

# HSI Update

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**[http: www.sdsc.edu/Storage/hsi](http://www.sdsc.edu/Storage/hsi)**

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# HPSS R4.2-related changes

- **New/changed structures (CNS, BFS)**
- **Changed symbols  
(nameserver, hpss\_limits.h)**
- **Changed header filenames (cns.xxx  
changed to ns.xxx)**

# HPSS R4.2-related changes

- **Client API changed parameters**  
(hpss\_Readdir,stageCallback,ACL calls)
- **New API Calls**
  - **Multi-HPSS related**
    - hpss\_ConvertIdsToName, hpss\_ConvertNamesTolds  
hpss\_SiteIdToName, hpss\_SiteNameTold
  - **Accounting-related**
    - hpss\_AcctCodeToName, hpss\_AcctNameToCode, hpss  
\_ChacctByName  
hpss\_GetAcctName, hpss\_SetAcctByName
  - **File-related**
    - hpss\_Fpreallocate, hpss\_Statvfs

# HSI Requirements

- **Single version of source, build for multiple levels**
  - HPSS 4.1.1.0-4.1.1.3 (old network address format)
  - HPSS 4.1.1.4-4.1.1.x (new network address format)
  - HPSS 4.2

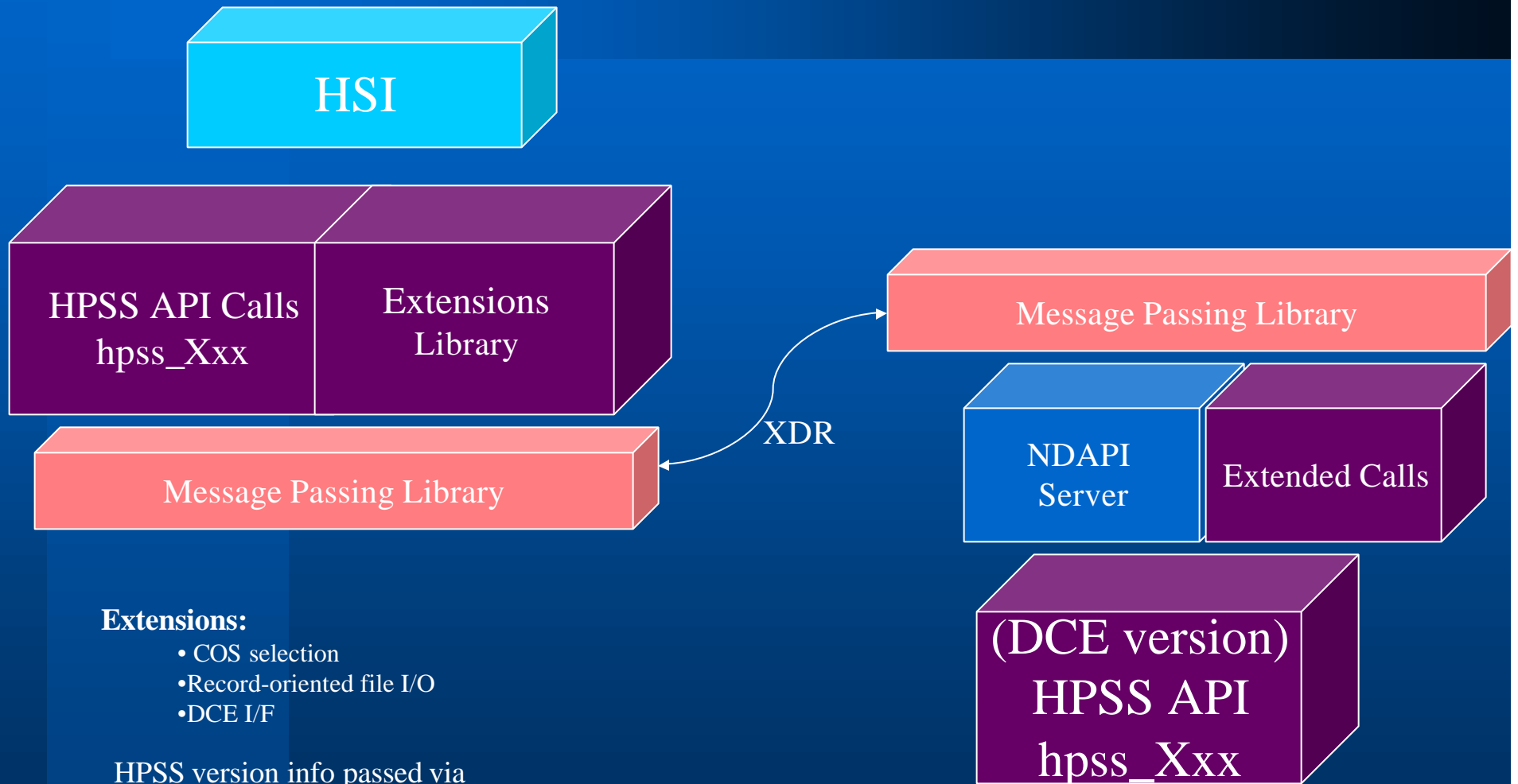
## HSI Requirements (cont.)

- **Non-DCE hsi: single executable to connect to systems at 4.1.1.3, 4.1.1.4+, 4.2**

## HSI Requirements (cont.)

- **Non-DCE hsi: transparently access multiple HPSS systems at different HPSS levels**
- **3rd party copies - any HPSS level to any level**

# Non-DCE HSI / NDAPI Architecture - 4.1.1.x



## Extensions:

- COS selection
- Record-oriented file I/O
- DCE I/F

HPSS version info passed via  
`hpssex_GetSiteInfo` 4.1.1.4)

# Non-DCE HSI / NDAPI Architecture - 4.2

HSI

- DCE version: conditional code for 4.2,4.1.1.x
- non-DCE version: compiled for HPSS 4.2 form of API calls

4.1.1.x <--> 4.2

Translation Layer

HPSS API Calls  
hpss\_Xxx

Extensions  
Library  
(hpssex\_Xxx,  
DCE I/F)

Message Passing Library

XDR

HPSS version  
e.g. 420

Message Passing Library

NDAPI  
Server

Extended Calls

(DCE version)  
HPSS API  
hpss\_Xxx

# HSI 2.3 Changes - Overview

# HSI I/O Evolution

- Version 1.x
  - hpss\_Read, hpss\_Write
  - no double buffering
  - ndapi: store-and-forward I/O
- Version 2.1.x
  - 3rd party IPI-3 support (unicos)
  - File Put/Get: direct-to-mover I/O; not double-buffered
  - multi-threaded; auto-detect stripe width
  - client-side hpss\_netopt.conf
  - store&forward I/O for piped transfers; double-buffered

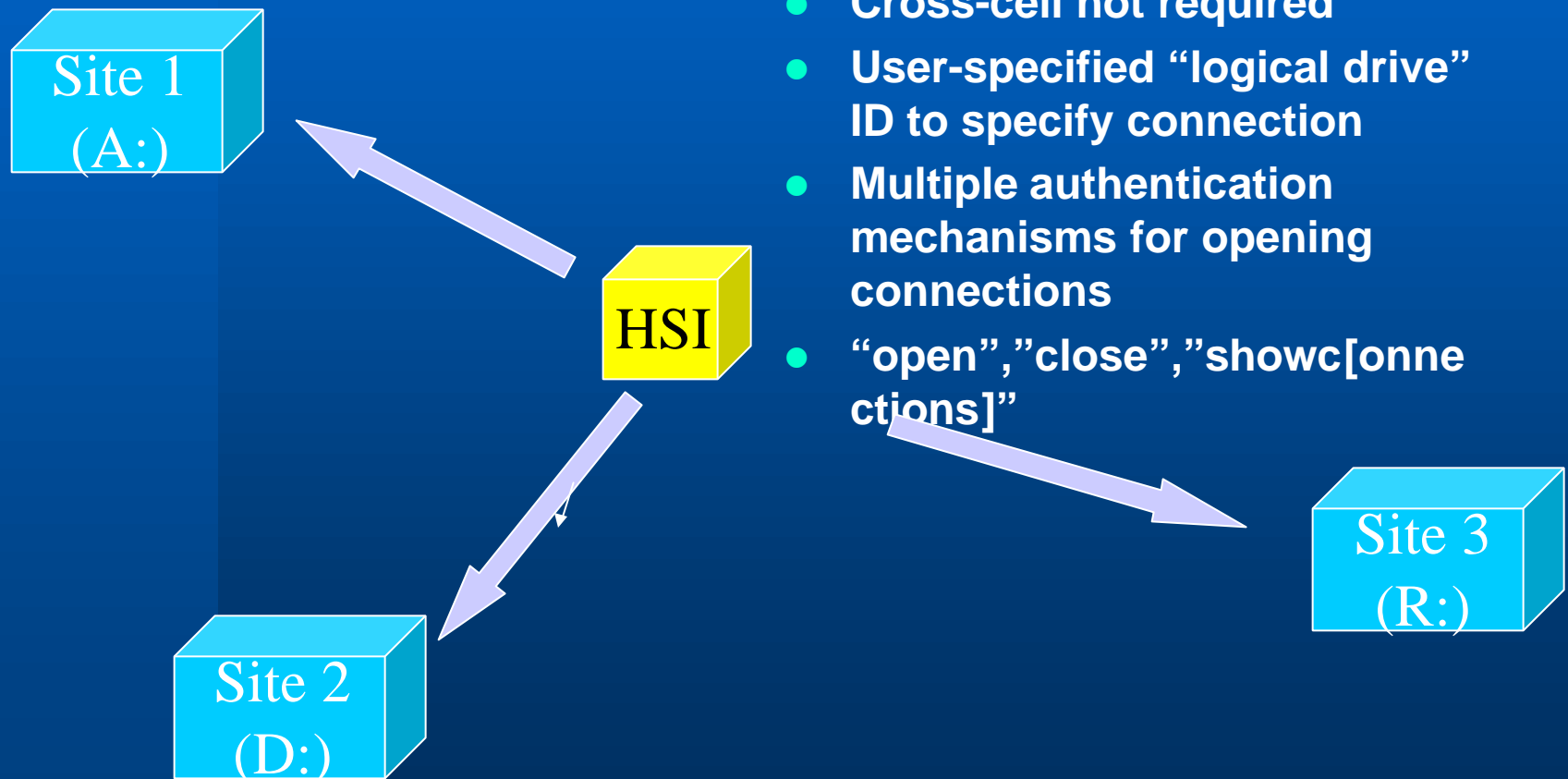
# HSI I/O Evolution

- Version 2.2.1
  - Inter-HPSS copies
    - 3 experimental methods defined/tested
      - local
      - mover-mover
      - mover-ndapi server

# HSI I/O Evolution

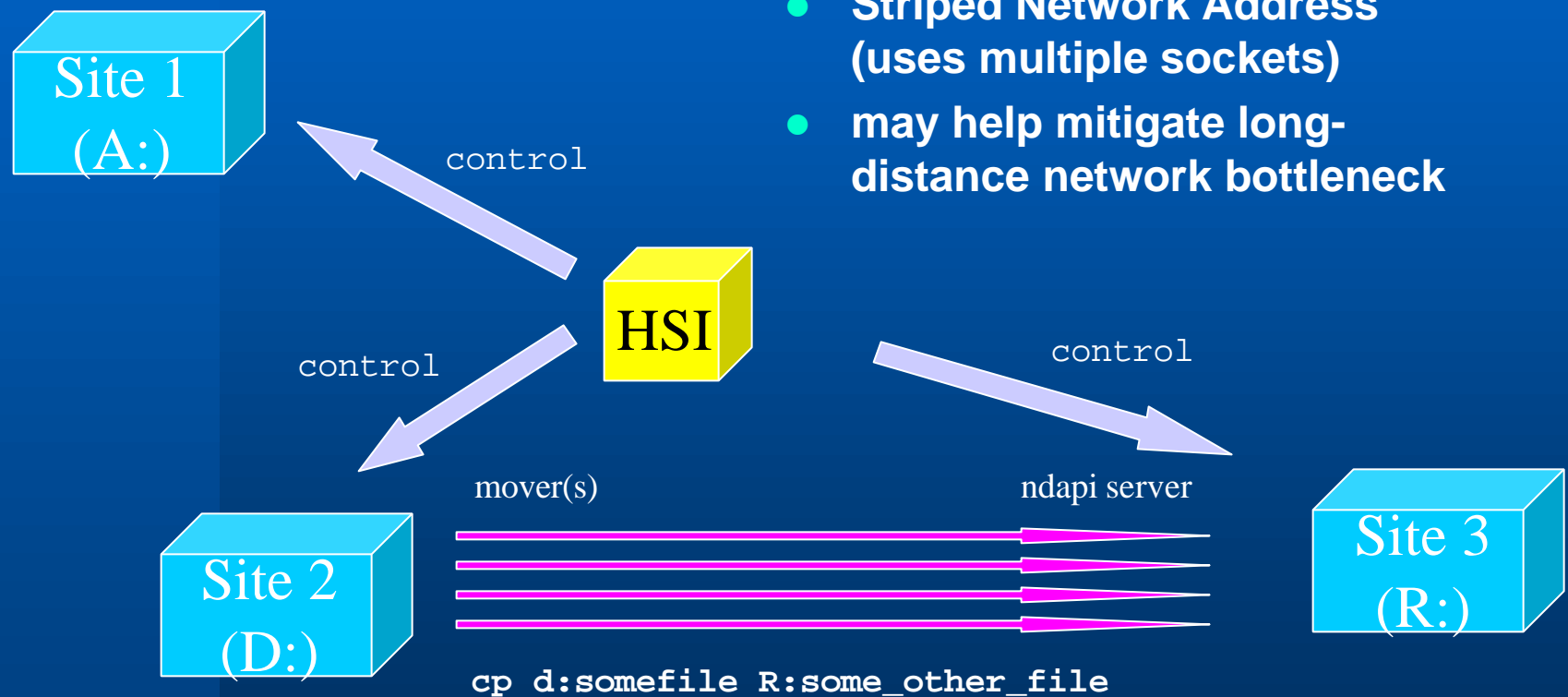
- Version 2.2.2
  - File Put/Get: buffer pool [full double buffering]
  - Store/Forward I/O for piped transfers
  - network striping for inter-hpss transfers)
- NDAPI Version 2.3
  - multi-threaded
  - IOD I/O for hpss\_Read/Write
    - optional store-and-forward I/O (firewalls)

# HSI Multi-HPSS



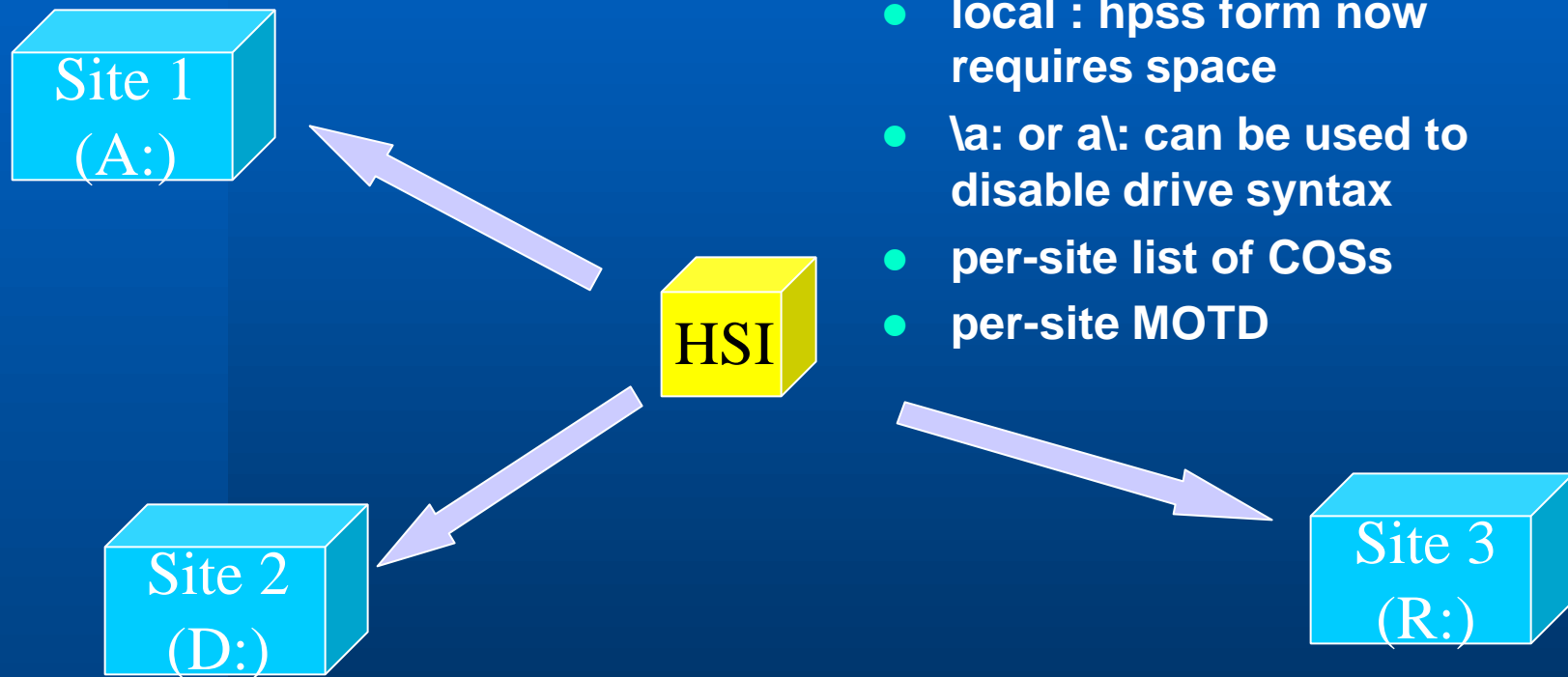
- Cross-cell not required
- User-specified “logical drive” ID to specify connection
- Multiple authentication mechanisms for opening connections
- “open”, “close”, “showc[onnections]”

# HSI 2.3 InterHPSS Copies



- Striped Network Address (uses multiple sockets)
- may help mitigate long-distance network bottleneck

# HSI Multi-HPSS Overview



- Optional “drive letter” prefix to specify connection for path (default: current connection)
- local : hpss form now requires space
- \a: or a\: can be used to disable drive syntax
- per-site list of COSs
- per-site MOTD

Example:

```
put file.c : a: file.c file.h R:hfiles/file.h
```

# COS Changes

- **mkcos.pl - generate template from lshpss -cos**

```
# HSI Class of Service Definitions
```

```
# Auto-generated on host rmds01 on Wed Apr 11 17:46:57 EDT 2001
```

```
1: type = cos  
id = 1
```

```
cosname = "Phenix Raw"  
comment = "Phenix Raw"  
hierarchy = "1"
```

```
access_size = 1 MB  
min_size = 0  
max_size = 50 GB  
transfer_rate = 4096  
latency = "0"
```

```
19: type = cos  
id = 19
```

```
cosname = "Phenix Dual"  
comment = "Phenix Dual"  
hierarchy = "19"
```

```
access_size = 1 MB  
min_size = 0  
max_size = 20 GB  
transfer_rate = 4096  
latency = "0"
```

```
2: type = cos  
id = 2
```

```
cosname = "Brahms Raw"  
comment = "Brahms Raw"  
hierarchy = "2"
```

```
access_size = 1 MB  
min_size = 0  
max_size = 50 GB  
transfer_rate = 4096  
latency = "0"
```

```
20: type = cos  
id = 20
```

```
cosname = "Brahms Dual"  
comment = "Brahms Dual"  
hierarchy = "20"
```

```
access_size = 1 MB  
min_size = 0  
max_size = 20 GB  
transfer_rate = 4096  
latency = "0"
```

# COS options

- **named COS lists**
- **lscos command**

## Usage:

```
lscos [-n] [-N list_name]
```

```
: With no arguments, lists general COS info
```

```
-n : list named COS Lists available for the connection
```

```
-N list_name : list COS IDs associated with the specified Named COS List
```

# COS-related Changes

- Named COS Lists

```
[HPSS]/hpss/mgleiche: lscos
```

```
52 HPSS Classes of Service defined
```

```
COS Name Exclusion Copies Min File Size Max Size + 1
```

```
ID Flags
```

```
-----  
1 3280 1 0 10,485,760  
2 nmc 1 0 33,554,432,000  
3 smos 1 0 33,554,432,000  
4 nexrad 1 0 33,554,432,000  
5 common 1 0 33,554,432,000  
6 srrs 1 0 33,554,432,000  
8 common > 10M 1 10,485,760 33,554,432,000  
9 3280 > 10M 1 10,485,760 33,554,432,000  
10 level1b 1 0 33,554,432,000  
...  
  
1303 IG88 Large 1 0 33,554,432,000  
1304 IG88 Huge 1 0 33,554,432,000  
-----
```

```
Flags: U/G/A - unavailable to current uid/gid/account N-no auto assignment
```

# COS-related Changes,cont.

```
[HPSS]/hpss/mgleiche-> lscos -n
```

```
9 HPSS Class-of-Service Lists Defined:
```

```
3615
```

```
Backup
```

```
NOAAPort
```

```
Nexrad3
```

```
Satellite
```

```
GOES
```

```
DMS
```

```
Datsav3
```

```
InSitu
```

# COS-related Changes,cont.

```
[HPSS]/hpss/mgleiche-> lscos -N DMS
```

```
4 HPSS Class-of-Service IDs defined for COS List "DMS":
```

```
1001
```

```
1002
```

```
1003
```

```
1004
```

To Use:

```
coslist = DMS  
put local : HPSS
```

or

```
put coslist=DMS local : HPSS
```

# HSI 2.3 -new platforms

- Solaris (using DCE Client API)
- Solaris64, SGI64 (files > 2GB)
- Compaq
- MAC OSX Server
- MAC OSX

# HSI 2.3 -platforms removed

- SunOS

# New Features for HSI 2.3

- **Auth Method Changes**
  - keytab [DCE keytab]
  - kerberos - multihomed host changes
- **Multi-HPSS**
  - motd, COS on ndapi server side
  - logical drive letters for HPSS pathnames
  - new parser
  - example of recursive inter-HPSS copy
  - Continuation of inter-HPSS copy - striped I/O (multiple sockets for long-distance IHCP's)

# New/changed commands

## – annotate

```
B:/home/gleicher/temp->annotate
```

```
Usage: anno[tate] [-R] [-e] [-d] [-f] [-A "string"] path ...
```

```
-A : annotation string (including metacharacters). An empty string  
is treated as if the -e option was specified
```

```
-R : recursively traverse directories in the specified path(s)
```

```
-e : erase any existing annotation
```

```
-d : operate only on directory objects
```

```
-f : operate only on file objects
```

# New/changed commands

## – annotate - examples

```
B:/home/gleicher/temp->anno -A "Tests from 01/05/05 with new bug-free hsi :) " HSI.bigtar
B:/home/gleicher/temp->ls -A HSI.bigtar
-rw-r--r-- 1 gleicher hpss 139622400 Jan 23 07:39 HSI.bigtar
Annotation: Tests from 01/05/05 with new bug-free hsi :)
```

### Multi-Line Example

```
B:/home/gleicher/temp->anno -A "Here are some files that\nI could probably get rid of"
B:/home/gleicher/temp->ls -ldA .
/home/gleicher:
drwxr-xr-x 13 gleicher hpss 512 Jun 4 10:52 temp
Annotation: Here are some files that
I could probably get rid of
```

# New/changed commands - plock

- **plock,punlock**

Usage: plock [-h] [-R] [-s] path ...

-h : read through symlinks as if they were regular files/directories  
[default: ignore symlinks]

-R : recursively traverse directories in the specified path(s)

-s : prestage files if necessary prior to locking

Usage: punlock [-h] [-R] path ...

-h : read through symlinks as if they were regular files/directories  
[default: ignore symlinks]

-R : recursively traverse directories in the specified path(s)

# New/changed commands - plock

- plock,punlock examples

```
A:/home/gleicher/temp->ls -lU 100meg
-rw-r--r-- 1 gleicher hpss 1 10190 TAPE 107937792 Mar 9 15:15 100meg
A:/home/gleicher/temp->plock -s 100meg
opening tape-resident file /home/gleicher/temp/100meg

A:/home/gleicher/temp->ls -lHU 100meg
  Mode   Links Owner Group COS Acct Where      Size      Date    Time Entry
-rw-r--r-- 1 gleicher hpss  1 10190 DISK-L 107937792 Mar 9 15:15 100meg
A:/home/gleicher/temp->punlock 100meg;ls -U 100meg
-rw-r--r-- 1 gleicher hpss  1 10190 DISK    107937792 Mar 9 15:15 100meg
```

# New/changed commands

- **showc[onnections]**

```
R4.2/hsi.2.3/src] gleicher% ./hsi -l gleicher -A dce -p 1219 -h hpss03i.sdsc.edu
```

```
Username: gleicher UID: 401 CC: 200 Copies: 1 [hsi.2.3 Mon Jun 4 08:14:20 PDT 2001]
```

```
A:/users/sdsc/gleicher->showc
```

```
List of Currently Active Connections
```

```
Current default connection handle: 1
```

Han-	Remote	Remote	HSM	Service	Ctl	Data	Port	Cmd
Drive	dle	IP Address	Hostname	Level	Port	Min	Max	Count

```
-----  
->A: 1 198.17.101.193 hpss03i.sdsc.edu 4.1.4 hpss_ndapi 1219 0 65535 1
```

```
HomeDir: /users/sdsc/gleicher
```

```
pwd0: /users/sdsc/gleicher
```

# New/changed commands

- **showc[onnections] cont.**

```
A:/users/sdsc/gleicher->open -A kerberos -p 1219 stingray.ccs.ornl.gov
Remote login name: gleicher
Kerberos Principal: gleicher@probe.ccs.ornl.gov:
```

```
Password for gleicher@probe.ccs.ornl.gov:
```

```
=====
```

```
NOTICE TO USERS
```

```
This is a Federal computer system and is the property of the United
```

```
...
```

```
For help or support, contact:
```

```
=====
```

```
B:/home/gleicher->showc
```

```
List of Currently Active Connections
```

```
Current default connection handle: 2
```

	Han-	Remote	Remote	HSM	Service	Ctl	Data	Port	Cmd
Drive	dle	IP	Address	Level		Port	Min	Max	Count

```
-----
```

A:	1	198.17.101.193	hpss03i.sdsc.edu	4.1.4	hpss_ndapi	1219	0	65535	2
----	---	----------------	------------------	-------	------------	------	---	-------	---

```
HomeDir: /users/sdsc/gleicher
```

```
pwd0: /users/sdsc/gleicher
```

```
->B: 2 160.91.192.82 stingray.ccs.ornl.gov 4.2.0 hpss_ndapi 1219 0 0 2
```

```
HomeDir: /home/gleicher
```

```
pwd0: /home/gleicher
```

# New/changed commands

- **setdrive - change drive letter for connection**

```
A:/users/sdsc/gleicher->setdrive a: c:  
Connection ID 1: Replaced drive letter 'A' with 'C'  
  
C:/users/sdsc/gleicher->
```

# New/changed commands

- **setcon[nection] Change active connection**

```
D:/users/sdsc/gleicher->showc
```

```
List of Currently Active Connections
```

```
Current default connection handle: 2
```

Drive	dle	IP Address	Hostname	Level	Port	Min	Max	Count	Cmd
C:	1	192.67.21.152	hpss03.sdsc.edu	4.1.4	hpss_ndapi	1219	0	65535	2
-----									
HomeDir: /users/sdsc/gleicher									
pwd0: /users/sdsc/gleicher									
->D:	2	192.67.21.153	hpss05.sdsc.edu	4.1.4	hpss_ndapi	1219	0	0	1
HomeDir: /users/sdsc/gleicher									
pwd0: /users/sdsc/gleicher									

```
D:/users/sdsc/gleicher->setcon 1
```

```
C:/users/sdsc/gleicher->
```

# New/changed commands

- Change active connection - easier

```
C:/users/sdsc/gleicher->showc
```

```
List of Currently Active Connections
```

```
Current default connection handle: 2
```

Drive	dle	IP Address	Hostname	Level	Port	Cmd	Min	Max	Count
->C:	1	192.67.21.152	hpss03.sdsc.edu	4.1.4	hpss_ndapi	1219	0	65535	2
		HomeDir: /users/sdsc/gleicher							
		pwd0: /users/sdsc/gleicher							
D:	2	192.67.21.153	hpss05.sdsc.edu	4.1.4	hpss_ndapi	1219	0	0	1
		HomeDir: /users/sdsc/gleicher							
		pwd0: /users/sdsc/gleicher							

```
C:/users/sdsc/gleicher->d:
```

```
D:/users/sdsc/gleicher->
```

# New/changed commands

- **idletime (non-DCE)**

```
B:/home/gleicher->idle
```

```
Idle timeout setting is 1800 seconds
```

```
B:/home/gleicher->idle -1
```

```
Idle timeout setting is unlimited (no idle timeout)
```

```
B:/home/gleicher->
```

```
B:/home/gleicher->idle 3600
```

```
Idle timeout setting is 3600 seconds
```

# New/changed commands

- **ls options**
  - **-A** : annotation string
  - **-P**: position info (examples)

## 2.3 - Prompt Options - PS1, PS2

`%C` : \*\*DCE Cellname  
`%c` : \*current connection ID  
`%d` : \*current logical drive ID in the form A:  
`%D` : system date in yyyy/mm/dd format  
`%h` : local hostname  
`%H` : \*remote HPSS hostname for current connection  
      \*\*DCE Hostname for DCE version  
`%I` : \*remote HPSS IP address for current connection  
`%W` : current HPSS working directory for connection  
`%wn` : current HPSS working directory -truncated to last  
      n directory paths  
`%%` : % character  
`%N` : current command number (1:N)  
`%T` : system time in hh:mm:ss format  
  
\* - non-DCE version

## 2.3 - Prompt Options - PS1, PS2

```
A:/users/sdsc/gleicher/HPSS/Doc/UserGuide->PS1 = "%d%w3->"
```

```
A:/users/sdsc/gleicher/HPSS/Doc/UserGuide/html->pwd  
pwd0: /users/sdsc/gleicher/HPSS/Doc/UserGuide/html
```

```
A:/users/sdsc/gleicher/HPSS/Doc/UserGuide/html->psdirilen=40
```

```
A:/users.../Doc/UserGuide/html->cd ..
```

```
A:/users/sdsc/gleicher/HPSS/Doc/UserGuide->
```

## HSI 2.3 - Currently In-Progress

- usage help

*verb* (e.g.: "plock")

or

*verb -?*

## HSI 2.3 - Currently In-progress

- **NDAPI Library Changes**
  - implement new 4.2 API calls
  - fully multi-threaded library, ndapi server
  - hpss\_Read/hpss\_Write changes: use IOD I/O by default
  - hpss\_Open change to allow continued use of private socket (firewalls)

## HSI 2.3 - Currently In-Progress

- **hsi code reorganization [one file/command family]**
- **parser update - add new drive syntax, getopt-style options**
  - **keyword = value will be replaced with -xxx option, variables**

## HSI 2.3 - Short-term

- **intelligent queuing code, integrated w/stage\_Callback**

## HSI 2.3 - Short-term

- **.hsirc file - per site stanza**
  - associate host(s) with drive letter(s)
  - authmethod, principal(s),etc.
  - auto-connect list (startup)

## HSI 2.3 - Near-term

- **ACL commands [recursive]**

# Future work

- xhsi, webhsi [NERSC]
- GUI hsi for Mac OSX, Windows 2000

# Future work

- **Partial file I/O; reput, reget**
- **quiesce improvements**
- **GK interface to throttle**
- **Persistent retries**

# Future work

- **User access profile (non-DCE)**
  - User-defined list of hosts,networks,allowable times

# Future work

- **Scheduler (non-DCE)**
  - queues
  - stage & notify
  - get & notify
  - put & notify
  - query/modify job attrs

# Future work

- replication

```
-put [-r a:, b:path,c:/COS] file  
...  
-replicate [a:,b:path] <-- set  
replicate list for all 'put's  
-get [-r a:,b:path,c:] file [:]  
hpssFile
```

# Future work - ?

- **libhsi**
- **TCL/PERL/PYTHON interface(s)**

# Future work

- **interactive command history, recall, edit**
- **ksh-style variables, functions**

# Future work

- **non-HPSS connections, ala ftp  
[workstation]**