

**MASTER'S THESIS (Spring 2011)****TOPIC:** *A Petri Net Model for Secure and Fault-Tolerant Cloud-Based Information Storage***PRESENTOR:** Daniel Fitch**ADVISOR:** Dr. Haiping Xu**DATE & TIME:** Wednesday, May 11, 2011, 2:00-3:00PM (CIS 599 Seminar Presentation)**LOCATION:** Dion 101**COMMITTEE MEMBERS:** Dr. Paul Bergstein and Dr. Xiaoqin (Shelley) Zhang**ABSTRACT**

With the advent of cloud computing, users are able to access a scalable and powerful Internet-based computing platform without the need for large initial investments. Cloud computing provides a promising opportunity for small and large organizations to transition from traditional data centers to cloud services, where they can be more concerned with the business logic, services, and data rather than the underlying network infrastructures and their associated cost. There are major concerns, however, with data security, service reliability, and service availability in the cloud as organizations have to relinquish control of their data centers to cloud providers. To address these concerns, in this thesis, we propose a novel security mechanism for secure and fault tolerant cloud based information storage. The security mechanism can be used to protect sensitive data such as personal or confidential information by utilizing needed encryption mechanisms and multiple cloud service providers as a service cluster. It not only supports maintaining the confidentiality of the stored data, but also ensures that the failure or compromise of an individual cloud provider will not result in a compromise of the overall data set. We design the communication protocols among users, directory, and cloud providers, and present a formal model of the security mechanism for information storage using colored Petri nets. The model is compositional and hierarchically designed, which is illustrated with a healthcare example for storage of a patient's medical record. To ensure the correct design of the Petri net model, we analyze and verify its key properties using an existing Petri net tool.