

# Elastic High Performance Computing in the Cloud at the Geneva Finance Research Institute

## CASE STUDY

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— Fabio Trojani

Professor of Finance at Geneva Finance Research Institute and a Senior Chair of the Swiss Finance Institute

A Research Fellow based in Switzerland has just pioneered something quite extraordinary in the world of high performance (HPC) computing.

Fabio Trojani is a Professor of Finance at the Geneva Finance Research Institute (GFRI) of the University of Geneva and a Senior Chair of the Swiss Finance Institute. He oversees a quantitative research team that carries out research in various areas of Financial Economics, Financial Econometrics and Statistics. A large part of Professor Trojani’s research builds on the analysis of large and complex data sets, using computation-intensive optimization and simulation methods that often deal with billions of records. These projects therefore need to be powered by a significant HPC infrastructure.

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In the past, Professor Trojani was running an on-premise HPC cluster on bare metal to support his research. However, the hardware was getting old and starting to fail; the team began to have trouble replacing the hard drives and there were costly problems with the power units as well. This chain of events prompted Professor Trojani to make a decision. Should he buy new hardware and replace his on-premise cluster, or look for a more innovative solution with better prospects for the long term?

There were two major drivers behind the Professor choosing to do something new. Firstly, he recognised that the flow of computational projects on his on-premise HPC cluster was not consistent. There were peak times when the research team needed unlimited resources, and then weeks would pass with the HPC environment sitting idle. Secondly, the cost of cooling and powering was greater than the cost of setting up an entirely cloud-based Infrastructure-as-a-Service (IaaS) environment.

With strict security protocol to adhere to, the Professor sought a German or a Swiss-based IaaS provider. A key requirement was the ability to quickly scale up and scale down the research team’s computational power, in order to pay only for the resources that were being consumed.

Professor Trojani chose ProfitBricks, a provider of virtual datacentres that allows corporate customers to combine the advantages of cloud computing with the established look and feel of a traditional datacentre. ProfitBricks offers the unique and appealing advantage of guaranteeing performance by mapping the physical processor one-to-one with the virtual processor.

The Professor, who had been a long-time on-premise user of Bright’s infrastructure management technology, decided to harness Bright’s technology again, but this time from the cloud, ensuring his team could enjoy exactly the same user experience as they had previously. Bright’s flexible architecture also made it possible to interface



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with the ProfitBricks APIs, enabling the Professor to spin up new HPC nodes on demand, and just as quickly decommission them.

Today, Bright underpins this ground-breaking elastic IaaS solution and provides Professor Trojani’s research team with a single management user interface. Bright simplifies the day-to-day operations of all aspects of the cloud-based infrastructure, enabling the team to easily expand as well as shrink the cluster’s capabilities based on the computational jobs in the queue.

As a result, researchers consume resources only when needed and pay by the minute, resulting in huge savings over the previous on-premise approach. Researchers from GFRI, the Swiss Finance Institute and other academic institutions are now empowered to access vast quantities of resources for short periods of time. And, as Bright abstracts the management of the cloud-based environment, they are now able to invest a substantially larger fraction of their time in addressing the deep and conceptual aspects of their research, rather than in finding ad hoc solutions for their data warehouse and computational needs.

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The Swiss Finance Institute has explicitly recognized this cost efficient HPC solution for academic research as one of his key initiatives in knowledge transfer. Looking forward, the Professor and his team plan to explore Bright’s ability to not only manage traditional HPC workload, but to also run Big Data workload side by side – leveraging the dynamic infrastructure built with ProfitBricks, and facilitating the dynamic deployment of compute resources according to demand, thus delivering new capabilities that will further enhance their research and insight.