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Multimedia Communications

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Story of Mr. MCRLab



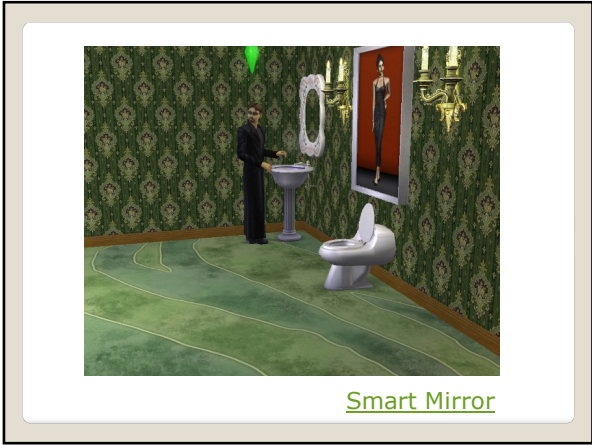
All characters appearing in this work are fictitious. Any resemblance to real persons, living or dead, is purely coincidental.

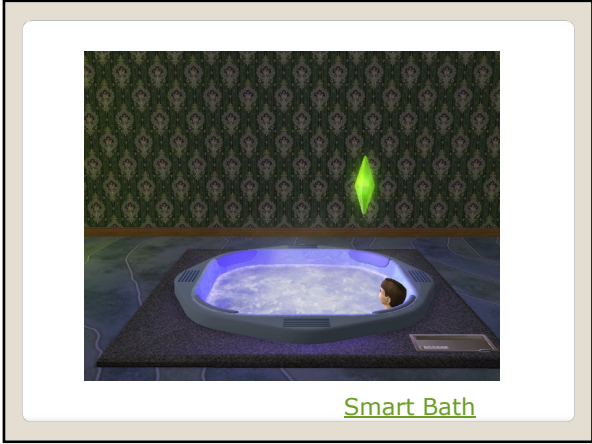
Movies presented are generated by Electronic Arts (EA)® Games



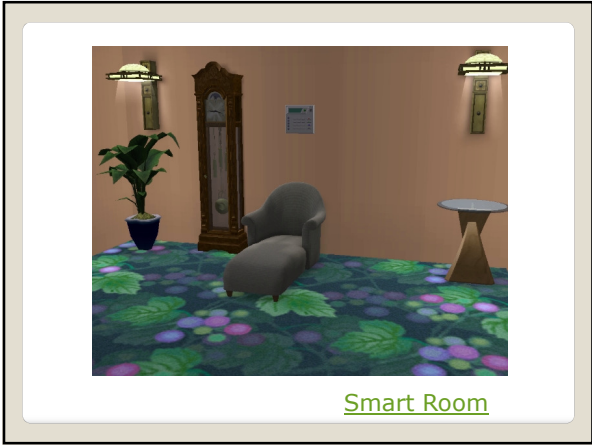
Smart Cars



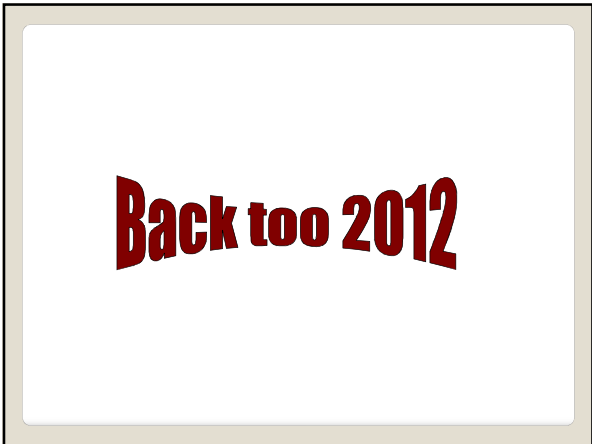












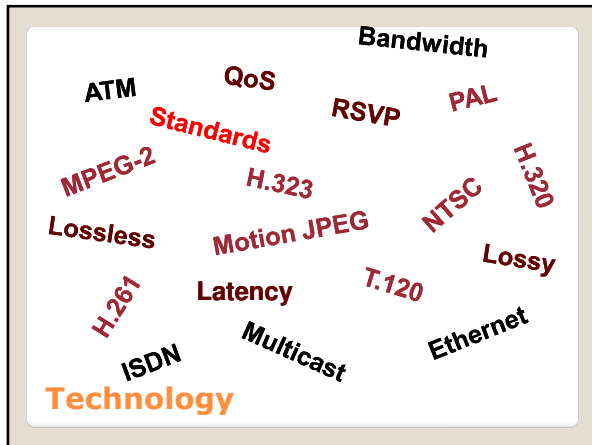
- At the end of the course YOU will be able to:
 - have an excellent understanding of multimedia enabling
 - technologies
 - services and
 - applications
 - master basic Networking concepts and protocols
 - understand how Multimedia and Networking (Communications) play together

Objectives of the course

- Performance
 - bandwidth
 - storage capacity
 - processing
- Quality
 - realtime
 - error tolerance
 - synchronization
- Perception
 - User experience

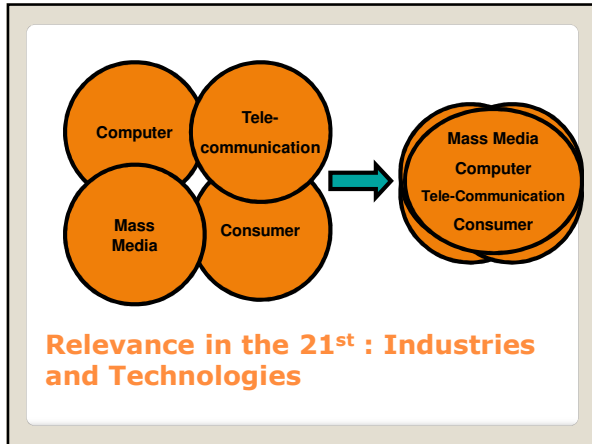
Key Issues

What is Multimedia ?

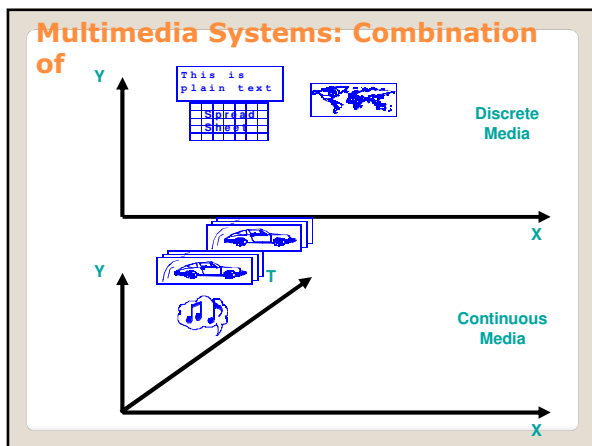


- Notion
 - Multi
 - Many
 - Media
 - "Things in the middle"
- Means to distribute and present information coded as
 - Graphics, animation, audio, video, text, haptics, smell, etc.
- by
 - Computer, TV, phone, etc.

Multimedia: Definition

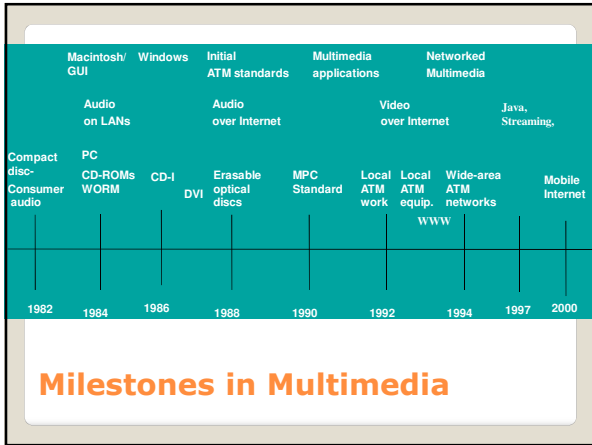


- Perception: How do humans perceive Information?
 - aural sense, visual sense
 - Representation (Computer Science): How is information coded?
 - ASCII, GIF, JPEG, ...
 - Presentation (in Electronics): Which 'medium' is used to convey (I/O) info?
 - paper, monitor, loudspeaker, ...
 - Storage (for Publishers): Where is information stored?
 - paper, Hard disk, CD-ROM, ...
 - Transmission (in Data Communication): Which 'medium' is used to transmit info?
 - coaxial, optical fiber, ...
 - Distribution (for Content Providers): Which 'medium' is used to exchange info?
 - CD, JAZ-Drives, optical fiber, ...
 - Dissemination (in Public): which 'medium' conveys info to the public?
 - Press, TV, Radio, (coming: Internet): term "mass media" coined in 1923
- Media: Interpretations**



- MULTIMEDIA COMMUNICATIONS is the field referring to the:
 - Representation,
 - Storage,
 - Retrieval, and
 - Dissemination
- of
 - Machine-processable information expressed in multiple media such as:
 - Text, Voice, Graphics, Images, Animations, Audio, Video, smell and touch

Multimedia: Communications



Application	Media	Selected Functions
Office automation	Images, Text, Spreadsheets, Mail	Composition, Filing, Communication
MEDICAL INFORM. SYSTEMS	Video, Telephony, Images, Text	Data Acquis., Communication, Filing
GEOGRAPHY	Images, Graphics	Data Acquis., Storage, Image Manip.
EDUCATION / TRAINING	Audio, Video, Images, Text	Browsing, Interactivity
COMMAND & CONTROL	Audio, Telephony, Images	Data Acquisition, Communication
WEATHER	Images, Numeric Data, Text	Data Acquis., Simulation, Data Integr.
BANKING	Numeric Data, Text, Images	Image Archiving
TRAVEL AGENTS	Audio, Video, Images, Text	Video Browsing, Communication
ADVERTISING	Video, Images	Image Composition, Enhancement
ELECTRONIC MAIL	Audio, Images, Text	Communication
ENGINEERING, CAD/CAM	Numeric Data, Text	Cooperative Work
CONSUMER ELECTRONIC CAT.	Audio, Video, Text	Video Browsing
HOME VIDEO DISTRIBUTION	Audio, Video	Video Browsing
REAL ESTATE	Audio, Video, Images, Text	Video Browsing, Communication
LIBRARY	Image, Text	Database Browsing, Query
LEGAL INFORMATION SYSTEMS	Image, Text	Database Query
TOURIST INFORMATION	Audio, Video, Text	Video Browsing
NEWSPRINT PUBLICATION	Image, Text	Image, Text Composition
DICTIONARIES	Image, Text	Database Browsing, Query
ELECTRONIC COLLABORATION	Audio, Video, Text	Videoconf., Concurrency, Communic.
AIR TRAFFIC CONTROL	Audio, Text, Graphics	Concurrency Control, Communication

Multimedia Applications

- Residential
 - Entertainment
 - Video on demand
 - Games
 - Interactive TV
 - News
 - Messaging
 - Transactions
 - Shopping
 - Banking
- Institutional
 - Advertisement
 - Publications
 - Telemedicine
 - Distance learning
- Business
 - Conferencing
 - Collaboration

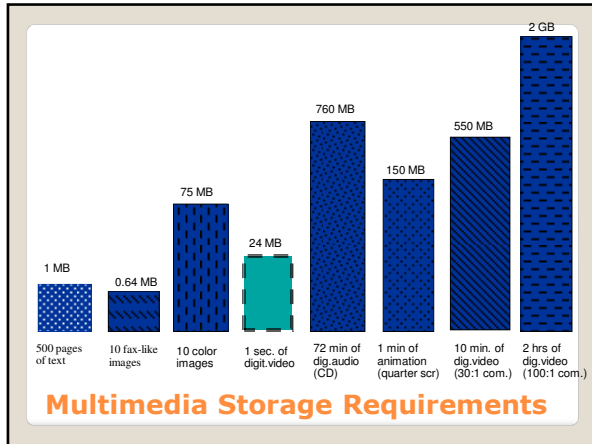
Multimedia Application Categories

- Conversational Services
 - Conferencing
 - Video telephony
- Messaging Services
 - multimedia e-mail
- Retrieval Services
 - VOD
 - News
 - Yellow Pages
- Distribution Services
 - Broadcast
 - Network games

Multimedia Service Categories

	Text	Image	Audio	Animation	Video
Object Type	Coded •ASCII •EBCDIC	Bit-mapped graphics, still photos, faxes	Noncoded stream of digitized audio or voice	Synced image and audio stream at 15-19 frames per sec (uncompressed)	TV analog or digital image with synced streams at 24-30 frames per sec
Size and Bandwidth	2 kB per page	Simple: 64 kB/image (uncompressed) Detailed: 7.5 MB/image (uncompressed)	Voice/phone •8 kHz/8bits (mono) 64 kb/s Audio CD DA •44.1 kHz/16bits (stereo;2 chan.) 1.4 Mb/s	20 Mb/s for 320 x 240 x 16 pixels per frame(16-bit color); 16 frames per sec	221 Mb/s for 640 x 480 x 24 pixels per frame (24-bit color); 30 frames per sec.

Multimedia Storage/Data Rate Requirements



Application	Delay	Accuracy	Throughput
File Transfer	Tolerant of variations in delay. (e.g. 100 msec) and end-to-end delay (e.g., 5 secs).	Any cell loss results in retransmission and lowering of throughput. Very low cell loss is tolerable.	Sustained bursts, with a large degree of idle time between transfers.
Interactive point of sale	Delay sensitive. End-to-end delay < 100 msec.	No cell loss.	Low transfer rates, with no high bursts; low utilization unless already concentrated.
Interactive image exchange	Delay sensitive. End-to-end delay < 100 msec.	Any cell loss results in retransmission and lowering of throughput. Very low cell loss is tolerable.	Intermittent bursts of high transfer rate with long periods of idle.
Video (H.221 compliant=CBR)	Very sensitive to both variation in delay and end-to-end delay.	No cell loss.	Sustained transfer rate, no burst, no idle.
Voice	Sensitive to both variation in delay and end-to-end delay. With echo cancellation, end-to-end delay can be relatively high.	High cell loss (up to 1%) is easily tolerated by modern coding algorithms with no loss of quality to the human ear.	Short bursts, predictable pattern of idle.

QoS Requirements for Various Applications
