Cairo University **Faculty of science** **Mathematics Department**		**Computer Sciences Division** **Solution Sheet 3 Chapter 3** **Operating System 2025** Dr. Hatem Moharram

Q(1): Check in Black only one of the choices following each statement.

1. Which of the following actions is an I/O operation?

○1- Blocking	○2- Dispatching.	○**3- Suspending.**	○4- all of the previous	○5- none of the previous

2. The reason(s) for moving a process from the running state to the ready state is (are):

○1- the running process has reached the maximum allowable time.	○**4- all of the previous**
○2- the OS assigns different levels of priority to different Processes.	○5- none of the previous
○3- the process freely release control of the processor.	

3. The amount of time that the process has been waiting belongs to:

○1- Process identification.	○2- Processor State Information.	○**3- Process Control Information.**
○4- all of the previous**.**	○5- none of the previous	○

4. The contents of the Program status word (PSW) belongs to:

○1- Process identification.	○**2- Processor State Information.**	○3- Process Control Information.
○4- all of the previous**.**	○5- none of the previous	○

5. The reason(s) for moving a process from the running state to the blocked state is (are):

○**1- to wait for another process to provide data.**	○4- all of the previous
○2- the process freely release control of the processor.	○5- none of the previous
○3- An interrupt occurs.	

6. a process in secondary memory and awaiting an event, then it is in the:

○1- Blocked state	○2- Ready/Suspend state	○**3- Blocked/Suspend state**	○4- all of the previous

7. The Process Image is:

○1- the process instructions	○2-The data needed by the process	○3-stacks	○4-some attributes
○**5- all of the previous**	○6- none of the previous		

8. the kernel

○1- A portion of the OS residents in main memory	○**4- all of the previous**
○2- contains the most frequently used functions in the OS	○5- none of the previous
○3- is the nucleus of the OS	

9. Which of the following systems handles multiple interactive jobs:

○1- multiprogramming systems	○**2- time sharing systems**	○3- batch processing systems
○4- all of the previous	○5- none of the previous	○

10. which of the following problems raised to the OS due to the development of time sharing and multiprogramming systems

○1- processes protection	○2- file system protection	○3-resources contention	○**4- all of the previous**

11. …….. is a small program that switches the processor from one process to another.

○1- the **OS**	○2- the **Interrupt handler**	○**3- Dispatcher**	○4- all of the previous

12. Logging on to a computer system lead to:

○**1- the creation of a process**	○2- **the termination of a process**	○3- **swapping the process**	○4- all of the previous

13. when a process requires more memory than the system can provide, the OS:

○1- **creates a process**	○2- **suspends the process**	○**3- terminates the process**	○4- all of the previous

14. when a process tries to access a memory location that it is not allowed to access, this means:

○1- **Memory unavailable**	○**2- Bounds violation**	○3- **Protection error**	○4- all of the previous

15. Which of the following can terminate a process?

○1- **The OS**	○2- **A process**	○3- **The user**	○**4- all of the previous**

16. A process that cannot execute until some event occurs is in the:

○1- **New state**	○**2- Blocked state**	○3- **Suspend state**	○4- all of the previous

17. a process in secondary memory and awaiting an event, then it is in the:

○1- **Blocked state**	○2- **Ready/Suspend state**	○**3- Blocked/Suspend state**	○4- all of the previous

18. in the five state model the Blocked state is added so that

○ 1- a running process can be suspended to dispatch a higher priority process.	○4- all of the previous
○ **2- processes waiting for some event can be moved to it.**	○5- none of the previous
○ 3- the OS can release sufficient main memory space to bring in a process that is ready to execute	

Q(2): Put √ in front of the right statements and × in front of the wrong statements and correct them.

1. **The process is the key tool that enables the OS to support multiple processes. False process control block**
2. **When a parent process terminates, all child processes associated with that parent terminate. False may be terminated**
3. **A process in the new state is not yet loaded into main memory and its PCB has been created. True**
4. **It is common that all of the processes in memory are waiting for some events to occur. True**
5. **When all of the processes in auxiliary storage are in the Blocked state, the OS can suspend one process and transferring it to main memory. False The contrary main memory to auxiliary storage**
6. **Swapping is an I/O operation, and therefore it will degrade the system performance. False enhance**
7. **When a process makes a call to an OS service, the processor's mode is set to the kernel mode. true**
8. **Time overrun means the process has run longer than the specified total time limit. False Time limit exceeded**
9. **Memory unavailable the process tries to access a memory location that it is not allowed to access. False Bounds violation**
10. **Condition codes are registers containing the results of the most recent arithmetic or logical operation. true**
11. **The processor creates and manages the process control block (PCB).** False by the OS

12. **Time limit exceeded means a process has waited longer than a specified maximum for a certain event to occur. False Time overrun**

13. **Protection error means the process attempts to execute a nonexistent instruction.** False **Invalid instruction**

14. **Swapping is an I/O operation, and therefore it will usually degrade the system performance. False will usually enhance performance**

15. The OS uses memory tables to manage and control the processes. false

Q(3): Answer the following questions

1) **What are the steps involved in creating the process?**
   - **Assign a unique process identifier:**
   - **Allocate space for the process:**
   - **Initialize process control block**
   - **Set up appropriate linkages**
   - **Create of expand other data structures**

2) **What happen when none of the processes in main memory is in the Ready state?**
   When none of the processes in main memory is in the Ready state, the OS swaps one of the blocked processes out onto disk into a suspend queue (suspended).
   The OS then brings in another process from the suspend queue, or it honors a new-process request.

3) **What data structures does the OS need to control processes and manage resources for them?**
   Memory Tables
   File Tables
   Process Table
   I/O Tables
   Process Control Block

4) **Mention the three general categories a process control block information can be grouped into.**
   Process identification
   Processor state information
   Process control information

5) **What is the reason for using two modes of execution?**
   - **It is necessary to protect the OS and key operating system tables from interference by user programs.**

6) **How does the processor know in which mode of execution it is to be executing?**
   - **there is a bit in the program status word (PSW) that indicates the mode of execution.**

7) **Mark each of the following as either PI for process identification information, PS for process state information, or PC for process control information. (6 marks)**

   a) ..... PID

b) ..... Stack Pointers

c) ..... Process priveleges

d) ..... Process state (state of process, such as ready, running, etc.)

e) ..... User-visible registers

f) ..... Parent ID

a) PI b) PS c) PC d) PC e) PS f)PI

8) **B) Sketch a diagram for the seven process state model. You must give the name of the transition, the from-state, and the to-state.the mark will be given to the correct state transition**