

PhEDEx



Physics Experiment Data Export

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(a site admin/user rather than developer)

Outline

 What is PhEDEx ?

 PhEDEx heartbeat

 PhEDEx

- Installation
- Configuration
- Agent management
- Log
- Monitoring

What is PhEDEx ?

- PhEDEx is the data file replica management system used by CMS
- Manages the prioritized transfer of files from multiple sources to multiple sinks
- Enables CMS to manage the distribution of data at dataset level rather than at file level
- Bridges the gap between “traditional” and “Grid” data distribution models
 - Traditional : large-scale transfers between large sites, often managed by hand
 - Grid : replication of data in response to user demand
- Manages multi-hop transfers through not-completely-connected distribution networks
 - A core, stable infrastructure handling large-scale continuous transfers
 - A dynamic, Grid-like infrastructure associating with the core

PhEDEx heartbeat



Heartbeat

-  The PhEDEx heartbeat tool is monitoring system which verifies cyclically the sites readiness to transfer data via PhEDEx
-  It regularly initializes file transfer between sites and reports its result
-  To provide ease for the user/admin to quickly identify the problem in the transfer process
-  To have an overall system view from a central point
-  Three different instances of the heartbeat client are run at CERN, Estonia and FNAL. The information is collected and stored centrally at CERN.

Heartbeat

 To participate, you need to tell operator

- Your site name such as TI_ASGC
- Directory into which test transfers can be stored. All the paths should be SRM paths, using ...?SFN=/path syntax
(T2_Taiwan : srm://f-dpm001.grid.sinica.edu.tw:8443/srm/managerv1?SFN=/dpm/grid.sinica.edu.tw/home/cms/heartbeat)
- A sample test file that can be used for transfers at your site. You can copy /castor/cern.ch/cms/test.transfer
- The size of the above-mentioned file (5008283 for test.transfer)
- whether your site requires push mode

 The files transferred will have name “heartbeat.TX_FOO.time.random”

 In theory, the files get cleaned up, but you may want to have an occasional look in there

 To join, please send a mail to Ulrich Felzmann (Ulrich.Felzmann@cern.ch)

PhEDEx



Installation, Configuration, Agent management and Log

Installation

- 🔊 Obviously you need a storage system. CMS requires SRM storage.
- 🔊 A computer on which you will run the agents is needed
 - large amounts of memory, disk space, network bandwidth or CPU capacity are not needed on this machine
- 🔊 CMS requests sites to use FTS and only FTS to transfer files from EGEE sites (T1 or T2), so that your agent host should install FTS prerequisites
- 🔊 You can use a gLite-3 UI or VOBOX as the agent host
 - if you do not, please see README-Deployment.txt and README-DLS.txt

Installation

- 🔊 The PhEDEx installation is RPM-based
- 🔊 Current production version : 2.4.2
- 🔊 RPMs are provided for slc3_ia32_gcc323 and slc4_ia32_gcc345 (Developers are still working on slc4_amd64_gcc345 RPMs)

```
cd /home/phedex
mkdir sw
export sw=$PWD/sw
wget -O $sw/aptinstaller.sh http://cmsdoc.cern.ch/cms/cpt/Software/download/cms/aptinstaller.sh
chmod +x $sw/aptinstaller.sh
eval ` $sw/aptinstaller.sh -path $sw -arch slc3_ia32_gcc323 config -sh `
apt-get update
apt-get install cms+PHEDEX+PHEDEX_2_4_2
rm -f PHEDEX
ln -s $sw/slc3_ia32_gcc323/cms/PHEDEX/PHEDEX_2_4_2 PHEDEX
```

- 🔊 Once PhEDEx is installed : PHEDEX/Documentation/README

Register your site

- 🔊 Send the following information to cms-phedex-admins@cern.ch
 - Site name (e.g. T2_Taiwan)
 - The email address of the contact person for the site
 - The DN for that person's grid certificate
 - The public key portion of the grid certificate (~/.globus/usercert.pem)
- 🔊 PhEDEx admins will send you an encrypted file that contains the information you need to access the PhEDEx database (TMDB)
- 🔊 Please have a look at README-Auth.txt for more detailed information

Configuration

- A copy of templates can be found in PHEDEX/Custom/Template
- Edit Config and storage.xml to meet your site's requirements
- The Config file

```
PHEDEX_BASE=/home/phedex;  
PHEDEX_INSTANCE=Dev;  
PHEDEX_LABEL=ATLANTIS;  
PHEDEX_SITE=Atlantis;  
PHEDEX_NODE=TX_Atlantis;  
PHEDEX_VERSION=2_4_0;  
PHEDEX_OS_VERSION=slc4_ia32_gcc345;  
X509_USER_PROXY=$PHEDEX_BASE/gridcert/proxy.cert;
```

Common PhEDEx settings

```
PHEDEX_GLITE_ENV=SomePath/etc/profile.d/grid_env.sh;  
GLITE_SD_PLUGIN=bdi;  
TIER1_FTS_SERVICE=Atlantis-FTS;
```

FTS specific settings

```
PHEDEX_SE=se.atlantis.underwater;
```

DLS specific settings

```
#### IMPORT ConfigPart.SRMDownload  
#### IMPORT ConfigPart.FTSDownload
```

Choose your transfer method by removing leading # from the one you want

- For more details about PhEDEx+FTS,
<http://www.cnaf.infn.it/~dbonacorsi/PhEDEx/PhEDExFTS.htm>

Configuration

The trivial file catalogue : storage.xml

```
<storage-mapping>
  <lfn-to-pfn protocol="direct"
    path-match="/+LoadTest/(.*)"
    results="/castor/cern.ch/cms/phedex_loadtest/$1"/>
  <lfn-to-pfn protocol="srm" chain="direct"
    path-match="(.*)"
    results="srm://castorgrid.cern.ch:8443/srm/managerv1?SFN=$1"/>
</storage-mapping>
```

protocol	used for transfer
path-match	match on LFN string (PFN for pfn-to-lfn)
chain	reuse result of another protocol
results	return string of matching rule

More details :

See next talk by Peter Elmer

<http://twiki/cern.ch/bin/view/CMS/SWIntTrivial>

Configuration

-  All CMS sites are encouraged to keep the configurations of their CMS services in the SITECONF area in the CVS repository (CMSSW CVS repository, COMP/SITECONF)
 - <http://cmsdoc.cern.ch/swdev/viewcvs/viewcvs.cgi/COMP/SITECONF/?cvsroot=CMSSW>
-  Request CVS directory for your site config
 - send a mail to cms-phedex-admin@cern.ch

Agent management

 PHEDEX/Utilities/Master -config **your_config_file** **action** [agents]

- Master : unix inetd like process management
- Supported actions : start, stop, terminate, kill

 For more details see online help : Master -h

 For a T2 site, the agents you need are: (assume PhEDEx templates are used)

- For downloads, run **info-ds** and **download-fts-tl**
- For exporting data to other sites, run **exp-pfn** and **exp-disk**
- For updating DLS, run **mgmt-blockdls**

 For example, to start the above five agents together, you run

Master -config Config start info-ds download-fts-tl exp-pfn exp-disk mgmt-blockdls

Log

- 📌 Each agent has its own log file, including subprocess output
 - If you use PhEDEx templates, your logs are in
`${PHEDEX_BASE}/${PHEDEX_INSTANCE}_${PHEDEX_SITE}/logs`
- 📌 Download agent redirects logs from download commands to separate log files with time stamp on each output line
 - If you use PhEDEx templates, the log of each individual FTS transfer for your download agent, `download-fts-tl`, can be found in
`${PHEDEX_BASE}/${PHEDEX_INSTANCE}_${PHEDEX_SITE}/state/download-fts-tl`

Log



Successful transfer

transfer time

file size

```
2006-10-07 02:06:54: FileDownload[3425]: xstats: to=T1_ASGC_Buffer from=T0_CERN_Export fileid=59124 state=3 size=3172594829 time_assigned=3625.55 time_all=3512.12 time_preclean=1.22 time_transfer=3487.49 time_validate=9.48 lfn=/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/58248DBF-7755-DB11-A634-003048561852.root from_pfn=srm://srm.cern.ch:8443/srm/managerv1?SFN=/castor/cern.ch/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/58248DBF-7755-DB11-A634-003048561852.root to_pfn=srm://castor.sc.grid.sinica.edu.tw:8443/srm/managerv1?SFN=/castor/grid.sinica.edu.tw/sc/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/58248DBF-7755-DB11-A634-003048561852.root
```



Sometimes things could go wrong

```
2006-10-07 01:01:03: FileDownload[3425]: alert: transfer failed: file failed validation: 2 (transfer failed with exit code signal 9 from /home/phedex/SITECONF/ASGC/PhEDEx/ftscp -passfile=/home/phedex/SITECONF/ASGC/PhEDEx/ftspass -server=https://prod-fts-ws.cern.ch:8443/glite-data-transfer-fts/services/FileTransfer -copyjobfile=/home/phedex/T1_ASGC/state/download-prod-fts-t0/1160078674.735.srm.cern.ch.copyjob -report=/home/phedex/T1_ASGC/state/download-prod-fts-t0/1160078674.735.srm.cern.ch.report; log output in /home/phedex/T1_ASGC/state/download-prod-fts-t0/1160078674.735.srm.cern.ch.copyjob.log); to=T1_ASGC_Buffer from=T0_CERN_Export fileid=59094 lfn=/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root from_pfn=srm://srm.cern.ch:8443/srm/managerv1?SFN=/castor/cern.ch/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root to_pfn=srm://castor.sc.grid.sinica.edu.tw:8443/srm/managerv1?SFN=/castor/grid.sinica.edu.tw/sc/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root
```

```
2006-10-07 01:01:07: FileDownload[3425]: xstats: to=T1_ASGC_Buffer from=T0_CERN_Export fileid=59094 state=100 size=3025654696 time_assigned=6795.63 time_all=6068.87 time_preclean=2.57 time_transfer=6032.68 time_validate=22.21 time_postclean=8.89 lfn=/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root from_pfn=srm://srm.cern.ch:8443/srm/managerv1?SFN=/castor/cern.ch/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root to_pfn=srm://castor.sc.grid.sinica.edu.tw:8443/srm/managerv1?SFN=/castor/grid.sinica.edu.tw/sc/cms/store/CSA06/CSA06-102-os-EWKSoup-0/REC0/CMSSW_1_0_2-REC0-He161069e60f9472aa003070c3d42e060/1007/6650E703-6D55-DB11-82C3-0002B3D8EA97.root
```

PhEDEx



Monitoring

Agent status

<http://cmsdoc.cern.ch/cms/aprom/phedex/prod/Components::Status?view=global>



PhEDEx – CMS Data Transfers

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[Status](#) [Processes](#)

Common Agents							
Node	FileDownload	FileExport	FileMSSPublish	FilePFNExport	FileRouter	FileStager	InfoDropStatus
T0_CERN_Export		UP	UP	UP	UP	UP	UP
T0_CERN_MSS	UP				UP		
T1_ASGC_Buffer	UP	UP	UP	UP	UP		UP
T1_ASGC_MSS	UP				UP		
T1_CERN_Buffer	UP	UP	UP	UP	UP	UP (0h09 ago)	UP
T1_CERN_MSS	UP				UP		UP
T1_FNAL_Buffer	UP	UP	UP	UP	UP		UP
T1_FNAL_MSS	UP				UP		
T1_FZK_Buffer	UP	UP	UP	UP	UP	UP	UP
T1_FZK_MSS	UP				UP		
T1_IN2P3_Buffer	UP	UP	UP	UP	UP		UP
T1_IN2P3_MSS	UP				UP		
T1_PIC_Buffer	DOWN (2d0h48 ago)	UP		UP	UP		UP
T2_Bari_Buffer	UP	UP		UP	UP		UP
T2_Beijing_Buffer	UP	UP		UP	UP		UP
T2_Belgium_IIHE	UP	UP (0h05 ago)		UP	UP		UP
T2_CSCS_Buffer	UP	UP		UP	UP		UP
T2_Caltech_Buffer	UP	UP		UP	UP		UP (0h05 ago)

Transfer rate



PhEDEx – CMS Data Transfers

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[Rate](#) [Rate Plots](#) [Queue Plots](#) [Quality Plots](#) [Transfer State](#) [Transfer Details](#)

Time span Include links with nothing but errors

Last 30 days									
To		From	Files	Total Size	Rate	Errors	Expired	Avg. Est. Rate	Avg. Est. Latency
<input type="text"/>	or <input type="text"/>	<input type="text"/>							
T1_FZK_Buffer		T0_CERN_Export	12595	36.2 TB	14.6 MB/s	2824	27499	24.5 MB/s	4d0h16
T2_DESY_MSS		T2_DESY_Buffer	16283	15.6 TB	6.3 MB/s	-	25497	7.0 MB/s	2d14h03
T1_CNAF_MSS		T1_CNAF_Buffer	4834	13.8 TB	5.6 MB/s	-	35089	37.3 MB/s	5d11h00
T1_FNAL_Buffer		T1_FNAL_MSS	5198	11.0 TB	4.4 MB/s	-	-	185.1 MB/s	0h00
T2_Estonia_Buffer		T1_RAL_Buffer	3677	10.2 TB	4.1 MB/s	1012	6575	8.1 MB/s	2d23h04
T1_CERN_MSS		T1_CERN_Buffer	5538	9.6 TB	3.9 MB/s	-	637	11.3 MB/s	1d7h08
T1_ASGC_Buffer		T0_CERN_Export	3273	9.6 TB	3.9 MB/s	343	6731	9.4 MB/s	5d2h48
T1_FNAL_MSS		T1_FNAL_Buffer	16511	8.7 TB	3.5 MB/s	-	7630	3.4 MB/s	1d12h54
T2_Estonia_Buffer		T1_FZK_Buffer	3118	8.6 TB	3.5 MB/s	775	18396	7.7 MB/s	3d17h35
T1_RAL_MSS		T1_RAL_Buffer	2989	8.0 TB	3.2 MB/s	-	3239	6.6 MB/s	13h10
T1_CNAF_Buffer		T0_CERN_Export	2635	7.8 TB	3.1 MB/s	3044	5197	4.0 MB/s	2d2h30
T1_CERN_Buffer		T1_FNAL_Buffer	3809	7.1 TB	2.9 MB/s	1733	1476	9.5 MB/s	1d13h37
T2_Spain_Buffer		T1_FNAL_Buffer	20083	6.4 TB	2.6 MB/s	3991	75591	3.4 MB/s	4d16h21
T1_RAL_Buffer		T0_CERN_Export	2277	6.1 TB	2.5 MB/s	11775	3090	4.9 MB/s	3d16h15
T2_Spain_IFCA		T1_CERN_Buffer	16773	5.7 TB	2.3 MB/s	1470	117922	6.1 MB/s	2d17h46
T2_DESY_Buffer		T1_CERN_Buffer	11186	5.0 TB	2.0 MB/s	860	42380	3.5 MB/s	2d6h21
T0_CERN_MSS		T0_CERN_Export	2156	4.5 TB	1.8 MB/s	-	15517	3.0 MB/s	6d11h47

Transfer rate plot

 **PhEDEx - CMS Data Transfers**

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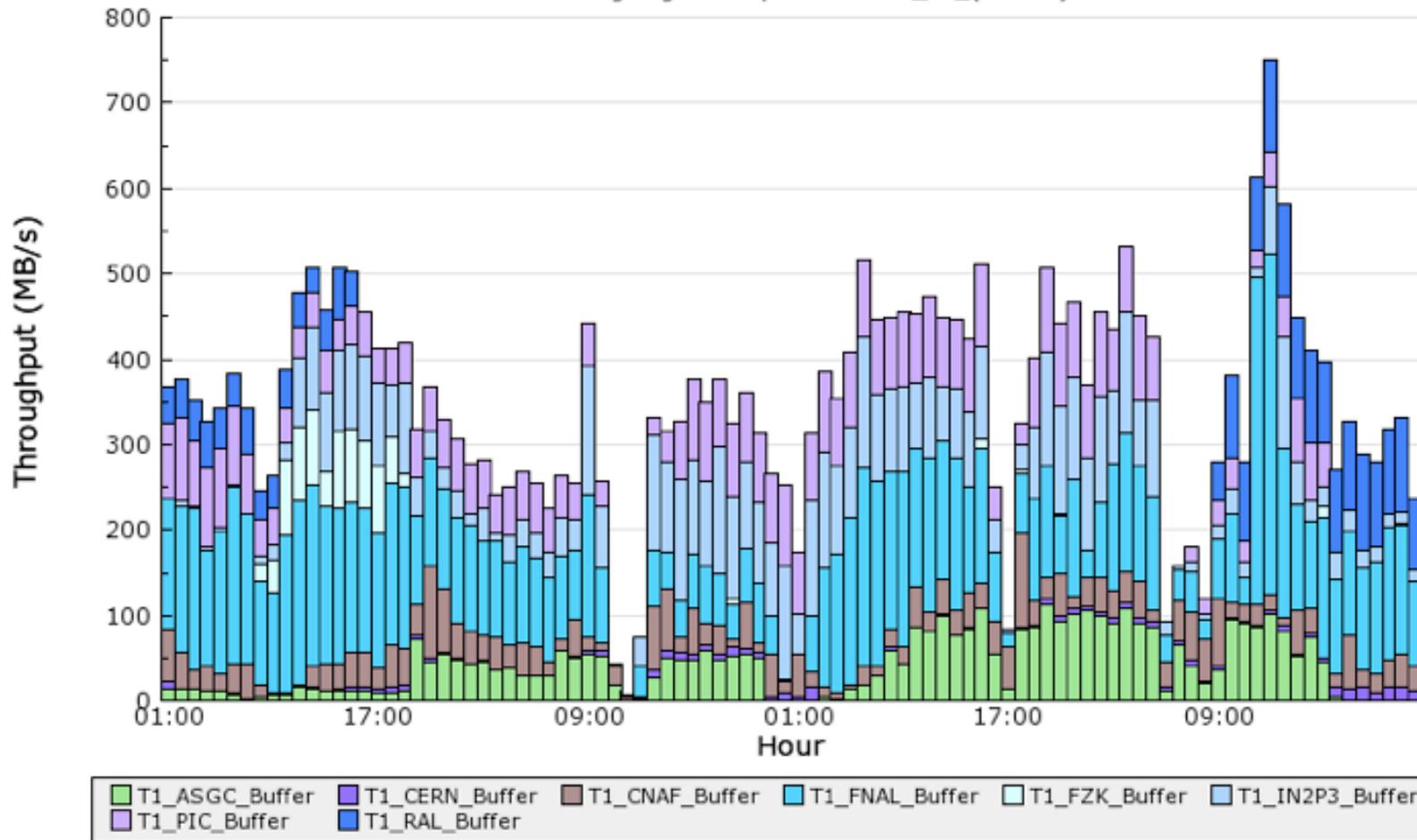
[Rate](#) | [Rate Plots](#) | [Queue Plots](#) | [Quality Plots](#) | [Transfer State](#) | [Transfer Details](#)

Regular expression to match against node or link names

Graph Period By Filter Up to

PhEDEx Prod Data Transfers By Destination

96 Hours from 2006-10-27 01:00 to 2006-10-31 00:00 GMT
Nodes matching regular expression 'T1_.*_(?!MSS)'



Transfer quality plots

 **PhEDEx - CMS Data Transfers**

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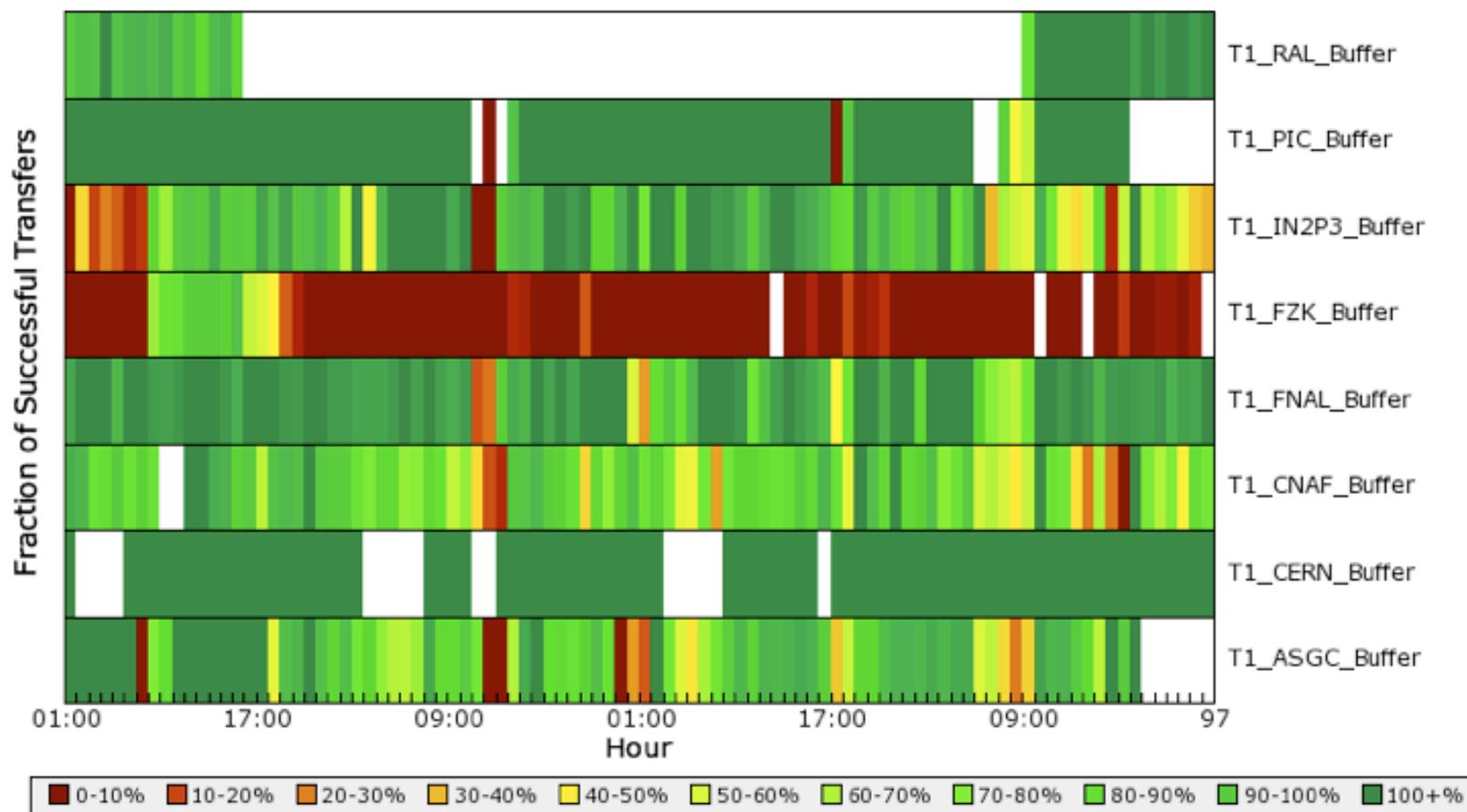
[Rate](#) | [Rate Plots](#) | [Queue Plots](#) | [Quality Plots](#) | [Transfer State](#) | [Transfer Details](#)

Graph Period By Filter Up to

PhEDEx Prod Transfer Quality By Destination

96 Hours from 2006-10-27 01:00 to 2006-10-31 00:00 GMT
Nodes matching regular expression 'T1_.*(?!MSS)'

Time up to and including which results will be shown



Transfer state details



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 Transfer Details

Update

Transfer State Details								
Age	To			From		Files		Detail
	Node	State	or	Node	State	N	Size	
Current	T1_FNAL_Buffer	transferring		T2_Caltech_Buffer	ready	1	1.6 GB	(Files)
Current	T1_FNAL_Buffer	transferring		T2_Wisconsin_Buffer	ready	8	13.1 GB	(Files)
Current	T1_FNAL_MSS	transferring		T1_FNAL_Buffer	ready	2	2.3 GB	(Files)
Current	T2_CSCS_Buffer	requested		T1_ASGC_Buffer	ready	125	495.9 GB	(Files)
Current	T2_CSCS_Buffer	transferring		T1_ASGC_Buffer	ready	2	8.0 GB	(Files)
Current	T2_CSCS_Buffer	transferring		T1_FNAL_Buffer	ready	2	8.2 GB	(Files)
Current	T2_DESY_MSS	transferring		T2_DESY_Buffer	ready	3	8.1 GB	(Files)
Current	T2_Rome_Buffer	error		T1_ASGC_Buffer	ready	111	112.1 GB	(Files)
Current	T2_Spain_Buffer	transferring		T1_FNAL_Buffer	ready	1	261.0 MB	(Files)
Current	T2_Spain_Buffer	error		T1_FNAL_Buffer	ready	29	4.9 GB	(Files)
Total		requested			ready	125	495.9 GB	
		error			ready	140	117.0 GB	
		transferring			ready	19	41.4 GB	
		All			All	284	654.3 GB	

Data replicas



PhEDEx - CMS Data Transfers

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[Datasets](#) | [Replicas](#) | [Subscriptions](#) | [Remove Datasets](#) | [Remove Files](#)

Sources: [MCGlobal¹](#) | [MCGlobal³](#) | [MCGlobal⁴](#) | [MCGlocal³](#) | [MCLocal¹](#) | [MCLocal¹](#)² | [MCLocal¹](#)³ | [MCLocal²](#)² | [MCLocal²](#)³ | [MCLocal³](#)² | [MCLocal³](#)³ | [MCLocal⁴](#)² | [MCLocal⁴](#)³ | [MTCC](#) [» other](#)

Nodes: [T1_ASGC_Buffer](#) | [T2_Taiwan_Buffer](#) [» other](#)

Name	Files	T1_ASGC_Buffer	T2_Taiwan_Buffer
» /CSA06-081-os-minbias/DIGI/CMSSW_0_8_1-GEN-SIM-DIGI-1154005302-merged	5464	167	-
» /CSA06-082-os-TTbar/DIGI/CMSSW_0_8_2-GEN-SIM-DIGI-1155826011-merged	5099	186	-
» /CSA06-083-os-EWKSoup/DIGI/CMSSW_0_8_3-GEN-SIM-DIGI-HLT-1156877645-merged	2101	152	-
» /CSA06-084-os-HLTSoup/DIGI/CMSSW_0_8_4-GEN-SIM-DIGI-HLT-1157592494-merged	2602	241	-
» /CSA06-103-os-EWKSoup0-0/AODSIM/CMSSW_1_0_6-mu_WmunuFilter-1161536585	775	775	-
» /CSA06-103-os-EWKSoup0-0/FEVT/CMSSW_1_0_4-mu_JPsi_mumuFilter-1161045561	163	98	-
» /CSA06-103-os-EWKSoup0-0/FEVT/CMSSW_1_0_4-su_BSM_mc2e_Filter-1161045561	127	77	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_Higgs_mc2gamma_Filter-1161045561	18	11	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_Higgs_mc2l_Filter-1161045561	70	42	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_HiggsTau_1lFilter-1161045561	211	126	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_HiggsWW_SigFilter-1161045561	7	4	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_HiggsWW_WWFilter-1161045561	3	2	-
» /CSA06-103-os-EWKSoup0-0/RECO/SIM/CMSSW_1_0_4-hg_Tau_Zand1lFilter-1161045561	87	52	53

Instance

[Production](#) [»»](#)

Not signed in | [Sign in](#)

Global view

(Sign in to change)

Options

Show columns

DBS

Name

Files

Bytes

Source

Node value

Node blocks

Node files

Node bytes

Destined blocks

Destined files

Destined bytes

Missing blocks

Missing files

Missing bytes

Filter rows

Show all rows

Show interesting rows

[Update](#)

Links and contacts



PhEDEx project web page :

<http://cms-project-phedex.web.cern.ch/cms-project-phedex/>



PhEDEx mailing list : hn-cms-phedex@cern.ch