Operating Systems

Unit 2: Process

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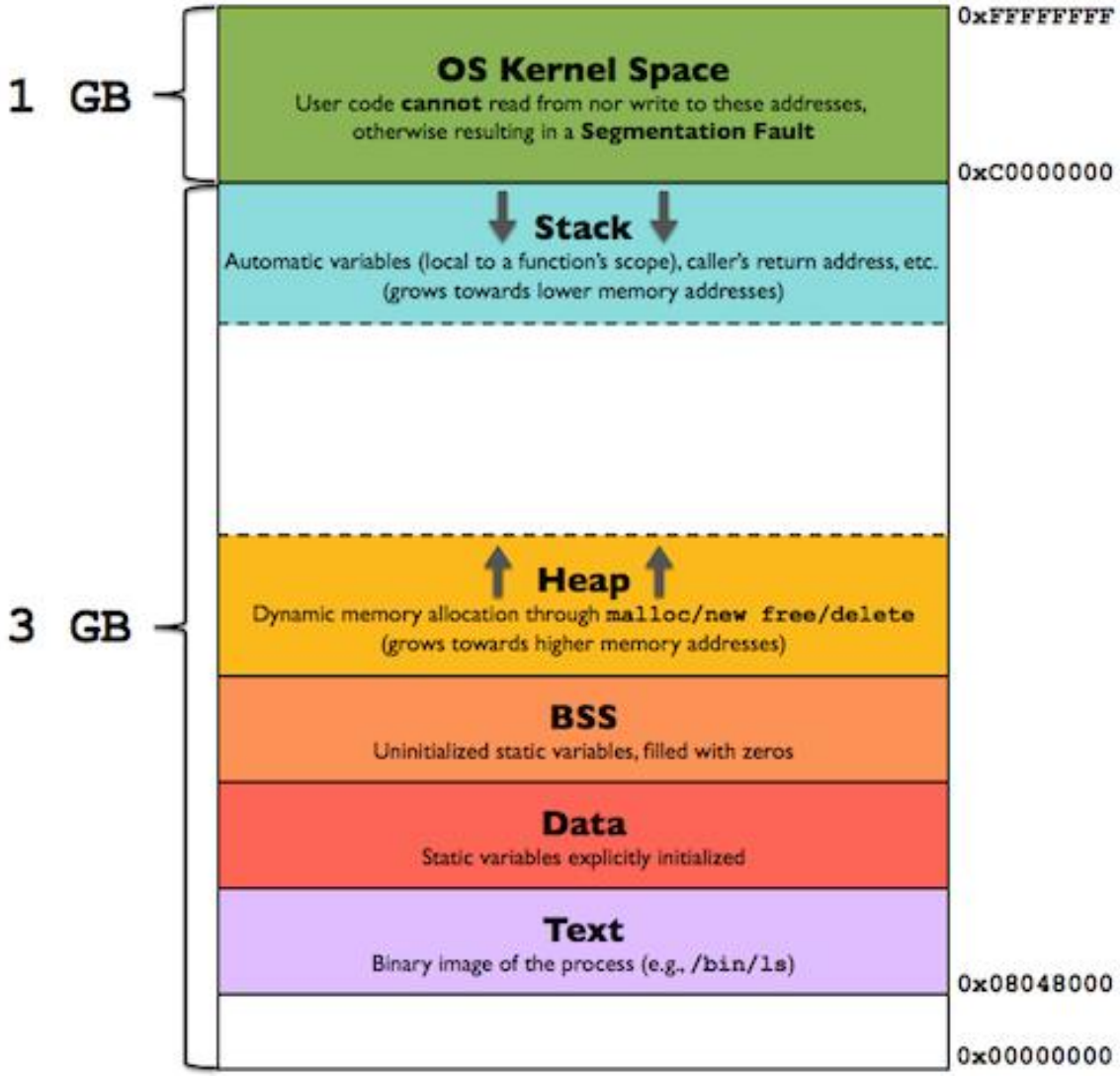
What is a process?

- A process is an instance of a program running
- Modern OSes run multiple processes simultaneously
- To put it in simple terms, we write a program in a text file and when we execute this program, it becomes a process which performs all the tasks mentioned in the program.

In-Memory Layout of a Process

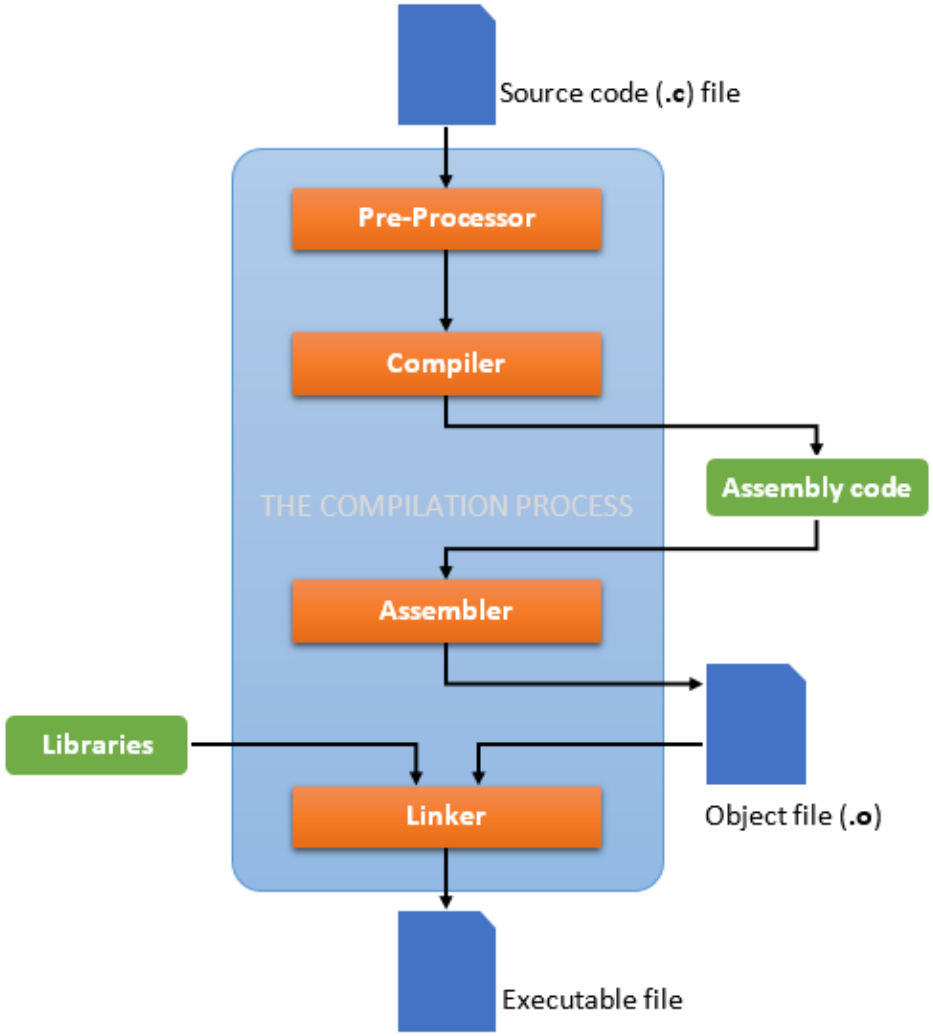


Program

- A program is a piece of code which may be a single line or millions of lines. A computer program is usually written by a computer programmer in a programming language.

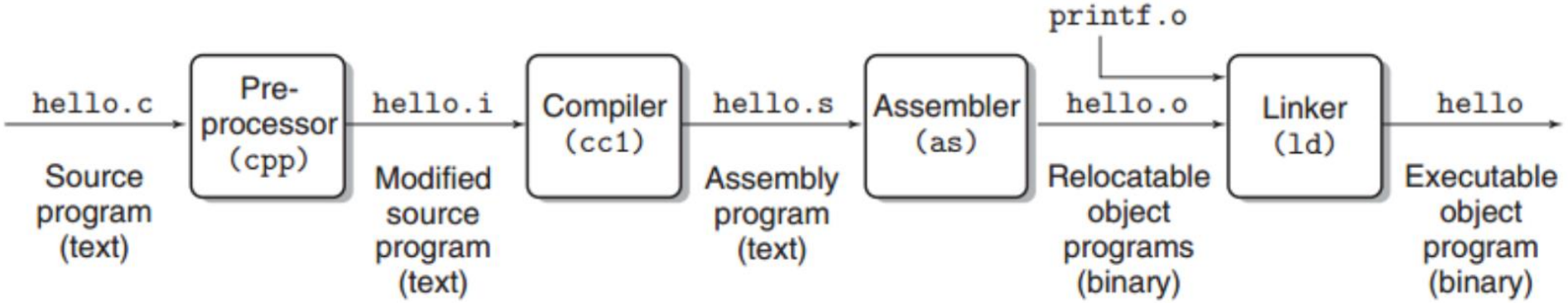
```c
#include <stdio.h>

int main() {
   printf("Hello, World! \n");
   return 0;
}
```

Compiling a C program

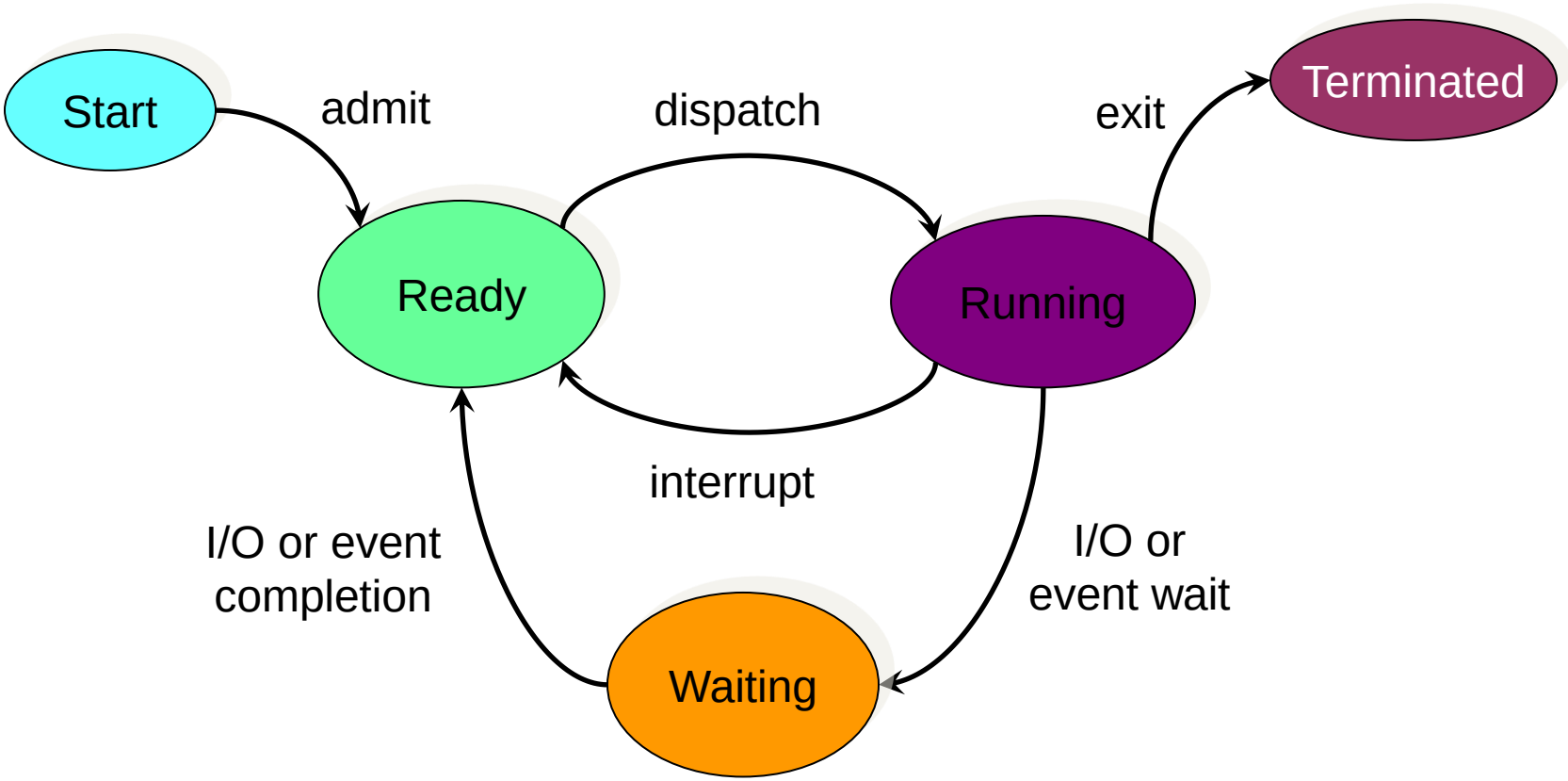


Compiling a hello.c

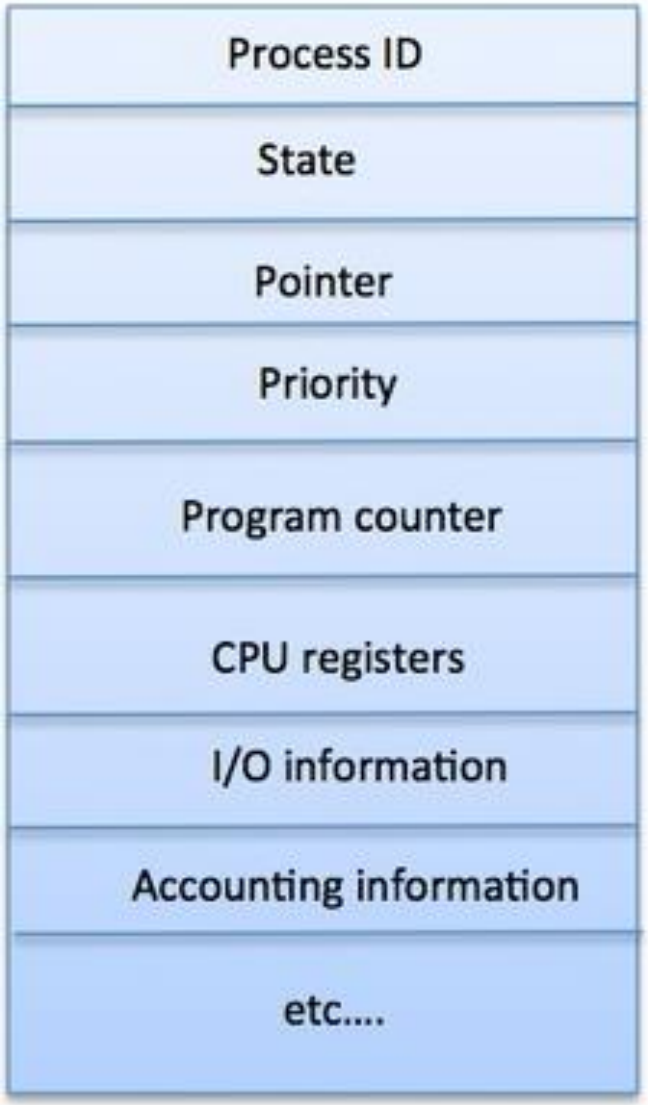
Command	Input	Output
gcc –E hello.c > hello.i	hello.c	hello.i
gcc –S hello.i	hello.i	hello.s
gcc –c hello.s	hello.s	hello.o
gcc –o hello hello.o	hello.o	hello



Process Life Cycle



Process Control Block (PCB)



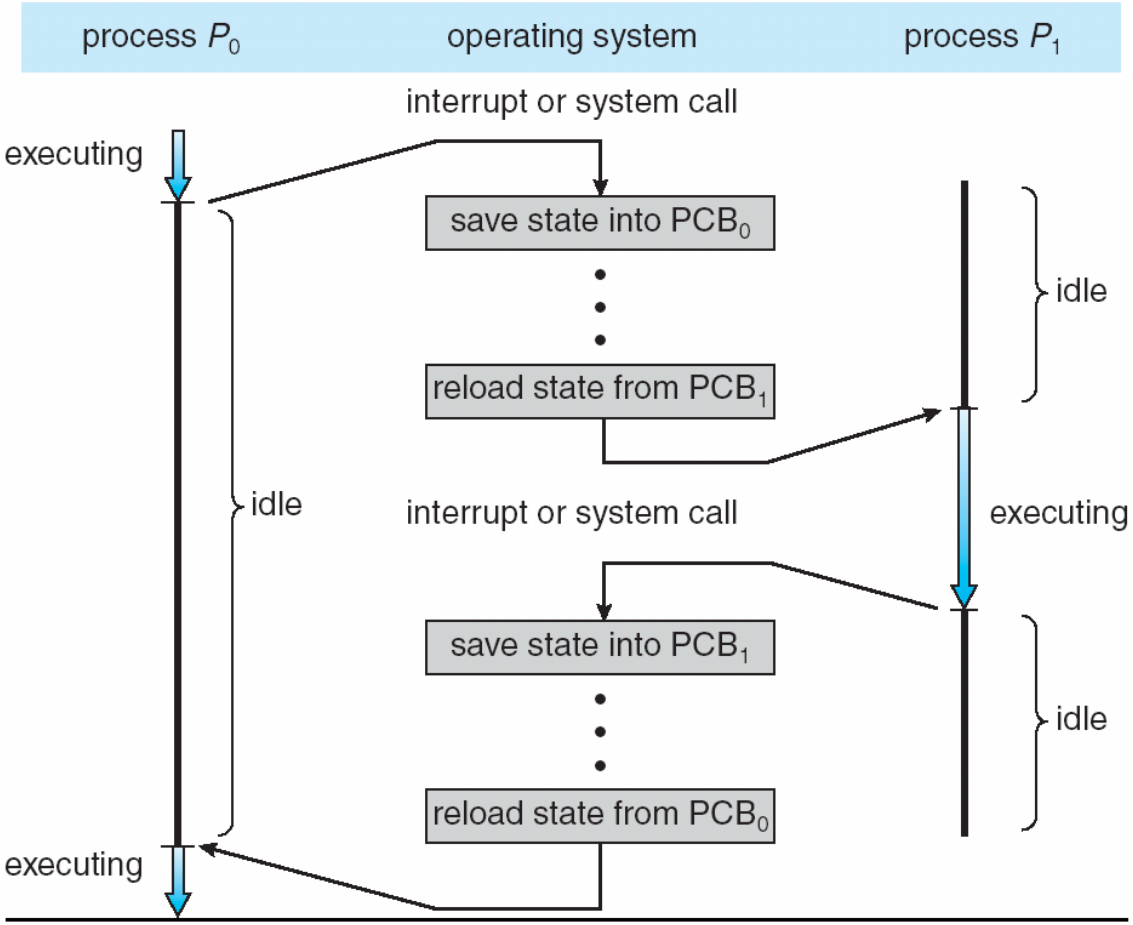
Process Scheduling

- The process scheduling is the activity of the process manager that handles the removal of the running process from the CPU and the selection of another process on the basic of a particular strategy.

Preemption

- Can preempt a process when kernel gets control
- Running process can vector control to kernel
  - System call, page fault, illegal instruction, etc.
  - May put current process to sleep—e.g., read from disk
  - May make other process runnable—e.g., fork, write to pipe
- Periodic timer interrupt
  - If running process used up quantum, schedule another
- Device interrupt
  - Disk request completed, or packet arrived on network
  - Previously waiting process becomes runnable
  - Schedule if higher priority than current running proc.
- Changing running process is called a *context switch*

Context Switch



Child and parent process