

Public Abstract

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Department:Computer Science

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Title:SOFTWARE-DEFINED MEASUREMENT TO SUPPORT
PROGRAMMABLE NETWORKING FOR SOYKB

Campuses are increasingly adopting hybrid cloud architectures for supporting science big data applications that require "on-demand" resources, which are not always available locally on-site. Policies at the campus edge for handling multiple such applications competing for remote resources can cause bottlenecks across applications. These bottlenecks can be proactively avoided with pertinent profiling, monitoring and control of application flows using software-defined networking (SDN) and pertinent selection of local or remote compute resources. We have studied the original data flow within SoyKB that also suffers from those bottlenecks, and also noticed some limitations such as slow data transfer speed, lack of performance information (such as availability, status and network health etc.) and inflexible control of resources to address application specific needs, which motivated us to propose new hybrid architecture for SoyKB workflow that resolves such issues.

We focus more on the measurement and control stages in the hybrid cloud management and detail how to utilize the measurement data to support cost optimized selection of sites for computation and effective traffic engineering at the campus-edge referencing ADON (Application-Driven Overlay Network-as-a-Service) architecture. We validate our approach with SoyKB use-case by conducting data transfer experiments with iRODS through a wide-area overlay network testbed implementation across two campuses. Our experimental evaluation shows that SoyKB can significantly benefit from our "SDM + SDN" scheme that provides performance visibility and dynamic control over wide-area network path. Additionally, we show some extra performance improvement we can achieve for SoyKB remote data transfer with proper TCP tuning process through our previously conducted experiments.