COSC450 Overview

Major Topic #1: Overview of Operating System

Slides #1

Slide #	**Short Summary**
1	Preview
2	Elements used in Computer, OS: Protected software provide interface between hardware and software
3	Macroscopic Diagram Breakdown
4	Hardware in Computer System (Physical Devices, Micro-architecture, Machine Language)
5	Macroscopic Diagram Breakdown (Circle- Software, Shell, Kernel, Hardware)
6	Von Newmann Architecture Diagram
7	Overview of Von Newmann
8	Von Newmann Bottleneck: Memory bottleneck since CPU is faster
9	CPU: executes instructions, utilized instruction cycle (Fetch & Execute Cycle)
10	Fetch Cycle: Reads instruction address, loads it, and moves program counter
11	Diagram (Instruction Cycle: Fetch Cycle)
12	Execute Cycle: Contents of IR decoded & executed, potentially involving interaction with memory and ALU.
13	An OS is: an extended machine from the user's perspective, and a resource manager from the developer's perspective.
14	N/A
15	The first gen of 'OS' consisted of vacuum tubes and plugboards (1945~1980)
16	N/A
17	First Gen used plugboards + tapes, took up whole room, 50 multiplication/sec
18	Second Gen of 'OS': Transistors and Batch System (1955~1965)
19	Picture of Second Gen Tape (from IBM)
20	^N/A
21	^N/A
22	N/A
23	N/A
24	N/A
25	N/A
26	Second Gen used Batch System to optimize use of expensive computer
27	Picture demonstrating workflow
28	N/A
29	Third Gen- IC and Multiprogramming (1965~1980)

30	Third gen launched by IBN, moved to electronic computer systems
31	Third gen used integrated circuit and CPU optimization techniques
32	Third gen used Multiprogramming, where processed are loaded into RAM and ran concurrently. Also uses CPU scheduler.
33	Diagram (Multiprogramming System)
34	Third Gen used Spooling, a buffering mechanism where data is temporarily stored as a file to be processed later
35	^ Spooling improved efficiency and multitasking
36	Diagram (Third gen)
37	Diagram (Third gen time sharing system)
38	Fourth Gen: Personal Computer built with LSI (Large Scale IC), VLSI, ULSI (1980~Present)
39	Fifth Gen: Mobile Computers (i.e. Smartphones)
40	Tons of operating system names

Slides #2

Slide #	**Short Summary**
1	Review (Vonn Newman, Generations of Computers)
2	Preview- Computer System Architecture, Operating System Implementation
3	Preview- Multiprocessor System Types, Multiprogramming, Operating System Operation
4	Modern computers consist of CPU + Memory + I/O Devices, with each device controller maintaining local buffer storage and in charge of a I/O device (also having a device driver, which becomes part of OS)
5	Diagram: I/O Devices -> USB controller, video controller, disk controller, etc.
6	CPU: Brain of computer, retrieves instructions (cycle) from memory to execute. Has cache and registers due to Von Newmann Bottleneck
7	CPU composed of: ALU (Arithmetic Logic Unit), Control Unit, Cache, & Registers (General, Program Counter (PC), Stack Pointer, Program Status Word (PSW))
8	CPU: When process stops running, OS saves content of each register in Process Table to finish the job. CPU performance can be improved by using pipelined design for fetch, decode, and execute process
9	CPU: may have multiple cores/calculation units
10	When I/O devices are ready to receive/send data, interrupts OS by sending signal. For I/O operations, instructions (read/write) are sent to device controller's register, then sent to device local buffer, then checks any error, then driver gives control to other parts of OS
11	