

EN0370 Sockets for Internet Programming

Sockets for Internet Programming Image

Layer 7 of the ISO/OSI 7 layer network model represents the level at which user applications perform peer to peer communications through an underlying protocol stack. The socket application programmer interface is a core technology that allows user applications to access this underlying protocol stack.

This module introduces the POSIX socket API defined by IEEE Std 1003.1 2004 edition. This will be in the context of producing network applications, primarily in the C programming language. There will be opportunities to develop a variety of network applications, including client/server and peer-to-peer applications. Techniques required for the development of robust, efficient and secure applications will be introduced.

1. News

[Assignment Specification](#) 1st March 2011

The assignment specification is now available. Please address any queries about the specification to [David Kendall](#).

Welcome to EN0370 for 2011. Teaching starts on Mon 17-01-2011.

2. Module Team

Module Tutor

[David Kendall](#) david.kendall@northumbria.ac.uk

Lecturer

Neil Eliot neil.eliot@northumbria.ac.uk

3. Teaching Arrangements

Lecture Mon 11.00 - 12.00 NB 316

Lab/Seminar Fri 14.00 - 16.00 EB D003 North

4. Synopsis

The aim of this module is to provide a grounding in the theoretical principles and practical application of the POSIX socket API.

On completion of this module, students will be able to:

1. Develop an appropriate client/server model for an internet aware application.
2. Critically analyse the sockets interface requirements of a given application.
3. Design, write and test, programs that use the POSIX socket API.

5. Teaching Plan

The following is a *provisional* guide to the organisation of the module for this year. These arrangements are subject to change during the course of the module.

Week	W/c	Lecture	Lab/seminar
1	17-Jan	Introduction. [Slides] Simple Example [Slides]	Admin. Lab familiarisation. Hello World.
2	24-Jan	Socket Preliminaries [Slides]	Network Programming Practical [Lab] [Code]
3	31-Jan	Elementary TCP Sockets [Slides]	Network Programming Practical [Lab] [Code]
4	07-Feb	Elementary UDP Sockets [Slides]	Network Programming Practical [Lab]
5	14-Feb	Concurrent Servers [Slides]	Network Programming Practical [Lab] [Code]
6	21-Feb	Broadcasting/Multicastin and Socket Options [Slides]	Network Programming Practical [Lab] [Code]
7	28-Feb	Signals and Non-blocking I/O [Slides]	Assignment Introduction, Planning and Preparation [Specification] [Code]
8	07-Mar	I/O Multiplexing [Slides]	Network Programming Practical
9	14-Mar	P2P programming with DHT's	Assignment Reviews
10	21-Mar	Assignment Surgery	Assignment Surgery
11	28-Mar	Assignment Surgery	Assignment surgery
12	04-Apr	Assignment Surgery	Assignment Demonstrations

Note:

In addition to the taught sessions, you are expected to undertake independent and directed learning. On average, you should be spending about 8 hours per week on this module.

6. Assessment

Summative assessment is undertaken via:

1. a group programming project + individual report, assessing all learning outcomes. [[Assignment Specification](#)]

Formative assessment is provided in the form of a variety of small development or analytical exercises with opportunities for discussion and review.

7. Recommended Reading

You are strongly advised to obtain a copy of one of the texts below for your personal use. Try the [Northumbria University campus bookshop](#).

- [DON01] Donahoo, M., *TCP/IP Sockets in C: Practical Guide for Programmers*, Morgan Kaufmann, 2001 [[Amazon](#)]
- [GAY00] Gay, W., *Linux Socket Programming By Example*, Que, 2000 [[Amazon](#)]
- [SFR04] Stevens, W.R., Fenner, B., Rudoff, A.M., *Unix Network Programming: Sockets Networking API v. 1*, Addison Wesley, 2004 [[Amazon](#)]

Useful C programming reference books are:

- [HS02] Harbison, S., Steele, G., *C: A Reference Manual*, Prentice Hall, 2002 [[Amazon](#)]
- [KR88] Kernighan, B., Ritchie, D., *The C Programming Language*, Prentice Hall, 1988 [[Amazon](#)]
- [PC06] Prinz, P., Crawford, T., *C in a Nutshell*, O'Reilly, 2006 [[Amazon](#)]

If you are new to C programming, try the following introduction:

- [KOC04] Kochan, S. *Programming in C*, Sams, 2004 [[Amazon](#)]

The latest edition of a classic text about C programming in a Unix environment is:

- [SR05] Stevens, W.R., Rago, S., *Advanced Programming in a Unix Environment*, Addison Wesley, 2005 [[Amazon](#)]

8. Other resources

Standards and references

- [IEEE Std 1003.1-2004](#) -- The POSIX standard
- [C Programming Language standard](#) -- Actually, this is a WG14 working paper for [ISO/IEC 9899:TC2](#), but it reflects the consolidated standard at the time of issue (and it's free!).
- [Standard C](#) -- a handy, online reference to the Standard C language and its library. Now superseded by the references above but still an extremely useful resource.
- [GNU C Library Manual](#) [[Local copy](#)]

C Programming Tutorials

- [C programming tutorial \(Cardiff\)](#)
- [C programming tutorial \(Strathclyde\)](#)
- [C programming tutorial \(Washington\)](#)
- [A C programming tutorial \(Stanford\)](#)

C Programming Style

- [Rob Pike's Notes on Programming in C](#)
- [AT&T/SUN C Programming Style Guide](#)
- [NASA C Programming Style Guide](#) -- This is 100 pages of good advice for writing solid code. [[Original link](#)]

Other links

- [RFC Search](#)
- [Beej's Guide to Network Programming](#) [[Local copy](#)]
- [Sockets FAQ](#)
- [Unix/Linux Tutorial for Beginners](#)