



# **Review and Experiences with Several Clouds from GEANT Framework**

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EaPEC 2018 Conference CHISINAU, Moldova  
Cloud workshop 18.10.2018

# What is goal of this presentation

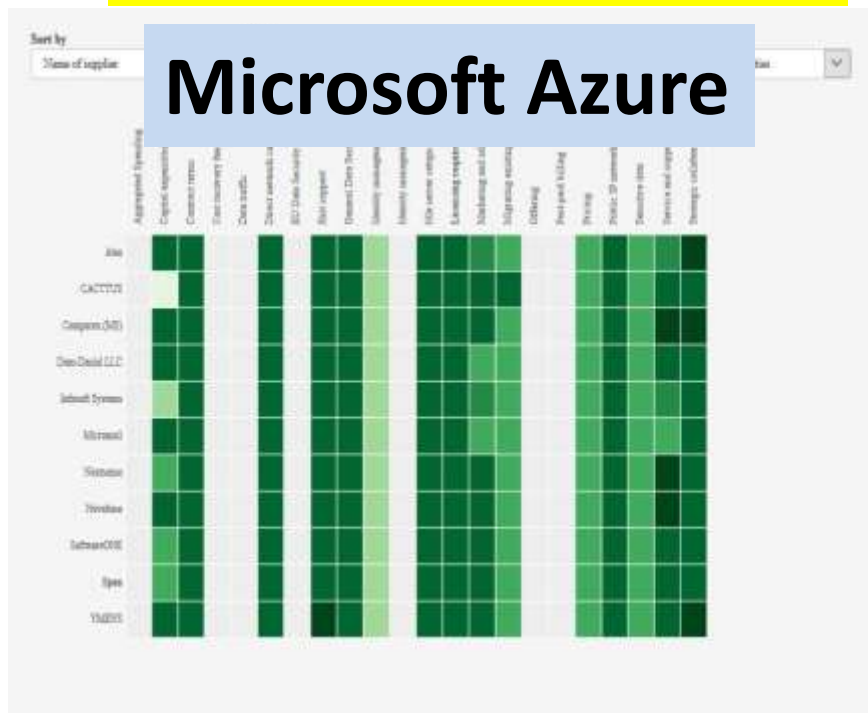
- To show implementation steps linked with the process working in the cloud
- Describe different levels of users and role of IT architects and administrators
- Show several basic technical details
- Help with decision which provider or cloud is best for my/yours solution (respecting company IT culture, style and tradition)

## Three groups of IaaS

<https://catalogue.geant.org/reports/>

# Amazon - AWS

IaaS and wide spectrum of services



# Big Vendors offer wide spectrum of services

## Azure is an open cloud

DevOps	    	Clients	  
Management	      		
Applications	  	PaaS and DevOps	  
App frameworks and tools	     		
Databases and middleware	     		
Infrastructure	     		

# Big Vendors offer wide spectrum of services

## *Review of all AWS Services*

### AWS services

Find a service by name or feature (for example, EC2, S3 or VM, storage).

#### Recently visited services

Billing

Cost Explorer

EC2

#### All services

##### Compute

EC2  
EC2 Container Service  
Lightsail  
Elastic Beanstalk  
Lambda  
Batch

##### Storage

S3  
EFS  
Glacier  
Storage Gateway

##### Database

RDS  
DynamoDB

##### Developer Tools

CodeStar  
CodeCommit  
CodeBuild  
CodeDeploy  
CodePipeline  
X-Ray

##### Management Tools

CloudWatch  
CloudFormation  
CloudTrail  
Config  
OpsWorks  
Service Catalog  
Trusted Advisor  
Managed Services

##### Internet of Things

AWS IoT  
AWS Greengrass

##### Contact Center

Amazon Connect

##### Game Development

Amazon GameLift

##### Mobile Services

Mobile Hub  
Cognito  
Device Farm  
Mobile Analytics  
Pinpoint

##### Amazon Redshift

##### Networking & Content Delivery

VPC  
CloudFront  
Direct Connect  
Route 53

##### Migration

AWS Migration Hub  
Application Discovery Service  
Database Migration Service  
Server Migration Service  
Snowball

##### Security, Identity & Compliance

IAM  
Inspector  
Certificate Manager  
Directory Service  
WAF & Shield  
Artifact  
Amazon Macie  
CloudHSM

##### Analytics

Athena  
EMR  
CloudSearch  
Elasticsearch Service  
Kinesis  
Data Pipeline  
QuickSight  
AWS Glue

##### Artificial Intelligence

Lex  
Amazon Polly  
Rekognition  
Machine Learning

##### Application Services

Step Functions  
SWF  
API Gateway  
Elastic Transcoder

##### Messaging

Simple Queue Service  
Simple Notification Service  
Simple Email Service

##### Business Productivity

WorkDocs  
WorkMail  
Amazon Chime

##### Desktop & App Streaming

WorkSpaces  
AppStream 2.0

# How to become cloud user

(Individual researcher or user as a part of the team)

- Go to particular company WEB and make registration
  - Credentials Received by email
- Login to particular cloud WEB
  - Microsoft <https://azure.microsoft.com/en-us/>
  - AWS <https://www.amazon.com/ap/signin?>
  - CloudSigma <https://zrh.cloudsigma.com>
- Work in **cloud DASHBOARD** (Define and control VM ) as **L1 user**
  - Define resource requests for CPU, Memory, disk, network
  - Generate or register your private SSH keys or password
  - Create VM
  - Start VM (start/stop/delete)

Users category:

L1 cloud owner /company main admin / superuser / cloud architect(not provider)

L2 user with rights to use VM as admin ( with knowledge linux or MS server)

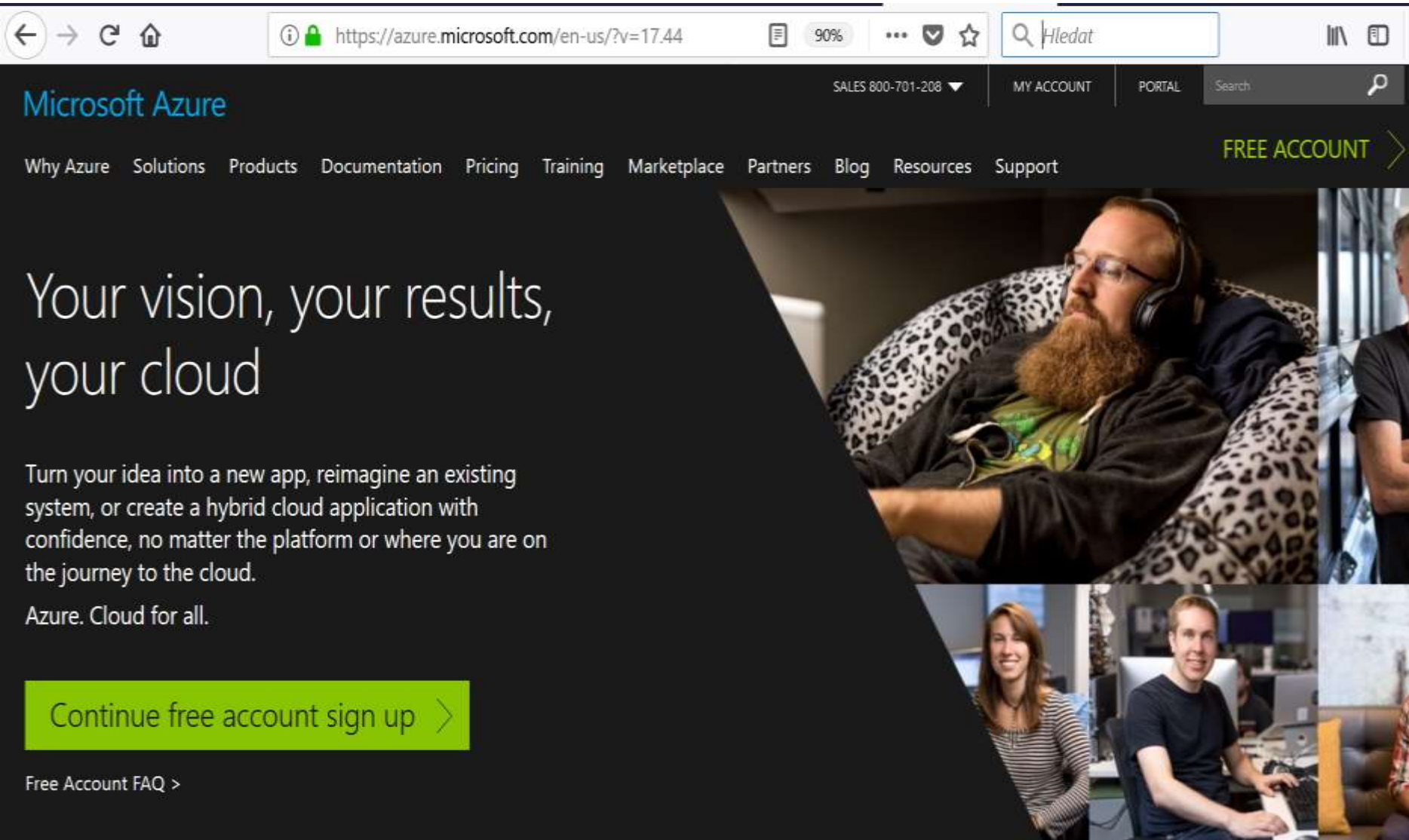
L3 application users and designers . They are using VM as at home.

(Mathematical modelling, Wordpress, Moodle , Office365)

**Many application users NO NEED to contact PROVIDERs or work with DASHBOARD**



# Microsoft Azure



The image is a screenshot of the Microsoft Azure website homepage. At the top, a browser address bar shows the URL <https://azure.microsoft.com/en-us/?v=17.44>. The page header features the "Microsoft Azure" logo on the left, a search bar with the text "Hledat" in the center, and navigation links for "SALES 800-701-208", "MY ACCOUNT", and "PORTAL" on the right. Below the header is a dark navigation bar with links for "Why Azure", "Solutions", "Products", "Documentation", "Pricing", "Training", "Marketplace", "Partners", "Blog", "Resources", and "Support". A prominent "FREE ACCOUNT" button with a right-pointing arrow is located on the right side of this bar. The main content area has a dark background on the left with the headline "Your vision, your results, your cloud" in white. Below the headline is a paragraph: "Turn your idea into a new app, reimagine an existing system, or create a hybrid cloud application with confidence, no matter the platform or where you are on the journey to the cloud." followed by "Azure. Cloud for all." A large green button with the text "Continue free account sign up" and a right-pointing arrow is positioned below the text. At the bottom left, there is a link for "Free Account FAQ". On the right side of the main content area, there is a collage of three images: a man with a beard and glasses wearing large headphones and reclining in a leopard-print chair; a woman with long brown hair smiling; and a man with short brown hair sitting at a desk with multiple monitors, typing on a keyboard.

Microsoft Azure

SALES 800-701-208

MY ACCOUNT

PORTAL

Search

FREE ACCOUNT >

Why Azure Solutions Products Documentation Pricing Training Marketplace Partners Blog Resources Support

## Your vision, your results, your cloud

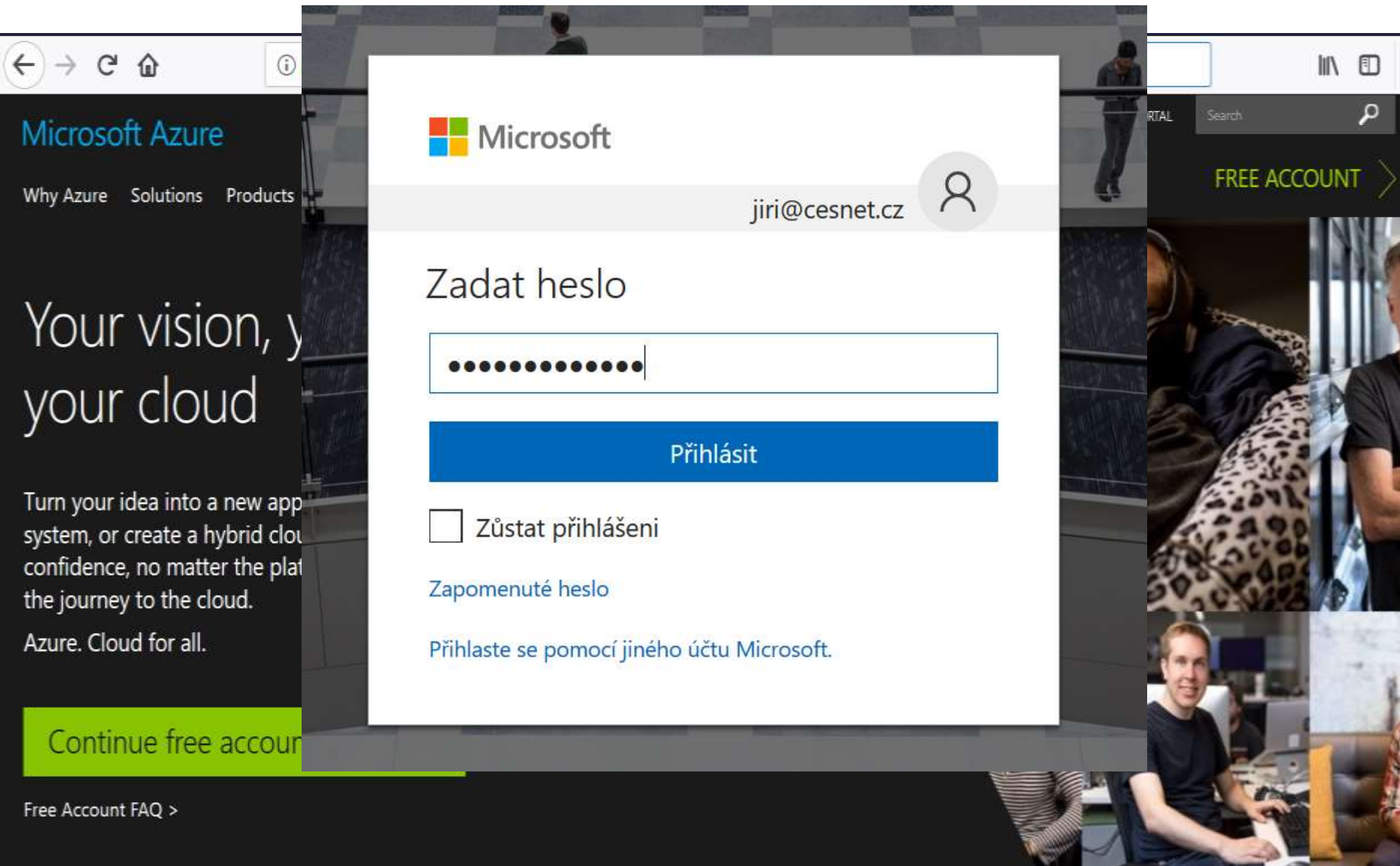
Turn your idea into a new app, reimagine an existing system, or create a hybrid cloud application with confidence, no matter the platform or where you are on the journey to the cloud.

Azure. Cloud for all.

Continue free account sign up >

Free Account FAQ >

# Microsoft Azure



The image shows a screenshot of the Microsoft Azure website with a login modal open. The background website has a dark header with the 'Microsoft Azure' logo and navigation links for 'Why Azure', 'Solutions', and 'Products'. The main content area features the slogan 'Your vision, your cloud' and a paragraph about turning ideas into new applications. A green button labeled 'Continue free account' is visible at the bottom left. The login modal is a white box in the center with the Microsoft logo and the email 'jiri@cesnet.cz'. It contains a password field with masked characters, a blue 'Přihlásit' button, a checkbox for 'Zůstat přihlášení', and links for 'Zapomenuté heslo' and 'Přihlaste se pomocí jiného účtu Microsoft.'.

Microsoft Azure

Why Azure Solutions Products

Your vision, your cloud

Turn your idea into a new app system, or create a hybrid cloud with confidence, no matter the platform. Start the journey to the cloud.

Azure. Cloud for all.

Continue free account

Free Account FAQ >

Microsoft

jiri@cesnet.cz

Zadat heslo

.....

Přihlásit

☐ Zůstat přihlášení

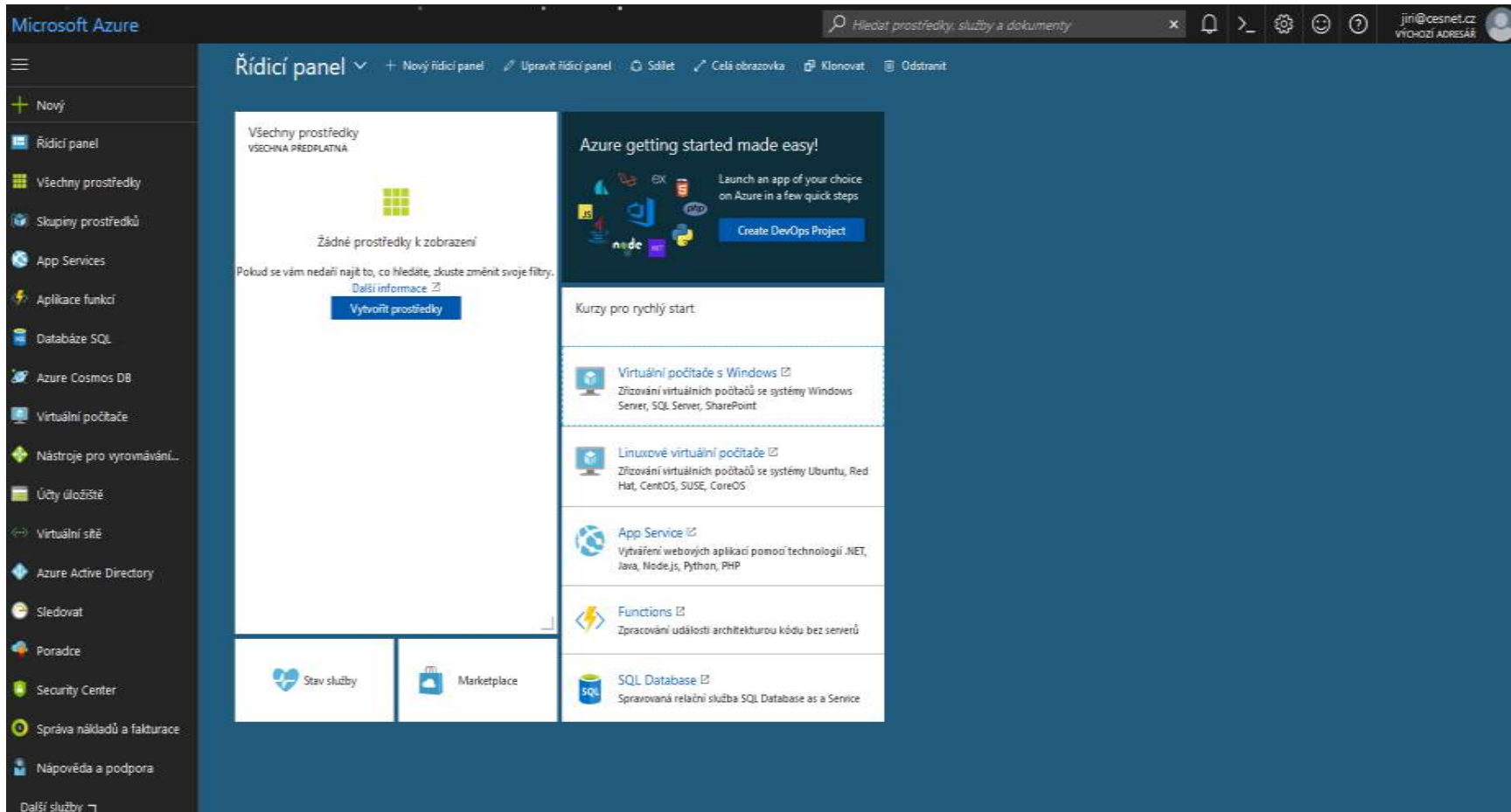
[Zapomenuté heslo](#)

[Přihlaste se pomocí jiného účtu Microsoft.](#)

FREE ACCOUNT >





# L1 cloud user - Azure Management - Dashboard




The screenshot displays the Microsoft Azure Management Dashboard. The top navigation bar includes the 'Microsoft Azure' logo, a search bar labeled 'Hledat prostředky, služby a dokumenty', and user information for 'jin@cesnet.cz'. The left sidebar contains a list of navigation items: 'Nový', 'Řídicí panel', 'Všechny prostředky', 'Skupiny prostředků', 'App Services', 'Applikace funkcí', 'Databáze SQL', 'Azure Cosmos DB', 'Virtuální počítače', 'Nástroje pro vyrovnávání...', 'Účty úložště', 'Virtuální síť', 'Azure Active Directory', 'Sledovat', 'Poradce', 'Security Center', 'Správa nákladů a fakturace', and 'Nápověda a podpora'. The main content area is titled 'Řídicí panel' and shows a 'Všechny prostředky' section with a message 'Žádné prostředky k zobrazení' and a 'Vytvořit prostředky' button. The right-hand panel features a 'Azure getting started made easy!' section with a 'Create DevOps Project' button, and a 'Kurzy pro rychlý start' section with links to 'Virtuální počítače s Windows', 'Linuxové virtuální počítače', 'App Service', 'Functions', and 'SQL Database'.

# Amazon Web Services

 Menu



 English

Sign In to the Console

## AWS Management Console

Getting Started Guide (Version 1.0)

Documentation - This Guide

Search

☐ Working with the AWS Management Console

☒ Working with Resource Groups

☒ Working with Tag Editor

☐ AWS Glossary

[AWS Documentation](#) » [Console Help](#) » [Getting Started Guide](#) » Working with the AWS Management Console

## Working with the AWS Management Console


Welcome to the [AWS Management Console](#). This guide provides a short introduction to working with the console. To learn how to work with individual services in the console, see [AWS Documentation](#).


### Topics


- [What Is the AWS Management Console?](#)
- [Getting Started with a Service](#)
- [Adding and Removing Shortcuts](#)
- [Selecting a Region](#)
- [Changing Your Password](#)
- [Getting Billing Information](#)
- [Using the Device of Your Choice](#)
- [Troubleshooting](#)

## What Is the AWS Management Console?

# Amazon Web Services

 Menu



 English

Sign In to the Console

## AWS Management Console


Getting Started Guide (Version 1.0)

Documentation - This Guide

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- AWS Glossary

[AWS Documentation](#) » [Console Help](#) » [Getting Started Guide](#) » Working with the AWS Management Console



### Root user sign in

Email

jiri@cesnet.cz


Password

••••••

Sign In

[Sign in to a different account](#)

[Forgot your password?](#)



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to working with the console.

- Troubleshooting

## What Is the AWS Management Console?

# CloudSigma IaaS

The screenshot shows the login and sign-up interface of the CloudSigma IaaS platform. The browser's address bar displays the URL `https://mnl.cloudsigma.com/ui/4.0/login`. The page header includes the CloudSigma logo, a 'powered by' badge for IPC, and a 'cloud.com.ph' badge. The main content area is divided into two sections: 'Sign In' and 'Create your Account Now. Sign Up'. The 'Sign In' section contains input fields for 'Email Address' and 'Password', a green 'Sign In' button, and social media login options for Facebook, Twitter, Google+, LinkedIn, and GitHub. A link for 'Forgot your password?' is also present. The 'Create your Account Now. Sign Up' section features a dropdown menu for location (currently set to 'Manila, Philippines') and an 'Email Address' input field. A green 'Live Support 24/7' button is located in the bottom left corner.

CloudSigma powered by **IPC** cloud.com.ph

Sign In

Email Address

Password

Sign In

f t g+ in

[Forgot your password?](#)

Create your Account Now. Sign Up

Manila, Philippines

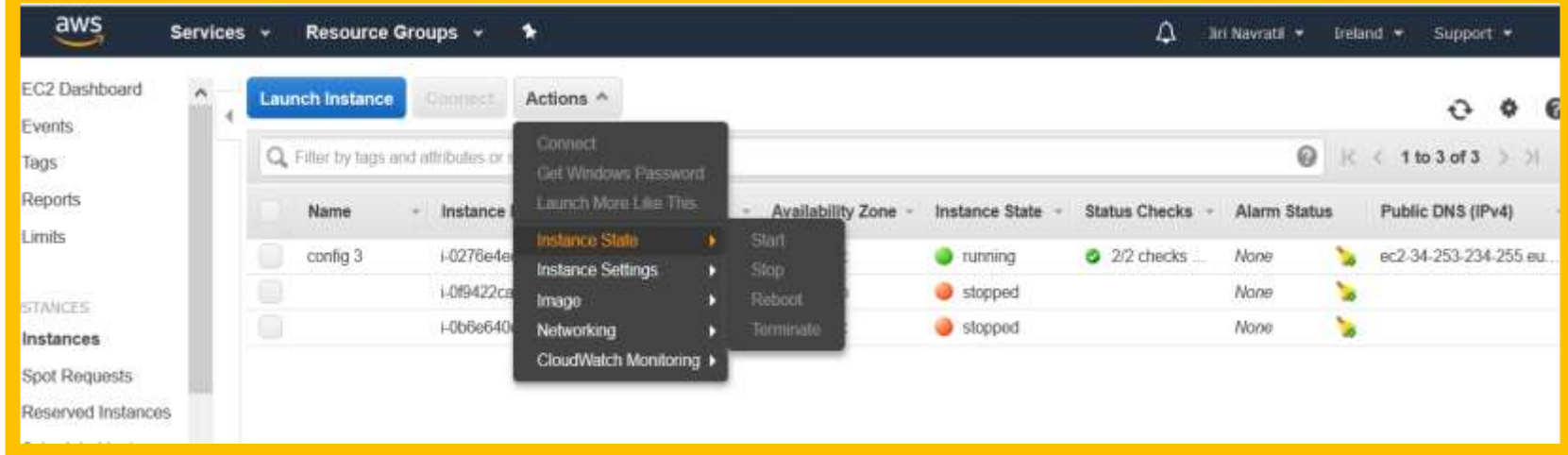
Email Address

Live Support 24/7

# Dashboards = control panels

Different form, terminology, different icons, etc.

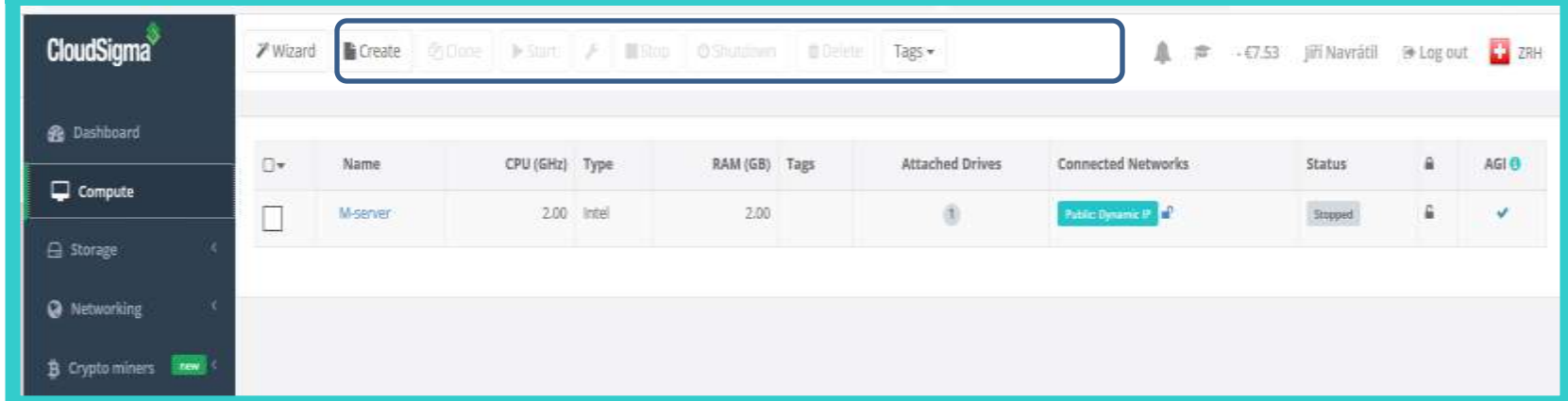
## AWS



The screenshot shows the AWS Management Console interface. The top navigation bar includes the AWS logo, 'Services', 'Resource Groups', and user information. The left sidebar lists various services like EC2 Dashboard, Events, Tags, Reports, Limits, INSTANCES, Instances, Spot Requests, and Reserved Instances. The main content area displays the 'Launch Instance' button and a table of instances. A dropdown menu is open over the 'Instance State' column, showing options: Connect, Get Windows Password, Launch More Like This, Instance State (highlighted), Instance Settings, Image, Networking, and CloudWatch Monitoring. The table lists instances with columns: Name, Instance ID, Availability Zone, Instance State, Status Checks, Alarm Status, and Public DNS (IPv4).

Name	Instance ID	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)
config 3	i-0278e4e...		running	2/2 checks	None	ec2-34-253-234-255.eu...
	i-0f9422ca...		stopped		None	
	i-0b5e640...		stopped		None	

## CloudSigma



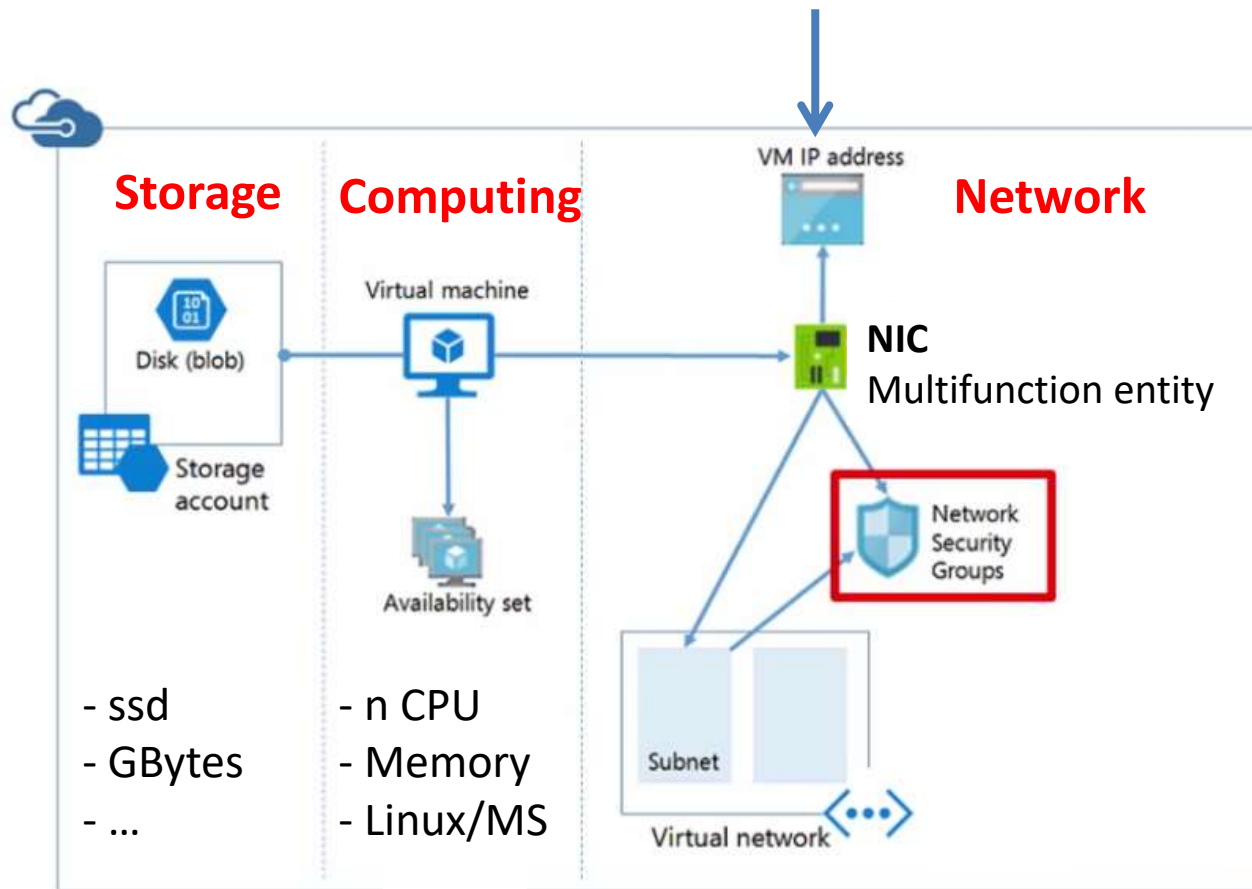
The screenshot shows the CloudSigma dashboard. The top navigation bar includes the CloudSigma logo, a 'Wizard' button, and a row of action buttons: Create, Clone, Start, Stop, Shutdown, and Delete. The left sidebar lists navigation options: Dashboard, Compute, Storage, Networking, and Crypto miners. The main content area displays a table of virtual machines with columns: Name, CPU (GHz), Type, RAM (GB), Tags, Attached Drives, Connected Networks, Status, and AGI.

Name	CPU (GHz)	Type	RAM (GB)	Tags	Attached Drives	Connected Networks	Status	AGI
M-server	2.00	Intel	2.00		1	Public Dynamic IP	Stopped	✓



# Resource allocation

(Storage, Computing power, Networking)



# Networking is important part of the cloud infrastructure

## IP addressing:

**Private IP** IP access to VM from private network

**Public IP Dynamic (DHCP)** direct access from anywhere,  
after each **Stop/ Restart** different IP

**Public IP Static** for extra \$

(example: CloudSigma - 2 CHF per Public Static IP)

## Definition of policies (Firewalls)

to Enable or to Block access from or to VM

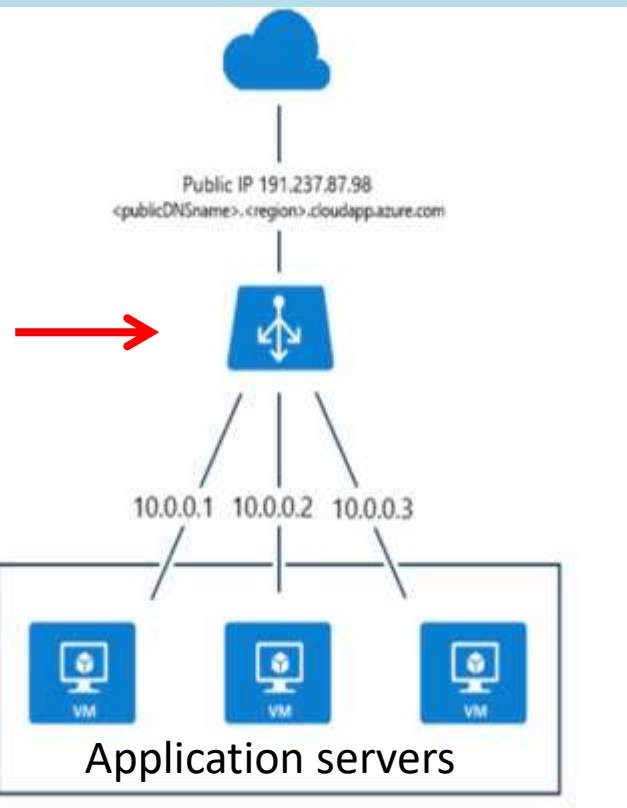
In CloudSigma policy, in Amazon AWS, Microsoft Security groups

What is main difference compare to non cloud solution:

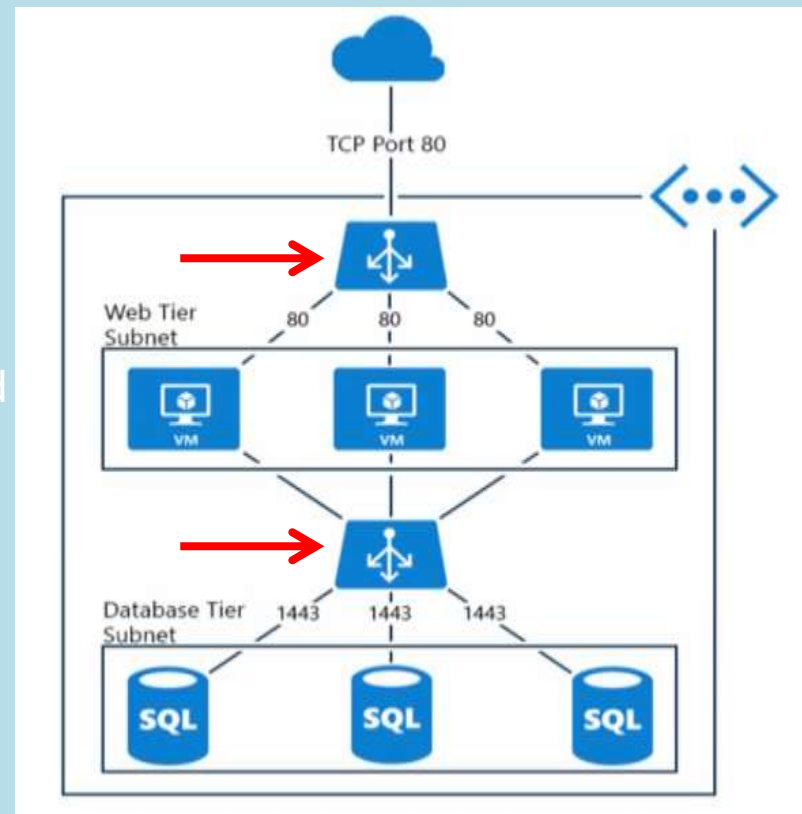
**Strong rules for access as default. Only SSH no other traffic**

# More complex infrastructures

knowledge of existing utilization



External Load balancer



Internal Load balancer

# What power I will need

Instance Family	Some Use Cases
General purpose (T2, M5, M4)	<ul style="list-style-type: none"><li>• Low-traffic websites and web applications</li><li>• Small databases and mid-size databases</li></ul>
Compute-optimized (C5, C4)	<ul style="list-style-type: none"><li>• High performance web servers</li><li>• Video-encoding</li></ul>
Memory-optimized (X1e, X1, R4)	<ul style="list-style-type: none"><li>• High performance databases</li><li>• Distributed memory caches</li></ul>
Storage-optimized (H1, I3, D2)	<ul style="list-style-type: none"><li>• Data warehousing</li><li>• Log or data-processing applications</li></ul>
Accelerated Computing (P3, P2, G3, F1)	<ul style="list-style-type: none"><li>• 3D visualizations</li><li>• Machine learning</li></ul>

# EC2 Purchasing Options





# L1 Cloud user - Dashboard Management

*L1 user is person who is responsible for creation infrastructure Cloud Architect*

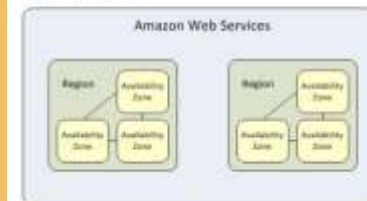
## AWS Regions



## Select Regions and AZ

### Region and Availability Zone Concepts

Each region is completely independent. Each Availability Zone is isolated, but the Availability Zones in a region are connected through low-latency links. The following diagram illustrates the relationship between regions and Availability Zones.



Resource Groups

Resources

You are using the following Amazon EC2 resources in the EU West (London) region:

- 0 Running Instances
- 0 Elastic IPs
- 0 Dedicated Hosts
- 0 Snapshots
- 0 Volumes
- 0 Load Balancers
- 0 Key Pairs
- 1 Security Groups
- 0 Placement Groups

Just need a simple virtual private server? Get everything you need to jumpstart your project - compute, storage, and networking - for a low, predictable price. Try Amazon Lightsail for free.

Create Instance

To start using Amazon EC2, you will want to launch a virtual server, known as an Amazon EC2 instance.

[Launch Instance](#)

US East (N. Virginia)  
US East (Ohio)  
US West (N. California)  
US West (Oregon)  
Canada (Central)  
EU (Ireland)  
EU (Frankfurt)  
**EU (London)**  
Asia Pacific (Singapore)  
Asia Pacific (Sydney)  
Asia Pacific (Seoul)  
Asia Pacific (Tokyo)  
Asia Pacific (Mumbai)  
South America (Sao Paulo)

Select  
DC

# L1 Cloud user - Dashboard Management





## Select Instance type

**Step 1: Choose an Amazon Machine Image (AMI)** [Cancel and Exit](#)

An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance. You can select an AMI provided by AWS, our user community, or the AWS Marketplace, or you can select one of your own AMIs.

**Quick Start** 1 to 35 of 35 AMIs

- My AMIs**
- AWS Marketplace**
- Community AMIs**
- ☐ Free tier only

 <b>Amazon Linux</b> Free tier eligible	<b>Amazon Linux AMI 2017.09.1 (HVM), SSD Volume Type - ami-760aaa0f</b> The Amazon Linux AMI is an EBS-backed, AWS-supported image. The default image includes AWS command line tools, Python, Ruby, Perl, and Java. The repositories include Docker, PHP, MySQL, PostgreSQL, and other packages. Root device type: ebs    Virtualization type: hvm    ENA Enabled: Yes	<a href="#">Select</a> 64-bit
 <b>Red Hat</b> Free tier eligible	<b>Red Hat Enterprise Linux 7.4 (HVM), SSD Volume Type - ami-bb9a6bc2</b> Red Hat Enterprise Linux version 7.4 (HVM), EBS General Purpose (SSD) Volume Type Root device type: ebs    Virtualization type: hvm    ENA Enabled: Yes	<a href="#">Select</a> 64-bit
 <b>SUSE Linux</b> Free tier eligible	<b>SUSE Linux Enterprise Server 12 SP3 (HVM), SSD Volume Type - ami-518b2628</b> SUSE Linux Enterprise Server 12 Service Pack 3 (HVM), EBS General Purpose (SSD) Volume Type. Public Cloud, Advanced Systems Management, Web and Scripting, and Legacy modules enabled. Root device type: ebs    Virtualization type: hvm    ENA Enabled: Yes	<a href="#">Select</a> 64-bit
 <b>Ubuntu</b>	<b>Ubuntu Server 16.04 LTS (HVM), SSD Volume Type - ami-add175d4</b> Ubuntu Server 16.04 LTS (HVM) FRS General Purpose (SSD) Volume Type. Support available from Canonical	<a href="#">Select</a>

..... etc.

# L1 Cloud user - Dashboard Management

## Select an existing key pair or create a new key pair ×

A key pair consists of a **public key** that AWS stores, and a **private key file** that you store. Together, they allow you to connect to your instance securely. For Windows AMIs, the private key file is required to obtain the password used to log into your instance. For Linux AMIs, the private key file allows you to securely SSH into your instance.

Note: The selected key pair will be added to the set of keys authorized for this instance. [Learn more about removing existing key pairs from a public AMI.](#)

Choose an existing key pair ▼

Select a key pair

jn-keys-aws

For future ssh access to instance

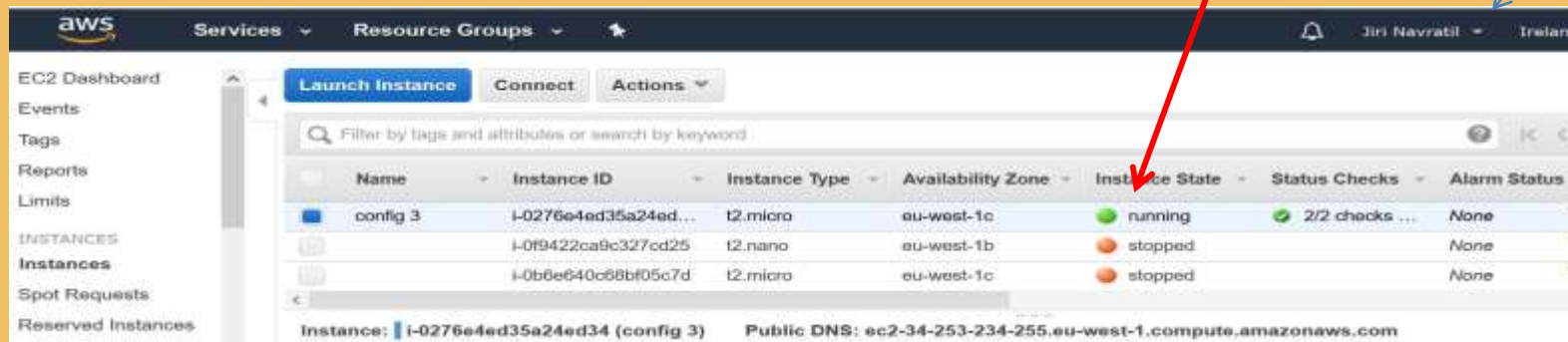
☐ I acknowledge that I have access to the selected private key file (jn-keys-aws.pem), and that without this file, I won't be able to log into my instance.

Cancel

Launch Instances !

# L1 Cloud user - Dashboard Management

## My cloud infrastructure - Status review



aws Services Resource Groups

EC2 Dashboard

Launch Instance Connect Actions

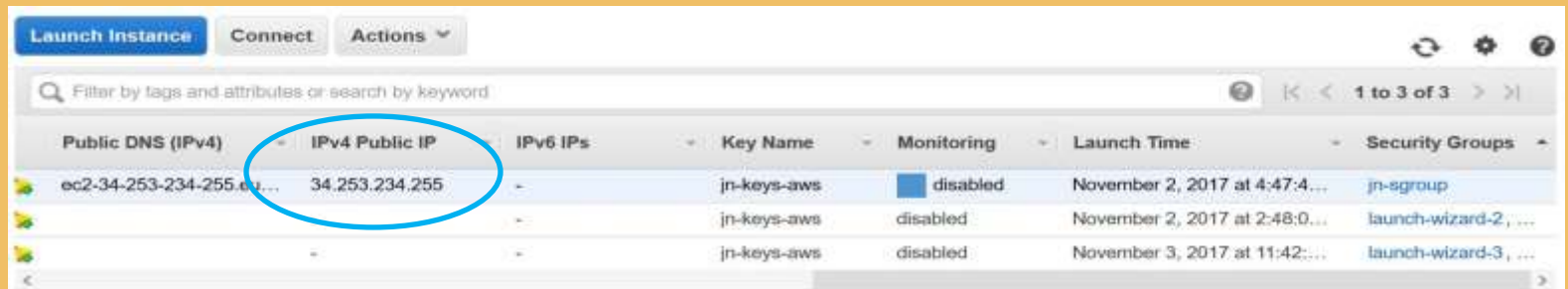
Filter by tags and attributes or search by keyword

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status
config 3	i-0276e4ed35a24ed...	t2.micro	eu-west-1c	running	2/2 checks ...	None
	i-0f9422ca9c327cd25	t2.nano	eu-west-1b	stopped		None
	i-0b8e640c88bf05c7d	t2.micro	eu-west-1c	stopped		None

Instance: i-0276e4ed35a24ed34 (config 3) Public DNS: ec2-34-253-234-255.eu-west-1.compute.amazonaws.com

Ireland

Cont. →



Launch Instance Connect Actions

Filter by tags and attributes or search by keyword

Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs	Key Name	Monitoring	Launch Time	Security Groups
ec2-34-253-234-255.eu...	34.253.234.255	-	jn-keys-aws	disabled	November 2, 2017 at 4:47:4...	jn-sgroup
		-	jn-keys-aws	disabled	November 2, 2017 at 2:48:0...	launch-wizard-2, ...
		-	jn-keys-aws	disabled	November 3, 2017 at 11:42:...	launch-wizard-3, ...

IP

keys

# L1 Cloud user - Dashboard Management

Action commands

The screenshot shows the AWS Management Console for the eu-west-1 region. The left sidebar contains navigation links for EC2 Dashboard, Events, Tags, Reports, Limits, INSTANCES, Launch Templates, Spot Requests, Reserved Instances, Dedicated Hosts, and Scheduled Instances. The main content area displays the EC2 dashboard with buttons for 'Launch Instance', 'Connect', and 'Actions'. A dropdown menu is open under the 'Actions' button, showing options: 'Connect', 'Get Windows Password', 'Launch More Like This', 'Instance State', 'Instance Settings', 'Image', 'Networking', and 'CloudWatch Monitoring'. Below the menu is a table of EC2 instances. The first instance, 'config 3', is highlighted with a red arrow pointing to it from the 'Valid for this instance' text. The table has columns for Name, Instance ID, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS (IPv4), IPv4 Public IP, and IPv6 IPs.

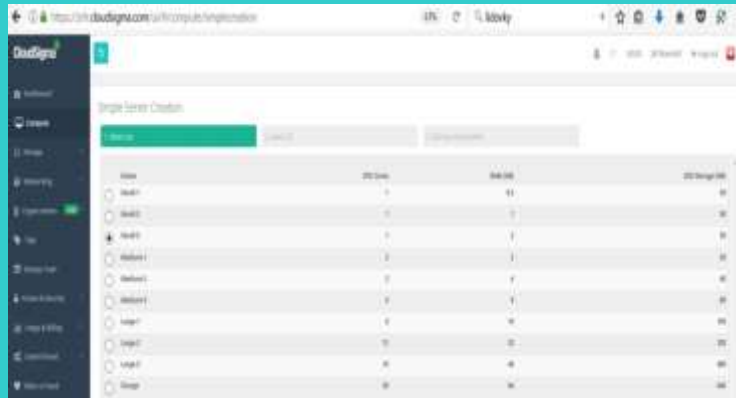
Name	Instance ID	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs
config 3	i-0276e4ed35a2...	eu-west-1c	running	2/2 checks ...	None	ec2-52-30-85-145 eu-w...	52.30.85.145	-
	i-003b0158e727...	eu-west-1b	stopped		None		-	-
	i-051713badf96...	eu-west-1a	stopped		None		-	-

Valid for this instance



# L1 Cloud user - Dashboard Management Process In CloudSigma (step 1-5)

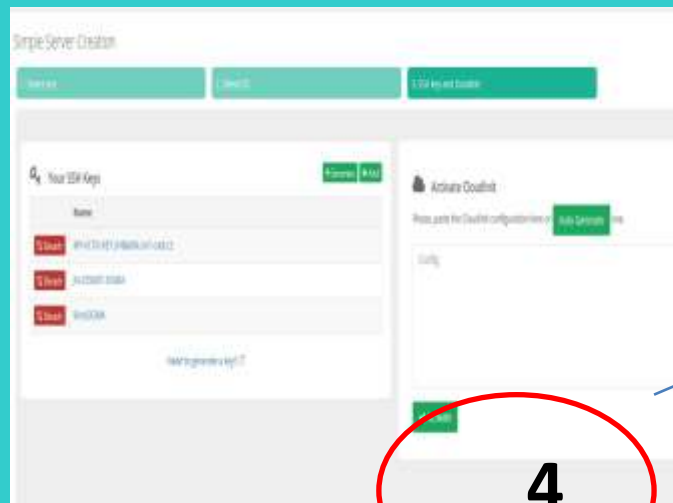
1



2

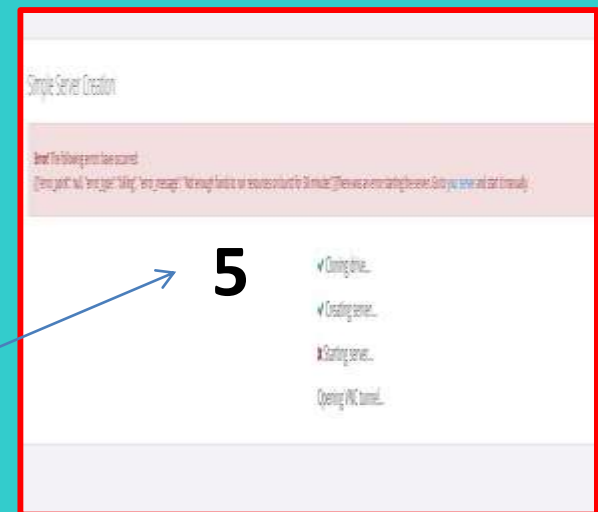


3



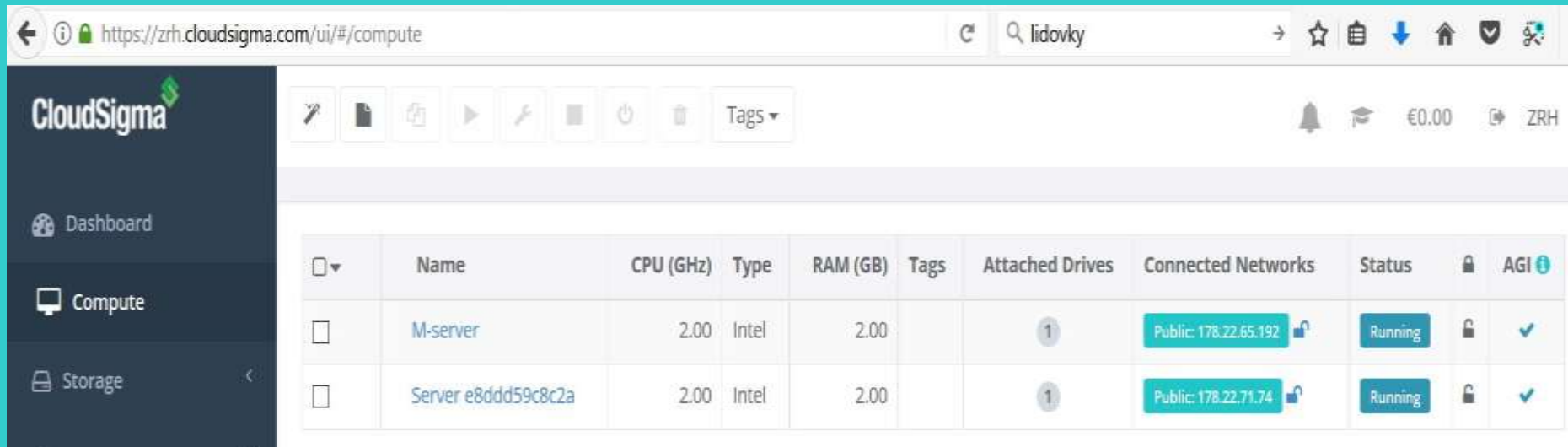
4

5



# L1 Cloud user Dashboard Management

## My cloud infrastructure - Status review



The screenshot shows the CloudSigma dashboard interface. The left sidebar contains navigation links for Dashboard, Compute, and Storage. The main area displays a table of cloud resources. Above the table is a toolbar with icons for editing, deleting, cloning, running, pausing, stopping, and tagging. The table lists two servers, both in a 'Running' state. The 'Connected Networks' column shows public IP addresses and a lock icon, which is annotated with an arrow and the text 'Security group'. The 'Attached Drives' column shows a single drive with a lock icon, annotated with an arrow and the text 'ssh keys'.

	Name	CPU (GHz)	Type	RAM (GB)	Tags	Attached Drives	Connected Networks	Status		AGI
<input type="checkbox"/>	M-server	2.00	Intel	2.00		1	Public: 178.22.65.192	Running		✓
<input type="checkbox"/>	Server e8ddd59c8c2a	2.00	Intel	2.00		1	Public: 178.22.71.74	Running		✓

ssh keys

Security group

# L1 user Set AWS Security groups

Security Group: sg-40d3c838

Description Inbound Outbound Tags

Edit

**Default only SSH no other traffic allowed**

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	Description ⓘ
SSH	TCP	22	0.0.0.0/0	

Create Security Group Actions

search : sg-f92efa82 Add filter

Name	Group ID	Group Name	VPC ID	Description
sg-f92efa82	jn-sgroup	vpc-dd6928b9	ssh, web	

Security Group: sg-f92efa82

Description Inbound Outbound Tags

Edit

**VM manager changed to open to all world for WEB**

Type ⓘ	Protocol ⓘ	Port Range ⓘ	Source ⓘ	Description ⓘ
HTTP	TCP	80	0.0.0.0/0	web http
HTTP	TCP	80	::/0	web http
Custom ICMP Rule - IPv4	Echo Reply	N/A	0.0.0.0/0	ping
Custom ICMP Rule - IPv4	Echo Reply	N/A	::/0	ping
SSH	TCP	22	0.0.0.0/0	
HTTPS	TCP	443	0.0.0.0/0	web https
HTTPS	TCP	443	::/0	web https

# L1 user - AWS Security groups

The screenshot displays the AWS Management Console interface for the EC2 Dashboard. The left sidebar shows navigation options: EC2 Dashboard, Events, Tags, Reports, Limits, INSTANCES, Instances, Spot Requests, and Reserved Instances. The main content area shows a table of EC2 instances with columns: Name, Instance ID, Instance Type, Availability Zone, Instance State, Status Checks, Alarm Status, Public DNS (IPv4), IPv4 Public IP, IPv6 IPs, Key Name, Monitoring, Launch Time, and Security Groups. Three instances are listed: 'config-3' (running), 'i-0b0e640c08b056c7d' (stopped), and 'i-06422a9c3270d25' (stopped). The 'config-3' instance is highlighted, and its details are shown in the right pane. The 'Key Name' column for the first two instances is 'j1-keys-aws', and for the third is 'j1-keys-aws'. The 'Security Groups' column for the first two instances is 'j1-sgroup', and for the third is 'j1-sgroup'. Two blue arrows point from the text labels 'ssh keys' and 'Security group' to the 'Key Name' and 'Security Groups' columns respectively.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs	Key Name	Monitoring	Launch Time	Security Groups
config-3	i-0278e4ed35a24ed34	t2.micro	eu-west-1c	running	2/2 checks ...	None	eu2-34-253-234-255.eu...	34.253.234.255	-	j1-keys-aws	disabled	November 2, 2017 at 4:47:5...	j1-sgroup
	i-0b0e640c08b056c7d	t2.micro	eu-west-1c	stopped		None	-	-	-	j1-keys-aws	disabled	November 3, 2017 at 11:42:1...	launch-wizard-3
	i-06422a9c3270d25	t2.nano	eu-west-1b	stopped		None	-	-	-	j1-keys-aws	disabled	November 2, 2017 at 2:48:0...	launch-wizard-2

ssh keys

Security group

# L1 user Set Azure Security groups

Microsoft Azure

Řídicí panel

JN-1-nsg  
Skupina zabezpečení sítě

Hledat (Ctrl+/)

Přehled

Protokol aktivít

Řízení přístupu (IAM)

Značky

Diagnostikovat a řešit problém...

NASTAVENÍ

Příchozí pravidla zabezpečení

Odchozí pravidla zabezpečení

Síťová rozhraní

Stav služby

Marketplace

Functions

SQL Database

Uložit

Zahodit

Další

Rozsah zdrojových portů

Cíl

Rozsah cílových portů

Protokol

Akce

Priorita

Název

HTTP

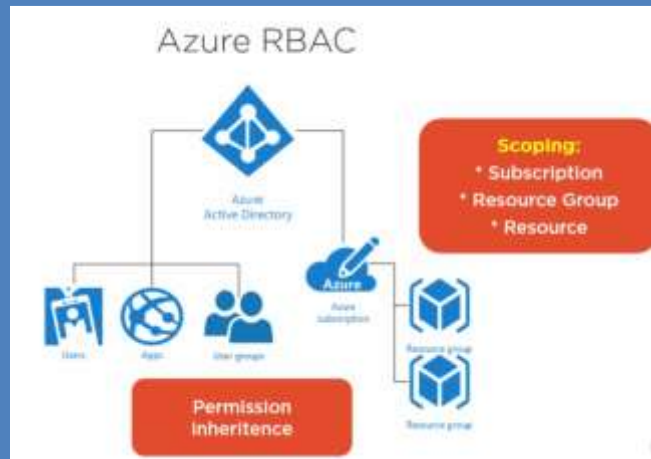
Inbound

Outbound



# Clouds offer complex user management

## Microsoft Azure example RBAC Role Based Access Control



### Roles

#### Owner

- Full access

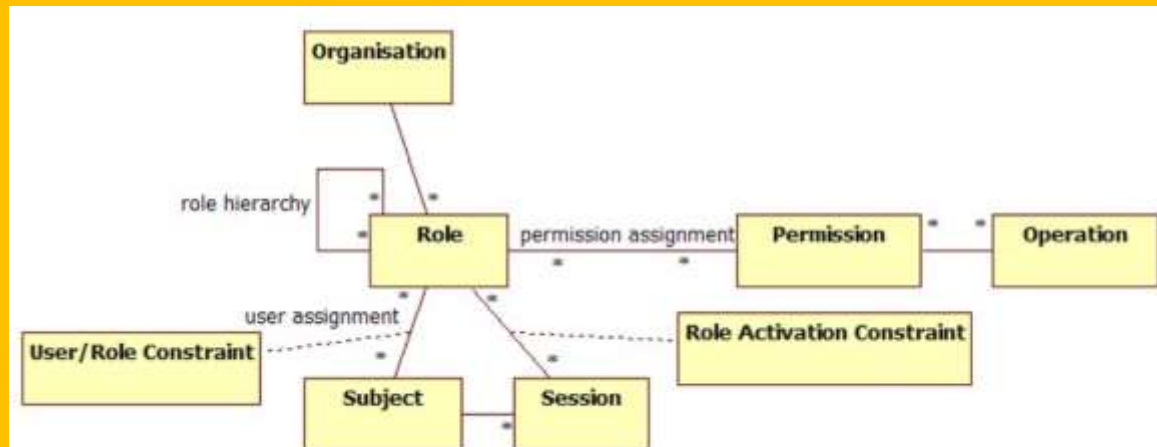
#### Contributor

- Full resource access but no grant/revoke privileges

#### Reader

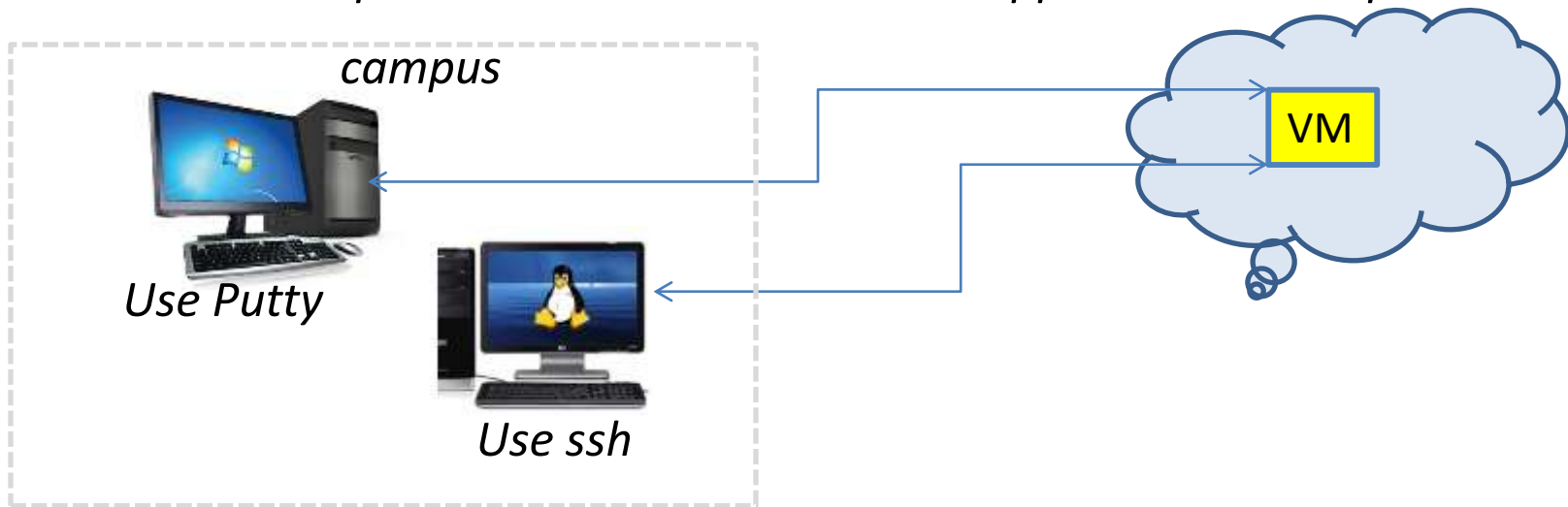
- Read-only resource access

## Amazon Role-Based Access Control Policy



## L2 user - Login to VM from local machine

*L2 user is person who will work in VM – application developer*

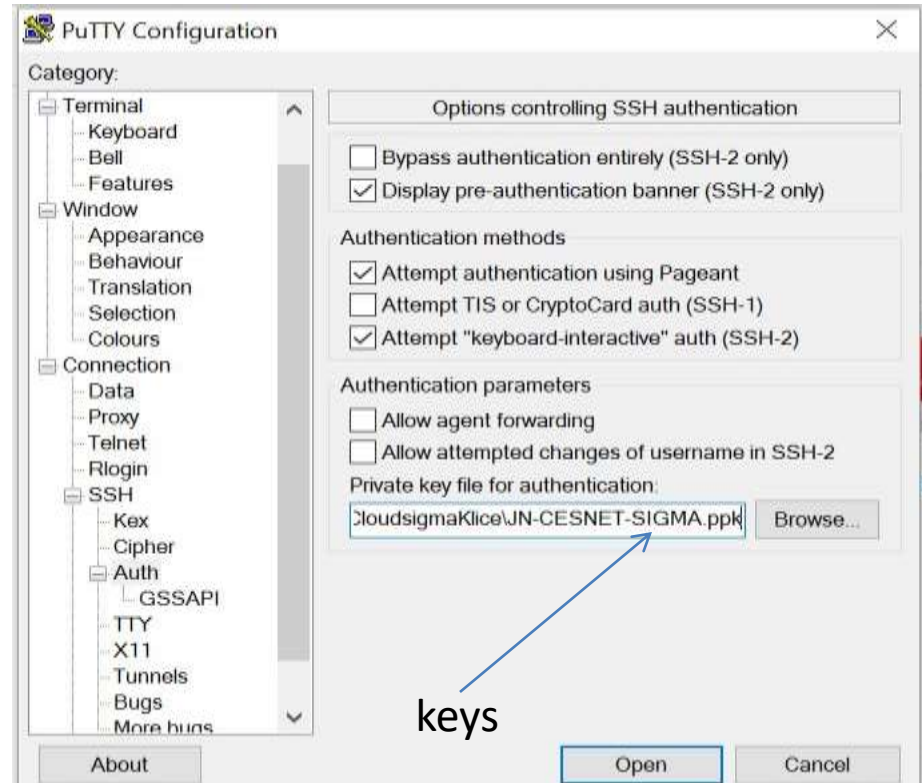
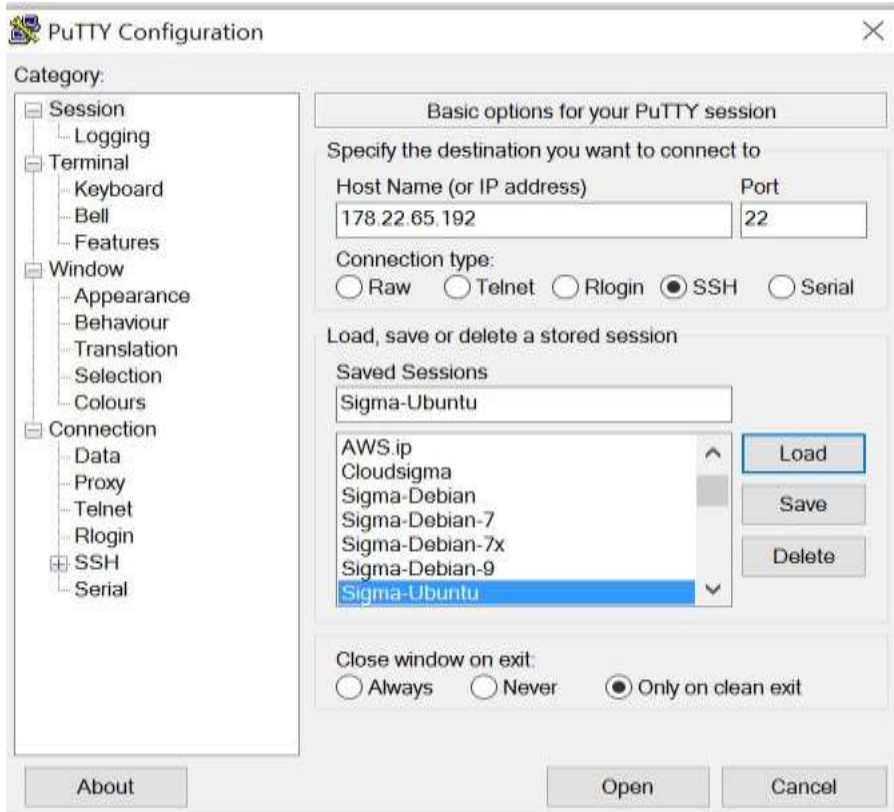


```
ssh -i .ssh/my_clouds-key.rsa root@xy-machine.aws.com
```

```
ubuntu@ip-172-31-9-117: ~  
Authenticating with public key "imported-openssh-key"  
Welcome to Ubuntu 14.04.5 LTS (GNU/Linux 3.13.0-133-generic x86_64)  
  
* Documentation:  https://help.ubuntu.com/  
  
System information as of Tue Nov 21 13:49:00 UTC 2017  
  
System load:  0.0      Processes:            109  
Usage of /:   19.7% of 7.74GB   Users logged in:     0  
Memory usage: 21%      IP address for eth0: 172.31.9.117  
Swap usage:   0%  
  
Graph this data and manage this system at:  
https://landscape.canonical.com/  
  
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud  
  
29 packages can be updated.  
20 updates are security updates.  
  
Last login: Fri Nov  3 08:55:22 2017 from eduroam-188.cesnet.cz  
ubuntu@ip-172-31-9-117:~$
```

# L2 user - Prepare to Login to VM from PC

## With PUTTY, PUTTYGEN



From Windows use "putty" with Your own keys or generated keys from provider converted to ppk via PUTTYGEN

# L2 user - Inside VM

Acting as System and Application administrator  
(*root or ubuntu/sudo, etc.*)

```
ubuntu@ip-172-31-18-242: /var/www/html
total 28
drwxr-xr-x  4 root root  4096 Nov  2 16:18 .
drwxr-xr-x  3 root root  4096 Nov  2 15:52 ..
-rw-r--r--  1 root root 11321 Nov  2 15:52 index.html
drwxr-xr-x  2 root root  4096 Nov  2 16:01 JN
drwxrwxrwx 49 1005 1005  4096 Nov  3 12:28 moodle
ubuntu@ip-172-31-18-242: /var/www/html$ pwd
/var/www/html
ubuntu@ip-172-31-18-242: /var/www/html$ df
Filesystem      1K-blocks      Used Available Use% Mounted on
udev            499480          0    499480   0% /dev
tmpfs           101468      10816    90652  11% /run
/dev/xvda1      8065444 1994124    6054936  25% /
tmpfs           507328          0    507328   0% /dev/shm
tmpfs           5120          0     5120   0% /run/lock
tmpfs           507328          0    507328   0% /sys/fs/cgroup
tmpfs           101468          0    101468   0% /run/user/1000
ubuntu@ip-172-31-18-242: /var/www/html$ ls /var
backups  cache  crash  lib  local  lock  log  mail  moddata  opt  run  snap  spool  tmp  www
ubuntu@ip-172-31-18-242: /var/www/html$ sudo ls /var
backups  cache  crash  lib  local  lock  log  mail  moddata  opt  run  snap  spool  tmp  www
ubuntu@ip-172-31-18-242: /var/www/html$ sudo ls /var/www
html
ubuntu@ip-172-31-18-242: /var/www/html$ sudo ls /var/www/html
index.html  JN  moodle
ubuntu@ip-172-31-18-242: /var/www/html$ ps -ef |grep apache
root      1269      1  0 Nov03 ?          00:00:29 /usr/sbin/apache2 -k start
www-data 15820    1269  0 06:25 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 15821    1269  0 06:25 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 15822    1269  0 06:25 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 15823    1269  0 06:25 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 15824    1269  0 06:25 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 17490    1269  0 12:44 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 17491    1269  0 12:44 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 17492    1269  0 12:45 ?          00:00:00 /usr/sbin/apache2 -k start
www-data 17722    1269  0 14:00 ?          00:00:00 /usr/sbin/apache2 -k start
ubuntu   17886 16892  0 14:50 pts/0    00:00:00 grep --color=auto apache
ubuntu@ip-172-31-18-242: /var/www/html$ uptime
14:50:54 up 11 days, 23:02,  2 users,  load average: 0.00, 0.00, 0.00
ubuntu@ip-172-31-18-242: /var/www/html$
```

# Moodle used as testing application

- **E-learning system used in many schools and universities, widely spread all over the world**
- Quite complex system with **own users, DB, WEB**
- You must install several fundamental software tools on VM as L2 user
  - MySQL database or other DB
  - Apache WEB,
  - PHP5.6 or 7.0
  - Moodle 3.2

L3 user Moodle admin to create:

- roles for rest of users: manager, teacher, student
- prepare content – courses
- link to mailing server

Make access for Moodle users, registration to courses, etc.

L4 Users (lectures, preparing content in the Moodle, students attending courses)

L3 and L4 Users running application users which doesn't know if it is on cloud or not)

## L2 user - Inside VM

### *Install your application*

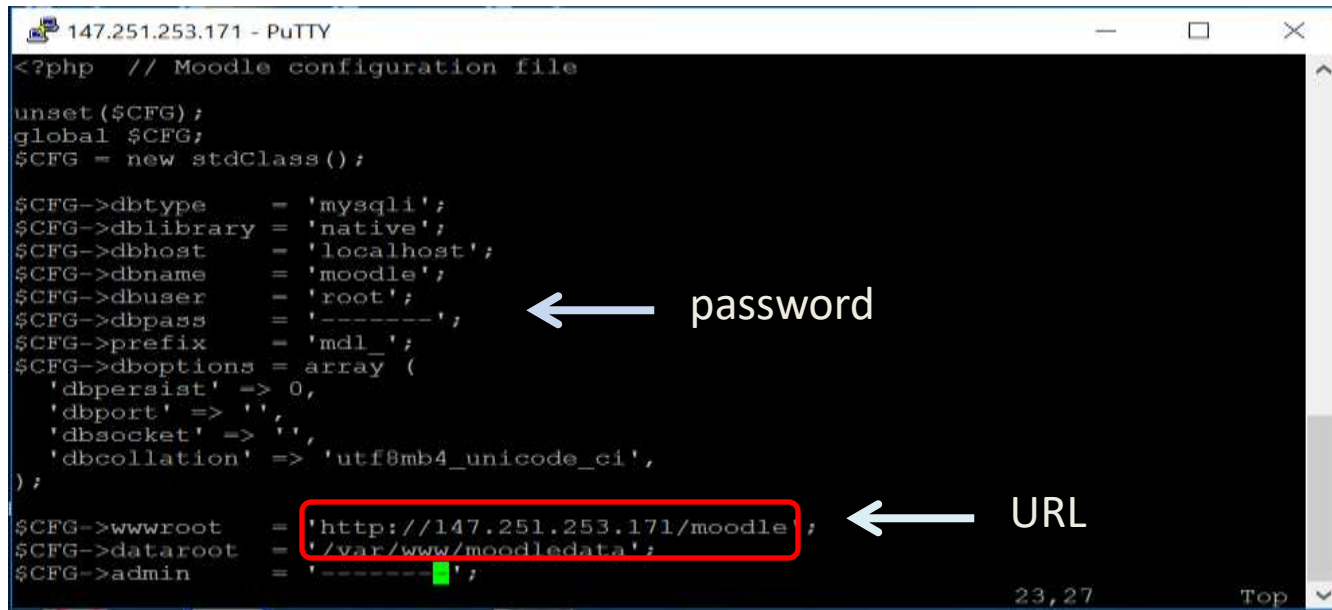
`sudo apt-get update`

`sudo apt-get install apache2 mysql-client mysql-server php5`

`sudo apt-get install graphviz aspell php5-pspell php5-curl php5-gd`

...

### *Configure Moodle*



```
<?php // Moodle configuration file

unset($CFG);
global $CFG;
$CFG = new stdClass();

$CFG->dbtype      = 'mysqli';
$CFG->dblibrary   = 'native';
$CFG->dbhost      = 'localhost';
$CFG->dbname      = 'moodle';
$CFG->dbuser      = 'root';
$CFG->dbpass      = '-----';
$CFG->prefix      = 'mdl_';
$CFG->dboptions   = array (
    'dbpersist' => 0,
    'dbport'    => '',
    'dbsocket'  => '',
    'dbcollation' => 'utf8mb4_unicode_ci',
);

$CFG->wwwroot     = 'http://147.251.253.171/moodle';
$CFG->dataroot    = '/var/www/moodledata';
$CFG->admin       = '-----';
```

# L3 user Login to Application

Nezabezpečeno | 34.253.234.255/moodle/login/index.php

## Moodle TESTING on AWS

Your session has timed out. Please log in again.

admin

.....



Remember username

Log in

[Forgotten your  
username or password?](#)

Cookies must be  
enabled in your browser

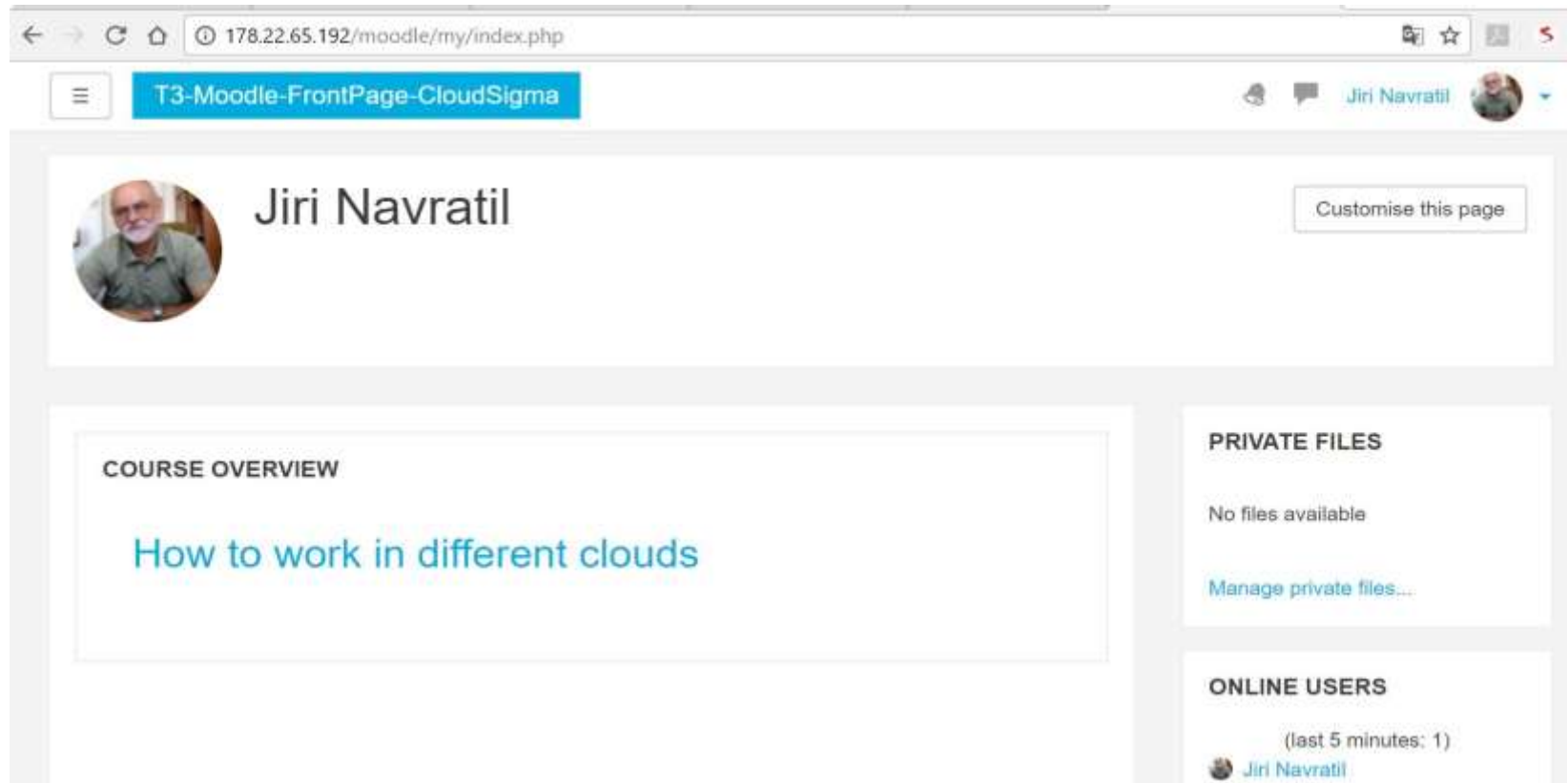


Some courses may  
allow guest access

Log in as a guest



# L3 user Inside Moodle



The screenshot shows a web browser window with the address bar displaying `178.22.65.192/moodle/my/index.php`. The browser's address bar and tabs are visible at the top. The page title is "T3-Moodle-FrontPage-CloudSigma". The user profile section shows a circular profile picture of Jiri Navratil, his name "Jiri Navratil", and a "Customise this page" button. Below the profile, the "COURSE OVERVIEW" section displays the text "How to work in different clouds". To the right, the "PRIVATE FILES" section indicates "No files available" and provides a link to "Manage private files...". The "ONLINE USERS" section shows "(last 5 minutes: 1)" and lists "Jiri Navratil" as the only online user.

178.22.65.192/moodle/my/index.php

T3-Moodle-FrontPage-CloudSigma

Jiri Navratil

Customise this page

COURSE OVERVIEW

How to work in different clouds


PRIVATE FILES

No files available

[Manage private files...](#)

ONLINE USERS

(last 5 minutes: 1)

 [Jiri Navratil](#)

# L3 user inside Moodle testing application

The screenshot shows a Moodle course interface. The browser address bar displays the URL `34.253.234.255/moodle/course/view.php?id=3`. The course name is 'Moodle AWS'. The user is logged in as 'Jiri Navratil'. The course content is organized into a sidebar menu with sections: 'IaaS Framework' (containing 'Participants', 'Badges', 'Competencies', 'Grades', and a folder 'Main Goals of this project' with sub-items 'Cloud Providers', 'Use cases', and 'Topic 4'), 'Dashboard', 'Site home', and 'Calendar'. The main content area is titled 'GN4 IaaS Framework Basic info' and includes a breadcrumb trail: 'Dashboard / My courses / IaaS Framework'. Below the title is a section 'Main Goals of this project' with a progress indicator 'Your progress' and a checklist item 'Geant as integrating element for academic environment'. The text describes GÉANT's role in helping vendors deliver cloud services to the European research and education community, mentioning 10,000 institutions and 50 million users. It also states GÉANT's goal to expand its service portfolio to include innovative services, noting that joint procurement is not possible through standard purchase processes. The section 'Cloud Providers' is partially visible at the bottom.

34.253.234.255/moodle/course/view.php?id=3

Moodle AWS

Jiri Navratil

## IaaS Framework

- Participants
- Badges
- Competencies
- Grades
- Main Goals of this project
  - Cloud Providers
  - Use cases
  - Topic 4

## GN4 IaaS Framework Basic info

[Dashboard](#) / [My courses](#) / [IaaS Framework](#)

### Main Goals of this project

Your progress ?

- ☐ Geant as integrating element for academic environment

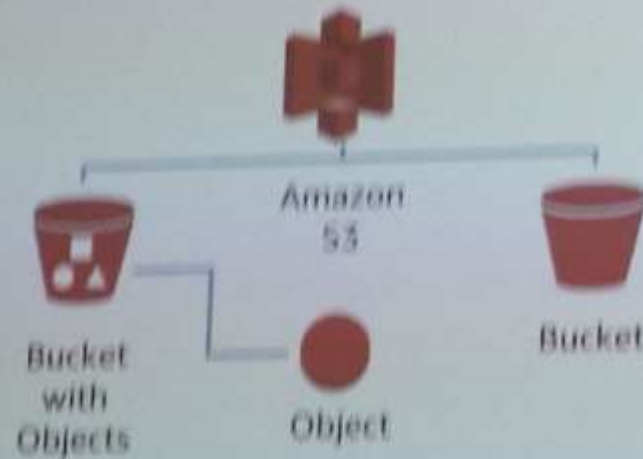
GÉANT is uniquely capable of helping vendors deliver cloud services to the European research and education community. This community consists of 10,000 institutions and 50 million users, who communicate and collaborate online on a daily basis, often in cross-organisational teams. Cloud services are vital to their work and research collaborations.

GÉANT is here to help you develop the most compelling and suitable cloud services by overcoming the obstacles that the organisational, technical and financial structures of research and education organisations often present.

As the designated internet service provider for the pan-European research and education community, GÉANT is interested in expanding our service portfolio to include a wide range of innovative services. This type of joint procurement is not possible through your standard purchase processes.

### Cloud Providers

# Amazon S3 storage concept



- Amazon S3 stores data as objects within buckets.

- An object is composed of a file and optionally any metadata that describes that file.

- You can have up to 100 buckets in each account.

- You can control access to the bucket and its objects.

An object key is the unique identifier for an object in a bucket.

`http://doc.s3.amazonaws.com/2006-03-01/AmazonS3.html`

Bucket

Object/Key

# Amazon S3 Facts

- Can store an **unlimited** number of objects in a bucket
- Objects can be up to 5 TB; no bucket size limit
- Designed for 99.999999999% durability and 99.99% availability of objects over a given year
- Can use HTTP/S endpoints to store and retrieve any amount of data, at any time, from anywhere on the web
- Highly scalable, reliable, fast, and inexpensive
- Can use optional server-side **encryption** using AWS or customer-managed provided client-side encryption
- Auditing is provided by access **logs**
- Provides standards-based **REST** and **SOAP** interfaces

# **Cloud Activity reports**

(Billing, Pricing, Licensing)

**To Open subscription for AWS, Microsoft, etc.**

**As individual you need valid Credit card !**

**OR**

**Your organization must sign a contract with reseller**

# Pricing models

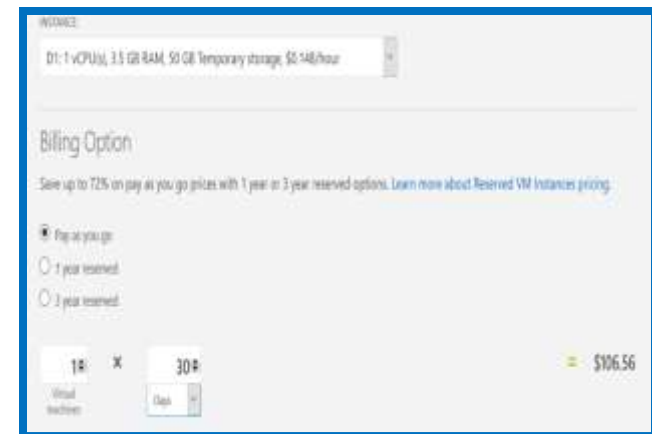
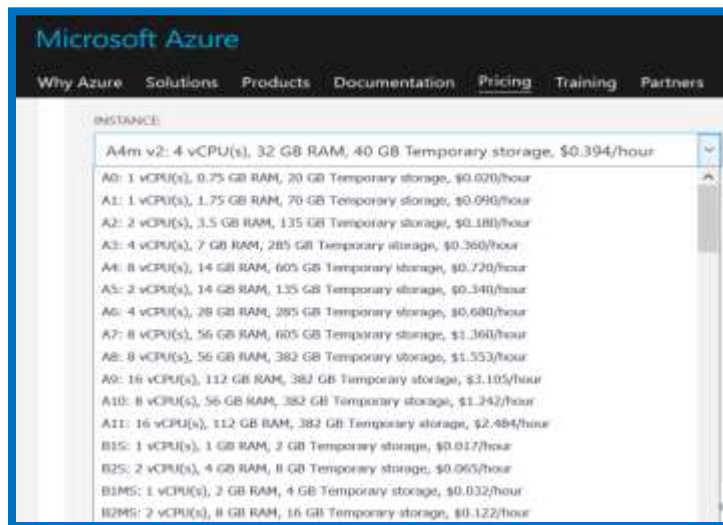
**AWS** - used resources for my testing cca 15 US/month

**CloudSigma** – allocated resources cca 60 EURO/per month

## Microsoft


- <http://azure.microsoft.com/en-us/pricing/calculator/>

- <https://azure.microsoft.com/en-us/pricing/details/virtual-machines/windows/>



Linear price to used resource or not ?

# Microsoft Invoice

 <b>Microsoft Azure</b>		<b>Příjemce faktury</b>	Jiří Cesnet Žitkova 4 160 00 Praha Česká Republika Česká republika Pro: JIRI NAVRATIL
<b>Číslo objednávky zákazníka</b>			
<b>Č. faktury</b>	E03005P25M		
<b>Fakturační cyklus</b>	16.3.2018 to 15.4.2018	<b>Průběžné platby</b>	
<b>Datum faktury</b>	24.4.2018	<b>E-mail vlastníka účtu</b>	jiří@cesnet.cz
<b>Způsob platby</b>	Credit Card		
<b>DIČ:</b>	CZ63839172		

---

**Faktura – souhrn**

**GEANT-JRA3-JN**

Předchozí zůstatek	3,54
Platba – děkujeme!	-3,54
Nevyrovnaný zůstatek (z předchozích fakturačních cyklů)	0,00

---

<b>Aktuální poplatky</b>	
Poplatky za použití	41,35
<b>Celkem cena bez daně</b>	41,35
DPH (0,000%) Srovnávací poplatek	0,00

---

<b>Celková částka</b>	<b>41,35 EUR</b>
-----------------------	------------------

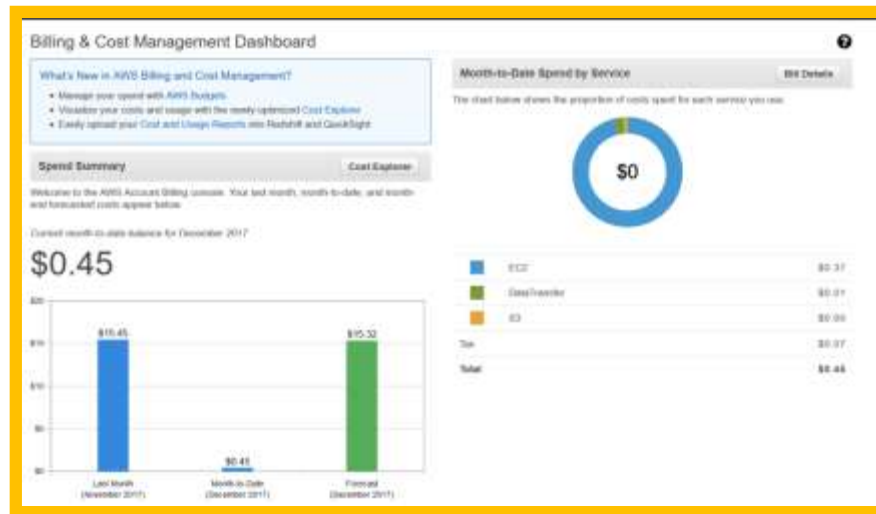
\*Pokyny k platbě na straně 2

---

ID předplatného	5b6c2ad-916a-49e5-ae56-6d7b99ca9ba	Č. objednávky	54950883-1bda-47ac-9985-082f131bc368
Microsoft Ireland Operations Ltd, One Microsoft Place, South County Business Park, Leopardstown, Dublin 18, D18 P521, Irsko			
OX 3825679EU			



# AWS Billing console



# AWS Monthly Invoice

**Bills**

Date: November 2017 [Download CSV](#) [Print](#)

<b>Total</b>	<b>\$15.45 USD</b>
<b>AWS Service Charges</b>	<b>\$15.45</b>
<a href="#">Expand All</a>	
<b>Details</b>	
<b>AWS Service Charges</b>	<b>\$15.45</b>
Data Transfer	\$0.00
Elastic Compute Cloud	\$12.74
Key Management Service	\$0.00
Simple Notification Service	\$0.00
Simple Storage Service	\$0.01
<b>Taxes</b>	
CT to be collected	\$0.00
GST to be collected	\$0.00
US Sales Tax to be collected	\$0.00
VAT to be collected	\$2.67

# CloudSigma Usage review

- Dashboard
- Compute
- Storage <
- Networking <
- Crypto miners new <
- Tags
- Devops Tools
- Access & Security <
- Usage & Billing <
- Control Panel <
- Refer a Friend
- Support <
- Documentation <

		Current	Subscriptions		Burst	Purchase	Cost for period
			Free	Paid			
Intel Resources	CPU	2 GHz	0 GHz	0 GHz	2 GHz	0 GHz	0
	RAM	2 GB	1 GB	0 GB	1 GB	0 GB	0
Storage Resources	Distributed SSD	200 GB	50 GB	0 GB	150 GB	0 GB	0
	Scale-out Magnetic	0 GB	0 GB	0 GB	0 GB	0 GB	0
Data Transfer	Outgoing Data Transfer	155.83 kB	5 TB	0 GB	0 GB	0 GB	0
Network Resources	<a href="#">Show All</a>						
Software Licenses	<a href="#">Show All</a>						
Total							

- Usage & Billing
- Usage & Purchasing
- Pricing
- Add Funds
- Subscriptions
- Reports
- Billing Logs
- Payment History
- Control Panel <
- Refer a Friend

# Summary

Existing infrastructures were built gradually during long period by different specialists (system engineers, technicians, networkers) connecting together many HW pieces with wired network.

On clouds you can create your new environment on remote infrastructure exactly as on your home infrastructure without touching HW and wires. You can apply programmatically all types of rights, restrictions and limitations. IT architects in large infrastructures appears as very important role.

No needs extra space, no HW no wiring. Work can be done in parallel to existing infrastructure in couple of weeks.

You should trust to cloud providers same way as you trust to your own DC staff or partners. There are principally same dangers - INTERNET.

You need experienced IT staff who know how to do it or to rent special contractors ! It is not task for cloud providers support !

Thank you for your attention

**Q ?**