Intermediate - Assembly

Badge Name: Intermediate - Assembly

Badge Description

The goal of this badge is for the learner to demonstrate the ability to convert C programs into assembly for a traditional assembly instructions set such as x86 and MIPS. Additionally, these programs should be built in a simple form and an optimized form and a demonstration of calling functions in assembly.

Badge Prerequisite Knowledge

- An understanding of assembly languages (completion of the badge **Core - Assembly (https://miamioh.instructure.com/courses/93898/pages/core-assembly)** or equivalent)
- An understanding of computer architecture (completion of the badge **Core - Architecture (https://miamioh.instructure.com/courses/93898/pages/core-architecture)** or equivalent)
- An understanding of basic architecture optimizations (completion of the badge **Core - Optimization (https://miamioh.instructure.com/courses/93898/pages/core-optimization)** or equivalent)

Badge Objectives

Demonstrate **application** and **analysis** of how to take C benchmarks and implement, test, and optimize them for a traditional assembly language.

Badge Knowledge

application and **anlysis** of the following:

- Show an example of a function call in assembly for one of the converted benchmarks

- Convert 6 of the benchmarks from C to assembly with comments that show each C line of code and corresponding assembly lines
- Optimize 2 of these benchmarks and show the improvement on speed of execution for the optimized versus the un-optimized

Badge Deliverables

- 8 program listings:

1. The 6 benchmarks (**C benchmarks (https://miamioh.instructure.com/courses/93898/pages/benchmarks)**) as assembly programs
    1. In one case you need to show a function call with call, stack and context save
2. Make 2 benchmarks in their optimized assembled format

Badge Assessment

Assessment will be based on a review on the satisfactory completion of the deliverables above and a demonstration of the programs executing and a brief discussion on optimization and comparison.

Badge Suggestions and Resources

- Function calls in MIPS: [**http://www.cs.umd.edu/class/sum2003/cmsc311/Notes/Mips/sub.html** (http://www.cs.umd.edu/cla]

- Some ideas on C to MIPS: **C_code.pdf (https://miamioh.instructure.com/courses/93898/files/10961913/download?wrap=1)** (https:/