Liberty Quarterly Update
20.0.0.1-20.0.0.3
Alasdair Nottingham – Liberty Lead Architect
@nottycode
Agenda

Part 1: 10 Minute Liberty overview

Part 2: Liberty and OpenShift – Arthur De Magalhaes

Part 3: What is new this quarter

Part 4: Q&A
10 minute overview
Why Choose Liberty

• Cloud Ready
  • Container optimized
  • Designed for dev/ops
  • Small disk footprint
  • Efficient memory usage
  • Fast startup
  • High throughput
  • Self-Tuned Thread Pool

• Developer friendly
  • Just enough application server
  • Fast inner loop with dev mode
  • Support for industry standard dev tools
  • Jakarta EE, Java EE, MicroProfile APIs
  • Zero Migration
What people are saying

- "Light operation and efficient operation (restart time can be reduced compared to ND)"
- "Ease of use small footprint ability to be built into a container"
- "It's the best tool for the job."
- "Easy to manage, Cloud Ready a Smart Product with cool feature. Modular flexible and fast."
- "Simple, well supported, cloud and container friendly."
- "Liberty is a fast-to-configure application server with some advantages over other similar products."
- "Simplicity of use."
- "Now that we have experienced Liberty, we are spoiled and want to stick to those easy, non-impacting migrations."
Just Enough Application Server

You control which features are loaded into each server instance

Java EE

<feature>jsf-2.3</feature>

Kernel

jsp-2.3  jsf-2.3
servlet-4.0
http-2.0  appmgr
Liberty in Containers

FROM open-liberty
ADD myapp.war /config/dropins/myapp.war

IBM Cloud Kubernetes Service
Azure Kubernetes Service
Google Kubernetes Engine
Amazon Elastic Kubernetes Service
Jelastic

Red Hat Open Shift Container Platform
Pivotal Kubernetes Service
Pivotal Cloud Foundry
Liberty Zero Migration

- Zero config migration
  - Write once, run forever
- Zero app migration
  - No behavior changes in existing features
  - New behaviors in new features
- Choose your Java
  - Java 13, 11, 8
  - AdoptOpenJDK
  - IBM
  - OpenJDK
  - Oracle
## Liberty Release Cadence

<table>
<thead>
<tr>
<th>All CD releases</th>
<th>CD releases ending .3 .6 .9 .12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Provided</td>
<td>5 years</td>
</tr>
<tr>
<td>iFixes</td>
<td>24 weeks</td>
</tr>
<tr>
<td>Proactive Security iFixes</td>
<td>Most recent</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Support: 5 years
iFixes: 24 weeks
Proactive Security iFixes: Most recent
Liberty Release Cadence Example

<table>
<thead>
<tr>
<th></th>
<th>All CD releases</th>
<th>CD releases ending .3 .6 .9 .12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Provided</td>
<td>5 years</td>
<td>5 years</td>
</tr>
<tr>
<td>iFixes</td>
<td>24 weeks</td>
<td>2 years</td>
</tr>
<tr>
<td>Proactive Security iFixes</td>
<td>Most recent</td>
<td>Most recent 2</td>
</tr>
</tbody>
</table>
How to get Support

WebSphere
- z/OS
- ND
- Base
- Core

IBM Cloud Pack for Apps
- IBM Integrated Application Runtimes
  - Java:
    - WebSphere
    - Liberty
    - MicroProfile
    - Jakarta EE
    - OpenJ9
    - HotSpot
  - Node.js:
    - Loopback
    - Express

Red Hat Runtimes
- Red Hat Runtimes
- Open Liberty
- JBoss EAP
- OpenJDK
- Spring
- Thorntail
- Node.js
- Red Hat AMQ
- Red Hat Data Grid

Integrated DevOps

Red Hat OpenShift
Liberty and OpenShift

Arthur De Magalhaes – Runtimes Containers Architect
Certified Liberty images

Certified by Red Hat: https://access.redhat.com/containers/#/search/liberty
Available from Docker Hub and IBM Cloud Container Registry

- 3 versions (latest and last 2 quarter drivers)
- 2 tags: kernel & full

IBM Java JRE 8

AdoptOpenJDK OpenJ9 JRE 8

AdoptOpenJDK OpenJ9 JRE 11

IBM Java JRE 8

AdoptOpenJDK OpenJ9 JRE 8

Ubuntu

Ubuntu
FROM open-liberty
RUN yum ...
COPY libs /config/libraries/
COPY server.xml /config/configDropins/defaults/

Certified image

Enterprise base image

Consistency across the enterprise

Dockerfile

OCI Container image

config
libraries
runtime framework
runtime language
UBI (RHEL)

Improves performance w/ layer caching
Cloud best practices via MicroProfile

- **MicroProfile OpenAPI**
  - Expose OpenAPI v3 definition

- **MicroProfile Config**
  - Bind ConfigMaps and Secrets

- **MicroProfile Health Check**
  - Separate endpoints for Pod readiness and liveness

- **MicroProfile Metrics**
  - Export metrics to Prometheus
Building application images with convenience

Multi-stage Dockerfile

```
FROM maven:latest AS builder
COPY mySourceCode/ /source/MyApp
RUN cd /source/MyApp && mvn clean package

FROM enterprise-base:backend
COPY --from=builder --chown=1001:0 /source/MyApp/target/MyApp.war /config/dropins/
COPY --from=builder --chown=1001:0 /source/MyApp/target/server.xml /config
```
Embracing Operators

User actions
New object, reconfigure

Kubernetes actions
Create, Update, Delete

Kubernetes events
Current state of cluster
Open Liberty Operator

Operator Hub:
https://operatorhub.io/operator/open-liberty

Open Source Community:
https://github.com/OpenLiberty/open-liberty-operator

Certified on 01/11/2020
Runtime Component Operator

- Creation / deployment of k8s or Knative resources
- Horizontal auto-scaling
- Resource constraints
- Built-in logging and monitoring (Prometheus) integration
- Auto-creation of Routes
- Readiness / liveness probes
- Environment variables setup
- Easy volume persistence setup
- Integration with kAppNav
- App-app service binding
- Image stream support
- Day 2 operations
- Integration with Certificate Manager
- Automatic setup of OpenID Connect Client
- Automatic binding to databases

https://github.com/application-stacks/runtime-component-operator
Connecting microservices with ease

- Red Hat’s Service Binding Operator: https://github.com/redhat-developer/service-binding-operator
- Service Binding Specification: https://github.com/application-stacks/service-binding-specification

```
service:
  provides:
    path: "/portfolio"
    secret: <secret_name>
  type: ClusterIP
  port: 9080
  protocol: https

```

```
service:
  - consumes: "service1"
    category: openapi
    namespace: "lob1"

```

```
  or

```

Env vars

Mounted property file

```

"connect-to" binding for OCP 4.x topology view

fetches URL, port, etc
Day 2 Operations

> oc client

https://github.com/OpenLiberty/open-liberty-operator/issues
Enterprise-Ready Application Stacks

Add governance and ensure enterprise consistency
100% Open Source

Sharable pre-built, cloud-optimized technology stacks

Production deploy to Kubernetes Server or Serverless Scaling

Open Liberty
Open Liberty & OpenJ9 using Maven
Select

Spring Boot®
Spring Boot using OpenJ9 and Maven
Select

Eclipse Vert.x
Eclipse Vert.x runtime for running Java applications
Select

[+ 15 stacks]

Appsody.dev - Open Source Project
Recent Updates
Focus areas

- APIs
- Foundation
- Orchestration
- Security
## Last 12 month highlights

<table>
<thead>
<tr>
<th>Release</th>
<th>Features</th>
</tr>
</thead>
</table>
| 19.0.0.4-6 2Q19 | f 30% startup performance improvement  
| 19.0.0.7-9 3Q19 | f 10% memory footprint improvement  
| 19.0.0.10-12 4Q19 | f Java SE 11 Hotspot  
| 20.0.0.1-3 1Q20 | d Liberty dev mode  
| | f Java SE 12  
| | f Oracle UCP  
| | f Liberty readiness analysis  
| | o UBI based docker images  
| | o Open Liberty Operator  
| | s TLS Hostname verification  
| | s OAUTH Hostname verification  
| | s OIDC Hostname verification  
| | s z/OS SAF groups  
| | s z/OS Keyring monitor  
| | f PostgreSQL as a first class db  
| | f Config validation REST API  
| | s OpenID Connect app password UI  
| | s OAuthPKCE support  
| | s z/OS SAF auditing  
| | s Custom login modules for JCA  
| | s API to change SAF password  
| | s Reader role  
| | s Trust JVM cacerts  
| | s OpenShift OAuth  
| | s SameSite cookie support  
| | d Open Liberty Appsody Stack  
| | d Kafka support in MicroShed Testing  
| | d Guide for deploying to Google Cloud Platform  
| | d Guide for using minishift  

- Improved annotation scanning perf  
- New metric for Process CPU Time  
- Improved Kafka reactive integration  
- Open http ports after starting apps  
- Migrate traditional WebSphere config  
- Support for OpenShift OAuth  
- SameSite cookie support  
- Dev mode for gradle  
- MicroProfile REST client generator  
- Guide for deploying to Google Cloud Platform  
- Guide for using minishift
Annotation Scan Caching

```
@ApplicationScoped
public class MyClass {
    @Inject
    private SomeBean bean;
}
```
Annotation Scanning Performance

**Startup Time (ms)**

- Big CDI
- Day Trader
- Big JAX-RS
- Petclinic
- Acme Air Micro

**Startup Improvement %**

- Big CDI
- Day Trader
- Big JAX-RS
- Petclinic
- Acme Air Micro

Graphs showing the comparison between different applications and versions (19.0.0.12 vs 20.0.0.1) for both startup time and improvement percentage.
EE7 Performance (Trade7)

- Competitive comparisons used docker images for the different frameworks
- Open Liberty shows good improvements in last year on all metrics and is better than competition on all metrics

System Configuration:

**SUT:** LinTel – SLES 12.3, Intel(R) Xeon(R) Platinum 8180 CPU @ 2.50GHz, 4 physical cores, 64GB RAM.

JDK version distributed with the docker images used for each server instance.
Process CPU Time Metric

Old CPU Load % maxes out based on usage of total physical CPUs

New CPU Load % maxes out based on container CPU limits
Delayed HTTP Port opening

Before

Start server → Open http ports → Start apps → Server started

Request to app fails with 404
Request to app not possible
Request to app succeeds 200

After

Start server → Start apps → Open http ports → Server started
SameSite Cookies

- Configure for JSESSION cookie
  
  ```xml
  <httpSession cookieSameSite="Lax|Strict|None|Disabled"/>
  ```

- Configure for SSO cookies
  
  ```xml
  <webAppSecurity sameSiteCookie="Lax|Strict|None|Disabled"/>
  ```

- Configure for your cookies
  
  ```xml
  <httpEndpoint id="defaultHttpEndpoint">
    <samesite lax="myLaxCookies" strict="myStrictCookies"
     none="myNoneCookies"/>
  </httpEndpoint>
  ```
Config Migration

- Point binary scanner at app deployed to tWAS and get Liberty config
- JDBC
- JMS
- Service Integration Bus
- Authentication Alias

http://ibm.biz/WAMT4AppBinaries
dev mode

Boosts developer productivity

Immediate feedback for code and config changes

No re-build necessary

Hot deployment, testing and debugging

mvn liberty:dev

gradle libertyDev
Liberty Gradle Plugin v3

New io.openliberty.tools group

dev mode support

Install latest Liberty from Maven Central by default

Configure Liberty server using Gradle project properties
MicroProfile REST Client Generator

Generate template interface for MP REST Client from OpenAPI document

- Command line using OpenAPI Generator in OpenAPI Tools
- VS Code using MP REST Client Generator extension

```bash
java -jar openapi-generator-cli-4.2.3.jar \generate
   --generator-name java
   --library microprofile
   --input-spec my.api.yaml
   --api-package my.example.api
   --model-package my.example.model
   --output project-dir
```
Open Liberty Application Stack

- Develop new applications easily with a stack that is ready for Kubernetes
  - Open Liberty as the runtime
  - Best practices and latest technologies (e.g. dev mode) built in
- Easy deployment onto Kubernetes platform
- Reusable and customizable
Labs, Questions
WebSphere Liberty Virtual POT

Download the operating system specific content zip file from either

- [https://ibm.box.com/WASLibertyVPoT](https://ibm.box.com/WASLibertyVPoT) (fast - about 10 minute download)

<table>
<thead>
<tr>
<th>File Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liberty Quarterly Update_20.0.0.1-3.final.pdf</td>
<td>charts only</td>
</tr>
<tr>
<td>LibertyPoT_20.0.0.3_LINUX.zip</td>
<td>charts &amp; lab instructions only</td>
</tr>
<tr>
<td>LibertyPoT_20.0.0.3_MAC.zip</td>
<td></td>
</tr>
<tr>
<td>LibertyPoT_20.0.0.3_WIN.zip</td>
<td></td>
</tr>
<tr>
<td>labs_n_presentations_only.zip V13</td>
<td></td>
</tr>
<tr>
<td>LibertyResourceList.pdf V2</td>
<td></td>
</tr>
</tbody>
</table>
Unzip to C:\wlp_pot

- Note: You can unzip to anywhere you wish but the lab instructions assume the unzip location is C:\wlp_pot

All labs in here

Eclipse IDE with Liberty tools

Liberty runtime and Java SDK

Follow labs\gettingStarted\0_setup_20180105\setup.pdf

Then choose any labs you want to do
Open Liberty Guides

- Hands-on learning in ~20 minutes
- 44 guides
  - MicroProfile & Jakarta EE
  - Open Shift, Docker, Kubernetes Istio
- Latest Guides
  - Deploying microservices to an OKD cluster using Minishift
  - Deploying microservices to Google Cloud Platform

https://openliberty.io/guides
• Open Liberty: https://www.openliberty.io/
• Eclipse MicroProfile: https://microprofile.io/
• Jakarta EE: https://jakarta.ee/
• Liberty advantage: https://www.ibm.com/downloads/cas/NVY3KY4E
• Open Liberty Guides: https://openliberty.io/guides
• Why Liberty is the best Java runtime for the Cloud https://developer.ibm.com/wasdev/docs/liberty-profile-best-java-runtime-cloud/
• WebSphere Application Server V8.5 Administration and Configuration Guide for Liberty Profile (Redbook)  
• Java support dates http://www.ibm.com/developerworks/java/jdk/lifecycle
• Single Stream Continuous Delivery https://www-01.ibm.com/support/docview.wss?uid=ibm10869798
• WebSphere Migration Knowledge Collection: Planning and Resources https://www-01.ibm.com/support/docview.wss?uid=swg27008724
• IBM Transformation Advisor http://ibm.biz/cloudta
• WebSphere Binary Migration Toolkit: http://ibm.biz/WAMT4AppBinaries
Next Quarterly Update

Liberty 20.0.0.1-3 Update

Session#1: April 8, 2020 from 1-3pm ET - http://ibm.biz/Liberty-Apr08
Session#2: April 22, 2020 from 9-11am ET - http://ibm.biz/Liberty-Apr22

Liberty 20.0.0.4-6 Update

Session#1: June 24, 2020 from 1-3pm ET - http://ibm.biz/Liberty-Jun24
Session#2: July 8, 2020 from 9-11am ET - http://ibm.biz/Liberty-Jul08
WebSphere & Cloud Pak for Apps Customer Advisory Board

All Customers and Business Partners welcome

http://ibm.biz/WebSphereAdvisoryBoard
email: claudiab@us.ibm.com

Possible engagement levels – no commitment needed:

1. Fly on the wall – NEW**
2. Stay ahead of the curve: more time commitment
3. Close the gap: quarterly involvement
4. At your own pace: impact longer term goals

NEW
Monthly sessions for Business Partners and in the IST timezone

OPEN invitation
Join 230+ other members
Recordings/charts:
ibm.biz/WASCABCommunityResources

What you get out of it:

✓ Direct access to architects, developers, team leads during sessions
✓ Insight into roadmaps, pre-announce insider tips (under Feedback agreement)
✓ Directly influence deliverables
✓ Gain insights from other customers
✓ Bonus: special sessions at conferences
✓ Bonus: Free Cloud assessment
Questions?

http://stackoverflow.com/questions/tagged/websphere-liberty
alasdair@us.ibm.com
Thank You

Your Feedback is Important