

Today:

Processes (Ch 3)

Process management

Announcements:

Weekly quiz tomorrow at the beginning of lab

Process

A program in memory and executing

A program is a passive item – it sits on a storage device, while a process is an active component that has been brought into memory and is executing.

Process Categories:

1. System processes – OS code that is executing
2. User processes – user / application code that is executing

Microprocessors / microcontrollers often have a privileged mechanism to determine whether the code is OS code or user code. This is often done with mode bits, which determine the current privilege level.

For example, the Motorola MC68332 has a supervisor-mode bit (S-bit) in the status register.

When the S-bit is set, for example:

- function code bits can be changed
- interrupt levels can be changed
- special instructions can be executed
- there is a separate OS stack

Context Switch

Modern operating systems execute processes concurrently. Old operating systems executed processes sequentially. There was exactly one in memory at any moment in time and that one completed before the next could execute.

Context: current state of the running process

The goal of a concurrent (multitasking) OS is to switch those processes so quickly that the user does not notice the delay (he believes that all processes are running simultaneously)

Quantum Time: the time allocated to a process before that process is interrupted and the context is switched. Most OSes are using a time between 8 and 10 ms.

Context Switch: a process management task that completes a process state-save and then completes a process state-restore of the next process to execute

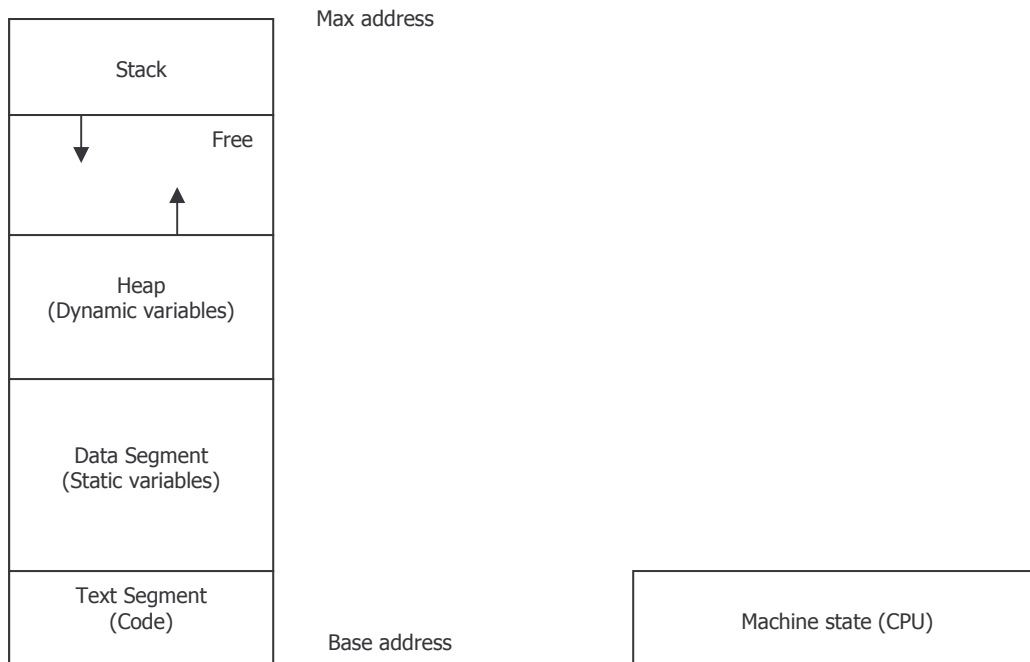
This occurs at the quantum time rate.

Cooperative multitasking – processes run and release on a schedule. The release responsibility is left to the process.

In cooperative multitasking, applications must play well together. If one application contains an infinite loop, control never gets released back to the OS because it is no longer playing fairly.

Preemptive multitasking – timer interrupt returns control to the OS. The process has been “preempted”

Image of a process in memory



On load, a process is given a block of memory defined by a base address and a maximum address.

Process Lifetime Diagram

There are five process states:

1. New – undergoing construction
2. Ready – waiting for the CPU time
3. Running – on the CPU
4. Waiting – I/O or signal wait
5. Terminated – done executing; deconstruction

