FIT2019
Network standards and specifications

Unit Guide

Semester 2, 2009

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Introduction

Welcome to FIT2019 Network Standards and Specifications. This unit examines the use of standards for data communication and networking protocols and the software environments that form the basis of modern computer networks. Methods by which these standards are developed and promulgated are studied as well. This unit will also enhance the choice of network specialisation study within the undergraduate degrees offered by the Faculty of Information Technology.

Unit synopsis

This unit introduces the idea of standards and the standardisation process within the networking and data communications area. It follows on from the core unit FIT1005 Networks and Data Communications with a focus on the: types of standards commonly found in information technology; creation, application and maintenance of networking standards; network protocol families, their interdependencies and sequence of development; methods used to define and maintain standards; composition and operation of the various national and international standards organisations; review of some key networking protocol standards and implementation issues.

Learning outcomes

Upon completion of this unit, students will:

1. have detailed understanding of families of network protocols and their interdependencies, and developed skills in their application;
2. understand the historical development of key internet protocols;
3. be familiar with the source documents and specifications used to define key internet protocols, and developed skills in their usage;
4. be familiar with the common methods used to define and promulgate network protocols;
5. be able to identify the national and international organisations whose roles involve the formation of standards in this area;
6. be able to comprehend the notation used in network standard definitions including formal data and structure definition languages such as EBNF, ASN.1, SGML or XML, and developed skills in using this notation;
7. have practical experience of methods used to capture and analyse network protocol packets.

Contact hours

4 hrs/week

Workload

For on campus students, workload commitments are:

- 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.
- You may need to allocate up to 5 hours per week in some weeks for use of a computer, including time for newsgroups/discussion groups.

Off-campus students generally do not attend lecture and tutorial sessions, however, you should plan to spend equivalent time working through the relevant resources and participating in discussion groups each week.

Unit relationships

Prerequisites

FIT1005 or equivalent

Relationships

FIT2019 is a core unit in the net-centric major of the Bachelor of Information Technology and Systems.

Teaching and learning method

FIT2019 uses a lecture-tutorial teaching approach.

Each lecture will discuss the week's theoretical concepts and will also go through specific examples and demonstrations.

In tutorials, students will discuss in-depth fundamental aspects about networks and data communications and apply their understanding to practical examples. The tutorials are critical in helping student consolidate concepts andpractise their problem solving skills.

Some tutorials will also contain a hands-on laboratory element. Some tutorials will also involve assessments.

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 Network Standards	No Tutorial in Week 1
2	Network Packet Analysis	
3	Network Protocols	
4	Data Notation Standards	Tutorial Quiz
5	State Transitions and State Machines	
6	History of the Internet and Evolution of Standards	Tutorial Quiz
7	Standards Organisations	Select project
8	Physical and Data Link Layer Standards.	
9	Network Layer Standards	Tutorial Quiz
10	Transport Layer Standards	Project review
Mid semester break		
11	Application Layer Standards	
12	Application Layer Standards	Project Assignment Due
13	Revision	

Unit Resources

Prescribed text(s) and readings

Douglas E. Comer, *Internetworking with TCP/IP: Principles, Protocols and Architecture*, Vol. 1, 5E, Pearson Prentice Hall, 2006, ISBN 0-13-198069-6.

Recommended text(s) and readings

The following are additional references for particular topics that will also be covered beyond the prescribed textbook above:

William Stallings. "Data and Computer Communications" 8E, Prentice Hall (2007).

Uyless Black. "Computer Networks: Protocols, Standards and Interface" 2E, Prentice Hall (1993).

William Stallings. "Wireless Communications & Networks" 2E, Prentice Hall (2004).

Cisco Systems Inc. "Internetworking Technologies Handbook" 4E, Cisco Systems (2004).

P.Loshin. "Essential Ethernet standards: RFCs and protocols made practical", Wiley (2000)

P.Loshin. "Big Book of Lightweight Directory protocol", Morgan-Kaufmann (2000)..

M.C.Libicki. "Information Technology Standards: Quest for the Common Byte". Butterworth-Heinemann (1995).

M.C.Libicki, J.Schneider, D.R.Frelinger, A.Slomovic. "Scaffolding the New Web: Standards and Standards Policy for the Digital Economy" Rand MR-1215-OSTP (2000). http://www.rand.org/publications/MR/MR1215 .

S.Bradner. "The Internet Standards Process - Revision 3", Internet Engineering Task Force, RFC 2026, October 1996. http://ftp.monash.edu.au/pub/rfc/rfc/rfc2026.txt .

J.B.Postel and J.F.Reynolds. "Internet Official Protocol Standards", Internet Engineering Task Force, RFC 2300, May 1998. http://ftp.monash.edu.au/pub/rfc/rfc/rfc2300.txt .

S.Dawkins, Charles.E.Perkins, and D.H.Crocker, "Two Stage Standardization Approach", Internet Engineering Task Force. http://tools.ietf.org/html/?draft=draft-dawkins-pstmt-twostage

Required software and/or hardware

You will need access to:

- Knoppix live Linux (boots from CD). The ISO image may be downloaded from http://www.knopper.net/knoppix/index-en.html and then burned into a CDROM. [Warning: improper use of Knoppix may damage the contents of your hard drive.]
- Wireshark, a protocol analyzer, which may be used to capture packets for analysis. It may be downloaded from http://www.wireshark.org/download.html.

All the above may be obtained from home and used on the home computer -- but be careful with Knoppix (as indicated above). Wireshark and other packet sniffers must never be used for malicious purposes in capturing data in transit.

On-campus students will find and use Knoppix and Wireshark only in the designated Data Communications lab for the tutorials. They should never be used in the other labs without authorization from academic staff. PDFCreator may be available on PC labs of your campus.

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. You will need to allocate up to 8 hours per week for reading and private study, including computer time for email and online discussion groups.

Apart from the general computing labs referred to above, students will be provided with ample time to experiment with protocols during tutorials in the Data Communications lab.

Study resources

Study resources we will provide for your study are:

- This Unit Information guide outlining the administrative information for the unit
- The FIT2019 web site on MUSO, where lecture slides, weekly tutorial requirements, assignment specifications, sample solutions and supplementary material will be posted.
- Web-based discussion groups that can be accessed from the FIT2019 unit Homepage

Assessment

Overview

Assessable tutorial exercises: 15%; Project assignment: 25%; Final 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:
  Assessable Tutorial Exercise 1: Layered protocols and data structures used in ICMP packets
  Description:
  This assessment is carried out during the tutorial in Week 4. The aims of this assessment are:

  - to examine in detail some of the data structures used in network protocols such as
    - Ethernet
    - Internet Protocol (IP)
    - Internet Control and Management Protocol (ICMP)
  - to use a protocol analyser package such as Ethereal to examine these data structures

  Weighting:
  5%
  Due date:
  Week 4 tutorial

- **Assignment task 2**

  Title:
  Assessable Tutorial Exercise 2: State concepts in network standards
  Description:

This assessment is carried out during the tutorial of Week 6. This aims to:

- review the state concepts in network protocols

Weighting:
5%
Due date:
Tutorial of Week 6

• Assignment task 3

Title:
Assessable Tutorial Exercise 3: Data and Network Layer Protocol standards
Description:
This assessment is carried out during tutorials of Week 9. The aims are:

- to review details of network protocols including addressing, packet header structure, fragmentation and reassembly and error management with ICMP.
- review knowledge of RFCs relevant to the above.

Weighting:
5%
Due date:
Tutorial in Week 9

• Assignment task 4

Title:
Project Assignment: Discussion and Analysis of a Standard Network Protocol
Description:
Students will conduct an in-depth study of a standard network protocol or familiy of protocols. The assignment is designed as a research paper, and encourages practical experimentation.

The study should involve extensive reading, testing of prototypes which are generally available for free under various platforms, and must involve packet analysis as a validation of expected behavior. Students will also be encouraged to practice protocol verification and critiquing.
Weighting:
25%
Due date:
Friday of Week 12, 5 pm
Remarks:
Submission of the report is in two modes:

- electronic, as a PDF or .doc file, via Damocles, http://viper.infotech.monashe.du.au/damocles/submit/
- **and** by printout, with a filled in and signed cover sheet. The printout and coversheet must be submitted via labelled boxes in the School office.

Students should consult the Faculty's general style guide:

http://www.infotech.monash.edu.au/resources/student/assignments/caulfield-styleguide.pdf

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 5% per day or part thereof including Saturday and Sunday.

Assignments received later 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