EFIGI

http://www.efigi.org

Web services at TERAPIX

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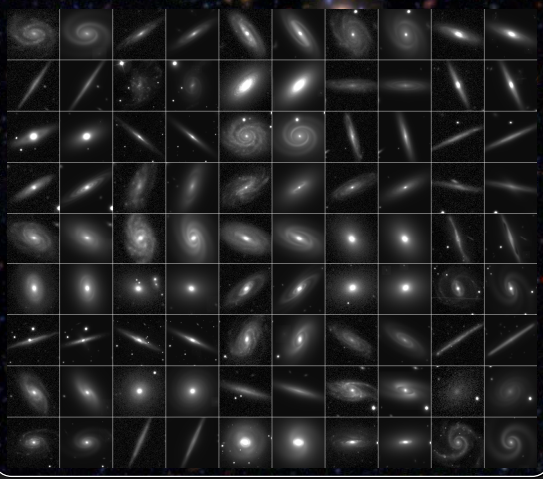
We present an implementation of V.O.-compliant web services built around software tools developed at the TERAPIX centre. These services allow to operate from a remote site several pipeline tasks dedicated to astronomical data processing on the TERAPIX cluster, including the forthcoming EFIGI morphological analysis tool.

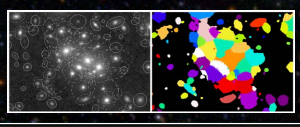
The EFIGI project

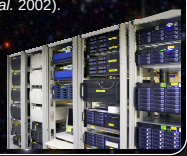
EFIGI (Extraction de Formes Idealisées de Galaxies en Imagerie) is a 3-year project coordinated by TERAPIX (Baillard et al. 2006). The main objective of EFIGI is to provide the community with robust and efficient software tools to automatically measure the shapes of galaxies from astronomical images.



TERAPIX

TERAPIX (Traitement Élémentaire, Réduction et Analyse des PIXels de megacam) is an astronomical data reduction centre located at IAP (Institut d'Astrophysique de Paris) and dedicated to the processing of extremely large data flows coming from from digital sky surveys.
TERAPIX develops, distributes and maintains a set of software tools for astronomical data processing and analysis (Bertin *et al.* 2002).





Rationale

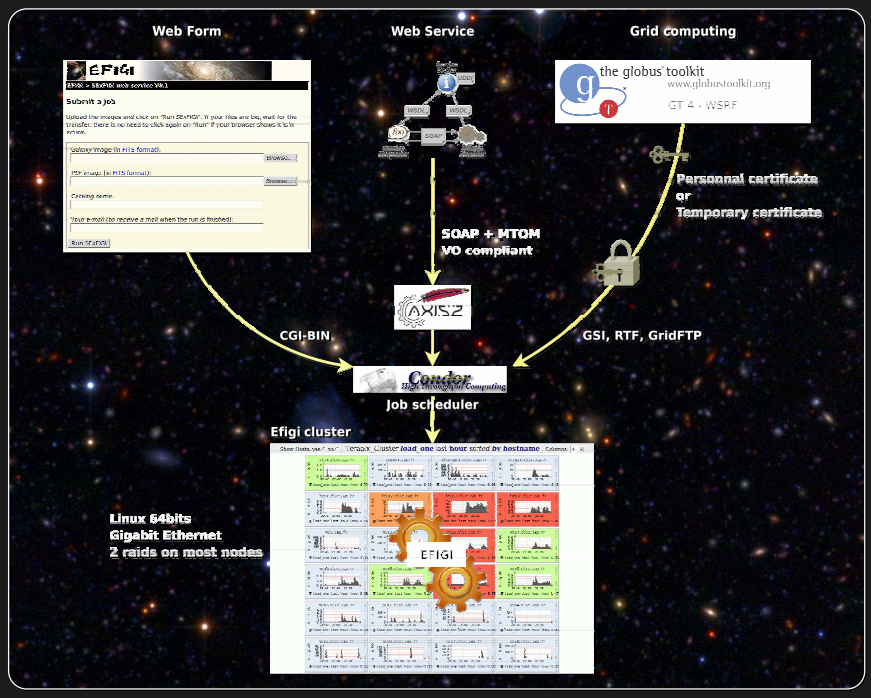
Instead of developing a web service dedicated only to galaxy morphology measurements, we investigated the possibility to offer a simple and generic mean to access several services related to astronomical image analysis/processing.
These services have in common that they are all directly related to executables that work on or generate FITS data files and XML-VOTable metadata files in batch mode. The executables have been developed and are maintained in-house, which means that they can easily be modified if needed.
Since users have different needs, we provide three ways to run our services:

- a web form for testing or occasional runs.
- a web service to pipe to other services or to include in programs.
- a Globus interface, the gate of the Grid computing, for more intensive uses.

Technology and conformance to standards

The astronomical community is currently involved in an international effort to normalise the format of metadata and web service protocols: the Virtual Observatory (VO). It would therefore be logical to design a system which conforms as much as reasonably possible to the VO recommendations.

- The tools designed at TERAPIX provide support for VOTables in output (although it is not yet clear whether this standard will remain popular in the future).
- Our web service prototype transfers files with MTOM according the new VO recommendations. Unfortunately this new protocol is rarely included in Web service libraries. Java and .NET can run MTOM but not Python nor Perl.
- The Grid service, based on Globus, offers reliable file transfer (RFT), security, accounting and the ability to connect to other VO Grid like the Japanese VO (Ohishi *et al.* 2004) or the German AstroGrid.



How to use it

- **The Web form**: http://efigix.iap.fr/ws/efigi_wi.html Fill the form, press "Run EFIGI". A mail is sent at the end of your run.
- **The Web service**: http://efigix.iap.fr:8080/axis2/services The WSDL description of the service, can be translated into your favorite language as long it knows MTOM. An example of client code written in Java is provided. It uses the Axis 2.1.3 version of WSDL2Java.
- **The Grid service**: http://efigix.iap.fr/ws/globus.html One needs to install Globus Toolkit and to have a certificate to use the Grid service. A certificate can be delivered for a week (automatic) or longer (send us a request).

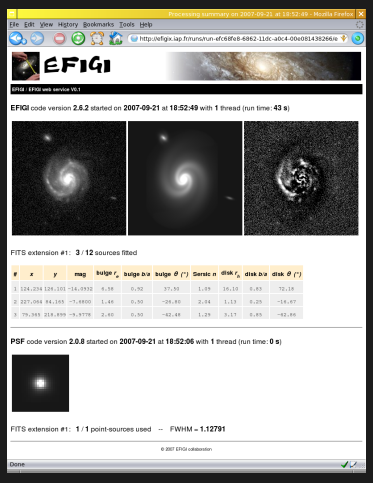
The EFIGI prototype

The EFIGI pipeline prototype is based on modified versions of several TERAPIX Tools including **nFIGI**, **PSFEx**, **SExtractor**, and **STIFF**. It requires two FITS images in input:

- the first image contains one or several galaxies to be measured
- The second image contains the Point Spread Function (it may actually contain a mix of galaxies and point-sources from which a proper model will automatically be derived).

After submission, the job is dispatched by Condor on the TERAPIX cluster. The final product consists of an XML VO-Table containing the morphological measurement vectors and diagnostic images. An XSLT filter is provided to present the results in a user-friendly way.

The current version of the EFIGI web service has limited functionalities and is only meant for testing. We expect the final version and additional services to be online in December 2007. Announcements will be made on the TERAPIX forums **http://terapix.iap.fr/forum**



References

- Axis2, Apache Web Services Engine: http://ws.apache.org/axis2
- Baillard *et al.*, 2006, *in* Astronomical Data Analysis Software and Systems XV, ASP Conf. Series 351, 236
- Bertin *et al.* 2002, in Astronomical Data Analysis Software and Systems XI, ASP Conf. Series 281, 228
- Condor: http://www.cs.wisc.edu/condor
- German Astronomy Community Grid (GACG): http://www.gac-grid.de
- Globus Toolkit: http://www.globus.org/toolkit
- Ohishi *et al.*, 2004, *in* Astronomical Data Analysis Software and Systems XIII, ASP Conf. Series 314, 296