

CSCE-231/2303 Spring 2020

Assignment 5: MIPS, RISC-V and x86

Programming

Assigned: Sunday, 22-3-2020

Due: Tuesday, 31-3-2020

Delayed submission with penalty until Thursday, 2-4-2020

Goals

This assignment is an individual assignment and you will work on it on your own. The goal of this assignment is to write the same problem with three different methods.

Implementation

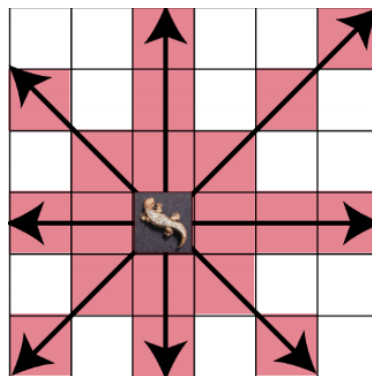
You are required to write the following problem using 1) MIPS using MARS simulator, 2) RISC-V using RARS simulator and 3) x86 using the VM you have installed for assignment 4.

Details

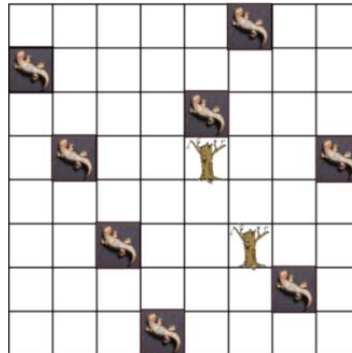
Baby Lizards problem (You should solve it using bitwise operations)

This problem is a fun twist on the N-Queen problem. To know more about the main N-Queen problem, you should read this link carefully: <http://gregtrowbridge.com/a-bitwise-solution-to-the-n-queens-problem-in-javascript/>

You have some baby lizards to be placed in a nursery (Square matrix). Each baby lizard can shoot out its tongue up, down, left, right and diagonally and eat another baby one. Moreover, their tongues are very long so they can shoot out to reach the edge of the nursery as shown in the below figure.



In your nursery, there are some trees planted in different places. Your baby lizards cannot shoot their tongues through the trees. Moreover, you can't move a lizard into the same place as a tree as shown in the below figure.



It's expected that the input of your program is the size of your nursery and the places of the planted trees. And the output is a matrix which has 1s for the blocks where the baby lizards and 2s for the trees.

For the figure shown above, your program should output this matrix:

```
{0, 0, 0, 0, 0, 1, 0, 0}
{1, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 0, 0, 1, 0, 0, 0}
{0, 1, 0, 0, 2, 0, 0, 1}
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 1, 0, 0, 2, 0, 0}
{0, 0, 0, 0, 0, 0, 1, 0}
{0, 0, 0, 1, 0, 0, 0, 0}
```

Important: You can refer to this link for more clarification

<https://www.freecodecamp.org/news/how-to-solve-the-baby-lizards-problem-a-fun-variant-on-the-n-queens-problem-a6980f5e72a/>

Test Case

Sample Input:

Size of board: 8

Board:

```
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 0, 0, 2, 0, 0, 0}
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 0, 0, 0, 2, 0, 0}
{0, 0, 0, 0, 0, 0, 1, 0}
{0, 0, 0, 0, 0, 0, 0, 0}
```

Sample Output:

```
{0, 0, 0, 0, 0, 1, 0, 0}
{1, 0, 0, 0, 0, 0, 0, 0}
```

```
{0, 0, 0, 0, 1, 0, 0, 0}
{0, 1, 0, 0, 2, 0, 0, 1}
{0, 0, 0, 0, 0, 0, 0, 0}
{0, 0, 1, 0, 0, 2, 0, 0}
{0, 0, 0, 0, 0, 0, 1, 0}
{0, 0, 0, 1, 0, 0, 0, 0}
```

What to submit

1. Your full in-line documented source code; it should include a main program that has some test cases that shows how your functions work.
2. A PDF report that includes:
 - a. Any assumptions you have made.
 - b. Your design approach to implement these function and why do you think it is the most optimum approach.
 - c. Screenshots for your running program.

How to submit:

Compress all your work: source code, report, readme file, and any extra information into a zip archive. You should name your archive in the specific format <Student_ID>_<Name>_Assignment5.zip. Finally, upload your code to blackboard.

Grade

This assignment is worth 5% of the overall course grade. The assignment will be graded on a 100% grade scale, and then will be scaled down to the 5% its worth. The grading of the assignment will be broken down as follows:

1. 10 % for just submitting a meaningful assignment before or on the due date. This 10% does not account for the correctness of your assignment but submitting an empty assignment without code will definitely results in loosing this 10% and consequently the whole grade of this assignment.
2. 65 % for the correctness and the quality of your code.
3. 25 % for the quality of your inline documentation and the readme file.

Delays

You have up to 2 working days of delay, after which the assignment will not be accepted and your grade in that case will be ZERO. For every day (of the 2 allowed days), a penalty of 10% will be deducted from the grade. And of course you will lose the 10% mentioned in point 1 above under the “Grade” section.