



# Hitachi controller-based storage virtualization case studies

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A decorative graphic in the bottom-right corner of the page, composed of a grid of overlapping squares in various shades of gray and beige, creating a stepped, staircase-like effect.

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## Hitachi controller-based storage virtualization case studies

***Virtualization has become an imperative for data centers as IT organizations seek dramatic improvements in resource and operational efficiencies, as well as responsiveness to business needs. As storage capacity requirements continue to grow in excess of 50% annually, storage infrastructure virtualization continues to be one of the most active projects within data centers. While there are multiple storage virtualization approaches, the acknowledged leader in heterogeneous storage virtualization is Hitachi Data Systems (HDS) with its Universal Storage Platform (USP) and Network Storage Controller (NSC) solutions. Hitachi implements virtualization at the controller level with the Universal Volume Manager virtualization software. Since Hitachi reports to have shipped more than 6,000 of its intelligent virtual controllers, the following case studies attempt to solidify and demonstrate the benefits accrued through the Hitachi virtualization solutions.***

### Case studies highlight business and technology benefits

While four case studies are not intended to be the ultimate authority as to the benefits accrued through storage virtualization, they do represent a diverse set of examples that depict unique issues within each enterprise, and creative solutions that were achievable through storage virtualization. It is important to note that most Hitachi virtualization deployments targeted the total storage infrastructure verses individual or application-centric deployments, a unique and common thread within Hitachi virtualization deployments. In addition, many of the deployments represented a technology refresh to some degree, with all targeting the creation of a client/business-desired shared, flexible, cost-effective storage environment. While none of the case studies included demonstrate the heterogeneous capability of Hitachi solutions, we have talked with dozens of users who are very satisfied with the flexibility and capability of externally attaching and virtualizing non-Hitachi arrays.

The most frequently mentioned reasons for deploying the Hitachi virtualization solutions included the following:

- platform for consolidation and simplification allowing creation of a cost-effective, virtualized tiered storage infrastructure with common storage services (including back-up and recovery, disaster recovery, and high availability) and management
- eliminate scale, disruptive back-up and migration outages, and performance issues



- tape minimization through SATA disks and Hitachi Virtual Tape Library Solutions with exceptional storage efficiencies
- increase storage utilization and provide more cost-effective storage solutions that match business requirements
- consolidation, centralization and infrastructure simplification
- enable storage asset optimization through the ability to externally attach, virtualize and centrally manage older arrays
- robust partitioning capability and security
- non-disruptive data migrations/placement with dynamic adjustment capability due to changing requirements within tiered deployments and technology refreshes
- robust data replication, snapshot, point-in-time copy capability, encompassing local, synchronous and asynchronous distances
- diverse platform support including mainframes
- dual parity (RAID 6) capability
- additional storage efficiencies through Hitachi Dynamic Provisioning (thin provisioning).

While some of the derived cost savings attributed to storage virtualization were not readily available, all those interviewed indicated that the business cases for the projects were all met, with the vast majority indicating that the breakeven timeframe was dramatically better than projected. Another common theme was that all installation, migration, operational integration, including management activities, were extremely timely. Moreover, each enterprise has ongoing plans to further leverage and enhance their shared virtualized storage infrastructure, and further engage the common storage services capability of the Hitachi virtualization solutions.

## First International Bank of Israel (FIBI)

### Background

FIBI is Israel's fifth-largest banking group offering a wide range of services, including credit, deposits, securities, foreign exchange, financial derivatives, international trade, mortgages, provident and mutual funds, portfolio management, underwriting and leasing services. Mataf is the FIBI IT organization, supporting the overall group, including FIBI Bank, its three main banking subsidiaries in Israel, and the two international subsidiaries. Mataf, run by EDS, is tasked with the operation and maintenance of the supporting IT infrastructure, and must ensure that the bank's data is secure and supporting applications are optimally running 24x7. The IT infrastructure includes two data centers (synchronous distance), IBM mainframes, 'open' systems (primarily Windows), and 100 TB of HDS storage, as well as an aging IBM 3494 tape library and Virtual Tape System (VTS - B18).



## The issues

Mataf is constantly required to manage its customers' data more effectively, improve SLAs, and streamline back-up/recovery operations (utilizing Tivoli Storage Manager – TSM). The current IBM VTS, which is at the end of its life, and the 3494 library with 3590E drives (160GB/cartridge) are in need of expensive upgrades, which, if completed, would only provide marginal improvements in service times. This situation caused Mataf to investigate the implementation of a virtualized tiered storage infrastructure, virtual disk library capability, and synchronous data copies for improved back-up and recovery capability. The goal was to minimize/eliminate the impact of tape operations on the business and to provide a robust storage infrastructure with common services and management. The evaluation included solutions from IBM, EMC and Hitachi. The Hitachi solution set was chosen because:

- the Virtual Tape Solution (VTS – Diligent Technologies' ProtecTIER VT) offered superior compression/deduplication, with up to 20 times improvement in effective storage capacity
- it provided the ability to truly leverage the installed Hitachi Universal Storage Platforms (USP)
- it provided the ability to support externally attached virtualized storage, including cost-effective SATA drives, common replication capability with robust synchronous data copy capability, and common management capability.

## The results

Initially, an Adaptable Modular Storage (AMS 500 – 22TB of cost-effective capacity SATA storage) was installed in each data center, both attached to installed virtualized USPs (USP 600 – 34TB; USP 100 – 20TB). This introduced tiered storage capabilities, with tier 1 being the internal USP disk used for critical data (both open and mainframe), tier 2 with virtualized AMS capacity storage (SATA) for the open environment, and tier 3 representing virtualized AMS capacity storage (SATA) for the mainframe. The first phase addressed the protection of 20TB of open production data and daily TSM incrementals currently on tape with the Hitachi VTS (phase two will be 20TB of primary mainframe TSM data, eliminating all tape). In addition, True Copy (synchronous) between the two data centers was implemented to address high availability requirements, and included support for a 50% annual disk storage growth rate. In fact, Oded Tagger, production manager, reported that the full 20TB first copy was compressed/deduplicated to about 4TB (1:5 ratio); however, the daily incrementals from approximately 150 back-ups totalling 800GB are now less than 40GB (1:20 ratio), and continue to improve (including the original 20TB to 4TB first copy). In addition, Oded indicated that the implementation of the tiered virtual storage, the VTS, and a synchronous copy has lowered his storage consumption rate (including tape) by two thirds.

Beyond providing enhanced service to its users, Mataf is fast on its way to meeting all of the most demanding business and compliance requirements. This initial undertaking took two months to accomplish through a joint team of HDS Global Solutions Services and Mataf.



## What's next?

The next phase is to transfer the final 20+ terabytes of mainframe TSM data to the Hitachi VTS, finally eliminating the entire tape environment. True Copy will support all environments, eventually providing a consistent high availability environment. The tape elimination project and virtualized storage tiers are proving to be so cost effective and enabling infrastructure simplification, that more aggressive projects are being targeted. Once this phase is complete, Mataf will be investigating the inclusion of a third data center within the infrastructure beyond synchronous distance (utilizing Hitachi Universal Replicator solution), allowing for the most advanced and available computing infrastructure, ensuring fully protected continuous processing for the bank and its customers, and a significant reduction in risk and business exposure.

## Alberta Justice

### Background and issues

The Western Canadian province of Alberta – home to 3.25 million people over 411,000 square miles, has more than 240 courtrooms in 17 locations, and each courtroom is responsible for the audio capture of court proceedings (coined 'for the record'). Each one hour of courtroom recording normally runs 90MB, and there are numerous copy, hold, back-up and migration steps (to either Calgary or Edmonton) where the recordings are stored on optical media. The data is stored in optical disk libraries (jukeboxes) for one year, and older media cartridges are exported for manual storage on shelves for ten years (with the possibility of extending to 25). Audio data storage requirements have been growing at 14% per year, and are being taxed by an ever-increasing number of time and labor-intensive data retrieval requests from over 1,500 users (judges, lawyers and court clerks/administrators). To make matters worse, the supporting software could not be economically upgraded to support NFS and newer technologies, as the current optical hardware is nearing the end of its life. Moreover, the geographically distributed nature of the courtrooms and distances has created service, performance and reliability issues, demonstrating that the current infrastructure could not meet future retention, recovery and governance requirements. In addition, each courtroom has a server with direct attached storage (DAS) of 200–400GB and associated workstations for business applications – email, Microsoft SQL Server and file & print – that are experiencing 80% data growth, with maintainability and back-up and recovery becoming problematic.

### The solution

The Alberta Justice system realized that a standardized, centralized, highly flexible, scalable, reliable and automated storage infrastructure was required to meet exponential demands for storage, compliance, back-up/recovery and future media formats to successfully meet both current and future electronic courtroom requirements. Moreover, the requirement to consolidate DAS, automate processes,



reduce inefficiencies and create a common storage infrastructure that was leverageable and allowed for orderly migrations to more advanced technologies was a must. After an extensive vendor/solution evaluation process, Alberta chose the Hitachi virtualization solution, embracing a tiered storage model comprised of the Network Storage Controller (NSC55) to manage the SAN and tier 1 fibre channel storage, and virtualized behind the NSC55 are Adaptable Modular Storage units (AMS500) for tier 2 SATA storage. Tier 1 addressed email, production, file & print, and current-year court recordings, while tier 2 addressed the more than one-year-old audio recordings.

The Hitachi Universal Volume Manager virtualization software created an aggregate storage pool that was flexible and leverageable across the entire Alberta Justice System. To meet availability and data recovery (DR) requirements, two identical virtualized, tiered storage solutions were implemented, one in Edmonton, the other in Calgary. Consistent with the requirement to standardize on a common infrastructure, Alberta chose the Hitachi Data Protection Suite, powered by CommVault, for a unified solution for non-disruptive back-up and recovery, migration, archiving and replication across its operating domains that included Linux, Novell and Windows.

## The results

The data migration effort of moving the current and historical optical/tape data to the Hitachi virtualized solution took just three months from the beginning of the implementation phase across the two active data centers, and included the consolidation of the DAS (and servers) from 15 sites. Both tier 1 and tier 2 data are in RAID 6 format for high-availability dual-disk failure protection. This first phase eliminated the many steps required in the older optical media process, and enabled faster individual user access to both active and inactive audio files, resulting in less delays in trials and appeals. Two full-time administrators were able to be reassigned due to savings achieved from reduced support/maintenance requirements for remote sites, elimination of the time required to buy, store and manage the optical media, minimization/simplification of remote hardware/software support, and the implementation of a common storage management, DR and replication solution. Budget savings were achieved through reduced vendor maintenance/support costs for remote sites (C\$15,000 a year), the elimination of an annual optical media cost of C\$100,000 a year and C\$8,000 a year for optical library maintenance. Another result was the elimination of a potential expenditure of C\$1,000,000 to upgrade the existing archive software if a new approach was not undertaken.

## What's next?

Phase 2 of the implementation is just completing, with the deployment of cross-site replication allowing for no single point of failure in the infrastructure and the elimination of pre-existing maintenance windows. While initial deployments have been simplistic from a virtualization perspective, Alberta envisions further exploitation of the virtual capability and expanded use of the infrastructure



functionality most likely to support and store court video feeds/evidence as well as other forms of electronic evidence.

## HDFC Bank Limited

### Background

HDFC Bank Limited, based in Mumbai, India, was among the first private sector banks established under the Reserve Bank of India's liberalization of the Indian banking industry in 1994. The bank delivers comprehensive corporate, retail and treasury banking services, and operates as a clearing bank for both the Bombay Stock Exchange and New York Stock Exchange. The bank's business philosophy is based on operational excellence, customer focus, product leadership and people. Business Today awarded HDFC Bank the best India Bank for 2006 and Forbes chose HDFC Bank as one of Asia-Pacific's best 50 companies.

### The issues

Since 2002, the bank has more than doubled its number of branches, customers and users, causing existing infrastructure solutions to become hard pressed to adapt and scale to meet the ever-increasing demand and new requirements. As pointed out by CN Ram, head of IT at HDFC Bank, 'it was time to revisit the technology environment and evaluate ways to better support the expansion plans, compliance demands, new requirements and dramatic growth, while maintaining the bank's excellent customer service levels'. The old practice of utilizing DAS with each server was proving to be a bottleneck that had to be eliminated if a flexible and scalable infrastructure was to be achieved. In addition to scale issues, there were utilization inefficiencies, time-consuming month-end-processing requirements, increasing data warehousing/business intelligence requirements, the need to improve overall systems availability (approaching 24x7) and implement common compliance and business continuity/disaster recovery solutions.

### The solution

A major portion of the overall infrastructure re-evaluation was the elimination of DAS with the servers and the implementation of a storage area network (SAN). A tiered storage infrastructure was desirable to better match diverse performance, functionality, protection and cost requirements. In addition, requirements included higher storage utilization rates, the desire to enable common services (including replication and DR) across the diverse operating environments, including AIX, Solaris and Windows, and expandable to support hundreds of terabytes of capacity with common management. After evaluating most major vendor solutions, HDFC Bank chose an iterative HDS solution that began in 2004 with the deployment of a Hitachi Lightning 9960 V for production and multiple 9500 V series (including SATA drives) supporting cost-effective test, development, back-up, data warehousing, archiving and compliance requirements. In 2005, the Hitachi Universal Storage



Platform and its enterprise virtualization capability were implemented to complete the tiered storage deployment, and the transition to a centralized SAN environment. The approach allowed for the leveraging of existing storage assets through the external virtualization capability, and enabled the implementation of a common tiered storage pool and services across all of the bank's environments. The use of the Hitachi Tiered Storage Manager for the dynamic migration of data across the storage tiers as business requirements dictated greatly enhanced the overall operating environment by eliminating the outages and time-consuming processes (including full copy back-up) associated with previously implemented procedures for data movement/migration. In addition, the USPs have since been upgraded, and an AMS 1000 has been attached for additional cost-effective capacity, further expanding the storage infrastructure and available tiers of storage. Moreover, a common disaster recovery and business continuity solution has been deployed, utilizing replication services to a disaster recovery site, further ensuring the high availability and compliance requirements demanded in today's 'always on' environments.

## **The results**

There has been an evolution in HDFC Bank's storage infrastructure, from a distributed mass of servers with DAS to a highly virtualized and centralized storage infrastructure. This has allowed the IT infrastructure to keep ahead of the demanding and ever-increasing requirements of the bank and its customers, while improving service levels, performance, availability, scalability and disaster recovery – and all with common management and storage services. According to CN Ram, the Hitachi storage virtualization capability 'has allowed HDFC Bank to provide cost-effective solutions that match their diverse business requirements, and has ensured the ongoing expansion of the bank will not be limited by the IT infrastructure'.

## **What's next?**

The bank is further exploiting and leveraging its virtualized storage infrastructure for more comprehensive business intelligence and risk management initiatives including Sarbanes-Oxley compliance, with respect to banking norms in India, as well as exploring the optimization of its current tape environment utilizing the Hitachi Virtual Tape Library solution.

## **EDB**

### **Background**

EDB is the second-largest outsourcer in the Nordic market and has over 40 years' experience servicing leading businesses primarily in Norway and Sweden. The company employs over 3,900 professionals and experienced 20% growth last year. EDB focuses on four major industry segment areas, including telecommunications,



banking and finance, retail and industry, and public sector. Across the industry segments, EDB provides specialized solutions/applications (with a focus on SAP) and IT support, operations and network services. Solutions are developed on the basis of detailed industry-specific and in-depth experience, with the use of IT to deliver efficiency gains to clients' businesses and working processes.

EDB has decades of experience in operating mission-critical IT systems, and offers a complete range of outsourcing services for large and medium-sized organizations. Realizing the dramatic growth in storage requirements and the need to expand its storage business model to provide multiple tiers of managed storage to meet the many diverse customer requirements, EDB undertook an effort to virtualize their storage environment and begin to offer common storage services that could be leveraged across the tiered storage infrastructure. The need to be able to dynamically move data between tiers and provide non-disruptive back-ups was critical, since prior processes were disruptive and time consuming. Flexibility, cost effectiveness and robustness of the virtualized environment became the goal.

## **The solution**

The market dynamics that EDB desired to productize involved providing multiple tiers of storage that reflected different cost/performance levels and allowed for dynamic and common management, measurement/monitoring, protection, costing and services matching customer requirements. The ability to utilize existing assets and improve utilization, efficiency and responsiveness were critical. EDB evaluated most major vendor solutions, focusing on scalability, manageability, robustness, references and economics, and chose the Hitachi solution that included the Universal Storage Platform (USP), Adaptable Modular Storage (AMS) and Workgroup Modular Storage (WMS) arrays to begin the evolution into a managed, virtualized tiered storage infrastructure.

The project implementation phases first centered on efficiency and the basic implementation of separate tiers. Tier 1 storage was fibre channel drives internal to the USP, tier 2 storage was AMS fibre channel drives externally virtualized through the USP, and tier 3 storage was WMS SATA drives attached and virtualized through the USP. The second phase was to further exploit the tiered storage and virtualization capability with dynamic and non-disruptive movement between tiers. The third phase included the implementation of common and consistent policy management (SLAs). In both the latter two phases, additional functionality and common services were introduced to address DR, high availability, replication and copy alternatives, further addressing customer requirements.

## **The results**

EDB has been able to transform its basic disruptive tiered storage alternatives into a shared, managed and dynamic, tiered virtualized solution. The solution created more business focused solutions and drove dramatically improved efficiencies, eliminated outages associated with back-ups/data migrations, provided more cost-effective customer solutions, and delivered better margins for EDB. The



virtualization effort, while simplifying the storage environment and improving service levels, allowed for a 40% reduction in storage administration support requirements.

The elimination of the disruptive outages previously associated with storage hardware updates and tier class changes was a key business requirement. Now that the dynamic capability exists, EDB has to convince sceptical customers and prospects of its ability. In addition, the storage virtualization capability is being further integrated into all business models and application portfolios/offerings.

### **What's next?**

EBD plans to fully exploit its shared virtualized storage infrastructure and offer additional disk and tape-based solutions. Currently, the Hitachi virtualization capability is being implemented in its second data center and the Hitachi Universal Replicator function is being evaluated for high availability requirements. The ability to exploit Hitachi's Dynamic Provisioning capability offers additional efficiency alternatives, as does Hitachi Virtual Tape Library and its content archiving solutions. The new shared infrastructure, partitioning capability, replication and common storage services model will be exploited to address more customer-centric business solutions.

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