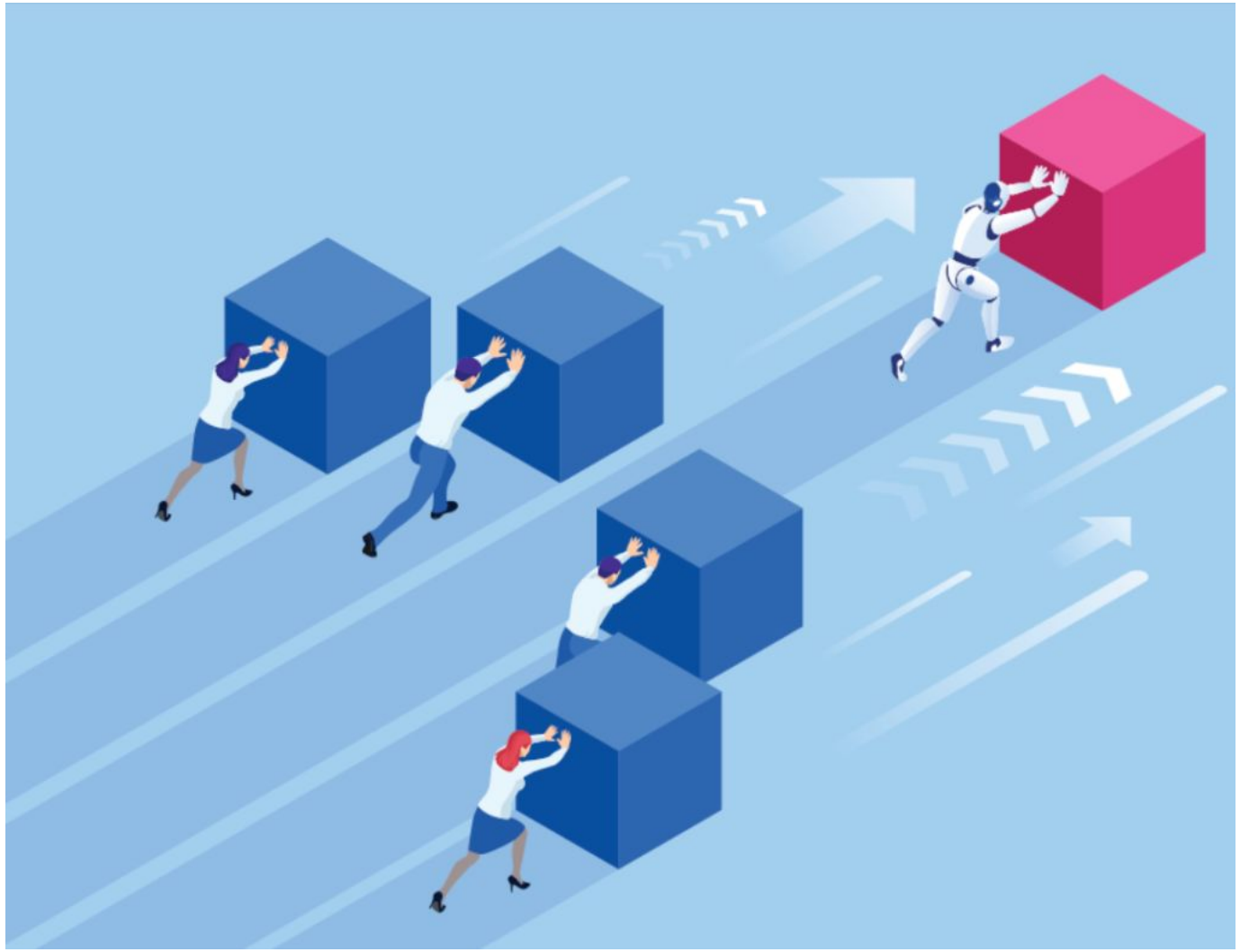
GitLab | GitOps

IaC...why bother?

Repeatability

- Automation
- Deploy to 1 environment

  or 1,000
- Consistency



IaC is self-documenting

- Manually-configured resources are black boxes
- No need for infrastructure documentation beyond diagrams
- Through git and change control policies, infrastructure changes are tracked over time

ec2.tf

gitlab-iac-demo > ec2.tf

```
# AMI

data "aws_ami" "centos" {
  owners = ["679593333241"]
  most_recent = true

  filter {
    name = "name"
    values = ["CentOS Linux 7 x86_64 HVM EBS *"]
  }

  filter {
    name = "architecture"
    values = ["x86_64"]
  }

  filter {
    name = "root-device-type"
    values = ["ebs"]
  }
}

# EC2 instance

resource "aws_instance" "web" {
  instance_type = "t3.micro"
  ami = data.aws_ami.centos.id

  tags = {
    Name = "gitops-demo"
    env = var.env
  }
}
```

GitOps vs IaC

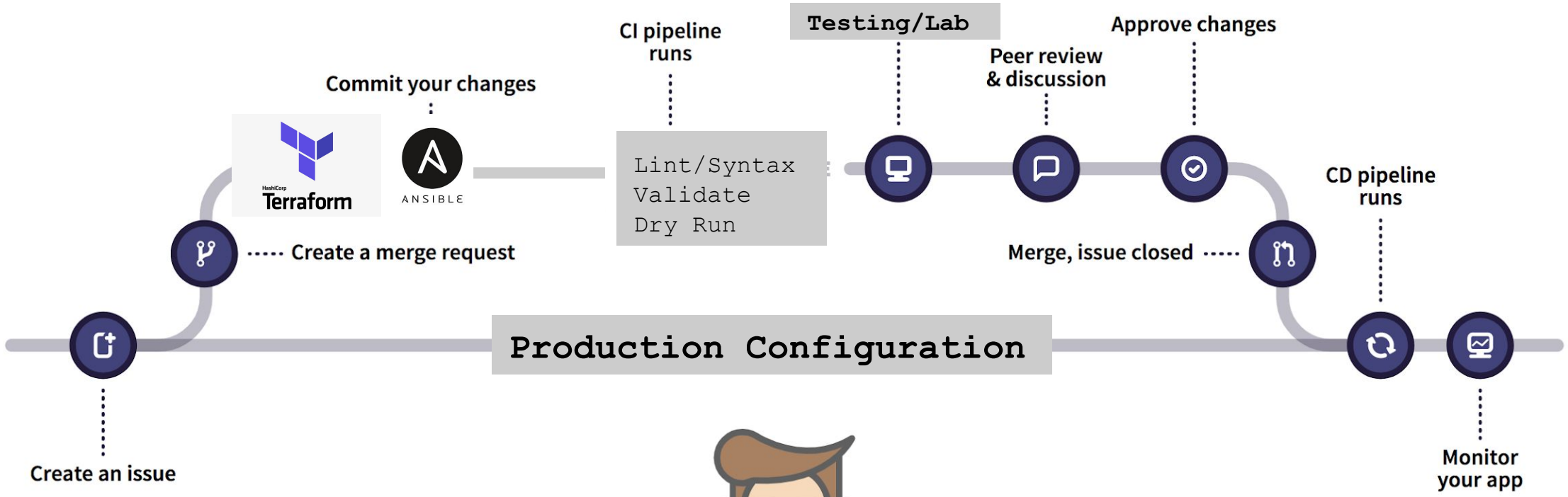
GitOps

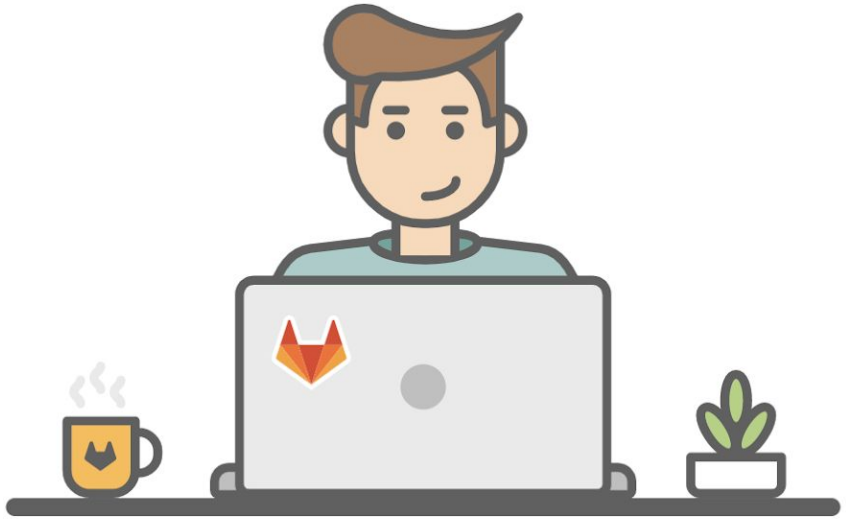
- Code is stored in git repository
- Change is enacted via Merge Request
- Code is scanned for security and best practices
- Infrastructure updates are automated

IaC

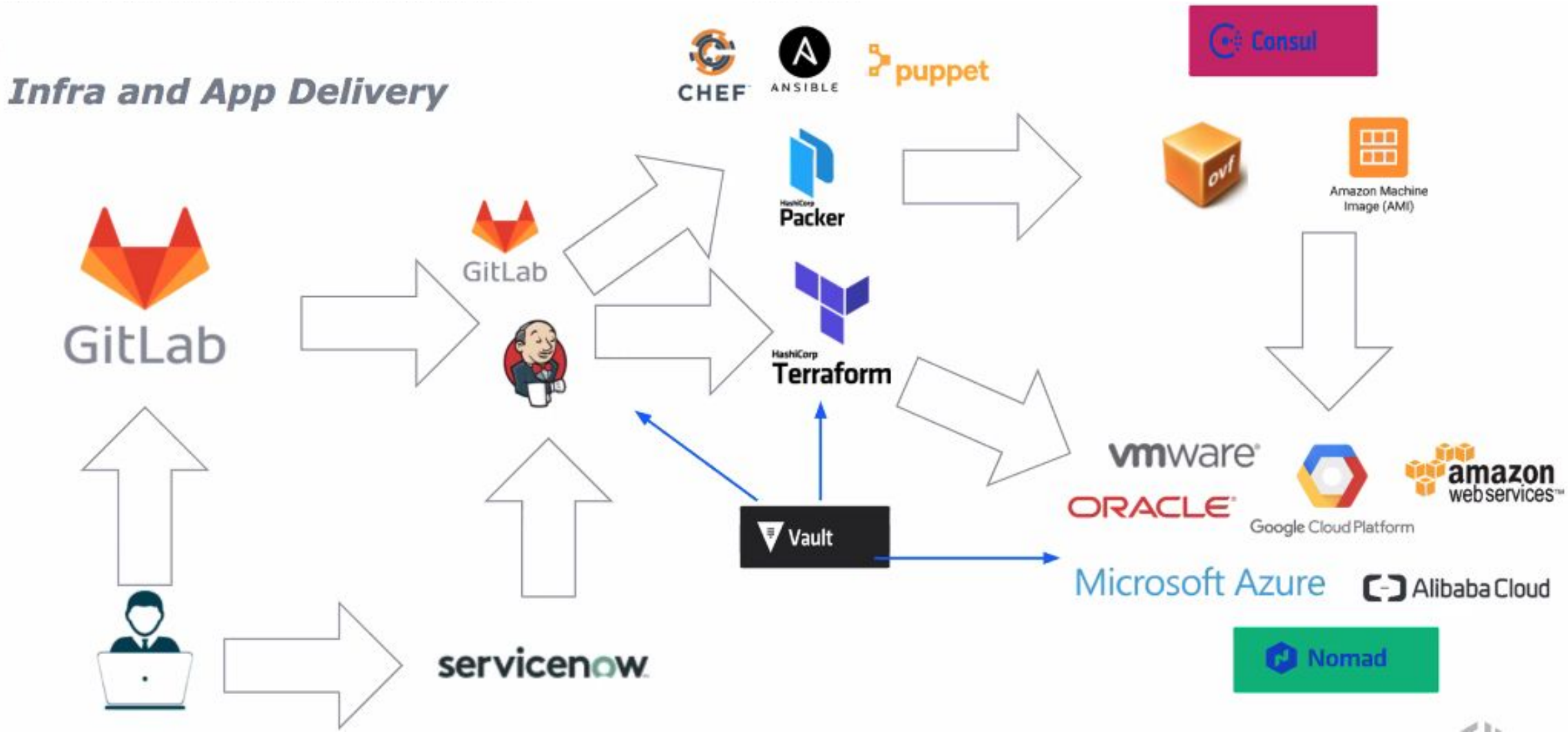
- Code may/may not be version controlled
- Code changes may or may not go through a review/approval process.
- Changes can be applied many ways (FTP or SSH to the server, command line manual runs, etc.) They may or may not be automated.

How GitLab does GitOps





Cloud Operating Model - Automated at Scale



GitOps Technologies

Git code repository	git		
Git management tool	GitLab	GitHub	Bitbucket
Continuous Integration tool	GitLab	Jenkins	circleci
Continuous Delivery tool	GitLab	Spinnaker	flux
Container Registry	GitLab	dockerhub	
Configuration manager	ANSIBLE	CHEF	puppet
Infrastructure provisioning	Terraform	pulumi	AWS CloudFormation
Container orchestration	kubernetes		

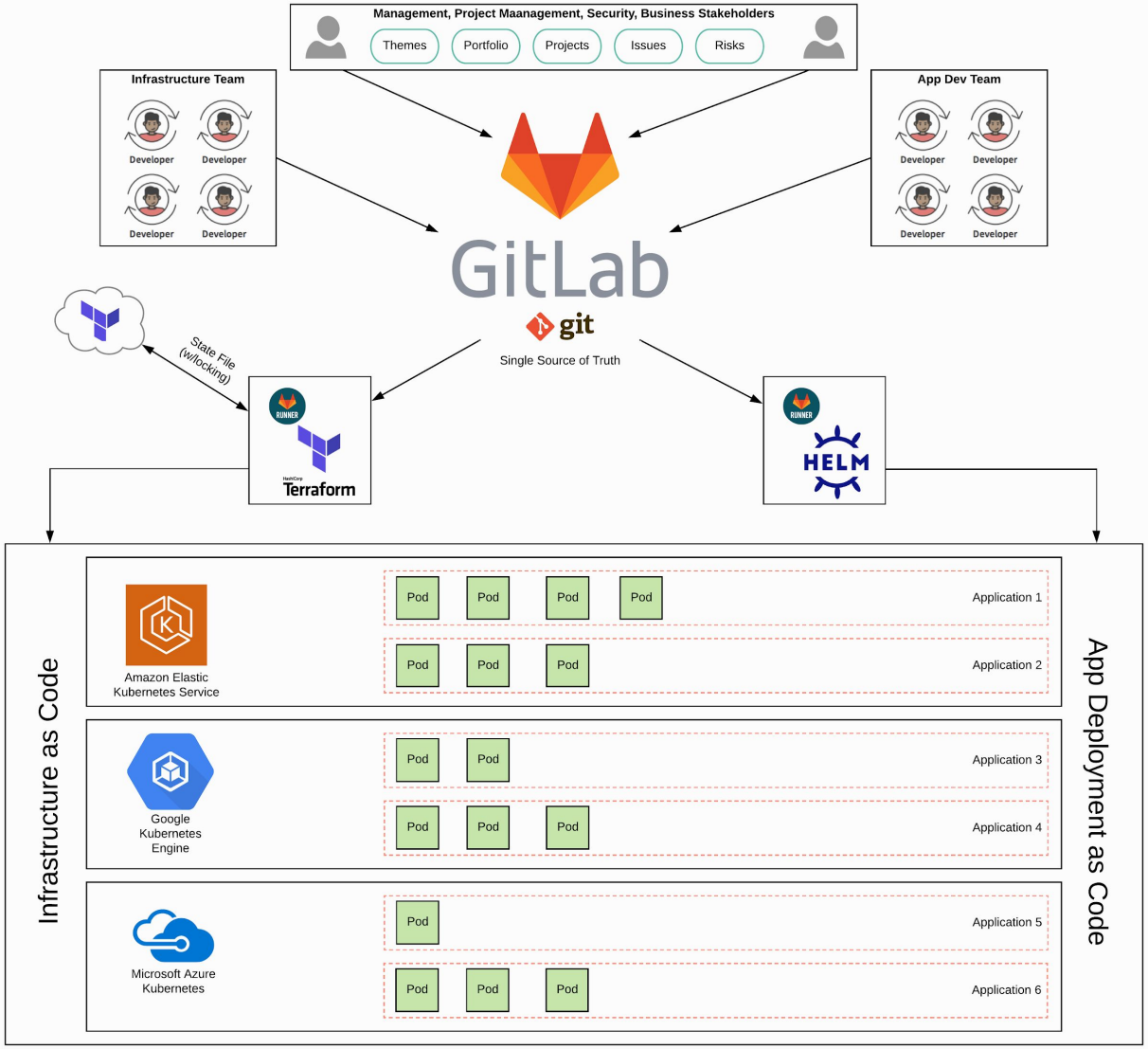
GitLab Architecture Sample

1. Terraform setups K8s clusters in three clouds and registers to GitLab Group
2. New managed-apps install via CI kicks off
3. AutoDevOps deploys apps via CI/CD
4. App “migration” by updating App Environment

Group Structure

```
├─ gitops-demo
    ├── readme
    ├── gitlab-manage
    ├── apps
    |   ├── cluster-management
    |   ├── my-asp-net-app1
    |   ├── my-python-app4
    |   ├── my-ruby-app3
    |   └── my-spring-app2
    └── infra
        ├── aws
        ├── gcp
        ├── azure
        └── templates
```

← build files here - .tf files



Demo

HashiCorp Terraform

Terraform

Enterprise Considerations

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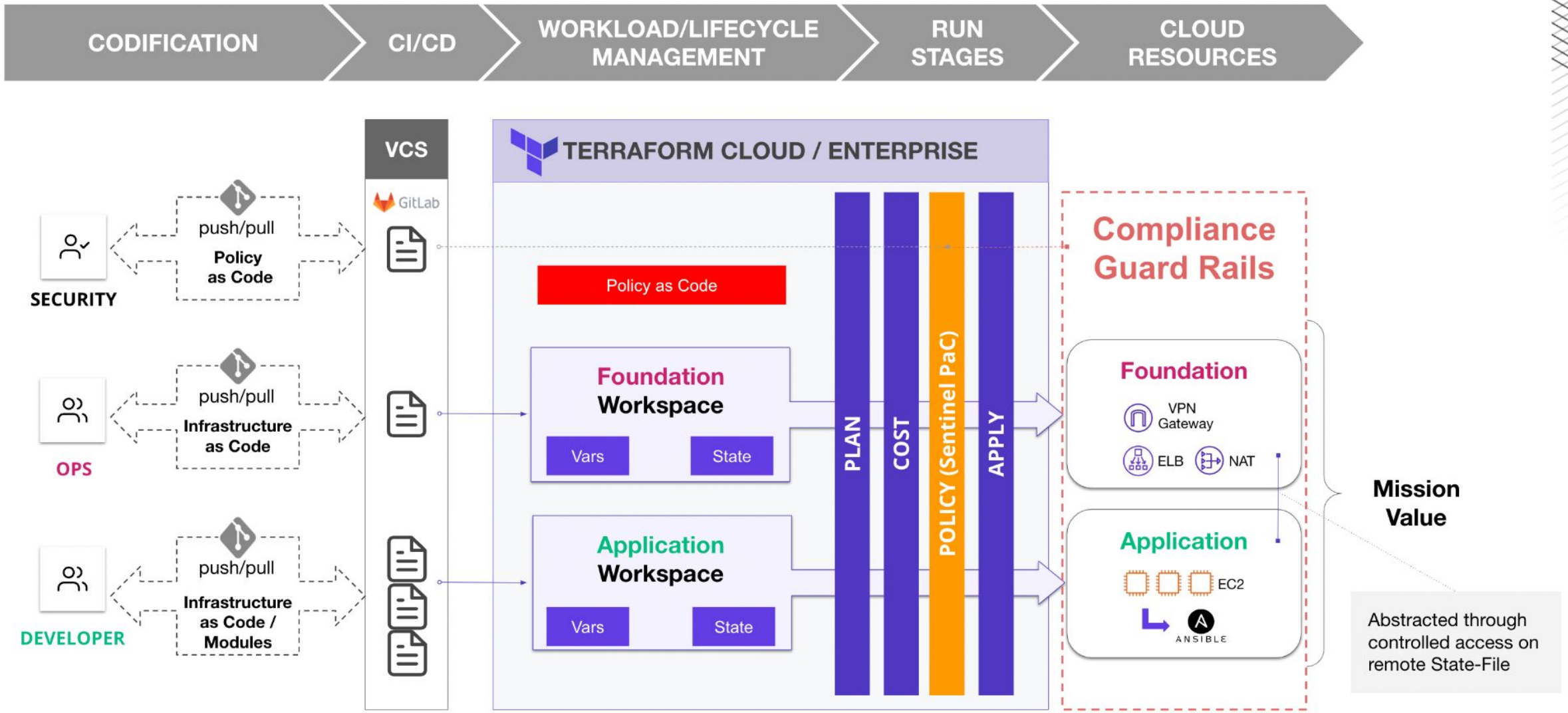
Enabling Secure Workflows (SaC / PaC)



HashiCorp

Vault

Vault use cases

Leverage any trusted source of identity to enforce access to systems, secrets, and applications.

Secrets management

Centrally store, access, and distribute dynamic secrets.

Encrypting application data

Keep application data secure with centralized key management and simple APIs for data encryption.

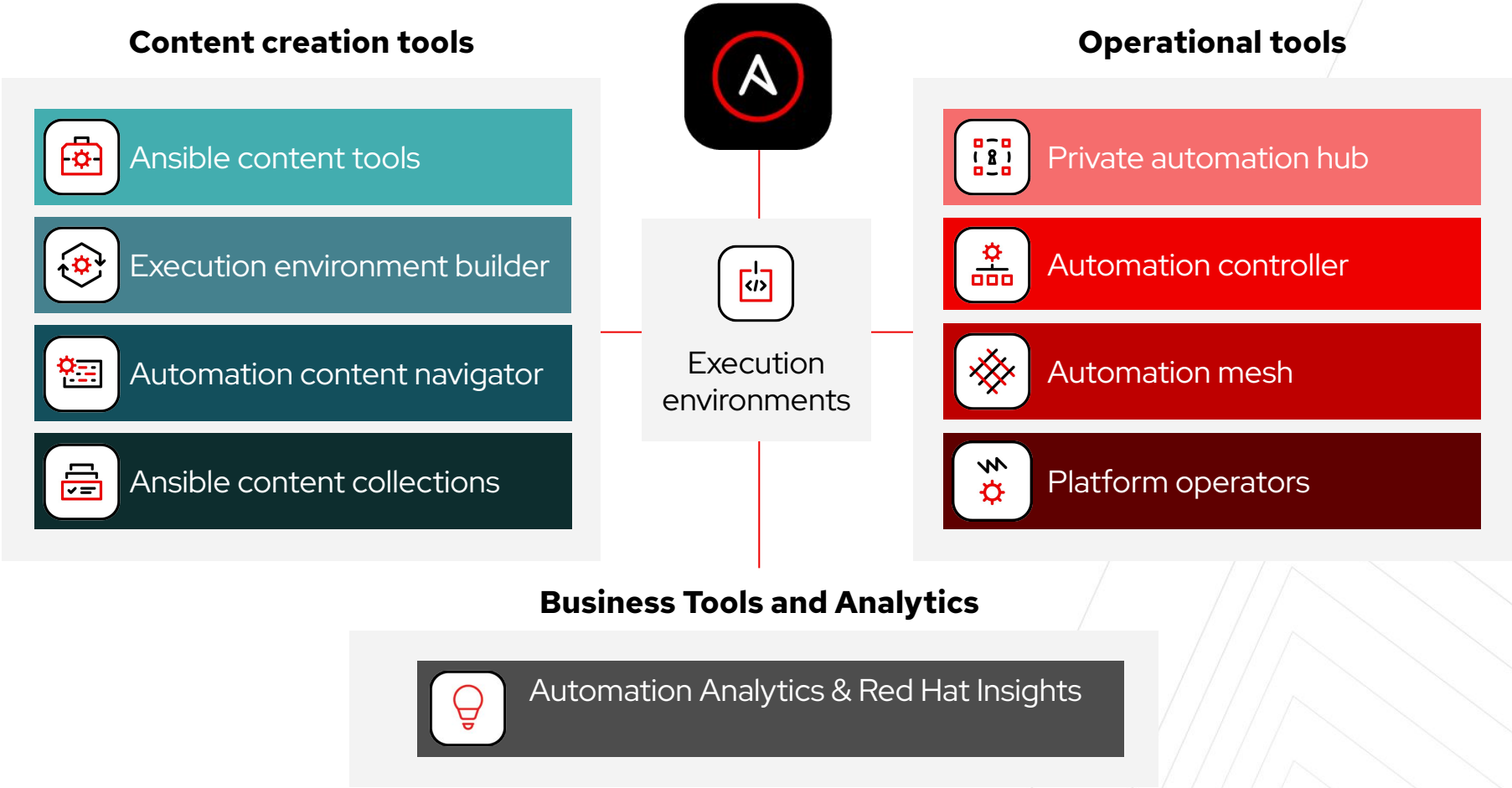
Identity-based access

Authenticate and access different clouds, systems, and endpoints using trusted identities.

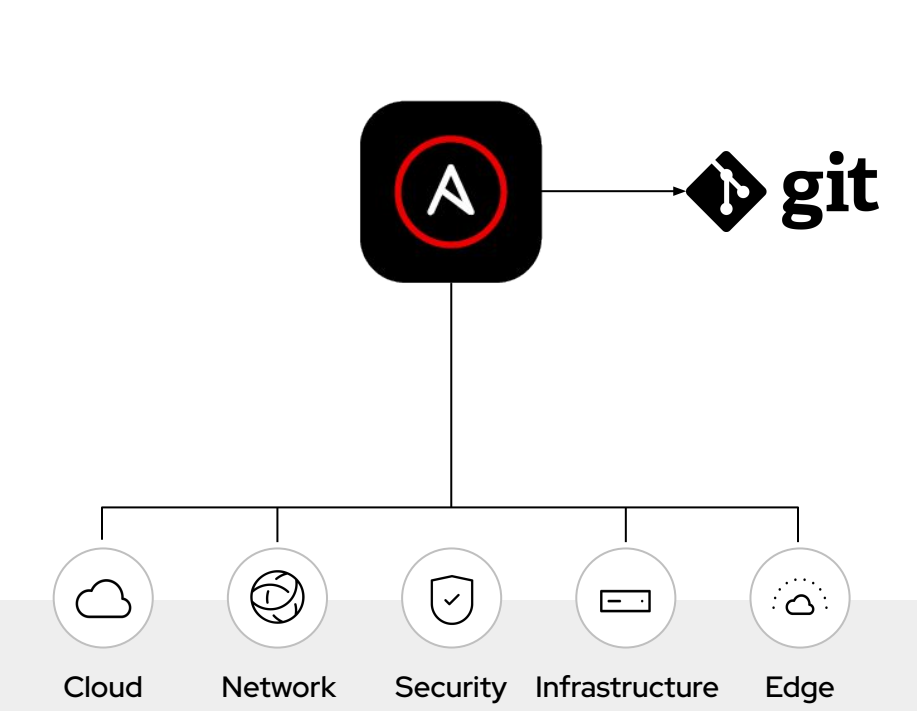
Red Hat
Ansible Automation
Platform

Red Hat Ansible Automation Platform

An integrated solution for the enterprise.



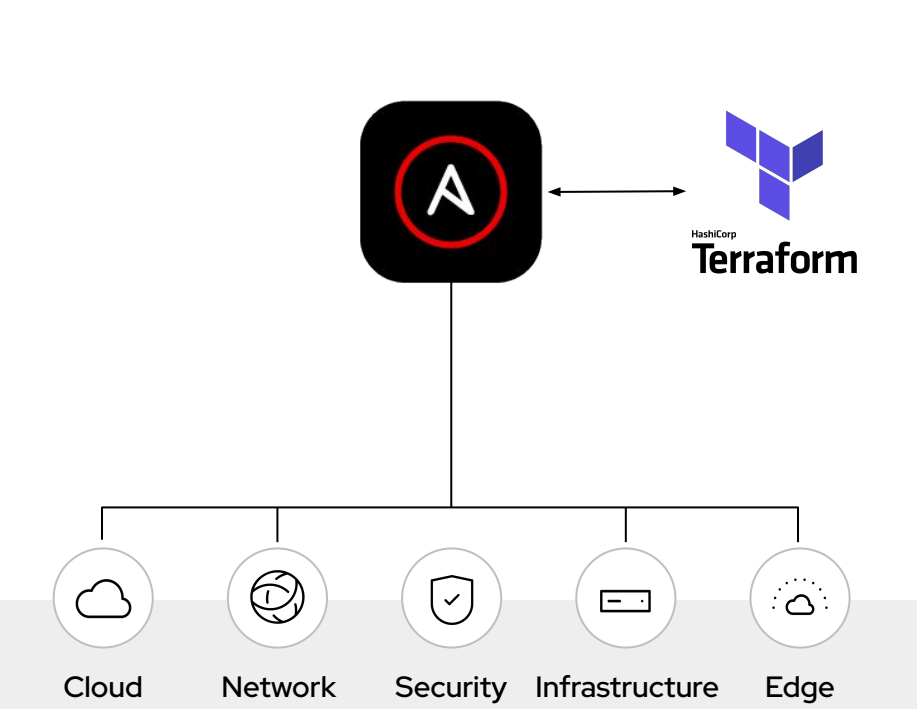
GitOps. IaC, merge requests, and CI/CD.



Ansible Automation Platform and GitOps

- **GitOps** is a framework that uses Git repositories as a single source of truth (SoT) to deliver infrastructure as code.
- **Infrastructure as Code (IaC)** is stored within a Git repositor as the SoT.
- **Merge Requests (MRs)** is the change mechanism for any updates to the infrastructure.
- **Continuous Integration/Continuous Delivery (CI/CD)** automates the infrastructure updates.
- **Ansible triggers and automates** the IaC updates via Ansible workflows while acting as a CI/CD tool and providing complete management of the entire lifecycle day-2 operations.

Everything as code. Everything is possible.



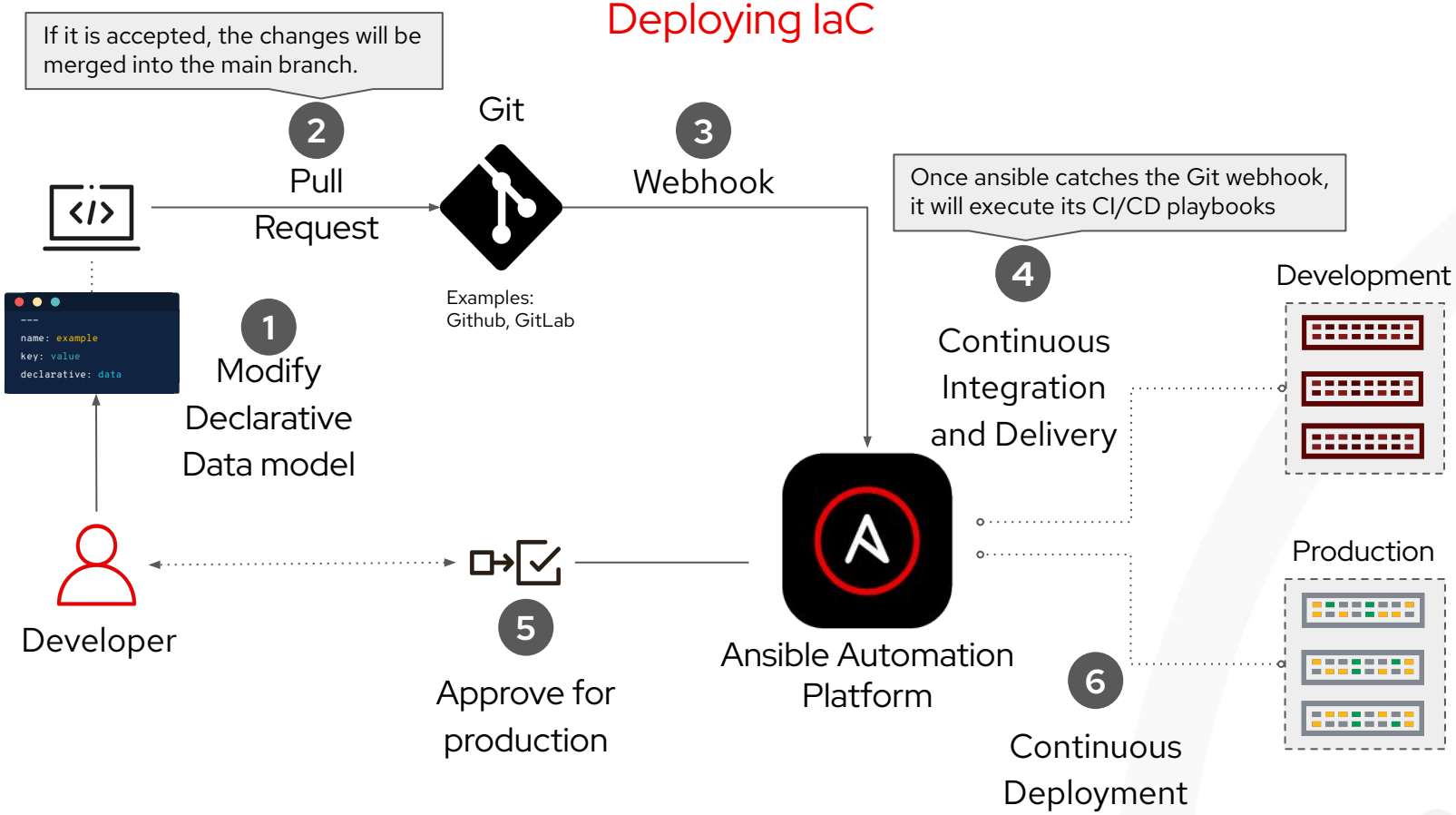
Infrastructure and configuration as code

- **Ansible creates** infrastructure manifests and triggers the provisioning and deprovisioning of infrastructure.
- **Dynamic inventory** management provides access to newly provisioned infrastructure without manual intervention.
- **Combine tool chains** to deliver infrastructure as code and configuration as code. Allowing for complete management of infrastructure life cycles with post-provisioning tasks.

CONFIDENTIAL designator

AAP as orchestrator for CI/CD

Deploying IaC



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