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Accelerate your bioinformatics discoveries
with bespoke clusters powered by
INTEL XEON TECHNOLOGY

CASE STUDY

ABSTRACT

"Health plays a pivotal role in national prosperity as high quality of life of people leads to more developments for a nation."

To raise the quality of life and wellbeing of people, biomedical research becomes crucial for enhancing global health, economic development and health equity which may generate enormous amounts of data. Europe is the hub of biomedical research which paves path for many prominent research universities in the region.

However, the rising amount of data from the extensive bioinformatics research performed by the researchers at various universities can impede their discoveries as huge datasets can slow down the computational process due to requirement of additional resources and cores.

The number of resources needed for each scientist at the universities for their individual innovation can lead to an overall increase in the capital expenditure for the university. University of Tübingen also began to face a similar challenge when its different researchers took up the task of advancing their research in the different fields of bioinformatics and extending the university's services and data to its partner sites.

It became vital for the university to maximize the number of cores integrated with a HPC software solution in a scalable manner to enable it with high security, have competing resources to support different virtual machines, and have high performance systems.

For this reason, it installed ClusterVision's High Performance Computing nodes at its main site which were built with the Intel 6230R Xeon processors and supported its OpenStack based cloud infrastructure.

The open-source cloud infrastructure helped in assigning increased number of virtual machines with multiple cores to each researcher which sped up their computations, helped them perform more number of calculations, and advance towards more findings.

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BUSINESS CHALLENGE

"Europe hosts several biomedical research institutes to enhance the quality of living organisms for better sustenance. "

University of Tübingen, one of its oldest public research universities lay a strong emphasis on biomedical and life sciences research. One of its most celebrated universities in Germany has a broad research focus covering almost all areas of academic research including education and media, neuroscience, microbiology and infection, and various others.

Owing to the vast research performed by various scientists, voluminous data is generated by the university. Researchers at the university then need additional virtual machines for their individual discoveries that are supported with high number of cores and competing resources.

This also called for a need for higher computational power so that the results were obtained at a rapid rate in a more flexible manner.
The need was generated to reduce the time to conclude tasks that are computationally intensive in nature; identify relevant data patterns by mining huge complex datasets; and take up novel approaches for processing exploratory data.

But all of this came at a cost for the university as to have a high-performance cluster, it needed to invest into new cloud infrastructure to provide a greater number of virtual machines to the scientists, which meant increased operational

The university provides generic virtual machines and generic cloud storage akin to other commercial cloud providers due to which it needed increased cloud capacity to extend its bioinformatics services. It is a bio-effort between various universities and other research institutes being part of the de.NBI Cloud infrastructure in Germany.

Storage is an important aspect for these scientists as they generate voluminous data from their research which is carefully analysed to draw out vital inferences.
For this reason, a CPU with increased capacity, its associated resources and strong performance became necessary for the university so that the scientists continued with their research operations in a seamless manner.
For this purpose, the university started to look out for a strong processor managed by an open-source cloud to ease out the job for the researchers and help them derive more accurate findings.

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"As some of the world's pathbreaking discoveries depend largely on High Performance Computing, the node delivered to University of Tübingen was developed using Intel processors."
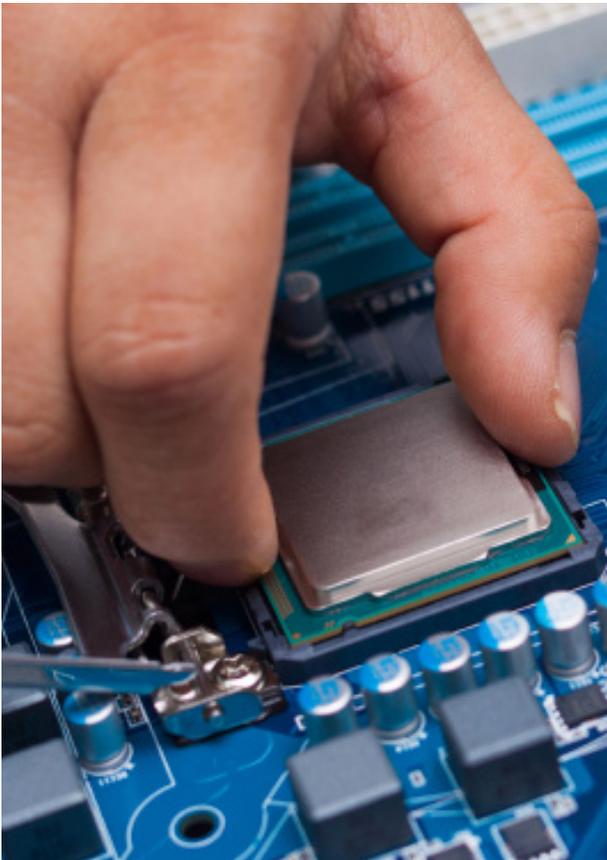
The node delivers a faster processor performance owing to the high clock rate. The performance of the processors enhancing the high capabilities of the OpenStack Cloud at the university which pronounces the number of resources allocated to each core in the virtual machines assigned to each researcher.

This helps in reducing the capital expenditure for the university as the cloud becomes scalable by generating more virtual machines, thereby providing researchers access to more cores and resources for their analysis.

Intel processors were chosen to support certain Intel specific AVX instruction sets which expedite computations on the nodes for bioinformatics research.

This has enabled the researchers at the university to perform a greater number of calculations at an accelerated pace, making their path to discoveries easier and more efficient.

The Intel processors are built with deep learning acceleration that support the convergence of HPC and AI. Additionally, its software ecosystem enables the HPC users to extract maximum output from their application investments and hardware. Both the hardware and the software combined deliver a comprehensive portfolio to the users to attain high performance for diverse workloads.

Furthermore, the popularity of the brand increases the reliability of the customers on it, making Intel the undisputed choice for them.

The new node was delivered to the university with the main aim to provide the ability to execute hypervisor isolated container workloads along with developing safer multi-tenant deployments.

Using the HPC clusters built with Intel processors enabled the scientists to take up more complex workloads and perform their computations at higher speeds.

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PROCESSOR WITH THE HPC ADVANTAGE

Processor Specifications

Cores	26
Threads	52
Memory Type	DDR4-2933
Speed	21. GHz
Intel Deep Learning Boost	Yes
Intel Turbo Boost Technology	2.0
Intel Hyper-Threading Technology	Yes
Intel Virtualization Technology (V/T)	Yes

The Intel based cluster is backed by a parallel filesystem storage that enables the life-sciences scientists with enhanced abilities to perform biomedical research and store the date with ease. The cluster and the OpenStack cloud integration provides a secure and resilient environment which is suitable for managing sensible genomics and health data at the university in Germany.

It not only provides the physical resources but also supports and accompanies the organizational aspects of academic research projects dealing with sensible data underlying GDPR regulations.

The university installed the cluster that was developed by ClusterVision, a European provider of high-performance computing cluster solutions. The institute advanced its knowledge-based data management systems and took up more efficient high performance parallel computing with the help of the new processor.
The new cluster helps in reducing the time used up for the extensive computational tasks which allows more data inclusion for complex calculations, reduces time to conclude longer calculations, determination of more precise results, and implementation of novel algorithms. Additionally, it helps in increasing the cloud CPU capacity to extend the bioinformatics services at the various sites of the university.

The installation of the HPC Intel processor cluster makes the OpenStack cloud versatile for the researchers and bioinformaticians at the university belonging to diverse fields of life sciences.

It facilitates vast research covering the full spectrum from phylogeny of birds, fundamental plant research, single-cell cancer research, microbiome of livestock to collections of Covid virus strains. The university believes that all this has been possible with the added horsepower of Intel integrated with the high-performance compute technology.

ClusterVision specializes in high performance computing (HPC) solutions, the technology that accelerates discovery. The company customizable HPC clusters to researchers and innovators all over Europe. With its in-house software development and technical experts, the company aims to develop a strong HPC platform accompanied with an exhaustive set of services and trainings.

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To learn more about how ClusterVision can help support your bioinformatics discoveries, please contact sales at :

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