

# Chapter 7: DAITSS Archival Storage

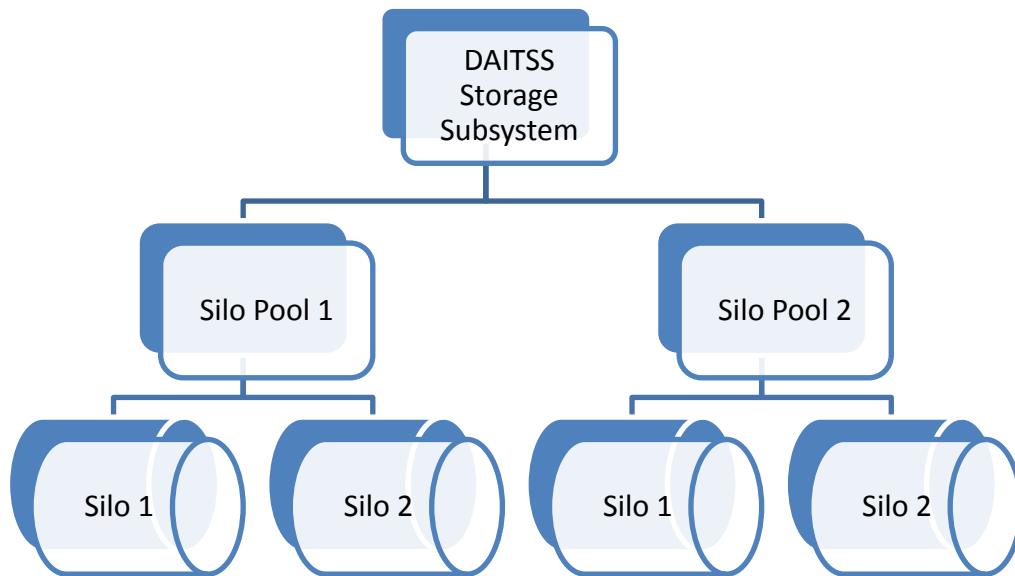
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## Topics covered in this chapter:

- ✓ A brief glossary of storage-related terms
- ✓ An overview of DAITSS archival storage
- ✓ The DAITSS storage process

## Overview of DAITSS Archival Storage

DAITSS Archival Storage is managed by the DAITSS Storage Subsystem, which consists of the Storage Master Service, one or more instantiations of the Silo Pool Service, one or more silo pools, and individual storage silos.



## Glossary

**Silo Pool:** A DAITSS Silo Pool is an administrative collection of storage silos. Each DAITSS Silo Pool is managed by a separate instantiation of the Silo Pool Service and is usually located on a separate server. Information about the AIPs stored in that Silo Pool is stored in an instance of the "store\_db" database unique to that Silo Pool.

**DAITSS Silo:** A large chunk of storage, typically 2TB, with a unique name.

**Active Silo:** A DAITSS Silo that is considered an active part of a Silo Pool in DAITSS Archival Storage. A silo may be active or retired. The default setting for new DAITSS silos is "active".

**Retired silo:** A once active storage silo that is no longer used to store AIPs. Although no longer active, the Silo Database still retains historic information about AIPs that have previously been stored on that silo, and historic information about AIPs deleted from a Retired Silo is still available to users via the Silo Management Interface.

**Silo State:** The definition of a Storage Silo within a Silo Pool. DAITSS allows three Silo States, "disk master," "tape master," and "idling." However, in the distributed VM version, only "disk master" is supported. To use DAITSS with tape silos, consult with DAITSS technical support.

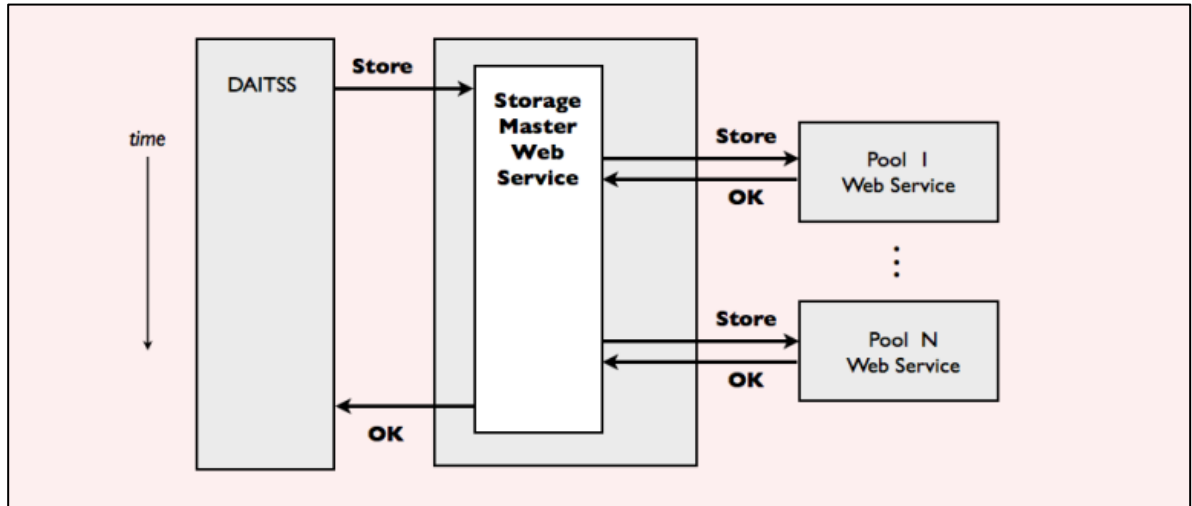
**Silo Methods:** The actions that are allowed on specific storage Silos. These methods are: delete, get (or read), and put (or write). Silo Methods are set via the DAITSS Silo Management Interface and govern DAITSS storage actions for that silo. (Note that filesystem permissions are not governed by Silo Methods.)

**DAITSS Archival Storage:** The physical storage on which AIPs in a DAITSS repository are contained.

**DAITSS Storage Master Service:** The DAITSS Storage Master Service mediates the storing of AIP tarfiles into DAITSS Silo Pools via the Silo Pool Services. Information about AIPs managed by the DAITSS Storage Master Service is stored in the "storagemaster" schema of the DAITSS "daitss\_db" database.

**DAITSS Silo Pool Service:** A web service instantiated for each Silo Pool to manage the content of each Silo Pool.

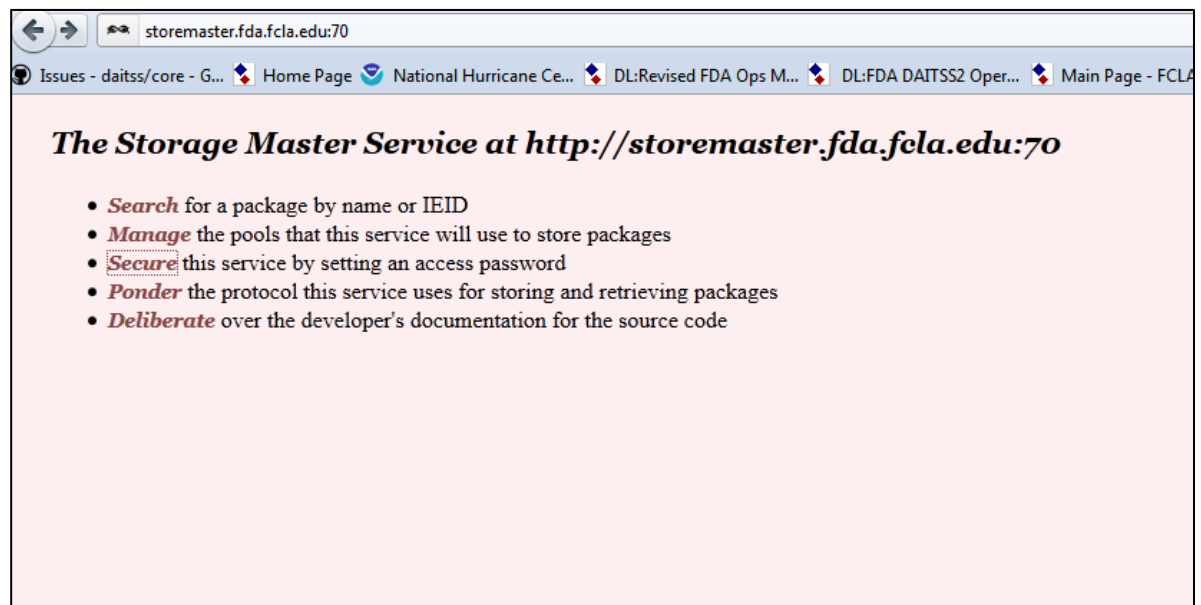
## Details of how Storage Service works



## DAITSS Storage Master Interface

The DAITSS Storage Master User Interface can be used by Operators to search for the location of AIPs in a DAITSS Silo Pool. (Note: To access the demonstration Storage Master Interface, point your browser to <http://storeagewriter.shades.local> after installing the DAITSS demonstration instance.)

1. Click on the "Search" option (text will change):



## Chapter 7: DAITSS Archival Storage

2. Enter an AIP's IEID:

***http://storemaster.fda.fcla.edu:70 ⇒ Search for Packages by Name or IEID***

Enter your search text and hit enter:

3. The resulting screen will list the URLs of all AIPs in storage with that IEID, along with the storage timestamp. (Note that multiple copies of the same AIP stored in different Silo Pools will have the same IEID.)

***http://storemaster.fda.fcla.edu:70 ⇒ Search for Packages by Name or IEID***

Returned 1 result for:

<i>Name</i>	<i>Location</i>	<i>Date</i>
<b>E20060312_AAAACM.000</b>		
	<a href="http://silos.tarchive.fcla.edu:70/048/data/E20060312_AAAACM.000">http://silos.tarchive.fcla.edu:70/048/data/E20060312_AAAACM.000</a>	2011-07-25 13:39:55
	<a href="http://silos.darchive.fcla.edu:70/047/data/E20060312_AAAACM.000">http://silos.darchive.fcla.edu:70/047/data/E20060312_AAAACM.000</a>	2011-07-25 13:39:57

Store Master Service Version 1.3.4, Git Revision ffadd74f486111e1aocda69255d6d5eeef929f1c, Capistrano Release 20110921183521.

### DAITSS Silo Management Interface Overview

The DAITSS Silo Management Interface enables a DAITSS Operator to view information about all storage silos assigned to a specific silo pool. In addition, Operators can add new silos to DAITSS archival storage.

(Note: To access the demonstration Silo Management Interface, point your browser to <http://silo.shades.local> after installing the DAITSS demonstration instance.)

**Packages in Silo /043**  
*silos.tarchive.fcla.edu* ⇒ */daitssfs/043*

(prev) page 1 of 38 next

Package Name	Size	Date	Package Name	Size	Date
E672VoOWF_JRWS6H.002	3.00 MB	May 31, 2011 - 12:40:49 PM	EPKFBRPWY_EWL4KJ.000	4.09 MB	May 26, 2011 - 03:17:24 AM
EYWR7Y6O7_VQM01J.001	34.02 MB	May 29, 2011 - 12:06:54 PM	E3PH4FoSL_ODJUJE.000	1.72 MB	May 26, 2011 - 03:17:08 AM
EZE40DA2D_90DoV8.001	91.79 MB	May 29, 2011 - 04:04:40 AM	E8JVYEK6N_GoFiF9.000	91.20 MB	May 26, 2011 - 03:16:45 AM
EL53WhM4_3IQUOC.001	11.11 MB	May 29, 2011 - 12:34:48 AM	E87MT9A1P_73MP5K.000	396.05 MB	May 26, 2011 - 03:14:53 AM
EWf1WOXTB_2CW2GY.000	9.53 MB	May 28, 2011 - 12:47:29 PM	EV9TCZ2QF_7OW7RJ.000	72.53 MB	May 26, 2011 - 03:12:09 AM
E16R2eUQ5_BIBL52.000	2.41 GB	May 28, 2011 - 07:37:16 AM	E9B78790A_9RDRBE.000	73.51 MB	May 26, 2011 - 03:11:08 AM
EBYV2PWRZ_LBJ80G.000	1.26 GB	May 28, 2011 - 06:13:36 AM	ET666MIHO_EPMBCG.000	79.54 MB	May 26, 2011 - 03:10:05 AM
EETAB17V3_BVG7CX.000	22.69 GB	May 28, 2011 - 06:12:13 AM	EVPNO1X1G_UDPPFY.000	69.90 MB	May 26, 2011 - 03:09:06 AM
EUKT5PQ7N_617NY3.000	299.59 MB	May 28, 2011 - 04:29:34 AM	E8K77IEST_2X3MS1.000	82.03 MB	May 26, 2011 - 03:08:10 AM
EG6QLCUA7_SFVIGQ.000	23.23 GB	May 28, 2011 - 03:43:51 AM	EJ1270GSH_K86F6X.000	69.06 MB	May 26, 2011 - 03:07:10 AM
ELW0735KM_GGNYWN.000	705.20 MB	May 28, 2011 - 03:33:31 AM	EVQR696So_VN45VE.000	69.07 MB	May 26, 2011 - 03:06:15 AM
EWLCBTMW3_MTB9ZH.000	22.55 GB	May 28, 2011 - 01:16:51 AM	E5BWB1P6F_WJ45XZ.000	242.89 MB	May 26, 2011 - 03:05:10 AM
EWZG2B9QB_AABZAD.000	570.52 MB	May 27, 2011 - 11:26:22 PM	E5CZ4SGIH_W3EE3L.000	396.05 MB	May 26, 2011 - 03:02:27 AM

Clicking on a Package Name displays detailed information about a specific package contained in the storage silo:

**Package E3PH4FoSL\_ODJUJE.000**  
*silos.tarchive.fcla.edu* ⇒ */daitssfs/043* ⇒ **E3PH4FoSL\_ODJUJE.000**

**Contents (tar file)**

File Name	KB	Date
E3PH4FoSL_ODJUJE/descriptor.xml	219.79	May 26, 2011 - 03:17:07 AM
E3PH4FoSL_ODJUJE/sip-files/silva_c.pdf	1,018.34	May 24, 2011 - 09:09:13 AM
E3PH4FoSL_ODJUJE/sip-files/UFEO042613.xml	6.43	May 24, 2011 - 09:09:13 AM
E3PH4FoSL_ODJUJE/xmlres-o.tar	468.48	May 26, 2011 - 03:17:06 AM

**Fixities (xml file)**

Action	Date	MD5	SHA1	Status
put	May 26, 2011 - 03:17:08 AM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	
fixity	June 11, 2011 - 12:15:27 PM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	July 01, 2011 - 12:15:21 PM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	July 15, 2011 - 10:13:15 PM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	August 06, 2011 - 09:36:25 AM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	August 20, 2011 - 07:22:10 PM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	September 08, 2011 - 08:46:15 AM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok
fixity	September 24, 2011 - 01:29:58 PM	793d8767c3d5d61ef513f28267ee6118	46746ee6b182d85fd8544af9eaoc43be2327a82a	ok

- Clicking on the text *tar file* will cause the AIP to be downloaded to your local workstation for troubleshooting purposes.

## Chapter 7: DAITSS Archival Storage

- The Contents section of the Package display lists all of the files within the AIP:
  - Descriptor.xml is the PREMIS in METS AIP descriptor that contains information about all Preservation Events
  - The sip-files directory contains the original versions of content files in the SIP after submission, their size in KB, and the timestamp associated with the file. (Note: DAITSS submission will delete any SIP content files not listed in the SIP descriptor, and these deleted files are not archived and will not be listed in the sip-files directory.)
  - Xmlres-0.tar is a tarfile of all schemas downloaded during the initial ingest. These are stored in each AIP.
- Clicking on a specific *File Name* will display the contents of the file if your workstation supports rendering of that file format.
- The Fixities section of the Package display lists all fixity checks performed on the AIP in that silo, and the Status column indicates whether the fixity check matched the checksum computed when the AIP was first stored/put (ok) or if it did not match (fail):


<b>Fixities (xml file)</b>				
<b>Action</b>	<b>Date</b>	<b>MD5</b>	<b>SHA1</b>	<b>Status</b>
put	May 25, 2010 - 10:01:01 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	
fixity	June 19, 2010 - 10:54:23 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	June 23, 2010 - 05:22:27 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	June 30, 2010 - 02:03:45 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 07, 2010 - 12:27:29 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 12, 2010 - 11:09:29 AM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 19, 2010 - 11:08:29 AM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 24, 2010 - 06:28:04 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 25, 2010 - 09:39:21 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	August 30, 2010 - 09:56:18 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	September 30, 2010 - 04:41:01 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	October 31, 2010 - 11:53:02 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	December 17, 2010 - 06:51:34 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	February 06, 2011 - 05:00:25 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	April 03, 2011 - 05:51:38 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	May 20, 2011 - 07:27:19 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	July 15, 2011 - 08:40:56 PM	fed2fc11a80b657d281213531fb79dd5	afdfc032ca6d4f152397fed40ab11ffff2ecda9	ok
fixity	September 07, 2011 - 09:22:24 PM	d41d8cd98f00b204e9800998ecf8427e	da39a3ee5e6b4b0d3255bfef95601890afd80709	fail

## Monitoring DAITSS Storage Silo Pools

The DAITSS Silo Management Interface provides useful information about the storage space available on each storage silo of a silo pool and the state of fixity checks run on each silo.

**Silo Management**  
*silos.ripple.fcla.edu*

You may [set a site password](#) or [add a new silo](#).

Silo	Free	State	Methods	Pkgs	Most Recent Package Fixities (earliest/latest)			
/001	159.20 GB	disk master	delete, get	4	2011-09-28 15:04:09	2011-09-28 15:04:09	<a href="#">list packages</a>	<a href="#">fixity xml</a>
/002	159.20 GB	disk master	delete, get	1,311	2011-09-28 14:43:05	2011-09-28 14:52:49	<a href="#">list packages</a>	<a href="#">fixity xml</a>
/003	159.20 GB	disk master	delete, get, put	679	2011-09-28 14:52:49	2011-09-28 15:04:09	<a href="#">list packages</a>	<a href="#">fixity xml</a>
/004	278.53 KB	disk master	delete, get	253	2011-09-28 15:04:09	2011-09-28 15:04:43	<a href="#">list packages</a>	<a href="#">fixity xml</a>
/005	421.89 KB	disk master	delete, get	224	2011-05-23 22:52:04	2011-09-28 14:43:05	 <a href="#">list packages</a>	<a href="#">fixity xml</a>
/006	262.14 KB	disk master	delete, get	204	2011-09-28 15:04:43	2011-09-28 15:05:15	<a href="#">list packages</a>	<a href="#">fixity xml</a>

The columns in the display:

- Silo: the number of the storage silo assigned to this pool
- Free: the amount of free space (in SI units) available on each silo for storing new AIPs
- State: the Silo State ("disk master", "tape master", or "disk idling")
- Methods: the methods allowed on this silo
- Pkgs: the number of AIPs stored on each silo
- Most Recent Package Fixities (earliest/latest): the timestamps of the most recent and oldest fixity checks performed.
  - A red triangle indicates that there are expired fixity checks, according to the expiration period set in the DAITSS config file
- List packages: a link to a listing of all AIPs located on each silo
- Fixity xml: a link to an XML version of the most current fixity checks run on that silo

Fixity checking is covered in Chapter 8.

## Adding a Storage Silo to a DAITSS Silo Pool

To add a new storage silo to a DAITSS Silo Pool, perform the following steps:

## Chapter 7: DAITSS Archival Storage

1. On your DAITSS server, create a directory for the new silo (need more details of what is possible on VM and where silos will be on VM), Say something about directory permissions recommendations?. In this example, the new directory on the DAITSS server is: `/var/daitss/silos/007`
2. Via the Silo Management Interface, click on add a "new silo".
3. You will be prompted to enter the name of the directory created in Step 1 above, then click the "proceed" button:

**New Silo**  
*silos.ripple.fcla.edu => Add New Silo*

Enter the Directory Name of the New Silo

4. The next screen, Silo Controls, will display the default settings for new silos on your system. If they are acceptable to you, click "cancel". Or, change the settings in any of the three sections and click "proceed" to save the new settings:

**Silo Controls**  
*silos.ripple.fcla.edu silos => /var/daitss/silos/007*

**Allowed States**

disk idling  
 disk master

**Allowed Methods**

delete  
 get  
 put

**Retire Entire Silo**

retired  
 active

5. The Silo Management screen will now display the new silo and, if "put" is an Allowed Method, DAITSS will begin to store packages on the new silo:



**Silo Management*****silos.ripple.fcla.edu***

You may set a site password or add a new silo.

<i>Silo</i>	<i>Free</i>	<i>State</i>	<i>Methods</i>	<i>Pkgs</i>	<i>Most Recent Package Fixities (earliest/latest)</i>			
/001	144.36 GB	disk master	delete, get	4	2011-10-03 08:03:33	2011-10-03 08:03:33	list packages	fixity xml
/002	144.36 GB	disk master	delete, get	1,311	2011-10-03 07:36:04	2011-10-03 07:46:23	list packages	fixity xml
/003	144.36 GB	disk master	delete, get	743	2011-10-03 07:46:23	2011-10-03 10:00:00	list packages	fixity xml
/004	278.53 KB	disk master	delete, get	253	2011-10-03 08:01:49	2011-10-03 08:02:23	list packages	fixity xml
/005	417.79 KB	disk master	delete, get	224	2011-10-03 08:02:57	2011-10-03 08:03:33	list packages	fixity xml
/006	262.14 KB	disk master	delete, get	204	2011-10-03 08:02:24	2011-10-03 08:02:57	list packages	fixity xml
/007	144.36 GB	disk master	delete, get, put	0				