

EE/CprE/SE 492 - sdmay21-10

Dynamic Programming Based FPGA Hosted Control-Flow Integrity (CFI)

Report 6

March 29th - April 12th

Client: Akhilesh Tyagi

Faculty Advisors: Zelong Li, Ananda Biswas

Team Members

Gregory Wendt - Meeting Scribe

Cole Schumacher - Meeting Facilitator

Nickolas Mitchell - Chief Engineer (FPGA)

Sam Henley - Chief Engineer (Software)

Maxwell Wangler - Test Engineer

Tristan Duyvejonck - Report Manager

Past Weeks Accomplishments

Over the past two weeks, our team has ran into some issues while finalizing our project. Sam, Greg, and Max encountered a bug in an LLVM pass. Nick researched ways to communicate between the FPGA and computer and found UART over USB to be the best option. During his implementation a driver error has occurred.

Pending Issues

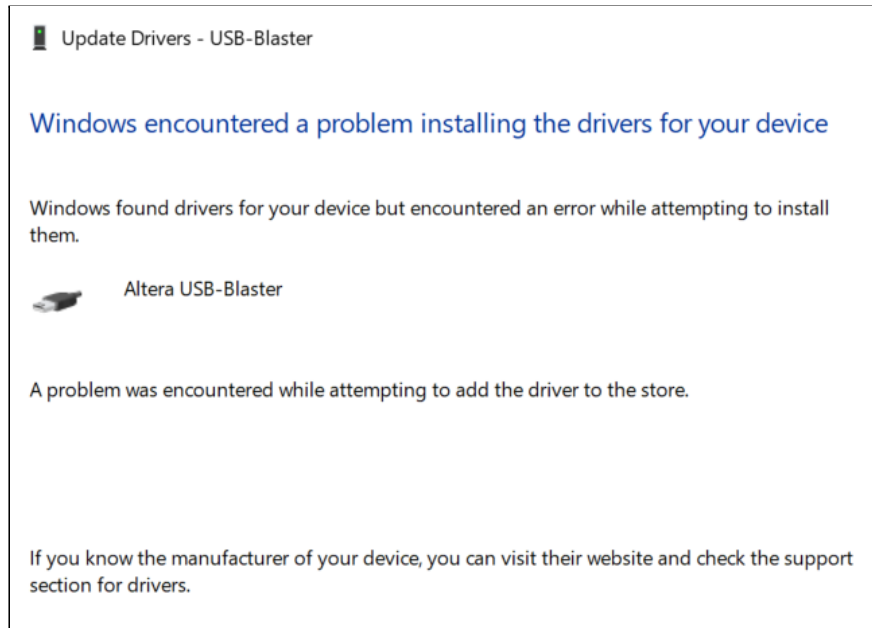
- Work towards a better understanding of LLVM compilers
 - Develop pass for inserting a function after each basic block
- Test VHDL code
- Implement Communication between FPGA and computer over UART and PuTTY
- FPGA driver bug
 - Unable to install driver for USB-blaster
- LLVM Pass bug

Individual contributions

NAME	Individual Contributions (Quick list of contributions. This should be short.)	Hours this week	HOURS cumulative
Gregory Wendt	Assisted in problem solving for VHDL and LLVM problems	3	20
Cole Schumacher	FPGA Simulation research, helping coordinate meetings	3	19
Nickolas Mitchell	Setup FPGA to connect to computer (ran into driver issue) Worked on setting up UART communication between computer and FPGA	7.5	48.5
Sam Henley	Development of LLVM Inject Function Pass	6	29
Maxwell Wangler	Assisted in problem solving for VHDL and LLVM problems.	2	18.5
Tristan Duyvejonck	Was not able to contribute	0	3

Plans for the Upcoming Report

- Gregory
 - Continue assisting with VHDL and LLVM problems
- Cole
 - Research simulation tools in Quartus Prime
- Nickolas
 - Test VHDL code
 - Contact ETG to figure out the FPGA driver issue.
 - Implement communication over UART from FPGA to computer.
 - Currently we plan to use PuTTY on the computer side with Visual Studio as a backup plan.
- Sam
 - Debug issues with LLVM Inject Function Pass
- Maxwell
 - Continue assisting with VHDL and LLVM problems.
- Tristan
 - Work with Sam developing LLVM passes



FPGA Driver Issue

```
Operand is null
%3 = call i32 @printlabel(<null operand!>)
Operand is null
%7 = call i32 @printlabel(<null operand!>)
Operand is null
%13 = call i32 @printlabel(<null operand!>)
in function main
LLVM ERROR: Broken function found, compilation aborted!
```

When invoking the Inject Function Pass on the program, LLVM encounters an error

<null operand>