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**FIT5174 Parallel and distributed systems - Semester 2, 2012**

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FIT5174 Parallel and distributed systems - Semester 2, 2012

Modern computer systems contain parallelism in both hardware and software. This unit covers parallelism in both general purpose and application specific computer architectures and the programming paradigms that allow parallelism to be exploited in software. This unit examines both shared memory and message passing paradigms in both hardware and software; concurrency, multithreading and synchronicity; parallel, clustered and distributed supercomputing models and languages. Students will program in these paradigms.

Mode of Delivery

Caulfield (Day)

Contact Hours

2 hrs lectures/wk

Workload

Workload commitments per week are:

- two-hour lecture
- one-hour unsupervised lab in B block (B3.48B, Caulfield) to study the background material and to work on assignments
- up to 3 hours per week of preparation including reviewing the lecture materials
- up to 3 hours per week surveying existing literature in the library, online resources etc; hands-on lab exercises
- a minimum of 3 hours per week personal study in order to satisfy the reading and assignment expectations

Unit Relationships

Prohibitions

CSE4333

Prerequisites

Recommended knowledge: operating systems, including synchronisation and interprocess communication mechanisms; advanced computer architecture, including pipelining techniques.

Chief Examiner

Dr Asad Khan
Campus Lecturer

Caulfield

Carlo Kopp (wk 1-2)

Asad Khan (wk 3-12)

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

Outcomes

At the completion of this unit students will have:

- knowledge of a variety of parallel architectures, such as bus-based, massively parallel, cluster, vector;
- knowledge of a variety of parallel programming paradigms, synchronisation and parallelisation primitives, message passing, data parallel, tuple space;
- understanding of concurrency, synchronicity and parallelism;
- understanding of the design issues of parallel systems;
- skills in designing, developing and debugging parallel programs using a variety of paradigms.

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

In-semester assessment: 100%

<table>
<thead>
<tr>
<th>Assessment Task</th>
<th>Value</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment 1 - Distributed Systems</td>
<td>25%</td>
<td>Week 5, Monday 20 August 2012, 12pm</td>
</tr>
<tr>
<td>Assignment 2 - Distributed Systems</td>
<td>25%</td>
<td>Week 9, Monday 17 September 2012, 12pm</td>
</tr>
<tr>
<td>Assignment 3 - Parallel Architectures</td>
<td>25%</td>
<td>Week 14, Monday 29 October 2012, 12pm</td>
</tr>
<tr>
<td>Class Test - Parallel Architectures</td>
<td>25%</td>
<td>Week 12 lecture</td>
</tr>
</tbody>
</table>

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:

- 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.policy.monash.edu/policy-bank/academic/education/quality/student-evaluation-policy.html

Previous Student Evaluations of this unit

Based on previous feedback the number of assignments has been reduced from four to three.

Online MonQuest Evaluations and Online Unit Evaluations will continue to be requested, and encouraged, to be done by as many students as possible as usual in Semester 2, 2012.

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.

VMPlayer (Freeware) or VMWare Workstation (VMWare Fusion for Mac users) software. This is available in University computer labs, but access to a personal computer with this software installed is highly recommended.
## Unit Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Activities</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unit Introduction on web (no lecture)</td>
<td>No formal assessment or activities are undertaken in week 0</td>
</tr>
<tr>
<td>1</td>
<td>Distributed systems</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Interprocess communication and remote procedure call</td>
<td></td>
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<tr>
<td>3</td>
<td>Message Passage Library (MPI)</td>
<td></td>
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<tr>
<td>4</td>
<td>Synchronisation, MUTEX, Deadlocks</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Election Algorithms, Distributed Transactions, Concurrency Control</td>
<td>Assignment 1 due Monday 20 August 2012, 12pm</td>
</tr>
<tr>
<td>6</td>
<td>(1) Faults, Distributed Consensus, and Security (2) Parallel Computing</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Instruction Level Parallelism</td>
<td></td>
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<tr>
<td>8</td>
<td>Vector Architecture</td>
<td></td>
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<tr>
<td>9</td>
<td>(1) Data Parallel Architectures (2) SIMD Architectures</td>
<td>Assignment 2 due Monday 17 September 2012, 12pm</td>
</tr>
<tr>
<td>10</td>
<td>(1) Introduction to MIMD (2) Distributed Memory MIMD Architectures</td>
<td></td>
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<tr>
<td>11</td>
<td>Super Scaler Processing</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Parallel Architectures Class Test (during the lecture)</td>
<td>Class Test in lecture Week 12</td>
</tr>
<tr>
<td>SWOT VAC</td>
<td></td>
<td>No formal assessment is undertaken in SWOT VAC; Assignment 3 due Week 14, Monday 29 October 2012, 12pm</td>
</tr>
</tbody>
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*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 - Distributed Systems
  Description: A theoretical assignment in the form of a research paper. The students will demonstrate their understanding of multi-process algorithms by researching and writing about their selected topics.
  Weighting: 25%
  Criteria for assessment: Individual assessment. Marks will be allocated, roughly equally, against the application areas listed in the assignment specification. Further marks will be allocated for the length of the paper (against the word limit) and the number and quality of references.
  Due date: Week 5, Monday 20 August 2012, 12pm

• Assessment task 2

  Title: Assignment 2 - Distributed Systems
  Description: Write parallel programs using the message passing programming model. The students will demonstrate their practical skills in developing parallel distributed applications through this assessment.
  Weighting: 25%
  Criteria for assessment: Individual assessment. This work will be assessed on a mix of programming tasks and theoretical write-up. Approximately 90% of the total marks for this assessment will be allocated to the programming related tasks and the remaining 10% for the theoretical write-up.
  Due date: Week 9, Monday 17 September 2012, 12pm
Assessment Requirements

• Assessment task 3

Title: Assignment 3 - Parallel Architectures

Description: A research paper on two contemporary computer architectures by focussing on hardware parallelism.

Weighting: 25%

Criteria for assessment: Individual assessment. Marks will be allocated, roughly equally, against the application areas listed in the assignment specification. Further marks will be allocated for the length of the paper (against the word limit) and the number and quality of references.

Due date: Week 14, Monday 29 October 2012, 12pm

• Assessment task 4

Title: Class Test - Parallel Architectures

Description: Students will be given a 60 minutes class test during the Week 12 lecture, based on the parallel architecture lecture notes, comprising several short questions.

Weighting: 25%


Due date: Week 12 lecture

Remarks: The test will be closed book.

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:
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 will not be allowed.

Referencing requirements

Formatting and referencing information will be provided on the unit website.
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-and-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 Commuity Services at 03 55146018 at Sunway
Other Information

**Reading list**

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


**Other**

Reading material including research papers, programming manuals and system specifications, will be distributed electronically as part of the background reading material for each week.