Reservoir – Resource and Service Virtualisation w/out Borders

Dr. Yaron Wolfsthal
IBM Haifa Research Lab

NESSI General Assembly 2007
Brussels – 11th & 12th December 2007
Agenda

- Project motivation
- Consortium partners
- Project innovation
- Main project results
Motivation: Service-Oriented Economy Is at Our Door

- Services over the internet are winning in the market
  - Consumers use YouTube, eBay, Amazon, Second Life...
  - SMEs use hosted Microsoft Exchange, Salesforce.com
  - Enterprises routinely rely on remote IT outsourcing

- Services reduce complexity and cost

Service-Oriented Economy requires Service-Oriented Infrastructure (SOI)
Motivation cont.

Delivering Services as Utilities

Next-Generation Infrastructure for Service Delivery

- Resources and services can be transparently and dynamically managed, provisioned and relocated virtually “without borders”
  - Realize the utility computing paradigm in commercial scenarios
  - Analog to electrical power delivery (utility computing)
  - Capacity can be shifted to guarantee supply and lower costs
- Adhere to SLA constraints via smart algorithms for placement and relocation of services

Impact - create the basis for future service products

- Enable utility-like deployment of services, relieving service consumers from awareness of IT attributes while providing QoS and security guarantees
## Partners and Competencies

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<th>Partner</th>
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<td>IBM HRL</td>
<td>Technology</td>
<td>Project Lead, Virtualization/SOA Infrastructure</td>
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<td>Telefonica I+D</td>
<td>Technology</td>
<td>Service Technology, Billing Infrastructure</td>
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<td>UCM</td>
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<td>Grid, Dynamic Allocation Technology</td>
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<td>Thales</td>
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<td>Partner, Monitoring and SLA Management</td>
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Reservoir, building upon deep integration of grid, virtualization and service management technologies, aims to develop an “internet-scale data center”.

The following slides outline the technical dimensions of the project.
Start from Grid Computing...
The RESERVOIR architecture consists of independent grid nodes, where each site consists of one or more physical resources which are partitioned by a virtualisation layer into virtual execution environments (VEEs). Inside these VEEs, service tasks execute.

Improved isolation, well defined billing units, relax dependencies.
Policy 1:
If possible keep VEEs from the same organization in the same physical box.

Add Automated Migration Policies.
Add Automated Migration Policies

Improved placement

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Policy 2:
Turn off underutilized physical boxes
Policy 1: If possible keep VEEs from the same organization in the same physical box

Policy 2: Turn off underutilized physical boxes
Break Migration Borders **Across** Domains

Policy 3: If possible keep VEEs in “owning” organization

Policy 4: If possible keep VEEs in least number of external organizations
Virtualize the Network

Create virtual networks connecting VEEs regardless of physical server location.
Virtualize Network and Storage

Enable secure access to data regardless of storage location
The SOI Equation

To accomplish the vision, we will pursue deep integration of virtualisation technologies with grid computing.

Integrating these key technologies - with supporting new techniques for business service management – underlies the vision of ubiquitous utility computing aimed to create basis for future service products.
Main Project Results

Architect and implement a platform for supporting complex services, which

- Enables dynamic deployment of complex multi-tier services across heterogeneous administration domains
- Uses virtualization of servers, storage and network to allow migration without borders
- Supports service definition, SLA management,
Main Project Results cont.

Definition of reference architecture for SOI

Building upon the notion of Virtual Execution Environment (VEE) to provide support for the dynamic deployment and re-allocation of Virtual Machines and Java Service Containers

Techniques for service management, including service definition, SLA management, accounting and billing

Developing VEE provisioning technology, including a policy engine and being able to deploy federated infrastructures comprising multiple sites or administration domains

Research on security in all levels of the architecture, including security in multi-tenancy environments, Virtual Execution Environment and service/application level
Summary

- Infrastructure for the emerging **Cloud Computing** paradigm, supporting the delivery of services as utilities
  - Transparent and dynamic provisioning, managing (including metering/billing) and relocation of resources and services across administrative domains – virtually “without borders”

- An integrated set of technologies, building on the partners’ expertise in Service Computing, virtualisation technologies, and business service management

![Diagram](grid-aware-virtualization-and-BSM)
Enabling the next wave of services