MP5: Simple Kernel Threads

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CSCE611: Operating System

Assigned Tasks:

Main: Completed.
Bonus: Option 1 completed.

System Design:

1. FIFO Scheduler with interrupts enable so that interrupts are handled in between the normal thread execution

Code Description:

I. A simple fifo queue is implemented for adding and removing threads from a ready queue in first in first out method.
II. Interrupts are enabled and whenever a timer interrupt is triggered as per given interval, the normal execution of the thread stops and a indicator is printed out onto the console.

Files modified:

a. Simple_fifo.H – New file
b. thread.C
c. scheduler.C
d. scheduler.H
e. kernel.C

Function Description:

a. **simple_fifo.H**
Logic Used:
There are two functions – add_to_last/next_element Add_to_last function adds the new thread in the back-end of the stack. Next_element() function pops the thread from the head of the stack and provides it the control of the thread to execute.

b. **thread.C**
Logic Used:
thread_shutdown():
During the shutdown of thread, the thread will be terminated and the control will be yielded. The current thread will also be deleted.

thread_start():
Interrupts are enabled when thread start function is called.

c. **scheduler.C**
Logic Used:
We have a FIFO stack initialized and a variable to store the maximum size of the stack.

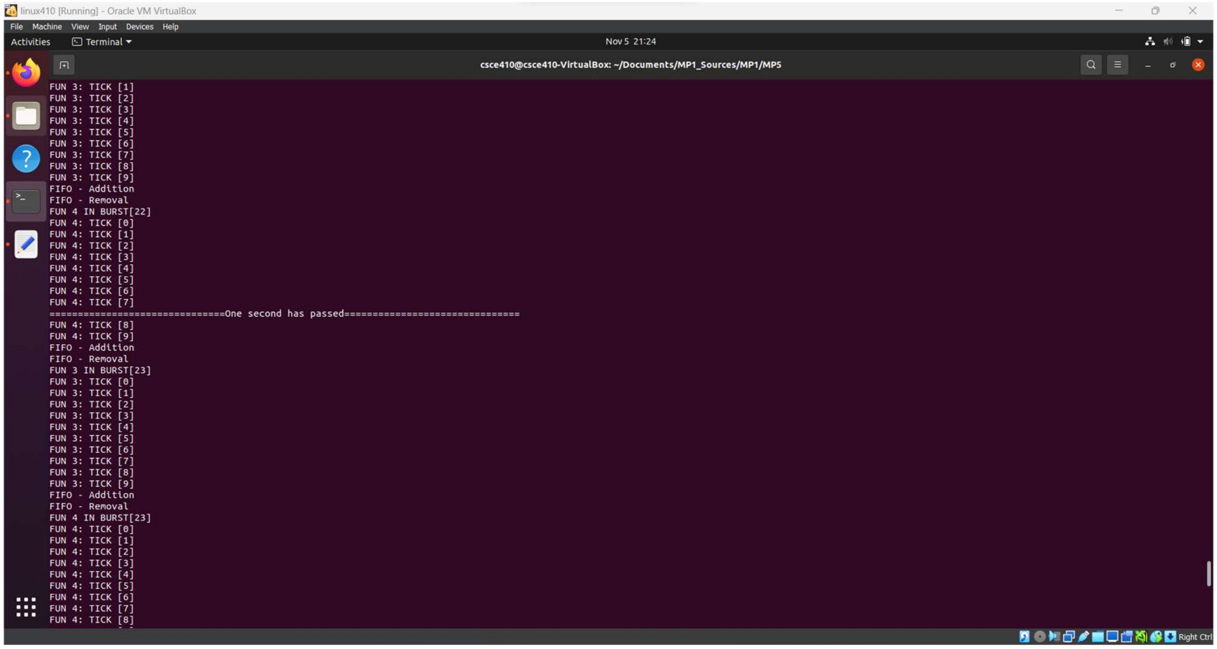
Scheduler():
This constructor initialized the size of the queue.

yield():
When there are more then 0 threads in the stack, the top element of the stack is popped and stored in a variable. The thread is then sent as the input to the dispatch_to function which provides control to the thread.

resume() / add():
Both these function perform similar actions, they inser the current thread to the last of the stack and then increases the size of queue by 1.

terminate():
Traverse through the list to check the thread id of the target thread matches. Once the match is found then reduce the size be 1. If id does not match then add the thread to the tail of the stack.

OUTPUT:


linux410 [Running] - Oracle VM VirtualBox
File Machine View Input Devices Help
Activities
Terminal
Nov 5 21:24
csce410@csce410-VirtualBox: ~/Documents/MP1_Sources/MP1/MP5
Right Ctrl

```
FUN 3: TICK [1]
FUN 3: TICK [2]
FUN 3: TICK [3]
FUN 3: TICK [4]
FUN 3: TICK [5]
FUN 3: TICK [6]
FUN 3: TICK [7]
FUN 3: TICK [8]
FUN 3: TICK [9]
FIFO - Addition
FIFO - Removal
FUN 4 IN BURST[22]
FUN 4: TICK [0]
FUN 4: TICK [1]
FUN 4: TICK [2]
FUN 4: TICK [3]
FUN 4: TICK [4]
FUN 4: TICK [5]
FUN 4: TICK [6]
FUN 4: TICK [7]
===============================One second has passed================================
FUN 4: TICK [8]
FUN 4: TICK [9]
FIFO - Addition
FIFO - Removal
FUN 3 IN BURST[23]
FUN 3: TICK [0]
FUN 3: TICK [1]
FUN 3: TICK [2]
FUN 3: TICK [3]
FUN 3: TICK [4]
FUN 3: TICK [5]
FUN 3: TICK [6]
FUN 3: TICK [7]
FUN 3: TICK [8]
FUN 3: TICK [9]
FIFO - Addition
FIFO - Removal
FUN 4 IN BURST[23]
FUN 4: TICK [0]
FUN 4: TICK [1]
FUN 4: TICK [2]
FUN 4: TICK [3]
FUN 4: TICK [4]
FUN 4: TICK [5]
FUN 4: TICK [6]
FUN 4: TICK [7]
FUN 4: TICK [8]
```