DevOps project: Implementation of CI/CD for Piggy Metrics

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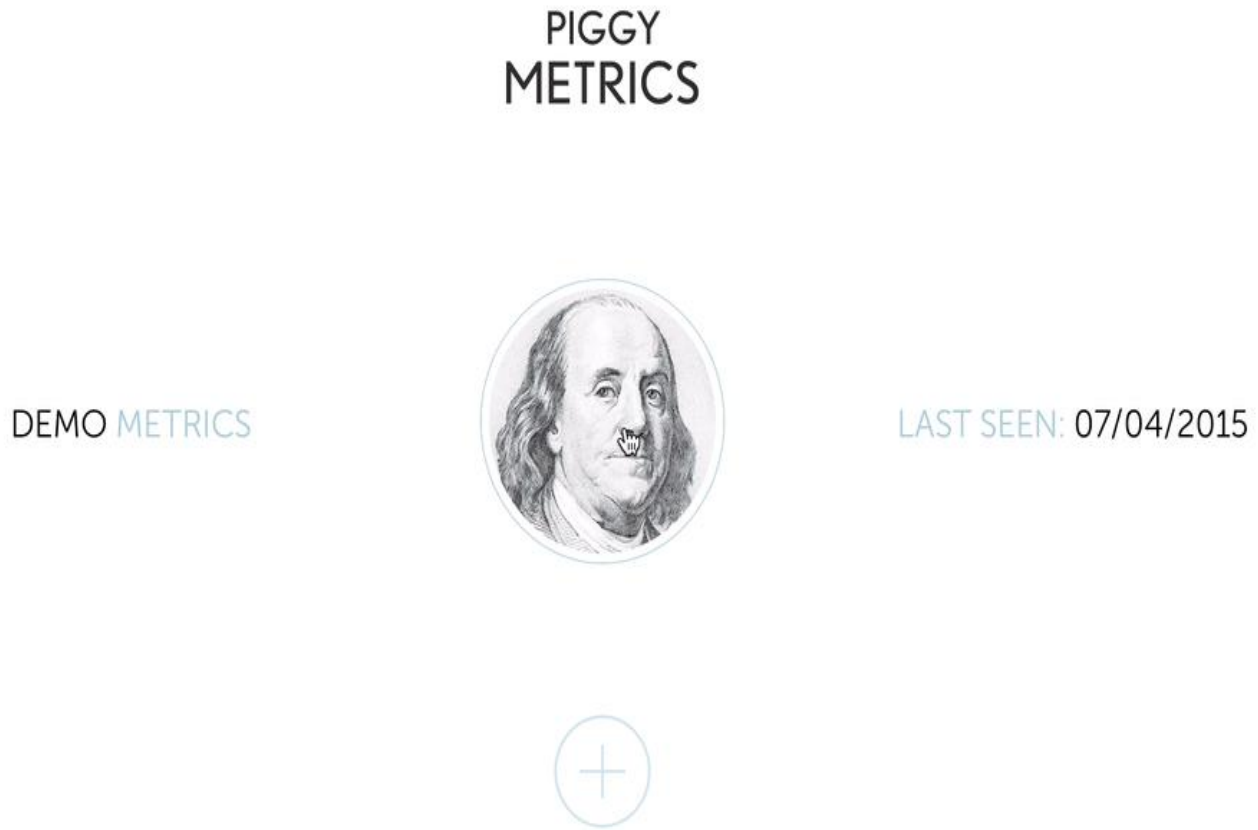
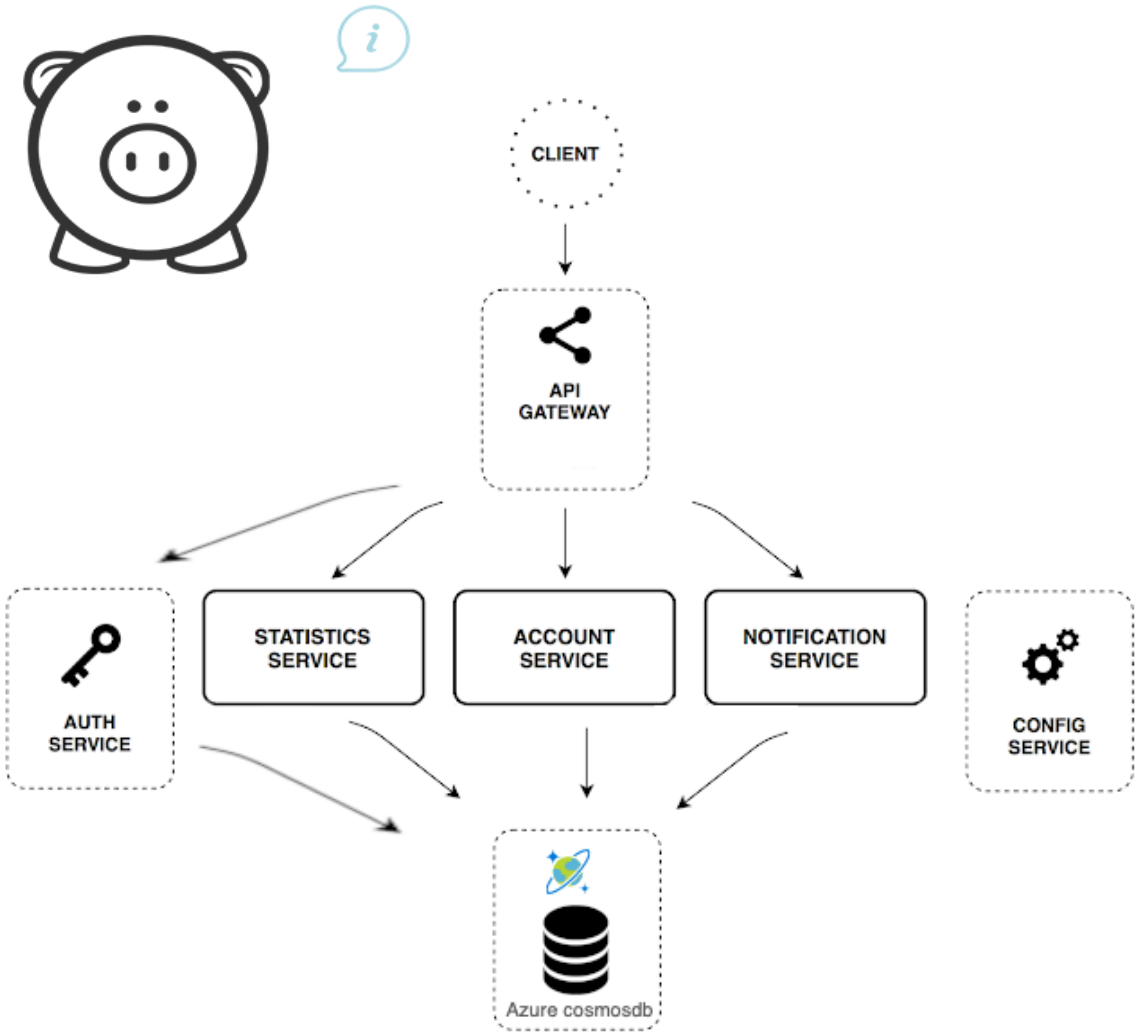
Piggy Metrics



- Piggy Metrics is a Microservice Architecture financial advisor app
- Piggy Metrics gives us the ability to:
  - Performs calculations on major statistics parameters
  - Capture time series
  - Stores user contact information, incomes/expenses items, savings and notification setting

Piggy Metrics Architecture



- Account Service: Contains general input logic and validation: incomes/expenses items, savings and account settings

- Statistics Service: Performs calculations on major statistics parameters and captures time series for each account

- Notification Service: Stores user contact information and notification settings (reminders, backup frequency, etc.)

- Auth Service: Stores the authentication data into the database

- Config Service: Configures the spring framework used to enable the integration of all the other services

Why DevOps?

Our customers believe that it is crucial for their business to focus on rapid value creation so that they can offer users value as quickly as possible.

- What We will be delivering to our customer:
  - *Release deliverables more frequently, with higher quality and stability*
  - *Stabilize work environment*
  - *Continuous delivery of software*
  - *Automation in repetitive tasks leaves more room for innovation*
  - *Promotes agility in the business*

DevOps strategy

- Terraform is used to provision the infrastructure needed
- Azure Cloud is our pick for cloud provider
- Docker to build containerized images
- AKS to host the Kubernetes cluster
- Extensible testing in our pipeline using GitHub actions
- Helm to deploy our application

Robust

Distributed Architecture

Adaptable

Quick and easy develop Cycle that can deploy fast

Scalable

Easy to scale using Kubernetes and AKS

Easy Maintenance

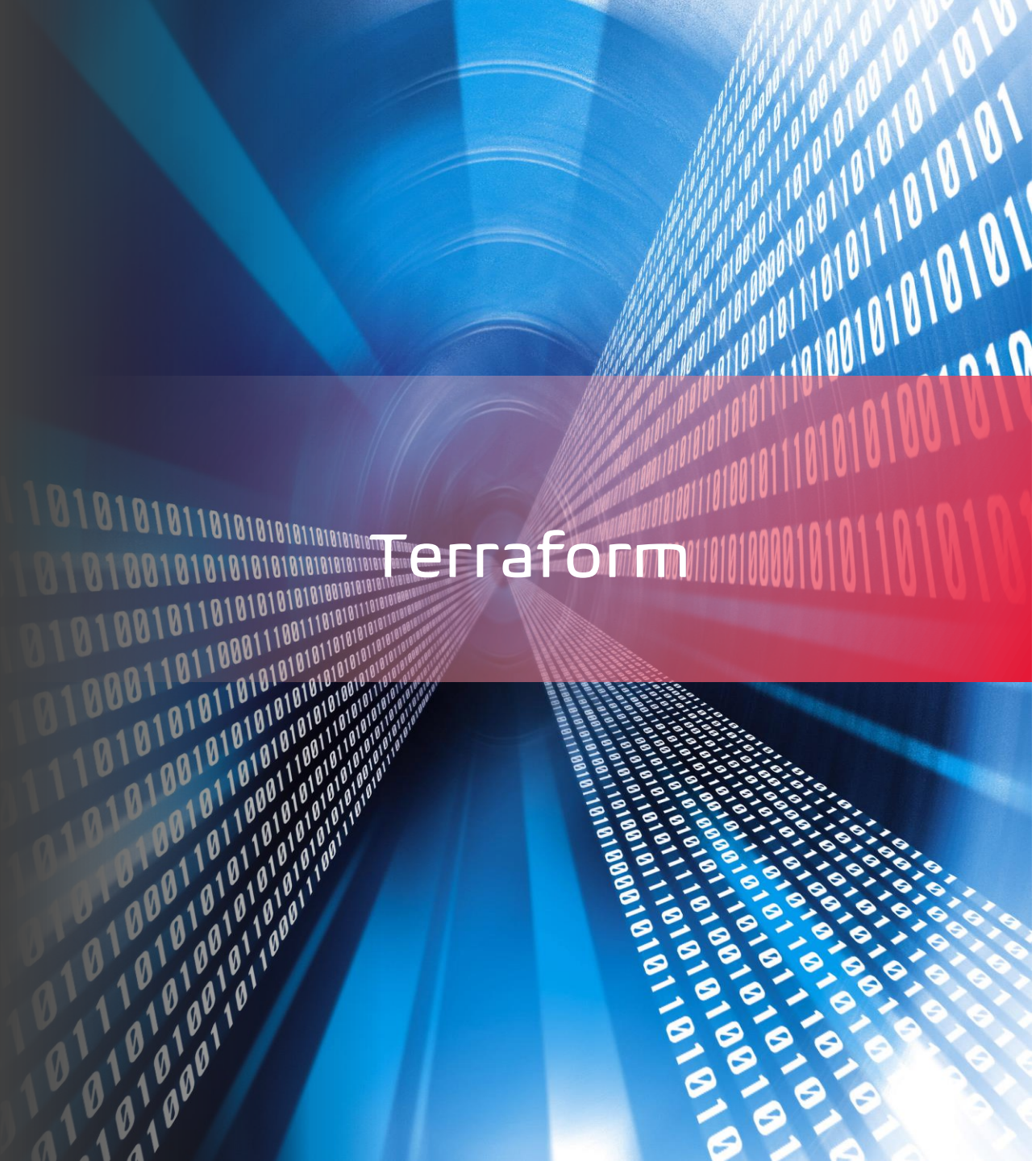
Deploy new changes Is easy and automatic

Easy provisioning

Modifications trouble-free

DevOps tools & demos

- Terraform
  - Azure infrastructure
- Docker
  - Jib
- Helm
- AKS
- Vault



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We use terraform to provision our infrastructure:

- **Terraform** is an open-source infrastructure as code software tool created by HashiCorp

- Users define and provide data center infrastructure using a declarative configuration language known as HashiCorp Configuration Language (HCL)

Demo terraform

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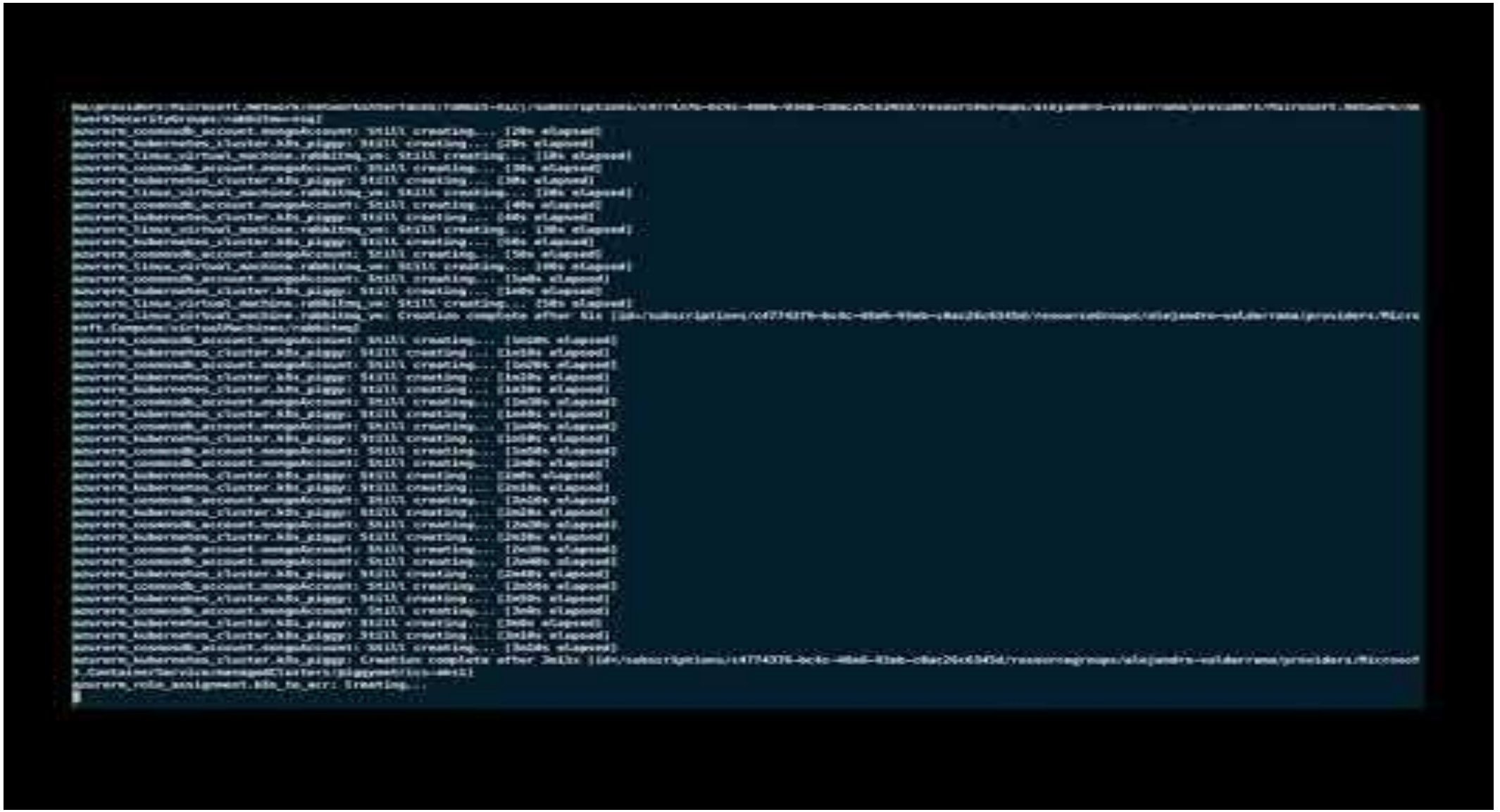
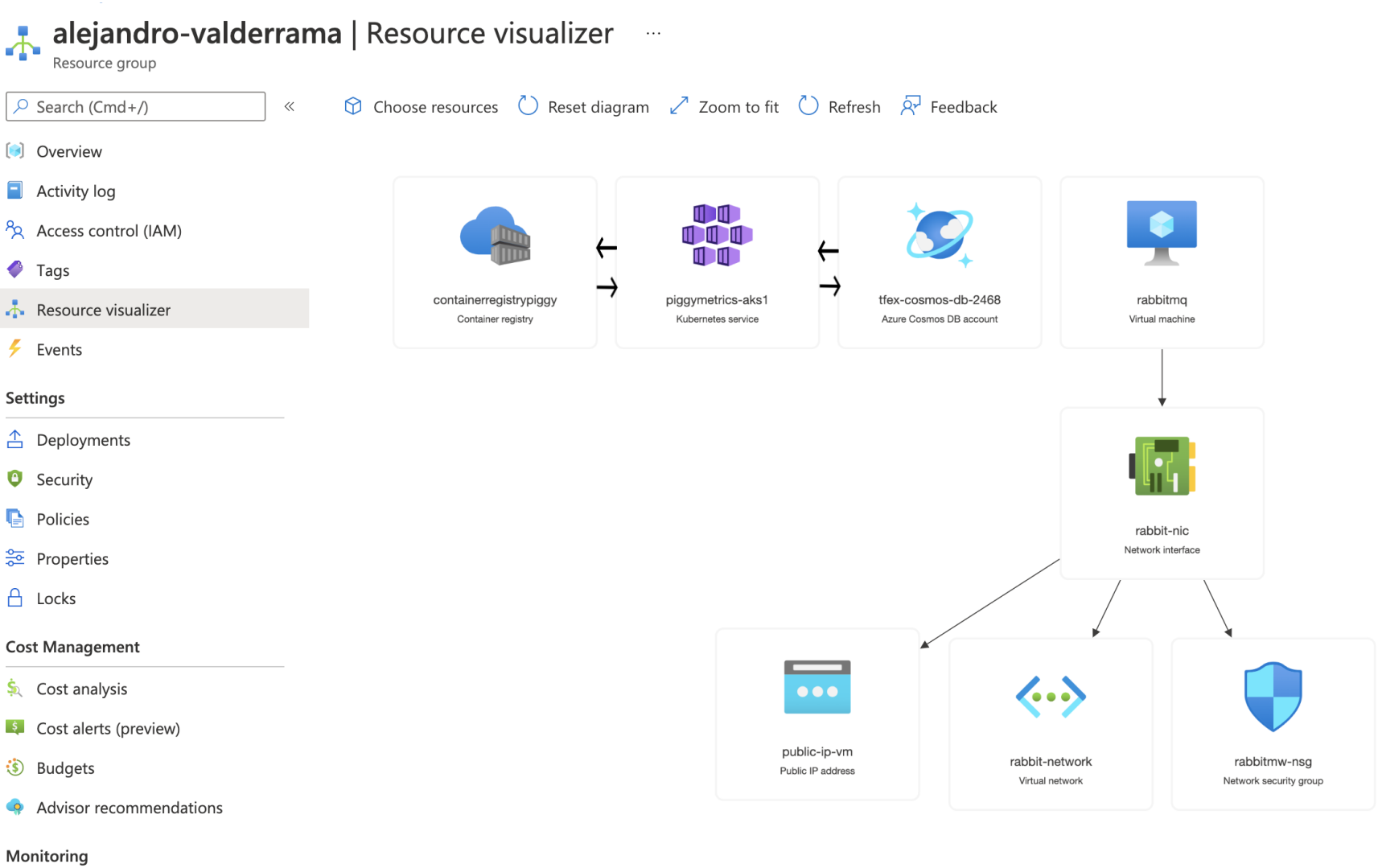
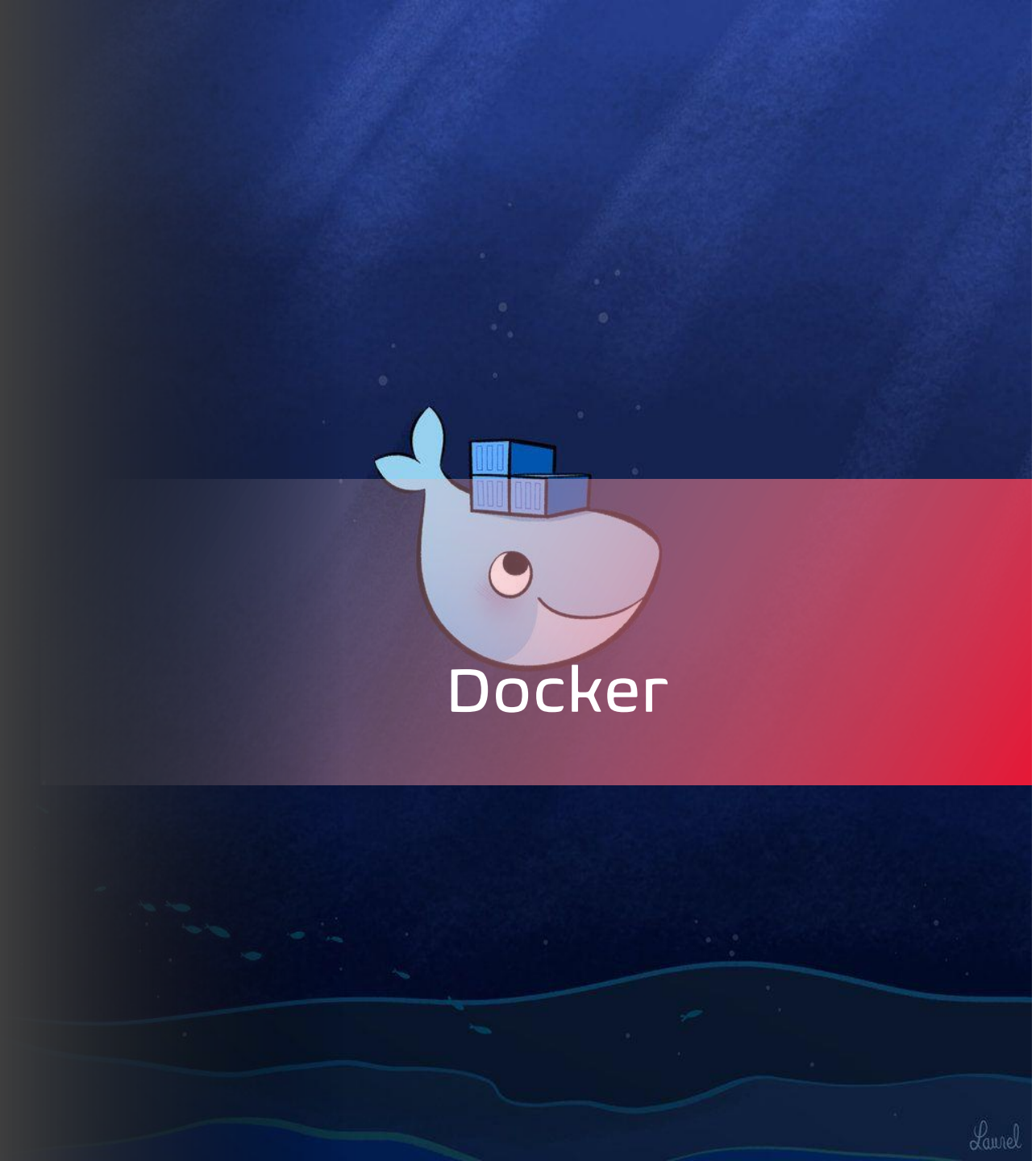


The piggymetrics infrastructure in Azure





Docker is an open source containerization platform:

- Docker provides the ability to package and run an application in a loosely isolated environment called a container
- Docker simplifies and accelerates the workflow, while giving developers the freedom to innovate with their choice of tools, application stacks, and deployment environments

Jib is used to build our containers

• Jib builds optimized Docker and OCI images for your Java applications without a Docker daemon - and without deep mastery of Docker best-practices. It is available as plugins for Maven and Gradle and as a Java library.

- **Fast**
- **Reproducible**
- **Daemonless**

Demo docker

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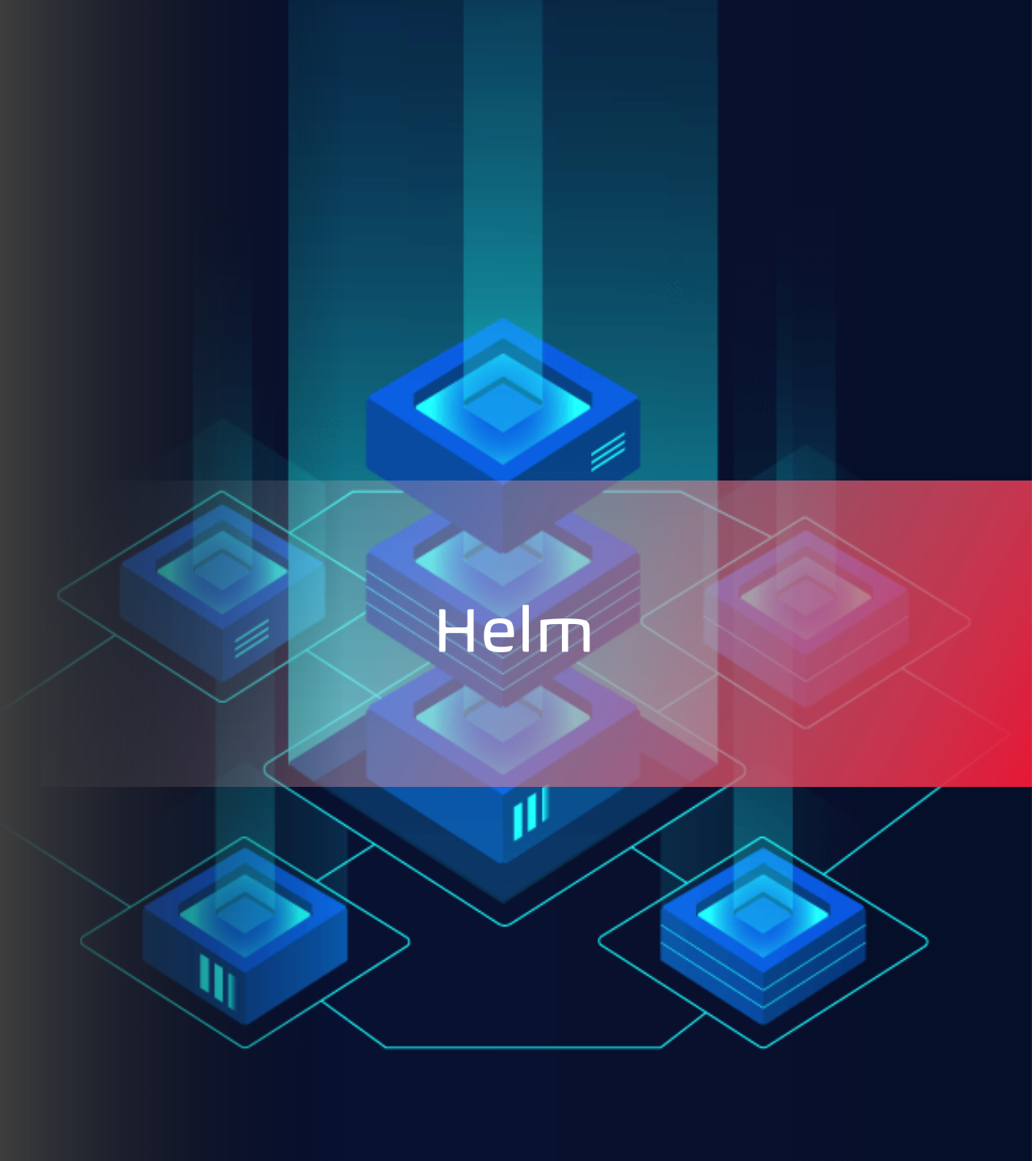

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We use Helm to quickly deploy the changes to the application:

- Helm helps combine multiple Kubernetes manifests (yaml) into a single unit called Helm Charts
- Helm gives the ability to customize application configurations during deployment

Demo helm

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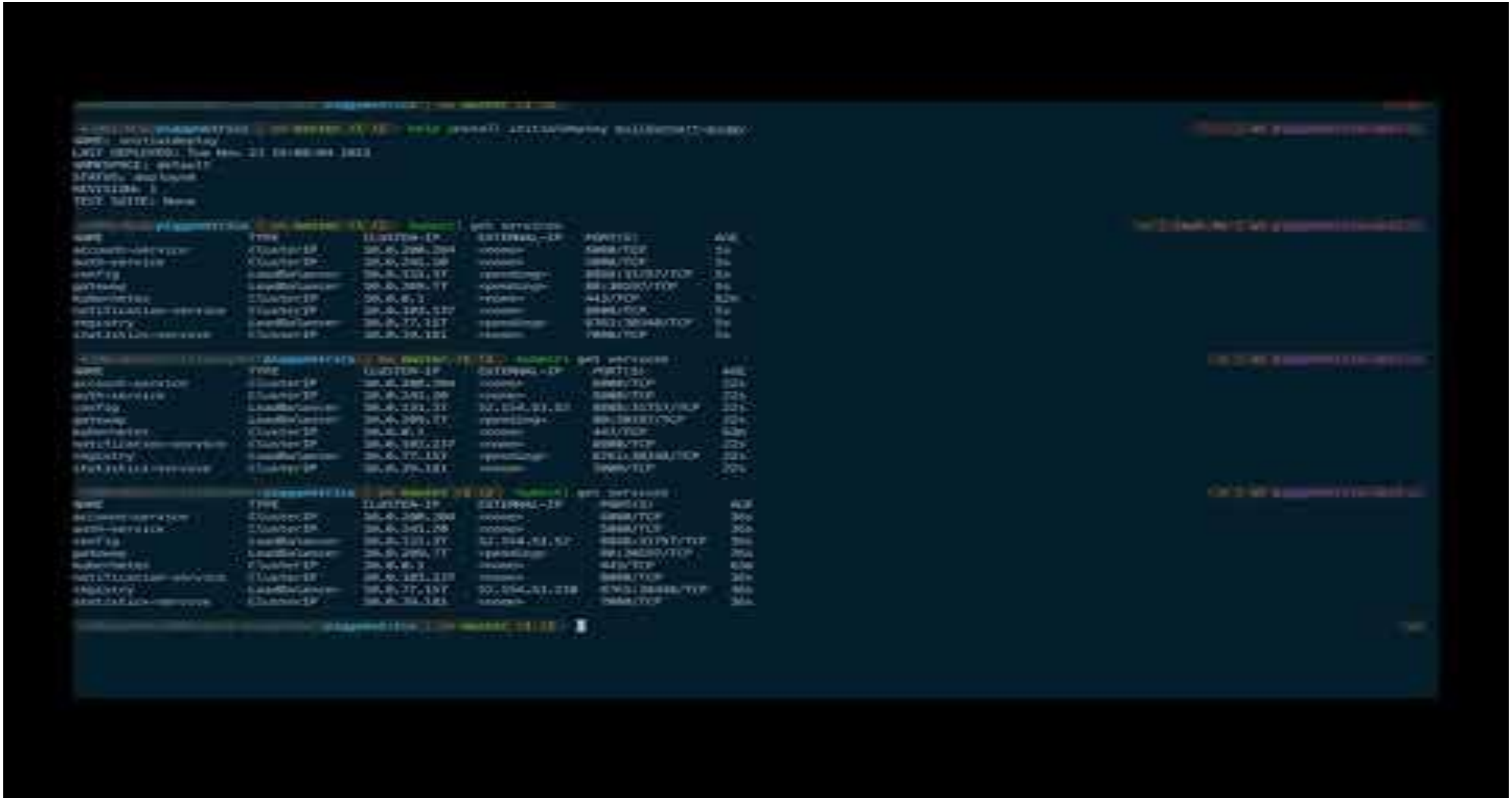

Azure Kubernetes Service (AKS)

- Azure Kubernetes Service is a managed container orchestration service based on the open-source Kubernetes system
- An organization can use AKS to handle critical functionality such as deploying, scaling and managing Docker containers and container-based applications

Demo AKS

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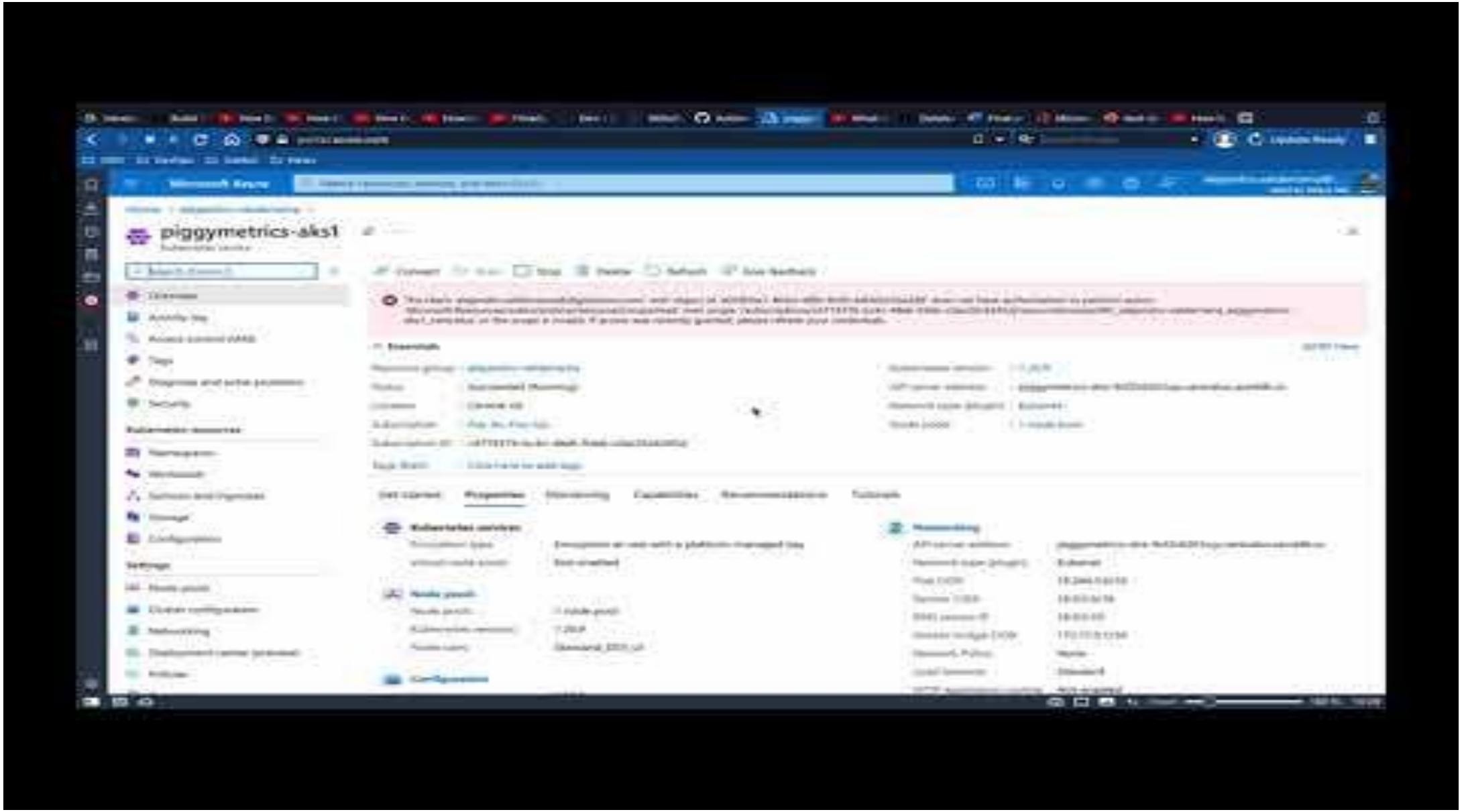

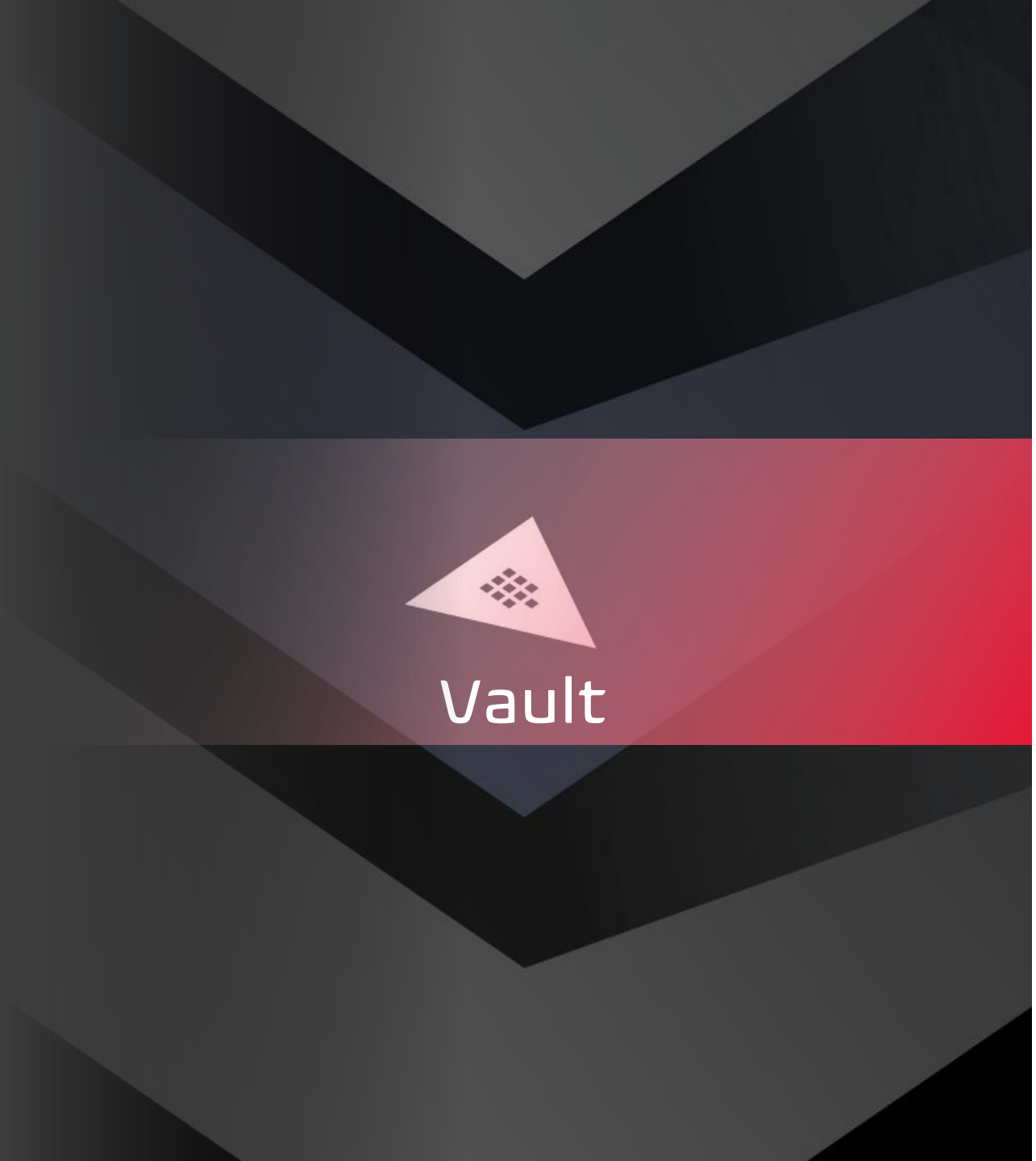

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- Vault is a secrets management tool specifically designed to control access to sensitive credentials
- It can be used to store sensitive values and at the same time dynamically generate access for specific services/applications on lease

Demo vault

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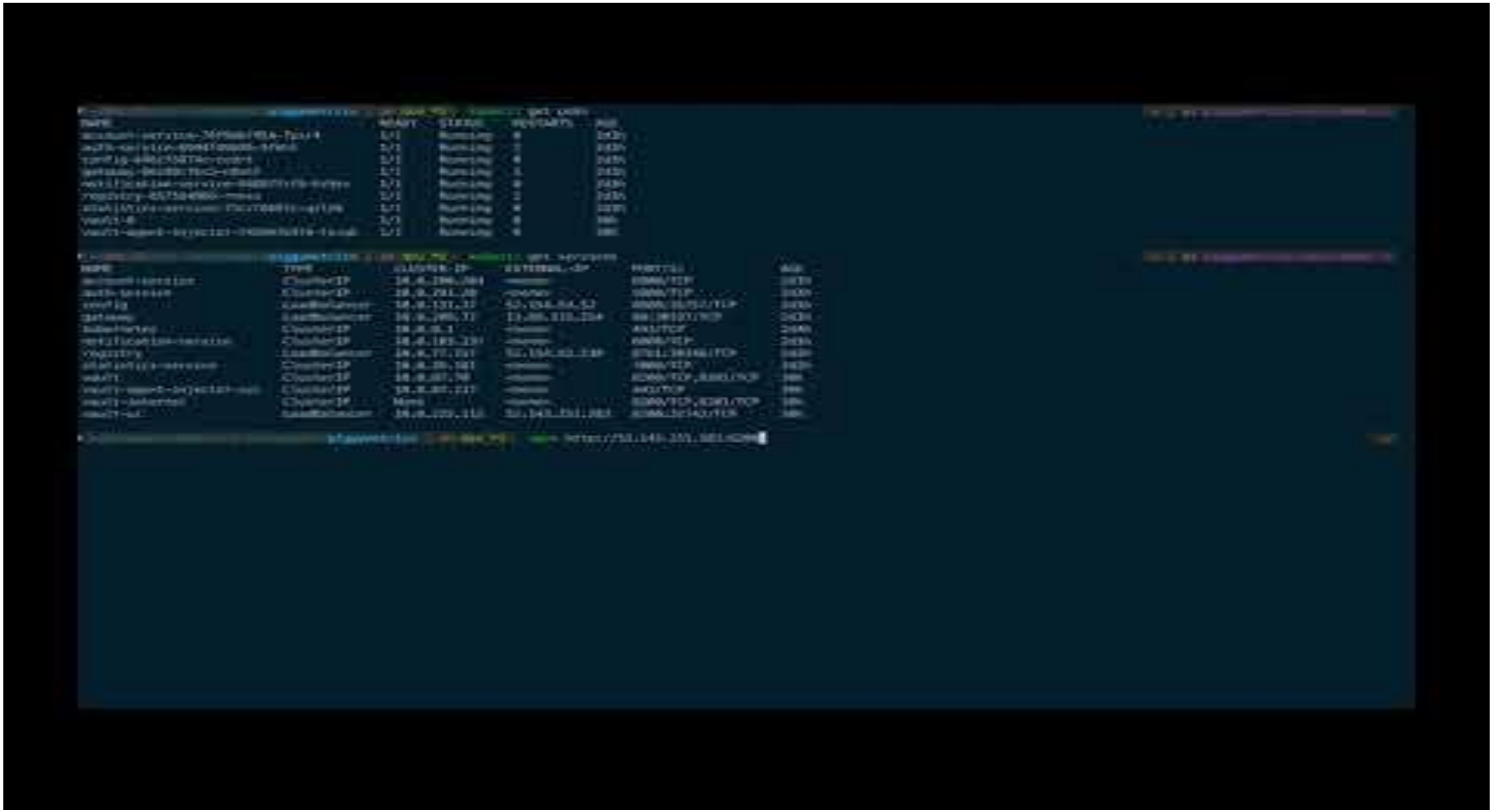

CI/CD pipeline using github actions

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- CI/CD
- Branching strategy
- Github actions

CI/CD

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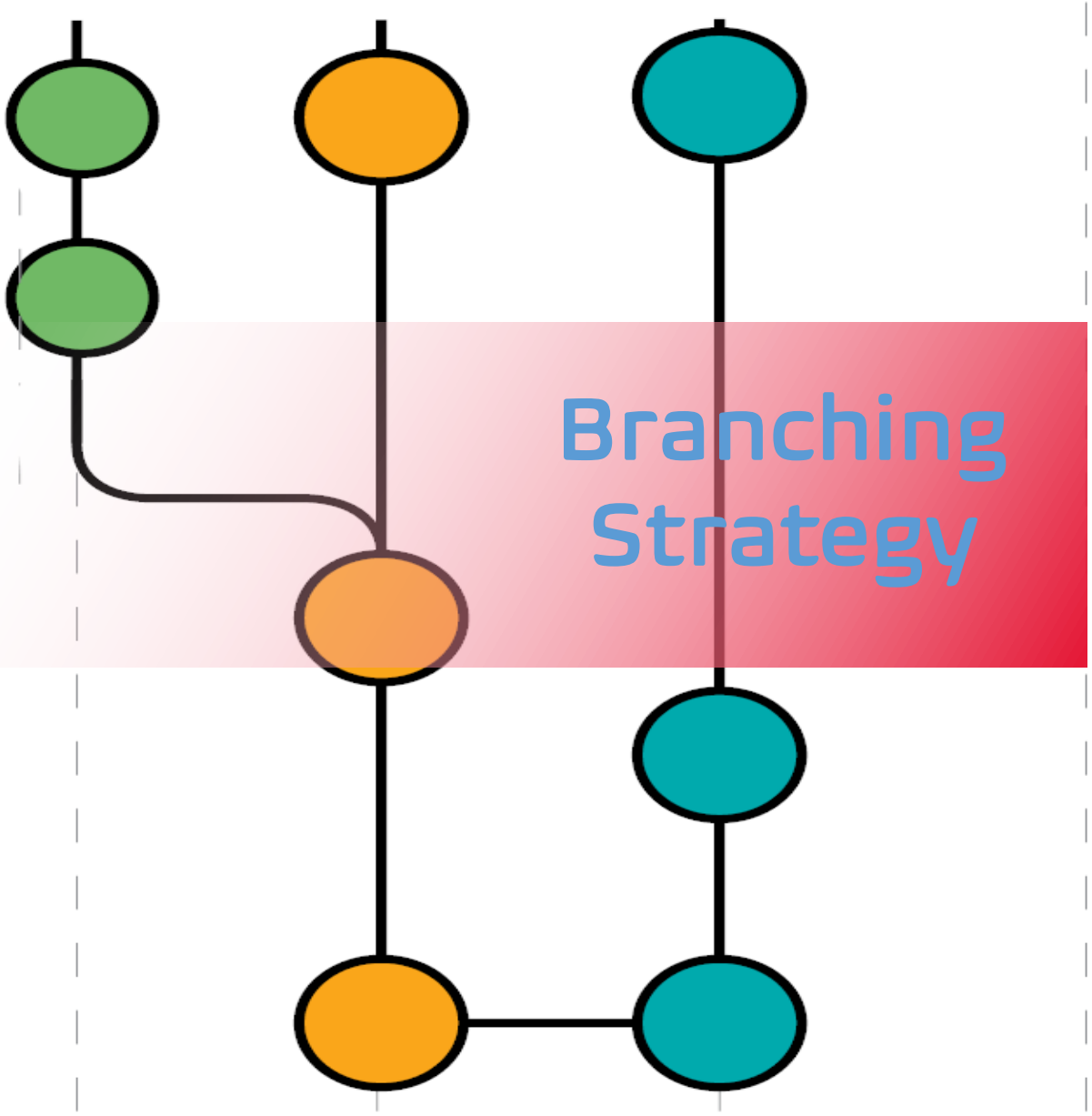
- CI/CD bridges the gaps between development and operation activities and teams by enforcing automation in building, testing and deployment of applications.
- Use automation to reduce the time, effort, and risk involved in shipping a release.
- We use various pipelines that get trigger with either push or pull request in some branches.



We propose a branching strategy that:

- Uses to main branches dev and master
- The master branch is always deployable.
- Push to other the dev occurs constantly

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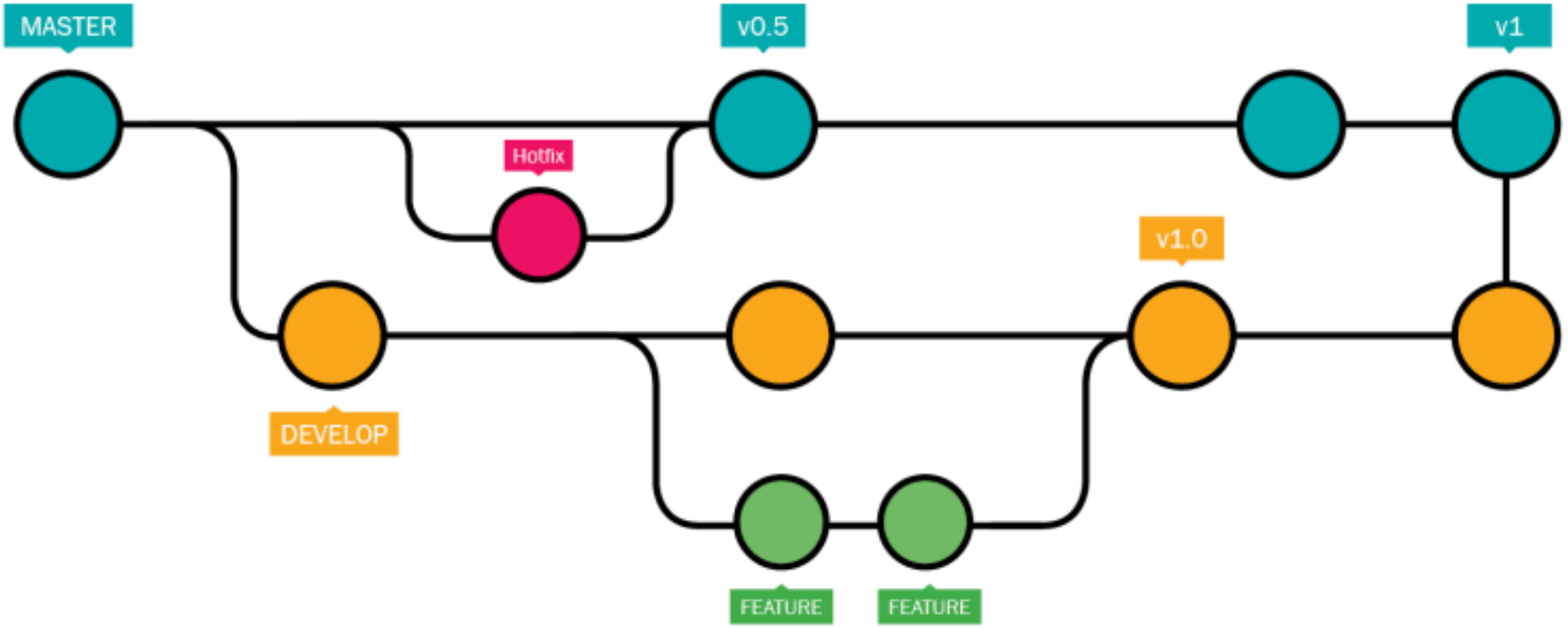
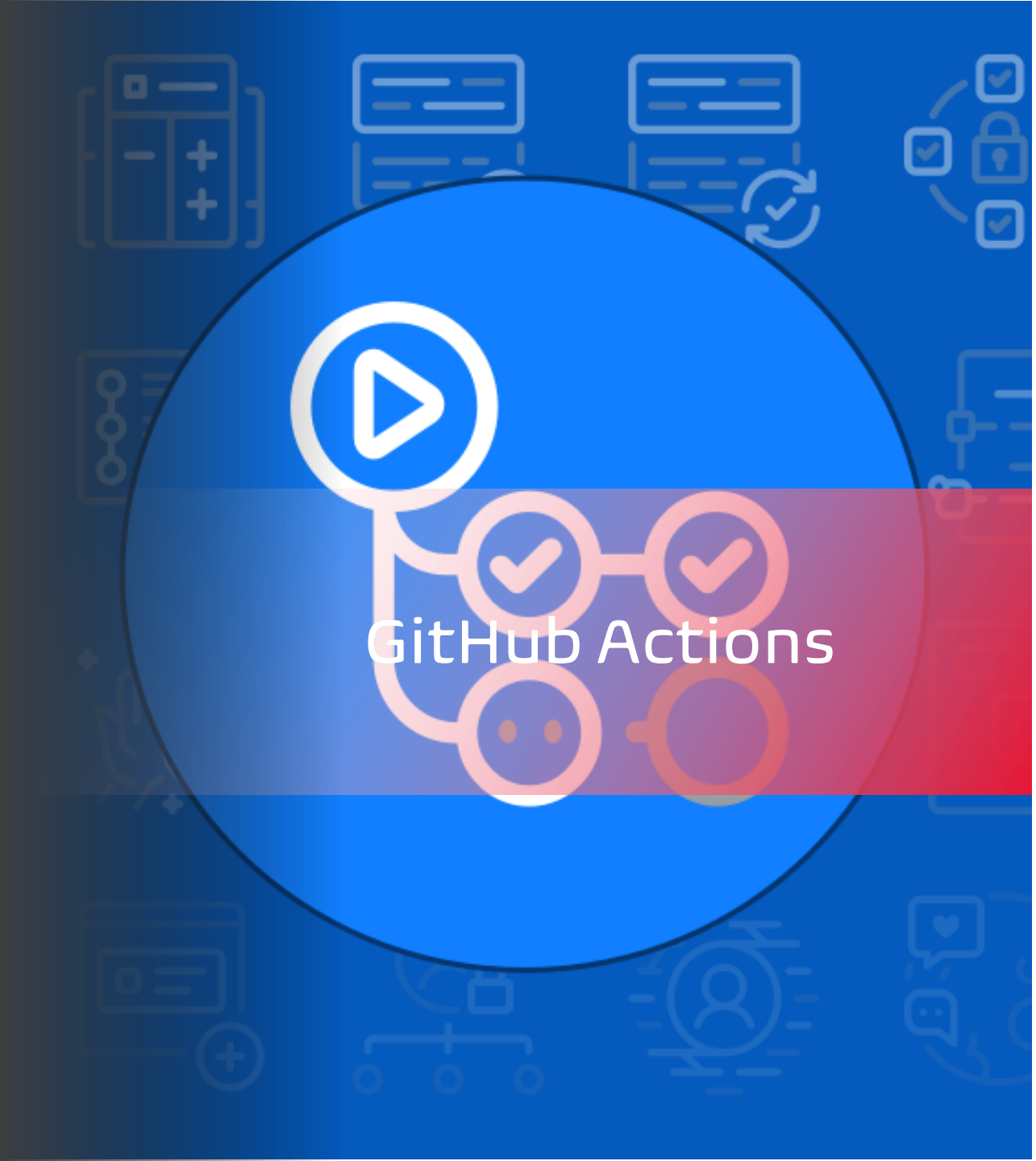
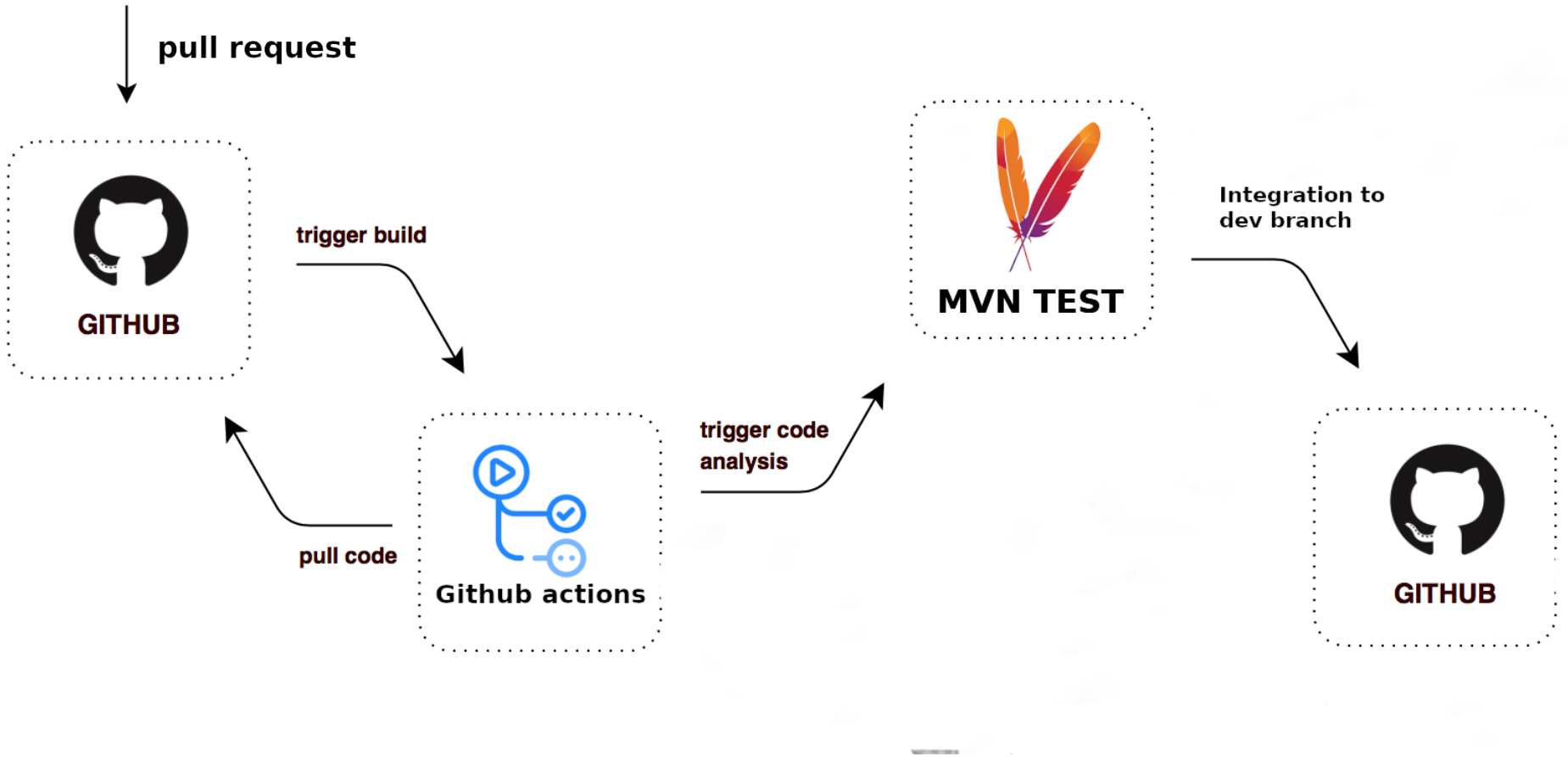
Branching strategy for Piggy Metrics.



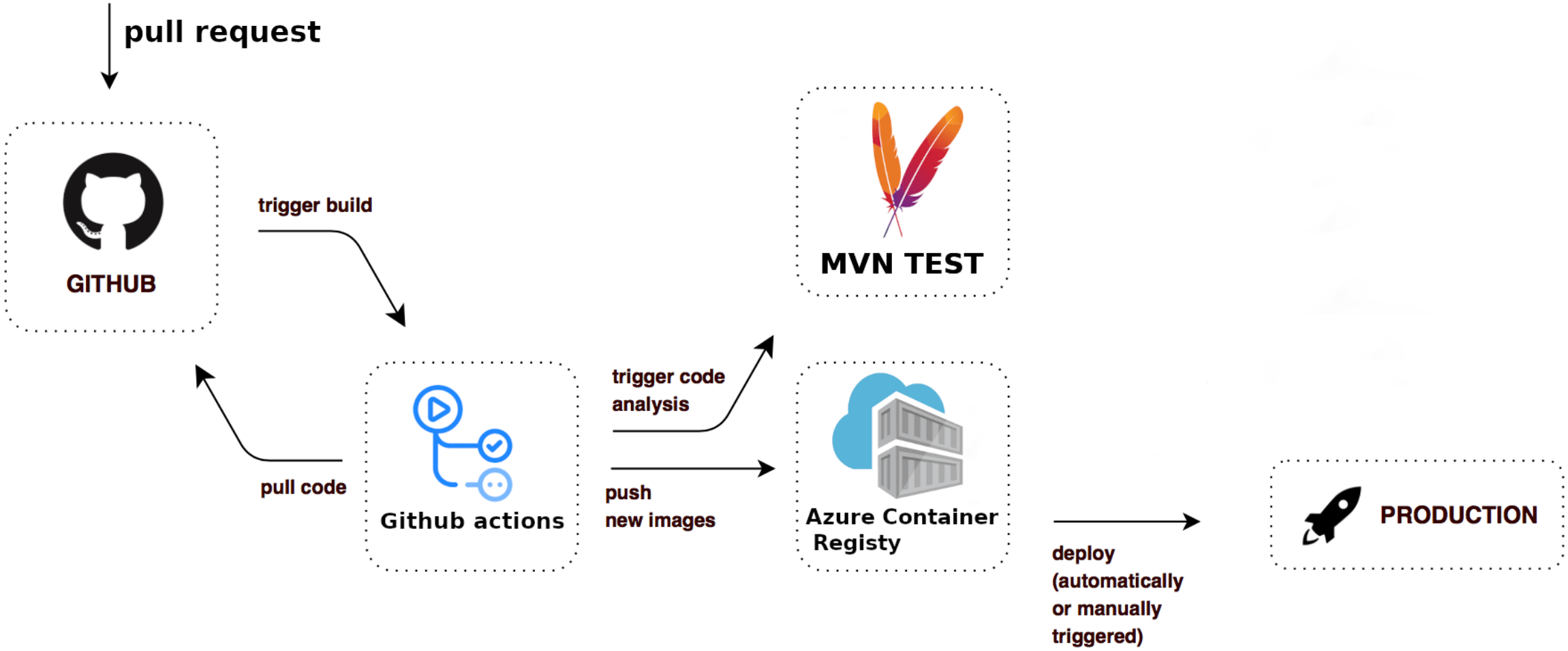


- GitHub Actions allow to create workflows that automatically build, test, publish, release, and deploy code:
- These workflows are made out of different tasks so-called actions that can be run automatically on certain events

From a new feature to dev



Pull request to master



Demo feature-dev

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Demo dev-prod

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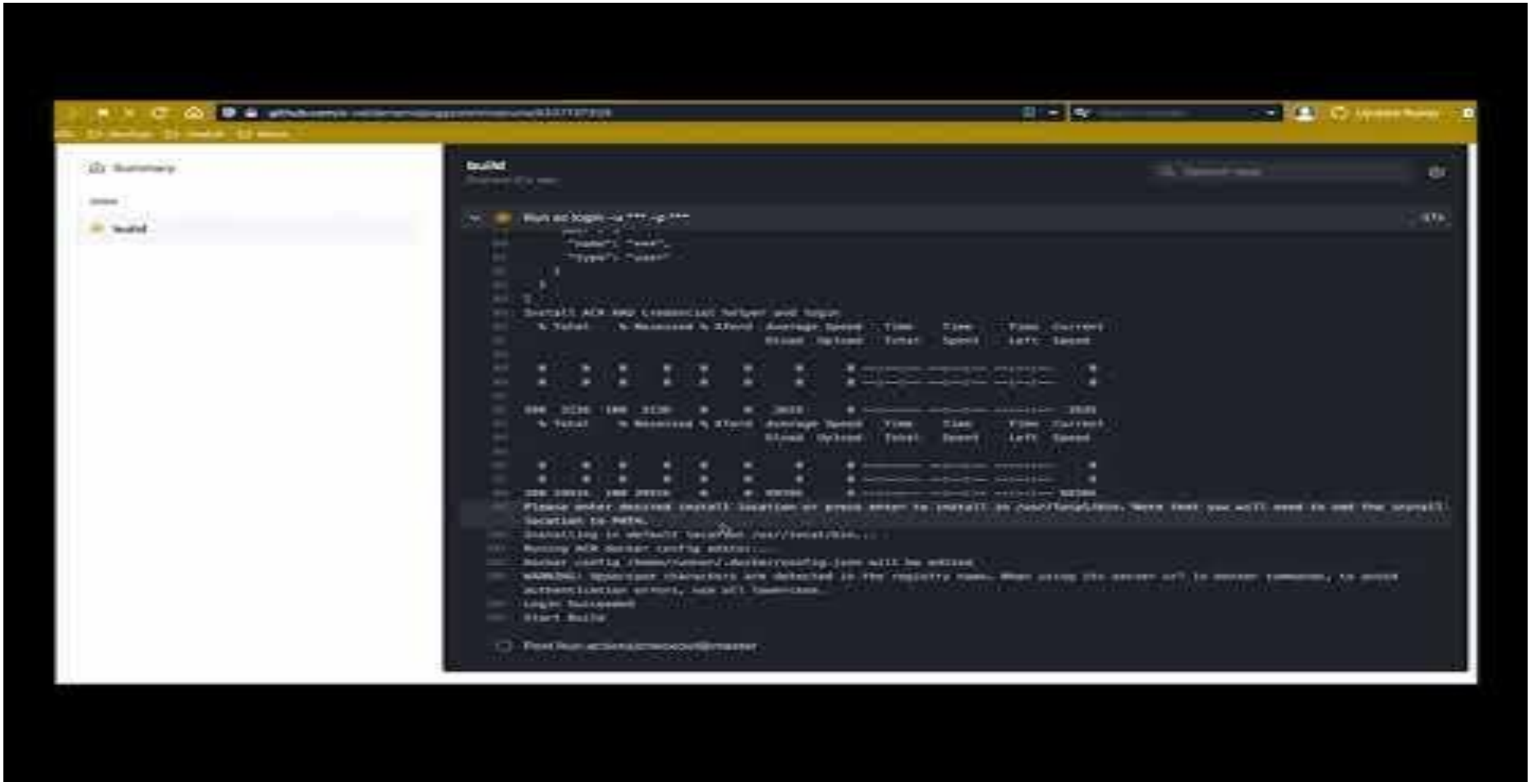

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What's next for Piggy Metrics

- Create a testing environment that deploys the changes added to the dev branch each time a pull request is accepted.
- Implement policies for enabling merging into dev and master branches.
- Add monitoring for the pods in AKS.
- Integrate vault secrete engine to interact with the CosmosDb database.

Q&A

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Thank you

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