Lab 1 Basic Debugging with Keil: Lab Report

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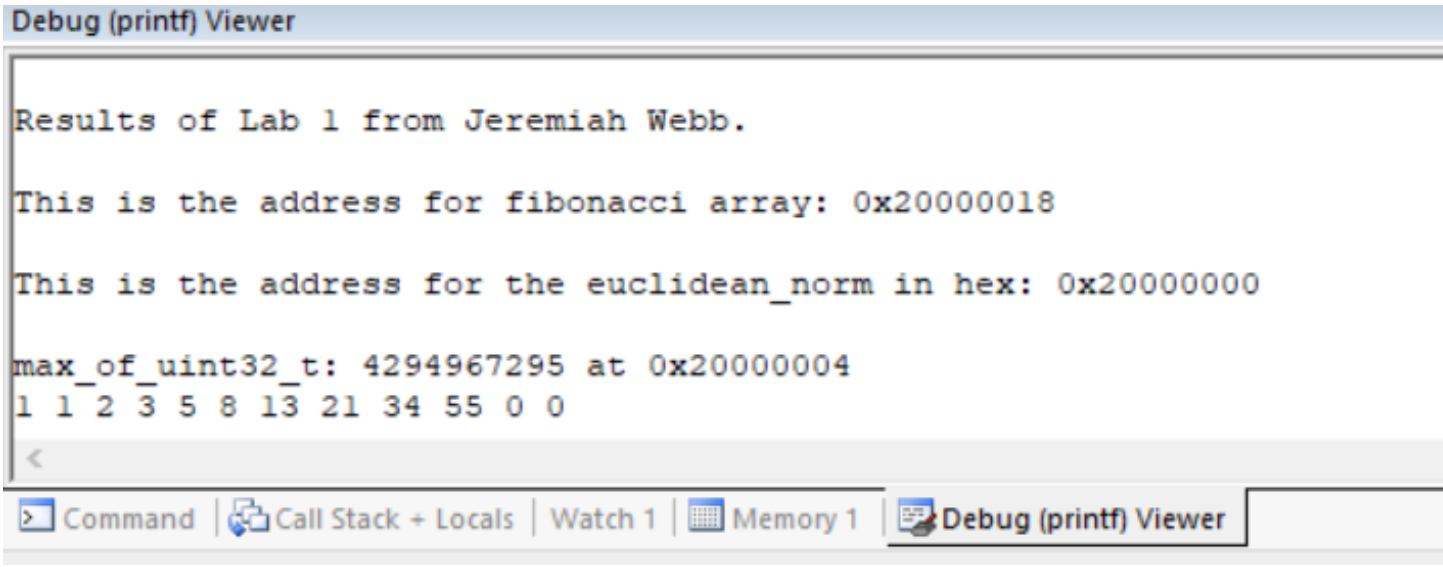
Section #2

Introduction

This lab was used to analyze and understand how students can debug their C programs in Keil MDK-ARM simulator. Students practiced basic debugging techniques such as using the debug (printf) viewer window, the Watch window to display local variables without the use of printing, and the Memory window to display global variables without the use of printing.

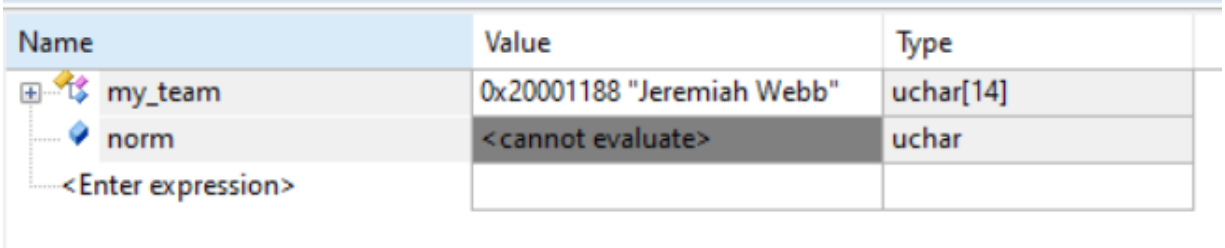
Report Artifacts

Report Artifact 1



For Artifact 1, we can see that the values of fibonacci_array[4] which is 5. However, for the euclidean_norm we cannot see the value, as instructed by form we were not required to print the value of the euclidean_norm. We can see the value of max_of_uint32_t, which is 4294967295.

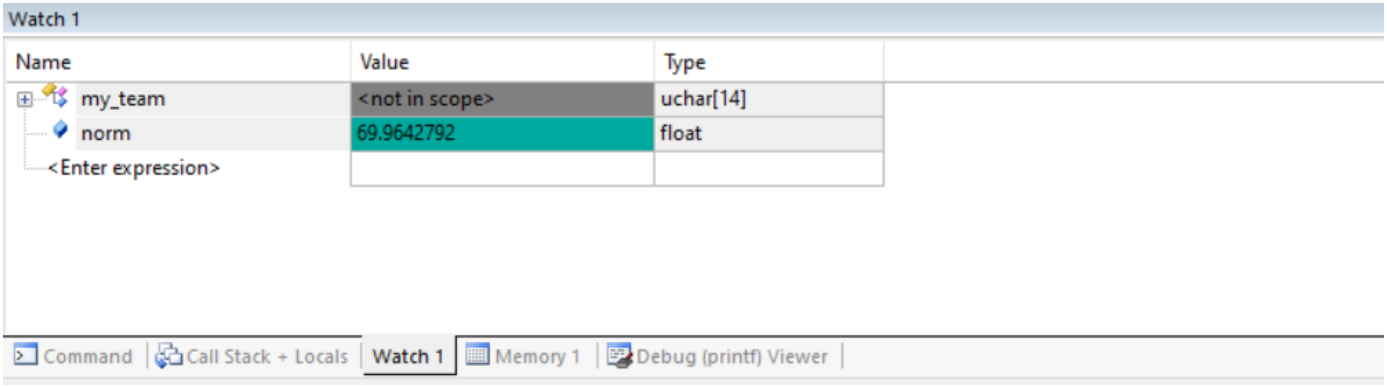
Report Artifact 2a



Name	Value	Type
my_team	0x20001188 "Jeremiah Webb"	uchar[14]
norm	<cannot evaluate>	uchar
<Enter expression>		

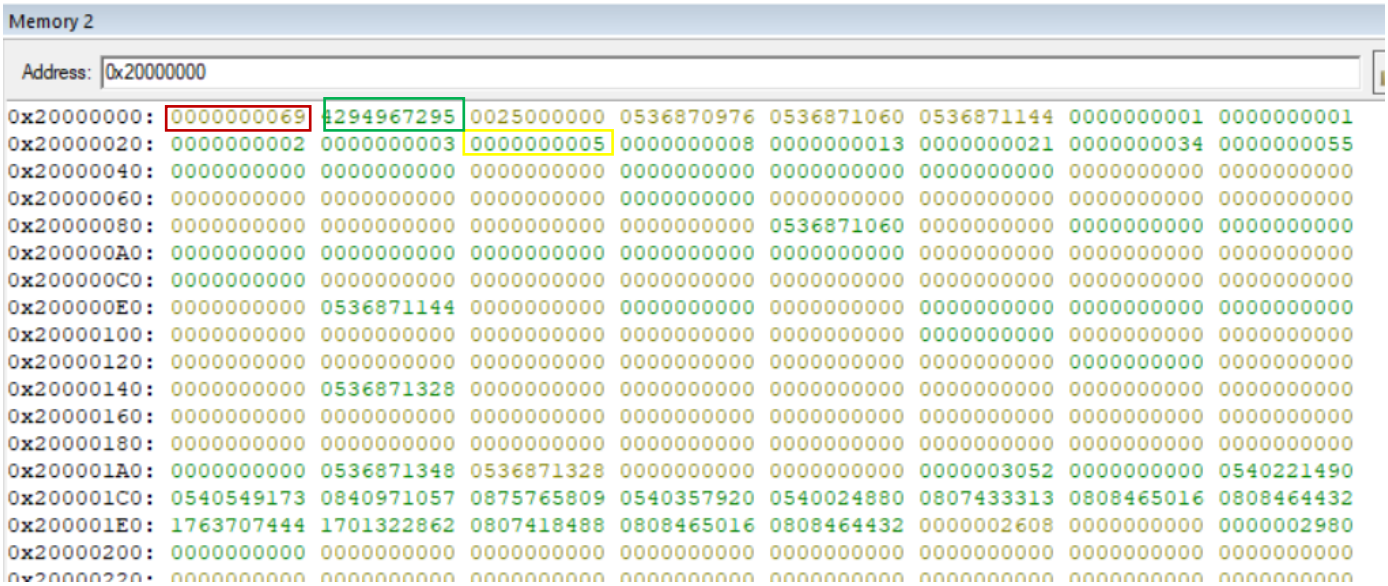
The value of “my_team” is Jeremiah Webb, its type is a character array.

Report Artifact 2b



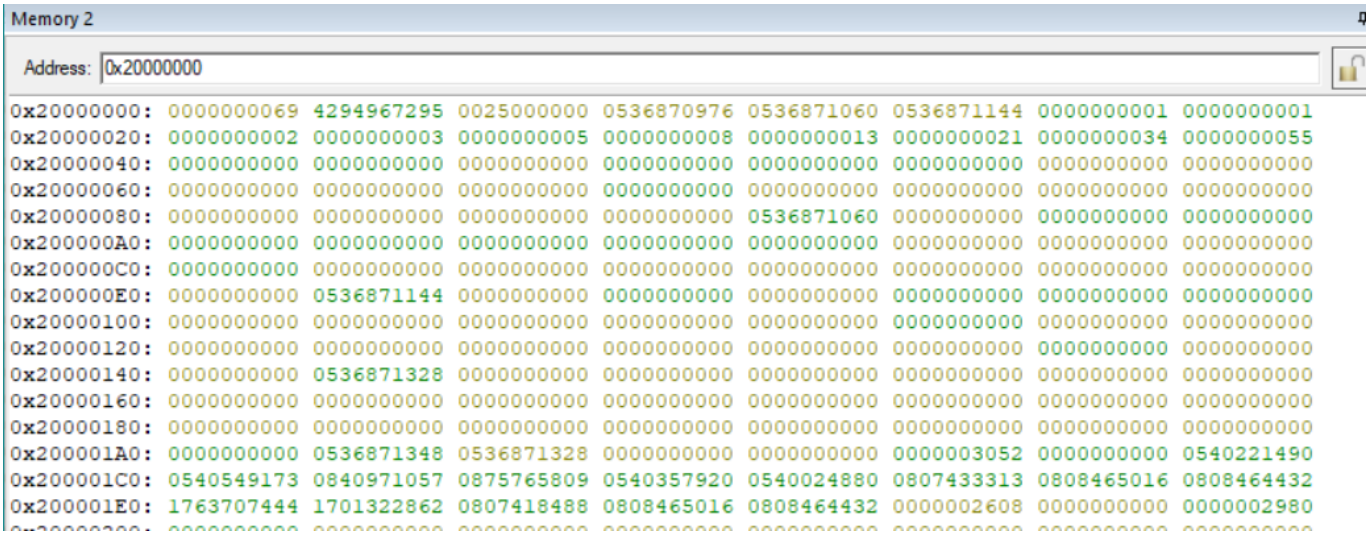
The value of “norm” is 69.9642792, its type is a float.

Report Artifact 3



In the yellow box one can see that the fibonacci_array[4] value is indeed 5. Euclidean_norm’s value is red box, which indicates it is 69. The max_ofuint32_t is 4294967295. These values check out as they match with Report Artifact’s 1 values.

Report Artifact 4



What one can see is that despite the changing of the order of the global variables they are all at the same addresses, as seen in Report Artifact 4 and in Report Artifact 3.

Code Snippets that were changed between Report Artifacts 3 & 4.

Initially:

```
//Stores the 1-11th values of the fibranachi sequence
uint32_t fibonacci_array[10];
//Stores the euclidean norm of the fibranachi sequence
uint32_t euclidean_norm = 0;
//Stores the max value of a uint32
uint32_t max_of_uint32_t = 0;
```

After:

```
//Stores the euclidean norm of the fibranachi sequence
uint32_t euclidean_norm = 0;
//Stores the max value of a uint32
uint32_t max_of_uint32_t = 0;
//Stores the 1-11th values of the fibranachi sequence
uint32_t fibonacci_array[10];
```

Narrative

Overall, the lab went well, there was some difficulty in ensuring the Euclidean function was working, however with help from the TA I was able to solve it. Otherwise, this lab was not too difficult and helped me understand the objectives. I enjoyed that we are being eased back into C programming and looking into the hard data and coding of C is helpful in visualizing how a program is running on a computer.

Results

In C programming we can see that debugging using Keil MDK-ARM simulator is extremely helpful in seeing how the computer runs a program from the high-level programming down to the assembly and binary. I learned how to use Keil effectively to do basic debugging for C. I now understand how to read the data outputted from a program based on addresses in hexadecimal.

Numerical Results:

Fibonacci_array[4] value is 5.

Value of max_of_uint32_t is 4294967295.

The value of “my_team” is Jeremiah Webb.

The value of “norm” is 69.9642792.

Euclidean_norm’s value is 69.