Evaluation Platform for Real-Time Resource Management Algorithms

Motivation

Trends:
Cloud computing is increasingly being used to power all types of systems, including cyber-physical systems (CPS) and the Internet-of-Things (IoT).

Similarly, network functions traditionally implemented in hardware are moving to software, which is known as Network Functions Virtualization (NFV).

Challenges:
How can we ensure the quality of service of virtual appliances matches that of traditional hardware?
How can we provide real-time performance guarantees for cloud applications?

Goal:
Develop an evaluation platform that enables the emulation and evaluation of real-time resource management algorithms for NFV, CPS and IoT applications in virtualized cloud environments.

Objectives

1. Build a cloud service provider that can be configured to dynamically manages its resources with different resource management algorithms.
2. Use our platform to emulate a virtualized cloud services provider handling customer requests subject to real-time deadlines.
3. Analyze and evaluate the performance of the algorithm based on performance statistics such as latency, deadline miss rate, and throughput.

Execution

1. Request
   Resource Manager
   2. Traffic
   Customer
   3. Evaluate

Design

Test Platform
- Request Handler
- State Manager
- Algorithm Under Test
- Analytics

Algorithms to Test
- Algorithm
- Algorithm
- Algorithm

Evaluation

Cumulative Processing Time Distributions

Latency Distributions

Future Work
- Compare different algorithms’ performance
- Run trials with larger cluster
- Minimize latency incurred by system overhead