Going Cloud-Native: Serverless Applications With Apache Ignite

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Agenda

• Serverless Computing with Ignite, any profit?
• Ignite connectivity options, which one to use and when?
• Demo: Creating an Ignite serverless function
• Ignite cluster deployment, self and managed service options?
Serverless Computing With Ignite
Any Profit?
cost savings
Pay for Only What You Use

What are we charged for?
- requests count
- function duration
- managed service
duration = startup_time + logic_execution_time
Breaking Down The Duration

\[
\text{duration} = \text{startup\_time} + \text{logic\_execution\_time}
\]

\[
\text{logic\_execution\_time} = \text{local\_logic\_execution\_time} + \text{remote\_logic\_execution\_time}
\]
duration = startup_time +
(llocal_logic_execution_time + remote_logic_execution_time)

faster with Ignite
But You Need To Select Proper Ignite Connectivity Option

\[
\text{duration} = \text{startup_time} + (\text{local_logic_execution_time} + \text{remote_logic_execution_time})
\]

influenced by selected Ignite connectivity option

faster with Ignite
Ignite Connectivity Options
Which one to use and when?
Thick Clients: Not the best fit for serverless functions

- Slowest Startup Time
  - The client waits while all servers become aware of it
  - The more servers the longer the startup time

- .NET and C++ thick clients start the JVM
Thick Clients:
A couple of reasonable usage scenarios

- Function traffic is consistent
  - Function is not retired/unloaded frequently

- You need an API unsupported by other connectivity options

- Ensure the client doesn’t accept TCP/IP connections:
  - `TcpCommunicationSpi.forceClientToServer.Connections` must be set to `true`
Thin Clients
Use by default in serverless environments

• Fast Startup Time
  – Just a TCP/IP connection with a server

• Cross-platform and lightweight
  – Java, .NET, Python, Node.js, etc.

• Feature-rich
  – Ignite 2.8: SQL, key-value, transactions
  – Ignite 2.9: compute, services and cluster
  – Ignite 2.10: continuous queries
Ignite REST Protocol: Use to generate Graal VM native image

- Startup time is comparable to the thin client startup time

- Use with the GraalVM native image feature
  - To be supported for Ignite thin and thick clients

- Enable the **ignite-rest-http** module
  - [https://www.gridgain.com/docs/latest/developers-guide/restapi](https://www.gridgain.com/docs/latest/developers-guide/restapi)
### Complete comparison of the connectivity options for serverless environments

<table>
<thead>
<tr>
<th></th>
<th>Thin Client (+ Ignite JDBC and ODBC)</th>
<th>Ignite REST API</th>
<th>Thick Client</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Startup Time</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Multi-language</strong></td>
<td>✔</td>
<td>✔</td>
<td>✔ (Java, .NET, C++)</td>
</tr>
<tr>
<td><strong>Feature Set</strong></td>
<td>✔ (subset)</td>
<td>✔ (subset)</td>
<td>✔</td>
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<tr>
<td><strong>Partition-awareness</strong></td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
</tr>
<tr>
<td><strong>Graal VM Native Image</strong></td>
<td>✗</td>
<td>✔</td>
<td>✗</td>
</tr>
</tbody>
</table>
Micronaut, Quarkus and Other Frameworks for serverless applications

• Prefer using the thin client or Ignite REST
  – To achieve fastest startup time

• Micronaut Integration
  – https://cwiki.apache.org/confluence/display/IGNITE/Micronaut+Integration

• Spring Boot integration
  – https://apacheignite-mix.readme.io/docs/spring-boot
Demo
Creating an Ignite serverless function
Ignite Cluster Deployment
Self and Managed Service Options?
Self-Service: Kubernetes vs VMs

VMs

Kubernetes

It’s up to you!
Ignite Managed Service: GridGain Nebula

GridGain Nebula Capabilities

- **Deploy Anywhere**
  Public clouds (AWS, Azure, Google), private clouds, bare metal, on-premises or hybrid

- **24x7 Active Monitoring**
  Best practices built on tested GridGain DevOps processes

- **Highly Secure**
  Controlled access and communication over the firewall

https://www.gridgain.com/products/managed-services/gridgain-nebula
Wrapping Up
Additional Resources

- Tutorial: Deploying Ignite Serverless Functions
  - [https://www.gridgain.com/docs/tutorials/serverless/azure-functions-tutorial](https://www.gridgain.com/docs/tutorials/serverless/azure-functions-tutorial)

- Ignite with Micronaut Tutorial:
  - [https://www.gridgain.com/docs/tutorials/micronaut/getting-started/ignite-micronaut-getting-started](https://www.gridgain.com/docs/tutorials/micronaut/getting-started/ignite-micronaut-getting-started)

- Serverless Architectures Deep-Dive:
  - [https://martinfowler.com/articles/serverless.html#WhatIsServerless](https://martinfowler.com/articles/serverless.html#WhatIsServerless)
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