“Київський фаховий коледж зв’язку”

Циклова комісія комп’ютерної інженерії

**ЗВІТ ПО ВИКОНАННЮ**

**ЛАБОРАТОРНОЇ РОБОТИ №1**

з дисципліни “Операційні системи”:

**Тема: “Знайомство з робочим середовищем віртуальних машин та особливостями операційної системи Linux”**

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**Мета роботи:**

1. Отримання практичних навиків роботи з середовищами віртуальних машин та операційними системами різних типів та сімейств – їх графічною оболонкою, входом і виходом з системи, ознайомлення зі структурою робочого столу, вивчення основних дій та налаштувань при роботі в системі.
2. Знайомство з основними видами сучасних ОС, короткий огляд їх можливостей.

**Матеріальне забезпечення занять:**

1. ЕОМ типу IBM PC.
2. ОС сімейства Windows (Windows 7).
3. Віртуальна машина – VirtualBox (Oracle).
4. Операційна система GNU/Linux – CentOS.
5. Сайт мережевої академії Cisco netacad.com та його онлайн курси по Linux

**Завдання для попередньої підготовки:** *Created by Dmytro Onufriiev*  
1. Прочитайте короткі теоретичні відомості до лабораторної роботи та зробіть невеликий словник базових англійських термінів з питань класифікації віртуальних середовищ.

|  |  |
| --- | --- |
| **Термін** | **Переклад** |
| Virtual machine | Віртуальна машина |
| Shared hosting | Віртуальний хостинг |
| Operating system | Операційна система |
| Hypervisor | Гіпервізор |
| Open source | Відкритий вихідний код |
| Distributions | Дистрибутиви |
| Graphical user interface | Графічний інтерфейс користувача |
| Command line interface | Інтерфейс командного рядка |
| Dedicated server | Виділений сервер |
| Performance | Продуктивність |
| Interpreters | Перекладачі |
| Host operating system | Операційна система хоста |
| Guest operating system | Гостьова операційна система |
| Background processes | Фонові процеси |
| Kernel of the  system | Ядро системи |

2. Прочитавши матеріал з коротких теоретичних відомостей дайте відповіді на наступні питання:

2.1. Охарактеризуйте поняття «гіпервізор». Які бувають їх типи?  
A hypervisor is software that manages the physical resources of a computer and distributes them among several operating systems, allowing them to run simultaneously. In other words, a hypervisor creates several copies of hardware resources from one physical computer. There are 2 types of hypervisors:

Type 1 is installed directly on the physical hardware (host). They work directly with the hardware and have direct access to resources.

Type 2 is software that is installed on the host's operating system. They run through the host operating system and use its resources.

2.2. Перерахуйте основні компоненти та можливості гіпервізору VMware.

**Variant 12**

The VMware hypervisor consists of two main components: VMware ESXi, a type 1 hypervisor that is directly installed on physical hardware, and VMware vCenter Server, which enables administrators to efficiently manage and control their hardware by offering centralized management of VMware virtual infrastructures. Key features include VMware vMotion, which facilitates real-time migration of virtual machines between servers without causing service disruptions, and VMware High Availability (HA), which automatically recovers virtual machines in the event of hardware failures.

Also, VMware offers several other valuable features. One of them is VMware Distributed Resource Scheduler (DRS), which automatically allocates resources to virtual machines based on their specific requirements. Another feature is VMware vSphere Storage vMotion, which allows the movement of virtual disks between storage devices without causing any service disruptions. Additionally, VMware provides features like VMware vSphere Replication, which replicates virtual machines for disaster recovery purposes, and VMware Fault Tolerance, which ensures the uninterrupted operation of virtual machines.

**Хід роботи. *Created by Vlad Sapozhnyk***

Дайте відповіді на наступні питання.

1. Перерахуйте етапи для розгортання операційної системи на базі віртуальної машини VirtualBox.

* Download and install VirtualBox
* Create a new virtual machine
* Configure virtual machine settings (RAM, virtual hard disk size, network settings, etc)
* Download an operating system image (usually an ISO file)
* Installing the operating system
* Setting up additional parameters
* Add additional features (optional)

1. Чи є якісь апаратні обмеження при встановленні 32- та 64-бітних ОС?

Yes:

* Processor: To install and use 64-bit operating systems, the virtual processor you choose for your virtual machine must support hardware virtualization. Some older processors may not have this feature or may need to be activated in the BIOS/UEFI.
* The amount of RAM: 64-bit operating systems typically require more RAM than their 32-bit counterparts.
* Virtualization options in the BIOS/UEFI: Some computers may require BIOS/UEFI settings to activate virtualization features to ensure optimal performance of virtual machines, especially with 64-bit operating systems.

1. Які основні етапи при встановленні CentOS в текстовому режимі?

* Timezone settings
* Language settings
* Software Selection
* Installation source
* Network settings
* Install Destination
* Kdump
* Set root password
* Create user

1. Яким чином можна до установити графічні оболонки Gnome та KDE на CentOS, якщо вона вже встановлена в текстовому режимі?

* Check the availability of repositories: Make sure that your system has access to the official CentOS repositories to install additional packages.
* Install the graphical shells: Install a GNOME or KDE desktop using the yum package manager. For example, to install GNOME, enter the command:

*sudo yum groupinstall "GNOME Desktop"*

Or to install KDE:

*sudo yum groupinstall "KDE Plasma Workspaces"*

* Customize the default shell (optional): After installation, you can choose which graphical shell to use by default when you log in. This can be done by changing the settings in the /etc/sysconfig/desktop file:

*sudo vi /etc/sysconfig/desktop*

In this file, you can specify "GNOME" or "KDE" in the DESKTOP line.

* Restart your system: After installing and configuring the shells, restart your computer to apply the changes.
* Enter graphical mode: After a reboot, you can log in to the system in graphical mode by selecting the appropriate option at login or by entering a command:

*startx*

* These steps will help you install GNOME or KDE graphical desktops on CentOS if you have already installed the system in text mode.

1. Дайте коротку характеристику графічних інтерфейсів, що використовуються в різних дистрибутивах Linux відповідно до свого варіанту (порядковий номер по журналу).

***Variant 15 (Xfce та Fvwm)***

A characteristic for the Xfce graphical interface:

Xfce is a lightweight and fast graphical user interface for Unix-like operating systems such as Linux and BSD. Here are some of the main features of Xfce:

* Lightness and performance: Xfce is famous for its lightness and low system resource consumption. It is designed to run on computers with weak hardware, making it an ideal choice for older computers or systems with limited resources.
* Modularity and customization: Xfce has a modular architecture that allows users to customize and extend its functionality according to their needs. Widgets, taskbars, themes and other elements can be easily changed or added.
* Well-organized menu: The Xfce application menu is well organized and easy to navigate. Users can quickly find and launch the programs they need.
* Panels and shortcuts: Xfce provides the ability to customize taskbars and create shortcuts to quickly access programs and folders. This provides a convenient workspace for users.
* Support for a variety of applications and themes: Xfce supports a large number of applications that integrate with its interface. In addition, a selection of themes and designs allows users to customize the interface to their liking.
* Stability and security: Xfce is known for its stability and security. It works well on a variety of hardware platforms and is supported by an active community of users and developers.

To summarize, Xfce is a lightweight, efficient, and well-organized graphical user interface with a wide range of customization options and a comfortable environment to work in.

A characteristic for the Fvwm graphical interface:

Fvwm (F Virtual Window Manager) is a very lightweight, fast and highly customizable window manager for Unix systems. Here are some of the main features of Fvwm:

* Lightweight and performance: Fvwm is designed with low system resource consumption in mind. It is one of the lightest window managers and is designed to be used on older or resource-constrained computers.
* Powerful customization system: One of the main advantages of Fvwm is its powerful customization system. Users can fully customize the appearance, behavior, and functionality of windows, panels, and other interface elements.
* Advanced window layout options: Fvwm allows users to customize window layout, size, scaling, and other parameters to their preferences.
* Hotkey and menu system: Fvwm supports an advanced system of hotkeys and customizable contextual menus that allow users to quickly access various functions and applications.
* Support for different styles and themes: Users can choose from a wide range of styles and themes to assign to windows to personalize their workspace.
* Advanced window decoration features: Fvwm allows you to customize window decorations such as borders, titles, control buttons, and other elements.
* Well-documented community and support: Fvwm has a long history of development and a large community of users and developers. A large amount of documentation and help is available for beginners and advanced users.

To summarize, Fvwm is an excellent choice for those looking for a very lightweight, yet powerful and customizable window manager with extensive customization options.

**Контрольнi запитання: *Created by Max Karpenko***

**1. Порівняйте гіпервізори типу 1 та типу 2, яка між ними відмінність та сфера їх застосування?**

Type 1 (native or "bare-metal") hypervisors are installed directly on the hardware. They provide high performance and efficiency, ideal for large data centers and cloud computing.

Type 2 (hosted) hypervisors run on top of an operating system that is already installed on the hardware. They are easier to manage and configure, but have lower performance compared to Type 1 hypervisors. They are more often used for development, testing, and small environments.

**2. Розкрийте поняття «GNU GPL», яка його основна концепція?**

The GNU GPL is a free software license that guarantees end users the freedom to use, study, distribute and modify the program, with the obligation to preserve these freedoms in modified and distributed versions.

**3. В чому суть програмного забезпечення з відкритим кодом?**

The essence of open source software is that its source code is available for study, modification and distribution by any user or organization. It promotes collaboration, innovation, and technology development by allowing anyone to contribute to improving the software product.

**4. Що таке дистрибутив?**

A distribution is a set of software assembled and configured in such a way that a user can easily install and use it on their computer or server. It can include the operating system, additional programs, libraries, and documentation. Distributions are often associated with Linux and other free and open source software, where each distribution offers its own set of programs and utilities, system settings, and package management methods for installing and updating software.

**5. Які задачі системного адміністрування можна реалізувати на базі ОС Linux?**

On the basis of the Linux OS, a wide range of system administration tasks can be implemented, including network configuration, user and access rights management, data backup and recovery, system and resource monitoring, configuration of web servers, databases, firewalls and system security, task automation using scripting, installing and updating software, configuring system services and daemons, and troubleshooting and maintaining workstations and servers.

**6. Як пов’язані між собою ОС Android та Linux?**

Android and Linux are connected through the Linux kernel. Android uses a modified Linux kernel as the basis for its system. This means that Android builds on the architecture and security provided by the Linux kernel, but extends it with its own components and interfaces for mobile devices, such as touchscreens, mobile communications, and apps. At the same time, Android adds a unique set of software and libraries to the upper layers of the system, making it significantly different from traditional Linux distributions.

**7. Основні можливості та сфера використання Embedded Linux?**

Embedded Linux is an adapted version of Linux for embedded systems that combines flexibility, open source and support for a variety of hardware. It is used in a wide range of applications, from consumer electronics, automotive systems and IoT devices to industrial controllers and medical equipment, thanks to its configurability, high security and reliability.

**8. Яким чином можна змінити типу завантаження Linux: в текстовому режимі (3 рівень) або графічному**

**(рівень 5)? Чим відрізняються режими CLI та GUI?**

To change the Linux boot type between text (level 3) and graphical (level 5) you can edit the init settings file (eg /etc/inittab on some systems) or use a service management system like systemd (https://nosystemd .org/ :D) by changing the target mode using the systemctl set-default command.

CLI (Command Line Interface) mode differs from GUI (Graphical User Interface) in the way it interacts with the user: CLI uses text commands to control the system and programs, while GUI provides a graphical interface with windows, icons, and menus to perform the same tasks. The CLI is more resource-efficient and flexible for automation, while the GUI simplifies interaction with the system for users without technical experience.

**Висновок:**

В ходi виконання лабораторної роботи познайомилися з робочим середовищем вiртуальних машин та особливостями операцiйної системи Linux, бiльш детально теоретично дослiджено питання встановлення дистрибутиву CentOS, Отримано практичнi навички встановлення дистрибутиву CentOS через virtual box.