COMP424-06A

Topics in Software Engineering

— Course Outline —

This paper covers several advanced topics in software engineering, such as formal specification, data refinement, finite-state machines and model checking.

A major theme of the paper is how precise specifications can help you to produce more reliable software cost-effectively. We cover formal specification and show how it can be used to specify systems at a high level of abstraction ("what it should do, rather than how should it do it"). The writing of such specifications typically reduces ambiguity and allows precise and automatic reasoning about the system, enabling you to ensure correctness before software is actually used. This is of particular importance for the design of reactive systems, i.e. software that controls safety-critical technical processes, where bugs can have serious consequences.

This paper has a strong laboratory component, in which you will use modern tools to apply the concepts and methods taught to a range of practical examples.

Lecturers

Prof. Steve Reeves. Room G 1.23, phone (07) 838 4398, `stever@cs.waikato.ac.nz`
Dr. Robi Malik. Room G 2.03, phone (07) 838 4796, `robi@cs.waikato.ac.nz`

Course Web Site

`http://www.cs.waikato.ac.nz/Teaching/COMP424A/`

Lecture Outlines

The course is divided into two parts of six weeks each.

- *Part I* covers the use of finite-state machines and model checking to specify and analyse reactive systems. Taught by Robi Malik.
- *Part II* is an introduction to specification and refinement in Z. Taught by Steve Reeves.

More detailed lecture material will be available from the course web site.

Lectures

Monday	10:00 – 11:00	I 1.01
Thursday	16:00 – 17:00	I 1.01
Friday	12:00 – 14:00	K G.01

Prerequisite Papers

COMP 240 Mathematical Foundations of Computer Science **and**
COMP 314 Software Engineering Project

Recommended Text

- B. Bérard, M. Bidoit, A. Finkel, F. Laroussinie, A. Petit, L. Petrucci, Ph. Schnoebelen, *Systems and Software Verification*, Springer, 2001.
- Jim Woodcock and Jim Davies, Using Z: Specification, Refinement, and Proof, Prentice Hall, 1996.

Teaching Strategy

The lectures will introduce, using references to text books and via lecture notes, new ideas and theory that form the basis for the topic covered. Where appropriate, there will also be practical work which aims to make you think about the material you have met in the lectures and so guide you towards your own understanding. Where practical work is not used, you will need to follow a more traditional line and read and do exercises in order to develop your understanding.

Attendance Policy

Lecture attendance is expected. The course notes provided and the text book references are not necessarily comprehensive and it is very likely that additional material will be covered in lectures. You are responsible for all material covered in lectures.

Expected Workload

You will be expected to spend about 13 hours per week on this course: four hours in lectures, three hours reading and thinking, and six hours on the assignments.

Assessment Schedule

The internal assessment consists of six assignments that are equally weighted, so each is worth $\frac{1}{6}$ of the total internal assessment.

- **Assignment 1.** Due Mon 13 Mar 9:00 A.M.
- **Assignment 2.** Due Mon 27 Mar 9:00 A.M.
- **Assignment 3.** Due Mon 10 Apr 9:00 A.M.
- **Assignment 4.** Due Mon 8 May 9:00 A.M.
- **Assignment 5.** Due Mon 22 May 9:00 A.M.
- **Assignment 6.** Due Mon 5 Jun 9:00 A.M.

Internal Assessment / Final Examination Ratio: 1:1

Reading Material

Handouts will be distributed in lectures, and readings will be assigned from the textbooks and other papers.

Computing Resources

You will use the G-block basement labs G B.13 and G B.19 running Gentoo Linux.

Performance Impairment

Special consideration for missed or impaired course work is covered under Assessment Regulations in the University Calendar. If you are prevented from sitting a final examination due to circumstances beyond your control, or if you are seriously impaired in your examination performance due to illness, injury, personal bereavement or any other critical circumstance, you can apply for special consideration. Contact the Assessment Office, ground floor, Student Information Centre—the Gateway, Gate 5, Hillcrest Road, for an Application for Special Consideration form and for advice on the special consideration procedure. You must consult either a registered medical or dental practitioner, midwife, registered psychologist or counsellor, depending on the circumstances, on the day of the examination or, if this is not possible, within 24 hours of the examination affected. You must hand in your application form within 72 hours after the examination. Make sure your family and flatmates know who to contact in case you ever need to use this process. The full criteria and procedures are set out in the University Calendar. You should not contact the lecturers concerned; they can only refer you to the Assessment Office. Leaflets explaining the procedure are available in the School Office and in the Assessment Office.

Student Concerns and Complaints

As part of its desire to maintain quality educational standards, the University has put in place a policy which outlines how students may raise individual concerns or complaints. The policy is intended to assist students in the resolution of individual student academic complaints constructively, quickly and fairly.
If you have a concern or complaint about a paper you are taking, about the teaching, assessment, or any other aspect, you should first raise it with the coordinator for the paper.
Alternatively, you should download a copy of the complaints policy or arrange an appointment with the Student Support Advisor who can talk you through the appropriate procedure, and check any written complaints, to make sure they follow the guide-

lines set out in the policy. The Student Support Advisor can be contacted by phoning 838 4466 extn. 6264 or by emailing `student.reps@waikato.ac.nz`.

Academic Integrity

All students involved in misconduct connected with assessment will receive zero marks for their work. Their behaviour will be documented for forwarding to the University Disciplinary Committee. Where appropriate, students are responsible for protecting their intellectual property, including computer disk files.

Official Policies

Your attention is drawn to the following policies and regulations which are contained in the University Calendar:

- Assessment Regulations
- Policy on the Use of Maori for Assessment
- Student Research Regulations
- Human Research Ethics Regulations
- Discipline regulations. This applies to any misconduct, including cheating, misuse of computer facilities, or other breach of the University regulations.
- Computer System Regulations

Your attention is also drawn to the following policies and regulations which are contained in the 2006 SCMS Undergraduate Handbook:

- Conditions Of Use Of SCMS Computer Systems