

## Ethernet Card Drivers: The Good, the Bad, and the Ugly

**Student:** Derrin Pierret, class of 2007

**Address:** 78 Brown St.

**Box #:** C3540

**Phone #:** (570) 577-8166

**E-mail:** [dpierret@bucknell.edu](mailto:dpierret@bucknell.edu)

**Student ID:** 10000791

**Faculty Mentor:** Lea Wittie

**Department:** Computer Science

**E-mail:** [wittie@bucknell.edu](mailto:wittie@bucknell.edu)

I would be very interested in staying at Bucknell this summer to develop a computer language translator (a compiler) with Professor Wittie. We feel that creating this compiler will bridge a gap that has yet to be connected in the computer science industry.

### **Problem:**

In the world of computers, for every piece of hardware in the computer, there is a piece of software that allows it to be used. For example, when you buy a new printer for your computer, the first thing the instructions will tell you to do is install the drivers (software) from the provided CD onto the computer. When that is done, the computer knows how to properly communicate with the printer, allowing you to use it.

The same is true for Ethernet cards, which are high speed modems for connecting computers to networks. Computers, as well as their applications, need to know how to communicate with their card so the user can access the internet or network. Without a good driver, the likelihood of problems occurring in the operating system (such as Windows, Unix, etc) increases dramatically. Unfortunately, Ethernet Card drivers are prone to errors, since the card's specifications can differ from the driver code that people write.

Professor Wittie has developed a programming language called Clay, which is very good at writing Ethernet Card drivers that are not prone to common errors. It avoids these errors by stating the card's specification and checking the driver code to see if they match up. However, since it needs to perform many specific tasks and access a lot of data, the language is pretty complex and is difficult to write programs in.

### **Project:**

We are able to deal with this complex language by creating a simpler language that is easier to define Ethernet card specifications in and developing a compiler to translate the easier language into the complex language Clay. This would allow the programmer to write a safe, yet complex, driver in a shorter amount of time.

The simpler language will be similar to the language HAIL, developed in San

Jose by the DoCoMo Communication Laboratories USA, Inc. Their language was good for defining the specifications of the card, but they translated the language HAIL into C, which does not have the safeguards that Clay offers. Translating a language similar to HAIL into Clay would allow for the drivers to be more protected from errors.

We plan using the summer to figure out how much of the simple language can be translated into Clay. We will then take that knowledge and use it to create the compiler to translate as much of the user-friendly language into Clay as possible. It is impossible to make a full translation from the simple language to the complex language, but we can get enough to make it significantly easier on the programmer. We will create the compiler using Yacc and Flex: the standard compiler making tools which I learned in Bucknell's CS 208 course.

### **Environment:**

Professor Wittie and I will meet in person at least once a week for 8-10 weeks. Both She and I will be available in Lewisburg for the majority of the summer. We will also be using the Linux computer systems in the Breakiron building for programming.

### **Conclusion:**

We think that the development of this translator would serve as a great tool for developing safe drivers for Ethernet Cards. We look forward to your approval.