Interaction Styles

User-computer dialogs

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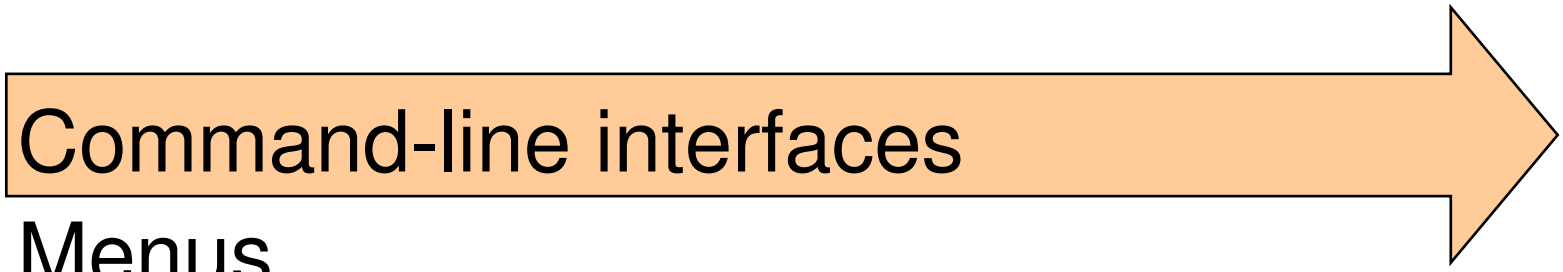
Interaction Style Categories



- Command-line interfaces
- Menus
- Natural Language
- Question/answer and query dialog
- Form-fills and spreadsheets
- WIMP
- Point and click
- Three-dimensional interfaces

Command-line Interface (def)

- An interface where the user types commands in response to a prompt
- Examples
  - Operating systems
    - MS-DOS
    - Unix
  - Applications
    - ftp
    - telnet

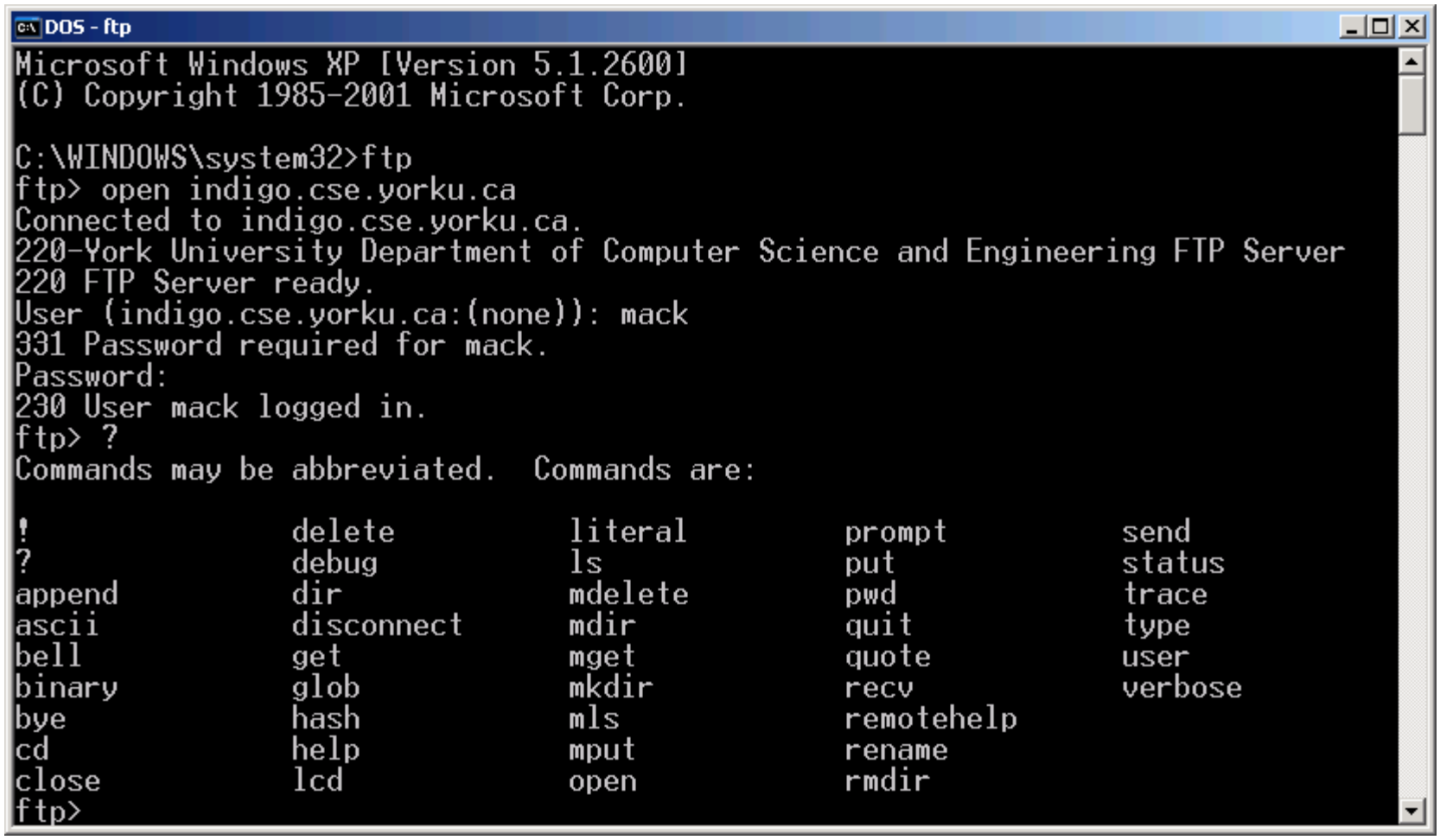
Command-line Interfaces

- Features
  - First interaction style (arguably)
  - Still widely used
  - Direct expression of commands to computer
  - May use function keys, single characters, abbreviations, or whole-word commands
  - Only interaction style available in some situations (e.g. remote access via telnet)

Command-line Interfaces (2)

- Advantages
  - Direct access to system functionality
  - Flexibility through options or parameters that modify behaviour of commands
  - Useful for repetitive tasks
  - Good for expert users
- Disadvantages
  - Arcane syntax difficult for novices
  - Options difficult to remember

Example


DOS - ftp
Microsoft Windows XP [Version 5.1.2600]
(C) Copyright 1985-2001 Microsoft Corp.
C:\WINDOWS\system32>ftp
ftp> open indigo.cse.yorku.ca
Connected to indigo.cse.yorku.ca.
220-York University Department of Computer Science and Engineering FTP Server
220 FTP Server ready.
User (indigo.cse.yorku.ca:(none)): mack
331 Password required for mack.
Password:
230 User mack logged in.
ftp> ?
Commands may be abbreviated. Commands are:
! delete literal prompt send
? debug ls put status
append dir mdelete pwd trace
ascii disconnect mdir quit type
bell get mget quote user
binary glob mkdir recv verbose
bye hash mls remotehelp
cd help mput rename
close lcd open rmdir
ftp>

Guidelines

- Commands should use vocabulary of the user, not of the technician or system
- Consistency from one command to the next

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- WIMP
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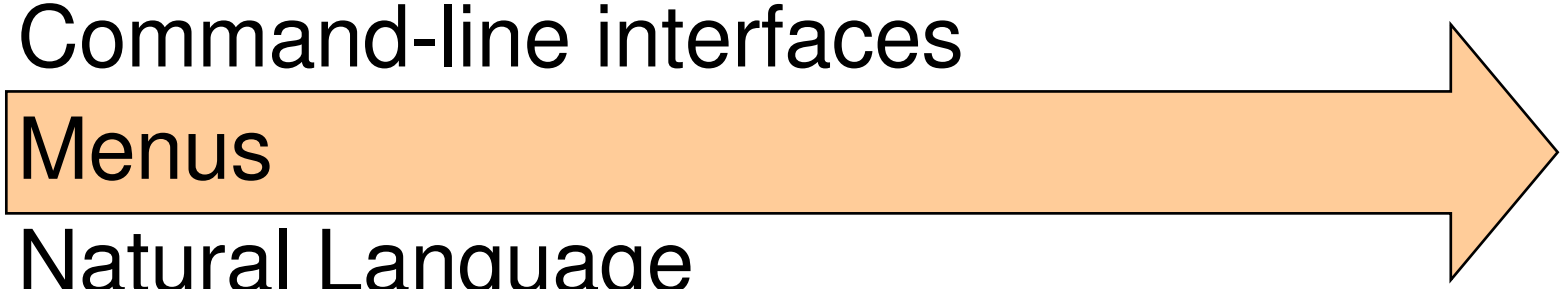
- Three-dimensional interfaces



Menu-based Interaction

- Features
  - Options displayed on the screen
  - Used on text-based and GUI-based systems
  - On text-based systems, options may be numbered
  - Shortcuts/accelerators possible
    - Just type the first letter or a unique letter of a command
    - Use TAB or arrow keys to navigate menu options
- Advantages
  - Less demand on user (since options are visible)
  - Relies on recognition, rather than on recall

Guidelines

- Make menu options meaningful in the user's language
- Logically group similar options to aid recognition
- User hierarchical organization where appropriate (viz. submenus)

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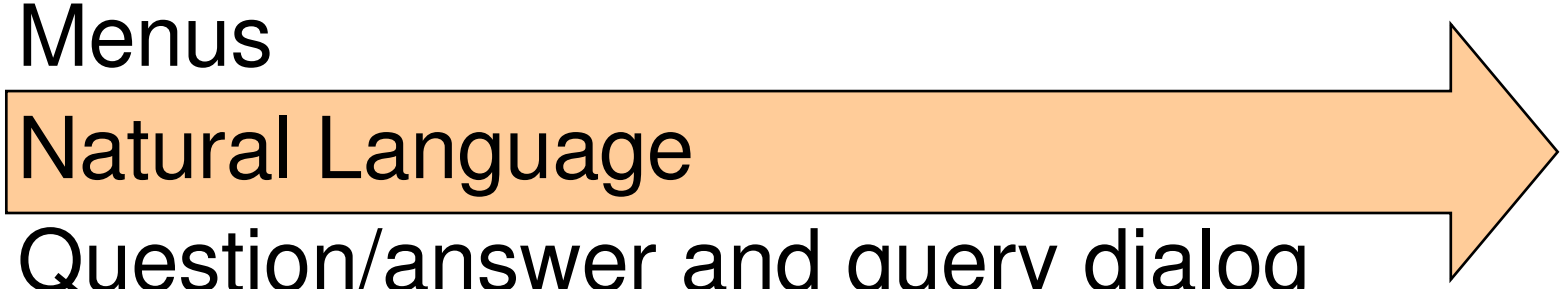

Natural Language Interaction

- Very attractive mode of interaction (at least at first glance)
- Scenario: the user cannot remember a command or is lost in a hierarchy of menus
- The cure: natural language understanding
- Forms: speech, written input
- Subject of considerable interest and research

Difficulty of Natural Language

- Parsing language is difficult
  - E.g., “the man hit the boy with the stick” Who has the stick?
- Words are vague or ambiguous
  - E.g., “exit” vs “close” Are they the same?
- Homonyms exacerbate speech input
  - E.g., “caret” vs “carrot” (same sound, different meaning)
- Spelling errors and/or variations exacerbate written input
  - E.g., “disk” vs “disc”, “color” vs “colour”, “center” vs “centre”
- Synonyms exacerbate written and speech input
  - E.g., “automobile” vs “car” (same meaning, different spelling)
- Converting audio speech to machine-readable text is very difficult!

Promise of Natural Language

- Relatively successful in restricted domains (but, is this natural language?)
- User must learn phrases that are understood
- But… language is, by its very nature, vague and imprecise, and this promotes flexibility and creativity
- Computers require precise language

NL Examples

- Eliza
  - http://en.wikipedia.org/wiki/ELIZA
- Turing test
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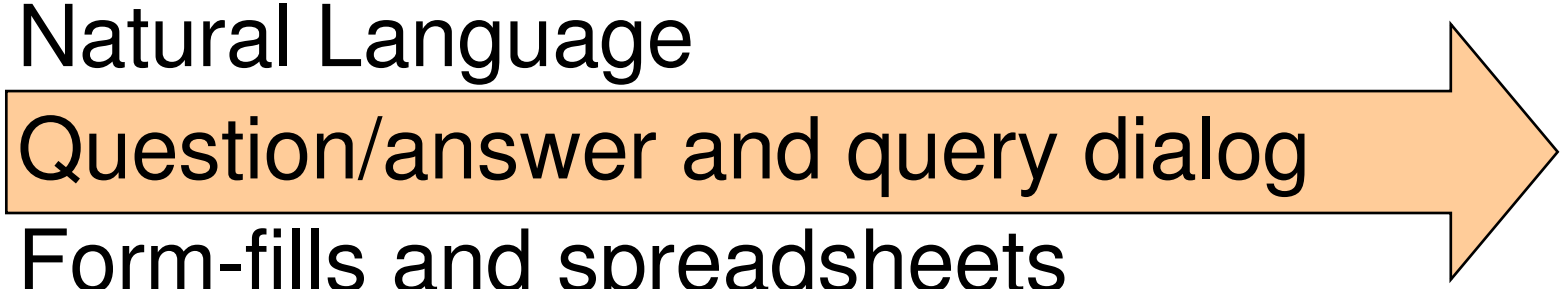


Features

- Simple medium to provide input to an application
- User is asked a series of questions
- Mainly with yes/no options or multiple-choice questions
- Main advantage: Constraining answers means input is always “parsable” by the application (i.e., spelling or typing mistakes are avoided)
- Easy to learn
- Limited in functionality
- Relaxing constraints means bogus input is possible
  - E.g., What is your name? (Response: buzz off)
- Appropriate for restricted domains

Query Languages

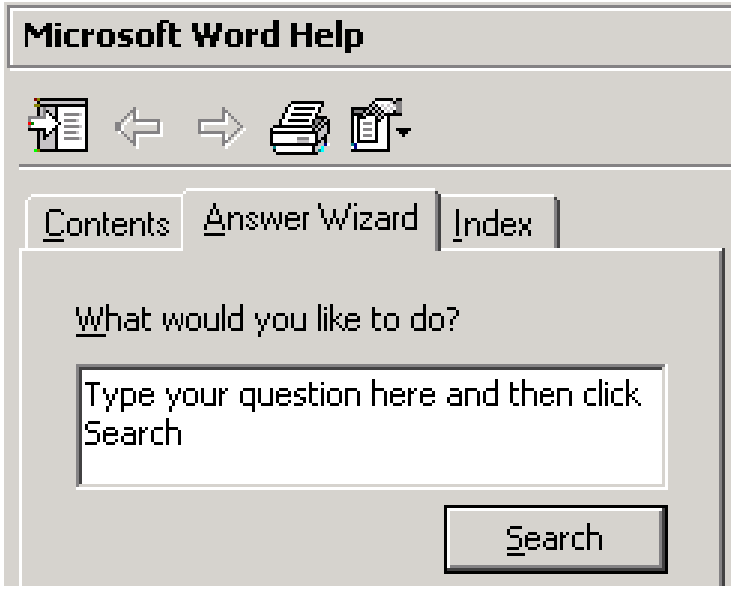
- Used to construct queries for databases
- Appear to use natural language phrases
  - SQL example…

```
SELECT Students.LastName, Students.FirstName,
  Students.Faculty
FROM Students
WHERE (((Students.Faculty)="arts"));
```

  - But, in fact, specific syntax is required (as well as knowledge of database)
- Knowledge of Boolean operators required
- Not well-suited for novices

Query vs. Natural Language

- Distinction is sometimes blurred
- What appears as a natural language interface may simply be a front for a query system
- E.g., MS Word
- Question parsed into keywords to form query



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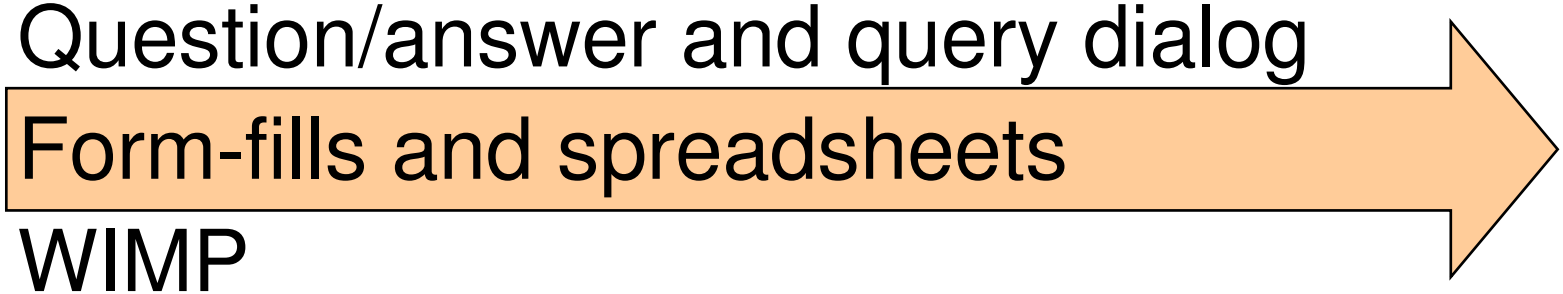

Features

- Used primarily for data entry
- Can also be used for data retrieval
- User is presented with a display resembling a paper form (often based on actual form)
- User already familiar with actual form (aides memory)
- Easy movement from field to field
- Some fields optional

Features (2)

- Requires correction facility (because users change their mind or make mistakes)
- Good for novice users or expert users

Spreadsheets for Forms

- Can be used as sophisticated forms
- Grid of cells
- Cells have formulae (e.g., the total for a row or column)
- Data may be added in any order
- System maintains consistency and updates values immediately
- User can manipulate values and observe effects
- Blurs distinction between input and output
- Attractive medium for forms

Spreadsheet Example

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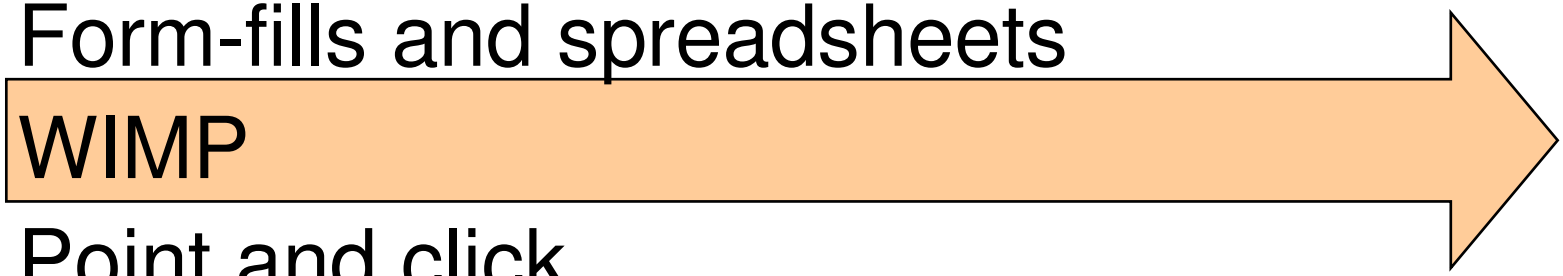
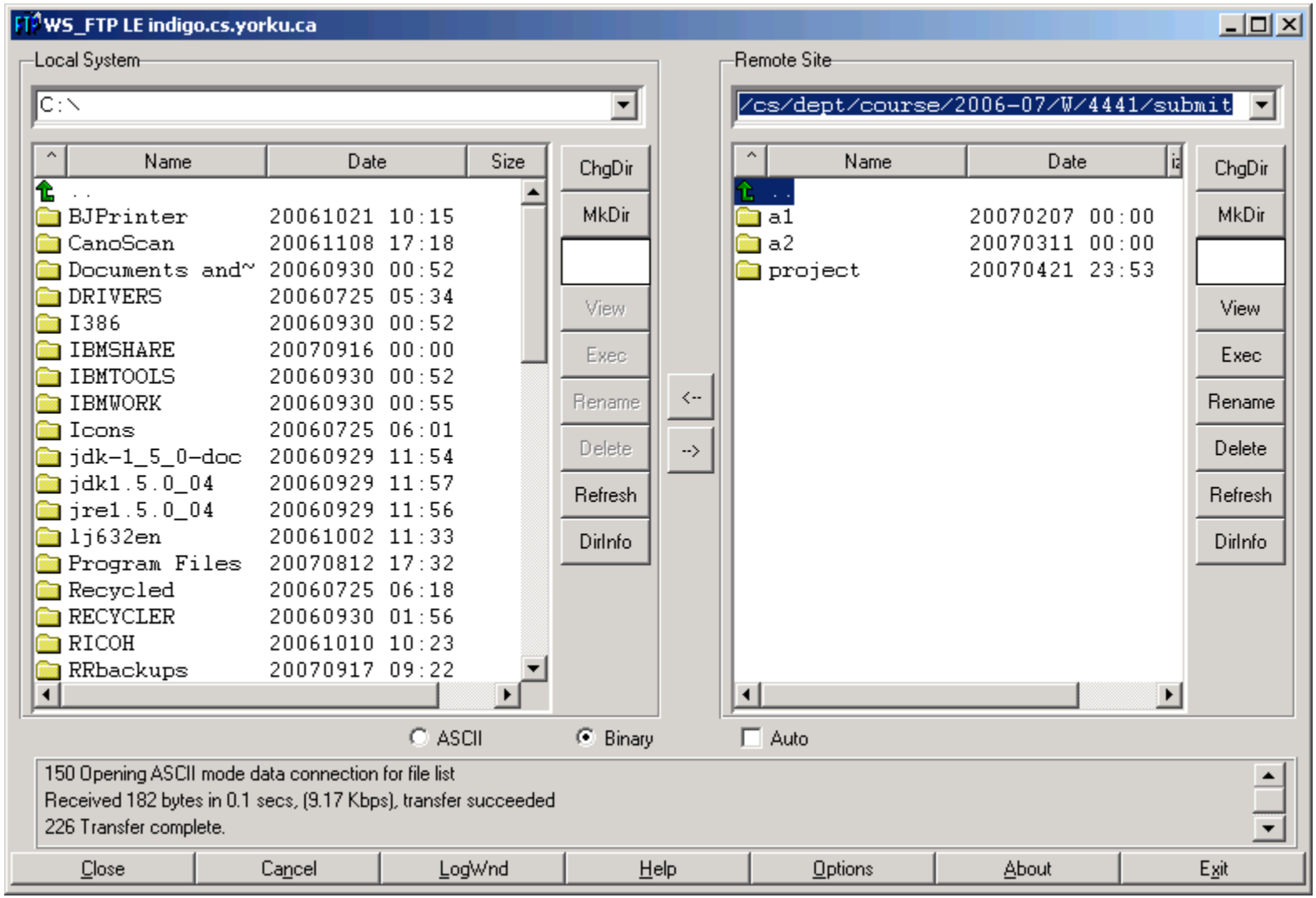


Features

- WIMP = windows, icons, menus, pointers
- Also called GUI (graphical user interface)
- Currently the most common environment for interactive computing
- Examples: Microsoft *Windows*, Apple *OS X*, *X-Windows* (for unix), Motif (for unix)

Example


WS_FTP LE indigo.cs.yorku.ca
Local System
C:\
Name
Date
Size
ChgDir
MkDir
View
Exec
Rename
Delete
Refresh
DirInfo
..
BJPrinter 20061021 10:15
CanoScan 20061108 17:18
Documents and~ 20060930 00:52
DRIVERS 20060725 05:34
I386 20060930 00:52
IBMSHARE 20070916 00:00
IBMTOOLS 20060930 00:52
IBMWORK 20060930 00:55
Icons 20060725 06:01
jdk-1_5_0-doc 20060929 11:54
jdk1.5.0_04 20060929 11:57
jre1.5.0_04 20060929 11:56
lj632en 20061002 11:33
Program Files 20070812 17:32
Recycled 20060725 06:18
RECYCLER 20060930 01:56
RICOH 20061010 10:23
RRbackups 20070917 09:22
<--
-->
Remote Site
/cs/dept/course/2006-07/W/4441/submit
Name
Date
ChgDir
MkDir
View
Exec
Rename
Delete
Refresh
DirInfo
..
a1 20070207 00:00
a2 20070311 00:00
project 20070421 23:53
ASCII
Binary
Auto
150 Opening ASCII mode data connection for file list
Received 182 bytes in 0.1 secs, (9.17 Kbps), transfer succeeded
226 Transfer complete.
Close
Cancel
LogWnd
Help
Options
About
Exit

Mixing Interaction Styles

- Mixing old with new
  - X-Windows (new) “on top of” unix (old)
  - Android (new) “on top of” linix (old)
- Old systems are often called legacy systems
- Legacy systems are very hard to replace or update, due to investment and momentum
- Adage: *If it ain’t broke, don’t fix it!*
- The old: command-line interaction
- The new: WIMP/GUI
- E.g., command-line interaction in a window

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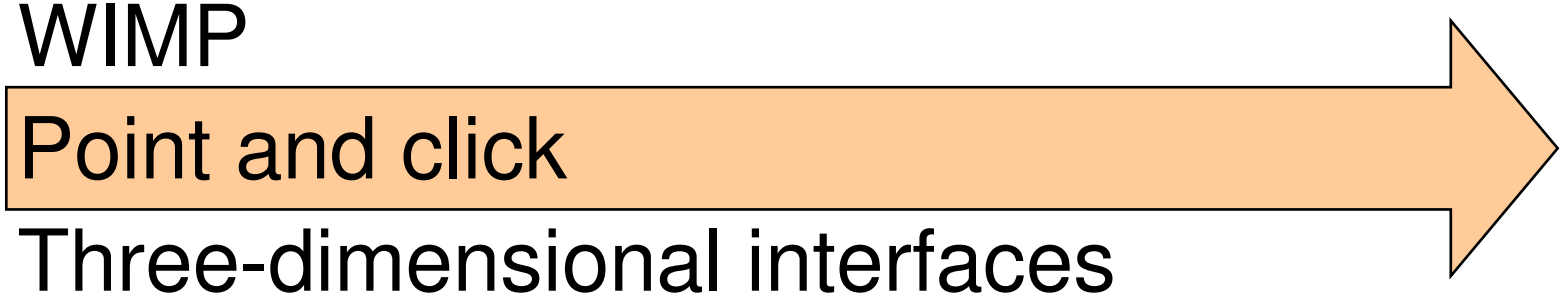

Features

- In multimedia systems (e.g., browsers), most interactions require only a single button click
- Closely related to WIMP (i.e., buttons also used in WIMP interfaces)
- Point-and-click philosophy is simpler
- Closely related to hypertext idea
- Not limited to mouse
- Also use for touch screen, such as information kiosks
- Popularized by WWW pages

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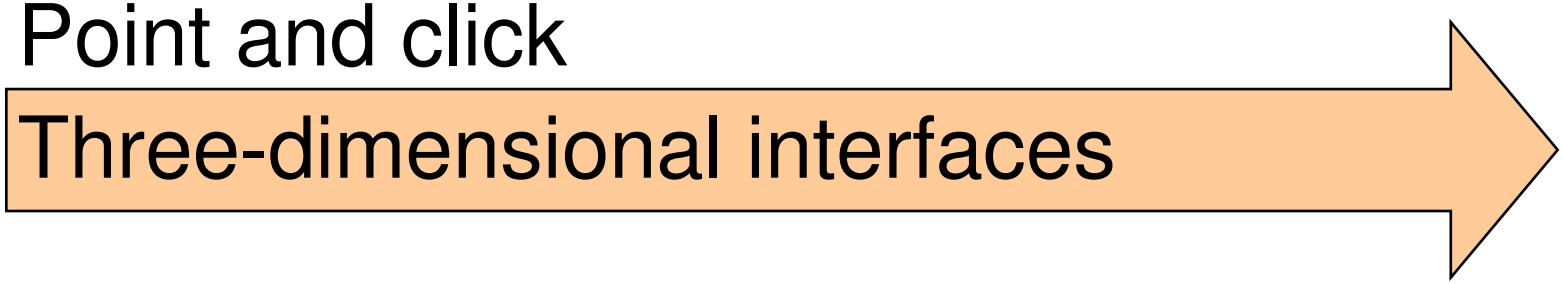
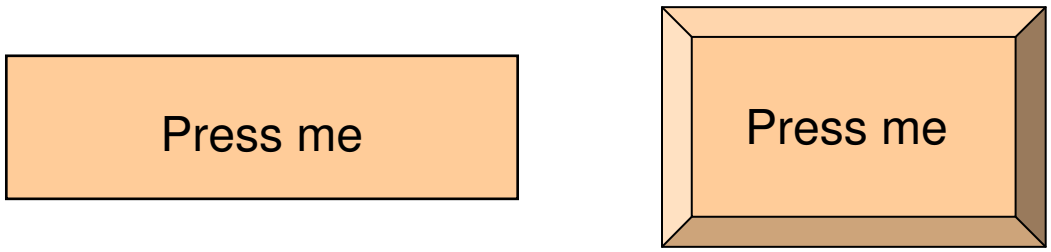


Features

- Increasing use of 3D in user interfaces
- Most obvious example are virtual reality (VR) and gaming
- Simplest example is 3D appearance for WIMP elements, raised buttons
- Appearance of being sculpted out of stone with light source to the upper-left/right

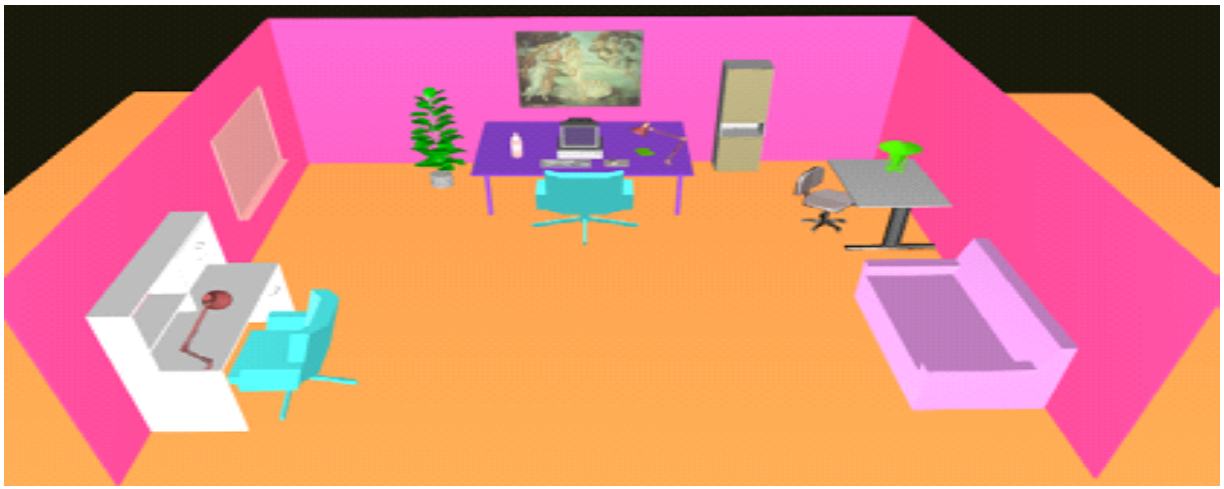


Features (2)

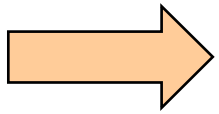
- Indiscriminate use of sculpted effects (e.g., on text, borders, menus) reduces sense of differentiation

Beyond WIMP Effects

- 3D also used for more complex workspaces
- Objects may be flat, but are displayed with perspective
- Shrink when farther away



Beyond WIMP Effects (2)

- 3D workspaces pose serious interaction problems
- Not for novices
- Output appears in 3D, but input is still the keyboard and mouse
- Problems in navigation, object manipulation, scene manipulation
- Systems tend to be highly moded
- Must think about degrees of freedom 

3D = 6 Degrees of Freedom