Introduction of NAREGI-PSE implementation of ACS and Replication feature

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NAREGI-PSE Group

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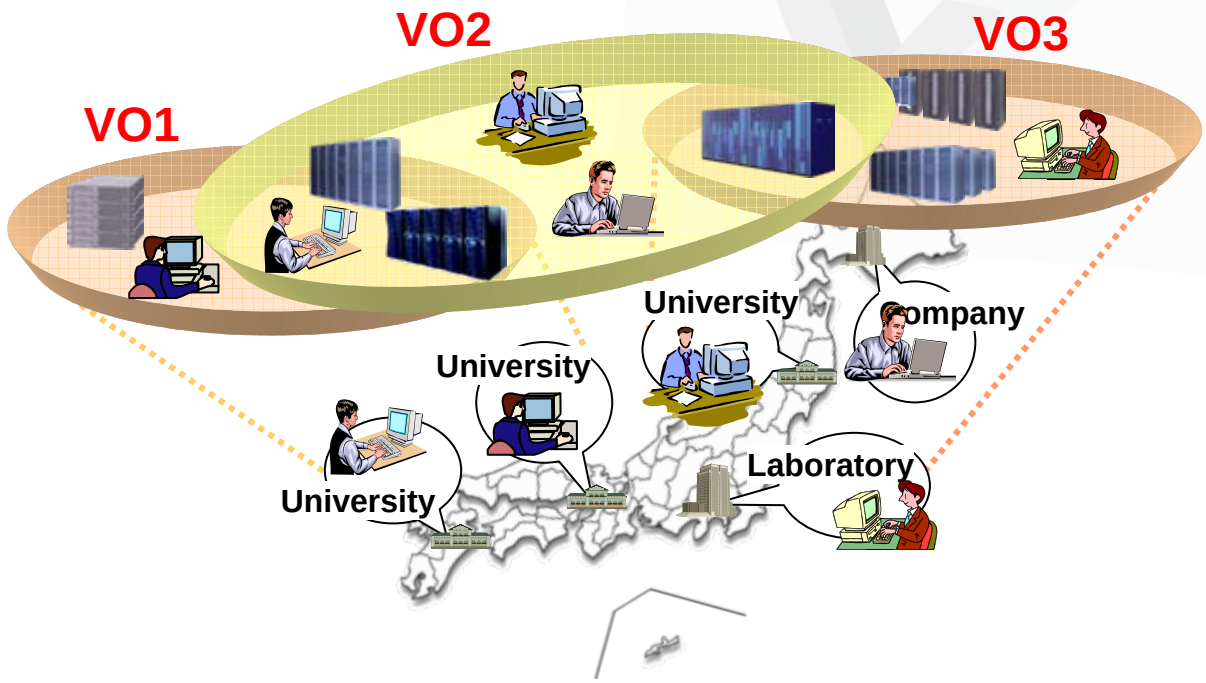
National Research Grid Initiative (NAREGI)

- A five-year R&D project started in fiscal 2003.

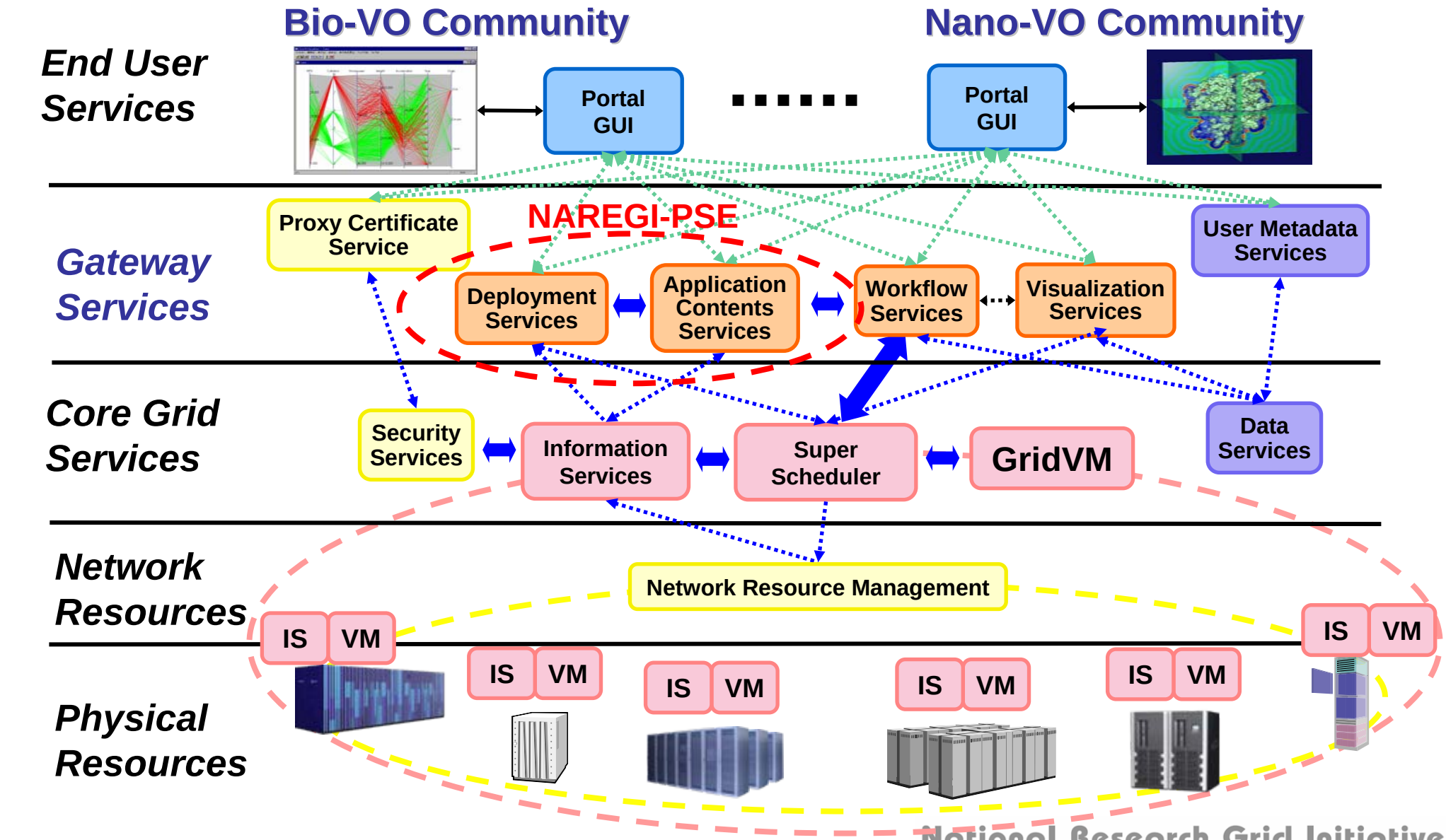
  => Next Generation Supercomputer Development Project
- Funded by Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT).
- The objective of the project is to develop grid middleware for large-scale, widely-distributed computing environments (science grid) in advanced research and education.
- The project is advancing on two fronts
  - with middleware R&D at the National Institute of Informatics (NII)
  - and grid-middleware research verification using nanotechnology at the Institute of Molecular Science (IMS).
- More Information, see http://www.naregi.org/index_e.html

Focus on Large-Scale Science Grid

- Cyber Science Infrastructure
- Collaboration
  - Virtual Organization (VO) on the Grid
- Applications
- Resources

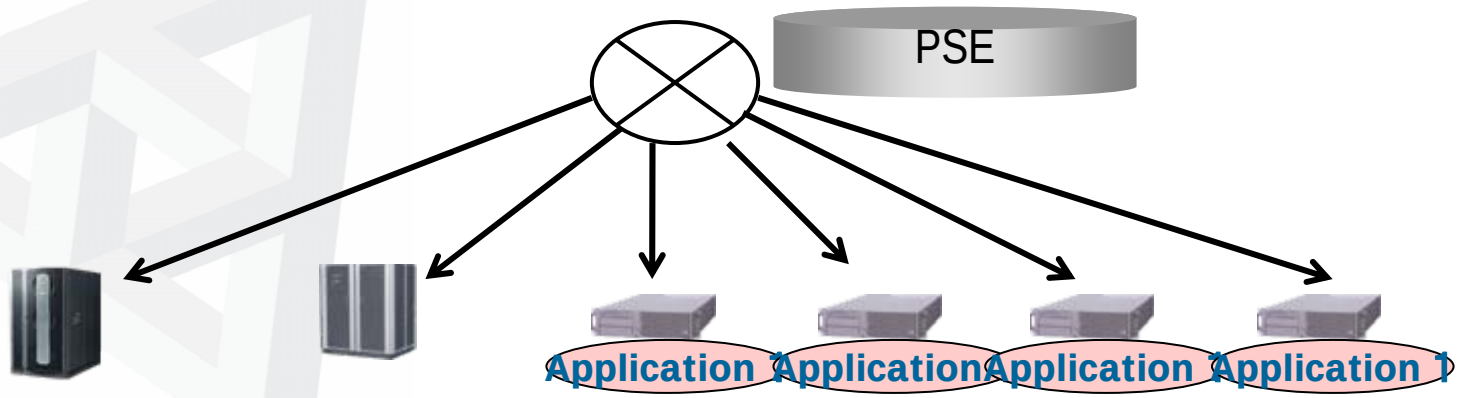


NAREGI Middleware Services Architecture



Deployment Services

- Function to deploy application on computer that meets resource requirement for application execution.
- The shell script executed after deploying can be registered.
  - After the application's file transfer, a necessary set-up steps and/or confirming procedure is executed.



NAREGI-PSE Concept

- Focus on a legacy application
  - Deploy application binaries for specific targets machine.
  - Compile source programs, if needed
- Provide a framework to distributed users' applications on grid
  - Users can register, compile, deploy and retrieve applications by using ACS for real-time collaborations.
    - Application developers distribute and share his/her applications by research community members.
    - Application users easy to use the latest research applications without compile and test run.

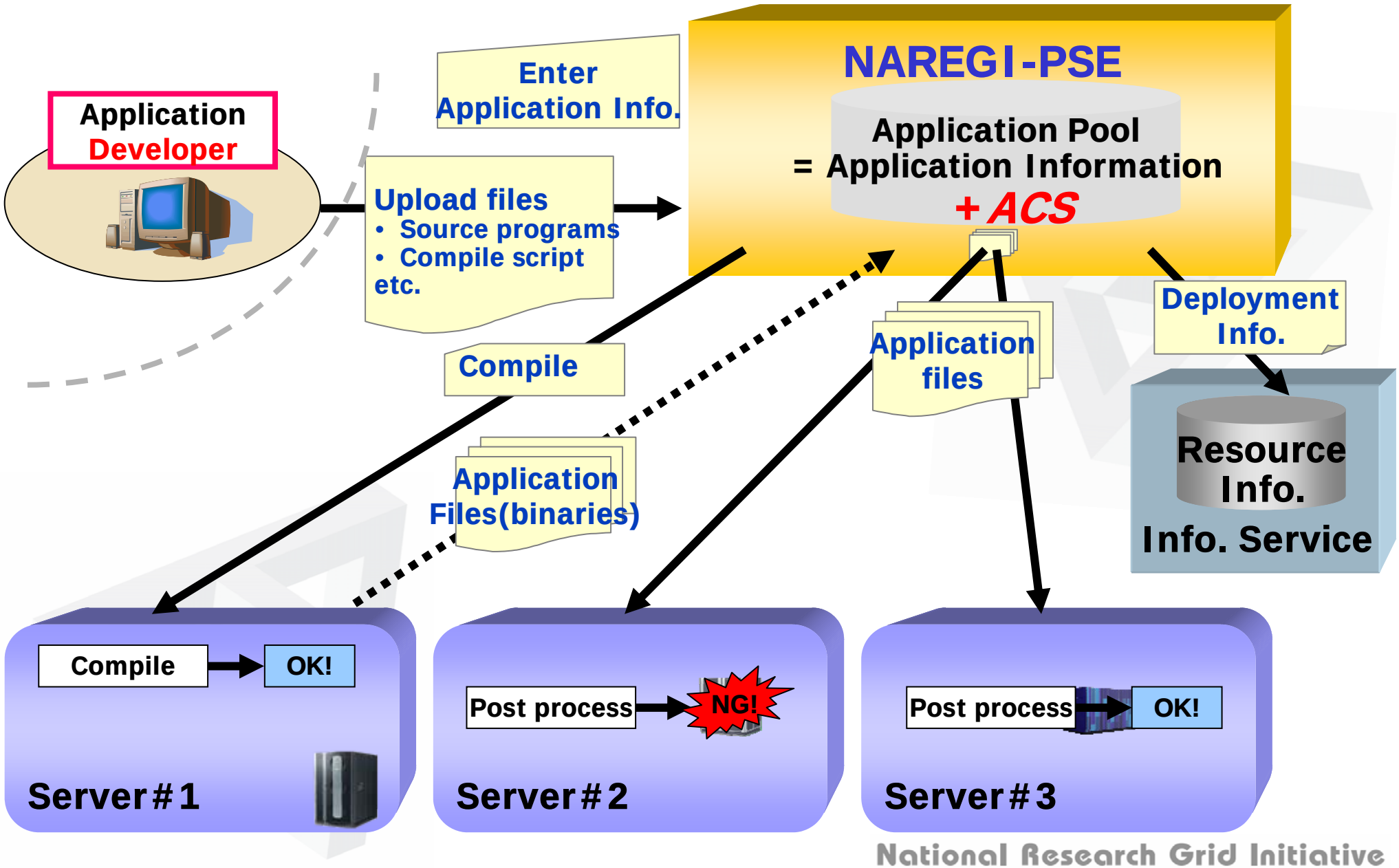
NAREGI-PSE objectives

NAREGI-PSE is an application management system in grid environment

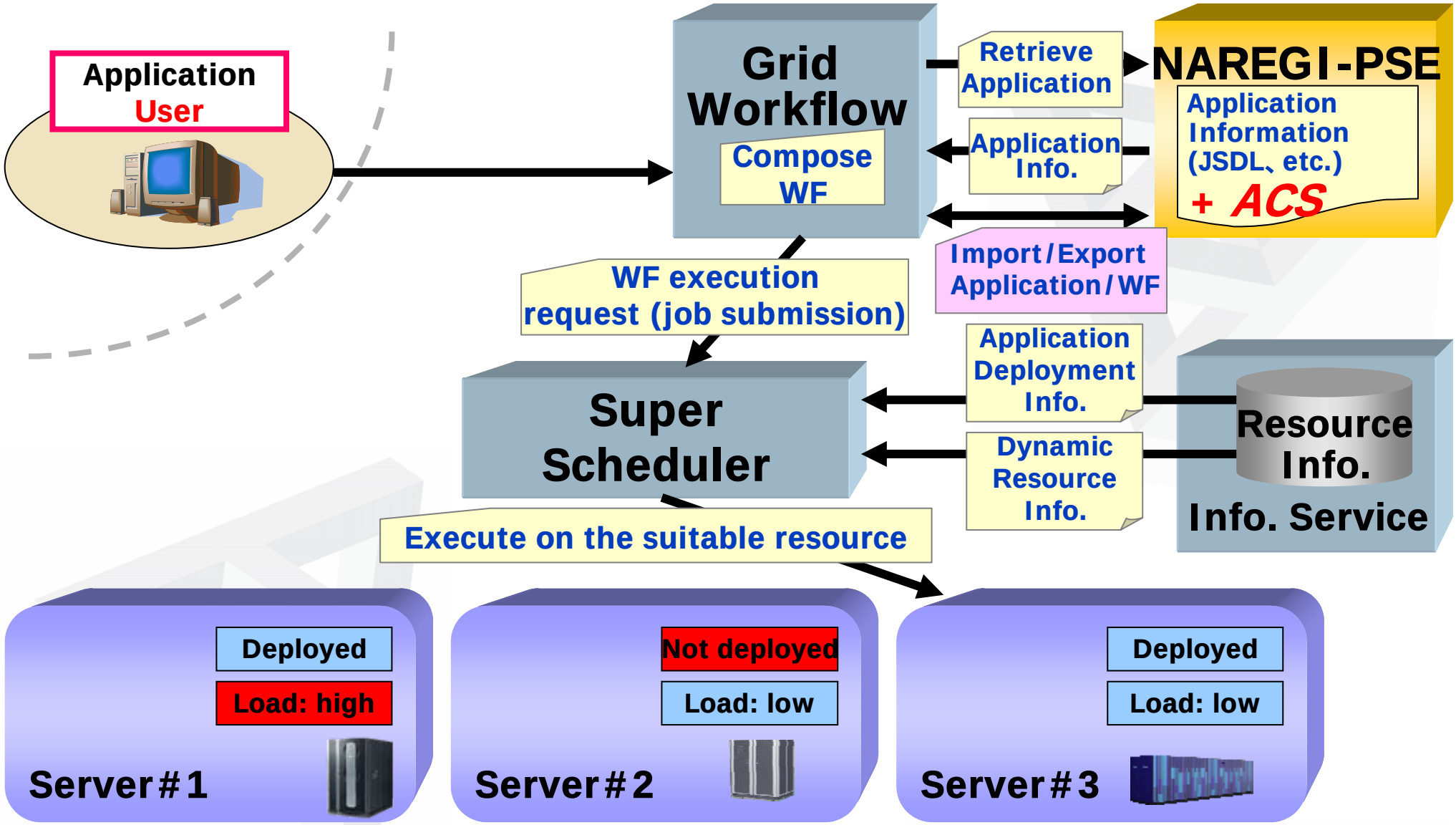
- To Share
  - 1) Registration and Management of Applications
  - 2) Sharing the applications within virtual organization (VO)
- To Prepare
  - 3) Preparation of an application execution on grid（Compilation, Confirmation of execution）
  - 4) Deployment and execution confirmation of application to grid environment

※1) GGF：Global Grid Forum

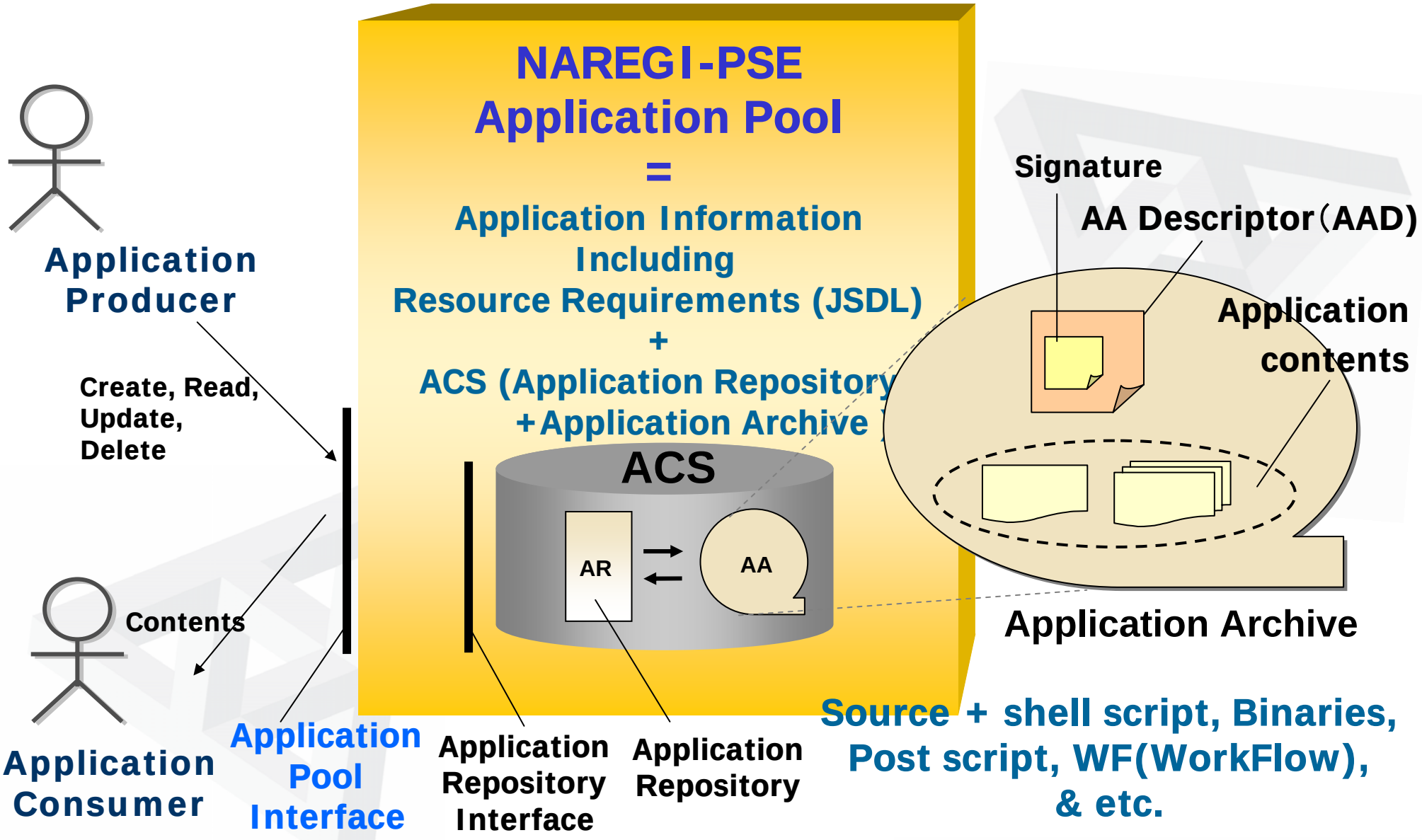
Register, Compile, and Deploy



Retrieve and Execute



Structure of Application Pool



Resource Requirements

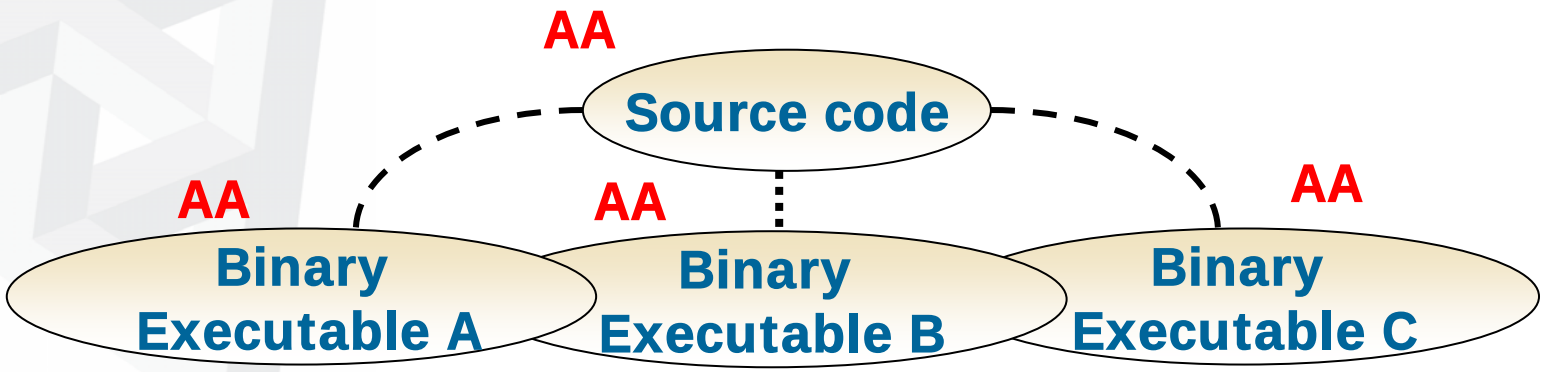
- Resource requirements of applications in NAREGI-PSE are:
  - Described based on Job Submission Description Language (JSDL).
- PSE refers to resource requirements of the applications:
  - to determine what nodes/systems are used for compilation/deployment.
  - Application user can copy JSDL from other application in PSE. They can modify JSDL to match their specific purposes in the Grid Workflow.

NAREGI-PSE and NAREGI-ACS

- NAREGI-ACS

  https://forge.gridforum.org/sf/go/projects.acs-wg/frs

  - NAREGI-PSE stores application files into Application Repository (ACS-AA) standardized by OGF.
  - ACS-AA can access from other OGSA-EMS standard Grid systems for Application Archives.
  - The application with a different resource requirement is stored as another application archive.
  - AA relation may be important to describe a relation between a source code and binaries.



Conforming status to ACS V1.0 (1)

ApplicationRepository

No	Category	Name	ACS1.0 Reference Implementation in NAREGI-PSE			Comments
			Specification Version	Support	Reason	
1	Resource Properties	Version	ACS1.0 (2006-05-08)	✓		
2		TransportType		✓		
3		TransportMethod		✓		
4		QueryExpressionDialect		✓		
5	Operations	Create	ACS1.0 (2006-05-08)	✓		
6		LookupArchives		×	EPR is managed on the PSE side	＊1)Returning the message as "OperationNotSupportedFault"
7	PortTypes	GetResourceProperty ＊1(GetRPProvider)	http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.wsdl	✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)
8		GetResourceProperty ＊1(GetRPProvider)		✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)
9		ImmediateResourceTermination(Destroy) ＊1(DestroyProvider)	http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.wsdl	✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)
10		NotificationProducer ＊1(SubscribeProvider)	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-01.wsdl	✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)

Conforming status to ACS V1.0 (2)

ApplicationArchive

No	Category	Name	ACS1.0 Reference Implementation in NAREGI-PSE			Comments
			Specification Version	Support	Reason	
1	Resource Properties	State	ACS1.0 (2006-05-08)	✓		
2		AAD		✓		
3		DifferentialAAD		✓		
4		CreationDateTime		✓		
5		BaseAA		✓		
6		NewerAA		✓		
7		Repository		✓		
8		QueryExpressionDialect		✓		
9	Operations	Update	ACS1.0 (2006-05-08)	✓		
10		GetContents		✓		
11		GetArchive		✓		
12	PortTypes	GetResourceProperty ＊1(GetRPProvider)	http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceProperties-1.2-draft-01.wsdl	✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)
13		GetResourceProperty ＊1(GetRPProvider)		✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)
14		ImmediateResourceTermination(Destroy) ＊2(ImmediateResourceTermination)	http://docs.oasis-open.org/wsrf/rlw-2	✓		＊2)Implements originally to delete not only WS-Resource but also physical assets of AA (complies ACS1.0 schema)
15		NotificationProducer ＊1(SubscribeProvider)	http://docs.oasis-open.org/wsn/2004/06/wsn-WS-BaseNotification-1.2-draft-01.wsdl	✓		＊1)Utilizes operation provided by GT4.0.1. (older schema 1.2-draft-01)

Conforming status to ACS V1.0 (3)

ApplicationArchiveCreatedMessageType

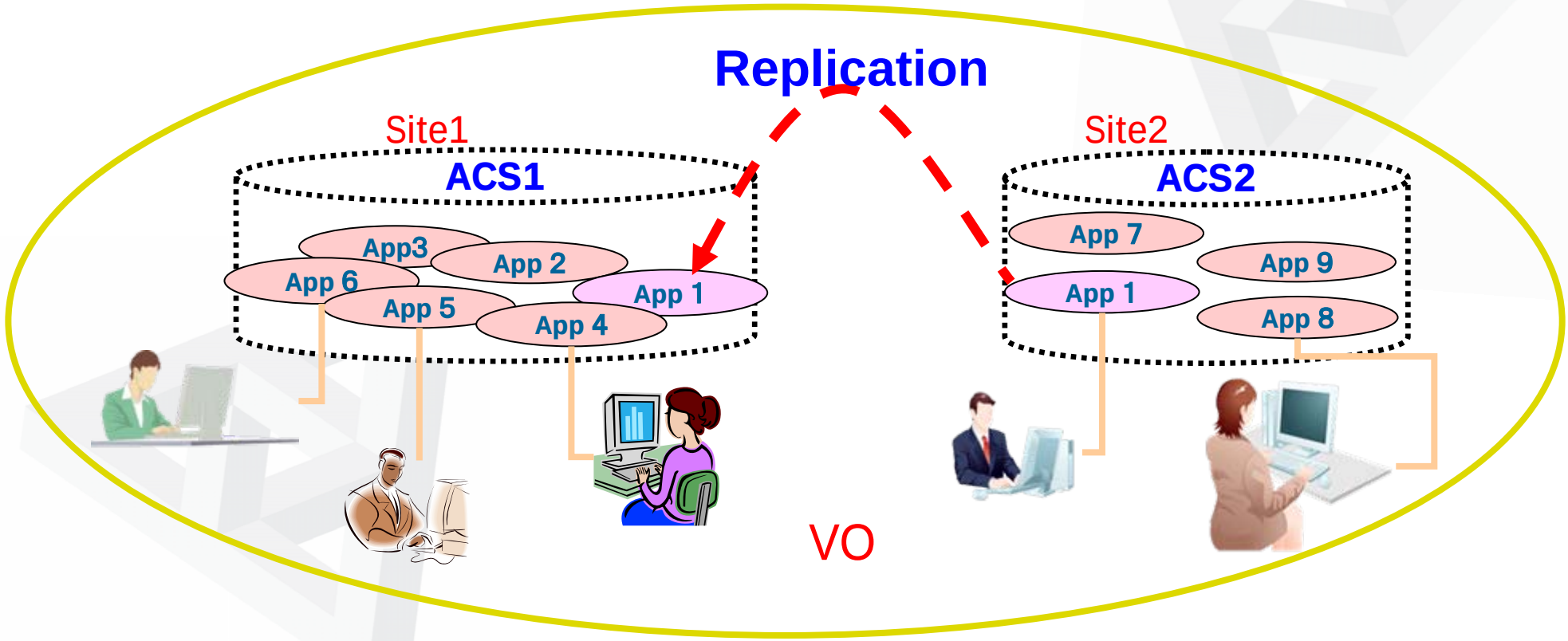
No	Category	Name	ACS1.0 Reference Implementation in NAREGI-PSE			Comments
			Specification Version	Support	Reason	
1	Properties	DateTime	ACS1.0 (2006-05-08)	✓		
2		AAID		✓		
3		ArchiveEPR		✓		

ApplicationArchiveUpdatedMessageType

No	Category	Name	ACS1.0 Reference Implementation in NAREGI-PSE			Comments
			Specification Version	Support	Reason	
1	Properties	DateTime	ACS1.0 (2006-05-08)	✓		
2		AAIDNew		✓		
3		AAIDOld		✓		
4		ArchiveEPRNew		✓		
5		ArchiveEPROld		✓		
6		DifferentialAAD		✓		

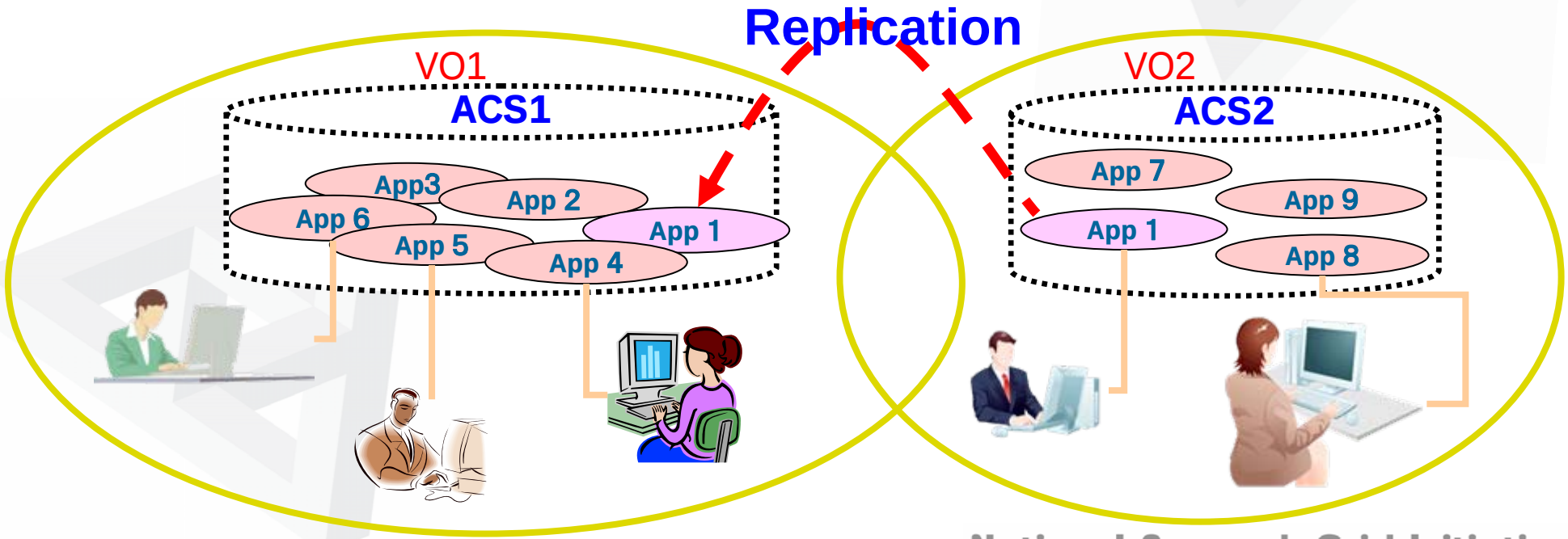
Multi site operation of ACS

- Robustness & Scalability are very important issues in large scale scientific grid environments.



Sharing of application within VO

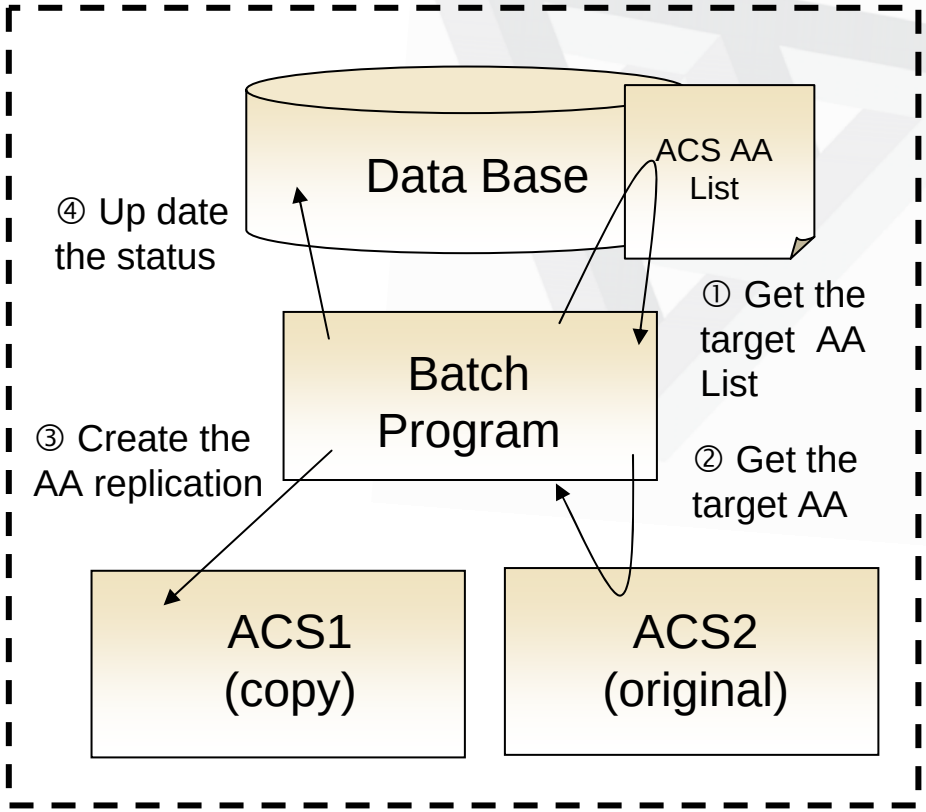
- Users who belong to the same VO (virtual organization) can share applications registered in PSE.
- Users who belong to the multiple VOs can share the same application within each VOs.
- Users can compile/deploy shared application.



Operation of Replication

- Set the Replication Flag (system)
- Create the Replication (batch program)
  - ① Get the target AA List
  - ② Get the target AA
  - ③ Create the AA replication
  - ④ Up date the status
- Delete the Replication (batch program)
  - ① Check the Status
  - ② If the original AA deleted, then delete the copied AA

Create the Replication Process



Conclusions

- NAREGI Beta version released at May,2006.
  - Download Site ; http://www.naregi.org/download/
- Beta version of NAREGI-PSE enables users
  - register their own applications,
  - compile and deploy the applications on the grid,
  - retrieve the application information,
  - and export the application information to Grid Workflow for execution.
  - import and export the workflow from Grid Workflow as a complicated application scenario.
- We are now discusses for NAREGI-PSE extension of AA replication feature.

Thank you!

Questions?

http://www.naregi.org