Operating Systems Concepts

Course Syllabus

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ISMA University
Riga, Latvia

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Contact Information

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Course duration, hours: 4h x 11 = 44h, 4 points

Course additional website https://sys.academy.lv/ contains:

- LS - lecture slides,
- LV - lesson videos,
- PW - trainings and practice work assignments,
- LW - lab work assignments,
- SW - online tools and software,
- BK - books, links to the frequently websites,
- QZ - tests and quizzes.

Course Objectives

The objectives of this course are to introduce the fundamental concepts, structure and components of modern operating systems (UNIX, Linux, MacOS, Android, iOS, Windows), to give your competency as a beginning user of Unix/Linux not only Windows.

You will leave from this course with the ability to local & remote use Unix/Linux to perform routine file management, file editing, command piping and filtering, file permissions, and customizations, scripting, management.

You will also know how to access Unix/Linux reference information and help material online so that you can gain more Unix/Linux knowledge when you require it.

Prerequisites and Required Skills

The course does not assume prior knowledge of operating systems. However, the course will move relatively fast.

Expected Skills: The course is not suited for students without basic mathematic & computing skills.

Teachings Philosophy

- Emphasis on building stuff that works: Practical skills.
- Lateness policy is designed to encourage success rather than timeliness, but we have to find a balance.
- Grading is mostly on functionality, though there is a role for clarity, modularity, efficiency and style.
- Readings are important to make our class time more effective and to gain confidence about learning from tutorials, references and so forth.
- Classwork gives you a chance to make mistakes with support
- LW & PW Assignments integrate several skills and go beyond Classwork

Reading supports Classwork which supports PW Assignments which supports the LW Assignments.

Honor Code

Unless otherwise instructed, feel free to discuss problem sets with other students and exchange ideas about how to solve them. However, there is a thin line between collaboration and plagiarizing the work of others. Therefore, I *require that you must compose your own solution* to each assignment. In particular, while you may discuss problems with your classmates, *you must always write up your own solutions from scratch*.

Reading Books

BK-01ENa. Computer Organization and Architecture, 10th Edition. 2016 - W. Stollings
(https://sys.academy.lv/library/BK-01ENa_Stallings-CO&A_10ed.pdf)

Optional Books

BK-01ENb. Operating System Concepts, 9th.ed. 2012, A. Silberschatz, P. Galvin, G. Gagne.
(https://sys.academy.lv/library/BK-01ENb_Silbershatz-OSC_9ed.pdf)

BK-02EN. Modern Operating Systems, 4th.ed. 2015, A. Tanenbaum, H. Bos.
(https://sys.academy.lv/library/BK-02EN_Tanenbaum-MOS_4ed.pdf)

BK-03ENa. Windows Internals. Part I, 7th.ed. 2017, M. Russinovich, D. Solomon, A. Ionescu.
(https://sys.academy.lv/library/BK-03ENa_Russinovich-WIN-I_7ed.pdf)

BK-03ENb. Windows Internals. Part II, 6th.ed. 2015, M. Russinovich, D. Solomon, A. Ionescu.
(https://sys.academy.lv/library/BK-03ENb_Russinovich-WIN-II_6ed.pdf)

Road Map

Lectures, Labs, Practices, Home Works Schedule and Reading Topics

Weeks	Chapters	Slides	Topics	Reading	Labs (*Optional)
1	I. SCA&OS Overview	LS-00 LS-01	Course Introduction. OS Evolution, Definition, Types.	BK-01, Ch.01	
2		LS-02	OS Concepts, Architectures, Structures.	BK-01, Ch.02	LW-01. Computing Basis's.
3	II. Storage Management	LS-03	OS Booting. Mass-Storage Structure.	BK-01, Ch.10	LW-02. Installing Virtual Machines for Oracle VirtualBox.
4		LS-04	File System Interface.	BK-01, Ch.11	
5		LS-05	File System Implementation.	BK-01, Ch.11	LW-03. Using ssh/rdp for remote Linux / UNIX / Mac / Windows servers management.
6		LS-06	File Systems Examples.	BK-01, Ch.12	
7	III. Security Management	LS-07 LS-08	OS Protection Models. Managing User Accounts on Linux.	BK-01, Ch.14	LW-04. Linux/UNIX Command Line Basics.
8		LS-09	OS Permissions. SUID/SGID/Sticky. Extended Attributes.	BK-01, Ch.15	LW-05. Linux/UNIX Shell Environment Variables.
9	IV. Process Management	LS-10	Processes & Threads. OS Examples. CPU Scheduling.	BK-01, Ch.03 BK-01, Ch.06	LW-06. Linux/UNIX Shell. Files Globbing & Streams Redirection.
10	V. Memory Management	LS-11	Main Memory. Virtual Memory.	BK-01, Ch.08 BK-01, Ch.09	LW-07. Linux/UNIX Permissions. SUID/SGID/Sticky Bits.
11	VI. I/O's Management	LS-12	I/O's Devices.	BK-01, Ch.13	LW-08. Linux/UNIX Regular Expressions and Filters.
	VII. Distributed & Embedded Systems	LS-13 LS-14	Distributed File Systems. Embedded Operating Systems	BK-01, Ch.17	
	VIII. Final Subject Grade	All bellow	Exam	All below Chapter	All below assignments Reports

Course Grading Policy

Course activity:	Cost, %
Interactive participation in Classroom or via Zoom	5%
Lab Works Reports	65%
LW1=10%, LW2=05%, LW3=05% LW4=10%, LW5=10%, LW6=10%, LW7=05%, LW8=10%. ____ * Optional LW	
Final Exam	30%
Test=20%, Task=10%.	
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Final Grade SUM	100%

Your Practice Skill after Course

1. Introduction to Linux/UNIX Philosophy
2. Positional Number Systems & Binary Operations Understanding
3. Getting Access to a Remote Linux/UNIX/Mac/Windows Systems
4. Installing VirtualBox on Windows and Mac
5. Installing Linux/Windows Using an Image for VirtualBox
6. Learn Linux/UNIX Directory Structure
7. Basic Shell and Linux/UNIX Commands
8. Linux Package Management
9. Working with Directories, Listing Files and Understanding ‘ls -l’ Output
10. OS File and Directory Permissions Understanding
11. Finding Files and Directories, Wildcards, Files Globbing
12. View/Edit Files Using vi, nano Editors
13. Understanding Basic & Extended Regular Expressions
14. Working with Linux/UNIX Filters utilities
15. User and Group Management Conception
16. File and Directory Extended Attributes Understanding (xattr)
17. Managing Linux/UNIX Processes and Jobs
18. At and Cron Scheduling
19. Shell and Python Scripting to Automate Tasks
20. Basic exam preparation for:
    RedHat Certified System Administrator / Engineer (RHCSA/RHCE),
    Linux Foundation Certified System Administrator / Engineer (LFCS/LFCE),
    Linux Professional Institute Certified Linux Administrator / Engineer / Enterprise (LPIC-1/LPIC-2/LPIC-3).