

Cancer centre speeds up life-saving treatments

Gustave Roussy runs eight times more analyses on genome deterioration a day, accelerating research into paediatric cancers and reducing patient waiting lists



Healthcare

France

Business needs

Gustave Roussy, a leading European centre for cancer treatment, sought to increase the processing capabilities of its bioinformatics platform to support more genome analyses per day while enhancing research programmes.

Solutions at a glance

- [Data Center](#)
- [Enterprise Support](#)

Business results

- Patients gain faster treatment with more genome analyses run each day
- Varied projects benefit from standardised components
- Research is boosted by introduction of new open-source software

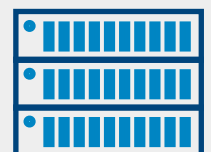
23%

less power use per genome analysis



5 years

of ongoing research is supported by scalable storage



According to the World Health Organization, cancer causes 20 per cent of premature deaths in Europe, and is a leading cause of death among children. As populations age across the continent, this figure is set to rise. Gustave Roussy, based in Villejuif, France, is Europe's leading cancer research and care organisation.

Founded in 1926, Gustave Roussy is a pioneer in the development of an innovative treatment for children with cancer. As part of the treatment, the centre analyses the genomic alterations of tumours to better adjust relapse therapies. The work of Gustave Roussy forms part of a European-wide programme for cancer treatment, with other participants being the Institut Curie in France and the University of Heidelberg in Germany. Daniel Gautheret, bio-IT platform manager, says, "Our aim is to achieve major breakthroughs in the treatment of these cancers, with fast-acting therapies that are tailored to individual patients. As well as building talented research teams, we continually invest in new technology that supports these goals."

Critical analyses demand higher processing

The process of treating young patients begins with the detailed analysis of tissue samples, as Gautheret explains, "For each individual, we take DNA from the tumour and from healthy tissue, and then carry out genome sequencing on both. From this, we obtain a profile of the tumour that we can compare to international data. Thus, we can identify alterations and use the information to help determine the most effective treatment."

It's crucial that this analysis takes place as soon as possible — ideally within one month — to maximise the effectiveness of subsequent treatment. However, the existing server environment limited the speed at which the biologists could work. "We could process just 12 analyses simultaneously," says Gautheret. "Timing has a real impact on the efficacy of treatments, so we needed an infrastructure that would maximise the number of analyses we could complete per day."

Storage was a challenge too: each sample generates 23 gigabytes (GB) of data and requires 300GB to be stored. With 200 children and two analyses necessary for each one, the centre's storage needs are continually rising.

"Our research tends to aggregate results from hundreds of analyses in order to detect trends. That means storing data for long periods," says Gautheret.

A platform dedicated to genomic analysis

Gustave Roussy is one of nine partner organisations within Dell EMC's Children's Cancer Care programme. This global initiative — part of the Dell EMC Sponsorships and Giving programme — involves a multimillion dollar commitment that covers both technology and volunteering by Dell EMC employees. Through it, Dell EMC has already provided technology to Gustave Roussy that powers classrooms so that children can continue with their education while receiving treatment.

"Given our strong relationship with Dell EMC through its efforts to support innovation in paediatric cancer, it was natural for us to solve our server and storage issues by turning to Dell EMC," says Gautheret.

The Genomic Data Analysis platform — the Dell EMC HPC System for Life Sciences — quickly emerged as the solution best suited to the centre's high compute needs. Specifically designed for genomic analysis and created through collaboration with Dell EMC customers working in the life sciences field, the platform is fully integrated and optimised, and enjoys first-class energy efficiency. It consists of Dell EMC PowerEdge R820 and R630 servers with Intel® Xeon® processors.

"Key factors for us were the open, standards-based architecture of the Dell EMC Genomic Data Analysis platform and the fact that Dell EMC tailored it to our needs," Gautheret says.

During the consultancy process, the Dell EMC HPC and Big Data team for Europe, the Middle East and Africa (EMEA) evaluated the data volumes based on the goal of 96 analyses a day. It then configured the solution to accommodate this volume. Gautheret says, "We were pleased that Dell EMC took into account our requirement for specialist sequencing and analysis software, ensuring that the platform would run even the newest open-source applications. These will speed up our research."

Rapid deployment ensures fast results

“Within a month of us deciding on the Dell EMC HPC System for Life Sciences platform, it was installed and ready for use,” says Gautheret. Dell EMC Education Services provided a day of training for the clinic’s IT team, and ProSupport remains on hand to help address queries. “We find the Dell EMC HPC System for Life Sciences platform easy to run and maintain,” Gautheret explains, “but we have the additional reassurance of regular visits from the Dell EMC team.”

Personalised treatments through faster profiling

Patients at the clinic are benefiting from the faster profiling that the platform enables. Gautheret says, “We can run 96 synchronous genome analyses per day — eight times as many as before. As a result, children receive treatment earlier and the list of pending tests is significantly reduced.”

Providing a high-performance computing (HPC) environment, the Dell EMC HPC System for Life Sciences platform is 11 times more powerful than the previous server infrastructure: it can run 12 billion processing tasks per second. Each genome analysis takes between 7 and 11 hours, with results available in 25 hours rather than 30 hours. This increased speed also means that the clinic can now consider analysing patients’ tumours in their entirety, rather than in small samples. Plus, it can run additional analyses purely for research purposes. “The data we’re obtaining thanks to Dell EMC will help our staff make leaps forward in terms of their knowledge of cancer and progress towards new treatments,” says Gautheret.

Superior data produced

Access to new software is enabling reprocessing of existing data, providing researchers with more accurate data. “Now that we have access to the latest applications we’re not only improving the quality of the data we produce, but we’re revisiting past data and refining the results. We’re speeding up our analysis as well as increasing the quality of our data,” says Gautheret.

Future research supported by scalable storage

Gautheret and his colleagues also wanted a scalable storage solution that could meet the long-term needs of the centre. Two Dell EMC storage solutions contribute to the performance and sustainability of the Dell EMC HPC System for Life Sciences solution. It uses Dell EMC PowerVault MD3460 storage arrays for fast storage and a Dell EMC Isilon solution for the most critical data, providing total storage capacity of 1 petabyte. They are integrated into the architecture and meet the needs of high flow rates during the execution of treatments and securing of long-term storage of genomic data.

Dealing with large data streams required dense interconnection from Dell EMC Networking switches with 40 Gigabits per second transfer rates, tailored to the needs of bioinformatics processing. Each of the storage solutions can evolve freely in performance or capacity to meet the future needs of the research division.

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Daniel Gautheret, bio-IT platform manager,
Gustave Roussy

“Not only can we process more analyses each day, but we can store all the data we’re producing and run additional analyses without worrying about storage,” Gautheret says. “Our research will be supported for the next five years thanks to the Dell EMC HPC Network File System storage.”

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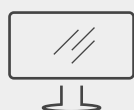
Daniel Gautheret, bio-IT platform manager,
Gustave Roussy

Innovation is enhanced by simplified IT environment

“We’re free to focus on developing treatments without worrying about technical limitations thanks to our Dell EMC HPC System for Life Sciences solution,” says Gautheret. The solution is built to industry standards, tightly integrating the software with the hardware, so it can support multiple workloads. Gautheret concludes, “Both our immediate commitment to patients and our ongoing efforts to develop new cancer treatments are supported by the Dell EMC HPC System for Life Sciences platform.”

Centre saves 23 per cent on power

In the past, the clinic relied on sequential processing. Thanks to Dell EMC HPC System for Life Sciences platform it can use parallel processing, which in turn reduces power consumption by 23 per cent each time it runs a genome analysis.



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