FAABRIC: Stateful Serverless Functions with Shared Memory and Message Passing

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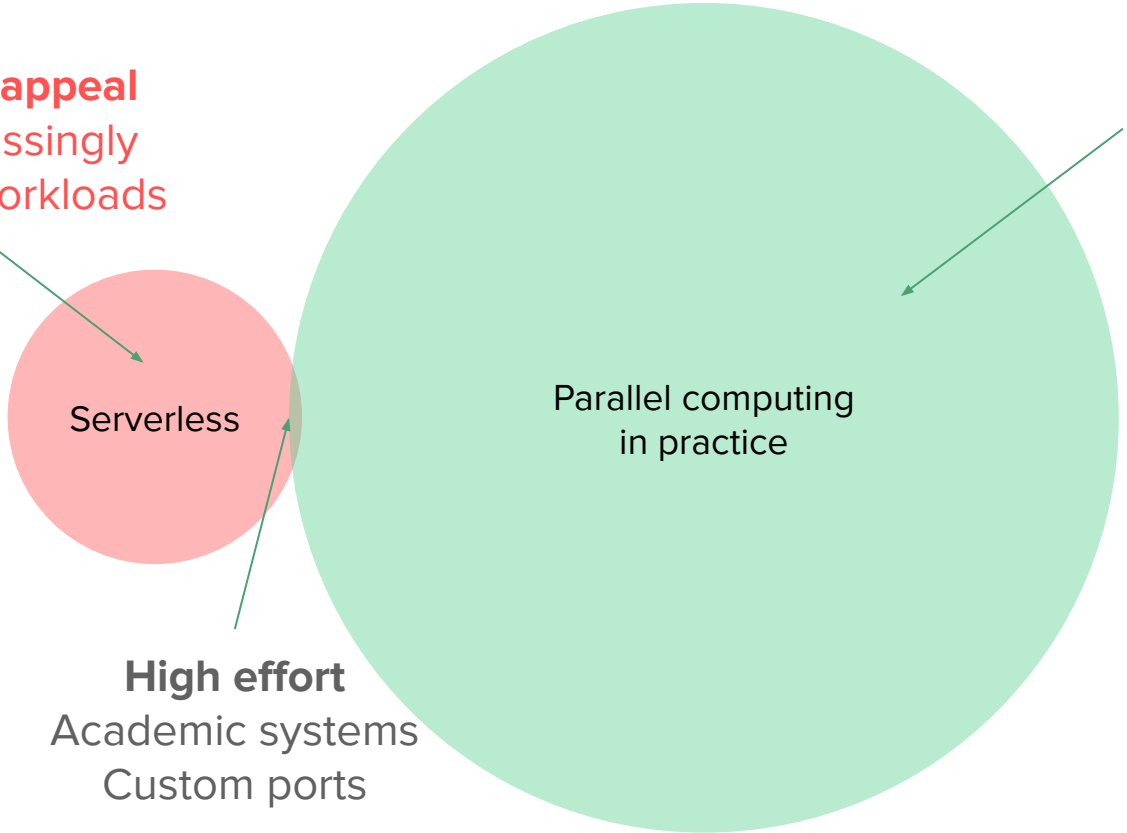
Serverless Today

Limited appeal
Embarrassingly
parallel workloads

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



High effort
Academic systems
Custom ports

Stateless ephemeral functions

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

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