



## Development Tools in Management VPC

The intent of this demo is to show how you can interact with the management cluster, and to introduce the tools used for a Cloud Native development workflow using the Cloud-Native Toolkit. This will provide a very basic introduction to each of tools and show the user interfaces so that they will be more familiar in subsequent presentations.

### Goals for the Demo:

- Familiarize the audience with tools used with the Cloud Native Toolkit

### Prerequisites:

- If you have not already done so, request access to the FS Cloud demo environment at: <https://techzone.ibm.com/collection/ibm-cloud-for-financial-services>
- Download the OpenVPN client
  - Windows <https://openvpn.net/community-downloads/>
  - MacOS <https://openvpn.net/client-connect-vpn-for-mac-os/>
  - Linux <https://openvpn.net/download-open-vpn/>
- Download the techzone.ovpn VPN certificate and add it to the OpenVPN client
  - Link <https://techzone-iam-agent.eqtyaj6hk2k.eu-de.codeengine.appdomain.cloud/vpn/download>



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### Demo Steps:

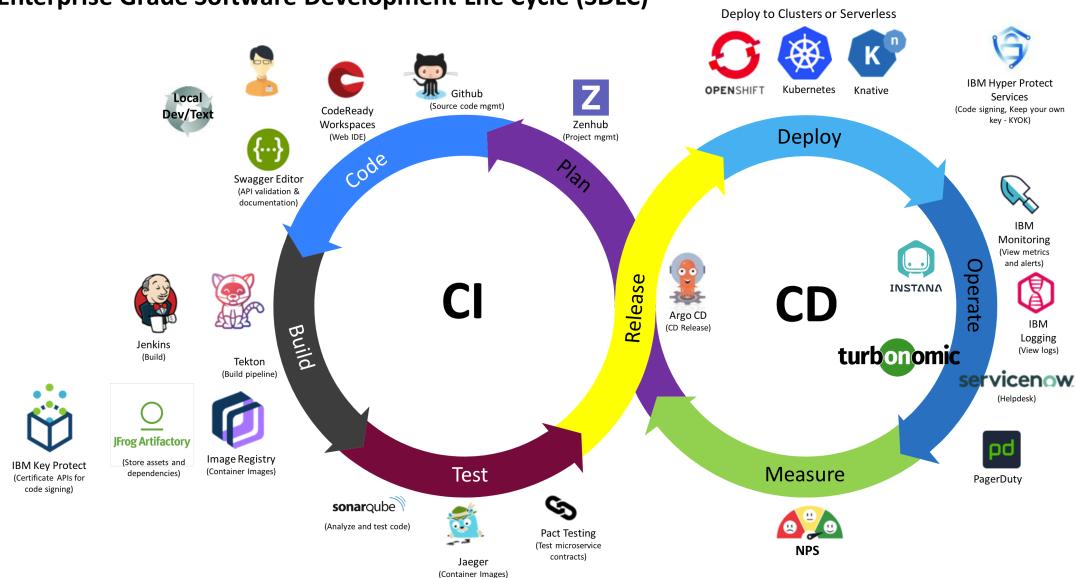
1. Set the stage... the tools that we're about to show are part of an enterprise-grade software development life cycle. This is the iterative process that enterprises use to build and deliver software reliably and consistently.

It covers everything in the software development lifecycle, including continuous integration (CI) and continuous delivery (CD) phases.

The continuous integration phase covers source control management, automated building, automated testing, container image and artifact management, and inspection/analysis for code quality and vulnerabilities.

The continuous delivery phase covers the cycle of delivering those container images and artifacts into production, monitoring and measuring performance, and using this cycle to feed improvements and new requirements back into the continuous integration cycle to improve the overall solution.

#### Enterprise Grade Software Development Life Cycle (SDLC)

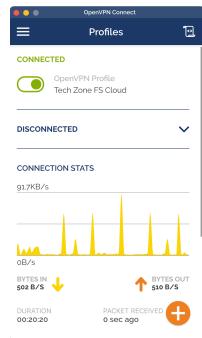


The tools that we are using for an enterprise software development lifecycle (and are covered in this document) are components of the Cloud Native Toolkit (<https://cloudnativetoolkit.dev/>)



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2. Now, let's examine how what tools we use to deliver software with this lifecycle within our FS Cloud instance.
3. First, we need to connect to the management cluster.
  - a. Connect the OpenVPN Client with the Tech Zone demo profile



- b. Navigate to <https://cloud.ibm.com/kubernetes/clusters>
- c. Select the “management-cluster” instance to view the cluster details
- d. Click the “OpenShift web console” button to bring up the OpenShift Dashboard

The screenshot shows the IBM Cloud interface for managing Kubernetes clusters. The cluster 'frontoffice-mgmt-cluster' is selected. The 'Actions...' dropdown menu is open, and the 'OpenShift web console' button is highlighted with a red arrow. The dashboard displays various cluster metrics and status indicators.

Overview	Node status	Add-on status	Master status	Ingress status
Worker nodes: 6 of 6 (Normal)	1 of 1 (Normal)	Normal	Healthy	
Worker pools: 1	Details	Details	Details	
DevOps: New				

**Details**

Cluster ID	Version	Infrastructure	Zones
c599eq6f0cth2mcnk8:	4.6.44_1556	VPC Gen2	eu-de-1, eu-de-2, eu-de-3
Created: 9/28/2021, 12:17 AM	Resource group: frontoffice-management	Image security enforcement: Enable	

**Node health**

Total nodes: 6	Status: 100% Normal
Critical: 0%	Warning: 0%
Normal: 100%	Pending: 0%

4. In the OpenShift Dashboard, click on the Application Launcher menu.



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The screenshot shows the Red Hat OpenShift Container Platform Management interface. A red box highlights the 'Application Stages' section, which contains links to various tools: ArgoCD, Artifactory, Ascent, Developer Dashboard, GitHub, IBM Logging, IBM Monitoring, Image Registry, Pact Broker, SonarQube, and OpenShift on IBM Cloud. An arrow points from the top right towards this highlighted area.

Here we want to highlight all of the tools we're going to cover and are instrumental in a an enterprise software development lifecycle:

- a. **ArgoCD** - Continuous Delivery via GitOps. ArgoCD is used to deliver applications into the test and production environments.
- b. **Artifactory** - managing assets/build artifacts. We will use Artifactory to store versioned artifacts that are produced by pipelines that automatically build the services for the OpenFN banking application.
- c. **Ascent** – View and download reference architectures and terraform templates for FS Cloud Architectures
- d. **Developer Dashboard** - get code starter kits and learning resources
- e. **Github** – link to Cloud Native Toolkit GitHub org. This is where you can find source code to pipeline tasks and terraform modules used within the Cloud Native Toolkit
- f. **IBM Logging** – link to IBM Cloud Logging. This is used to store and manage application logs (part of the continuous integration lifecycle)
- g. **IBM Monitoring** – link to IBM Cloud Monitoring. This is used to manage cluster and resource performance and load (part of the continuous integration lifecycle)
- h. **Image Registry** – link to IBM Container Registry. This is used to store container images that are produced by pipelines that automatically build the services for the OpenFN banking application.
- i. **Pact Broker** – contract testing using Pact. This is used to manage and test software contracts for services that are part of your application. This is used to prevent breaking changes in your service contracts.



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- j. **SonarQube** – code quality analysis. This is used to scan your code for coding quality and vulnerabilities.
5. Now let's look a bit closer at each one of these tools.
6. In the application launcher menu, click on the “ArgoCD” link. You’ll be taken to the ArgoCD login screen. Click on the “Log in via OpenShift” button to log in.

Application	Project	Status	Repository	Target	Path	Destination	Namespace
business-svc-cred-card	openfnbank	Healthy	https://github.ibm.com/openfn-bank/op...	test	business-svc-cred-card	in-cluster	openfn-test
business-svc-curr-acct	openfnbank	Healthy Synced	https://github.ibm.com/openfn-bank/op...	test	business-svc-curr-acct	in-cluster	openfn-test
business-svc-cust-postn	openfnbank	Healthy Synced	https://github.ibm.com/openfn-bank/op...	test	business-svc-cust-postn	in-cluster	openfn-test
business-svc-sav-acct	openfnbank	Healthy Synced	https://github.ibm.com/openfn-bank/op...	test	business-svc-sav-acct	in-cluster	openfn-test
exp-svc-acct	openfnbank	Healthy Unknown	https://github.ibm.com/openfn-bank/op...	test	exp-svc-acct	in-cluster	openfn-test
support-svc-data	openfnbank	Healthy Synced	https://github.ibm.com/openfn-bank/op...	test	support-svc-data	in-cluster	openfn-test

Once logged in you can see the ArgoCD dashboard. ArgoCD is used to deliver applications into the test and production environments.

This screen shows all of the GitOps continuous delivery deployments configured to deploy into this cluster and their status/health. We'll go into greater detail on GitOps workflows later.

7. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “Artifactory” link. Artifactory is a universal artifact repository. It is used to store assets for your applications. In this case we’re using it to store versioned copies of files generated by our DevOps build processes.

Click on “Artifacts” in the left menu, and browse the tree structure. Assets generated by pipelines in this cluster are placed in generic-local/openfn-frontoffice/



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The screenshot shows the JFrog Artifactory Open Source interface. The left sidebar has a 'Tree' view showing a hierarchy of artifacts under 'generic-local'. One folder, 'openfn-frontoffice', is expanded, revealing sub-artifacts like 'architecture-builder-bff-0.0.1.tgz', 'business-svc-cred-card-0.0.1.tgz', and 'web-app-0.0.46.tgz'. The right panel displays detailed information for the selected artifact, 'web-app-0.0.46.tgz'. The 'General' tab shows the following details:

Name	Value
Name	web-app-0.0.46.tgz
Repository Path	generic-local/openfn-frontoffice/web-app-0.0.46.tgz
URL to file	<a href="https://artifactory-tools.frontoffice-mgmt-cluster-48d3a96f95acc62076e928d79df50cf1-l000.eu-de.containers.appdomain.cloud/artifactory/generic-local/openfn-frontoffice/web-app-0.0.46.tgz">https://artifactory-tools.frontoffice-mgmt-cluster-48d3a96f95acc62076e928d79df50cf1-l000.eu-de.containers.appdomain.cloud/artifactory/generic-local/openfn-frontoffice/web-app-0.0.46.tgz</a>
Module ID	N/A
Deployed By	admin
Size	3.23 KB
Created	04-10-21 08:01:18 +00:00
Last Modified	06-10-21 14:19:09 +00:00
Downloads	0
Remote Downloads	0

The 'Checksums' tab lists SHA-256, SHA-1, and MD5 values.

Using a centralized artifact storage solution makes it easier to track and search for files or artifacts, and allows you to keep versioned copies of all the artifacts of your applications. This makes it easy to reproduce specific build versions of your solutions, and makes it easy to roll back to one of those specific versions.

8. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “Techzone Deployer” link. **TechZone Deployer** enables you to access and download terraform templates for IBM’s hybrid-cloud software across IBM Cloud, AWS or Azure



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IBM Ecosystem Labs - ASCENT

Documentation

### Architecture and Security Controls Enterprise Tool (ASCENT)

**What is ASCENT?**

ASCENT is a tool created by IBM to accelerate partner's journey to the IBM Cloud. Through automation and integration, ASCENT enables enterprises to deliver compliant cloud architectures which can be clearly evidenced and communicated with Governance, Risk and Compliance teams. Click on the links below to learn more about how ASCENT automates and integrates Security Controls, Reference Architectures and Cloud Services.

Login

This tool is used to view FS Cloud reference architectures, download terraform templates for producing FS Cloud architecture instances, and map compliance controls to specific resource instances.

9. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “Developer Dashboard” link. The Developer Dashboard shows links to all the tools associated with this cluster, plus learning resources and application source code starter kits.

IBM Garage Cloud Native Toolkit | IBM Cloud Console | Developer Guide | Git Org

### Developer Dashboard

Tools

The following tools have been been configured in your dashboard

Tekton	Artifactory	Github	Image Registry
SonarQube	Argo CD	LogDNA	Sysdig
Pact Testing			

Learn

Starter Kits

Click on the “Learn” tab to see links to various learning resources. This includes links for Cloud Native development learning and best practices.



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The screenshot shows the IBM Garage Cloud Native Toolkit Developer Dashboard. The top navigation bar includes links for 'IBM Garage Cloud Native Toolkit', 'IBM Cloud Console', 'Developer Guide', and 'Git Org'. Below the navigation is a search bar and a 'Tools' dropdown. The main content area is titled 'Developer Dashboard' and features a 'Learn' tab which is currently selected. Under the 'Containers and Kubernetes' section, there are several cards: 'What is a Container?' (Link), 'What is an Image?' (Link), 'Docker Basics' (Link), 'Kubernetes' (KataCoda), 'Creating a Cluster' (Link), 'Deploy Containers Kubectl' (Link), 'Deploy Containers YAML' (Link), 'Intro to Networking' (Link), and 'Health Checks' (Link). A decorative icon of three interconnected cubes is located in the top right corner.

Click on the “Starter Kits” tab to see a list of application starter kits. These are fully functional production-grade code starters that can be cloned to get started quickly and easily on a new project.

The screenshot shows the same developer dashboard, but the 'Starter Kits' tab is now selected. The main content area is titled 'Developer Dashboard' and features a 'Starter Kits' tab which is currently selected. Under the 'Starter Kit Git Repositories' section, there is a brief description: 'Follow the commands below to install the Cloud-Native Toolkit CLI tools. Login to the IBM Cloud account and configure your command line for access to either Cluster.' It also says 'To use the Starter Kit Code Repositories, click on the link and generate a template into your own git organization, Then follow instructions below.' Below this, there is a section titled 'Use the following starter kits to create your own git repos. This will help you to accelerate the start of your project' with eight cards: 'React UI Patterns' (Carbon based UI to help with common patterns using React framework), 'Angular UI Patterns' (Carbon based UI to help with common patterns using Angular framework), 'TypeScript GraphQL' (Node.js TypeScript GraphQL Backend for Frontend), 'TypeScript Microservice' (Node.js TypeScript Microservice using OpenAPI endpoints), 'Spring Boot Microservice' (Spring Boot Java Microservice), 'Quarkus Microservice' (Java), 'Liberty Microservice' (Java), and 'Artificial Intelligence (AI) Microservice' (Deep Learning Model: Locate and Detect multiple objects in image). Each card has a 'Link' button and a 'Clone' button.

10. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “GitHub” link. This will open the <https://github.com/cloud-native-toolkit> GitHub org.

Here you can find application source code, terraform templates, and definitions for Tekton pipeline tasks that are used by the Cloud Native Toolkit.



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The screenshot shows the GitHub repository page for the Cloud-Native Toolkit. It features a sidebar with pinned repositories: `ibm-garage-iteration-zero`, `multi-tenancy-gitops`, `planning`, `automation-modules`, `developer-guide`, and `ibm-garage-cloud-cli`. The `ibm-garage-iteration-zero` repository has 13 stars and 29 forks. The `multi-tenancy-gitops` repository has 28 stars and 160 forks. The `planning` repository has 2 stars and 1 fork. The `automation-modules` repository has 6 stars and 18 forks. The `developer-guide` repository has 25 stars and 47 forks. The `ibm-garage-cloud-cli` repository has 8 stars and 7 forks. On the right side, there is a "People" section showing a grid of user profiles and a "Top languages" section listing HCL, Shell, Dockerfile, HTML, and TypeScript.

11. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “IBM Logging” link.

This will take you to <https://cloud.ibm.com/observe/logging>, where you can see your logging instances for the FS Cloud architecture.

The screenshot shows the IBM Cloud Observability Logging dashboard. The left sidebar has links for Observability, Logging, Monitoring, and Activity Tracker. The main area displays a table for the "frontoffice-logging" instance. The table columns include Name, Status, Resource group, Region, Sources, Plan, and View. The instance is listed as Active in the frontoffice-common resource group in Frankfurt. There are buttons for "Add log sources" and "Open dashboard". The bottom of the screen shows pagination controls.

Click on the “Open Dashboard” link for the frontoffice-logging instance to open the log dashboard. Here you can see all of the logs for this instance.



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The screenshot shows the IBM Cloud Observability interface. On the left, there's a sidebar with a search bar and links for 'Observability', 'Logging', 'Monitoring', and 'Activity Tracker'. The main area is titled 'frontoffice-logging (Frankfurt)'. It has tabs for 'Everything', 'Filters', 'Tags', 'Sources', 'Apps', and 'Levels'. The 'Sources' tab is active, showing a list of log entries. One entry is highlighted with a yellow background:

```
Oct 2 23:44:18 https://172.21.0.1:443/apis/autoscaling/v2beta2/timeout=32s
Oct 2 23:44:18 sysdig-agent-47b64 sysdig-agent [604] felix/int_dataplane.go 1454: Applying dataplane updates
Oct 2 23:44:18 calico-node-z1nf1f calico-node [INFO] [65] felix/int_dataplane.go 1454: Applying dataplane updates
Oct 2 23:44:18 felix/int_dataplane.go 223: Asked to resync with the dataplane on next update. Family="inet"
Oct 2 23:44:18 calico-node-z1nf1f calico-node [INFO] [65] felix/int_dataplane.go 306: Resyncing users with dataplane.
Family="inet"
Oct 2 23:44:18 felix/int_dataplane.go 306: Resyncing users with dataplane.
Oct 2 23:44:18 felix/int_dataplane.go 356: Finished resync Family="inet"
Oct 2 23:44:18 calico-node-z1nf1f calico-node [INFO] [65] felix/int_dataplane.go 1468: Finished applying updates to dataplane. msecToApply=2.0864540000000003
Oct 2 23:44:18 felix/int_dataplane.go 1468: imaster-proxy<-static_<334>Oct 2 21:44:18 haproxy[9]:
17.17.237.42:443 [0/0] [D] [C] [S] [R] [P] [E] masterapiserverFrontend/masterapiserverBackend</3599e9fb0ch3mnb83g> vpc.private.eu-de.containers.cloud.ibm.com 1/3/216742 8938 -- 28/28/27/27/27/0/0
Oct 2 23:44:18 felix/int_dataplane.go 1468: imaster-proxy<-static_<334>Oct 2 21:44:18 haproxy[9]:
17.17.237.42:443 [0/0] [D] [C] [S] [R] [P] [E] masterapiserverFrontend/masterapiserverBackend</3599e9fb0ch3mnb83g> vpc.private.eu-de.containers.cloud.ibm.com 1/3/216742 8938 -- 28/28/27/27/27/0/0
Oct 2 23:44:18 sonarqube-sonarqube-74d65734-457qn sonarqube [INFO] 2021.10.02 21:44:18 INFO app[]
[o.a.p.PluginService] no modules loaded
Oct 2 23:44:18 sonarqube-sonarqube-74d65734-457qn sonarqube [INFO] 2021.10.02 21:44:18 INFO app[]
[o.a.p.PluginService] loaded plugin [org.elasticsearch.transport.NettyPlugin]
Oct 2 23:44:18 sonarqube-sonarqube-74d65734-457qn sonarqube [WARNING] OpenJDK 64-Bit Server VM warning: Option UsConcMarkSweep deprecated in version 9.0 and will likely be removed in a future release.
Oct 2 23:44:18 sonarqube-sonarqube-74d65734-457qn sonarqube [WARNING] Ticks are now being generated at a higher frequency than the system timer. This may cause problems with some JFR verb="GET"
URL="/healthz" latency=150.327us resp=200 userAgent="kube-probe/1.19" srcIP="10.10.10.5:2949"
Oct 2 23:44:19 mongodb-b0dccc-hb9vp mongo [ NETWORK [listener] connection accepted from 127.0.0.1:43728 #214606
connections now open]
Oct 2 23:44:19 mongodb-b0dccc-hb9vp mongo [ NETWORK [conn214606] received client metadata from 127.0.0.1:43728
conn214607 [ driver: { name: "PyMongo", version: "3.8.0" }, os: { type: "Linux", name: "Linux", architecture: "x86_64", version: "3.10.0-1160.42.1.el7.x86_64" }, platform: "Python 3.7.3 final/final" ]
Oct 2 23:44:19 sysdig-agent-f3d2 sysdig-agent [9_021, 19664, 19754, Information, analyzer=5472]: ts=1633211059,
reporter=dead, c4=18, fp0=45, smr1, std, fls8
Oct 2 23:44:19 mongodb-b0dccc-hb9vp mongo [ NETWORK [conn214607] and connection 127.0.0.1:43728 #14607 [14 connections now open]
Oct 2 23:44:19 mongodb-b0dccc-hb9vp mongo [ NETWORK [conn214607] and connection 127.0.0.1:43728 #13 connections now open]
```

This allows you to view application logs, track interactions, and identify issues within your applications running in the FS Cloud demo architecture instance.

12. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “Monitoring” link. This opens <https://cloud.ibm.com/observe/monitoring>, where you can access a Sysdig instance to monitor the status and performance of your Kubernetes clusters.

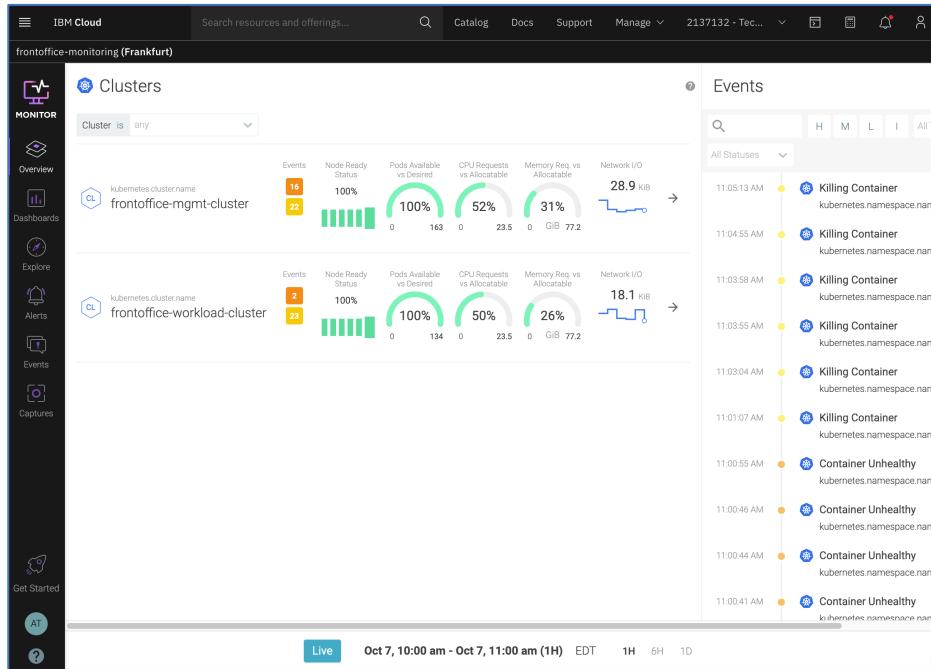
Name	Status	Resource group	Region	Sources	Plan	View
frontoffice-monitoring	Active	frontoffice-common	Frankfurt	Platform metrics	Add sources	Graduated Tier

Click on the “Open Dashboard” link to access the Sysdig dashboard.

Once the dashboard loads, click on the “Overview” tab, and select “Clusters” to see an overview of the OpenShift clusters for the FS Cloud reference architecture instance.



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Sysdig allows you to view the performance of your resource instances. Here we can use it to monitor the status of our management and workload OpenShift clusters. This can tell us the load (what percent of resources are being utilized), network traffic, and details about general performance and resource consumption for our cluster and workloads.

13. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “Pact Broker” link. This will open up the Pact Broker user interface, which can be used to test API contracts within your applications.  
The Pact Broker application can help you know which microservices within your application must be released together, and can help prevent breaking changes when releasing new versions of your applications.



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A pact between Example App and Example API

Requests from Example App to Example API

- A request for an alligator given there is an alligator named Mary
- A request for an alligator given there is not an alligator named Mary
- A request for an alligator given an error occurs retrieving an alligator

Interactions

Given there is an alligator named Mary, upon receiving a request for an alligator from Example App, with

```
{  
  "method": "get",  
  "path": "/alligators/Mary",  
  "headers": {  
    "Accept": "application/json"  
  }  
}
```

Example API will respond with:

```
{  
  "status": 200,  
  "headers": {  
    "Content-Type": "application/json; charset=utf-8"  
  },  
  "body": {  
    "name": "Mary"  
  }  
}
```

14. Go back to the OpenShift Dashboard, open the Application Launcher menu, and click on the “SonarQube” link. SonarQube is a code analysis tool. It will scan your codebase and provide feedback and analysis on coding practices, style, and raise known issues or vulnerabilities.

Click on the “Projects” tab in the header. Here you can see the analysis for the microservices used by the OpenFN banking application.

The screenshot shows the SonarQube interface with the following details:

- exp-svc-acct**: Passed. Last analysis: October 6, 2021, 2:04 PM. Metrics: 0 Bugs, 0 Vulnerabilities, - A Hotspots Reviewed, 11 A Code Smells, 0.0% Coverage, 66.1% Duplications, 568 JS JavaScript.
- business-svc-cust-post**: Passed. Last analysis: October 6, 2021, 2:04 PM. Metrics: 0 Bugs, 0 Vulnerabilities, - A Hotspots Reviewed, 11 A Code Smells, 0.0% Coverage, 32.7% Duplications, 283 JS JavaScript.
- web-app**: Passed. Last analysis: October 6, 2021, 10:14 AM. Metrics: 6 D Bugs, 0 Vulnerabilities, - A Hotspots Reviewed, 17 A Code Smells, 0.0% Coverage, 3.2% Duplications, 3.6k S JavaScript, CSS, ...
- business-svc-sav-acct**: Passed. Last analysis: October 6, 2021, 10:13 AM. Metrics: 0 A Bugs, 0 Vulnerabilities, - A Hotspots Reviewed, 1 A Code Smells, 0.0% Coverage, 0.0% Duplications, 286 JS JavaScript.



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15. In the OpenShift Dashboard, click on the “Pipelines” link in the left menu. Emphasize this is where you find your DevOps Pipelines (based on Tekton), that you can use for automating your entire development (continuous integration) workflow (which we’ll cover in more detail in another demo).

The screenshot shows the Red Hat OpenShift Container Platform dashboard. The left sidebar is titled "Administrator" and contains the following navigation items:

- Home
- Overview
- Projects
- Search
- Explore
- Events
- Operators
- Workloads
- Networking
- Storage
- Builds
- Pipelines (highlighted with a red arrow)
- Tasks
- Triggers
- Monitoring

The main content area is titled "Project: openfn-dev" and shows the "Pipelines" tab selected. It displays a list of pipelines with their last run status and time. The pipelines listed are:

Name	Last Run	Task Status	Last Run Status	Last Run Time
experience-service-accounts	PLD	experience-service-accounts-lev8of	Succeeded	Oct 6, 2:08 pm
business-service-customer-position	PLD	business-service-customer-position-wd5tne	Succeeded	Oct 6, 2:07 pm
web-app	PLD	web-app-laJaw4	Succeeded	Oct 6, 10:19 am
business-service-savings-account	PLD	business-service-savings-account-nirja	Succeeded	Oct 6, 10:16 am
business-service-current-account	PLD	business-service-current-account-46uwux	Succeeded	Oct 6, 10:16 am
support-service-data	PLD	support-service-data-ghlw9s	Succeeded	Oct 6, 10:08 am
business-service-credit-card	PLD	business-service-credit-card-oxd127	Succeeded	Oct 6, 10:07 am

16. Finally, navigate to <https://cloudnativetoolkit.dev/> and reiterate that we’re using the development tools and templates that are available through the Cloud Native Toolkit.

The Cloud-Native Toolkit is an open-source collection of assets that enable application development and support teams to deliver business value quickly using Red Hat OpenShift or IBM Cloud-managed Kubernetes. This guide provides information to help Developers, Administrators, and Site Reliability Engineers use the Toolkit to support delivering business applications through the entire Software Development Life Cycle (SDLC).

Expand the “Reference” menu item, and show that there is additional detail available for every tool examined in the FS Cloud demo instance.



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The Cloud-Native Toolkit is an open-source collection of assets that enable application development and support teams to deliver business value quickly using Red Hat OpenShift or IBM Cloud-managed Kubernetes. This guide provides information to help Developers, Administrators, and Site Reliability Engineers use the toolkit to build and run applications.