

CSC2002S: Architecture Assignment

MIPS Assembly Programming

MIPS is a family of RISC architectures. The 32-bit version of MIPS has 32 general purpose registers and 32 single precision floating point registers – 2 floating point registers may be combined to store a double precision floating point value. In this assignment, we'll look at MIPS assembly programming using the QtSpim emulator.

Question 1 [30 marks]

Write a program (**question1.asm**) that will receive the number of lines of input, n , followed by n lines of text and will then print them in reverse order. Each line should be stored in memory.

Sample IO:

```
Enter n, followed by n lines of text:
3
one
two
three
The values are:
three
two
one
```

Question 2 [30 marks]

Write a program (**question2.asm**) that will receive a series of positive integers to be added, separated by the '+' operation. Compute the sum of these values. Assume that the input sum has no whitespace.

Sample IO:

```
Enter a sum:
10+4+50+6
The value is:
70
```

Question 3 [40 marks]

Spreadsheets, consisting of units called cells, are useful for summing numbers. Another useful feature of spreadsheets is the ability of cells to reference other cells.

Write a program (**question3.asm**) that will function as a simple 1D spreadsheet. Each cell can consist of either a positive integer or a formula (a reference to another cell). Formulae are denoted with the character '=', eg: '=2' is a reference to cell 2, and that formula should be

replaced with the integer value in cell 2. Cells are indexed from 0. The program should also accept n number of cells, as the first integer will indicate the number of cells, similar to Question 1. The program should then print all cells in order. Finally, the sum of all cells should be printed at the end.

Sample IO:

```
Enter n and formulae:
3
1
2
3
The values are:
1
2
3
6
```

Sample IO (do not include the comments):

```
Enter n and formulae:
5                                #The number of cells
1                                #Cell 0: integer value
2                                #Cell 1: integer value
3                                #Cell 2: integer value
=1                                #Cell 3: formula referencing cell 1
=3                                #Cell 4: formula referencing cell 3
The values are:
1
2
3
2                                #Cell 3 displays cell 1's value
2                                #Cell 4 displays cell 3's value
10                               #Sum of all cells
```

Submission

Create a compressed archive, zip, of all files. Name the zip file with your student number and upload to Automarker.

NOTE:

1. We can determine the end of a string inputted from console by checking for the line feed (LF) character, which has an ASCII code of 0x0A or 10.