

T2 – Tutorial: Microsoft Azure Large-Scale Data Analysis

Fabian Gieseke

Image Group
Department of Computer Science
University of Copenhagen

Sigurdsgade 41, Room 1.08
fabian.gieseke@di.ku.dk

Optional Part: Azure Tutorial

- 1 Since the following steps require to create a Microsoft account (along with providing a mobile phone number) as well as creating a NVIDIA developer account, **we have decided to make this part optional!** Thus, you do not need to do the following steps, neither for the homework assignments nor for the final exam!
- 2 You will learn how to access cloud computing resources.
- 3 This part is supported by Microsoft: Each Absalon “Team XX” will get free credits (about 100\$ per month, for both May and June).
- 4 You might run out of free credits at some point, but you do not have to pay for any resources allocated via the following steps (you do not need to enter any credit card information). **If you are in doubt: Get in touch with us!**
- 5 How do we get the credits? Each team will get a code. To get the code, send me an e-mail (fabian.gieseke@di.ku.dk) or get in touch with me on Thursday. You can also get the code before Thursday and/or without attending the tutorial.

Outline

- ① Microsoft Azure Account
- ② Azure & GPU Server
- ③ Installing Tensorflow
- ④ Stopping & Deleting Resources

Outline

- ① Microsoft Azure Account
- ② Azure & GPU Server
- ③ Installing Tensorflow
- ④ Stopping & Deleting Resources

Microsoft Azure Account & Free Subscription

Microsoft Azure

Search Microsoft Azure



Creating a Microsoft Azure Pass Subscription

Creating an Azure Pass subscription is a two step process.

1. Redeem your Azure Pass Promo Code
2. Activate your subscription

Step 1: Redeeming a Microsoft Azure Pass Promo Code:

1

Open a browser and navigate to: www.microsoftazurepass.com

It is recommended you use an In-Private Browser session. Other log-ins can persist and cause errors during the activation step.

Follow instructions provided on <https://www.microsoftazurepass.com/howto>

Microsoft Azure Account & Free Subscription

All Microsoft Sites

Microsoft Azure

Search Microsoft Azure

Try Microsoft Azure Pass

We're offering an Azure Pass, so for a limited time period, you can try Azure for free.

SIGN UP FOR YOUR PASS

To begin, select your country and enter a promo code.

Denmark

(type in code here that you got from us)

Submit →

*No credit card required

[Redemption Process Guide](#)

For issues or additional questions [Create a Support Case](#).



[Privacy & cookies](#) [Terms of use](#)



©2017 Microsoft, One Microsoft Way, Redmond, WA 98052 USA

Outline

- ① Microsoft Azure Account
- ② Azure & GPU Server
- ③ Installing Tensorflow
- ④ Stopping & Deleting Resources

Creating a GPU instance . . .

Microsoft Azure

Search resources

Dashboard

+ New dashboard

Edit dashboard

Share

Fullscreen

Clone

Delete

fabiangieseke@google...
FABIANGIESEKEGOOGLEMAIL...

New

Dashboard

All resources

Resource groups

App Services

SQL databases

SQL data warehouses

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Billing

More services >

All resources
ALL SUBSCRIPTIONS

No resources to display

Try changing your filters if you don't see what you're looking for. [Learn more](#)

Create resources

Azure Health
MY RESOURCES

Quickstart tutorials

Windows Virtual Machines

Provision Windows Server, SQL Server, SharePoint VMs

Linux Virtual Machines

Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs

App Service

Create Web Apps using .NET, Java, Node.js, Python, PHP



Functions

Process events with a serverless code architecture



SQL Database

Managed relational SQL Database as a Service



Marketplace

Log in to Azure via <http://portal.azure.com/>

Creating a GPU instance ...

Microsoft Azure New

New

Search the marketplace

MARKETPLACE See all

- Compute >
- Networking >
- Storage >
- Web + Mobile >
- Databases >
- Data + Analytics >
- AI + Cognitive Services >
- Internet of Things >
- Enterprise Integration >
- Security + Identity >
- Developer tools >
- Monitoring + Management >
- Add-ons >
- Containers >
- Blockchain >

RECENT

fabiangieseke@googlemail.com

More services >

This screenshot shows the Microsoft Azure portal's 'New' blade. On the left is a sidebar with various service icons and names: Dashboard, All resources, Resource groups, App Services, SQL databases, SQL data warehouses, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, Monitor, Advisor, Security Center, and Billing. Below this is a 'More services' link. The main area is titled 'New' and contains a search bar labeled 'Search the marketplace'. Below the search bar is a 'MARKETPLACE' section with a 'See all' link, followed by a list of service categories: Compute, Networking, Storage, Web + Mobile, Databases, Data + Analytics, AI + Cognitive Services, Internet of Things, Enterprise Integration, Security + Identity, Developer tools, Monitoring + Management, Add-ons, Containers, and Blockchain. At the bottom of the blade is a 'RECENT' section, which is currently empty. The top right corner of the blade shows the user's email address, fabiangieseke@googlemail.com, and a profile icon.

Creating a GPU instance ...

Fabiangieseke@googlemail.com

Microsoft Azure New Compute

New

Search the marketplace

Marketplace See all

Compute Networking Storage Web + Mobile Databases Data + Analytics AI + Cognitive Services Internet of Things Enterprise Integration Security + Identity Developer tools Monitoring + Management Add-ons Containers Blockchain RECENT

Compute

FEATURED APPS See all

-  Windows Server 2012 R2 Datacenter Simple to deploy, cost-effective, application-focused, and
-  Windows Server 2016 Datacenter Simple to deploy, cost-effective, application-focused, and
-  Red Hat Enterprise Linux 7.2 Red Hat Enterprise Linux 7 is the world's leading enterprise Linux platform built to meet the needs of
-  Ubuntu Server 16.04 LTS Ubuntu Server delivers the best value scale-out performance available.
-  SQL Server 2016 SP1 Enterprise on Windows Server 2016 Enterprise version of SQL Server 2016 SP1 for transactional, data
-  Virtual machine scale set Deploy multiple instances of a single image.
-  Azure Container Service A pre-configured environment for scalable deployment and

More services > https://portal.azure.com

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS fabiangieseke@googlemail.com

Ubuntu Server 16.04 LTS Canonical

Ubuntu Server 16.04 LTS amd64 20170508 Public Azure, 20170330 Azure China, 20170113 Azure Germany, 20161221 Azure Gov. Ubuntu Server is the world's most popular Linux for cloud environments. Updates and patches for Ubuntu 16.04 will be available until April 2021. Ubuntu Server is the perfect virtual machine (VM) platform for all workloads from web applications to NoSQL databases and Hadoop. For more information see [Ubuntu on Azure](#) and [using Juju to deploy your workloads](#).

Legal Terms

By clicking the Create button, I acknowledge that I am getting this software from Canonical and that the legal terms of Canonical apply to it. Microsoft does not provide rights for third-party software. Also see the [privacy statement](#) from Canonical.

PUBLISHER	Canonical
USEFUL LINKS	Documentation FAQ Pricing details

Select a deployment model

Resource Manager

Create

Mehr services >
<https://help.ubuntu.com/16.04/index.html>

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS Create virtual machine Basics fabiangieseke@googlemail...

New

Dashboard

All resources

Resource groups

App Services

SQL databases

SQL data warehouses

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Billing

More services >

Create virtual machine Basics

1 Basics Configure basic settings

2 Size Choose virtual machine size

3 Settings Configure optional features

4 Summary Ubuntu Server 16.04 LTS

Name: gpuserver

VM disk type: HDD

User name: cooluser

Authentication type: SSH public key (Password selected)

Password: (redacted)

Confirm password: (redacted)

Subscription: Azure Pass

Resource group: Create new (coolresources selected)

Location: East US

Important: Choose HDD as VM disk type!

OK

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS Create virtual machine Choose a size fabiangieseke@googlemail.com

Create virtual machine

- Basics Done ✓
- Size Choose virtual machine size >
- Settings Configure optional features >
- Summary Ubuntu Server 16.04 LTS

Choose a size

Browse the available sizes and their features

Loading pricing... Click here to open pricing calculator

Supported disk type	Minimum cores	Minimum memory (GB)
HDD	1	0

Recommended | View all

DS1_V2 Standard	DS2_V2 Standard	DS3_V2 Standard
1 Core	2 Cores	4 Cores
3.5 GB	7 GB	14 GB
2 Data disks	4 Data disks	8 Data disks
3200 Max IOPS	6400 Max IOPS	12800 Max IOPS
7 GB Local SSD	14 GB Local SSD	28 GB Local SSD
Load balancing	Load balancing	Load balancing
Premium disk support	Premium disk support	Premium disk support

DS4_V2 Standard	DS11_V2 Standard	DS12_V2 Standard
8 Cores	2 Cores	4 Cores
28 GB	14 GB	28 GB
16 Data disks	4 Data disks	8 Data disks

Select

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS Create virtual machine Choose a size fabiangieseke@googlemail.com

Create virtual machine

- Basics Done ✓
- Size Choose virtual machine size >
- Settings Configure optional features >
- Summary Ubuntu Server 16.04 LTS

3,652.19 DKK/MONTH (ESTIMATED)

Choose a size
Browse the available sizes and their features

D13 Standard	H8 Standard	H8M Standard
8 Cores	8 Cores	8 Cores
56 GB	56 GB	112 GB
16 Data disks	16 Data disks	16 Data disks
16x500 Max IOPS	16x500 Max IOPS	16x500 Max IOPS
400 GB Local SSD	1000 GB Local SSD	1000 GB Local SSD
Load balancing	Load balancing	Load balancing

NV6 Standard	F1S Standard	F2S Standard
6 Cores	1 Core	2 Cores
56 GB	2 GB	4 GB
8 Data disks	2 Data disks	4 Data disks
8x500 Max IOPS	3200 Max IOPS	6400 Max IOPS
380 GB Local SSD	Load balancing	Load balancing
Load balancing	Premium disk support	Premium disk support
Tx M60 Graphics		

Select

More services > Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS Create virtual machine Settings

fabiangieseke@googlemail.com

New

20170330 Azure China, 20170113 Azure

is the world's most popular Linux for cloud

will be available until April 2021. Ubuntu Server

loads from web applications to NoSQL

Ubuntu on Azure and using Juju to deploy your

getting this software from Canonical and that

not provide rights for third-party software.

1 Basics Done ✓

2 Size Done ✓

3 Settings Configure optional features >

4 Summary Ubuntu Server 16.04 LTS >

Storage

Use managed disks No Yes

* Storage account (new) coolresourcesdisks597

Network

* Virtual network (new) coolresources-vnet

* Subnet default (10.0.0.0/24)

* Public IP address (new) gpuserver-ip

* Network security group (firewall) (new) gpuserver-nsg

Extensions

Extensions No extensions

High availability

* Availability set None

OK

Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure New Compute Ubuntu Server 16.04 LTS Create virtual machine Summary

New

20170330 Azure China, 20170113 Azured's most popular Linux for cloud be available until April 2021. Ubuntu Server ids from web applications to NoSQL. on Azure and using Juju to deploy your

Dashboard

All resources

Resource groups

App Services

SQL databases

SQL data warehouses

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Billing

More services >

Highlight All Match Case Whole Words 4 of 5 matches

Create virtual machine

Summary

Validation passed

Basics

Subscription	Azure Pass
Resource group	(new) coolresources
Location	East US

Settings

Computer name	gpuserver
Disk type	HDD
User name	cooluser
Size	Standard NV6
Storage account	(new) coolresourcesdisks597
Managed	No
Virtual network	(new) coolresources-vnet
Subnet	(new) default (10.0.0.0/24)
Public IP address	(new) gpuserver-ip
Network security group (firewall)	(new) gpuserver-nsg
Availability set	None
Guest OS diagnostics	Disabled
Boot diagnostics	Enabled
Diagnostics storage account	(new) coolresourcesdiag276

OK Download template and parameters

NV

Highlight All Match Case Whole Words 4 of 5 matches

fabiangieseke@googlemail.com

Creating a GPU instance ...

Microsoft Azure

Dashboard + New Search resources 8 > ? ? ? fabiangieseke@googlemail.com

All resources ALL SUBSCRIPTIONS

No resources to display

Try changing your filters if you don't see what you're looking for. [Learn more](#)

Create resources

Quickstart tutorials

Windows Virtual Machines Provision Windows Server, SQL Server, SharePoint VMs

Linux Virtual Machines Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs

App Service Create Web Apps using .NET, Java, Node.js, Python, PHP

Functions Process events with a serverless code architecture

SQL Database Managed relational SQL Database as a Service

Marketplace

gutest Not found Deploying Ubuntu Server 16.04 LTS

gpulsda Not found

Azure Health MY RESOURCES

After some time (5-10 minutes), you should see ...

NV Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure gpuserver

gpuserver Virtual machine

Search (Ctrl+ /)

Connect Start Restart Stop Move Delete Refresh

Essentials

Resource group (change) coolresources

Status Running

Location East US

Subscription (change) Azure Pass

Subscription ID 4be4303d-624a-482b-b236-bb17fdb07a72

Computer name gpuserver

Operating system Linux

Size Standard NV6 (6 cores, 56 GB memory)

Public IP address 40.71.190.251

Virtual network/subnet coolresources-vnet/default

View All

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec

Availability set

Disks

Extensions

Network interfaces

Size

Backup

Properties

Locks

Automation script

SCHEDULES

Auto-shutdown

fabiangieseke@googlemail.com

fabiangieseke@GOOGLEMAIL.COM

3

Creating a GPU instance ...

Microsoft Azure gpuserver

gpuserver Virtual machine

Search (Ctrl +/)

Connect Start Restart Stop Move Delete Refresh

Essentials ▾

Resource group (change)
[coolresources](#)

Status
Running

Location
East US

Subscription (change)
[Azure Pass](#)

Subscription ID
4be4303d-624a-482b-b236-bb17fdb07a72

Computer name
gpuserver

Operating system
Linux

Size
Standard NV6 (6 cores, 56 GB memory)

Public IP address
40.71.190.251

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

New

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Availability set

Disks

Extensions

Network interfaces

Size

Backup

Properties

Locks

Automation script

SCHEDULES

Auto-shutdown

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

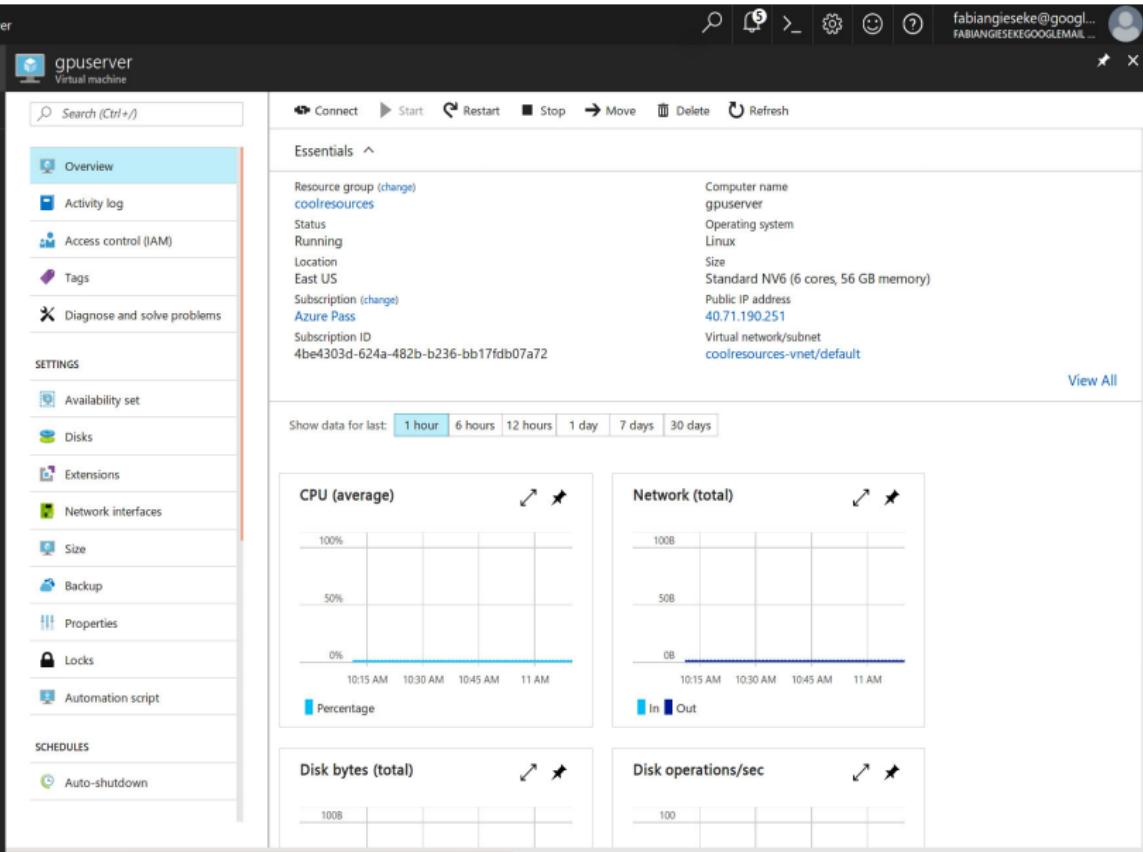
View All

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec



Creating a GPU instance ...

Microsoft Azure gpuserver

gpuserver
Virtual machine

Search (Ctrl +/)

Connect Start Restart Stop Move Delete Refresh

New

Overview

All resources

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Resource groups

App Services

SQL databases

SQL data warehouses

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Billing

More services >

https://portal.azure.com/#blade/HubsExtension/Resources/resourceType/Microsoft.Resources/resources

Essentials

Resource group (change) coolresources

Status Running

Location East US

Subscription (change) Azure Pass

Subscription ID 4be4303d-624a-482b-b236-bb17fdb07a72

Computer name gpuserver

Operating system Linux

Size Standard NV6 (6 cores, 56 GB memory)

Public IP address 40.71.190.251

Virtual network/subnet coolresources-vnet/default

View All

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec

100%
50%
0%
10:15 AM 10:30 AM 10:45 AM 11 AM
Percentage

100B
50B
0B
10:15 AM 10:30 AM 10:45 AM 11 AM
In Out

100B
100

10:15 AM 10:30 AM 10:45 AM 11 AM

Creating a GPU instance ...

Microsoft Azure All resources

All resources fabiangieseke@gmail.com (Default Directory)

+ Add Columns Refresh

Subscriptions: Azure Pass

Filter by name... All types All locations No grouping

7 items

NAME	TYPE	RESOURCE GROUP	LOCATION	SUBSCRIPTION	...
coolresourcesdiag899	Storage account	coolresources	East US	Azure Pass	...
coolresourcesdisks336	Storage account	coolresources	East US	Azure Pass	...
coolresources-vnet	Virtual network	coolresources	East US	Azure Pass	...
gpuserver	Virtual machine	coolresources	East US	Azure Pass	...
gpuserver54	Network interface	coolresources	East US	Azure Pass	...
gpuserver-ip	Public IP address	coolresources	East US	Azure Pass	...
gpuserver-nsg	Network security group	coolresources	East US	Azure Pass	...

Creating a GPU instance ...

Microsoft Azure All resources gpuserver-nsg fabiangieseke@gmail.com (Default Directory)

gpuserver-nsg Network security group

Search (Ctrl+ /)

Move Delete

Essentials ^

Resource group (change)
coolresources
Location
East US
Subscription name (change)
Azure Pass
Subscription ID
4be4303d-624a-482b-b236-bb17fdb07a72

Security rules
1 inbound, 0 outbound
Associated with
0 subnets, 1 network interfaces

1 Inbound security rule

PRIORITY	NAME	SOURCE	DESTINATION	SERVICE	ACTION
1000	default-allow-ssh	Any	Any	SSH (TCP/22)	Allow

0 Outbound security rules

PRIORITY	NAME	SOURCE	DESTINATION	SERVICE	ACTION
No results.					

Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure All resources gpuserver-nsg fabiangieseke@gmail.com (Default Directory)

+ Add Columns Refresh

Subscriptions: Azure Pass
Filter by name...

7 items

NAME	...
coolresourcesdiag276	...
coolresourcesdisks597	...
coolresources-vnet	...
gpuserver	...
gpuserver966	...
gpuserver-ip	...
gpuserver-nsg	...

gpuserver-nsg Network security group

Search (Ctrl+ /)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Inbound security rules

Outbound security rules

Network interfaces

Subnets

Properties

Locks

Automation script

MONITORING

Diagnostics logs

SUPPORT + TROUBLESHOOTING

Effective security rules

Move Delete

Essentials

Resource group (change)
coolresources

Location
East US

Subscription name (change)
Azure Pass

Subscription ID
4be4303d-624a-482b-b236-bb17fdb07a72

Security rules
1 inbound, 0 outbound

Associated with
0 subnets, 1 network interfaces

1 Inbound security rule

PRIORITY	NAME	SOURCE	DESTINATION	SERVICE	ACTION
1000	default-allow-ssh	Any	Any	SSH (TCP/22)	Allow

0 Outbound security rules

PRIORITY	NAME	SOURCE	DESTINATION	SERVICE	ACTION
No results.					

NV Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure All resources gpuserver-nsg - Inbound security rules fabiangieseke@googlemail...

gpuserver-nsg - Inbound security rules

gpuserver-nsg - Network security group

Columns Refresh

Search (Ctrl+ /)

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Inbound security rules

Outbound security rules

Network interfaces

Subnets

Properties

Locks

Automation script

MONITORING

Diagnostics logs

SUPPORT + TROUBLESHOOTING

Effective security rules

Add Default rules

Search inbound security rules

PRIORITY	NAME	SOURCE	DESTINATION	SERVICE	ACTION
1000	default-allow-ssh	Any	Any	SSH (TCP/22)	Allow

Highlight All Match Case Whole Words 4 of 5 matches

Creating a GPU instance ...

Microsoft Azure All resources gpuserver-nsg - Inbound security rules Add inbound security rule

Add inbound security rule
gpuserver-nsg

Advanced

* Name: jupyter

* Priority: 1010

* Source: Any

Service: Custom

* Protocol: Any

* Port range: 8888

* Action: Allow

OK

Highlight All Match Case Whole Words 4 of 5 matches

fabiangieseke@googlemail.com

This screenshot shows the Microsoft Azure portal interface for creating an inbound security rule. The main title bar indicates the user is in the 'gpuserver-nsg - Inbound security rules' section. A sub-header 'Add inbound security rule' is visible above the configuration form. The configuration form itself has a title 'Add inbound security rule' and a 'gpuserver-nsg' context indicator. It includes fields for 'Name' (set to 'jupyter'), 'Priority' (set to '1010'), 'Source' (set to 'Any'), 'Service' (set to 'Custom'), 'Protocol' (set to 'Any'), 'Port range' (set to '8888'), and 'Action' (set to 'Allow'). At the bottom of the configuration window is an 'OK' button. The overall background of the portal is dark blue.

Outline

- ① Microsoft Azure Account
- ② Azure & GPU Server
- ③ Installing Tensorflow
- ④ Stopping & Deleting Resources

Installing TensorFlow

Microsoft Azure All resources gpuserver

gpuserver Virtual machine

email (Default Directory)

Columns Refresh

Search (Ctrl+)/

Connect Start Restart Stop Move Delete Refresh

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Availability set

Disks

Extensions

Network interfaces

Size

Backup

Properties

Locks

Automation script

SCHEDULES

Auto-shutdown

Subscription (change)
Azure Pass

Subscription ID
4be4303d-624a-482b-b236-bb17fdb07a2

Public IP address
40.71.93.73

Virtual network/subnet
coolresources-vnet/default

OK

View All

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec

Log in to server ...

The screenshot shows the Microsoft Azure portal interface for managing a virtual machine named 'gpuserver'. The left sidebar lists various resources under 'All resources', including 'email (Default Directory)', 'Azure Pass', and several network-related resources. The main content area is focused on the 'gpuserver' VM, with the 'Overview' tab selected. Key details shown include the Public IP address (40.71.93.73), the Azure Pass subscription, and the specific VM ID (4be4303d-624a-482b-b236-bb17fdb07a2). Below the summary, there are four performance monitoring charts: CPU usage over time, total network traffic (In and Out), disk byte usage, and disk operation rates per second. A prominent red callout at the bottom right of the charts reads 'Log in to server ...', pointing to the 'Connect' button at the top of the page.

Installing TensorFlow

```
fgieseke@bart:~$ ssh cooluser@40.71.93.73
cooluser@40.71.93.73's password:
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.4.0-77-generic x86_64)
```

```
* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/advantage
```

```
Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud
```

```
0 packages can be updated.
0 updates are security updates.
```

```
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.
```

```
cooluser@gpuserver:~$
```

Log in to server ...

Installing TensorFlow



COMPUTEWORKS

Gameworks

JETPACK

DESIGNWORKS



Member Area

Hello, Fabian ▾

Home > ComputeWorks > Deep Learning > Software > cuDNN Download

cuDNN Download

NVIDIA cuDNN is a GPU-accelerated library of primitives for deep neural networks.

I Agree To The Terms of the [cuDNN Software License Agreement](#)

Please check your framework documentation to determine the recommended version of cuDNN.

If you are using cuDNN with a Pascal (GTX 1080, GTX 1070), version 5 or later is required.

[Download cuDNN v6.0 \[April 27, 2017\], for CUDA 8.0](#)

[Download cuDNN v6.0 \[April 27, 2017\], for CUDA 7.5](#)

[Download cuDNN v5.1 \[Jan 20, 2017\], for CUDA 8.0](#)

[cuDNN User Guide](#)

[cuDNN Install Guide](#)

[cuDNN v5.1 Library for Linux](#)

[cuDNN v5.1 Library for Power8](#)

[cuDNN v5.1 Library for Windows 7](#)

[cuDNN v5.1 Library for Windows 10](#)

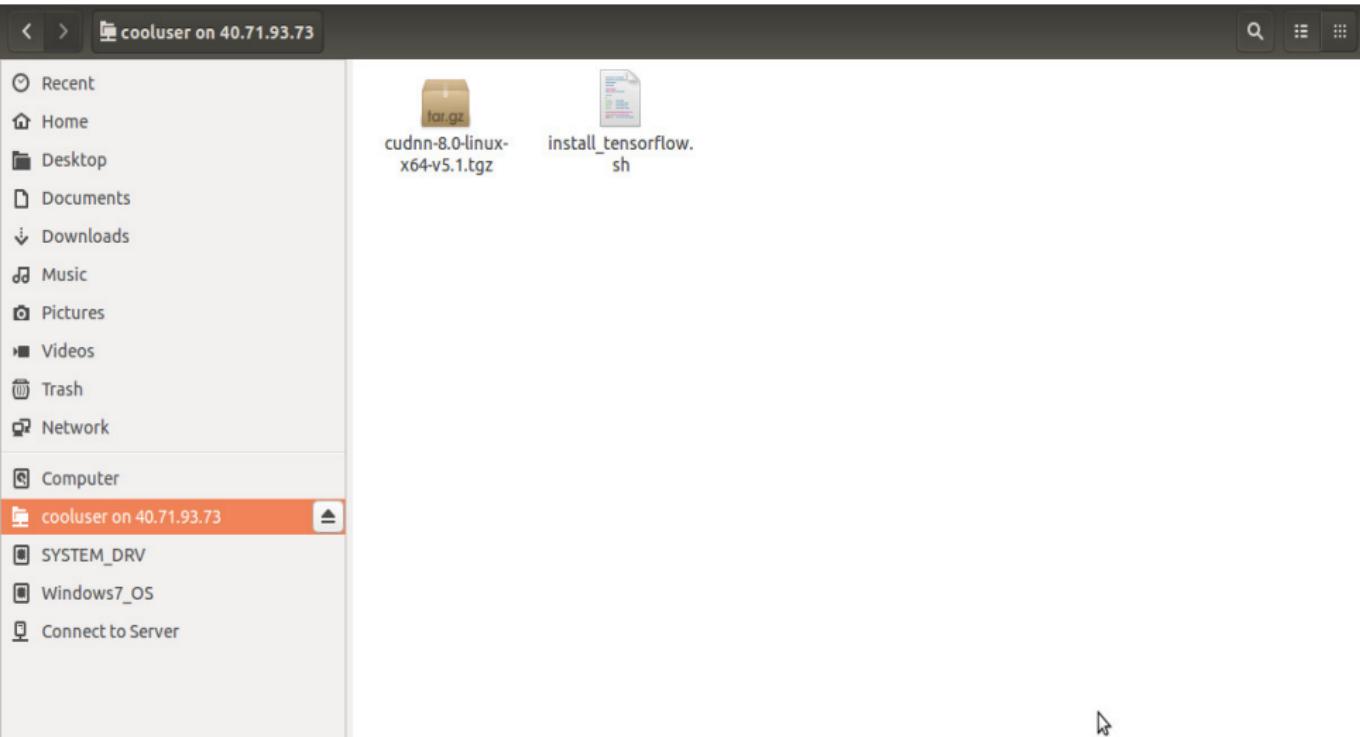
[cuDNN v5.1 Library for OSX](#)

[cuDNN v5.1 Library for Android](#)

Download the file cudnn-8.0-linux-x64-v5.1 from <https://developer.nvidia.com/cudnn>

Note: You need to create a Nvidia developer account for downloading the file ...

Installing TensorFlow



Copy this file and the installation script (see Absalon) to the server (e.g., via WinSCP)

Installing TensorFlow

```
fgieseke@bart:~$ ssh cooluser@40.71.93.73  
cooluser@40.71.93.73's password:  
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.4.0-77-generic x86_64)
```

```
* Documentation: https://help.ubuntu.com  
* Management: https://landscape.canonical.com  
* Support: https://ubuntu.com/advantage
```

```
Get cloud support with Ubuntu Advantage Cloud Guest:  
http://www.ubuntu.com/business/services/cloud
```

```
0 packages can be updated.  
0 updates are security updates.
```

```
To run a command as administrator (user "root"), use "sudo <command>".  
See "man sudo_root" for details.
```

```
cooluser@gpuserver:~$ ls -l  
total 100760  
-rw-rw-r-- 1 cooluser cooluser 103174002 May 16 10:17 cudnn-8.0-linux-x64-v5.1.tgz  
-rw-rw-r-- 1 cooluser cooluser 1995 May 16 10:17 install_tensorflow.sh  
cooluser@gpuserver:~$ sh install_tensorflow.sh
```

```
Reading package lists... Done
```

```
Building dependency tree
```

```
Reading state information... Done
```

```
linux-headers-4.4.0-77-generic is already the newest version (4.4.0-77.91).
```

```
linux-headers-4.4.0-77-generic set to manually installed.
```

```
The following additional packages will be installed: some time. You will have to log in again ...
```

Start installation process ... (will take about 14 minutes). Note: The server will reboot automatically after

Installing TensorFlow

```
fgtseke@bart:~$ ssh cooluser@40.71.93.73
cooluser@40.71.93.73's password:
Welcome to Ubuntu 16.04.2 LTS (GNU/Linux 4.4.0-77-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

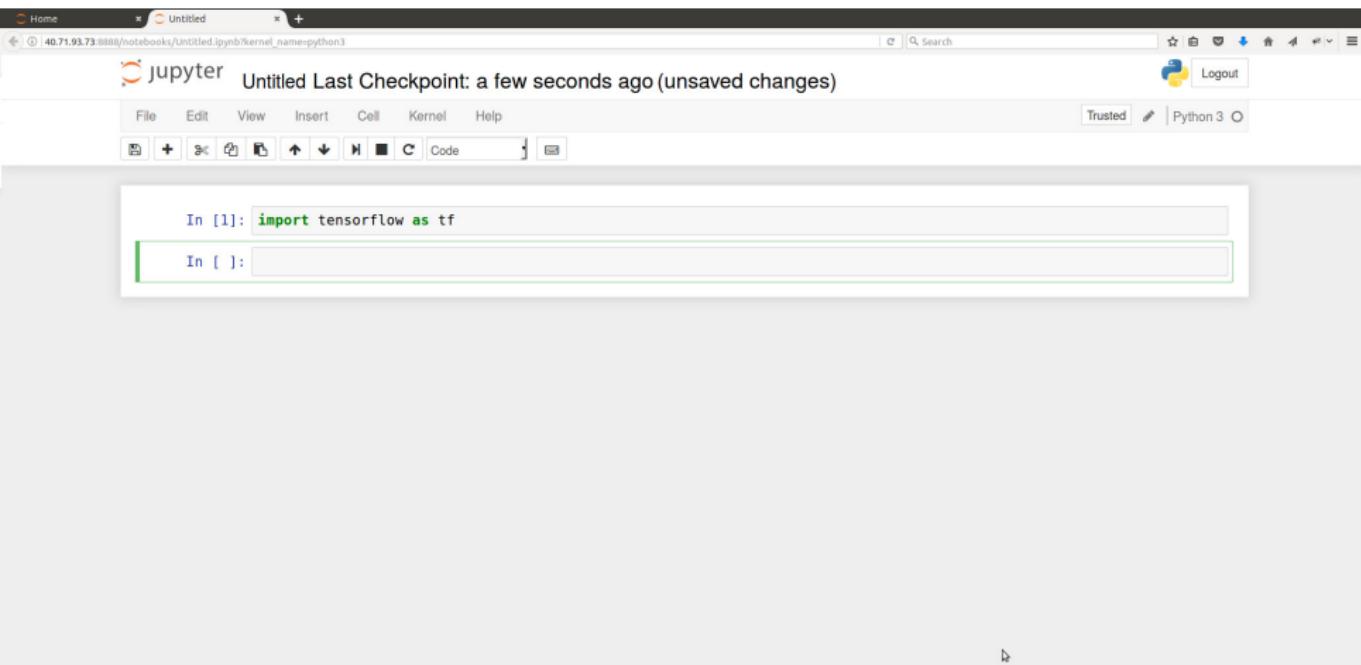
Get cloud support with Ubuntu Advantage Cloud Guest:
 http://www.ubuntu.com/business/services/cloud

10 packages can be updated.
4 updates are security updates.

Last login: Tue May 16 10:16:44 2017 from 130.225.188.33
cooluser@gpuserver:~$ source tensorflow_venv/bin/activate
(tensorflow_venv) cooluser@gpuserver:~$ jupyter notebook --no-browser --ip=* --port=8888
[I 11:02:26.601 NotebookApp] Writing notebook server cookie secret to /run/user/1000/jupyter/notebook_cookie_secret
[W 11:02:26.672 NotebookApp] WARNING: The notebook server is listening on all IP addresses and not using encryption. This is not recommended.
[I 11:02:26.703 NotebookApp] Serving notebooks from local directory: /home/cooluser
[I 11:02:26.703 NotebookApp] 0 active kernels
[I 11:02:26.703 NotebookApp] The Jupyter Notebook is running at: http://[all ip addresses on your system]:8888/?token=5a9a64214ea939202197b67e146524d5c51cbdb009d9ebc7
[I 11:02:26.703 NotebookApp] Use Control-C to stop this server and shut down all kernels (twice to skip confirmation).
[C 11:02:26.703 NotebookApp]

Copy/paste this URL into your browser when you connect for the first time,
to log in. Afterwards start a Jupyter notebook via jupyter notebook --no-browser --ip=* --port=8888
http://localhost:8888/?token=5a9a64214ea939202197b67e146524d5c51cbdb009d9ebc7
```

Installing TensorFlow



The screenshot shows a Jupyter Notebook interface with the following details:

- Title Bar:** Home, Untitled, +, 40.71.93.73:8888/notebooks/Untitled.ipynb?kernel_name=python3, Search, Logout.
- Toolbar:** File, Edit, View, Insert, Cell, Kernel, Help.
- Code Cells:**
 - In [1]: `import tensorflow as tf`
 - In []:
- Bottom Right:** A small icon resembling a downward-pointing arrow inside a circle.

Copy the link, open a browser, and paste the link. Replace 'localhost' with the IP address of your server.
You can now open a new notebook with TensorFlow running on a powerful GPU!

Outline

- ① Microsoft Azure Account
- ② Azure & GPU Server
- ③ Installing Tensorflow
- ④ Stopping & Deleting Resources

Stopping the machine ...

Microsoft Azure All resources gpuserver

gpuserver Virtual machine

Search (Ctrl+ /)

Connect Start Restart Stop Move Delete Refresh

All resources fabiangieseke@gmail.com (Default Directory)

Add Columns Refresh

Subscriptions: Azure Pass

Filter by name...

NAME

- coolresourcesdiag899
- coolresourcesdisks336
- coolresources-vnet
- gpuserver**
- gpuserver54
- gpuserver-ip
- gpuserver-nsg

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

SETTINGS

Availability set

Disk

Extensions

Network interfaces

Size

Backup

Properties

Locks

Automation script

SCHEDULES

Auto-shutdown

Resource group (change) coolresources

Status Running

Location East US

Subscription (change) Azure Pass

Subscription ID 4be4303d-624a-482b-b236-bb17fdb07a72

Computer name gpuserver

Operating system Linux

Size Standard NV6 (6 cores, 56 GB memory)

Public IP address 40.71.190.251

Virtual network/subnet coolresources-vnet/default

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec

IMPORTANT: The machine will cost money/credits as long it is running. However, you can stop the machine.

Stopping the machine ...

Microsoft Azure All resources gpserver fabiangieseke@gmail.com (Default Directory)

All resources gpserver

+ Add Columns Refresh

Subscriptions: Azure Pass
Filter by name...

7 items

NAME	...
coolresourcesdiag899	...
coolresourcesdisks336	...
coolresources-vnet	...
gpserver	...
gpserver54	...
gpserver-ip	...
gpserver-nsg	...

gpserver Virtual machine

Search (Ctrl+ /)

Connect Start Restart Stop Move Delete Refresh

Deallocating

Essentials ^

Resource group (change)
coolResources

Status
Deallocating

Location
East US

Subscription (change)
Azure Pass

Subscription ID
4be4303d-624a-482b-b236-bb17fdb07a72

Computer name
gpserver

Operating system
Linux

Size
Standard NV6 (6 cores, 56 GB memory)

Public IP address
gpserver-ip

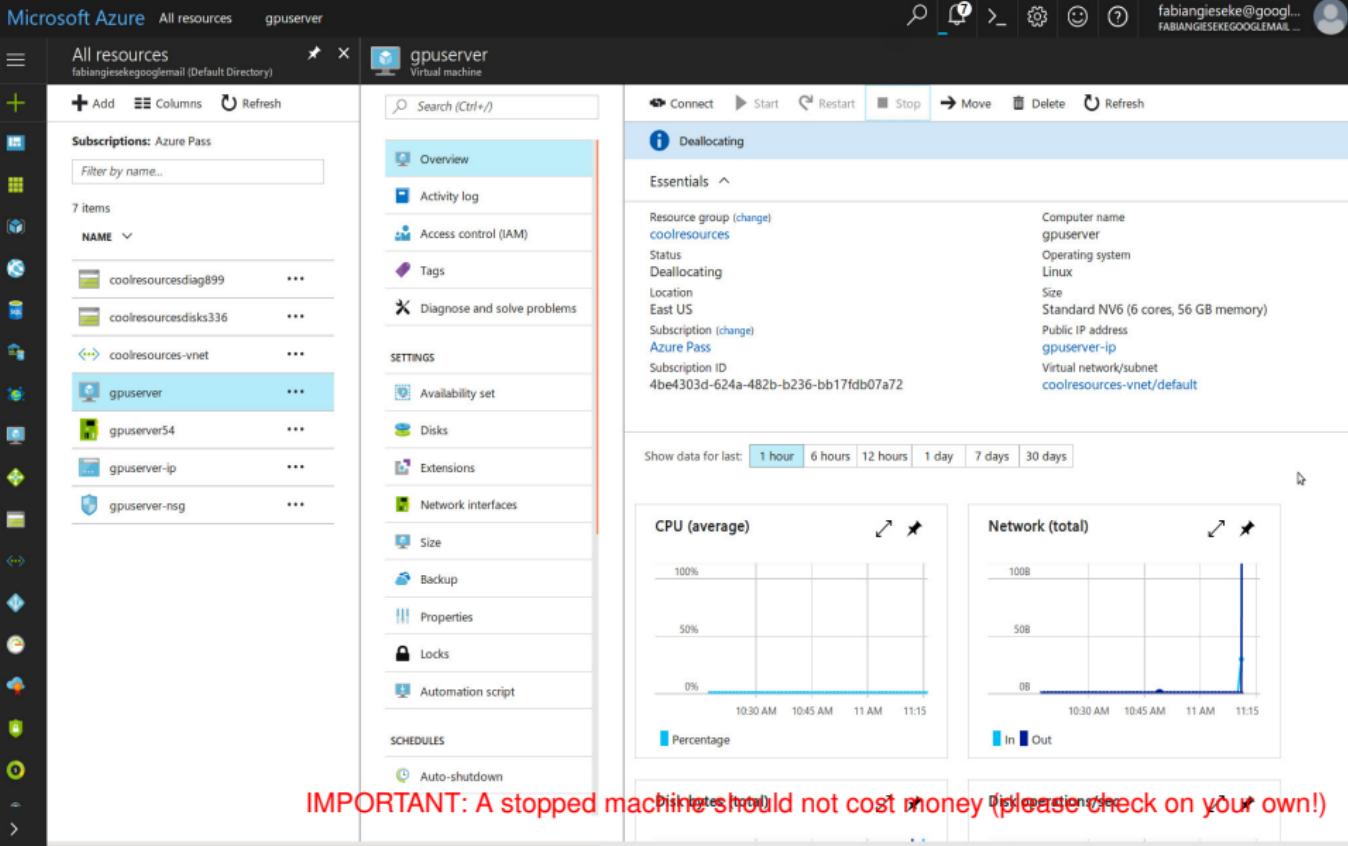
Virtual network/subnet
coolresources-vnet/default

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

IMPORTANT: A stopped machine should not cost money (please check on your own!)



Starting the machine again . . .

Microsoft Azure All resources gpuserver

gpuserver Virtual machine

Search (Ctrl+ /)

Connect Start Restart Stop Move Delete Refresh

Start

Essentials

Resource group (change) coolresources

Status Stopped (deallocated)

Location East US

Subscription (change) Azure Pass

Subscription ID 4be4303d-624a-482b-b236-bb17fdb07a72

Computer name gpuserver

Operating system Linux

Size Standard NV6 (6 cores, 56 GB memory)

Public IP address gpuserver-ip

Virtual network/subnet coolresources-vnet/default

View All

Show data for last: 1 hour 6 hours 12 hours 1 day 7 days 30 days

CPU (average)

Network (total)

Disk bytes (total)

Disk operations/sec

Percentage

In Out

IMPORTANT: If needed again, just start the machine again . . .

Deleting resources . . .

Microsoft Azure All resources gpuserver

The screenshot shows the Microsoft Azure portal interface. On the left, there's a sidebar with various icons representing different service categories. The main area displays a list of resources under 'All resources'. One resource, 'gpuserver', is highlighted and selected. The right side of the screen provides detailed information about this virtual machine, including its Overview, Activity log, Access control (IAM), Tags, and Diagnose and solve problems sections. Below these, there are sections for SETTINGS (Availability set, Disks, Extensions, Network interfaces, Size, Backup, Properties, Locks, Automation script) and SCHEDULES (Auto-shutdown). A large central area is titled 'gpuserver Virtual machine' and contains a 'Delete' button. A modal dialog box is open, asking 'Delete virtual machine' and 'Do you want to delete the virtual machine 'gpuserver'?'. Below the dialog, there are 'Yes' and 'No' buttons. To the right of the dialog, there's some detailed information: Subscription (Azure Pass), Public IP address (52.168.94.92), Subscription ID (4be4303d-624a-482b-b236-bb17fdb07a72), and Virtual network/subnet (coolresources-vnet/default). At the bottom, there are performance monitoring charts for CPU (average), Network (total), Disk bytes (total), and Disk operations/sec, along with a time range selector for 'Show data for last: 1 hour, 6 hours, 12 hours, 1 day, 7 days, 30 days'.

IMPORTANT: Other resources might also cost money (not much though). You can delete them at some point.