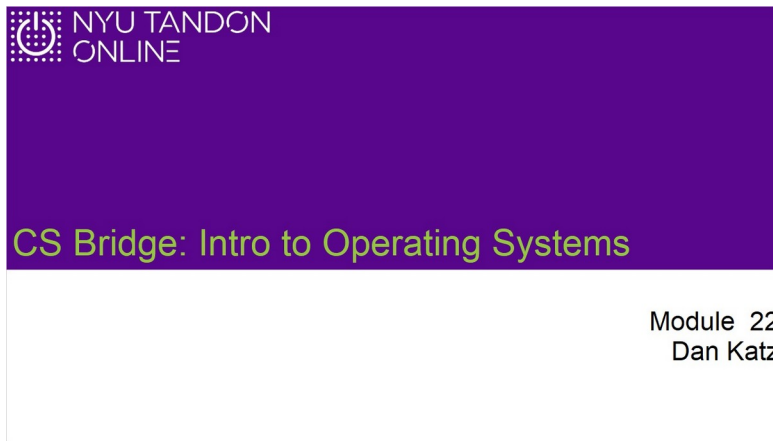


CS Bridge Module 22 Intro to OS

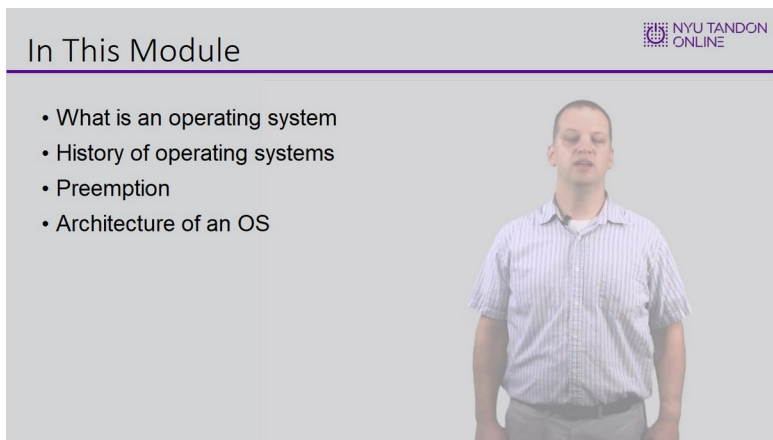
1. Week 12 Module 22 Intro to OS

1.1 CS Bridge: Intro to Operating Systems



Notes:

1.2 In this module



1.3 What is an OS

What is an OS



- Definition: A *Program that controls execution of application programs and acts as interface between applications and computer hardware.*
- Software which manages the system
- Runs on the same processor as the user's program code
- Does not include applications

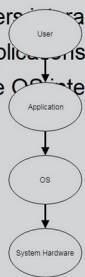


1.4 Layers of Interaction

Layers of Interaction



- Users interact with Applications
- Applications interact with the OS
- The OS interacts with system hardware



1.5 What you buy in the store

What You Buy in the Store




- The OS is only a small portion of what you buy!
- We're only concerned with the KERNEL.
- Extra stuff includes:
 - Web browsers
 - Text editors
 - Device drivers
 - Any other application




1.6 The OS as a resource manager

The OS as a Resource Manager





- The system can be viewed as a collection of resources
 - Memory
 - CPU time
 - File handles
 - Etc
- Since resources are limited, some program must decide how, best, to allocate those resources
- The OS must allocate some of those resources to itself



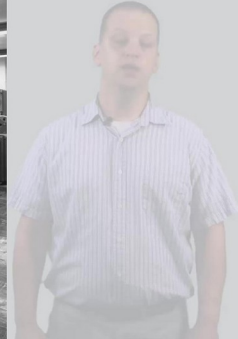
1.7 Back in the olden days

Back in the Olden Days






Source




1.8 Today's environment

Today's Environment





- Today we have lots of processing power and lots of memory, enough to run multiple programs at the same time, multitasking!
- The OS becomes a resource manager
 - The OS manages allocation of resources
 - The OS decides which programs can run and when
 - The OS will stop and restart running programs, preemption
 - This is called Time sharing



1.9 Monitoring running programs

Monitoring Running Programs

- In a modern OS, many programs can be loaded, all at the same time.
- In a modern OS, the same program could be loaded multiple times
- We need a way to track running programs
...A PROCESS



1.10 OS levels

OS Levels

Level	Name
13	Shell
12	User Processes
11	Directories
10	Devices
9	File Systems
8	Communications
7	Virtual Memory
6	Secondary storage
5	Primitive processes
4	Interrupts
3	Procedures
2	Processor instruction set
1	Electronic Circuits



1.11 Knowledge Check

(Drag and Drop, 10 points, unlimited attempts permitted)

Knowledge Check

List the 3 levels required to have a functional Operating System

File systems

Directories

Shell

Primitive Processes

Secondary Storage

Electronic Circuits

Virtual Memory

Drag Item	Drop Target
Virtual Memory	List the 3 levels required to have a functional Operating System
Secondary Storage	List the 3 levels required to have a functional Operating System
Primitive Processes	List the 3 levels required to have a functional Operating System
File systems	Rectangle 1
Directories	Rectangle 1
Shell	Rectangle 1
Electronic Circuits	Rectangle 1

Drag and drop properties

Return item to start point if dropped outside the correct drop target

Snap dropped items to drop target (Free)

Delay item drop states until interaction is submitted

Feedback when correct:

That's right! You selected the correct response.

Feedback when incorrect:

You did not select the correct response.

Correct (Slide Layer)

The screenshot shows a 'Knowledge Check' interface from NYU Tandon Online. The question is 'List the 3 levels required to have a functional Operating System'. A grey feedback box is centered on the screen, displaying 'Correct' and 'That's right! You selected the correct response.' with a 'Continue' button. Below the question, several draggable items are visible: 'File systems', 'Secondary Storage', 'Electronic Circuits', 'Virtual Memory', and 'Processes'.

Incorrect (Slide Layer)

NYU TANDON ONLINE

Knowledge Check

List the 3 levels required to have a functional Operating System

Incorrect
You did not select the correct response.

File systems

Continue

Processes

Secondary Storage

Electronic Circuits

Virtual Memory

Try Again (Slide Layer)

NYU TANDON ONLINE

Knowledge Check

List the 3 levels required to have a functional Operating System

Incorrect
That is incorrect. Please try again.

File systems

Try Again

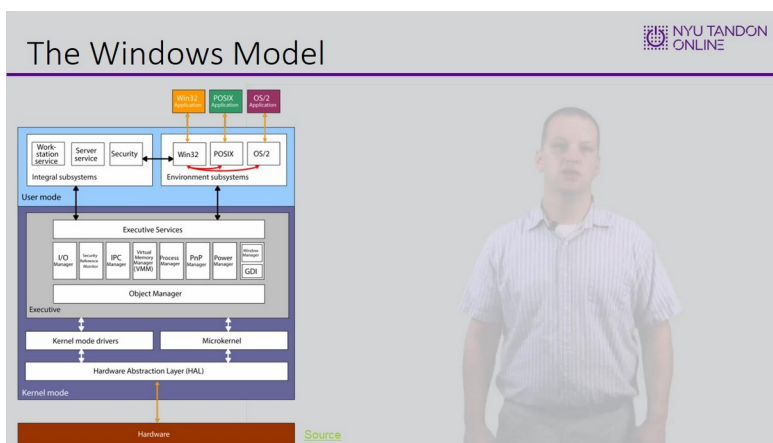
Processes

Secondary Storage

Electronic Circuits

Virtual Memory

1.12 The windows Model

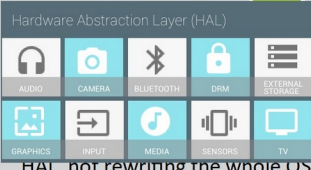


1.13 The HAL

The HAL

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- Different types of systems have slightly



Hardware Abstraction Layer (HAL)

provide the kernel
which program

re changing the

HAL, not rewriting the whole OS

Source: Android HAL

1.14 Knowledge Check

(True/False, 10 points, 2 attempts permitted)

Knowledge Check

NYU TANDON ONLINE

One day, a student decides to upgrade their computer by buying more RAM, a new graphics card, and switching from a HDD to a SSD. Does changing the hardware require a change in the Operating System?

☒ No, only the HAL (Hardware Abstraction Layer) needs to be changed

☐ Yes, changing the hardware requires the Operating System to be re-written

Correct	Choice
X	No, only the HAL (Hardware Abstraction Layer) needs to be changed
	Yes, changing the hardware requires the Operating System to be re-written

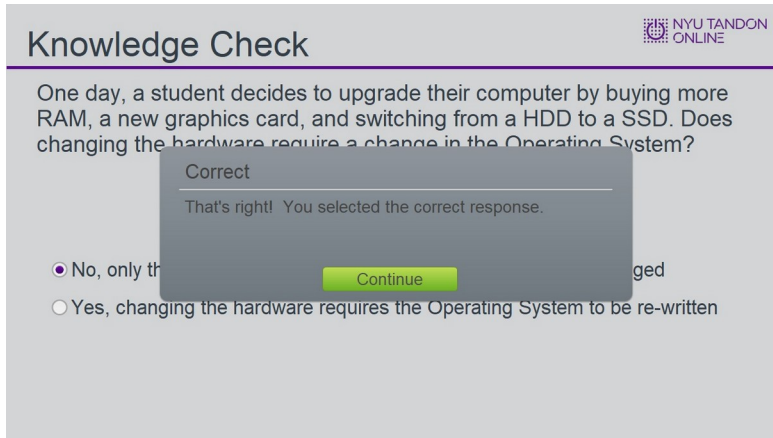
Feedback when correct:

That's right! You selected the correct response.

Feedback when incorrect:

Since the hardware only interacts with one key part of the Operating System, it does not need to be changed!

Correct (Slide Layer)



The screenshot shows a 'Knowledge Check' interface with the NYU Tandon Online logo in the top right. The question asks if changing hardware requires a change in the Operating System. A modal box displays 'Correct' and 'That's right! You selected the correct response.' The 'No, only the hardware needs to be changed' option is selected, and a 'Continue' button is visible.

Knowledge Check NYU TANDON ONLINE

One day, a student decides to upgrade their computer by buying more RAM, a new graphics card, and switching from a HDD to a SSD. Does changing the hardware require a change in the Operating System?

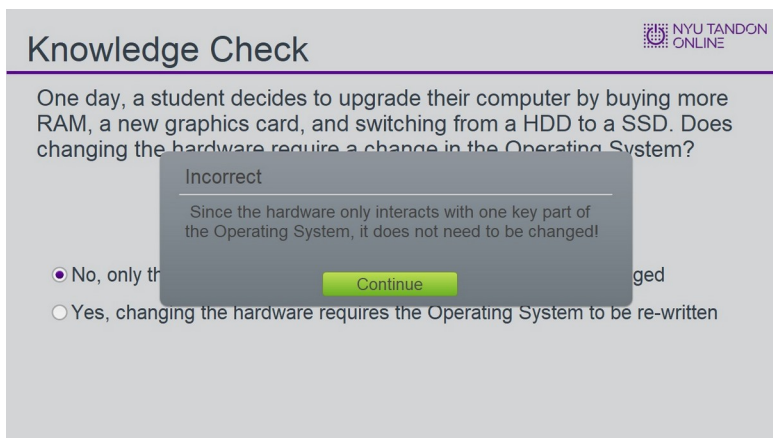
Correct
That's right! You selected the correct response.

☒ No, only the hardware needs to be changed

☐ Yes, changing the hardware requires the Operating System to be re-written

Continue

Incorrect (Slide Layer)



The screenshot shows the same 'Knowledge Check' interface. A modal box displays 'Incorrect' and the feedback text: 'Since the hardware only interacts with one key part of the Operating System, it does not need to be changed!'. The 'No, only the hardware needs to be changed' option is selected, and a 'Continue' button is visible.

Knowledge Check NYU TANDON ONLINE

One day, a student decides to upgrade their computer by buying more RAM, a new graphics card, and switching from a HDD to a SSD. Does changing the hardware require a change in the Operating System?

Incorrect
Since the hardware only interacts with one key part of the Operating System, it does not need to be changed!

☒ No, only the hardware needs to be changed

☐ Yes, changing the hardware requires the Operating System to be re-written

Continue

Try Again (Slide Layer)

Knowledge Check

NYU TANDON
ONLINE

One day, a student decides to upgrade their computer by buying more RAM, a new graphics card, and switching from a HDD to a SSD. Does changing the hardware require a change in the Operating System?

Incorrect
That is incorrect. Please try again.

☒ No, only the hardware is changed
☐ Yes, changing the hardware requires the Operating System to be re-written

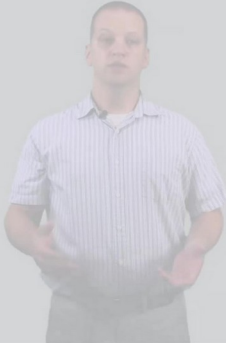
Try Again

1.15 Windows device drivers

Windows Device Drivers

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ONLINE

- Kernel layer software written by companies that design hardware
- Provides functions for the kernel to call in order to access the hardware
- Was the cause of frequent “blue screening” before WHQL

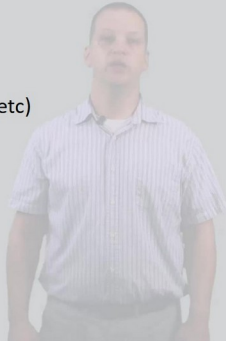


1.16 UNIX

UNIX

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- A multi-user, multi-tasking OS
- Designed to allow users to manage their own tasks
- Released into public domain with open source
- Comes in many different flavors (AIX, Linux, Solaris, etc)
- Has been modified many many times!




1.17 In this module, we learned

What We've Learned

- What is an operating system
- History of operating systems
- Preemption
- Architecture of an OS



1.18 End of Module

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End of Module

Exit