PoD:
dynamically create and use remote PROOF clusters

A thin client concept
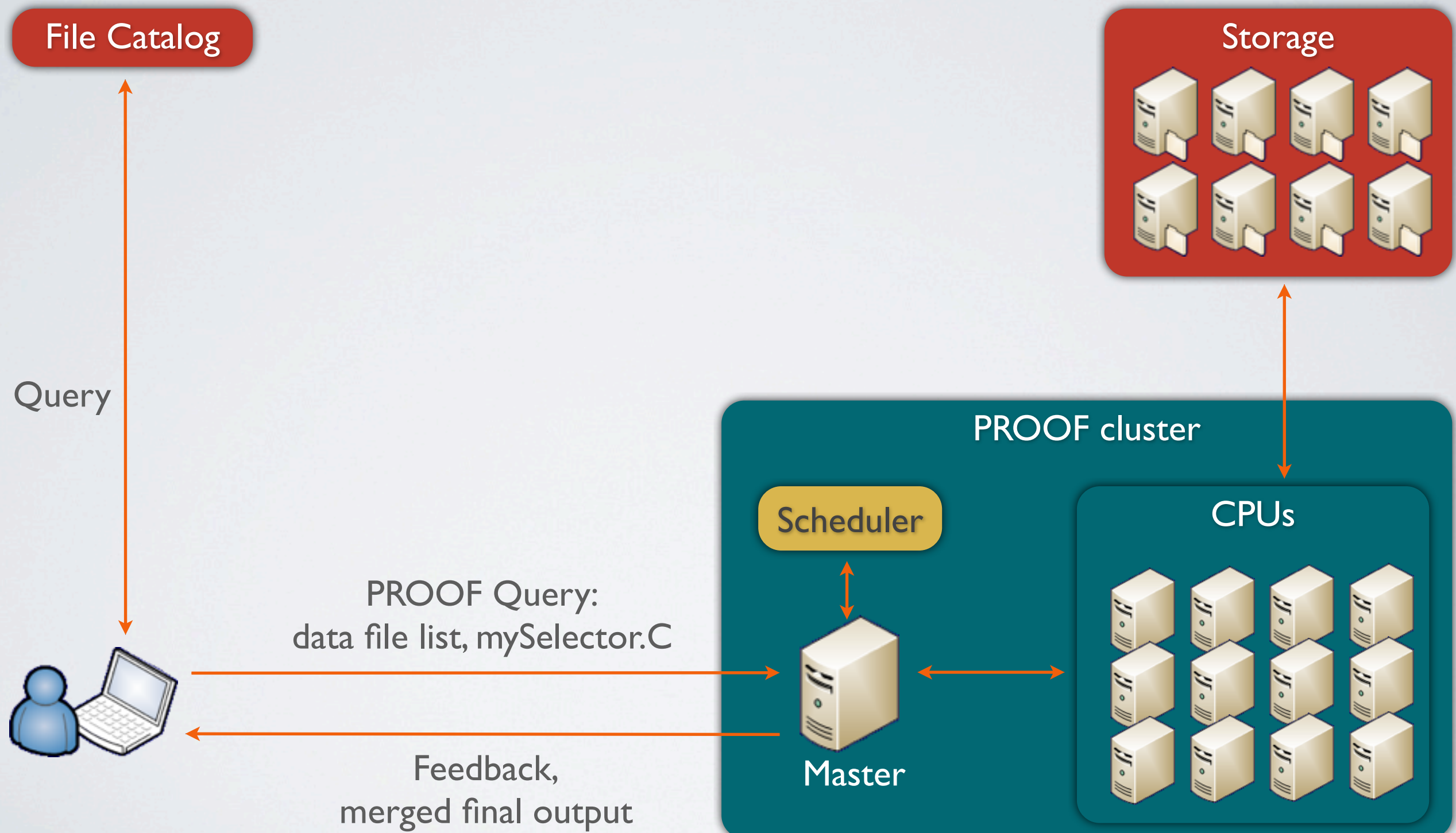
Anar Manafov, GSI Darmstadt
CHEP 2012

PROOF

File Catalog

Storage

Query

PROOF cluster

PROOF Query:
data file list, mySelector.C

Scheduler

CPUs

Master

Feedback,
merged final output

Different job managers

Job Manager plug-in system

SSH	LSF	PBS	Grid Engine
AliEn	Condor	gLite	LoadLeveler

PoD is shipped with a number of plug-ins to cover all major RMSs, such as local cluster systems and Grid.

If there is no RMS available, then the SSH plug-in can be used.
The SSH plug-in is also used to setup PROOF clusters on Clouds.

Set your private PROOF cluster up

**Start
PoD Server**

pod-server start

Set your private PROOF cluster up

Start
PoD Server

→

Submit PoD Jobs
using PoD Job Manager

pod-server start

pod-submit -r [*lsf* | *pbs* | *condor* | ...] -q *myqueue* -n *100*

or

pod-ssh -c *pod_ssh.cfg* submit

Set your private PROOF cluster up

Start PoD Server	→	Submit PoD Jobs using PoD Job Manager	→	Check for Your PROOF Cluster

pod-server start

pod-submit -r [*lsf* | *pbs* | *condor* | *...*] -q *myqueue* -n *100*
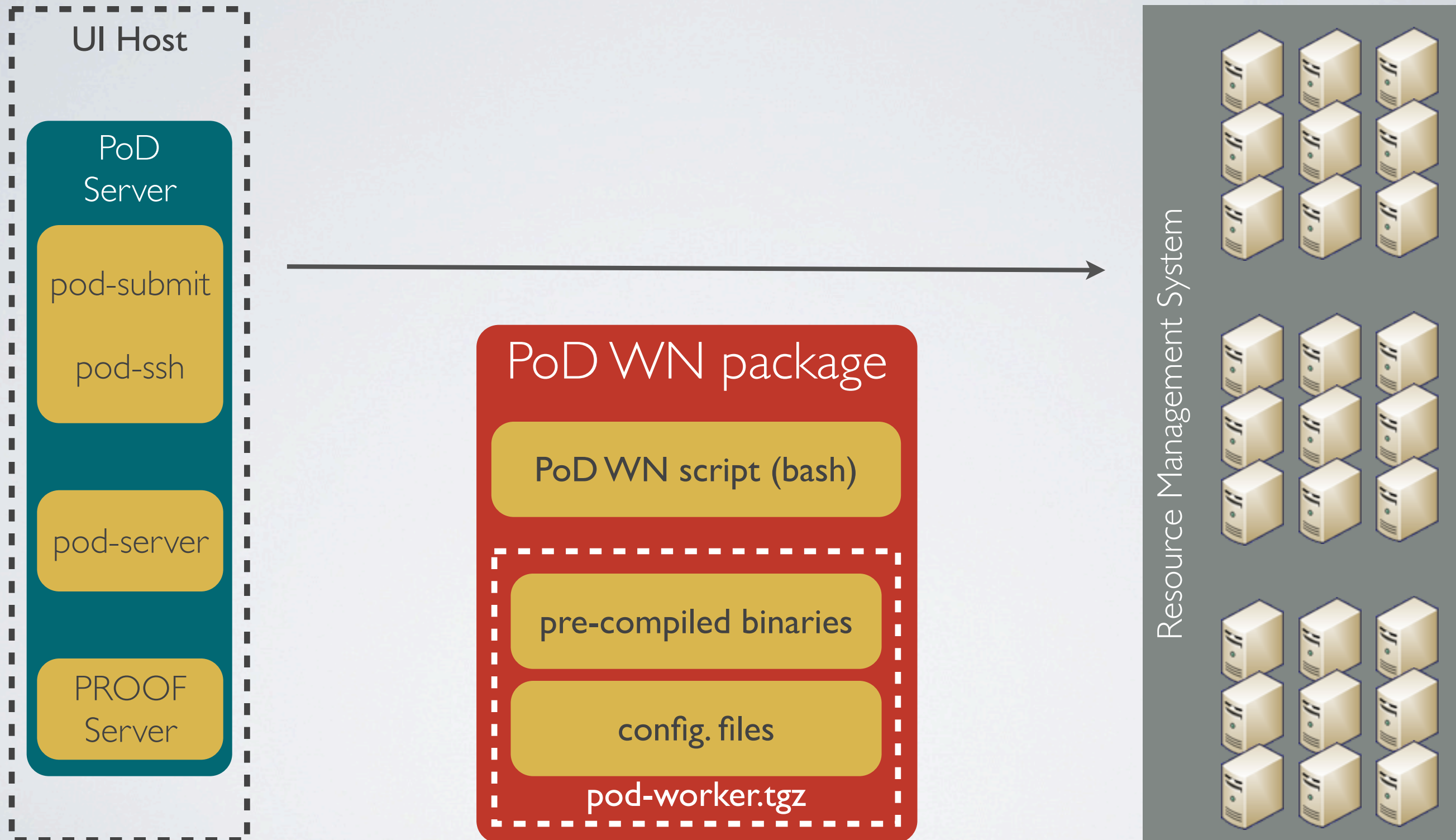
or

pod-ssh -c *pod_ssh.cfg* submit

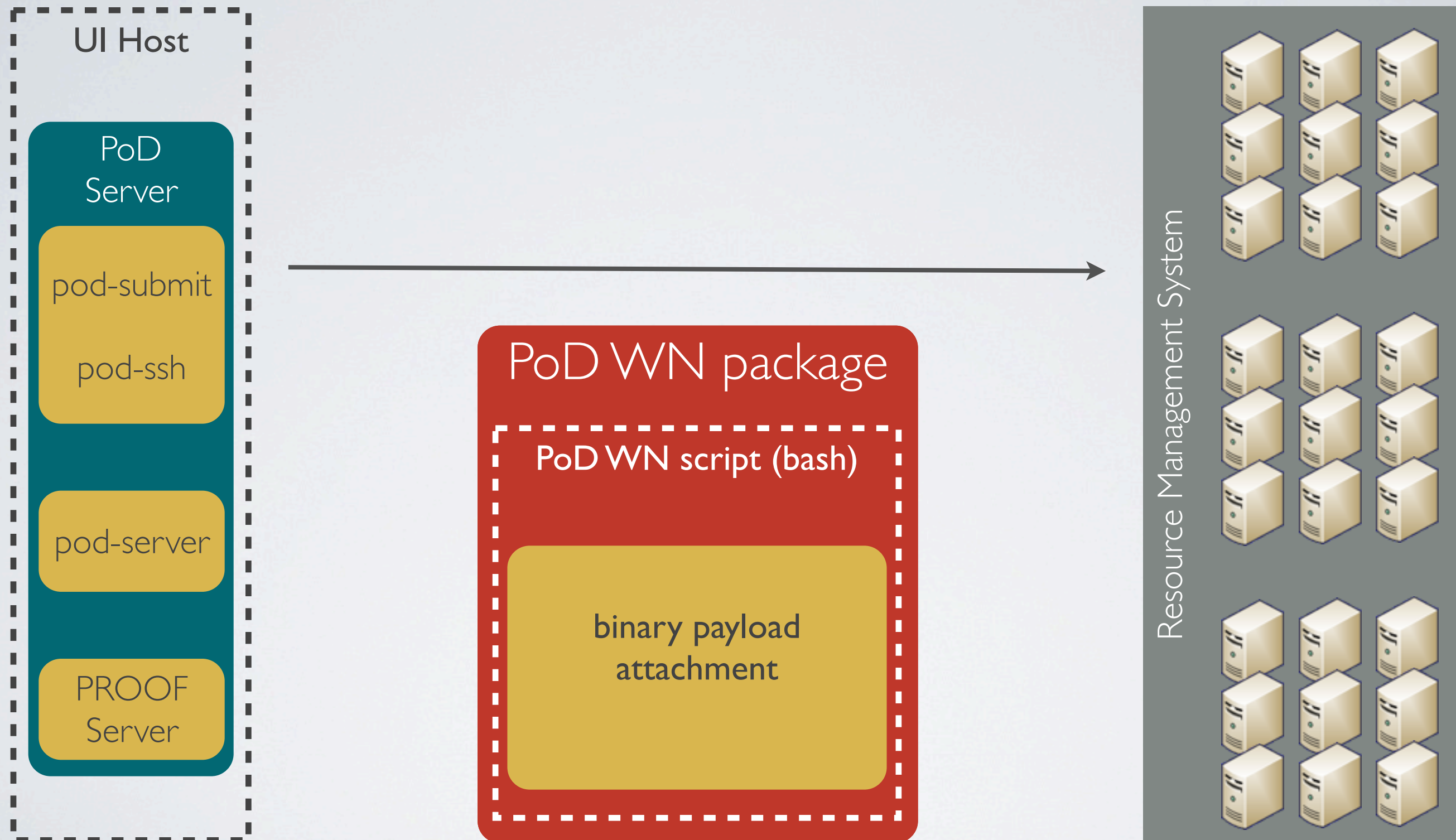pod-info -l -n

PoD vs "Static" approach

a User

- can entirely control his/her dynamic cluster,
- can setup and use it on demand,
- can dynamically change an amount of WNs,
- can select a preferable master host,
- doesn't need admins to take an action,
- doesn't disturb other users,
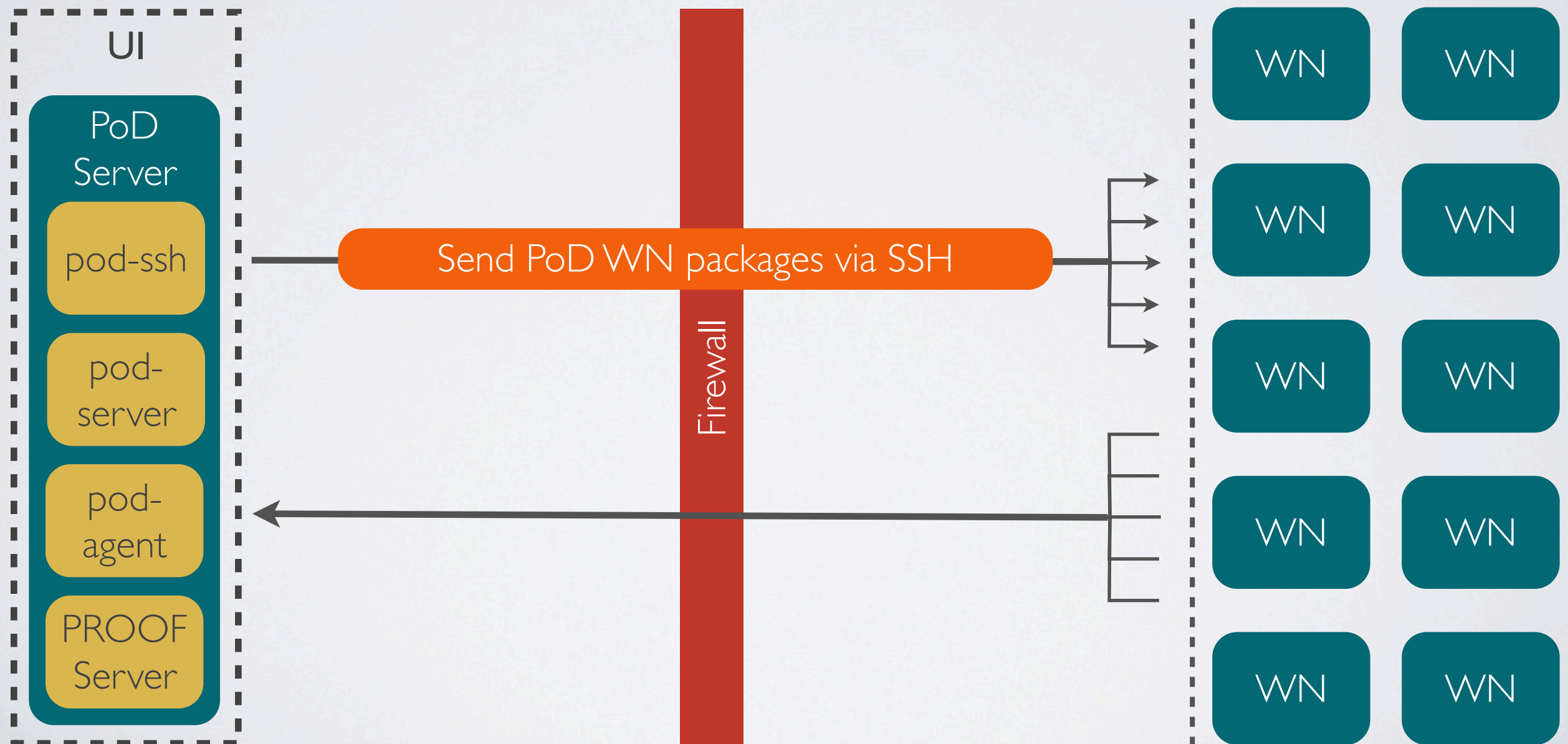- is free to choose a ROOT ver. for services.
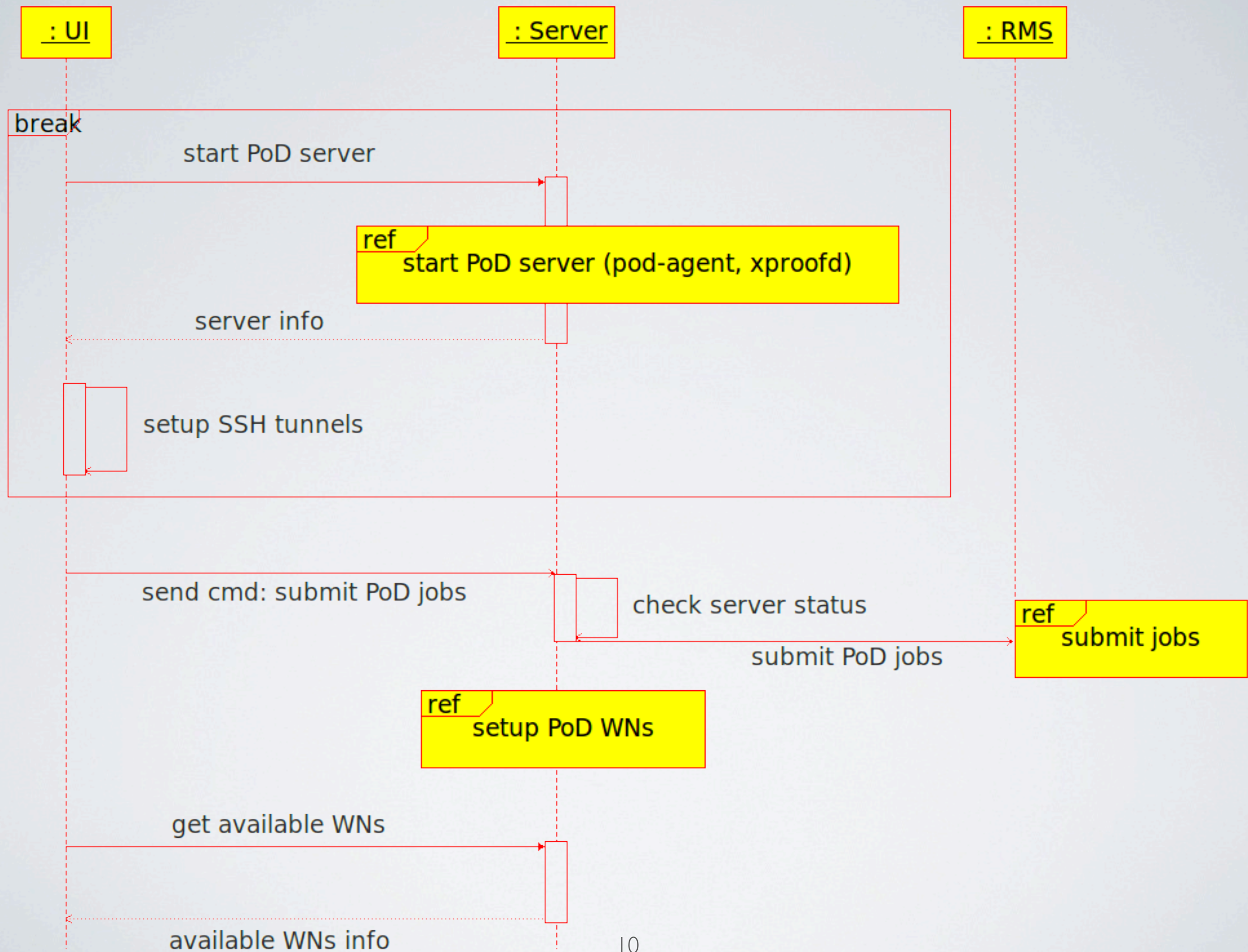
Binary Payload Attachment

UI Host

PoD Server
- pod-submit
- pod-ssh
- pod-server
- PROOF Server

PoD WN package

PoD WN script (bash)

pre-compiled binaries

config. files

pod-worker.tgz

Resource Management System

Binary Payload Attachment

PoD Server

pod-submit

pod-ssh

pod-server

PROOF Server

PoD WN package

PoD WN script (bash)

binary payload attachment

Resource Management System

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PoD SSH

a simple CSV file as an input to the plug-in:

ID,	login@host,	ssh params,	WN work dir,	num of proof WNs
r1,	anar@lxg27.gsi.de,	-p24,	/tmp/test,	10
a2,	user@lxi001.kkk.es,		~/pod_wn,	
14,	doom@host.my,	-p22,	/opt/pod/,	

UI

PoD Server

pod-ssh

pod-server

pod-agent

PROOF Server

Firewall

Send PoD WN packages via SSH
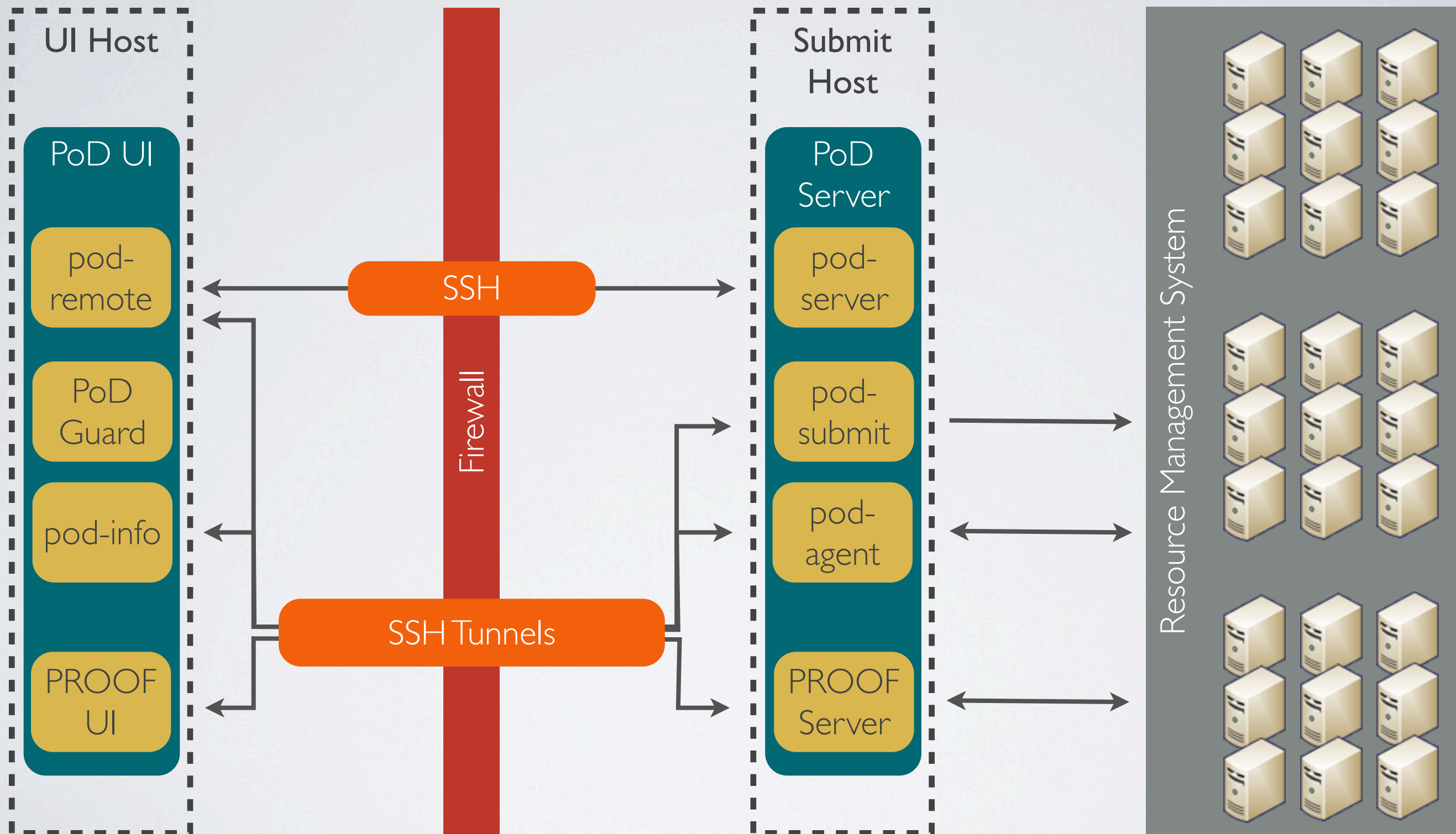
WN WN WN WN WN WN WN WN WN WN WN WN

pod-remote: a thin client concept

pod-remote

```
pod-remote --start \
        --remote anar@host.gsi.de:/PoD/3.11 \
        --env-local env_demac012.sh
```

```
pod-remote --start \
          --remote anar@host.gsi.de:/PoD/3.11 \
          --env-local env_demac012.sh
```

```
pod-info -sd
    PoD Server Type: remote (managed by pod-remote)
    XPROOFD [47445] port: 21001
    PoD agent [47450] port: 22001
    PoD agent port is forwarded via local port: 22001
    XPROOFD port is forwarded via local port: 21001
```

```
pod-remote --start \
            --remote anar@host.gsi.de:/PoD/3.11 \
            --env-local env_demac012.sh
```

```
pod-info -sd
    PoD Server Type: remote (managed by pod-remote)
    XPROOFD [47445] port: 21001
    PoD agent [47450] port: 22001
    PoD agent port is forwarded via local port: 22001
    XPROOFD port is forwarded via local port: 21001
```

```
pod-info -c
anar@localhost:21001
```

pod-remote --command "*pod-ssh -c /home/etc/ssh_hst.cfg submit*"

pod-remote --command "*pod-ssh -c /home/etc/ssh_hst.cfg submit*"

pod-info -ln
64
worker manafov@lxi049.gsi.de:21001 (direct connection) startup: 1s
worker manafov@lxi049.gsi.de:21001 (direct connection) startup: 1s
worker manafov@lxi049.gsi.de:21001 (direct connection) startup: 1s
worker manafov@lxi049.gsi.de:21001 (direct connection) startup: 1s
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worker manafov@lxi049.gsi.de:21001 (direct connection) startup: 1s
worker manafov@lxi054.gsi.de:21001 (direct connection) startup: 2s
worker manafov@lxi054.gsi.de:21001 (direct connection) startup: 2s
worker manafov@lxi054.gsi.de:21001 (direct connection) startup: 2s
worker manafov@lxi054.gsi.de:21001 (direct connection) startup: 2s
...

```
TProof::Open(gSystem->GetFromPipe("pod-info -c"));
```

```
TProof::Open(gSystem->GetFromPipe("pod-info -c"));
```

```
TProof::Open("pod://")
```

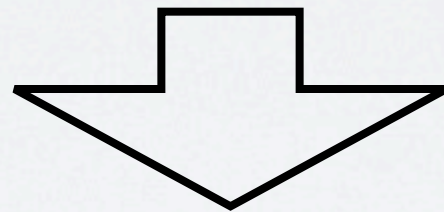```
TProof::Open(gSystem->GetFromPipe("pod-info -c"));
```

```
TProof::Open("pod://")
```

```
pod-remote --stop
```

no need to write all arguments when using
pod-ssh, pod-remote

pod-remote --start \
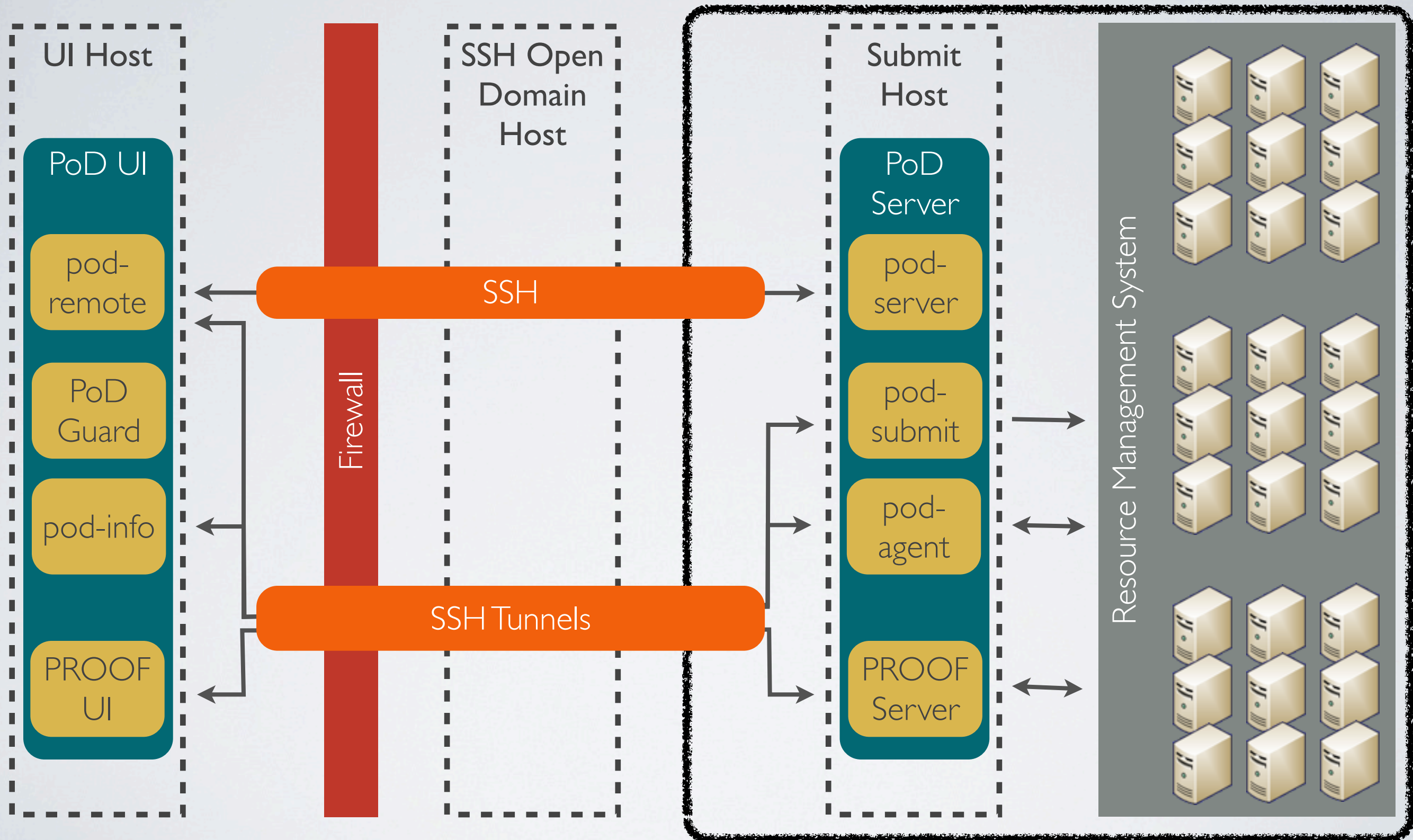   --remote *anar@host.gsi.de:/PoD/3.11* \
    --env-local *env_demac012.sh*

pod-remote --command "*pod-ssh -c /home/etc/ssh_hst.cfg submit*"
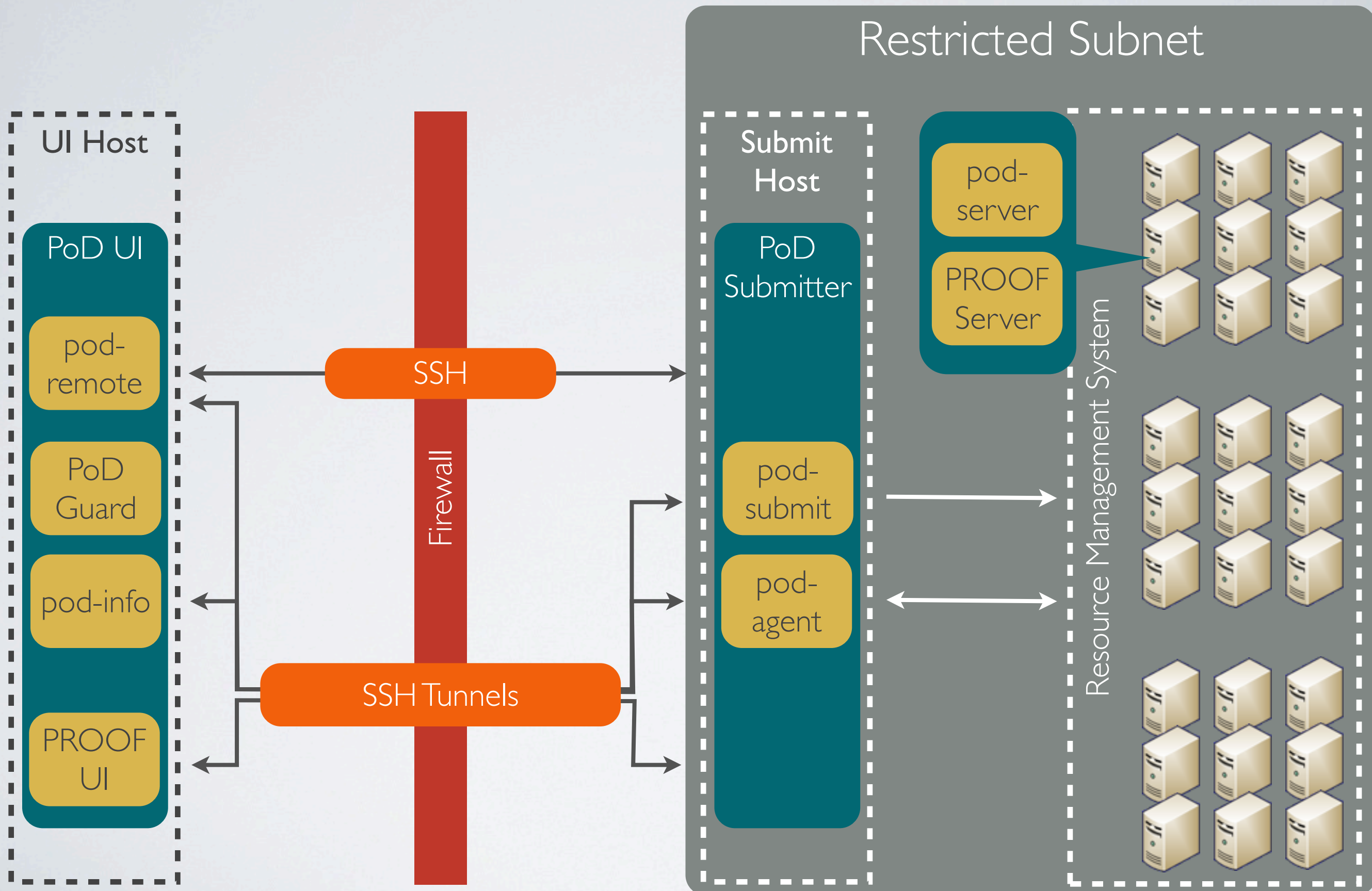
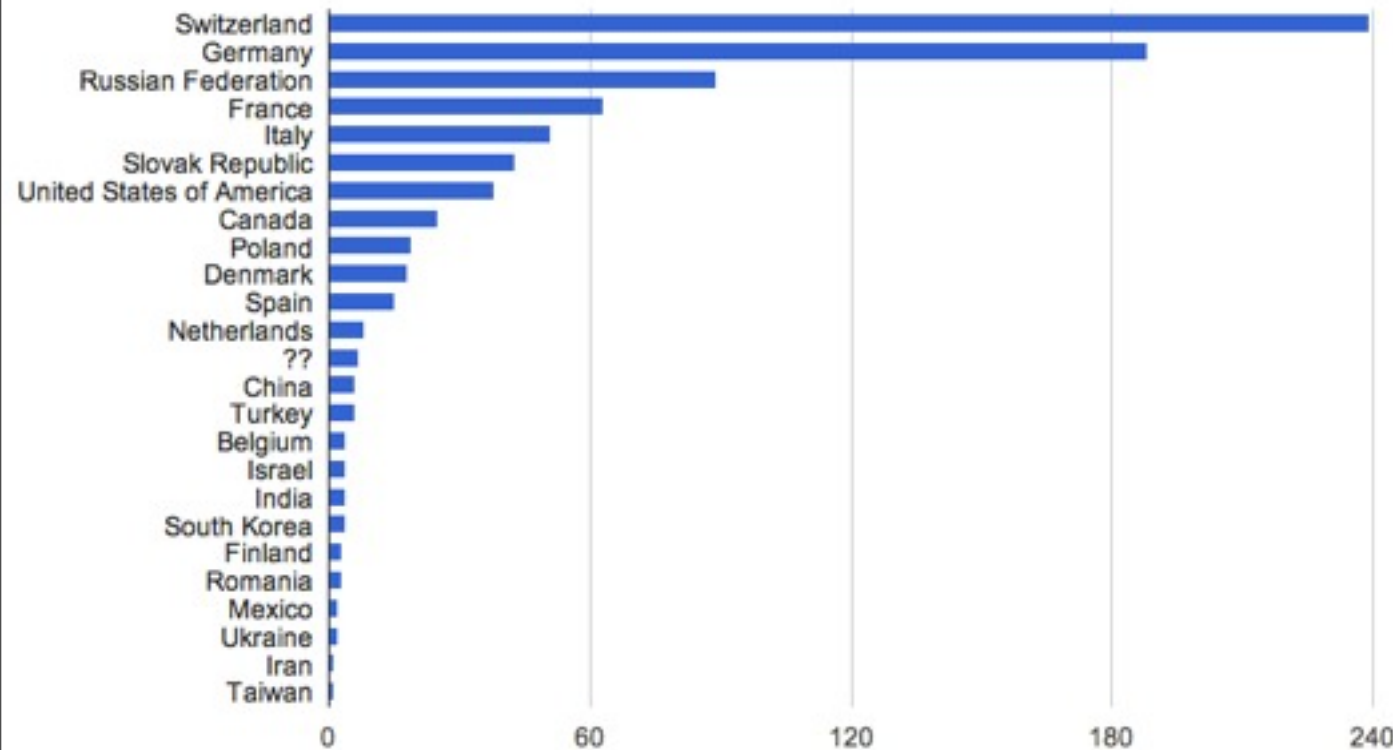pod-remote --start
pod-remote --command "*pod-ssh submit*"

pod-remote: via open domain

Dynamic Master architecture

UI Host

PoD UI
- pod-remote
- PoD Guard
- pod-info
- PROOF UI

Firewall

SSH

SSH Tunnels

Restricted Subnet

Submit Host

PoD Submitter
- pod-submit
- pod-agent

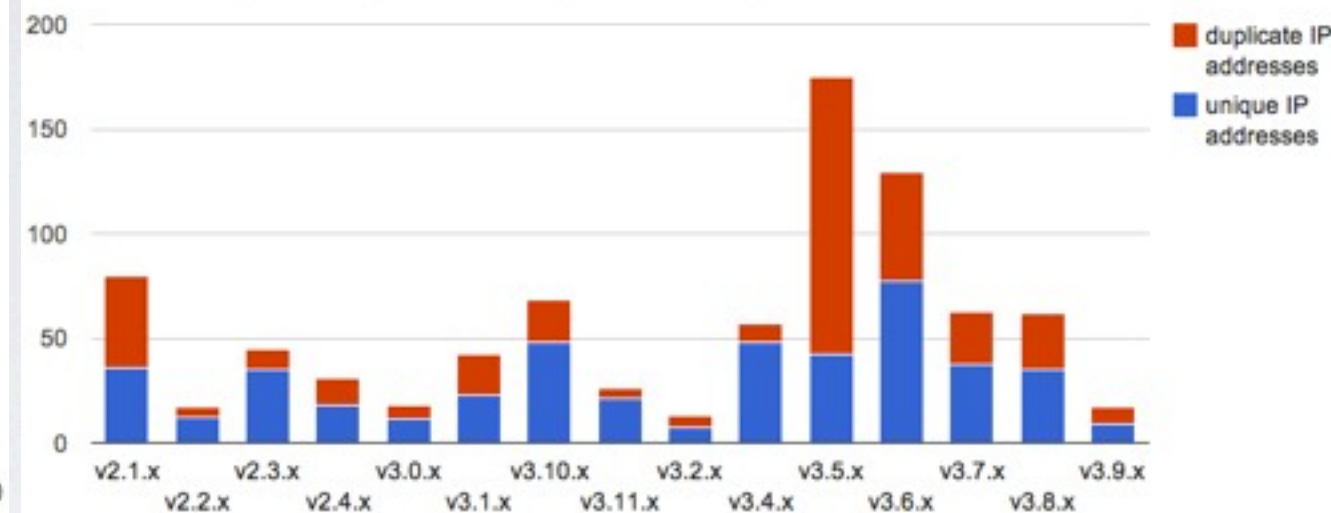pod-server

PROOF Server

Resource Management System

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Downloads by Country

~**900** Downloads since June, 2010
24 countries
~**200** Unique Downloads per year

Downloads by Versions (accumulated by minor numbers)

PoD is now officially a part of ATLASLocalRootBase package:
https://twiki.atlas-canada.ca/bin/view/AtlasCanada/ATLASLocalRootBase#Using_PROOF_on_Demand_PoD

PoD related Posters (Track 3, CHEP 2012)

- **Computing On Demand: Dynamic Analysis Model** >> **with LIVE DEMOs!!!**

- Dynamic parallel ROOT facility clusters on the Alice Environment

- Enabling data analysis à la PROOF on the Italian ATLAS-Tier2's using PoD

- Integrating PROOF Analysis in Cloud and Batch Clusters

- PEAC - A set of tools to quickly enable PROOF on a cluster