



**MONASH** University  
Information Technology

**FIT3142**  
**Distributed computing**

**Unit Guide**

**Semester 2, 2012**

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.

*Last updated: 03 Jul 2012*

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# **FIT3142 Distributed computing - Semester 2, 2012**

Modern computer systems rely increasingly on distributed computing mechanisms, implemented often as clusters, web services, grids and clouds. Distributed computing systems can provide seamless (or web-like) access to a variety of networked resources, e.g. processing cores, large data stores and information repositories, expensive instruments, high-speed links, sensor networks, and multimedia services for a wide range of applications. This unit provides foundation knowledge and understanding of the basic mechanisms required to implement distributed computing systems, especially clouds, grids, web services and clusters. Topics covered include: Introduction to parallel and distributed computing mechanisms, concurrency and synchronisation, monitors, deadlocks, concurrent program analysis - Deadlock, Safety & Liveness properties, computational and service-oriented grids. LVS and Beowulf Clusters. Gridservices, Webservices, WSDL, HPC Portals, Home Grids, Clouds and Peer-to-Peer (P2P) networks. Distributed applications, and their performance and reliability in relation to processor and network performance constraints.

## **Mode of Delivery**

Clayton (Day)

## **Contact Hours**

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

## **Workload**

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

- Lectures: 2 hours
- Lab Sessions: 2 hours
- Tutorials: 1 hour (MURPA - Monash University Research Projects Abroad)
- and up to an additional 7 hours for completing lab and assignment work, private study and revision.

## **Unit Relationships**

### **Prohibitions**

FIT3010

### **Prerequisites**

([FIT2069](#), [FIT2070](#) and one of [FIT3141](#) or [ECE2041](#)) or ([FIT1005](#)/[FIT2008](#) and [FIT2022](#))

## **Chief Examiner**

**Dr Carlo Kopp**

## **Campus Lecturer**

**Clayton**

**Carlo Kopp, 63/210**

Consultation hours: By appointment / email (part time staff)

## **Tutors**

**Clayton**

**TBD**

# Academic Overview

## Outcomes

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

- understand basic problems in distributed computing, especially in relation to concurrency, parallelism, synchronisation, deadlocks, safety and liveness properties;
- understand differences between various distributed computing models and widely used distributed computing schemes;
- understand basic functional and performance concepts in grids and clouds 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;
- discuss some of the enabling technologies e.g. high-speed links, emulators and storage area networks for building computer grids and clouds;
- explain the use of some of the cloud computing, grid computing and clustering middleware used to implement virtual super computers, including security mechanisms;
- explain programming toolkits such as Parallel Virtual Machine (PVM) for writing parallel computer applications;
- explain HPC Portals, peer-to-peer (P2P) networking and semantic grids;

elaborate some of the significant grid and cloud 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 middleware;
- gain basic familiarity with commonly used grid application tools and middleware interfaces;
- extend the grid and test these applications.

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

Assessment Task	Value	Due Date
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## Academic Overview

Assignment 1	10%	Friday Week 7
Assignment 2	10%	Friday Week 12
Laboratory Work	10%	Weekly (starting Week 2)
Tutorial Work	10%	Weekly
Examination 1	60%	To be advised

## Teaching Approach

### Lecture and tutorials or problem classes

This teaching and learning approach provides facilitated learning, practical exploration and peer learning.

### 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

### 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.monash.edu.au/about/monash-directions/directions.html>

<http://www.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html>

## Previous Student Evaluations of this unit

Students in the previous offering found this unit to be intellectually stimulating.

If you wish to view how previous students rated this unit, please go to

<https://emuapps.monash.edu.au/unitevaluations/index.jsp>

## Unit Schedule

Week	Activities	Assessment
0		No formal assessment or activities are undertaken in week 0
1	Introduction: Sockets, RPC, Objects, Clusters, Grids, Clouds; Administrative: Lab Registration; Check MURPA Schedule	Tutorial 1
2	Distributing Computing Schemes	Tutorial 2; Lab 1
3	Concurrency, Parallelism, Synchronisation, Deadlocks, Safety	Tutorial 3; Lab 2
4	Grid Middleware	Tutorial 4; Lab 3
5	Grid Security	Tutorial 5; Lab 4
6	Advanced Distributed Networking Technologies	Tutorial 6; Lab 5
7	Clusters and Distributed Programming Environments	Tutorial 7; Lab 6; Assignment 1 due Friday Week 7
8	High Performance Computing and Grids	Tutorial 8; Lab 7
9	Distributed Application Performance Modelling	Tutorial 9; Lab 8
10	Reliability of Distributed Applications	Tutorial 10; Lab 9
11	The Design of Distributed Applications	Tutorial 11; Lab 10
12	Limits to Distributed Application Performance	Tutorial 12; Lab 11; Assignment 2 due Friday Week 12
	SWOT VAC	No formal assessment is undertaken in SWOT VAC
	Examination period	LINK to Assessment Policy: <a href="http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html">http://policy.monash.edu.au/policy-bank/academic/education/assessment/assessment-in-coursework-policy.html</a>

\*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

(<http://www.infotech.monash.edu.au/resources/staff/edgov/policies/assessment-examinations/unit-assessment-hu>)

Academic Integrity - Please see the Demystifying Citing and Referencing tutorial at

<http://lib.monash.edu/tutorials/citing/>

## Assessment Tasks

### Participation

To meet the learning objectives for this unit students are expected to attend 80% of Tutorials (MURPA) and 80% of Labs. Failure to meet these expectations may cause difficulties in passing the unit.

#### • Assessment task 1

**Title:**

Assignment 1

**Description:**

This assignment will be a written report requiring some independent reading.

Further details will be provided during the semester.

**Weighting:**

10%

**Criteria for assessment:**

Individual assessment of independent work by student:

1. How well underlying principles and theories are demonstrated in the student's answers
2. The appropriateness of the formatted report style
3. The quality of the student's arguments

**Due date:**

Friday Week 7

#### • Assessment task 2

**Title:**

Assignment 2

**Description:**

This assignment will be a written report requiring some independent reading.

Further details will be provided during the semester.

**Weighting:**

10%

**Criteria for assessment:**

Individual assessment of independent work by student:

1. How well underlying principles and theories are demonstrated in the student's answers



## Assessment Requirements

2. The appropriateness of the formatted report style
3. The quality of the student's arguments

**Due date:**

Friday Week 12

• **Assessment task 3**

**Title:**

Laboratory Work

**Description:**

Weekly laboratory exercises and tasks.

**Weighting:**

10%

**Criteria for assessment:**

Individual assessment of independent work by student:

1. Quality of solutions/answers to problems/questions (demonstrates understanding of learning materials)

**Due date:**

Weekly (starting Week 2)

• **Assessment task 4**

**Title:**

Tutorial Work

**Description:**

Weekly attendance of MURPA tutorials and reporting by students.

**Weighting:**

10%

**Criteria for assessment:**

Individual assessment of independent work by student:

1. How well underlying principles and theories are demonstrated in the student's answers
2. The appropriateness of the formatted report style
3. The quality of the student's arguments

**Due date:**

Weekly

## Examinations

• **Examination 1**

**Weighting:**

60%

**Length:**

3 hours

**Type (open/closed book):**

Closed book

**Electronic devices allowed in the exam:**

Non programmable scientific calculator

## **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.

You must negotiate any extensions formally with your campus unit leader via the in-semester special consideration process:

<http://www.infotech.monash.edu.au/resources/student/equity/special-consideration.html>.

## **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 is not permitted.

## **Referencing requirements**

External materials must be properly cited and referenced.

## 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>)
- Assessment  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/assessment-in-coursework-p>)
- Special Consideration  
(<http://www.policy.monash.edu/policy-bank/academic/education/assessment/special-consideration-policy.h>)
- 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
- Academic and Administrative Complaints and Grievances Policy  
(<http://www.policy.monash.edu/policy-bank/academic/education/management/complaints-grievance-policy>)
- Codes of Practice for Teaching and Learning  
(<http://www.policy.monash.edu.au/policy-bank/academic/education/conduct/suppdocs/code-of-practice-tea>)

### 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](http://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](mailto: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