

FED4FIRE EXPERIMENTS

Benefits of federated facilities

How many people does it take to find a parking space?

It's easy to find parking in Santander, Spain. Just open a smartphone app and you'll see where space is available, thanks to a citywide network of sensors which feeds into a vast data hub.

But could people – or indeed their smartphones – be used to collect, process and distribute the data instead of relying on a centralised server?

Fed4FIRE helped to simulate in real-time this alternative distributed approach using the Smart Santander testbed. Researchers found that 250-500 mobile users within the city centre area could collect and distribute, via phone-to-phone protocols, data that was 80-90% as reliable as 20-200 centrally-networked sensors. This accuracy is good enough for useful applications, without having to build expensive sensor networks, even for fast-changing situations like finding a free parking space.

Earth, please observe!

Every few hours a host of satellites orbits the planet and beams vast amounts of data and sensor readings back to Earth. Are Cloud services robust enough to integrate and process that data? Can they make it available for commercial services like disaster management software, maritime surveillance or homeland security?

It's too expensive to answer this question with standard experimental infrastructure, not to mention data security and privacy issues. So the company Elecnor Deimos decided to study this set up – satellite network, ground stations, Cloud services and end-users – in Fed4FIRE. They also tested some of the newer, more experimental networking and infrastructures at the forefront of Internet technologies.

The virtual experiments showed the technical feasibility of their ideas, justifying investment in a small-scale, real-world pilot including a real-time satellite feed.

Heads up! TV streaming for the future

Managing the Internet-based services and optimising data traffic associated with TV streaming is a tricky affair, but the company Televes wanted to be sure its streaming service could meet rising demand.

Combining the BonFIRE platform to simulate streaming servers and VirtualWall for end-user interactions, Fed4FIRE helped Televes to find out how usage and demand affected service quality.

The experiment highlighted some technical issues and helped Televes draw up a solid upgrade plan, giving the company a competitive edge especially in the United States.

Safe and secure in the Cloud

Achieving security and privacy in the Cloud is difficult because so many actors are involved: hosts, service providers, federators and more. But the advent of “intelligent protection” makes

“Without Fed4FIRE this experiment would have been very difficult, even impossible. The amount of time and cost would have made it unaffordable.”

security more robust as automated agents (small computer programs) can identify breaches and fix vulnerabilities even across complex, virtual and distributed networks.

A Fed4FIRE experiment found that intelligent agents developed by BT were activated within 1 minute of a virtual machine coming online; they also performed well in a network of more than 50 virtual machines. The federated nature of Fed4FIRE helped BT show that the agents had commercial value because they could deploy them across the borders of ownership, location, hardware infrastructure and software.

Untangling wireless...ness

A new protocol called Pragmatic General Multicast (PGM) is currently under development to improve the quality of wireless data transmission. It supports error detection and data packet retransmission simply and without having to increase bandwidth.



“The direct value for us was the availability and access to a very valuable resource of private Cloud testbeds which is usually quite hard to acquire.”

The companies Philips and WOOX Innovations tested an experimental PGM set-up using the w.iLab testbed to see how new PGM systems performed in a real environment with lots of potential interference from other wireless devices. No single facility could have managed such a large-scale experiment with so many prototype devices.

The partners found that devices retransmitted missed packets within a reasonable time, encouraging the partners to pursue development of PGM-enabled devices.

The quality of ‘quality assurance’

Mobile network operators monitor their networks extensively so they can optimise operations and meet service level agreements. But is their monitoring data reliable?

Across such vast, complex networks it would be impossible to assess every potential source of inaccuracy, so Naudit created a virtual network instead. Using Fed4FIRE the company controlled all variables and investigated how different parameters influenced monitoring reliability and accuracy.

Having now updated its algorithms, the company boasts new active network monitoring tools that provide network operators in Europe and America with strong data on which to base business-critical network management decisions.

That’s rich! Cloud configurations for audiovisual content

Everyone says content is king, but today we want our music and video delivered faster and at higher resolution than ever before. Streaming services need to know how network traffic and different

Cloud configurations affect the quality and cost of their services – not leaving it to trial and error. Fed4FIRE helped media company VCI quickly accumulate enough data to select optimal configurations for its services and its Cloud infrastructure requirements for both indoor and outdoor use.

Super-sized middleware experimentation

Fed4FIRE has provided a double bonus for the Digital Enterprise Research Institute (DERI) in Ireland: not just a mechanism to test its powerful new middleware, but also a platform for delivering services to end-users.

DERI’s Super Stream Collider (SSC) aspires to be the world’s largest and fastest Linked Data Stream platform. Fed4FIRE combined the power of Cloud-based processing (BonFIRE), data service distribution (PlanetLab) and emulation (VirtualWall) to make data from Smart Santander’s sensor networks accessible for powerful new apps, and tools for residents and city planners.

Locked and loaded: secure Cloud storage

Ever worried about saving confidential, sensitive or personal data to the Cloud?

“By using Fed4FIRE platforms we can reduce the effort ... and time for experiments.”

Researchers at BT and major security vendors have developed a security service prototype, but they needed to know whether it worked for data stored across several Cloud systems, for example in virtual or syndicated Clouds.

Fed4FIRE’s real-world Cloud infrastructure, linked and managed through APIs the jFed tool suite, proved the prototype service would work. It is now being deployed to enhance the security of commercial Cloud services. Surely, that’s enough to put customers’ minds at rest!

About Fed4FIRE

The Future Internet Research and Experimentation (FIRE) facility supports critical research and development by creating a number of specialist Internet testbeds for new technologies – hardware and software, infrastructure and protocols. Federating these testbeds in new and exciting ways under Fed4FIRE brings together previously distinct domains of Internet research, and provides a boost for Europe’s technology sector and wider economy.

