

A Cloud Platform for Service Oriented Software Development & Running

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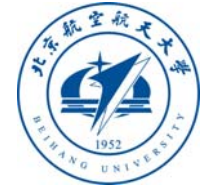
March 23, 2011



北航计算机新技术研究所
The Institute of Advanced Computing Technology



OW2
Consortium



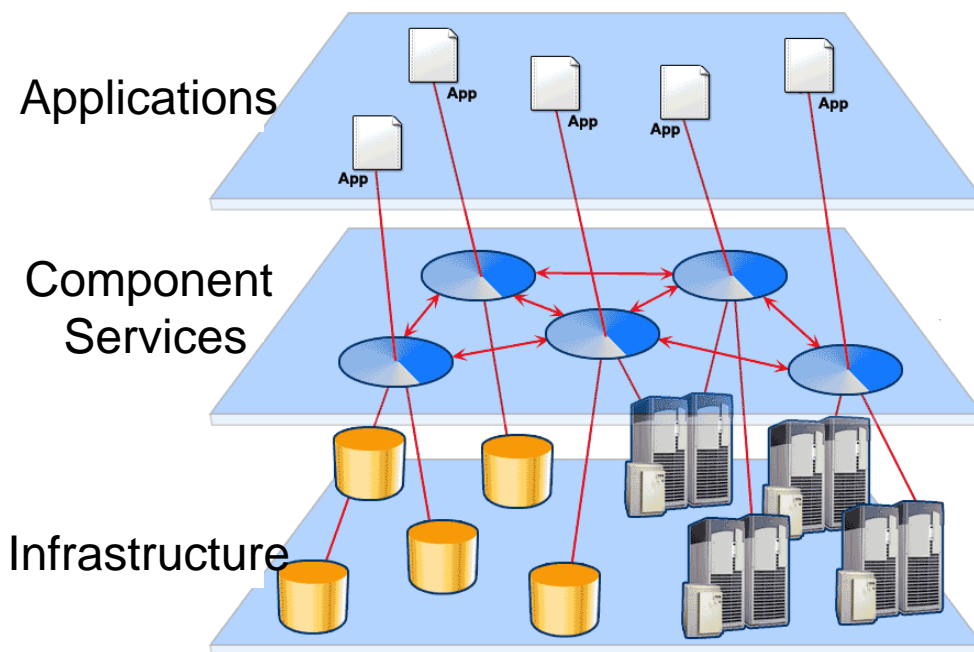
Agenda

- Service oriented software development
- Service cloud platform
- iVIC project
- Summary



Service oriented software development

- Service-oriented software design & development
- Basic approach
 - ◆ Improve the productivity of software development through reusing of loosely-coupled services over Internet



■ Key issues

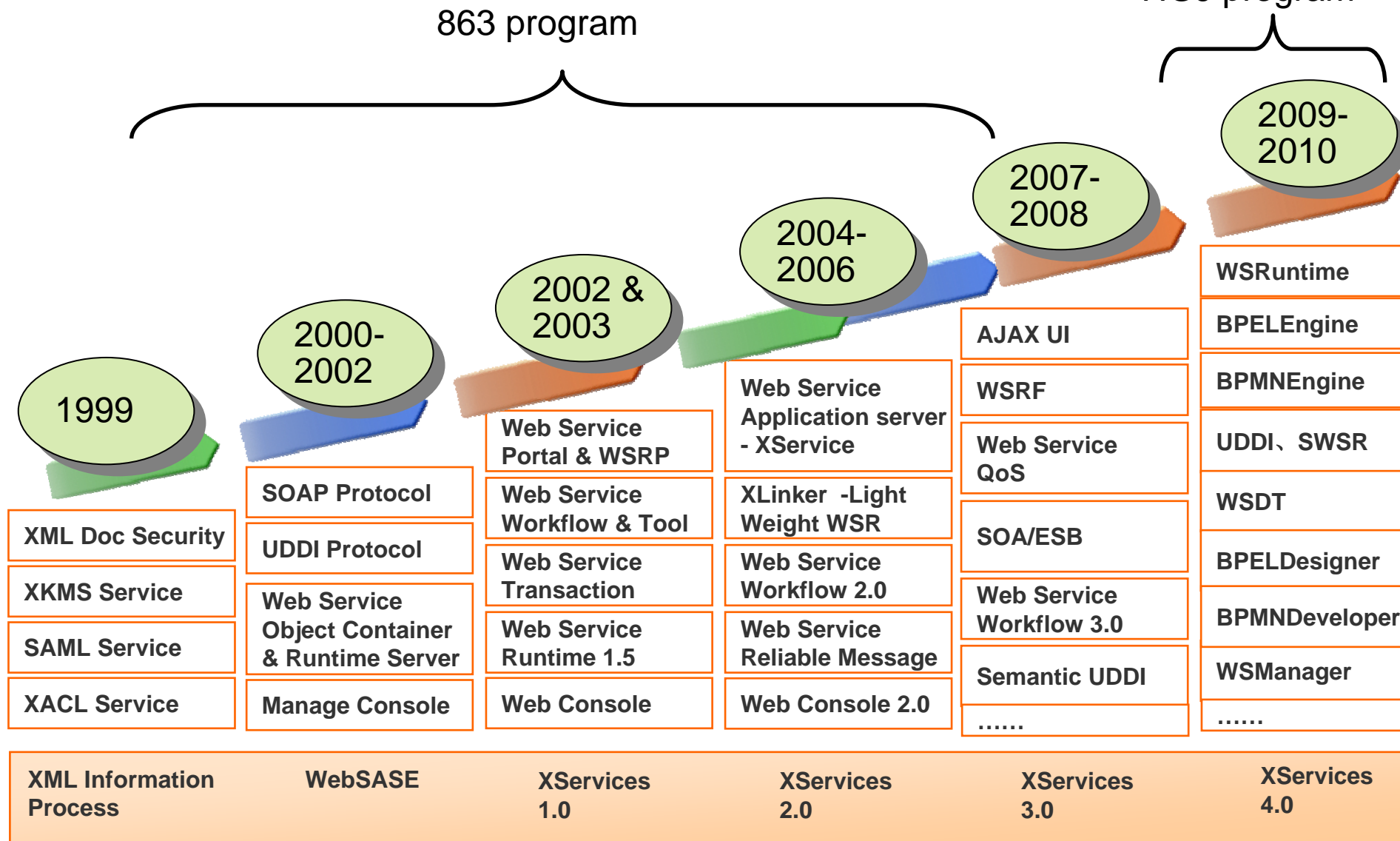
- ◆ Service management
- ◆ Service composition
- ◆ Runtime management



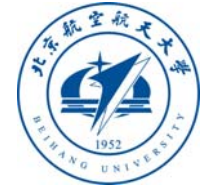
From WebSASE to XServices

HGJ program

863 program

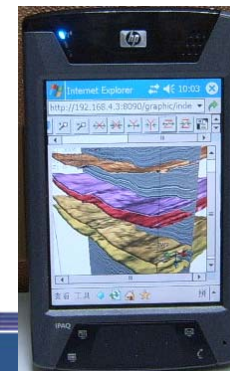
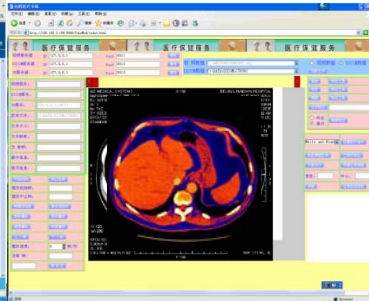
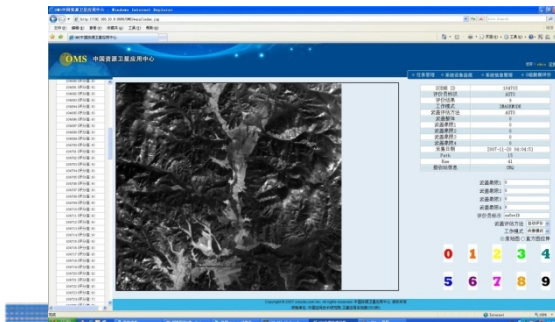
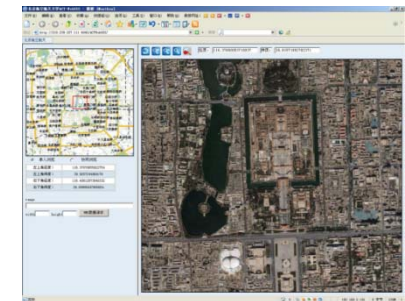
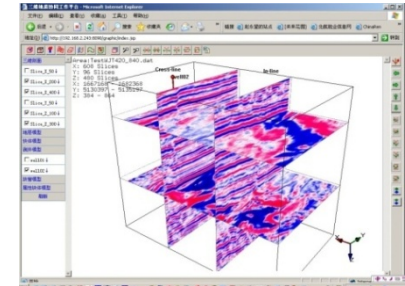


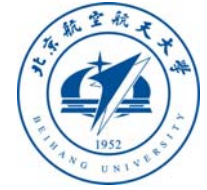
Consortium




Success stories: applications

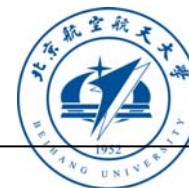
- **Application domains:** e-Government, Satellites, Remote Sensing, Health, Geology, ITS
- **7 applications:**
 - ◆ SOA based telecontrol and telemetering system of satellites
 - ◆ Remote sensing data public service platform
 - ◆ Management and service system of large scale spatial data
 - ◆ Collaborative visualization system of 3D geological data
 - ◆ Collaborative analysis system of medical data
 - ◆ Remote control services of microscope
 - ◆ Traffic information publishing system
- **12 Collaborating organizations**
 - ◆ **Nonprofit Orgs:** OW2 Opensource Consortium, Internet Open Standards Lab(ISOL)
 - ◆ **Research Institutes:** Chinese Standards Institute of Electronic Technology, 27th Institute of Chinese Electronic Technology Inc. , Chinese Academic of Spatial Technology, Peking University
 - ◆ **Companies:** French Thales Inc., CVICSE, InterVision, China Center for Resource Satellite Data & Application(CRESDA), Jandar, Petrochina Daqing Oilfield, Sinopec Shengli Oilfield



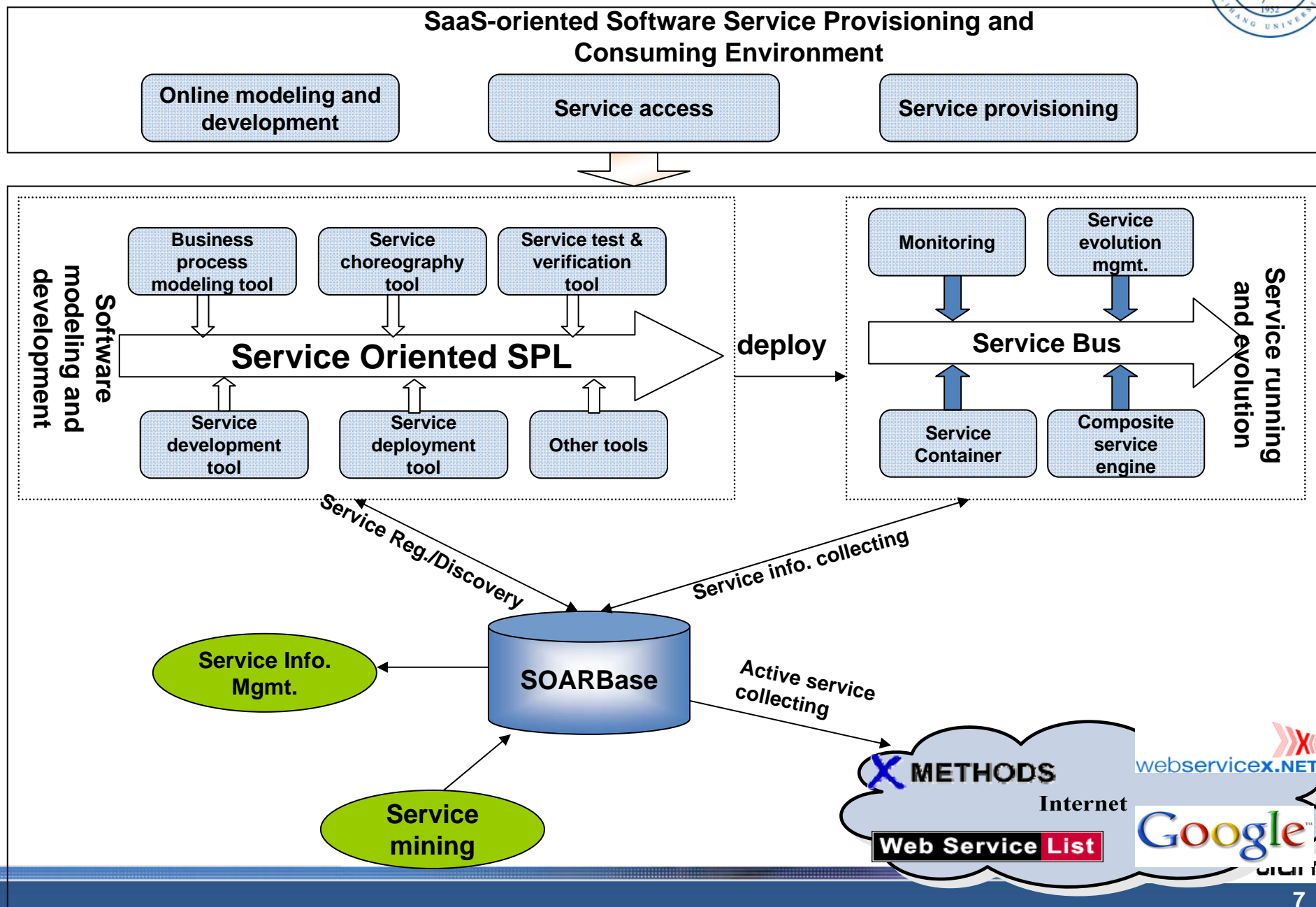


Trustie project & SOARWare

- Trustie project: a key 863 project from MOST
 - ◆ 2007-2010 The Trustie logo consists of the Chinese characters '确实' (Trustie) in red, with the word 'Trustie' written in a stylized font below them.
 - ◆ Highly-trustworthy software production tools and environments
- For us: Beihang University
 - ◆ Focusing on service-oriented software design & development, and the trustworthy characteristics of software quality
 - ◆ **SOARWare** : Service oriented software production and running environment
 - Service resource management
 - Design and development
 - Runtime support



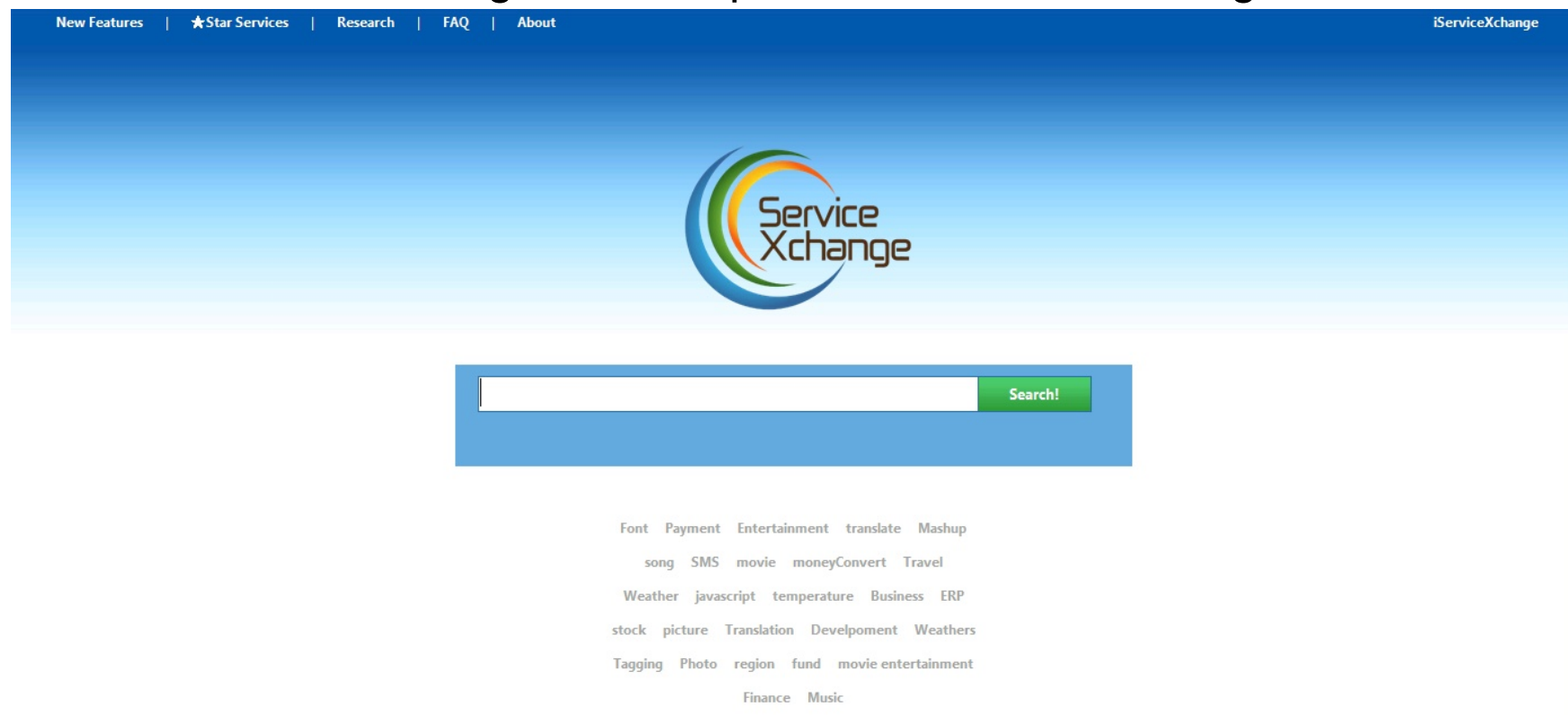
Architecture of SOARWare

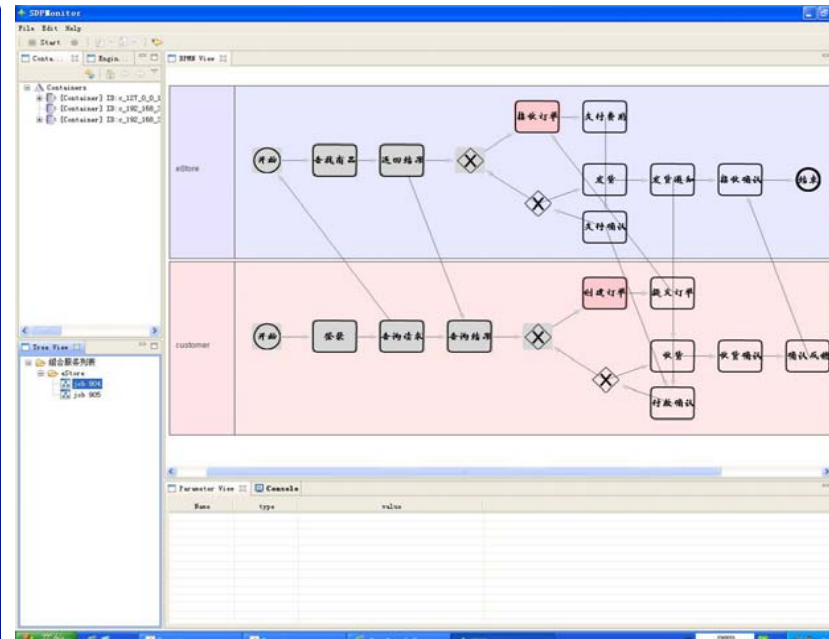
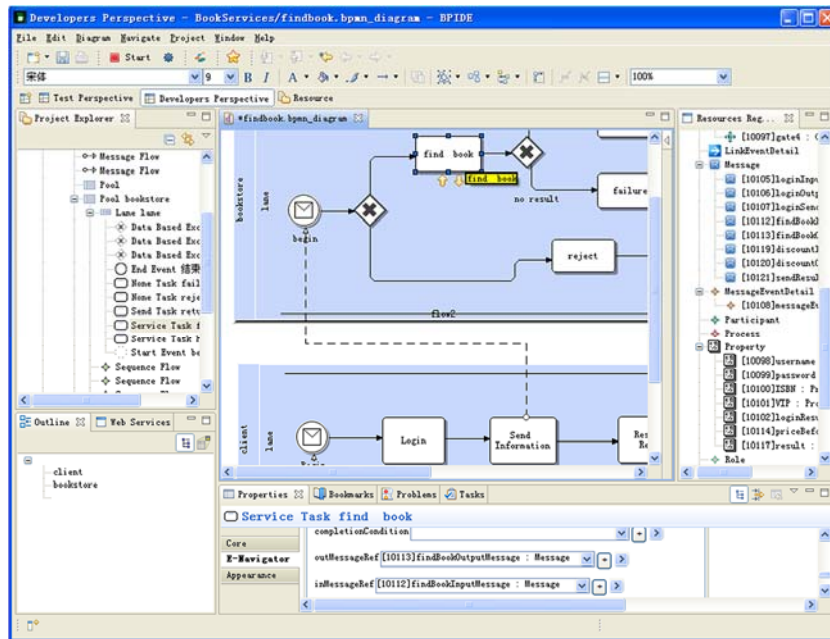
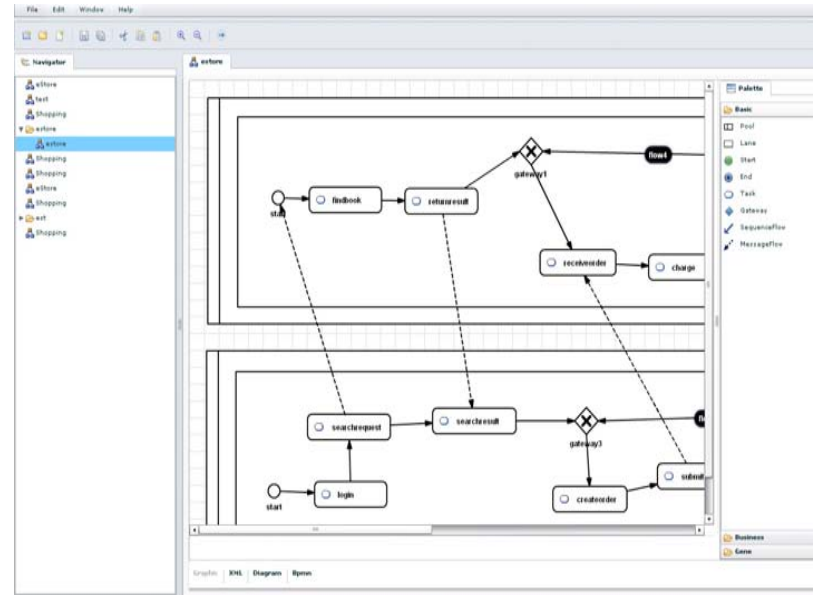
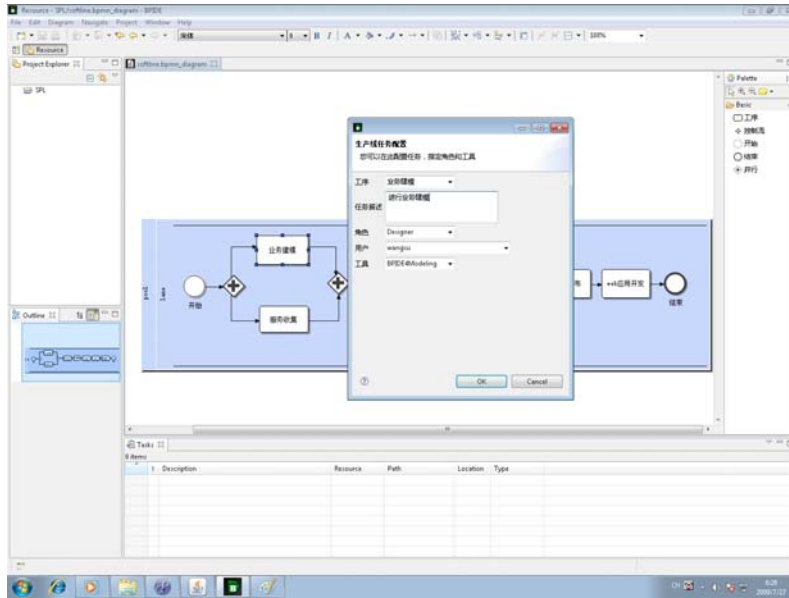


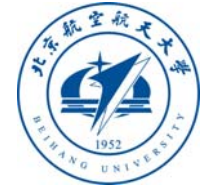


ServiceXchange

- A stable and simplified version of SOARBase
 - ◆ www.servicexchange.cn
 - ◆ Not including business process resource management



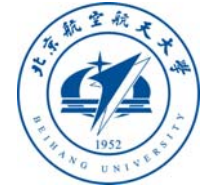




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Reflections- many development supporting software involved



■ Tools

- ◆ Business process modeler
- ◆ Service composition tool
- ◆ Verification and test tool
- ◆ Service deployment tool
- ◆ Monitoring tool

■ Middleware

- ◆ Service container
- ◆ Composite service execution engine (workflow engine)
- ◆ Service bus



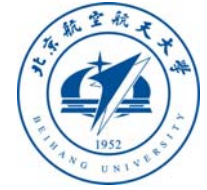
Problems

- The extra work for developers
 - ◆ Install and configure various development tools
 - ◆ Install and configure runtime supporting middleware
 - ◆ Obtain and maintain underlying resources
 - ▶ **Machines**
 - ▶ **Networks**
- However they should focus on “development”.



Our goal

- Building a cloud platform for service oriented software development
 - ◆ Instant development without installing tools
 - ◆ Instant deployment without installing middleware
 - ◆ Instant running without knowing the underlying resources



Moving towards a cloud platform

- Online application development: **SaaS**
 - ◆ Browser-based IDE
 - ◆ Business process centric development
 - ◆ Online sharing of software services
- Transparent deployment and running: **PaaS**
 - ◆ Similar to Google AppEngine, etc.

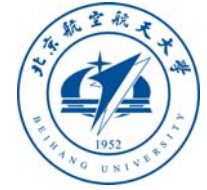




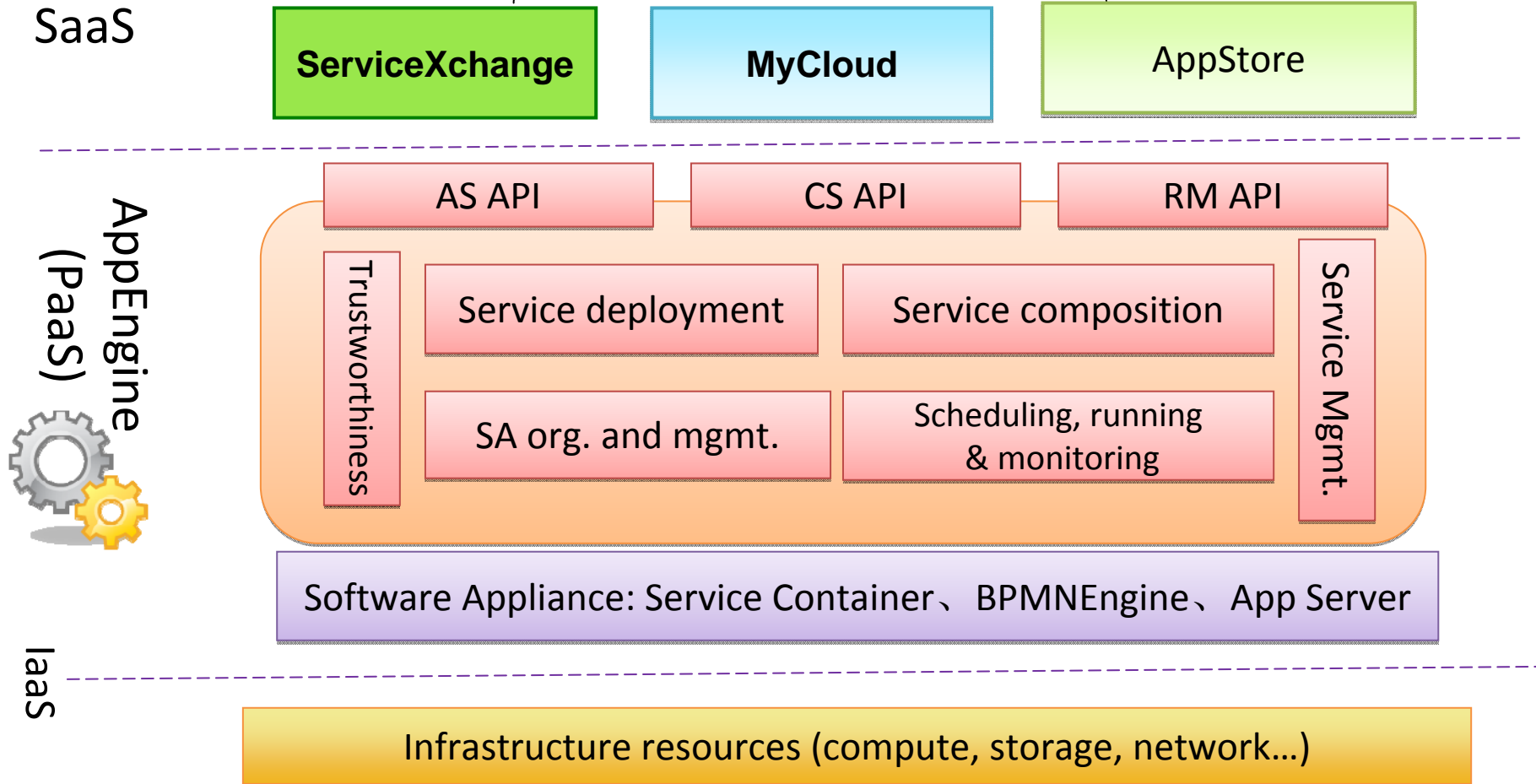
Some key issues

- On-demand hosting environment provisioning
- Load balancing
 - ◆ Clusters of service containers
- Fault tolerance and recovery
 - ◆ Service replication
- Security by separation
 - ◆ Service → runtime middleware
 - ◆ Service → Service

SCP: Service Cloud Platform



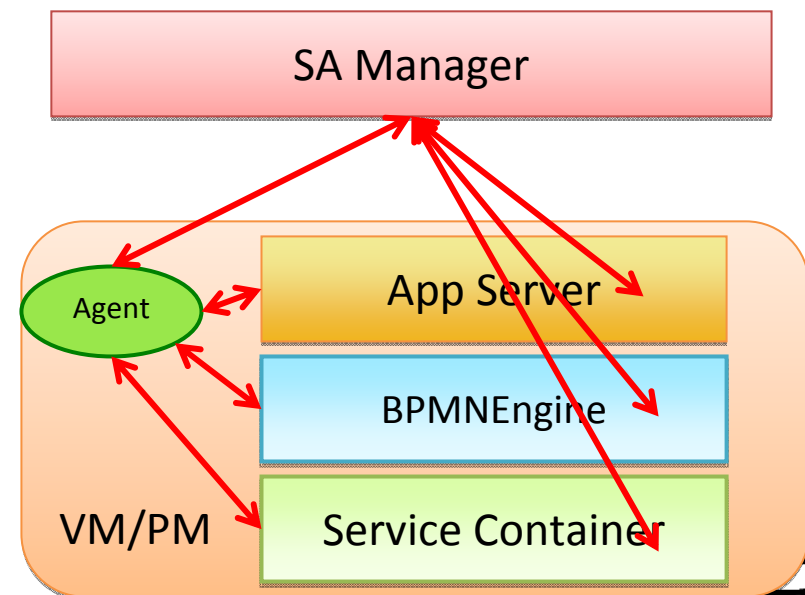
Online development



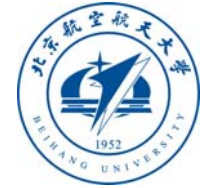
Software appliance provisioning



- Software appliance=VM/PM+ middleware
 - ◆ Dynamic provisioning
 - ◆ Manageability
- Functions
 - ◆ Dynamic deployment/un-deployment of SAs
 - ◆ Lifecycle management
 - ◆ Monitoring
 - ◆ Logging



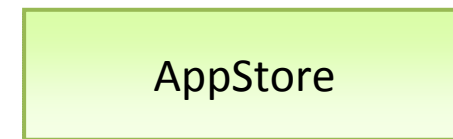
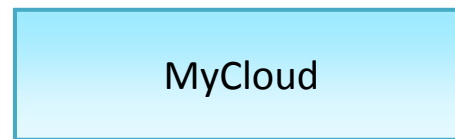
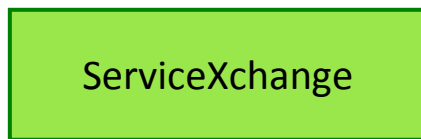
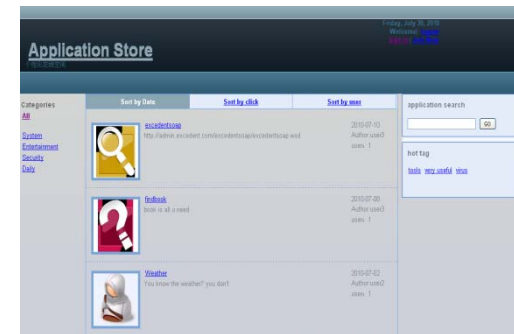
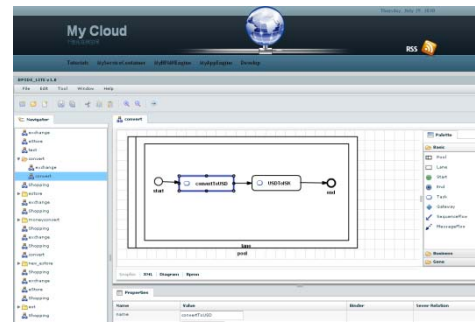
AppEngine and SaaS tools



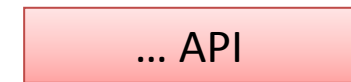
Online development

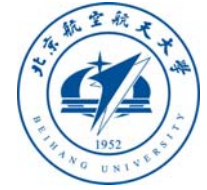
Online App Access

SaaS

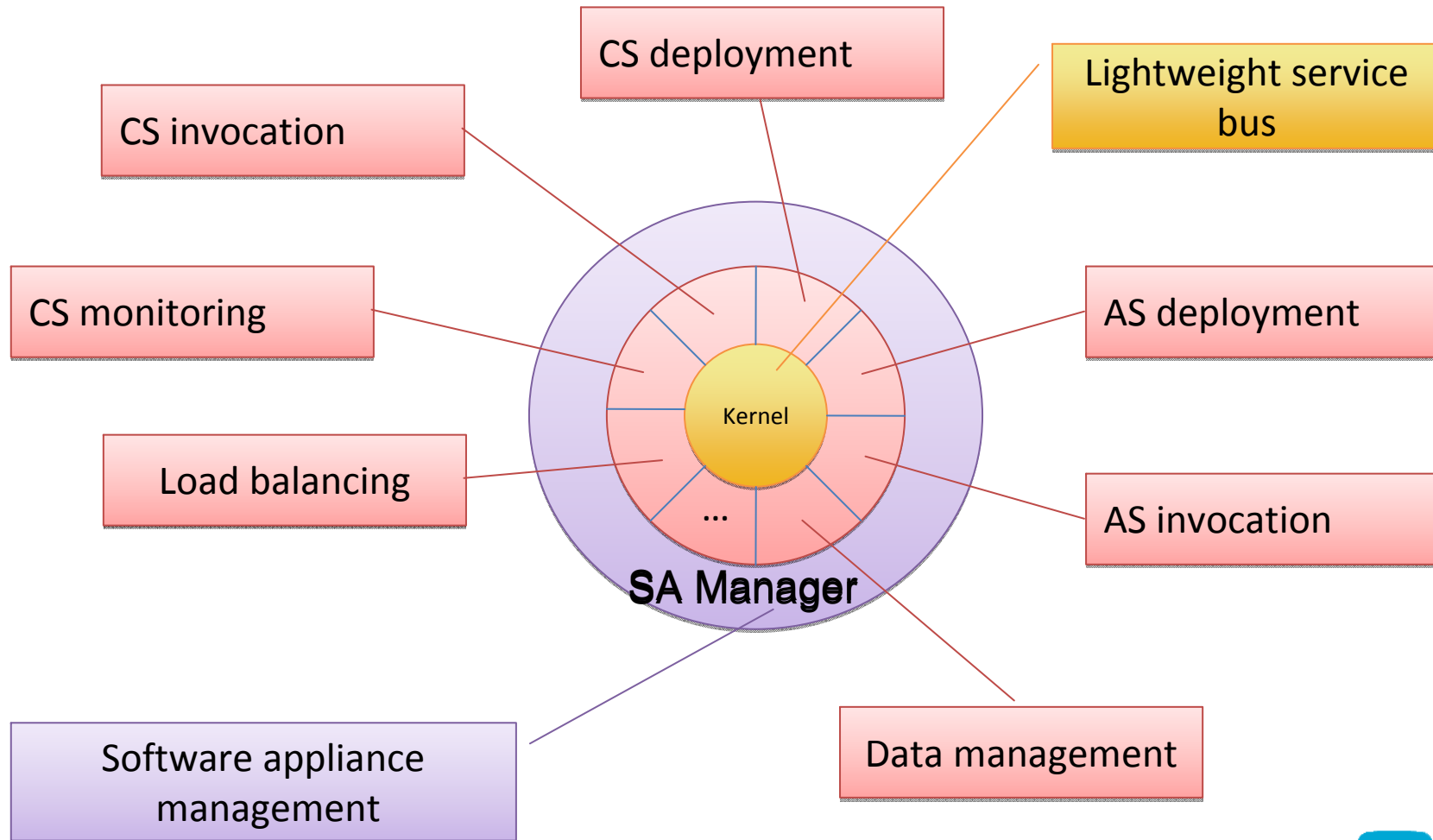


AppEngine
(Paas)





App Engine: hosting environment



MyCloud

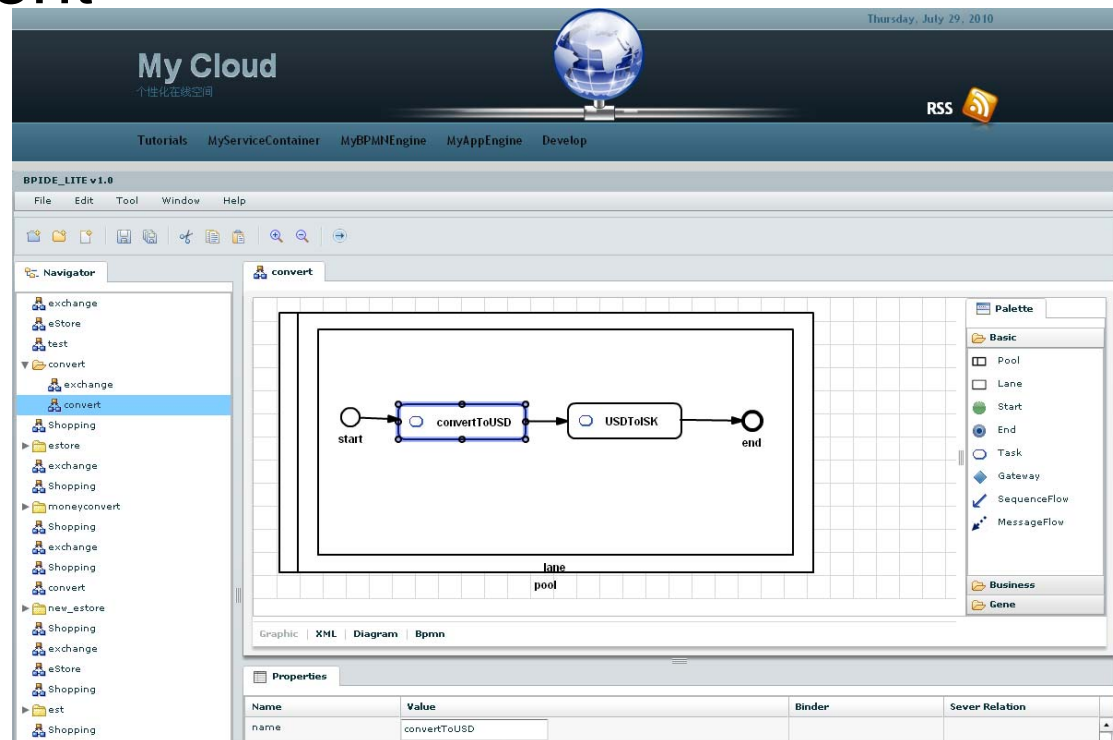


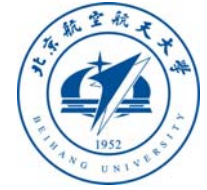
- Personalized development environment
 - ◆ Service subscription
 - ◆ App development tools
 - Instant development tools: BPIDELite- a light-weight BPMN editor and service composition tool suite.
 - Instant deployment interface
 - ◆ Instant running-Virtual runtime environment
 - MyServiceContainer
 - MyBPMNEngine
 - Online monitoring tool



BPIDELite

- Flex-based development toolset
 - ◆ BPMN-based business process modeling
 - ◆ Service orchestration
 - ◆ Instant deployment





MyServiceContainer

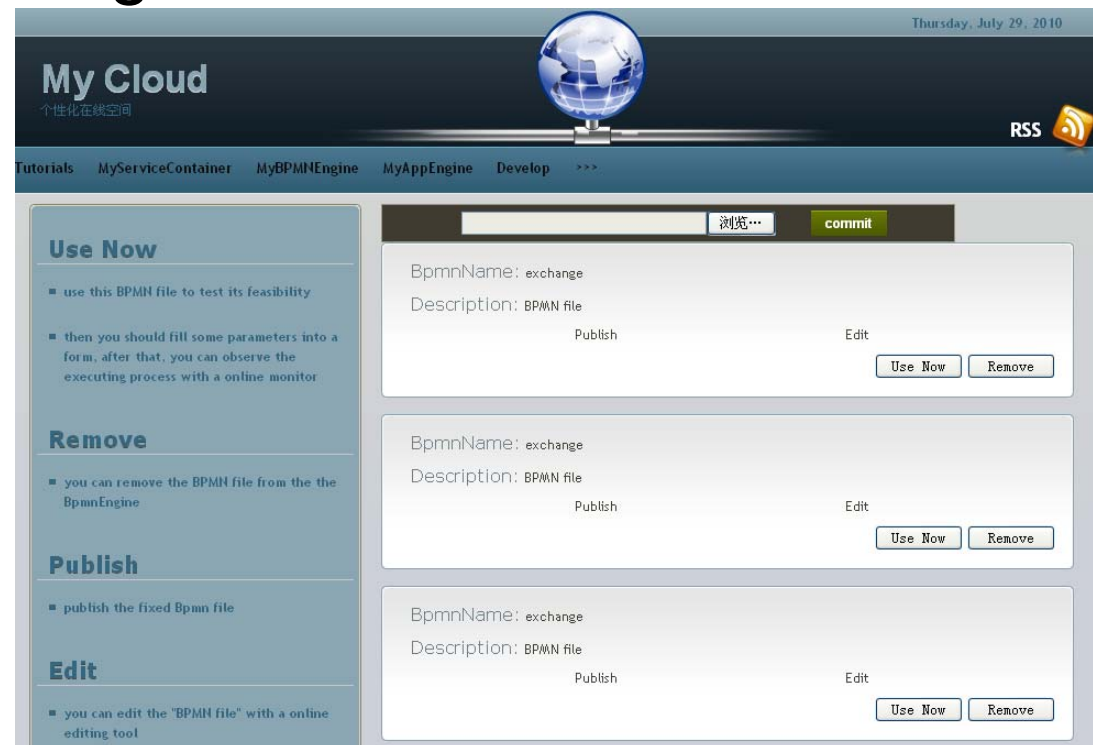
- Virtual service container
 - ◆ Service deployment/un-deployment
 - ◆ WSDL file browsing
 - ◆ Service invocation

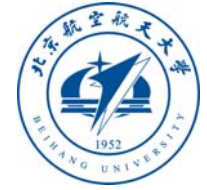
The screenshot displays the 'My Cloud' web application interface. At the top, there is a navigation bar with the date 'Thursday, July 29, 2010' and an RSS icon. Below the navigation bar, there are tabs for 'Tutorials', 'MyServiceContainer', 'MyBPMEngine', 'MyAppEngine', and 'Develop'. The main content area is divided into two columns. The left column contains three sections: 'Invoke' with instructions on how to use the service, 'Remove' with instructions on how to remove a service, and 'Definition' with instructions on how to view WSDL file details. The right column features a search bar with a '浏览...' button and a 'commit' button. Below the search bar, there are three service entries, each with a 'Service Name', 'Description', and 'WSDL file' field, and 'Invoke' and 'Remove' buttons.



MyBPMNEngine

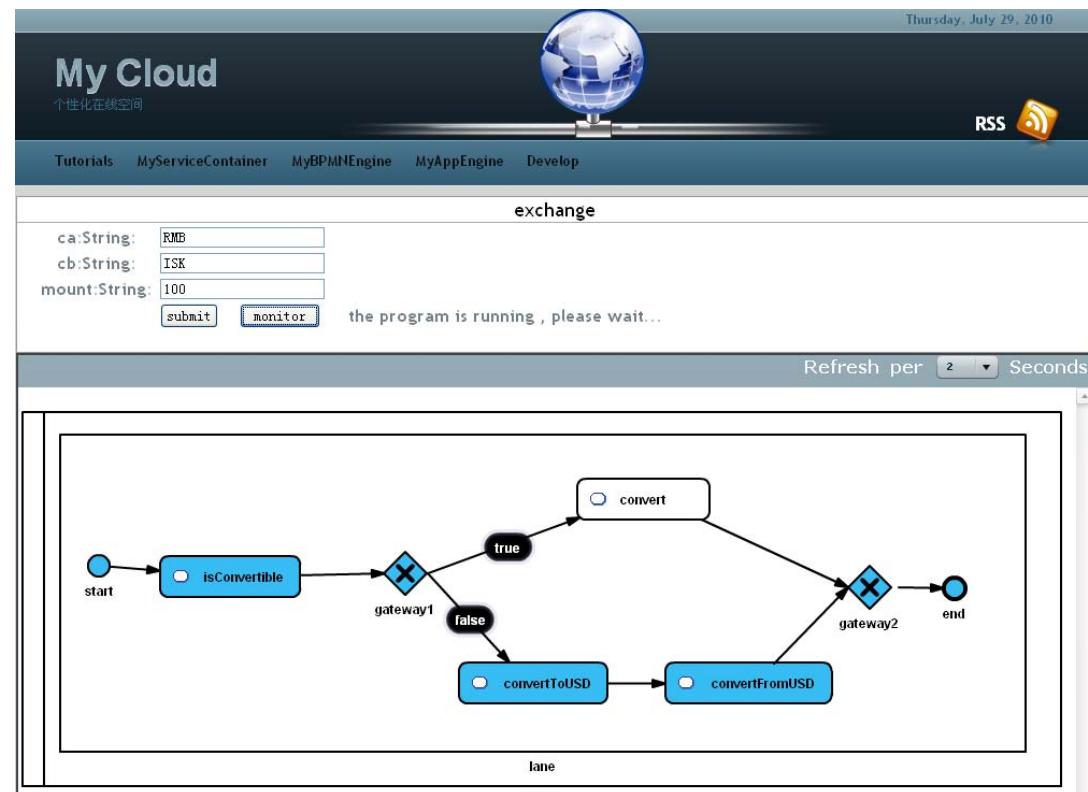
- Virtual composite service execution engine
 - ◆ BPMN compliant
 - ◆ CS deployment
 - ◆ BPMN model browsing
 - ◆ Service invocation

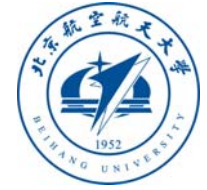




Online monitoring

- Flex-based composite service monitoring
 - ◆ Instance state
 - ◆ Intermediate state (similar to debugging)





App Store




■ Application management

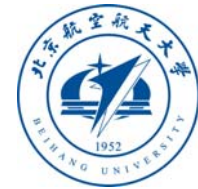
- ◆ App publishing
- ◆ App categorizing
- ◆ App search

Friday, July 30, 2010
Welcome! [logout](#)
[Sign In](#) | [User View](#)

Application Store

个性化在线空间

Categories	Sort by Date	Sort by click	Sort by user	application search
All System Entertainment Security Daily	 excedentsoap http://admin.excedent.com/excedentsoap/excedentsoap.wsd		2010-07-10 Author:user3 user: 1	<input type="text"/> <input type="button" value="GO"/>
	 findbook book is all u need		2010-07-08 Author:user3 user: 1	hot tag tools very useful virus
	 Weather You know the weather? you don't		2010-07-02 Author:user2 user: 1	



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Solution: iVIC – Towards Resource & Software Virtualization



■ iVIC

- ◆ The Internet-oriented Virtual Computing Infrastructure
- ◆ Towards resource virtualization

■ Design Goals (**)

- ◆ Support resource allocation based on VM instances
 - ➔ To provide another software encapsulate method
 - **Image creation, dissemination and optimization**
 - **Container for VM Images: Load VM images dynamically**
 - ➔ To provide internet-scale resource allocation and adaption
 - **Wide-Area Network VM Migration**
- ◆ Support the network application virtualization
 - ➔ **Linking virtual machine instances via virtual network overlays**

Solution: iVIC – Towards Resource & Software Virtualization



■ iVIC

- ◆ The Internet-oriented Virtual Computing Infrastructure
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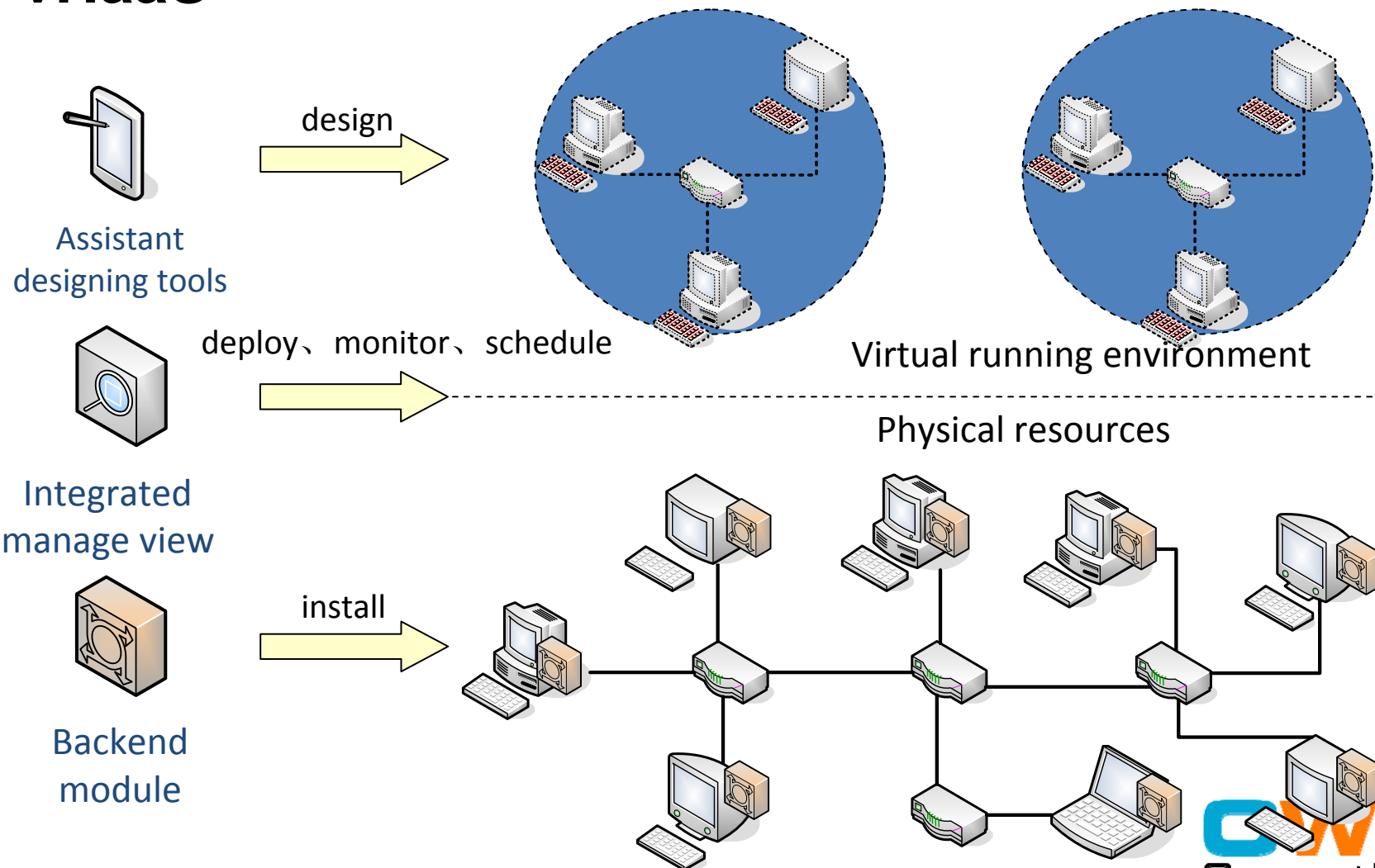
vHaaS: virtualized Hardware as a Service

◆ Wide-Area Network VM Migration

vSaaS: virtualized Software as a Service

iVIC: Towards Resource Virtualization

1. vHaaS



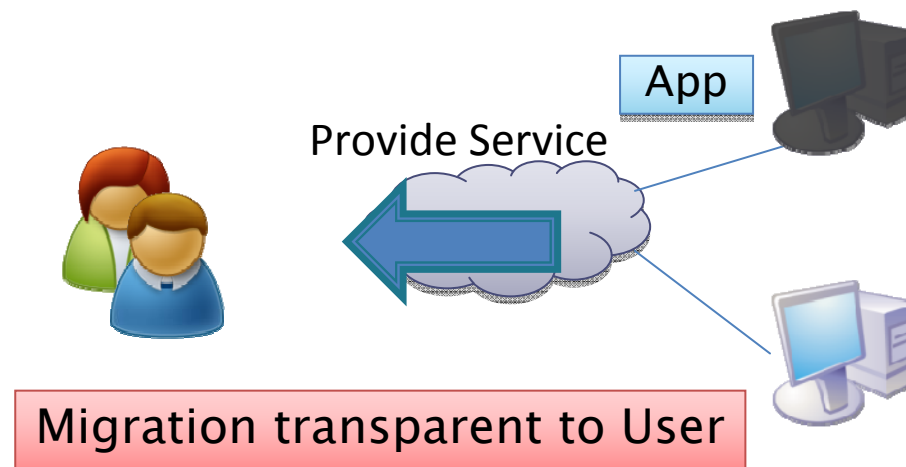
VM Migration over WAN

■ Motivation

- ◆ To support wide-area resource sharing, like department, organization, city, or anything bigger than an office
- ◆ underlying resource may not be in the same LAN (link, subnet)

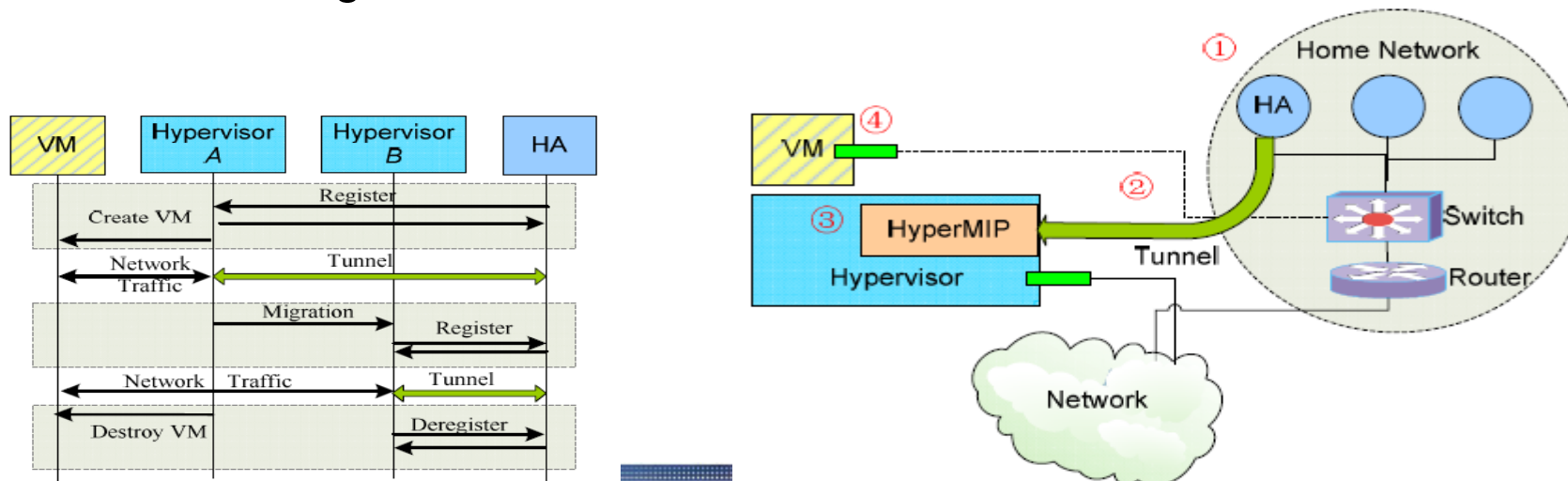
■ Current VM technology lacks in support of WAN Migration

- ◆ Network Problem: VM's IP address will be unavailable to other Internet host
- ◆ Storage Problem: Hosts must share a network storage, which is inefficient for WAN hosts

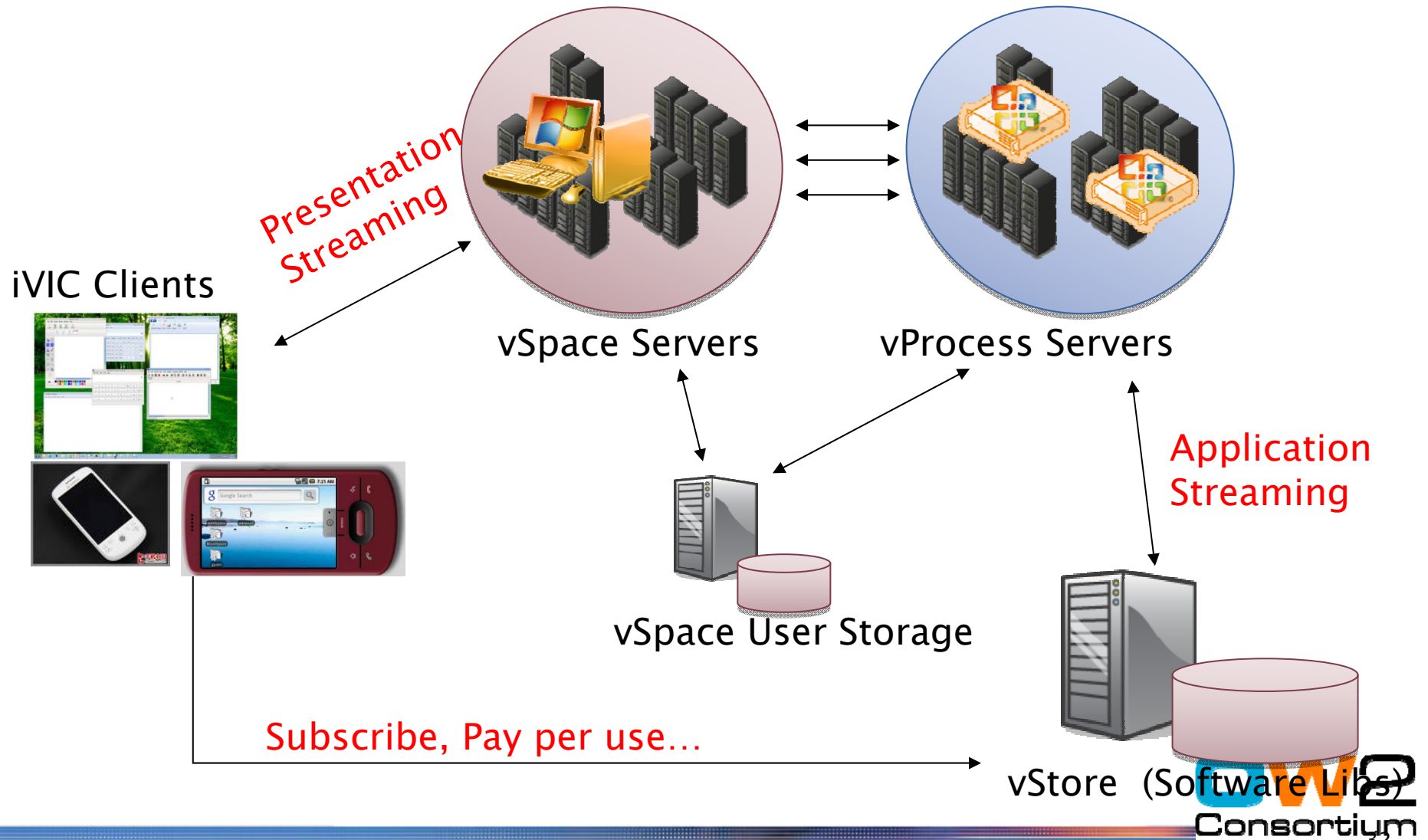


VM Network Migration HyperMIP

- Similar problem with Mobile IP
 - ◆ Mobile IP deals with actual physical device movement
 - ◆ VM migration only involve with runtime-state movement
- Our solution: Hypervisor Controlled Mobile IP
 - ◆ HyperMIP: Hypervisor Controlled Mobile IP
 - ➔ **Combine Proxy-mode mobile-ip stack with hosts VM Migration:**
 - ◆ VM does not need to install Mobile IP stack
 - ◆ VMMs manage Network restoration for VM



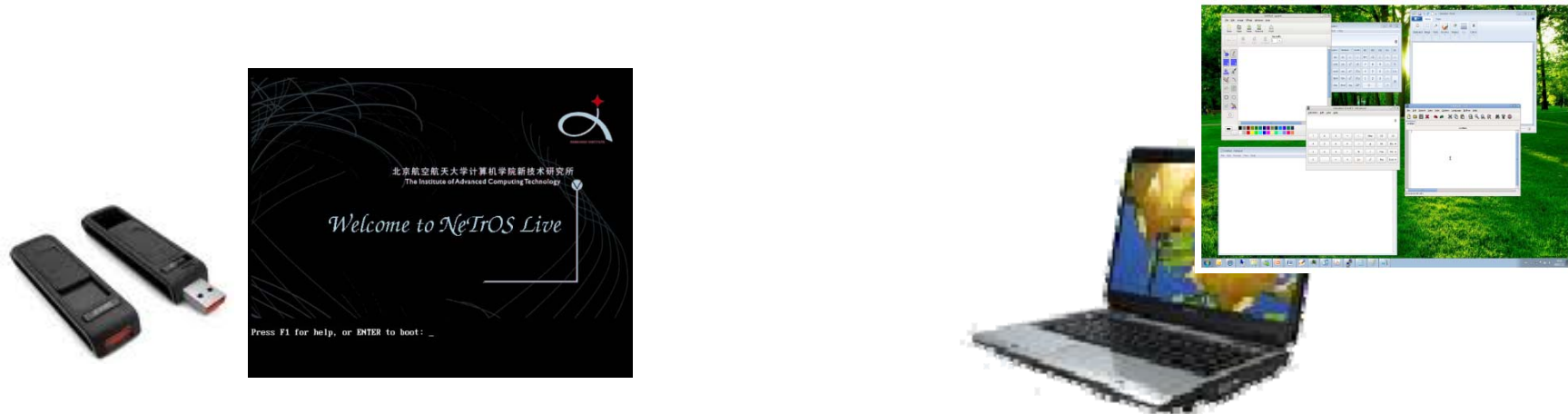
Virtualized SaaS



Linking to iVIC vSaaS

■ From you laptop

- ◆ By using browser with iVIC Client Plugins.



- ◆ By plug a **USB Flash Disk** into any computer.

■ From you mobile phone

- ◆ By install an **iVIC Mobile Client**.



Summary of iVIC



■ iVIC Platform

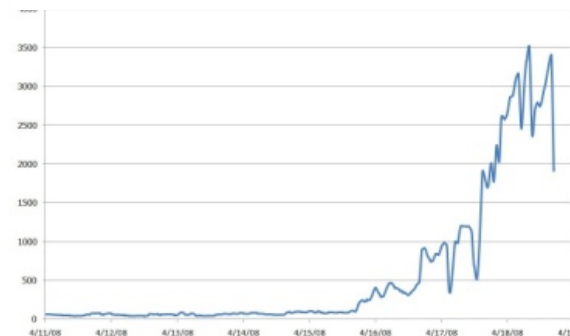
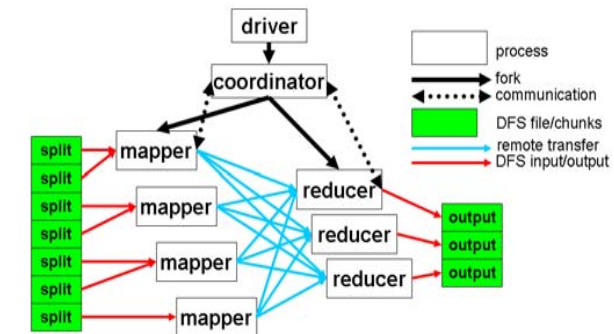
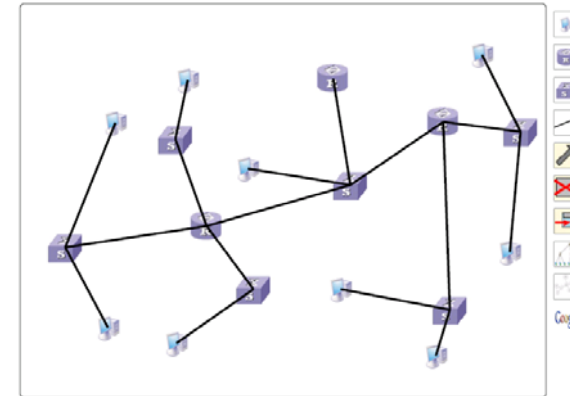
- ◆ Programmable virtual computing environment
- ◆ Low cost, high flexibility and reliability
- ◆ Virtualized Software as a Service

■ Key technologies

- ◆ VM Migration over WAN
- ◆ P2P based iVIC-VPN
- ◆ VM high availability
- ◆ Software streaming

■ Applications

- ◆ Software lab
- ◆ Massive data processing (MapReduce)
- ◆ HPC - vCluster
- ◆ High scalability web hosting

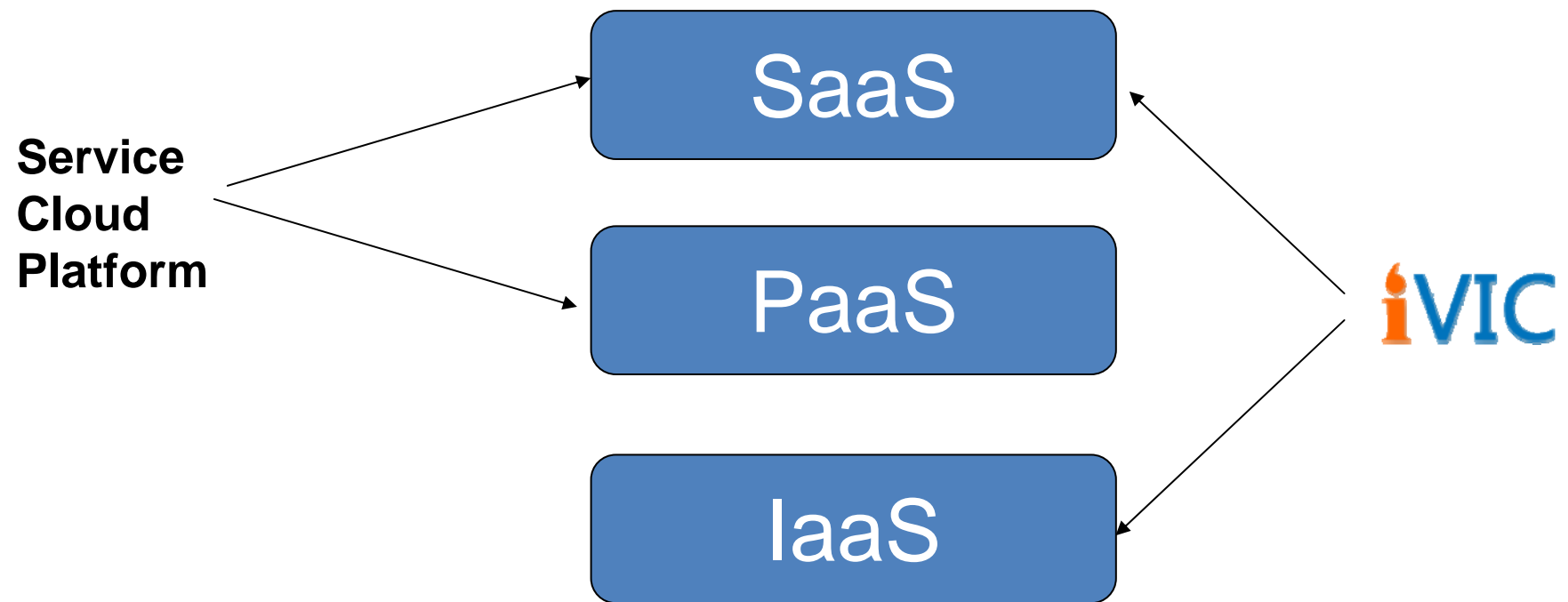




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Possible synergies with some OW2 project (1)

■ With JASMINe

- ◆ The OW2 JASMINe project aims to develop an administration tool dedicated to Java EE (Apache, JOnAS, EasyBeans, ...), MOM (JORAM, ...) or SOA distributed applications (**Orchestra, Bonita, Petals, ...**) in order to facilitate the job of the system administrator.
- ◆ JASMINe *Design, Deploy, Monitoring* and *Self-management* can be used to improve our service cloud platform



Possible synergies with some OW2 project (1)

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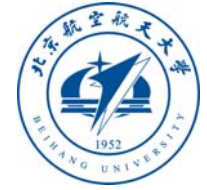
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- ◆ JASMINe *Design, Deploy, Monitoring* and *Self-management* can be used to improve our service cloud platform



Possible synergies with some OW2 project (2)

■ With JOnAS

- ◆ JOnAS is the basis of a more global middleware suite delivered within OW2. **It is the cornerstone of the Service Oriented Architecture**, which includes other famous OW2 projects like the workflow manager Bonita, the BPEL engine Orchestra or the portal eXo Platform.
- ◆ JOnAS provides runtime support for Java EE-based service applications
- ◆ We can adopt JOnAS clustering management and deployment technologies for services



Possible synergies with some OW2 project (3)

■ With ProActive

- ◆ ProActive features Java Parallel Programming seamlessly integrated with **Scheduling** and **Resource Management**. ProActive simplifies the programming and execution of parallel applications on Linux, Windows and Mac, together with the management of resources such as Desktop, Servers, Clusters, Enterprise GRIDs and Clouds.
- ◆ Our service cloud platform focuses on PaaS and SaaS layers, thus ProActive can be leveraged to facilitate infrastructural resource management.



Thank you!

Q&A