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# HNSciCloud Multi-Cloud Approach – An open hybrid cloud for science

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Ten of Europe's leading public research organisations led by CERN launched the Helix Nebula Science Cloud (HNSciCloud) Pre-Commercial Procurement to establish a European hybrid cloud platform that will support the high-performance, data-intensive scientific use-cases of this "Buyers Group" and of the research sector at large. It calls for the design and implementation of innovative Infrastructure as a Service (IaaS) solutions for compute, storage, network connectivity, Federated Identity Management and Service Payment Models, to augment & enhance the science community's existing systems.

The RHEA Group HNSciCloud Nuvla multi-cloud solution provides the European science community a means to access, via their existing academic network infrastructure, large scale commercial cloud resources (computing and storage) from multiple cloud providers securely and transparently. The Nuvla platform allows users to authenticate with their academic on-line credentials to manage compute resources and to access local and cloud-based data locally. Users can deploy Virtual Machines (VMs) and/or Containers to multiple clouds and monitor their usage and cloud performance. Nuvla's brokering system means users (or the procuring authorities) can choose which cloud to use based on price, performance, location or other factors which are important to them. The Nuvla service is completely neutral with respect to cloud providers, so by using Nuvla, users can deploy their VMs and containers to any supported cloud. Users may have their own orchestration tools and can optionally deploy directly to the clouds of their choice by using their native APIs.

Users signing-in via Nuvla can still access the underlying cloud resources directly; such users still benefit from the data management, usage and performance monitoring offered by Nuvla as a way the users maintain control while Nuvla helps them get the best value for money and performance from the resources to achieve their needs. In the future, almost any other public/commercial cloud could be integrated provided it is connected to GÉANT and meets the minimum performance and reliability requirements, as demonstrated with the inclusion of the Advania cloud.

As well as delivering processing and resource at scale via the GÉANT network, the platform supports the eduGAIN and Elixir AAI (SAML 2.0) identity federations, allowing users to access cloud resources via a web browser, Application Programming Interface (API) or Command Line Interface (CLI) – with access rights accorded by their unique identity. OneData allows data to be shared across multiple clouds as well as with local infrastructures. Organisations with their own internal cloud can also access that cloud via Nuvla allowing commercial and internal clouds to be managed from one interface. Nuvla is based on the SlipStream open-source software and Cyfronet's Onedata extended within the HNSciCloud project to support the diverse scientific requirements of the Buyers Group with three European commercial clouds - Open Telekom, Exoscale and Advania – that provide secure, high-performance cloud resources, including High-Performance Computing (HPC) as a service and access to Graphical Processing Units (GPU).

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