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Argo Rollouts Step plugins



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Agenda

Intro to Argo Rollouts and current status

How to extend Argo Rollouts

Why canary step plugins

How does it work

How to write your own

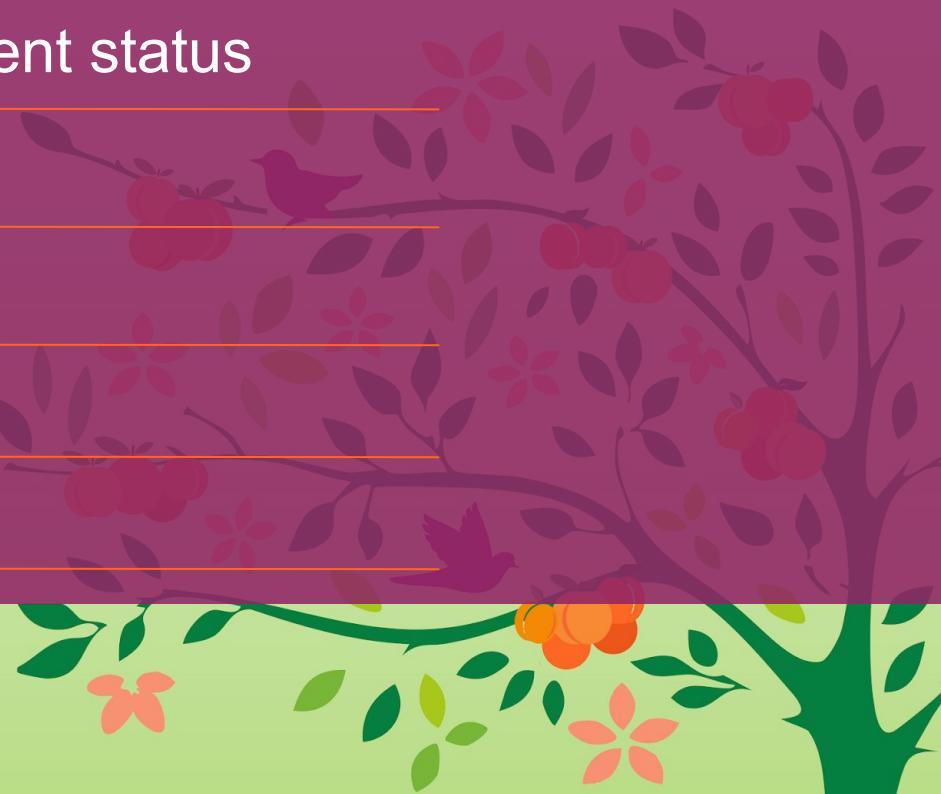


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Progressive Delivery



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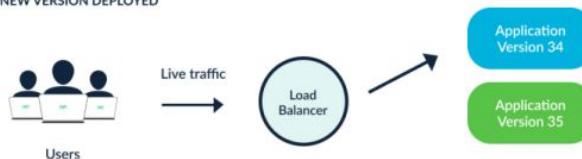
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Blue/Green

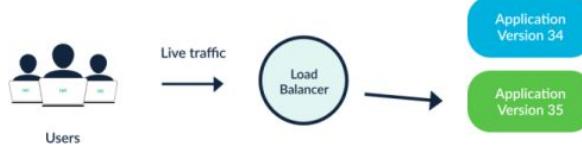
1 INITIAL VERSION



2 NEW VERSION DEPLOYED



3 SWITCH TRAFFIC



4 FINISH



Canary

1 INITIAL VERSION



2 NEW VERSION USED BY 10% OF USERS



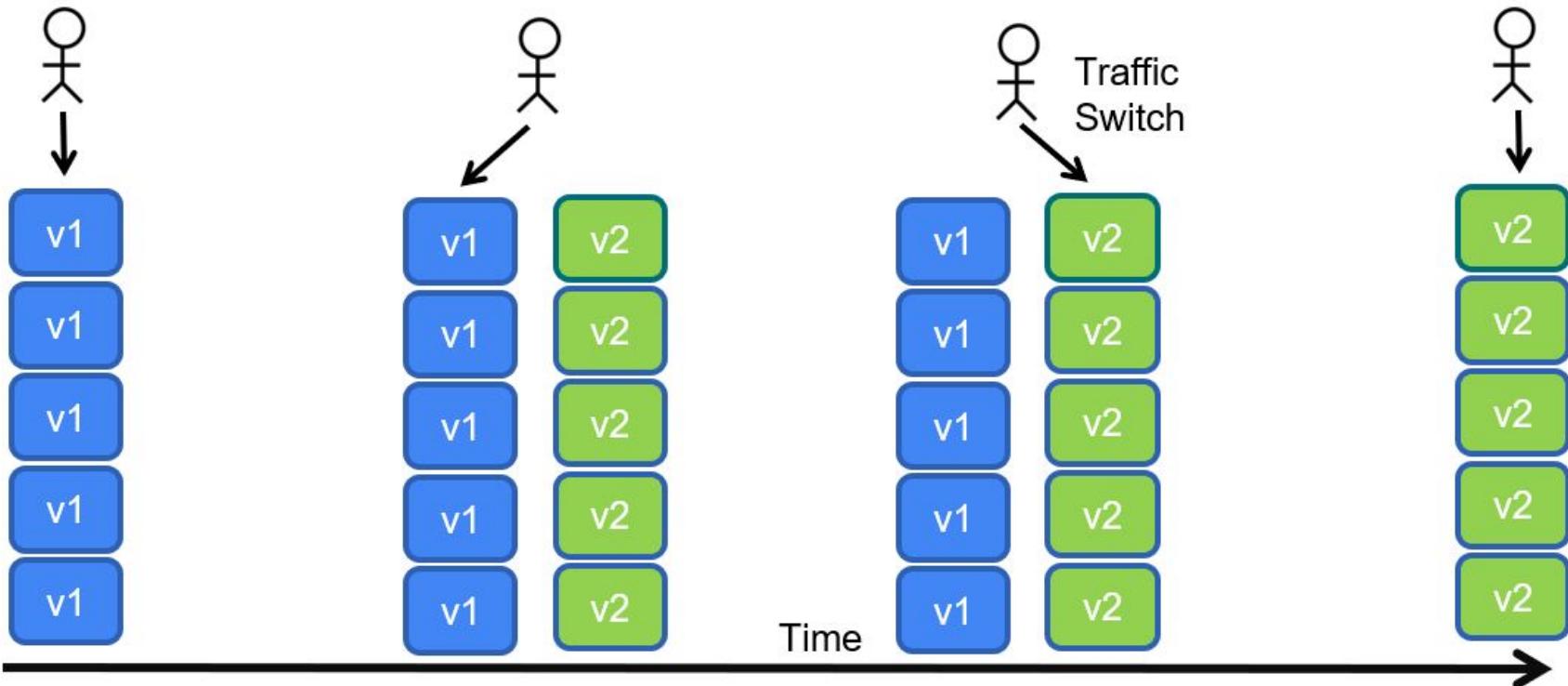
3 NEW VERSION USED BY 33% OF USERS



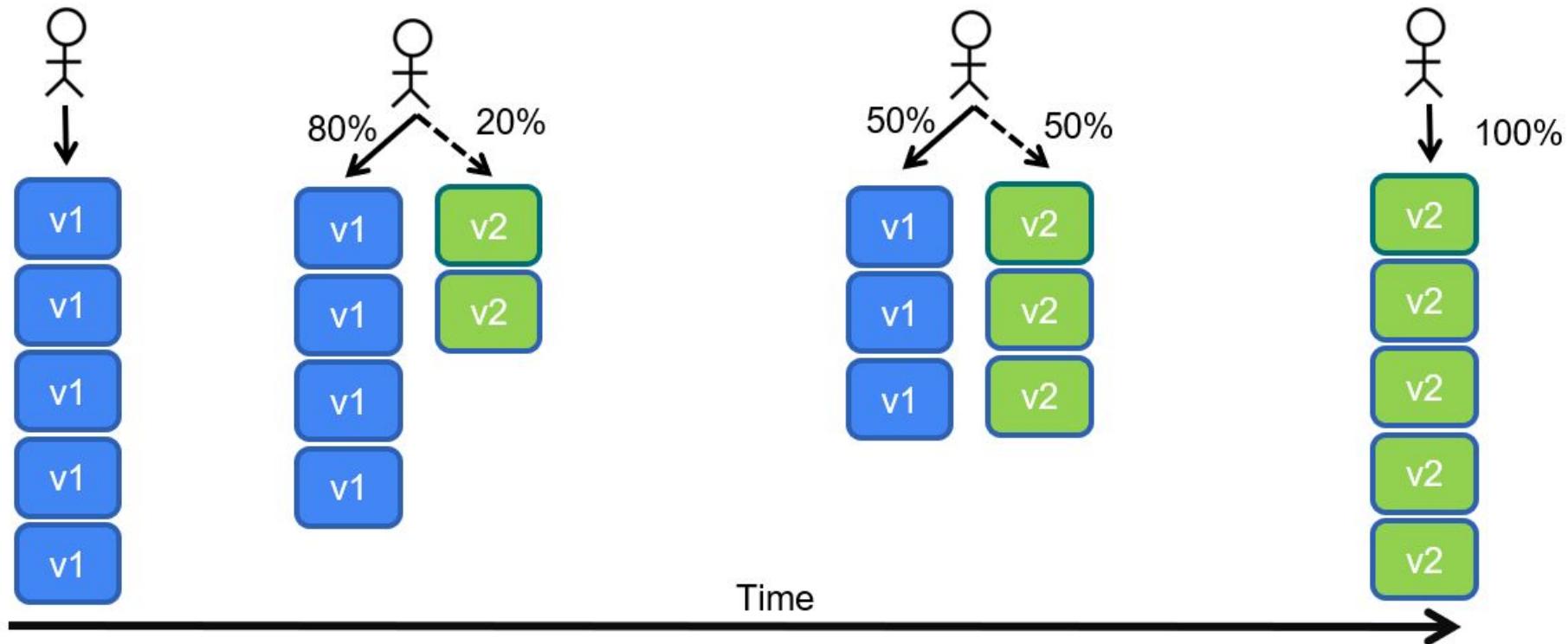
4 NEW VERSION USED BY ALL USERS



Blue/Green



Canary



Argo Rollouts



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Argo Rollouts - Progressive Delivery for Kubernetes

- Kubernetes native
- Standalone project
- Does NOT depend on Argo CD
- Blue/Green support
- Canary support
- A/B testing and other Experiments
- Zero downtime releases
- Automatic rollbacks based on metrics
- Must be installed on each cluster



Project Stats



3.3K+

Stars



290K+

Last Year Visitors



7.8K+

Commits



1.8K+

Merged PRs



~225

Active
Contributors



85+

Active
Organizations



900+

Closed Issues



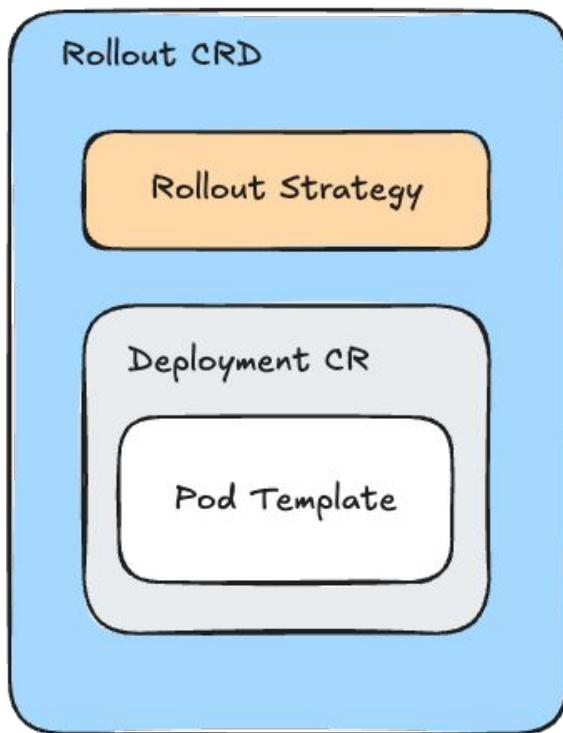
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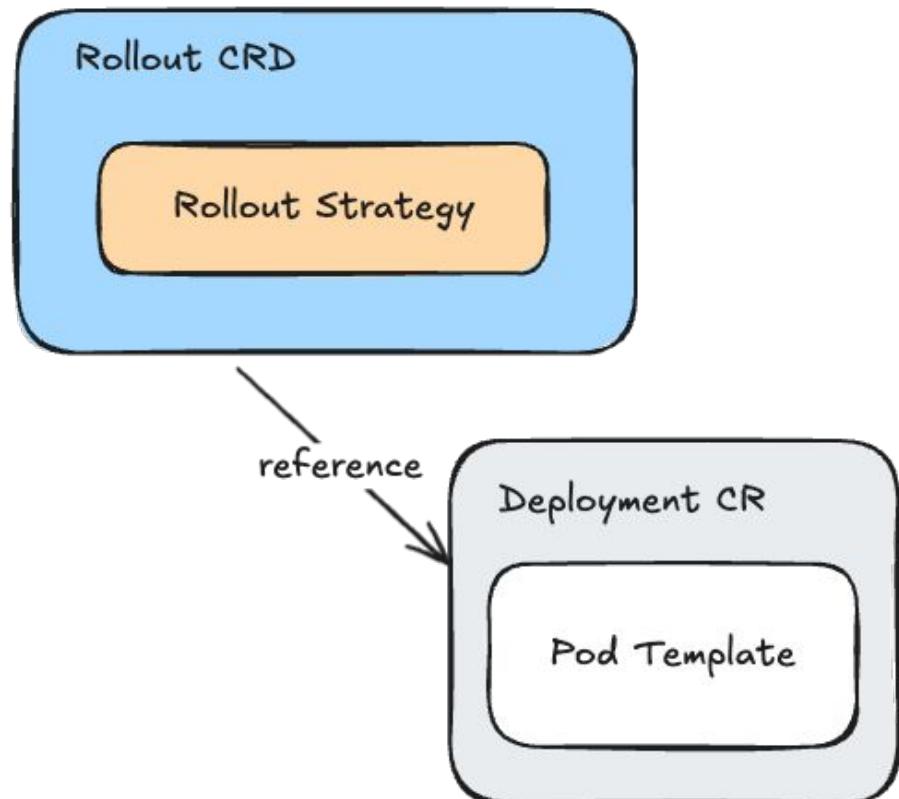
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By Extension



By Reference



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```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: canary-example
spec:
  replicas: 10
  revisionHistoryLimit: 2
  selector:
    matchLabels:
      app: cost-demo
  template:
    metadata:
      labels:
        app: cost-demo
    spec:
      containers:
        - name: cost-demo
          image: gcr.io/kostis-codefresh/rollouts-autoscaling-example:v1
          ports:
            - name: http
              containerPort: 8080
              protocol: TCP
strategy:
  canary:
    canaryService: argo-rollouts-canary-service
    stableService: argo-rollouts-stable-service
    steps:
      - setWeight: 10
      - pause:
          duration: 1h
      - setWeight: 20
      - pause: {}
```

Deployment + Strategy = Rollout

```
strategy:
  canary:
    canaryService: argo-rollouts-canary-service
    stableService: argo-rollouts-stable-service
    steps:
      - setWeight: 10
      - pause:
          duration: 1h
      - setWeight: 20
      - pause: {}
```

Graphical dashboard

rollouts-demo ⓘ

Restart Retry Abort Promote PromoteFull

Steps

- Set Weight: 20%
- Pause
- Set Weight: 40%
- Pause: 10s
- Set Weight: 60%
- Pause: 10s
- Set Weight: 80%
- Pause: 10s

Summary

Strategy Canary
Step 1/8
Set Weight 20
Actual Weight 20

Containers

rollouts-demo

argoproj/rollouts-demo:yellow

Revisions

Revision 2
argoproj/rollouts-demo:yellow
rollouts-demo-6cf78c66c5

Revision 1
argoproj/rollouts-demo:blue
rollouts-demo-687d76d795



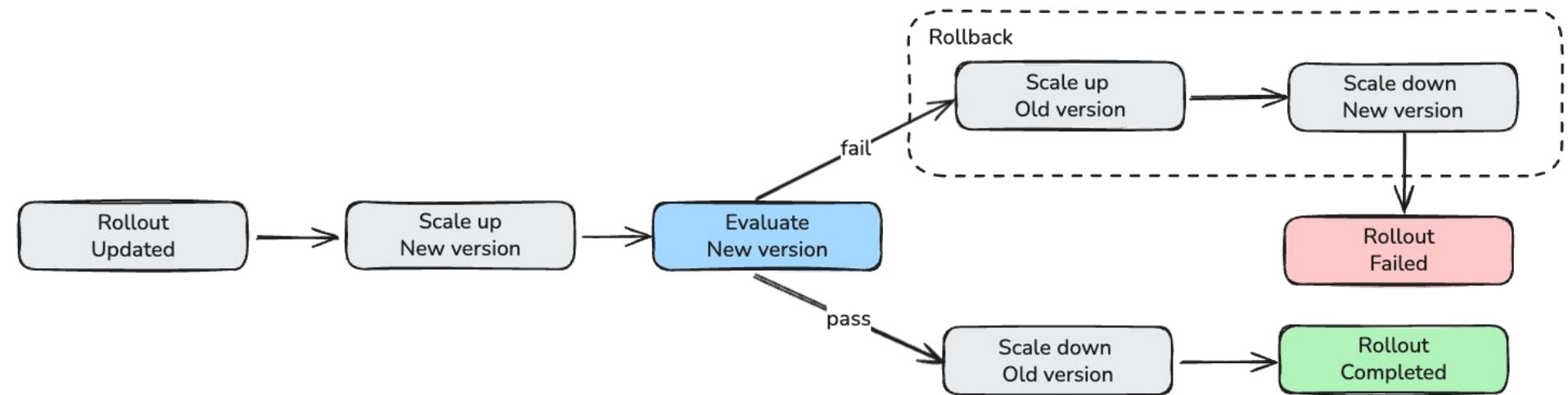
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Automatic Rollbacks



Extension Mechanisms



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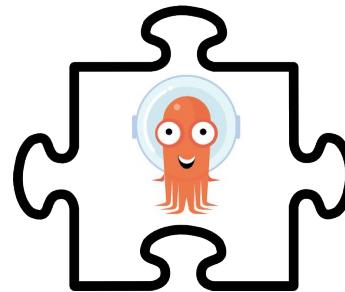
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Supported Traffic Managers



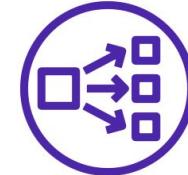
CONTOUR



Custom plugin



cilium

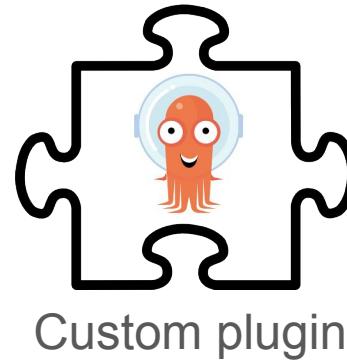


træfik
proxy



Gateway API

Supported Metric Providers



Custom Web call

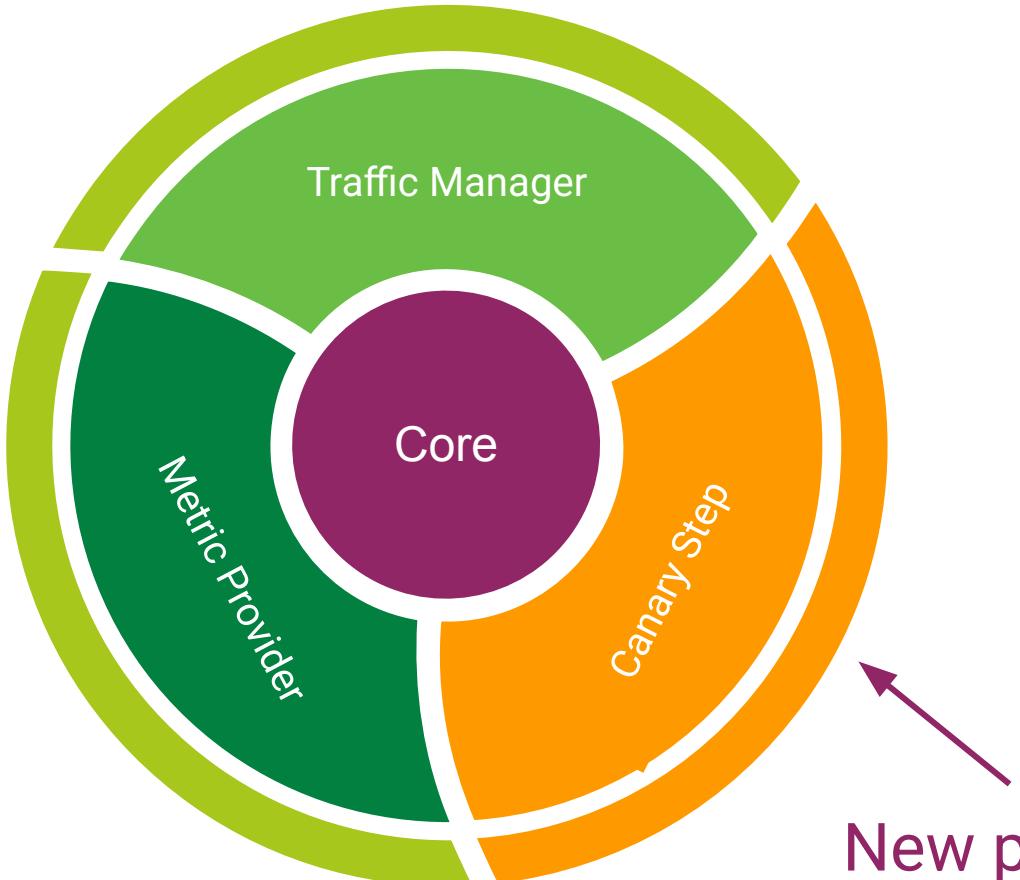


Amazon Cloudwatch



Custom Job





New plugin system

Canary Steps



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Existing Canary Steps

Built-in steps



```
strategy:
  canary:
    canaryService: rollout-canary-preview
    stableService: rollout-canary-active
    trafficRouting:
      traefik:
        weightedTraefikServiceName: traefik-service
    steps:
      - setWeight: 30
      - pause: {duration: 2m}
      - setWeight: 60
      - pause: {duration: 2m}
      - setWeight: 100
      - pause: {duration: 2m}
  analysis:
    templates:
      - templateName: simple-200-return
```



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Existing Canary Steps

- **SetWeight** → shift traffic to new version
- **SetCanaryScale** → launch new version but don't send traffic just yet
- **Pause** → stop the promotion process
- **Analysis** → run smoke tests or other checks
- **Experiment** → used for A/B testing
- **SetHeaderRoute** (Istio, GatewayAPI) → send to canary only specific connections
- **SetMirrorRoute** (Istio) → copy/clone existing traffic

Plugin Advantages

- ✓ Easy support for 3rd party solutions
- ✓ Different lifecycle for each plugin
- ✓ Smaller core codebase
- ✓ Increased core codebase stability
- ✓ Reduced maintenance for core developers



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Use Cases



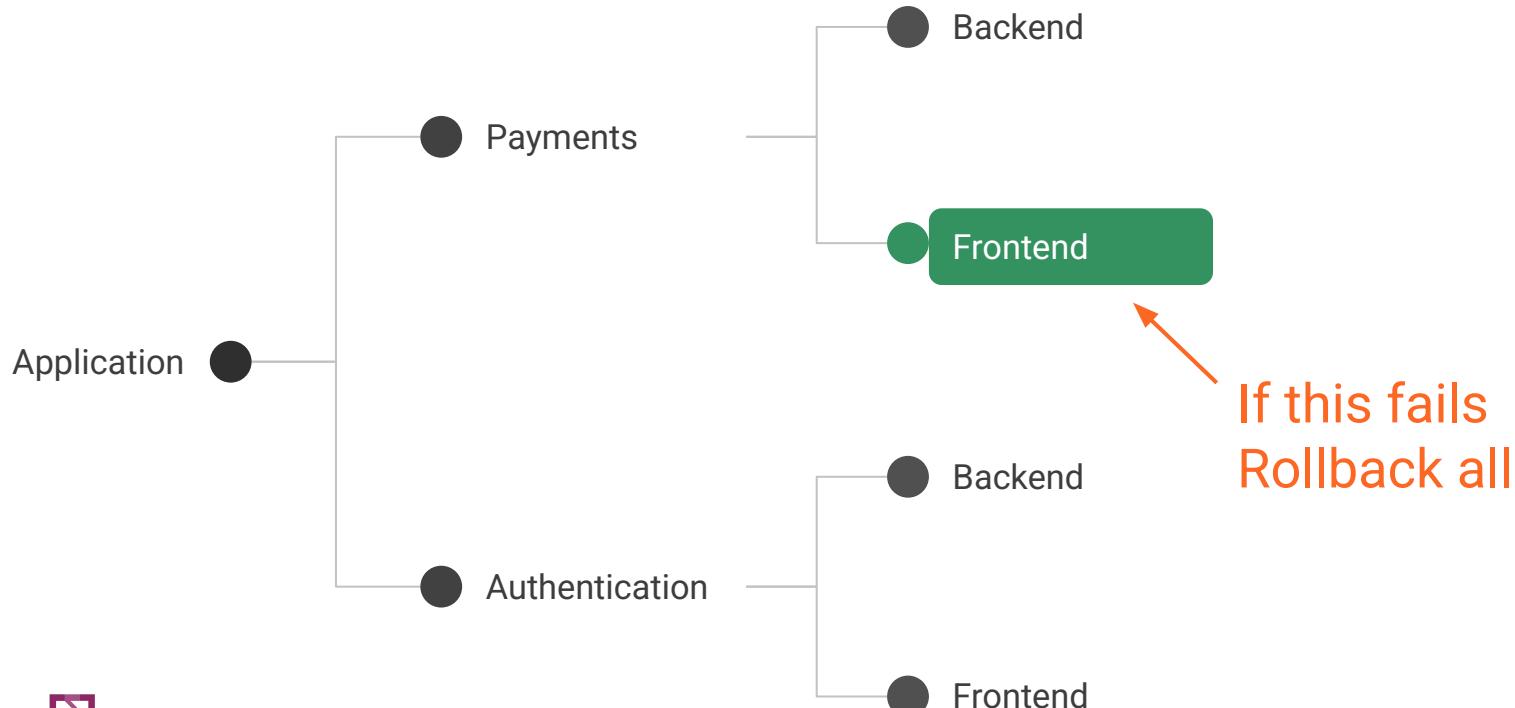
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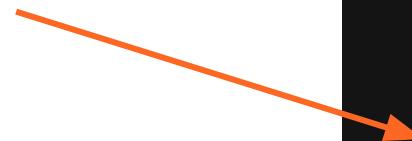
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Rollback Dependencies



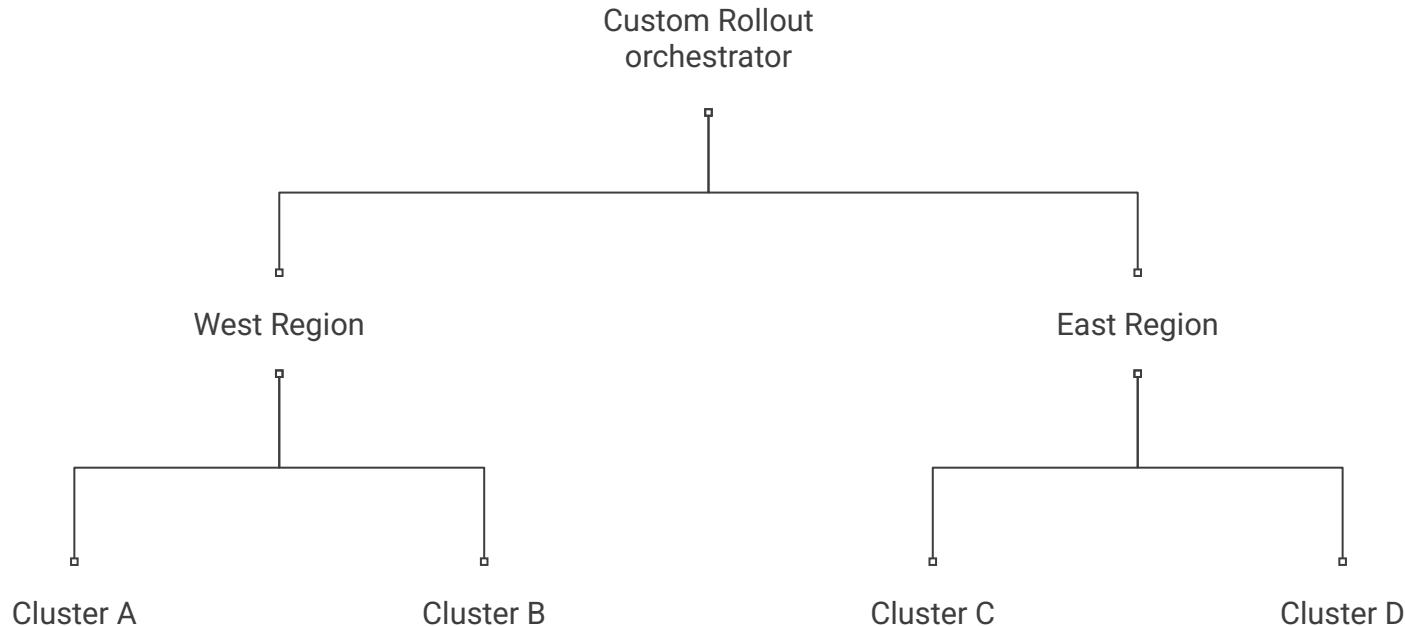
Rollback Dependencies*

Continue if all other services are ok.
Abort if any of them has failed.



```
strategy:  
  canary:  
    steps:  
      - setWeight: 20  
      - pause: {}  
      - setWeight: 50  
      - pause: {duration: 10}  
      - plugin:  
          name: check-others  
      - setWeight: 100
```

Multi-Cluster Rollouts



Multi-Cluster Rollouts*

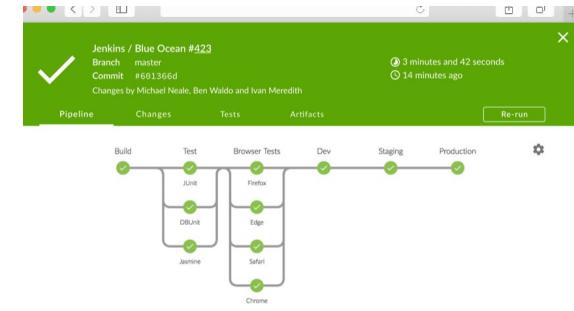
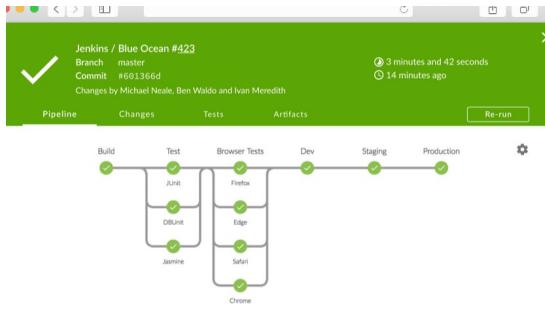
Make sure that
regions are at the
same canary
percentage



```
strategy:  
  canary:  
    steps:  
      - setWeight: 10  
      - pause: {duration: 5}  
      - plugin:  
          name: wait-for-regions  
      - setWeight: 50  
      - pause: {duration: 5}  
      - plugin:  
          name: wait-for-regions  
      - setWeight: 100  
      - plugin:  
          name: wait-for-regions
```

* This is a fictional example and not an existing plugin

Trigger Tests



Continuous
Integration

Canary
Deployment

E2E Testing

Run E2E/Smoke Tests*

Run e2e tests with
external CI



```
strategy:  
canary:  
  steps:  
    - setWeight: 10  
    - pause: {duration: 5}  
    - plugin:  
        name: run-e2e-tests  
    - setWeight: 80  
    - pause: {duration: 5}  
    - plugin:  
        name: run-smoke-tests  
    - setWeight: 100
```

* This is a fictional example and not an existing plugin

And so many more...

- Send a Slack/Teams notification
- Put a marker on Grafana dashboards
- Wait for approval in CRM
- Update a JIRA issue
- Start an incident
- Process a runbook
- Trigger any external API system



Configuring Step Plugins



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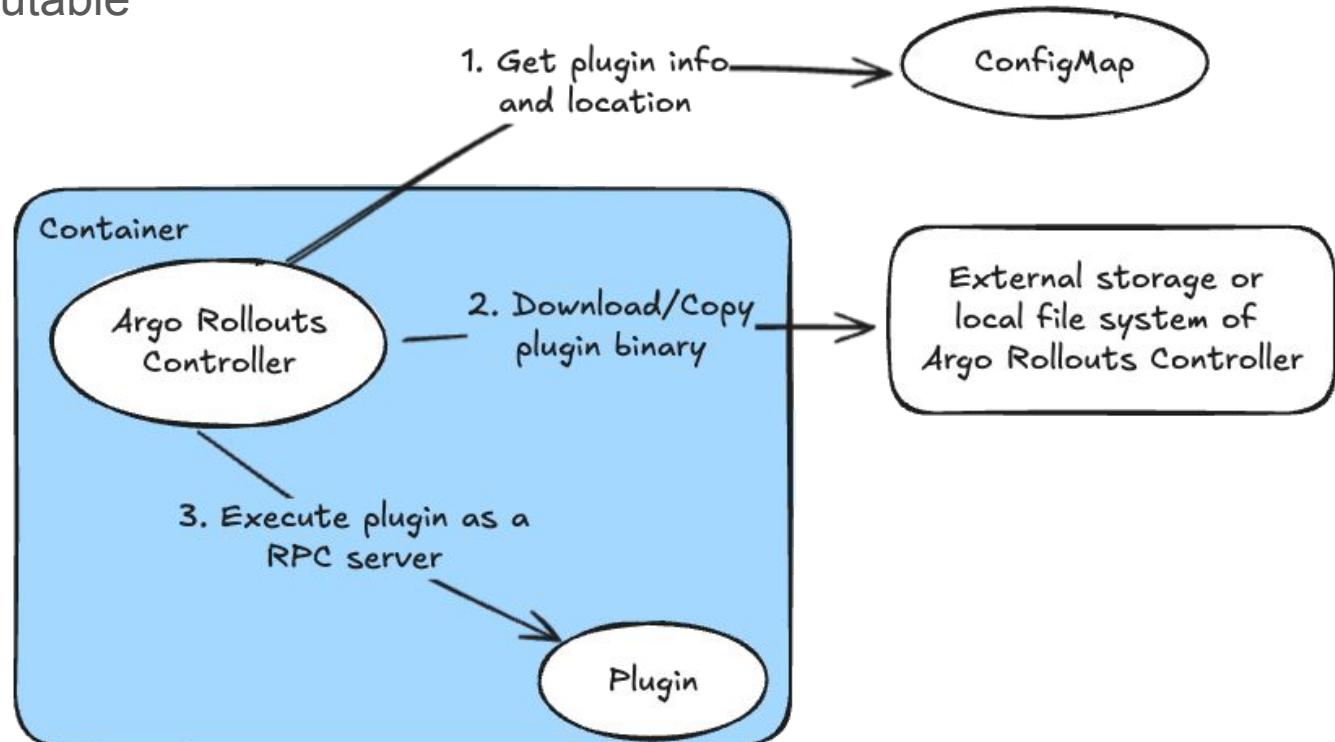


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Under the Hood

- Standalone executable
- Written in Go
- RPC server



Configure the Controller

- Can be mounted in the Pod
 - Init containers
 - Volume mount
 - Baked in container image
- Can be downloaded at startup
- Disabled plugin will be skipped during Rollout

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: argo-rollouts-config
data:
  stepPlugins: |-  
    - name: argoproj-labs/step-exec  
      location: file:///tmp/argo-rollouts/step-exec  
      disabled: false  
      args:  
        - --log-level  
        - debug  
    - name: argoproj-labs/my-other-step  
      location: https://artifacts.com/download/v1/linux-amd64  
      sha256: 08f588b1c799a37bbe8d0fc74cc1b1492dd70b2c
```

Canary Rollout Configuration

- Name must match what is configured in the controller
- Config is the plugin payload

```
apiVersion: argoproj.io/v1alpha1
kind: Rollout
metadata:
  name: example-plugin
spec:
  strategy:
    canary:
      steps:
        - plugin:
            name: argoproj-labs/step-exec
            config:
              command: echo "hello world"
        - plugin:
            name: argoproj-labs/my-other-step
            config:
              args: [ "value1", "value2" ]
              foo: bar
      setWeight: 50
```



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Write Your Own



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Step Plugin API

```
● ● ●

type StepPlugin interface {

    // Initializes the step plugin. Called once when the plugin is loaded.
    InitPlugin() error

    // Runs a step plugin for the StepContext
    Run(*Rollout, *StepContext) (StepResult, error)

    // Terminate stops an uncompleted operation started by the Run operation
    Terminate(*Rollout, *StepContext) (StepResult, error)

    // Abort reverts the actions performed during the Run operation
    Abort(*Rollout, *StepContext) (StepResult, error)

    // Type returns the type of the step plugin
    Type() string
}
```



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Getting Started

1. Watch the ArgoCon Talk (recording)
2. Implement the API
3. Build the binary
4. Write documentation on how to use it
5. Publish code/binary in a public repository
 - Possibility to host it in argoproj-labs
6. Add it to the [documentation](#)
7. Become a maintainer for your plugin



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Takeaways



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Takeaways

- Comprehensive plugin architecture
 - Metric providers, traffic routers and canary steps
- Multiple use cases are now enabled
 - Many existing open issues for Argo Rollouts can be solved with a custom plugin
 - Plugins allow third-party software to integrate with Argo Rollouts faster
- Minimal maintenance burden
 - Pluggable architecture reduce maintenance cost for the Argo Rollouts core codebase
- We need your contributions
 - As a community, we can build a rich plugin marketplace to enhance Argo Rollouts capabilities

Get involved today!

All Argo projects need
more maintainers.



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Thank You!



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More Resources

- Plugin system
 - <https://argo-rollouts.readthedocs.io/en/stable/plugins/>
- Step plugin Documentation
 - <https://argo-rollouts.readthedocs.io/en/stable/features/canary/plugins/>
- Example
 - <https://github.com/argoproj/argo-rollouts/tree/master/test/cmd/step-plugin-sample>
- Find us at CNCF slack #argo-rollouts channel
 - <https://communityinviter.com/apps/cloud-native/cncf>
- Check out the ArgoCon NA 2025 Presentation
 - TODO: add link (when recording is up)



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