

## COE 301/ ICS 233, Term 172

### Computer Architecture & Assembly Language

#### Programming Assignment#3

Due date: Thursday, March 15, 2018

**Q.1.** It is required to write a MIPS assembly program that does the following:

- (i) Ask the user to enter the base of an input number (2-16). Your program should give an error if the entered base is outside the given range and ask the user to reenter the base.
- (ii) Read the entered number in the specified base. Your program should report an error message if an invalid digit is entered. Write a procedure for reading a number in a given base.
- (iii) Ask the user to enter the base he wants the number to be converted to (2-16). Your program should give an error if the entered base is outside the given range and ask the user to reenter the base.
- (iv) Print the number in the required base. Only the significant digits have to be printed. Write a procedure for printing the number in the required base.

A sample execution of the program is shown below:

```
Enter the base of the input number: 10
Enter a number in base 10: 20
Enter the base of the output number: 2
The entered number in base 2 is: 10100
```

```
Enter the base of the input number: 16
Enter a number in base 16: 5A
Enter the base of the output number: 2
The entered number in base 2 is: 1011010
```

```
Enter the base of the input number: 2
Enter a number in base 2: 11011
Enter the base of the output number: 10
The entered number in base 10 is: 27
```

**Q.2.** The greatest common divisor (GCD) of two integers can be computed recursively as follows:

```
int GCD (a, b){
    if (b == 0)
        return a
    else
        return GCD (b, a % b)
}
```

- (i) Write a recursive MIPS function to compute the GCD of two integers. Assume that the two integers numbers will be passed in \$a0 and \$a1 and that the GCD values will be returned in \$v0. Use MIPS programming convention in preserving registers.
- (ii) Write a MIPS program to ask the user to enter two integer numbers, read them and then display their GCD by calling the implemented function in (i).

A sample execution of the program is shown below:

*Enter first integer: 36  
Enter second integer: 24  
GCD of the two integers: 12*

*This assignment can be done by a group of two students. Every group of two students submit only one solution. The solution should be well organized and your program should be well documented. Submit a soft copy of your solution in a zip file. The name of the zip file should be your ID with the new format (i.e. 200157690). Your solution should be submitted in a word or pdf file that contains the following items:*

- i) *Your name and ID*
- ii) *Assignment number*
- iii) *Problem statement*
- iv) *Your solution along with the code*
- v) *Discussion of what worked and what did not work in your program. Include snapshots that demonstrate the working parts of your program. If things did not work and you attempted to solve them, mention that and write about the difficulty that you have faced.*
- vi) *In addition to including your code as part of the solution document, include also the code as a separate file so that the grader can run it and test it for correctness.*