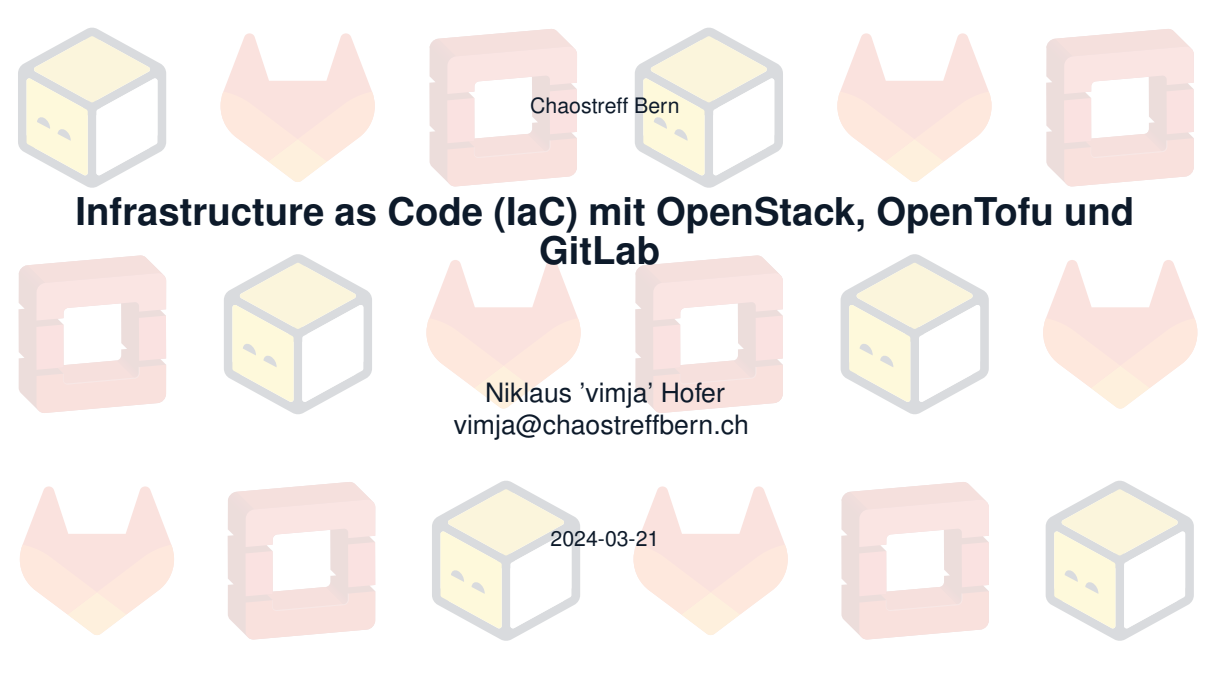




Chaostreff Bern

Infrastructure as Code (IaC) mit OpenStack, OpenTofu und GitLab

Niklaus 'vimja' Hofer
vimja@chaostreffbern.ch

2024-03-21



IaC

Git und CI/CD

IaC vs Configuration Management

OpenTofu

- OpenTofu State

- OpenTofu mit GitLab

- OpenTofu Provider und Module

OpenTofu vs Terraform



IaC

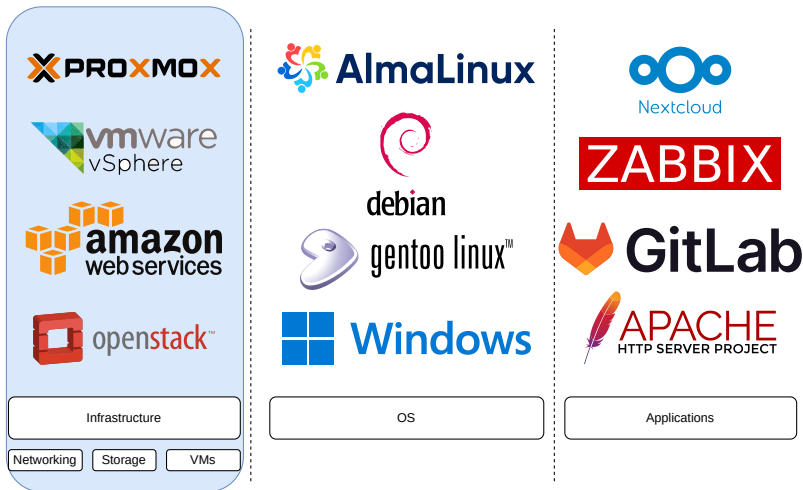
Git und CI/CD

IaC vs Configuration Management

OpenTofu

OpenTofu vs Terraform

Was ist Infrastructure?





```
resource "openstack_compute_instance_v2" "gitlab_server" {
  name           = "Chaostreff Bern GitLab server"
  flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
  key_pair       = "vimja"
  security_groups = ["default", "SSH"]

  block_device {
    uuid           = "f36a92fc-b187-41c1-8054-57dce71ac6e8"
    source_type    = "image"
    volume_size    = 32
    boot_index     = 0
    destination_type = "volume"
  }

  network {
    name = "default"
  }
}
```



```
resource "openstack_compute_instance_v2" "gitlab_server" {  
  name          = "Chaostreff Bern GitLab server"  
  flavor_id     = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"  
  key_pair      = "vimja"  
  security_groups = ["default", "SSH"]  
  
  block_device {  
    uuid          = "f36a92fc-b187-41c1-8054-57dce71ac6e8"  
    source_type   = "image"  
    volume_size   = 32  
    boot_index    = 0  
    destination_type = "volume"  
  }  
  
  network {  
    name = "default"  
  }  
}
```



```
resource "openstack_compute_instance_v2" "gitlab_server" {
  name          = "Chaostreff Bern GitLab server"
  flavor_id     = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
  key_pair      = "vimja"
  security_groups = ["default", "SSH"]

  block_device {
    uuid          = "f36a92fc-b187-41c1-8054-57dce71ac6e8"
    source_type   = "image"
    volume_size   = 32
    boot_index    = 0
    destination_type = "volume"
  }

  network {
    name = "default"
  }
}
```



```
resource "openstack_compute_instance_v2" "gitlab_server" {
  name           = "Chaostreff Bern GitLab server"
  flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
  key_pair       = "vimja"
  security_groups = ["default", "SSH"]

  block_device {
    uuid           = "f36a92fc-b187-41c1-8054-57dce71ac6e8"
    source_type    = "image"
    volume_size    = 32
    boot_index     = 0
    destination_type = "volume"
  }

  network {
    name = "default"
  }
}
```




```
resource "openstack_compute_instance_v2" "gitlab_server" {  
  name           = "Chaostreff Bern GitLab server"  
  flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"  
  key_pair       = "vimja"  
  security_groups = ["default", "SSH"]  
  
  block_device {  
    uuid           = "f36a92fc-b187-41c1-8054-57dce71ac6e8"  
    source_type    = "image"  
    volume_size    = 32  
    boot_index     = 0  
    destination_type = "volume"  
  }  
  
  network {  
    name = "default"  
  }  
}
```

IaC Beispiel: tofu apply



Kommando:

```
tofu apply
```



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be created
+ resource "openstack_compute_instance_v2" "gitlab_server" {
  + flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
  + id            = (known after apply)
  + key_pair       = "vimja"
  + name          = "Chaostreff Bern GitLab server"
  + security_groups = [
    + "SSH",
    + "default",
  ]

  + block_device {
    + boot_index      = 0
    + destination_type = "volume"
    + source_type      = "image"
    + uuid            = "f36a92fc-b187-41c1-8054-57dce71ac6e8"
    + volume_size     = 32
  }

  + network {
    + fixed_ip_v4 = (known after apply)
```

IaC Beispiel: tofu apply



Output (gekürzt):

Plan: 1 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value:

laC Beispiel: tofu apply



Output (gekürzt):

Plan: 1 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

laC Beispiel: tofu apply



Output (gekürzt), 2/2:

Plan: 1 to add, 0 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

openstack_compute_instance_v2.gitlab_server: Creating...

openstack_compute_instance_v2.gitlab_server: Still creating... [10s elapsed]

openstack_compute_instance_v2.gitlab_server: Creation complete after 18s [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837]

Apply complete! Resources: 1 added, 0 changed, 0 destroyed.



Kommando:

```
openstack server create \  
  --flavor e2da14c9-e260-4dba-9851-dd4f80dcea5c \  
  --image f36a92fc-b187-41c1-8054-57dce71ac6e8 \  
  --boot-from-volume 32 \  
  --key-name vimja \  
  --network 7161472b-e9f5-484b-a396-9dd442458322 \  
  --security-group 7105d004-a039-4c68-ba8b-785cb55803e2 \  
  --security-group 72e6b3a2-8c86-4e5a-b9aa-d97c336d1a56 \  
  'Chaostreff Bern GitLab server'
```

Idempotenz Beispiel #1



Kommando:

```
tofu apply
```


Idempotenz Beispiel #1



Output (gekürzt):

No changes. Your infrastructure matches the configuration.

OpenTofu has compared your real infrastructure against your configuration and found no differences, so no changes are needed.

Apply complete! Resources: 0 added, 0 changed, 0 destroyed.

Idempotenz Beispiel #2



Kommando:

```
tofu apply
```

Idempotenz Beispiel #2



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  id          = "207f4fd4-e3e9-4dc9-999a-99d29b1e0837"
  ~ name      = "git.chaostreffbern.ch (GitLab server)" -> "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value:

Idempotenz Beispiel #2



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  id          = "207f4fd4-e3e9-4dc9-999a-99d29b1e0837"
  ~ name      = "git.chaostreffbern.ch (GitLab server)" -> "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

Idempotenz Beispiel #2



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  id          = "207f4fd4-e3e9-4dcb-999a-99d29b1e0837"
  ~ name      = "git.chaostreffbern.ch (GitLab server)" -> "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

openstack_compute_instance_v2.gitlab_server: Modifying... [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837]

openstack_compute_instance_v2.gitlab_server: Modifications complete after 3s [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837]

Apply complete! Resources: 0 added, 1 changed, 0 destroyed.

Idempotenz Beispiel #3



Änderung an der Datei:

```
--- vm.tf          2024-03-18 16:32:02.094796494 +0100
+++ vm.tf.orig     2024-03-18 16:31:52.301676295 +0100
@@ -1,6 +1,6 @@
  resource "openstack_compute_instance_v2" "gitlab_server" {
    name          = "Chaostreff Bern GitLab server"
-   flavor_id     = "3a5c8eec-111b-441e-a4cb-c0a69767dea6"
+   flavor_id     = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
    key_pair      = "vimja"
    security_groups = ["default", "SSH"]
```

Idempotenz Beispiel #3



Kommando:

```
tofu apply
```

Idempotenz Beispiel #3



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  ~ flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c" -> "3a5c8eec-111b-441e-a4cb-c0a69767dea6"
    name           = "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value:

Idempotenz Beispiel #3



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  ~ flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c" -> "3a5c8eec-111b-441e-a4cb-c0a69767dea6"
    name           = "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

Idempotenz Beispiel #3



Output (gekürzt):

OpenTofu will perform the following actions:

```
# openstack_compute_instance_v2.gitlab_server will be updated in-place
~ resource "openstack_compute_instance_v2" "gitlab_server" {
  ~ flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c" -> "3a5c8eec-111b-441e-a4cb-c0a69767dea6"
    name           = "Chaostreff Bern GitLab server"
  # (16 unchanged attributes hidden)
}
```

Plan: 0 to add, 1 to change, 0 to destroy.

Do you want to perform these actions?

OpenTofu will perform the actions described above.

Only 'yes' will be accepted to approve.

Enter a value: yes

openstack_compute_instance_v2.gitlab_server: Modifying... [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837]

openstack_compute_instance_v2.gitlab_server: Still modifying... [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837, 10s elapsed]

openstack_compute_instance_v2.gitlab_server: Modifications completed after 15s [id=207f4fd4-e3e9-4dcb-999a-99d29b1e0837]

Apply complete! Resources: 0 added, 1 changed, 0 destroyed.



IaC

Git und CI/CD

IaC vs Configuration Management

OpenTofu

OpenTofu vs Terraform



 3   4

Project

 cirrax-cloud

 Pinned

Issues

0

Pipelines

Merge requests

1

Manage

>

Plan

>

</> Code

>

Merge requests

1

Repository

Branches

 Help

chaostreffbern / cirrax-cloud / Merge requests / 12

server MATRIX: Increase the disk size.

Edit

Code ▾

 **Niklaus Hofer** requested to merge `develOp` into `main` just now

Overview 0

Commits -

Pipelines 0

Changes 1

Add a to do

 Compare `main` ▾ and `latest version` ▾ 1 file **+1 -1**▾ **server_MATRIX.tf** **+1 -1** ☐ Viewed 

```
1 1 resource "openstack_blockstorage_volume_v3" "MATRIX_vda" {
2 2     name      = "matrix.chaostreffbern.ch: OS"
3 3     description = "First disk (/dev/vda) of matrix.chaostreffbern.ch, used to store the OS."
4 4     size      = 48
5 5     + size      = 64
6 6     lifecycle {
7 7         prevent_destroy = true
```

 3   4

Issues 0

Pipelines

Merge requests 0

Manage >

Plan >

</> Code >

Build >

Pipelines

Jobs

Pipeline editor

Pipeline schedules

Artifacts

Help

chaostreffbern / cirrax-cloud / Pipelines / #2352

All servers: Handle resizing of disks properly.

[Cancel pipeline](#)[Delete](#)

 **Blocked** Niklaus Hofer created pipeline for commit `fc569e81` 

For `main`

`latest` 60 6 Jobs

Pipeline Needs Jobs 6 Tests 0

Group jobs by Stage Job dependencies

validate

 fmt 

 validate 

build

 plan 

deploy

 apply 

cleanup

 delete-state 

 destroy 



IaC

Git und CI/CD

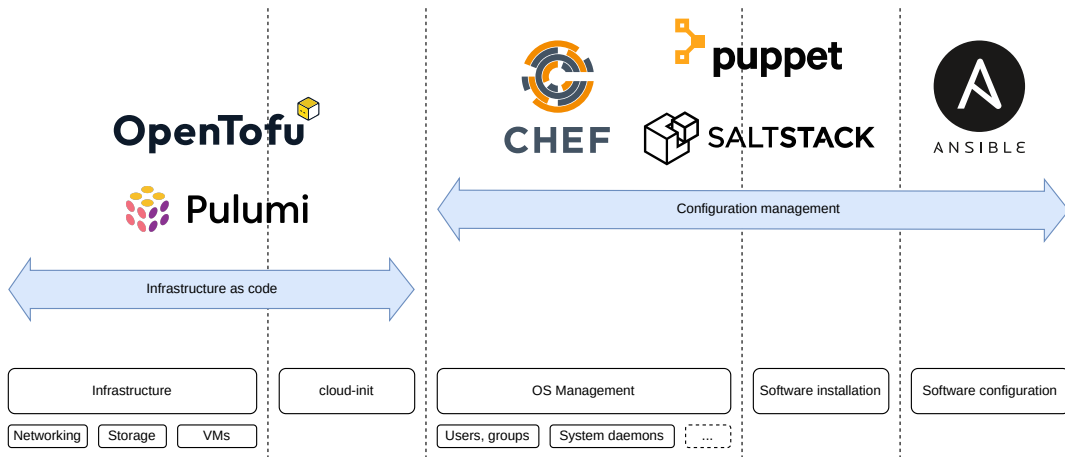
IaC vs Configuration Management

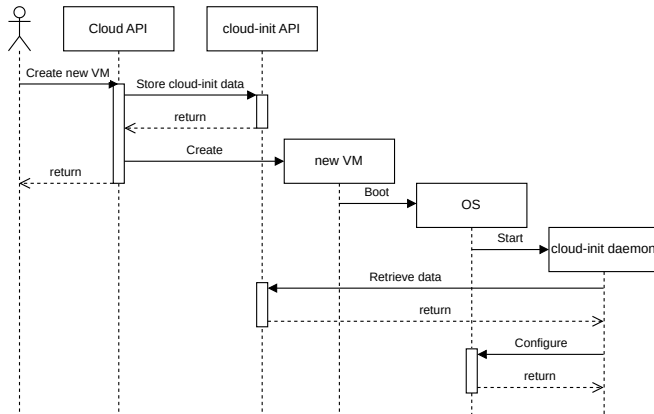
OpenTofu

OpenTofu vs Terraform



Die gleiche Idee, unterschiedliche Anwendungsbereiche.

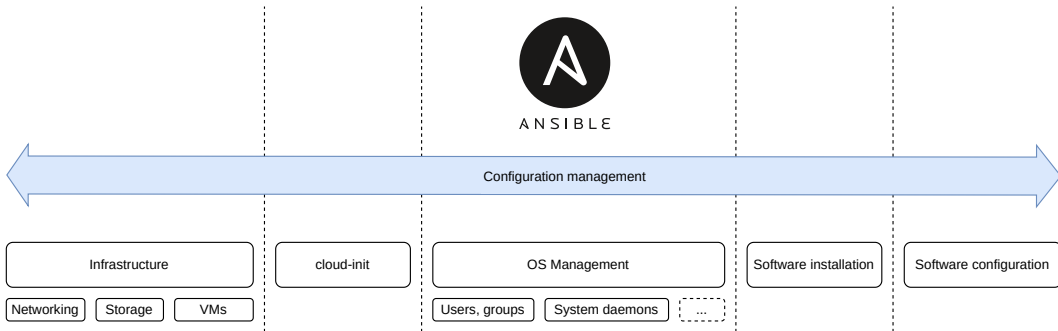




Configuration Management als IaC



14





IaC

Git und CI/CD

IaC vs Configuration Management

OpenTofu

- OpenTofu State

- OpenTofu mit GitLab

- OpenTofu Provider und Module

OpenTofu vs Terraform



IaC

Git und CI/CD

IaC vs Configuration Management

OpenTofu

- OpenTofu State

- OpenTofu mit GitLab

- OpenTofu Provider und Module

OpenTofu vs Terraform



```
user { 'vimja':  
  ensure    => present,  
  managehome => true,  
  home      => '/home/vimja',  
  shell     => '/bin/bash',  
}
```



```
file { '/etc/conf.d/net':  
  ensure => present,  
  owner   => 'root',  
  group   => 'root',  
  mode    => '0640',  
  content => template('netifrc/net.erb'),  
}
```



```
apache::vhost { 'www.chaostreffbern.ch':  
    ensure    => present,  
    port      => 443,  
    ssl       => true,  
    ssl_key   => '/etc/letsencrypt/live/www.chaostreffbern.ch/privkey.pem',  
    ssk_chain => '/etc/letsencrypt/live/www.chaostreffbern.ch/fullchain.pem',  
    docroot   => '/var/www/www.chaostreffbern.ch/htdocs',  
}
```



```
concat { "${priority_real}${filename}.conf":  
  ensure => $ensure,  
  path   => "${apache::vhost_dir}/${priority_real}${filename}.conf",  
  owner  => 'root',  
  group  => $apache::params::root_group,  
  mode   => $apache::file_mode,  
  order  => 'numeric',  
  require => Package['httpd'],  
  notify => Class['apache::service'],  
}
```




Kommando:

```
openstack server create \  
  --flavor e2da14c9-e260-4dba-9851-dd4f80dcea5c \  
  --image f36a92fc-b187-41c1-8054-57dce71ac6e8 \  
  --boot-from-volume 32 \  
  --key-name vimja \  
  --network 7161472b-e9f5-484b-a396-9dd442458322 \  
  --security-group 7105d004-a039-4c68-ba8b-785cb55803e2 \  
  --security-group 72e6b3a2-8c86-4e5a-b9aa-d97c336d1a56 \  
  --min 3 --max 5 \  
  'Chaostreff Bern GitLab server'
```

.
.

```
openstack server list --column ID --column Name
```

Output:

```
+-----+-----+
| ID                      | Name                      |
+-----+-----+
| 0774faf3-d081-4517-989f-719d8e06d303 | Chaostreff Bern GitLab |
| 253e9e58-61b1-4f94-a9cc-a015e0e880db | Chaostreff Bern GitLab |
| 7ec5b9f1-e7d5-412b-9c1b-c0b3681dedf3 | Chaostreff Bern GitLab |
| b628b889-b16c-4245-a4d1-53725e098e81 | Chaostreff Bern GitLab |
| f62c3020-ddc4-4b71-82ed-18a4106594ed | Chaostreff Bern GitLab |
.
.
.
```



Kommando:

```
openstack volume list --column ID --column Name
```



Output:

ID	Name
2855430e-bffe-4443-bef7-91a5e2c527a2	
2c468e15-33ef-494b-b172-5e812a424d36	
a53e5100-703a-4eb0-bc36-56c8945c5544	
a75f4ed5-bf38-454f-a5ba-7e47a59b5155	
.	
.	
.	



```
resource "openstack_compute_instance_v2" "gitlab_server" {
  name           = "Chaostreff Bern GitLab server"
  flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"
  key_pair       = "vimja"
  security_groups = ["default", "SSH"]

  block_device {
    uuid           = "f36a92fc-b187-41c1-8054-57dce71ac6e8"
    source_type    = "image"
    volume_size    = 32
    boot_index     = 0
    destination_type = "volume"
  }

  network {
    name = "default"
  }
}
```



```
resource "openstack_compute_instance_v2" "gitlab_server" {  
  name           = "Chaostreff Bern GitLab server"  
  flavor_id      = "e2da14c9-e260-4dba-9851-dd4f80dcea5c"  
  key_pair       = "vimja"  
  security_groups = ["default", "SSH"]  
  
  block_device {  
    uuid           = "f36a92fc-b187-41c1-8054-57dce71ac6e8"  
    source_type    = "image"  
    volume_size   = 32  
    boot_index     = 0  
    destination_type = "volume"  
  }  
  
  network {  
    name = "default"  
  }  
}
```



```
{
  "version": 4,
  "resources": [
    {
      "type": "openstack_compute_instance_v2",
      "name": "gitlab_server",
      "provider": "provider[\"registry.opentofu.org/terraform-provider-openstack/openstack\"]",
      "instances": [
        {
          "block_device": [
            "...": "..."
          ],
          "created": "2024-03-19 19:56:38 +0000 UTC",
          "flavor_id": "e2da14c9-e260-4dba-9851-dd4f80dcea5c",
          "id": "04bc1995-ff47-4e31-8377-1d3c6b717ada",
          "key_pair": "vimja",
          "name": "Chaostreff Bern GitLab server",
          "network": [
            "...": "..."
          ],
        }
      ]
    }
  ]
}
```



```
{
  "version": 4,
  "resources": [
    {
      "type": "openstack_compute_instance_v2",
      "name": "gitlab_server",
      "provider": "provider[\"registry.opentofu.org/terraform-provider-openstack/openstack\"]",
      "instances": [
        {
          "block_device": [
            "...": "..."
          ],
          "created": "2024-03-19 19:56:38 +0000 UTC",
          "flavor_id": "e2da14c9-e260-4dba-9851-dd4f80dcea5c",
          "id": "04bc1995-ff47-4e31-8377-1d3c6b717ada",
          "key_pair": "vimja",
          "name": "Chaostreff Bern GitLab server",
          "network": [
            "...": "..."
          ],
        ]
      ]
    }
  ]
}
```




```
{
  "version": 4,
  "resources": [
    {
      "type": "openstack_compute_instance_v2",
      "name": "gitlab_server",
      "provider": "provider[\"registry.opentofu.org/terraform-provider-openstack/openstack\"]",
      "instances": [
        {
          "block_device": [
            "...": "..."
          ],
          "created": "2024-03-19 19:56:38 +0000 UTC",
          "flavor_id": "e2da14c9-e260-4dba-9851-dd4f80dcea5c",
          "id": "04bc1995-ff47-4e31-8377-1d3c6b717ada",
          "key_pair": "vimja",
          "name": "Chaostreff Bern GitLab server",
          "network": [
            "...": "..."
          ],
        ]
      ]
    }
  ]
}
```



```
resource "openstack_blockstorage_volume_v3" "gitlab_server_vdb" {  
    name          = "Chaostreff Bern GitLab server: vdb"  
    description   = "A disk to keep the GitLab Backups on."  
    size          = 64  
}  
  
import {  
    to = openstack_blockstorage_volume_v3.gitlab_server_vdb  
    id = "93343632-4228-4c99-99cd-4a260f5db219"  
}
```



```
resource "openstack_blockstorage_volume_v3" "gitlab_server_vdb" {  
  name          = "Chaostreff Bern GitLab server: vdb"  
  description   = "A disk to keep the GitLab Backups on."  
  size          = 64  
}  
  
import {  
  to = openstack_blockstorage_volume_v3.gitlab_server_vdb  
  id = "93343632-4228-4c99-99cd-4a260f5db219"  
}
```



```
resource "openstack_blockstorage_volume_v3" "gitlab_server_vdb" {  
    name          = "Chaostreff Bern GitLab server: vdb"  
    description   = "A disk to keep the GitLab Backups on."  
    size          = 64  
}  
  
import {  
    to = openstack_blockstorage_volume_v3.gitlab_server_vdb  
    id = "93343632-4228-4c99-99cd-4a260f5db219"  
}
```

State speichern



 3   5

Project

-  cirrax-cloud
-  Pinned 
- Issues 0
- Pipelines
- Merge requests 1

 Manage 

 Plan 

 Code 

 Build 

 Secure 

 Deploy 

 Help

chaostreffbern / cirrax-cloud / Terraform states

Terraform states 1

Name	Pipeline	Details	Actions
default		Niklaus Hofer updated 22 hours ago	

State speichern



 3   5

Project

C cirrax-cloud

Pinned

Issues

0

Pipelines

Merge requests

1

Manage

Plan

Code

Build

Secure

Deploy

Help

chaostreffbern / cirrax-cloud / Terraform states

Terraform states 1

Name	Pipeline	Details	Actions
default		Niklaus Hofer updated 22 hours ago	

Copy Terraform init command

Download JSON

Lock

Remove state file and versions

State speichern



The screenshot shows the GitLab web interface with a sidebar on the left containing navigation links: Project, Pinned, Issues, Pipelines, Merge requests, Manage, Plan, Code, Build, Secure, Deploy, and Help. The main content area displays the 'Terraform init command' dialog box. The dialog box has a title bar with a close button (X) and a copy icon. The text inside the dialog box reads: 'To get access to this terraform state from your local computer, run the following command at the command line. The first line requires a personal access token with API read and write access. [How do I create a personal access token?](#)' Below this text is a code block containing the following commands:

```
export GITLAB_ACCESS_TOKEN=<YOUR-ACCESS-TOKEN>
export TF_STATE_NAME=default
terraform init \
  -backend-config="address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME" \
  -backend-config="lock_address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME/lock" \
  -backend-config="unlock_address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME/lock" \
  -backend-config="username=vimja" \
  -backend-config="password=$GITLAB_ACCESS_TOKEN" \
  -backend-config="lock_method=POST" \
  -backend-config="unlock_method=DELETE" \
  -backend-config="retry_wait_min=5"
```

 At the bottom right of the dialog box is a 'Close' button. In the background, a table with an 'Actions' column is partially visible.

Terraform init command

To get access to this terraform state from your local computer, run the following command at the command line. The first line requires a personal access token with API read and write access. [How do I create a personal access token?](#)

```
export GITLAB_ACCESS_TOKEN=<YOUR-ACCESS-TOKEN>
export TF_STATE_NAME=default
terraform init \
  -backend-config="address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME" \
  -backend-config="lock_address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME/lock" \
  -backend-config="unlock_address=https://git.chaostreffbern.ch/api/v4/projects/261/terraform/state/$TF_STATE_NAME/lock" \
  -backend-config="username=vimja" \
  -backend-config="password=$GITLAB_ACCESS_TOKEN" \
  -backend-config="lock_method=POST" \
  -backend-config="unlock_method=DELETE" \
  -backend-config="retry_wait_min=5"
```

Close



IaC

Git und CI/CD

IaC vs Configuration Management

OpenTofu

OpenTofu State

OpenTofu mit GitLab

OpenTofu Provider und Module

OpenTofu vs Terraform


GitLab

Docs

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v16.10
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Manage your infrastructure
Infrastructure as Code
Terraform state
Terraform integration in merge requests
GitLab Terraform helpers
Terraform template recipes
Troubleshooting
Create Kubernetes clusters
Connect Kubernetes clusters
Runbooks
Analyze GitLab usage
Experiment, Beta, GA
Collapse sidebar

Infrastructure as Code with Terraform and GitLab

Tier: Free, Premium, Ultimate
Offering: GitLab.com, Self-managed, GitLab Dedicated

To manage your infrastructure with GitLab, you can use the integration with Terraform to define resources that you can version, reuse, and share:

- Manage low-level components like compute, storage, and networking resources.
- Manage high-level components like DNS entries and SaaS features.
- Incorporate GitOps deployments and Infrastructure-as-Code (IaC) workflows.
- Use GitLab as a Terraform state storage.
- Store and use Terraform modules to simplify common and complex infrastructure patterns.

Watch a [video overview](#) of the features GitLab provides with the integration with Terraform.

Terraform and OpenTofu support

On this page

- Terraform and OpenTofu support
- Integrate your project with Terraform
- Latest Terraform template (deprecated)
- Stable and advanced Terraform templates (deprecated)
- Use a Terraform template (deprecated)
- Build and host your own Terraform CI/CD templates
- Terraform template recipes
- Integrate your project with OpenTofu
- Related topics

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Issues 0

Pipelines

Merge requests 0

Manage >

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Code >

Build v

Pipelines

Jobs

Pipeline editor

Pipeline schedules

Artifacts

Help

chaostreffbern / cirrax-cloud / Pipelines / #2352

All servers: Handle resizing of disks properly.

[Cancel pipeline](#)[Delete](#)

 Blocked Niklaus Hofer created pipeline for commit `fc569e81` 

For `main`

`latest` GO 6 Jobs

Pipeline Needs Jobs 6 Tests 0

Group jobs by

Stage

Job dependencies

validate

 fmt 

 validate 

build

 plan 

deploy

 apply 

cleanup

 delete-state 

 destroy 



```
---
include:
  - component: git.chaostreffbern.ch/vimja/gitlab-opentofu-cicd-component/full-pip
    inputs:
      version: 0.11.0
      opentofu_version: 1.6.1
stages:
  - validate
  - test
  - build
  - deploy
  - cleanup
variables:
  TF_VAR_os_username: 'niklaus'
  CI_REGISTRY: 'registry.gitlab.com'
```



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OpenTofu mit GitLab

OpenTofu Provider und Module

OpenTofu vs Terraform

⌘ Providers

Providers are a logical abstraction of an upstream API. They are responsible for understanding API interactions and exposing resources.

 AWS	 Azure	 Google Cloud Platform
 Kubernetes	 Alibaba Cloud	 Oracle Cloud Infrastructure
 Azure Stack by: hashicorp	 Google Beta by: hashicorp	 Helm by: hashicorp
 Oracle Public Cloud by: hashicorp	 VMware vSphere by: hashicorp	

```
resource "openstack_blockstorage_volume_v3" "MATRIX_vda" {
  name      = "matrix.chaostreffbern.ch: OS"
  size      = 64
}

resource "openstack_compute_instance_v2" "MATRIX" {
  name          = "matrix.chaostreffbern.ch"
  flavor_id     = openstack_compute_flavor_v2.MEDIUM.id
  key_pair      = openstack_compute_keypair_v2.VIMJA.name
  stop_before_destroy = true

  block_device {
    uuid          = openstack_blockstorage_volume_v3.MATRIX_vda.id
    source_type   = "volume"
    boot_index    = 0
  }

  lifecycle {
    replace_triggered_by = [
      openstack_blockstorage_volume_v3.MATRIX_vda.size
    ]
  }
}
```

```
resource "openstack_blockstorage_volume_v3" "MATRIX_vda" {
  name      = "matrix.chaostreffbern.ch: OS"
  size      = 64
}

resource "openstack_compute_instance_v2" "MATRIX" {
  name          = "matrix.chaostreffbern.ch"
  flavor_id     = openstack_compute_flavor_v2.MEDIUM.id
  key_pair      = openstack_compute_keypair_v2.VIMJA.name
  stop_before_destroy = true

  block_device {
    uuid          = openstack_blockstorage_volume_v3.MATRIX_vda.id
    source_type   = "volume"
    boot_index    = 0
  }

  lifecycle {
    replace_triggered_by = [
      openstack_blockstorage_volume_v3.MATRIX_vda.size
    ]
  }
}
```



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INFRASTRUCTURE



Terraform

Infrastructure as code
provisioning



Nomad

Workload scheduling and
orchestration



Packer

Build and manage images
as code



Vagrant

Environment workflows



Waypoint

Internal developer
platform

SECURITY



Vault

Identity-based secrets
management



Boundary

Secure remote access



Consul

Service-based networking

Community Providers

harana

argocd

by: harana-oss



buildkit

by: RutledgePaulV



carvel

by: carvel-dev



cilium

by: littlejo



ciscoapphosting

by: robertcsapo



constellation

by: edgelessys



dinker

by: andrewbaxter



docker

by: ErwinSalas



docker

by: abh80



docker

by: bamhm182



docker

by: rohdealx



docker

by: kreuzwerker



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OpenTF Announces Fork of Terraform. Read more >>



The OpenTF Manifesto



Let's go, OpenTofu!



Was kommt jetzt?

- ▶ Fragerunde
- ▶ 15 Minuten Pause
- ▶ Demo unseres Setups
- ▶ Kollekte

Der nächste Vortrag ist am Donnerstag den 25. April ab 19:30 Uhr, zum Thema Smart Meter.