OPERATING SYSTEMS
IT2758
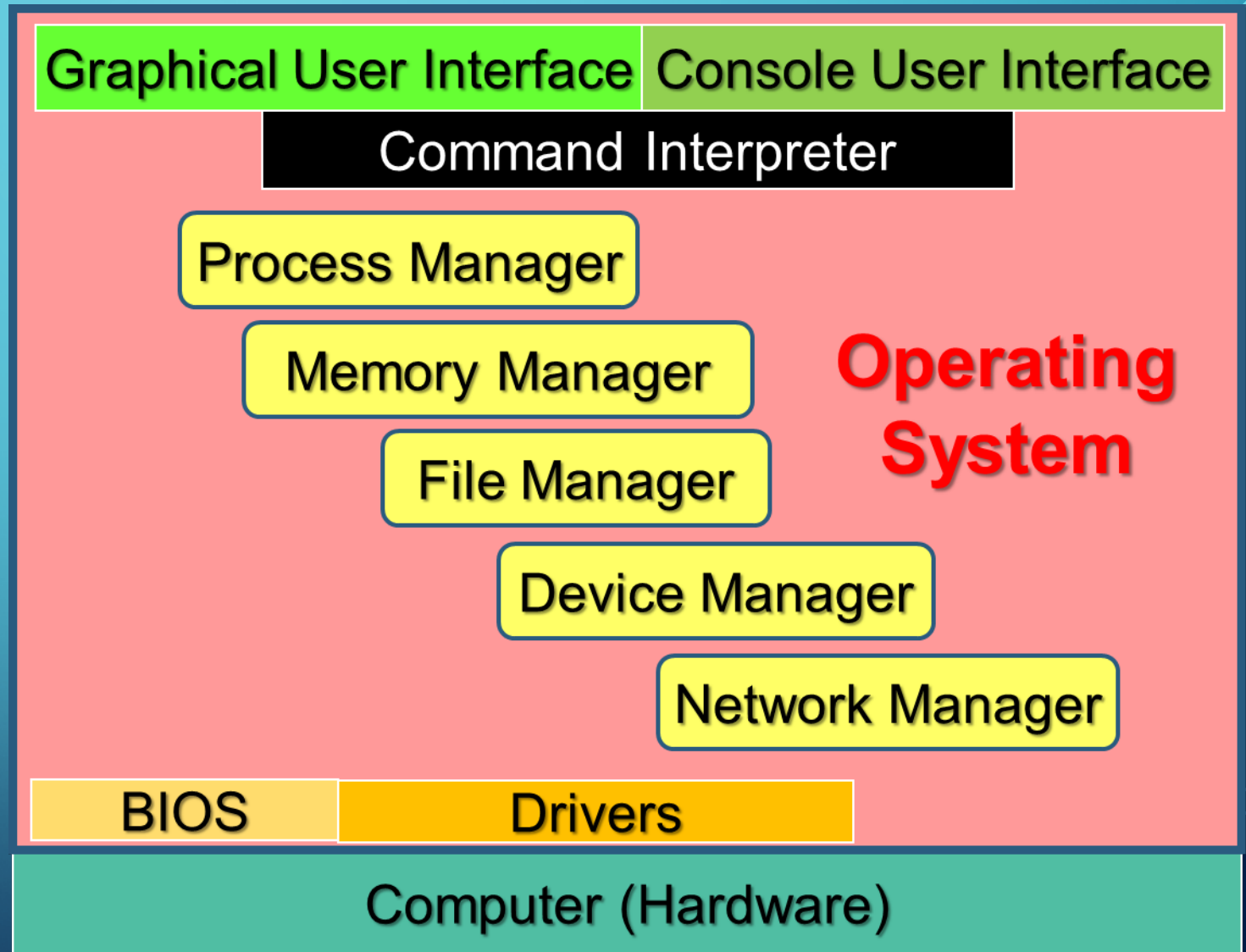
Introduction :
The Motivations

WHAT IS OS?

- **System manager**
  - **Process**
  - **Memory**
  - **File**
  - **Device**
  - **Network**

Graphical User Interface	Console User Interface

Command Interpreter

Process Manager

Memory Manager

Operating System

File Manager

Device Manager

Network Manager

BIOS	Drivers

Computer (Hardware)

WHAT IS OS?

- **The "middleman" between hardware and software applications**
  - **Provides the Human-Machine Interface (text and/or graphical)**
- **Manages resources of a computer system (physical + logical)**
- **Manages the system communications, instructions and data traffic**
- **Manage by using algorithms. Aims to be a fair <u>traffic controller</u> and <u>resource allocator</u>**

EXAMPLES OF OS FUNCTIONS

- **Every <u>general-purpose</u> computer must have an OS to run other programs**
  - **Allows installation/configuration of software**
- **Operating systems perform basic tasks like**
  - **recognizing <u>input</u> from the (<u>keyboard, mouse, touch screen</u>)**
  - **sending <u>output</u> to the <u>display screen</u>**
  - **keeping track of <u>files</u> and <u>directories</u> on the <u>disk</u>**
  - **controlling <u>peripheral devices</u> such as <u>video</u> and <u>printers</u>**

WHY LEARN OS?

- **Cyber-Security**
- **Computer Administration & Forensics**
- **Server & Network Administration**
- **Embedded System Development (IoT)**
- **Virtualisation**
- **Grid and Cloud Computing**
- **Data Warehousing**
- **Database Administration**
- **Application Development**
- **Clustering and Networking**
- **Enterprise Storage**

- OS is the glue that puts everything together
- Virtually every IT device needs an OS
- Essential topic in Uni (Comp Science / IT / Engineering etc)

IoT – RASPBERRY PI

- **Installation, Setup & Configuration**
- **Development Environment**
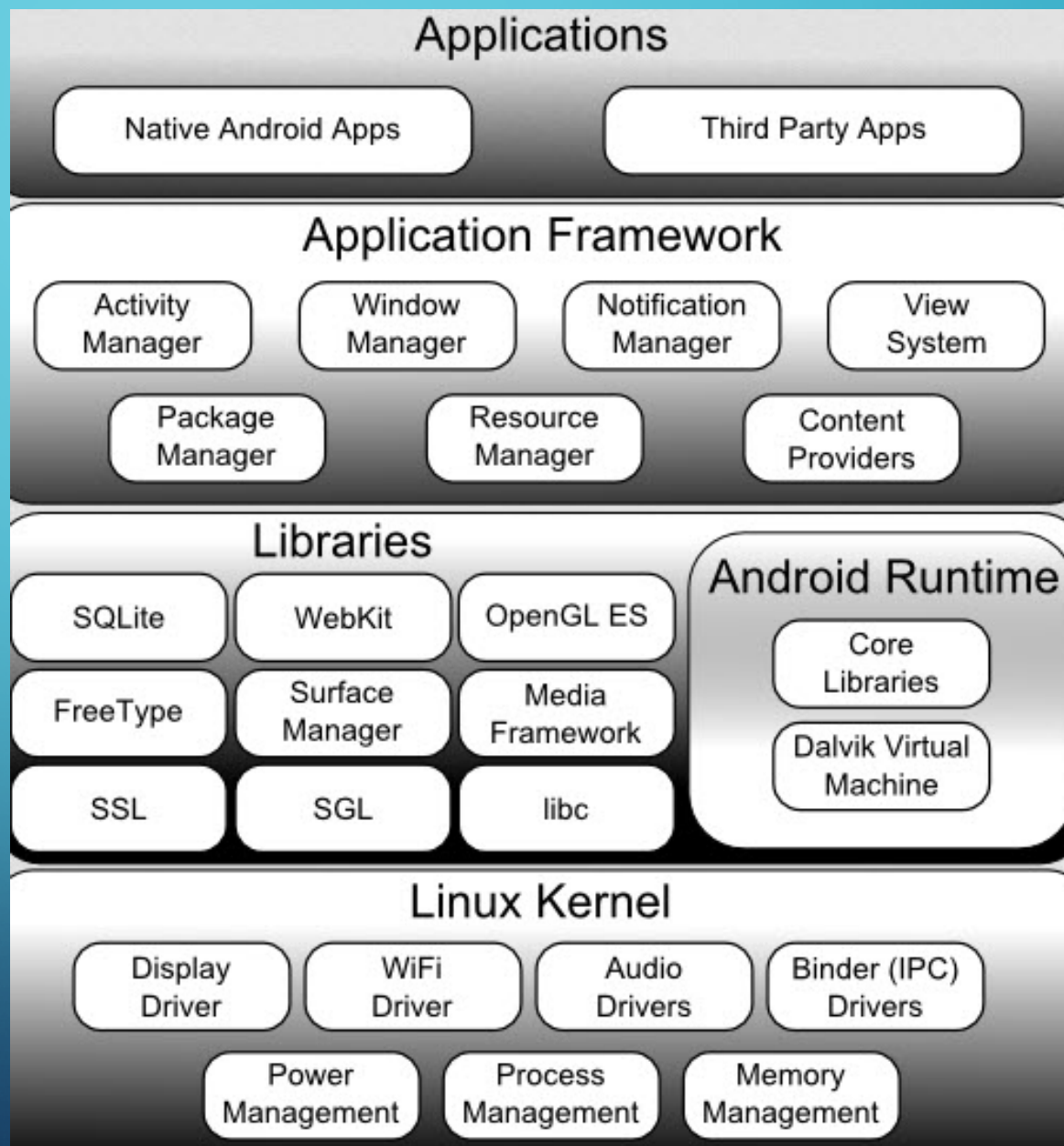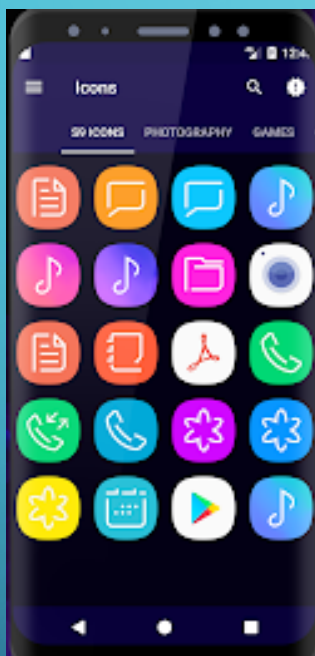- **Deployment**
- **2 types of OS**
  - **Raspbian (Linux based)**

  - **Win10 IoT**

UNIX TERMINAL IN MacOS X

```
                    🏠 emily — -bash — 80×20
          ~ — -bash                          London Server
Last login: Mon Jun 12 17:28:48 on ttys001
[Emilys-iMac:~ emily$ ls -al
total 40
drwxr-xr-x+ 15 emily  staff    480 Jun 12 17:28 .
drwxr-xr-x   6 root   admin    192 Jun 12 13:30 ..
-r--------   1 emily  staff      7 Jun 10 17:06 .CFUserTextEncoding
-rw-r--r--@  1 emily  staff   8196 Jun 10 17:11 .DS_Store
drwx------   2 emily  staff     64 Jun 12 17:28 .Trash
-rw-------   1 emily  staff     14 Jun 12 13:17 .bash_history
drwx------  18 emily  staff    576 Jun 12 17:29 .bash_sessions
drwx------+  8 emily  staff    256 Jun 10 18:49 Desktop
drwx------+  3 emily  staff     96 Jun 10 17:06 Documents
drwx------@  4 emily  staff    128 Jun 10 17:11 Downloads
drwx------@ 52 emily  staff   1664 Jun 10 19:20 Library
drwx------+  3 emily  staff     96 Jun 10 17:06 Movies
drwx------+  3 emily  staff     96 Jun 10 17:06 Music
drwx------+  3 emily  staff     96 Jun 10 17:06 Pictures
drwxr-xr-x+  4 emily  staff    128 Jun 10 17:06 Public
Emilys-iMac:~ emily$ 
```

- **Advantages:**
  - Get your Mac to do exactly what you want, when you want
  - Make changes to your Mac's filesystem and directories
  - Use Unix's find, locate, and grep commands to locate files containing specific information
  - Create unique "super commands" to perform tasks that you specify
  - Run multiple Unix programs and processes at the same time
  - Access remote servers and interact with remote filesystems
  - Install the X Window system and learn the best X11 applications
  - Use freely downloadable open source applications
  - Take advantage of command-line features that let you shorten repetitive tasks

SYSTEM ADMIN

```
USERNAME=$(cat file | cut -d: -f1)
echo "$USERNAME"

ID=$(cat file | cut -d: -f2)
echo "$ID"

USER_SHELL=$(cat file | cut -d, -f2 | cut -d: -f2)
echo "$USER_SHELL"

useradd -m -s "$USER_SHELL" -u "$ID" "$USERNAME"
```
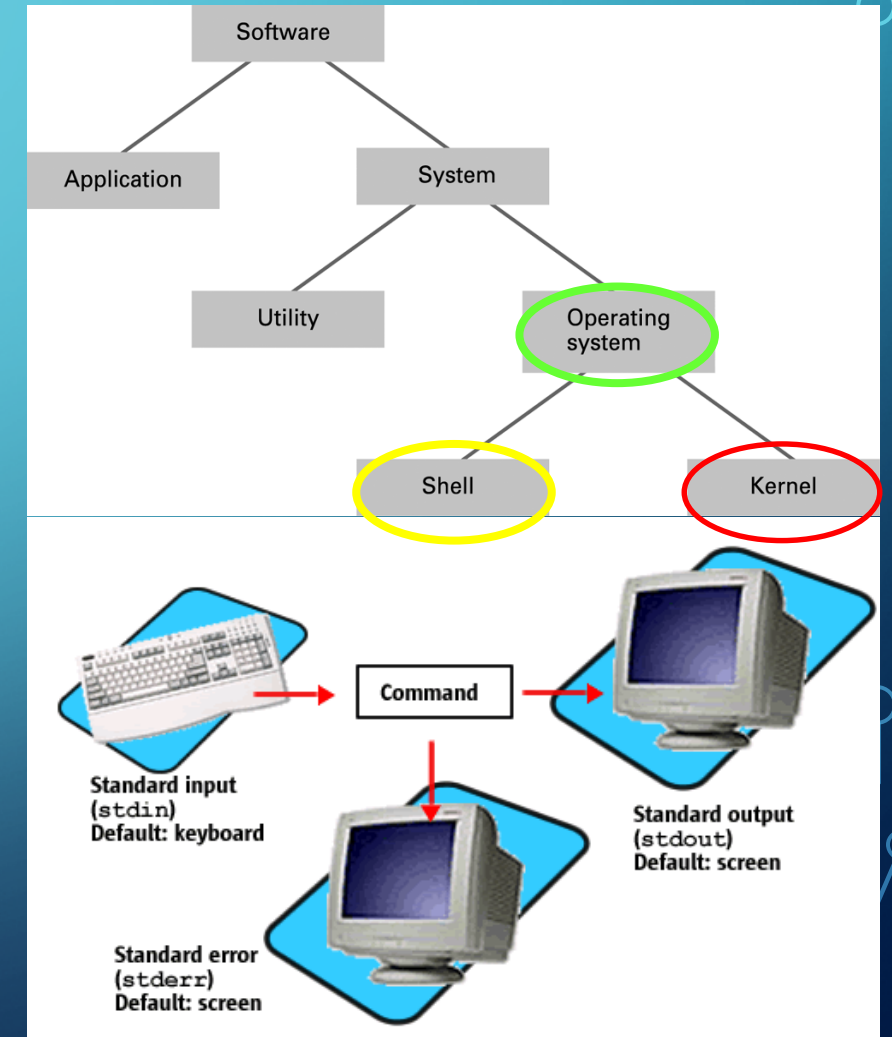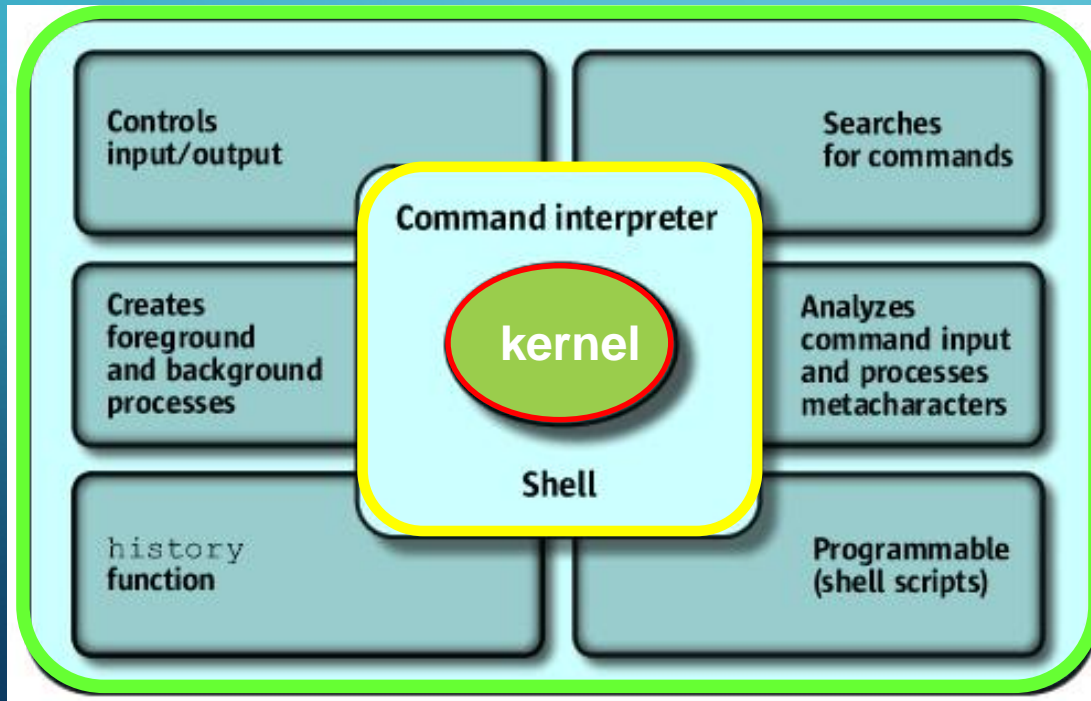
- Certification Requirement
  - Red Hat
  - Oracle Linux
  - MCSE
  - CompTIA A+
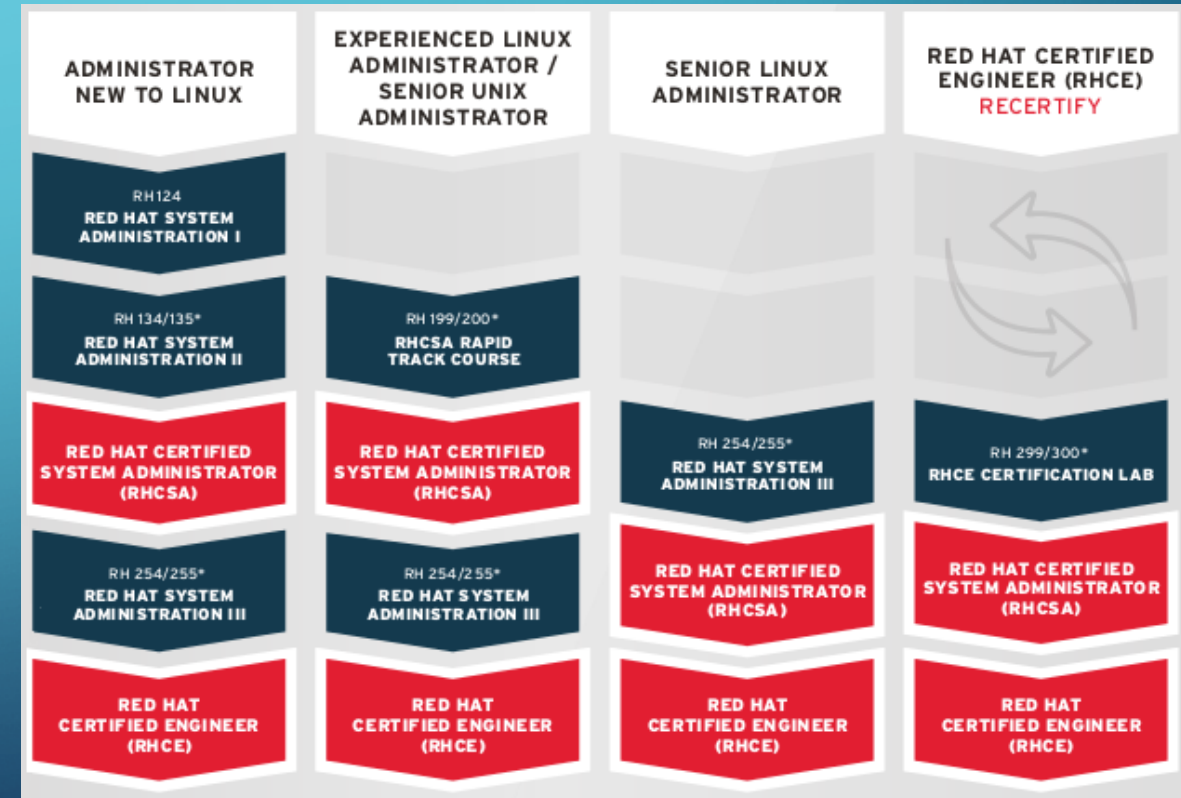
OS = KERNEL + SHELL

- **Kernel**
  - **Vital/core system software (protected, not accessible to normal users)**
  - **Loaded first to run when computer starts up.**
- **Shell**
  - **Command Line Interpreter/Interface (CLI)**
  - **Used to communicate with the kernel**

WHY LEARN SHELL COMMANDS?

- **System Administration (Embedded / Mobile Devices, Workstations, Servers etc)**
- **System Recovery, Restore & Backup**
- **Speed and Efficiency**
  - **Scripting & batch processing (e.g. user account and active directory management)**
  - **Troubleshooting**
  - **Malware hunting/tracking**
  - **Cyber warfare**

UNIX VS DOS SHELL COMMANDS

Command	UNIX/Linux	Win DOS
List directory	ls	dir
Display contents	cat/more/less	type
Copy a file	cp	copy
Delete a file/dir	rm	del
Rename a file	mv	rename
Create folder	mkdir	md
Check disk space	df	chkdsk
Change directory	cd	cd
Show current dir	pwd	cd
Clear screen	clear	cls