Heliophysics Integrated Observatory

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HFC Developers Guide

0.2

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Date:	20 May 2012
Editor:	**Xavier Bonnin**, ObsParis
Contributors:	Jean Aboudarham, Christian Renié, Nicolas Fuller
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Revision History

Version	Date	Released by	Detail
0.1	20/03/2012	X.Bonnin	First draft
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Note: Blank

Introduction

The Heliophysics Feature Catalogue (HFC) is a database-oriented service of the Heliophysics Integrated Observatory (HELIO). It provides access to solar and heliospheric feature information, extracted by recognition codes (FRC), then ingested into the catalogue using automated scripts. Both human (as web GUI) and machine (as a SOAP web service) queries are supported by the service through dedicated interfaces.

Suggested Reading

To build the service	
Java (compile service)	http://www.oracle.com/technetwork/java/javase/overview/index.html
Tomcat (web container to host the service)	http://tomcat.apache.org/
HTTPD (HTTP server)	http://httpd.apache.org/
Maven (build system)	http://maven.apache.org/ (or use a plug-in to your development environment)
STILTS (command-line tools based on STIL, the Starlink Tables Infrastructure Library)	http://www.star.bris.ac.uk/~mbt/stilts/
AWStats - Free log file analyzer for advanced statistics	http://awstats.sourceforge.net/
To extend the service	
SOAP + WSDL (web service definition)	http://www.w3.org/TR/wsdl (or use a plug-in to your development environment)

System Requirements

System requirements for the HFC are listed in the following table:

Name	Version	Comment
MySQL	5.0.xx or greater	***Mandatory:*** *required to store FRC data.*
Sun Java 6 runtime	6 or greater	***Mandatory:*** *required to run Apache softwares, and to execute database ingestion programs.*
Apache Tomcat	6.0 or greater	***Mandatory:*** *required to host the Helio Query Interface (HQI). Others web containers like Glassfish 3 can be used as alternative.*

Apache http server	2.2.xx or greater	***Optional:*** *used as a proxy server for the HFC interfaces.*
AWstats		***Optional:*** *used as statistical analyser.*
PHP	5.3 or greater	***Mandatory:*** *used by the GUI.*
STILTS	2.4 or greater	***Mandatory:*** *used to query the HFC using SSW/HELIO package, and to create VOTables and CSV files from the GUI.*
Python	2.6 or 2.7	***Optional:*** *used to run some useful scripts*

HFC was developed and tested under Red Hat 4.1.2-52 Linux and FreeBSD 8.2 OS.

Service Installation

Dependencies

mysql-connector-java-5.0.6-bin.jar
PHP modules: SOAP, XML, GD, MYSQL
Python modules: MySQLdb, argparse

Downloading the Source

After having installed all the required packages, the source tree ***helio-hfc*** can be found in the HELIO SVN repository:

http://helio-vo.svn.sourceforge.net/svnroot/helio-vo/trunk/helio-hfc

The source tree contains three folders *helio-hfc-database*, *helio-hfc-server*, and *helio-hfc-gui*.

Building the Database

To retrieve the latest release of the HFC database, download and restore the *helio-hfc/helio-hfc-database/scripts/sql/hfc_create.sql* script file from the SVN repository. This script permits to copy all of the tables and views of the HFC into a MySQL database.
It must be notice that this script will not create this database it-self, neither user accounts with restricted access rights[1]; the administrators of the MySQL server must previously do this first step, by configuring the mysql database in root mode. We suggest to provide at least two access levels to the database:

- A full access level (i.e., read/write) that allows developers to modify/update/add tables and insert FRC data into the catalogue.
- A restricted access level (i.e., read-only) that allows users to query the catalogue.

[1] By default, all of the user account definitions used in the script are set to CURRENT_USER, assuming that this user has the appropriate privileges to write into the database.

To create a new database with the appropriate access privileges, please refer to the dedicated MySQL documentation accessible from the main web site: http://www.mysql.com/.

Note: This script does not contain any FRC data. To know how inserting data into the catalogue, read *Adding new Data* Section at the end of this document.

Installing the Interfaces

HQI

A war archive file containing the latest release of the Helio Query Interface (HQI) can be found in:

http://sourceforge.net/projects/helio-vo/files/.

To deploy the HQI in Tomcat or GlassFish, please refer to the installation guide "Service Interface Specification.docx".
Once the HQI is up and running, make sure that the property file is configured with the right Java DataBase Connectivity (JDBC) information (an example of such a property file for the HFC, **hfc-hqi-property.txt**, can be found in the *helio-hfc-server/config* directory), and that the *WEB-INF/**web.xml*** file is correctly setup with the current property file's path, by editing the `<env-entry-value>/path_to_the_property_file</env-entry-value>` line.

Note: To easily produce the property file for the HFC, edit and execute the *hfc_hqiManager.py* python script stored in *helio-hfc-server/scripts* folder. To see the list of script's input arguments, just enter "python hfc_hqiManager.py --help" from the prompt.
The script requires two ascii files to be run: a first one that contains JDBC information, and a second one, optional, that defines constraints on some interface keywords. (Examples of such JDBC and constraint input files can be found in *helio-hfc-server/config/inputs* folder.)

Web GUI

Installation is made with a SVN export of http://helio-vo.svn.sourceforge.net/svnroot/helio-vo/trunk/helio-hfc/helio-hfc-gui.

Configuration file: global.php
Required:
Parameters for accessing the HFC database (MYSQL server, schema, user).
BIN_PATH: binary path for system tools like wget (default is /usr/bin)
STILTS_EXE: STILTS command with path to be used for creating VOTables and CSV files from SQL queries
FONT_PATH: path to the TTF file font used by JPGRAPH
Optional:
DEFAULTS_FIELDS_feat: mandatory fields of the feat table/view to include in a query
OPT_FIELDS_feat: list of optionnal fields of the feat table/view that a user can select through the 'Output options' tab of the GUI

STILTS

In order to query the HFC using the HELIO package of SolarSoft (SSW), an instance of STILTS must be installed on the server. Last version of the software can found from the web site http://www.star.bris.ac.uk/~mbt/stilts/.
To start the STILTS server, enter the following command line:

java -classpath stilts.jar:/path_to_mysql_connector_lib/mysql-connector-java-5.0.6-bin.jar -Djdbc.drivers=com.mysql.jdbc.Driver uk.ac.starlink.ttools.Stilts server tasks="sqlclient tcopy" port=8080 &

Note: the port number (here 8080) might be different, depending on the server's configuration.

Structure of the Code

Web GUI

The following table provides the list of scripts/files used to run the GUI.

Script	Description	Standalone	Parameters
but_menu.php	Main top and bottom menu		
classdatej.php	Julian dates class		
common.php	common javascript used in index.php		
common_result.js	common javascript used in results.php		
db_content.php	Database content page		
drawgraph_globalview_sep.php	HFC list entry population graph	yes (PNG image)	none
drawgraph_yearview.php	HFC content for one year	yes (PNG image)	none
feat_int.png			
footer.php	common footer		
FP7-cap-RGB12.gif	Logo FP7		
functions.php	various functions		
get_track_info.php	Filament tracking page	yes	id : Database index of a filament
global.php	configuration file		
graph_param_feat.php	Feature parameter evolution graph	yes (PNG image)	id : Database index of a filament, feat : feature type, param : database field name
header.php	common header		
helio_logo4_sm.jpg	Logo HELIO		
help.php	Database and fields description page	yes	
hfc_sql_query.php	SQL Free search page		
hfc_to_csvxml.php	Makes CSV ou VOTable file		
hps_pm.php	Calls propagation model	yes	m: modele number, dt : date obs, lon : longitude
index.php	home page		
jpgraph	Graph library		
js	Directory for external javascript modules		
legende_map_carr.png	Carrington maps legend		
logo-lesia-full.jpg	Logo LESIA		
makemap_carr.php	Create a PNG image of Carrington map at a given date	yes (PNG image)	date : date obs, feat : feature type or all, zoom : zoom factor
makemap_pixobs.php	Create a PNG image of pixel map at a given date, with observation image (opt)	yes (PNG image)	date : date obs, feat : feature type, obs : with observation image, noaa : with NOAA
make_rs.php	Create a PNG image of a feature raster scan	yes (PNG image)	what : feature type pro|sp, id : feature database id
paramsol.php	Various functions for Sun parameters		
plot_solar_struct.php	Various functions fro drawing solar features		
plot_t2.php	Create a PNG image of pixel map at a given date, with observation image (opt) for types II	yes (PNG image)	
plot_t3.php	Create a PNG image of pixel map at a given date, with observation image (opt) for types III	yes (PNG image)	date : date obs, obs:with observation image, zoom : zoom factor
print_res_hour.php	Prints results for one hour		
print_tab_hours.php	Prints results for one date		
results.php	Main results page		
showmap.php	Manage printing of the various map		

Script	Include or require
index.php	functions.php
	header.php
	but_menu.php
	common.php
	footer.php
results.php	functions.php
	header.php
	but_menu.php
	common_result.js
	footer.php
hfc_to_csvxml.php	functions.php
print_tab_hours.php	functions.php
makemap_carr.php	functions.php, plot_solar_struct.php
print_res_hour.php	functions.php
plot_t3.php	functions.php, jpgraph
plot_t2.php	functions.php, jpgraph
makemap_pixobs.php	functions.php, plot_solar_struct.php
hps_pm.php	
make_rs.php	functions.php
get_track_info.php	functions.php, header.php, js/carousel/jcarousellite_1.0.1
graph_param_feat.php	functions.php, jpgraph
footer.php	but_menu.php
db_content.php	functions.php, header.php, but_menu.php, footer.php
drawgraph_globalview_sep.php	functions.php, jpgraph
drawgraph_yearview.php	functions.php, jpgraph
help.php	functions.php, header.php
hfc_sql_query.php	functions.php, header.php, but_menu.php, footer.php
functions.php	global.php, paramsol.php, classdatej.php
common.php	js/uploadvot.js
header.php	js/DataTables-1.9.0/media/js/jquery.dataTables.min.js, js

Logging

HQI:
Read the dedicated installation guide.

Web GUI:
The SQL queries are logged in /tmp/hfcgui_*schema*.log
where *schema* is the name of the MySql schema.

Maintaining & Extending the Service

The service does not require any particular maintenance; just make sure that the HFC database, the HQI and the GUI are up-to-date (checking regularly *helio-hfc* source tree in the SVN repository).

Adding new Data

Because of the constraints between tables (see Figure 1), new data produced by recognition codes must be ingested in a given way. The following list gives the tables to update by order of insertion (the terms in bracket indicate if data must be provided by FRC or not):

1. OBSERVATORY table (mandatory)
2. OBSERVATIONS table (mandatory)
3. PP_INFO table (mandatory only if pre-processing steps were performed on the original observation before the detection)
4. PP_OUTPUT table (mandatory only if pre-processing steps were performed on the original observation before the detection)
5. FRC_INFO table (mandatory)
6. [FEATURE] table (optional)
7. [FEATURE]_TRACKING table (optional)

Note: In the case where no feature has been detected by a FRC for a given image/observation, only the OBSERVATORY, OBSERVATIONS, and FRC_INFO tables[2] must be at least updated.

Format of the FRC data as well as the way to insert them into the database are let at the discretion of the administrators. However, Java scripts to add data from current FRC available can be found in the *helio-hfc/helio-hfc-database/hfc_insert/src* folder for convenience. These scripts can read semiColon-Separated Values (CSV) format files from a local disk or from a distant ftp server.

Note: Copies of latest csv data files provided by people in charge of FRC, are archived by the Observatoire de Paris in the following ftp server:

ftp://ftpbass2000.obspm.fr/pub/helio/

[2] Or the OBSERVATORY, OBSERVATIONS, PP_INFO, PP_OUTPUT, and FRC_INFO tables, if detections require pre-processings.

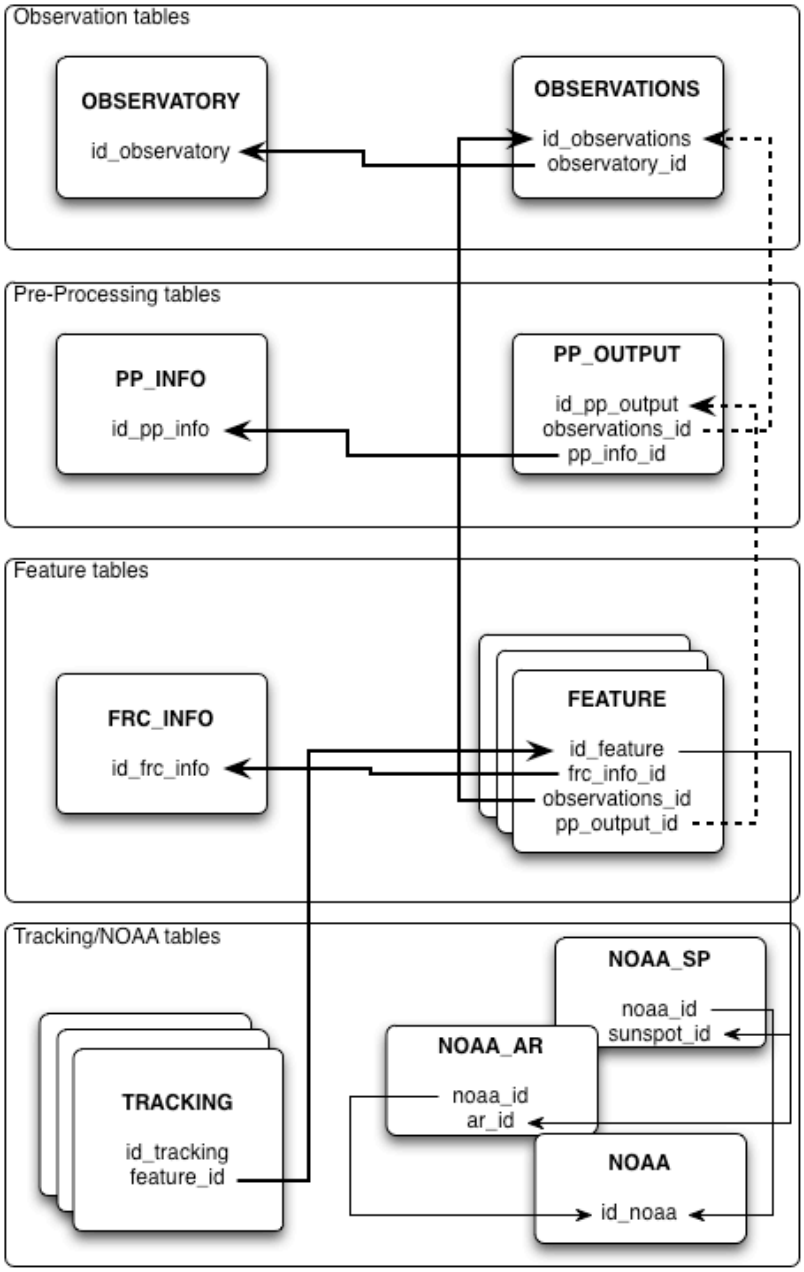

Figure 1. Cross-references between tables in the database.