Development and evaluation of a Kubernetes cluster simulator based on Batsim

Presented by: Théo Larue
Supervised by: Olivier Richard & Michael Mercier

Université Grenoble Alpes

August 31, 2020

Table of contents

Computer infrastructures

Distributed systems, many domains: Grid, Edge, HPC, Cloud, P2P, Volunteer, Cluster.
These systems increase in complexity. (-¿ some ref to illustrate the size of supercomputers)

Studying distributed systems

Why studying these infra? To test a system performances under varying loads, applications, scheduling policies, system size and topology. Or to develop new RJMS or research new scheduling algorithms.

Studying distributed systems

How to study these infra? Too many elements and interactions to consider, so no theoretical study.
Real experiments are too costly (both in time and resources) and not reproducible.

Studying distributed systems

First solution: emulation resolves the issue of reproducibility.
Second option: simulation resolves both reproducibility and scalability issues + refs on existing simulators.

Domain specific simulators

refs on domain specific simulators.

Software specific simulators

YARNSim, SLURM simulator

Publication specific simulators

"Publish and perish" - Milian Poquet

Batsim

Batsim - related work

Kubernetes

Kubernetes cluster simulation

Batsim concepts

Kubernetes concepts

Batkube integration with Kubernetes

Time interception

Time synchronization

Studied workloads and platforms

Minimum delay

TODO for future work, study min delay effect on makespan and mwt

Timeout

Maximum simulation timestep

Experimentation on a real cluster

Deviation with reality

Capabilities of Batkube

Features to implement

Limitations

Perspectives for future work

References I

../report/biblio.bib