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## Evaluating Different Options for Scientific Computing in Public Clouds

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Cloud computing has emerged as a new paradigm for on-demand access to a vast pool of computing resources that provides a promising alternative to traditional on-premises resources. There are several advantages of using clouds for scientific computing. Clouds can significantly lower time-to-solution via quick resource provision, skipping the lengthy process of building a new cluster on-premises or avoiding long queue wait times on shared computing facilities. By providing a wide range of possible virtual machine configurations, clouds allow to easily adapt to changing workloads. Clouds can also reduce the total cost of ownership by allowing dynamic auto-scaling of computing resources depending on the current workload, or by leveraging spot instances that represent excess cloud capacity. A new serverless computing model has become popular recently, which enables users to seamlessly execute the so-called cloud functions without having to manually manage and scale virtual machine instances.

Nowadays public clouds provide many options for running computing tasks ranging from manually managed on-demand virtual machines and HPC clusters to preemptible spot instances and cloud functions. This brings up several questions: which options are suitable for which kind of applications and use cases, what are their advantages and drawbacks, and how these options compare to traditional computing resources such as on-premises clusters. To answer these questions, we have implemented support for using the mentioned options as computing resources for running applications on Everest, a web-based distributed computing platform. This platform provides users with tools to publish and share computing applications as web services, and manages the execution of these applications on user-provided computing resources. Since Everest already supports the use of on-premises servers and clusters as such resources, this allowed us to evaluate and compare the new cloud-based resources against the traditional ones for execution of typical scientific computing applications such as bag-of-tasks and workflows. This approach also enables simple migration of existing applications to these new resources.

In this report we will describe the implementation of new cloud-based resources for Everest and will present the results of their experimental evaluation and comparison.

### Summary

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