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# Providing A Platform API With Kubernetes And Crossplane

Hannes Blut & Jan Willies, Accenture





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# Intro

From left to right:  
Hannes Blut  
Jan Willies  
Promotion  
Performance 2022

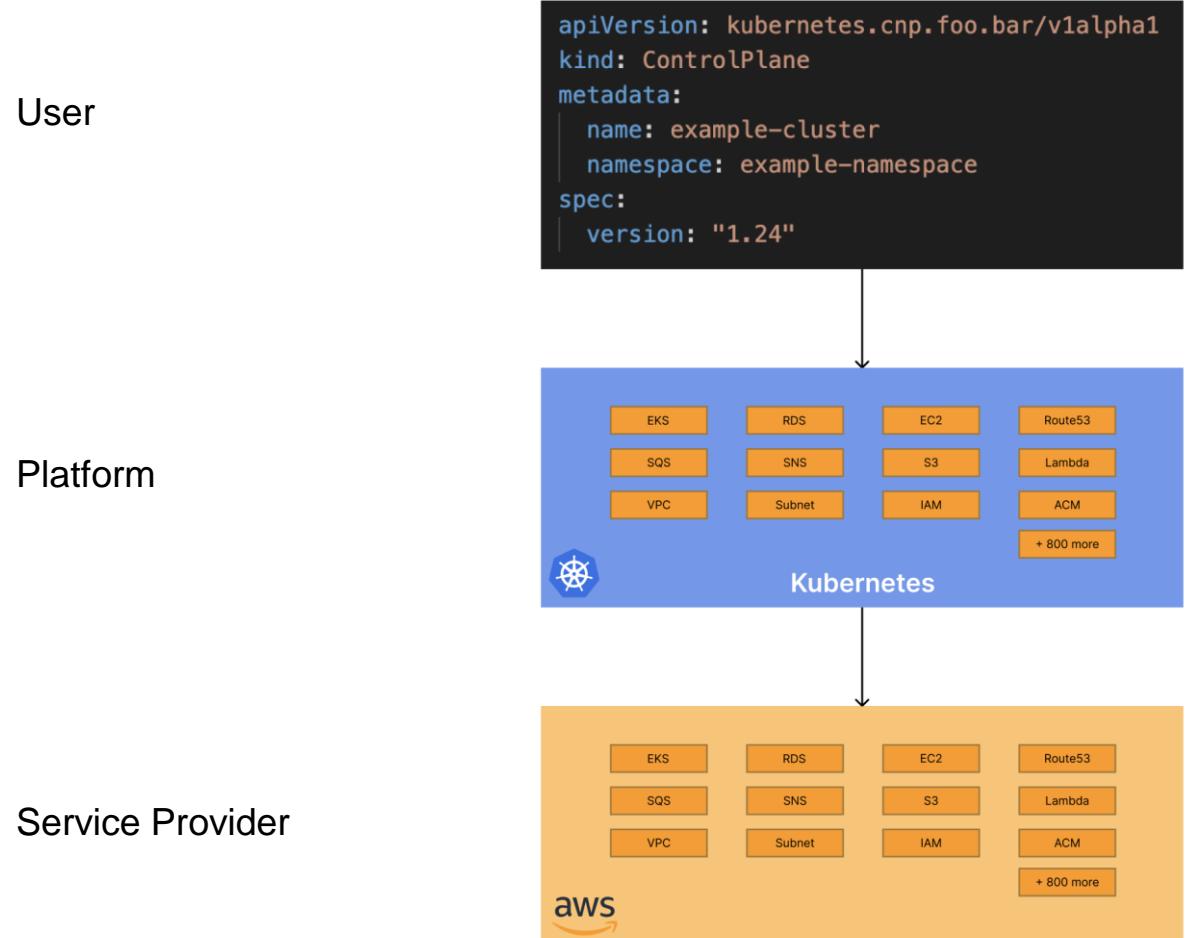


**Hannes Blut**  
Cloud Architect  
*Accenture*



**Jan Willies**  
Platform Architect  
*Accenture*

# Crossplane mirrors external APIs into the Kubernetes Resource Model



# A closer look at the Kubernetes example



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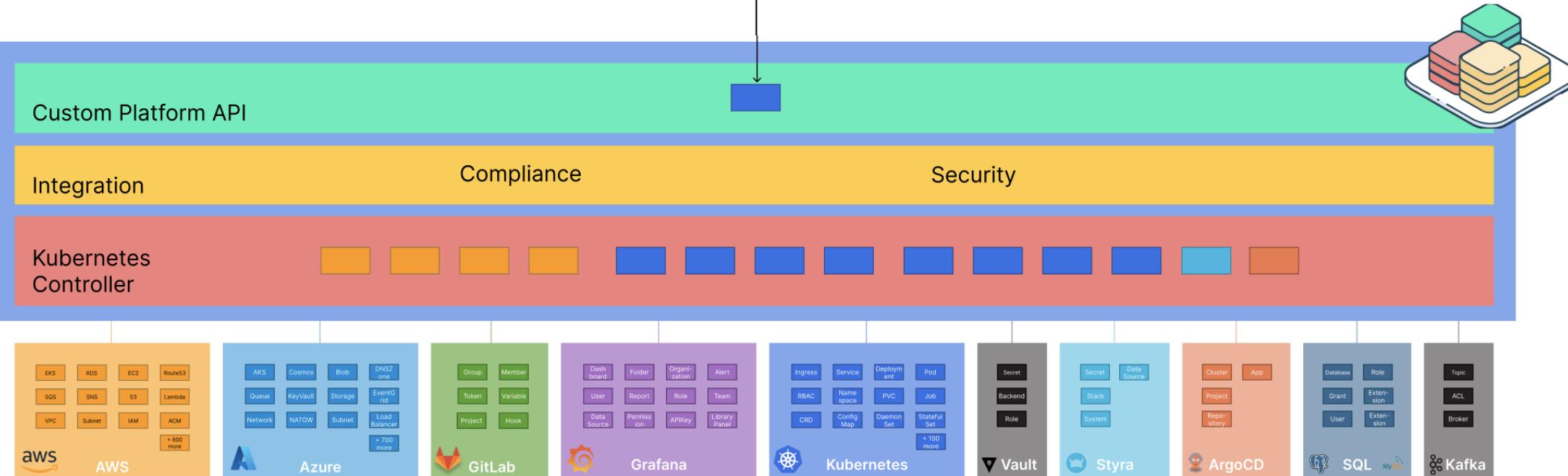
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User

```
apiVersion: kubernetes.cnp.foo.bar/v1alpha1
kind: ControlPlane
metadata:
  name: example-cluster
  namespace: example-namespace
spec:
  version: "1.24"
```

Platform



# Top 9 challenges

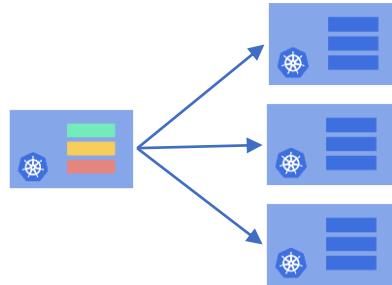
we encountered when running this approach at scale

# #1: Crossplane Deployment Model



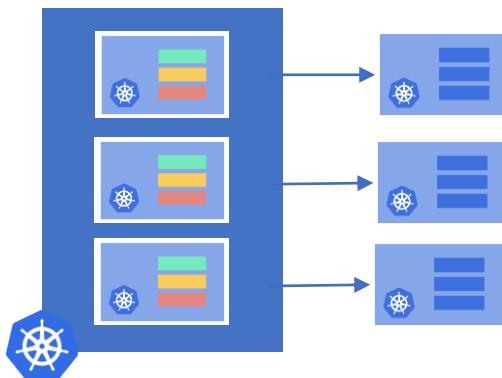
**Every Kubernetes cluster gets a crossplane installation**

- + Good integration between infra and apps
- + Hard isolation between tenants
- Bootstrapping: how to create those clusters?



**Deployment via central crossplane instance**

- + Bootstrapping problem solved
- Soft isolation between tenants
- Scalability challenges



**Virtual crossplane instance per tenant**

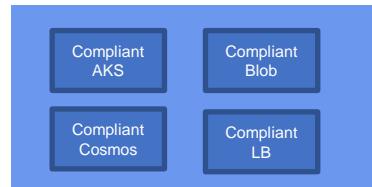
- + Hard isolation between tenants
- + Separation between control plane and data plane
- More complex setup

# #2: Approach to Crossplane Compositions

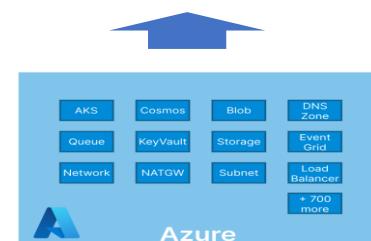
Top Down



Bottom Up



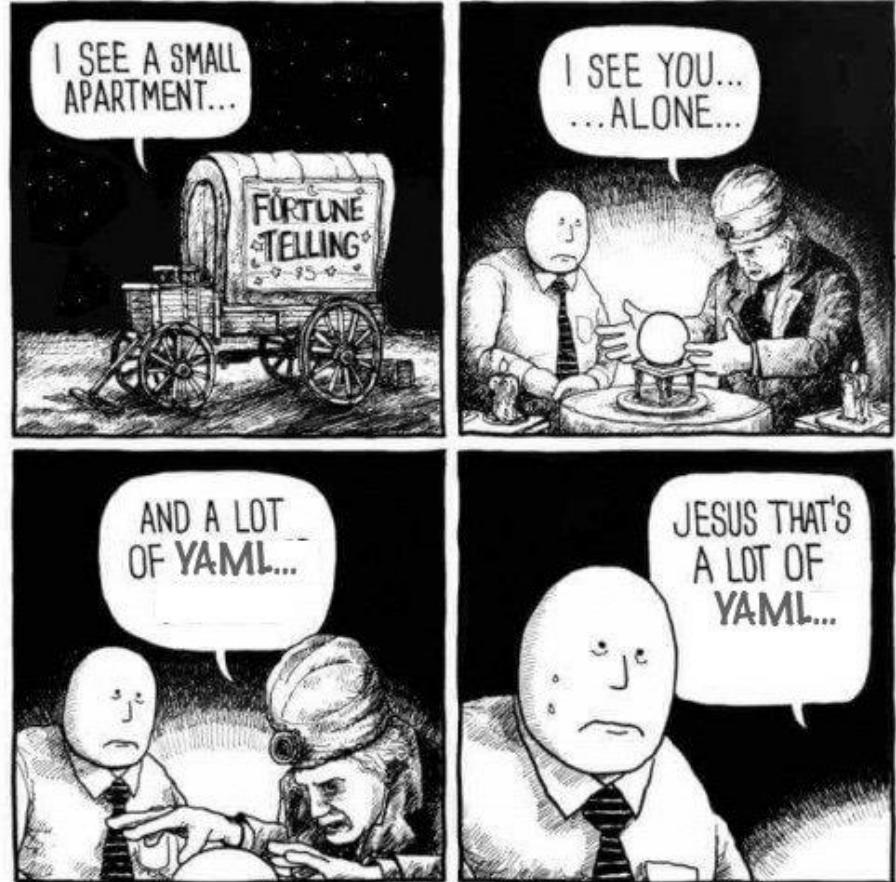
Shared Responsibility



# #3: YAML

"Kubernetes is my favorite yaml database"

- Crossplane is a low code platform
- No need to write code to offer an API
- But still need to describe the API
- That's done in OpenAPI in yaml
- That's also where lots of issues can be found: indentation, types, whitespaces, etc
- Be prepared to take a different approach to managing yaml



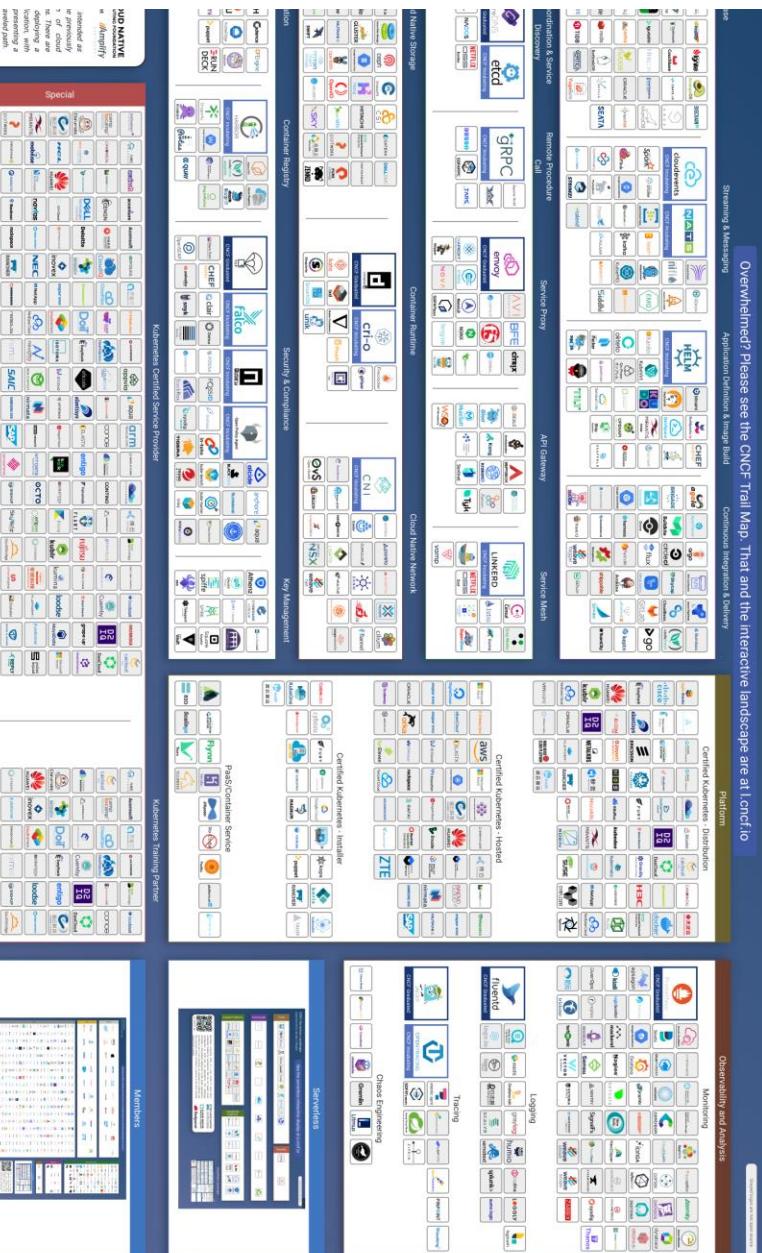
# #4: Manage user expectations

- Compared to containers, infrastructure is slow
- Some services easily take 10min to become "ready"
- Depending on the approach, users need to learn Kubernetes
- Communicate your platform product clearly
- Shared responsibilities
- Asynchronous reconciliation





# #5: Leverage the wealth of the Kubernetes Ecosystem



Shift left: a layer in front of service providers to apply policies:

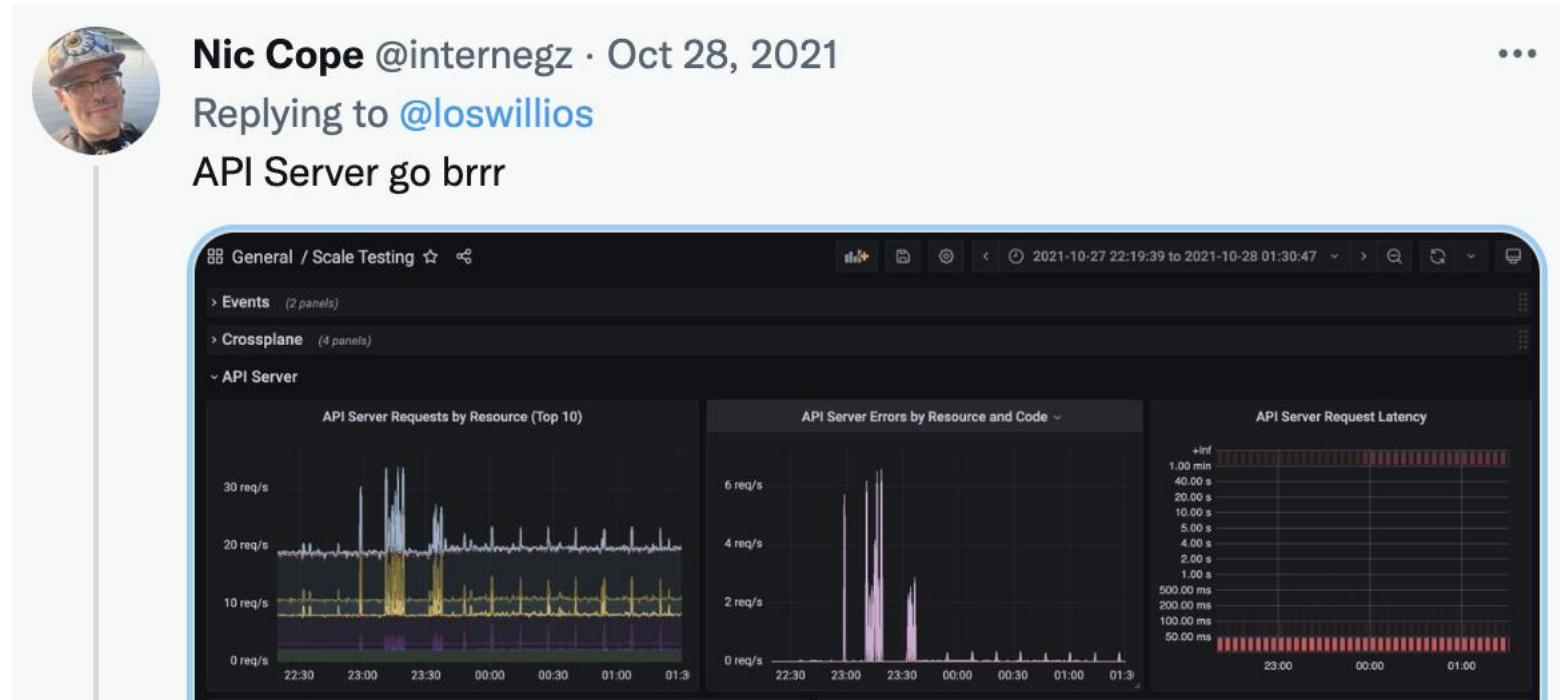
- RBAC permission management can be applied to infrastructure resources
- OPA / Kyverno / ... policies can be applied for even more fine grained control
- Quotas, naming conventions, etc can be applied

Other examples:

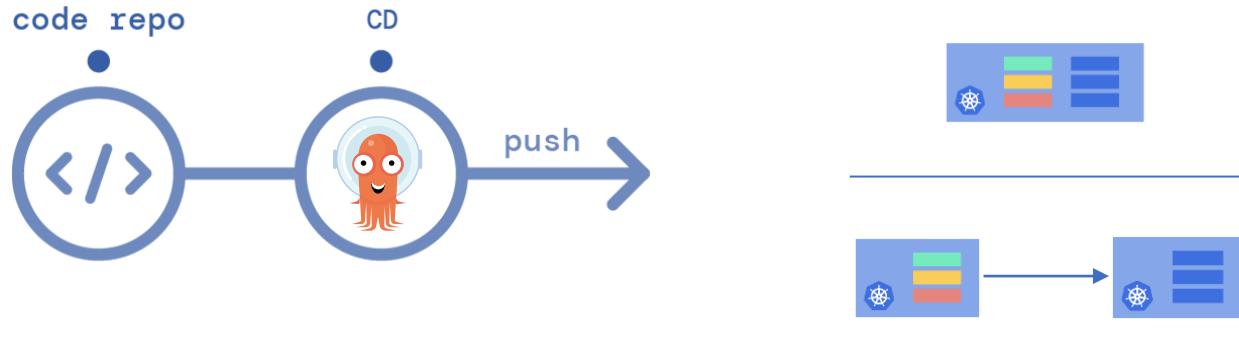
- kube-janitor to delete demo-environments after x days
- Kubecost to manage costs

# #6: CRD Maturity

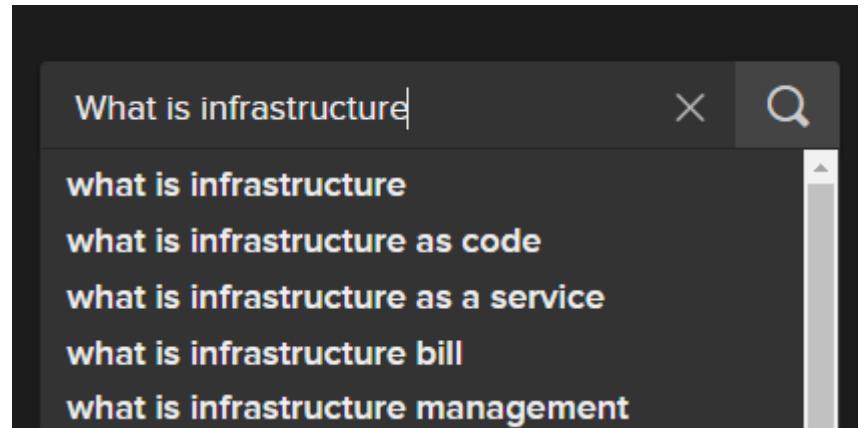
- Immutability of CRD fields
- Support for migrating breaking API changes (e.g. from v1beta1 to v1beta3)
- Scalability: how does the kubernetes API server cope with a thousand CRDs and several thousand CRs?



# #7 GitOps infrastructure deployments



- Use GitOps for infrastructure
- Combine your infrastructure with your application deployment
- Deploy your secrets with GitOps... ???



# #8 Document your product

- Create API documentation
- Create usage documentation
- Offer release notes

crossplane/provider-aws@v0.27.0

[github.com/crossplane/provider-aws/tree/v0.27.0](https://github.com/crossplane/provider-aws/tree/v0.27.0)

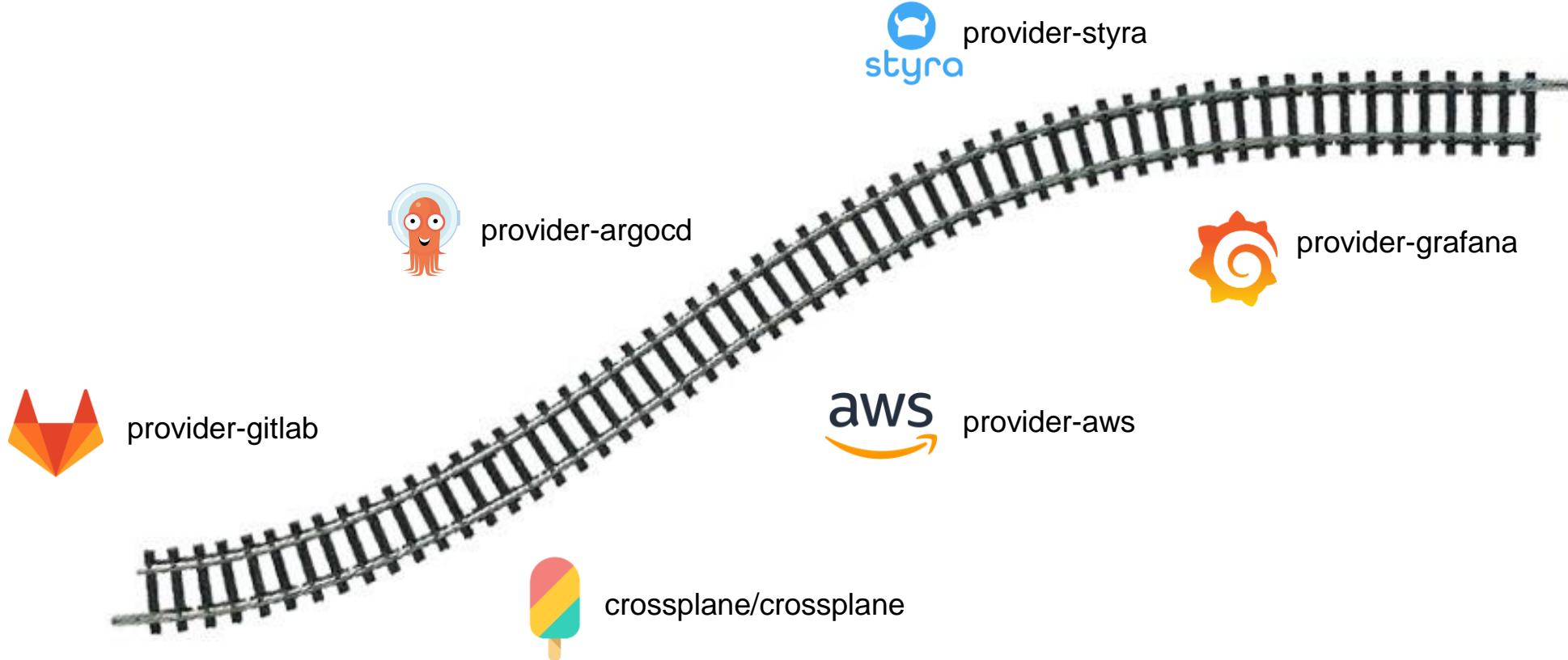
v0.27.0

CRDs discovered: 161

e.g. CacheCluster, acm.aws

Kind	Group	Version
Certificate	acm.aws.crossplane.io	v1beta1
CertificateAuthority	acmpca.aws.crossplane.io	v1beta1
CertificateAuthorityPermission	acmpca.aws.crossplane.io	v1beta1
APIKey	apigateway.aws.crossplane.io	v1alpha1
Authorizer	apigateway.aws.crossplane.io	v1alpha1
BasePathMapping	apigateway.aws.crossplane.io	v1alpha1
Deployment	apigateway.aws.crossplane.io	v1alpha1
DocumentationPart	apigateway.aws.crossplane.io	v1alpha1
DocumentationVersion	apigateway.aws.crossplane.io	v1alpha1
DomainName	apigateway.aws.crossplane.io	v1alpha1

# #9: Contributions



If you are working with open source, contribute and share your story



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# Thank you for listening!

Find us at [slack.crossplane.io](https://slack.crossplane.io)

also:

- [twitter.com/loswillios](https://twitter.com/loswillios)
- [github.com/janwillies](https://github.com/janwillies)
- [github.com/blut](https://github.com/blut)