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Towards a WBEM-based Implementation of the OGF GLUE Information Model

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OUTLINE

- **Why Information Modeling in Grid Systems**
- **OGF and GLUE 2.0**
- **GLUEMan:**
 - a WBEM-based Implementation of GLUE 2.0

Use Cases

- **I want to submit my job:** **1**
 - On an execution environment matching my job requirement
 - **OS, CPU Type/Arch**
 - **Software packages**
 - if and how I can consume resources
 - **MaxWallTime, ...**
 - **VO, group, role**
 - via an endpoint I can talk to
 - **Protocol?**
 - **AuthZ?**

- **I want to discover all services provides by a certain administration domain** **2**

- **I want to know where I've free storage area on disk that I can use** **3**

Information Modeling

- **How do we describe resources shared in Grid systems in order to enable:**
 - Resource awareness
 - Resource discoverability
 - Resource requirements expression
 - Resource monitoring

Current Situation

- **Several Grid infrastructures using different schema definitions**
- **The most widely deployed schema definition is GLUE Schema 1.3**
 - Designed to support service selection
 - Adopted by gLite and other Grid middlewares
- **The first GLUE Schema version was released in 2002**
 - 1.x revisions were designed to maintain backwards compatibility
 - Need for re-design
- **For interoperable Grids, we need to unify the modeling of Grid resources into a community standard**

OGF GLUE WG

- **New OGF Working Group approved at OGF 19 (Jan 2007)**
- **Focus:**
 - facilitate interoperability between Grid infrastructures via common information models and reference implementation for describing Grid resources in response to use cases
- **Goal:**
 - define a use case document collecting use cases from different Grid projects/infrastructures
 - define a conceptual model defining the abstract schema GLUE 2.0 satisfying the collected use cases.
 - develop reference implementations
 - **Starting with XML Schema, LDAP, SQL DDL**
- **Unify modeling approaches and experience in production systems**

<http://forge.ogf.org/sf/sfmain/do/viewProject/projects.glue-wg>

Given the GLUE 2.0 Specification and the reference implementations

how can we support the writing of providers which produce information conformant to the specification?

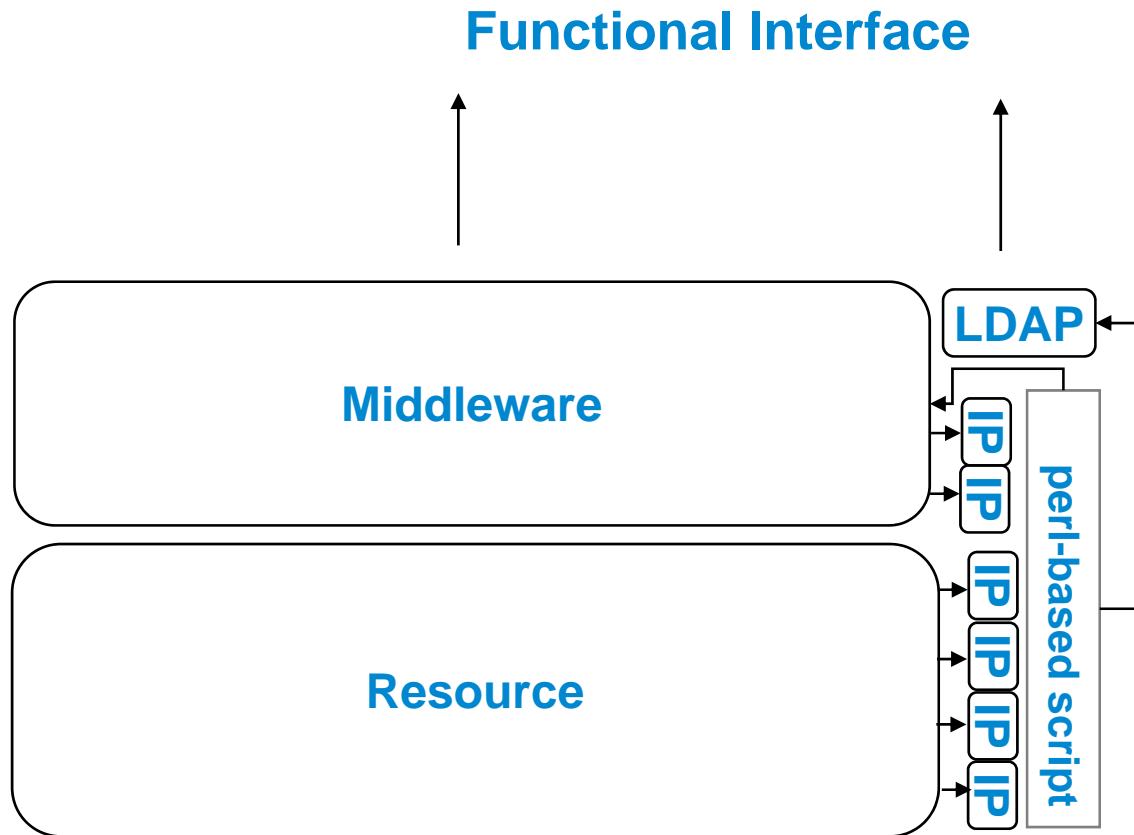
Concepts

- **Information Model (IM):**
 - Abstract description of entities, their properties and relationships of real-world concepts
 - Useful to explore domain concepts with project stakeholders
 - Our real-world concepts are Grid resources
- **Concrete Data Model (CM):**
 - Needed to design the internal schema of a real software system
- **Information Providers (IP):**
 - Actual software components that perform measurements of properties in a system
- **Information Provider Manager (IPM):**
 - Service
 - exposing the properties of a system defined by an information model using a concrete data model
 - scheduling the information provider execution

Aspects to be Considered When Writing IP

- **Which programming language can I use?**
- **What is the data format?**
- **How can we reduce the information provider intrusiveness?**
- **How can they be quickly adapted to the underlying system?**

Mapping Concepts in gLite 3.x



- **Pre-WS and WS Interfaces**
- **“out-of-band” information**
 - Information about services and resources is provided by an external publisher (based on OpenLDAP)
- **Situation:**
 - IM: GLUE 1.3
 - CM: LDAP
 - IP: any language, output LDIF
 - IPM: OpenLDAP

Considerations

- **Information providers**

- typically written by many parties
 - **Need expertise in the managed resource**
 - **Need simple way to write and plug them**
- different types of consumers for the information
 - **resource users (high-level services, end-users)**
 - **site admins**
- Consumers may want to access the information via different interface
 - functional vs. management

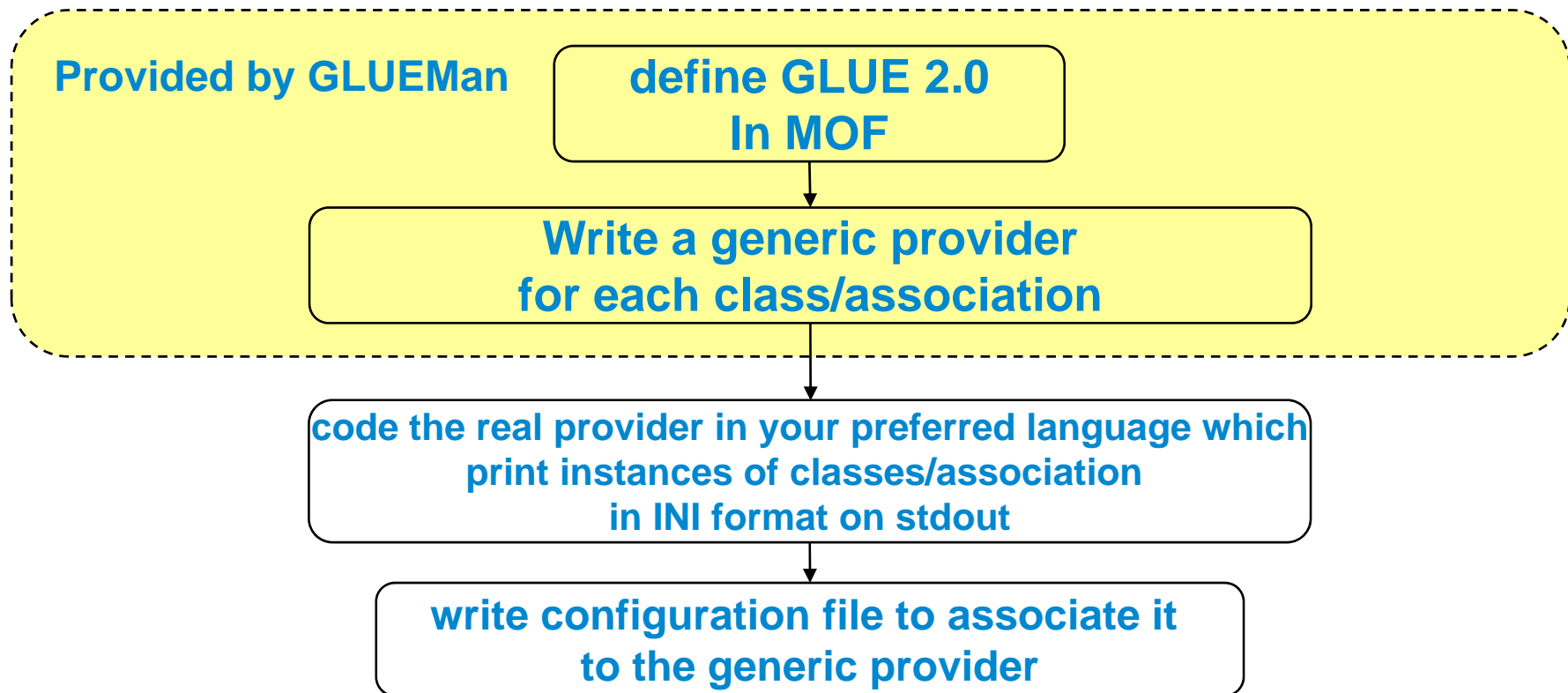
Our Approach

- **Leverage WBEM-based technologies**
 - WBEM:
 - a suite of standards for the managing distributed IT resources
 - defined by the DMTF
 - with several commercial and open source implementations
- **Selected software:**
 - Open Pegasus (<http://openpegasus.org/>)
 - open-source implementation of the DMTF CIM and WBEM standards in C++
 - CIMPLE Library (<http://cimple.org>)
 - CIM Provider Engine
 - to simplify provider development
 - to make providers portable across different WBEM implementations

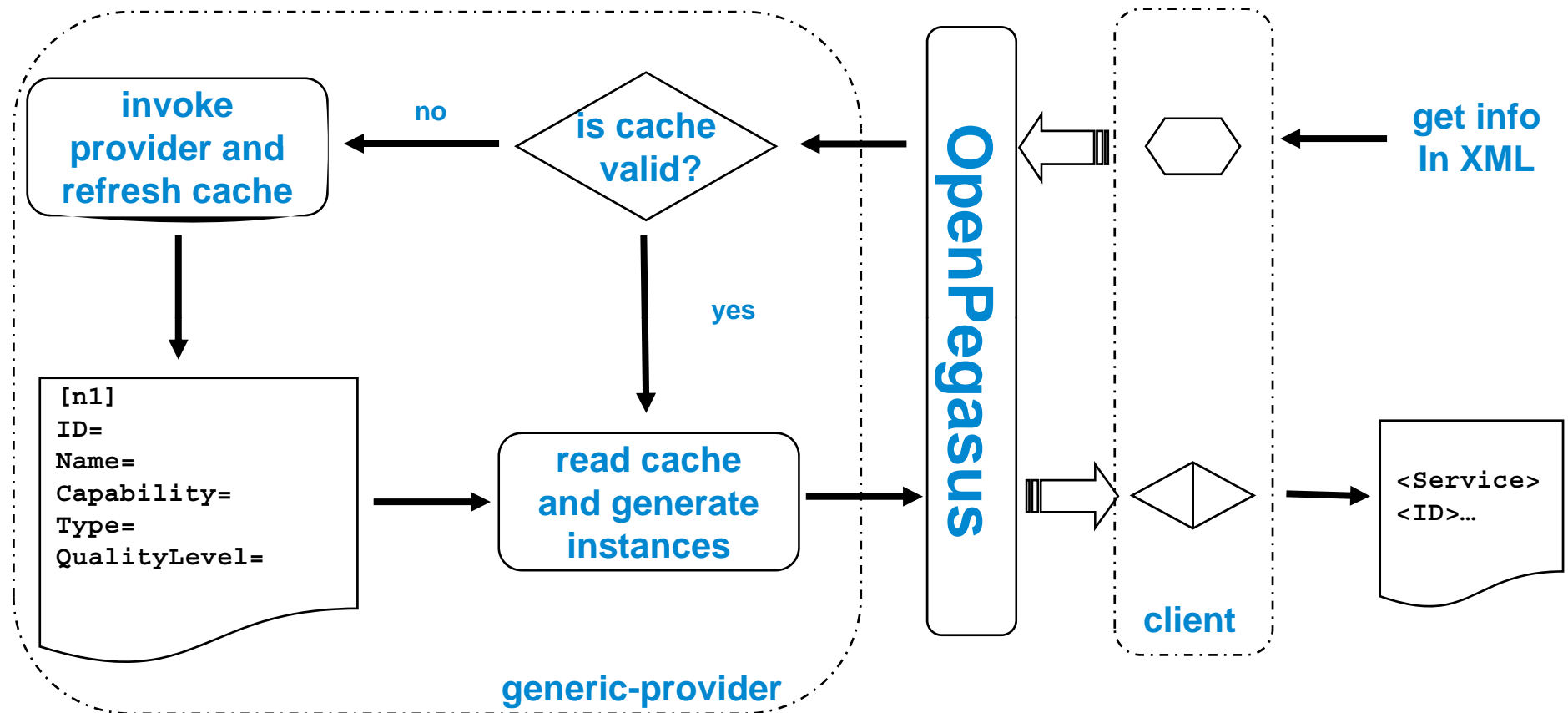
Identified Requirements

- **General**
 - Isolate provider developers from WBEM-specific details
 - Read-only providers
 - Support any programming languages
 - Reduce intrusiveness
- **Provider**
 - Enforce strong data conformance checking
 - Help in detecting errors about the produced information
 - Easy the writing of configuration-based information
- **Client**
 - Support multiple output renderings
 - **at least XML, LDAP, SQL**
 - Easy the addition of new renderings

GLUEMan Generic Provider



Simplified Functional View



Possible Deployment Scenario in gLite

Situation:

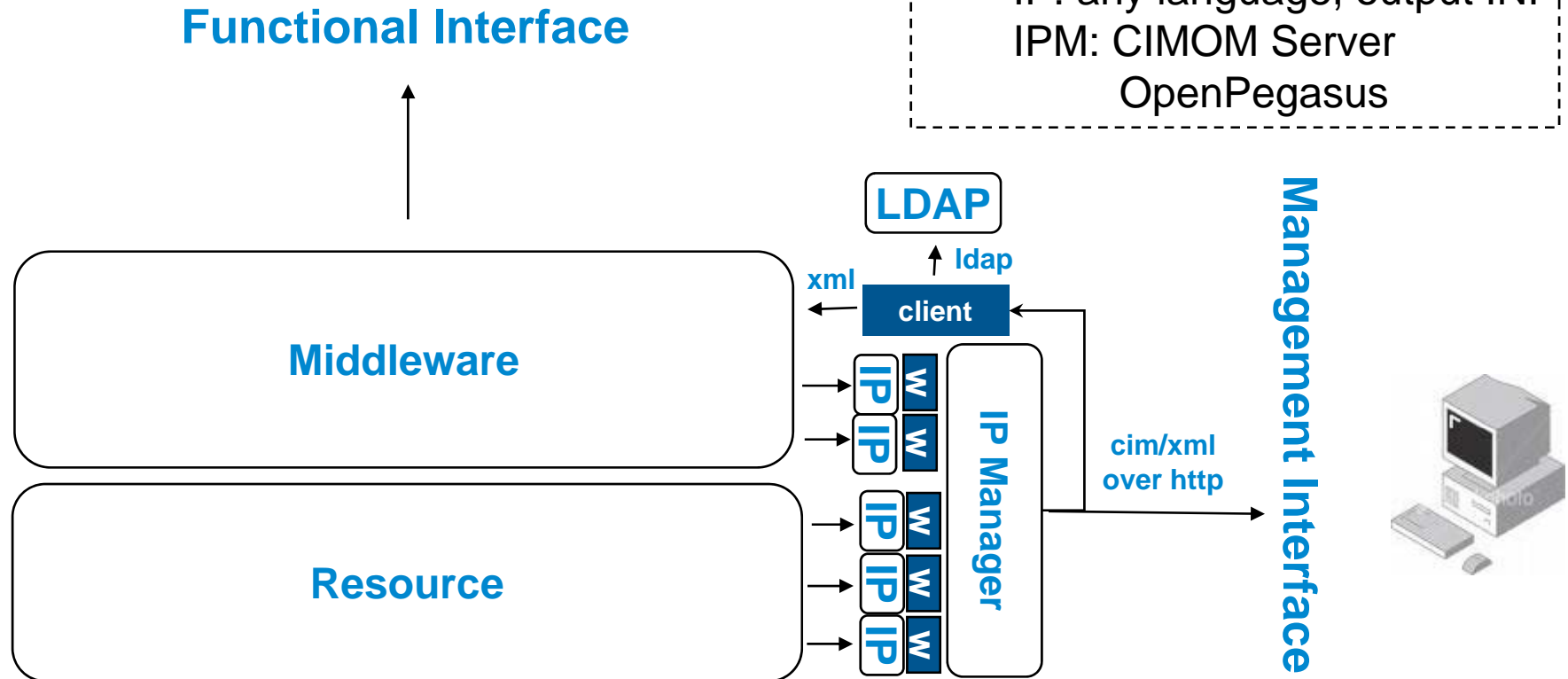
IM: GLUE 2.0

CM: various,
rendering at the client side

IP: any language, output INI

IPM: CIMOM Server

OpenPegasus



abstraction layer to isolate from IP manager specific aspects

GLUEMan Release Milestones

- **Feb2008: Alpha Release**
 - Generic provider written in C++
 - **Support for caching**
 - Client with XML and LDAP rendering aligned to latest GLUE 2.0 draft
- **Apr2008: Beta Release**
 - All foreseen functionalities implemented
 - Aligned with latest GLUE 2.0 Spec (possibly in public comment)
 - Tested integration with
 - **CREAM-BES/UNICORE-BES**
 - **OpenLDAP**
 - Basic suite of providers for PBS/LSF

Conclusion

- **Information Modeling of Grid resources is a key component to enable interoperable Grid systems**
- **GLUE 2.0 is maturing as OGF community standard**
- **Information will be generated by many parties**
- **Need for flexible framework**
 - Easily plug information providers and adapt them to different systems
 - Extract the information in the desired format
- **We presented GLUEMan as a WBEM-based approach to providing such a framework**

References

- **OMII-Europe Project**
 - <http://omii-europe.org>
- **JRA2 Activity Wiki**
 - <http://omii-europe.forge.cnaf.infn.it/jra2>
- **OGF GLUE Working Group**
 - <http://forge.ogf.org/sf/sfmain/do/viewProject/projects.glue-wg>
- **GLUE 2.0 Specification (latest draft)**
 - <http://forge.ogf.org/sf/go/doc14639>

Thank you!!!

GLUEMan Team:

- Sergio Andreozzi (leader)
 - Marco Canaparo
 - Michele Carpenè
- **Check for release announcement:**
 - <http://omii-europe.forge.cnaf.infn.it/jra2>