CS-E4160 - Laboratory Works in Networking and Security, 9.01.2019-29.03.2019

Course Arrangements

Slides originally made by Essi Jukkala, Aalto University

Aalto University
School of Science

Department of Computer Science

Course Personnel

Responsible teacher

- Antti Ylä-Jääski

Assistants

- Felipe A. R. Yaguache
- Dancun Omondi Ogenda
- Markus Holmström

Course information, contact information

All course materials in MyCourses

- https://mycourses.aalto.fi/course/view.php?id=16934

For general discussion about assignments
- Slack
- MyCourses General Discussion forum

Personal matters to course personnel mailing list
- cs-e4160@aalto.fi

Please do not contact course staff directly!

Course Contents and Motivation

Get to try all the things you have learned!

Hands on learning of the basics of:

• Configuring, monitoring and diagnosing different services and computer networks

• Configuring and inspecting some computer and network security related stuff

• Linux administration and networking tools

Course material will provide you with the base information

• Learn to search for information and instructions yourself!

Prerequisites

Recommended prerequisites:

• A course on computer networks or similar

Useful skills

• Basics of Unix-based systems administration (we will be using Ubuntu in the course)

• Command line

We will have a brief lecture on Linux/Unix basics to help you get started

• During the course you should be able to do things in Unix-based machines

Assignments

Path A
- **Network tools**
- **Email server**
- **IPv6**
- **Encrypted filesystems**
- **Firewall**
- **Extra: OpenFlow (May Change)**

Path B
- **Network tools**
- **Web server**
- **DNS**
- **Network filesystems**
- **VPN**
- **Extra: OpenFlow**

Course Environment

You will install your own Virtual Machines (VMs)
- VirtualBox as the Hypervisor
- Three virtual Ubuntu servers
- Virtual networks
- Installation instructions in MyCourses
- You will have to bring your own laptop to the sessions

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Schedule

Week	Event	Path A	Path B
2	This Lecture		
3	Linux Crash Course		
4	Round 1 demos	Networking tools	Networking tools
6	Round 2 demos	Email server	Web server
9	Round 3 demos	Ipv6	DNS
11	Round 4 demos	Encrypted Filesystems	Network Filesystems
13	Round 5 demos	Firewall	VPN
14	Extra Round demos	OpenFlow(May Change)	OpenFlow

Before demo weeks there are reception weeks where you can get help.

Passing the course

You can get 5 or 10 ECTS from this course

- Path A or Path B: 5 ECTS, intro(n/w tools) + 4 mandatory assignments (+ 1 extra)
- Path A+B: 10 ECTS, intro (n/w tools) + 8 mandatory assignments (+ 1 extra)
- You have to demonstrate each assignment to an assistant to be graded
- Points for each task shown in the assignment
- First assignments is shared between paths

Extra assignments

- Can be used to replace missed mandatory assignment
- Can be used to increase your total score

Detailed grading information is available in MyCourses

Reception sessions

During reception week you can ask questions about your assignments

- Assistants will answer your questions the best they can
- But they will not do the assignments for you

Reception sessions

- Not mandatory!
- No reservation, first-come-first-serve
- Exact times and dates will be in MyCourses
    - Tuesdays (14:00 onwards unless otherwise specified)

Demo sessions

Reserve your personal slot in MyCourses
- 30 minutes per assignment
- You can reserve 30min + 30min, if doing both paths

Demonstrate your solution for the assignment face-to-face
- Assistants will ask questions, you answer to your best knowledge
- Your responsibility is to prepare your answers to questions so that your can demonstrate the whole assignment in reserved times

Demos are MANDATORY SESSIONS
- Will be held in room C111 for the first the first three rounds and in B322 after that.

FAQs

Can I bring paper notes? Or can I use electronic notes?

• Yes, but you should leave all material you brought to course personnel

Can I work with a pair?

• Yes, but you will have to demo with your own virtual machines without your pair!

Can I reuse the work of some other student?

• Zero tolerance; plagiarism will lead to failing of the whole course

• The course personnel asks you additional questions to see you understand what you were doing and why

Can I use my own work from previous years? Do I have to demo those?

• Contact the course personnel!

Assignments

First assignment: Network tools

Common for both paths!

• Setup your VMs, learn to find information

Basic Unix-tools for networking

• ip, netstat, dig, ping, traceroute

Configuring network interfaces

Client-server communication with netcat and telnet

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Path A

A2: Email server

Setup an email server
• Configure postfix
• Learn to filter spam with procmail and spamassassin
• Learn to filter non-spam with procmail

A3: IPv6

Build a small network with IPv6
Routing in IPv6
Connect to global IPv6 using Teredo

A4: Encrypted filesystems

Simulation of encryption of an external memory (such as an USB memory stick)
• Two different schemes:
- Encrypted loopback device with dm_crypt
- Encryption layer for an existing filesystem with encFS
Truecrypt also used to create a hidden volume inside another encrypted volume.

A5: Firewall

Firewall basics
Packet filtering with netfilter/iptables
Squid as web proxy to control traffic

Path B

B2: Web server

Configuring Apache
A basic Node.js application
Encryption using SSL / HTTPS
Using nginx as a reverse proxy

B3: DNS

Create caching-only name server
Create a DNS domain
Configure subdomains
Secure the server with DNSSEC

B4: Network filesystems

Setup and compare network filesystems
- NFS
- Samba
- sshfs
- WebDAV

B5: VPN

Introduction to VPN concepts
OpenVPN used to establish a host-to-net VPN scenario

Extra A and B: OpenFlow

Openflow basics

• Build custom topologies with mininet
• Control switches using POX
• Create a layer-2 firewall with Pyretic

Requires basic knowledge of Python

Extra for path A may change!

Questions?