



ΤΜΗΜΑ ΗΛΕΚΤΡΟΛΟΓΩΝ &
ΗΛΕΚΤΡΟΝΙΚΩΝ ΜΗΧΑΝΙΚΩΝ

ΣΧΟΛΗ ΜΗΧΑΝΙΚΩΝ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΔΥΤΙΚΗΣ ΑΤΤΙΚΗΣ

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University of West Attica - Dr. Grigorios Koulouras

Προπτυχιακό Πρόγραμμα Σπουδών
«Ηλεκτρολόγων και Ηλεκτρονικών Μηχανικών»

Μάθημα «Νεφροϋπολογιστική»

Hands-on LAB01

«Υλοποίηση Local PDE Ubuntu Server σε Hyper-V»

Κωδικός Μαθήματος: EEE-9.2.4, EEE-9.3.7

Ακαδημαϊκό Έτος: 2023-2024

Διδάσκων:

Δρ. ΚΟΥΛΟΥΡΑΣ ΓΡΗΓΟΡΙΟΣ
Αναπληρωτής Καθηγητής

email: gregkoul@uniwa.gr

Περιεχόμενα

- ▶ Hyper-V
 - ▶ Hyper-V Manager
- ▶ Εγκατάσταση Hyper-V Platform
- ▶ Δημιουργία VM PDE Ubuntu Server
- ▶ Δημιουργία PDE σε VM
- ▶ Εγκατάσταση Docker
- ▶ Εκτέλεση ενός Docker Container

Microsoft Hyper-V

Ας ξεκινήσουμε

Install Hyper-V on Windows 10 or 11

4

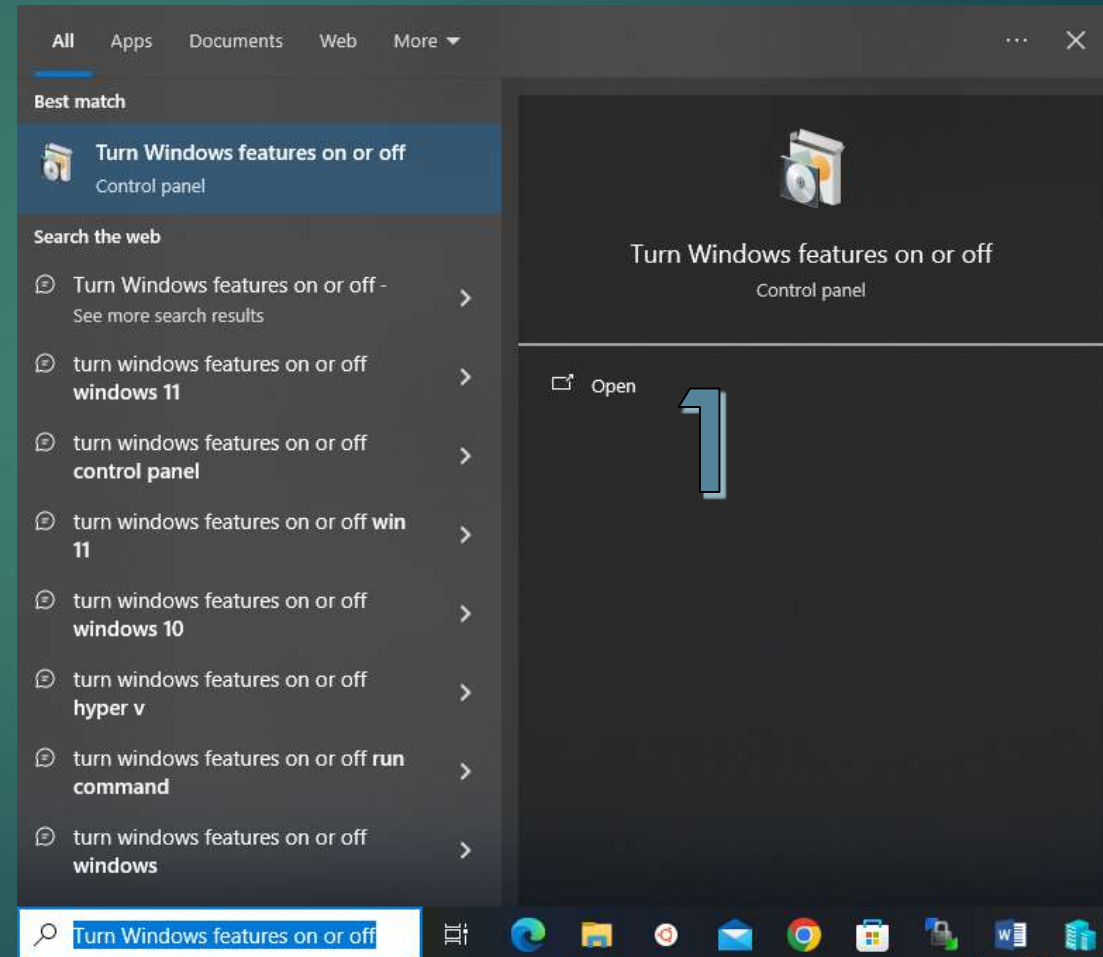
- ▶ Σε αυτό το μάθημα θα εγκαταστήσουμε με την εργαλειοθήκη Hyper-V των Windows.



Install Hyper-V on Windows 10 or 11

5

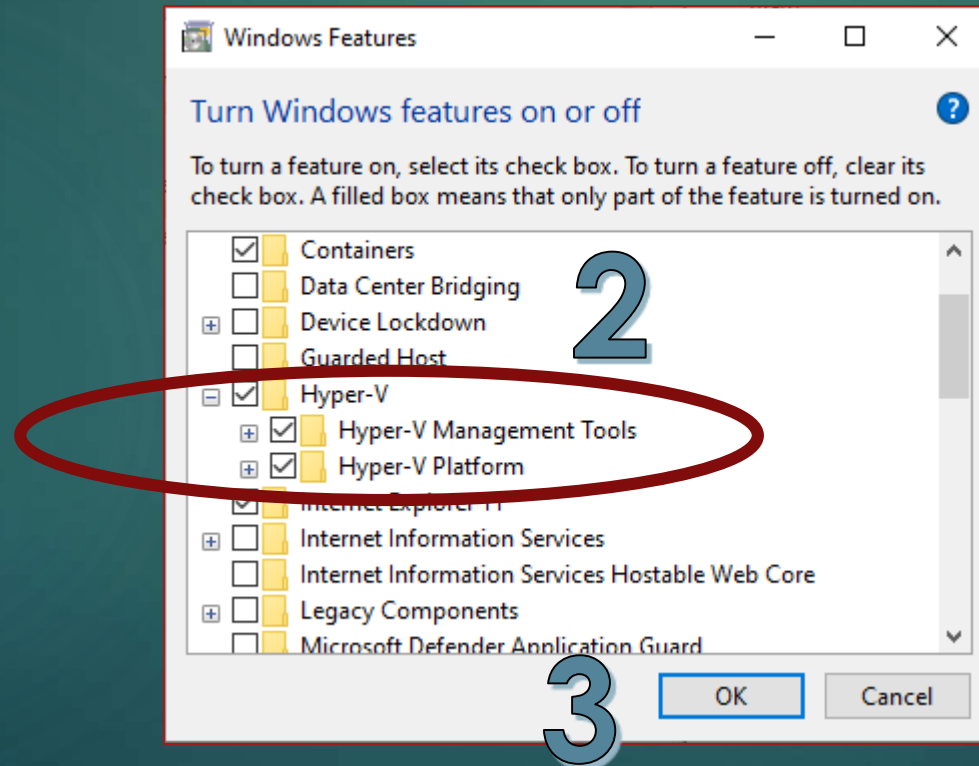
- ▶ Πατώντας στο Search Icon των Windows, ψάχνουμε για το «Turn Windows feature ON of OFF» και το ανοίγουμε.



Install Hyper-V on Windows 10 or 11

6

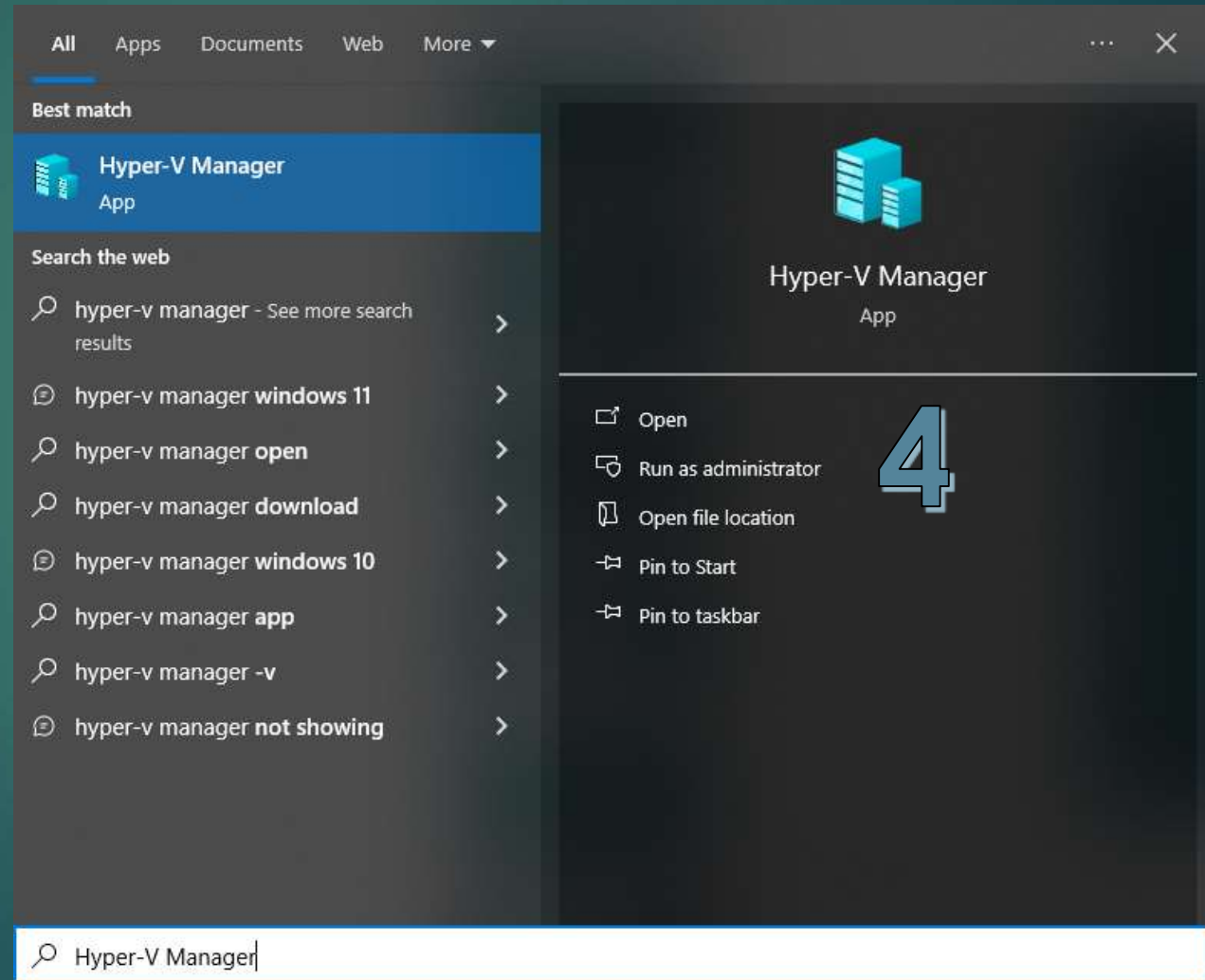
- ▶ Σε αυτό σημείο ενεργοποιούμε το Hyper-V μαζί με το Hyper-V Management Tools και το Hyper-V Platform και στη συνέχεια πατάμε OK.



Install Hyper-V on Windows 10 or 11

7

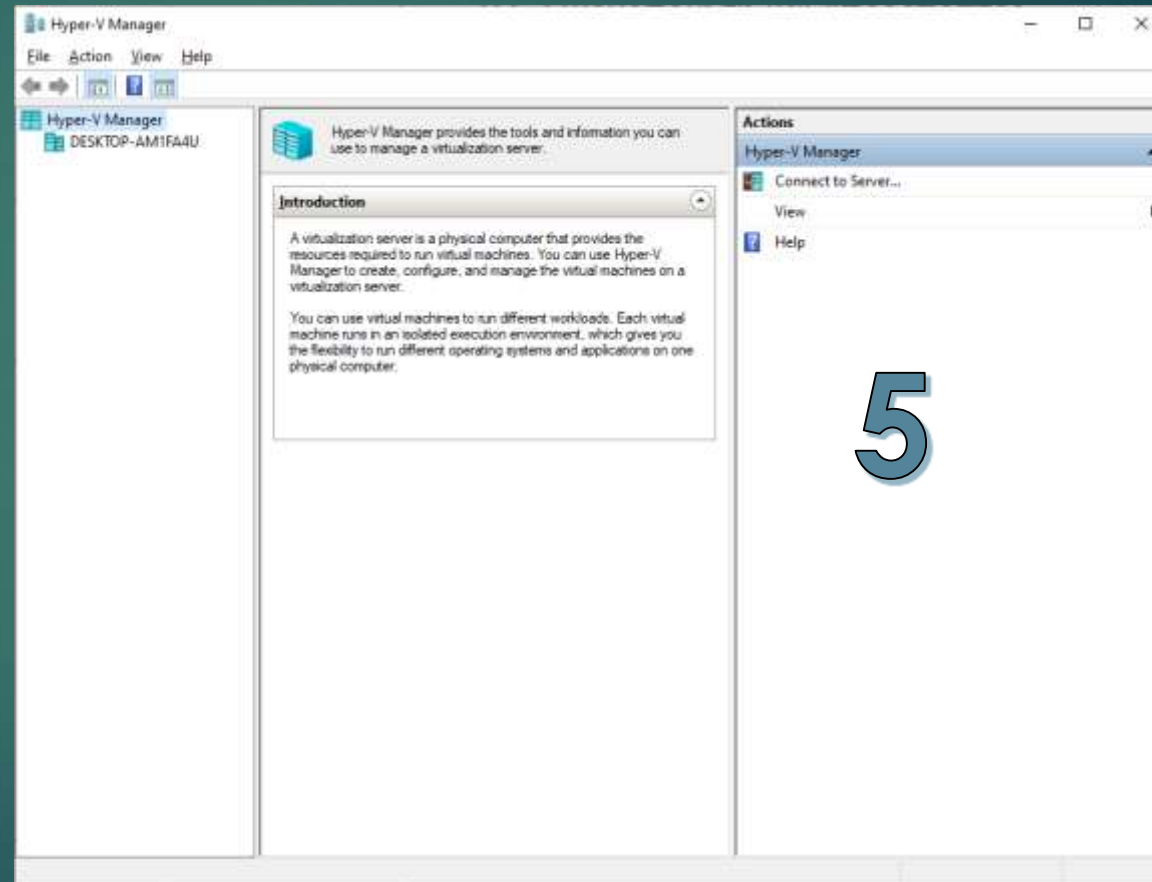
- ▶ Όταν ολοκληρωθεί η εγκατάσταση, θα ζητήσει να γίνει restart το λειτουργικό σύστημα.
- ▶ Μετά το restart, πατώντας στο Search Icon των Windows, ψάχνουμε για το «Hyper-V Manager» και το ανοίγουμε.



Install Hyper-V on Windows 10 or 11

8

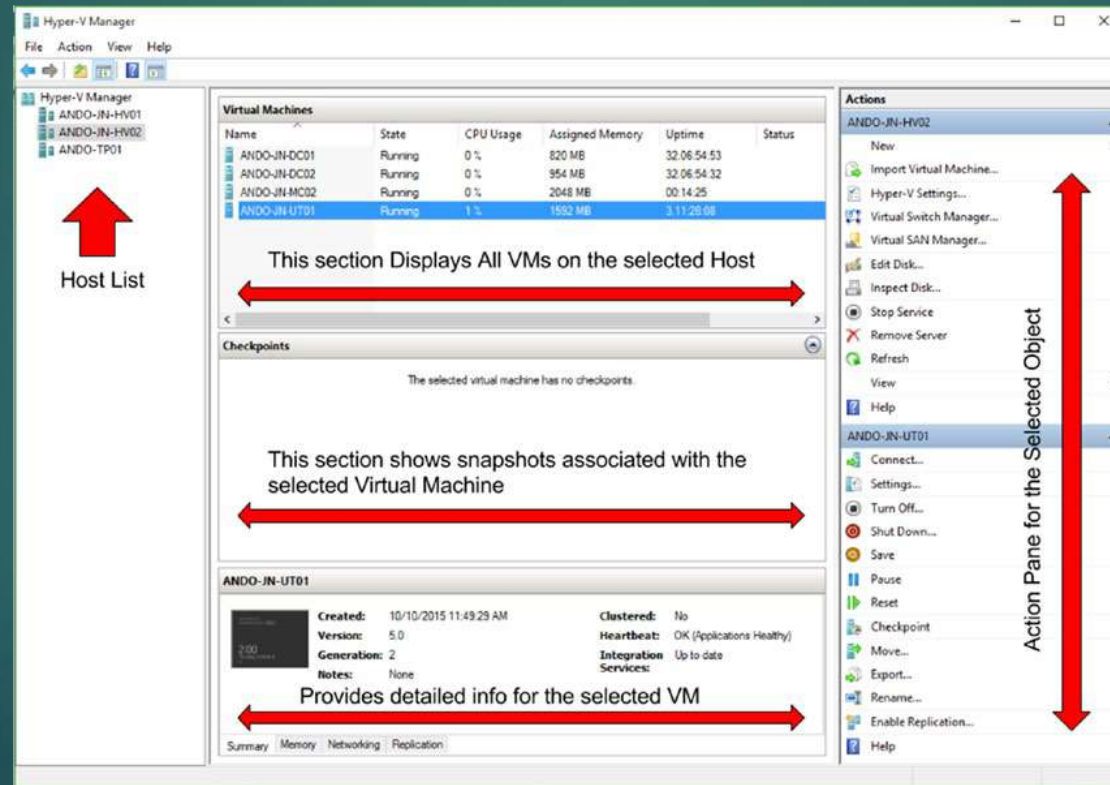
- ▶ Με την βοήθεια του «Hyper-V Manager» μπορούμε να δημιουργήσουμε ένα νέο Virtual Machine ή ακόμα και να εκτελέσουμε ένα έτοιμο.



Create a new VM

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- ▶ Παρακάτω απεικονίζονται τα διαφορετικά τμήματα του Hyper-V Manager.



Create a new VM

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- ▶ Θα κατεβάσουμε το ISO Image της τρέχουσας έκδοσης Ubuntu Server LTS.

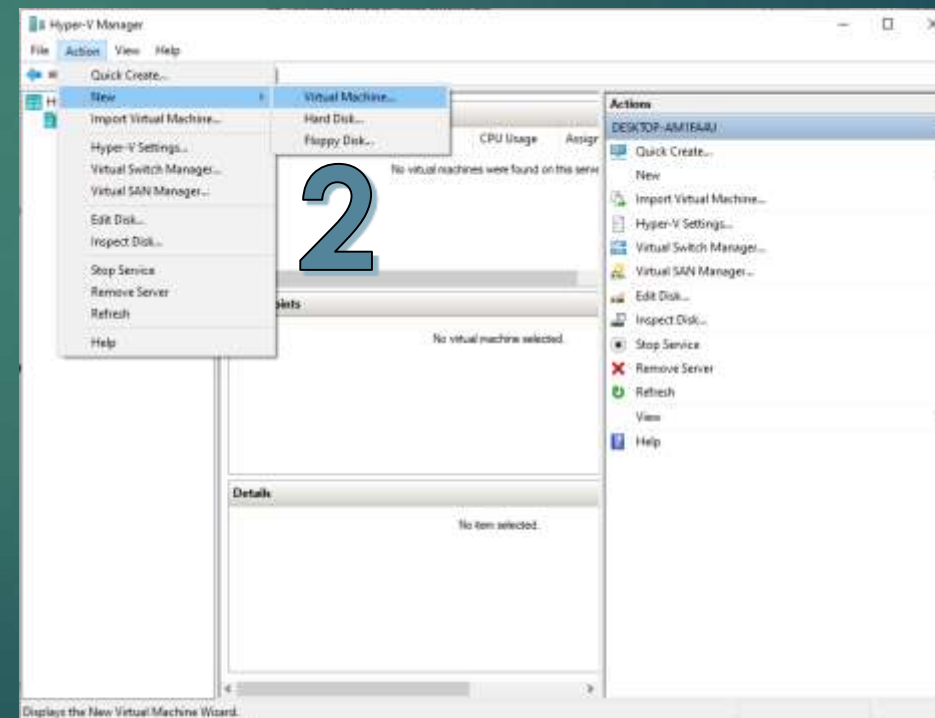
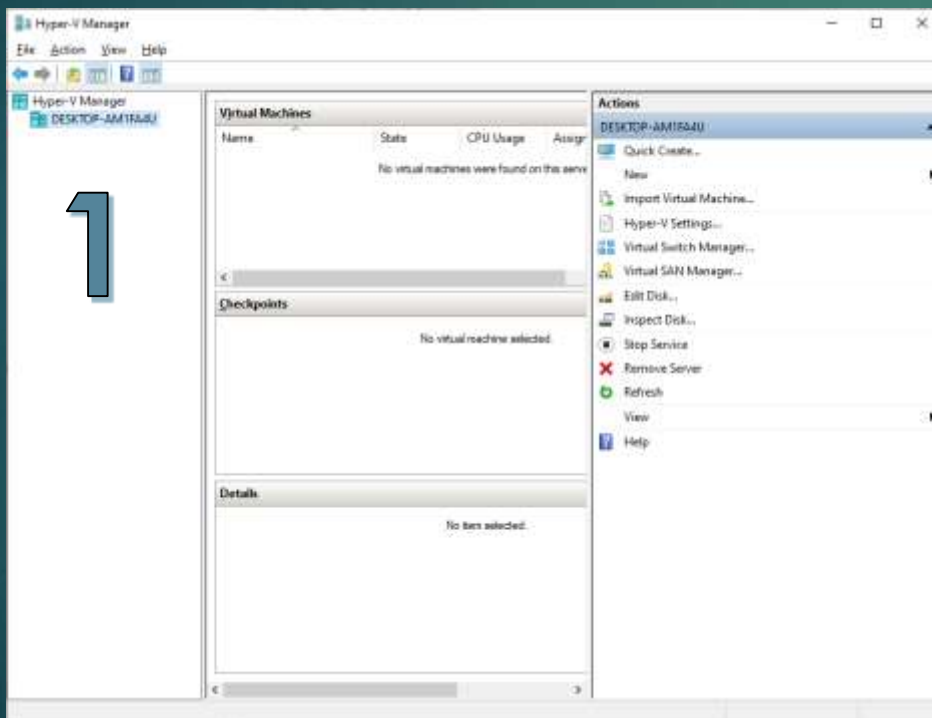
<https://ubuntu.com/download/server>

[Ubuntu Server 22.04.3](#)

Create a new VM

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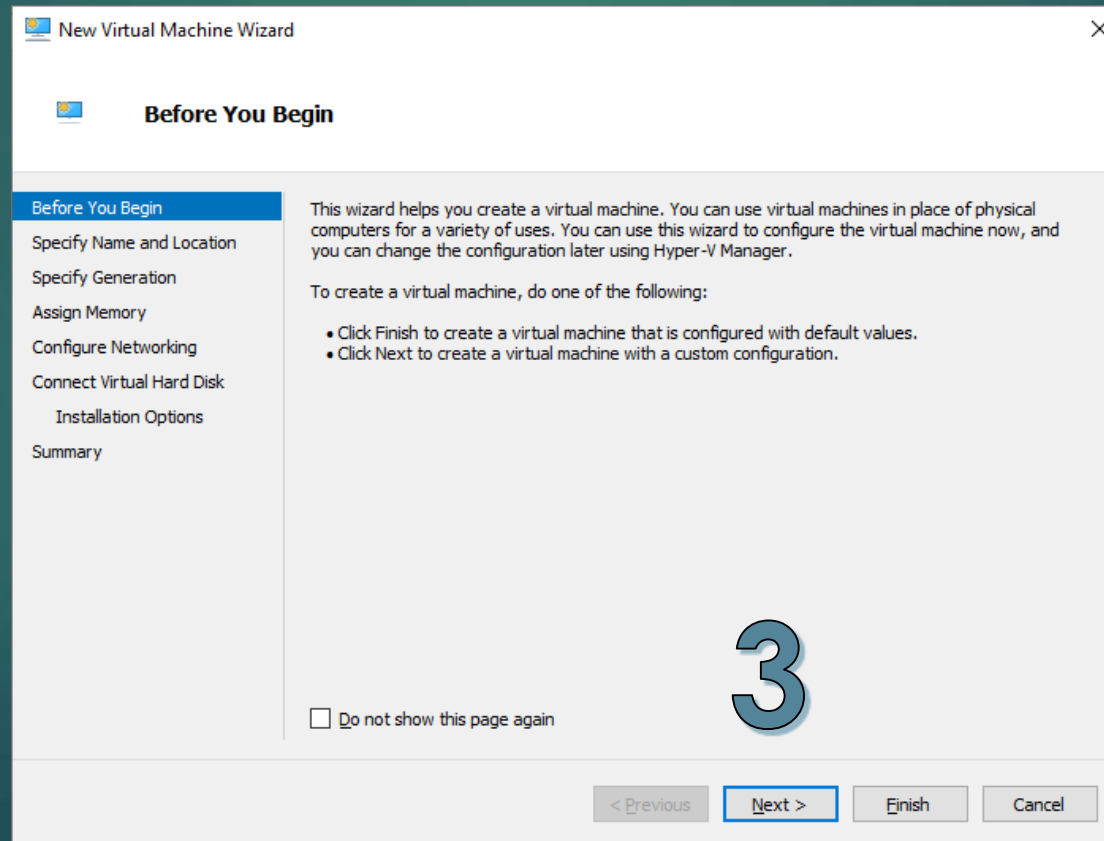
- ▶ Θα δημιουργήσουμε ένα νέο VM και θα εγκαταστήσουμε το λειτουργικό Ubuntu Server 22.04.3 LTS που κατέβηκε νωρίτερα.



Create a new VM

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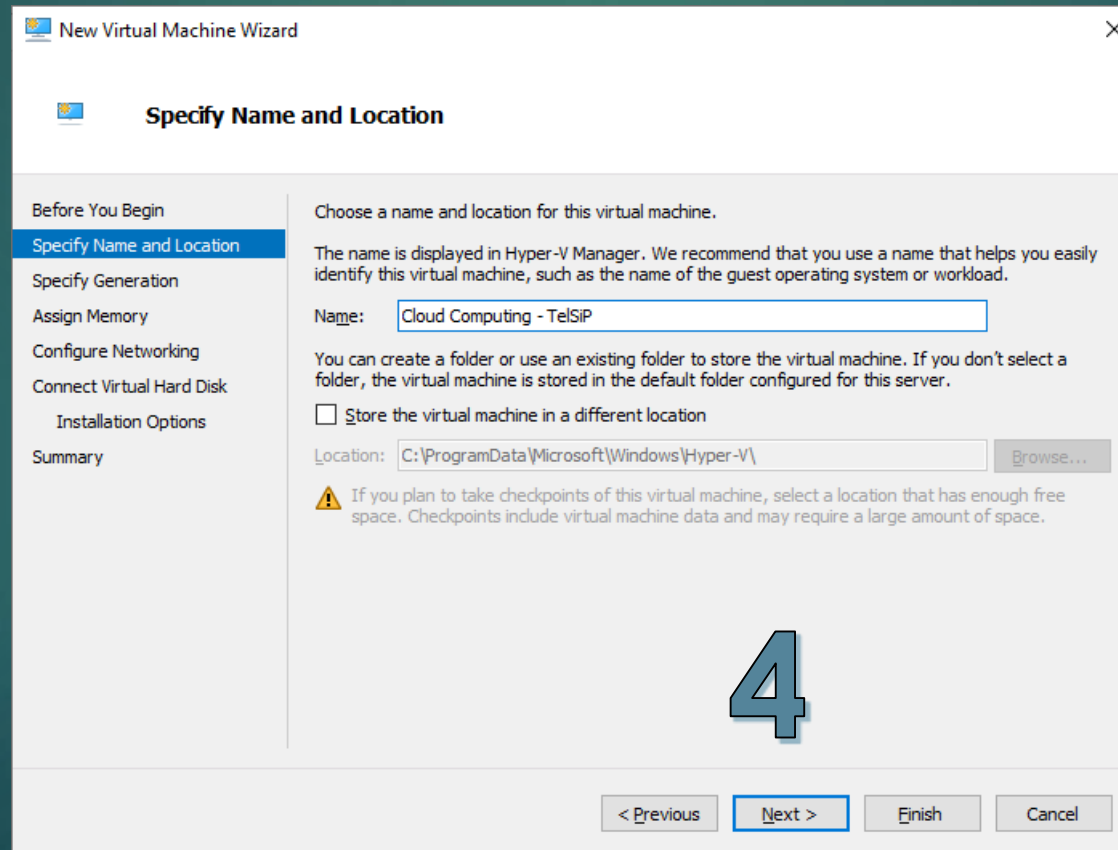
- Ακολουθούμε τα παρακάτω βήματα:



Create a new VM

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- Επιλέγουμε όνομα για το Virtual Machine.

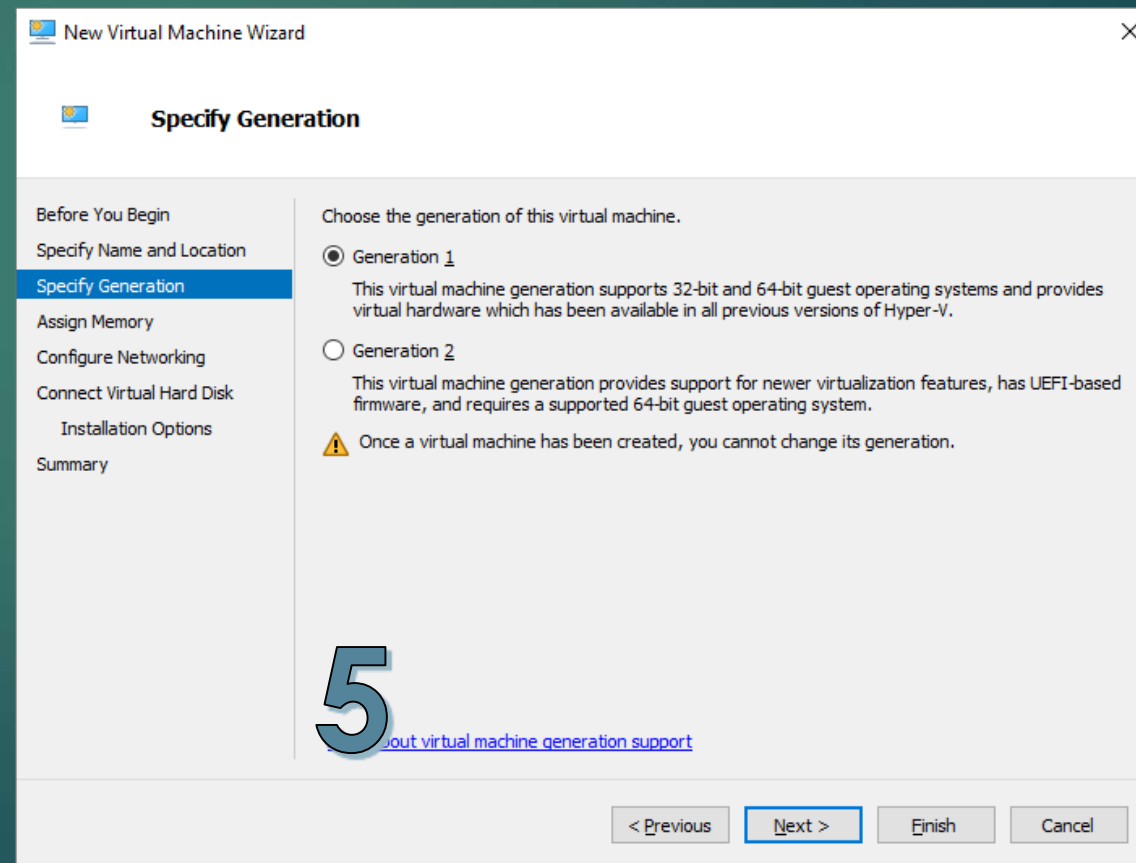


The screenshot shows the 'New Virtual Machine Wizard' window, specifically the 'Specify Name and Location' step. The window has a title bar with the Microsoft logo and the text 'New Virtual Machine Wizard'. On the left, there is a navigation pane with the following steps: 'Before You Begin', 'Specify Name and Location' (which is highlighted), 'Specify Generation', 'Assign Memory', 'Configure Networking', 'Connect Virtual Hard Disk', 'Installation Options', and 'Summary'. The main area of the wizard contains the following text: 'Choose a name and location for this virtual machine.' followed by 'The name is displayed in Hyper-V Manager. We recommend that you use a name that helps you easily identify this virtual machine, such as the name of the guest operating system or workload.' Below this, there is a 'Name:' label and a text box containing 'Cloud Computing - TelSiP'. Further down, it says 'You can create a folder or use an existing folder to store the virtual machine. If you don't select a folder, the virtual machine is stored in the default folder configured for this server.' There is a checkbox labeled 'Store the virtual machine in a different location' which is currently unchecked. Below the checkbox, there is a 'Location:' label and a text box containing 'C:\ProgramData\Microsoft\Windows\Hyper-V\' with a 'Browse...' button to its right. At the bottom of the main area, there is a warning icon and text: 'If you plan to take checkpoints of this virtual machine, select a location that has enough free space. Checkpoints include virtual machine data and may require a large amount of space.' At the bottom of the window, there are four buttons: '< Previous', 'Next >' (which is highlighted), 'Finish', and 'Cancel'. A large blue number '4' is overlaid on the bottom right of the wizard window.

Create a new VM

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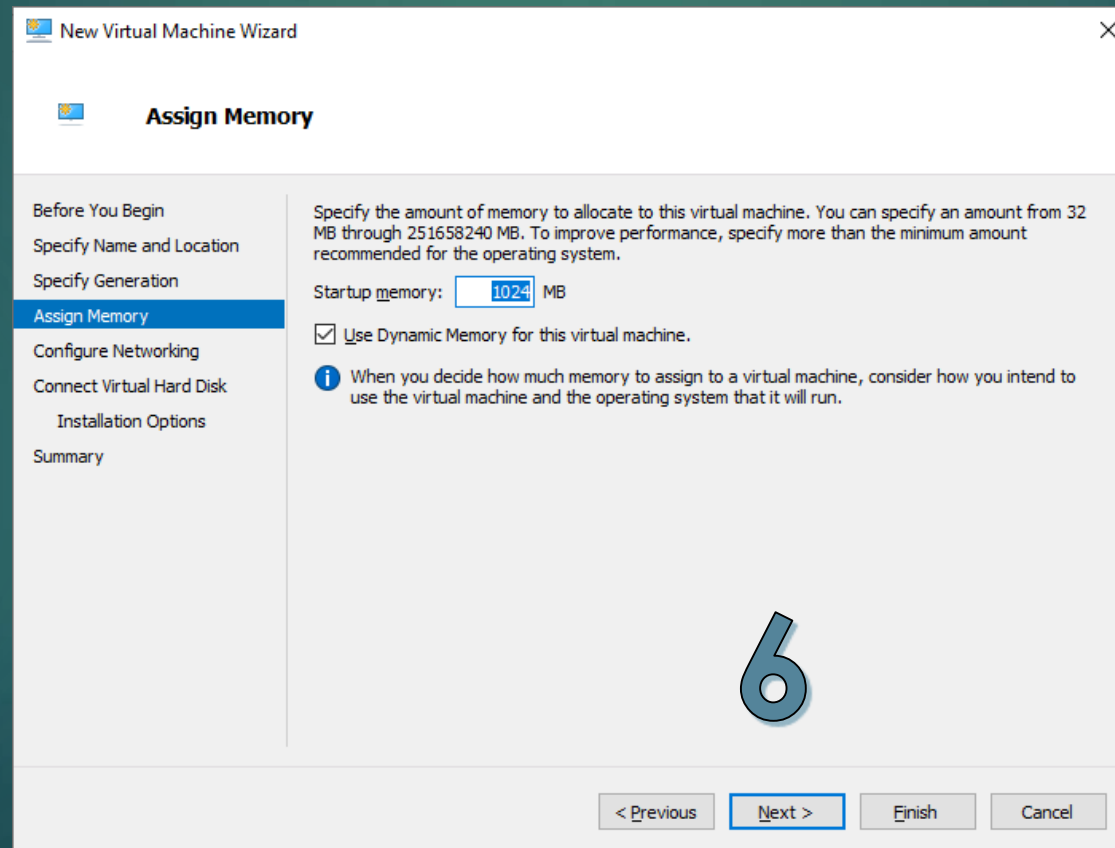
- Επιλέγουμε την γενιά του VM. Για μεγαλύτερη συμβατότητα επιλέγουμε «Generation 1».



Create a new VM

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- ▶ Στη συνέχεια ρυθμίζουμε την μνήμη RAM που θα έχει το VM.

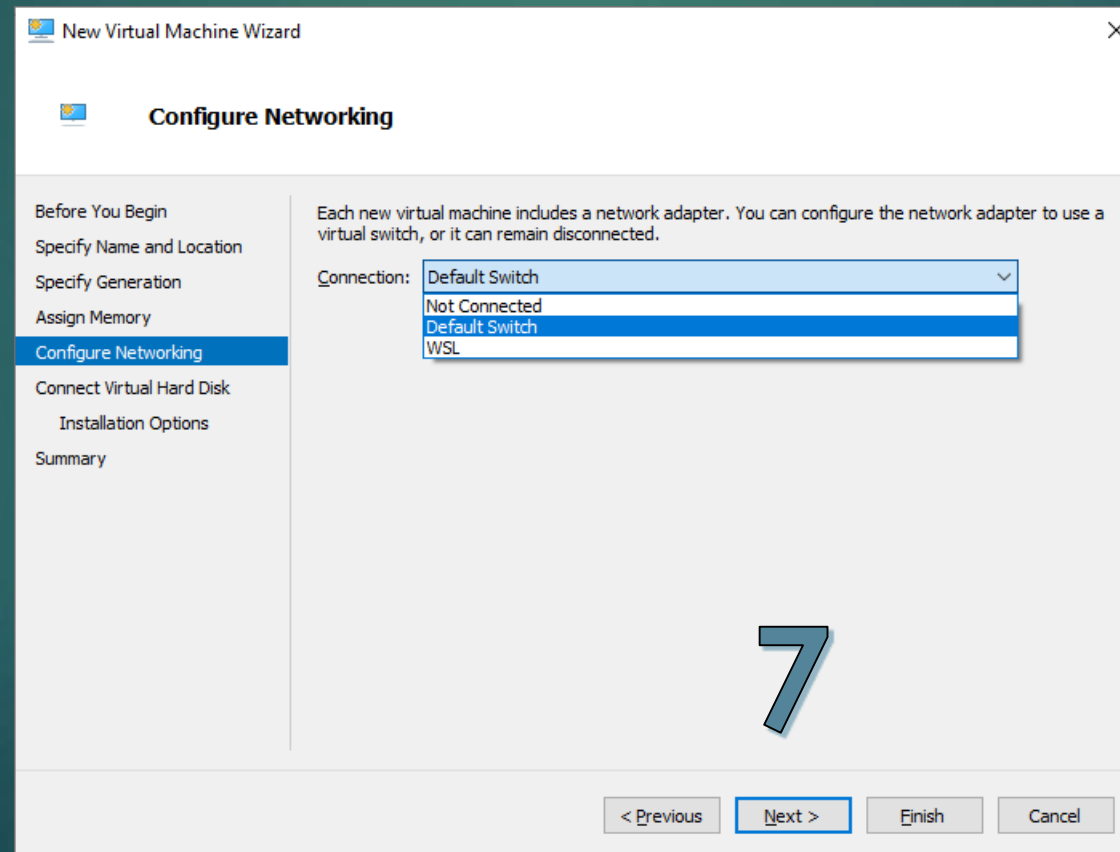


The screenshot shows the 'New Virtual Machine Wizard' window, specifically the 'Assign Memory' step. The left sidebar contains a list of steps: 'Before You Begin', 'Specify Name and Location', 'Specify Generation', 'Assign Memory' (highlighted), 'Configure Networking', 'Connect Virtual Hard Disk', 'Installation Options', and 'Summary'. The main area has a title bar 'Assign Memory' and a description: 'Specify the amount of memory to allocate to this virtual machine. You can specify an amount from 32 MB through 251658240 MB. To improve performance, specify more than the minimum amount recommended for the operating system.' Below this, the 'Startup memory' is set to '1024 MB'. There is a checkbox 'Use Dynamic Memory for this virtual machine.' which is checked. An information icon (i) is followed by the text: 'When you decide how much memory to assign to a virtual machine, consider how you intend to use the virtual machine and the operating system that it will run.' At the bottom, there are four buttons: '< Previous', 'Next >' (highlighted), 'Finish', and 'Cancel'. A large blue number '6' is overlaid on the bottom right of the window.

Create a new VM

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- Ρυθμίζουμε την δικτύωση του VM.



Create a new VM

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- Δημιουργούμε έναν εικονικό σκληρό δίσκο για να εγκατασταθεί το λειτουργικό σύστημα.

New Virtual Machine Wizard

Connect Virtual Hard Disk

Before You Begin
Specify Name and Location
Specify Generation
Assign Memory
Configure Networking
Connect Virtual Hard Disk
Installation Options
Summary

A virtual machine requires storage so that you can install an operating system. You can specify the storage now or configure it later by modifying the virtual machine's properties.

☒ **Create a virtual hard disk**
Use this option to create a VHDX dynamically expanding virtual hard disk.

Name: Cloud Computing - TelSiP.vhdx
Location: C:\ProgramData\Microsoft\Windows\Virtual Hard Disks\ Browse...
Size: 127 GB (Maximum: 64 TB)

☐ **Use an existing virtual hard disk**
Use this option to attach an existing virtual hard disk, either VHD or VHDX format.

Location: C:\ProgramData\Microsoft\Windows\Virtual Hard Disks\ Browse...

☐ **Attach a virtual hard disk later**
Use this option to skip this step now and attach an existing virtual hard disk later.

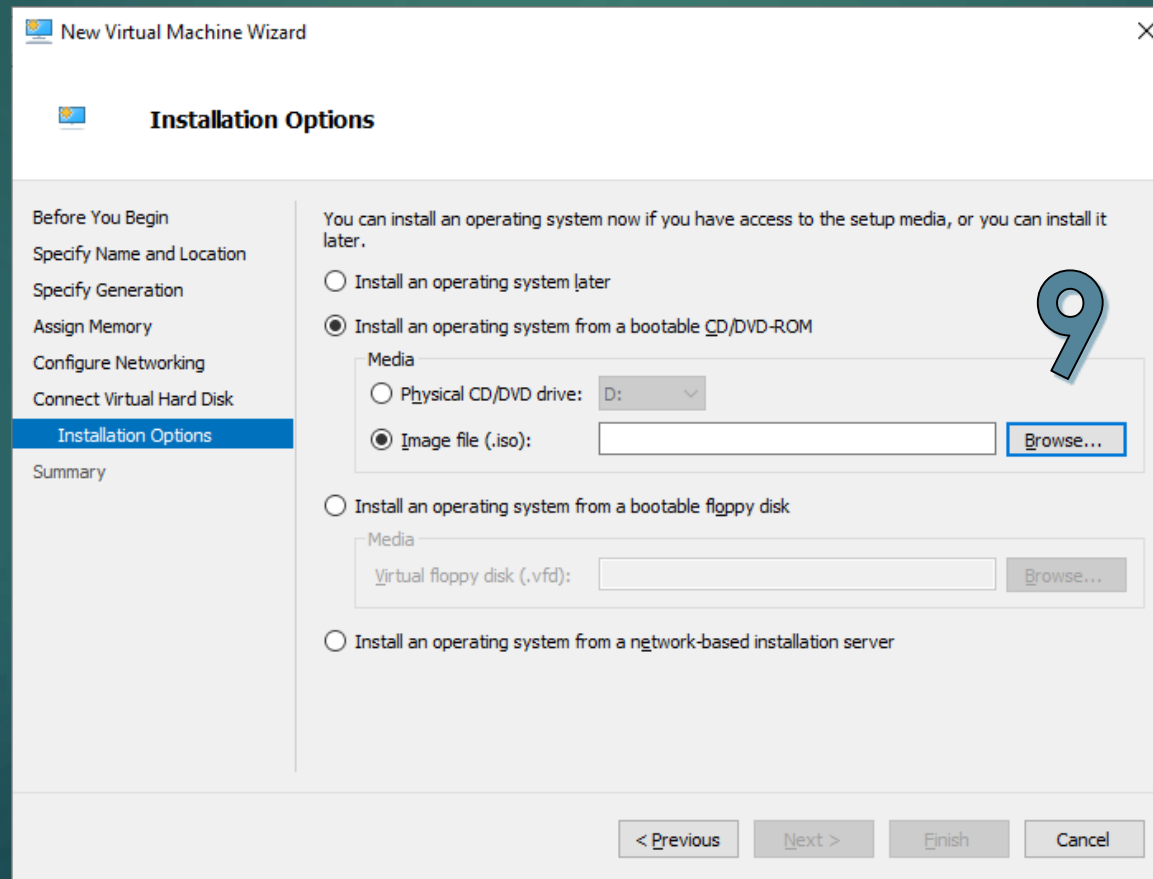
8

< Previous Next > Finish Cancel

Create a new VM

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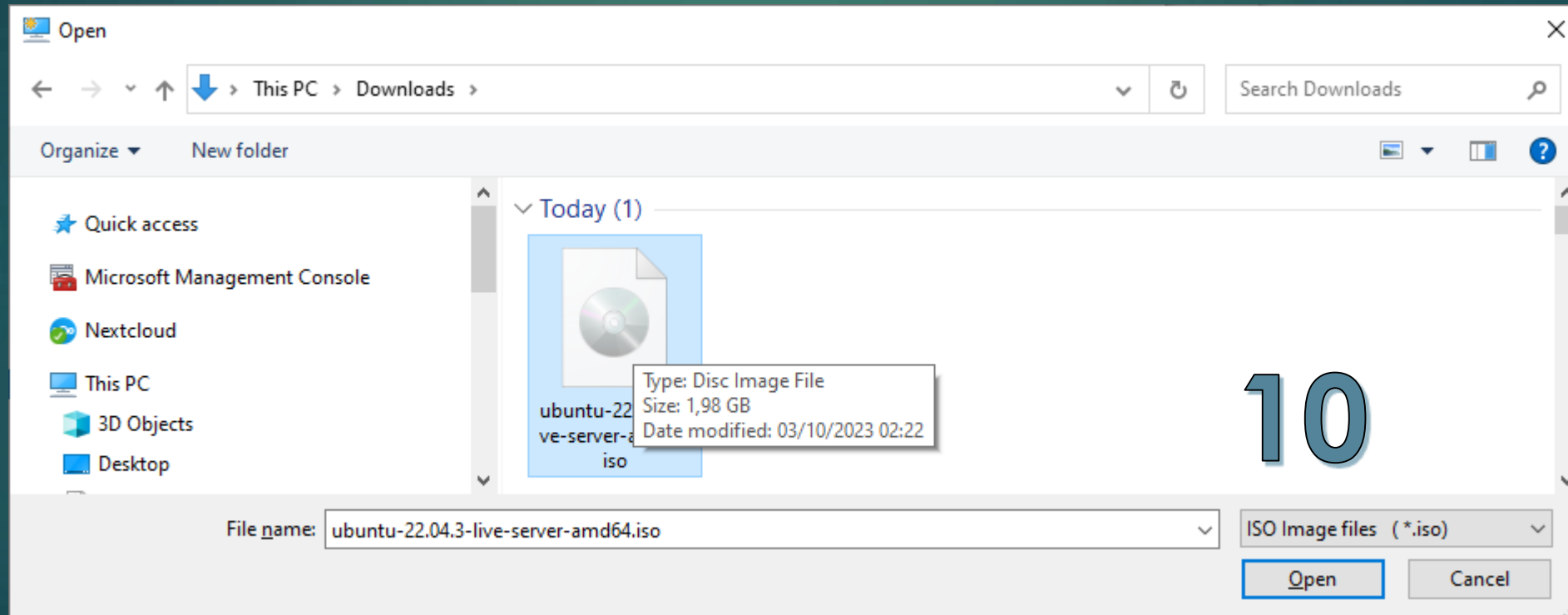
- Επιλέγουμε το ISO Image που κατέβηκε νωρίτερα.



Create a new VM

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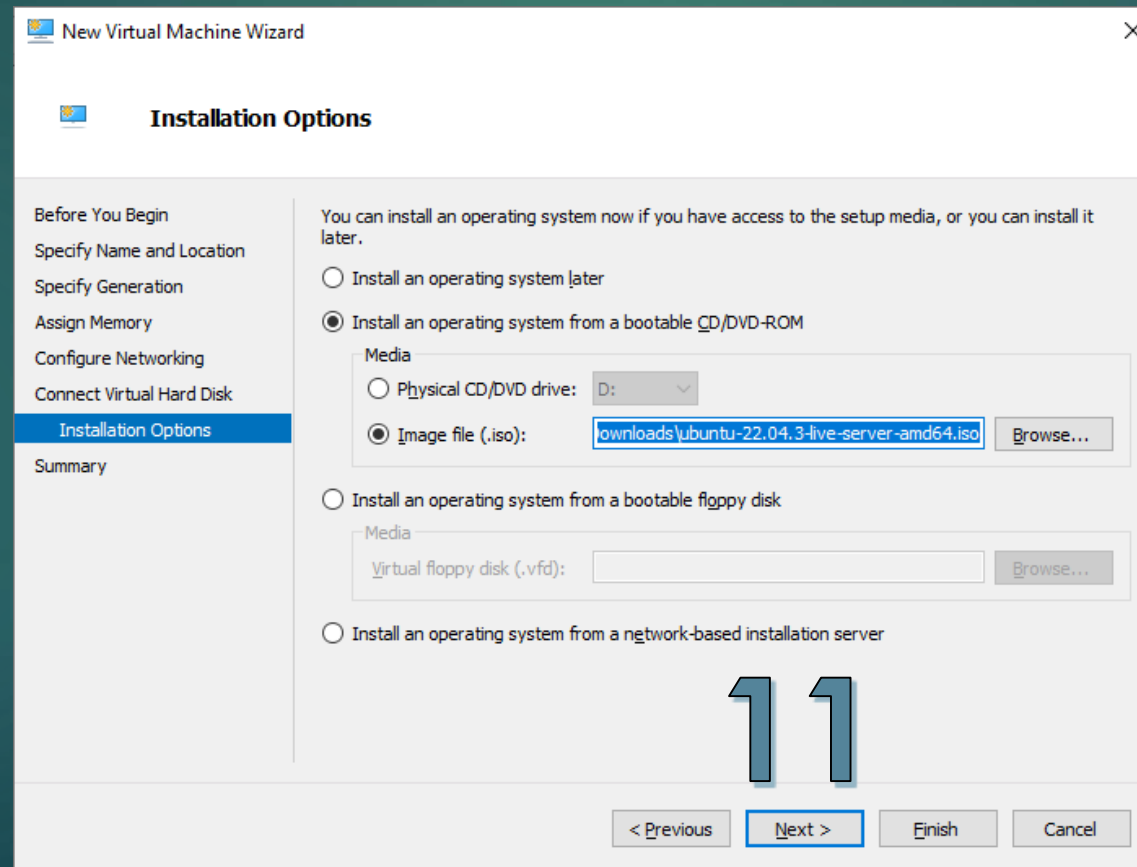
- Eival to Ubuntu Server 22.04.3



Create a new VM

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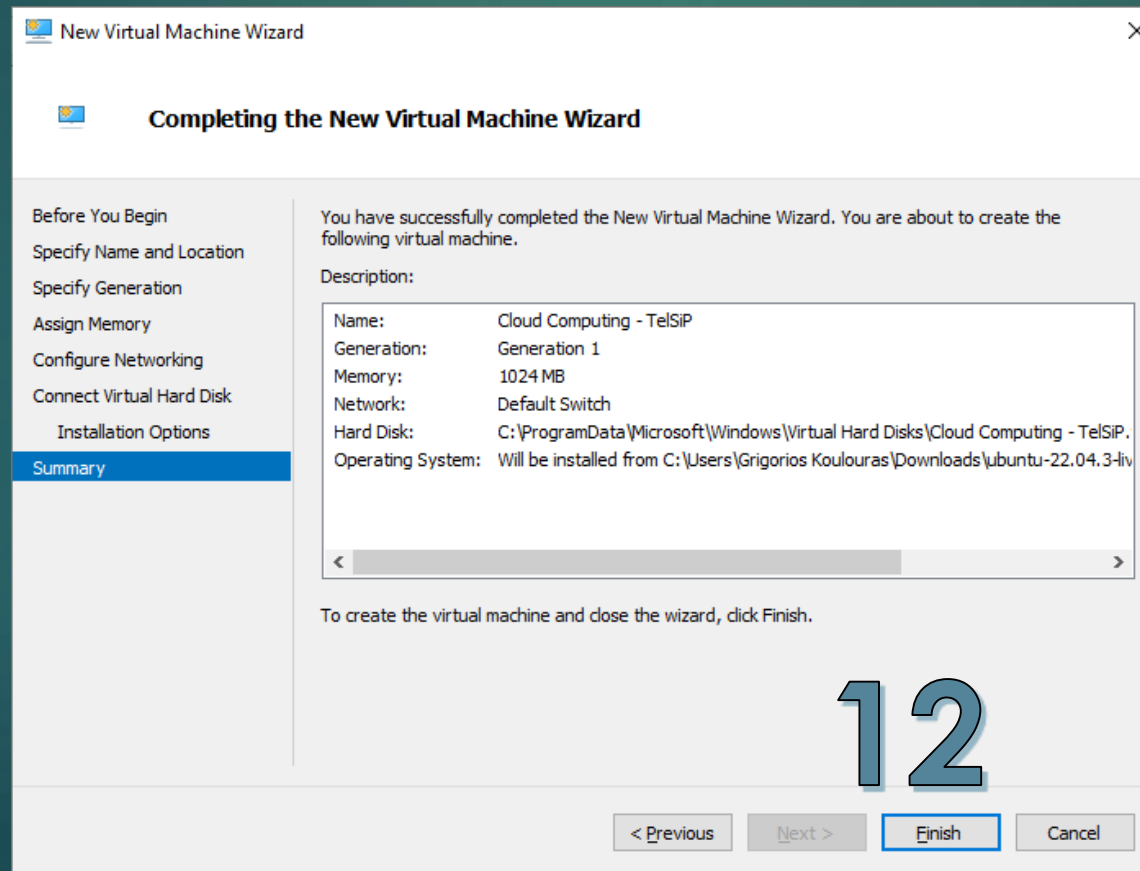
► Πατάμε Next



Create a new VM

21

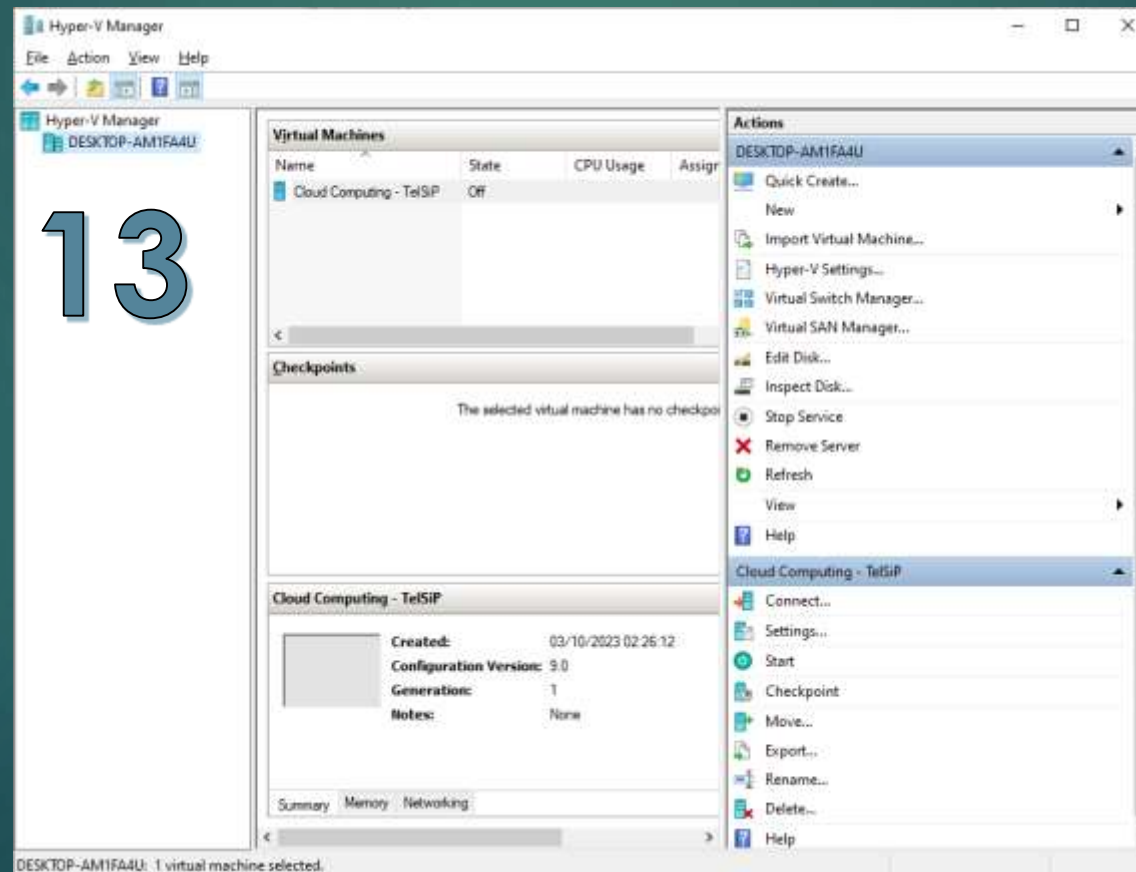
- ▶ Αφού επιβεβαιώσουμε όλες τις ρυθμίσεις, πατάμε Finish.



Create a new VM

22

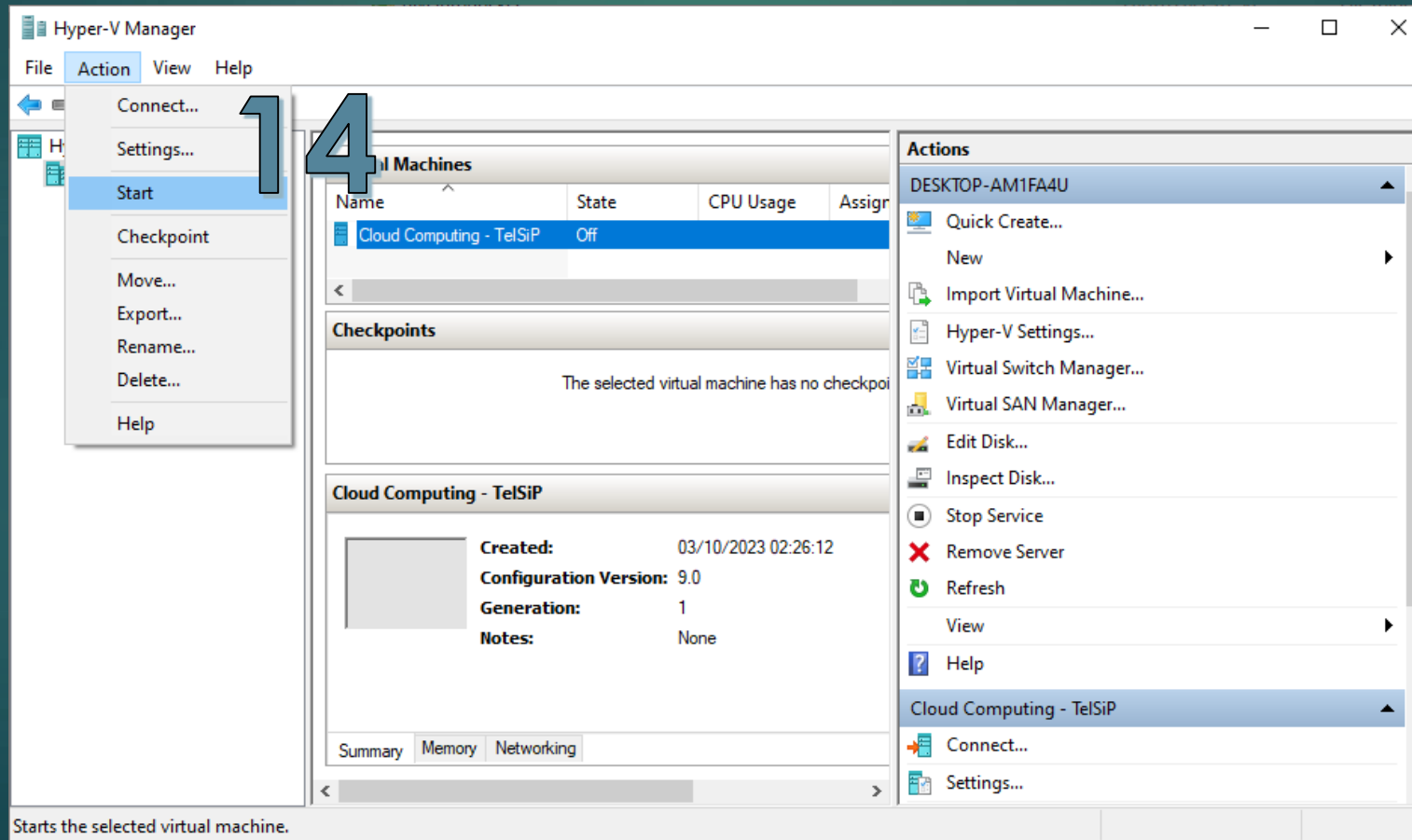
- Το VM είναι έτοιμο για εγκατάσταση...



Create a new VM

23

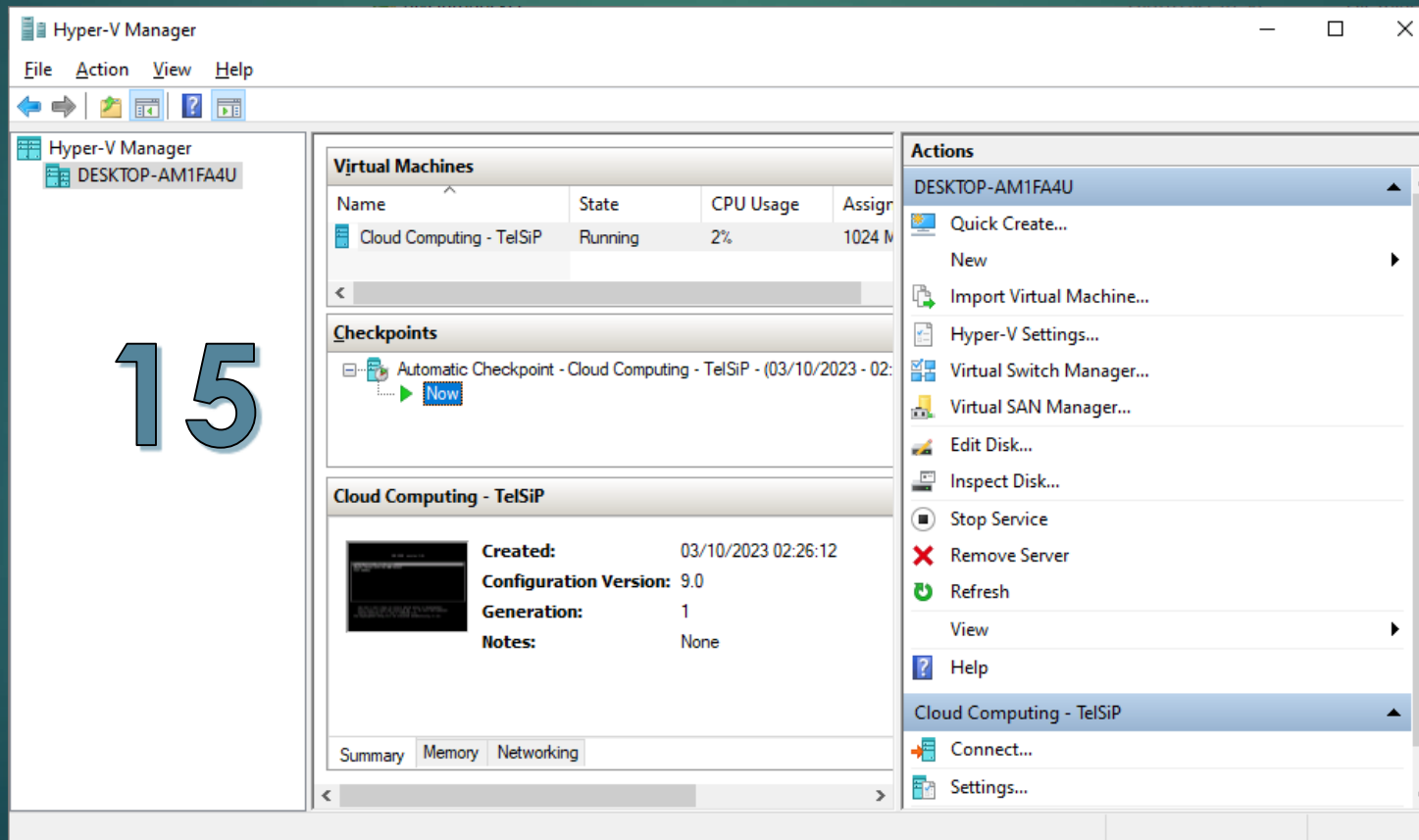
- Στο menu «Action», επιλέγουμε «Start».



Create a new VM

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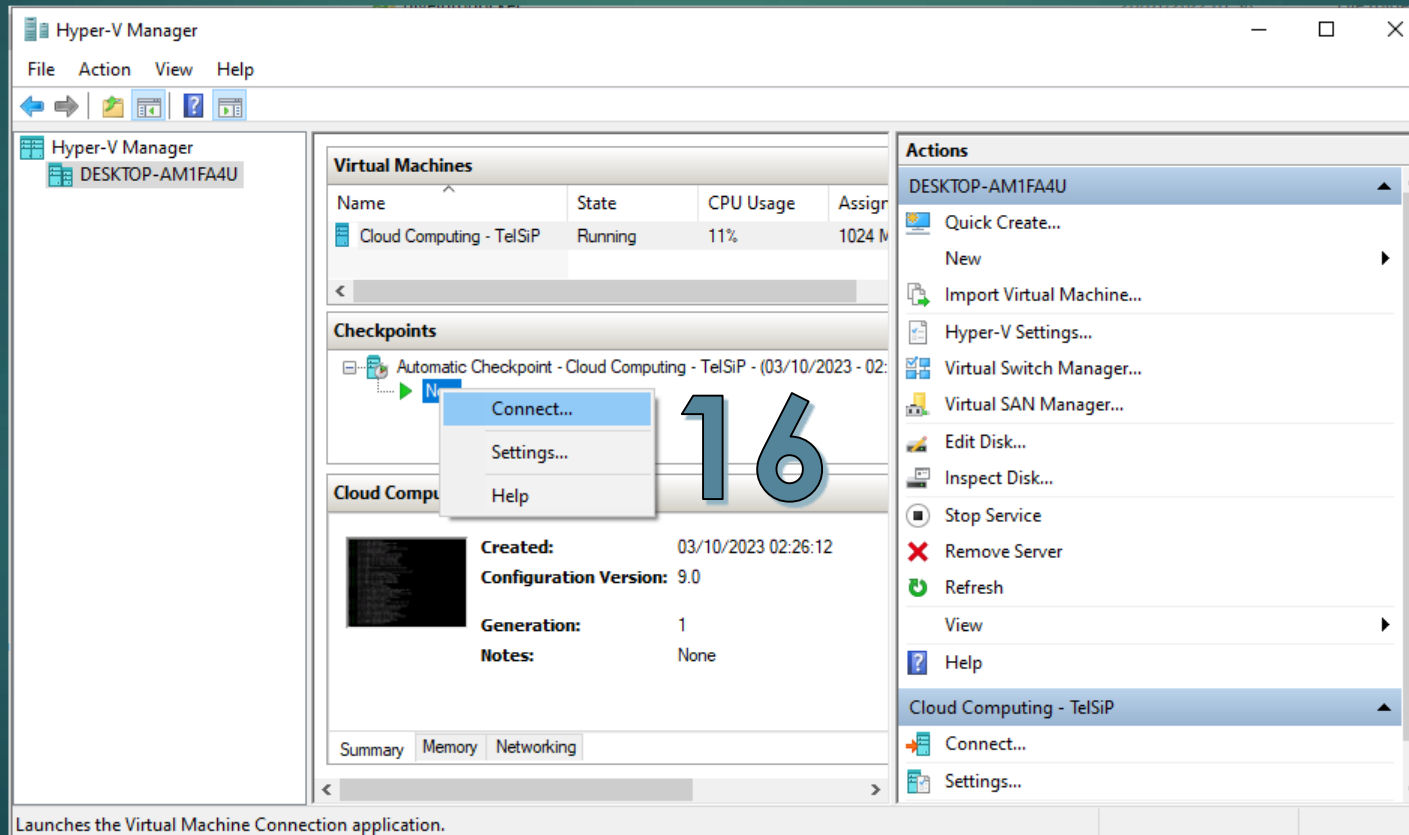
- ▶ Βλέπουμε ότι ξεκίνησε.



Create a new VM

25

- Συνδεόμαστε στην κονσόλα.

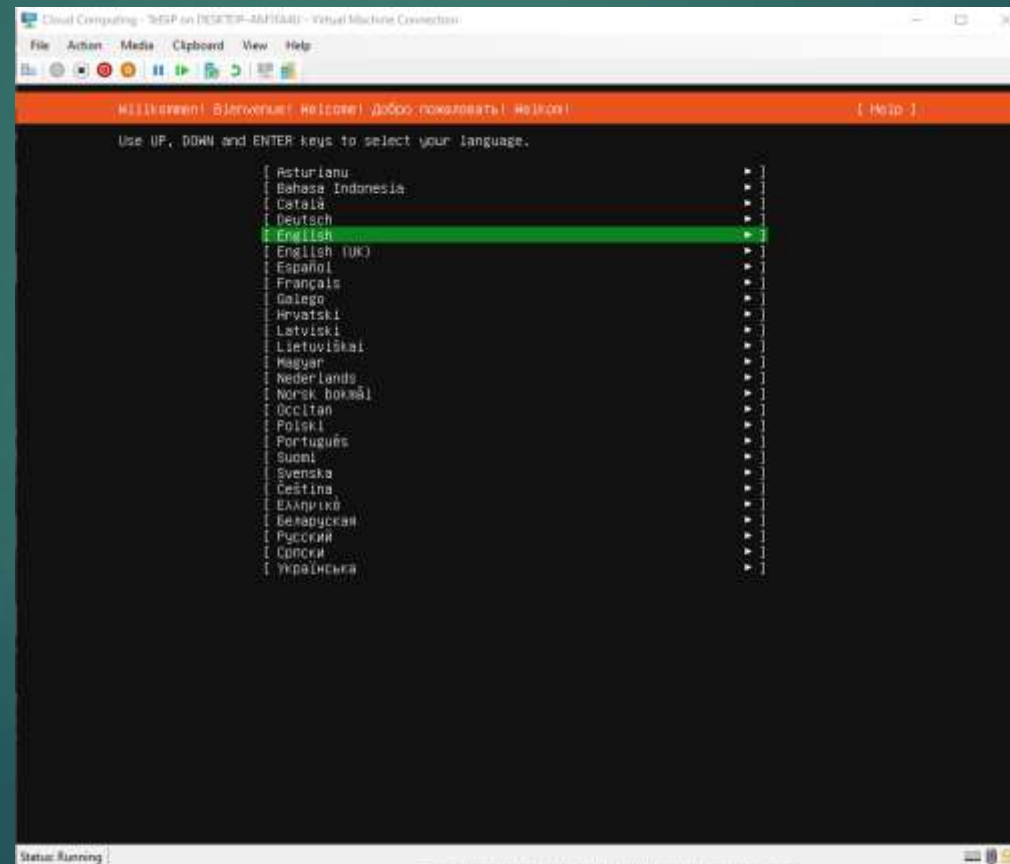


Install Ubuntu Server 22.04.3 LTS

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- ▶ Ακολουθούμε τα παρακάτω βήματα, για την εγκατάσταση του λειτουργικού.

1

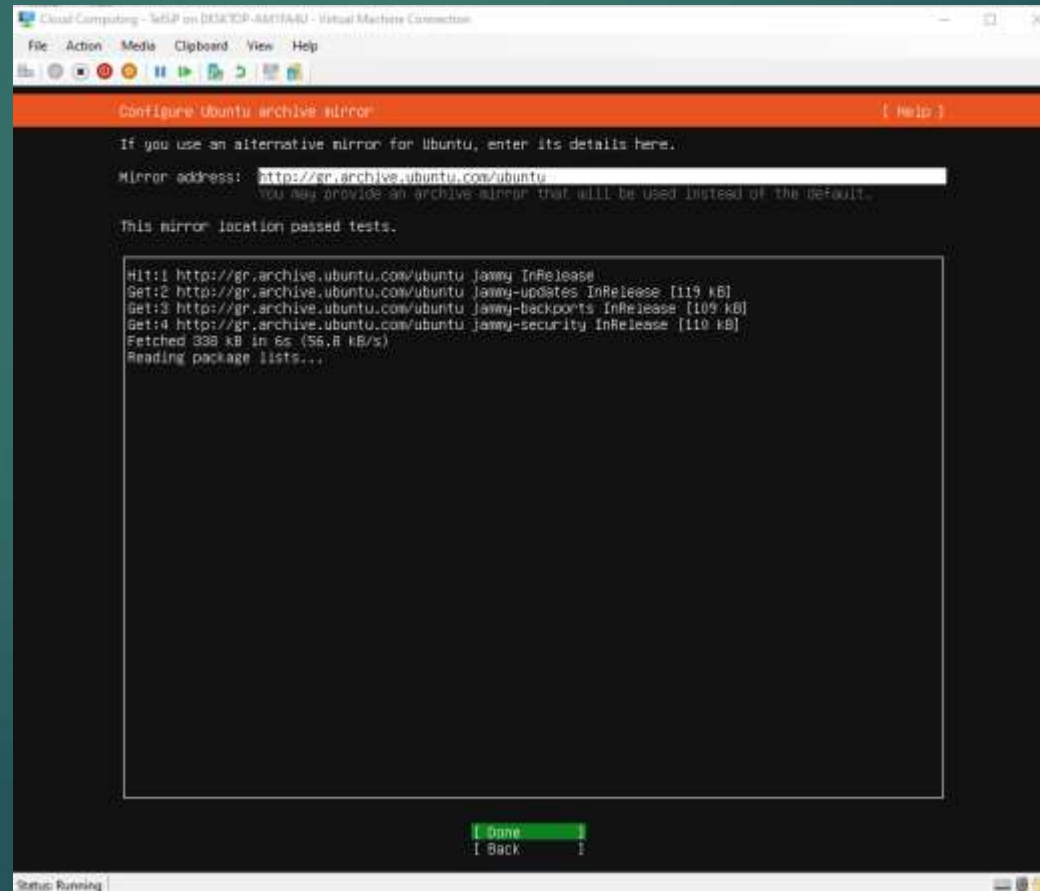


Install Ubuntu Server 22.04.3 LTS

27

- Επιλέγουμε τον Server που θα μας σερβίρει τα αρχεία της εγκατάστασης.

2



```
Cloud Computing - WinSP on DESKTOP-8M1T46U - Virtual Machine Connection
File Action Media Clipboard View Help

Configure Ubuntu archive mirror [ Help ]

If you use an alternative mirror for Ubuntu, enter its details here.

Mirror address: http://gr.archive.ubuntu.com/ubuntu
You may provide an archive mirror that will be used instead of the default.

This mirror location passed tests.

Hit:1 http://gr.archive.ubuntu.com/ubuntu jammy InRelease
Get:2 http://gr.archive.ubuntu.com/ubuntu jammy-updates InRelease [119 kB]
Get:3 http://gr.archive.ubuntu.com/ubuntu jammy-backports InRelease [109 kB]
Get:4 http://gr.archive.ubuntu.com/ubuntu jammy-security InRelease [110 kB]
Fetched 338 kB in 6s (56.8 kB/s)
Reading package lists...

Done
Back

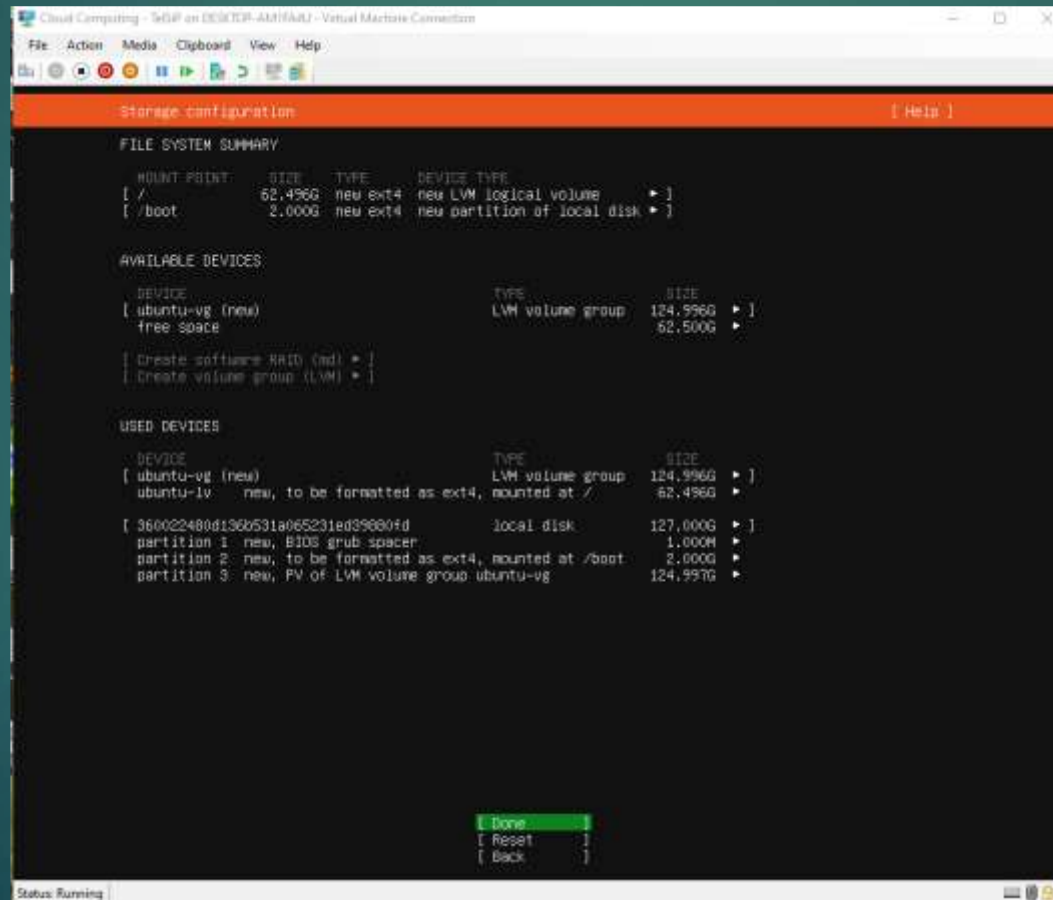
Status: Running
```

Install Ubuntu Server 22.04.3 LTS

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- Επιλέγουμε που θα γίνει η εγκατάσταση του λειτουργικού.

3

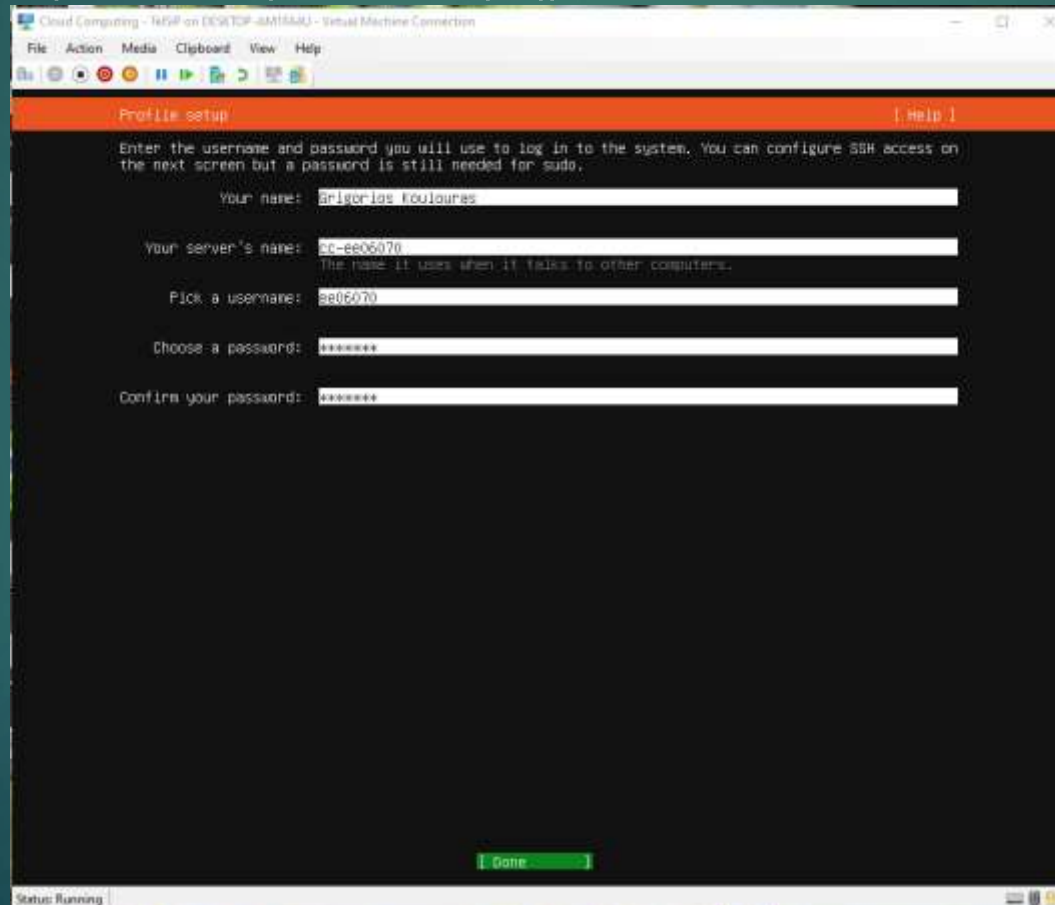


Install Ubuntu Server 22.04.3 LTS

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- Ακολουθούμε τα παρακάτω βήματα:

4

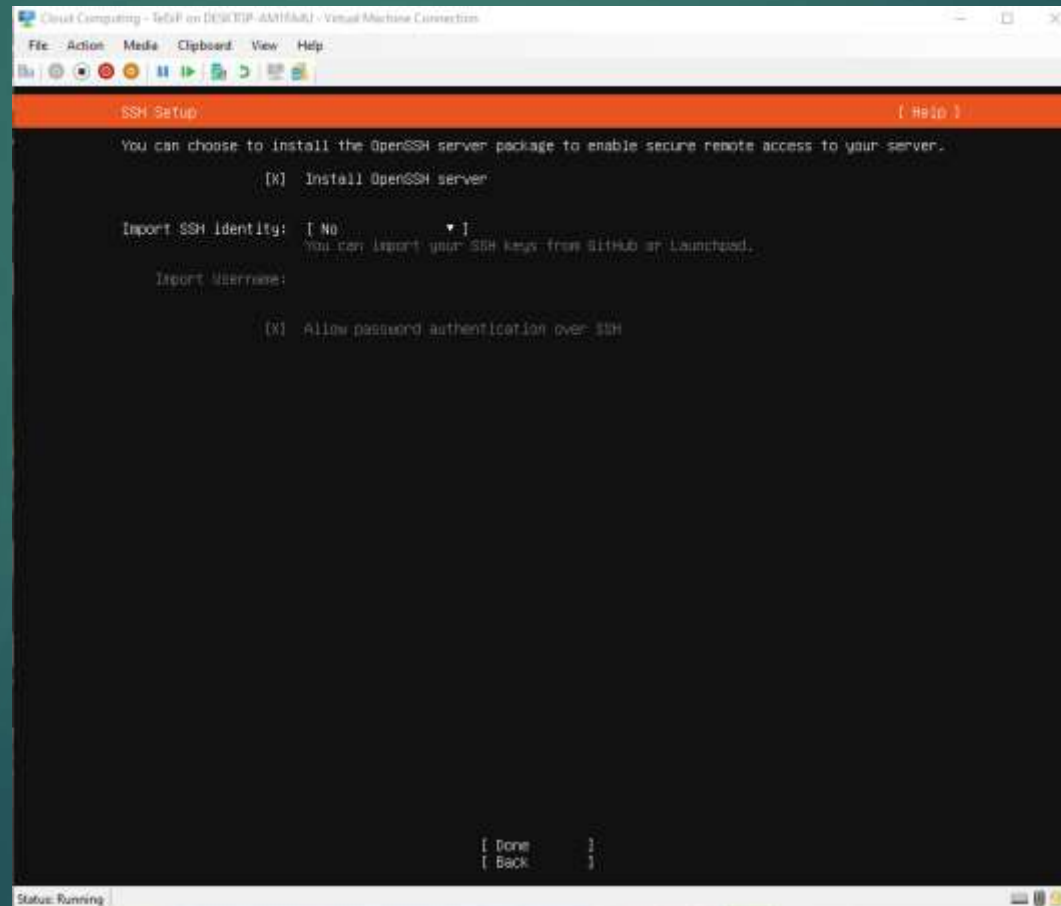


Install Ubuntu Server 22.04.3 LTS

30

- ▶ Ενεργοποιούμε τον OpenSSH Server για να έχουμε απομακρυσμένη διαχείριση.

5

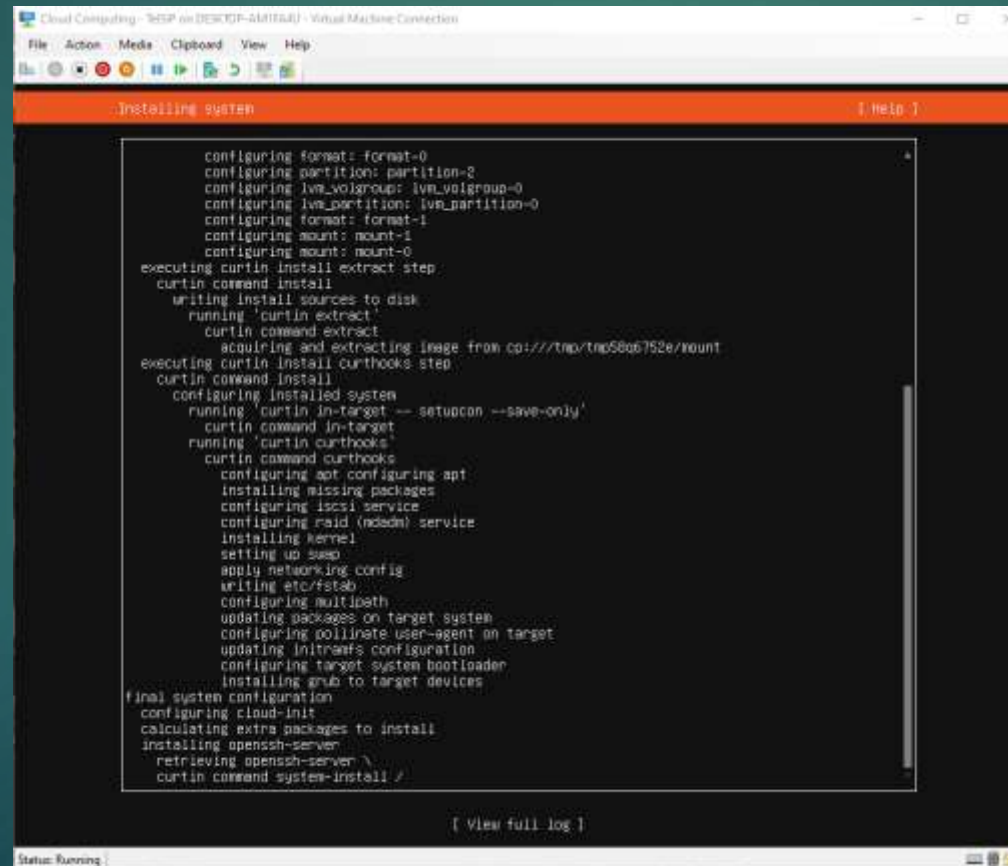


Install Ubuntu Server 22.04.3 LTS

31

- Περιμένουμε να ολοκληρωθεί η εγκατάσταση.

6



```
Cloud Computing - TSP on DESKTOP-AMT64 - Virtual Machine Connection
File Action Media Clipboard View Help

Installing system [ Help ]

configuring format: format-0
configuring partition: partition-2
configuring lvm_voigroup: lvm_voigroup-0
configuring lvm_partition: lvm_partition-0
configuring format: format-1
configuring mount: mount-1
configuring mount: mount-0
executing curtin install extract step
curtin command install
writing install sources to disk
running 'curtin extract'
curtin command extract
acquiring and extracting image from cpi:///tmp/tmp58q6752e/mount
executing curtin install curthooks step
curtin command install
configuring installed system
running 'curtin in-target -- setupcon --save-only'
curtin command in-target
running 'curtin curthooks'
curtin command curthooks
configuring apt configuring apt
installing missing packages
configuring iscsi service
configuring raid (mdadm) service
installing kernel
setting up sudo
apply networking config
writing etc/fstab
configuring multipath
updating packages on target system
configuring pollinate user-agent on target
updating initramfs configuration
configuring target system bootloader
installing grub to target devices
final system configuration
configuring cloud-init
calculating extra packages to install
installing openssh-server
retrieving openssh-server \
curtin command system-install /

[ View full log ]

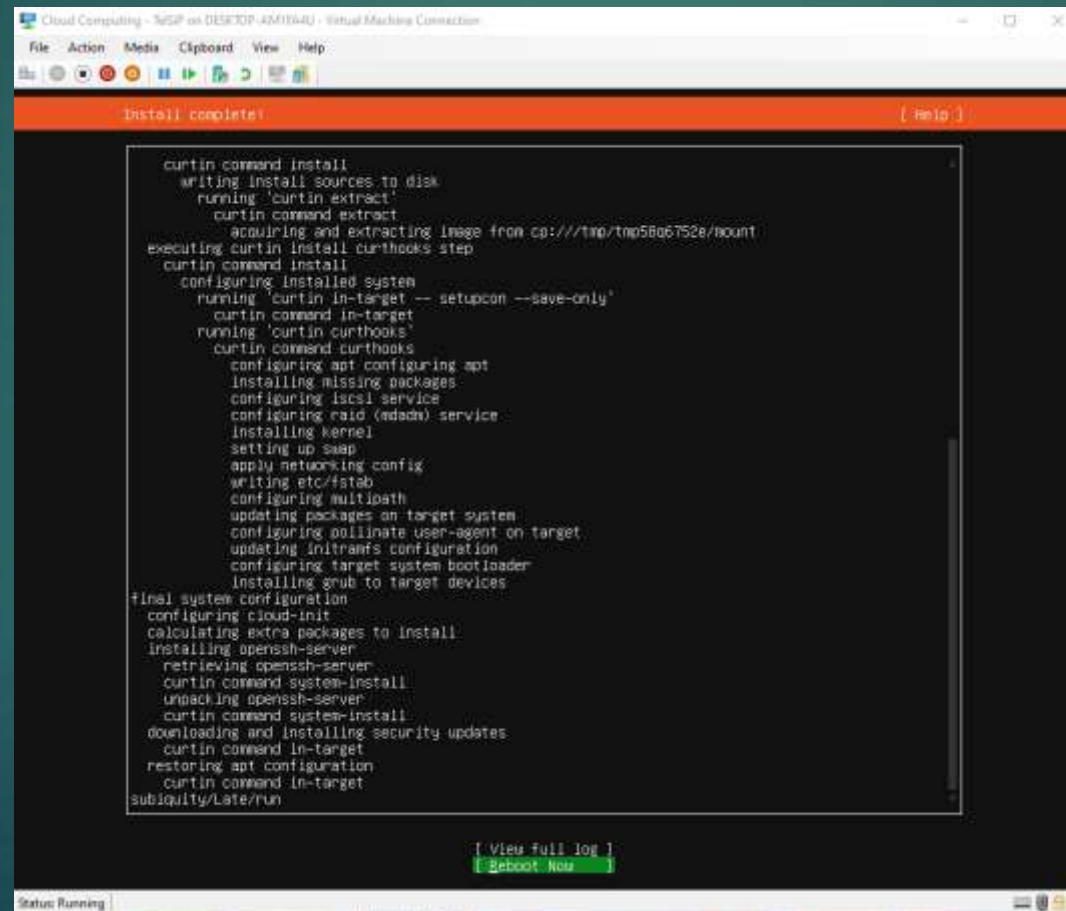
Status: Running
```

Install Ubuntu Server 22.04.3 LTS

32

- ▶ Τώρα χρειάζεται επανεκκίνηση.

7



```
Cloud Computing - WSP on DESKTOP-AM1164U - Virtual Machine Connection
File Action Media Clipboard View Help
Install complete! [ Help ]

curtin command install
writing install sources to disk
running 'curtin extract'
curtin command extract
acquiring and extracting image from cp:///tmp/tmp56a6752e/hount
executing curtin install curthooks step
curtin command install
configuring installed system
running 'curtin in-target -- setupcon --save-only'
curtin command in-target
running 'curtin curthooks'
curtin command curthooks
configuring apt
installing missing packages
configuring iscsi service
configuring raid (mdadm) service
installing kernel
setting up swap
apply networking config
writing etc/fstab
configuring multipath
updating packages on target system
configuring pollinate user-agent on target
updating initramfs configuration
configuring target system bootloader
installing grub to target devices
final system configuration
configuring cloud-init
calculating extra packages to install
installing openssh-server
retrieving openssh-server
curtin command system-install
unpacking openssh-server
curtin command system-install
downloading and installing security updates
curtin command in-target
restoring apt configuration
curtin command in-target
subiquity/late/run

[ View full log ]
[ Reboot Now ]

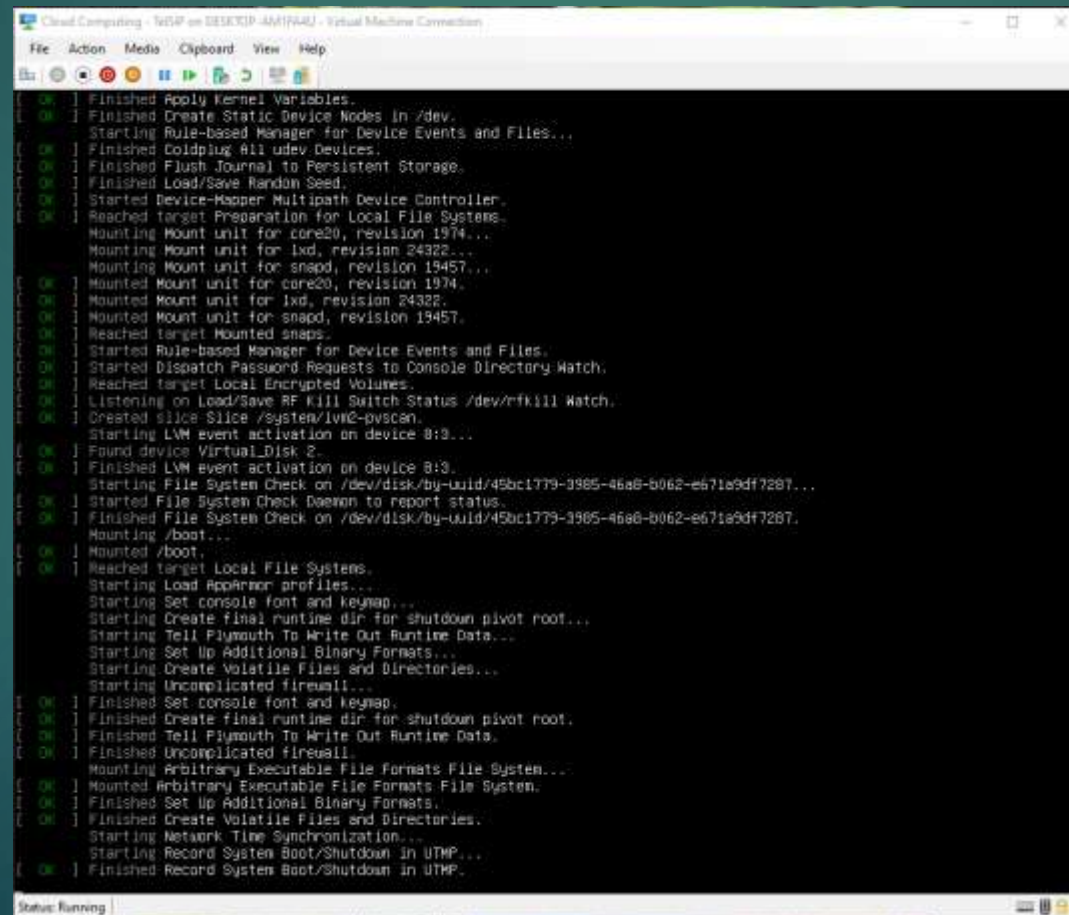
Status: Running
```


Install Ubuntu Server 22.04.3 LTS

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► 'Εγινε Reboot...

8



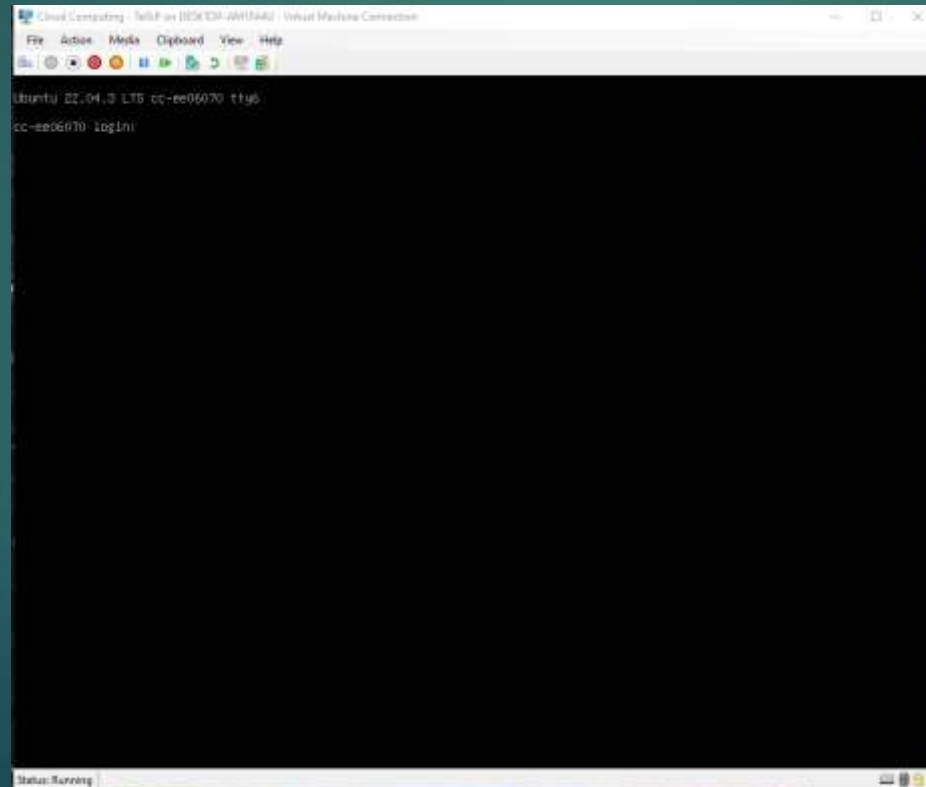
```
Cloud Computing - NAT on DESKTOP-AM194UJ - Virtual Machine Connection
File Action Media Clipboard View Help
[ OK ] Finished Apply kernel Variables.
[ OK ] Finished Create Static Device Nodes in /dev.
[ OK ] Starting Rule-based Manager for Device Events and Files...
[ OK ] Finished Coldplug All udev Devices.
[ OK ] Finished Flush Journal to Persistent Storage.
[ OK ] Finished Load/Save Random Seed.
[ OK ] Started Device-Mapper Multipath Device Controller.
[ OK ] Reached target Preparation for Local File Systems.
[ OK ] Mounting Mount unit for core20, revision 1974...
[ OK ] Mounting Mount unit for lxd, revision 24322...
[ OK ] Mounting Mount unit for snapd, revision 19457...
[ OK ] Mounted Mount unit for core20, revision 1974.
[ OK ] Mounted Mount unit for lxd, revision 24322.
[ OK ] Mounted Mount unit for snapd, revision 19457.
[ OK ] Reached target Mounted snaps.
[ OK ] Started Rule-based Manager for Device Events and Files.
[ OK ] Started Dispatch Password Requests to Console Directory Watch.
[ OK ] Reached target Local Encrypted Volumes.
[ OK ] Listening on Load/Save RF Kill Switch Status /dev/rfkill Watch.
[ OK ] Created slice /system/lnx2-pvscan.
[ OK ] Starting LVM event activation on device 8:3...
[ OK ] Found device Virtual.Disk 2.
[ OK ] Finished LVM event activation on device 8:3.
[ OK ] Starting File System Check on /dev/disk/by-uuid/45bc1779-3985-46a6-b062-e671a9df7287...
[ OK ] Started File System Check Daemon to report status.
[ OK ] Finished File System Check on /dev/disk/by-uuid/45bc1779-3985-46a6-b062-e671a9df7287.
[ OK ] Mounting /boot...
[ OK ] Mounted /boot.
[ OK ] Reached target Local File Systems.
[ OK ] Starting Load AppArmor profiles...
[ OK ] Starting Set console font and keymap...
[ OK ] Starting Create final runtime dir for shutdown pivot root...
[ OK ] Starting Tell Plymouth To Write Out Runtime Data...
[ OK ] Starting Set Up Additional Binary Formats...
[ OK ] Starting Create Volatile Files and Directories...
[ OK ] Starting Uncomplicated firewall...
[ OK ] Finished Set console font and keymap.
[ OK ] Finished Create final runtime dir for shutdown pivot root.
[ OK ] Finished Tell Plymouth To Write Out Runtime Data.
[ OK ] Finished Uncomplicated firewall.
[ OK ] Mounting Arbitrary Executable File Formats File System...
[ OK ] Mounted Arbitrary Executable File Formats File System.
[ OK ] Finished Set Up Additional Binary Formats.
[ OK ] Finished Create Volatile Files and Directories.
[ OK ] Starting Network Time Synchronization...
[ OK ] Starting Record System Boot/Shutdown in UTMP...
[ OK ] Finished Record System Boot/Shutdown in UTMP.
Status: Running
```

Install Ubuntu Server 22.04.3 LTS

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- ▶ Το VM είναι έτοιμο. Θα πρέπει να κάνουμε Log in με τα Credentials του δημιουργήσαμε κατά τη διάρκεια της εγκατάστασης.

9



- ▶ Σε αυτό το σημείο μπορούμε να πούμε ότι έχετε έτοιμο ένα Προσωπικό Περιβάλλον Ανάπτυξης (Personal Development Environment – PDE) για να μπορέσετε να εντρυφήσετε στην τεχνολογία του Linux και του Docker που θα ακολουθήσει.

Αναφορές

36

- ▶ Syrewicze, A., & Siddaway, R. (2018). Pro Microsoft Hyper-V 2019: Practical guidance and hands-on labs. Apress.