



***NORTHROP GRUMMAN***

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# Storage Management

Tier	Billing Unit	Storage Type	Backup (Y/N)	Replication Supported (Y/N)	Location
<b>Storage Tier 1 at CESC</b>	Gigabyte (Allocated Space)	High Availability NAS or SAN	Y	Y	CESC/SWESC
<b>Storage Tier 2 at CESC</b>	Gigabyte (Allocated Space)	Standard Availability NAS or SAN	Y	N	CESC/SWESC
<b>Storage Tier 2 at CESC</b>	Gigabyte (Allocated Space)	Standard Availability NAS or SAN	N	N	CESC/SWESC
<b>Storage Tier 2 outside of CESC</b>	Gigabyte (Allocated Space)	Standard Availability NAS or SAN	Y	N	Customer Site
<b>Storage DASD (Direct Access Storage Device)</b>	Gigabyte (Raw Space)	Physically Attached Storage (Internal or External)	Y	N	Any
<b>Storage DASD</b>	Gigabyte (Raw Space)	Physically Attached Storage (Internal or External)	N	N	Any



- Tier 1 is highly available high performance storage.
  - IOPS counts in excess of 15,000
  - End to End redundancy through storage frame
  - Remote Administration – Automation in place
  - Provisioning changes are transparent
- Tier 2 is highly available scalable performance storage
  - IOPS approaching Tier1 are possible
  - End to End redundancy
  - Remote Administration – Automation in place
  - Provisioning changes are transparent
- DASD is (Direct Attached Storage) internal or external
  - Performance determined by attachment type, SCSI, SAS, Internal Disk etc.
  - Redundancy not always possible; typically not shared with other systems
  - Limited or no remote automation
  - Provisioning changes require downtime and manual effort

# Program Consolidation Initiative

- Currently - Multiple frames of different product lines complicate storage management and extend service delivery timelines
  - More than 11 storage frames of different sizes have been migrated into CESC/SWESC during transformation
- This summer the ITP is migrating and consolidating to EMC's VMAX technology for Tier1 and Clarion Technology for Tier 2
  - 3 to 5 month migration
  - Agency notification through change control process
- This consolidation will move ~240TB from Tier 1 to Tier 2
  - Leaving ~75TB on Tier 1 to support DR and High Performance systems

# Managing Storage

- Points for Agency Consideration - What is consuming storage?
  - Percentages by file type, i.e. jpeg, mp3, database or office docs.
  - Duplicates Files. How much space is consumed by the same file?
  - Identify the largest files in the environment, i.e. freeware apps from the internet, multiple user created versions of backups, etc.
  - Archiveable files. Files that have not been accessed in a specified period of time. Can they be moved to a lower tier of storage or removed ?
  - Identify application trends for better capacity planning. For example, how fast is my database growing?
  - How much I/O (disk performance) do my systems require? Can it be moved to a lower tier?

# Managing Storage

- Storage Mitigation Strategies
  - Create business policies for user storage utilization, i.e. quotas, limitation on personal files, identify storage for non essential data, etc.
  - Review storage monthly utilization rates.
- User tools
  - Command line utilities, i.e. “find” , “du – k” , “df –k” , etc for UNIX. Windows explorer utilities and Windows search utilities.
  - Free downloadable tools that will produce lists of files by type, date, owner, etc. (examples: UltraSearch or FileList)
- ITP tools (may require Work Request )
  - EMC Storage scope + SRM (Storage Resource Management)
  - EMC Control Center

# Managing Storage

- Storage Service Requests
  - Request may require a “Work Request” or a “Services Request” via VCCC
  - These require agency authorization to approve potential additional storage costs and specify which Storage Tier is desired
- Customer Actions
  - How to remove files
    - Based upon review of generated file lists, customers can delete unneeded files using agency change control practices
- Next Steps
  - VITA is putting together a business readiness plan to support storage management
  - ITP is developing meetings and webinars to share technical information, guidance and practical “how to” information on storage management with agency teams