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”
<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](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
An operating system interacts with many aspects of a computer 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.
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

- 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

- 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.

**Figure 10.6** Address resolution in partition memory management.
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

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