# Human-Computer Interaction

Dr. Mohammed Al-Ebady

Computer Science Department

University of Karbala

## Lecture 4

2017

# Headlines

- Conceptual models based on activities
- Conceptual Models Based on Objects
- A Case of Mix and Match
- Interface Metaphor
- Interaction Paradigms

# 1- Conceptual models based on activities



The most types of activities that users are likely to be engaged in when interacting with systems are:

1. instructing
2. conversing
3. manipulating and navigating
4. exploring and browsing

# 1.1 Instructing

A first thing to note is that the various kinds of activity are not mutually exclusive, as they can be carried out together. For example, it is possible for someone to give instructions while conversing or navigate an environment while browsing. However, each has different properties and suggests different ways of being developed at the interface. The first one is based on the idea of letting the user issue instructions to the system when performing tasks. This can be done in various interaction styles: typing in commands, selecting options from menus in a windows environment or on a touch screen, speaking aloud commands, pressing buttons, or using a combination of function keys.

# Cont.

This kind of conceptual model describes how users carry out their tasks through instructing the system what to do. Examples include giving instructions to a system to perform operations like tell the time, print a file, and remind the user of an appointment. diverse of devices has been designed based on this model, including VCRs, hi-fi systems, alarm clocks, and computers. The way in which the user issues instructions can vary from pressing buttons to typing in strings of characters. Many activities are readily supported by giving instructions.

One of the main benefits of an instruction-based conceptual model is that it supports quick and efficient interaction. It is particularly suited to repetitive kinds of actions performed on multiple objects. Examples include the repetitive actions of saving, deleting, and organizing messages or files.


Lay's
Ruffles
Fritos
Cheetos
SNYDER'S
PRETZELS
Famous Amos
Knott's
Oreo
Nutri-Grain
Crunch
Butterfinger
Reese's
Hershey's
Mr. Nature
Grandma's
RICE KRISPIES TREATS
o-Insert Money
o-Press Selection Buttons
SELECTION
o-Insert Dollar Bill
o-Make Selection
COIN RETURN
PUSH


Coca-Cola
$1
A CAN
PEPSI
Sprite
Dr Pepper
7up


Always touch in and out
with your Oyster or contactless payment card to pay the right fare on the Tube, DLR, London Overground, TfL Rail and most National Rail services
oyster
Always touch in and out on the readers located at station entrances and exits, platforms and ticket gates even if the gates are open. When travelling by bus or tram you only need to touch in to pay the right fare
For more information visit tfl.gov.uk/waystopay or @tflwaystopay
MAYOR OF LONDON
TRANSPORT FOR LONDON
Payment methods
Coins
£2
£1
50p
20p
10p
5p
Cards
Notes
London Underground
Buy tickets
By destination
One day tickets
Group/family & children
Extensions
Extend your Travelcard
oyster
Get new cards
Quick guide
Touch card on the yellow reader
Quick tickets
Single to Zone 1
Return to Zone 1
Day Travelcard Zones 1-6
Please hold your Oyster card flat on the yellow card reader until the screen confirms it has been updated
Cards

# 1.2 Conversing

This conceptual model is based on the idea of a person conversing with a system, where the system acts as a dialog partner. In particular, the system is designed to respond in a way another human being might when having a conversation with someone else. It differs from the previous category of instructing in being intended to reflect a more two-way communication process, where the system acts more like a partner than a machine that simply obeys orders.

# Cont.

This kind of conceptual model has been found to be most useful for applications in which the user needs to find out specific kinds of information or wants to discuss issues. Examples include advisory systems, help facilities, and search engines. The proposed tourist application described earlier would fit into this category.

# Cont.

Examples of the former include banking, ticket booking, and train time inquiries, where the user talks to the system in single-word phrases yes, no, three) response to prompts from the system. Examples of the latter include search engines and help systems, where the user types in a specific query how do change the margin widths?) which system responds by giving various answers. main benefit of a conceptual model based holding a conversation is that it allows people, especially novices, to interact with a system in a way they are already familiar with.

# Cont.

Here is the beginning of a dialog between a user who wants to find out about car insurance and an insurance company's reception system:

<user dials an insurance company>
"Welcome to St. Paul's Insurance Company. Press 1 if new customer, 2 if you are an existing customer".
<user presses 1>
"Thank you for calling St. Paul's Insurance Company. If you require house insurance press 1, car insurance press 2, travel insurance press 3, health insurance press 4, other press 5"
<user presses 2>
"You have reached the car insurance division. If you require information about fully comprehensive insurance press 1, 3rd-party insurance press 2..."

# 1.3 Manipulating and Navigating

The third type is based on allowing users to manipulate and navigate their way through an environment of virtual objects. It assumes that the virtual environment shares some of the

properties of the physical world, allowing users to use their knowledge of how physical objects behave when interacting with virtual objects.

# Cont.

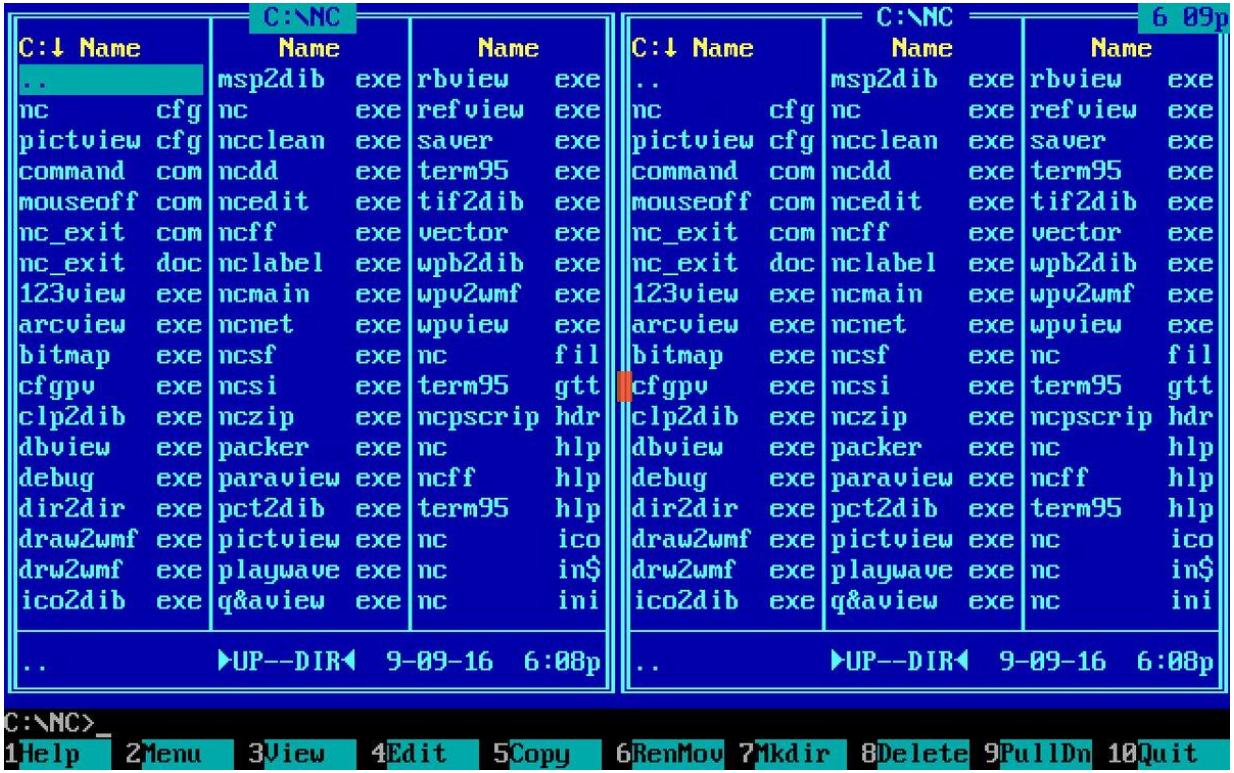
For example, virtual objects can be manipulated by moving, selecting, opening, closing, and zooming in and out of them. Extensions to these actions can also be included, such as manipulating objects or navigating through virtual in ways not possible in the real world

# Cont.

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation.  All rights reserved.

C:\Users\User copy C:\Users\desktop\Example.txt D:\backup\Example.txt
```

Copy Command in MS-DOS




Norton Commander Interface

# Cont.

Apple Computer Inc. was one of the first computer companies to design an operating environment using direct manipulation as its central mode of interaction.

The highly successful Macintosh desktop demonstrates the main principles of direct manipulation (see Figure 2.5).

To capitalize on people's understanding of what happens to physical objects in the real world, they used a number of Visual and auditory

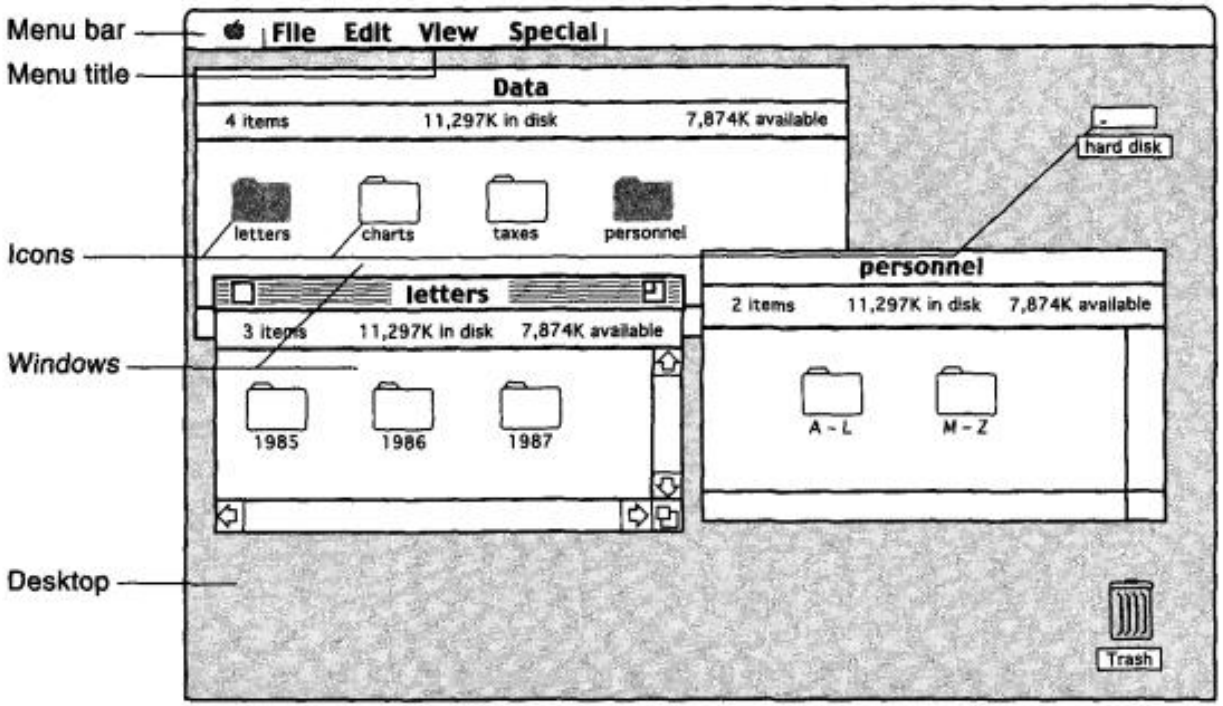



Figure 2.5 Original Macintosh desktop interface.

cues at the interface that were intended to emulate them

# 1.4 Exploring and Browsing

The fourth kind is based on the system providing information that is structured in such a way as to allow users to find out or learn things, without having to formulate specific questions to the system.

Please review the example in page 42

# Cont.

This conceptual model is based on the idea of allowing people to explore and browse information, exploiting their knowledge of how they do this with existing media books, magazines, radio, libraries, pamphlets, brochures). When people go to a tourist office, a bookstore, or a dentist's surgery, often they scan and flick through parts of the information displayed, hoping to find something interesting to read. CD-ROMs, web pages, portals and e-commerce sites are applications based on this kind of conceptual model.

# Cont.

What conceptual models are the following applications based on?

(a) a 3D video game, say a car-racing game with a steering wheel and tactile, audio, and visual feedback

(b) the Windows environment

(c) a web browser

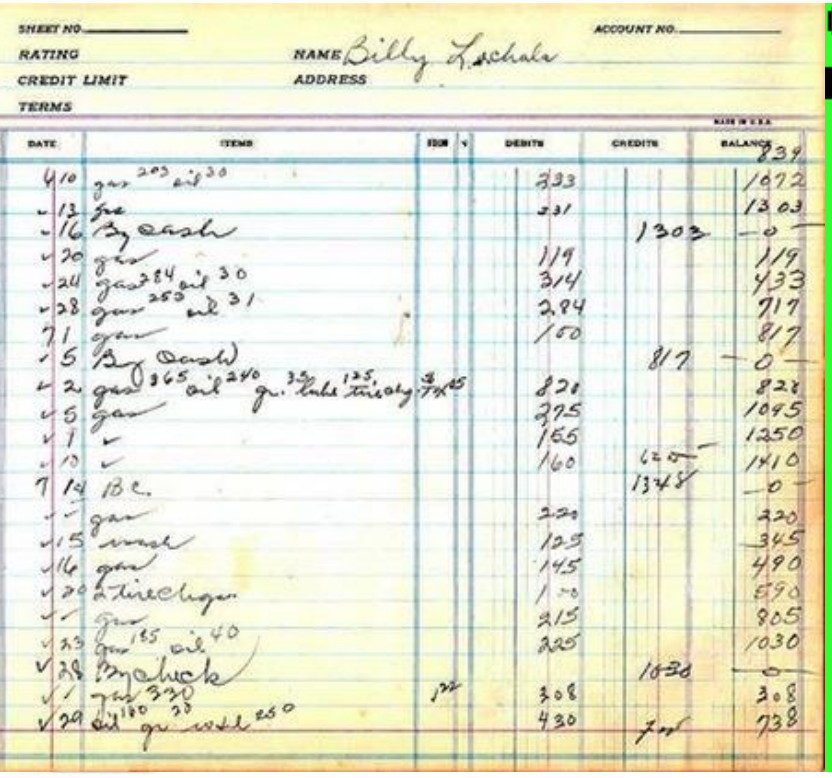
# 2- Conceptual Models Based on Objects

The second category of conceptual models is based on an object or artifact, such as a tool, a book, or a vehicle. These tend to be more specific than conceptual models based on activities, focusing on the way a particular object is used in a particular context. They are often based on an analogy with something in the physical world.

An example of a highly successful conceptual model based on an object is the spreadsheet (Winograd, 1996). The object this is based on is the ledger sheet. The first spreadsheet was designed by Dan Bricklin, and called It enabled people to carry out a range of tasks that previously could only be done very laboriously and with much difficulty using other software packages, a calculator, or by hand (see Figure 2.7).

# Cont.

**Vintage ledger paper**




**Reference card showing annotated screen dump for VisiCalc**

# Key aspects of Bricklin conceptual model

(i) to create a spreadsheet that was to a ledger sheet in the way it looked, with columns and rows, which allowed people to capitalize on their familiarity with how to use this kind of representation, (ii) to make the spreadsheet interactive, by allowing the user to input and change data in any of the cells in the columns or rows, and to get the computer to perform a range of different calculations and recalculations in response to user input.

# Xerox introduced the 8010 "Star" system

**It was designed as an office system**

# A Case of Mix and Match?

As we have pointed out, which kind of conceptual model is optimal for a given application obviously depends on the nature of the activity to be supported. Some are clearly suited to supporting a given activity using manipulation and navigation for a flight simulator) while for others, it is less clear what might be best writing and planning activities may be suited to both manipulation and giving instructions). In such situations, it is often the case that some form of hybrid conceptual model that combines different interaction styles is appropriate. The down side of mixing interaction is that the underlying conceptual model can end up being more complex and ambiguous, making it more difficult for the

# Interface Metaphor

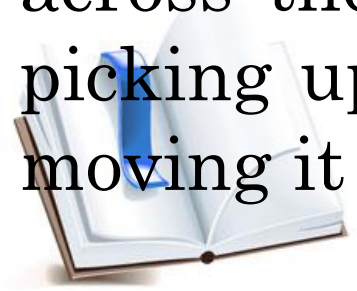
Another way of describing conceptual models is in terms of interface metaphors. By this is meant a conceptual model that has been developed to be similar in some way to aspects of a physical entity (or entities) but that also has its own behaviors and properties. Such models can be based on an activity or an object or both.

# Cont.

As well as being categorized as conceptual models based on objects, the desktop and the spreadsheet are also examples of interface metaphors. Another example of an interface metaphor is a search engine. The tool has been designed to invite comparison with a physical object a mechanical engine with several parts working together with an everyday action searching by looking through numerous files in many different places to extract relevant information.

# Cont.

Interface metaphors are based on conceptual models that combine familiar knowledge with new concepts. As mentioned in Box 2.2, the Star was based on a conceptual model of the familiar knowledge of an office. Paper, folders, filing cabinets, and mailboxes were represented as icons on the screen and were designed to possess some of the properties of their physical counterparts. Dragging a document icon across the desktop screen was seen as equivalent to picking up a piece of paper in the physical world and moving it (but of course is a very different action).



# Benefits of metaphors

Interface metaphors have proven to highly successful, providing users with a familiar orienting device and helping them understand and learn how to use a system. People find it easier to learn and talk about what they are doing at the computer interface in terms familiar to them whether they are computer-phobic or highly experienced programmers.

# Computing metaphors

Bluetooth - Bluetooth is used in a computing context to describe the wireless technology that is able to unite technology, communication, and consumer electronics. The name is taken from King Harald Blue Tooth, who was a 10th century legendary Viking king responsible for uniting Scandinavia and thus getting people to talk to each other.

# Interaction Paradigms

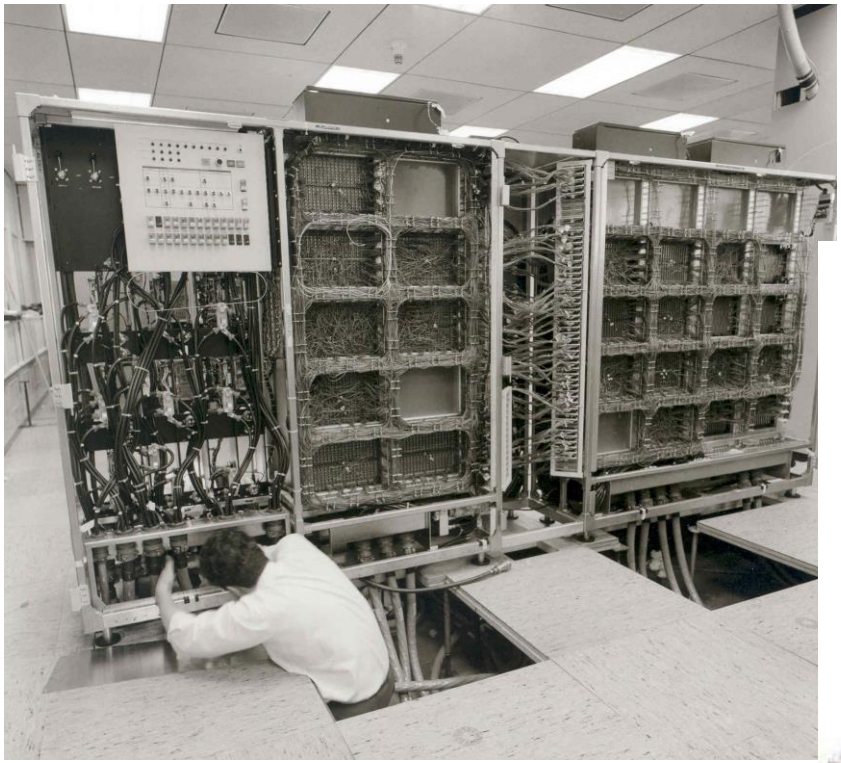
At a more general level, another source of inspiration for informing the design of a conceptual model is an interaction paradigm. By this it is meant a particular philosophy or way of thinking about interaction design. It is intended to orient designers to the kinds of questions they need to ask.

# Cont.

For many years the prevailing paradigm in interaction design was to develop applications for the desktop intended to be used by single users sitting in front of a CPU, monitor, keyboard and mouse. A dominant part of this approach was to design software applications that would run using a GUI or WIMP interface (windows, icons, mouse and pull-down menus, alternatively referred to as windows, icons, menus and pointers).

# Cont.

A recent trend has been to promote paradigms that move beyond the desktop. With the advent of wireless, mobile, and handheld technologies, developers started applications that could be used in a diversity of ways besides running only on an individual's desktop machine.



**Mounting the IBM 370 mainframe computer at Bosch site Feuerbach 1971**

**Apple III with 5 MB ProDrive hard drive.**

**Mobile Devices**

# Ubiquitous Computing

The late Mark Weiser an influential visionary, proposed the interaction paradigm of ubiquitous computing. His vision was for computers to disappear into the environment so that we would be no longer aware of them and would use them without thinking about them. As part of this process, they should invisibly enhance the world that already exists rather than create artificial ones. He meant that technology to integrated seamlessly into the physical world in ways that extend human capabilities.

***Ubiquitous computing will produce nothing fundamentally new, but by making everything faster and easier to do, with less strain and fewer mental gymnastics, it will transform what is apparently possible (Weiser, 1991, p. 940).***

# Pervasive Computing

Pervasive computing is a direct follow-on of ideas arising from ubiquitous computing. The idea is that people should be able to access and interact with information any place and any time, using a seamless integration of technologies. Such technologies are often referred to as smart devices or information appliances designed to perform a particular activity. Such as intelligent fridges and smart pan.

# Wearable Computing

The MIT Media Lab has created several such innovations. One example is wearable computing (Mann, 1996). The combination of multimedia and wireless communication presented many opportunities for thinking about how to embed such technologies on people in the clothes they wear.

# Thank You