Experimentation on federated testbeds in Fed4FIRE

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Porto Roadshow
Porto, Feb. 18, 2020
Fed4FIRE Federation for FIRE
(Future Internet Research & Experimentation)

2012-2016

Fed4FIRE+
2017-2021
Fed4FIRE assets – facilities (doc.fed4fire.eu)
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 providers
- Standardized APIs
- Multiple tools
- Multiple testbeds

Testbeds trust IdPs in federation

All of them can appear and disappear!
# Users

![Line chart showing the growth of users over time. The chart includes data for total users, users without classes, and IMEC users and students only.](chart.png)
Monthly usage: #slivers, #users

Sliver: depends on testbed, multiple nodes typically
#unique users April 2019-September 2019: 234
#unique users October 2018-September 2019: 340
Average sliver duration: 96 hours
# Projects (1 project = set of experiment runs)
#Testbeds usable with Fed4FIRE account: +65
https://fedmon.fed4fire.eu (October 2019)
Monitoring federation is key (https://fedmon.fed4fire.eu)

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Fed4FIRE as a meta-testbed
Remotely Experiment with new technologies
jFed tool: easy access for testbeds (jfed.ilabt.imec.be)
Fed4FIRE as Meta-testbed

Enables all kind of experimentation because of bare metal hardware of all kinds of equipment

Including creation of new platforms, testbeds, …
Company wants to deliver global video service

- Cost efficient
- Redundant
Design: start with US and EU users
Single testbed prototype
Upscaling
Day night emulation
Network Function Virtualization experiments on Fed4FIRE
Virtual Network Infrastructure Topology
Automating with Experiment Specification (eSpec)
What is an Experiment Specification?

Espec bundles:

1. Resource Specification
2. Files to be uploaded
3. Commands to be executed

Extras: SSH, RNG
Fed4FIRE as meta-testbed

Combine computing, networking and storage for all your needs (SDN/NFV/SDX/5G/machine learning/IoT/cloud)
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<tr>
<th>Time</th>
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| 13:30 | HANDS-ON INTRODUCTION: HOW TO USE FED4FIRE+ TOOLS AND TESTBEDS  
Brecht Vermeulen, IMEC – Ghent University |
| 14:15 | Hands-on training for specific topics:      |
| 15:15 | Coffee break                                |
| 15:30 | Hands-on training for specific topics:      |
| 13:30 | TRACK 2: Wireless experimentation           |
| 15:15 | TRACK 2: Cloud and wired networking         |
| 13:30 | TRACK 3: IoT experimentation                |
| 15:30 | TRACK 4: Big data and machine learning      |

Tutorials today
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Hands-on training for specific topics:

- TRACK 1: Wireless experimentation
- TRACK 2: Cloud and wired networking
- TRACK 3: IoT experimentation
- TRACK 4: Big data and machine learning
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