

CREATING A VIRTUAL MACHINE IN WINDOWS 10 OPERATING SYSTEM USING A PROGRAM HYPER-V

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Abstract: Nowadays, multiple applications from various developers enable us to create virtual machines on our physical computers. Windows 10 includes the Hyper-V program, which also allows us to create virtual machines. This paper outlines the necessary system requirements for creating a virtual machine using Hyper-V, explains how to enable the Hyper-V program in Windows 10, and describes the process of creating a virtual machine with it.

Key words: Windows, virtual machine, operational system, Hyper-V

1. INTRODUCTION

The term virtual machine can be defined as having a virtual computer within a physical computer. On a virtual machine, we can install any operating system we want (even though our physical computer already has an operating system installed), i.e., we can install the operating system that is already on our physical computer, or another operating system of our choice. On the virtual machine, we can also install any applications we want, and we can open any files we want if we have the appropriate application installed on the virtual machine (VM) to support them. The installed operating system, applications, and files on the VM created using Hyper-V Manager will remain on it even after the VM is turned off and restarted.

2. CREATING A VIRTUAL MACHINE

2.1. System requirements for creating a virtual machine using Hyper-V

The program that is already included in the Windows 10 operating system and allows us to create a VM on our physical computer is called Hyper-V. Hyper-V can be described as a type of hypervisor, i.e., a program that we use to create one or more VMs on our physical computer in order to overcome the limitations of physical hardware [1]. To use it, we first need to check our system to see if it meets the system requirements necessary for running Hyper-V [2], [3]:

- To run Hyper-V, it is necessary that our Windows 10 operating system is the Pro, Enterprise, or Education edition (*Start* → *Settings* → *System* → *About*, Edition :).
- Our processor type must be 64-bit with Second Level Address Translation (SLAT).
- To create a VM, virtualization must be enabled in the computer's BIOS. Different hardware manufacturers create different BIOS, and Figure 1 shows how to enable virtualization in the BIOS on a Lenovo ThinkPad P50 (after starting the computer, press the F1 key to enter the BIOS).
- We need a minimum of 4GB of RAM.

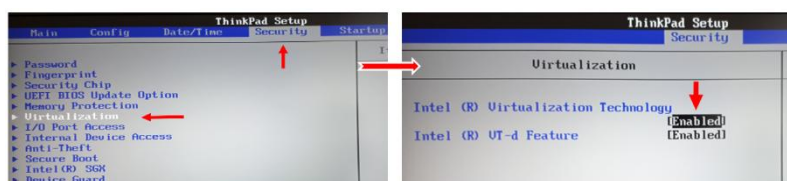


Figure 1 – Enabling virtualization in the BIOS of the Lenovo ThinkPad P50

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2.2. Enabling Hyper-V

In the Windows 10 operating system, the option to use Hyper-V is disabled by default. There are several ways to open the window that allows us to enable it. The first method is to type "Turn windows features on or off" in the taskbar search field and press *Enter* or click the best match option, Figure 2.

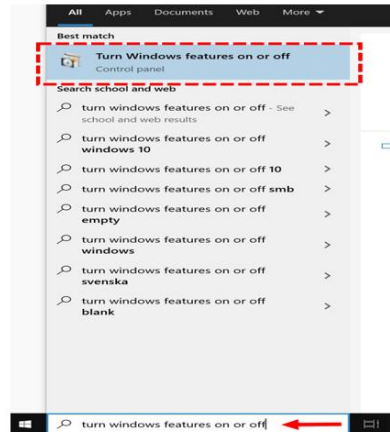


Figure 2 – Opening the window

The second method is to press the *Start button*, select *Settings*, and then open the *Apps applet*. In the newly opened window, click the *Optional features* link, and a new window will open where we will click the *More Windows features* link. A new window named *Windows Features* will open, where we can turn Windows features on or off. We will check the Hyper-V option, Figure 3.

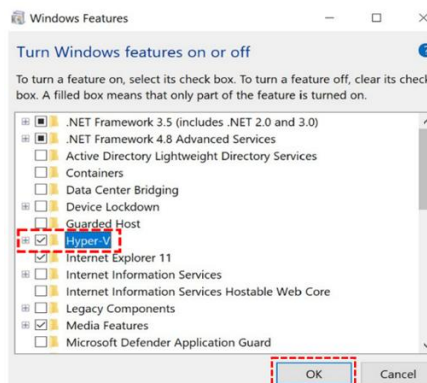


Figure 3 – Enabling the option Windows Features of Hyper-V

After checking the Hyper-V option, we will click the OK button, and Windows will begin the process of installing the required changes. To finalize the required change, it is necessary to restart our computer after the installation process is complete.

2.3. Creating a virtual machine using Hyper-V

We can now launch Hyper-V Manager (*Start* → *Windows Administrative Tools* → *Hyper-V Manager*), as showed on Figure 4a), and a window named Hyper-V Manager will open, allowing us to create and manage all created VMs, Figure 4b). Hyper-V Manager provides us with tools and

information that we can use to manage the virtual server [4]. A virtual server is a physical computer that provides the necessary resources to run VMs.

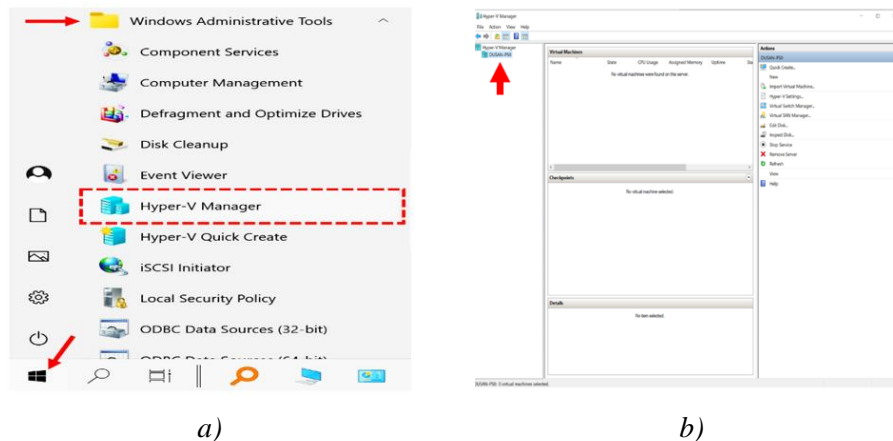


Figure 4 – Starting of Hyper-V manager

We can use Hyper-V Manager to create, configure, and manage VMs on the virtual server. With Hyper-V Manager, we can create multiple VMs, each of which will act as an isolated execution environment, allowing us to install different operating systems and applications on a single physical computer [5].

In the left navigation pane, we can see all different servers, and one of them will be our computer. In our case, it is the server named DUSAN-P50, which is actually the name of our computer. When it is selected, it means that we will create a VM on it, which will be presented in the following sections. In this paper, we will create a VM named *Dusan - Ubuntu 20.04* on which we will install the Ubuntu 20.04 operating system.

We can create a VM using the options *New* and *Quick Create* in the *Action* pane on the right. The option *New* allows us to create not only a VM but also a virtual hard disk or a virtual floppy disk. Using the option *New*, we will create a VM using a wizard that, compared to the *Quick Create* option, allows us to configure the VM during the creation process according to our preferences through the following steps:

- Defining the name and location of the VM,
- Specifying the generation of the VM,
- Specifying the amount of memory to be allocated to the VM,
- Configuring the network,
- Creating a virtual hard disk on which the operating system for the VM will be installed, and
- Specifying the installation of the operating system on the VM.

If we do not want to perform the configuration ourselves, we can skip the aforementioned six steps and press the *Finish* button in the first window of the wizard, which will create the VM configured with default values. We will always be able to make desired changes to the configuration in Hyper-V Manager later.

Creating a VM using the *Quick Create* option is relatively simpler, and in the further text, we will show how to create a VM on a computer using this option.

First, we select the name of our computer in the left navigation pane (in our case, it is DUSAN-P50), and then click the *Quick Create* option in the *Actions* pane on the right. A new window named *Create Virtual Machine* will open, Figure 5a), where we can define all the details regarding our VM. The window presents a list of operating systems from which we can choose the operating system we want to install on our VM. If the desired operating system is not on the list, we will press the *Local*

installation source button, and a window will appear where we can select an ISO file that will install our desired operating system, Figure 5b). Of course, it is necessary to have the desired ISO file on our computer to define it as the installation source. Then we will press the *Create Virtual Machine* button, and the process of creating the VM will begin.

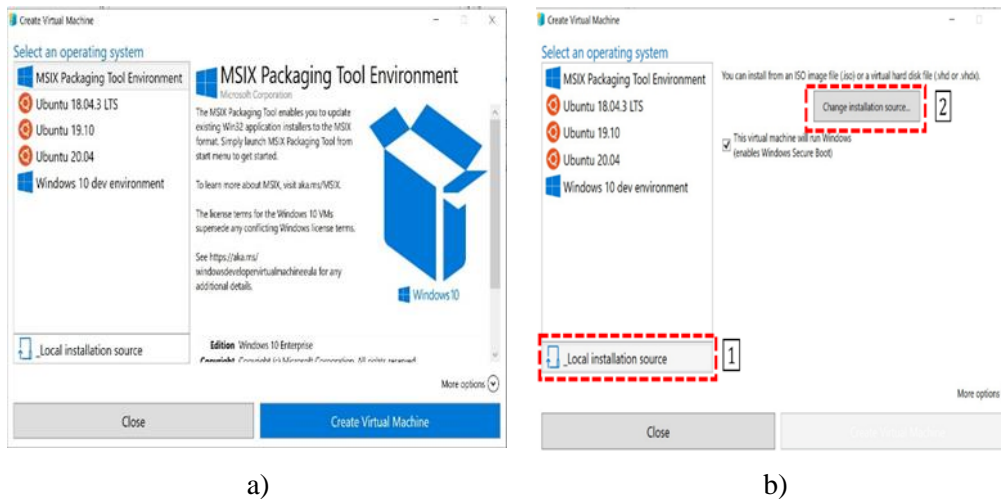


Figure 5 – Window *Create Virtual Machine* and selection of ISO file of desired OS

We will select the Ubuntu 20.04 operating system from the provided list of operating systems, press the *More options* option in the window, and enter the name for our VM *Dusan - Ubuntu 20.04* in the newly appeared *Name* field. Below this field, in the *Network* option, we can set it to have no network or leave *Default Switch*, which is recommended. Pressing the *Create Virtual Machine* button, Figure 6a) will start the VM creation process, and when it is finished, if everything is successful, we will be notified as shown in Figure 6b).

In the window shown on Figure 6b), we are allowed to immediately connect to the created VM (the *Connect* button), to edit existing settings (the *Edit Settings* button), or to simply close the active window (by clicking the X in its upper right corner).

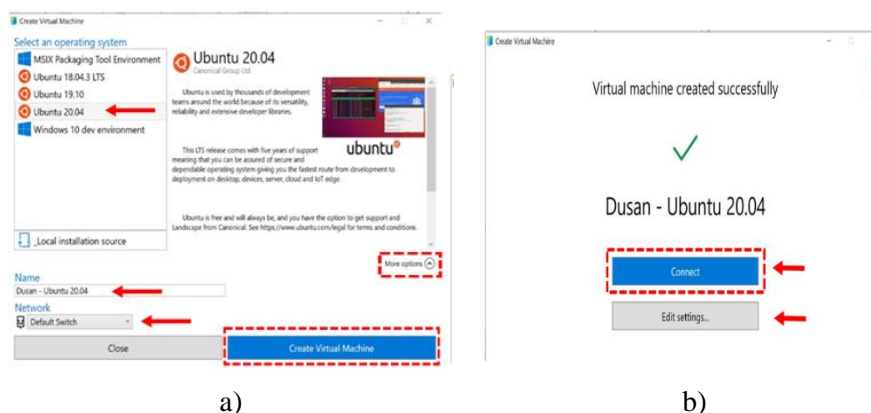


Figure 6 – Starting of the process of creating of VM and options

After we press the *Connect* button, a new window will open informing us that the created VM is turned off and if we want to start it, we need to press the *Start* button in the window, Figure 7a). After we press the *Start* button, the VM will start and the installation process of the Ubuntu operating system will begin. When the operating system installation is complete, we will have our VM with the installed

Ubuntu 20.04 LTS operating system (which is not currently the latest release of Ubuntu 20.04.3 LTS), Figure 7b). After performing the software update (using Software Updater), we will have the latest release of Ubuntu 20.04.3 LTS (Long Term Support) installed on our VM and we can start working on it as desired.

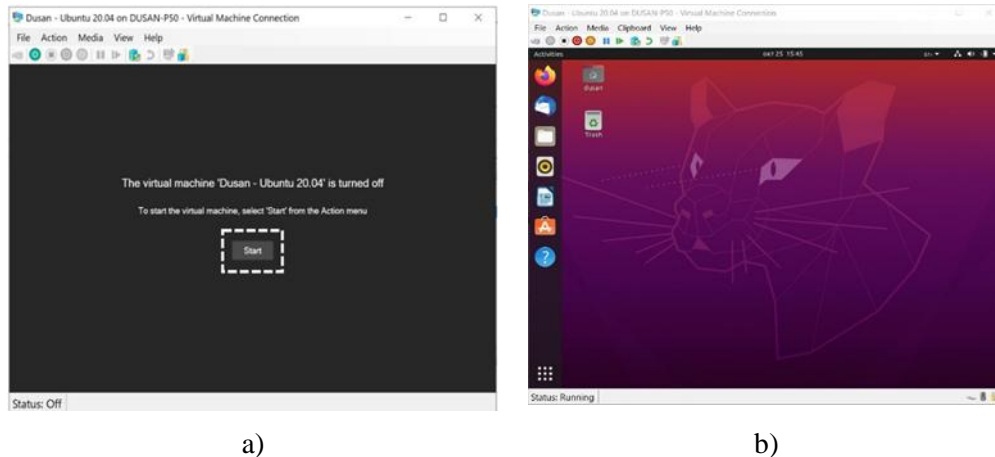


Figure 7 – VM window and VM with installed Ubuntu OS

In the VM, we can also make certain settings (*File* → *Settings*) related to the VM as desired, such as allocating devices to the VM, allocating memory to the VM, allocating processor resources to the VM, etc., which we can also do in Hyper-V Manager for the selected VM.

Once we are done, we will turn off the VM using the *Turn Off* or *Shut Down* command in the *Action* drop-down menu (or icon). The *Turn Off* command shuts down the VM and it is equivalent to shutting down a computer, so data loss is possible, while the *Shut Down* command shuts down the operating system on the VM and the VM itself. After turning off the VM, we can also close the VM connection window by selecting the *Exit* command in the *File* menu (or simply clicking on the X in the upper right corner of the window).

When we do this, the *Hyper-V Manager* window will still be active and will now contain our created VM in the *Virtual Machines* panel. In it, we can now, after selecting the desired created VM in the upper central panel *Virtual Machines*, perform certain activities on it using the newly appeared commands in the *Actions* panel on the right:

- *Connect* - opening the *Virtual Machine Connection* window to connect to the selected VM (which is the same as double-clicking on the selected VM in the *Virtual Machines* panel),
- *Settings* - settings for the VM,
- *Start* - starting the VM (which is the same as selecting the desired VM in the *Virtual Machines* panel and enabling the drop-down menu to appear with a right-click where we would activate the *Start* command), then double-clicking on the image in the lower central panel (named the same as the VM name, which in our case is *Dusan – Ubuntu 20.04 – Summary* tab) to open the VM window,
- *Checkpoint* - creating a VM checkpoint (day and time) allows us to save the existing state of the VM for the selected day and time, so if a problem arises due to changes, we can return the VM to its previous state at the defined day and time (the list of checkpoints will be displayed in the central middle panel under *Checkpoints*),
- *Move* - moving the VM's virtual hard disk,
- *Export* - exporting the VM,
- *Rename* - renaming the VM,
- *Delete* - deleting the VM.

In case we select the *Hyper-V Manager* item in the left navigation panel of the *Hyper-V Manager* window, the content of the central part of the window, as well as the right *Actions* panel, will change, allowing us to connect to another server by clicking on *Connect to Server*, where the other server is essentially another computer that will run the VM. This means that using Hyper-V Manager, we can manage VMs on our computer as well as on other computers, which is referred to here as a server.

3. CONCLUSION

Hyper-V was first implemented in the Windows Server 2008 operating system and has been since an integral part of the Windows operating system (certain editions). Hyper-V as part of the Windows 10 operating system represents a powerful tool for creating and managing VMs. It allows us to overcome the hardware limitations of our physical computer, install multiple operating systems on our computer, and protect our computer from certain software problems that arise in the VM. It is relatively easy to install and use, which significantly reduces the occurrence of errors and uncertainties during its use. However, during the virtualization process, we should always control the details of the virtualized infrastructure to avoid situations where computer resources are either unused or overloaded.

4. REFERENCES

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