Education and Culture DG

Lifelong Learning Programme

Education, Audiovisual & Culture Executive Agency

FREE TECHNOLOGY ACADEMY

Open Networks

Study Guide

This project has been funded with support from the European Commission. This communication reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained herein.

Presentation

GNU/Linux has enabled the concept of Open Networks. Free and Open Source Software (FOSS) is powering many commercial solutions in the market today.

This module, “Open Networks”, considering networking, where it came from where it is going and explores common networking tasks.

The student will learn how to install and configure networking devices as well as explore typical networking services found on networks today.

The activities in this module use a practical approach to allow the student explore the studied topics by applying these concepts in both simulation and on real GNU/Linux systems.

The course in the context of the FTA Programme

This course covers many fundamental concepts and tasks, but focuses on practical usage of GNU/Linux and FOSS in real networking situations. Some more advanced concepts are covered in the later chapters which are also relevant in an academic context.

Academic Requirements

Basic knowledge and skills in administration of GNU/Linux systems is recommended. Expertise in system and network administration for any platform is desirable. These requirements are fully covered in the FTA module “Basic GNU/Linux”.

Learning Outcomes

These are some of the skill that learners will achieve after completing this course:

- Building a networking device using GNU/Linux and FOSS Software.
- Building switched systems and Virtual Local Area Networks (VLANS).
- Designing and building IP networks using IPv4 and IPv6 using GNU/Linux and Quagga.
- Using GNU/Linux for Wireless Networks.
- Tunnelling over the Internet using Open Virtual Private Networks (OpenVPN).
- Understanding, building and troubleshooting IP Telephony networks based on the Session Initiation Protocol (SIP).
- Establishing IP Services for networks.
- An introduction to and building of Software Defined Networks (SDN) using Mininet and OpenDaylight.
- An introduction to Network Function Virtualisation (NFV).

Learning Methodology

All courses provided by the Free Technology Academy are conducted entirely online at the FTA Campus. The learning methodology at the FTA allows learners to define their own study schedule: most communication takes place using asynchronous tools, and learners can choose when to work in their assignments and class activities as long as they respect a few deadlines. In general, study doesn't need to happen at fixed days and times. This model allows for anyone to join FTA courses, regardless of their location, as long as they have regular access to the Internet.

Studying at the FTA is quite different from studying at a conventional university. The course tutor is more a guide or a coach than a traditional lecturer, which means more freedom for learners but also more responsibility in planning their study. The learning methodology is based on three main pillars: course materials, class debates and Continuous Assessment Activities (CAA).

Course materials are the main source of information for FTA learners. They cover all the learning objectives of the course, and constitute the reference resource that will be used when evaluating learners. Course materials are also a very valuable resource for self-learning.

During the course, tutors will use the class forum to engage learners in discussions and debates on specific issues related to the course's content. Also, several activities will be proposed to help learners extend their understanding of these topics. Within these activities, relevant personalities may be invited to participate in the course as guests lecturers, giving a video talk and discussing it with the class afterwards.

Continuous Assessment Activities, besides being the main evaluation tool on most FTA courses, represent an important didactic resource by themselves. These activities will help learners consolidate and summarize the key aspects of the course, and at the same time will provide tutors with an opportunity to give learners personalised feedback.

The virtual classroom

The place where FTA courses take place is the virtual classroom. This is an online space that can only be accessed by enrolled learners and their tutors. It gives them access to a set of tools and applications that will facilitate the learning process, including an online version of the learning materials and access to the learner's grades and profile.

The main communication tools that will be used in this course are:

Forums

Discussion forums represent the main communication channel in this course's classroom. The classroom has three kinds of forums:

Normal forums: messages and their replies are organised in threads. Keep in mind to start a new thread if you are discussing a new topic.

Debate forums: a special kind of discussion forum where you can't see your classmate's replies until you post your own. This is meant to provide a level playing field for all, so that even those who join the discussion at a later stage can contribute.

Announce forums: only the tutor can post here. It is used to send reminders of important dates, news about the course, etc.

Once the course is finished the classroom will be frozen. Forums will still be accessible for learners and tutors, read-only, for reference purposes.

Wiki

The FTA Campus has a Wiki space which can be accessed from outside the campus:

http://wiki.freeknowledge.eu/index.php/FTA:Main_Page

This Wiki is organised by courses, which can be accessed directly from the classroom. This space is public and persistent between different editions of the course, which means that future learners can build upon the work of their predecessors.

An obvious application for the Wiki is to collect interesting resources: links to reference documents, relevant news and events, etc. It will also be useful to collect the results from debates and other activities, and for any other use that FTA learners and teachers can think of.

Evaluation model

The duration of this course is 13 weeks, with a time dedication which is equivalent to a 5 ECTS course. This corresponds to a workload of roughly 125 hours for the student.

The evaluation of learners is done continuously during the whole course. There are a number of assignments that will be published during the course for which learners will receive grades: the Continuous Assessment Activities (CAA). These activities will consist in answering a set of questions and/or writing a short essay.

Also, the participation of each student in class activities such as debates and guest lectures is evaluated by tutors along with the CAA. This doesn't mean that tutors give good grades to correct comments and bad grades to incorrect ones. Participating in class activities, helping classmates solve their doubts, posing interesting questions, contributing to the wiki and joining debates and discussions in a constructive way are all positively evaluated.

Rules

There are 3 Continuous Assessment Activities in this course. In order to pass the course, at least 2 of the 3 activities must be delivered.

The instructions for each activity will be published in the classroom (see Calendar).

Learners will have two full weeks to complete each CAA.

Each activity is ranked from 1 to 10, where 10 means excellent, 6 is the passing grade and 1 denotes the absence of all merit.

The 3 CAA account for 80% of the final grade. The other 20% corresponds to participation in class activities and debates.

Learners must complete the activities by themselves, plagiarism will not be tolerated. Copying text without properly citing its source will be punished, depending on the case, with repeating the activity with a maximum grade of 6 or directly with a grade of 1.

FTA Certificates

Those learners who complete the evaluation activities with a final grade of 6 or more are entitled to receive an FTA certificate for this course.

FTA certificates are recognised by the participating universities and enable learners to extend their studies in the area of Free Technologies, complementing the universities' existing curricula.

Study plan

It is advisable to try to keep a regular dedication to studying the materials and solving the assignments. This, combined with an active participation in discussions, debates and other class activities, is the way to take the most out of the course. For this reason, a particular study plan is suggested for the distribution of the materials during the course:

Section	Title	Course week
1	Networking Device	1
2	Network Simulation	1
3	Networking	3, 4
4	Switching	3, 4
5	Internet Protocol	5, 6
6	Routing	5, 6, 7
7	Wireless LANs	6, 7
8	Virtual Private Network (VPN)	8
9	IP Telephony	9, 10
10	IP Services	9, 10
11	Software Defined Networking	11, 12
12	Network Functions Virtualisation	11, 12

Calendar

These are the key dates for this course:

Date	Event
May 15, 2015	Course start
June 5, 2015	CAA1 Instructions
June 19, 2015	CAA1 Submission deadline
July 3, 2015	CAA2 Instructions
July 17, 2015	CAA2 Submission deadline
August 7, 2015	CAA3 Instructions
August 21, 2015	CAA3 Submission deadline
August 21, 2015	Course end

CAA Submission format

The CAA submission should be delivered in OpenDocument (.odt) format. Please also upload a copy in PDF format. After completing the document, submit it in the relevant CAA section of the classroom. It should be typed in double spacing with styles conforming to the following table:

Style	Font	Size	Other
Heading 1	FreeSans	16	Bold
Heading 2	FreeSans	14	Bold
Heading 3	FreeSans	13	Bold & Italics
Text Body	Liberation Serif	12	
Pre-formatted text	FreeMono	10.5	

- The submission should have a 25 mm margin on the top, bottom, left and right margins. Everything except the page numbers must fall within the margins. Page numbers should be in the top right hand corner of each page numbered consecutively throughout the text.
- The title page should be as follows:

> **CCA <no>: <Title>**
>
> **<Student Name>**
>
> Submitted in partial fulfilment of requirements for the:
>
> ***Open Networks, Free Technology Academy, 2015***

- Quotations of less than 1½ lines (15 words) are placed within inverted commas in the body of the text. Quotations of 16 words or more are placed in a separate, indented paragraph.
- Appendices are to be used when supplementary information or materials were used but not of direct importance to the CAA. Examples are specification sheets, ...

- The following sections are expected in the CAA Submission:
  - CCA Question
  - Introduction
  - Solution
  - Bibliography
  - List of Abbreviations
- All material used in the submission must be acknowledged to its owner. It is essential that the source is indicated using proper Harvard style referencing. Any statements made which draw on the work of others, need to be supported by reference to the published medium. Failure to acknowledge through referencing is considered to be plagiarism, cheating or copying. Therefore the following declaration must be included and signed at the end of the CAA Submission.

Declaration

I declare that all material in this submission is entirely my own work except where duly acknowledged.

I have cited the sources of all quotations, paraphrases, summaries of information, tables, diagrams or other material; including software and other electronic media in which intellectual property rights may reside.

I have provided a complete bibliography of all works and sources used in the preparation of this submission.

Signed : <Student name>