Can BEYAZNAR
161044038

CSE 312 HOMEWORK 2

1) Sample Running Instructions

A) SPIMOS_GTU_1.S

```
cse312@ubuntu:~/Desktop/spimsimulator-code-r730/CPU$ spim load SPIMOS_GTU_1.s
Loaded: /usr/share/spim/exceptions.s

index of filename : 0

name of file : BinarySearch.asm

index of filename : 1

name of file : LinearSearch.asm

index of filename : 2

name of file : Collatz.asm


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194432
Start_PC : 4194304
End_PC : 4194444
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1

ProcessID : 1
ProcessName : BinarySearch.asm
Process_State : Running
CurrentProgramCounter : 4194444
Start_PC : 4194444
End_PC : 4194692
parent_process : 0
```

```
-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1

ProcessID : 1
ProcessName : BinarySearch.asm
Process_State : Running
CurrentProgramCounter : 4194444
Start_PC : 4194444
End_PC : 4194692
parent_process : 0


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 2

ProcessID : 2
ProcessName : LinearSearch.asm
Process_State : Ready
CurrentProgramCounter : 4194692
Start_PC : 4194692
End_PC : 4194864
parent_process : 1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 3

ProcessID : 3
ProcessName : Collatz.asm
Process_State : Ready
CurrentProgramCounter : 4194864
Start_PC : 4194864
End_PC : 4195196
parent_process : 2


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-
```

```
-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

PC: 4194444

46 is in the list.


Terminated -> ProcessID : 1



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194432
Start_PC : 4194304
End_PC : 4194444
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1

ProcessID : 2
ProcessName : LinearSearch.asm
Process_State : Running
CurrentProgramCounter : 4194692
Start_PC : 4194692
End_PC : 4194864
parent_process : 1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-
```

```
-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 2

ProcessID : 3
ProcessName : Collatz.asm
Process_State : Ready
CurrentProgramCounter : 4194864
Start_PC : 4194864
End_PC : 4195196
parent_process : 2


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

PC: 4194688

28 is in the list.
The index of value is : 2


Terminated -> ProcessID : 2



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194432
Start_PC : 4194304
End_PC : 4194444
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1
```

```
-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1

ProcessID : 3
ProcessName : Collatz.asm
Process_State : Running
CurrentProgramCounter : 4194864
Start_PC : 4194864
End_PC : 4195196
parent_process : 2


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

PC: 4194860

1 : 1
2 : 2 1
3 : 3 10 5 16 8 4 2 1
4 : 4 2 1
5 : 5 16 8 4 2 1
6 : 6 3 10 5 16 8 4 2 1
7 : 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
8 : 8 4 2 1
9 : 9 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
10 : 10 5 16 8 4 2 1
11 : 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
12 : 12 6 3 10 5 16 8 4 2 1
13 : 13 40 20 10 5 16 8 4 2 1
14 : 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
15 : 15 46 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
16 : 16 8 4 2 1
17 : 17 52 26 13 40 20 10 5 16 8 4 2 1
18 : 18 9 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
19 : 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
20 : 20 10 5 16 8 4 2 1
21 : 21 64 32 16 8 4 2 1
22 : 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
23 : 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
24 : 24 12 6 3 10 5 16 8 4 2 1
25 : 25 76 38 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1


Terminated -> ProcessID : 3



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-
PC: 4194860

1 : 1
2 : 2 1
3 : 3 10 5 16 8 4 2 1
4 : 4 2 1
5 : 5 16 8 4 2 1
6 : 6 3 10 5 16 8 4 2 1
7 : 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
8 : 8 4 2 1
9 : 9 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
10 : 10 5 16 8 4 2 1
11 : 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
12 : 12 6 3 10 5 16 8 4 2 1
13 : 13 40 20 10 5 16 8 4 2 1
14 : 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
15 : 15 46 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
16 : 16 8 4 2 1
17 : 17 52 26 13 40 20 10 5 16 8 4 2 1
18 : 18 9 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
19 : 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
20 : 20 10 5 16 8 4 2 1
21 : 21 64 32 16 8 4 2 1
22 : 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
23 : 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
24 : 24 12 6 3 10 5 16 8 4 2 1
25 : 25 76 38 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1


Terminated -> ProcessID : 3



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194432
Start_PC : 4194304
End_PC : 4194444
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

cse312@ubuntu:~/Desktop/spimsimulator-code-r730/CPU$
```

B) SPIMOS_GTU_2.s

```
CurrentProgramCounter : 4194636
Start_PC : 4194304
End_PC : 4194656
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 1

ProcessID : 3
ProcessName : Collatz.asm
Process_State : Running
CurrentProgramCounter : 4195320
Start_PC : 4195320
End_PC : 4195652
parent_process : 2


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

PC: 4195320



Terminated -> ProcessID : 3



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194636
Start_PC : 4194304
End_PC : 4194656
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-
```

C) SPIMOS_GTU_3.s

```
CurrentProgramCounter : 4195796
Start_PC : 4196032
End_PC : 4196364
parent_process : 5


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

PC: 4195796

16 8 4 2 1
10 : 10 5 16 8 4 2 1
11 : 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
12 : 12 6 3 10 5 16 8 4 2 1
13 : 13 40 20 10 5 16 8 4 2 1
14 : 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
15 : 15 46 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
16 : 16 8 4 2 1
17 : 17 52 26 13 40 20 10 5 16 8 4 2 1
18 : 18 9 28 14 7 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
19 : 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
20 : 20 10 5 16 8 4 2 1
21 : 21 64 32 16 8 4 2 1
22 : 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1
23 : 23 70 35 106 53 160 80 40 20 10 5 16 8 4 2 1
24 : 24 12 6 3 10 5 16 8 4 2 1
25 : 25 76 38 19 58 29 88 44 22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1


Terminated -> ProcessID : 6



-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Index : 0

ProcessID : 0
ProcessName : init
Process_State : Ready
CurrentProgramCounter : 4194580
Start_PC : 4194304
End_PC : 4194612
parent_process : -1


-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

cse312@ubuntu:~/Desktop/spimsimulator-code-r730/CPU$
```

2) Report

In this assignment, I made the syscals mentioned first. Each kernel first calls init syscall and creates the process table. Then I ran the waitpid to prevent the kernel from being interrupt while loading the file. After the kernel reads all the files, the waitpid is removed and continues to be interrupt. While being interupt, the interupt handler works. interupt handler performs the necessary checks before making a context switch (Is it the last remaining process in Process table? Is there a process to delete? etc.). Then the context switch process starts. If the process it is in is completely finished, it deletes it and runs the next one from it. It updates the registers and pc in the spim before running. If there is no delete operation, the data of the currently running process is updated (Register values and pc value are changed.), And the values of the next process are assigned to the spim registers. These processes continue until all processes in the process table are deleted (except init process). Also, whenever there is a context switch, the process table is printed. In addition, I produced a solution to check whether the process table is empty. In this solution method, I assign the value 99 to the R[REG_A1] parameter if all processes are finished. And my kernels stay in the loop until my $a1 register is 99. Thus, the kernel continues to run until all processes are finished

In some cases, the articles he writes on the terminal can be complicated. Or Collatz.asm can go into an infinite loop when it runs a lot. I tried to solve these problems as much as I could. However, these problems can be observed even if they are not very common. I think these problems are caused by syscalls. If there is an interrupt in any writing operation, these problems generally occur.