

SYSTEMS I — LAB 7

Procedure calls in assembly

One last time with the MIPS simulator! We're going to write a couple of small programs that use procedures...

1 Your assignment

1.1 `find-max` revisited

Recall, from Lab-6, that you wrote a program named `find-max.s` that search through an array of integers to find a maximum value. For this assignment, you need to revise that program. Specifically, begin by copying a skeleton of the program from my directory:

```
$ cp ~sfkaplan/public/cs16/new-find-max.s .
```

Open the file, and you will see that there are three methods that you write, and then three locations (marked `STEP 1`, `STEP 2`, and `STEP 3` in the comments) where you must call each of those methods in turn. Specifically, the methods you must write are:

- `PrintArray`: Given a pointer to an array and its length, print its contents to the screen, where each row specifies first the *index* and then the *value* at that index. For example, the array `[5, 3, -1, 6]` should appear as:

```
0 5
1 3
2 -1
3 6
```

- `FindMax`: Given a pointer to an array and its length, search for the maximum value in the array and *return the index of that maximum value*.
- `PrintResult`: Print the outcome of the call to `FindMax`, like so:

```
The maximum value is 6, found at index 3.
```

1.2 Calculating exponents

Assume that we have two integers, x and y , where x can have any value, and y must be non-negative. We want a program that will calculate x^y and print the result for us.

Write a program, `calc-exponent.s`, where `$a0` holds the value of x and `$a1` holds the value of y , and `calcexp` is the name of a procedure that calculates x^y .

There are some **important restrictions** on how the `calcexp` procedure can be written. Specifically, it **cannot contain a loop**, nor may it call another method that contains a loop. In order to calculate x^y , take advantage of the following definition:

- $x^0 = 1$
- $x^y = x \times x^{y-1}$, if $y > 0$.

The output of this program should look like this:

```
5 ^ 3 = 125
```

2 How to submit your work

Once again, use the `cs16-submit` command to turn in programming work. Specifically:

```
cs16-submit lab-7 new-find-max.s calc-exponent.s
```

This assignment is due on Friday, November 7, at 11:00 am