Kubernetes
the Deltatre way

15 JUN, 5:30 PM

ogr officine grandi riparazioni

newesis e Professional | Have Fun!

tag Talent Garden

Kubernetes CI/CD

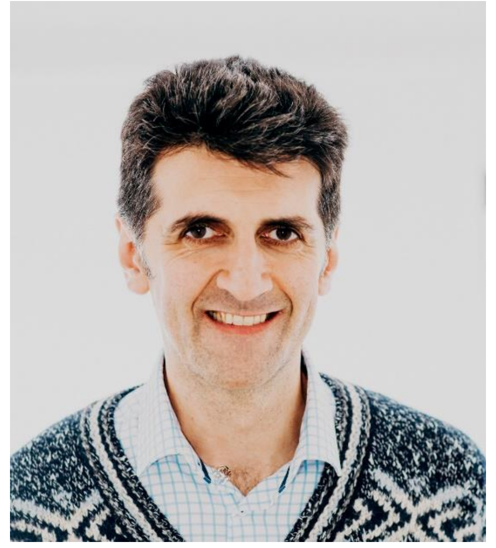
Deltatre Innovation Lab

RAUNO DE PASQUALE (NEWESIS)
SUPPORTED BY
MARCELLO TESTI (SPARKFABRIK)

ABOUT US

- Linkedin: https://www.linkedin.com/in/rauno-de-pasquale-b075773
- Twitter: @RaunoDepa

- Rauno De Pasquale, Co-Founder and CTO at Newesis Srl, constantly trying to reconcile his degree in Philosophy with a passion for computer science. After almost 18 year at Deltatre, at the beginning of 2019 he creates Newesis, with the aim of simplifying the use of the most advanced services of Cloud platforms even in fields other than sports.



- Linkedin: https://www.linkedin.com/in/mtesti/

- Marcello Testi, Professional at SparkFabrik. Agile practitioner. Feeling lucky and old because I have witnessed early net/web adoption (one of my first offices was in a small room with noisy modems and servers). Currently with a young AND mature company, helping customers taking advantage of cloud native solutions.

AGENDA

- Knowing the common options to operate the deployment of an application.
- Knowing the difference between imperative and declarative commands
- Content of today session:
  - Managing deployments with Kubectl and plain manifest files
  - Managing deployments with Kustomize and manifest patching
  - Managing deployments with Helm and templates chart
  - Managing deployments with Terraform and HCL templates
  - Integration Demo: GitLab, Google Kubernetes Engine and Helm
- This session has the scope of providing the basic skills to be able to define and execute the deployment of an application in a Kubernetes environment.

- Speaker: Rauno De Pasquale (Newesis) supported by Marcello Testi (SparkFabrik)
- Organised by: #DeltatreLab supported by #Newesis and #SparkFabrik
- Powered by: #Deltatre
- Hashtags: #DeltatreK8S #Containers #Docker #Kubernetes #meetup #webinar

WHAT THIS SESSION IS NOT

- How to manage your GIT repository
- List and comparison between CI\CD platforms
- Deep dive in CI\CD as for example how to integrate automatic testing in CI\CD workflow
- How to build the application into Docker Images
  - Refer to:
    - Monday 25-May 17:30 --> 19:30 - Kubernetes the Deltatre way: Docker in Action
- Managing deployments with Custom Resources and Operators
  - Wait for:
    - Monday 22-Jun 17:30 --> 19:30 - Kubernetes the Deltatre way: Kubernetes extensibility: CRD & Operators

IMPERATIVE VS DECLARATIVE

- Imperative
  - Execute a command

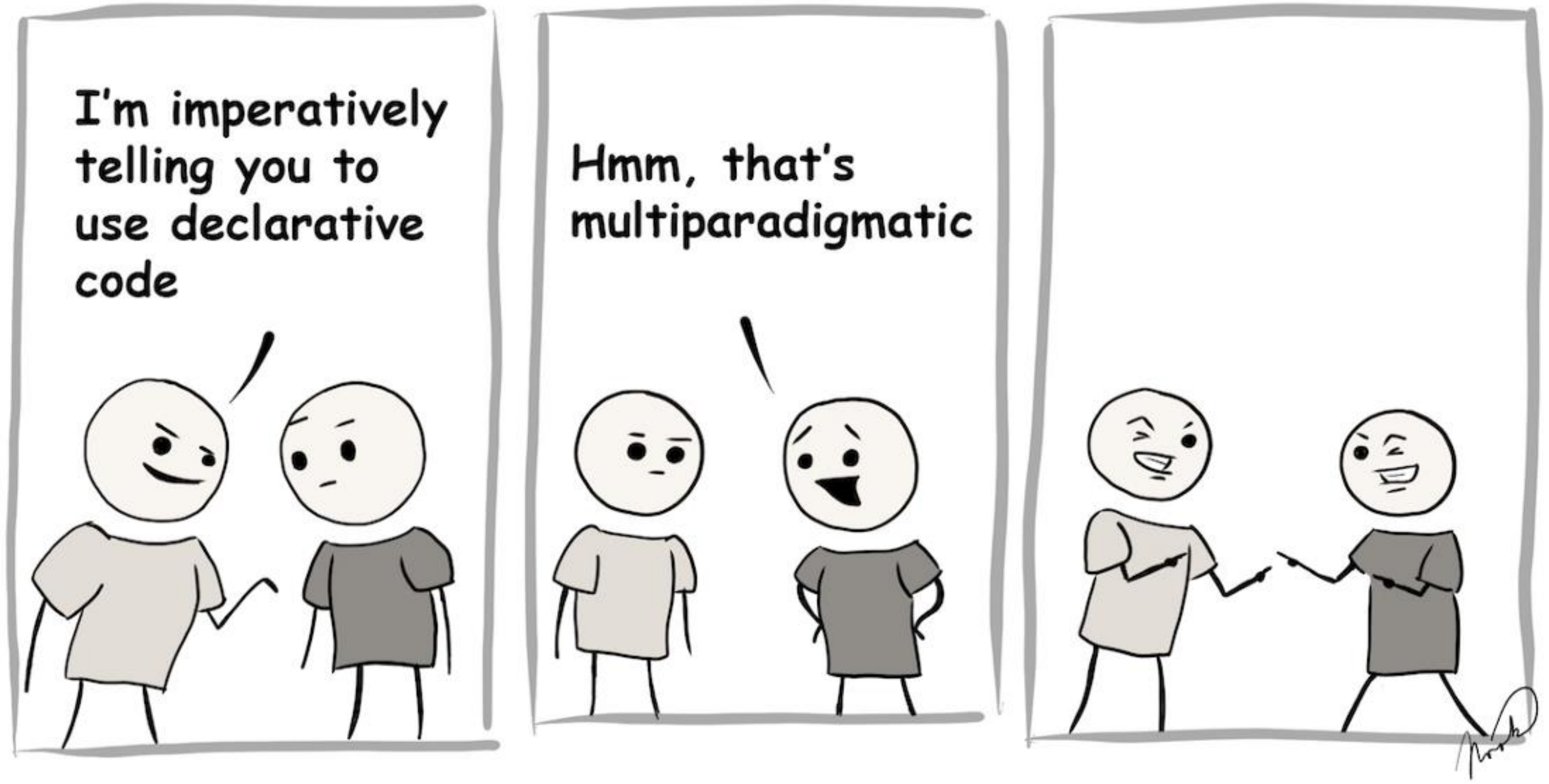
```
kubectl run myapp --image myrepo:mytag --replicas 2
```

```
kubectl label deployment myapp foo=bar
```

```
kubectl scale --replicas 3 deployment myapp
```

- Declarative
  - Define the desired state

```
apiVersion: apps/v1
kind: Deployment
metadata:
  name: myapp
spec:
  replicas: 3
  selector:
    matchLabels:
      run: myapp
  template:
    metadata:
      labels:
        run: myapp
    spec:
      containers:
      - name: myapp
        image: psdocker/myapp:mytag
        env:
        - name: WHOAMI
          value: "HAL 9000"
```


I'm imperatively telling you to use declarative code
Hmm, that's multiparadigmatic

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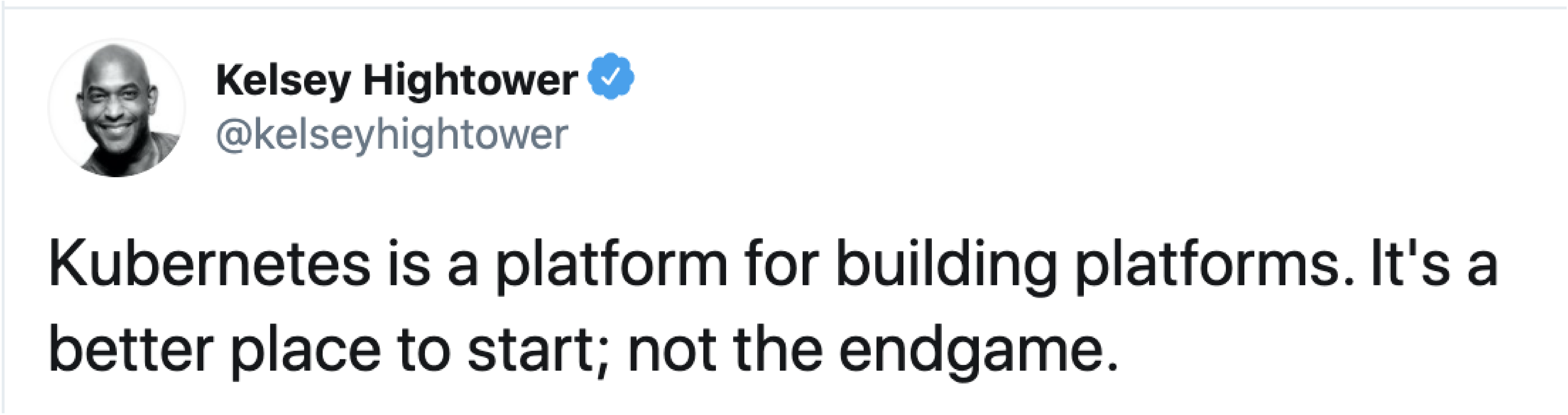
Imperative vs Declarative Demo

WHY "KUBERNETES CI\CD"?



Kelsey Hightower
@kelseyhightower

Kubernetes is a platform for building platforms. It's a better place to start; not the endgame.

WHAT COMPOSES AN APPLICATION DEPLOYMENT

POD

Deployment

Namespace

Limit Quota Policy

Config Map

Secret

Cert Manager

Service

Ingress

Ingress Controller

Load Balancer

Public DNS

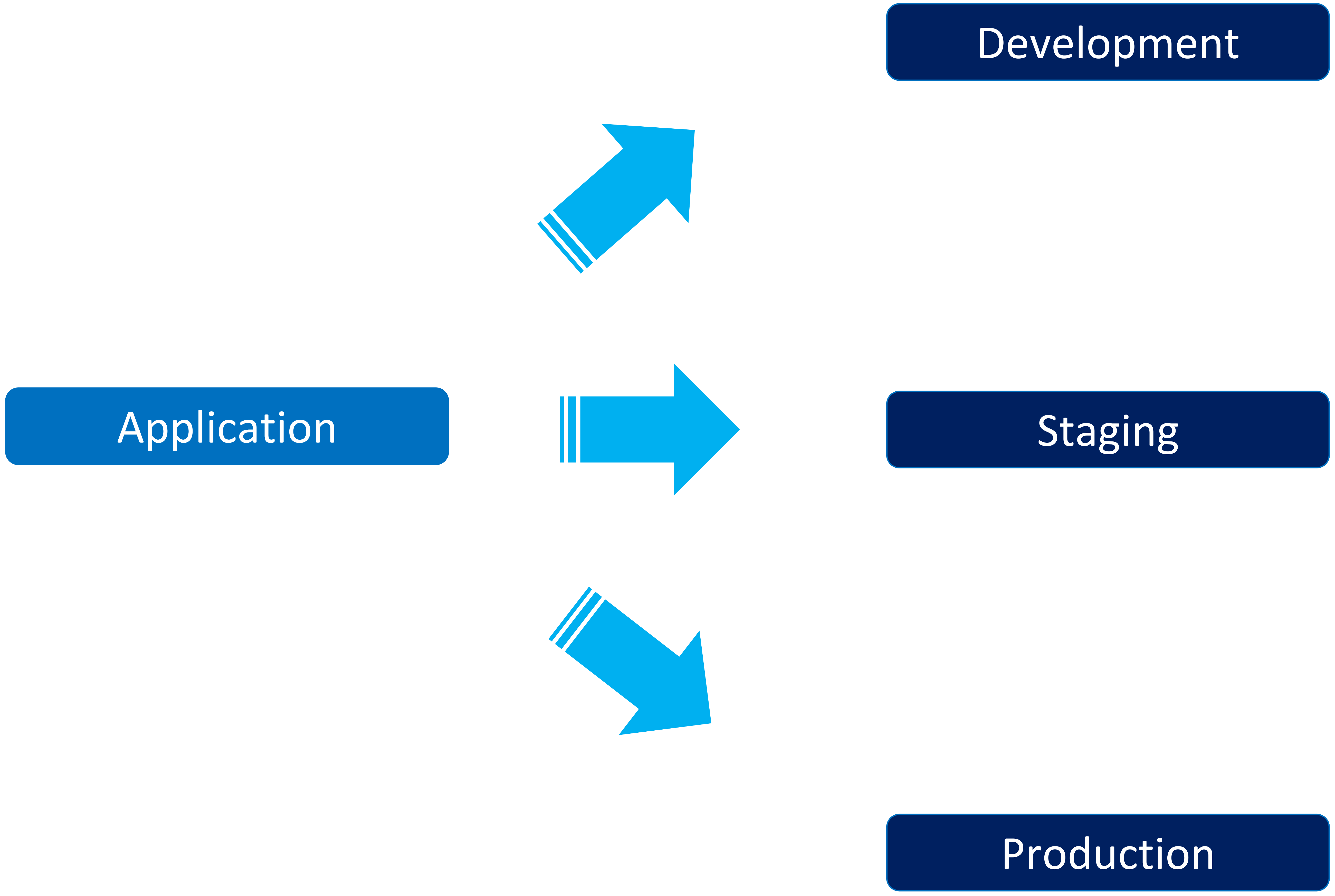
Volume

Storage

Storage Class

Storage Provider

WHAT MAKES IT EVEN MORE COMPLEX



Application

Development

Different Namespace per feature branch

One replica per deployment

Development Docker Registry

Staging

Single Namespace

Multi-replica replica per deployment no auto-scaling

Persistent Storage

Production

Multi-region setup

Multi-replica per deployment with autoscaling

Production Docker Registry

Deployment Tools

KUBECTL AND PLAIN MANIFEST

- Official Kubernetes Tool
- No need to install additional packages
- Simple (or better “simpler”)
- Standard, you need to know how to use it
- Does not directly support variables
    - Reuse by cloning and editing
    - You need different manifests
    - Or you need placeholder and pipelines managing the variables
- Does not manage dependencies
    - You need to manage files and folders orders
    - Or you need pipelines to be constructed to manage orders of execution

Kubectl Demo

KUSTOMIZE AND JSON PATCH

- Official Kubernetes Tool
- No need to install additional packages
- Support variables, patching and composition
    - Reuse by common “modules”
    - Easier to segment “ownership” and centrally manage common elements
    - Easier to manage changes between environments or deployments by changing only snippets with variation
- Deployment is done via Kubectl
    - You need to manage files and folders orders
    - Or you need pipelines to be constructed to manage orders of execution

Kustomize Demo

HELM AND CHART TEMPLATES

- Not part of Kubernetes
- You need to install a specific tool
- Natively support variables
    - But it does not support patching
- Support for conditional file or portion of file selection
    - But it does not support composition
- Natively support dependencies
- Concept of “packages” of application and versioning of the package and not only of individual elements

Helm Demo

TERRAFORM AND HCL

- Same HCL syntax you use for other Terraform resources
- Natively managing dependencies
- Natively support variables
- Integration with Terraform Validate, Plan and Apply workflow
- Two possible options:
  - Direct resource deployment (Kubernetes Provider)
  - Helm support (Helm provider)

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Terraform Demo

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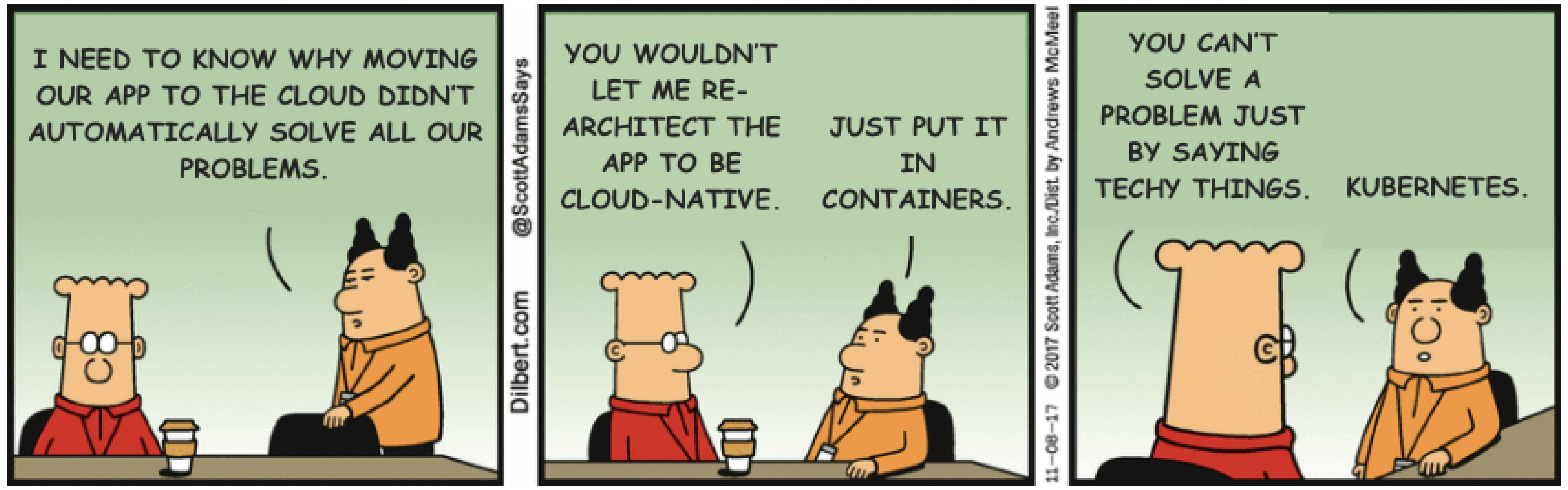
Integration with Pipelines Demo


I NEED TO KNOW WHY MOVING OUR APP TO THE CLOUD DIDN'T AUTOMATICALLY SOLVE ALL OUR PROBLEMS.
YOU WOULDN'T LET ME RE-ARCHITECT THE APP TO BE CLOUD-NATIVE.
JUST PUT IT IN CONTAINERS.
YOU CAN'T SOLVE A PROBLEM JUST BY SAYING TECHY THINGS.
KUBERNETES.
Dilbert.com @ScottAdamsSays
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DID YOU FINISH THE SOFTWARE YET?
NO, I'M STILL PAYING OFF THE TECHNICAL DEBT FROM THE LAST PROGRAMMER YOU RUSHED.
I DON'T KNOW WHAT THAT MEANS.
WELL, THAT EXPLAINS A LOT.
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DID YOU FINISH WRITING THE SOFTWARE?
NO.
I SPENT THE LAST THREE DAYS SETTING UP MY PROGRAMMING ENVIRONMENT.
SO... YOU'VE DONE... NOTHING?
NOTHING YOU'D UNDER-STAND.
Dilbert.com @ScottAdamsSays
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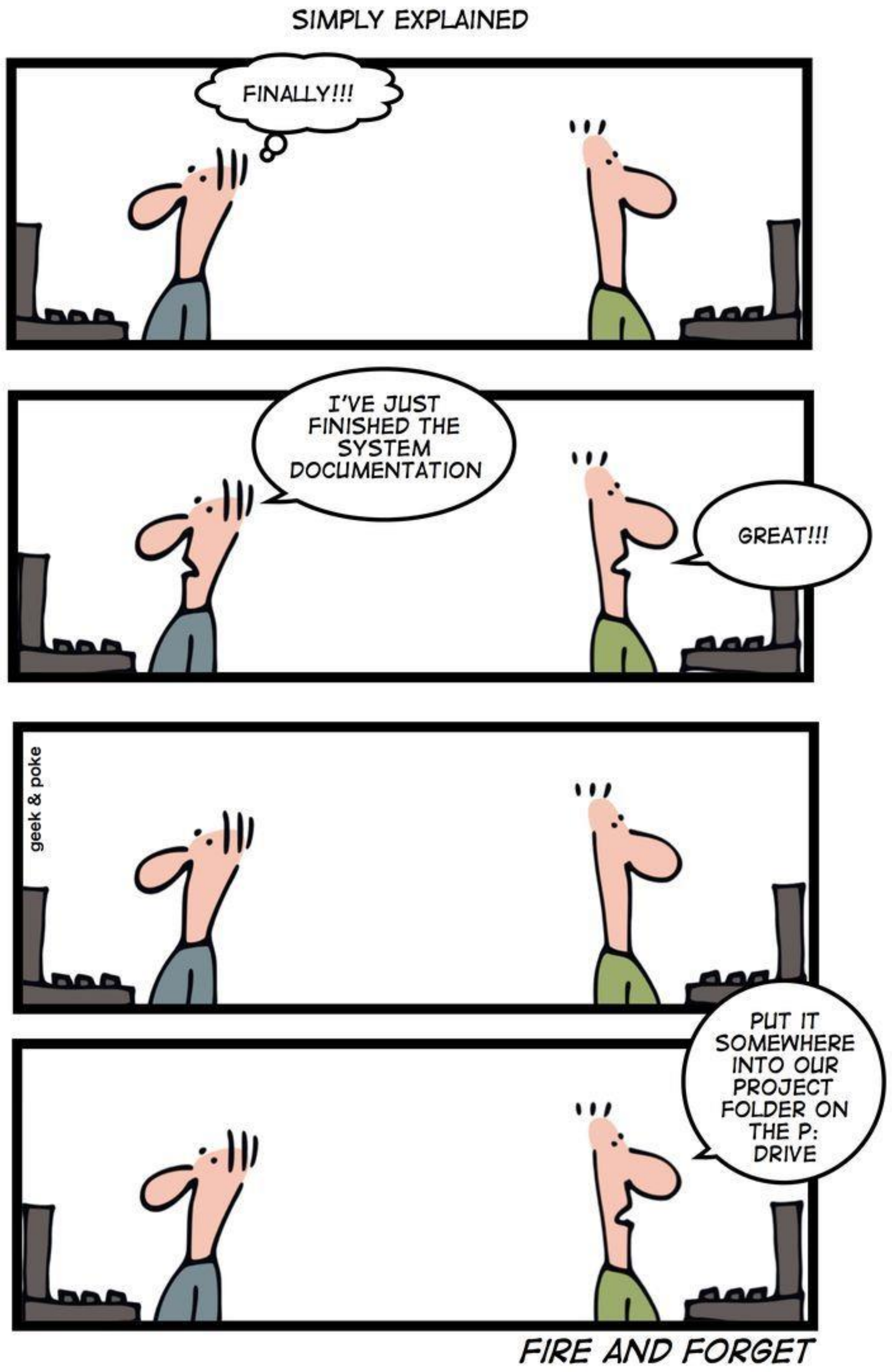
SO WHAT SHOULD I USE?

- We presented some option, probably the most popular ones, but these are not the only options available
- Next session we'll talk about Custom Resources and Operators as an alternative approach to define and manage your solutions in Kubernetes
- Presented solutions are not necessarily alternatives, you can combine them following your specific use cases
- Start simple and gradually add complexity
- Think about the organisational needs and software lifecycle model
    - Distributed responsibilities works well with Kustomize
    - Autonomous teams works well with Helm
    - Terraform competence centre could prefer to use it also for Kubernetes


SIMPLY EXPLAINED
FINALLY!!!
I'VE JUST FINISHED THE SYSTEM DOCUMENTATION
GREAT!!!
geek & poke
PUT IT SOMEWHERE INTO OUR PROJECT FOLDER ON THE P: DRIVE
FIRE AND FORGET

LINKS

Kubectl - https://kubernetes.io/docs/reference/kubectl/kubectl/

Kustomize - https://github.com/kubernetes-sigs/kustomize

Kustomize - https://kubectl.docs.kubernetes.io/pages/reference/kustomize.html

Helm - https://helm.sh/docs/

Terraform and Kubernetes - https://www.terraform.io/docs/providers/kubernetes/guides/getting-started.html

Terraform and Helm - https://www.hashicorp.com/blog/using-the-kubernetes-and-helm-providers-with-terraform-0-12/

Helm and Kustomize together - https://medium.com/devops-dudes/helm-is-not-enough-you-also-need-kustomize-82bae896816e

GitOps and Kubernetes - https://itnext.io/continuous-gitops-the-way-to-do-devops-in-kubernetes-896b0ea1d0fb

THE END – Q&A ?

WHAT'S YOUR TAKE ON THIS, DILBERT?
WHAT? SORRY. I WAS USING THIS TIME TO THINK ABOUT SOMETHING USEFUL.
Dilbert.com DilbertCartoonist@gmail.com