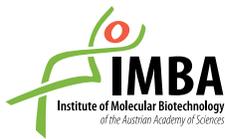


IMBA cuts time to deploy HPC environments from months to hours with Red Hat



The Institute of Molecular Biotechnology (IMBA) is a leading European institute for molecular biology research. With research data volumes growing exponentially, the institute needs to rapidly deploy high-performance computing (HPC) environments used by scientists to conduct and support their research. Using Red Hat OpenStack Platform, managed by Red Hat Ansible Automation and Red Hat Satellite, the institute created a flexible, scalable, software-defined datacenter that has cut installing custom environments from months to hours. The new platform helps the institute optimize its resource use and datacenter footprint, simplifying and streamlining IT to focus on supporting innovative research.

Software

Red Hat® OpenStack® Platform

Red Hat Ansible® Automation

Red Hat Satellite

Red Hat Enterprise Linux®



Healthcare/life sciences

220 employees

14 research groups

Benefits

- Reduced time to install custom HPC environment from 6 months to 1 hour
- Consolidated 3 HPC environments with efficient, scalable foundation
- Improved compute performance
- Simplified management with automation and proactive updates

“Red Hat OpenStack Platform allows us to tie IT resources, such as GPU [graphics processing] and high memory nodes, servers, networking, and storage together however we need to deliver HPC environments to our researchers.”

Petar Forai
Deputy Head of IT,
Institute of Molecular Biotechnology



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Petar Forai
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Accommodating rapid growth in research data needs

Composed of 14 research groups, the Institute of Molecular Biotechnology (IMBA) develops new and innovative approaches, technologies, and model systems to make groundbreaking discoveries in molecular biology and medicine. Owned by the Austrian Academy of Sciences, IMBA is part of the Vienna BioCenter of molecular biology research institutes, universities, and biotechnology companies. Researchers at IMBA benefit from access to unique, state-of-the-art scientific and information technologies.

“Modern biology relies on computing tools because of the growing volume of data generated by microscopes, sequencers, and other equipment,” said Petar Forai, Deputy Head of IT at IMBA. “Analyzing exponentially growing data requires high-performance computing environments. We must provide the specialized IT infrastructure each project needs as quickly as possible.”

With both the complexity of technology requirements and data volume increasing, IMBA sought a better way to scale its infrastructure without requiring additional staff. The institute knew automation would be key to this change, but its basic automation capabilities were isolated and assigned to specific IT resources, such as storage, networking, and compute.

As a result, the institute began looking for a centralized automation framework that could be applied across all of its individual datacenters’ resources to build a unified, software-defined datacenter.

Creating a software-defined datacenter

After evaluating several OpenStack platform offerings, including solutions from Suse and Canonical, IMBA sought a supported, more integrated technology that could support a wider range of networking, storage, compute, and other datacenter service technologies. As an existing customer of Red Hat Enterprise Linux, the institute decided to adopt Red Hat OpenStack Platform to build a flexible, scalable high-performance computing (HPC) environment, running in private cloud.

“Support is very important to us, and one of the main reasons we chose Red Hat,” said Forai. “Adopting Red Hat OpenStack Platform would also give us a comprehensive support chain, with Red Hat and the other datacenter service vendors providing validated designs for integrations between their technologies.”

After a proof of concept, IMBA’s engineers installed OpenStack to create environments for development, staging, and platform. Alongside the institute’s existing automation approach, Red Hat Ansible Automation provides comprehensive, simple-to-use automation capabilities that can be applied across the institute’s entire IT infrastructure. To keep its Red Hat environment protected and up-to-date, IMBA uses Red Hat Satellite to manage upgrades and security fixes. These solutions run on Red Hat Enterprise Linux across 220 servers. In total, the environment includes massive data storage of 200TB of flash memory across 20 servers.

With these technology solutions, IMBA has created an efficient, effective, software-defined environment for HPC to support innovative research projects and store more research data. IMBA now runs this OpenStack infrastructure in parallel with its legacy infrastructure to support new projects, as well as around 30% of close to 200 applications that require an HPC environment.

“We are in the process of migrating applications, starting with the biggest and most resource-intensive,” said Forai. “We began with research applications and data analysis pipelines, specifically bioinformatics analysis tools that process images, videos, and genomic data sets.”

Improving research infrastructure efficiency and performance

Reduced provisioning times from months to hours

Previously, adapting IT infrastructure to meet the performance requirements of each research project was difficult and time-consuming. Installing physical equipment and delivering it to the user would take six months. Now, IMBA's IT teams can use efficient, automated processes to respond to scientists' requests for custom HPC environments in hours.

"Red Hat Ansible Automation lets us automate services end-to-end in our datacenter," said Forai. "For example, to provide an HPC data analysis environment for researchers, we automated installation of both OpenStack and the environment running on it, completing a build that would have previously taken six months in just an hour."

Streamlined datacenter footprint

While IMBA's legacy environments often ran for several years on dedicated physical resources, its software-defined datacenter can reuse and adapt hardware, reducing the institute's physical data-center footprint while increasing capacity.

By integrating its HPC environments into a single environment running on Red Hat OpenStack Platform, IMBA can treat its datacenter as a flexible set of compute resources that can be connected and combined as needed to deliver custom research environments.

"Red Hat OpenStack Platform allows us to tie IT resources, such as GPU [graphics processing] and high memory nodes, servers, networking, and storage together however we need to deliver HPC environments to our researchers," said Forai. "We've used Red Hat technology to consolidate three completely different HPC environments, making more efficient use of valuable IT resources that are in high demand."

Significantly improved research environment performance

Compared to its previous systems, IMBA has seen an improvement in the performance and agility of its computing capabilities. With faster, more efficient processes and performance, the institute's researchers can work at the scale and pace demanded by their projects.

"We used to struggle to provide some environments for big data analysis. With OpenStack, that's no longer an issue. We have one particular application that runs seven times faster than before, even though it's now running on a virtual machine," said Forai. "We can give researchers the environments they need running in parallel with their existing environments. We can then scale those as needed, because Red Hat OpenStack Platform makes shifting resources between applications much easier."

Simplified security management with supported enterprise software

The institute's Red Hat infrastructure management solutions, combined with expert enterprise support, helps optimize IMBA's OpenStack and Linux environment and protect it from vulnerabilities.

Red Hat Ansible Automation automates upgrade procedures, backups, and daily tasks, including creating users and groups, while Red Hat Satellite tracks security information for OpenStack, Linux, and provisioned technologies running on them, as well as hosting local mirrors of IMBA's Red Hat Enterprise Linux environment for backup and failover purposes.

Reducing resource demand with expansion of self service

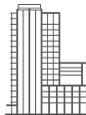
The institute plans to continue migrating applications and resources to its new OpenStack environment, with plans to move its VMware infrastructure in the near future. Additionally, IMBA plans to use Red Hat OpenShift to build a dedicated container infrastructure for key applications, as well as offering in-house, self-service IT capabilities to developers and scientists.

“Our software-defined datacenter built on Red Hat technology means scientists can analyze their growing data set efficiently,” said Forai. “It’s a long-term strategic investment. It shows that, given sufficient time and expertise, smaller teams can build OpenStack environments to successfully support large, complex IT needs.”

About the Institute of Molecular Biotechnology

The Institute of Molecular Biotechnology (IMBA) is an academic research institute that conducts basic research in the areas of molecular biology and medicine. It is located in the Vienna BioCenter, a dynamic cluster of research institutes, universities and biotech companies, in the heart of Europe. Its resources give our scientists the freedom to develop new approaches, design innovative technologies, create novel model systems – and make groundbreaking discoveries.

About Red Hat



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