

HSI Update

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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_SiteldToName, 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

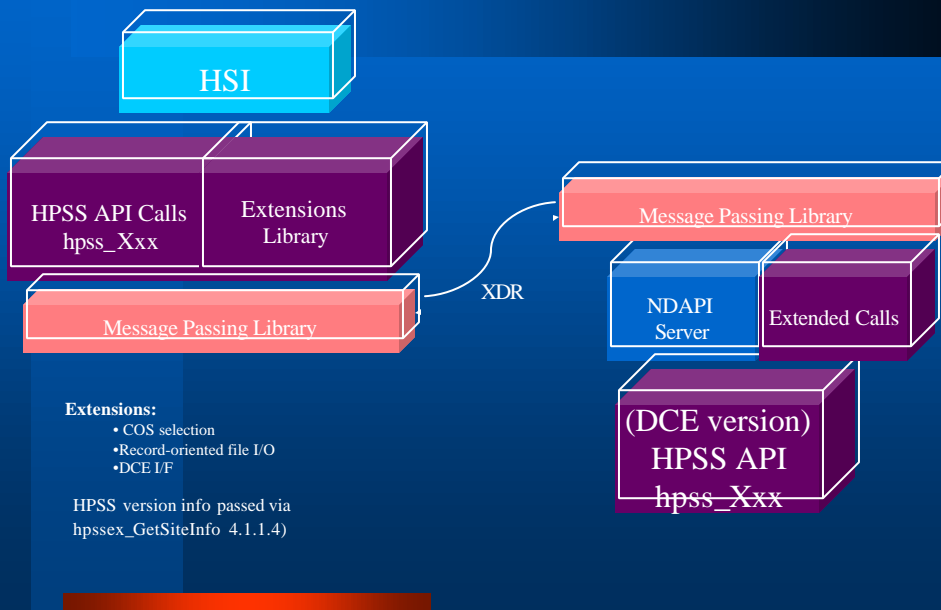
HSI Requirements (cont.)

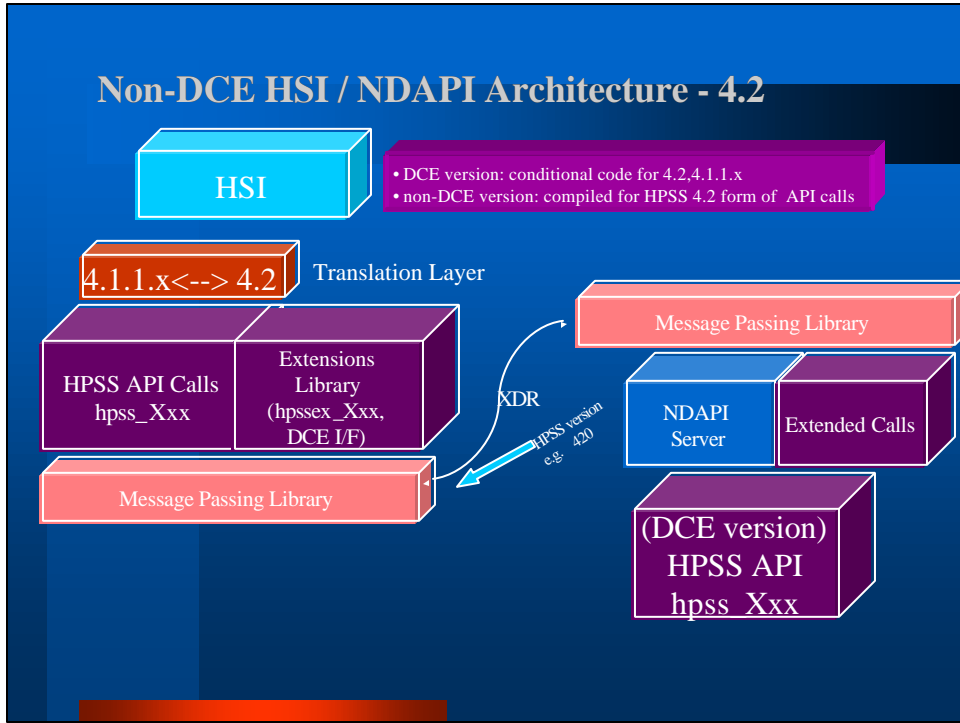
- **Non-DCE hsi: single executable to connect to systems at 4.1.1.3, 4.1.1.4+, 4.2**

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





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

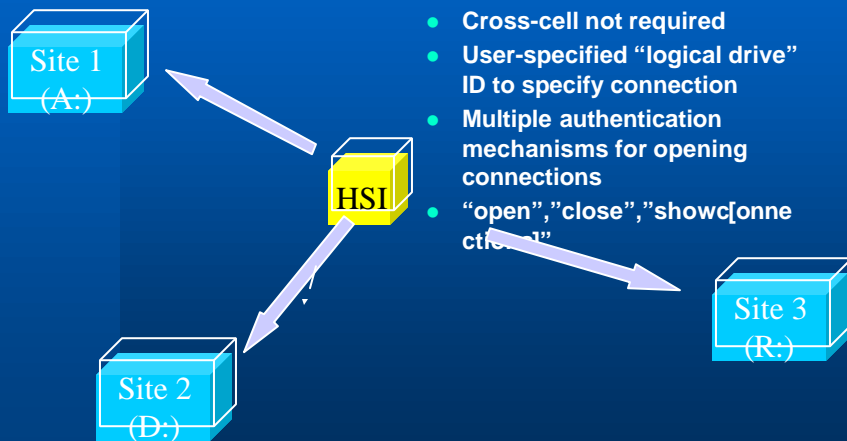
HSI I/O Evolution

- 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



HSI 2.3 InterHPSS Copies

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

control

control

control

mover(s)

ndapi server

```
cp d:somefile R:some_other_file
```

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

control

control

control

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           19: type = cos           2: type = cos           20: type = cos
id = 1                 id = 19                  id = 2                  id = 20
cosname = "Phenix Raw" cosname = "Phenix Dual" cosname = "Brahms Raw" cosname = "Brahms Dual"
comment = "Phenix Raw" comment = "Phenix Dual" comment = "Brahms Raw" comment = "Brahms Dual"
hierarchy = "1"       hierarchy = "19"         hierarchy = "2"         hierarchy = "20"
access_size = 1 MB    access_size = 1 MB      access_size = 1 MB     access_size = 1 MB
min_size = 0          min_size = 0            min_size = 0           min_size = 0
max_size = 50 GB      max_size = 20 GB       max_size = 50 GB      max_size = 20 GB
transfer_rate = 4096  transfer_rate = 4096    transfer_rate = 4096   transfer_rate = 4096
latency = "0"         latency = "0"           latency = "0"          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 levellb 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 -lA 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 Hostname      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  
  Han- Remote      Remote    HSM Service Ctl Data Port Cmd  
Drive dle IP Address Hostname Level Port      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
```

```
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
      Han- Remote      Remote      HSM Service Ctl Data Port Cmd
Drive dle IP Address Hostname Level Port      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->psdirlen=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; reget, 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]