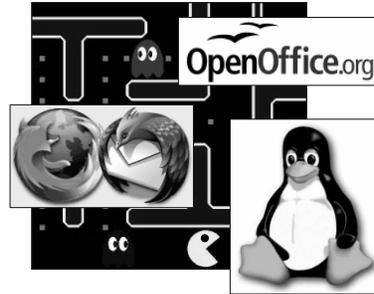


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*Mastering Cyberspace:
An introduction to practical computing*

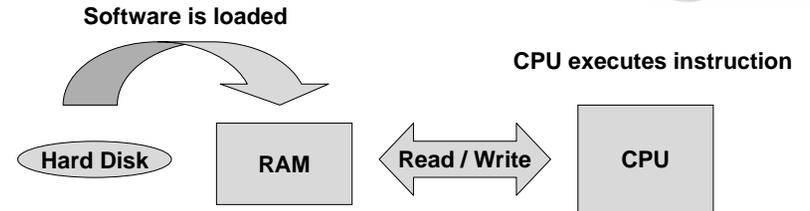
Software



What is software?

Instructions and other data for the computer

- Also known as “programs”
- Loaded from Secondary Storage into Primary Memory
- Runs (executes) from RAM



<http://en.wikipedia.org/wiki/Software>

File Formats

All data is stored as (binary) numbers

- Data is organised in **files** (chunks of related data)
- Method of encoding depends on the software, called **file format**

File Formats

- Defines the way that the numbers are interpreted
- E.g. for a graphics file:
“first the width, then the height, then all the pixel color values line by line”

File Extensions

- A dot followed by letters at the end of a file name
- Windows OS uses the file extension to determine the file format
- Also used to decide which application to use to open the file

Graphics	.jpg , .png , .gif	Video	.mpg , .avi , .divx
Sound	.mp3 , .wma , .ogg	Programs	.exe , .com , .bat
Text	.txt , .doc	Program Code	.c , .java , .cs , .py

Standards

Open Standard

- Published publicly
- Free to use
- Maintained by a "non-profit" organisation
- E.g. XML, HTML, UML
- “Open” does not necessarily mean “good”

Proprietary Standard

- Intellectual property of an entity (individual / company)
- Use of the standard is usually through license
- E.g. Adobe Flash, RealPlayer, some digital rights management (DRM) technologies
- Risk for users: vendor lock-in

“The nice thing about standards is that there are so many to choose from.”

Copyright and Patents

Software subject to normal legal copyright

- Copyright = “right to copy”
- Creator retains the rights to their creations (not the ideas *behind* them)
- Usually lasts for the life of the author plus 50 or 70 years
- Best applicable to: music, visual art, literature, programs

Software Patents

- Retain control over ideas / inventions
- Usually enables to exclusively commercialise an idea for 20 years (can be important to amortise research cost)
- US recognises software patents, Europe does not
- Hotly debated issue

Proprietary Software

Software that has restrictions on using and copying

- All rights are retained by the owner.
- Owner enforces these restrictions

Can be:

- Commercial
- Freeware
- Shareware
- Semi-free (for non-profit)

Would you have invested?



Microsoft Corporation, 1978

Freeware

Software is distributed free of charge

- No agreement about distribution, access to source code

Types of Freeware

- Loss Leader (given away with loss as sales promotion)
- Adware
- Donationware
- Postcardware

Abandonware

- Not legally recognised

E.g. MS Internet Explorer, Apple iTunes, Adobe Reader

Shareware

Idea: try before you buy

Trial period offered

- Purchase the license and upgrade to commercial version

Nagware

- Reminder messages to license software

Crippleware

- Software lacks the advanced features until licensed
- E.g. Word processor that cannot Save or Print

E.g. WinZip, TextPad

Open Source / Free Software

Free Software

- Freedom to use and study the work
- Freedom to copy and share the work with others
- Freedom to change the work
- Freedom to distribute changed and therefore derivative works

Copyright prevents these acts

- Explicit permission is required
- Free software license gives permission

*"I would love to change the world,
but they won't give me the source code"*

Richard Stallman

- Free Software Foundation (FSF)
- GNU General Public License (GPL)
- Copyleft



<http://en.wikipedia.org/wiki/Copyleft>

Spyware, Malware, Viruses

Spyware

- Collects data from your PC and sends it to someone else
- May otherwise look like (or even be) a useful program
- The data may be sensitive (e.g. passwords, personal documents) or just statistical

Malware

- Generic term for malicious software
- Usually malicious program is disguised as useful program
- Causes harm, such as deleting or modifying data

Viruses

- Small programs that attach themselves to other programs
- May cause harm

Golden rule: never run programs (or open files) that you cannot trust !!!

Kinds of Software

Application Software

- Helps the user complete a task
- E.g. word processor, spreadsheet, database, web browser, games

System Software

- Needed to run the computer system
- Operating System (OS): manages all the hardware resources for application programs (CPU, RAM, HD, ...)
- Device drivers: programs that help an OS to control a piece of hardware
- Diagnostic and maintenance tools: tools for analysis, trouble shooting and optimisation (e.g. checkdisk, defrag)

Operating System

Low-level software that allows you to use the system

- Default interface when no application is running
- Manages the system: CPU, memory, HD, ...
- Does all the direct interaction with the hardware (using drivers)

Examples:

- Microsoft Windows: most used, but many complaints *"Windows - so intuitive you only need a 678-page manual."*
- Macintosh OS: more expensive, less software & hardware, more focus on usability
- Unix, Linux: more technical

*"Unix is user-friendly.
It's just very selective about
who its friends are."*

Mac and PC:
<http://www.apple.com/getamac/ads/>

http://en.wikipedia.org/wiki/Operating_system

Command Line Interface

Text-based

- Powerful way to combine different commands
- Hard to use: textual commands look weird if you don't know them
- Good for experts that use it often

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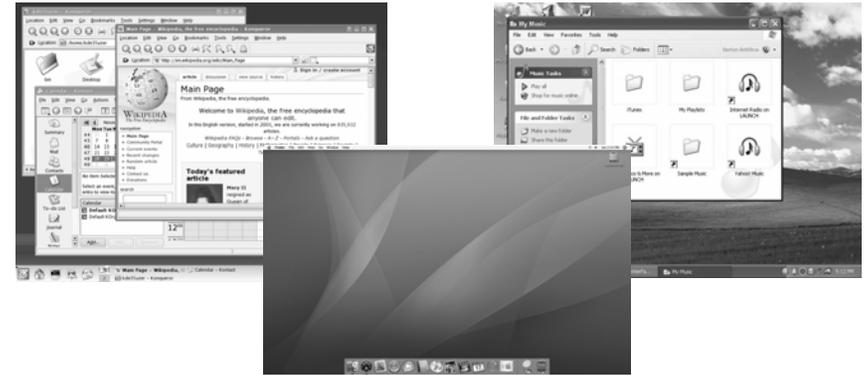
Digital UNIX (ruru.cs.auckland.ac.nz) (ttyg8)
login: andrew-l
Password:
Last login: Wed Feb 17 17:16:41 from andrew-l-pc.cs.a
36ruru % ls -l
total 5338
drwx----- 6 andrew-l staff      8192 Feb 29 1996 BUPscripts
-rw-r--r--  1 andrew-l staff    120320 Feb 24 16:14 Hardware and Software.doc
drwx----- 2 andrew-l staff      8192 Jun  9 1997 bin
-rw-r--r--  1 andrew-l staff       78 Nov 17 14:06 echo
drwx----- 13 andrew-l staff     8192 Mar 11 11:38 noc
-rw-r--r--  1 andrew-l staff    183566 Jan 11 16:08 netman.ps
-rw-r--r--  1 andrew-l staff    1820608 Jan 11 16:00 phdthesis.ps
drwx----- 2 andrew-l staff      8192 Aug 15 1998 pictures
drwx----- 2 andrew-l staff     8192 Aug 15 1998 public.htm
drwx----- 17 andrew-l grad0     8192 Mar  4 18:31 public.html
drwx----- 1 andrew-l staff     8192 Feb 27 1996 test
drwx----- 1 andrew-l staff    3252419 Jan 11 16:08 trainhw.ps
-rw-r--r--  2 andrew-l staff      8192 Dec 17 1997 turf
-rw-r--r--  1 andrew-l staff       242 Jun 11 1997 update_char
37ruru %
    
```

http://en.wikipedia.org/wiki/Command_line_interface

Graphical User Interface (GUI)

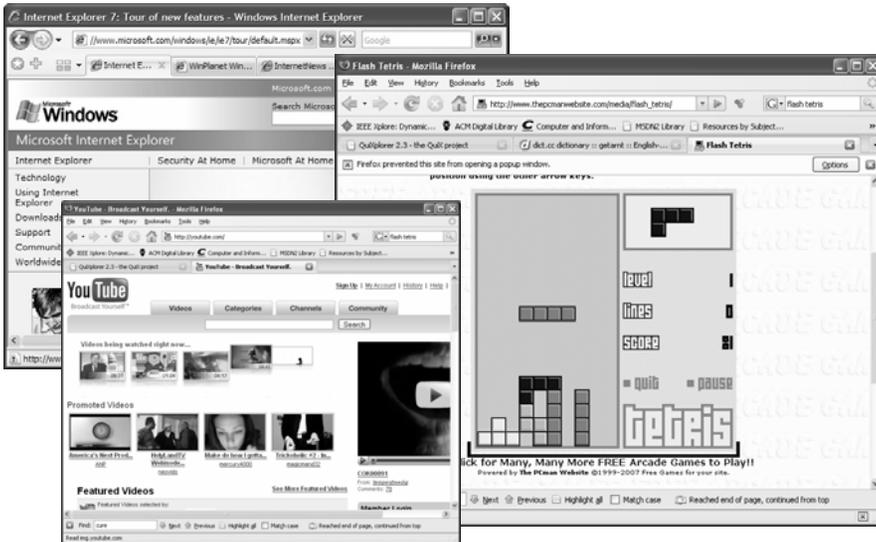
Picture based

- Windows, Icons, Mouse, Pointer
- Easy to use
- Good for beginners

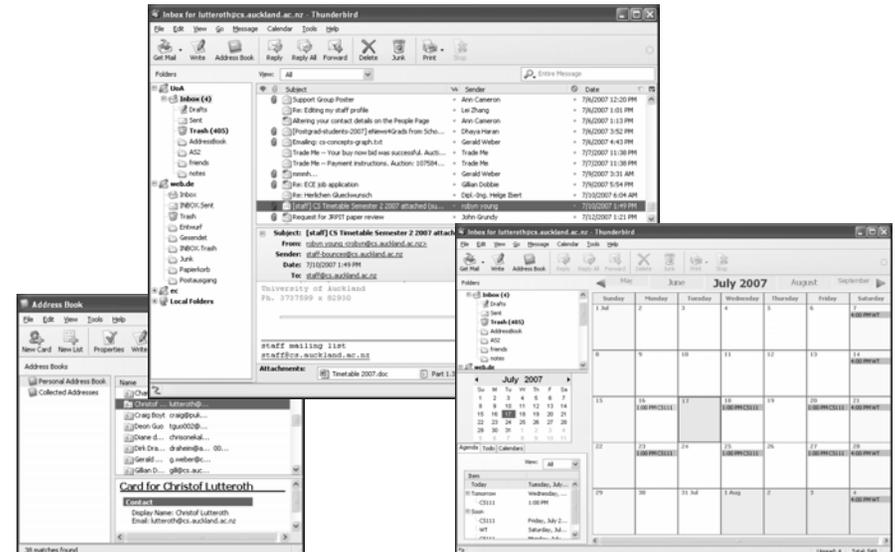


<http://en.wikipedia.org/wiki/GUI>

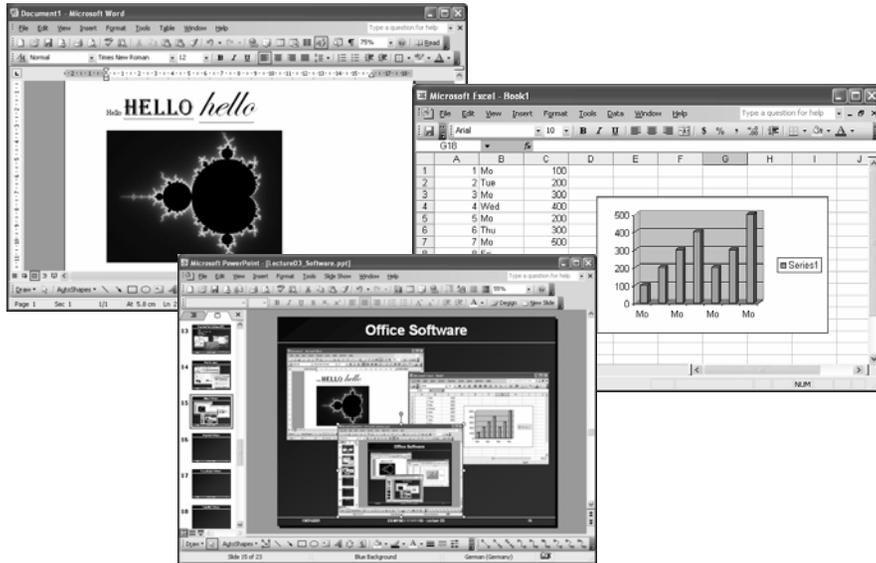
Web Browsers



Email Clients



Office Software



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Graphics Software

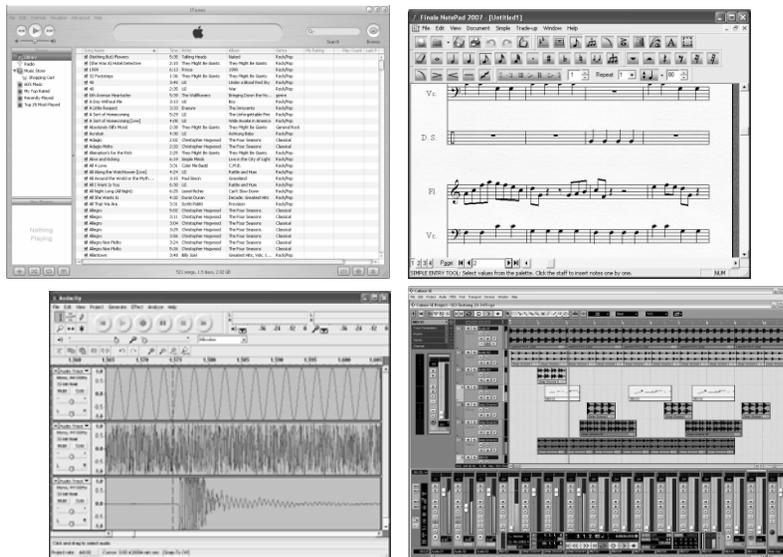


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Sound/Music Software

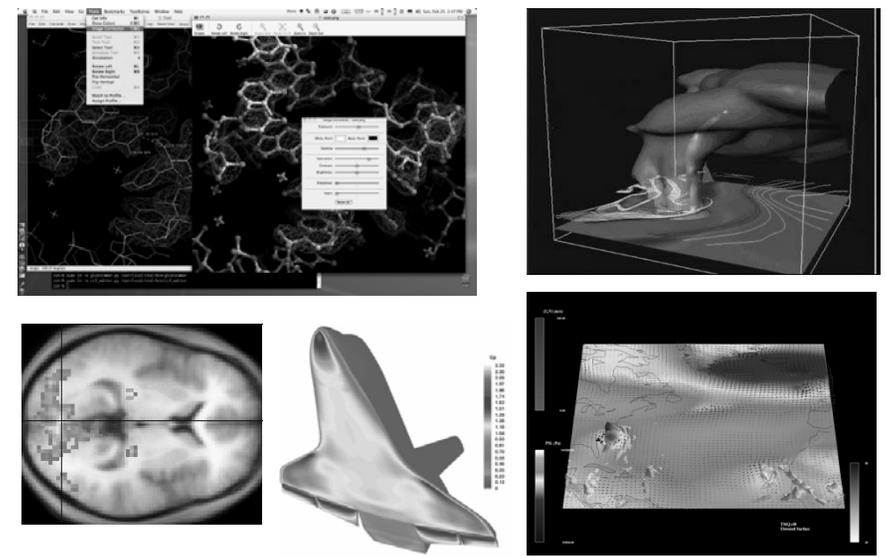


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Scientific Software



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Security Software

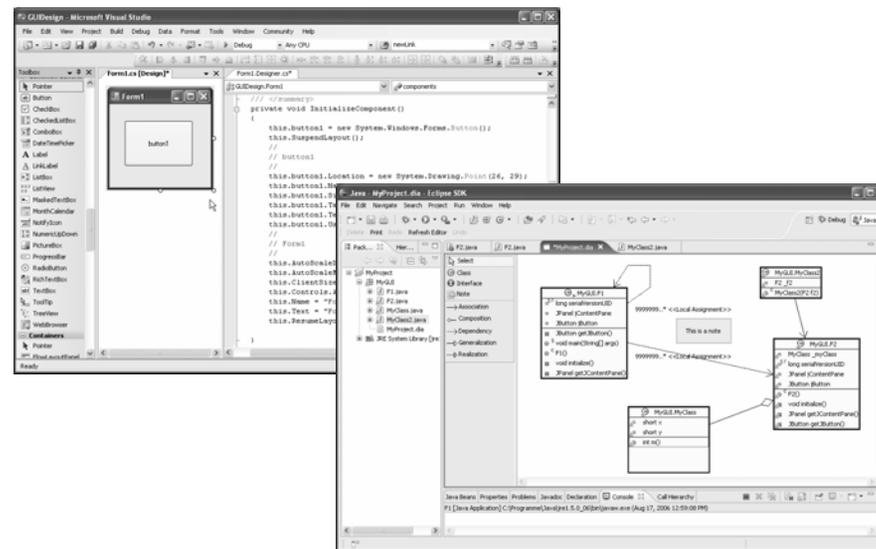


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Software Development Tools



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What if software fails?

Usually software is not perfect !!!

- Too complex to be completely free of errors
- Many programmers have good technical know-how but lack a sense of usability
- User interfaces are often not logical

*"Men are from Mars.
Women are from Venus.
Computers are from hell."*

If a problem occurs...

- It may not be your fault
- You are most likely not the only one with that problem
- Ask others for help !!!
- Search the Internet and you will often find solutions

Is it easy to fix a defect in a program?

- Unfortunately, usually not
- The internals of proprietary software are usually not accessible
- Open-source programs can be large and hard to understand
- But often problems can be circumvented by using the program in a different way

Summary

- **Software (programs) consists of instructions that control the computer and data**
- **Programs are loaded from secondary storage into primary memory, then executed by the CPU**
- **Data is organized in files, which have different file formats**
- **Software (and other data) is protected by copyright laws**
- **Software can be proprietary or open-source or a mixture of both**
- **Different kinds of software:**
 - System software
 - Applications
 - Spyware, Malware, Viruses

If all else fails, read the manual.

I am going to the OTL now. Everybody invited to come along !

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