Heliophysics Integrated Observatory

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Instrument Location Service User Manual

Version 0.1

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Revision History

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1. Introduction

The Instrument Location Service (ILS) was created as a helper service to enable more precise data requests to the Data Provider Access Service (DPAS). The ILS allows a client to determine which instruments are capable of viewing any particular event. The ILS can specify which instruments are available and therefore able to see a particular event or set of event(s), but does not give instrument location. The ILS was created to further help the client by filtering down the location, with the ILS a client can be certain which instruments should be able to view the event further allowing the client to easily obtain the data 'if needed' from the DPAS.

1.1. Suggested Reading

To build the service	
Helio Interface Specification	Service Interface Specification.docx
Helio API	Helio API
Java (compile service)	http://www.oracle.com/technetwork/java/javase/overview/index.html
Tomcat (web container to host the service)	http://tomcat.apache.org/
Maven (build system)	http://maven.apache.org/ (or use a plug-in to your development environment)
To extend the service	
SOAP + WSDL (web service definition)	http://www.w3.org/TR/wsdl (or use a plug-in to your development environment)
ILS Database Design	Helio_ICS_ILSDBStructure.doc

2. Use

The ILS service has several methods of access to query on the data and obtain results. ILS by default responds in an XML IVOA Votable format. The ILS response requires the client to query on a particular table located in a relational database. A client may do simple time based queries or more complex queries to obtain the needed results. Access to the ILS service are:

2.1. Helio Front End

The most common to interact with all Helio services including the ILS is the standard Front End produced by Helio.

Access to the Front end is make with the: http://helio.i4ds.technik.fhnw.ch/Helio-dev/

See Figure 1 for a screen shot of the Helio Front End with a particular link marked to access the ILS service.

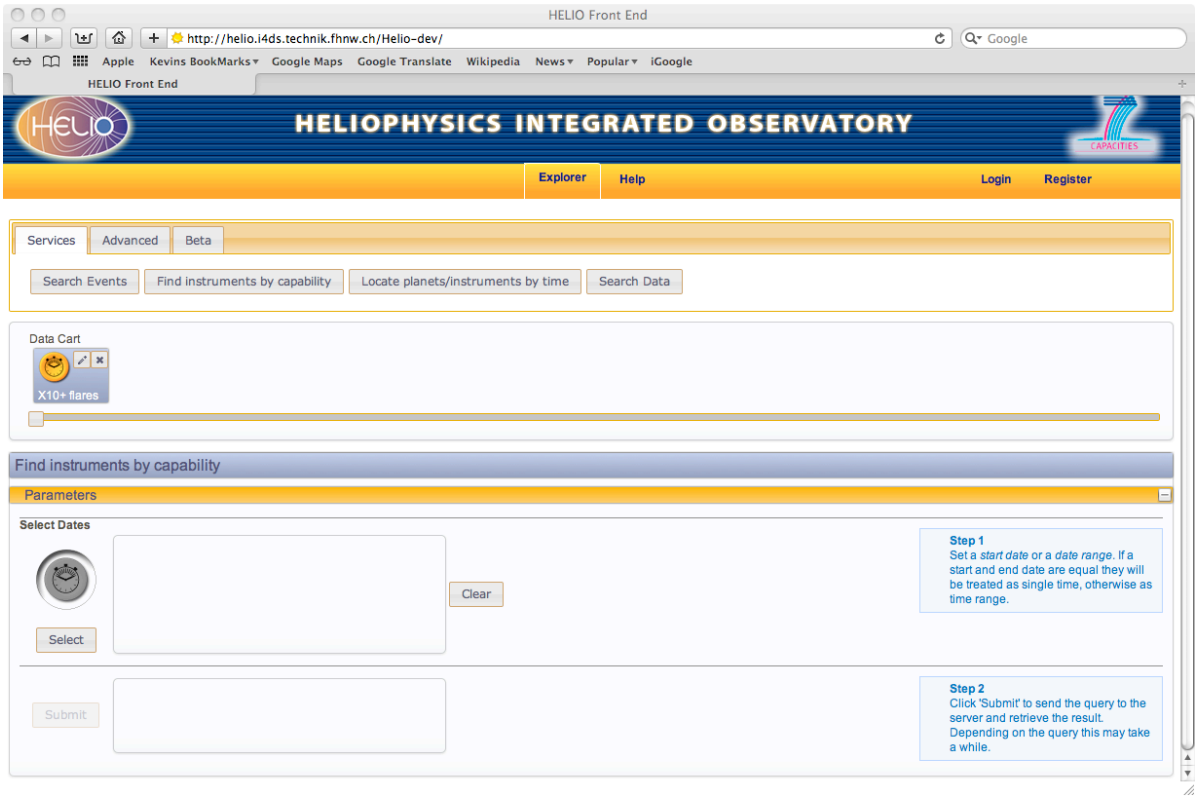

Fig 1. Helio Front-End

2.2. Testing Website

A website to test the individual services was produced and a specific ILS entry can be found here:
http://www.helio-vo.eu/services/interfaces/helio-ils_ui8.php

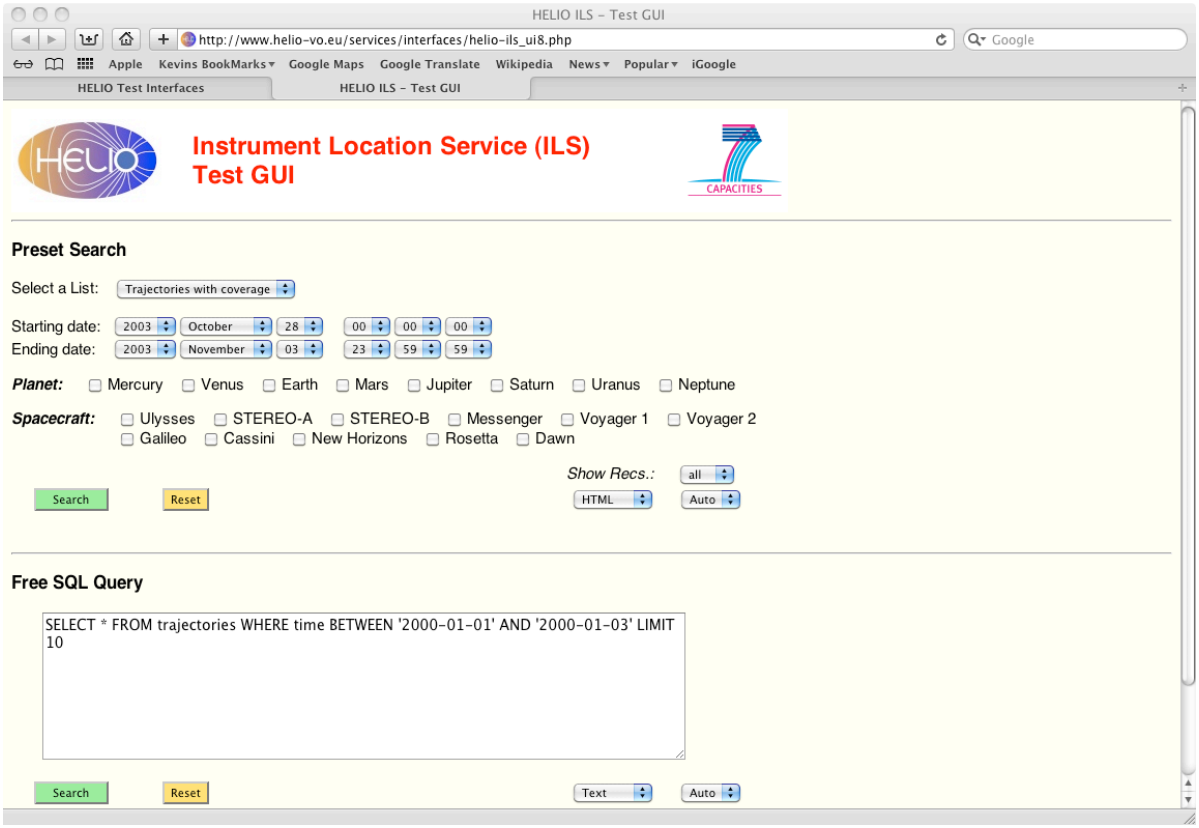

Fig 2. Helio Front End ILS Search page.

2.3. Helio API

Helio Application Programmers Interface is a full API to access many of the Helio services in both Java and IDL. See the Helio API documentation.

2.4. Restful Service

Standard wget, curl, or even a standard web browser can be used to query the ILS. See the DBStructure and Interface Specification documents for detailed querying and available fields to be queried on.
Common Time based query is shown below:

http://msslkz.mssl.ucl.ac.uk/helio-ils/HelioQueryService?STARTTIME=2009-10-15T20:30:56&ENDTIME=2009-10-20T20:30:56&FROM=trajectories

2.5. SOAP

Several programming languages allow the reading of a WSDL (Web Service Description Language). Primary ILS location wsdl can be found here:
http://msslkz.mssl.ucl.ac.uk/helio-ils/HelioService1_0?wsdl

2.5.1. Java

Java contains an application called 'wsimport' that allows the client to give a url or filename of a WSDL.

2.5.2. Perl

Perl provides two libraries for interactions with SOAP

- SOAP::Light
- SOAP::WSDL

2.5.3. IDL

There is no add-on or library to enable SOAP in IDL. Users would have to create there own SOAP calls.

3. Functionality

Details of the SOAP and Restful interfaces along with parameters are detailed in the Interface Specification. Below is a brief summary of the SOAP interface. The parameters below can also be used on the Restful services.

3.1. Time Query

Common time query frequently used on the ILS.

3.1.1. Inputs (taken from 2.6 of Interface Specification)

- STARTTIME - ISO8601 input Start Time. YYYY-MM-dd['T'HH:mm:ss[SSS]]
- ENDTIME - ISO8601 input End Time. YYYY-MM-dd['T'HH:mm:ss[SSS]]
    - Both start time and end time can have one or array of values; the output response will have data for multiple time(includes start time and end time). Remember MAXRECORDS value is applicable for each pair of start and end time. For example MAXRECORDS=10 and start and end time has 2 pair of value. Votable returned will have 2 tables having 10 records each.
- TIME – Not used by the Helio interface, but defined in the PQL Generic Dataset section. This parameter is best described as STARTTIME/ENDTIME ISO8601 format separated by a '/'.
- **FROM** – Table or Instrument name to query on, one or many tables can be queried; each table name should be separated by comma.

3.1.2. Query

'Query' interface part of the HQI allows more complex queries, it contains all the inputs as a 'TimeQuery' with the added inputs of:

3.1.3. Inputs

- SELECT – specify the returned columns. See section 2.7.2 of the Interface Specification.
- WHERE – See section 2.7.3 of the Interface Specification Document.

3.2. SQLSelect

'SQLSelect' interface is similar to the 'Query' interface, but allows direct SQL where clauses for the WHERE parameter. This is not available for all services, but is available for services that are connected to relational databases i.e. ILS.

3.3. GetTableNames

No Inputs are needed for the GetTableNames interface method and reports all the table names that are connected to the ICS.

3.4. GetFieldNames

Return all the field (or column) information known about a particular table.

3.4.1. Inputs

TableName – String containing a particular table name.

4. VOTable

Outputs of the HQI service including ICS and ILS will contain a IVOA Votable format to describe the returned data. VOTable specification can be found here: http://www.ivoa.net/Documents/VOTable/20091130/

All interfaces to the HQI receive a VOTable format that is normally parsed to be more pleasing to the end-user, though the passing between services is typically a VOTable.

See Helio Query Interface Specification (sections 2.9 and 2.10) for more detailed description of the response of the HQI interface.

4.1. Sample

Below is a smaller version of the Restful Votable result given in section 2.4:
http://msslkz.mssl.ucl.ac.uk/helio-ils/HelioQueryService?STARTTIME=2009-10-15T20:30:56&ENDTIME=2009-10-20T20:30:56&FROM=trajectories

A common easy to use tool used by scientist to process Votables is TopCat and Stilts.
TopCat is a popular GUI version that uses stilts:
http://www.star.bristol.ac.uk/~mbt/topcat/
http://www.star.bris.ac.uk/~mbt/stilts/

Sample:

```
<VOTABLE version='1.1' xmlns="http://www.ivoa.net/xml/VOTable/v1.1">
<RESOURCE> <DESCRIPTION>Helio ILS service information.</DESCRIPTION> <INFO
name="QUERY_STATUS" value="OK"/> <INFO name="EXECUTED_AT" value="2012-06-
29 14:51:47"/> <INFO name="MAX_RECORD_ALLOWED" value="50000"/> <INFO
name="QUERY_STRING" ><![CDATA[SELECT
trajectories.target_obj,trajectories.time,trajectories.julian_int,trajecto
ries.julian_fractional,trajectories.r_hci,trajectories.long_hee,trajectori
es.lat_hee,trajectories.long_hci,trajectories.lat_hci,trajectories.long_ca
```

```
rr FROM trajectories WHERE  ( time>='2009-10-15T20:30:56'  AND time
<='2009-10-20T20:30:56' )  AND target_obj like '%%'  ORDER BY
trajectories.time  LIMIT 50000]]></INFO> <INFO name="QUERY_URL"
><![CDATA[http://msslkz.mssl.ucl.ac.uk:80/helio-
ils/HelioQueryService?STARTTIME=2009-10-15T20:30:56&ENDTIME=2009-10-
20T20:30:56&FROM=trajectories]]></INFO> <TABLE name="ils-trajectories">
<FIELD arraysize="*" datatype="char" name="target_obj"
utype="helio:trajectories.target_object"> <DESCRIPTION>Target
Name</DESCRIPTION> </FIELD> <FIELD arraysize="*" datatype="char"
name="time" ucd="time.phase" utype="helio:time.time" xtype="iso8601">
<DESCRIPTION>Date String</DESCRIPTION> </FIELD> <FIELD datatype="int"
name="julian_int" ucd="time"
utype="helio:trajectories.julian_date.julian_date_int">
<DESCRIPTION>Julian integer</DESCRIPTION> <VALUES null='-2147483648'/>
</FIELD> <FIELD datatype="double" name="julian_fractional">
<DESCRIPTION>Julian Fraction</DESCRIPTION> </FIELD> <FIELD
datatype="double" name="r_hci" ucd="pos.bodyrc.alt;pos.heliocentric"
utype="helio:location.r_hci"> <DESCRIPTION>Radial Distance
AU</DESCRIPTION> </FIELD> <FIELD datatype="double" name="long_hee"
ucd="pos.ecliptic.lon;pos.heliocentric" utype="helio:location.long_hee">
<DESCRIPTION>Solar Ecliptic-HAE longitude</DESCRIPTION> </FIELD> <FIELD
datatype="double" name="lat_hee" ucd="pos.ecliptic.lat;pos.heliocentric"
utype="helio:location.lat_hee"> <DESCRIPTION>Solar Ecliptic-HEE
latitude</DESCRIPTION> </FIELD> <FIELD datatype="double" name="long_hci"
ucd="pos.bodyrc.long;pos.heliocentric" utype="helio:location.long_hci">
<DESCRIPTION>HGI Longitude</DESCRIPTION> </FIELD> <FIELD datatype="double"
name="lat_hci" ucd="pos.bodyrc.lat;pos.heliocentric"
utype="helio:location.lat_hci"> <DESCRIPTION>HGI Latitude</DESCRIPTION>
</FIELD> <FIELD datatype="double" name="long_carr" ucd="pos"
utype="helio:location.long_carr"> <DESCRIPTION>Carrington
Longitude</DESCRIPTION> </FIELD> <DATA> <TABLEDATA>   <TR>
<TD>SATURN</TD>     <TD>2009-10-16T00:00:00</TD>     <TD>2455120</TD>
<TD>0.5</TD>     <TD>9.44</TD>     <TD>176.66</TD>     <TD>2.22</TD>
<TD>100.79</TD>     <TD>-4.9</TD>     <TD>121.46</TD>   </TR>   <TR>
<TD>ROSETTA</TD>     <TD>2009-10-16T00:00:00</TD>     <TD>2455120</TD>
<TD>0.5</TD>     <TD>1.14</TD>     <TD>22.9</TD>     <TD>-3.7</TD>
<TD>307.0</TD>     <TD>2.1</TD>     <TD>327.6</TD>   </TR>   <TR>
<TD>DAWN</TD>     <TD>2009-10-16T00:00:00</TD>     <TD>2455120</TD>
<TD>0.5</TD>     <TD>1.61</TD>     <TD>80.5</TD>     <TD>-2.3</TD>
<TD>4.3</TD>     <TD>-2.8</TD>     <TD>25.0</TD>   </TR>
</TABLEDATA> </DATA> </TABLE> </RESOURCE> </VOTABLE>
```