



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 LAB03
«Υλοποίηση Remote PDE Ubuntu Server σε Azure»

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- ▶ Δημιουργία προσωπικών κλειδιών SSH
- ▶ Azure for Students
- ▶ Ubuntu Server VM στην υποδομή Azure
- ▶ Δημιουργία free dynamic DNS
- ▶ Σύνδεση στην εικονική μηχανή με SSH
- ▶ Ενημέρωση Λογισμικού

Δημιουργία προσωπικών κλειδιών SSH

SSH Keys

Δημιουργία προσωπικών κλειδιών SSH 1/3

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- Με την παρακάτω εντολή δημιουργούμε τοπικά στον Η/Υ μας ένα συσχετισμένο ζευγάρι κλειδιών SSH το οποίο θα χρειαστούμε στην συνέχεια του μαθήματος.

```
user@snf-15678:~$ ssh-keygen
Generating public/private rsa key pair.
Enter file in which to save the key (/home/user/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /home/user/.ssh/id_rsa
Your public key has been saved in /home/user/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:1g7H08jrMJ/YEQd6Heax0BdflfkHJ5njlVr8sTr4TU user@snf-39158
The key's randomart image is:
+---[RSA 3072]---+
|                 o=*|
|                . OB*|
|               o =o.X*|
|              = 0 =+E+|
|             S X * o =|
|            . = =   o |
|           o +
|          B o
|         . =
+-----[SHA256]-----+
user@snf-15678:~$
```

Δημιουργία προσωπικών κλειδιών SSH 2/3

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- Με την παρακάτω εντολή βλέπουμε τα αρχεία που μόλις δημιουργήθηκαν.
 - Το `id_rsa` είναι το Private Key
 - Το `id_rsa.pub` είναι το Public Key

```
user@snf-15678:~$ ll .ssh/
total 28
drwx----- 2 user user 4096 Nov 21 23:52 ./
drwxr-xr-x  9 user user 4096 Nov 21 11:36 ../
-rw-----  1 user user 2602 Nov 21 23:52 id_rsa
-rw-r--r--  1 user user  568 Nov 21 23:52 id_rsa.pub
user@snf-15678:~$
```

Δημιουργία προσωπικών κλειδιών SSH 3/3

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- Με την παρακάτω εντολή βλέπουμε το περιεχόμενο του αρχείου `id_rsa.pub` που είναι το SSH Public Key.

```
user@snf-15678:~$ cat .ssh/id_rsa.pub
ssh-rsa
AAAAB3NzaC1yc2EAAAADAQABAAQGBgQCH44cr1HLkxHSsL84/RbIfBedK+voVSxB5d0u/vp+GGpIle5gONGqupy/yI7XDtkWbh2N+m34
Tm0laRMvJmMkKs3RYxISFcPowi1yukm3hnXCrRla+YRCMAB852QHue82QrcjKZS7H6nU8wjaF9K575xa5zWLdDdLoTa+YF1MhPEb9up
NfAOYopESzbp2wBWkaGMigdwLrOJlScoBUDaGcuIYYdaJNmZhBy76W8zZz7zYD5CaTqWlgMGUvDL5r1iuPV4n393gNGzqpBKvhRsc9P
U2PSvov5wWTz0wk4i6cAGr0gX09vMXvpF5I9nRDn24ovV2ffUQzWg5tms8INYyorCyAew2+UkJ05/WfijSD2vrykCrtm99luOhw9ztL
oDgfCBKrtXUieDwHouARMGFKlpLF50DUK7pF4r3cbdviid/eSjpx4Fq6ZdKs2v4NYoaxsfz00ywkUnG0t75psd0asdJKEBH9ZoFW73v
o/knnXIqsTHP31I4pd0t/Itbrv28= user@snf-39158
user@snf-15678:~$
```

Azure for Students

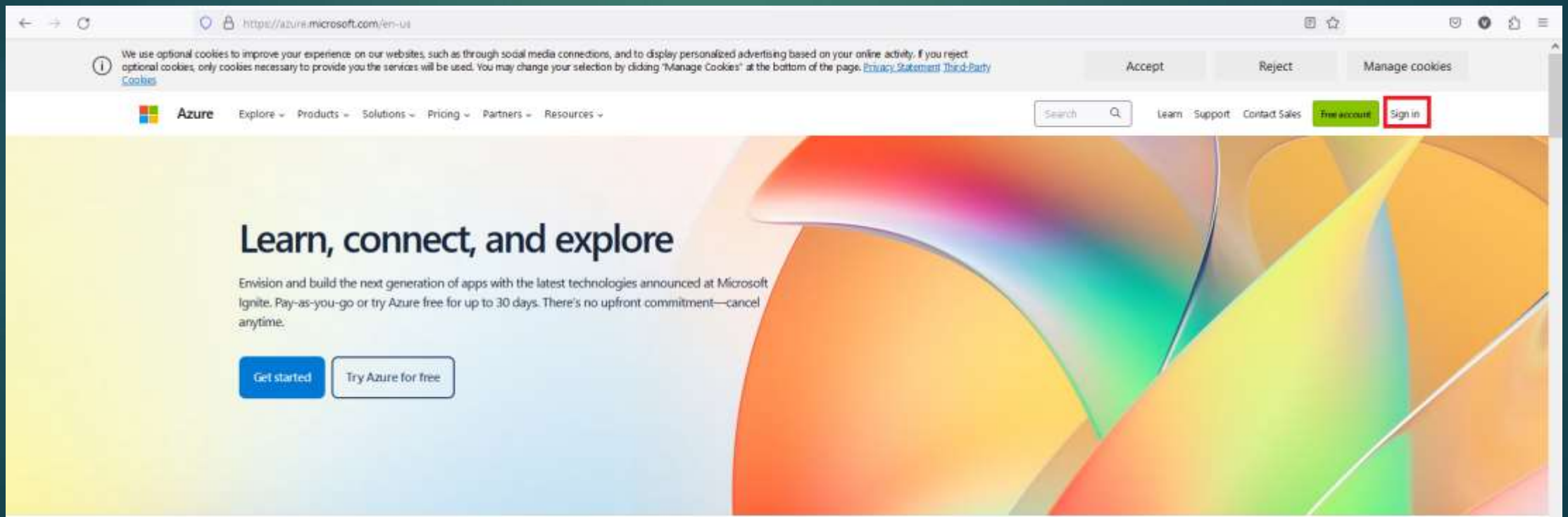
Start Free

Azure for Students 1/7

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- Στο παρακάτω link πατήστε το κουμπι "Sign in".
- Είσοδος με το ακαδημαϊκό e-mail.

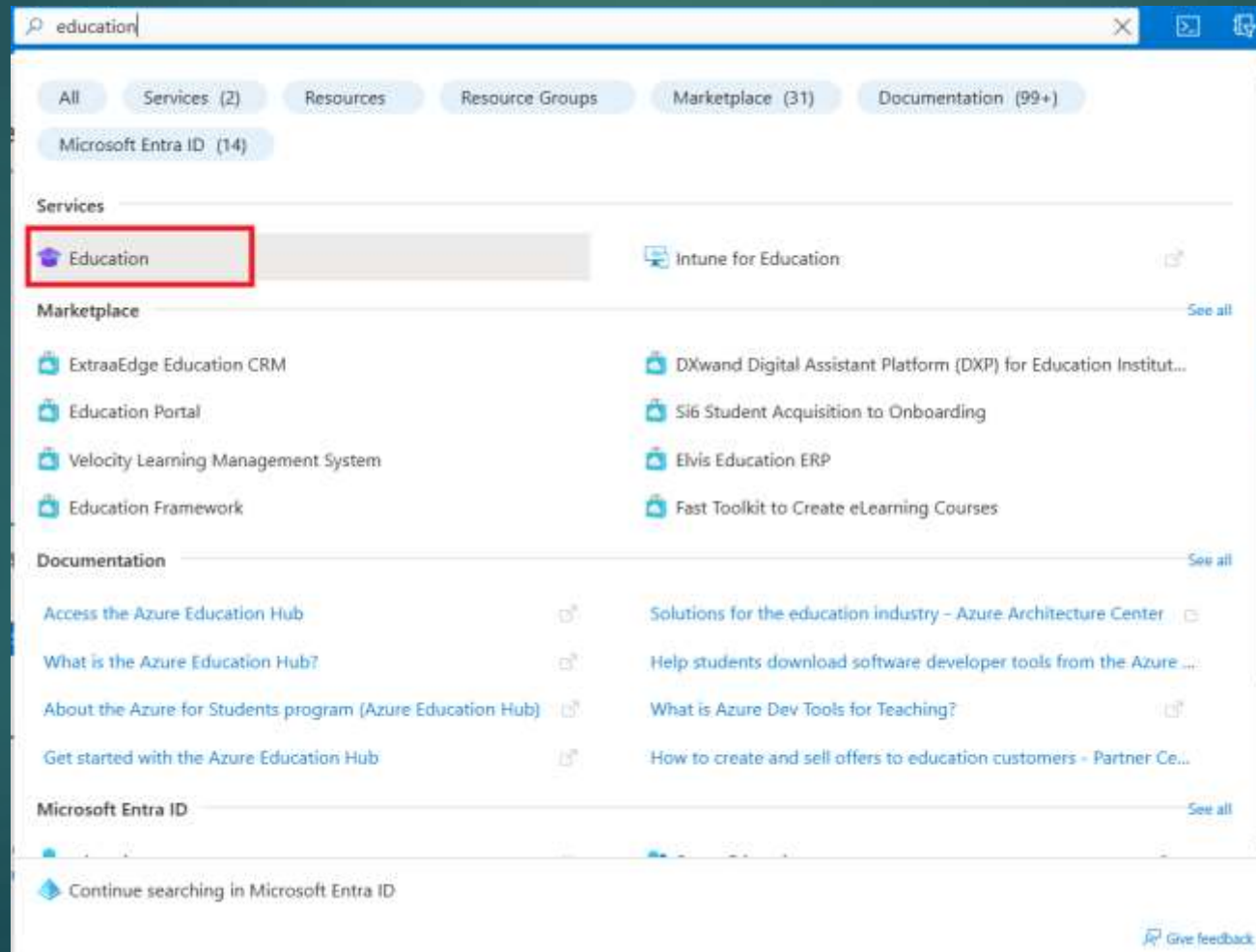
<https://azure.microsoft.com/en-us>



Azure for Students 2/7

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- Επιλογή Education στα Services...



Azure for Students 3/7

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- Επιλογή Sign up now στην καρτέλα Overview.

The screenshot shows the Microsoft Azure Education Overview page. The top navigation bar includes the Microsoft Azure logo, a search bar, and user information. The main content area is titled 'Education | Overview' and features a 'Sign up now' button highlighted with a red box. Below this, there are three columns of content: 'Popular solutions', 'Free Services', and 'Free software'. Each column lists various Azure services and their benefits for students.

Sign up for Azure for students and start building the future.
Students 18 and up can get \$100 in free credits. Get software, templates, and the resources to build custom apps in the cloud.

[Sign up now](#)

Popular solutions

- [Deploy a Docker container](#)
Create simple containers to host apps.
- [Create your first Node.js app](#)
Build and deploy web, mobile and API-based
- [Create and train a Machine Learning model](#)
Train, deploy, automate, manage, and track
- [Build and deploy your first website](#)
Automatically publish to web as your code

[Explore all](#)

Free Services

- [Azure Virtual Machines – Windows](#)
Use 750 hours of access to B1s virtual
- [Azure Blob Storage](#)
Get 5 GB of locally redundant storage (LRS)
- [Computer Vision](#)
Receive 5000 AI transactions to process visual
- [Azure App Service](#)
Quickly create up to 10 powerful apps with 1

[Explore all](#)

Free software

- [Visual Studio Code](#)
- [Visual Studio Community 2019 \(version 16.0\)](#)
- [Machine Learning Server 9.4.7 for Windows](#)

[Explore all](#)

Azure for Students 4/7

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- Επιλογή Start free για το πρόγραμμα Azure for Students.

Azure

Explore Products Solutions Pricing Partners Resources

Search

Learn Support Contact Sales Sign in

Build in the cloud free with Azure for Students

Use your university or school email to sign up and renew each year you're a student

[Start free](#) [Learn about eligibility](#)

Start with \$100 Azure credit

No credit card required

Azure for Students 5/7

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- Συμπλήρωση των πεδίων με τα πραγματικά στοιχεία σας.

Student Verification

Start by entering your name as per the school records. Select your school's country and enter your school's name. Enter your date of birth as per the school records.

First name

This field is required

Last name

This field is required

Country

Greece

If your country is not listed, the offer is not available in your region. [Learn More](#)

School name

Type in a school name

School name will help provide Microsoft with additional information for verification. If available, please enter it here.


Date of birth

mm/dd/yyyy

School email address

eee15@unisa.gr

Παρακαλούμε λύστε τον γρίφο, ώστε να βεβαιώσουμε ότι δεν είστε ρομπότ.





Azure for Students 6/7

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- Συμπλήρωση των πεδίων με τα πραγματικά στοιχεία σας.

Your profile

Country/Region 

Greece 

Choose the location that matches your billing address. **You cannot change this selection later.** If your country is not listed, the offer is not available in your region. [Learn More](#)


First name

This field is required


Middle name (Optional)

Last name

This field is required

Email address for important notifications 

This field is required

Phone 

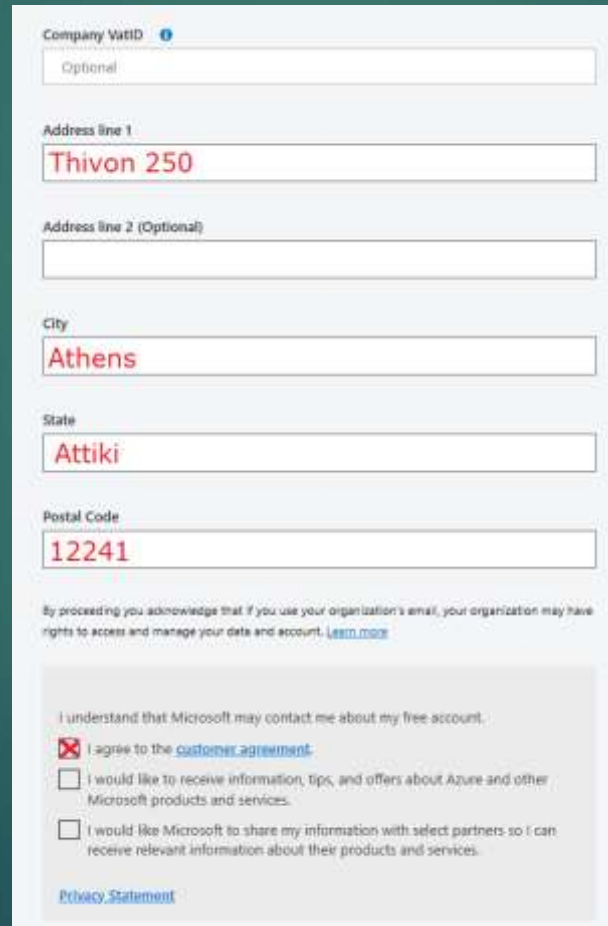
Example: 612 345 6789

This field is required

Azure for Students 7/7

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- Συμπλήρωση των πεδίων που φαίνονται με κόκκινη γραμματοσειρά.



Company VatiD ⓘ

Optional

Address line 1

Thivon 250

Address line 2 (Optional)

City

Athens

State

Attiki

Postal Code

12241

By proceeding you acknowledge that if you use your organization's email, your organization may have rights to access and manage your data and account. [Learn more](#)

I understand that Microsoft may contact me about my free account.

☒ I agree to the [customer agreement](#).

☐ I would like to receive information, tips, and offers about Azure and other Microsoft products and services.

☐ I would like Microsoft to share my information with select partners so I can receive relevant information about their products and services.

[Privacy Statement](#)

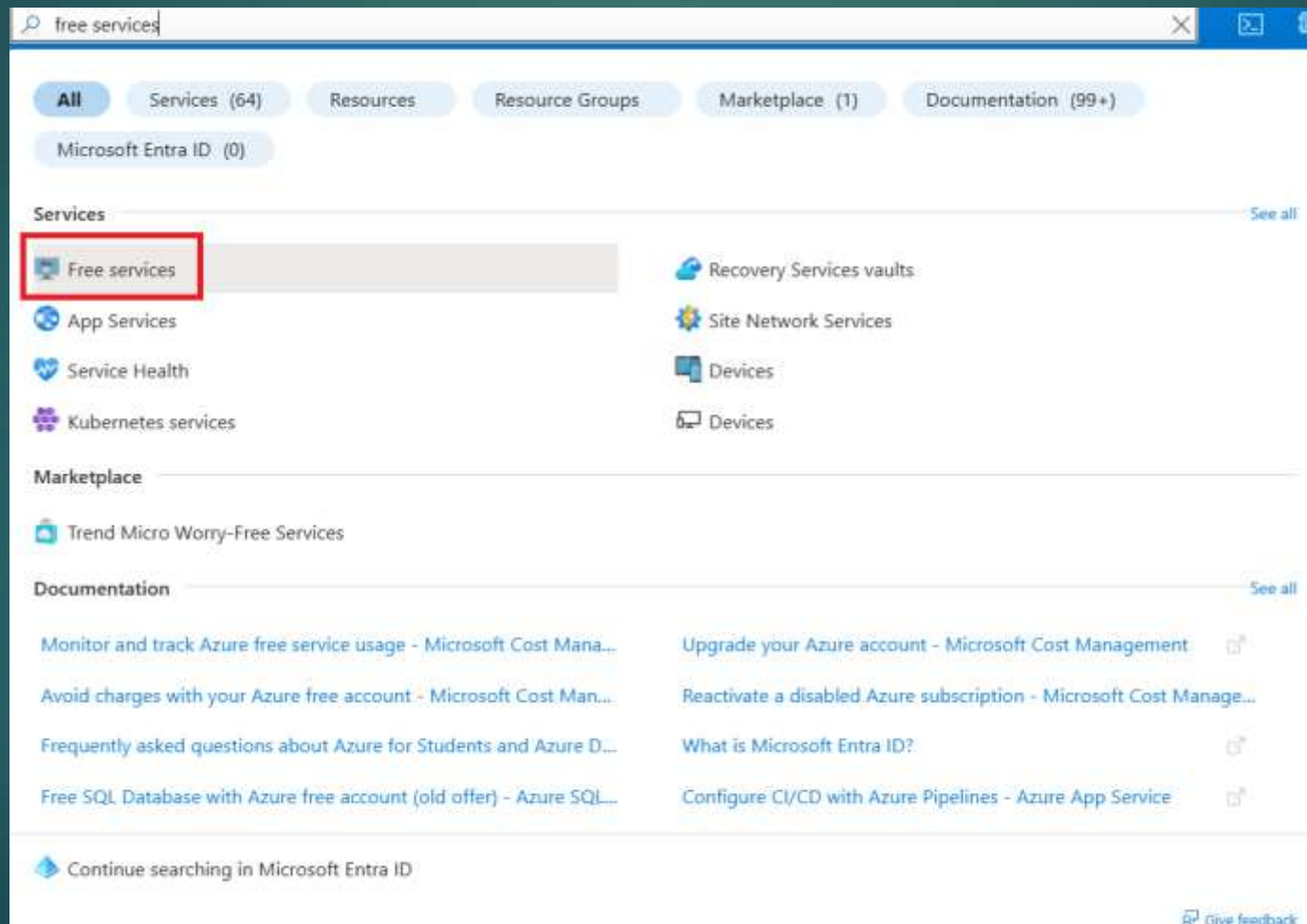
Ubuntu Server VM στην υποδομή Azure

Linux Virtual Machine

Ubuntu Server VM στο Azure 1/7

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- Αναζήτηση "Free Services" και επιλογή της αντίστοιχης υπηρεσίας.



Ubuntu Server VM στο Azure 2/7

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- Πάτημα κουμπιού "Create" στην καρτέλα "Linux Virtual Machine".

Home > Free services

Services free for 12 months with the Azure free account

Services that are included for free with your Azure free account. You can use these services within the limits listed below without getting charged. [To learn more, see the Azure free account FAQ.](#)

Windows Virtual Machine COMPUTE	Linux Virtual Machine COMPUTE	Azure Managed Disks STORAGE	Azure Blob Storage STORAGE
750 hours each of B1s and B2ats v2 (AMD-based) burstable VMs. Create Windows virtual machines (VMs) in seconds to meet your workload and budget needs. Learn more	750 hours each of B1s and B2ats v2 (AMD-based) burstable VMs. Create Linux virtual machines (VMs) in seconds to meet your workload and budget needs. Learn more	64 GB x 2 (P6) solid state drives SSD storage, plus 1 GB snapshot and 2 million I/O operations Get high performance, durable block storage for Azure Virtual Machines with simplified management. Learn more	5 GB locally redundant storage (LRS) hot block with 20,000 read and 10,000 write operations Use massively-scalable object storage for any type of unstructured data. Learn more
Create	Create	Create	Create

Azure Files STORAGE	Key Vault SECURITY	Azure Media Services Encodin... MEDIA	Azure Database for MySQL DATABASES
100GB of LRS transaction optimized, hot, and cool files. 2 million read, list, and other file operations Migrate to simple, distributed, cross-	10,000 transactions RSA 2048-bit keys or secret operations, Standard tier. Safeguard and maintain control of keys and other secrets. Learn more	20 output minutes Standard encoder video or audio source file encoding. Index, package, protect, and stream video and audio at scale. Learn more	750 hours of Flexible Server—Burstable B1MS Instance, 32 GB storage, and 32 GB backup storage Host a fully managed, scalable MySQL database in Azure. Learn more

Ubuntu Server VM στο Azure 3/7

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- Συμπλήρωση απαραίτητων στοιχείων VM, όπως ονομασία, επιλογή Region και image.

Create a virtual machine

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ Azure for Students

Resource group * ⓘ (New) CloudComputing_group

[Create new](#)

Instance details

Virtual machine name * ⓘ CloudComputing ✓

Region * ⓘ (US) East US

Image * ⓘ Ubuntu Server 22.04 LTS - x64 Gen2

Size * ⓘ Standard_B1s - 1 vcpu, 1 GiB memory (7,59 \$/month) (free services eligible)

Ubuntu Server VM στο Azure 4/7

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- Συμπλήρωση απαραίτητων στοιχείων VM, όπως Username και ssh public key που δημιουργήθηκε νωρίτερα.

Enable Hibernation (preview) ☐

Administrator account

Authentication type ☒ SSH public key ☐ Password

Username * azureuser ✓

SSH public key source Use existing public key ✓

SSH public key * ssh public key

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Review + create < Previous Next : Tags >

Ubuntu Server VM στο Azure 5/7

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- Επιλογή “**Create**” για δημιουργία του νέου VM.

Create a virtual machine

Validation passed

Cost given below is an estimate and not the final price. Please use [Pricing calculator](#) for all your pricing needs.

Price

1 X Standard B1s
by Microsoft
[Terms of use](#) | [Privacy policy](#)

Subscription credits apply ⓘ
0.0104 USD/hr
[Pricing for other VM sizes](#)

TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

Name

Preferred e-mail address

Preferred phone number

Create < Previous Next > [Download a template for automation](#)

Ubuntu Server VM στο Azure 6/7

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- Πάτημα του κουμπιού “Go to resource”.

Home >

CreateVm-canonical.0001-com-ubuntu-server-jammy-2-20231116111124 | Overview

Deployment

Search << Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

Your deployment is complete

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-j... Start time: 16/11/2023, 11:20:28
Subscription: [Azure for Students](#) Correlation ID: b18ee0dc-5d01-471c-bca8-d94dd9fbe531

Resource group: [CloudComputing_group](#)

▼ Deployment details

^ Next steps

[Setup auto-shutdown](#) Recommended

[Monitor VM health, performance and network dependencies](#) Recommended

[Run a script inside the virtual machine](#) Recommended

[Go to resource](#) [Create another VM](#)

Give feedback

Tell us about your experience with deployment

Ubuntu Server VM στο Azure 7/7

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- Σε αυτό το σημείο φαίνεται η δημόσια IP διεύθυνση του VM.

The screenshot displays the Azure portal interface for a virtual machine named 'CloudComputing'. The left sidebar contains navigation options such as Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Connect, Networking, and Settings. The main content area is divided into two sections: 'Essentials' and 'Properties'. The 'Essentials' section provides a summary of the VM's status, including its resource group, location, subscription, and public IP address. The 'Properties' section lists detailed specifications like the operating system, image publisher, and VM generation. The public IP address, 20.115.118.104, is highlighted with a red box in the 'Essentials' section.

Home > CreateVm-canonical.0001-com-ubuntu-server-jammy-2-20231116111124 | Overview >

CloudComputing
Virtual machine

Search

Connect Start Restart Stop Hibernate (preview) Capture Delete Refresh Open in mobile Feedback CLI / PS

Overview

Activity log
Access control (IAM)
Tags
Diagnose and solve problems

Connect

Connect
Bastion

Networking

Network settings
Load balancing
Application security groups
Network manager

Settings

Disks
Extensions + applications
Configuration

Essentials [JSON View](#)

Resource group (move) : [CloudComputing_group](#)

Status : Running

Location : East US

Subscription (move) : [Azure for Students](#)

Subscription ID : 530a07a9-fca9-4e3d-8446-d74385a3631d

Tags (edit) : [Add tags](#)

Operating system : Linux (ubuntu 22.04)

Size : Standard B1s (1 vcpu, 1 GiB memory)

Public IP address : **20.115.118.104**

Virtual network/subnet : [CloudComputing-vnet/default](#)

DNS name : [Not configured](#)

Health state : >

Properties Monitoring Capabilities (7) Recommendations Tutorials

Virtual machine

Computer name : CloudComputing

Operating system : Linux (ubuntu 22.04)

Image publisher : canonical

Image offer : 0001-com-ubuntu-server-jammy

Image plan : 22_04-lts-gen2

VM generation : V2

VM architecture : x64

Agent status : Ready

Networking

Public IP address : [20.115.118.104 \(Network interface cloudcomputing353 \)](#)

Public IP address (IPv6) : -

Private IP address : 10.1.1.4

Private IP address (IPv6) : -

Virtual network/subnet : [CloudComputing-vnet/default](#)

DNS name : [Configure](#)

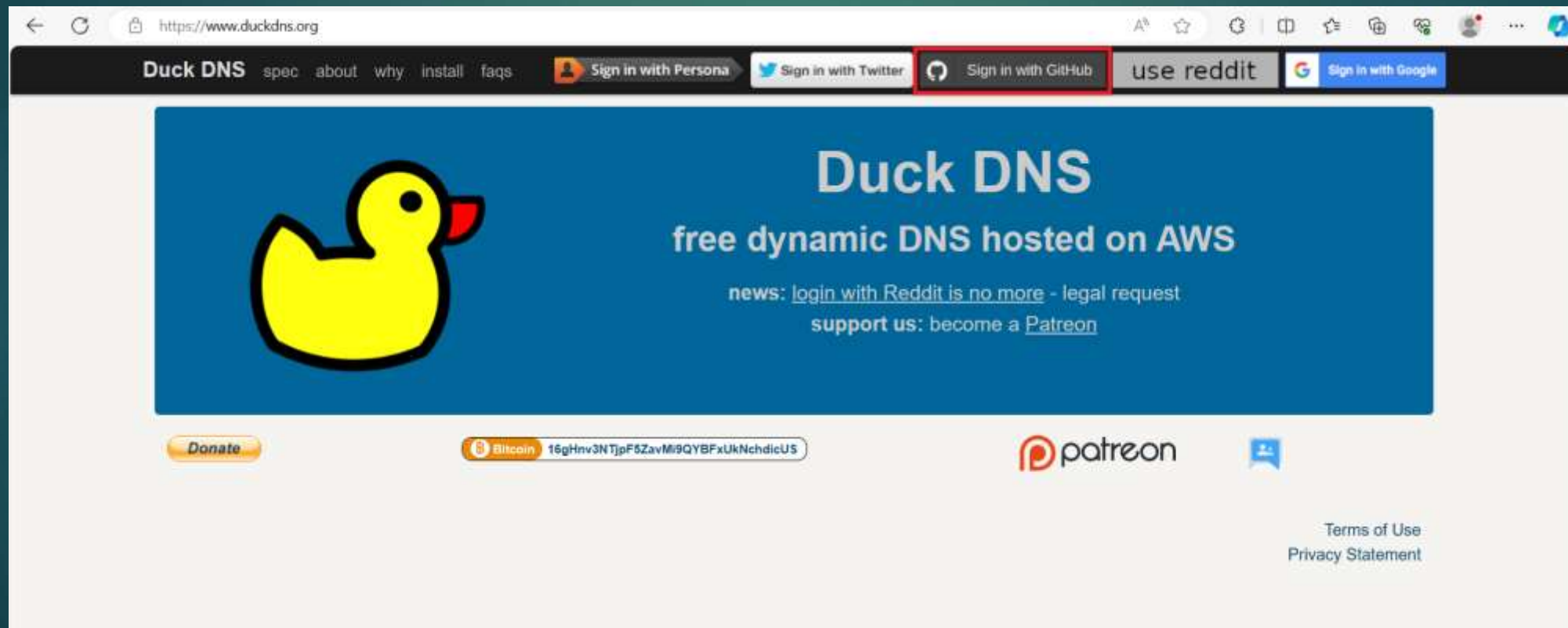
Size

Δημιουργία free dynamic DNS 1/3

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- Ακολουθώντας το παρακάτω Link μπορούμε να δημιουργήσουμε δωρεάν έναν λογαριασμό και να φτιάξουμε ένα dynamic DNS για το VM μας. Κάνουμε Sign in με έναν από τους διαθέσιμους τρόπους.

<https://www.duckdns.org>



Δημιουργία free dynamic DNS 2/3

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- Στο πεδίο Subdomain επιλέγουμε το username που έχουμε στο Πανεπιστήμιο και στο πεδίο current IP γράφουμε την IP του VM μας. Τέλος πατάμε το κουμπί “update ip”.

domains 1/5

http://

sub domain

.duckdns.org

add domain

domain	current ip	ipv6	changed
<u>eee19</u>	20.115. <div>update ip</div>	ipv6 address <div>update ipv6</div>	0 seconds ago <div>delete domain</div>

This site is protected by reCAPTCHA and the Google [Privacy Policy](#) and [Terms of Service](#) apply.

Δημιουργία free dynamic DNS 3/3

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- Στη γραμμή εντολών γίνεται έλεγχος αν έχουν ενημερωθεί οι DNS Servers με την νέα IP.

```
Γραμμή εντολών
Microsoft Windows [Version 10.0.22621.2715]
(c) Microsoft Corporation. Με επιφύλαξη κάθε νόμιμου δικαιώματος.

C:\Users\helen>ping eee19[redacted].duckdns.org

Pinging eee19[redacted].duckdns.org [20.115.[redacted]] with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 20.115.[redacted]:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),
```

Σύνδεση στην εικονική μηχανή με SSH

Remote Connection

Σύνδεση στην εικονική μηχανή με SSH

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- Εφόσον υπάρχουν τα συσχετισμένα ζευγάρια κλειδιών στον φάκελο .ssh στο home directory του χρήστη μας, μπορεί να γίνει η σύνδεση στην απομακρυσμένη εικονική μηχανή χωρίς την χρήση Credentials.
- Στην γραμμή εντολών γράφουμε την παρακάτω εντολή προκειμένου να γίνει η σύνδεση με την εικονική μηχανή.

```
C:\Users\helen>ssh azureuser@eee19.....duckdns.org
The authenticity of host 'eee19.....duckdns.org (20.115.....)' can't be established.
ED25519 key fingerprint is SHA256:wCnEPkkk8Ly82phQKcJSN7XagQvddb9h0dBtR8Ec0BU.
This key is not known by any other names
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes
Warning: Permanently added 'eee19.....duckdns.org' (ED25519) to the list of known hosts.
Welcome to Ubuntu 22.04.3 LTS (GNU/Linux 6.2.0-1016-azure x86_64)
```

Ενημέρωση Λογισμικού

Update and Upgrade

- ▶ `sudo apt update`
- ▶ `sudo apt upgrade`

[illegible]

- Αν υπάρχουν νέα διαθέσιμα πακέτα να γίνει η αναβάθμισή τους.

Ενημέρωση Λογισμικού 2/2

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- ▶ Τρέχουμε την εντολή:

`sudo apt dist-upgrade`

```
user@snf-16064:~$ sudo apt-get dist-upgrade
Reading package lists... Done
Building dependency tree
Reading state information... Done
Calculating upgrade... Done
The following NEW packages will be installed:
  amd64-microcode intel-microcode iucode-tool libxmlsec1 libxmlsec1-openssl libxslt1.1 linux-headers-4.4.0-193 linux-headers-4.4.0-193-generic linux-image-4.4.0-193-generic
  linux-modules-4.4.0-193-generic linux-modules-extra-4.4.0-193-generic motd-news-config ubuntu-advantage-tools
The following packages will be upgraded:
  base-files linux-generic linux-headers-generic linux-image-generic open-vm-tools ubuntu-minimal ubuntu-server
7 upgraded, 13 newly installed, 0 to remove and 0 not upgraded.
Need to get 69.9 MB of archives.
After this operation, 308 MB of additional disk space will be used.
Do you want to continue? [Y/n]
```

- ▶ Αν υπάρχουν ενημερώσεις να γίνει η αναβάθμισή τους
- ▶ Στην συνέχεια τρέχουμε τις εντολές:
`sudo apt autoremove`
`sudo apt autoclean`
- ▶ Τέλος κάνουμε reboot με την εντολή:
`sudo reboot`
- ▶ Μετά το reboot θα πρέπει να γίνει επανασύνδεση στο εικονικό μηχάνημα