

CSC373 Worksheet 1 Solution

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1. The cpu utilization is 100%.

The CPU utilization formula is given as

$$\text{CPU Utilization} = 1 - \prod_i \text{I/O blocked time of } i\text{th process} \quad (1)$$

Since the processes do no I/O, we can write there is no I/O blocked time.

Thus, we can conclude

$$\text{CPU Utilization} = 1 - 0 \quad (2)$$

$$= 1 \quad (3)$$

which is 100%.

Notes

- **CPU Utilization**

- Means % of time CPU is in use
- Formula is

$$\text{CPU Utilization} = 1 - \prod_i \text{I/O blocked time of } i\text{th process} \quad (4)$$

- **Process**

- Means a program in execution

- **PID**

- Is a short hand form for ‘process identifier’

- **Process States**

- in simplified view, process can be in one of the three states

1. **Running:**

- * Is running on a processor
- * Means ‘Is executing instructions’

2. **Ready:**

- * Is ready to run
- * But, OS chosen to not to run it at the moment

3. **Blocked:**

- * Is not ready to run until some other event takes place

Example

Running an I/O request to disk → process blocked → other process can do their job while waiting

2. It takes total of 10 seconds to run.

The first task only uses CPU, and takes 4 seconds.

But, for the second task, on top of 4 seconds used for I/O, 1 second is used for preparing and initiating I/O, and the other 1 second is used for signaling that I/O is done.

So in total, we have $4 + 4 + 1 + 1 = 10$ seconds.

10 seconds

Time	PID: 0	PID: 1	CPU	I/Os
1	RUN:cpu	READY	1	
2	RUN:cpu	READY	1	
3	RUN:cpu	READY	1	
4	RUN:cpu	READY	1	
5	DONE	RUN:io	1	
6	DONE	WAITING		1
7	DONE	WAITING		1
8	DONE	WAITING		1
9	DONE	WAITING		1
10*	DONE	DONE		

3. Yes. Switching the order does matter.

When the order is switched, the process 2 with I/O runs, and the process 2 enters the blocked state.

While at blocked state, the other process executes.

Since both take 4 seconds, by the time process 2 finishes, process 1 is finished.

Thus, total of 6 seconds are taken.