

# Chapter 4, Specialized Application Software

Modified by M. L. Malone, Sept. 2007

At the end of this chapter the student will be able to...

- Describe the following software:
  - graphics software
  - audio & video editing software
  - multimedia software
- Describe storage for bitmap graphics & vector graphics
- Define Web authoring
- Discuss elements of Web site design
- Define virtual reality & describe its applications
- Define expert systems & describe its applications
- Define/discuss robotics

## Specialized Applications

- Graphics Programs
- Audio & Video Software
- Multimedia Programs
- Web Authoring Programs
- Emerging Applications
  - Virtual Reality
  - Knowledge-based Systems
  - Robotics

## Desktop Publishing

- Programs that allow you to create publications
  - Mix text & graphics
  - Professional quality
- Popular programs
  - Adobe InDesign
  - Microsoft Publisher
  - QuarkXPress

## Image Editors

- Programs for creating & editing bitmap images
  - What are bitmap images?
  - How do they store graphics?
  - Bitmap images aka raster images
- Popular programs
  - Microsoft Paint
  - Adobe Photoshop
  - Corel PhotoPaint
  - Paint Shop Pro ← *included in Office 2007*

## Graphics: What is a bitmap graphic?

- A grid of dots
- Color of each dot stored as binary number

### The Digital World

- Graphics in Black & White: a table

```
0000000000
0111111110      ■■■■■■■■
0001001000      ■      ■
0001001000      ■      ■
0000000000
```

Or the sequence of bits:

```
00000000000111111100001001000000100100000000000000
```

- What if the background was white, the table top was red, & the table legs were blue?
- Hexadecimal codes: [www.december.com/html/spec/color.html](http://www.december.com/html/spec/color.html)

### Hex Codes for Red, White, & Blue

- White      FFFFFFFF
- Red        FFC0CB
- Blue       0000FF

### Binary Codes for Red, White, & Blue

- White                  FFFFFFFF  
1111 1111 1111 1111 1111 1111
- Red                  FFC0CB  
1111 1111 1101 0000 1101 1100
- Blue                  0000FF  
0000 0000 0000 0000 1111 1111

### Illustration Programs

- To create & edit vector images
  - How do vector graphics work?
- Popular programs
  - Adobe Illustrator
  - CorelDraw
  - Macromedia FreeHand
  - Micrografx Designer

Example: Vector Graphics on an  
800 (cols) by 600 (rows) monitor  
Example 2: Vector Graphics on an  
800 (cols) by 600 (rows) monitor

## How do vector graphics compare with bitmap graphics?

- resize better
- less storage (usually!)
- easier to edit
- but... not usually as realistic
  - Why?

### Image Galleries

- Libraries of electronic images
- Used for a variety of applications
- Two basic types
  - Stock photographs
  - Clip art

### Graphic Suites

- Bundled graphic programs
- Cost effective
- Popular suites
  - CorelDraw Graphics Suite
  - Adobe's Creative Suites
  - Macromedia's Studio

### Audio & Video

- Video editing software
  - Enhances digital video footage
  - Apple's iMovie & Windows Movie Maker
- Audio editing software
  - Creates & edits audio clips
  - Create MP3s
  - Ableton's Live & Sony's ACID

### Multimedia

- The integration of a variety of media into one presentation
  - Video
  - Music
  - Voice
  - Graphics
  - Text
- Should include user interactivity

### Links & Buttons

- Buttons are links through a presentation
  - Used to navigate the "About Asthma" multimedia presentation
- Links can be to...
  - Video
  - Sound Graphics
  - Text Files

## Developing Multimedia Presentations

- Plan & Analyze
- Design
- Create
- Test
- Support

## Digital Video Editing

- Capture Video
- Edit a Movie
- Create a DVD

## Multimedia Authoring Programs

- Combine video, audio, graphics, & text
- Popular programs
  - Macromedia Director
  - Authorware
  - Toolbook

## Web Authoring

- Why important?
- Not only for commercial sites
  - Ex: blogs
- Web Site Design
- Web Authoring Programs

## Web Site Design

- Interactive multimedia form of communication
  - Create a graphical map of overall content
  - Add multimedia elements like animation
    - Macromedia's Flash
    - Morphing

## Web Authoring Programs

- Web page editors or HTML editors
  - Provide support for Web site design
  - Creates HTML coding
- Popular programs
  - Macromedia Dreamweaver
  - NetObjects Fusion
  - Microsoft FrontPage

## Emerging Applications

- Artificial intelligence (AI)
  - Attempts to simulate human senses, thought processes, & actions
  - Designed to help people & organizations become more productive
- Three areas of AI
  - Virtual reality
  - Knowledge-based (expert) systems
  - Robotics

## Virtual Reality (VR)

- Artificial or simulated reality
  - Generated in 3-D by a computer
  - aka virtual environments
- Virtual reality modeling language (VRML)
  - Used to create real-time animated 3-D scenes
  - Cosmos Worlds from Cosmos Software

## Knowledge-Based (Expert) Systems

- AI that uses a database (knowledge base) for assistance
- A very simple example: <http://ext1.aiinc.ca/demos/javawhale.html>

## Robotics

- Field of study concerned with using robots
- Robot
  - Computer-controlled machine
  - Mimics motor activities of living things
  - Three types of robots
    - Perception systems
    - Industrial robots
    - Mobile robots

### Robotics: Working

- A robotic arm arranging chocolates in a box  
Robotics: Working
- The Mini-Andros II hazardous duty mobile robot  
Robotics: Working
- Robotic vacuum cleaner  
Robotics: Working
- Robug III
  - Designed to work in radioactive areas, like the core of a nuclear reactor.
  - Walks over obstacles
  - Climbs walls.
  - Drags loads of over 220 pounds.
  - Mounted video cameras let human operators see & assess any damage.Robotics: Working

- Skyworker
  - For building, assembling, & maintaining future space stationsRobotics: Exploring

- 2003 Mars Rover  
Robotics: Exploring

- Nomad Autonomous Rover
  - For exploring the Antarctic
  - Searches for & identifies rocks by color, shape, & size.
  - Can detect the presence of iron, often a major component of meteorites.

## Robotics: Exploring, etc.

- RoboTuna
  - underwater exploration
  - covert surveillance

## Robotics: Moving

- Asimo In action
- Battle-Bot used in *Robot Wars*
  - combat game
  - pits robot against robot in a fight to the death.
  - radio-controlled machines armed with drills, saws, projectiles & other means of destruction.
  - victory to the robot that renders its opponent immobile.

## Robotics: Sensing

- Done now!
  - Cars that parallel park themselves
- Cars that drive themselves?
  - Ex: use sensors in median and along edges of road
  - Ex: use visual cues (lines in road?)
    - Difficult!
      - glare, lighting changes, & shadows hard to “interpret”

## Robotics: Sensing

- Speech recognition
- Speech synthesis
  - Easier! Why?

## Robotics: Thinking

- Deep Blue vs Kasparov (1997)
  - 400 million chess moves per second
  - 1st computer system to defeat a reigning world champion in a match under standard chess tournament time controls
  - Video clip

## Robotics: Thinking

- Cog
  - Designed to learn from its environment the way that a child does

## Robotics: Thinking

### The Turing Test (1950)

- Proposed a test to answer –
  - Can machines think?
  - Can machines carry on human-like conversations?
- A human interrogator asks questions
- Subjects (person or computer) in other rooms
- Questions typed on keyboard
- Answers show up on screen

## Robotics: Thinking : The Turing Test

- If the human interrogator can't tell the difference between the person & the machine, then the answer to the question "Can machines think?" has to be yes.  
Arguments Against Validity of Turing Test: Machines can...
- Easily simulate human conversational behavior
  - Does this mean they can think?
- Perform intelligently without being able to chat like a human.
  - What is "intelligence" anyway?
- ALICE (Artificial Linguistic Internet Computer Entity)
  - Winner of the 2004 Loebner Prize
    - \$100,00 prize to computer who wins unrestricted Turing Test

A Look to the Future: Robots Can Look, Act, & Think Like Us
- Latest research
  - Give robots a sense of values so they can make decisions independently
- The Saya robot is under development in Tokyo  
Related Careers in IT: Desktop Publisher
- Use computers to format & create publication-ready material
- Generally requires --
  - completion of a program or degree
  - good communication skills
  - artistic ability
- Good entry level salaries

## Review Questions

- Describe graphics, including desktop publishers, image editors, illustration programs, image galleries, & graphics suites.
- Discuss audio & video editing software.
- What is multimedia?
- How are multimedia presentations developed?
- Describe Web authoring, including Web site design & Web authoring programs.
- Discuss three areas of artificial intelligence.  
Looking Ahead...
- Read/Study Chapter 5 ASAP.