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| Module Name: | NBU CoE and CoFC + HPUX/Solaris | | **Test Engineer:** | **Kushal Chitranshu** |
| **ISV:** | NBU 7.7.3 | | **Percent Complete:** |  |
| **Module Creation Date:** | |  | **Test Start Date:** |  |
| **Hardware/Software Matrix Revision:** | |  | **Test Duration:** | 30 work days (6 weeks) |

### Objectives

### The GoGreen IC test module is used for testing HPE ISV backup partner software with HPE StoreOnce Backup systems.

* StoreOnce Catalyst CoE and CoFC targets should be tested for all phases.
* For Catalyst stores all deduplication will take place on the backup server (low bandwidth) unless otherwise stated.

### The following test phases are included:

**Phase 1 – Integration + Basic backup and restore**

* Test phase goals: Build/integrate backup environment and perform basic backup and restore tests.

**Phase 2 – Varying block sizes**

* Test phase goals:
  + Record StoreOnce dedup ratio and backup throughput performance when data changes by 1% between 14 full backups. Run for 256, 512, 1024 KB block sizes.
  + Identify the best (highest throughput) block size to use for the remaining test phases.

**Phase 3 – Varying rates of data change**

* Test phase goals: Record StoreOnce dedup ratio and backup throughput performance when data changes by 1%, 3%, and 5% between 14 full backups.

**Phase 4 – Different backup methods**

* Test phase goals:
  + Monthly backup schedule which includes weekly full and daily incremental backups, and backup expiration.
  + Target side deduplication (high bandwidth) backups.

**Phase 5 – Disaster Recovery**

* Test phase goals:
  + Select Catalyst target type for all phase 5 tests.
  + Do a complete disaster recovery of the server – Recover from primary backup on the local StoreOnce and replicated backup on a remote StoreOnce.

### Ring Requirements

The ring built to meet the test requirements should be built from the following components.

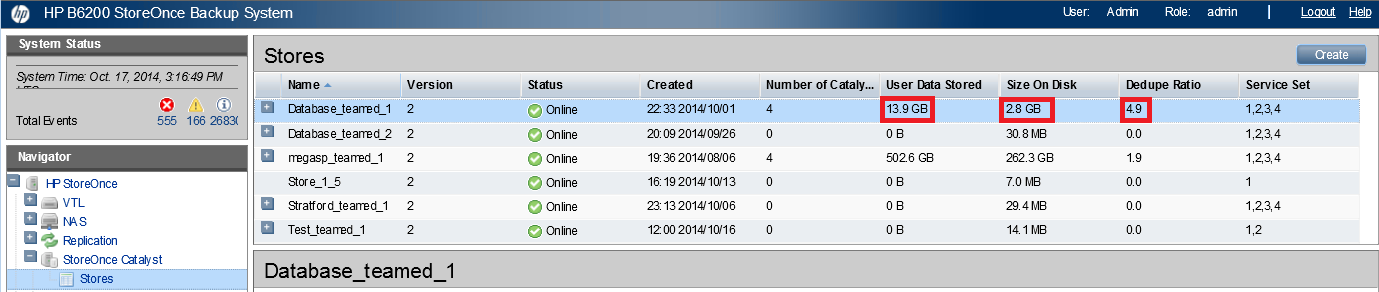
* NetBackup 7.7.3
* Operating systems:
* HPUX – **MANDATORY**
* Solaris – **MANDATORY**
* StoreOnce Catalyst CoE and CoFC
* Associated HBA’s and HP Switches for SAN
* HP Primary Storage Devices

### Notes

* All tests will be recorded to include expected (passed) and non-expected (failed) results.
* Test results will include the date, time and test engineer identification.
* All hardware components will utilize the firmware and driver versions as stated in the current Data Agile BURA Compatibility Matrix at http://hpe.com/storage/buramatrix
* All software (Application, OS, DDI, Wizards, etc…) patches will be current per the ISV.
* **Any test issue, outside of configuration, requiring a server reboot to “fix” the problem should be flagged as a failure!**

**Recording Backup Statistics**

* **StoreOnce User Data Stored, Size On Disk, Deduplication Ratio**
  + The user data stored, size on disk, and deduplication ratios recorded will be the aggregate statistics for the backup scenario.
  + The user data stored, size on disk, and deduplication ratio should be recorded after each backup run.
  + User data stored, size on disk, and deduplication ratios can be obtained from the StoreOnce Web GUI as illustrated in the following figure:



* + Test automation tools can be used to provide the StoreOnce statistics after each backup.
* **Throughput Performance**
  + The backup throughput performance should be recorded for each backup run and is the performance of the individual backup.
  + The backup throughput performance should be obtained from the backup application GUI.
  + Test automation tools can be used to provide the backup throughput statistics after each backup.

**Test Dataset**

The dataset used for testing on HPUX and Solaris servers will be a Data Mover 100GB dataset (a specific test may require a larger dataset). The Data Mover dataset is created using the dm6\_setutil.pl tool. For example, to create a 100GB dataset using dm6\_setutil.pl the user would run the following command:

* HPUX and Solaris: # ./create\_data\_dm.pl –datadir “/data” –setsize 100

The dataset should reside on a storage array large enough (to allow for the dataset, and restoring and comparing files) LUN such as 3PAR, EVA, or MSA. The data drive on the server should be created as follows:

* Windows: Mount the storage array LUN on drive H. Create a \data folder on drive H. Copy the dataset to the H:\data folder.
* Linux/UNIX: Mount the storage array LUN on /data. Create the dataset in the /data folder.

### Test Components

List all the components actually tested in the configuration.

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| **Host** | **Model** | **OS** | **HBA (driver)** | **Data Type/Size** | **Application/Role** |
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| **StoreOnce** | **Model** | **SW Release** | **Application/Role** |
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| **Raid Array** | **Model** | **Controller Version** | **Application/Role** |
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| **Dataset** | **Size** | **File type/Compression** | **Dataset Tool** |
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| --- | --- | --- | --- |
| **Switch** | **Model** | **Topology** | **Application/Role** |
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### Test Results

| EBS Acceptance Tests | P/F | Results |
| --- | --- | --- |
| EXAMPLE RECORD FOR RESULTS | | |
| Perform this test. (record, in detail, how environment responded to said test)   * 1. Do this.   2. Do that. | P  Column is green with a “**P**” if all tests for section passed. If any tests failed column is red with an “**F**”. | 1. [YOUR initials here-Date] Backups were initiated while this was done. The backups all continued without a pause. Data was verified and no corruption was found. 2. [YOUR initials here-Date] Backups were initiated while that was done. The backups all halted and failed as expected. Error reports on the application GUI stated that there was a read error (code 34) and that it tried 3 times before failing the job. |
| **Phase 1 – Integration and basic backup and restore tests**  Hardware integration and basic functionality test – All phase 1 tests to Catalyst targets will be run with HP StoreOnce Primary Transfer Policy set to “Low Bandwidth” on the store being used for backups. | | |
| 1. Configure Servers and Storage - Install and configure the required servers and storage.    * Server storage    * Install and configure the server interconnects (FC HBA, LAN, iSCSI) and primary storage for all test servers. Setup any required zoning and LUN mapping.  * FW & drivers   + Install the current firmware and drivers for all test equipment. * Configure backup targets   + Present the required StoreOnce Catalyst, VTL, and NAS storage devices to the test servers. * Create dataset   + Create the dataset and save to the primary storage device data volume.  1. Configure ISV or Plugin - Install and configure backup application software and plugins    * Install per vendor specification on each server (note any special configuration settings, patches, unique performance settings, etc.). 2. Simple Backups    * Backup - Perform a full backup of the system disk on each server to each configured backup device.    * Create Checksum - Using a tool such as windiff, md5summer, etc. create a checksum of a few files to be used during the following restore test. 3. Simple Restores – Perform a restore of a few files    * Restore - Perform a restore of the few files on each server to an alternate location. The files should be the same ones used to create checksums in the backup test.    * Compare - Compare the original files to the restored files using the checksum generated during the backup test. 4. Expire Backups – Verify backups are removed from the StoreOnce    * Expire the backups from the backup application\plugin catalog. Do not run any further tests until housekeeping has completely removed the data from the StoreOnce. |  |  |
| **Phase 2 – Varying Block Sizes (Only run this phase if the ISV and backup target type support different block sizes.)**  Run backups with varying block sizes for backup throughput and deduplication comparison.   * Backup the dataset using 256KB, 512KB and 1024KB block sizes. * 1% of the dataset should be modified between each backup. * Phase 2 tests to Catalyst targets should be run with HP StoreOnce Catalyst Primary Transfer Policy set to "Low Bandwidth" on the store being used for backups. * Identify the best (highest throughput) block size to use for the remaining test phases. | | |
| 1. Document the environment  * Record the test components used:   + Servers (model, OS, HBA, application/role)   + StoreOnce (model, SW release)   + Primary storage device (model, SW/FW release)   + Dataset (type, size), FC and LAN switch (model, topology used)  1. Full backup  * Perform a full backup of the dataset from a single server to a backup device and record the backup throughput rate and deduplication ratio.  1. Create checksum  * Create a checksum of the dataset.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Simulate 2 weeks of backups  * Repeat full backups with data modification (steps 2 and 4) 13 more times. Steps 2, 4 and 5 will simulate 2 weeks of full backups.  1. Restore data  * Restore the dataset from the first full backup to an alternate location and compare the restored files with the original files using checksum. (Note: Restoring to the first full backup will refresh the dataset/database for the next test phase.)  1. Expire the backups  * Expire the backups from the backup application catalog. Ensure all backups have been deleted from the backup storage device:   + For Catalyst stores and NAS shares make sure the backup files are removed from the backup device after the backup catalogs have been expired by the backup application.   + For VTL tape media, expire and reformat the backup media using the backup application.   + Wait for storage device housekeeping to complete prior to running any new backups.  1. Repeat for 512KB and 1024KB block sizes  * Repeat steps 2-8 for 512KB and 1024KB block sizes. |  |  |
| **Phase 3 – Varying rates of change**  Run backups with varying rates of data change for deduplication comparison.   * The backup block size should be the fastest block size identified in phase 2 tests. | | |
| 1. Document the environment  * Record the test components used:   + Servers (model, OS, HBA, application/role)   + StoreOnce (model, SW release)   + Primary storage device (model, SW/FW release)   + Dataset (type, size), FC and LAN switch (model, topology used)  1. Full backup  * Perform a full backup of the dataset from a single server to a backup device and record the backup throughput rate and deduplication ratio.  1. Create checksum  * Create a checksum of the dataset.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Simulate 2 weeks of backups  * Repeat full backups with data modification (steps 2 and 4) 13 more times. Steps 2, 4 and 5 will simulate 2 weeks of full backups.  1. Restore data  * Restore the dataset from the first full backup to an alternate location and compare the restored files with the original files using checksum. (Note: Restoring to the first full backup will refresh the dataset/database for the next test phase.)  1. Expire the backups  * Expire the backups from the backup application catalog. Ensure all backups have been deleted from the backup storage device:   + For Catalyst stores and NAS shares make sure the backup files are removed from the backup device after the backup catalogs have been expired by the backup application.   + For VTL tape media, expire and reformat the backup media using the backup application.   + Wait for storage device housekeeping to complete prior to running any new backups.  1. Repeat for 3% and 5% rates of data change  * Repeat steps 2-7 for 3% and 5% rates of data change. |  |  |
| **Phase 4.1 – Different Backup Methods – Monthly Backup Schedule (Catalyst targets only if testing multiple protocol types)**  Run a monthly backup schedule with full and incremental backups expiring data after day 28.   * Phase 4 test 1 should be run with HP StoreOnce Catalyst Primary Transfer Policy set to "Low Bandwidth" on the store being used for backups. * The backup block size should be the fastest block size identified in phase 2 tests. | | |
| 1. Document environment  * Record the test components used:   + Servers (model, OS, HBA, application/role)   + StoreOnce (model, SW release)   + Primary storage device (model, SW/FW release)   + Dataset (type, size)   + FC and LAN switch (model, topology used)  1. Full backup  * Perform a full backup of the dataset from a single server to a backup device and record the backup throughput rate and deduplication ratio.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Incremental backup  * Perform an incremental (changes since previous backup) backup of the dataset from a single server to a backup device and record the backup throughput rate and deduplication ratio.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Simulate 1 week of backups  * Repeat incremental backup and data modification (steps 4-5) 5 more times. Steps 2-6 will simulate 1 week of backups with 1 full backup followed by 6 incremental backups.  1. Simulate 1 month of backups  * Repeat full and incremental backups and data modification (steps 2-6) 3 more times. Steps 2-7 will simulate 1 month of backups with 4 full backups and 24 incremental backups.  1. Expire a full backup  * To continue the simulation of a monthly backup schedule:   + Expire the original full backup from step 2.  1. Run a full backup  * To continue the simulation of a monthly backup schedule: Run a full backup.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Expire an incremental backup  * To continue the simulation of a monthly backup schedule: Expire the original incremental backup from step 4.  1. Run an incremental backup  * To continue the simulation of a monthly backup schedule: Run an incremental backup.  1. Modify 1% of the data  * Use the data change utility to modify 1% of the dataset.  1. Simulate 1 week of backups with expiration  * To continue the simulation of a monthly backup schedule:   + Repeat the expire incremental backup, run incremental backup and data modification (steps 11-13) 5 more times always expiring the oldest incremental backup.   + Steps 8-14 will simulate 1 week of data expiration and backups with 1 full backup followed by 6 incremental backups.  1. Simulate 2 week of backups with expiration  * To continue the simulation of a monthly backup schedule:   + Repeat the expire of full and incremental backups always expiring the oldest backup, run full and incremental backups and data modification (steps 8-14).   + Steps 8-15 will simulate 2 weeks of data expiration and backups. Steps 2-15 will simulate 42 days of full and incremental backups with data expiration during the final 14 days.  1. Create checksum  * Create a checksum of the dataset.  1. Restore data  * Restore the dataset from the last full and incremental backups to an alternate location and compare the restored files with the original files using checksum.  1. Expire the backups  * Expire the backups from the backup application catalog. Ensure all backups have been deleted from the backup storage device: * For Catalyst stores and NAS shares make sure the backup files are removed from the backup device after the backup catalogs have been expired by the backup application. * Wait for storage device housekeeping to complete prior to running any new backups.  1. Refresh the dataset  * Delete the dataset and the restored files. After the files have been deleted create a fresh version of the dataset on the proper storage volume. |  |  |
| **Phase 4.2 – Different Backup Methods – Target side deduplication (Catalyst targets only if testing multiple protocol types)**  Run backups in high-bandwidth mode so data deduplication occurs on the StoreOnce (this test is for Catalyst targets only)   * The backup block size should be the fastest block size identified in phase 2 tests. | | |
| 1. Document the environment  * Record the test components used:   + Servers (model, OS, HBA, application/role)   + StoreOnce (model, SW release)   + Primary storage device (model, SW/FW release)   + Dataset (type, size), FC and LAN switch (model, topology used)  1. Setup target side deduplication  * Setup the StoreOnce Catalyst target to use target side (high-bandwidth) deduplication. Depending on the capabilities of the backup application, this may need to be set using the StoreOnce GUI and/or the backup application.  1. Full backup  * Perform a full backup of the dataset from a single server to a backup device and record the backup throughput rate and deduplication ratio.  1. Create checksum  * Create a checksum of the dataset.  1. Simulate 2 weeks of backups  * Repeat full backups with data modification (steps 3 and 5) 13 more times. Steps 3, 5 and 6 will simulate 2 weeks of full backups.  1. Restore data  * Restore the dataset from the last full and incremental backups to an alternate location and compare the restored files with the original files using checksum.  1. Expire the backups  * Expire the backups from the backup application catalog. Ensure all backups have been deleted from the backup storage device: * For Catalyst stores make sure the backup files are removed from the backup device after the backup catalogs have been expired by the backup application. * Wait for storage device housekeeping to complete prior to running any new backups. |  |  |
| **Phase 5 – Disaster Recovery**  Test different disaster recovery scenarios.   * Phase 5 tests to Catalyst targets should run with StoreOnce Catalyst Primary Transfer Policy set to “Low Bandwidth.” * The backup block size should be the fastest block size identified in phase 2 tests. | | |
| 1. Document the environment  * Record the test components used:   + Servers (model, OS, HBA, application/role)   + StoreOnce (model, SW release)   + Primary storage device (model, SW/FW release)   + Dataset (type, size), FC and LAN switch (model, topology used)  1. Setup StoreOnce remote data replication  * Configure the local StoreOnce target to replicate data to a "remote" StoreOnce target (if a remote StoreOnce is not available it is okay to test with a second local StoreOnce as the "remote" target): * For Catalyst targets, the backup application must be used to create a copy to a remote Catalyst target.  1. Perform a full backup with replication  * Perform a full backup of the dataset on the server to the local backup device.  1. Create checksum  * Create a checksum of the dataset.  1. Simulate a server hardware failure  * Simulate a server hardware failure by deleting the entire test dataset from the server.  1. Restore data  * Restore the dataset from the local target and compare the restored files with the original files using checksum.  1. Simulate a site failure  * Simulate a site failure by deleting the entire test dataset from the server and delete the local StoreOnce target. * For Catalyst stores, delete the local Catalyst store using the StoreOnce GUI.  1. Restore data from remote StoreOnce target (Catalyst only)  * Restore the dataset from the remote StoreOnce target and compare the restored files with the original files using checksum.  1. Replicate data back to local StoreOnce target  * Replicate the data from the remote StoreOnce target to the local StoreOnce target * For Catalyst targets, recreate the local Catalyst target and copy the data from the remote target to the local target using the ISV or application with the Catalyst plug-in.  1. Restore data from local StoreOnce target  * Simulate failure by deleting the entire test dataset. Restore the dataset from the local StoreOnce target and compare the restored files with the original files using checksum.  1. Expire the backups  * Expire the backups from the backup application catalog. Ensure all backups have been deleted from the local and remote backup storage devices: * For Catalyst stores and NAS shares expire the backup catalogs using the backup application. * Wait for storage device housekeeping to complete prior to running any new backups. |  |  |