**Assignment 4**

**Mitigating data loss**

The ideal solutions to overcome the Data loss in Assignment 3 are to implement:

1. Scenario\_2\_One\_program\_with\_a\_sub\_process
2. Scenario\_3\_One\_process\_with\_two\_threads
3. Two processes - “Scenario\_4\_two\_processes”

The objective of this Assignment is to experiment with concurrency solutions for overcoming data losses.

Things needed for this assignment

1. Virtual application file (Assignment4.ova Download Assignment4.ova). Please download and work on this file to implement the following tasks otherwise you will run into errors.

2. Virtual machine manager (preferably Oracle VM VirtualBox. It is assumed that you already downloaded and installed Oracle VM VirtualBox. If not, please download and install Oracle VM VirtualBox from <https://www.virtualbox.org/wiki/DownloadsLinks> to an external site.

**Task 1: Technique 1: Accept the data stream using the main program and process them using a sub-process.**

Navigate to the Scenario 2 code folder from the terminal using "cd Desktop/Scenario\_2\_-\_One\_program\_with\_a\_sub\_process/Code".

Then compile the following scrips:

* "gcc -o calling\_python\_with\_process calling\_python\_with\_process.c -I/usr/include/python3.8/ -lpython3.8"
* "gcc -o calling\_python\_with\_process\_wait calling\_python\_with\_process\_wait.c -I/usr/include/python3.8/ -lpython3.8"(Any warnings after compiling the scripts can be ignored)

Next, run these 2 scripts in different terminal windows:

* "./calling\_python\_with\_process"
* "./calling\_python\_with\_process\_wait"

Once the program is started in both terminals, send the simulated data by running "./a.out." as per Assignment 3 (Please refer to Step 4: Setting up the ECUSimulator from Assignment 3). This will process the data and the processed time information will be stored in "time.txt".

Finally, modify the "plot.py" file in the "Home" directory to use the "time.txt" files that were created and run the script to generate the new plots. Then, compare the plots to the ones you obtained in assignment 3–do you see any improvements?

*(Modification1: Update the path to your new time file. Modification2: Update the logic in batch\_process\_time function to extract the time information of Time between Start and End from your time file).*

**Task 2: Technique 2: Use one thread to accept the data and another to process them.**

Navigate to the Scenario3 folder from the terminal using "cd Desktop/Scenario\_3-\_One\_process\_with\_two\_threads/Code"

Now compile the script of Scenario3 in the terminal with the following command:

* "gcc -o test\_threads\_single\_process test\_threads\_single\_process.c -lpthread -I/usr/include/python3.8/ -lpython3.8"(Any warnings after compiling the scripts can be ignored)

Now run the compiled script using:

* "./test\_threads\_single\_process"

Once the program is started simulate the data "./a.out.", this will populate the time information of the data processed in "time.txt"

Finally, modify the "plot.py" in the "Home" folder to this file to generate the plot and run the script to generate the new plots. Then, compare the plots to the ones you obtained in task 1–do you see any improvements?

*(Modification1: Update the path to your new time file. Modification2: Update the logic in batch\_process\_time function to extract the time information of Time between Start and End from your time file)*

**Task 3: Technique 3: Use one process to accept the data and another to process them.**

Navigate to the Sceanrio4 folder from the terminal using "cd Desktop/Scenario\_4\_–\_two\_processes’/Code"

Once you are in this folder compile the following scripts

* "gcc -o first\_program first\_program.c -lpthread -I/usr/include/python3.8/ -lpython3.8"
* "gcc second\_program.c -o second\_program -I/usr/include/python3.8/ -lpython3.8" (Any warnings after compiling the scripts can be ignored)

Next, run the scripts in different terminal windows.

* "./first\_program"
* "./second\_program"

Now send the simulated data using "./a.out."

Once the data is processed the information on time taken for processing will be stored in "time\_program\_1.txt" and "time ram \_2.txt". (Note: time\_program\_1.txt will be generated once you terminate both the programs with ctrl+c in the terminal)

Now modify the "plot.py" in the "Home" folder to this file to generate the plot and run the script to generate the new plots. Then, compare the plots to the ones you obtained in task 2–do you see any improvements?

*(Modification1: Update the path to your new time file. Modification2: Update the logic in batch\_process\_time function to extract the time information of Time between Start and End from your time file). Generate separate plots for first and second program.*

**Task 4: Reflection**

1. Which scenario was best and why?
2. What did you learn from this assignment?

**Submission:**

1. Implement all 3 scenarios as per the description above and submit a report that addresses the following questions for each scenario.
2. Describe how the data is being processed. Add your plots to the report.
3. Compare the results with the data loss obtained from assignment 3 and describe your findings in one or two paragraphs.
4. Reflection