

Course Reform and Practice of Linux Operating System Based on the Whole Process Case

Long Zhang, Yanjun Wang, Donghao Cai

Xi'an Eurasia University, Shaanxi Xi'an, 710065, China

Keywords: Linux Operating System(Linux OS); Teaching Reform; Whole Process Case

Abstract. The Linux operating system application course belongs to the subject platform course, and it is a professional basic course of many majors. This course focuses on application, and the theory is not difficult, but it is completely different from the Windows operating system habits. There are many commands and parameters, which bring about student's memory obstacles and use obstacles. The focus of curriculum reform and the main issues to be addressed in this article is how can students better master this course and have a certain practical ability.

This article has designed a typical case in practical work based on the whole process, decomposed the case into various knowledge points, and integrated it into the learning process of this course. The case runs through the entire learning process.

After one year of reform and analysis, based on the classroom spot checks, homework, and analysis of the final exam teaching results, it can be found that the teaching effect and student learning enthusiasm have improved significantly.

1. Introduction

Linux is currently the mainstream operating system, which has the advantages of being free of charge, stable, and highly secure. According to statistics from authoritative agencies in 2018, Linux has occupied 80% of the market share in the server field. At the same time, the android operating system is built on the Linux kernel research and development. Numerous mainstream server applications such as Apache, Nginx, MySQL, PHP, etc. are based on the Linux operating system. In ICT, IoT, virtualization, cold storage, big data and other technologies need to learn Linux systems; many universities have listed the "Linux operating system" as a core course or platform course for computer-related majors. The objective of the "Linux Operating System" course of the School of Information Engineering of Xi'an Eurasia College is to enable students to fully grasp the basic knowledge of the Linux operating system and to independently complete the installation, configuration, management and maintenance of the Linux system. Further application development lays the foundation and also lays the foundation for the smooth development of the subsequent professional courses.

2. Problems in Curriculum Teaching

The main knowledge points of this course include: system installation, file system and file management, user and group management, process management and system monitoring, network configuration, vim editor and shell, shell front-end package manager YUM, regular expressions, Pipelines and input-output redirection commands have complex knowledge points and are not highly correlated. Traditional case teaching is that a case corresponds to a knowledge point or a chapter. For this course that focuses on practical applications, this fragmented and simplified case is difficult to achieve the basic management and maintenance skills of students' Linux operating systems, enabling students to handle the daily operation and maintenance of enterprise servers, which can basically The goal of being a competent system engineer in an enterprise [1].

3. Course Design Ideas and Methods

The course design method described in this article first deconstructs the traditional course structure organized by textbooks, then selects a genuine case of an enterprise, restructures each knowledge point according to the tasks in the actual work process, and conducts appropriate teaching case studies. Transformation, forming a teaching case throughout the course of the course [2]. In the teaching process, it decomposes into several progressive sub-projects. These projects are premised on the application, with the problem to be resolved or the task to be completed as the background. In each teaching unit, the project is continuously driven by the progressive Development of classroom teaching. In this kind of teaching implementation, the teacher guides the students to begin from a simple need and then proposes new tasks by constantly raising new requirements or adding new functions, so that students gradually maintain a high level of curiosity and concentration. Complete the entire project [3].

By filling out the entire process of the project, students have a complete grasp of the knowledge points and practical abilities that this course should know.

4. Case Selection

Linux plays a pivotal role and is widely used in new technology fields such as servers and big data. The introduction of the leading causes of the various majors of the School of Integrated Information Engineering and the role of this course as a platform course. The course group chose the application of server direction as a teaching case.

At present, mainstream architecture of the web service system is LAMP (ie Linux + Apache + Mysql + PHP) and LNMP (ie Linux + Nginx + Mysql + PHP). Mysql is the most widely used database management system in Linux systems. The database of most companies' Linux server systems uses the Mysql database. PHP is a server-side scripting language and one of the most widely used design languages for dynamic websites and web application systems. Apache is the web server software with the largest market share, and it is used by more than 60% of websites worldwide. Nginx is a lightweight, high-concurrency Web server developed by the Russians and currently has the largest domestic market share. Compared with Apache, it is characterized by a simple operation and maintenance, fast processing of static files, and minimal consumption of system resources. And its market share is increasing year by year, and the future development is good, so the course group chose LNMP architecture to build a WordPress blog demo site as a teaching project [1].

5. Case Decomposition and Teaching implementation

5.1. Case decomposition

The complete project is to build a WordPress blog demo site based on the LNMP architecture, which is broken down into 13 sub-tasks, as shown in Figure 1:

(1) Install Linux operating system, corresponding knowledge points: installation and use of VMware virtual machine, mirror installation of Linux operating system, master system power on / off and restart operation;

(2) Add new users and new groups, corresponding knowledge points: master the addition, deletion, modification of Linux users and groups, and be familiar with account configuration files;

(3) Configure yum source, corresponding knowledge points: yum command;

(4) Set up an ftp server and verify, corresponding knowledge points: how to start the service (expanded knowledge), use vim text editor to configure related files, process management and monitoring;

(5) Configure server IP, gateway, subnet mask, etc. to ensure connection to the external network, corresponding knowledge points: network management knowledge, ping command, computer network (expanded knowledge);

(6) Upload the Nginx, php, mysql, and WordPress installation packages to the server, review the

use of the vim editor to configure the FTP user, and introduce the use of the WinSCP tool (extended knowledge);

(7) Unzip multiple installation packages into the specified folder at the same time, corresponding knowledge points: use files management and regular expression knowledge;

(8) Compile and install Nginx, corresponding knowledge points: understand and use the GCC Makefile compilation tool;

(9) Write shell scripts and automatically install PHP. Corresponding knowledge points: master the shell environment, shell scripts: loops, structures, etc., and set the script operation permissions

(10) Install Mysql (mysql-mariadb), corresponding knowledge points: database operation (extended knowledge);

(11) Install WordPress, corresponding knowledge points: comprehensive use and review of learned knowledge points;

(12) Add a new hard disk to the server, corresponding knowledge points: master the creation, mounting, and unmounting of the file system;

(13) Disk expansion, corresponding knowledge points: logical volume management, review of the use of files, directory operations, partition mounting, and reloading;

(14) Other server configuration (self-study).

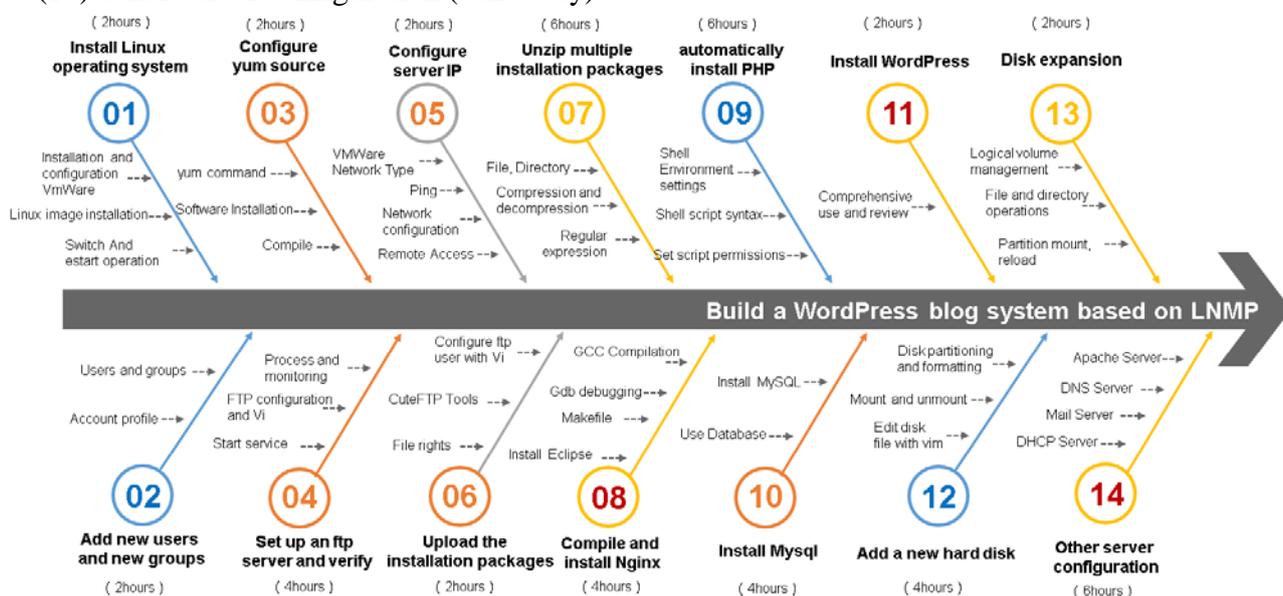


Figure 1. Task breakdown diagram

5.2. Teaching implementation

The process of project implementation is divided into two parts, namely demonstration and demonstration, and imitation exercises. The teacher decomposes according to the above items, and arranges the subtasks corresponding to each class reasonably according to the class hours. The teacher explains the knowledge points involved in the sub-task in detail, and demonstrates the completion of the sub-task. The operation process can be screened and sent to the students, and the students can watch it repeatedly to improve the efficiency of the classroom. At the same time, in order to prevent students from mechanical imitation, classroom questions and answers or small cases need to be added to enhance understanding.

Because there is no division of roles in this case, in order to prevent students from having dependence and affecting teaching results, it is not recommended to complete assignments in groups. However, students are encouraged to discuss with each other to sort out ideas and improve their ability to analyze and solve problems. Teachers can provide assistance, but should not do it directly for students.

After the students submit their assignments in the classroom, the teacher should make targeted comments based on the student's assignments and problems exposed during the completion process, and reserve time for the students to correct the assignments to prevent students from listening and

not correcting, which affects the teaching effect.

Finally, guide students to summarize the main knowledge points of this lesson. Before the next class, students are required to repeat the content and operation points of the previous class to prevent students from forgetting and affecting the completion of the next task [1].

During the completion of normal subtasks, teachers can extend new knowledge points on the basis of the original project. To complete such a project, students need to collect relevant materials on their own to realize the project. If they cannot rely on the knowledge acquired in the classroom, they cannot complete in this link, the role of teachers is to propose project expansion, stimulate students' thinking, and guide students to actively and autonomously explore to improve their ability to solve problems [4].

6. Assessment Method

The Linux operating system course pays attention to the cultivation of students' professional post ability, pays attention to the main role of students' learning and the cultivation of self-learning ability. The assessment should take into account both process evaluation and result evaluation. Assessment method of the machine test. The procedural evaluation focuses on the learning process and the behavior of students. It is recommended that procedural evaluation is not less than 50% of the total assessment score. Linux operating system courses focus on practical skills, organize teaching by subtasks, and can individually evaluate each task. Skills and theoretical skills to finalize the entire complete project. Process evaluation runs through the curriculum, and effective process evaluation helps teachers adjust their teaching plans according to the actual teaching progress [5]. The computer-based exam is a final and final assessment. The topics cover basic command operations, user (group) management, disk management, system management, software package management, process management, Vim editor, shell program design, server configuration, and so on. The design of the computer-based examination questions should follow the focus on the use of basic assessment basic commands, basic system knowledge, and mastery of skills, focus on overall and systematic evaluation, and design comprehensive questions around the main line of ability improvement and the needs of the enterprise to improve. For the examination of students' comprehensive application ability, it is recommended that the computer-based examinations account for 50% of the total score.

Examples of comprehensive computer-based assessment questions: Configure a WWW server, and configure a disk quota (a quota of 100Mb space) for the user (add an ordinary user, the user name uses their own pinyin), and the user uploads the website file via FTP (provided by the teacher), And finally test whether the website can be accessed normally through the IP address in the browser. Question assessment points: user management (main directory settings, default login shell settings), disk quota management, WWW server configuration, FTP server configuration. This topic is a typical enterprise application scenario, which integrates a number of typical knowledge points and skills of this course. This topic requires higher students' basic knowledge, skills and comprehensive ability assessment, and a higher degree of discrimination.

7. Conclusion

The "Linux operating system" application is a professional platform course focusing on understanding and practical skills. The application-oriented case teaching method runs through the entire course through a real and transformed enterprise project engineering case. The different subtasks decomposed from this case cover different curriculum knowledge points. Through the continuous advancement of the subtask, it is gradually deepened. Complete the entire case. Students can not only experience real engineering projects, understand the knowledge structure of the curriculum, and have an overall understanding of the curriculum, but also develop the ability to connect theory with practice, analyze problems, and solve problems through case projects. At present, this case teaching method has been applied to the Linux operating system curriculum of the School of Information Engineering. According to the daily classroom spot checks, homework

corrections, and analysis of the final exam teaching results, it can be found that the teaching effect and student learning enthusiasm have improved significantly. Due to the above-mentioned advantages of practice-oriented penetration case teaching, it can be extended to other practical professional courses.

Acknowledgment

In this paper, the research was sponsored by the Key curriculum construction project of Xi'an Eurasia University (Project No. 2018KC005) and Teaching Reform Project of Shaanxi Computer Education Society(JXJXH-1905).

References

- [1] Ma Min, et al. Practical Research on Application-oriented Penetration Case Teaching Method-Taking the Linux course as an example [J]. Journal of Hubei Radio & TV University. 2019 (39): 48-51.
- [2] Jiang Zhihua's "Case-through Teaching Method" Exploration—Taking the Course of "National Economic Accounting" as an Example [J]. Educational Theory and Practice, 2013 (24): 48-50.
- [3] Cao Dan, Zeng Ying. Practical Research on the Penetrating Case Teaching Method in "VB Program Design" [J]. Computer Knowledge and Technology, 2016 (27): 87-88.
- [4] Liao Wangyu. The application of penetrating case teaching method in data mining course [J]. Computer Products and Distribution, 2018 (3): 209-210.
- [5] Li Xin. Discussion on Teaching Reform of Linux Operating System in Colleges and Universities [J]. Journal of Higher Education, 2017 (20): 152-154.