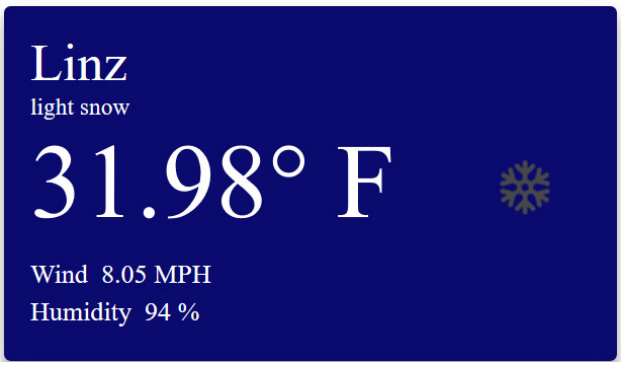
Tutorial CD with Keptn tested by Hey

This is a tutorial for setting up a continuous delivery with Keptn (https://keptn.sh/) for an example application that is tested by Hey (https://github.com/rakyll/hey) and monitored by Dynatrace (https://www.dynatrace.com/).

Keptn is a tool for an event-based control plane for continuous delivery and automated operations for cloud-native applications. Hey is a load generator for web applications. Dynatrace is used in this tutorial for production monitoring.

Create and deploy an application

- Implement your own web application:
  - For this tutorial an angular weather-app was implemented, which displays the requested weather data from the open weather API (https://openweathermap.org/api) and displays the results.



  - Make sure that the application has a */health* endpoint which returns a 200 http status code for the liveness and readiness probe for the helm chart in section *onboard first microservice.*

- Create a Docker image for your application. For example to dockerize an angular app use the following Dockerfile:

```
FROM node:12.7-alpine AS build
WORKDIR /usr/src/app
COPY package.json package-lock.json ./
RUN npm install
COPY . .
RUN npm run build:ssr


CMD ["npm", "run", "start"]
```

- Push the created Docker image to your Dockerhub account with the following command: *docker push YOUR-ACCOUNT/YOUR-APPLICATION*

Hey Service

- Create a Hey service for testing the response time of your application.
- Start off with the following go-template https://github.com/keptn-sandbox/keptn-service-template-go and execute the following steps:
  - Replace every occurrence of “keptn-service-template-go” with “hey-service”.
  - Replace every occurrence of (Docker) image names and tags from keptnsandbox/keptn-service-template-go to your Docker organization and image name (e.g., YOUR-ACCOUNT/hey-service).
  - Download the Linux version of Hey (https://hey-release.s3.us-east-2.amazonaws.com/hey_linux_amd64) and save it in the root directory of the Hey service for executing the Hey test.
  - Change the HandleDeploymentFinishedEvent function in the eventhandlers.go file to send 200 requests and test the availability of the application:

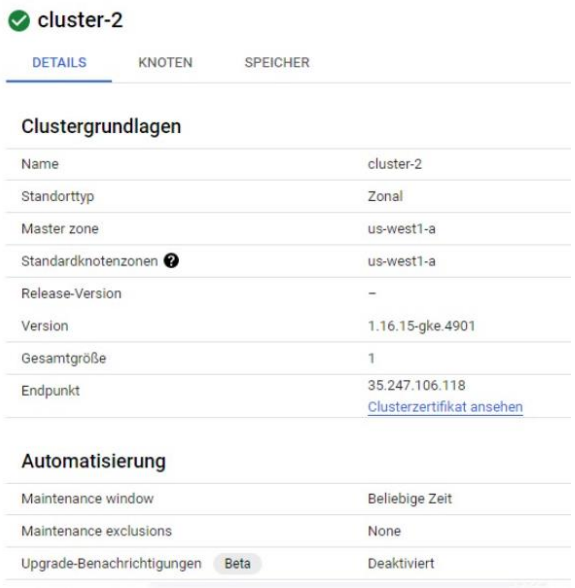
```
func HandleDeploymentFinishedEvent(myKeptn *keptn.Keptn, incomingEvent cloudevents.Event, data *keptn.DeploymentFinishedEventData) error {
    log.Printf("Handling Deployment Finished Event: %s", incomingEvent.Context.GetID())

    // capture start time for tests
    startTime := time.Now()

    // Send Test Finished Event
    // default 200 requests are sent
    url := data.Service + "." + data.Project + "-" + data.Stage + ".svc.cluster.local"
    log.Printf("Sending test requests to %s", url)
    cmd := exec.Command("./hey_linux_amd64", url)

    stdoutStderr, err := cmd.CombinedOutput()
    if err == nil {
        return myKeptn.SendTestsFinishedEvent(&incomingEvent, "", "", startTime, "pass", nil, "hey-service")
    }
    if stdoutStderr != nil {
        log.Printf("%s\n", stdoutStderr)
    }
    log.Printf("Error occured when running hey %v", err)

    return myKeptn.SendTestsFinishedEvent(&incomingEvent, "", "", startTime, "fail", nil, "hey-service")
}
```

- Insert the highlighted line into the Dockerfile to include the Hey binary:

```
ARG version=develop
ENV VERSION="${version}"

# Copy the binary to the production image from the builder stage.
COPY --from=builder /src/hey-service/hey-service /hey-service
COPY --from=builder /src/hey-service/hey_linux_amd64 /hey_linux_amd64

EXPOSE 8080

# required for external tools to detect this as a go binary
ENV GOTRACEBACK=all
```

Setup Google Cluster:

- At first create a big enough cluster in the Google Kubernetes Engine with the following settings:
  - Nodes: 1
  - Image Type: ubuntu
  - VM: 8v 32GB



- Create a connection with the cluster in the cloudshell.

Setup Keptn:

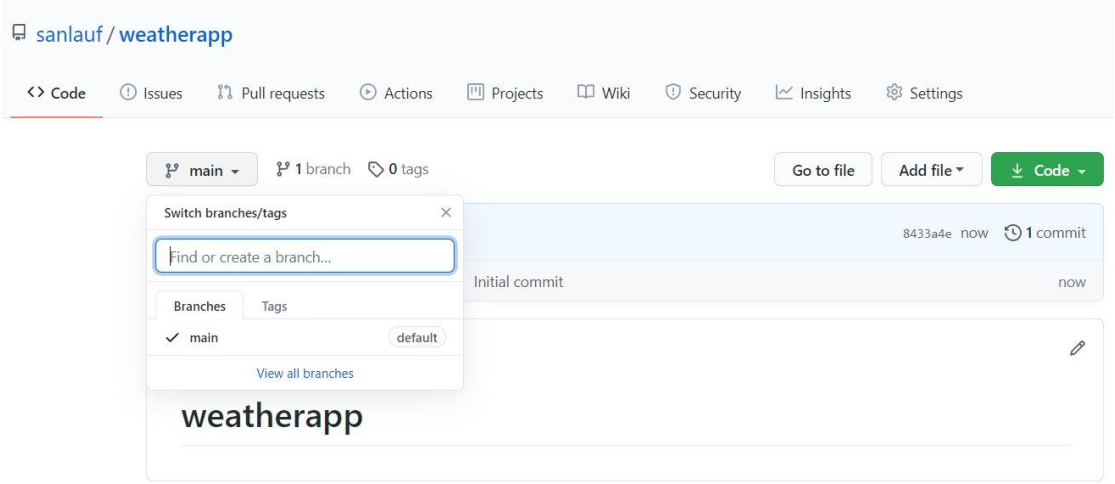
- For easier execution use the Linux subsystem for Windows or Linux.
- For the following steps follow the instructions in https://tutorials.keptn.sh/tutorials/keptn-upscaling-dynatrace-07/index.html#2
  - Download and install Istio (Step 3).
    Istio creates the connection between your Google Cluster and Keptn.
  - Download and install Keptn (Step 4-5).
  - Configure Keptn and Istio (Step 6).
    Istio will be configured for traffic routing and as an ingress to the Google cluster.
  - Connect your Keptn CLI to the Keptn installation (Step 7)
- Setup Dynatrace for monitoring the application:
  - Create an account at https://www.dynatrace.com.
  - Execute the steps 9-11 in https://tutorials.keptn.sh/tutorials/keptn-upscaling-dynatrace-07/index.html#8

Deploy and Test the Application

- At first deploy the Hey service with the following commands executed in the Hey service directory:
  kubectl apply -f deploy/service.yaml

  kubectl -n keptn set image deployment/hey-service hey-service=YOUR-DOCKER-ACCOUNT/hey-service:$VERSION –record

- Create a Git repository.



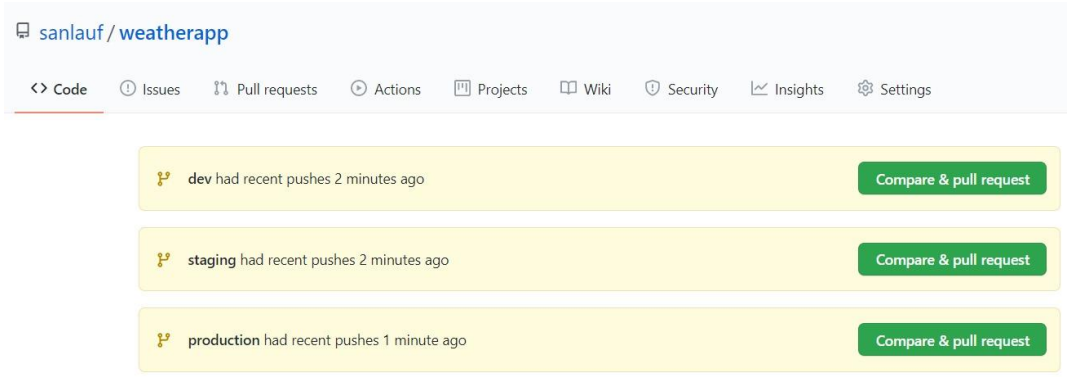
- Create a shipyard.yaml file for defining the stages and their test/deployment strategies. In our example we have three stages. For the dev stage direct deployment is used and for staging and production the blue_green deployment strategy.

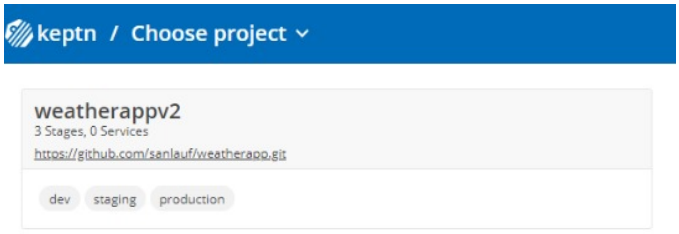
shipyard.yaml

```
stages:
  - name: "dev"
    deployment_strategy: "direct"
    test_strategy: "functional"
  - name: "staging"
    approval_strategy:
      pass: "automatic"
      warning: "automatic"
    deployment_strategy: "blue_green_service"
    test_strategy: "performance"
  - name: "production"
    approval_strategy:
      pass: "automatic"
      warning: "manual"
    deployment_strategy: "blue_green_service"
    remediation_strategy: "automated"
```

- Create a Keptn project with the following command:
  keptn create project YOUR-PROJECT --shipyard=./shipyard.yaml --git-user=YOUR-USER --git-token=YOUR-GITTOKEN --git-remote-url=YOUR-REPOSITORY-URL

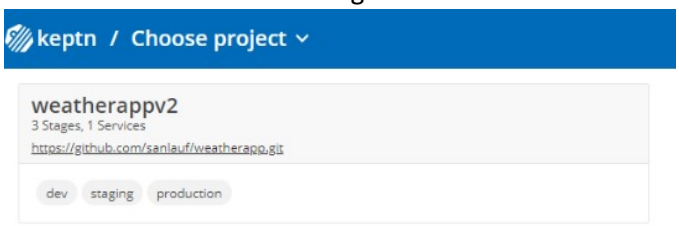
In the following screenshots the created stages are shown on Github and Keptn:





- To onboard your first microservice download a template helm chart from https://github.com/keptn/examples/tree/master/onboarding-carts/carts and adapt it for your service. Then execute the following command:
  keptn onboard service YOUR-SERVICE --project=YOUR-PROEJCT --chart=./YOUR-SERVICE

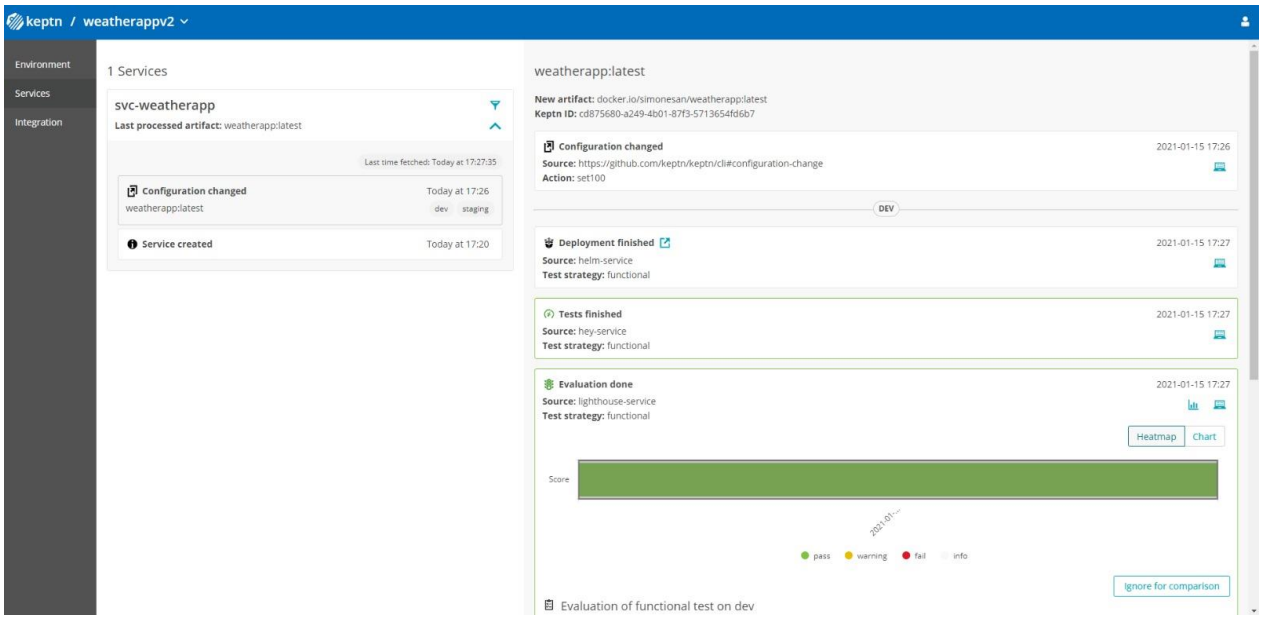
  You can now detect the change of the number of services:

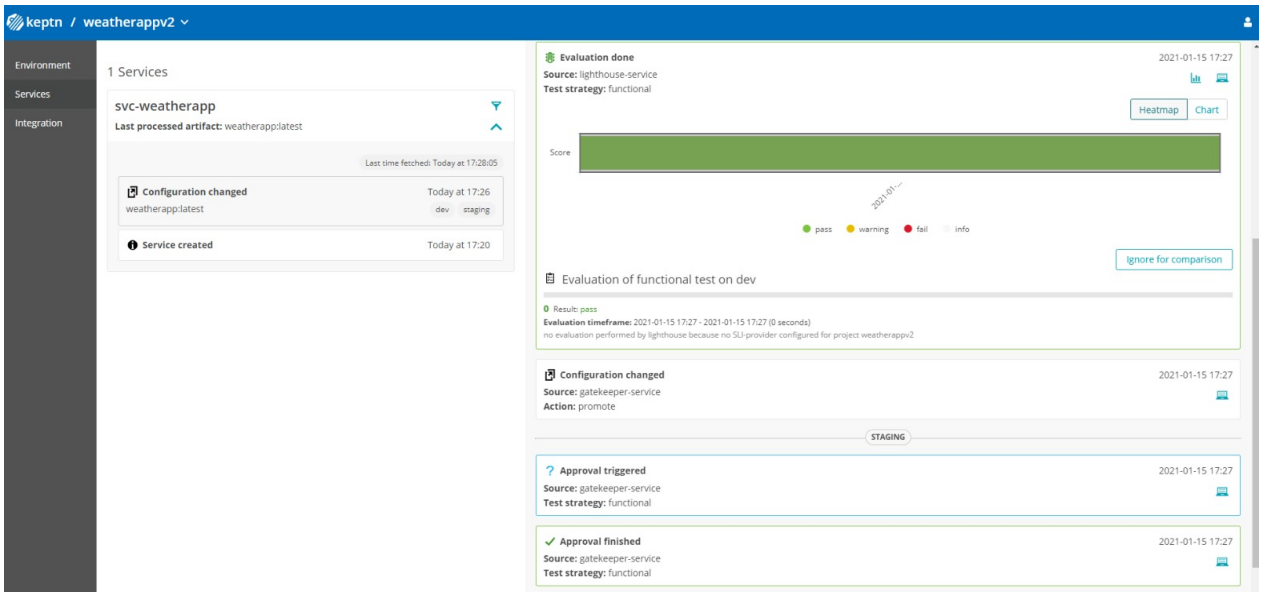


- To deploy your first build or a new version with Keptn send a new artefact of your project with the following command:
  keptn send event new-artifact --project=YOUR-PROJECT --service=YOUR-SERVICE --image=YOUR-DOCKERIMAGE-URL

  Verify the pods that should have been created for the service execute the following command:

In the following screenshots you can notice the triggered events:





- To view your application execute the following command to get the URLs of your application in the different stages:
  kubectl get vs –n YOUR-PROJECT-STAGE

```
clc@DESKTOP-K2D7KEA:/mnt/c/Users/Stefan/Desktop/Studium/Master/3.Semester/CLC/Projekt/clc3_project$ kubectl get vs -n weatherappv2-dev
NAME             GATEWAYS                          HOSTS                                                                AGE
svc-weatherapp   [public-gateway.istio-system mesh]   [svc-weatherapp.weatherappv2-dev.35.203.149.57.xip.io svc-weatherapp]   9m20s
clc@DESKTOP-K2D7KEA:/mnt/c/Users/Stefan/Desktop/Studium/Master/3.Semester/CLC/Projekt/clc3_project$ kubectl get vs -n weatherappv2-staging
NAME             GATEWAYS                          HOSTS                                                                AGE
svc-weatherapp   [public-gateway.istio-system mesh]   [svc-weatherapp.weatherappv2-staging.35.203.149.57.xip.io svc-weatherapp]   8m14s
clc@DESKTOP-K2D7KEA:/mnt/c/Users/Stefan/Desktop/Studium/Master/3.Semester/CLC/Projekt/clc3_project$ kubectl get vs -n weatherappv2-production
NAME             GATEWAYS                          HOSTS                                                                AGE
svc-weatherapp   [public-gateway.istio-system mesh]   [svc-weatherapp.weatherappv2-production.35.203.149.57.xip.io svc-weatherapp]   5m39s
clc@DESKTOP-K2D7KEA:/mnt/c/Users/Stefan/Desktop/Studium/Master/3.Semester/CLC/Projekt/clc3_project$
```

- To connect your project with Dynatrace execute the following commands:
  kubectl apply -f https://raw.githubusercontent.com/keptn-contrib/dynatrace-sli-service/0.7.1/deploy/service.yaml -n keptn

  keptn add-resource --project=YOUR-PROJECT --resource=sli-config-dynatrace.yaml --resourceUri=dynatrace/sli.yaml

  keptn configure monitoring dynatrace --project=YOUR-PROJECT

  On your Dynatrace Dashboard you can now monitor your application.