BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI (RAJASTHAN)
INSTRUCTION DIVISION
FIRST SEMESTER 2014-2015
Course Handout (Part II)

Aug 01, 2014

In addition to part-I (General handout for all courses appended to the timetable) this portion gives further specific details regarding the course:

Course Number & Title : **IS F462 Network Programming**
Instructor In-Charge : **HARI BABU K**
Course Website **: http://csis/faculty/khari/NetProg141**

1. Scope and Objective of the Course

This course is intended for software engineers involved in developing, maintaining and supporting distributed and network applications in UNIX environment. The course teaches starting from the basics of computer networks to designing and implementing network servers such as web, mail servers etc. Other well known network programming paradigms like RPC are also studied. Various well known protocols like TELNET, HTTP, FTP, SMTP, NFS etc are discussed to demonstrate the network programming concepts. Course structure also involves interesting assignments and labs to strengthen the concepts.

2. Text Book

T1. W. R. Stevens,UNIX Network Programming, Vol I, Networking APIs: Sockets and XTI, Pearson Education, 3rd Edition.

T2. W.R.Stevens, UNIX Network Programming, Interprocess Communication, Vol II Pearson Education, 2nd Edition.

3. Reference Books

R1. The Linux Programming Interface: Linux and UNIX System Programming Handbook by Michael Kerrisk, No Starch Press © 2010

(http://library.books24x7.com/toc.aspx?bookid=41558)

R2. W.R. Stevens, Advanced Programming in the UNIX Environment, Pearson Education, 2008.

4. Course Plan:

S.No.	Learning Objective	Topic	Reference to Text Book
1	Overview of System Programming	Unix History; Fundamental Concepts; System Programming Concepts;	R1: Chapter 1,2,3
2		Unix File I/O; Standard I/O Library; fcntl; ioctl; Unix Processes; Program Execution; Error Handling; Unix Signals	R1: Chapter 4, 5, 6, 13, 20, 24-26
3	Unix Inter Process Communication	Unix IPC: Pipes, FIFOs, System V Message queues , System V Semaphores, System V Shared Memory, Memory mapping;	R1: Chapter 43-49, 51-55
4			T2: Chapter 3,4,6
5	Socket Programming	Overview of Transport Layer Protocols: TCP, UDP; Client-server architectures;	T1: Chapter 2 + class notes
6		Sockets, Sockaddr structure; TCP and UDP Socket API; TCP client-server examples; UDP examples; Socket Options;	T1 : Chapter 3-5,7, 8 R1: Chapter 59
7		Domain name conversion API; IPv6 differences; IPv4-IPv6-compatibility; Choice: TCP or UDP?; Adding reliability to UDP applications;	T1 : Chapter 11, 12, 22
8		Protocol Implementation Issues: encoding, framing; Case study: HTTP, CGI; Windows Socket API; Java Socket API;	T1: Chapter 5 R1: Chapter 59 Class notes

10	Unix I/O models	Non-Blocking I/O; I/O multiplexing; Signal driven I/O; Asynchronous I/O (POSIX API); Client and server design with select() call; shutdown(); Advanced I/O API;	T1 : Chapter 6, 14, 25 + class notes R1: Chapter 63
11	Unix Domain Protocols; Daemons;	Addressing; Socket pair; Descriptor passing; User credentials; Credential passing; Daemon processes; inetd super server, sylogd;	T1 : Chapter 15,13 R1: Chapter 34, 37
12	Client-server Design Alternatives	Overview of Pthreads; Pthreads Synchronization;	R1: Chapter 29
		Non-blocking I/O; Non-blocking connect; Client alternative designs; Performance analysis;	T1: Chapter 16
13		Preforking models; Prethreading models; Performance analysis; Case study: Apache; The C10K problem; Event-driven architectures; Concurrency models for UDP servers;	T1 : Chapter 22, R1: Chapter 60,61
			T1: Chapter 22
14	Multicasting	Broadcasting: concepts & implementation; Multicasting: addresses; concepts, implementation; Broadcasting & multicasting in IPv6;	T1 : Chapter 20,21
15	Raw sockets, Data link access	Socket creation; input, output; ping: design & implementation; trace route: design & implementation; UDP asynchronous errors;	T1 : Chapter 28,29
16	Distributed Programming	SUN RPC: high level API; port mapper; rpcgen; XDR; low-level API: authentication; multithreading; Overview: DCE-RPC, DCOM, Java RMI, CORBA; Web-based RPC overview: XML-RPC, SOAP;	T2 : Chapter 16
17			Class notes

5. Evaluation Scheme:

Component	Duration	Weightage (%)	Date, Time & Venue	Remarks
Midterm Test	90 Mins	25%	7/10 4:00 - 5:30 PM	Closed Book
Labs	60 min	20%		Take Home
Assignments	-	20%		Take Home
Comprehensive Examination	3 hours	35%	2/12 AN	Partly open

6. Notices:

All notices shall be displayed only on IPC notice Board.

7. Labs

Attendance during labs carries 2% weightage. Each lab will accompany with a lab exercise for 5 marks. All such exercises will carry 18% weightage.

8. Malpractices:

While coding assignments/lab exercises you are not allowed to share source code but discussions are allowed with other groups. Any copying detected among groups/individuals will result in awarding ZERO/-ve marks to all involved groups/individuals.

9. Make-up Policy:

No makeup will be given for Labs and Assignment components. For tests, however, make-up will be granted strictly on prior permission and on justifiable grounds only.

10. Chamber Consultation Hours:

To be announced in the class.

Instructor-in-charge IS F462