

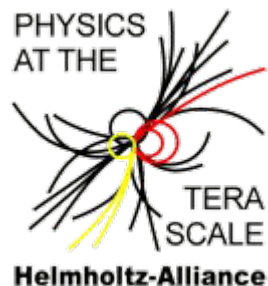


# HappyFace as a meta monitoring tool for the ATLAS experiment

Haykuhi Musheghyan

Under supervision of: Prof. Dr. Arnulf Quadt, Dr. Gen Kawamura, Dr. Jordi Nadal

*II. Physikalisches Institut, Georg-August-Universität Göttingen*



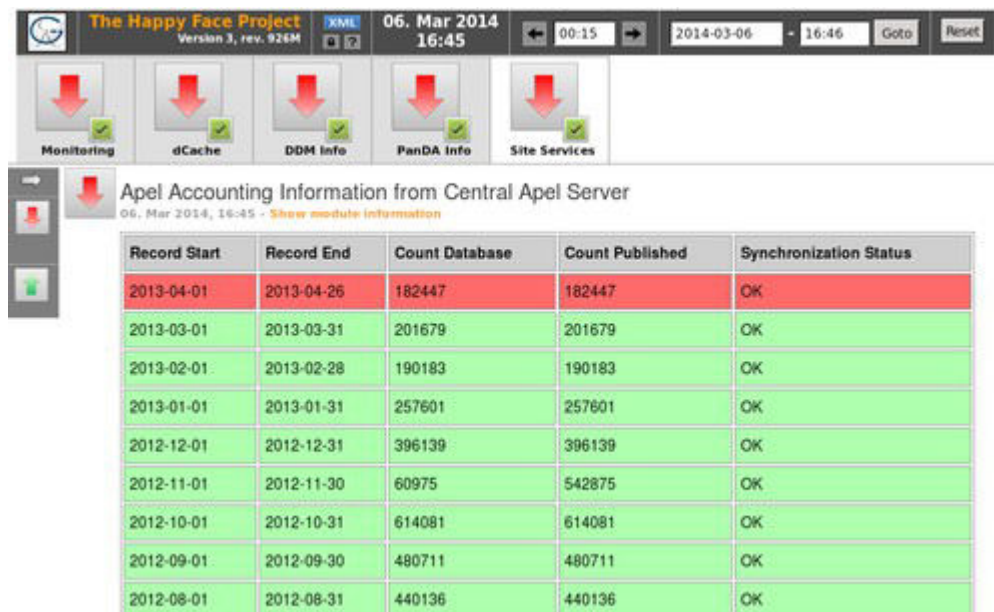
- ➔ **Introduction**
- ➔ **Interface**
- ➔ **Project developers**
- ➔ **Basic workflow**
- ➔ **Database structure**
- ➔ **Developed modules**
- ➔ **Non ATLAS modules**
- ➔ **ATLAS modules**
- ➔ **Web-services**
- ➔ **Installation**
- ➔ **Ongoing development**
- ➔ **Smart monitoring**
- ➔ **Conclusion**

*HappyFace project is a meta monitoring tool to monitor grid sites.*

- Aggregates, processes and stores information from different monitoring sources

## Requirements

- Single access point
- History functionality
- Fast accessibility
- Comfortable usage
- Modular structure
- Up-to-date monitoring information

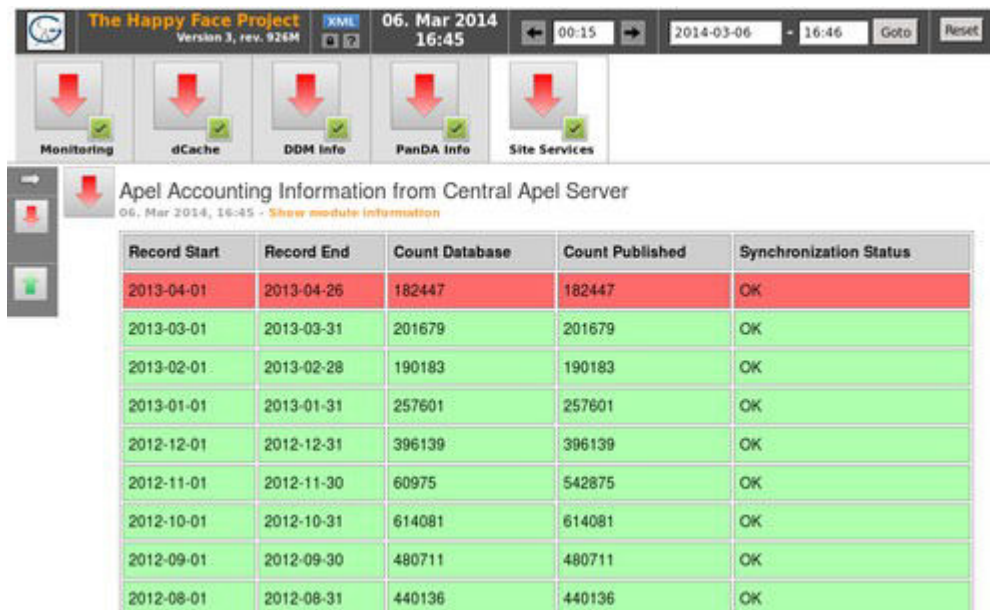


The screenshot shows the 'The Happy Face Project' web interface. At the top, it displays the project name, version (3, rev. 926M), and the current date and time (06. Mar 2014 16:45). Below this, there are five modules: Monitoring, dCache, DDM Info, PanDA Info, and Site Services, each with a red arrow icon and a green checkmark. The 'Monitoring' module is selected, showing 'Apel Accounting Information from Central Apel Server'. The table below lists accounting records with columns for Record Start, Record End, Count Database, Count Published, and Synchronization Status.

Record Start	Record End	Count Database	Count Published	Synchronization Status
2013-04-01	2013-04-26	182447	182447	OK
2013-03-01	2013-03-31	201679	201679	OK
2013-02-01	2013-02-28	190183	190183	OK
2013-01-01	2013-01-31	257601	257601	OK
2012-12-01	2012-12-31	396139	396139	OK
2012-11-01	2012-11-30	60975	542875	OK
2012-10-01	2012-10-31	614081	614081	OK
2012-09-01	2012-09-30	480711	480711	OK
2012-08-01	2012-08-31	440136	440136	OK

HappyFace project is a joint collaboration within the DE cloud in terms of the module development.

*The core has been developed at **KIT (CMS)** and the **Georg-August-Universität Göttingen (ATLAS)***



The screenshot shows the 'The Happy Face Project' monitoring interface. At the top, it displays the project name, version (3, rev. 926M), and a timestamp (06. Mar 2014 16:45). Below this, there are five status indicators: Monitoring, dCache, DDM Info, PanDA Info, and Site Services, each with a red arrow pointing down and a green checkmark. The main section is titled 'Apel Accounting Information from Central Apel Server' and shows a table of accounting data for the period 06. Mar 2014, 16:45. The table has five columns: Record Start, Record End, Count Database, Count Published, and Synchronization Status. The first row is highlighted in red, indicating the current record.

Record Start	Record End	Count Database	Count Published	Synchronization Status
2013-04-01	2013-04-26	182447	182447	OK
2013-03-01	2013-03-31	201679	201679	OK
2013-02-01	2013-02-28	190183	190183	OK
2013-01-01	2013-01-31	257601	257601	OK
2012-12-01	2012-12-31	396139	396139	OK
2012-11-01	2012-11-30	60975	542875	OK
2012-10-01	2012-10-31	614081	614081	OK
2012-09-01	2012-09-30	480711	480711	OK
2012-08-01	2012-08-31	440136	440136	OK

*The interface of HappyFace is the following*

**History  
Navigation**

**Category  
Navigation**

**Module  
Navigation**

**Module  
content**

The screenshot shows the HappyFace interface with a top navigation bar and a main content area. The top bar includes the Happy Face Project logo, version information (Version 3, rev. 926M), a date/time display (13. Jun 2014 12:45), and a search bar with a 'Goto' button and a 'Reset' button. Below the top bar is a row of six modules: Monitoring, DB Webservice, Site Services, dCache, PanDA Info, and DDM Info. Each module has a red down arrow and a green up arrow icon, with a green checkmark indicating status. The main content area is divided into sections. The first section is 'Panda Parsing' with a date/time display and a 'Show module information' link. Below this is a table showing the status of all sites. The second section is 'The GoeGrid Queues Status for HammerCloud Functional Tests' with a date/time display and a 'Show module information' link. Below this is a table showing the status of analysis queues.

Site Name	Queue Name	Queue Type	Status	Efficiency	Active	Running	Defined	Holding	Finished	Failed	Cancelled
GoeGrid	ANALY_GOEGRID	analysis	online	91.0	111	201	0	6	109	10	0
GoeGrid	GoeGrid	production	online	99.0	822	1007	0	51	730	6	0

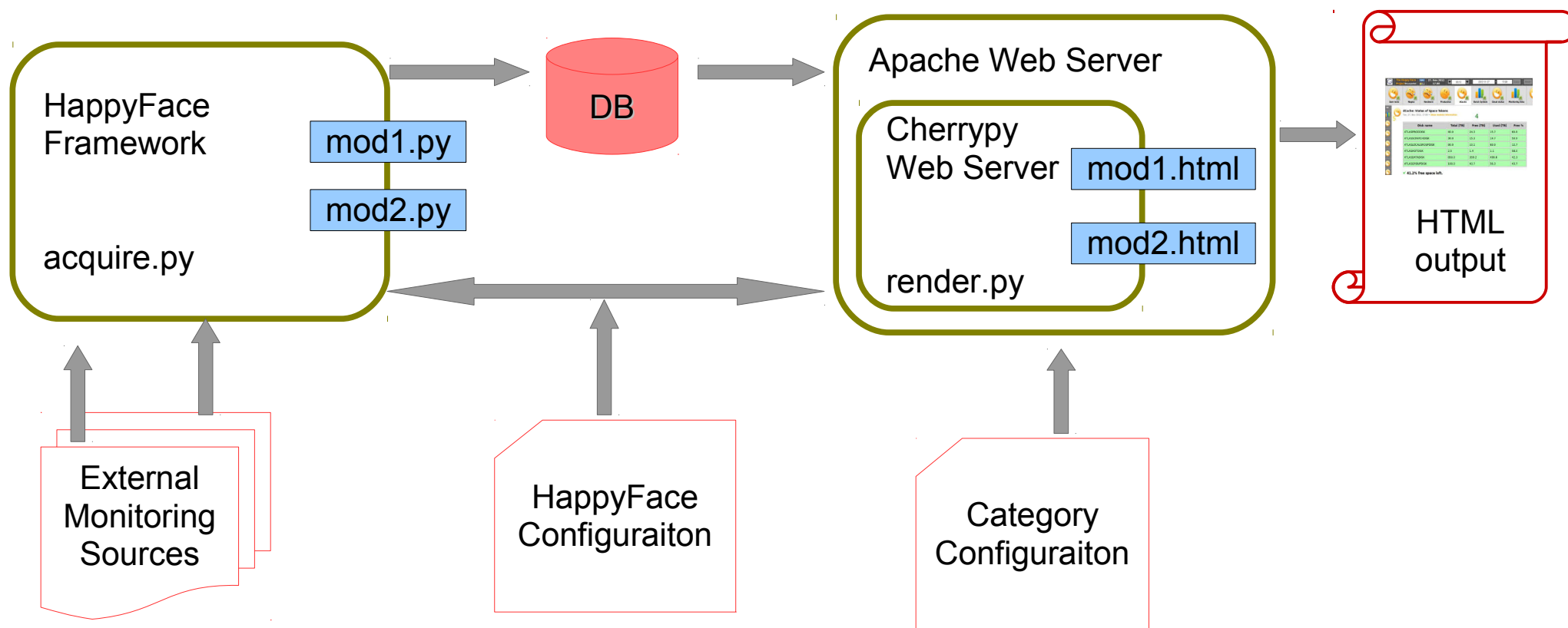
  

Queue Name (always visible)	Status	Link
ANALY_GOEGRID	100	<a href="#">Details</a>

HappyFace has a simple module and category rating system.

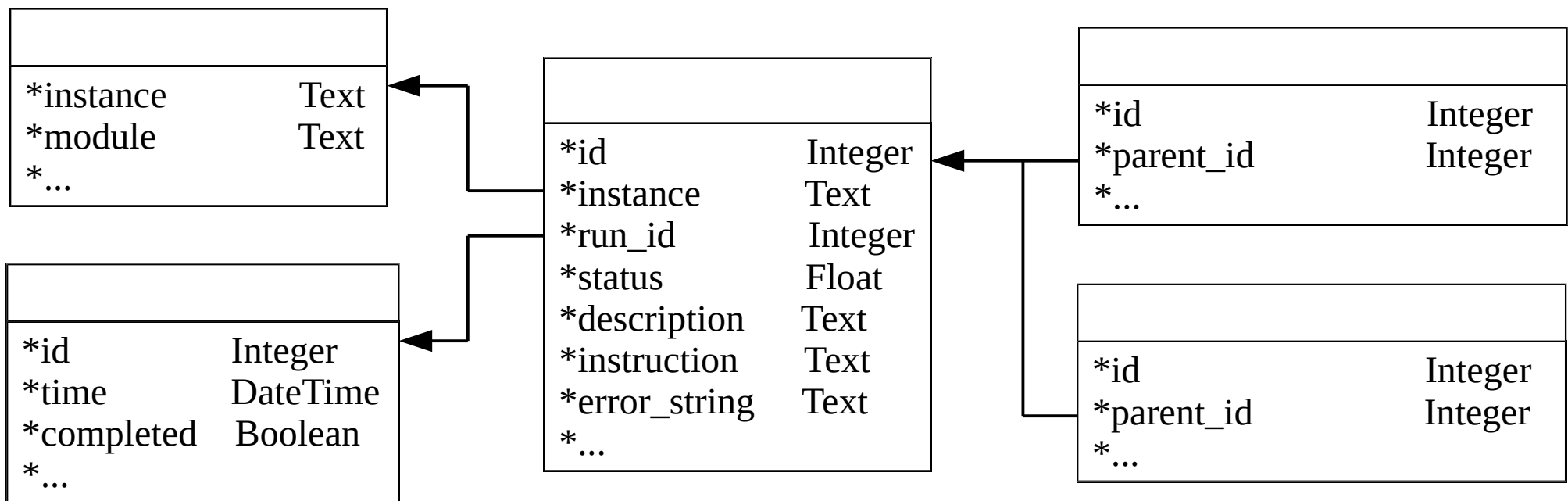
## *Basic workflow of HappyFace*

- Retrieve data from external sources
- Information is stored in SQLite database
- Output is processed by the **HappyCore** as a HTML file



## Database structure of HappyFace

- Each module has exactly ONE module table and can have several subtables
- Only a minimal set of information is stored: name, id, status, etc.



## *The list of developed modules*

### Non ATLAS modules

- Ganglia
- GStat
- SAM tests
- HammerCloud Functional Tests
- Compute Node Information
- Nagios
- dCache Dataset Restore Monitor
- dCache Pool Information
- CreamCE
- PBS

### ATLAS modules

- Apel Accounting
- Panda
- Analysis Ganga Jobs
- DDM Dashboard
- DDM Deletion



**The Happy Face Project** Version 3, rev. 926 **18. Feb 2014 16:57** XML 00:15 2014-02-19 00:40 Goto Reset

Monitoring CREAMDB Info PBS Info Site Services dCache PanDA Info Ganglia DDM Info DB Webservice


**CREAMCE**  
18. Feb 2014, 16:57 - Show module information

Queue	REGISTERED	PENDING	IDLE	RUNNING	REALLY_RUNNING	CANCELLED	HELD	DONE_OK	DONE_FAILED	PURGED	ABORTED	Total
atlas	0	0	7	0	0	0	0	0	0	0	0	7
atlasL	0	0	5	0	0	0	0	0	0	0	0	5
atlasS	0	0	4	0	0	0	0	0	0	0	0	4
atlasXL	0	0	507	3	940	0	0	0	0	0	0	1450
ops	0	0	43	0	0	0	0	0	0	0	0	43
opsL	0	0	2	0	0	0	0	0	0	0	0	2
opsS	0	0	1	0	0	0	0	0	0	0	0	1
opsXL	0	0	3	0	0	0	0	0	0	0	0	3
Total	0	0	572	3	940	0	0	0	0	0	0	1515

## CreamCE

- Queue information
- User information

User	Local User	REGISTERED	PENDING	IDLE	RUNNING	REALLY_RUNNING	CANCELLED	HELD	DONE_OK	_FAILED	PURGED	ABORTED	Total
CN_Maarten_Litmaath_CN_410032_CN_litmaath_OU_Users	sgmops01	0	0	4	0	0	0	0	0		0	0	4
CN_Pavlos_Daoglou_OU_auth_gr_O_HellasGrid_C_GR_ops	ops039	0	0	4	0	0	0	0	0		0	0	4
CN_Robot_ATLAS_Data_Management_CN_531497_CN_ddmad	atlas014	0	0	4	0	0	0	0	0		0	0	4
CN_Robot_ATLAS_Data_Management_CN_531497_CN_ddmad	sgmatl44	0	0	4	0	0	0	0	0		0	0	4
CN_Robot_ATLAS_Data_Management_CN_531497_CN_ddmad	atplt006	0	0	15	0	0	0	0	0		0	0	15
CN_Robot_ATLAS_Pilot1_CN_614260_CN_atlpilo1_OU_Us	atplt001	0	0	333	0	311	0	0	0		0	0	644
CN_Robot_ATLAS_Pilot2_CN_531497_CN_atlpilo2_OU_Us	prdatl46	0	0	167	3	629	0	0	0		0	0	799
CN_Robot_grid_client_Dimitri_Nilsen_OU_KIT_O_Ge	ops009	0	0	41	0	0	0	0	0		0	0	41
Total		0	0	572	3	940	0	0	0		0	0	1515

<div>  <b>The Happy Face Project</b>  Version 3, rev. 926 </div> <div> XML </div> <div> 18. Feb 2014 16:57 </div> <div> 00:15 </div> <div> 2014-02-19 - 01:18 </div> <div> Goto </div> <div> Reset </div>												
Monitoring	CREAMDB Info	PBS Info	Site Services	dCache	PanDA Info	Ganglia	DDM Info	DB Webservice				
Node	REGISTERED	PENDING	IDLE	RUNNING	REALLY_RUNNING	CANCELLED	HELD	DONE_OK	DONE_FAILED	PURGED	ABORTED	Total
N/A	0	0	233	0	55	0	0	0	0	0	0	288
compute-0-10	0	0	6	0	0	0	0	0	0	0	0	6
compute-0-13	0	0	9	0	0	0	0	0	0	0	0	9
compute-0-15	0	0	9	0	0	0	0	0	0	0	0	9
compute-0-17	0	0	11	0	0	0	0	0	0	0	0	11
compute-0-19	0	0	14	0	0	0	0	0	0	0	0	14
compute-0-2	0	0	5	0	0	0	0	0	0	0	0	5
compute-0-21	0	0	25	0	0	0	0	0	0	0	0	25
compute-9-4.local	0	0	0	0	4	0	0	0	0	0	0	4
compute-9-5.local	0	0	0	0	12	0	0	0	0	0	0	12
compute-9-6.local	0	0	0	0	7	0	0	0	0	0	0	7
compute-9-7.local	0	0	0	0	6	0	0	0	0	0	0	6
compute-9-8.local	0	0	0	0	7	0	0	0	0	0	0	7
compute-9-9.local	0	0	0	0	19	0	0	0	0	0	0	19
Total	0	0	572	3	940	0	0	0	0	0	0	1515

*CreamCE*

● Node information

**The Happy Face Project**  
Version 3, rev. 926M

17. Jan 2014 12:45

00:15

2014-02-16 - 16:58

Goto Reset

Monitoring dCache DDM Info PanDA Info Site Services

dCache Pool Information  
17. Jan 2014, 12:45 - [Show module information](#)

Start: 2014-01-15 12:45 End: 2014-01-17 12:45

Pools	63
Pools with status warning	4
Pools with status critical	0
Pools with status warning [%]	6.34920634921
Pools with status critical [%]	0.0
Total Space [TiB]	1050.74
Free Space [TiB]	344.56
Used Space [TiB]	706.18
Precious Space [TiB]	0.90
Removable Space [TiB]	0.30
Free Space/Total Space	0.327922768725

error/warning results




Poolname	<input checked="" type="checkbox"/> Total Space [TiB]	<input checked="" type="checkbox"/> Free Space [TiB]	<input checked="" type="checkbox"/> Used Space [TiB]	<input checked="" type="checkbox"/> Precious Space [TiB]	<input checked="" type="checkbox"/> Removable Space [TiB]	<input checked="" type="checkbox"/> Free Space/Total Space
Toggle Selection	Plot Col	Plot Col	Plot Col	Plot Col	Plot Col	Plot Col
<input checked="" type="checkbox"/> pool-p6-2-data	18.00	1.91	16.08	0.00	0.00	0.11
<input checked="" type="checkbox"/> pool-p1-2-data	17.96	6.95	11.01	0.57	0.00	0.39
<input checked="" type="checkbox"/> pool-p5-7-data	17.98	2.68	15.30	0.00	0.00	0.15
<input checked="" type="checkbox"/> pool-o9-5-data	20.98	10.67	10.32	0.00	0.01	0.51


*dCache Pool Information*

*contains*

- Pools status
- Space usage

**The Happy Face Project** Version 3, rev. 926M [XML](#) 06. Mar 2014 11:15   -

 Monitoring  dCache  DDM Info  PanDA Info  Site Services

 **dCache Dataset Restore Lazy**  
06. Mar 2014, 11:15 - [Show module Information](#)

Total number of stage requests	1
... with status Pool2Pool:	0
... with status Staging:	0
... with status Suspended:	1
... with status Waiting:	0
Stage request with problems	1
... with status Waiting:	0
... with status Suspended:	1
... with status Unknown:	0
... time limit hit (48 hours)	0
... retry limit hit (2)	0

Pool2Pool | Staging | Waiting | Suspended | Unknown | Expired | Tried

*dCache Dataset*

*Restore Lazy contains*

- Total stage requests
- Problematic stage requests

*Panda module contains*

- Analysis queue status
- Production queue status
- Queue status for the HammerCloud Functional Tests
- Analysis for the Ganga jobs

**The Happy Face Project**  
Version 3, rev. 926M

04. Mar 2014 17:00

2014-03-04 - 17:08

Goto Reset

Monitoring dCache DDM Info PanDA Info Site Services

**Panda Parsing**  
04. Mar 2014, 17:00 - [Show module information](#)

Site Name	Queue Name	Queue Type	Status	Efficiency	Active	Running	Defined	Holding	Finished	Failed	Cancelled
GoeGrid	ANALY_GOEGRID	analysis	online	63.0	1020	209	3096	7	88	50	58
	GoeGrid	production	online	99.0	1157	1072	0	25	403	2	0

**The GoeGrid Queues Status for HammerCloud Functional Tests**  
04. Mar 2014, 17:00 - [Show module information](#)

Analysis queues:

Queue Name (always visible)	Status	Link
ANALY_GOEGRID	100	<a href="#">Details</a>

All analysis queues are good.

[show/hide good queues](#)

Production queues:

Queue Name (always visible)	Status	Link
GoeGrid	100	<a href="#">Details</a>

All production queues are good.

[show/hide good queues](#)

**Analysis Ganga Jobs**  
04. Mar 2014, 17:00 - [Show module information](#)

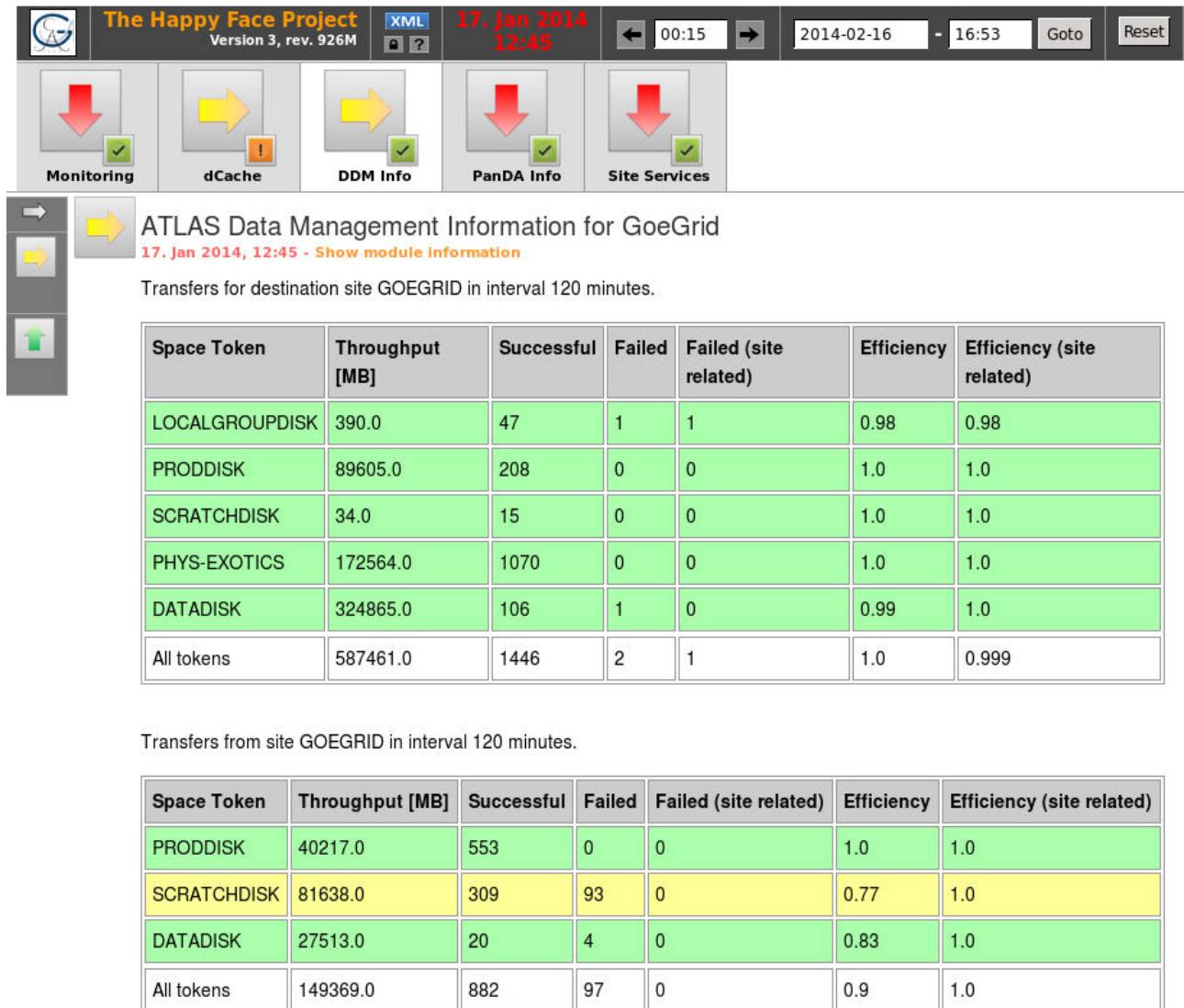
Queue Name (always visible)	Finished	Failed	Def	Ass	Wait	Act	Sent	Run	Hold	Trans
ANALY_GOEGRID	181	1	1	0	0	0	0	4	1	0

[show/hide good queues](#)



## DDM Dashboard contains

- Transfers to GoeGrid within 120 minutes
- Transfers from GoeGrid within 120 minutes
- Dataset deletion efficiency



## DDM Dashboard

### contains

- Transfers to GoeGrid within 120 minutes
- Transfers from GoeGrid within 120 minutes
- Dataset deletion efficiency

#### Dataset Deletion Efficiency for GoeGrid

17. Jan 2014, 12:45 - [Show module information](#)

DDM Deletion for site GOEGRID

	Datasets					Files		Volumes [GB]		
Space Token	To delete	Waiting	Resolved	Queued	Deleted	To delete	Deleted	To delete	Deleted	Errors
GOEGRID_DATADISK	1	0	1	0	1	0	5	0.0	0.03	0
GOEGRID_DET-INDET	0	0	0	0	0	0	0	0.0	0.0	0
GOEGRID_LOCALGROUPDISK	0	0	0	0	0	0	0	0.0	0.0	0
GOEGRID_PHYS-EXOTICS	0	0	0	0	0	0	0	0.0	0.0	0
GOEGRID_PRODDISK	47	0	39	8	57	296	560	38.11	97.49	0
GOEGRID_SCRATCHDISK	11	0	10	1	7	1	99	0.0	0.29	0
Summary	59	0	50	9	65	297	664	38.11	97.81	0

*HappyFace web-services provide an easy access to the*

- Database structure
- Data, stored in the database

*Two kinds of web-service are provided for the database access*

- REST-ful web-service with the JSON output
  - Tuning phase
- W3C-compliant WSDL/SOAP-based web-service with the XML output
  - Tuning phase



**The Happy Face Project**  
Version 3, rev. 926M

05. Mar 2014 10:28

00:15 2014-03-06 - 18:42 Goto Reset

Monitoring CREAMDB Info PBS Info Site Services dCache PanDA Info Ganglia DDM Info DB Webservice

Websocket for HappyFace Database Access  
04. Mar 2014, 12:04 - [Show module information](#)

**Tables**

- ☐ mod\_grid\_ka\_announcement
- ☐ mod\_d\_cache\_data\_management
- ☐ mod\_d\_cache\_info\_pool\_goe
- ☐ mod\_cer\_nd\_cache\_tapeinfo
- ☐ mod\_cms\_phedex\_error\_log
- ☐ mod\_analysis\_ganga\_jobs
- ☐ mod\_rss\_feed
- ☐ mod\_panda
- ☐ mod\_jobs\_dist
- ☐ mod\_compute\_node\_information
- ☐ mod\_multiplot
- ☐ mod\_ganglia\_goe
- ☐ mod\_jobs\_statistics
- ☐ mod\_g\_stat
- ☐ mod\_cms\_phedex\_block\_test\_files
- ☐ mod\_black\_holes
- ☒ mod\_functional\_tests
- ☐ mod\_sam2
- ☐ mod\_sam\_goe
- ☐ mod\_apel
- ☐ mod\_ddm
- ☐ mod\_jobs\_efficiency\_plot
- ☐ mod\_d\_cache\_mover\_info
- ☐ mod\_cms\_phedex\_data\_extract
- ☐ mod\_creamce
- ☐ mod\_ddm\_deletion
- ☐ mod\_ganglia
- ☐ mod\_d\_cache\_dataset\_restore\_lazy
- ☐ mod\_phedex\_stats
- ☐ mod\_webservice

From: 1 Jan 2014 12:45  
To: 04 Mar 2014 12:45

[QUERY!](#)

[Download](#)

**Subtables**

- ☒ mod\_functional\_tests
- ☐ sub\_functional\_tests\_aft\_details
- ☐ sub\_functional\_tests\_pft\_details

**Columns**

- ☒ id
- ☒ instance
- ☒ run\_id
- ☒ status
- ☒ description
- ☒ instruction
- ☒ error\_string
- ☒ source\_url
- ☒ url\_aft
- ☒ url\_pft
- ☒ queues\_aft
- ☒ queues\_pft
- ☒ status\_aft
- ☒ status\_pft

**The Happy Face Project**  
Version 3, rev. 926M

05. Mar 2014 10:28

00:15 2014-03-06 18:42 Goto Reset

Monitoring CREAMDB Info PBS Info Site Services dCache PanDA Info Ganglia DDM Info DB Webservice

**Webbservice for HappyFace Database Access**  
04. Mar 2014, 12:04 - [Show module information](#)

**Tables**

- ☐ mod\_grid\_ka\_announcement
- ☐ mod\_d\_cache\_data\_management
- ☐ mod\_d\_cache\_info\_pool\_goe
- ☐ mod\_cer\_nd\_cache\_tapeinfo
- ☐ mod\_cms\_phedex\_error\_log
- ☐ mod\_analysis\_ganga\_jobs
- ☐ mod\_rss\_feed
- ☐ mod\_panda
- ☐ mod\_jobs\_dist
- ☐ mod\_compute\_node\_information
- ☐ mod\_multiplot
- ☐ mod\_ganglia\_goe
- ☐ mod\_jobs\_statistics
- ☐ mod\_g\_stat
- ☐ mod\_cms\_phedex\_block\_test\_files
- ☐ mod\_black\_holes
- ☒ mod\_functional\_tests
- ☐ mod\_sam2
- ☐ mod\_sam\_goe
- ☐ mod\_apel
- ☐ mod\_ddm
- ☐ mod\_jobs\_efficiency\_plot
- ☐ mod\_d\_cache\_mover\_info
- ☐ mod\_cms\_phedex\_data\_extract
- ☐ mod\_creamce
- ☐ mod\_ddm\_deletion
- ☐ mod\_ganglia
- ☐ mod\_d\_cache\_dataset\_restore\_lazy
- ☐ mod\_phedex\_stats
- ☐ mod\_webservice

**Subtables**

- ☒ mod\_functional
- ☐ sub\_functional
- ☐ sub\_functional

From: 1 Jan 2014 12:45  
To: 04 Mar 2014 12:45  
[QUERY!](#)  
[Download](#)

**JSON output**

```
[
  {
    "content": [
      1,
      "2014-03-04 18:23:42.000000",
      1,
      "functional_tests",
      2,
      0.0,
      "",
      "",
      "",
      "",
      "both||hammercloud.cern.ch/hc/app/atlas/ssb/analysis/",
      "both||hammercloud.cern.ch/hc/app/atlas/ssb/prod/",
      "ANALY_GOEGRID",
      "GoeGrid",
      0.0,
      1.0
    ],
    [
      2,
      "2014-03-04 18:24:16.000000",
      2,
      "functional_tests",
      3,
      0.0,
      "",
      "",
      "",
      "",
      ""
    ]
  }
]
```

## *Installation of HappyFace is simple*

- New RPM packages are available
  - HappyFace-3.0.0-1.x86\_64.rpm
  - HappyFace-ATLAS-3.0.0-20140304.x86\_64.rpm
  - HappyFace-ATLAS-internal-resource-3.0.0-20140304.x86\_64.rpm
  - HappyFace-ATLAS-webservice-3.0.0-20140304.x86\_64.rpm
- yum testing repository exists

- Grid-enabled command wrapper implementation is still ongoing
  - This will provide an access to the protected information.
- Mobile/smartphone application developement is in final stage
  - The application is be available for both major smartphone OS Android and iOS.
- Smart Monitoring System (independent project)
  - This will provide analitical information for the site services.

## *Motivation*

- It is possible to use monitoring information for more than only show the current status of the observation object

## *Outcome of analytics*

- Make a service degradation forecast due to the load
- Perform the service failure Root Cause Analysis (RCA)
- Define the critical level dynamically

*This information can be useful for*

- Users

- If it is known 1 hour in advance that a certain service might fail on a site nobody will submit additional jobs there

- Site Administrators

- Service failure Root Cause Analysis would be helpful in bottleneck identification in the infrastructure

- Site Administrators, Cloud support and Central Services Managers

- It will be possible to tune the Resource Management Systems and load balancers automatically to find out a certain load thresholds for different sites. If site will increase the hardware power or tune the systems threshold will be changed automatically.

*This work currently doing our PhD student Erekle Magradze  
(email: [erekle.magradze@cern.ch](mailto:erekle.magradze@cern.ch) ).*

*For more details, please contact him directly.*

- HF is a robust framework working for various experiments CMS/ATLAS/Belle in different sites.
- HF has modular structure and supplies a web-service in a different format and time frames.
- HF mobile application soon will be available to use
- As a next step of HF project Smart monitoring system can be taken into account
- The goal is to make HF used by the ATLAS community.

**Thanks for the attention**