Grid Operational Supports for Middleware Deployment and User Administration

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Background

- Toward construction of a production level science grid, geographically distributed computational resources have to work in close cooperation with each other
- Organizations offering computational resources to the grid are independent of each other
- To do so, a grid middleware is needed
  - Grid middleware is a large software collection
  - It is hard to install and configure the middleware because administrators need much knowledge
  - There are several methods that make installation easier
  - Consistent configuration of middleware in multiple sites is still hard because administrators need to configure settings properly communicating with administrators in multiple site

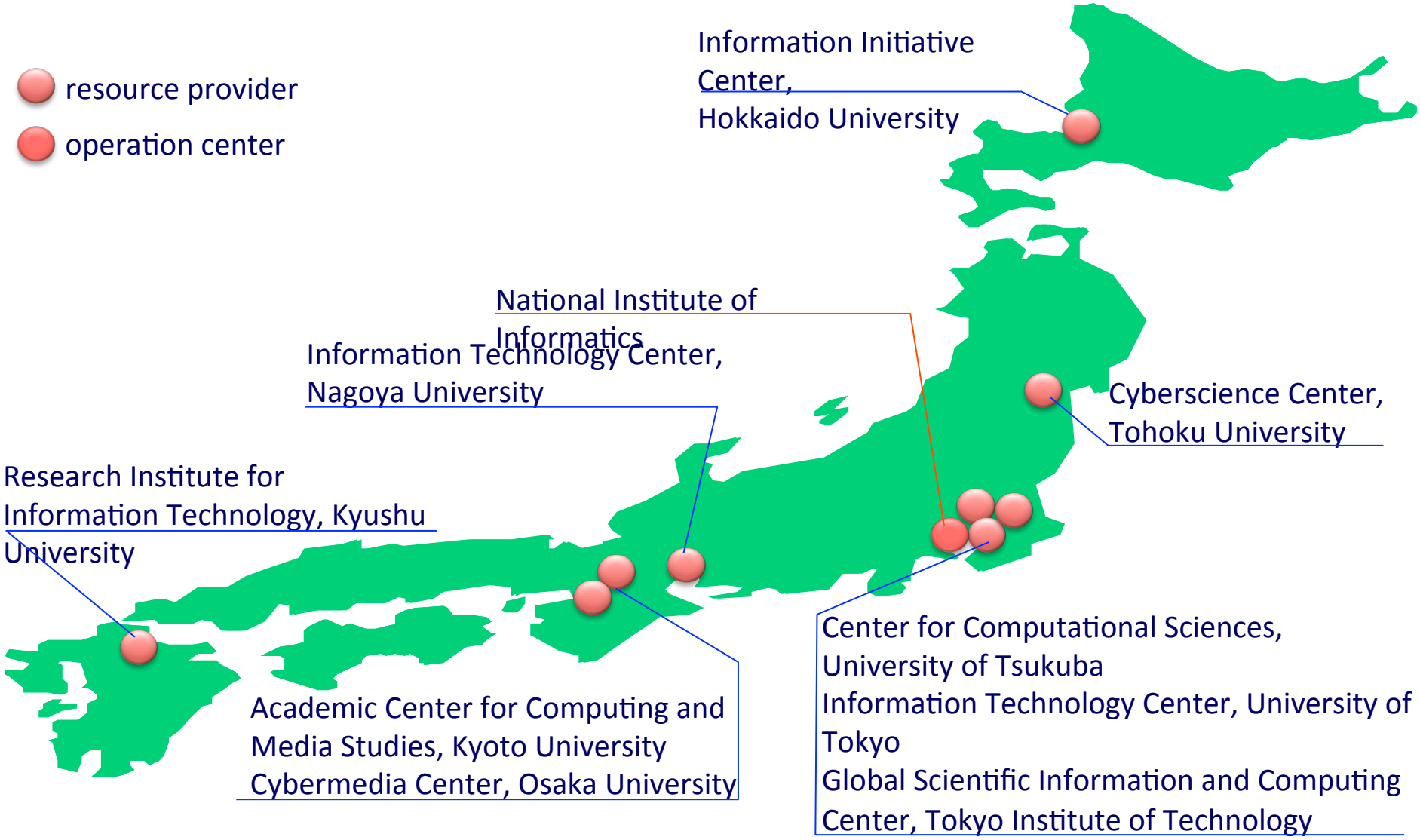
Background (cont'd)

- Each resource provider operates own computational resources under each operation policy
  - To use the resources, users must apply for an account at multiple site
  - Administrators must maintain mapping information between users' client certificates and local account in sites if GSI is adopted as security infrastructure
- To enable users to access the grid infrastructure, a systematic user administration for the grid infrastructure is needed

Inter-university Grid Infrastructure

- In case of Japan…
- An inter-university grid infrastructure is organized by
  - supercomputer centers in 9 universities
  - an operation center in National Institute of Informatics (NII)
- NAREGI Middleware was adopted to operate the inter-university grid infrastructure

Resource Providers



Computer Systems

Site	Hardware	#cores*	Memory[GB]**	#nodes
Hokkaido U.	DELL PowerEdge R200			
	Hitachi HA8000/110W	2	2/4	27
Tohoku U.	NEC SX-9	16	1000	4
U. Tsukuba	Appro XtremeServer-X3	16	32	4
U. Tokyo	Hitachi HA8000-tc/RS425	16	32	4
Tokyo Tech.	HP ProLiant SL390s	12	54/96	375
Nagoya U.	Fujitsu PRIMERGY RX200	2	2	6
	Fujitsu HX600	16	64	16
Kyoto U.	Fujitsu HX600	16	32	4
Osaka U.	NEC SX-8R	8	64/256	8
	NEC SX-9	16	1000	32
	NEC Express5800/120Rg-1	4	16	12
Kyushu U.	Fujitsu PRIMERGY RX200S3	4	8	12

#cores* = #cores/node, Memory[GB]** = Memory[GB]/node

Grid Middleware

– developed by the Center for Grid Research and Development, NII

– uses GSI and VOMS

– developed by the Cyber Science Infrastructure

• computing services

– control nodes (operated in OC)

• grid service (security, job brokering, information service, portal, …)

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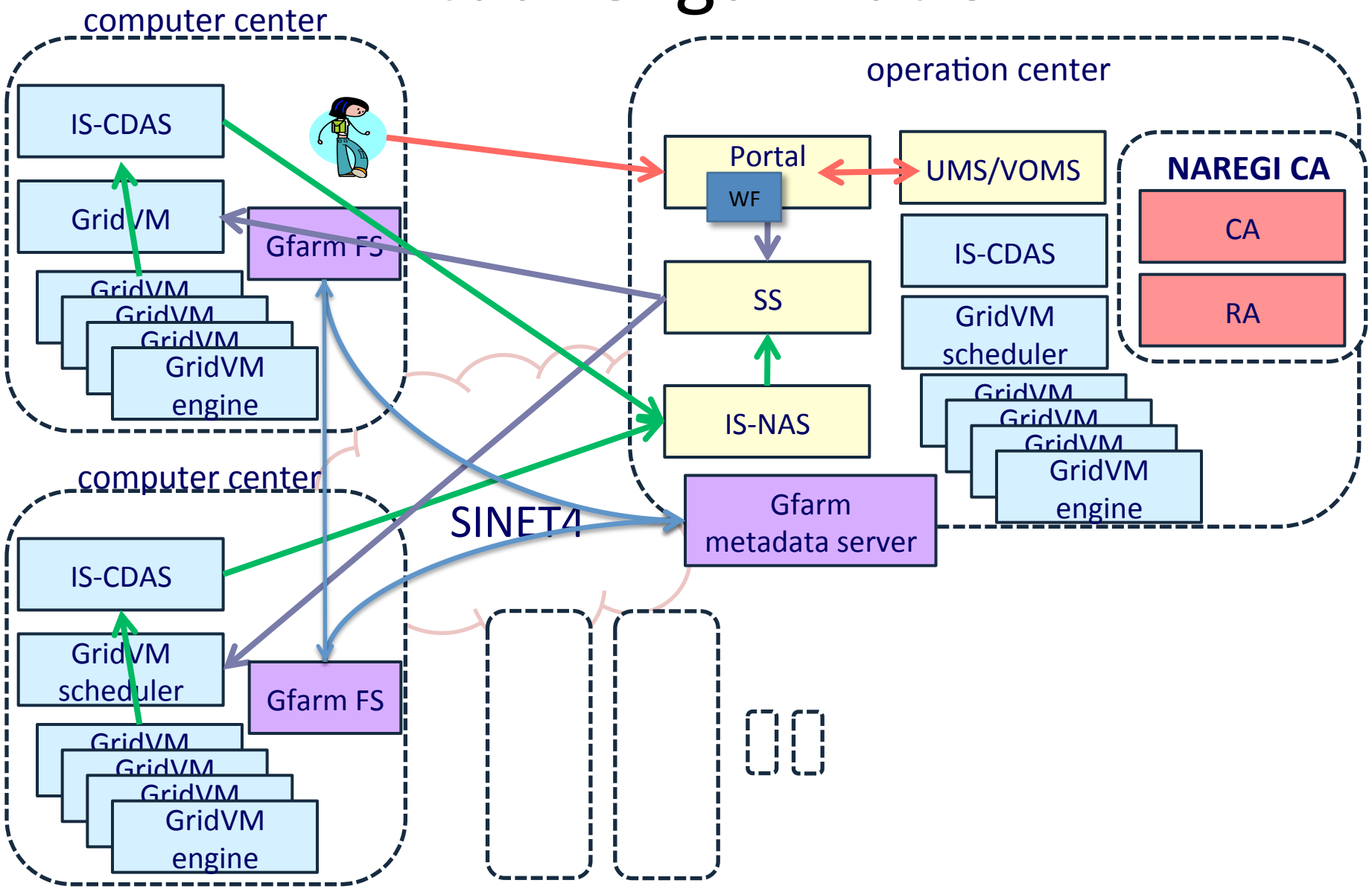
Virtual Organization



Target Problems

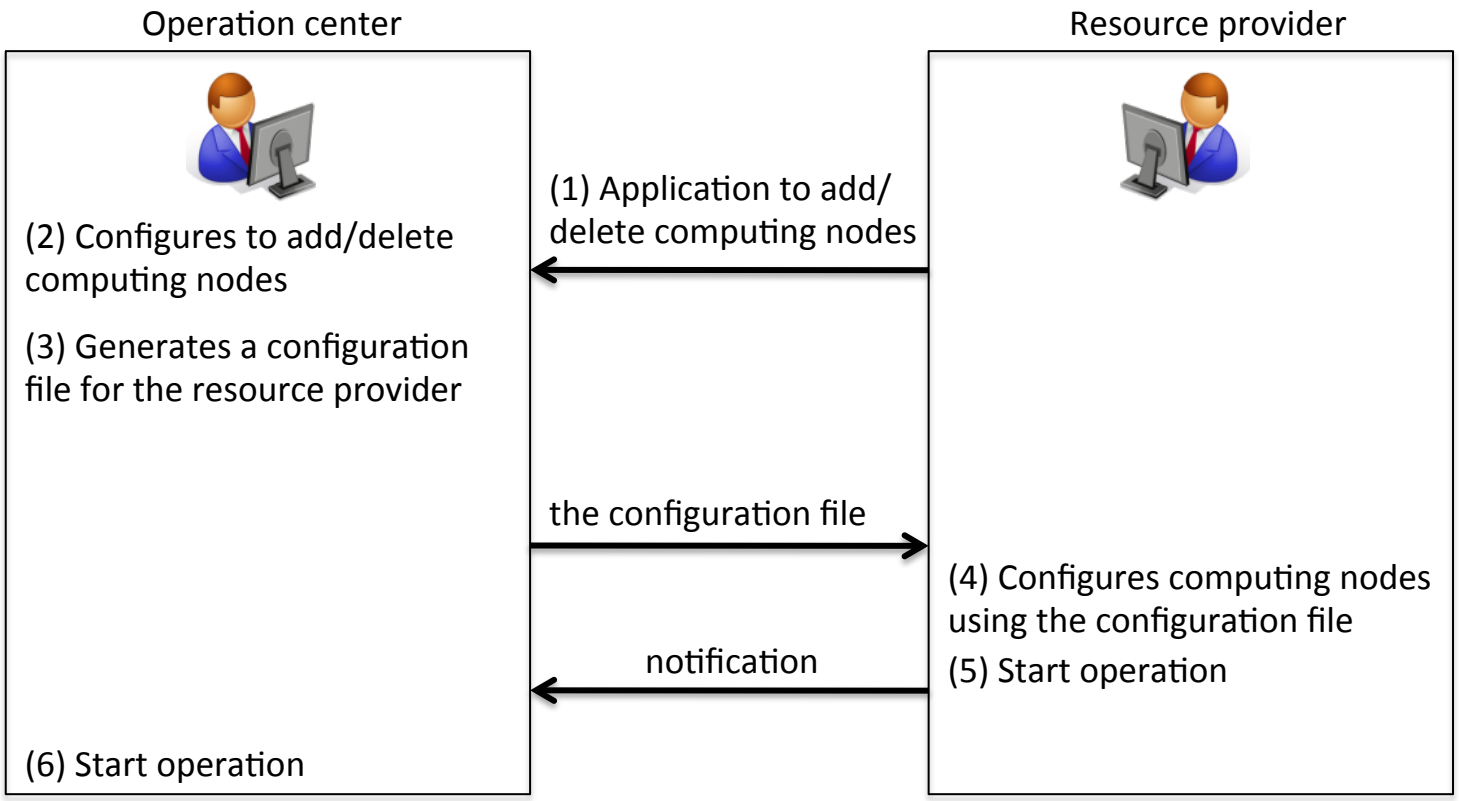
- Deployment of grid middleware
  - installation
    - must be done easily
  - configuration
    - must be done correctly and effectively
- User administration
  - applying for accounts at multiple sites
  - obtaining grid user certificate
  - creating grid-mapfile at each site

Deployment of Grid Middleware

- We need to deploy suitable components of the NAREGI middleware to both resource providers and the operation center
- We developed installation tools to deploy the NAREGI middleware
  - The installation tools enable administrators of both resource providers and the operation center to install suitable components in their sites

Configuration Procedure

- In deployment using our tools, a configuration procedure will be done as follows



Remarkable Points in Deployment

- The installation tools make configuration procedures easier by concentrating necessary information on single configuration file
- What administrators in resource provider have to know is
  - simple information of grid component configuration
    - This node is a GridVM component, …
  - basic information about computing nodes that administrators manage daily
- No deep knowledge of grid middleware is needed

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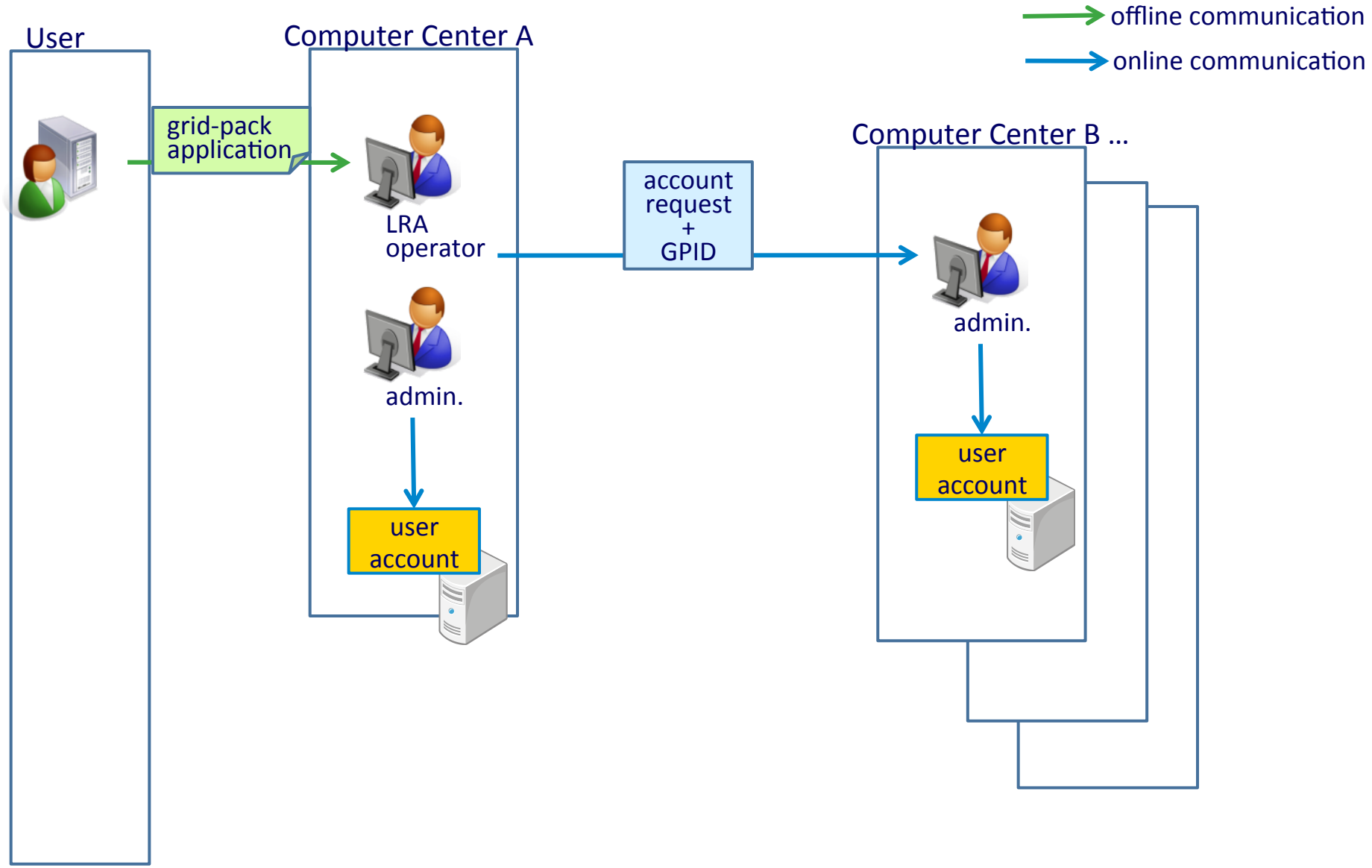
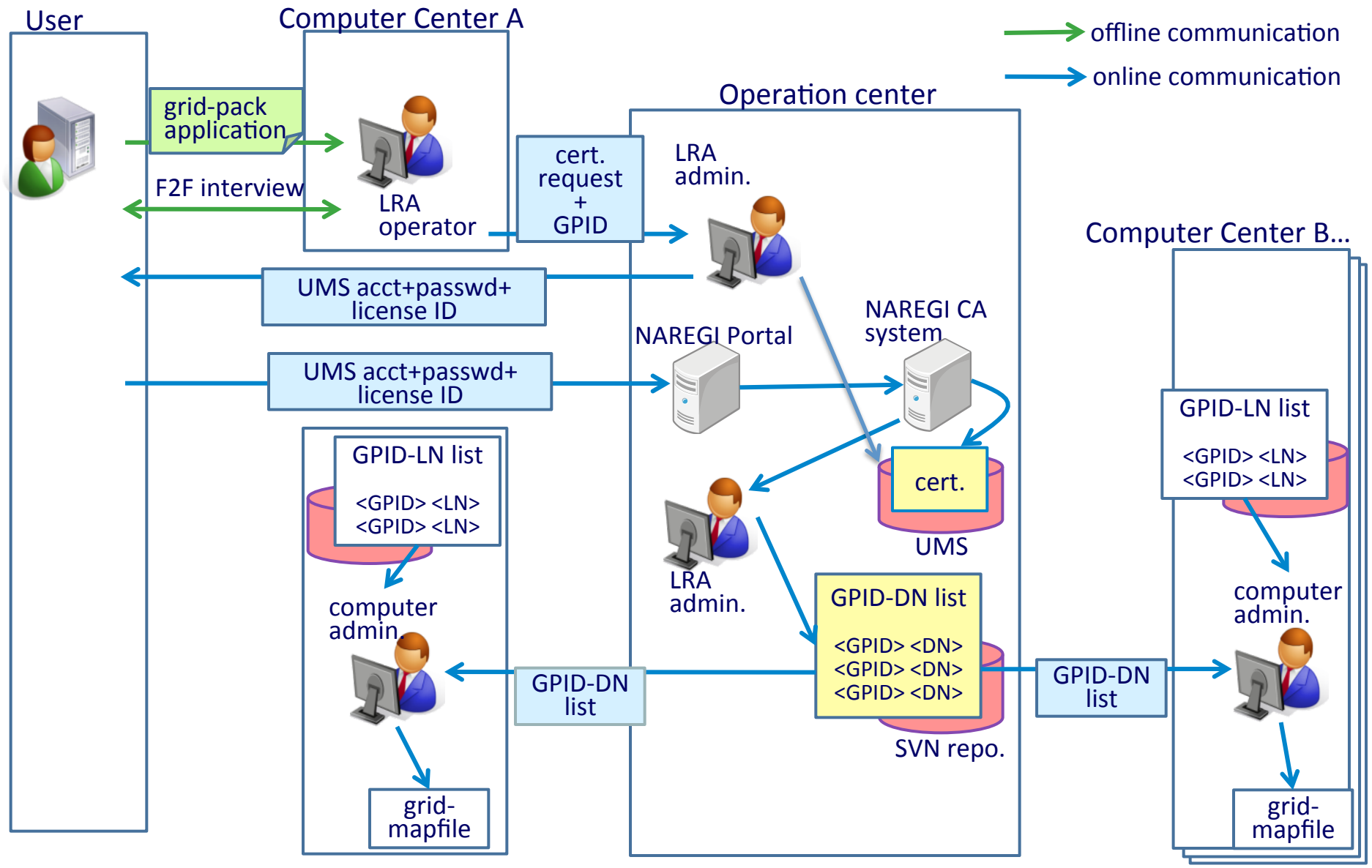
Grid-Pack

- We established an application system, called “Grid-Pack”, solving the problems
- Concept of Grid-Pack
  - User applies for account at only one resource provider (Grid-Pack application)
  - Grid-Pack application = account & certificate requests
  - Proxy application procedure to create an account on another resource provider
  - RA operation on each resource provider (LRA) following the Authentication Profile for Classic X.509 PKI
  - semi-automatic generation mechanism of grid-mapfile at each site

Registration of User Account



mapfile


User
Computer Center A
offline communication
online communication
Operation center
grid-pack application
F2F interview
LRA operator
cert. request + GPID
LRA admin.
UMS acct+passwd+ license ID
NAREGI CA system
NAREGI Portal
UMS acct+passwd+ license ID
Computer Center B...
GPID-LN list
<GPID> <LN>
<GPID> <LN>
cert.
UMS
LRA admin.
GPID-DN list
<GPID> <DN>
<GPID> <DN>
<GPID> <DN>
SVN repo.
computer admin.
GPID-DN list
GPID-DN list
computer admin.
grid-mapfile
grid-mapfile

Problem in Grid-Pack

-
  - The operation center notifies users of LicenseID.
    - sends users an email attached an encrypted archive including UMS account, password and LicenseID.
    - notifies users of the password of the encrypted archive by telephone.
- User identification with F2F interview
- With drastic increase of the number of user at be bottle-neck of the procedure.
- How do we ease heavy duties in the operation?

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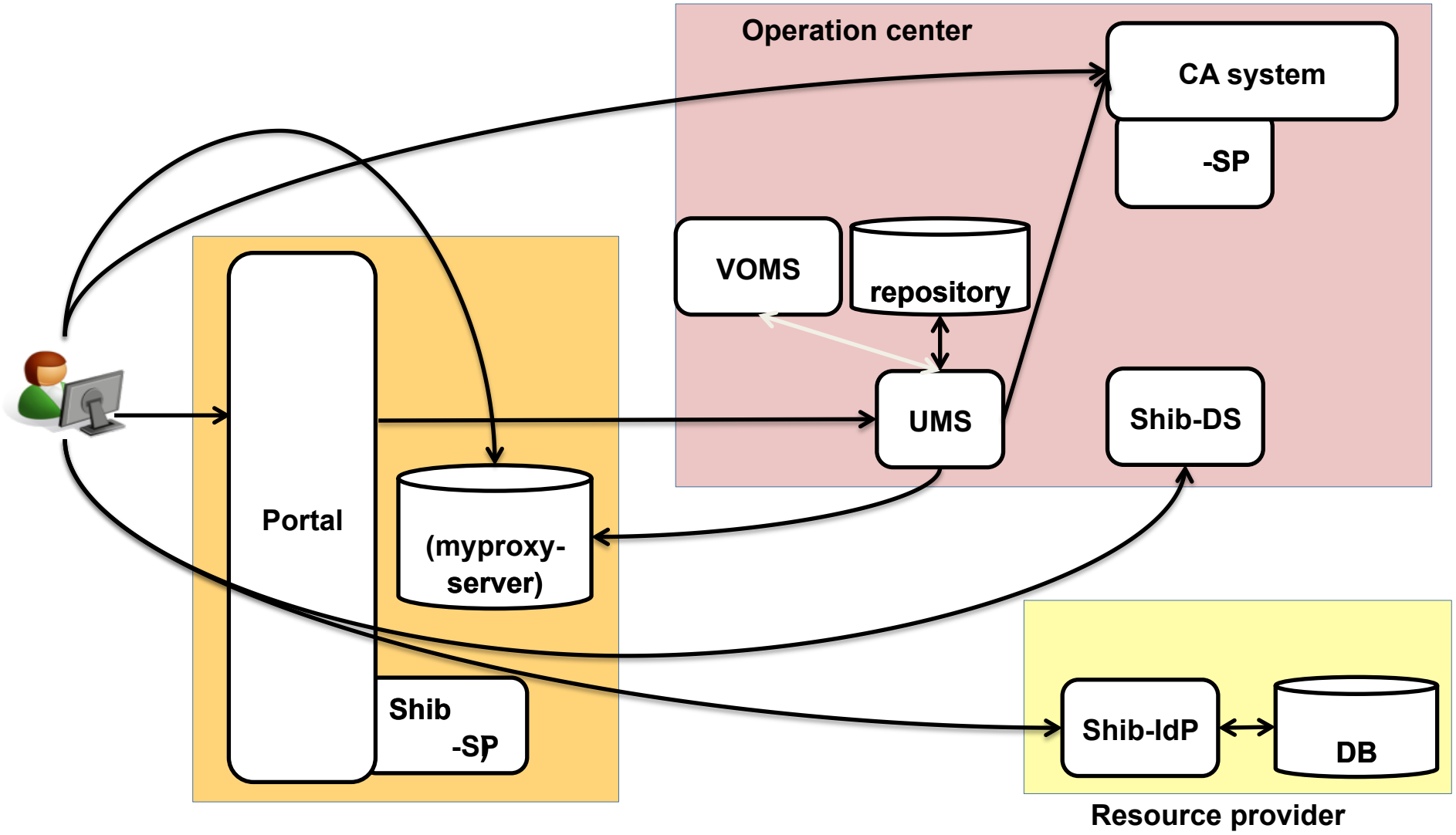
Federated Authentication System with Shibboleth

LicenseID

- Grid Portal: Service Provider
- operations on UMS
  - storing user certificate
  - LicenseID
- Grid Portal: Service Provider
  - operations on UMS
    - creating user account
    - storing user certificate

Shibboleth


Operation center
CA system
-SP
VOMS
repository
UMS
Shib-DS
Portal
(myproxy-
server)
Shib
-SP
Shib-IdP
DB
Resource provider

Summary

- We mentioned our experience of grid operational supports in the inter-university grid infrastructure focusing on the grid middleware deployment and the user administration
- The grid middleware installation tools enable administrators in resource provider to install and configure grid middleware without detailed knowledge of the middleware
- The user administration tools offer users to apply accounts to use the grid infrastructure in easy way and help administrators to register user accounts and maintain grid-mapfiles in multiple resource providers

Future Plan

- We plan to extend the testbed for the authentication system using GSI and Shibboleth in order to start operation among 9 resource providers
- The goal is to start the production level operation of the user administration in FY2011