Indian Institute of Technology Tirupati

CS4100: Computer System Design

Final Evaluation of the CSD Project

1. Write a program to perform a matrix multiplication of two compatible matrices. The program should demonstrate the following capabilities of your programming language.

   - Able to implement the multiplication operation even though the hardware does not have multiplier unit
   - Able to perform compatibility of the two matrices by dimension comparison
   - Demonstrate whether a memory can be allocated dynamically
   - Demonstrate whether your language accept keyboard inputs for matrix and display the results in screen?
   - What is the lines of code in your programming language by writing the most compact code?
   - What is the size of VM code and assembly code when your program is being translated?

   Note: if the programming language does not support all the features asked here, perform the matrix multiplication with compile time declaration.

2. Write a program to perform a following set of operations on a linked-list. To create a node, to insert a node in the existing list, to update the content of the linked list, to delete a node, to erase the complete list. Ensure to test the following features in your programming language.

   - Is your language support abstract data type and dynamic memory allocation to abstract data type?
   - If it does not support, is there any alternative ways to implement ADT and linked list?

3. Implementation of stack using an array where a push and pop operation could be performed. Write one application such as string reverse, parenthesis matching, etc. using your stack. Prefer to implement recursion for such application.

   - Demonstrate function call and recursion while implementing any of the applications.
   - Demonstrate global variable concept which uses heap location of the memory.

4. Write a program to perform merge sort of integer elements given in an array of size n. Implement the divide and conquer strategy for sorting.

5. Write a program to find a substring in a given string of characters. The program should primarily demonstrate the following features.

   - Demonstrate the supported keyboard characters
   - Dealing with characters, end of string etc feature should be demonstrated

6. Additional **5 more** programs of your choice. Write five more short programs to demonstrate specific features of your language. The same program should be used to demonstrate the capabilities of all other system components such as Compiler, Virtual machine, Assembler, and CPU. The demonstration should also include the limitations of your design.