Application Modernization

Using Open Source Tools to Kick Start Modernization

Richard Hofmeister

App Dev SSA

Red Hat

When Business Makes Technical Decisions

We are moving *all* of our applications to the cloud. Everything written in the last 30 years needs to go.

John Doe
CTO, Acme Unlimited

I found a new platform that is more secure, and with the new mandate we need to migrate workload. How long will that take?

Burt Macklin
Business Leader, Acme Unlimited

We are moving *all* of our applications back on premise. That cloud bill was way more than we budgeted.

Mantis Toboggan
CFO, Acme Unlimited

Accelerate your journey to Kubernetes with the Konveyor Community

A community of people passionate about helping others modernize and migrate their applications to the hybrid cloud by **building tools to rehost, replatform, and refactor applications to run on Kubernetes & cloud-native technologies**

www.konveyor.io

The State of Application Modernization Report 2022

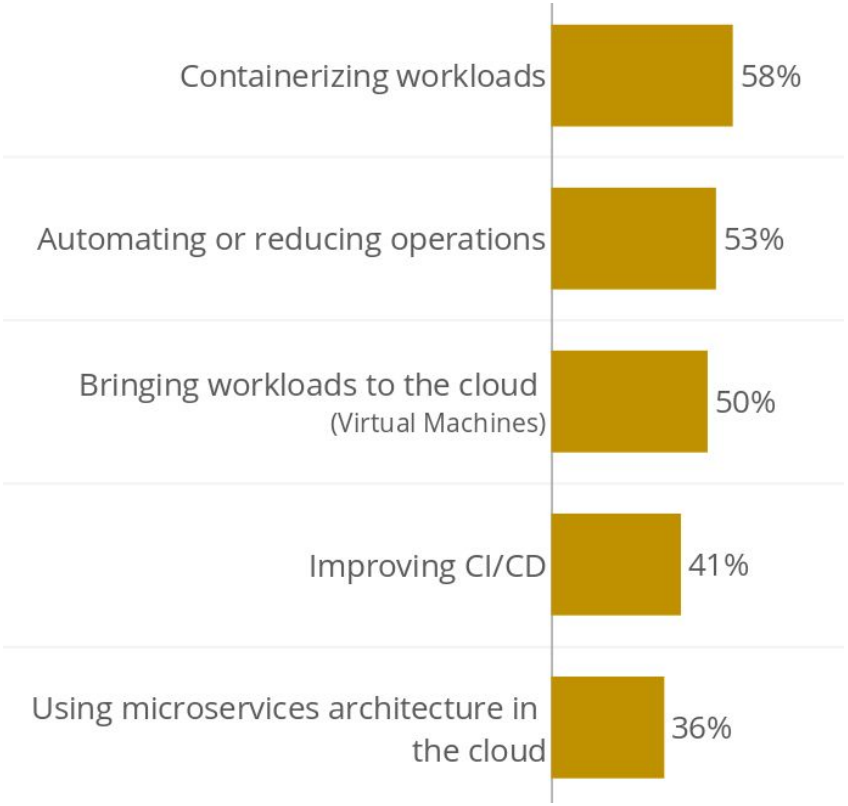
Learn why enterprises plan to modernize more than half of their existing applications to run on Kubernetes within the next year. And see how these 600 companies will approach the move, along with other key insights, to inform your modernization strategy.

View the report

konveyor.io/modernization-report

Application Modernization

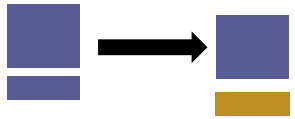
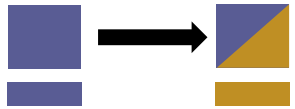
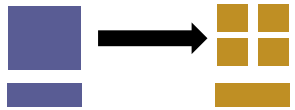
Ways companies define modernization



Top reasons for modernization

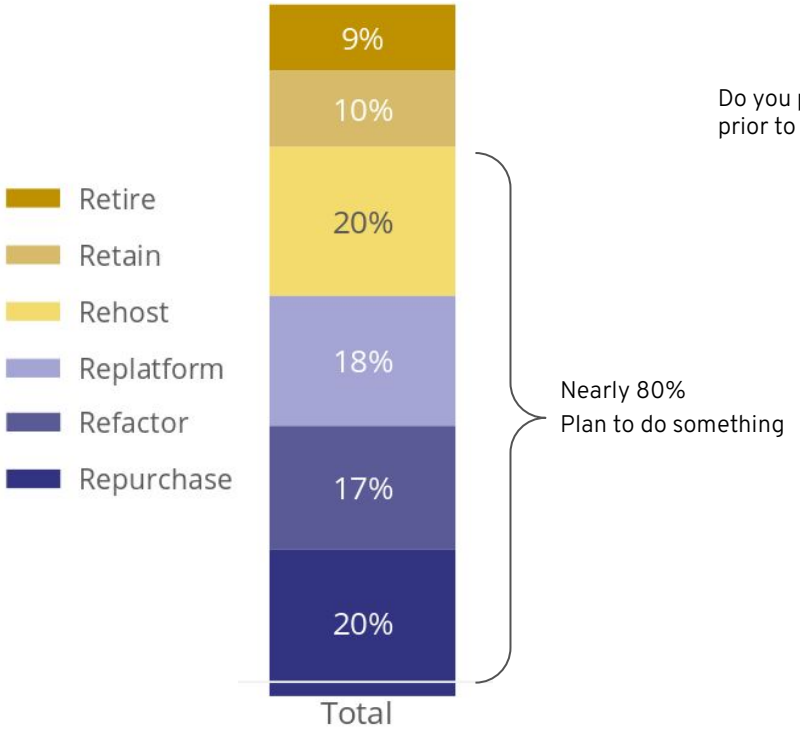
Source: Application Modernization Report, Konveyor Community, 2022

Modernization Strategies

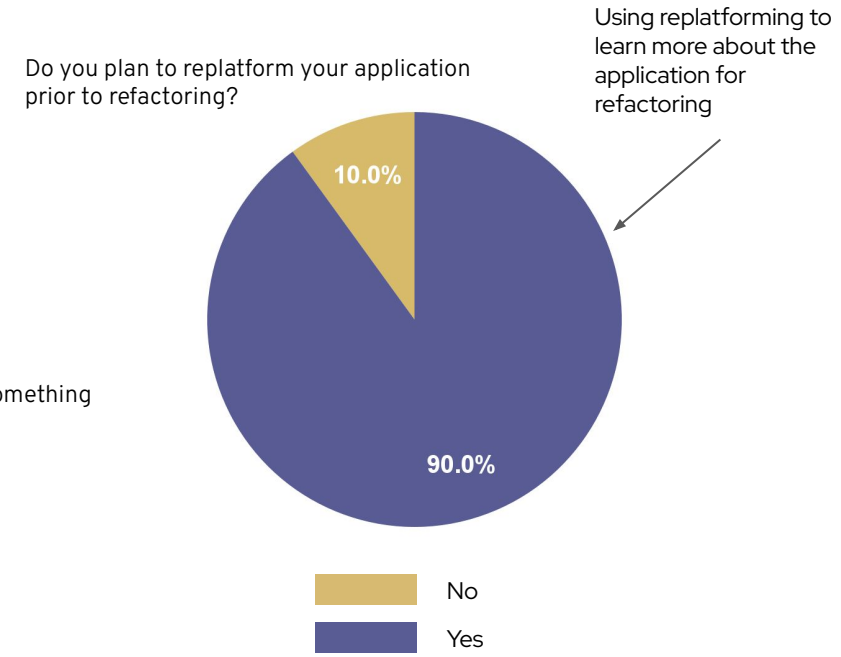
Action	Definition / Example	
Retire	Sunsetting the application.	
Retain	Continue running the application as-is.	
Rehost	Migrating an application as-is to a new platform. Example: Migrating virtual machines as is to a new virtualization platform.	
Replatform	Making optimizations to the application that do not require re-architecture or significant code changes in order to achieve business or technical benefits. Example: Migrating an application into a container in order to standardize application delivery and day-2 operations across application teams.	
Refactor	Changing how an application is developed and/or architected, typically to be more cloud-native Example: Strangling a monolith into microservices.	
Repurchase	Moving to SaaS or Replacing portions of an application with as a service offerings Example: Consuming Kafka as a Service within an existing application.	

How to Modernize?

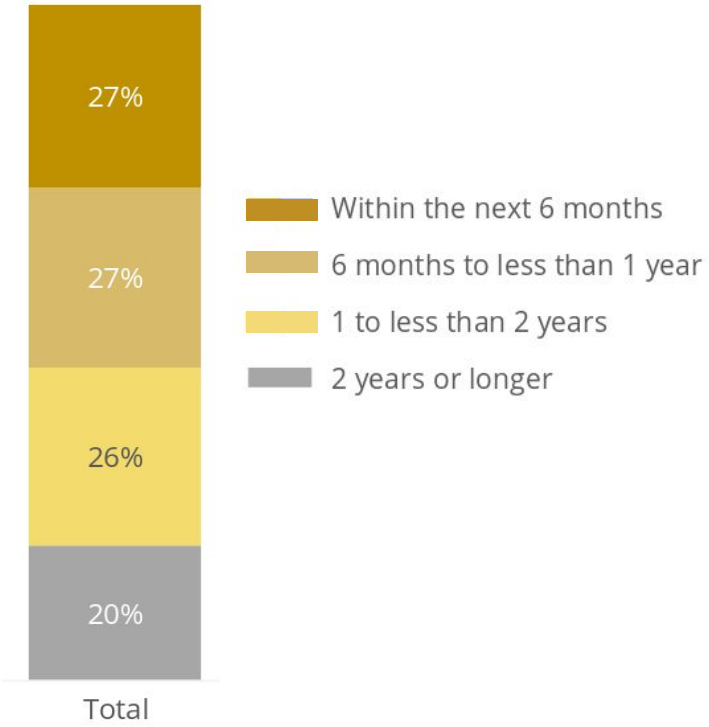
Strategies companies are planning to use

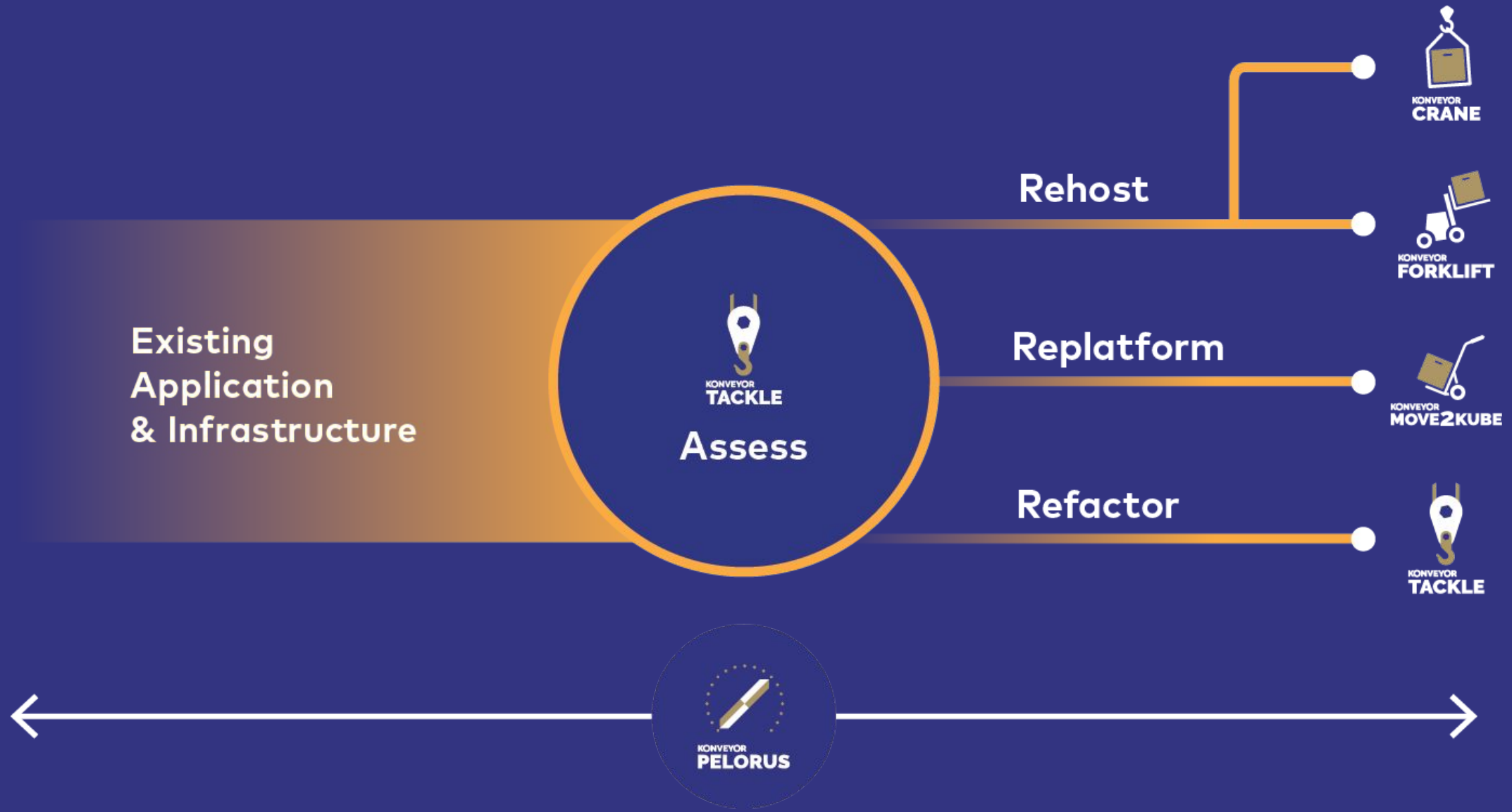


Replatforming prior to refactoring

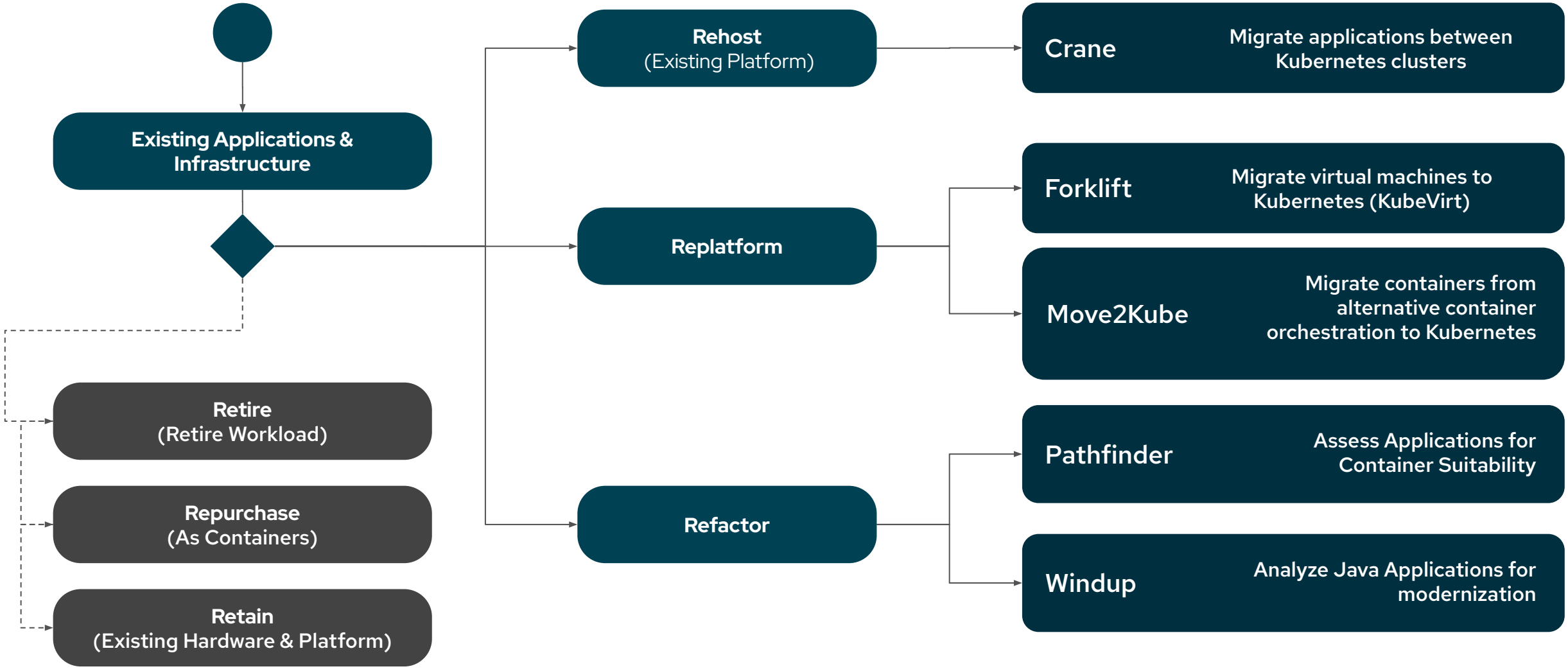


Expected pace of modernization




Existing
Application
& Infrastructure
KONVEYOR
TACKLE
Assess
Rehost
Replatform
Refactor
KONVEYOR
CRANE
KONVEYOR
FORKLIFT
KONVEYOR
MOVE2KUBE
KONVEYOR
TACKLE
KONVEYOR
PELORUS

Migrating to OpenShift with *Konveyor*



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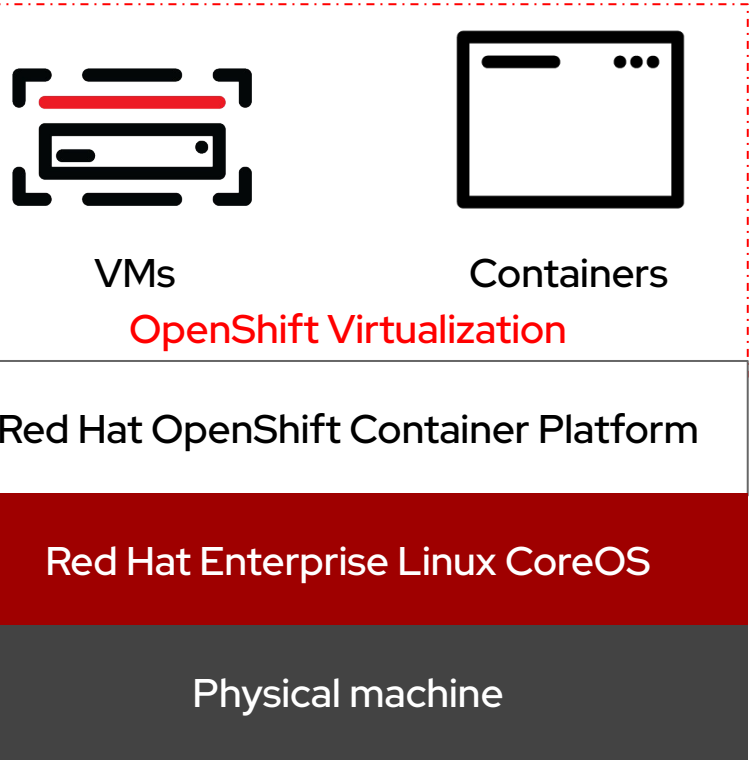
But what if my application requires a Virtual Machine?

OpenShift 4.5 introduced the general availability of OpenShift Virtualization.

Enabling OpenShift Virtualization in a OpenShift cluster it allows users to deploy virtual machines in their projects side-by-side with their containerized applications.

OpenShift can deploy applications in virtual machines according to the same rules as applications running in containers.



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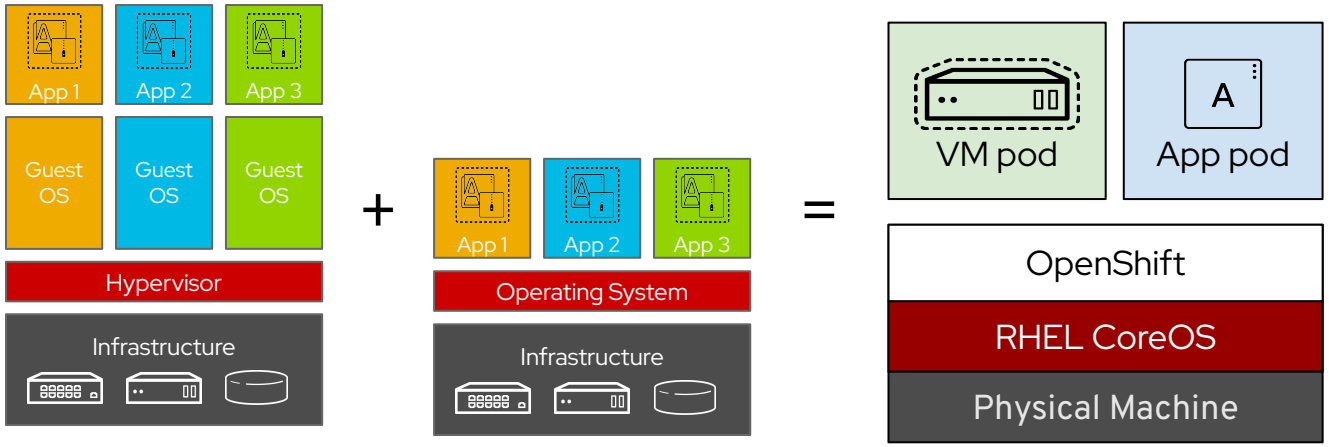
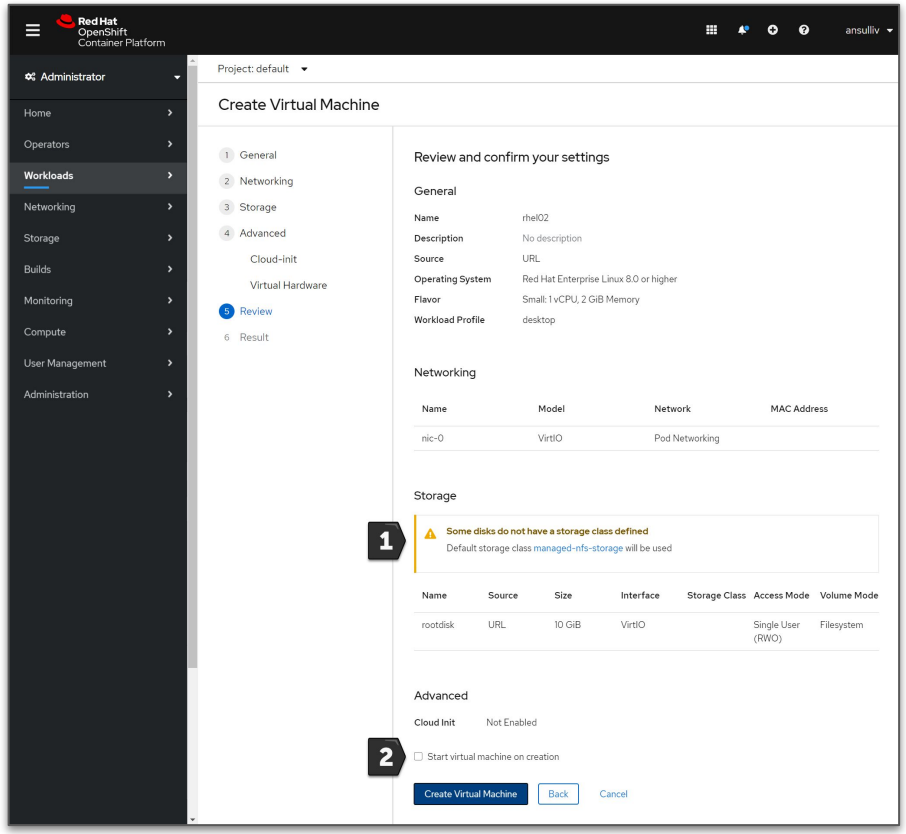
Isn’t a Virtual Machine different from a container?

Technical facts:

- Containers are methods of process isolation
- A Virtual Machine is a process

Running a Virtual Machine inside a container platform is equal to running a Virtual Machine as a container.





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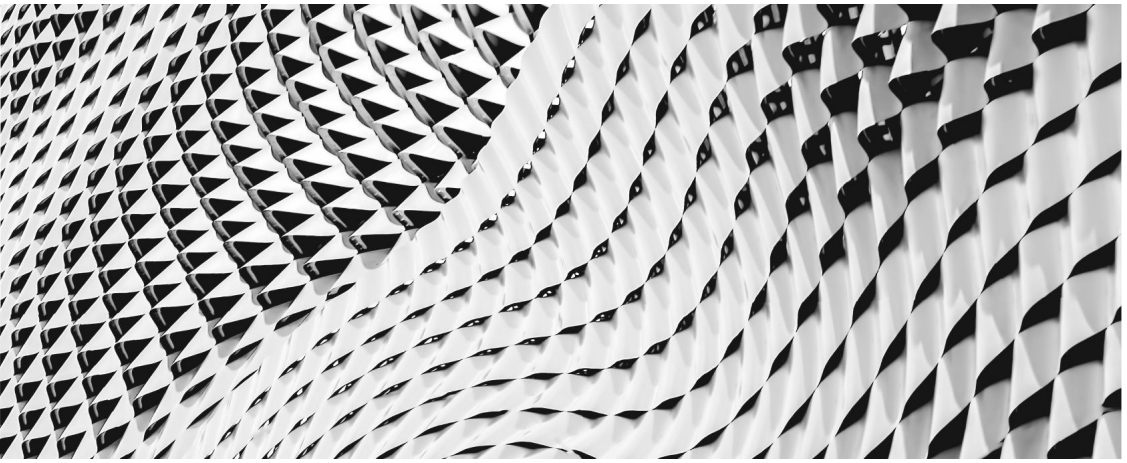
Tackle to Access Applications



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Assess, Prioritize, and Refactor Applications to Kubernetes

Streamline the modernization of your application portfolio to Kubernetes.

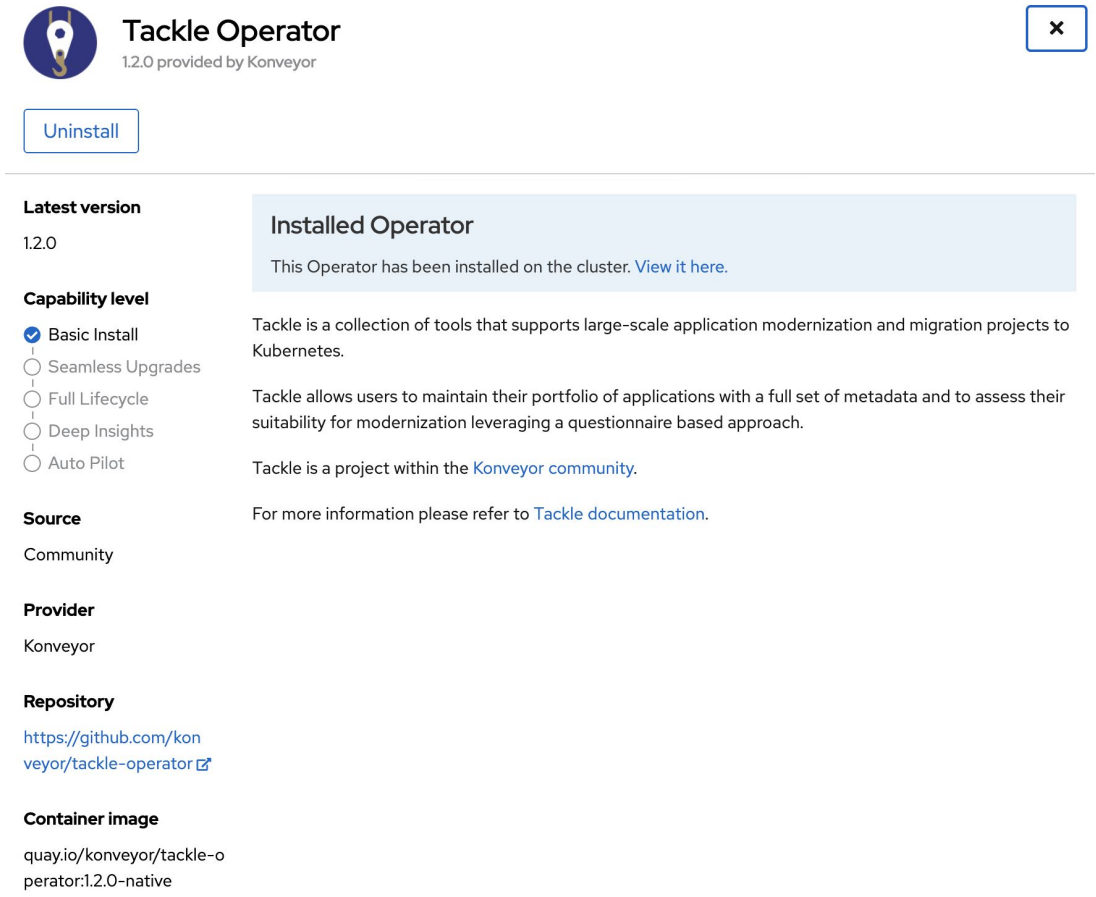
Through interrelated open source tools, Tackle gives you insight throughout the adoption process

Whether you're making decisions at the portfolio or application level.

https://www.konveyor.io/tools/tackle

Tackle Operator

Install Tackle in your Kubernetes cluster with almost no effort



- Can be installed in all Kubernetes distributions
- Available in operatorhub.io and OpenShift
- Requires Operator Lifecycle Manager on upstream Kubernetes distributions
- Provides a tackle CRD to provision all components
- Capability Level II

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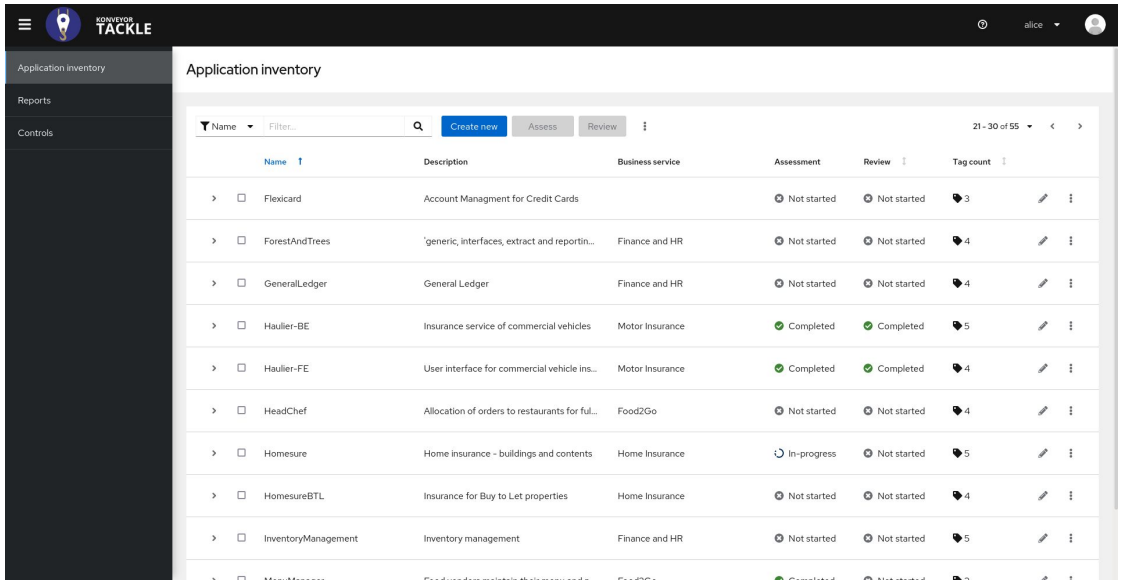
Application Inventory

Application Portfolio Management



- Used to maintain a portfolio of applications
- It is the hub, and natural integration point for all Tackle projects in the future
- Through the use of tags extensible metadata can be added to describe and categorize the applications in multiple dimensions
- Applications can be linked to the business services that they support
- Application interdependencies can be defined and managed

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Assessment Areas

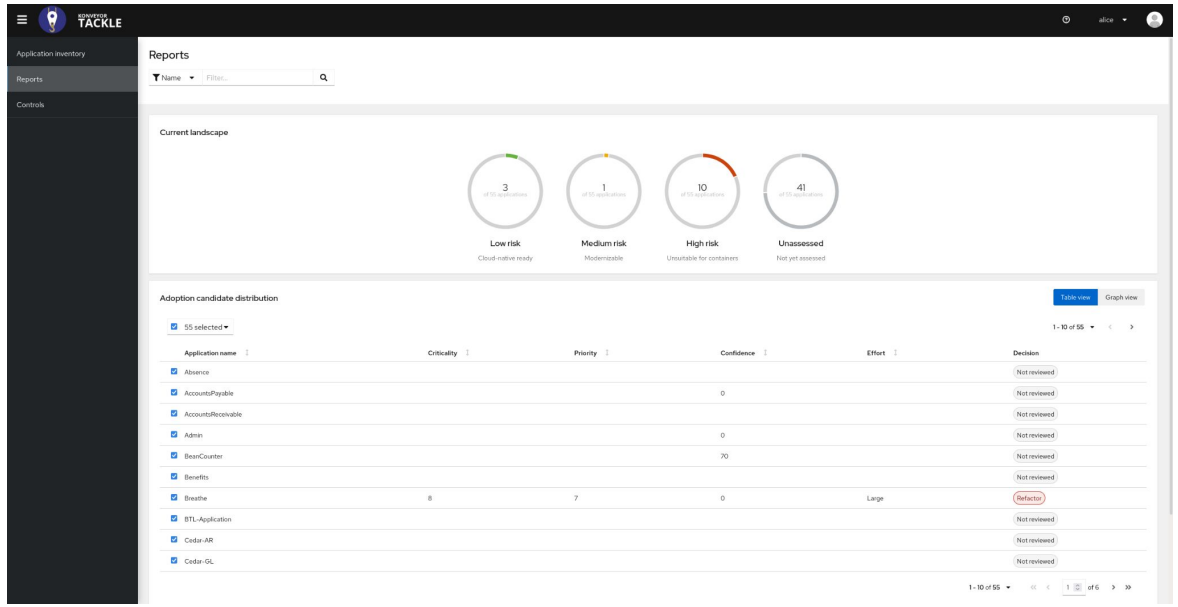
Assessment questions cover the following application aspects

- Architectural Suitability
- Dependencies
- Application Resiliency
- Communication
- Compliance
- State Management
- Runtime Profile
- Observability

- Level of Ownership
- Service Discovery
- Deployment Complexity
- Application Testing
- Application Security
- Application Configuration
- Clustering
- Custom Questions

Application Assessment

Assess your Application Portfolio for containerization suitability



- A questionnaire based tool that assesses the suitability of applications for deployment in containers within an enterprise Kubernetes platform
- The reports provide information about the suitability of the applications for containerization, highlighting risks and producing an adoption plan informed by effort, priority and dependencies

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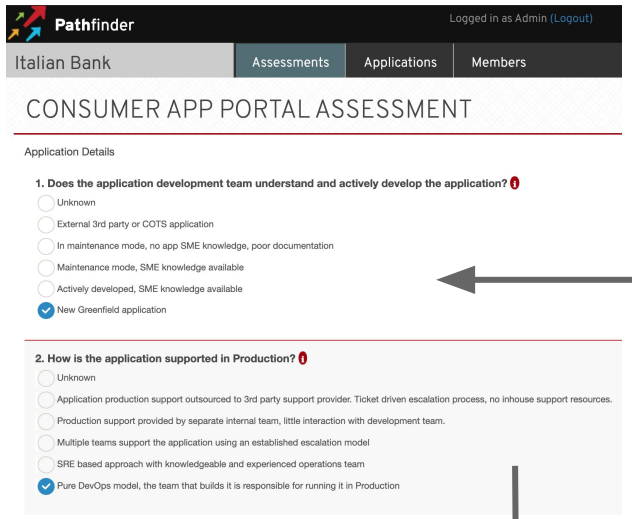
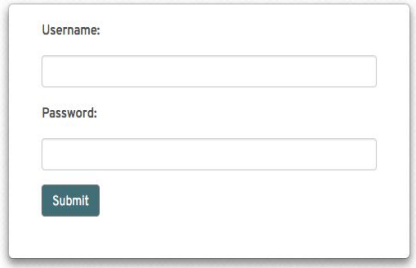
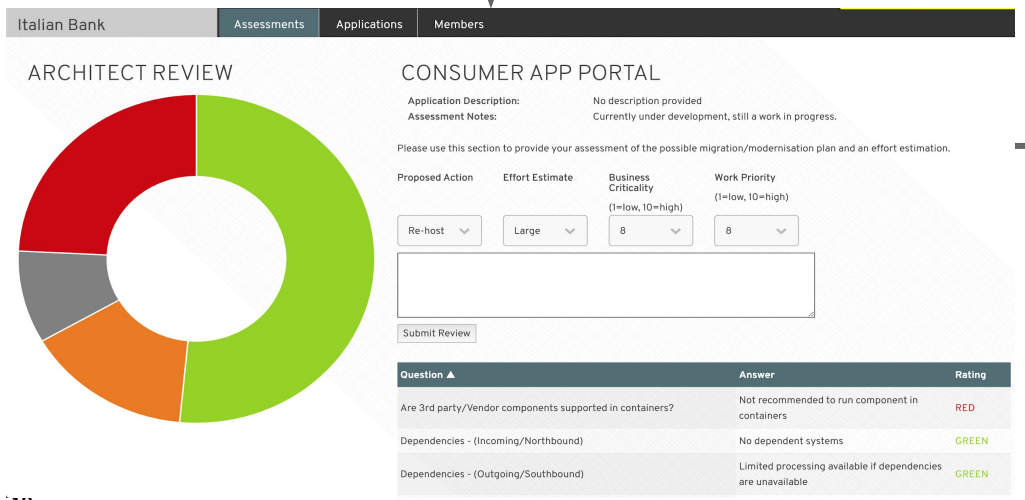
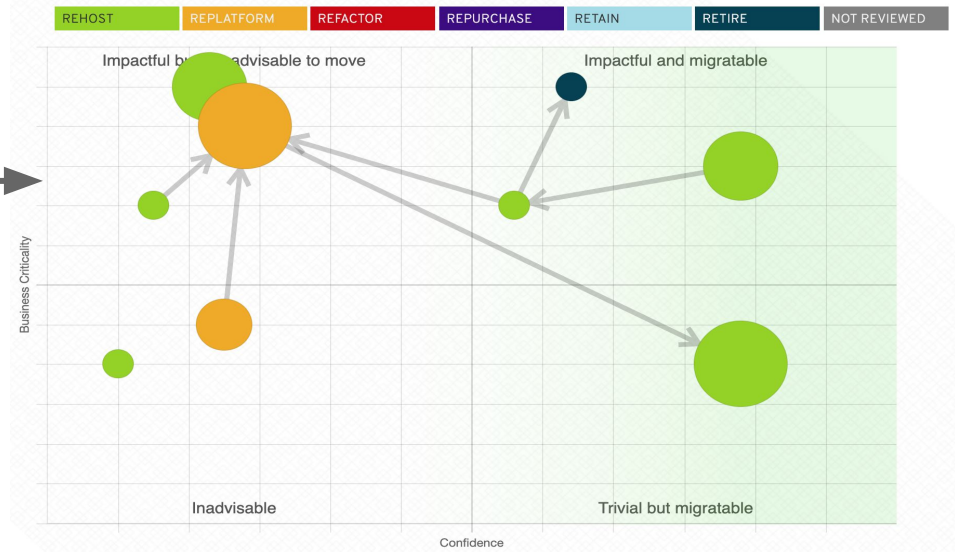
Pathfinder

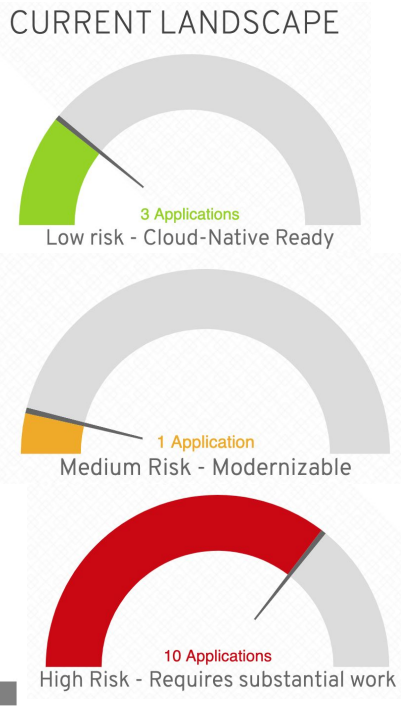
Pathfinder is an application assessment which can quickly assist a customer with creating a strategy for containerisation of their applications.











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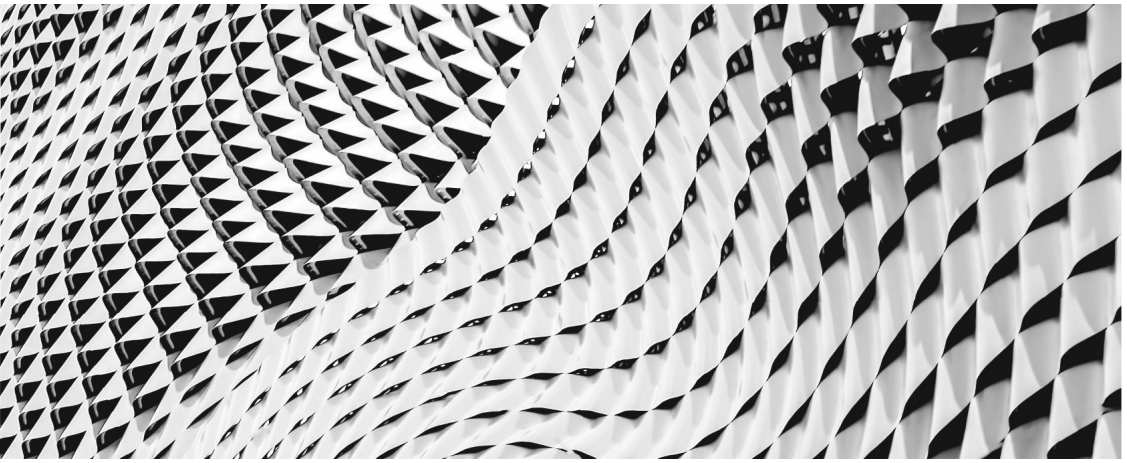
MTA to Analyze Applications



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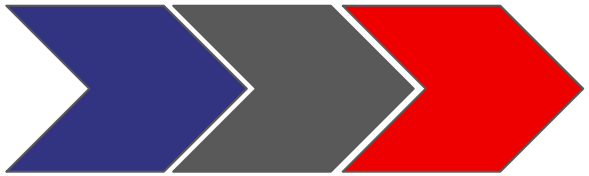

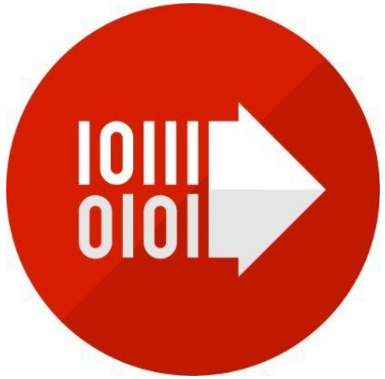

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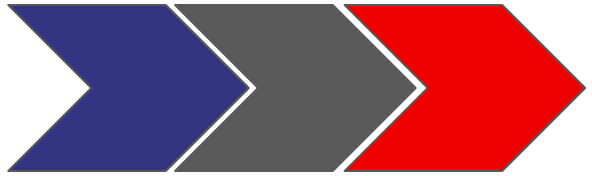

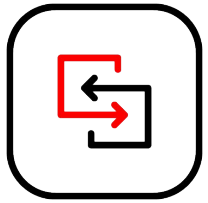

Migration Toolkit
for Applications

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Migration Toolkit for Applications

The tools, reports, and knowledge that help developers accelerate application modernization and migration projects.

Download

Overview | Download | Getting started | Use cases and migration paths

Migration Toolkit for Applications overview

Modernize and migrate applications and move to cloud and containers

The Migration Toolkit for Applications (MTA) is an assembly of tools that support large-scale Java application modernization and migration projects across a broad range of transformations and use cases. It accelerates application code analysis, supports effort estimation, accelerates code migration, and helps you move applications to the cloud and containers.

https://developers.redhat.com/products/mta/overview

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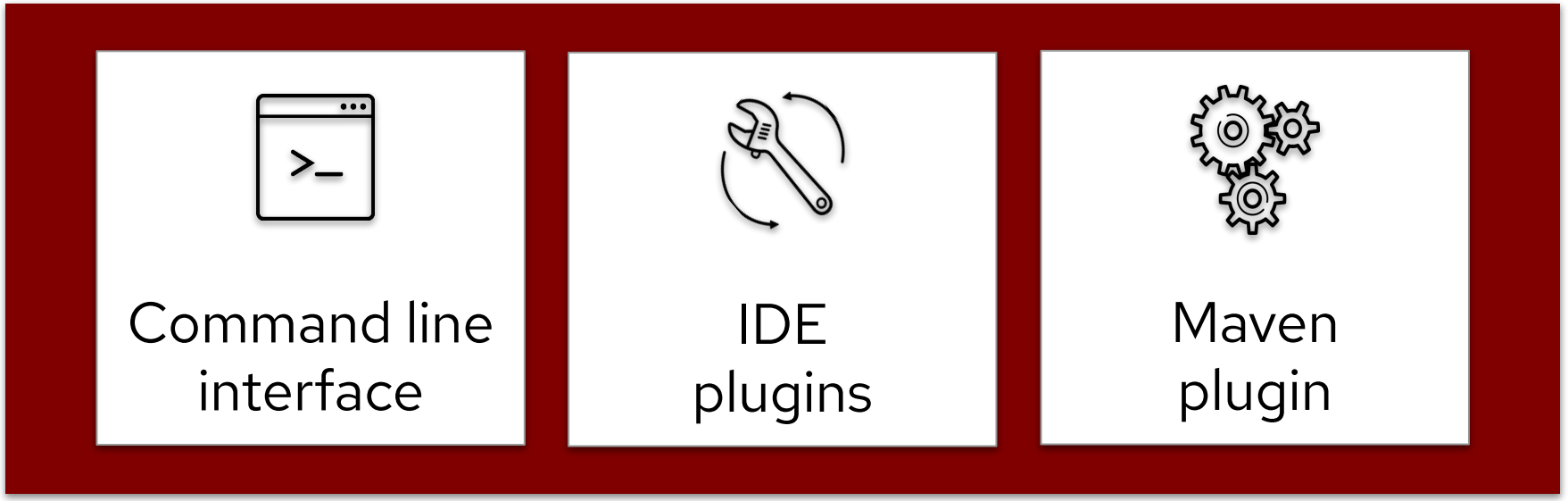
Migration Toolkit for Applications

Other distributions



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Command Line Interface

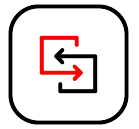
Features

- Great for larger / automated analyses
- Easy to script
- Typical Use Case
  - Create a folder structure where your artifacts are stored
  - Have a script run through all
  - Move the resulting reports to a simple Web Server for consumption

```
$ <MTA_HOME>/bin/mta-cli --input /path/to/jee-example-app-1.0.0.ear --output
/path/to/report-output/ --source eap:5 --target eap:7 --packages com.acme
org.apache
```

Maven Plugin

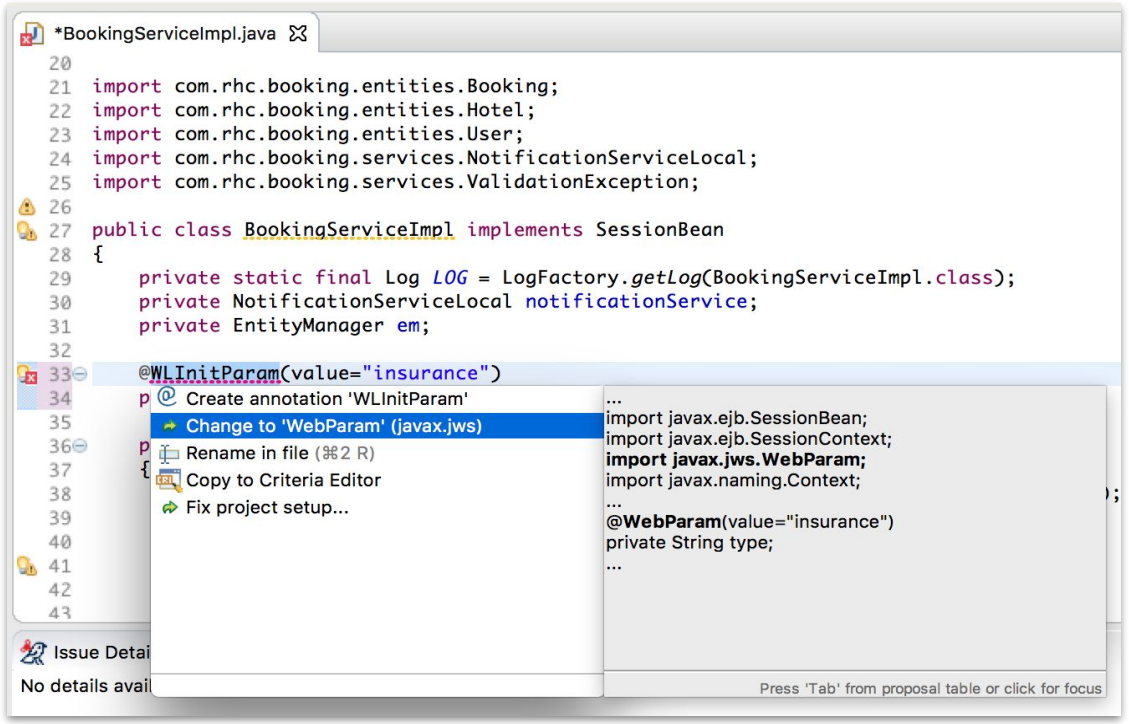
Features

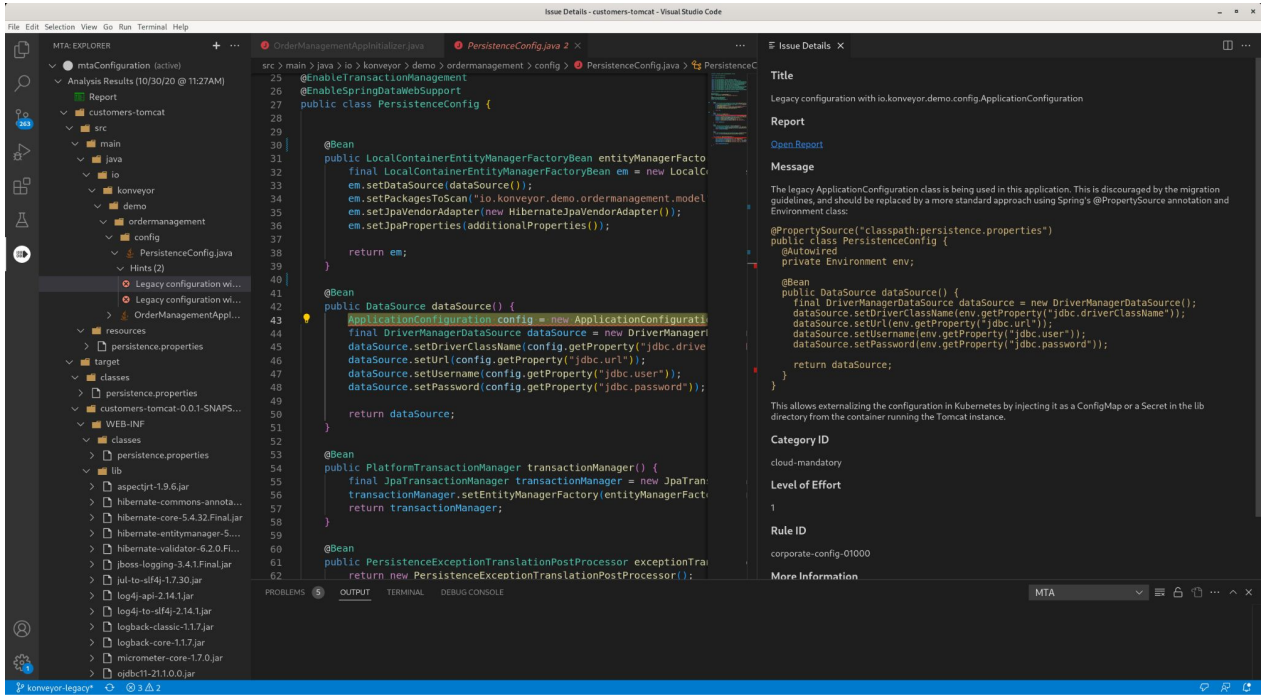


- For teams who want to continuously evaluate Migration efforts with each build iteration
- Easy to add to your CI/CD or build processes
  - CLI - add a step in your pipeline
  - Maven Plugin - Integrate into your Maven build

IDE Plugins

Task list, inline hints, support for code changes





Eclipse(Che, CodeReady Studio) / VS Code / IntelliJ

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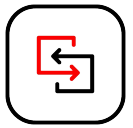
Migration paths Matrix



Source Platform	Targets							
	Migration to JBoss EAP 7	**Cloud Readiness**	**OpenJDK 8 & 11**	**Jakarta EE 9**	**Camel 3**	**Spring Boot in Red Hat Runtimes**	**Quarkus**	**Open Liberty**
Oracle WebLogic Server	✔	✔	✔	-	-	-	-	-
IBM WebSphere Application Server	✔	✔	✔	-	-	-	-	✔
JBoss EAP 4	✘ [1]	✔	✔	-	-	-	-	-
JBoss EAP 5	✔	✔	✔	-	-	-	-	-
JBoss EAP 6	✔	✔	✔	-	-	-	-	-
JBoss EAP 7	✔	✔	✔	-	-	-	-	-
Thorntail	✔ [2]	-	-	-	-	-	-	-
Oracle JDK	-	✔	✔	-	-	-	-	-
Camel 2	-	✔	✔	-	✔	-	-	-
Spring Boot	-	✔	✔	✔	-	✔	✔	-
Any Java application	-	✔	✔	-	-	-	-	-
Any Java EE application	-	-	-	✔	-	-	-	-

https://developers.redhat.com/products/mta/use-cases

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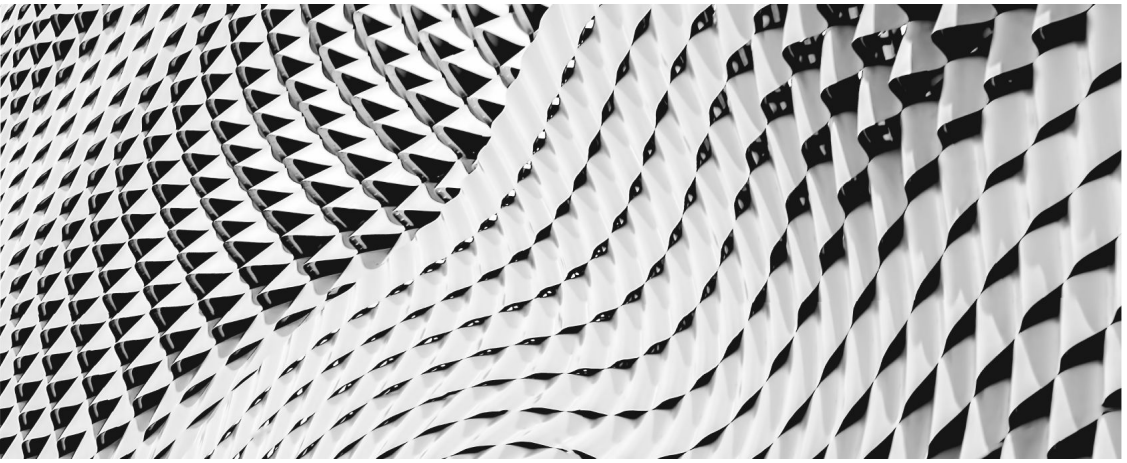
Advanced Usage

Build your own rules

- For your own Frameworks
  - “If you encounter this - here is how you migrate”
- Also great for large engagements, once you have built your “cookbook”
- Provide your internal guidance and link directly to your documentation

```
<rule id="cookbook-eap7-02000" xmlns="http://windup.jboss.org/schema/jboss-ruleset">
        <when>
            <javaclass references="weblogic.utils.StringUtils.{*}"/>
        </when>
        <perform>
            <hint category-id="mandatory" effort="1" title="WebLogic StringUtils usage">
                <message>Replace with the `StringUtils` class from Apache Commons.</message>
                <link href="https://commons.apache.org/proper/commons-lang/" title="Apache Commons Lang"/>
                <message>Also, check the wiki for an example in conjunction with our XYZ-SUPERFRAMEWORK</message>
                <link href="https://our.internal.wiki/migration/StringUtils/" title="StringUtils usage and"/>
                <tag>weblogic</tag>
            </hint>
        </perform>
</rule>
```

DEMO – MTA



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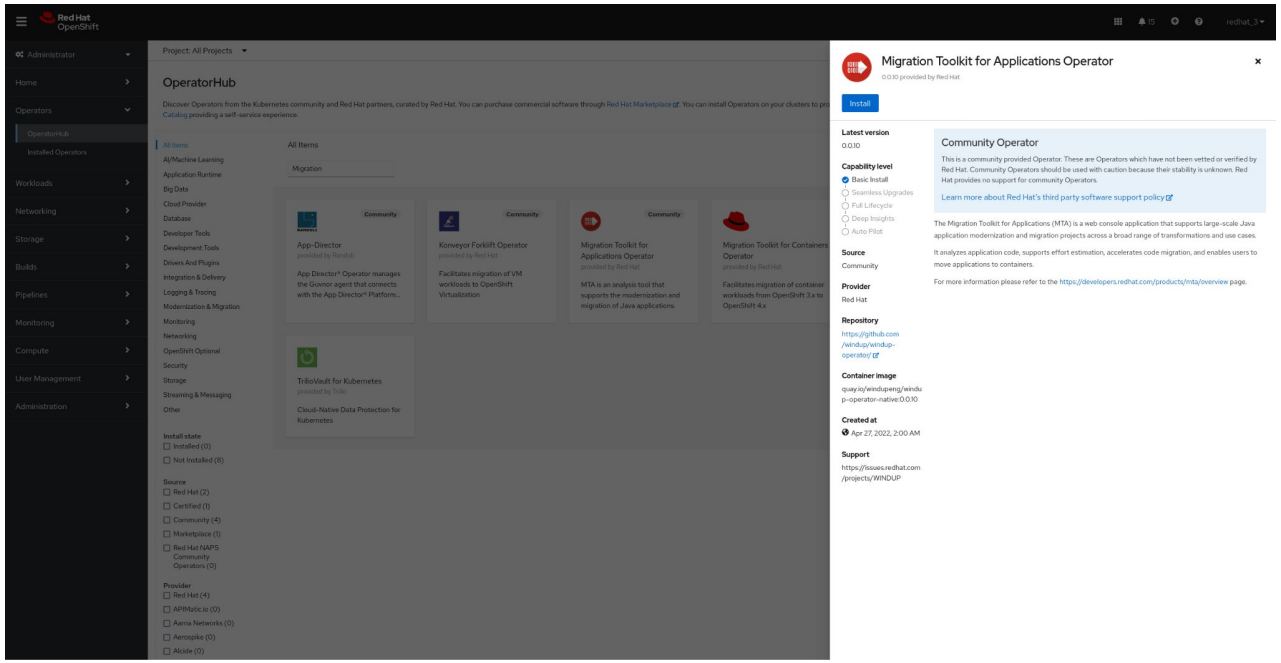
Operator

Install MTA in your OpenShift cluster with almost no effort

- Available in OperatorHub
- Provides a tackle CRD to provision all components
- Capability Level II



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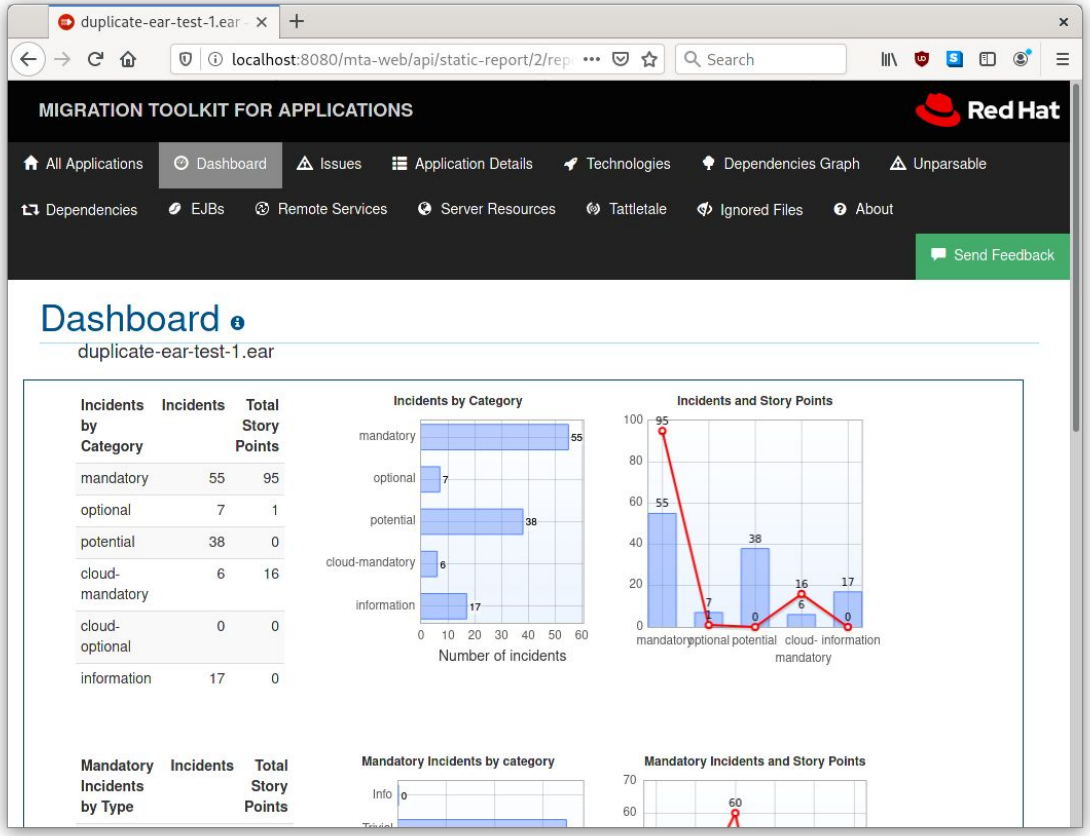
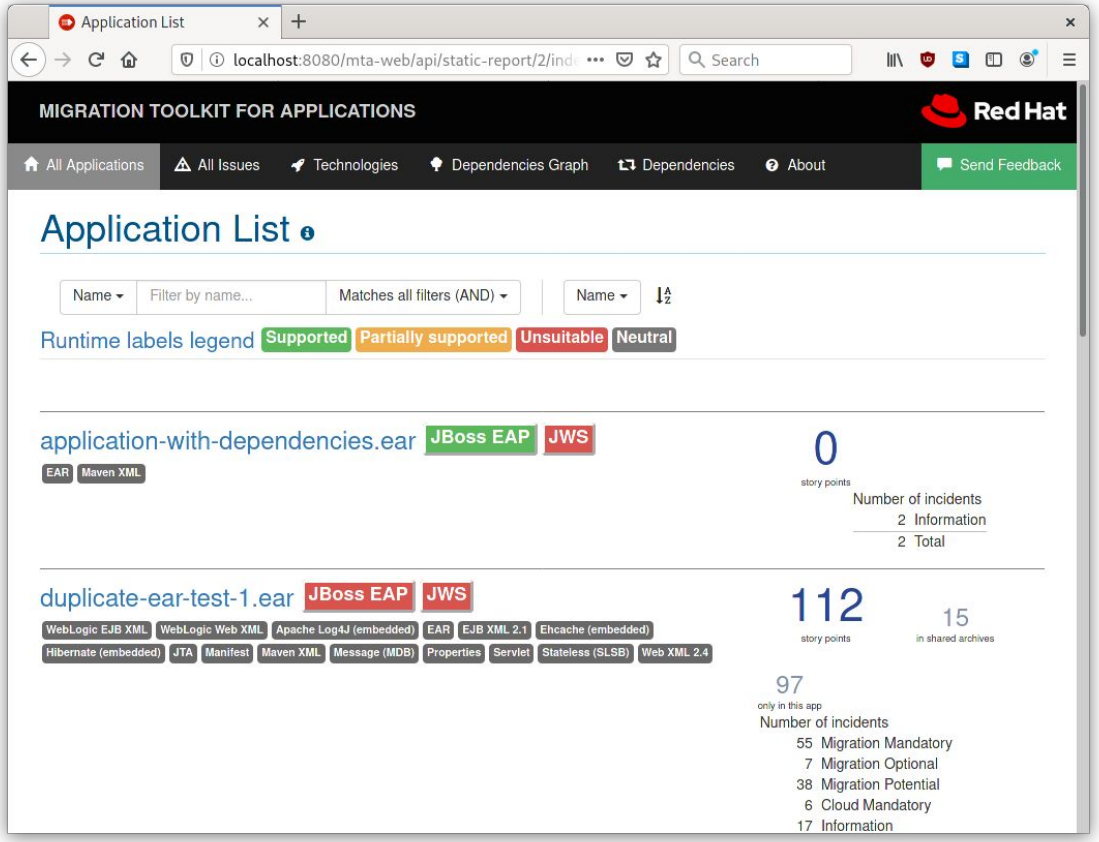
Application Analysis

Issue type analysis and support for effort estimation





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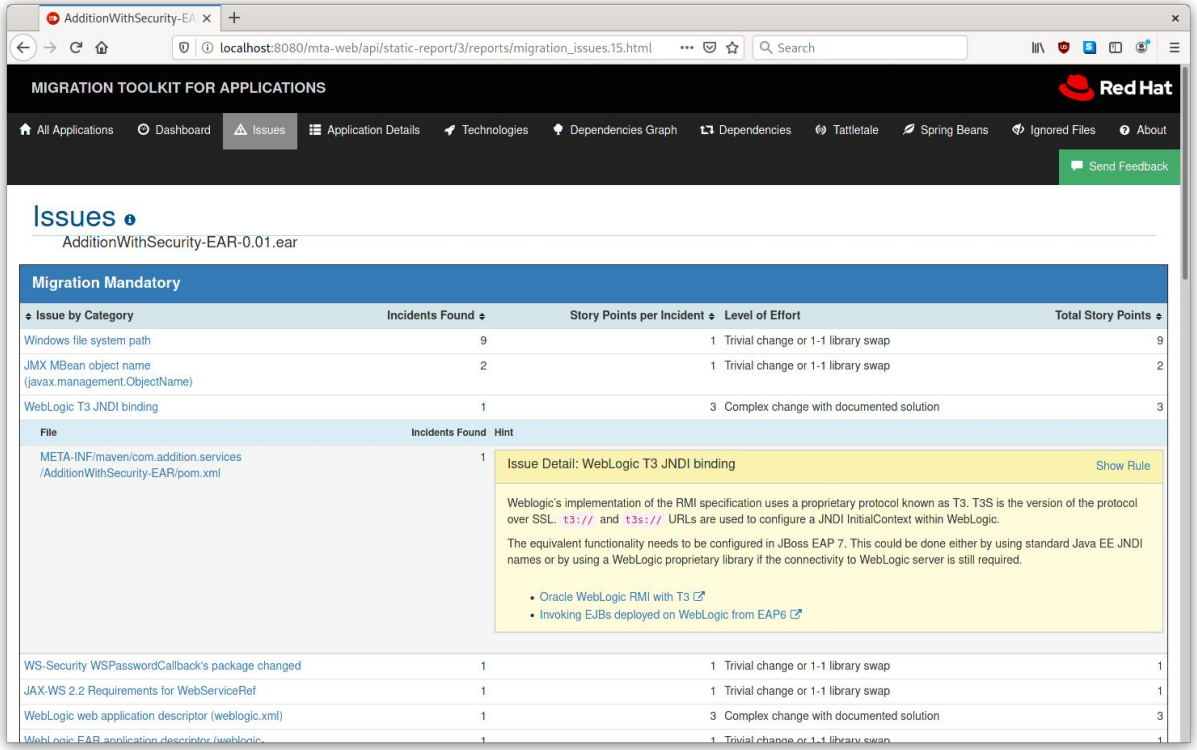
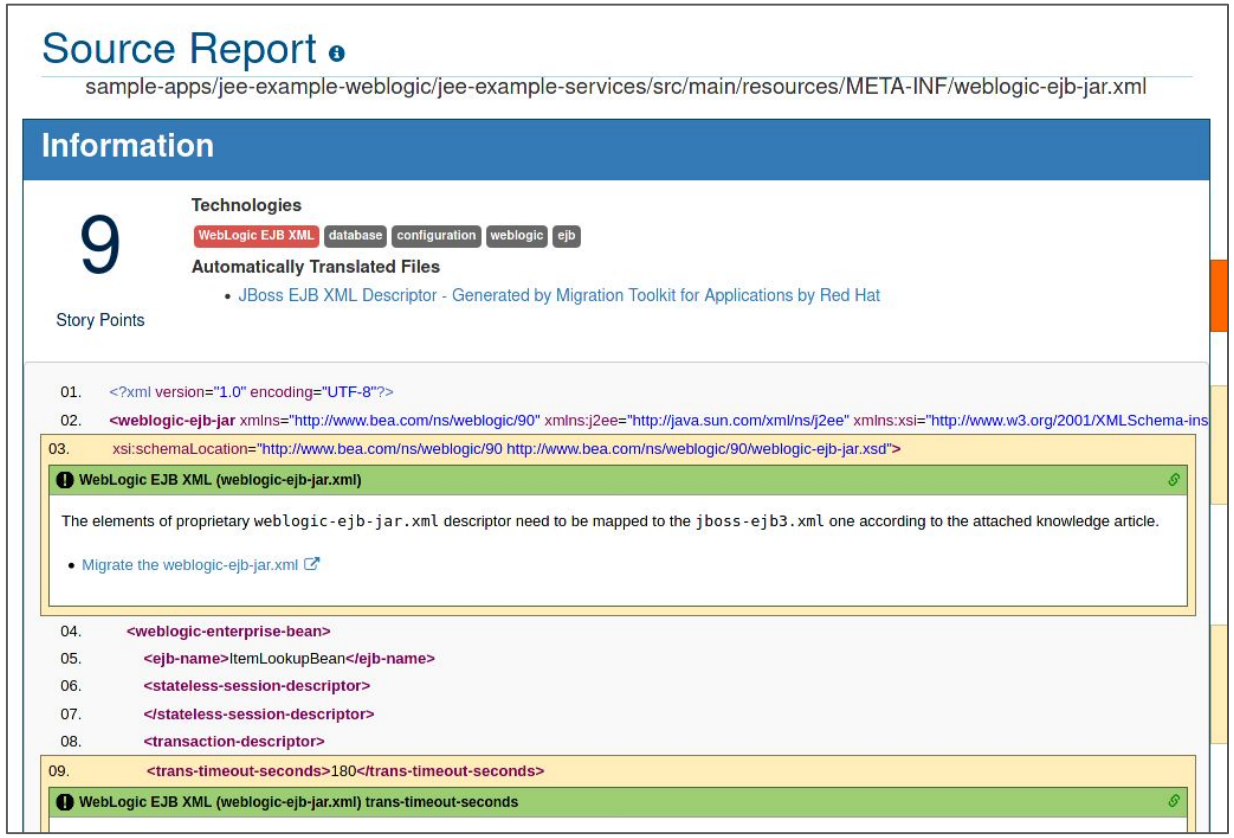
Application Analysis

Issue identification and guidance for developers





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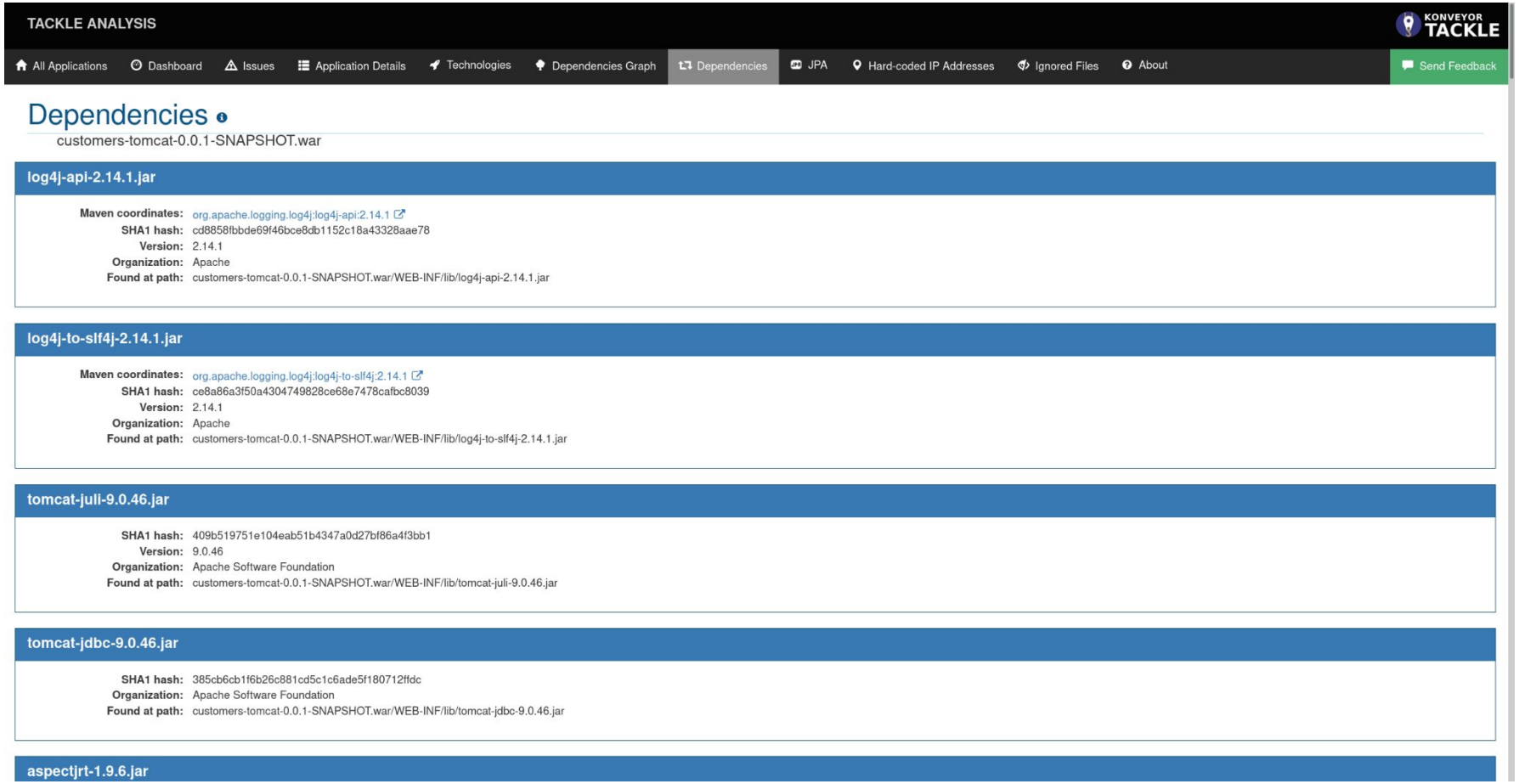
Application Analysis

Dependencies identification



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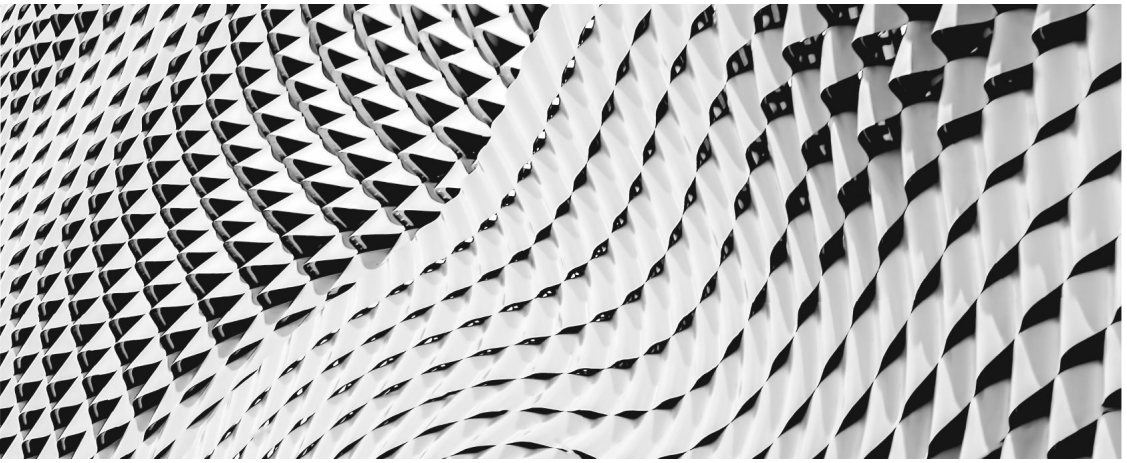
Why?



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Gartner®

By 2027, 85% of the workload placements made until 2022 will no longer be optimal, highlighting the evolving need for application mobility and portability.

- *Gartner, Workload Placement in Hybrid IT — Making Great Decisions About What, Where, When and Why, Henrique Cecci, David Cappuccio, 2 May 2022

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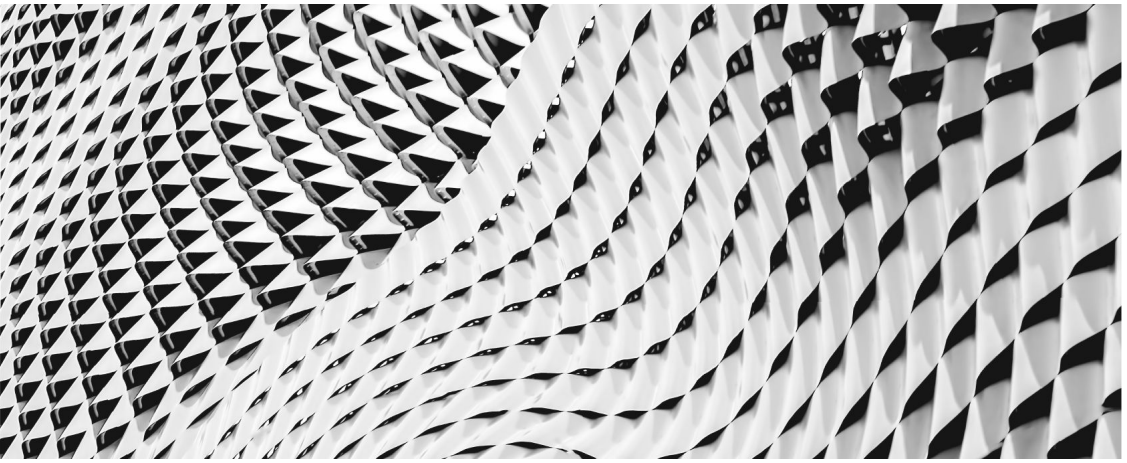
Never-Ending Modernization

Preparing for the Journey, not the destination

- Java Migration from 8 > 11 > 17 and beyond
- Preparing workloads to move to the cloud and back
- Standardizing Platforms
- Tracking applications as new versions release
- Justifying and prioritizing legacy modernization
- Sprint Planning and Resource Allocation

MTA Roadmap



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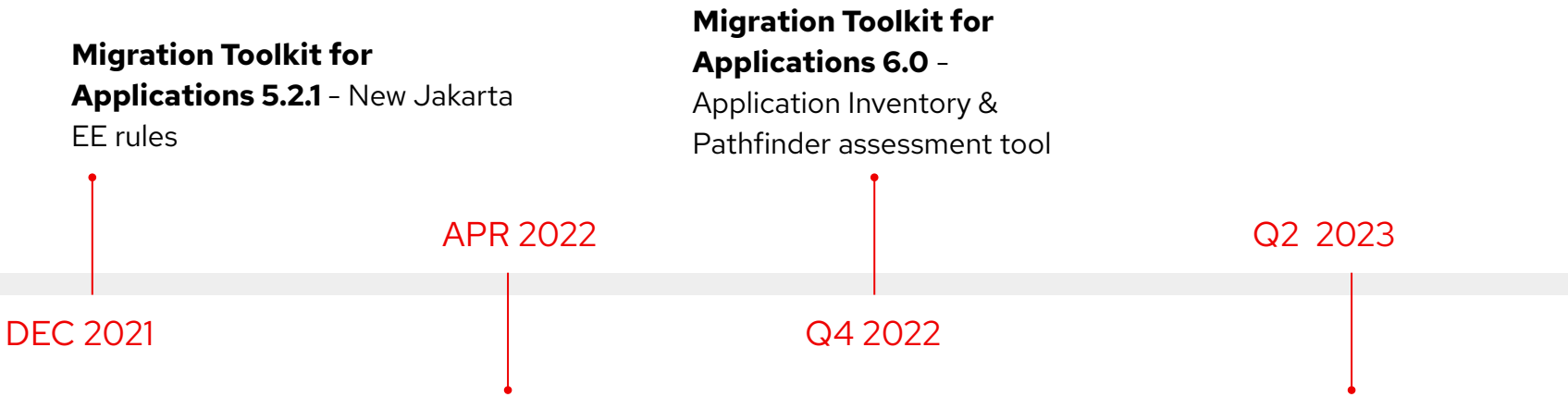
Red Hat Modernization and Migration Solutions

Roadmap Timeline



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Thank you

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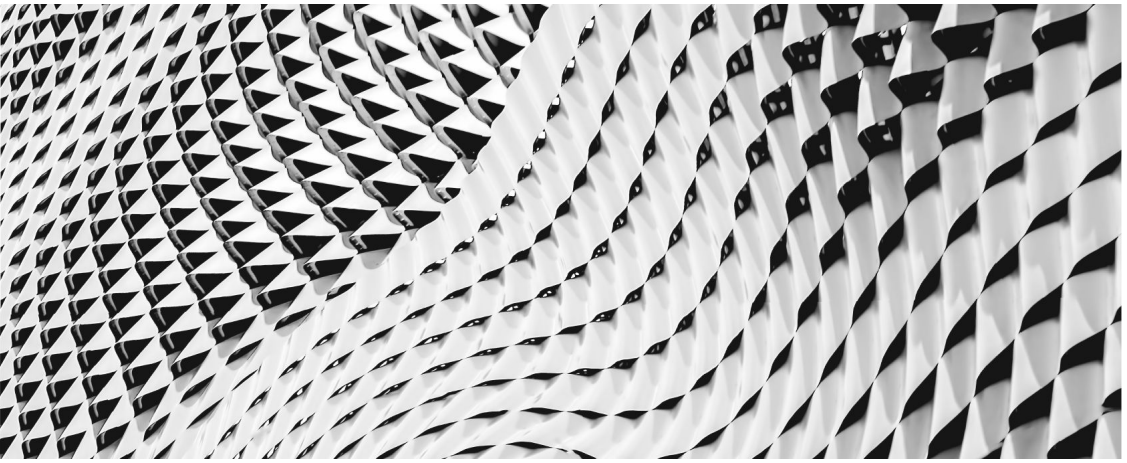
Appendix



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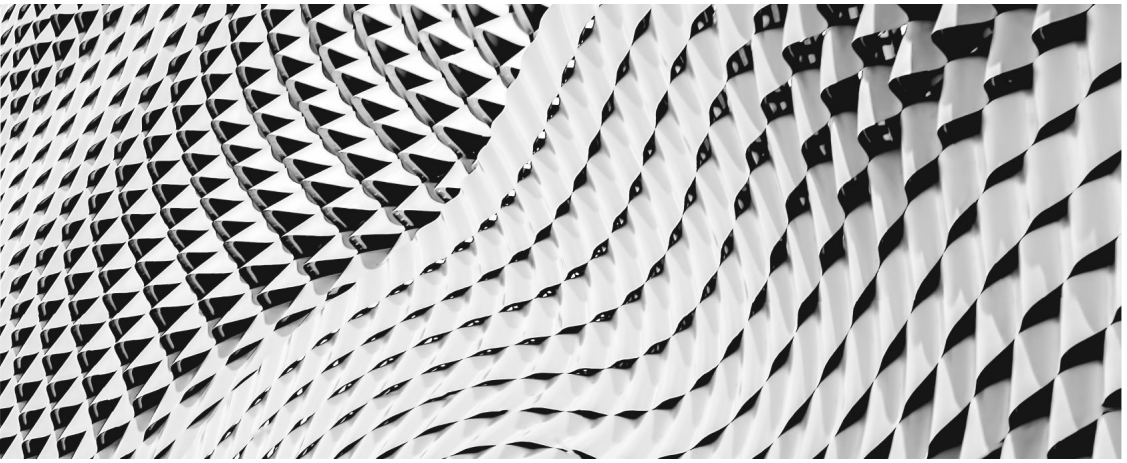
What's New in Tackle 2.0



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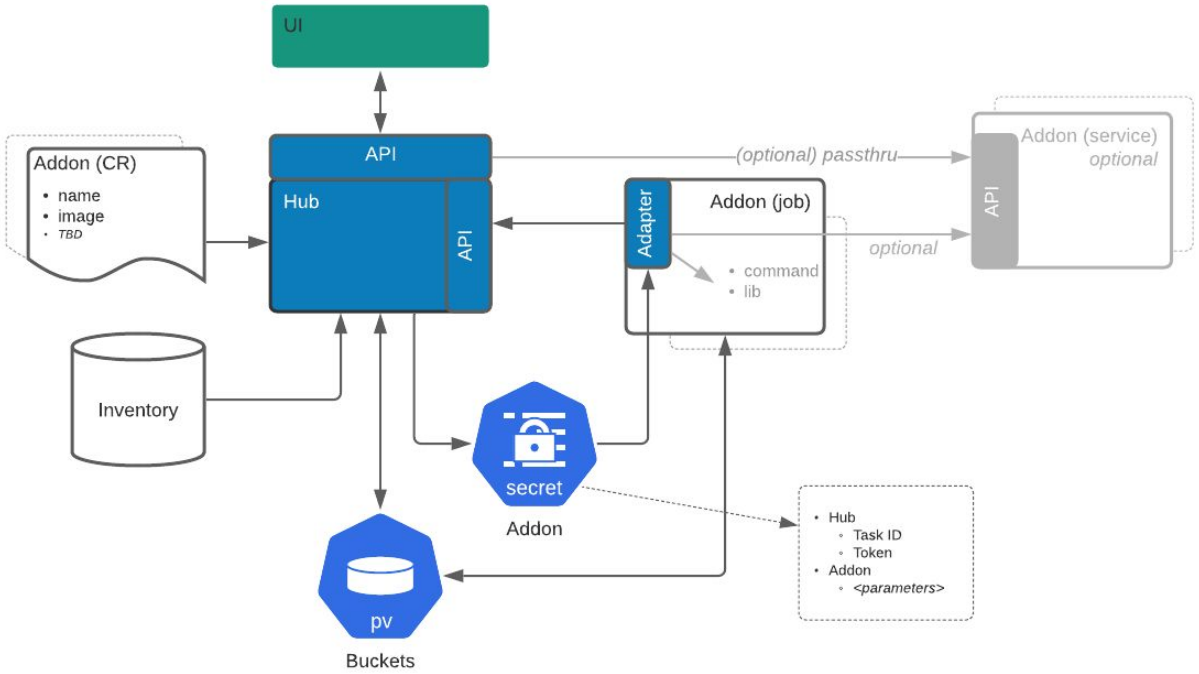
Hub and Spoke Architecture

Complete rearchitecture to simplify integration and improve scalability



- Tackle Hub as the central component to store application data
- Addons enrich application data or integrate with external systems to act on application source
- Refactored backend and Kubernetes native approach to improve scalability

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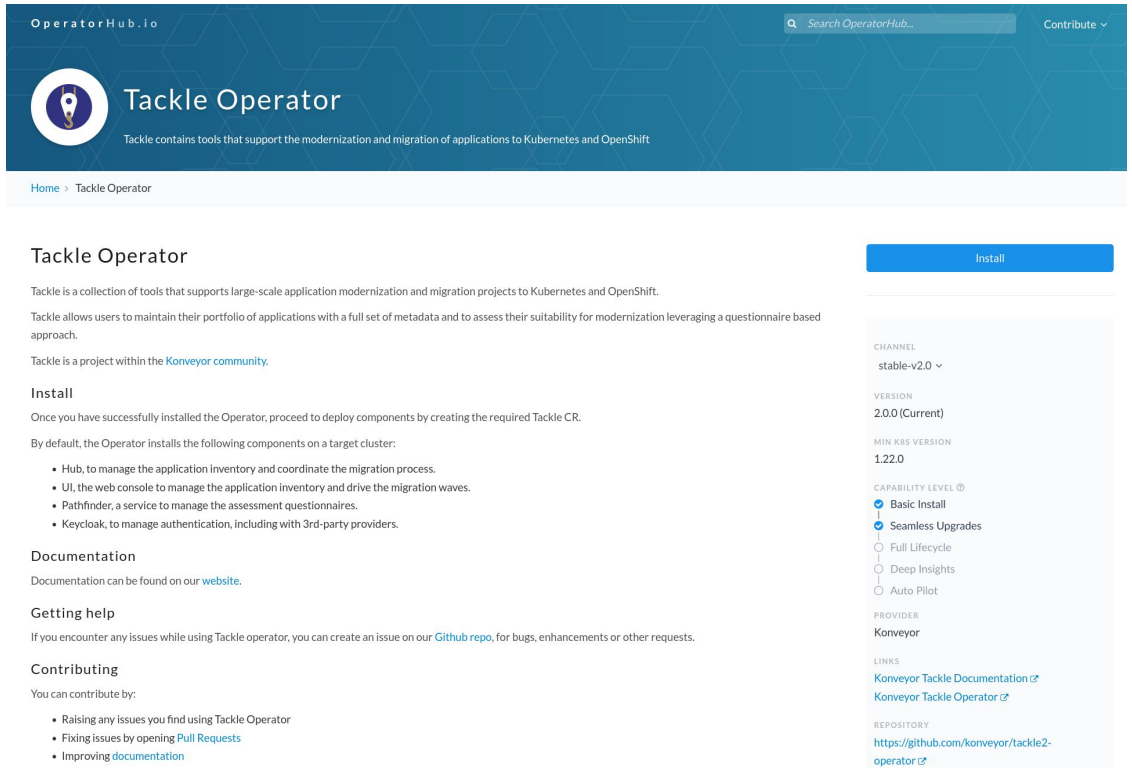
Tackle Operator

Manage and upgrade your Tackle instances

- Completely reimplemented operator
- Available for all Kubernetes distributions
- Capability Level II, allowing seamless upgrades
- Enhanced configuration management
  - Enable authless deployment
  - Manage volume sizes
  - Configure storage classes
- Manages two CRs now: tackle and addon



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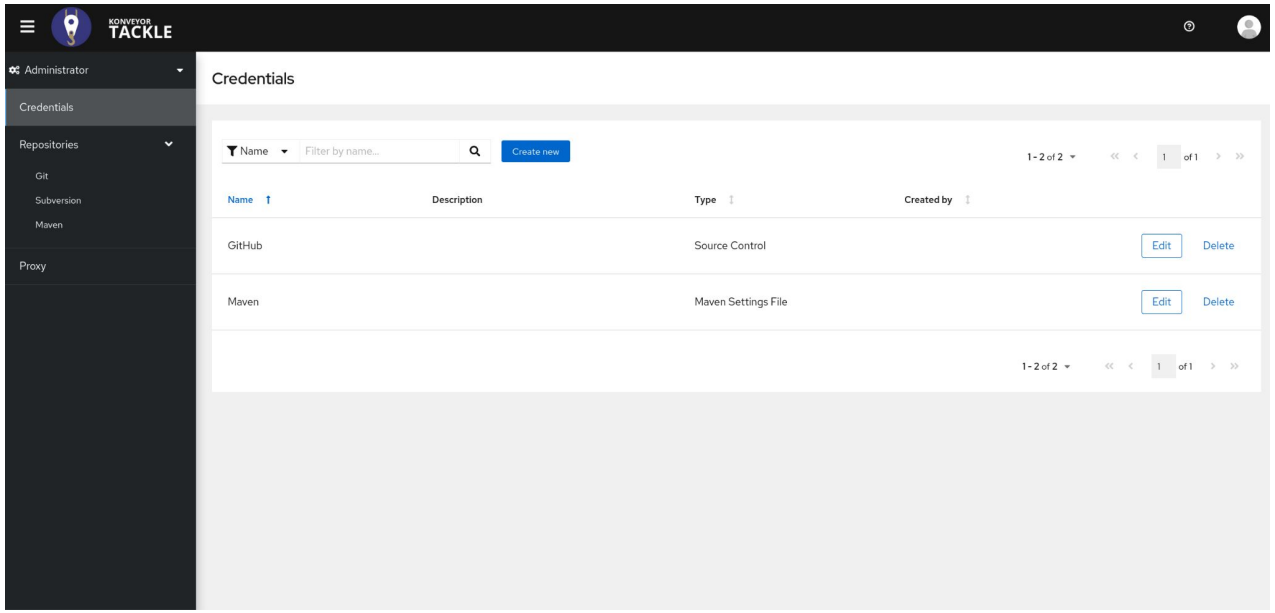
Administrator Perspective

New perspective to manage the toolkit



- Dedicated perspective to manage tool-wide configuration.
- Similar approach and design to the OpenShift Administrator Perspective.
- Enforces enhanced RBAC with three new differentiated personas:
  - Administrator
  - Architect
  - Migrator

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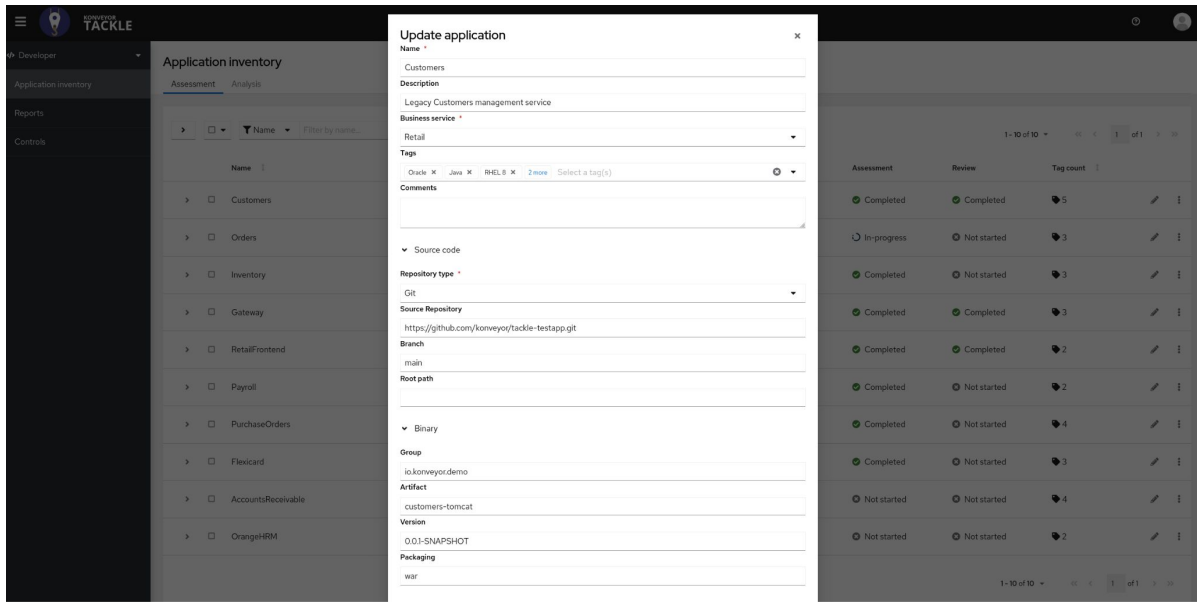
Integration with repositories

Get source code and binaries from repositories

- Integration with source code and binaries repositories:
  - Git
  - Subversion
  - Maven Artifact repositories



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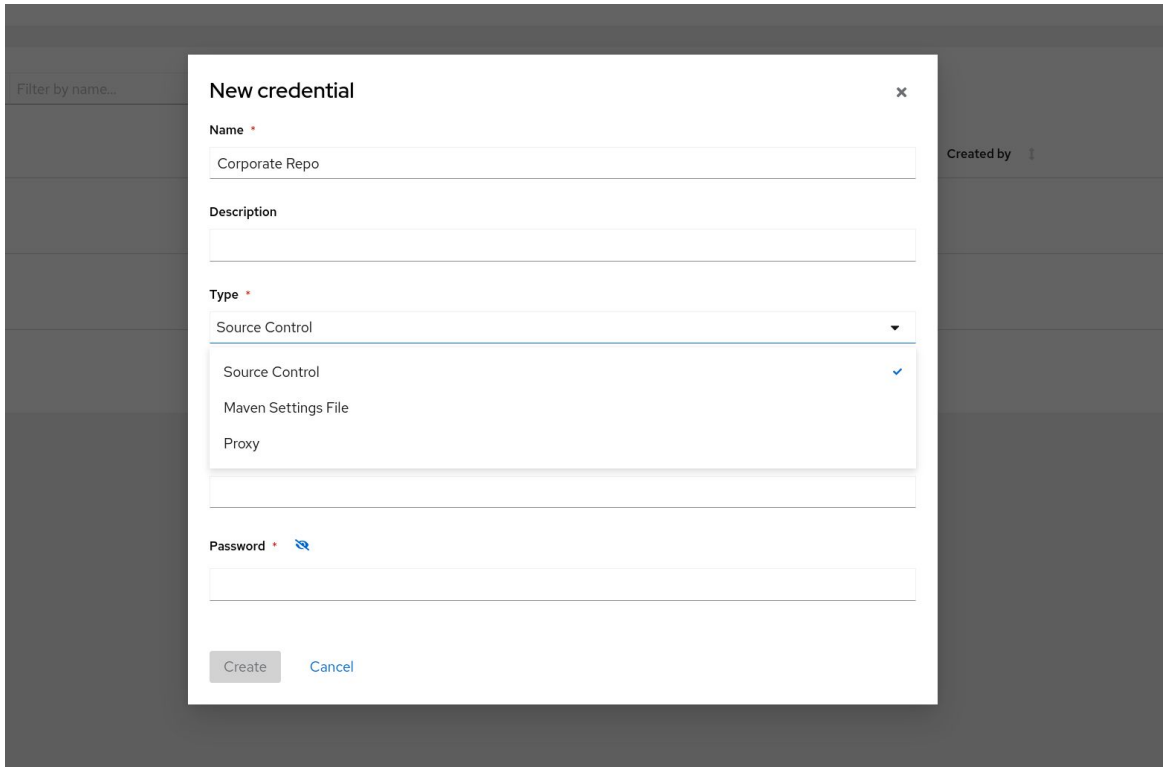
Credentials Management

Manage and assign credentials securely



- Secure store for multiple credential types:
  - Source control
  - Maven settings files
  - Proxy
- Credentials are managed by administrators and assigned by architects to applications.

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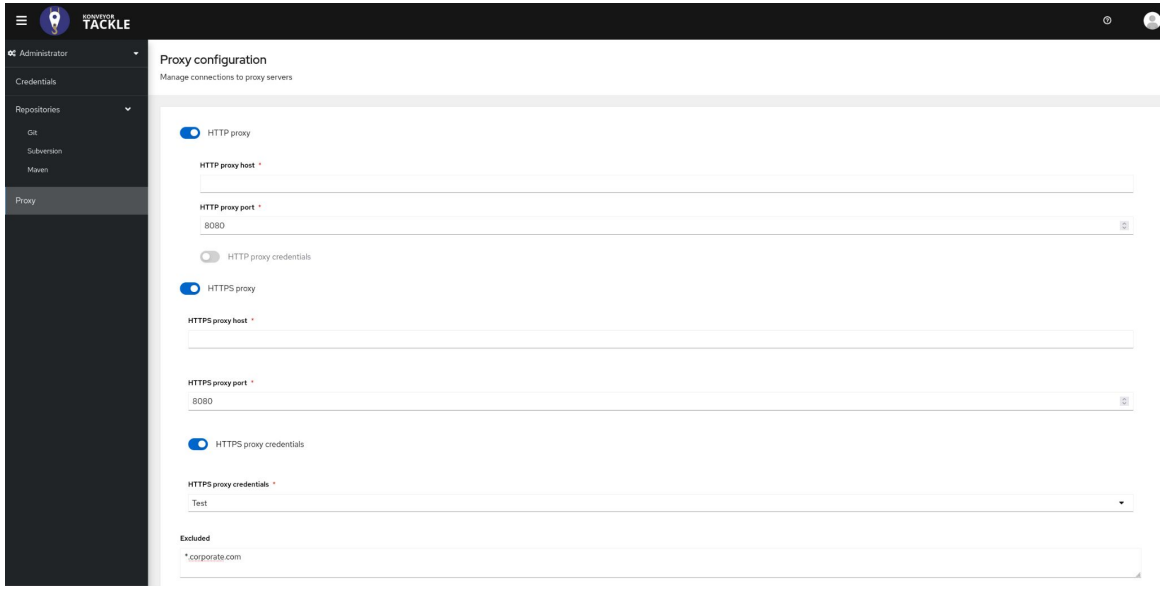
Proxy integration

Allow the use of proxies to connect to external systems

- HTTP and HTTPS proxy configuration in the UI/UX.
- Used to interact with external systems like repositories.



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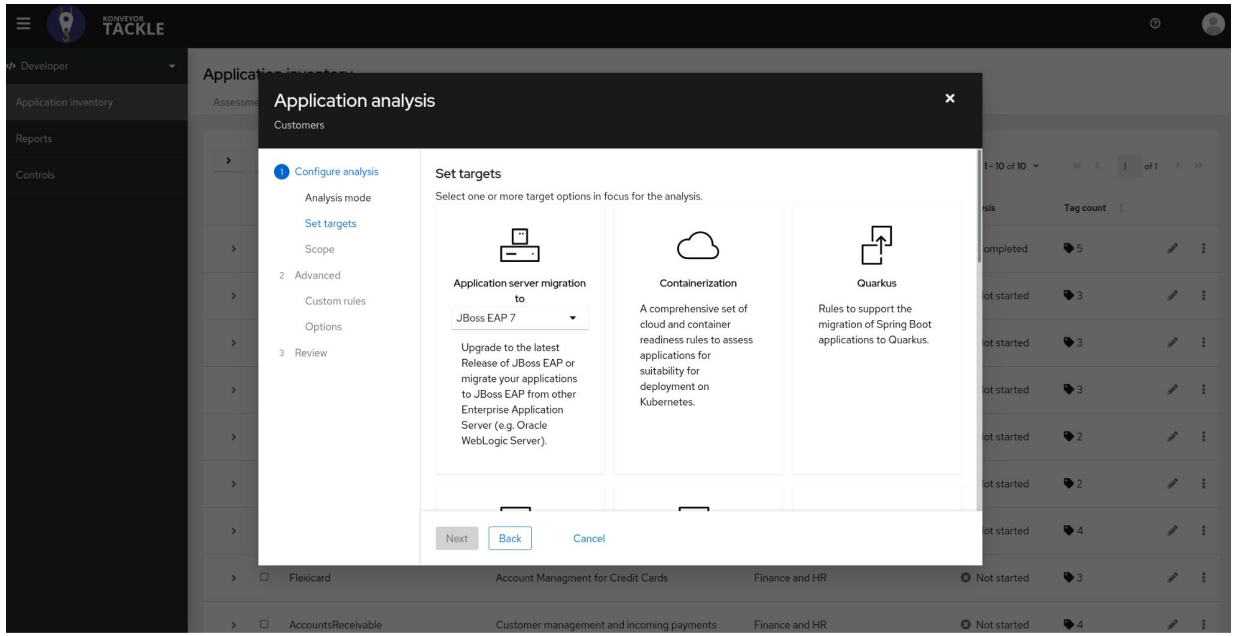
Application Analysis

Get precise data about your Application Portfolio and estimate migration cost



- Analyzes application source code and binaries and helps estimating the migration effort for different targets or paths
- Decompiles and analyzes Java applications executing an extensible set of rules to identify issues
- Support numerous migration paths and creates a rich set of reports

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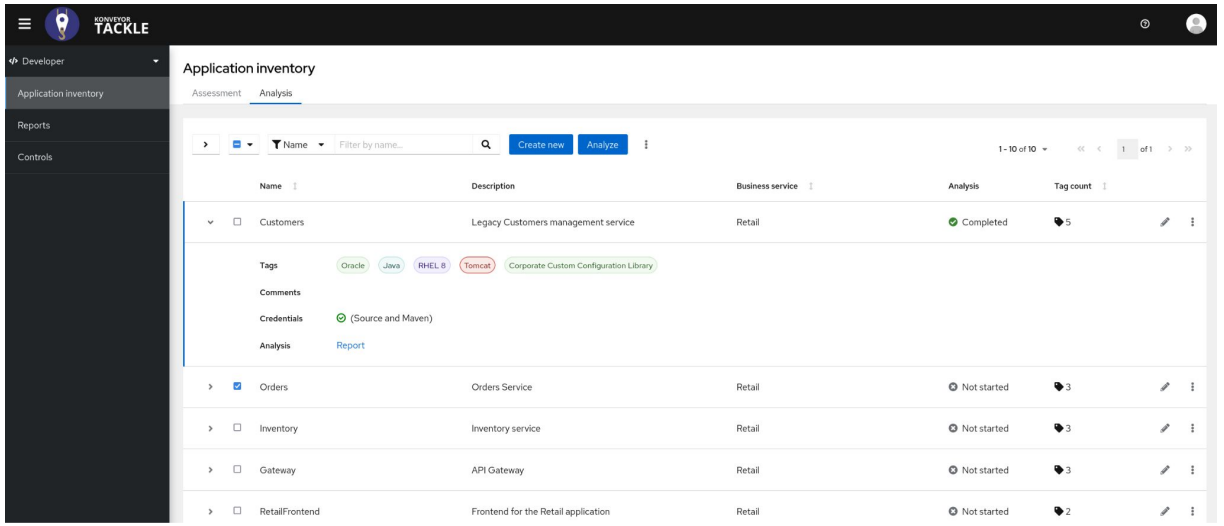
Application Analysis

Integration with Windup

- Execute application analysis from the application inventory.
- Leverage the integration with repositories to streamline the user experience.
- Oriented to bulk analysis.
- Enhanced inventory view with dedicated tabs to assessment and analysis data.



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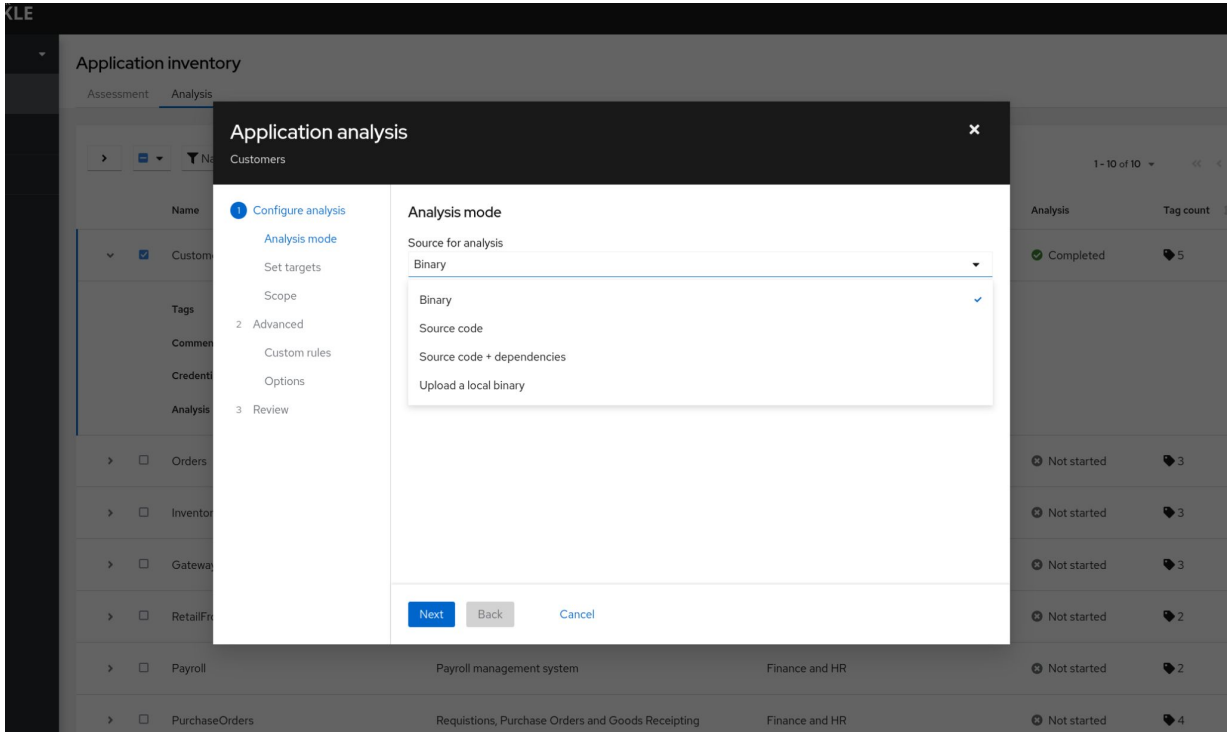
Application Analysis

New analysis modes



- Multiple analysis modes:
  - Source
  - Binary
  - Source + dependencies (parses POM to gather dependencies)
  - Upload a binary from local workstation

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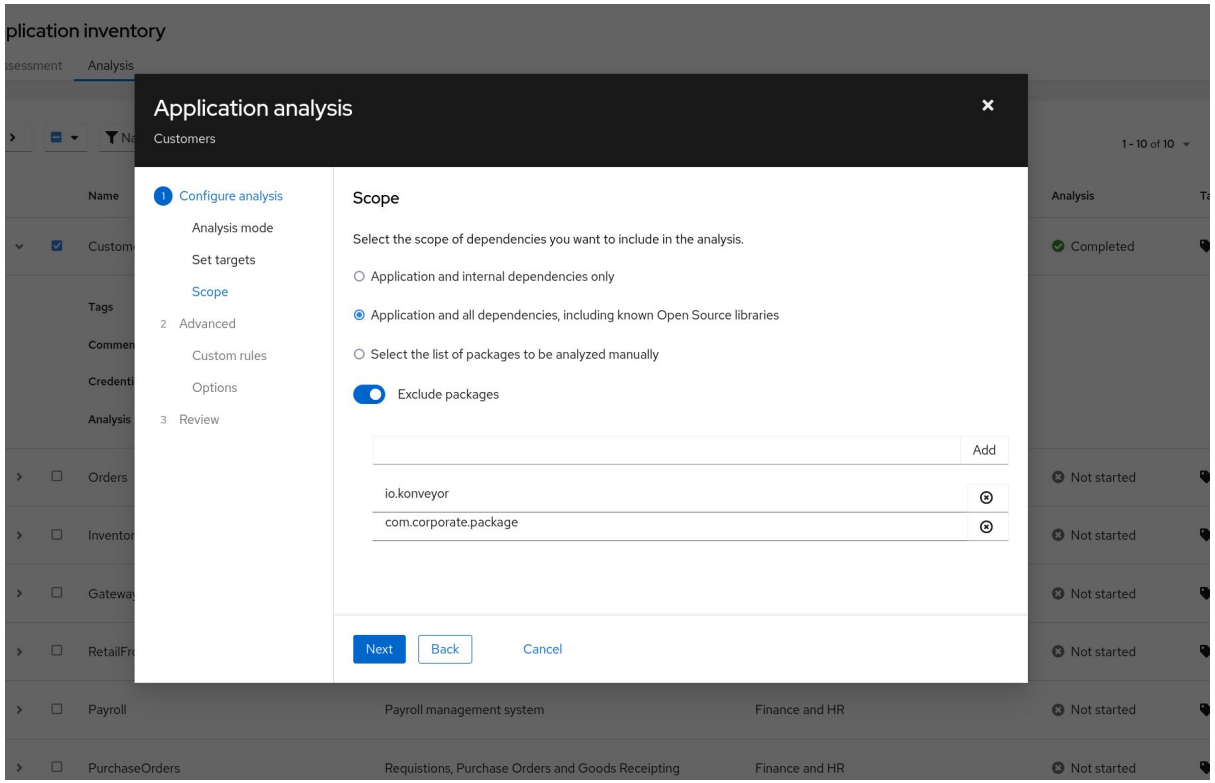
Application Analysis

Analysis scope selection

- Simplified user experience to configure the analysis scope.
- Possibility to force the analysis of known Open Source libraries.
- Predetermined analysis scopes or manual selection of packages to analyze.



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