

Mid-Term Review

- Good Results
- Always Answer Questions
- Review Of The Trouble Spots

Chapter 8

Assignment 2

High Level Programming Languages



Assignment Two

- Using the two programs below that we discussed in class...
- ...create a program that uses the **<form>** structure to say, “good morning,” or “good day,” or “good evening”

Selection

```
<html>
<body>
<script type="text/javascript">
var d = new Date()
var time = d.getHours()
if (time < 10)
{
document.write("<b>Good morning!</b>")
}
else if (time>10 && time<16)
{
document.write("<b>Good day!</b>")
}
else
{
document.write("<b>Good evening!</b>")
}
</script>
</body>
</html>
```

Functions

```
<html>
<head>
<script type="text/javascript">
function displaymessage()
{
alert("Hello World!")
}
</script>
</head>
<body>
<form>
<input type="button" value="Click
me!"
onclick="displaymessage()" >
</form>
</body>
</html>
```

Hints

- Start with **Hello World** program
- Get the next example programs to work
- Break things into steps and test
- Distinguish between **<head>** and **<body>** placement
- Instead of **document.write (...)** you will use **alert (...)**
- “play” with JavaScript
http://www.w3schools.com/js/js_howto.asp

Hello World

```
<html>  
<body>  
<script type="text/javascript">  
document.write("Hello World!")  
</script>  
</body>  
</html>
```

Chapter 10

Operating Systems



Chapter Goals

- Describe the **two main responsibilities** of an operating system
- Define **memory** and **process management**
- Explain how **timesharing** creates the **virtual machine illusion**
- Explain the relationship between **logical** and **physical addresses**
- Compare and contrast **memory management techniques**

Software Categories

- **Application software** Software written to address specific needs—to solve problems in the real world

Word processing programs, games, inventory control systems, automobile diagnostic programs, and missile guidance programs are all application software

- **System software** Software that manages a computer system at a fundamental level

It provides the tools and an environment in which application software can be created and run

Operating System

- An **operating system**
 - manages computer resources, such as memory and input/output devices
 - provides an **interface** through which a human can interact with the computer
 - allows an application program to interact with these other system resources

Operating System

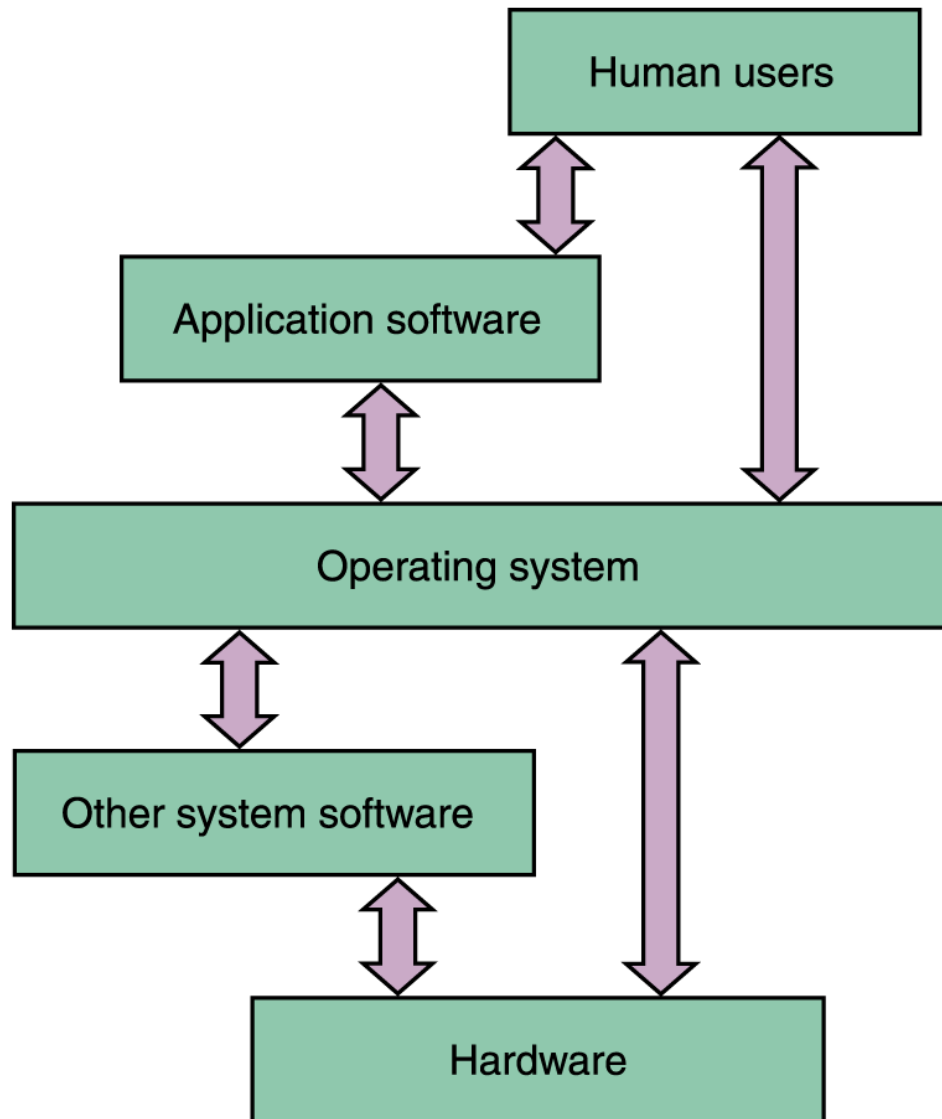


Figure 10.1
An operating system interacts with many aspects of a computer system.

Operating System

- The various roles of an operating system generally revolve around the idea of “sharing nicely”
- An operating system **manages resources**, and these resources are often **shared in one way or another** among programs that want to use them

Resource Management

- **Multiprogramming** The technique of keeping multiple programs in main memory at the same time that compete for access to the CPU so that they can execute
- **Memory management** The process of keeping track of what programs are in memory and where in memory they reside

Resource Management

- **Process** A program in execution
- The operating system performs **process management** to carefully track the progress of a process and all of its intermediate states
- **CPU scheduling** determines which process in memory is executed by the CPU at any given point

Batch Processing

- A typical computer in the 1960s and '70s was a *large machine*
- Its processing was managed by a human *operator*
- The operator would *organize various jobs* from multiple users into *batches*

Batch Processing

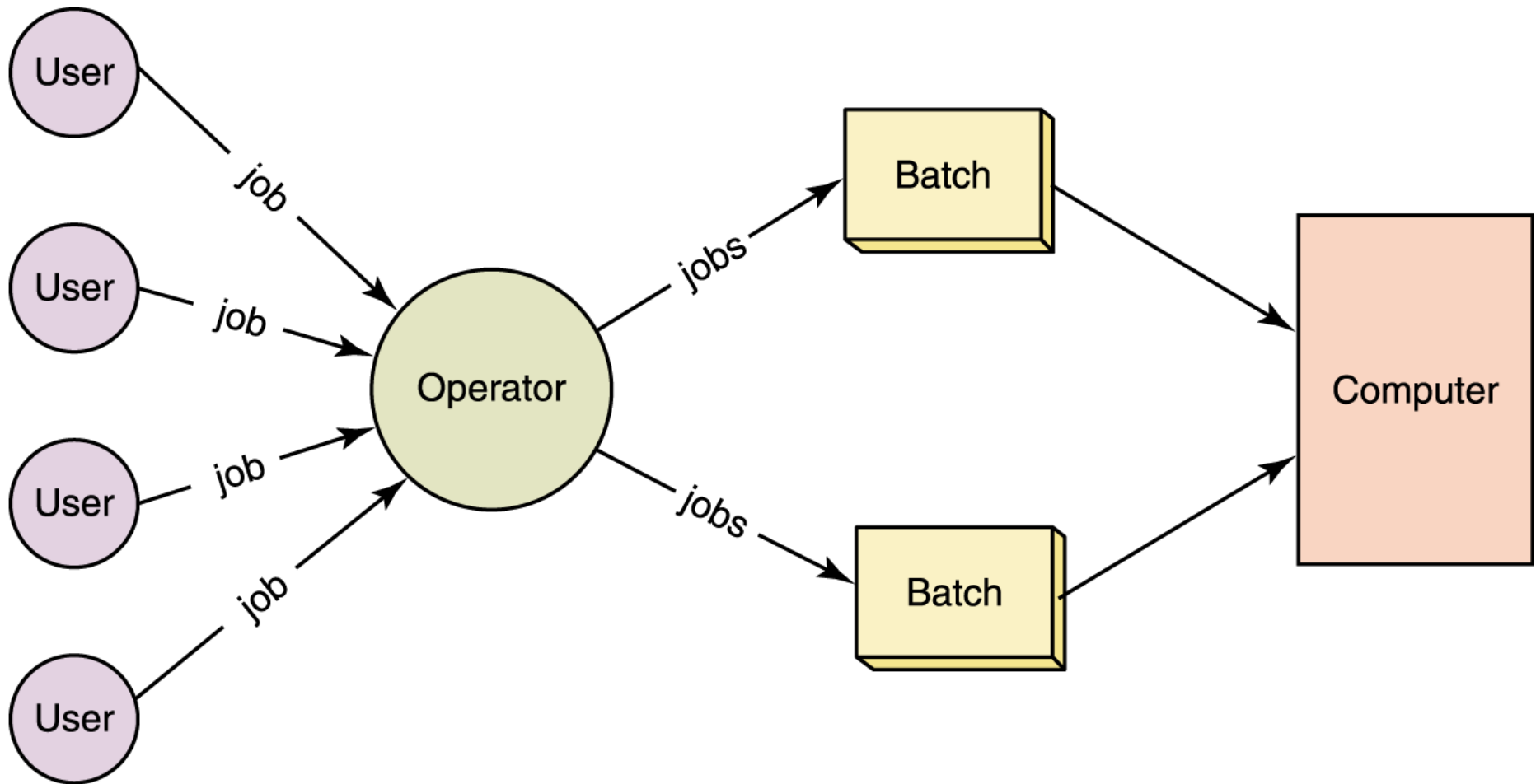


Figure 10.2 In early systems, human operators would organize jobs into batches

Timesharing

- **Timesharing system** A system that allows multiple users to interact with a computer at the same time
- **Multiprogramming** A technique that allows multiple processes to be active at once, allowing programmers to interact with the computer system directly, while still sharing its resources
- In a timesharing system, each user has his or her own **virtual machine**, in which all system resources are (in effect) available for use

Other Factors

- **Real-time System** A system in which response time is crucial given the nature of the application
- **Response time** The time delay between receiving a stimulus and producing a response
- **Device driver** A small program that “knows” the way a particular device expects to receive and deliver information.

Memory Management

- Operating systems must employ techniques to
 - Track where and how a program resides in memory
 - Convert **logical addresses** into actual **addresses**
- **Logical address** (sometimes called a virtual or relative address) A value that specifies a generic location, relative to the program but not to the reality of main memory
- **Physical address** An actual address in the main memory device

Memory Management

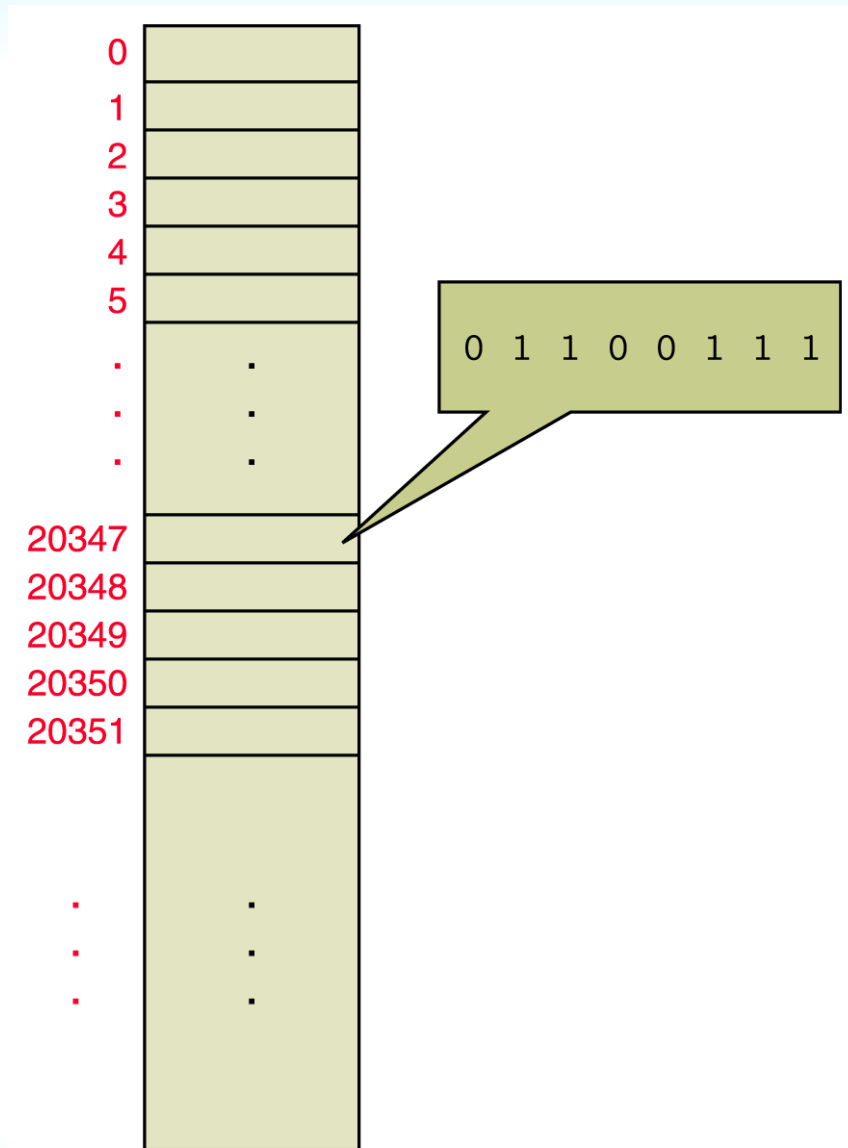


Figure 10.3
Memory is a continuous set
of bits referenced by specific
addresses

Single Contiguous Memory Management

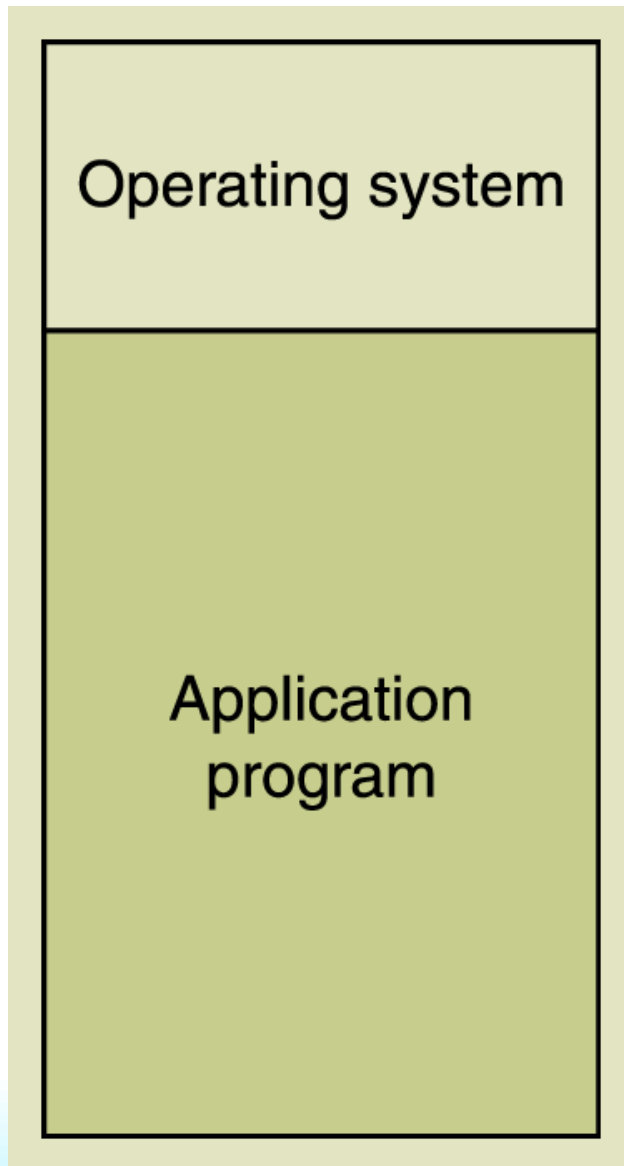


Figure 10.4
Main memory
divided into two
sections

- There are only two programs in memory
 - The operating system
 - The application program
- This approach is called **single contiguous memory management**

Single Contiguous Memory Management

- A logical address is simply an integer value relative to the starting point of the program
- To produce a physical address, we add a logical address to the starting address of the program in physical main memory

Single Contiguous Memory Management

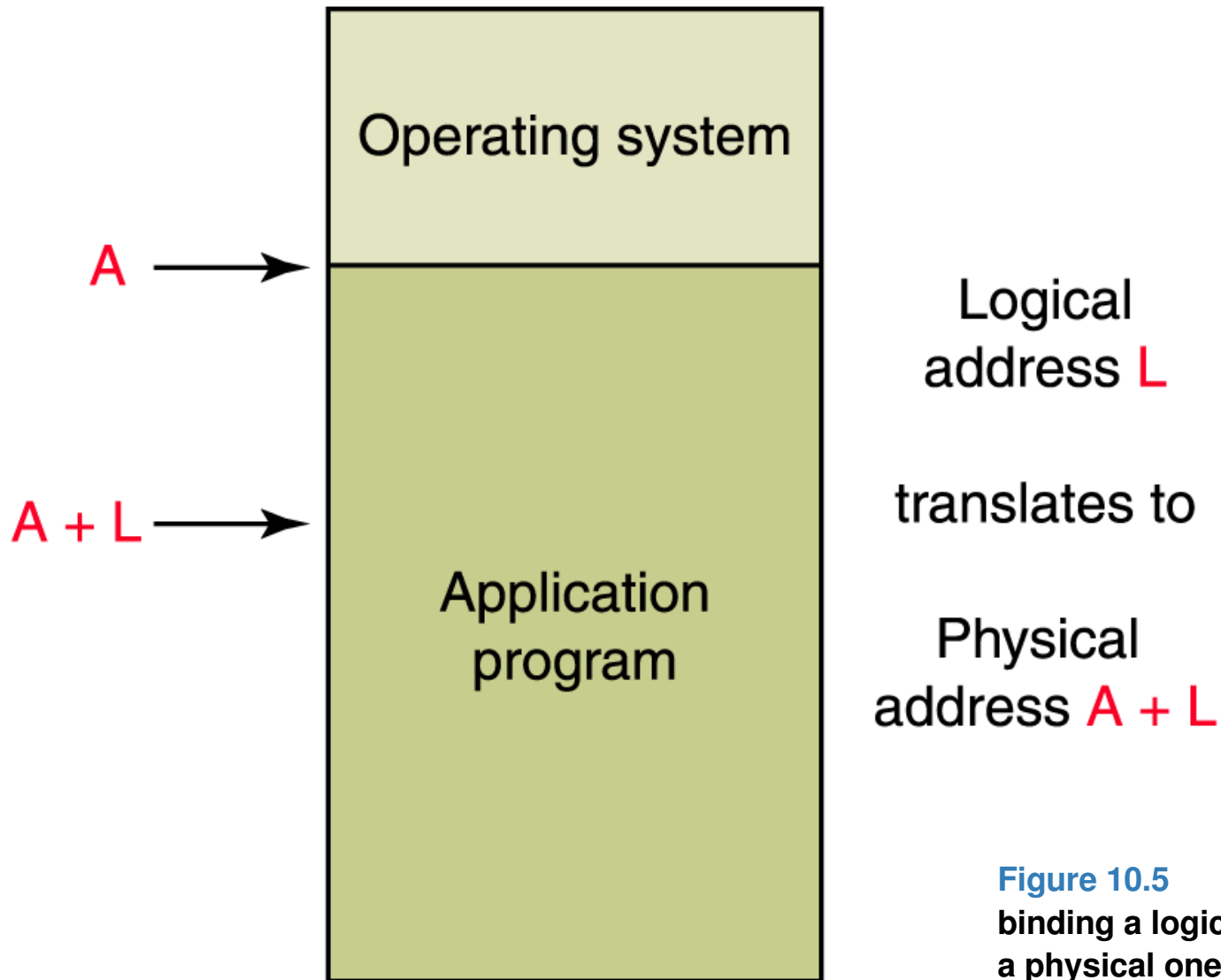


Figure 10.5
binding a logical address to
a physical one

Partition Memory Management

- **Fixed partitions** Main memory is divided into a particular number of partitions
- **Dynamic partitions** Partitions are created to fit the needs of the programs

Partition Memory Management

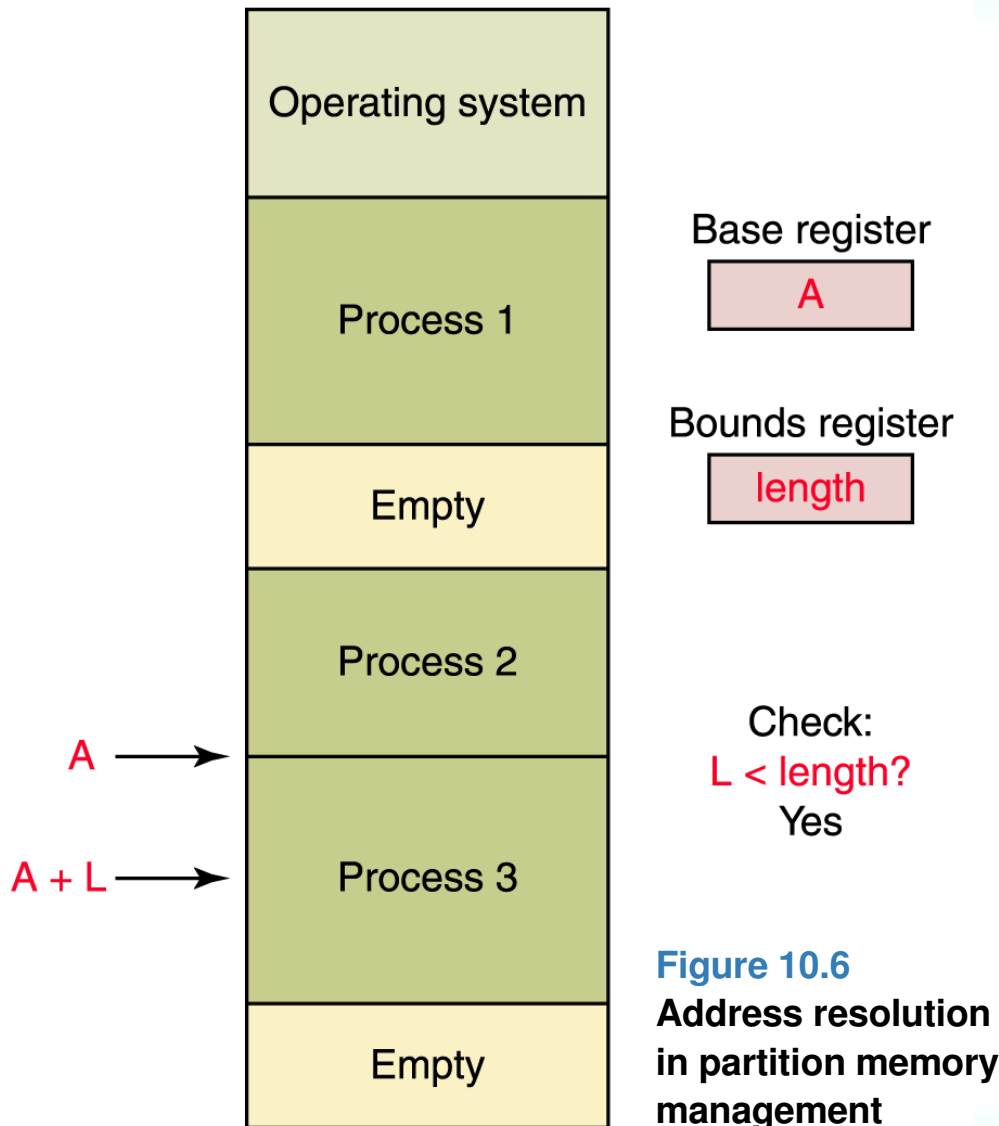


Figure 10.6
Address resolution
in partition memory
management

- At any point in time memory is divided into a set of partitions, some empty and some allocated to programs
- **Base register** A register that holds the **beginning address** of the current partition
- **Bounds register** A register that holds the **length of the current partition**

Partition Selection Algorithms

Which partition should we allocate to a new program?

- **First fit** Allocate program to the first partition big enough to hold it
- **Best fit** Allocated program to the smallest partition big enough to hold it
- **Worst fit** Allocate program to the largest partition big enough to hold it

Paged Memory Management

- **Paged memory technique** A memory management technique in which processes are divided into **fixed-size pages** and stored in **memory frames** when loaded into memory
 - **Frame** A fixed-size portion of *main memory* that holds a **process page**
 - **Page** A fixed-size portion of a *process* that is **stored** into a memory frame
 - **Page-map table** (PMT) A table used by the operating system to keep track of **page/frame** relationships

Paged Memory Management

P1 PMT		Memory	
Page	Frame	Frame	Contents
0	5	0	
1	12	1	P2/Page2
2	15	2	
3	7	3	
4	22	4	
		5	P1/Page0
		6	
		7	P1/Page3
		8	
		9	
		10	P2/Page0
		11	P2/Page3
		12	P1/Page1
		13	
		14	
		15	P1/Page2
		.	.
		.	.
		.	.

P2 PMT	
Page	Frame
0	10
1	18
2	1
3	11

Figure 10.7
A paged memory management approach

- To produce a physical address, you first look up the page in the PMT to find the frame number in which it is stored
- Then multiply the frame number by the frame size and add the offset to get the physical address

Paged Memory Management

- **Demand paging** An important extension of paged memory management
 - Not all parts of a program actually have to be in memory at the same time
 - In demand paging, the **pages are brought into memory on demand**
- **Page swap** The act of **bringing in a page from secondary memory**, which often causes another page to be written back to secondary memory

Paged Memory Management

- The demand paging approach gives rise to the idea of **virtual memory**, the **illusion** that there are no restrictions on the size of a program
- **Too much page swapping**, however, is called **thrashing** and can seriously degrade system performance.

Homework

- **Begin Reading Chapter Ten, Sections 10.1 - 10.2**
- **Begin Assignment #2 - don't wait 'til the last minute!!!**

Have A Good Night



Autumn Moon
by Ansel Adams



Nasa Encore