

**h\_da**

HOCHSCHULE DARMSTADT  
UNIVERSITY OF APPLIED SCIENCES

**fbi**

FACHBEREICH INFORMATIK



# Cloud Overview & Oracle Cloud Infrastructure





# Robert Marz – Independent Consultant



## Primary Job Role

Senior Technical Architect  
with database centric view of the world

## DOAG (German Oracle User Group)

Active Member of Database Community  
Responsible for Cloud Topics



@RobbieDatabee



robbie.databee.org



robert@databee.org



**Databees.**



**ORACLE**  
ACE

# 500+ Technical Experts Helping Peers Globally



**ORACLE**  
ACE Director



**ORACLE**  
ACE



**ORACLE**  
ACE Associate

---

[bit.ly/OracleACEProgram](https://bit.ly/OracleACEProgram)

Nominate yourself or someone you know: [acenomination.oracle.com](https://acenomination.oracle.com)

# What is a Cloud?



Cloud?

---



**There is no cloud**

it's just someone else's computer



## Begriffsbestimmung Cloud

---

"Cloud Computing ist ein **Modell**, das es erlaubt **bei Bedarf**,  
**jederzeit** und überall bequem über ein Netz auf einen geteilten Pool  
von konfigurierbaren **Rechnerressourcen** [...] zuzugreifen,  
die **schnell** und mit minimalem Managementaufwand oder **geringer**  
**Serviceprovider-Interaktion**  
zur Verfügung gestellt werden können."

BSI (basierend auf der NIST-Definiton von 2011)



# Cloud Computing

---

Cloud Computing bezeichnet das **dynamisch** an den Bedarf **angepasste**, **hochautomatisierte**

- Anbieten
- Nutzen
- Abrechnen

von IT-Dienstleistungen über ein Netz.

BSI (basierend auf der NIST-Definiton von 2011)



# Cloud charakteristische Eigenschaften

## On-demand Self Service

Die Provisionierung der Ressourcen (z. B. Rechenleistung, Storage) läuft automatisch ohne Interaktion mit dem Service Provider ab.

## Broad Network Access

Die Services sind mit Standard-Mechanismen über das Netz verfügbar und nicht an einen bestimmten Client gebunden.

## Resource Pooling

Die Ressourcen des Anbieters liegen in einem Pool vor, aus dem sich viele Anwender bedienen können (Multi-Tenant Modell). Dabei wissen die Anwender nicht, wo die Ressourcen sich befinden, sie können aber vertraglich den Speicherort, also z. B. Region, Land oder Rechenzentrum, festlegen.

## Rapid Elasticity

Die Services können schnell und elastisch zur Verfügung gestellt werden, in manchen Fällen auch automatisch. Aus Anwendersicht scheinen die Ressourcen daher unendlich zu sein.

## Measured Services

Die Ressourcennutzung kann gemessen und überwacht werden und entsprechend bemessen auch den Cloud-Anwendern zur Verfügung gestellt werden.



# Cloud Geschmacksrichtungen

## Public Cloud

Im Internet  
von jedem  
buchbar

- Amazon AWS
- MS Azure
- Google Cloud
- Oracle Cloud

## Private Cloud

Betrieb on  
premises  
alle Cloud  
Eigenschaften

- OpenStack
- Oracle Cloud  
Machine
- MS Azure Stack

## Hybrid Cloud

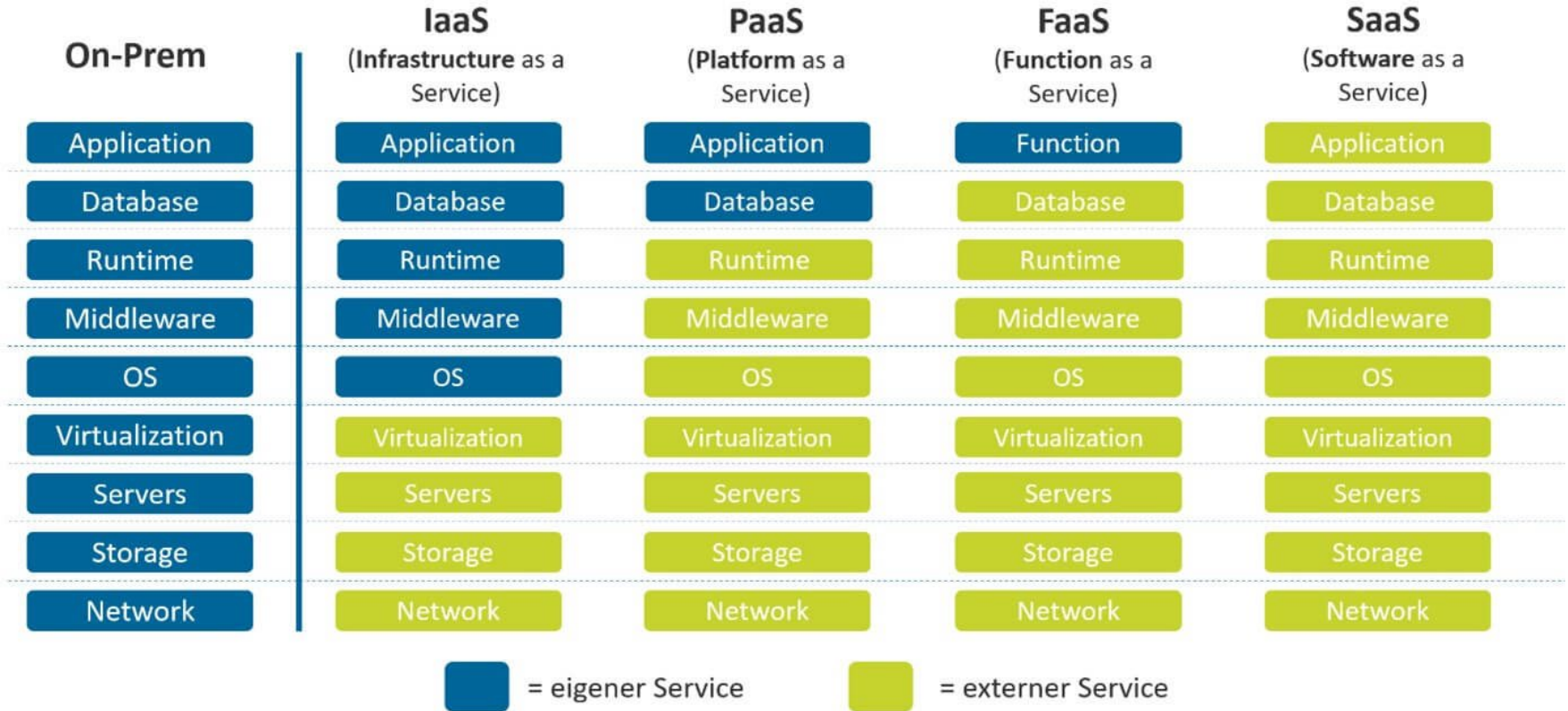
Public &  
Private  
gemischt  
weit  
verbreitet

## Multi-Cloud

Mischung von  
Public  
Clouddiensten  
verschiedener  
Anbieter



# Cloud Servicemodelle



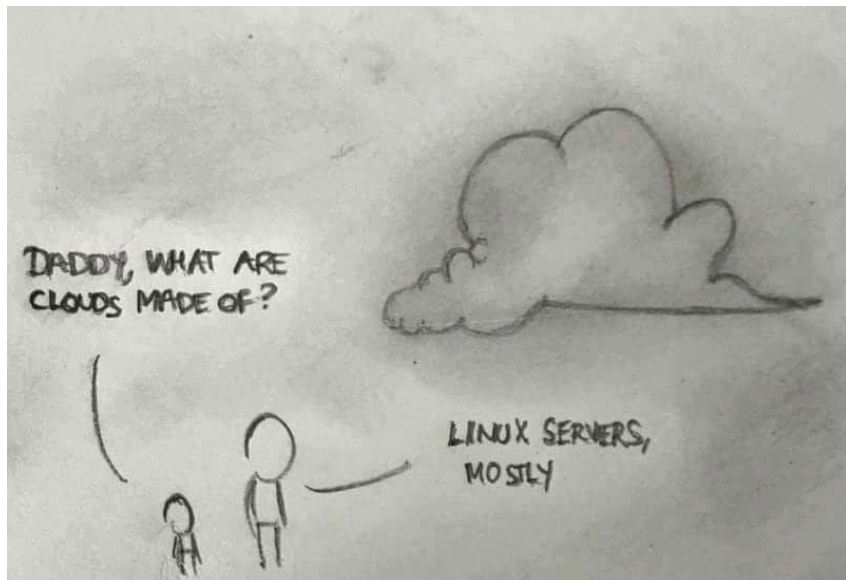


What means IaaS?

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



# IaaS Clouds



## 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>**

---

**CLOUD**



# Oracle Cloud Infrastructure Overview

**GOVERNANCE**  
(IAM / APIs)

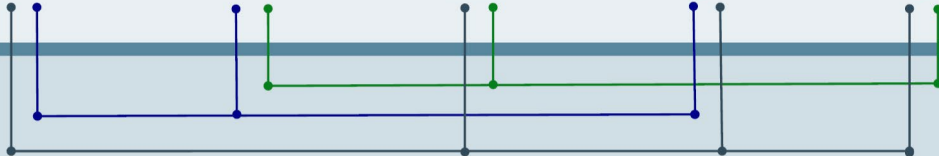


COMPUTE      STORAGE      DATABASE      NETWORK      EDGE

Services



Virtuelles Netzwerk



Physikalisches Netzwerk



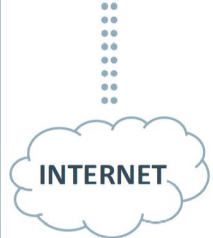
**ORACLE**  
**REGION**

RECHENZENTREN/  
AVAILABILITY DOMAINS



Verbindung - FastConnect/IPSec

ORACLE  
REGION *n*



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](#)

©2020 Robert Marz @RobbieDatabee

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  
(not anymore)

See each other





# Virtual Cloud Network Wizard



# Virtual Cloud Network Wizard

## VCN Wizard

Launched via  
Menu

Networking  
> Virtual Cloud  
Networks  
> Create Virtual  
Network

Creates  
Resources

in one easy step

Start VCN  
Wizard

VCN with Internet  
Connectivity  
... and Site-to-Site VPN  
Connect

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

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)

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) <input type="text"/>	<input type="text"/>	<input type="text"/>

VIEW DETAIL PAGE AFTER THIS RESOURCE IS CREATED

Demo



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

Create Virtual Cloud Network

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

CREATE IN COMPARTMENT

DOAG-DB

robbiedatabee (root)/DOAG-DB

NAME *OPTIONAL*

DOAG-DB Netzwerk

- CREATE VIRTUAL CLOUD NETWORK ONLY
- CREATE VIRTUAL CLOUD NETWORK PLUS RELATED RESOURCES

**Demo**

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

Networking » Virtual Cloud Networks » Virtual Cloud Network Details



AVAILABLE

## DOAG-DB Netzwerk

Terminate Apply Tag(s)

VCN Information Tags

CIDR Block: 10.145.120.0/24 OCID: ...fj45ra Show Copy  
Compartment: robbiedatabee (root)/DOAG-DB Default Route Table: Default Route Table for DOAG-DB Netzwerk  
Created: Sat, 17 Nov 2018 15:34:31 GMT DNS Domain Name: doagdb... Show Copy

### 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)

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

Create Subnet

Sort by: Created Date (Desc) No Subnets

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

Create Subnet





# The Virtual Cloud Network

Create Virtual Cloud Network

CREATE IN COMPARTMENT

DOAG-DEV

robbiedatabee (root)/DOAG-I

NAME *OPTIONAL*

doagdev

CREATE VIRTUAL CLOUD

CREATE VIRTUAL CLOUD

Automatically sets up a firewall rules at ingress and egress traffic to your Instance created in the same Compartment as th

## Create Subnet

Name: Public

Security List:

DHCP Option

CIDR: 10.0.2

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

@RobbieDatabee

# related Resources)

sses)

s)

# Demo



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

Networking » Virtual Cloud Networks » Virtual Cloud Network Details



AVAILABLE

## doagdev

Terminate Apply Tag(s)

VCN Information Tags

CIDR Block: 10.0.0.0/16  
Compartment: robbiedatabasee (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)

## 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 AVAILABLE	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: <a href="#">Default Route Table for doagdev</a> Security Lists: <a href="#">Default Security List for doagdev</a>	DHCP Options: <a href="#">Default DHCP Options for doagdev</a>
	Public Subnet yFpl:EU-FRANKFURT-1-AD-2 OCID: ...2tpbia Show Copy AVAILABLE	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: <a href="#">Default Route Table for doagdev</a> Security Lists: <a href="#">Default Security List for doagdev</a>	DHCP Options: <a href="#">Default DHCP Options for doagdev</a>
	Public Subnet yFpl:EU-FRANKFURT-1-AD-1 OCID: ...cs5ffq Show Copy AVAILABLE	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: ... Show Copy	Route Table: <a href="#">Default Route Table for doagdev</a> Security Lists: <a href="#">Default Security List for doagdev</a>	DHCP Options: <a href="#">Default DHCP Options for doagdev</a>

# Networking in OCI

The image features a central 3D rendered blue cloud with a yellow Ethernet cable plugged into its side. The background is filled with several other similar blue clouds and yellow Ethernet cables, some of which are slightly out of focus, creating a sense of depth and connectivity. An orange horizontal bar is positioned across the middle of the image, containing the text 'Networking in OCI' in white.



# OCI Networking Components (1/3)

## Networking

VCN

Virtual  
Cloud  
Network

**IPv4 only**

Covers  
Network  
Addresses

single,  
contiguous  
CIDR block

Subnets

Scope

Regional  
Availability  
Domain  
specific

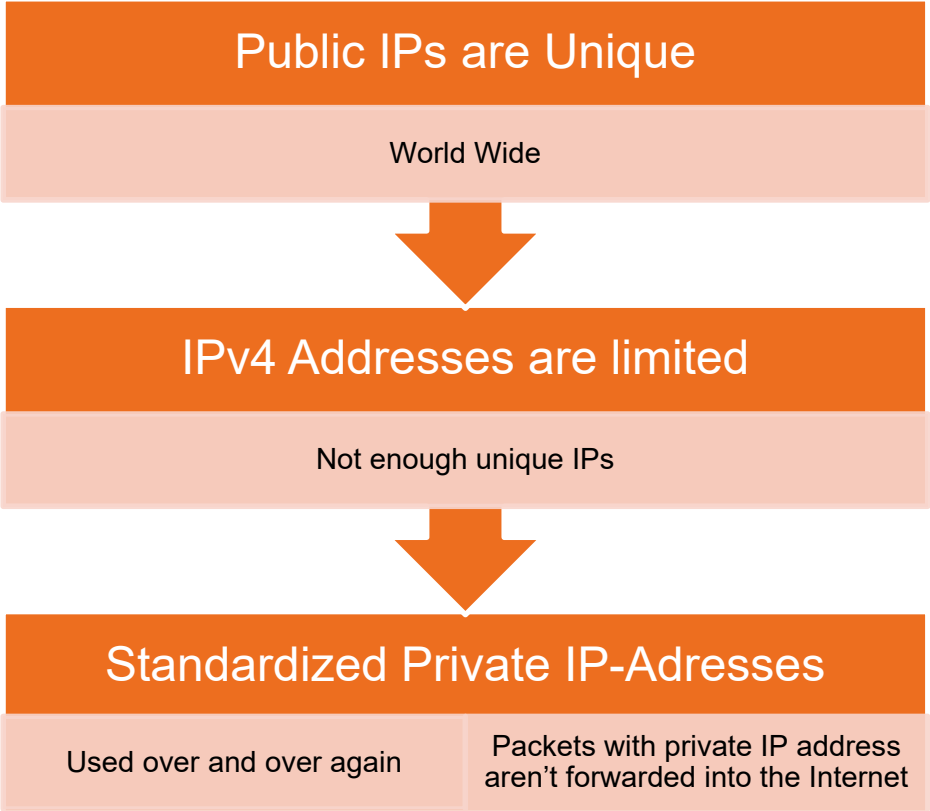
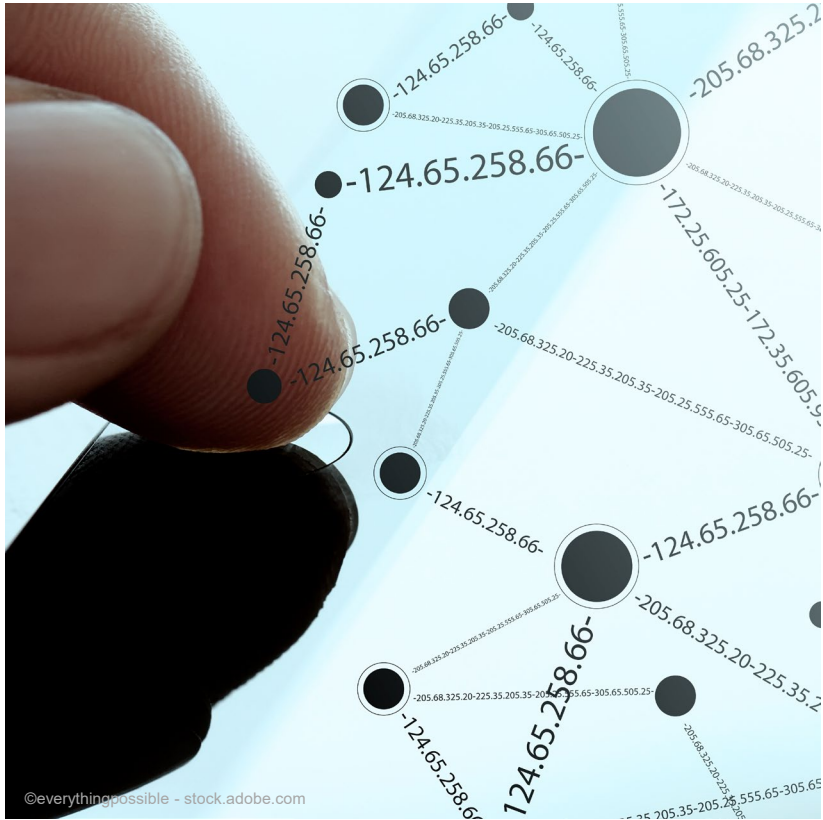
contain  
VNICs  
with same

route table  
security lists  
DHCP Options





# Private & Public IPs





# 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 Calculator”  
“IP Subnet Calculator”

**Network**

192.168.132.0 mask 255.255.255.0

**CIDR**

192.168.132.0/24

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



## Subnet masking in Action

Network 192.168.132.197/28  
netmask 255.255.255.240

IP	Masked IP
192.168.132.197	192.168.132.192



## Subnet masking in Action

Network 192.168.132.197/28  
netmask 255.255.255.240

IP	Masked IP
192.168.132.197	192.168.132.192
192.168.132.190	192.168.132.176



## Subnet masking in Action

Network 192.168.132.197/28  
netmask 255.255.255.240

IP	Masked IP
192.168.132.197	192.168.132.192
192.168.132.190	192.168.132.176
192.168.132.209	192.168.132.208



# Subnet masking in Action

Network 192.168.132.197/28  
netmask 255.255.255.240

IP	Masked IP
192.168.132.197	192.168.132.192
192.168.132.190	192.168.132.176
192.168.132.209	192.168.132.208
192.168.132.200	192.168.132.192



## 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 – Why planning ahead is important

## 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

Optional

Assigned to VNIC  
50 static IPs free of charge

Requirements

Public Subnet, Internet Gateway



# 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 3+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



ICP Options



# OCI Networking Gateways

## 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





# Connecting on-Premises to the Cloud

# Paths into the Cloud

ssh Tunnel	to public IP	Ends on Compute Server
	Testing and Development only	
	Custom Firewall Appliance	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



# Paths into the Cloud: ssh Tunnel

## ssh Tunnel

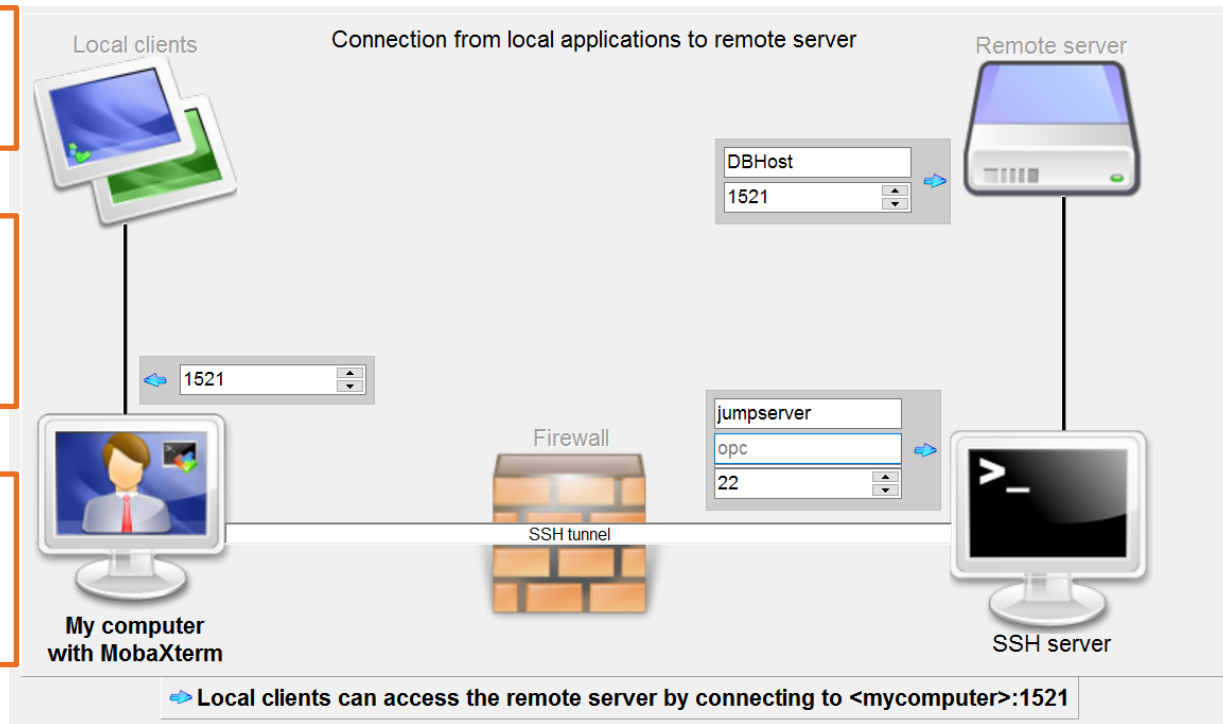
opens Port on local host

## tunnels

IP Packets to ssh-destination  
„jumpserver“

## forwards

IP Packets to any host/port  
accessible from jumpserver





# Paths into the Cloud: Autonomous Database

Autonomous DBs

can't have VNICs

Access

encrypted via Internet

Wallet

Download zip-Archive  
Import directly to SQL Developer  
unzip & configure for SQLNet

Database Connection

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

You will need the client credentials and connection information to connect to your database. The client credentials include the wallet, which is required for all types of connections.

## Download Client Credentials (Wallet)

To download your client credentials, click Download, and supply a password for the wallet.

Download

## Connection Strings

Use the following connection strings or TNS names for your connections. See the [documentation](#) for details.

TNS Name ⓘ	Connection String ⓘ
ADWFINANCE_HIGH	...2av7afb6b6bl_adwfinance_high.adwc.oraclecloud.com <a href="#">Show</a> <a href="#">Copy</a>
ADWFINANCE_MEDIUM	...v7afb6b6bl_adwfinance_medium.adwc.oraclecloud.com <a href="#">Show</a> <a href="#">Copy</a>
ADWFINANCE_LOW	...g2av7afb6b6bl_adwfinance_low.adwc.oraclecloud.com <a href="#">Show</a> <a href="#">Copy</a>

Showing 3 Item(s)

Close



# 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 (€)

## 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

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

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

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



# FastConnect Pricing EUR - Euro (€)

Infrastructure > FastConnect > Pricing

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

$$24h * 31 = 744h$$

1 Gbps:  
 $744 * €0,1845 = €137,27$

10 Gbps:  
 $744 * €1,107 = €823,61$

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

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). <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

<ul style="list-style-type: none"> <li>Oracle Cloud Infrastructure - FastConnect</li> </ul>	€2,656	€2,656
<ul style="list-style-type: none"> <li>Network</li> </ul> <p>Utilization</p> <ul style="list-style-type: none"> <li>▶ Number of Instances / 1 Instance(s)</li> <li>▶ Average Days Usage per Month / 31 day(s)</li> <li>▶ Average Hours Usage per Day / 24 hour(s)</li> </ul> <p>Configuration</p> <ul style="list-style-type: none"> <li>FastConnect 1 Gbps (B88325) / 1           <ul style="list-style-type: none"> <li>Port Hour <input type="text" value="1"/></li> </ul> </li> <li>Outbound Data Transfer (B88327) / 240000           <ul style="list-style-type: none"> <li>Gigabyte Outbound Data Transfer Per Month <input type="text" value="240000"/></li> </ul> </li> <li>FastConnect 10 Gbps (B88326) / 1           <ul style="list-style-type: none"> <li>Port Hour <input type="text" value="1"/></li> </ul> </li> </ul>	€2,656	€2,656

[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 (\$)

Cloud / Cloud Networking /  
Networking Cloud Pricing

Buy now

Overview **Networking Cloud Pricing** Service Gateway

## Oracle Networking Cloud Pricing

Cost Estimator

Oracle Cloud infrastructure offers low networking prices that enable customers to move significant quantities of data for less. Inbound data transfer is free, and we offer a high threshold for free outbound data transfer - the first 10TB per month is free for each tenancy. After that, outbound data transfer rates are based on geography.

Product	Pay As You Go	Metric
Inbound Data Transfer	Free	Gigabyte Outbound Data Transfer per Month
Outbound Data Transfer - First 10 TB / Month	Free	Gigabyte Outbound Data Transfer per Month
Outbound Data Transfer - Over 10 TB / Month- Originating in North America and Europe	\$0.0085 USD	Gigabyte Outbound Data Transfer per Month
Outbound Data Transfer - Over 10 TB / Month- Originating in APAC, Japan and South America	\$0.025 USD	Gigabyte Outbound Data Transfer per Month
Outbound Data Transfer - Over 10 TB / Month- Originating in Middle East and Africa	\$0.050 USD	Gigabyte Outbound Data Transfer per Month

Note: VPN Connect is a free service with no port hour charges. Data transfer cost is covered under networking cloud pricing.

<https://cloud.oracle.com/networking/pricing> as of 24-JUN-2020

Assumptions:

1GBit Connection

1 TB Data transfer

takes 3h (roughly)

$24h \times 30 / (3h * TB) \approx 240 TB$

$240 TB - 10 TB \approx 230.000 GB$

$230.000 * \$0.0085 = \$1,955.0$

**max per Month**



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

## FastConnect Cloud Pricing

Cost Estimator

USD - US Dollar (\$)

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

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

<https://www.oracle.com/cloud/networking/fastconnect.html#pricing> as of 24-JUN-2020

$$24h * 31 = 744h$$

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

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

- Additional costs:
- + Network Provider (leased line)
  - + Datacenter Provider (+ OCI Outbound Traffic)



# 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 24-JUN-2020

# 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)

## 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	kr0.0696
Inbound Data Transfer	Free

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

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

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



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

Infrastructure > FastConnect > Pricing

Try for Free Buy Now

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

NOK - Norwegian Krone (kr)

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

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.

$$24h * 31 = 744h$$

$$1 \text{ Gbps: } 744 * \text{kr}1.7406 = \text{kr}1,295.01$$

$$10 \text{ Gbps: } 744 * \text{kr}10.4434 = \text{kr}7,769.89$$

- 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 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

Outbound Data Transfer (B88327) / 240000

kr15,997

kr15,997

Gigabyte Outbound Data Transfer Per Month

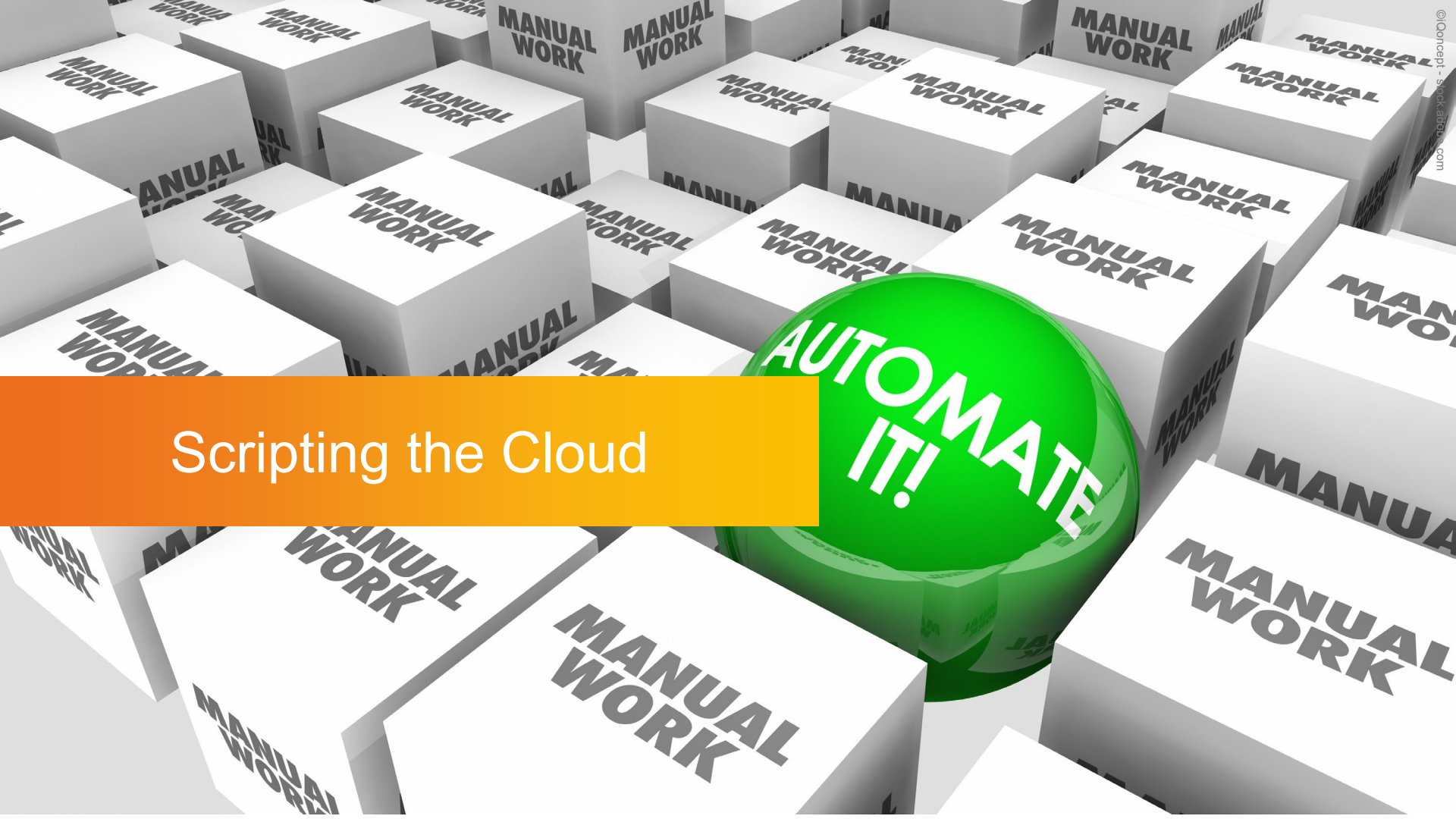
FastConnect 10 Gbps (B88326) / 1

kr7,770

kr7,770

Port Hour

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



Scripting the Cloud



## Scripting means Automation: Infrastructure as Code

---

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 – Automate all the Things!

## 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

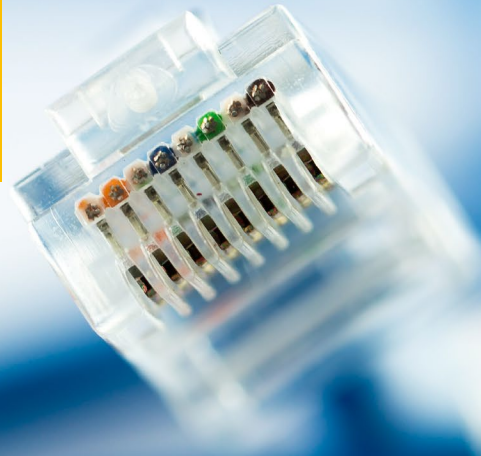
Defacto Standard for Scripting Cloud Resources

### Ansible

Agentless Orchestration and Automation

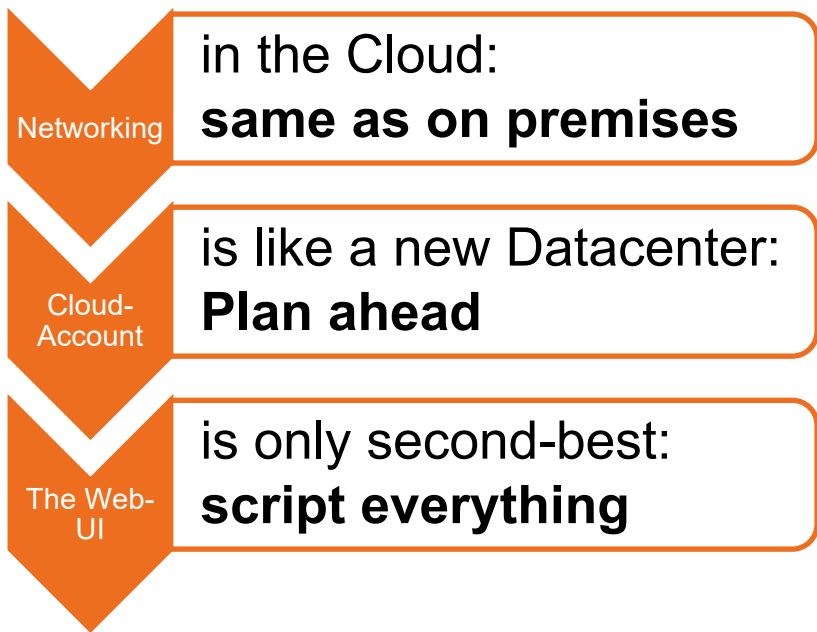
OCI Module provided by Oracle

# Conclusion





## Automate your Cloud



The Sky Cloud is the  
~~Limit~~

