

## Computer Architecture - CS2323. Autumn 2023

### Lab-1 (Basic assembly programming)

---

Write an assembly program using RISC-V instructions to add the first 10 integers and then subtract the next five integers. The integer numbers are present in contiguous memory locations starting from address 0x10000000. Each integer number is of size 8 bytes. The final result of the computation should be present in register x10. Use of any other register for intermediate values is as per your choice, but the result must be in x10. Use only `add`, `sub`, `ld` instructions for implementation.

The following code template can be helpful. Tutorial videos are already shared with you.

```
.data
#The following line defines the 15 values present in the memory.
# We would use different values in our evaluation and
# hence you should try various combinations of these values in your testing.
.dword 1000, 1001, 1002, 1003, 1004, 1005, 1006, 1007, 1008, 1009, 523, 524, 525, 533, 512
#(dword stands for doubleword)

.text
#The following line initializes register x3 with 0x10000000
#so that you can use x3 for referencing various memory locations.
lui x3, 0x10000
#your code starts here

#  WRITE YOUR CODE HERE

#The final result should be in register x10
```

Instructions:

1. Use Ripes simulator from:  
[https://github.com/mortbopet/Ripes/releases/download/v2.2.4/Ripes-v2.2.4-linux-x86\\_64.AppImage](https://github.com/mortbopet/Ripes/releases/download/v2.2.4/Ripes-v2.2.4-linux-x86_64.AppImage) - the 2.2.4 version is more stable and reliable than later ones.
2. Configure simulator for 64-bit processor (click on the processor button below File in the top-left and select 64-bit single cycle processor).
3. While doing this exercise, try to use breakpoints, single stepping, etc. features of the simulator for a better understanding. We will need these features when debugging the programs in subsequent assignments. Also, see the corresponding disassembled (translated) code in the right pane.

**Submission instructions:**

1. Submit the assembly code as a file named YOUR\_ROLLNUM.s (e.g., CSYYBTECHXXXXX.s)
2. The assignment should be done individually
3. Copying from others or any other source is strictly prohibited and subject to strict penalty
4. Assignments will be tested for similarity among each other and any violation will be reported appropriately