# CSCI 202 Computer Organization II

# MIPS Programming Project

Due February 15th, 12:40PM ET

**Description:**

Assume your Howard ID as a decimal integer is X. Let N = 26 + (X % 11) where % is the modulo operation, and M = N – 10.

You will write a MIPS program that reads a string of *up to* 1000 characters (excluding the trailing carriage return and null character) from user input.

- With single slash (/) as the delimiter, split the input string into multiple substrings (with the slash removed). If there is no slash in the input, the whole input string is considered a substring referred to below.
- For each substring,
  - Pick the characters from '0' to '9' and from 'a' to β and from 'A' to Δ. β stands for the M-th lower case letter and Δ stands for the M-th upper case letter in the English alphabet, where M is as defined at the beginning of the description. Consider each such character as a base-N digit and calculate the sum. The sum is "-" if there are no such characters. In a base-N number, both 'a' and 'A' correspond to the decimal integer of 10, both 'b' and 'B' to 11, and so on, and both β and Δ correspond to N – 1.
  - Output the calculated sum.
- If there are multiple substrings, the output for the substrings should be separated by two spaces with a single slash in between, for example, "2 / 3 / 4".
- The program must exit after processing one single user input.
- The processing of the whole input string must be done in a subprogram *labelled as process_whole_string*. The main program must call *process_whole_string* and pass the string address into it **via the register $a0**. The subprogram parses the string and prints the output as described above. No return value is necessary from the subprogram.
- When processing each substring, *process_whole_string* must call another subprogram *labelled as process_substring*, where the substring address is passed into *process_substring* **via the stack**, and the sum of the substring is returned to Subprogram A **via the register $v0**.

**Sample test cases (assuming the Howard ID is 12345678):**

12345678 % 11 = 4, therefore the base is 26 + 4 = 30, β is 't' and Δ is 'T'.

- Input: C
  Output: 12

- Input: 0/1/2/A/b/T/t/Z/?

  Output: 0 / 1 / 2 / 10 / 11 / 29 / 29 / - / -

- Input: a0 / 123 / 0Ab9

Output: 10 / 6 / 30

- Input: 1 0 / xyz!/2.3.4/ @!A t$ //

  Output: 1 / - / 9 / 39 / - / -

**Requirements:**

- The program must be able to run correctly under QtSpim.
- The program must be named as mips.s.
- The output must have the exact format as specified above. **No other messages or prompts should be printed except the numbers and the error messages.**
- The subprograms must be labelled properly as required.
- All development must be done with Github. A **brand new Github repo** dedicated to this project must be used.
- Specifically, there MUST BE ONE COMMIT for EVERY (or fewer for the last) five lines of new or modified MIPS code (excluding empty lines, and lines with only comment/directives/labels). More frequent commit is fine. With each commit, the commit message must explain the purpose of the added/changed code. **Commits must be made while the program is being developed**. Commits done afterwards are NOT ACCETPABLE.
- **Submissions not fully meeting the above requirements will lose significant portion (≥ 70%) of the credits.**
- Syntax error or program terminating abnormally without output will result in **zero credits**. If the program freezes during execution, a large number of points will be deducted. Therefore, make sure to test your program thoroughly before submission.

**Submission:**

- Add 'csdrli' (the instructor) and 'OnionKnightChong' (the TA) as collaborators to your Github repository.
- Create a plain text file named readme.txt. Such a file can be created with notepad on Windows and TextEdit (in plain text mode) on MacOS. The file should include ONLY the link to your Github repository that can be used to clone your repo.
- Submit the readme.txt file to http://hucs.dynu.net/lij/courses/submit_hw.html under "CSCI 202 - MIPS Programming Project". Anything else must not be submitted.