Kubernetes 101

Kamil Szczygieł

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Who am I?

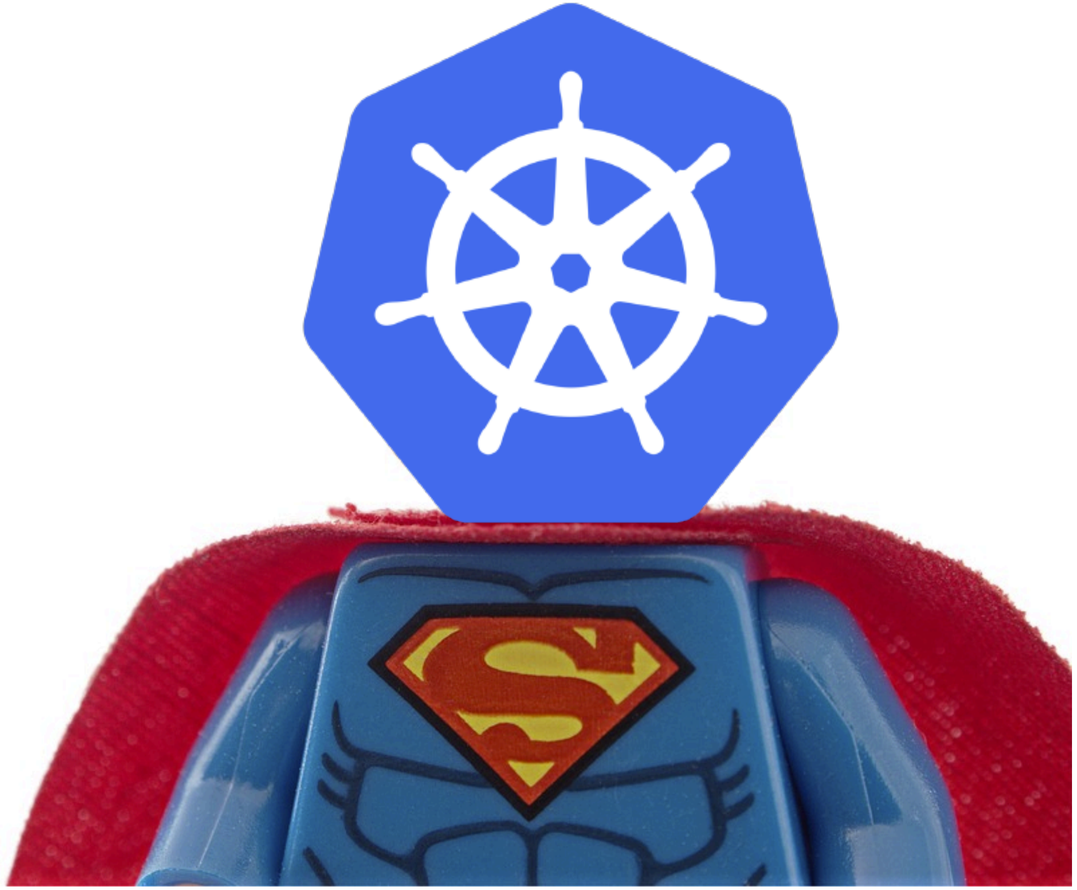
- DevOps Architect and consultant
- DC/OS, Mesos, Kubernetes, Kafka, Cassandra
- Terraform, SaltStack, Ansible
- Automation freak

Who uses Docker?

Who uses Docker Compose?

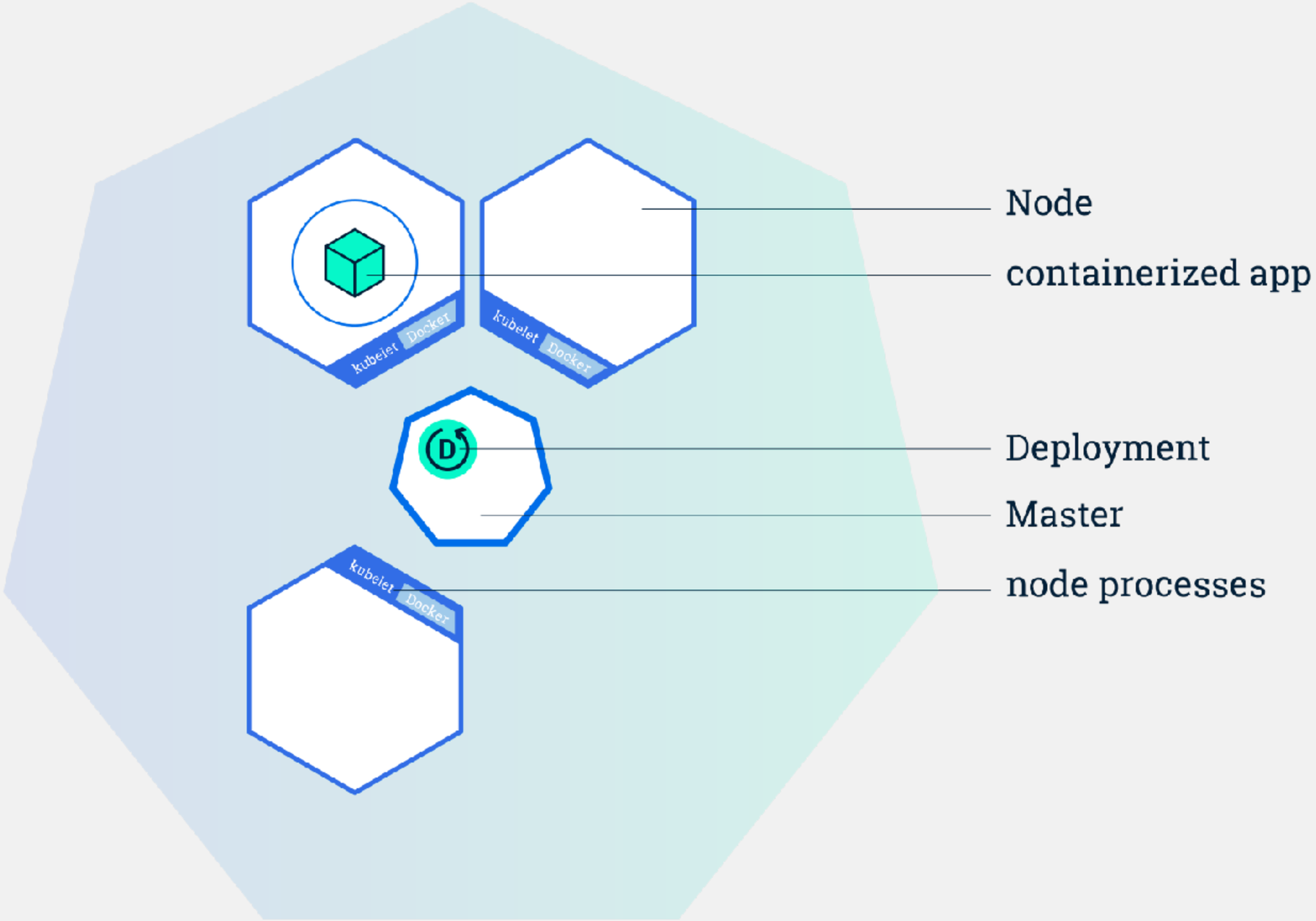
Who uses Docker Swarm?

Kubernetes?

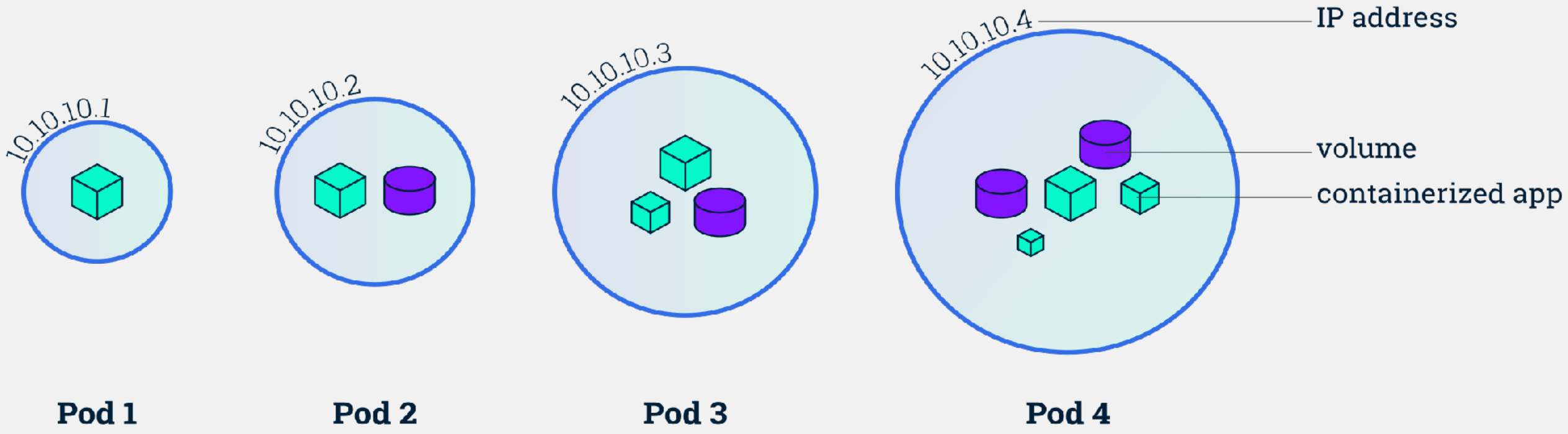


Kubernetes

- Open-source system for automating deployment, scaling and management of containerized applications
- Builds upon 15 years of experience of running production workloads at Google
- Great community



Kuberneters Cluster

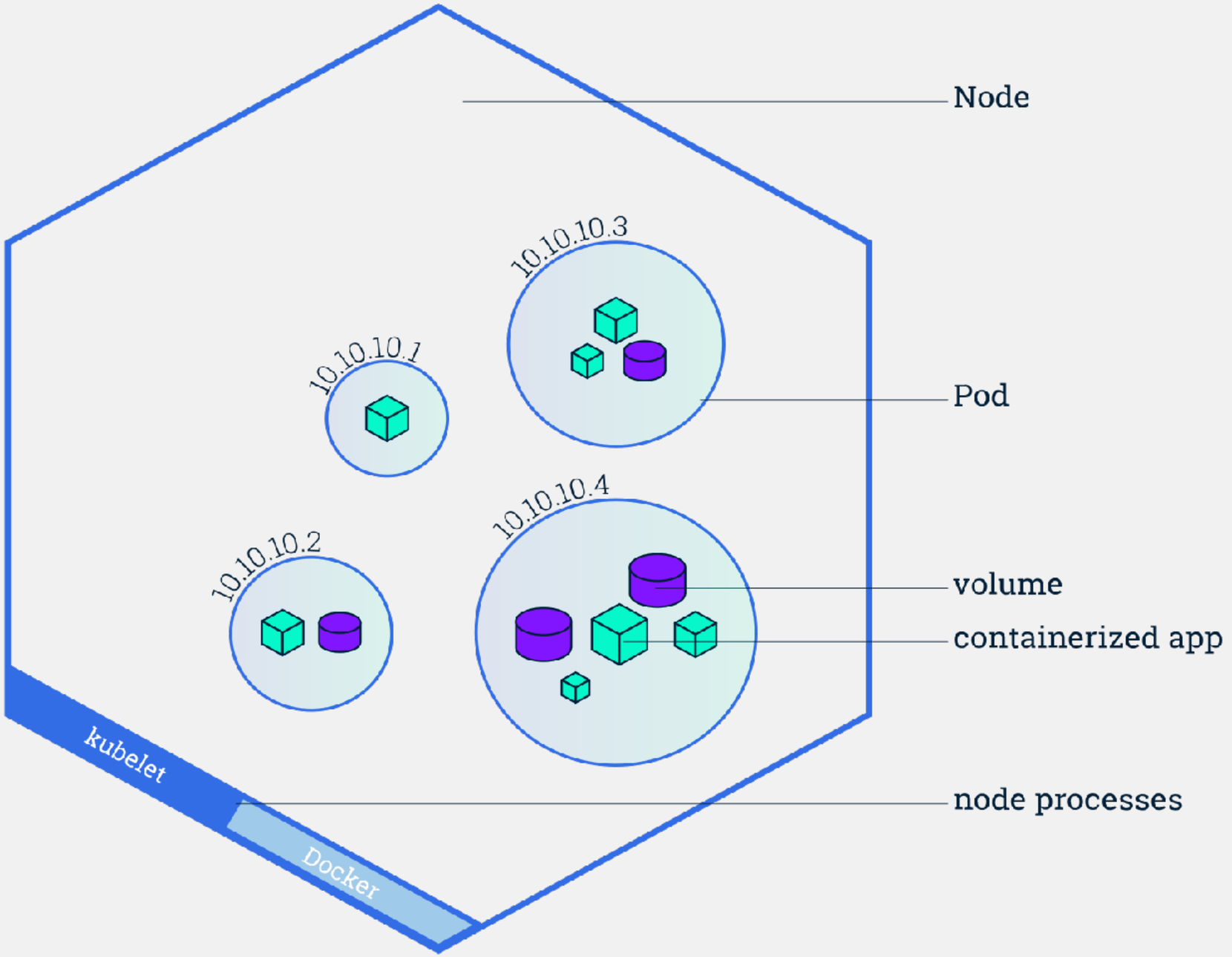

10.10.10.1
10.10.10.2
10.10.10.3
10.10.10.4
IP address
volume
containerized app
Pod 1
Pod 2
Pod 3
Pod 4

Pod example

Deployment

- Describes desired state of application
- Deployment controller changes the actual state to the desired state at a controlled rate
- Scaling
- Rollover
- Rollbacks

Deployment example


Node
10.10.10.3
10.10.10.1
Pod
10.10.10.4
10.10.10.2
volume
containerized app
kubelet
Docker
node processes

StatefulSet

- Provides guarantees about the ordering and uniqueness of Pods
- Maintains a sticky identity for each of Pods
- Each Pod has a persistent identifier that it maintains across any rescheduling
- Unique network identifiers
- Persistent storage
- Ordered, graceful deployment/scaling/deletion/termination
- Ordered, automated rolling updates

StatefulSet limitations (?)

- Storage must be created via PersistentVolume provisioner or pre-provisioned
- Deleting and/or scaling a StatefulSet down will not delete the volumes associated with the StatefulSet

StatefulSet example

DaemonSet

- Ensures that all (or some) Nodes run a copy of a Pod
- As nodes are added to the cluster, Pods are added to them
- As nodes are removed from the cluster, Pods are garbage collected
- Running cluster storage deamons e.g. Ceph
- Running log collectors e.g. fluentd
- Running monitoring agents e.g. sysdig-agent, datadog-agent, collectd

DaemonSet example

But why devs love Kubernetes?

Most significant features for devs

- Horizontal pod autoscaling based on CPU/custom metrics
- Object versioning
- Safe application updates, including rollbacks
- Declarative application definition
- Great integration with CI pipeline

How to deploy Kubernetes?

- Manually…
- kubeadm
- https://github.com/kubernetes/minikube
- https://github.com/kubernetes/kops
- https://github.com/kubernetes-incubator/kubespray
- And many, many others…

Live demo

Let's hope it won't fail…

Useful tools around Kubernetes

- https://github.com/kubernetes/dashboard
- https://github.com/kubernetes/ingress-nginx
- https://github.com/kubernetes-incubator/external-dns
- https://github.com/jetstack/kube-lego
- https://github.com/jetstack/cert-manager
- https://github.com/kubernetes/kompose

Packaging applications

- https://github.com/kubernetes/helm
- https://github.com/kubernetes-helm/monocular

Building CI/CD

- Got Jenkins? GREAT! https://github.com/jenkinsci/kubernetes-plugin
- Got Atlassian Bamboo? Bad luck :(scripting awaits… no official plugin YET
- Prefer SaaS? https://buddy.works/

Live demo

Let's hope it won't fail…

Conclusions

- Building an infrastructure for containerized workloads? Kubernetes looks very promising
- Scales ~~very~~ well
- Safe application deployments, updates, rollbacks
- Great integration with services around (Let's Encrypt, DNS handling, cloud providers)
- Great integration with CI
- Difficult to understand at first, but once you get it, you'll love it

Thanks!

Q&A TIME

kamsz@kamsz.pl

@KamilSzczygiel

https://github.com/kamsz/pystok-09012018