

Work Package 6 – JRA1

Evolution of VO protocols and standards

Work Package Objectives

- To decide what technical standards and protocols are required for Euro-VO
- To bring forward these requirements to the IVOA, in the frame of WP2-4 activities
- To develop drafts of these standards
- To develop prototype software implementing the draft standards
- To make all possible effort to conclude international agreement on the necessary standards
- To ensure that deployments within Euro-VO are compatible with IVOA standards.

Work Package Activities

- Remit of WP6:
 - Cover those areas of IVOA activity not addressed by WP7
 - Work closely with WP7 (and others) to ensure Euro-VO presents a unified message to the IVOA and that its needs are met.

Plan

- Co-ordinate and document prototypes and standards
- Cover standards not addressed in WP7 (Data Access Layer, Data Models and VO Query Language):
 - Applications
 - Grid & Web Services
 - Resource Registry
 - Semantics
 - VO Event
 - VOTable
 - Theory
 - Data Curation & Preservation

Structure

- Work Teams were established to focus on each of the IVOA Working Groups
- Work Team decides what level of involvement within its IVOA Working Group is required and plans accordingly
- Work Team participate in IVOA interoperability meetings to present EuroVO-AIDA findings, prototype and reference implementations.

IVOA Standards

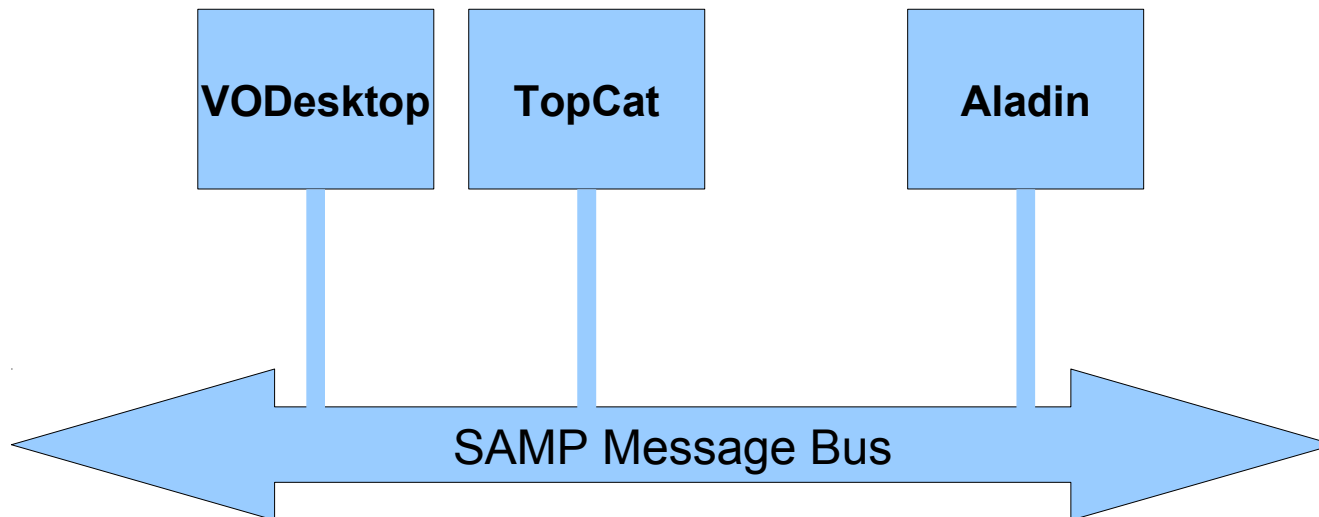
- The following standards relevant to WP6 have made significant progress during AIDA Stage 3:
 - Recommended:
 - IVOA Standard document 1.2 (Mar 2010)
 - Table Access Protocol 1.0 (Feb 2010)
 - UWS 1.0 (Oct 2010)
 - VODataService 1.1 (Oct 2010)
 - In RFC
 - Web Services Basic Profile 1.0 RFC
 - IVOA Support Interfaces (VOSI) 1.0 RFC

Applications

- **SAMP**
 - Simple Application Messaging Protocol
 - Definition:
 - A messaging protocol that enables astronomy software tools to inter-operate and communicate. It consists of a list of common file formats for the exchange of data between different applications and a messaging system that enables the applications to share data and take advantage of each other's functionality

Why do we need SAMP?

- Maximises interoperation between (and therefore utility of) applications whilst minimising development and support costs
- Loose binding de-couples distributed development efforts



Applications

- SAMP adopted by:
 - Aladin
 - GAIA
 - JSky/JSkyCat
 - SPLAT
 - VODesktop
 - VOSpec
 - VirGO
 - DS9
 - Microsoft WWT

Applications

- SAMP Summary:
 - Nearly all the important tools now talk SAMP
 - SAMP been used from various languages, tools, platforms; no serious problems with the standard have been encountered
 - SAMP is being adopted elsewhere also, for instance within HIPE (Herschel Interactive Processing Environment).
 - No perceived need for additional application-specific standards, within either AIDA or IVOA.

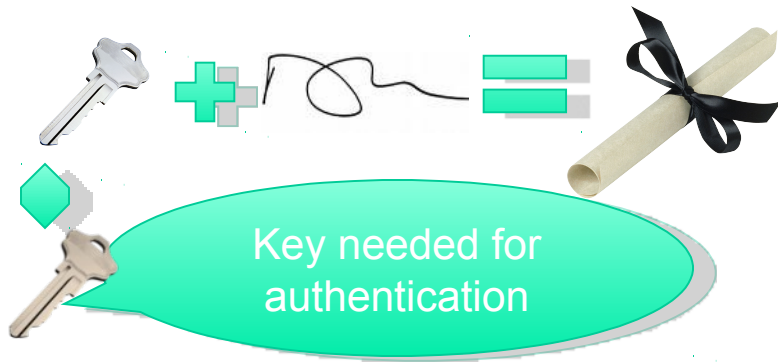
Grid & Web Services

- Security
- IVOA Support Interfaces
- VOSpace
- UWS

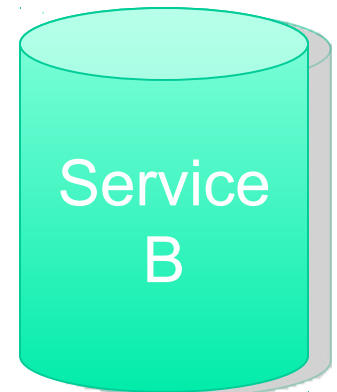
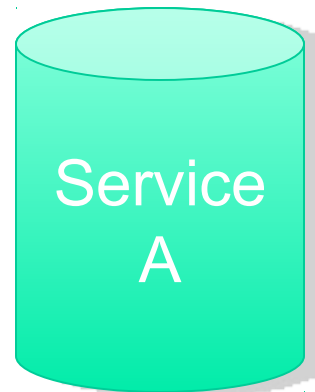
Grid & Web Services

- Security:
 - Credential Delegation Protocol
 - Protocol:
 - Provides a mechanism for the user to upload a "proxy" of the certificate to the server.
 - Therefore services can act on behalf of a user when they are not physically connected to the network

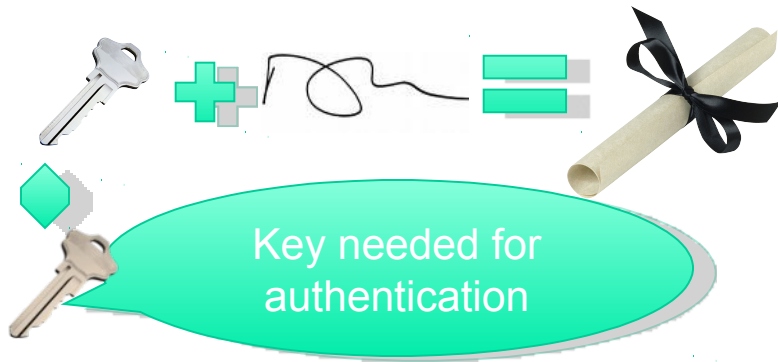
Why do we need Credential Delegation?



User



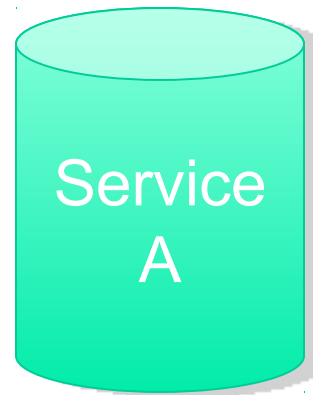
Why do we need Credential Delegation?



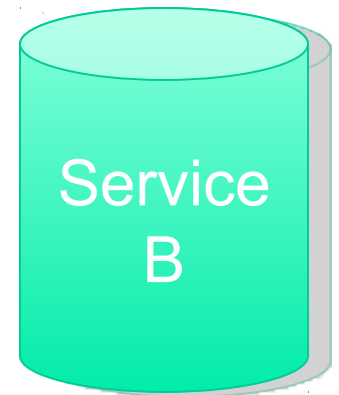
User



Calls as
user

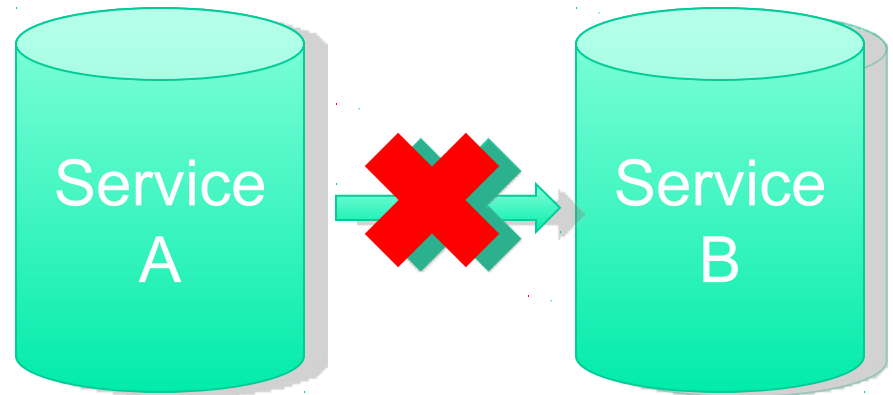
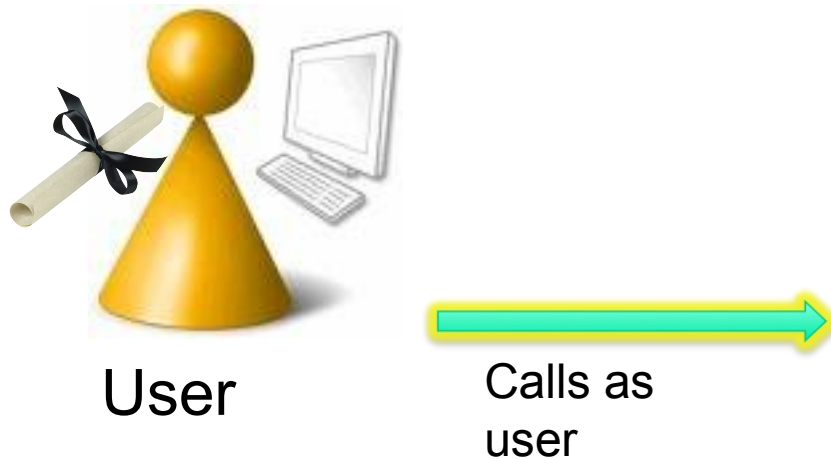
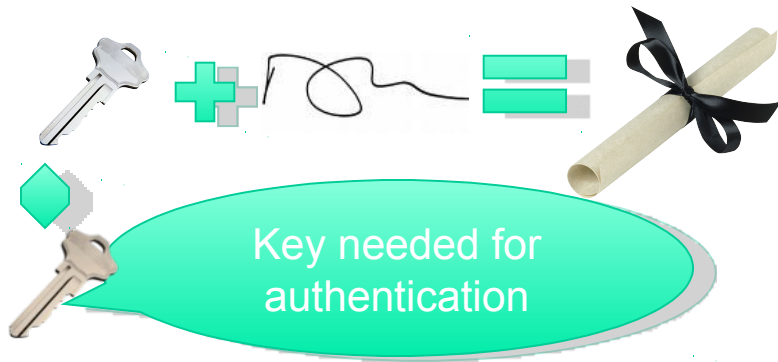


Service
A

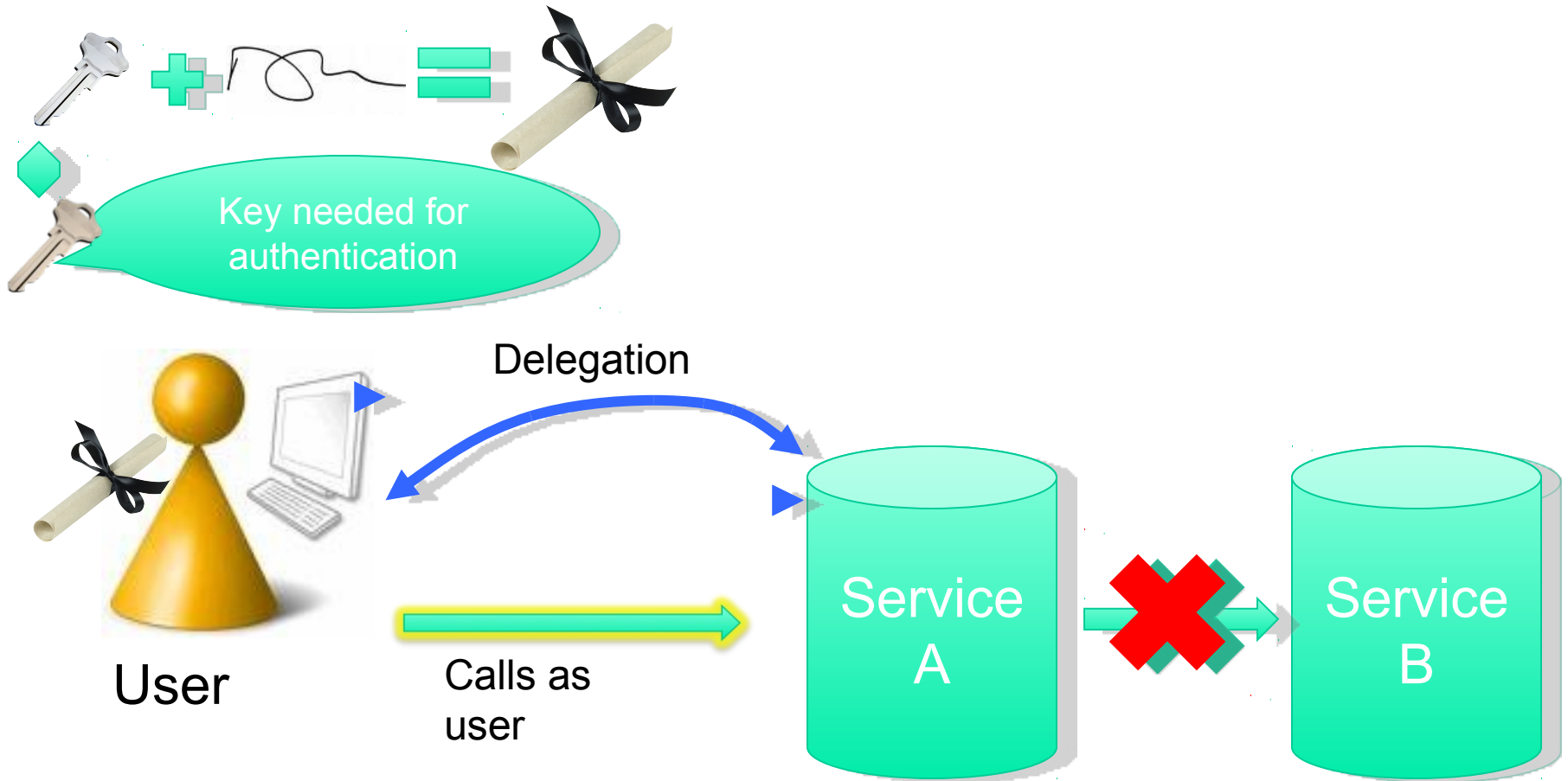


Service
B

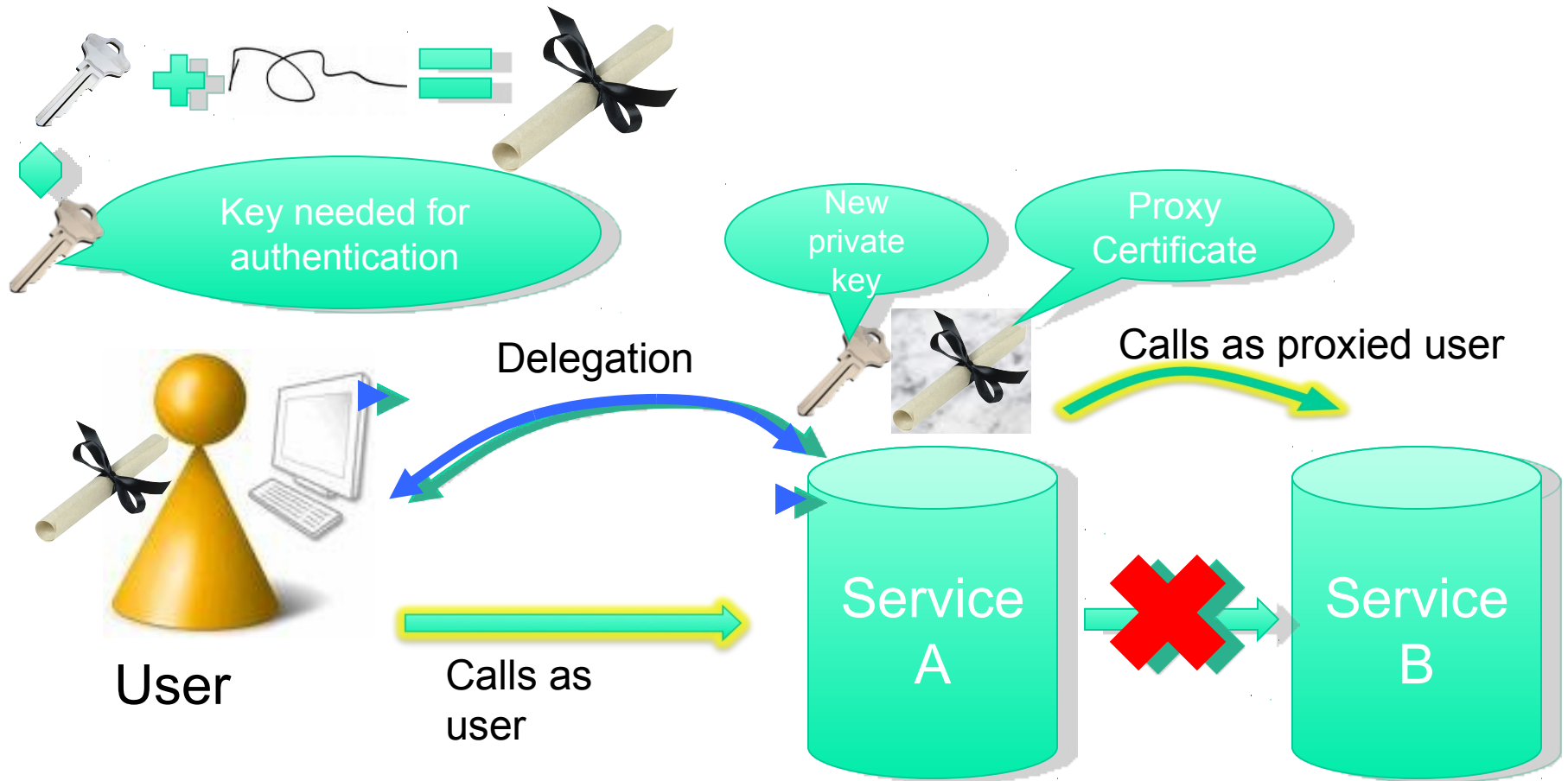
Why do we need Credential Delegation?



Why do we need Credential Delegation?



Why do we need Credential Delegation?



Grid & Web Services

- IVOA Support Interfaces (VOSI)
 - Definition:
 - Describes the minimum required interface to participate in the IVOA as a web service
 - V1.0 in RFC period
 - Defines metadata to describe tabular data that is common in astronomical catalogues

Why do we need VOSI?

- By defining a common interface to service metadata in the form of a list of Capability descriptions, VOSI encourages the use of generic service investigation software thus reinforcing the DRY (Don't Repeat Yourself) principle, regardless of the functionality the service provides.

Grid & Web Services

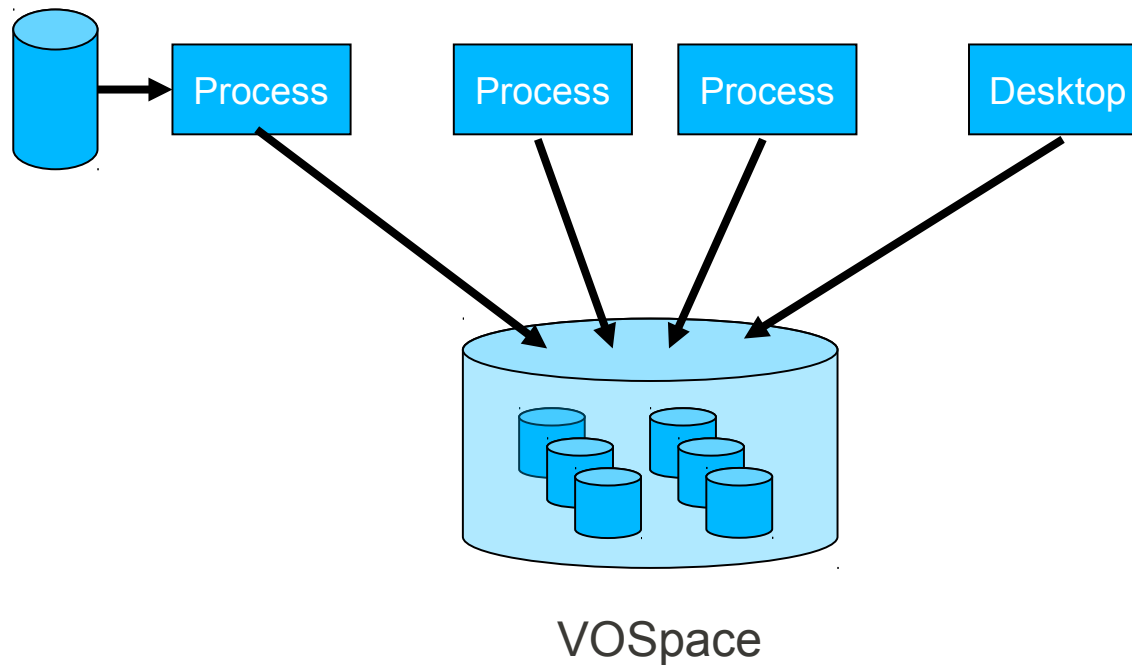
- VOSpace
 - Definition:
 - The IVOA interface to distributed storage. It specifies how VO agents and applications can use network attached data stores to persist and exchange data in a standard way

Grid & Web Services

- VOSpace
 - V1.1 compliant services deployed
 - Next generation VOSpace (V2.0) draft specification published
 - V2.0 moves from SOAP to REST
 - REST prototype demonstrated at Victoria Interop (May 2010)

Why do we need VOSpace?

- Data can be distributed and stored use various storage techniques
- Applications see a single source of data



UWS

- **Universal Worker Service Pattern**
 - A way to interact with a service in an asynchronous fashion.
 - Each request to the service becomes a separately manageable “job”.
- Now an IVOA Recommendation (October 2010)
- Already used as the basis for part of TAP

Registry

- New documents and schemata:
 - VODataService v1.1 IVOA Recommendation (October 2010)
 - VOStandard v0.3
 - VOApplication v0.9
 - New SLAP extension schema v0.1
 - SCS, SIAP and SSAP extension schema in use
 - TAP extension schema and document
 - CEA Schema (AstroGrid) being prepared as an IVOA discussion Note

Why do we need Registry Interface?

- Defines interfaces that support interactions between applications and registries as well as between the registries themselves
- Fundamental to accessing and maintaining registry data



The Virtual Observatory's Yellow Pages

Semantics

- Vocabularies and Ontologies
 - New vocabularies implementation starting to emerge following Vocabularies Recommendation

Why do we need Ontologies?

- An ontology is a description of the concepts and relationships that can exist for things that exist or may exist in some domain
- Ontologies are typically specified in languages that allow abstraction away from data structures and implementation strategies and are thus considered "semantic" rather than "logical" or "physical"
- Ontologies are used for integrating heterogeneous databases, enabling interoperability among disparate systems, and specifying interfaces to independent, knowledge-based services
- By operating at the “semantic” level, new and unique insights into existing data are possible.

Theory

- Continued standards process for protocol and data model for theoretical data
- SimDM document note for Victoria Interop
- SimDAP prototype implementations for cosmological simulation and stellar evolution models
- Evolutionary stellar data made accessible via TOPCAT
- White Dwarf models inserted in the public BaSTI DB
- Refined Science Use Case with VO tools and evolutionary stellar models for a pipeline of comparison observational and theoretical data
- Worked on SSP (Single Star Population) data models
- Developed tools to enable SSP to fit observed galaxy data

VOTable

- Why do we need VOTable?
 - VOTable is a flexible storage and exchange format for tabular data, with particular emphasis on astronomical tables
 - Interoperability is encouraged through the use of standards (XML)
 - The XML fabric allows applications to easily validate an input document, as well as facilitating transformations through XSLT (eXtensible Style Language Transformation) engines.

Data Curation and Preservation

- **IVOA Standard document 1.2 formally Recommended (March 2010)**

Summary

- Highlights for this period are:
 - Many important VO standards directed and driven by AIDA partners have been promoted to IVOA Recommendation or in the final stages of Review
 - Continued success of SAMP with take-up by applications
 - VOSpace continues to mature with REST pattern demonstrators emerging
 - Theory remains a very active element of IVOA with much innovation and prototyping continuing