Kernel lab report

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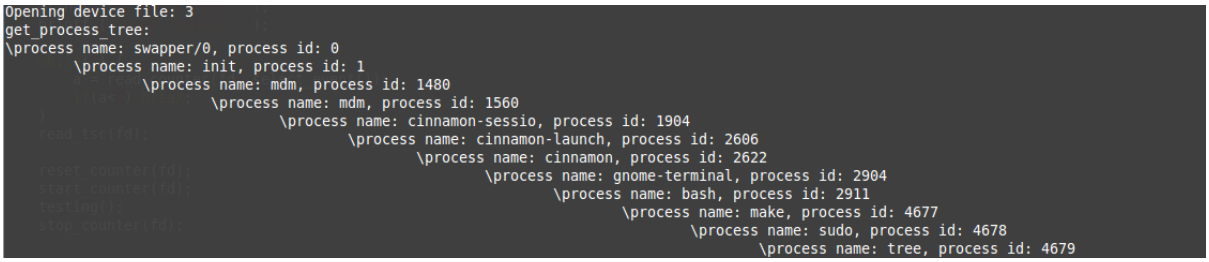
1. Process tree

We implemented a kernel module (chardev) that prints all of the parent processes to the root from the process calling the device. The communication has been done using the ioctl() function inside a process, and we have used our own structure containing the process name and the process id. Inside the module, it searches the processes using task_struct and task_struct→parent, and puts the information in our structure, and we simply read the information back from our structure.



2. Program Management Unit

We also implemented a kernel module starting, stopping, resetting, selecting, and reading the PMU counter and also reading the TSC register. For the job in between resetting, starting, and stopping the counter, we thought about doing a simple bubble sort for an array of size 8. You'll have to enter one of the provided options to observe a particular register, and you'll be able to see the differences.

```
Hello! this is PMU counter. We would do some bubble sort. These are options you can choice!
0: exit.
1: uops retired.
2: uops issued.
3. stalled cycles.
4. resource stalls.
5. instr retired.
6. core cycles.
7. ref cycles.
8. all.
Please select PMU event to monitor!
Type your event: 8
Stopping PMU counter...Done! Reseting PMU counter...Done! Reading PMU counter...Done!
uops retired:          0
uops issued:           0
stalled cycles:        0
resource stalls:       0
instr retired:         0
core cycles:           0
ref cycles:            0
TSC: 244350091123
Starting PMU counter...Done!
array[8]: [7, 9, 3, 1, 7, 9, 3, 1]
array[8]: [7, 3, 9, 1, 7, 9, 3, 1]
array[8]: [7, 3, 1, 9, 7, 9, 3, 1]
array[8]: [7, 3, 1, 7, 9, 9, 3, 1]
array[8]: [7, 3, 1, 7, 9, 3, 9, 1]
array[8]: [7, 3, 1, 7, 9, 3, 1, 9]
array[8]: [3, 7, 1, 7, 9, 3, 1, 9]
array[8]: [3, 1, 7, 7, 9, 3, 1, 9]
array[8]: [3, 1, 7, 7, 3, 9, 1, 9]
array[8]: [3, 1, 7, 7, 3, 1, 9, 9]
array[8]: [1, 3, 7, 7, 3, 1, 9, 9]
array[8]: [1, 3, 7, 3, 7, 1, 9, 9]
array[8]: [1, 3, 7, 3, 1, 7, 9, 9]
array[8]: [1, 3, 3, 7, 1, 7, 9, 9]
array[8]: [1, 3, 3, 1, 7, 7, 9, 9]
array[8]: [1, 3, 1, 3, 7, 7, 9, 9]
array[8]: [1, 1, 3, 3, 7, 7, 9, 9]
Stopping PMU counter...Done! Reading PMU counter...Done!
uops retired:     134293
uops issued:      110124
stalled cycles:    86826
resource stalls:    3642
instr retired:    107174
core cycles:       50615
ref cycles:       113850
TSC: 244351156204
Please select PMU event to monitor!
Type your event: 0
Bye!
```