



# Research on Computer Music Teaching System Based on Ubuntu

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**Abstract.** In order to reduce the cost of establishing a computer music teaching system, this paper introduces the method of establishing a computer music teaching system based on the open source operating system Ubuntu and open source music software, and introduces the working principle and process of the system.

**Keywords:** computer · music teaching · ubuntu · linux

## 1 Introduction

The computer music education system refers to the computer as an auxiliary tool, the computer as the medium, the computer as an auxiliary tool, the use of computer technology, the computer to complete a variety of music education and practice tasks. With one or more sets of servers as the center, this software can be used for general or professional music teaching with multiple sets of servers. For example, conducting music education and art practice in middle schools; Music teaching and art practice of public majors in college music teaching, such as music performance, music theory, etc. With the advantages of strong function, flexible operation and high application efficiency, it has been widely used in music teaching at all levels in the United States and other European and American countries, and gradually formed a new feature [1]. Because of the particularity of musicology, the computer music education system must conform to three basic requirements in its operation: first, to achieve a highly centralized management system; Second, each computer has a fixed number, can independently complete large-scale, high-density multimedia computing, including audio computing, video computing, etc.; Third, in the calculation process, the requirement for data transmission delay is very low (usually, the data transmission delay is not more than 10 ms). This situation makes the computer music education system compared with the general computer network classroom, has a great difference.

However, in the current commercial software environment, there are relatively mature solutions for this system application. However, its high fees for the use of patent technology and system procurement often make the schools at all levels in the underdeveloped areas of our country, especially the remote primary and secondary schools, prohibitive and unable to do so [2]. At present, this phenomenon has seriously restricted the overall quality of music teaching in colleges and universities. In recent years, the rise of open

source communities such as Linux has given us a good way to deal with this problem. Open source software is basically free and very flexible and easy to configure. Building this system on the basis of open source software not only greatly reduces the cost and technical threshold of system construction, but also avoids the patent barrier, which lays a good foundation for its development in both research and application [3].

The computer music teaching system of Ubuntu discussed in this paper is to take Ubuntu, the mainstream release version of the open source operating system GNU/Linux, and related open source software as the basis and support on a common and relatively low level computer hardware platform. After certain configuration and integration, to achieve a complete [4], completely open source computer music teaching system. The article builds on Ubuntu as a prototype, but Ubuntu is only an example, and the methods discussed in this article can be applied to other GNU/Linux versions as well. In terms of process, to establish a computer music education system based on Ubuntu, the first problems to be solved are: 1) to establish a unified server and a unified management system between each workstation within the system; Secondly, the real-time performance of each computer platform is improved, and the special music software is configured, so that the computer platform can communicate and synchronize with the server and teacher platform quickly [5]. The third is to deal with background management and background management problems [6]. The following steps are detailed.

## 2 System Planning and Design

In the planning and design of the system, we should start from the size of the whole system and calculate the hardware requirements of each computer including server and workstation according to the size. If it is too high, it will waste funds and resources; if it is too low, it will not meet the operation requirements and reduce the effectiveness and scope of application of the operation. For example, in a system of 20 student workstations +1 teacher workstations, the performance index of the main hardware of the computer should be: the CPU on the server side should have a main frequency greater than 2.6 GHz, with 2 or more processor cores is the best choice, hard drive of at least 500 gigabytes, storage of at least 2 gigabytes; The CPU frequency of the system must be at least 1.8 GHz, with or without disk, storage space of at least 512 M; Because the teacher workstation also needs to run certain instructional software, such as presentation, monitoring, and so on for the student workstation, the hardware configuration is slightly higher than the student workstation configuration, can be sandwiched between the server and the student workstation, and must be equipped with a hard drive. With the increase of the number of teachers and students workstations in colleges and universities, the requirements for hardware equipment such as servers and teachers workstations will also increase. In addition, if you have enough money, you can also use the serial port interface of the motherboard or use IEEE1394, USB, PCI and other interfaces to connect MIDI devices or separate audio cards, so that teachers and students can have a workstation to meet the conditions of hardware MIDI data input and output capabilities, or let it have high quality audio processing capabilities [7].

However, in the diskless network, the operating system and application software of each workstation are stored in the hard disk of the server, although the flexibility of

a single workstation is not as good as that of the diskette network, but because its late management and maintenance are carried out on the server, so it can greatly reduce the workload. Moreover, its performance is also very good, can be extended very well. So, in cases where it is not particularly necessary, the best architecture is a diskless network. Moreover, in practical applications, G-rated Ethernet should be selected regardless of the configuration, due to the large amount of audio and video data to be transferred. For the most part, the example discussed below is a diskless network [8].

### 3 Install and Debug the Server System

Ubuntu Server Edition can be used by this server operating system. Ubuntu Server is designed specifically for servers and does not include other useless packages, making the server hardware more efficient than other derivative versions. The Ubuntu server is very clean, and according to the desktop instructions, it won't have a desktop environment. For ease of use, install the Gnome desktop environment under the text interface first. After confirming that your network is unblocked, the following command will be executed:

```
Launch X# to the image screen
sudoapt-getinstallgdm# Environment Manager
Use sudoapt-get Installubuntu-desktop #
```

```
sudoshutdown-rnow# Restart your computer and then you will want to debug Ubuntu
```

Server as a server without disks. The design idea of this paper is: In the login phase, the workstation uses the server as the login server. After the login, the server is mainly used as the nfs server to provide hard disk space, which is mapped as the root directory of the workstation. Then, the workstation will not use the hardware resources of the server, but use its own hardware resources to carry out computing. In its earliest days, Ubuntu itself contained a terminal component without a disk, the LTSP. The LTSP program is designed to provide more client support for the Ubuntu server, which can use a weaker hardware computer to browse the Web, send and receive E-mail, create files, and run other simple desktop programs. It can be seen that LTSP technology can be used in general computer network classroom, but not in computer music education. The reason: LTSP is also a diskette less device, but it is a diskette less terminal, which does not meet our needs for a diskette workstation. LTSP concentrates on the server's hardware resources, that is, when the client runs the program, it uses the server's CPU and memory resources, while the client basically does keyboard, mouse, graphics, and NIC input and output. For example, LTSP is used in a computer music teaching system [9]. If the number of clients requiring real-time audio computing suddenly increases at the same time, the server will become overwhelmed and stop working, causing the whole system to crash. And, worst of all, in LTSP mode, the user can't even use a MIDI input machine, let alone play a game, because all the hard drives on the server are occupied, including USB ports, sound cards, etc. Therefore, in computer music education, LTSP can no longer be used, but to build a real sense of diskette workstation, that is, distributed computing.

#### 3.1 Configuring Tftp, Dhcp, and Nfs Services

```
Sudopasswdroot# assigns a password to the root user
```

```

Password:# Enter the password of the existing user
EnternewUNIXpassword:# Enter the root user password
RetypenewUNIXpassword:# Type the root user password again to confirm
gksu/usr/sbin/gdmsetup# Allows root user login.

```

The preceding commands are used to log in to the system as the root user. The following workstation operations also need to be performed under the root user. Restart your computer and log in to apt-getInstalltftpd-hpa # as root to install the tftp service suite.

```

nano/etc./default/tftpd-hpa# Set tftpd and check
Whether RUN_DAEMON = "yes"; Whether OPTION
= "-l-s/var/lib/tftpboot"/etc./init. d/tftpd-hpastart# Start the tftpd service.
Netstat pna | greptft# see if TFTP service can begin to work
apt-getinstalldhcp3-server# Installs the dhcp service suite.
nano/etc./default/dhcp3-server# Sets the dhcpd
Working interface: Specifies the network adapter through which the server provides
dhcp
For services, as with eth0, INTERFACES = "eth0"nano/etc./dhcp3/dhcpd. Conf#
main Settings, set as required /etc./init. d/dhcp3 -serverStart # Starts the dhcp server.
apt-getinstallnfs-commonnfs-kernel-servernfsclient# Installs the nfs service suite
nano/etc./exports# Configures the service/etc./init. d/nfs-kernel-serverstart# Starts
the nfs
service.

```

### 3.2 Preparing Core Modules for Remotely Starting the Client NIC

```

Apt - getinstallsyslinux# syslinuxcp installation /usr /lib /syslinux/ pxelinux.
0/var/lib/tftpboot/# Copy pxelinux. 0 file to the tftpboot directory
# Set up pxelinux in tftpboot. Cfg directory
# In pxelinux. Cfg directory to create a file named after the client IP address, if there
are multiple clients, you need to create multiple files, and the client IP address as the
file name, the server through this method to distinguish different clients, to import their
different virtual root directory
The nano/var/lib/tftpboot/pxelinux. Cfg/default# Configure the client file default is
used as an example. The file is as follows:
DEFAULTubuntuLABELubuntukernellinuxappendinitrd
= initrd. Nfsroot = /dev/nfsnfsroot = 192. 168. 1. 88:/home/cache/netboot/rootip =
dhcpPROMPT1TIMEOUT3

```

## 4 Workstation Deployment

The specific configuration scheme includes the following aspects: First, a set of Ubuntu operating system is suitable for users, and it is used as the hardware platform of users. After that, you need to do some necessary operations, such as masking certain directories, modifying certain files, and finally wrapping the entire root directory and copying it to



the finished system into the server. With the server at this point, the work on the teacher workstation ends for the time being, and the configuration continues on the server:

`Cp/home/cache/netboot/tftpboot / * / var/lib/tftpboot / #` on the server copy the kernel and `initrd.Img` to `/var/lib/tftpboot/ls-lhnetfs. Tgzcpnetfs..tgz/home/cache/tarzxvfnetfs. Tgz&&rm-frnetfs. Tgzls#` put just compressed netfs. Unzip a TGZ file to `/home /cache /netboot /root /CD/home/cache/netboot/root/etc./delete rmmtab#` mtab file to this, the whole system is implemented, can adjust students workstation for PXE boot mode to boot. Finally, it is necessary to improve the interactive classroom teaching management function of the whole system:

`apt-getinstallitac-masteritac-clientlibitac#`

Install classroom teaching management system.

`Itac - launcher#` operation management system, the system in `the/etc./itac/keys` generated some key pair, `the/etc./itac/keys/public/the teacher/the key` under the key is student workstation installation key, when the client need to copy them to the U disk for later use.

Log in to the student workstation as root and install the client of the management system:

`Apt-getinstallitac-clientlibitac #` Installs the classroom teaching management system.

Copies the U dish in the key # to `the/etc./itac/keys/public/the teacher/key`.

## 5 Later Maintenance and Backup of the System

In the later maintenance of the system, attention should be paid to: regular maintenance, in order to use the administrator account. The running order of the system is: server - teacher - student end. After the platform is repaired, you can set up a smaller account for the platform. When the entire system is repaired, all servers and teachers' computers can be backed up as ISO self-guided files, and then burned. In this way, if the system crashes, the DVD can be used to quickly recover. Backup instructions must be performed separately on the server and teacher's computer. When the first backup is made, you must run the entire instruction in its entirety, and only the following instructions can be used for subsequent backups. `File /etc./app/source. List#` edits the source list file, changes the source address in the source list file, and saves it.

`apt acquisition; apt-getinstallremastersys#` In System - > Administration - > Restore - > Restore system to perform restore and display backup prompts on the screen. When this work is completed, the ISO file will be placed in `master/slave master/slave/can` be burned, can be saved or published.

## 6 Conclusion

In a word, after the adjustment and configuration of the computer, the computer music teaching system needs to meet the three important characteristics of the operation of the problem has been solved successfully, on the basis of Ubuntu, has basically realized the computer music teaching system. In this paper, the implementation principles and methods of the system are discussed comprehensively from two aspects of theory and

practice. However, many instructions in its implementation must be completed by the terminal, which has a high demand on the knowledge and skills of the operator, and brings adverse effects on the large-scale promotion and popularization of the system. Therefore, the further design of the system, and the further design of the system, the realization of the system's humanization, Windows and wizard.

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