



# Oracle Cloud Infrastructure Netzwerkeinrichtung für DBAs

Robert Marz





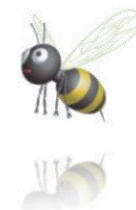
## Kunde

Senior Technical Architect mit datenbankzentrischen  
Weltbild



## its-people

Portfolio Manager Database Technologies  
Blog Editor



## DOAG

Aktives Mitglied der DOAG Datenbank Community.  
Verantwortlich für Cloud Themen



@RobbieDatabee



blog.its-people.de



Robert.Marz  
@its-people.de

# Why Networking for DBAs?

**After Subscribing to IaaS Cloud Services  
You start with an empty virtual Datacenter**



Do I have to do it all by myself?

**OMG no.  
Ask someone who knows this stuff by heart.  
(And probably is in Charge for these topics)**



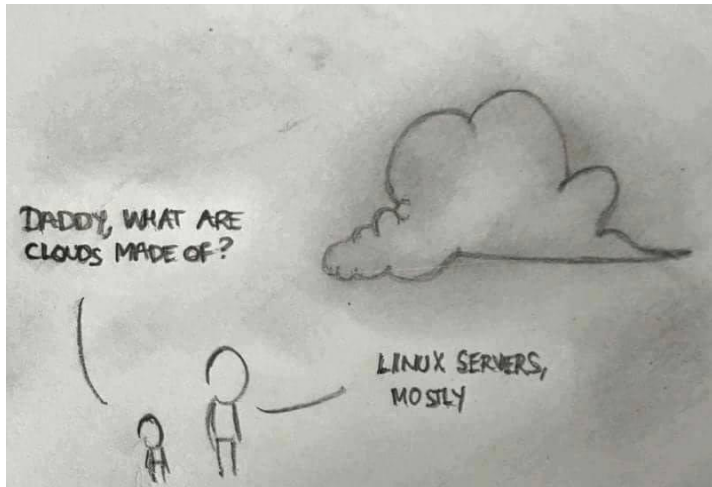
Do I really need to know all this stuff?

**Nope.**

**But Oracle Cloud Infrastructure is network driven.  
It's the topic of this session - Knowledge never hurts!**

What is it good for?

**You can help yourself.  
Think about adding DNS-Entries for Scanlisteners**



# What are Clouds made of?

Linux Servers

Mostly

Network Components

Other supporting stuff

Software Defined (SDx)

Everything is Virtual

For Cloud-Users

# OCI Basics

**ORACLE<sup>®</sup>**

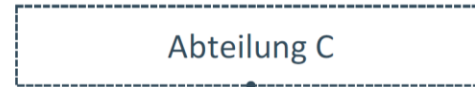
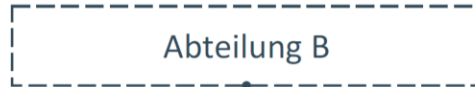
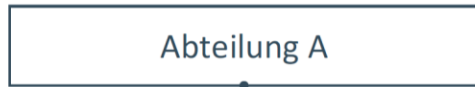
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**CLOUD**

# Oracle Cloud Infrastructure Overview



**GOVERNANCE**  
(IAM / APIs)



COMPUTE

STORAGE

DATABASE

NETWORK

EDGE

Services



Virtuelles Netzwerk

Physikalisches Netzwerk



**ORACLE**  
**REGION**

RECHENZENTREN/  
AVAILABILITY DOMAINS

AD  
1

AD  
2

AD  
3

Verbindung - FastConnect/IPSec

ORACLE  
REGION *n*

INTERNET

Kunden  
RZ

# Identity Domains, Tenants & Cloud-Account



ORACLE® Cloud Infrastructure

SIGN IN



## Cloud Account

Cloud Account with Identity Cloud Service

robbiedatabee

Next >

### Administrators

- Perform administrative tasks for individual services
- Monitor key metrics and notifications for services
- Manage users and roles for cloud services
- Access the console for services you administer

### Users

- Launchpad to all of your applications and services
- Change your identity details and preferences

Cloud Tenant

Continue

[Notices](#) | [Terms of Use](#) | [Privacy](#)

Identity Domains,  
Tenants  
& Cloud Account

Mean the same thing:  
Your Cloud Space

Part of your Cloud URLs

Enter your Identity Domain;  
Login with user & password

# Compartments

Logical Dividers

Namespaces

Subdomains

Separation

Departments

Applications

“New Features”

nestable (6 levels)

*Nov. 1, 2018*

Renameable

*Sept. 7, 2017*

Deleteable

*Oct. 18, 2018*

Cloud Resources

**Stay in their Compartment**

See each other



Virtual Cloud Network Wizard

# VCN Wizard

---

Launched via Menu

Networking  
> Virtual Cloud Networks  
> Create Virtual Network

---

Creates Resources

in one easy step

---

Optional  
“with related resources”

But:  
less options to configure

---

All created resources

can be modified afterwards

---

Exception: VCN IP Range

---

# The Virtual Cloud Network Wizard (Network only)



Create Virtual Cloud Network [help](#) [cancel](#)

CREATE IN COMPARTMENT

DOAG-DB

robbedatabase (root)/DOAG-DB

NAME OPTIONAL

DOAG-DB Netzwerk

CREATE VIRTUAL CLOUD NETWORK ONLY

CREATE VIRTUAL CLOUD NETWORK PLUS RELATED RESOURCES

Creates a Virtual Cloud Network only. You'll still need to set up at least one Subnet, Gateway, and Route Rule to have a working Virtual Cloud Network.

CIDR BLOCK

10.145.120.0/24

Specified IP addresses: 10.145.120.0-10.145.120.255 (256 IP addresses)

DNS RESOLUTION

USE DNS HOSTNAMES IN THIS VCN

Allows assignment of DNS hostname when launching an Instance

DNS LABEL

doagdb

Only letters and numbers, starting with a letter. 15 characters max.

DNS DOMAIN NAME (READ-ONLY)

doagdb.oraclevcn.com

TAGS

Tagging is a metadata system that allows you to organize and track resources within your tenancy. Tags are composed of keys and values that can be attached to resources.

[Learn more about tagging](#)

TAG NAMESPACE	TAG KEY	VALUE
None (apply a free-form tag)		

[+ Additional Tag](#)

VIEW DETAIL PAGE AFTER THIS RESOURCE IS CREATED

Create Virtual Cloud Network

Demo

# The Virtual Cloud Network Wizard (Network only) [zoom]



Create Virtual Cloud Network

[help](#) [cancel](#)

CREATE IN COMPARTMENT

DOAG-DB



robbiedatabasee (root)/DOAG-DB

NAME *OPTIONAL*

DOAG-DB Netzwerk



CREATE VIRTUAL CLOUD NETWORK ONLY

CREATE VIRTUAL CLOUD NETWORK PLUS RELATED RESOURCES

Creates a Virtual Cloud Network only. You'll still need to set up at least one Subnet, Gateway, and Route Rule to have a working Virtual Cloud Network.

CIDR BLOCK

10.145.120.0/24

Specified IP addresses: 10.145.120.0-10.145.120.255 (256 IP addresses)

# The Virtual Cloud Network Wizard (Network only) - Results



MENU ORACLE Cloud Infrastructure compartment eu-frankfurt-1

Networking » Virtual Cloud Networks » Virtual Cloud Network Details

## DOAG-DB Netzwerk

Terminate Apply Tag(s)

**VCN**  
AVAILABLE

**VCN Information** Tags

<b>CIDR Block:</b> 10.145.120.0/24	<b>OCID:</b> ...fj45ra <a href="#">Show</a> <a href="#">Copy</a>
<b>Compartment:</b> robbiedatabasee (root)/DOAG-DB	<b>Default Route Table:</b> <a href="#">Default Route Table for DOAG-DB Netzwerk</a>
<b>Created:</b> Sat, 17 Nov 2018 15:34:31 GMT	<b>DNS Domain Name:</b> doagdb... <a href="#">Show</a> <a href="#">Copy</a>

### Subnets *in* robbiedatabasee (root) *Compartment*

Create Subnet

Sort by: Created Date (Desc) No Subnets

There are no Subnets in robbiedatabasee (root) that match the filter criteria.

Create Subnet

Resources

- Subnets (0)
- Route Tables (0)
- Internet Gateways (0)
- Dynamic Routing Gateways (0)
- Security Lists (0)
- DHCP Options (0)
- Local Peering Gateways (0)
- NAT Gateways (0)
- Service Gateways (0)

Demo

# The Virtual Cloud Network



Create Virtual Cloud Network

CREATE IN COMPARTMENT

DOAG-DEV

robbiedatabasee (root)/DOAG-I

NAME *OPTIONAL*

doagdev

CREATE VIRTUAL CLOUD

CREATE VIRTUAL CLOUD

Automatically sets up a public IP address and an internet gateway for the virtual cloud network. You can set up firewall rules at the virtual cloud network level to allow ingress and egress traffic to your Instance created in the same Compartment as the virtual cloud network.

## Create Subnet

Name: Public Subnet

Security List: Default Security List

DHCP Options: Default DHCP Options

CIDR: 10.0.2.0/24

Route Table: Default Route Table

DNS Label: A

Create Virtual Cloud Network

Create Virtual Cloud Network

The Virtual Cloud Network was created: [doagdev](#)

Create Internet Gateway

The Internet Gateway "Internet Gateway doagdev" was created

Update Default Route Table

The Route Table was updated: [Default Route Table for doagdev](#)

Create Subnet

Public Subnet yFpl:EU-FRANKFURT-1-AD-1 was created

Create Subnet

Public Subnet yFpl:EU-FRANKFURT-1-AD-2 was created

Create Subnet

Public Subnet yFpl:EU-FRANKFURT-1-AD-3 was created

Close

Resources)

resses)

s)

Demo

# The Virtual Cloud Network Wizard (Network + related Resources) Results



AVAILABLE

## doagdev

Terminate Apply Tag(s)

VCN Information Tags

CIDR Block: 10.0.0.0/16  
Compartment: robbiedatabase (root)/DOAG-DEV  
Created: Sat, 17 Nov 2018 16:33:52 GMT  
OCID: ...6ysg4q Show Copy  
Default Route Table: Default Route Table for doagdev  
DNS Domain Name: doagdev... Show Copy



### Resources

- Subnets (3)
  - Route Tables (1)
  - Internet Gateways (1)
  - Dynamic Routing Gateways (0)
  - Security Lists (1)
  - DHCP Options (1)
  - Local Peering Gateways (0)
  - NAT Gateways (0)
  - Service Gateways (0)
- List Scope COMPARTMENT

## Subnets in DOAG-DEV Compartment

Create Subnet

Sort by: Created Date (Desc) Displaying 3 Subnets < Page 1 >

	Public Subnet yFpl:EU-FRANKFURT-1-AD-3 OCID: ...pn5egq Show Copy	CIDR Block: 10.0.2.0/24 Virtual Router MAC Address: 00:00:17:75:8F:4D	Availability Domain: yFpl:EU-FRANKFURT-1-AD-3 DNS Domain Name: sub1117163... Show Copy Subnet Access: Public Subnet	Route Table: Default Route Table for doagdev Security Lists: Default Security List for doagdev	DHCP Options: Default DHCP Options for doagdev
	Public Subnet yFpl:EU-FRANKFURT-1-AD-2 OCID: ...2tpbia Show Copy	CIDR Block: 10.0.1.0/24 Virtual Router MAC Address: 00:00:17:75:8F:4D	Availability Domain: yFpl:EU-FRANKFURT-1-AD-2 DNS Domain Name: sub1117163... Show Copy Subnet Access: Public Subnet	Route Table: Default Route Table for doagdev Security Lists: Default Security List for doagdev	DHCP Options: Default DHCP Options for doagdev
	Public Subnet yFpl:EU-FRANKFURT-1-AD-1 OCID: ...cs5ffq Show Copy	CIDR Block: 10.0.0.0/24 Virtual Router MAC Address: 00:00:17:75:8F:4D	Availability Domain: yFpl:EU-FRANKFURT-1-AD-1 DNS Domain Name:	Route Table: Default Route Table for doagdev Security Lists: Default Security List for doagdev	DHCP Options: Default DHCP Options for doagdev



# Networking in OCI



# Networking

## VCN

Virtual Cloud Network

IPv4 only

Covers Network Addresses

single, contiguous CIDR block

## Subnets

exists in a single

availability domain

contain VNICs with same

route table  
security lists  
DHCP Options



# Private IP Networks



RFC1918 name	IP address range	number of addresses	largest <u>CIDR</u> block (subnet mask)	<u>classful</u> description
24-bit block	10.0.0.0 – 10.255.255.255	16777216	10.0.0.0/8 (255.0.0.0)	single class A network
20-bit block	172.16.0.0 – 172.31.255.255	1048576	172.16.0.0/12 (255.240.0.0)	16 contiguous class B networks
16-bit block	192.168.0.0 – 192.168.255.255	65536	192.168.0.0/16 (255.255.0.0)	256 contiguous class C networks

[https://en.wikipedia.org/wiki/Private\\_network](https://en.wikipedia.org/wiki/Private_network)

# IP Subnetworks – Masking & CIDR



IP Addresses in the same Subnet are considered local

no routing required

Subnet Masking

Binary Operation “AND”

Google

**Network**

192.168.132.0 mask 255.255.255.0

“Network Calculator”

**CIDR**

192.168.132.0/24

“IP Subnet Calculator”

IPv4 Addresses are 4 Bytes	192	168	132	197
Each Byte has 8 Bits, 0-255	1100 0000	1010 1000	1000 0100	1100 0101
Subnet Masks	255	255	255	0
CIDR counts the 1s (3 x 8 = 24)	1111 1111	1111 1111	1111 1111	0000 0000
Network Address (logical AND)	192	168	132	0

# Examples of IP-Subnets



Network	Low IP Network Adr	High IP Broadcast Adr	# Adrs	Netmask
192.168.132.197/28	192.168.132.193 192.168.132.192	192.168.132.206 192.168.132.207	14	255.255.255.240
172.24.19.100/20	172.24.16.1 172.24.16.0	172.24.19.254 172.24.19.255	4096	255.255.240.0
10.100.0.0/16	10.100.0.1 10.100.0.0	10.100.255.254 10.100.255.255	65534	255.255.0.0

## IP Routing

whenever a Packet has to leave its subnet

“Destination is not on the switch”

Addresses in own Subnet are considered local

no routing

**NEVER OVERLAP**

IP-Ranges in Networks

## Plan Ahead

Use only “new” IP-Ranges for Networks

as small as possible

as big as necessary

at least 3 Subnets for Availability Domains

A Cloud Account is a new Datacenter

Chance for a fresh Start

Quick and Dirty Trials

Don't let them become productive

Destroy and rebuild



# Networking

## VNIC

Virtual Network Interface Card

## Private IP

Assigned to each VNIC

primary

unchanged during lifetime

## Public IP

Routable from Internet

assigned to VNICs

optional



# Networking

## Route Tables

Routes from Subnet to outside VCN

Default

empty

## Security Lists

Virtual Firewall Rules

Stateful, Stateless

Ingress = inbound; egress = outbound

Default Set (stateful)

Ingress: allow ssh, icmp type 33+4

Egress: allow any

## DHCP Options

Configuration Set

Limited Options

DNS Type

Search Domain



AVAILABLE

## Default Security List for DOAG-DB Netzwerk

[Edit All Rules](#)
[Terminate](#)
[Apply Tag\(s\)](#)

[Security List Information](#)
[Tags](#)

OCID: ...sunwca [Show](#) [Copy](#)

Created: Sat, 17 Nov 2018 15:34:31 GMT

Instance traffic is controlled by firewall rules on each Instance in addition to this Security List

### Resources

[Ingress Rules \(3\)](#)

[Egress Rules \(1\)](#)

## Ingress Rules

### Stateless Rules

No Ingress Rules

There are no stateless Ingress Rules for this Security List.

### Stateful Rules

Source: 0.0.0.0/0	IP Protocol: TCP	Source Port Range: All	Destination Port Range: 22	Allows: TCP traffic for ports: 22 SSH Remote Login Protocol
Source: 0.0.0.0/0	IP Protocol: ICMP	Type and Code: 3, 4		Allows: ICMP traffic for: 3, 4 Destination Unreachable: Fragmentation Needed and Don't Fragment was Set
Source: 10.145.120.0/24	IP Protocol: ICMP	Type and Code: 3		Allows: ICMP traffic for: 3 Destination Unreachable

verk

Demo

ICP Options

## Gateways (GW) Virtual Routers

Dynamic Routing GW (DRG)	private Network traffic VCN and on-Premises	
Internet GW	provides direct Internet Access	
NAT GW	Network Address Translation	Connects Cloud resources to Internet without Public IP
Service Gateway	Peers VCN with other Oracle Cloud Services	e.g. Object Storage
Local Peering GW (LPG)	Peer VCNs in <b>same</b> Region	
Remote Peering Connection	Peer VCNs in <b>different</b> Regions	

# Connecting to the Cloud



# Paths into the Cloud

ssh Tunnel	to public IP	Ends on Compute Server	
	Testing and Development only		
	Custom Firewall Appliance	Compute Instance	Custom Image
		Custom VPN Setup	e.g. <a href="#">OpenVPN</a>
	IPSec VPN	Connect on-Premises VPN to Dynamic Routing Gateway (DRG)	Routing through public Internet
OCI FastConnect	Private Connection		
	Peering	Private Public	
	Expensive	+ Provider (leased Line) + Datacenter	

# OCI Networking Costs - Currencies



**Next Topic**

# OCI Networking – Costs EUR - Euro (€)



Infrastructure > Oracle Cloud Infrastructure > Networking > Pricing

## Networking

Try for Free Buy Now

Overview Features **Pricing** Learn More Documentation

EUR - Euro (€)

Assumptions:  
1Gbit Connection  
1 TB Data transfer  
takes 3h (roughly)

## Networking

Pricing calculator →

Product	Pay as You Go (GB Outbound Data Transfer Per Month)
Outbound Data Transfer - First 10 TB / Month	Free
Outbound Data Transfer - Over 10 TB / Month	€0.0074
Inbound Data Transfer	Free

$24h \times 30 / (3h * TB) \approx 240 TB$   
 $240 TB - 10 TB \approx 230.000 GB$   
 $230.000 * 0,0074€ = 1.702€$   
**max per Month**

<https://cloud.oracle.com/networking/pricing> as of 01-JAN-2019

# FastConnect Pricing EUR - Euro (€)



Infrastructure > FastConnect > Pricing

**FastConnect** Try for Free Buy Now

Overview Features **Pricing** Providers Supported Services Connectivity Models Learn More Documentation

EUR - Euro (€)

FastConnect

Pricing calculator →

Product	Pay as You Go (Port Hour)	Includes
FastConnect 1 Gbps	€0.1845	No separate charges for inbound or outbound data transfer
FastConnect 10 Gbps	€1.107	No separate charges for inbound or outbound data transfer

Note: Pricing shown does not include fees the Network Provider or Datacenter Provider may charge for connectivity. For more details please refer to the "Billing and Pricing" section of the [FastConnect FAQ](#).

$$24h * 31 = 744h$$

1 Gbps:  
 $744 * €0,1845 = €137,27$

10 Gbps:  
 $744 * €1,107 = €823,61$

Additional costs:  
+ Network Provider (leased line)  
+ Datacenter Provider  
+ OCI Networking

<https://cloud.oracle.com/fastconnect/pricing> as of 01-JAN-2019

# Oracle Cloud Cost Estimator EUR – Euro (€)



## Configuration Options

Pay As You Go

Monthly Flex

Oracle Cloud Infrastructure - FastConnect

€2,656

€2,656

Network

€2,656

€2,656

### Utilization

- ▶ Number of Instances / 1 Instance(s)
- ▶ Average Days Usage per Month / 31 day(s)
- ▶ Average Hours Usage per Day / 24 hour(s)

### Configuration

FastConnect 1 Gbps (B88325) / 1

€137

€137

Port Hour

1

Outbound Data Transfer (B88327) / 240000

€1,696

€1,696

Gigabyte Outbound Data Transfer Per Month

240000

FastConnect 10 Gbps (B88326) / 1

€824

€824

Port Hour

1

[https://cloud.oracle.com/en\\_US/cost-estimator](https://cloud.oracle.com/en_US/cost-estimator) as of 01-JAN-2019

# OCI Networking – Costs USD - US-Dollar (\$)



Infrastructure > Oracle Cloud Infrastructure > Networking > Pricing

## Networking

Try for Free Buy Now

Overview Features **Pricing** Learn More Documentation

USD - US Dollar (\$) -

Assumptions:

1GBit Connection

1 TB Data transfer  
takes 3h (roughly)

## Networking

Pricing calculator →

Product	Pay as You Go (GB Outbound Data Transfer Per Month)
Outbound Data Transfer - First 10 TB / Month	Free
Outbound Data Transfer - Over 10 TB / Month	\$0.0085
Inbound Data Transfer	Free

$24h \times 30 / (3h * TB) \approx 240 TB$   
 $240 TB - 10 TB \approx 230.000 GB$   
 $230.000 * \$0.0085 = \$1,955.0$   
**max per Month**

<https://cloud.oracle.com/networking/pricing> as of 01-JAN-2019

# FastConnect Pricing USD - US-Dollar (\$)



Infrastructure > FastConnect > Pricing

**FastConnect** Try for Free Buy Now

Overview Features **Pricing** Providers Supported Services Connectivity Models Learn More Documentation

USD - US Dollar (\$) ▾

$$24h * 31 = 744h$$

1 Gbps:  
 $744 * \$0.2125 = \$158.10$

10 Gbps:  
 $744 * \$1.275 = \$948.60$

FastConnect

Pricing calculator →

Product	Pay as You Go (Port Hour)	Includes
FastConnect 1 Gbps	\$0.2125	No separate charges for inbound or outbound data transfer
FastConnect 10 Gbps	\$1.275	No separate charges for inbound or outbound data transfer

Additional costs:  
+ Network Provider (leased line)  
+ Datacenter Provider  
+ OCI Networking

Note: Pricing shown does not include fees the Network Provider or Datacenter Provider may charge for connectivity. For more details please refer to the "Billing and Pricing" section of the [FastConnect FAQ](#).

<https://cloud.oracle.com/fastconnect/pricing> as of 01-JAN-2019

# Oracle Cloud Cost Estimator – USD - US-Dollar (\$)



## Configuration Options

Pay As You Go

Monthly Flex

▼ Oracle Cloud Infrastructure - FastConnect

\$3,060

\$3,060

▼  Network

\$3,060

\$3,060

### Utilization

- ▶ Number of Instances / 1 Instance(s)
- ▶ Average Days Usage per Month / 31 day(s)
- ▶ Average Hours Usage per Day / 24 hour(s)

### Configuration

▲ FastConnect 1 Gbps (B88325) / 1

\$158

\$158

Port Hour

▲ Outbound Data Transfer (B88327) / 240000

\$1,953

\$1,953

Gigabyte Outbound Data Transfer Per Month

▲ FastConnect 10 Gbps (B88326) / 1

\$949

\$949

Port Hour

[https://cloud.oracle.com/en\\_US/cost-estimator](https://cloud.oracle.com/en_US/cost-estimator) as of 01-JAN-2019

# OCI Networking – Costs NOK – Norwegian Krone (kr)



Infrastructure > Oracle Cloud Infrastructure > Networking > Pricing

## Networking

Try for Free Buy Now

Overview Features **Pricing** Learn More Documentation

NOK - Norwegian Krone (kr)

Assumptions:  
1Gbit Connection  
1 TB Data transfer  
takes 3h (roughly)

## Networking

Pricing calculator →

$24h \times 30 / (3h * TB) \approx 240 TB$   
 $240 TB - 10 TB \approx 230.000 GB$   
 $230.000 * kr0.0696 = kr16,008$   
**max per Month**

Product	Pay as You Go (GB Outbound Data Transfer Per Month)
Outbound Data Transfer - First 10 TB / Month	Free
Outbound Data Transfer - Over 10 TB / Month	kr0.0696
Inbound Data Transfer	Free

<https://cloud.oracle.com/networking/pricing> as of 01-JAN-2019

# FastConnect Pricing USD - NOK – Norwegian Krone (kr)



Infrastructure > FastConnect > Pricing

FastConnect

Try for Free Buy

Overview Features **Pricing** Providers Supported Services Connectivity Models Learn More Documentation

NOK - Norwegian Krone (kr) -

$$24h * 31 = 744h$$

1 Gbps:

$$744 * kr1.7406 = kr1,295.01$$

10 Gbps:

$$744 * kr10.4434 = kr7,769.89$$

FastConnect

Pricing calculator →

Product	Pay as You Go (Port Hour)	Includes
FastConnect 1 Gbps	kr1.7406	No separate charges for inbound or outbound data transfer
FastConnect 10 Gbps	kr10.4434	No separate charges for inbound or outbound data transfer

Additional costs:

+ Network Provider (leased line)

+ Datacenter Provider

+ OCI Networking

Note: Pricing shown does not include fees the Network Provider or Datacenter Provider may charge for connectivity. For more details please refer to the "Billing and Pricing" section of the [FastConnect FAQ](#).

<https://cloud.oracle.com/fastconnect/pricing> as of 01-JAN-2019

# Oracle Cloud Cost Estimator NOK – Norwegian Krone (kr)



## Configuration Options

Pay As You Go

Monthly Flex

Oracle Cloud Infrastructure - FastConnect

kr25,061

kr25,061

Network

kr25,061

kr25,061

### Utilization

- ▶ Number of Instances / 1 Instance(s)
- ▶ Average Days Usage per Month / 31 day(s)
- ▶ Average Hours Usage per Day / 24 hour(s)

### Configuration

FastConnect 1 Gbps (B88325) / 1

kr1,295

kr1,295

Port Hour

1

Outbound Data Transfer (B88327) / 240000

kr15,997

kr15,997

Gigabyte Outbound Data Transfer Per Month

240000

FastConnect 10 Gbps (B88326) / 1

kr7,770

kr7,770

Port Hour

1

[https://cloud.oracle.com/en\\_US/cost-estimator](https://cloud.oracle.com/en_US/cost-estimator) as of 01-JAN-2019



# Scripting the Cloud

**AUTOMATE  
IT!**

Building up and tearing down of virtual environments happens frequently in the Cloud

Some changes can only be made by recreating the resource

Provisioning Cloud Resources by Clicking the UI is tedious and error prone

Use the Web-UI for Orientation only

Scripting is automation and documentation at the same time: **Software Defined Infrastructure**

# Scripting Options

## REST API

“The Master”

Provides Access to ALL Resources and Options

More Programming than Scripting

## OCI CLI

Python Based CLI

Unix & Windows

OpenSource Hosted on GitHub

## HashiCorp Terraform

Scripting across all Major IaaS Providers

Provider by Oracle

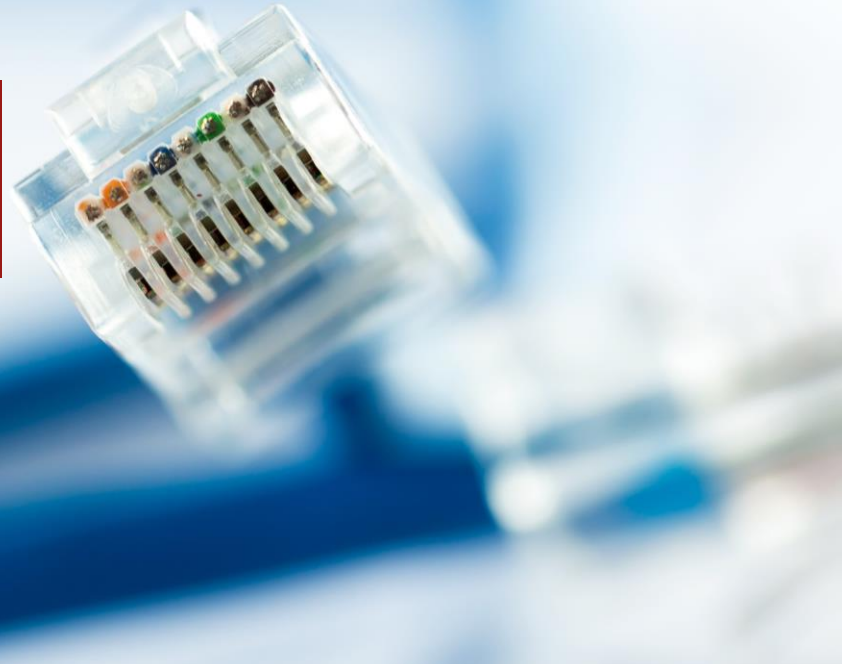
De facto Standard for Scripting Cloud Resources

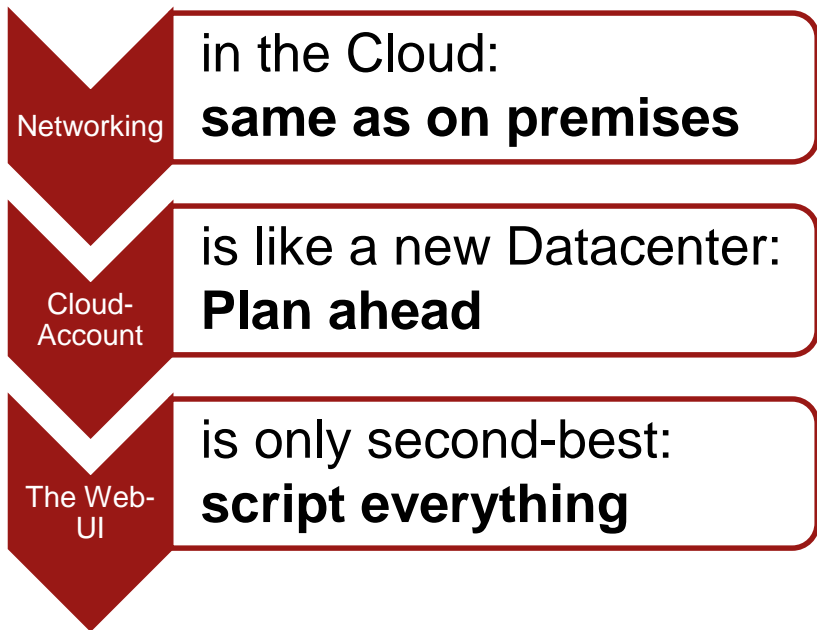
## Ansible

Agentless Orchestration and Automation

OCI Module provided by Oracle

# Conclusion





**The Sky Cloud is the  
Limit**



DOAG 2019 Noon2Noon:  
Die Oracle Datenbank in der Cloud  
16.-17. Januar 2019, Frankfurt am Main  
<https://www.doag.org/de/event/eventdetails/567305>

DOAG DB Community  
Veranstaltungen

DOAG 2019 Datenbank  
3.-4. Juni 2019 Düsseldorf  
<https://datenbank.doag.org/>  
Call for Papers startet heute



Vielen Dank für Ihre  
Aufmerksamkeit.