Function as a Service (FaaS) - why you should care and what you need to know

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SERVERLESS = FaaS
WHAT SERVERLESS ISN’T
WHAT IF I TOLD YOU THERE IS NO CLOUD

IT'S JUST SOMEONE ELSE'S COMPUTER?
DOGS ARE ALSO GREAT ...
WHAT SERVERLESS IS
SERVERLESS DEFINED

“... is a cloud computing code execution model in which the cloud provider fully manages starting and stopping of a function's container platform as a service (PaaS) as necessary to serve requests, and requests are billed by an abstract measure of the resources required to satisfy the request ...”

- wikipedia
ARCHITECTURAL EVOLUTION

Service

- Autonomous
- Loosely-coupled

Microservice

- Single Purpose
- Stateless
- Independently Scalable
- Automated

Function

- Single Action
- Ephemeral

f( )
ARCHITECTURAL EVOLUTION

Traditional n-tier

- Client
- LB
- Web Server
- App Server
- DB
- LDAP

BaaS / MBaaS

- Mobile App.
- Auth.
- Svc
- Svc
- Svc
- DB

Application logic

"MIDDLE-TIER-LESS"?
"BACK-END-IS-SOMEONE-ELSES-PROBLEM"?
SERVERLESS - KEY CHARACTERISTICS

- Developers focus on code; not operations
- Reactive Architecture (vs. Reactive Programming)
- Typically polyglot (node.js, java, python, etc.)
- Ephemeral - spin up / down on invocation
- Stateless
- Loosely coupled / Task focussed
- Asynchronous - event-triggered
- Typically exposed as a REST API, typically receive JSON events
- Utility billing - pay only for usage - 1/10s granularity
GOOD SERVERLESS USE-CASES

● Processing Web-hooks
● Scheduled tasks (ala cron)
● Data Transformation:
  ○ (Mobile) Image manipulation (compression, conversion, etc)
  ○ Voice packet to JSON transformation (eg. Alexa, Cortana)
  ○ (Mobile) Video Analysis (Frame-grabbing)
  ○ PDF Generation
● ChatBots
BAD SERVERLESS USE-CASES

● Any long-running process
  ○ Simulating particle interactions
  ○ Two dimensional, single-precision, complex FFT
  ○ Monte Carlo Simulations
  ○ Risk Analysis
  ○ Etc.
● Any task that requires large amounts of memory
● Any blocking process
SERVERLESS - THE GOOD

- High concurrency
- In-place updates / replacement
- Identify dead code
- High utilization
- Scalable
- Granular pricing
- App. / Infra. Separation
- Polyglot
- Security - small attack area
- Singular focus
- Strong motivation to optimize, easier to prioritize

* I don’t drink light beer
SERVERLESS - THE BAD

- It’s different than what you’re used to
- You will likely have to live without your favourite framework or library
- Increased latency (vs long-lived server model or local function call)
- Large variance in latency
- Very complex at scale
- Stateless and ephemeral
- Little time for code optimization
- Cloud Provider Resource Limits
- Pricing can be complex - look out for extras
SERVERLESS - THE UGLY

- Vendor / Service Provider Control
- Debugging
  - Your usual tricks won’t work
- Integration testing
- It’s very new
  - stack overflow won’t help you
  - Dearth of skills / experience
  - Patterns are still emerging
  - No / few books
- No / few tools
AMAZON LAMBDA

- GA - Apr. 2015
- License - proprietary
- Pricing: $0.20 / 1 million requests (first 1 million requests per month are free)
- Polyglot: Node.js, Java
- Security: AWS AIM
- Event Sources: AWS resources, HTTP
- Lambda@Edge

AWS Lambda

https://aws.amazon.com/lambda/
MICROSOFT AZURE FUNCTIONS

- GA - Nov. 2016
- License - proprietary
- Security - OAuth
- Polyglot - C#, F#, Node.js, Python or PHP.
- Event Sources - Azure Services, Timers, WebHooks, HTTP Req.
- Pricing - $0.000016/GB-s (1 million requests and 400,000 GB-s per month free)
- 99.95% availability
IBM BLUEMIX OPENWHISK

- [http://openwhisk.org/](http://openwhisk.org/)
- GA: Feb 2016
- License: ASL v2
- Polyglot: Node.js, Swift
- Event Sources: BlueMix services, Watson, other SaaS
- Pricing: $0.000017 GB-s
- Event Sequencing, Templates
CLOUD FUNCTIONS BETA
A serverless environment to build and connect cloud services

- License - proprietary
- GA: Feb. 2016 (Beta)
- PolyGlot: Node.js only
- Event Sources: HTTP, FireBase, Stackdriver logging, etc.
- Pricing: $0.40 / invocation (first 2 million / month free) - CPU, memory, disk, network extra

https://cloud.google.com/functions/
FUNKTION

open source event based lambda programming for kubernetes

fungtion.fabric8.io

- License : ASL v2
- GA : June 2016 (project)
- PolyGlot : java, groovy, node.js, kotlin
- Orchestration / EIPs
- Tightly integrated with Kubernetes / OpenShift
- 200+ event sources (messaging, protocols, databases, social media services and cloud functions)
- Vert.x support coming
- Multiple implementation options
- Pricing TBD
- A framework - not a service
- License: MIT
- Node.js based
- Support for AWS Lambda, Apache OpenWhisk, Microsoft Azure Functions
- Provider independent
- Packaging, deployment, project structure, automation
- CLI and yaml base UI (for now)

Build auto-scaling, pay-per-execution, event-driven apps on AWS Lambda

https://serverless.com
https://github.com/serverless
OTHER SERVERLESS PROJECTS / SERVICES

APEX | SERVERLESS INFRASTRUCTURE

http://funcatron.org
WHERE THINGS ARE HEADING

- Event chaining, pipelines
- Orchestration
- Execution optimization
- Better developer experience
  - Templating / generators for connecting event sources
  - Broader language support
  - Instant deployment from a (Web) IDE
  - CI/CD
- Better debugging, monitoring, diagnostics
SUMMARY

- Stateless, ephemeral, event-driven, task-focused
- Utility billing
- Likely augment existing architectures, not replace them
- Think about the code; not infrastructure / ops.
- Still emerging (AWS Lambda - only 3 years old)
- Predominantly experimental, non-critical use-cases
- Red Hat’s Plans:
  - Building on Kubernetes / Linux Containers (OpenShift)
  - Investing in Funktion
  - Also looking at other OSS projects
  - Serverless Dev Preview availability in OpenShift this year
QUESTIONS ?
THANK YOU

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