Operating System Design

**Assignment # 2**

Multi-Core MapReduce

Due date: October 4, 2013

Professor: Ricardo Bianchini

TA: William Katsak

Group Members (ID#)

Taichi Hirao (134005387)

Michael Spaniol (133002726)

Theophilus Mensah (129006665)

**Objective**

The objective of this assignment was to implement a Loadable Kernel Module (LKM) that can be dynamically loaded into the running kernel. The LKM would serve as a character pseudo-device that would provide the userspace with an encryption service. The Vigenère Cipher was used for encryption.

**Architectural Description of Framework**

The implementation of the “LKM Encryption” was achieved by creating a main char device (cryptctl) in /dev, that is called by the user to create a pair of encrypt, decrypt character devices. The main char device provided an ioctl() function for creating, writing, and reading from the device pairs. A text written to the encrypt device is converted to an encryption before writing it to the device, while an encrypted text written to the decrypt device is decrypted and stored as regular text. Each encrypt/decrypt device had its own operations for writing and reading to and from it. Semephores were not explicitly used, but the main device gets unlocked when create is called from the test application. All the device are destroyed when the cryptctl module is removed. The implementation was coded to allow creation of maximum of 16 new devices.

**Conclusion**

The task was very complex, but very intuitive. 70% of time was spent learning about kernel development and implementation. We could not get the writing and reading to and fro the encrypt/decrypt device pairs implemented including the cipher. Debugging the devices was also very time consuming.