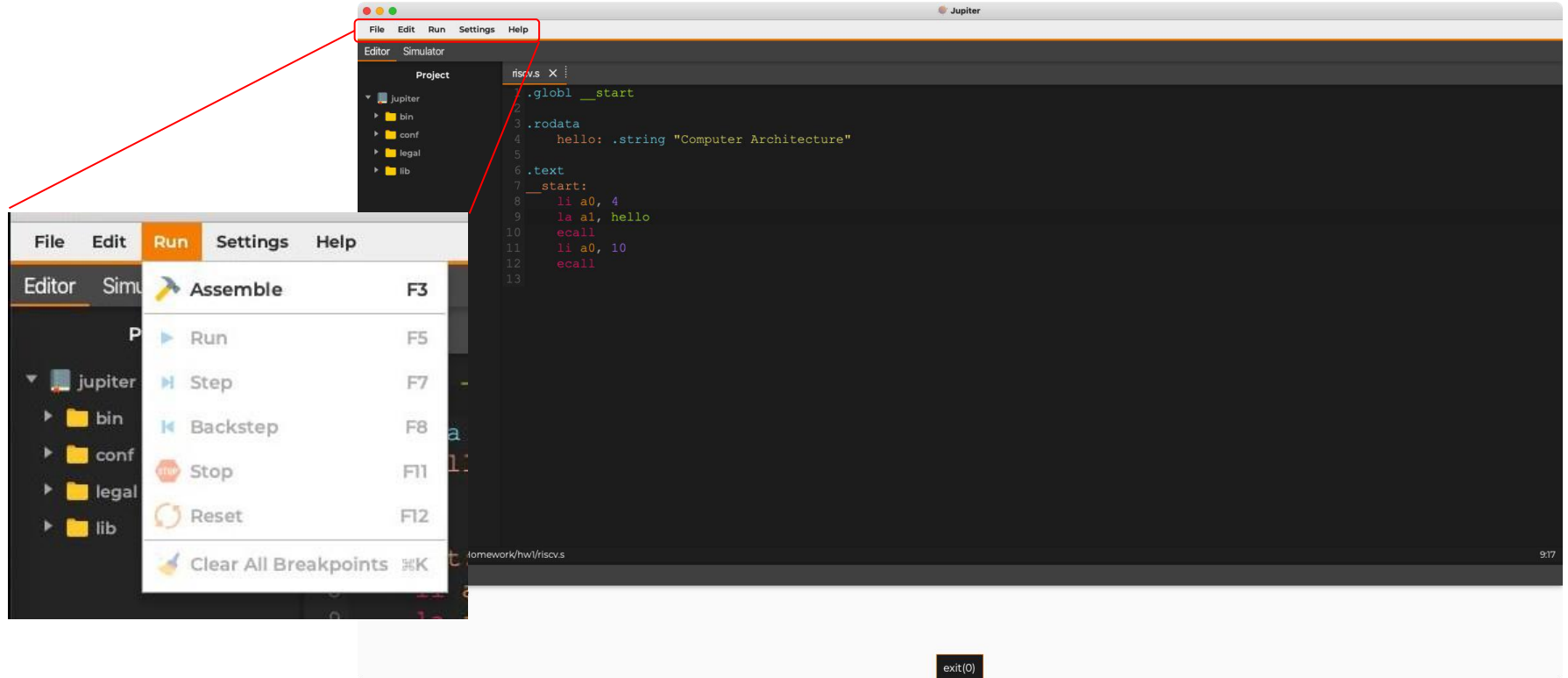# CA2023 Fall HW1

RISC-V Assembly Code

Description

- In this homework, you are going to use Jupiter RISC-V simulator to develop a simple calculator.
- After finishing this homework, you will be familiar with the usage of Jupiter RISC-V simulator, register definition, and some basic operations in RV32I Base Integer Instruction Set.

Jupiter

Jupiter GUI

Jupiter GUI

Jupiter CLI

```
> jupiter riscv.s
Computer Architecture

Jupiter: exit(0)
```

TODO

- You are going to develop a simple calculator, which supports seven operations.
- Addition(0), subtraction(1), multiplication(2), integer division(3), minimum(4), power(5), and factorial(6).

Sample I/O

- Input file contains 3 lines, operand A, operation op, operand B, respectively. ($0 \leq A, B \leq 1024$, op $\in \{0, 1, 2, 3, 4, 5, 6\}$)
- Your program should output the correct result (A op B).

```
> jupiter hw1.s
10
0
10
20

Jupiter: exit(0)
```

```
> jupiter hw1.s
10
1
10
0

Jupiter: exit(0)
```

```
> jupiter hw1.s
10
2
10
100

Jupiter: exit(0)
```

```
> jupiter hw1.s
10
3
0
division by zero

Jupiter: exit(0)
```

Sample Code

- In the sample code, you don't need to do I/O operations by yourself. A, op, B will be stored at register s0, s1, s2 registers.
- You need to store the result to register s3.

```
22 ####################################
23 #    TODO: Develop your calculator   #
24 #                                    #
25 ####################################
```

Sample Code

- If op=3 and B=0, just jump to `division_by_zero_except`

```
38 division_by_zero_except:
39     li a0, 4
40     la a1, division_by_zero
41     ecall
42     jal zero, exit
```

Grading Policy

- Total 100%
  - For operations +, -, x, / and min, each has 4 test cases, 3 points per test case.
  - For operations ^ and !, each has 5 test cases, 4 points per test case.
- We will judge the correctness of your program by running the following command:

```
$ jupiter [student_id].s < input_file
```

- Don't worry about overflow and underflow.
- No need to handle 0^0.
- 10 points off per day for late submission.
- You will get 0 point for plagiarism.

Submission

- Due date: 10/03 23:59 (Tuesday)
- Please rename your program [student_id].s and upload it to NTU COOL.
  - For example, if your student id is b12345678, your program file name should be b12345678.s.