The SPEC Cloud Group's Research Vision on FaaS and Serverless Architectures

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SPEC RG Cloud - Serverless

Gaining deeper understanding in serverless and FaaS architectures, with a focus on performance (evaluation).
Business Logic vs. Operational Logic

Cloud (Native) Application

Types of logic
- FaaS
- Serverless

Challenges
Business Logic vs. Operational Logic

Logic directly related to use case:
- Fetching a user’s balance
- Generating a daily report
- Calculating portfolio risk

Logic related to QoS:
- Keeping OS up to date
- Serving clients
- Managing DB connections

Types of logic
FaaS
Serverless
Challenges
Joint Problem

Cloud users: want to avoid complex operational logic

Business Logic

Operational Logic

Cloud providers: aim for higher resource utilization

Types of logic
FaaS
Serverless
Challenges
Monoliths

- Difficult to Scale
- Infrequent, complex deployments
- Tightly coupled stack
Microservices (µs)

- scalable
- DevOps practices
- Complexity shifts from application logic to operational logic.

Types of logic

**FaaS**
Serverless

**Challenges**

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<tr>
<th>Operational Logic</th>
<th>µs</th>
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**Infrastructure**

Monoliths  Microservices  FaaS
Function-as-a-Service

• Clear separation of business logic vs. operational logic
• Minimal unit of deployment
• Minimal coupling between each layer

Monoliths                   Microservices

Types of logic
Faas
Serverless
Challenges

TU Delft
Serverless vs. FaaS

**Serverless**
- (Almost) no operational logic
- Event-Driven
- Granular billing

**FaaS**
- A form of *serverless* computing
- User provides a function — deployed and managed by cloud provider
What is next in Serverless?
Further Separation of Business and Operational Logic

• Function Composition
• Serverless workflows
Focus on Cost/Performance

- Non-Functional Requirements (NFRs)

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<td>high</td>
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<td>low</td>
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scheduler $\rightarrow$ $$$

scheduler $\rightarrow$ $
Hybrid Clouds

• Benchmark of FaaS platforms
  • Reliability
  • Latency: cold/hot starts
  • Throughput
  • …
Roadmap

- Extended vision
- Reference Architecture
- Benchmark
HotCloudPerf’18

- “Performance in the cloud datacenter”
- April 9, 2018 in Berlin, Germany
- https://hotcloudperf.spec.org/
- Held in conjunction with ICPE 2018
Interested?

https://research.spec.org/working-groups/rg-cloud.html

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Additional Slides
Ongoing work: reference architecture for FaaS platforms
Why Research Serverless and FaaS?

• Growing industry-driven adoption.
• Current approaches are still very immature and wasteful.
• Far more logic delegation to the infrastructure (us!).
• New technologies, same issues
  • orchestration, versioning, scheduling, testing, monitoring, benchmarking…