Computer Organization Spring2023
HW1: MIPS Programming

Homework 1 Description

- 1-a: Factorial (0%)
- 1-b: Hourglass (30%)
- 1-c: GCD (30%)
- 1-d: Prime (40%)

1-a: Factorial

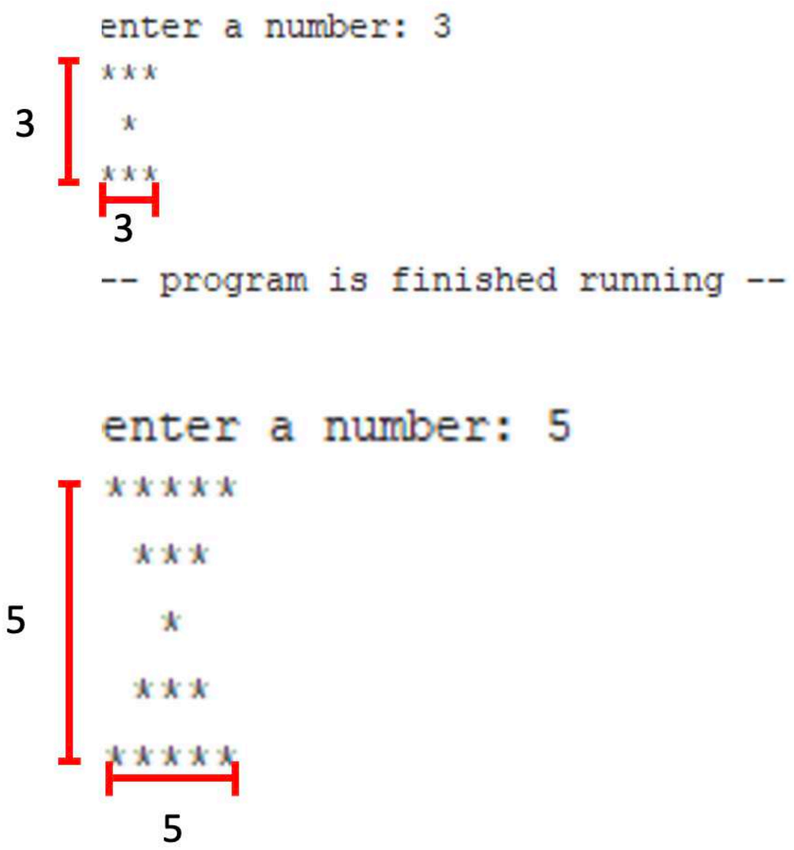
- The attached files factorial.c and factorial.s are modified from the example given in textbook for computing n!.
- In this part, please execute factorial.s on MIPS simulator MARS for practice.

1-b: Hourglass

- Give an input number and draw a hourglass
- Please refer to *hourglass.cpp* for input and output formats and algorithm.
- Input number will be a non-negative number (3~100).

1-b: Hourglass

- Example




```
Reset: reset completed.

enter a number: 4
****
 **
 **
****

-- program is finished running --


Reset: reset completed.

enter a number: 6
******
 ****
  **
  **
 ****
******
```

1-c: GCD

- Read two integers from standard input and output their greatest common divisor.
- Input range: positive integers within reasonable range(excluding 0).
- Please refer to *gcd.cpp* for input and output formats and algorithm.
- Note: separate the two input numbers by pressing Enter, and there should be a space before the numbers. The output does not need to end with a new line.

1-c: GCD

- Example

  Input :

  Enter first number: 56

  Enter second number: 49

  Output :

  The GCD is: 7

1-d: Prime

- Please determine whether the input integer is a prime number, and output the result.
- If it is not a prime number, also output the closest prime number to the input number.
- if there are two prime numbers with the same distance, both should be output.
- Input range: non-negative integers within reasonable range(excluding 0 and 1).
- Please refer to *prime.cpp* for input and output formats and algorithm.
- Note : when outputting, there should be a space before each number, and the output does not need to end with a new line.

1-d: Prime

- Example 1

  Input:

  Enter the number n = 17

  Output:

  17 is a prime

- Example 2

  Input:

  Enter the number n = 22

  Output:

  22 is not a prime, the nearest prime is 23

- Example 3

  Input:

  Enter the number n = 30

  Output:

  30 is not a prime, the nearest prime is 29 31

Notes

- For every task, the corresponding implement in C is provided.
- There's no strict regulation of input and output format string, but try to be as clear as you can. You can follow the format in reference .c files.
- Late submission will have 20% penalty per day.
- For all the tasks, test cases and results will not overflow 32-bit registers.
- Any assignment work by fraud will get a zero point.

Notes

- The files you should hand in include:
    1. hourglass.s
    2. GCD.s
    3. prime.s
- Please compress these files into one zip file, and name your zip file as HW1_studentID.zip.
- Due date: 2023/03/23(Thursday) 23:59:59

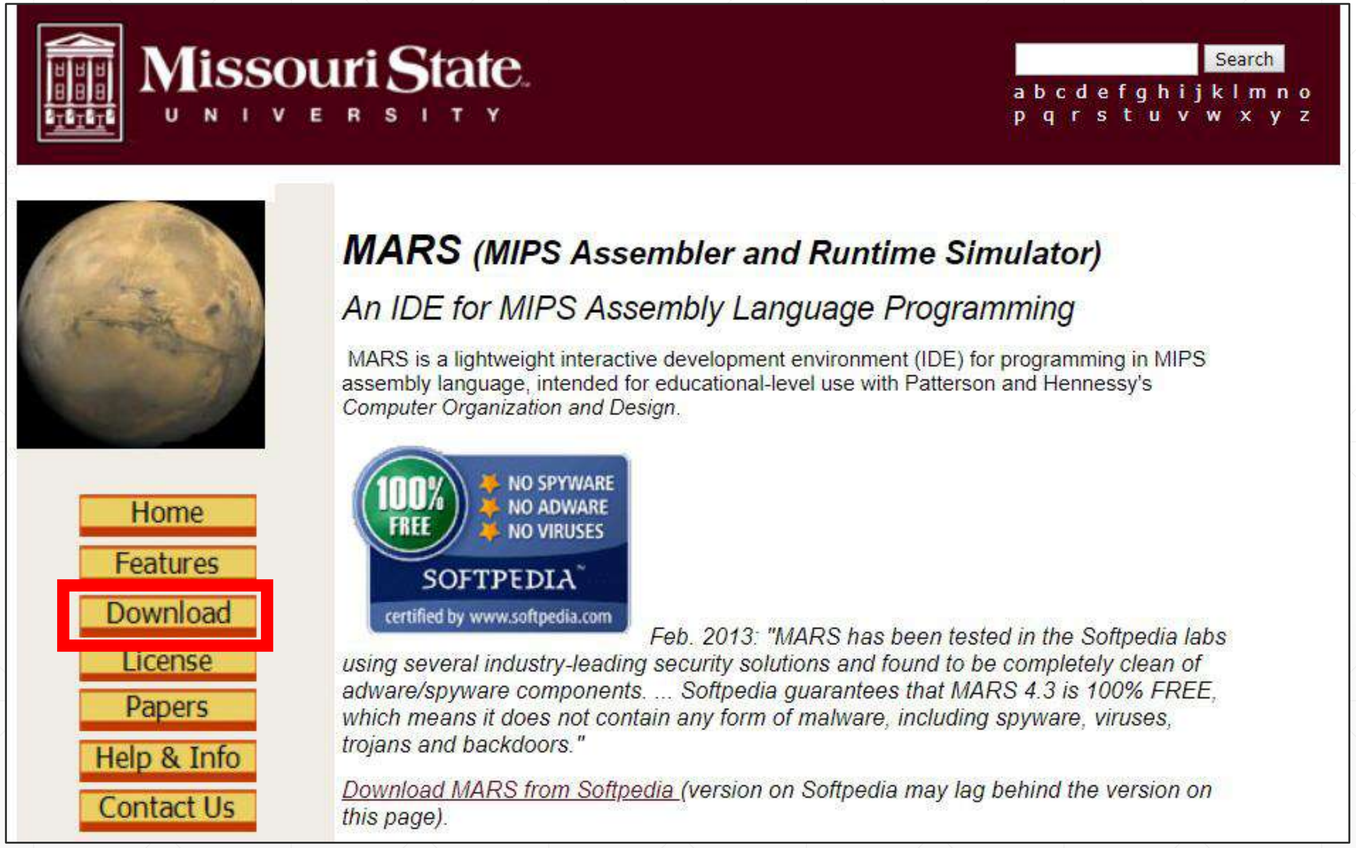
Download and Using MARS

- Download and installation:
  - Download MARS from the page:

    http://courses.missouristate.edu/KenVollmar/MARS/
  - Download the version chosen by yourself, and install it
- Steps for running a MIPS code on MARS:
  1. File ->New
  2. Write MIPS code
  3. Run -> Assemble (F3)
  4. Run -> Go (F5)

MARS

http://courses.missouristate.edu/KenVollmar/mars/



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2 Download MARS V4.5, Aug. 2014 (jar archive including Java source code)

Note: Is your MARS text unreadably small? Download and use a new release 1 Java 9, which contains a fix to automatically scale and size AWT and Swing components for High Dots Per Inch (HiDPI) displays on Windows and Linux. Technical details.

Previous MARS version: MARS v4.4, Aug. 2013

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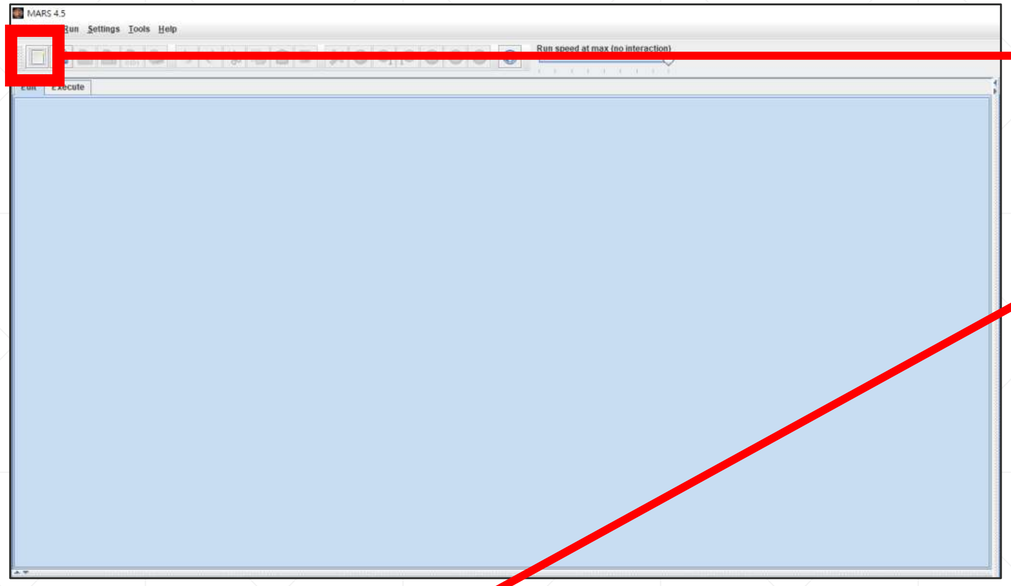
Windows	150.94 MB	jdk-11.0.2_windows-x64_bin.exe

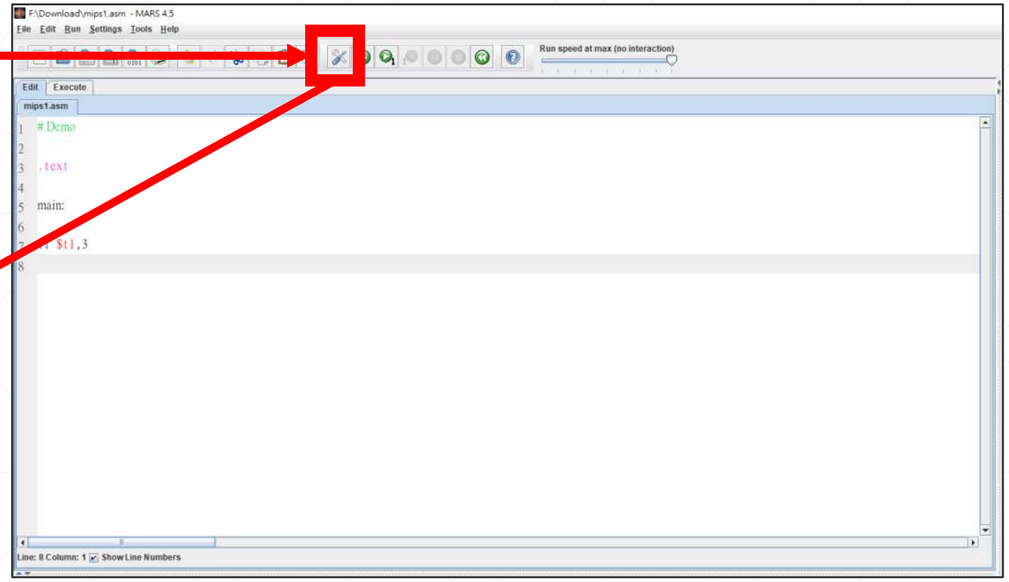
1

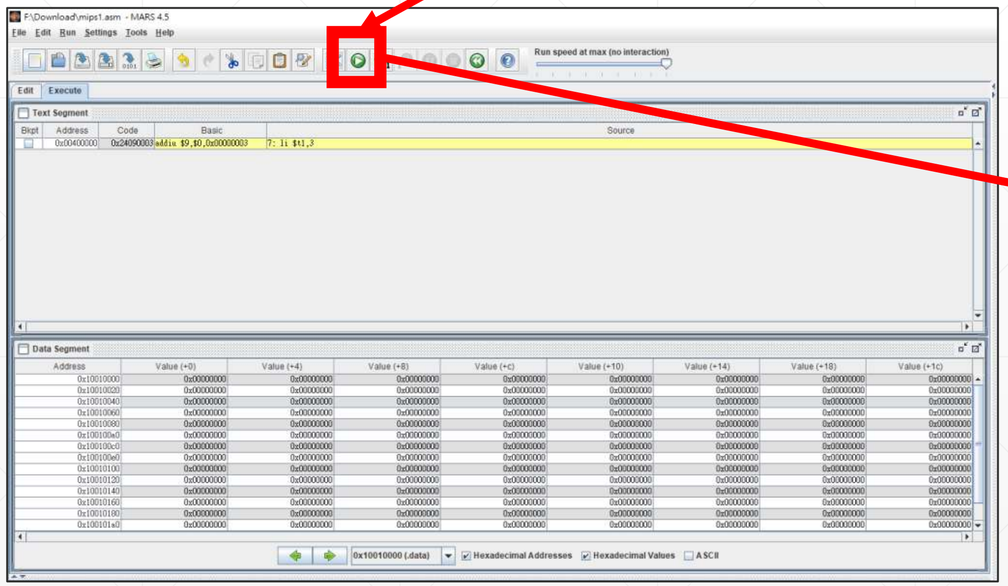
jdk-11.0.2_windows-x64_bin.exe

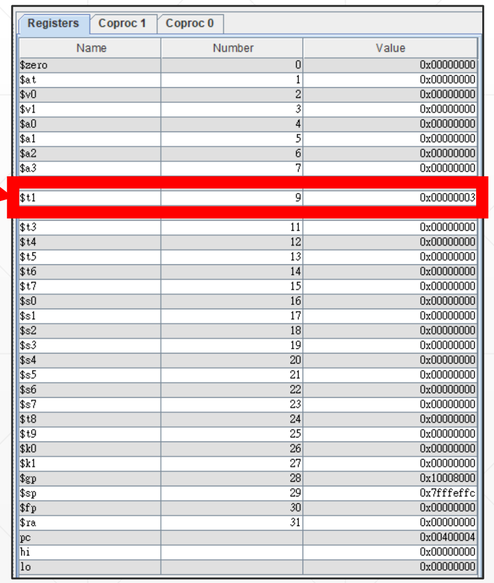
2

Mars4_5.jar










```
# Demo

.text

main:

li $t1,3
```