An interoperable architecture using the CDPP/AMDA service and the SPASE model

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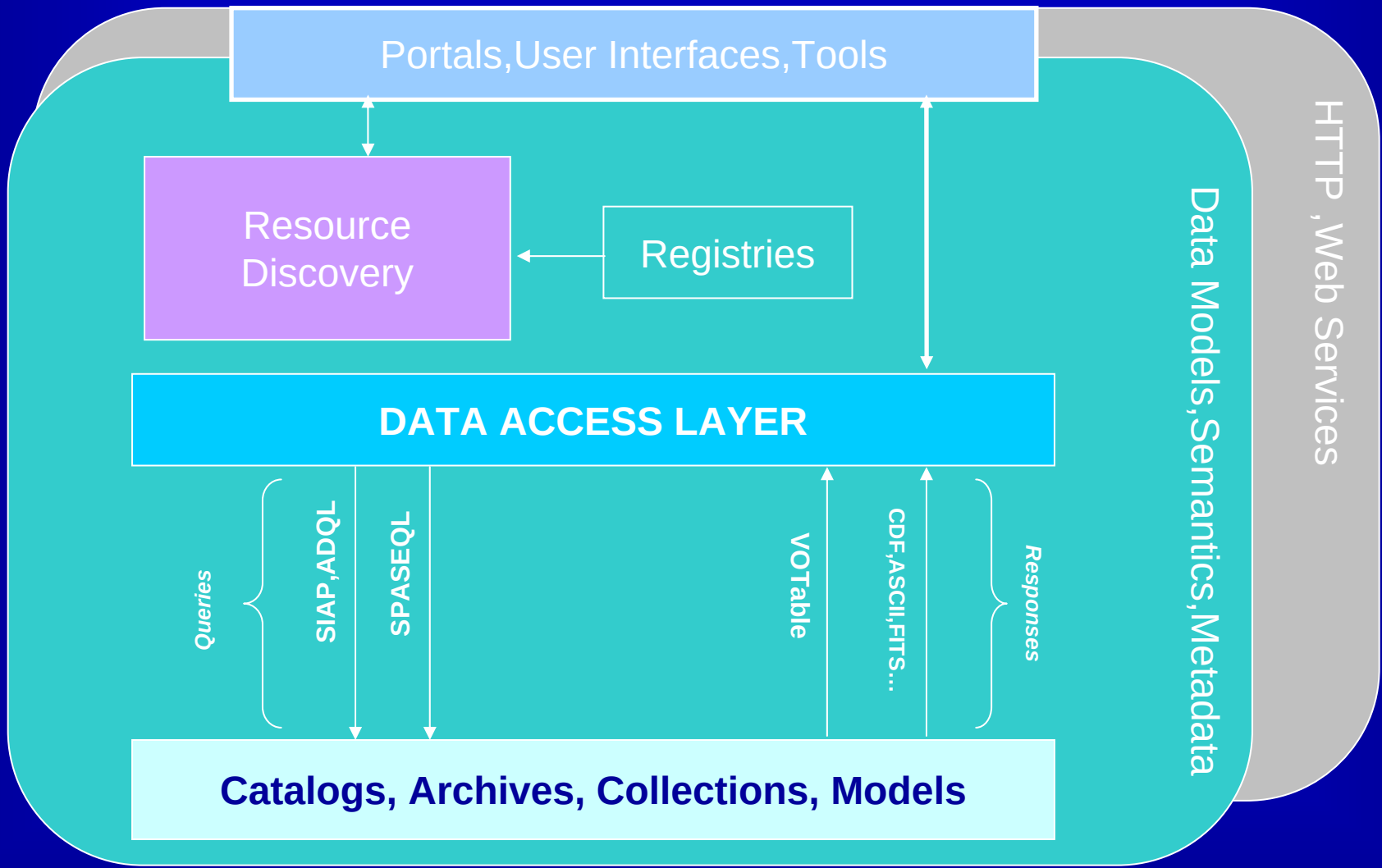
Introduction

A use case of Virtual Observatory with a science tool (AMDA) and a metadata model (SPASE)

This work was done for the EuroPlaNet/IDIS Plasma Node

Overall architecture of a Virtual Observatory



A Virtual Observatory

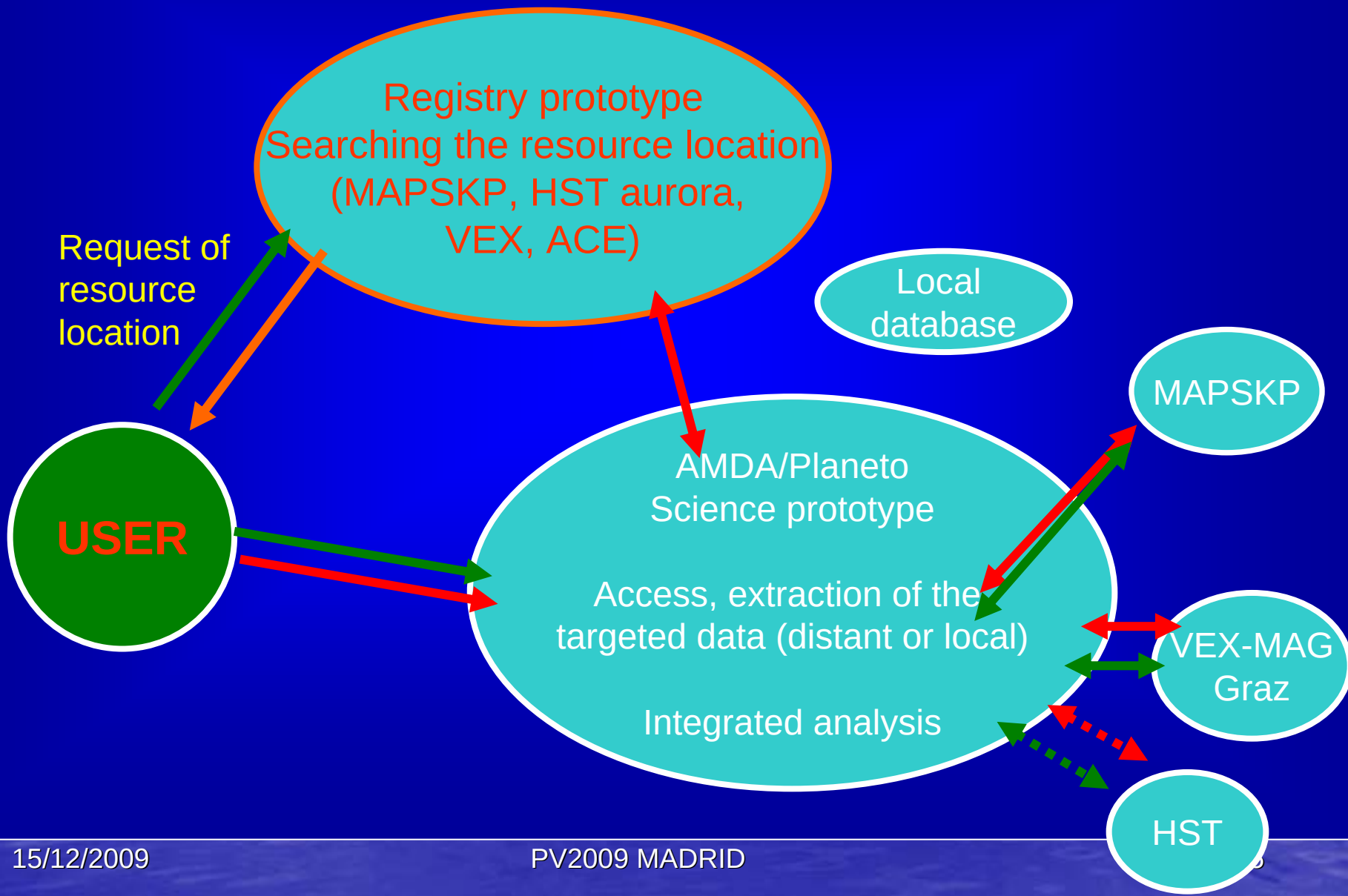
- One of the goals of IDIS is to provide a Virtual Observatory environment for Planetary sciences

- Access to remote data from software tools is essential in a Virtual Observatory environment

- This access should be made in a standard way to avoid duplicating efforts in software development

- To reach this goal, we developed a prototype of remote data access from AMDA

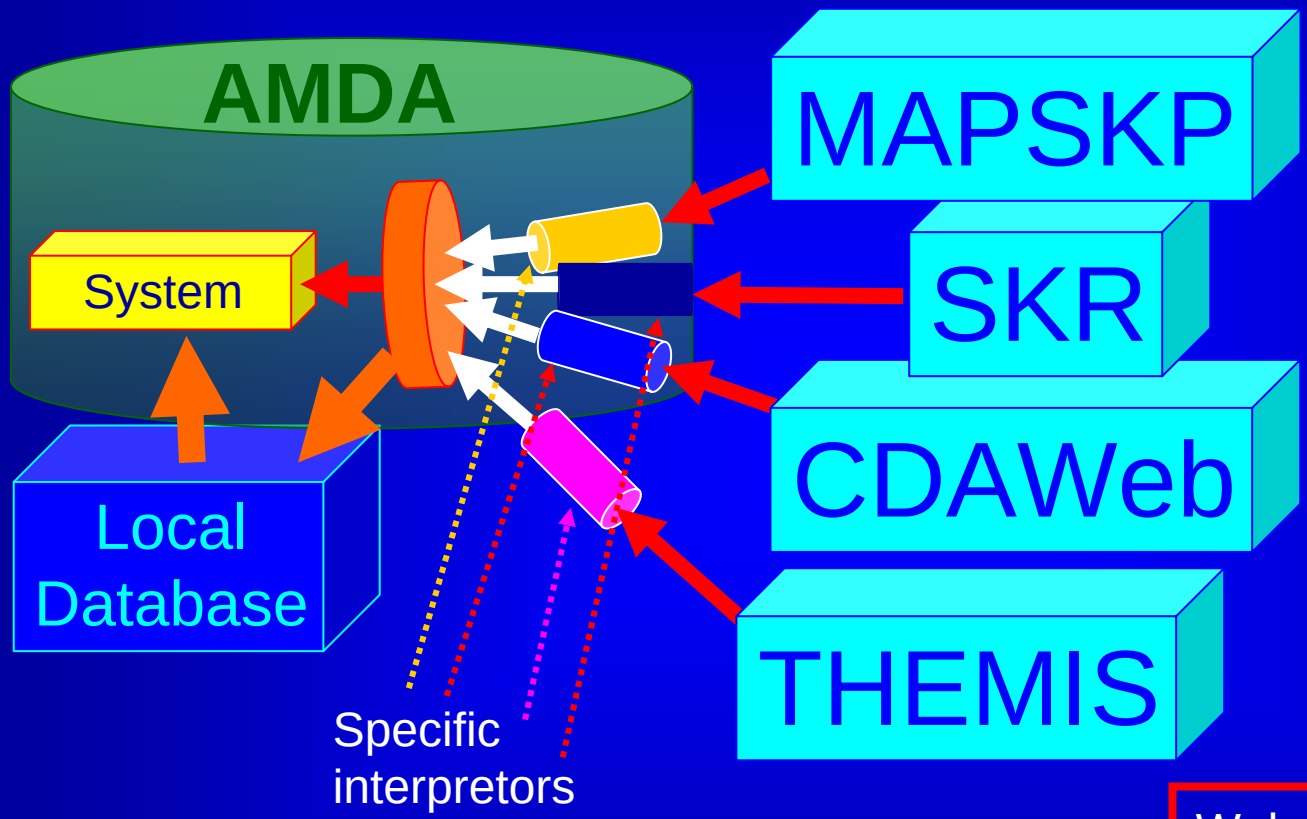
A Use Case


Registry prototype
Searching the resource location
(MAPSKP, HST aurora,
VEX, ACE)
Request of
resource
location
Local
database
MAPSKP
USER
AMDA/Planeto
Science prototype
Access, extraction of the
targeted data (distant or local)
Integrated analysis
VEX-MAG
Graz
HST

Two successive versions implemented:

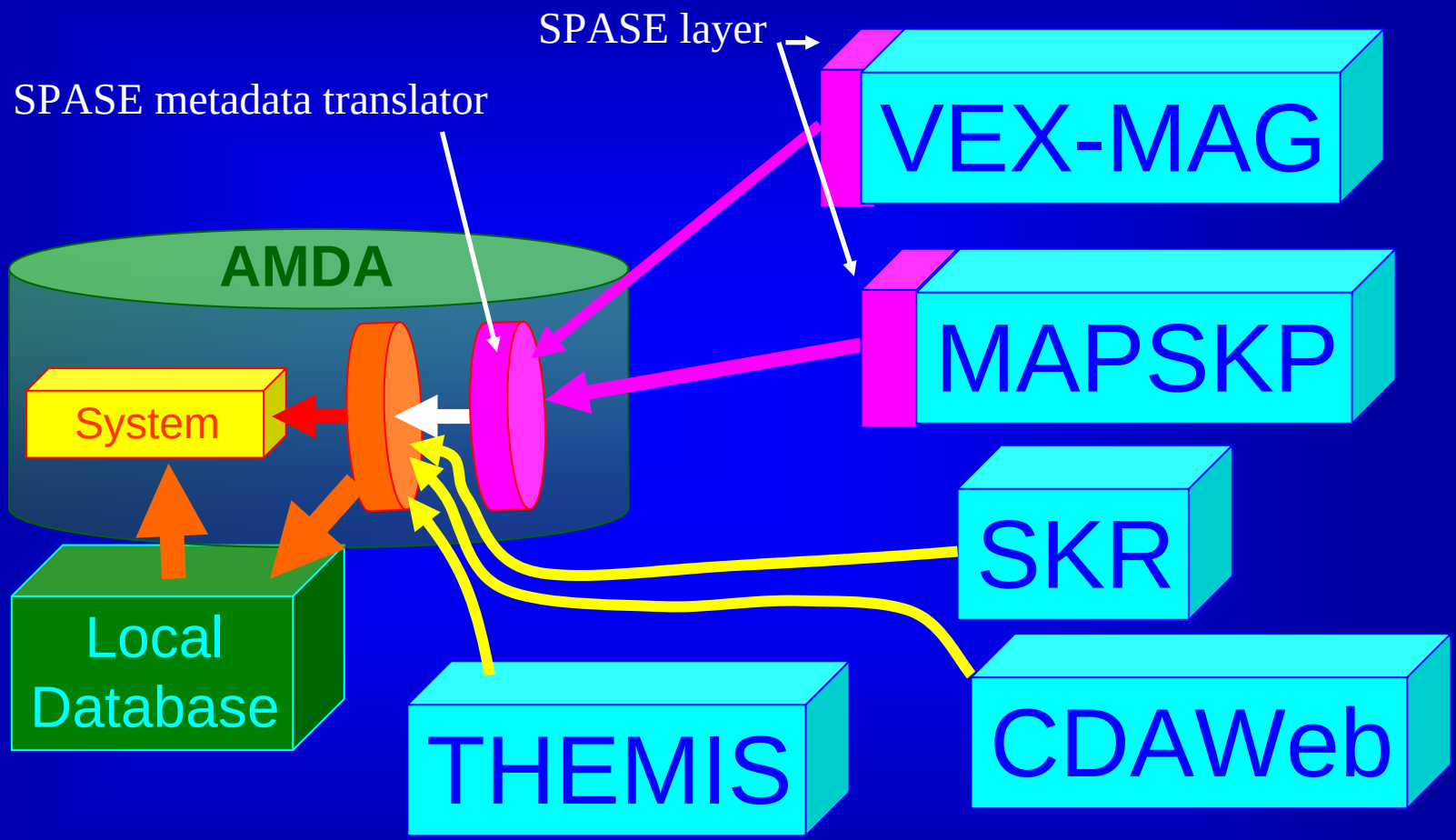
- One with a specific interface for each source of data
- One with a standard interface

AMDA / IDIS Version 1



Web-services:
- Content of the database?
- Get the descriptors
- Get data (url list)

AMDA/IDIS Version 2 : SPASE compliant

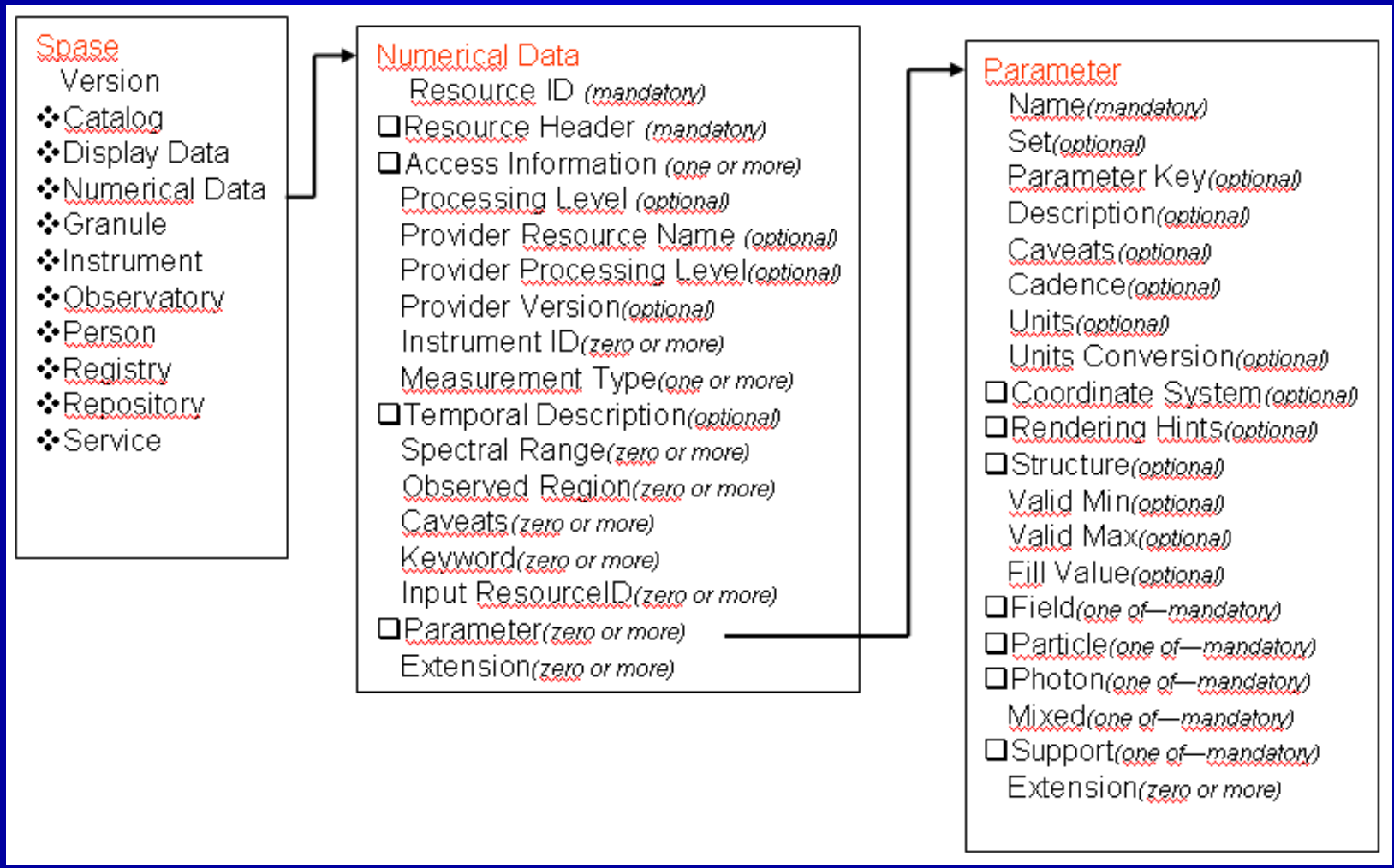


Any database including a SPASE based interoperability layer can be used by AMDA

What is needed to implement a standard interface ?

- A standard data model
- Descriptions of resources , compliant with this model
- A Registry
- An interface to the Registry

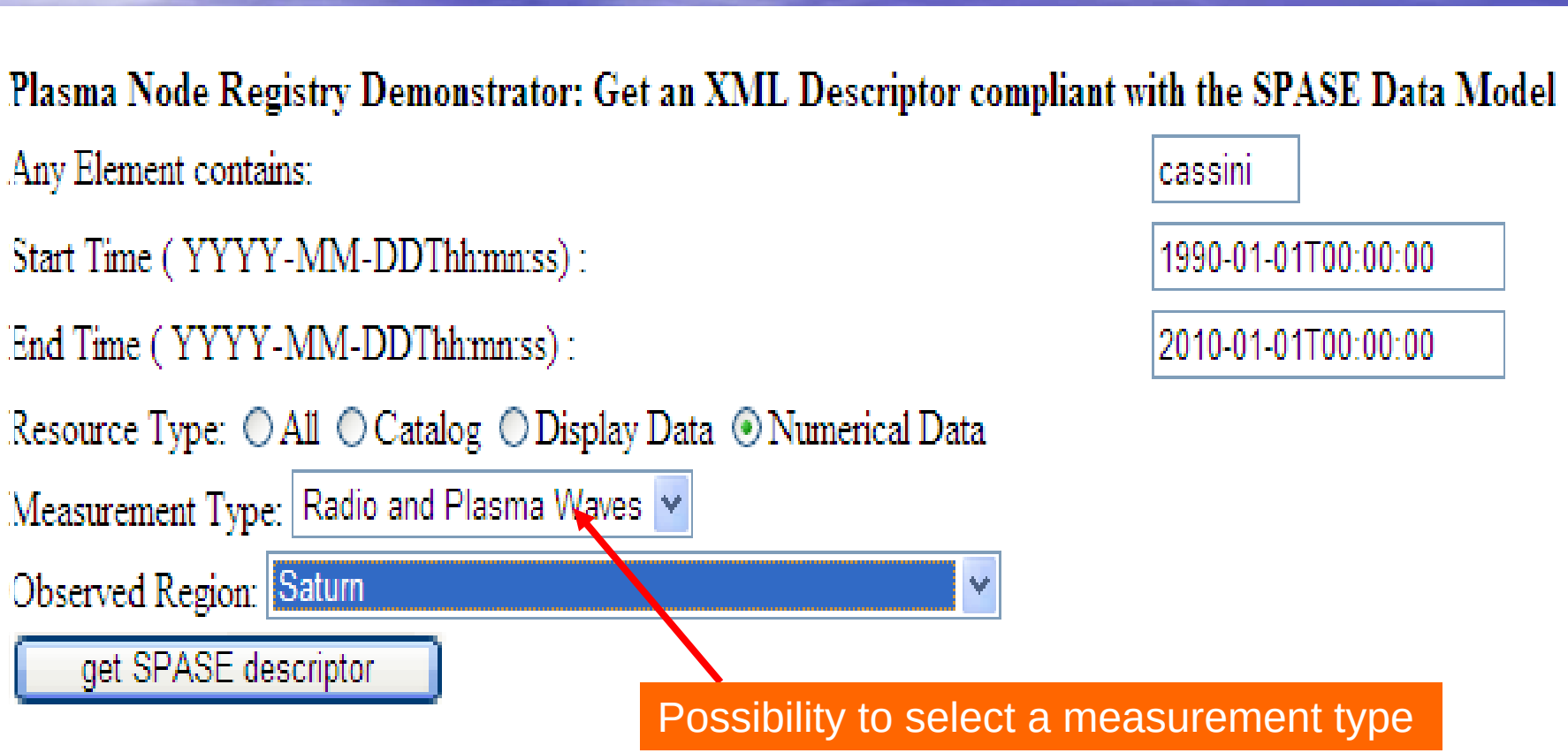
Hierarchical view of the Spase model



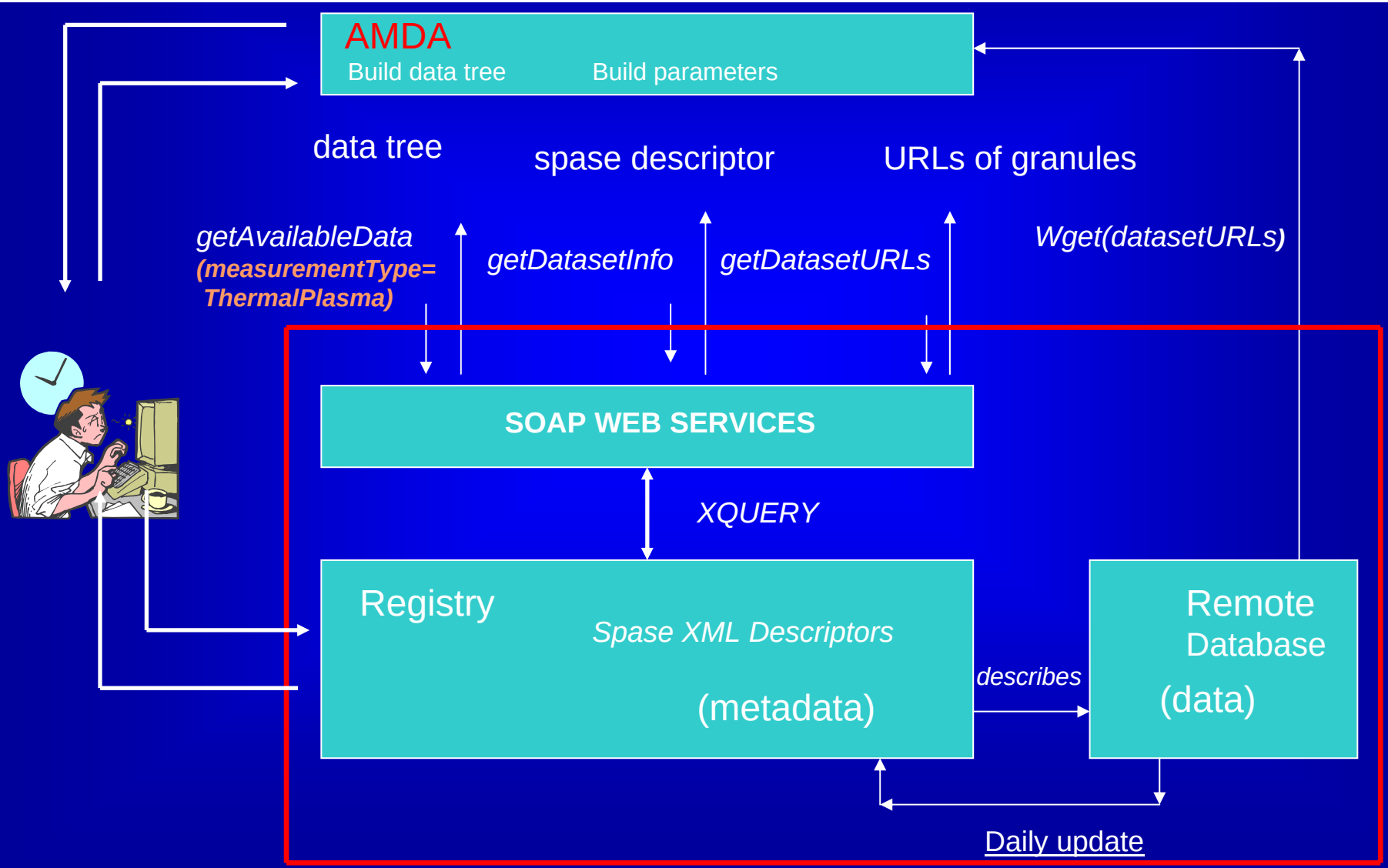
EPN Plasma Node Registry of Data Products

- Set of XML descriptors of planetary plasma data (MAPSKP, *VEX*, *MEX*), **down to the physical parameter level**
- Compatible with the SPASE model
- eXist database (XML native)
- Associated Web accessible Search Engine
  - Measurement Type
  - Region
  - Time

Plasma Node Registry Search Web interface



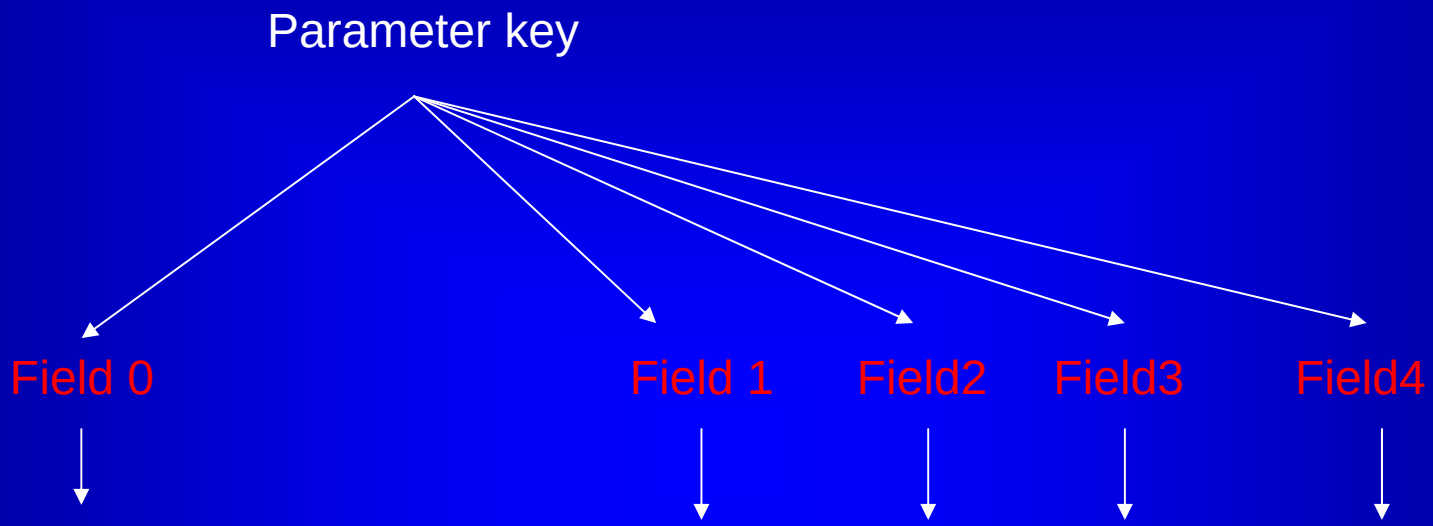
Architecture



An auxiliary XML descriptor is used to describe information needed to access the tabular data in an ASCII file

```
<dataset xml:id="MAG_KG">
        <parameter xml:id="VECTOR">
                <data_type>FLOAT</data_type>
        </parameter>
        <parameter xml:id="MAGNITUDE">
                <data_type>FLOAT</data_type>
        </parameter>
</dataset>
```

An example of Data File : Magnetic Field in KG Coordinates

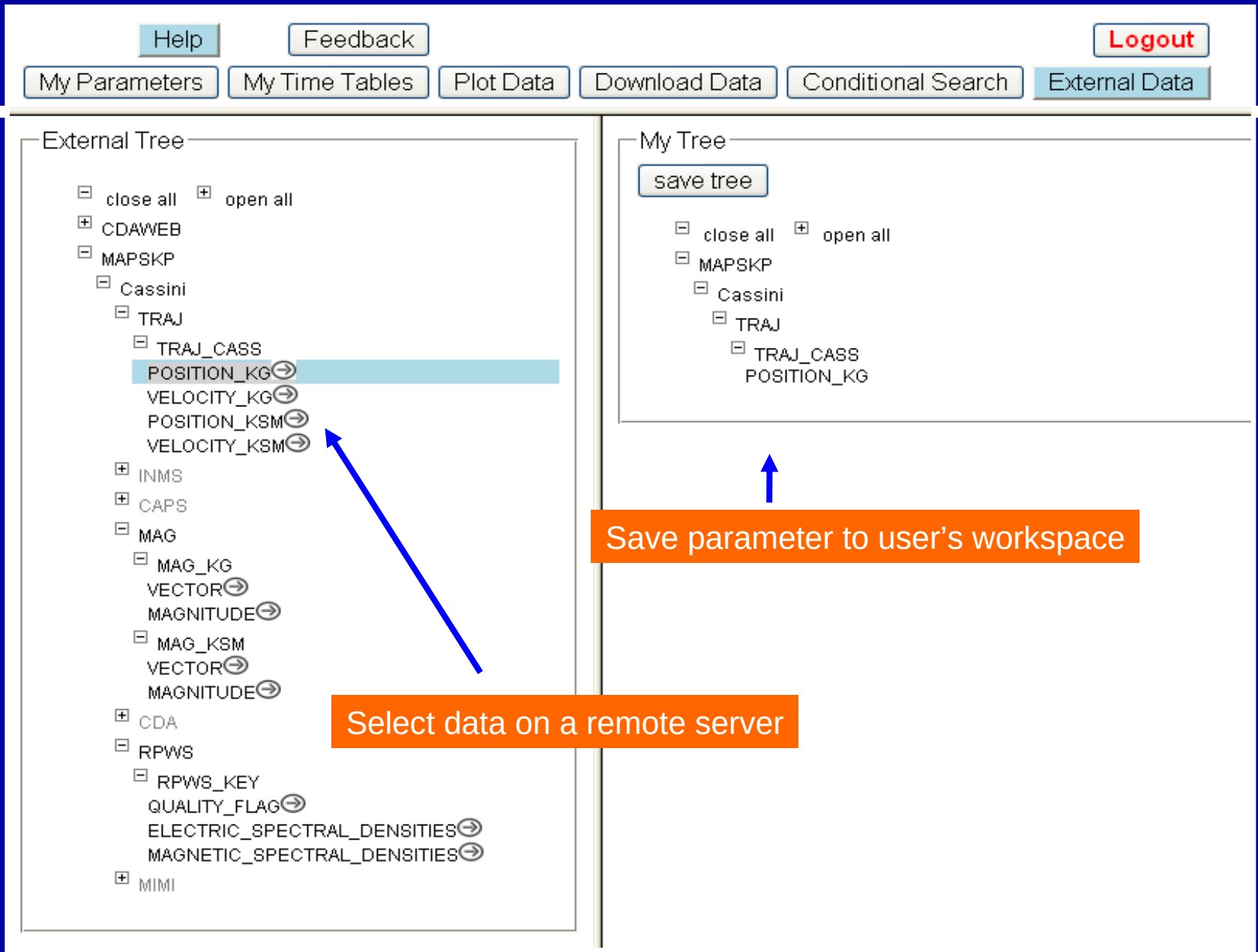


Time [UTC]	Bx	By	Bz	|B|
2004-182T00:00:58.000	0.897	5.648	-2.254	6.147
2004-182T00:01:58.000	0.954	5.669	-2.222	6.163
2004-182T00:02:58.000	0.897	5.648	-2.254	6.147
2004-182T00:03:58.000	0.897	5.648	-2.254	6.147

```
<PhysicalParameter>
  <Name>Time_UTC</Name>
  <ParameterKey>Field0</ParameterKey>
  <Description>Sample UTC in the form yyyy-dddThh:mm:ss.sss</Description>
  <Units/>
  <ValidMin>2004-060T00:00:00.000</ValidMin>
  <ValidMax>2020-366T00:00:00.000</ValidMax>
  <Support>Temporal</Support>
</PhysicalParameter>
```

```
<PhysicalParameter>
  <Name>MAGNETIC_FIELD_VECTOR</Name>
  <ParameterKey>field1</ParameterKey>
  <Units>nT</Units>
  <CoordinateSystem>
    <CoordinateRepresentation>Cartesian</CoordinateRepresentation>
  </CoordinateSystem>
  <Structure>
    <StructureType>Vector</StructureType>
    <Size>3</Size>
    <Description/>
    <Element>
      <Name>Bx</Name>
      <Index>1</Index>
      <ParameterKey>Field1</ParameterKey>
    </Element>
    <Element>
      <Name>By</Name>
      <Index>2</Index>
      <ParameterKey>Field2</ParameterKey>
    </Element>
    <Element>
      <Name>Bz</Name>
      <Index>3</Index>
      <ParameterKey>Field3</ParameterKey>
    </Element>
  </Structure>
  <Measured>
    <Field>
      <FieldQuantity>Magnetic</FieldQuantity>
    </Field>
  </Measured>
</PhysicalParameter>
```

Use « ParameterKey » to read Elements


Help
Feedback
Logout
My Parameters
My Time Tables
Plot Data
Download Data
Conditional Search
External Data
External Tree
close all
open all
CDAWEB
MAPSKP
Cassini
TRAJ
TRAJ_CASS
POSITION_KG
VELOCITY_KG
POSITION_KSM
VELOCITY_KSM
INMS
CAPS
MAG
MAG_KG
VECTOR
MAGNITUDE
MAG_KSM
VECTOR
MAGNITUDE
CDA
RPWS
RPWS_KEY
QUALITY_FLAG
ELECTRIC_SPECTRAL_DENSITIES
MAGNETIC_SPECTRAL_DENSITIES
MIMI
My Tree
save tree
close all
open all
MAPSKP
Cassini
TRAJ
TRAJ_CASS
POSITION_KG
Save parameter to user's workspace
Select data on a remote server

Conclusion

SPASE is a good candidate to describe and access remote plasmas physics data with AMDA

More work is needed to handle more complex queries