Multimedia Applications Development

Multimedia Application Classes

- **Game systems —they were the leaders in using multimedia technology because:**

- **The market is very large**

- **The demands on quality, although intense, are not crucial to the success**

- **Multimedia repositories —they are mostly play-back only systems**

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- **End users do not usually add information components**

- **The input and output components of the workflow are completely independent of each other**

- **They are similar to game systems except the size of the database is usually much larger and the indexing of the data components is required**

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Interactive TV, video-on-demand

- **These systems are usually developed from cable TV technology**

- **The term *set-top box* is the common short name for the next generation of digital information processing system providing a connection between the digital network and the TV and other home appliances, such as telephone, fax, and so on**

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- In addition to providing the the basic cable TV converter function, the set-top boxes will have a wide range of functions that will allow them to provide a full interactive multimedia interface to services provided by cable companies and other service vendors

- The standardisation of the interface between the set-top box and the outside network and the interface between the set-top box and the home appliance is a critical issue

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Video/phone conferencing and hypermedia mail

- **The ability of seeing the picture of the other person in a video conference is a major improvement over just hearing the voice**

- **In addition to the ability of seeing the picture, there are many more functions, for example, interactive whiteboard, sharing of paper based diagram, sharing of output from a computer, etc**

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- **Video messages may be kept for a longer period than voice message, thus they require much more storage space**

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Shared workspaces and executive environments

- **A shared workspace allows a user to run applications and to display the output on screens on remote locations**

- **A shared executive environment allows different users on remote locations to execute the same application on their own workstation with the same set of data**

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Business process workflow Applications

- **These applications depend on the business process for which a multimedia solution is being designed**

- **Traditional relational databases need to be extended in order to handle multimedia elements**

- **Object-oriented databases are much more natural medium for multimedia objects**

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Types of Multimedia Systems

Home/Entertainment systems

- **Mostly interactive but not live**
- **The interaction is completely pre-programmed**
- **These systems may include a PC and a set-top box plus a TV**
- **They provide a connection to a cable service or to some service available on the Internet**

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Business systems

Dedicated systems

- the creation, storage and manipulation of multimedia object is performed completely within the system

Departmental systems

- use a LAN to provide shared object storage management and shared processing
- support a specific business process or some well defined combination of business processes shared by most or all users in the department

Enterprise-wide systems

- Consist of a large number of LANs and WANs that are interconnected and allow sharing a number of departmental level or enterprise-level storage management and processing resources
- Support a combination of dedicated local applications and departmental applications as well as interdepartmental applications

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Components of Multimedia Systems

Multimedia input systems

- *Scanning node*— captures still image and document image
- *User workstation*— may be used as voice and video input node
- *Video capture node*— this is required because video capture requires special hardware and software
- *Professional studio*— for high quality, professional multimedia objects

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Multimedia output systems

- *User workstation*— serve as the output node for text, graphics, image, audio or video

- *Teleconferencing studio*— a professional studio may contain multiple monitors, sound systems and channel switching controls

- *Print server* – for text, graphics and image hard-copy output

- *Fax server*— for data coming through the telephone channel

- *Gateway nodes*— for communication with other systems

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Multimedia storage systems

- **Require a large amount of on-line storage as well as near-line and off-line storage. Also require the ability of duplicating some multimedia objects.**

- *Database server*— **supports the normal database requirement of a multimedia application**

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- *Image server*— provides a storage and indexing of document images and graphics

- *Voice mail server*—primarily for voice messages

- *Audio server*—manages all digitized voice and audio objects, is capable of handling isochronous playback of these objects

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- *Video server*— must be capable of maintaining constant playback speed, and handling of a very large amount of data

- *Duplication station*— provides specialized high-speed duplication for different media, such as recordable CDs, optical disks, and so on

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Multimedia systems development cycle

- **Planning and costing**

- **Designing**

- **Developing and producing**

- **Testing and debugging**

- **Delivering**

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Planning and costing

The main concerns in this phase are

- to capture the ideas and requirements of you or your clients
- to identify the potential audience and users of the application
- to find out the benefit that will gain from developing the application
- to evaluate the feasibility and costs of the entire project, including all tasks of production, testing and delivery

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- **Often, a 'back-of-the-envelop' or 'paper napkin' approach is used at this stage**
  - The essentials are to capture the ideas and to quickly evaluate the feasibility of these ideas
  - The most important considerations are

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hardware— the most common limiting factor for both development time and final users

- very poor sound output device or even no sound device

- limited amount of storage

- very narrow network bandwidth

software

- the cost of development software is fairly high

- the cost of software required in delivering to the end users may add up to a large sum

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contents— using existing material or producing from scratch

■ existing material may not match your requirement

■ they are copyrighted, permission may not be granted

■ producing new material is expensive and time-consuming

skill— require very broad skill

■ computer skill

■ artistic skill

■ application domain skill

■ It is helpful to develop a pilot project or prototype before starting a full-scale development

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Designing

Design is a creative activity

- **It requires the knowledge and skill with computer**

- **It requires the talent in graphics arts, video and music**

- **It also requires the knowledge of the subject area of the application**

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Storyboarding —graphical outlines

- *Storyboards* describes the project in exact detail using words and sketches for each screen images, sound, and navigational choice

- Storyboarding can be very detail—sketching out every screen, right down to specific colour and shade, text contents, attributes, etc.

- It may just a schematic guide

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Storyboards can be drawn

- **using traditional media, such paper and pencil**
- **using a computer tool**

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Design —Architecture

- Architecture is the arrangement of the multimedia information
- A well-organized document will help the user find information more efficiently
- The architecture design should start early

Types of architecture
- Linear
- Hierarchy
- Nonlinear
- Composite

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Design —User interface

The main emphasis in the design of multimedia user interface is multimedia presentation

- ■ *Contents selection* **is the key to convey the information to the user**
- ■ **content can be influenced by constraints imposed by**
- ■ the size and complexity of the presentation
- ■ the quality of information
- ■ the limitation of the display hardware
- ■ the need for presentation completeness and coherence

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- **Media must be chosen to be "adequate"**

  For example, to present a course on how to play tennis, graphics and video are more suitable than text only.

- **Coordination —composition of different media**

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- **User interface techniques**

A sample application in remote surveillance

- A camera is connected to a computer which serves as a camera server. The server controls the camera through a standard serial interface. The control command is initiated from a client which is located remotely. The video data is digitized, compressed and sent to the client to be displayed there.

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- **Keyboard —fixed control commands are assigned to keys**
- **Buttons in a system with Graphical User Interface (GUI)**
- By clicking a button marked left, the camera is panned to the left.
- **Scroll bars—may be attached to the side of the video window**
- **Special device —joystick may be a more natural way of controlling the camera**
- **Direct manipulation of the video window — clicking a point in the video window, the camera is panned and/or tilted to centre at the point**

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User-friendliness

- **User-friendliness is the primary goal of multimedia interface**

- **What this user-friendliness means and how this property is achieved and how this is measured are not always clear**

- **Easy to learn instructions —the users do not need a long period of time before they can use the system**

- **Easy to remember instructions— for both sporadic and everyday users**

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Effective instructions —the user interface should enable effective use of the application

- **logically connected functions should be presented together and in a similar way**
- **graphical symbols are more effective than textual input and output**
- **different media should be able to be exchanged and shared among different applications**
- **Promptly feedback after a user initiates an action is necessary**
- **A configuration of a user interface should be usable by both professional and sporadic users**

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Developing and producing

- **Production is the phase when your multimedia project is actually rendered**
- **By now your project plan (and storyboard) has be filled with all details**
- **The tasks to be performed in this phase are:**
- Acquiring all media elements
- Composing the elements according to the storyboard
- **This is the phase when your artistic talent and your technical knowledge are in high demand**
- **You need to set up a method of tracking your media elements**
- **You need to set up a method of tracking the progress of your work**
- **You need a way (or an expert) to solve technical problem quickly**

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Rights and permissions

- **If you acquire content from somewhere, it is very important to know who has the right of the work**
- **The copyright law lists the following nine types of works that are protected:**
- **literary works, dramatic works, musical works, artistic works**
- **sound recordings, cinematograph films, television broadcast, sound broadcasts, published editions of works**

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You should license the rights to use copyrighted material before you use it in a multimedia project

- **you may be able to negotiate outright ownership of copyrighted material**
- **you may be able to license the rights to use that material**

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You need to consider what rights do you require

- **How will the material be used and distributed**
- **Is the license for a fixed period**
- **Is the license exclusive or non-exclusive**
- **Where will your product be distributed**
- **Does the content owner have the authority to assign right to you**
- **Will the copyright owner receive renumeration for the license**

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Testing and debugging

- **Like all other software, testing and debugging is an important and time-consuming phase**
- *Alpha testing* **is typically an internal activity**
- The product is tested by in-house team
- *Beta testing* **involves a wider range of testers**
- They should be representative of real users
- They should not include persons who have been involved in the production of the project

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- **A multimedia application may be used :**
- by many different users, many of them know very little about computers, and
- on a variety of different platforms and configurations, many different hardware and software
- **Therefore, it is important to test the product in a wide range of configurations**

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Delivering

- **You should plan how to deliver the product very early in the development process**
- **Nowadays, CD-ROM and Internet are the two most popular means of delivering multimedia applications**
- **According to the means of delivery and the target**
- **audience, you need to plan how the application is to be installed and used**

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- **You need to include all necessary elements in the distribution**
- **all media elements— movie clips, sound clips, external casts**
- **runtime libraries— Director runtime**
- **drivers— DirectX**
- **helper programs— QuickTime viewer, Acrobat reader**
- **installation program, compression and decompression programs**

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Summary

Multimedia application classes

- **Game systems**
- **Multimedia repositories**
- **Interactive TV**
- **Video/phone conferencing and hypermedia mail**
- **Shared workspace and execution environment**
- **Business process workflow applications**

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Types of multimedia systems
- **Home/entertainment systems**
- **Business systems**

Components of multimedia systems
- **Multimedia input systems**
- **Multimedia output systems**
- **Multimedia storage systems**

Multimedia application development life cycle
- **Planning and costing**
- **Designing**
- **Developing and producing**
- **Testing and debugging**
- **Delivering**