

## **Assignment - 3 Lab Assignment**

**CSL3020: Computer Architecture  
AY 2024-25, Semester – V  
Due on: 8-09-2024**

**Total:50 Marks**

### **General Instructions:**

- 1. Clearly mention the assumptions you have made, if any.**
- 2. Clearly report any resources you have used while attempting the assignment.**
- 3. Any submission received in another format or after the deadline will not be evaluated.**
- 4. Make sure to add references to the resources that you have used while attempting the assignment.**
- 5. Plagiarism of any kind will not be tolerated and will result in zero marks.**

### **Submission Guidelines:**

- 1. Submit a single report depicting methods, results, and observations. Preparing a report is mandatory; failing it will lead to non-evaluation of the assignment.**
- 2. Name your report as YourRollNo.pdf. And your program codes as yourRollNo.asm**
- 3. There is no need to make a zip file. Just upload the report and program directly on the google-classroom, that is, submission will contain{YourRollNo.pdf, YourRollNo.asm}. Do not upload files in any other format.**
- 4. Do not copy-paste screenshots, etc. in the report. The report should look like a technical document, containing plots, tables, etc. whenever necessary.**
- 5. Adhere to the instructions given, failing them may result in a penalty.**
- 6. Late submissions will be penalized with 25% per day after the deadline.**

## Objective:

The purpose of this lab assignment is to familiarize students with the basics of MIPS assembly language. You will write, execute, and debug MIPS programs that perform basic string operations like string concatenation, palindrome etc.

## Instructions:

### 1. Software Installation:

#### ◦ MARS (MIPS Assembler and Runtime Simulator):

1. Visit the official [MARS](#) website.
2. Download the latest version of MARS (MARS4\_5.jar).
3. Ensure you have Java installed on your system. If not, download and install Java from [here](#).
4. Run the MARS4\_5.jar file by double-clicking it or using the command line: `java -jar MARS4_5.jar`.

## Task

### Subtask 1: Concatenate:

(10)

Write a program that concatenates two strings and stores the address of result in a register.

### Subtask 2: Input / Output: Palindrome:

(10)

Write a program that stores the address of a string in a register if the string is a palindrome. The program should print 'P' if the string is a palindrome and 'NP' if it is not.

### Subtask 3: Input / Output: Reverse:

(15)

Write a program that stores the address of the string in a register and prints the reversed string.

### Subtask 4: Input / Output: Size of the String:

(15)

Stores the address of a given null-terminated string in a register. Calculates and prints the size (length) of the string, excluding the null terminator.

## Concatenation:

Concatenation of strings refers to the operation of joining two or more strings end-to-end to form a single string. For example, concatenating "Hello, " and "world!" results in "Helloworld!".

## Palindrome:

A palindrome is a string that reads the same forwards and backwards, ignoring spaces, punctuation, and case. For example, the string "radar" is a palindrome because it remains "radar" when reversed.

## Reverse:

Reversing a string involves rearranging its characters in the opposite order. For instance, reversing the string "hello" results in "olleh".

**Deliverables:**

- MIPS assembly code (submitted as a .asm file).
- A brief report detailing the installation and usage of MARS, along with an explanation of how the program works and its functionality.
- Your report should contain the detailed summary of each section of your code which should reflect your understanding.

**Report should contain the following points:**

- Describe your experience with the MARS software.
- Provide a brief explanation of the MIPS code, focusing on its objective and key operations (e.g., salary calculation).
- Highlight any challenges faced and how you overcame them.
- Summarize the program's output.
- Reflect on what you learned from the assignment and the relevance of MIPS programming in real-world scenarios.

**Evaluation Criteria**

- Correctness: Accurate execution and analysis of the MIPS code.
- Comprehensiveness: Thorough analysis of output and methods
- Clarity: Clear and well-organized report presentation.
- Insightfulness: Depth of understanding and interpretation of performance data.

**Note:**

- **You are required to submit a combined single report and code for both tasks before the deadline for the second task.**
- **Keep the code and screenshots of task one from the lab with you for adding it in the report.**