Process and process management – Part 3

Agenda

- PCB
- Context switch
- System calls vs library functions
- Random number generation

Process Control Block (PCB)

- Whenever a process is created, for every process PM (process manager) will create a look up table or say a data structure called process control block (PCB) in kernel space.
- It is a data structure, which contains the following information about a process:

1) Process state

2) Process ID, its Parent ID

3) Program counter

4) CPU registers

5) CPU scheduling information

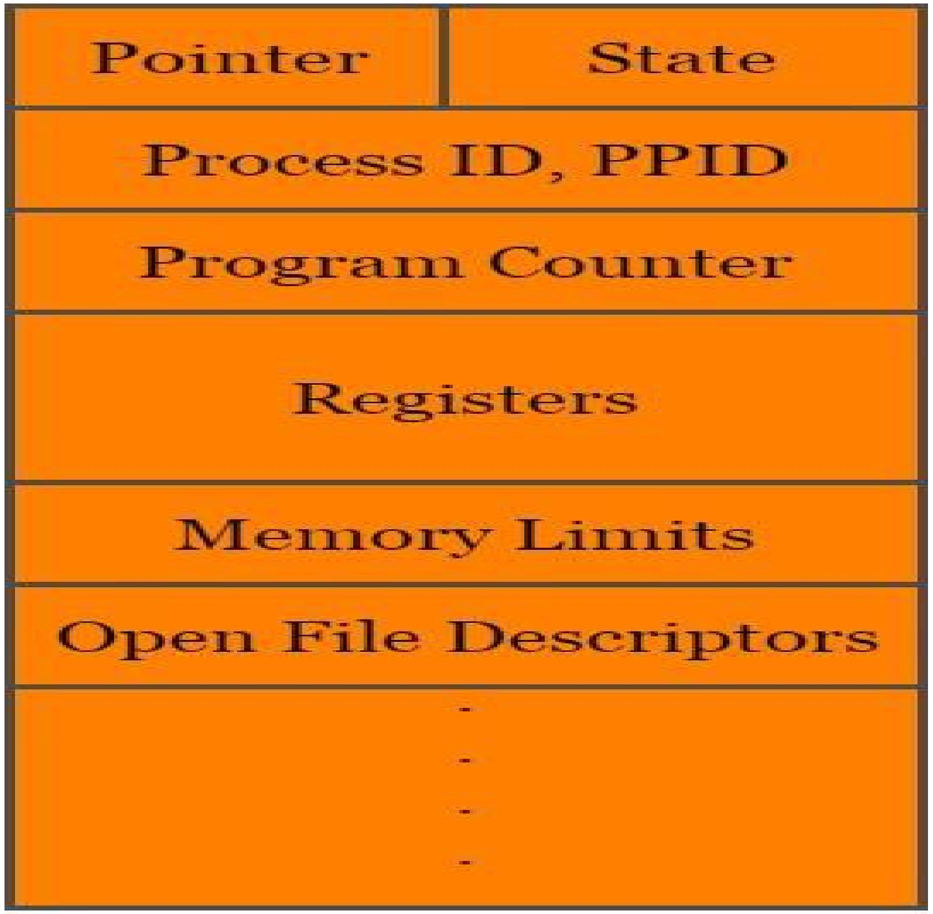
6) Memory-management information

7) List of open file descriptors

8) Accounting information

9) I/O status information

Process Control Block (Contd..)

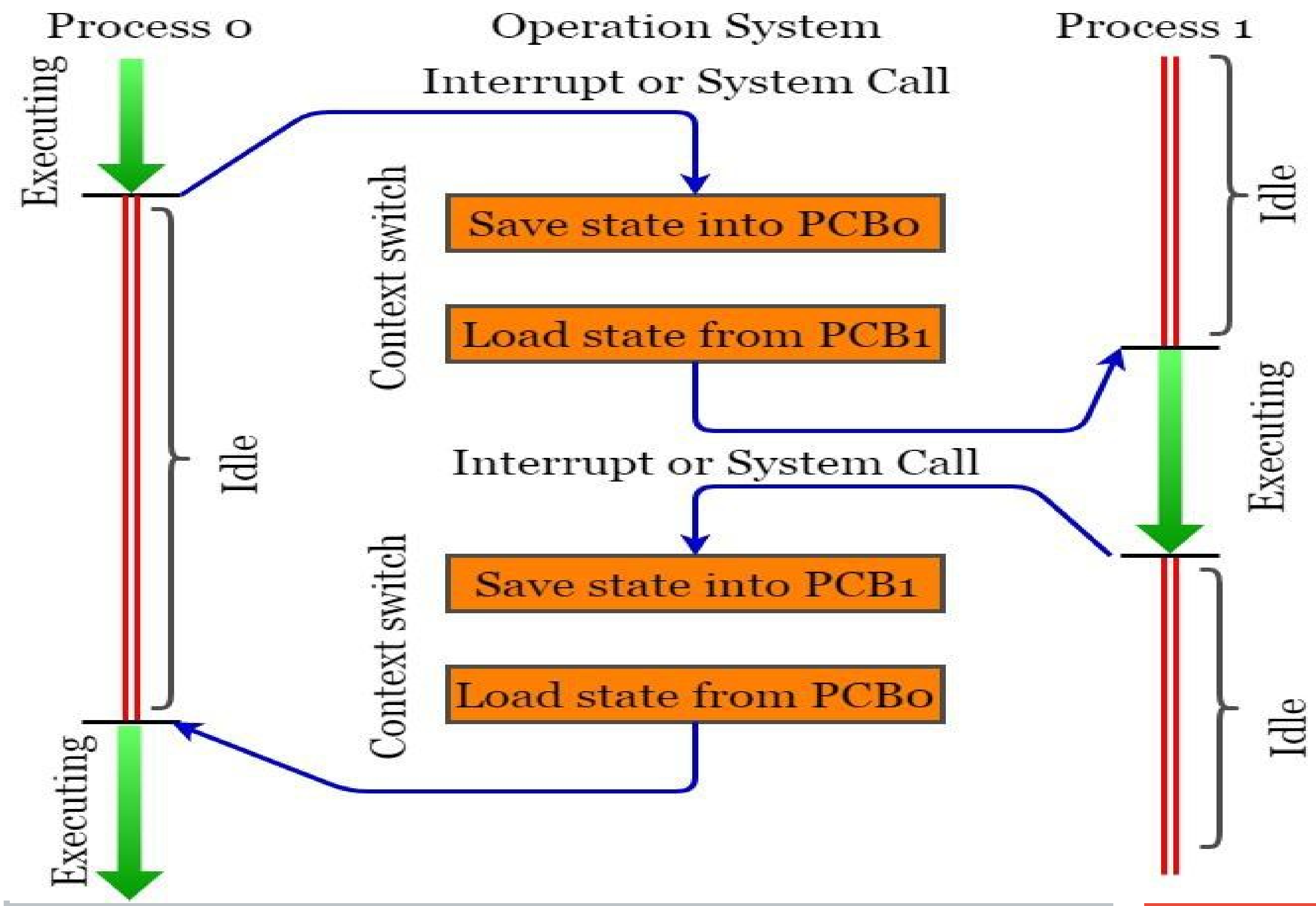


Process Control Block

Context switch

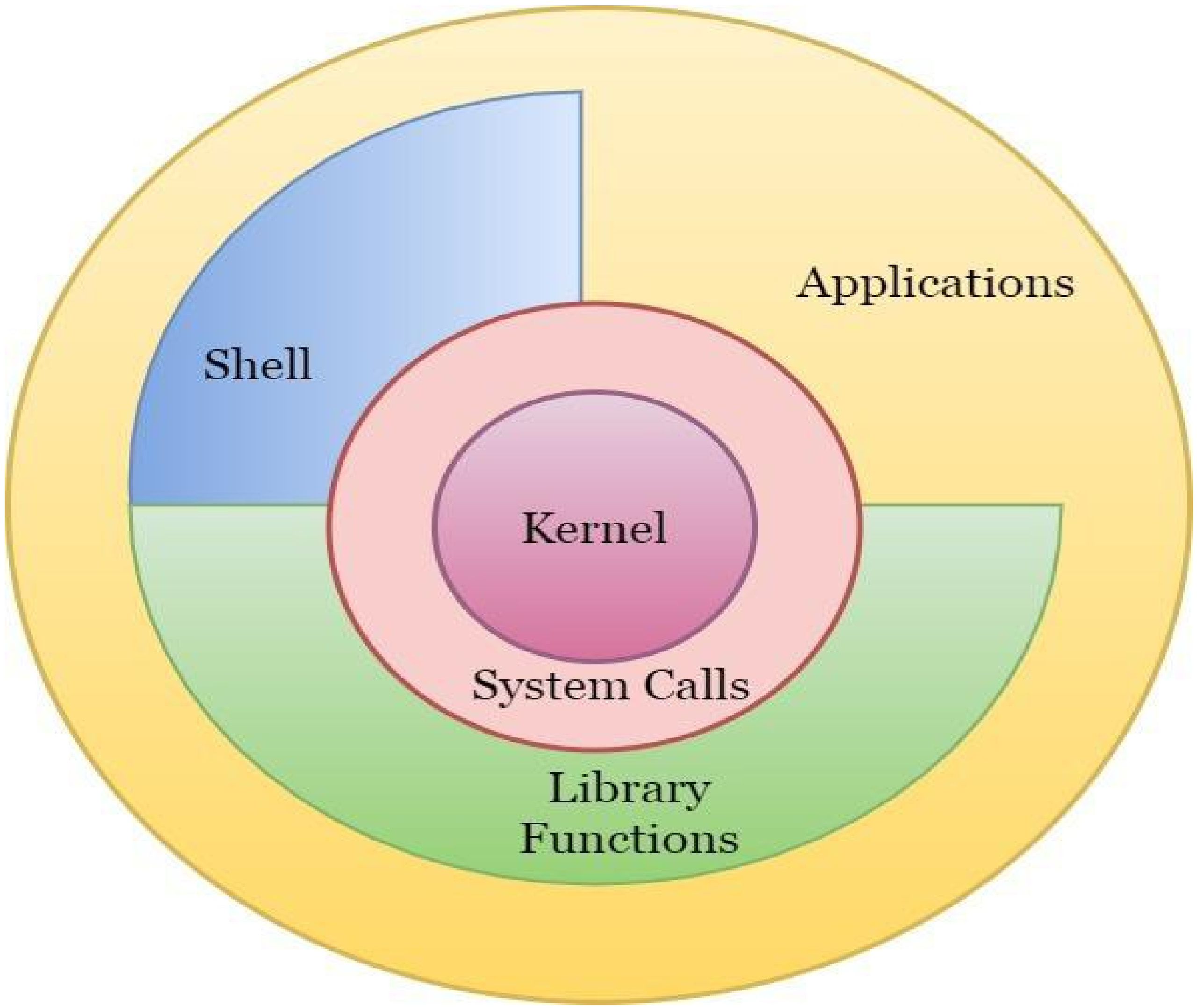
- A context switch is the mechanism to store and restore the state or context of a CPU in Process Control block so that a process execution can be resumed from the same point at a later time.
- Using this technique, a context switcher enables multiple processes to share a single CPU.
- Context switching is an essential part of a multitasking operating system features.
- The state from the current running process is stored into the respected PCB. After this, the state for the process to run next is loaded from its own PCB to CPU registers.

Context Switch (Contd..)



System calls vs Library functions

Library Functions	System calls
Supported by compilers	Supported by operating system
Another name is Application Programming Interface (API)	Another name is System Call Interface (SCI)
Writing program with APIs is called as application programming	Writing program with SCIs is called as system programming
They are slower but process calling library functions execute faster	They are faster but process calling system calls execute slower
Library functions are programmer friendly and specific to tasks For eg fgetc() reads only ASCII characters	System calls are OS friendly and generic in nature For eg read()
Library functions execute in Users Space	System call executes in Kernels Space
Library functions can be debugged using debugger.	System calls cannot be debugged as executed by kernel but you can check return value and error numbers to avoid failure.


Applications
Shell
Kernel
System Calls
Library Functions

Library Functions and System Calls Used in Process Management.

We are going to study following functions and system calls in process management.

system()
fork()
vfork()
exit()

_exit()
atexit()
wait()
waitpid()

Random number generation

```
int rand(void);

void srand(unsigned int seed);
```

- The rand() function returns a pseudo-random integer in the range 0 to RAND_MAX inclusive.
  (i.e., the mathematical range [0, RAND_MAX])
- The srand() function sets its argument as the seed for a new sequence of pseudo-random integers to be returned by rand().
- If no seed value is provided, the rand() function is automatically seeded with a value of 1.