FORGE Service Lab Technical Contact Training

FORGE Service Lab

DIGILE

Terminology

Term	Definition
Contract	A legally binding document that enables a project formation and defines the type of the project (SDA, FPA, FPACRA)
Project	As an outcome of a signed contract a project will be formed. Various tools and resources will be made available to the project depending on the type (SDA, FPA, FPACRA)
OpenStack project	OpenStack project (aka. Tenant) is an instance of the CRA allocated for certain project types
SDA	One of the contract types is the Service Development Agreement
FPA	One of the contract types is FORGE Partner Agreement
FPA (CRA)	FORGE Partner Computing Resource Allocation is an optional addendum to the FPA contract
CRA	Computing Resource Allocation is a predefined set of computing resources. CRA realizes as FORGE OpenStack project (aka. Tenant) that has certain quota from FORGE IaaS and that is available for SDA projects
TC	FORGE Service Lab terms and conditions
IaaS	Infrastructure as a Service e.g. FORGE OpenStack, AWS
PaaS	Platform as a Service e.g. Heroku
SaaS	Software as a Service e.g. Google Apps
Technical contact	A techical role in the project that will administer technical aspects of the project e.g. CRA
Administrative contact	A role that will sign the contract and therefore enable collaboration project formation

Technical contact role

- Technical contact role
  - Is legally binding role that is defined in the contract
  - Contains operational tasks which require technical Linux skills
  - Will be trained so that he'll able to help other project members
- Manage project's user accounts and computing resources
  - Adds and remove additional user accounts and manages computing environment quotas
  - Ensure that each user uses FORGE services in strict adherence with TC
  - Act as a 2nd tier technical support for the project
  - May request specific support from FORGE in e.g. implementing a generic purpose digital service recipe
  - Help project members in using FORGE computing environment and other FORGE services
- Help and train other project members
  - Promote and help project members in using collaboration channels, tools, documentation and help channels
  - Help project members in using cloud environment

FORGE HW

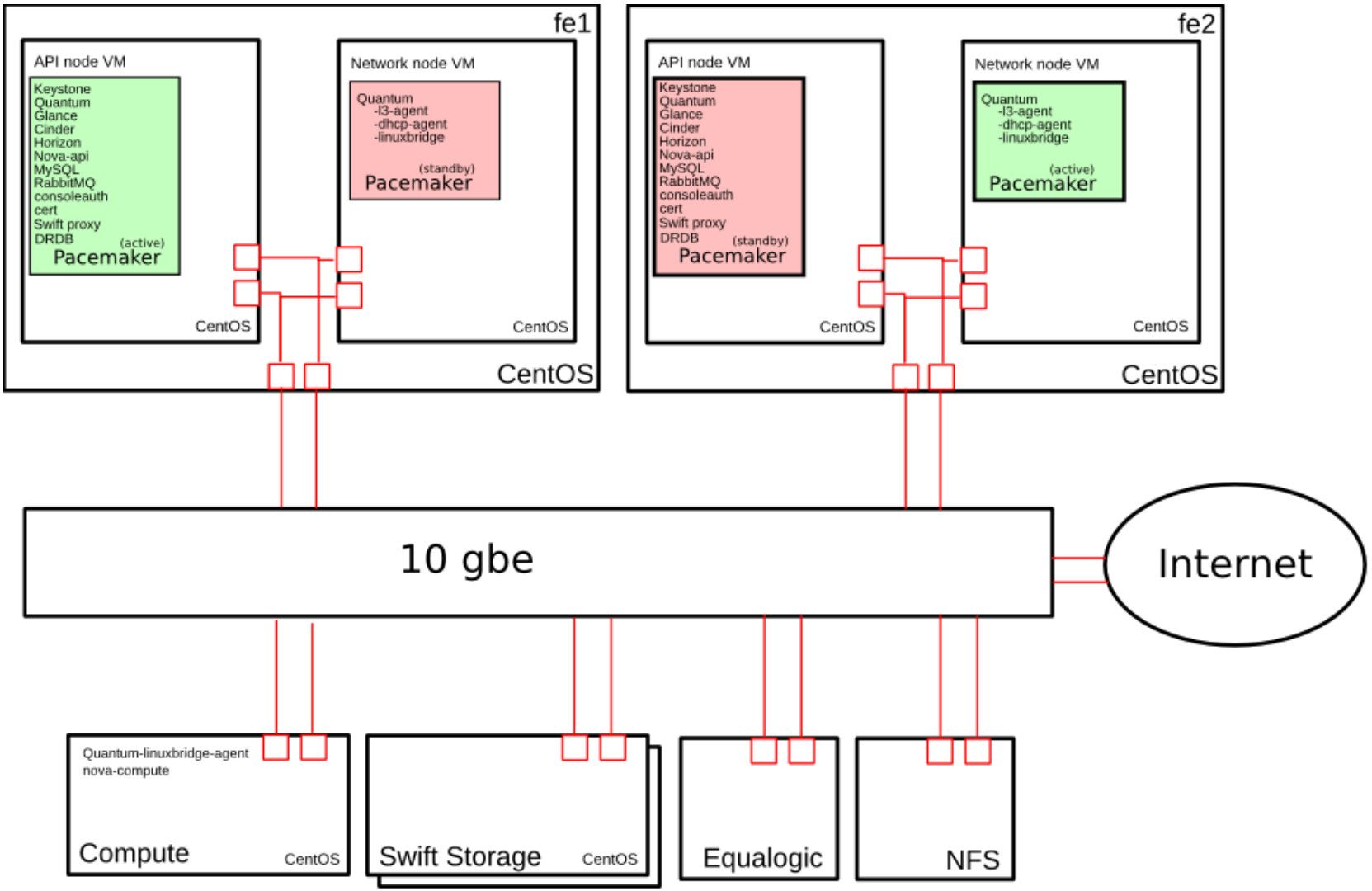
FORGE CRA

- Computing Resource Allocation consists of CRA units
- Resources are available trough OpenStack IaaS
- 1 CRA
  - 16 vcores, 32G RAM
  - 10G / vcore instance storage
  - 1TB volume storage from central storage
  - 1TB object storage
  - 5 external IPv4 IPs and shared wide network bandwidth
  - 16 instances
- Bigdata CRA
  - Suitable for a e.g. Hadoop cluster
  - 46 cores, 10G / vcore instance storage, 400G RAM, 94TB ephemeral disk, 1TB volume storage, 1TB object storage
  - 16 instances

FORGE CRA storage options

- Instance storage
  - Like local root disk that has some space
  - Deleted when virtual machine is deleted
- Block storage from central storage
  - Like a persistent unformatted disk
  - Storage comes from central storage with RAID disks
  - Can be detached and attached to VMs (one at the time)
  - Won’t be deleted when virtual machine is deleted
- Object storage
  - Like Amazon’s S3
  - Access via URL get / put / delete
  - Objects have metadata
  - Triple replication

FORGE IaaS architecture



Compute HW

- 16 x Dell C6220 (3 dedicated for operations)
  - 2 x CPUs/node
  - 16 HT cores / CPU Intel E5-2650, 20 MB cache, 2,00 GHZ
  - CPUs are 2 x over-committed in cloud middleware (tot. 1024 HT vcores)
  - 128 GB RAM / node (tot. 2048 GB)
  - 2 x 10 Gb Ethernet for failover + management network
  - 6 x 900 GB SAS disks ~ 2,7 TB usable (RAID)
- 12 x HP SL4540 (big data)
  - 2 x CPUs/node
  - 20 HT cores / CPU Intel E5-2670v2
  - CPUs are not over-committed in cloud middleware (tot. 480HT vcores)
  - 196 GB RAM / node (tot. 2352 GB)
  - 2 x 10 Gb Ethernet for failover + management network
  - 2 x 100 GB SSD for OS and 15 x 4 TB SATA (raw!) / node
  - Live migration of the VMs might not be possible
  - RAID5 (6+1) and LVM configuration aimed to balance robustness and performance

Storage HW

- Object storage Dell R720XD
  - 1 x Intel E5-2630L (6 cores)
  - 32 GB RAM
  - 36 TB disk (SATA)
  - Multiple copies of object for fail-over (no RAID). Tolerates a node failure.
  - Due to redundancy +30 TB usable capacity

- Volume storage EqualLogic PS6510ES
  - 7 x 400GB SSD, 41 x 2TB SATA
  - RAID6 protected
  - 2 x 10 Gb Ethernet controllers for failover
  - 64 TB usable space of which part is for NFS

FORGE virtual machine flavors

- Flavors determine the sizing for the virtual machines
- It's possible for a techical contact to ask for a custom flavor by issuing a support ticket
- The basis for big data CRA and flavors is a Hadoop cluster: 1 + 2 + 10 + 1 . 1 monitor(tiny/small, 2 namenodes(hadoop.small), 10 datanodes(hadoop.medium) and 1 control vm(tiny) for ansible and such.

The default flavors

Name	Memory_MB	Disk	Ephemeral	Swap	VCPUs	RXTX_Factor	Is_Public
m1.tiny	1024	10	0		1	1.0	False
m1.small	2048	10	0		1	1.0	False
m1.medium	4096	20	0		2	1.0	False
m1.large	8192	40	0		4	1.0	False
m1.xlarge	16384	80	0		8	1.0	False

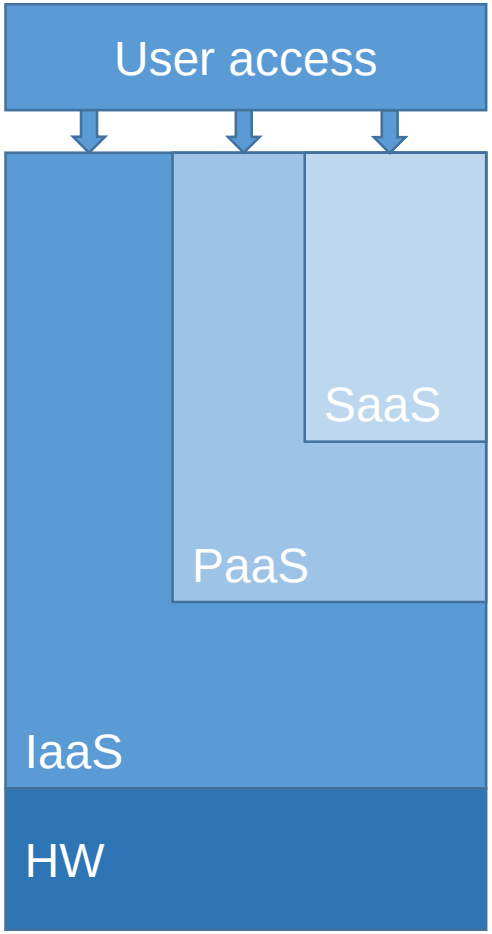
The specific flavors for big data projects

Name	Memory_MB	Disk	Ephemeral	Swap	VCPUs	RXTX_Factor	Is_Public
m1.tiny	1024	10	0		1	1.0	False
m1.small	2048	10	0		1	1.0	False
hadoop.small	18432	100	4300		2	1.0	False
hadoop.medium	36864	100	8600		4	1.0	False
hadoop.large	92160	100	21500		10	1.0	False

FORGE cloud service model

Cloud computing service models

- SaaS (Software as a Service)
  - Provides you with access to application software. You don't have to worry about the installation, setup and running of the application. Service provider will do that for you. You just have to pay and use it through some client.
  - Examples: Google Apps, Microsoft Office 365.
- PaaS (Platform as a Service)
  - Computing platforms which typically includes operating system, programming language execution environment, database, web server etc.
  - Examples: AWS Elastic Beanstalk, Windows Azure, Heroku, Force.com, Google App Engine, Apache Stratos
- IaaS (Infrastructure as a Service)
  - Computing infrastructure, physical or (quite often) virtual machines and other resources like virtual-machine disk image library, block and file-based storage, firewalls, load balancers, IP addresses, virtual local area networks etc.
  - Examples: Amazon EC2, Windows Azure, Rackspace, Google Compute Engine



FORGE cloud service model

- FORGE provides IaaS trough OpenStack
  - GUI
  - CLI
  - REST APIs
- FORGE provides some SaaS for
  - Project management
  - Source code version control
  - Collaboration
  - Instant messaging
- Additionally FORGE provides
  - Documentation
  - Reusable example Ansible recipes which can be used to build digital services
  - Plaza service cataloque for digital services (beta)
  - Service design support (alpha)

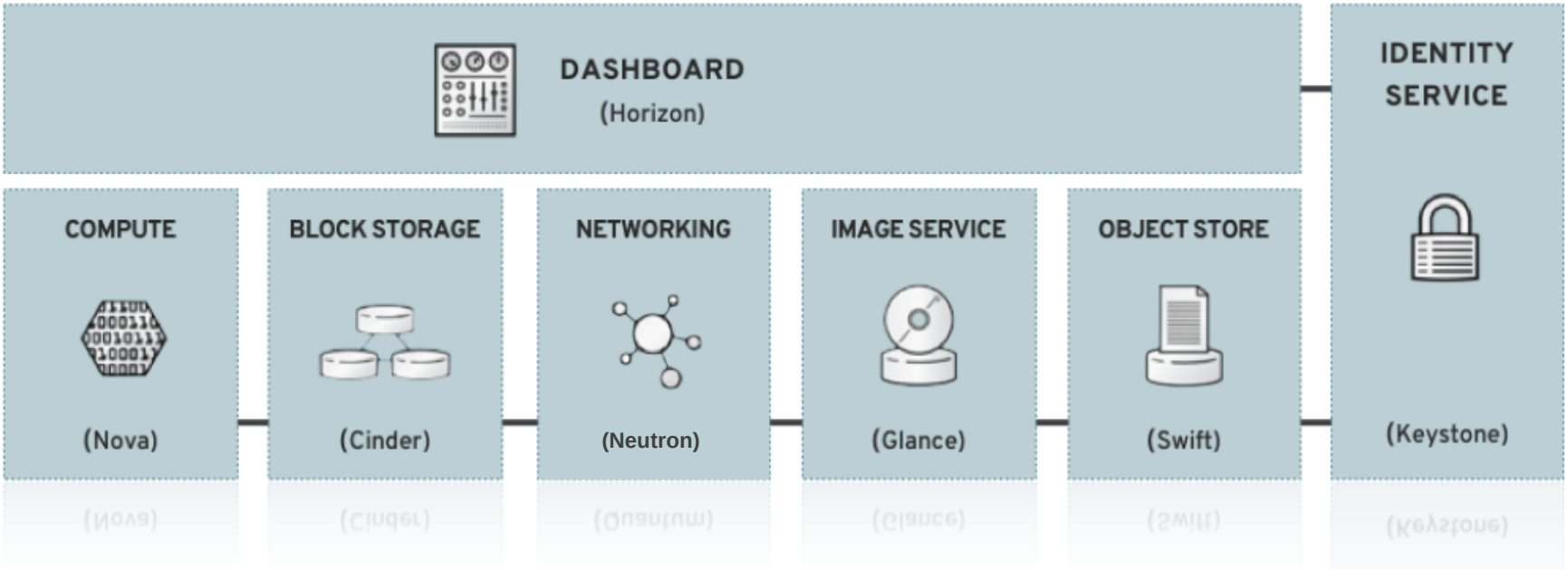
FORGE IaaS

- FORGE uses OpenStack to provide IaaS
- OpenStack is a free and open-source software
  - OpenStack.org release it under the terms of the Apache License 2.0
- OpenStack consists of a series of interrelated projects that control resource pools throughout a data center
  - Processing
  - Storage
  - Networking resources
  - KVM hypervisors
- Users manage resources using
  - A web-based dashboard
  - Command-line tools
  - RESTful API

https://cloud.forgeservicelab.fi

OpenStack components

OpenStack consists of several integrated projects



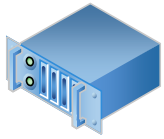
By courtesy of OpenStack Foundation

IaaS usage illustrated

User

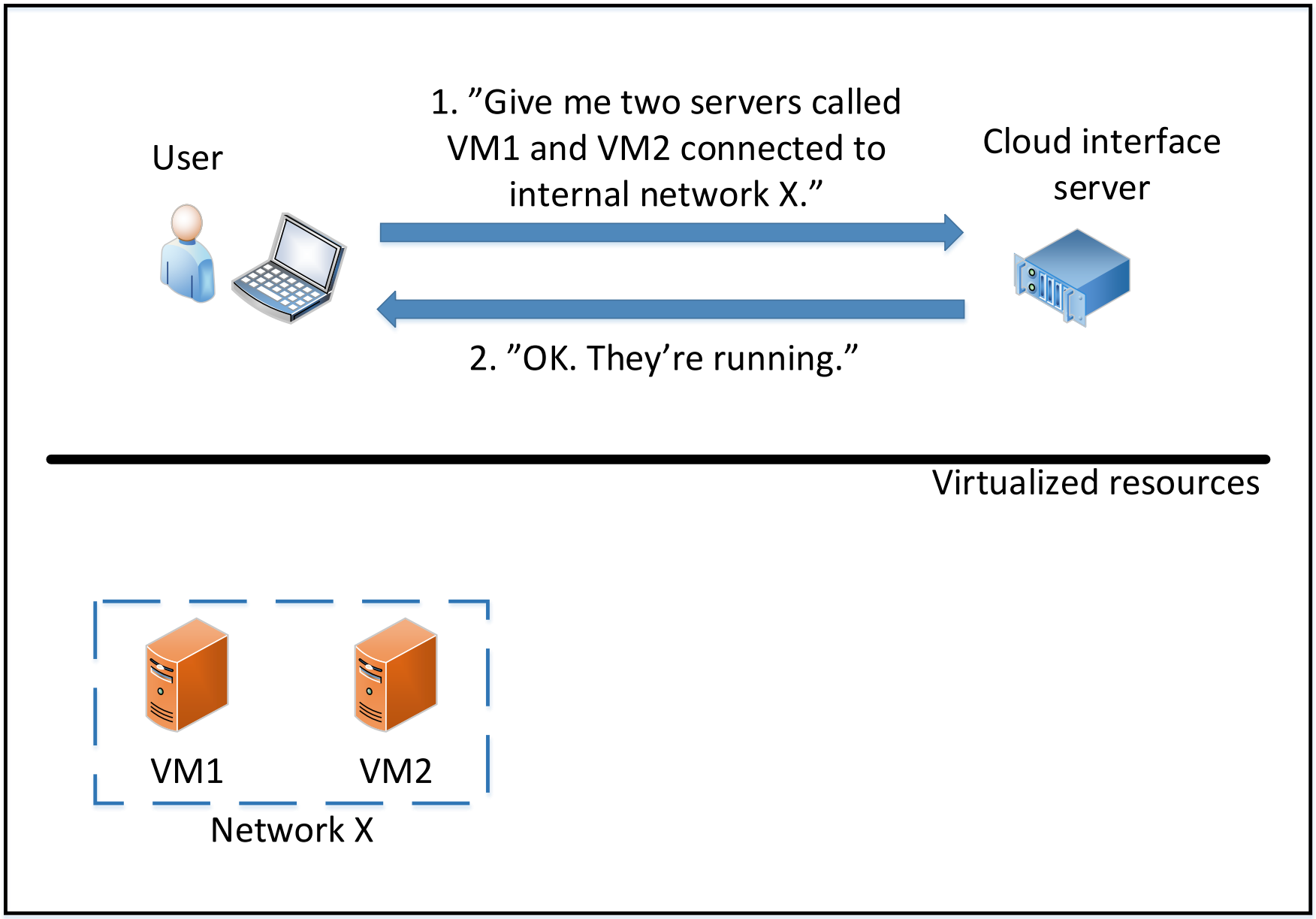
1. ”Give me two servers called VM1 and VM2 connected to internal network X.”

Cloud interface server



Virtualized resources

By courtesy of Risto Laurikainen, CSC



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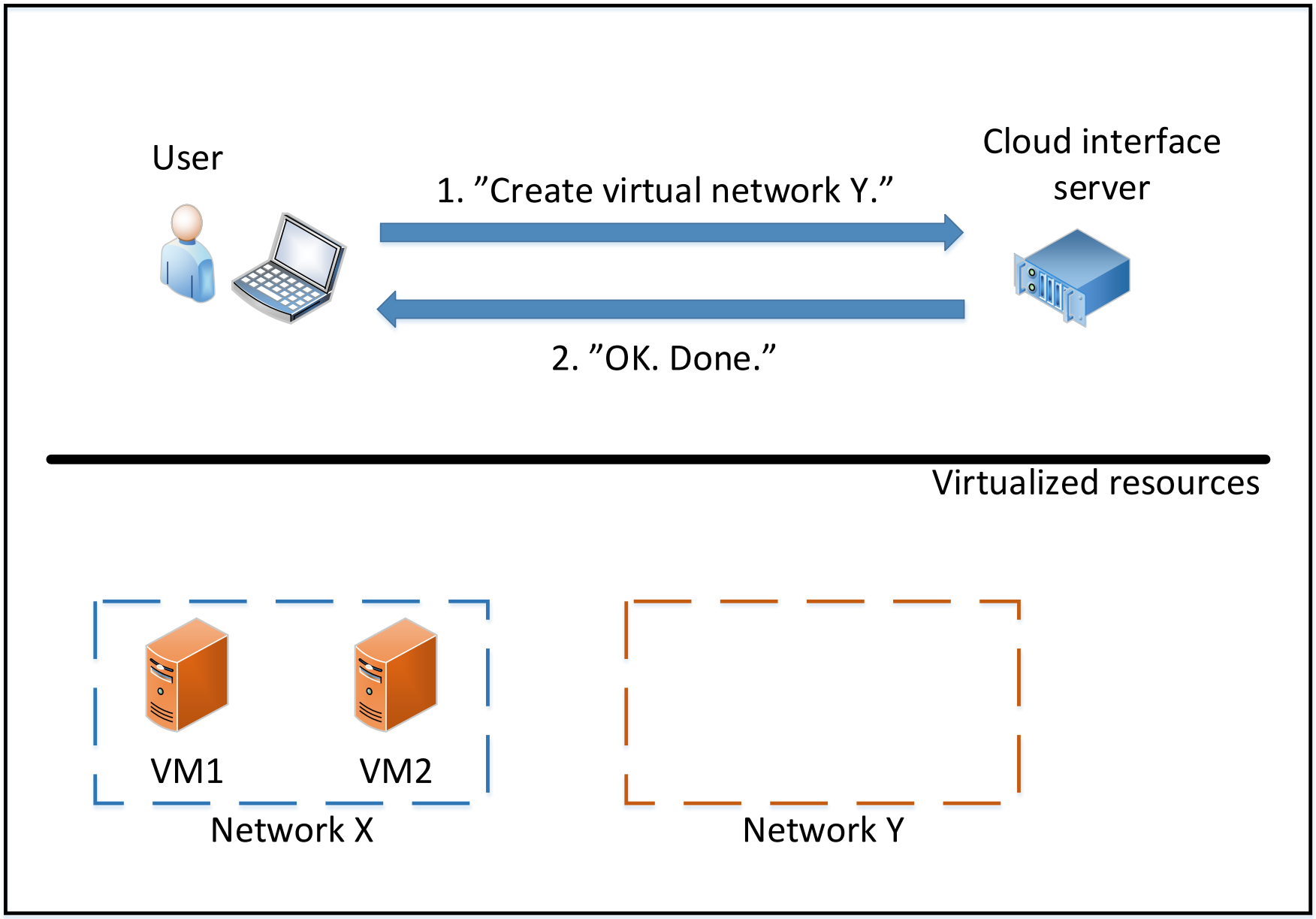

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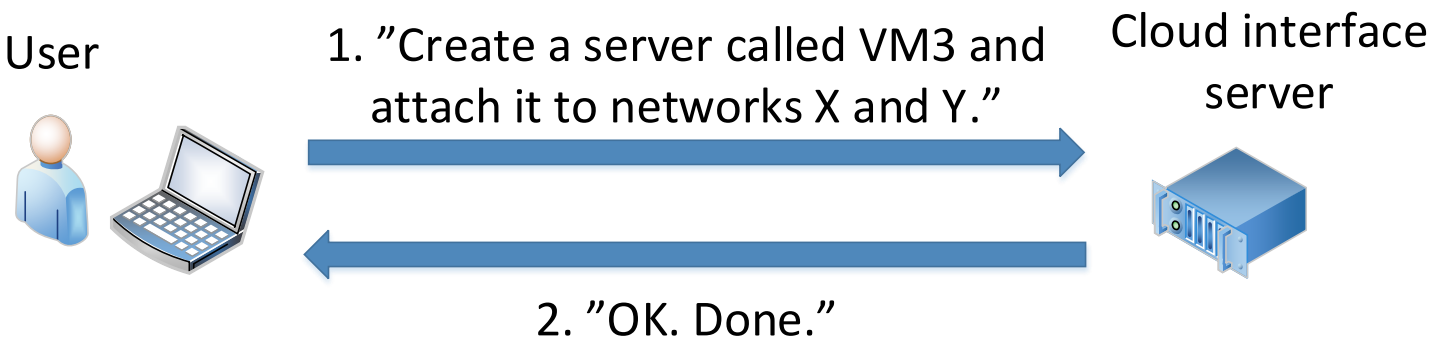

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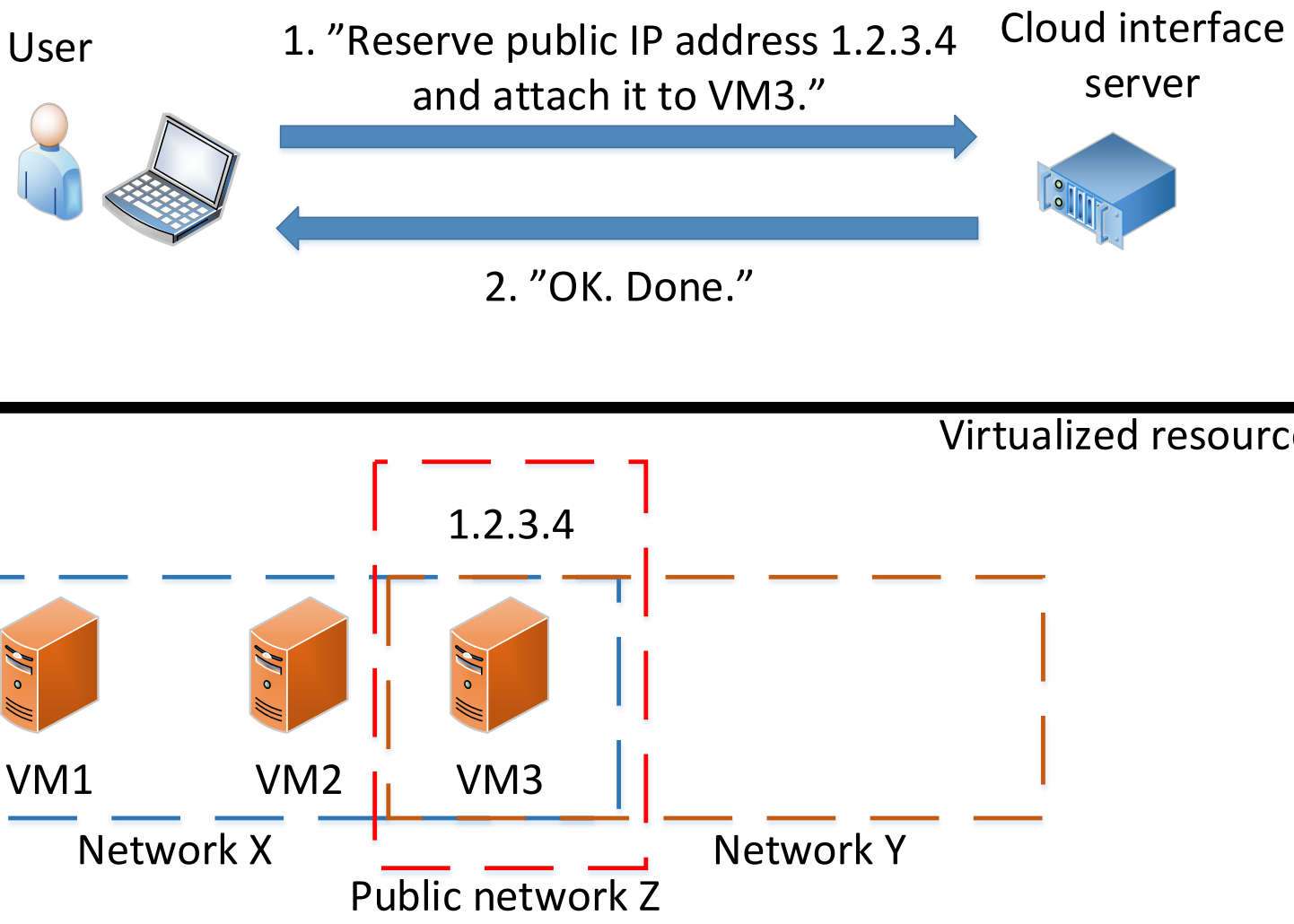

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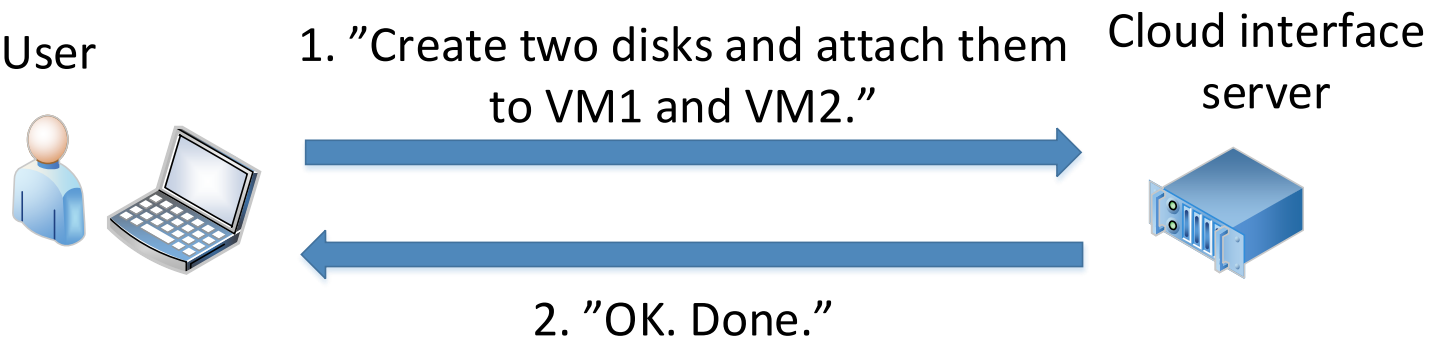

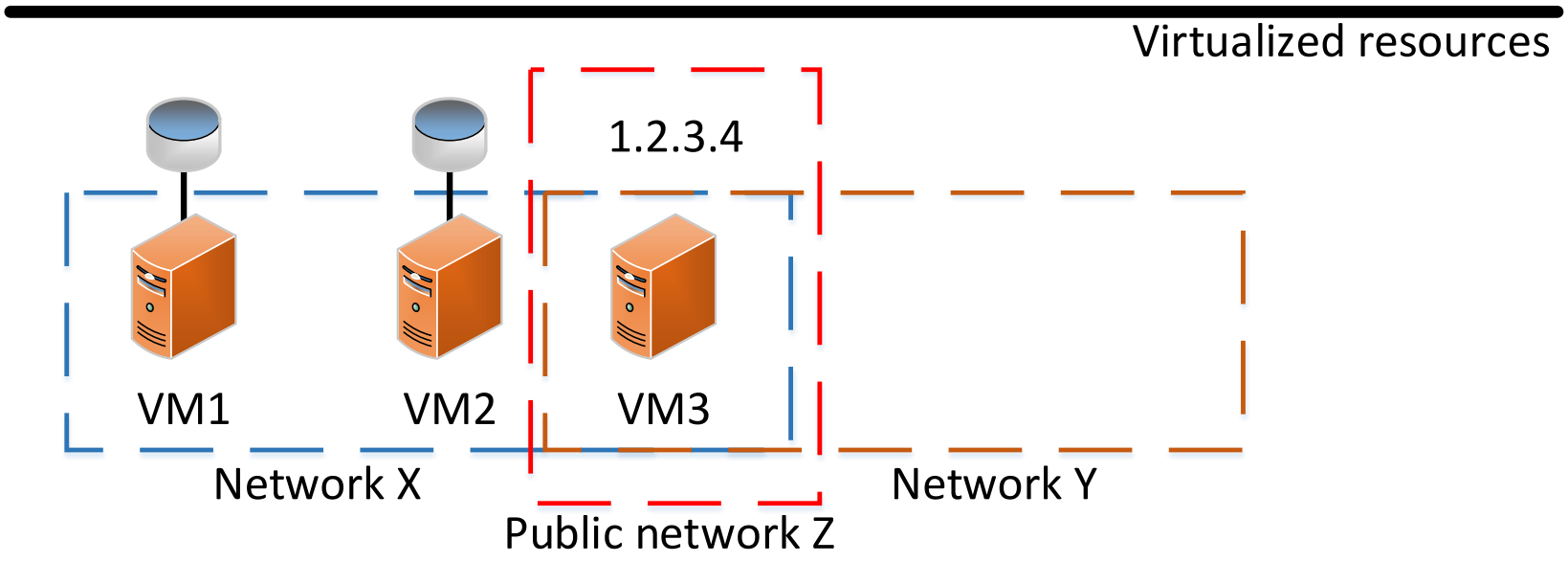

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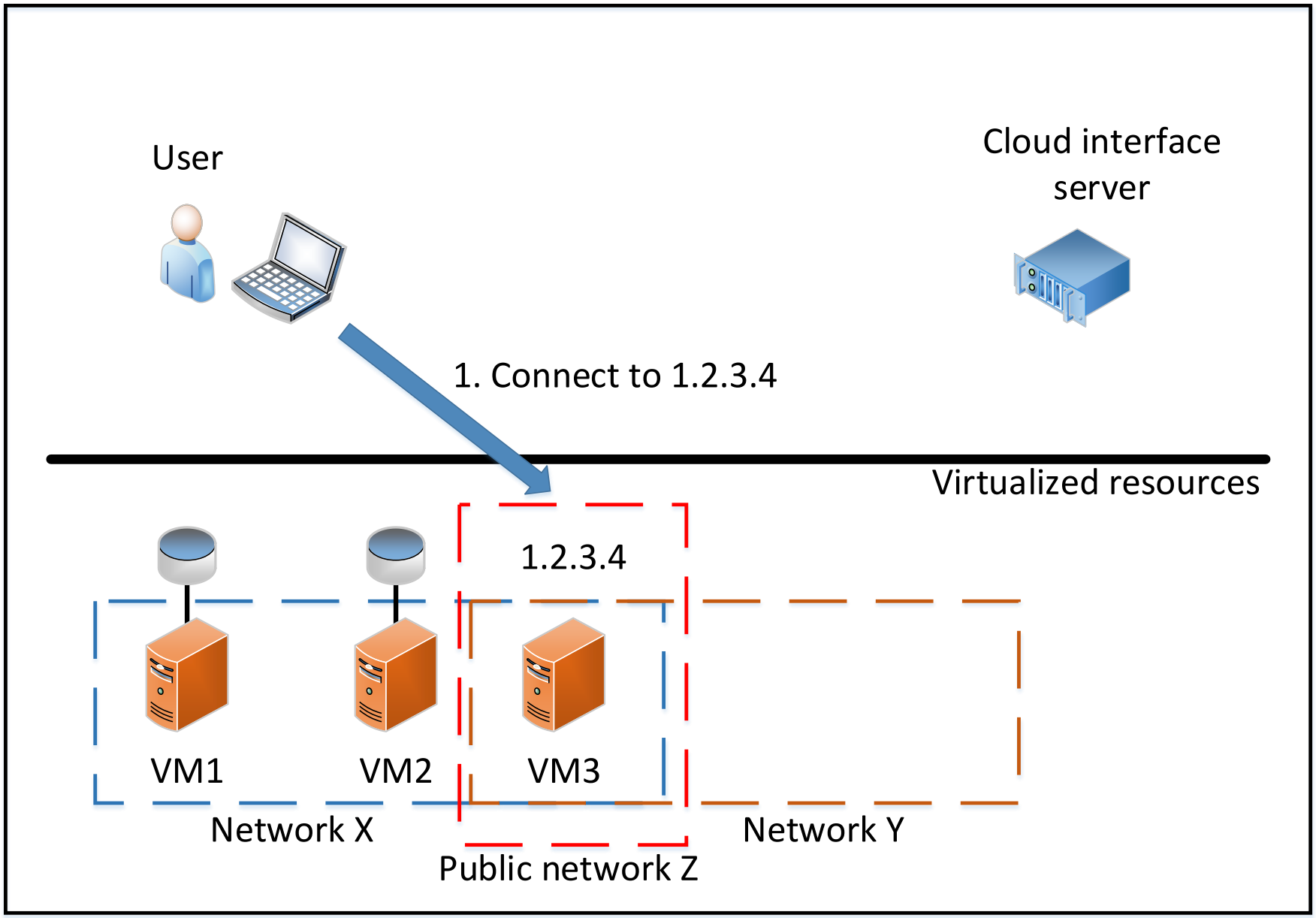


By courtesy of Risto Laurikainen, CSC

Excercise 1 – Getting support

EXCERCISE

- Search instructions from wiki about how technical contact can add more users
  - Login to https://support.forgeservicelab.fi
  - Tip: Search for ”More users”

Excercise 2 – Instant collaboration

EXCERCISE

- Install XMPP client and join forge-support channel
  - Login to https://support.forgeservicelab.fi
  - Search instructions from wiki about how to install XMPP instant messaging client
  - Tip: Search for ”XMPP”
  - Install XMPP client, configure it and join forge-support channel

Excercise 3 – Launch Linux image

EXCERCISE

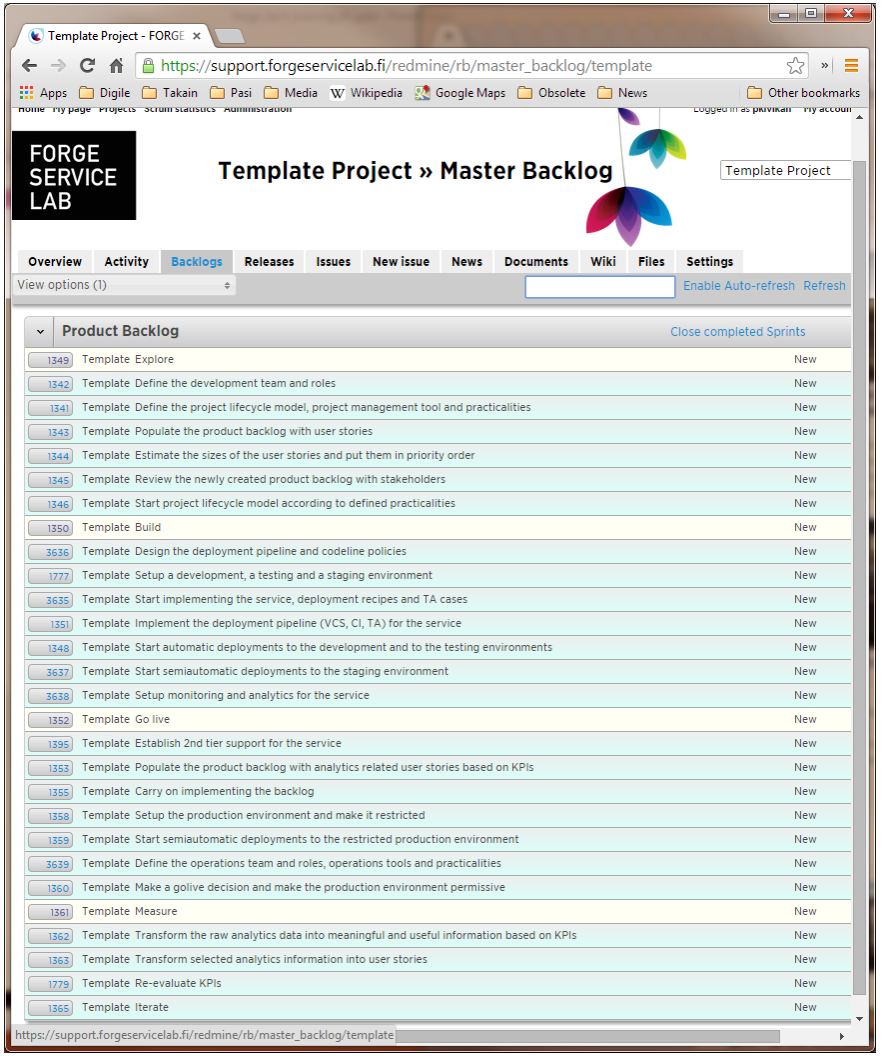
- Search instructions from wiki about how to launch a Linux image using Horizon GUI
  - Login to https://support.forgeservicelab.fi
  - Tip: Search for ”Launch Linux image”
- Launch Ubuntu 14.04
  - Login to https://cloud.forgeservicelab.fi
  - Launch Ubuntu 14.04 server image from the list of available images
  - Finally terminate the instance

FORGE SaaS

FORGE SaaS - Redmine

REDMINE
flexible project management

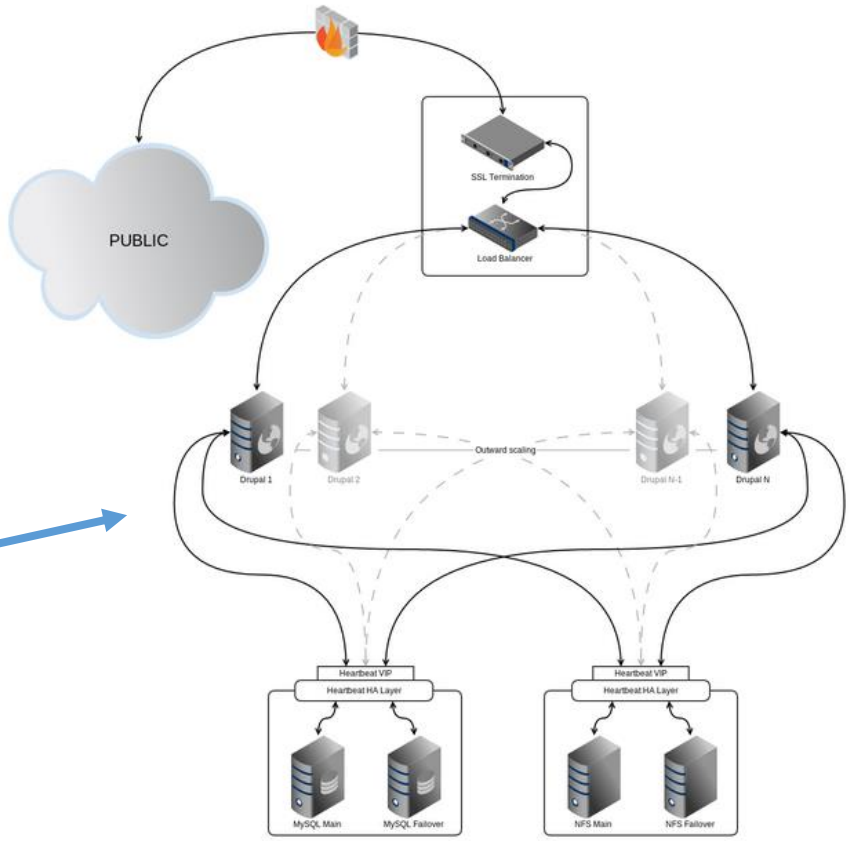
- Project management tool
  - Opensource and licenced under the terms of GNU General Public License v2 (GPL)
- FORGE usage
  - Project management and operations
  - FORGE backlog
  - Support requests (issues)
  - Announcements (news)
- Everybody
  - Documentation (wiki)
  - Collaboration (forums)
- Service Development usage
  - Project management tool
  - Available on request
  - Template project



https://support.forgeservicelab.fi

FORGE SaaS - GitLab

- Version control tool similar to Github
  - Completely free and opensource and licenced under the terms of MIT license
- Repository management
- Example recipes for building build digital services
- Collaboration on code



https://git.forgeservicelab.fi

FORGE SaaS - XMPP

- XMPP is Extensible Messaging and Presence Protocol
  - Open protocol (open standard)
  - Implementations can be developed using any software license
- Communications protocol for message-oriented middleware based on XML (Extensible Markup Language)
- FORGE's fast support channel
- Instant collaboration with others

https://git.forgeservicelab.fi

FORGE Add-ons - Ansible

- Ansible is an opensource tool for application configuration management, deployment and orchestration
- Simple way to manage the complexity of application deployment
- Rather than writing custom code to automate systems, your team writes simple task descriptions = playbooks
- Small learning curve - understand on first read
- FORGE has several reusable playbooks available in GitLab
- It’s encouraged to share reusable playbooks with others
- Deployment can be just a matter of pressing enter

ANSIBLE

Playbooks are available at https://git.forgeservicelab.fi

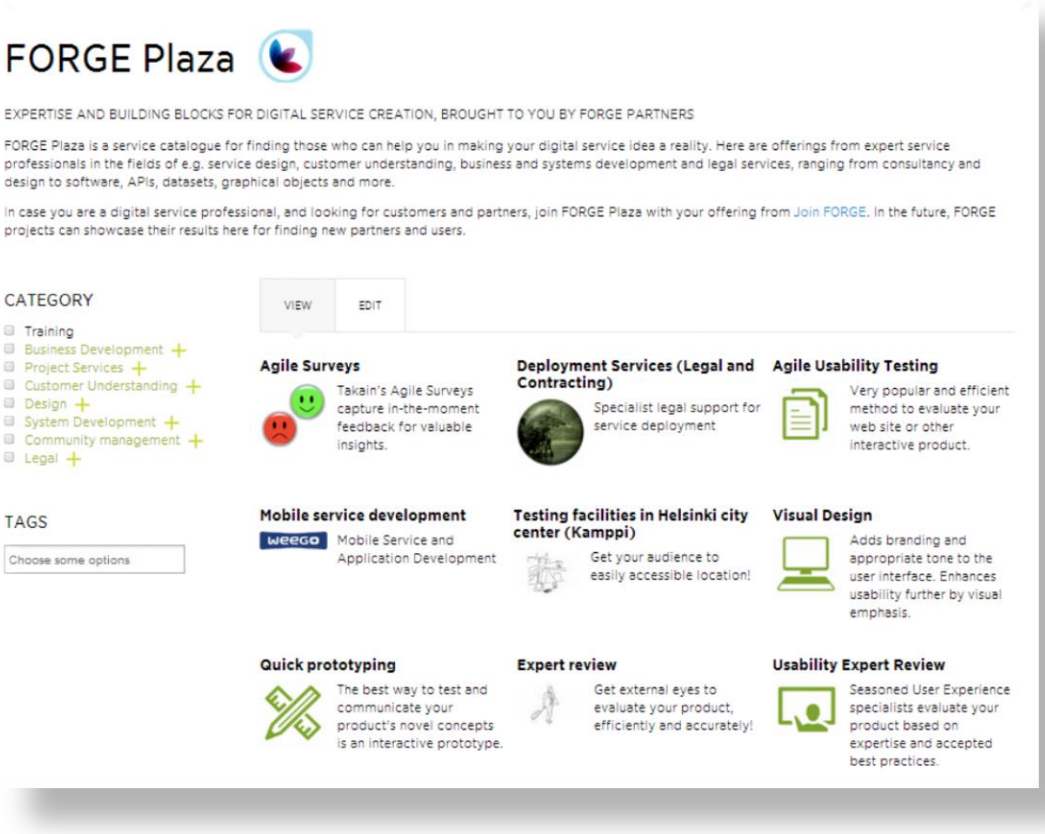
FORGE Add-ons – Ansible playbooks

- FORGE provides some reusable recipes to deploy certain services e.g.
  - CI – Jenkins
  - TA – Robot test framework
  - Monitoring – Nagios
  - Containers - Docker demo
  - Example WEB service – Drupal cluster
  - Identity backend – SimpleSAMLphp
  - Analytics
  - …

Playbooks are available at https://git.forgeservicelab.fi

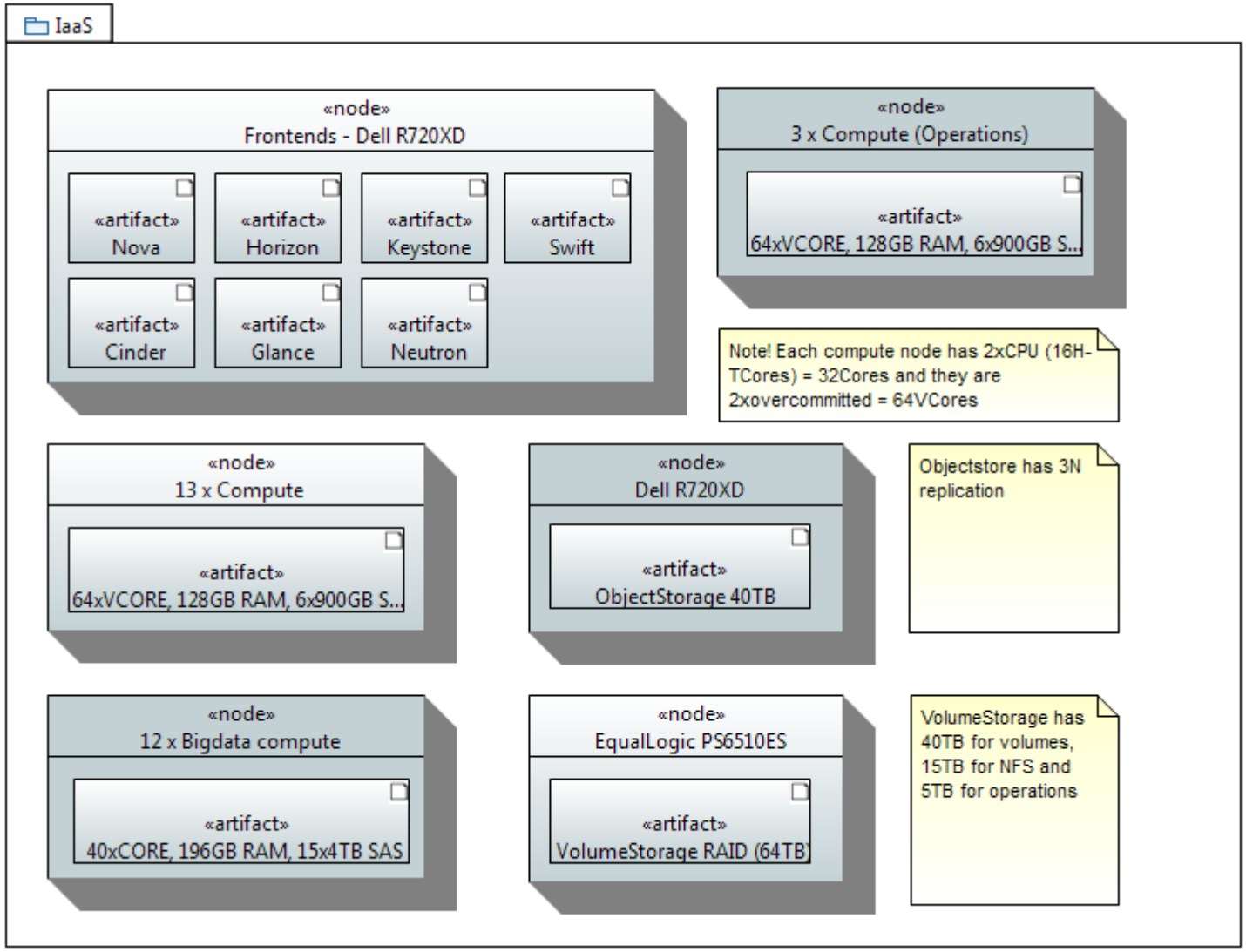
FORGE - Plaza

- It contains information about parties and services they offer
- It helps parties to find relevant partners and service components
- It helps parties to showcase their offering and participate in competitive biddings

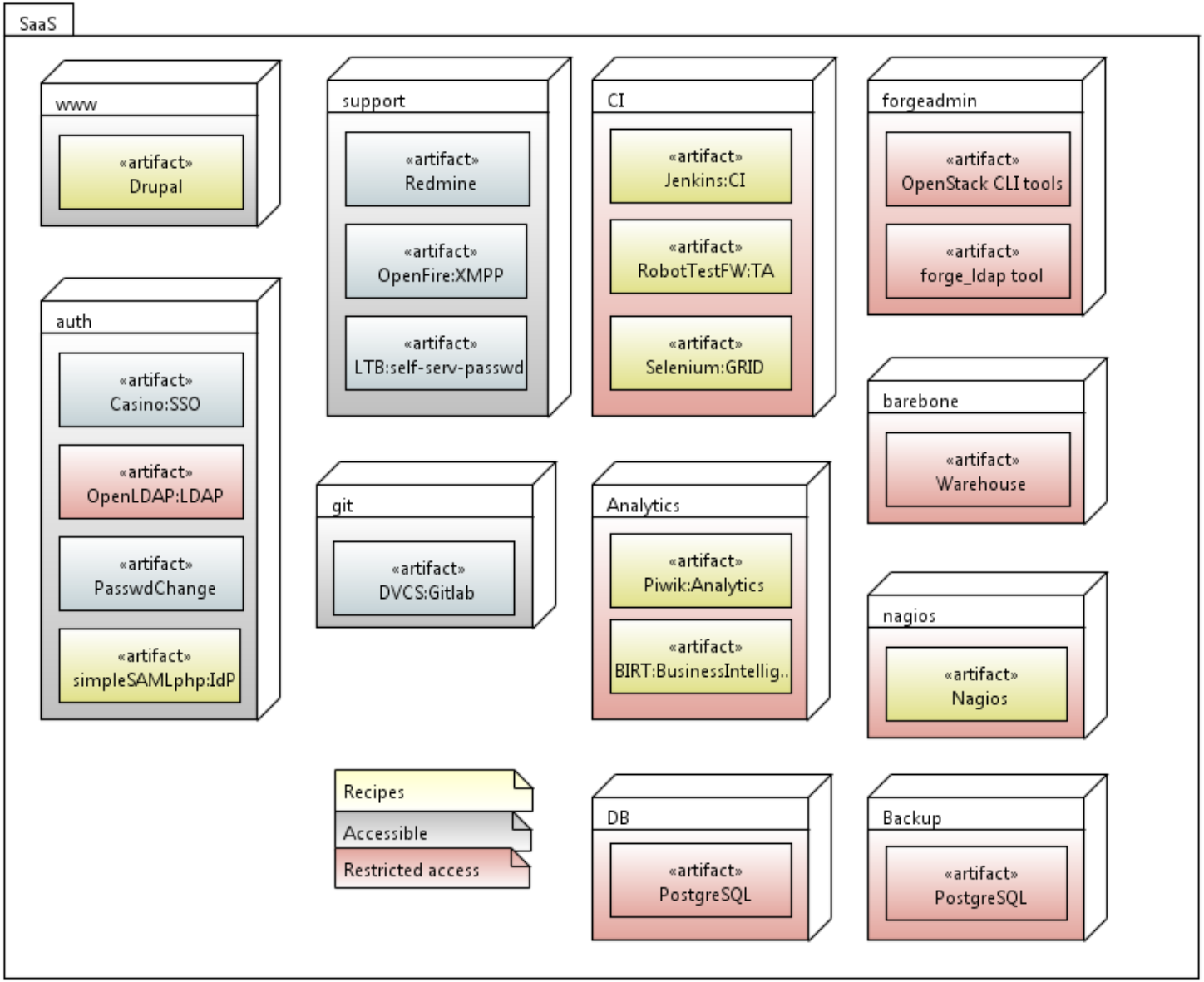


http://forgeservicelab.fi

FORGE IaaS summary

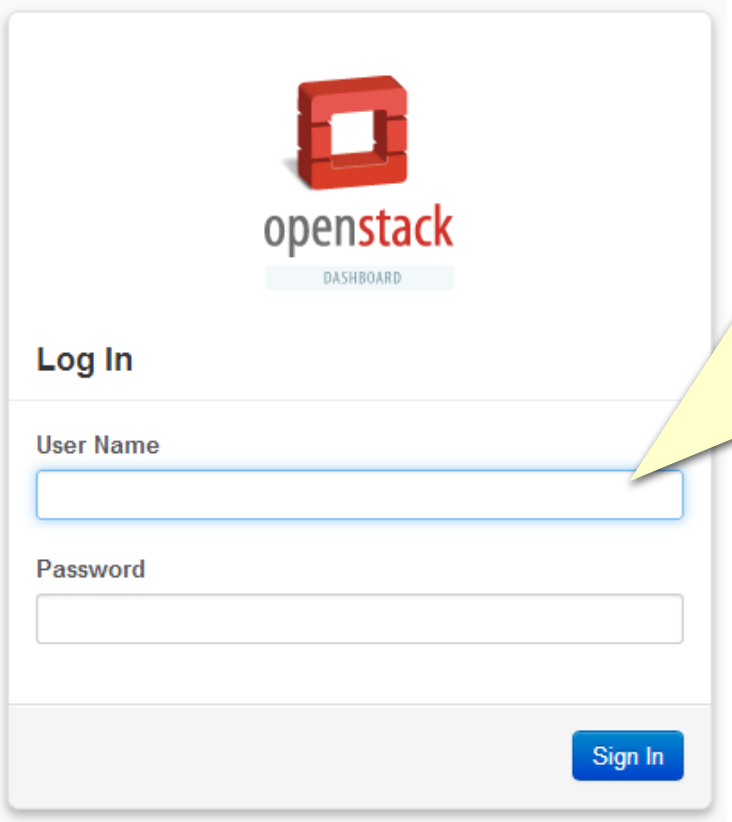


FORGE SaaS and Add-ons summary



FORGE IaaS screenshots

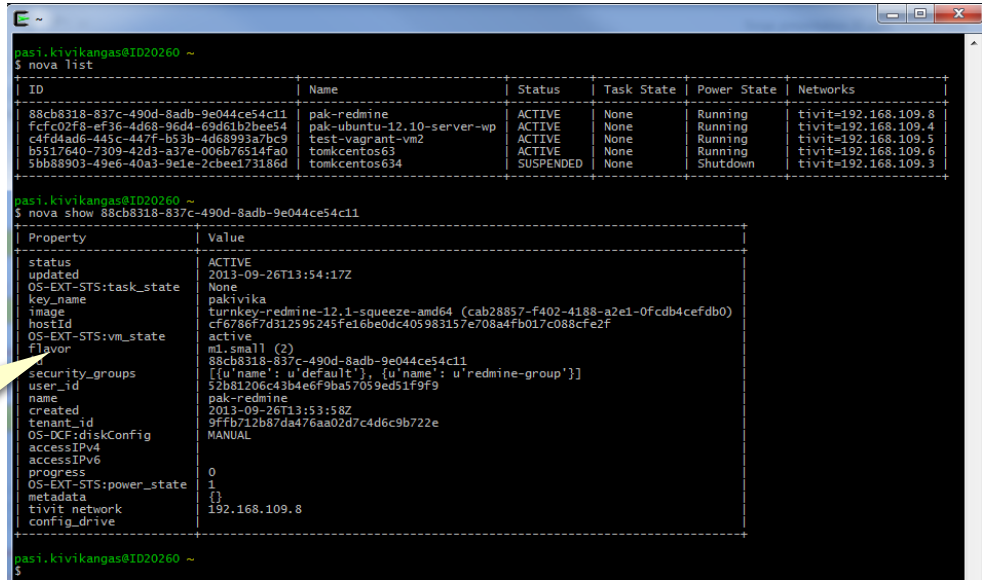
FORGE IaaS



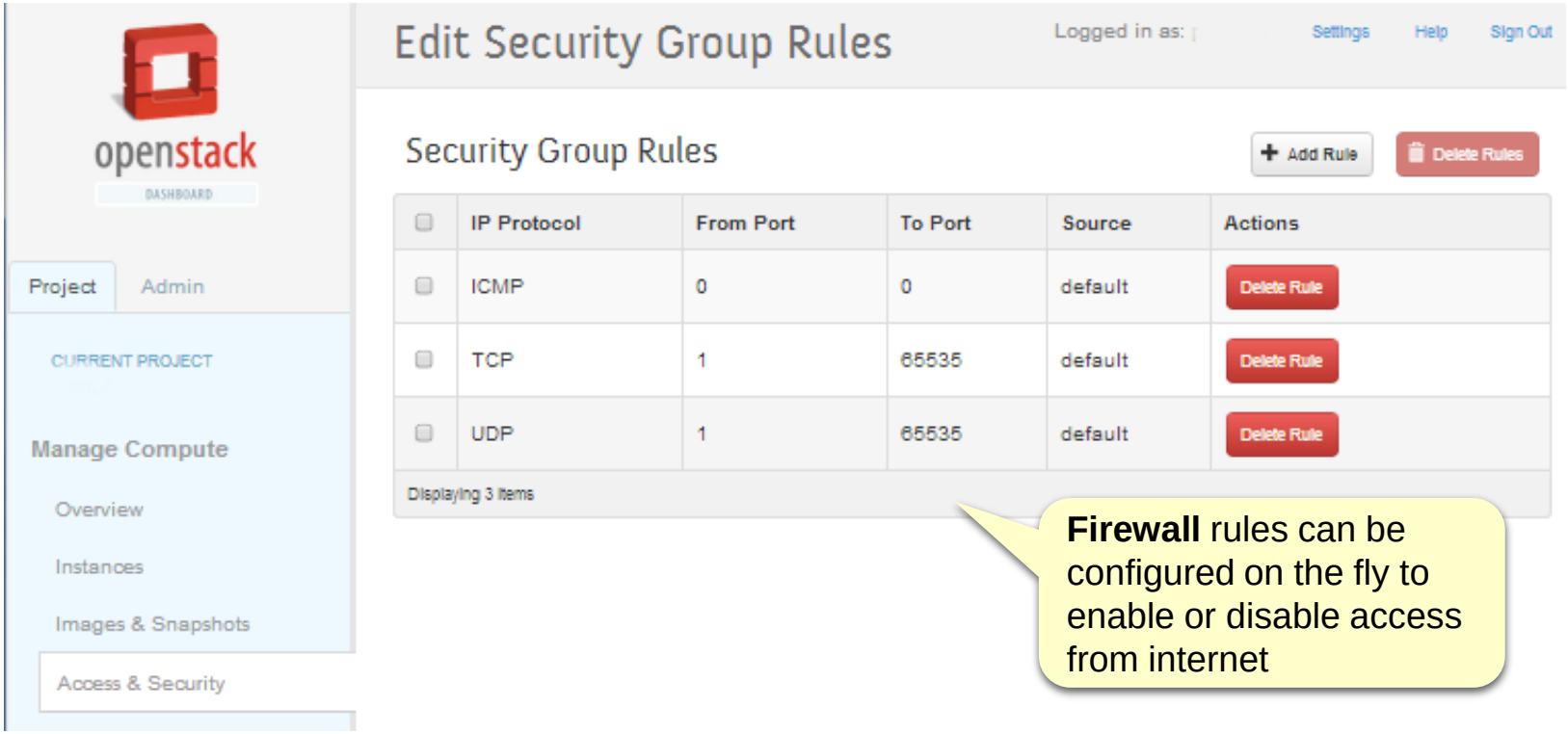
Graphical admin UI to FORGE computing services makes administration tasks easy

- Create Linux images
- Launch instances
- Modify firewall, networks
- Create volumes and attach them to instances

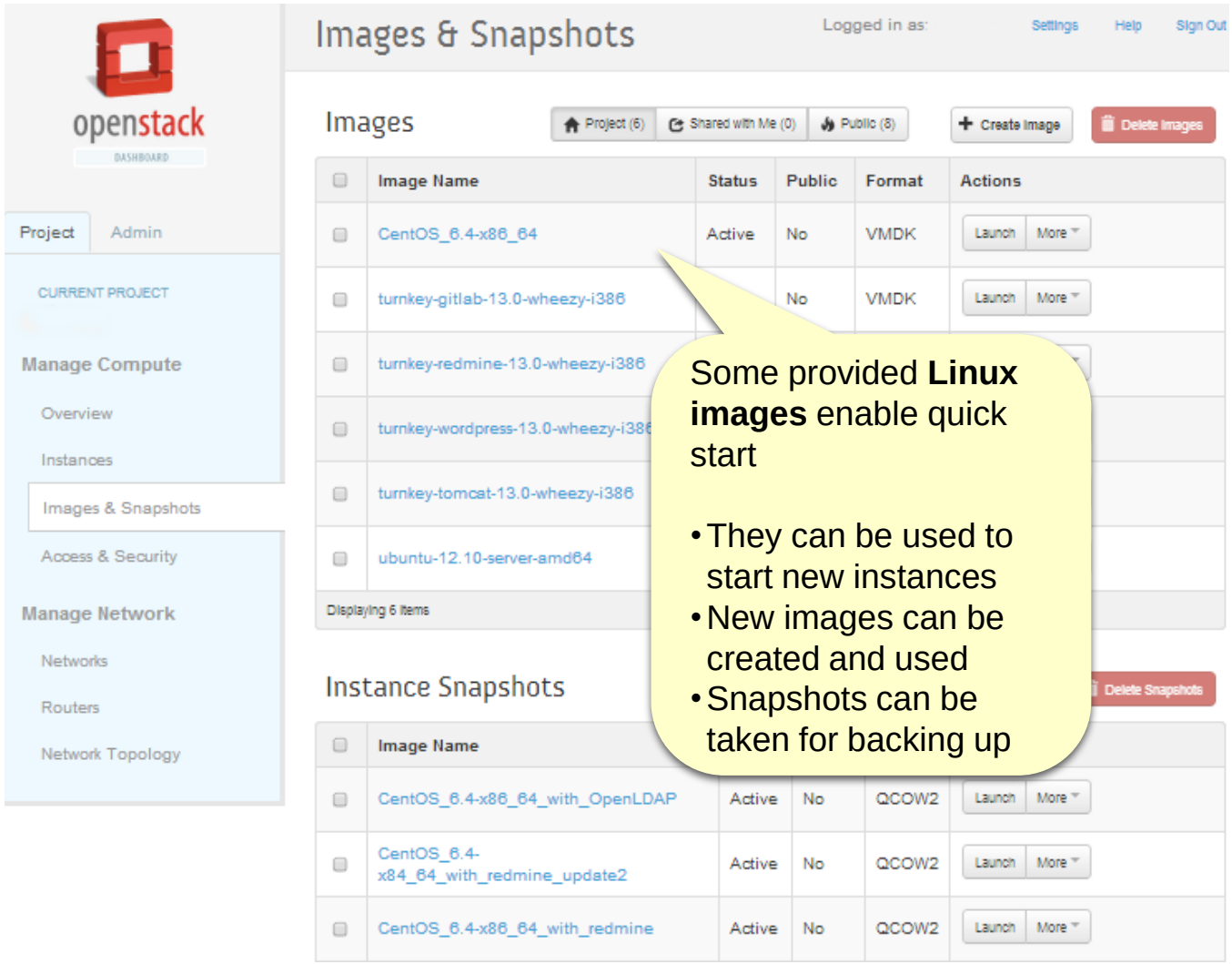
CLI admin access is possible trough APIs to the computing services and by UI. Eg. Start/stop instance can be done from local host.



FORGE IaaS


openstack
DASHBOARD
Project
Admin
CURRENT PROJECT
Manage Compute
Overview
Instances
Images & Snapshots
Access & Security
Edit Security Group Rules
Logged in as:
Settings
Help
Sign Out
Security Group Rules
+ Add Rule
Delete Rules
IP Protocol
From Port
To Port
Source
Actions
ICMP
0
0
default
Delete Rule
TCP
1
65535
default
Delete Rule
UDP
1
65535
default
Delete Rule
Displaying 3 items
Firewall rules can be configured on the fly to enable or disable access from internet

FORGE IaaS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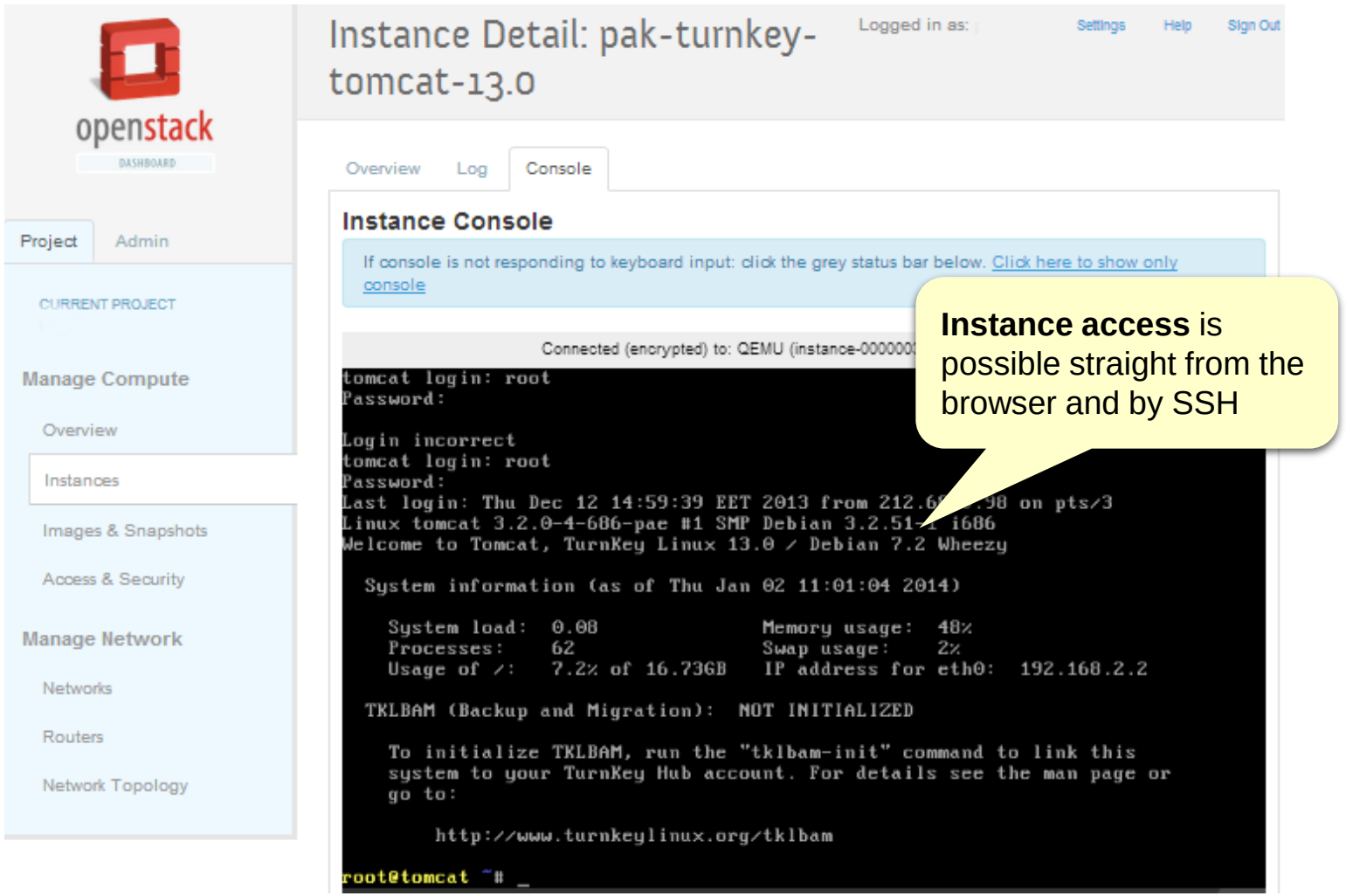
Routers
Network Topology
Images & Snapshots
Logged in as:
Settings
Help
Sign Out
Images
Project (6)
Shared with Me (0)
Public (8)
Create Image
Delete Images
Image Name
Status
Public
Format
Actions
CentOS_6.4-x86_64
Active
No
VMDK
Launch
More
turnkey-gitlab-13.0-wheezy-i386
No
VMDK
Launch
More
turnkey-redmine-13.0-wheezy-i386
turnkey-wordpress-13.0-wheezy-i386
turnkey-tomcat-13.0-wheezy-i386
ubuntu-12.10-server-amd64
Displaying 6 items
Instance Snapshots
Delete Snapshots
Image Name
CentOS_6.4-x86_64_with_OpenLDAP
Active
No
QCOW2
Launch
More
CentOS_6.4-x84_64_with_redmine_update2
Active
No
QCOW2
Launch
More
CentOS_6.4-x86_64_with_redmine
Active
No
QCOW2
Launch
More
Some provided **Linux images** enable quick start
• They can be used to start new instances
• New images can be created and used
• Snapshots can be taken for backing up

FORGE IaaS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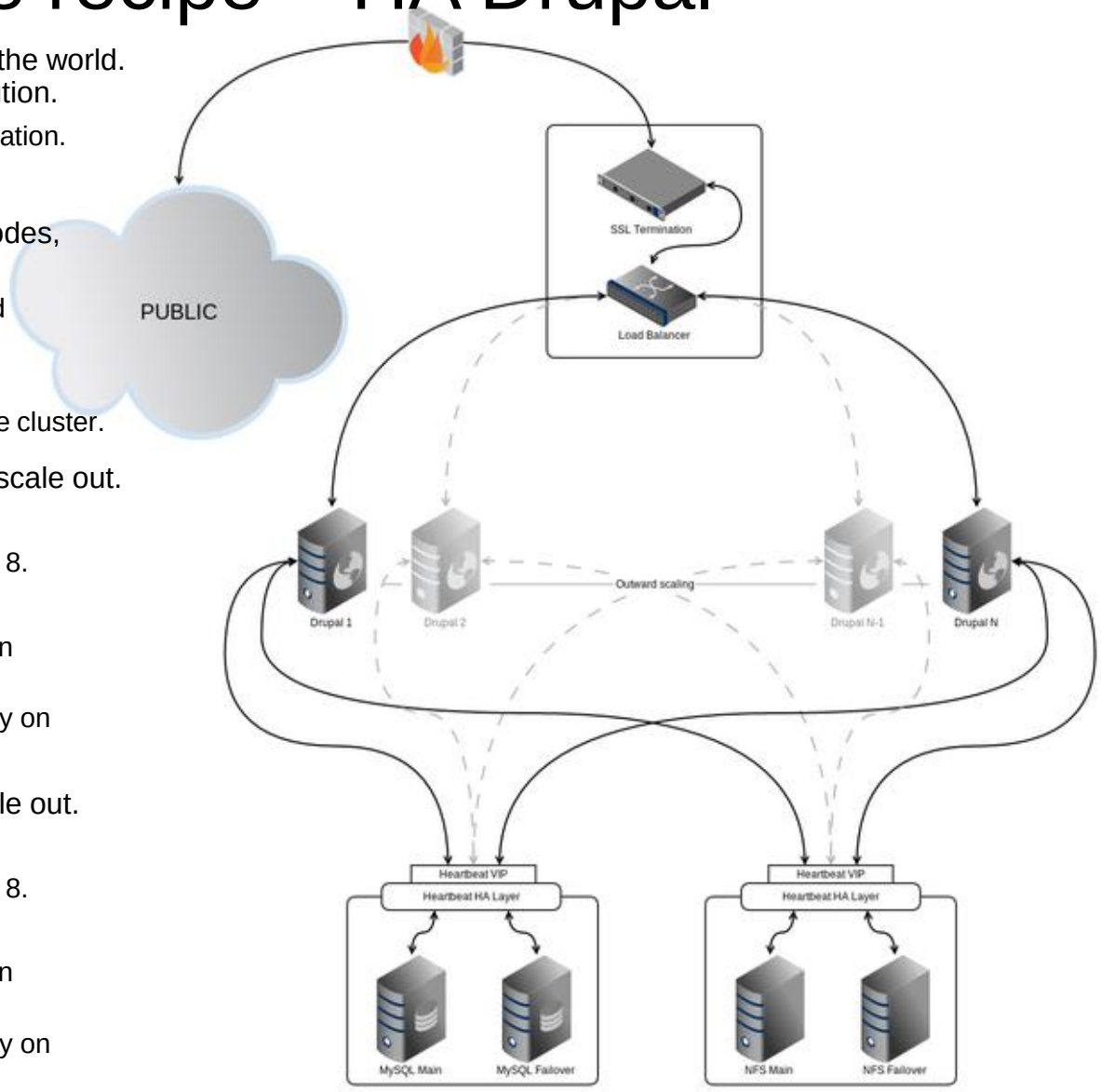
Networks
Routers
Network Topology
Instance Detail: pak-turnkey-tomcat-13.0
Logged in as:
Settings
Help
Sign Out
Overview
Log
Console
Instance Console
If console is not responding to keyboard input: click the grey status bar below. Click here to show only console
Connected (encrypted) to: QEMU (instance-0000000
tomcat login: root
Password:
Login incorrect
tomcat login: root
Password:
Last login: Thu Dec 12 14:59:39 EET 2013 from 212.6 .98 on pts/3
Linux tomcat 3.2.0-4-686-pae #1 SMP Debian 3.2.51-1 i686
Welcome to Tomcat, TurnKey Linux 13.0 / Debian 7.2 Wheezy
System information (as of Thu Jan 02 11:01:04 2014)
System load: 0.08 Memory usage: 48%
Processes: 62 Swap usage: 2%
Usage of /: 7.2% of 16.73GB IP address for eth0: 192.168.2.2
TKLBAM (Backup and Migration): NOT INITIALIZED
To initialize TKLBAM, run the "tklbam-init" command to link this system to your TurnKey Hub account. For details see the man page or go to:
http://www.turnkeylinux.org/tklbam
root@tomcat ~# _
Instance access is possible straight from the browser and by SSH

Example service recipe – HA Drupal

- **Load Balancer:** Only element exposed to the world. Performs SSL termination and load distribution.
  - Nginx web server to handle SSL termination.
  - HAProxy load balancer.
- **Drupal webserver cluster:** At least two nodes, scales out.
  - Apache web server with mod_php5 and mod_rewrite to serve Drupal
  - PHP5 as per Drupal's requirements
  - NFS client to access the shared storage cluster.
- **MySQL HA cluster:** Two nodes, does not scale out.
  - MySQL server version 5.1 or higher.
  - DRBD distributed block device, version 8.
  - Heartbeat cluster daemon.
  - Python Nova Client tool, needed only on OpenStack deployments.
  - Heartbeat FloatingIP script, needed only on OpenStack deployments.
- **NFS HA cluster:** Two nodes, does not scale out.
  - NFS server to provide shared storage.
  - DRBD distributed block device, version 8.
  - Heartbeat cluster daemon.
  - Python Nova Client tool, needed only on OpenStack deployments.
  - Heartbeat FloatingIP script, needed only on OpenStack deployments.



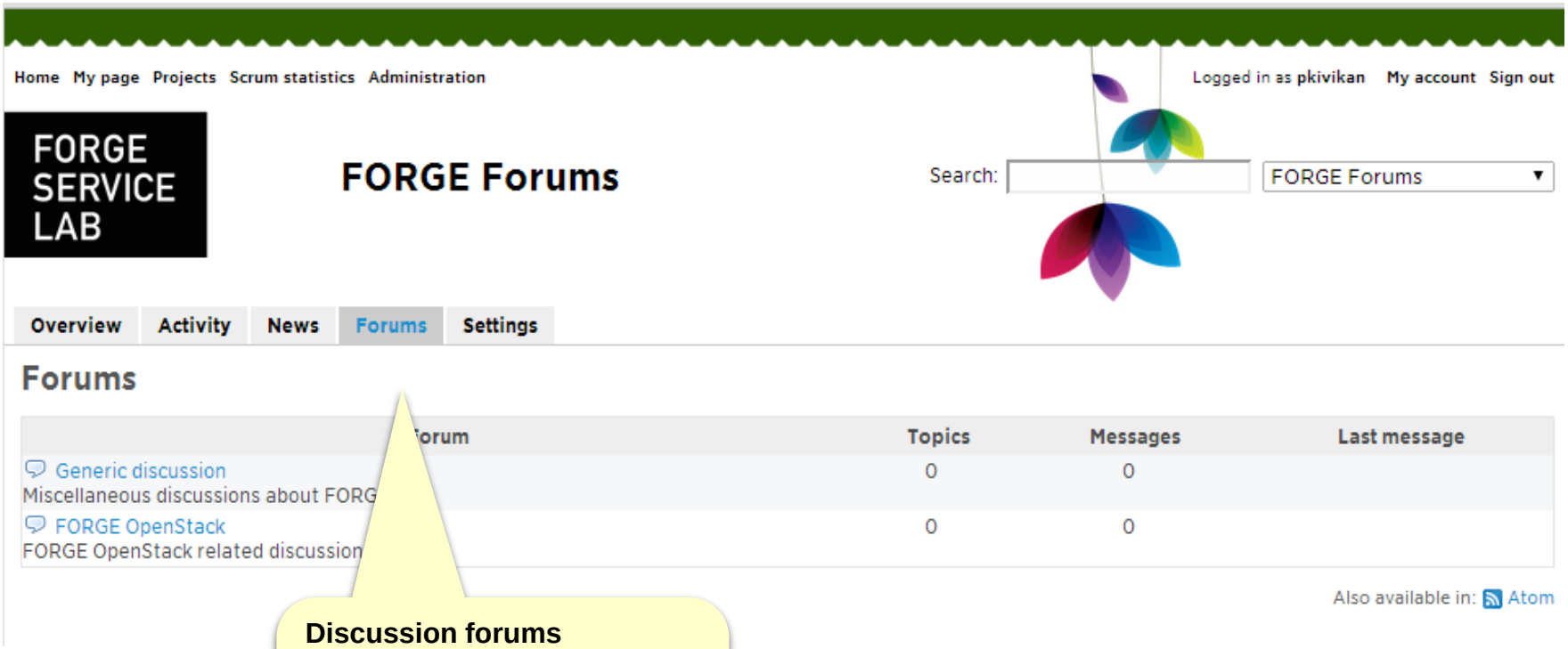
Playbook is available at https://git.forgeservicelab.fi

FORGE SaaS screenshots

Redmine, GitLab, XMPP, Plaza

Forums

REDMINE
flexible project management

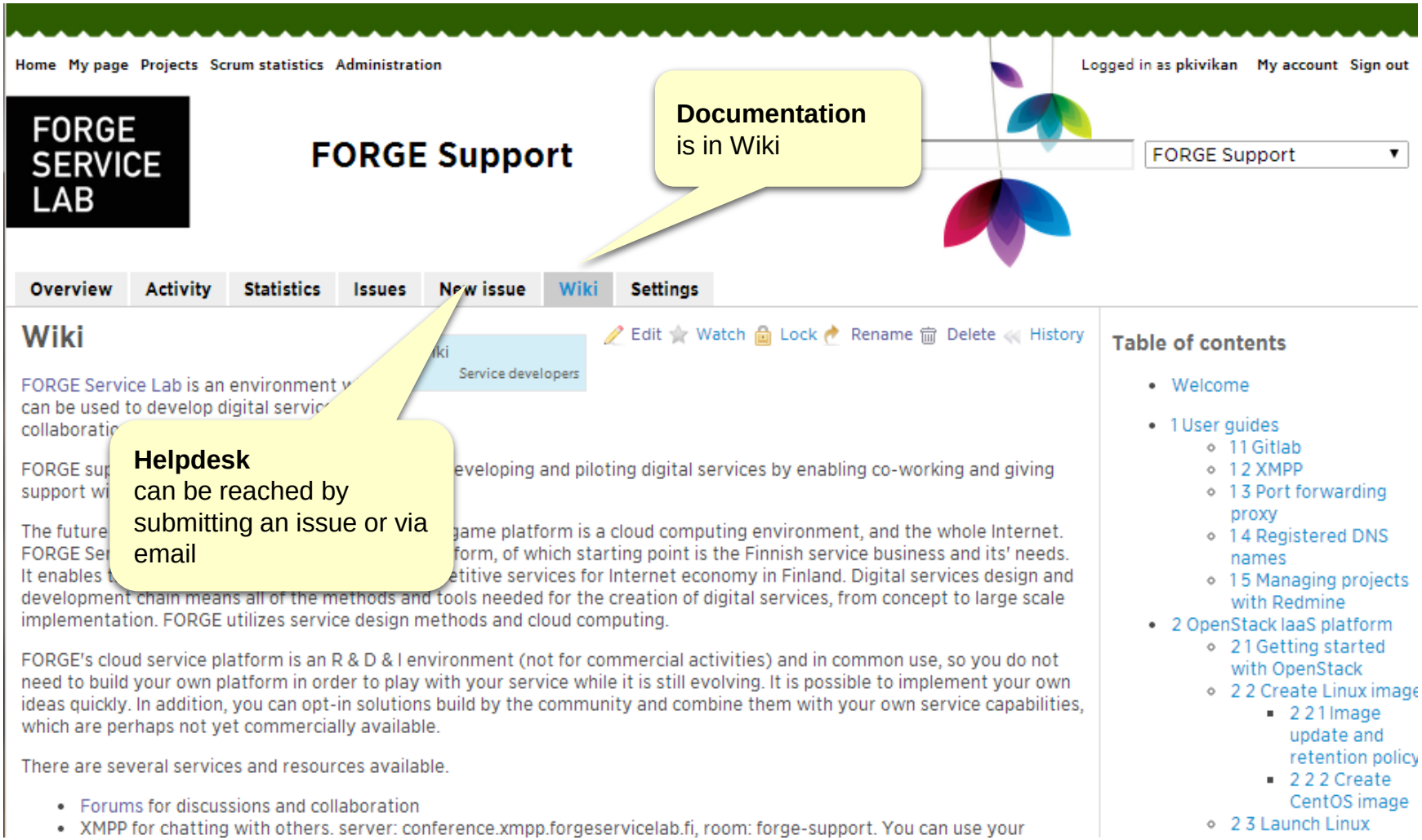


Discussion forums

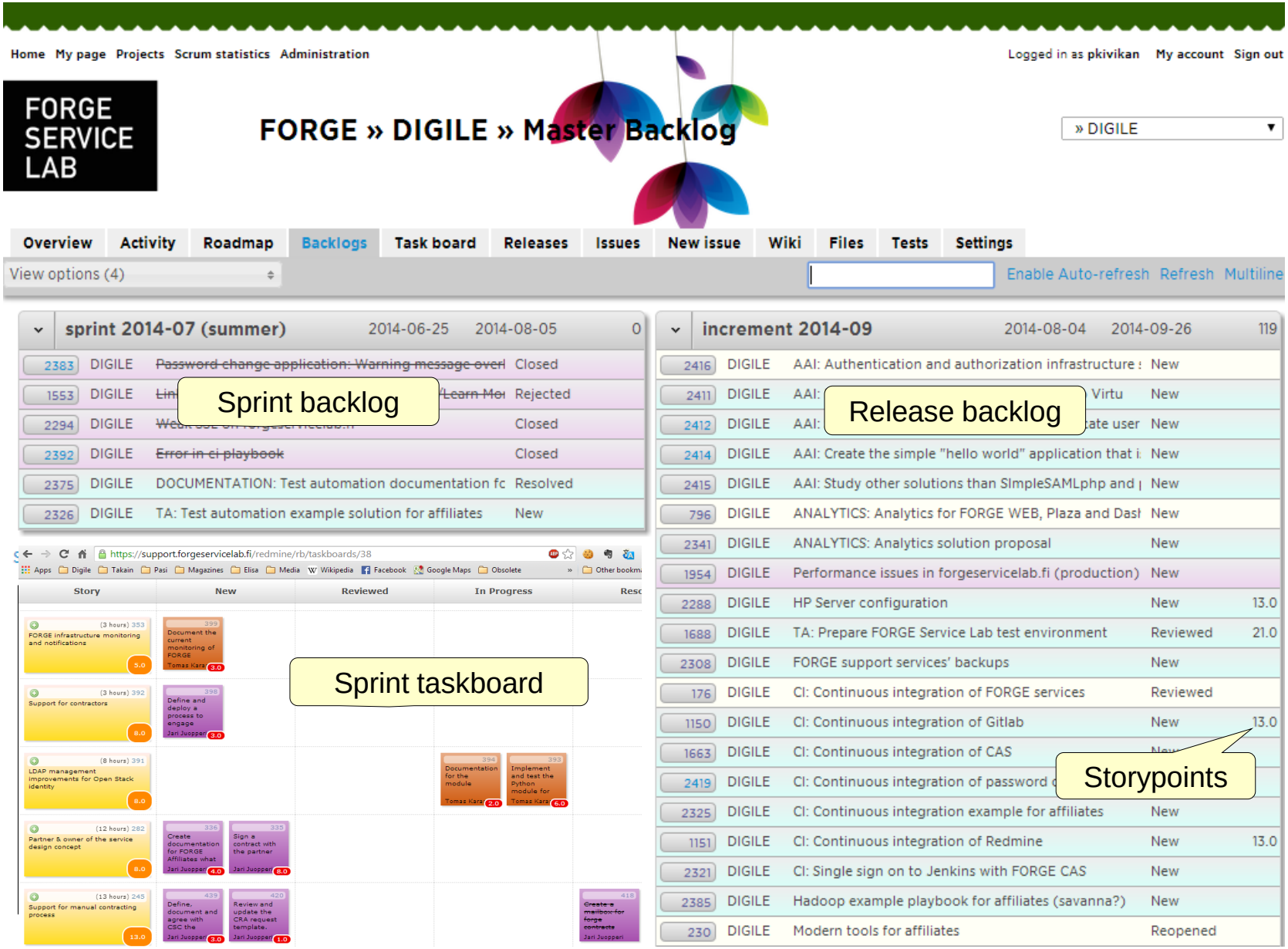
- Get important information
- Provide feedback
- Discuss and collaborate with others

Wiki documentation

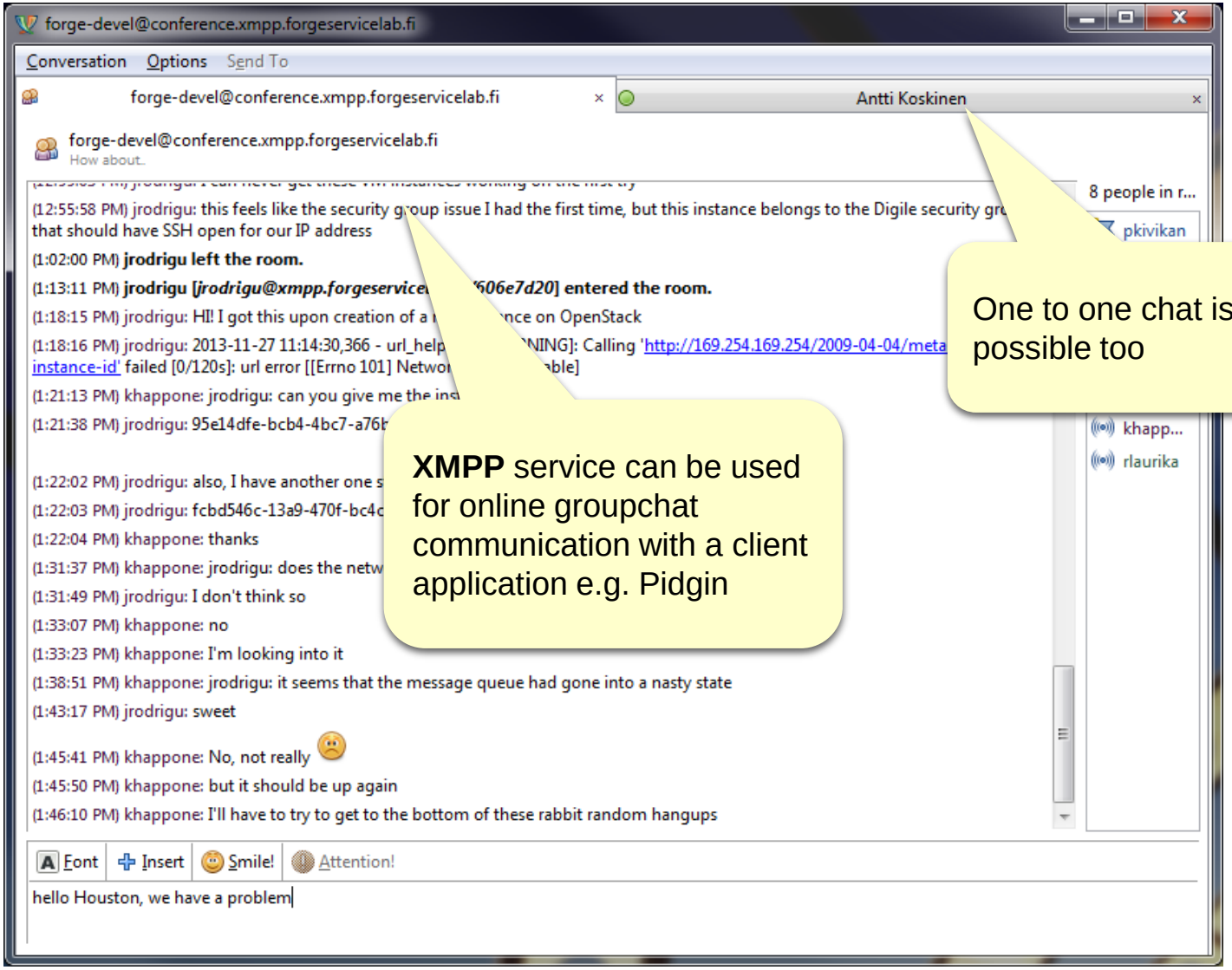
REDMINE
flexible project management



Agile project management tool



Instant messaging



Password managment

PASSWORD CHANGE

Your login is required

Enter your old password and choose a new one.
Forgot your password?
- Email a password reset link

Your password must conform to the following const
- Minimum length: 8
- Maximum length: 16
- Minimum number of uppercase characters: 1
- Minimum number of digits: 1
- Minimum number of special characters: 1
- Your new password may not be the same as your old password

Single sign-on provides means to use same credentials in most of FORGE services

Login
Old password
New password
Confirm

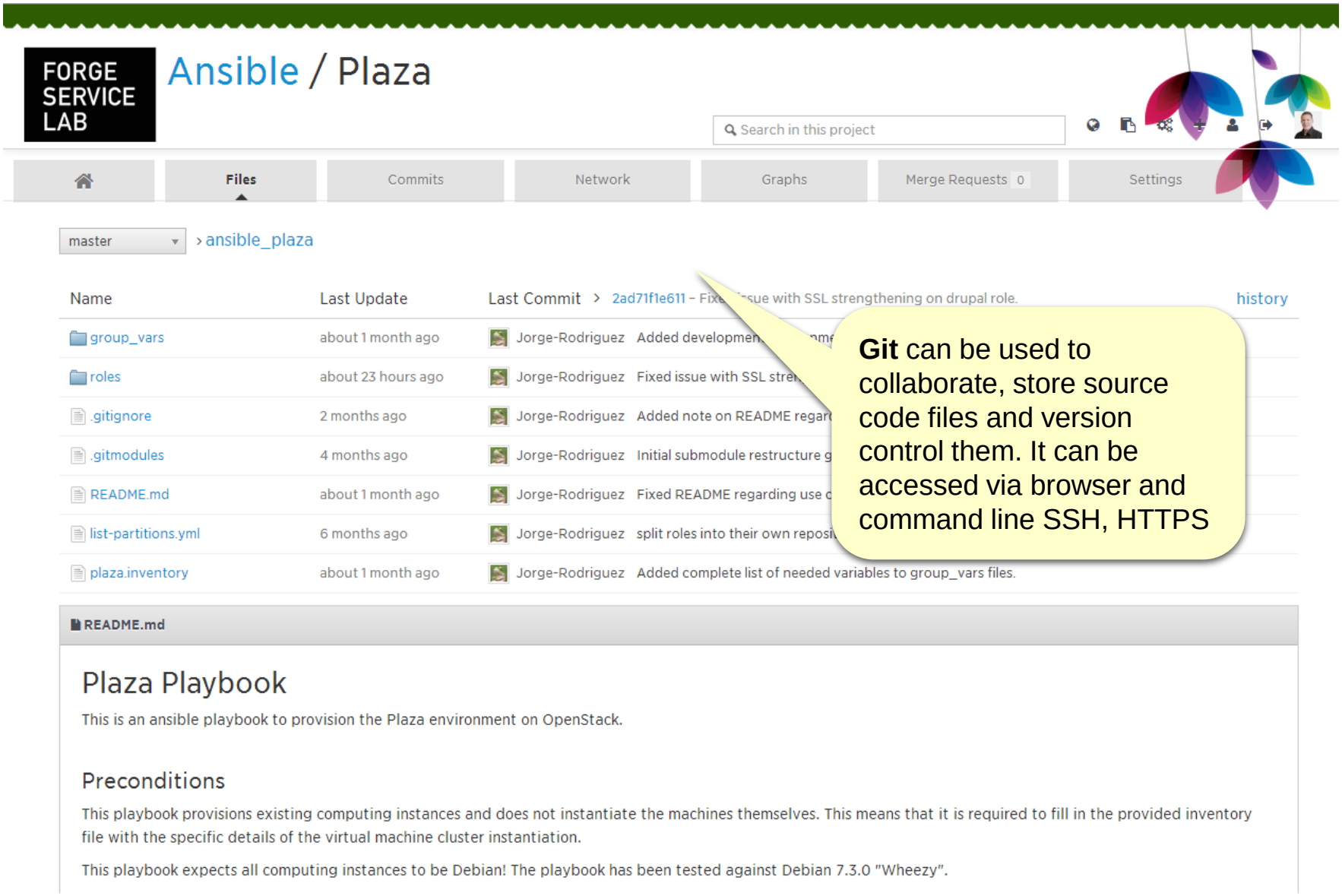
Type the text
Privacy & Terms
reCAPTCHA™

Send

A desired **password** can be selected and forgotten password can be recovered by users

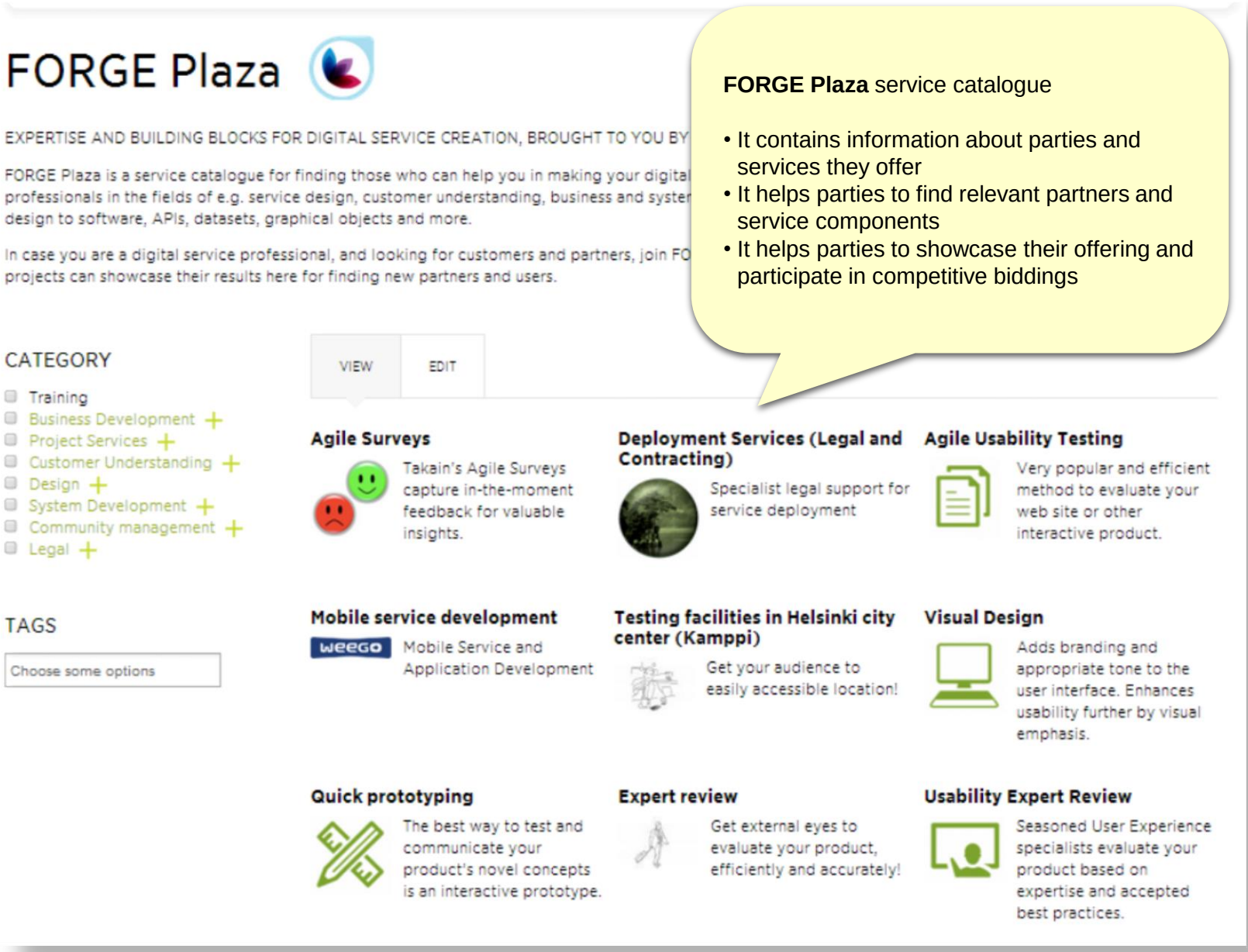
Git

GITLAB



Git can be used to collaborate, store source code files and version control them. It can be accessed via browser and command line SSH, HTTPS

FORGE Plaza



FORGE Plaza service catalogue

- It contains information about parties and services they offer
- It helps parties to find relevant partners and service components
- It helps parties to showcase their offering and participate in competitive biddings

DIGILE

FORGE Service Lab

DIGILE in a Nutshell

- **DIGILE** is the Center for Science, Technology and Innovation (SHOK) focusing on Internet economy and related technologies and business
- **Mission:** DIGILE creates Internet economy competencies to enable new global business and job growth for DIGILE's stakeholders and partners
- **Three main services**:
  - **Research:** Cooperative national and international research programs to create new technological and business innovations
  - **Solutions:** Facilitation of business ecosystems and lead solution creation to explore new global business opportunities
  - **Digital service creation:** FORGE Service Lab for fast digital service creation and competence scaling
- **Core enablers**:
  - International networking
  - Operative excellence
  - Co-creation leadership

FORGE Service Lab
WHAT, WHY, WHO, FOR WHOM

- **WHAT:** FORGE Service Lab is a laboratory for creating digital services in the Internet-era. It is intended as a tool to accelerate the creation of digital services in Finland - *from an idea to a scalable implementation*.

- **WHY:** Internet economy will grow stronger and digitalisation spreads across all industries. Most of the value is being created via digital services. As a result, digital services know-how needs to become one of the nation's core competencies.

- **WHO:** DIGILE, CSC-IT Center for Science, Kainuun Etu Oy with the Ministry of Traffic and Communication, the financing partner for the ramp-up

- **FOR WHOM**: To all who are interested in developing digital services e.g. businesses, educational institutions, business development teams, the public sector – all industries and government sectors are included.

FORGE Service Lab – Offering

Legal & Contract framework for each stakeholder: service developers and partners

Offers wide development framework for service projects where multiple stakeholders and partners can share openly the knowledge and develop efficiently globally recognisible successfull services

Partner network from multidisciplinary perspectivie: eg. Business development, Service Design, Technical development

Reference model for the creation of digital services, from the idea to the scalable implementation

Crowdsourcing methods ad tools which enables to create as meaningful and successfull service as possible from the end users perspective

Cloud computing platform for agile and fast ways to develop and test the services

Guidance and support for the project during the service creation path in order to manage the big picture

More information

- Documentation
  - https://support.forgeservicelab.fi/redmine/projects/forge-support/wiki
- Support tickets
  - https://support.forgeservicelab.fi/redmine/projects/forge-support/issues/new
- XMPP
  - forge-support@xmpp.forgeservicelab.fi
- Email
  - support@forgeservicelab.fi

THANK YOU