



From Chaos to Calm

Building a Unified and Scalable CI/CD Pipeline at Akamai

Introduction



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Prev. Team Lead @ Clarizen

[Tomer Patel](#)

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Agenda

- Who we are? What's our DNA?
- CI/CD - What? Why?
- CI/CD Flow - from PR to Production
- Key Takeaways

We make life better
for billions of people **billions**
trillions of times per day

by **powering** and
protecting life online

Akamai Global Scale

When it comes to high quality data, Akamai has the unfair advantage.



● Edge PoPs

4,200
Edge PoPs

130
Countries

5+
24/7 SOCC Locations

Visibility at Scale Powers Vast Intelligence

over

40B
bots
a day

over

780M
app
attacks

average data

946TB
per day analyzed

78B

web app attacks
a quarter

1,176
DDoS attacks
a quarter

Our DNA



Different Engineering Roles

Dev, QA, Perf, Ops, DevOps

Multi Regions

HA/DR, Data Localization

over

97M
Lines of Code

Over

120
Engineers

over

4

Different code
bases - Java,
Scala/Spark,
python, Node.js

over

15

Different cloud
resources used, such
as Kafka, Postgres &
S3

Multi Cloud

Azure, Azure Gov, Linode

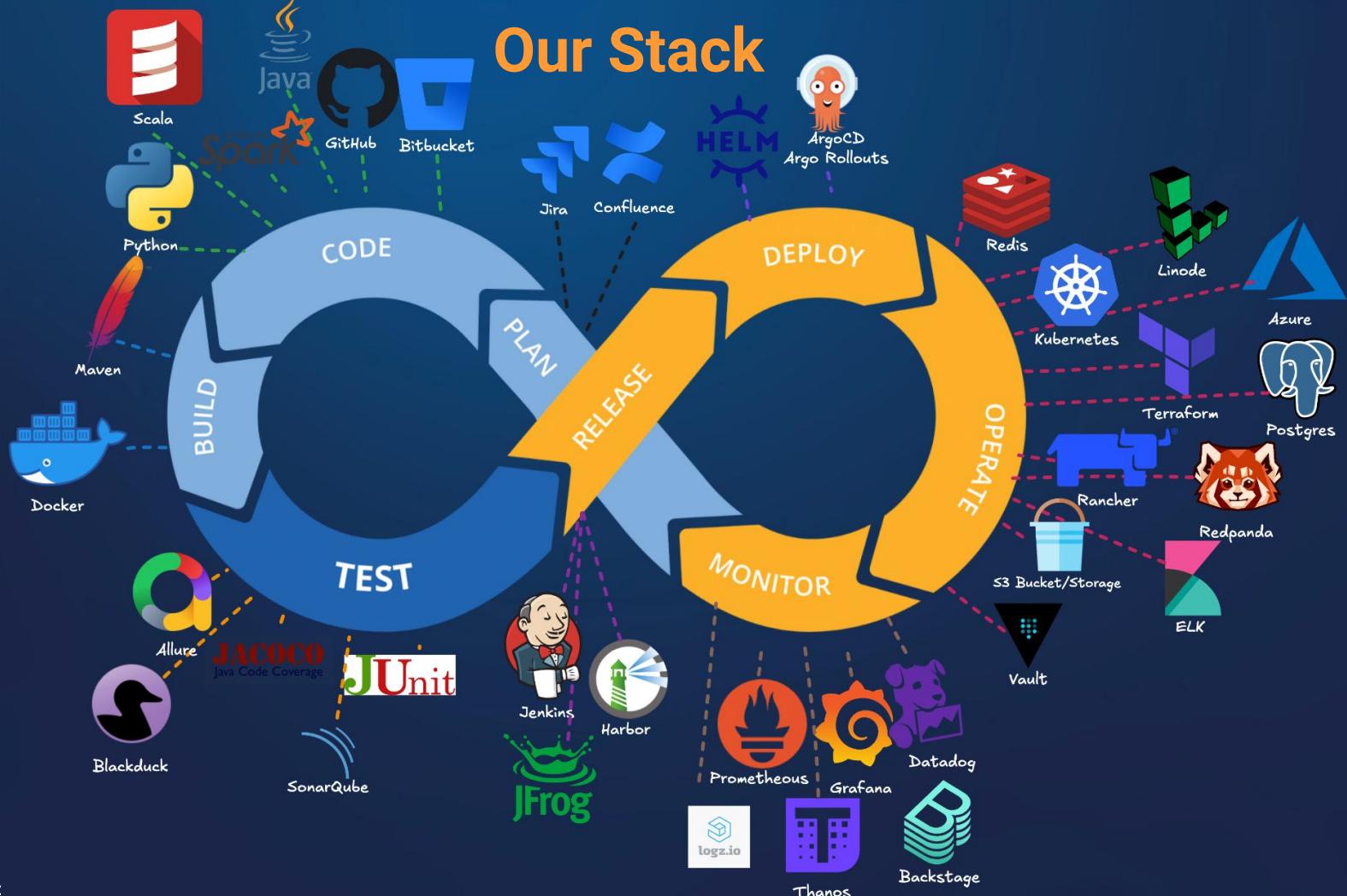
Our Development - Problems & Solutions

Problems

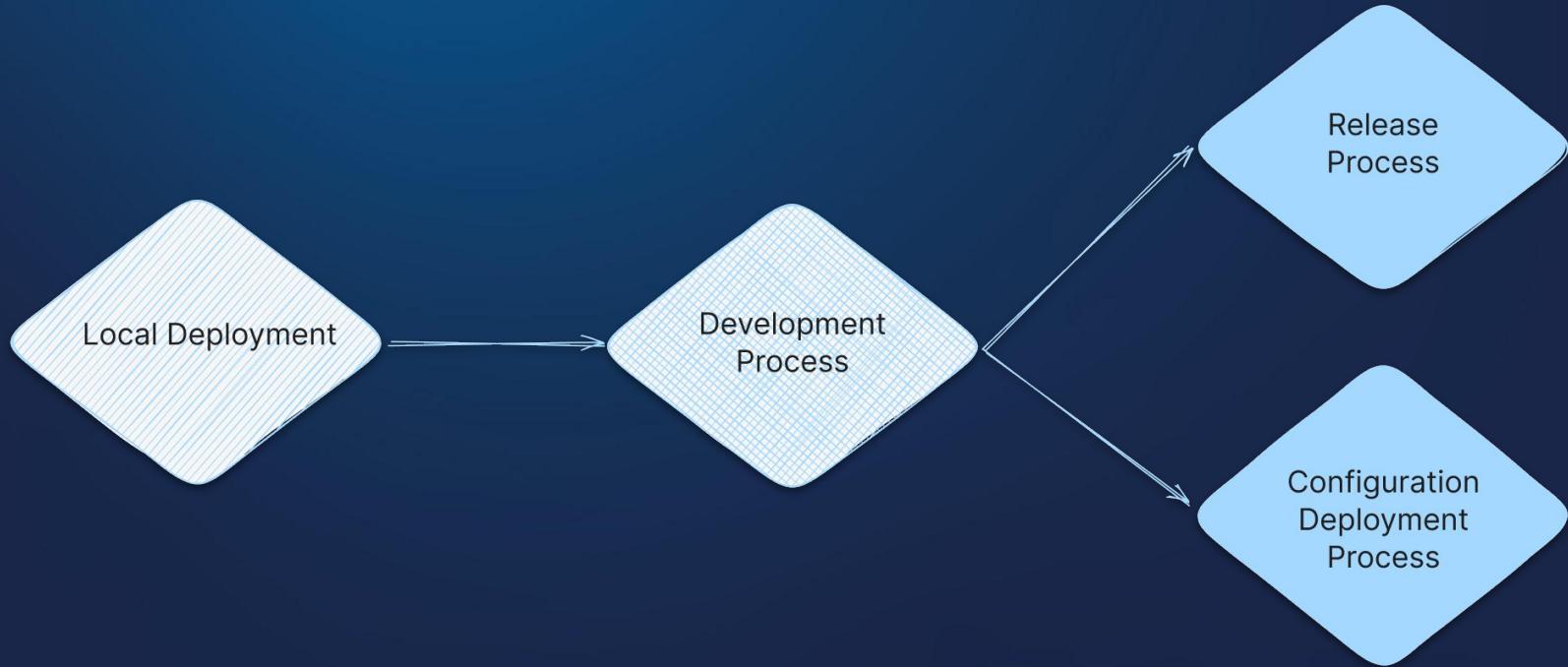
- **Long** deployments
 - It take **weeks** to deploy to production
- **Bugs** during deployments
- Manual and **repetitive** work
- Back and forth **communications**
- No **history**

Solutions

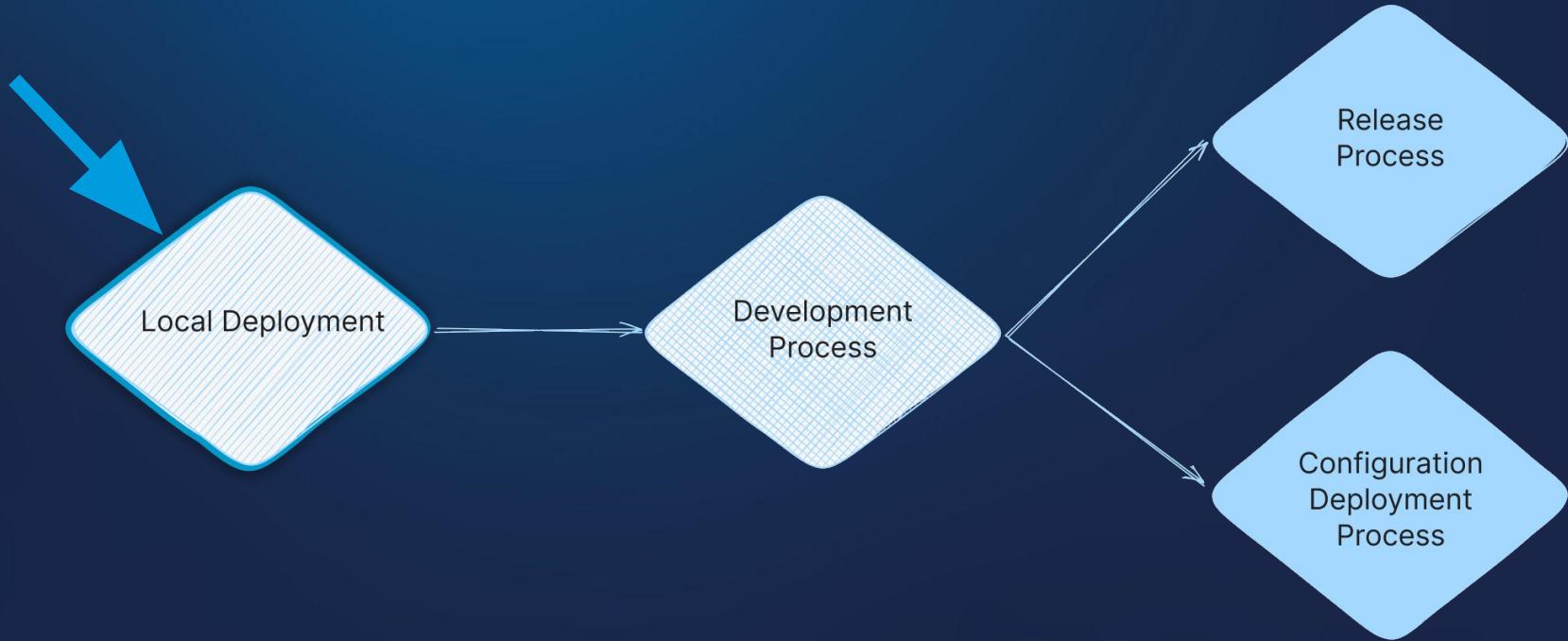
- **Short cycles** - ship new features and bug fixes quickly and efficiently
- No manual work! **Automation!**
- Saves time for development teams
 - Focus on **core** values
 - Deploy **multiple times** a day...
- Full **Auditing** on delivered code



High level Flow



High level Flow



Local Deployment

Temporary Environment Creation

Rapid Local Code Testing in a Real Environment

Problem

Developers often face **delays** in testing local code due to the **time-consuming** PR and **merge process**.

Solution

Our CI/CD project introduces a **Temp Env** that provides a quick and temporary testing environment.

Rapid Local Code Testing in a Real Environment

Key Features

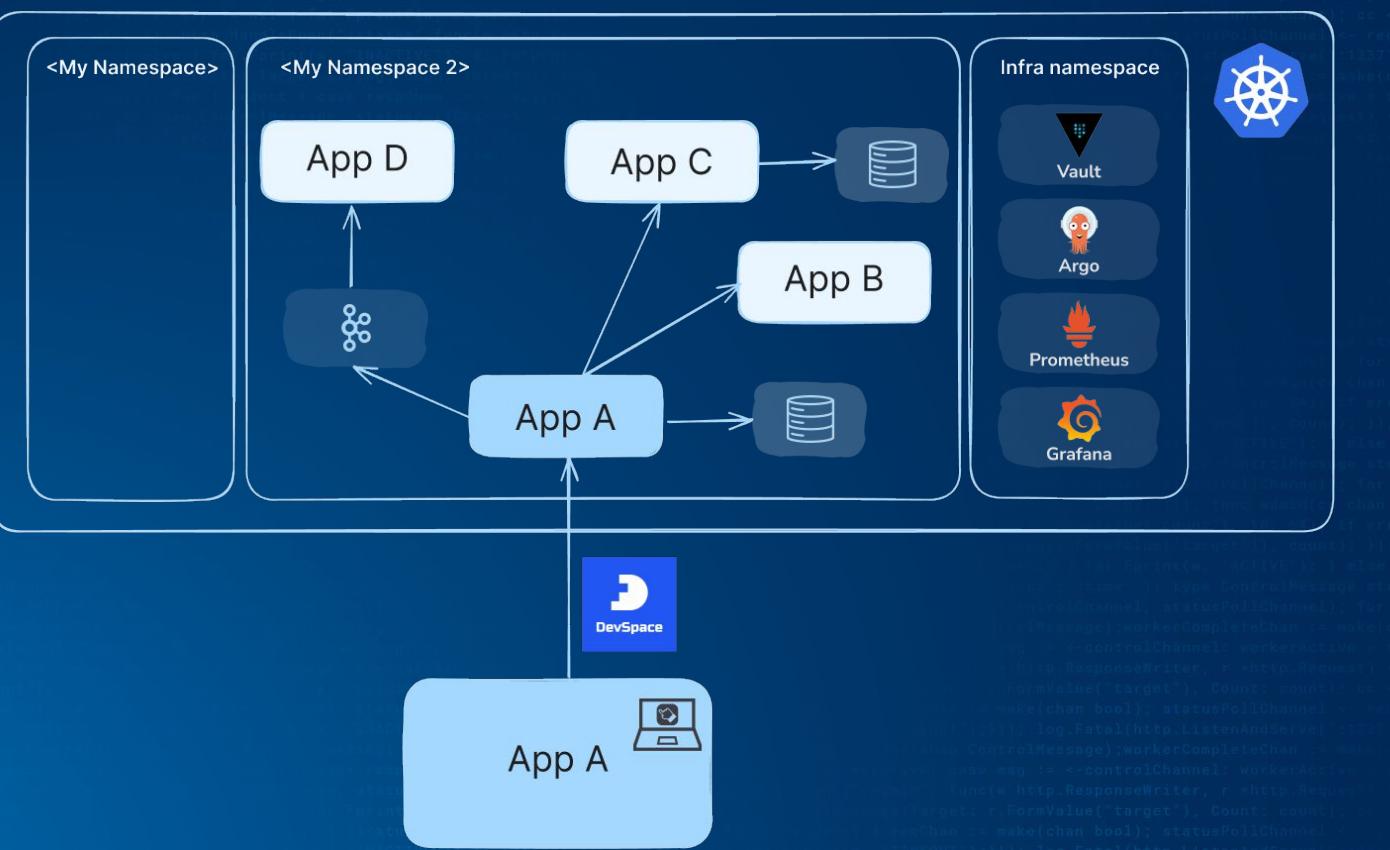
- ▶ App, storage, and other cloud **resources creation**: Easily create necessary resources
- ▶ **Messaging** Integration: Seamlessly update the environment using Webex
- ▶ GitHub **History**: Maintain a record of changes using GitHub
- ▶ Devspace Deployment: **Deploy local code** snapshots directly to the Temp Env

Rapid Local Code Testing in a Real Environment

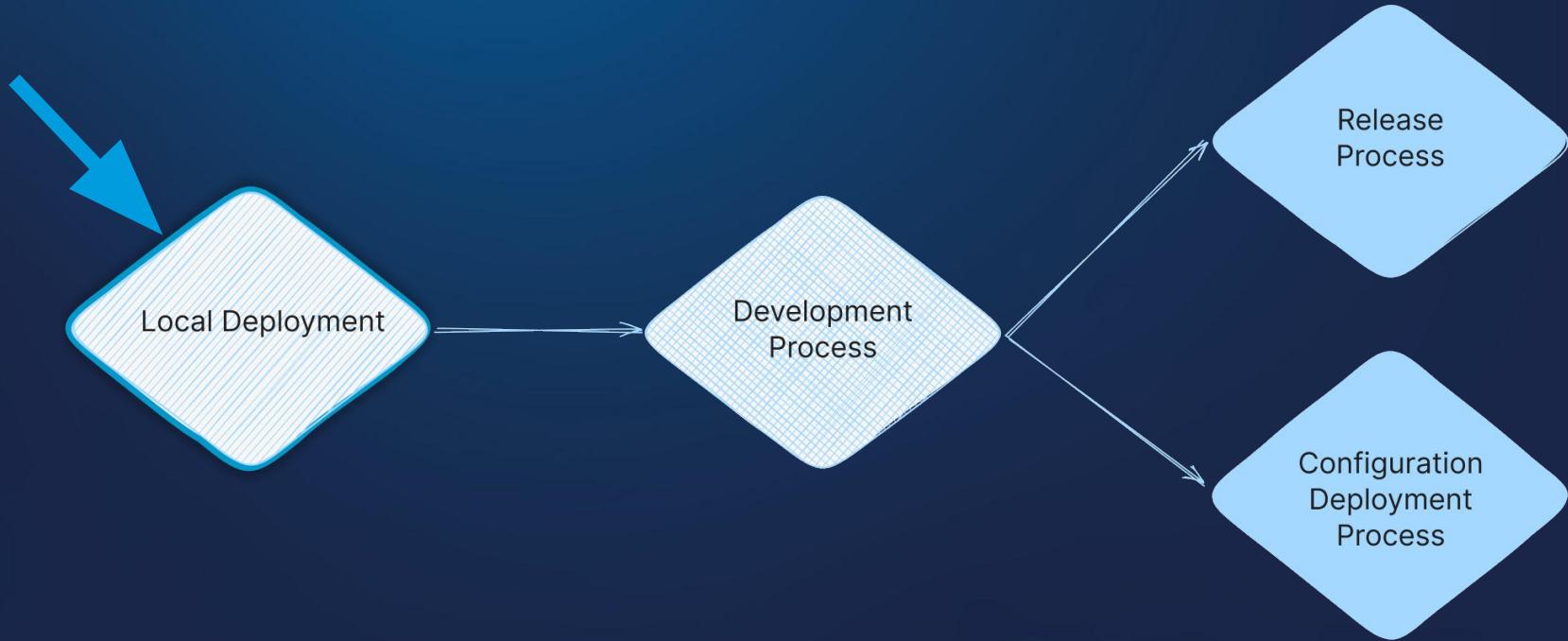
Benefits

- ▶ **Faster Testing:** Reduce development cycles and time-to-market.
No need to merge or push commits in git
- ▶ **Increased Productivity:** Empower developers to iterate and experiment more efficiently
- ▶ **Risk Mitigation:** Identify and address issues early in the development process

Architecture



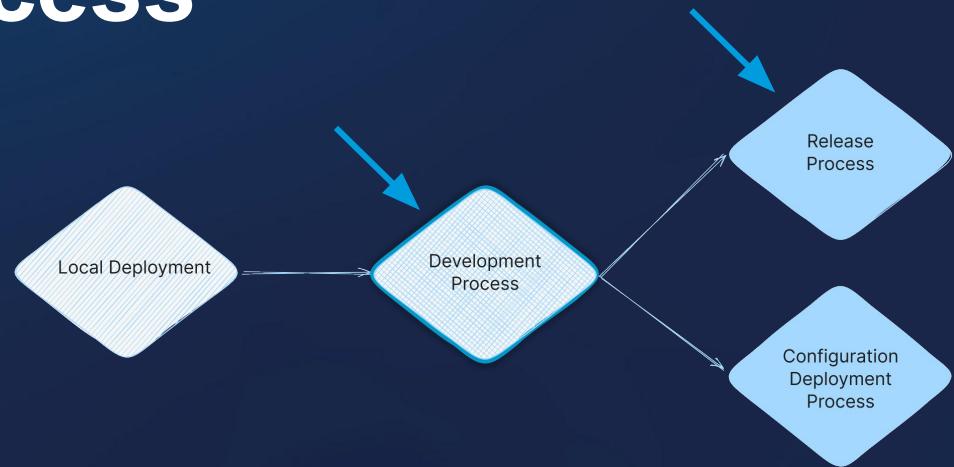
Up Until Now....



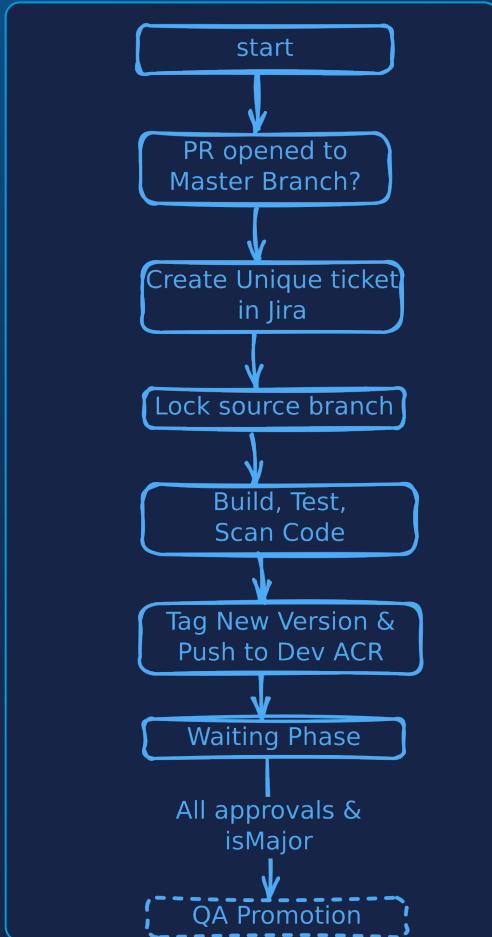
Deployment Process

Release Process

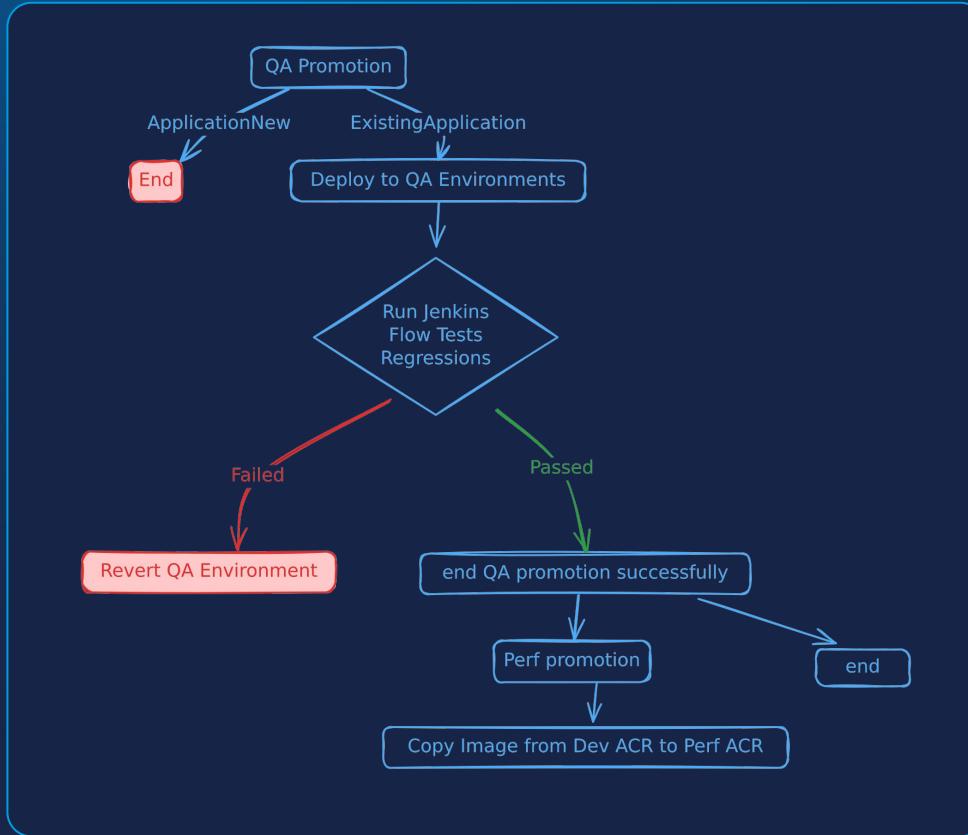
From PR to Production



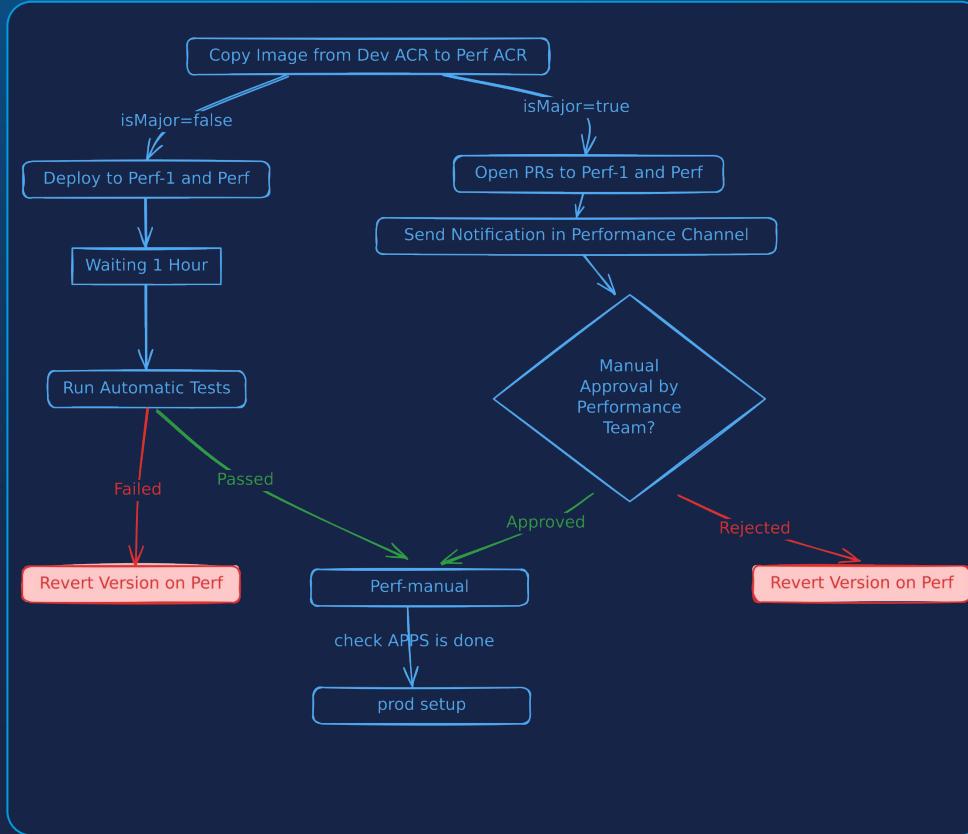
Release Process Diagram



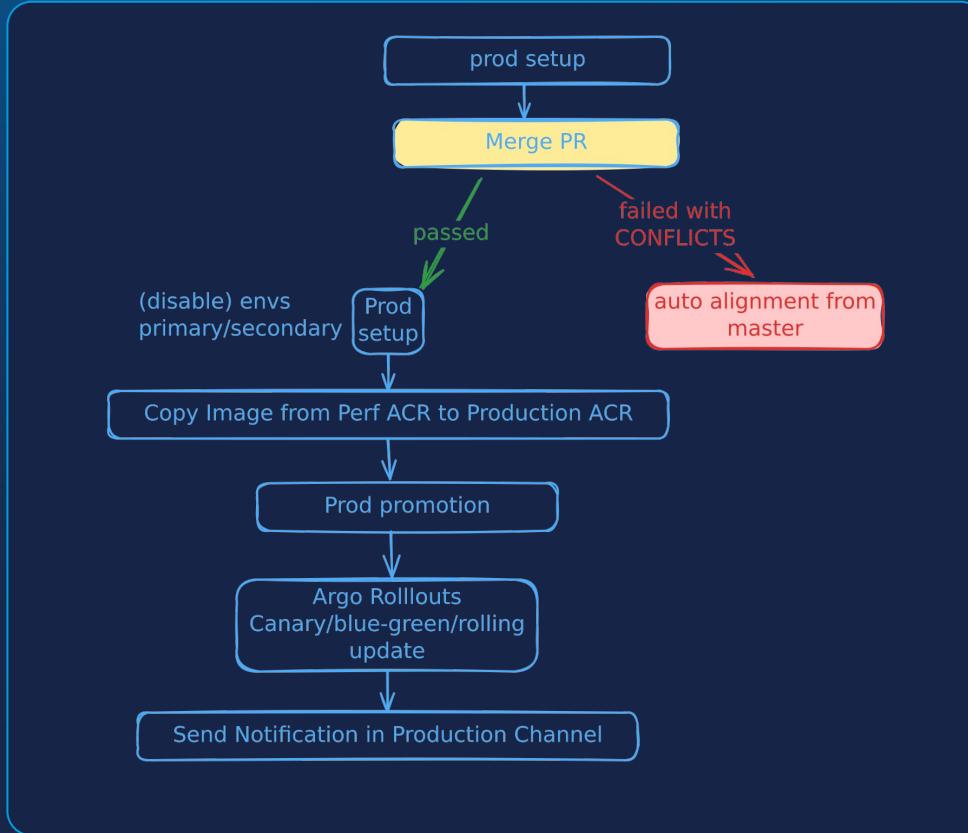
Release Process Diagram



Release Process Diagram



Release Process Diagram



Release Process - Audit

Jira tickets for auditing:

- History
- Visibility
- Approvals
- Owners
- Links
- ...

The screenshot shows a Jira ticket interface for a PR. At the top, there's a purple icon with a white target symbol, followed by the text "CSICICD / CSICICD-1049". Below this, the title "groot-wsa PR 1338 Tag 1.0.0.2577" is displayed. A blue button labeled "Release Ready" is highlighted. Below the title, there are several buttons: "Edit", "Add comment", "Assign", "More", and "Release Ready". Under the "Details" section, the ticket is categorized as a "Story" (Type) with an "Undetermined" priority. It has labels: APPS=2/2, PR=CSIAZURE_groot-wsa_1338, isMajor=true, scan-passed, and tests-passed. The impact is listed as "Medium" and it does not affect SOX. In the "Description" section, the PR details are provided: "PR 1338 for groot-wsa branch bugfix/CSIDEV-40299_update-groot-core to branch master by [REDACTED]@akamai.com". It also lists "DEV+QA CODE APPROVERS" and two "PERF APPROVAL" sections, both of which have been completed.

CSICICD / CSICICD-1049

groot-wsa PR 1338 Tag 1.0.0.2577

Edit Add comment Assign More Release Ready

Details

Type: Story Resolution: Unresolved

Priority: Undetermined

Labels: APPS=2/2, PR=CSIAZURE_groot-wsa_1338, isMajor=true, scan-passed, tests-passed

Impact: Medium

Affects SOX: No

Description

PR 1338 for groot-wsa branch bugfix/CSIDEV-40299_update-groot-core to branch master by [REDACTED]@akamai.com

DEV+QA CODE APPROVERS: [REDACTED], [REDACTED], [REDACTED], [REDACTED]

PERF APPROVAL groot-wsa: [REDACTED], [REDACTED]

PERF APPROVAL groot-wsa-eu: [REDACTED], [REDACTED]

Release Process - Audit

Support
configuration
changes

Issue Links

relates to

- [CSIDEV-40299 Groot-WSA new version errors - Azure](#) BLOCKED

links to

- [Jenkins Build](#)
- [PR #1338](#)
- [PR PRD p1-prod azure groot-wsa](#)
- [PR PRD prod-apps linode groot-wsa](#)

Show 2 more links (2 links to)

Sub-Tasks

1.	QA	CSICICD-1050	CLOSED	View Details i
2.	PERF	CSICICD-1051	CLOSED	View Details i
3.	PERF-MANUAL	CSICICD-1052	IN PROGRESS	View Details i
4.	PRD	CSICICD-1053	IN PROGRESS	View Details i

Activity

Release Process - Audit

Auditing all operations

Activity

All Comments Work Log History Activity Transitions Oldest first ↑

Load more older comments

svc_CSI_DevOps added a comment - 23-May-24 08:07 AM

Promotion process has not been triggered for groot-wsa PR #1338 Approvals: Unapprovals:

Edit · Delete · Pin · ⚙

svc_CSI_DevOps added a comment - 23-May-24 08:23 AM

Promotion process has not been triggered for groot-wsa PR #1338 Approvals: Unapprovals:

Edit · Delete · Pin · ⚙

svc_CSI_DevOps added a comment - 23-May-24 08:40 AM

Promotion process has been triggered for groot-wsa PR #1338 Tag: 1.0.0.2577

Edit · Delete · Pin · ⚙

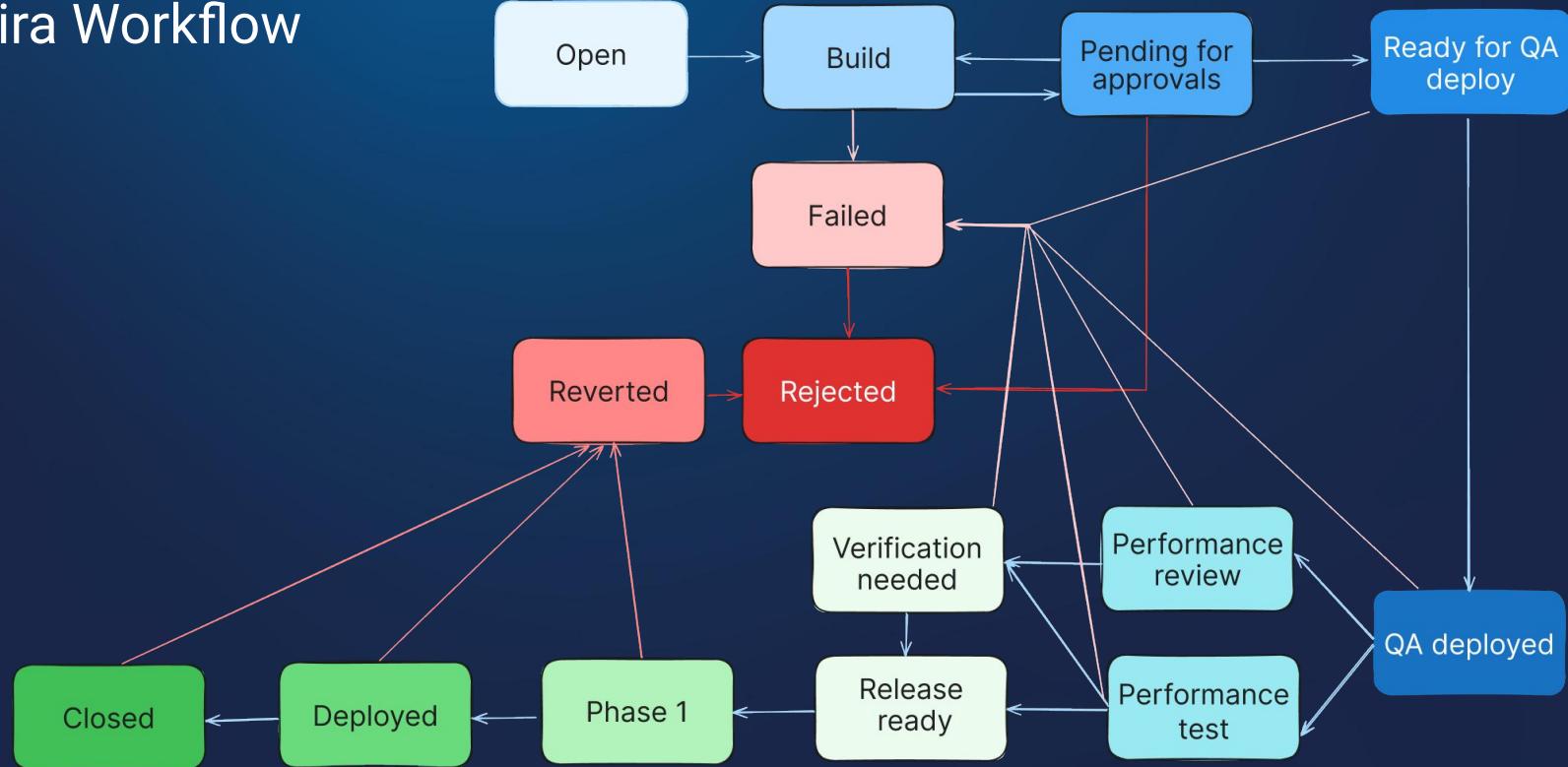
svc_CSI_DevOps added a comment - 23-May-24 12:03 PM

Docker images pushed to DevACR

Edit · Delete · Pin · ⚙

Release Process - Audit

Jira Workflow



Release Process - Vulnerability Scanning

SonarQube
scanning SAST Tool

Burp Suite
DAST Tool

WIZ
scanning in the environments

BlackDuck
scanning

The screenshot shows the AkamaiVuln interface with the following details:

- Find** search bar: Search term is empty.
- Projects** tab selected.
- Components** tab.
- Vulnerabilities** tab.
- Black Duck KnowledgeBase** tab.
- Results Found:** 362 Results Found, Last Updated at 11:38 PM.
- Filters:** Clear filters, Policy Rule: CSI Policy.
- Project List:**
 - yondu-at0_PR_BUILD > pr-2**: Group: CSI, 237 Components. Last Scan: 1/8/2024, Updated: 5/15/2024. License: Unknown License, Phase: In Development. Issues: 1 Unspecified Policy Violation, 1 Critical Security Risk, 43 High License Risks, 62 High Operational Risks.
 - external-spark-metrics_PR_BUILD > pr-166**: Group: CSI, 18 Components. Last Scan: 1/10/2024, Updated: 4/16/2024. License: Unknown License, Phase: In Development. Issues: 1 Unspecified Policy Violation, 1 Critical Security Risk, 6 Medium License Risks, 4 High Operational Risks.
 - databricks-infra-jobs_PR_BUILD > pr-273**: Group: CSI, 163 Components. Last Scan: 1/10/2024, Updated: 5/15/2024. License: Unknown License, Phase: In Development. Issues: 1 Unspecified Policy Violation, 2 Critical Security Risks, 1 High License Risk, 45 High Operational Risks.
 - pii-learning_PR_BUILD > pr-622**: Group: CSI, 793 Components. Last Scan: 1/10/2024, Updated: 5/15/2024. License: Unknown License, Phase: In Development. Issues: 3 Unspecified Policy Violations, 3 Critical Security Risks, 54 High License Risks, 238 High Operational Risks.
 - optimize-job-app_PR_BUILD > pr-147**: Last Scan: 1/10/2024, Updated: 5/15/2024. License: Unknown License, Phase: In Development.
- Left sidebar:** Dashboard, Find, Scans, Reports, Manage (Security Risk, License Risk, Operational Risk) filters.
- Bottom footer:** BLACK DUCK v2024.1.0 | Notices, © 2024 Synopsys, Inc. All rights reserved.

Release Process - Webex Notifications



CSI Devops 14:39

CICD groot-wsa PR #1333:Pending Approval

PR #1333 for the groot-wsa repo has a successful Build. Application Tests + Scan have passed and is pending for approval

[link to pull request](#)



CSI Devops Sunday, 9:31

CICD groot-wsa Tag 1.0.0.2553:promote to PERF manual

Deployment to PERF MANUAL started

Approval of your feature from the performance team is required

[pr link for azure perf environment](#)

[pr link for linode perf-1 environment](#)

[jenkins perf manual promotion job](#)

[link to ticket](#)



CSI Devops 15/02/2024, 14:57

CICD groot-wsa PR #1272:tracking info

[Click here to view ticket for tracking](#)



Please make sure:

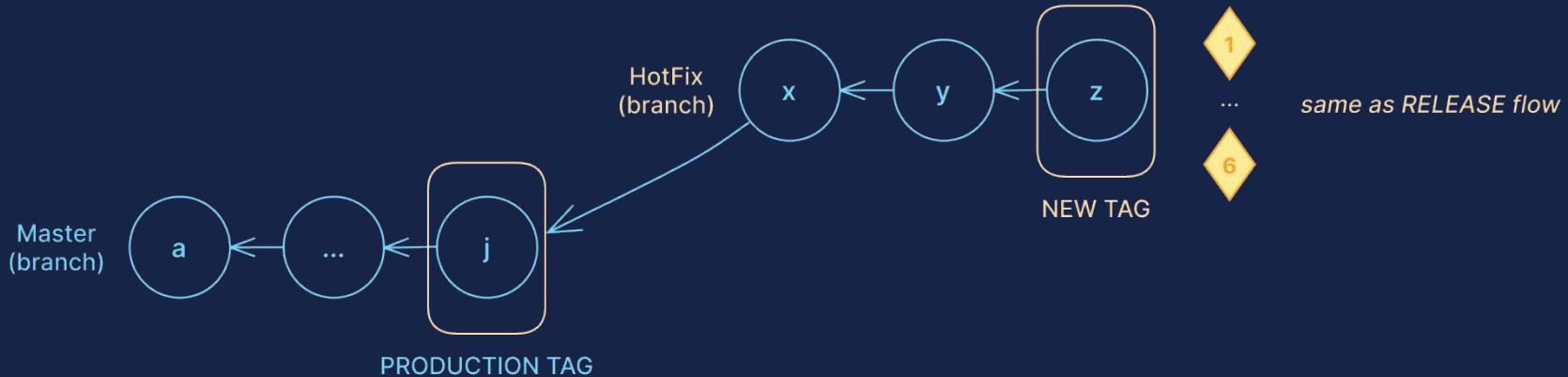
- you get the approvals from qa/perf/code reviewer(s)
- isMajor=[true/false] label is set to your perfered value (default true)

[More info about isMajor lable and cicd next steps here](#)

Release Process - Hotfix

- Same as release process
- Won't have issues with current open PRs (not merged to master)

Case 3 - HOT-FIX management



Release Process - Common Library

What happens if we have a common library for multiple repos?

Base Component



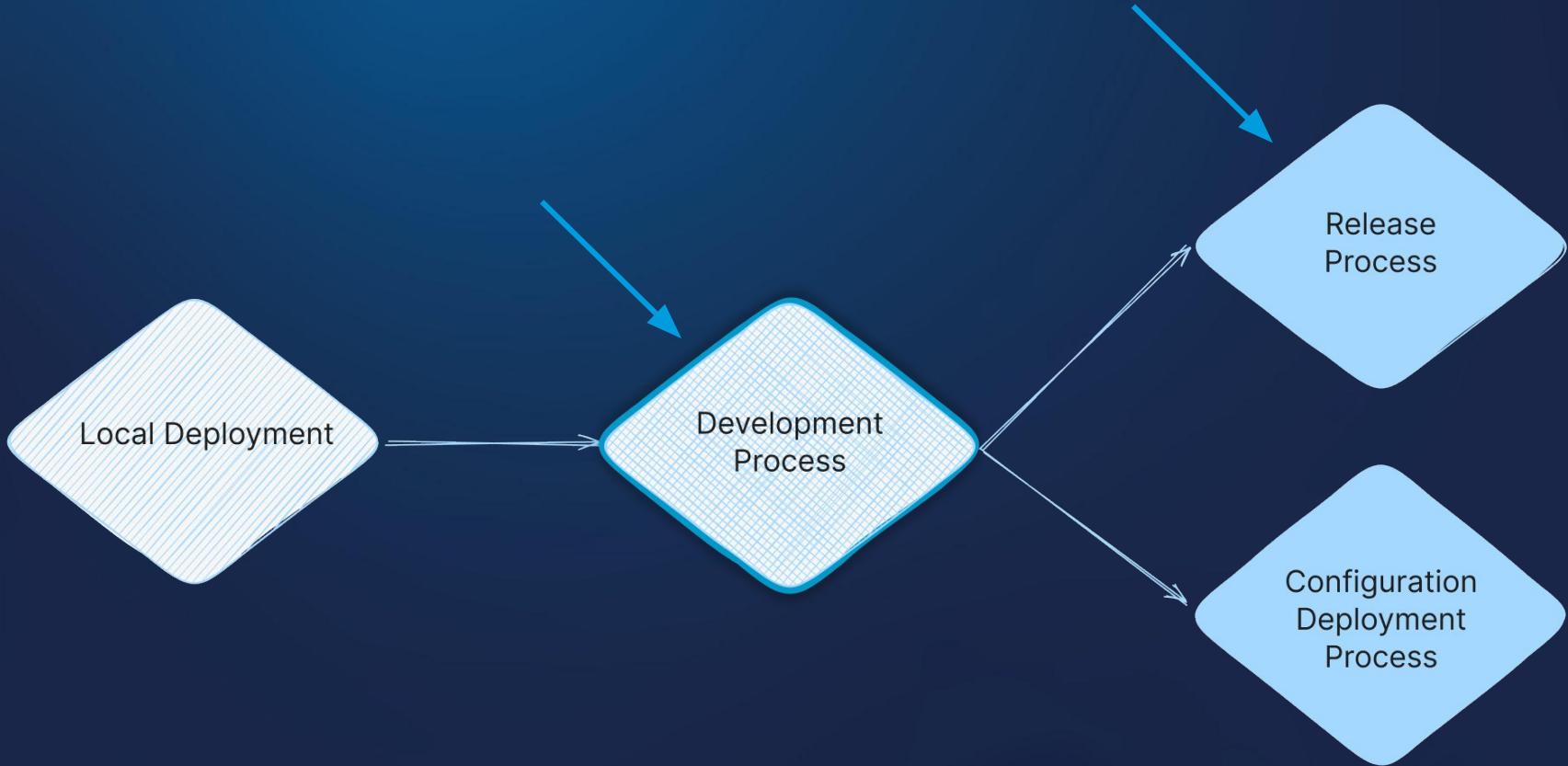
Child Component



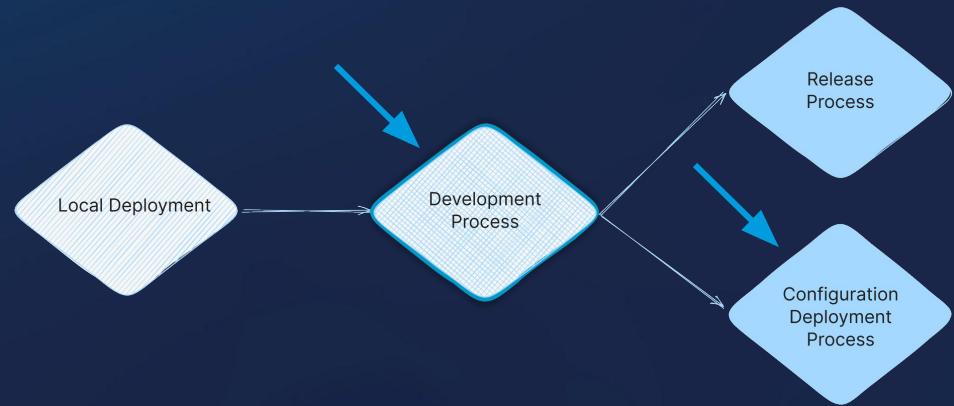
Release Process - Deployment Strategy

- By using **Argo Rollouts** we can apply different methodologies to different app types, for example:
 - Blue-green
 - Canary
 - Default k8s strategy (Rolling Update)
- Apps will be deployed to production **automatically**
 - During **deployment window**
(not on nights/ weekends/ Holidays/ Moratoriums & etc)
 - Production wait **Queue**

Up Until Now....



Configurations CI/CD



Rapid Local Code Testing in a Real Environment

Which **configurations** do we use?

- ArgoCD: app configurations
- Complex app Configurations using files: JSON, YAML and etc.
- Terraform: Kafka, Storage, Redis, Postgres, etc.

Configurations CI/CD

Problem

- Manual configurations
- No audit on configuring updates
- No Backups
- No Validations

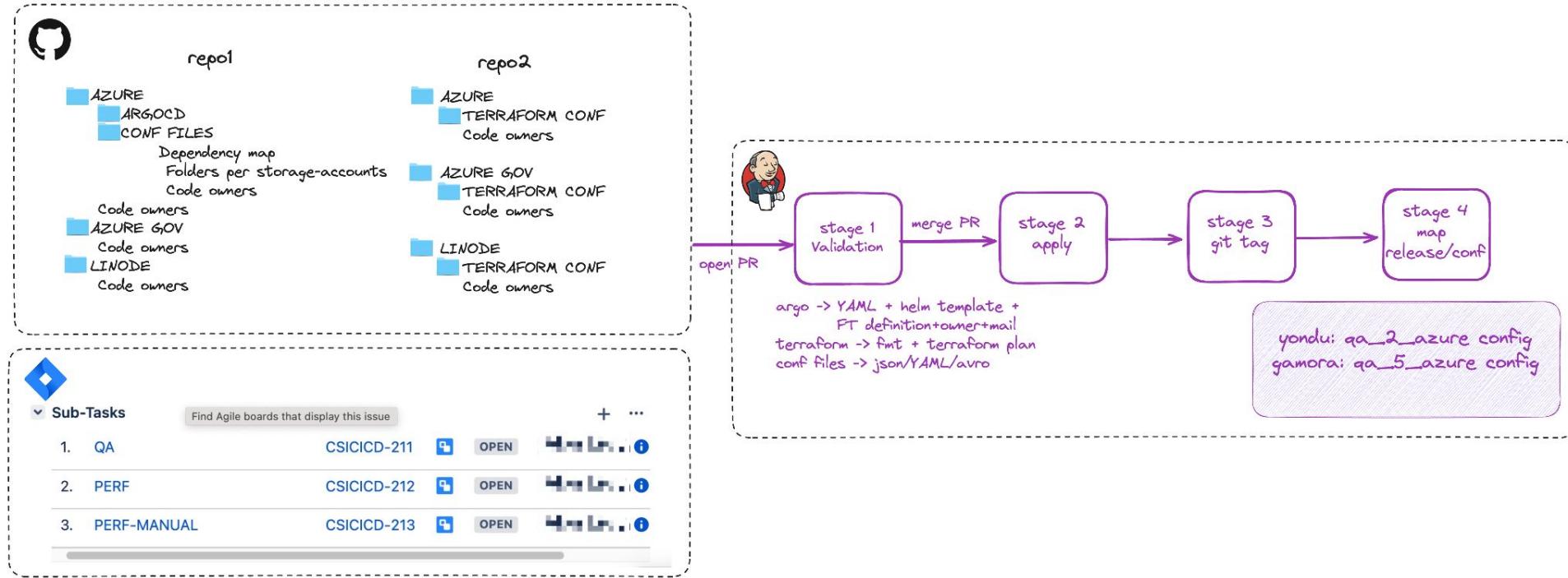
Solution

Will be treated as a CI/CD process, with same automation principals

Configurations CI/CD

1. **Deployment** of configuration file from git
2. **Validation** of configuration changes
3. **Auto-deployment** of configuration from git
4. **Create tags** on each change in all repositories
5. **Sync/refresh** of the map apps/configuration tag
6. **Timeline of deployments** (release/configuration)

Configurations CI/CD



Visibility

By leveraging Backstage (CNCF project), Developer Portal which monitors our CI/CD was created

CICD Flow Dashboard

Ticket Workflow Legend

```
graph LR; Open((Open)) -- "Build triggered/in progress" --> Build[Build]; Build -- "Build successful" --> PendingApprovals[Pending Approvals]; PendingApprovals -- "Get ALL approvals from reviewers" --> ReadyForQA[Ready for QA Deploy]; ReadyForQA -- "QA Deployment/PFs Passed" --> QAVerified[QA Verified]; QAVerified -- "Deploying to performance" --> PerformanceReview[Performance Review]; PerformanceReview -- "Performance deployment passed" --> VerificationNeeded[Verification Needed]; VerificationNeeded -- "Approved by perf PR Merged" --> ReleaseReady[Release Ready]; VerificationNeeded -- "Rejected by perf or PR build to merge" --> Failed[FAILED]; ReadyForQA -- "QA Deployment/PFs Failed" --> Failed; ReadyForQA -- "Build Failed" --> Failed;
```

QA/PERF Ticket Workflow Legend

```
graph LR; Open((Open)) -- "Deployment Started" --> InProgress[In Progress]; InProgress -- "Deployment Failed" --> Failed[FAILED]; InProgress -- "Deployment Successful" --> Closed[Closed];
```

Issues

CREATED AT	SUMMARY	TICKET KEY	STATUS	QA TICKET KEY	QA STATUS	PERF TICKET KEY	PERF STATUS
3/6/2024, 11:45:55 AM	groot-wsa PR 1290	CSICICD-214	Build	CSICICD-215	Open	CSICICD-216	Open
5/16/2024, 3:21:33 PM	yonduu-active-detection PR 11 Tag 1.0.0.5	CSICICD-882	FAILED	CSICICD-883	In Progress	CSICICD-884	Open

Visibility

Akamai

Search

Home

Catalog

Announcement

Teams/Squads

CICD Flow Da...

App Version Tr...

CICD stats

Perf Approval...

Welcome to Perf Tracker!

Perf Approval Tracker

Refresh Data

Pending Perf Approvals

APPLICATIONS	TAG	CLOUD	TICKET LINK	MERGED	INPUT LINK	APPROVED	PERF OWNER
elector-gamora-behavioral4-azure,elector-yondu-waf-triggers-dlr,elector-yondu-wtd-azure	1.0.0.2229	linode	CSICID-3383	<input type="checkbox"/>	Perf-1/161	<input type="checkbox"/>	Select Owner
bowie-waf-triggers-dlr	1.0.0.3	linode	CSICID-3155	<input type="checkbox"/>	Perf-1/150	<input type="checkbox"/>	Select Owner

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Akamai

Visibility

Jenkins - Overview

Plugins Count: 154 | Project Count: 2

Note: To view all available metrics, you need to have the latest version of the Jenkins Datadog plugin.

Job Events

Jenkins Build Events Timeline

Jenkins Build events

SOURCE	MESSAGE	DATE
Job pr_build	build #8151 unstable on jenkins-0	Oct 6, 9:07 pm
Job pr_build	build #8152 success on jenkins-0	Oct 6, 9:03 pm
Job pr_build	build #8152 started on jenkins-0	Oct 6, 8:50 pm
Job pr_build	build #8051 aborted on jenkins-0	Oct 6, 8:48 pm
Job pr_build	build #8151 started on jenkins-0	Oct 6, 8:43 pm
Job pr_build	build #8150 success on jenkins-0	Oct 6, 5:53 pm
Job pr_build	build #8150 started on jenkins-0	Oct 6, 5:49 pm
Job pr_build	build #8149 success on jenkins-0	Oct 6, 4:54 pm
Job pr_build	build #8149 started on jenkins-0	Oct 6, 4:50 pm
Job pr_build	build #8148 success on jenkins-0	Oct 6, 4:47 pm
Job pr_build	build #8048 aborted on jenkins-0	Oct 6, 4:44 pm

Job Status

Failing and passing Jenkins jobs: 2

Completed job runs over the past 4 hours:

Job	Runs
pr_build	18
rc_build	13

System Events

Jenkins System Events Timeline

Jenkins System Events

SOURCE	MESSAGE	DATE
Jenkins node pr-build-8151-mv60x-tr0kh...	host:jenkins-0	Oct 6, 9:07 pm
Jenkins node pr-build-8152-3v2bx-kdh4z...	host:jenkins-0	Oct 6, 9:03 pm
Jenkins node pr-build-8152-3v2bx-kdh4z...	host:jenkins-0	Oct 6, 8:50 pm
Jenkins node pr-webhook-11443-vp15L...	host:jenkins-0	Oct 6, 8:50 pm
Jenkins node pr-webhook-11443-vp15L...	host:jenkins-0	Oct 6, 8:44 pm
Jenkins node pr-build-8151-mv60x-tr0kh...	host:jenkins-0	Oct 6, 8:44 pm
Jenkins node pr-webhook-11442-m7qd2...	host:jenkins-0	Oct 6, 8:43 pm
Jenkins node pr-webhook-11442-m7qd2...	host:jenkins-0	Oct 6, 8:43 pm
Jenkins node cicd-configuration-argoc...	host:jenkins-0	Oct 6, 6:49 pm
Jenkins node cicd-configuration-argoc...	host:jenkins-0	Oct 6, 6:39 pm
Jenkins node cicd-configuration-argoc...	host:jenkins-0	Oct 6, 6:38 pm

Nodes

Jenkins Node Count

Jenkins Nodes Status

NODE_NAME	NODE STATUS	ONLINE COMPUTERS
kamai	Up	1

Queue

Queue size: 0 items

Buildable items: 0 items

Pending items: 0

Blocked items: 0

Job Duration Trends

Average job durations over the past 4 hours:

Job	Avg Duration
pr_build	18.0
rc_build	7.5

Time between last successful job and current failed job (MTBF)

Time between last successful job and current failed job (MTBF):

Job	MTBF
pr_build	18.0
rc_build	7.5

Job Duration Trends

Time between last failed job and current successful job (MTTR):

Job	MTTR
pr_build	3.5
rc_build	2.5

From PR to Production

Before

- Deployments occurred **weeks** after developers completed to code
- **Slow** time to market - Customers get bug fixes and new feature every couple weeks

After

- Deployments occur multiple times a **day**
- **Faster** time to market - customers can get bug fixes and features immediately
- **Cost reduction** - test and achieve more in lower env.

What's Next

- Improve reliability and performance
- “CI/CD for CI/CD” - implementing CI/CD on DevOps Workload
- MLOps - ML lifecycle support
 - Training, serving & versioning ML models
 - LLMOps
- Add KPIs & metrics

Call to Action

Identify the pains
from all the different
roles / stakeholders

Why?

Try to Implement
and improve over
time

Agile

Don't be afraid
from changes

How?

Leverage open
source projects with
non open sources

Don't
reinvent
the wheel

CI/CD is a culture
you need to adopt

Motivate
Track
Monitor





Questions?



Thank You!

