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Deployment?
Where we code, we don‘t care about Deployments

Introduction to GitOps

DevOps Saxony
Meet beginners, enthusiasts and experts!

15.05.2023

CLOUD NATIVE
COMPUTING FOUNDATION

Who am I?

Yet another **Daniel**

Continuous Testing and Delivery

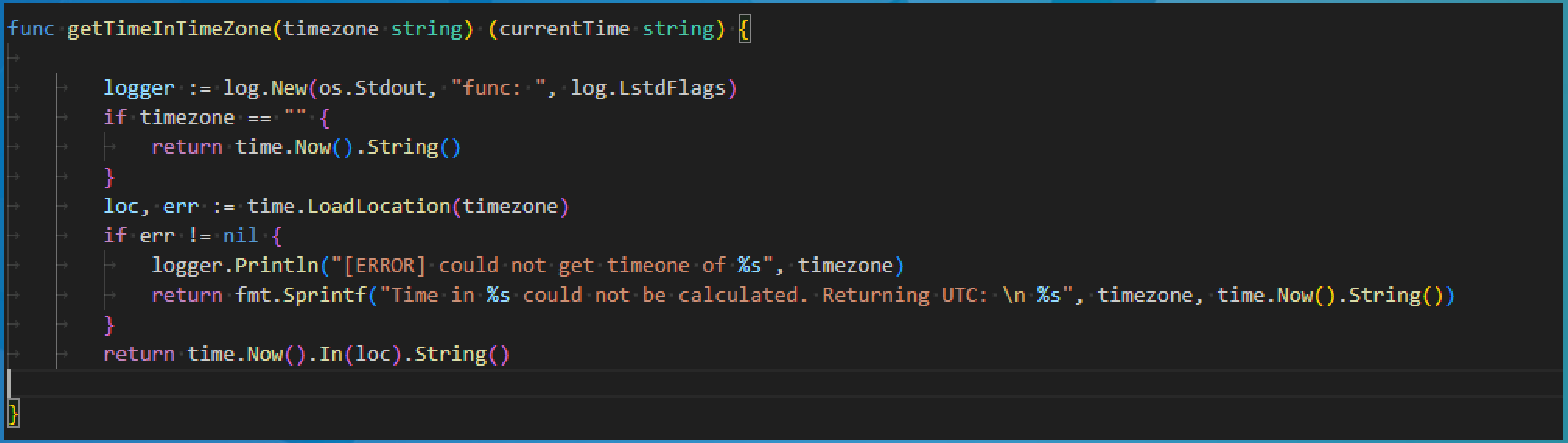
Big fan of DevOps

Always learning new stuff

Let‘s pretent we have an awsome website

https://awsome-site-staging.my-devbox.de/

And we want to deliver a great new feature…



```
func getTimeInTimeZone(timezone string) (currentTime string) {

    logger := log.New(os.Stdout, "func: ", log.LstdFlags)
    if timezone == "" {
        return time.Now().String()
    }
    loc, err := time.LoadLocation(timezone)
    if err != nil {
        logger.Println("[ERROR] could not get timeone of %s", timezone)
        return fmt.Sprintf("Time in %s could not be calculated. Returning UTC: \n %s", timezone, time.Now().String())
    }
    return time.Now().In(loc).String()

}
```

How do we do configuration management?

GitOps…

Whats the fuzz about?

- Golden Source of Truth in SCM
  - Not just the configurations itself
  - Versions have to be pinned and (automatically) updated on new release
- Everyone should be able to just clone the repository and get the same system as me
- Changes in the infrastructure or configuration are just a git-commit away

How to GitOps?

- Used (most of the time) with Kubernetes
  - But other infrastructures are possible

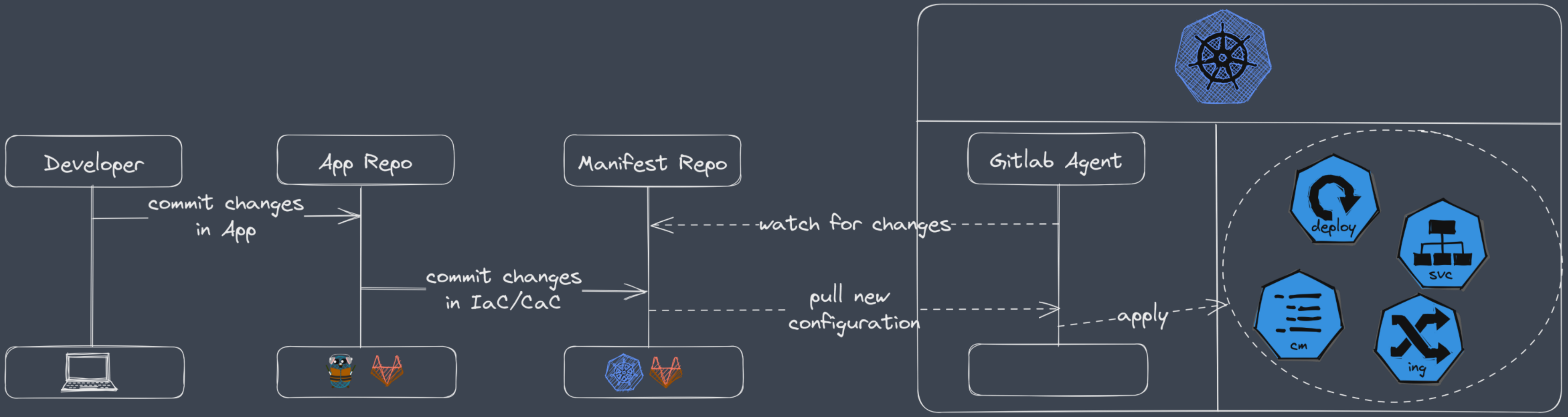
GitOps by Configuration Push

- CI-Server actively publishes the new configuration into the system
  - kubectl, Terraform, Ansible, Helm, …
- ❖ mirrors deployment-activities of developer (CLI-commands, etc.)
- ❖ Fire-and-Forget-rollout
- ❖ CI-Server needs to know system credentials

GitOps by Configuration-Pull

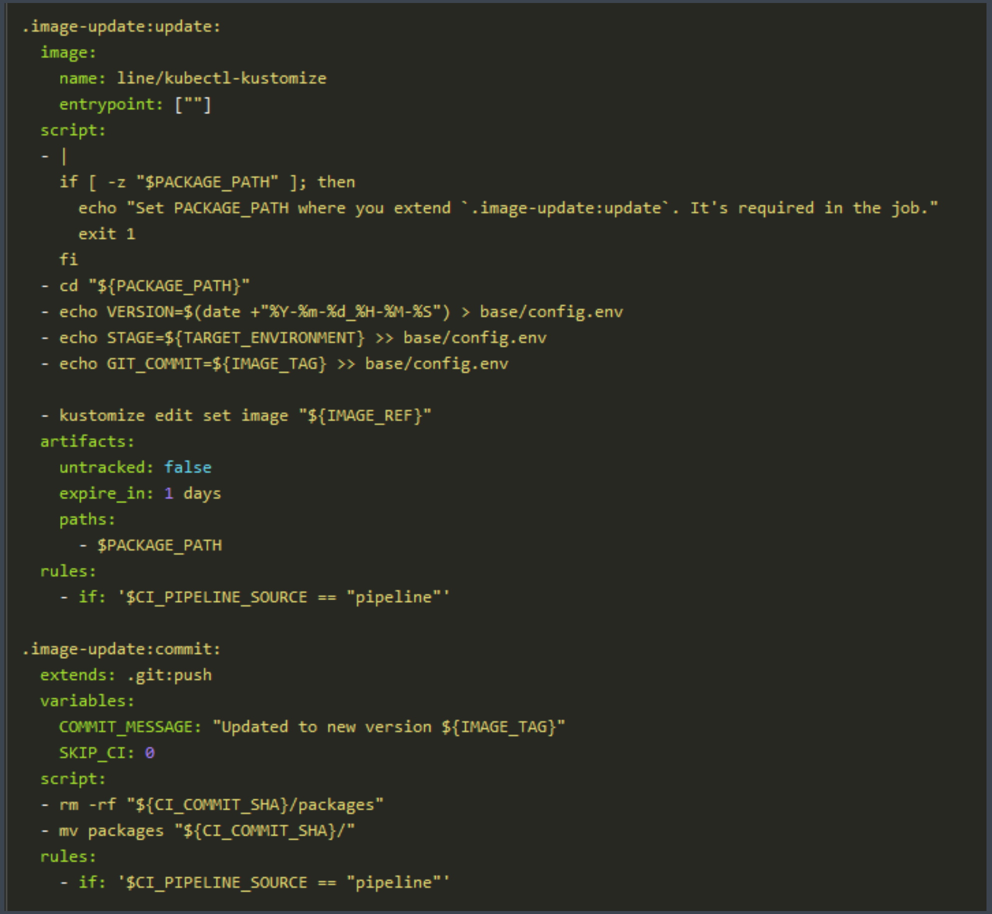
- A Controller inside the system gets new configurations and pulls it into existance
  - argoCD, Flux, GitLab GitOps, …
- ❖ Enforces a declarative, immutable description of the desired system
- ❖ Changes during runtime can be reconciled
- ❖ No potential exposure of system credentials

GitOps with GitLab



Apply changes to the manifests

- Changes are done by a special CI-Job
  - kustomize to apply new configurations to the new packages
    commit: „Updated to new version …“



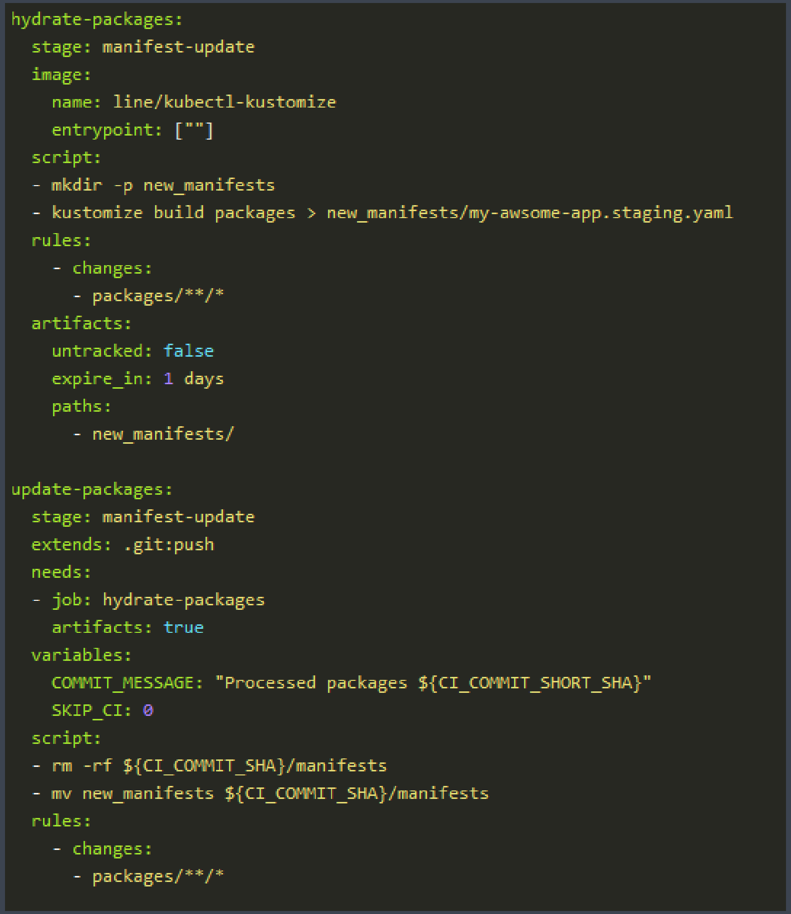
```
.image-update:update:
  image:
    name: line/kubectl-kustomize
    entrypoint: [""]
  script:
  - |
    if [ -z "$PACKAGE_PATH" ]; then
      echo "Set PACKAGE_PATH where you extend `.image-update:update`. It's required in the job."
      exit 1
    fi
  - cd "${PACKAGE_PATH}"
  - echo VERSION=$(date +"%Y-%m-%d_%H-%M-%S") > base/config.env
  - echo STAGE=${TARGET_ENVIRONMENT} >> base/config.env
  - echo GIT_COMMIT=${IMAGE_TAG} >> base/config.env

  - kustomize edit set image "${IMAGE_REF}"
  artifacts:
    untracked: false
    expire_in: 1 days
    paths:
      - $PACKAGE_PATH
  rules:
    - if: '$CI_PIPELINE_SOURCE == "pipeline"'

.image-update:commit:
  extends: .git:push
  variables:
    COMMIT_MESSAGE: "Updated to new version ${IMAGE_TAG}"
    SKIP_CI: 0
  script:
  - rm -rf "${CI_COMMIT_SHA}/packages"
  - mv packages "${CI_COMMIT_SHA}/"
  rules:
    - if: '$CI_PIPELINE_SOURCE == "pipeline"'
```

Apply changes to the manifests

- Changes are done by a special CI-Job
  - kustomize to apply new configurations to the new packages commit: *„Updated to new version …“*
- Changes are picked up by a second CI-Job
  - Running kustomize from the package data
  - Creates the „truth“-manifest with commit *„Processed packages ….“*



```
hydrate-packages:
  stage: manifest-update
  image:
    name: line/kubectl-kustomize
    entrypoint: [""]
  script:
  - mkdir -p new_manifests
  - kustomize build packages > new_manifests/my-awsome-app.staging.yaml
  rules:
    - changes:
      - packages/**/*
  artifacts:
    untracked: false
    expire_in: 1 days
    paths:
      - new_manifests/

update-packages:
  stage: manifest-update
  extends: .git:push
  needs:
  - job: hydrate-packages
    artifacts: true
  variables:
    COMMIT_MESSAGE: "Processed packages ${CI_COMMIT_SHORT_SHA}"
    SKIP_CI: 0
  script:
  - rm -rf ${CI_COMMIT_SHA}/manifests
  - mv new_manifests ${CI_COMMIT_SHA}/manifests
  rules:
    - changes:
      - packages/**/*
```

Let‘s see if our website changed…

https://awsome-site-staging.my-devbox.de/

Conclusions

- GitOps defines the **process** in which the **desired state** of an application is **described** and managed as **IaC**/CaC in a **source code management system**
- Two major ways and ideas to implement GitOps:
  - Push-Pipelines
  - Pull-Pipelines

  with advantages and disadvantages on both sides
- All tools to deploy and manage applications from CLI can be unsed and instrumantalized for both implementations

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Thank you for your attention

in X ◎ YouTube

Feel free to connect

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Other Works: https://gitlab.tools.my-devbox.de/explore