PROJECT ABSTRACT:

With the rapid advance in Information Technologies (ITs), IT infrastructures have become highly complex. Even in a small company, there exists various software, hardware components such as servers, firewalls, printers, and so on. For each component, multiple configuration parameters are provided. For example, the tunable parameters in a web server include MaxClients, Keepalive timeout, MinSpareServers, and so on. System operators can configure these parameters based on the workload and company policies in order to achieve good system performance as well as satisfying security requirements.

Performing system configuration is a non-trivial task. First of all, the large number of configurable parameters leads to high-dimensional search space. Second, for system components that provide services (e.g., a web server), the service workload can change dynamically depending on time. Therefore, the configuration also needs to flexibly adapt to workload dynamics. The current configuration is generally performed manually by system operators, which requires a high level of domain expertise. Moreover, the manual configuration process is time-consuming and error-prone. To address these issues, this project will explore the use of machine learning techniques (e.g., reinforcement learning, supervised learning, and unsupervised learning) to automatically perform system configuration. Due to the time limit of the scholarship, this project will only focus on a particular IT component (e.g., a multi-tier web system) as a case study.

This project is a collaboration with Victoria University of Wellington and the selected student will be supervised by staff from both universities. For students who are considering research as a career path, this project provides them the opportunity to develop research skills and gain firsthand research experience, and potentially get an academic publication. On the other hand, students who may not work in the research field will still benefit from learning new machine learning techniques and gaining hands-on experience on system configuration.

STUDENT SKILLS:
- Good programming skills (e.g., Python)
- Basic knowledge about machine learning will be useful
- Experience with system configuration, web deployment and virtual machine will be useful

PROJECT TASKS:
- Review literature
- Formulate the problem
- Set up an experimental testbed for evaluation
- Collect workload data
- Evaluate the performance of at least one machine learning algorithms on the testbed
- Collect and analyse the evaluation results
- Complete a research poster

EXPECTED OUTCOMES:
- Student’s Research Poster (as per clause 6 of the Scholarship regulations)
- A summary of literature review
- An experimental testbed