

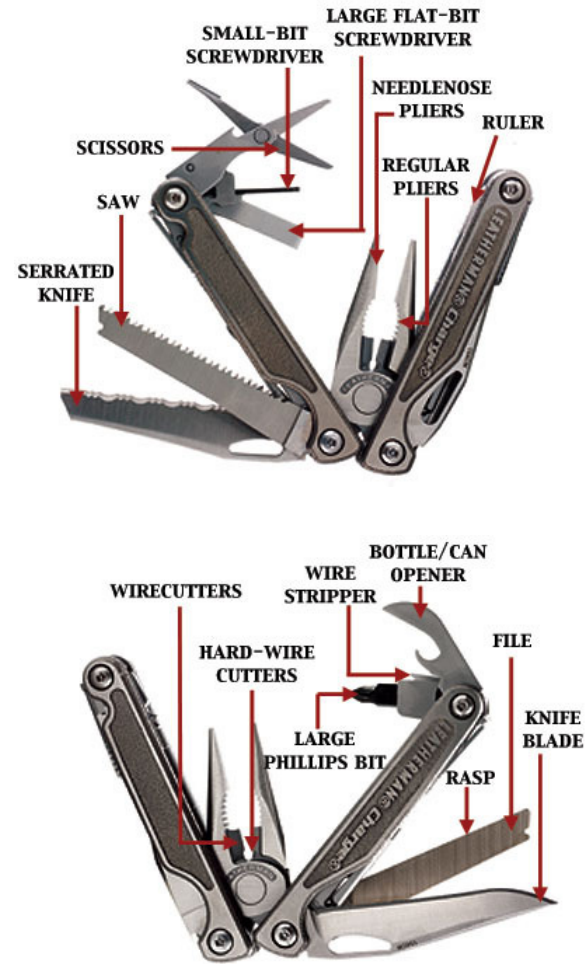
# **OSG Storage Operations Toolkit**

**Production-Driven, Community-Contributed**

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**OSG Storage Forum, Fermilab, July 1 2009**

# Concept



Leatherman Charge Ti, with 17 tools and lightweight titanium handles, \$100.

Photo Courtesy: Charles Schiller, Copyright: Time Inc., Source: This Old House magazine

Product: <http://www.leatherman.com/multi-tools/full-size-tools/charge-tti.aspx>

# Concept



## OSG Storage Operations Toolkit Contents and Functionality

Utility Name					
RPM 1	SRM PNFS Reclaimer	osg_dc_srm_space_reclaimer	Y	Y	Y
RPM 2	Core Operations	osg_dc_analyze_disk_usage_of_all_pools	Y	Y	Y
		osg_dc_analyze_disk_usage_of_pnfs_dir		Y	Y
		osg_dc_analyze_num_replicas_disk_pnfs_of_pnfs_dir		Y	Y
		osg_dc_cancel_stuck_restores		Y	Y
		osg_dc_cleanup_broken_transfers		Y	Y
		osg_dc_cleanup_disk_files_not_in_pnfs	Y	Y	Y
		osg_dc_compare_checksum_disk_pnfs_for_all_files	Y	Y	Y
		osg_dc_create_graph_of_poolmanagerconf		Y	Y
		osg_dc_disk_usage_du		Y	Y
		osg_dc_find_files_in_pnfs_not_on_disk	Y	Y	Y
		osg_dc_find_files_on_a_pool		Y	Y
		osg_dc_find_num_replicas_for_all_files	Y	Y	Y
		osg_dc_find_path_for_pnfsid		Y	Y
		osg_dc_find_pnfsid_for_path		Y	Y
		osg_dc_find_pools_with_file		Y	Y
		osg_dc_get_all_poolgroups_system_summary		Y	Y
		osg_dc_get_html_dump_of_fs_usage_of_pnfs_dir	Y	Y	Y
		osg_dc_move_files_from_full_pool_to_another_pool	Y	Y	Y
		osg_dc_query_all_transfer_rates		Y	Y
		osg_dc_query_srm_transfer_rate		Y	Y
		osg_dc_verify_discrepancy_disk_usage_of_all_pools		Y	Y
RPM 3	Physical File Manager	osg_dc_PFM	Y	Y	Y
		osg_dc_retire_a_pool	Y	Y	Y
RPM 4	dCache Chronicle	osg_dc_chronicle	Y	Y	Y
RPM 5	Development API: Python	Development API for dCache: Python		Y	Y
RPM 6	Pool Local Operations	osg_dc_automatic_restart_offline_pool		Y	Y
		osg_dc_pool_usage_nagios_plugin		Y	Y
		osg_dc_check_certificates_CRLs		Y	Y

Data Removal Capability  
Load Exhaustive Run  
Tool Abrasive Level  
Automatic Cron

Naming convention - osg\_dc: dCache, osg\_bm: BeStMan, osg\_xrd: xRootD, osg\_hdp: Hadoop

**Protective Measure:** A site can choose to set its **Toolkit Site Cautionary Level** to: **low**, **medium**, or **high**. Abrasive tools may not run until the Site level is set to **low**. Out of the box level is **medium**.

OSG Storage Operations Toolkit, with 25+ tools and lightweight titanium handles, \$0.

# Principles

- Driven by production-scale operations.
- Contributed by Community.
- Adopted by larger Community.
- Utility first, design is second.
- Portability of deployment across Sites.
- Not out-of-box, not in the product.

# OSG Storage Operations Toolkit

## Contents and Functionality

Contents  
in the Box

Utility Name					
RPM 1	SRM PNFS Reclaimer	osg_dc_srm_space_reclaimer	Y	Y	Y
RPM 2	Core Operations	osg_dc_analyze_disk_usage_of_all_pools		Y	
		osg_dc_analyze_disk_usage_of_pnfs_dir			
		osg_dc_analyze_num_replicas_disk_pnfs_of_pnfs_dir	Y		
		osg_dc_cancel_stuck_restores			
		osg_dc_cleanup_broken_transfers			
		osg_dc_cleanup_disk_files_not_in_pnfs	Y	Y	
		osg_dc_compare_checksum_disk_pnfs_for_all_files		Y	
		osg_dc_create_graph_of_poolmanagerconf			
		osg_dc_disk_usage_du			
		osg_dc_find_files_in_pnfs_not_on_disk		Y	
		osg_dc_find_files_on_a_pool			
		osg_dc_find_num_replicas_for_all_files		Y	
		osg_dc_find_path_for_pnfsid			
		osg_dc_find_pnfsid_for_path			
		osg_dc_find_pools_with_file			
		osg_dc_get_all_poolgroups_system_summary			
		osg_dc_get_html_dump_of_fs_usage_of_pnfs_dir		Y	
		osg_dc_move_files_from_full_pool_to_another_pool	Y	Y	
		osg_dc_query_all_transfer_rates			
		osg_dc_query_srm_transfer_rate			
		osg_dc_verify_discrepancy_disk_usage_of_all_pools			
RPM 3	Physical File Manager	osg_dc_PFM	Y	Y	
		osg_dc_retire_a_pool	Y	Y	
RPM 4	dCache Chronicle	osg_dc_chronicle		Y	Y
RPM 5	Development API: Python	Development API for dCache: Python			
RPM 6	Pool Local Operations	osg_dc_automatic_restart_offline_pool			Y
		osg_dc_pool_usage_nagios_plugin			Y
		osg_dc_check_certificates_CRLs			Y



# Examples (osg\_dc = dCache)

```
osg_dc_analyze_disk_usage_of_all_pools      osg_dc_find_num_replicas_for_all_files
osg_dc_analyze_disk_usage_of_pnfs_dir      osg_dc_find_path_for_pnfsid
osg_dc_analyze_num_replicas_disk_pnfs_of_pnfs_dir  osg_dc_find_pnfsid_for_path
osg_dc_cancel_stuck_restores              osg_dc_find_pools_with_file
osg_dc_cleanup_broken_transfers           osg_dc_get_html_dump_of_fs_usage_of_pnfs_dir
osg_dc_cleanup_disk_files_not_in_pnfs     osg_dc_move_files_from_full_pool_to_another_pool
osg_dc_compare_checksum_disk_pnfs_for_all_files  osg_dc_query_all_transfer_rates
osg_dc_du                                  osg_dc_query_srm_transfer_rate
osg_dc_find_files_in_pnfs_not_on_disk       osg_dc_verify_discrepancy_disk_usage_of_all_pools
osg_dc_PFM                                osg_dc_automatic_restart_offline_pool
osg_dc_pool_usage_nagios_plugin           osg_dc_check_certificates_CRLs
osg_dc_chronicle                          Development API for dCache: Python
```

## The dCache Chronicle<sup>©</sup>

THE DCACHE CHRONICLE

Thursday, May 14, 2009

Evening Ed.

Executive Summary: Total disk capacity is 272.0 TB, of which 208.0 TB is in precious usage, 7.0 TB is cached. Disk utilization today is -79%. Almost 55.0 TB is free. Storage system has 2 PoolGroups. Total pools found now are 90. Analysis of user-storage directory shows 46 users. There are 7 users consuming over a TB. 20 users have no consumption. Filecount is 107821 combined, and worth 23.0 TB in the filesystem. Overall, the users have 353 lost files. Full listing is in next mail.

# Adoption


- Install/configuration is easy and quick.
- In use by many LHC (ATLAS and CMS) Sites in the US and Brazil.
- Popular among dCache Sites in the EU. In use across Sites in Germany, UK, Italy, among others.
- Plan to start joint effort with DESY dCache team to facilitate standardization.

# Current Availability - Downloads

## OperationsToolkit

Open Science Grid **Storage**

[Download](#)  [Read](#)  [Contribute your Tools](#) 

OSG Storage Operations Toolkit		All RPMs	v2.4_p2	
RPM 1	SRM PNFS Space Reclaimer	dCache PNFS Server node	v1.1	
RPM 2	Core dCache Operations	Any dCache Server node	v2.5	
RPM 3	Physical File Manager / PFM	Any dCache Server node	v2.1	
RPM 4	dCache Chronicle	Any dCache Server node	v1.4	
RPM 5	Development API: Python	Any dCache node	v2.1	
RPM 6	dCache Pool Local Operations	dCache Pool nodes	v1.1	
<b>Future:</b>				
RPM 7	Hadoop Chronicle	Any Hadoop node	v1.0	
RPM 8	Development API: Perl	Any dCache node	v1.0	

# Current Availability - Documents

## OperationsToolkit

Open Science Grid Storage



### General: Auto-notification of updates, ToolControl.conf, ExaByte Grids

Toolkit now comes with a minor monthly auto-notification feature. It compares the locally installed version number with the currently available more recent version, if any, and notifies the site to do timely upgrades. Note that it is similar to the standard feature in the market, but an automatic download or install is not performed for obvious reasons.

Primary configuration resides in ToolControl.conf. A sample is [here](#).

Aim of this software is to simplify or automate or autoengineer operations, so that humans can spend more time building ... Exabyte Grids and Clouds.

### RPM 1: SRM PNFS Space Reclaimer

**Requirements:** Storage system - dCache. User - root. PNFS server node with DB access from SRM node.

This utility has its own policy file, and requires careful initial configuration. To enable operations of this utility, see detailed document at [OSG TWiki](#).

### RPM 2: Core dCache Operations

**Requirements:** Storage system - dCache. User - root. Any server node, with PNFS mounted. Preferably, with [Jython](#) installed. Jython is only required by 4 utilities. All other utilities will perform as normal, even without it.

Example, see this [note](#). To install Jython:

```
$ {jdk_dir}/bin/java -jar jython_installer-2.2.1.jar --console
```

Standard install of Jython does not provide all packages. Choose 'all/everything' option.

Deployment of Jython based minor subset, on a node without a local dCache install, requires a local copy of `cells.jar` and `dcache.jar` in `/opt/d-cache/classes`.

As user root, install the RPM.

```
$ rpm -Uvh osg-dcache-tools-core-operations-VER.i386.rpm
$ Edit /opt/d-cache/toolkit/ToolControl.conf
```

Note the [Cautionary\\_Level](#) tuning. Based on a site's own discretion and level of comfort, this can be set to [high](#), [medium](#), or [low](#). Toolkit comes with a default setting

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$ rpm -Uvh osg-dcache-tools-core-operations-VER.i386.rpm
$ Edit /opt/d-cache/toolkit/ToolControl.conf
```

Note the [Cautionary\\_Level](#) tuning. Based on a site's own discretion and level of comfort, this can be set to [high](#), [medium](#), or [low](#). Toolkit comes with a default setting of [medium](#). Only when a site decides to choose a setting of [low](#) cautionary level, will the tools with data removal capability become enabled.

```
$ source /opt/d-cache/toolkit/setup.sh
```

This will bring all `osg_dc*` in \$PATH. Type `osg_dc`, then try if TAB toggles and highlights all utilities.

Most site administrators prefer command-line quick reference. Documentation is available with each utility.

For each utility, please use `'-h'` or `'--help'`.

```
osg_dc analyze disk usage of all pools
osg_dc analyze disk usage of pnfs dir
osg_dc analyze num replicas disk pnfs of pnfs dir
osg_dc cancel stuck restores
osg_dc cleanup broken transfers
osg_dc cleanup disk files not in pnfs
osg_dc compare checksum disk pnfs for all files
osg_dc create graph of poolmanagerconf
osg_dc disk usage du
osg_dc find files in pnfs not on disk
osg_dc find files on a pool
osg_dc find num replicas for all files
osg_dc find path for pnfsid
osg_dc find pnfsid for path
osg_dc find pools with file
osg_dc get all poolgroups system summary
osg_dc get html dump of fs usage of pnfs dir
osg_dc move files from full pool to another pool
```

# Current Availability - Contribute

## Operations**Toolkit**

Open Science Grid **Storage**



OSG Storage welcomes all creative solutions developed by members of the Site community. Please use this page to directly upload your contributions. Thank you for sharing your expertise.

<b>Your full name (required):</b>	<input type="text"/>
<b>File:</b>	<input type="text"/> <input type="button" value="Browse..."/>
	<input type="button" value="Upload"/>

Valid file formats are .tar, .gz, .zip, .tgz

# Forward Plan

- Aggregation and inclusion of key **Hadoop (osg\_hdp)** utilities. E.g. Hadoop Chronicle.
- Periodic addition of new features, new utilities, bug fixes, new APIs.
- Inclusion of a subset in the Virtual Data Toolkit (VDT) distribution.
- **BestMan** and **xRootD** utilities are welcome from the OSG Community.
  - Current need is not known, or not existent, possibly due to efficient and quick direct interfaces between LBNL team and Sites.

# Contributing Institutions, June 2009

- Brookhaven National Laboratory
- California Institute of Technology
- Cornell University
- Fermi National Accelerator Laboratory
- Istituto Nazionale di Fisica Nucleare, Italy
- Massachusetts Institute of Technology
- Purdue University
- University of California-San Diego
- University of Edinburgh, Scotland
- University of Nebraska-Lincoln
- University of Wisconsin-Madison

# More Information

- Web:

<http://datagrid.ucsd.edu/toolkit/>

- Email:

[osg-storage@opensciencegrid.org](mailto:osg-storage@opensciencegrid.org)

- Contact:

- Brian Bockelman: [bbockelm@math.unl.edu](mailto:bbockelm@math.unl.edu)

- Frank Würthwein: [fkw@ucsd.edu](mailto:fkw@ucsd.edu)

- Abhishek Singh Rana: [rana@fnal.gov](mailto:rana@fnal.gov)