

FIT3010
Grid computing

Unit Guide

Semester 1, 2010

The information contained in this unit guide is correct at time of publication. The University has the right to change any of the elements contained in this document at any time.

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FIT3010 Grid computing - Semester 1, 2010

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Consultation by appointment (part time staff)

Introduction

Welcome to FIT3010 Grid Computing. This is a 6 point elective unit for Bachelor of Information Technology 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, and performance in relation to processor and network performance constraints.

Learning outcomes

At the completion of this unit students will be able to:

- 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, including security mechanisms;
- explain programming 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;
- gain familiarity with commonly used grid application tools and middleware interfaces;
- extend the grid and test these applications;
- gain familiarity with MPI as employed in clusters and grids;
- understand basic performance concepts in grids and identify frequent causes of performance problems in grid applications;
- understand basic software and hardware reliability concepts in grids and identify frequent causes of reliability problems in grid applications.

Contact hours

2 hrs lectures/wk, 1 hr laboratory/wk, 1 hr tutorial/wk

Workload

For on campus students, workload commitments are:

- Two-hour lecture and
- one-hour laboratory (requiring advance preparation)
- one-hour MURPA presentation (required)

- 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

FIT1001 and one of FIT1002, CSE1202 or CSE1301 and one of FIT1005 or FIT2008

Teaching and learning method

Teaching approach

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.

Timetable information

For information on timetabling for on-campus classes please refer to MUTTS,
<http://mutts.monash.edu.au/MUTTS/>

Tutorial allocation

On-campus students should register for tutorials/laboratories using the Allocate+ system:
<http://allocate.its.monash.edu.au/>

Unit Schedule

Week	Date*	Topic	Key dates
1	01/03/10	Introduction to Grid Computing; Revision IPC Techniques	No tutorial in the first week
2	08/03/10	Grid Middleware	No tutorial in the 2nd week
3	15/03/10	Custom Grid and Grid Applications	
4	22/03/10	Grid Security	
5	29/03/10	Advanced Grid Networking Technologies	
Mid semester break			
6	12/04/10	Clusters and Grid Programming Environments	
7	19/04/10	High Performance Computing and Grids	Assignment 1 submission
8	26/04/10	Grid Performance Modelling	
9	03/05/10	Reliability of Networked Applications	
10	10/05/10	The Design of Grid Applications	
11	17/05/10	Grid Enabled Application Case Study	
12	24/05/10	Limits to Grid Application Performance	Assignment 2 Submission
13	31/05/10	Revision	

*Please note that these dates may only apply to Australian campuses of Monash University. Off-shore students need to check the dates with their unit leader.

Improvements to this unit

Additional revision material included on interprocess communications, grid performance, network and system reliability and defensive programming strategies, and porting applications to grids.

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>

Plaszczyk 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.

Assessment

Overview

Examination (3 hours): 60%; In-semester assessment: 40%

Faculty assessment policy

To pass a unit which includes an examination as part of the assessment a student must obtain:

- 40% or more in the unit's examination, and
- 40% or more in the unit's total non-examination assessment, and
- an overall unit mark of 50% or more.

If a student does not achieve 40% or more in the unit examination or the unit non-examination total assessment, and the total mark for the unit is greater than 50% then a mark of no greater than 49-N will be recorded for the unit.

Assignment tasks

Assignment coversheets

Assignment coversheets are available via "Student Forms" on the Faculty website:

<http://www.infotech.monash.edu.au/resources/student/forms/>

You MUST submit a completed coversheet with all assignments, ensuring that the plagiarism declaration section is signed.

Assignment submission and return procedures, and assessment criteria will be specified with each assignment.

• Assignment task 1

Title:

Assignment 1

Description:

This is a theoretical assignment requiring research on a specified topic covered in preceding lectures. It is done individually by the students.

Weighting:

15%

Due date:

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

• Assignment task 2

Title:

Assignment 2

Description:

This is a theoretical assignment requiring research on a specified topic covered in preceding lectures. It is done individually by the students.

Weighting:

15%

Due date:

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

- **Assignment task 3**

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%

Due date:

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

Examination

- **Weighting:** 60%

Length: 3 hours

Type (open/closed book): Closed book

See Appendix for End of semester special consideration / deferred exams process.

Due dates and extensions

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 not regarded as appropriate reasons for granting extensions. Students are advised to NOT assume that granting of an extension is a matter of course.

Students requesting an extension for any assessment during semester (eg. Assignments, tests or presentations) are required to submit a Special Consideration application form (in-semester exam/assessment task), along with original copies of supporting documentation, directly to their lecturer within two working days before the assessment submission deadline. Lecturers will provide specific outcomes directly to students via email within 2 working days. The lecturer reserves the right to refuse late applications.

A copy of the email or other written communication of an extension must be attached to the assignment submission.

Refer to the Faculty Special consideration webpage or further details and to access application forms:
<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>

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.

Appendix

Please visit the following URL: <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