Welcome @ FGRE
July 6th – July 10th

Wifi: WelcomeATiMindS
http://doc.ilabt.iminds.be/fgre

FED4FIRE

geni
Exploring Networks of the Future

iMinds
CONNECT.INNOVATE.CREATE

	Monday	Tuesday		Wednesday			Thursday	Friday
Block I (8:30-10)	Welcome Intro to Fed4FIRE Intro To GENI	Emulation, Scale Up, stitching, cloud 11:30-12:30 Labwiki presentation		LabWiki hands-on	Wireless Sensors		Team Project	Team Project
Block II (10:30 – 12:30)	Getting started tutorial (Lab zero) Introduction to APIs			Wireless & Mobile robots	Big data analysis	Ansible	Team Project	Team Project
Block III (1:30 – 3:30)	More advanced tutorial (Lab one)	Smartcity Smart-santander	Open-flow	Team Project			Team Project	Team project presentations, and evaluation
Project (4-5.30)	OpenFlow introduction Use case presentation of openflow Introduction to team projects and team formation	Smart-Fire tutorial .	Open-flow 1.3 and NFV	Team Project			Team Project	
Evening		Social event (19:00)		Lab visit (17:30 – 18:00)				

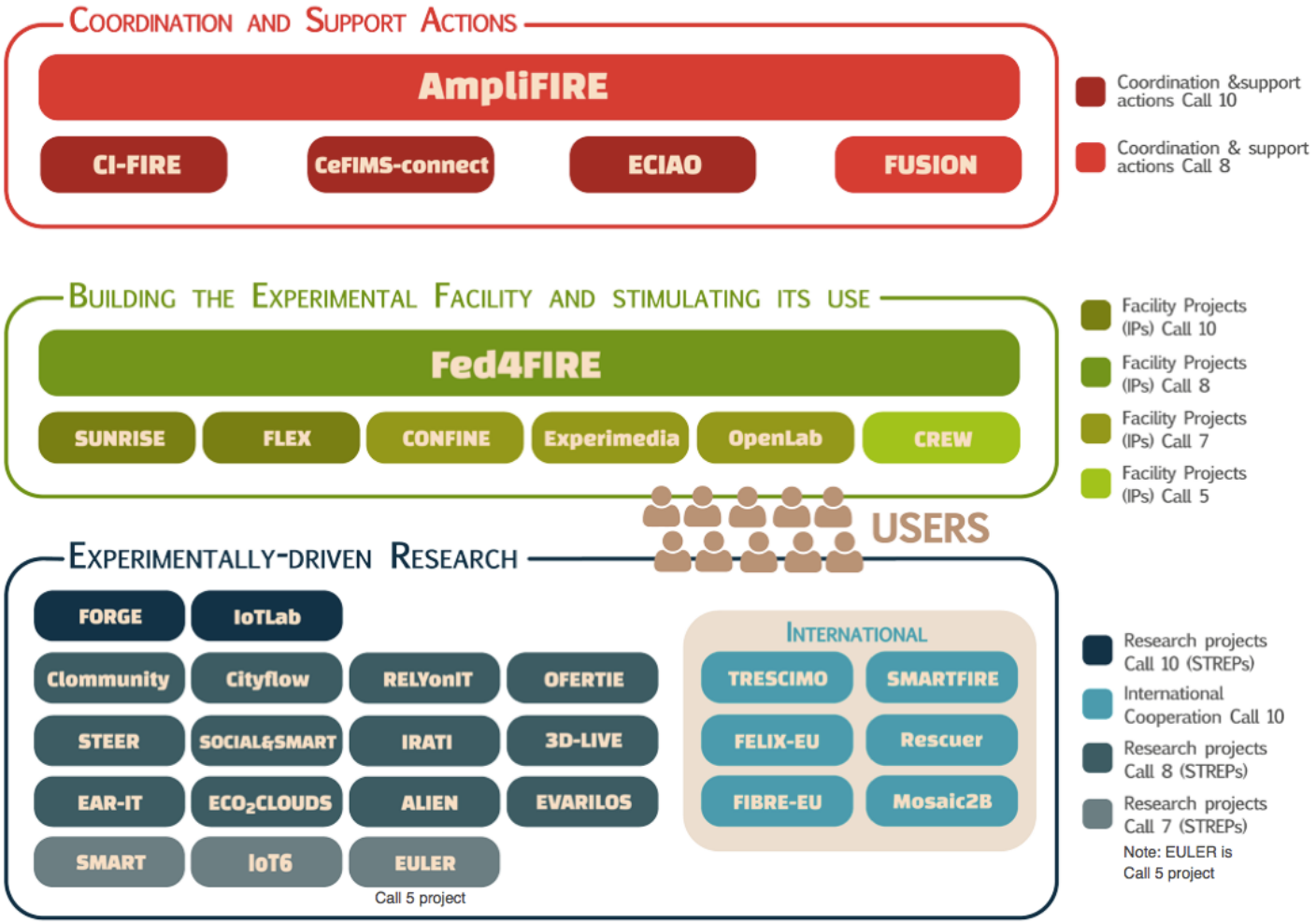
Main organizers

With support of

FGRE: Fed4FIRE resources

July 6th, Gent
Brecht Vermeulen, iMinds

Fed4FIRE's role in European FIRE framework



Source figure: FIRE Brochure 2014 (AmpliFIRE)

Fed4FIRE – general info

- IP project coordinated by iMinds
- 10/2012 - 9/2016
- Total budget: 7.75 MEUR
- 42 partners

Fed4FIRE assets - facilities

- Wired
- Wireless
- Open Flow
- Cloud
- Other

Fed4FIRE assets – tools

MySLICE

UPMC SORBONNE UNIVERSITÉS

jFed

iMinds

SFAWRAP

Inria informatiques mathématiques

LabWiki

NICTA

qml

NICTA

geni Exploring Networks of the Future

GCF

Inria informatiques mathématiques

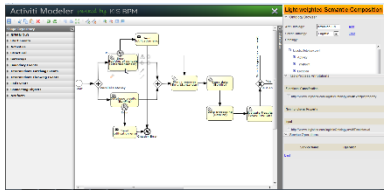
epcc

nepi

Inria informatiques mathématiques

OMF

NICTA



MULTI-DOMAIN SERVICE DESK

PART OF THE GÉANT SERVICE PORTFOLIO

DANTE

FITeagle

Future Internet Testbed Management Framework

Technische Universität Berlin

YourEPM

Atos

iMinds

CONNECT.INNOVATE.CREATE

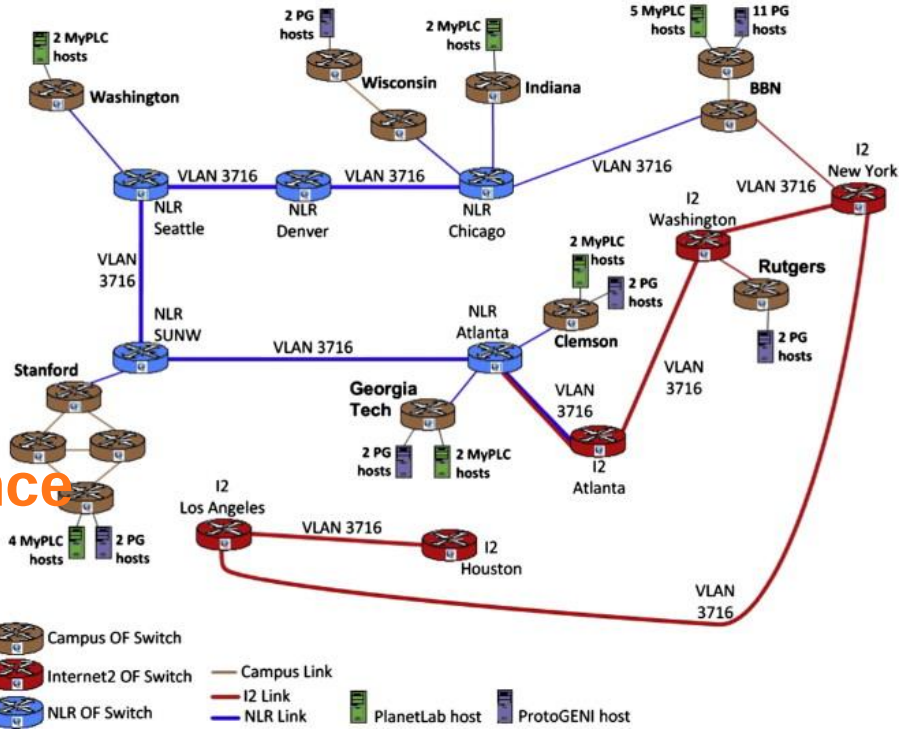
FED4FIRE

Fed4FIRE facilities

- Diverse technologies
- Diverse implementation stacks

US GENI federation

More testbeds
More uniformity of testbeds
Designed GENI AM API (instageni rack, exogeni rack, Openflow, Wimax)
GEC = Geni Engineering Conference

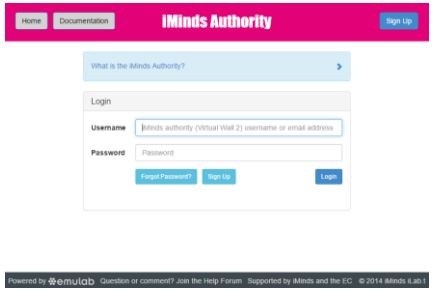


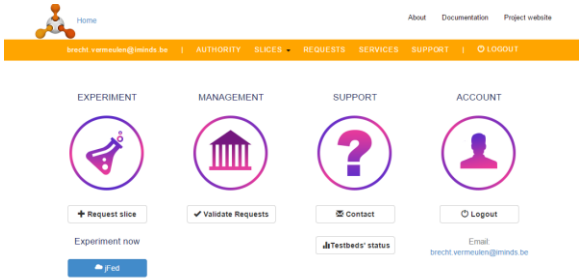
FED4FIRE

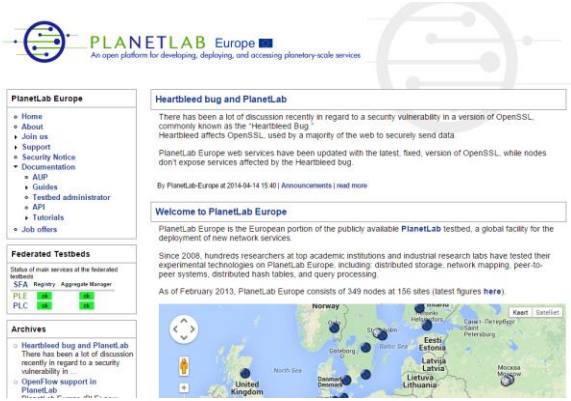
Goals of federation

- Make it easy for experimenters to use multiple testbeds
  - Single account
  - Single (or small number) of tools, choice of tools
- Multiple testbeds
  - To scale up
  - To use/combine special resources (e.g. wireless robots)
  - Redundancy (e.g. testbed in maintenance)
  - To re-use experiments (class exercises, scientifically, …)
  - To compare environments (e.g. wireless, openflow hardware, …)

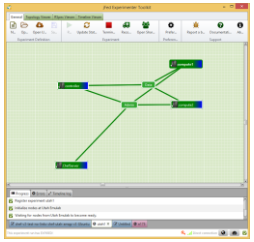
Design principles

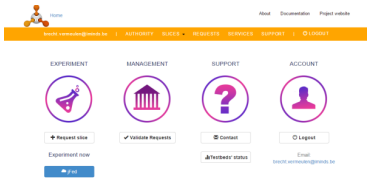






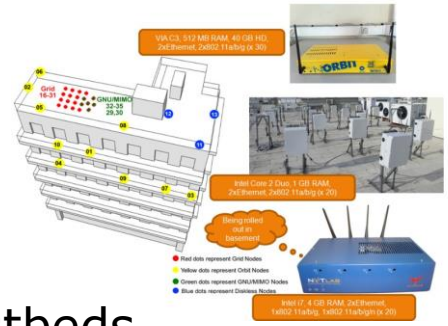
Multiple identity provider





Multiple tools

Testbeds trust IdPs in federation



Multiple testbeds

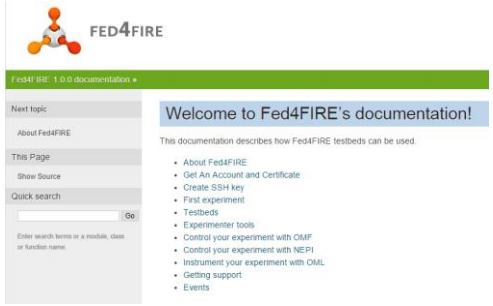
All of them can appear and disappear !

FED4FIRE

iMinds CONNECT.INNOVATE.CREATE

Experiment workflow

Experiment workflow



Documentation
http://doc.fed4fire.eu

Create Account

Federation policy: experimenter can run tutorial experiments to learn testbeds

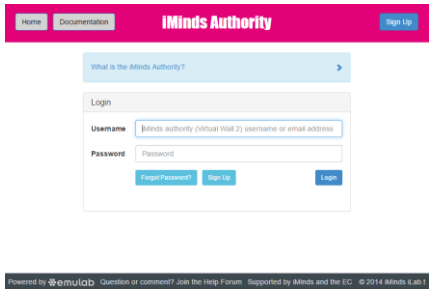
Do more experiments and tutorials:
Provision resources, control resources
(ask more quota to testbeds if needed as testbeds can have different policies)

FED4FIRE

iMinds
CONNECT.INNOVATE.CREATE

Technical workflow between components

Workflow (protocol: XMLRPC over SSL)



Create Account and get certificate

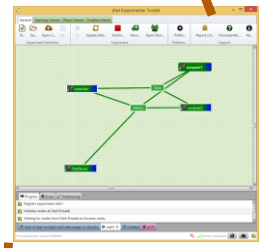
Slice Authority API

Member Authority API

3. Create slice/get credential (signed XML)

2. Get credential (signed XML)

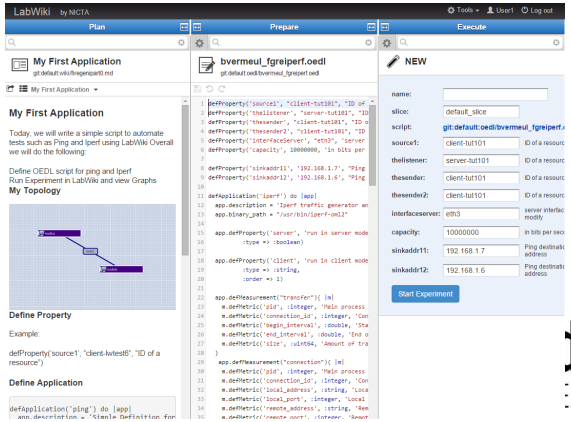
1. Use signed certificate in tool



4. Provision resources

Aggregate Manager API

5. Control resources



Monitoring

jFed testing and monitoring

https://flsmonitor.fed4fire.eu

http://monitor.ilabt.iminds.be

Testbed Name	Ping latency (ms)	GetVersion Status	Free Resources	Internal testbed monitoring status	Last chec
BonFIRE	31.17	N/A	N/A	ok	2014-12-0
C-Lab	52.15	ok	113	ok	2014-12-0
FUSECO	15.77	ok	19	ok	2014-12-0
Koren	280.88	ok	3	N/A	N/A
NETMODE	61.02	ok	20	ok	2014-12-0
NITOS Broker	68.11	ok	38	ok	2014-12-0
NITOS SFAWrap	30.34	ok	111	ok	2014-12-0
Norbit	N/A	N/A	N/A	ok	2014-12-0
Ofelia (Bristol openflow)	16.94	ok	48	ok	2014-12-0
Ofelia (Bristol vtam)	16.92	ok	2	ok	2014-12-0
Ofelia (i2CAT openflow)	16.92	ok	5	ok	2014-12-0
Ofelia (i2CAT vtam)	16.98	ok	6	ok	2014-12-0
Planetlab Europe	30.36	ok	273	ok	2014-12-0
SmartSantander	58.9	ok	0	ok	2014-12-0
Virtual Wall 1	0.1	ok	70	N/A	N/A
Virtual Wall 2	0.12	ok	64	ok	2014-12-0
Virtual Wall 2 (openflow)	0.55	ok	2	ok	2014-12-0
w-iLab.t 2	4.71	ok	61	ok	2014-12-0

Test Name	Last Test Start Time (CET)	Last Test Duration	Last Partial Success	Last Full Success	Time since last Failure	Last Log	History
Confine	2014-12-01 21:05:03	10 minutes and 38 seconds	SUCCESS	SUCCESS	4 days and 11 hours	log	history
Fuseco	2014-12-01 21:27:02	27 seconds	FAILURE	FAILURE		log	history
NETMODE	2014-12-01 22:36:37	1 minute and 40 seconds	SUCCESS	FAILURE		log	history
Nitos Broker	2014-12-01 22:38:18	1 minute and 18 seconds	SUCCESS	FAILURE		log	history
Nitos SFAWrap	2014-12-01 22:39:37	14 seconds	FAILURE	FAILURE		log	history
Planetlab Europe	2014-12-02 03:43:26	10 minutes and 49 seconds	SUCCESS	SUCCESS	6 days and 21 hours	log	history
Virtual Wall	2014-12-02 03:39:06	2 minutes and 51 seconds	SUCCESS	SUCCESS	3 days and 22 hours	log	history
Virtual Wall	2014-12-02 03:36:25	2 minutes and 40 seconds	SUCCESS	SUCCESS	3 days and 22 hours	log	history
Virtual Wall 1	2014-12-02 03:32:11	4 minutes and 12 seconds	SUCCESS	SUCCESS	3 days and 22 hours	log	history
Virtual Wall 1	2014-12-02 03:29:14	2 minutes and 56 seconds	SUCCESS	SUCCESS	3 days and 22 hours	log	history
Wilab.t	2014-12-02 03:42:42	44 seconds	WARN	WARN		log	history
Wilab.t	2014-12-02 03:41:58	44 seconds	WARN	WARN		log	history

API testing

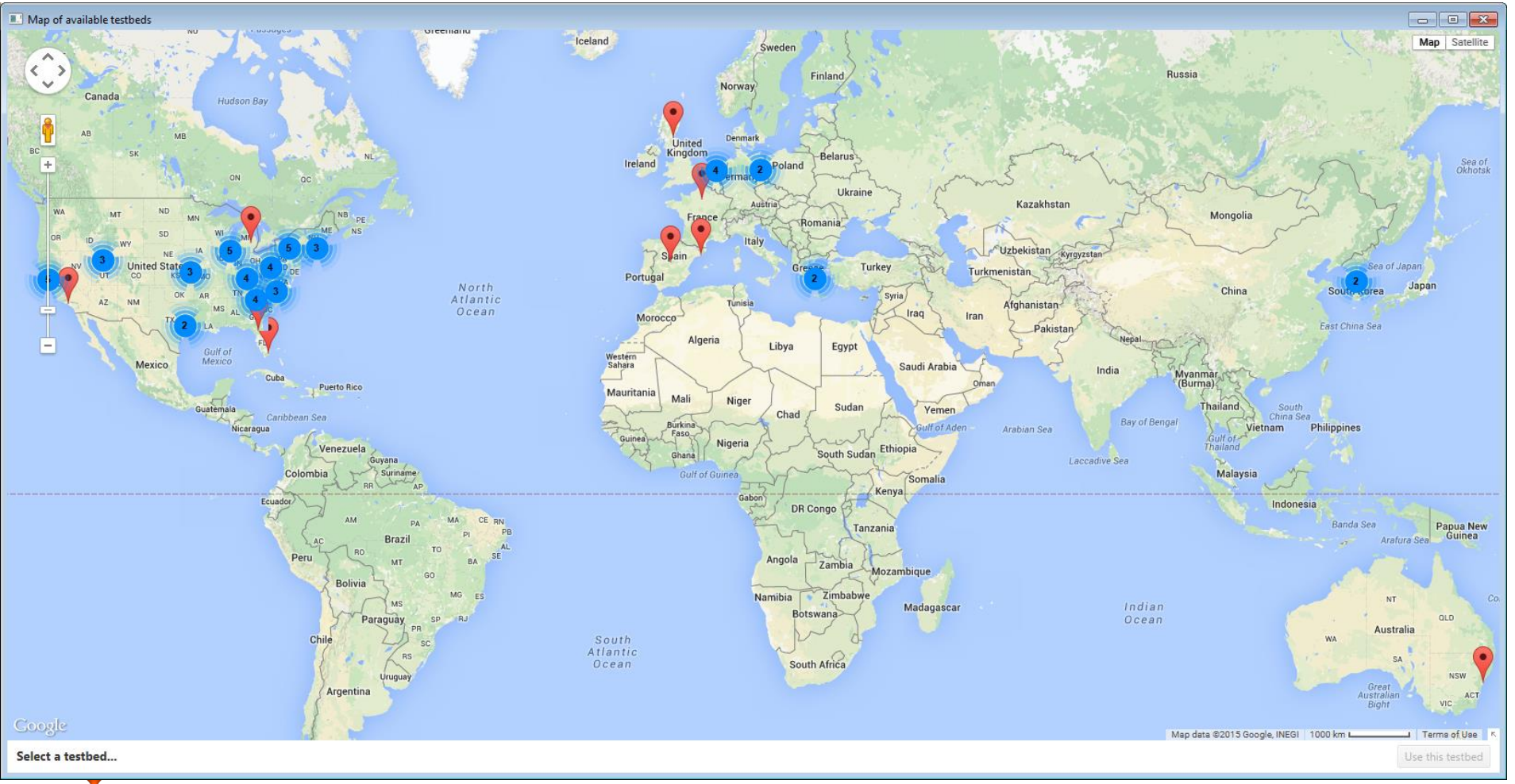
- ✓ setUp
- ✓ getVersion
- ✓ getTestUserCredential
- ✓ getTestUserInfo
- ✓ retrieveCredentialSomehow
- ✗ createProject
- ✓ createSlice
- ✗ lookupProjectsByUrnNoFilter
- ✗ lookupProjectsByNameNoFilter
- ✓ getSliceCredentials
- ✗ updateProject
- ✓ lookupSlicesNoFilter
- ✗ lookupProjectsNoFilterAfterUpdate
- ✓ updateSlice
- ✗ lookupProjectMembers
- ✗ lookupProjectsForMember
- ✓ lookupSlicesNoFilterAfterUpdate
- ✓ lookupSliceMembers

International federation and connectivity

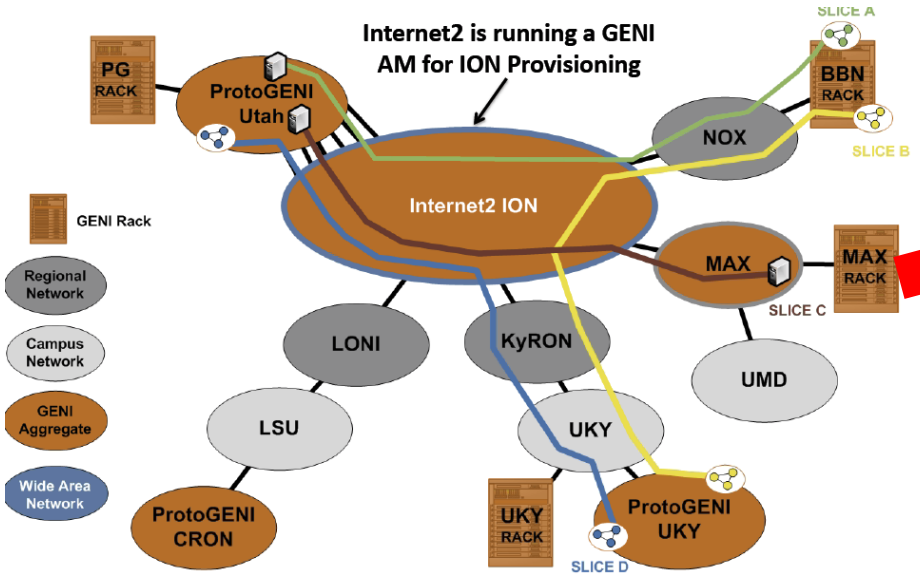
Other compatible initiatives

- South-Korea
- Canada
- Japan
- Brazil
- China
- Russia

Accessible testbeds: single tool and account



Layer 2 connectivity = stitching VLANs



Meshed L2 connections possible

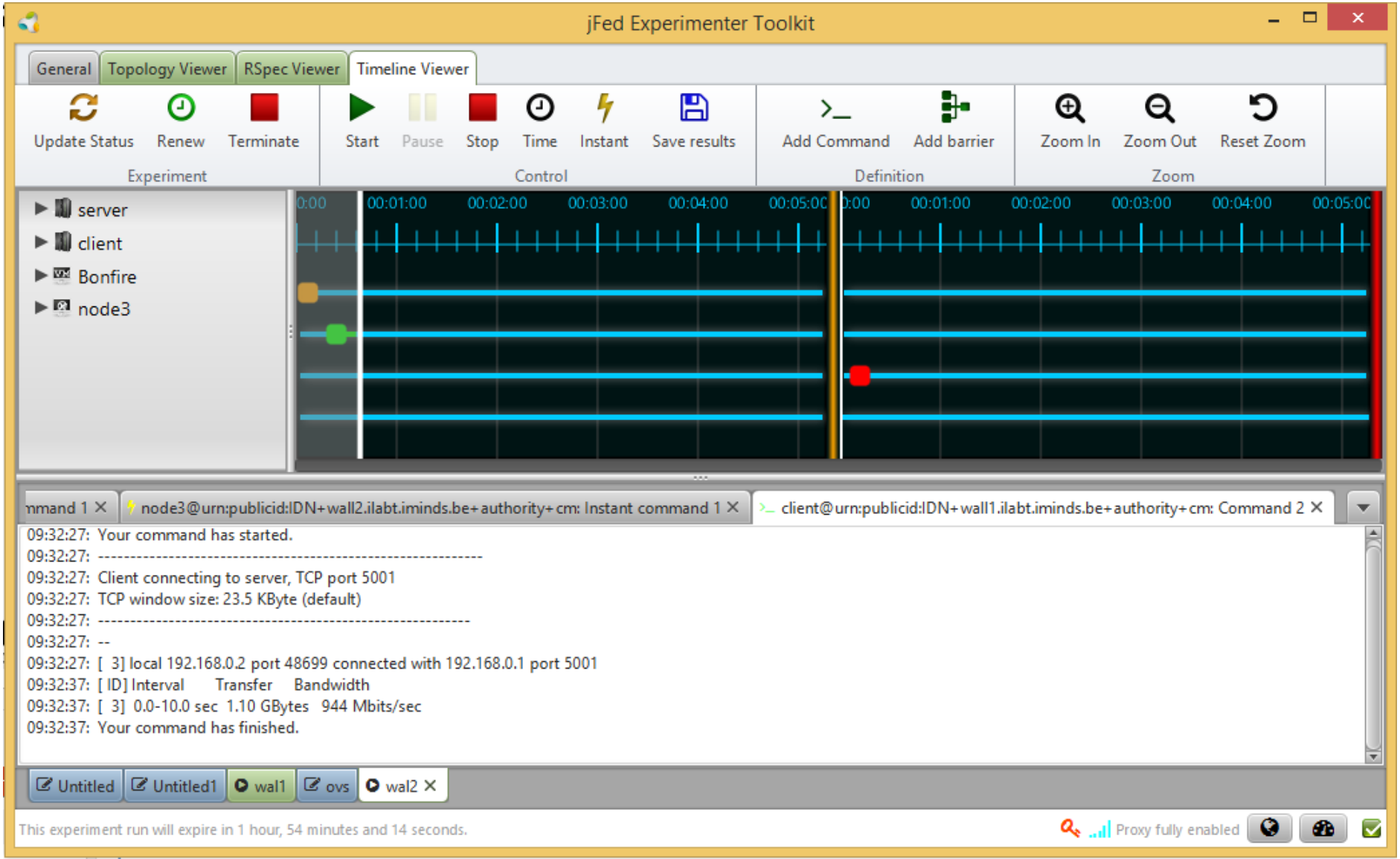
SDX = software defined exchange

eases connectivity (=exchange)

VLAN translation needed + SDN functionality

Tools beyond provisioning: experiment control

jFed: timebased experiment control



Labwiki experiment control (OMF/OML)

LabWiki by NICTA — Tools — User1 — Log out

Plan

My First Application
git:default:wiki/firegenipart0.md

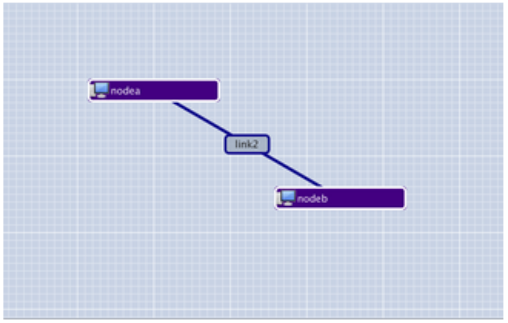
My First Application

My First Application

Today, we will write a simple script to automate tests such as Ping and Iperf using LabWiki Overall we will do the following:

Define OEDL script for ping and Iperf
Run Experiment in LabWiki and view Graphs

My Topology



Define Property

Example:

defProperty('source1', "client-lwtest6", "ID of a resource")

Define Application

```
defApplication('ping') do |app|
  app.description = 'Simple Definition for
```

Prepare

bvermeul_fgreiperf.oedl
git:default:oedl/bvermeul_fgreiperf.oedl

```
1  defProperty('source1', "client-tut101", "ID of
2  defProperty('thelistener', "server-tut101", "ID
3  defProperty('thesender', "client-tut101", "ID o
4  defProperty('thesender2', "client-tut101", "ID
5  defProperty('interfaceServer', "eth3", 'server
6  defProperty('capacity', 10000000, 'in bits per
7
8  defProperty('sinkaddr11', '192.168.1.7', "Ping
9  defProperty('sinkaddr12', '192.168.1.6', "Ping
10
11 defApplication('iperf') do |app|
12   app.description = 'Iperf traffic generator an
13   app.binary_path = "/usr/bin/iperf-oml2"
14
15   app.defProperty('server', 'run in server mode
16           :type => :boolean)
17
18   app.defProperty('client', 'run in client mode
19           :type => :string,
20           :order => 1)
21
22   app.defMeasurement("transfer"){ |m|
23     m.defMetric('pid', :integer, 'Main process
24     m.defMetric('connection_id', :integer, 'Con
25     m.defMetric('begin_interval', :double, 'Sta
26     m.defMetric('end_interval', :double, 'End o
27     m.defMetric('size', :uint64, 'Amount of tra
28   }
29    app.defMeasurement("connection"){ |m|
30     m.defMetric('pid', :integer, 'Main process
31     m.defMetric('connection_id', :integer, 'Con
32     m.defMetric('local_address', :string, 'Loca
33     m.defMetric('local_port', :integer, 'Local
34     m.defMetric('remote_address', :string, 'Rem
35     m.defMetric('remote_port', :integer, 'Remot
```

Execute

NEW

name:		
slice:	default_slice	
script:	git:default:oedl/bvermeul_fgreiperf.(	
source1:	client-tut101	ID of a resourc
thelistener:	server-tut101	ID of a resourc
thesender:	client-tut101	ID of a resourc
thesender2:	client-tut101	ID of a resourc
interfaceserver:	eth3	server interfac modify
capacity:	10000000	in bits per sec
sinkaddr11:	192.168.1.7	Ping destinatic address
sinkaddr12:	192.168.1.6	Ping destinatic address

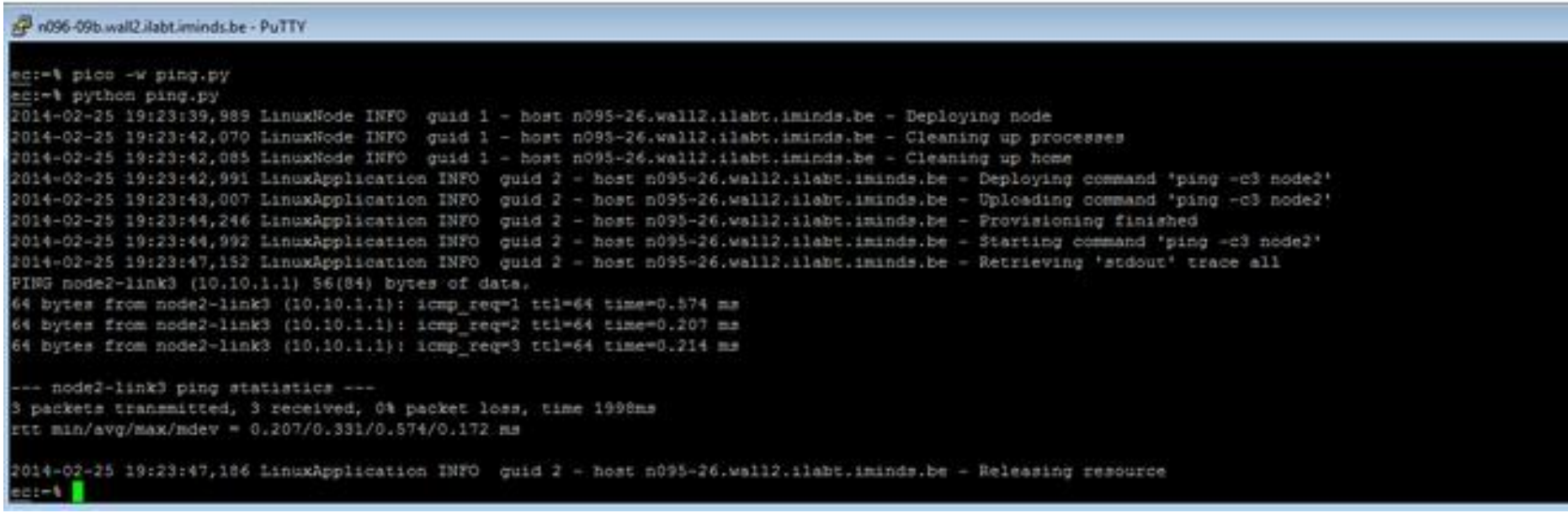
Start Experiment

FE

Minds
)VATE.CREATE

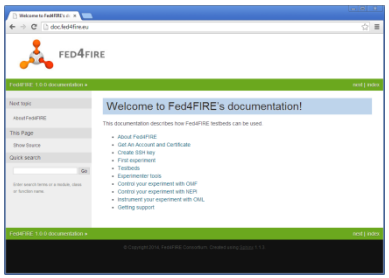
NEPI experiment control

- http://doc.fed4fire.eu/nepi.html

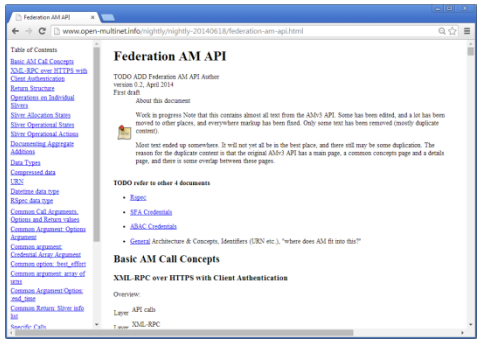


Workflow adding a testbed to the federation

Adding a testbed to the federation



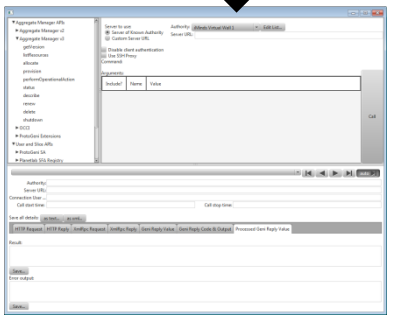
doc.fed4fire.eu



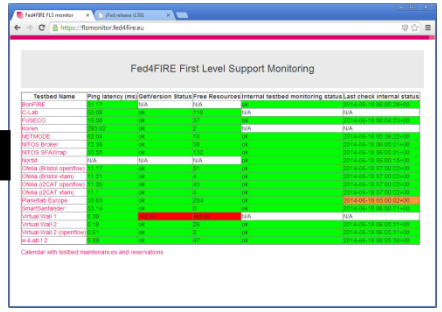
AM API doc

Design RSpecs

Implement AM API on top of testbed



Test with jFed probe

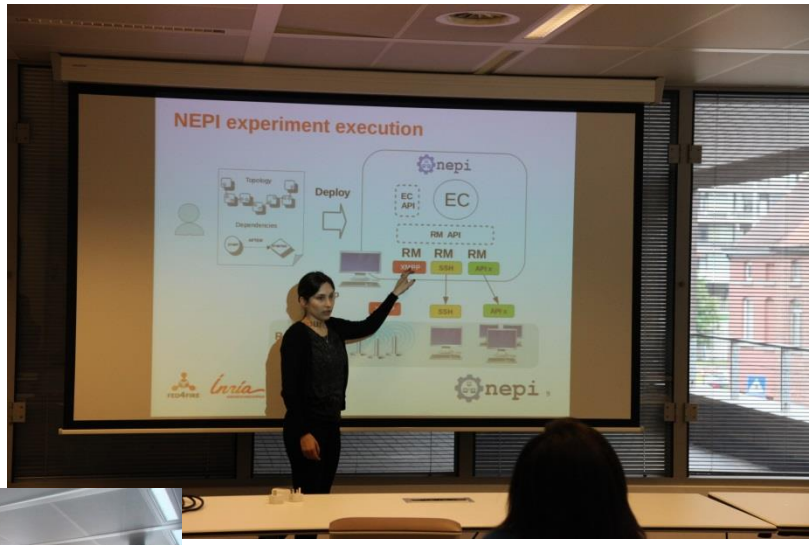


Dashboard and nightly testing (+internal testbed monitoring)

Document testbed

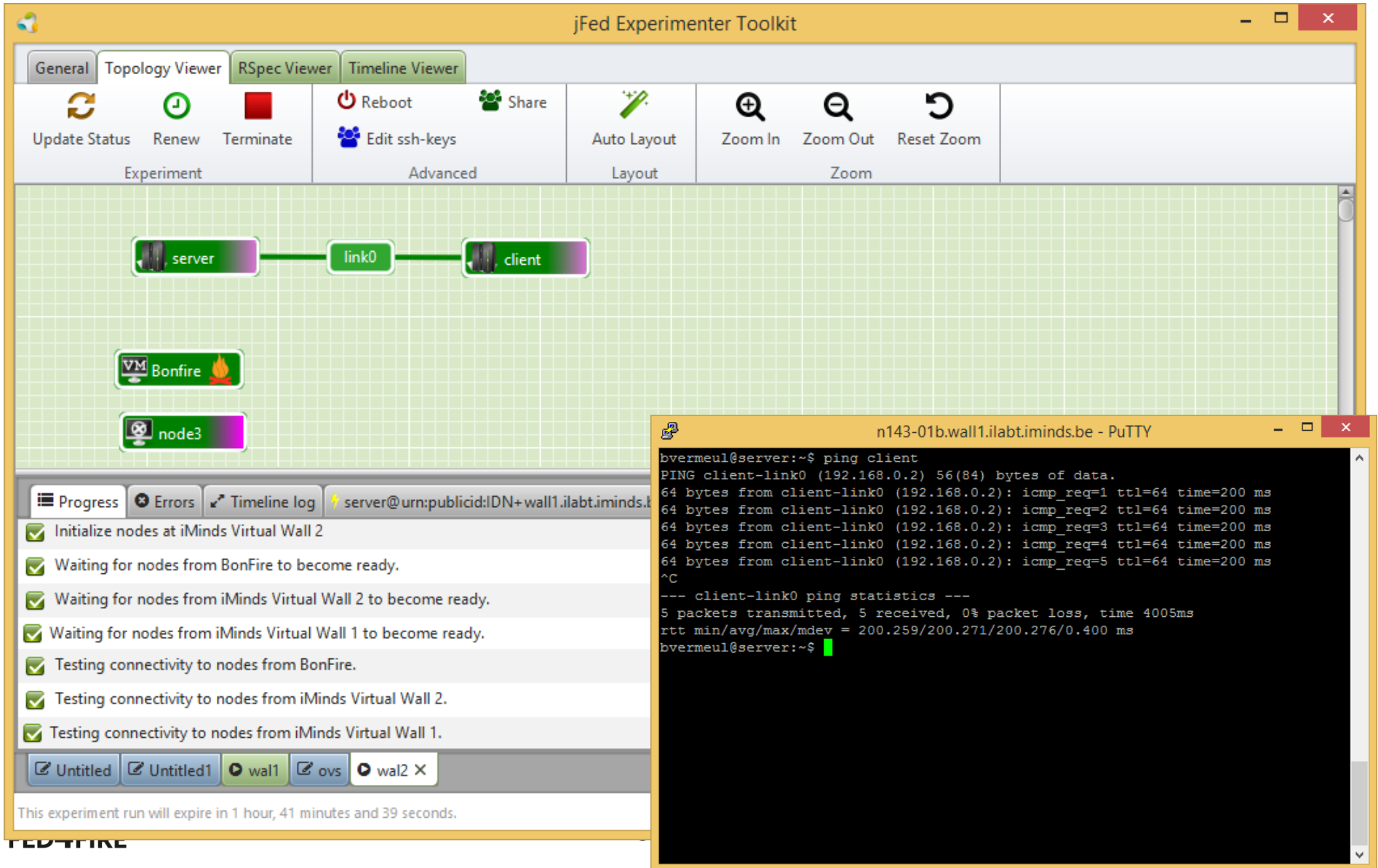
Add testbed in Experimenter tools

Use cases

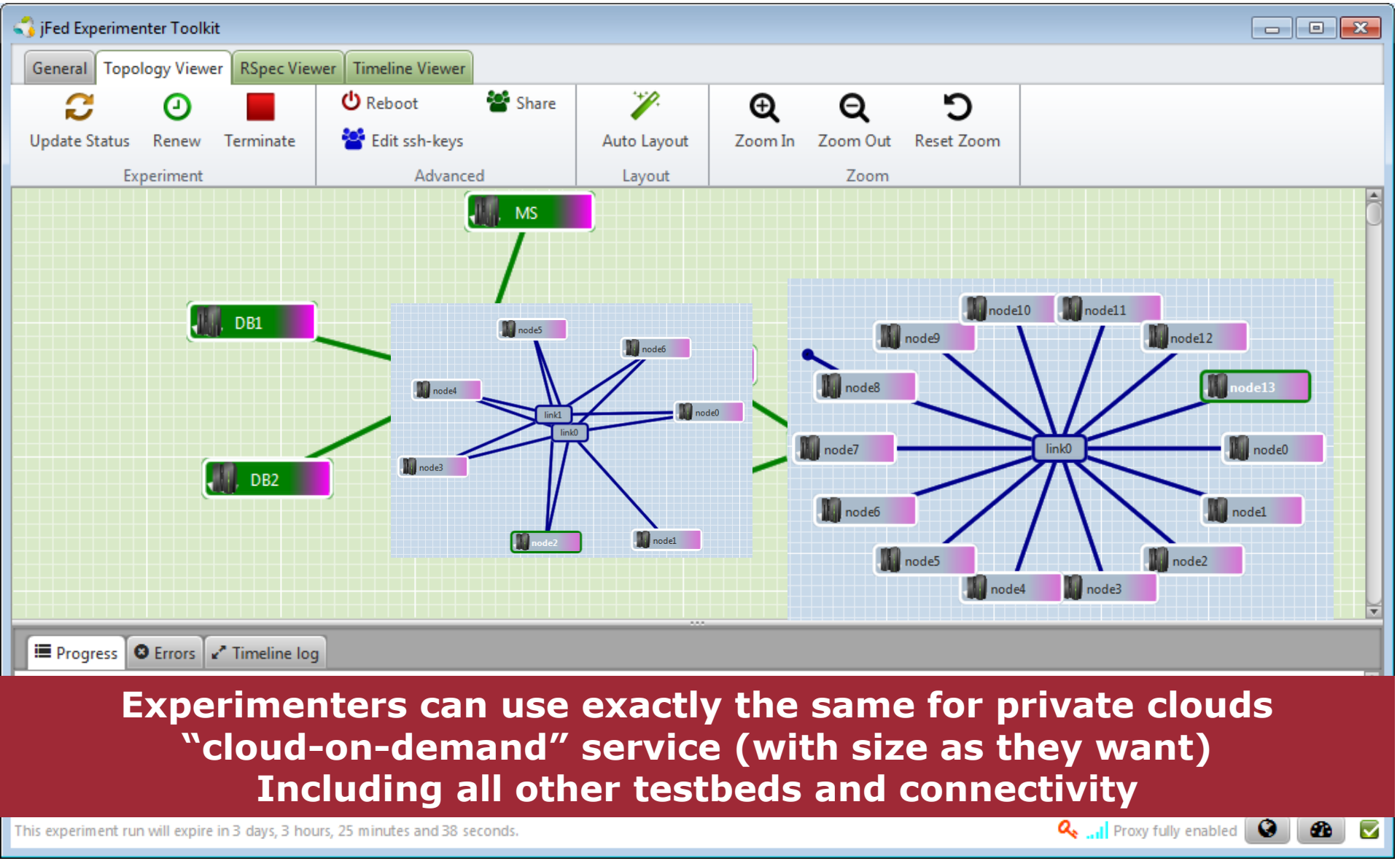


FIRE-GENI
Summer school
2014 - 2015

From account creation to first experiment (tutorial with client-server & emulated link)



Example: SME does scalability testing

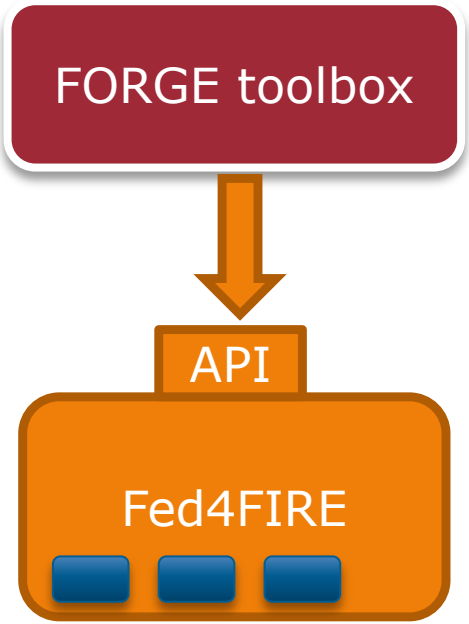


Experimenters can use exactly the same for private clouds
"cloud-on-demand" service (with size as they want)
Including all other testbeds and connectivity

Forge: lab in Greece using iMinds testbed

- 200 students in 4 sessions

FORGE



FED4FIRE

Wireless LAN throughput

In this lab session we'll investigate the different Wi-Fi settings and features which impact the throughput in a WLAN hotspot network. This course is provided by Ghent University and iMinds as part of the FORGE project, Forging Online Education through FIRE.

Learn more about FORGE »

Introduction

You will be using actual hardware (and no simulations) to experiment with different settings and features of Wi-Fi (Wireless Fidelity, based on IEEE 802.11 standards) when deploying a WLAN (Wireless Local Area Network) hotspot network. By using this hardware to solve multiple questions in a set of well-thought-out exercise scenarios, you will gain a better insight in the different aspects which impact the achievable throughput in your WLAN.

Live experimentation

The wireless nodes you will be using are part of the **iMinds w-iLab.t Zwijnaarde** testbed (a.k.a. "wilab2"), which is *physically located at the Zwijnaarde campus in Belgium* but can be configured, managed and tested completely from within the web interface you are currently using. This web interface itself is controlling the wireless nodes and is also dynamically created and hosted at the **iMinds Virtual Wall** testbed, which is *physically located at the Zuiderpoort offices (Ghent) in Belgium*.

These so called *FIRE (Future Internet Research and Experimentation)* testbeds can also be used in research projects to collaborate with industry partners to e.g. study and improve WLAN functionality. However, the configuration and experiments that you will perform during this lab session do not differ from the ones that are also applicable within your own WLAN at home.

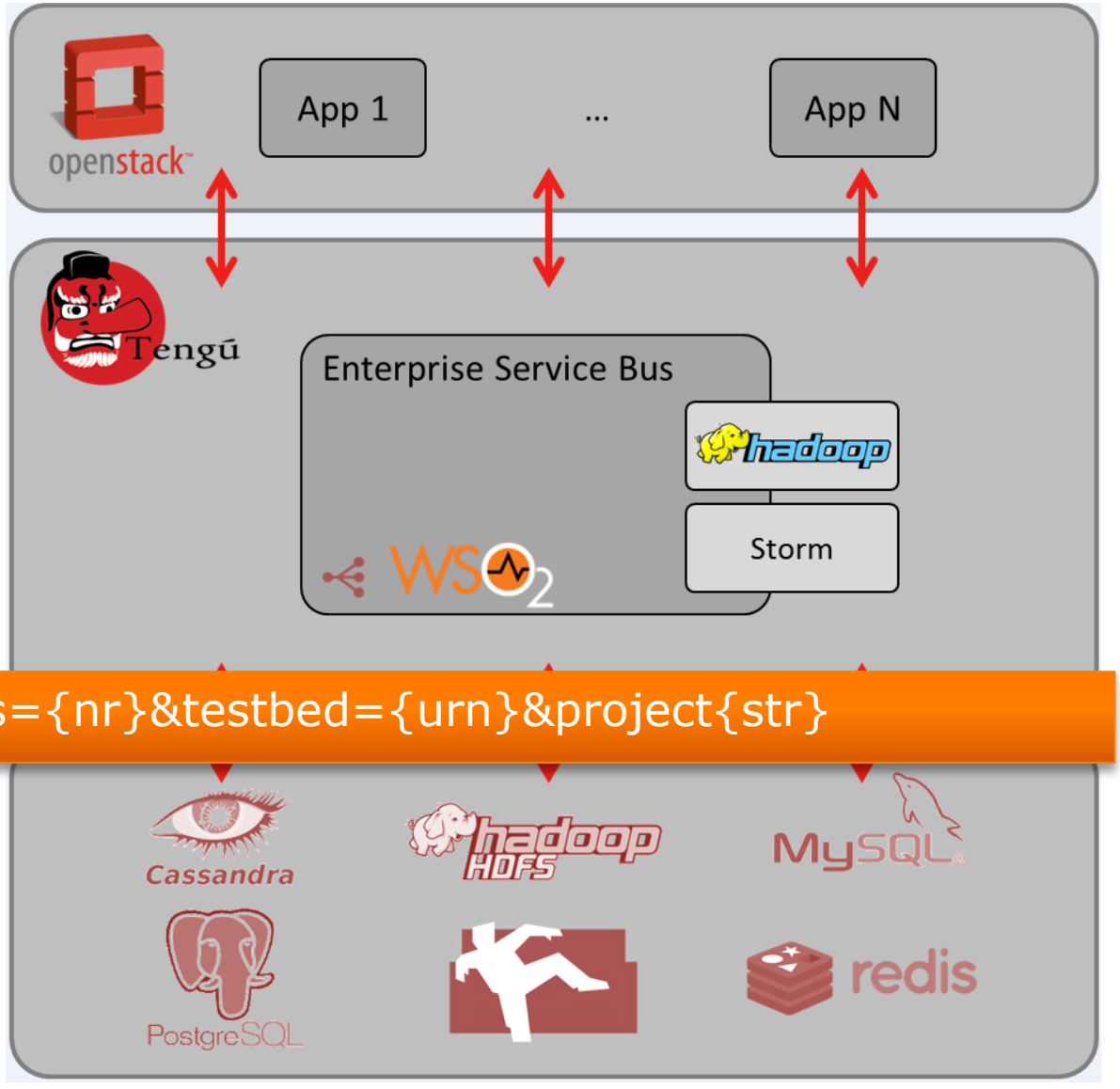
Usage of iMinds iLab.t Virtual Wall and w-iLab.t

Tengu service platform

Cloud-on-demand

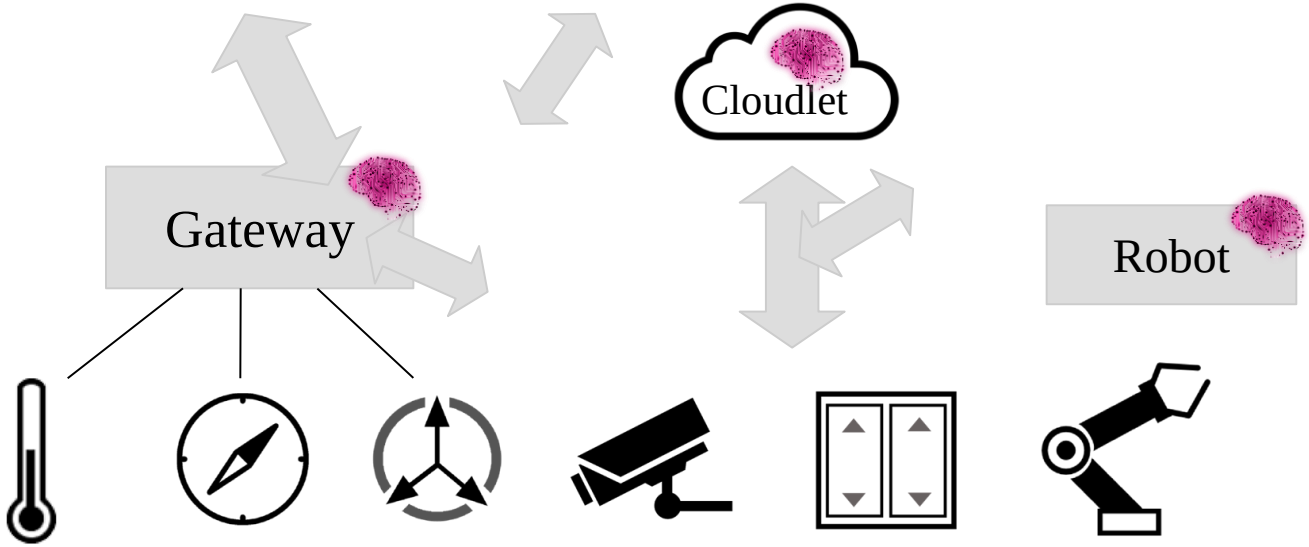
Hadoop/Storm/Lambda
-on-demand

Powered by RSpec
and Chef

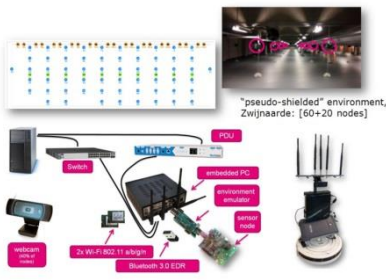


FED4FIRE

IOT EXAMPLE



sensors/
actuators



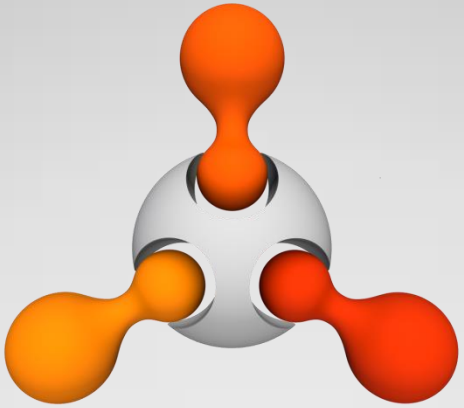
Use multiple testbeds/technologies with single account and tool

Extend your experimental research to other testbeds: upscale, other hardware

Re-use front-end tools / control tools / tutorials / classes

Easy use through federations
http://www.geni.net
http://doc.fed4fire.eu
http://www.fed4fire.eu

Combine and test on all layers



FED4FIRE

Thank you

brecht.vermeulen@iminds.be

www.fed4fire.eu