Seminar: Friday 30 March 2012:

Monash Undergraduate Research Projects Abroad (MURPA)

Student Presentations live – Including High Definition Video links with the United States

A group of Monash students have recently been engaged in eScience undergraduate research internships in the United States at NCSA, Illinois, as well as UCSD, San Diego and, for the first time, Technion University in Haifa, Israel, from early January 2012. eScience involves a combination of computational thinking/expertise – coupled with a chosen area of the sciences / social science.

The annual MURPA program exposes final year undergraduate students to an international research experience within a leading research laboratory. This is the first year Technion University in Haifa, Israel has taken a Monash student.

On Friday 30 March the group of returned MURPA students will present their outcomes by High Definition Video back to their US hosts (NCSA and UCSD) and live to a Monash audience at Clayton campus.

Melbourne
Date: Friday 30 March
Time: 9.30 - 11am
Location - Monash University:
Clayton: Seminar Room 135, Building 26, Clayton Campus
Caulfield: H7.82, Caulfield Campus

Enquiries: Caitlin Slattery (Faculty of IT)

San Diego
Date: Thursday 29 March
Time: 3.30 - 5pm
Location: 6004 Meeting Room

Enquiries: Teri Simas

Illinois
Date: Thursday 29 March
Time: 5.30 - 7pm
Location: Room 3000 NCSA

Enquiries: Jay Alameda

Monash Student Presentations:

Ling Ding (NCSA), David Warner (Technion), Thomas Moore, John Bell, Satvik Kumar, Minh Ngoc Nhat Huynh, Victoria Weldon (UCSD)

Overview of Projects:

Liang Ding (Bachelor of Software Engineering)
Project title: Parallel reduction tree based debugging in Eclipse
Abstract: The project is working on the components of the Parallel Tools Plug-in for Eclipse, with a particular focus on the debugging infrastructure. The integration of a new debug library will be explored, which is developed at Monash into the infrastructure. This will allow PTP to work across multiple backend technology, including MRnet and SCI. This project will expand the range of backend debug services for PTP. It will allow NCSA to run Eclipse on a wider range of supercomputers, including the new Blue Water system.

David Warner (Bachelor of Computer Science (Hons))
Project Title: Automatically Assigning Academic Reviewers to Papers
Abstract: Assigning academic reviewers to newly-written journal or conference papers is a task that must be performed by experts who are often not paid for their time. This project involved building a small database of academic authors and an author-document similarity system for automatically assigning reviewers to papers. Reviewers are ranked according to the similarity between their own documents and the new paper. Similarities are calculated using latent semantic indexing (LSI) and latent Dirichlet allocation (LDA) models, and the system may be extended in the future to use different algorithms. Evaluation of such a system is difficult, as traditionally academic reviewers remain anonymous, but it was possible to compare the automatically generated results with hand-picked expert selections for a small number of recent conference and journal submissions. While there remains significant scope for improving the system – expanding the author/document database and making the similarity measure's reasoning more accessible, for example – the results so far have been promising, with the system's output generally resembling real expert selections.

Thomas Moore (Bachelor of Software Engineering)
Project Title: An automated approach for the systems definition of ad hoc wireless sensor networks.
Abstract: Android is a specialised variation of Linux that is targeted at smartphones and tablets with enhancements for power management and optimisations for the ARM architecture. This coupled with ease of development and the existing support for many of the sensor platforms already in use make it a prime base for developing a sensor network software footprint. Current methods of configuring a network of sensor nodes do not scale with the size of the network and amount of hardware heterogeneity between nodes. In this talk we discuss how we can adapt the methods used to create and manage modern large scale computing clusters to the area of wireless sensor networks using Android as a platform.

John Bell (Bachelor of Information Technology Systems)
Project Title: Increasing utility of and awareness in SciVee
Abstract: SciVee is a website used to promote scholarly discourse and collaboration. The premise behind the project was to:
1. Help facilitate the utility of the SciVee website, by developing a phone app that can integrate with TeachU: PC software used to record lecture slide transitions and voice. The app's function is to act as a slide controller and voice recorder, as the lecturer roams about freely.\\ 2. Crystallise what SciVee stands for and help promote one of its key elements: namely, a SciVeeCast which integrates video, a written report and multimedia zooming.

Satvik Kumar (Bachelor of Software Engineering)
Project Title: Extending GSOM to HPC systems
Abstract: Self-Organising Map (SOM) and Growing Self-Organising Map (GSOM) are popular methods for exploratory data analysis. The real advantage of these methods is their ability to provide a visualisation of a many dimensional dataset into an easily understandable two-dimensional map. However to produce this mapping of the dataset the processing requirements are quite high. A new algorithm has been created where Sammon's projection is used to merge an array of GSOMs generated on subsets of a large dataset. This technique has been run on multi core desktop computers with some success but the hardware here still constrains the size of the dataset that can be analysed. The project aims to provide an implementation that can run on large HPC systems to allow the generation of the GSOM for massive datasets.

Minh Ngoc Nhat Huynh (Bachelor of Software Engineering)
Project Title: Approaches to author Rocks virtual machine in Amazon Elastic Compute Cloud
Abstract: Rocks is an open-source Linux cluster distribution that enables end users to easily build computational clusters, grid endpoints and visualisation tiled-display walls. It is intended for addressing the difficulties of deploying manageable clusters. However, maintenance and health monitoring for large-scale clusters have been a problem for non-cluster experts. The cost for an IT specialist to perform these administrative tasks is relatively expensive. Thus building and maintaining their own cluster is still not feasible for lots of researchers. Amazon allows researchers to rent computing resources to support their experiments. Users rent a virtual machine by core/hour and are charged for network in/out by Amazon. The question to be asked here is how we can bring Rocks and Amazon Elastic Compute Cloud (Amazon EC2) together to take advantage of the strength of both – the ability to make a cluster easily with Rocks and the freedom from maintaining the infrastructure. The current method to author a Rocks virtual machine in Amazon EC2 takes about 40 minutes which is considered relatively slow. By using new Amazon Elastic Block Storage and combining with other high data transfer software, authoring times can be improved to be 3-4 times faster than the current method.

Victoria Weldon (Bachelor of Science and Bachelor of Engineering)
Project Title: Electrical Propagation Prediction and Validation for Patient-Specific Cardiac Models
Abstract: Congestive heart failure is one of the leading causes of death in the US, and often involves disruptions to the heart's electrical mechanisms, which in turn impedes pumping action and prevents sufficient blood from flowing through the body. One treatment for this condition is Cardiac Resynchronisation Therapy (CRT), which involves implantation of a pacemaker to stimulate the tissue and increase heart performance. However, this procedure is costly and invasive and currently 30-40% of patients do not respond to the therapy. The Cardiac Mechanics Research Group at UCSD is developing patient-specific models of the heart to better predict which patients will respond. This project involves adaptation, development and validation of systems to match existing clinical ECG and VCG measurements to electrical propagation patterns on the internal surface of the heart. This is done to determine if this is a viable method of prediction and if the method can be used to reduce the number of invasive tests required to produce a patient specific model.

If you would like to see what exciting results they can achieve, learn about their experiences and more about the 'MURPA' program then please join us.