



Partnership for International Research and Education
A Global Living Laboratory for Cyberinfrastructure Application Enablement

Project Title: Cloud Computing Security

Student: Keiko Hashizume, PhD Student, Florida Atlantic University

Research Advisor: Dr. Eduardo B. Fernandez, Florida Atlantic University

CI-PIRE Partner Advisor: Dr. Nobukazu Yoshioka, National Institute of Informatics, Japan



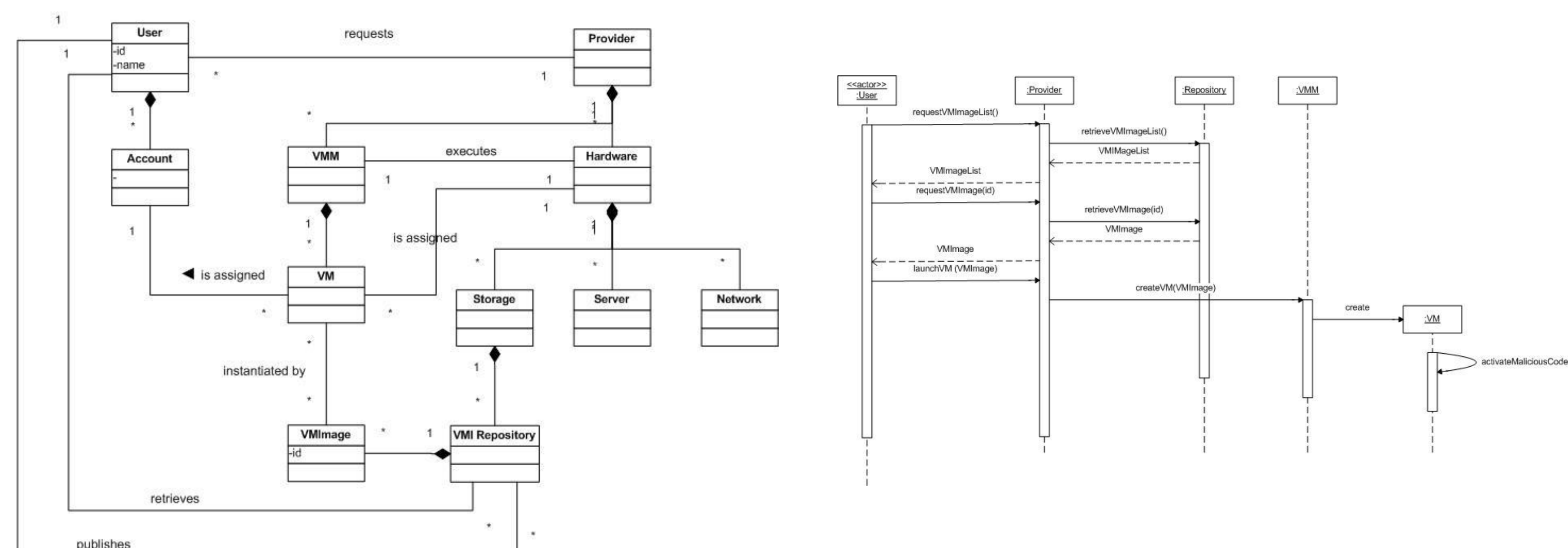
I. Research Overview and Outcome

Overview

- Virtualization is a key feature for cloud computing.
- Virtualization allows users to create, copy, share, migrate, and roll back virtual machines, which create significant benefits for its users.
- However, it also comes with new security problems. Cloud providers must undertake a substantial effort to secure their systems in order to minimize these threats that include attacks to communication, monitoring, modification, migration, mobility and availability.
- In this work, we examine how virtualization gives raise to some security issues, and we describe them as misuse patterns.
- Misuse patterns provide ways to understand and solve these problems. They also provide forensic information.

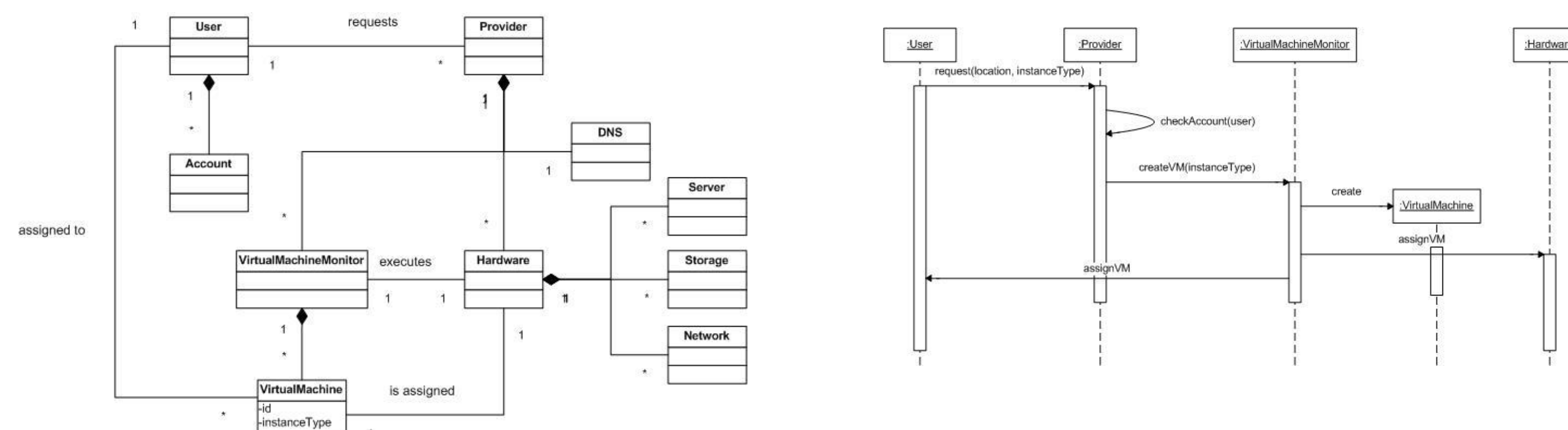
Malicious Virtual Machine Creation

- Virtual Machine Images are used to instantiate Virtual Machines (VM) that contain their initial file system state and software.
- An attacker may create a virtual machine image that contains malicious code so it can infect the virtual machines created by other users.



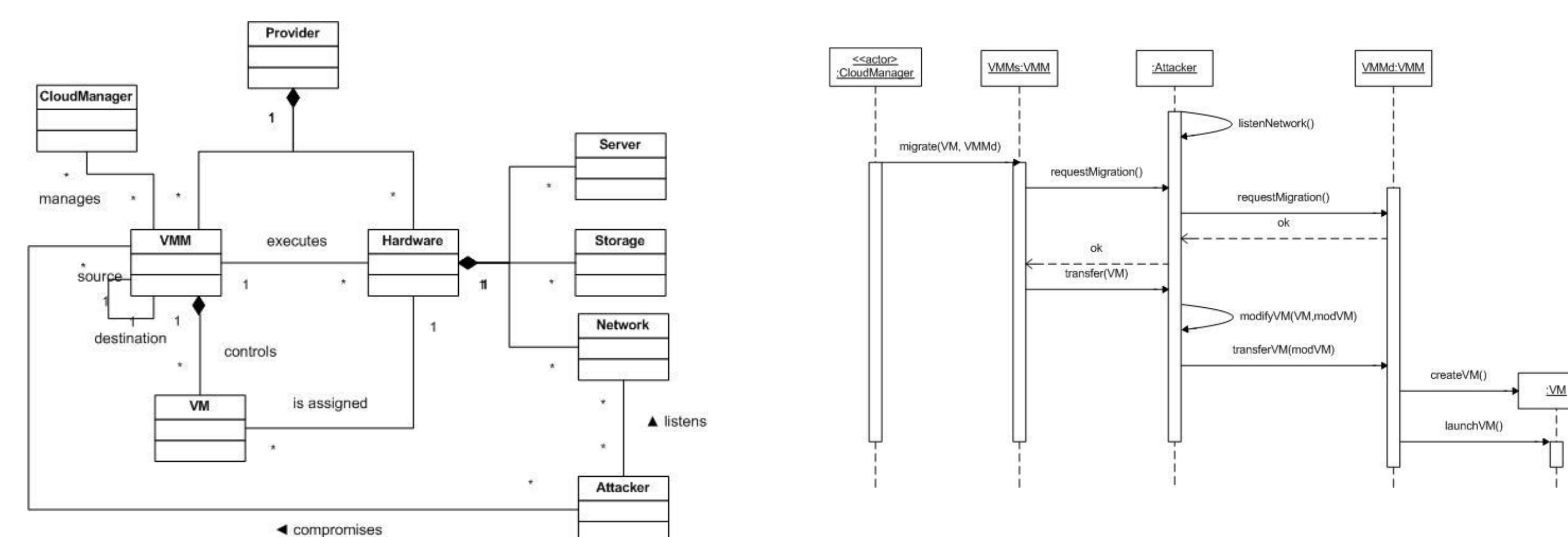
Resource Usage Monitoring Inference

- An attacker's virtual machine may be placed in the same hardware as the victim's virtual machine to obtain some information from it, such as estimate of traffic rates or to detect cache activity spikes.



Malicious Virtual Machine Migration Process

- The attacker tries to access sensitive information or modify the virtual machine (VM) content while the VM is in transit.



Publication

- K. Hashizume, E. Fernandez, and N. Yoshioka, "Misuse Patterns for Cloud Computing", sent to the 26th ACM Symposium on Applied Computing – SAC 2011

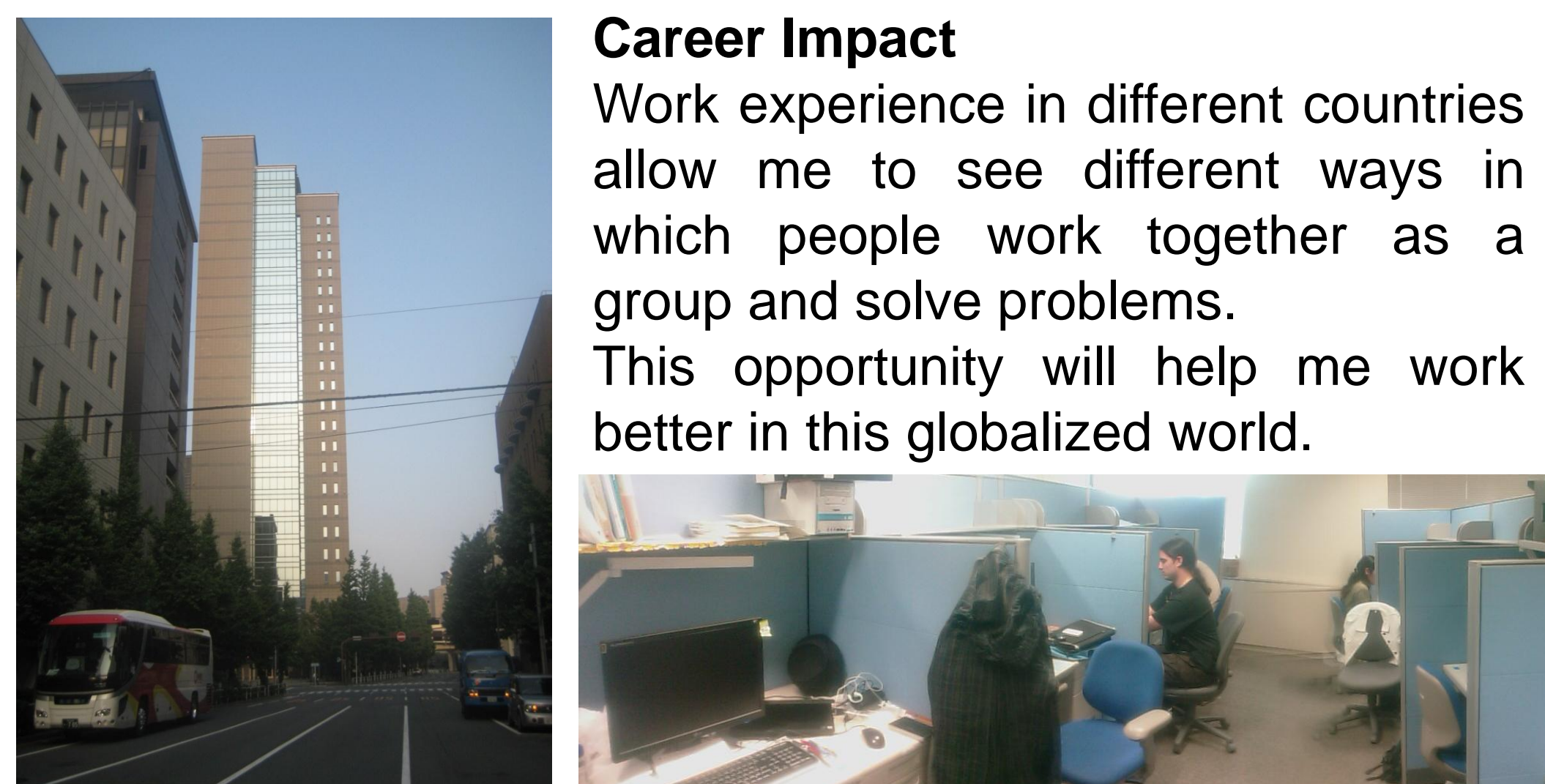
II. International Experience

NII

The National Institute of Informatics (NII) is a Japanese research institute created for the purpose of advancing the study of informatics.

Career Impact

Work experience in different countries allow me to see different ways in which people work together as a group and solve problems. This opportunity will help me work better in this globalized world.



Mount Fuji

Mount Fuji is the highest mountain in Japan at 12,388 ft.

There is an old saying about Fuji-san, "Only a fool climbs Fuji twice."



Kamakura

The Great Buddha of Kamakura is a bronze statue that was originally housed inside a temple, but at the end of the 15th century a tsunami destroyed the temple. Since then, the Buddha has been standing in the open air.



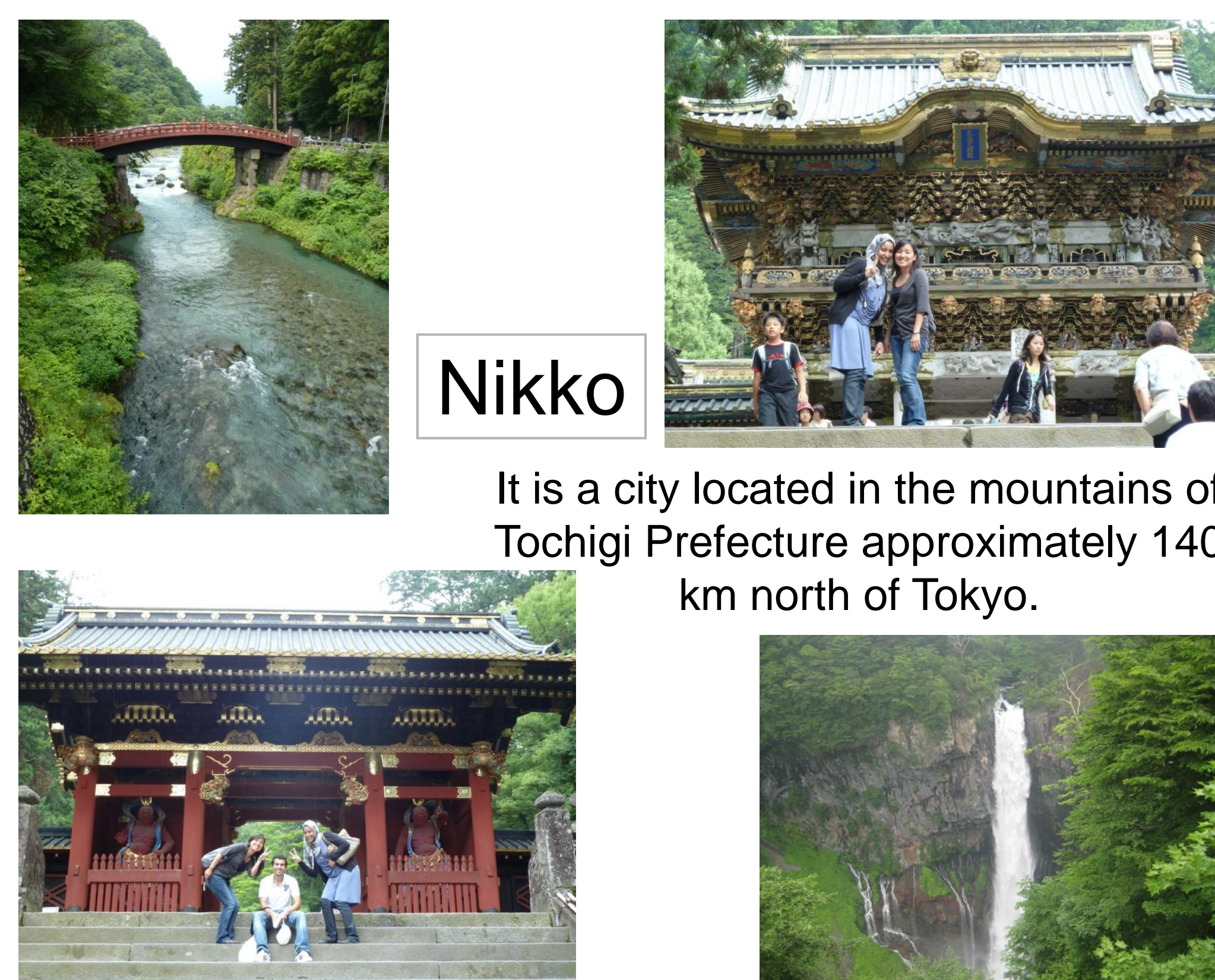
Kyoto

Kyoto was Japan's capital and the Emperor's residence from 794 until 1868. It takes about 2 hours to get there by Shinkansen (bullet train).



Nikko

It is a city located in the mountains of Tochigi Prefecture approximately 140 km north of Tokyo.



Tokyo



III. Acknowledgement

The material presented in this poster is based upon the work supported by the National Science Foundation under Grant No. OISE-0730065. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.