

## **Seminar: Friday 8 March 2013:**

### **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 UCSD, San Diego and, for the first time, the University of Warwick in the United Kingdom from early January 2013. 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 University of Warwick has taken a Monash student.

On Friday 8 March the group of returned MURPA students will present their outcomes by High Definition Video back to their US hosts and live to a Monash audience at Clayton campus.

#### **Melbourne**

Date: Friday 8 March

Time: 9.30 - 10.30am

Location - Monash University:

Seminar Room G12A, Building 26, Clayton Campus

Enquiries: [Caitlin Slattery](#) (Faculty of IT)

#### **San Diego**

Date: Thursday 7 March

Time: 2.30 - 3.30pm

Location: 5004 Meeting Room

Enquiries: [Teri Simas](#)

#### **Monash Student Presentations:**

Gavin Kreoger, Daniel Sun (Warwick), Tim Telfer, Jared Griffiths, Ruijie Chow (UCSD)

#### **Overview of Projects:**

##### **Huajun Daniel Sun (Bachelor of Software Engineering)**

**Project title:** Implementing a Graph Drawing Tool for Chain Event Graph

*Abstract:* A Chain Event Graph (CEG) is a graphical framework for modelling discrete processes which exhibit strong asymmetric dependence structures between the variables of the problem. The current CEG software tool was adapted from another graphical modelling software tool, and as a result it is somewhat "clunky" and limited in its display. It can not draw multiple edges from one position to another, does not show relationship amongst

positions who are at the same stage, is missing the implementation on the AHC Model selection algorithm and so on. CEG Statisticians relies on R (A statistical programming system) to build Chain event graph models as well as computing the model selection algorithm. And the whole process can be very slow. An extension of the current CEG tool is essential for CEG gurus to work on more complicated data set by being able to draw the chain event graph. However, due to the lack of source code support for the current CEG tool, it is more feasible to build an alternative graph drawing tool from ground up. This project focuses on building a demo on such a CEG graph drawing tool .

**Gavin Kroeger** (Bachelor of Science)

**Project Title:** Augmentation and Installation of Nimrod/G

**Abstract:** Parametric computational experiments are a required occurrence in nearly all fields of theoretical science, and as such, programs such a Nimrod have been made to assist this endeavour. Nimrod/G, a variant of Nimrod, is a program capable of trivialising large scale variable sweeps in experiments, and because of this was requested to be installed at the Centre for Scientific Computing at Warwick University. At the same time, Nimrod/G did not have an RPM package, and thus an RPM was made, and used to install Nimrod/G on the machines at the CSC.

**Tim Telfer** (Bachelor of Software Engineering)

**Project Title:** Automating the Deployment and Management of Software Stacks For Ad-Hoc Wireless Sensor Network Devices

**Abstract:** This project aims to greatly decrease the time and effort involved in deploying an ad-hoc wireless sensor node network. Utilizing methodology from Rocks Clusters approach for deploying and managing cluster nodes can help to allow researchers to deploy wireless sensor networks with minimal time spent on device configuration. The project uses CyanogenMod, an open source device firmware based on android, for its wide range of benefits when used on sensor node devices. It combines these with edify, a powerful and simplified installation scripting language, to solve the deployment of device software and configuration in a scalable way.

**Rui Jie Chow** (Bachelor of Software Engineering)

**Project Title:** Extending GSOM to the Gordon supercomputer

**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. This project's focus is on implementing scalable GSOM algorithm on a HPC called Gordon at the San Diego Supercomputer Center. The algorithm will be tested using very large text data sets.

**Jared Griffiths** (Bachelor of Software Engineering)

**Project Title:** Performing MapReduce tasks in Kepler using Nimrod/K

**Abstract:** Implementing actors in the Kepler Scientific Workflow tool compatible with the Nimrod/K Director to perform MapReduce functions. The project involved devising a way to perform efficient mapping and reducing functions, using the dynamic token tag parallelism

offered by Nimrod/K. This project will help increase the understanding of the versatility of Nimrod/K so that it may be used to implement other complex use cases.

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.