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Quote

„I think it is more likely that grids will be re-branded or merge into cloud computing... I think in five years something like 80 to 90 percent of the computation we are doing could be cloud-based.“
Kate Keahey
Scientist at Argonne National Laboratory and a Computation, Institute fellow at the University of Chicago

„SOAs are like snowflakes – no two are alike.“
David Linthicum - Consultant

„No printing is permitted of this book. This book cannot be given to someone else. This book cannot be read aloud.“
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ToMaTo - Next Generation Testbed Software

ICSY is developing a novel experimentation software for network research called ToMaTo (TOpology MANagement TOol) that enables easy setup and control of networking experiments. ToMaTo’s graphical editor allows researchers to create network topologies in seconds, so that they can focus on the experiment and not on how to set it up.

Facilitate Network Research

ToMaTo allows researchers to design topologies for network experiments, consisting of devices and connectors. Devices are networking components like computers; connectors are networking components that transport and manipulate networking data like switches or routers. Researchers can run their experiment software on the devices like on virtual machines and can connect them via hubs, switches, routers or via the Internet. A graphical editor supports easy and fast setup of topologies, so that researchers can focus on their experiments.

To build huge topologies the integrated topology creator can be used to create star, ring or full mesh topologies consisting of large numbers of devices. The devices are automatically connected, configured and arranged to form the selected topology.

ToMaTo helps researchers to configure their topologies by automatically configuring network interfaces so that all devices can communicate.

Users are free to adapt this setup to their needs.

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ToMaTo - Next Generation Testbed Software

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Easy to Use Tools
ToMaTo also supports link emulation, i.e. researchers can configure common networking characteristics like packet loss, latency and bandwidth limitations for the network connections between their devices. Packet capturing allows researchers to track what packets are sent and received by their devices. Using tools like Wireshark, the users can analyze the network traffic after the experiment. A built-in console viewer allows researchers to get command line access to their devices with a single click.

All this is realized by a host component, a backend and a frontend component. The host component is installed on all physical hosts and provides virtualization features. The backend component contains all the program logic and manages resources and user accounts. The frontend consists of a website including a graphical editor and a console viewer.

Support of Large Experiments
ToMaTo stays lightweight and efficient in resource usage, i.e physical hosts can hold up to hundreds of virtual devices. This allows researchers to build large topologies or run multiple concurrent experiments while the resource usage stays low. A low number of physical nodes is needed to build large experiments.

G-Lab-Cluster
As part of the German-Lab project (see ICSY Report 2 & 3 - 2009), ICSY runs a server cluster that is part of the German-Lab experimental facility, consisting of over 180 nodes at 10 sites all over Germany. Work package 7 of German-Lab is responsible for running and maintaining the experimental facility. As member of this work package as well as some projects related to the experimental facility, ICSY developed ToMaTo in cooperation with its German-Lab partners.

The German-Lab experimental facility already contains 20 ToMaTo-enabled hosts and plans exist to increase this number to 50. All German-Lab users can access and use ToMaTo for their own network research experiments. The goal of ToMaTo is to support network research and to help researchers focus on the experiment. With its contribution to this software, ICSY helps to enable networking research in general and future internet research like the ICSY SONATE project in particular.

http://tomato.german-lab.de

(Text: Dennis Schwerdel)
Transform ICSY’s Venice into Marketable Product

ICSY incorporated its research results in the area of service-oriented architectures directly into the Venice Service Grid. Now, ICSY initiates a cooperation (Venice4IESE) with the Fraunhofer IESE in order to transform Venice into a marketable product, addressing small and medium sized enterprises (SME).

The goal of the Venice4IESE project is to accelerate the transfer of basic research results in the industry and to commercialize the Venice Service Grid (short Venice). Within the scope of so called “transfer projects”, working groups from the Computer Science department at the University of Kaiserslautern work together with the Fraunhofer Institute for Experimental Software Engineering (IESE) to transform research results into marketable products.

Venice is being developed since 2003 within numerous ICSY projects as a service development and provisioning platform. The platform consolidates the scientific results of many bachelor and master theses as well as the dissertation of Dr. Markus Hillenbrand.

The platform’s architecture is based on the service orientation paradigm and therefore suitable for addressing the potential of distributed parallel operating systems. Venice offers the potential to implement applications tailored to the specific customer requirements. Loosely coupled and reusable services can be combined in new application solutions on the platform. Via modular design the graphical user interfaces (GUIs) of Venice applications can also be personalized and reused. The GUIs, just like the services, are loosely coupled and can be integrated in a joint interface at runtime.

The collaboration of ICSY with industrial partners within the Venice4IESE project will transfer the Venice platform into a product combining scientific results with industry know-how. Small and medium-sized companies can contribute to the development of the product concepts via best-practice reports. Information on domain-specific requirements can contribute to a context-specific extension of the services offered by Venice.

(Text: Aneta Kabzeva)

ICSY Joins GpENI Network Testbed

ICSY expands its international reach by joining the GpENI project. GpENI is an international programmable network testbed with nodes across the world.

ICSY is collaborating with GpENI (Great Plains Environment for Network Innovation) by hosting a GpENI node cluster and acting as a network fan-out site.

A GpENI node cluster consists of at least five nodes consisting of at least one management node, two PlanetLab nodes, and two Vini nodes. PlanetLab is a virtualization infrastructure which allows for experiment execution. Vini is a programmable router, allowing for specific network architectures to be created. The ICSY GpENI node is made up of five servers.

The network that connects all GpENI nodes is a flat layer 2 network. The core part of the network is made up of fiber connections between the University of Kansas (KU), Kansas State University (KSU), University of Nebraska – Lincoln (UNL), and University of Missouri – Kansas City (UMKC). Over 30 sites around the world are connected to this network through layer 2 tunneling technologies.

ICSY has a L2TPv3 tunnel to the University of Kansas. This tunnel is then shared with the Karlsruhe Institute of Technology (KIT), the Technische Universität München, and the University of Vienna through an ICSY hosted OpenVPN server.

GpENI was created to build a collaborative network research infrastructure funded by the participating institutions.

http://gpeni.net

(Text: Nathan Kerr)
Successful Completion of GDI-Grid project

ICSY has developed a workflow engine capable of integrating diverse service technologies thus building the basis for geospatial applications in Grid environments.

The D-Grid project (“Geodateninfrastruktur-Grid” - “Spatial Data Infrastructure Grid”) **GDI-Grid** developed solutions for efficient integration and processing of geospatial data based on Geo Information Systems (GIS) and Spatial Data Infrastructure (SDI) in Grid environments. A wide area of SDI applications were covered and used to demonstrate the demand for data and computing resources and to proof the large benefit of using Grid environments for processing geospatial data.

A Grid infrastructure for three sample scenarios was implemented: flood simulation, disaster routing and noise emission simulation in urban environments. Each scenario provided a Geospatial workflow demonstrating the benefits of using the Grid’s powerful data management and massively parallel computing capabilities. ICSY provided the GDI-Grid workflow engine that executes these workflows.

For example, a flood modeling service based on workflows has been developed by utilizing hydrodynamic simulation. The GDI-Grid project showed how massive terrain data could be processed in Grid Computing environments based on OGC Web service interfaces, and thus creating synergies between Grid Computing and SDIs.

(Text: Tino Fleuren)

ICSY Alumni

ICSY wishes to stay in contact with former colleagues, students, and student researcher in order to build a strong alumni network.

Alumni receive the ICSY report in order to get a quarterly update of ICSY’s activities.

We report about selected highlights of the past months, present current research topics, and inform former ICSY members about news in research and lecture.

ICSY hopes you enjoy reading the report and would like to stay in touch with ICSY.

If you have any questions, or would like to give feedback about the ICSY report please send an email to alumni@icsy.de

Please inform other former colleagues and students about ICSY Alumni.

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