

COP 4600 Operating Systems Spring 2011

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Office hours: Tu-Th 5:00-6:00 PM

Lecture 15 – Thursday, March 17, 2011

- Last time:
 - Midterm solutions
- Today:
 - Virtualization for the three abstractions
 - Threads
 - Virtual Memory
 - Bounded buffer
 - The kernel of an operating system
 - Threads
 - State
 - Thread manager
 - Thread state
 - Kernel and application threads
- Next time
 - Processor switching

Virtualization – relating physical with virtual objects

Virtualization □
simulating the interface
to a physical object by:

1. Multiplexing □ create multiple physical objects from one instance of a physical object.
2. Aggregation □ create one virtual object from multiple physical objects
3. Emulation □ construct a virtual object from a different type of a physical object.
Emulation in software is slow.

Method	Physical Resource	Virtual Resource
Multiplexing	processor	thread
	real memory	virtual memory
	communication channel	virtual circuit
	processor	server (e.g., Web server)
Aggregation	disk	RAID
	core	multi-core processor
Emulation	disk	RAM disk
	system (e.g. Macintosh)	virtual machine (e.g., Virtual PC)
Multiplexing + Emulation	real memory + disk	virtual memory with paging
	communication channel + processor	TCP protocol