

UNIVERSITY OF VIENNA – TRANSTEC HIGH-PERFORMANCE CLUSTER SUPPORTS BIOLOGICAL RESEARCH

Processing and Analysing Enormous Scientific Database

“transtec has provided us with a basic IT configuration for our new department at the University of Vienna. This delivers optimum performance and capacity at a moderate price for our research into and the development of bioinformatics. Thanks to this new infrastructure, we can now realise major projects together with our national and international cooperation partners without being hindered by technical limitations. The affordable price has meant that we still have part of our investment budget left for system upgrades.

In retrospect, we can attest to the absolute reliability of the system and all of the statements made by transtec apply even today. Taking into account the particularly complex departmental conditions, transtec's achievement is a clear indication of the company's excellent consultancy skills”.

UNIVERSITY PROFESSOR THOMAS RATTEI, HEAD OF THE DEPARTMENT FOR COMPUTATIONAL SYSTEMS BIOLOGY OF THE LIFE SCIENCES FACULTY AT THE UNIVERSITY OF VIENNA

THE COMPANY

The Department for Computational Systems Biology is one of twenty four departments in the life sciences faculty at the University of Vienna. Life sciences cover a wide array of scientific disciplines. They study all aspects of life, its development, evolution, diversity and interaction with the environment. A fundamental, systematic approach to research and development is thus of central importance to the field of life sciences. Methods however vary and range from genetics, (functional) genomes, structural analytics, physiology and ecology and integrate theory, informatics and biomathematics.

Biomathematics is a rapidly developing scientific discipline which combines the methods of biology, mathematics and informatics. This field is essential for processing and analysing enormous databases that are generated by modern biological research. The amount of publicly available DNA sequences alone is doubled year after year. In the attempt to capture and analyse this data and apply it to all fields of life sciences, a bottleneck exists which can only be alleviated with specialised software tools and mathematical methods.

The newly established Department for Computational Systems Biology is one of twenty five departments of the life sciences faculty at the University of Vienna. The main activities of the research department include investigating and analysing biological data from a wide array of research projects.

HIGH-AVAILABILITY CONFIGURATION FOR NEWLY FOUNDED DEPARTMENT

“The complexity of the Computational Systems Biology Department's new infrastructure was so great that we had to restrict our objective in the first project phase to developing potential solutions with manufacturers for the initial configuration. In combination with results from a benchmark suite from standard bioinformatics applications, we could use both for the public tender of the HPC solution. Besides the basic consideration of finding suitable components for the university environment, we also focussed on factors such as price, performance/capacity, availability, resource utilisation and maintenance costs” explains University Professor Thomas Rattei, Head of the Department for Computational Systems Biology of the life sciences faculty at the University of Vienna.

transtec was the clear winner in both tenders. The price/performance ratio offered by the transtec team wasn't the only factor that clearly elevated the company above the competition. transtec's tender also provided the best solutions for tackling complex faculty conditions such as the maximum ceiling load, power consumption and the size of the server centre.



"All our research projects are based on enormous databases. Our scientific profile requires a solution that can guarantee a failsafe and efficient storage of all critical research data. Another important factor was permanent availability of these sensitive databases and the entire IT infrastructure. The transtec solution fulfils all these requirements with merit".

UNIVERSITY PROFESSOR THOMAS RATTEI, HEAD OF THE DEPARTMENT FOR COMPUTATIONAL SYSTEMS BIOLOGY OF THE LIFE SCIENCES FACULTY AT THE UNIVERSITY OF VIENNA

SCIENTIFIC PROFILE REQUIRES MAXIMUM PERFORMANCE AND AVAILABILITY

The high-performance computing solution designed and rolled out by transtec delivers maximum performance, storage capacity and availability. The cluster is based on six transtec CALLEO 341 and eight transtec CALLEO 642 Twin² Servers, the latter comprising of 4 compute nodes. A total of 192 Terabytes of storage is also provided by three PROVIGO 550 RAID systems per fibre channel connection.

ACTIVE-ACTIVE CLUSTER ENSURES SUPERIOR PERFORMANCE AND 100% FAIL SAFETY

The fact that the infrastructure has been designed as an active-active cluster makes it special. Each comprises 2 NFS servers and one storage unit without one single-point-of-failure. "We were well aware that an active-active cluster had an extremely complex design, however we still opted for this type of cluster to ensure maximum performance and availability. Effective load balancing allows us to directly influence the cluster's performance. This is achieved by multiple cluster activation and capacity pooling" explains Professor Rattei. This solution also offers the University of Vienna maximum support in the event of a server crash. If a system breaks down, the activities running on the affected unit are automatically transferred to another active node. The department's initial IT configuration forms the basis for all of the department's activities: research, development and administration. Hardware implementation and commissioning is now complete with an investment totalling approx. 200,000 Euros.

SOLUTION

- || 32 cluster nodes comprising eight transtec CALLEO 642 Twin² Servers:
 - 4-in-1 cluster, each with 2x Intel® Xeon™ E5620 Quad-core Processors, 24 Gigabytes of RAM, 3x 1 Terabyte hard drives
- || Six transtec CALLEO 341 Servers implemented as NFS servers:
 - each with 2x Intel® Xeon™ E5620 Quad-core Processors, 24 Gigabytes of RAM, 2x 0.5 Terabyte hard drives, 4 Gbit Fibre Channel Dual Port Controller
- || Two transtec PROVIGO 550 RAID plus extension:
 - each with 24x 2 Terabyte hard drives, 4x 4Gbit FC host connection
- || transtec PROVIGO 550 SUMO RAID:
 - 48x 2 Terabyte hard drives, 4x 4Gbit FC host connection

The extended network includes eleven thin clients as well as several notebooks (office network). Two high memory nodes (128 GB RAM), two login servers, two virtualisation servers and four database servers are also in operation in the Department for Computational Systems Biology. All servers are IPMI manageable.