More than IaaS: Academic Cloud Services for Researchers

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Abstract

SWITCH as the Swiss NREN has been extending its service portfolio since 1987. Starting out from network connectivity, collaboration services and AAI completed the portfolio. In 2014, SWITCH set out to become a provider for computing and storage infrastructure on a cloud platform. On top of this platform we operate a national service for file sync and share (SWITCHdrive). The compute and storage infrastructure itself is also offered as a national service in as an infrastructure as a service called SWITCHengines. The next step we are working on in a project called SCALE-UP is to offer cloud services for the academic community. The presentation will give an overview and the current state of development of the project.

Content

Since 2014, SWITCH runs an OpenStack based cloud infrastructure for the academic users in Switzerland. The infrastructure as a service (IaaS) offering on this infrastructure is called SWITCHengines and serves a growing user base in Swiss academia. The service is mainly targeted at researchers, professors and students for research and education use cases. While users already see great value in SWITCHengines with its IaaS offering, requirements regarding more specific services for academia have become apparent. Those services are created within the project SCALE-UP which runs from August 2015 to end of 2017.

In 2016, SWITCH updated the strategy for its main business fields and with that also the strategy in the Cloud area. SWITCHengines and the SCALE-UP project are two corner stones within that strategy.

SWITCH is building the new services together with 8 project partners in the universities, those being from IT department as well as from research. With this approach we make sure that requirements from academia are taken into account in the development process. SCALE-UP comprises individual work packages that are being tackled in a phased approach. At the end 2016, most of the packages had concluded the concept phase that included collecting requirements and know-how from the community and first results of the implementation and usage by pilot users were available.

In the talk, strategic considerations will be touched and the focus will be on the results and ongoing work of the following topics that are part of the SCALE-UP project:
Big Data Analysis
We aim to provide researchers with an easy-to-use, scalable environment for analyzing complex data. Standard tools such as Hadoop and Apache Spark are integrated, so researchers do not need to spend time installing and configuring them. In research, these technologies are not yet widely used, so providing an environment to learn using these tools is essential. As of the time of writing, a learning environment for students with basic tutorials has been completed as well as a tool for the automatic provisioning of big data analytic clusters. In 2017, the tools will be tested in the field and further improved using the feedback of the users.

Scientific Data Pools
Complementary to the big data analysis service, we look at the challenges of managing large quantities of data that are to be analyzed. First examples of public data sets in the Terabyte scale have been replicated to our infrastructure so that they can be used for research. Users will start to work on these data in 2017 which will help us further develop the available tools towards a service.

Collaborative Applications
Based on the open source sandstorm framework, we provide a self-service environment for e.g. a simple Wordpress based website, an archive for project documents, collaborative editing or iPython notebooks. One of the essential aspects regarding the usability was the integration with federated authentication, which has been completed. Similar to the above topics, a wider number of users are going to use the system in 2017 to help us further develop the available tools.

Virtual Private Cloud (VPC)
IT services in universities and research institutes are interested in using SWITCH's IaaS offering to increase redundancy and also be able to cope with peak loads. With our VPC solution, virtual machines can be integrated into the campus network, and internal services can be accessed easily behind the firewall. A prototype of the VPC has been implemented and tested successfully with a customer in 2016. In the following year, the solution will be further improved regarding stability and performance and tested with selected institutions.

Container Technology
We are also looking into newer technologies that emerge. The goal here is to find out which use cases container technologies provide a benefit and also provide the necessary services on our infrastructure. A feasibility study and documentation of best practices for this next-generation technology has been made. The next steps in 2017 are to provide container services on our OpenStack infrastructure and gain operational experience with exemplary use cases.

Marketplace
Universities increasingly use our infrastructure as a basis for their own services to academia, sometimes even for national services. To present such national services from the community and the ones SWITCH offers, we want to provide a common place that we call marketplace. In 2016, we started with a concept for a marketplace for academic cloud services and reaching out to the institutions about their needs. By mid of 2017, a first proof-of-concept will be implemented to show the feasibility of such a marketplace.
Author Bio:

Patrik Schnellmann is Cloud Project Manager at SWITCH. He holds an MSc in Computer Science and a Master of Advanced Studies in Management, Technology and Economics from the Federal Institute of Technology in Zurich. Before joining SWITCH in 2004, he acquired experience in the finance industry and the Swiss government.