

## 1. Course Code

2216

## 2. Course Title

Linux Applications

## 3. Teacher

OKUDA, Ryosuke

## 4. Term

Spring 2

## 5. Course Requirements (Courses / Knowledge prerequisite for this course)

The students are required to finish or have equivalent knowledge of [2206] Foundations of Computer Systems.

## 6. Course Overview and Objectives

This course is a Linux primer for beginners. Unlike Windows and Mac, Linux users can enjoy its full performance by using various commands including shell and filters. Also users should understand the model of process, memory, file system of Linux. This course will provide a knowledge and skills of using basic Linux commands and also a basic idea of the internal structure of Linux.

## 7. Course Outline

- 1 Ubuntu as a desktop computer
- 2 Installing Ubuntu 20.04
- 3 First steps on basic commands of Linux
- 4 Practice on basic commands
- 5 What happens when a command is executed
- 6 Environmental variables and job control
- 7 Pipes and filters
- 8 Practice on pipes and filters
- 9 Shell scripts
- 10 Practice on writing shell scripts
- 11 Account control and security on Linux
- 12 Group work: "What Linux is" & "Why people use Linux"
- 13 Virtual memory
- 14 Linux process memory model
- 15 Group work presentation
- 16 Term end examination

## 8. Textbooks (Required Books for this course)

"Linux Fundamentals" by Paul Cobbaut, which can be download from <http://linux-training.be/linuxfun.pdf>

## 9. Reference Books (optional books for further study)

None.

## 10. Course Goals (Attainment Targets)

- (1) To be able to use basic commands of Linux
- (2) To understand the structure of Linux
- (3) To be able to make shell scripts
- (4) To understand what Linux is
- (5)
- (6)
- (7)
- (8)

## 11. Correspondence relationship between Educational goals and Course goals

Educational goals of the school		Course Goals	
High level ICT skills	Basic academic skills	(1)	
	Specialized knowledge and literacy	(2),(3)	
Human skill (Tankyu skill)	Ability to continually improve own strengths		
	Ability to discover and resolve the problem in society	Problem setting	
		Hypothesis planning	
		Hypothesis testing	
		Practice	
	Fundamental Competencies for Working Persons	Ability to step forward	
Ability to think through		(4)	
Ability to work in a team		(4)	
Professional ethics			

## 12. Evaluation

Goals	Evaluation method & point allocation					
	examination	Quiz	Reports	Presentation	Deliverables	Other
(1)	○		○			
(2)	○		○			
(3)	○		○			
(4)				○		
(5)						
(6)						
Allocation	30		50	20		

## 13. Evaluation Criteria

Examination	A correct understanding of the Linux basic commands and concepts described in the class.
Quiz	
Reports	A correct understanding of Linux security mechanisms. Be able to combine commands to achieve complex processing.
Presentation	Essential ideas of Linux and why people use Linux must be explained.
Deliverables	

Other	
<b>14. Active Learning</b>	
Hourly percentage of active learning within the whole class time	10%
1	Active learning such as problem solving assignment using the knowledge and skills acquired in class.
	Sometimes
2	Active learning such as group works and discussions.
	Sometimes
3	Outcome presentations and feedbacks.
	Sometimes
4	Students actively make decisions on how the class should be conducted.
	Not at all
<b>15. Notes</b>	

## 16. Course plan

(Notice) This plan is tentative and might be changed at the time of delivery

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Lesson 1 and 2: Installing Ubuntu Lecture 90 min + Exercise 90 min

"Ubuntu" is a popular distribution of Linux. Each student will install Ubuntu 20.04 to a removable HDD in classroom D and learn basic operation of GUI.

- 1) Download Ubuntu 20.04 image file and install it to a removable HDD.
- 2) Getting familiar with GNOME UI

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Lesson 3 and 4: First steps on basic commands of Linux

Lecture 90 min + Exercise 90 min

Apart from the graphical tools of Ubuntu, students will learn basic commands using the command line interface.

- 1) Working with directories
- 2) Working with files
- 3) The structure of directories
- 4) Users and groups
- 5) File permissions
- 6) Editor

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Lesson 5 and 6: What happens when a command is executed

Lecture 90 min + Exercise 90 min

The Linux command line interface, shell, executes various tasks after an user enter a command before the command is executed. Understanding the behaviors is the basic of shell scripting.

- 1) Commands and arguments
- 2) Expansion
- 3) Shell variables
- 4) Control operators
- 5) Shell history

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Lesson 7 and 8: Pipes and filters

Lecture 90 min + Exercise 90 min

Most of the Linux commands are designed to work with other commands. Combining multiple commands enables more powerful data processing. Students will learn how to combine commands.

- 1) Pipes and I/O redirection
- 2) Simple Filters

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Lesson 9 and 10 : Shell scripts

Lecture 90 min + Exercise 90 min

Shell script is one of most powerful features of Linux. It is a kind of programming language which enables users to automate complicated tasks. Students will learn basics of shell script.

- 1) "[" command
- 2) Conditional execution
- 3) Loops
- 4) Shell functions

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Lesson 11: Account and security

Lecture 90 min

Managing user accounts and file security is the basic of Linux system management. Students will learn the basic idea and commands for managing them.

- 1) Changin default permission and group owner
- 2) ACL (Access Control List)
- 3) POSIX capabilities
- 4) MAC (Mandatory Access Control)

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Lesson 12: "What Linux is" and "Why people use Linux"

Group work 90 min

Several groups are formed with three or four students. Each group is requested to do group work to find out "What Linux is" and "Why people use Linux". Each group also requested to give a presentation on the findings in Lesson 15.

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Lesson 13 and 14: Process and memory model

Lecture 90 min + Exercise 90 min

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This lesson addresses a basic internal structure of Linux. Students will learn how multi process computer system works safely.

- 1) Virtual memory system
- 2) Linux process memory model
- 3) Privileged operation

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Lesson 15: Presentation

Presentation 90 min

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Each group which was formed in Lesson 12 is requested to give a short presentation on "What Linux is" and "Why people use Linux".

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Lesson 16: Term-end Examination

Examination 90 min

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A term-end exam will be conducted.