



Open Liberty

Liberty Quarterly Update

24.0.0.1-24.0.0.3

Alasdair Nottingham – Liberty Lead Architect

Agenda

Open Liberty



Part 1: 30 Minute Liberty overview

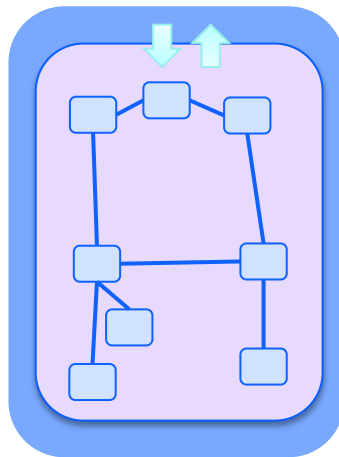
Part 2: What is new this quarter

Part 3: Q&A

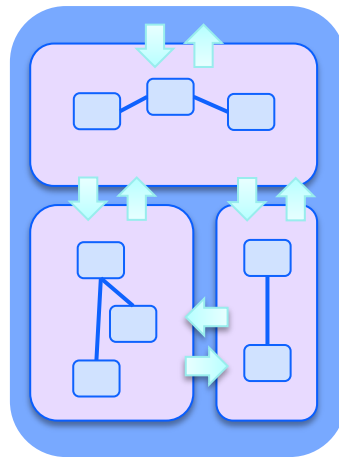
30 minute overview

There is a Spectrum of Architecture Styles

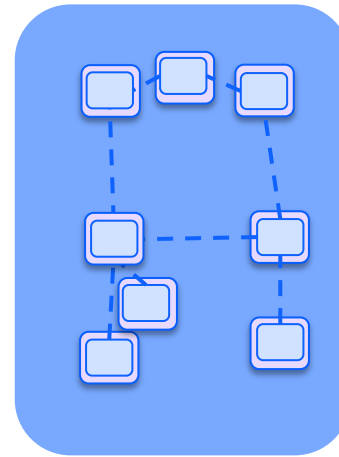
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Monolith



"Macroservices"



Microservices



Just enough application runtime

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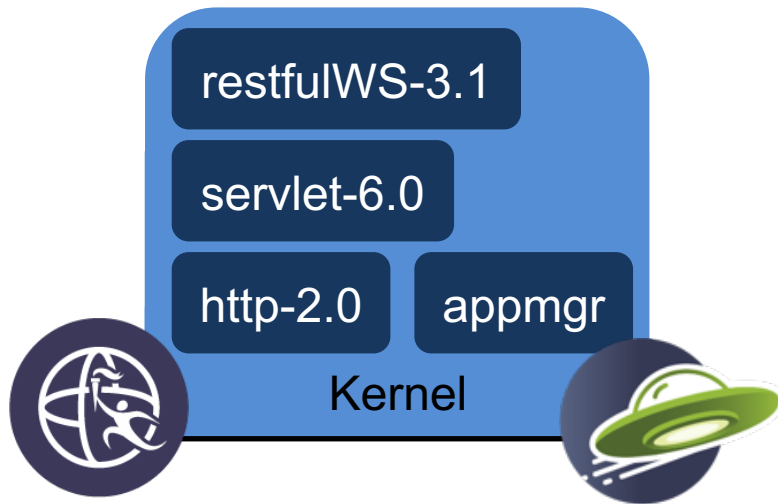


With a Traditional App Server, the Full API stack as well as administration and operations features are loaded in each server instance

With Liberty, you control which features are loaded into each server instance



```
<feature>restfulWS-3.1</feature>
```



Simple right-size build

Friction-free, right-size application and container build

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Application Build

Maven and Gradle Plugins

All Liberty artefacts released to maven central

| Package | Size on Disk | Memory |
|---|--------------|--------|
| Java EE 8 / Jakarta EE 8 + MicroProfile 3.3 | 121MB | 165MB |
| MicroProfile 3.3 | 59MB | 113MB |
| Servlet 4.0 | 24MB | 72MB |

Right-size runtime

Container Build

Leading container build approaches –
Dockerfile, Cloud Native Buildpack,
Source-2-Image

Certified Liberty images released to IBM
Container Registry

```
FROM icr.io/appcafe/open-liberty:kernel-slim-java8-openj9-ubi
COPY --chown=1001:0 server.xml /config/
RUN features.sh
COPY --chown=1001:0 target/*.war /config/apps
RUN configure.sh
```

Production-ready right-size containers

Liberty Operators

Addressing the Kubernetes skills gap

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Insulate from Kubernetes complexities

Automate common task: deploy, scale, upgrade, dump gather

Security capabilities out-of-the-box

Reduce configuration by up to 80%

New: simplified license management (WebSphere Liberty Operator)

```
apiVersion: liberty.websphere.ibm.com/v1
kind: WebSphereLibertyApplication
metadata:
  name: liberty-cloud-demo
spec:
  license:
    accept: false
    edition: IBM WebSphere Application Server
    productEntitlementSource: Standalone
    metric: Processor Value Unit (PVU)
  replicas: 3
  applicationImage: liberty-cloud-demo:1.0
  pullPolicy: Always
  expose: true
  storage:
    size: 2Gi
    mountPath: "/logs"
```

Cloud Deployments

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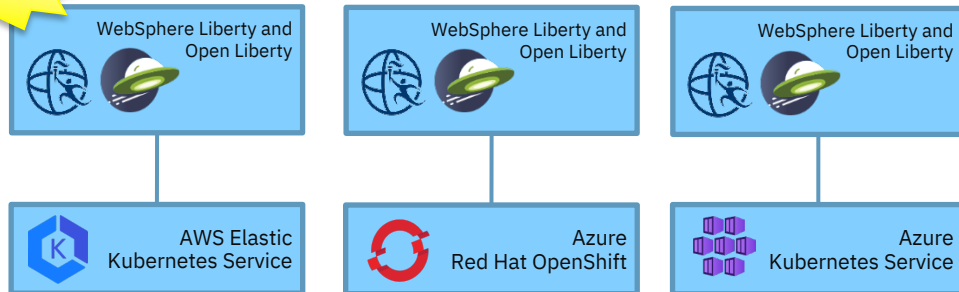
Support on leading clouds

- Liberty supported on all leading Cloud Virtual Machine, Kubernetes and OpenShift Environments
- Azure, AWS, IBM Cloud, Google Cloud, ... (Bring-Your-Own-License)
- **New:** AWS ECS Fargate CaaS



Simplified setup

- Marketplace and Partner Solution options simplify and accelerate setup in AWS and Azure at no extra cost
 - Provision or re-use Cluster
 - Provision or re-use container registry
 - Networking and load-balancing
 - Operator install and configuration
 - Application deployment



<https://docs.microsoft.com/en-us/azure/developer/java/ee/websphere-family>

Performance

Help reduce costs and achieve sustainability targets

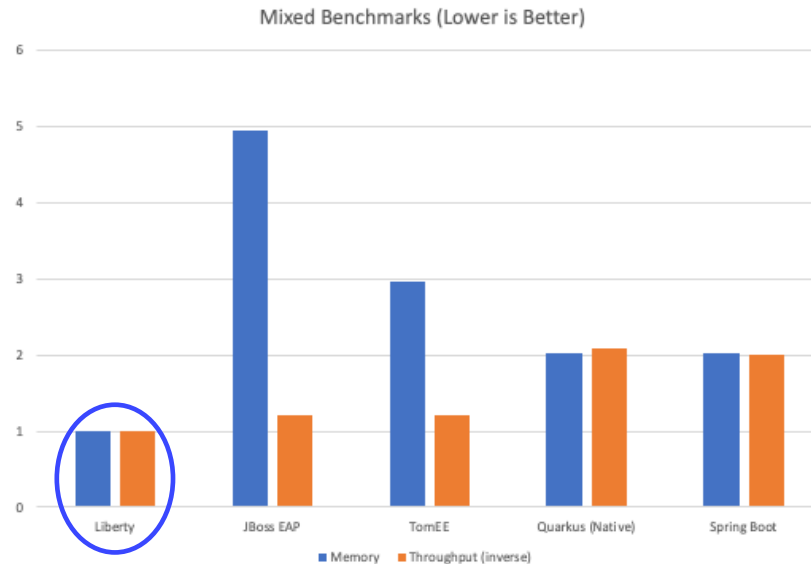
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Better throughput and lower memory mean less hardware for the same workloads

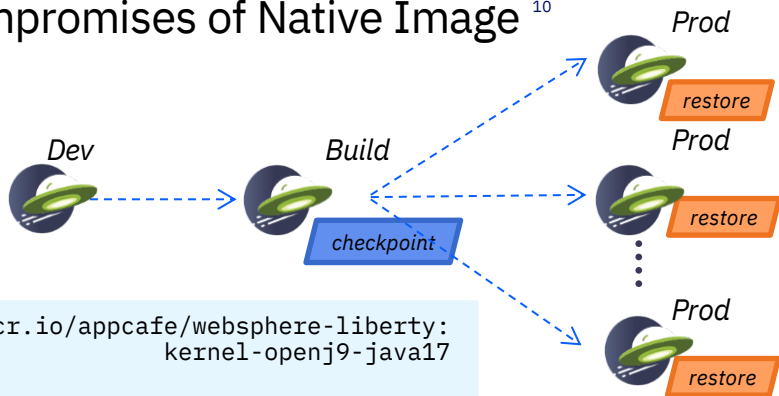
Less hardware means lower infrastructure and license costs

Less hardware means lower environmental impact



InstantOn without compromise

- Start applications in milliseconds
- Ideal for serverless
- Up to 10-18x faster
- With all the benefits of the JVM and none of the compromises of Native Image¹⁰



```
FROM icr.io/appcafe/websphere-liberty:  
kernel-openj9-java17
```

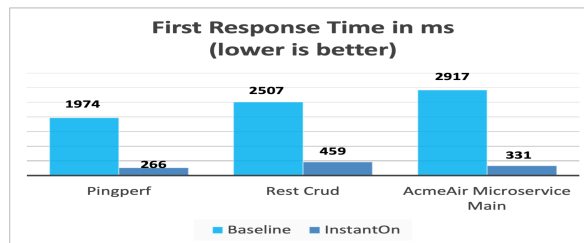
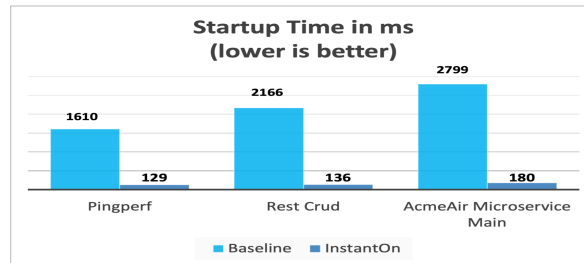
```
COPY src/main/liberty/config/*.xml  
/config/server.xml
```

```
RUN features.sh
```

```
COPY target/*.war /config/apps/
```

```
RUN configure.sh
```

```
RUN checkpoint.sh afterAppStart
```



| Characteristics | Semeru InstantOn | Semeru JVM | Graal Native |
|-------------------------|------------------|------------|--------------|
| Full Java support | Yes | Yes | No |
| 'Instant on' | Yes | No | Yes |
| High throughput | Yes | Yes | No |
| Low memory (under load) | Yes | Yes | No |
| Dev-prod parity | Yes | Yes | No |

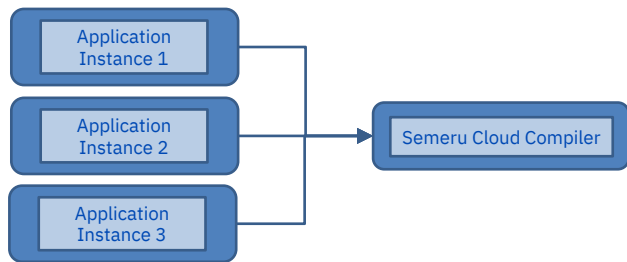
Cloud Optimization

Optimizing memory for Kubernetes deployments

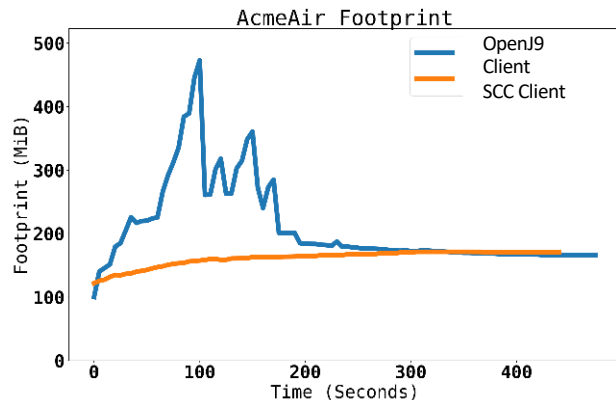
Offloads costly JIT compilation to separate server

Dramatically reduces peak memory usage

Future: Simple Kubernetes enablement through Liberty Operators



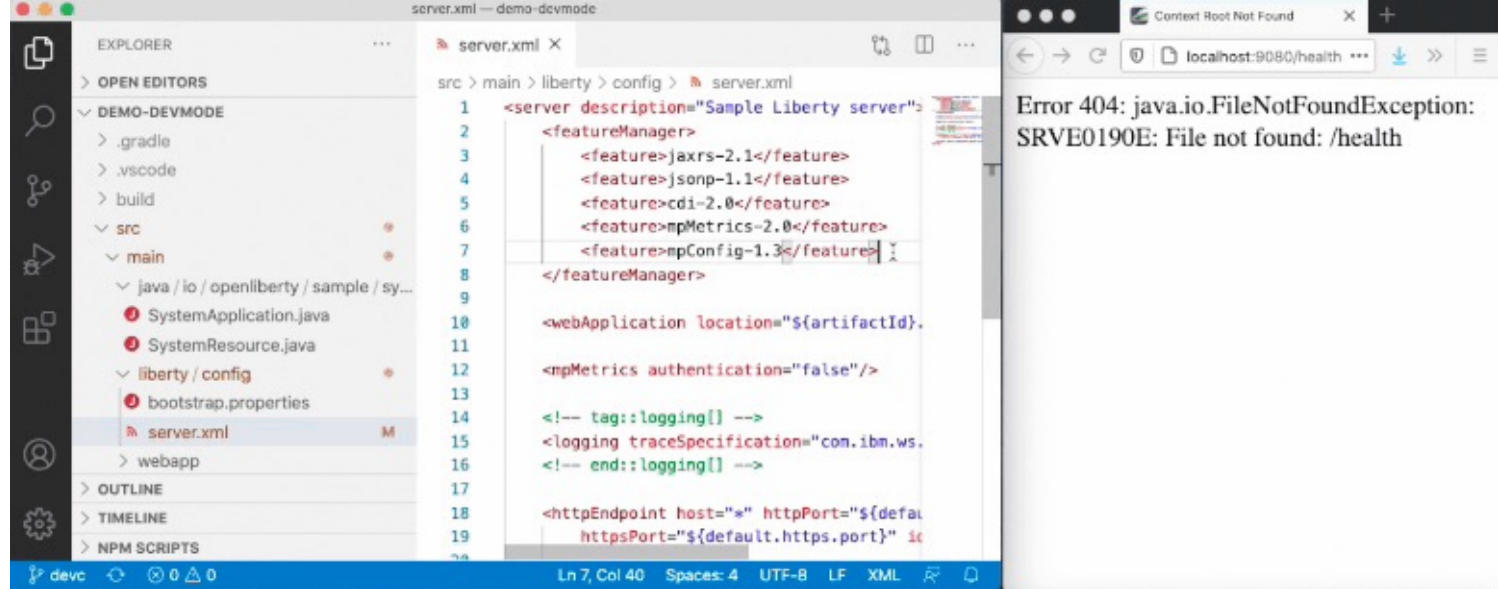
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| Service | Memory limit w/o SCC Server | Memory limit with SCC Server | Saving |
|----------|-----------------------------|------------------------------|----------|
| Auth | 1,050 MB | 750 MB | 300MB |
| Booking | 3,300 MB | 2,400 MB | 900MB |
| Customer | 1,650 MB | 1,050 MB | 600MB |
| Flight | 2,250 MB | 1,250 MB | 1,000 MB |
| Main | 600 MB | 450 MB | 150MB |
| Total | 8,850 MB | 5,900 MB | 2,950 MB |

Dev Mode

- No rebuild
- No redeploy
- No install
- No restart
- Just code!
- In containers too



CI/CD Optimized

Seamless currency to eliminate technical debt and stay secure

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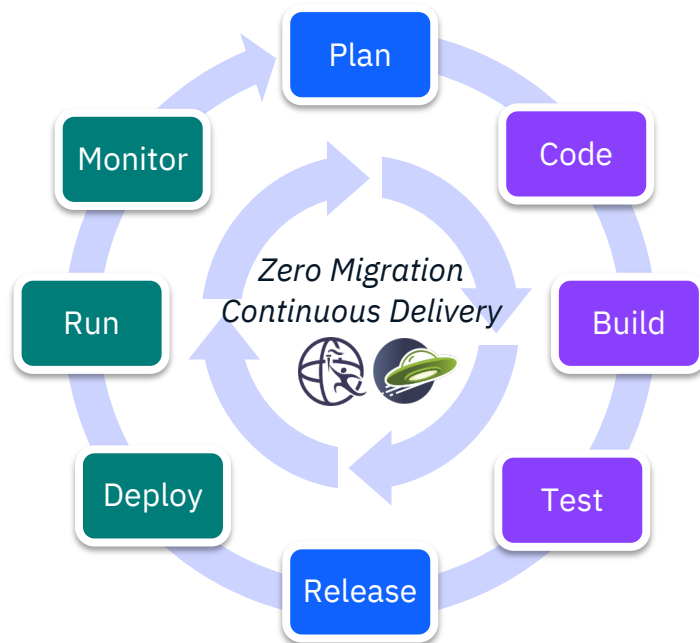


Zero Migration makes staying current easy

- No configuration or runtime behavior changes

Continuous Delivery gives frequent and reliable access to the latest features and fixes

- Full releases every 4 weeks
- Quarterly LTS releases



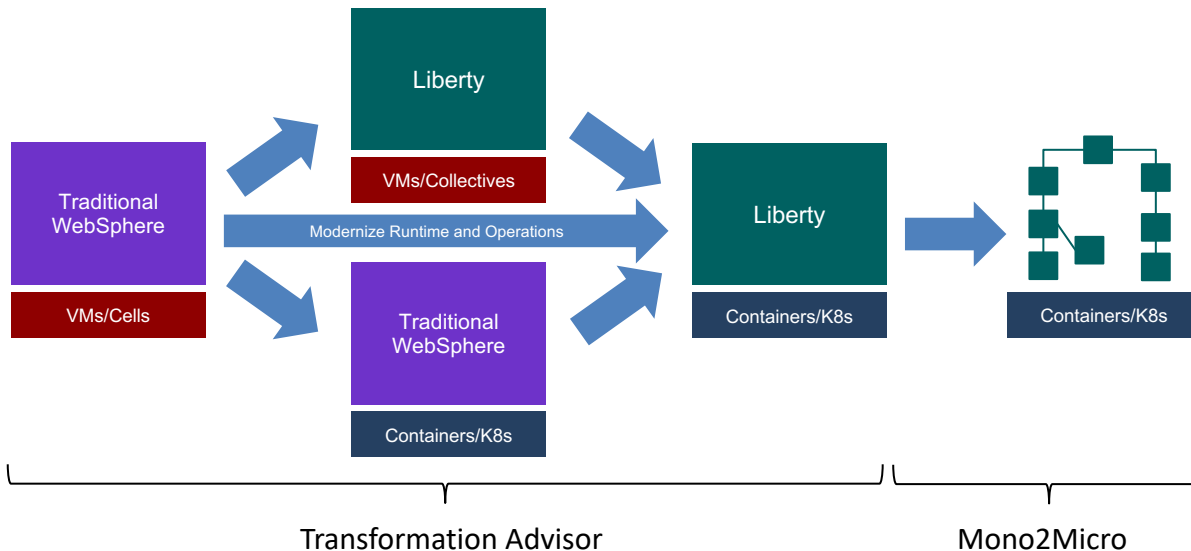
Liberty is Ideal for Modernization

Open Liberty



Liberty is the only runtime with the breadth of first-class deployment, API, and architecture choices to enable progressive modernization, reducing risk, reducing cost, and reducing time-to-value

- First-class support for VMs and Containers/Kubernetes
- First-class support for Monoliths and Microservices
- First-class support for Java EE, Jakarta EE and MicroProfile



Recent Updates

Periodic Table of Liberty (24.0.0.3)



zOS

ND

Base

Core

Open
Liberty

New in
4Q23

New in
3Q23

New in
2Q23

New in
1Q24

APIs

| batchSMLogging-1.0 | | zosLocalAdapters-1.0 | | zosTransaction-1.0 | | zosSecurity-1.0 | | |
|--------------------------|--------------------------|----------------------|-------------------------|--------------------|---------------------------|-----------------------|-------------------------|--|
| collectiveController-1.0 | | dynamicRouting-1.0 | | healthManager-1.0 | | scalingController-1.0 | | |
| clusterMember-1.0 | | healthAnalyzer-1.0 | | scalingMember-1.0 | | Security | | |
| cloudant-1.0 | jakartaee-9.1 | | batchManagement-1.0 | | Operations | | acmeCA-1.0 | |
| javaee-8.0 | jakartaee-8.0 | | wsAtomicTransaction-1.2 | | | | wsSecurity-1.1 | |
| javaee-7.0 | heritageAPIs-1.1 | | | | | | wsSecuritySaml-1.0 | |
| jakartaee-10.0 | sipServlet-1.1 | | | | | | | |
| appAuthorization-2.1 | mpGraphQL-2.0 | | adminCenter-1.0 | | audit-1.0 | | ldapRegistry-3.0 | |
| bells-1.0 | mpReactiveMessaging-3.0 | | collectiveMember-1.0 | | constrainedDelegation-1.0 | | oauth-2.0 | |
| facesContainer-4.0 | mpReactiveStreams-3.0 | | distributedMap-1.0 | | federatedRegistry-1.0 | | openid-2.0 | |
| grpc-1.0 | osgiConsole-1.0 | | eventLogging-1.0 | | jwt-1.0 | | openidConnectClient-1.0 | |
| jdbc-4.3 | persistenceContainer-3.1 | | logstashCollector-1.0 | | jwtSso-1.0 | | openidConnectServer-1.0 | |
| json-1.0 | springBoot-3.0 | | monitor-1.0 | | sessionDatabase-1.0 | | passwordUtilities-1.1 | |
| jsonbContainer-3.0 | webProfile-10.0 | | openapi-3.1 | | webCache-1.0 | | samlWeb-2.0 | |
| jsonpContainer-2.1 | webProfile-9.1 | | requestTiming-1.0 | | wmqMessagingClient-3.1 | | scim-1.0 | |
| mail-2.1 | webProfile-8.0 | | usageMetering-1.0 | | | | socialLogin-1.0 | |
| microProfile-6.1 | webProfile-7.0 | | restConnector-2.0 | | | | spnego-1.0 | |
| mpContextPropagation-1.3 | xmlBinding-4.0 | | sessionCache-1.0 | | | | transportSecurity-1.0 | |

Focus areas

Open Liberty



Developer Experience

APIs

Core Runtime

Cloud

Security

Liberty Last Quarter Review

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Security

- OpenID Connect Back Channel Logout

Dev Exp

Core Runtime

- InstantOn
 - scim-1.0
 - jaxws-2.2
 - xmlWS-3.0
- InstantOn support for Power and z
- Verbose GC OOTB

API

- MicroProfile Reactive Messaging 3.0
- MicroProfile Reactive Streams 3.0

Cloud

- Java 21 container images

Cloud native reactive microservices with WebSphere Liberty InstantOn and Kafka

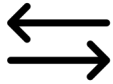
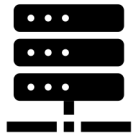
Developed by Kevin Grigorenko

GitHub: <https://github.com/IBM/libertyEventDrivenSurvey>

Solution includes:

- 01 Microservices (containers)
- 02 Cloud Native (containers)
- 03 MicroProfile Reactive Messaging
- 04 Kafka event streams
- 05 Knative Scale-to-zero
- 06 Liberty InstantOn
- 07 Red Hat OpenShift

Microservices



HTTP/
REST

Microservice

- Limited functional scope
- Network-accessible service
- Runs in its own process

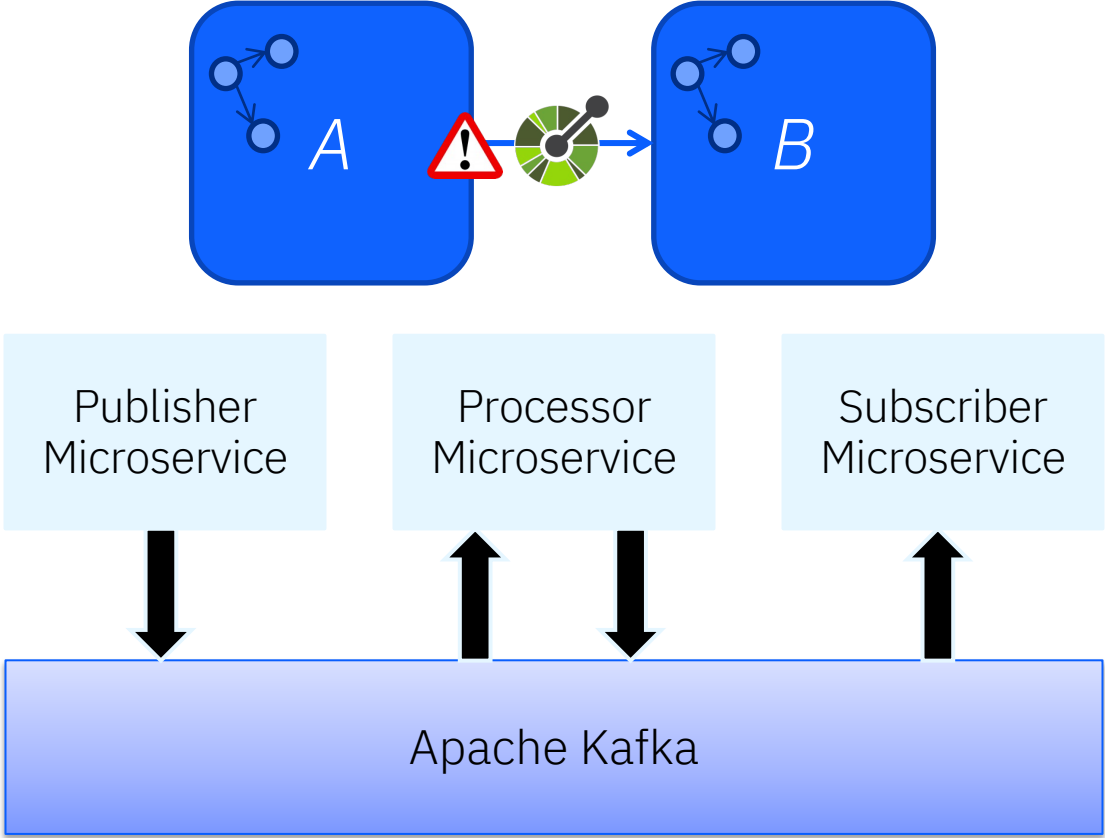
Container



JAKARTA EE



Reactive Microservices



Publisher Microservice

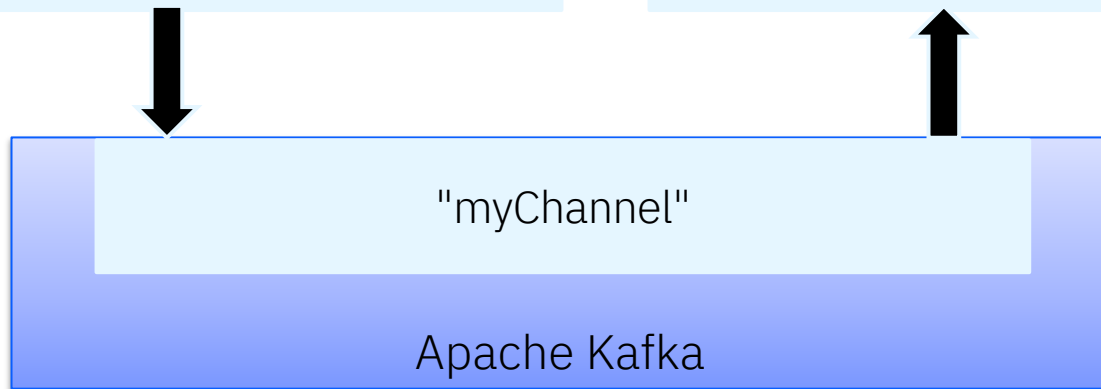
```
@Inject @Channel("myChannel")
private Emitter<String> emitter;

public void publishMessage() {
    emitter.send("a");
    emitter.send("b");
}
```

Subscriber Microservice

```
@Incoming("myChannel")
public void sink(String word)

@Incoming("myChannel")
@Outgoing("outgoing1")
public void transform(String word)
```

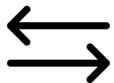


Knative Serving

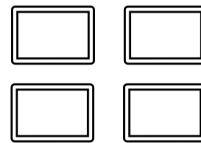
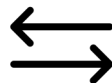


OpenShift Serverless

KNative Serving



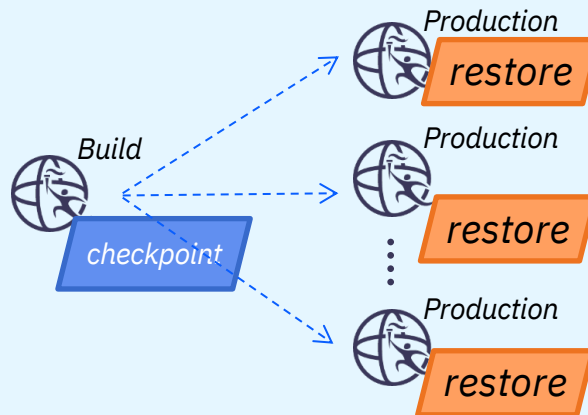
HTTP/
REST



Pods

```
autoscaling.knative.dev/max-scale: "10"  
autoscaling.knative.dev/scale-down-delay: "300s"
```


IBM WebSphere Liberty InstantOn



Up to
15X
faster!



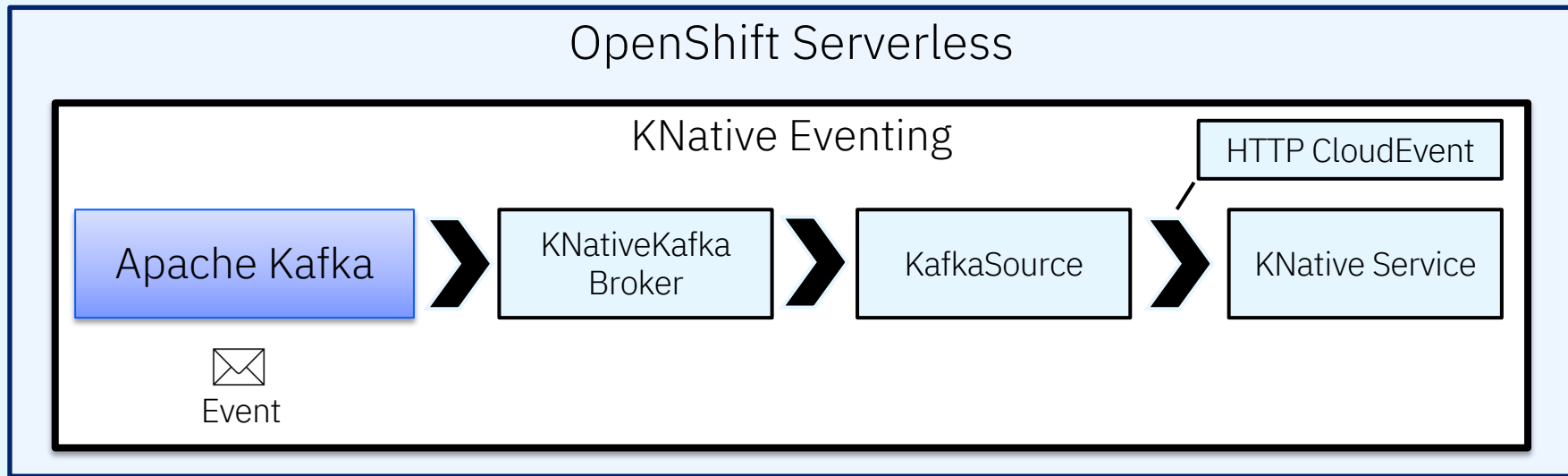
IBM WebSphere Liberty



IBM Semeru Runtimes

OpenJ9 OpenJDK

Knative Eventing



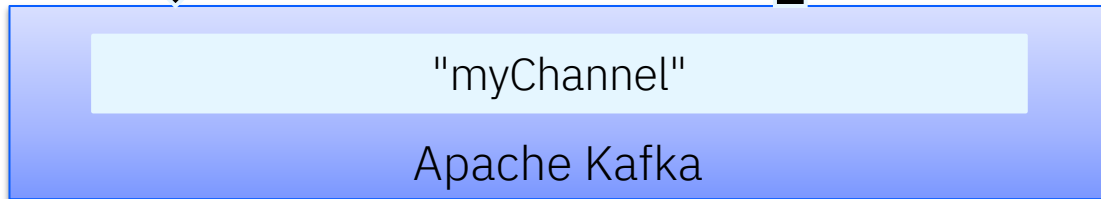
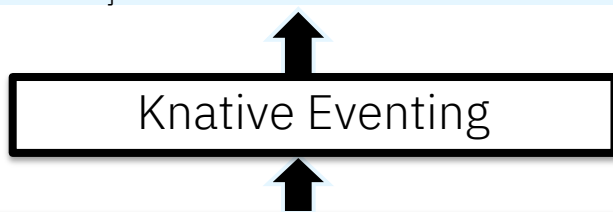
Publisher Microservice

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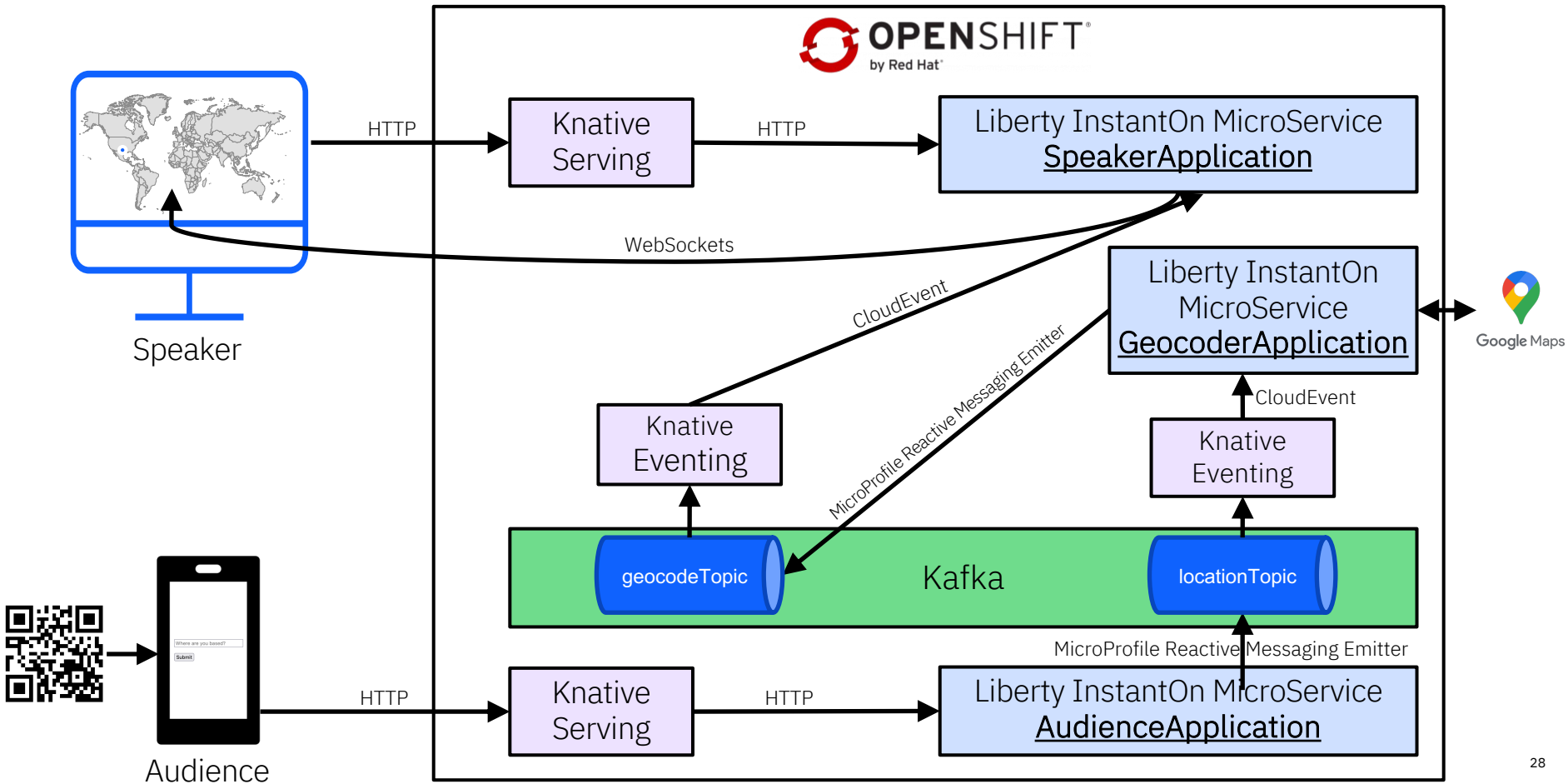
public void publishMessage() {
    emitter.send("a");
    emitter.send("b");
}
```

Subscriber Microservice

```
@RequestScoped
public class CloudEventsProcessor {
    @Path("locationInput")
    @POST
    @Produces(MediaType.APPLICATION_JSON)
    public Response locationInput(CloudEvent incoming) {
        CloudEventData data = incoming.getData();
        String location = null;
        try (StringDeserializer deserializer = new StringDeserializer()) {
            location = deserializer.deserialize(null, data.toBytes());
        }
    }
}
```



Event Driven Architecture



Periodic Table of Liberty (24.0.0.3)



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ND

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Core

Open
Liberty

New in
4Q23

New in
3Q23

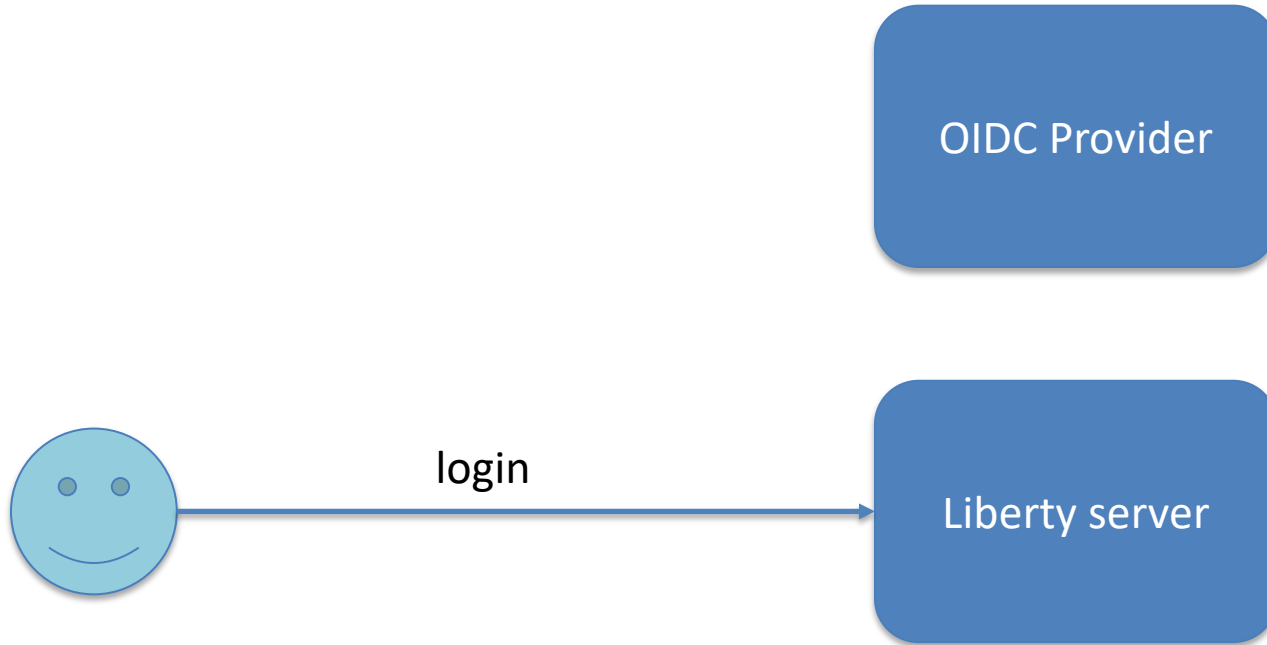
New in
2Q23

New in
1Q24

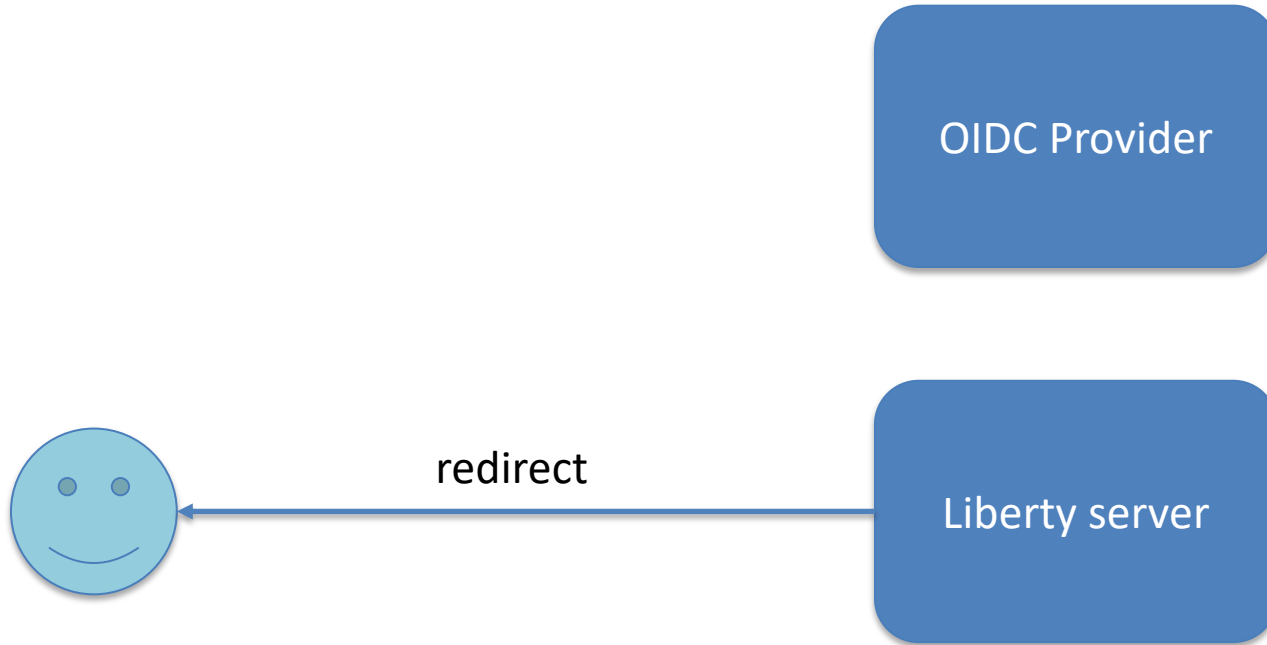
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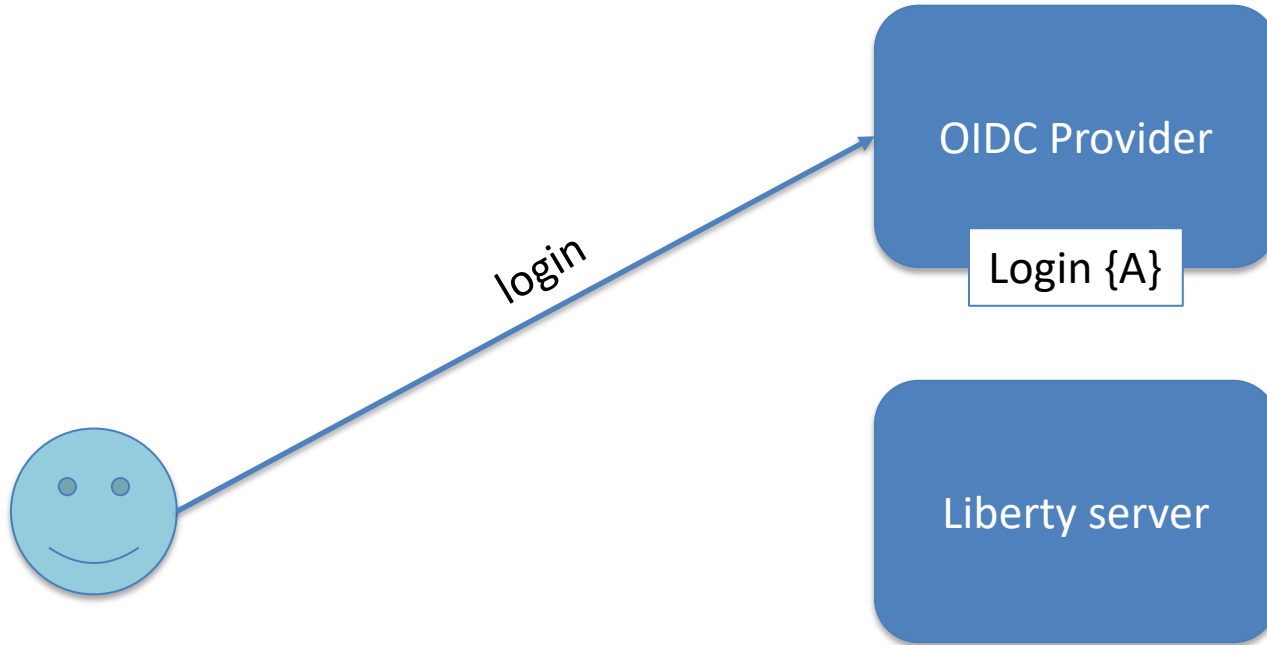
SSO with OIDC



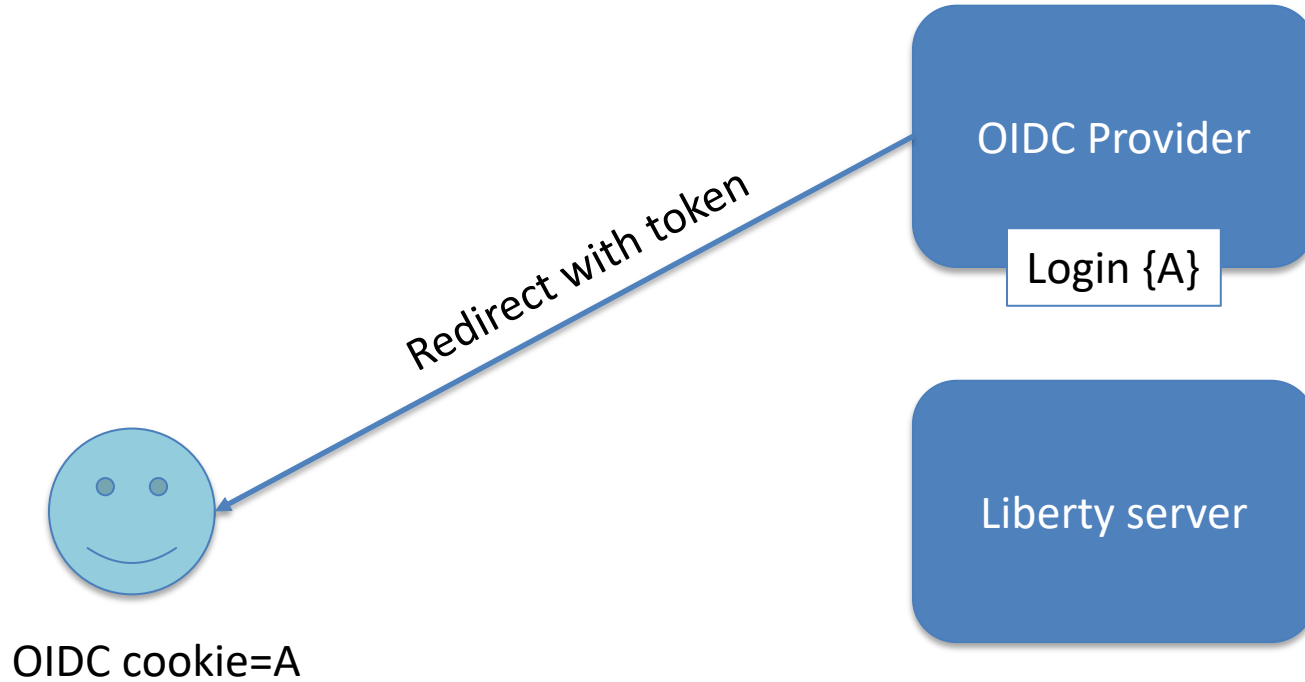
SSO with OIDC



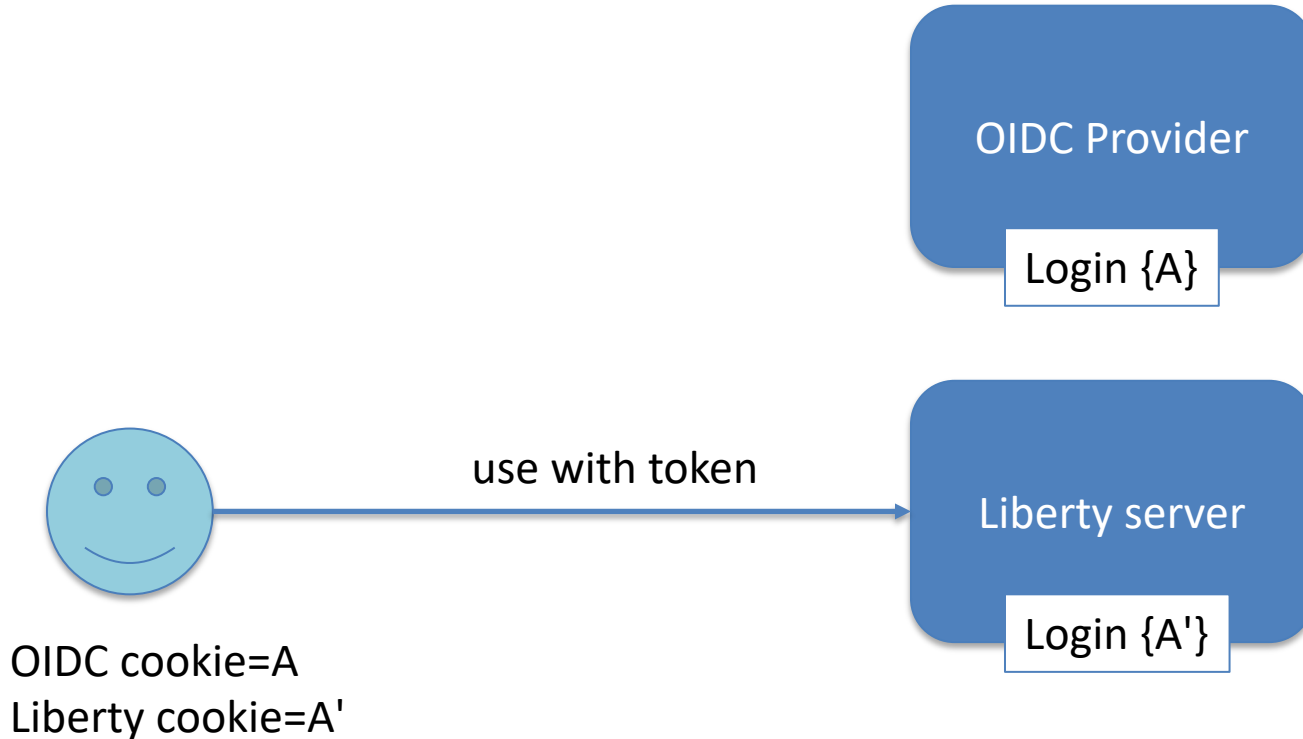
SSO with OIDC



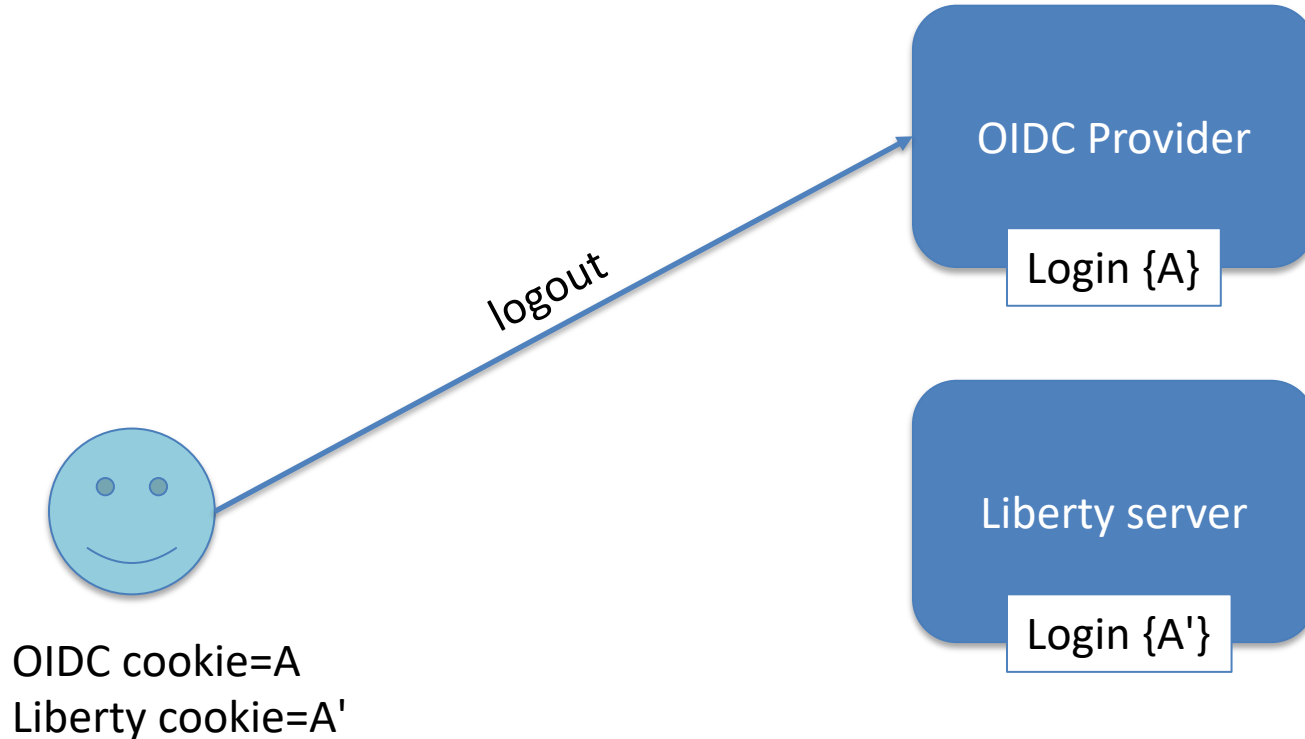
SSO with OIDC



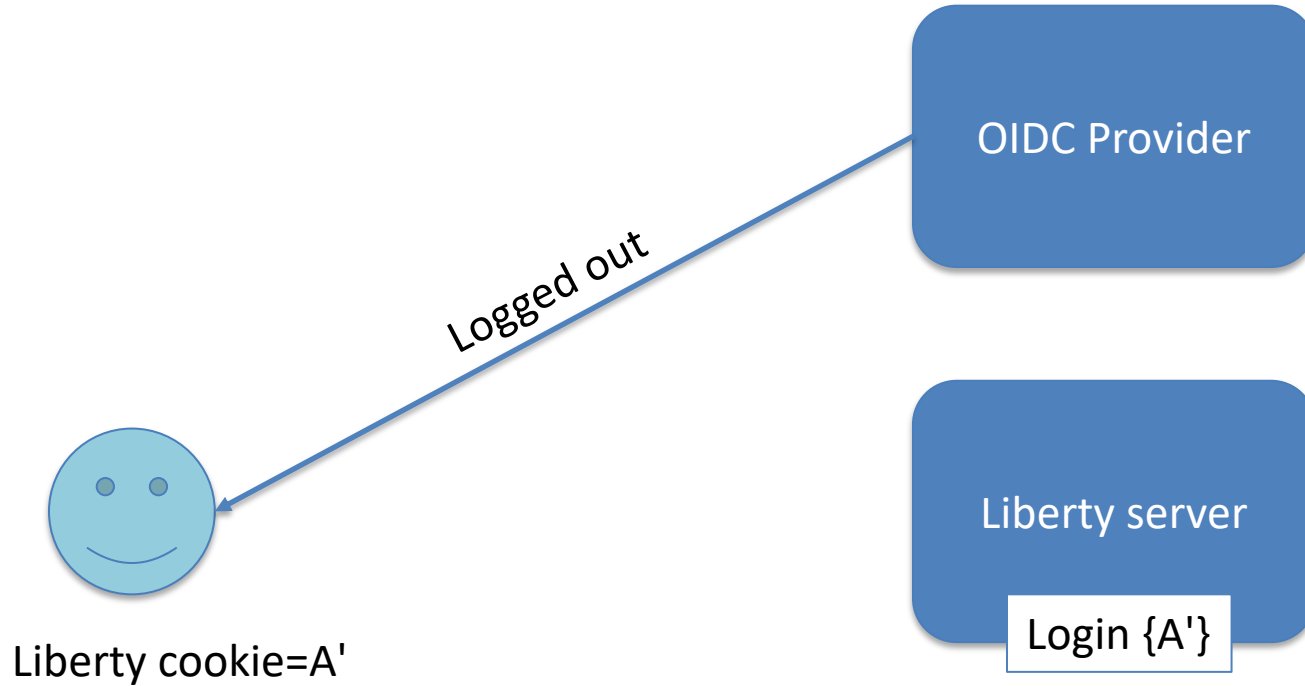
SSO with OIDC



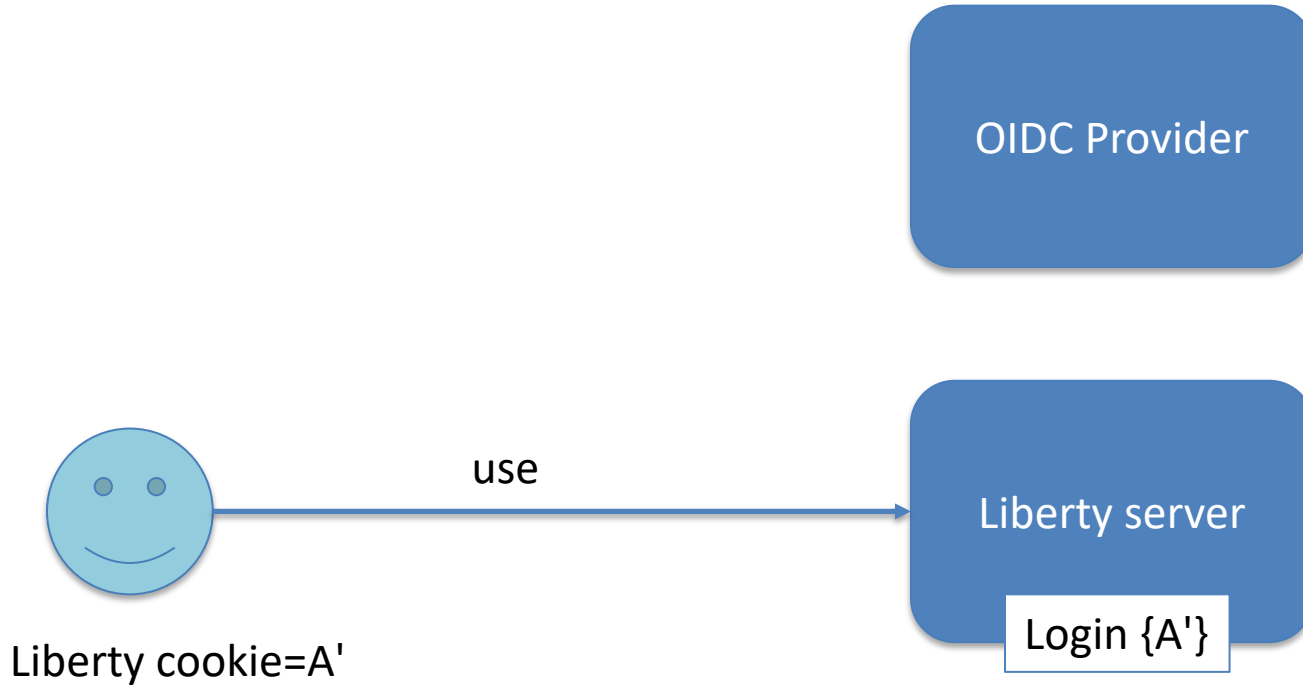
SSO with OIDC logout



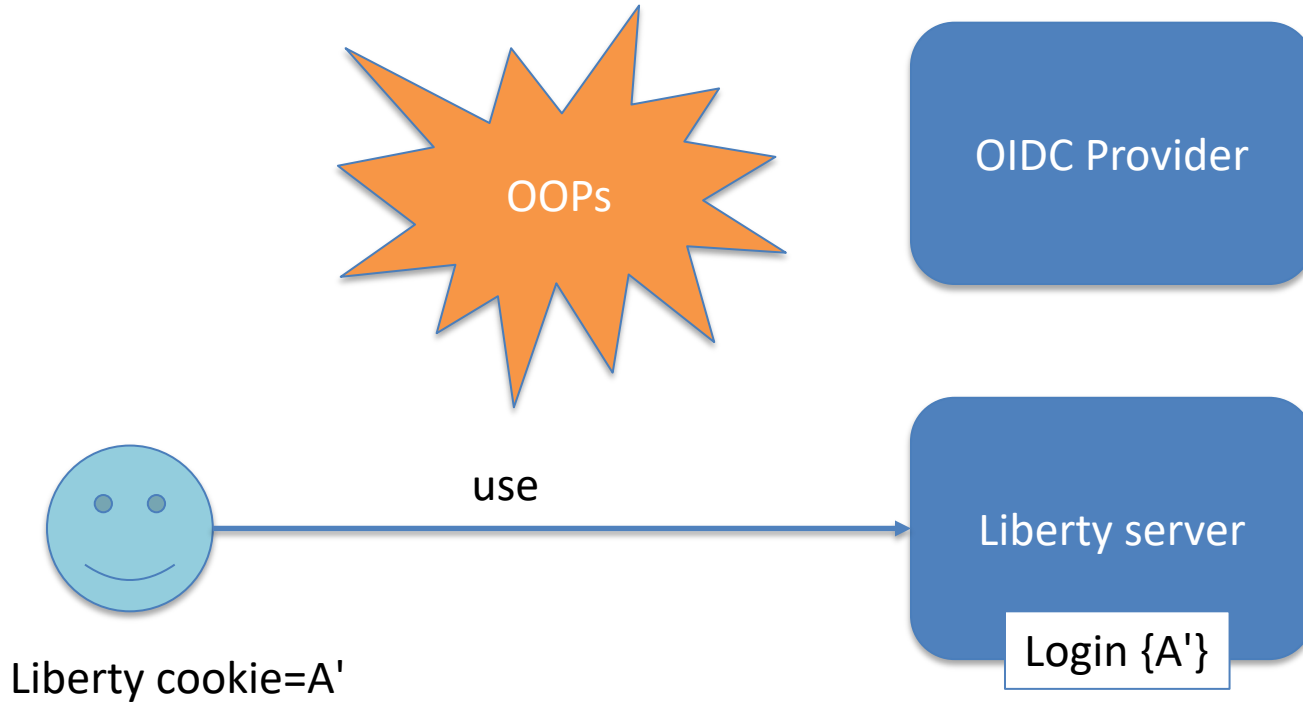
SSO with OIDC logout



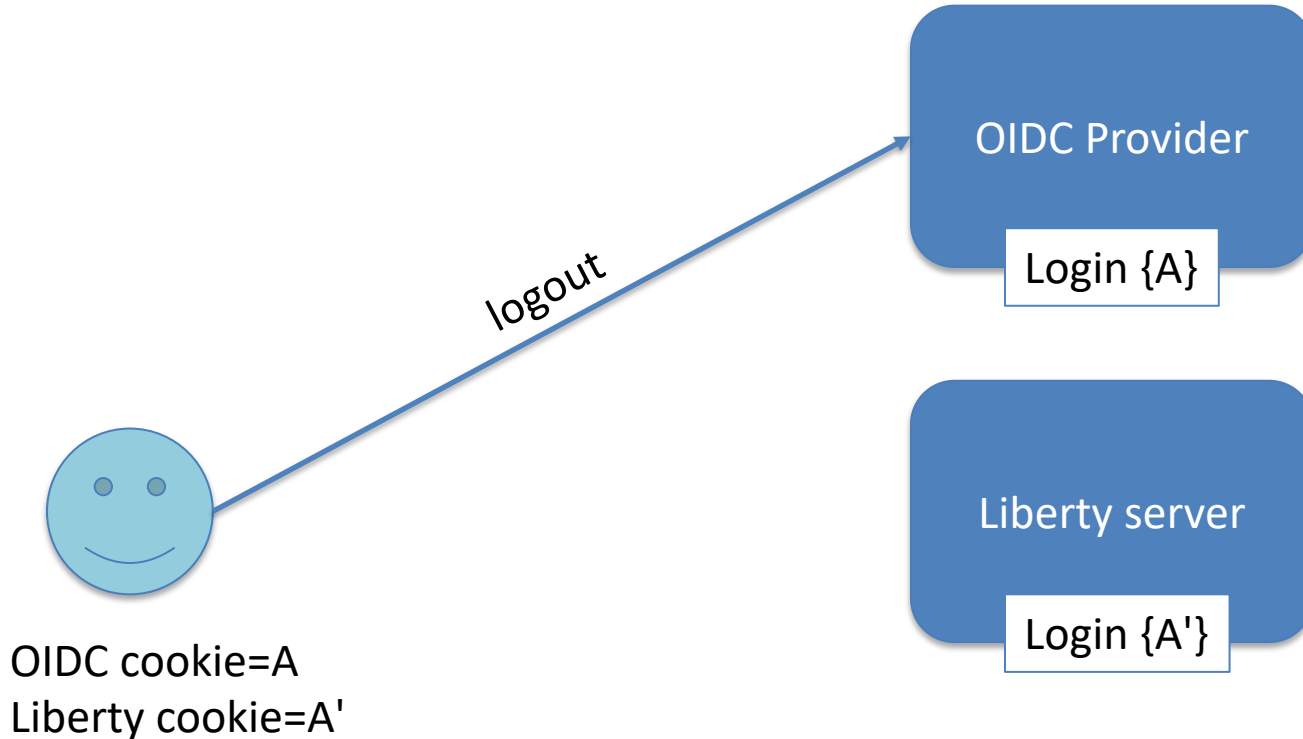
SSO with OIDC



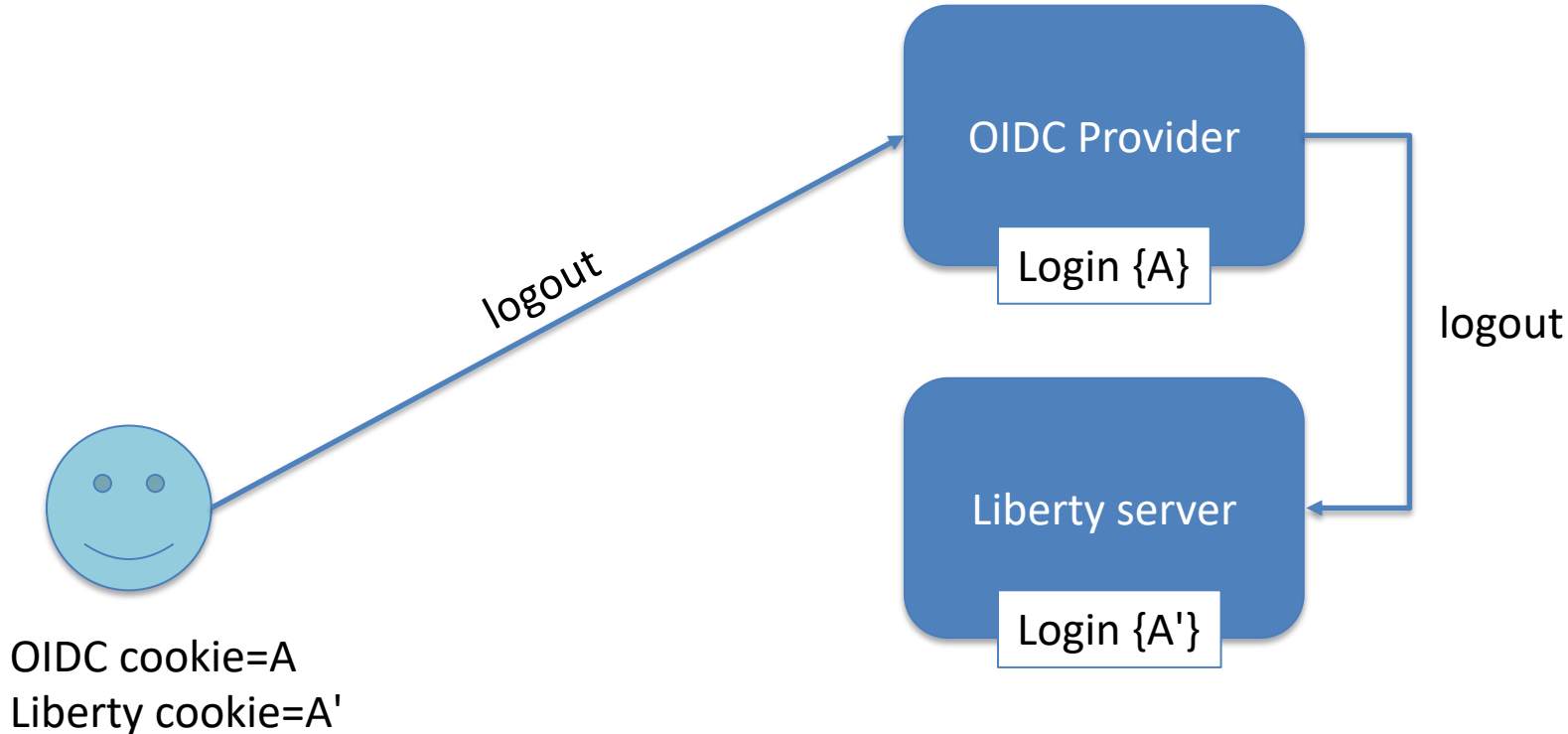
SSO with OIDC



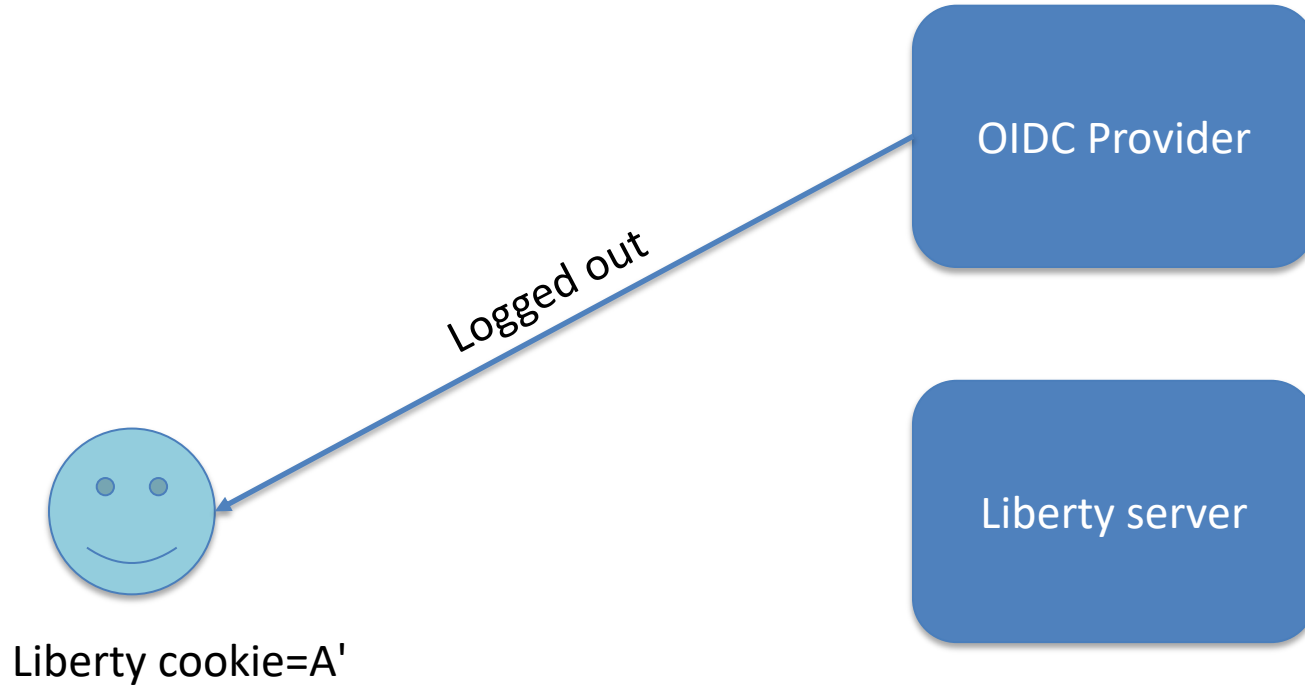
SSO with OIDC logout



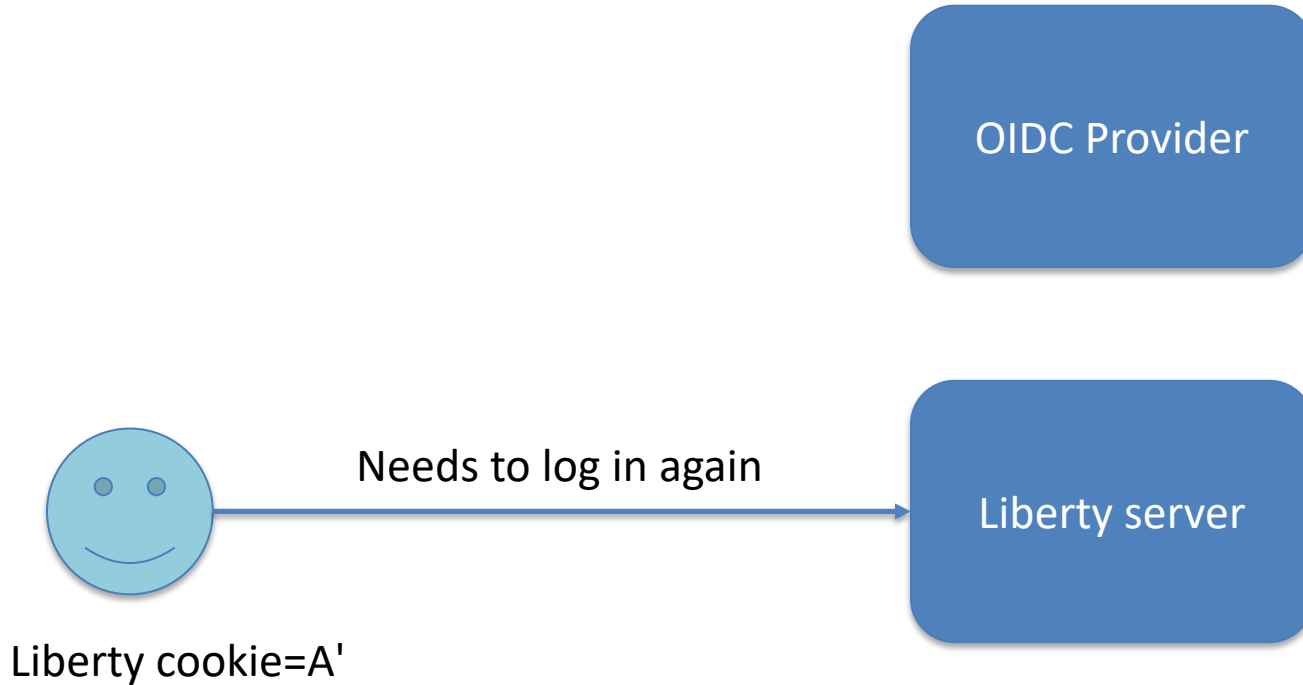
SSO with OIDC logout



SSO with OIDC logout



SSO with OIDC



How to configure



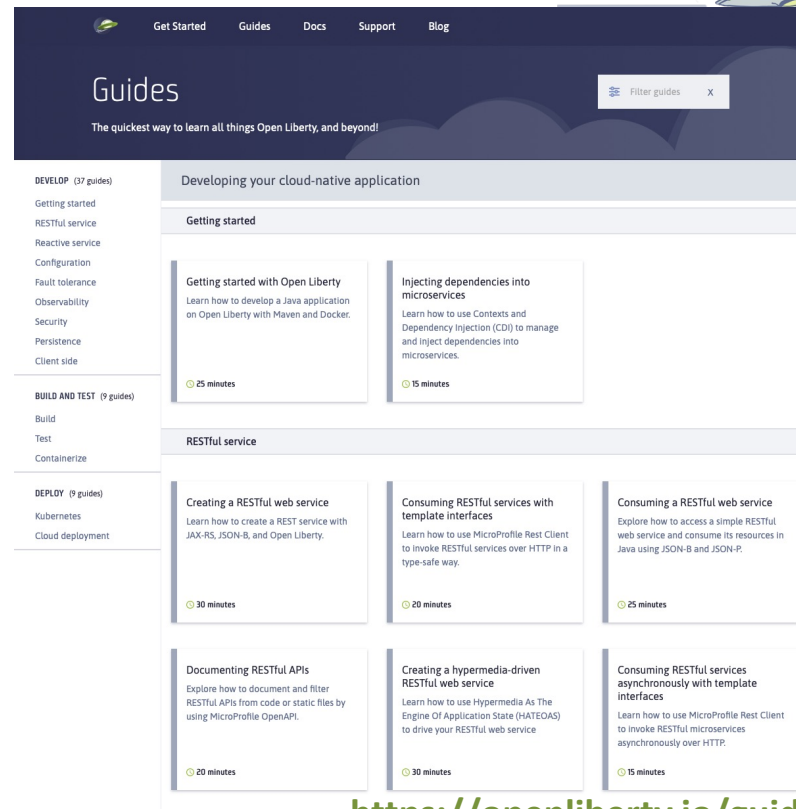
- Configuration goes in your OIDC Provider
- socialLogin-1.0
 - https://hostname.for.liberty/ibm/api/social-login/backchannel_logout/{socialLoginId}
- OpenidConnectClient-1.0
 - https://hostname.for.liberty/oidcclient/backchannel_logout/{oidcClientId}
- Id value is from the id attribute on oidcLogin or openidConnectClient element in Liberty server.xml

Labs, Questions

Open Liberty Guides



- Hands-on learning in ~20 minutes
- 64 guides
 - MicroProfile & Jakarta EE
 - Open Shift, Docker, Kubernetes Istio
- Latest Guide
 - *Enabling distributed tracing in microservices with OpenTelemetry and Jaeger*



<https://openliberty.io/guides>

Liberty References

Read



Why choose Liberty for
Microservices
ibm.biz/6ReasonsWhyLiberty

Choosing the right Java
runtime
ibm.biz/ChooseJavaRuntime

How to approach application
modernization
ibm.biz/ModernizeJavaApps

Watch



Explore the latest on WebSphere and
Liberty
ibm.biz/LibertyTV

View our recent Expert TV episode all
about Liberty ibm.biz/Liberty101

Learn more about Liberty in containers
and Operator-based deployment
ibm.biz/LibertyContainerOperator

Experience

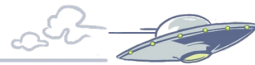


Try Liberty as a beginner
openliberty.io/guides/getting-started.html

Learn Liberty, MicroProfile,
Containers, Kubernetes,
Hands-on
openliberty.io/guides

Try dev mode in Containers
<https://openliberty.io/guides/docker.html>

Resources



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.ibm.com/support/pages/node/869798>
- Container Support Policy: <https://www.ibm.com/support/pages/node/6349145>
- Enhancement Requests: <https://cloud-platform.ideas.ibm.com>

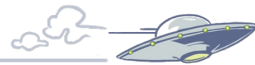
Migration Tools

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

Developer Tools

- IntelliJ IDEA <https://plugins.jetbrains.com/plugin/14856-liberty-tools>
- VS Code <https://marketplace.visualstudio.com/items?itemName=Open-Liberty.liberty-dev-vscode-ext>
- Eclipse <https://marketplace.eclipse.org/content/liberty-tools>

Resources



Red Hat UBI images

- icr.io/appcafe/websphere-liberty
- icr.io/appcafe/open-liberty

Configuration/build files in github

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

Next Quarterly Update

Open Liberty



Liberty 24.0.0.1-3 Update

~~Session#1: April 18, 2024 from 9-10:30 ET~~

Session#2: April 25, 2024 from 1-2:30 ET

Liberty 24.0.0.4-6 Update

Session#1: July 18, 2024 from 9-10:30 ET - <https://ibm.biz/Liberty-Jul18>

Session#2: July 25, 2024 from 1-2:30 ET - <https://ibm.biz/Liberty-Jul25>

Join the Liberty CAB

WebSphere Customer Advisory Board

Email:

claudiab@us.ibm.com

Webex:

<https://ibm.webex.com/meet/claudiab>

Community Resource:

<http://ibm.biz/WASCABCommunityResources>

Advisory Board:

<http://ibm.biz/WebSphereAdvisoryBoard>

Weekly meetings

Thursday and Friday
9:15 am EST

Join →

Monthly meetings

- Business Partner track
- Time zone friendly sessions

Join →

Other Programs

- Cloud Pak Week
- Previews, Demos
- Labs, workshops
- 1-on-1

We're here to help

Join 350+ other members
Be part of customer round
tables and deep dive meetings

Engage when you have time:

- Stay in the loop at meetings
- Share solutions and pain points
- Connect with other customers
- Access to resources and experts
- Customized meetings
- Special offers

Questions?

<http://stackoverflow.com/questions/tagged/websphere-liberty>
alasdair@ibm.com



Thank You

Your Feedback is Important