EPFL

The École Polytechnique Fédérale de Lausanne is a research institute based in Lausanne, Switzerland, specializing in physical sciences and engineering. It comprises 11,000 students, 350 faculty and 6,000 staff.

Industry

Education

Strategic priorities

• Cloud Transformation

VMware footprint

• VMware® Cloud Foundation™

• VMware Aria Automation™

• VMware Cloud™ on AWS

• VMware NSX® Distributed IDS/IPS™

EPFL Supports Research Dynamism with Anything as a Service Approach

Relentless curiosity is a powerful thing, but today, world-class research requires powerful technology tools and capabilities. Switzerland's École Polytechnique Fédérale de Lausanne is bolstering its growing reputation as a European research powerhouse by providing its research teams with all the IT resources needed. VMware Cloud Foundation and VMware Aria Automation help create a self-service IT portal for 3,000 researchers, shortening the time to scientific breakthroughs.

Forging closer collaboration

École Polytechnique Fédérale de Lausanne (EPFL) strives to be recognized as one of the world's leading technology universities. It is home to over 500 laboratories and research groups, each at the forefront of science and technology. The university's work addresses critical areas such as data science, personalized health, biomedical engineering, energy, robotics and advanced manufacturing. To thrive, EPFL wants to share its knowledge, engage the general public and forge closer collaboration with other institutions and research laboratories.

Building a reputation for excellence

EPFL is one of Europe's youngest technology universities and now one of the world's best. Founded in 1969, the university is 14th in the QS World University Rankings, up two places from 2020, sitting alongside Colombia and Yale.

"We're young, but we're climbing fast," says Philippe Morel, director of IT operations and infrastructure, EPFL. "It's important we keep improving."

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Philippe Morel, Director of IT Operations and Infrastructure, EPFL

EPFL BOLSTERING ITS GROWING REPUTATION

Much of the upward progress is credited to the ability of EPFL to attract academic talent and research funding. Its high-profile research programs include the Blue Brain Project, the Swiss Plasma Center and the Venice Time Machine. It has launched more than 350 start-ups since 2000, while EPFL spin-offs raised more than USD $750 million in funding in 2020.

In a crowded field, EPFL is seen as a place where great work can take place, and great careers can take off. The challenge for EPFL is to continue to attract the best talent, investment and industry partners.

"From an IT infrastructure perspective, we need to provide researchers with everything they need. They should be able to start their research on day one," says Morel. This requires infrastructure to be flexible and secure as well as fast and easy to access. EPFL needs to keep its research community close and ensure high-value projects remain in the school environment.

"Unfortunately, we'd noticed some researchers were stepping outside of the university's IT infrastructure and finding their own public cloud solution," says Morel. "This was not acceptable. We cannot risk sensitive research data moving out of the school environment."

The risks are manifold. EPFL must respect Switzerland's data sovereignty laws, among the strictest in the world. Failure to act posed a risk to EPFL from a legal, reputational and control perspective.

Providing the ideal environment for world-class research

"We had to completely change how we provided our IT services to the researchers. It had to be fast, easy and reliable. Management set us the task of being able to provision a new virtual machine within 15 minutes," says Morel.

It was a challenge Morel and his 14-strong team were able to overcome faster than they'd imagined. They elected to develop a private cloud, accessed via an automated self-service portal, to offer research teams a more secure alternative to commercial cloud consumption. "The only way this would work was if we made our services better," says Morel.

The team built the private cloud with VMware Cloud Foundation and the portal with VMware Aria Automation. The new platform was fully tested and launched within three months.

"VMware Cloud Foundation provides everything we need: compute, storage and networking as well as load balancing and flexibility," says Morel. "With VMware Aria Automation we're providing a public cloud-like user experience while maintaining security, compliance and control. We are a small team, but VMware enables us to offer anything as a service (XaaS)."

VMware NSX Distributed IDS/IPS helps protect sensitive research work while VMware Aria Automation establishes the necessary management control. This allows EPFL to manage the cost, performance, configuration and delivery of infrastructure and cloud native applications across any cloud. The approach also helps strengthen data governance.

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Handing power to the research community

The goal of "15-minute provisioning" has been met and the self-service portal has been enthusiastically embraced by the university's research community. The number of virtual machines in use is up from 2,000 in 2020 to nearly 4,000 in two years while use of public cloud has plummeted.

"The research community love it. Adoption has been much bigger than we expected," says Morel. "We don't have the authority to forbid researchers from using public cloud, but we're now able to provide them with a faster, cheaper, more secure alternative. Our private cloud means we don't stand in the way of research ingenuity."

Overall, 2022 has been a stellar year for research at EPFL. Eleven of its researchers were ranked in the top 0.1 percent of Clarivate's annual list of Highly Cited Researchers. High profile projects include a cell therapy platform to fight cancer, an antibody treatment for Alzheimer's and a molecular treatment of tuberculosis. "It's rewarding to see EPFL maintain its reputation for world-class research and facilities and know that our team has played an important part in that," says Morel.

The private cloud also makes better use of existing resources. "We're not over-provisioning or seeing resources stood idle, neither are we overpaying for a short-term fix," Morel explains. There is plenty of room to accommodate future research demand, and the university may consider renting out spare IT capacity in the meantime.

The engagement with VMware paves the way for a true, multi-cloud approach. The near-term goal, says Morel, is to be able to move standard workloads to an appropriate public cloud—determined by cost, security or Switzerland's strict data sovereignty rules—while keeping the most sensitive workloads in the private cloud.

EPFL already has a small set-up with VMware Cloud on AWS for disaster recovery purposes; greater multi-cloud flexibility will strengthen disaster recovery as well as help cross-border research teams.

"We want to be able to cloud-burst when necessary, with the freedom to move workloads to cope with peaks," says Morel. "VMware understands the multi-cloud experience. I need our multi-cloud environment to be simple to manage, ideally with workloads pushed automatically to the appropriate cloud. VMware has the tools to manage this."

Perhaps the biggest impact, he adds, has been the shift in mindset among his team: "There was initial skepticism about VMware Aria Automation and what this meant to the individual in terms of their job roles, but that has disappeared completely. We now have the team wanting to diversify their skill sets and explore the next round of innovation."

"Our role is as a service provider. We want to start providing the value we bring to our researchers to our students. We have an opportunity to excite the next generation of researchers, and show them the tools which enable major scientific advances."

Philippe Morel, Director of IT Operations and Infrastructure, EPFL

Extending cloud access to students

The next challenge for Morel's team to push the boundaries of research is to provide students with machine learning (ML) laboratories. Students can already access virtual machines (VMs) through the VMware Horizon VDI solution, and plans are in place to also provide GPU as a service through the VDI. Students can then start mastering data sets and algorithms through small neural network projects for example.

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