Linux 2 DEVOPS 2020
Lektion 8

Idag

- Virtuella servrar 1
- Virtualisering och olika sorters hypervisors
- Skapa en Linuxserver i molnet (AWS) och se hur den administreras

Allmänt om virtuella system

- Tar bort kopplingen mellan ”maskin” och hårdvara
  - Eller gör den åtminstone svagare
- I idealfallet lätt att skapa och att flytta
- Kan köras på olika sorters hårdvara
- Kan (ofta) köras på olika sorters operativsystem

Allmänt om virtuella system

”A virtual machine (VM) is a software program or operating system that not only exhibits the behavior of a separate computer, but is also capable of performing tasks such as running applications and programs like a separate computer. A virtual machine, usually known as a guest is created within another computing environment referred as a "host." Multiple virtual machines can exist within a single host at one time.”

Från Techopedia,

https://www.techopedia.com/definition/4805/virtual-machine-vm

Övning 1

- Vilka virtuella system (i vid bemärkelse) vet ni om att ni brukar använda?

Allmänt om virtuella system

- Några exempel av olika slag
  - JVM (Java virtual machine)
  - En molntjänst i stil med Dropbox
  - Virtuell Windows-server på ett kluster av Linux-datorer

Virtuell server

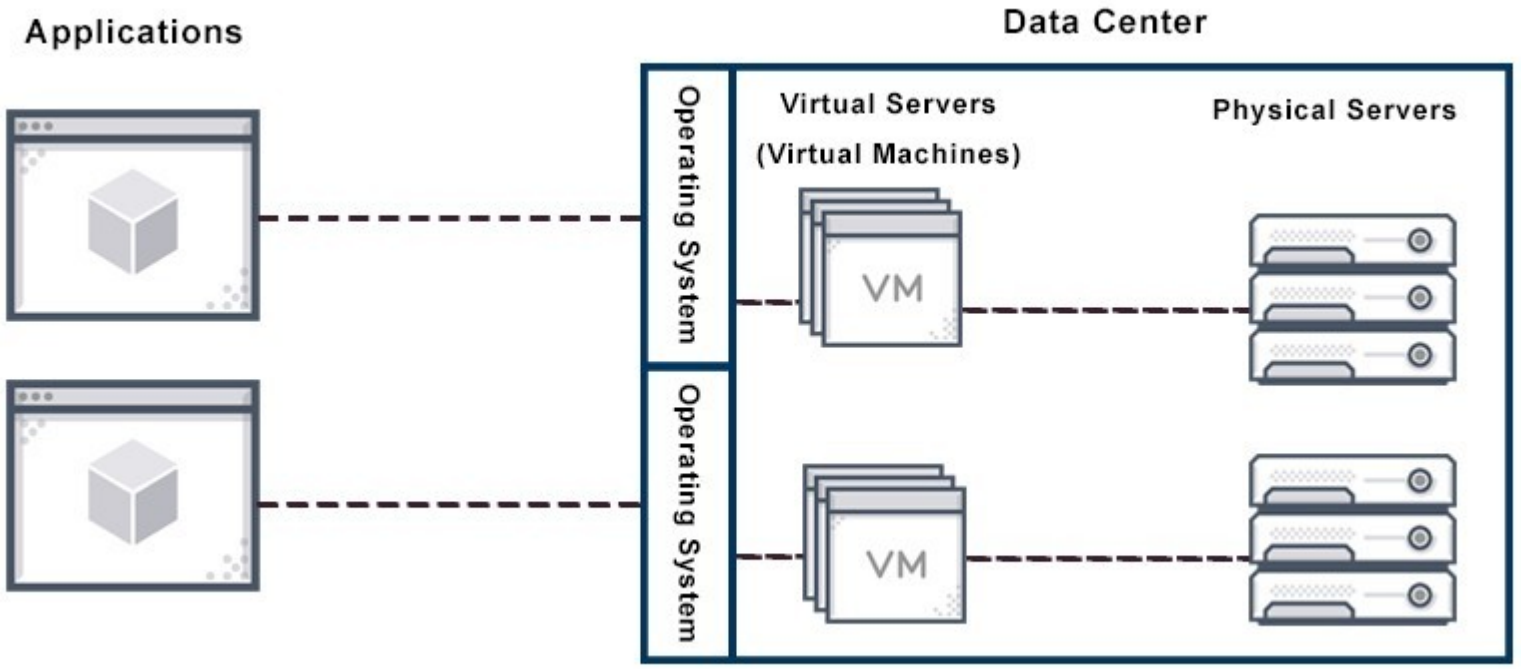


Bild stulen från avinetworks.com

Virtuell server

- En virtuell server kan flyttas mellan fysiska servrar
- En fysisk server kan innehålla ett antal virtuella servrar
- Virtuell server på en viss fysisk server eller i ett moln

Virtuell server

- Flexibilitet
- Skalbarhet
- Tar bort den direkta fysiska kopplingen

Hypervisor

”A hypervisor (or virtual machine monitor, VMM, virtualizer) is computer software, firmware or hardware that creates and runs virtual machines.” (Wikipedia)

Hypervisor

- Typ 1 – direkt på hårdvaran, dvs hypervisorn är även operativsystemet
  - Exempel: VMware ESXi, Microsoft Hyper-V, Xen
- Typ 2 – Ett program som körs på ett operativsystem, t ex Linux
  - Exempel: VirtualBox, WMware workstation

Hypervisor

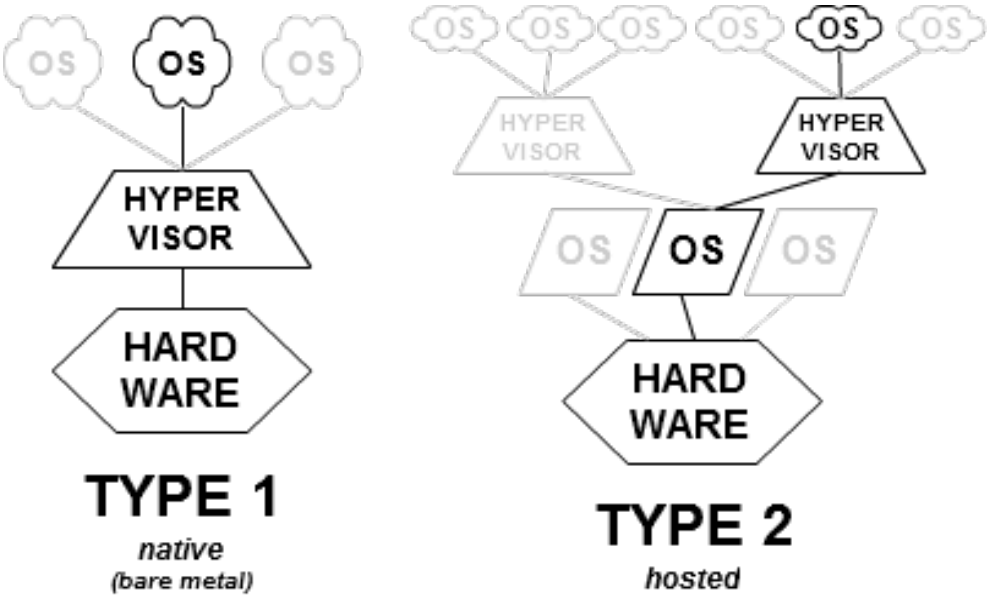


Bild från Wikipedia

Virtuella maskiner

- Enkelt att sätta upp en maskin för att testa miljön
- Skapa miljöer med flera maskiner som interagerar
- Användbart för utveckling, test och drift

Använda virtuella servrar ”in house”

- Fortfarande serverpark i egen datahall
- Minska effekten av enstaka hårdvarufel med virtualisering i flera skikt
- Utgår från typiska behov av relationsdatabaser, fillagring och applikationer

Scenario

- Vi tänker oss att vi skall bygga upp ett sådant ”in house” system med hög grad av virtualisering
- Databaskluster
- Lagring
- Virtuella servrar för applikationer

Databaskluster

”Clustering, in the context of databases, refers to the ability of several servers or instances to connect to a single database. An instance is the collection of memory and processes that interacts with a database, which is the set of physical files that actually store data.”

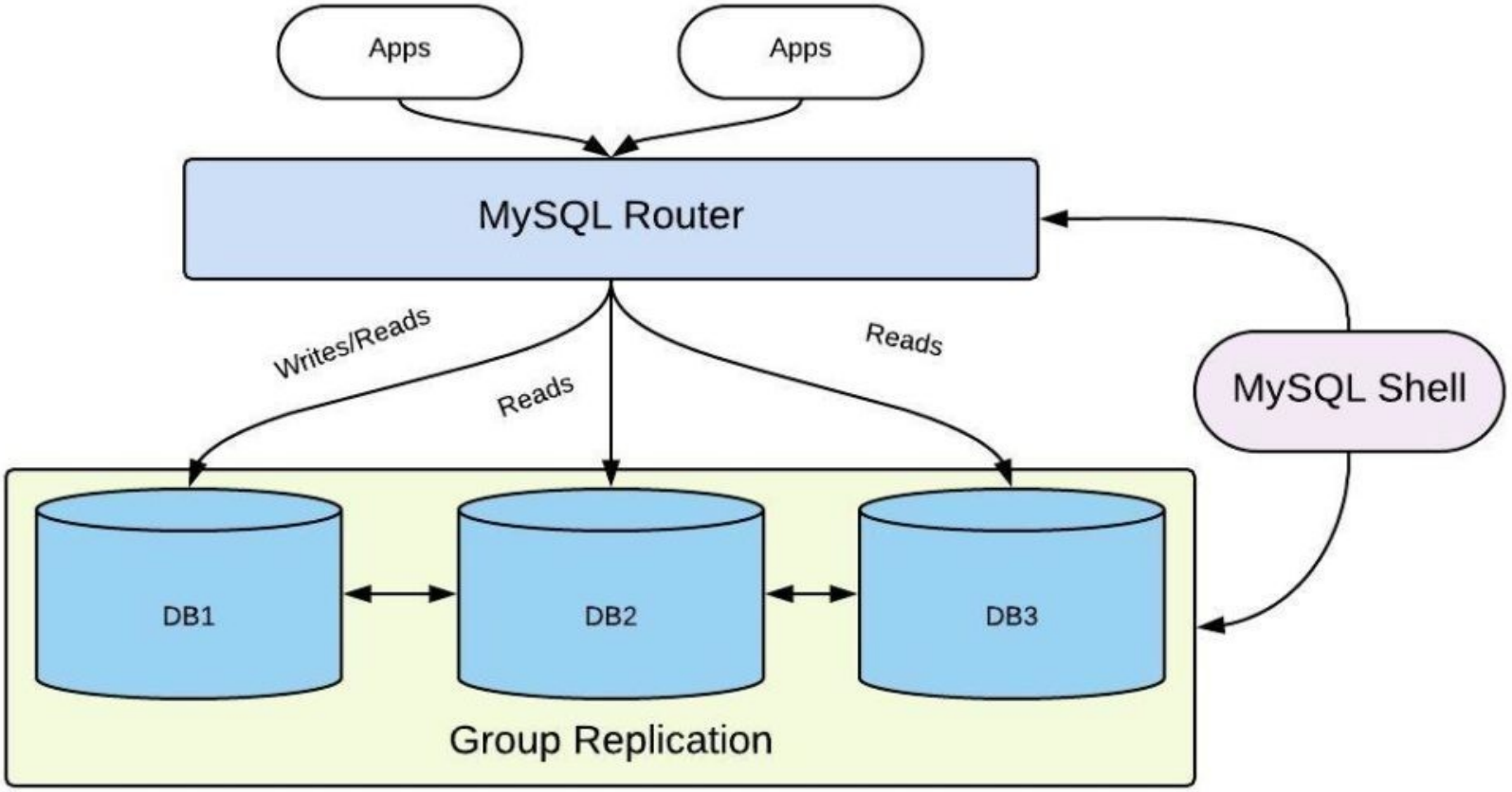
Från Techopedia

https://www.techopedia.com/definition/17/clustering-databases

Databaskluster

- Databashanterare på flera servrar, som kommunicerar med varandra
- Enskilda databaser ”spridda” över klustret, inte hårt kopplade till en viss server
- Feltolerans (inte beroende av en viss server)
  - ”shared nothing”
- Lastbalansering

Databaskluster



Exempel (MySQL), bild stulen från percona.com

VPS (Virtual Private Server)

- I detta scenario en virtuell serverinstans på en lokal hypervisor
- Kan enkelt flyttas till annan hårdvara vid behov
- Får sina resurser tilldelade / konfigurerade
- Tillgång till del av den fysiska serverns resurser
- Eget operativsystem på den virtuella servern

Övning 2

- Tänk dig att ett företag överväger att gå från fysiska servrar till virtuella servrar (”in house”) för drift av en stor e-handelssite med tillhörande logik och relationsdatabaser med data om både varor och kunder.
- Formulera för- och nackdelar med en sådan övergång.

Övning 2, exempel

- Fördelar
  - Minskade hårdvarukostnader på sikt
  - Möjlighet till förbättrad driftsäkerhet
  - Lättare att skala upp vid behov
- Nackdelar
  - En investering i mer hårdvara vid övergången ger högre kostnader momentant
  - Ytterligare en del att administrera i drift

Övning 3

- Antag nu att företaget i förra övningen bestämt att ni skall gå vidare och bygga upp ett system av virtuella servrar. Gör en riskanalys för själva övergången från fysiska till virtuella servrar, och föreslå åtgärder för de risker som får ett högt riskvärde.

Övning 3, exempel

Risk	Sannolikhet	Konsekvens	Riskvärde	Åtgärder
Problem med att kopiera över data	3	5	15	Testa ut en bra rutin
Förseningar i att bygga upp det viruella systemet	2	3	6	-
Program som inte fungerar i den nya miljön	2	5	10	Testa igenom, skriv om vid behov
Personal inte säker på hur de skall hantera virtuella servrar	3	4	12	Utbildning

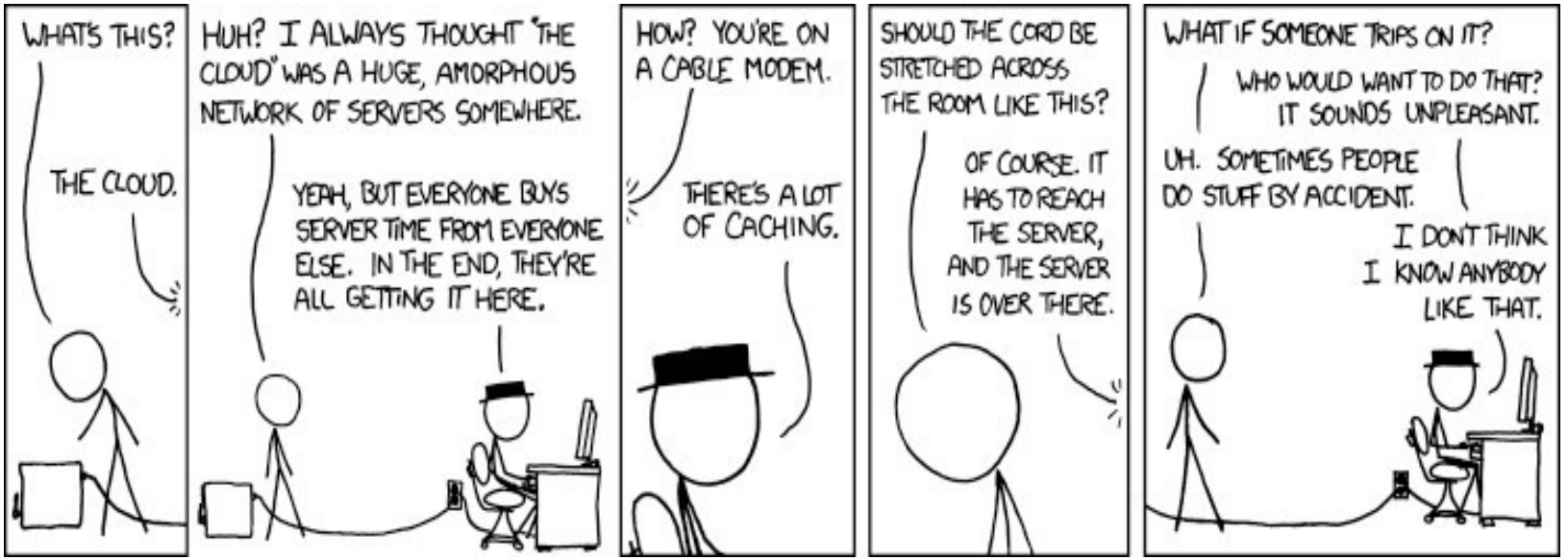
Virtuell server i molnet

- Leverantör som tillhandahåller en stor och spridd serverpark bakom de virtuella servrarna.
- Stora aktörer: AWS (Amazon), Azure (Microsoft), Google cloud (Google)

Cloud (molntjänster)

- Många servrar i nätverk
- Virtuella servrar kan i princip ligga var som helst i detta nät
- Tjänster av olika slag, från en ”egen” server till specifika funktioner

Cloud (molntjänster)



xkcd av Randall Munroe, xkcd.com

Cloud (molntjänster)

”Cloud computing is the on-demand availability of computer system resources, especially data storage (cloud storage) and computing power, without direct active management by the user. The term is generally used to describe data centers available to many users over the Internet.[1] Large clouds, predominant today, often have functions distributed over multiple locations from central servers.” (Wikipedia)

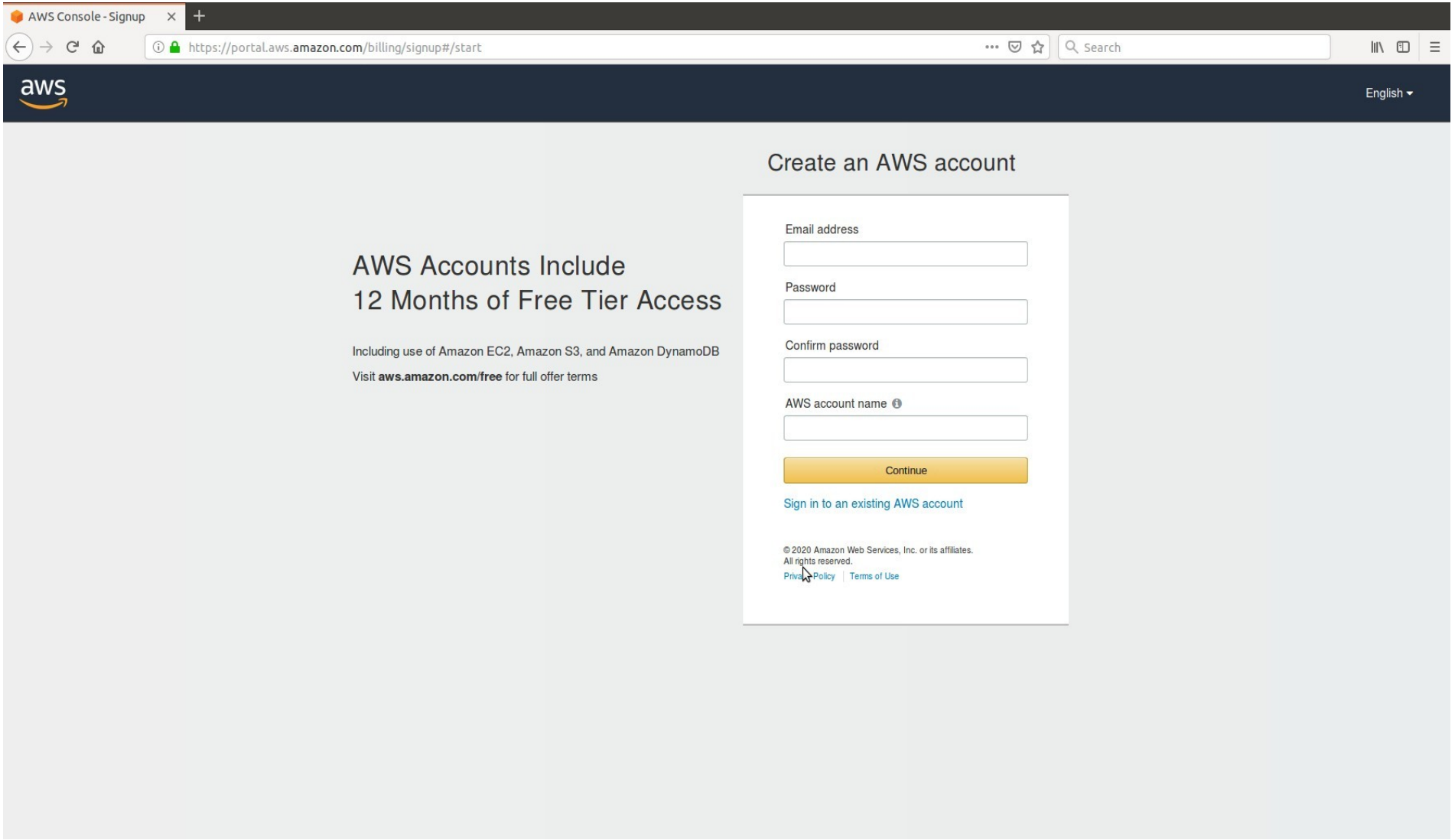
Cloud (molntjänster)

- ”Private cloud” – egen serverpark utspridd till att utgöra moln för ett företag att lägga servrar och tjänster på.
- ”Public cloud” – moln tillgängligt för vem som helst som vill köpa tjänster, såsom hos de stora leverantörerna.

Server i AWS

- Behövs ett konto hos AWS
- Finns en uppsättning färdiga serveruppsättningar som man kan välja att köra
- Notera behovet av att generera ett nyckelpar för inloggning
- https://aws.amazon.com/

Server i AWS


AWS Console - Signup
https://portal.aws.amazon.com/billing/signup#/start
Search
aws
English
Create an AWS account
AWS Accounts Include
12 Months of Free Tier Access
Including use of Amazon EC2, Amazon S3, and Amazon DynamoDB
Visit aws.amazon.com/free for full offer terms
Email address
Password
Confirm password
AWS account name
Continue
Sign in to an existing AWS account
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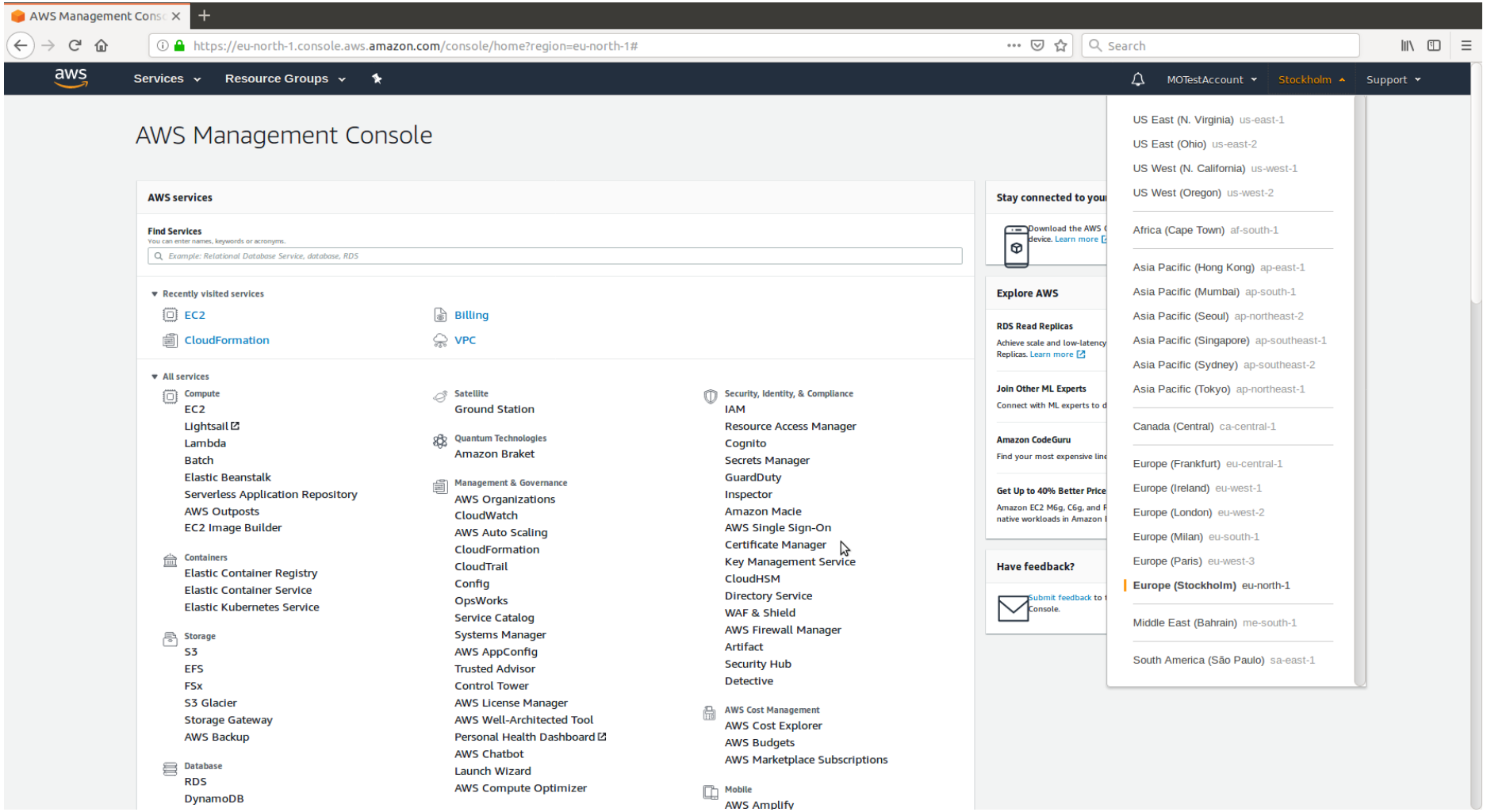
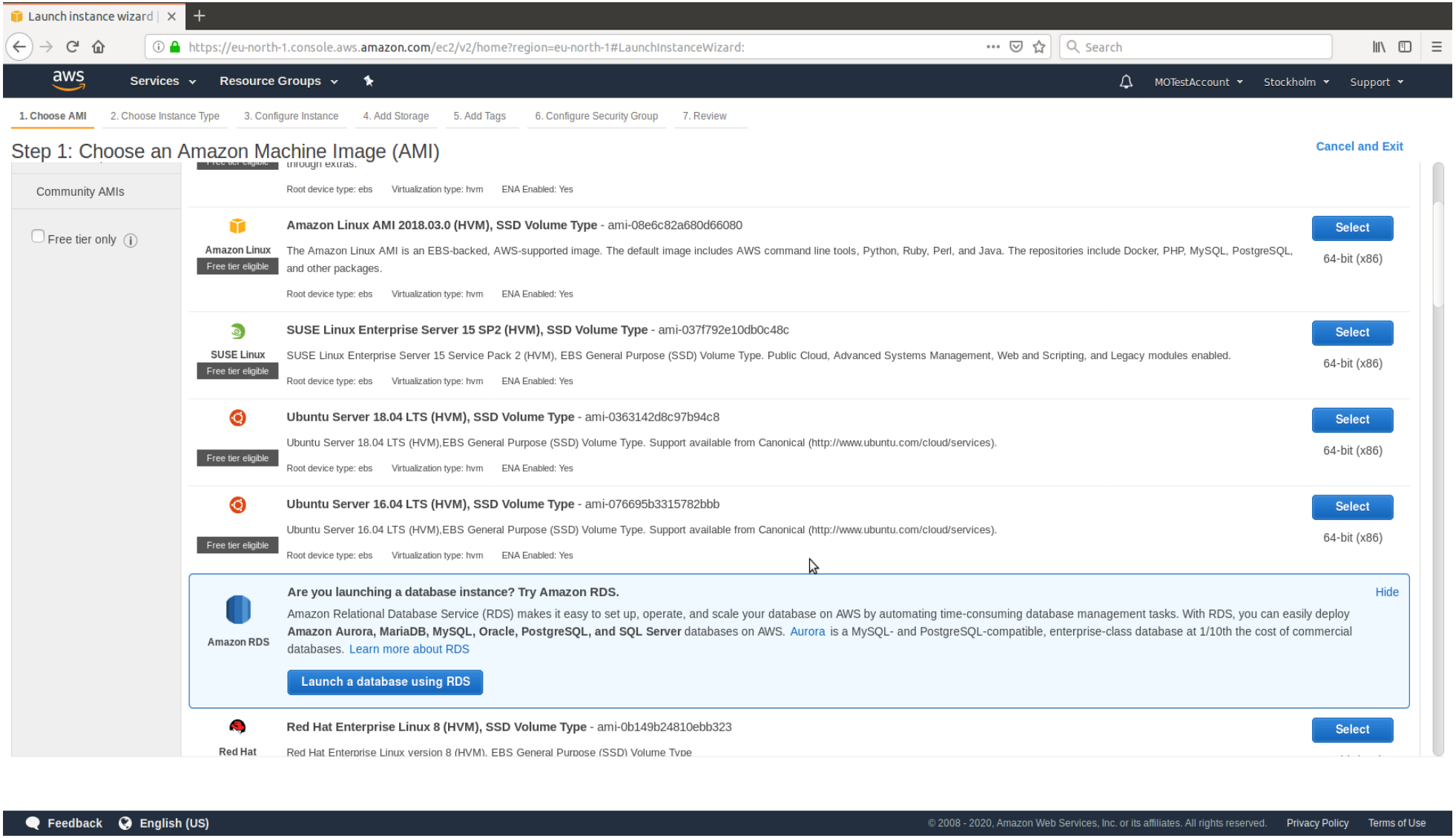
Server i AWS


AWS Management Console
https://eu-north-1.console.aws.amazon.com/console/home?region=eu-north-1#
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
AWS Management Console
AWS services
Find Services
You can enter names, keywords or acronyms.
Example: Relational Database Service, database, RDS
Recently visited services
EC2
Billing
CloudFormation
VPC
All services
Compute
EC2
Lightsail
Lambda
Batch
Elastic Beanstalk
Serverless Application Repository
AWS Outposts
EC2 Image Builder
Containers
Elastic Container Registry
Elastic Container Service
Elastic Kubernetes Service
Storage
S3
EFS
FSx
S3 Glacier
Storage Gateway
AWS Backup
Database
RDS
DynamoDB
Satellite
Ground Station
Quantum Technologies
Amazon Braket
Management & Governance
AWS Organizations
CloudWatch
AWS Auto Scaling
CloudFormation
CloudTrail
Config
OpsWorks
Service Catalog
Systems Manager
AWS AppConfig
Trusted Advisor
Control Tower
AWS License Manager
AWS Well-Architected Tool
Personal Health Dashboard
AWS Chatbot
Launch Wizard
AWS Compute Optimizer
Security, Identity, & Compliance
IAM
Resource Access Manager
Cognito
Secrets Manager
GuardDuty
Inspector
Amazon Macie
AWS Single Sign-On
Certificate Manager
Key Management Service
CloudHSM
Directory Service
WAF & Shield
AWS Firewall Manager
Artifact
Security Hub
Detective
AWS Cost Management
AWS Cost Explorer
AWS Budgets
AWS Marketplace Subscriptions
Mobile
AWS Amplify
Stay connected to your
Explore AWS
RDS Read Replicas
Join Other ML Experts
Amazon CodeGuru
Get Up to 40% Better Price
Have feedback?
US East (N. Virginia) us-east-1
US East (Ohio) us-east-2
US West (N. California) us-west-1
US West (Oregon) us-west-2
Africa (Cape Town) af-south-1
Asia Pacific (Hong Kong) ap-east-1
Asia Pacific (Mumbai) ap-south-1
Asia Pacific (Seoul) ap-northeast-2
Asia Pacific (Singapore) ap-southeast-1
Asia Pacific (Sydney) ap-southeast-2
Asia Pacific (Tokyo) ap-northeast-1
Canada (Central) ca-central-1
Europe (Frankfurt) eu-central-1
Europe (Ireland) eu-west-1
Europe (London) eu-west-2
Europe (Milan) eu-south-1
Europe (Paris) eu-west-3
Europe (Stockholm) eu-north-1
Middle East (Bahrain) me-south-1
South America (São Paulo) sa-east-1

Server i AWS


Launch instance wizard
https://eu-north-1.console.aws.amazon.com/ec2/v2/home?region=eu-north-1#LaunchInstanceWizard:
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review
Step 1: Choose an Amazon Machine Image (AMI)
Cancel and Exit
Community AMIs
Free tier only
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Amazon Linux AMI 2018.03.0 (HVM), SSD Volume Type - ami-08e6c82a680d66080
Amazon Linux
Free tier eligible
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
Select
64-bit (x86)
SUSE Linux Enterprise Server 15 SP2 (HVM), SSD Volume Type - ami-037f792e10db0c48c
SUSE Linux
Free tier eligible
SUSE Linux Enterprise Server 15 Service Pack 2 (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
Select
64-bit (x86)
Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-0363142d8c97b94c8
Free tier eligible
Ubuntu Server 18.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Select
64-bit (x86)
Ubuntu Server 16.04 LTS (HVM), SSD Volume Type - ami-076695b3315782bbb
Free tier eligible
Ubuntu Server 16.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).
Root device type: ebs Virtualization type: hvm ENA Enabled: Yes
Select
64-bit (x86)
Are you launching a database instance? Try Amazon RDS.
Hide
Amazon RDS
Amazon Relational Database Service (RDS) makes it easy to set up, operate, and scale your database on AWS by automating time-consuming database management tasks. With RDS, you can easily deploy Amazon Aurora, MariaDB, MySQL, Oracle, PostgreSQL, and SQL Server databases on AWS. Aurora is a MySQL- and PostgreSQL-compatible, enterprise-class database at 1/10th the cost of commercial databases. Learn more about RDS
Launch a database using RDS
Red Hat Enterprise Linux 8 (HVM), SSD Volume Type - ami-0b149b24810ebb323
Red Hat
Red Hat Enterprise Linux version 8 (HVM), EBS General Purpose (SSD) Volume Type
Select
Feedback
English (US)
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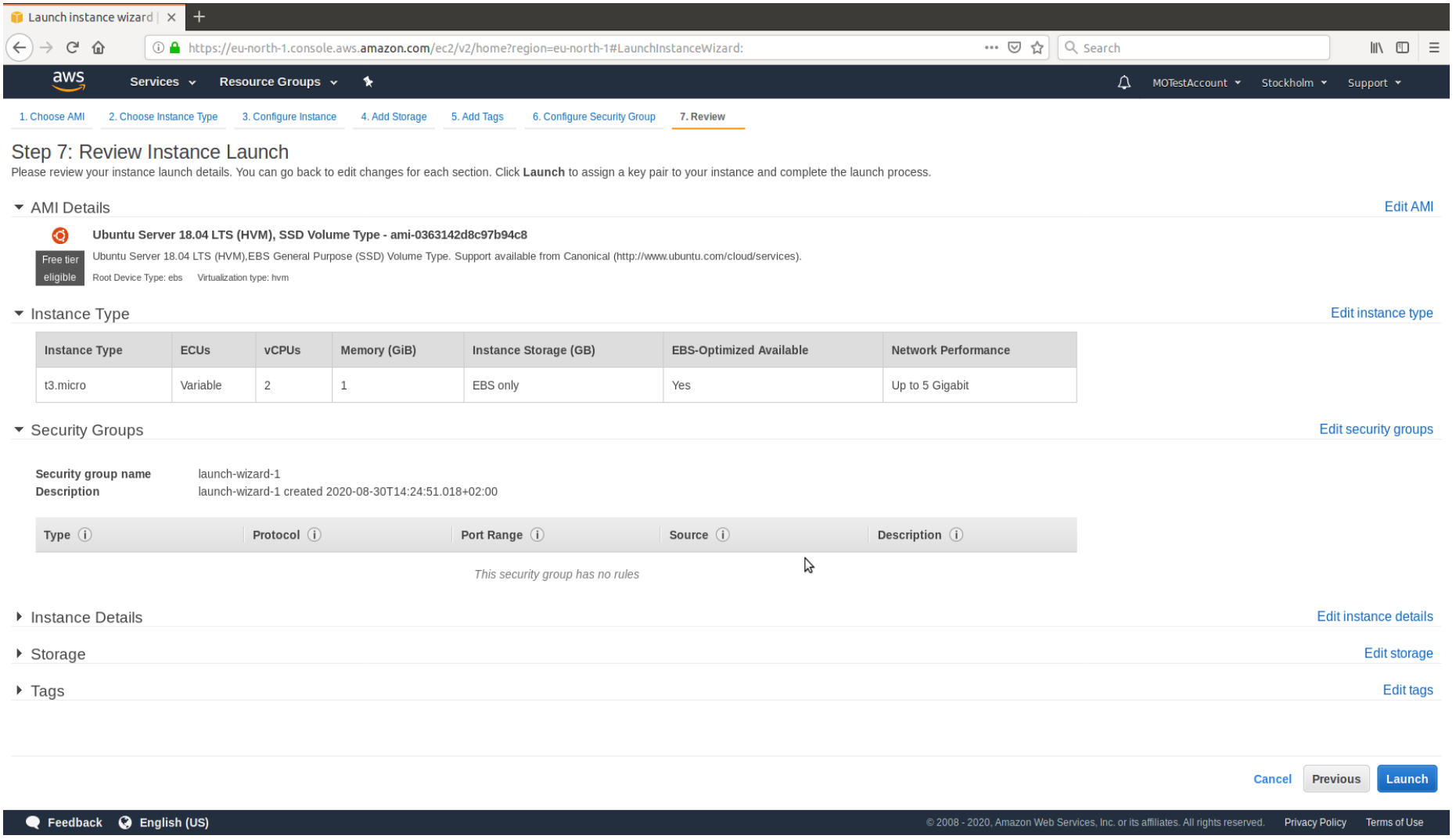
Server i AWS


Launch instance wizard
https://eu-north-1.console.aws.amazon.com/ec2/v2/home?region=eu-north-1#LaunchInstanceWizard:
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
1. Choose AMI
2. Choose Instance Type
3. Configure Instance
4. Add Storage
5. Add Tags
6. Configure Security Group
7. Review
Step 7: Review Instance Launch
Please review your instance launch details. You can go back to edit changes for each section. Click Launch to assign a key pair to your instance and complete the launch process.
AMI Details
Edit AMI
Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-0363142d8c97b94c8
Free tier eligible
Ubuntu Server 18.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).
Root Device Type: ebs
Virtualization type: hvm
Instance Type
Edit instance type
Instance Type | ECUs | vCPUs | Memory (GiB) | Instance Storage (GB) | EBS-Optimized Available | Network Performance
t3.micro | Variable | 2 | 1 | EBS only | Yes | Up to 5 Gigabit
Security Groups
Edit security groups
Security group name launch-wizard-1
Description launch-wizard-1 created 2020-08-30T14:24:51.018+02:00
Type | Protocol | Port Range | Source | Description
This security group has no rules
Instance Details
Edit instance details
Storage
Edit storage
Tags
Edit tags
Cancel
Previous
Launch
Feedback
English (US)
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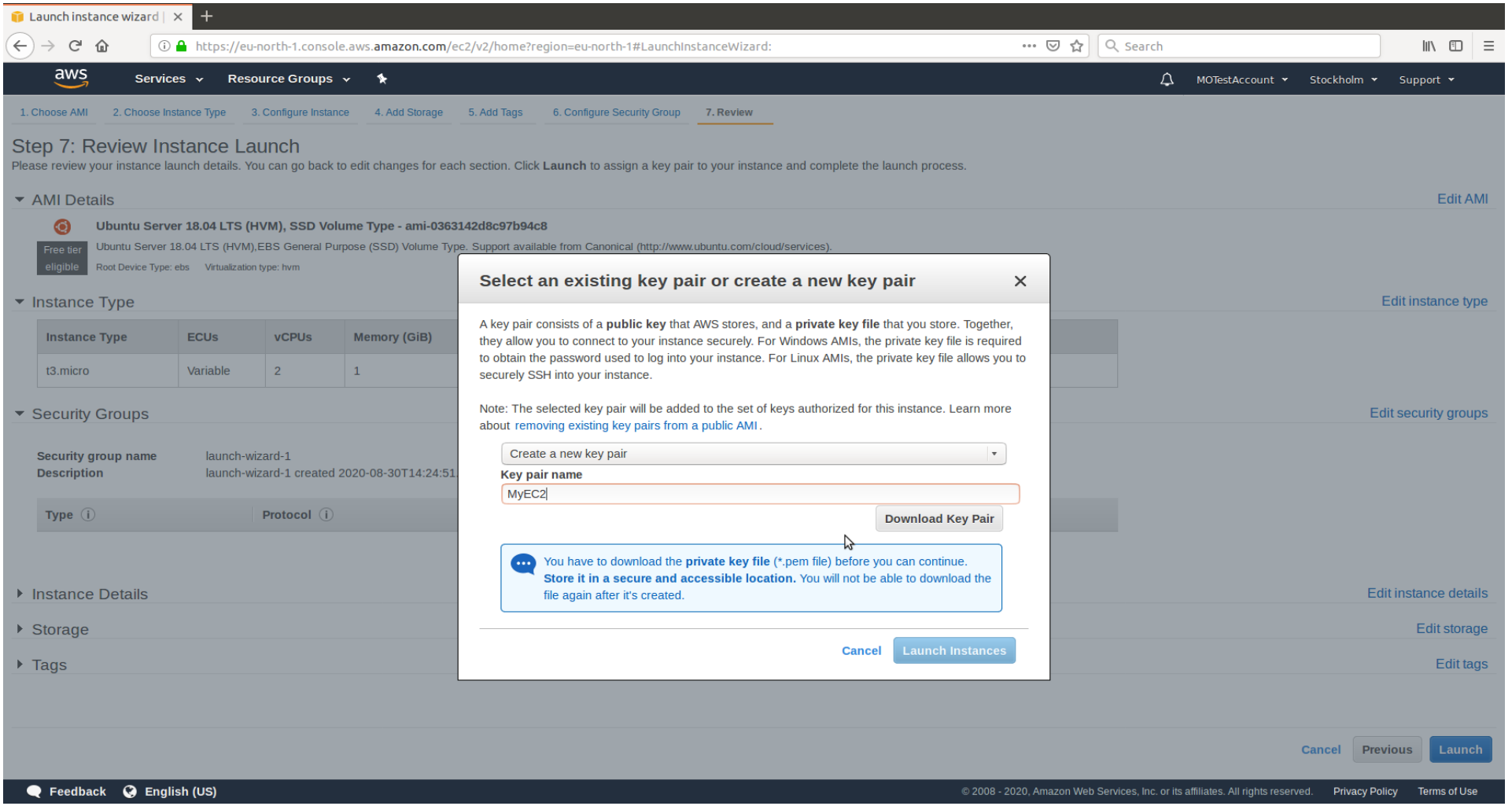
Server i AWS


Launch instance wizard
https://eu-north-1.console.aws.amazon.com/ec2/v2/home?region=eu-north-1#LaunchInstanceWizard:
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
1. Choose AMI
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AMI Details
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Ubuntu Server 18.04 LTS (HVM), SSD Volume Type - ami-0363142d8c97b94c8
Free tier eligible
Ubuntu Server 18.04 LTS (HVM),EBS General Purpose (SSD) Volume Type. Support available from Canonical (http://www.ubuntu.com/cloud/services).
Root Device Type: ebs
Virtualization type: hvm
Instance Type
Edit instance type
Instance Type
ECUs
vCPUs
Memory (GiB)
t3.micro
Variable
2
1
Security Groups
Edit security groups
Security group name
launch-wizard-1
Description
launch-wizard-1 created 2020-08-30T14:24:51
Type
Protocol
Instance Details
Edit instance details
Storage
Edit storage
Tags
Edit tags
Cancel
Previous
Launch
Feedback
English (US)
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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.
Create a new key pair
Key pair name
MyEC2
Download Key Pair
You have to download the private key file (*.pem file) before you can continue. Store it in a secure and accessible location. You will not be able to download the file again after it's created.
Cancel
Launch Instances

Server i AWS

- Koppla upp med ssh:

  ```
  ssh -i /path/my-key-pair.pem my-instance-user-name@my-instance-public-dns-name
  ```

  Exempel:

  ```
  ssh -i MyEC2.pem ubuntu@ec2-13-49-175-190.eu-north-1.compute.amazonaws.com
  ```

Övning 4

- Gör dig en Linux-server i AWS.
  - Konto kräver diverse uppgifter, men en standard Linux-server kan köras gratis så länge den inte har mycket trafik.
- Logga in med ssh
- Ta en titt på vilka daemoner som är igång på din nygjorda server

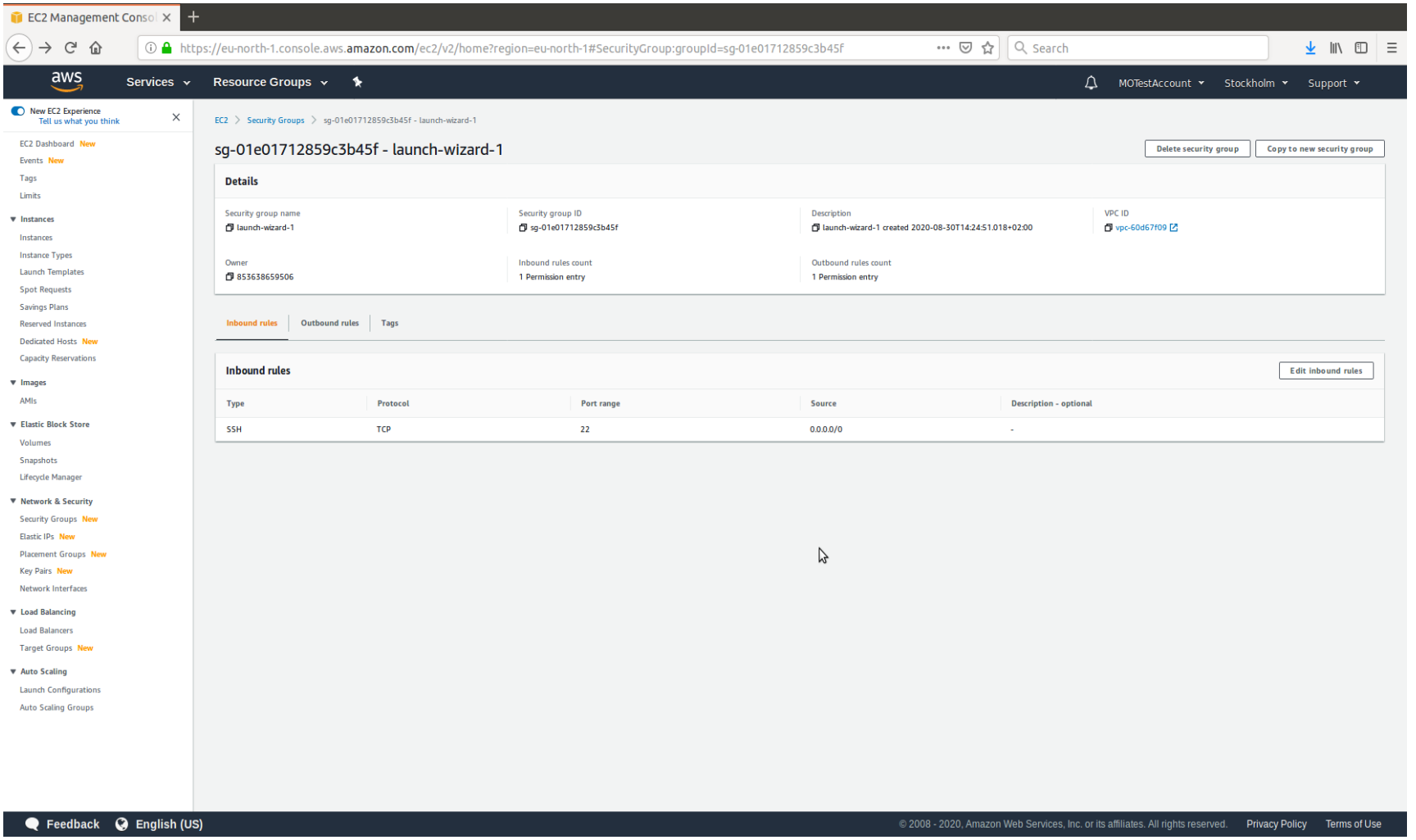
Server i AWS

- Vad finns installerat per default på servern du skapat?
- Tänkte du på något kring nycklarna du genererade?

Övning 5

- Gör nu din AWS-maskin till en LAMP-server.
- Se till att den kan nås från Internet.

Övning 4


EC2 Management Consol
https://eu-north-1.console.aws.amazon.com/ec2/v2/home?region=eu-north-1#SecurityGroup:groupId=sg-01e01712859c3b45f
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
New EC2 Experience
Tell us what you think
EC2 Dashboard New
Events New
Tags
Limits
Instances
Instances
Instance Types
Launch Templates
Spot Requests
Savings Plans
Reserved Instances
Dedicated Hosts New
Capacity Reservations
Images
AMIs
Elastic Block Store
Volumes
Snapshots
Lifecycle Manager
Network & Security
Security Groups New
Elastic IPs New
Placement Groups New
Key Pairs New
Network Interfaces
Load Balancing
Load Balancers
Target Groups New
Auto Scaling
Launch Configurations
Auto Scaling Groups
EC2 > Security Groups > sg-01e01712859c3b45f - launch-wizard-1
sg-01e01712859c3b45f - launch-wizard-1
Delete security group
Copy to new security group
Details
Security group name
launch-wizard-1
Security group ID
sg-01e01712859c3b45f
Description
launch-wizard-1 created 2020-08-30T14:24:51.018+02:00
VPC ID
vpc-60d67f09
Owner
853638659506
Inbound rules count
1 Permission entry
Outbound rules count
1 Permission entry
Inbound rules
Outbound rules
Tags
Inbound rules
Edit inbound rules
Type
Protocol
Port range
Source
Description - optional
SSH
TCP
22
0.0.0.0/0
-
Feedback
English (US)
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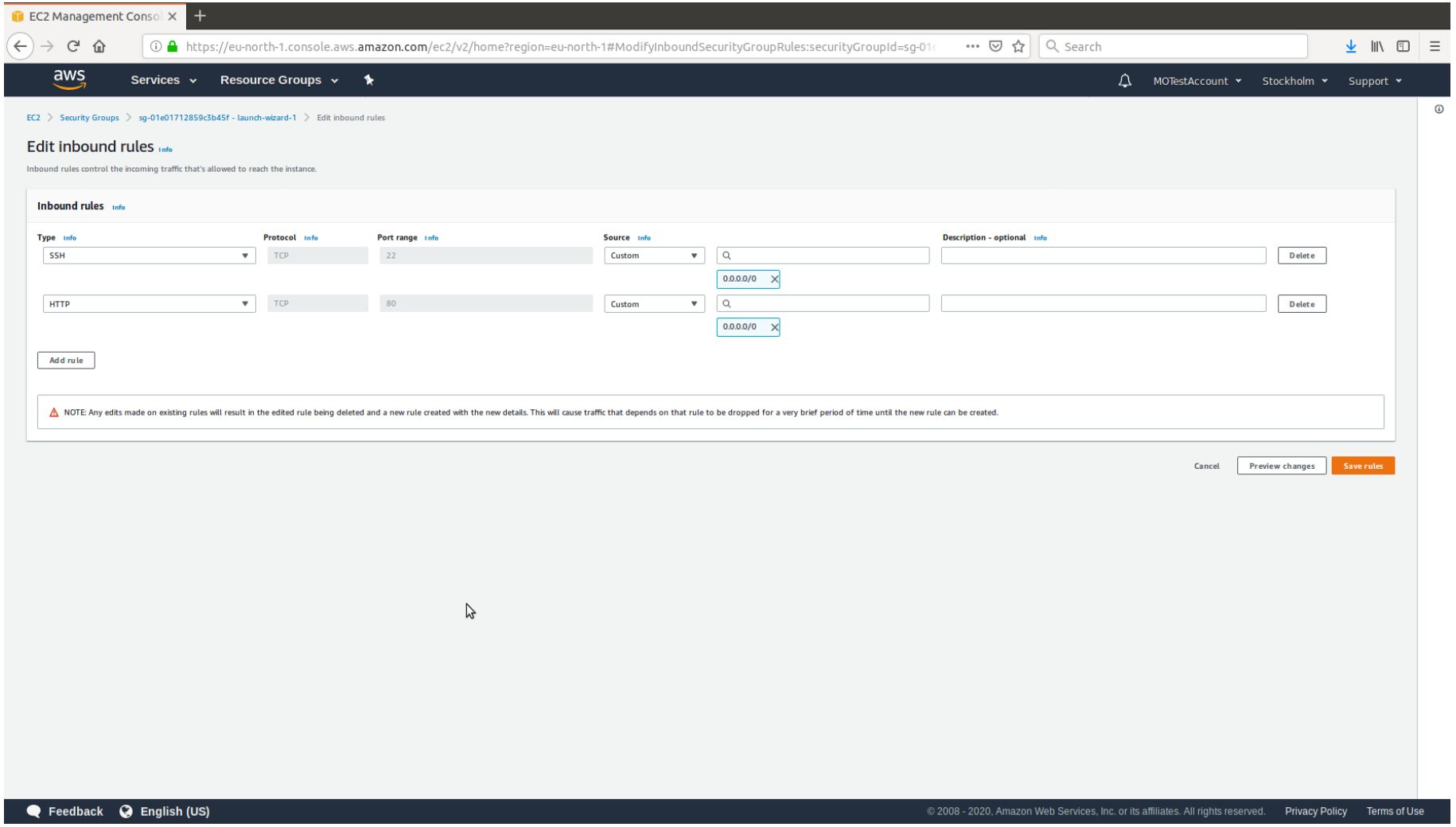
Övning 4


EC2 Management Conso
https://eu-north-1.console.aws.amazon.com/ec2/v2/home?region=eu-north-1#ModifyInboundSecurityGroupRules:securityGroupId=sg-01
Search
aws
Services
Resource Groups
MOTestAccount
Stockholm
Support
EC2 > Security Groups > sg-01e01712859c3b45f - launch-wizard-1 > Edit inbound rules
Edit inbound rules Info
Inbound rules control the incoming traffic that's allowed to reach the instance.
Inbound rules Info
Type Info
Protocol Info
Port range Info
Source Info
Description - optional Info
SSH
TCP
22
Custom
0.0.0.0/0
Delete
HTTP
TCP
80
Custom
0.0.0.0/0
Delete
Add rule
NOTE: Any edits made on existing rules will result in the edited rule being deleted and a new rule created with the new details. This will cause traffic that depends on that rule to be dropped for a very brief period of time until the new rule can be created.
Cancel
Preview changes
Save rules
Feedback
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Att tänka på vid val av moln

- Region – var har de sina serverhaller, samt legala aspekter.
- Startkostnader, inkl utbildning / experimenttid som kommer behövas.
- Löpande kostnader.
- Avtal avseende upptider, utryckning vid behov etc.
- Support.
- Säkerhetsaspekter.

Tillbakablick, reflektion, kommentarer ...