Liberty Quarterly Update 21.0.0.4-21.0.0.6

Alasdair Nottingham – Liberty Lead Architect

@nottycode

Agenda

Part 1: 20 Minute Liberty overview

Part 2: Jakarta EE 9 Update

Part 3: What is new this quarter

Part 3: Q&A

20 minute overview

Open Liberty

6 reasons why Liberty

Lightweight, highly-efficient runtime

CI/CD optimized operational experience

Simple true-to-production developer experience

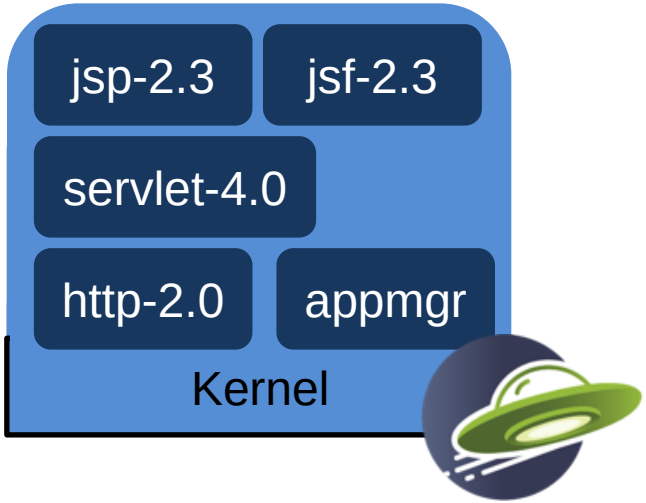
Just enough runtime	80% disk and 56% memory saving
Low operating cost	4x increased density over Tomcat & Spring Boot
Continuous delivery	Zero-effort security fixing & zero technical debt
Zero migration	100% v2v & fixpack migration saving
Kubernetes optimized	Self-tuned optimal perf, production-ready, kube-native
Developer experience	Container & kube-native experience, rapid inner loop

Just Enough Application Server

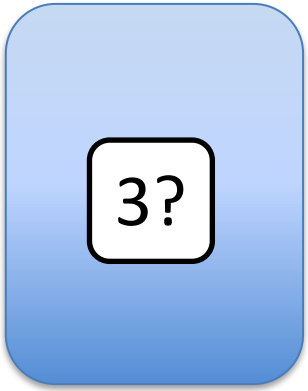
Open Liberty

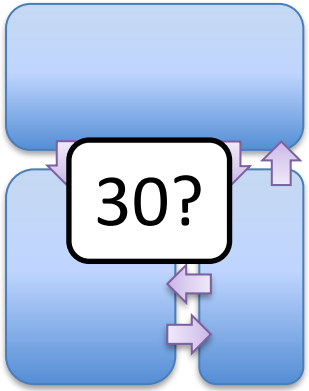
You control which features are loaded into each server instance

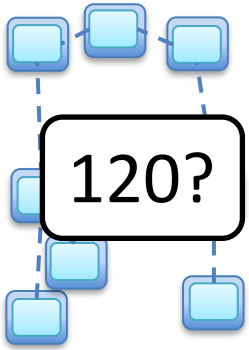

```
<feature>jsf-2.3</feature>
```

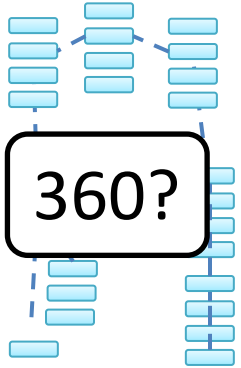


Granularity cost implications







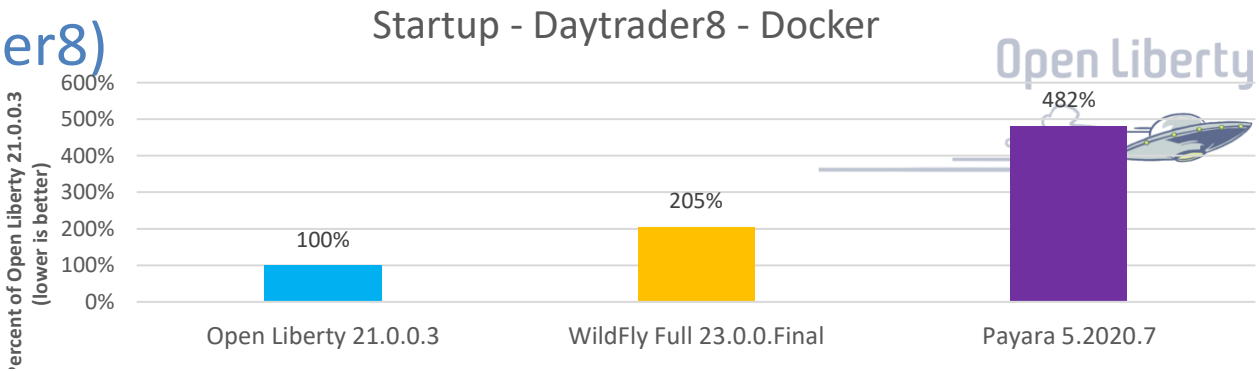


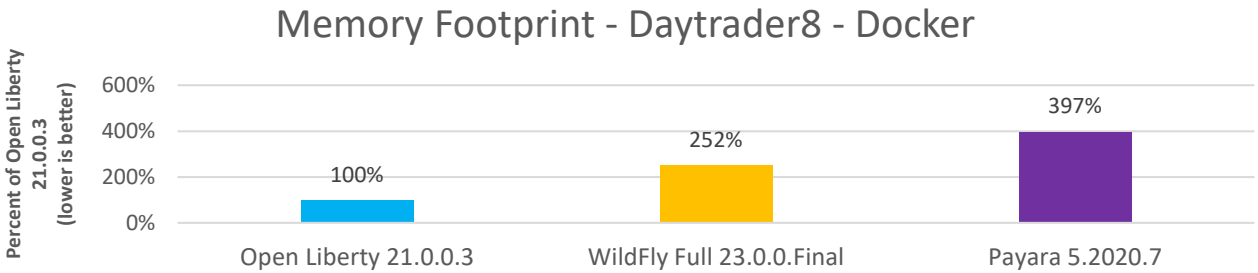
Disk?
Memory?
$$$?

X	X	X	X
200MB	200MB	200MB	200MB
=	=	=	=
600MB	6GB	24GB	72GB

Performance (Daytrader8)

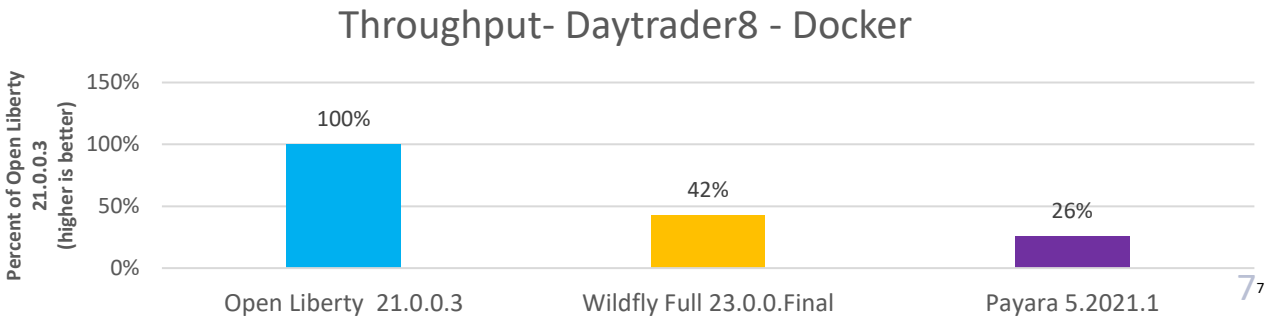
- Comparisons used each application server's Docker image
- Liberty outperforms others on all metrics for EE8 performance (startup time about half, throughput and memory footprint over 50% better)





System Configuration:

SUT: LinTel – Ubuntu 20.04.1 LTS, Intel(R) Xeon(R) Platinum 8180 CPU @ 2.50GHz, 4 cpus, 4GB RAM.
JDK version distributed with the docker images used for each server instance.



Low Operating Cost

Modernization led to optimized resource usage by **75%**

and reduced infrastructure footprint by **50%**

Major US healthcare provider

Cloud platforms shift responsibilities

Traditional Deployment

- I develop the app
- I give the Ops team a WAR file
- I *occasionally* update app dependencies

App

Server

Java

OS

VM

- I deploy the app
- I handle automation
- I monitor the app
- I maintain the infrastructure
- I apply important security fixes
- I plan and execute migrations

Cloud platforms shift responsibilities

Open Liberty

Cloud-native Platform Deployment

- I develop the app
- I *occasionally* update app dependencies
- I deploy the app
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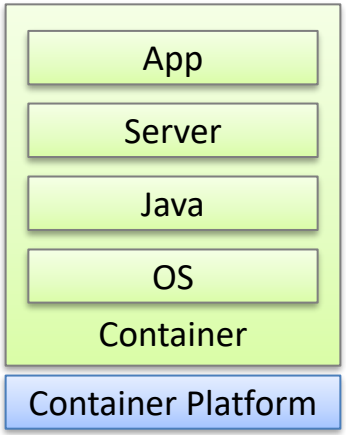


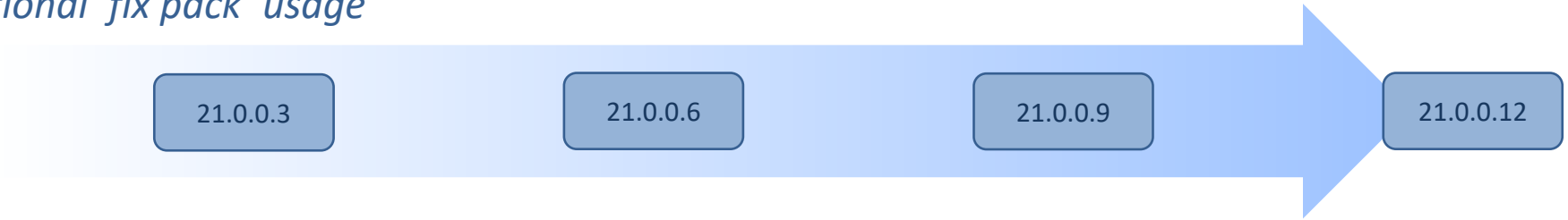
- I manage a cloud platform
- I provide services to the application teams

Liberty Release Cadence

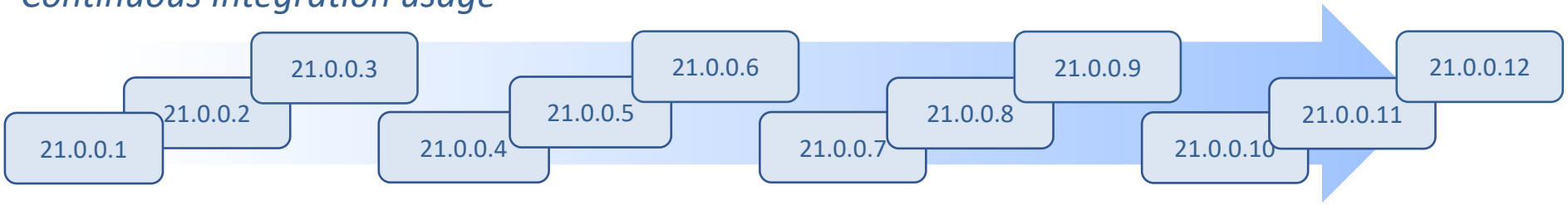
Liberty's 'zero migration' architecture makes picking up a new release simple

Skipping a release does not introduce migration work

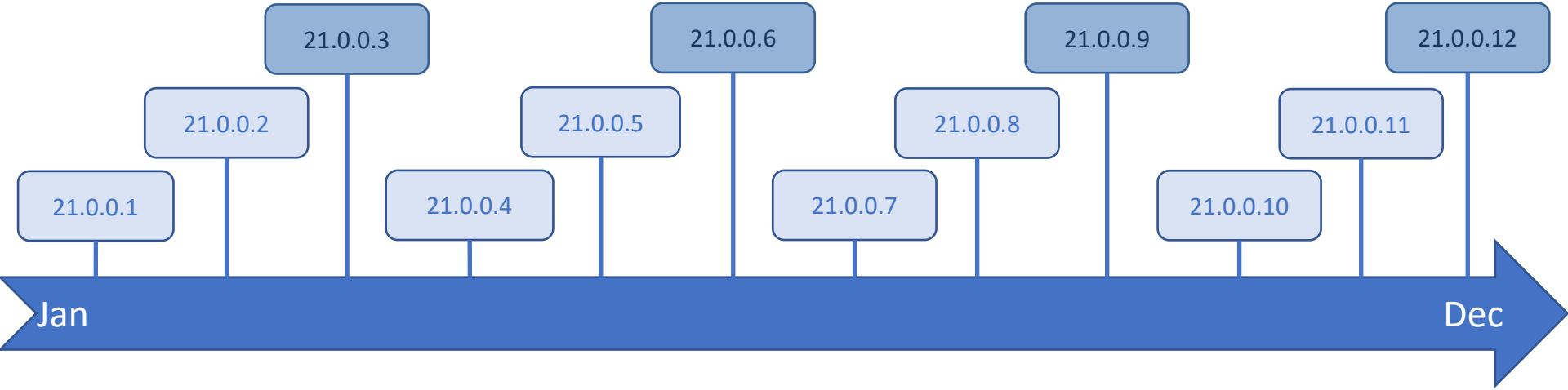
Traditional 'fix pack' usage



Continuous Integration usage



Liberty Release Cadence



	All CD releases	CD releases ending .3 .6 .9 .12
Support Provided	5 years	5 years
iFixes	24 weeks	2 years
Proactive Security iFixes	Most recent	Most recent 2

Zero Migration

- ✓No configuration behavior changes
- ✓No runtime feature behavior changes
- ✓No removals

Stay current with a rebuild
(no app or config changes necessary)

Skipping a release does not introduce additional migration work

Never apply an ifix again

Zero Migration

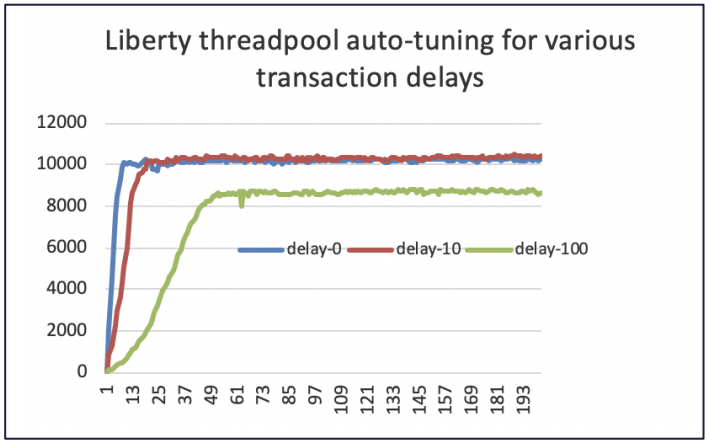
Today we migrated all our Liberty servers config from EE7 to EE8.
This process normally take 18 months in traditional WebSphere, cannot say how many manhours exactly.

Today it took 18 minutes, with Liberty's continuous delivery stream.

In July all apps starting to use EE8 framework.

Henrik Lundström, WAS Systems Administrator, Handelsbanken (Sweden)

Kubernetes optimized



Open Liberty Operator
provided by IBM

Deploy and manage applications running on Open Liberty

docker hub

MICROPROFILE
OPTIMIZING ENTERPRISE JAVA

Open Liberty

- **Deliver faster** without costly tuning exercises
- Get **optimal performance** even as the environment changes

- **Simple Operator-based deploy** and day-2 operations experience
- Supported **production-ready images**
- **APIs** for Kubernetes integration
- Container-based **usage tracking**

Kubernetes Optimized

“You don't have to tune thread pools. Liberty does an outstanding job”

WebSphere Technology Owner
Large health provider

Developer experience

Open Liberty

IDEs

Dev Mode

Repositories

The Central Repository

dockerhub

Build

Maven™

Gradle

APIs

Java EE™

JAKARTA EE

Spring Boot®

Testing

JUnit

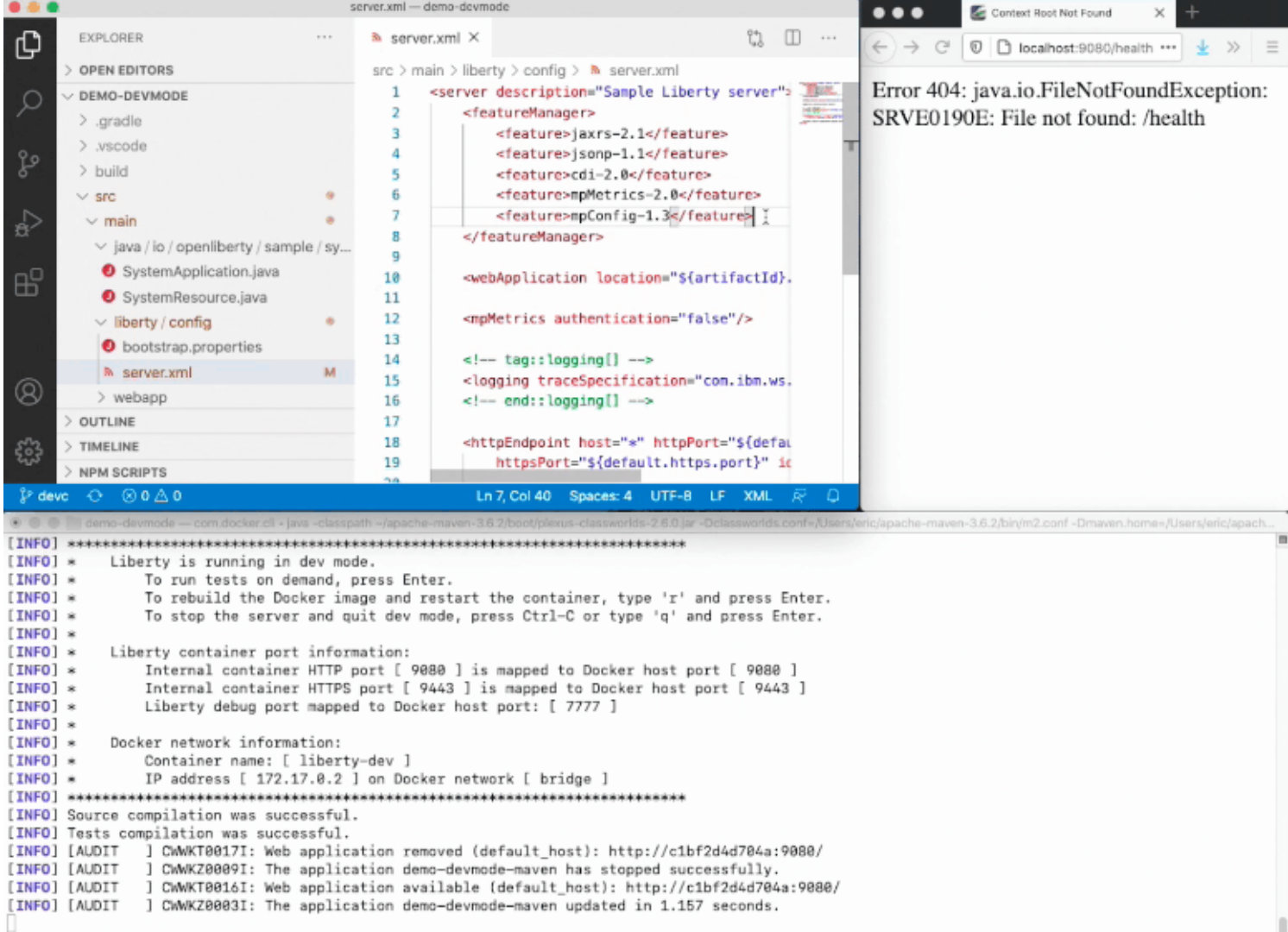
Jesse Gallagher
@Gidgerby

Have I mentioned lately how much of a delight @OpenLibertyIO is to work with? It's just thoroughly pleasant.

Tim Zöller
@javahippie

The @OpenLibertyIO dev mode is one of the best hot-reload features I have ever worked with, I am seriously impressed!

Dev mode in action



How to get Support

Open Liberty

WebSphere

z/OS

ND

Base

Core

WebSphere Hybrid Edition

IBM Integrated Application Runtimes

Java:

- WebSphere
- Liberty
- MicroProfile
- Jakarta EE
- OpenJ9

Cloud Foundry Migration Runtime

Transformation Advisor

Mono2micro

Red Hat OpenShift

Liberty and Jakarta EE 9

Jared Anderson – Jakarta EE Dev Lead for Liberty

20

Jakarta EE 9.0

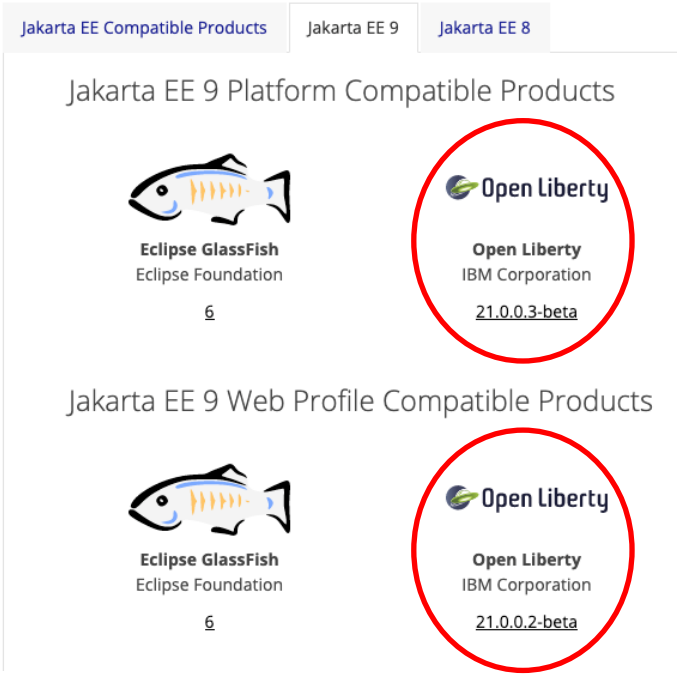
Jakarta EE 9 – Nov 20, 2020

- Final Specifications for ALL Projects
  - https://jakarta.ee/specifications/
- Final APIs for ALL Projects
  - https://mvnrepository.com/artifact/jakarta
- Final TCKs for ALL Projects
  - https://download.eclipse.org/jakartaee/
- Final Compatible Implementation(s)
  - Glassfish 6.0.0 for Platform Specification Certification
  - https://jakarta.ee/compatibility/

JakartaOne LiveStream – Dec 08, 2020

- https://jakartaone.org/2020/
- Formal announcement of Jakarta EE 9

Compatible Products



- https://jakarta.ee/compatibility/#tab-9
- First Vendor Compatible Implementation!
- https://openliberty.io/blog/2021/03/05/jakarta-ee-9-compatibility.html

Jakarta EE 9.1

Jakarta EE 9.1 – May 25, 2021

- Main goal: Support Java SE 11
  - TCK hits due to supporting multiple Java SE versions
  - Lack of CORBA ORB in Java SE 11, for example
- Formal Announcement
  - https://jakarta.ee/news/jakarta-ee-9-1-released/
- Final Compatible Implementation(s)
  - IBM Open Liberty - https://openliberty.io/blog/2021/05/26/jakarta-ee-9-1-compatibility.html
  - Eclipse Glassfish
  - Apache TomEE
  - Red Hat Wildfly
  - ManageCat ManageFish
  - https://jakarta.ee/compatibility/#tab-9_1

General Strategy

- Two prong approach
  - Work with Open Source communities who have a Jakarta EE 9 version of a function
  - Transform existing Open Source and internal EE 8 implementation

Eclipse Transformer

- IBM took the lead in creating a transformer project to be able to have code and test reuse and not require dual maintenance
- Using the transformer tool allows for rapid development and test of internal and open source implementations of Jakarta features
- IBM created a new Eclipse Open Source project to share this technology.
- Other companies are using this same technology to create their Jakarta EE 9 offerings
- Blog post outlining how to use the Eclipse Transformer: https://openliberty.io/blog/2021/03/17/eclipse-transformer.html

New Feature Names

- With the package rename in Jakarta EE 9, the short names of Jakarta features also changed. Liberty feature short names for Jakarta EE 9 features are changed to match the new short names. Example, jpa is now persistence, jca is now connectors, etc

  - There are a few exceptions.
    - concurrent was not changed to concurrency
    - Instead of authentication and authorization, we are using appAuthentication and appAuthorization to align with appSecurity Liberty feature (the Jakarta short name is just called security).

  - If a user specifies the old name with the new version number, a helpful error message tells you what the new name is during server startup

New JAX-RS Implementation

- JAX-RS 2.0 and 2.1 implementation in Liberty uses the Apache CXF open source implementation.
- With Restful Web Services 3.0, the implementation in Liberty has been changed to use RestEasy
- Main reason for this change is performance. While comparing different JAX-RS implementation, the performance team noted that RestEasy outperformed CXF. Jakarta EE 9 is the right time to make this transition to a new implementation
- Internal measurements of different applications that use Restful Web Services function show 7 to 20% throughput improvements.

What’s next?

- Completing development and test of Open Liberty value-add features that depends on Java / Jakarta EE technologies to support Jakarta EE 9
- Updating WebSphere Liberty value-add features to support Jakarta 9
- Make this function available in a non-beta release. Rerun all TCKs against the non-beta release with Java 8 and 11
- Working with the community to support newer Java levels in the TCK. When the TCK and Liberty support Java 17, we will certify with Java 17 as well.
- MicroProfile 5.0 (which will work with Jakarta EE 9) support when it becomes available. MicroProfile 5.0 should finalize by end of this year.

Open Liberty value-add features

- Open Liberty value-add features to be updated
  - acmeCA-2.0, adminCenter-1.0, audit-1.0,auditCollector-1.0, authFilter-1.0, batchManagement-1.0, constrainedDelegation-1.0, distributedMap-1.0, federatedRegistry-1.0, grpc-1.0, grpcClient-1.0, jwt-1.0, oauth-2.0, openidConnectClient-1.0, openidConnectServer-1.0, passwordUtilities-1.0, restConnector-2.0, restHandler-1.0, samlWeb-2.0, sessionCache-1.0, sessionDatabase-1.0, socialLogin-1.0, spnego-1.0, webBundle-1.0, webBundleSecurity-1.0, webCache-1.0, wsAtomicTransactions-1.2, wsSecurity-1.1, wsSecuritySaml-1.1

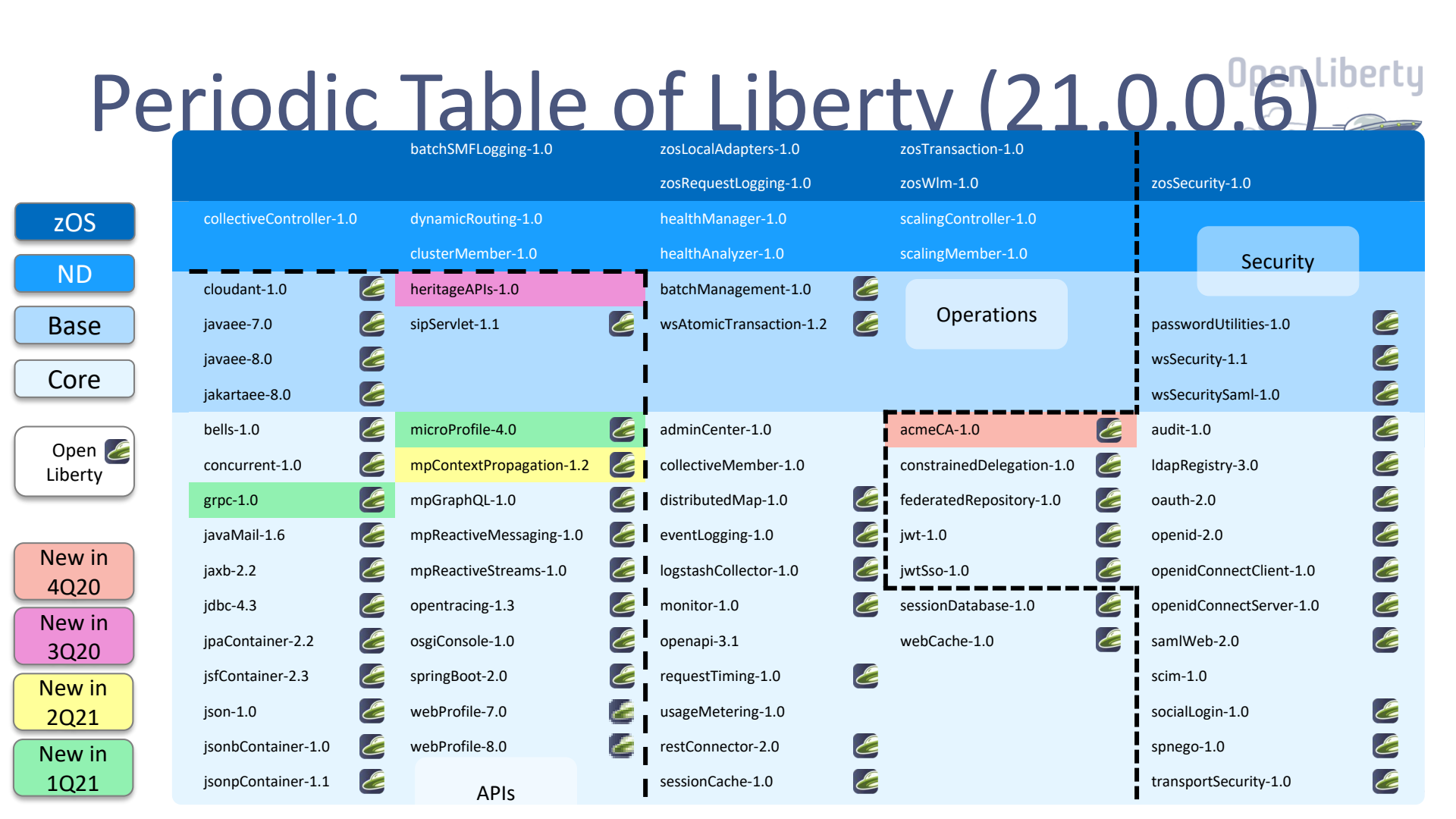
WebSphere Liberty value-add features

- WebSphere Liberty value-add features to be updated
  - core - collectiveMember-1.0, openapi-3.0?
  - base - wmqJmsClient-2.0 (depends on MQ)
  - nd - clusterMember-1.0, collectiveController-1.0, dynamicRouting-1.0, healthAnalyzer-1.0, healthManager-1.0, scalingController-1.0, scalingMember-1.0
  - zos - batchSMFLogging-1.0, zosLocalAdapters-1.0, zosRequestLogging-1.0, zosSecurity-1.0, zosTransaction-1.0

Recent Updates

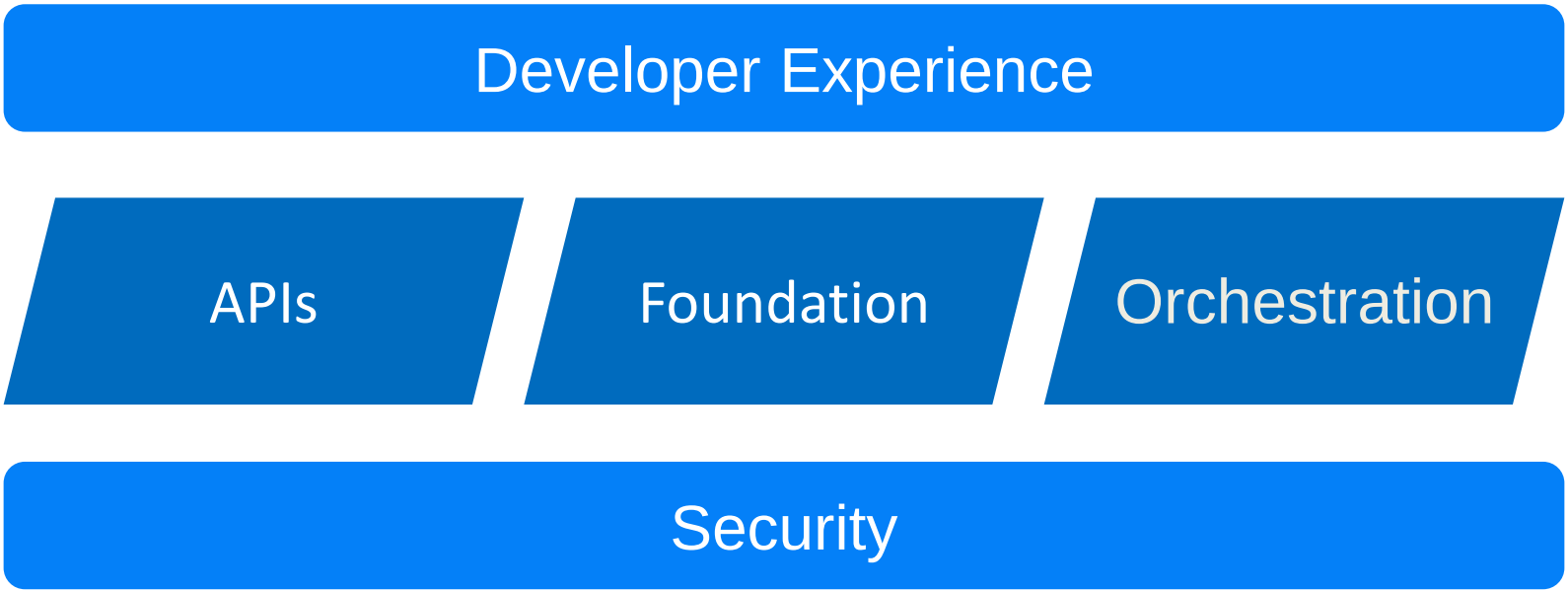
Open Liberty

Periodic Table of Liberty (21.0.0.6)



Focus areas

Open Liberty



Liberty Last Quarter Review

Security

- Container Res-Auth for direct lookups
- LTPA/JWT authentication filter
- LDAP bind using Kerberos

Dev Exp

- Gradle 7 support
- Multi-Module Maven Project support in dev mode
- Arquillian Plugin supports for Jakarta EE 9
- 10 Guides now support running in browser
- Guide for Code Ready Containers

Foundation

- Request Timing config to not generate javacore
- Config app extension location
- Automatically cleanup JDBC connections

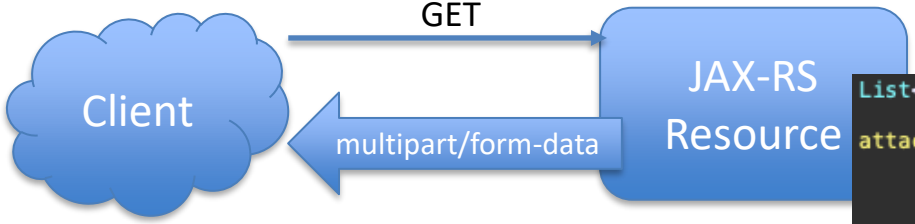
API

- MP Context Propagation 1.2
- JAX-RS Multipart payload

Orchestration

- Request Timing metrics available to Prometheus

JAX-RS Multipart Form Payloads




```
List<IAttachment> attachments = new ArrayList<>();

attachments.add(AttachmentBuilder.newBuilder("file1")
                                 .inputStream("some.xml", Util.xmlFile())
                                 .contentType(MediaType.APPLICATION_XML)
                                 .build());

attachments.add(AttachmentBuilder.newBuilder("file2")
                                 .inputStream(Util.asciidocFile())
                                 .fileName("mpRestClient2.0.asciidoc")
                                 .contentType("text/asciidoc")
                                 .contentId("myContentId")
                                 .header("MyCoolHeader", "SomeValue")
                                 .build());
```

JAX-RS Multipart Form Payloads


```
List<IAttachment> attachments = new ArrayList<>();

attachments.add(AttachmentBuilder.newBuilder("blogPost")
                .inputStream(new FileInputStream("/path/to/yesterdaysBlogPost.xml"))
                .fileName("myRenamedBlogPost.asciidoc")
                .contentType("text/asciidoc")
                .contentId("myBlogPostID")
                .header("X-PriorityLevel", "Medium")
                .build());
attachments.add(AttachmentBuilder.newBuilder("file1")
                .inputStream("some.xml", new FileInputStream("/path/to/myPicture.png"))
                .contentType("image/png")
                .build());

Response response = client.target(BLOG_SITE_URI)
                          .request()
                          .post(Entity.entity(attachments, MediaType.MULTIPART_FORM_DATA));
```

Auto Closing Connections

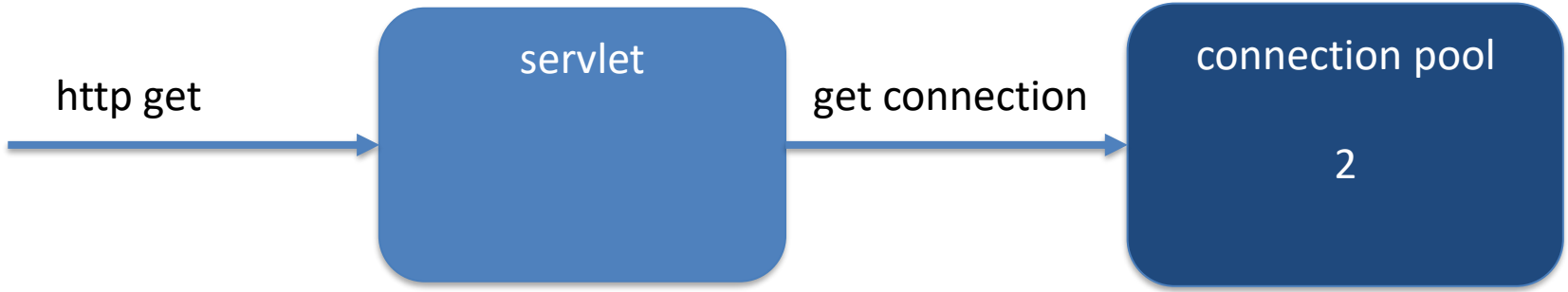
servlet

connection pool

3

Auto Closing Connections

Auto Closing Connections



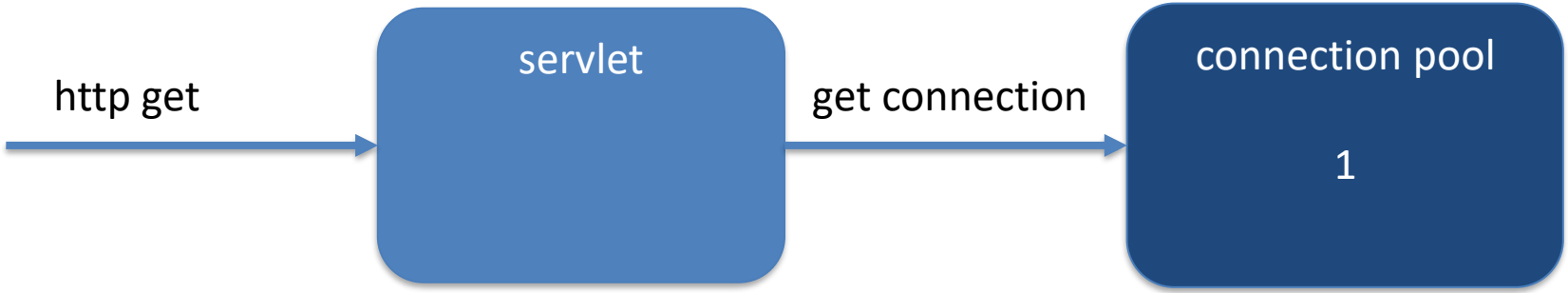
Auto Closing Connections

servlet

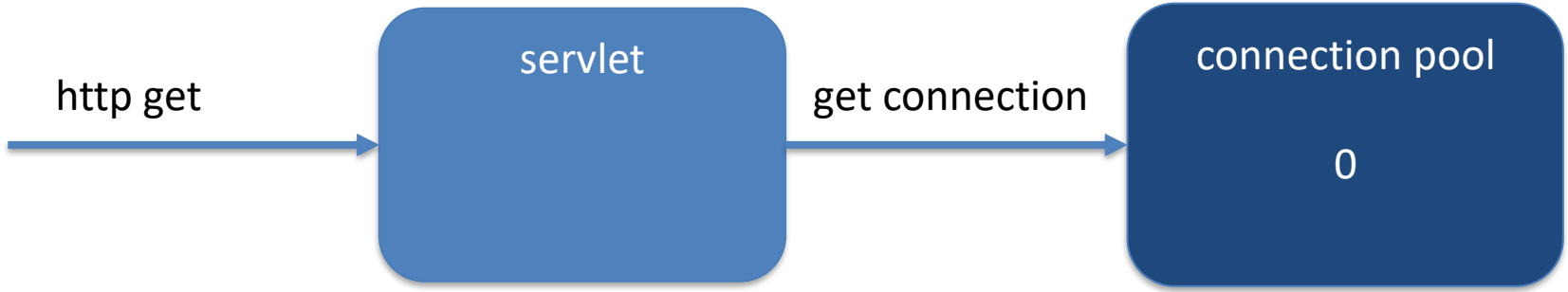
connection pool

2

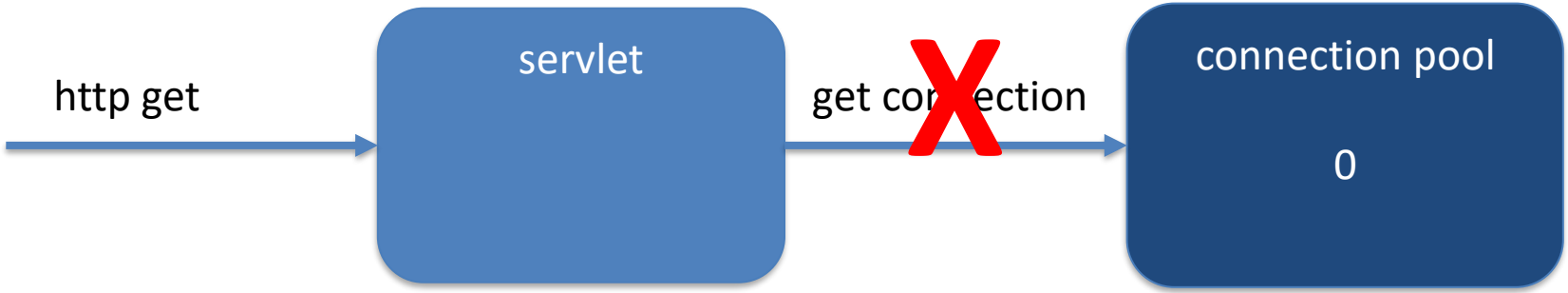
Auto Closing Connections



Auto Closing Connections



Auto Closing Connections



Auto Closing Connections

- Since 21.0.0.7

Auto Closing Connections

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Auto Closing Connections

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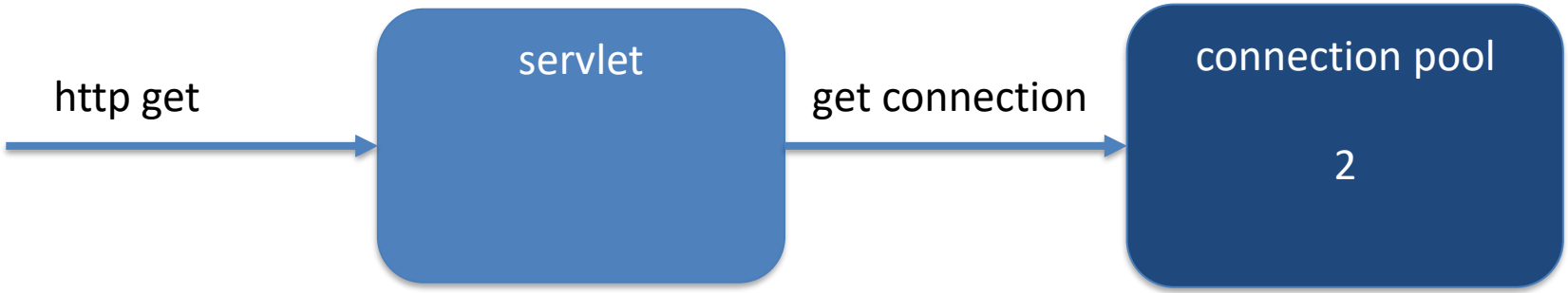


Auto Closing Connections

- Since 21.0.0.7

Auto Closing Connections

- Info message to help identify to close the connection

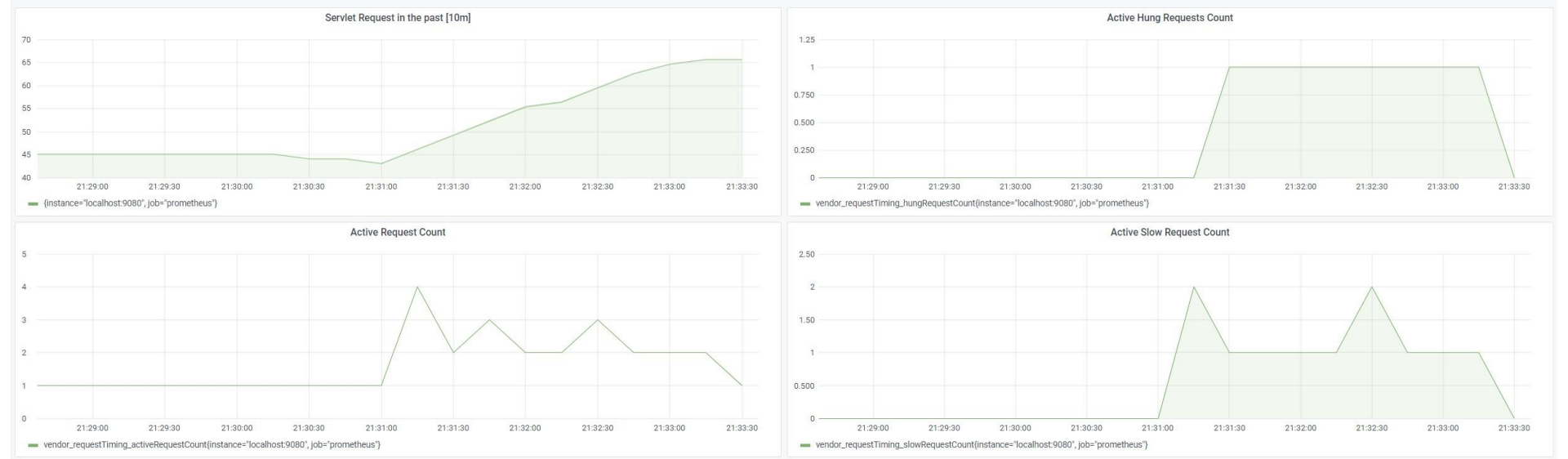
```
J2CA8070I: A connection that was obtained from jdbc/myDS
was not closed. The following stack identifies the code
that obtained the connection:

com.ibm.ejs.j2c.ConnectionManager.allocateConnection(Con
nectionManager.java:467)
com.ibm.ws.rsadapter.jdbc.WSJdbcDataSource.getConnection
(WSJdbcDataSource.java:140)
com.ibm.ws.rsadapter.jdbc.WSJdbcDataSource.getConnection
(WSJdbcDataSource.java:114)
test.MyServlet.doGet(MyServlet.java:251)
```

Request Timing in MP Metrics

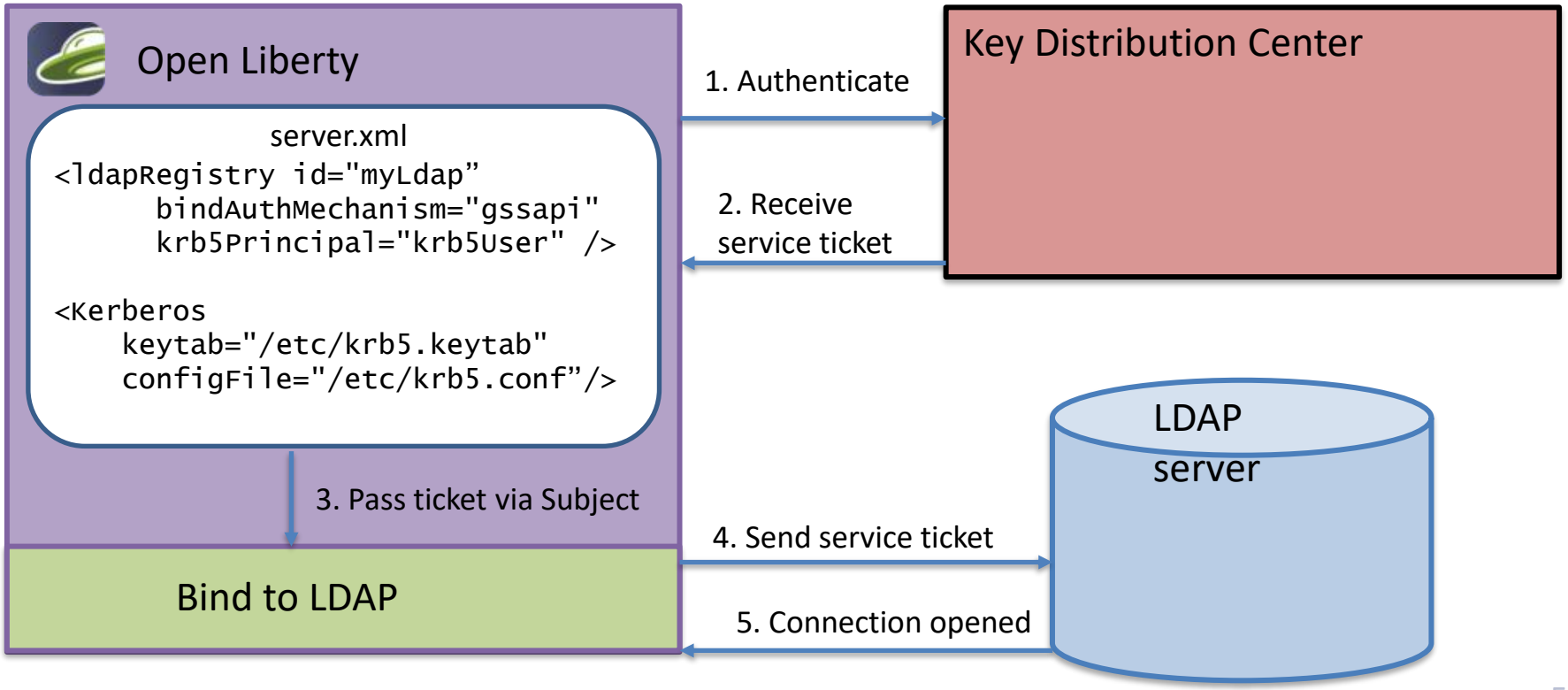

```
<featureManager>
    <feature>mpMetrics-3.0</feature>
    <feature>requestTiming-1.0</feature>
</featureManager>

<requestTiming sampleRate="1”
               slowRequestThreshold="10s">
    <servletTiming slowRequestThreshold="2s"
                   hungRequestThreshold="10s"/>
</requestTiming>
```

```
# TYPE vendor_requestTiming_activ
# HELP vendor_requestTiming_activ
requests currently running.
vendor_requestTiming_activeReques
# TYPE vendor_requestTiming_reque
# HELP vendor_requestTiming_reque
requests since the server started
vendor_requestTiming_requestCount
# TYPE vendor_requestTiming_hungR
# HELP vendor_requestTiming_hungRequestCount The number of servlet
requests that are currently running but are hung.
vendor_requestTiming_hungRequestCount 0
# TYPE vendor_requestTiming_slowRequestCount gauge
# HELP vendor_requestTiming_slowRequestCount The number of servlet
requests that are currently running but are slow.
vendor_requestTiming_slowRequestCount 0
```

Request Timing Grafana



Kerberos bind to LDAP server



Config for Kerberos Authentication

Keytab Search order

1. server.xml
2. <user.home>/krb5.keytab

Credential Cache Search order

1. server.xml
2. KRB5CCNAME environment variable
3. /tmp/krb5cc_<uid>
4. <user.home>/krb5cc_<user.name>

Server.xml

```
<ldapRegistry id="myLdap”
      bindAuthMechanism="gssapi"
      krb5Principal="krb5User" />

<Kerberos
    keytab="/etc/krb5.keytab"
    configFile="/etc/krb5.conf”/>
```

Multi-Module Support in dev mode

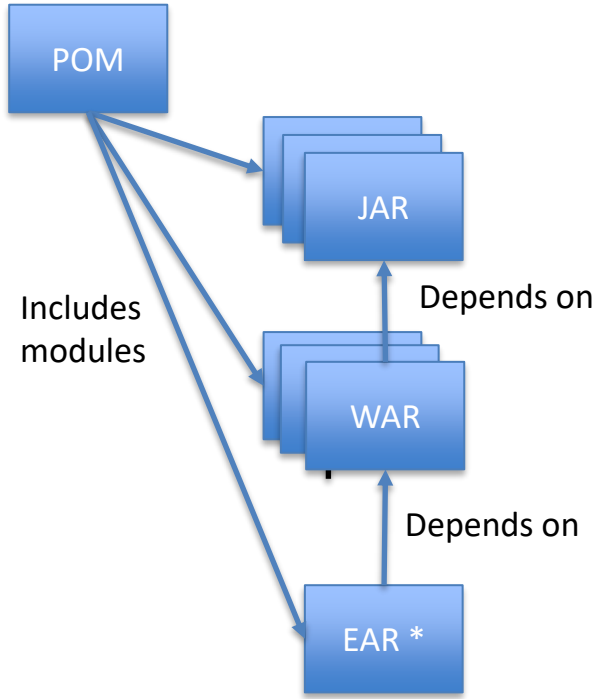
Open Liberty

Fast iterative development for projects with multiple modules

Hot deploy, test and debug changes

Available in milestone releases for Liberty Maven Plugin

mvn liberty:devc



Labs, Questions

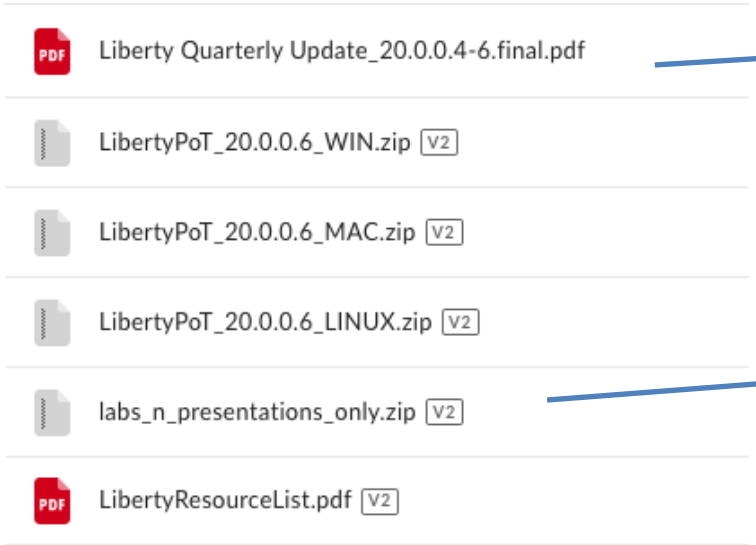
Open Liberty

WebSphere Liberty Virtual POT

Download the operating system specific content zip file from either

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

https://public.dhe.ibm.com/ibmdl/export/pub/software/websphere/wasdev/pot/ (slower but firewall friendly – about 1 hour download)



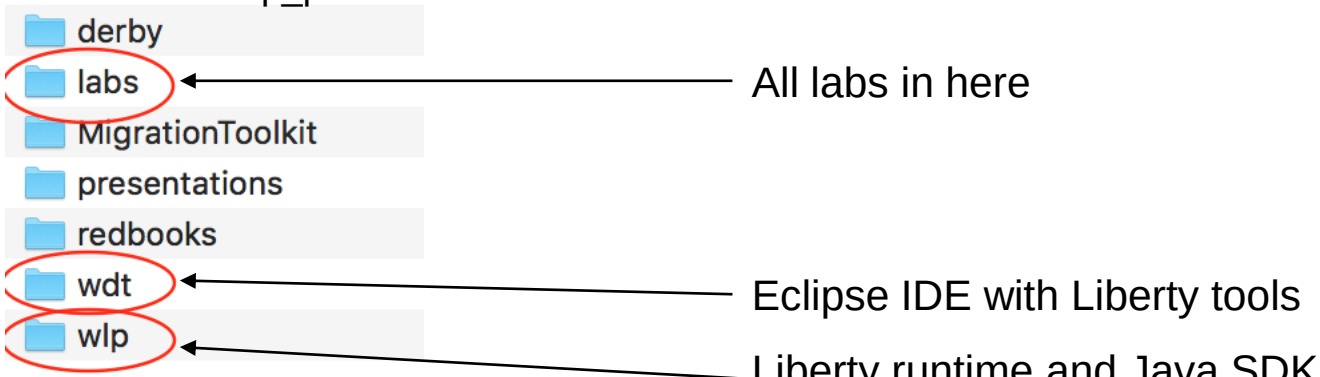
charts only

charts & lab instructions only

WebSphere Liberty Virtual POT

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



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
- 52 guides
  - MicroProfile & Jakarta EE
  - Open Shift, Docker, Kubernetes Istio
- Latest Guides
  - *Authenticating users through social media providers*
  - *Deploying microservices to OpenShift by using Kubernetes Operators*

https://openliberty.io/guides

Resources

Useful Liberty Links

- Why choose Liberty for Microservices: https://ibm.biz/6ReasonsWhyLiberty
- Choosing the right Java runtime: https://ibm.biz/ChooseJavaRuntime
- How to approach application modernization: https://ibm.biz/ModernizeJavaApps
- Open Liberty: https://www.openliberty.io
- Open Liberty Guides: https://www.openliberty.io/guides

Programming API Links

- Eclipse MicroProfile: https://microprofile.io
- Jakarta EE: https://jakarta.ee

Support Links

- 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
- Container Support Policy: https://www.ibm.com/support/pages/container-deployment-support-policy-websphere-liberty

Migration Tools

- IBM Transformation Advisor http://ibm.biz/cloudta
- WebSphere Binary Migration Toolkit: http://ibm.biz/WAMT4AppBinaries

Resources

Red Hat UBI images

- https://hub.docker.com/r/ibmcom/websphere-liberty
- https://hub.docker.com/r/openliberty/open-liberty

Ubuntu images

- https://hub.docker.com/_/websphere-liberty
- https://hub.docker.com/_/open-liberty

IBM Container Registry images

- https://cloud.ibm.com/docs/Registry?topic=RegistryImages-ibmliberty

Configuration/build files in github

- https://github.com/WASdev/ci.docker
- https://github.com/OpenLiberty/ci.docker

Next Quarterly Update

Liberty 21.0.0.4-6 Update

~~Session#1: July 21, 2021 from 1-3pm ET - http://ibm.biz/Liberty-Jul21~~

Session#2: Aug 4, 2021 from 9-11am ET - http://ibm.biz/Liberty-Aug04

Liberty 21.0.0.7-9 Update

Session#1: Sep 22, 2021 from 1-3pm ET - http://ibm.biz/Liberty-Sep22

Session#2: Sep 29, 2021 from 9-11am ET - http://ibm.biz/Liberty-Sep29

WebSphere Customer Advisory Board

All Customers and Business Partners welcome

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

OPEN invitation

Join 230+ other members

Recordings/charts:

ibm.biz/WASCABCommunityResources

NEW

Monthly sessions for Business Partners and in the IST timezone

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

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@ibm.com

Thank You

Your Feedback is Important

Open Liberty