



MONASH University

**FIT5164
GRID computing**

Unit Guide

Semester 2, 2009

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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FIT5164 GRID computing - Semester 2, 2009

Chief Examiner:

Dr Asad Khan

Fax: +61 3 990 58731

Lecturer(s) / Leader(s):

Caulfield

Dr Asad Khan

Fax: +61 3 990 58731

Introduction

Welcome to FIT5164. Grid Computing is a 6 point Master level unit. The unit provides an introduction to Computer Grids for areas such as Software-as-a-Service, Service-Oriented Architecture, and Cloud Computing. The unit covers the technologies and infrastructure for the design and management of computer banks and data centres. Use of the Grid is highlighted by research and case studies in Business, Science, and Engineering. An introduction to developing Grid-enabled applications (services) is provided. The deployment of sensor networks with the Grid is included in the curriculum.

Unit synopsis

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.

Learning outcomes

At the completion of this unit students will:

1. To be able to evaluate enabling technologies such as high-speed links and storage area networks for building computer grids.
2. To 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.
3. To be able to design a grid computing application in one of the key application areas e.g. Computer Animation, E-Research.
4. To be able to install a grid computing environment.
5. Develop communications skills and accept the code of professional conduct and practice through short presentations and group work.

Contact hours

2 hours of lectures/week, 2 hours of tutorials/week

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.

Unit relationships

Prerequisites

FIT1002 or equivalent.

For MAIT students, FIT9017, FIT9018, FIT9019, FIT9030, FIT9020 and FIT4037.

Required knowledge: Some experience with a C like programming language or Java.

Relationships

FIT5164 is an elective unit in MAIT and MIT degree programs.

Before attempting this unit you must have satisfactorily completed

FIT1002 or equivalent. For MAIT students, FIT9017, FIT9018, FIT9019, FIT9030, FIT9020 and FIT4037 or equivalent. You should have knowledge of a C like programming language or Java.

Teaching and learning method

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.

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.cc.monash.edu.au/>

Unit Schedule

Week	Topic	Key dates
1	Introduction to Grids	
2	Grid Middleware	
3	Custom Grids and Applications	
4	Grid Security	
5	Advanced Grid Networking Technologies	
6	Clusters and Grid Programming Environments	
7	Grid Processing Framework	Assignment 1 due on Friday, 04/Sep, 12PM
8	Grid to Instruments and Sensors Integration	
9	Case studies of Grid Security and Engineering Design Support	
10	Building Home Grids with Peer-to-Peer Networking	
Mid semester break		
11	Project Work	
12	Commodity Grid for Large-Scale Pattern Recognition	Assignment No. 2 due on Friday 16/Oct, 12PM
13	Revision and Exam Preparation	

Unit Resources

Prescribed text(s) and readings

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

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>

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

VMPlayer

Equipment and consumables required or provided

On-campus students 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.

Study resources

Study resources we will provide for your study are:

Study resources we will provide for your study are:

- 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 web site on MUSO, where resources outlined above will be made available.

Assessment

Overview

Assignment work: 30%, Lab work: 10%, Exam (3 hours): 60%

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 44% then a mark of no greater than 44-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:

A feasibility study of virtual application hosting on the Internet.

Weighting:

15%

Due date:

Friday, 04/Sep, 12PM

• Assignment task 2

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%

Due date:

Friday 16/Oct

• **Assignment task 3**

Title:

Tutorial Work

Description:

The theoretical aspects covered in the lectures are practically undertaken in the tutorial sessions in this assessment within groups of upto five student. Each group is expected to,

- ◆ Email the completed theoretical questions at the end of the tutorial.
- ◆ Demonstrate the practical part during the tutorial.

Weighting:

10%

Due date:

Weekly assessment

Examination

- **Weighting:** 60%

Length: 3 hours

Type (open/closed book): Closed book

Remarks:

The Exam comprises:

- ◆ 30 Multiple Choice Questions based on the Tutorial Exercises
- ◆ 5 Short answer questions
- ◆ 1 Theoretical question

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