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CS 2640.03

Project 2

Project topic: Fibonacci Sequence.

Pseudocode used in the project for the Fibonacci calculation:

```
fib(n):
        a = 0
        b = 1
        for i from 0 to n - 1:
                array [i] = a
                temp = b
                b += a
                a = temp
```

Fibonacci sequence's base case is that the first number in the list is 0 and second is 1. Subsequent numbers are a summation of the previous two numbers. For example, the first eight numbers in the sequence are: {0, 1, 1, 2, 3, 5, 8, 13}.

The project approach is very straightforward and is the iterative way, unlike a common recursive method. First, 0 is stored in a and 1 is stored in b. Then in a loop going over every iteration until n^{th} number requested, the value of a is returned. It's accurate to return a's value because the value is updated every iteration. In the method used for the project, a always get b's value because b holds the value of the next Fibonacci number and is updated every iteration.

The range for input is: [0, 47]. Such specific end number is the limit because in our class, we use MIPS and it's 32 bits. Thus, the maximum value permitted is the one mentioned above and is conveniently calculated through the java code below on the next page:

```
public class calcMaxValue {

	public static void main (String[] args) {

		long a = 0;
		long b = 1;
		int i = 0;
		long size = (long)(Math.pow(2,32)) - 1;

		long array[] = new long[100];

		while (b <= size) {
			array [i++] = a;
			System.out.println(a);
			long temp = b;
			b += a;
			a = temp;
		}

		System.out.println(i); // 47 is obtained from here.

	}
}
```