January 8, 2003

MEMORANDUM FOR:

FROM: John Ward
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             NCEP Central Operations

SUBJECT: NCEP Storage Standards for the High Performance Storage Subsystem

This memorandum defines the storage standards for operational and developmental data residing on the IBM supercomputer. NCEP Central Operations (NCO) has the responsibility for establishing and maintaining data storage standards. Representatives of the Production Management Branch (PMB), Environmental Modeling Center (EMC), and Meteorological Development Laboratory (MDL) established the guidelines for the formal storage standards based on data retention requirements for each organization.

NCEP's space managed data will be stored in the High Performance Storage Subsystem (HPSS). The HPSS includes software that provides hierarchical storage management (HSM) and archive functions for high-performance computing environments. To ensure efficient use of data storage and to prevent saturation of the HPSS, data retention periods and user quotas are established. Production data and parallel/developmental data will be maintained in file family directory structures which corresponds to a specified retention period. The data retention periods have been categorized into three file families; 1-year, 2-years, and archive (indefinitely). When creating a file for migration to tape, a retention period must be specified. Any data assigned retention periods 1-year or 2-years will become unavailable upon reaching the expiration date (established at file creation).

In addition, the HPSS system administrators will assess data storage quotas for users based on space availability. If a user's quota is exhausted, further writing to the HPSS data space will be prohibited, and the user must remove selected data files to free-up space. HPSS performs an automatic quota assessment every five minutes. Therefore, a ten minute lag is possible between the time a file is removed and the next assessment cycle. The user will remain locked out until the next assessment cycle or an HPSS administrator perform a manual intervention. To avoid unnecessary lockouts and inconveniences, it is advised that users perform routine space assessments whenever possible, and remove obsolete files. Adjustments to user quotas are subject to space availability, usage, and operational requirements.

Data Definition

Data is defined in two classes:

(1) Production/Operational (data managed and/or created by PMB)

(2) Developmental (data created and managed by EMC, MDL, CPC)

Three categories of data:

(1) hpssprod (PMB - production)

(2) hpsspara (EMC - parallel group) (developmental data - generate forecast model data similar to operational model data, except different input/initial conditions)

(3) hpssuser (general user)

Standard Data Manipulation Guidelines (applicable to all data)

(1) Data will be moved onto and retrieved from the HPSS data space using the parallel file transfer protocol (pftp) and associated parallel "put" and parallel "get" interfaces.

(2) It is recommended that small files (less than 1 MB) be tar'd into a 1GB or greater tar file for storage in the HPSS data space.

(3) A tar like utility (htar) can be used for creating and reading tar files in HPSS. The htar utility generates an index file for each tar file it creates. It can also be used to create an index for existing tar files.

(4) As a default, HPSS will create a 2nd tape copy of all files stored to protect data against media failure **only**.

PLEASE NOTE:

(a) Do not consider the 2nd tape copy as a backup of the data. **This tape will only be used if the primary tape is corrupted.**

(b) The amount of storage space required for the duplication of a data file will assess against the user's quota.

(c) Once a file is deleted from storage, the actual index reference to the file is lost.

(5) All user IDs (whether individual or group) must be HPSS defined and have a valid HPSS home directory.

(6) To gain access to the HPSS data space, users of group accounts must login using the assigned group ID.

Storage Guidelines for Production Data (hpssprod)

(1) Production data files will be moved into the HPSS data space based on the file's retention period and file size.

(2) There are three file family levels which corresponds with the retention periods; 1-year, 2-years, and archive (indefinitely). All production data files must be stored in a file family based on the required retention period.

(3) Specification of the retention period is mandatory at file creation time (during file transfer into the HPSS data space).

(4) Once the retention period for a data file expires, the file is deleted from the HPSS data space.

(5) Newly created run history files will remain on the HPSS disk for 15 days or as disk space and system requirements allow.

(6) Recalled files will remain on disk 24 hours before they are eligible for re-migration. **On the other hand, large files (32 MB or greater) will automatically recall into the user's workspace unless an alternate location is specified.**

Storage Guidelines for Developmental Data

#	*Parallel Data (hpsspara)*

(1) Parallel data files will be moved into the HPSS data space based on the file's retention period and file size.

(2) There are three file family levels which corresponds with a retention period (1-year, 2-years, and archive (indefinitely)). All parallel data must be stored in a file family based on the required retention period.

(3) Specification of the retention period is mandatory at file creation time (during file transfer into the HPSS data space).

(4) Once the retention period for a data file expires, the file is deleted from the

HPSS data space.

(5) User quotas will be implemented to manage HPSS usage.

(6) HPSS will monitor user quotas every five minutes. Therefore, a ten minute lag is possible between the time a file is removed and the next assessment cycle. Write restrictions on HPSS home directories will be assessed to users where quotas are exhausted.

(7) Users should monitor data space usage to prevent exhausting assigned quotas. If user quotas are exhausted, the system will prohibit further writing to the storage system. To remedy this situation, the user will be required to make sufficient space available by removing selected files from the system. Lockouts can be avoided through routine monitoring of data space usage.

General User Data **(hpssuser)**

(1) User data will default to the archive file family (indefinitely) retention period, however, user quotas will be assessed.

(2) User quotas will be implemented to manage HPSS usage.

(3) HPSS will monitor user quotas every five minutes. Therefore, a ten minute lag is possible between the time a file is removed and the next assessment cycle. Write restrictions on HPSS home directories will be assessed to users where quotas are exhausted.

(4) Users should monitor data space usage to prevent exhausting assigned quotas. If user quotas are exhausted, the system will prohibit further writing to the storage system. To remedy this situation, the user will be required to make sufficient space available by removing selected files from the system. Lockouts can be avoided through routine monitoring of data space usage.

NCEP/TSM

User NFS data will be backed to the Tivoli System Management (TSM) subsystem.

(1) Selected Regatta nodes and associated user NFS data will be backed to tape daily using the TSM storage subsystem. The file list can be viewed at:

 http://ibmdocs.ncep.noaa.gov/userman/filesystem.list.html

(2) Retrieval of data from TSM storage system will require Storage System Administrator intervention.