

Public Abstract

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Graduation Term:SP 2015

Department:Computer Science

Degree:MS

Title:APP CHAINING SOFTWARE-AS-A-SERVICE FOR AN ADVANCED MANUFACTURING MARKETPLACE

Advances in the field of cloud computing and networking have led to development of Marketplaces (e.g., Awesim) that support Advanced Manufacturing enterprises. These Marketplaces host Apps that perform simulation and modeling on specialized designs (e.g., pipes, automobile parts). However, the salient limitation in these App Marketplaces is the lack of a development environment that supports effective runtime capabilities for 'Agile Manufacturing' that efficiently and cost-effectively integrates several Apps when building innovative products.

To address this problem, we propose a new Software-as-a-Service based App Runtime for the Marketplace environment that can be utilized for agile development of 'Apps' that involve high-performance modeling and simulation. Our solution approach features a web framework for the App runtime that: (a) builds upon the abstractions for most common workflows to support management of generic 'Apps', (b) provides a chaining mechanism to create complex workflows for creation of new Apps based on customer requirements, and (c) runs complex simulation jobs on remote supercomputer resources and publishes customer-facing results for specific sets of inputs. We demonstrate how multiple Apps can be chained using our web framework for a product case study viz., 'WheelSim' deployed in the NSF GENI Cloud platform. Our results show improved App development convenience via rich UI elements interacting with RESTful web services and through dynamic chaining of workflows. Our study also provides App developers with insights pertaining to estimation of resource cost, App pricing issues relevant to a manufacturing Marketplace, and the corresponding performance achievable with common App configurations in a cloud environment.