BEZEQ BOOSTS DATA WAREHOUSE INFRASTRUCTURE AGILITY WITH ELASTIC NVMe

First deployment cuts database run times up to 90%, boosts throughput 2x-3x;

second infrastructure cuts CPU utilization 50%,

delivers 50-85% faster response times

Bezeq is the leading telecommunications provider in Israel, offering a variety of services to business and private customers. These services include phone and internet services, smart devices, cybersecurity and cloud backup services. Its massive data warehouse in Tel Aviv holds vital data on sales, services, financial transactions, engineering devices and customer interactions. Information extracted from that data helps management to streamline operations and make decisions on expansion into promising new lines of business such as high-performance computing and hosted cloud services.

Bezeq chose Excelero NVMesh® as the centerpiece of a new scale-out storage architecture to power its mission-critical data warehouse. With its initial deployment of an NVMe-powered storage infrastructure, Bezeq achieved a 2x to 3x throughput improvement and cut query run times by up to 90%. A second infrastructure using NVMesh helped deliver 50-85% faster response times to complex queries – and 18-23 Gbps throughput to an Oracle database report.

Excelero provides a readily extensible platform from which it can grow. The new storage platform prepares Bezeq for the age of the self-adapting warehouse and facilitates future use of machine learning.

Benefits of NVMesh for data warehouses:

- **Elastic NVMe**
  Leverage NVMe flash at any scale

- **Unbeatable performance**
  3x more throughput
  90% faster runtimes than AFA

- **Scale linearly**
  Performance and capacity

- **Predictable application performance**
  Storage is not a bottleneck

- **100% software-defined**
  No expensive proprietary hardware

- **Easy to manage & monitor**
  Minimize maintenance TCO

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CASE STUDY

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AGILITY TO STAY AHEAD OF COMPETITIVE MARKETS

Agility is vital to enterprise data centers and especially those with mission-critical data warehouses. Top-performing companies have optimized data warehouse infrastructures and cutting-edge applications to capture, store and analyze more data faster to make better business decisions. Organizations continually are deploying new infrastructures or scaling existing ones. They need the flexibility to deploy on new, more cost-effective solutions, knowing their infrastructure will perform flawlessly.

With innovations in machine learning and evolution in low-latency, high-performance scale-out storage, the age of the self-adapting data warehouse is coming. Today more than ever, there is a real opportunity to create competitive advantage by deploying advanced data warehouse infrastructures. Analytics capabilities are heavily influenced by the volume of data that can be analyzed and the speed at which this can be done. Scale-out, high-performance storage is therefore the backbone of the next generation data warehouse infra-structures. It doesn't matter how powerful the analytics engine is, or how feature-rich the used applications are - if the storage infrastructure does not meet performance and scalability requirements of the data ware-house and its applications

Organizations that are seeking to differentiate through strong analytics need high-performance storage at massive scale. Traditionally, all flash arrays have been the go-to architecture for analytics environments, but these solutions were not designed to meet performance requirements dictated by today's analytics applica-tions and enabled by technologies such as GPU's.

After a very successful first use of NVMesh in a scale-out architecture, we deployed another new infrastructure that really `put Excelero's claims to the test – claims that NVMesh was hardware-agnostic, highly scalable, and top-performing even in the most demanding of uses. NVMesh came through with flying colors on all fronts. NVMesh enabled 50% less CPU utilization in our new HPE-based architecture – so that we get more out of our existing investment, and add new applications to the existing infrastructure without adding costs.

In our business, efficiency is imperative, and agility is everything. We either move swiftly, and efficiently, or we lose our chance in a highly competitive telco landscape. With Excelero, we can pivot to meet new oppor-tunities, whether for operating more efficiently or adding new line of business. The software is so versatile that we're finding more applications where it provides greater efficiency and performance.

- Igal Muginstein, Storage and backup team Manager Bezeq

LEVERAGING NVMe IN THE NEXT-GENERATION DATA WAREHOUSE

All flash arrays have contributed tremendously to present-day data warehouses but today they are unable to feed data fast enough to data-hungry analytics engines and GPU servers. Next-generation data warehouses essentially require two fundamental changes in storage design: faster storage media and scalable high-per-formance architectures. The latest generation of NVMe flash devices already solves part of the problem as a single NVMe flash drive can deliver more than a million IOPs. But to leverage NVMe flash at scale you also need to take away the controller bottleneck of traditional flash arrays.

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This was also the experience for the Bezeq IT team. First they migrated from an Oracle Exadata system to a Hitachi UCP with internal Fusion IO and F400 all-flash array running via Fibre Channel several years ago. With present-day application requirements, the storage solution's insufficient throughput, slow response times, and inability to be expanded led the IT team at Bezeq to seek a revamp.

The team was already familiar with the performance benefits of NVMe and the potential the new flash standard has for advanced analytics. It saw Excelero's NVMesh as a readily extensible platform from which Bezeq could grow its data warehouse storage architecture. After some initial tests of NVMesh, the team quickly recognized it as a highly advanced solution and immediately spotted the tangible benefits of replacing the all-flash array with the simplicity and scale of Excelero's software-defined distributed block storage.

NVMesh FOR THE NEXT-GENERATION DATA WAREHOUSE

NVMesh is a Software-Defined Block Storage solution that features Elastic NVMe, a distributed block layer that allows data warehouse applications to utilize pooled NVMe storage devices across a network at local speeds and latencies. NVMe storage resources are pooled with the ability to create arbitrary, dynamic block volumes that can be utilized by any host running the NVMesh block client. These virtual volumes can be striped, mirrored, or both while enjoying centralized management, monitoring, and administration. In short, data warehouse applications can enjoy the latency, throughput, and IOPS of a local NVMe device while at the same time getting the benefits of centralized, redundant storage.
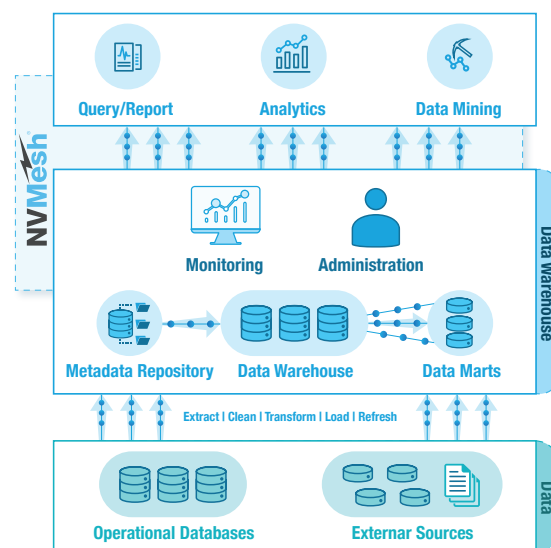
NVMesh provides the ability to attach volumes ubiquitously, enabling users to mount databases on any server at any time. NVMesh is deployed as a virtual, distributed non-volatile array and supports both converged and disaggregated architectures, giving customers full freedom in their architectural data warehouse design.

NVMesh SOLUTION FOR BEZEQ

Bezeq deployed Excelero NVMesh® as the centerpiece of a new scale-out storage architecture to power a mission-critical data warehouse for DRP, Dev and Test with 59 net TB of vital data on sales, services, financial transactions, engineering device and customer interactions, of a total 118 TB available.
The company uses the data in the data warehouse to generate reports that help management streamline operations. The data warehouse also supports Bezeq's expansion into promising new lines of business such as high-performance computing and hosted cloud services.

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In Bezeq's first NVMesh deployment the architecture ran on Fujitsu PRIMERGY servers with Intel NVMe devices and Mellanox 100Gbps Ethernet switches. The Bezeq team felt system results were so strong that Bezeq added a new data warehouse production infrastructure in early 2020, also built around NVMesh. This time, the new infrastructure is based on even more cost-effective servers – a new primary server, the HPE DL560 Gen10 for Oracle based data warehouse, and four storage nodes on HPE Apollo 2800 NVMe Appliance with near 64 TB Net RAID 10 which will be expanded next quarter. The team installed two Mellanox 100Gb switches for high availability of infrastructure.
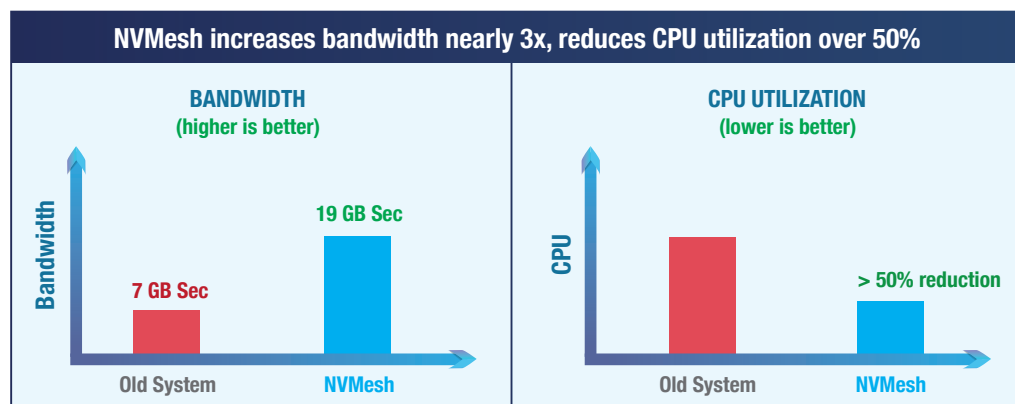
As the new infrastructure went into production, NVMesh helped it deliver 50-85% faster response times to complex queries in the data warehouse application. Bezeq now is obtaining 18-23 Gbps throughput to an Oracle database report - extremely high throughput at a database level, in addition to NVMesh's already strong performance at the block storage level.

BEZEQ DATA WAREHOUSE STORAGE PERFORMANCE, PREVIOUS VENDOR VS. NVMesh

Test Run	VSP-F400 + FusionIO	NVMesh Performance	Gain
CRM Report	1:22:54	0:51:03	38%
Invoices	1:23:10	00:21:42	74%
Cash Flow	1:26:16	00:21:00	76%
Monthly Payment Report	1:00:00	00:11:00	82%
Daily Critical Job 1	3:35:00	02:44:00	24%
Daily Critical Job 2	0:20:00	00:09:03	55%
Daily Critical Job 3	00:12:25	00:03:43	70%
Daily Critical Job 4	00:26:00	00:08	69%
Daily Critical Job 5	01:01	00:15:30	75%
Daily Critical Job 6	00:13:30	00:06:30	52%

The Bezeq team found multiple benefits to using NVMesh besides the undisputable massive performance gain:

- The software-only approach allows Bezeq to use any hardware, which completely avoid vendor lock-in Scalability is as simple as adding additional NVMe drives or nodes
- The team detected reduced CPU demand, enabling them squeeze
- maximum compute power from existing resources.