CA2021 Spring HW3

RISC-V Assmbly Code

Description

- In this homework, you are going to use Jupiter RISC-V simulator to implement a function, which calculate a recurrence relation equation.
- You will be familiar with the behavior of a function call after you finish this homework.

TO-DO

- You are going to implement a function, which calculate recurrence relation T(n) without using pseudo-instruction.

$$T(n) = \begin{cases} T(n-100) + 2 \times T\left(\left\lfloor \frac{n}{2} \right\rfloor\right) + 5 & if\ n > 1 \\ 1 & otherwise \end{cases}$$

$0 \leq n \leq 1024$, and $n \in \mathbb{N}$.

- Input: an integer n.
- Output: an integer, that is the result of T(n).

Caller-saved or Callee-saved Registers

- RISC-V Green Card

REGISTER NAME, USE, CALLING CONVENTION ④

REGISTER	NAME	USE	SAVER
x0	zero	The constant value 0	N.A.
x1	ra	Return address	Caller
x2	sp	Stack pointer	Callee
x3	gp	Global pointer	--
x4	tp	Thread pointer	--
x5-x7	t0-t2	Temporaries	Caller
x8	s0/fp	Saved register/Frame pointer	Callee
x9	s1	Saved register	Callee
x10-x11	a0-a1	Function arguments/Return values	Caller
x12-x17	a2-a7	Function arguments	Caller
x18-x27	s2-s11	Saved registers	Callee

Sample I/O

```
r09922113@linux1 [~/CA] jupiter -b hw3.s
0
1

Jupiter: exit(0)
r09922113@linux1 [~/CA] jupiter -b hw3.s
5
22

Jupiter: exit(0)
```

Grading Policy

- We will judge the correctness of your program on CSIE workstation.

  ```
  $jupiter -b [student_id]_hw3.s < input_file
  ```

- Pseudo-instruction (e.g. li, ret...) is not allowed.
- Time limit: 30 seconds per testcase.
- 10 points off per day for late submission.
- You will get 0 point for plargism.

Submission

- Due date: 4 / 13 23:59 (Tuesday)
- Please rename your program **[student_id]_hw3.s**(lowercase) and upload it to NTU COOL.

Reference

- Jupiter RISC-V simulator

  https://github.com/andrescv/Jupiter
- Jupiter RISC-V simulator docs

  https://github.com/JupiterSim/Docs