First Assembly Program

COSC-230
Assignment

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Topics

- Assignment

- Requirements

- Testing

- Plagiarism

- Submission

Task

- You will be writing one assembly function.

- The function calculates both the **product** and **sum** of an array of 32-bit integers.

- The **sum** is returned.
- The **product** is put into a **by-reference** parameter.

Prototype

```
int32_t sum_prod (const int32_t *values,
                  uint64_t num_values,
                  int32_t &product);
```

Name: `sum_prod`

Returns: `int32_t`

Parameters:

- `const int32_t *values` – the array of 32-bit integers.
- `uint64_t num_values` – the total number of elements in the *values array.
- `int32_t &product` – the memory address where you need to store the product of the array.

C++ Version

```cpp
int32_t sum_prod (const int32_t *values,
                  uint64_t num_values,
                  int32_t &product) {
    uint64_t i;
    int32_t sum;

    sum = 0
    product = 1;

    for (i = 0;i < num_values;i++) {
        sum += values[i];
        product *= values[i];
    }
    return sum;
}
```

Requirements

- You must use numeric labels for your for loop.

- Use the ABI names for registers
  - ABI names: t0, a0, s0, etc.
  - Index names: ~~x10, x15, x20~~, etc.

Testing

- Compile using the following command.

```
~> riscv64-unknown-linux-gnu-g++ -o lab lab.cpp lab.S
~> ./lab
```

- Replace lab with the name of your lab file.

- CTRL-D ends the integers, which can be done by holding the control key and pressing the d key.
  - This is called the EOF (end of file) character.

Example #1

```
~> ./lab
Enter values as integers (CTRL-D to stop):
10
20
30
40
50
Sum     = 150
Product = 12000000
```

Example #2

```
~> ./lab
Enter values as integers (CTRL-D to stop):
-5
-1
-3
-1
Sum     = -10
Product = 15
```

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Plagiarism Policy

- This is an **individual assignment**.

- You must NOT be able to see anyone else's code.

- Do NOT send your code and do not accept someone sending you code.

- Do NOT use any online source, such as Chegg, Stackoverflow, etc.

- You MAY use the online notes that I have created for you.

- You MUST cite anyone with whom you worked with, including classmates, students in another class, professors, and TAs.
    - Please note that even if you cite another student, professor, or TA, it does NOT mean you may share code.

- If you cannot attest to the truthfulness of not cheating using the bullets above. DO NOT submit your code. It is better just to get a 0 here and let it be done. If you proceed with copied code, the office of Student Conduct and Community Standards (SCCS) will become involved.

Submission

- Compile and assemble with the following command.

```
~> riscv64-unknown-linux-gnu-g++ -o lab lab.cpp lab.S
~> ./lab
```

- Replace **lab** with the name of your lab.
  - Make sure you have comments in your code, including a header and inline comments.
  - Submit only your .S file.

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