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| Backup Environment Initial Assessment Report  CustomerY |
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This report provides a high-level summary of the findings derived from the initial assessment of CustomerY's backup environment. An HPE representative will explain this report in more detail during a workshop at your premises.

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Prepared By

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HPE StoreOnce powered by

Intel ® Xeon® processor

**Key Findings – Executive Dashboard**

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| $ReportImage_G1$ | $ReportImage_G2$ | $ReportImage_G3$ | $ReportImage_G4$ |
| **Backup Window** | **Backup Success Rate** | **Deduplication Saving Potential** | **Average Restores per Week** |
| 0.08 Min - 40.5 H | 96% | 92%(2.70 PB) | 13.11 |
| Longest job: **40.5 H**  12-hour+ jobs: **118** | Completed jobs: **18,761** Failed jobs: **753** | Total Backups: **2.94 PB** With StoreOnce: **239.41 TB** | Avg. weekly restores: 13.11 |
| Backup windows vary widely. Typically an 8 hour backup window allows ample time to perform the backup jobs and retries, if necessary in case of failures, without running into production hours. They also leave room for additional housekeeping operations and some margin for future data growth | Any failed backup job could put business critical data at risk should a destructive failure (logical or physical) happen to the primary storage. | Deduplication technology can drive substantial cost reductions in backup environments by eliminating the storage of identical data (e.g. similar PPT slide sets stored multiple times). An estimate of your potential storage saving of redundant data is provided above. | StoreOnce restore and backup performance times are roughly equivalent. A larger number of restores will benefit more from higher StoreOnce restore performance**.** |
| HPE StoreOnce key benefits | | | |
| HPE StoreOnce provides industry-leading backup and restore (!) performance that helps to reduce backup windows and meet backup SLAs | HPE StoreOnce is a purpose-built backup appliance and provides higher reliability than tape solutions by using an industry unique HA failover capability resulting in increased backup success rates | HPE StoreOnce provides federated deduplication to allow deduplication at the application source, backup server, on a virtual storage appliance or a dedicated appliance depending on your needs | HPE StoreOnce provides faster access to data since backup and restore performance are roughly equivalent. |

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| Assessment Summary | |
| Only unexpired backups are displayed for this analysis. ISV-maintained logs can guarantee accuracy for unexpired backups only. | **HPE StoreOnce 6500**   * Scale-out architecture * Industry-leading backup and restore performance * High availability thru node failover * Federated Catalyst for pooling of resources     **HPE StoreOnce VSA**   * StoreOnce functionality for the software-defined data center * Full feature compatibility with the HW-appliances |
| **Collection Period**  Data Collection Date: May 27, 2016  Data Collection Period (Jobs): May 15, 2016 - May 27, 2016  Data Collection Period (Images): May 31, 2009 - May 27, 2016 |
| Environment Snapshot (NetBackup)   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Master Server | Version | #  Clients | #  Jobs | Backup | Copy | Total | | ebs1roc1 | 7.7.1.0 | 835 | 19,514 | 2.58 PB | 370.69 TB | 2.94 PB | |
| **Media Server Averages**  Averages for the period May/15/2016 - May/27/2016   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Server | Sun Avg (GB) | Mon Avg (GB) | Tue Avg (GB) | Wed Avg (GB) | Thu Avg (GB) | Fri Avg (GB) | Sat Avg (GB) | | ebs11bck | 861 | 1,418 | 11,897 | 2,185 | 1,394 | 578 | 1,138 | | ebs12-bck | 10,232 | 8,910 | 8,858 | 9,394 | 9,243 | 3,255 | 13,922 | | ebs13-bck | 9,611 | 8,908 | 8,989 | 10,514 | 6,842 | 5,084 | 11,541 | | ebs14bck | 4,718 | 2,621 | 1,596 | 2,522 | 6,664 | 2,386 | 3,226 | | ebs2-bck | 4,835 | 3,638 | 7,572 | 4,984 | 4,750 | 2,670 | 4,422 | | ebs3-bck | 8,788 | 2,916 | 4,895 | 4,205 | 4,402 | 2,330 | 4,366 | | ebs5-bck | 7,507 | 3,898 | 6,538 | 10,527 | 7,190 | 3,119 | 5,888 | | ebs6-bck | 16,487 | 13,008 | 21,317 | 13,119 | 10,815 | 7,662 | 18,383 | | ebs7-bck | 10,751 | 9,191 | 10,021 | 10,020 | 10,537 | 9,997 | 16,208 | | |

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| **Key Findings – Detailed Analysis** | |
| May/15/2016 - May/27/2016 |  | | |
| /tmp/ExectZBD2P/abe979d35f.png | **15 Longest Backup times**  This chart shows the 15 backup jobs with the longest backup times which could be impacting the backup windows.  Long backup windows are influenced by large amounts of data, performance constraints with in the environment and sub-optimal load balancing and job distribution.  Extended backup windows can cause missed backup SLAs, both backup and restore window SLAs, and impact performance during production hours.   StoreOnce provides industry-leading backup and restore performance speeds and a scale-out architecture to easily grow the backup environments to meet business demands. | |
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| May/15/2016 - May/27/2016 |  | |
| /tmp/ExectZBD2P/dfb7603a0d.png | **Backup Jobs by Job Duration**  The chart on the left displays the number of backup jobs that fall into specific time duration window.   HPE recommends analyzing backup jobs that exceed 6-8 hours since these may indicate areas of potential improvement in backup SLAs and could be negatively impacted as data volumes continue to grow. | |
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May/15/2016 - May/27/2016

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| /tmp/ExectZBD2P/d23f5deb71.png | **Backup job success rate**  The chart on the left shows the backup jobs sorted by successfully completed vs. failed/incomplete.  A high backup job failure rate can potentially lead to unprotected data and missed restore SLAs. Backups can fail due to a variety of reasons including:   * Environment instabilities * Tape library or backup appliance HW failures * Incorrect tape handling * Space over-allocation   HPE StoreOnce provides a variety of mechanisms to increase backup success rates:   * Autonomic failover (HA) * No tape handling required * Dynamic space allocation across multiple nodes * Automatic scheduling of backups for remote sites. |
| May/15/2016 - May/27/2016  /tmp/ExectZBD2P/1dec1c6ab0.png | **Total Backups by data type**  The chart on the left shows the total backup capacity and percentage of total by application type.   Understanding the application data type and related capacity allows HPE to estimate the expected deduplication benefits (next chart).  HPE StoreOnce deduplication technology works across all application and data types. HPE is constantly seeking to enhance the StoreOnce deduplication algorithm to provide application-specific optimizations. |

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| Additional assessment findings |  |
| May/15/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/7d1ccce39b.png | **Backup Amount by Retention**  The chart on the left shows the amount of backup capacity per retention time.  Adjusting application retention time settings to 90 days or less, except data with special retention requirements (e.g. legal), can result in substantial capacity reductions.  Data retained for extended periods of time, can potentially be moved off to tape or online archiving solutions to achieve cost reductions.  HPE offers integrated BURA solutions that address backup, recovery and archiving needs in a holistic fashion. |
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| May/15/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/1abde936d1.png | **Copy Capacity by Retention**  The chart on the left shows the amount of backup capacity that is kept as a copy of the original backup (either at the same site or at a different site) sorted by retention time.  Extra copies of backup data are typically kept for DR scenarios (DC loss) or tape vaulting. These copies can either be created by running secondary copy jobs or by backing up the original data twice. This processing can substantially increase backup windows and adds additional load to the backup server and network.  Using low-bandwidth replication technologies, HPE StoreOnce allows replication to run as a background task with no server involvement. |

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| May/20/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/bfb11a91ad.png | **Daily Backups by Application**  The chart on the left shows the amount of data, broken down by application type, backed up over the course of a week.  Data expiring in less than 7 days is not reflected in the chart.  Spreading backup schedules for different applications over the days of a week allows for better overall resource utilization and potentially shorter backup windows. |
| Apr/27/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/a9e1f5ef87.png | **Daily Backup Volume**  The chart on the left shows the amount of data being backed up daily over the course of the last 91 days.  This provides an indication about the growth of backup data over a 90 day period and highlights any daily fluctuations over the analysis period. |

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| May/15/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/e29f80c926.png | **Long Queue Time Consumers**  The chart on the left shows the amount of hours a backup job had to wait in queue until being started.  Having jobs waiting in queue to be started can point to serious issues in the environment:   * Unavailable devices * Conflicting jobs/policies * Network saturation * Backup device saturation     These queued jobs might run past their designated backup window. The cause of long queue times should be investigated.  HPE StoreOnce solutions can provide remedies to a variety of causes for backup jobs with long queue times. |

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| May/15/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/99d2f6ccc3.png | **Capacity by Media Agent Servers**  The chart on the left shows the amount of data backed up per media agent server.  Distributing backup workloads across available backup servers allows for better overall resource utilization and potentially shorter backup windows. |
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| May/15/2016 - May/27/2016 |  |
| /tmp/ExectZBD2P/7e40dcb8ac.png | **Restores**  The chart on the left shows the number of restores based on the available data. |
| **Top 15 Longest Restores**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Restore | Files | GB | Success | Started | Duration (hr) | | fms01dr-bck | 3495943 | 59.3292 | No | 2016-05-09 | 176.186 | | m1sap03-bck | 97 | 896.4291 | Yes | 2016-05-25 | 7.294 | | nfmspdrdb-bck | 309 | 763.9421 | Yes | 2016-05-25 | 5.149 | | dmsdr01-bck | 339 | 532.7246 | Yes | 2016-05-25 | 2.795 | | nfmspdrdb-bck | 113 | 35.4981 | Yes | 2016-05-25 | 1.014 | | m1sap03-bck | 1 | 0.0012 | Yes | 2016-05-25 | 0.7 | | ebs6-bck | 46 | 5.8950 | No | 2016-05-20 | 0.34 | | m1sap03-bck | 1 | 0.0012 | Yes | 2016-05-25 | 0.272 | | billrate01dr-bck | 70 | 14.9143 | Yes | 2016-05-24 | 0.254 | | m1sap03-bck | 1 | 0.0012 | Yes | 2016-05-25 | 0.203 | | el6pdbdr-bck | 7 | 11.0079 | Yes | 2016-05-25 | 0.159 | | m1sap03-bck | 1 | 0.2037 | Yes | 2016-05-25 | 0.157 | | m1sap03-bck | 1 | 0.0002 | Yes | 2016-05-25 | 0.123 | | m1sap03-bck | 1 | 0.2034 | Yes | 2016-05-25 | 0.118 | | m1sap03-bck | 1 | 0.2019 | Yes | 2016-05-25 | 0.108 | | **Long Restores**  The table to the left show the 15 longest restores. |
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| Financial benefits of a StoreOnce driven approach |  |
| All non-expired backups from May/31/2009 - May/27/2016 |  |
| /tmp/ExectZBD2P/76a870dcae.png | **Space Saving Potential**  The chart on the left contrasts the current total backup capacity footprint in the overall environment with the potential footprint after StoreOnce Deduplication technology is used.   Deduplication technology helps reduce the amount of required capacity by eliminating identical blocks of data stored multiple times. This can lead to dramatic cost savings (HW, Support, and Power & Cooling).   HPE StoreOnce deduplication technology, based on a large number of HPE patents, can be run anywhere in the data center where it provides the highest savings. |
| **Space Saving Potential** |
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| |  |  |  | | --- | --- | --- | | Data Type | Without Dedupe (GB) | With Dedupe Prediction (GB) | | MS-Exchange-Server | 253,811 | 12,691 | | MS-SQL-Server | 47,336 | 5,272 | | MS-Windows | 201,604 | 9,520 | | NBU\_Catalog | 7,266 | 1,817 | | SAP | 32,347 | 2,310 | | Standard | 2,258,427 | 194,162 | | Sybase | 29 | 7 | | VMware | 279,728 | 19,374 | | **Totals** | 3,080,548 | 245,153 |  * The deduplication ratio assumptions made in this report are based on field collected values and engineering estimates for HPE StoreOnce products over a wide variety of customer environments. Deduplication results and ratios are environment specific and vary by application, retention time applied, amount of changed data, type of data, backup ISV applications used, and other factors. * The above deduplication savings calculator assumes that this is a non-deduplicated and non-compressed source environment. It also assumes that the backups are done at least once a week. Customers moving from an already deduplicated environment will see lower benefits.   HPE can also offer backup consulting engagements, a proof-of-concept and/or the usage of data analysis tools in your environment. All of these approaches will add more accurate & environment-specific deduplication ratio estimates. | **Data Reduction thru Deduplication**  The table on the left shows the potential savings broken down by application type when utilizing deduplication technology. |
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| Compared to more traditional architectures, StoreOnce technology and its associated products and solutions provide financial benefits in a wide variety of areas. The table below lists some of these benefits. Your HPE account executive can create an ROI analysis tailored to your environment. |  |

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| HPE StoreOnce Recovery Manager Central  [HPE StoreOnce Recovery Manager Central software](http://www.hp.com/go/rmc) (RMC) integrates [HPE 3PAR primary storage](http://www.hp.com/go/3par) with [HPE StoreOnce Backup systems](http://www.hp.com/go/storeonce) to provide converged availability and a flat backup service to augment traditional backup approaches. StoreOnce RMC combines the performance of snapshots with the protection of backups, to enable fast, reliable, and simple protection for business-critical applications.   * Rapid online recovery – VMware administrators using RMC can create hundreds of non-disruptive, application consistent, virtual machine snapshots with rapid online recovery. * Faster backup and restore – RMC’s Express Protect enables flat backup of VM snapshot data from HPE 3PAR to StoreOnce, independent of the backup application. Compared to traditional backup it delivers 17 times faster backups and 5 times faster restores. * Less cost and complexity – RMC flat backup simplifies the backup architecture required for protecting and recovering VMs in VMware environments. Using award-winning StoreOnce technology, all backups are deduplicated to reduce average backup storage requirements by up to 20 times. * Application managed data protection – VMware administrators can monitor and manage snapshots, and backup and recovery, directly from within HPE OneView for VMware vCenter. * Reduced risk exposure - VM backups stored on HPE StoreOnce are self-contained, fully independent volumes. Unlike snapshots, in the event of a disaster or if physical problems occur in the production storage environment, these backups can be restored back to the original or a different HPE 3PAR array. * The following paragraphs show predicted savings (Backup window duration & licensing costs) based on the assessed customer environment. This analysis focuses on two simple and easy to implement cases:   + RMC for high-speed file system backups   + RMC-V for VM-consistent backups for VM environments | **Reduction in backup duration and backup software licensing costs**  HPE Recovery Manager Central in combination with Express Protect allows to transparently move backup data from 3PAR Snapshots to a StoreOnce-based deduplication store. Thru the integration of 3PAR and StoreOnce, this can speed up backups by up 17x as compared to traditional backup methods and allows snapshot and backup management from one console. RMC licensing is capacity-agnostic and therefore allows substantial cost savings as compared to a backup software driven process. |
| /tmp/ExectZBD2P/9b0b6f6184.png | **Backup Data Types**  The chart shows how much backup capacity in your environment falls into these two key RMC use cases. This capacity is being used below for the RMC benefits analysis. |

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| **RMC Licensing** | **Lower your licensing costs** |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Data Type | Total Capacity | Traditional backup ISV cost [per TB licensing]\*\* | RMC-based licensing costs\* | Benefit | | File System | 4.75 TB | $17,970 |  | No backup software license required | | Virtual Machine backups | 8.42 TB | $31,835 |  | No backup software license required | | Totals | 13.18 TB | $49,804 | $9,300 |  | | **Total Predicted Savings** | | |  | $40,504 |   *\* RMC-V license for a 3PAR 74xx/84xx system – license and support.*  *\*\* Based on an assumed license cost/TB/year of $1,260 (for 3 years) – support included.*  *\*\*\* Largest backup per datatype, per polciy, per client.*  /tmp/ExectZBD2P/75ed4e9c47.png  RMC moves data directly from 3PAR primary storage to StoreOnce. This process tightly integrates with 3PAR Virtual Copy and is very efficient in only moving (and dedupes) changed blocks. The mechanism does not require lengthy “file system walks”.  1 Source: Gartner (February 2014)  Document: Analyze the TCO of Local Backup and Cloud | RMC can offset your traditional backup ISV software license charges. RMC licenses are lower cost compared to traditional ISV license charges. For File System and VM backups, the table below provides a rough cost comparison between ISV-based vs. RMC-based licensing over a three year period. Backup software licensing varies widely therefore the figures below only provide a rough estimate – the cost of $1,260/TB/year is taken from a recent Gartner report.1 |

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| **Faster Backups with RMC** |  |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Policy Name | Client Name | Duration (full backup) (hours) | Predicted backup duration (17x faster) (hours) | Reduction in backup window duration  (17x faster) (hours) | | OMDB01PP\_FS\_OS | omdb01pp-bck | 40.49 | 2.38 | 38 | | ROCEXCAS01\_FS\_OS | rocexcas01-bck | 31.70 | 1.86 | 30 | | ELINK01\_FS\_APP | elink01-bck | 29.87 | 1.76 | 28 | | ELINK01\_FS\_APP | elink01-bck | 28.02 | 1.65 | 26 | | ELINK01\_AD\_ELPAPPS\_5YR | elink01-bck | 27.22 | 1.60 | 26 | | ELINK01\_AD\_ELPAPPS\_1YR | elink01-bck | 25.28 | 1.49 | 24 | | M1DW01\_DB\_DATAM\_RO\_COLD | m1dw01-bck | 22.19 | 1.31 | 21 | | ELINK01\_FS\_APP | elink01-bck | 20.85 | 1.23 | 20 | | ELINK01\_FS\_APP | elink01-bck | 20.68 | 1.22 | 19 | | EDMSAPP\_FS\_APPS | edmsapp-bck | 19.83 | 1.17 | 19 | | **Total** |  | **266** | **16** | **250** | | **Lower your licensing costs**  The table to the left lists the top 10 file-system based backups and their duration. RMC can speed up file backups by up to 17x helping to keep backups within SLAs. |
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| /tmp/ExectZBD2P/2e9e354be7.png | **Smaller overall backup window for file system data**  The chart show the overall reduction in the backup window that can be achieved with RMC when backing up file system data. |
| HPE also offers backup consulting engagements, a proof-of-concept and/or the usage of data analysis tools in your environment. All of these approaches will add more accurate & environment-specific deduplication ratio estimates and can include a complete TCO analysis for your backup modernization project. |  |

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| |  |  |  |  | | --- | --- | --- | --- | | CAPEX & OPEX Savings area | Category | Existing Environment | With HPE StoreOnce | | Storage HW |  |  |  | |  | Capacity Savings | **2.94 PB** | **239.41 TB** | | Server HW |  |  |  | |  | Appliance-driven Replication | High server load for replication tasks | Free up server resources to allow additional backup job processing | | Networking |  |  |  | |  | Low-bandwidth replication | Full data transfer required | Only deduped data will be transferred | | Administrative |  |  |  | |  | Single File/Item Restore | Admin time intensive | Substantial reduction in time effort | |  | Tape handling | Admin time intensive, error-prone | Substantial reduction in time effort | | Risk mitigation |  |  |  | |  | Tape Handling | High backup failure rate due to improper tape handling | Increase in backup success rate | |  | High-Availability / Controller failover | Backup/Restore interruption in case of controller failure | Controller failover and job restart | |  |
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| GetProtected Guarantee - Status |  |
| $ReportImage_QNOQ$  M1 is conditionally qualified for the GetProtected Guarantee   * Qualification period: May/15/2016 - May/27/2016 * Total number of policies: 932 * Number of policies that fulfill the GPG retention level greater than 90 days: 25 * Number of policies that fulfill the retention time criteria and are of GPG-qualified data types (VMs, File and Print, Exchange): 6 * Number of conditionally qualified policies that fulfill schedule regularity rule: 1 * Number of policies with a maximum of 1% daily change rate (incremental compared to previous full): 1   (subject to the <20% media file analysis) | **GPG Qualification**   * Virtual machines, file and print services, and Exchange * Retention greater than 90 days * <=1% daily change rate * Less than 20% media files   Schedule Regularity:   * FullOnly: at least six full backups per week * FullIncremental: one weekly full and daily incremental backups |
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| |  |  |  |  | | --- | --- | --- | --- | | Policy Name | Policy Type | Schedule Type | Client | | ROCEXMB02\_EXCH\_IS\_HOT | MS-Exchange-Server | FullOnly | ROCEXMB02 | | **Qualified Backups**  The table shows the qualifying backups. Listing of non-qualifying policies can be provided on request. |