

dCache in the cloud environment

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The PaNOSC/ExPaNDS (and others) use case

PaNOSC

Search

Title

Techniques

- Reflectometry
- Spectroscopy
- Phase Contrast Imaging
- Soft diffraction
- Scattering
- UV VUV spectroscopy
- Photoemission microscopy
- Polarised reflectivity
- Microfluorescence
- Gamma spectroscopy
- Three-axis spectrometers
- X-ray excited optical luminescence
- Diffraction Imaging

Documents

Recoil Effects on Reflection from Relativistic Mirrors in Laser Plasmas

Valenta / ELI Esirkepov / KPSI

Relativistic mirrors can be realized with strongly nonlinear Langmuir waves excited by intense laser pulses in underdense plasma. On reflection from the relativistic mirror the incident light affects the mirror motion. The corresponding recoil effects are investigated analytically and with particle-in-cell simulations. It is found that if the fluence...

[Petr Valenta; \(2020\), Recoil Effects on Reflection from Relativistic Mirrors in Laser Plasmas, DOI:10.1142/s0217751x19430103](#)

Reflectometry

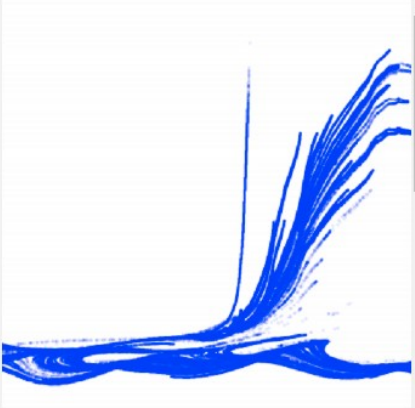
Type: Publication

Licence / Visibility: MIT / Public

Started on: 03/10/2020

Ended on: 03/10/2020

Released on: 03/10/2020



Laser-Driven Proton Acceleration from Cryogenic Hydrogen Target

Reinhold / CERIC-ERIC Astraia / ESS

2D particle-in-cell simulation of the interaction of high-intensity laser pulse (parameters are relevant to L4 laser) with a cryogenic hydrogen target. Only protons with energy above 300 MeV at the end of the simulation are tracked and their position and energy are visualized. Two different groups of protons accelerated by different mechanisms can ...

[Dana Scully; \(2020\), Re-polarization of the aft quantum plasma collector, DOI:10.9563/if.2015.87.012](#)

X-ray excited optical luminescence

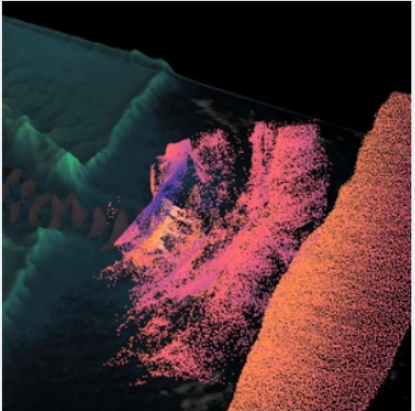
Type: Proposal

Licence / Visibility: MIT / Public

Started on: 09/11/2017

Ended on: 03/21/2019

Released on: 01/01/2020



The PaNOSC/ExPaNDS (and others) use case

PaNOSC

Laser-Driven Proton Acceleration from Cryogenic Hydrogen Target

Description

2D particle-in-cell simulation of the interaction of high-intensity laser pulse (parameters are relevant to L4 laser) with a cryogenic hydrogen target. Only protons with energy above 300 MeV at the end of the simulation are tracked and their position and energy are visualized. Two different groups of protons accelerated by different mechanisms can be distinguished from each other in space: Protons originated from the target interior and from the target rear side.

Citation	Dana Scully; (2020), Re-polarization of the aft quantum plasma collector, DOI:10.9563/if.2015.87.012
Keywords	X-ray excited optical luminescence,
Type	Proposal
Author	Laima Reinhold
Other	Stuff

Datasets

PaNOSC Test Dataset 11

HEIMDAL @ ESS

Name

my-environment

Description

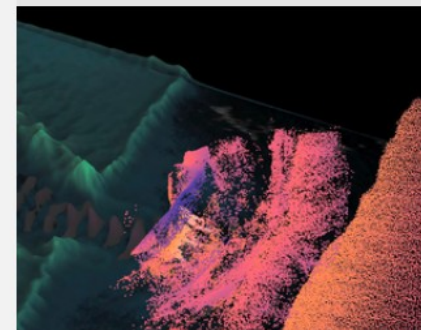
re-produce research|

Flavour

jupyter_small

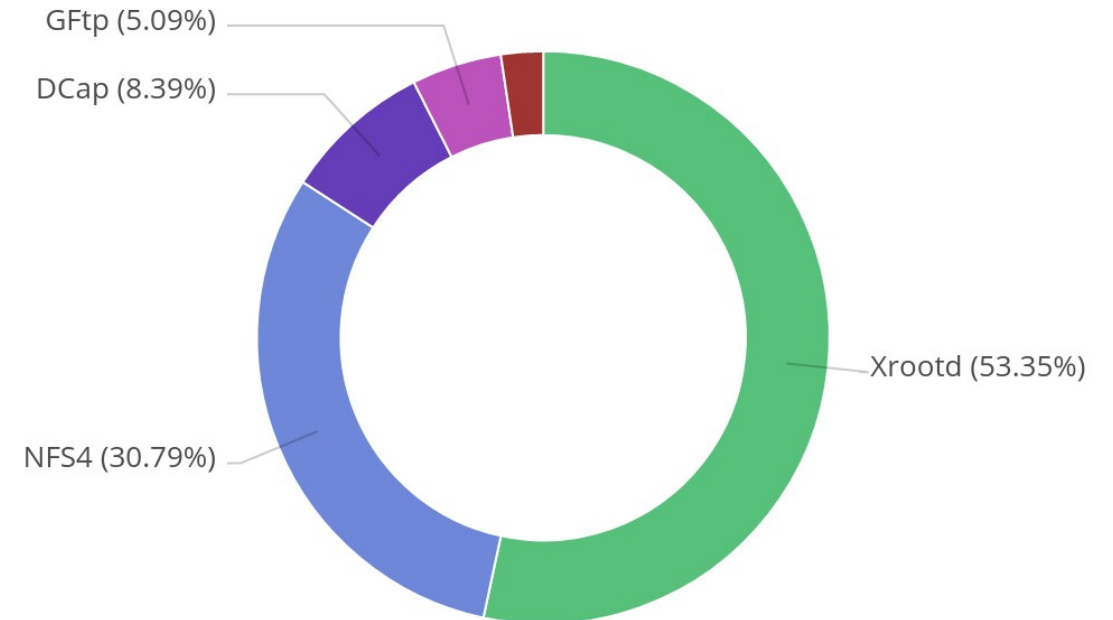
Spawn

Preview Visualization



Storage in the Cloud

- Object store
 - Data accessed with unique ID as a single object
 - Accessible from anywhere
 - S3, SWIFT
- Block Storage
 - Disk storage attached to a virtual machine
 - Accessible from attached VM only
- Shared file system
 - Disk storage attached to a virtual machine
 - Accessible from many VM in parallel
 - NFS, SMB



The issue with OpenStack (and others)

- User defined VM images
 - The users is free to select images to spawn
 - storage can't trust to OS level authentication/mapping
- Shared pool of IP addresses
 - After disposal VM's IP returned to the pool
 - Storage system can't trust client's IP address

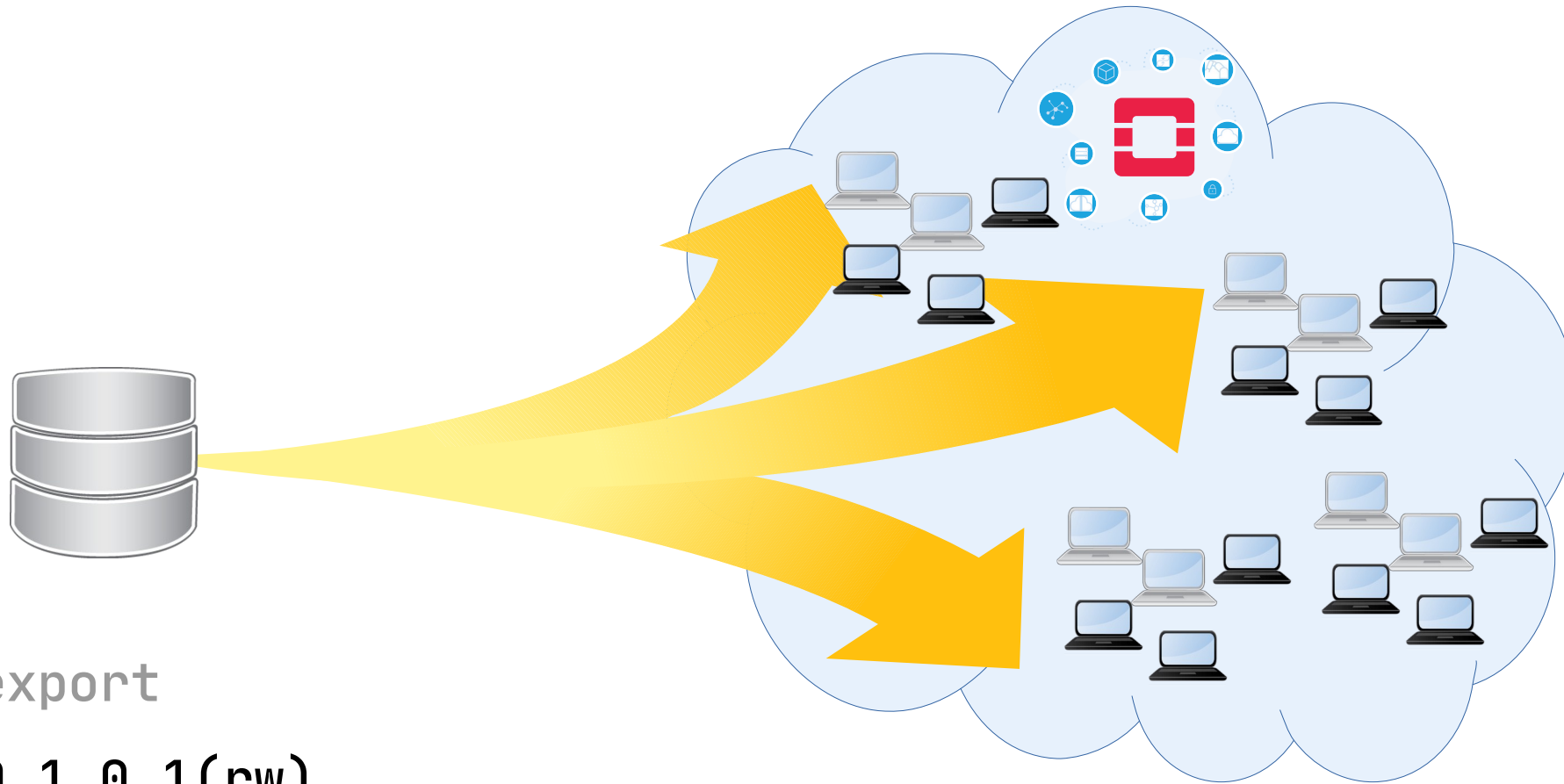
The issues with NFS as cloud share

- NFSv3 based on trusted hosts
 - server exports based on IP address
 - OS is responsible to proper mapping
- NFSv4.0+
 - Strong authentication is enforced
 - Krb5 + LDAP/AD
 - Backward compatibility is agreed for migration period
- **On the field, most of sites run NFSv4.0+ in NFSv3 security mode**

"IP-based access control allows you to control access to Filestore instances based on the IP address of clients."

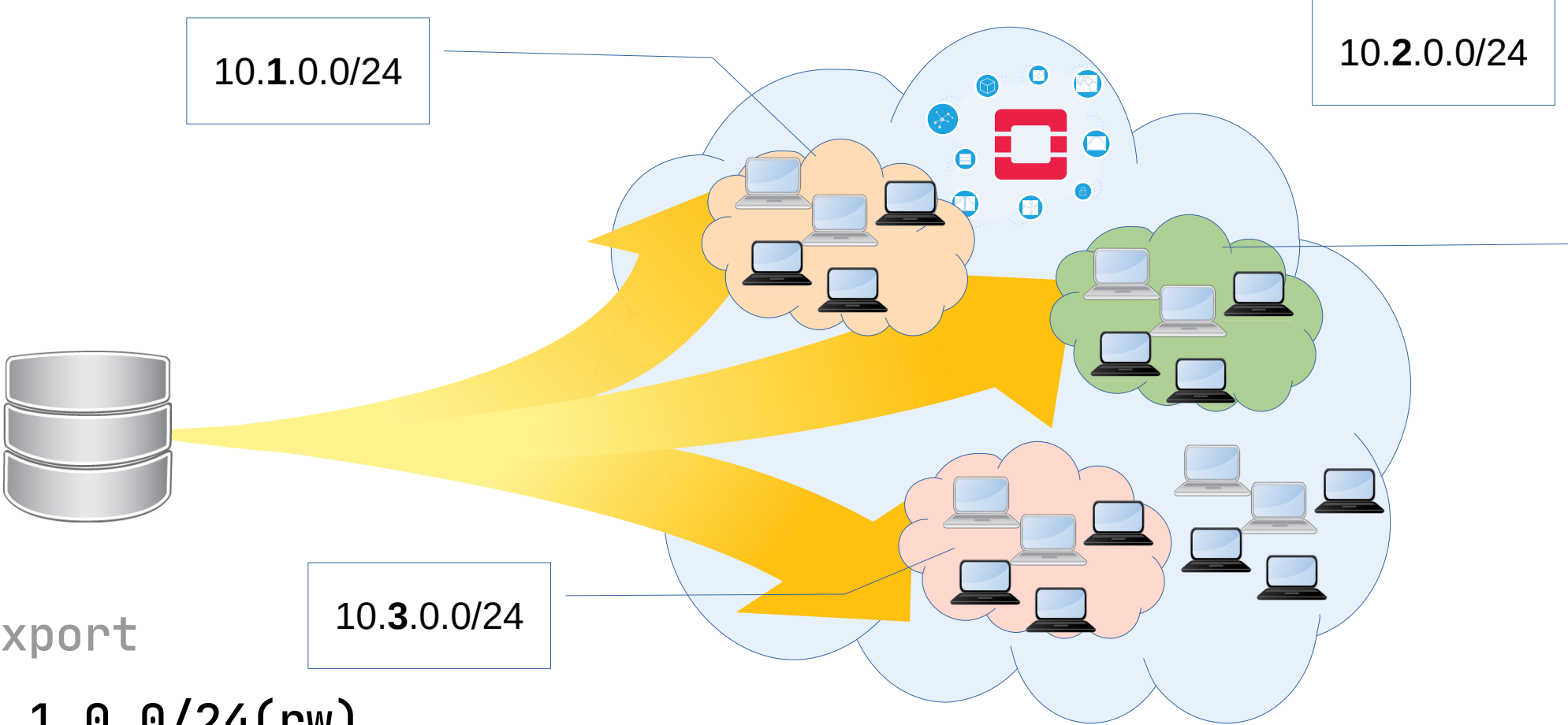
<https://cloud.google.com/filestore/docs>

Shared storage in OpenStack



```
# /etc/export  
/data 10.1.0.1(rw)
```

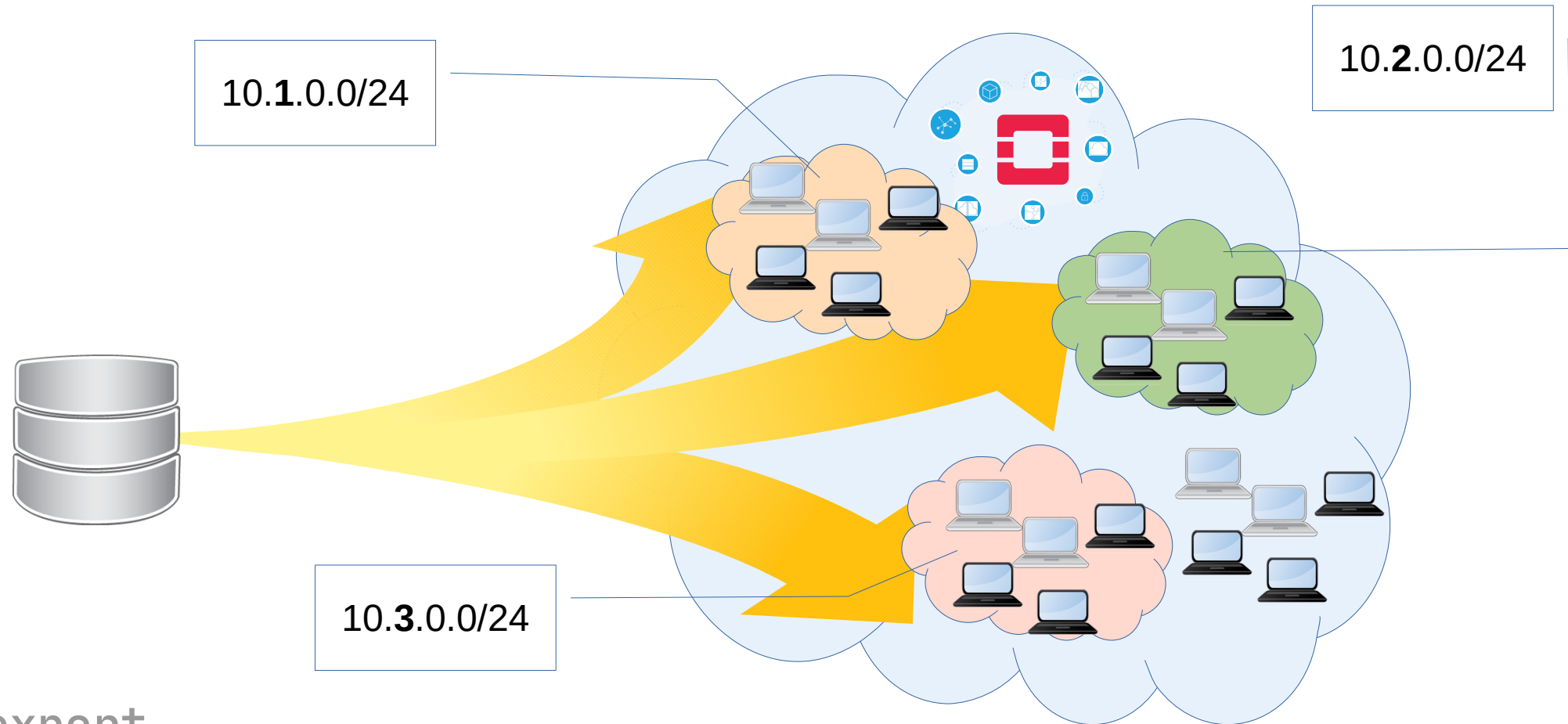
1. Project Networks



/etc/export

/data 10.1.0.0/24(rw)

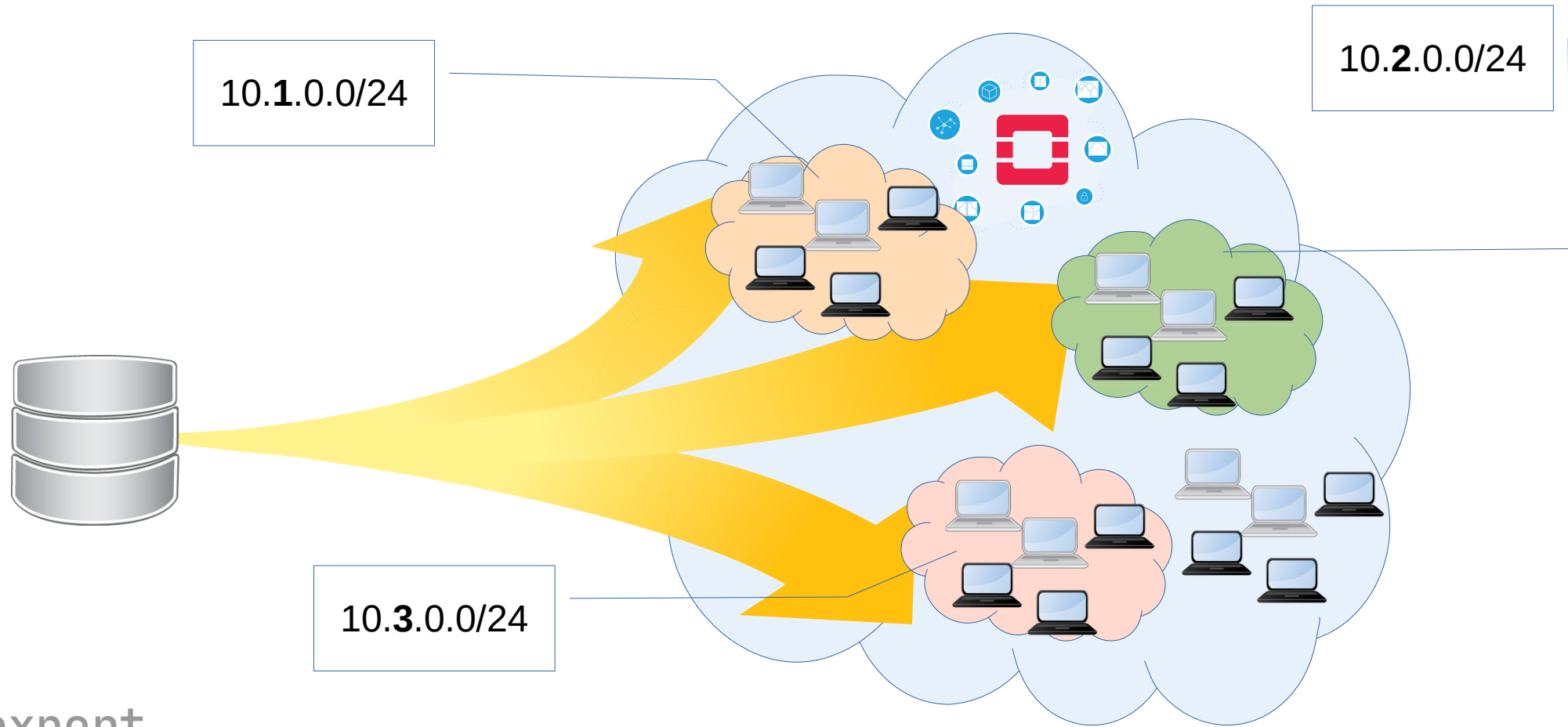
2. Map VMs to a user



```
# /etc/export
```

```
/data 10.1.0.0/24(rw,all_squash,anonuid=123,anongid=123)
```

3. Use trusted VMs



```
# /etc/export
```

```
/data 10.1.0.1(rw,secure)
```

REST interface

- HTTP(s) based REST API
- Integration into projects workflow or portal
 - Simple API to manage export table
 - Compatible with OpenStack manila
- Same building block as dCache REST interface
 - All dCache supported authN, authZ 'for free'

REST interface

- Get defined exports
 - GET 'https://localhost:8080/v1/exports'
- Create share '/data'
 - POST 'https://localhost:8080/v1/exports/data'
- Add client to the share
 - POST 'https://localhost:8080/v1/client/10.1.0.1' ...
- Remove client
 - DELETE 'https://localhost:8080/v1/client/10.1.0.1'
- Remove share
 - DELETE 'https://localhost:8080/v1/exports/data'

REST interface example

```
$ curl -s -XPUT 'https://localhost:8080/v1/client/10.1.0.2' -d '{
  "path": "/data",
  "anonuid": 1001,
  "iomode": "R0",
  "anongid": 1001,
  "root_squash": false
}'
```

REST interface example

```
$ curl -s 'https://localhost:8080/v1/exports'  
{  
  "path": "/data",  
  "anonuid": 1001,  
  "iomode": "R0",  
  "anongid": 1001,  
  "client": "10.1.0.2",  
  "root_squash": false  
}
```

REST interface example

```
$ curl -s -XDELETE 'http://localhost:8080/v1/client/10.1.0.2/data'
```

```
$ curl -s -XDELETE 'https://localhost:8080/v1/exports/data'
```

In transit data protection

- In transit data protection in the cloud have new challenges
 - Use of public networks
 - Can't dynamically spawn kerberos infrastructure
- No kerberos infrastructure provided by public clouds

RPC-over-TLS

- IETF NFS working group activity
 - Protocol standard expected by 1Q 2021
- Implementation status
 - linux kernel
 - TLS code in kernel, NFS code underway
 - FreeBSD
 - client/server as addon on top of existing kernel
 - HammerSpace
 - server implementation prototype
 - dCache
 - client/server implementations, but disabled in official releases

Summary

- POSIX access is required even in Clouds
 - All commercial providers have NFS in portfolio
- NFS community works to address cloud challenges
 - RPC-over-TLS
 - 3rd party copy
- dCache developers work on better cloud integration
 - Shares storage REST API
 - Geo-aware zones

Thank you