Introduction to OS

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Its purpose is to

- Manage the resources of the computer
- Provide the applications programmer (N.B., *not* the end user of applications) with a usable programming interface to access those resources

The interface (graphical or otherwise) that the end user interacts with is *not* part of the OS

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That's just another program that uses the OS

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If the end-user sees it, it's not part of this unit!

Resources

So what are resources?

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- Hardware: cpu, memory, disk, network, sound, video, keyboard, mouse, printer, camera, ...
- Software: anything that controls the above, though use of the cpu (running applications) is a primary focus

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Why do they need managing?

1. They are limited with not enough to go round
2. They need protection
3. They need to meet certain criteria

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My laptop is currently running about 370 programs

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Protection comes in many forms

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- Preventing one program from accidentally (or intentionally) corrupting another program or its data: security
- Ensuring certain resources are only available to those programs that are allowed: authorisation
- Protecting you from your own stupid mistakes (Did you really want to delete that?)

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- Security: prevention of accidental or malicious access or modification

Programming Interface

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- And so on

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Much better to let someone else do the hard work (a common theme in Computer Science)

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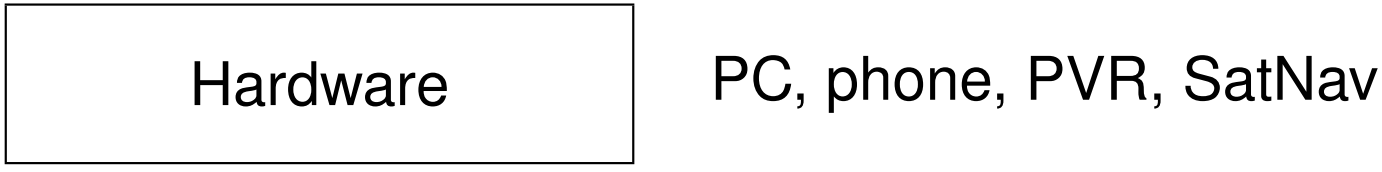
- We don't have do it
- The expert is better at it and (presumably) understands the hardware well
- The expert is a better programmer than us and can get better performance out of the hardware
- The programmer knows more Computer Science than us and knows the many pitfalls and necessary tricks that OS programming involves

Programming Interface

They do it so we don’t have to

Programming Interface

Layer Abstraction:



Programming Interface

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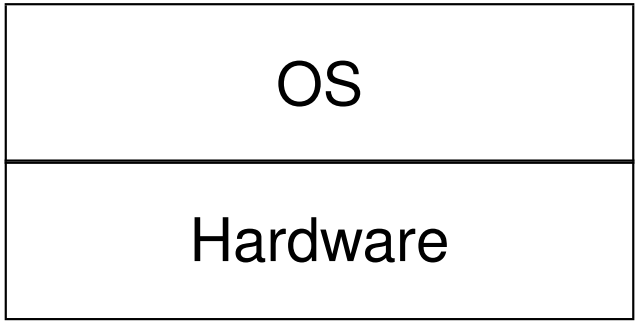

Linux, OS X, Windows, Android

PC, phone, PVR, SatNav

Programming Interface

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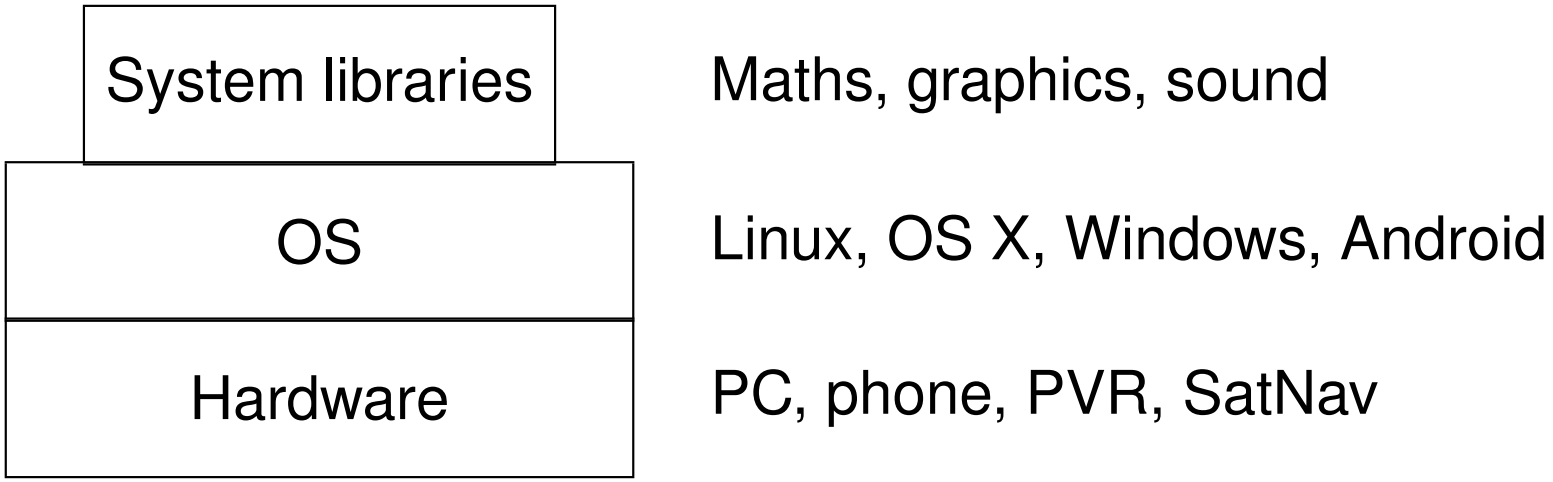

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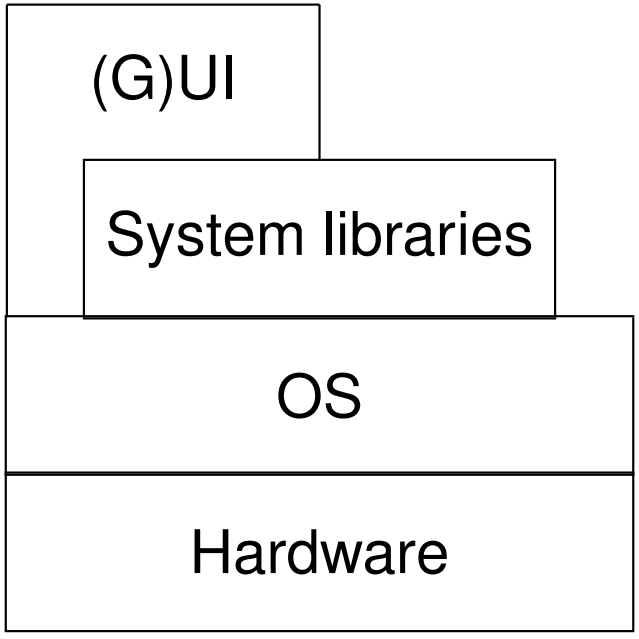

Command line, windowing, touch

Maths, graphics, sound

Linux, OS X, Windows, Android

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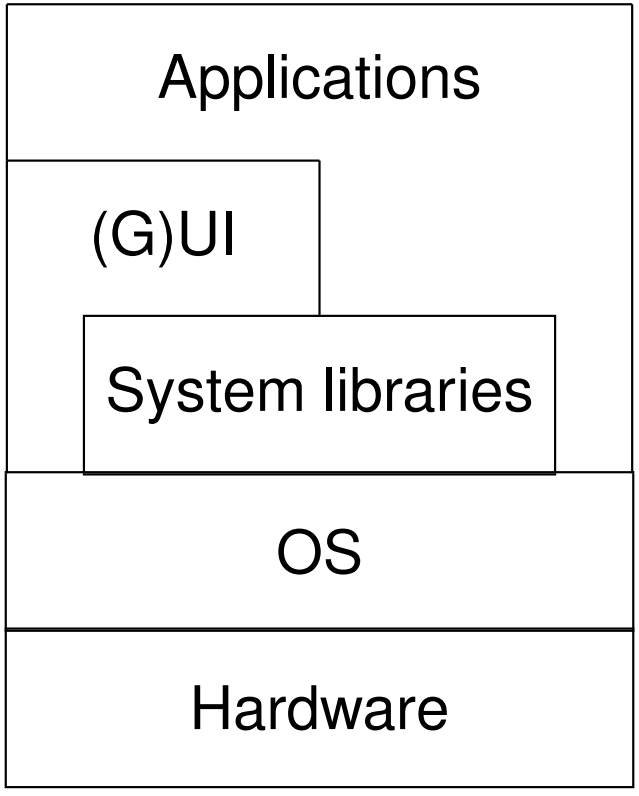

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Important Point

Reemphasising a very important point:

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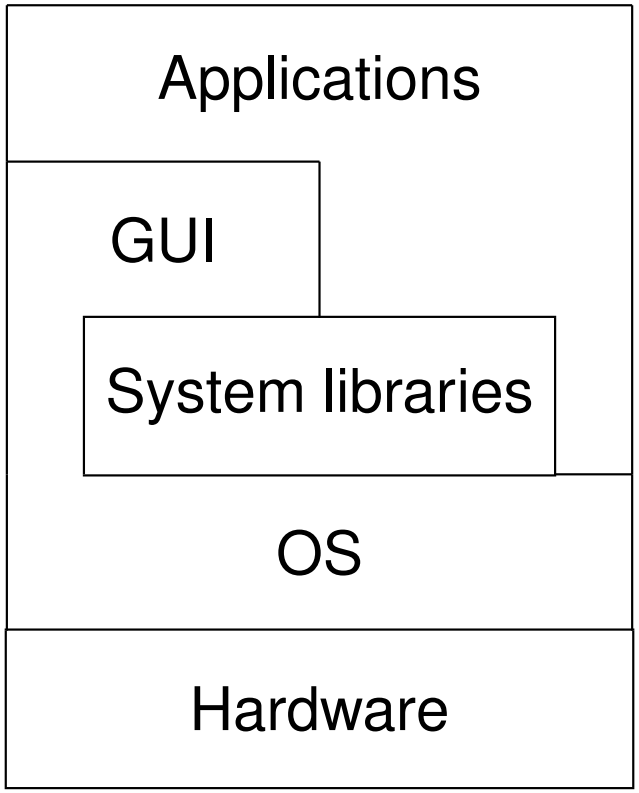
There was a time when certain OS vendors tried to tie the GUI into the OS (to gain speed and commercial advantage)

Programming Interface

Bad Layer Abstraction:



Browser, word processor, game

Windows

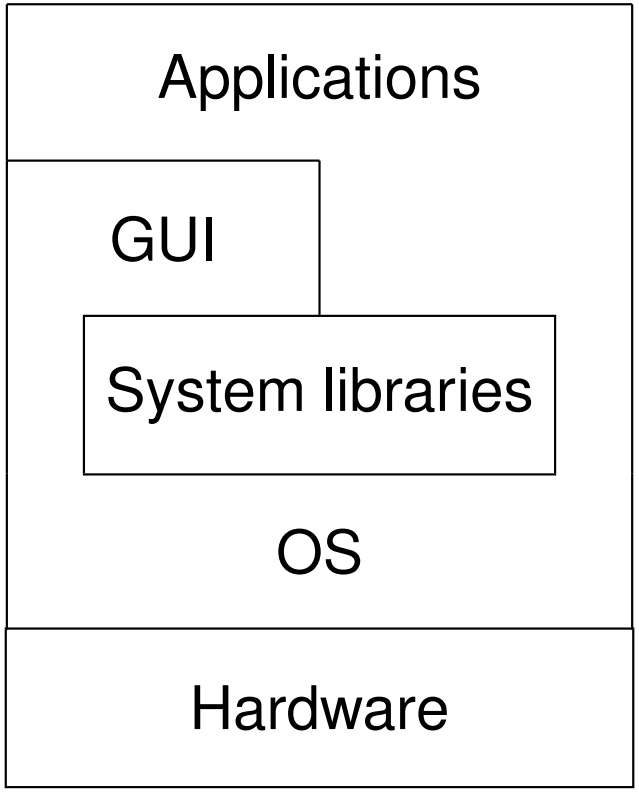
Maths, graphics, sound

Windows

PC

Programming Interface

Very Bad Layer Abstraction:



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Mostly

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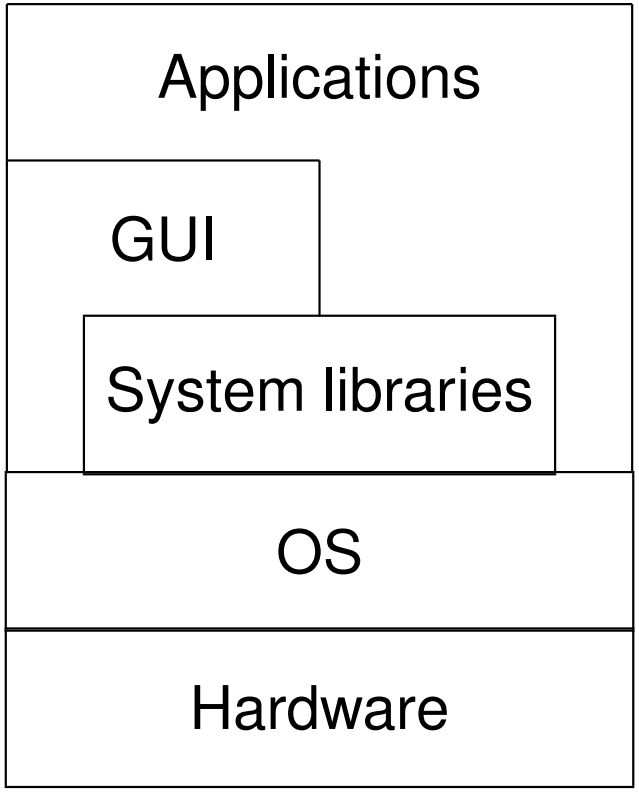
But we must be careful as some people don't realise the difference between an OS and everything else

Programming Interface

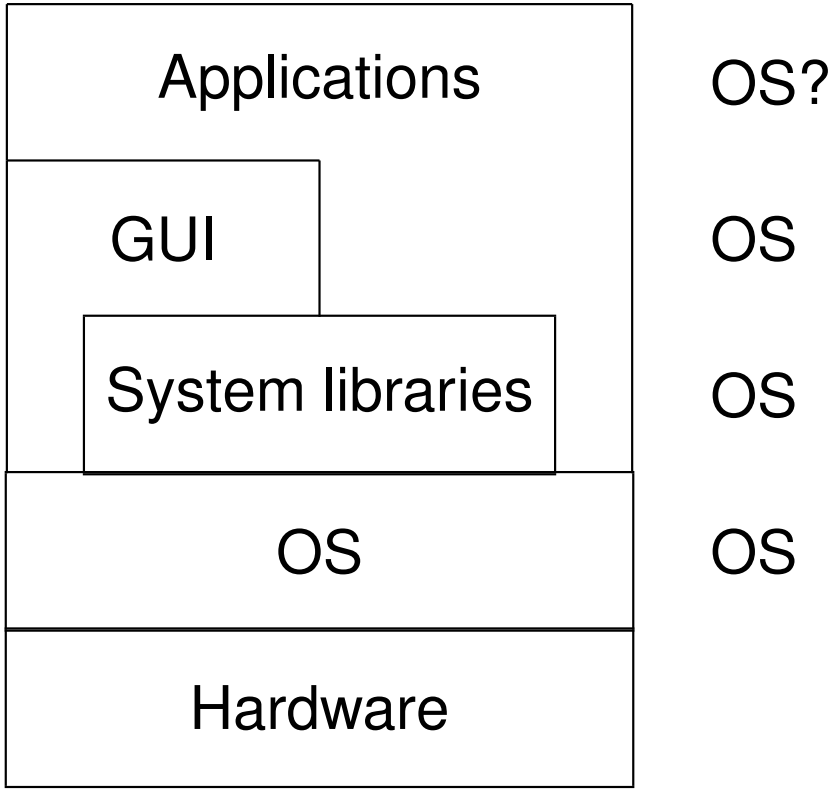
CS view:



OS

Programming Interface

Marketer's view:



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There are a couple of vital aspects of an OS that are sometimes overlooked:

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So a perfect OS would be completely invisible!

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So some people confuse the GUI with the OS; many confuse the GUI with the OS and the hardware!

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N.B. when we say “Intel” or “x86” we mean Intel, AMD and all the compatible architectures

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Some software companies encourage and make capital out of this confusion

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But typical users base their choices on GUIs, not OSs

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Note, since the advent of smartphones, of the above OSs, Unix derivatives (Linux and Mac) are the most popular

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- Phones. Palm OS, Symbian, Windows CE/Mobile/Phone 7/Phone 8, Android, iPhone OS
- Experimental. Minix, Plan 9, Mach, Singularity, Amoeba, etc.
- Networking. NetWare (Novell), Cisco IOS, DD-WRT etc. For controlling networking hardware
- Distributed OSs. Management of collections of computers, or making a collection appear as a single large computer

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- Embedded. μCLinux, Windows Embedded, RTOS, etc. Small, resource frugal
- Real-time. QNX, μCLinux, etc. For controlling systems where a fast response is critical
- OSs for gadgets (MP3 players, etc.) Conservation of battery power is the largest problem
- Other. OS/2, MacOS 9, RISC OS, BeOS, z/OS (IBM). Various sizes

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And we've not even mentioned historical OSs yet

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The ones we do notice are failing in their purpose!

ARX project Arthur OS RISC OS AmigaOS Amiga Unix AEGIS Domain/OS vikek OS Apple DOS UCSD Pascal ProDOS GS/OS SOS Lisa OS Newton OS Mac OS 8 Mac OS 9 A/UX MkLinux Mac OS X v10.x iOS Atari DOS Atari TOS Atari MultiTOS XTS-400 BeOS Blue Eyed OS Cosmoe GCOS Burroughs MCP COS SIPROS SCOPE MACE KRONOS NOS NOS/BE RDOS AOS DG/UX CTOS DOS Deos HeartOS CP/M DR-DOS OS/8 ITS TOPS-10 WAITS TENEX TOPS-20 RSTS/E RSX-11 RT-11 VMS Domain/OS TSB Digital UNIX HP-UX Ultrix Guardian OSS OSE Towns OS Google Chrome UTX-32 INTEGRITY HDOS HT-11 HP-UX HP MIE OLERT-E Multics HeartOS DEOS iRMX ISIS-II BESYS CTSS GM OS GM-NAA I/O IBSYS IJMON SOS UMES OS/360 OS/VS SVS OS/VSn MVS/SE OS/390 z/OS DOS/360 z/VSE CP/CMS VM/370 VM/XA VM/ESA z/VM AIX/370 OpenSolaris UTS z/Linux BOS/360 MTS MUSIC/SP ORVY WYLBUR PC DOS/IBM DOS OS/2 J MultiJob GEORGE 2/3/4 TME ICL VME iVideOS LynxOS MicroC/OS-II Xenix MS-DOS Windows Singularity Midori TMX NetWare MontaVista RTXC