FIT5164 GRID computing - Semester 2, 2012

E-Research provides means to harnessing contemporary ICT capabilities for solving challenging problems in science, medicine, and engineering. Computer grids play an pivotal role in E-Research; providing a seamless (web-like) access to a variety of networked resources, e.g. large data stores and information repositories, expensive instruments, high-speed links, sensors networks, and multimedia services for a wide range of applications. Topics covered include: Computational and Service-Oriented Grids, Grid-enabled Applications, Gridservices, OGSA, Webservices, WSDL, Clustered Computing, GridMPI, Instruments and Sensors, Parametric Computing, P2P, and Data Grids.

Mode of Delivery

Caulfield (Evening)

Contact Hours

2 hrs lectures/wk, 2 hrs laboratories/wk

Workload

Students will be expected to spend a total of 12 hours per week during semester on this unit as follows:

- two-hour lecture and
- two-hour tutorial (or laboratory) (requiring advance preparation)
- and up to an additional 8 hours in some weeks for completing lab and project work, private study and revision in order to satisfy the reading and assignment expectations.

Unit Relationships

Prerequisites

One of FIT9017, FIT9008, FIT9004 or FIT9018

Chief Examiner

Dr Asad Khan

Campus Lecturer

Caulfield

Abdul Malik Khan (wk 1-2)

Asad Khan (wk 3-12)

Consultation hours: Thu 1-3pm, Room 221 Building 63, Clayton
Tutors

Caulfield

Abdul Malik Khan

Chandana Watagodakumbura
Academic Overview

Outcomes

At the completion of this unit students will:

- be able to evaluate enabling technologies such as high-speed links and storage area networks for building computer grids;
- be able to utilise grid computing and clustering middleware, such as Parallel Virtual Machine (PVM), Message Passing Interface (MPI), HPC Portals, and Peer-to-Peer networks for implementing virtual super computing resources;
- be able to design a grid computing application in one of the key application areas e.g. Computer Animation, E-Research;
- be able to install a grid computing environment;
- develop communications skills and accept the code of professional conduct and practice through short presentations and group work.

Graduate Attributes

Monash prepares its graduates to be:

1. responsible and effective global citizens who:
   a. engage in an internationalised world
   b. exhibit cross-cultural competence
   c. demonstrate ethical values

critical and creative scholars who:

   a. produce innovative solutions to problems
   b. apply research skills to a range of challenges
   c. communicate perceptively and effectively

Assessment Summary

Examination (2 hours): 50%; In-semester assessment: 50%

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Value</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1</td>
<td>15%</td>
<td>Week 7, Friday 7 September 2012, 12pm</td>
</tr>
<tr>
<td>Assignment 2</td>
<td>25%</td>
<td>Week 12, Friday 19 October 2012, 12pm</td>
</tr>
<tr>
<td>Tutorial Exercises</td>
<td>10%</td>
<td>Weekly</td>
</tr>
<tr>
<td>Examination 1</td>
<td>50%</td>
<td>To be advised</td>
</tr>
</tbody>
</table>
Teaching Approach

Lecture and tutorials or problem classes

The lecture stream will present the implementation details and design principles of the computational grid as well as relevant middleware, networking protocols, and technologies. It will also show students how to implement the grid.

The tutorial sessions will reinforce the concepts learned during the lectures through the hands-on work and completion of the exercises relating to the theory covered in the lectures.

The lectures and tutorial/laboratory material will be made available to the students through the course website week-by-week basis.

Feedback

Our feedback to You

Types of feedback you can expect to receive in this unit are:

- Informal feedback on progress in labs/tutes
- Graded assignments with comments
- Interviews

Your feedback to Us

Monash is committed to excellence in education and regularly seeks feedback from students, employers and staff. One of the key formal ways students have to provide feedback is through SETU, Student Evaluation of Teacher and Unit. The University's student evaluation policy requires that every unit is evaluated each year. Students are strongly encouraged to complete the surveys. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

For more information on Monash's educational strategy, and on student evaluations, see:
http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this unit

If you wish to view how previous students rated this unit, please go to https://emuapps.monash.edu.au/unitevaluations/index.jsp

Required Resources

Please check with your lecturer before purchasing any Required Resources. Limited copies of prescribed texts are available for you to borrow in the library, and prescribed software is available in student labs.

Required software and/or hardware: Grid support Virtual Machines. This is available on the unit website.

VMWare workstation (VMWare Fusion for Mac users) is available on-campus in computer labs for student use.
Academic Overview

Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook.
# Unit Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Students should register for the tutorials and check for any clashes in their schedule</td>
<td>No formal assessment or activities are undertaken in week 0</td>
</tr>
<tr>
<td>1</td>
<td>Introduction to Grids</td>
<td>Weekly assessed tutorials commence (10% of unit marks)</td>
</tr>
<tr>
<td>2</td>
<td>Grid Middleware</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Custom Grids and Applications</td>
<td></td>
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<tr>
<td>4</td>
<td>Grid Security</td>
<td></td>
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<tr>
<td>5</td>
<td>Advanced Grid Networking Technologies</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Clusters and Grid Programming Environments</td>
<td></td>
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<tr>
<td>7</td>
<td>Grid Processing Framework</td>
<td>Assignment 1 due Friday 7 September 2012, 12pm</td>
</tr>
<tr>
<td>8</td>
<td>Grid to Instruments and Sensors Integration</td>
<td></td>
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<tr>
<td>9</td>
<td>Case studies of Grid Security and Engineering Design Support</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Building Home Grids with Peer-to-Peer Networking</td>
<td></td>
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<tr>
<td>11</td>
<td>Project Work</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Commodity Grid for Large-Scale Pattern Recognition</td>
<td>Assignment 2 due Friday 19 October 2012, 12pm</td>
</tr>
<tr>
<td></td>
<td>SWOT VAC</td>
<td>No formal assessment is undertaken in SWOT VAC</td>
</tr>
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</table>

*Unit Schedule details will be maintained and communicated to you via your MUSO (Blackboard or Moodle) learning system.*
Assessment Requirements

Assessment Policy

Faculty Policy - Unit Assessment Hurdles

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at
http://lib.monash.edu/tutorials/citing/

Assessment Tasks

Participation

• Assessment task 1

  Title: Assignment 1
  Description: An essay style assignment on a topic or topics relating to grid computing.
  Weighting: 15%
  Criteria for assessment:

  1. Correctness and understanding - there may be more than one "right" answer in many cases. We will look for answers that reflect understanding of the underlying principles and theories.
  2. Completeness - that you have answered all parts of each question.
  3. Presentation - that you have presented your answers in a suitably formatted report style.
  4. Use of evidence and argument - you are able to explain your position by using logical argument drawing on the theory presented in the unit.

  Due date: Week 7, Friday 7 September 2012, 12pm

• Assessment task 2

  Title: Assignment 2
  Description: This assignment is completed in groups of up to five students. Students will be provided with a realistic grid design case. They will need to demonstrate the specified aspects of this project in the lab and later submit a written report detailing the overall design of the project.
  Weighting: 25%
  Criteria for assessment:

  Lab Demo:

    1. All programs must compile and run correctly. Evidence of testing is required.
    2. Programs must meet the problem specification.
Written submission:

1. Correctness and understanding - there may be more than one "right" answer in many cases. We will look for answers that reflect understanding of the underlying principles and theories.
2. Completeness - that you have answered all parts of each question.
3. Presentation - that you have presented your answers in a suitably formatted report style.
4. Use of evidence and argument - you are able to explain your position by using logical argument drawing on the theory presented in the unit.

A marking guide will be provided on the unit website detailing the overall marks distribution and for allocating marks in a way that recognises different contributions of group members for the lab demo and the written submission.

Due date:
Week 12, Friday 19 October 2012, 12pm

• Assessment task 3

Title: Tutorial Exercises
Description: The theoretical aspects covered in the lectures are practically undertaken in the tutorial sessions in this assessment within groups of up to five students. Each group is expected to:

   1. Email the completed theoretical questions at the end of the tutorial.
   2. Demonstrate the practical part during the tutorial.

Weighting: 10%

Criteria for assessment: Marks will be allocated to each group member on the basis of:

   1. The number of completed tutorial exercises by the group.
   2. The student's contribution in completing these exercises during the tutorial (assessed by the tutor).

Due date: Weekly

Examinations

• Examination 1

Weighting: 50%
Length: 2 hours
Type (open/closed book): Closed book
Electronic devices allowed in the exam: None
Remarks: The Exam comprises:
Multiple Choice Questions based on the Tutorial Exercises
♦ Short answer questions
♦ Theoretical question

Assignment submission

It is a University requirement (http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-procedures.html) for students to submit an assignment coversheet for each assessment item. Faculty Assignment coversheets can be found at http://www.infotech.monash.edu.au/resources/student/forms/. Please check with your Lecturer on the submission method for your assignment coversheet (e.g. attach a file to the online assignment submission, hand-in a hard copy, or use an online quiz).

Online submission

If Electronic Submission has been approved for your unit, please submit your work via the VLE site for this unit, which you can access via links in the my.monash portal.

Extensions and penalties

Submission must be made by the due date otherwise penalties will be enforced.


Returning assignments

Students can expect assignments to be returned within two weeks of the submission date or after receipt, whichever is later.

Resubmission of assignments

Resubmission of assignments is not allowed.
Other Information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University’s academic standards, and to provide advice on how they might uphold them. You can find Monash’s Education Policies at: http://policy.monash.edu.au/policy-bank/academic/education/index.html

Key educational policies include:

- Plagiarism (http://www.policy.monash.edu/policy-bank/academic/education/conduct/plagiarism-policy.html)
- Special Consideration (http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.html)
- Grading Scale (http://www.policy.monash.edu/policy-bank/academic/education/assessment/grading-scale-policy.html)
- Discipline: Student Policy (http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-discipline-policy.html)
- Academic Calendar and Semesters (http://www.monash.edu.au/students/key-dates/)
- Orientation and Transition (http://www.infotech.monash.edu.au/resources/student/orientation/); and
- Codes of Practice for Teaching and Learning (http://www.policy.monash.edu/policy-bank/academic/education/conduct/suppdocs/code-of-practice-teaching-learning.html)

Student services

The University provides many different kinds of support services for you. Contact your tutor if you need advice and see the range of services available at www.monash.edu.au/students. For Sunway see http://www.monash.edu.my/Student-services, and for South Africa see http://www.monash.ac.za/current/

The Monash University Library provides a range of services and resources that enable you to save time and be more effective in your learning and research. Go to http://www.lib.monash.edu.au or the library tab in my.monash portal for more information. At Sunway, visit the Library and Learning Commons at http://www.lib.monash.edu.my/. At South Africa visit http://www.lib.monash.ac.za/.

Academic support services may be available for students who have a disability or medical condition. Registration with the Disability Liaison Unit is required. Further information is available as follows:

- Website: http://monash.edu/equity-diversity/disability/index.html
- Email: dlu@monash.edu
- Drop In: Equity and Diversity Centre, Level 1 Gallery Building (Building 55), Monash University, Clayton Campus, or Student Community Services Department, Level 2, Building 2, Monash University, Sunway Campus
- Telephone: 03 9905 5704, or contact the Student Advisor, Student Community Services at 03 55146018 at Sunway
Other Information

Reading list

Students can supplement their knowledge of the unit through the following:


The Grid 2 Blueprint for a New Computing Infrastructure edited by Ian Foster and Carl Kesselman (The Elsevier Series in Grid Computing), 2004

Grid Computing for Developers (Programming) by Vladimir Silva (Charles River Media Programming Series), 2006


Other

Please visit http://www.infotech.monash.edu.au/units/appendix.html for further information about:

• Continuous improvement
• Unit evaluations
• Communication, participation and feedback
• Library access
• Monash University Studies Online (MUSO)
• Plagiarism, cheating and collusion
• Register of counselling about plagiarism
• Non-discriminatory language
• Students with disability
• End of semester special consideration / deferred exams

Materials available to students include weekly lecture slides, tutorials, hands-on exercises, Virtual Machines with Grid support operating systems and tutorial/lab instructions available week-by-week basis. Specifications to assignments, marking guidelines and sample exam papers will be made available.

• Weekly detailed lecture notes outlining the learning objectives, discussion of the content, and required readings;
• Weekly tutorial or laboratory tasks and exercises with solutions provided one to two weeks later;
• Assignment specifications;
• A sample examination and suggested solution;
• This Unit Guide outlining the administrative information for the unit;
• The unit website on MUSO, where resources outlined above will be made available.