Interactive Computing with Serverless Functions in rFaaS

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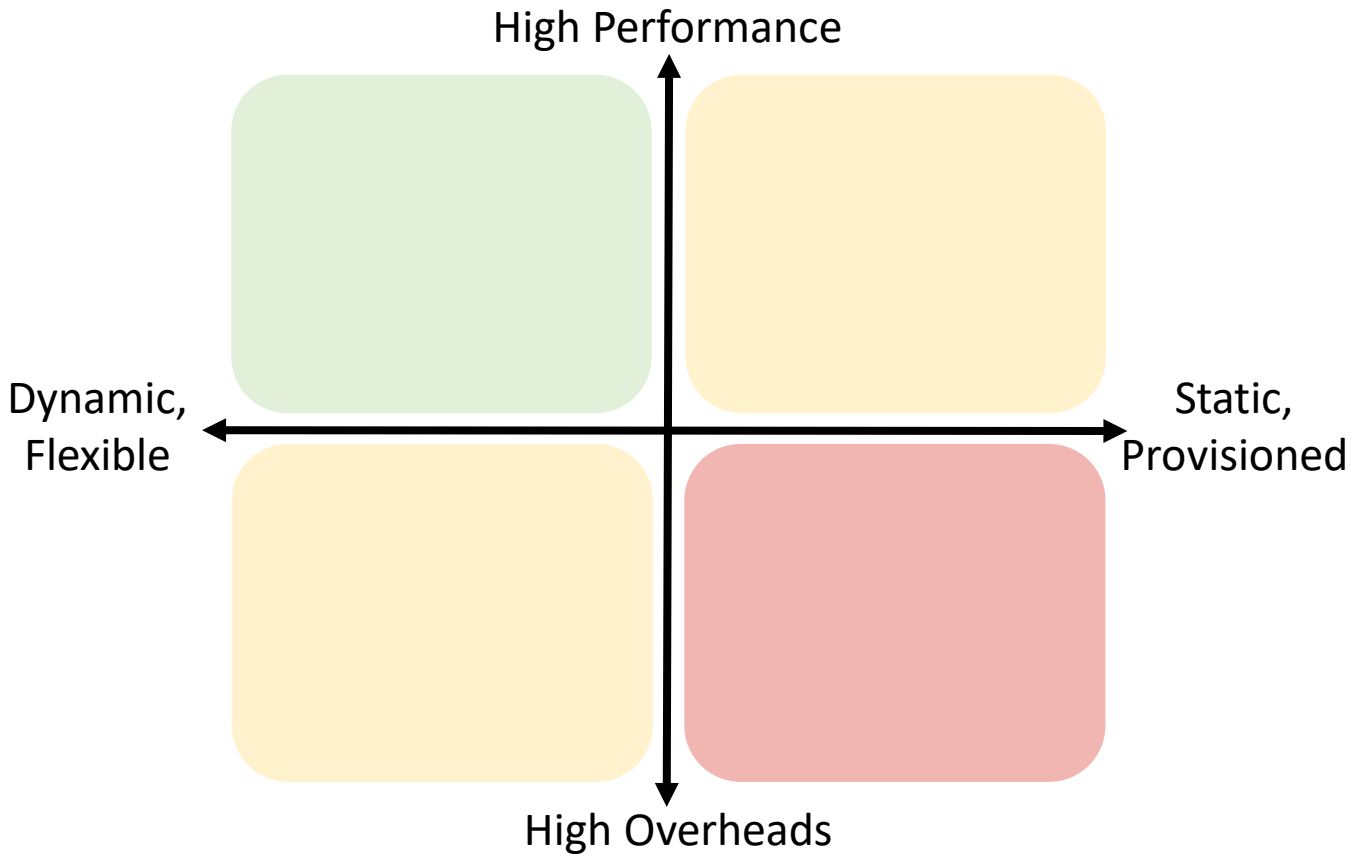
ETH Zurich

Function-as-a-Service for HPC



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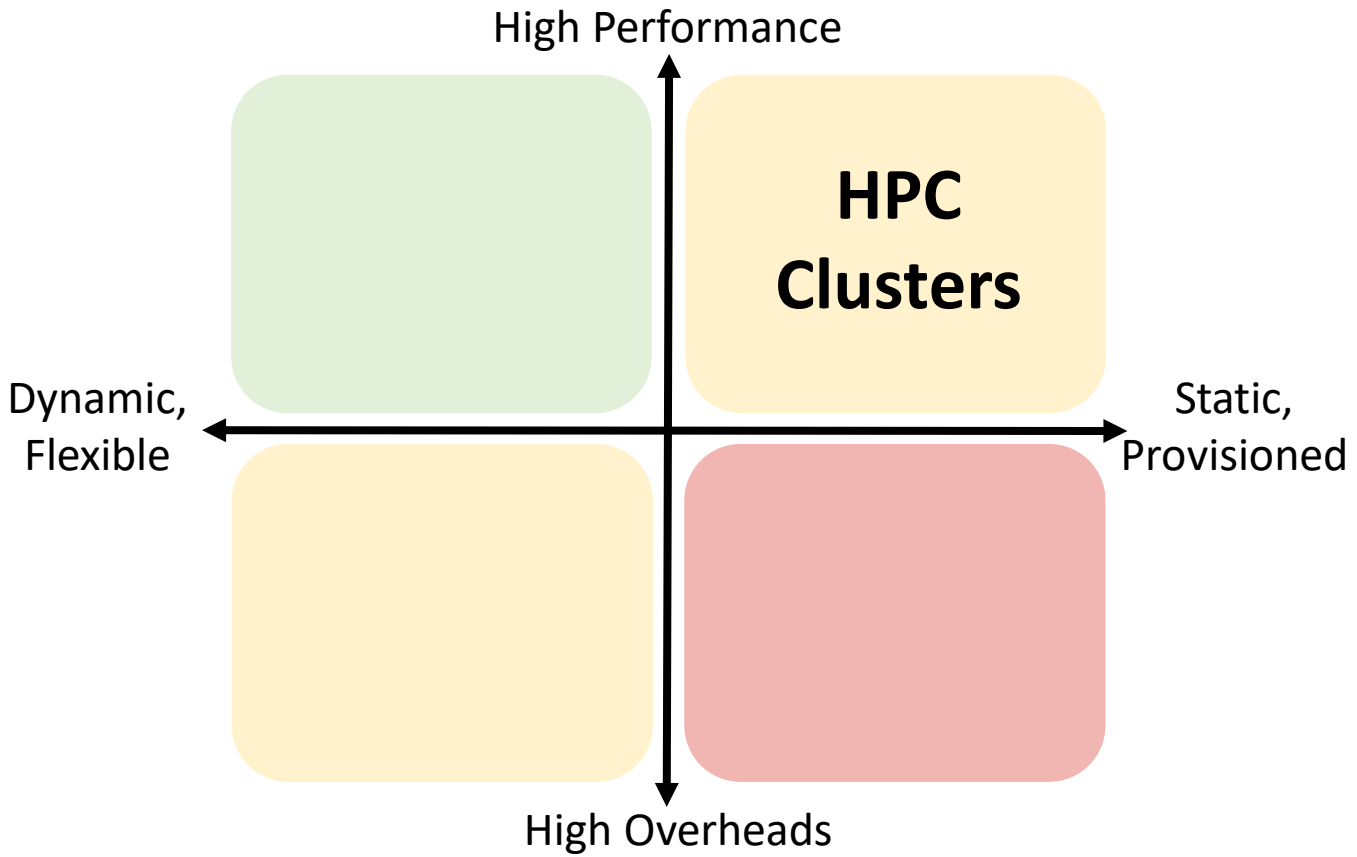
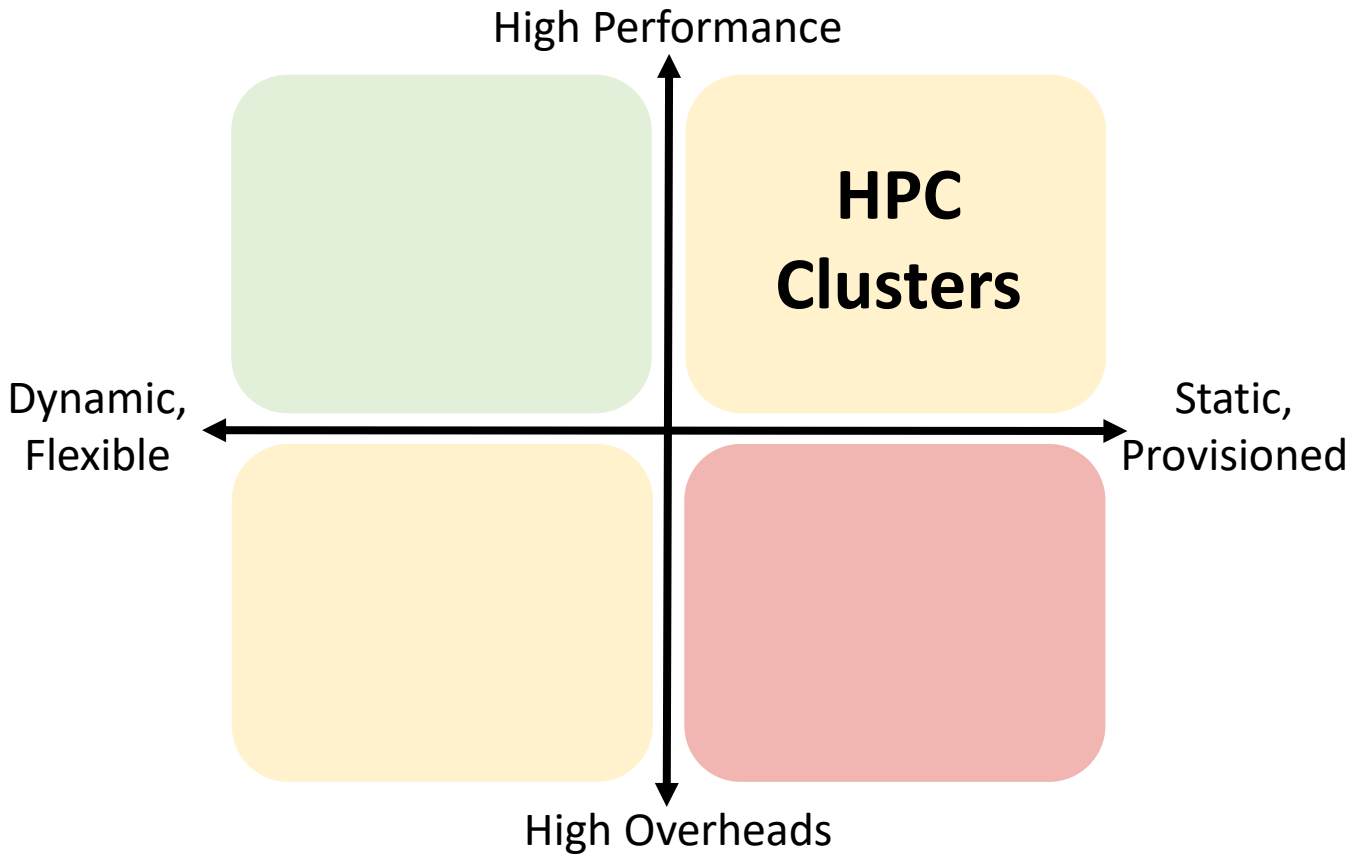


Function-as-a-Service for HPC

Long-running jobs

Static parallelism



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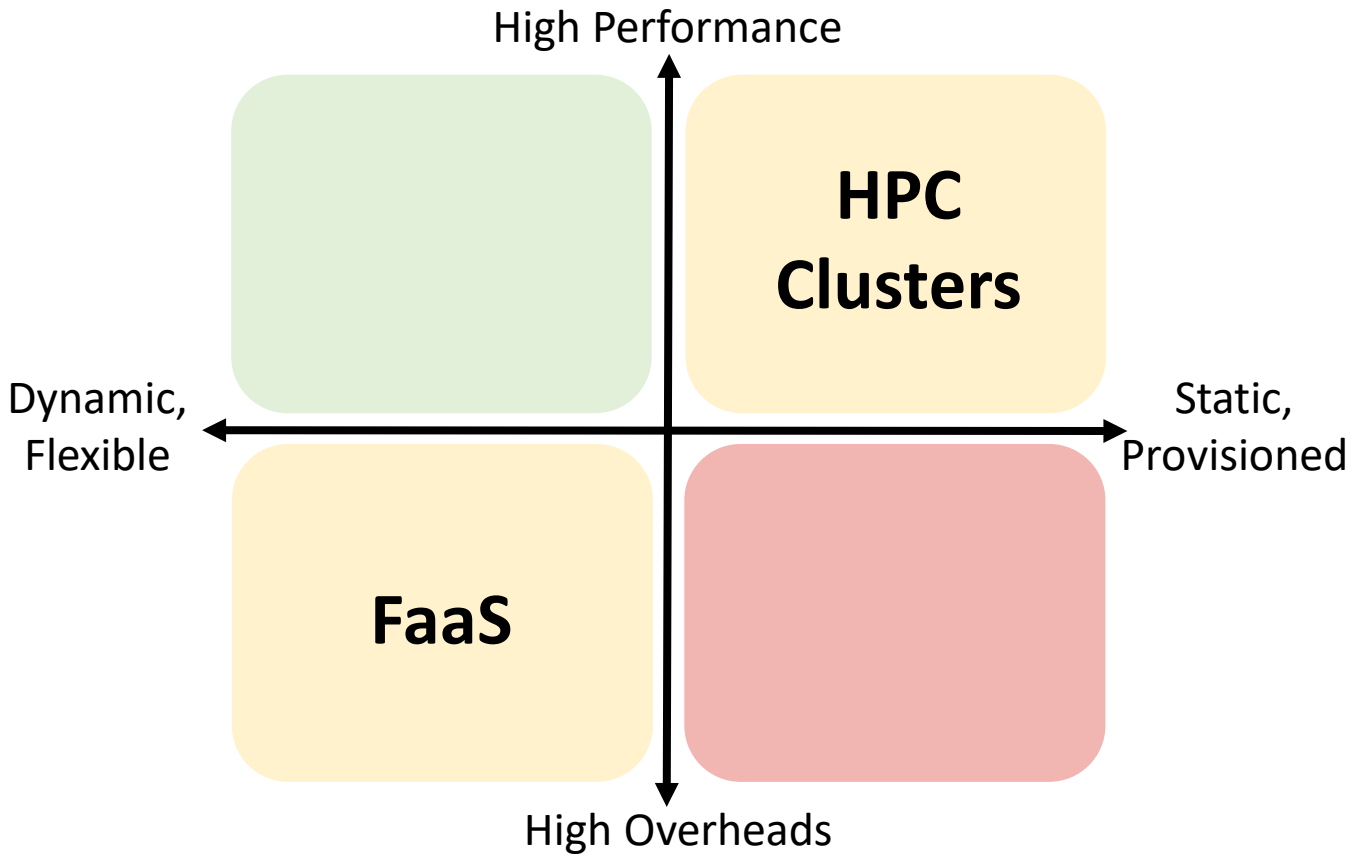

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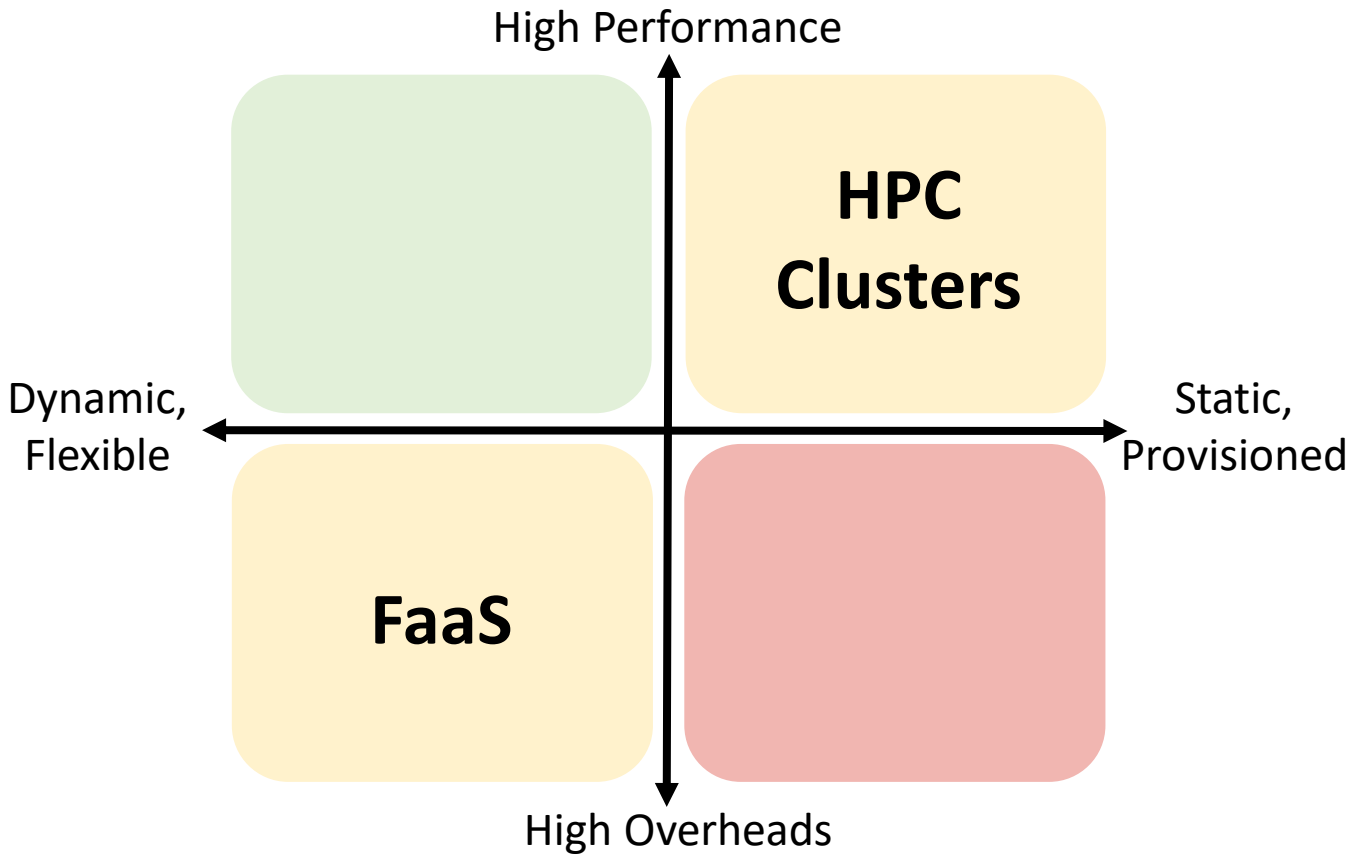


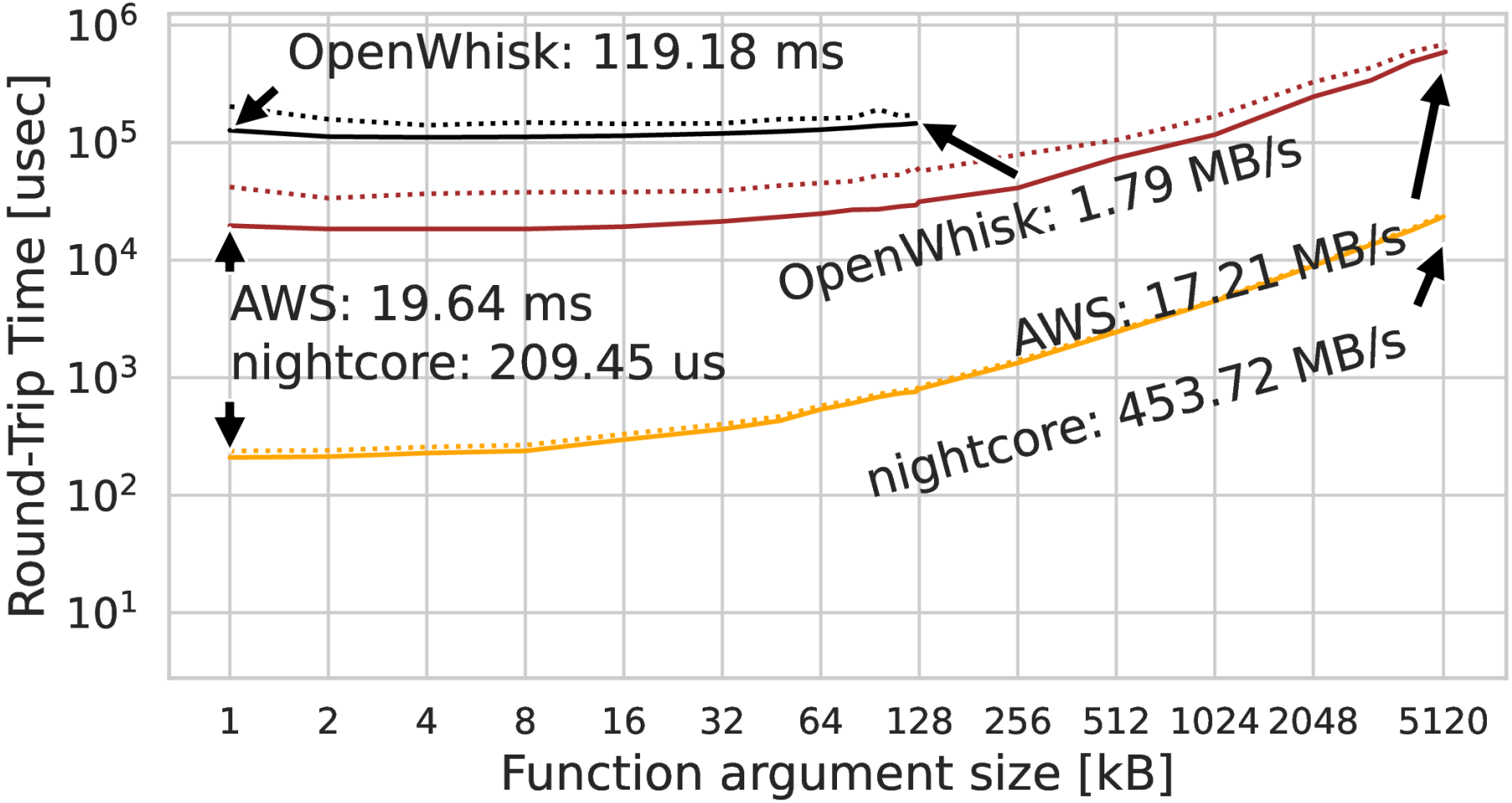
Malleable jobs

Latency-sensitive jobs

Interactive computations

Dynamic parallelism

How fast FaaS invocations are?



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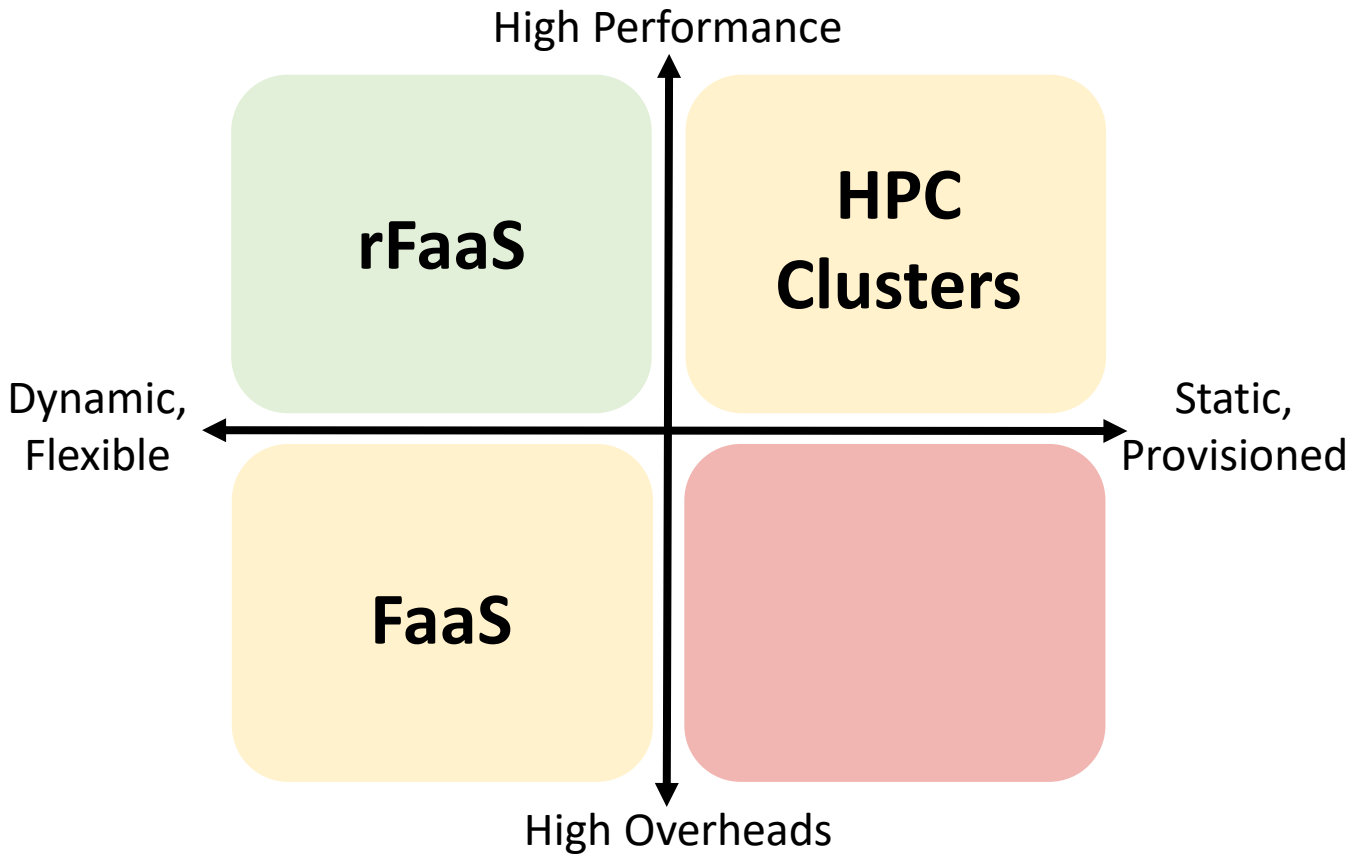

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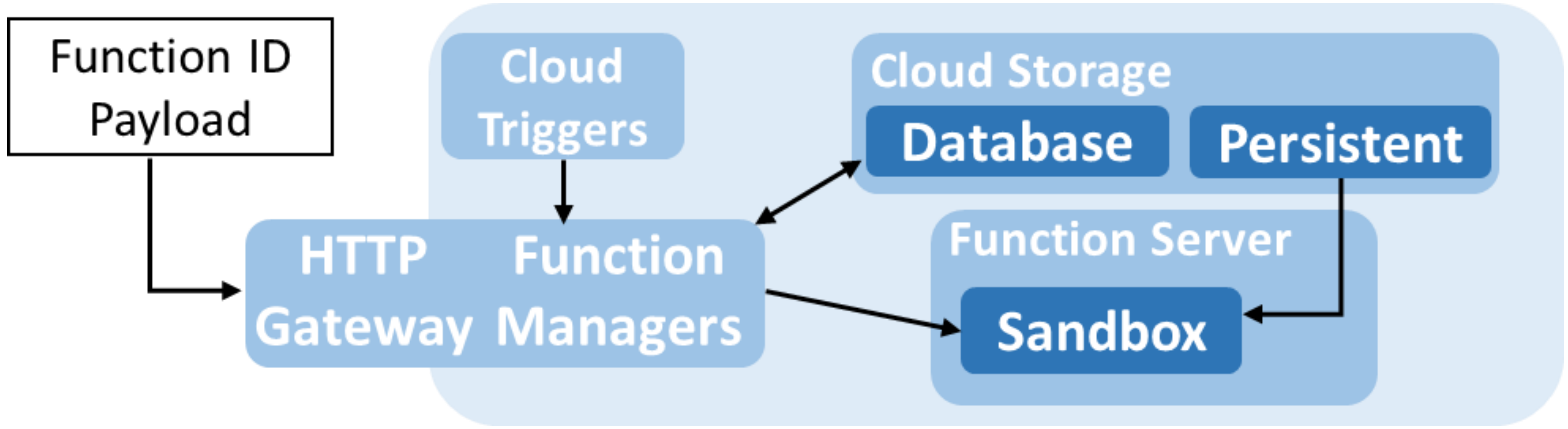
Function-as-a-Service – can it work in HPC?



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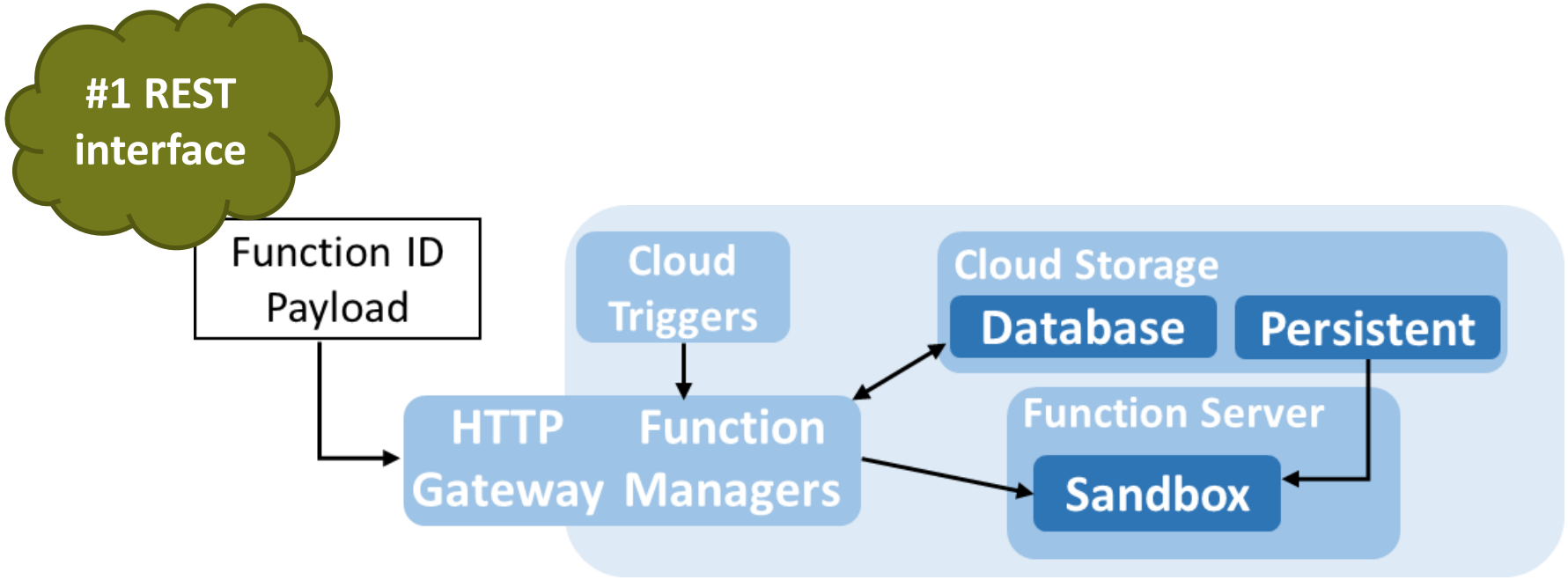

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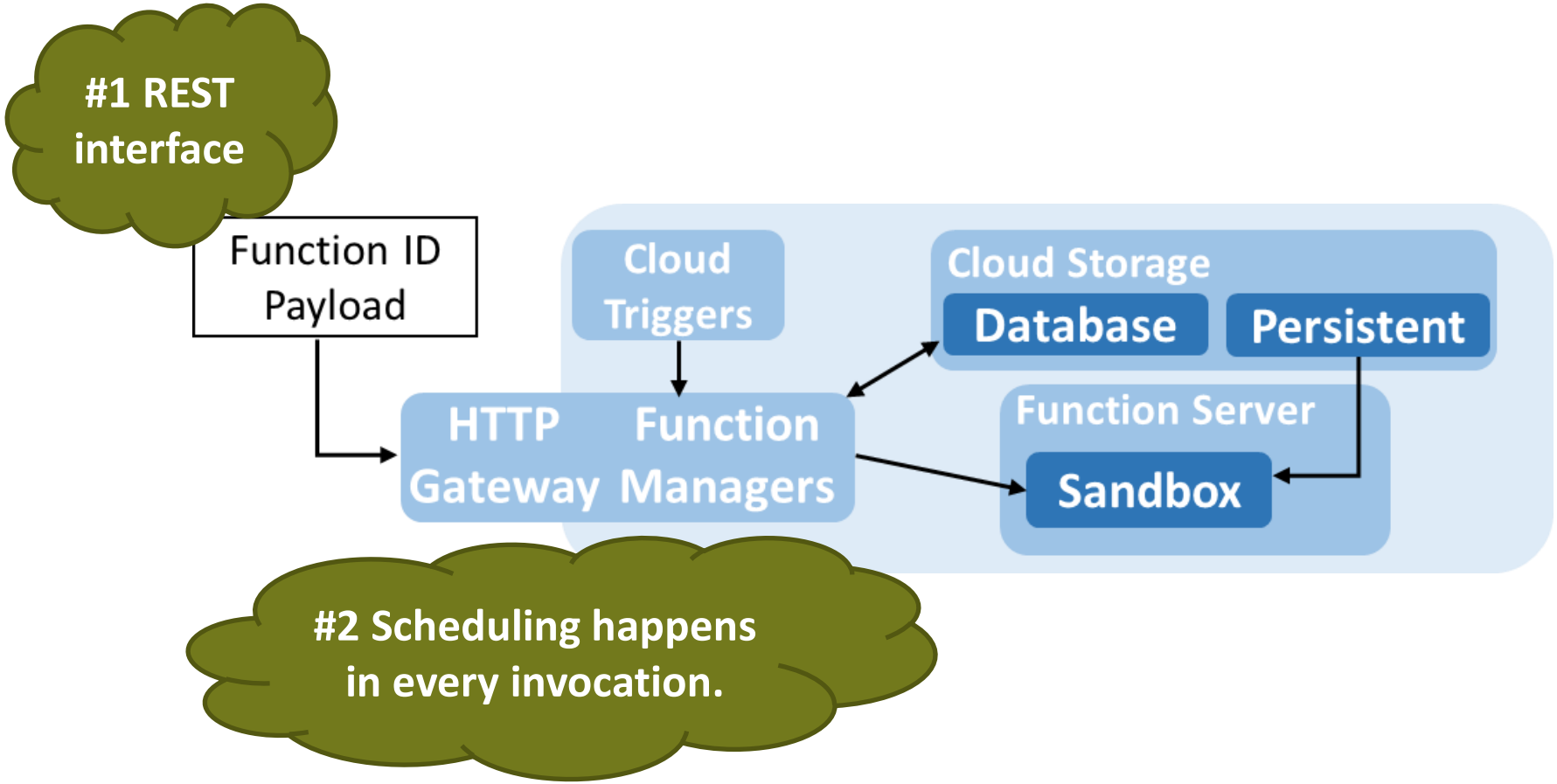

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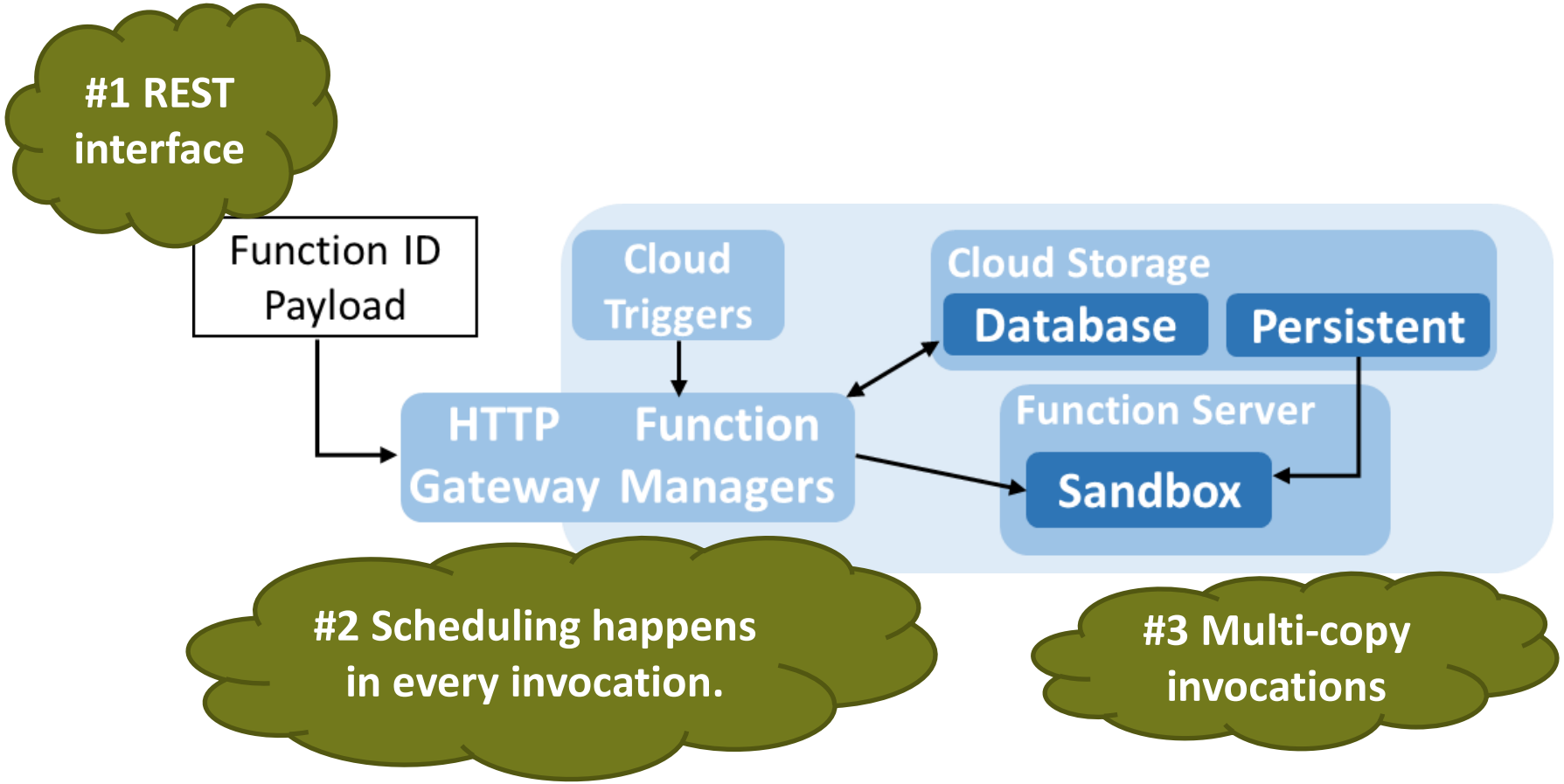

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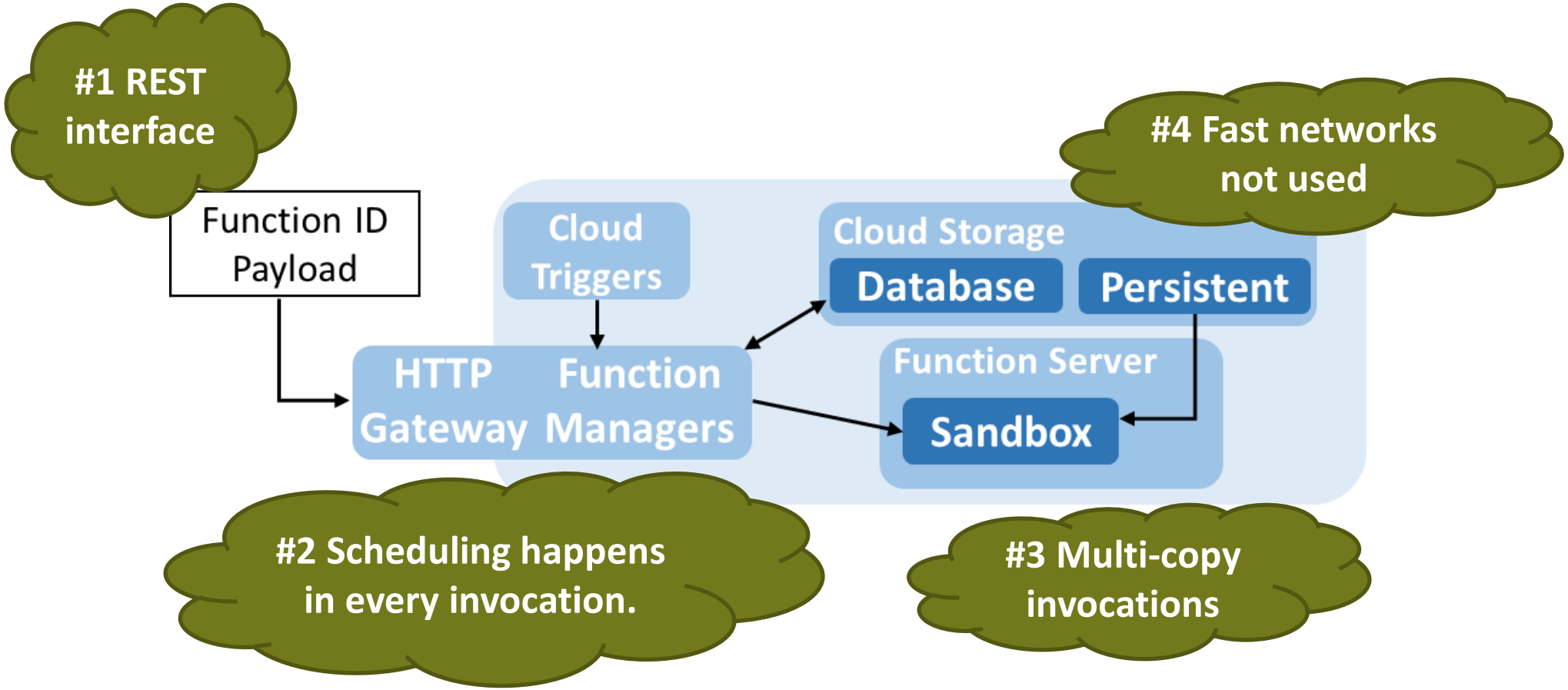

Programming model

```
void compute(int size, options & opts) {
 rfaas::invoker invoker{opts.rnic_device};
 invoker.allocate(opts.lib, opts.size * sizeof(double),
   rfaas::invoker::ALWAYS_WARM_INVOCATIONS);

 auto alloc = invoker.allocator<double>{};
 rfaas::buffer<double> in = alloc.input(2 * size);
 rfaas::buffer<double> out = alloc.output(2 * size);

 auto f = invoker.submit("task", in, size, out);
 local_task(in.data() + size, out.data() + size, size);
 f.get();

 invoker.deallocate();
}
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- Serverless leases

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- RDMA abstractions

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- Serverless leases
- RDMA abstractions
- Zero-copy invocations

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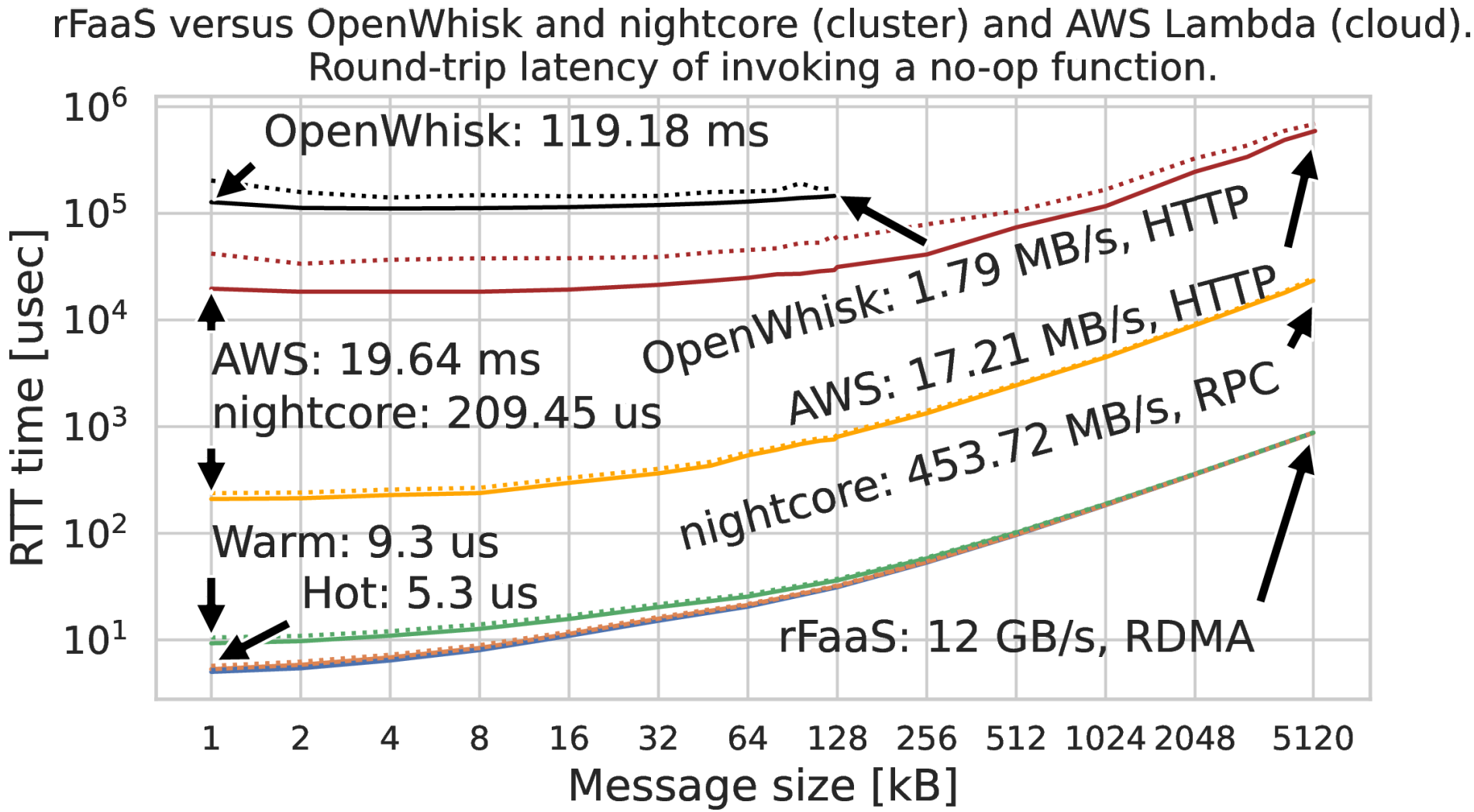

PARSEC: Black-Scholes

- Massively parallel computations
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- 10M equations, 229M input, 38M output.

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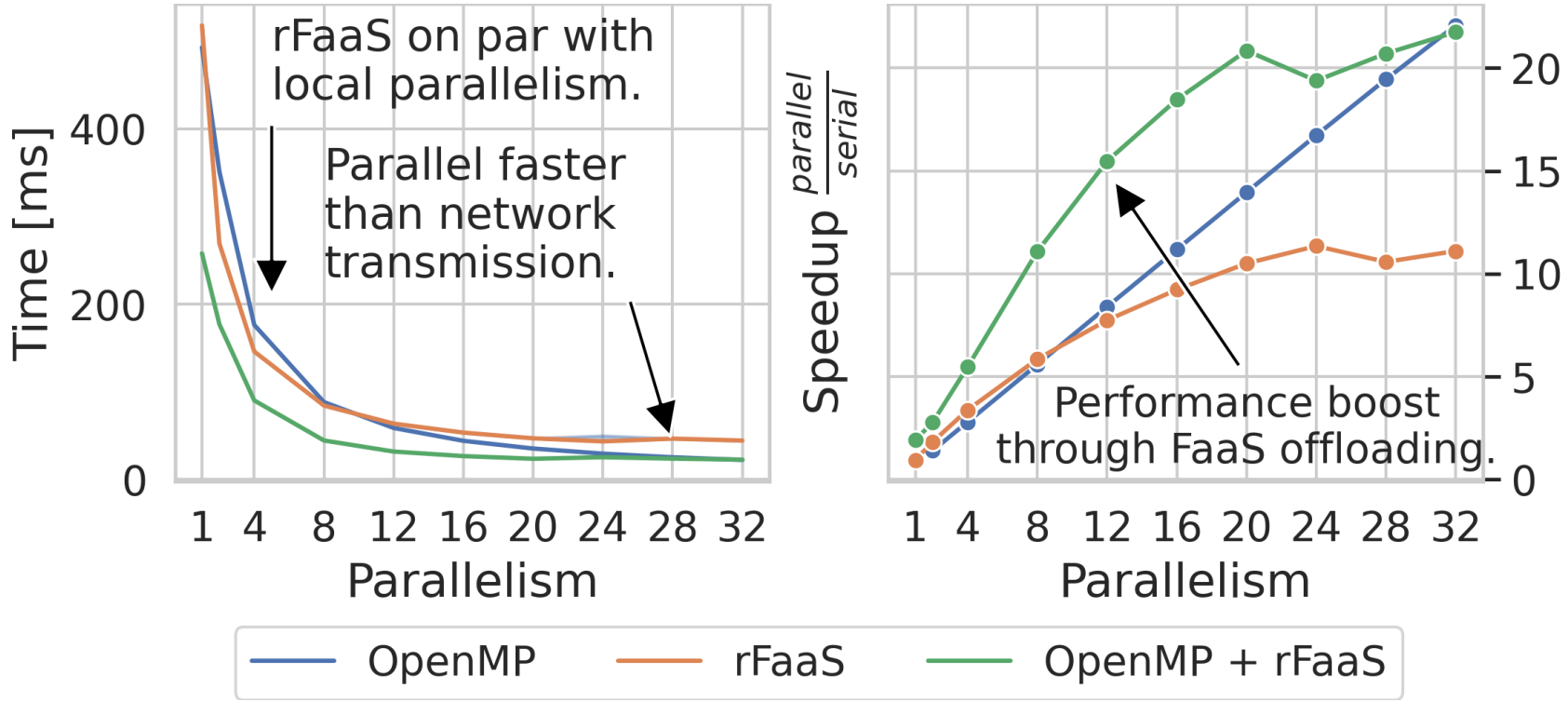

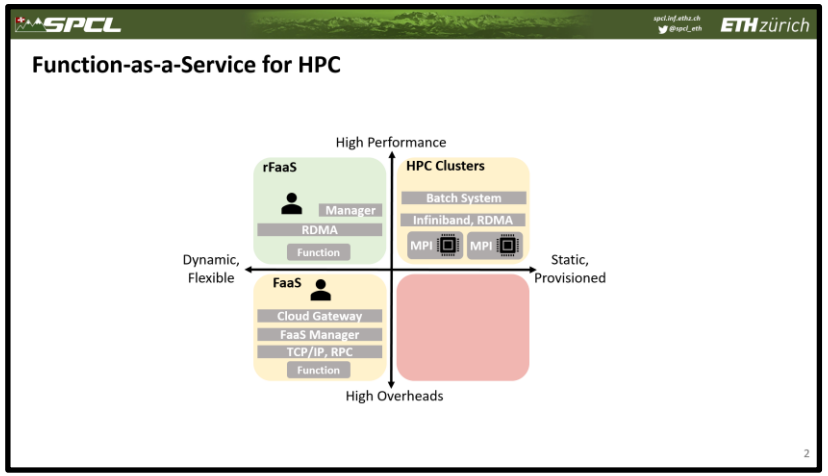

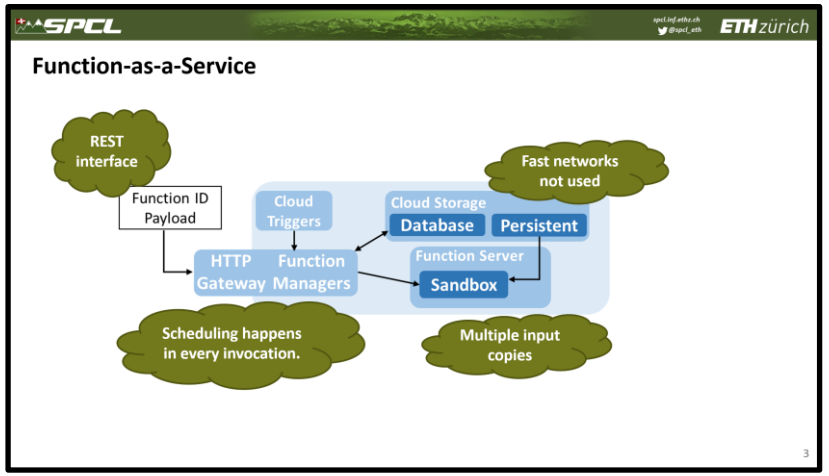

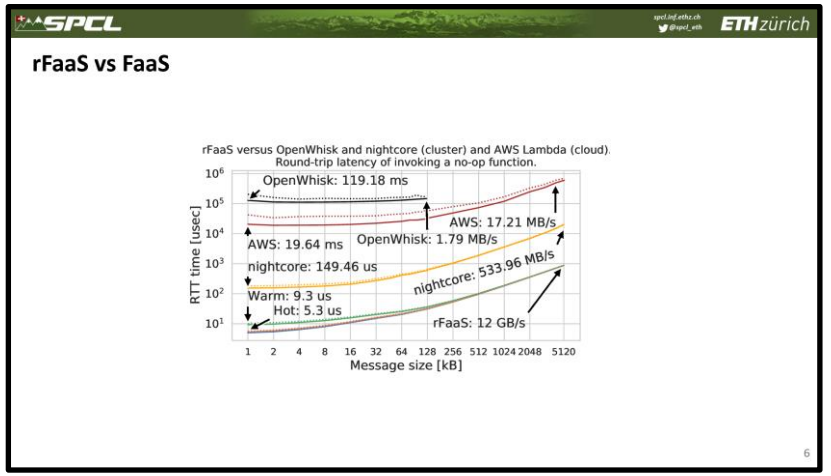

spcl/rFaaS

Paper preprint

https://mcopik.github.io/projects/rfaas/