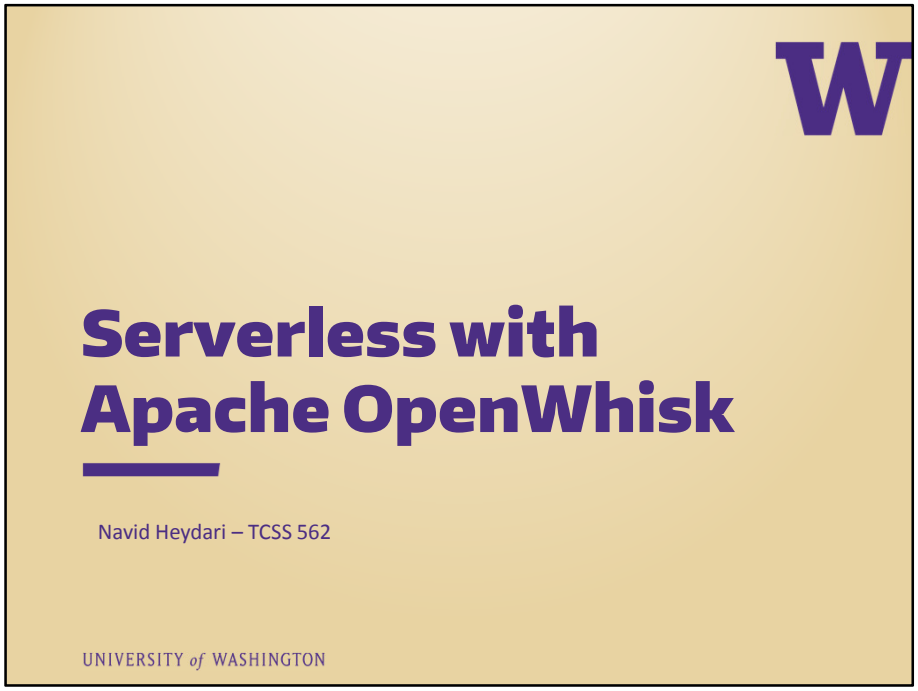
Serverless with
Apache OpenWhisk
Navid Heydari – TCSS 562
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Agenda

- What is **OpenWhisk?**
- What is **IBM Cloud Function?**
- **History**
- **Key Features and Components in OpenWhisk**
- **Use Case**
- **Languages Supported in OpenWhisk to write Actions**
- **Advantages and disadvantages**
- **Pricing**
- **CLI and API**
- **Demo**
- **References**

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What is OpenWhisk? IBM Cloud Function?

- **Apache OpenWhisk:**
  - **Open source**
  - **Serverless Computing Framework**
  - **Easier to provisioning**
  - **Focus** on **coding** and **functionality** rather than how to expose the functionality.
  - **Cloud native**
  - **Event Driven**
  - Focused on **Stateless action Concept**

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- What is serverless: function/action that could do something rather than focusing on how it can be deployed and how it can be exposed to outside, focus on the logic and the business parts that needs to be solved.
- Cloud native – designed to work in cloud
- Event driven there is built-in functionality and logical process to listen to events → concept of triggers

- NOTE that Serverless NOT a solution for everything and every situation.
- Actions normally will be tried to be stateless, however in case of persistent state, there are some options, like S3 or Redis. In real world application.

What is IBM Cloud Function?

> **IBM Cloud Function:**
  - IBM **serverless cloud** env.
  - **Based** on **Apache OpenWhisk.**

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History

- Who?
  - Apache open source project
- Why?
  - Make it easier for developers
  - Event-based
  - Cloud native open source environment
- How?
  - Based on cloud native and 12 factors
  - Few Key components (Next slide)

Key Components

- Events
- Action
- Trigger
- Rules

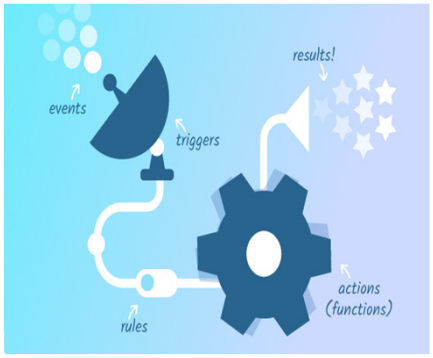

Figure 1: Apache OpenWhisk website: https://openwhisk.apache.org/ 05/20/2018

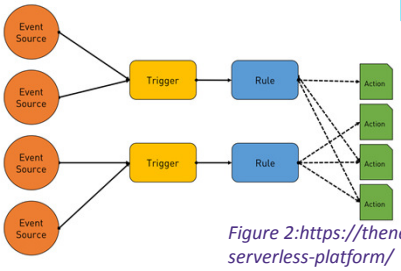

Figure 2:https://thenewstack.io/behind-scenes-apache-openwhisk-serverless-platform/ accessed 05/19/2018

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- Action is the **stateless** function that needs to be done
- Trigger (in publisher consumer model and using topic exchange) filled a topic (end points)
- To register an action as a new consumer of a trigger, one creates an OpenWhisk **rule**. (glue between triggers and actions)

- One action can be called by many triggers – loosely coupled.

Use Case

- There is a RSS feed triggers to enable an action every time new feed is coming, action can capture the URL, sent it to somewhere or log it in S3 or Redis or memCache, and also send a text/email or a message into a slack channel as notification.

Advantages and Disadvantages

- **Advantage:**
  - Light weight
  - Fast to develop a deploy
  - Packaging concept (combining Actions under one namespace) P.with(M_p).a.with(M_a).invoke(P)
  - Externally driven Events listener
  - Open Source (Build it locally!)
- **Disadvantage:**
  - Not a solution for everything
  - Still evolving
  - Open source (Complex!)
    - Starting without IBM Cloud will be Challenging

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Externally driven Events listener
LIKE : RSS feed, Build Tool Trigger messages into Slack Channel

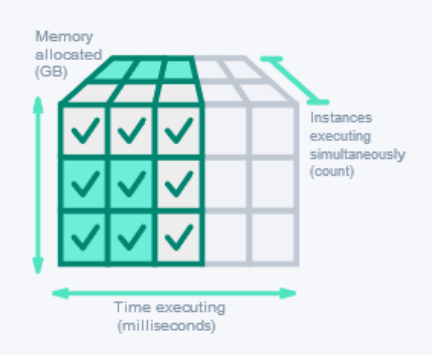
Languages Supported in OpenWhisk to write Actions

Currently, …

- **JavaScript**
- **Swift**
- **Python**
- **PHP** function
- **a Java** method
- any binary-compatible executable including **Go programs**
- run any custom code put in a **Docker container.**

IBM Cloud Function for OpenWhisk Pricing

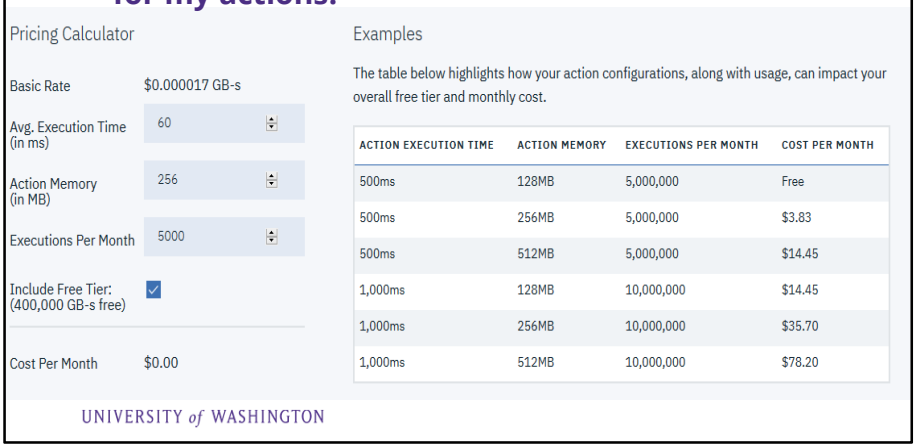
- **Basic Cloud Functions Rate:**
  - **$0.000017 per second of execution, per GB of memory allocated**
- **API Gateway Rate:**
  - **Free/No Limits**



Reference picture: https://console.bluemix.net/openwhisk/learn/pricing

Pricing (Cont.) – Cost Example

> **Below is showing how much I would be charged for my actions.**



Pricing Calculator

Basic Rate	$0.000017 GB-s
Avg. Execution Time (in ms)	60
Action Memory (in MB)	256
Executions Per Month	5000
Include Free Tier: (400,000 GB-s free)	☑
Cost Per Month	$0.00

Examples

The table below highlights how your action configurations, along with usage, can impact your overall free tier and monthly cost.

ACTION EXECUTION TIME	ACTION MEMORY	EXECUTIONS PER MONTH	COST PER MONTH
500ms	128MB	5,000,000	Free
500ms	256MB	5,000,000	$3.83
500ms	512MB	5,000,000	$14.45
1,000ms	128MB	10,000,000	$14.45
1,000ms	256MB	10,000,000	$35.70
1,000ms	512MB	10,000,000	$78.20

Communicate with OpenWhisk/ Bluemix

- Using **CLI**
  - Using **IBM Bluemix** command line tool
  - `Bx wsk action create <myActionName> <actionFile>`
- Using **API**
  - **Create end points**
  - Web Action in Bluemix **(--url** when using create/update action)
    - Explained in demo

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Through CLI: download and install Bluemix CLI, and use that to create or update actions and invoke them through command line.

Demo (UI Demo & CI Demo)
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References:

1. Baldini, Ioana, et al. “The Serverless Trilemma: Function Composition for Serverless Computing.” Proceedings of the 2017 ACM SIGPLAN International Symposium on New Ideas, New Paradigms, and Reflections on Programming and Software, 2017, pp. 89–103.
2. https://openwhisk.apache.org/ (accessed: 05/20/2018)
3. https://console.bluemix.net/docs/ (accessed: 05/19/2018)
4. https://console.bluemix.net/openwhisk/learn/cli (accessed: 05/21/2018)
5. https://console.bluemix.net/openwhisk/learn/pricing (accessed: 05/17/2018)
6. http://www.actoncloud.com/blog/compare-serverless/ (accessed: 05/17/2018)
7. https://thenewstack.io/hands-guide-creating-first-serverless-application-apache-openwhisk/ (accessed: 05/08/2018)

Thank you
&
Q/A
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