

Bespoke containers with Jlink and OpenShift

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Overview



Java modules



Red Hat
OpenShift

Red Hat Universal Base Image (UBI)

[red.ht/ubi-eula](#) (PDF)

`registry.access.redhat.com/ubi9/ubi`

`ubi, ubi-minimal, ubi-micro`

<https://catalog.redhat.com/software/containers/explore>

Red Hat UBI OpenJDK

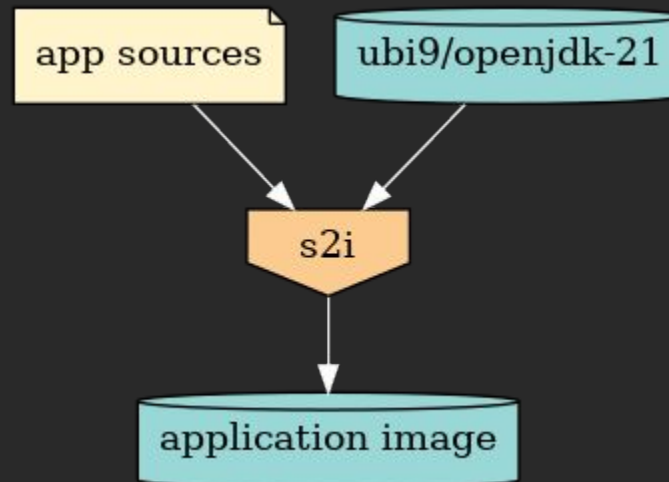
Builder: `registry.access.redhat.com/ubi9/openjdk-21`

Runtime: `registry.access.redhat.com/ubi9/openjdk-21-runtime`

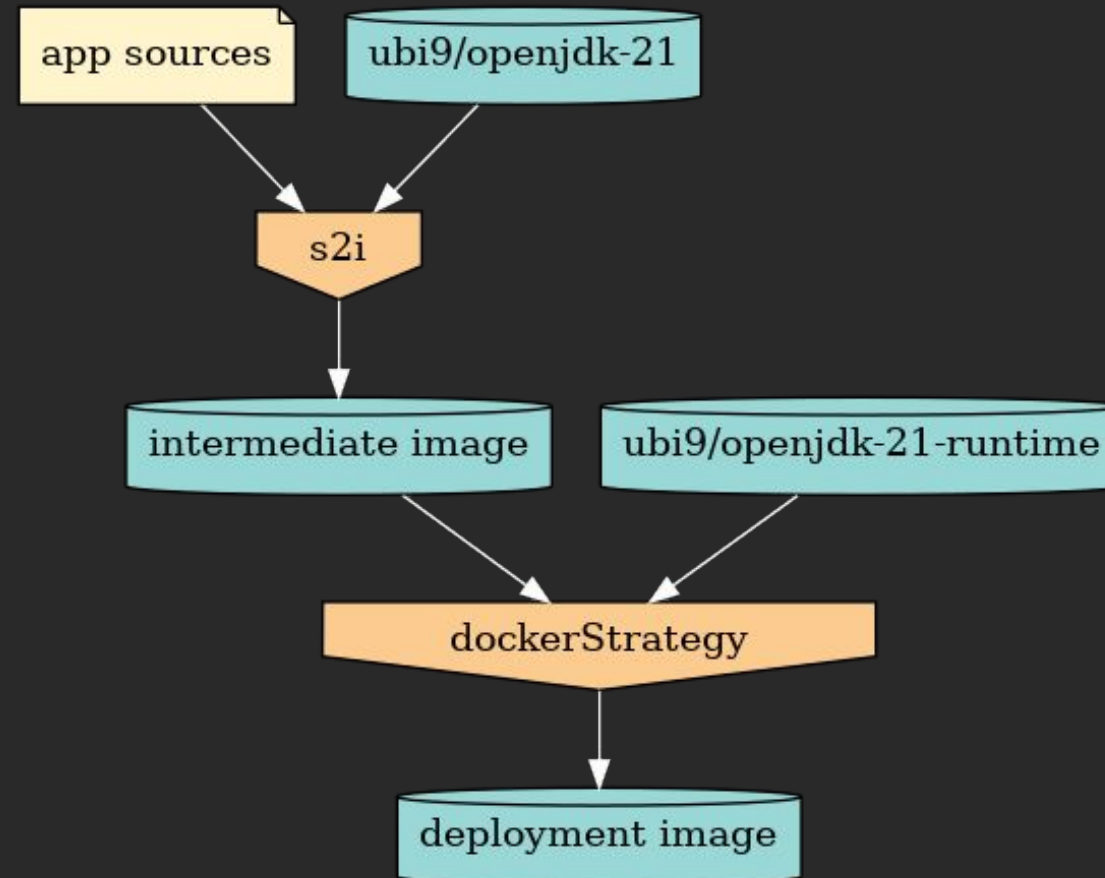
<https://jboss-container-images.github.io/openjdk/>

OpenShift Source to Image (S2I)

```
$ oc new-app 'java~<application git URI>'
```



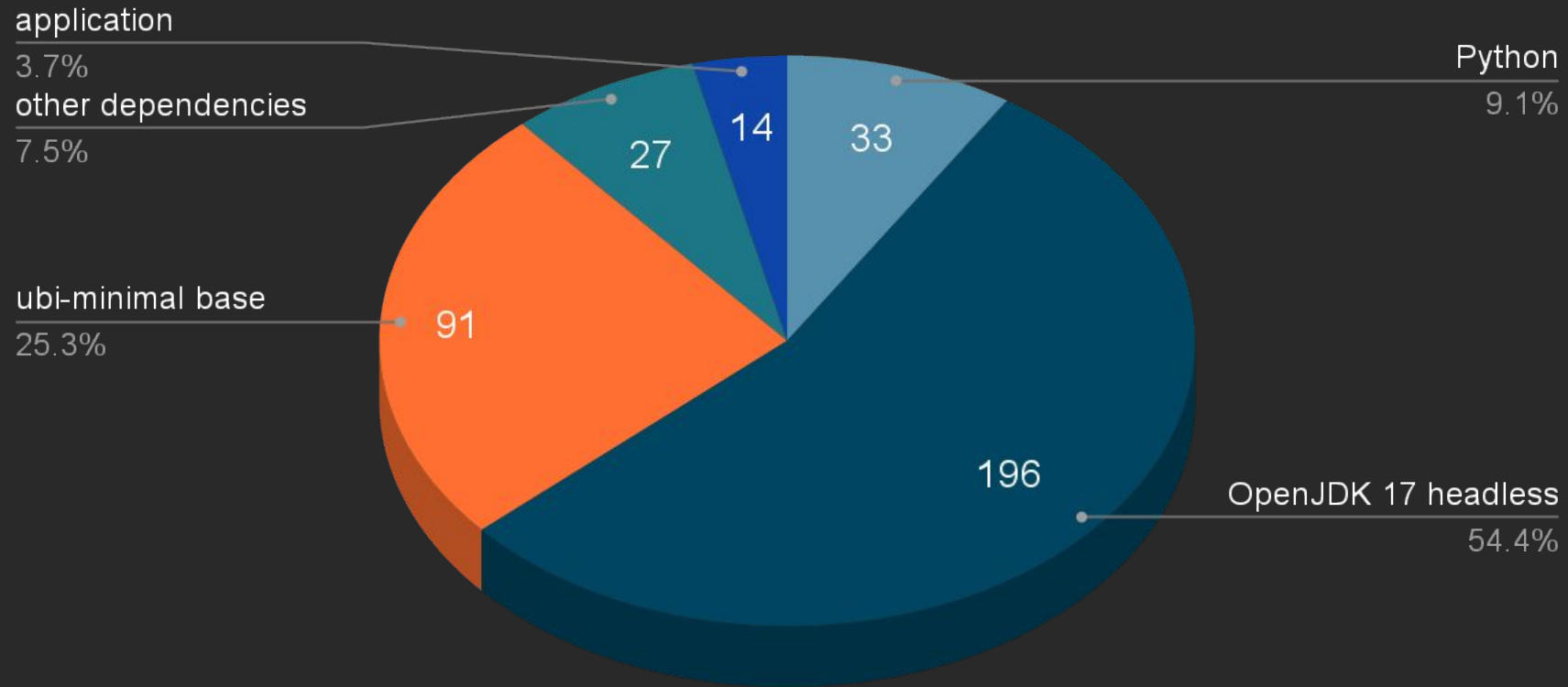
Multi-stage build pipelines



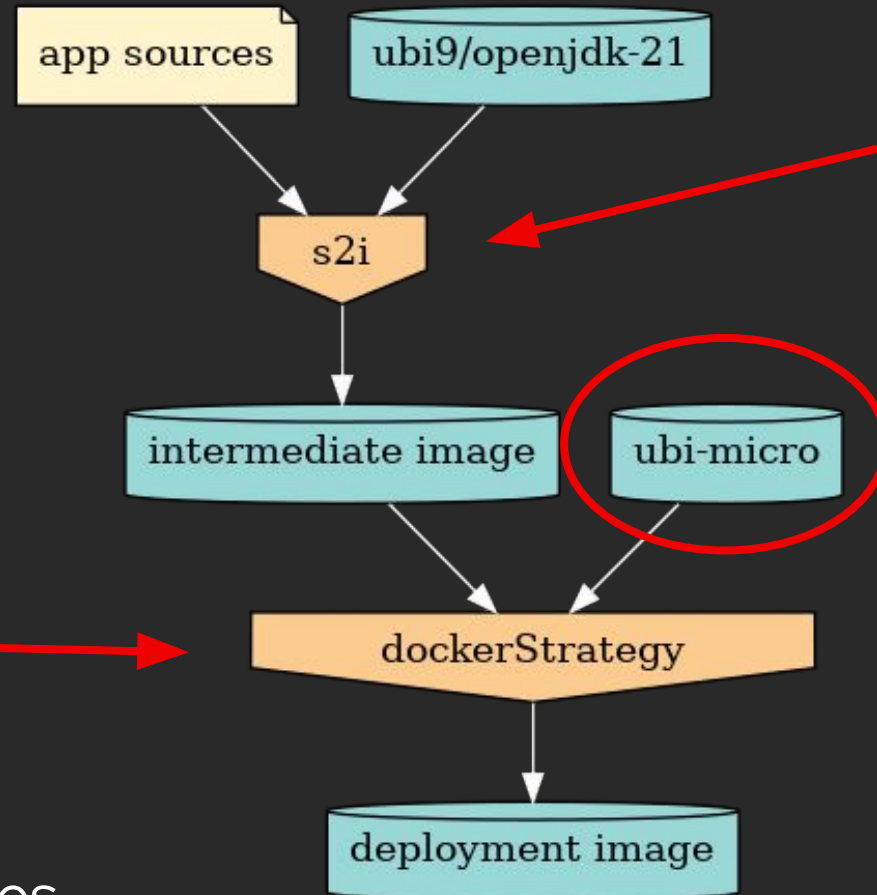
```
11 images:
12   - from:
13     kind: ImageStreamTag
14     name: quarkus-quickstart:latest
15     paths:
16     - sourcePath: /deployments
17       destinationDir: /deployments
18     dockerfile: |-
19       FROM
20       COPY deployments /
21       CMD java -jar /deployments/quarkus-run.jar
22 strategy:
23   type: Docker
24   dockerStrategy:
25     from:
26       kind: ImageStreamTag
27       name: ubi8-openjdk-11-runtime:latest
28 triggers:
29   - type: ConfigChange
30   - type: ImageChange
31     imageChange:
32       automatic: true
33     from:
```

Multi-stage build size breakdown

App image size: 361 MiB (95%)



Our approach



Analyse application
jlink RedHat JVM

Cherry-pick:

- Application
- Stripped JVM
- Run script
- System dependencies

Demo

Phase 1

The build

`S2I_ENABLE_JLINK=true`

```
$ jdeps --module-path ... --multi-release $JAVA_VERSION -R -s \  
"$appjar" > module-deps.txt
```

(Lots of output processing goes here)

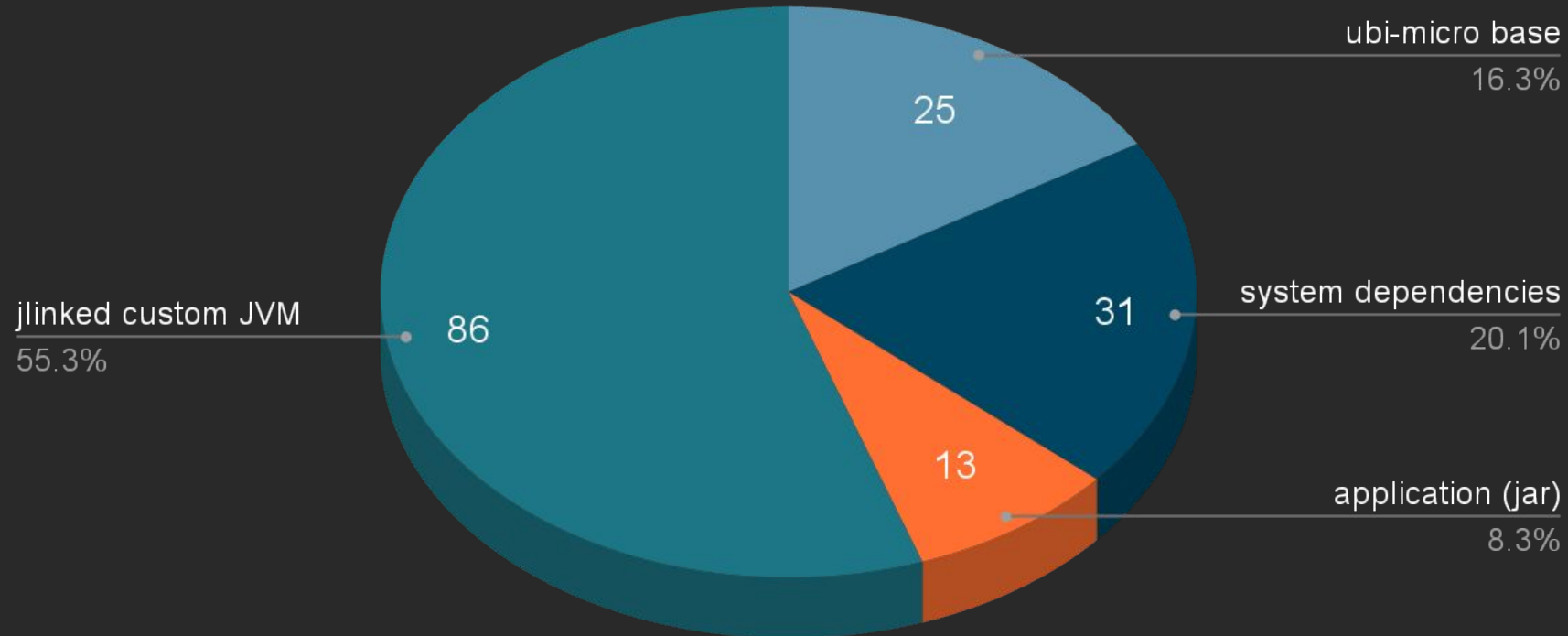
```
$ jlink --output app-jre \  
--add-modules <(module-deps.txt) --strip-debug --no-man-pages \  
--compress=2
```

Phase 2

```
4 FROM intermediateImage AS intermediateImage
5 USER 0
6 RUN mkdir -p /mnt/jrootfs
7 RUN microdnf install --installroot /mnt/jrootfs --releasever 9 --setopt install_weak_deps=0 --nodocs -y \
8     --config=/etc/dnf/dnf.conf \
9     --noplugins \
10    --setopt=cachedir=/var/cache \
11    --setopt=reposdir=/etc/yum.repos.d \
12    --setopt=varsdir=/etc/dnf/vars \
13    grep gawk
14 RUN rm -rf /mnt/jrootfs/var/cache/* /mnt/jrootfs/var/lib/rpm /mnt/jrootfs/var/lib/dnf
15
16 FROM registry.access.redhat.com/ubi9/ubi-micro AS lean-runtime
17 ARG JAVA_HOME=/usr/lib/jvm/java
18 # application
19 COPY --from=intermediateImage /deployments /deployments
20 # stripped KVM
21 COPY --from=intermediateImage /tmp/jre ${JAVA_HOME}
22 # run script
23 COPY --from=intermediateImage /opt/jboss/container/ /opt/jboss/container/
24 # system dependencies
25 COPY --from=intermediateImage /mnt/jrootfs/ /
26 ENV JAVA_HOME="${JAVA_HOME}" PATH="${JAVA_HOME}/bin:$PATH"
27 USER 185
28 CMD /opt/jboss/container/java/run/run-java.sh
```

Jlink-OpenShift size breakdown

Jlinked image size: 156 MiB (43%)



Wrap-up

When?

JDK11

FIPS, tzdata, locales, debugging...

<https://github.com/jboss-container-images/openjdk/tree/jlink-dev>

Thank you!

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