

Operating Systems

CMPT 424

Lab 6

Goals
Memory protection with base and limit tracking
This active learning exercise will help you make progress on the practical aspects of developing your operating system.

- Instructions**
1. Look at your *iProject 3* functional requirements as Issues in GitHub as part of the “*iProject 3*” milestone and make sure that everything is in there.
 2. Increase your memory from 256 bytes to 768 bytes. Be sure that you can map a memory partition number (0,1,2) to the appropriate base address (0, 256, 512).
 3. Add to your Process Control Block as necessary to keep track of where a given process is held in memory.
 4. Add memory protection fields (base and limit memory addresses) to your PCB.
 5. Add other new features as specified in your Issues and *iProject 3*.
 6. Test. (You should be really good at this by now. You better be!)
 7. Read chapter 8.3 in the 8th edition of our text again.
 8. Read chapters 14.1 and 14.3.3 in the 8th edition of our text.

- Questions**
1. What?
 2. Why?

- Resources**
- <http://lwn.net/Articles/250967/>
 - <http://duartes.org/gustavo/blog/post/memory-translation-and-segmentation/>
 - Chapter 13 in <http://pages.cs.wisc.edu/%7Eremzi/OSTEP/>
 - Chapter 15 in <http://pages.cs.wisc.edu/%7Eremzi/OSTEP/>
 - Code to test memory limits:

A9 A9 A2 01 EC 13 00 AC 0B 00 8D F0 00 EE 0B 00 D0 F5 00 00

Grading Your work on this lab will contribute to your grade for *iProject3*.

Submitting Commit your work to your private GitHub account in an appropriately named folder. Make sure to tag your commit messages with the Issue number they address.

The screenshot displays a terminal window on the left with the following output:

```
>load  
Process ID: 0  
>run 0  
>Memory access error from process 0  
>
```

On the right, a dashboard provides system information:

- Log:** Shows two entries for process 0: one in an 'Idle' state at 4:17:25 pm and a 'Memory access error from process 0' at 4:17:19 pm.
- Processes:** A table with columns PID, PC, IR, ACC, X, Y, Z, Priority, State, Location. It indicates 'No programs are in execution'.
- Memory:** A table showing memory addresses from 0x000 to 0x018 in increments of 0x008, with corresponding data values.
- Hard Drive:** A section with a dropdown menu and a table showing drive status for partitions 0:0:0, 0:0:1, and 0:0:2.
- CPU:** Shows 'No Instruction' with a table for PC, IR, ACC, X, Y, Z.
- System Info:** A box containing the hex string 'A9 A9 A2 01 EC 13 00 AC 0B 00 8D F0 00 EE 0B 00 D0 F5 00 00'.

A red curved arrow points from the hex string in the System Info box to the memory access error message in the terminal.