The Hebrew University Builds a High-Density Datacenter for Advanced Scientific Applications

The Customer

Hebrew University was founded in 1925 as the first major Zionist enterprise in Israel. Among its founders are some of the greatest scientists and intellectual giants of the 20 th century: Albert Einstein, Chaim Weizmann, Hayim Nahman Bialik, Martin Buber, and Sigmund Freud. Since its establishment, the university's researchers have been at the forefront of global research and have even won many prestigious awards over the years, including eight Nobel Prizes and hundreds of Israel Prizes.

Hebrew University is ranked among the **100** leading universities in the world. Its student body numbers **23,500** students from Israel and **65** other countries and **6,000** academic & administrative staff.

Yissum, the Hebrew University's technology transfer company, is **15th** in the world in the number of patents registered.

Hebrew university stands among leading global universities and is committed to excellence in teaching, learning and research. Over the years, the Hebrew University published numerous creative and ground-breaking research papers, which advance the fields of science and technology in Israel and around the world.

A quote from Prof. Albert Einstein, Founder

"I know of no public event which has given me such delight as the proposal to establish a Hebrew University in Jerusalem."

Einstein, April 1921

The Hebrew University's management's mission is to improve and upgrade the university's facilities in a way that can guarantee adequate teaching and research conditions in a changing technological and dynamic environment. Therefore, the university initiates and implements projects for improvement of physical infrastructure, the implementation of advanced technology and electro-mechanical systems that will support the research and academic work that takes place on the six campuses of the Hebrew University.

The Challenge

To provide a powerful, resilient and energy efficient versatile HPC datacenter for advanced academic research and simulations utilizing an existing building space in record time.

In addition to several existing scientific datacenters on the Hebrew University's campuses, , the management of the Hebrew University of Jerusalem (HUJI) decided to build a consolidated datacenter for advanced AI, analysis of large data sets, and scientific simulation applications that will serve all the academic faculties when using advanced computing. The new datacenter combines an innovative approach of providing services to researchers with a "local cloud" while optimally combining HPC systems and GPU systems with fast communication infrastructure.

The defined goals included the establishment of a high-performance, high availability datacenter by retrofitting an existing basement hall into a scientific state of the art datacenter, with an advanced computing infrastructure able to carry AI and High density computing.

The University's project leaders defined the following key requirements:

- High Density: The datacenter will support high density cooling and power solutions for over 35KW per IT cabinet with a built-in capacity for further expansion.
- Energy efficiency for operational costs savings and for sustainability.
- CAPEX savings: a modular "pay as you grow" approach utilizing existing infrastructure to the extent possible.
- Improve the campus' overall datacenter energy efficiency.

The leaders of the project at the Hebrew University examined several leading academic centers in Israel that completed computing projects of a similar scope.

The projects that were examined did not meet the requirements defined for the HPC project in terms of performance, compute and power density and energy efficiency.

The university decided to convert an available underutilized space in the Computer Sciences building to an HPC Datacenter. The space is located on the ground floor of the building and included some physical challenges (physical dimensions, ceiling height, etc.). The space constraints dictated to the university leaders to look for innovative solutions that will be able to overcome the physical constraints while achieving the University's objectives.

An additional challenge was the Covid pandemic which created many process interruptions and global supply chain issues that extended lead times. The University had decided to go ahead and not let these issues get in the way.
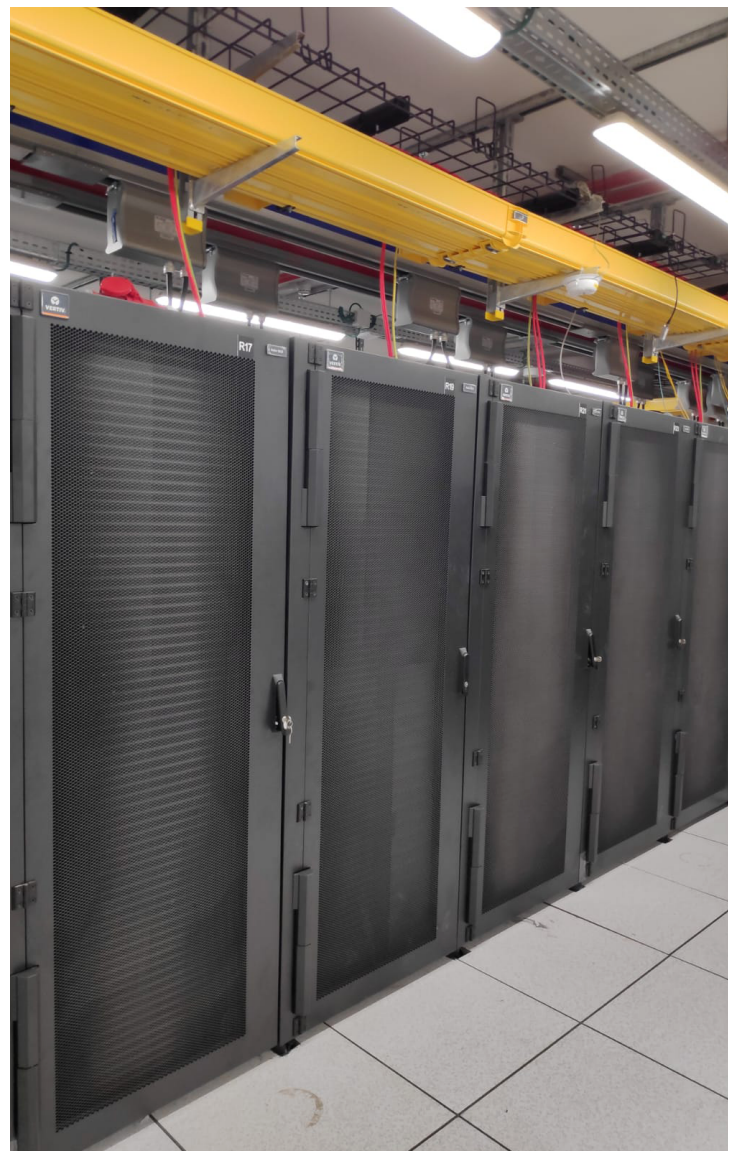
The Solution

A turn-Key project utilizing Best of Breed cooling, power, and network solutions.

Place of use: The picturesque Givat Ram Campus

After careful consideration, The Hebrew University chose the solution offered by Alexander Schneider Ltd which enabled creative integration and utilization of an existing data center infrastructure established and maintained previously by this company

Products & Systems:

- Vertiv (Liebert) HPC free cooling chillers
- Vertiv DCL 35KW in-Rack Cooling
- Vertiv DCD 35KW rear door heat exchangers with the ability to grow to 50 kW by adding an active cooling unit to the server cabinets.
- Vertiv DCM heavy duty Racks
- Panduit Copper & Fiber network structured cable systems
- Starline Modular Bus Bars
- Raritan rack PDUs
- Electrical panels

Services:

- Design
- Installation & Integration
- White space Fit Out
- Startup and commissioning.
- 24 x 7 on site support

Cooling:

With Vertiv's DCD Rear Door HEX (Heat Exchangers) high density cooling solutions, the Hebrew University's Computer Science Faculty was able to retrofit quickly and cost efficiently an existing basement space into a 1.2MW, N+1 energy efficient and resilient HPC datacenter.

The key advantages of the DCD rear door hex are:

- Effective high-density cooling in confined spaces (e.g., low room height).
- Energy efficiency for better TCO (Total Cost of Ownership).
- Small footprint thereby allowing more IT racks to be deployed in the limited space.

The cooling solution's small footprint was a major deciding factor. The University's project managers wanted to allow the deployment of as many IT racks as possible into the existing structure. Normally, high density cooling requires a significant overhead of in-room cooling systems that occupy floor space that would otherwise be used for IT racks. Therefore, the small footprint of the Vertiv DCD was extremely valuable for the University as it allowed them to design a datacenter that would be able to accommodate more IT racks & systems.

Vertiv's Liebert HPC Chillers

Phase 1 of the project included two 600 KW chillers and the construction of the infrastructure for a third 600KW chiller to be added later. For phase 1, the room now has capacity for 600KW IT load with N+1 redundancy. In phase 2, the university will add a chiller for a total of 1.2MW IT load N+1. This modular 'pay as you grow' approach provided initial CAPEX savings as well as improved operational efficiency.

The Liebert HPC chillers take advantage of the Jerusalem weather with an indirect free cooling chillers feature that provides substantial operational cost savings in the electricity bills.

Legrand Starline Bus bars

The Legrand bus bar is a groundbreaking modular busway for datacenter power distribution.

This innovative bus bar provides maximum flexibility for making changes in real time, without downtime, while ensuring reliability and the ability to expand to meet evolving needs.

The modular datacenter bus bar system has a wide variety of Plug-In units that allow data center operators to feed server cabinets with a variety of different capacities, on the same busbar system. This flexibility ensures uninterrupted functionality and enables rapid adaptation to the changing power requirements.

Overall, the Track Busway from Legrand Starline provides the Hebrew University's Computer Science Faculty with a reliable, versatile, and efficient power distribution solution suitable for their high-power density computer facilities.

Panduit's Wyr-Grid®

The Panduit Wyr-Grid® Overhead Cable Tray System is designed to route, manage, and protect copper data cables, fiber optic, or power cables within data centers, connected buildings etc.

Innovative features significantly reduce installation time and costs, and enhance cable management and user safety at the Hebrew University's Computer Science Faculty.

Wyr-Grid® Cable Tray System easily integrates with FiberRunner® Pathways to provide a segregated copper and fiber cabling strategy.

Panduit's FiberRunner®

The FiberRunner® Routing System is a system of channel, fittings and brackets designed to segregate, route, and protect fiber optic and high-performance copper cabling. It is suited for The Hebrew University's groundbreaking HPC datacenter data center applications where cable is routed from distribution areas to equipment cabinets or racks. It can be deployed over the racks or in under floor applications. Available in a variety of dimensions varying capacity requirements.

Raritan PDU's

Raritan PDU's are known for reliability, quality, and ease of use and can be managed through the network by the IT department easily.

Using Raritan PDU's and sensors, the customer can measure the temperature, Humidity, Air flow, etc. The controller can be "hot swappable.

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Commissioning:

In pursuit of datacenter resiliency, the University's project team wanted to leave no stone unturned to verify that there are no hidden infrastructure problems that would cause downtime in the future. Alexander Schneider's commissioning team delivered that peace of mind.

Using Alexander Schneider proprietary 19" 4KW server emulators the datacenter was tested and re tested in partial and in full IT loads. As a result, the customer has been able to witness the proper operation of the datacenter's cooling, power, and controls infrastructure in various loads prior to the IT re-location to the room.

Results and Success

The new University HPC Datacenter is innovative and groundbreaking. The project was completed successfully following tight cooperation between the computer science department and the building and infrastructure department of the Hebrew University. The project was supported from Day One by the University's management.

Alexander Schneider delivered a state-of-the-art HPC datacenter using products from the leading global brands such as Vertiv, Liebert, Knurr, Legrand, Starline, Raritan and Panduit, all represented in Israel by Alexander Schneider.

- 1.2MW (N+1) HPC datacenter
- Rack densities of 35KW/rack
- Designed for agility and quick changes.
- "Free" space by utilizing an unused basement hall.
- Energy efficiency with free cooling
- Quick turnaround time

This state-of-the-art and high-performance data center built by The Hebrew University guarantees maximum flexibility, high performance, energy efficiency, cost savings and optimal utilization of resources and space. The partnership between the University and Alexander Schneider continues with 24X7x365 service and support provided by Alexander Schneider's experienced service team.