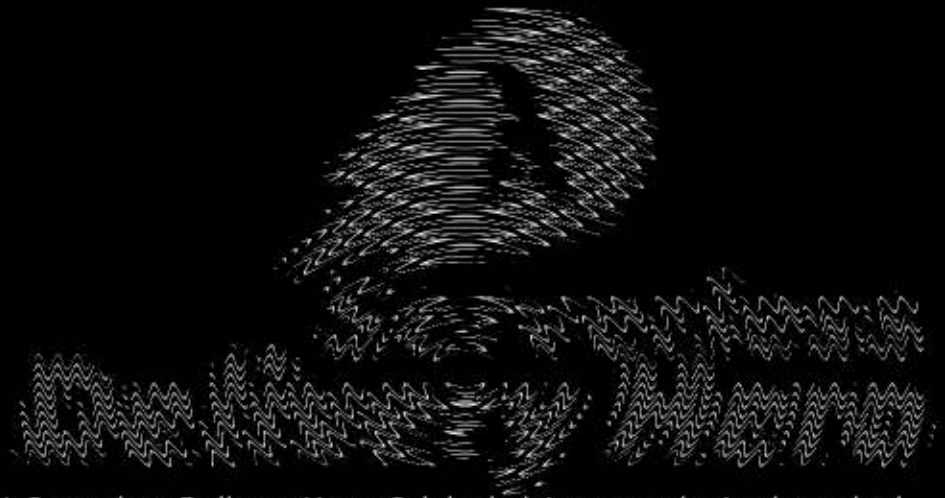
Service Engineering Research Area
ICCLAB SPLAB

Zurich University of Applied Sciences
zh aw School of Engineering
InIT Institute of Applied Information Technology



* Serverless Delivery Hero. Original picture may be trademarked.

Josef Spillner <josef.spillner@zhaw.ch>
Service Prototyping Lab (blog.zhaw.ch/icclab)

Dec 21, 2017 | Vienna Software Seminar

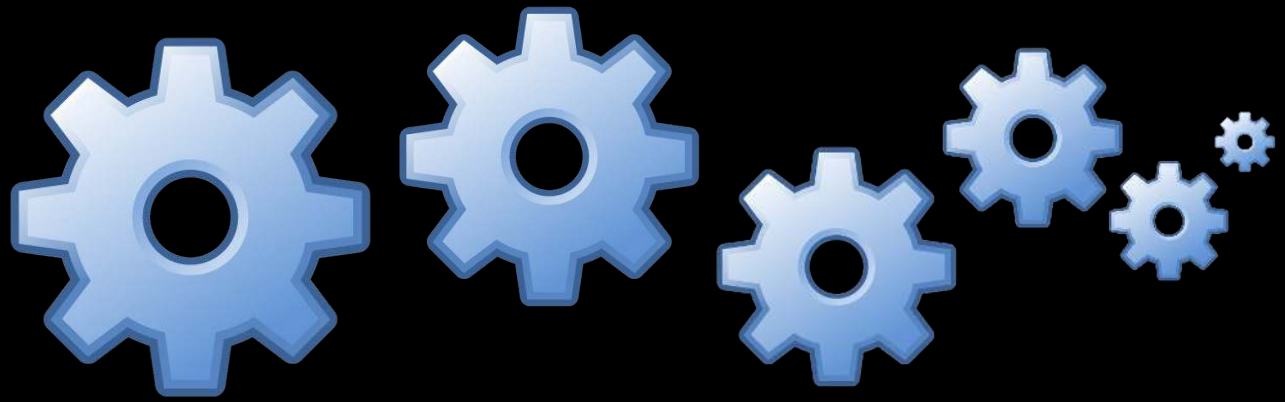
Miniaturisation

meetup.com/FloridaGardeners

japanese.alibaba.com

TINY

ToCS Vol.4



Prospects of Serverless Applications

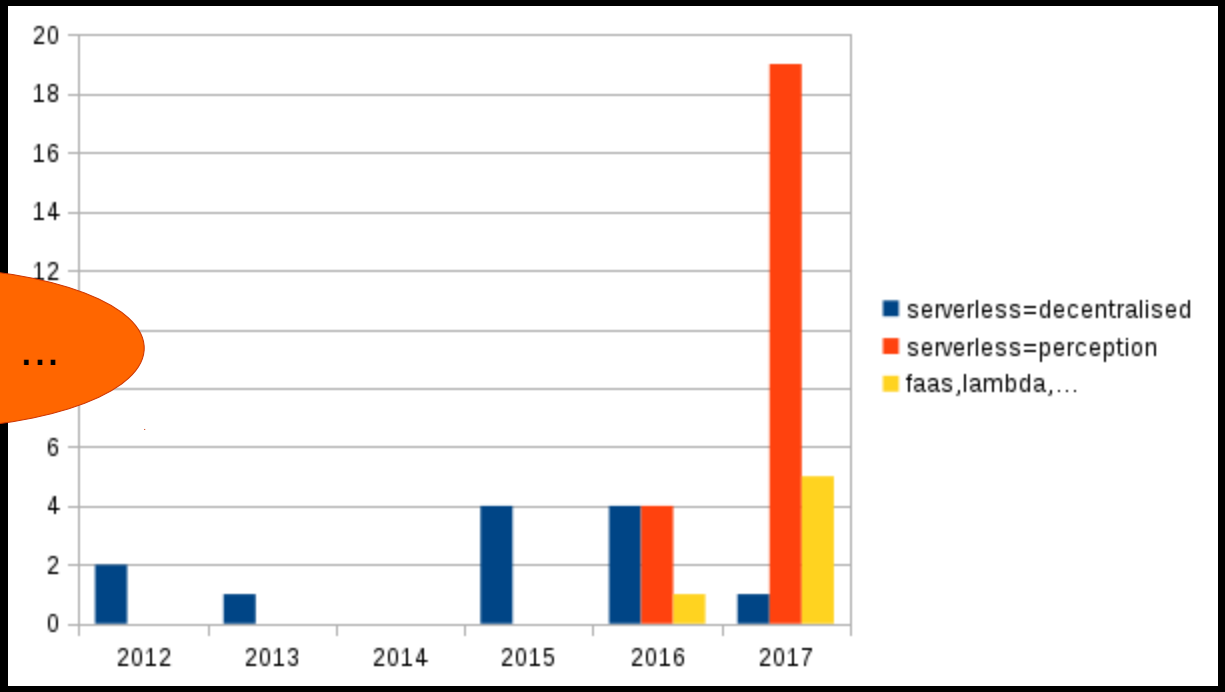
Industry: DEPOT meta-model

- Deployment model → control plane APIs, gateways, limits
- Execution model → isolation, state, memory/time limits
- Programming model → function signatures, implementations
- Orchestration model → Step Functions, Composer...
- Tariff model → pay-per-call, -per-load, ...

Academia:

catching up...

Example → ...



Our Function-as-a-Service Research

Academia claims

Global claims

1st control plane analysis

1st HPC/SC analysis

1st function in production at uni

1st tutorial at conference

1st code transformation tools

1st function marketplace

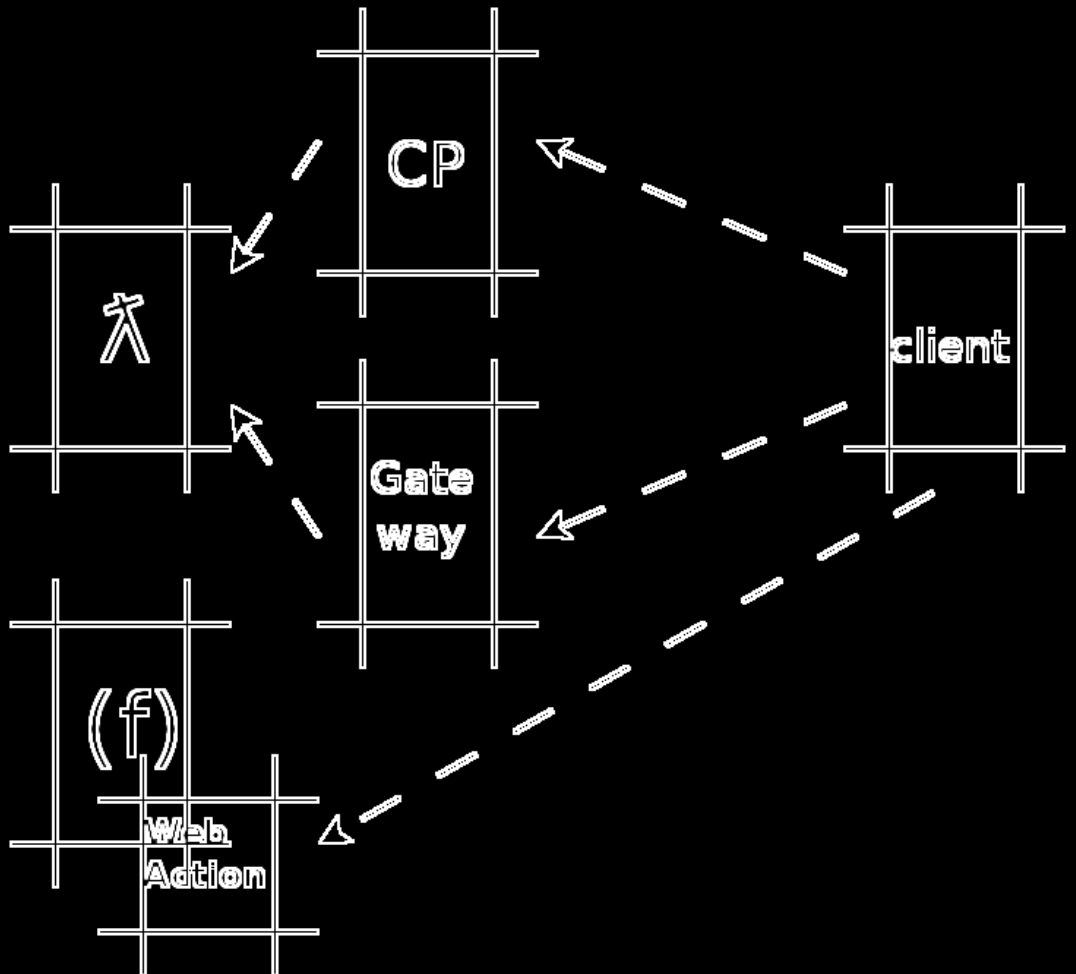
1st multi-provider migration

2nd runtime
(after OpenLambda †)

Function-as-a-Service Delivery

But: What about ~~software~~ service delivery?

- sensu stricto: serving the clients
  - according to message exchange patterns
- sensu lato: entire end-to-end pipeline from idea to dev to ops to usage



Function-as-a-Service Delivery

Mostly solved problems

- Deployment via SLFW, Composeless or provider-specific tools (awscli, wsk, gcloud, ...)
- Aggregate-monitored execution

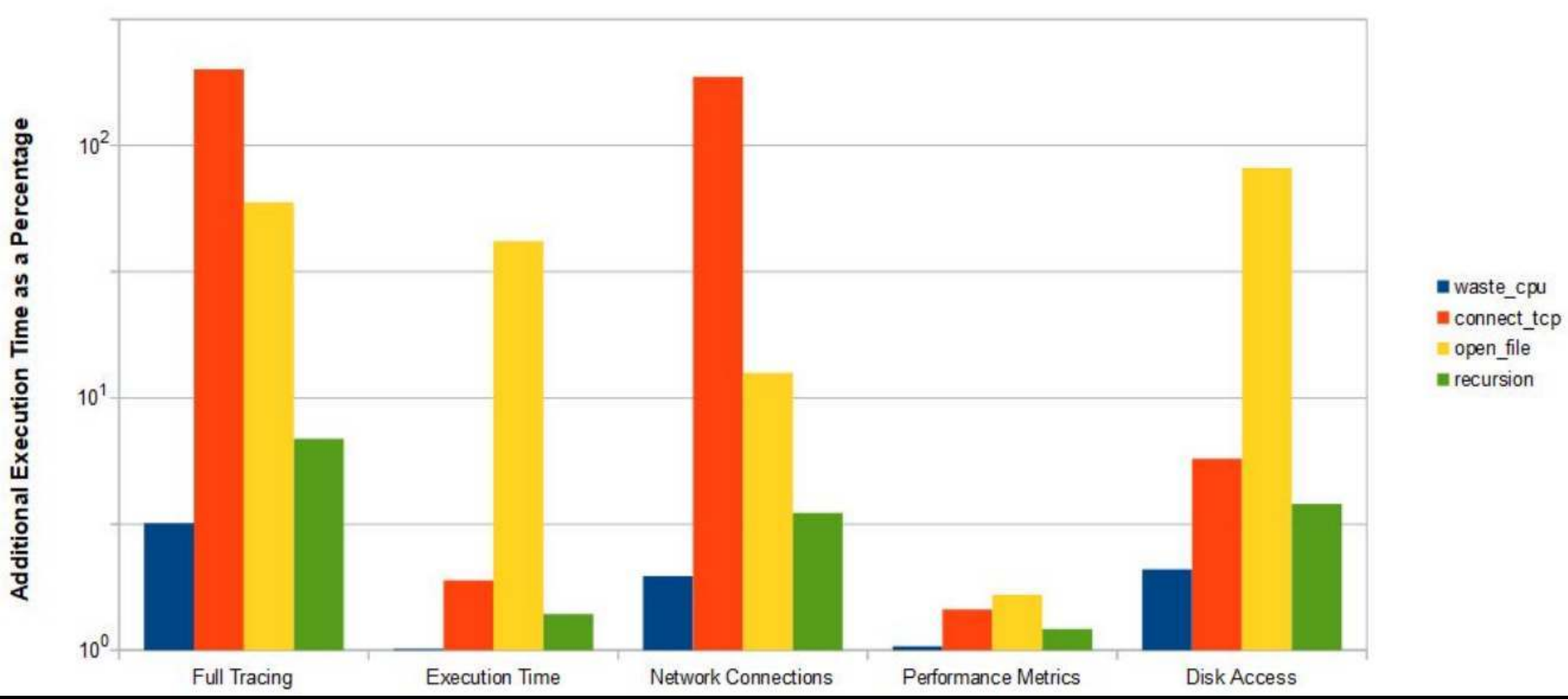
Open issues

- Real-time insight
- Debugging support
  - Google Stackdriver? AWS X-Ray? RLY?
- Automated code transformation and fitting

Proposal →
“DevOps-style Tracing, Profiling and Autotuning of Cloud Functions“

Tracing

Using Snafu‘s python3-tracing executor *

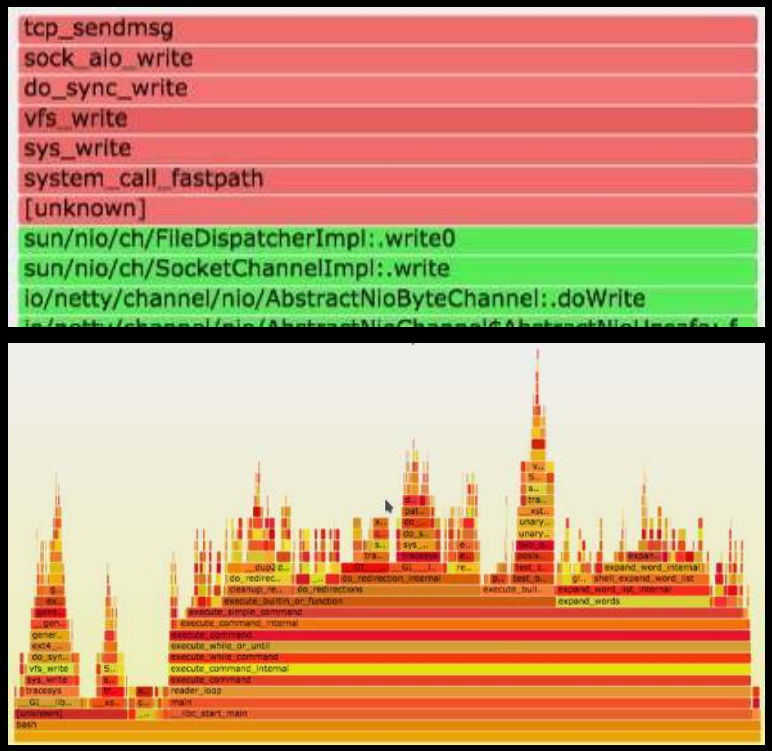


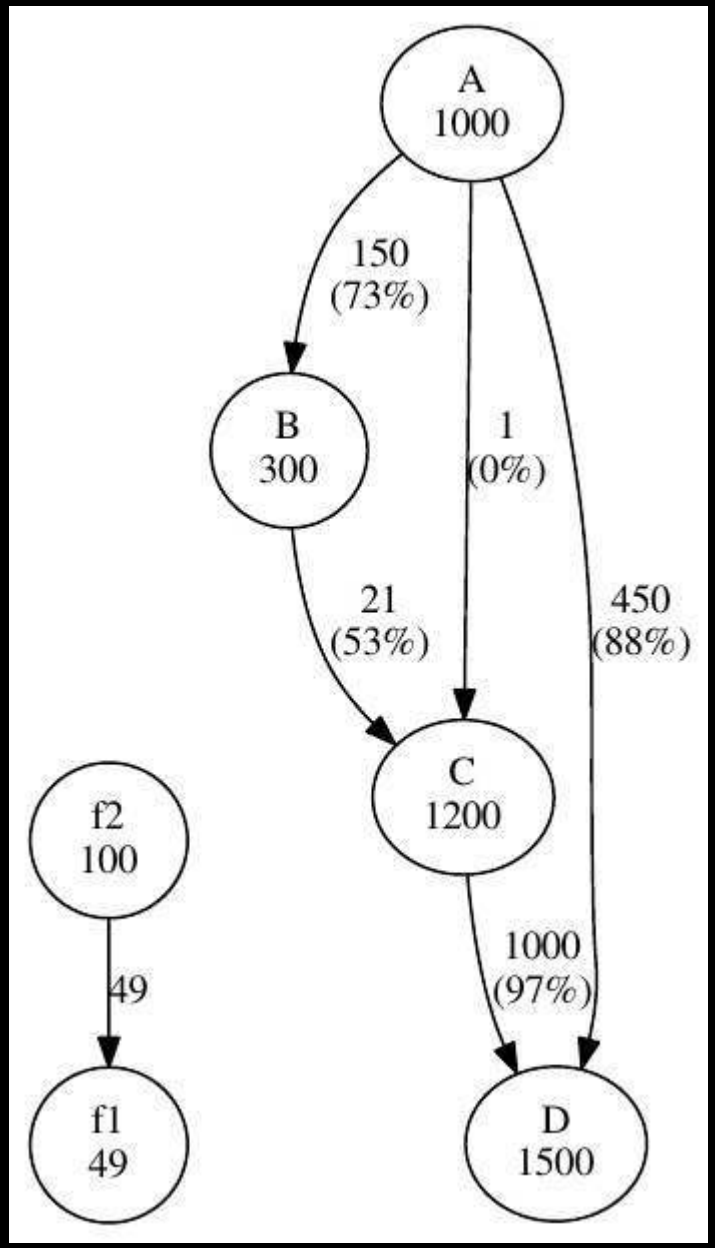
* contributed by L. Fernández-Garcés & Bernard Jollans @ KTH

Profiling

Application topology and behaviour
- precise, via execution traces
- heuristic, via e.g. Peddycord‘s algorithm

Insights through visualisation
- flame graphs (B. Gregg USENIX ‘13/‘17)





Autotuning

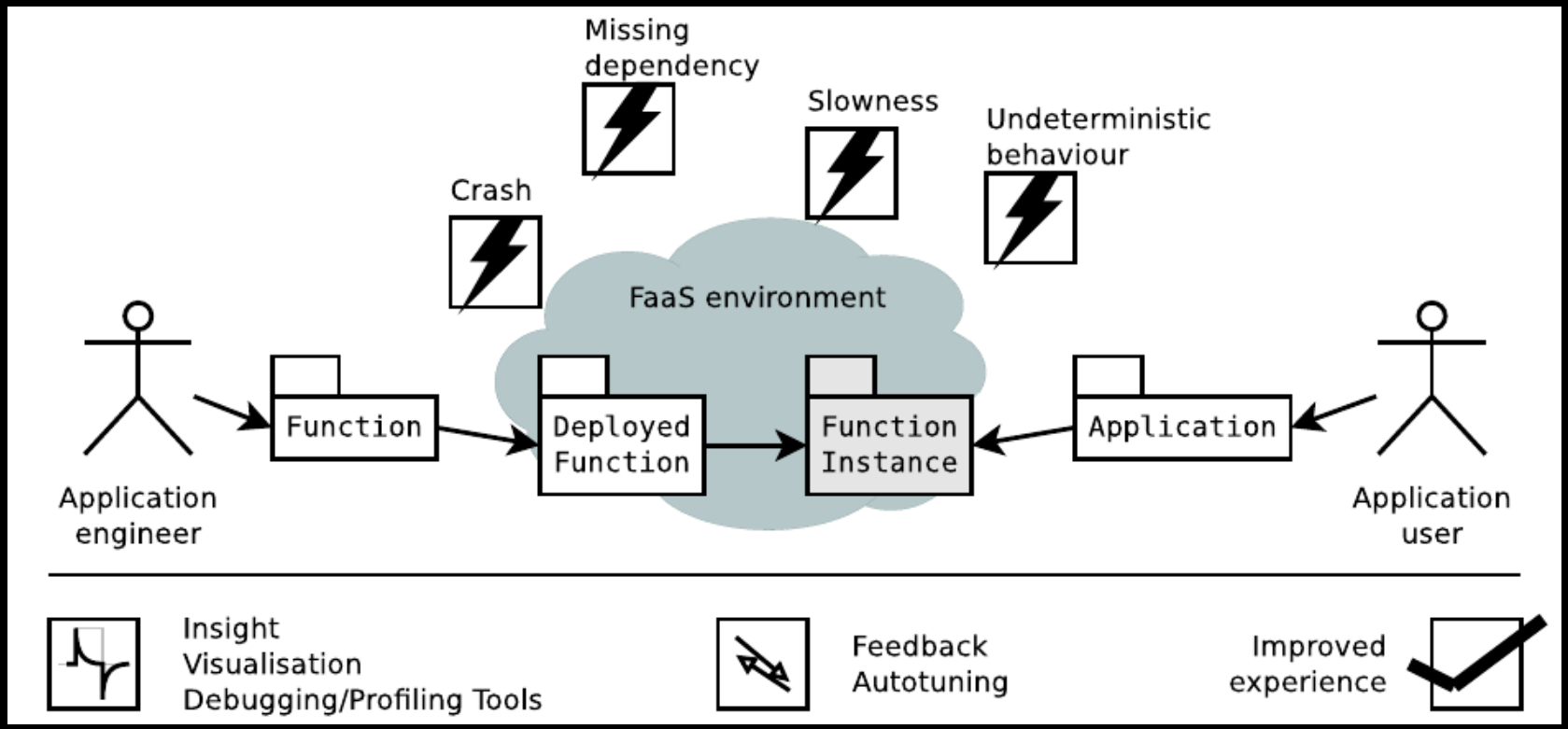
Computers are dumb but fast + programmable!

Rules (disclaimer: not thought through)

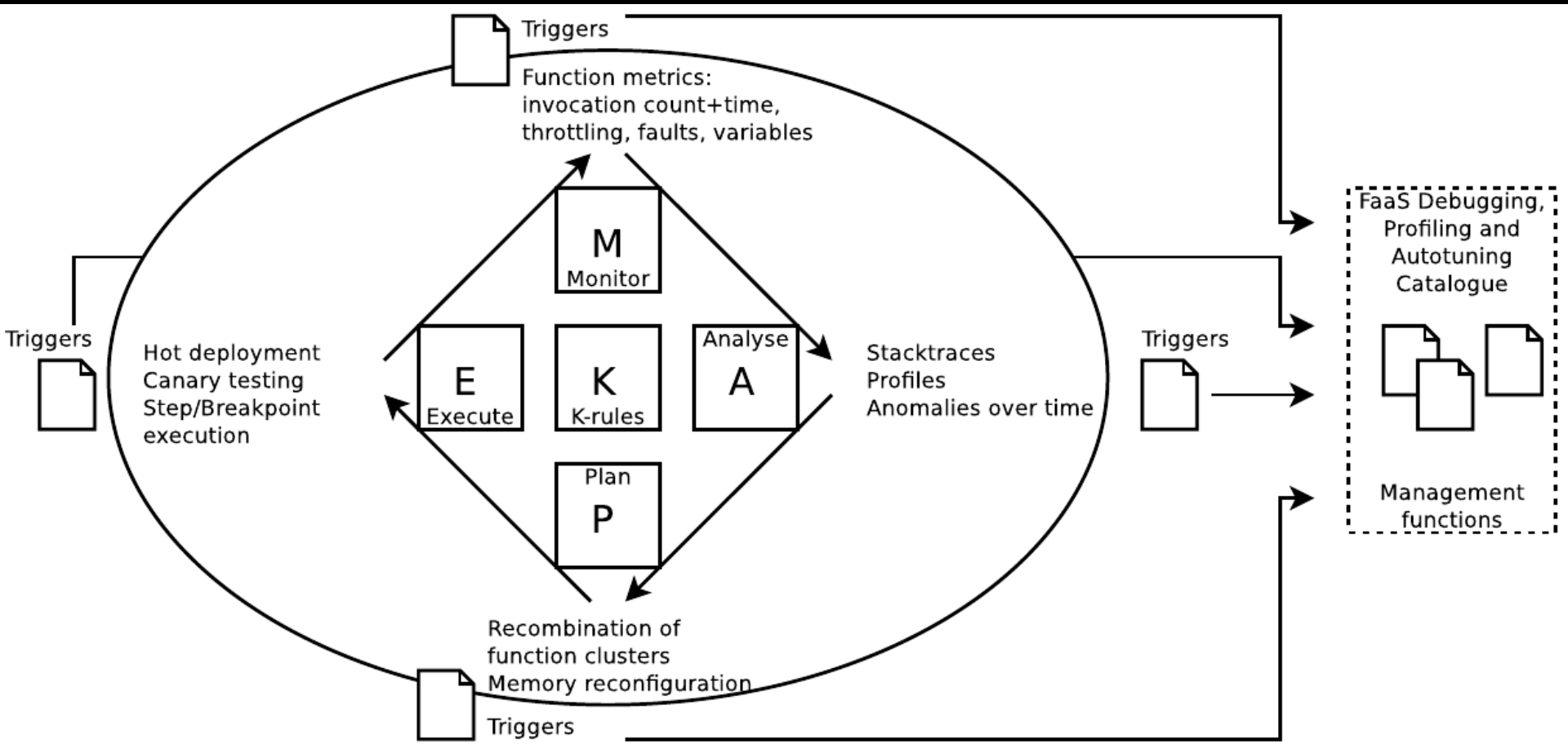
- timeout reached → redeploy with different decomposition granularity, use worm functions (state handover), [when applicable] redeploy with more memory
- out of memory → implement map-reduce schemes, recluster local private functions, redeploy with more memory
- data latency issues → use cache, narrow gap (edge, copy)
- dependency service unavailable → notify

Automation + constructive developer notification

DevOps Perspective



DevOps Perspective



Rapid Service Prototyping

1) Programming
    using FaaSification (decomposition): shallow, medium, deep

2) Provisioning
    through commercial clouds
        big 4
    through community clouds
        GuiFi
    through ad-hoc networks (device, meshes)

3) Autotuning

4) Service Delivery

5) ...

6) Profit!

Closing

Cloud functions are
- the sincerest form of microservices (“stateless nanoservices“)
- great for education, link to programming
- practically free for small to medium usage (but you pay for state)

Negatives
- manual programming and debugging still tedious at scale
- rapid service prototyping still cumbersome

Upcoming Events:

Feb 2018: Serverless @ Swiss Python Summit
May 2018: Serverless @ DevOpsDays Zurich-Winterthur (CfP still open)
Dec 2018: Serverless symposium @ 11th IEEE/ACM UCC/BDCAT Zurich

https://blog.zhaw.ch/icclab/tag/faas/