

31268 Web Systems

Week 2: Operating Systems
Part 1: What runs the web?

The Web

- Is it....

MAGIC !!!



BROWSER

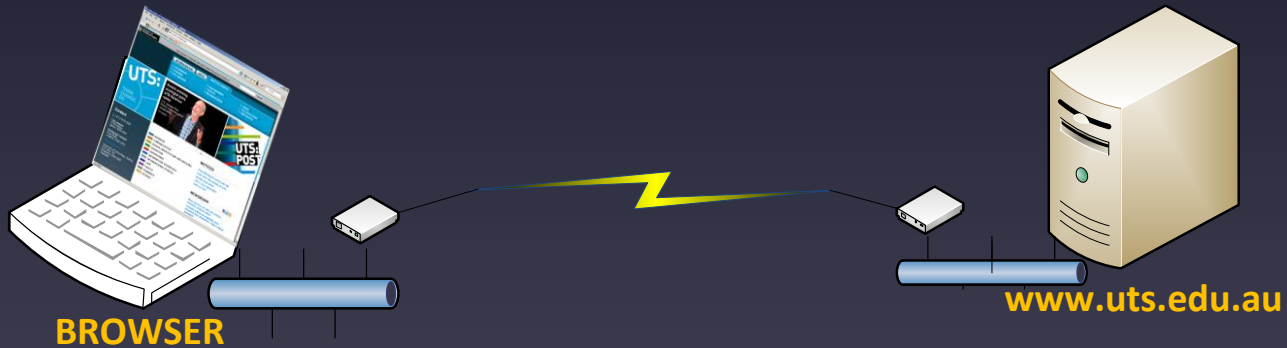


www.uts.edu.au

The Web

- Is it....

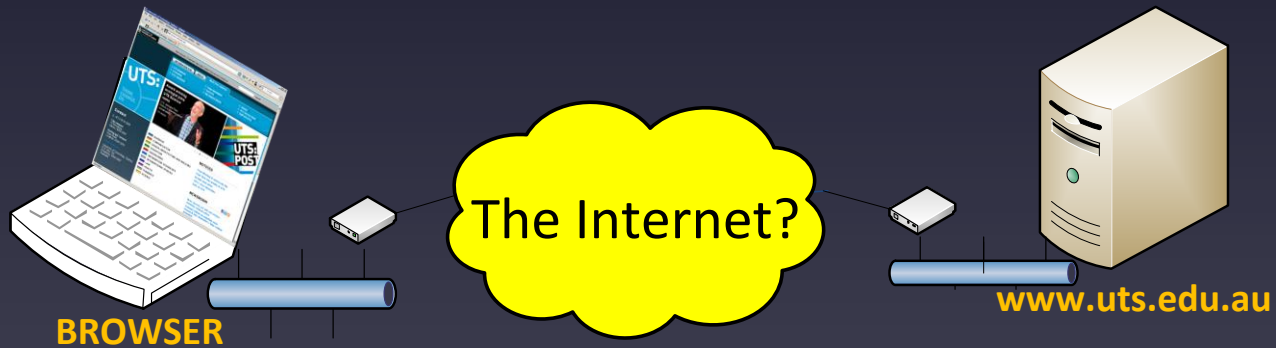
A network!!!



The Web...

- Is it ...

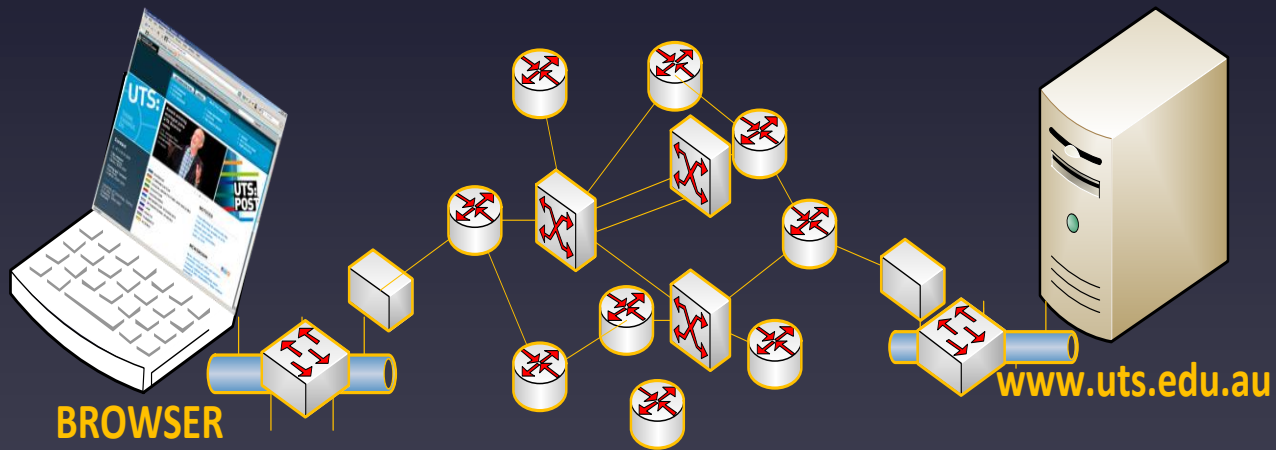
The “internet”



The Web ...

- Is It ...

**A network of
networks...**



The Web ...

- Is it...

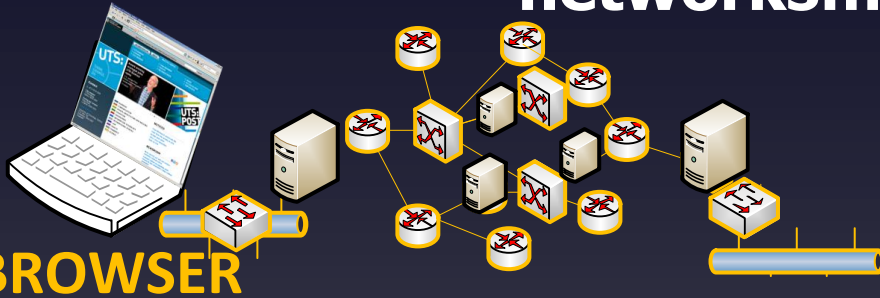
**A bunch of
computers and
a network of
networks...**



The web...

A bunch of computers and a network of networks...

- Is It ...



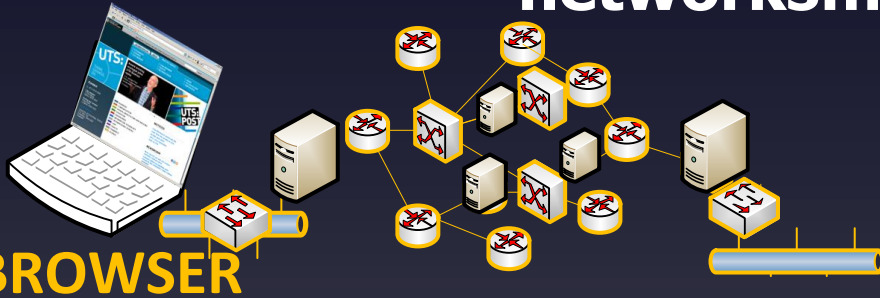
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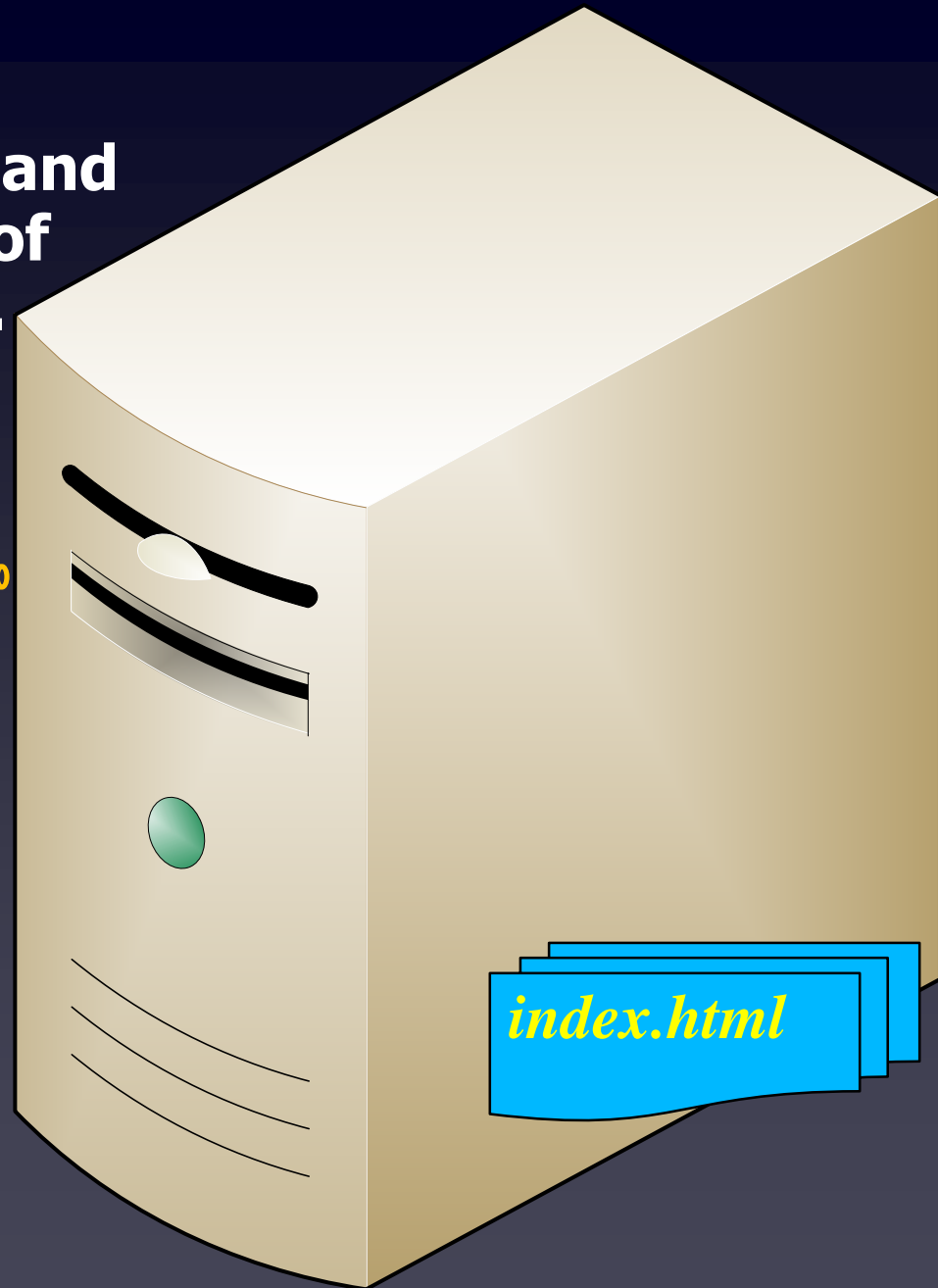
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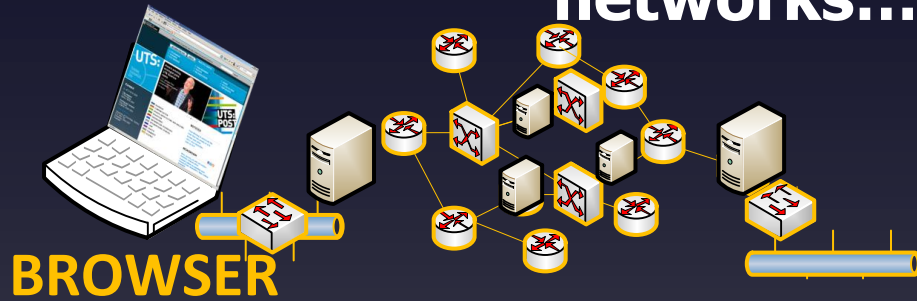
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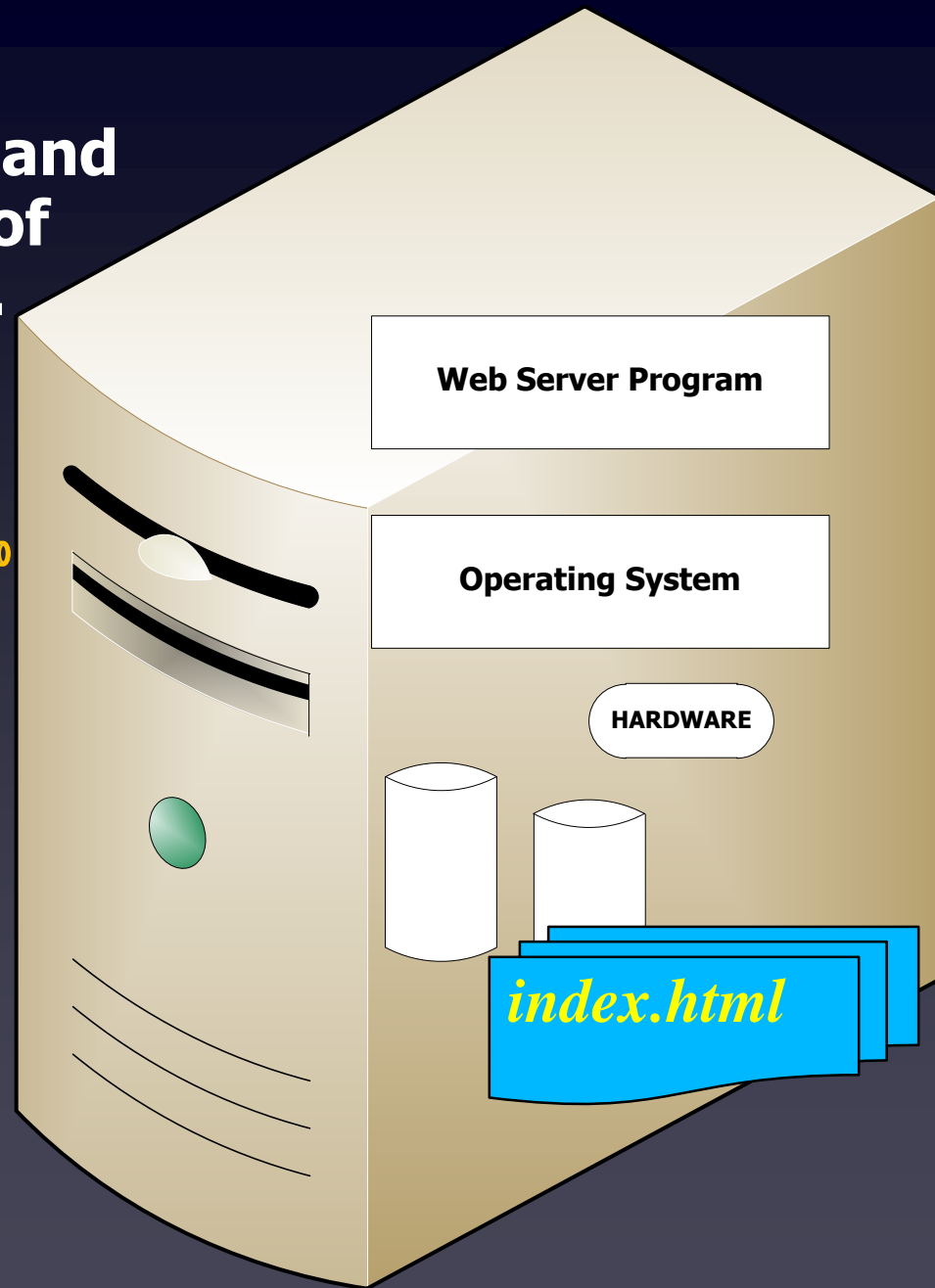
The web...

A bunch of computers and a network of networks...

- Is It ...



... and a whacking
big computer
running the
web site program on
an **operating system**
running on
HARDWARE



Weeks 1-3

- For the next 3 weeks we will talk about the web and **Operating Systems**:
 - Introduction to Operating Systems
 - User Interfaces
 - UNIX operating system
 - File systems
 - Process management
 - Memory Management

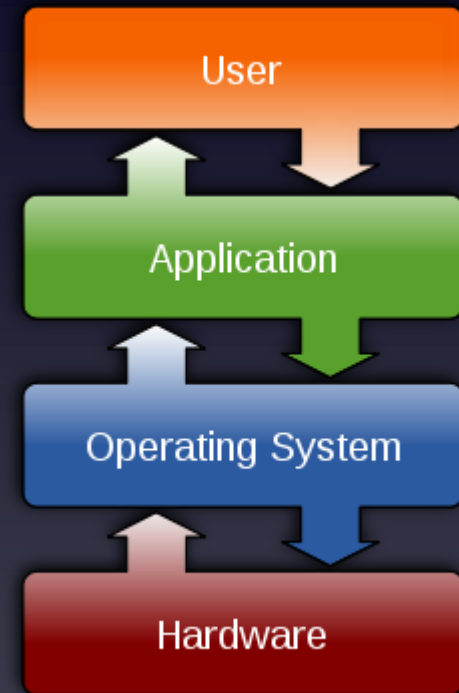
What is an Operating System ?

Definition: An operating system is a piece of **software** that sits between all programs and the computer's hardware.



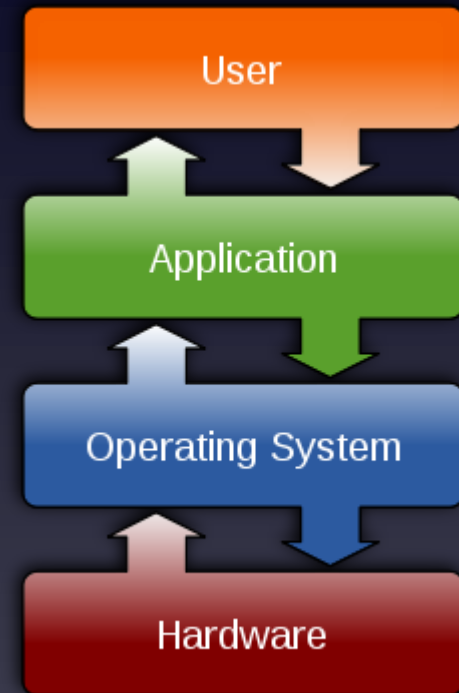
What is an Operating System?

- Manages your computer
- Runs programs



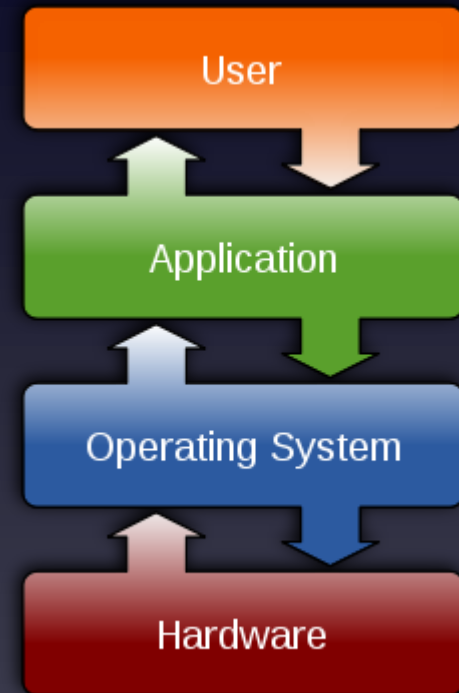
What is an Operating System?

- Manages your computer
- Runs programs
- Interface between user and hardware



What is an Operating System?

- Manages your computer
- Runs programs
- Interface between user and hardware
- Provides services to programs & users
- Protects users and programs from each other....



Common Operating Systems (OS)

LARGE systems

Mainframes pioneered OS since the 1960's

- IBM still run mainframes – z/OS will still run ancient programs!
- Handles 1000's of users simultaneously
 - IBM Mainframes also run Linux!
- **Supercomputers** now tend to run Linux



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- Supercomputers now tend to run Linux

Minicomputers

- openVMS, IBM OS/400
- **UNIX** & Unix-like OS
 - e.g. **Linux**, BSD, Solaris, HP-UX, Mac OSX



Common Operating Systems (OS)

Personal Computers

- Linux
- Microsoft Windows, Mac OS/X (actually Unix!)
- Anyone heard of BeOS? CP/M? Amiga?



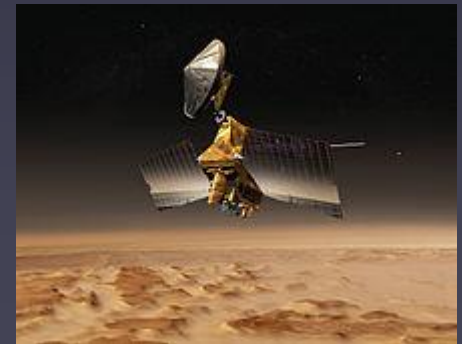
Common Operating Systems (OS)

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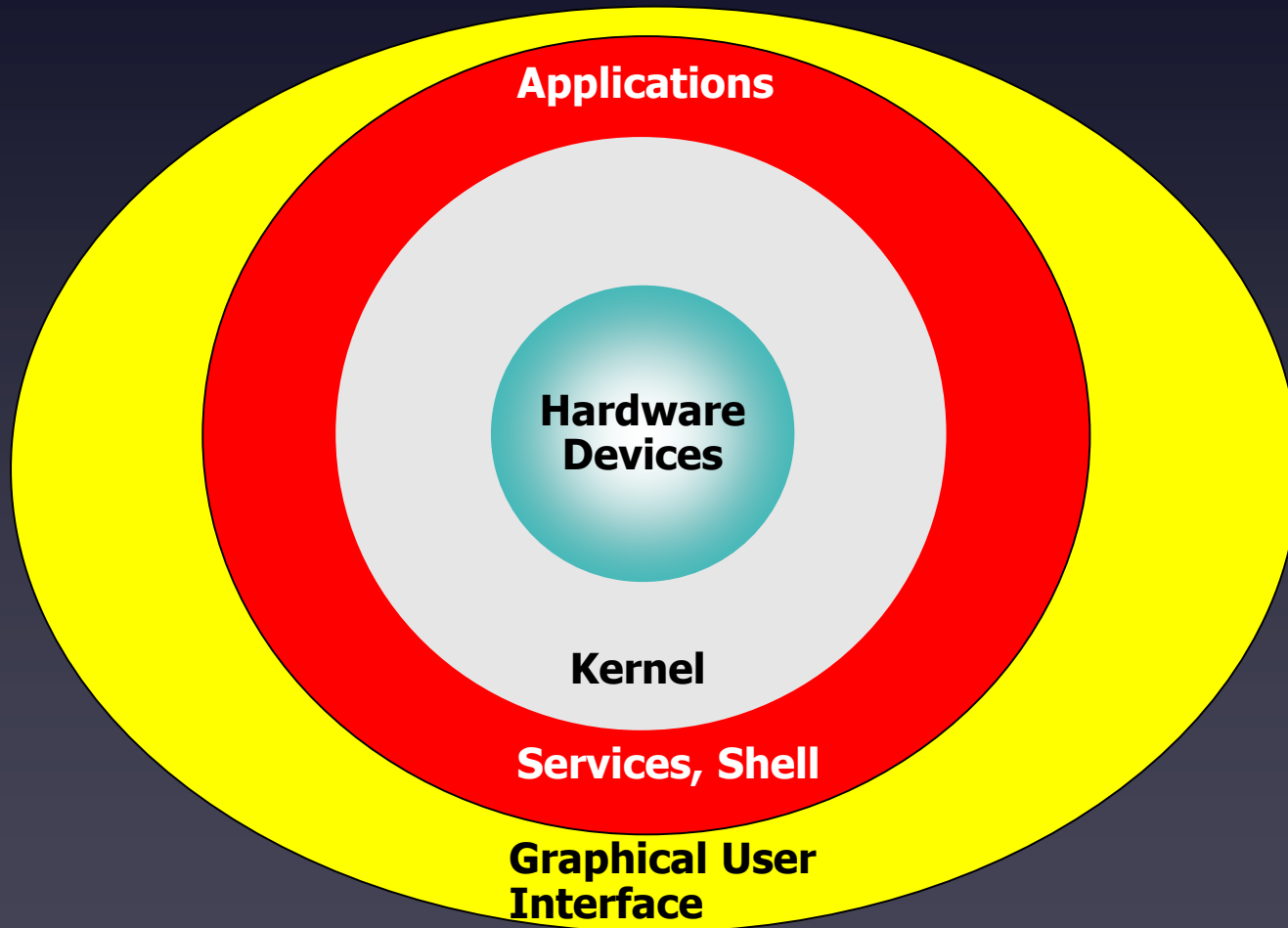
- Linux
- Microsoft Windows, Mac OS/X (actually Unix!)
- Anyone heard of BeOS? CP/M? Amiga?

Embedded systems

- Military, telecommunications, etc
 - Eg: VxWorks, QNX, Integrity, Linux

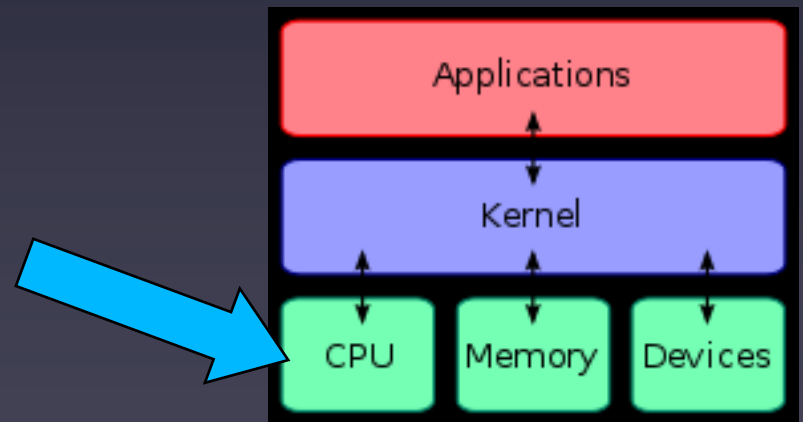
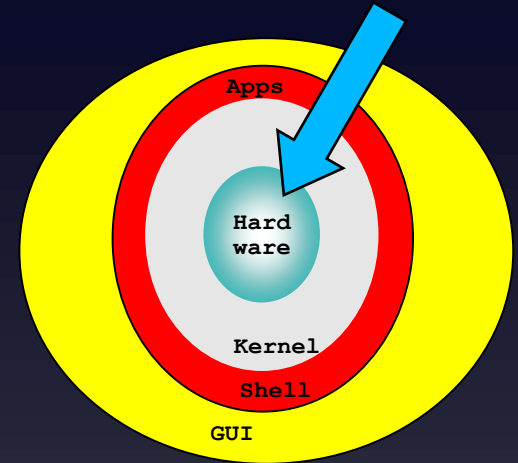


An OS architecture: the "onion" model



What does the model mean?

- Let's look at the HARDWARE layer

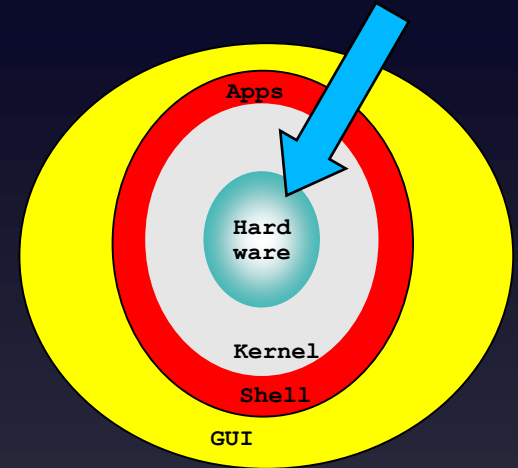


What does the model mean?

Operating systems can be constructed in a set of layers:

- **Hardware**

- CPU – central processing unit
 - e.g. Intel Core 2 Duo
- Memory



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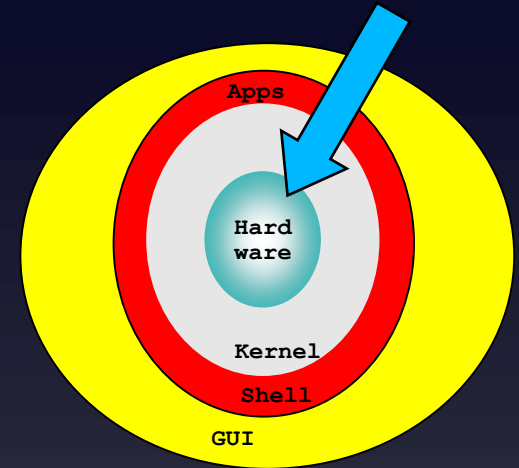
- CPU – central processing unit

- e.g. Intel Core 2 Duo

- Memory

- **Input/Output devices**

- e.g. mouse, keyboard
 - e.g. display, printer



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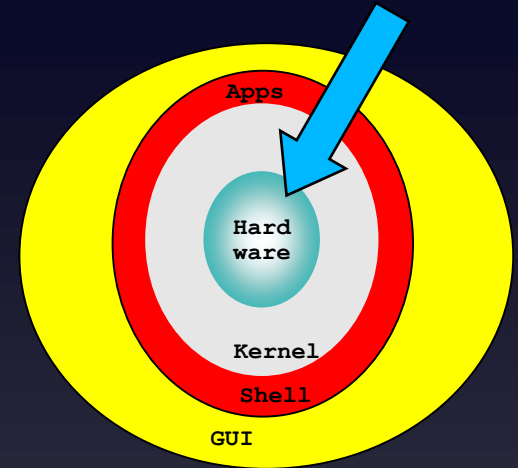
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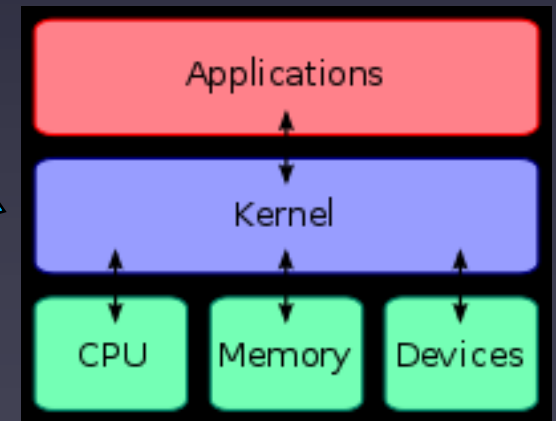
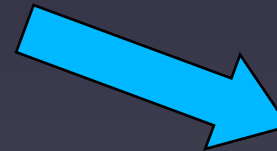
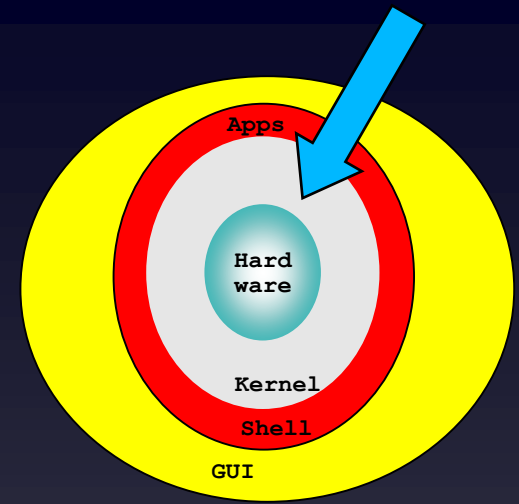
- **Storage**

- e.g. flash, hard drive, DVD



What does the model mean?

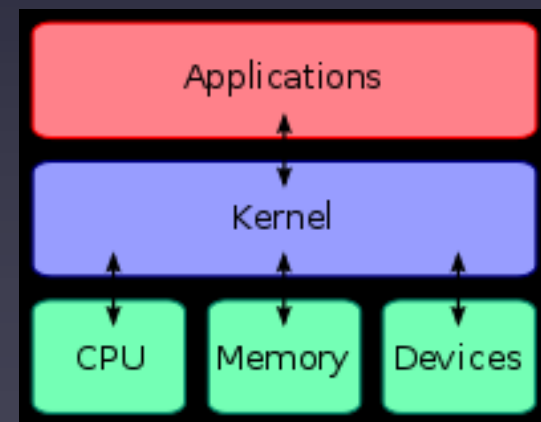
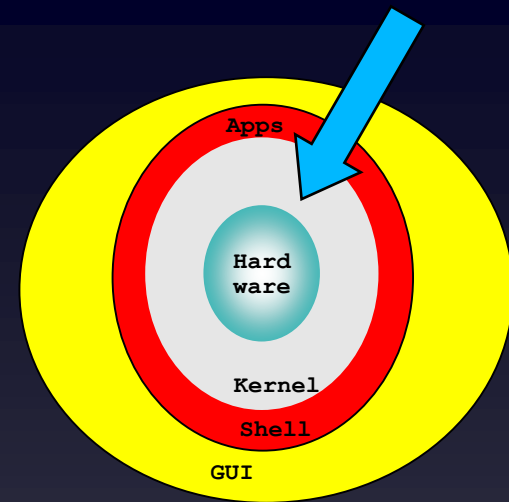
- Let's look at the **KERNEL** layer



What does the model mean?

Next layers:

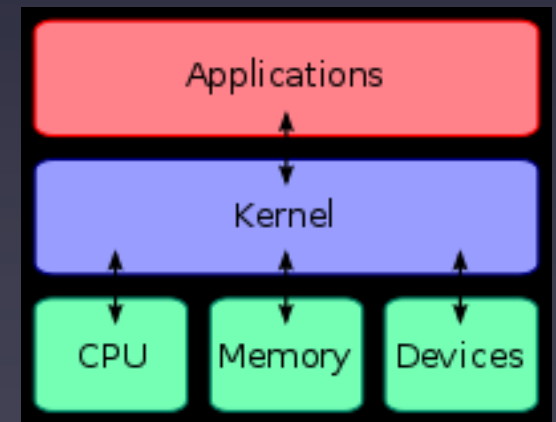
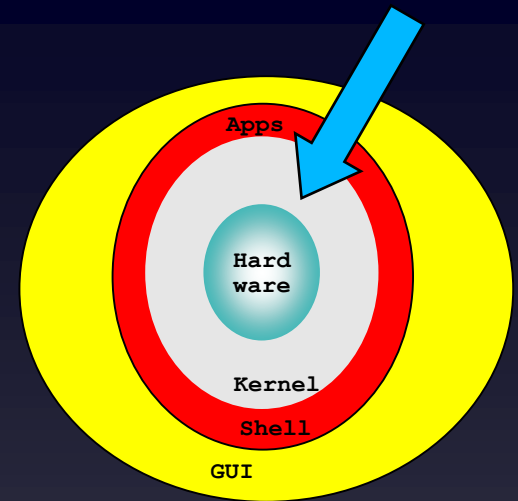
- **Kernel**
 - Controls the hardware directly
 - Device drivers, firmware, etc



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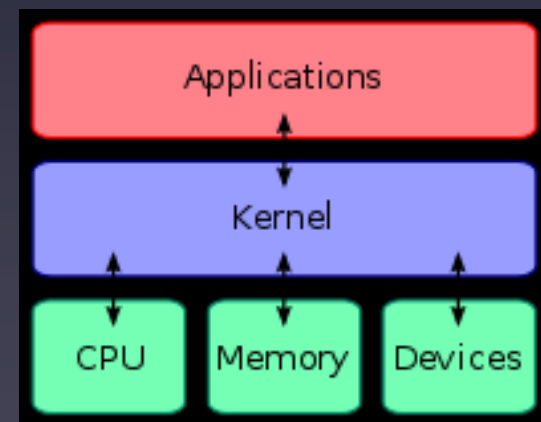
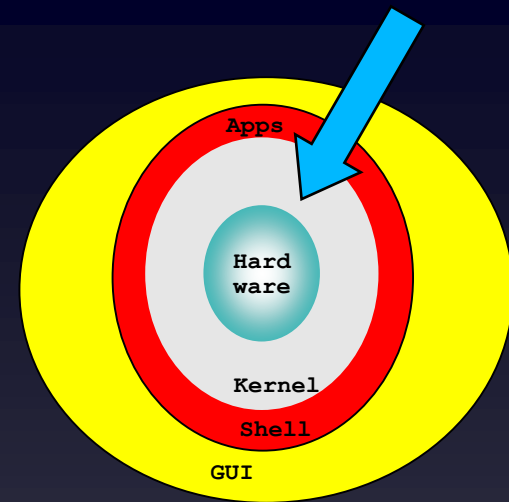
- **Kernel**
 - Controls the hardware directly
 - Device drivers, firmware, etc
 - Provides **resources** and services to applications
 - E.g. CPU, memory, storage, video, mouse , keyboard, memory, etc



What does the model mean?

Next layers:

- **Kernel**
 - Controls the hardware directly
 - Device drivers, firmware, etc
 - Provides resources and services to applications
 - E.g. CPU, memory, storage, video, mouse , keyboard, memory, etc
 - **Manages access** to privileged resources



***STOP: 0x000000D1 (0x00000000, 0xF73120AE, 0xC0000008, 0xC0000000)

A problem has been detected and Windows has been shut down to prevent damage to your computer

DRIVER_IRQL_NOT_LESS_OR_EQUAL

If this is the first time you've seen this Stop error screen, restart your computer. If this screen appears again, follow these steps:

Check to make sure any new hardware or software is properly installed. If this is a new installation, ask your hardware or software manufacturer for any windows updates you might need.

If problems continue, disable or remove any newly installed hardware or software. Disable BIOS memory options such as caching or shadowing. If you need to use Safe Mode to remove or disable components, restart your computer, press F8 to select Advanced Startup Options, and then select Safe Mode.

**** ABCD.SYS - Address F73120AE base at C0000000, DateStamp 36B072A3

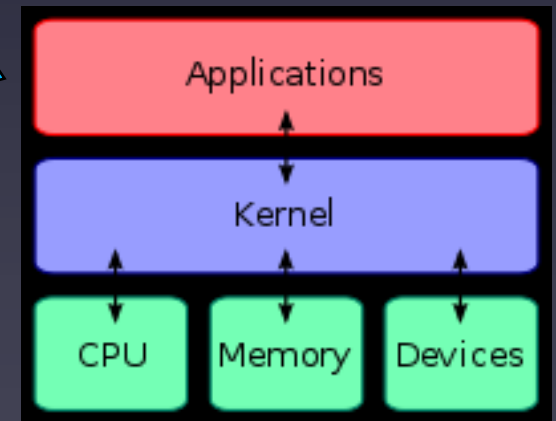
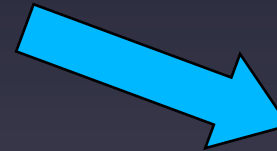
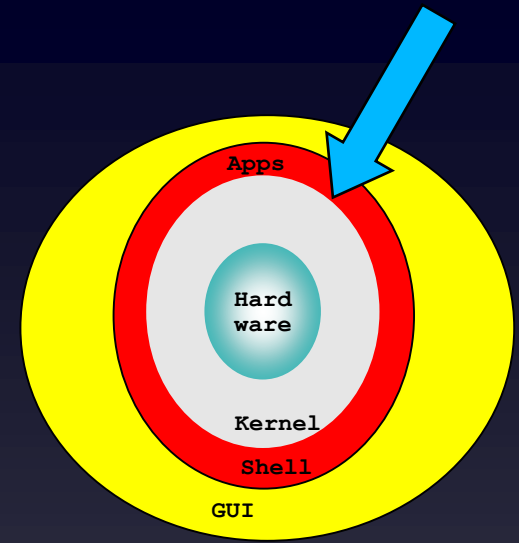
Kernel1 Debugger Using: COM2 (Port 0x2F8, Baud Rate 19200)

Beginning dump of physical memory

Physical memory dump complete. Contact your system administrator or technical support group.

What does the model mean?

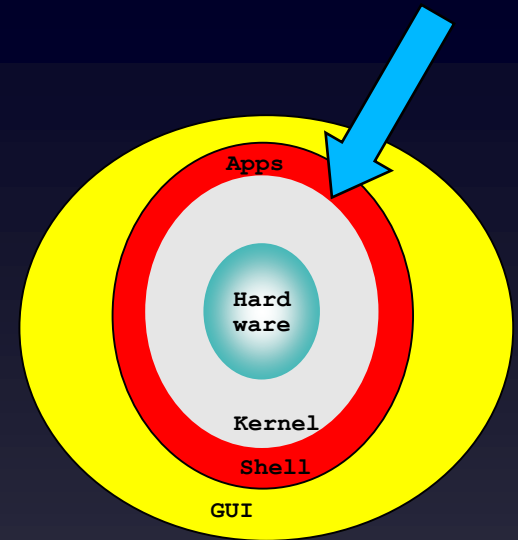
- Let's look at the **Apps** layer



What does the model mean?

Top layers:

sometimes called "*userland*",
"user space", "application layer" ..



- Applications

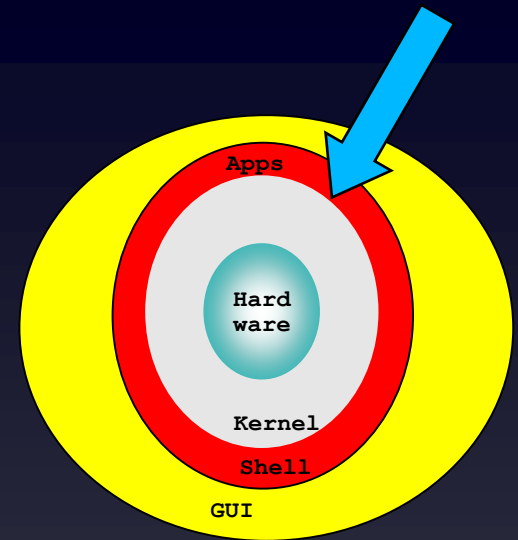
–Programs to do “something” for the user.



What does the model mean?

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- Applications

- Programs to do “something” for the user.

- Services

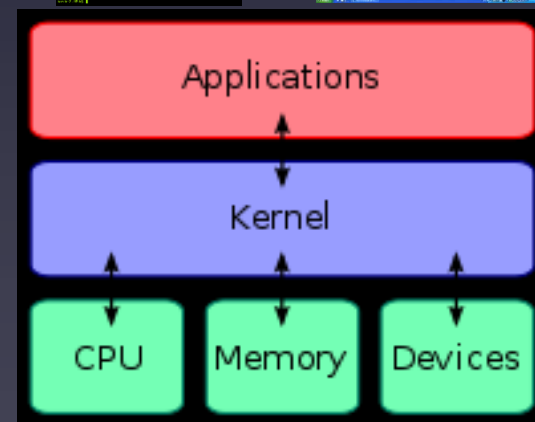
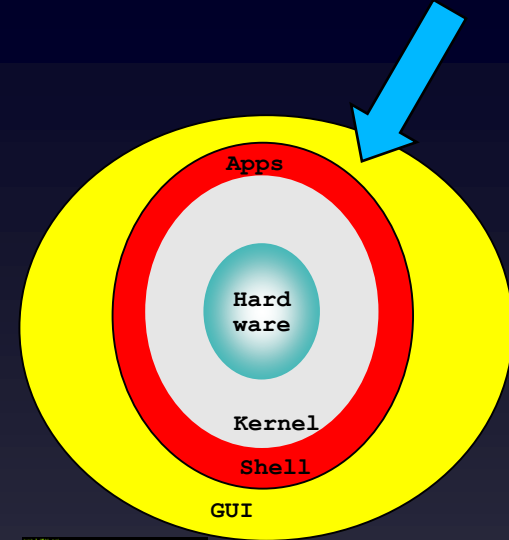
- Services are programs that run “behind the scenes”

- usually provides system support
 - eg: security, networking



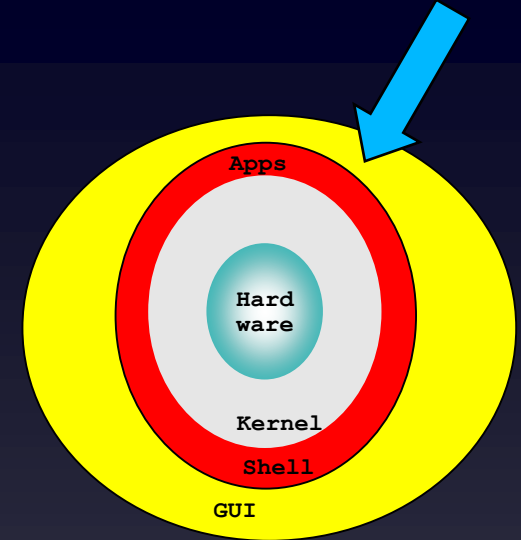
What does the model mean?

- Let's look at the **Interface** layer



What does the model mean?

Topmost layer: "**User Interface**"



- **Shell**

- also known as **Command Line Interface (CLI)** (or **Interpreter**), **Command Prompt**, **Terminal** etc
- A program that makes a set of commands available to the user

```
bash-2.05b$ pwd
/home/dstone
bash-2.05b$ cd /usr/portage/app-shells/bash
bash-2.05b$ ls -al
total 60
drwxr-xr-x  3 root root 4096 May 14 12:05 .
drwxr-xr-x 26 root root 4096 May 17 02:36 ..
-rw-r--r--  1 root root 13710 May  3 22:35 ChangeLog
-rw-r--r--  1 root root 2924 May 14 12:05 Manifest
-rw-r--r--  1 root root 3720 May 14 12:05 bash-2.05b-r11.ebuild
-rw-r--r--  1 root root 3516 May  2 20:05 bash-2.05b-r9.ebuild
-rw-r--r--  1 root root 5083 May  3 22:35 bash-3.0-r11.ebuild
-rw-r--r--  1 root root 4030 May 14 12:05 bash-3.0-r7.ebuild
-rw-r--r--  1 root root 3931 May 14 12:05 bash-3.0-r6.ebuild
-rw-r--r--  1 root root 4267 Mar 29 21:11 bash-3.0-r9.ebuild
drwxr-xr-x  2 root root 4096 May  3 22:35 files
-rw-r--r--  1 root root 164 Dec 29 2003 metadata.xml
bash-2.05b$ cat metadata.xml
<?xml version="1.0" encoding="UTF-8"?>
<!DOCTYPE pkgmetadata SYSTEM "http://www.gentoo.org/dtd/metadata.dtd">
<pkgmetadata>
  <herdbase-system</herd>
</pkgmetadata>
bash-2.05b$ sudo /etc/init.d/bluetooth status
Password:
* status: stopped
bash-2.05b$ ping -q -c 1 en.wikipedia.org
PING rr.chtpa.wikipedia.org (207.142.131.247) 56(84) bytes of data:
--- rr.chtpa.wikipedia.org ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 112.076/112.076/112.076/0.000 ms
bash-2.05b$ grep -i /dev/sda /etc/fstab | cut --fields=3
/dev/sda1      /mnt/usbkey
/dev/sda2      /mnt/ipod
bash-2.05b$ date
Wed May 25 11:36:56 PDT 2005
bash-2.05b$ lsmod
Module                  Size  Used by
joydev                   8256   0
ipw2200                 175112   0
ieee80211               44220   1 ipw2200
ieee80211_crypt         4872   2 ipw2200,ieee80211
e1000                   84468   0
bash-2.05b$
```

What does the model means?

Top most layer: "**User Interface**"



- Shell

- also known as **Command Line Interface (CLI) (or Interpreter), Command Prompt, Terminal etc**
- A program that makes a set of commands available to the user

- Graphical User Interface (GUI)

- A user-friendly interface on top of the operating system
- Often runs the "shell" commands transparently
- Sometimes a WEB interface