“Київський фаховий коледж зв’язку”

Циклова комісія комп’ютерної та програмної 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. Знайомство з гіпервізорами різного типу, віртуалізацією при роботі з операційними системами.

2. Знайомство з основними видами сучасних ОС, короткий огляд їх можливостей.

**Матеріальне забезпечення занять:**

1. ЕОМ типу IBM PC.

2. ОС сімейства Windows та віртуальна машина Virtual Box (Oracle).

3. ОС GNU/Linux (будь-який дистрибутив).

4. Сайт мережевої академії Cisco netacad.com та його онлайн курси по Linux

**Завдання для попередньої підготовки**

***Prepared by student: Koshkin I., Sarapyn Y.***

|  |  |
| --- | --- |
| Термін англійською | Термін українською |
| **Operating System** | Операційна система |
| **Shared hosting** | Віртуальний хостинг |
| **Machine simulators** | Машинні тренажери |
| **Binary translation** | Двійковий переклад |
| **Host operating system** | Операційна система хоста |
| **Modularity** | Модульність |

***Prepared by student: Koshkin I.***

* 1. ***Охарактеризуйте поняття «гіпервізор». Які бувають їх типи?***

A hypervisor (also known as a Virtual Machine Monitor, VMM) is software or hardware that creates and manages virtual machines. It allows multiple operating systems to run on a single physical computer independently of each other.

**Types of hypervisors:**

**Type 1 hypervisors (Bare Metal or Native Hypervisors):**

* Operate directly on the physical hardware of the host machine, without an underlying operating system.
* Typically used in server environments and provide high levels of performance and security.
* Examples: VMware ESXi, Microsoft Hyper-V, Xen, KVM.

**Type 2 hypervisors (Hosted Hypervisors):**

* Run on top of an existing operating system installed on the physical computer.
* Often used on workstations for testing and software development, as they allow running multiple operating systems on a single computer.
* Examples: VMware Workstation, Oracle VirtualBox, Parallels Desktop.

Варіант 10 (Кошкін Ілля)

Hypervisor Hyper-V

**Hyper-V** - this is a hypervisor developed by Microsoft for creating and managing virtual machines on Windows platforms. It is part of the Windows Server operating system and is also available in Windows 10 and Windows 11 Pro editions.

**Main components of Hyper-V:**

**Hypervisor**:

* This is the core component that enables virtual machines to run directly on physical hardware. It manages the allocation of resources between guest operating systems.

**Virtual machines**:

* Guest operating systems that run on virtual machines created and managed by Hyper-V. Each VM has its own resources (processor, memory, network, and disk system).

**Virtual Switches**

* These are virtual network adapters used to connect virtual machines to physical networks or to create internal networks between virtual machines.

**Віртуальні жорсткі диски (VHD, VHDX)**:

* Files that contain virtual machine data. The VHD and VHDX formats are used to store operating system data and other files.

**Hyper-V Manager**:

* It is a graphical interface for creating, managing, and monitoring virtual machines and Hyper-V resources.

**Hyper-V Replica**:

* A feature that allows remote copying of virtual machines to another server for backup and disaster recovery.

**Failover Clustering**:

* Cluster support ensures high availability of virtual machines. If one server fails, another server can automatically take over the virtual machine's operation.

**Dynamic Memory**:

* A mechanism that allows dynamically adjusting the amount of memory allocated to virtual machines based on their needs.

**GPU virtualisation**:

* It allows virtual machines to use the graphical resources of the physical machine to perform tasks related to visualization, such as in VDI (Virtual Desktop Infrastructure) environments.

**Main features of Hyper-V:**

**Support for various operating systems:**

* Hyper-V supports various operating systems, including Windows, Linux, and FreeBSD, as guest operating systems.

**Extensive backup and recovery options:**

* Hyper-V Replica allows for creating backups and recovering virtual machines in case of a disaster.

**Scalability:**

* Hyper-V allows for the management of thousands of virtual machines in large data centers and cloud platforms.

**source isolation**:

* Virtual machines operate in isolation from one another, which ensures security and stability.

**Live Migration**:

* The ability to migrate virtual machines between physical hosts without interrupting their operation, which is important for maintaining continuous service.

***Prepared by student: Koshkin I.***

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

**Installing VirtualBox:**

* Download and install VirtualBox on your computer from the official Oracle website.

**Creating a New Virtual Machine:**

* Open VirtualBox and click on the "New" button.
* Specify the name of the virtual machine, choose the type of operating system (e.g., Linux, Windows), and its version (32-bit or 64-bit).

**Configuring Hardware Resources:**

* Specify the amount of memory to be allocated to the virtual machine.
* Create or attach a virtual hard disk for storing virtual machine data.

**Adding the OS ISO Image:**

* In the virtual machine settings, go to the "Storage" section.
* Add the ISO file with the operating system image to the virtual CD/DVD drive.

**Starting the Virtual Machine:**

* Click on the "Start" button to launch the virtual machine.
* VirtualBox will automatically boot the OS from the ISO image.

**Installing the Operating System:**

* After booting the OS from the ISO image, perform the standard installation process.

***2.2 Чи є якісь апаратні обмеження при встановленні 32- та 64-бітних ОС?***

Hardware limitations when installing 32-bit and 64-bit operating systems:

**32-bit OS:**

* Can run on any processor that supports 32-bit architecture (x86).
* Memory limitation: up to 4 GB RAM.

**64-bit OS:**

* Requires a processor with 64-bit architecture support (x64).
* Can use more than 4 GB of RAM and supports larger computational capacities.
* In VirtualBox, installing a 64-bit OS requires **Intel VT-x** or **AMD-V** support in the processor, as well as enabling these features in the BIOS.

***2.3 Які основні етапи при встановленні OS Linux в текстовому режимі?***

### **Main stages of installing OS Linux in text mode:**

1. Boot from the installation disk or USB drive.
2. Select language and regional settings.
3. Configure the network (if needed).
4. Partition the hard drive.
5. Choose packages for installation.
6. Install the system and bootloader.
7. Configure users and complete the installation.

***2.4 Яким чином можна до установити графічні оболонки Gnome та KDE в Linux, якщо вона вже встановлена в текстовому режимі (вкажіть необхідні команди та пакети)?***

#### **Installing Gnome:**

1. **Update the repository list and install the Gnome package:**

sudo apt update

sudo apt install gnome-core

**For the full version of GNOME:**

sudo apt install gnome

1. **Reboot the system or switch to the graphical interface with the command:**

sudo systemctl start gdm

**Installing KDE:**

1. **Update the repository list and install KDE Plasma:**

sudo apt update

sudo apt install kde-plasma-desktop

1. **Reboot the system or switch to the graphical interface with the command:**

sudo systemctl start sddm

These commands allow you to add graphical environments after installing Linux in text mode. You can also switch between multiple graphical environments through the display manager at login.