



# Oracle Cloud Infrastructure Netzwerkeinrichtung für DBAs

Robert Marz



## Kunde

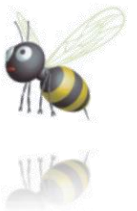
Senior Technical Architect mit datenbankzentrischen  
Weltbild



**ORACLE**  
ACE

## its-people

Portfolio Manager Database Technologies  
Blog Editor



## DOAG

Aktives Mitglied der DOAG Datenbank Community.  
Verantwortlich für Cloud Themen



@RobbieDatabee



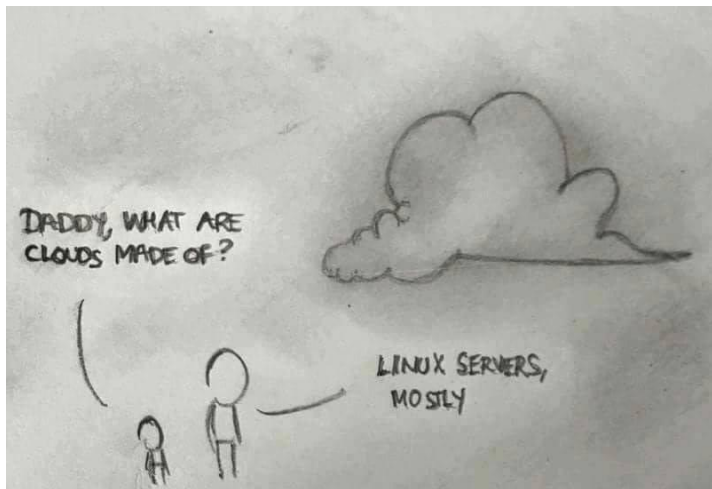
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# Why Networking for DBAs?

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



# 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

# 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

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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>

**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* 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

Demo

# 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 rule to allow ingress and egress traffic to your Instance created in the same Compartment as the

## 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

Resources)

resses)

s)



# The Virtual Cloud Network Wizard (Network + 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: 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: <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	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	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: <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



# 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

# 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”

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



# 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



## Default Security List for DOAG-DB Netzwerk

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

Security List Information [Tags](#)

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

Networking » Virtual Cloud Networks » Virtual Cloud Network Details » DHCP Options » DHCP Option Details



AVAILABLE

## Default DHCP Options for DOAG-DB Netzwerk

[Terminate](#) [Apply Tag\(s\)](#)

DHCP Option Information [Tags](#)

OCID: ...63gyda [Show](#) [Copy](#)

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



### Resources

[DHCP Options \(2\)](#)

## DHCP Options

Displaying 2 DHCP Options

[Edit DHCP Options](#)

DNS Type: Internet and VCN Resolver

Search Domain: doagdb.oraclevcn.com

Source:  
10.145.120.0/24

IP Protocol:  
ICMP

Type and  
Code: 3

Allows: ICMP traffic for: 3  
Destination Unreachable

## 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	
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



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

Assumptions:

1GBit Connection

1 TB Data transfer

takes 3h (roughly)

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

$240 TB - 10 TB \approx 230.000 GB$

$230.000 * 0,0074€ = 1.702€$

**max per Month**

# FastConnect Pricing



$$24h * 30 = 720h$$

1 Gbps:  
 $720 * €0,1845 = €132,84$

10 Gbps:  
 $720 * €1,107 = €797,04$

## 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

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](#).



# 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 ist automation and documentation at the same time

# 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

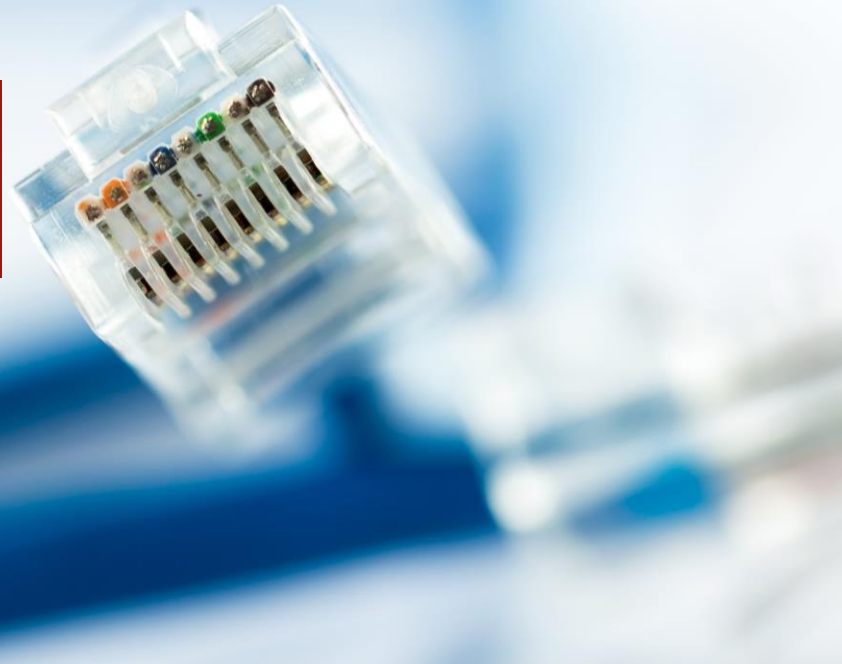
De facto Standard for Scripting Cloud Resources

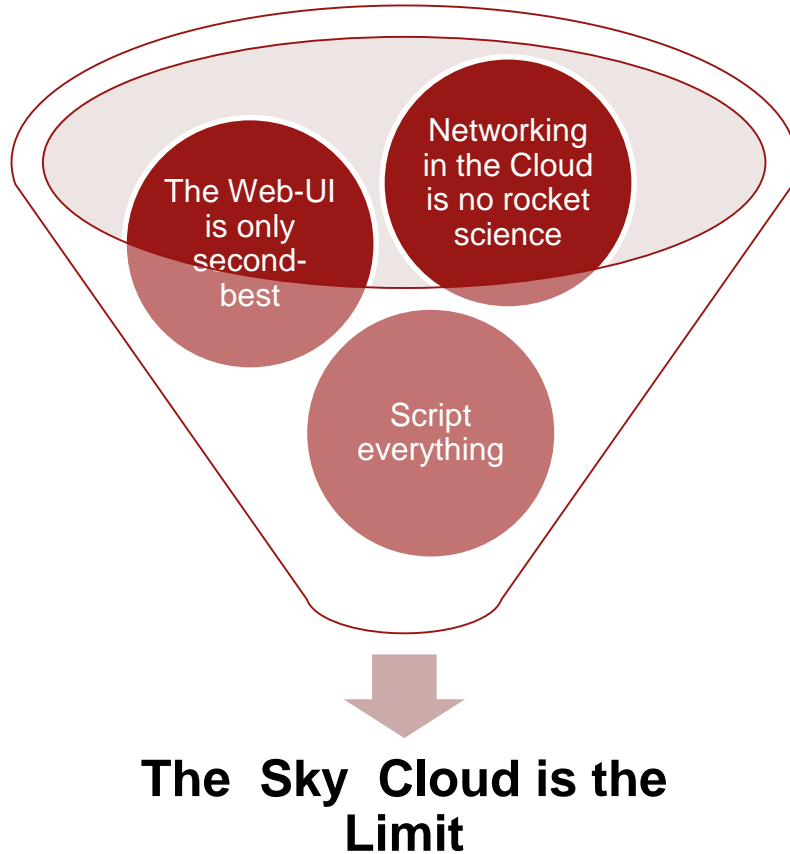
## Ansible

Agentless Orchestration and Automation

OCI Module provided by Oracle

# Conclusion







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.