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

Multimedia Applications Development

- 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

Multimedia Applications Development

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**

Multimedia Applications Development

- 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

Multimedia Applications Development

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**

Multimedia Applications Development

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

Multimedia Applications Development

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**

Multimedia Applications Development

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

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

- ***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**

Multimedia Applications Development

- ***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**

Multimedia Applications Development

Multimedia systems development cycle

- **Planning and costing**
- **Designing**
- **Developing and producing**
- **Testing and debugging**
- **Delivering**

Multimedia Applications Development

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

Multimedia Applications Development

- **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

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

Storyboards can be drawn

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

Multimedia Applications Development

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

Multimedia Applications Development

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

Multimedia Applications Development

- **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**

Multimedia Applications Development

- **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.

Multimedia Applications Development

- **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**

Multimedia Applications Development

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

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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**

Multimedia Applications Development

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

Multimedia Applications Development

- **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**

Multimedia Applications Development

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**

Multimedia Applications Development

- 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

Multimedia Applications Development

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**

Multimedia Applications Development

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