MONASH University

FIT3010
Grid computing

Unit guide

Semester 2, 2008

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FIT3010 Grid computing - Semester 2 , 2008

Unit leader :

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Introduction

Welcome to FIT3010 Grid Computing. This is a 6 point elective unit for Bachelor of Information Techology and Systems in the Faculty of IT. The unit has been designed to provide you with an understanding of computer grids and related concepts in this emerging field within information and communication technologies. The unit provides a mix of theoretical study and practical work in grid design and grid-enabled applications.

Unit synopsis

Contemporary computers grids provide means to implement on-demand computing. These grids can also provide 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. LVS and Beowulf Clusters. Gridservices, Webservices, WSDL, HPC Portals, Home Grids, and Peer-to-Peer (P2P) networks. Grid applications.

Learning outcomes

- Discuss some of the enabling technologies e.g. high-speed links and storage area networks for building computer grids.
- Explain the use of some of the grid computing and clustering middleware used to implement virtual super computers.
- Explain programing toolkits such as Parallel Virtual Machine (PVM) and Message Passing Interface (MPI) for writing parallel computer applications.
- Explain HPC Portals, peer-to-peer (P2P) networking and semantic grids.
- Elaborate some of the significant grid computing areas of application e.g. Bio-Technology, eHealth and eMedicine, Finance, and Computer Networks.
- Install and configure a small computer grid using Globus toolkit or a similar middleware.
- Develop small, showcase applications e.g. a parallel protein matching algorithm, or a transient webserver application using the grid services.
- Extend the grid and test these applications.
- Students learn to work on their projects in groups and gain experience in team work and inter-personal communications.
- Each group of students shall develop a practical grid computing application, in one of the areas listed under 5, in the remaining time for this unit.
- Adopt a problem solving approach.
- Accept the code of professional conduct and practice.
- Act in accordance with best practice, industry standards and professional ethics.
- Work effectively within small groups.
- Conduct presentations/short seminars.

Workload

- Two-hour lecture and
- two-hour tutorial (or laboratory) (requiring advance preparation)
- a minimum of 2-3 hours of personal study per one hour of contact time in order to satisfy the reading and assignment expectations.
- You will need to allocate up to 5 hours per week in some weeks, for use of a computer, including time for newsgroups/discussion groups.

Unit relationships

Prerequisites

Before attempting this unit you must have satisfactorily completed FIT1002 Computer Programming, or equivalent. You should have some experience with a C like programming language or Java.

Relationships

FIT3010 is an elective unit in the net-centric major of the Bachelor of Information Technology and Systems.

Continuous improvement

Monash is committed to ‘Excellence in education' and strives for the highest possible quality in teaching and learning. To monitor how successful we are in providing quality teaching and learning Monash regularly seeks feedback from students, employers and staff. Two of the formal ways that you are invited to provide feedback are through Unit Evaluations and through Monquest Teaching Evaluations.

One of the key formal ways students have to provide feedback is through Unit Evaluation Surveys. It is Monash policy for every unit offered to be evaluated each year. Students are strongly encouraged to complete the surveys as they are an important avenue for students to "have their say". The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied and areas for improvement.

Student Evaluations

The Faculty of IT administers the Unit Evaluation surveys online through the my.monash portal, although for some smaller classes there may be alternative evaluations conducted in class.

If you wish to view how previous students rated this unit, please go to
http://www.monash.edu.au/unit-evaluation-reports/

Over the past few years the Faculty of Information Technology has made a number of improvements to its courses as a result of unit evaluation feedback. Some of these include systematic analysis and planning of unit improvements, and consistent assignment return guidelines.

Monquest Teaching Evaluation surveys may be used by some of your academic staff this semester. They are administered by the Centre for Higher Education Quality (CHEQ) and may be completed in class with a facilitator or on-line through the my.monash portal. The data provided to lecturers is completely anonymous.
Monquest surveys provide academic staff with evidence of the effectiveness of their teaching and identify areas for improvement. Individual Monquest reports are confidential, however, you can see the summary results of Monquest evaluations for 2006 at http://www.adm.monash.edu.au/cheq/evaluations/monquest/profiles/index.html

Unit staff - contact details

Unit leader

Dr Asad Khan

Lecturer(s) :

Dr Asad Khan

Tutor(s) :

Mr Anang Hudaya Muhamad Amin
Postgraduate Student

Teaching and learning method

The unit is taught through face to face lectures and the lab work undertaken during the tutorial sessions. The students are expected to spend some time outside the formal teaching hours to supplement their studies and to complete the coursework.

Communication, participation and feedback

Monash aims to provide a learning environment in which students receive a range of ongoing feedback throughout their studies. You will receive feedback on your work and progress in this unit. This may take the form of group feedback, individual feedback, peer feedback, self-comparison, verbal and written feedback, discussions (on line and in class) as well as more formal feedback related to assignment marks and grades. You are encouraged to draw on a variety of feedback to enhance your learning.

It is essential that you take action immediately if you realise that you have a problem that is affecting your study. Semesters are short, so we can help you best if you let us know as soon as problems arise. Regardless of whether the problem is related directly to your progress in the unit, if it is likely to interfere with your progress you should discuss it with your lecturer or a Community Service counsellor as soon as possible.

Unit Schedule

Week	Topic	Key dates
1	Introduction to Grid Computing	No tutorial in the first week
2	Grid Middleware	No tutorial in the 2nd week
3	Custom Grids and Applications	
4	Grid Security	
5	Advanced Grid Networking Techologies	
6	Clusters and Grid Programming Environments	
7	Grid Processing Framework	Assignment 1 submission
8	Grid to Instruments and Sensors Integration	
9	Invited lecture	
10	Site Visit/Research lecture	
11	Parameteric Computing	
Mid semester break		
12	Home grids / P2P Networks	Assignment 2 (presentation and submission)
13	Revision	

Unit Resources

Prescribed text(s) and readings

Foster I., Kesselman C., "**The Grid 2: Blueprint for a New Computing Infrastructure**" 2nd Ed, Morgan Kaufmann, 2003, ISBN 978-1-55860-933-4.
Website: http://books.elsevier.com/uk/mk/uk/subindex.asp?isbn=1558609334
cover image: http://books.elsevier.com/uk/bookscat/coverssmall/1558609334small.jpg

Plaszczak P., Wellner R., **Grid Computing: The Savvy Manager's Guide** (The Savvy Manager's Guides), ISBN: 0127425039.

Text books are available from the Monash University Book Shops. Availability from other suppliers cannot be assured. The Bookshop orders texts in specifically for this unit. You are advised to purchase your text book early.

Recommended text(s) and readings

Grid Computing: A Practical Guide to Technology and Applications(Programming Series) by Ahmar Abbas.

Required software and/or hardware

There is no software requirement

Equipment and consumables required or provided

Students on-campus may use the facilities available in the computing labs. Information about computer use for students is available from the ITS Student Resource Guide in the Monash University Handbook. You will need to allocate up to 8 hours per week for use of a computer, including time for newsgroups/discussion groups.

Study resources

Study resources we will provide for your study are:

The FIT3010 web site is linked at MUSO, where lecture slides, weekly tutorial requirements, assignment specifications, sample solutions, and supplementary material will be posted.

Library access

The Monash University Library site contains details about borrowing rights and catalogue searching. To learn more about the library and the various resources available, please go to http://www.lib.monash.edu.au. Be sure to obtain a copy of the Library Guide, and if necessary, the instructions for remote access from the library website.

Monash University Studies Online (MUSO)

All unit and lecture materials are available through MUSO (Monash University Studies Online). Blackboard is the primary application used to deliver your unit resources. Some units will be piloted in Moodle. If your unit is piloted in Moodle, you will see a link from your Blackboard unit to Moodle (http://moodle.monash.edu.au) and can bookmark this link to access directly. In Moodle, from the Faculty of Information Technology category, click on

the link for your unit.

You can access MUSO and Blackboard via the portal: http://my.monash.edu.au

Click on the Study and enrolment tab, then Blackboard under the MUSO learning systems.

In order for your Blackboard unit(s) to function correctly, your computer needs to be correctly configured.

For example:

- Blackboard supported browser
- Supported Java runtime environment

For more information, please visit: http://www.monash.edu.au/muso/support/students/downloadables-student.html

You can contact the MUSO Support by: Phone: (+61 3) 9903 1268

For further contact information including operational hours, please visit:
http://www.monash.edu.au/muso/support/students/contact.html

Further information can be obtained from the MUSO support site:
http://www.monash.edu.au/muso/support/index.html

Assessment

Unit assessment policy

The unit is assessed with two assignments, labwork, and a two hour closed book examination. To pass the unit you must:

- attempt both the assignments, the labwork, and the examination
- achieve no less than 40% of the possible marks in the exam
- achieve no less than 40% in the units non-examination assessment
- achieve no less than 50% of possible marks for the unit

If a student does not achieve 40% or more in the unit examination or the unit non-examination assessment then a mark of no greater than 44-N will be recorded for the unit.

Assignment tasks

- ### Assignment Task

  Title : Assignment 1

  Description :

  This is a theoretical assignment requiring research into two or three sub-topic relating to the concepts covered in the first three lectures. It is done individually by the students.

  Weighting : 15%

  Criteria for assessment :

  This assignment tests the students' ablity to to build upon the concepts learnt in the lectures by independently researching the specified topics and reporting upon these clearly and concisely in their written reports.

  Due date : This assignment becomes due at the end of week 7 of the semester.

- ### Assignment Task

  Title : Assignment 2

  Description :

  This assignment is completed in groups of up to five students. The students are provided with a real life like grid design case. They demonstrate the specified aspects of this project in the lab and later submit a written report detailing the overall design of the project.

  Weighting : 15%

  Criteria for assessment :

  This assignment tests the practical skills learnt in the tutorial sessions by students developing practical aspects of the grid and demonstrating these aspects in the last week of the semester. The theoretical component of this assignment tests students' overall understanding of the unit through an overall grid design based on a realistic case study.

Due date : This assignment becomes due at the end of week 12 of the semester.

- **Assignment Task**

Title : Tutorials

Description :

The theoretical aspects covered in the lectures are practically undertaken in the tutorial sessions by the students for this assessment.

Weighting : 10%

Criteria for assessment :

- Successful completion of the practical work during the lab sessions.
- Assessment of the lecture material through multiple choice questions.

Due date : The completed tutorial sheets are submitted at the end of week 12 with the second assignment.

Examinations

- **Examination**

Weighting : 60%

Length : 3 hours

Type (open/closed book) : Closed book

Assignment submission

The parts of the assignments that require written submission must be delivered to the labelled mailbox at the offices of the Caulfield School of IT on or before the nominated submision date and time, with the appropriate cover sheet correctly filled out and attached. Do not email the written submissions.

Assignment coversheets

The assignment cover sheets are available for downloading (to print) from,

http://www.infotech.monash.edu.au/resources/student/assignments/

University and Faculty policy on assessment

Due dates and extensions

The due dates for the submission of assignments are given in the previous section. Please make every effort to submit work by the due dates. It is your responsibility to structure your study program around assignment deadlines, family, work and other commitments. Factors such as normal work pressures, vacations, etc. are seldom regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Requests for extensions must be made to the unit lecturer at your campus at least two days before the due date. You will be asked to forward original medical certificates in cases of illness, and may be asked to provide other forms of documentation where necessary. A copy of the email or other written communication of an extension must be attached to the assignment submission.

Late assignment

Assignments received after the due date will be subject to a penalty of 10% per day late. Assignments received more than one week after the due date will not normally be accepted.

Return dates

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

Assessment for the unit as a whole is in accordance with the provisions of the Monash University Education Policy at http://www.policy.monash.edu/policy-bank/academic/education/assessment/

We will aim to have assignment results made available to you within two weeks after assignment receipt.

Plagiarism, cheating and collusion

Plagiarism and cheating are regarded as very serious offences. In cases where cheating has been confirmed, students have been severely penalised, from losing all marks for an assignment, to facing disciplinary action at the Faculty level. While we would wish that all our students adhere to sound ethical conduct and honesty, I will ask you to acquaint yourself with Student Rights and Responsibilities (http://www.infotech.monash.edu.au/about/committees-groups/facboard/policies/studrights.html) and the Faculty regulations that apply to students detected cheating as these will be applied in all detected cases.

In this University, cheating means seeking to obtain an unfair advantage in any examination or any other written or practical work to be submitted or completed by a student for assessment. It includes the use, or attempted use, of any means to gain an unfair advantage for any assessable work in the unit, where the means is contrary to the instructions for such work.

When you submit an individual assessment item, such as a program, a report, an essay, assignment or other piece of work, under your name you are understood to be stating that this is your own work. If a submission is identical with, or similar to, someone else's work, an assumption of cheating may arise. If you are planning on working with another student, it is acceptable to undertake research together, and discuss problems, but it is not acceptable to jointly develop or share solutions unless this is specified by your lecturer.

Intentionally providing students with your solutions to assignments is classified as "assisting to cheat" and students who do this may be subject to disciplinary action. You should take reasonable care that your solution is not

accidentally or deliberately obtained by other students. For example, do not leave copies of your work in progress on the hard drives of shared computers, and do not show your work to other students. If you believe this may have happened, please be sure to contact your lecturer as soon as possible.

Cheating also includes taking into an examination any material contrary to the regulations, including any bilingual dictionary, whether or not with the intention of using it to obtain an advantage.

Plagiarism involves the false representation of another person's ideas, or findings, as your own by either copying material or paraphrasing without citing sources. It is both professional and ethical to reference clearly the ideas and information that you have used from another writer. If the source is not identified, then you have plagiarised work of the other author. Plagiarism is a form of dishonesty that is insulting to the reader and grossly unfair to your student colleagues.

Register of counselling about plagiarism

The university requires faculties to keep a simple and confidential register to record counselling to students about plagiarism (e.g. warnings). The register is accessible to Associate Deans Teaching (or nominees) and, where requested, students concerned have access to their own details in the register. The register is to serve as a record of counselling about the nature of plagiarism, not as a record of allegations; and no provision of appeals in relation to the register is necessary or applicable.

Non-discriminatory language

The Faculty of Information Technology is committed to the use of non-discriminatory language in all forms of communication. Discriminatory language is that which refers in abusive terms to gender, race, age, sexual orientation, citizenship or nationality, ethnic or language background, physical or mental ability, or political or religious views, or which stereotypes groups in an adverse manner. This is not meant to preclude or inhibit legitimate academic debate on any issue; however, the language used in such debate should be non-discriminatory and sensitive to these matters. It is important to avoid the use of discriminatory language in your communications and written work. The most common form of discriminatory language in academic work tends to be in the area of gender inclusiveness. You are, therefore, requested to check for this and to ensure your work and communications are non-discriminatory in all respects.

Students with disabilities

Students with disabilities that may disadvantage them in assessment should seek advice from one of the following before completing assessment tasks and examinations:

- Faculty of Information Technology Student Service staff, and / or
- your Unit Coordinator, or
- Disabilities Liaison Unit

Deferred assessment and special consideration

Deferred assessment (not to be confused with an extension for submission of an assignment) may be granted in cases of extenuating personal circumstances such as serious personal illness or bereavement. Information and forms for Special Consideration and deferred assessment applications are available at http://www.monash.edu.au/exams/special-consideration.html. Contact the Faculty's Student Services staff at your campus for further information and advice.