SPINNAKER

DevelopIntelligence

ABOUT DEVELOPINTELLIGENCE

Our purpose…

We help organizations learn and adopt new technologies.

…Impacts you daily.

When you talk on the phone, watch a movie, connect with friends on social media, drive a car, fly on a plane, pay with a credit card, shop online, and order a latte with your mobile app, you are interacting with technology developed by one of our customers.

In 2018 alone...

Over 62,000,000 expert-led learning hours

Training to nearly 7,500 engineers

Programs in 30 countries

Over 100 active trainers, with an average of over two decades of experience each.

TECHNOLOGIES WE TEACH

AND MANY OTHER TRENDING TECHNOLOGIES

OUR PRACTITIONERS

WELCOME

Develop Intelligence

Mark Your Attendance:

- ➢ Go to the Course Calendar Invite
- ➢ Click on the Course Event Link
- ➢ Press Check-In

VIRTUAL TRAINING

What we want

...what we've got

VIRTUAL TRAINING EXPECTATIONS FOR ME

I pledge to:

- Make this as interesting and interactive as possible
- Ask questions in order to stimulate discussion
- Use whatever resources I have at hand to explain the material
- Try my best to manage verbal responses so that everyone who wants to speak can do so
- Use an on-screen timer for breaks so you know when to be back

VIRTUAL TRAINING EXPECTATIONS FOR YOU

- Arrive and Return on Time
- Mute unless speaking
- Use chat or ask questions verbally

AGENDA

AGENDA

Our *mandatory* goals for this class:

- Become familiar with Spinnaker and it's role
- Understand the UI of Spinnaker
- Understand an Application, Pipeline, and Stage
- Purpose of Spinnaker
- How to get Spinnaker within Salesforce
- Helm and Baking
- Spinnaker Expression Language

SOME OTHER ITEMS YOU'LL PICK UP

- Canary
- Understanding of Kubernetes
- How it works
- Debugging Tips

CONTINUOUS INTEGRATION AND DELIVERY

CONTINUOUS INTEGRATION

- Taking code and integrating and testing with every check in!
- Employs Continuous Integration (CI) Server
  - Jenkins
  - Bamboo
  - Cruise Control
  - Travis

EXTENDING CI WITH SPINNAKER

- Spinnaker takes content created in CI and deploys to staging and production
- Jenkins could do that to a point:
  - It does not manage multiple servers too well
  - Jenkins (not JenkinsX) doesn’t work that well with Kubernetes

CONTINUOUS INTEGRATION

- Tool that monitors version control of changes
- When a change is detected, the tool will automatically
  - compile
  - test
  - report
- Overtime reports on the overall code quality of your project

WHY CONTINUOUS INTEGRATION?

- Confidence that a release will perform
- Fully automated testing
- Ability to have a "one click" deploy
- Repeated and reliable
- Enhances Collaboration Among Developers
  - Builds are no longer secret
  - No longer require the use of deployment expert
- Manual building is fairly stupid
- Process seen in action! You know if it works or doesn’t

PURPOSE OF A CI SERVER

- Configured to watch your version control system
- Check out or update your source code every time a change is made
- Run the automated build process
- Store the binaries where they are accessible to the whole team
- Reducing risk by providing faster feedback
- Identify and fix integration and regression issues faster

HOW DOES CI IMPROVE SOFTWARE QUALITY

- Everyone has information on the build at every single moment
- Developers are aware of the constant change in their project
- Notifications to all Developers when the build fails

PROVIDE VALUE TO THE END USER FASTER

- Ensures that software is build, tested, and maintained regularly
- There is always a deployment of some kind
- Deployments are no longer magical mystery events that happen every month

EMPOWERING TEAMS

- Continuous Integration can deploy onto the servers themselves.
- Power to real time view results
- Expand the role of the developer include operations.

REDUCING ERRORS

- Ensures the correct version, configuration, database schema, etc. are applied the same way every time through automation
- Staging areas are equivalent to production areas
- Less surprises.
- No more hidden configuration that we don’t know about at production time

LOWERS STRESS

- A Release becomes commonplace without the typical stress
- No weekend battles
- Less embarrassing releases
- Rollback versions easily to a well known build

DEPLOYMENT FLEXIBILITY

- Instantiate a new environment or configuration by making a few changes to the automated delivery system.
- Create multiple version of environments

PRACTICE MAKES PERFECT

- Final deployment into production is being rehearsed every single time the software is deployed to any target environments.
- Overtime deployment becomes standard practice
- Check in frequently
- Don’t check in broken code
- Don’t check in untested code
- Don’t check in when the build is broken
- Don’t go home after checking in until the system builds
- Every Check in is a potential release!

WILL IT HAPPEN OVERNIGHT?

- It will take time for all those invested
- Testing will have to be commonplace
- Commitments in code will have to be small
- Behaviors and rituals will need to change

HOW DOES CI HELP RELEASE ON TIME?

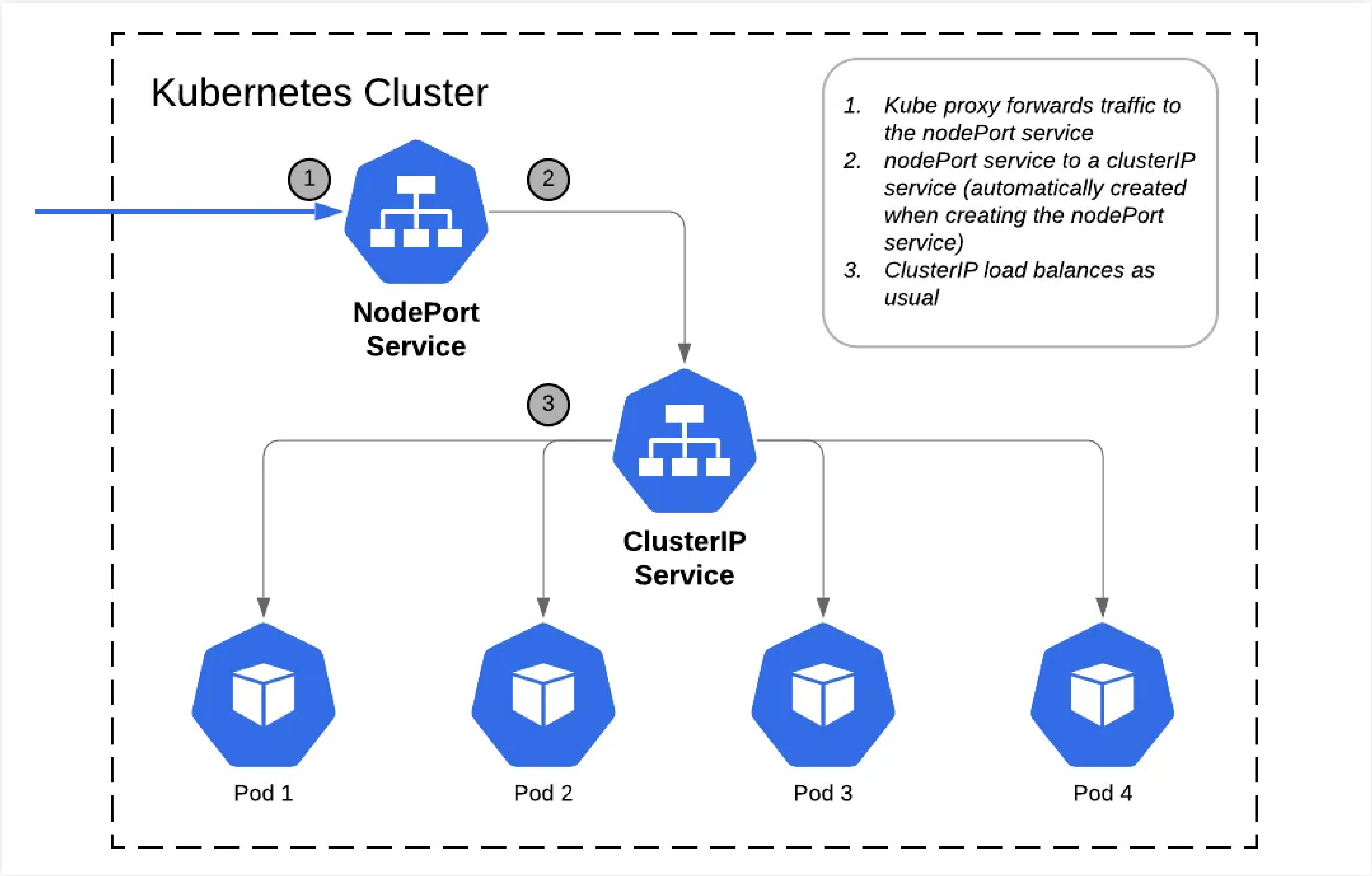
- Automation, Automation, Automation, Automation
- Humans are slow, why not let computers do the work?
- Problems no longer are debt: If anything fails it must be fixed immediately
- Bugs, along with testing, are squashed oftentimes permanently!
- Lessens the fear of "integration hell"
- Lessens the fear of production deployment!

FUTURE IS HERE

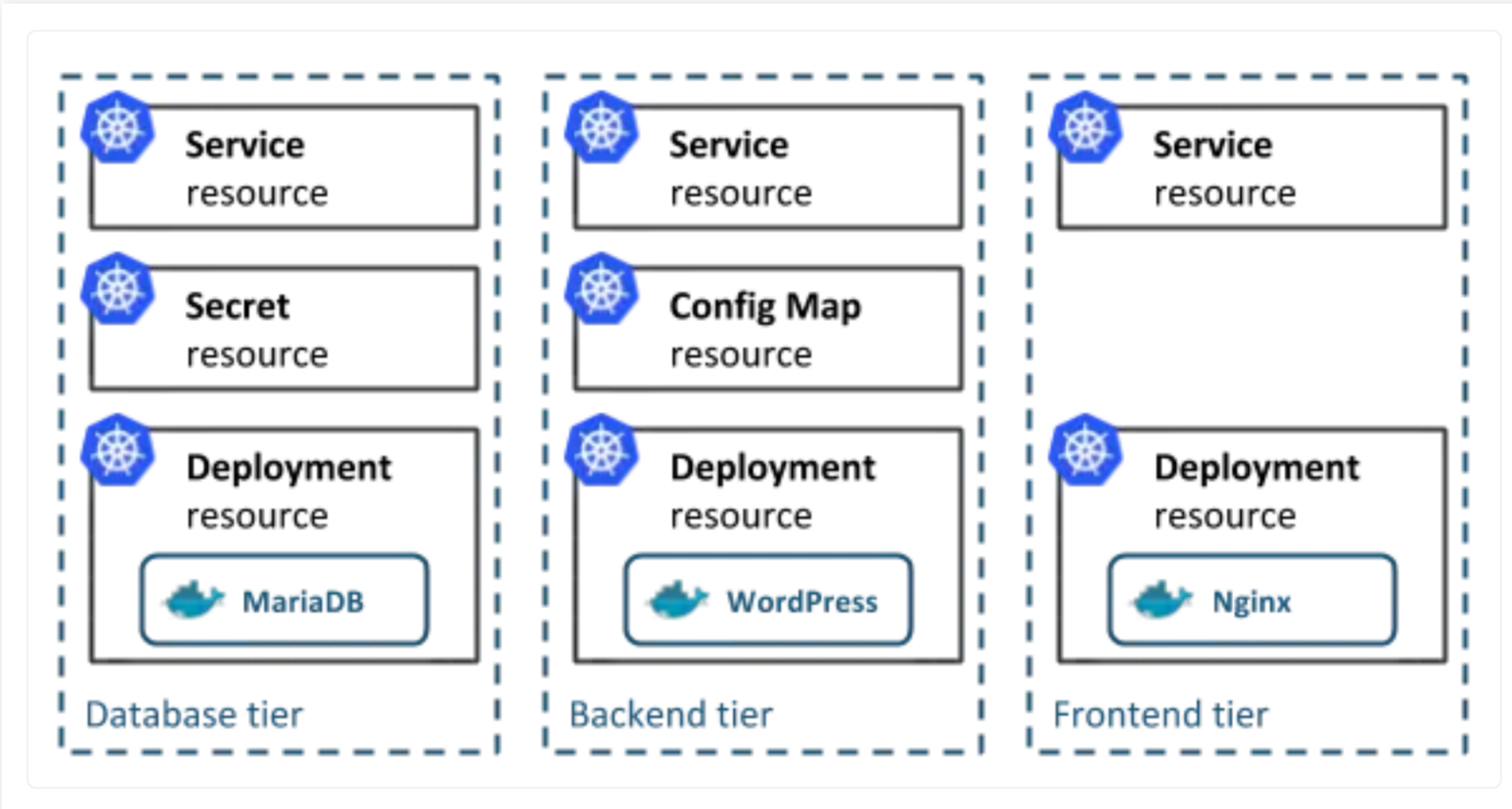
- Spinnaker, Jenkins, and Kubernetes allows for IaC (Infrastructure as Code)
- Continuous Integration is committed as code, using `Jenkinsfile`
- Kuberenetes `replicaSet`, `deployment`, `ingress`, etc are all `yaml` files
- Spinnaker can use these files to deploy fleet of systems

KUBERNETES

KUBERNETES NODE PORT AND CLUSTER IP



3-TIER ARCHITECTURE



REVIEW OF RESOURCES

POD

- Group of one or more containers (such as Docker containers)
- Shared storage/network
- Specification for how to run the containers

SERVICE

- Service is an abstraction which defines a logical set of Pods and a policy by which to access them
- Sometimes this pattern is called a micro-service).
- The set of Pods targeted by a Service is usually determined by a selector

DEPLOYMENT

- Provides declarative updates for Pods and ReplicaSets.
- Describe a desired state in a Deployment
- Deployment Controller changes the actual state to the desired state at a controlled rate.
- You can define Deployments to create new ReplicaSets,
- Or remove existing Deployments and adopt all their resources with new Deployment

CONFIGMAP

- Bind to your Pods' containers and system components at runtime
  - Configuration files
  - Command-line arguments
  - Environment variables
  - Port numbers
  - Other configuration artifacts
- Enable you to separate your configurations from your Pods and components, making workloads portable.

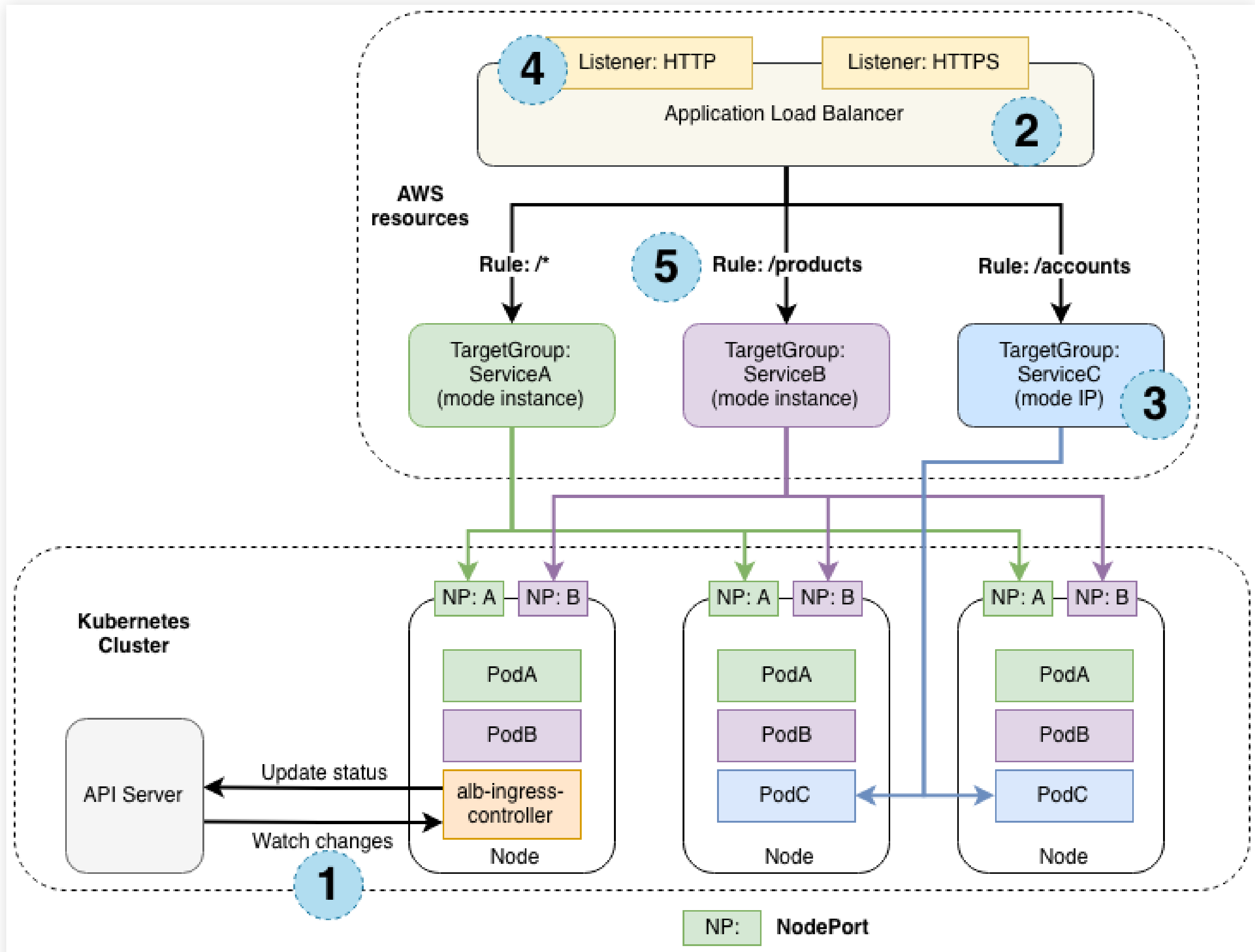
SERVICEACCOUNT

- Service accounts allow pods to communicate to the Kubernetes API.
- They are bound to specific namespaces, and created automatically by the API server or manually through API calls.
- Service accounts are tied to a set of credentials

INGRESS

- Object defines rules for routing HTTP(S) traffic to applications running in a cluster.
- An Ingress object is associated with one or more Service objects
- Each Service is associated with a set of Pods

KUBERNETES AND INGRESS



OVERVIEW

WHAT IS SPINNAKER?

- Open Source, Multicloud Platform
- Release Software at high velocity and confidence
- Extends where Jenkins CI leaves off
- Manages Staging and Deployment
- Makes use of containers
- Provides Baking Ability and Canary Ability

APPLICATIONS

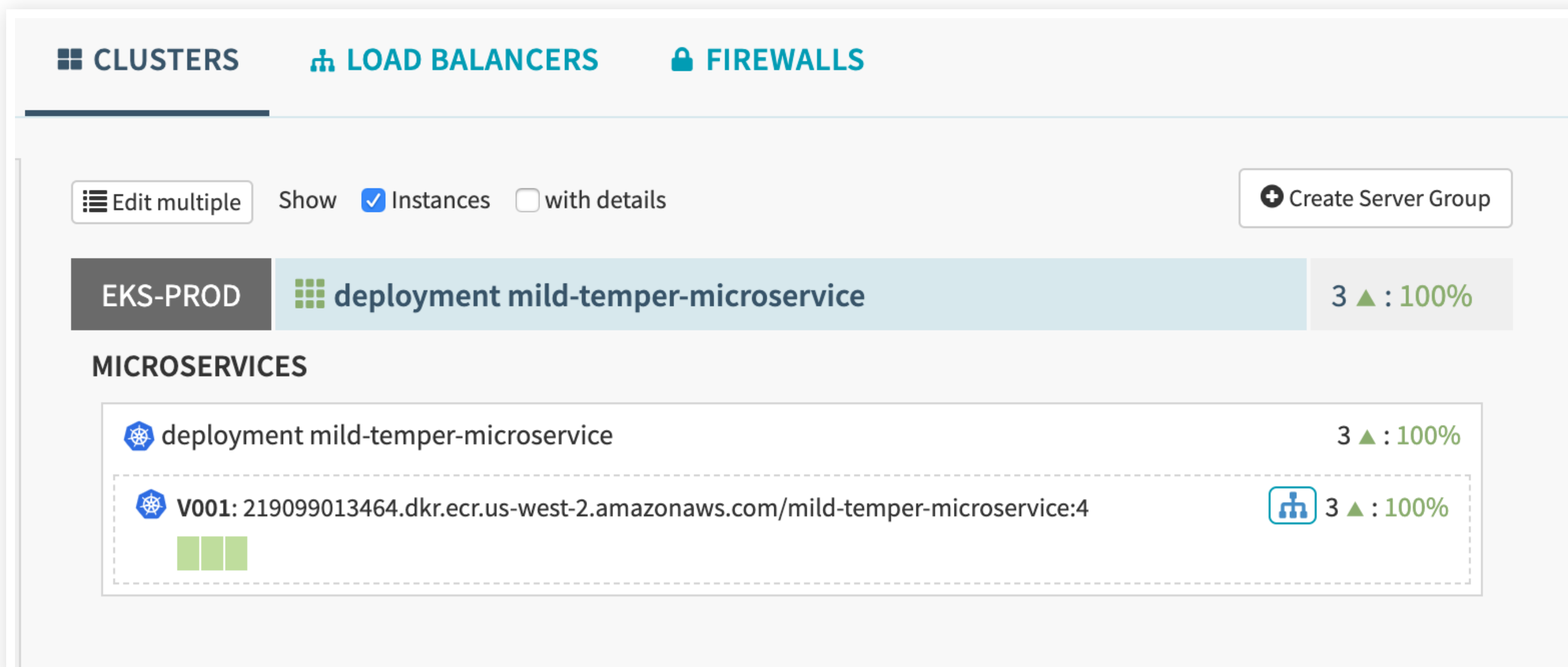
- Represents the service which you are going to deploy using Spinnaker
- It is the center of your universe in regards to your application
- Contains all configuration for that service, and all the infrastructure on which it will run
- You will typically create a different application for each service

INSIDE THE APPLICATION

- Firewalls
- Load Balancers
- Clusters of Services or Deployments
- Server Groups
- Canary Configurations

CLUSTERS

- Logical Groups of Server Groups
- Does not map to a Kubernetes Cluster
- It *does* map to a Kubernetes *Deployment*



Source: https://www.spinnaker.io/reference/providers/kubernetes/#cluster

SERVER GROUP

- Collection of Instances
- With Basic Configuration Settings
    - Number of Instances
    - Autoscaling Policies
    - Their Metadata

DEPLOYMENT HIGHLIGHTED

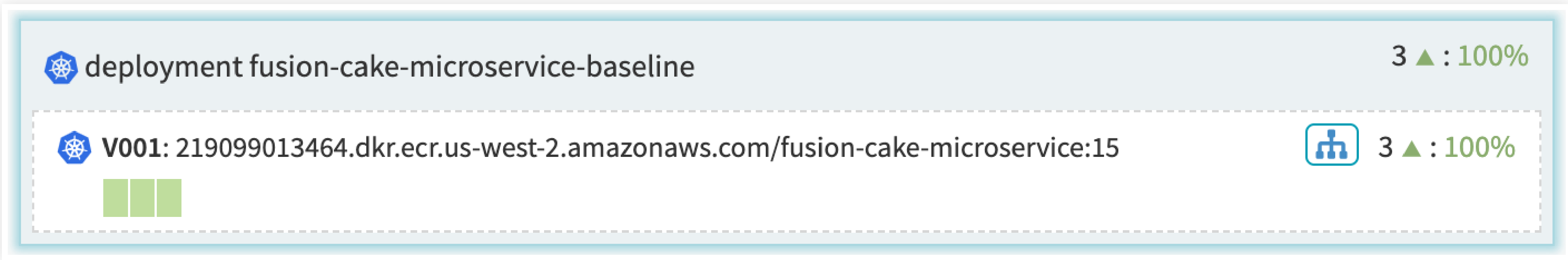


Figure 1. The Deployment is highlighted

REPLICA SET HIGHLIGHTED

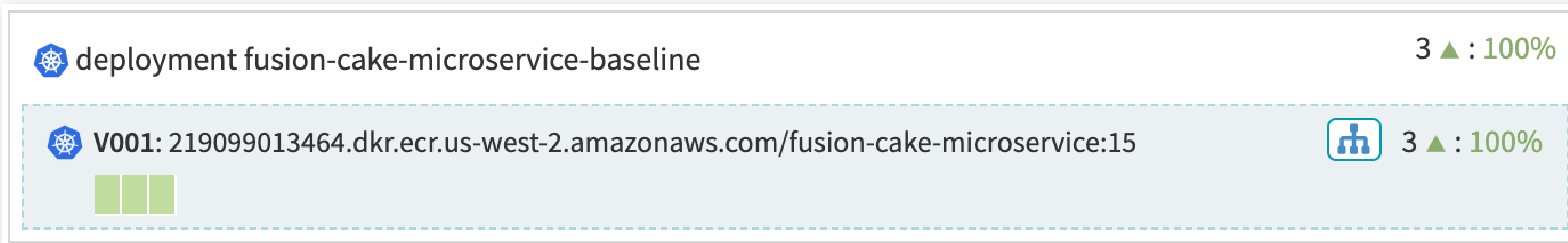
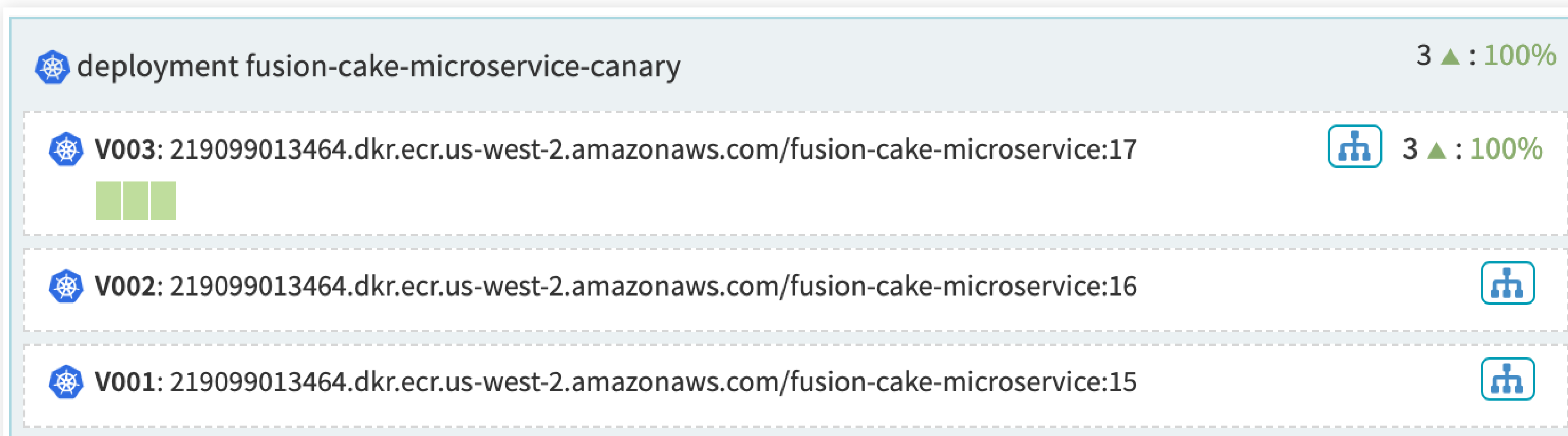


Figure 2. The Replica Set is highlighted

REPLICA SET HISTORY

- With deployments history of the deployments are maintained
- The following shows a history
- Deployments can be:
  - *rolled back*
  - *deleted*
  - *restarted*
  - *scaled*

REPLICA SET HISTORY



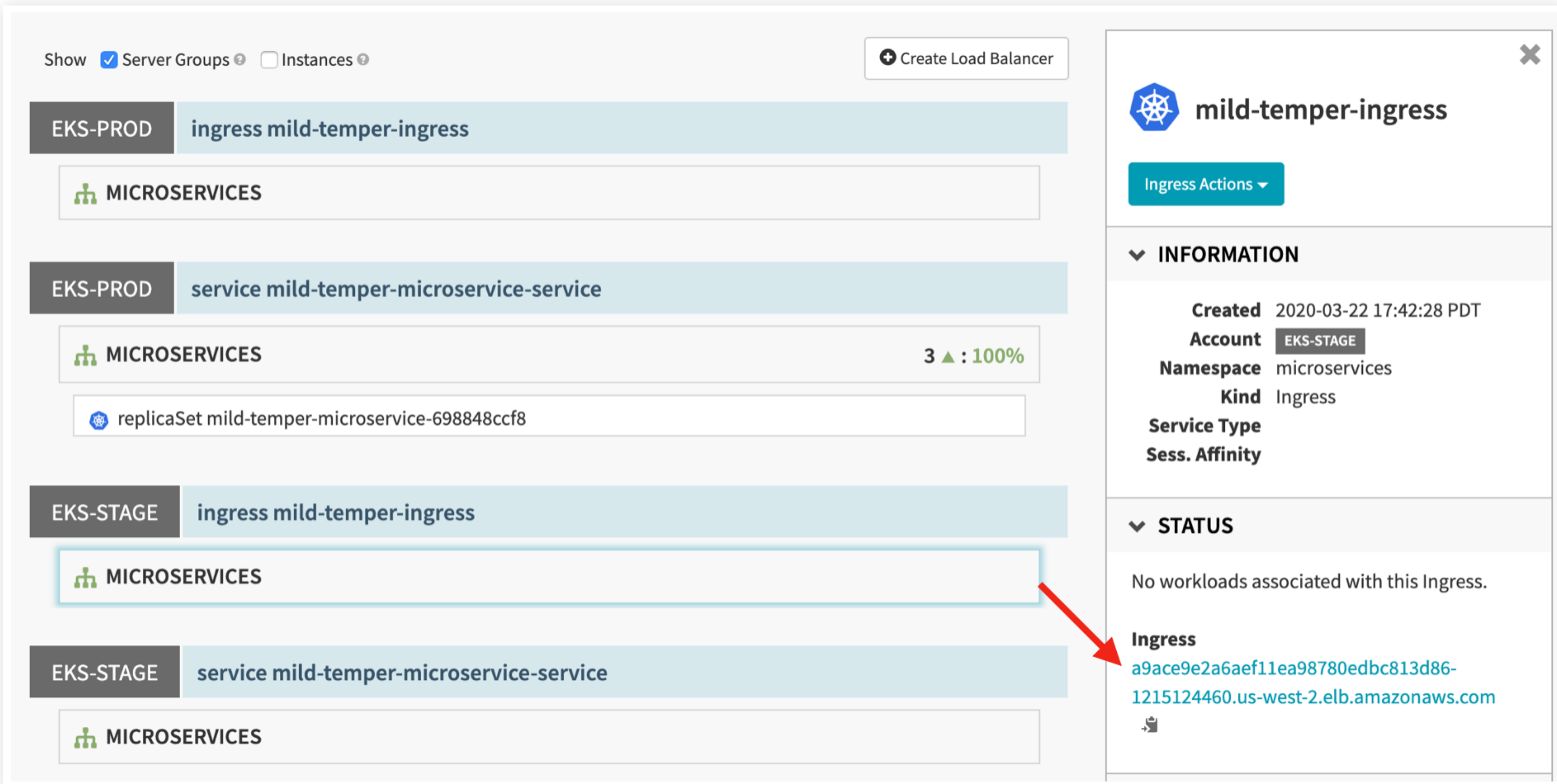
LOAD BALANCERS

- Load Balancer is associated with:
  - An ingress protocol
  - Kubernetes Service
- It balances traffic among instances in its Server Groups.
- You can enable health checks for a load balancer
- Flexibility to define health criteria and specify the health check endpoint.

LOAD BALANCING

LOAD BALANCING WITH INGRESS

The following shows the ingress protocol

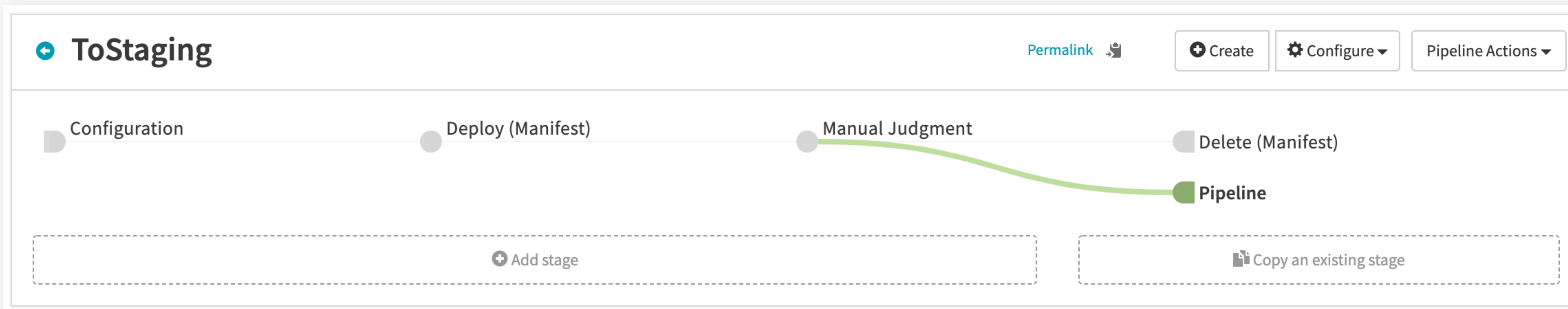


FIREWALLS

- Firewall defines network traffic access
- Firewall rules defined by an IP range (CIDR) along with a communication protocol (e.g., TCP) and port range
- It is associated with Kubernetes Network Policies

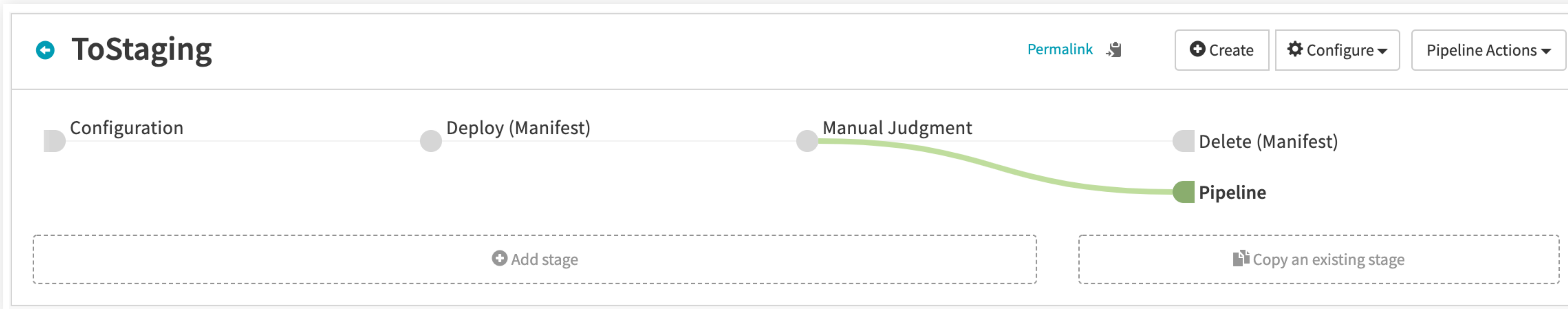
Source: https://www.spinnaker.io/reference/providers/kubernetes-v2/#networkpolicies

PIPELINE



- Key deployment management construct in Spinnaker
- Manage deployments in a consistent, repeatable and safe way.
- Consists of a sequence of actions, known as *stages*
- Possibility to pass parameters from stage to stage along the pipeline using artifacts

PIPELINES CONTINUED



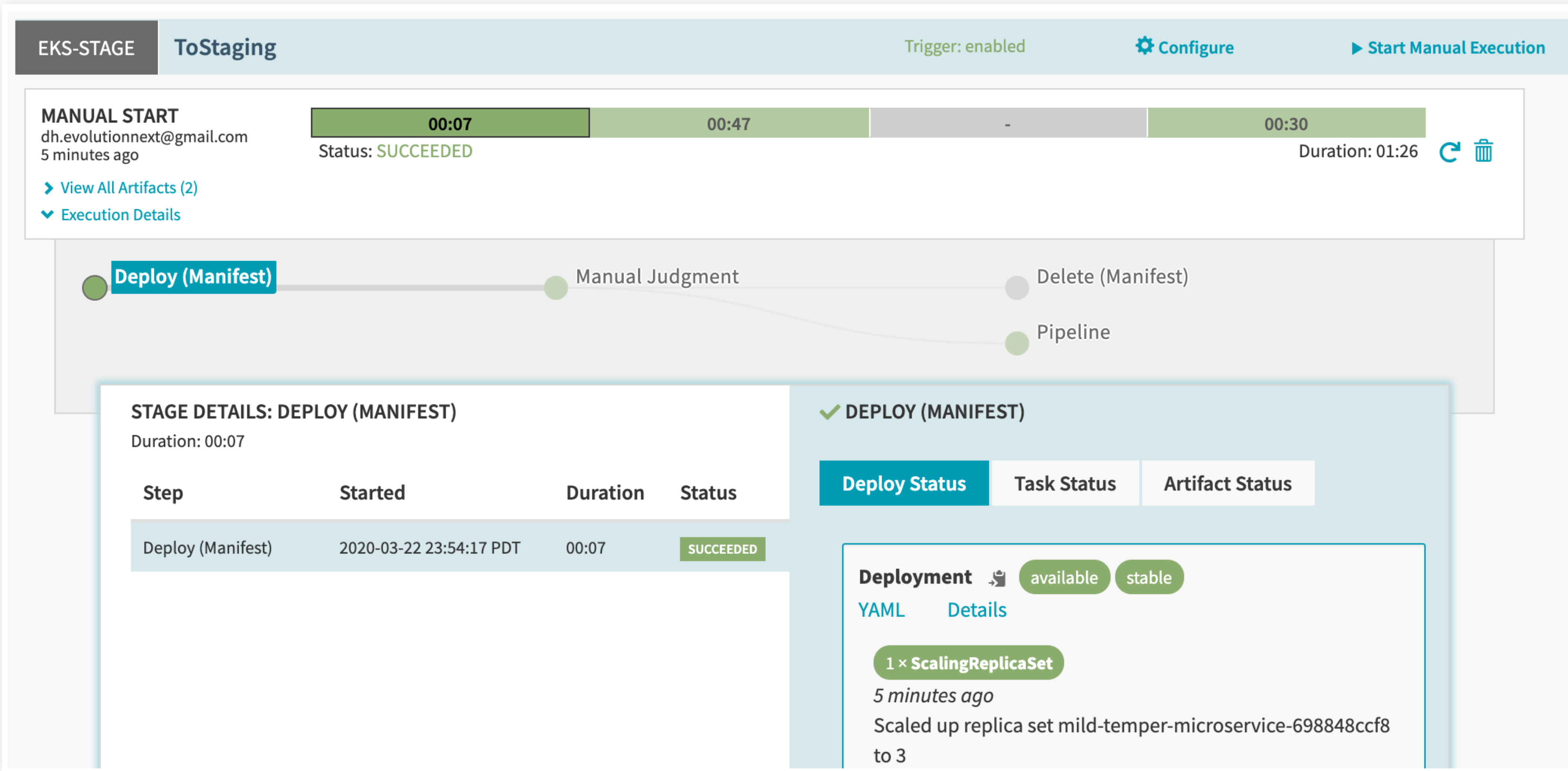
- Includes *scaffolding functions* (manual judgment, wait, run Jenkins job) that together precisely defines your runbook for managing your deployments
- Started manually or triggered by an event:
  - `git push`
  - Docker image upload
  - CRON Schedule
- You can emit notifications

PIPELINE ANATOMY

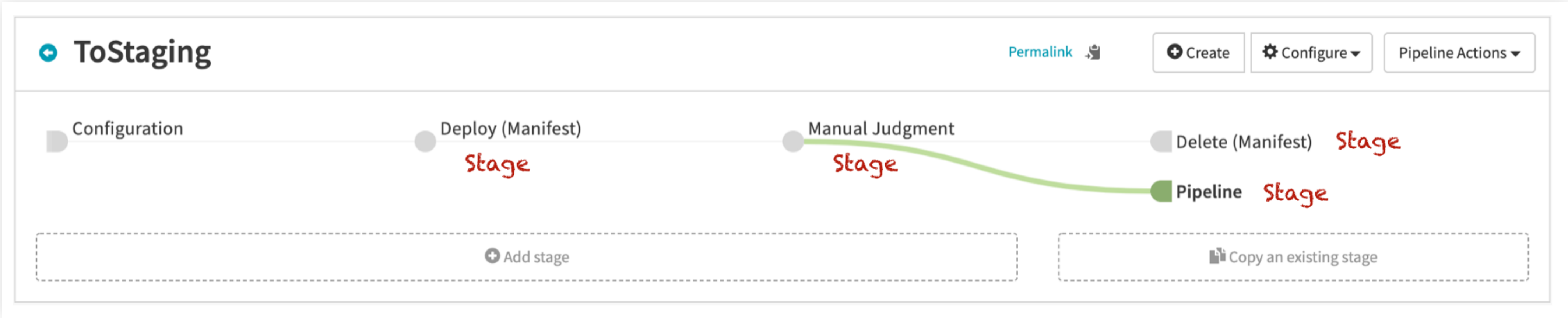
- Define your sequence of stages at the top.
- Spinnaker supports parallel paths of stages, as well as the ability to specify whether multiple instances of a pipeline can be run at once.
- Specify details for a given stage in the sections underneath the pipeline.

VIEWING PIPELINE EXECUTION HISTORY

- Serves as a means to introspect details of each deployment operation
- An effective audit log of enforced processes/policies on how you make changes to your deployed applications landscape.



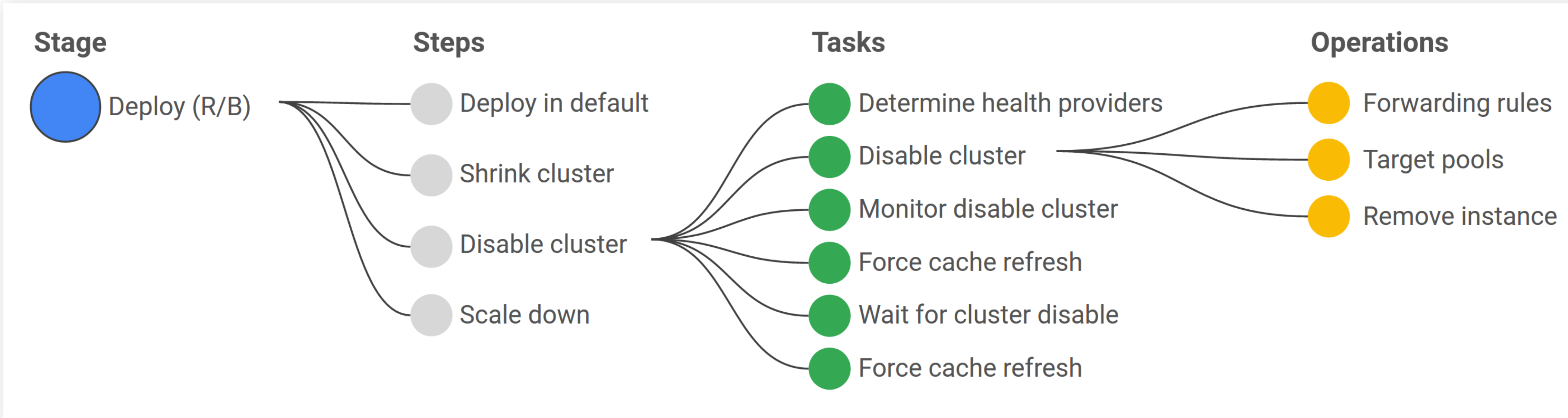
STAGE



- Atomic building block for a pipeline
- Sequenced to form a pipeline
- Spinnaker provides multiple stages:
  - Deploy
  - Resize
  - Disable
  - Manual Judgment

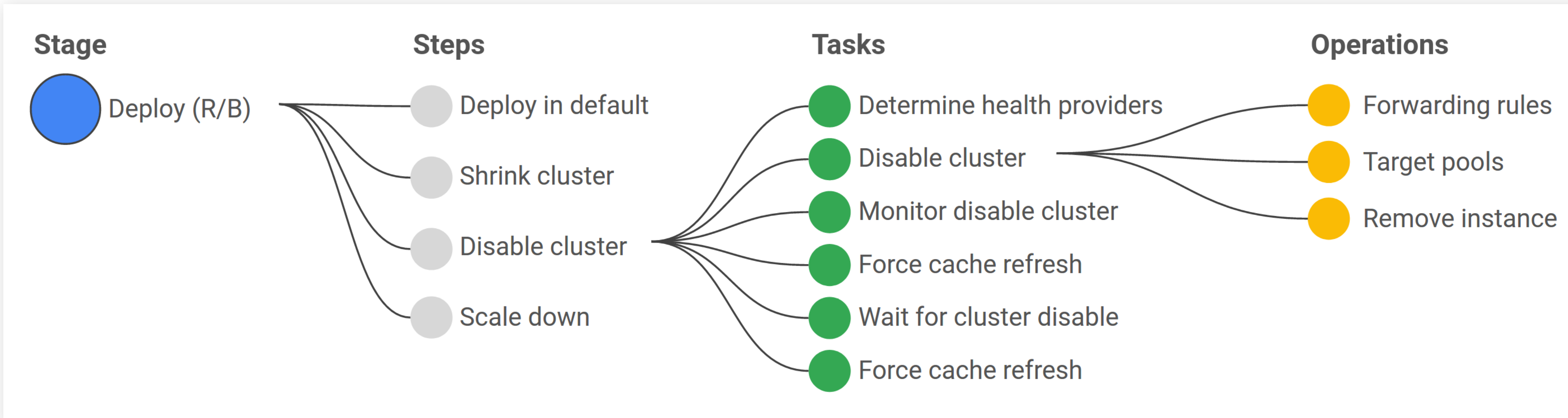
https://www.spinnaker.io/reference/pipeline/stages/

ONE STAGE, MULTIPLE STEPS; ONE STEP, MULTIPLE ACTIONS



- Automation does not end with orchestrating only the high-level steps of your release process
- Each of these operational steps often corresponds to a sequence of calls to the cloud platform
- Each of which needs to be remediated in failure scenarios
- The red/black Deploy stage is an example of how Spinnaker fully supports this notion

BREAKING DOWN THE STAGE



- The Red/Black Deploy stage in Spinnaker actually entails a sequence of steps
- Each given step is actually a set of tasks that need polling, remediation to ensure requisite state is reached prior to proceeding
- A given task often entails multiple API calls to the specific cloud platform, cognizant of expected response codes and remediating actions in failure

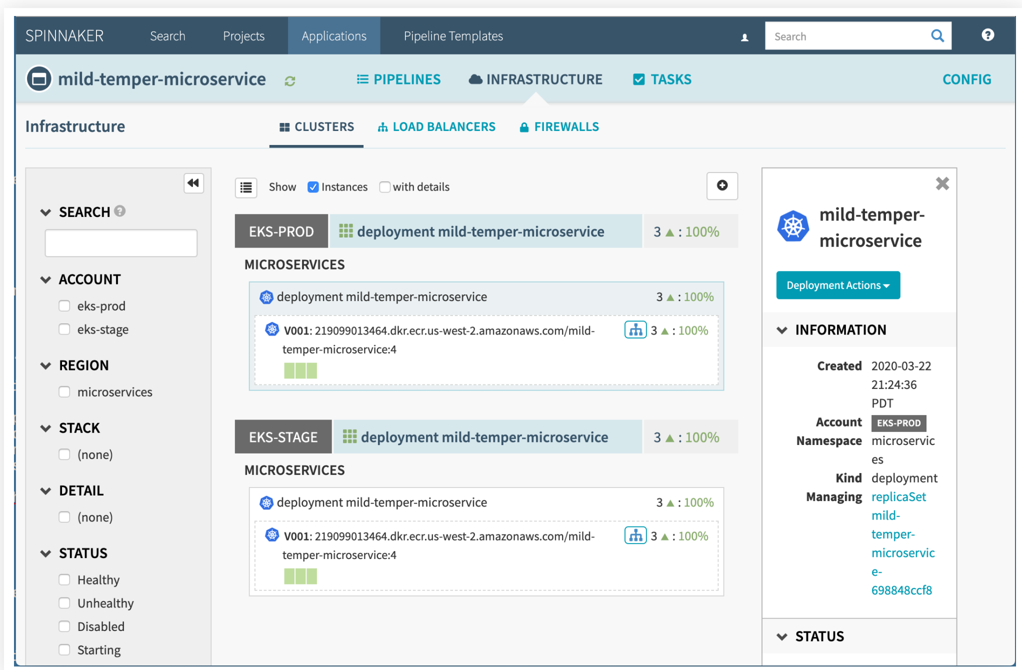
CLUSTERS

Source: https://www.spinnaker.io/concepts/clusters/

CLUSTER DEFINITION

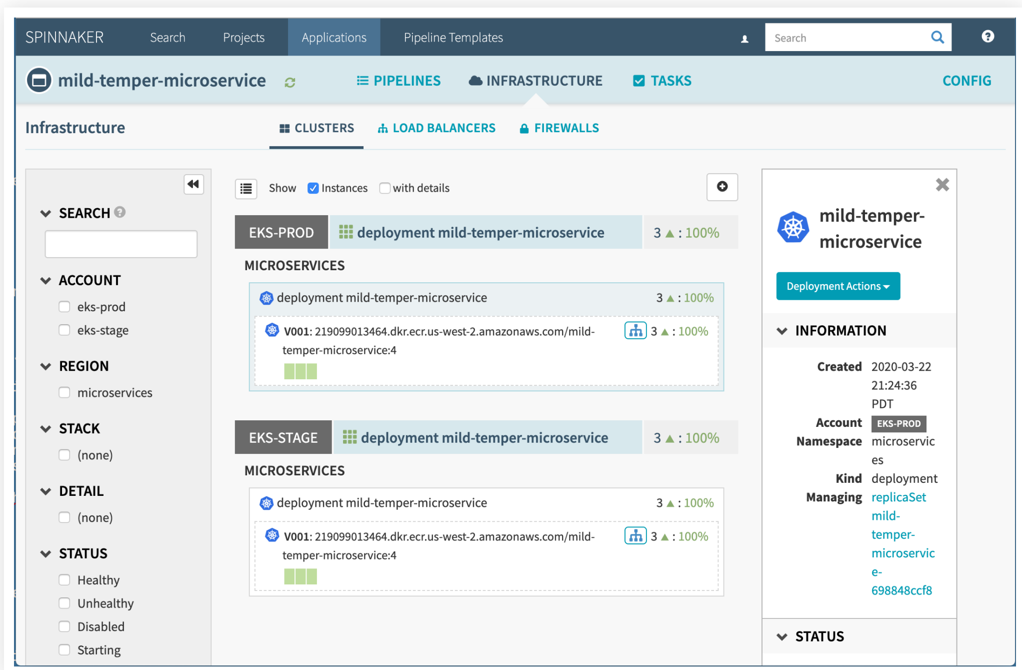
- Spinnaker acts as a single pane of glass from which to manage your global deployments across multiple clouds!
- Contains information related to:
  - Health and status of running environments
  - Metadata around deployments and individual instances
- Also ability to perform ad-hoc actions you can perform on the resources you see such:
  - resize
  - clone
  - disable
  - roll back

LEFT PANE



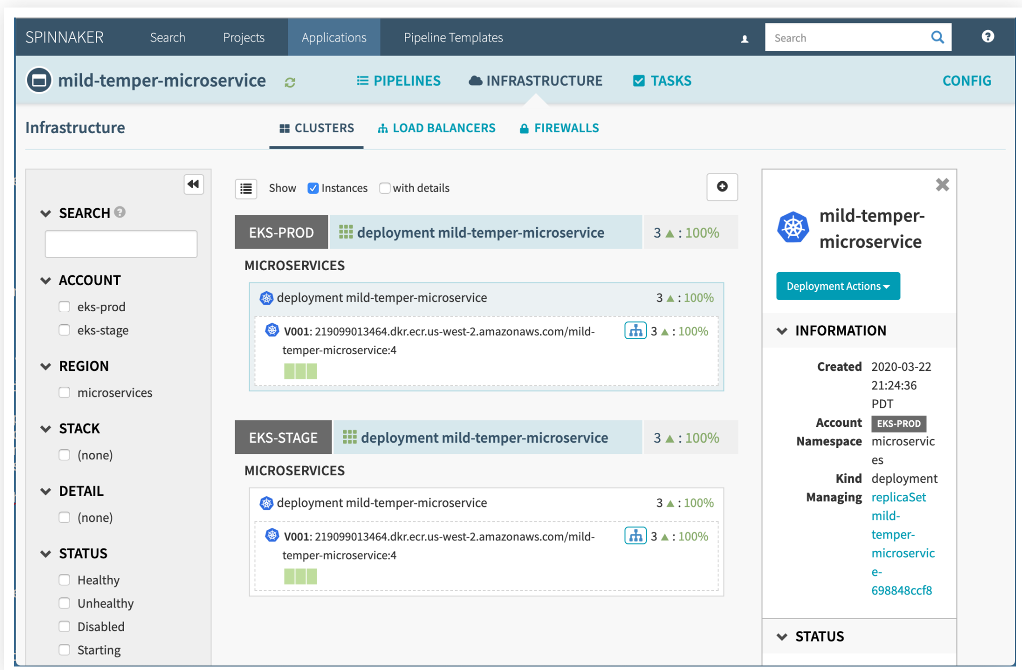
- Filters for viewing your deployed services.
- Search by string match, or narrow by specific attributes of your services,such as:
  - Cloud platform
  - Region
  - Designated environments and stacks.

MAIN PANE



- Lists the deployed services.
- Green chiclets are individual instances (pods)
- All grouped into Server Groups (a particular deployment)

RIGHT PANE



- Provides details for the item currently selected in the center section
- For each item, Spinnaker provides details related to both application-level concerns (Jenkins job details) as well as infrastructure-level concerns (machine type, auto-scaling policies).

SPINNAKER PROCESS

1. Create an Application
    - One Application per Microservice
2. Define your Infrastructure
    - Define infrastructure for each application
    - Pipelines deploy services to the server groups you define
    - NOTE: Not necessary since you can define infrastructure from pipeline
3. Create a Pipeline
    - Create all the pipelines needed to deploy the service or services covered by the application
4. Run your Pipeline
    - Automatic
    - Triggered

CLOUD PROVIDERS

OVERVIEW

- A Cloud Provider is an interface to a set of virtual resources that Spinnaker has control over.
- Typically, this is a IaaS provider, like AWS, or GCP
- It can also be a PaaS, like App Engine, or a container Orchestrator, like Kubernetes.
- The cloud provider is central to everything you do in Spinnaker.
  - It’s where you deploy your Server Groups, the source of your deployable artifacts
  - and the subject of automation via Pipelines.

ACCOUNTS

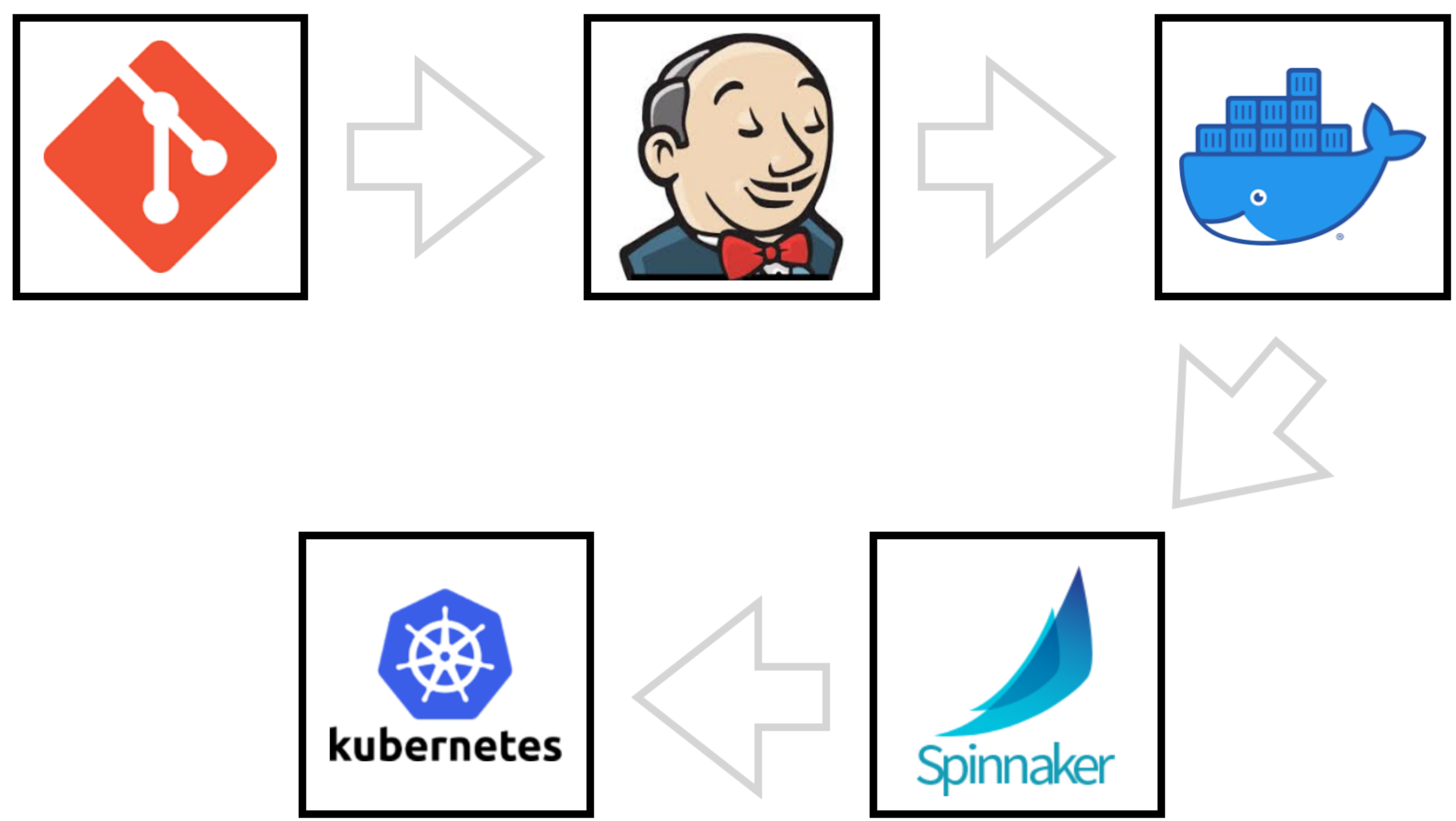
- An Account is a named credential Spinnaker uses to authenticate against a cloud provider.
- Each provider has slightly different requirements for what format credentials can be in, and what permissions they need to have afforded to them.
- Each Supported Provider has their own way to create an account and register the credentials with **Halyard**.
- Keep in mind that every Provider can have as many accounts added as desired
  - This will allow you to keep your environments (e.g. staging vs. prod):
    - Separate
    - Restrict access to sets of resources using Spinnaker's Authorization mechanisms

CLOUD PROVIDERS SUPPORTED

- App Engine
- Amazon Web Services
- Azure
- Cloud Foundry
- DC/OS
- Docker v2 Registry (Note: This only acts as a source of images, and does not include support for deploying Docker images)
- Google Compute Engine
- Kubernetes
- Oracle

DEPLOYING MICROSERVICES

THE PROCESS



THE STEPS

1. Setup a repository for a microservice
2. Setup a CI application to run unit integration tests
3. Create an Spinnaker Application
4. Define the Infrastructure
5. Create a Pipeline
6. Run your Pipeline

Source: https://www.spinnaker.io/guides/user/get-started/

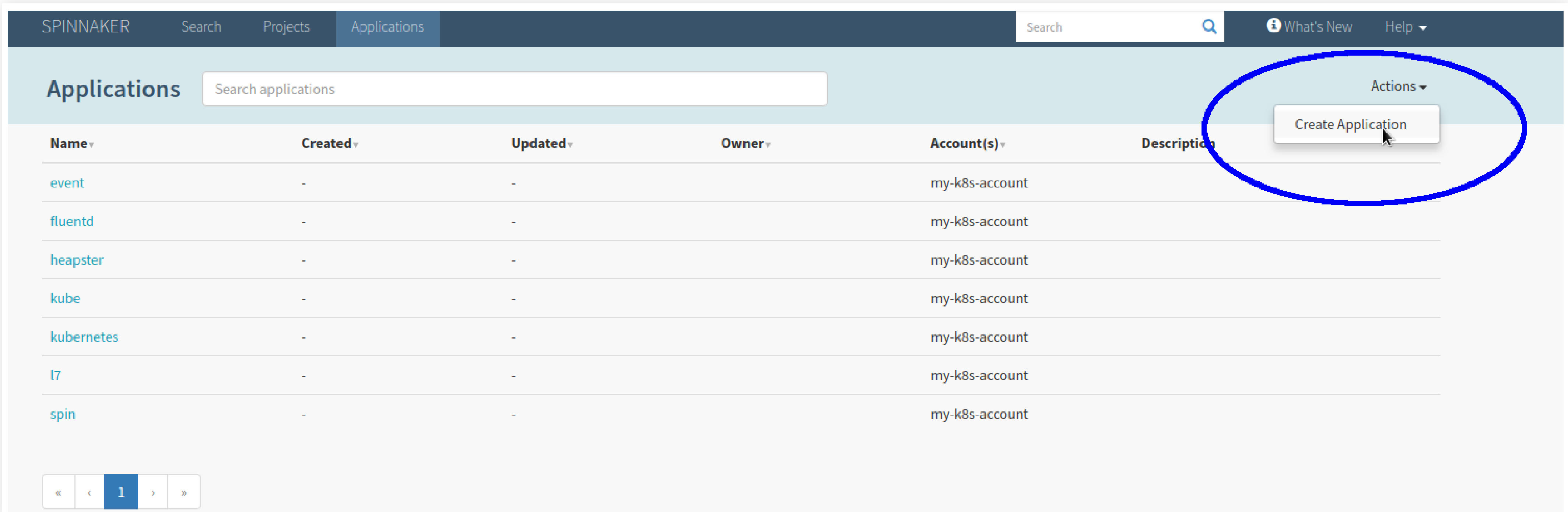
CREATE AN APPLICATION

- One Application per Microservice
- This is the root where we will begin
- Note that your application configuration affects what you can do with Spinnaker—you can enable or disable some Spinnaker features.

ABOUT AN APPLICATION

- An application in Spinnaker is a construct that represents some service that you are going to deploy (typically a microservice).
- It includes:
  - The pipelines that process the service through to deployment in production
  - The infrastructure on which the service is run:
    - Clusters
    - Server Groups
    - Firewalls
    - Load Balancers
    - Canary Configs

CREATING THE APPLICATION



- You can’t create a deployment pipeline unless you have an application to put it in.
- Click on the **Applications** tab
- Click on Create Application

ENTERING APPLICATION ATTRIBUTES

- Provide the attributes for the new Application
- Click **Create**

MORE APPLICATION ATTRIBUTES

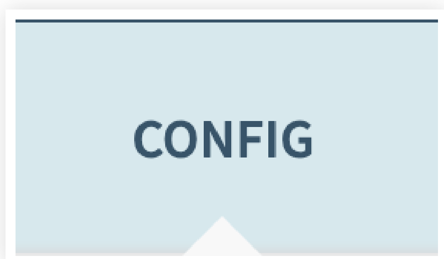
Field	Required	Description
`Name`	Yes	A unique name to identify this application.
`Owner Email`	Yes	The email address of the owner of this application, within your installation of Spinnaker.
`Repo type`	No	The platform hosting the code repository for this application. Stash, Bitbucket, or GitHub.
`Description`	No	Use this text field to describe the application, if necessary.
`Consider only cloud provider health`	Bool, default=no	If enabled, instance status as reported by the cloud provider is considered sufficient to determine task completion. When disabled, tasks need health status reported by some other health provider (load balancer, discovery service).

APPLICATION ATTRIBUTES CONTINUED

Field	Required	Description
`Show health override option`	Bool, default=no	If enabled, users can toggle previous option per task.
`Instance port`	No	This field is used to generate links from Spinnaker instance details to a running instance. The instance port can be used or overridden for specific links configured for your application (via the Config screen).
`Enable restarting running pipelines`	Bool, default=no	If enabled, users can restart pipeline stages while a pipeline is still running. This behavior is not recommended.

EDITING THE CONFIGURATION

If you need to go back and edit your configuration you can hit the config button on the upper right hand side



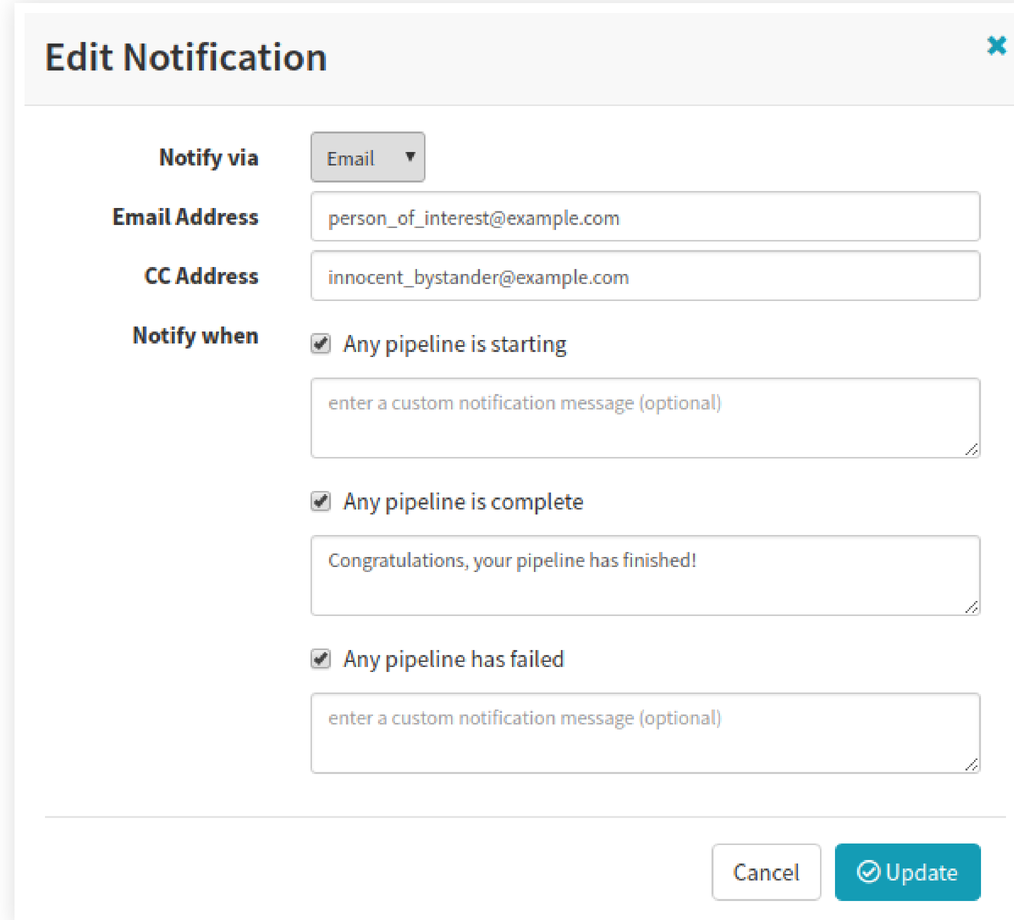
The Configuration has some of the following sections:

- Edit Notifications
- Features
- Links
- Traffic Guards
- Custom Banners
- Delete Application

EDITING NOTIFICATIONS

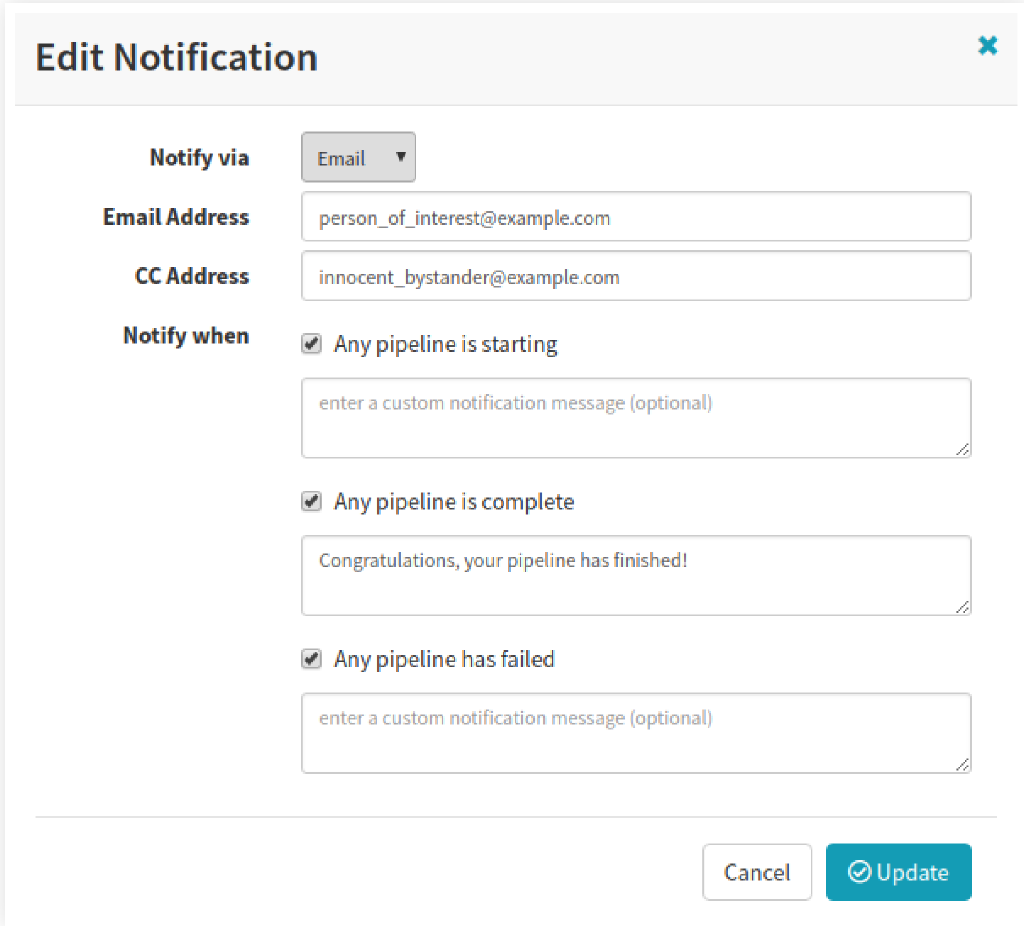
Spinnaker can send notification for any application and are optional

Click **Add Notification Preferences**



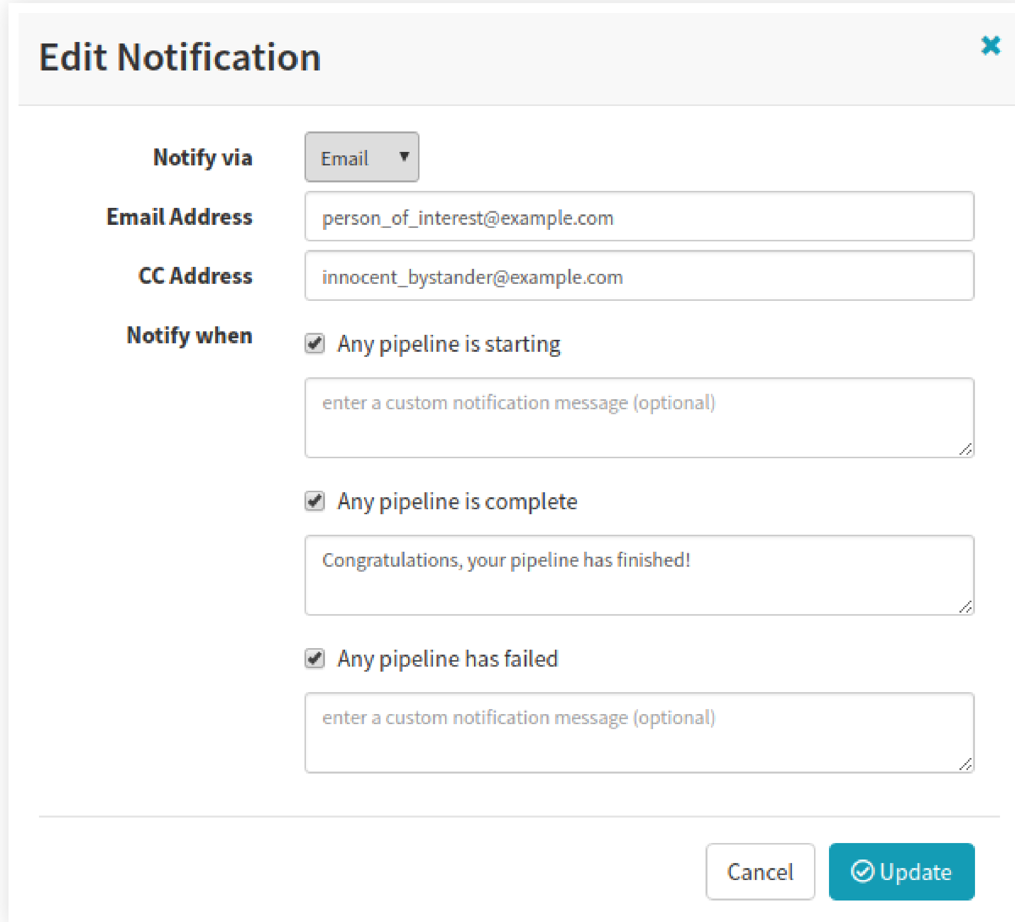
SELECTING THE NOTIFICATION MEDIUM

- Select the notification medium:
  - Email
  - SMS
  - Slack



EDITING NOTIFICATIONS

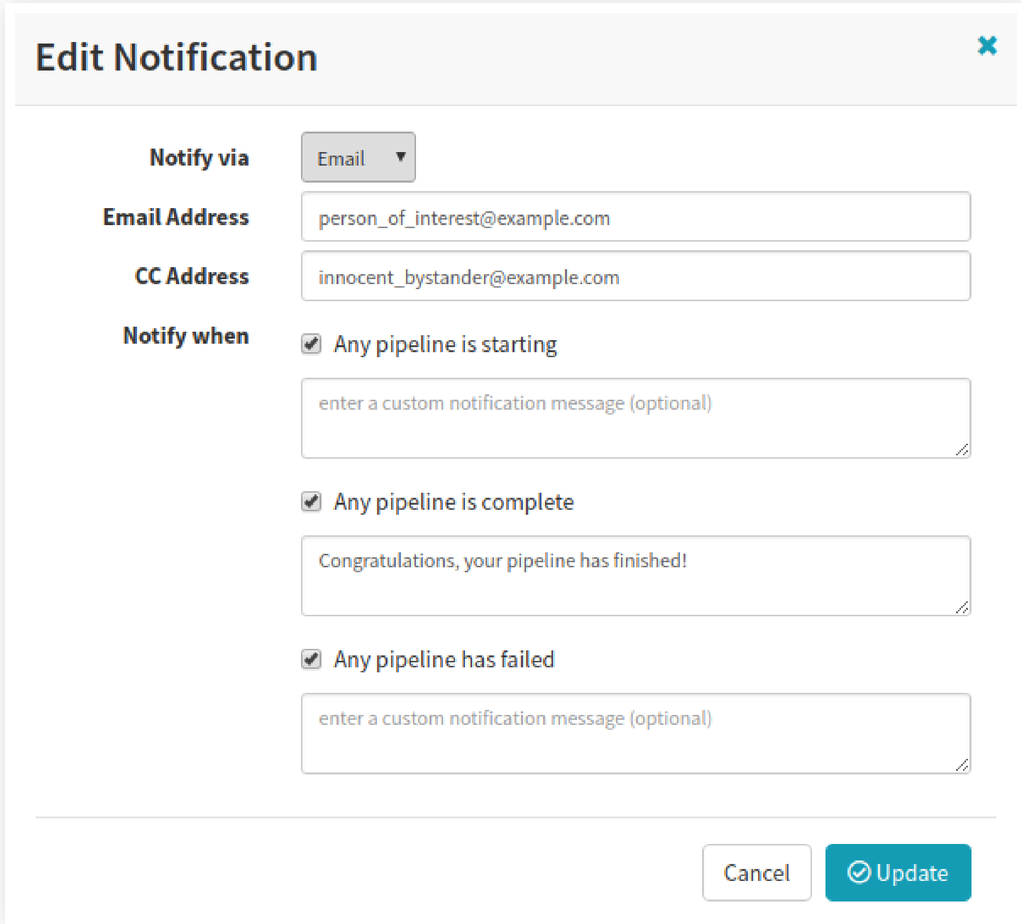
- Provide the information for the type you chose:
  - Email address
  - Phone number
  - Slack Members



PIPELINE EVENTS

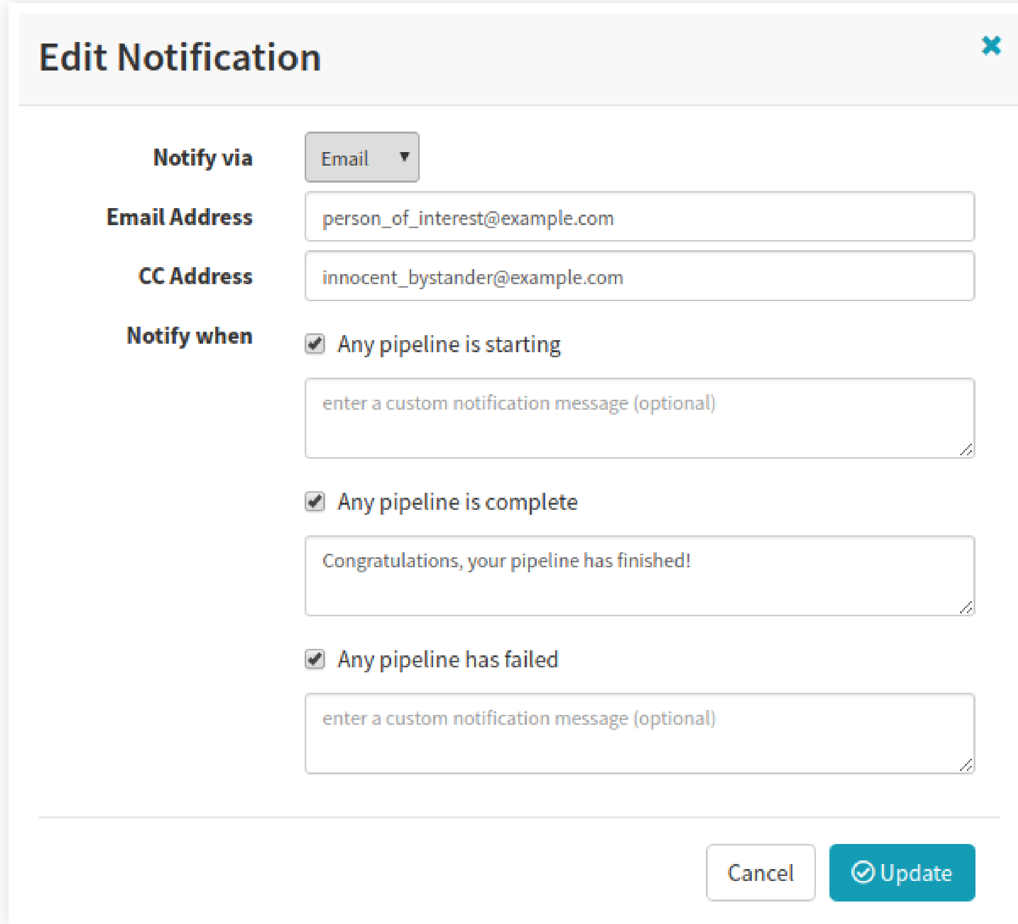
For each event, enter any custom text you want included in the notification.

- A pipeline started
- A pipeline finished
- A pipeline failed



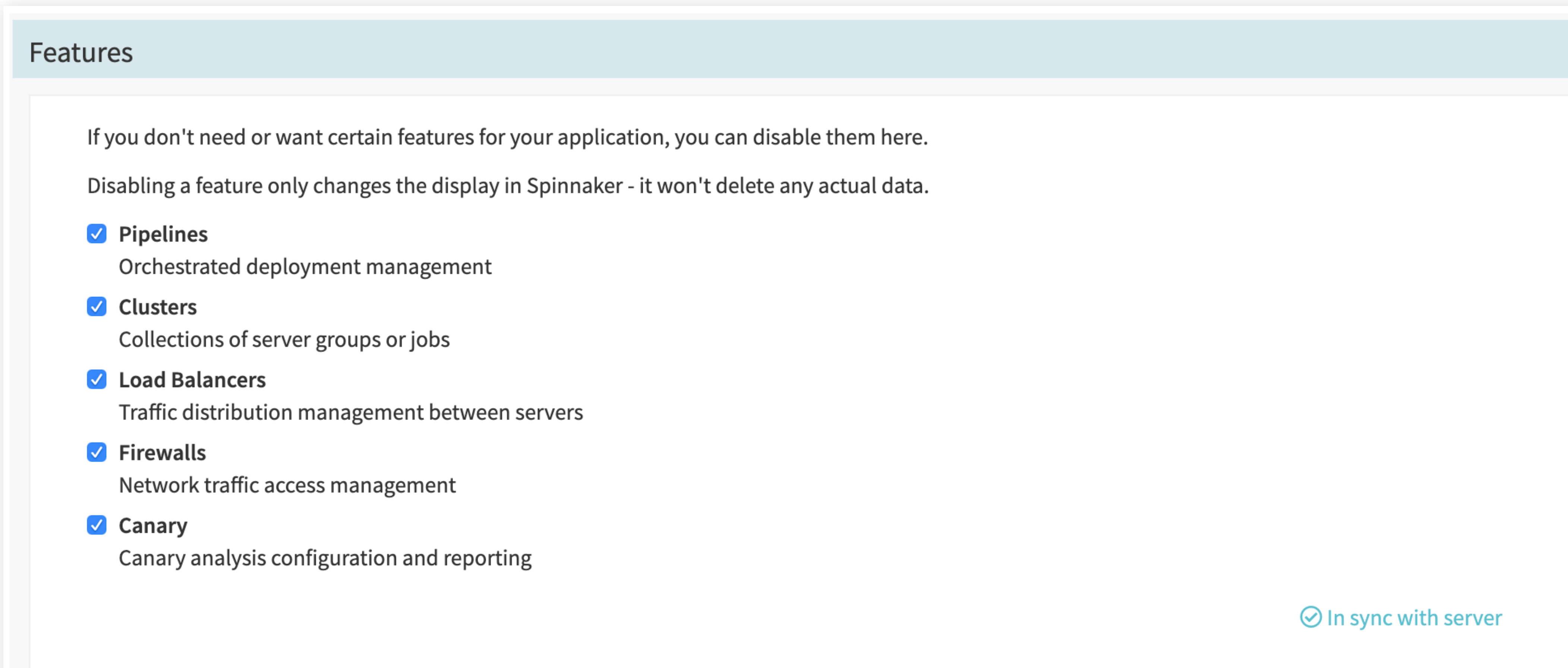
UPDATE AND ADDING NOTIFICATIONS

1. Click **Update**
2. Repeat these steps to add more notifications, if you want.
3. Click **Edit** next to any existing notification to change its preferences, or click **Remove** to delete it.



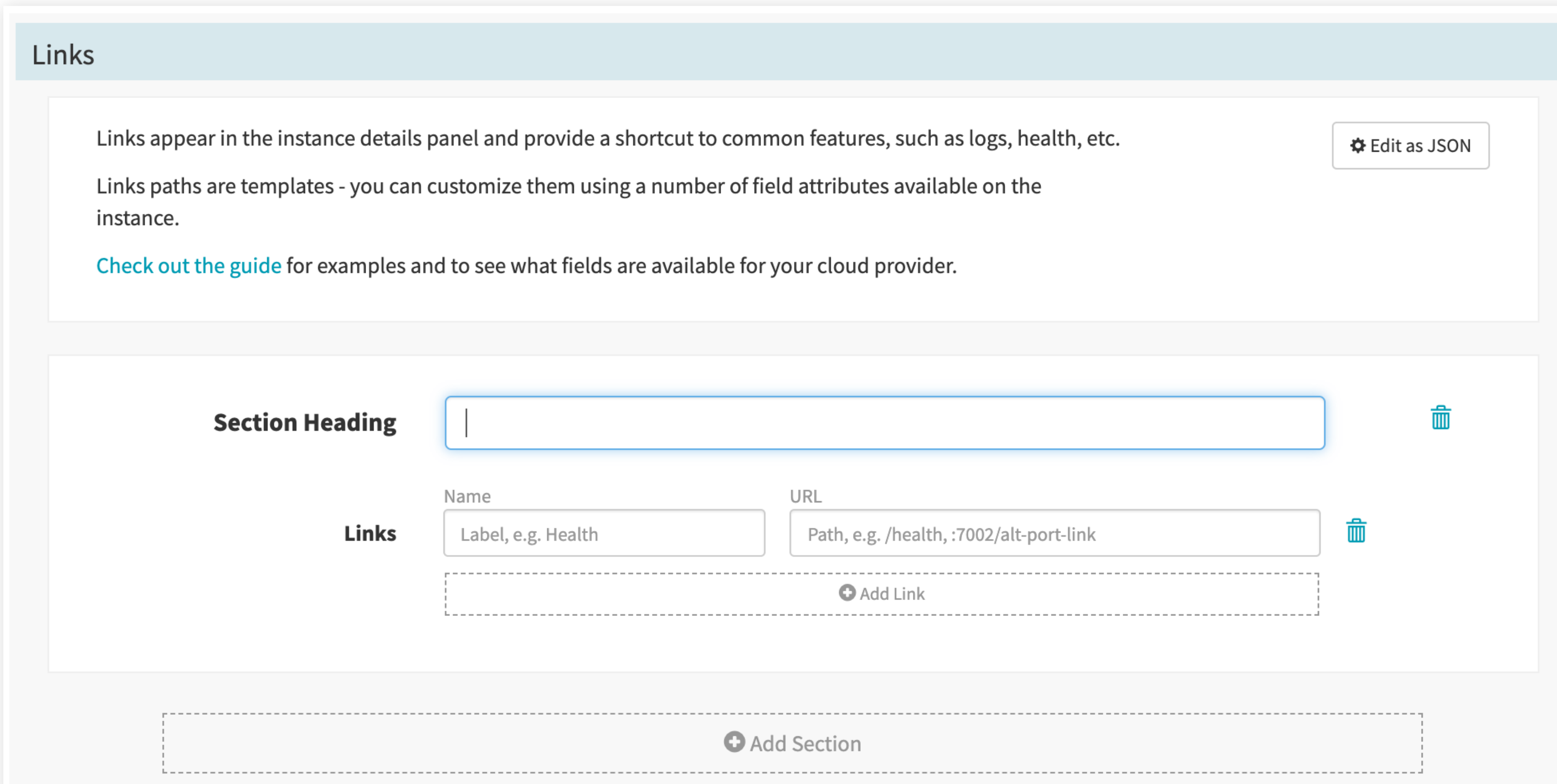
ENABLING FEATURES IN SPINNAKER

In order to not allow Spinnaker from annoying you about resources you don't use you can turn them off



CUSTOM LINKS

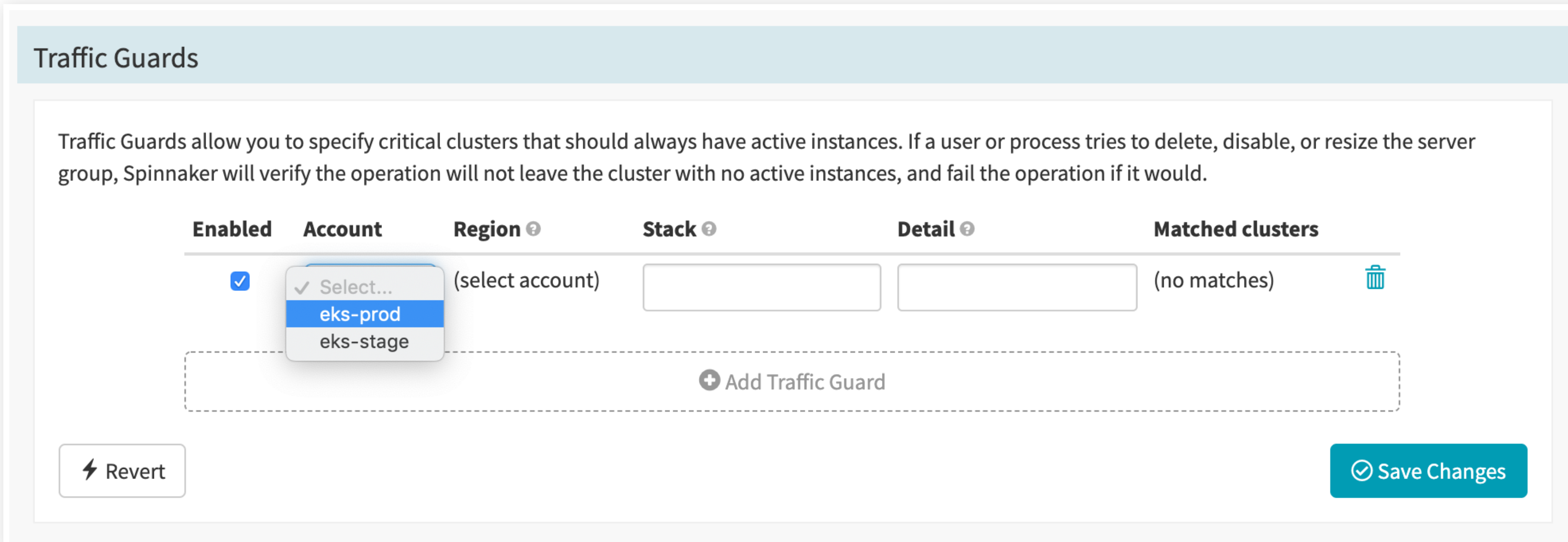
- You can include custom links to the instance details panel, providing shortcuts to information related to the instance, like logs, health, and so on.
- It currently doesn't work with Kubernetes resources unless exposed from cluster



CUSTOM LINK PROCESS

1. In the **Links** section, click **Add Section**
2. Provide text for the new **Section heading**.
3. In the **Links** fields, type the text that you want to display, and the path to the link target.
4. You can reference these specific instance attributes by wrapping them in curly braces. For example, to include the region where the instance lives, for a GCE or AWS instance, use `{region}`. These are for the path only, not the link display text.
5. Click **Add Link** for each additional link you want displayed in this section.
6. Click **Add Section** for any additional sections.
7. Click **Revert** to clear your work in progress.
8. This does not remove any saved custom instance links.
9. Click **Save Changes** when you're finished.

TRAFFIC GUARDS



- A traffic guard is a cluster which you have designated as always having at least one active instance.
- With traffic guard enabled, if a user or process tries to delete, disable, or resize the server group, Spinnaker will verify the operation will not leave the cluster with no active instances, and fail the operation if it would.

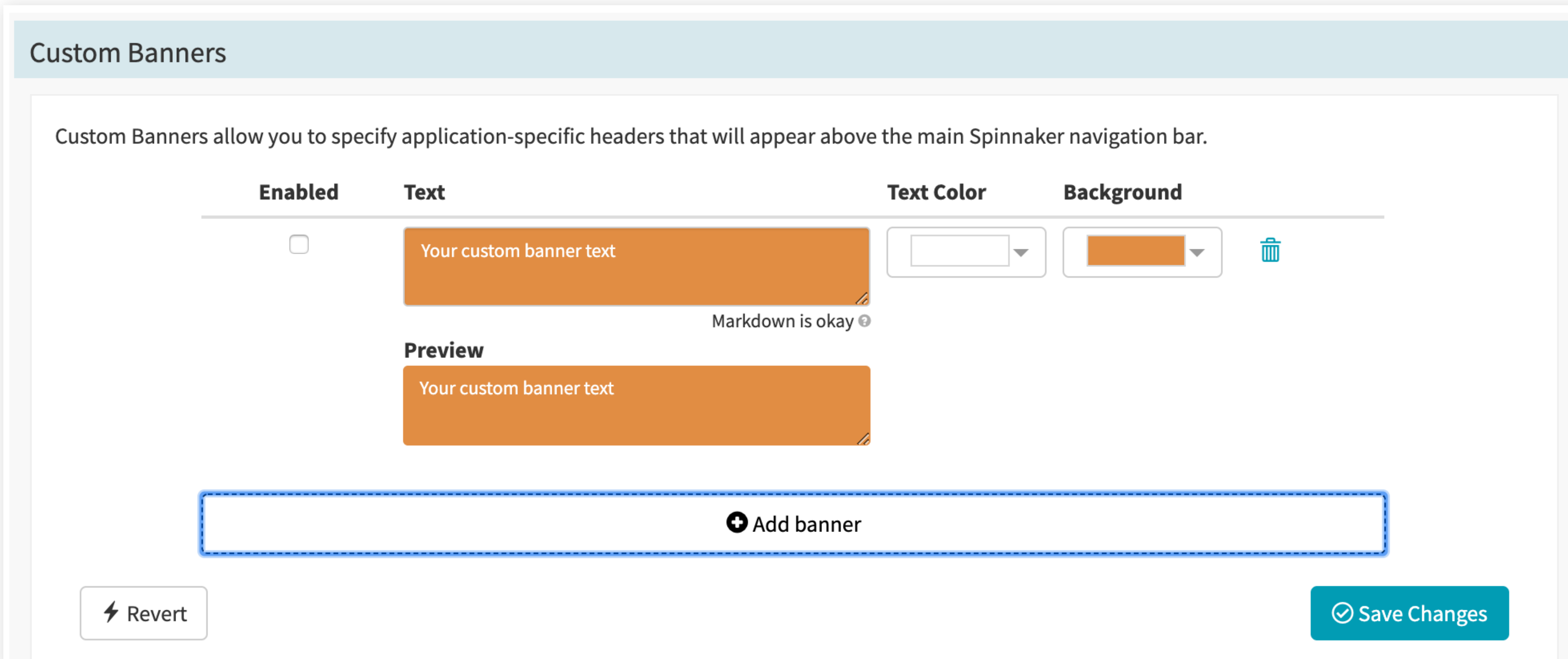
TRAFFIC GUARD PROCESS

In the Traffic Guards section:

- Click **Add Traffic Guard**
- Set the following values as seen in table below
- Click **Save Changes** to apply your new traffic guard, or changes to an existing one

Field	Required?	Description
Account	Yes	The account for which you're setting up the traffic guard
Region	Yes	The applicable region from the list, or * for all
Stack	No	The stack to which to apply this traffic guard. Leave blank to apply the guard only to a cluster that has no stack.
Detail	No	The detail string necessary to identify this cluster via the application-stack-detail naming convention

CUSTOM BANNERS



CUSTOM BANNER PROCESS

You can create simple text based banners

1. Click **Add Banner**
2. Click **Enable** to enable the banner
3. Select a text color for the foreground color
4. Select a background color for the background color

DEFINE THE INFRASTRUCTURE THE SERVICE WILL RUN

- You define infrastructure for each application.
- Your pipelines deploys services to the server groups you define.
- This means that production environments can be deployed without a pipeline.
- This will provide you with the initial production environment

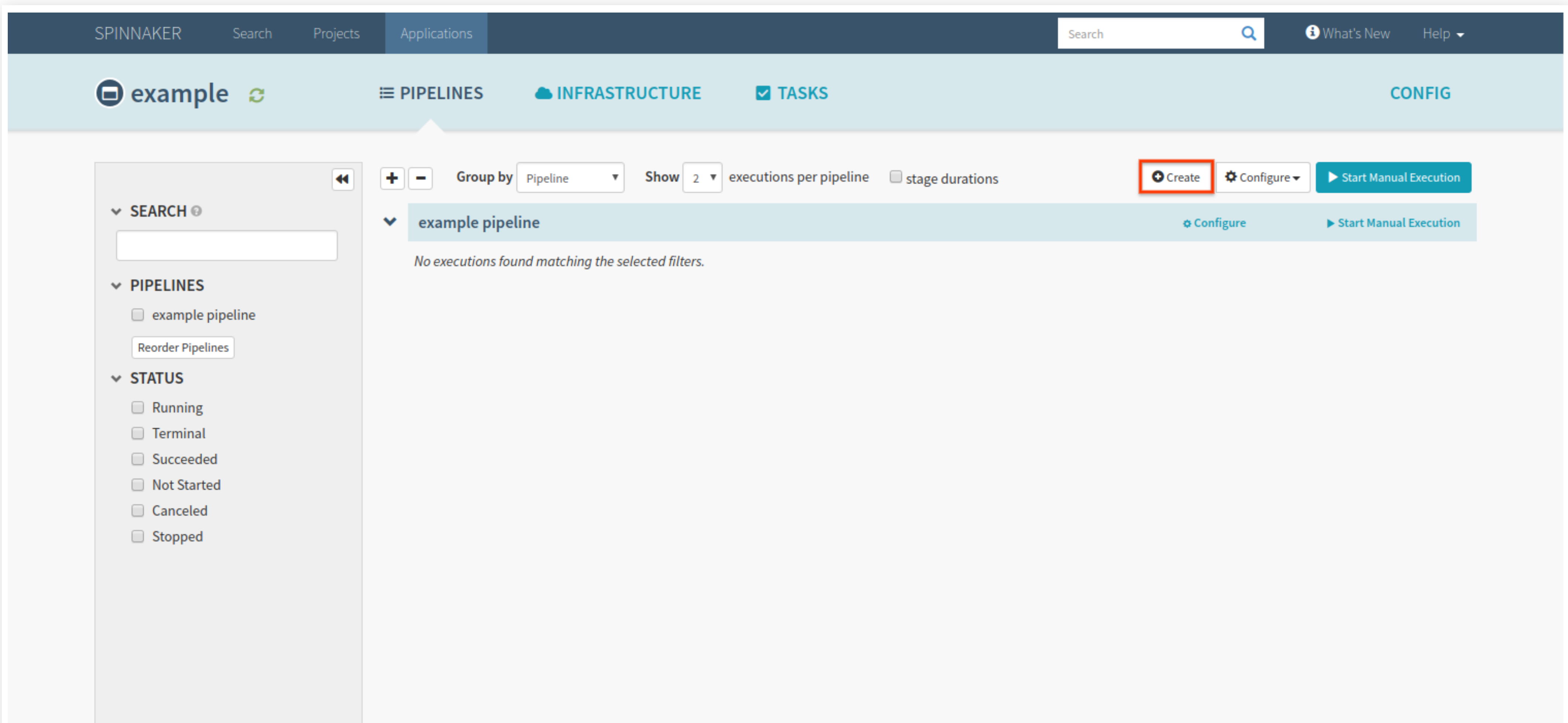
> this step is not a prerequisite for creating pipelines. In fact, you can use pipelines to create infrastructure.

PIPELINES

- How we control and deploy our application
- Series of stages that can be combined in any order
- Can be automatic or manual
- Triggered by a wide arrange of inputs

CREATE A PIPELINE

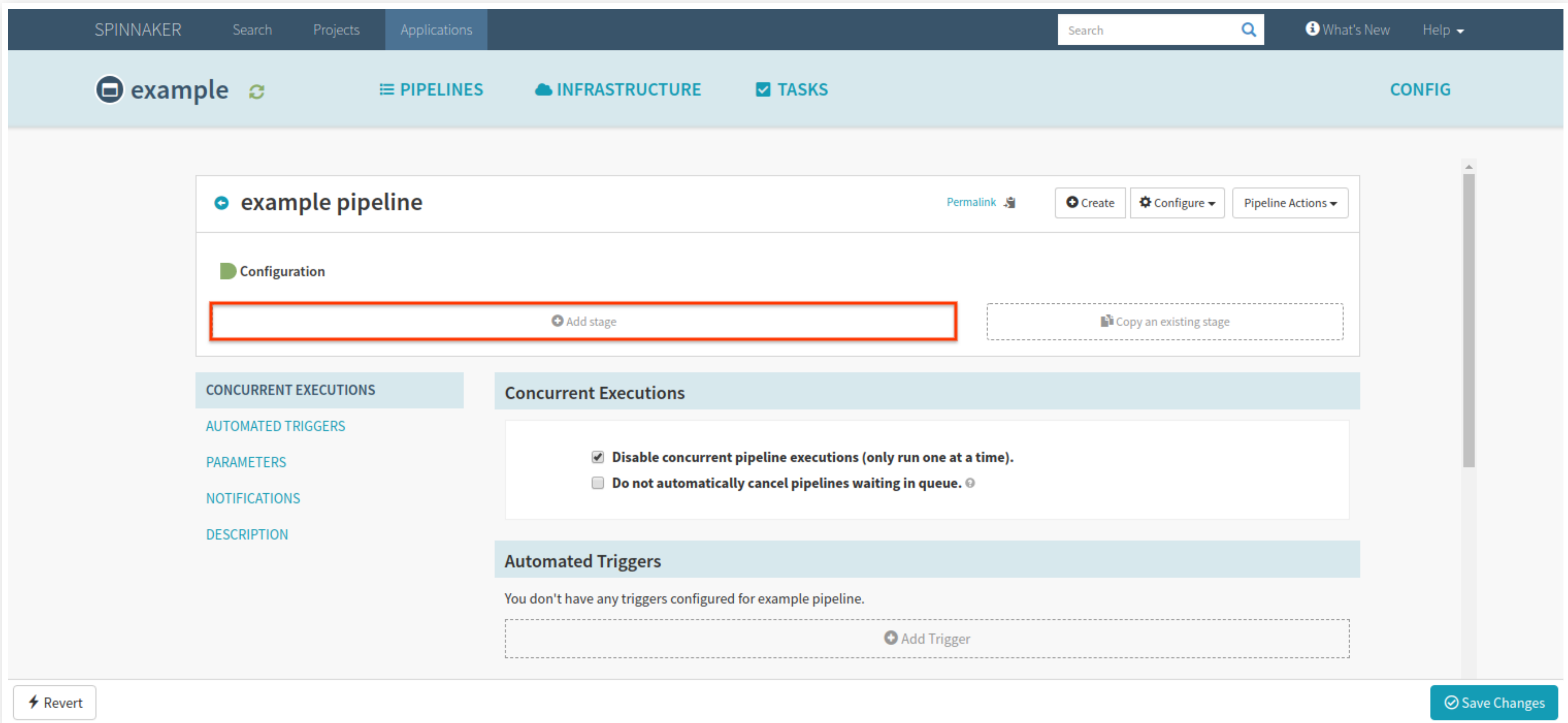
- After creating the Application, navigate the **Pipelines** tab in your navigation
  - Name your pipeline
  - Then add stages



CONFIGURATION STAGE

- The initial stage that you are provided is the configuration stage
- It is where we define:
  - *expected artifacts*
  - *triggers*
  - *parameters*
  - *notifications*

ADDING STAGES

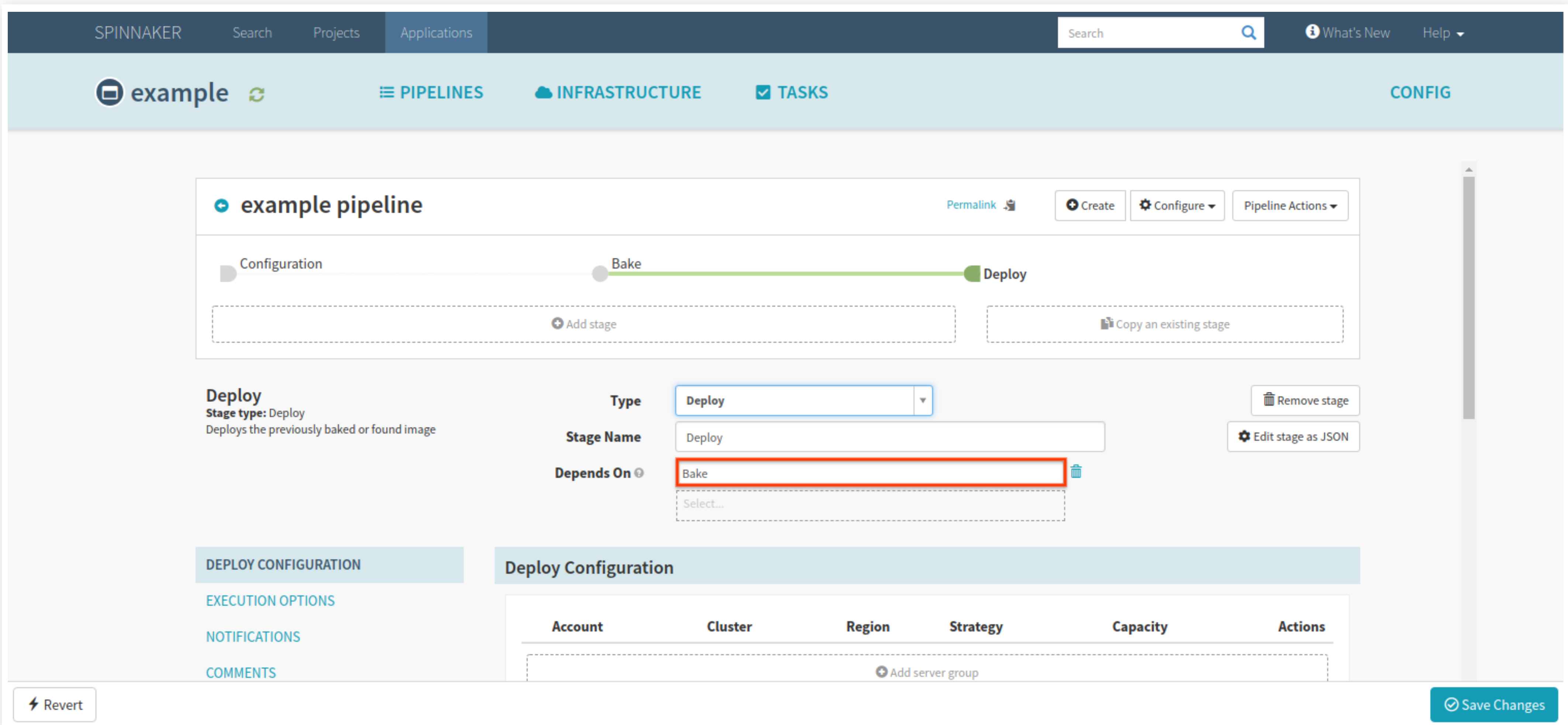


ADDING STAGE PROCESS

- The first step in any pipeline is **Configuration**, where you can set up pipeline triggers and parameters.
- Each stage specifies an action the pipeline will take once it's configured.
- The steps include
  - Select Add stage from your pipeline configuration screen.
  - Set the stage type using the drop-down menu.

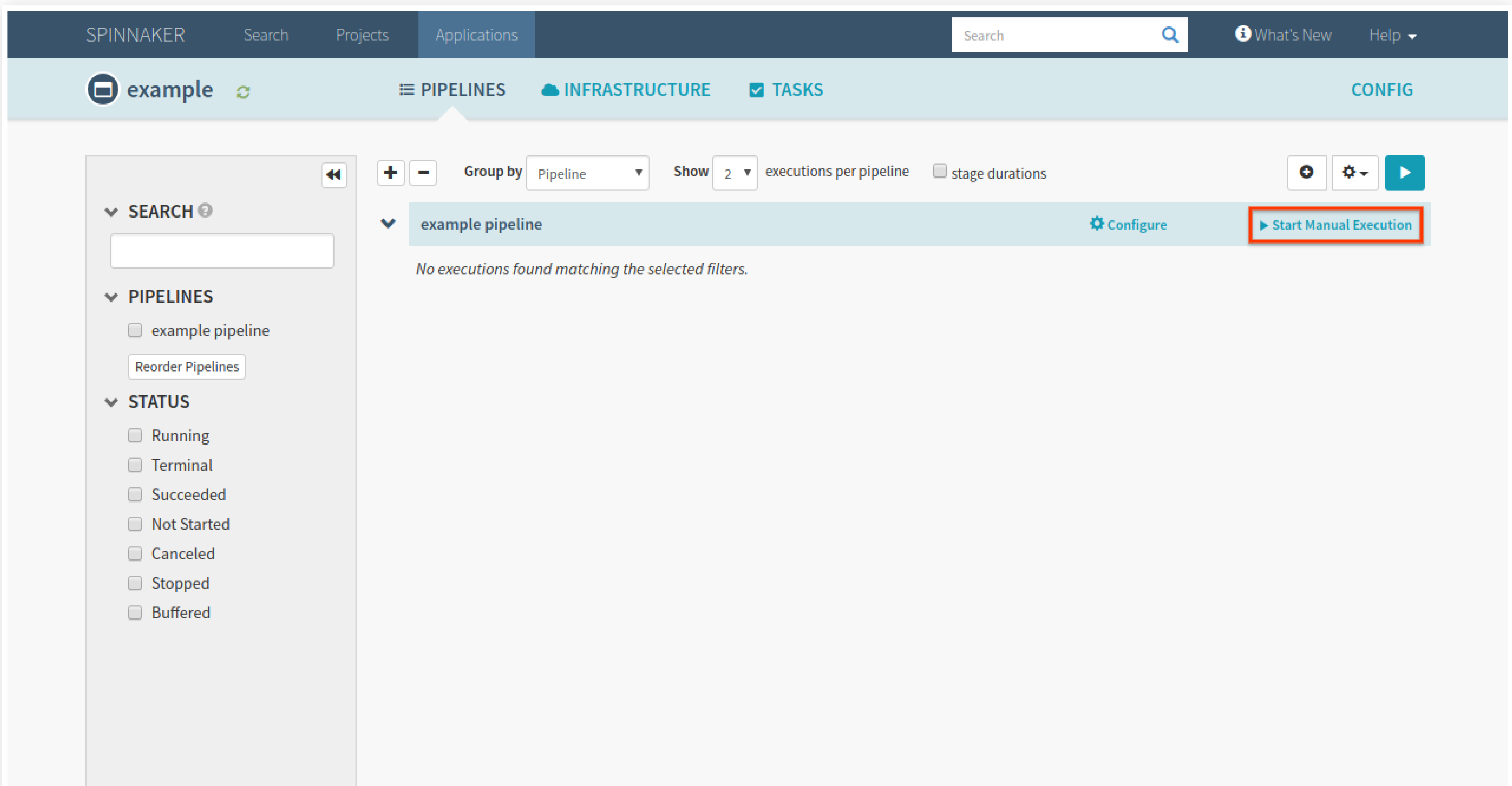
STAGE DEPENDS ON

If this isn't the first stage in your pipeline, make sure that this stage depends on the desired upstream stage(s) using the Depends on field.

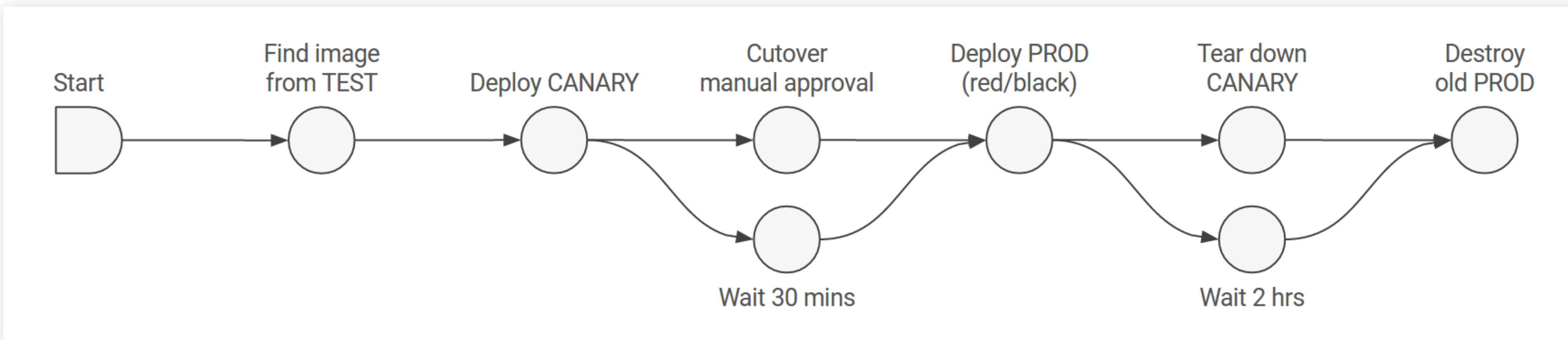


MANUALLY RUN YOUR PIPELINE

You can run a pipeline manually, but most pipelines are triggered automatically. If you so care to, particularly if you don't want to redo the build, you can click on **Start Manual Execution**

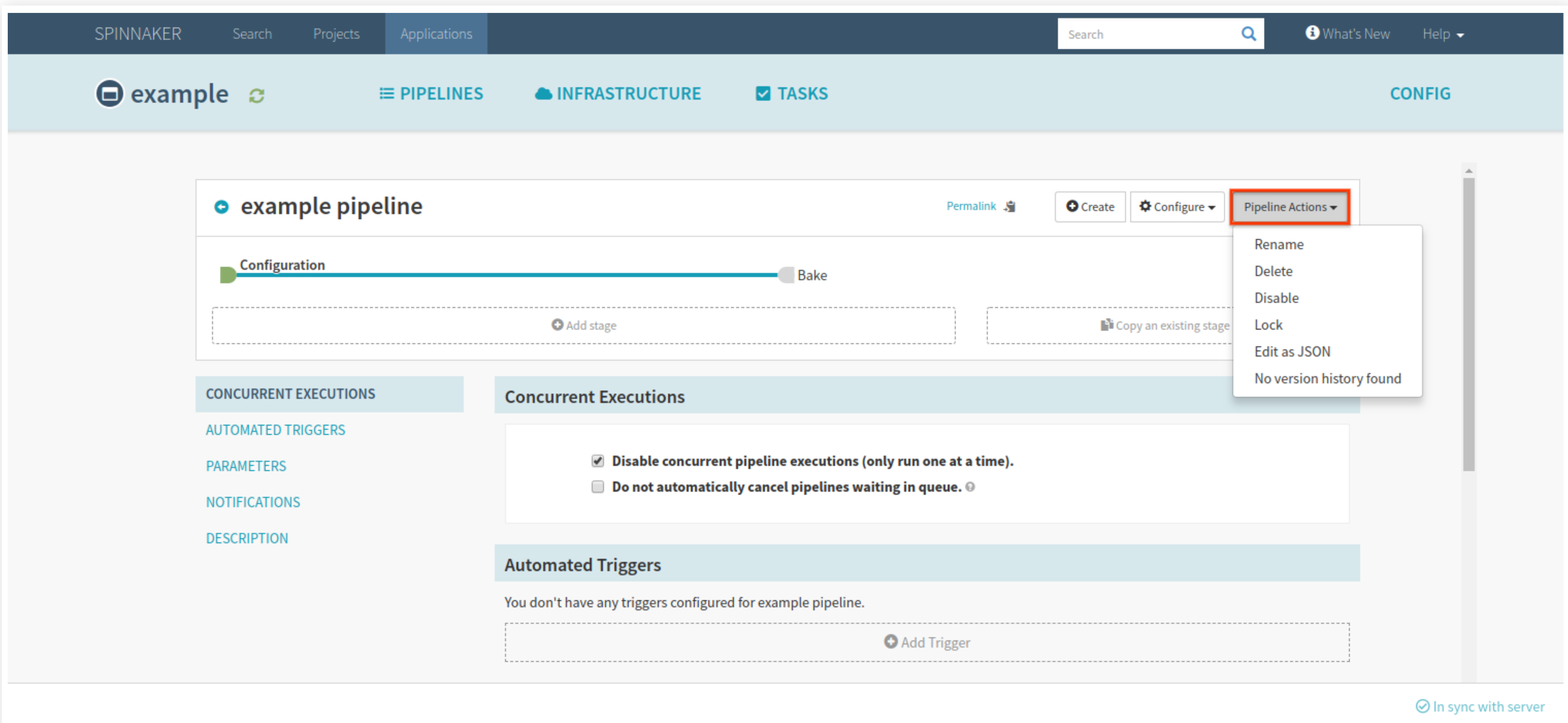


APPLICATION DEPLOYMENT



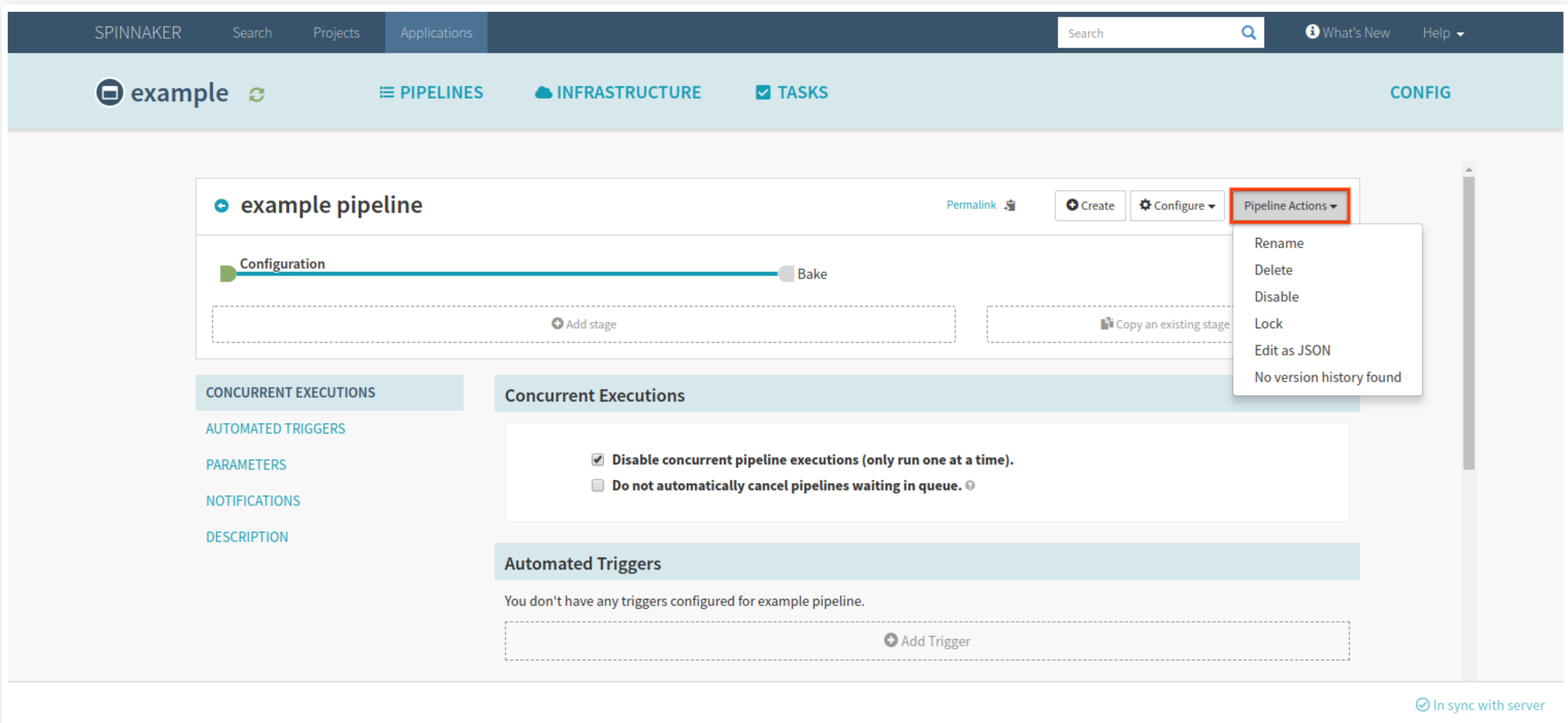
DISABLING A PIPELINE

- From the Pipelines tab, click **Configure** to modify an existing pipeline
- Click Pipeline actions in the upper right corner, and select **Disable**.

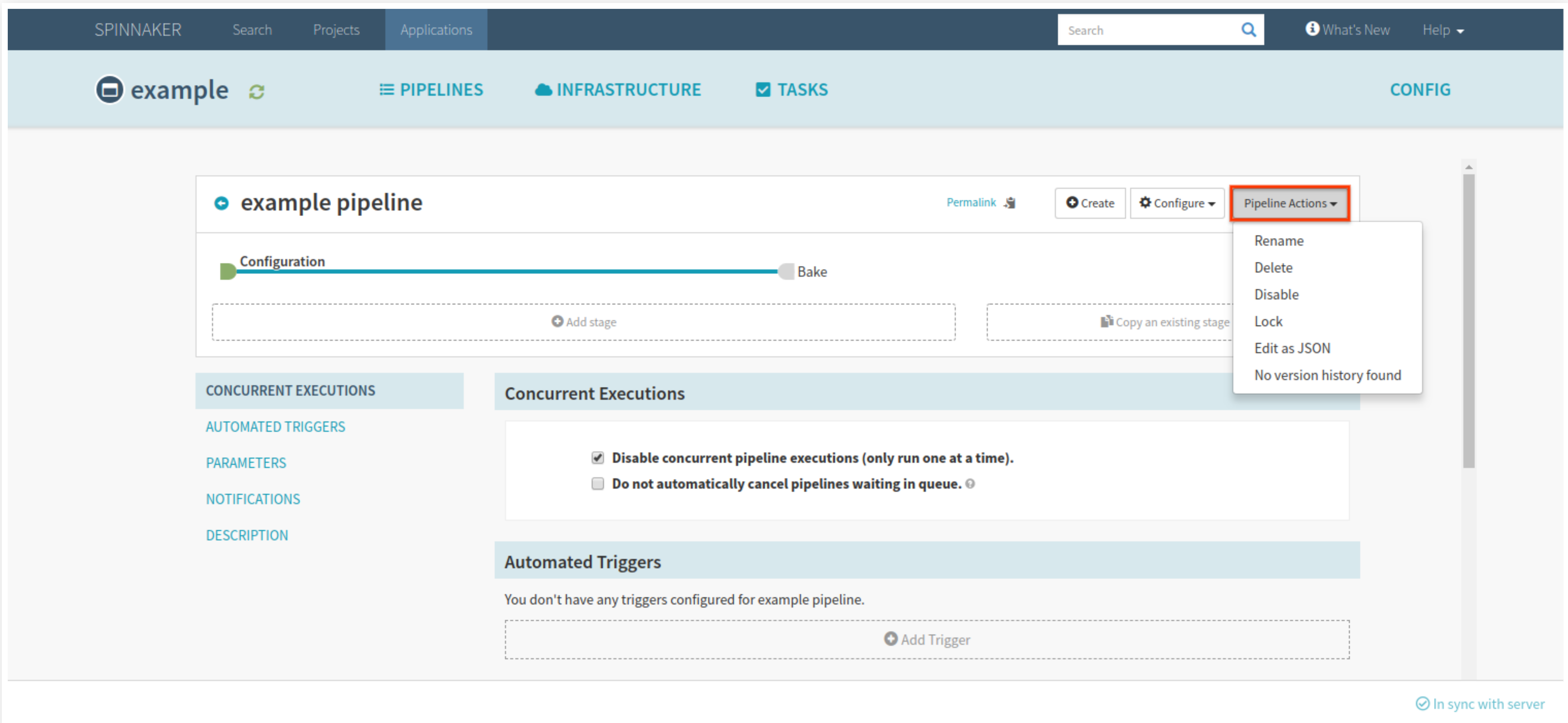


DELETING A PIPELINE

- From the Pipelines tab, click **Configure** to modify an existing pipeline.
- Click **Pipeline actions** in the upper right corner, and select **Delete**.



EDITING AS JSON



EDITING AS JSON PROCESS

- You can also edit your pipeline in JSON
- This is fraught with danger if you get it wrong
- It can be helpful if things go wrong already
  - Perhaps the UI is not updating the backend correctly
  - You wish to diagnose issues
- When you use the **Edit as JSON** feature, you are directly editing the payload.
- Edit as JSON allows you to set pipeline fields or properties not exposed by the UI.

REVISION HISTORY

- Each time you save your pipeline, the current version is added to revision history
- You can use revision history to diff two versions of a pipeline or to restore an older version of a pipeline.

  1. From the **Pipelines** tab, click **Configure** to modify an existing pipeline
  2. Click **Pipeline Actions** in the upper right corner, and select **View revision history**

CHANGING VERSIONS

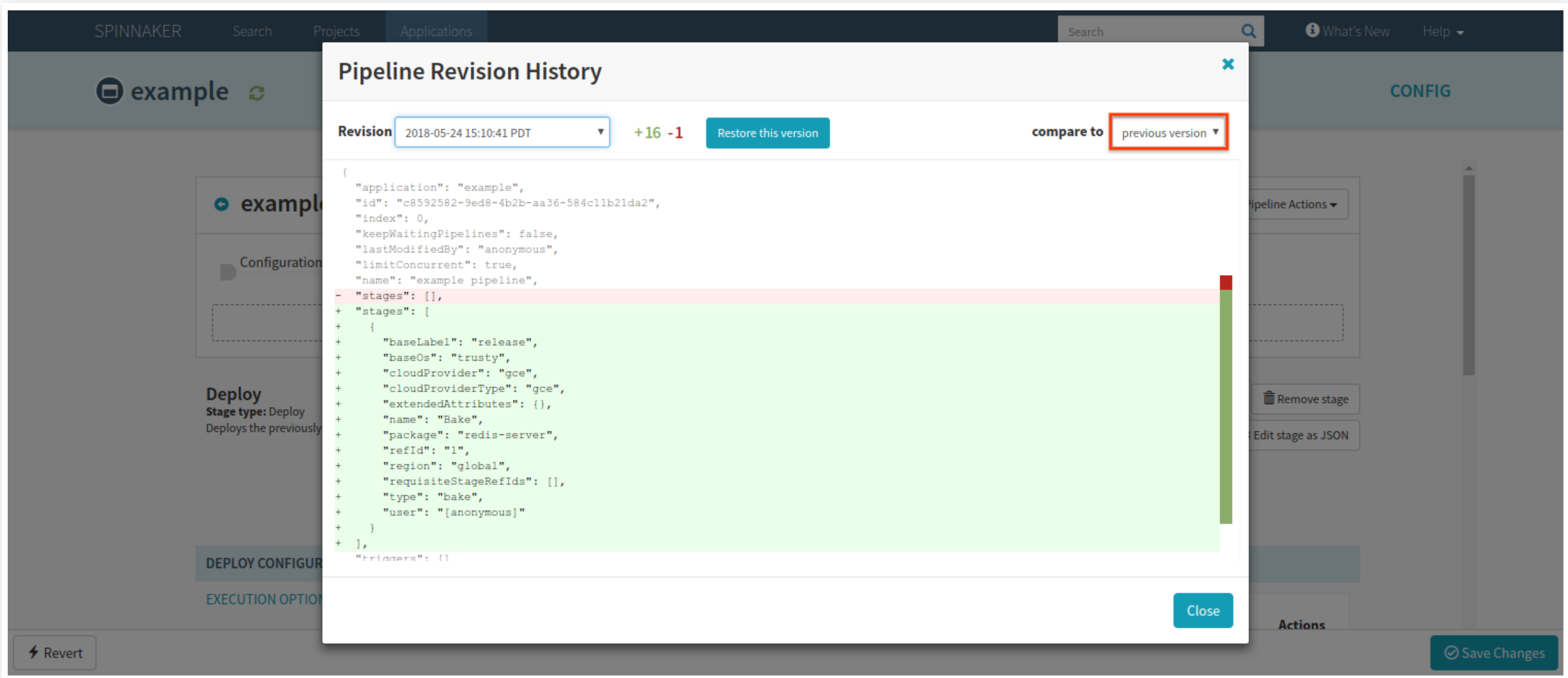
- You can compare any version of your pipeline to either the version before it or the current pipeline.

    1. View the version history

    2. Select a version from the Revision drop-down.

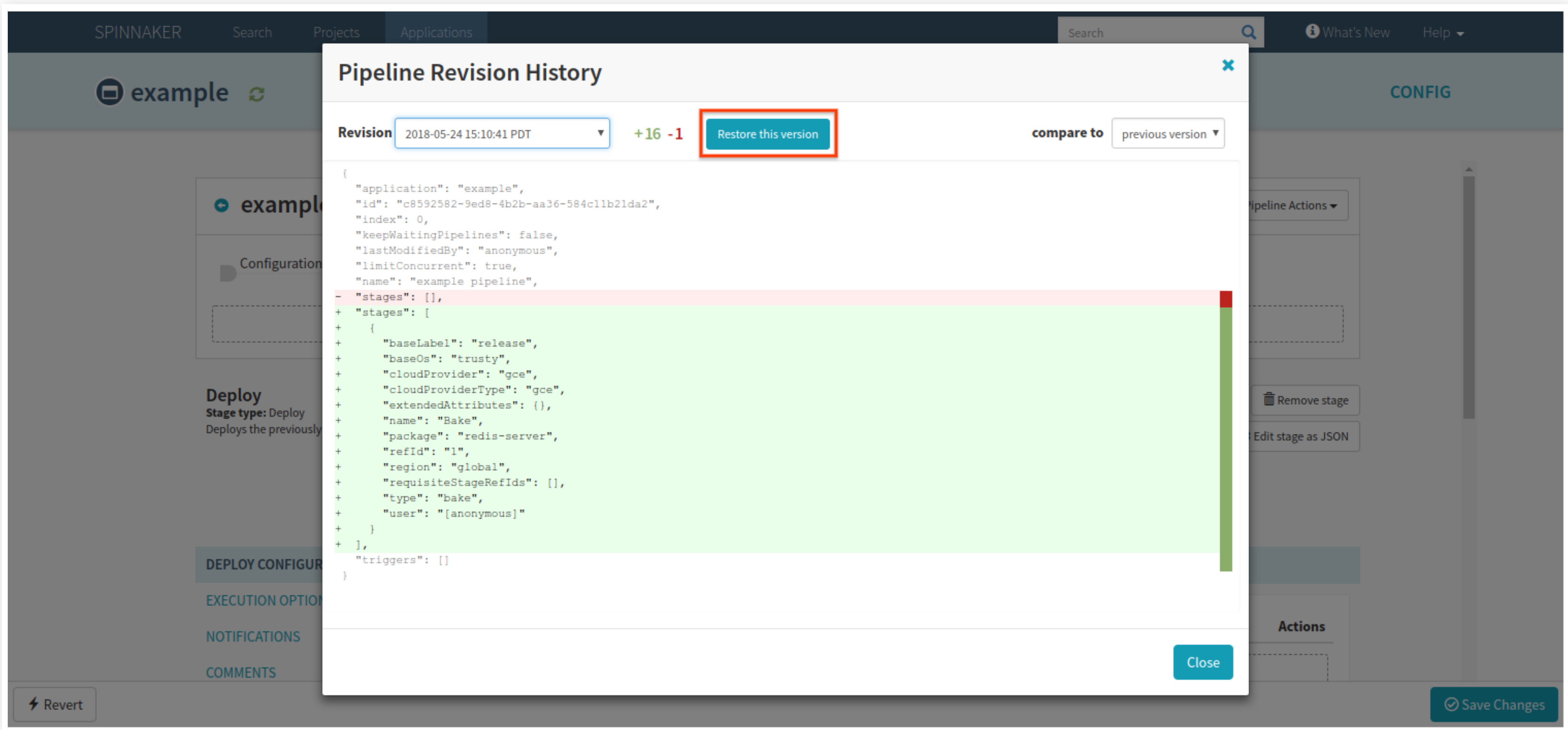
COMPARING VERSION

You can also compare a review to either the current revision or the previous one



REVERTING YOUR PIPELINE

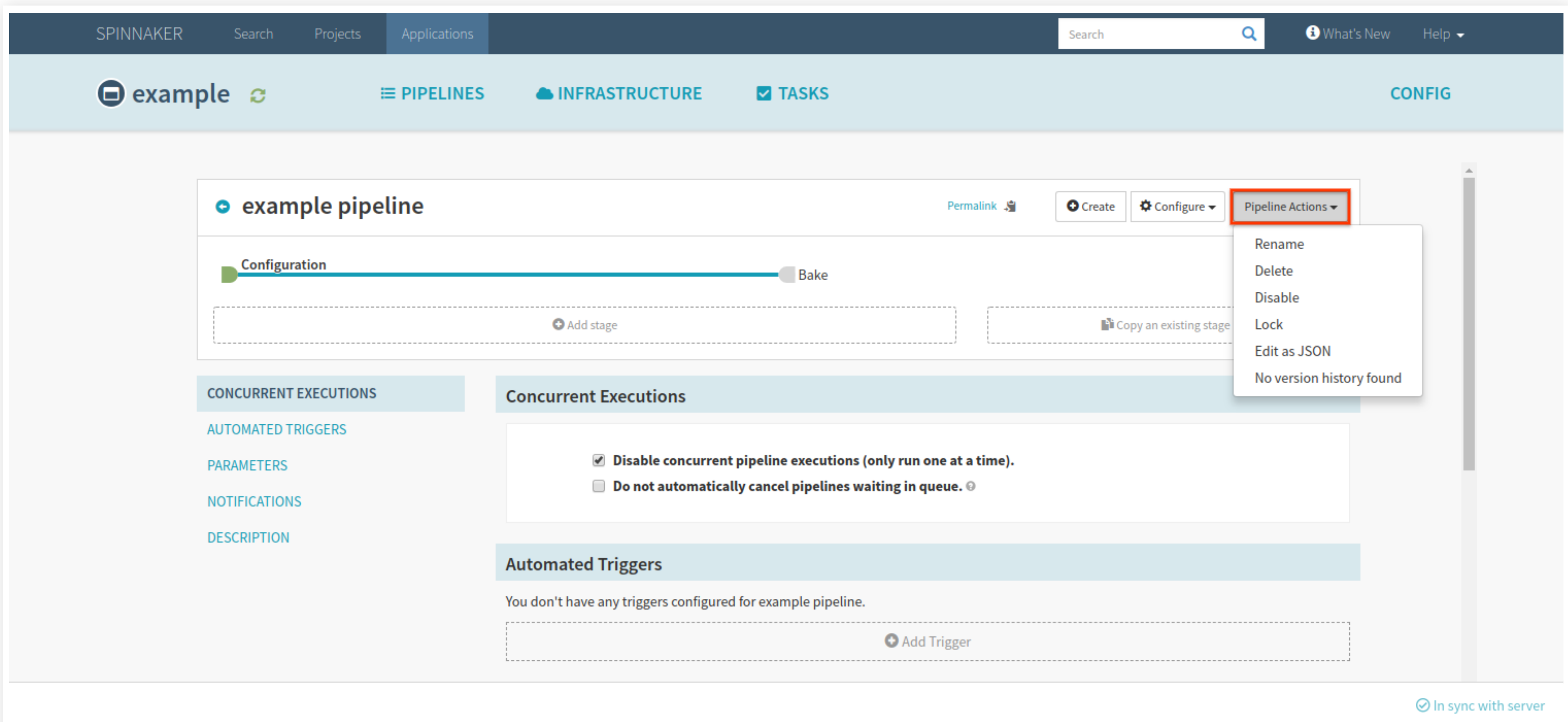
If you select a different version, you can revert to that same version



RENAME A PIPELINE

1. From the **Pipelines** tab, click **Configure** to modify an existing pipeline.

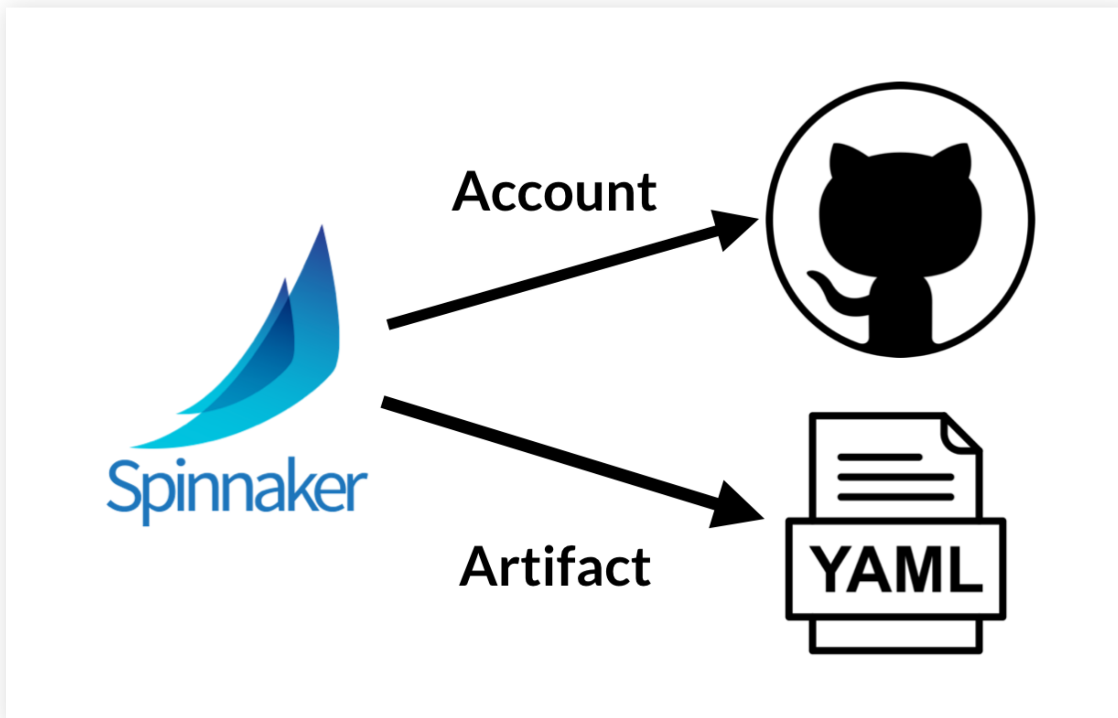
2. Click **Pipeline actions** in the upper right corner, and select **Rename**



ARTIFACTS

ARTIFACTS IN SPINNAKER

- Named JSON object that refers to an external resource
  - A Docker image
  - A file stored in GitHub
  - An Amazon Machine Image (AMI)
  - A binary blob in Amazon S3, Google Cloud Storage, etc.



ARTIFACT FRUSTRATION

Artifacts are one of the most frustrating aspects to Spinnaker

```
Failed on startup: Unmatched expected artifact
ExpectedArtifact(matchArtifact=Artifact(type=s3/object,
customKind=false, name=s3://XXXXXXXXXX-alpha.191%2B926bb3b3.tgz,
version=null, location=null, reference=null, metadata={id=01317db7-1e30-
4c02-a302-826449d83f94}, artifactAccount=f5cs-spin, provenance=null,
uuid=null), usePriorArtifact=false, useDefaultArtifact=false,
defaultArtifact=Artifact(type=null, customKind=true, name=null,
version=null, location=null, reference=null, metadata={id=ca86ca54-6719-
471e-b10e-fb4a6f20e85d}, artifactAccount=null, provenance=null,
uuid=null), id=0730e728-e19a-43af-b9e5-9856332e939d, boundArtifact=null)
could not be resolved.
```

WHAT IS THE "ADDRESS" OF OUR ARTIFACTS?

- URI of the location of our artifact
- Provenance information about the commit that triggered the resource

> Provenance *def:* - The place of origin or earliest known history of something

ARTIFACT DECORATION

- To allow more provenance information, a JSON is used to describe extras like:
  - name
  - version
  - location
- This is called *artifact decoration*
- Every Spinnaker artifact follows this specification whether:
  - Supplied to a pipeline
  - Accessed within a pipeline
  - Produced by a pipeline–follows

ARTIFACT FORMAT

As an example, an object stored in Google Cloud Storage (GCS) might be accessed using the following Spinnaker artifact:


```
{
  "type": "gcs/object",
  "reference": "gs://bucket/file.json#135028134000",
  "name": "gs://bucket/file.json",
  "version": "135028134000"
  "location": "us-central1"
}
```


Another example


```
{
  "type": "docker/image",
  "reference": "gcr.io/project/image@sha256:29fee8e284",
  "name": "gcr.io/project/image",
  "version": "sha256:29fee8e284"
}
```

SPINNAKER ARTIFACT FIELDS

Field	Explanation	Notes
`type`	How the external resource is classified. (This allows for easy distinction between Docker images and Debian packages, for example).	
`reference`	The URI used to fetch the resource.	
`artifactAccount`	The Spinnaker artifact account that has permission to fetch the resource.	
`version`	The version of the resource. (By convention, version should only be compared between artifacts of the same type and name.)	Optional.
`provenance`	The relevant URI from the system that produced the resource. (This is used for deep-linking into other systems from Spinnaker.)	Optional.

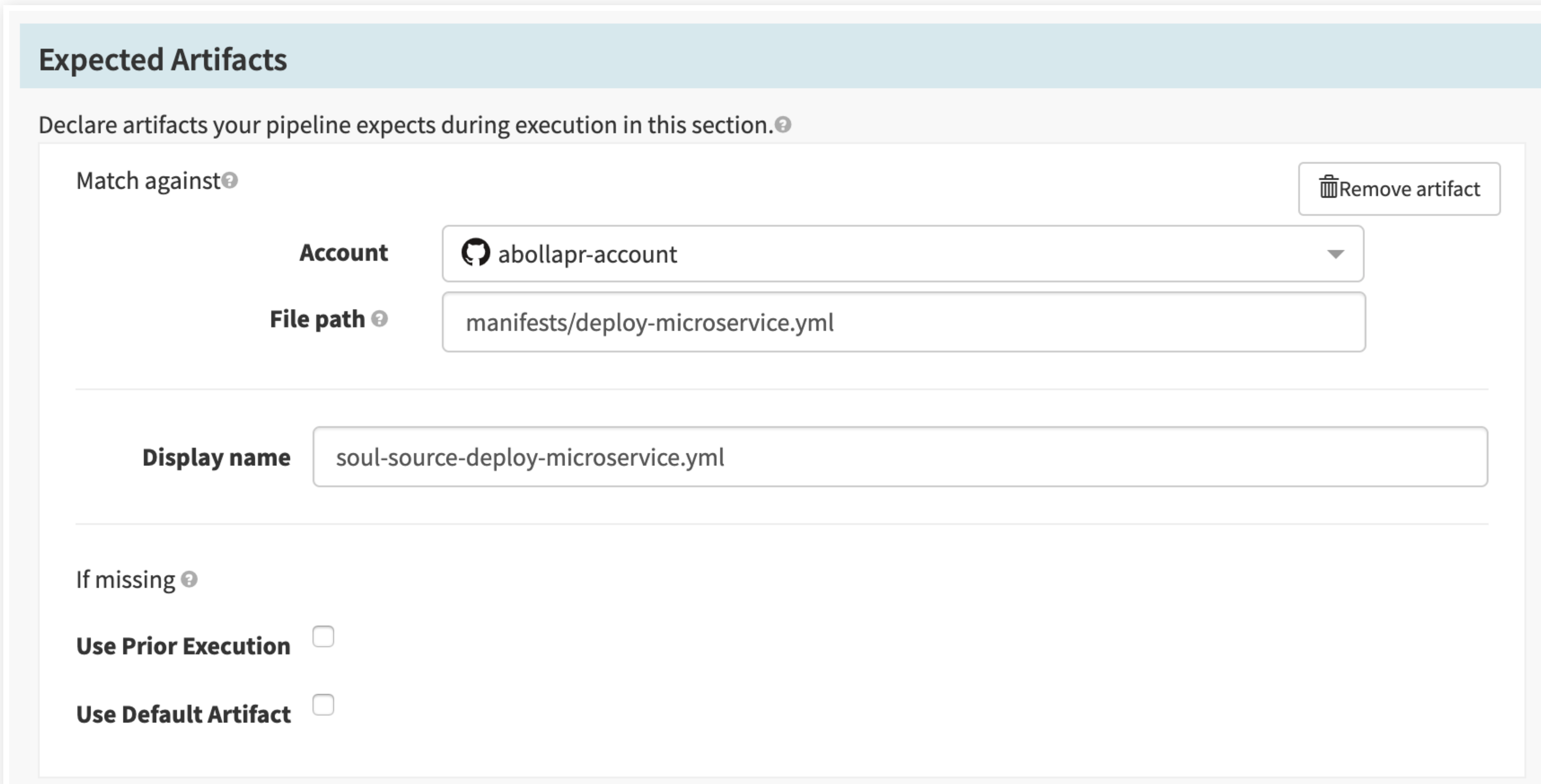
SPINNAKER ARTIFACT FIELDS CONTINUED

metadata	**Arbitrary key / value metadata pertaining to the resource. (This can be useful for scripting within pipeline stages.)**	**Optional.**
`location`	The region, zone, or namespace of the resource. (This does not add information to the URI, but makes multi-regional deployments easier to configure.)	Optional.
`uuid`	Used for tracing the artifact within Spinnaker.	Assigned by Spinnaker.

EXPECTED ARTIFACTS

- Expects a particular artifact to be available
- Declarable within a pipeline trigger or stage
- Spinnaker compares an incoming artifact (for example, a manifest file stored in GitHub) to the expected artifact (for example, a manifest with the file path `path/to/my/manifest.yml`)
- If there is a match it is *bound* to that artifact and used

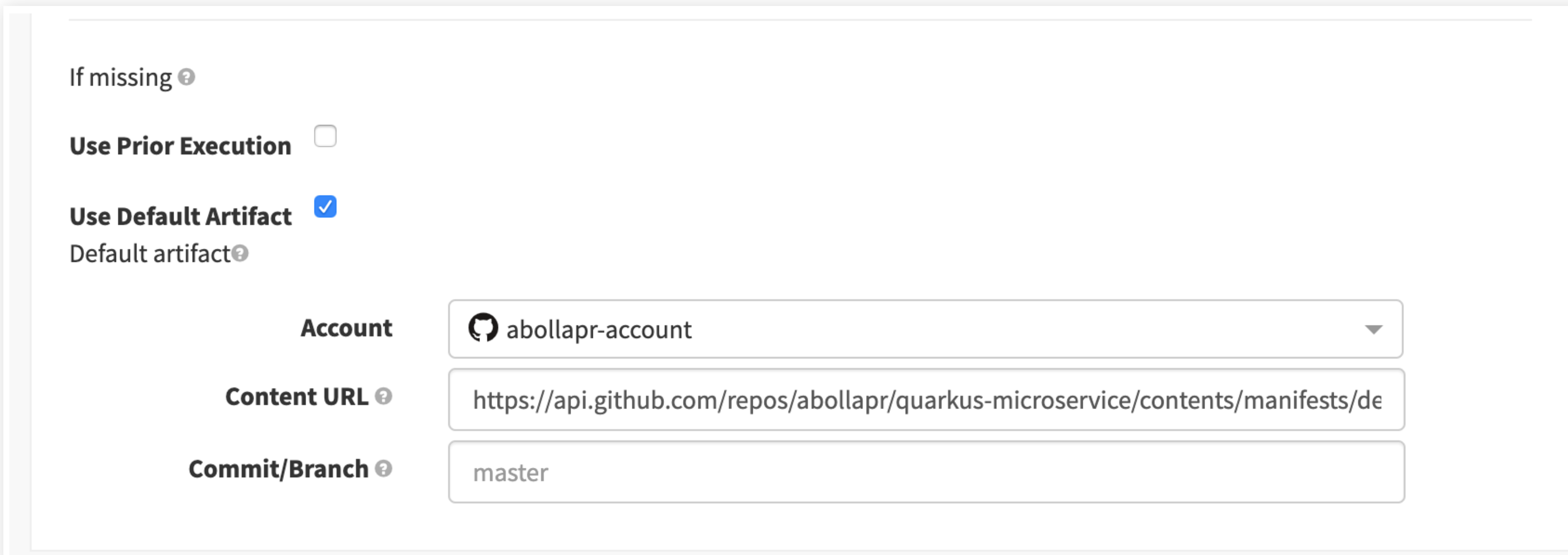
EXPECTED AND BOUND ARTIFACT



MATCHED ARTIFACTS

- Used to disambiguate between similar artifacts coming from the same account
    - e.g. Different `yaml` files from the same repository
- Filter by fields in the artifact format against which to compare in the incoming artifact
- Used to specify that the trigger should begin pipeline execution only if the incoming artifact matches the parameters that you provided

PRIOR EXECUTION AND DEFAULT ARTIFACTS



PRIOR EXECUTION AND DEFAULT ARTIFACTS FIELDS

- **If Missing**
  - Provide fallback behavior for the expected artifact in case the trigger doesn't find the desired artifact.
- **Use prior execution**
  - Spinnaker will fall back to the artifact used in the last execution.
  - If you enable the **Use default artifact** Spinnaker will use a default artifact,
  - Allows you to provide fallback behavior for the first time a trigger is used, when no previous execution exists

REVIEW OF ARTIFACTS

- Expected - An artifact that a trigger or stage expects to have
- Bound - An artifact that has been fulfilled
- Matched - Enter fields to disambiguate similar artifacts

ARTIFACTS IN PIPELINES DEFINED

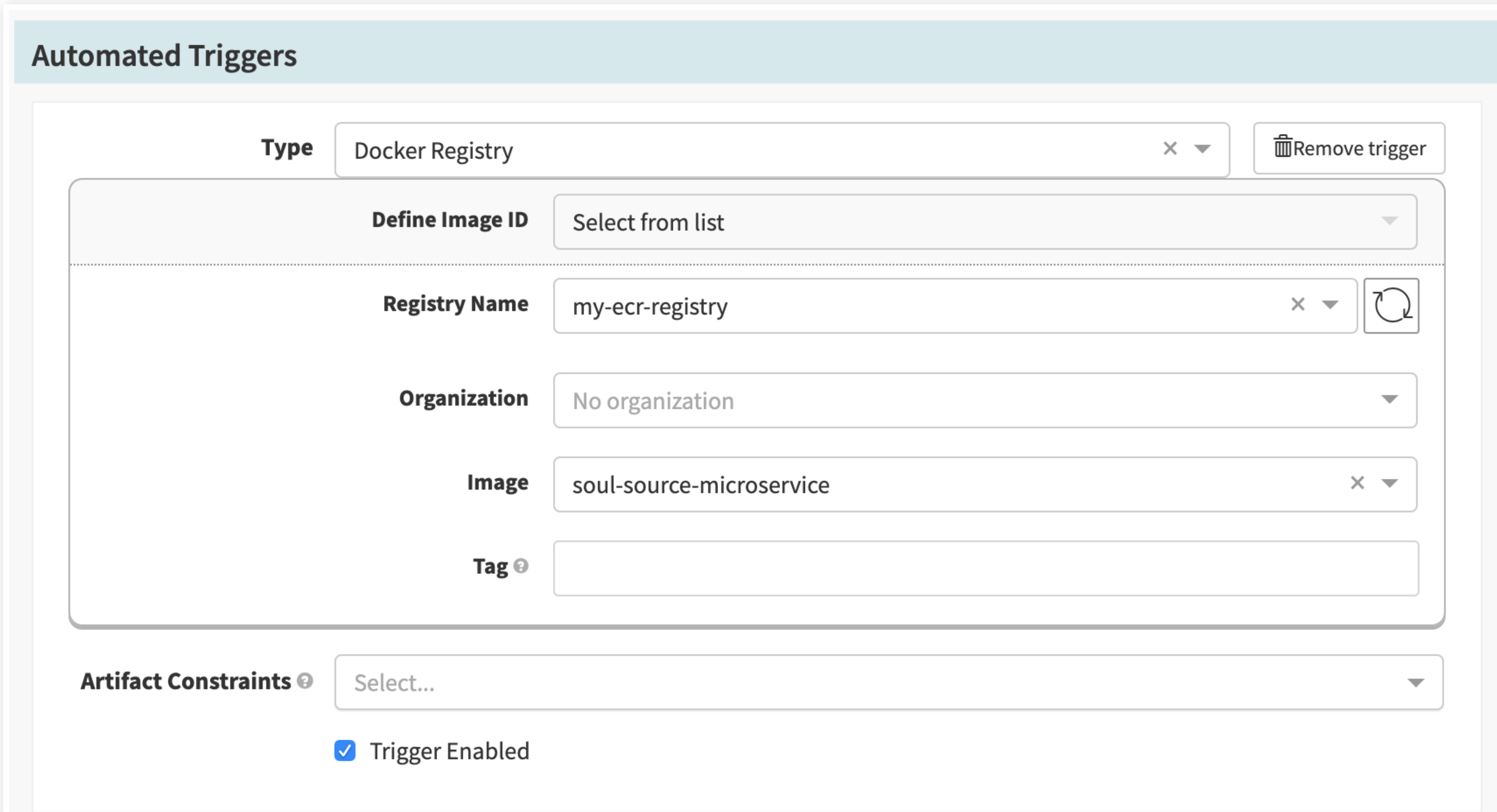
- An artifact arrives in a pipeline execution either from an external trigger (for example, a Docker image pushed to a registry)
- Getting fetched by a stage. That artifact is then consumed by downstream stages based on predefined behavior.

EXPECTED ARTIFACTS

- Enable a stage to bind an artifact from:
  - Another pipeline execution
  - Stage output
  - Running environment

TRIGGERS

When configuring a pipeline trigger, you can declare which artifacts the trigger expects to have present before it begins a pipeline execution!



FIND ARTIFACT FROM EXECUTION

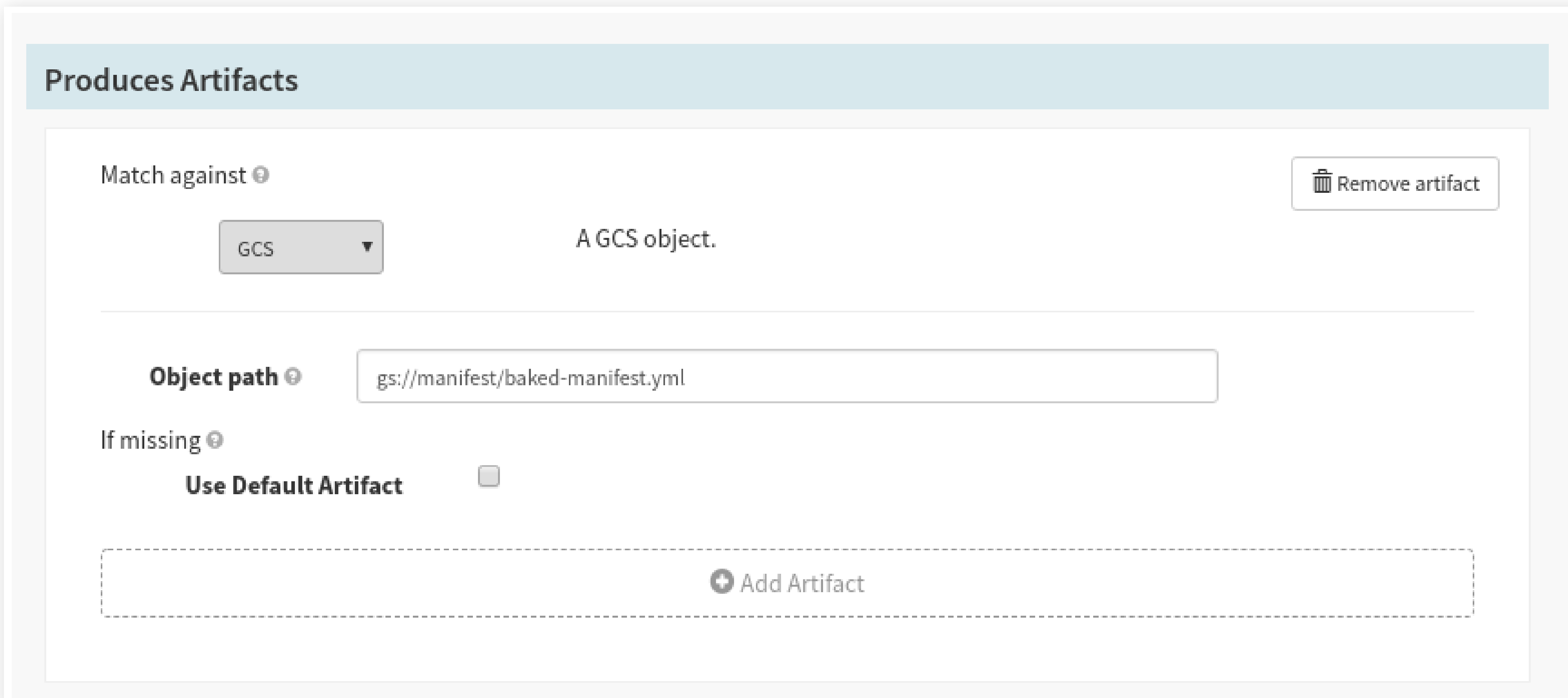
- To allow you to promote artifacts between executions, you can make use of the “Find Artifact from Execution” stage.
- All that’s required is the pipeline ID whose execution history to search, and an expected artifact to bind.
- This will be particularly useful for canary attainment of baseline

ARTIFACTS PASSED BETWEEN PIPELINES

- Artifacts can be passed between pipelines.
- Two cases:
  - Pipeline B is triggered by Pipeline A - Pipeline B is triggered by Pipeline A, therefore Pipeline B will have Pipeline A's artifacts
  - Pipeline A triggers Pipeline B - Pipeline A is triggers Pipeline B, therefore Pipeline B will have Pipeline A's artifacts

STAGES THAT PRODUCE ARTIFACTS

Stages can be configured to ‘Produce’ artifacts if they expose the following Stage configuration:



WAYS TO PRODUCE ARTIFACTS

1. To bind artifacts injected into the stage context - If your stage emits artifacts (such as a “Deploy (Manifest)” stage) into the pipeline context, you can match against these artifacts for downstream stages to consume.

2. To artificially inject artifacts into the stage context - If you are running a stage that does not natively emit artifacts (such as the “Run Job” stage), you can use the default artifact, which always binds to the expected artifact, to be injected into the pipeline each time it is run. Keep in mind: If the matching artifact is empty, it will bind any artifact, and your default artifact will not be used.

> If you are configuring your stages using JSON, the expected artifacts are placed in a top-level `expectedArtifacts: []` list.

VARIOUS TYPES OF ARTIFACTS

There are various types of artifacts or you can define your own:

- Docker Image
- Embedded Base64
- GCS Object
- S3 Object
- Git Repo
- GitHub File
- GitLab File
- Bitbucket File
- HTTP File
- Kubernetes Object
- Oracle Object

SOURCES

https://www.spinnaker.io/reference/artifacts-with-artifactsrewrite/
https://www.spinnaker.io/reference/artifacts-with-artifactsrewrite/in-kubernetes-v2/

LINKING SPINNAKER TO GITHUB

OVERVIEW

- In order to connect to github, we will need to establish a token
- This will build a connection from Spinnaker to Github
- As users you will create the token
- As administration you will put the token in Spinnaker using Halyard

CREATING A TOKEN

- Visit your github account at: https://github.com/settings/tokens
- Click on the **Generate new token** button

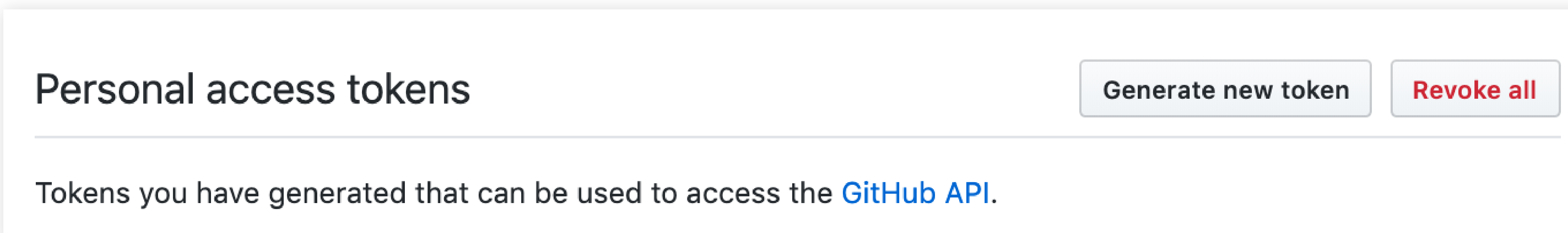


Figure 3. Token Page

SELECT THE `public_repo` SCOPE

Select the `public repo` scope

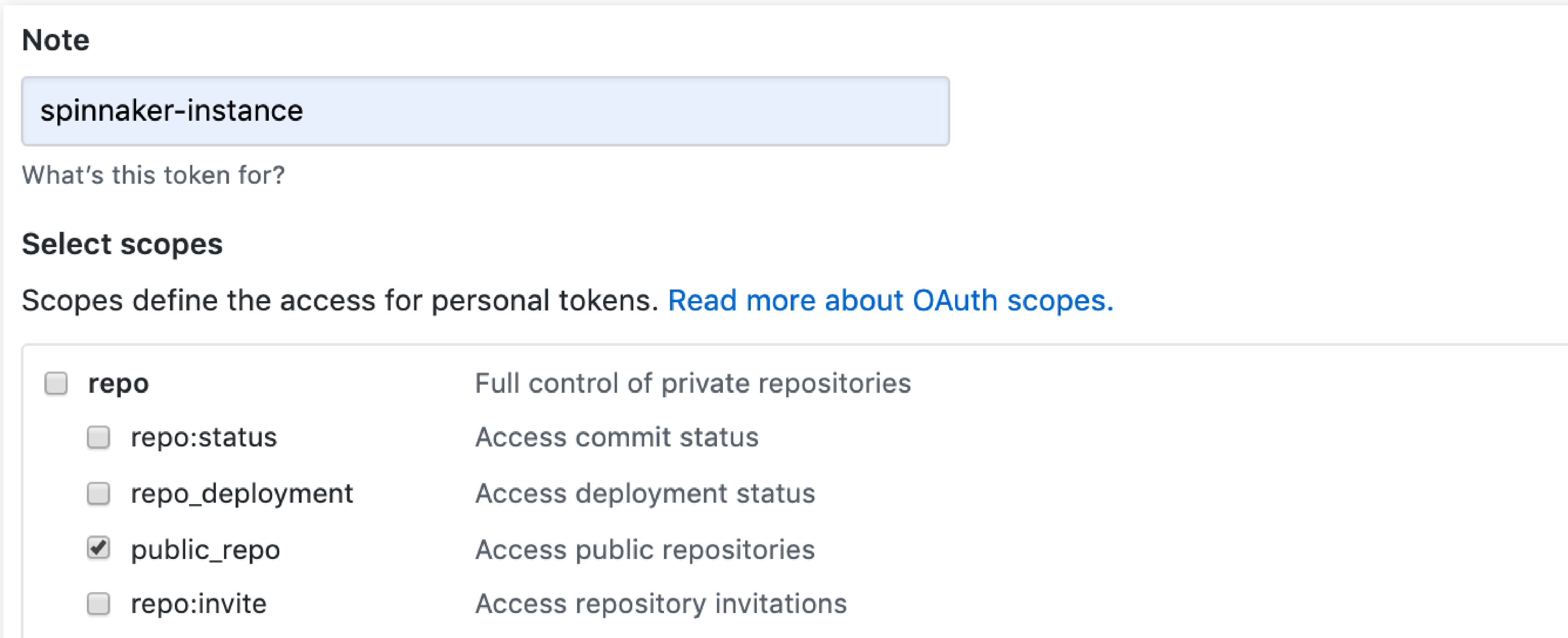
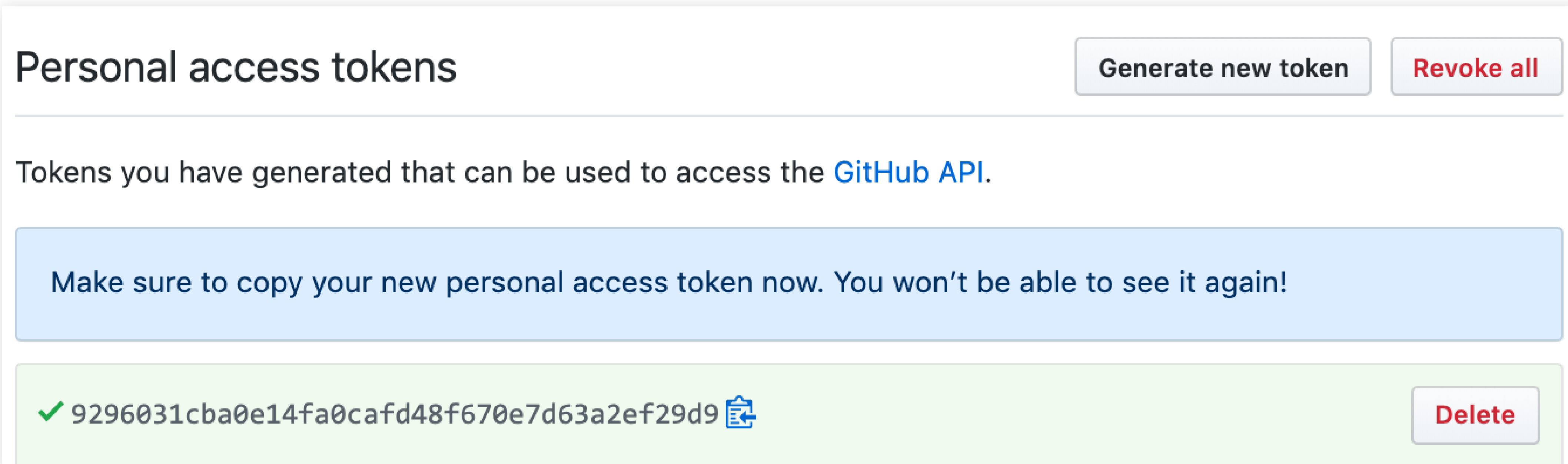


Figure 4. Allowing Use

COPYING THE TOKEN

- You have one shot to copy the token and secure it
- Copy it, by clicking on the clipboard icon next to the hash



SETTING UP THE TOKEN IN SPINNAKER

Paste the token and store it in a temporary file

```
pbpaste > token_file.txt
```

Setup some temporary fields for both the location of token file, and the github account name

```
TOKEN_FILE=~/token_file.txt
ARTIFACT_ACCOUNT_NAME=<github-username>-account
```

INSTALLING YOUR GITHUB CONNECTION

```
hal config features edit --artifacts true
hal config artifact github enable
```

Add your account:

```
hal config artifact github account add $ARTIFACT_ACCOUNT_NAME \
    --token-file $TOKEN_FILE
```

DEPLOY TO SPINNAKER

```
hal deploy apply
```

LAB 1: DEPLOYING EKS MICROSERVICES

EXPRESSIONS

EXPRESSIONS DEFINED

- Dynamically set and access variables during pipeline execution
- Any text field can use an expression
- Use them to:
  - Use arbitrary values about the state of your system in the execution of your pipelines.
  - Turn on or off particular stages or branches of your pipeline
  - Dynamically name your stack
  - Check the status of another stage
  - Perform other operations.

WHAT ARE EXPRESSIONS?

A pipeline expression is made up of $ followed by opening/closing brackets: `${ }`

```
${expression here}
```

STRING INTERPOLATION

```
${expressionA}-randomString-${expressionB}
```

Given "Hello" for `expressionA` and `world` for `expressionB`, this will result in:

```
Hello-randomString-world.
```

WHERE CAN EXPRESSIONS BE USED?

- Pipeline expressions any place in the UI where you can enter free-form text
- Exception of the pipeline **Configuration** stage with exception of Expected Artifacts and "Use Default Artifact"
- If text field is unavailable, there is a feature called **Edit as JSON**

WHEN ARE THEY EVALUATED

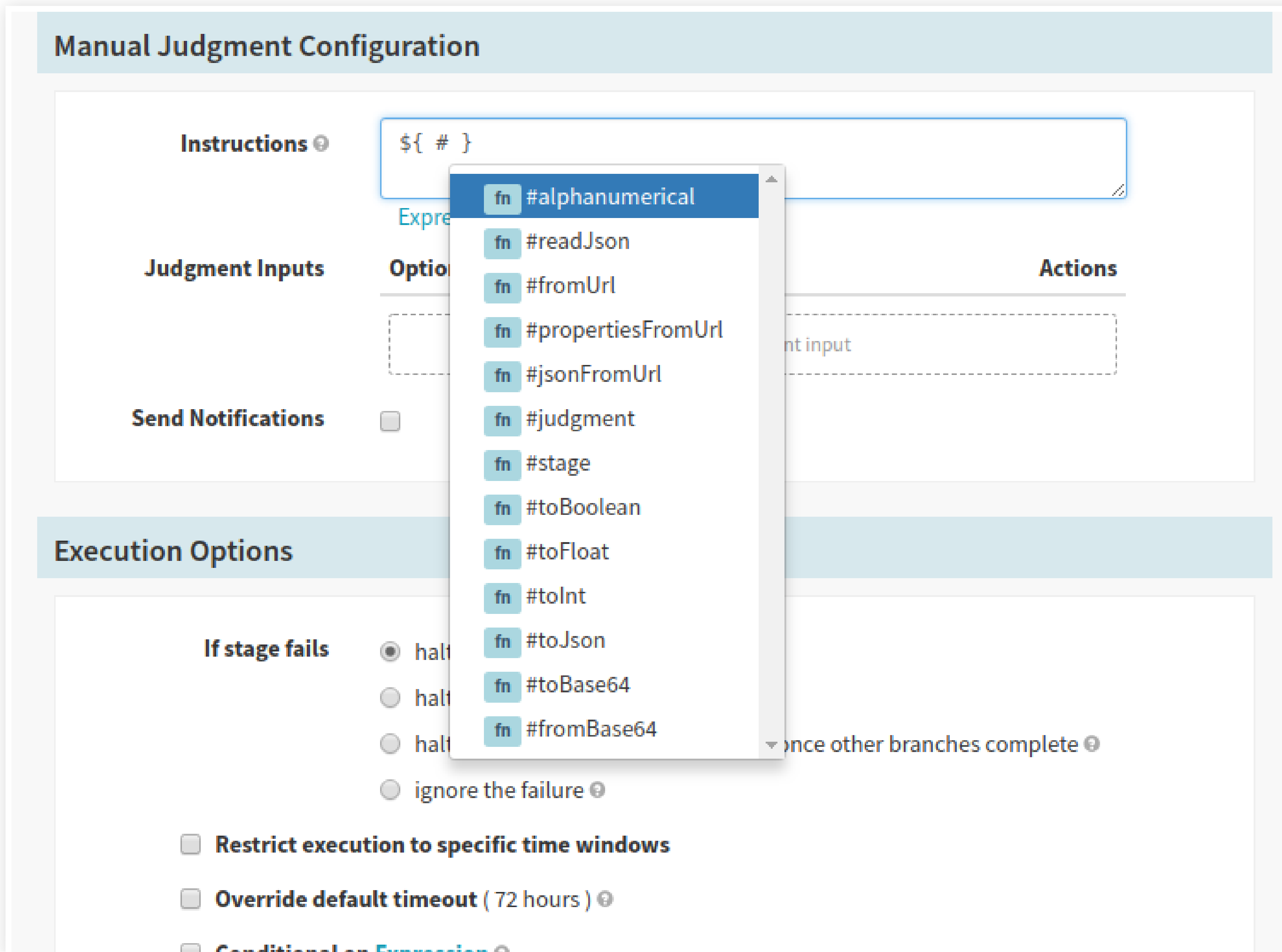
- Expressions are evaluated at the beginning of that stage
- **Configuration** needs to be evaluated *before* expression

HELPER FUNCTIONS

- Helper functions simplify common use cases
  - Access a particular stage by name
  - Strip non-alphanumerical characters
  - Parse JSON

FINDING HELPER FUNCTIONS

Adding a pound sign (#) within your pipeline expression displays a list of all the helper functions that are available



HELPER PROPERTIES

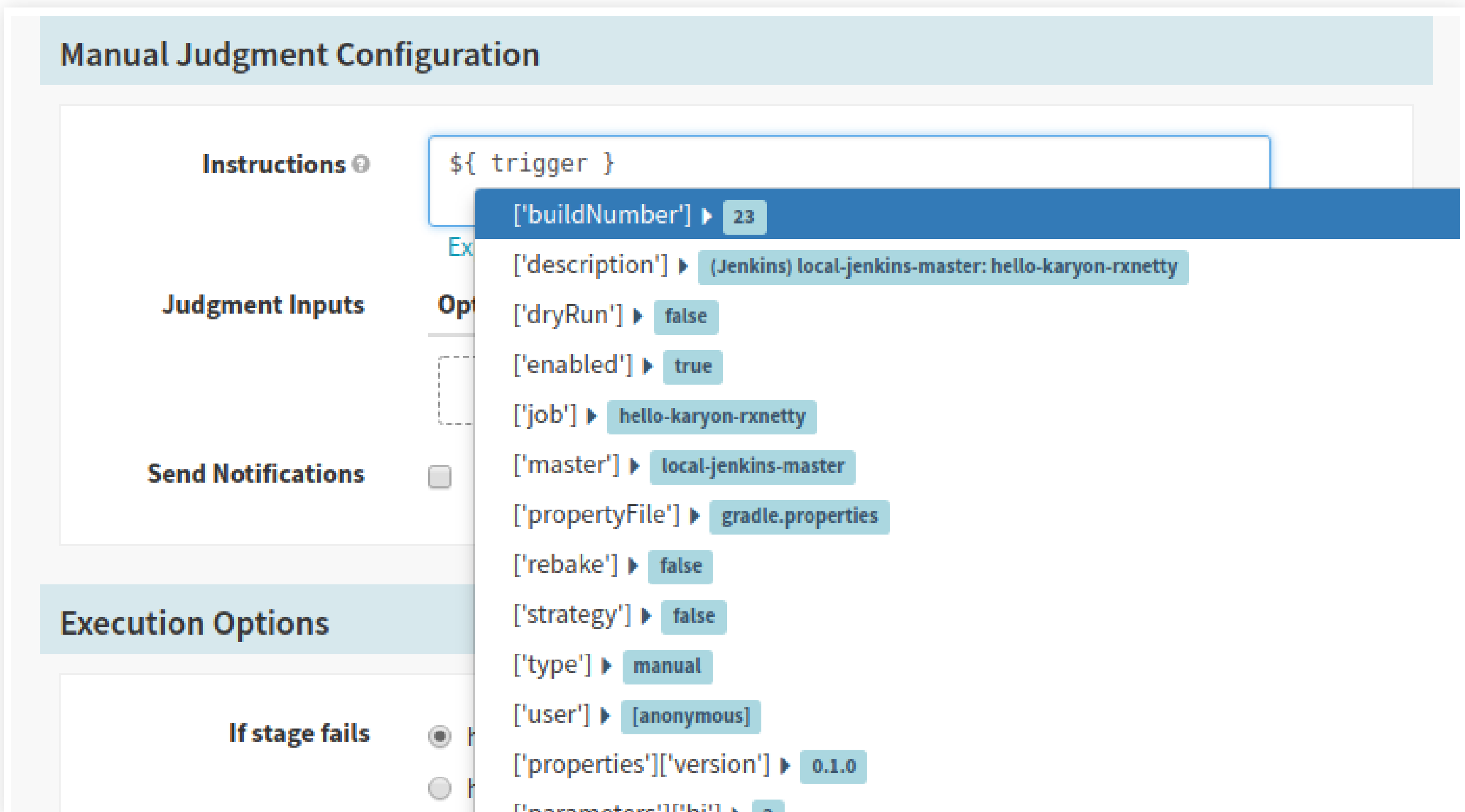
Helper properties are variables which refer to global information about the current pipeline execution.

- `execution` - refers to the current pipeline execution
- `trigger` - information about the pipeline trigger
  - e.g. Jenkins trigger and want to know which build triggered the current pipeline
  - `${trigger["buildInfo"]["number"]}`

GETTING HELP WITH HELPER PROPERTIES

- List available helper properties and stages enter a question mark (?) into your pipeline expression
- Type a little more of what you are looking for to narrow down your choices

> Once a helper property is added to the expression you can use any of the meta keys (Shift, Command, Alt, Control) to bring up a list of all the pipeline context that is relevant to the selected helper property.



CONTEXT VALUES

- *Context Values* are specific to a stage.
- Includes:
  - Stage Name
  - Status
  - Start and End Time

FINDING CONTEXT VALUES

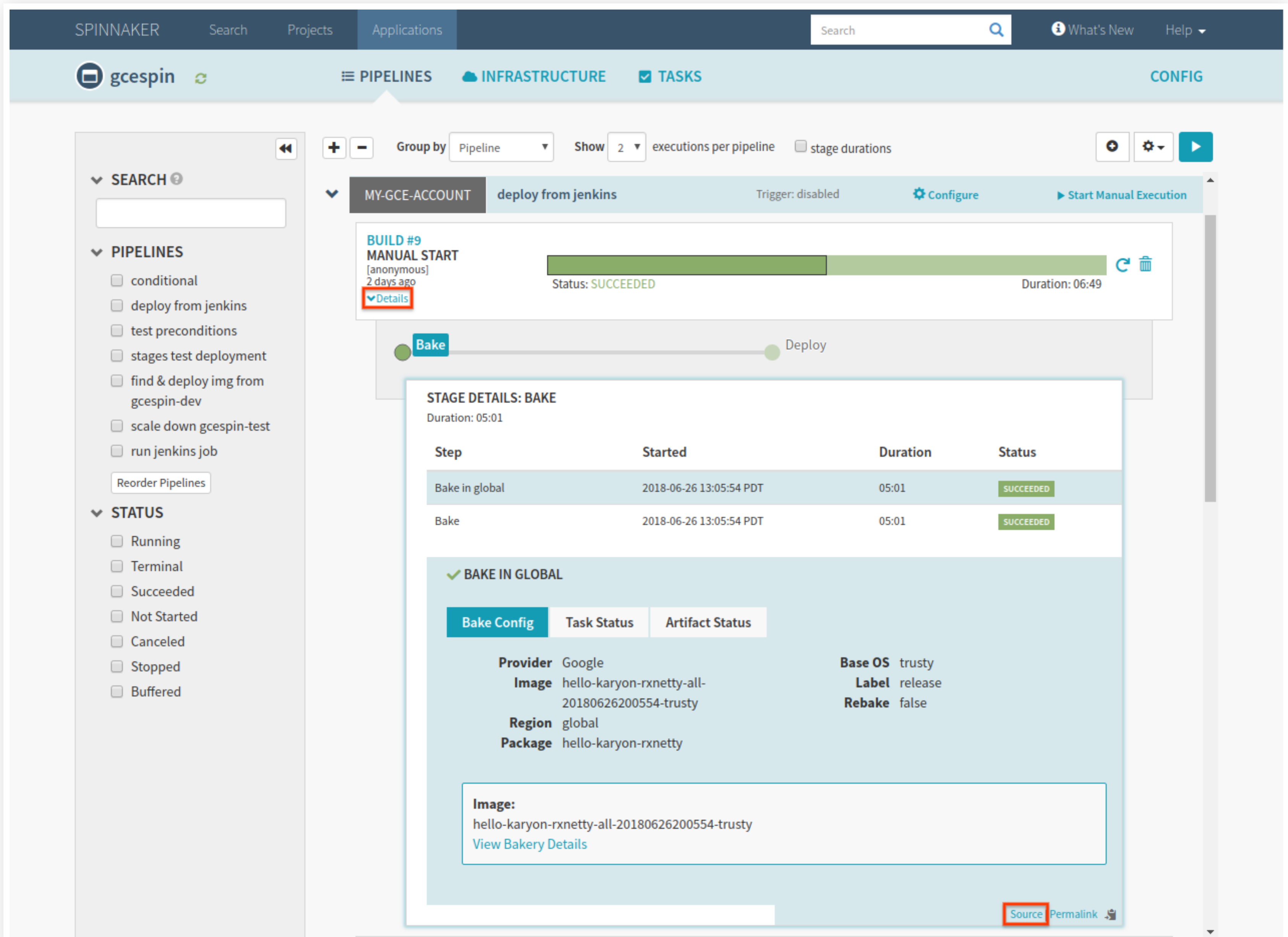
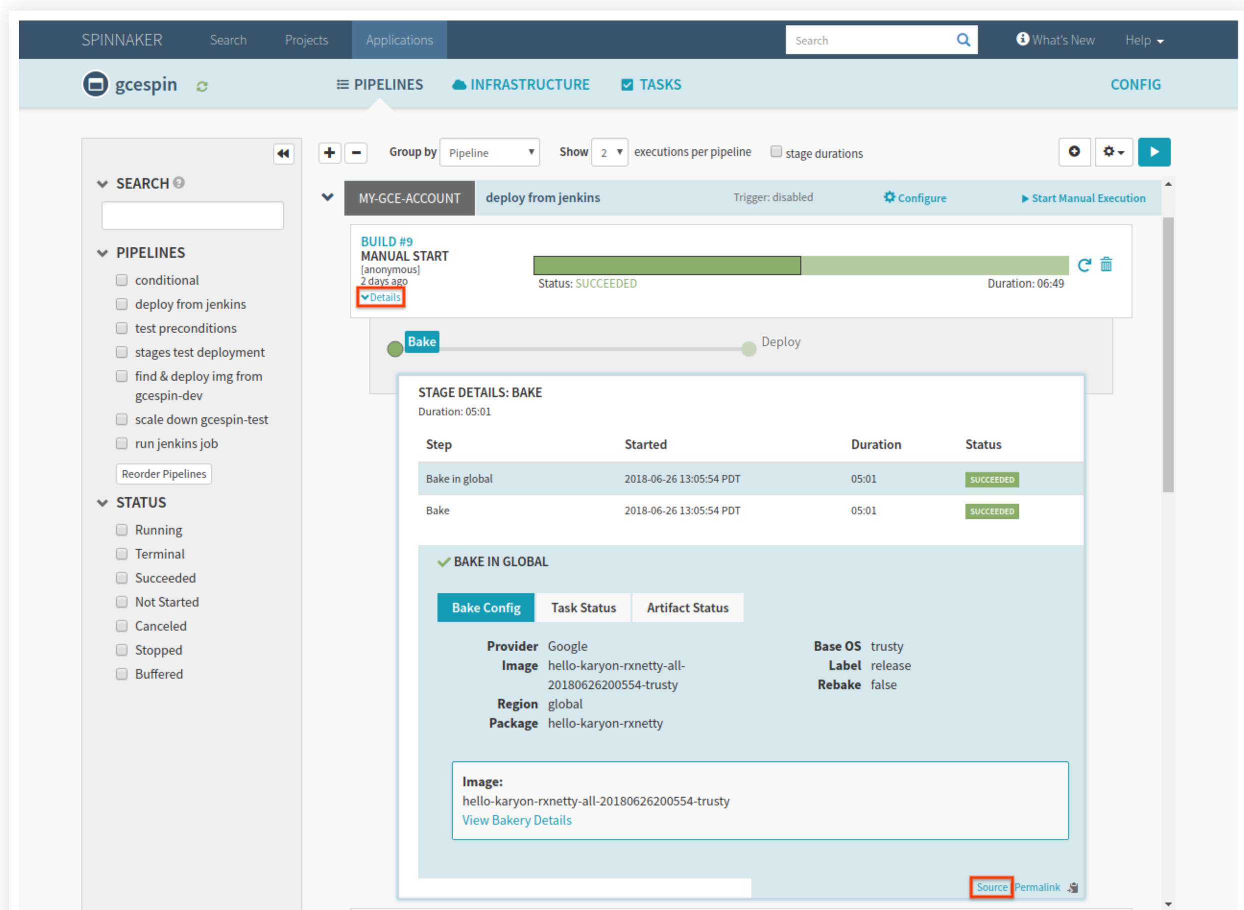


Figure 5. Click on the source link under the pipeline execution, which opens a new tab containing the JSON details of your pipeline execution.

TESTING PIPELINE EXECUTIONS

- Testing is done through the API
- You need a running instance of Spinnaker
- Use **Source** of any stage and identify the pipeline execution



USING `curl`

You can then use `curl` to test your expression

```
PIPELINE_ID=[your_pipeline_id]
curl http://api.my.spinnaker/pipelines/$PIPELINE_ID/evaluateExpression \
       -H "Content-Type: text/plain" \
       --data '${ #stage("Deploy").status.toString() }'
```

This then returns if successful

```
{"result": "SUCCEEDED"}
```

PIPELINE UNSUCESSFUL


```
{
  "detail":
    {
      "{ #stage(\"Deploy\").status.toString() ":
        [
          {
            "description":
              "Failed to evaluate [expression] Expression
              [{ #stage( #root.execution, \"Deploy\").status.toString()
]
              @0: No ending suffix '}' for expression starting at
character 0:
              { #stage( #root.execution, \"Deploy\").status.toString()
",
```

LAB 2: USING EXPRESSIONS

BAKING

Baking turns templates into manifests with the help of a templating engine. Helm relies on the `helm template` command to produce yaml files

REMINDER ON HELM TEMPLATES

We can take any `yaml` resource meant for Kubernetes

```yaml
apiVersion: v1
kind: ConfigMap
metadata:
  name: mychart-configmap
data:
  myvalue: "Hello World"
```

TEMPLATIZE HELM TEMPLATES:

We can then templatize it with a release, called *release name*

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: {{ .Release.Name }}-configmap
data:
  myvalue: "Hello World"
```

`{{ .Release.Name }}` will be replaced by the name of the release when the end user runs

DEBUGGING OUR CHART

```
helm install --debug --dry-run goodly-guppy ./mychart
```

RESULT CHART

```
apiVersion: v1
kind: ConfigMap
metadata:
  name: goodly-guppy-configmap
data:
  myvalue: "Hello World"
```

HELM CHARTS OFFERS A LOT

- Values
- Defaults
- Template Functions and Pipelines
- Flow Control
- Variables
- Embedded Templates

Read more: https://helm.sh/docs/chart_template_guide/getting_started/

INTENTIONS

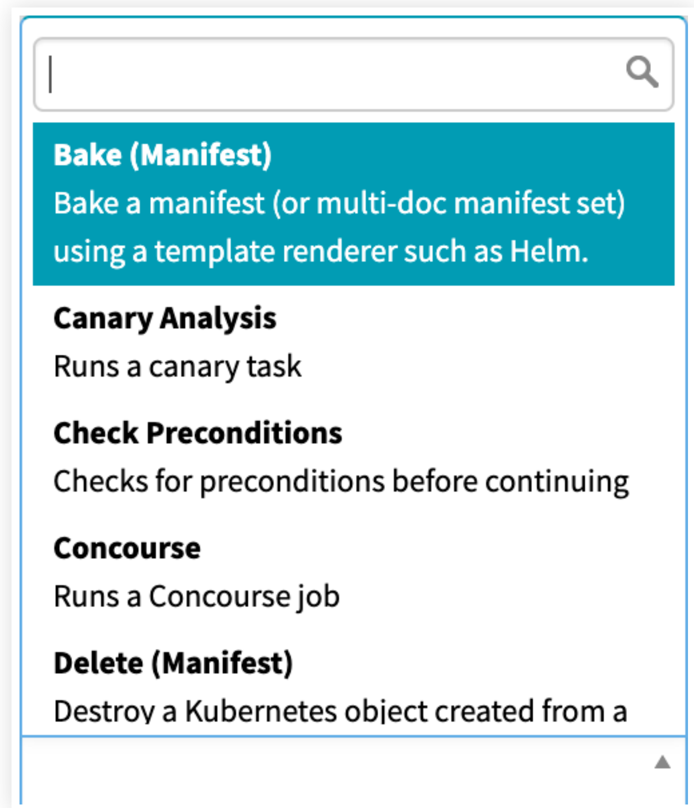
This stage is intended to help you package and deploy applications that you own, and are actively developing and redeploying frequently. It is not intended to serve as a one-time installation method for third-party packages. If that is your goal, it's arguably better to call helm install once when bootstrapping your Kubernetes cluster.

CONFIGURE ARTIFACT SUPPORT IN HAL

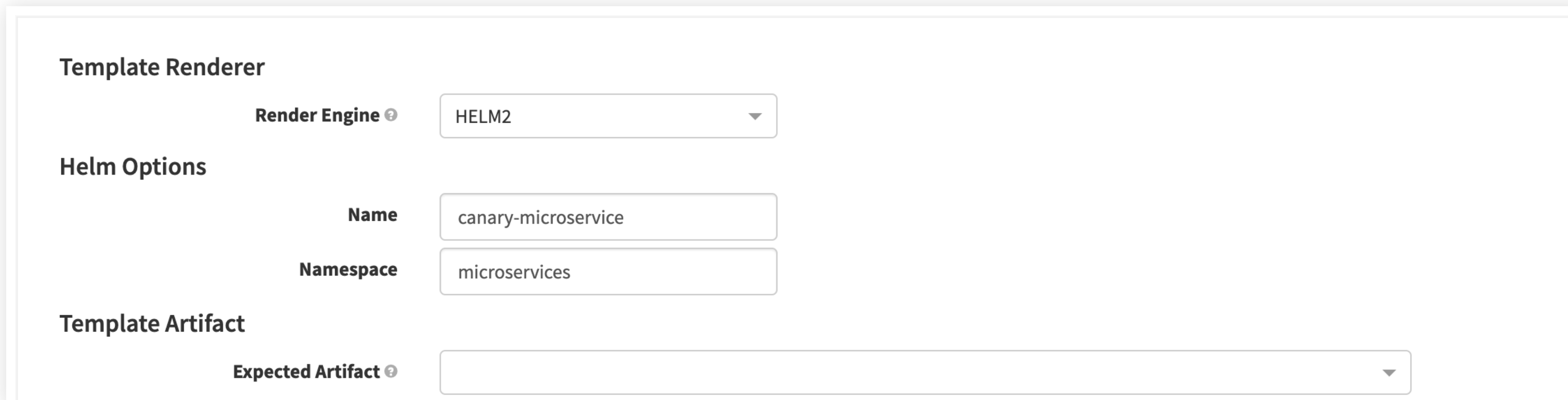
- Make sure that you have configured artifact support in Spinnaker first in Halyard
- All Helm charts are fetched/stored as artifacts in Spinnaker

CREATE A BAKE MANIFEST STAGE

- Create a "Bake (Manifest)" stage



CONFIGURE THE BAKE MANIFEST STAGE



CONFIGURE THE BAKE MANIFEST STAGE DETAIL

- Enter the release name (required) - The Helm release name for this chart. This determines the name of the artifact produced by this stage
- The template artifact (required) - The Helm chart that you will be deploying, stored remotely as a `.tar.gz` archive
- The release namespace - The Kubernetes namespace to install release into. If parameter is not specified default namespace will be used
- Zero or more override artifacts (optional) - The files passed to `--values` parameter in the helm template command. Each is a remotely stored artifact representing a Helm Value File.
- Statically specified overrides - The set of static of `key/value` pairs that are passed as `--set` parameters to the `helm template` command.

HELM CHARTS AND NAMESPACE

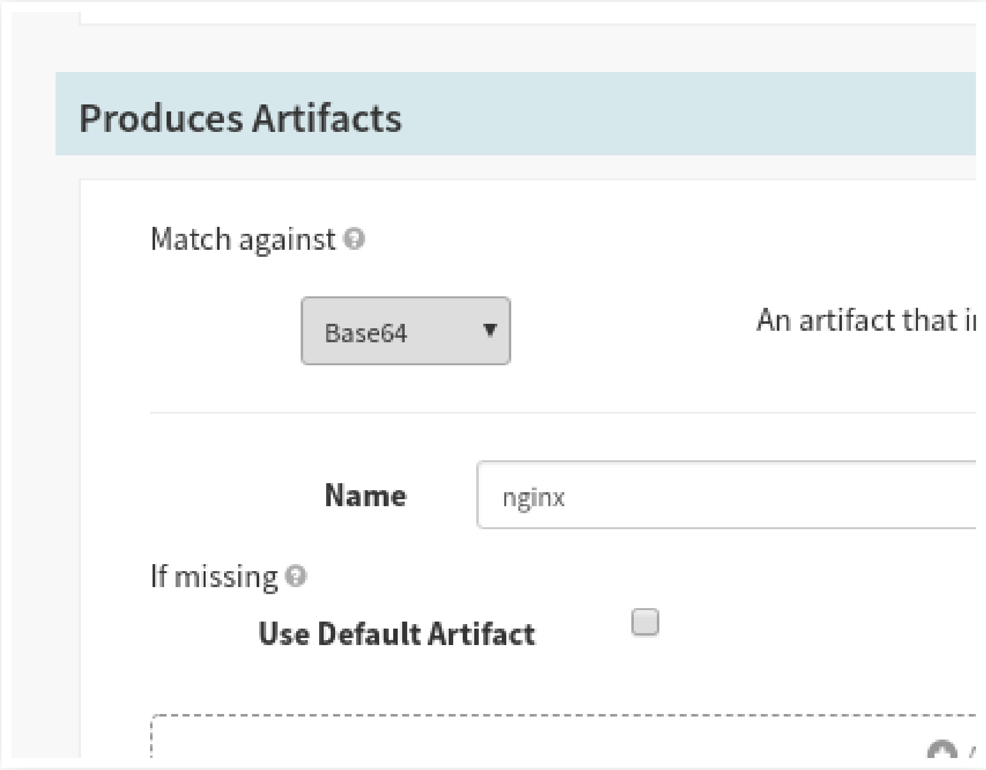
Make sure you have `namespace` declaration in your helm chart if you are overriding the `namespace`

```
metadata:
  namespace: {{ .Release.Namespace }}
```

PRODUCING BAKED ARTIFACTS

In the "Produces Artifacts" section:

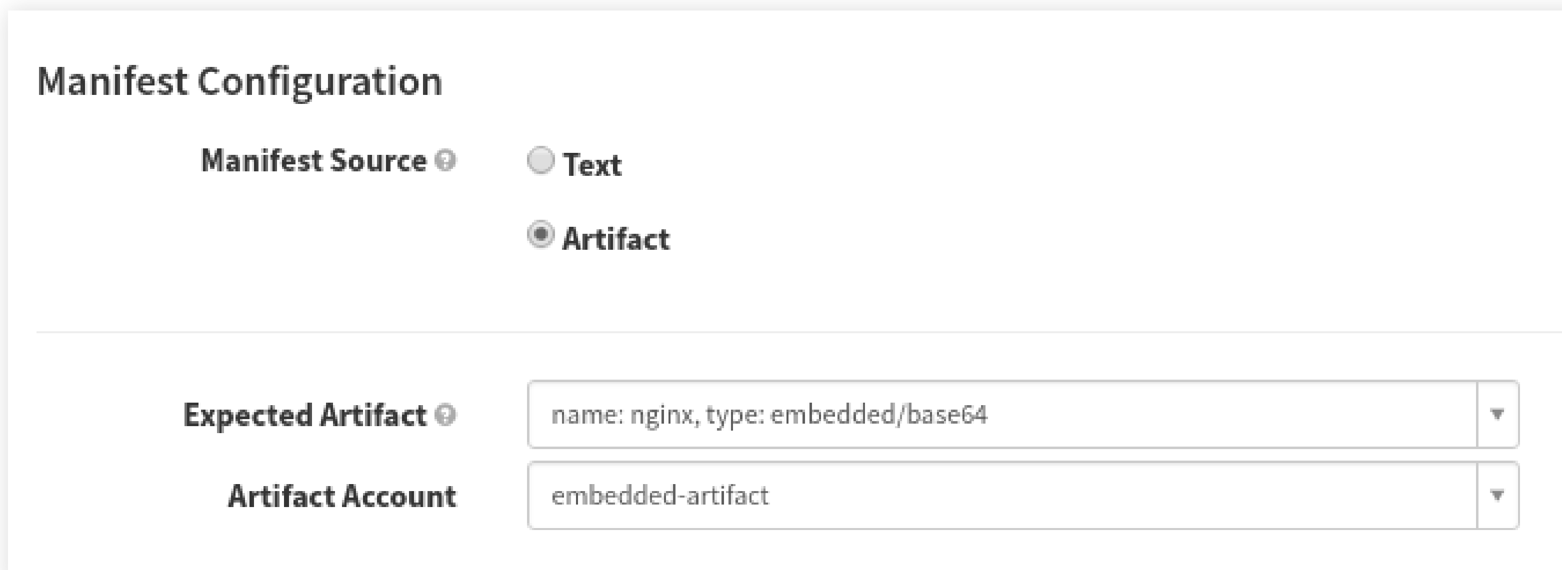
- Spinnaker has automatically created an `embedded/base64` artifact
- The artifact is bound when the stage completes
- Represents the fully baked manifest set to be deployed downstream



CONFIGURE DOWNSTREAM DEPLOYMENT

Now that the manifest set has been baked by Helm

- Configure a downstream stage (in the same pipeline or in one triggered by this pipeline)
- Deploy the artifact produced by the “Bake (Manifest)” stage



Note: Make sure to select "embedded-artifact" as the artifact account for your `base64` manifest set. This is required to translate the manifest set into the format required by the deploy stage.

LAB 3: DEPLOYING HELM MICROSERVICES

ROLLBACKS

AUTOMATIC ROLLBACKS

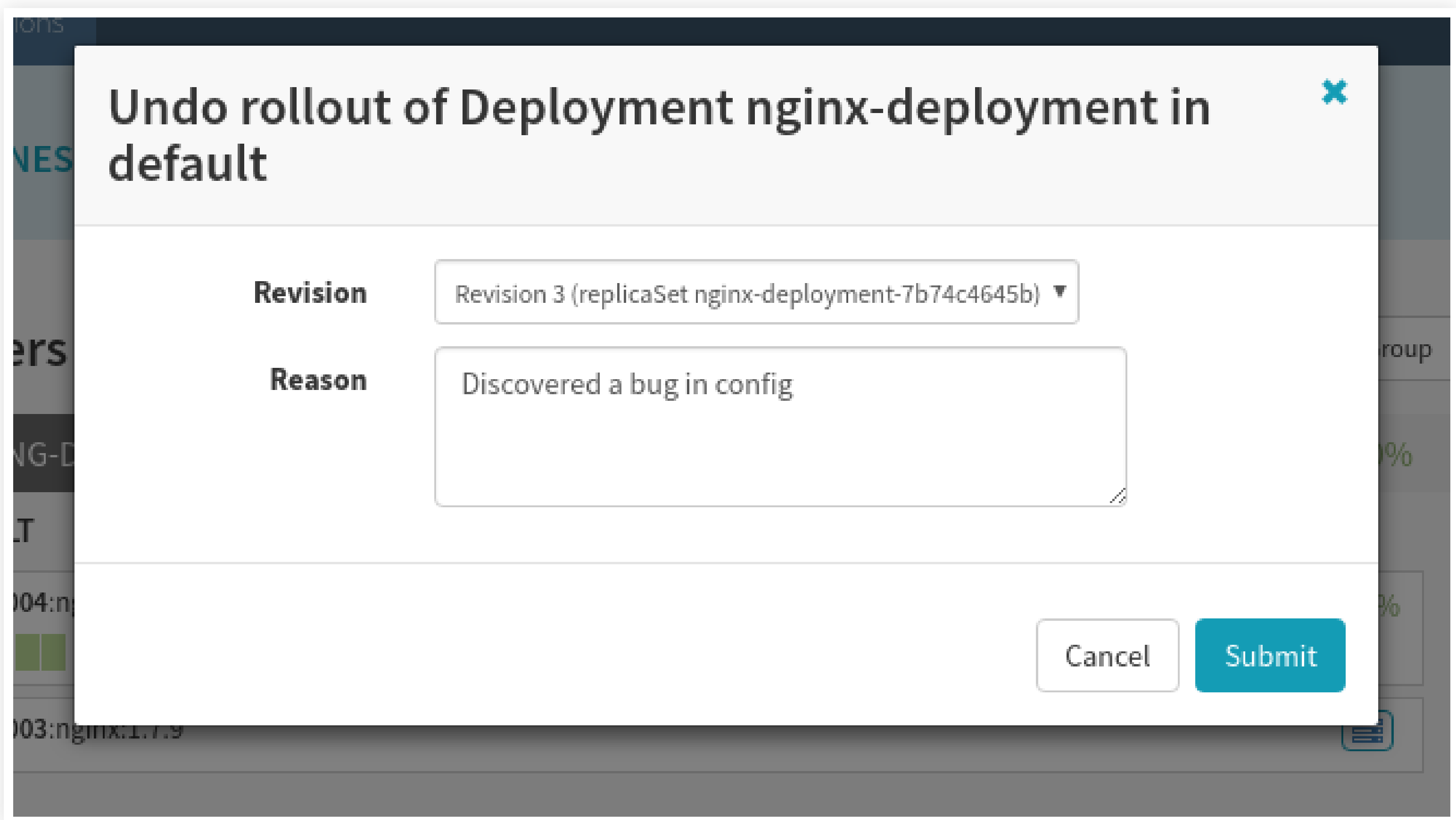
- Having manifests is optimal, IaC
- Rollbacks though are necessary when things go wrong

VIEWING THE ROLLBACKS

- When using a Kubernetes `Deployment`, history of rollouts is in the `Clusters` tab of your Application
- Spinnaker exposes “Undo Rollout” functionality in two places:
  - Clusters tab
  - Pipeline stage

AD HOC ROLLBACKS

- In cases where you see something is immediately wrong and isolated to a resource in the “Clusters” tab
- You can select “Undo Rollout” from the “Actions” dropdown
- This provides an opportunity to select a healthier alternative



AUTOMATED ROLLBACKS

- You can also configure automated rollbacks inside of Spinnaker pipelines.
- These stages are best configured to run when other stages or branches fail, indicating that something has gone wrong in your rollout.
- Number of Revisions Back:
  - Counts how many revisions the current active revision should be rolled back by. If you have the following state:

```
nginx-deployment-2d8178b77 (Revision 5) # active
nginx-deployment-7bdd110f7 (Revision 4)
nginx-deployment-0b13cc8c1 (Revision 1)
```

And roll back by `"1"` revision, `(Revision 4)` will be active again. Roll back by `"2"` revisions and `(Revision 1)` will be active again.

Keep in mind that Kubernetes will implicitly roll-forward the old configuration, creating `(Revision 6)` in both cases.

PARAMETERIZED ROLLBACKS

- Parameterize the target resource to roll back
- Reference anything via pipeline expressions
- Point to something specified using pipeline parameters, for example:
    - Upstream deploy stage
    - Another stage’s outputs
    - Using pipeline expressions.

VERSIONING ARTIFACTS

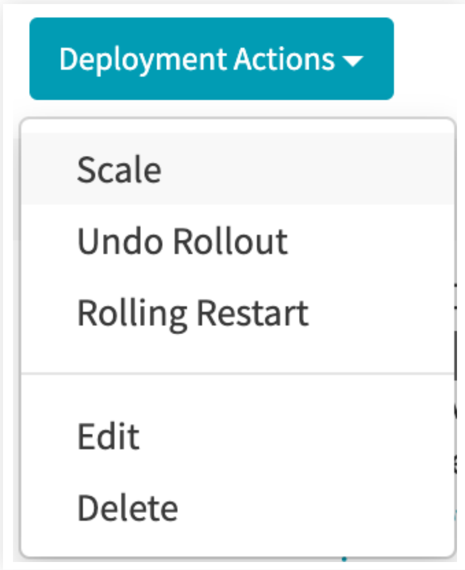
- Rolling Back will not work unless artifacts are versioned, this includes:
  - Docker images
  - `ConfigMap`
  - Kubernetes Secrets

Source: https://blog.questionable.services/article/kubernetes-deployments-configmap-change/

SCALING

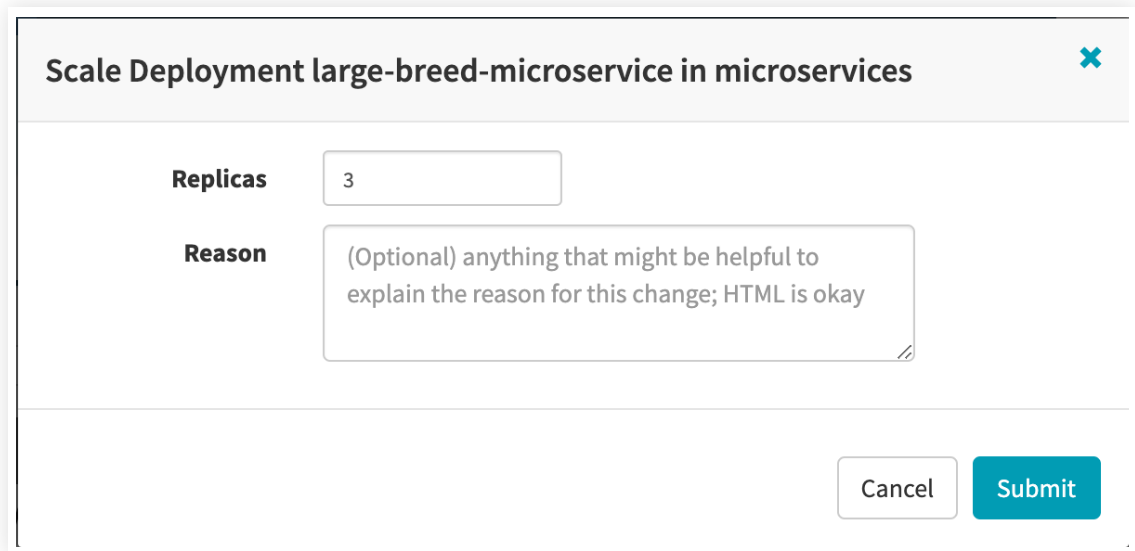
SCALING RESOURCES

From the **Clusters** Page and selecting the Deployment you can scale the Replica Sets supports



SELECT THE REPLICAS

You can then select the number of replicas you wish to either increase or decrease



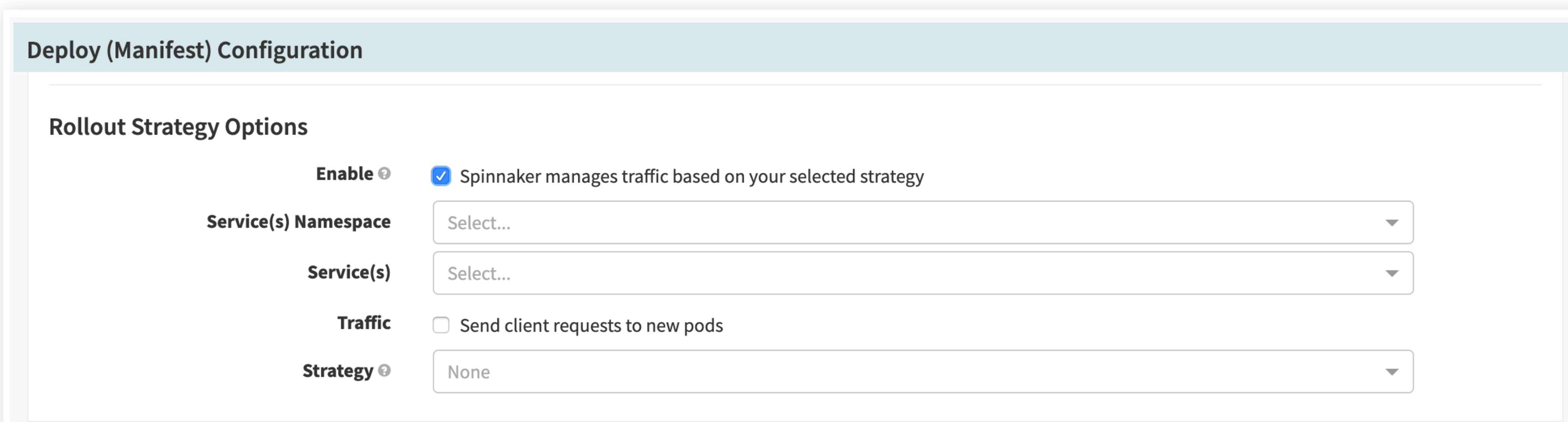
If you want the number of replica sets permanent, be sure to update your yaml file, changes will not be persisted

ROLLOUT STRATEGIES

- Deploys your containers as either:
  - Dark Rollouts
  - Highlander
  - Red/Black (also known as Blue/Green)
- Is only valid for Kubernetes `ReplicaSet`
- Verifies health checks
- Disables old server groups
- Enabling new server groups

CONFIGURATION OPTIONS

- Configuration options allow you to associate a workload with one or more services
- Decide whether the workload should receive traffic, and determine how Spinnaker should handle any previous versions of the workload in the same cluster and `namespace`



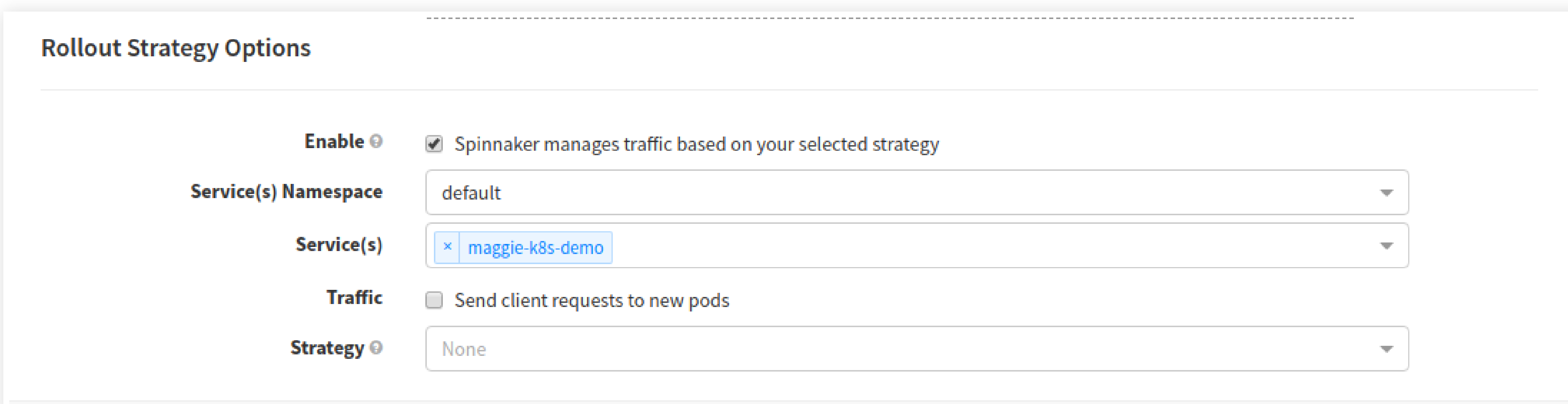
CONFIGURATION DETAILS

- Service namespace - Select the namespace containing the service(s) you would like to associate with the workload.
- Service(s) - Select one or more services you would like to associate with the workload. Spinnaker will add a traffic.spinnaker.io/load-balancers annotation listing the selected services as described here.
- Traffic - Check this box if you would like the workload to begin receiving traffic from the selected services as soon as it is ready. If you do not check this box, you can add a subsequent Enable (Manifest) stage to begin sending traffic to the workload.
- Strategy - Select a strategy if you would like Spinnaker to handle previous versions of the workload currently deployed to the same cluster and namespace. Select None if you do not want Spinnaker to take any action regarding existing workloads.

STRATEGIES

DARK ROLLOUTS

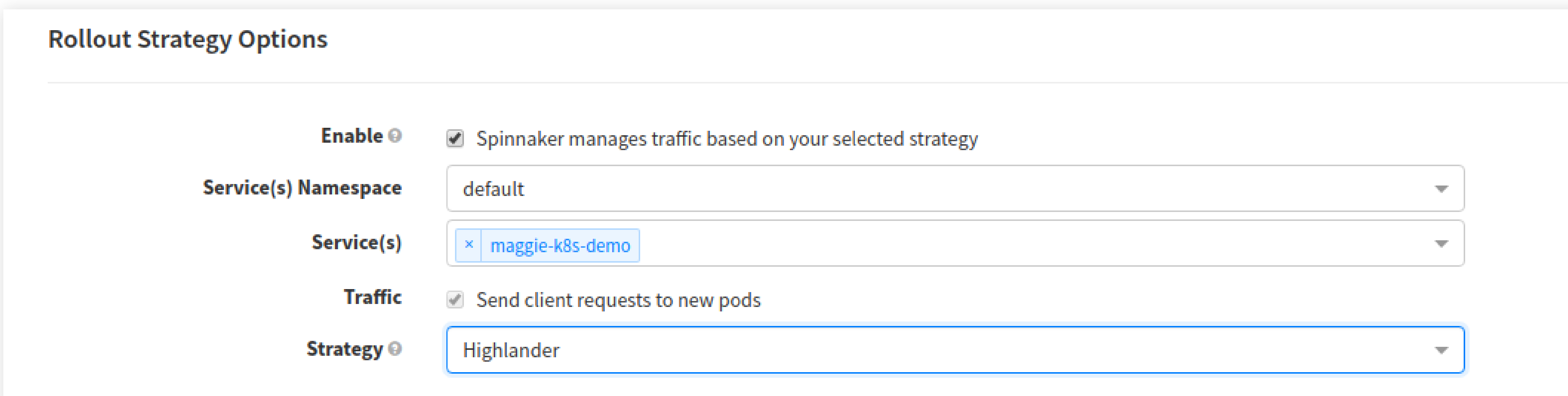
- Use a dark rollout to deploy a new version of your application alongside the existing version(s)
- Does not immediately route any traffic to the new version.
- Add subsequent Enable (Manifest) and Disable (Manifest) stage to begin sending traffic to the new version and stop sending traffic to the old version(s).



HIGHLANDER

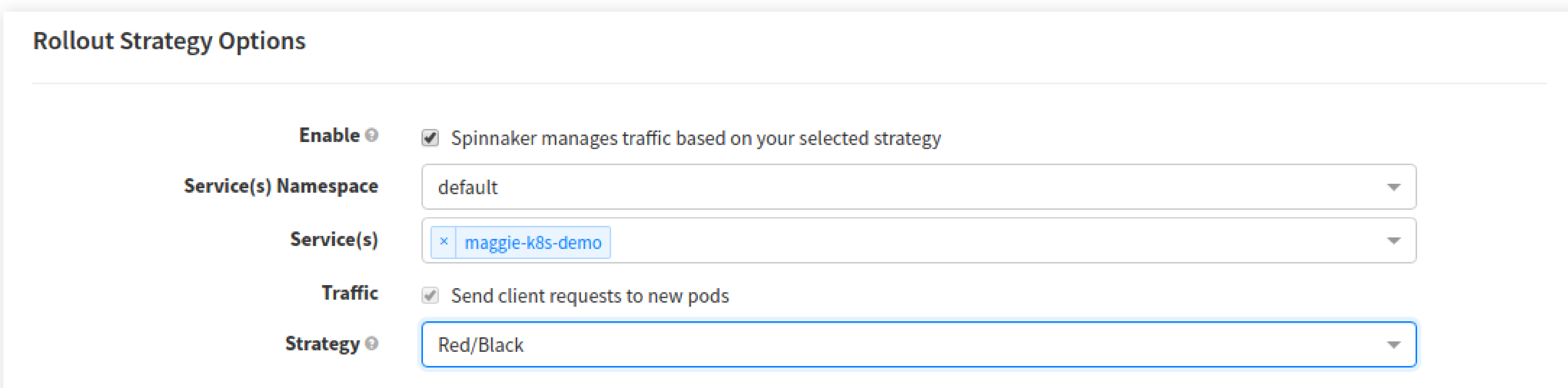
"There can be only one" — Highlander (1986)

- Deploy a new version of your application alongside the existing version(s)
- Send client traffic to the new version
- Then disable and destroy existing versions in the cluster



RED/BLACK (BLUE/GREEN)

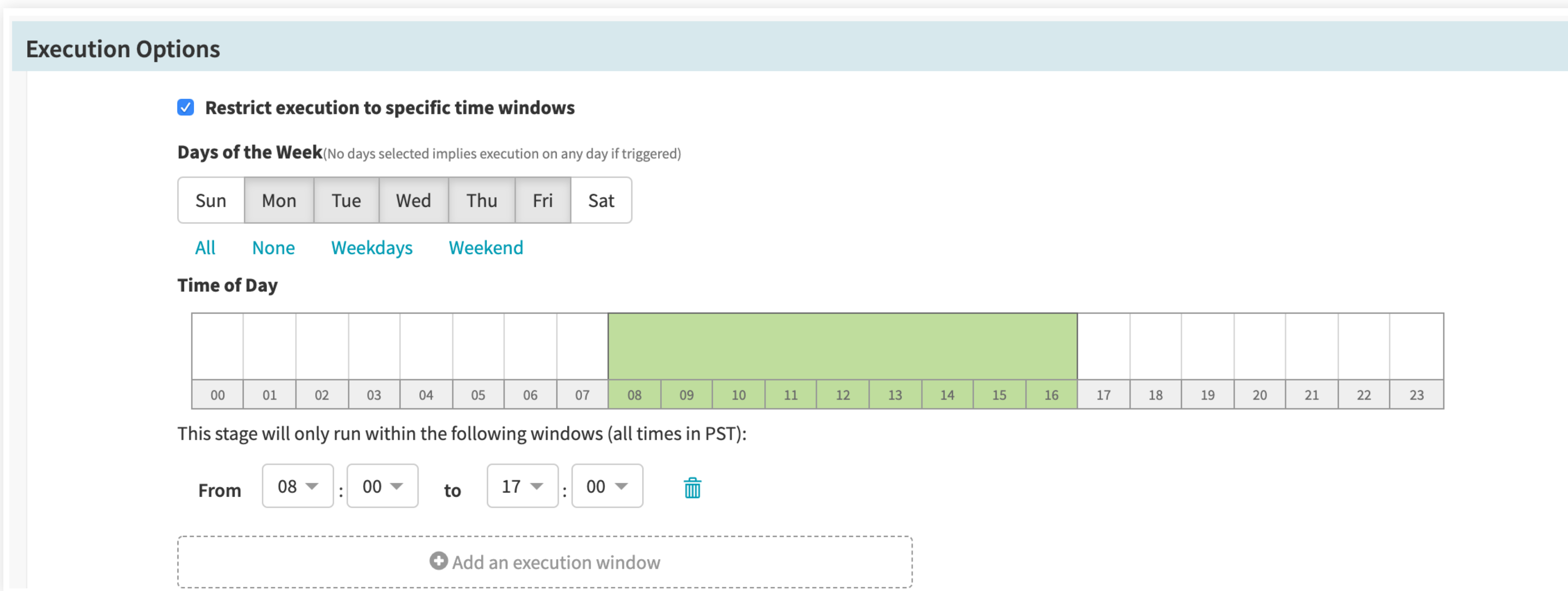
- Red/black rollout to deploy a new version of your application alongside the existing version(s)
- Send client traffic to the new version, and then disable existing versions in the cluster
- Optionally, add subsequent Destroy (Manifest) stages to clean up any unwanted workloads in the cluster
- Alternately, easily roll back to a previous version by:
  - Configuring an **Enable (Manifest)** stage
  - Or using an ad-hoc Enable operation from the Clusters tab.



RESTRICT EXECUTION

EXECUTION WINDOWS

- Execution windows allow you to restrict the times of the day or week when deployments can happen.
- By using execution windows, you can ensure that deployments don't interfere with times where your service is at peak demand.
- You can also use execution windows to make sure that there is always someone in the office ready to manually intervene or rollback your pipeline.



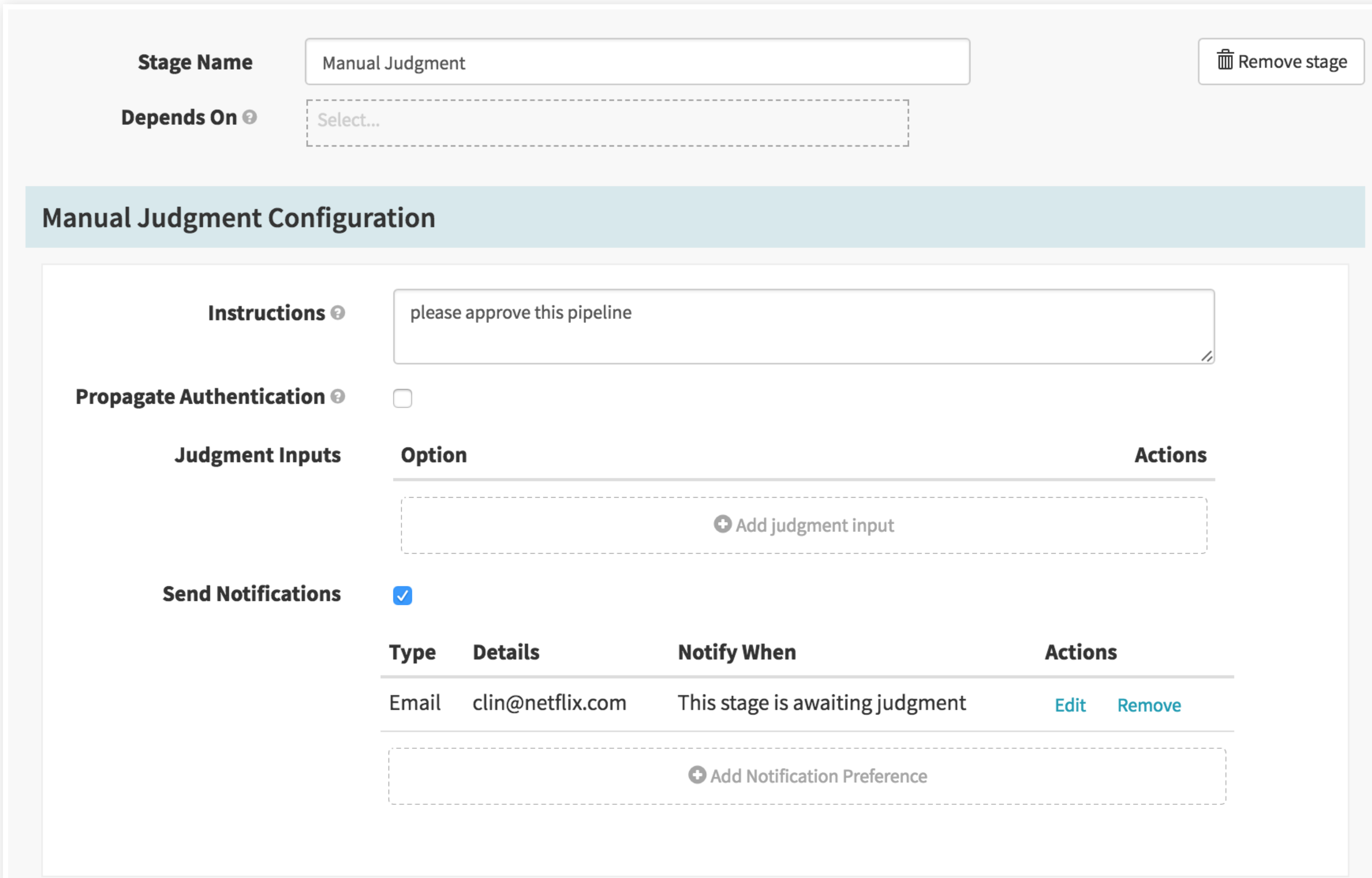
MANUAL JUDGMENT

MANUAL JUDGMENT DEFINED

Manual Judgments serve as a gate for your pipeline You can add manual judgment stages to interrupt the pipeline execution to run a manual check This is great for teams that have a manual or out-of-band QA process

1. Click on Configuration and select **Add New Stage**
2. Enter "Please approve this pipeline" in the instructions

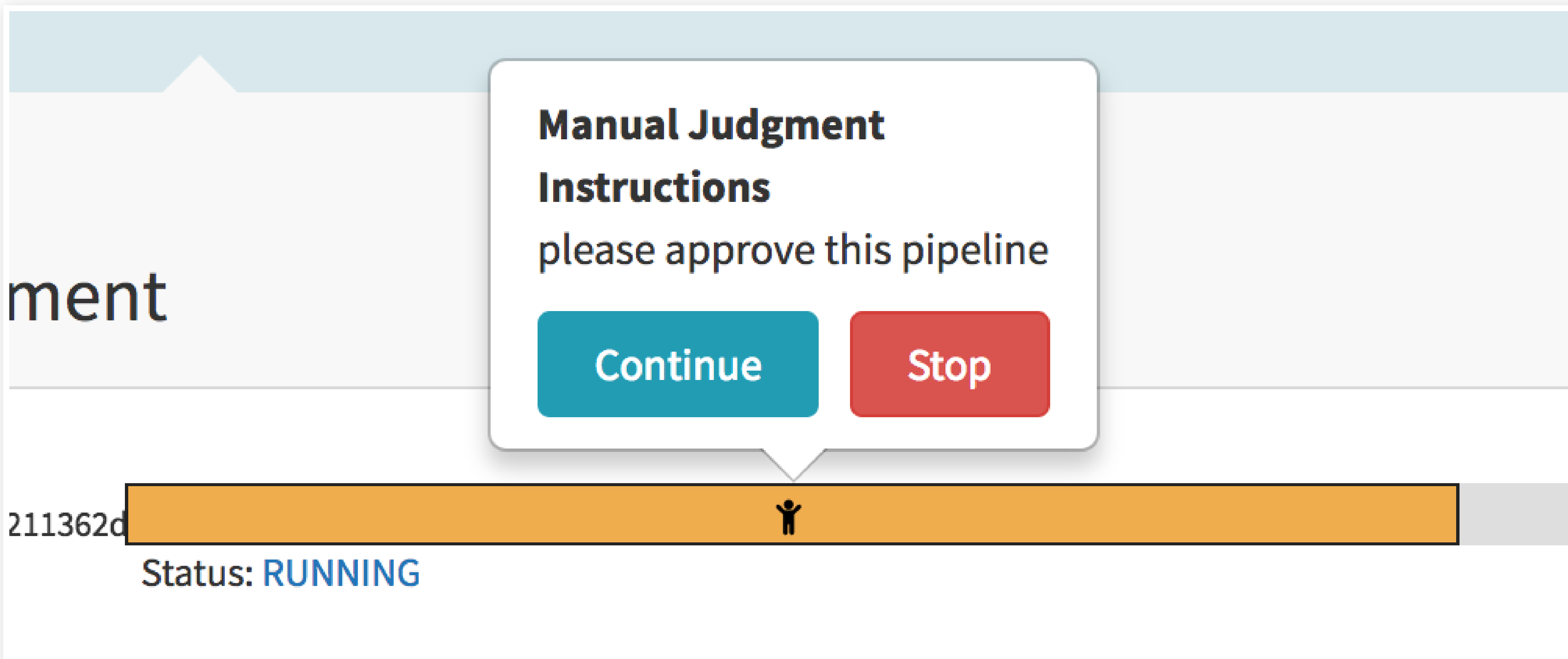
NOTIFICATIONS WITH MANUAL JUDGMENT



NOTIFICATIONS WITH MANUAL JUDGMENT

1. Click on **Add Notification Preference**
2. In the popup dialog:
    1. Select type Email
    2. Enter your email address
    3. Select to notify when **This stage is awaiting judgment**.
    4. Click **Update**

WAITING FOR APPROVAL

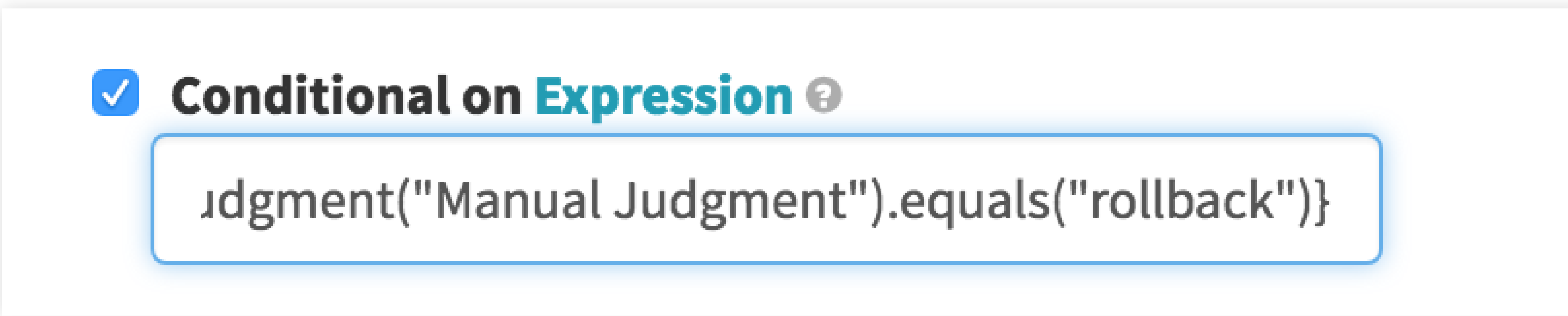


CHANGING PIPELINE ON SELECTED JUDGMENT

You can enter in your own choices and use SpEL to respond to the answers

TRIGGERING ON CHOICE

Once applied you can create a subsequent stage that will conditionally trigger on your choice, using Expressions (SpEL)



CANARY DEPLOYMENT

WHAT IS IT?

- Canary is a deployment process in which a change is partially rolled out then evaluated against the current deployment (baseline)
- Ensure that the new deployment is operating at least as well as the old.
- This evaluation is done using key metrics that are chosen when the canary is configured.
- Microservices would need to expose some of their metrics
- Canaries are usually run against deployments containing changes to code, but they can also be used for operational changes, including changes to configuration.

PREREQUISITES

- Have metrics to evaluate
  - Provide metrics in your microservice application
  - Either deploy metrics or have it scraped
  - Support is built in for:
    - StackDriver
    - Datadog
    - Prometheus
    - SignalFx
    - NewRelic

PROCESS

- Enable Canary
- Create one or more canary configurations
- Add one or more canary stages

ENABLE CANARY

- Use Halyard
- Setup *one* Metrics Service
- Setup *one* a Storage Service

SETTING UP CANARY ANALYSIS

```
hal config canary enable
```

SETTING UP THE SCOPE

- Each configuration is visible to all canary pipeline stages
- It can be configured so that it is only visible to the application where it was created

```
hal config canary edit --show-all-configs-enabled false
```

SETTING UP THE CANARY JUDGE

- The current default judge is `NetflixACAJudge-v1.0`
- A judge accesses the quality of your deployment against the baseline
- Each is compared to determine any degradation
- Other judges are available and are pluggable

```
hal config canary edit --default-judge JUDGE
```

IDENTIFY YOUR METRICS PROVIDER

```
hal config canary edit --default-metrics-store STORE
```

`STORE` can be:

- atlas
- datadog
- stackdriver
- prometheus
- newrelic

PROVIDE A DEFAULT METRICS ACCOUNT

- Add the account name to use for your metrics provider
- Default can be overridden

```
hal config canary edit --default-metrics-account ACCOUNT
```

PROVIDE THE DEFAULT STORAGE ACCOUNT

- Add the account name to use for your storage provider
- Default can be overridden

```
hal config canary edit --default-storage-account ACCOUNT
```

SETTING UP PROMETHEUS

```
hal config canary prometheus enable
```

MANAGE OR VIEW PROMETHEUS ACCOUNT FOR CANARY

Add a Halyard/Spinnaker account to Prometheus

```
hal config canary prometheus account add ACCOUNT --base-url
```

Edit a Halyard/Spinnaker account to Prometheus

```
hal config canary prometheus account edit ACCOUNT --base-url
```

Operations for `delete` and `list` are also available

CREATE A CANARY CONFIGURATION

- Canary configuration is done per *application*
- Each Application will have one or more configurations
- Stages are defined separately

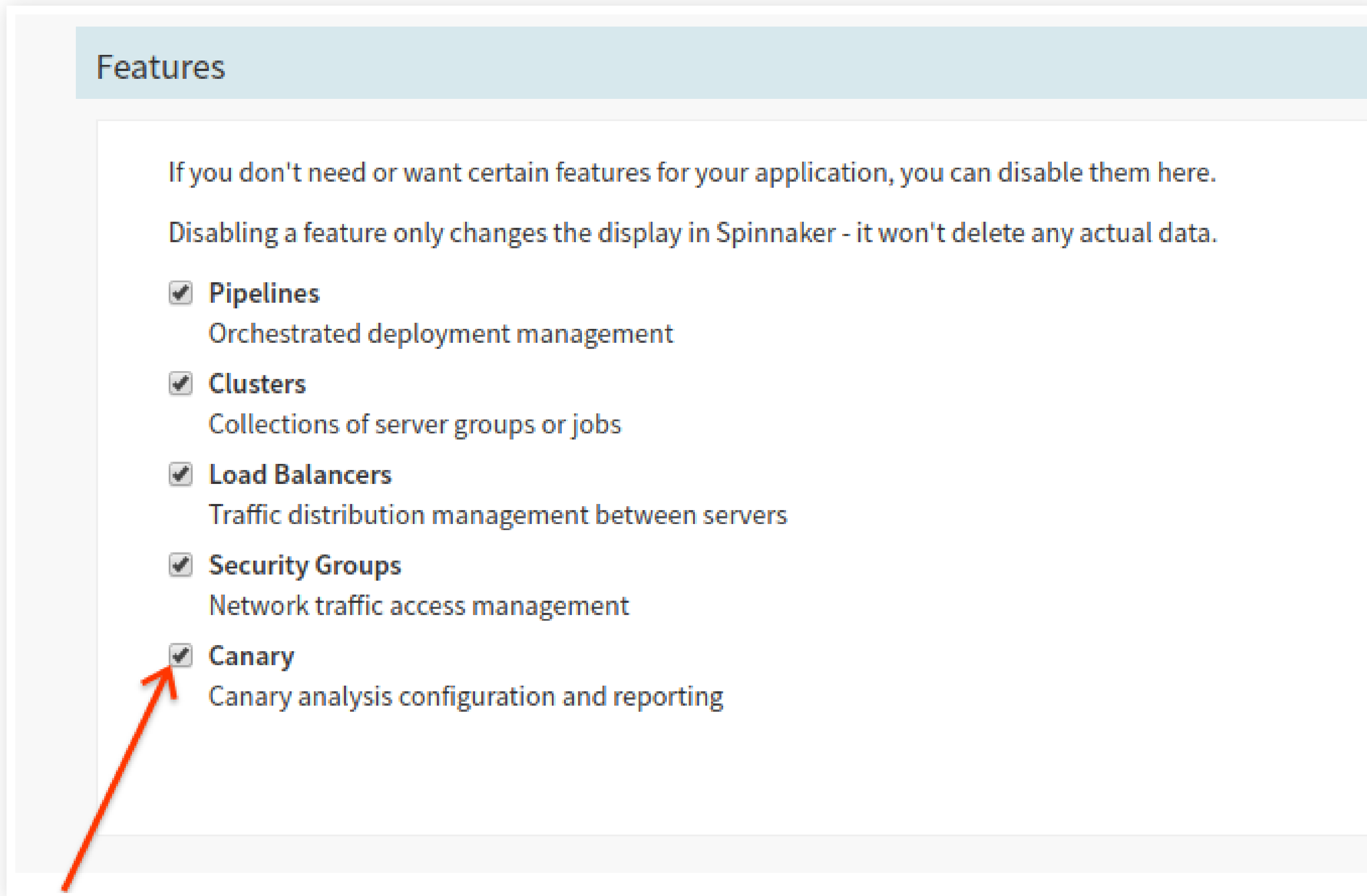
WHAT YOU WILL BE ADDING INTO A CANARY CONFIGURATION

You will be adding the following to your canary configuration:

- A name by which a canary stage can choose this configuration
- The specific metrics to evaluate, and a logical grouping of those metrics
- Default scoring thresholds (which can be overridden in the canary stage)
- Optionally, one or more filter templates

ENABLING CANARY AT THE USER LEVEL

- In the Application config, activate the Canary option
- Do this separately for all applications that will use automated canary analysis



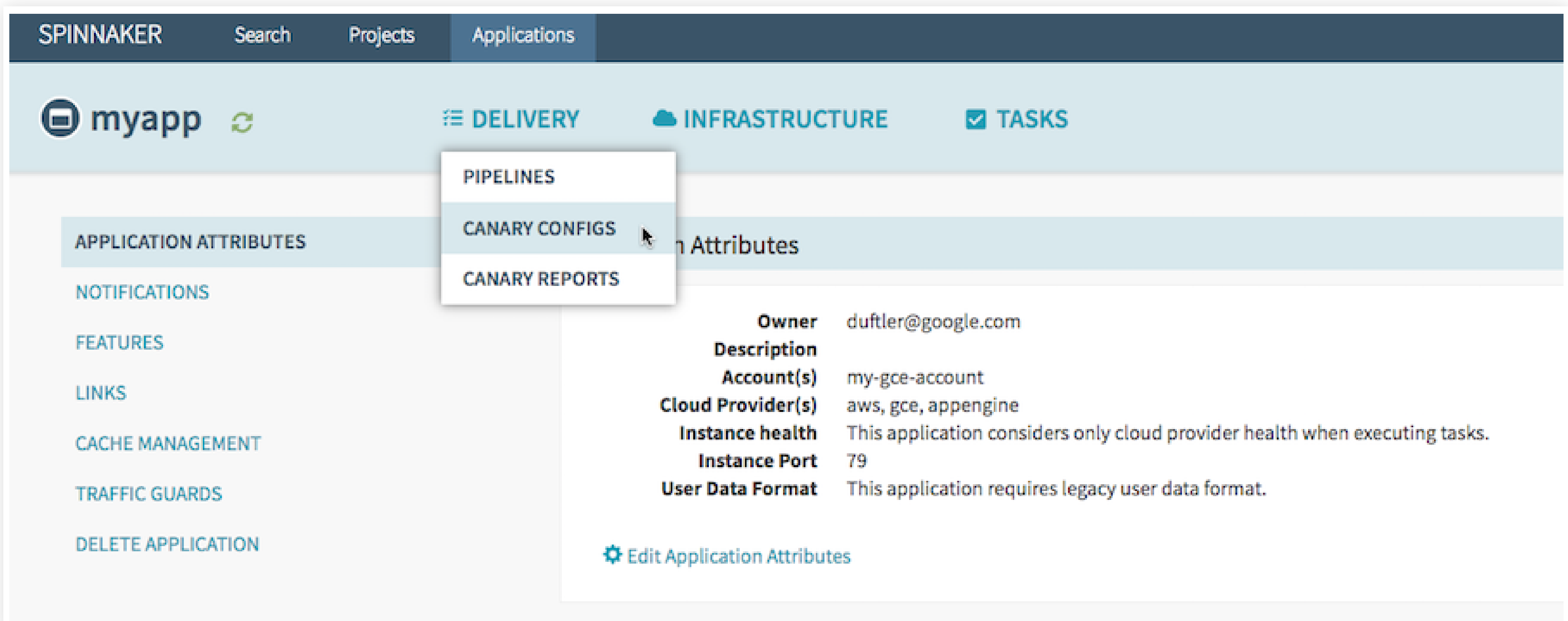
CREATE YOUR CANARY CONFIGURATION

- Configurations you create within an application are available to all pipelines in that application
- Unless it is setup that all configurations are available to all applications

STEPS FOR CANARY CONFIGURATION SUPPORT

SELECTING THE CANARY CONFIGURATION

Hover over the **Delivery** Tab, select Canary Configs



SELECTING YOUR CONFIGURATION

- Select **Add Configuration**
- Provide a name and a description. The name is displayed when you show the canary stage on pipeline
- Select your telemetry provider

CREATE METRICS GROUP

1. Create groups to determine weights
2. Click Group to create each group you’ll use. Select the group and click the edit icon
3. An example, would be "cpu" group to add a set of cpu metrics

CREATE METRICS

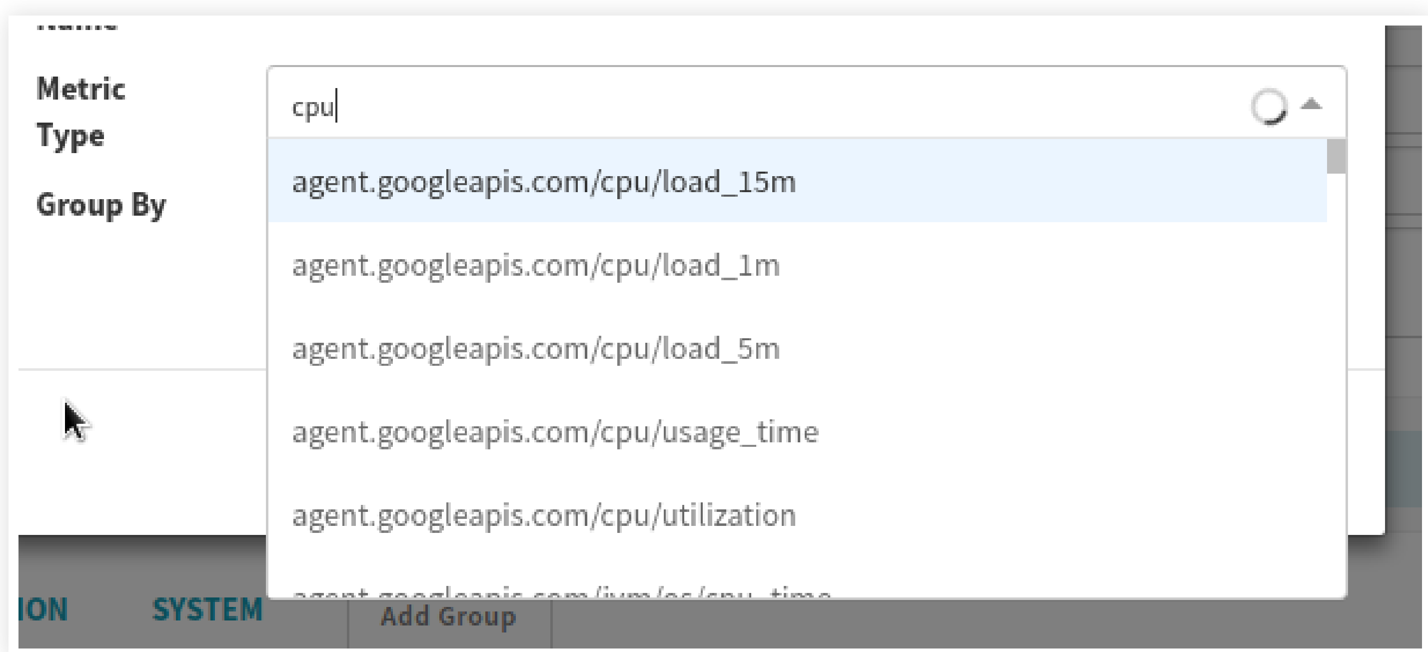
1. In the **Metrics** section, add **Metric**
2. Select the group to add this metric
3. Give the metric a name
4. Specify whether this metric fails when the value deviates too high or too low, or both compared to the baseline
5. Optionally, choose a filter template

```
resource.type = "gce_instance" AND
resource.labels.zone = starts_with("${zone}")
```

IDENTIFYING METRICS

- Identify the metric you wish to include in this configuration
- Optionally, if your providers, supports aggregation, you can click **Group by** and enter the metric metadata
- For example, when you create a metric you can group its time series by resource or metric label. You can group a time series by zone, for example (`resource.zone`)

When you create a canary configuration, you create metric groups, and scoring thresholds and weights are applied to groups (rather than to specific metrics). But the grouping described in this step is for aggregating metrics before they're returned to Kayenta.



ADD FILTER TEMPLATE

If you are using *StackDriver* or *Prometheus* you can add filter templates then assign it to a metric

1. Click **Add Template**
2. Provide a Name - This is the name by which you can select it when configuring the specific metric.
3. In the Template field, enter an expression using the *FreeMarker* template language[https://freemarker.apache.org/docs/dgui_quickstart_template.html]
4. The expression is expanded using the variable bindings specified via the Extended Params in any canary stage that uses this configuration.
5. These variable bindings are also implicitly available: `project`, `resourceType`, `scope`, `location`

EDITING A CONFIGURATION

- In **Delivery** tab select **Canary Configs**
- Select the configuration you would like to edit

ADDING A CANARY STAGE

ABOUT CANARY STAGES

Canary analysis can be performed over data points collected beginning from the moment of execution and into the future, or it can be performed over a specified time interval.

REAL-TIME ANALYSIS

- A real-time analysis means that the canary analysis is performed over a time interval beginning at the moment of execution.
- The analysis happens for a specified time period, beginning when the stage executes (or after a specified Delay).
- For Real Time, also specify the number of hours to run (Lifetime).

RETROSPECTIVE ANALYSIS

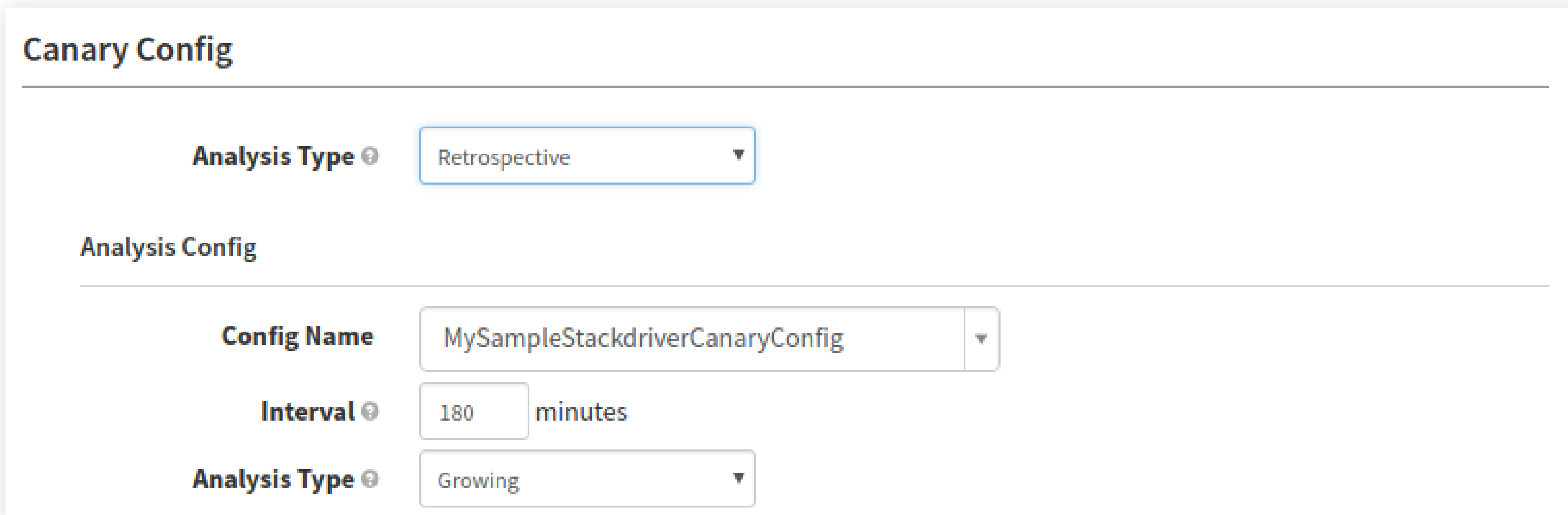
- In a retrospective analysis the canary analysis is performed over an explicitly specified time interval (likely in the past).
- Analysis occurs over some specified period. Typically, this is done for a time period in the past, against a baseline deployment and a canary deployment which have already been running before this canary analysis stage starts.
- Note that this analysis might analyze data for resources which no longer exist, for which there are still published time series.

METRIC SCOPE

Metric scope defines:

- Where, when, and on what the canary analysis occurs.
- Specific baseline and canary server groups
- Start and end times and interval
- Cloud resource on which the baseline and canary are running

DEFINING THE CANARY STAGE



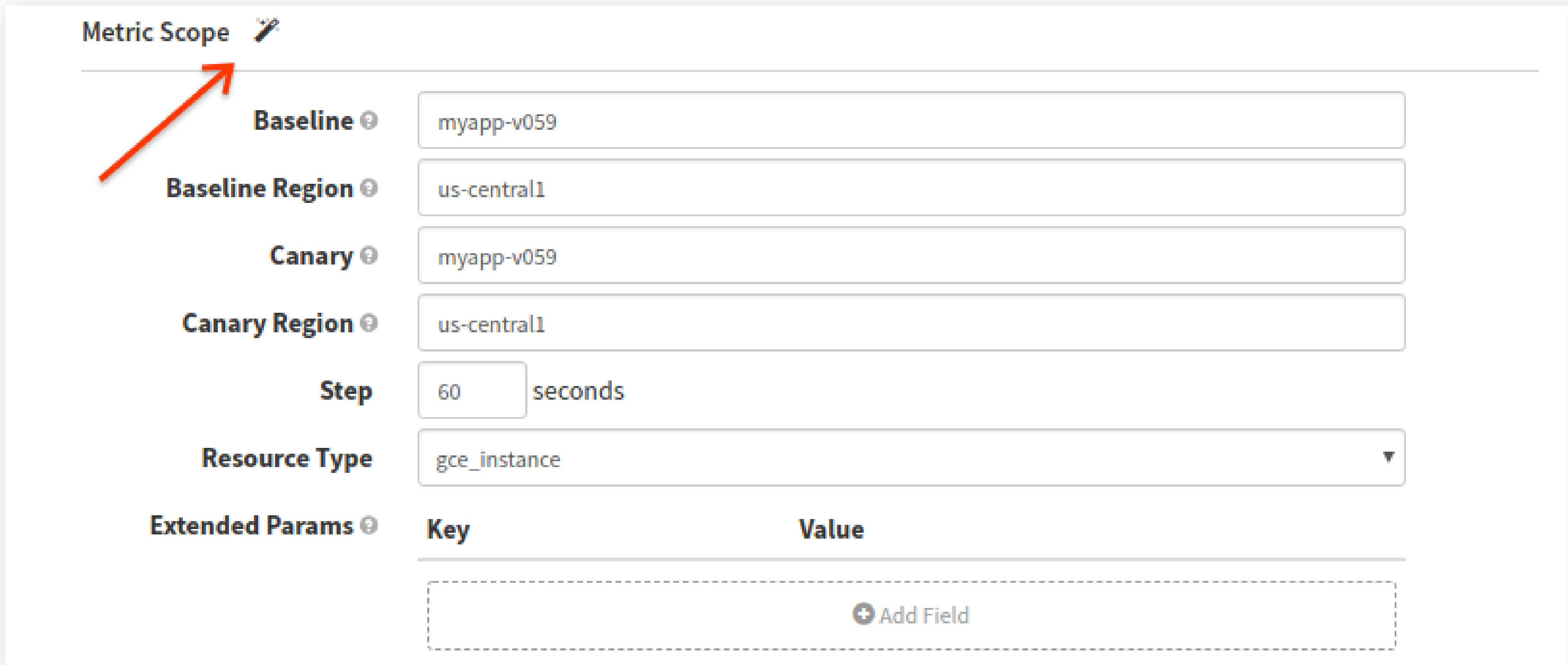
DEFINING THE CANARY STAGE DETAILS

- In your pipeline click on **Add Stage**
- For type, select **Canary**
- Give it the stage name and depends on field
- In the analysis type select **Real Time** or **Retrospective**
- Choose a configuration name for the configuration you created before adding this stage

DEFINING THE CANARY STAGE DETAILS CONTINUED

- Set a delay: How many minutes to wait until warmed up
- Set an interval: This is how frequently (in minutes) to capture and score the metrics.
- Lookback Type: Growing or Slowing
  - In a growing analysis, a judgment is taken every [interval] minutes, but each judgment goes all the way back to the beginning of the Lifetime.
  - A sliding Lookback also makes a judgment every [interval], but each judgment only looks at the data from the most recent lookback duration. It would not be unusual for the Interval and the look-back duration to be the same, but they don't have to be.

THE METRIC SCOPE



- Adjust Scoring Thresholds is needed - The thresholds are pre-populated based on those configured in the main canary config, but you can override them here.
- Specify the account that you are using for metrics and storage
- Metric Scope has a magic wand next to the name that automatically resolve to available resources

DEFINING THE CANARY STAGE DETAILS CONTINUED

- Baseline - The server group to treat as the “control” in the canary analysis—that is, the deployment against which to compare the canary deployment.
- Baseline Region - The region in which the baseline server group is deployed.
- Canary - The server group to treat as the experiment in the analysis.
- Canary Region - The region in which that canary server group is deployed.
- Step - The interval, in seconds, for the metric time series.
- Start Time and End Time (for retrospective) For a retrospective analysis, the specific time span over which to conduct the analysis.
- Extended Params - Add any additional parameters, which are specific to the metric sources and which can be used to refine the scope of the analysis. These parameters can provide variable bindings for use in the expansion of custom filter templates specified in the canary config.

JUDGMENT

Judgment goes through two phases:

- Data collection
  - Collect data from both baseline and canary deployments
  - Stored in a timeseries database
  - Include a set of tags or annotations that identify deployment
- Judgment
  - Compare the metrics from the data collection
  - Renders a pass or fail
  - Can be configured with a "marginal" decision

JUDGMENT PHASES

DATA VALIDATION

- Ensures that there is data
- If no data is found in either baseline or canary, it moves onto the next metric
- Judge does not fail if there is no data, since some data it’s ok to have no data

DATA CLEANING

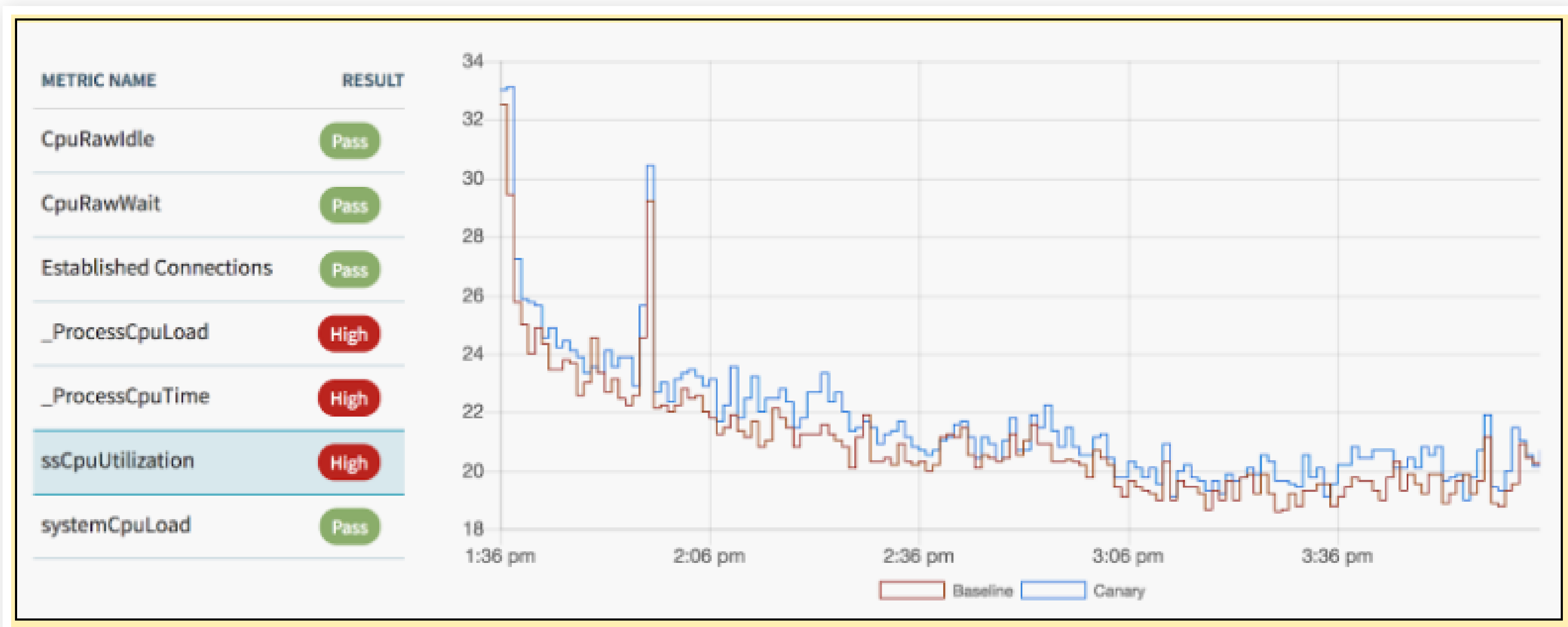
- Handling Missing Values
- Impute values for missing values
- Optionally, outliers can be removed

METRIC COMPARISON

- This is the step that compares the canary and baseline data for each included metric.
- Classification indicating there is a significant difference between baseline and canary
- Each metric is either *Pass*, *High*, or *Low*
- Uses nonparametric statistical test to check for a significant difference between the canary and baseline metrics

CHECK THE SCORE

- If 9 out of 10 is "Pass" it is classified as pass if specified in the root configuration
- Default judge is biased for simplicity- easy to interpret and understand

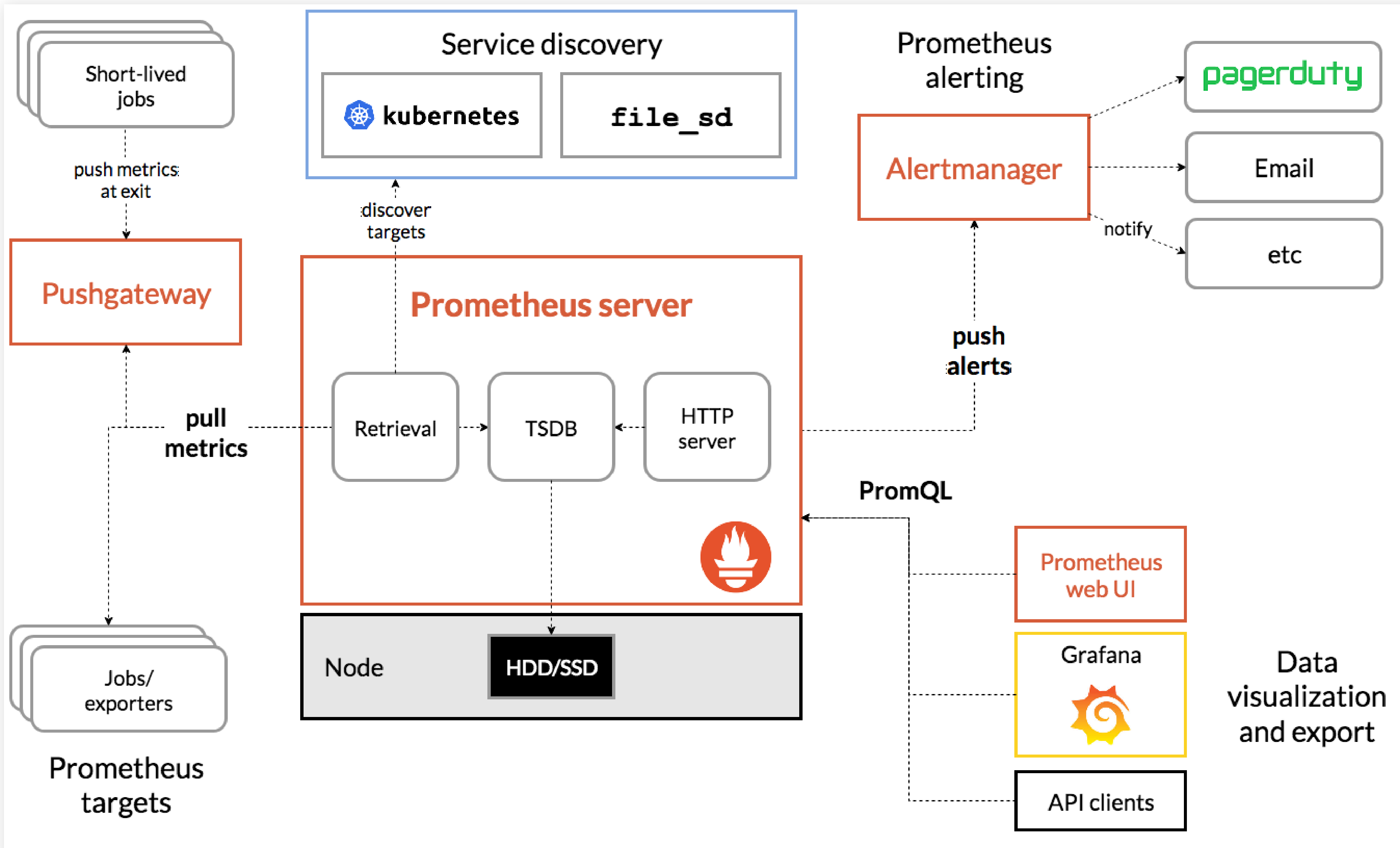


PROMETHEUS

PROMETHEUS OVERVIEW

- Prometheus is just one of the available metrics packages that analyzes data from your microservice
- There are various metrics packages to include in your microservice in a variety of languages
- The metrics are "scraped" by Prometheus and aggregated into reports

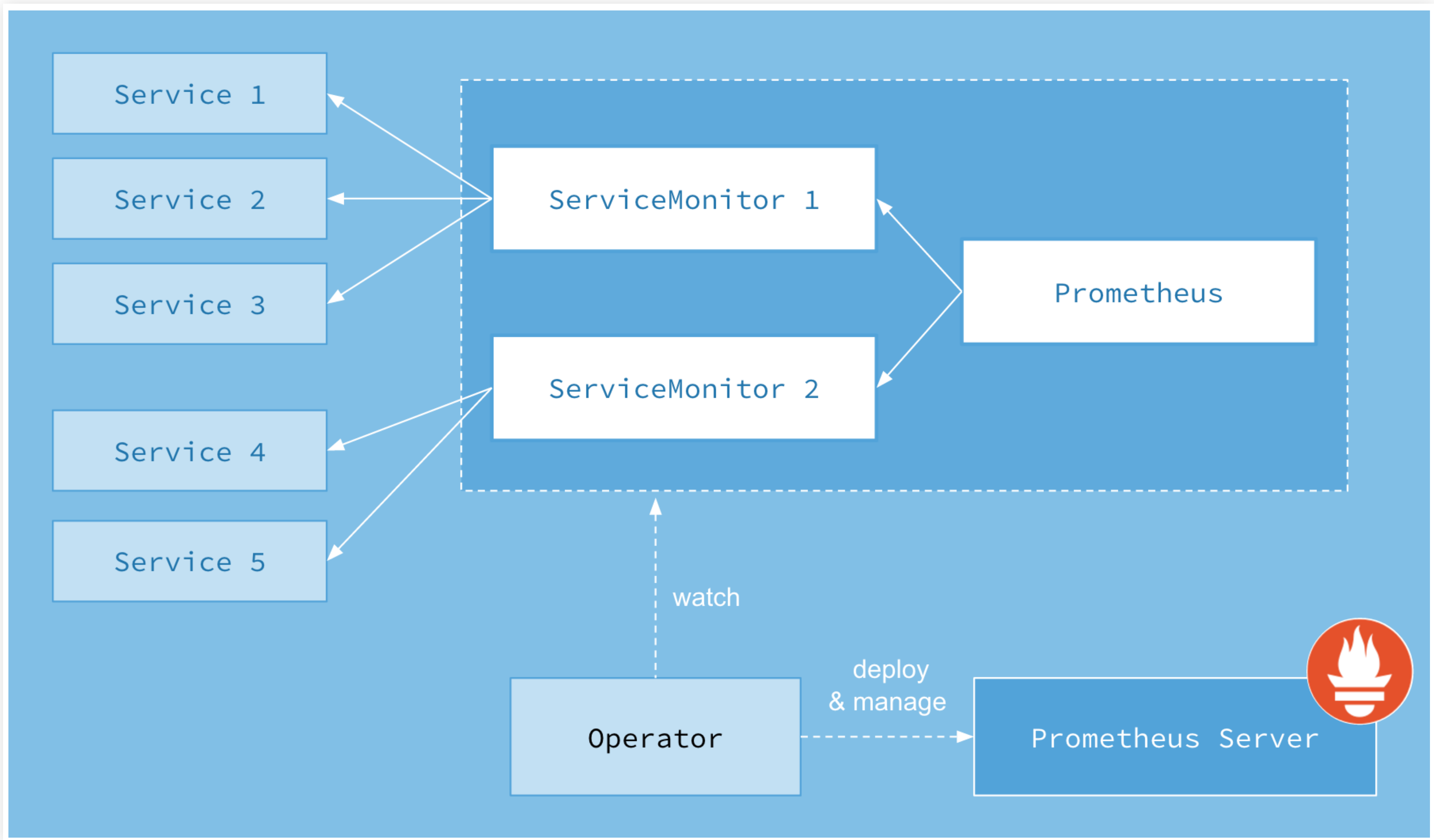
PROMETHEUS ARCHITECTURE



PROMETHEUS SETUP IN KUBERNETES

- There are various utilities to get Prometheus up and running, and documentation is terrible
- One of the easier ones, despite horrible documentation, is the Prometheus Operator on Helm(https://coreos.com/operators/prometheus/docs/latest/user-guides/getting-started.html)

PROMETHEUS OPERATOR



SETUP FOR PROMETHEUS

```
helm install <name> stable/prometheus-operator
```

⚠ Ensure that you are in the right context. For canary testing you would need to be in `staging`

CREATE A SERVICE MONITOR

- By default, Prometheus is install in the `default` namespace
- `namespaceSelector` will look for metrics in other `namespaces`
- This `ServiceMonitor` needs to be deployed in the `default` namespace

```
apiVersion: monitoring.coreos.com/v1
kind: ServiceMonitor
metadata:
  labels:
    release: lasertag
  name: teama-microservice-service-monitor
spec:
  endpoints:
    - interval: 30s
      path: /metrics
      port: web
  namespaceSelector:
    matchNames:
      - microservices
```

CREATE A `NodePort` OR `LoadBalancer`

Once established, deploy a `NodePort` or `LoadBalancer`

```
apiVersion: v1
kind: Service
metadata:
  name: prometheus
spec:
  type: (NodePort | LoadBalancer)
  ports:
  - name: web
    nodePort: 30900
    port: 9090
    protocol: TCP
    targetPort: web
  selector:
    app: prometheus
```

⚠ Choose `NodePort` or `LoadBalancer`, `(NodePort | LoadBalancer)` is not a valid option

LAB 4: ADVANCED FEATURES

TERRAFORM DEPLOYMENTS

ABOUT TERRAFORM

- Terraform is a software that can:
  - Provision cloud resources
  - Manage Infrastructure and Services
- Created by Hashicorp (https://www.terraform.io/)

HOW IT WORKS

- Configuration based Infrastructure as Code
- Describe the components as to the desired state

KEY FEATURES

- **Infrastructure as Code** - Using files to describe the infrastructure you wish to create
- **Execution Plans** - Shows what Terraform will do, when applied
- **Resource Graph** - Terraform builds a graph of all resources and performs in parallel
- **Change Automation** - Since it is code, changes can be applied with little human interaction

MULTI-CLOUD PROVISIONING

- Terraform can provision varying resources in multicloud platforms all in one infrastructure as code resource
- View the providers at https://registry.terraform.io/browse/providers
    - AWS
    - GCP
    - Digital Ocean
    - Kubernetes
    - Alibaba
    - More…

SETTING UP TERRAFORM FOR AWS ACCESS

Keep in mind that you can run on different cloud providers

```
$ export AWS_ACCESS_KEY_ID=(your access key id)
$ export AWS_SECRET_ACCESS_KEY=(your secret access key)
```

Terraform can also use `$HOME/.aws/credentials`

THE ESSENCE OF A TERRAFORM FILE

- `profile` refers to the AWS credentials file
- `provider` is a plugin that translates API interactions
- `resource` are resources that you can create, such as servers, databases, and load balancers

Creating an AWS Resource and an AWS Instance

```
provider "aws" {
  profile    = "default"
  region     = "us-east-1"
}

resource "aws_instance" "example" {
  ami           = "ami-2757f631"
  instance_type = "t2.micro"
}
```

PREPARING TERRAFORM

- Enter into the folder where your Terraform files (*.tf*) are located
- Run `terraform init`
- What it does:
  - Scans all *tf* files
  - Figure out which providers you're requiring
  - Downloads the code for the providers
- It is safe to run multiple times

```
$ terraform init
```

PLANNING TERRAFORM

- Analyze what Terraform will do before running
- It is similar to *diff* commands in git or bash
- Anything with a plus (+) indicates an item will be created
- Anything with a minus (-) indicates an item will be removed
- Anything with a tilde (~) indicates an item will be modified

```
$ terraform plan
```

Can yield the response similar to the following

```
# aws_instance.example will be created
  + resource "aws_instance" "example" {
      + ami                          = "ami-1b32e166bceacff1"
      + arn                          = (known after apply)
      + associate_public_ip_address  = (known after apply)
      + availability_zone            = (known after apply)
      + cpu_core_count               = (known after apply)
```

APPLYING TERRAFORM

- Scans the current directory for the configuration and applies the changes appropriately.
- Terraform keeps track of all the resources it already created so it knows your infrastructure already exists with subsequent runs

```
$ terraform apply
```

TERRAFORM IS MEANT FOR VERSION CONTROL

- The Terraform Configuration Files you create should be stored in git
- What you shouldn't check in is the scratch folder or state files
  - `.terraform` folder
  - `*.tfstate`
  - `*.tfstate.backup`

TERRAFORM STATE FILES

- As you run Terraform it records information about the infrastructure it created in a *Terraform state file*.
- By default, when you run Terraform in the folder */foo/bar*, Terraform creates the file */foo/bar/terraform.tfstate*.
- State files contains a custom JSON format that records a mapping from the Terraform resources in your configuration files to the representation of those resources in the real world.

WHERE TO STORE THE STATE FILE?

To work in a team environment:

- Each of your team members needs access to the same Terraform state files.
- That means you need to store those files in a shared location.

LOCKING OF THE STATE FILES

- If two team members are running Terraform at the same time you can run into race conditions
- Multiple Terraform processes make concurrent updates to the state files
- This leads to:
  - Conflicts
  - Data loss
  - Corruption

STANDARD PROCEDURE FOR SHARED STATE FILES

In a different project folder:

- Create an S3 bucket via Terraform
- Create a Dynamo DB resource to manage locking

In your main project folder:

- Setup a `terraform.backend` entry where you will list:
  - `bucket` - Name of the S3 bucket
  - `key` - File Path where the state is be written
  - `region` - AWS Region
  - `dynamodb_table` - What DynamoDB will be used for locking
  - `encrypt = true` - Whether to encrypt data

SHARED STATE EXAMPLE IN TERRAFORM

```
terraform {
  backend "s3" {
    # Replace this with your bucket name!
    bucket         = "my-team-application.tfstate"
    key            = "global/s3/terraform.tfstate"
    region         = "us-west-2"

    # Replace this with your DynamoDB table name!
    dynamodb_table = "my-team-application-locks"
    encrypt        = true
  }
}
```

CHICKEN AND EGG IN TERRAFORM

- First run the Terraform to set up S3 bucket and DynamoDB
- Then run your application with the backend

WHERE CAN WE RUN TERRAFORM?

- Client (your) machines
- Cloud Instances
- CI/CD Frameworks

TERRAFORM CHOICES

- There are many choices for you to make where you decide to run Terraform
- Some choices are better than others in different situations

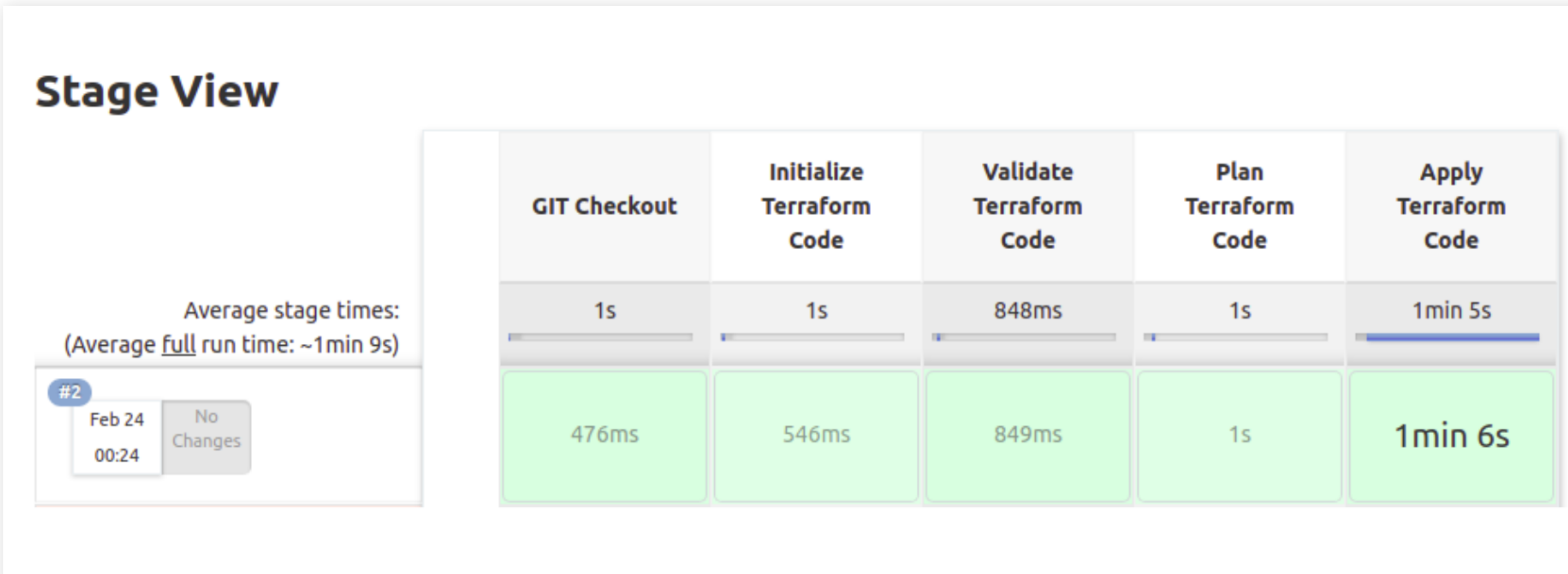


Figure 6. Example of Terraform in Jenkins, a CI tool

TERRAFORM IN SPINNAKER

Arguments For:

- You need the output local to your pipelines so as to perform other operations
- You are wanting to setup infrastructure as a Kubernetes Job
- You don't want terraform run on client machines and require more control (CI can also be used for this purpose)

Arguments Against:

- Makes more sense to create infrastructure in CI rather than CD for locality purposes
- Operators prefer to run Terraform on local machines

What do you think?

TERRAFORM IN SPINNAKER SOLUTIONS

- Kubernetes Job
- Armory.io
- OpsMx Terraspin

KUBERNETES JOB

- Single purpose work
- A `Job` creates one or more Pods
- Will continue to retry execution of the Pods until a specified number of them successfully terminate.
- The Job object will start a new Pod if the first Pod fails or is deleted (for example due to a node hardware failure or a node reboot).
- You can also use a Job to run multiple Pods in parallel.

EXAMPLE KUBERNETES JOB

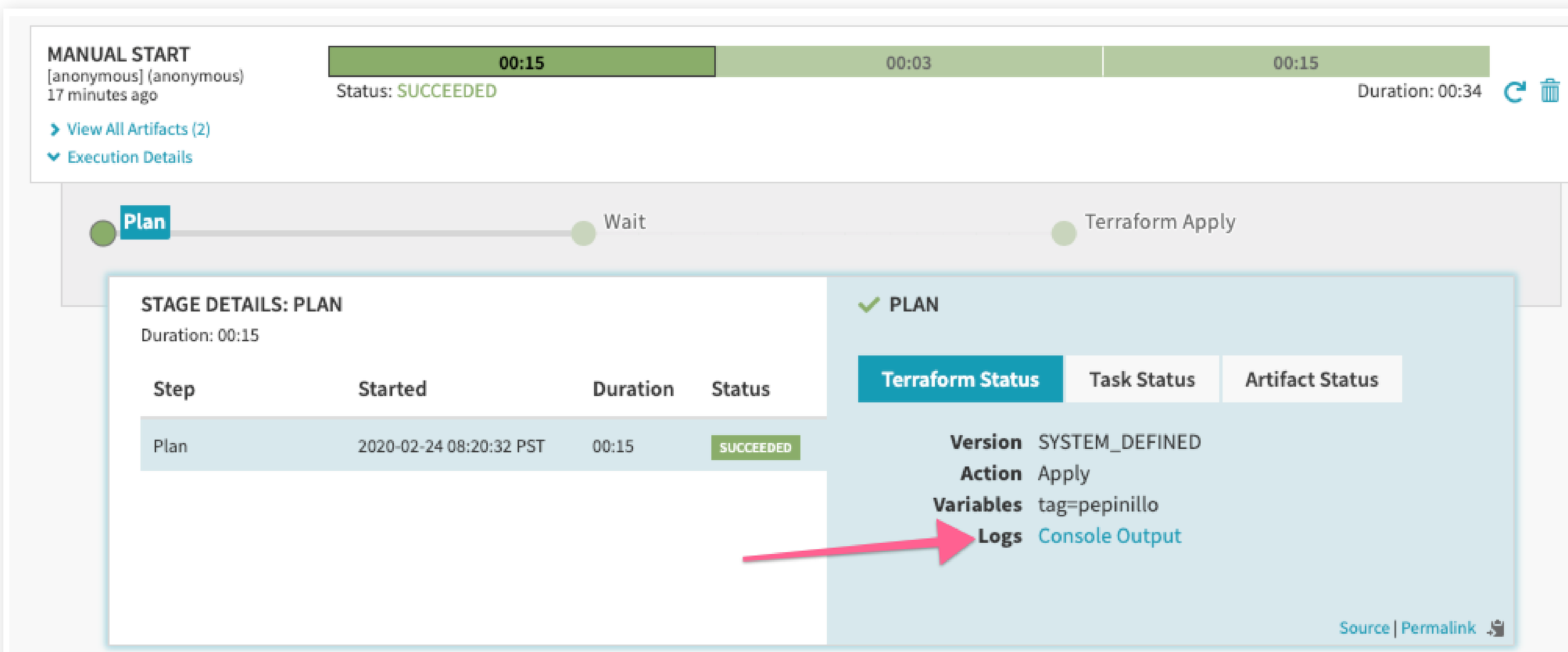
```
apiVersion: batch/v1
kind: Job
metadata:
  name: pi
spec:
  template:
    spec:
      containers:
      - name: pi
        image: perl
        command: ["perl",  "-Mbignum=bpi", "-wle", "print bpi(2000)"]
      restartPolicy: Never
  backoffLimit: 4
```

RUNNING TERRAFORM AS A KUBERNETES JOB

- Since Kubernetes can run anything, that would include a Terraform job
- What is required?
  - Creating a container that is derived from a Terraform image https://hub.docker.com/r/hashicorp/terraform

ARMORY.IO

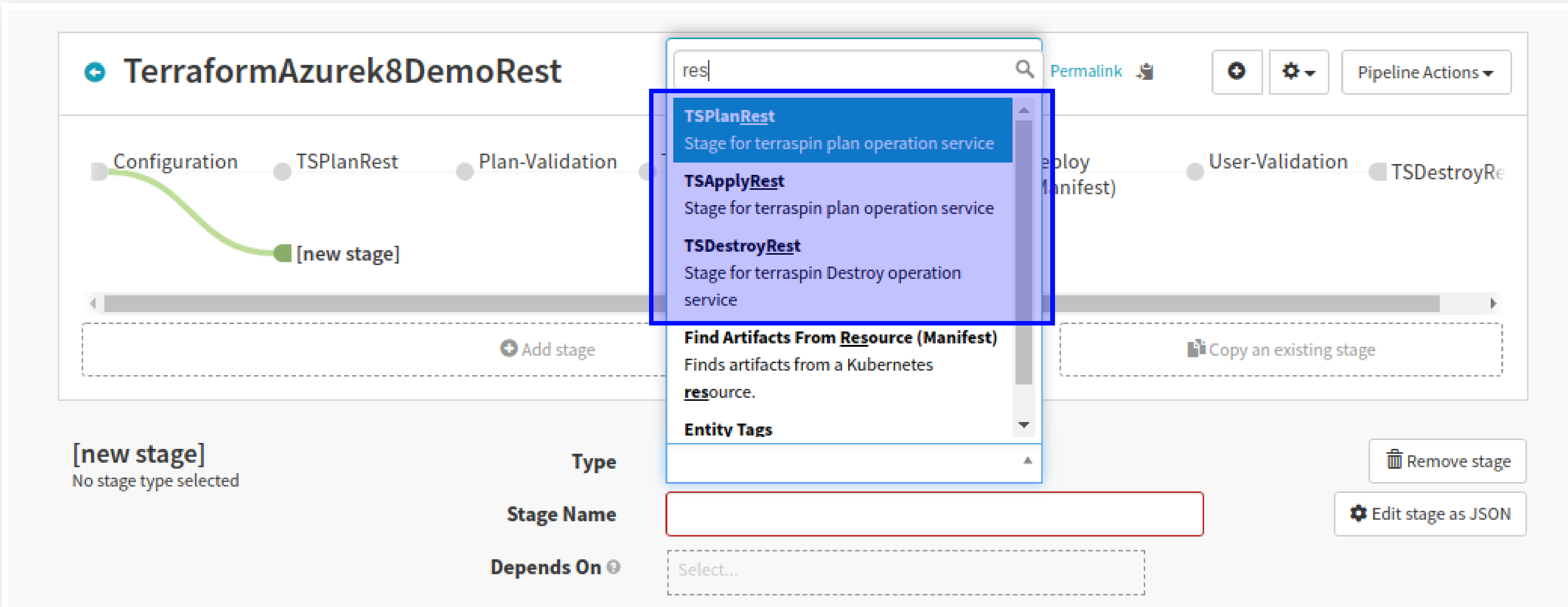
- Armory, a Spinnaker company created some custom stages for Spinnaker
- This performs `terraform init` and `terraform apply` as separate stages
- Includes state management
- Part of their proprietary platform, not part of the OSS Platform



OPSMX TERRASPIN

- OpsMX, another Spinnaker company also created some custom stages for Spinnaker
- Installation includes a Kubernetes ConfigMap and setting up microservice files through halyard
- Includes State Management to S3
- Provide three stages:
    1. TSPlanRest
    2. TSApplyRest
    3. TSDestroyRest

OPSMX TERRASPIN IN SPINNAKER

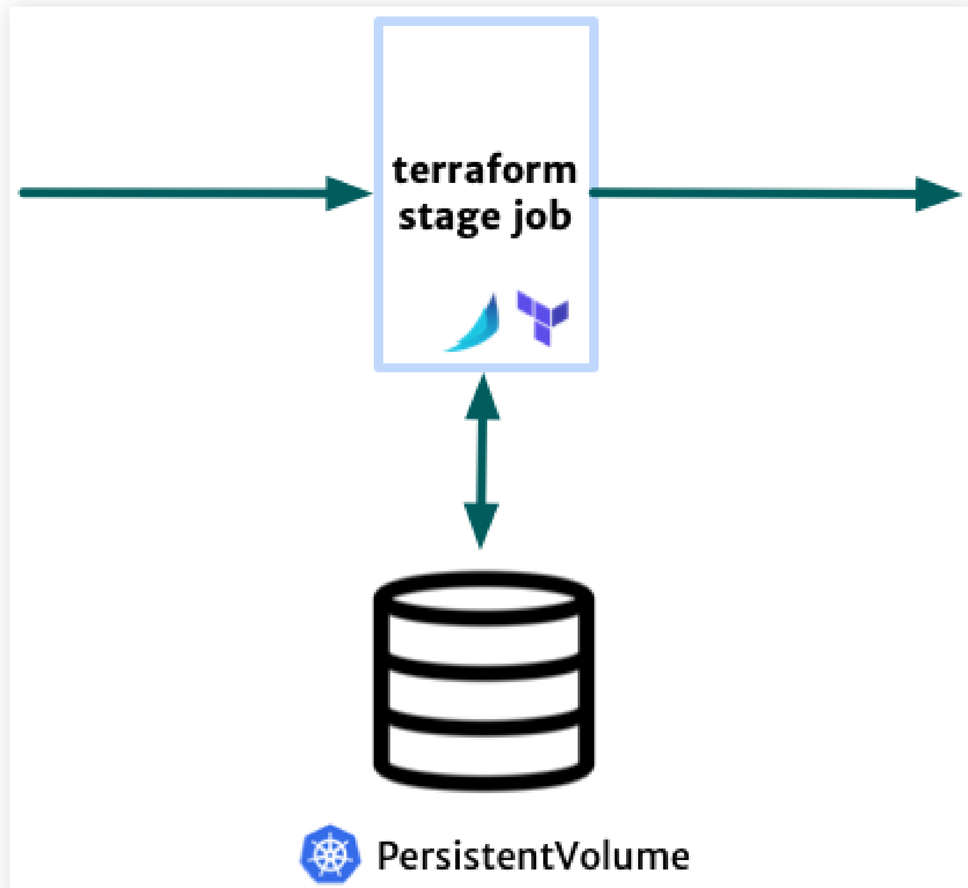


https://docs.opsmx.com/codelabs/how-to-create-terraform-webhook-stage-in-spinnaker

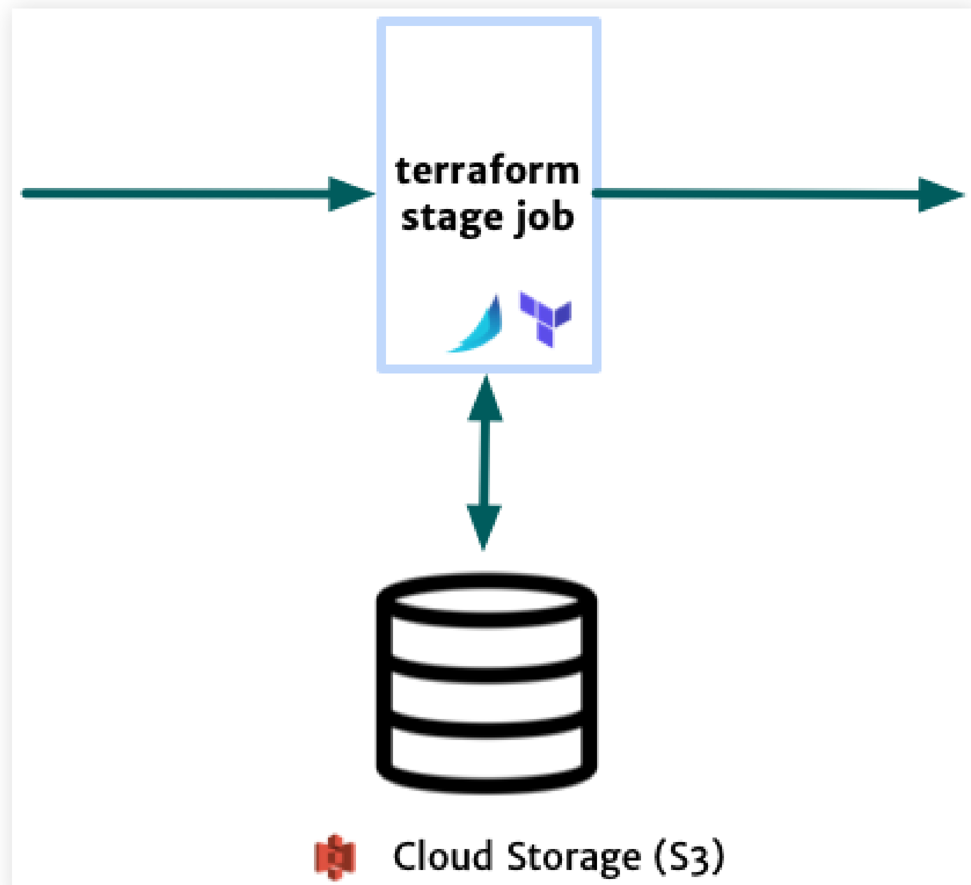
WHERE DO WE STORE THE TERRAFORM STATE IN KUBERNETES?

- State can either or both be stored as a:
  - `PersistentVolume` in Kubernetes
  - Using S3 and Dynamo DB for storage

POSSIBLE SOLUTION #1: USE A PERSISTENT VOLUME



POSSIBLE SOLUTION #2: USE S3 BUCKET



TRADE-OFFS IN CORPORATE ENVIRONMENT

- You certainly have trade-offs:
  - Everyone has their own Terraform instance but shares the same S3 cloud bucket
  - Run in a cloud instance that backs up in an S3 cloud bucket
  - Run as a Kubernetes Job that also backs up with S3 cloud bucket

Source: https://learn.hashicorp.com/terraform/getting-started/build

EXAMPLE *DOCKERFILE*

- `COPY` in
  - the *rds.tf* which is the terraform file
  - a *.sh* file that will run the job
- Make *.sh* file the entrypoint

```
FROM hashicorp/terraform:light

COPY rds.tf /
COPY run.sh /

ENTRYPOINT ["/run.sh"]
```

.SH FILE (PART 1) RUNNING TERRAFORM

```
#!/bin/sh
terraform init
terraform apply -auto-approve
```

.SH FILE (PART 2) SPINNAKER PROPERTY

- A technique that is certainly worth knowing is how to pass parameters from one stage to the next
- To achieve this within spinnaker, you can run the job and `echo` a string with a `SPINNAKER_PROPERTY_` prefix
- The `SPINNAKER_PROPERTY_` prefix can be used by Spinnaker to carry these values to other stages

.SH FILE (PART 3) TERRAFORM OUTPUT

```
echo "SPINNAKER_PROPERTY_DB_ADDRESS=$(terraform output db_address | tr -
d '"')"
echo "SPINNAKER_PROPERTY_DB_NAME=$(terraform output db_name | tr -d
'"')"
echo "SPINNAKER_PROPERTY_DB_SECRET=$(terraform output db_secret | tr -d
'"')"
echo "SPINNAKER_PROPERTY_DB_USERNAME=$(terraform output db_username | tr
-d '"')"
```

BETTER OPTIONS? HASHICORP VAULT

- If your question is whether transferring `db_secrets` is safe, using `echo`, answer is likely not.
- This is where Hashicorp Vault can perform a particular role.

OVERVIEW OF HASHICORP VAULT

- Integrate with external systems using pluggable components, called:
  - Secrets engines
  - Authentication methods
- Purpose of those components is to manage and protect your secrets in dynamic infrastructure
- (e.g. database credentials, passwords, API keys)
- Server/Client Paradigm

HOW DO SECRETS GET STORED?

- Secrets are stored on the server
- Information is encrypted in storage
- Vault itself cannot read the information without Unsealed Keys

EXAMPLE OF A SECRET

Storing a Secret

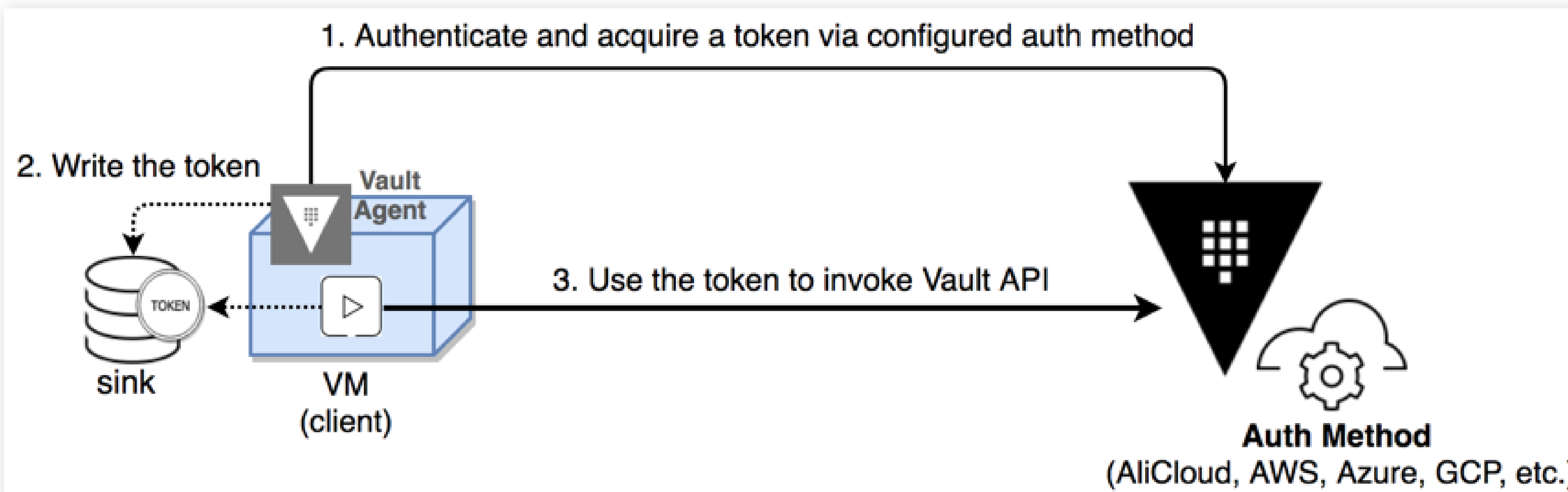
```
$ vault kv put secret/hello foo=world excited=yes
```

Retrieving a Secret

```
$ vault kv get -field=excited secret/hello
```

HOW DOES VAULT INTEGRATE WITH KUBERNETES?

- Vault Agent Sidecar
  - Pods in Kubernetes Run and Agent Sidecar that is provided by an injector
  - The sidecar negotiates with the Vault Server to retrieve Secrets
  - Secrets are stored in a file for easy retrieval in an application



SOURCES FOR VAULT AGENT

https://www.youtube.com/watch?v=R3EYd9YnShU&t=2787s
https://github.com/jweissig/vault-k8s-sidecar-demo

WHAT DOES THIS MEAN WITH SPINNAKER?

In Kubernetes Job:

- Run Terraform to create infrastructure
- Terraform in the form of output generates secrets (e.g. database)
- Use Sidecar Authentication to generate the secrets to the database.

In Kubernetes App:

- Use Sidecar Authentication to retrieve the secrets to the file system of your microservice
- Agent Sidecar will place secrets conveniently in a file system of your microservice

LAB 5: TERRAFORM AND SPINNAKER

AWS

SPINNAKER PROVIDER

- Spinnaker can release artifacts in some the following Compute Services
  - **Amazon Elastic Compute Cloud (EC2)** - - Use this option, if you want to manage AWS EC2 via Spinnaker
  - **Amazon Elastic Container Service (ECS)** - - Use this option, if you want to manage containers in AWS ECS
  - **Amazon Elastic Kubernetes Service (EKS)** - Use this option, if you want to manage containers in AWS EKS. This option uses Kubernetes V2 (manifest based) Clouddriver
  - **Amazon Lambda (Lambda)** - Use this option, if you want to enable AWS Lambda support

AWS AND IAM STRUCTURE

- Spinnaker for AWS will use AWS IAM (Identity Access Management)
- AWS requires IAM accounts set beforehand:
  - AWS Managing Account
  - AWS Managed Accounts

SPINNAKER AND AWS ACCOUNTS

- Halyard configures Spinnaker to use the AWS Managing account to control the AWS Managed account(s)
- AWS Managing account assumes control of the AWS Managed account(s) through the use of AWS IAM Roles.
- By assuming a role across AWS Accounts, Spinnaker can control AWS resources from multiple AWS Managed accounts.

SPINNAKER ACCOUNTS

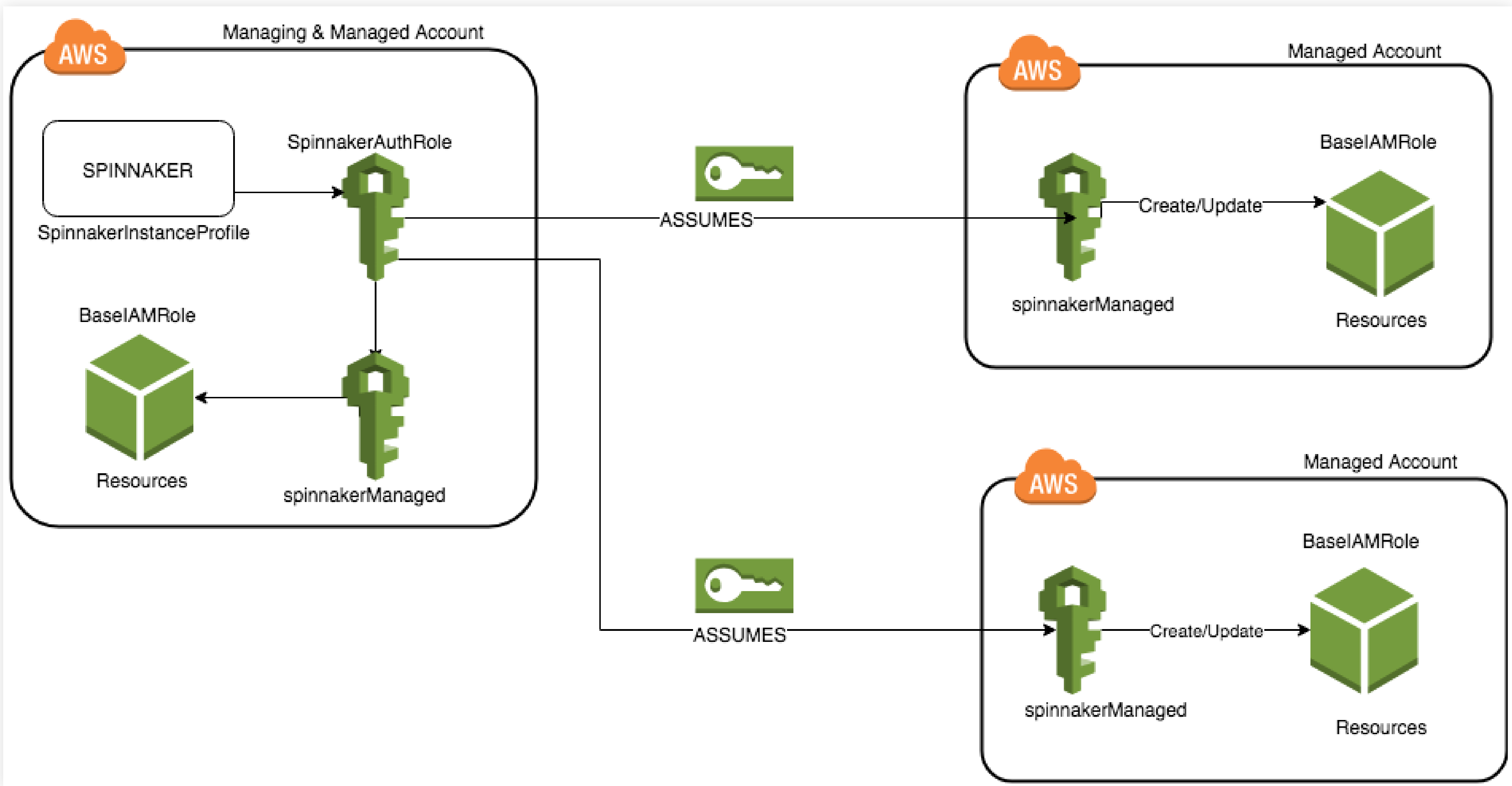
1. **AWS Managing Account** - There is always exactly one managing account. This account is what Spinnaker authenticates as and, if necessary, uses to assumes roles in the managed account(s).

2. **AWS Managed Account** - Every AWS account that you want to modify resources in is a managed account. Managed accounts require AWS IAM policies and a trust relationship to grant AssumeRole access to the managed account(s).

SPINNAKER ACCOUNTS

The AWS Managing account assumes the roles of the AWS Managed account(s).

Example: AWS Managing account spinnakermanaging can assume the Managed role in the accounts accountdev, accountstaging, accountprod and deploy a baked AMI in the pipeline.

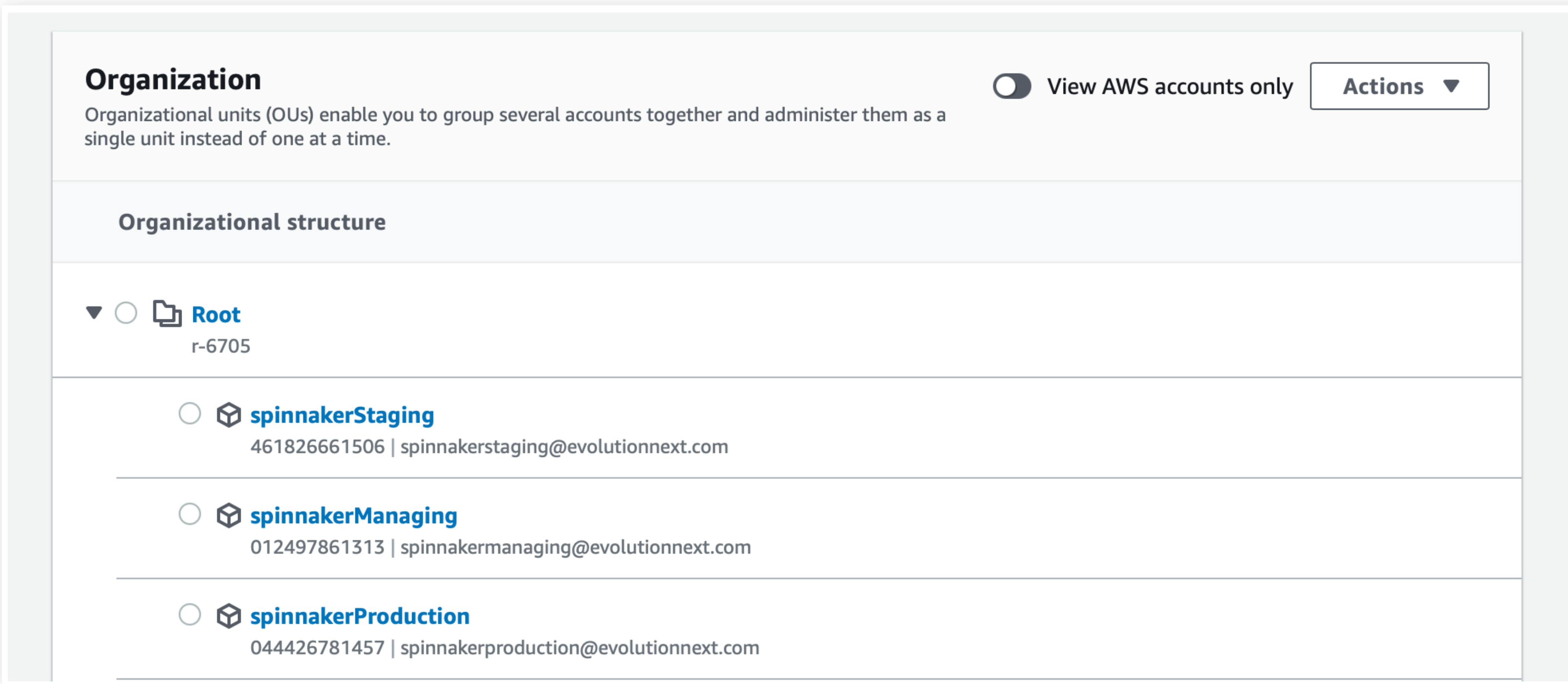


HOW TO PROVIDE ACCESS

You can grant your IAM users permission to switch to roles within your AWS account or to roles defined in other AWS accounts that you own.

CREATE ORGANIZATION

- Enable an AWS organization, and create a managing account, and one or more managed accounts
- The Managing Account manages the Managed Accounts, and we will need to provide a link between the Managing Role and the Managed Role



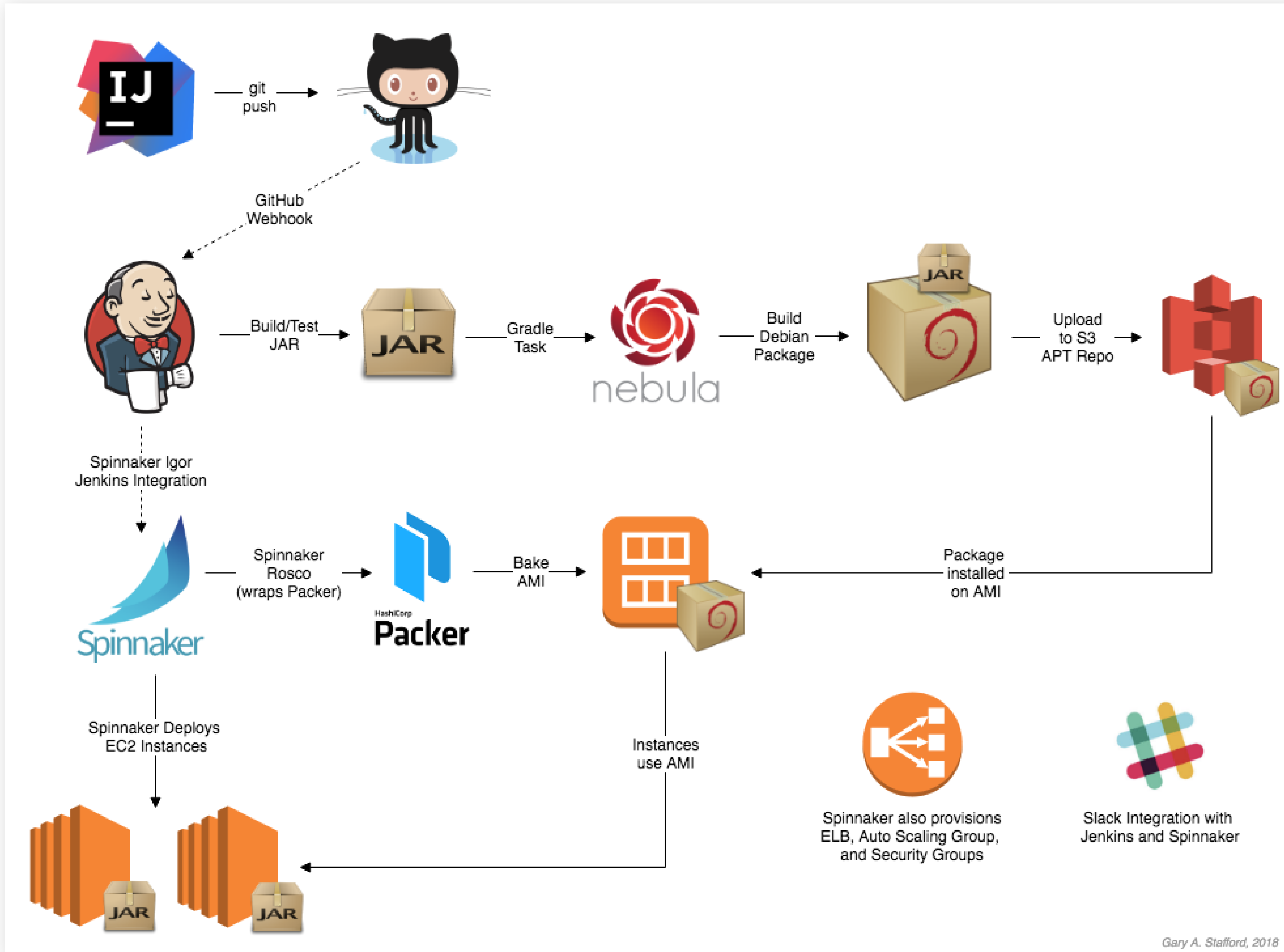
CREATE SOME "ACCOUNTS"

- You can create multiple accounts in your "organization"
- Your company may have one or more organizations
- Your team may have their own "account" where your jobs would run
- You may have accounts for purpose, like development, staging, or production

Name	Account Id
`spinnakerManaging`	`100000000001`
`develop`	`200000000002`
`staging`	`300000000003`

OVERVIEW HOW DEPLOYING TO CLOUD PROVIDER

ALTERNATIVE OVERVIEW

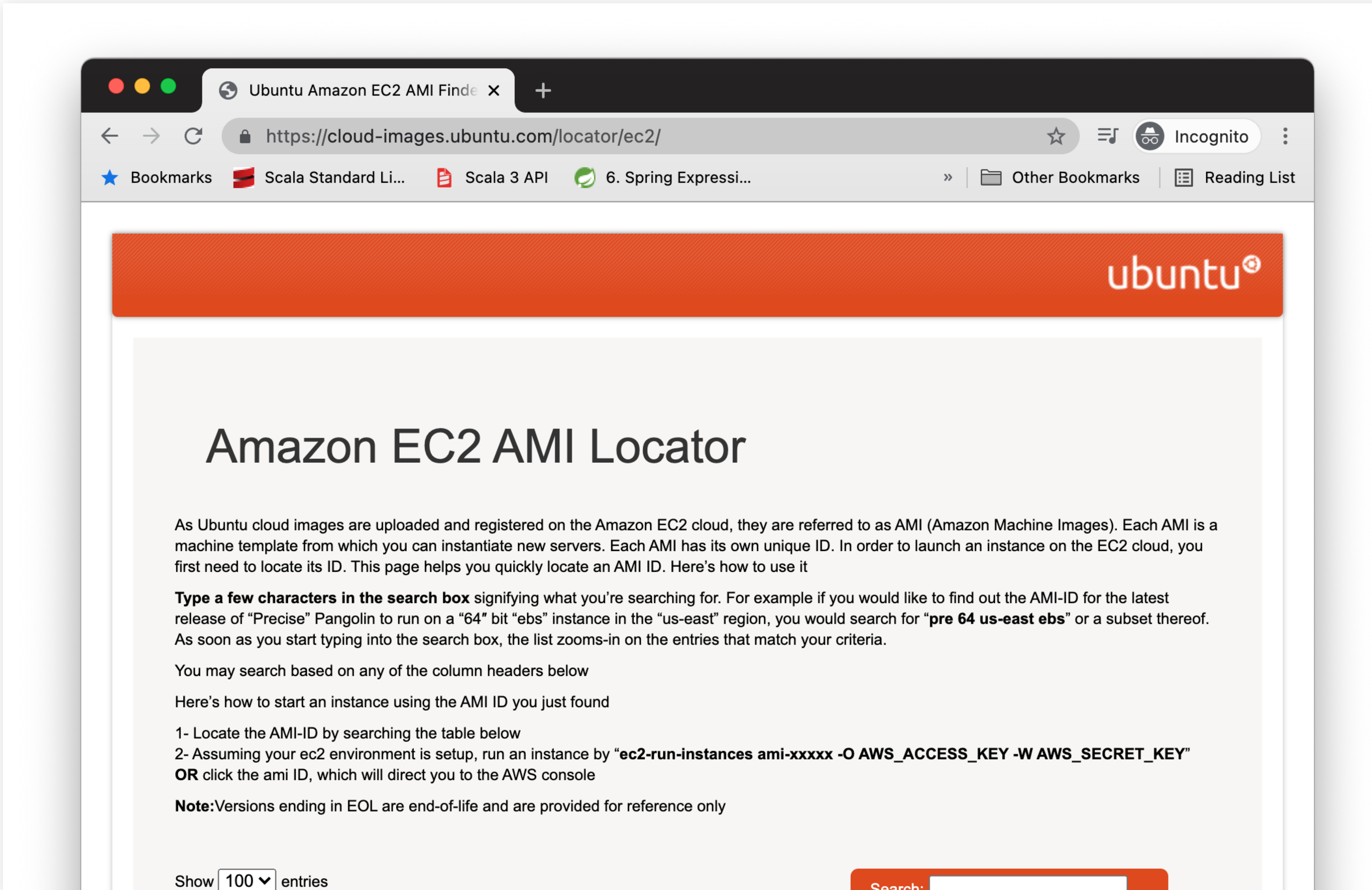


BAKING

- Whereas previously, we used baking images to refer to using Helm, using an AWS Specific Provider it means making a machine image
- Jenkins will be responsible for creating a debian image (`.deb`), but not storing the debian file
- Under the hood Spinnaker uses Hashicorp Packer to build the image
- This also procures an EC2 to do the baking and creates an image as an AMI

FINDING THE APPROPRIATE AMI IMAGE

https://cloud-images.ubuntu.com/locator/ec2/



HANDING OFF FROM DEBIAN REPOSITORY TO JENKINS

- Jenkins is responsible for creating a debian package
- The Debian Package is created by the build tool which should be in your build script
  - Maven - JDeb
  - Gradle - Nebula

SETTING UP A DEBIAN REPOSITORY

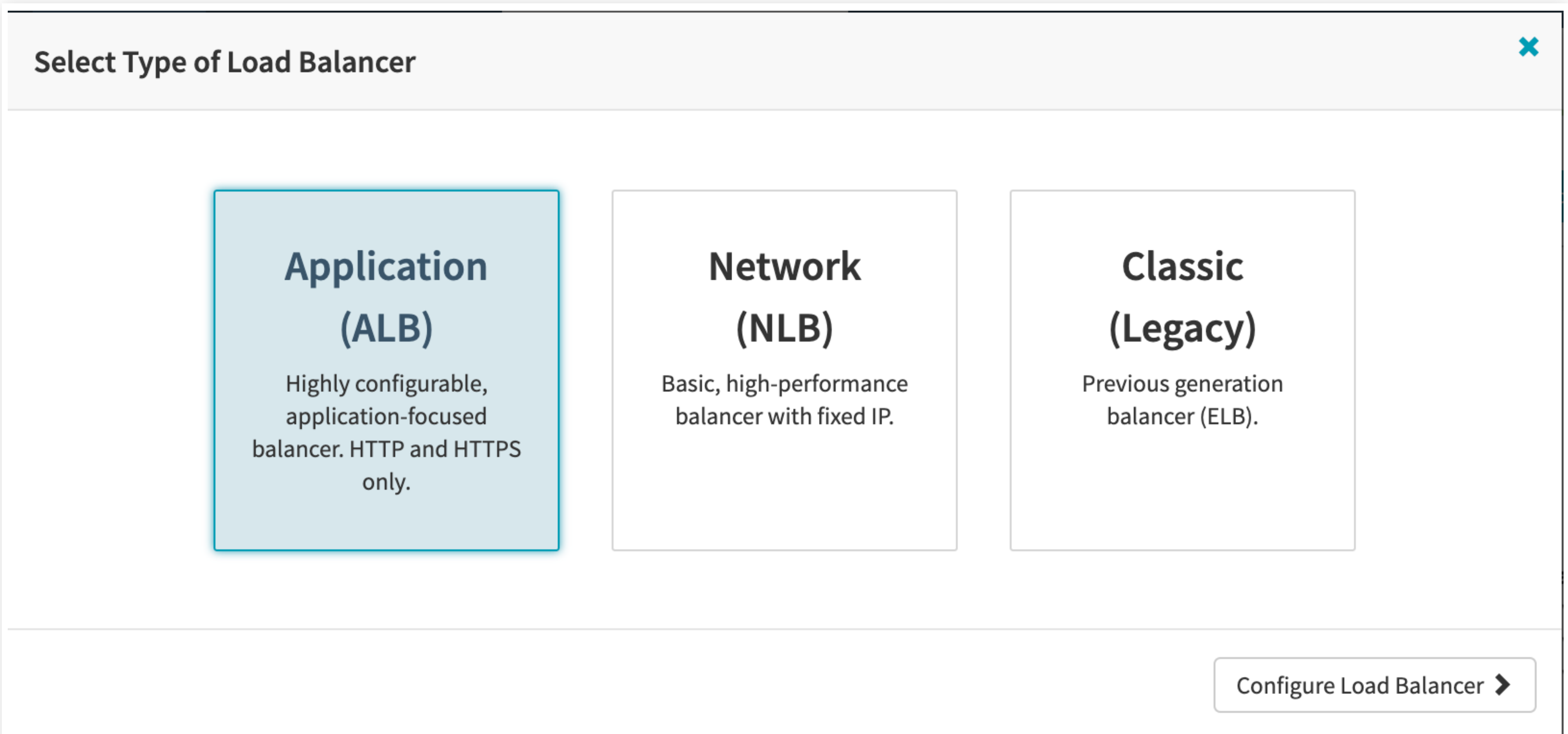
- Choose a Debian Repository (e.g. Artifactory, Nexus, Aptly)
- Set up Jenkins to create the debian package and install it to your Debian Repository

SETTING UP ROSCO TO HANDLE YOUR DEBIAN REPOSITORY

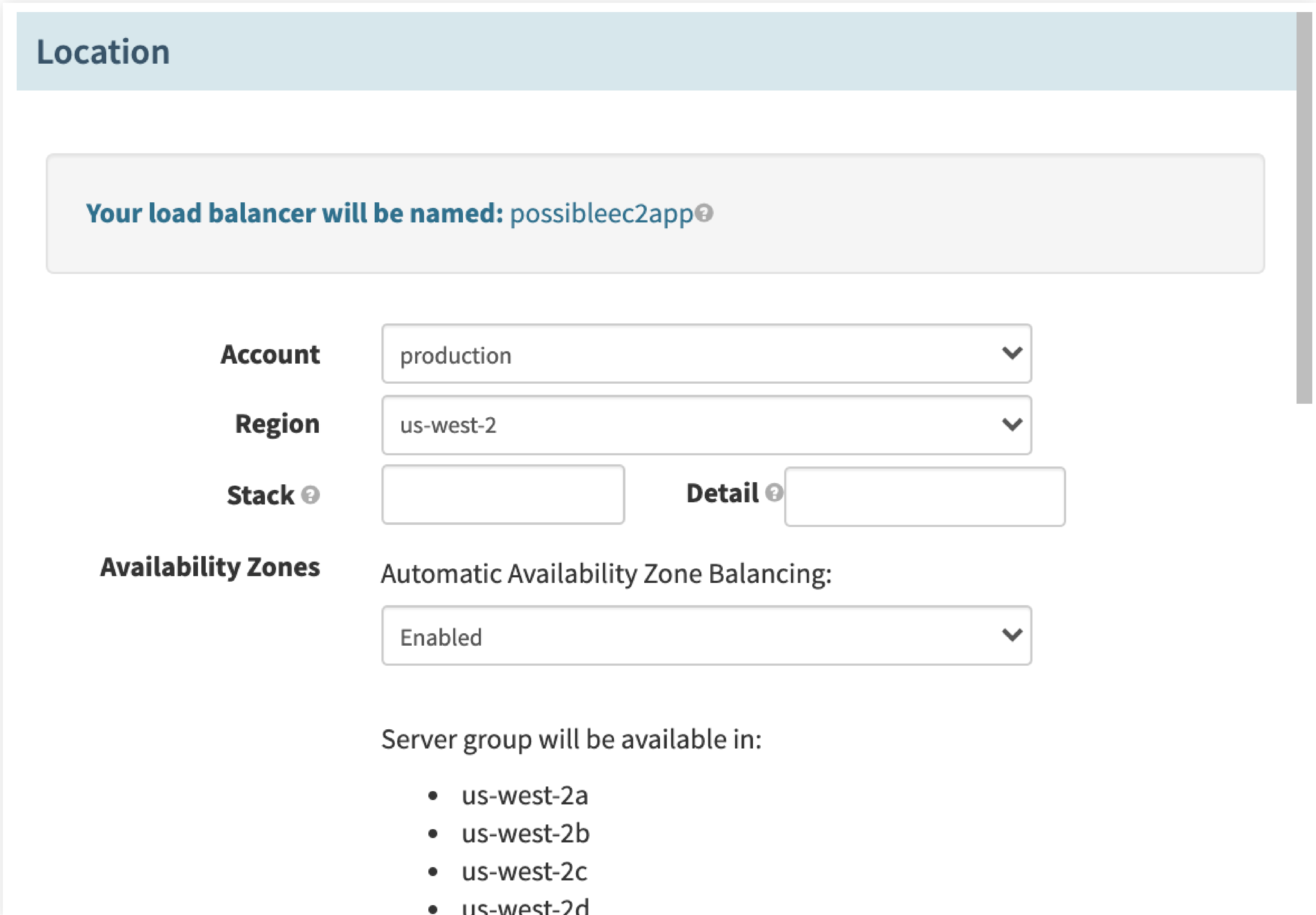
- Baking means turning a Linux AMI + Debian Files + Debian Dependencies and converting it to a new AMI
- Rosco is the Microservice of Spinnaker in charge of performing that operation
- Rosco needs to be configured by Spinnaker Administrator using Halyard or other means

SETTING UP A LOAD BALANCER

- First a Load Balancer needs to be established before running an application
- This is different from Kubernetes-based jobs
- Select the kind of load balancer you wish to use, ALB, NLB, or Classic



ESTABLISHING A LOAD BALANCER



PLACING INFORMATION INTO LOAD BALANCER

- **Account** - The Account where this load balancer will be created
- **Region** - What cloud region will this load balancer go into.
- **Stack** - Naming to create vertical scaling
- **Detail** - Naming to describe the name of the deployment (Should be less than 32 characters)
- **Availablity Zones** - Select which zones where the deployments should be applied
- **VPC Subnet** - Each VPC (Virtual Private Cloud) has its own subnets, subnets that can public or private, typically for routers this will be public

CLOUD COMPONENT ARCHITECTURE

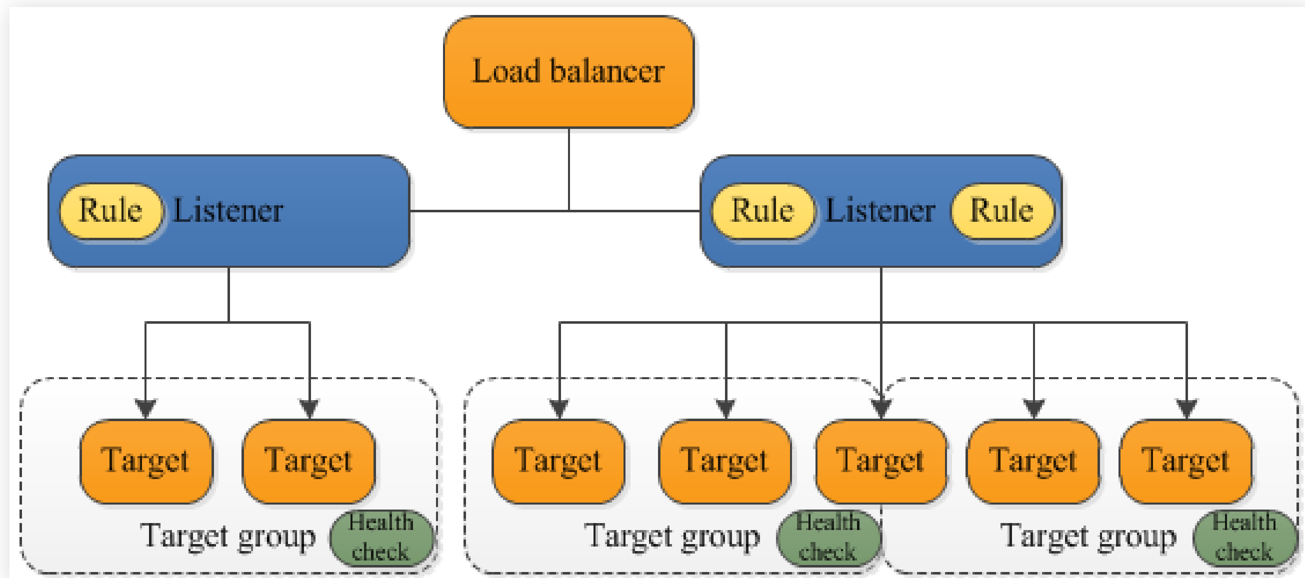


Figure 8. Component Architecture from AWS

Source:
https://docs.aws.amazon.com/elasticloadbalancing/latest/application/introduction.html

LISTENERS IN AWS

- Before you start using your Application Load Balancer, you must add one or more listeners.
- A listener is a process that checks for connection requests, using the protocol and port that you configure.
- The rules that you define for a listener determine how the load balancer routes requests to its registered targets.

Source: https://docs.aws.amazon.com/elasticloadbalancing/latest/application/load-balancer-listeners.html

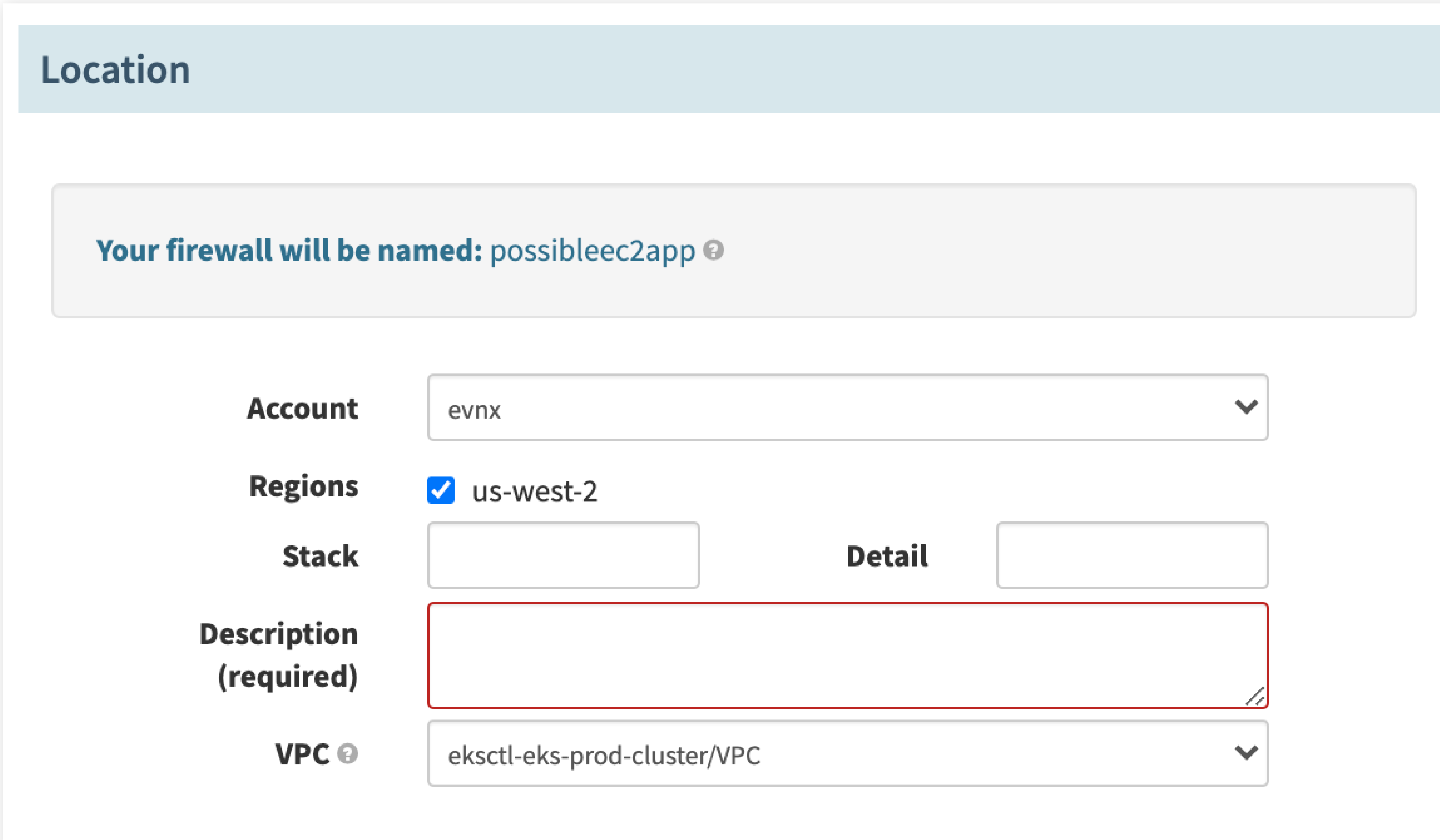
TARGET GROUPS IN AWS

- Each target group is used to route requests to one or more registered targets.
- When you create each listener rule, you specify a target group and conditions.
- When a rule condition is met, traffic is forwarded to the corresponding target group.
- You can create different target groups for different types of requests.
- For example, create one target group for general requests and other target groups for requests to the microservices for your application.

Source: https://docs.aws.amazon.com/elasticloadbalancing/latest/application/load-balancer-target-groups.html

SETTING UP FIREWALL CONFIGURATION

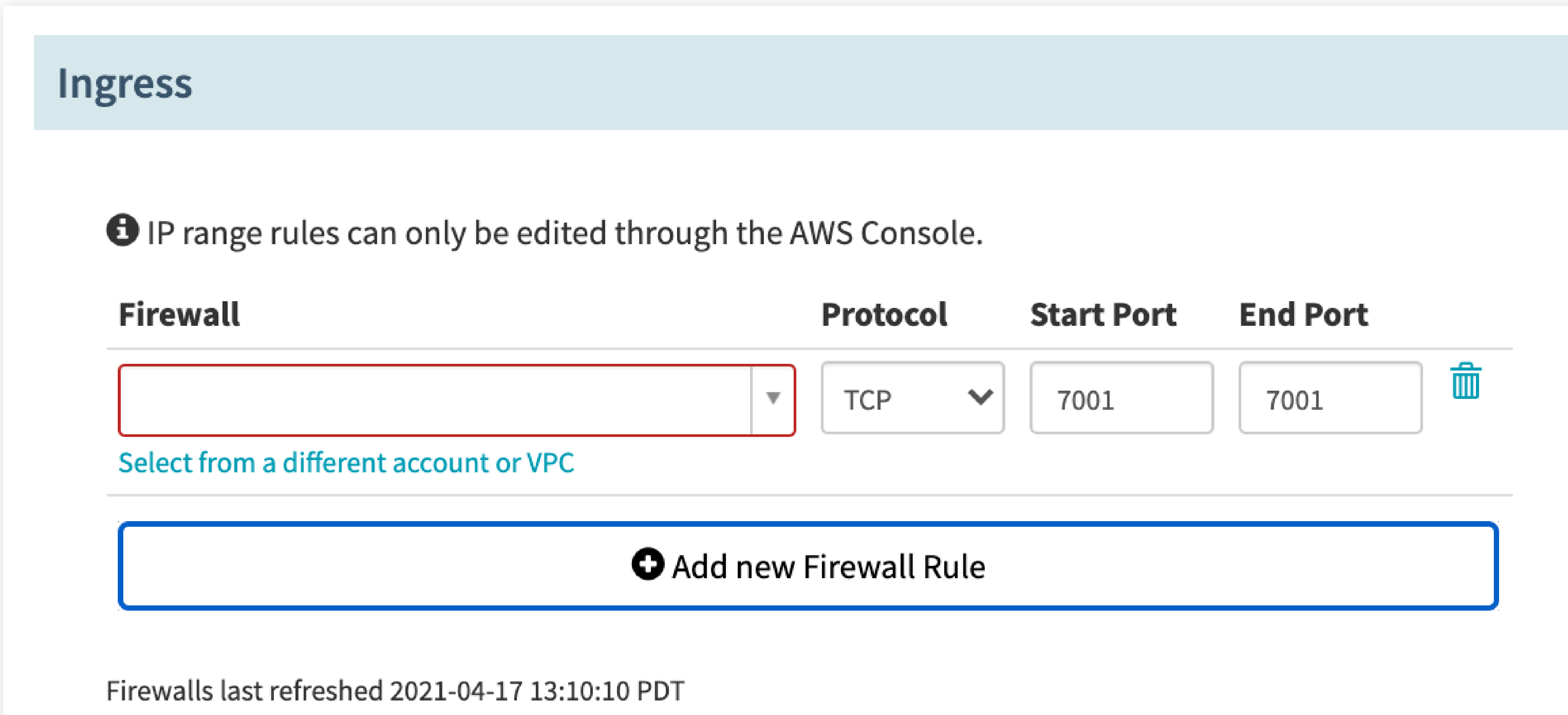
FIREWALL LOCATION



FIREWALL LOCATION FIELDS

- **Account** - Which Account in AWS will be holding this account
- **Region** - Which Region do we use
- **Stack** - Naming to create vertical scaling
- **Detail** - Naming to describe the name of the deployment (Should be less than 32 characters)
- **Description** - Description of the firewall
- **VPC** - What VPC will this apply

FIREWALL INGRESS



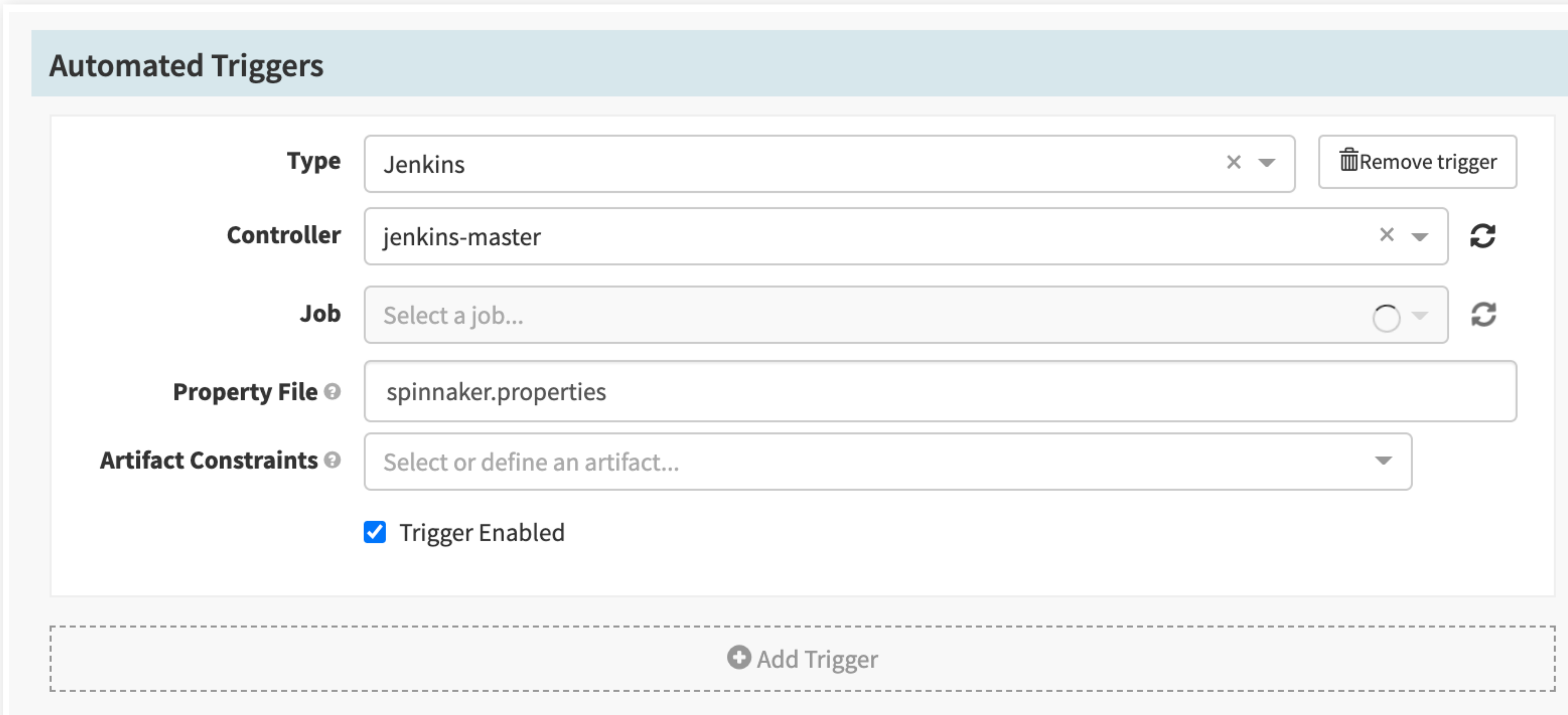
FIREWALL INGRESS FIELDS

- **Firewall** which firewall do you will to apply additional rules
- **Start Port** which port do we start
- **End Port** which port do we end

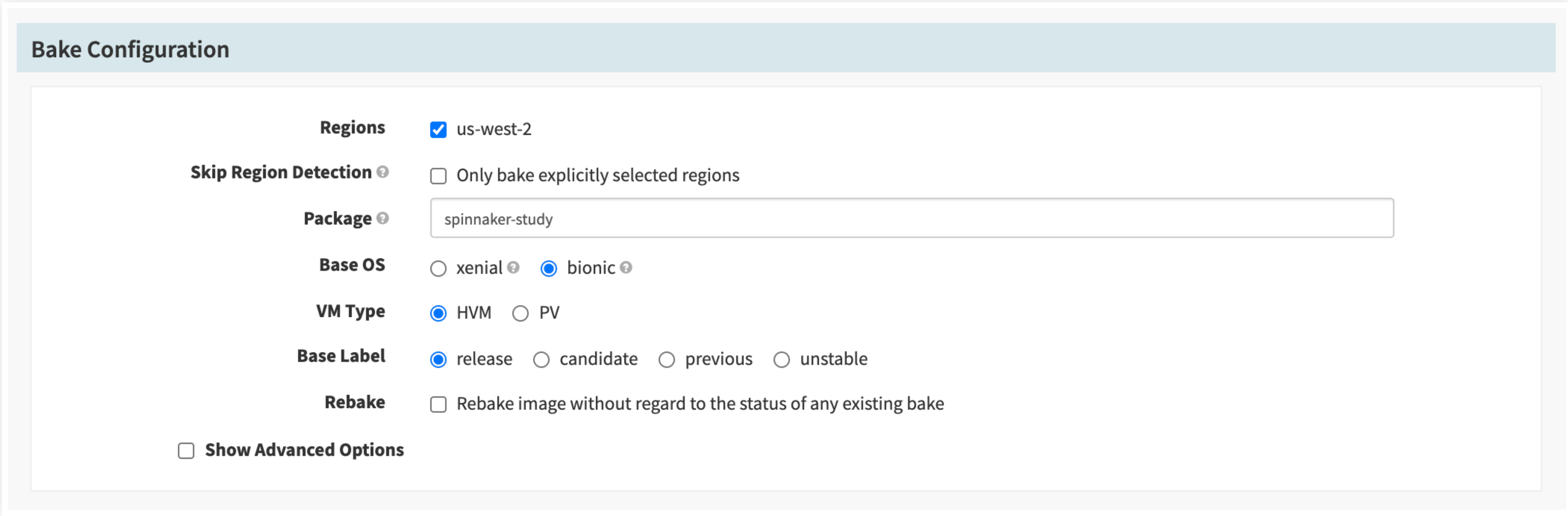
CREATING AN AWS PIPELINE

- Creating an AWS Pipeline is the same as creating a Kubernetes based Pipeline
- The only difference is that you need to use a Jenkins trigger to get the debian file

USING A JENKINS TRIGGER



CREATE A BAKING STAGE



HVM VS PV

- AMIs offer a choice of virtualization type: *PV* and *HVM*
- Every AWS AMI uses the Xen hypervisor on bare metal
- Xen offers two kinds of virtualization: HVM (Hardware Virtual Machine) and PV (Paravirtualization)

HVM

- VMs running on top of their hypervisors are not aware that they are sharing processing time with other clients on the same hardware
- The host should have the capability to emulate underlying hardware for each of its guest machines.
- Provides the ability to run an operating system directly on top of a virtual machine without any modification
- Runs as if it were run on the bare-metal hardware

PARAVIRTUALIZATION

- This technique is fast and provides near native speed in comparison to full virtualization
- Guest operating system requires some modification before everything can work.
- These modifications allow the hypervisor to export a modified version of the underlying hardware to the VMs
- This allows near native performance

AMAZON RECOMMENDATIONS

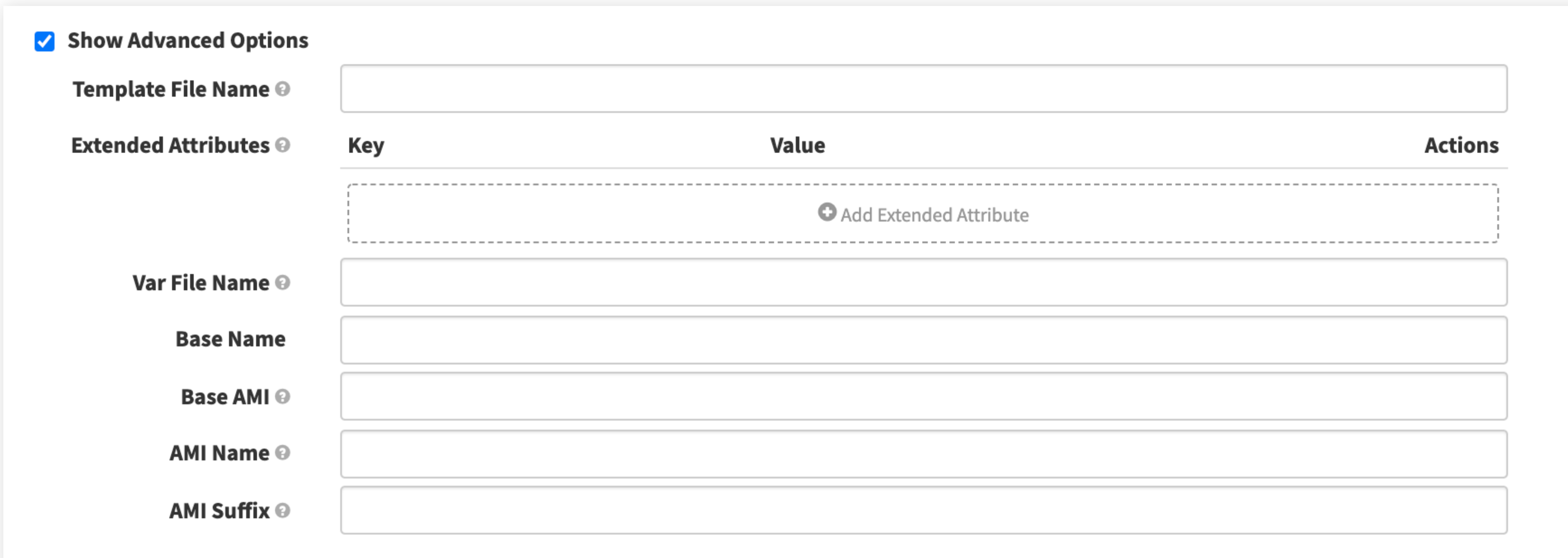
- Amazon currently recommends users to choose HVM instead of PV.
- Ignoring their advice can have very real consequences.
- For example, in the AWS Frankfurt region, if you try to select an AWS AMI (Amazon Linux) using PV, you will be greatly restricted in your choice of instance types

Source: https://cloudacademy.com/blog/aws-ami-hvm-vs-pv-paravirtual-amazon/

BAKING FIELDS

- **Region** - Region where baking will take place
- **Skip Region Detection** - Spinnaker will detect regions to bake in from downstream deploy stages. This prevent failed deploys from accidentally missed regions during the bake process. This will disable
- **Package** - This should *be inline with the name of the debian file* that you created
- **Base OS** - What Debian Repository should we look for the application, established in Spinnaker configuration
- **VM Type** - HVM or PV
- **Rebake** - Do we need to rebake images, even if already baked in subsequent builds
- **Base Label** - What label should be applied to the baked AMI: release, candidate, previous, unstable

ADVANCED BAKING STAGE

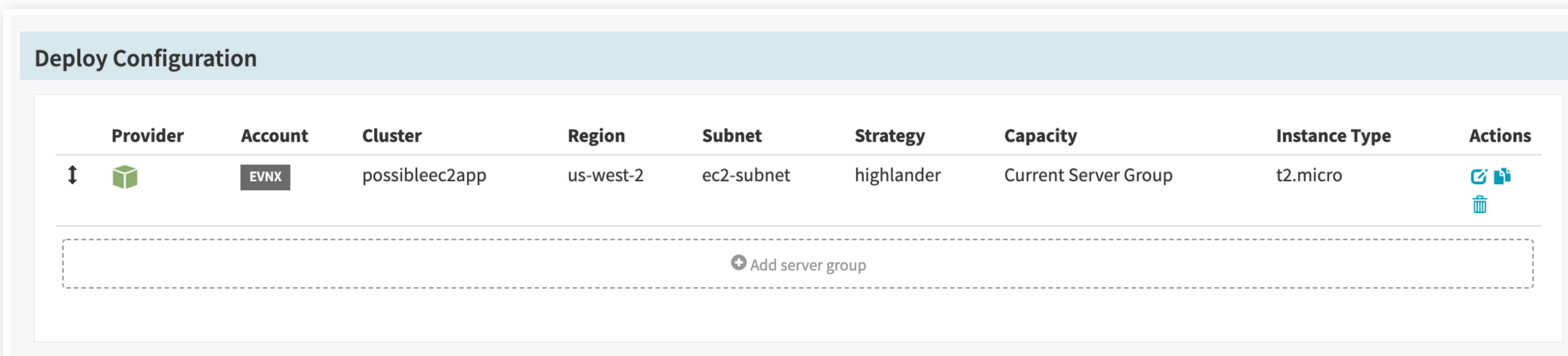


BAKING ADVANCED FIELDS

- **Template File Name** - Which packer template do you wish to use, overriding the one that is configured by administrators
- **Extended Attributes** - Packer accepts other variables in case you have your template
- **Var File Name** - If you have an external file that stores variable use this field
- **Base Name** - This would override the base name that you would like to use
- **Base AMI** - This would override the Base OS
- **AMI Name** - Override the full name default of the baked image
- **AMI Suffix** - Override the suffix date format

CREATE A DEPLOYMENT STAGE

When creating a server group, click add server group



BASIC SETTINGS

BASIC SETTINGS FIELDS

- **Account** - which account do you wish to deploy
- **Region** - which region will we apply
- **VPC Subnet** - which subnet to apply, typically this would be in a private subnet
- **Stack** - Naming to create vertical scaling
- **Detail** - Naming to describe the name of the deployment (Should be less than 32 characters)
- **Traffic** - Do we wish to start sending traffic out to the new location
- **Strategy** - What strategies do you wish to use on the deployment, some different one as opposed to Kubernetes
- **Reason** - Apply any notes required

LOAD BALANCERS

Load Balancers

Target Groups

Select...

Classic Load Balancers

No load balancers found in the selected account/region/VPC

If you are looking for a load balancer or target group from a different application,
click here to load all load balancers.

LOAD BALANCERS FIELDS

- **Target Groups -** which target groups you wish to send the information
- **Classic Load Balancers -** not particularly requires since we aren’t using Classic Load Balancing

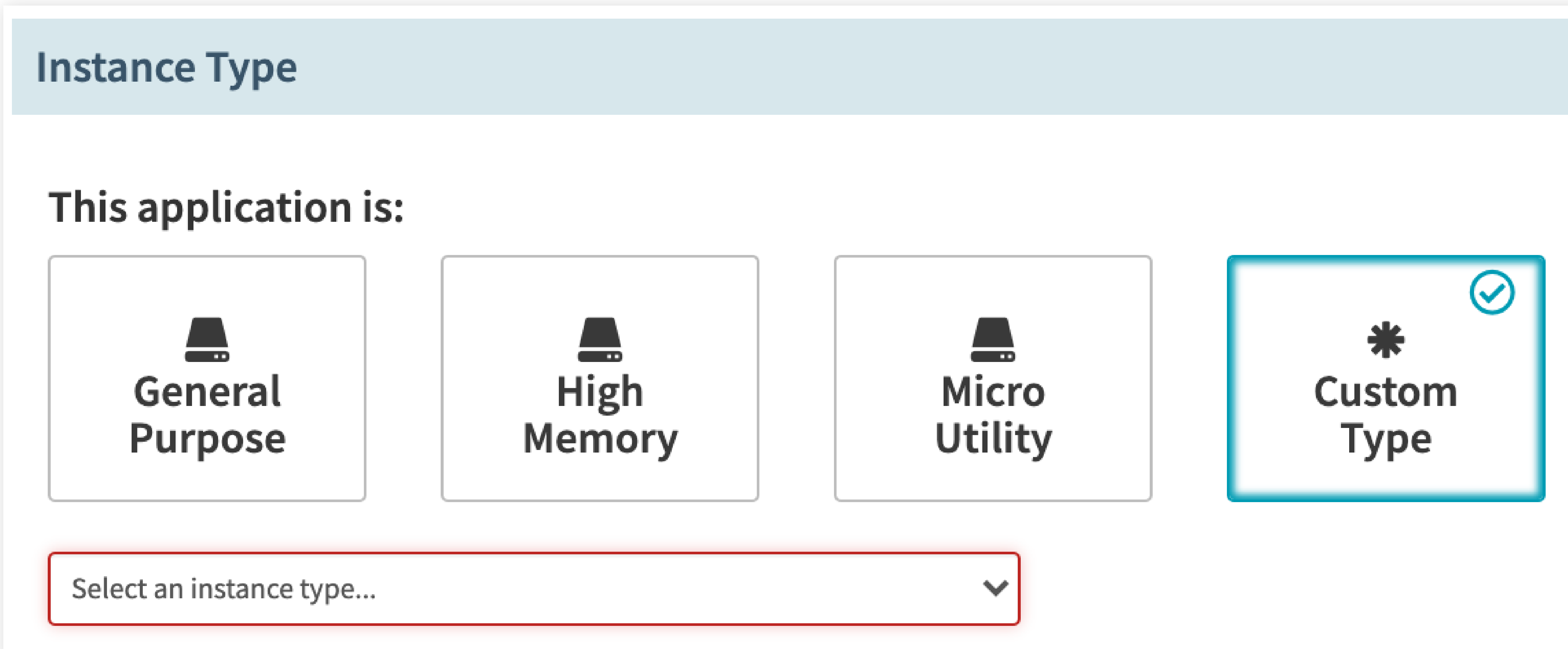
FIREWALLS


Firewalls
Firewalls
Select...
default (sg-09270608f466a1006)
external-webgroup (sg-0eed13c778b92f279)
ist.

FIREWALL FIELDS

- **Firewalls** - Select the firewalls you wish to use for your deployment

INSTANCE TYPES

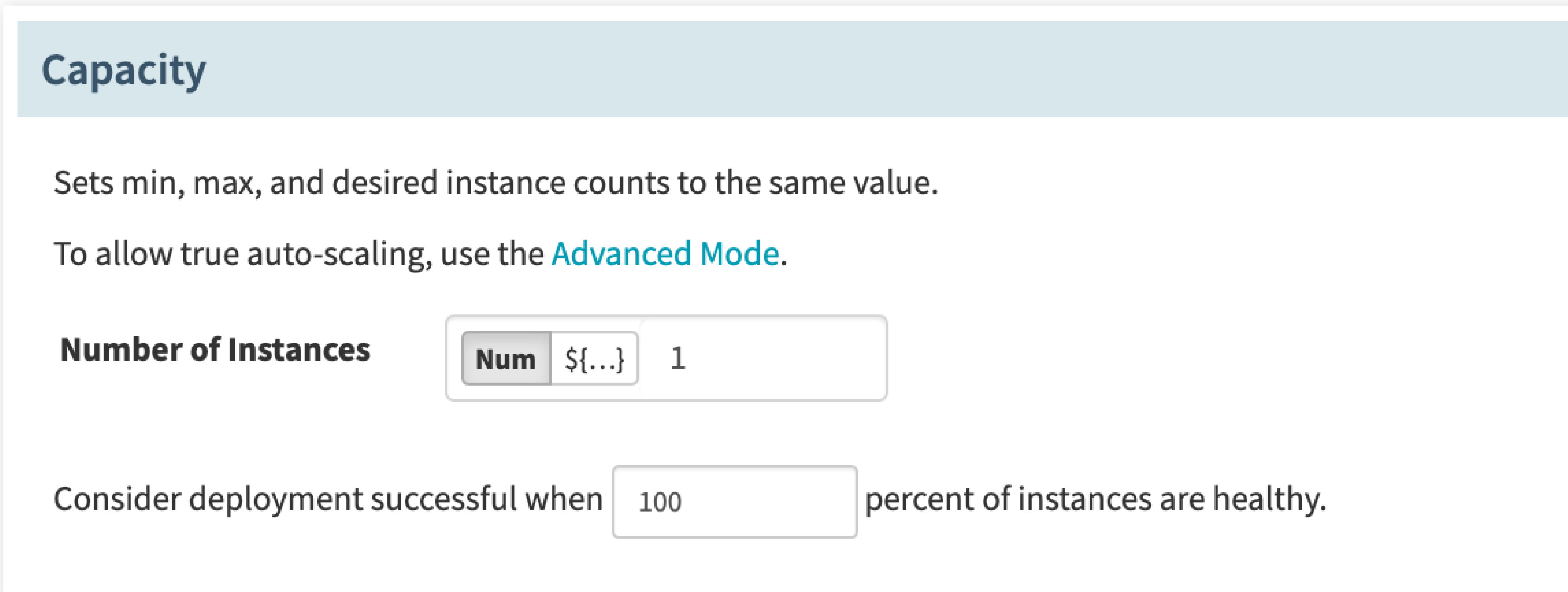


INSTANCE TYPE FIELDS

- Select what type of instance you wish to deploy
- Varieties for AWS are available

CAPACITY

- Select the capacity of instances you wish to deploy



AVAILABILITY ZONES

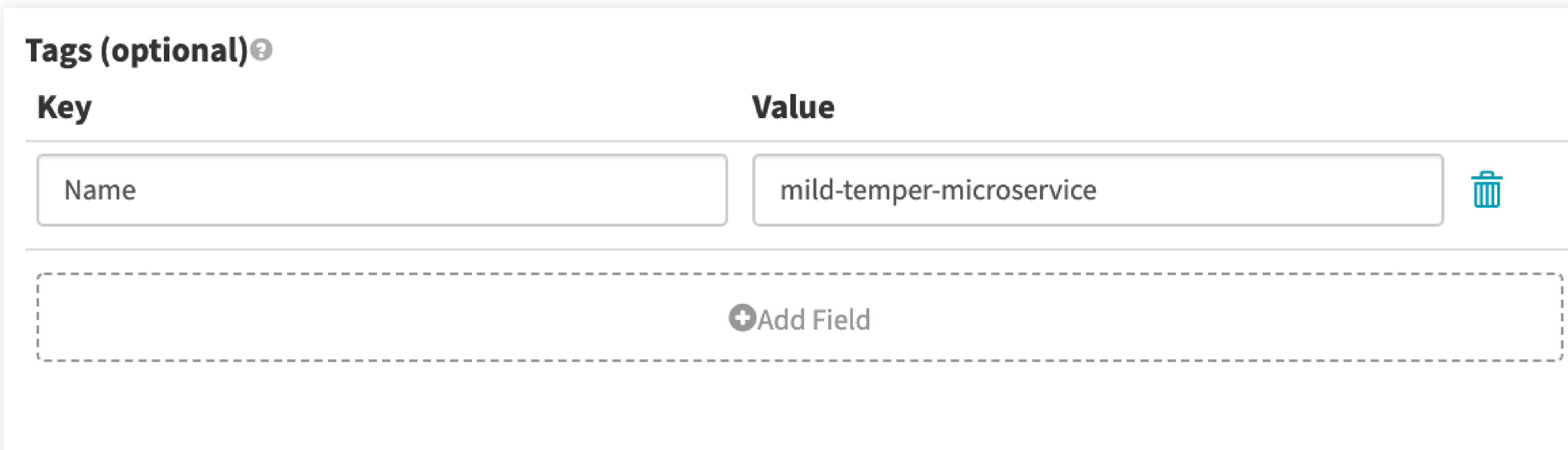
- Select if you wish to manually or automatically deploy images across multiple zones
- If automatic, you can which zones to deploy

ADVANCED SETTINGS

- There are plenty of Advanced Setting when deploying, it would take a lot of time to go through each one.
- The important one is which key to use, so that an ssh connection can be made to the EC2 instance.
- Once that has been selected, the Add button should be active

TAGS

You have the ability to create optional tags to go with the deployment you wish to make



LAB 6: AWS PROVIDER

AGENDA

AGENDA

Our *mandatory* goals for this class:

- Become familiar with Spinnaker and it's role
- Understand the UI of Spinnaker
- Understand an Application, Pipeline, and Stage
- Purpose of Spinnaker
- How to get Spinnaker within Salesforce
- Helm and Baking
- Spinnaker Expression Language

SOME OTHER ITEMS YOU'LL PICK UP

- Canary
- Understanding of Kubernetes
- How it works
- Debugging Tips

CONCLUSION

- Dev-ops is hard, requires a lot of knowledge in:
  - Command line programming
  - Kubernetes
  - Prometheus
  - Multiple Languages

You will need to be creative