# Lecture 11 - Paradigms

Paradigms for Interaction

- New computing technologies arrive, creating a new perception of the human-computer relationship
  - Batch processing -> Impersonal computing
  - Time sharing -> Interactive computing
  - Networking -> Community computing
  - Graphical displays -> Direct manipulation
  - Microprocessor -> Personal computing
  - WWW -> Global information
  - Ubiquitous computing -> ???
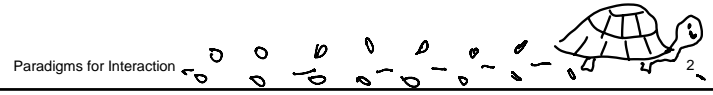
Time-sharing

- 1940s and 1950s – explosive technological growth

- 1960s – need to channel the power

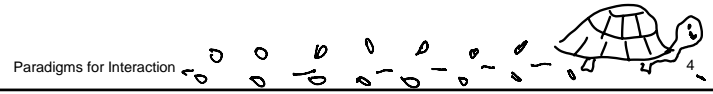- Single computer supporting multiple users
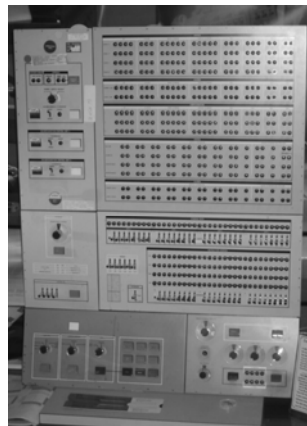
IBM 360

Video Display Units

- More suitable medium than paper

- 1962 – Sutherland's Sketchpad

- Computers for visualizing and manipulating data

- One person's contribution could drastically change the history of computing

Programming toolkits

- Engelbart at Stanford Research Institute

- 1963 – augmenting man's intellect

- 1968 NLS/Augment system demonstration

- The right programming toolkit provides building blocks to producing complex interactive systems
  - The tablet sdk makes developing for the tablet relatively easy

Personal computing

- 1970s – Papert's LOGO language for simple graphics programming by children

- A system is more powerful as it becomes easier to user

- Future of computing in small, powerful machines dedicated to the individual

- Alan Kay at Xerox PARC
  - Smalltalk – first OO language – visual interface
  - the Dynabook as the ultimate personal computer (better than today's PDAs)

Window systems and the WIMP interface

- Humans can pursue more than one task at a time

- Windows used for dialogue partitioning, to "change the topic"

- 1981 – Xerox Star first commercial windowing system

- Windows, icons, menus and pointers now familiar interaction mechanisms

Metaphor

- Relating computing to other real-world activity is effective teaching technique
- LOGO's - turtle dragging its tail
- File management on an office desktop
- Word processing as typing
- Financial analysis on spreadsheets
- Virtual reality – user inside the metaphor
- Paper - tablet
- Problems
  - Some tasks do not fit into a given metaphor
  - Cultural bias

Direct(?) manipulation

- 1982 – Shneiderman describes appeal of graphically-based interaction
  - Visibility of objects
  - Incremental action and rapid feedback
  - Reversibility encourages exploration
  - Syntactic correctness of all actions
  - Replace language with action
- 1984 – Apple Macintosh
  - The model-world metaphor
  - What You See Is What You Get (WYSIWYG)

More Direct Tablet

- Stylus direct onto output surface
- Inking
  - See http://www.microsoft.com/presspass/features/2002/Oct02/10-29tabletinking.mspx
- Recognition
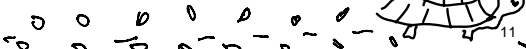
Hypertext

- 1945 – Vannevar Bush and the memex

- Key to success in managing explosion of information

- Mid 1960s – Nelson describes hypertext as non-linear browsing structure

- Hypermedia and multimedia

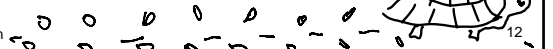- Nelson's Xanadu project still a dream today

Computer Supported Cooperative Work (CSCW)

- CSCW removes bias of single user / single computer system

- Can no longer neglect the social aspects

- Electronic mail is most prominent success

Groupware Taxonomy

|	Same place	Different place
Same time	"Synchronous, co-located" • Whiteboard • Lecture/tutorial • Meeting • Decision Support Systems	"Synchronous, distributed" • ICQ/IRC chat • MS Netmeeting • (Internet) Phone • Video conferencing
Different time	"Asynchronous, co-located" • "Sticky notes"/annotations • Whiteboard, cabinet • Shared PC	"Asynchronous, distributed" • Email, Newsgroups • ICQ message • Document repository

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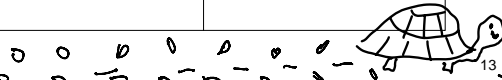
The World Wide Web

• Hypertext, as originally realized, was a closed system
• Simple, universal protocols (e.g. HTTP) and mark-up languages (e.g. HTML) made publishing and accessing easy
• Critical mass of users lead to a complete transformation of our information economy
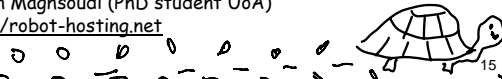• Browser centric desktop

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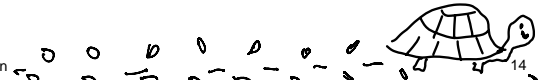
Agent-based Interfaces

• Original interfaces
• Commands given to computer
• Language-based
• Action based
• Agents - return to language by instilling proactivity and "intelligence" in command processor
• Avatars, natural language processing

Shahin Maghsoudi (PhD student UoA)
http://robot-hosting.net

Ubiquitous Computing

"The most profound technologies are those that disappear."   Mark Weiser, 1991

• Late 1980's: computer was very apparent

• How to make it disappear?
• Shrink and embed/distribute it in the physical world
• Design interactions that don't demand our intention

Sensor-based and Context-aware Interaction

- Humans are good at recognizing the "context" of a situation and reacting appropriately
- Automatically sensing physical phenomena (e.g., light, temp, location, identity) becoming easier
- How can we go from sensed physical measures to interactions that behave as if made "aware" of the surroundings?