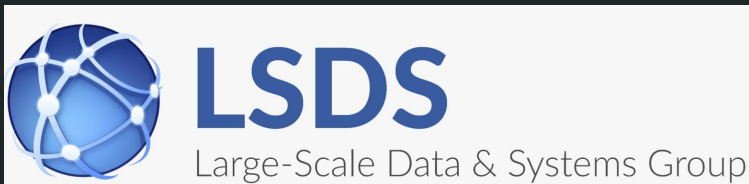


FAABRIC: Stateful Serverless Functions with Shared Memory and Message Passing

WOSC

Tuesday December 7th, 2021

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Serverless Today

Limited appeal
Embarrassingly
parallel workloads

Serverless

High effort
Academic systems
Custom ports

Parallel computing
in practice

Existing code
Deep learning
Molecular simulations
Bioinformatics
Genomics
Fluid dynamics
etc.



Stateless ephemeral functions

The title 'Stateless ephemeral functions' is centered at the top. Below it, three horizontal curly braces are positioned under the words 'Stateless', 'ephemeral', and 'functions' respectively. The first brace is green, the second is red, and the third is grey. Below each brace is a line of text in a matching color.

Parallel applications need state

Can't pass messages
Can't guarantee a level of
parallelism

Provider-specific, undefined
Need threads and processes

But, they make the provider's life easier

FAABRIC: Making More Applications Serverless

1. Threads and Processes

2. Shared Memory

3. Message Passing

4. Provider-friendly

All transparently via existing APIs like OpenMP and MPI

<https://github.com/faasm/faabric>
<https://github.com/faasm/experiment-mpi>

FAABRIC Demo: LAMMPS

LAMMPS

- Molecular dynamics simulator
- Original 1995 paper >30k citations
- Used in thousands of real-world applications and HPC environments
- Still active

Demo

- Unmodified code
- Executing on FAABRIC integrated with Knative on Azure K8s Service

<https://github.com/faasm/faabric>
<https://github.com/faasm/experiment-mpi>