TYPE OF MULTIMEDIA AUTHORING TOOLS

Now let us briefly see the type of authoring tools available in the market.

There are mainly four type of multimedia authoring tools that are as follows :

(i) Icon based Authoring tools
(ii) Time based Authoring tools.
(iii) Theatrical Authoring tools.
(iv) Card-based or Page-based Authoring tools.

(i) **Icon-based Authoring Tools :** Nowdays Icon-based authoring tools are mostly used by multimedia designers and develpers. These tools permit creation of an Icon-based flow script which is then converted to an application. *Macromedia Authoring professional, Icon Author* etc. are the most common example of Icon-based authoring tools.

(ii) **Time-based Authoring tools :** Time-based authoring tools are also most common multimedia authoring tools that used by many multimedia developers. These type of authoring tools use timescals to decide duration of message on the screen. *Macromedia action, Animation works Interactive* etc. are most common example of time-based authoring tools.

(iii) **Theatrical Authoring Tools :** These type of tools are used by expert multimedia developer. Theatrical authoring tools refers to media component as independent cast members, which are assembled with the help of score that is a sequencer in terms of time, linking and animation. We can apply complex visual effect on these score to create powerful presentations. Nowdays *Macromedia Director* is used as Theatrical Authoring Tools.

(iv) **Card-based or Page-based Authoring Tools :** With the help of these type of tools we can put all information as stack of cards or pages. These pages and cards can further be linked with each other in predefined orders. We can also create the cross linkages along with baranching facility. *Hypercard by Apple, Asymetric tool book* and many presentation software are examples of these categories.

Function of Multimedia Authoring Tools :

There are four (4) most common function provided by almost all multimedia authoring software. These are as follows :

(i) Importing (ii) Creating
(iii) Integrating (iv) Delivering

(i) **Importing :** It should be allow to import many media elements that may have been developed with the help of other software package.

(ii) **Creating :** Multimedia authoring tools should some fundamental features for creation of text, picture and may be sound if not vedio.

(iii) **Integrating :** Multimedia authoring tools should allow you to define sequences and provide linkages.

(iv) **Delivering :** Multimedia authoring tools should allow you to develop self-running application and encription of application data.

Features of Multimedia Authoring Software :

Now let us see "What are Multimedia Authoring Software and their features ?"

Definition : *"Multimedia authoring software is the main production tool for multimedia. Authoring actually is just a speed-up form of programming although you need not know complications of a programming language or an API, but you do need to understand how programs work."*

An multimedia authoring system is a program which has pre-programmed components for development of interactive multimedia software titles, these systems vary widely in capabilities orientation and learing capabilities of user. Following are the main features of multimedia authoring software :

(i) Icon-based program.
(ii) Most User-friendly.
(iii) Intigrated Multimedia elements such as text, graphics, sound, animation and video.
(iv) DLL (Dynamic Link Library) for extending features.
(v) Script language programs (Lingo macromedia director), Action script (Macromedia Flash), Open script (Asymetrix Tool book).
(vi) Hypertext
(vii) Supporting CD-ROM or laser disc sources.
(viii) Cross-platform capability.
(ix) Supporting Video for Windows Operating System.
(x) Runtime player for distribution.
(xi) Media embedding capabilities.

KEY FACTORS OF SELECTING CD-BASED MULTIMEDIA AUTHORING TOOLS :

Now let us see *"What are the various key factor of selecting CD-based multimedia authoring tools ?"*

We can divide key factors of selecting CD-based multimedia authoring tools into two (2) groups. These are as follow :

(i) Content key factors/guidelines.
(ii) Technical keyfactors/guidelines.

(i) Content Key factors/Guidelines :

Content key factors assist a multimedia developer to decide upon the multimedia componet, such as text, graphics or animation, to be used as a medium for conveying the information. These key factors or guidelines also define the rules for effective implementation of the delivery medium.

Content key factors can be further divided into the following categories :

(i) Scripting key factor
(ii) Graphics key factor
(iii) Audio key factor
(iv) Animation key factor

(i) **Scripting key factors :** Scripting involves representating information with thehelp of text. We should consider the following guidlines during writing textual content for multimedia.

- Under standing the audience.
- Script should be in the active voice
- Use audio for scripting
- Format text

Therefore you should select a multimedia authoring tools that have capibility of scripting.

(ii) **Graphics key factors :** Authoring tools should have full power of creating and editing of graphics. The color of the graphics should be implemented according to the perferences of the audience.

Authoring tools should allow to save a graphics file in various format and it should have importing and exporting features.

(iii) **Audio Key Factor :** Audio integration in a multimedia application is a critical task. Audio should be perfectely synchronized with the on-screen event. Your authoring tools should have capability of recording sound, editing sound, importing and exporting sound in various sound formats.

(iv) **Animation key factor :** Animation can be used for presenting information in a creative way. Animation has the advantage of combining the text and graphics elements for presenting information. Authoring tools should have the capability of creating, editing, saving animated files in various formats.

(ii) Technical key factors :

Technical key factor refer to the technical and the phisical details that enable an application to run efficiently on computer. Following are some technical key factors that you need to keep in mind whenover you select CD-based multimedia authoring tools :

(i) Screen resolution
(ii) Operating system

(iii) Delivery medium
(iv) The speed of processor
(v) The available memory space

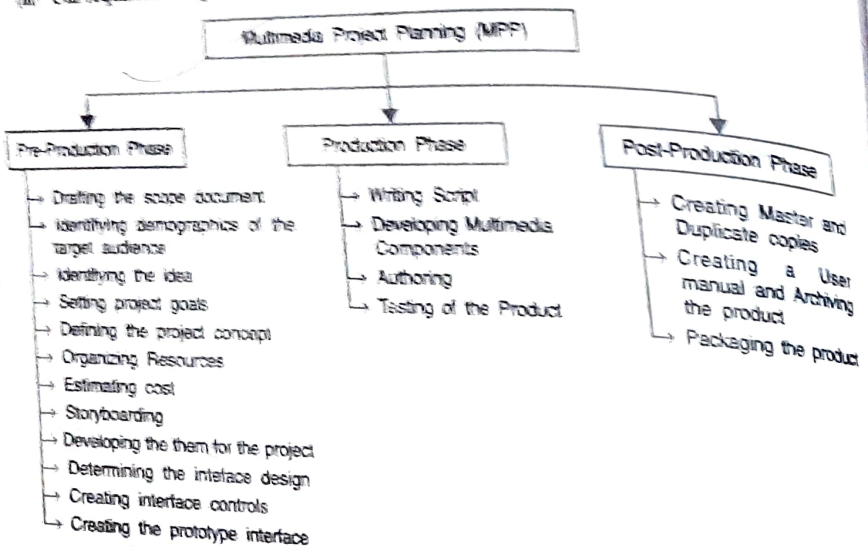
In short we can say that, We can select a CD-based multimedia authoring tools based of the following criteria :

(i) The general features of the tool
(ii) Our own capabilities
(iii) Our requirements (present & future)

Planning and distribution of Multimedia project stages in desining and producting multimedia product for CD :

Multimedia project planning involves mainly three (3) stages or phases. These are has follows :

(i) The pre-production phase
(ii) The production phase
(iii) The post production phase



I. Pre-Production Phase :

This phase deal with all the activities that you require to undertake before you actually start working on the project. In this phase, you gather client requirement, understand user specification and plan for the project based on the information gathered.

The preproduction phase include the following tasks that you will prefer.

(i) Drafting the scope document
(ii) Identifying demographics of the target audience
(iii) Identifying the idea
(iv) Setting project goals
(v) Defining the project concept
(vi) Organizing Resources
(vii) Estimating cost
(viii) Storyboarding
(ix) Developing the them for the project
(x) Determining the inteface design
(xi) Creating interface controls
(xii) Creating the prototype interface

(1) Drafting the scope Document :

The scope document defines project goals, time frame and deliverables for the project. We create scope document for two purposes :

(i) Stakeholder in the project use it to confirm that their requirements have been accurately captured and understood by the development team.

(ii) The development team uses the document to create a design for the product.

(2) Identifying Demographics of the Target Audience :

It is must important for you to understand the need of target audience for whom you are developing the project. Demographics are the variables, such as age, Gender, Occupation, Religon, Race, Family size, Nationality, mantal status and eduction, based on which you can define the target audience. This helps you to understand the audience and makes it easier to develop a project that fulfills their needs.

(3) Identifying the Idia :

There are many people work in a group or team to generate a fresh idia. A team is always better to generate ideas than a individual for generating ideas than a individual for generating idea for a project because a team can contribute more information than an individual.

According to creative experts, idea generation can be divided in to the following three (3) steps:

(i) Fact finding (ii) Incubation
(iii) Idea generation

(i) **Fact finding :** This step involves a careful discussion about objectives of the project considring the requirements of the clients and the demographics of target audience.

(ii) **Incubation :** this step is the provision of time for understanding and absorbing the aim of the project. The many facts need to be obsorbed before introducing fresh idea.

(iii) **Idea Generation :** This steps involves the generation of the required idea after you have analyzed the information. There are many idea generation techniques which help in the throught process which generating new idea. These are :

* Brain storming * Synectics * Heuristic Ideation technique (HIT)

(4) Setting Project Goals :

The goal of a multimedia project is defined by the scope of work which is written description of the proposed multimedia project. The scope of work clarifies your idea and goals regrading the proposed project. It also help the development team members to visualize the basic objectives of the programe. You should consider the following criteria while setting goals and objectives :

(i) Arranging the objectives of a goal hierarchically
(ii) Starting quantiative objectives
(iii) Setting realistic goals

(5) Defining the Product Concept :

In this stage of pre-production phase, you define the product concept. this helps you to determine how the final product will appear after completion.

(6) Organizing Resources :

After you fix the goals and objectives of the project, you need to organize the resources that you will utilize in multimedia project.

The organizing resource involves following three steps :

(i) Selecting the Delivery Media
(ii) Identifying the project learn
(iii) Identifying the Hardware and Software requirements

(7) Estimating Cost :

In this step of pre-production phase, you should estimate the cost of the project. Estimating cost helps in defining the profit margin for the multimedia project. The cost of multimedia project depends on the labor rate and the duration for which resources are allocated.

(8) Storyboarding :

The story board is a graphical representation of the proposed multimedia project. It is an exten-

sion of idea presented in the programme script. Story boarding assists the development team to get a comperhensive understanding of the vision centered around the multimedia product. A story board is a comic book-like sequence of sketches depicting the key sports in an animation or a multimedia project. In other words we can say that story board is presented with a series of templates used for various purpose. Some of the common templates, which are required to represent a comlex application are :

(i) Logic flow and branching sequence templates
(ii) Animation sequence templates
(iii) The Story board template
(iv) Audio/video templates
(v) Factor details templates

Storybord hepls the developing team to :

(i) Assess the logic flow of sequence used in a multimedia project.
(ii) Get an idea of the number of frames you need for an animation.
(iii) Determine and create intermediatory steps between two key spots to ensure smoothe movement of a animation in a multimedia application.
(iv) Get an idea about the digital video/audio content that need to shot/recorded and edited.
(v) Determine the amount of special assistance that might indeed outside assistance of out sourcing.
(vi) Identify the content that might need special permission or might require copyright issues.

(9) Developing a Theme for the project :

This is an important steps involved in the preproduction phase. You should keep in you mind a them and style that suits the target audience. You should visualize the ambience, mood, style, color scheme etc. keeping in mind the target audience. The selection of the theme is a key decision and plays a major role in the acceptance of a product. For example, if you are designing a multimedia product targeted for kids must be bright with a bibrant color scheme and cartoon characters. Following are certain considerations that must be considered while designing a screen laout :

(i) Balance (ii) Unity (iii) Color

(i) **Balance :** Balance refers to the harmony between the components of screen layout. Whenever you design screen layout you should ensure that the various components of the layout have an appealing balance ;

(ii) **Unity :** Unity is the quality of the layout that decide the whatevers of the screen. The total layout should appear to be belonging to a common theme, with the various components supporting each other in such a way that they collectively contribute to communicate the message effectively.

(iii) **Color :** Colors play a major role in communicating ideas, grabbing attention of a viewer and reinforcing a message. Colors have symbolic meanings attached to them. Dark colors represent sobriety seriousness and even mystery, whereas light color, convery cheerfulness and freedom.

(10) Determining the Interface Desing :

During multimedia project design, the developers need to define the method by which the users will interact with the application. A user interface is the means through which a user interacts with the application. User interaction include various activity such as how the user navigates through an application and how the application responds to activities, such as clicking a button or a hyperlinks. The control of application is an important considaration while designing the user interface. It depends upon the audience and the type of application. Interface designing also include defermining the navigation structure of an application. Designing the structure of a product involves creating a navigation map. Generally a navigation map is a visual represntation of the structure of the product. It includes the table of content along with a chart that depicts a logical flow of the product and provides you with links to connect to the various area of the product.

A nevigation map may follow one of the following structures :

(i) **Linear structure :** In this structure, you navigate in a sequential manner, moving from one page (P) to another.

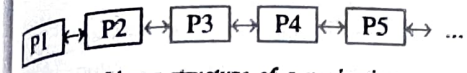
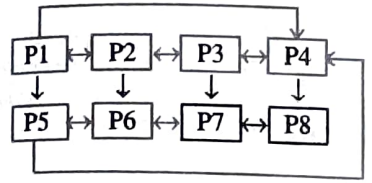


Figure : Linear structure of a navigation map

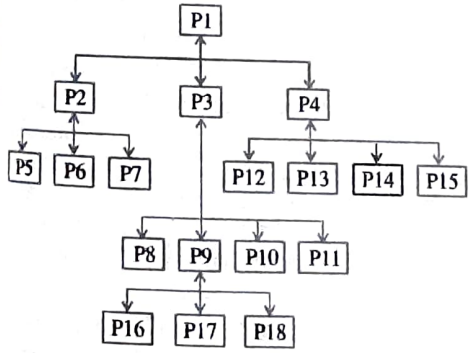
(ii) **Non-linear structure :** This structure is the opposite of the linear structure. You can navigate freely through the content, which means that you are not resstricted by predefermined structure.

Figure show the graphical representation of non-linear navigation map.



Non-linear structure of a Navigation Map

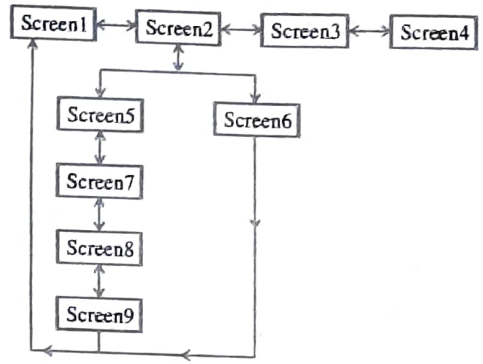
(iii) **Hierarchical Structure :** This structure is just similar to the structure of an inverted tree. In Hierarchical structure you can move from top to lower brach. It generally starts with of branches might increase as you navigate to the lower level branches. The branches follow the logical flow of the content. The following figure show a hierarchical navigation map.



Hierarchical structure of a navigation map

(iv) **Composite or Compound Structure :** It is a combination of any of three structure discussed above. The usual mix is linear and non-linear structures resulting an navigation map that allows the user to navigate freely but for certain portion, wherein the movements need to be linear.

The following figure show composit structure of a navigation map.



Composit structure of a navigation map

(11) Creating Interface Controls :

Interface controls are used for navigation in the form of button or link. These buttons should appropriately convery the type of content they represent. A common practice is the use of icons and symbols as button to represent the type of content that they link.

Control Buttons

(12) Creating the Prototype Interface :

This is the dummy interface designed to seek approval of the client. This is the sample of the type of interface that you will use in the final product. It is not necessary to include all the details of the content in the prototype. But the prototype should be explanatory enough to give a fair idea about the final interface to the client.

II. Production Phase :

Production phase is the second phase in the multimedia project development. In this phase you do the following :

(1) Write the script.
(2) Develop multimedia components.
(3) Integrate the components.
(4) Test the product.

(1) Writing a Script :

A script is a written description of the product. In the script, you document the flow of the product when writing a script, you should provide a detailed description of each component on the screen. Following are certain guidelines that you should follow while writing the script :

(i) Understand the audience.

(ii) Script in the active voice. The use of active voice while scripting helps a developer to address the audience.

(iii) Use an appropriate size and style for the written text. The content should be easily readable. Important words can be underlined, italicized or colored for grabbing audience's attention.

(2) Developing Multimedia Components :

Once the script writing is over, the multimedia component (building block) are to be developed while creating these components you also need to refer to the scope document.

(i) **Developing Text :** Text is one of the primary medium of communication of information. You can follow the following guidelines while developing text :

(i) The amount of text put in multimedia application may be limited to short paragraphs or point wise lists.

(ii) The size of font should be larger enough to be read easily by the multimedia user/audience.

(iii) The special effects on text should be used to highlight important concepts or message but do not overdo them.

(iv) The text styling and formating should be consistent over the complete application.

(v) Use font type and point size which commonly available. This will make sure that the text tooks the same as it was designed.

(ii) Developing Graphics :

Graphics is the most predominant component of multimedia and help in making your multimedia presentation illustrative, interesting and more meaningful. You can follow the following guidelines while developing graphics.

(i) Do not overburden your graphics screen with too much of simultaneous information.

(ii) Use graphics that are appropriate for delivering the message.

(iii) Keep the graphics on the screen simple, user-friendly, clear and elegant as possible.

(iv) Implement the color of the graphics according to the preferences of the audience.

(v) Use appropriate and consistent size of graphics.

(vi) Keep a check on screen resolution.

(iii) **Developing Audio/Sound :** Audio/Sound is a very exciting part of multimedia application. It provides voice to visuals, which loads to increas interest levels and involvenment of the audience. While developing audio/sound, you should follow the following guidelines :

(i) The sound should match the graphics.

(ii) It should be relevant to the project needs.

(iii) Do not use excessive sound in your application.

(iv) Use background music to maintain and enhance the spirit of the CBT content.

(v) The mixing of the audio track and their synchronization with the video and graphics should be correct.

(iv) **Developing Video :** Video help in communication a lot of information in a small time. Video enhances the impact of multimedia application, especially in areas involving difficult concept. Digital Video can be acquired from either digital recording or by converting analog video footage of high quality into digital video.

You can follow the following guidelines while developing video or integrating video in a multimedia application :

(i) Data transfer rate should be high in a multimedia application.

(ii) Use appropriate size of window to display information.

(iii) Use appropriate fram rate and image resolution.

(3) Authoring :

Authoring is the process of combining materials such as video, graphics, text, sound, animation, document and files into a format suitable for viewing on the appropriate device. Such divices include but not limited to DVD players and computers and Internet Web browsers. Authoring tool also known as authorware is a program that helps you write hyper text or multimedia application. There are various type of authoring tools available in the market, which you can use to develope multimedia application for defferent purposes. You can select any authoring to according to your need. For example, you use Macromedia Director and Flash to create animations for the Web, CD-ROMs, Kiosks, Macromedia Authorware to develop interactive online applications and Macromedia Dreamweaver to create multimedia application for the internet.

(4) Testing of the Product (Multimedia Testing)

First of all let us see "What is testing?"

Definition: *"Testing the application/program is committed to deliver the product without any defect within the scope of testing." In other words we can say that "testing is the process of eliminating maximum number of bugs or issues to deliver a potential product."*

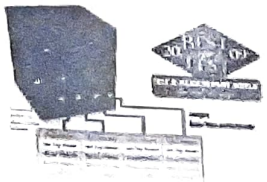


Figure: Multimedia Testing

In general, testing is finding out how well something works. Testing is act of checking if a product performs as expected while test plan is a road map for successful complete testing and test case is a action that validate the product success or failure.

Technologies are continually changing and there are many ways to distribute your products to the market. CD, DVD, Blu-ray Disc, mobile phones and the Internet are common distribution channels. Multimedia Testing involves testing your multimedia products on these different formats and mediums.

You might think that the process of producing a CD or DVD has evolved to a point where testing is no longer required. However, this is not true. With this kind of media, you first have to produce a master or gold copy of your software from which all other copies are made. If there are any mistakes in the gold copy they will be replicated to all of the media that will be distributed to your customers. This can devastate a company's reputation and subsequent rollbacks or fixes can greatly increase costs.

These problems are typically stemmed from developers using one environment for testing. The compliment of drivers, plugins, codecs, etc included on the gold disc might be sufficient to install your product on that test machine, but not others.

Another general problem that can be identified by Multimedia Testing is the existence of small content errors that are easy to miss during development, such as spelling mistakes or inaccurate information in change logs, web pages or read me files.

Let us see"Why do CDs and DVDs need to be tested?"

When you're pressing CDs and DVDs they have got to be right first time - you can't fix them later. But what sort of things can go wrong? Typical issues include:

- **Minimum hardware requirements** - do you know how much CPU power and memory your application needs? Does their

usage increase over time? How would you find out?

- **Minimum software requirements** - does it work with all the Windows and Mac versions you want to support?
- **Media players and plug-ins** - are these supplied with the operating systems or do they need to be installed separately? What happens if the user cannot or will not install them?
- **Content** - has the copy been checked for typos and omissions? Is the video quality consistent? Are there any dropouts or momentary losses of audio synchronization?
- **Functionality** - do the media player controls and navigation work correctly?
- **Gameplay** - have you assessed the vector-based animations such as Flash for smoothness of animation, realism, continuity, playability, perspective and lighting effects?

Web Testing Services

In the current competitive and fast paced market it is essential for any business to have a high-quality web presence to attract and interact with customers. Since a website or web service is open to all at all times, certain attributes are required to maintain and extend the image and reputation of your business. Quality, consistency and usability are the main attributes of success for any website. To achieve this, it is necessary to exercise many different types of testing before going live.

You can perform the following areas of testing for you website or web application:

1. **Functional testing** – Ensures that all the features of your website / web application are functioning properly. Testing should be done on links on the web pages, images, texts, database aspect, forms for submission and retrieval of data and cookies.
2. **Security testing** –Involves testing of confidentiality, authorization, integrity, availability and vulnerability aspects of the website or web application.
3. **Compatibility testing** – Ensures that your web site or web application is compatible with different types of browser, operating system, server, database, mobiles, printers, languages, etc.
4. **Load testing** – Measures the behavior of a website or web application with increasing load. For example, number of parallel users and/or numbers of transactions to determine what load can be handled by the website or web application.
5. **Performance testing** – Testing to evaluate the website's or web applications stability, scalability and performance aspects. This has to be done on different connection speeds, Operating Systems and hardware by simulating the load.
6. **Stress testing** – This is conducted to evaluate a website or web application at, or beyond, the limits of its specified performance requirements.
7. **Usability Testing** - Determines the extent to which the website or web application is understood, easy to learn, easy to operate and attractive to the users under specified conditions.
8. **Accessibility Testing** – Ensures that your website or web application is accessibility compliant to different standards like DDA in UK, W3C guidelines and section 508 in US.
9. **User Acceptance Testing** – This is done with respect to user needs, requirements and business processes conducted to determine whether or not a website or web application satisfies the acceptance criteria and to enable the user, customers or other authorized entity to determine whether or not to accept the website or web application.

Black Box V/s White Box Testing

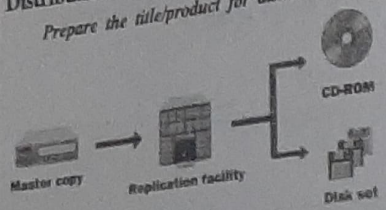
Both white-box and black-box testing techniques are important and are intended to find different types of faults. The major dereferences between these two techniques are as follows:

	Black Box Testing or Functional Testing	White Box Testing or Glass Box Testing or Structural Testing
1	This method focus on functional requirements of the software, i.e., it enables the software engineer to derive sets of input conditions that will fully exercise all functional requirements for a program.	This method focuses on procedural details i.e., internal logic of a program.
2	It is Not an alternative approach to white box technique rather is complementary approach that is likely to uncover a different class of errors.	It concentrates on internal logic, mainly.
3	Black box testing is applied during later stages of testing.	Whereas, white box testing is performed early in the testing process.
4	It attempts to find errors in following categories : a) Incorrect or missing functions b) Interface errors c) Errors in data structures or external database access d) Performance errors e) Initialization and termination errors.	Whereas, white box testing attempts errors in following cases a) Internal logic of your program. b) Status of program.
5	It disregards control structure of procedural design (i.e., what is the control structure of our program, we do not consider here).	It uses control structure of the procedural design to derive test cases.
6	Black box testing, broadens our focus, on the information domain and might be called as "testing in the large' i.e., testing bigger monolithic programs.	White box testing, as described by Hetzel is "testing in small" i.e., testing small program components (e.g., modules or small group of modules).
7	Using black box testing techniques, we derive a set of test cases that satisfy following criteria (a) Test cases that reduce, (by a count that is greater than 1), the number of additional test cases that must be designed to achieve reasonable testing. (b) Test cases that tell us something about the presence or absence of classes of errors rather than an error associated only with the specific tests at hand.	Using white box testing, the software engineer can desire test cases that (a) Guarantee that all independent paths within a module have been exercised at least once. (b) Exercise all logical decisions on their true and false sides. (c) Execute all loops at their boundaries and within their operational bounds. (d) And exercise internal data structures to ensure their validity.
8	It includes the tests that are conducted at the software interface.	A close examination of procedural detail is done.
9	Are used to uncover errors.	Logical paths through the software are tested by providing test cases that exercise specific sets of conditions or loops.
10	To demonstrate that software functions are operational i.e., input is properly accepted and output is correctly produced. Also, the integrity of external information (e.g. database) is maintained.	A limited set of logical paths be however examined.

III. Post-Production Phase

Distribution of multimedia product

Prepare the title/product for distribution



The final step in your production is to build a *master copy* of the title. The master organizes all the files in your title together, so the title can locate and retrieve files as it needs them.

What you do next with the master depends on how you plan to distribute the title. If, for example, you're preparing a presentation for a small group to use, you may simply copy it onto floppy disks and hand it out. If, on the other hand, you're preparing a title to sell, you will copy it in larger quantities onto floppy disks or CD-ROMs.

The equipment involved in replicating a title on CD-ROM is expensive, so you will probably work with a facility that specializes in this work. You should choose the facility early and discuss their requirements in detail. You need to know how to organize your master copy and the format to deliver it in to the facility. Always test your master before you hand it off to make sure it performs the way the final title should perform.

Getting video out of your computer

Once you have finished assembling and editing clips, it's time to get your final production out of your computer and on its way to distribution. These days, creative professionals are expected to deliver video that can be used in multiple media. Broadcast and film professionals alike are now creating web-based work, while web designers may need to create animations that are output in video formats. DVDs have also become an extremely popular way to combine high-quality video and audio content with menu-driven interactivity. To address this growing need for flexibility, Adobe Premiere Pro and After Effects offer a wide range of options that enable you to produce high-quality deliverables for any medium.

The program you edited in the timeline does not actually contain the material from which it was pieced together. Rather, it references your source files. Before export, make sure that the timeline is ready to output at the quality you require. For example, replace any offline files with high-resolution files suitable for final export. To get your edited program out of your computer in one piece, you can:

- Record the timeline to physical media including videotape or motion picture film, assuming that you have the proper hardware for video or film transfer, or have access to a service provider that offers the appropriate equipment and services.
- Export a video file for viewing from a hard disk, removable cartridge, CD, DVD, or the web.
- Export portions of your timeline as clips.
- Capture stills or sequences of stills.

From Adobe Premiere Pro, you can also export:

- An **EDL** (edit decision list)
- An **AAF** (Advanced Authoring Format) file

Good housekeeping

In professional production environments, after a video project has been completed, it is typically cleared from the editing system to make room for new work. Because the multigigabyte storage media that would be needed is costly, and the process of uploading can be very time-consuming, projects and source files are not usually saved in their entirety. If you do want to save your entire project, you can trim unused frames from some or all of your source clips and remove unused clips in their entirety from Project Bins.

Typically, however, a digital master file is *exported and archived*, the original raw footage is stored on tapes, and an EDL is saved. If the project needs to be revised later, the master file can often be edited. For more extensive repurposing, the EDL can be used to recapture the necessary clips from the original tapes. Files used to develop titles, graphics, and animations, as well as portions of the project that have undergone extreme manipulation to achieve special effects can also be *archived*.

Today, more and more production professionals are exporting AAF files, rather than EDLs, to *archive or exchange projects*. AAF is a widely supported industry standard for high-end exchange of data, such as the information necessary to transfer a video project from one platform to another. An AAF file helps you preserve as much of the project's integrity as possible when you transfer it to another system. However, not all elements of a project can be successfully transferred using AAF. Also, the application you use to open the AAF file may not support all features. In general, an AAF file dependably translates editing data and commonly used transitions, such as cross-dissolves and wipes, but does not support effects (filters) or audio fade and pan information, including audio transitions.

Exporting to videotape

You can record your edited program onto videotape directly from your computer. This process can be as simple as playing the timeline and recording on a connected device. When you record standard DV video back to standard DV tape, all that is required is an *IEEE 1394 connection*. However, if you plan to record DV audio and video to an analog format, such as VHS tape, you'll need a device that can convert DV to analog using the connectors supported by your analog video recorder. Most DV cameras and all DV video tape recorders are capable of this conversion; some DV cameras require you to record the video to DV tape, then copy the DV tape to the analog video recorder.

Exporting to digital files

You can prepare variations of a program or clip for a variety of different uses. For example, you can create separate versions for DVD distribution and web viewing. Adobe Premiere Pro and After Effects both offer built-in support for exporting the following digital video file formats: *Microsoft AVI, Animated GIF, QuickTime, MPEG-1 and -2, as well RealMedia and Windows Media files for the web.* After Effects also exports Adobe Flash (SWF) files. Several audio-only formats and a variety of still-image and sequence formats are also supported by both applications. Additional file formats may be available if provided with your video capture card or if you add third-party plug-in software.

To start the export process, you enter settings that determine the properties of the final file. These settings may include the data rate for playback, the color depth, the frame size and frame rate, the quality, and what type of compression method, or codec, to use. Choosing compression settings is a balancing act that varies depending on the type of video material, the target delivery format, and the intended audience. Often, you discover the optimal compression settings through trial and error. Prior to distribution, you should always test the files you export on the type of platform or equipment you expect your audience to use.

Web video

The web is rapidly gaining importance as a vehicle for distributing video content. From training programs, to sharing the experience of personal events such as weddings, to full-length feature films, video delivered via the Internet or a corporate intranet is big business.

DVD

Adobe Encore DVD adds creative authoring for professional DVD production to the Adobe Production Studio solution set. To learn more about DVD production and Adobe Encore DVD, take a look at the Adobe DVD Primer on the Adobe website at www.adobe.com/motion/primers.html.

Multimedia development team and skills required

Developing a full-fledged multimedia application/title involves a rich mix of skills ranging from

project management and interface design to sound preparation and programming. Although multimedia tools make it possible for one person to perform every task, few people have the combination of technical, artistic, and management skills necessary to fill every role well. As a rule, multimedia application/ title is best developed collaboratively by teams with a range of expertise. Often, however, budgets and schedules require multimedia developers to manage all of the roles themselves. To be successful working alone or with a small team, you should

1. Seek out information about each role's responsibilities. The more you understand, the better you'll perform in these roles.
2. Keep your projects simple at first. Then you can undertake more complex multimedia effects and title design as your expertise grows.

A multimedia team has the following members:

1. Producer
2. Writer/Content expert
3. Editor/Proofreader
4. Graphic /Interface designer
5. Illustrator/Animator
6. Audio technician
7. Video technician
8. Programmer
9. Tester

1-Producer

The producer manages the development of the title, including planning, budgeting, and scheduling the project. The producer often directs the content, much as an art director oversees print materials. The five skills a producer needs to be successful are organization, the ability to make decisions quickly, being a good negotiator, being diplomatic, and having lots of energy.

2-Writer/Content expert

The writer researches the content of the title, helps storyboard it, and then writes all of the text. Sometimes a content expert works with the writer to help communicate the right information.

3-Editor/Proofreader

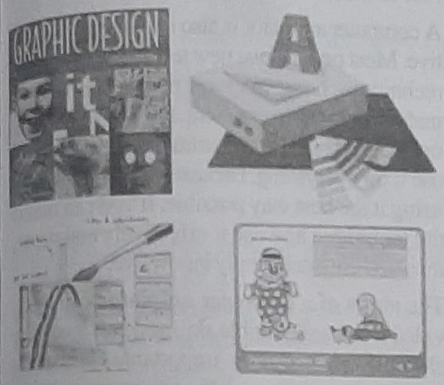
The editor reviews all of the written material onscreen for interest, clarity, conciseness, and grammatical correctness. The editor also checks that the text works well with the other media. A proofreader polishes the final work.

Following are some skills that required for a multimedia/ film editor:

1. Knowledge of the movie production
2. Knowledge of editing equipment and a willingness to keep up with changes in that technology
3. A good photographic eye for camera angles and special effects, as well as knowledge of audio effects
4. Ability to work alone on detailed and sometimes tedious work
5. Problem-solving skills to make film sequences work well or to work with the available footage
6. Strong interpersonal skills to work well with directors, cinematographers, sound editors special effects editors and music producers

7. Flexibility to deal with production delays, unexpected problems and varied personality types
8. Willingness to work long hours on rush assignments
9. A commitment to high-quality work and to continuing to improve your own skills and knowledge.

4-Graphic /Interface designer



Interface designer may be someone who knows how to organize and communicate visual information and responsible for creative design. The interface designer establishes a consistent design for the title by specifying what the navigation system looks like, where information and media appear onscreen, and what fonts, colors, and graphical design elements to use.

Characteristics of Graphic Designers

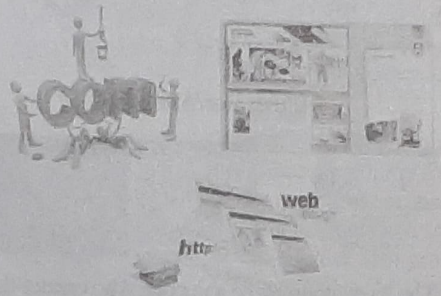
Graphic/Interface Designers /artists have creative vision and ability to thing spatially, but also have solid business and communication skills. Graphic designers know how to:

1. *Listen* - First and foremost, interface/graphic designers need to be able to listen. Listen to clients, the targeted audience, their boss and their subordinates. How else will the designer understand the message or the product without listening to what the client needs and wants.
2. *Manage Time Effectively* - No interface/ graphic artist has unlimited amounts of time to create a project. Being able to stay organized and know how long it takes to finish tasks is a necessary skill to be able to produce quality designs with a looming deadline.
3. *Attend to Details* - The interface/graphic designer is the last line of defense before a project goes to print or is live online. Projects need to be free of minor flaws to increase the designer's and the client's integrity and credibility.
4. *Solve Problems* - All graphic design projects have obstacles, knowing how to overcome them is crucial.
5. *Be Flexible* – Graphic/interface designers will get opportunities to work with various types of individuals and companies. An ability to cater other people's needs and skill levels is crucial to working in the fast paced world of graphic design.

Following are some skills that required for a Graphic /Interface designer:

(i) Web Design

Web design is probably the most valuable skill to have as a graphic designer. It will open up a large new client base for you, allow you to create and update your portfolio site and much more. Being fluent in web design and multiple coding languages will not only make it easier to keep steady work from home, but will make you much more attractive to potential employers who are looking to cut costs by finding multi-talented designers.



(ii) Illustration

Designers often have backgrounds in fine art such as drawing and illustration, but end up

putting their focus on commercial graphic design which can create a disconnect from their fine art origins. Keeping your illustration skills sharp or becoming a better illustrator will allow you to create more creative designs, do freelance illustration work and even sell stock illustrations online! Plus you can save money doing your own illustrations for your graphic and web designs.

(iii) Online Marketing

Online marketing is an essential skill for anyone looking to make the most of their freelance design business. Knowing the latest marketing tactics will help you gain exposure, name recognition and more clients. There are dozens of easy ways to increase traffic to your portfolio site and not taking advantage of them would be a very big missed opportunity!

(iv) Blogging:

Starting a blog is probably the easiest and best thing you can do to increase awareness of your collection.

5-Illustrator/Animator

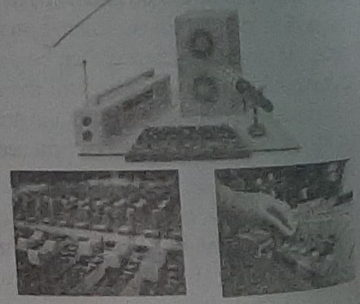
The illustrator may be someone who creates the graphical parts of the title, such as the screen elements and buttons. The illustrator also prepares the drawings, scanned photographs, and animations that are specified in the storyboard.

What qualities does a person need to be a successful computer animator? First they need to technically creative. By this I mean that they need to be able to be creative even though much of what they do it very technical. Many people tend to get bogged down by the technical aspects of computer illustration and animation. A good computer animator is very talented technically but is still very creative. This is a hard mix to achieve.

A computer animator is also intelligently innovative. Most people love new technologies and new techniques, however, most people don't always understand how to use them. It is like when someone gets a brand new hammer and they want to use it for everything, because it is new, instead of using it the best way possible. If you can master the technique and use it effectively and wisely then you are intelligently innovative.

The **skills** of a computer **animator** can be divided into hard tangible skill and soft intangible **skills**. Both are very important. Hard skills include knowledge of the programs required such as Adobe Illustrator, Flash, 3D Studio Max, Adobe Photoshop, Swish, Rhino, CAD, Adobe After Effects, and Light Wave to name a few. These skills are important and often more technical. They put you in a position to get hired. Equally important are the soft skills. These include all your artistic skills. They are called soft skills because they are more difficult to measure. However, they are very important as they will determine how long you will be employed and how successful your career is. Hard skills are great to get a job, soft skills are important for keeping one.

6-Audio technician

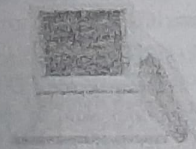


Audio technician may be someone with a good ear for voice-overs and sound effects. The audio technician prepares the voice narration, sound effects, and music for the title. This work typically involves converting traditionally recorded sounds to a digital format that a computer can handle.

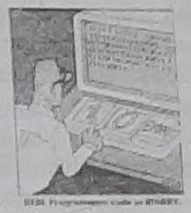
7-Video technician

The video technician may be someone who prepares the video for the title, which may involve shooting the original videotape. The video technician then converts the data on the tape into a digital format for the computer.

8-Programmer



Programmer may be someone who can implement programs that integrate media elements and give a clear design and previously created media elements (graphics, sounds, video, etc.) a programmer creates running software for the title. Generally "A multimedia programmer is a software engineer who integrates all of the multimedia elements into a seamless whole using an authoring language or programming language." In other words we can say that the programmer writes the code that integrates all of the media effects into a working title. The code tells the computer what information to display and when. (Some software lets you build multimedia titles without writing code.)



9-Tester

The tester verifies that every feature of the title works correctly. A tenacious tester looks at every word, screen, and media effect to ensure their quality. The tester also runs the title on different hardware configuration. In real world, a **tester** is an external, third party.

VARIOUS FORMATS OF CDS AND DVDS

Overview of Optical Disk

Optical disk is a storage medium from which data is read and to which it is written by lasers. Optical disks can store much more data — up to 6 gigabytes (6 billion bytes) — than most portable magnetic media, such as floppies.

Definition: "*An optical disk is a compact disk or CD. The formatting of the optical disk will dictate whether it is a DVD, CD, read-only or rewritable. Optical disks have replaced vinyl records, cassette tapes, videotapes and floppy disks*"

The optical disc was invented in 1958.The optical disk became the preferred medium for music, movies and software programs because of its many advantages. Compact, lightweight, durable and digital, the optical disk also provides a minimum of 650 megabytes (MB) of data storage. A double-layered and double-sided DVD optical disk holds up to 15.9 gigabytes (GB) of data.

The optical disk is so named because its technology is based on light. As the disk spins, a laser beam follows a spiraling trail of *pits* and *lands* in the plastic material of the disk. The *pits* reflect light differently than the *lands*, while a device translates the reflective difference to bits of "on/off" or 1 and 0. The bits form bytes that carry the digital code of the data stored on the optical disk.A standard optical disk measures 4.724 inches (120 mm) in diameter and .0472 inches (1.2 mm) in thickness. It is made from *polycarbonate* with a reflective layer of *aluminum*, coated in lacquer. The master optical disk is made from *glass*. *Nickel stampers* are produced from the glass master and used in an injection-molding machine to "press" or produce multiple copies of the optical disk for distribution. If the disk is double-layered, there will be stampers for each layer, after which the two layers must be bonded together. A double-sided disk requires different stampers for each side, in addition to each layer.

[I]CDs (*Compact Disc*):

Following are some formats of the CDs:

	CD-ROM
Media type	Optical disc
Capacity	184 MiB (8 cm) 650-900 MB (12 cm)
Read mechanism	150 KiB/s (1×) 10800 KiB/s (72x)
Write mechanism	150 KiB/s (1×) 8400 KiB/s (56x)
Usage	Data storage, video, audio, open interne

1. CD-ROM
2. CD-i
3. WORM
4. CD-RW
5. CD-ROM XA
6. Photo CD
7. VCD

1. CD ROM (*Compact Disc-Read-Only Memory*):

CD Pronounced *see-dee-rom* is short form for *Compact Disc-Read-Only Memory*, a type of optical disk capable of storing large amounts of data — up to 1GB, although the most common size is 650MB (megabytes). A single CD-ROM has the storage capacity of 700 floppy disks, enough memory to store about 300,000 text pages.

CD-ROMs are *stamped* by the vendor, and once stamped; they cannot be erased and filled with new data. To read a CD, you need a CD-ROM player. All CD-ROMs conform to a standard size and format, so you can load any type of CD-ROM into any CD-ROM player. In addition, CD-ROM players are capable of playing audio CDs, which share the same technology.

CD-ROMs are particularly well-suited to information that requires large storage capacity. This includes large software applications that support color, graphics, sound, and especially video.

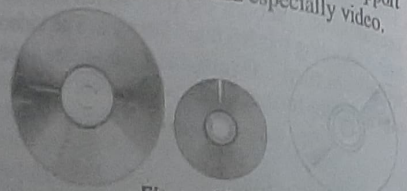


Figure: CD-ROM

Definition: *"CD-ROM (Compact Disc, read-only-memory) is a version of the CD that is designed to store computer data in the form of text and graphics, as well as hi-fi stereo sound."*

Today, CD-ROMs are standardized and will work in any standard CD-ROM drive. CD-ROM drives can also read audio compact discs for music, though CD players cannot read CD-ROM discs.

CD-ROM Data Storage

Although the disc media and the drives of the CD and CD-ROM are, in principle, the same, there is a difference in the way data storage is organized. Two new sectors were defined, Mode 1 for storing computer data and Mode 2 for compressed audio or video/graphic data.

CD-ROM Mode 1

CD-ROM Mode 1 is the mode used for CD-ROMs that carry data and applications only. In order to access the thousands of data files that may be present on this type of CD, precise addressing is necessary. Data is laid out in nearly the same way as it is on audio disks: data is stored in sectors (the smallest separately addressable block of information), which each hold 2,352 bytes of data, with an additional number of bytes used for error detection and correction, as well as control structures. For mode 1 CD-ROM data storage, the sectors are further broken down, and 2,048 used for the expected data, while the other 304 bytes are devoted to extra error detection and correction code, because CD-ROMs are not as fault tolerant as audio CDs. There are 75 sectors per second on the disk, which yields a disc capacity of 681,984,000 bytes (650MB) and a single speed transfer rate of 150 KBps, with higher rates for faster CD-ROM drives. Drive speed is expressed as multiples of the single speed transfer rate, as 2X, 4X, 6X, and so on. Most drives support *CD-ROM XA* (Extended Architecture) and Photo-CD (including multiple session discs).

CD-ROM Mode 2

CD-ROM Mode 2 is used for compressed audio/video information and uses only two layers of error detection and correction, the same as the CD-DA. Therefore, all 2,336 bytes of data behind the sync and header bytes are for user data. Although the sectors of CD-DA, CD-ROM Mode 1 and Mode 2 are the same size, the amount of data that can be stored varies considerably because of the use of sync and header bytes, error correction and detection. The Mode 2 format offers a flexible method for storing graphics and video. It allows different kinds of data to be mixed together, and became the basis for CD-ROM XA. Mode 2 can be read by normal CD-ROM drives, in conjunction with the appropriate drivers.

Data Encoding and Reading

The CD-ROM, like other CD versions, has data encoded in a spiral track beginning at the *center* and ending at the outermost edge of the disc. The spiral track holds approximately 650 MB of data. That is about 5.5 billion bits. The distance between two rows of *pits*, measured from the center of one track to the center of the next track is referred to as *track pitch*. The track pitch can range from 1.5 to 1.7 microns, but in most cases is 1.6 microns.

Constant Linear Velocity (CLV) is the principle by which data is read from a CD-ROM. This principal states that the read head must interact with the data track at a constant rate, whether it is accessing data from the inner or outermost portions of the disc. This is affected by varying the rotation speed of the disc, from 500 rpm at the center, to 200 rpm at the outside. In a music CD, data is read sequentially, so rotation speed is not an issue. The CD-ROM, on the other hand, must read in random patterns, which necessitates constantly shifting rotation speeds. Pauses in the read function are audible, and some of the faster drives can be quite noisy because of it.

2. CD-I (Compact Disc - interactive):

CD-i (Compact Disc - interactive) is the multimedia CD format specified in 1986. CD-i was specified as an entire system, comprising not just a disc and data format, but hardware and software system, a variety of special compression methods for audio and visual data, and a method of interleaving audio, video, and text data. Developed as a user-friendly alternative to a PC, CD-I players are easier to use, and have TV video output as well. Full screen motion video capabilities were added to the original specification later.

A *CD-i player* is a stand-alone system that includes a CPU, memory, and an integrated operating system. It can be connected to a TV set for displaying pictures and sound, or to a stereo system. The user interacts by positioning a cursor and selecting options, with a device such as a specialized remote control.

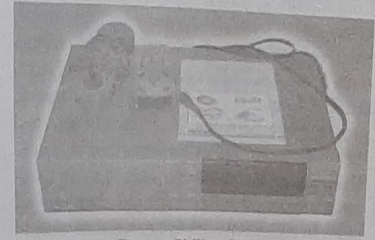


Figure: Philips CD-I

Although CD-i never realized broad commercial success, it is now used in education, training, and other professional applications.

3. WORM :

When used in all capital letters, *WORM* is an acronym for write *once, read many*, an optical disk technology that allows you to write data onto a disk just once. After that, the data is permanent and can be read any number of times.

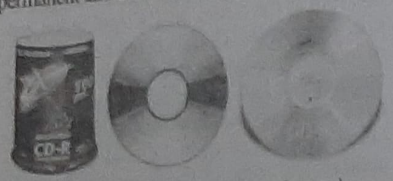


Figure: WORM (write once, read many)

Unlike CD-ROMs, there is no single standard for WORM disks, which means that they can only be read by the same type of drive that wrote them. This has hampered their acceptance, although they have found a niche market as an archival media. WORM is also called CD-R.

4. CD-RW (Compact *Disc, ReWriteable*)

DEFINITION: *"CD-RW (compact disc rewriteable) is a compact disc (CD) format that allows repeated recording on a disc."*

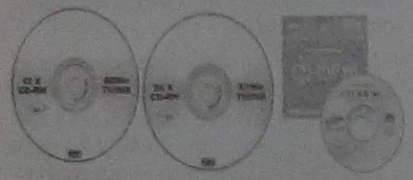


Figure: CD-RW (Compact Disc, ReWriteable)

Like regular CDs , CD-Rs and CD-RWs are composed of a *polycarbonate plastic substrate*, a thin reflective metal coating, and a protective outer coating. CD-R is a *write once, read many* (*worm*) format, in which a layer of organic polymer dye between the polycarbonate and metal layers serves as the recording medium. The composition of the dye is permanently transformed by exposure to a specific frequency of light. In a CD-RW, the dye is replaced with an alloy that can change back and forth from a crystalline form when exposed to a particular light, through a technology called *optical phase change*. The patterns created are less distinct than those of other CD formats, requiring a more sensitive device for playback.

Similar to CD-R, the CD-RW's *polycarbonate substrate* is preformed with a spiral groove to guide the *laser*. The alloy phase-change recording layer, which is commonly a mix of silver, indium, antimony, and tellurium, is sandwiched between two layers of *dielectric material* that draw excess heat from the recording layer. After heating to one particular temperature, the alloy will become crystalline when it is cooled; after heating to a higher temperature it will become amorphous (won't hold its shape) when it is cooled. By controlling the temperature of the laser, crystalline areas and non-crystalline areas are formed. The crystalline areas will reflect the laser, while the other areas will absorb it. The differences will register as *digital* data that can be unencoded for playback. To erase or write over recorded data, the higher temperature laser is used, which results in the non-crystalline form, which can then be reformed by the lower temperature laser. CD-RW discs usually hold 74 minutes (650 *MB*) of data, although some can hold up to 80 minutes (700 MB).

5. CD-ROM XA

Definition: *"The CD-ROM XA (Compact Disc - Read-Only-Memory Extended Architecture) is a modification of CD-ROM that defines two new types of sectors that enable it to read and display data, graphics, video, and audio at the same time."*

The CD-ROM XA was developed jointly by Sony, Philips, and Microsoft, and its specifications were published in an extension to the Yellow Book. CD-ROM XA discs contain Mode 2 sectors (areas left free for extra data by the omission of error detection and correction code) and were designed to allow audio and other data to be interleaved and read simultaneously. Formerly, images had to be loaded before the audio tracks could be played.

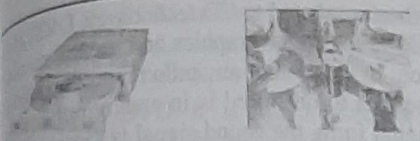


Figure: CD-ROM XA (Compact Disc - Read-Only-Memory Extended Architecture)

The CD-ROM XA specifications include 256 color modes, which are compatible with PC formats and CD-i, and Adaptive Differential Pulse Code Modulation (ADPCM) audio, which is also defined for CD-I. Photo CD, Video CD and CD-EXTRA have all subsequently been based on CD-ROM XA, although it has not survived as a separate technology.

6. Photo CD

Photo CD is a process from Kodak that puts film images (including scanned prints and slides) on a compact disk as digitally stored images that you can view or work with at your computer. The images can also be printed out on photographic paper with a special Kodak machine.

7. VCD (Video Compact Disc)

VCD stands for video compact disc (video CD). VCD was introduced in 1993 by JVC, Philips, SONY and Matsushita. Video data is demanding in terms of storage capacity; it requires approximately 5 MB of storage per second of video, which would translate to about two minutes of video on a 680 MB CD. In order to store video information on a CD in a practical fashion, the data must be compressed for storage and then decompressed for replay in real time. MPEG-1 compresses data at ratios of up to 200:1. MPEG is an international standard, and can be used by any manufacturer to create hardware for use with MPEG video. MPEG video can also be recorded on any CD. VCD formatting removes unnecessary information from MPEG-1 data, and adds specialized video authoring capabilities through inclusion of a CD-i (CD- Interactive) runtime application.

Definition: *"The Video CD is a compact disk format based on CD-ROM XA that is specifically designed to hold MPEG-1 video data and to include interactive capabilities."*

VCD has a resolution similar to that of VHS, which is far short of the resolution of DVD. Each VCD disk holds 72-74 minutes of video and has a data transfer rate of 1.44 Mbps. VCDs can be played on a VCD player connected to a television set (in the same way that video cassettes can on a VCR) or computer, on a CD-i player, on some CD-ROM drives, and some DVD players.

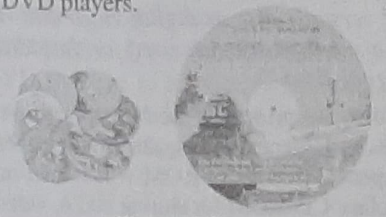


Figure: VCD

VCD variations include: VCD 2.0, which was introduced in 1995 and adds hi-resolution stills, fast-forward, and rewind functions to the original specifications; VCD-ROM, which was introduced in 1997 and enables the creation of hybrid VCD/CD-ROM disck; VCD-Internet, which was introduced in 1997 and is a standardized means of linking video and Internet data; and SuperVCD, which uses either high bit rate MPEG-1 or variable bit rate MPEG-2 for the use of CD-R drives instead of DVD drives.

Data Transfer Speeds

Transfer Speed	KiB/s	Mb/s
1x	150	1.2288
2x	300	2.4576
4x	600	4.9152
8x	1200	9.8304
10x	1500	12.2880
12x	1800	14.7456
20x	3000	24.5760
32x	4800	39.3216
36x	5400	44.2368
40x	6000	49.1520
48x	7200	58.9824
50x	7500	61.4400
52x	7800	63.8976
56x	8400	68.8128
72x	10800	88.4736

Table: Data Transfer Speeds

[II] DVD (Digital Video Disk/Digital Versatile Disk)

Definition: *"The Digital Versatile Disc (DVD) is a high-density double-sided compact disc that can store up to 17 gigabytes of digital data (roughly the equivalent of 24 CDs), especially high-resolution audio-visual material." In other words we can say that "digital versatile disc or digital video disc (DVD) is a small plastic disc used for the storage of digital data."*

DVDs are primarily used to store encyclopedias and interactive magazines and games. It is expected that DVD-ROM will sooner or later replace CD-ROM for storing audio, video, and text data.

FIGURE: DVD

The Digital Versatile Disc (DVD) is an optical information storage technology with multiple applications. Lasers read pitted digital patterns stamped on DVDs. American, Dutch, and Japanese manufacturers, specifically Philips Electronics, Sony Corporation, Matsushita Electric Industrial Company, and Toshiba Corporation, innovated DVDs simultaneously to surpass compact disc (CD) memory capabilities. DVDs consist of two extremely thin, round plastic discs known as *substrates*, which are sealed together. Each DVD can store 4.7 gigabytes of compressed information per side, enough to hold a two-hour movie. If the sides are double-layered, a DVD can contain 17 gigabytes.

When compared to CD technology, DVD also allows for better graphics and greater resolution. In the case of an audio recording, where the data to be stored is in analog rather than digital form, the sound signal is sampled at a rate of 48,000 or 96,000 times a second, then each sample is measured and digitally encoded on the $4^{3}/_{4}$-in. (12-cm) disc as a series of *microscopic pits* on an otherwise polished surface. The disc is covered with a *protective, transparent coating* so that it can be read by a *laser beam*. As with other **optical disks** nothing touches the encoded portion, and the DVD is not worn out by the playing process. Because DVD players are backward compatible to existing technologies, they can play CD and CD-ROM discs; however, CD players cannot play DVD and DVD-ROM discs.

DVD Formats

Following are different formats of the DVDs:

1) DVD+R
2) DVD+RW
3) DVD-RAM
4) DVD-R
5) DVD-RW
6) DVD-ROM
7) DVD+R D4 and DVD-R DL

First of all let us see" Why So Many DVD Formats?"

The key difference among the standards is based on which standards each manufacturer adheres to. Similar to the old VHS/Beta tape wars when VCRs first hit the markets, different manufacturers support different standards. Often called a *format war*, both the industry and consumers are still waiting to see which format will emerge as the industry standard.

Now let us see" What is the difference between DVD+R and DVD-R?"

DVD+ ("plus") and DVD- ("dash") are two challenging DVD formats. The big difference with DVD+R vs. DVD-R is that there are hybrid (dual-format) drives capable of reading both types. The different variations on the term DVD (e.g. +R, -R, -ROM, and so on) describe the way data is stored on or written to the disc itself. These are called *physical formats*.

1. **DVD+R:** *DVD+R* is a recordable DVD format like to CD-R. A DVD+R can record data only once and then the data becomes permanent on the disc. The disc cannot be recorded onto a second time. DVD+R formats are supported by Philips, Sony, Hewlett-Packard, Dell, Ricoh, Yamaha and others.
2. **DVD+RW:** *DVD+RW* is a re-recordable format similar to CD-RW. The data on a DVD+RW disc can be erased and recorded over many times without damaging the medium. DVD+RW formats are also supported by Philips, Sony, Hewlett-Packard, Dell, Ricoh, Yamaha and others.

   Note: *DVDs that have been made using a +R/+RW device can be read by most commercial DVD-ROM players.*
3. **DVD-R: DVD-R** is a recordable DVD format similar to CD-R and DVD+R. A DVD-R can record data only once and then the data becomes permanent on the disc. The disc cannot be recorded onto a second time. There also are two additional standards for DVD-R disks: DVD-RG for general use, and DVD-RA for authoring, which is used for mastering DVD video or data and is not typically available to the general public. This format is also supported by Panasonic, Toshiba, Apple Computer, Hitachi, NEC, Pioneer, Samsung, Sharp and DVD Forum.
4. **DVD-RW: DVD-RW** is a re-recordable format similar to CD-RW or DVD+RW. The data on a DVD-RW disc can be erased and recorded over numerous times without damaging the medium. DVDs created by a -R/-RW device can be read by most commercial DVD-ROM players. This format is also supported by Panasonic, Toshiba, Apple Computer, Hitachi, NEC, Pioneer, Samsung, Sharp and DVD Forum.
5. **DVD-RAM: DVD-RAM** discs can be recorded and erased repeatedly but are compatible only with devices manufactured by the companies that support the DVD-RAM format. DVD-RAM discs are typically housed in cartridges. This format is also supported by Panasonic, Toshiba, Apple Computer, Hitachi, NEC, Pioneer, Samsung, Sharp and DVD Forum.
6. **DVD-ROM: DVD-ROM** was the first DVD standard to hit the market and is a read-only format. The video or game content is burned onto the DVD once and the DVD will run on any DVD-ROM-equipped device. DVD-ROMs are similar to CDs. This format is also supported by Panasonic, Toshiba, Apple Computer, Hitachi, NEC, Pioneer, Samsung, Sharp and DVD Forum.
7. **DVD+R DL and DVD-R DL :** Dual layer technology is supported by a range of manufacturers including Dell, HP, Verbatim, Philips, Sony, Yamaha and others. As the name suggests, dual layer technology provides two individual recordable layers on a single-sided DVD disc. Dual Layer is more commonly called Double Layer in the consumer market, and can be seen written as DVD+R DL or DVD-R DL. *DVD+R DL* (also called DVD+R9) is a Dual Layer writeable DVD+R. *DVD-R DL* (also called DVD-R9) is a Dual Layer writeable DVD-R. The dual layered discs can hold 7.95GB.

The dual layered discs (DVD+R9 and DVD-R9) can hold 7.95GB and double sided dual layer (called dvd-18) can hold 15.9GB.

Non-standardized DVD formats

DVD-VCD: It is a DVD-Video disc that has data on it that has been encoded by using the MPEG-1 video format with the same definitions VCD has.

DVD-SVCD: It is also not a valid DVD standard, since the DVD standard does not support the SVCD resolution. The term DVD-SVCD is used to describe a hacked, or non-standard DVD-Video disc that has SVCD compatible content on it.

DVD-MP3: It is created with and contains only digital audio files in the MP3 format. Not all DVD players can play DVD-MP3 discs.

DVD-D: It is a disposable DVD format that provides limited time play duration of up to 48 hours after the packaging has been opened. After the designated time has passed, DVD players are unable to read the disc. The packaging of the disc is airtight and the DVD itself has a special coating that begins to deteriorate when exposed to air. The DVD-D format is currently being used for video game and movie rentals where not only can intellectual property rights be better protected, but consumers have no need to worry about the hassle of DVD rental returns. According to the manufacturer's Web site, both the DVD-D disc and the cardboard packaging it comes in can be recycled.

The DVD-D format was developed by German company FDD Technologies AG, and while no official definition of the D has been offered, many use the short form to mean *DVD-Destroy* or *DVD-Destruct*.

HD-DVD: It is short form for high definition-DVD, a generic term for the technology of recording high-definition video on a DVD. In general, HD-DVD is capable of storing between two and four times as much data as standard DVD.

FIGURE: HD-DVD

Blu-ray Disc (BD): Uses a 405 nm (nanometers)-wavelength blue-violet laser technology, in contrast to the 650nm-wavelength red laser technology used in traditional DVD formats. The rewritable Blu-ray disc, with a data transfer rate of 36Mbps (1x speed) can hold up to 25GB of data on a single-layer disc and 50GB on a dual-layer disc. On a 50GB disc, this translates into 9 hours of high-definition (HD) video or approximately 23 hours of standard-definition (SD) video. The Blu-ray format was developed jointly by Sony, Samsung, Sharp, Thomson, Hitachi, Matsushita, Pioneer and Philips, Mistubishi and LG Electronics.

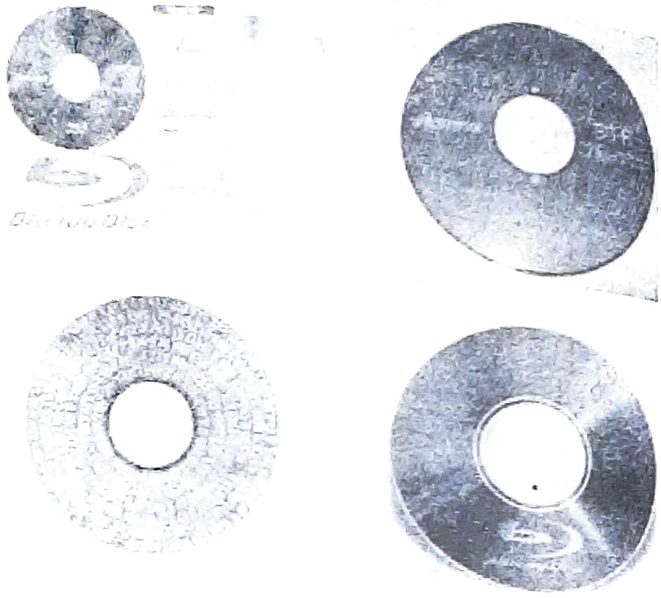


FIGURE: Blu-ray Disc (BD)

Advanced Optical Disc (AOD) - AOD and Blu-ray are similar in that they both use 405nm-wavelength blue-violet laser technology. While Blu-ray has storage capacity of 25GB on a single-layer disc, AOD has a storage capacity of 20GB on a single-layer disc and the capacity to hold 30GB on a dual-layer disc. AOD was developed jointly by Toshiba and NEC.

Base (1×) and (current) maximum speeds by generation

Generation	Base	Max	
	(Mbit/s)	(Mbit/s)	×
1st (CD)	1.17	65.62	56×
2nd (DVD)	10.55	210.94	20×
3rd (BD)	36	432	12×

Table: Generation of optical disks and their Base (1×) and (current) maximum speeds

EXERCISE

1. What is multimedia authoring ? What are various types of multimedia suthoring tools ? Explain function of multimedia suthoring tools.
2. Explain various features of multimedia authoring software.
3. What are the factors of selecting CD-Based multimedia authoring tools ? Explain.
4. Explain various stages of multimedia production.
5. What are pre-production phase in planning of multimedia project ? Explain.
6. What do you mean by post-production phase in multimedia project ? Explain.
7. What is master copy ? How do you distribute final multimedia product ? Explain.
8. Write short note on the followings :
   (i) Authoring
   (ii) Multimedia Testing
   (iii) Black box V/s White box testing
   (iv) Production Phase
   (v) Navigation map
9. Explain the followings :
   (i) Storyboarding
   (ii) Developing a theme for the project
   (iii) Developing multimedia components
10. What is testing ? Why do CDs and DVDs need to be tested ? Explain.
11. Write short note on the followings :
   (i) Various formats of CD
   (ii) Various formats of DVD
   (iii) Web video and sound
12. How do you planning and costing a multimedia project ? Explain.
13. What task are involved in multimedia project development ? Explain ?
14. What are the importance of multimedia development team in multimedia project development ? Explain skills of a multimedia team.
15. What are the characteristics of a graphics designer ? Explain various skills that are required for a graphics/Interface designer.
16. What are various skills for a multimedia editor ? Explain.
17. Who is Animator ? Explain various skills for an Animator/Illustrator.
18. What is CD ? Explain various format of CDs.
19. What is DVD ? Explain various format of DVD.
20. Explain the followings :
   (i) Blu-ray Disk
   (ii) AOD
   (iii) VCD
   (iv) HD-DVD
   (v) DVD+R D4 and DVD-R D4
   (vi) WORM