Serverless on Kubernetes
What we learned from customers

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The next 30 minutes

Application paradigms evolution

Customer needs & Solutions journey

Serverless + Kubernetes future

Collaborating further
Serviceful
(circa 2012)

HTTP Serving
Load Balancing
HTTP Serving / Load Balancing

- Internet
- Front-Ends
- Workers
- Shared Services
Canadian Broadcasting (CBC)

OBJECTIVES

Provide real-time results of Canadian election at very high scale (nationwide). While keeping the experience for mobile and desktop devices responsive and impressive.

TACTICS

Using App Service Environment to (auto) scale across 3 different geo-regions and utilize (peak time) close to 1300 cores. Used App Service apps to provide API, Web and Mobile experiences.

RESULTS

Successfully served 3.6 billion requests over six hours, at a peak of 800K RPS.
Serviceful

HTTP Serving
Load Balancing
Automatic Scaling
Multi-language
CI / CD
Zero down time deployment (slots)
Authentication / Authorization
Rich Monitoring
...

Microsoft Azure
Event-driven applications (circa 2014)

- Batch processing
- Async workloads
- Glue application together
- Extensibility endpoints
FaaS & Serverless
circa 2015

Rich set of triggers
Event-driven scale
Glue application together
Extensibility endpoints
Serverless Eventing in Azure Functions

index.js

```javascript
module.exports = async function (context, myQueueItem) {
    // Process queue item
};
```

function.json

```json
{
    "bindings": [
        {
            "name": "myQueueItem",
            "type": "queueTrigger",
            "direction": "in",
            "queueName": "myqueue",
            "connection": "AzureWebJobsStorage"
        }
    ]
}
```
Serverless Eventing in Azure Functions

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Serverless Eventing in Azure Functions

How many events are being generated?

Event Source

index.js

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```

function.json

```
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Serverless Eventing in Azure Functions

Event Source

Event Driven Scale Controller

Scale functions based on event metrics

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Serverless Eventing in Azure Functions

Event Source

Scale functions based on event metrics
FaaS & Serverless & Containers
*(circa 2016)*

Develop locally, deploy anywhere
Application portability
Bring my own dependencies
Serverless Eventing in Azure Functions Containers

Event Source → Scale functions based on event metrics → Event Driven Scale Controller

```
module.exports = async function (context, myQueueItem) {
  // Process queue item
};
```

```
func init --docker-only
```

```
FROM mcr.microsoft.com/azure-functions/node:2.0
ENV AzureWebJobsScriptRoot=/home/site/wwwroot \n    AzureFunctionsJobHost__Logging__Console__IsEnabled=true
COPY ./home/site/wwwroot
RUN cd /home/site/wwwroot &
    npm install
```
Serverless on Kubernetes

(circa 2018)

- Control over ingress, patching
- Custom OS modules
- Multi-cloud & on-prem
- Hardware options
Kubernetes for applications

Kubernetes focuses on container infrastructure, not on applications

Application developers need to be experts in Kubernetes APIs

Production use of Kubernetes requires mastery of the broader cloud-native ecosystem

"[Kubernetes] is really hard to get into it and understand how all the parts play together, even for experienced people."

– Software Architect @ Crisp

"A key principle for us when it comes to choosing a platform is that we can maintain the size of our team."

– CTO @ Handled.io
Serverless Eventing in Azure Functions Containers

Event Source

Event Driven Scale Controller

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COPY . /home/site/wwwroot
RUN cd /home/site/wwwroot && 
    npm install
```
Serverless Eventing in Kubernetes

Event Source

i. Apache Kafka
ii. AWS Cloudwatch
iii. AWS SQS Queues
iv. Azure Event Hubs
v. Azure Service Bus
vi. Azure Storage Queue
vii. GCP Pub/Sub
viii. Liiklus Topic
ix. NATS Streaming
x. Prometheus
xi. Rabbit MQ Queue
xii. Redis Lists

Scale functions based on event metrics

```
module.exports = async function (context, myQueueItem) {
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};
```

func init --docker-only

func kubernetes install --namespace keda

func kubernetes deploy --name <name-of-function-deployment> --registry <container-registry-username>
Key components of Azure used by Best Buy

- Azure Event Hub
- Azure Functions
- Cosmos DB
- Azure App Service
- App Gateway / Front Door
- Azure Key Vault
Serverless on Kubernetes
Future Direction

I. Capitalize on the power of combining Serviceful + Event-Driven + FaaS + Serverless + Kubernetes

II. Deliver the best tradeoff between control and productivity

III. Have Serverless reach places where it isn’t being used, e.g. highly regulates industries

Can only be achieved through open source collaboration
Open Source Collaboration

Projects
Azure Functions Runtime
Azure Functions Tools
Durable Functions
KEDA

Execution Rhythm
Weekly Community Calls
Daily triages
Incremental releases

Partner Companies
Red Hat
Pivotal
<add your company name here>

Contributors
127 (includes Microsoft FTE)
Thank you!

Learn more
http://keda.sh
http://azure.com/functions

Stop by the Microsoft booth

Attend
KEDA: Event Driven and Serverless Containers in Kubernetes by Jeff Hollan
Thursday, November 21 • 10:55am - 11:30am

Reach out:
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