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FACULTY OF ENGINEERING & TECHNOLOGY

BCS-501 Operating System

Lecturer-03

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I/O Structure

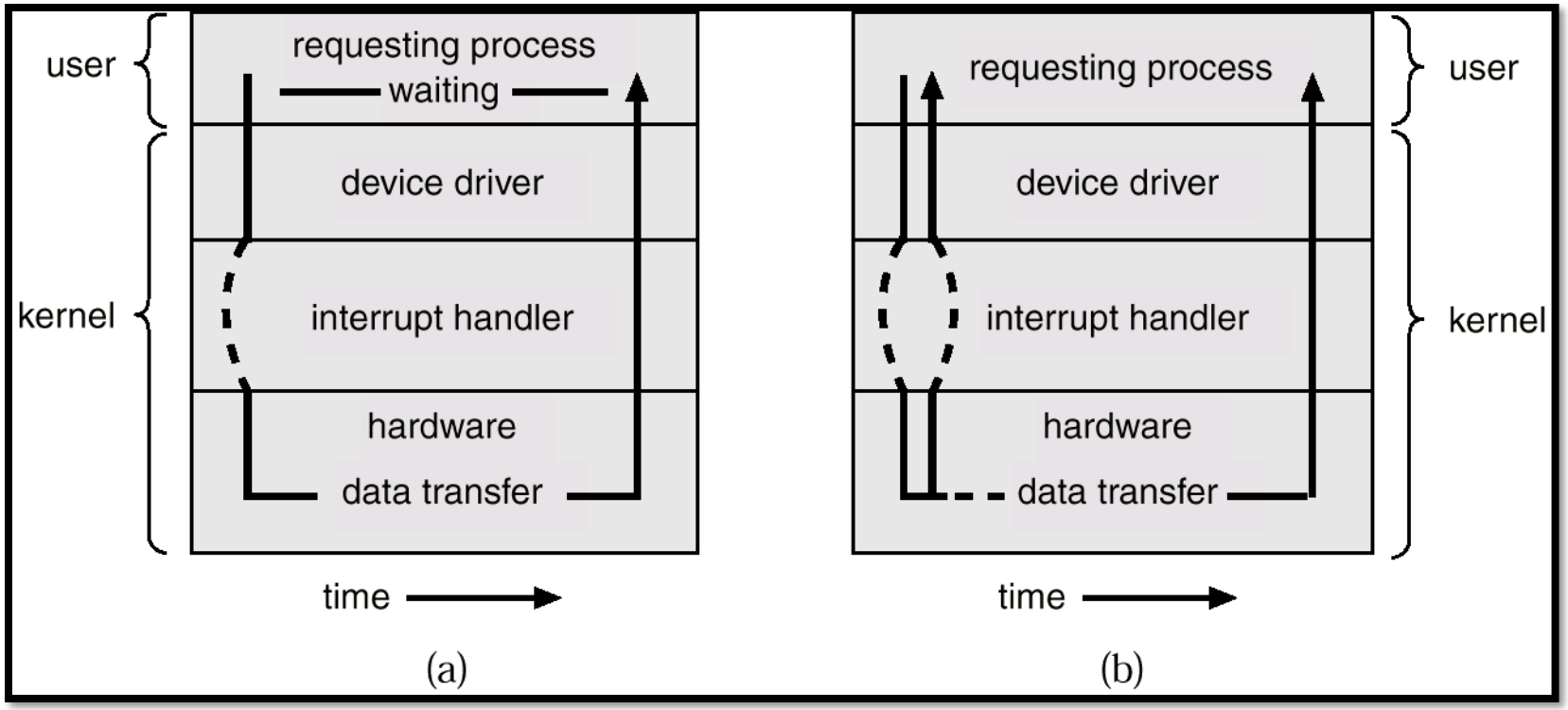
I/O Structure

Synchronous I/O - After I/O starts, control returns to user program only upon I/O completion

- Wait instruction idles the CPU until the next interrupt
- Wait loop (contention for memory access)
- At most one I/O request is outstanding at a time, no simultaneous I/O processing

Asynchronous I/O - After I/O starts, control returns to user program without waiting for I/O completion

- System call – request to the operating system to allow user to wait for I/O completion
- Device-status table contains entry for each I/O device indicating its type, address, and state
- Operating system indexes into I/O device table to determine device status and to modify table entry to include interrupt


user
kernel
requesting process
waiting
device driver
interrupt handler
hardware
data transfer
time
(a)
requesting process
device driver
interrupt handler
hardware
data transfer
time
user
kernel
(b)

I/O Structure

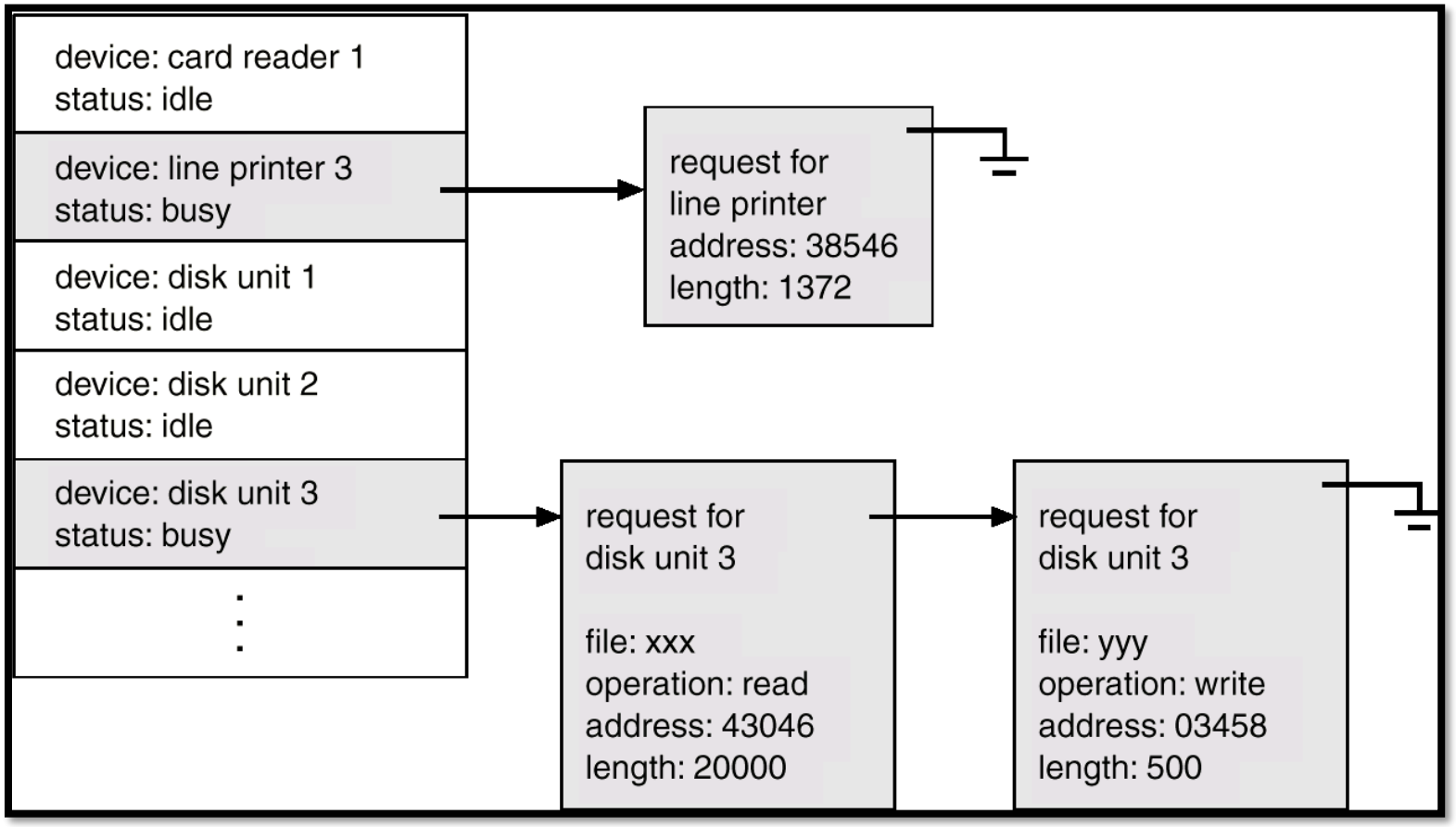
After I/O starts, control returns to user program only upon I/O completion.

- wait instruction idles the CPU until the next interrupt
- wait loop (contention for memory access).
- At most one I/O request is outstanding at a time, no simultaneous I/O processing.

After I/O starts, control returns to user program without waiting for I/O completion.

- *System call* – request to the operating system to allow user to wait for I/O completion.
- *Device-status table* contains entry for each I/O device indicating its type, address, and state.
- Operating system indexes into I/O device table to determine device status and to modify table entry to include interrupt.

Device-Status Table



MCQ

I/O hardware contains _____
a) Bus
b) Controller
c) I/O port and its registers
d) All of the mentioned

The data-in register of I/O port is _____
a) Read by host to get input
b) Read by controller to get input
c) Written by host to send output
d) Written by host to start a command

Device drivers are implemented to interface _____
a) character devices
b) block devices
c) network devices
d) all of the mentioned

When hardware is accessed by reading and writing to the specific memory locations, then it is called _____
a) port-mapped I/O
b) controller-mapped I/O
c) bus-mapped I/O
d) none of the mentioned

The host sets _____ bit when a command is available for the controller to execute.
a) write
b) status
c) command-ready
d) control