Operating System and Computer Security

Operating Systems
- Run wide variety of tasks
- Run when computer is started
- Only one OS operates at a time

Applications
- Run specified tasks
- Only run when initiated
- Can run multiple applications at a time

What does Operating System do
- Manages all the resource in a computer (including processor, memory, i/o devices)
- Provides an interface between the hardware and application software.

Mostly used OS
- Desktop
  - Windows
  - Mac OS
  - Unix/Linux and their siblings.
- PDA
  - Palm
  - Pocket PC
  - Embedded Linux OS

Macintosh Operating System
- Evolved from 1984’s original MacOS
- 1984 Mac was first commercial computer with Graphical User Interface (GUI) and mouse
- Currently MacOS 9, MacOS X
- Inventor of trash can, alias (shortcut), pull-down menus, etc.

Mac OS Details
- Control Strip
- Alias (same as shortcut)
- Single-button Mouse (can be customized)
- Sherlock 2 (global search utility, copied in Windows 2000 and Windows ME)
- Easy to use, hard to troubleshoot

Evolution is progressive change or improvement
Windows OS

- Windows is built on top of MS-DOS, the MicroSoft-Disk-Operating-System, based QDOS.
- Windows 1.0 very delayed, very poor quality
- Windows 3.1 (c. 1992) first usable version, still very limited in comparison to MacOS 6
- Windows 95 revolutionary for Intel based computers, but, just a copy of Mac OS

Windows 95

- Stole Recycle Bin, Shortcuts, and Menu System from Macintosh OS
- Excellent user-friendliness for operations
  - Like MacOS, suffers from un-friendliness for troubleshooting
- Excellent multi-tasking capabilities (run multiple programs)-uses virtual memory

Multi-tasking

- The ability to run several programs at the same time.
- CPU can only run one program at a time. OS will switch programs for it. Since the switching is so fast, it looks like running multiple programs at the same time.
- Two multi-task mechanism
  - Cooperative multi-tasking (program voluntarily release CPU )
  - Preemptive multi-tasking.(OS deprives the CPU control when time is up)

Windows History

- Windows 95 for home machines, stable, simple
- Windows NT 4.0 for business/office computers
- Windows 98 replaces 95, very unstable, just a facelift
  - W98 Release 2 much better, still sucked
- Windows 2000 replaces Win NT 4.0
  - Incredibly stable, not very backwards compatible
- Windows ME (Millennium Edition) replaced W98 (fall 2000)
  - Almost no new features
  - Seems a little more stable than W98
  - Faster Startup

Windows XP

- Released 2002
- Home version and business version based on same OS
  - Previously, Win NT & 95 different, 2000 and ME different
- More stable than Win 98/ME, not as stable as W2000

Linux and Unix

- Unix was the first usable OS and still widely used today. It runs on special computers, e.g. Sun, Silicon Graphics, HP, DEC
- Linux was a miracle, initialized by Linus Torvalds and maintained by programmers all over the world.
- Both are based on a stable command line OS
  - By comparison, Windows based on unstable command line OS, MS-DOS
- Both Linux and Unix use an X-Windows GUI
### Ranking the Operating Systems

**Stability**
- Unix
- Linux
- Mac OS X
- Windows 2000
- Windows XP Pro
- Windows XP Home
- Mac OS 9
- DOS
- Windows 95
- Windows 98
- Windows ME

**Ease of Use**
- Mac OS 9
- Windows ME/98/95
- Mac OS X
- Windows 2000/NT
- Linux
- Unix
- DOS

### Future of Operating Systems

- Microsoft must address stability problems in home computers – Windows XP was a small step
- Linux becomes more popular, but only for advanced users and in server market.
- Macintosh’s market penetration more based on hardware appeal rather than software
  - In old days, Macs succeeded because they were the only GUI on the block. People bought Macs for the software
  - Windows is such a good copy that hardware, reliability, and price is now a big reason for the purchase of a Macintosh

### Computer security challenges

- Virus
- Email Virus
- Worm
- Trojan Horse
- Spam

### Virus

- Viruses are fragments of computer code that can piggyback on the normal programs
  - When normal program is infected by virus, virus will run first every time you start the program.
- Viruses can duplicate themselves and infect other programs.
- Original virus are less and less popular now.
  - People don’t copy files from others, but would rather download from the original source.
  - Anti-virus software is widely used.

### Email virus

- An e-mail virus moves around in e-mail messages, and usually replicates itself by automatically mailing itself to dozens of people in the victim’s e-mail address book.
- Two kinds
  - Executable attachment (.exe .vbs .com .bat files).
  - Macro language viruses.

### Fact about email virus

- **BOTTOM LINE:** There is *NO* such thing as an E-mail text virus!
- You can not get a virus or any system damaging software by reading an e-mail*. Emails (that is, the ACTUAL message can not contain viruses)
- Email viruses always resides in the attachment. So don’t run any suspect attachment files.
**Worm**
- A worm is a computer program that has the ability to copy itself from machine to machine by taking advantage of the security hole in the system.
- Security holes are bugs in the OS.
- This is the most serious threat now
  - Your Computer can be infected by just plugging in the internet.
  - MSblast and SoBig are the recent worms that damage hundreds of thousand computers.

**Trojan Horse (back door)**
- A Trojan horse is simply a computer program. The program claims to do one thing (it may claim to be a game) but instead does damage when you run it (it may erase your hard disk).
- Trojan horse usually does replicate itself.

**Suggestions to secure your computer**
- Use anti-virus software.
- Update your computer regularly.
- Be careful with the email attachments
  - Safe: .jpg .bmp .pdf .txt ....
  - Unsafe: .exe .doc .xls .ppt ...
- Avoid email software by Microsoft (outlook, outlook express...). They are mostly targeted.
- Use firewall or router to protect you from worm attack.

**Spam (junk mail)**
- Spamming is business
  - Most effective way to stop it is legislation. Most states passed law to restrict it, but none fully banned it.
- How spammers get your mail.
  - Web search
  - Sending test emails
  - Exchange or buy from other spammers
- A case study: How an HTML email can reveal your identity.

**Suggestions to fight spam**
- Never reply junk emails
- Moreover, never even open them.
- Don’t post your actual email address in the website.
  - Sparty_at_msu.edu
  - Sparty@NOSPAMMINGmsu.edu
  - Use a picture of your email address.
- When send group emails, put all the recipients in the BCC field to protect other people.