Homework 2 OS 3500-002

Q1. The number of Processes in this program are as follows:

1. At i=0 there is just one parent so it is 1
2. At i=1 there is a parent and a child it is 2
3. At i=2 there is a parent and a child and they run once so it is 4
4. At i=3 there is a parent and a child and they run twice so it is 8
5. At i=4 the condition is not satisfied

Total = 8+4+2+1 = 15

Q2. The pid value is as follows:

1. Child, pid value = 0
2. Child, pid value = 4609
3. Parent, pid value = 4609
4. Parent, pid value = 4608

Q3.

The following will be the child processes as per the code:

Line X output:

CHILD: 0

CHILD: -1

CHILD: -4

CHILD: -9

CHILD: -16

Line Y output:

PARENT: 0

PARENT: 1

PARENT: 2

PARENT: 3

PARENT: 4

Q4.

It is important for a scheduler to distinguish between I/O bound and CPU bound processes in order to be able to provide the maximum efficiency of the system. It is used to identify the correct number of processes of both to merge them and find the best way to get it to work together. The I/O requests will be received, and the optimal utilization of the system should be met.

Q5.

The regressive round robin scheduler favors the CPU-bound processes because they get the additional 10 milliseconds when all time quantum is used but, on the other hand, IO-bound processes can be blocked being going through the full quota of time quantum while priority is unaffected

Q6.

A.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| P1 | P1 | Pidle | P2 | P3 | P2 | P3 | P4 | P2 | P3 | Pidle | P5 | P6 | P5 |  |
| 0 | 10 | 20 | 25 | 35 | 45 | 55 | 60 | 75 | 80 | 90 | 100 | 105 | 115 | 120 |

B.

|  |  |  |  |
| --- | --- | --- | --- |
| Thread | AT | CT | CT – AT = TAT |
| P1 | 0 | 20 | **20** |
| P2 | 25 | 80 | **55** |
| P3 | 30 | 90 | **60** |
| P4 | 60 | 75 | **15** |
| P5 | 100 | 120 | **20** |
| P6 | 105 | 115 | **10** |

C.

|  |  |  |  |
| --- | --- | --- | --- |
| Thread | AT | TAT | TAT – BT = WT |
| P1 | 20 | 20 | **0** |
| P2 | 25 | 55 | **30** |
| P3 | 25 | 60 | **35** |
| P4 | 15 | 15 | **0** |
| P5 | 10 | 20 | **10** |
| P6 | 10 | 10 | **0** |

D.

Total time taken = 120 units

Time for which CPU is busy = 120 - 15 = 105 units

CPU Utilization rate = Time for which CPU is busy / Total time

CPU Utilization rate = 105 / 120 = 0.875 or 87.5%

Q7.

1. Total processes = 5;

1 creating process, 2 parent processes, 2 child processes.

1. Total threads = 2;

Since only 2 children can go into if block, only 2 threads will be created

Q8.

1. Child value = 5
2. Parent = 0

Since at pid==0 a child process is created, the call to runner assigns the value 5 and exits and p stays at 0 because pid > 0