The FEDERICA project

A federated infrastructure for Future Internet research

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FEDERICA is an EU-funded project under Framework Programme 7 (FP7) which aims to create a scalable, Europe-wide technology-agnostic infrastructure in order to support research experiments on new Internet architectures and protocols. For achieving this, the project uses an infrastructure based on gigabit Ethernet circuits from the GÉANT2 backbone that are coupled with virtualisation technologies.

The e-infrastructure

The FEDERICA infrastructure is based on the multi-domain European National Research and Education Networks (NRENs) and the GÉANT2 backbone. FEDERICA resources are hosted at Points of Presence (PoPs) of participating NRENs. These resources are circuits, switches and nodes capable of virtualising hosts, e.g. open source routers or end systems.

FEDERICA uses virtualisation in computing and network systems, to create a technology-agnostic and neutral infrastructure. It creates "slices" from this substrate, which are a set of virtual network and computing resources according to the user's request.

Virtual slices of FEDERICA's infrastructure may be created, allocated and used simultaneously by researchers for testing, even with disruptive experiments, within a large production substrate. The researchers will have full control of the allocated virtual nodes and network in their slice and can access specific network monitoring information. The infrastructure capabilities allow a much faster research and experiment cycle.

Access to the infrastructure is normally free of charge for researchers in both academia and the private sector, with priority given to projects funded by the European Community. Access is subject to compliance with an Acceptable User Policy, which requires the user of the services to provide explicit feedback. A User Policy Board is responsible for accepting and prioritizing user requests. Each user group is assured testing privacy and that testing results are not accessible by other users.

Internal research

Besides the plans to engineer and offer an operational infrastructure as a service in the short term, the project is conducting research towards prototyping and testing certain virtualization elements, such as slicing tools and novel architectures, not deemed sufficiently mature to be offered as a service by the project. Research includes general control, management and monitoring architectures for virtual networks, user controlled networks, and software routers and is being tested on the infrastructure itself.

The research can be divided in two areas. The first is related to the control and management of a set of virtual networks and associated tools and protocols. There is active research for multi-domain services, such as for Bandwidth on Demand and Quality of Service, which only lately is producing draft standards. The other area has the broader scope of evaluating architectures, which radically differ from the ones used in the Internet of today and are focused towards virtual infrastructures. The results of the research will be engineered into the infrastructure where appropriate.

New inter-domain services for virtualized resources are envisaged and will be explored also through the participation in the IPsphere Forum.

User communities

The target users of the infrastructure are researchers actively engaged in research on networking, who use networks not just as the tool, but primarily as the subject of their work. User groups will include EC projects, research groups in universities or research centres, equipment manufacturers and telecommunications research labs, or even individuals (e.g. PhD students). Users of the FEDERICA infrastructure can be distinguished into contributors and consumers. Contributors are able to modify, in a controlled way, their allocated virtual slice, i.e. its properties, configuration and software. Consumers are the users, who are simply using a FEDERICA slice or layer to do higher-layer or application-layer testing.

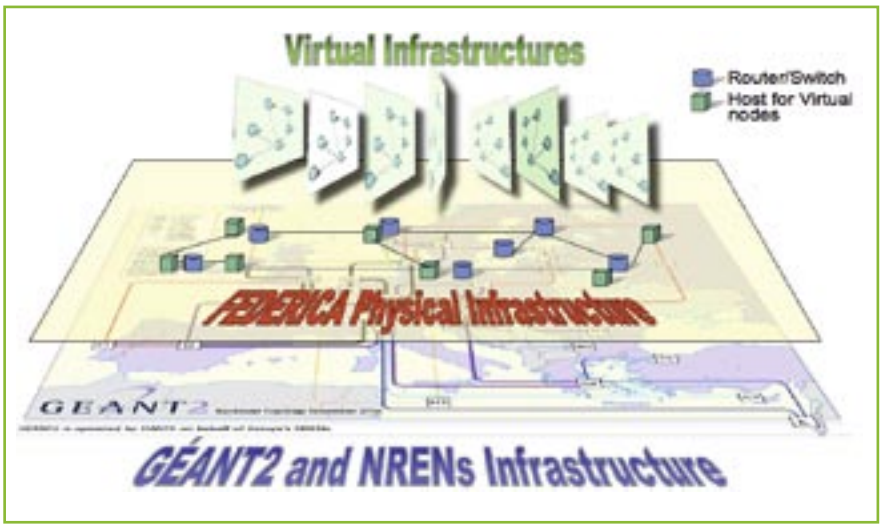
Conclusion

The FEDERICA project enables Future Internet researchers to access rapidly and efficiently resources for their experiments and tailor their own "slice" according to their needs.

Management and control of distributed, parallel, virtual networks, which may communicate among them and with the open Internet, are also key functions in the next generation networks. The FEDERICA project will develop experience and draft a model for managing and using virtual infrastructures as a combination of networks and systems.

Leveraging advanced networking and virtualization offers new scenarios to fundamental and innovative research in the existing infrastructures. The FEDERICA project started on 1 January 2008 and continues for 30 months. By October 2008, the first researchers will be able to access the infrastructure.

More information is available at *www.fp7-federica.eu*



FEDERICA's e-infrastructure