Tutorial 1: RT Services on Linux

1: The improvements observed in A1 with respect to the execution of the task using the standard Linux scheduling services.

While executing both tasks while also running other I/O intensive processes, these were the results:

```
[dmtar@archd LinuxRTServices]$ sudo ./pt p4
Integration value is: 1.552. It took 383988738 ns to compute.
Task p4 inter-arrival time: min: 393408291 / max: 393408291
Task p4 inter-arrival time: min: 393408291 / max: 403283980
Task p4 inter-arrival time: min: 344068021 / max: 403283980
Task p4 inter-arrival time: min: 316668873 / max: 403283980
Task p4 inter-arrival time: min: 316668873 / max: 452003530
```

```
[dmtar@archd LinuxRTServices_84807_xxxxx]$ sudo ./pt p1 30
ID: 2747 RT Priority: 30
Integration value is: 1.561. It took   2636250 ns to compute.
Task p1 inter-arrival time: min: 100496637 / max: 100496637
Task p1 inter-arrival time: min: 99561819 / max: 100496637
Task p1 inter-arrival time: min: 99117919 / max: 100496637
Task p1 inter-arrival time: min: 99117919 / max: 100548805
Task p1 inter-arrival time: min: 99117919 / max: 100773931
```

Figure 1: Process output without RT priority.
Figure 2: Process output after assigning RT priority.

Assigning a real-time priority to the process reduces the necessary time to compute each thread load. In our case, the time to compute the *Heavy_Work* method went from 383 ms to 26 ms. It also reduces the inter-arrival times.

2: The impact of priorities in Assignment A3.

While executing both tasks while also running other I/O intensive processes, these were the results:

```
[dmtar@archd LinuxRTServices_84807_xxxxx]$ sudo ./pt p1 1
ID: 1430 RT Priority: 1
Integration value is: 1.552. It took 168496656 ns to compute.
Task p1 inter-arrival time: min: 158084935 / max: 158084935
Task p1 inter-arrival time: min: 106331571 / max: 158084935
Task p1 inter-arrival time: min: 105184579 / max: 158084935
Task p1 inter-arrival time: min: 105184579 / max: 359171809
Task p1 inter-arrival time: min: 103322326 / max: 359171809
```

```
[dmtar@archd LinuxRTServices_84807_xxxxx]$ sudo ./pt p4 50
ID: 1423 RT Priority: 50
Integration value is: 1.552. It took  25764561 ns to compute.
Task p4 inter-arrival time: min: 100004005 / max: 100004005
Task p4 inter-arrival time: min: 99991850 / max: 100004005
Task p4 inter-arrival time: min: 99991850 / max: 100016645
Task p4 inter-arrival time: min: 99984306 / max: 100016645
```

Figure 3: Process output with RT priority equal to 1.
Figure 4: Process output with RT priority equal to 50.

While running many processes on core CPU0, we verify that the ones running with a higher priority have more concise inter-arrival times, *viz.* the difference between the minimum and the maximum times tend to get lower.

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