Apache OpenWhisk 101
A Cloud-Native, Open Source, Serverless Platform Incubating at the ASF

Ying Chun Guo
guoyingc@cn.ibm.com
WeChat ID: daisy-ycguo
Agenda

- What is serverless computing?
- What is Apache OpenWhisk?
- Apache OpenWhisk programming model
- Apache OpenWhisk community
What is serverless computing?
Serverless developers focus more on code, less on infrastructure.
What is serverless computing?

Serverless = Functions as a Service

• Functions-as-a-Service (FaaS)
  – Small units of code are executed as needed as discrete actions, scaling without the need to manage servers or any other underlying infrastructure.
  – Event-driven computing. Functions that are triggered by events or HTTP requests.

• Backend-as-a-Service (BaaS)
  – third-party API-based services replace core subsets of functionality in an application
  – Those APIs are provided as a service that auto-scales and operates transparently
Benefits of serverless

- **Zero server ops**
  - No provisioning, updating, and managing server infrastructure.
  - Flexible Scalability

- **No compute cost when idle**
Emerging workloads are a good fit for event-driven programming

- Execute logic in response to database change
- Perform analytics on sensor input messages
- Provide cognitive computing via chatbots
- Schedule tasks performed for a short time
- Invoke autoscaled APIs and mobile backends
What is Apache OpenWhisk?
Apache OpenWhisk is …

A serverless, open source cloud platform that executes functions in response to events at any scale.

Apache OpenWhisk offers:

- Apache Software Foundation (ASF)
  - True, community-driven open source (Apache 2 License)
- Proven on IBM Cloud
  - Exact, same code in open source
Developers work with triggers, actions, rules, and packages.

Data sources define events they emit as **Triggers**.

Developers map **Actions** to **Triggers** via **Rules**.

**Packages** provide integration with external services.
Built on solid open source foundations

Apache Incubator

Apache OpenWhisk™
Has many deployment options

**Local Development**
- OS X
- Ubuntu
- Windows

**Distributed**
- Kubernetes
- Mesos
- Docker
- Compose

All component services are built into Docker containers
Getting Started with IBM Cloud Functions

IBM Cloud Functions (based on Apache OpenWhisk) is a Function-as-a-Service (FaaS) platform which executes functions in response to incoming events and costs nothing when not in use. Learn More

What's New:
- Updated Action runtimes: NodeJS 8, Swift 4
- Get started quickly with Templates: Try it now
- New logging service integration (see the Logs link in the left navigation)
- Compliance: New ISO certifications (ISO 27001, ISO 27017, ISO 27018)
- Available in new datacenter: Frankfurt, Germany (see the Region selector)
- Increased maximum execution time for Actions: 10 minutes

https://console.bluemix.net/openwhisk/
Apache OpenWhisk programming model
Event driven programming model

Packages provide integration with external event sources

Packages define events they emit as Triggers

Developers map Actions to Triggers via Rules

Action (function)

Rule (map)

Trigger (event)

Data sources

Results
Action

**Action**: A stateless, relatively short-running function invoked as an event handler.

**Goal**: An Action’s run time is measured in milliseconds, ... well under the defaulted maximum of 5 minutes.
Trigger

The named channel for a **class of events**. Triggers represent the events (and their data) themselves without any concept of how they were generated.

**Note:** In a pub-sub system, a trigger could be viewed as a message topic.
Rule:

A mapping from a **Trigger** to an **Action** which may contain simple conditional logic.

**Note:** OpenWhisk evaluates incoming events (that belong to a **Trigger**) and invokes the assigned **Action** (event handler) associated by the **Rule**.
Package

**Package:**

*A named, shared collection of (Namespaced) Actions, Triggers, Feeds, Rules, ...*

---

**Note:** Designed as a first-class entity in the OpenWhisk Model, being used by new Whisk Deploy tool (*“wskdeploy”*) for 1-click Deployments
Event-Trigger-Rule-Action Processing

**OpenWhisk Platform**

- **Actions & Action Sequences**
  - Action NodeJS
  - Action 1 NodeJS
  - Action 2 Python
  - Action 3 Swift
  - Action 1 Swift
  - Action 2 Docker

**Sample Event sources**
- Data Stores
- Social Media
- Instrumented Machines

**External Service Eco-System**
- 3rd Party or Self-Enabled
  - REST APIs
  - Message Queues
  - Events
  - Feeds

**Packages**
- Package Feed
- Package Feed
- Package Feed

**Triggers / Rules**
- Rule
- Rule
- Rule

**Event sources**
- Sample Event sources

**Processing**
- OpenWhisk Platform

**Social Media**
- Icon set: YouTube, Twitter, Facebook, LinkedIn, Snapchat

**Instrumented Machines**
- Icon set: Truck, Clock, Heart, Map Pin, Euro Sign, Globe, Car, Face Mask

**Actions & Action Sequences**
- Action NodeJS
- Action 1 NodeJS
- Action 2 Python
- Action 3 Swift
- Action 1 Swift
- Action 2 Docker
Demo1: Your first action, trigger and rule

function main(params) {
  var date = new Date();
  console.log("Invoked at: " + date.toLocaleString());
  return { message: "Invoked at: " + date.toLocaleString() }
}

$ wsk activation poll

$ wsk action create handler handler.js

$ wsk action invoke --blocking handler

$ wsk trigger create every-20-seconds \ 
  --feed /whisk.system/alarms/alarm \ 
  --param cron "/20 * * * *" \ 
  --param maxTriggers 15

$ wsk rule create \ 
  invoke-periodically \ 
  every-20-seconds \ 
  handler

https://github.com/IBM/ibm-cloud-functions-action-trigger-rule
Demo2: Database change triggered action

https://github.com/IBM/ibm-cloud-functions-cloudant-trigger
Demo3: HTTP API request triggered action

https://github.com/IBM/ibm-cloud-functions-rest-api-trigger
Apache OpenWhisk community
The Apache OpenWhisk community is growing
Apache OpenWhisk ecosystem

**Tooling**
- wskdeploy
  (deployer + spec.)
- debugger
- devtools
  (Compose, Kube)
- playground
  (XCode Extension)
- xcode (x3)
- vscode

**CLI**
- wsk ("wsk")

**Command Line Interface**
- wskdeploy
- (deployer + spec.)
- debugger
- devtools
  (Compose, Kube)
- playground
  (XCode Extension)
- xcode (x3)
- vscode

**API Gateway**
- OpenWhisk “Core”
  - Router
  - Controller
  - Message Bus
  - Invokers
  - Key-Value Store
  - Document Store

**OpenWhisk “Catalog”**
- OpenWhisk
  “Core”
- OpenWhisk
  “Catalog”

**Packages**
- Alarms
- Kafka
- Cloudant
- Push Notifications
- JIRA
- RSS

**Application “Samples”**
- slackbot
- slackinvite
- GitHubSlackBot
- matos

**External Resources**
- openwhisk.github.io (openwhisk.org)

**Workshop, Tutorial**
- "Template"
OpenWhisk Project Vital Statistics

• GitHub ("Core" Repo.)
  – **Stars**
    • **3285**: [https://github.com/apache/incubator-openwhisk/stargazers](https://github.com/apache/incubator-openwhisk/stargazers)
    • and growing ~10-20 per week on average
  – **Stats**
    • **626 forks** [https://github.com/apache/incubator-openwhisk/network](https://github.com/apache/incubator-openwhisk/network)
    • **Contribution Graphs**: [https://github.com/apache/incubator-openwhisk/graphs/contributors](https://github.com/apache/incubator-openwhisk/graphs/contributors)
    • **120+ Contributors** *(all repos.)*
  – Working on the first release 0.9 in Apache
Get started

Delivered as
Open source via Apache openwhisk.org

Managed OpenWhisk with IBM Cloud Functions console.bluemix.net/openwhisk/

- github.com/apache?q=openwhisk
- slack.openwhisk.org
- twitter.com/openwhisk
- medium.com/openwhisk
- dev@openwhisk.incubator.apache.org
LINUXCON
containercon
CLOUDOPEN
CHINA 中国
THINK OPEN
开放性思维