OS COURSE Syllabus

Lecturer and contact Information

Dr. Nezer J Zaidenberg

054-5531415 (054-55π)

scipio@scipio.org

Best way to reach me is probably on whatsapp

Course Information

The purpose of this course is to provide an overview of computer operating systems system programming under Linux and the Linux kernel. Topics to be discussed include a brief history of OS anid their design and development. System programming, Design patterns and kernel development. The course will cover major components, design patterns and the algorithms and implementation techniques used to create them. The class will be presented using a mix of theory and hands-on exercises. The programming assignments will be done on Linux machines using C.

English

The course was selected to be taught in the English language.

The exam, all exercises, all classes, and scribe will be in English.

Note that the recitation will be in Hebrew.

You can also use English, Hebrew, Swedish and Bulgarian in personal communication with me. (But you may only use English in public communication in class!)

Text

Books

APUE 3e Stevens and Rago 0321637739 A-W

Linux Kernel Development 3e Robert Love 067232946-8 A-W

Highly Recommended

POSA 5e Doug Schmidt et al Vol 1-5 0471486485 Wiley

Tutorials and guides

Beej's guide to network programming

Beej's guide to IPC

POSIX thread libraries https://www.cs.cmu.edu/afs/cs/academic/class/15492-f07/www/pthreads.html

TLDP Linux kernel module programming guide

Course Outline/Schedule (Subject to change)

1. Overview of Operating Systems

   o What is an OS
   o Brief history.

2. Processes

   o Definition
   o Process States
     ▪ 5 state model
   o Process structure
     ▪ PCB and components
   o Operations on Processes
   o Signals

3. Network and other types of file descriptors

   o TCP sockets
   o I/O Multiplexing using select and poll
   o UNIX IPC – UDS Sockets, file locking and mmap
   o Synchronization
   o Mutex (Sock door) and producer consumer

4. Threads

5. Design patterns

   o Singleton
   o Factory
   o Fascade
   o Adapter
   o Visitor
   o Active Object
   o Pipeline
   o Thread poll

6. Kernel modules

7. Kernel parts code review (time permitting – not all kernel parts will be reviewed in all terms)

- o Block layer
- o UFS (ext2, ext4)
- o CFS (Schedueler)
- o Swapper
- o Grub and boot process

Grade Structure

Up to 40% homework for best 7 out of 10

There will be bonus tasks in most exercises that can give you bonuses of more then 20% to the final grade

60% will be the exam

I. 40% QUIZ style questions
II. 60% open questions
III. The exam is written and should be answered in English

Scribe

Will be completed by 7 students and will be reviewed by me.

The scribe will grant the preparators 5 points bonus to the final grade.