OSTEP Chapter 4

ECE 3600, Fall 2022

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1. Processes

process = running program

with associated address space, registers (PC, SP, FP), and I/O

time sharing = virtualized CPU

context switch mechanism, scheduling policy

process API: create, kill, wait, control, status

2. Loading

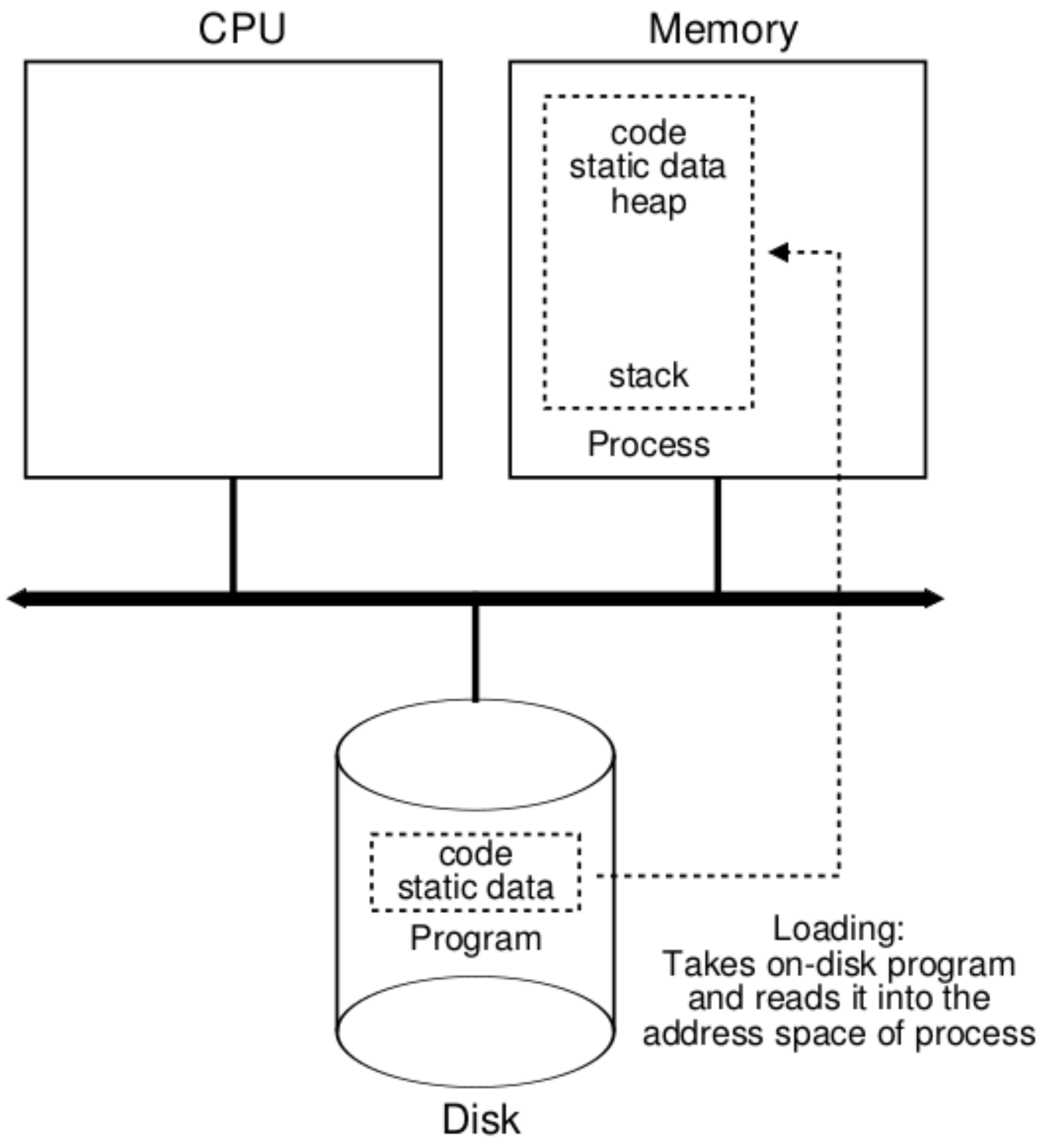

Figure 4.1: **Loading: From Program To Process**

3. States

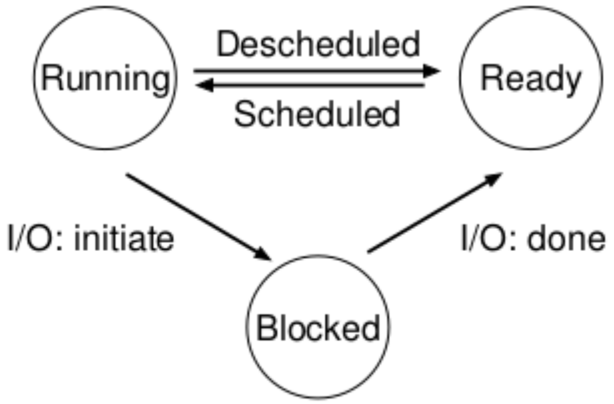

Figure 4.2: **Process: State Transitions**

4. Trace: CPU

Time	$Process_0$	$Process_1$	Notes
1	Running	Ready	
2	Running	Ready	
3	Running	Ready	
4	Running	Ready	$Process_0$ now done
5	–	Running	
6	–	Running	
7	–	Running	
8	–	Running	$Process_1$ now done

Figure 4.3: **Tracing Process State: CPU Only**

5. Trace: CPU and I/O

Time	Process_0	Process_1	Notes
1	Running	Ready	
2	Running	Ready	
3	Running	Ready	Process_0 initiates I/O
4	Blocked	Running	Process_0 is blocked,
5	Blocked	Running	so Process_1 runs
6	Blocked	Running	
7	Ready	Running	I/O done
8	Ready	Running	Process_1 now done
9	Running	–	
10	Running	–	Process_0 now done

Figure 4.4: **Tracing Process State: CPU and I/O**

6. Exercises

Exercises from the book using process-run.py:

1. Run process-run.py with the following flags: -l 5:100,5:100. What should the CPU utilization be (e.g., the percent of time the CPU is in use?) Why do you know this? Use the -c and -p flags to see if you were right.

2. Now run with these flags: ./process-run.py -l 4:100,1:0. These flags specify one process with 4 instructions (all to use the CPU), and one that simply issues an I/O and waits for it to be done. How long does it take to complete both processes? Use -c and -p to find out if you were right.

3. Switch the order of the processes: -l 1:0,4:100. What happens now? Does switching the order matter? Why? (As always, use -c and -p to see if you were right)