks that are intended to be recorded on only one side. The second side of a single-sided disk may not have its second side finished, polished and tested but it still has the same coating.

These days 5.25 inch disks (1.2 MB capacity) are used primarily in older computers although some people buy optional 5.25" disk drives for their new PCs to be able to read and write to the old disks.

3.5 inch type is encased in a hard plastic shell with a sliding metal cover. When the disk is inserted into the drive, the cover slides back to expose the disk to the read/write head. The term floppy disk refers to the disk inside, not to the square plastic protector.

The 3.5 inch size floppy disk come in three capacities:

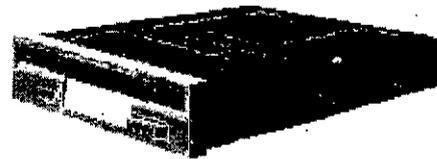
1. double density
2. high density and
3. very high density

Floppy Disk Drives

A floppy-disk drive is a device that reads and writes data to and from floppy disks. The drive includes:

1. a spindle that rotates the disk
2. read/write head that can move in and out as the disk spins to position themselves at any spot on the disk surface.
3. drive light
4. eject button.

The diskettes, spin at around 300 revolutions per minute (RPM), so the longest it can take to position a desired point under read/write head is the amount of time required for one revolution = $60/300 = 1/5$ seconds. The farthest the heads would ever have to move is from the center of the disk to the outside edge. The heads can move from one extreme to the other in even less time about $1/6$ seconds. For example, workers carry their files from office computer to home computer and back on a diskette instead of in a briefcase. Students use the campus computers but keep their files on their own diskettes.



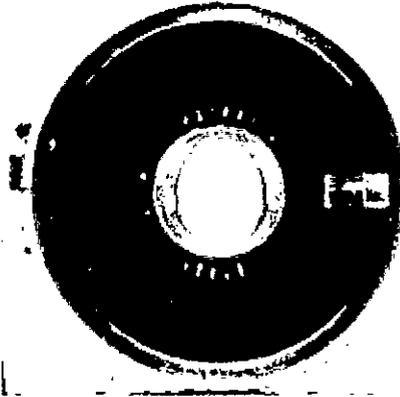
But since both operations, the horizontal movement of read/write head and the rotation of disk take place simultaneously, the maximum time to position the heads over a given location on the floppy disk remains the greater of the two times or $1/5$ second.

HARD DISKS

It is also called as mass-storage device. Like floppy disks, hard disks store data in tracks that are divided into sectors. A hard disk is a stack of metal platters that spin on one spindle, like a stack of rigid floppy disks. Each platter is coated with iron oxide and the entire unit is encased in a sealed chamber to make it free from dust and other contamination.

MAGNETIC TAPE

Like your tape recorder's cassette, it has magnetic coated plastic material. It is very useful to store large volumes of data. While larger tape spools with magnetic tape units are used with mainframe computers, the small cassette tapes, similar to music cassettes are used with Personal Computers.



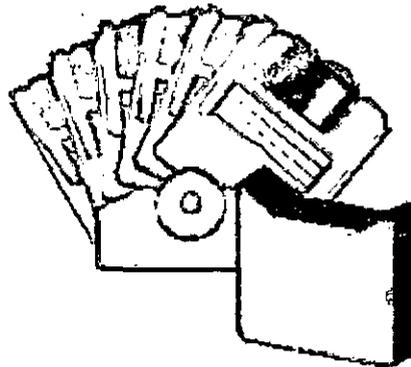
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Drawbacks of Tape

1. Records must be processed in the order in which they reside on the tape. Therefore, accessing a record requires the scanning of all records that precede it. This form of access is called Sequential Access.
2. Operations such as rewinding a tape or back-spacing a certain number of records or blocks increase the performance and flexibility of a magnetic-tape device.

FLOPPY DISKS

There are two kinds of floppies, 3½" and 5¼" in sizes. These floppies are made of vinyl material and have a plastic coated jacket over them. The vinyl material has a coating of magnetic oxide so that data can be stored on it. Floppy disk can be used both as an input device and an output device meaning that you can both write on it and read from it.



Floppy disk is used for the storage of data which is encoded by electromagnetic means on to tracks on the disk surface. A floppy disk is made of flexible material usually a kind of plastic which has magnetizable particles upon its surface. Floppy disks are supplied within special envelopes which have holes set in them for the drive shaft and read/write heads of the disk drives which are used to operate with the disks. The disks are designed to be handled within the envelope which protects the recording surface.

Floppy disks are used with word processing systems and with PCs and their popularity is related to the ease with which they can be handled and stored off line. They are classed as exchangeable disks. It is also known as diskette.

Types of Floppy Disks

Floppies come in two physical sizes:

5 1/4 inch and

3 1/2 inch.

The size refers to the diameter of the disk, not to the capacity.

The 5 1/4" type is encased in a flexible vinyl envelope with an oval cutout that allows the read/write head to access the disk.

The density of the disk is a measure of the quantity of the disk surface: the higher the density,

secondary storage. The programs and data (residing in secondary storage) if needed by the central processing unit for processing are first transferred from the secondary to the RAM (primary memory). Then the CPU reads it from the RAM and processes it.

Memory Hierarchy

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Electronic memories (internal memory) are fast, but are expensive, so design tradeoffs have to be made. In fast electronic memory, the speeds are limited by the time it takes for a signal to propagate through the connected combinational logic circuits and to change the state of the storage elements. In slower memory units (external memory), which requires some form of physical movement, speeds are further limited by the mechanical characteristics of the devices.

Great changes in memory capacity, speed, and cost have been made over the years, and there will be more in the future. Memory speeds have historically had an inverse nonlinear relationship to cost. There are vast differences in speed and price among the various memory devices. We try to organize our system memories in ways that optimize processing speed and minimize cost. To do this we equip systems with different types of memories, each serving a different purpose. Registers are used to store information (temporarily) within the central processing unit. Their speed is needed to keep the processor running as fast as possible.

Instructions and data that are part of an executing program need to be accessed quickly (within nanoseconds). This ensures that CPU will not have to spend time waiting for information from memory.

Magnetic bubble memories are currently used mostly in secondary storage applications. It is faster than hard disks and magnetic tapes but are slower than internal memory.

Hard disks are used to store programs which you are developing or letters you are writing. In such storage you can usually wait a while (milliseconds or seconds) to view the stored program and change them.

Magnetic tapes are used for backup copies of programs, where internal memory can occupy up to 3 layers depending on how the system is designed.

External memory is often split into two classes based on access speed. Programs and data that are more frequently used by the system are typically stored online *i.e.*, data is on disk devices. Whereas backup copies of important programs or data that will not be needed soon are stored offline *i.e.*, on magnetic tapes or diskettes.

Organising and Accessing Stored Data

As a user of computer system, you just offer data as you are instructed to do; but in real sense data can not be dumped helter-skelter into a computer. System analyst has to decide how data from users will be received, organized and stored, and also in which manner data will be processed by the computer.

Data Manipulation and Retrieval:

Data management encompasses the storage, retrieval, and manipulation of data. Many existing information systems are designed using traditional approaches to develop new information systems. In traditional, or flat file, processing files are re stored, merged, and processed by a key field (a unique identifies for a record). For example, in an author file the key might be "author's number"

- **Sound card** - This is used by the computer to record and play audio by converting analog sound into digital information and back again.
- **Graphics card** - This translates image data from the computer into a format that can be displayed by the monitor. Some graphics cards have their own powerful processing units (called a GPU — graphics processing unit). The GPU can handle operations that normally would require the CPU.
- **Ports** - In computer hardware terms, a port is an interface that allows a computer to communicate with peripheral equipment.
- **Real-time clock** - Every PC has a clock containing a vibrating crystal. By referring to this clock, all the components in a computer can synchronize properly.
- **Complementary Metal-oxide Semiconductor** - The CMOS and CMOS battery allow a computer to store information even when the computer powers down. The battery provides uninterrupted power.
- **Fans, heat sinks and cooling systems** - The components in a computer generate heat. As heat rises, performance can suffer. Cooling systems keep computers from overheating.

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1.12 MEMORY AND STORAGE DEVICES

In this section we discuss the devices which act as both input and output devices and those which can be used for storing data.

Secondary Storage

Although the central processing unit has internal memory but this memory cannot store both an application program and data indefinitely for processing; Also internal memory is semiconductor memory - which is costly and volatile in nature - where the data are lost when the electricity is interrupted or computer is switched off. Another limitation of primary storage is that the storage requirements for programs and data on which it operate exceeds the capacity of primary storage in all computer system.

For example, the RAM capacity of a large mainframe computer would not come close to meeting the data and program storage needs of even a small company. So it is necessary to extend the storage capabilities of a computer by using devices external to main-memory.

An external storage is also called secondary storage (or auxiliary storage) because it provides a second, longer-term storage for programs and data needed frequently but not currently active. It usually consists of disk units electronically connected to the system. An input/output operations is required to access or retrieve information stored in secondary storage. Secondary storage is necessary because primary storage can be used only temporarily. Data is placed in primary storage only when it is needed for immediate processing; where as data which is not being currently processed reside in the secondary memory. Also data in secondary storage remains there until overwritten with new data or deleted and is accessed when needed.

Secondary storages are used to store system programs (viz; operating system, assembler, interpreter, compiler and so on), data files, software packages and so on. The arithmetic and logical operations can not be performed directly on the data stored in secondary storage this is because the reason that central processing unit can not read informations directly from the

Descendants of the IBM PC compatibles make up the majority of microcomputers on the market today, although interoperability with the bus structure and peripherals of the original PC architecture may be limited or non-existent.

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1.11 CONNECTIONS

Let's take a look at the main components of a typical desktop computer:

- **Central processing unit (CPU)** - The microprocessor "brain" of the computer system is called the central processing unit. It's a chip that holds a complete computational engine. It uses assembly language as its native language. Everything that a computer does is overseen by the CPU.
- **Memory** - This is very fast storage used to hold data. It has to be fast because it connects directly to the microprocessor. There are several specific types of memory in a computer:
 - **Random-access memory (RAM)** - Used to temporarily store information with which the computer is currently working
 - **Read-only memory (ROM)** - A permanent type of memory storage used by the computer for important data that doesn't change
 - **Basic input/output system (BIOS)** - A type of ROM that is used by the computer to establish basic communication when the computer is first powered on
 - **Caching** - The storing of frequently used data in extremely fast RAM that connects directly to the CPU
 - **Virtual memory** - Space on a hard disk used to temporarily store data and swap it in and out of RAM as needed
 - **Flash memory** - a solid state storage device, Flash memory requires no moving parts and retains data even after the computer powers off
- **Motherboard** - This is the main circuit board to which all of the other internal components connect. The CPU and memory are usually on the motherboard. Other systems may be found directly on the motherboard or connected to it through a secondary connection. For example, a sound card can be built into the motherboard or connected through an expansion slot.
- **Power supply** - An electrical transformer regulates the electricity used by the computer.
- **Hard disk** - This is large-capacity permanent storage used to hold information such as programs and documents. Traditional hard drives contain moving parts — the drive has platters on which it stores data. The drive spins the platters to record and read data. But some newer hard drives are flash-based with no moving parts. These drives are called solid-state drives.
- **Operating system** - This is the basic software that allows the user to interface with the computer.
- **Integrated Drive Electronics (IDE) Controller** - This is the primary interface for the hard drive, CD-ROM and floppy disk drive.
- **Accelerated Graphics Port (AGP)** - This is a very high-speed connection used by the graphics card to interface with the computer.

emulator known as Classic allowing users to run Mac OS 9 applications under Mac OS X, version 10.4 and earlier on PowerPC machines. The most recent version is Mac OS X v10.6 "Snow Leopard." In addition to Snow Leopard, all new Macs are bundled with assorted Apple-produced applications, including iLife, the Safari web browser and the iTunes media player. Apple released Mac OS X 10.7 in 2010, which will be available in the summer of 2011. This operating system features many new features such as: Mission Control, the Mac App Store (available now by software update), and launchpad which is an iPad like way of viewing apps currently installed on Mac. Apple is also releasing a feature known as "resume" which is similar to the hibernate function, found on Microsoft Windows.

Originally, the hardware architecture was so closely tied to the Mac OS operating system that it was impossible to boot an alternative operating system. The most common workaround, used even by Apple for A/UX, was to boot into Mac OS and then to hand over control to a program that took over the system and acted as a boot loader. This technique was no longer necessary with the introduction of Open Firmware-based PCI Macs, though it was formerly used for convenience on many Old World ROM systems due to bugs in the firmware implementation. Now, Mac hardware boots directly from Open Firmware (most PowerPC-based Macs) or EFI (all Intel-based Macs), and Macs are no longer limited to running just Mac OS X.

Following the release of the Intel-based Mac, third-party platform virtualization software such as Parallels Desktop, VMware Fusion, and VirtualBox began to emerge. These programs allow users to run Microsoft Windows or previously Windows-only software on Macs at near native speed. Apple also released Boot Camp and Mac-specific Windows drivers that help users to install Windows XP or Vista and natively dual boot between Mac OS X and Windows. Though not condoned by Apple, it is possible to run the Linux operating system using Boot camp or other virtualization workarounds.

Because Mac OS X is a UNIX system, borrowing heavily from FreeBSD, many applications written for Linux or BSD run on Mac OS X, often using X11. Apple's smaller market share than Microsoft's means that a smaller range of shareware is available, but many popular commercial software applications from large developers such as Microsoft Office and Adobe Photoshop are ported to both Mac OS and Windows. And much of open source software like the Firefox web browser and the OpenOffice.org office suite are cross-platform and run natively.

1.10 PC PLATFORM

IBM PC compatible computers are those generally similar to the original IBM PC, XT, and AT. Such computers used to be referred to as **PC clones**, or **IBM clones** since they almost exactly duplicated all the significant features of the PC architecture, facilitated by various manufacturers' ability to legally reverse engineer the BIOS through clean room design. Columbia Data Products built the first clone of an IBM personal computer through a clean room implementation of its BIOS. Many early IBM PC compatibles used the same computer bus as the original PC and AT models. The IBM AT compatible bus was later named the ISA bus by manufacturers of compatible computers. The term "IBM PC compatible" is now a historical description only since IBM has withdrawn from personal computer sales.

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from Microsoft and Apple are designed to accomplish essentially the same goals. To users, however, the position and movement of the virtual knobs and levers make all the difference.

These things are largely matters of preference and style, but you can still make a reasonable attempt to quantify them, and we did. We tested two all-in-one desktops and two laptops—one Mac and one PC per category—and assembled a panel of testers with a range of experience and preference that ran the gamut from expert users to my wife's stepfather, who, by his own account, had never actually turned on a computer. Our testers were asked to set up the computers right out of the box and explore the machines through everyday tasks such as Web surfing, document creation, uploading photos, downloading Adobe Acrobat files and playing music and movies through Media Center and Front Row (the entertainment software suites integrated into Vista and Leopard, respectively). Our testers were instructed to divorce themselves as much as possible from their previous technological preferences and rate their experiences with each computer's software and hardware.

The Gateway One PC had a processor that runs 400 MHz slower than its iMac competitor (not a heck of a difference in this age of dual-core chips), but it also had two extra gigabytes of DDR2 memory. In the laptop category, our Asus M51 had a 2.2 GHz processor, compared to 2.4 GHz for our MacBook. But the Asus had a larger screen, a more sophisticated graphics card and an extra gig of RAM.

All that extra RAM may seem to give an advantage to the PCs. Vista, however, is a noted memory hog, so throwing more RAM into PC computers is probably less of a performance booster for manufacturers than it is a new baseline hardware specification.

1.9 MACINTOSH PLATFORM

The **Macintosh** or **Mac**, is a series of several lines of personal computers designed, developed, and marketed by Apple Inc. The first Macintosh was introduced on January 24, 1984; it was the first commercially successful personal computer to feature a mouse and a graphical user interface rather than a command-line interface.

Production of the Mac is based on a vertical integration model in that Apple facilitates all aspects of its hardware and creates its own operating system that is pre-installed on all Mac computers. This is in contrast to most IBM PC compatibles, where multiple sellers create and integrate hardware intended to run another company's operating software. Apple exclusively produces Mac hardware, choosing internal systems, designs, and prices. Apple does use third party components, however, such as graphics subsystems from nVidia and ATI. Current Mac CPUs use Intel's x86 architecture; the earliest models (1984–1994) used Motorola's 68k and models from 1994–2006 used the AIM alliance's PowerPC. Apple also develops the operating system for the Mac, currently Mac OS X version 10.6 "Snow Leopard". The modern Mac, like other personal computers, is capable of running alternative operating systems such as Linux, FreeBSD and in the case of Intel-based Macs, Microsoft Windows. However, Apple does not license Mac OS X for use on non-Apple computers.

The original Macintosh was the first successful personal computer to use a graphical user interface devoid of a command line. It used a desktop metaphor, depicting real-world objects like documents and a trashcan as icons on screen. The *System* software introduced in 1984 with the first Macintosh and renamed *Mac OS* in 1997, continued to evolve until version 9.2.2. In 2001, Apple introduced Mac OS X, based on Darwin and NEXTSTEP; its new features included the Dock and the Aqua user interface. During the transition, Apple included an

Adobe Photoshop 2 : Further Topics [Duration: 1 Day]

This course provides a continuation of the Adobe Photoshop 1 : Basic Digital Image Editing course for those wishing to further their knowledge of the popular image manipulation software. Topics covered include how images from Photoshop can be used in applications such as Word, PowerPoint or Publisher and how to save images using different image formats and colour modes for printing and Web content. Along with demonstrations, the session will involve practical work on projects (to be decided by the group) and will cover more advanced topics including working with layers, colour management, image repair and improvement, and other manipulation effects.

Adobe Photoshop 3 : Digital Skills and Efficiencies [Duration: 1 Day]

This course is a continuation of the "Further Topics" course and it presents an opportunity to enhance your skills and gain knowledge on (as yet) unexplored functions that optimise your time whilst minimising repetitive keystrokes / mouse usage. Various technical, graphical, photographic and fonts skills will be covered within the course to help you best prepare images for inclusion in flyers, adverts, leaflets or as web buttons. The course will also include additional image enhancements, colouring up and introduction to colour wheels, monochromes and paths (for selection and text). To help make your Photoshop sessions more efficient you will learn how to

1. use and create actions for general purpose tasks (cropping, resizing, colour toning, inverting, saturating or de-saturating, bordering, etc.).
2. create a web gallery using a folder of images that allow web users to view image information and provide feedback.
3. use time savers such as Actions and Batch Processing.

1.8 MACINTOSH VERSUS PC

There are two types of people, Mac people and PC people. And if the marketing is to be believed, the former is a hip, sport-coat-and-sneakers-wearing type of guy who uses his computer for video chatting, music mash-ups and other cool, creative pursuits that starchy, business-suited PC users could never really appreciate unless they tried them on the slick Apple interface. Then again, Windows PC enthusiasts probably think that Mac guy is a smug slacker with an overpriced toy that can't do any serious computing anyway. Funny thing is, both stereotypes are wrong. With a 7.5 percent market share, Macs are no longer just the computer choice of artists and unemployed writers. (Apple is, in fact, the fourth largest computer manufacturer in the world.) And now, more than ever, the guts of both platforms are remarkably similar.

Both types of machines use Intel processors (although some PCs can be configured with processors from AMD). Both buy memory, hard drives and graphics cards from the same small pool of suppliers. The underlying operating systems have distinctly different flavors, but in terms of functionality, Microsoft Windows Vista and Mac OS X Leopard have surprisingly similar built-in multimedia, Internet and productivity applications.

Yet what makes the platforms feel so dissimilar is their approaches to these applications. Internet Explorer versus Safari, Windows Media Center versus Front Row, Photo Gallery versus iPhoto, Backup and Restore Center versus Time Machine—these system components

Testing

Always test your programs to make sure they meet the objectives of your project, they work properly on the intended delivery platforms and they meet the needs of your client or client user.

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Delivering

Package and deliver the project to the end user.

Multimedia Needs

Needless to say that you need a good computer to start with. You also need software to match it too. Not that since somebody told you to use a particular software, you will use that. You must use the software with which you are familiar with. This will help you in saving time and energy.

You also need to stay organized, because as the construction work gets under way, all the little bits and pieces of multimedia content will get lost under growing piles of paper, cassettes, videotapes, disks, phone messages, permissions and releases, cookie crumbs, photocopies and mail. Even in offices, where the floors are swept every morning, you are bound to lose some important paper which accidentally drops in the night. You must forget about time management. A project which you estimate to complete in 24 hours would normally take 48 hours. You will need time in abundance so that you are not racing against time, which would effect your output. Budgeting is another factor you should look into.

You cannot create a project all alone. It is very difficult though not impossible. You will need the help of other people. Multimedia is often a team effort: artwork is performed by graphic artists, video shoots by video producers, sound editing by audio producers and programming by programmers. You might have to do some dirty work like carrying things for others.

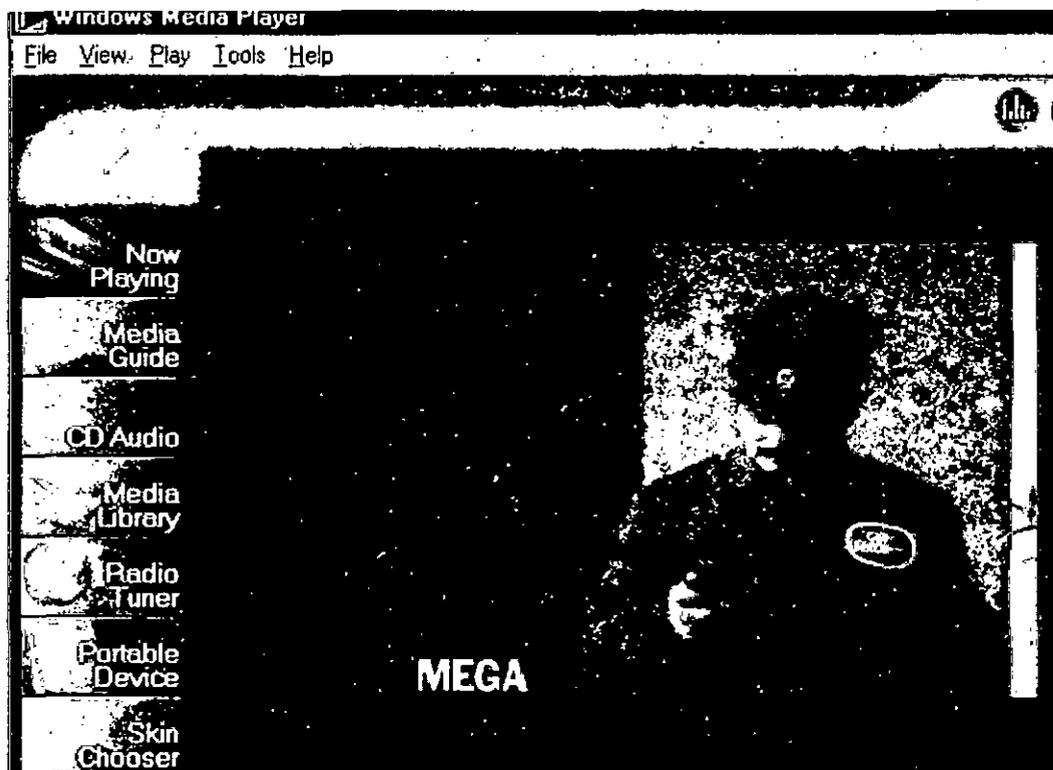
1.7 MULTIMEDIA SKILLS AND TRAINING

There are various computer institutions in India which provide the computer training and that too specially for the multimedia applications. The most famous tools which are used in the training are: Adobe Photoshop (for photo touching and manipulating the existing photo/object); CorelDRAW (for creating and editing art works, designed for the print media, even the books and magazines too); Adobe Flash (for creating life-like animations from a scratch). Of these Flash is very common, since the animations created through it are used for the websites too. A typical Adobe Photoshop, learning curriculum is shown next.

Adobe Photoshop 1 : Basic Digital Image Editing [Duration: 1/2 Day]

Adobe Photoshop is a popular and professional image manipulation package allowing you to work with greyscale and colour images in a variety of formats for use in printed documents, presentations and Web pages. This PC-based course will introduce participants to some of the more useful tools in the Adobe Photoshop repertoire and will provide an opportunity for practical work using the Adobe Photoshop environment. Participants will learn how to enhance images by cleaning, cropping, cloning, red eye removal, colour replacement and rotation. This course will also cover desaturation of images, applying original colour to specific items, image annotation and picture properties.

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A familiar push-button control panel is used for stop, rewind, play, fast-forward, record and single-stop and these applications display time references, frame counts and audio and transparency levels.

1.6 CREATIVITY AND ORGANIZATION

Most multimedia and Web projects must be undertaken in stages. Some stages should be completed before other stages begin and some stages may be skipped or combined.

Here are the four basic stages in multimedia project:

Planning and Costing

A project always begins with an idea or a need that you refine by outline its messages and objectives. Identify how you will make each message and objective work within your authoring system. Before you begin developing, plan what writing skills, graphic art, music, video and other multimedia expertise will be required. Develop a creative graphic look and feel, as well as a structure and navigation system that will let the viewer visit the messages and content. Estimate the time needed to do all elements, and prepare a budget. Work up a short prototype of proof-of-concept. The more time you spend getting your arms around your project and defining its content and structure, the faster you can later build it and less reworking and rearranging will be required midstream.

Make a mental flow of the project before beginning to assemble.

Designing and producing

Perform each of the planned tasks to create a finished product.

In addition, QuickTime has the following VR commands:

- ◆ CORRECTION specifies an image correction mode.
- ◆ FOV sets the initial field-of-view angle.
- ◆ NODE sets the initial node.
- ◆ PAN sets the initial pan angle.
- ◆ TILT sets the initial tilt angle.

Microsoft Video for Windows

Audio video Interleaved (AVI) is a Microsoft-developed format for playing full-motion interleaved video and audio sequence in Windows, without specialized hardware. Video data is interleaved with audio data within the file that contains the motion sequence, so the audio portion of the movie remains synchronized to the video portion.

The AVI file format is not an extensible, "open" environment and lacks features needed for serious video editing environments. To improve this situation, a group of interested companies recently created the OpenDML file format to make AVI more useful for the professional market. Because QuickTime works with OpenDML files and delivers on Windows platform and across the Web, look for a growing number of neat multimedia projects housed in a QuickTime container. AVI provides the following features:

- ◆ Playback from hard disk or CD-ROM.
- ◆ Playback on computers with limited memory; data is streamed from the hard disk of CD-ROM player without using great amounts of memory.
- ◆ Quick loading and playing, because only a few frames of video and a portion of audio are accessed at a time.
- ◆ Video compression to boost the quality of your video sequences and reduce their size.

Movie Editors

With the invention of QuickTime and Video for Windows, desktop video publishing (DVP) on PCs had become a digital process. Improved compression and decompression techniques allow quarter - half and full-screen/full-motion movies instead of the small, 160x120-pixelized movies characteristic of earlier digital video experiments.

With desktop editing software and an appropriate video digitizing board, you can digitize video clips, edit the clip offline, add special effects and titles, mix sound tracks and save the finished products as a digital file on magnetic or optical media. The Targa board from TrueVision, VideoBlaster from Create Labs, Super VideoWindows SL from New Media Graphics and other boards are available for making AVI movies for Windows.

Specialized video editors have been designed around this technology for PC environments - for example, AVID's VideoShop, Media100, Fast's VideoMachine, Adobe's Premiere and Ulead's Media-Studio Pro.

These applications let you mix video clips, audio recordings, animation, still images and graphics to create QuickTime or AVI movies. You arrange your clips linearly, cutting and pasting and layering them into transitions with special effects such as dissolves, page turns, spins, tinting, distorting and replicating.

QuickTime is also used to deliver multimedia to the World Wide Web as a plug-in for Netscape and Internet Explorer. On the Web, QuickTime can deliver 3-D animation, real-time special effects, virtual reality and streaming video and audio. QuickTime is not an "authoring tool," nor a video, image, sound or text editor, its role as a powerful cross-platform integrator or multimedia objects and formats makes it a tool upon which multimedia developers depend. QuickTime Pro is a necessary upgrade to the free QuickTime packages so you can do more than simply play back movies. The upgrade contains two applications. Movie Player lets you import and combine over 30 different file formats. You can compress them into deliverable multimedia projects using the Sorenson Video and QDesign audio compressors so they will streak from any Internet-ready Web server.

With built-in filters in Movie Player, you can adjust colours, contrast and brightness and you can apply special effects to your composition, such as film noise and edge detection. The Picture Viewer application is used for viewing and converting still images among many standard image-file formats, including Photoshop's native format. QuickTime includes built-in support for ten different media types (video, audio, text, timecode, music/MIDI, sprite/animation, tween, MPEG, VR, 3-D) and offers a comprehensive set of "services" such as:

- ◆ Timing and synchronization
- ◆ Audio and image data compression and decompression
- ◆ Image blitting, format conversion, scaling, composition and transcoding.
- ◆ Audio mixing, sample rate conversion and format conversion
- ◆ Audio and video effects and transitions
- ◆ Synchronized storage and read and write
- ◆ Media import and export
- ◆ Standard user interface elements, such as movie controller, media previewers and media capture dialogs.

QuickTime Embedded Commands for HTML

When delivering QuickTime projects on the World Wide Web, you can embed powerful commands into your HTML documents that control and fine-tune the display of your QuickTime file:

- ◆ AUTOPLAY starts a movie playing automatically.
- ◆ BGCOLOR sets a background colour for the movie display.
- ◆ CACHE indicates whether the movie should be cached (Netscape Navigator 3.0 or later).
- ◆ CONTROLLER specifies whether to display the QuickTime movie controller bar.
- ◆ HEIGHT and WIDTH specify size of the movie in Web pages.
- ◆ HIDDEN allows sound-only movies to play in the background without affecting the look of a Web page.
- ◆ HREF indicates which URL to link to when the movie is clicked.
- ◆ LOOP loops movie playback automatically.
- ◆ SCALE scales the movie display automatically.
- ◆ TARGET provides a frame target for the URL specified in an HREF tag.
- ◆ VOLUME sets the default playback volume.

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- ◆ Ability to create images from scratch, using line, rectangle, square, circle, ellipse, polygon, airbrush, paintbrush, pencil, and eraser tools, with customizable brush shapes and user-definable bucket and gradient fills.
- ◆ Multiple typefaces, styles, and sizes, and type manipulation and masking routines.
- ◆ Filters for special effects, such as crystallize, dry brush, emboss, facet, fresco, graphic pen, mosaic, pixelize, poster, ripple, smooth, splatter, stucco, swirl, watercolour, wave, and wind.
- ◆ Support for third-party special effect plug-ins.
- ◆ Ability to design in layers that can be combined, hidden, and recorded.

Sound Editing Tools

By drawing a representation of a sound in fine increments, whether a score or a waveform, you can cut, copy, paste, and otherwise edit segments of it with great precision, something impossible to do in real-time. Using sound editing software, you can make your own sound effects and install them as system beeps.

For all this you need to know about tempos, clefs, notations, keys, and instruments. And you will need a MIDI synthesizer or device connected to your computer. Many MIDI applications provide both sequencing and notation capabilities, and some let you edit both digital audio and MIDI within the same application.

Plug-ins

Image-editing programs usually support powerful plug-in modules available from third-party developers that allow you to warp, twist, shadow, cut, diffuse, and otherwise filter your images for special visual effects. EyeCandy from AlienSkin Software offers a comprehensive set of filters. Kai's Power Tools from Corel offers special effects and has powerful built-in algorithms for making fractal images. The PhotoTools suite from Extensis lets you quickly add/drop shadows, bevels, glows, and embossing effects.

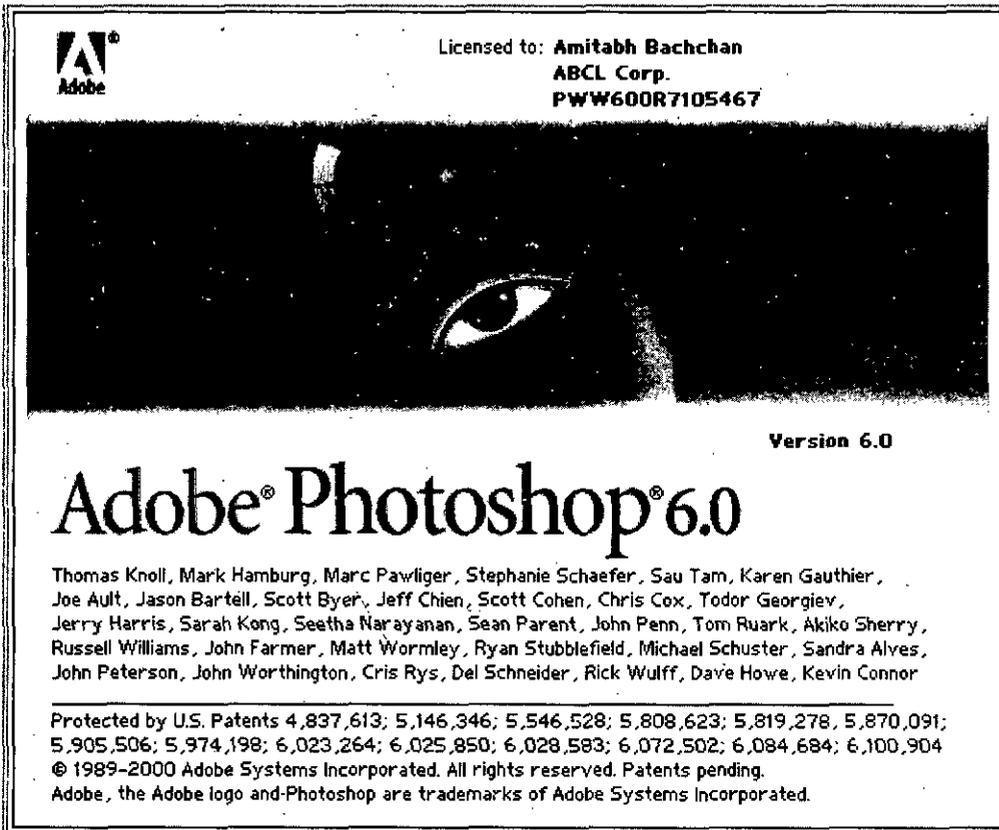
Animation, Video and Digital Movie Tools

Animations and digital video movies are sequences of bitmapped graphic scenes (frames), rapidly played back. But animations can also be made within the authoring system by rapidly changing the location of objects and sprites to generate appearance of motion. Most authoring tools adopt either a frame or object-oriented approach, but rarely both. Movie-making tools typically take advantage of QuickTime for Windows and Microsoft Video for Windows technology and let you create, edit and present digitized motion video segments, usually in a small window in your project.

To make movies from video, you need special hardware to convert the analog video signal to digital data. Movie-making tools such as Premiere, videoShop and MediaStudio Pro let you edit and assemble video clips captured from camera, tape, other digitized movie segments, animations, scanned images and from digitized audio or MIDI files. The completed clip, often with added transition and visual effects, can then be played back-either stand-alone or windows within your project.

QuickTime for Windows

The heart of QuickTime is a software-based architecture for seamlessly integrating sound, text, animation and video (data that changes over time) on Macintosh and Windows platforms.



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painting and drawing programs and can be used to create images from scratch as well as images digitized from scanners, video frame-grabbers, digital cameras, clip art files, or original artwork files created with painting or drawing package.

Here are some features typical of image-editing applications and of interest to multimedia developers:

- ♦ Multiple windows that provide views of more than one image at a time.
- ♦ Conversion of major image-data types and industry-standard file formats.
- ♦ Direct inputs of images from scanner and video sources.
- ♦ Employment of a virtual memory scheme that uses hard disk space as RAM for images that require large amounts of memory.
- ♦ Capable selection tools, such as rectangles, lassos, and magic wands, to select portions of a bitmap.
- ♦ Image and balance controls for brightness, contrast, and colour balance.
- ♦ Good masking features.
- ♦ Multiple undo and restore features.
- ♦ Anti-aliasing capability, and sharpening and smoothing controls.
- ♦ Colour mapping controls for precise adjustment of colour balance.
- ♦ Tools for retouching, blurring, sharpening, lightening, darkening, smudging, and tinting.
- ♦ Geometric transformations such as flip, skew, rotate, distort, and perspective changes.
- ♦ Ability to resample and resize an image.
- ♦ 24-bit colour, 8- or 4-bit indexed colour, 8-bit gray-scale, black-and-white, and customizable colour palettes.

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- ◆ An intuitive graphical user interface with pull-down menus, status bars, palette control, and dialog boxes for quick, logical selection.
- ◆ Ability to paint with patterns and clip art.
- ◆ Ability to pour a colour, pattern or gradient into any area.
- ◆ Customizable pen and brush shapes and sizes.
- ◆ Eyedropper tool that samples colours.
- ◆ Autotrace tool that turns bitmap shapes into vector-based outlines.
- ◆ Support for scalable text fonts and drop shadows.
- ◆ Multiple undo capabilities, to let you try again.
- ◆ Painting features such as smoothing coarse-edged objects into the background with anti-aliasing; airbrushing in variable sizes; shapes; densities; and patterns; washing colours in gradients; blending; and masking.
- ◆ Support for third-party special effect plug-ins.
- ◆ Object and layering capabilities that allow you to treat separate elements independently.
- ◆ Zooming for magnified pixel editing.
- ◆ All common colour depths: 1-, 4-, 8-, and 16-, 24-, or 32-bit colour, and gray-scale.
- ◆ Good colour management and dithering capability among colour depths using various colour models such as RGB, HSB, and CMYK.
- ◆ Good palette management when in 8-bit mode.
- ◆ Good file importing and exporting capability for image formats such as PIC, GIF, TGA, TIF, WMF, JPG, PCX, EPS, PTN, and BMP.

Animation and Modelling Tools

In the recent years lots of animation and modelling tools have entered the market. These can create 3-D modelling which enhance the production values of the multimedia projects. Popular modelling software are: AutoDesk's Discreet, StrataVision's 3D, Specular's LogoMotion and Infini-D, Alias' Wavefront, Avid's SoftImage, and Caligari's trueSpace, etc.

A good 3-D modelling tool should include the following features:

- ◆ Multiple windows that allow you to view your model in each dimension, from the camera's perspective, and in a rendered preview.
- ◆ Ability to drag and drop primitive shapes into a scene.
- ◆ Ability to create and sculpt organic objects from scratch with Bezier spline drawing tools.
- ◆ Lathe and extrude features.
- ◆ Colour and texture mapping.
- ◆ Ability to add realistic effects such as transparency, shadowing, and fog.
- ◆ Ability to add spot, local, and global lights, to place them anywhere, and manipulate them for special lighting effects.
- ◆ Unlimited cameras with focal length control.
- ◆ Ability to draw spline-based paths for animation.

Image Editing Tools

Image editing applications are specialized and powerful tools for enhancing and retouching existing bitmapped images. These applications also provide many of the features and tools of

You do not have to be a programmer or a computer scientist to make multimedia work for you, but you do need some familiarity with terms and building blocks; even the simplest multimedia tool requires an iota of knowledge to operate. If someone sends you a file in Macintosh AIF format, you should know that you're getting digitalized sound. Then load up your tools and open the help files' learning curve. It will be easier to manage because you have the bigger picture.

Now, we will discuss the various software tools that would be needed to create multimedia projects. This would involve various editing applications for text, images, sounds, and motion video. Not only tools for editing, but some tools for creating too. Like a scanner for creating scanned images. Paint or a graphic program for graphic creation, etc.

Text Editing or Word Processing

Microsoft Word is probably the first application that you learn in computer. This is mostly used for creating and editing text. This software can be used for letters, resumes, purchase orders, and other common documents.

The documents can be edited using various tools such as spell checker, table formatters, thesauruses, and other tools. In multimedia too, you would be using text to highlight the display. This text in most of the cases comes from the word processing software, because of its ease of operations.

Graphic and Text Scanning

It is not that you would be typing the text in all the cases. You may enter the text in computer by scanning it from the matter already available. In fact, while using scanner you cannot only scan the text, but can scan the images too, which can be stored in the computer.

For all this you need to have what is called as OCR software, meaning Optical Character Reader software, which reads all the characters on the image character by character. OCR software turns bitmapped characters into electronically recognizable ASCII text.

Most OCR applications claim about 99% accuracy when reading 8- to 30- point characters at 300 dpi and can reach processing speeds of about 150 characters per second. These programs, however, have difficulty in reading poor copies of originals where the edges of characters have bled; these and poorly received faxes in small print may yield more recognition errors than it is worthwhile to correct after the attempted recognition.

Drawing and Painting Tools

Painting would immediately make you think of Paint program. Well, it is the most common software available with Windows. But, there are others too, which are much faster, accurate and more useful. Software like, Photoshop, Fireworks, and Painter come in the category of creating bitmap images. While drawing software are: CorelDRAW, Freehand, Designer, etc. These are used to create vector-based graphics.

While choosing the drawing or painting software you must look for the following in the software:

- ◆ Scalable dimensions, so that you can resize, stretch, and distort both large and small bitmaps.
- ◆ Paint tools to create geometric shapes, from squares to circles and from curves to complex polygons.

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software used here is the presentation software from Microsoft named as Microsoft PowerPoint.

Multimedia is enjoying widespread use in training programs. The teacher replaces speaking in the above example. Flight attendants learn to manage international terrorism and security through simulation. Mechanics learn to repair engines. Sales people learn about product lines and leave behind software to train their customers. Fighter pilots practice full-terrain sorties before spooling up for the real thing.

Games

There is no limit to the number of games available in the market for playing on computers. These games are quite similar to the ones you see in so called Video Parlours. Most of them are interactive; i.e., they react to what you do or how you play. All of them are part of a multimedia application, since all of them make good use of sound and graphics.

1.5 MULTIMEDIA REQUIREMENTS: HARDWARE, SOFTWARE

Let us now learn about the Computer which you would need to create Multimedia. Not only a computer, you also need software to match it too. You must use the software with which you are familiar. This will help you in saving time and energy. It is not that you would see the hardware which is needed now but you would also make mentally sure that the same would last at least 3 years.

Let us look at the two major factors like Hardware and Software in little details.

Hardware

For all practical purposes we would be talking about Personal Computers in general. This, however, does not rule out the possibility of running the multimedia product on any other computer. It can even be running on a TV with the help of a television set-top box such as Sega, Nintendo or Sony. These are becoming popular overseas though have a little presence in India.

Software and Operating System

The most important software which a personal computer has, is Operating System. And the most popular operating system now-a-days is Windows. It is upto you to use the version which suits you the best since Windows XP is the latest, but other versions like Windows 98/ME/2000 are also available in the market.

A graphic is first converted into bitmaps in computer. Sound is converted to digitized sound. For these whichever tools you use would not make a difference since the end product is the same. Indeed, many software tools readily convert picture, sound and other multimedia files (and even whole functioning projects) from Macintosh to Windows format, and vice versa using known file formats or even binary compatible files that require no conversion at all.

Multimedia software tells the hardware what to do. Display the colour red. Move that tiger three leaps to the left. Slide in the words "Now You've Done It!" from the right and blink them on and off. Play the sound of cannibals crashing. Run the digitized movie of Captain Hook. Turn down the volume on that MP3 file!

A perfect example of Multimedia is the creation of a motion picture called Toy, which was totally made in the studio using the various animations and live actors. It used live pictures and merged them with animations and fit in the sound to create an effect which had been highly appreciated by many. Some time back Japanese made a complete film on Ramayan, totally animated with Hindi sound.

Application in Education and Training

Some time back, a publisher in New Delhi issued Model Test Papers of class XI and XII in the form of CD-ROMs. You had to put the CD in the computer and it would ask you the question. You have to replay choosing one of the options given there and the result would come on the screen immediately. It is another form of training. Though the concept is quite new in India, but, is catching up fast in other countries. The teaching method is more and more interactive using the multimedia concepts and instead of teacher asking the questions the questions are asked by the computer and students have to reply on the computer itself by pressing various keys. Thus, the result is compiled on the spot.

Science and Technology

Over the years Multimedia with the help of Internet has taken the Science and Technology to a new height. An experiment being done in USA can be watched in India. Of course, if the surgeon allows it to be seen. Similarly all the new information is passed over the thousands of computers in few seconds, to keep every user know about it. I know of cases where doctors in India send x-ray and other reports to the corresponding doctors in USA via Internet and ask for the possible treatments.

The same thing happens in other spheres of research. All the possible research materials are shared. The most important part which the Multimedia and Internet have given to the mankind is the communication. It takes hardly few seconds to transfer the sound and graphics from one part of the world to another.

Kiosks

Kiosks are like booths, wherein you feed the data to get the information. These are very useful in places like Exhibitions, where you press a button to know where you are. All the relative information about the other places, which you can visit are shown along with maps; etc. We have one placed at Ashoka Hotel to help tourists know more about Delhi. Supposing you have to go to Karol Bagh from Ashoka Hotel, it would not just tell you the distance, but will also tell you the route and how much the Taxi and Scooter would charge.

In other countries similar types are available on railway stations, shopping malls, museums and grocery stores. These are stand-alone terminals or kiosks to provide information and help. Such installations reduce demand on traditional information booths and personnel, add value and they can work round the clock, even in the middle of the night, when live help is off duty.

Business

I am quite sure that you must have seen a sales conference of a company. If not at least must have heard about it. There the speaker while talking about the sales has the various charts and graphs displayed on the board using the overhead projector. This becomes the part of the sales display and supports the figures given by the speaker. The same can now be done using the various facilities of the multimedia with graphs and sounds. The most common

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- to learn about Macintosh versus PC
- to learn about Macintosh Platform
- to learn about PC Platform and Connections
- to learn about Memory and Storage Devices
- to learn about Input Devices
- to learn about Output Hardware
- to learn about Communication Devices

1.2 INTRODUCTION

In this unit, you will learn the definition of multimedia. You will be introduced to CD-ROMs and various multimedia applications. You will come to know about multimedia requirements of Hardware and Software. You would be introduced to creativity and organization. You will learn various multimedia skills and training. Learn to compare Macintosh and PC. You will be introduced to Macintosh Platform. You will learn about various PC platforms and its connections. Learn about memory and storage devices. You will be introduced to various input devices. Learn about the various types of hardware used for output. You will learn about various communication devices

1.3 DEFINITION OF MULTIMEDIA

First thing first, let us understand what Multimedia means. Multi- means many, *i.e.*, not one, more than one. Media means medium to communicate or talk. Now how would a computer talk to you. It would either create a sound, show a picture or some text on the screen. All this would be communicated to you by computer using medium like Monitor to show the text and picture, speaker to broadcast sound. All these mediums of the computer, like monitor and speaker are collectively called Computer Media.

Now what we make of Multimedia. It is a process by which computer communicates with you using more than one computer medium like sound, text, graphics, animation or video. Any two or more combinations from the above can be used and the net result can be displayed on the monitor screen or transferred to your web or the web site which you may create.

1.4 CD-ROMS AND MULTIMEDIA APPLICATIONS

Among the various applications of multimedia are the dazzling effects you can see in most of the advertisements on the TV. How about Pepsi advertisement of Oh Bubbly. It makes good use of sound, graphics, and animation. Most of the advertisements which you see on the TV are the results of computer created animation (using software called Flash, about which you would be reading in a later chapter) and combinations of pictures shot by either still or video camera. These pictures are then changed to suit according to needs using a software called Photoshop, about which too you will read in a later unit.

UNIT—1

INTRODUCTION AND HARDWARE

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STRUCTURE

- 1.1 Objectives
- 1.2 Introduction
- 1.3 Definition of Multimedia
- 1.4 CD-ROMs and Multimedia applications
- 1.5 Multimedia requirements: Hardware, Software
- 1.6 Creativity and Organization
- 1.7 Multimedia Skills and Training
- 1.8 Macintosh versus PC
- 1.9 Macintosh Platform
- 1.10 PC Platform
- 1.11 Connections
- 1.12 Memory and Storage Devices
- 1.13 Input Devices
- 1.14 Output Hardware
- 1.15 Communication Devices
 - Summary
 - Review Questions
 - Further Readings

1.1 OBJECTIVES

The objectives of this unit can be summarized as followings:

- to learn about Definition of Multimedia
- to learn about CD-ROMs and Multimedia applications
- to learn about Multimedia requirements: Hardware, Software
- to learn about Creativity and Organization
- to learn about Multimedia Skills and Training