

Introduction to DevOps Tools

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Tools

- DevOps tools cover a range of processes within the SDLC:
 - Define and plan
 - Code, build, and configure
 - Test
 - Packaging and preproduction
 - Release, deploy and orchestration
 - Continuous management and configuration
 - Monitoring



1. Git, GitHub, GitLab

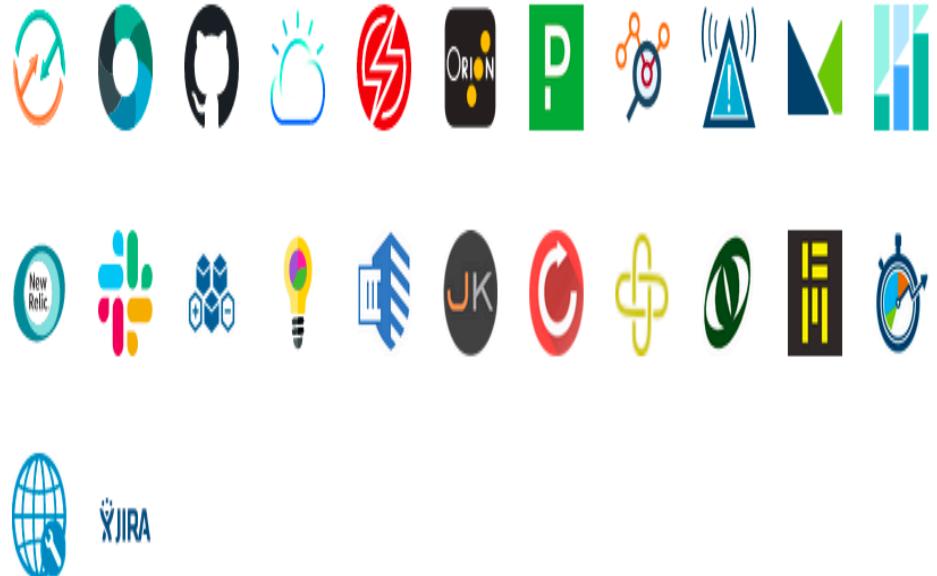


- Git is a version control software for tracking the history of source code repositories
- More than 70% of developers prefer Git to other forms of VCS ¹
- GitHub is a Git hosting platform, but adds many of its own features
- Git is a command line tool. GitHub provides a Web-based graphical interface.
- GitHub provides access control and several collaboration features, such as a wikis and basic task management tools for every project
- GitLab is a web-based DevOps lifecycle tool that provides a Git-repository manager providing wiki, issue-tracking and CI/CD pipeline features, using Open Source

1. StackOverflow 2017 Developer Survey (<https://insights.stackoverflow.com/survey/2017#work-version-control>)

2. Continuous Delivery Toolchains

- Continuous Delivery toolchains support development, deployment and operation tasks
- Toolchains provide an integrated set of tools to build, deploy and manage your apps
- You can create toolchains that include IBM Cloud services, Open Source tools and Third-party tools that make development and operations repeatable and easier to manage
- Build, test and deploy in a repeatable way with minimal human intervention



How do I create a Toolchain ?

<https://cloud.ibm.com/devops/toolchains>

The screenshot shows the 'Create a Toolchain' page on the IBM Cloud DevOps toolchains website. The URL in the browser is https://cloud.ibm.com/devops/create?env_id=ibm:yp:eu-de. The page has a header with tabs like 'Toolchains - IBM Cloud', 'Courses and tutorials - IBM Cloud', 'Cloud Learn Hub | IBM', 'DevOps toolchains - IBM Cloud', and 'Create a Toolchain - IBM Cloud'. Below the header is a search bar and navigation links for Catalog, Docs, Support, Manage, and Sudharshan Govindan's A... . On the left, there's a sidebar with 'Toolchains / Create a Toolchain' and sections for 'Filters' (Deployment targets: Cloud Foundry, Kubernetes, Virtual Server; Tool integrations: Delivery Pipeline, DevOps Insights, Eclipse Orion Web IDE, Git Repos and Issue Tracking, GitHub, PagerDuty, Sauce Labs) and 'Build and Deploy Templates' (All 13). The main content area displays several toolchain templates under 'Build and Deploy Templates' and 'Build, Test, and Deploy Templates'. Each template card includes a title, icon, brief description, and a 'Tools:' section with icons for Cloud Foundry, Kubernetes, and Helm.

To get started, select a toolchain template. You can use the filters or the search box to narrow the scope.

Filters

Deployment targets

- Cloud Foundry
- Kubernetes
- Virtual Server

Tool integrations

- Delivery Pipeline
- DevOps Insights
- Eclipse Orion Web IDE
- Git Repos and Issue Tracking
- GitHub
- PagerDuty
- Sauce Labs

All (13)

Build and Deploy Templates

- Develop a Cloud Foundry app**
IBM
Continuously deliver a Cloud Foundry app with repos and issue tracking hosted by IBM.
Tools:
- Develop a Kubernetes app**
IBM
Continuously deliver a secure Docker app to a Kubernetes Cluster.
Tools:
- Develop a Kubernetes app with Razee**
IBM
Continuously deliver a secure Docker app to a Kubernetes Cluster using Razee
Tools:
- Develop a Kubernetes app with image signing**
IBM
Continuously deliver a secure signed Docker app to a Kubernetes Cluster.
Tools:
- Develop a Kubernetes app with Helm**
IBM
Continuously deliver a secure Docker app to a Kubernetes Cluster using a Helm Chart.
Tools:

Build, Test, and Deploy Templates

- Develop a Cloud Foundry app with DevOps Insights**
IBM
Use analytics to determine whether to deploy.
- Develop and test microservices on Cloud Foundry**
IBM
Continuously deliver a microservices app with repos and issue tracking.
- Develop and test microservices on Kubernetes with Helm**
IBM
Continuously deliver a microservices app on Kubernetes using quality gates and Helm release coordination.

How do I create a Toolchain ?

- Click on the hamburger menu which is located at top left corner in IBM Cloud dashboard
- Select DevOps
- Select your Region from Location drop-down. For e.g., London

The screenshot shows the IBM Cloud dashboard with the DevOps section selected. The sidebar on the left lists various services like Dashboard, Resource List, Classic Infrastructure, Functions, Kubernetes, OpenShift, VMware, VPC Infrastructure, API Management, App Development, and DevOps. The DevOps section is expanded, showing Interconnect, Observability, Schematics, Security, Apple, Blockchain, Integrate, Managed Solutions, and Watson. Below this, there's a summary of recent support cases, user access management, and the IBM Cloud status map. A prominent 'Create resource' button is located at the top right of the main content area.

The screenshot shows the 'Create a Toolchain' page within the IBM Cloud interface. The top navigation bar includes tabs for 'Toolchains - IBM Cloud', 'Courses and tutorials - IBM Cloud', 'Cloud Learn Hub | IBM', 'DevOps toolchains - IBM Cloud', and 'Create a Toolchain - IBM Cloud'. The main content area is titled 'Create a Toolchain' and instructs the user to select a toolchain template. It features a search bar and a 'Filters' section with options for deployment targets (Cloud Foundry, Kubernetes, Virtual Server) and tool integrations (Delivery Pipeline, DevOps Insights, Eclipse Orion Web IDE, Git Repos and Issue Tracking, GitHub, PagerDuty, Sauce Labs). Below these are two sections of tool templates: 'Build and Deploy Templates' and 'Build, Test, and Deploy Templates', each containing several items like 'Develop a Cloud Foundry app', 'Develop a Kubernetes app', and 'Develop a Kubernetes app with Raze'.

Develop a Cloud Foundry app toolchain – step 1

The screenshot shows the 'Create a Toolchain - IBM Cloud' page in the IBM Cloud interface. The 'Create' tab is active. The 'Toolchain Name' field contains 'simple-toolchain-20200617142302213'. The 'Select Region' dropdown is set to 'Dallas'. The 'Select a resource group' dropdown is set to 'default'. Under 'Tool Integrations', 'Git Repos and Issue Tracking' is selected, with sub-options for GitHub, GitLab, Bitbucket, and GitHub Enterprise Whitewater. The 'Git Repos and Issue Tracking' section is expanded, showing it's built on GitLab Community Edition. The 'Server' dropdown is set to 'US South (https://us-south.git.cloud.ibm.com)'. The 'Repository type' dropdown is set to 'Clone'. The 'Source repository URL' field contains 'https://github.com/open-toolchain/node-hello-world'. The right sidebar features 'ASK A QUESTION' and 'FEEDBACK' buttons.

Develop a Cloud Foundry app toolchain – step 2

The screenshot shows the 'Create' tab selected in the IBM Cloud DevOps toolchain creation interface. The 'Toolchain Name' field contains 'simple-toolchain-20200617142302213'. The 'Select Region' dropdown is set to 'Dallas', and the 'Select a resource group' dropdown is set to 'default'. The 'Select a source provider' dropdown is set to 'Git Repos and Issue Tracking'. Under 'Tool Integrations', the 'Delivery Pipeline' tab is selected, showing fields for 'App name' (set to 'simple-toolchain-20200617142302213') and 'IBM Cloud API key' (represented by a redacted string). Below these are dropdowns for 'Region' (Dallas), 'Organization' (sudharshan.govindan@i...), and 'Space' (dev). At the bottom are 'Cancel' and 'Create' buttons.

Develop a Cloud Foundry app toolchain – step 3

The screenshot shows the IBM Cloud DevOps toolchains interface for a toolchain named "simple-toolchain-20200617142302213". The interface is divided into sections: Overview, Connections, and Manage. The Overview section displays three main components: Think (Issues), Code (Git), and Deliver (Delivery Pipeline). The Issues component shows a green status with the message "Configured". The Git component shows a green status with the message "Configured". The Delivery Pipeline component shows a red status with the message "No stages detected". A prominent message at the top states: "Your toolchain is ready! Quick start: Commit a change to the Git repo to trigger a new build and deployment." Below the interface, there are feedback and question submission buttons.

Inbox | Resource list - IBM Cloud | simple-toolchain-20200617142302213 | Cloud Learn Hub | IBM | DevOps toolchains - IBM Cloud | sudharshan-govindan/toolchain | +

https://cloud.ibm.com/devops/toolchains/b8e819bf-edaa-4a83-b82a-5216b4ac7269?env_id=ibm:yp:us-south

IBM Cloud Search resources and offerings... Catalog Docs Support Manage Sudharshan Govindan's A... Details Actions... Add tool +

Toolchains / simple-toolchain-20200617142302213 Add tags

Overview Connections Manage

Your toolchain is ready! Quick start: Commit a change to the Git repo to trigger a new build and deployment. For step-by-step instructions, see the [tutorial](#) for this toolchain.

Think

Issues simple-toolchain-20... ✓ Configured

Code

Git simple-toolchain-20... ✓ Configured

Deliver

Delivery Pipeline simple-toolchain-20... No stages detected

Eclipse Orion Web IDE ✓ Configured

Feedback ASK A QUESTION

Develop a Cloud Foundry app toolchain – step 3.1

Click on Git tool under Code phase

The screenshot shows the IBM Cloud Git interface for a project titled "simple-toolchain-20200617142302213". The left sidebar includes options like Project overview, Details, Activity, Releases, Repository, Issues, Merge Requests, Analytics, Wiki, Snippets, and Settings. The main area displays the repository details: 9 Commits, 1 Branch, 0 Tags, and 1.3 MB Files. A commit history table lists files like README, .ignore, .gitignore, README.md, app.js, manifest.yml, package.json, and README.md, all updated within the last 4 years. A commit from Ankur Patel is highlighted with the message "Update node, Express and cfenv". A "Clone" button is visible at the top right of the commit list.

Develop a Cloud Foundry app toolchain – step 3.2

Click on Eclipse Orion Web IDE tool under Code phase

The screenshot shows the IBM Cloud DevOps interface. The top navigation bar includes tabs for 'Inbox', 'simple-toolchain-2020061714...', and 'simple-toolchain-2020061714...'. The URL is https://cloud.ibm.com/devops/code/edit/edit.html?env_id=ibm:yp:us-south#/devops/code/file/sudharshan.govindan@in.ibm.com-b8e819bfec... . The main content area displays the 'simple-toolchain-20200617142302213' workspace. On the left, there's a file tree with files like README.md, package.json, manifest.yml, app.js, .gitignore, .cfignore, public, and launchConfigurations. The right side shows the contents of README.md, which contains the heading 'node-hello-world'. Below this is a table of files with columns for Name, Date Modified, and Size. A 'Git' section shows the Git URL as https://us-south.git.cloud.ibm.com/sudharshan.govindan/simple-toolchain-20200617142302213.git and a 'Git Repository' link. At the bottom, there are sections for 'JavaScript' (Project Path: /devops/code/file/sudharshan.govindan@in.ibm.com-b8e819bfedaa4a83b82a5216b4ac7269/simple-toolchain-20200617142302213/, ECMA Version: 7, Development Environment: browser,node,express,cfenv), 'ESLint Configuration' (None), 'Node Configuration' (package.json file), and 'Tern Configuration' (None). On the far right, there are 'FEEDBACK' and 'ASK A QUESTION' buttons.

Develop a Cloud Foundry app toolchain – step 4

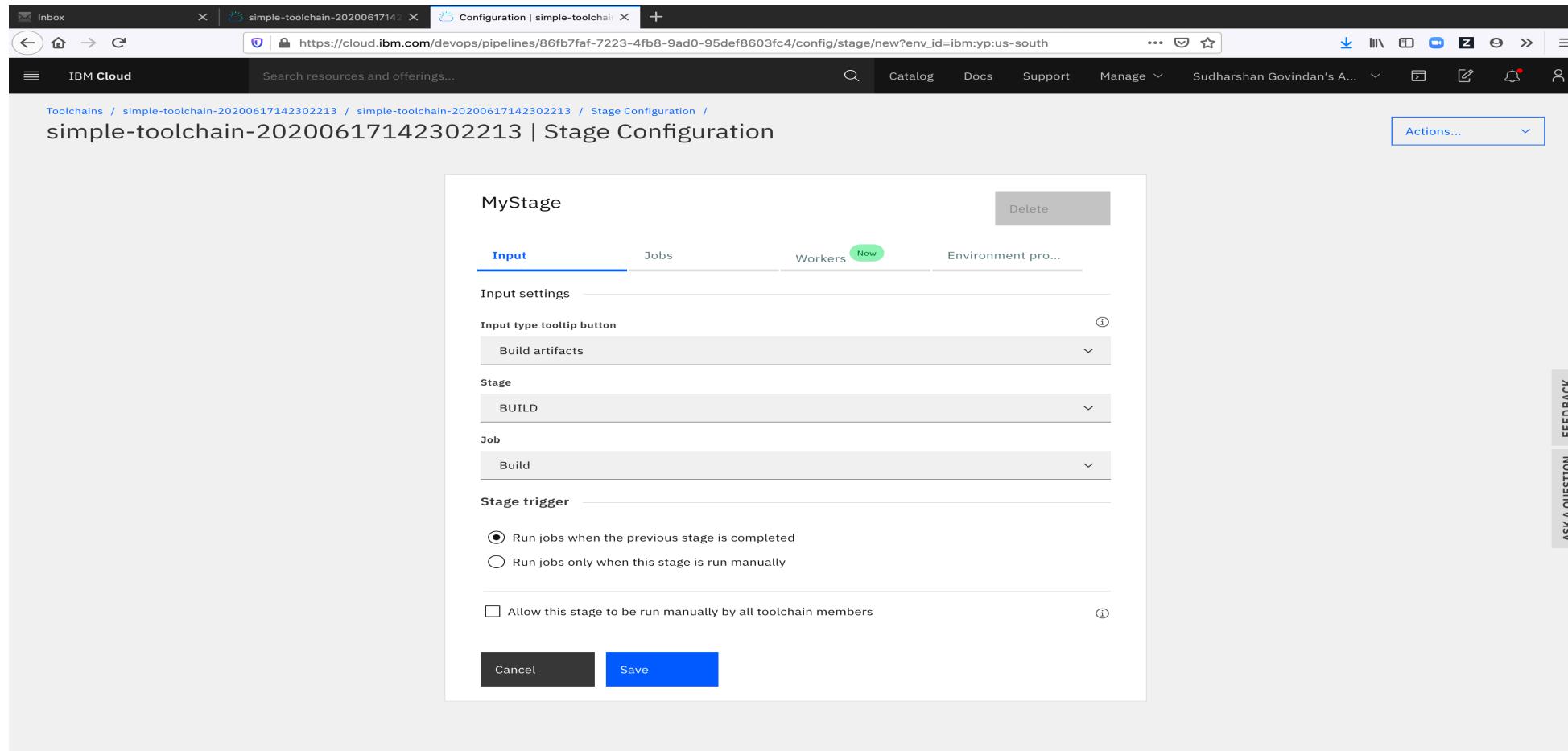
The screenshot shows the IBM Cloud DevOps Pipelines interface for a delivery pipeline named "simple-toolchain-20200617142302213". The pipeline consists of two stages: "BUILD" and "DEPLOY".

- BUILD Stage:** Status is "STAGE PASSED".
 - Last Input: "Last commit by kKpXFbLb... 111d ago". Includes links to "Update node", "Express and cfenv".
 - Jobs: One job named "Build" has passed 3m ago.
 - Last Execution Result: One build named "Build 1".
- DEPLOY Stage:** Status is "STAGE PASSED".
 - Last Input: "Stage: BUILD / Job: Build". Includes a "Build 1" icon.
 - Jobs: One job named "Rolling Deploy" has passed now.
 - Last Execution Result: One build named "Build 1". Includes a link to "View console".

A banner at the top left indicates an "Upcoming change in 2.7 pipeline base image: Java™ JVM has been upgraded to Java™ 11." with a "Learn more" link. On the right side, there are buttons for "Add Stage" and "Actions...". A vertical sidebar on the right includes "FEEDBACK" and "ASK A QUESTION" buttons.

Develop a Cloud Foundry app toolchain – step 4.1

Click on Add Stage located at the top right corner



The screenshot shows the IBM Cloud Pipeline configuration interface. The URL in the browser is https://cloud.ibm.com/devops/pipelines/86fb7faf-7223-4fb8-9ad0-95def8603fc4/config/stage/new?env_id=ibm:yp:us-south. The page title is "simple-toolchain-20200617142302213 | Stage Configuration". The main content area displays the "MyStage" configuration. The "Input" tab is active, showing "Build artifacts" selected under "Input type". The "Stage" dropdown is set to "BUILD". The "Job" dropdown is set to "Build". Under "Stage trigger", the radio button for "Run jobs when the previous stage is completed" is selected. A checkbox for "Allow this stage to be run manually by all toolchain members" is unchecked. At the bottom are "Cancel" and "Save" buttons. The "Workers" tab is highlighted with a green circle.

Develop a Cloud Foundry app toolchain – step 4.2

The screenshot shows the IBM Cloud DevOps Pipeline interface. A delivery pipeline named "simple-toolchain-20200617142302213" is displayed. The pipeline consists of three stages: BUILD, DEPLOY, and MyStage. The BUILD and DEPLOY stages are green, indicating they have passed. The MyStage stage is grey, indicating it has not run. The context menu for the MyStage stage is open, showing options: Configure Stage, Clone Stage, Reorder Stage, and Delete Stage. The URL of the page is visible at the bottom: https://cloud.ibm.com/devops/pipelines/86fb7faf-7223-4fb8-9ad0-95def8603fc4/config/stage/5af8cc0a-3370-4c06-84c5-3e59560367f3/jobs/?env_id=ibm:yp:us-south.

Develop a Cloud Foundry app toolchain – step 5

The screenshot shows the IBM Cloud Application Details page for an app named "simple-toolchain-20200617142302213". The page is divided into several sections:

- Overview:** Shows the app is running, with a "Visit App URL" link. It displays 1 instance running at 100% health, using 128 MB total memory allocation (128 MB used, 7.875 GB available). A slider allows adjusting memory from 0 to 4224 MB.
- Runtime cost:** Shows current charges of Rs 0,00 and estimated total for Jun 1, 2020 - Jun 30, 2020 as Rs 0,00.
- Connections:** Shows 0 connections, with a "Create connection" button.
- Continuous delivery:** Shows that continuous delivery is enabled and automated.
- Activity feed:** Displays recent events: "started simple-toolchain-20200617142302213 app" and "updated simple-toolchain-20200617142302213 app".

Develop a Cloud Foundry app toolchain – step 6

The screenshot shows the IBM Cloud Resource list interface. The top navigation bar includes tabs for 'Inbox', 'Resource list - IBM Cloud', 'Cloud Learn Hub | IBM', 'DevOps toolchains - IBM Cloud', and 'sudharshan-govindan/toolchain'. The main header has a search bar 'Search resources and offerings...', a magnifying glass icon, and links for 'Catalog', 'Docs', 'Support', 'Manage', and a user profile for 'Sudharshan Govindan's A...'. On the far right of the header is a blue button labeled 'Create resource' with a '+' sign.

The left sidebar contains a tree view of resources:

- Devices (0)
- VPC infrastructure (0)
- Clusters (0)
- Cloud Foundry apps (1)
 - simple-toolchain-20200617142302213 (sudharshan.govindan@in.ibm.com / dev, Dallas, SDK for Node.js™, Started)
- Cloud Foundry services (0)
 - Services (1)
 - Continuous Delivery (default, Dallas, Continuous Delivery, Active)
 - Storage (0)
 - Network (0)
 - Cloud Foundry enterprise environments (0)
 - Functions namespaces (0)
 - Apps (0)
- Developer tools (1)
 - simple-toolchain-20200617142302213 (default, Dallas, Toolchain, -)
- VMware (0)
- Schematics workspaces (0)

The main content area displays a table with columns: Name, Group, Location, Offering, Status, and Tags. The table shows the two resources listed in the sidebar. A vertical 'FEEDBACK' bar is on the right side of the page.

Name	Group	Location	Offering	Status	Tags
simple-toolchain-20200617142302213	sudharshan.govindan@in.ibm.com / dev	Dallas	SDK for Node.js™	Started	-
simple-toolchain-20200617142302213	default	Dallas	Toolchain	-	-

Adding tools to an existing toolchain

The image displays two screenshots of the IBM Cloud DevOps toolchain interface.

Left Screenshot: Shows the configuration of a toolchain named "simple-toolchain-20200617142302213". The "Code" section is highlighted, showing "Git" and "Delivery Pipeline" components, both of which are marked as "Configured". The "Deliver" section shows "No stages detected". The "Think" section includes "Issues" and "Eclipse Orion Web IDE", both also marked as "Configured". A message box indicates that the toolchain is ready and suggests committing a change to trigger a build.

Right Screenshot: Shows the "Add tool integration" catalog. The "Categories" sidebar lists: All integrations (23), Communication, Artifacts, Monitoring, Version Control, CI/CD, Quality, IDE, Planning, IBM, and Secrets. The main area displays various tool integrations in a grid:

- Communication:** Artifactory (Third Party • Developer Tools)
- Artifacts:** Availability Monitoring (IBM • Developer Tools)
- Monitoring:** Bitbucket (Third Party • Developer Tools)
- Version Control:** Store build artifacts in your Artifactory repository.
- CI/CD:** Artifacts
- Quality:** Test, monitor, and improve your application as you build it.
- IDE:** Eclipse Orion Web IDE (IBM • Developer Tools)
- Planning:** Delivery Pipeline Private Worker (IBM • Developer Tools)
- IBM:** DevOps Insights (IBM • Developer Tools)
- Secrets:** Automate your builds, deployments, and more.
- CI/CD:** Run pipeline workloads on your own infrastructure.
- Quality:** Elevate your DevOps to increase deployment quality, delivery control, and speed to market.
- IDE:** Event Management (IBM • Developer Tools)
- Planning:** Git Repos and Issue Tracking (IBM • Developer Tools)
- IBM:** GitHub Enterprise Whitewater (IBM • Developer Tools)
- Monitoring:** Internal GitHub Enterprise allowing IBM Confidential projects.
- CI/CD:** GitHub (Third Party • Developer Tools)
- Quality:** GitLab (Third Party • Developer Tools)
- Planning:** Store and manage code on GitHub.com or on your own GitHub Enterprise server.
- Version Control:** Version Control • Planning
- Version Control:** Version Control • Planning

Toolchain Tutorials

<https://www.ibm.com/cloud/architecture/courses/toolchain-tutorials>

The screenshot shows a web browser window with the URL <https://www.ibm.com/cloud/architecture/courses/toolchain-tutorials> in the address bar. The page is titled "Courses and tutorials" and features a chalkboard background with mathematical calculations related to limits and derivatives. The main content area displays several toolchain tutorials:

- Develop on public cloud, deploy to private with IBM Cloud DevOps** (90 minutes)
- Introduce toolchains by using the "Develop a Cloud Foundry app" toolchain** (10 minutes)
- Use the "Develop a Kubernetes app" toolchain** (40 minutes)
- Use the "Develop a Kubernetes app with Helm" toolchain** (60 minutes)
- 60 minutes** (partially visible)
- 20 minutes** (partially visible)
- 60 minutes** (partially visible)
- 15 minutes** (partially visible)

At the bottom left, there is a "IBM Developer" logo, and at the bottom right, a page number "18".

IBM Cloud Continuous Delivery



Git Repos and Issue Tracking

- Git repositories
- Modern Git workflow
- Merge requests
- Issue boards
- HA setup (multiple availability zones)

Based on GitLab CE



Delivery Pipeline

- CI/CD
- Easy setup
- Deploy to any cloud, including hybrid
- Build pull requests
- Our container image or your own

New: Tekton



Eclipse Orion Web IDE

- IDE in a browser
- Code completion
- Refactoring
- Git client

Based on Eclipse Orion



DevOps Insights

- Collect quality data
- Establish policies
- Implement gates
- Analyze trends



Open Toolchain

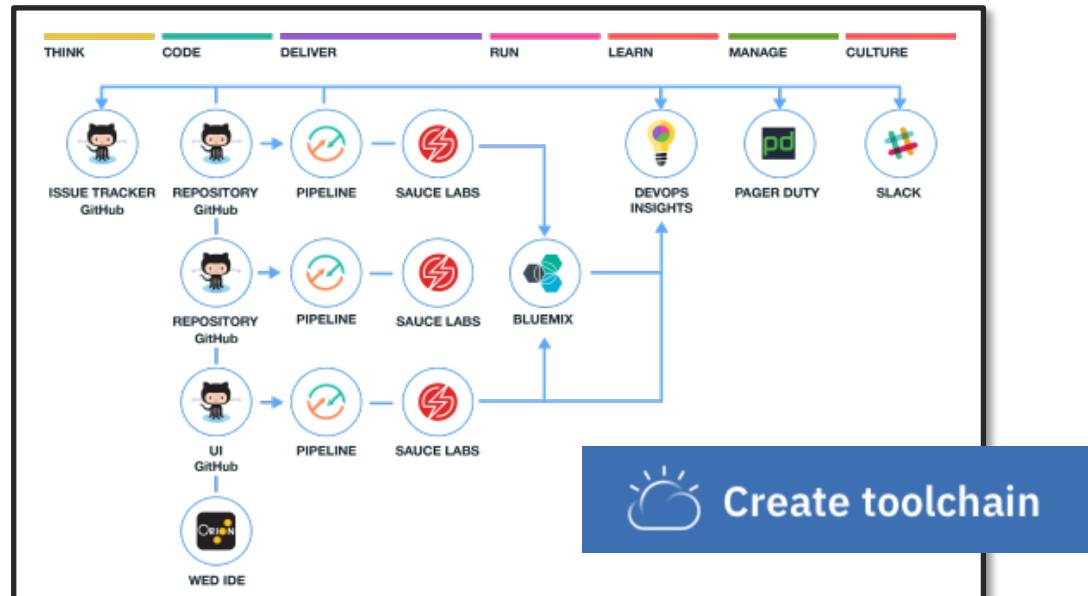
- Setup new projects quickly
- Integrate IBM and third-party tools
- Reproduce best practices with templates
- Access tools in one place

Open Toolchain



Create and manage toolchains of best of breed industry tools

A sample open toolchain for building, and deploying and managing three microservices



To get started visit:
<https://cloud.ibm.com/devops>

- **Toolchains provide an integrated set of tools that support the best practices to build, deploy and manage your apps.**
 - **You can create toolchains that include IBM Cloud services, open source tools, and third-party tools that make development and operations repeatable and easier to manage.**
 - **Rapidly instantiate new toolchains from templates to on-board new teams quickly.**



Get started quickly with toolchain templates

1-click setup of sample code and fully configured toolchain



Toolchains /
Create a Toolchain

Filters

Deployment Target

- Cloud Foundry
- Kubernetes
- Virtual Server

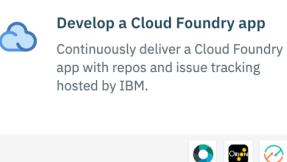
Tools

- Delivery Pipeline
- DevOps Insights
- Eclipse Orion Web IDE
- Git Repos and Issue Tracking
- GitHub
- Google Analytics
- New Relic
- PagerDuty
- Sauce Labs

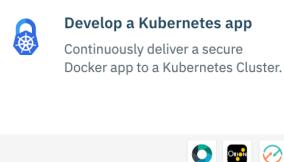
Search

All (10)

Build and Deploy Templates



Develop a Cloud Foundry app
Continuously deliver a Cloud Foundry app with repos and issue tracking hosted by IBM.



Develop a Kubernetes app
Continuously deliver a secure Docker app to a Kubernetes Cluster.



Develop a Kubernetes app with Helm
Continuously deliver a secure Docker app to a Kubernetes Cluster using a Helm Chart.

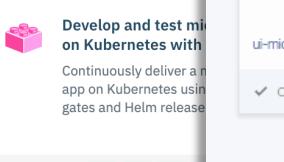
Build, Test, and Deploy Templates



Develop a Cloud Foundry app with DevOps Insights
Use analytics to determine whether to deploy.



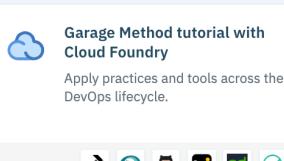
Develop and test microservices on Cloud Foundry
Continuously deliver a microservices app with repos and issue tracking.



Develop and test microservices on Kubernetes with Helm
Continuously deliver a microservices app on Kubernetes using Gates and Helm releases.



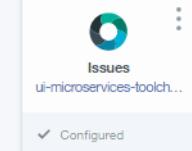
Canary testing in Kubernetes using Istio
Develop and canary test new features in your Kubernetes application using Istio.



Garage Method tutorial with Cloud Foundry
Apply practices and tools across the DevOps lifecycle.



THINK

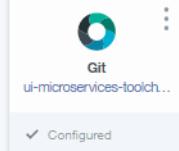


Issues
ui-microservices-toolch...

✓ Configured



CODE



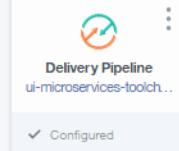
Git
ui-microservices-toolch...

✓ Configured

Customizable templates, so you can define your own



DELIVER

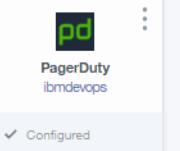


Delivery Pipeline
ui-microservices-toolch...

✓ Configured



MANAGE

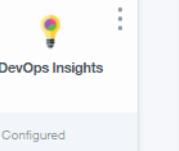


PagerDuty
ibmdevops

✓ Configured



LEARN

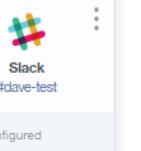


DevOps Insights

✓ Configured



CULTURE



Slack

#dave-test

✓ Configured

Get your teams up and running quickly

Add more tools or mix and match... it's open!

Choose from a growing list of open source, third party, and other IBM tools

Create new toolchain templates

Tool Integrations



Alert Notification

Never miss critical issues.

IBM

Experimental



Artifactory

Store build artifacts in your Artifactory repository.

Third Party



Availability Monitoring

Test, monitor, and improve your application as you build it.

IBM



Cloud Event Management

Turn IT events into actionable incidents.

IBM

Experimental



Delivery Pipeline

Automate your builds, deployments, and more.

IBM



DevOps Insights

Use analytics to determine whether to deploy.

IBM

Beta



Eclipse Orion Web IDE

A browser-based IDE for web and cloud development.

IBM



Hub Enterprise Whitewater

Code and manage your code and engage in social coding, with dedicated

IBM



Git Repos and Issue Tracking

IBM hosted repos and issue tracking based on GitLab Community Edition.

IBM



GitHub

Store and manage code in a social way.

Third Party



Jenkins

Build, deploy, and automate any project.

Third Party



JIRA

Manage projects and track issues.

Third Party



Nexus

Store build artifacts in your Nexus repository.

Third Party



PagerDuty

When major issues arise, send alerts and get alerts.

Third Party



Rational Team Concert

Manage your team and resources.

IBM



Sauce Labs

Automate continuous integration testing for your project.

Third Party



Slack

Coordinate and collaborate on your project.

Third Party



SonarQube

Inspect the quality of your code.

Third Party



UrbanCode Deploy

Gain insights into deployments that are



Other Tool

Create a custom integration with any tool.





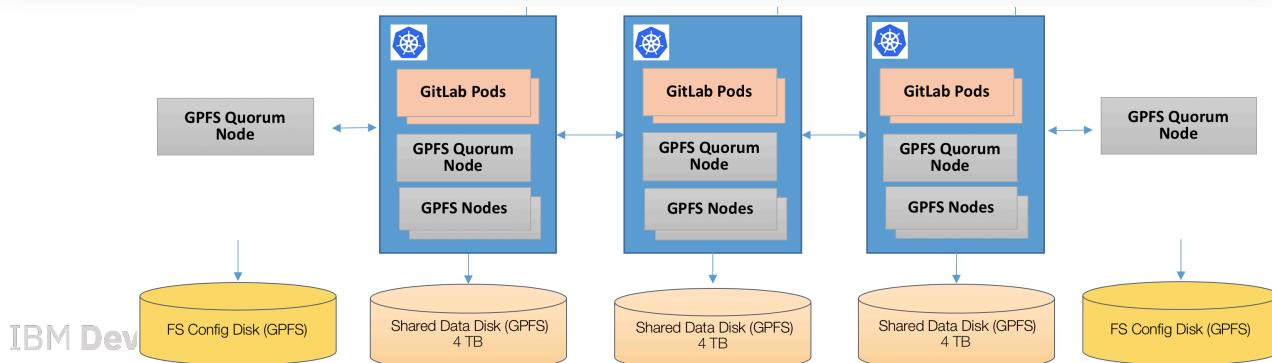
Git Repos & Issue Tracking

The screenshot shows the IBM Cloud Git Repository interface. On the left, a sidebar lists project navigation options: Overview, Repository (selected), Files, Commits, Branches, Tags, Contributors, Graph, Compare, Charts, Issues (0), Merge Requests (0), and Wiki. The main area displays a repository for 'CB-20180717012518069-RC-SimpleCF'. It shows a commit for 'package.json' with the message 'Initial' by 'Simon Kaegi' 2 years ago. A tooltip over the commit details shows a timeline of commits from July 17, 2018, to January 9, 2017, including 'Reduced memory needs', 'Merge pull request #3 from jasmsing/patch-1', 'Adding an entry for nodejs buildpack', 'Adding manifest', 'adding ignore files', 'Initial', and 'Create README.md'.

Cloud hosted social coding
Commits, pull requests, issue tracking, graphs, ...

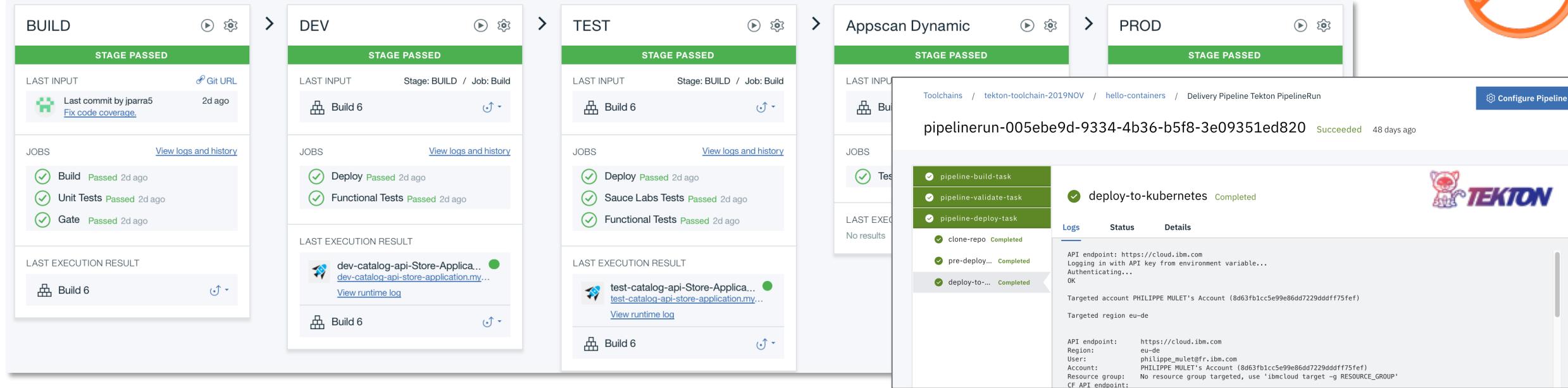
High resilience, multi zone architecture with regular off-site backups

Based on GitLab™ Community Edition





Delivery Pipeline



Easy Setup

- Deploy an application from a Git repo in a few clicks.

Continuous Integration

- Automate builds, tests and deploys for many types of code, running builds automatically when code changes.
- Follow GitOps best practices by building pull requests.

Deliver to Multiple Cloud Platforms

- Deploy applications to any environment within network path: IBM Cloud Kubernetes, Cloud Foundry, Virtual Machines or other cloud providers.

IBM Dev

Custom jobs with your own docker images

- Use curated version of build and dev tools in pipelines; or bring your own images with your tools for building, testing and deploying.

Bring your own pipeline worker

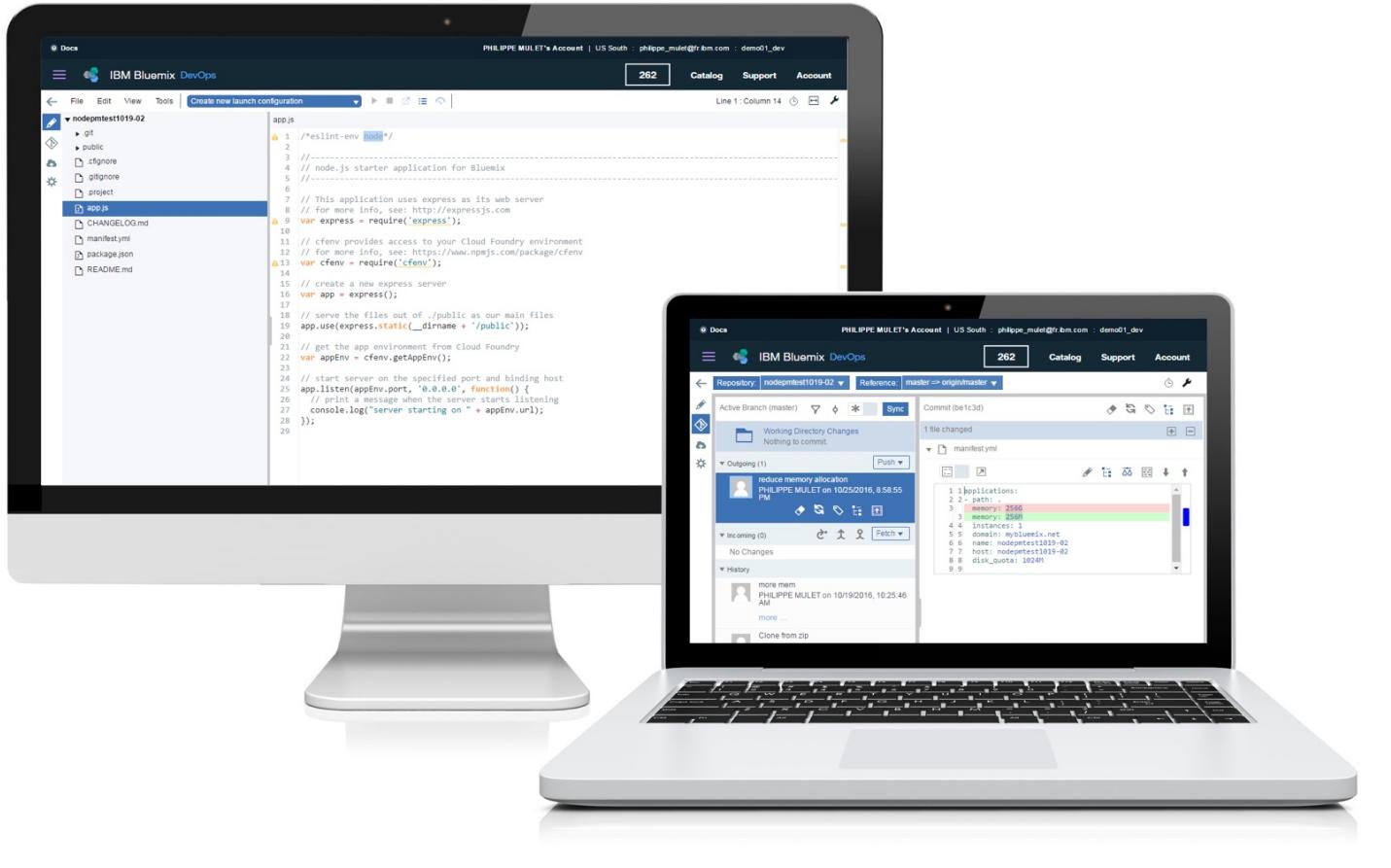
- Register your own pipeline worker to poll and execute workloads on private or local networks.

Pipeline as code with Tekton

- Define your pipeline as code with Tekton open standard and manage it as code in your repo.

Page 24

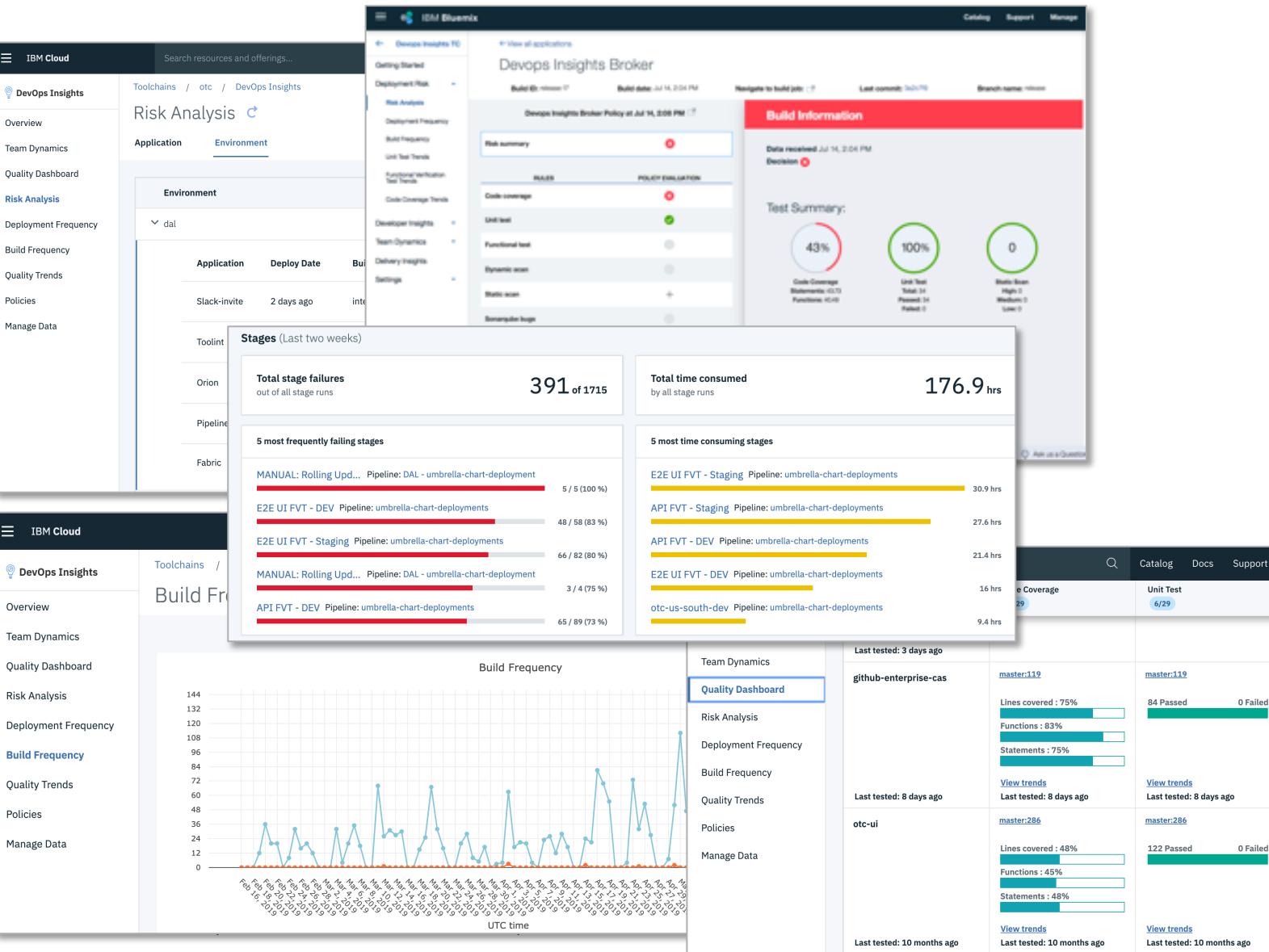
Eclipse Orion Web IDE



- Edit your code from anywhere
- Persisted user workspace
- Cloud-hosted, Web-based IDE
- Built-in Git client
- Create, edit, run, debug
- Powerful syntax highlighting, code assist, and refactoring
- “Live Edit” – push hot changes directly to the Cloud
 - For Cloud Foundry apps
 - Node.js, HTML, CSS



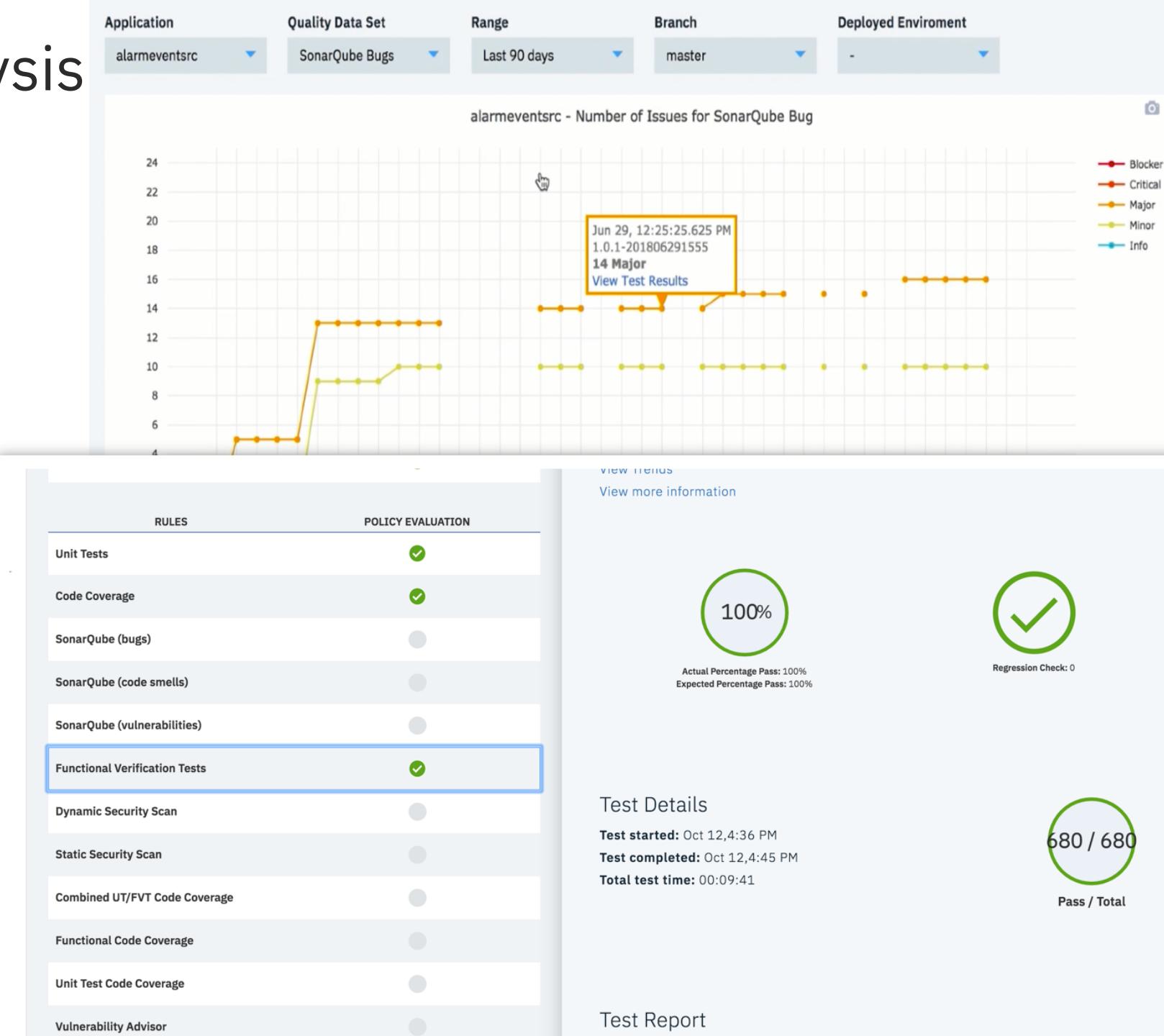
DevOps Insights



- ✓ **Speed:** Aggregate data from a variety of testing and code scanning tools to provide a comprehensive dashboard view of the risk profile of projects.
- ✓ **Quality:** Ensure quality through automated enforcement of policies and gates based on test metrics.
- ✓ **Control:** Track deployment risk and measure results over time as teams react to the trends in their DevOps practices

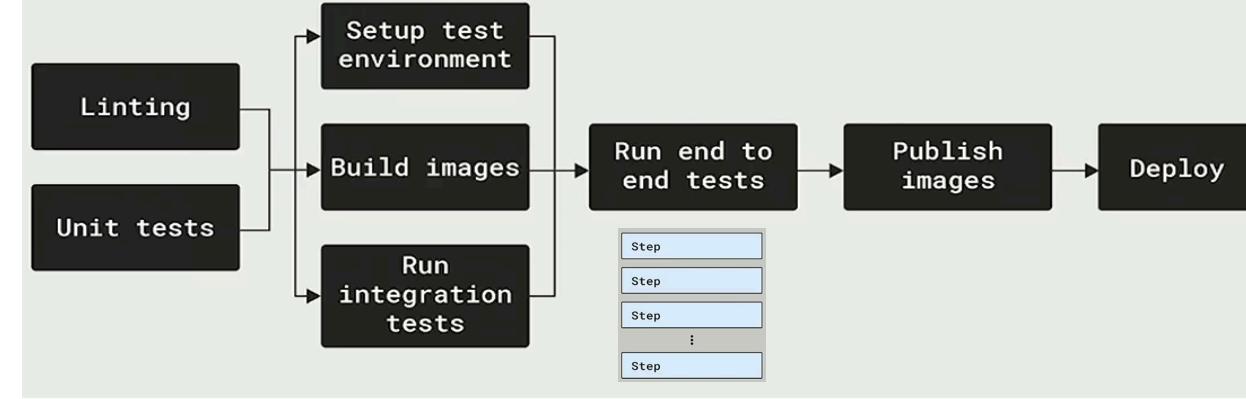
Deployment Risk Analysis

- ✓ Understand build status, security scan results, code coverage, and test coverage to evaluate whether to promote your app to the next environment.
- ✓ Ensure quality through automated enforcement of policies and gates based on quality metrics
- ✓ Identify your project's development risk.





TEKTON
<https://tekton.dev/>



“Open-standard” backed Pipeline-as-code

- Multi-vendor collaboration with foundation backed governance
- Uses Kubernetes CRDs and leverages existing tooling (helm, kustomize, ksonnet)

Future of CI/CD Runtimes

- Evolving CI/CD pattern support in lock-step with latest Kubernetes patterns
- Already adopted for products by IBM DevOps, Kabanero, OpenShift, Jenkins X, Puppet Nebula, with internal POCs at Google, eBay, Alibaba, ...

Tekton Community!

- Catalog of best practices for authoring pipelines and tasks
- Sub-projects that extend Tekton for important use-cases and support experimentation (Dashboard UI, CLI, Triggers, Webhooks Extension, Operator)
- Committers and contributors willing to lend a hand.
(Plumbing, Knative Build, Kubeflow)

Google

redhat

IBM

Pivotal

cloudbees

Continuous Delivery Foundation

CDF believes in the power of Continuous Delivery to **empower** developers and teams and to produce **high quality** software more **rapidly**

CDF believes in the **open-source** solutions collectively addressing the whole SDLC

CDF fosters and sustains the ecosystem of open-source, **vendor neutral** projects through **collaborations** and **interoperability**



IBM Developer **Jenkins**



JenkinsX

<https://cd.foundation/>



TEKTON

CDF Members

PREMIER

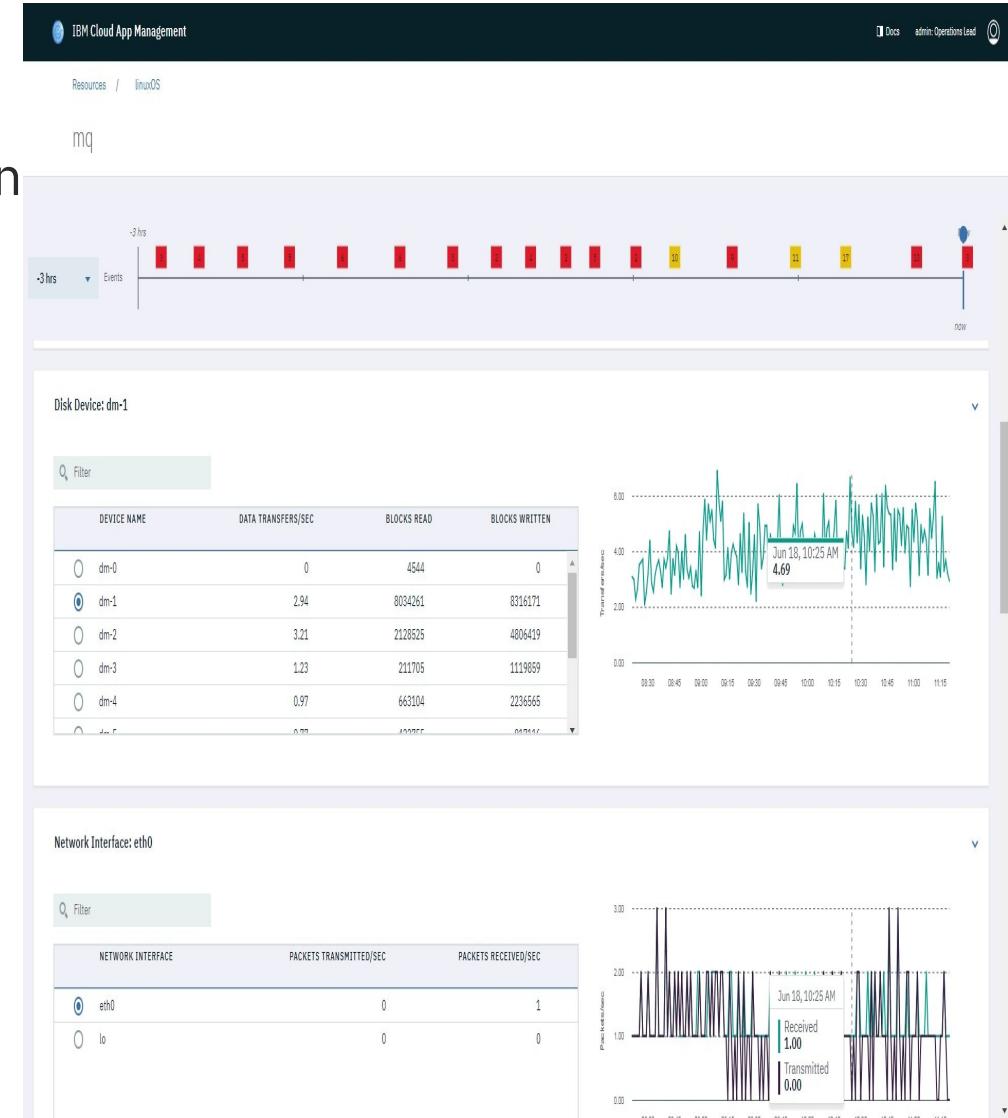


GENERAL AND END USER MEMBERS



3. Cloud Monitoring

- Series of strategies and practices for analyzing, tracking, and managing cloud-based services and applications
- Provides IT administrators and DevOps teams to maintain visibility into the performance of their digital assets
- Capabilities:
 - Real-time, 24x7 monitoring of virtual machines, services, databases and applications
 - Multilayer visibility into application, user and file access behavior across all cloud-based applications and services
 - Advanced reporting and auditing capabilities for ensuring regulatory standards are being met
 - Large-scale performance monitoring integrations across multi-cloud and hybrid cloud environments
 - Website / Database monitoring
 - Application Performance Management (APM)



Cloud Monitoring - Application Performance Management

- APM is a vital component of any cloud monitoring solution
- Plays a critical role in keeping your applications running smoothly and efficiently
- APM measures application availability and performance, providing development teams the tools they need to quickly troubleshoot issues in an application's environment
- APM solutions help an enterprise improve user experience, meet application and user service level agreements (SLAs), minimize downtime and lower overall operational costs
- APM solution optimized for DevOps pipeline should:
 - Provide visibility into performance and availability for the entire application environment
 - Allow API monitoring that focuses on uptime, performance and data validation
 - Track and display data for all microservices in operation
 - Enable continuous delivery, security and availability
 - Use analytics to provide actionable insights

Cloud Monitoring - APM - IBM Cloud App Management

<https://www.ibm.com/in-en/marketplace/app-management>

- Available as a separate SaaS offering
- As an add-on to IBM Cloud Pak for Multicloud Management

The screenshot shows the IBM Cloud App Management interface. At the top, there is a navigation bar with tabs: Getting Started, Incidents, Resources (which is selected), and Administration. Below the navigation bar is a search bar labeled "Search" and a sorting dropdown set to "Sort A-Z". The main area is divided into a grid of 12 boxes, each representing a different type of resource:

- DataPower Gateways: 2 Resources, Last updated --. View Resources.
- DB2 Instances: 3 Resources, db2apm : db2apm:db... Resources, Last updated. View Resources.
- IBM Integration Brokers: 3 TRADEBK Resources, Last updated. View Resources.
- IBM Integration Servers: 3 TRADEBK : TRADEEG Resources, Last updated. View Resources.
- Linux Systems: 9 sapm-docker5 Resources, Last updated. View Resources.
- MQ Queue Managers: 3 TRADEQM : Resources, Last updated. View Resources.
- MQ Queues: 20 TRADEQM : KMQ.IRA.... Resources, Last updated. View Resources.
- UNIX Systems: 2 -- Resources, Last updated. View Resources.
- WebSphere Application Servers: 3 f8e80d2ae0afNode0... Resources, Last updated. View Resources.
- WebSphere Applications: 11 ivtApp Resources, Last updated. View Resources.
- WebSphere Clusters: 2 -- Resources, Last updated. View Resources.
- Windows Systems: 2 -- Resources, Last updated. View Resources.

4. IBM Cloud Event Management

<https://www.ibm.com/cloud/event-management>

- Identify and prioritize operational incidents
- Notify the right people at the right time
- Guide and automate resolution activity
- Available as a separate SaaS offering
- As an add-on to IBM Cloud Pak for Multicloud Management

The screenshot displays the IBM Cloud Event Management interface. On the left, a card shows details for an incident in a cluster named 'rtr06-ResourceCluster':

- Open for: 2m
- Owner: Edward
- Group: Web-infrastructure [Assign group](#)
- Status: Assigned

Below this are links for '4 events' and '0 comments'.

A 'Recent Timeline' section lists three events from 2m ago:

- Event #kyr5-pqgo (warning icon)
- Event #1tn5-kysx (error icon)
- Event #ro0b-9yva (critical icon)

Each event entry includes the event ID, timestamp, and date.

At the bottom of the main card are buttons for 'Resolve' and 'In progress'.

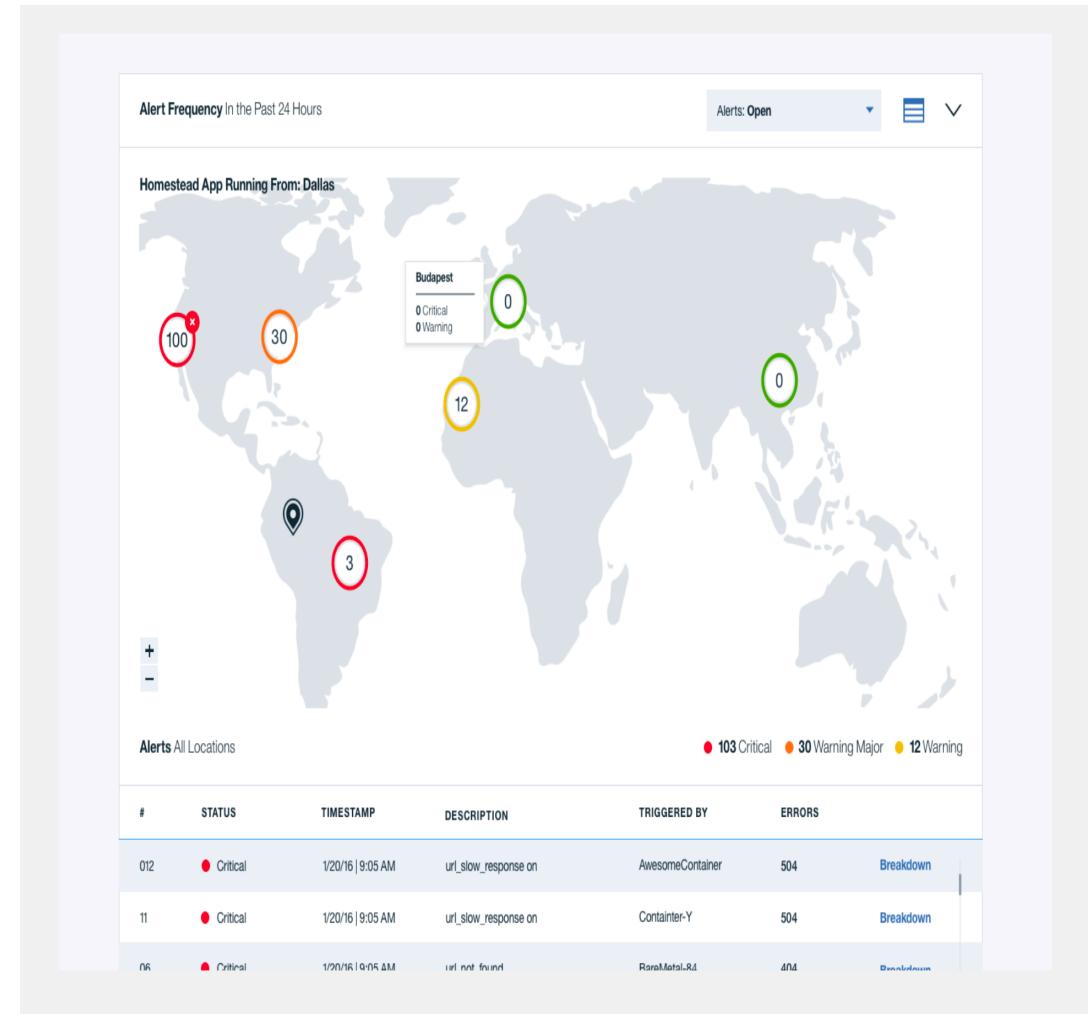
To the right, a 'Suggested runbooks (1)' panel shows a single runbook titled 'Restart HTTP Proxy' with a success rate of 100% and a 5-star rating. It includes 'Preview' and 'Run' buttons.

On the far right, a 'Collaborate (13)' sidebar lists users A, Annette, R, RJ, and B, Brock, each with a colored circle icon.

5. Availability Monitoring

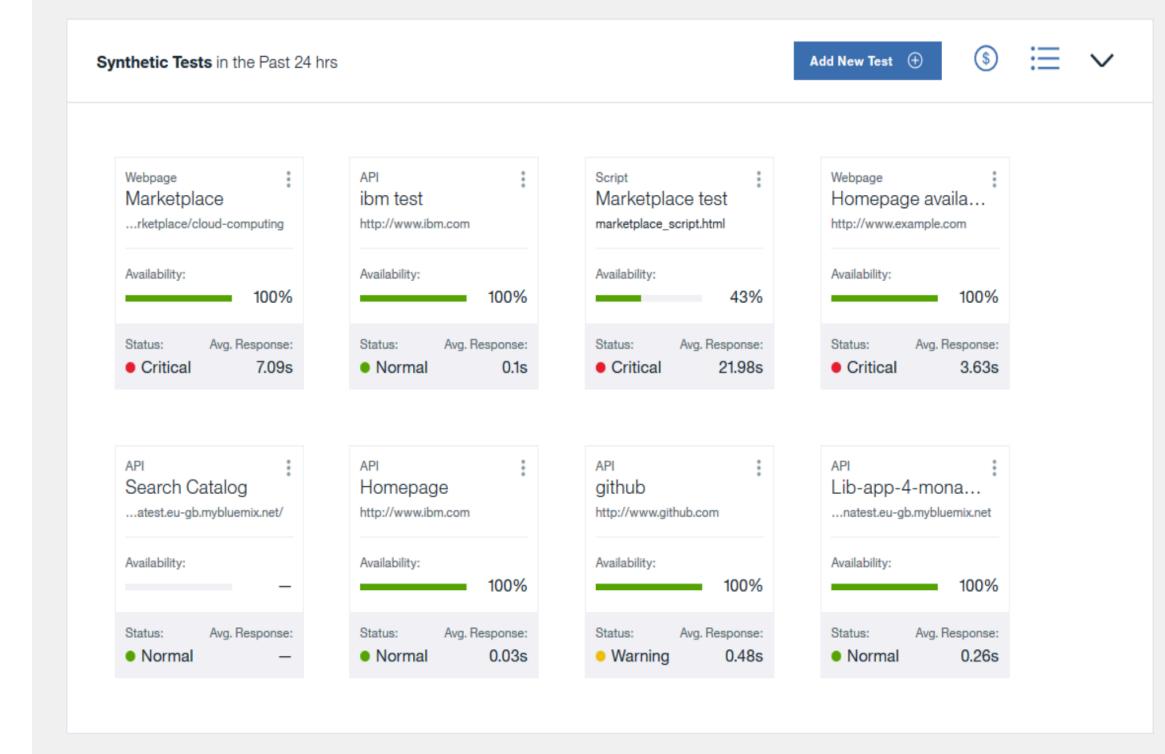
<https://cloud.ibm.com/catalog/services/availability-monitoring>

- Helps DevOps teams ensure their applications are “always” available and meeting user expectations for response time
- Tightly integrated into the DevOps toolchain, runs synthetic tests from locations around the world, around the clock to proactively detect and fix performance issues before they impact users



Availability Monitoring

- Runs simulated web page loads, REST API load tests, and scripted user interaction tests
- Alerts users of issues through notifications, such as email, Slack, or SMS
- Helps identify whether an app deployment or change caused an issue by presenting a correlated analysis of alerts, metrics, and deployment activities
- Diagnoses the exact step of failure by providing waterfall analysis that pinpoints slow requests, broken links, large images, slow external API calls, and more
- Accelerates diagnosis by providing an automated browser capture of the failure
- Provides daily, weekly, and monthly scores to ensure that target uptime and user satisfaction goals are being met



Availability Monitoring - Demo

The screenshot shows the IBM Cloud Resource list interface. The left sidebar lists categories such as Devices, VPC infrastructure, Clusters, Cloud Foundry apps, Cloud Foundry services, Services, Storage, Network, Functions namespaces, Apps, and Developer tools. Under Cloud Foundry apps, there is a entry for 'simple-toolchain-20200617142302213'. The main area displays a table with columns: Name, Group, Location, Offering, Status, and Tags. The entry for the toolchain is listed under the 'Cloud Foundry apps' section.

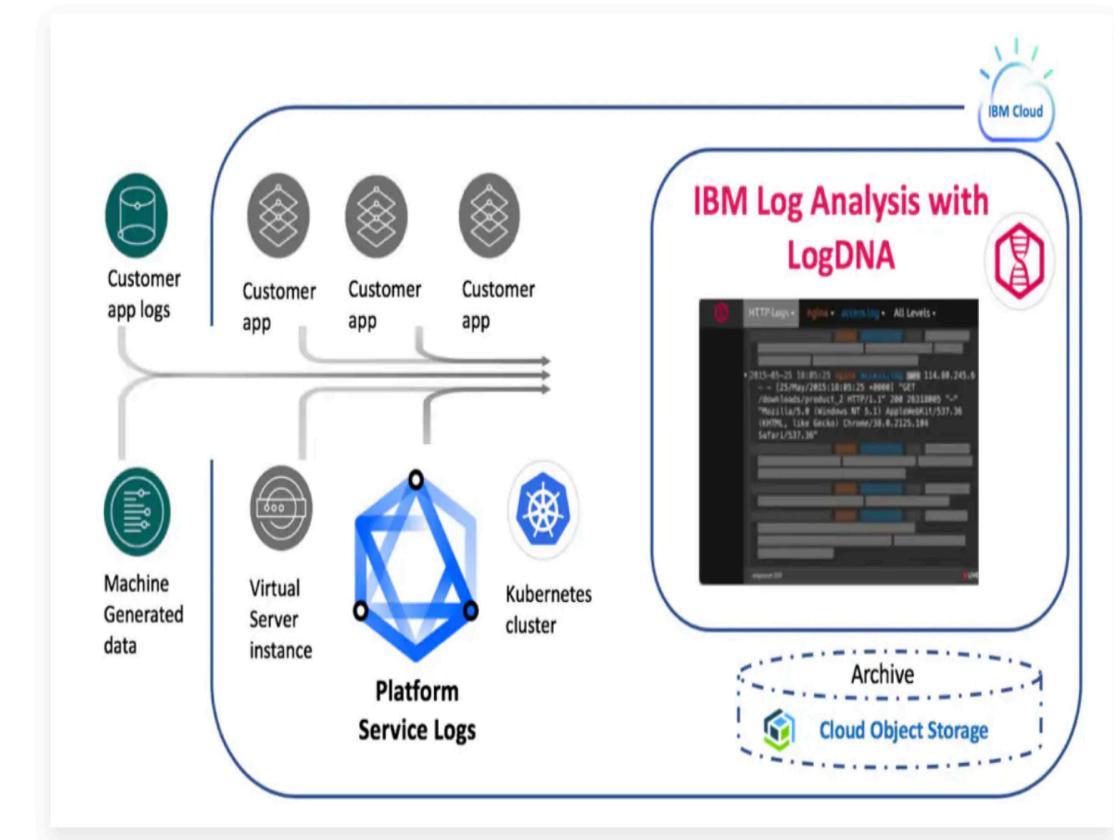
The screenshot shows the Application Details page for the 'simple-toolchain-20200617142302213' application. The 'Overview' tab is selected. Key metrics shown include Health (100%, 1/1 instance(s) running), MB memory per instance (4224 / 128), Runtime cost (Rs 0.00 / 0.00), and Continuous delivery status. The 'Runtime' tab is also visible.

The screenshot shows the Availability Monitoring interface for the 'simple-toolchain-20200617142302213' application. The 'Availability Monitoring' tab is selected. It displays three circular metrics: Availability (—%), Tests (1), and Service Usage (0%). Below these are sections for Average Test Availability (In the last 24 hrs), Latest Test Status (Unknown (1)), and Service Usage (Currently on Free Plan). Buttons for 'Add New Test', 'View All Tests', and 'See Monitoring Details' are present at the bottom.

6. IBM Log Analysis with LogDNA

<https://cloud.ibm.com/catalog/services/ibm-log-analysis-with-logdna>

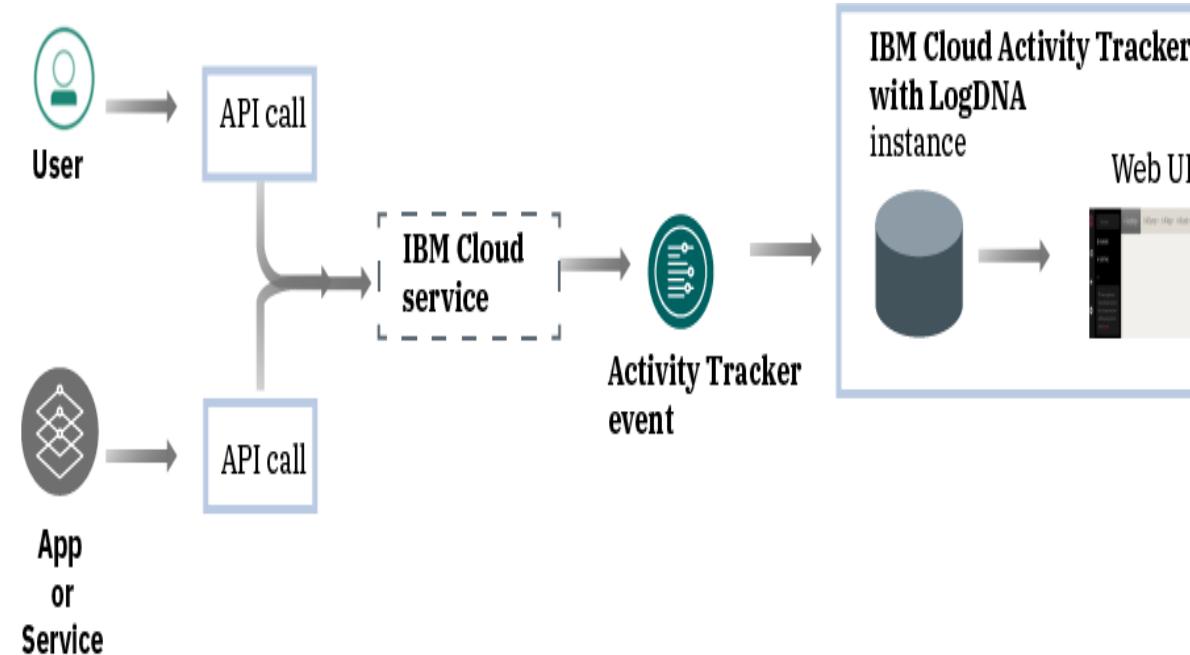
- Troubleshoot logs in real-time to diagnose issues and identify problems
- Automatic parsing and indexing of log sources
- Keyword based log search and graphing
- Get alert notifications of important events and errors
- Support for 30+ Log Sources



7. IBM Cloud Activity Tracker with LogDNA

<https://cloud.ibm.com/catalog/services/ibm-cloud-activity-tracker-with-logdna>

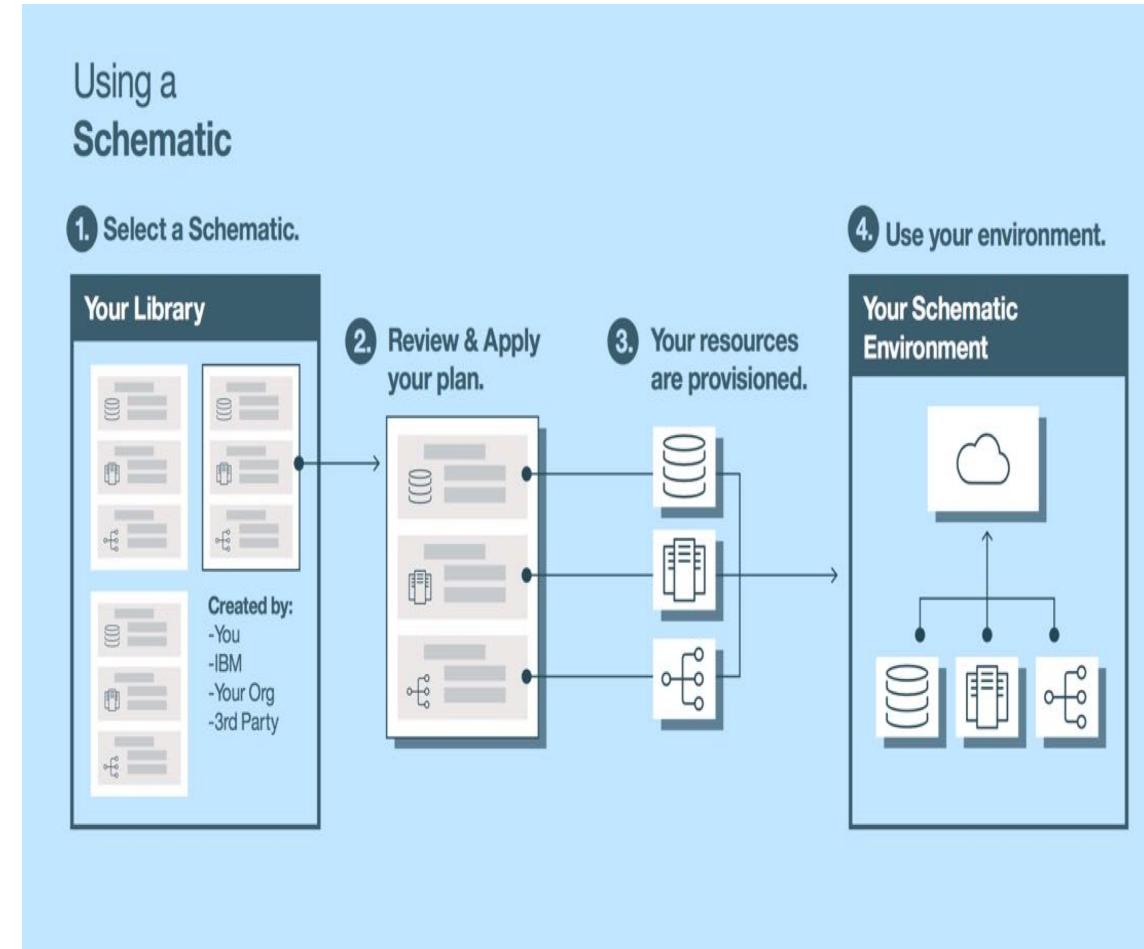
- Monitor the activity of your IBM Cloud account
- Investigate for abnormal activity and critical actions
- Comply with regulatory audit requirements
- Alert notification on actions as they happen
- Events that are collected, comply with the Cloud Auditing Data Federation (CADF) standard



8. Infrastructure as Code (IaC)

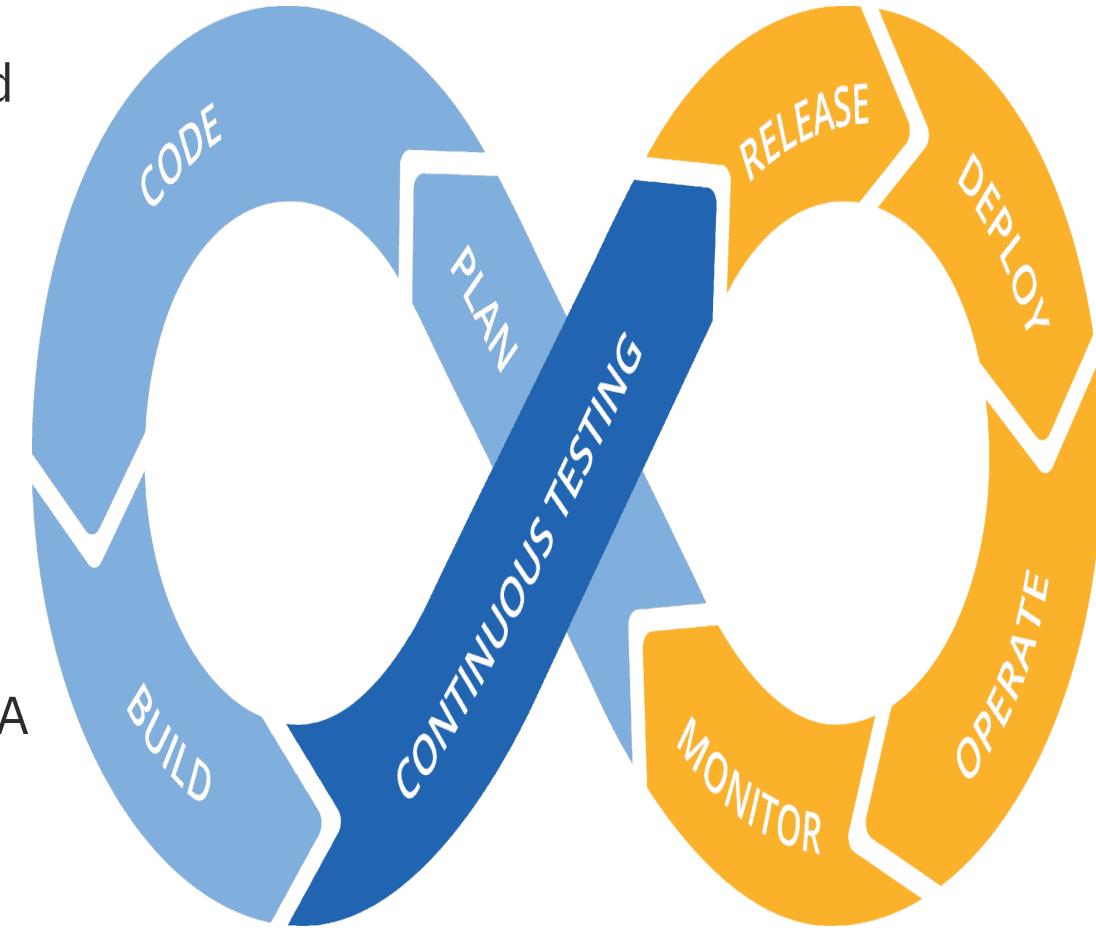
<https://cloud.ibm.com/schematics/>

- IaC uses a high-level descriptive coding language to automate the provisioning of IT infrastructure
- IaC automates the provisioning of infrastructure, enabling your organization to develop, deploy and scale cloud applications with greater speed, less risk and reduced cost
- IaC is also an essential DevOps practice, indispensable to a competitively paced software delivery lifecycle
- IBM Cloud Schematics, built on Terraform (open source tool), is a simplified solution for automating infrastructure management



9. Continuous Testing

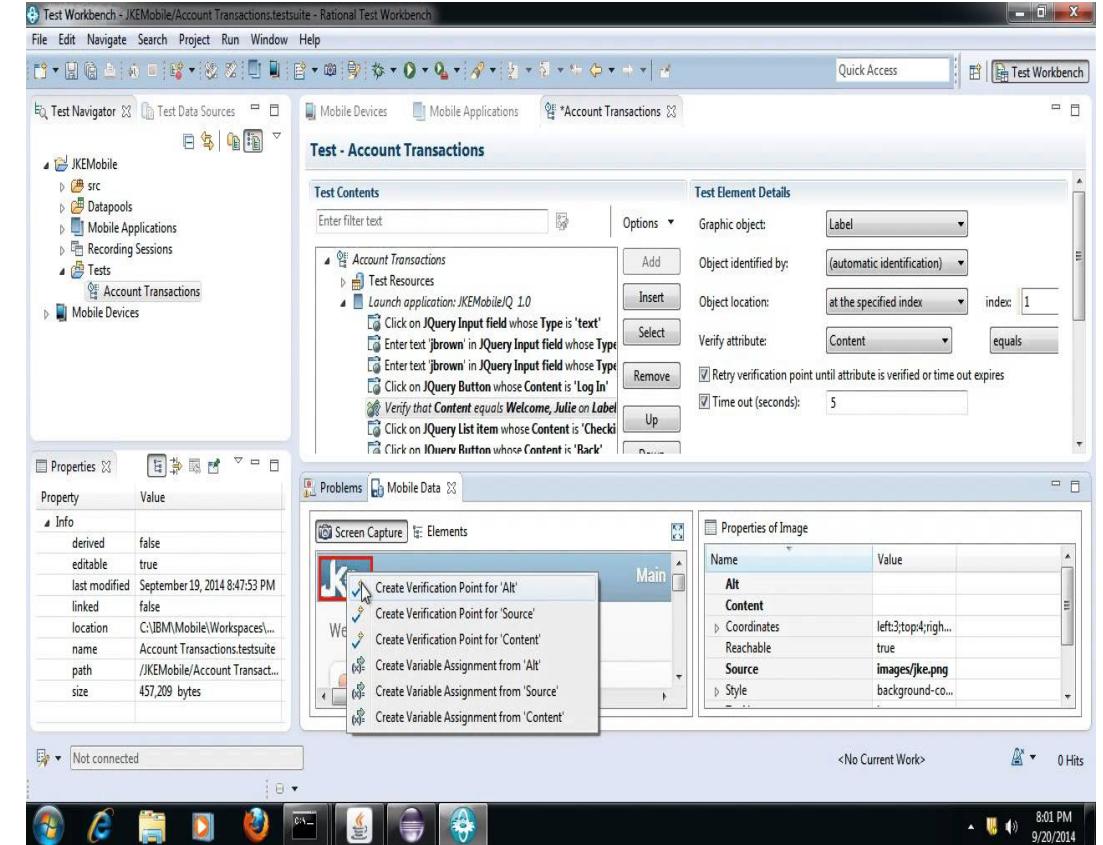
- Process of incorporating automated feedback at different stages of SDLC in support of better speed and efficiency when managing deployments
- It is a critical driver behind the effectiveness of CI/CD processes and plays a crucial role in improving code quality, avoiding costly bottlenecks, and expediting DevOps processes
- Addresses inefficiencies by helping DevOps teams "shift left"
- Works by using automated tools to load pre-defined QA scripts at all stages of production



Continuous Testing – Rational Test Workbench

<https://www.ibm.com/us-en/marketplace/rational-test-workbench>

- Provides software testing tools to support a DevOps approach
- API testing, Functional UI testing, Performance testing and Service virtualization
- It helps you automate and run tests earlier and more frequently to discover errors sooner
- Simplify test creation with testing and code-free authoring
- Script-less, visual performance test and workload models
- Continuous integration testing
- Emulate workloads accurately with realistic user scenarios
- Extensibility and support for standards and protocols



Continuous Testing – Rational Test Virtualization Server

<https://www.ibm.com/us-en/marketplace/rational-test-virtualization-server>

- Enables early and frequent testing in the development lifecycle
- Removes dependencies by virtualizing part or all of an application or database so software testing teams don't have to wait for the availability of those resources to begin
- Virtualize services, software and applications
- Update, reuse and share virtualized environments
- Get support for middleware technologies
- Benefit from integration with other tools



10. IBM UrbanCode

Continuous integration, continuous delivery and release management for every application:

- UrbanCode Deploy
- UrbanCode Velocity
- UrbanCode Build
- UrbanCode Release

<https://www.ibm.com/cloud/urbancode>

Additional Resources

- Free eBook: Putting the Ops in DevOps for Dummies -

<https://www.ibm.com/account/reg/in-en/signup?formid=urx-30483>

- Free eBook: DevOps for Dummies –

<https://www.ibm.com/account/reg/us-en/signup?formid=urx-13593>

- IBM Cloud Learn Hub - <https://www.ibm.com/cloud/learn/devops>

- DevOps toolchains - <https://www.ibm.com/cloud/architecture/toolchains/>

- DevOps tools on IBM Cloud –

https://cloud.ibm.com/catalog?category=devops%20logging_monitoring#services