



The logo for AWS Summit Online. It features the AWS logo on the left, which consists of the letters "aws" in white with a curved arrow underneath pointing to the right. To the right of the logo, the words "SUMMIT" and "ONLINE" are stacked vertically in a large, white, sans-serif font.

aws SUMMIT
ONLINE

Kubernetes GitOps on AWS

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Solutions Architect

Amazon Web Services

Has any of this happened to you?

The deployment just failed

But it worked on my machine / in the X environment!





All of a sudden, there's a problem...

Did anyone just change anything? Who? When? What?

Development



Operations, Network,
DBAs, etc.

All of a sudden, there's a problem...

We've lost the server(s)/environment? We have documentation on how to rebuild it, right?



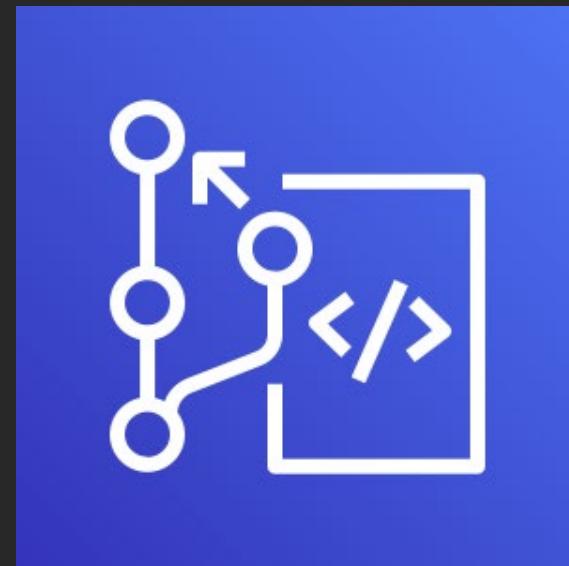
Things just seem generally



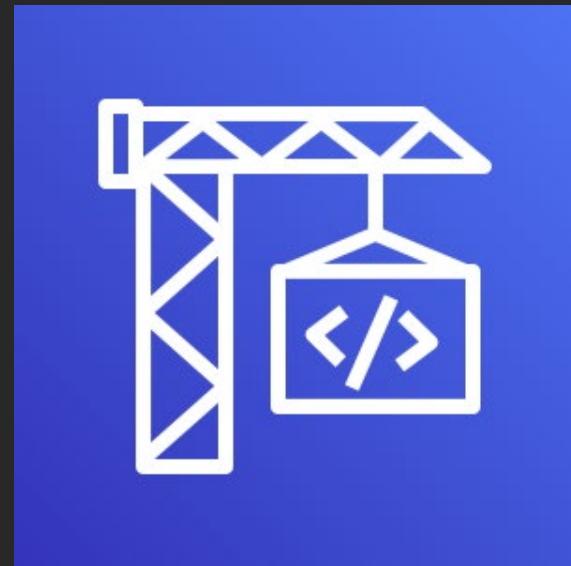
What is GitOps?

Modern software development

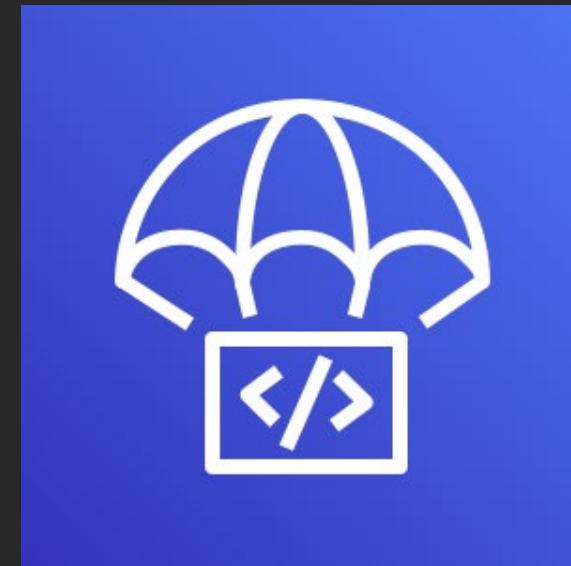
Traditionally, there have been three key activities/systems in managing change



Changes to
the code



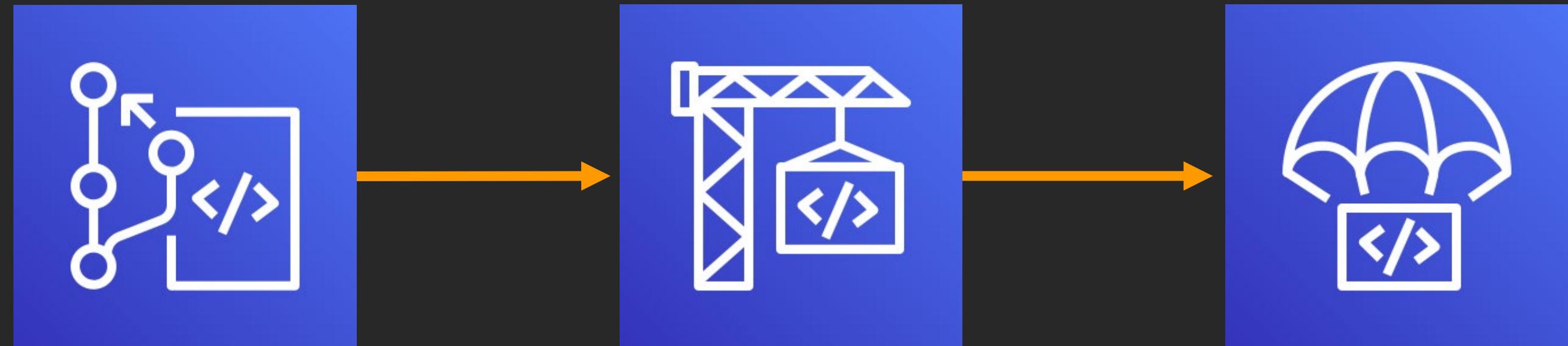
Building and testing
the application



Deploying the
new version

CI/CD

Automating, on success, is called continuous integration and continuous delivery (CI/CD)



Changes to
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Building and testing
the application

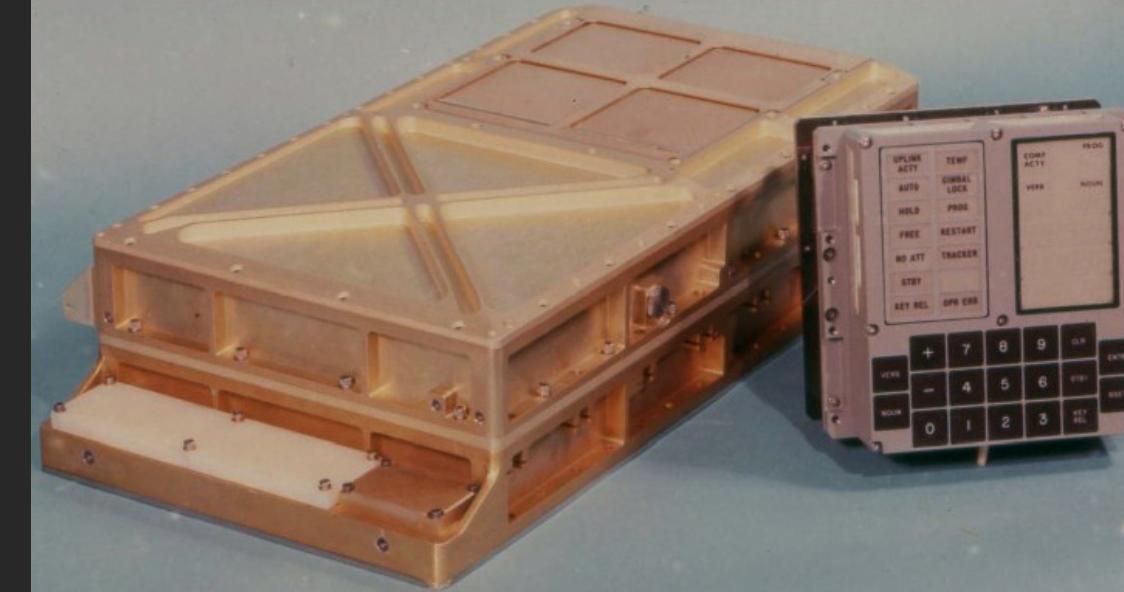
Deploying the
new version

Application code vs. infrastructure

We used to have bespoke and long-lived hardware that we deployed the code to



Application code



vs.

Infrastructure

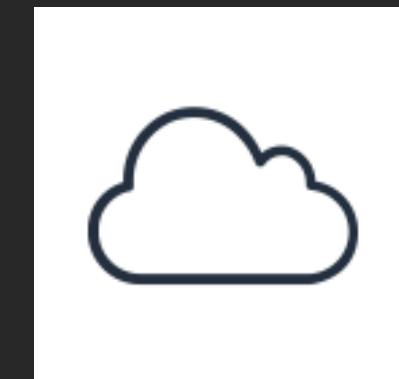
Application code vs. infrastructure

But with the cloud, we don't need to worry about hardware and can ask for things as code



Application code

vs.

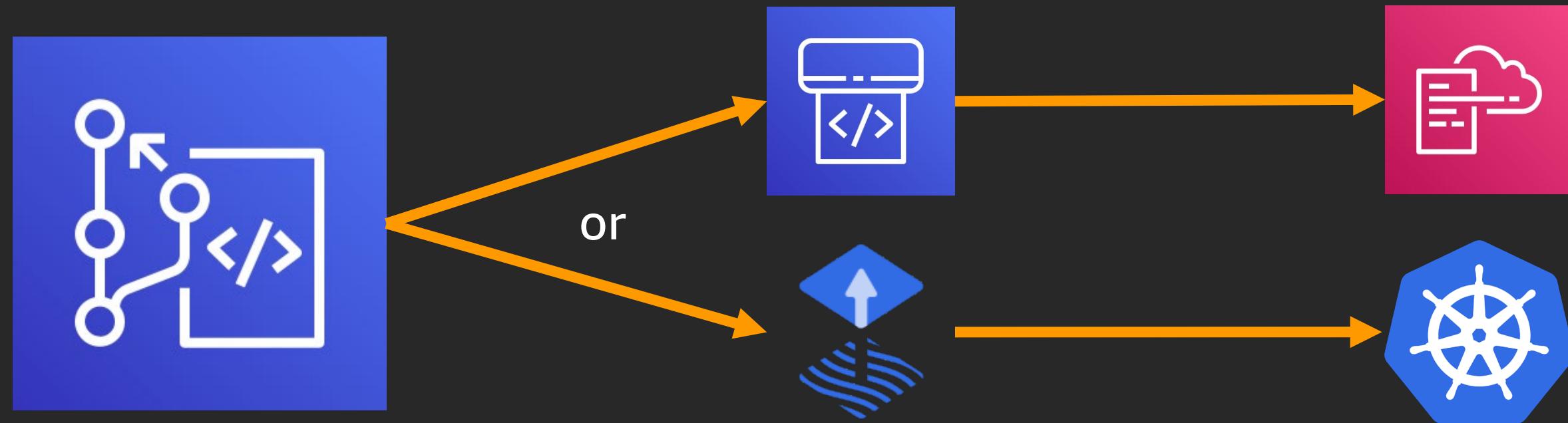


JSON/
YAML/
CDK code

Infrastructure

GitOps

Can we apply git-driven CI/CD processes to infrastructure code?

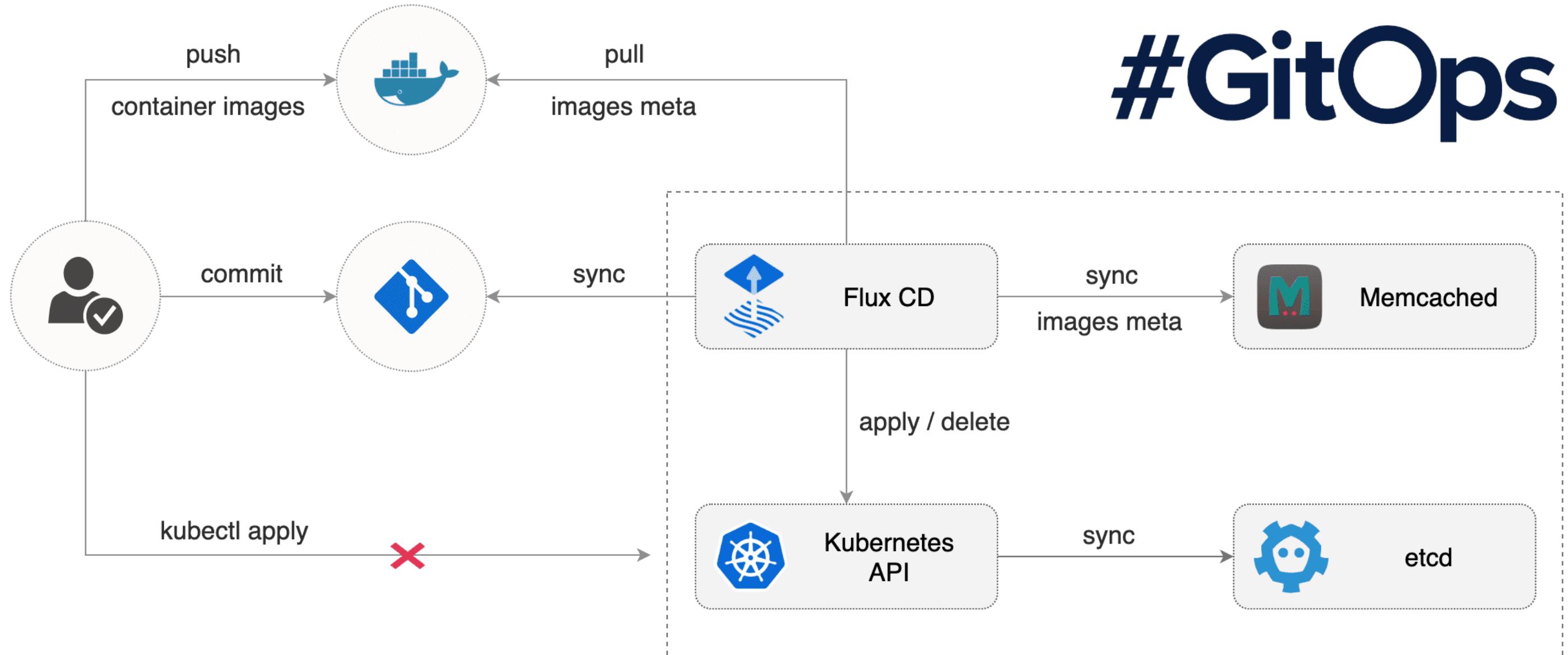


Changes to the infrastructure code are merged

CodePipeline or Flux notices the changes to AWS CloudFormation or Podspec

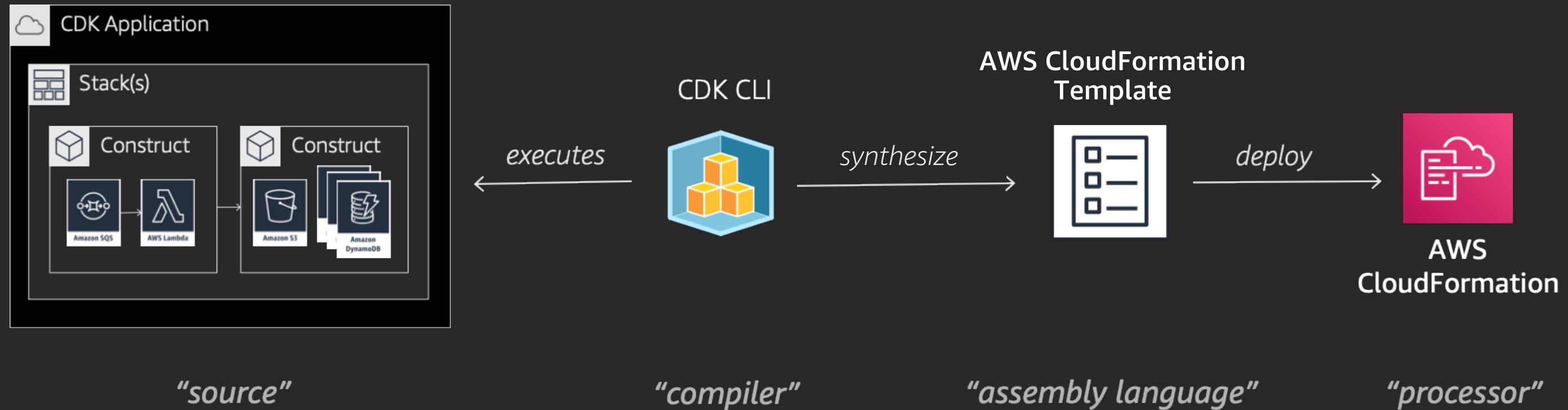
The changes are deployed to AWS or Kubernetes

What is Flux?



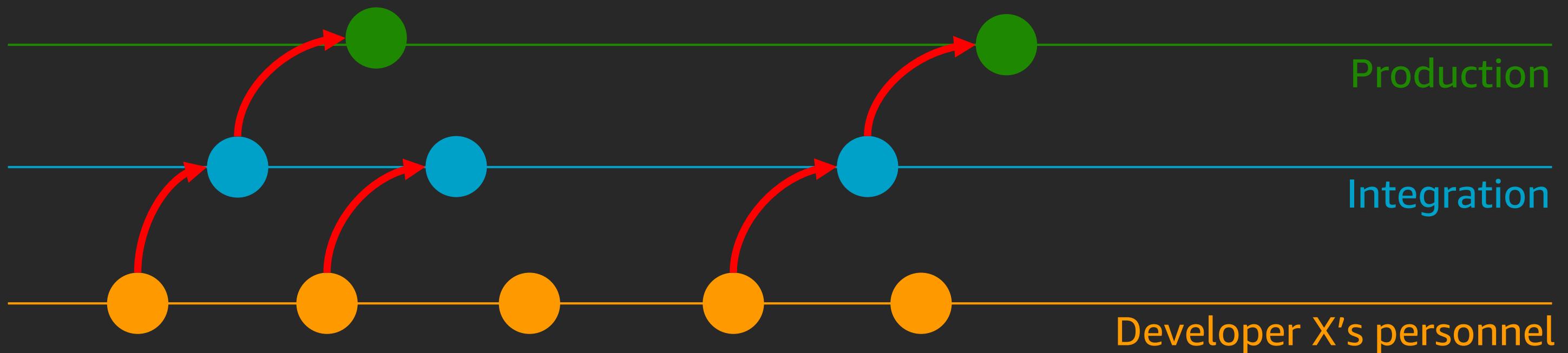
What is the AWS Cloud Development Kit (AWS CDK)

The big picture: From AWS CDK app to AWS CloudFormation to provisioned infrastructure



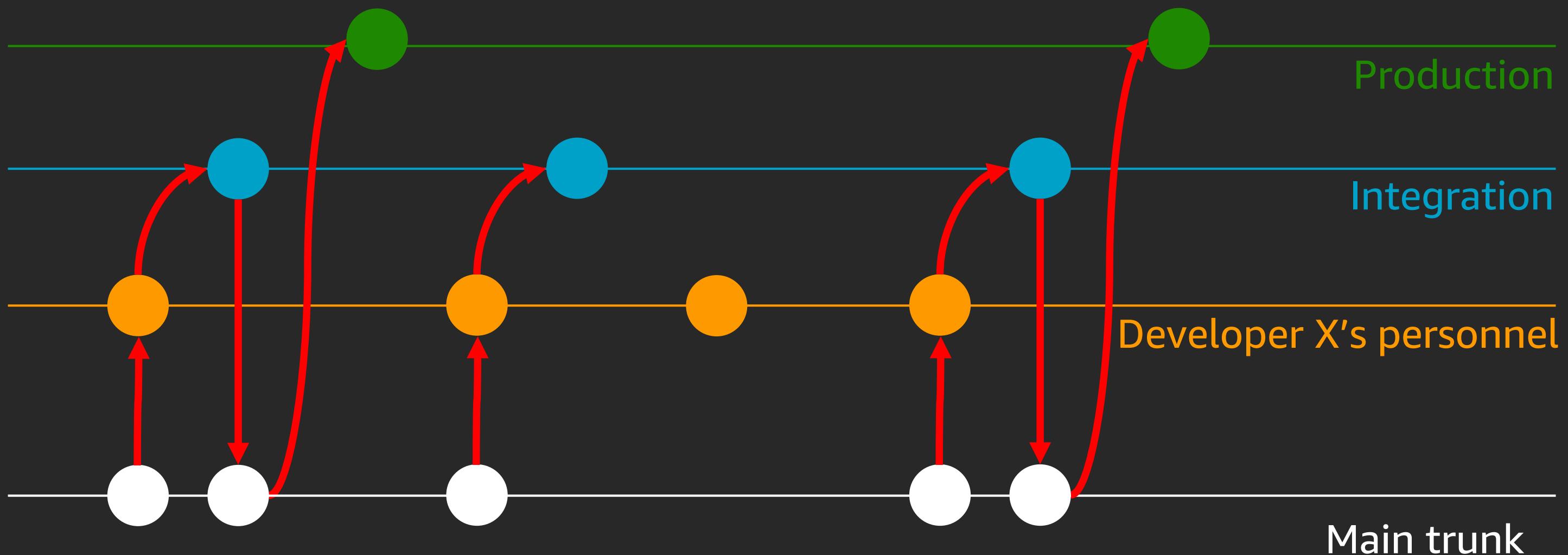
What is GitOps?

Control via PRs & environment branches (merge to them and it'll deploy there on successful tests)



What is GitOps?

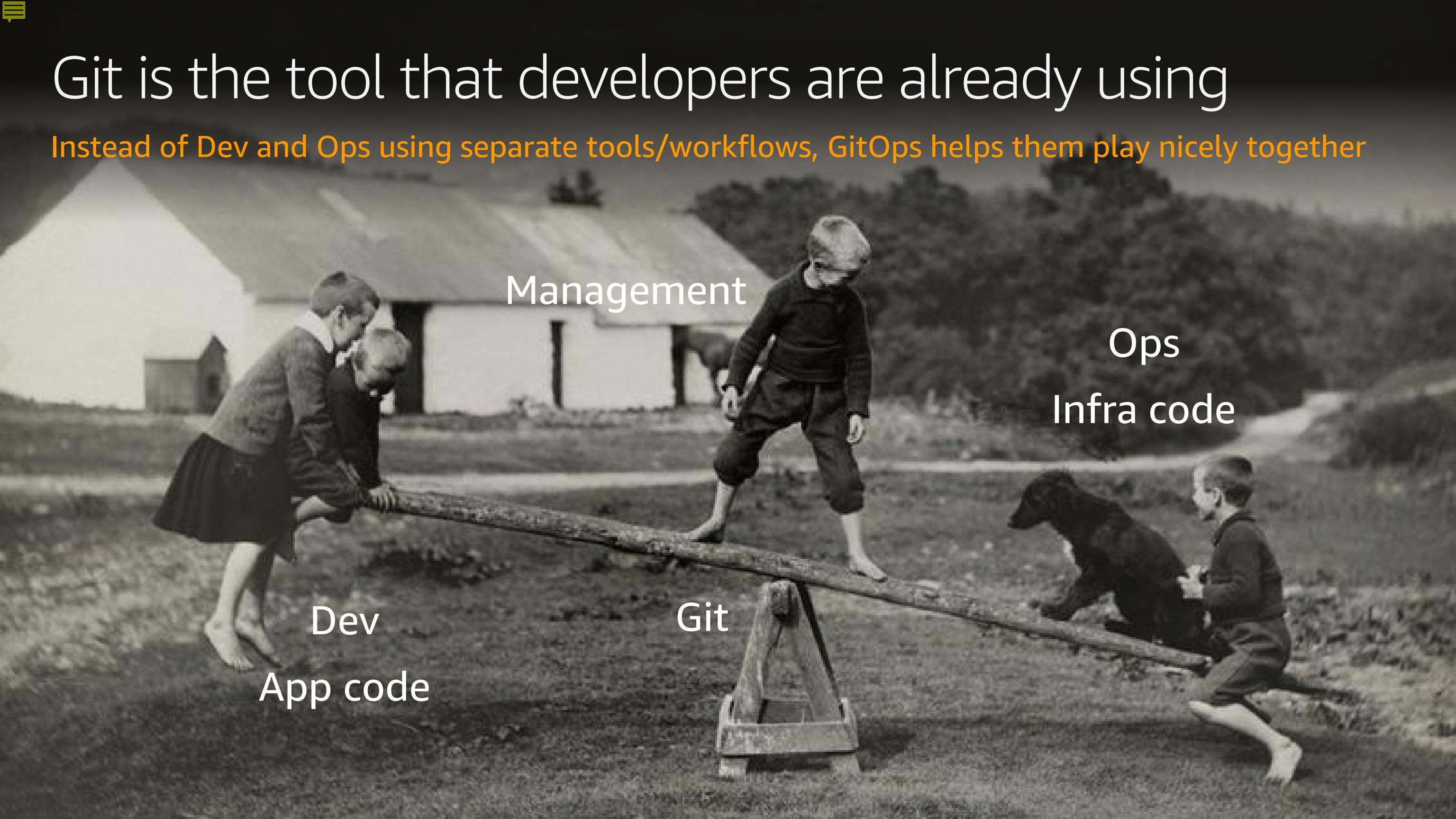
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Why GitOps?

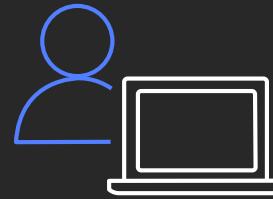
Git is the tool that developers are already using

Instead of Dev and Ops using separate tools/workflows, GitOps helps them play nicely together



Git is a great source of truth

It keeps track of the full history of changes, serving as a great auditing and reporting tool



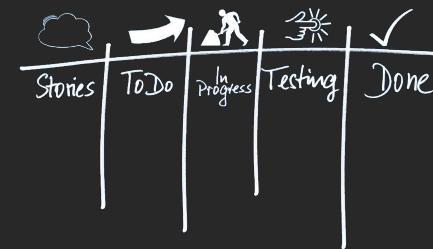
Who

```
/**  
 * Simple HelloButton() method.  
 * @version 1.0  
 * @author john doe <doe.j@example.com>  
 */  
HelloButton()  
{  
    JButton hello = new JButton( "Hello, wor  
    hello.addActionListener( new HelloBtnList  
    // use the JFrame type until support for t  
    // new component is finished  
    JFrame frame = new JFrame( "Hello Button"  
    Container pane = frame.getContentPane();  
    pane.add( hello );  
    frame.pack();  
    frame.show();      // display the fra  
}
```

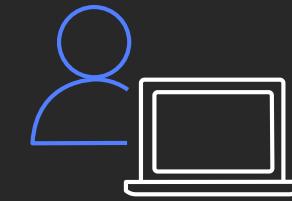
What



When



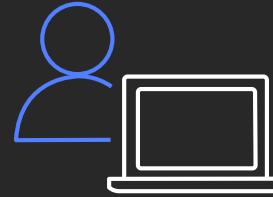
Why



Who

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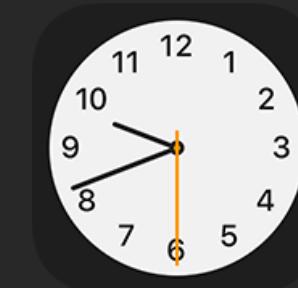
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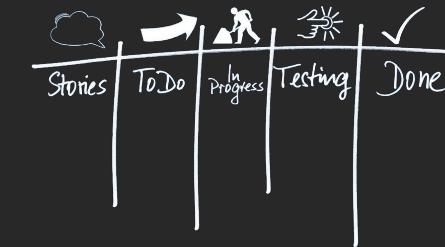
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Who

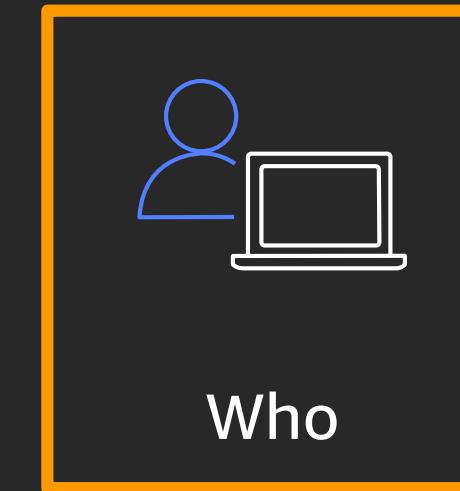
What



When



Why

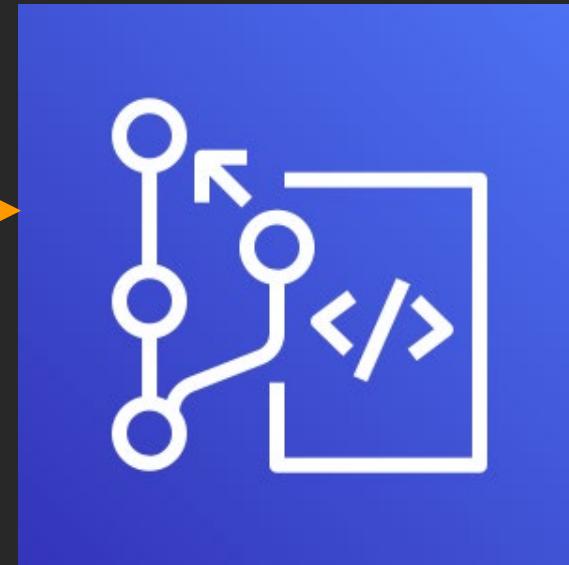
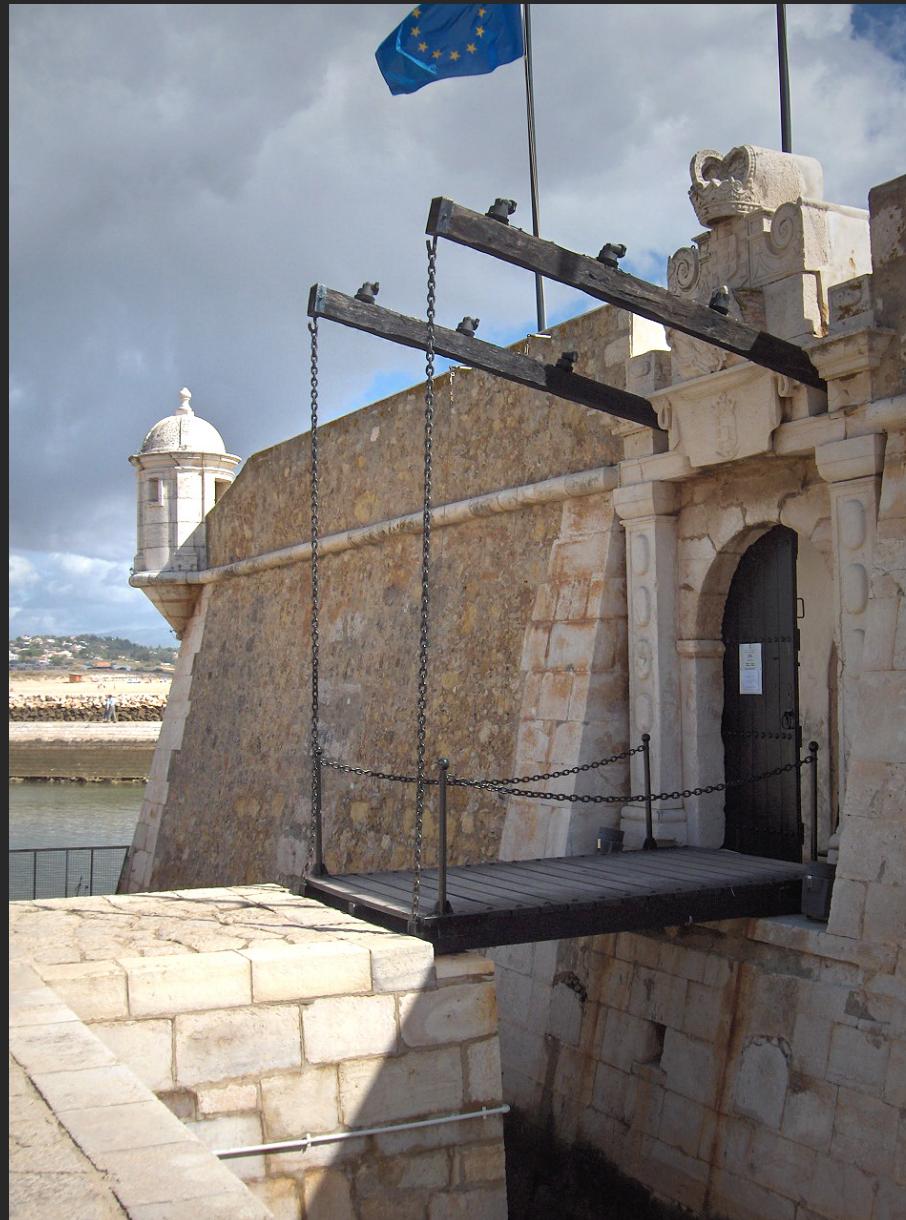


Who

Enforced peer review (via pull request) of every change

Git is a great place to control change

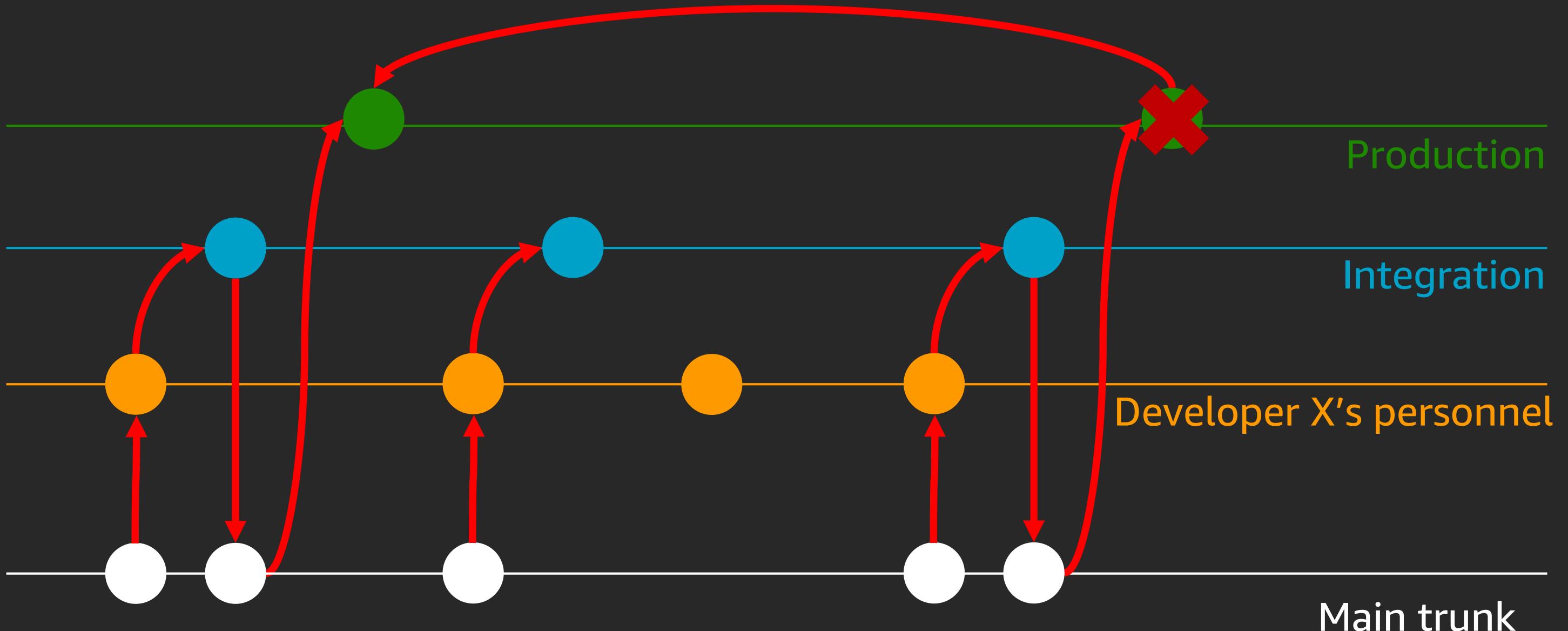
It is easier to control change if you force it all through one entry point to one pipeline



Requiring approved **pull requests** leading to mandatory security tests via a **DevSecOps** pipeline as the only way in

Git can help with rollbacks

Because you have the full change history, you can just redeploy older commits to the trunk*

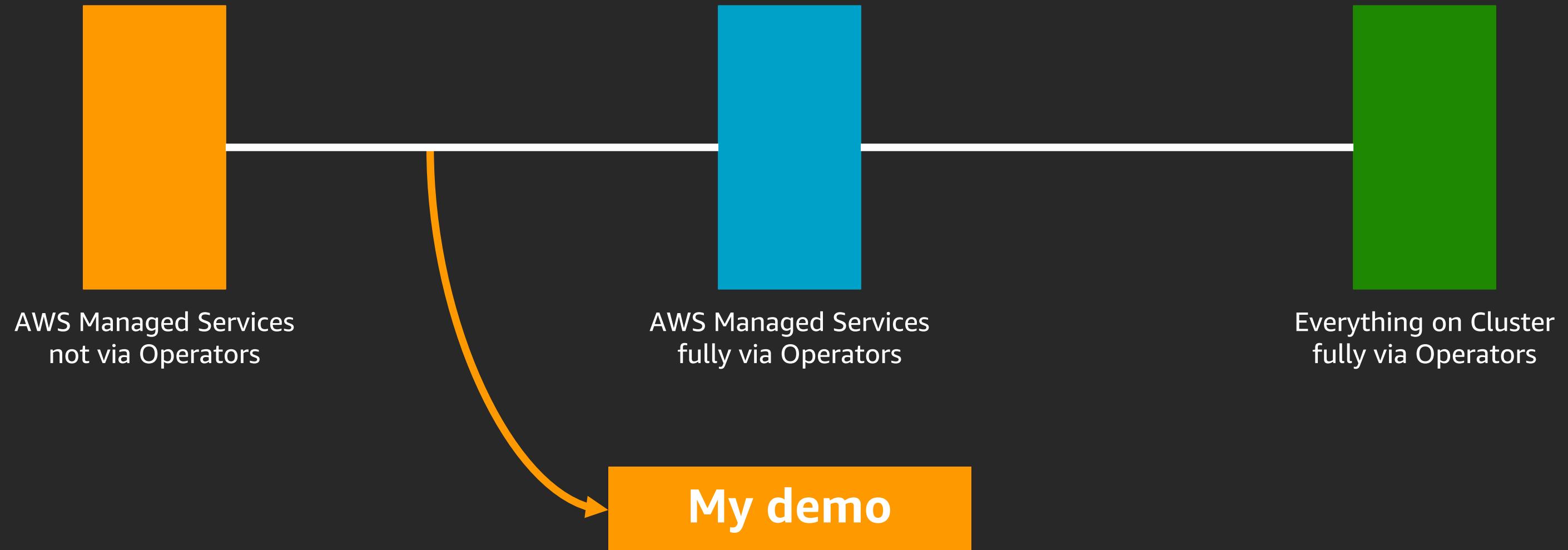


*Some architecture/thought needs to go into things to allow for this (DB schema change, etc.)

Cloud vs. Kubernetes management

CDK/AWS CloudFormation vs. Kubernetes Operators

It's a spectrum!

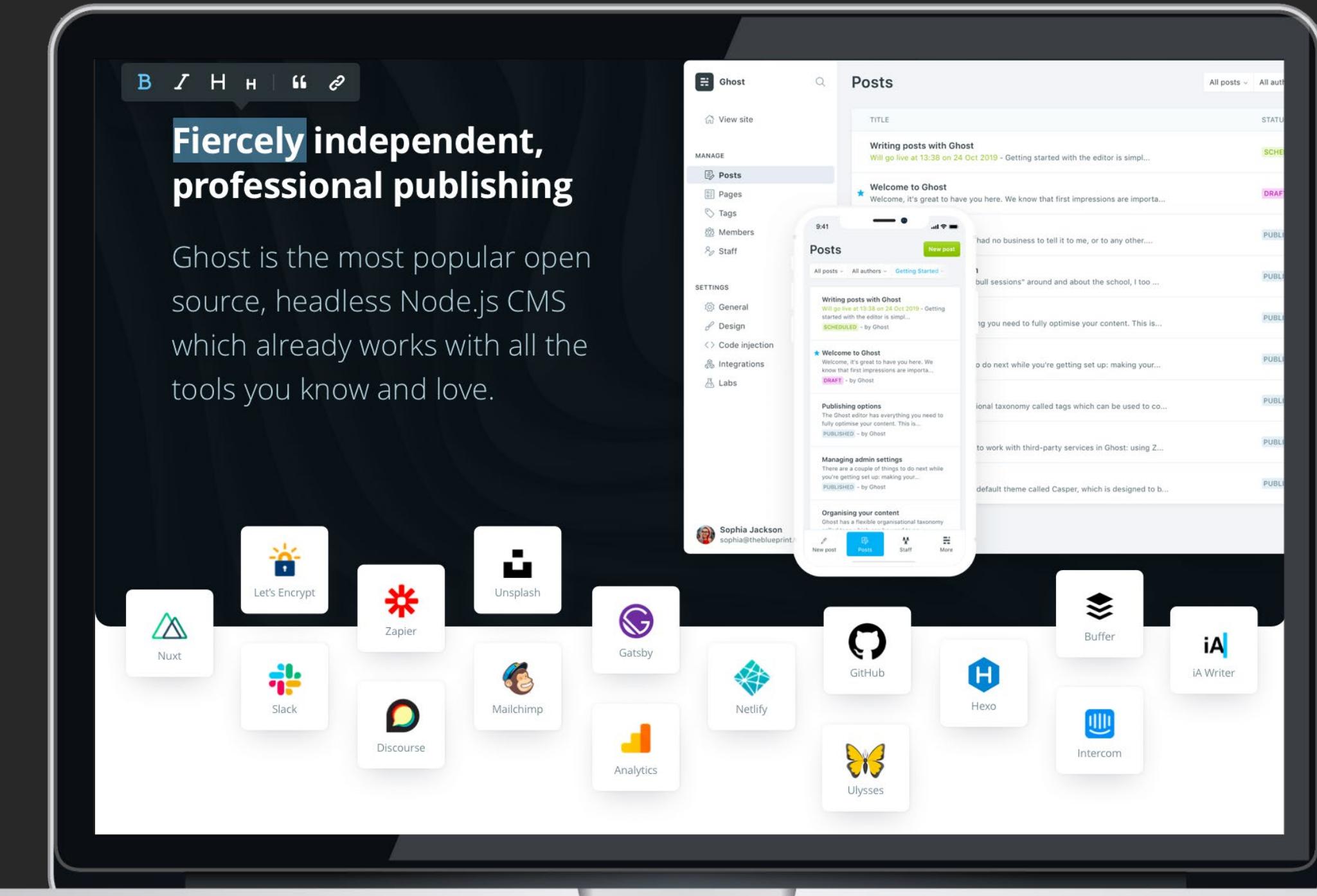


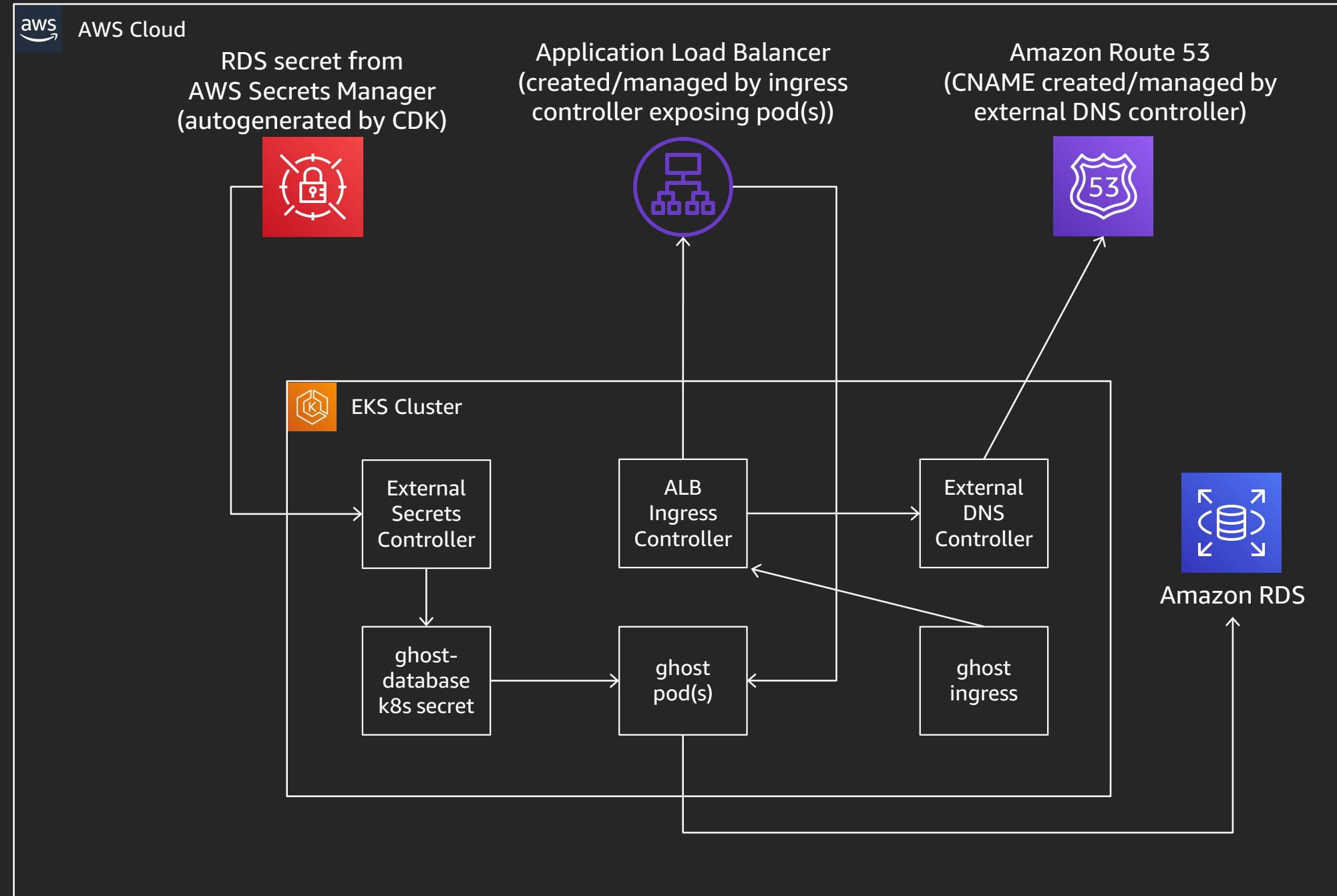
Demo

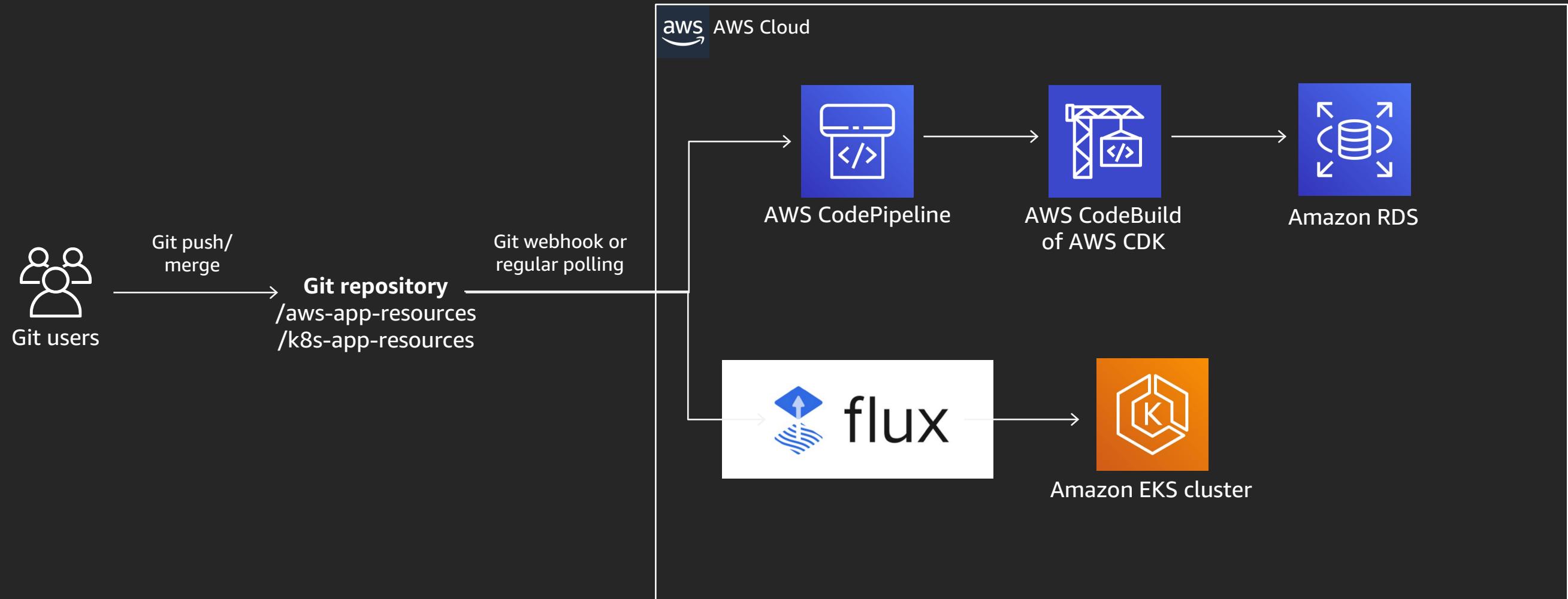
Our demo app is Ghost

Ghost is a good example, as it is both open source and distributed as a 12-factor Docker image

It is stateless (storing all its state in a MySQL database) and gets its environment settings from environment variables at runtime







<https://github.com/jasonumiker/k8s-plus-aws-gitops>

In closing

Go back to the office and try GitOps so that:

- Your app works in every environment
- Your developers and operations play nice together with the same tool
- You know the who, what, when, why (and who approved) of every change
- You are in control of your environments and changes to them
- You can roll back to a known, and self-documenting, earlier state

GO BUILD!

Thank you!

Jason Umiker