Are Your Organization's CI/CD Pipelines Secure?

Angel Rivera - @punkdata

Developer Advocate

circleci

DEVOPS WORLD by CloudBees

AGENDA

- Intro
- SDLC + CI/CD
- DevSecOps + Pipeline Integrations
- Securing Pipelines
- Recap

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Hi I'm Angel

Developer Advocate.

My job is to **inspire** developers!

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History : Software : Development

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Software : Development : Practices

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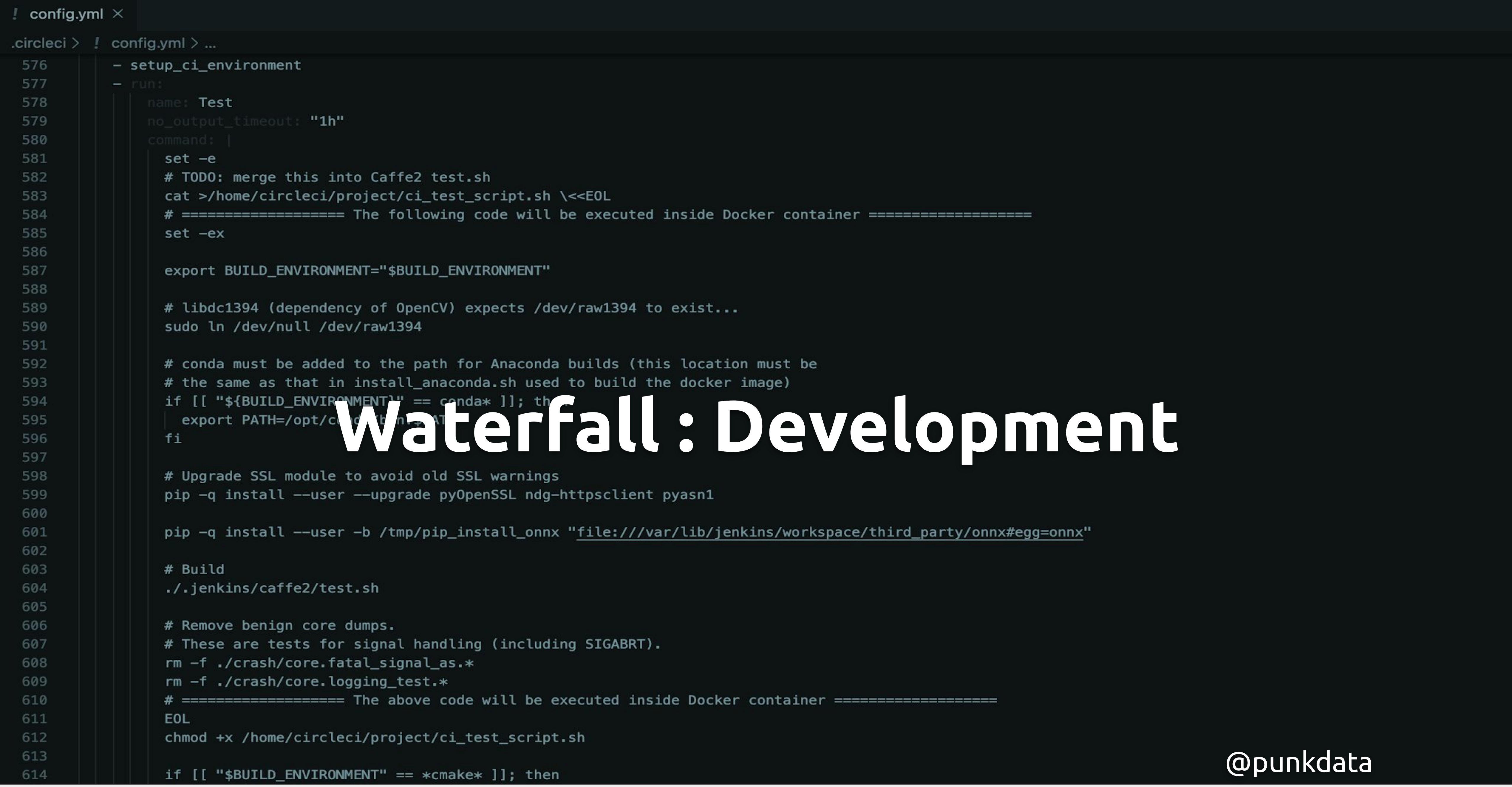
Waterfall : Development



```
- setup_ci_environment
- run:
    name: Test
    no_output_timeout: "1h"
    command: |
      set -e
      # TODO: merge this into Caffe2 test.sh
      cat >/home/circleci/project/ci_test_script.sh \<<EOL
      # =================== The following code will be executed inside Docker container ===================
      set -ex

      export BUILD_ENVIRONMENT="$BUILD_ENVIRONMENT"

      # libdc1394 (dependency of OpenCV) expects /dev/raw1394 to exist...
      sudo ln /dev/null /dev/raw1394

      # conda must be added to the path for Anaconda builds (this location must be
      # the same as that in install_anaconda.sh used to build the docker image)
      if [[ "${BUILD_ENVIRONMENT}" == conda* ]]; then
        export PATH=/opt/conda/bin:$PATH
      fi

      # Upgrade SSL module to avoid old SSL warnings
      pip -q install --user --upgrade pyOpenSSL ndg-httpsclient pyasn1

      pip -q install --user -b /tmp/pip_install_onnx "file:///var/lib/jenkins/workspace/third_party/onnx#egg=onnx"

      # Build
      ./.jenkins/caffe2/test.sh

      # Remove benign core dumps.
      # These are tests for signal handling (including SIGABRT).
      rm -f ./crash/core.fatal_signal_as.*
      rm -f ./crash/core.logging_test.*
      # =================== The above code will be executed inside Docker container ===================
      EOL
      chmod +x /home/circleci/project/ci_test_script.sh

      if [[ "$BUILD_ENVIRONMENT" == *cmake* ]]; then
```

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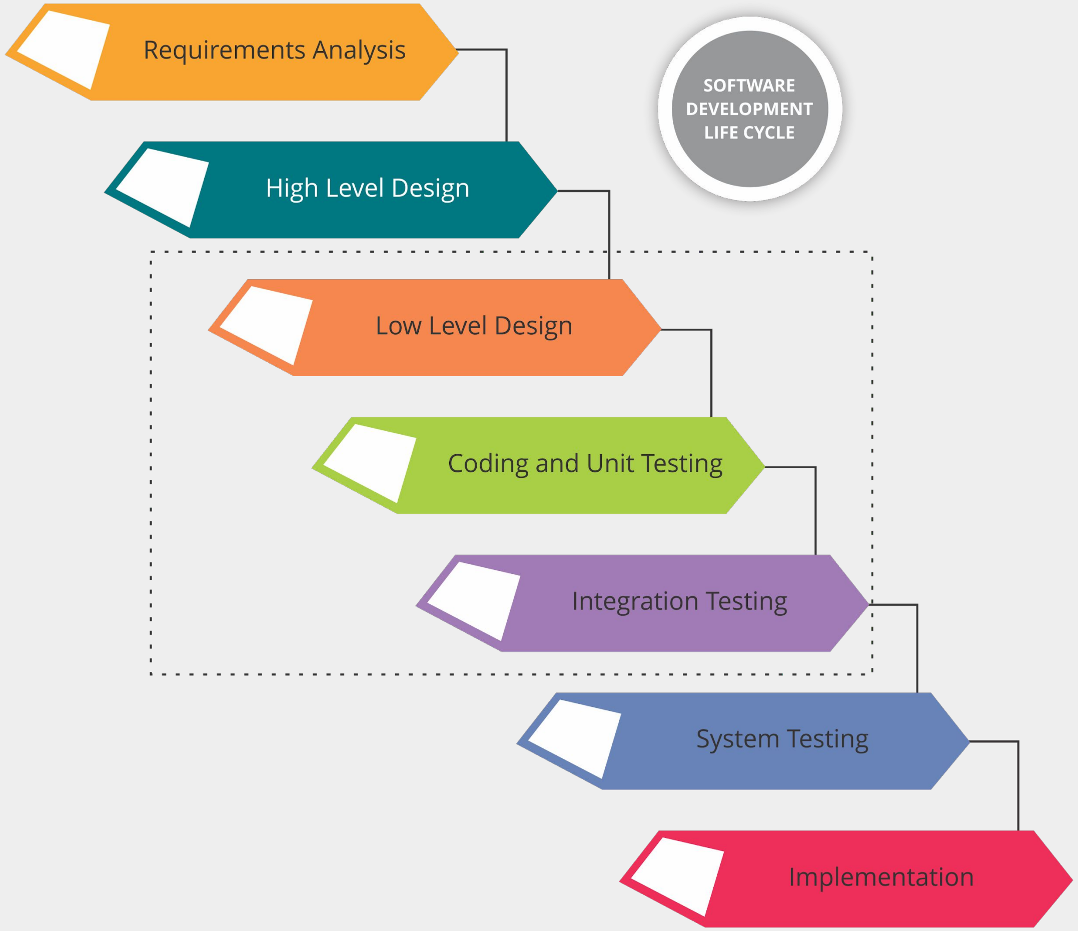
Waterfall : Development



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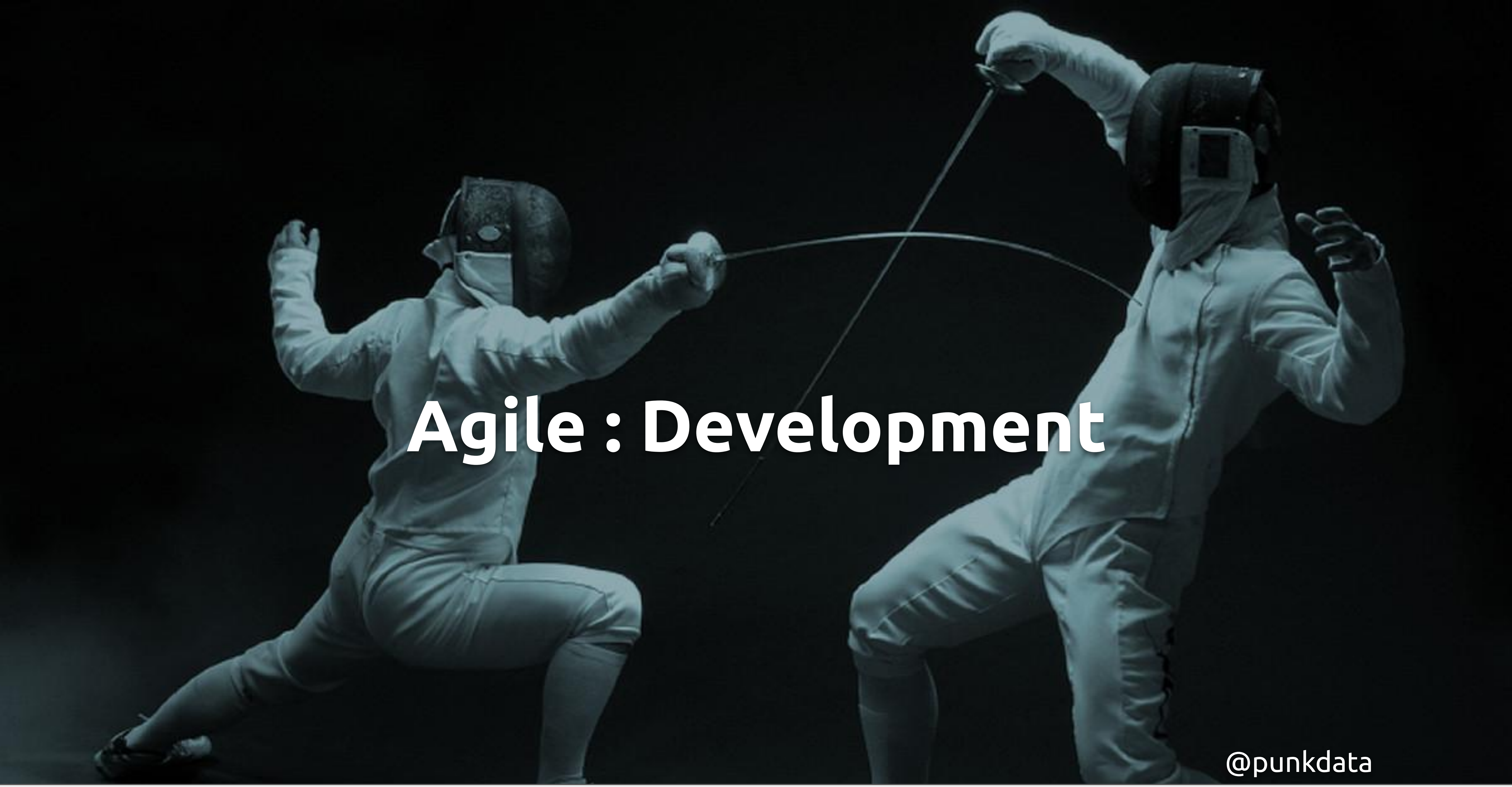

Agile : Development

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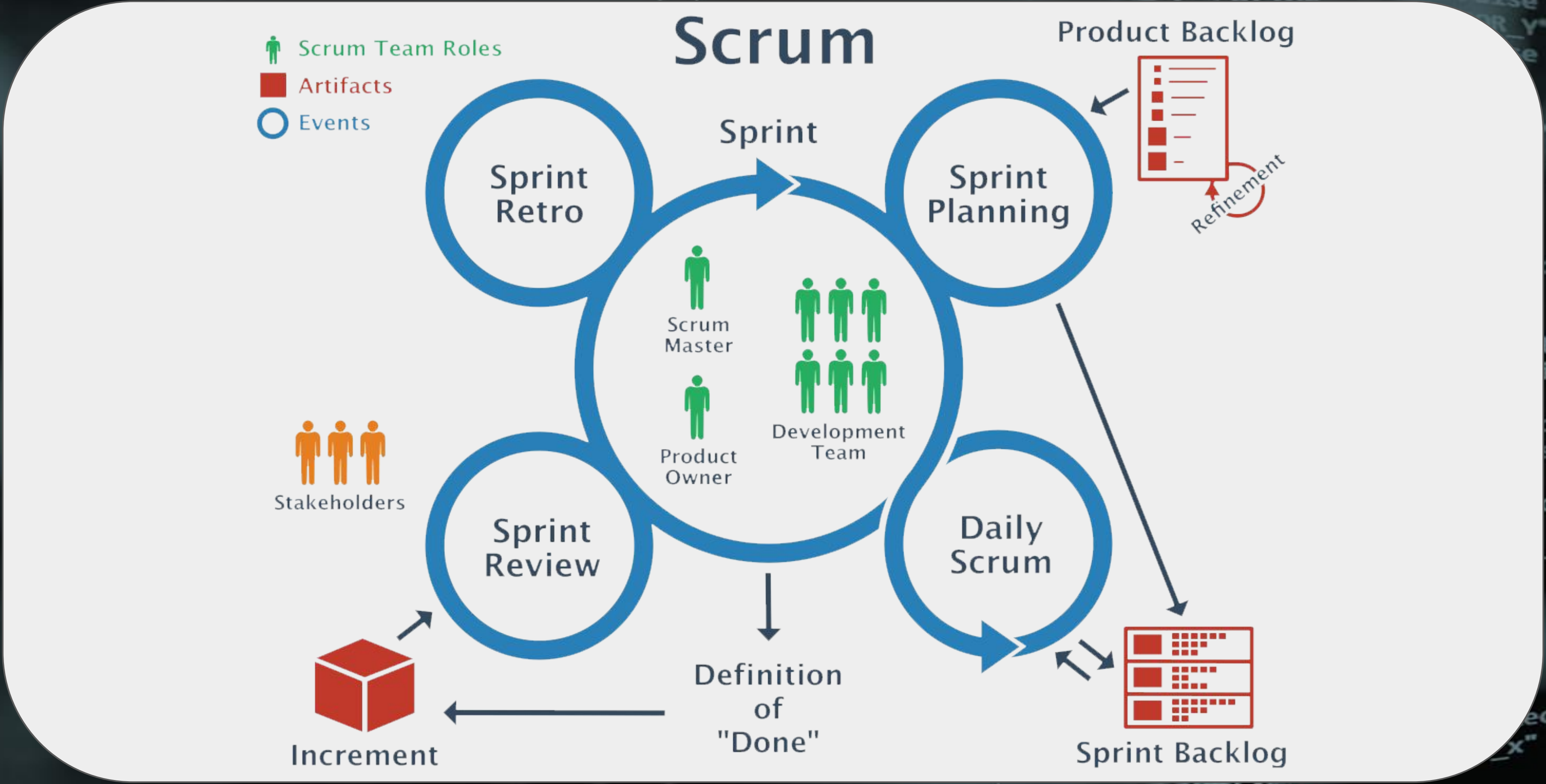
Agile : Development



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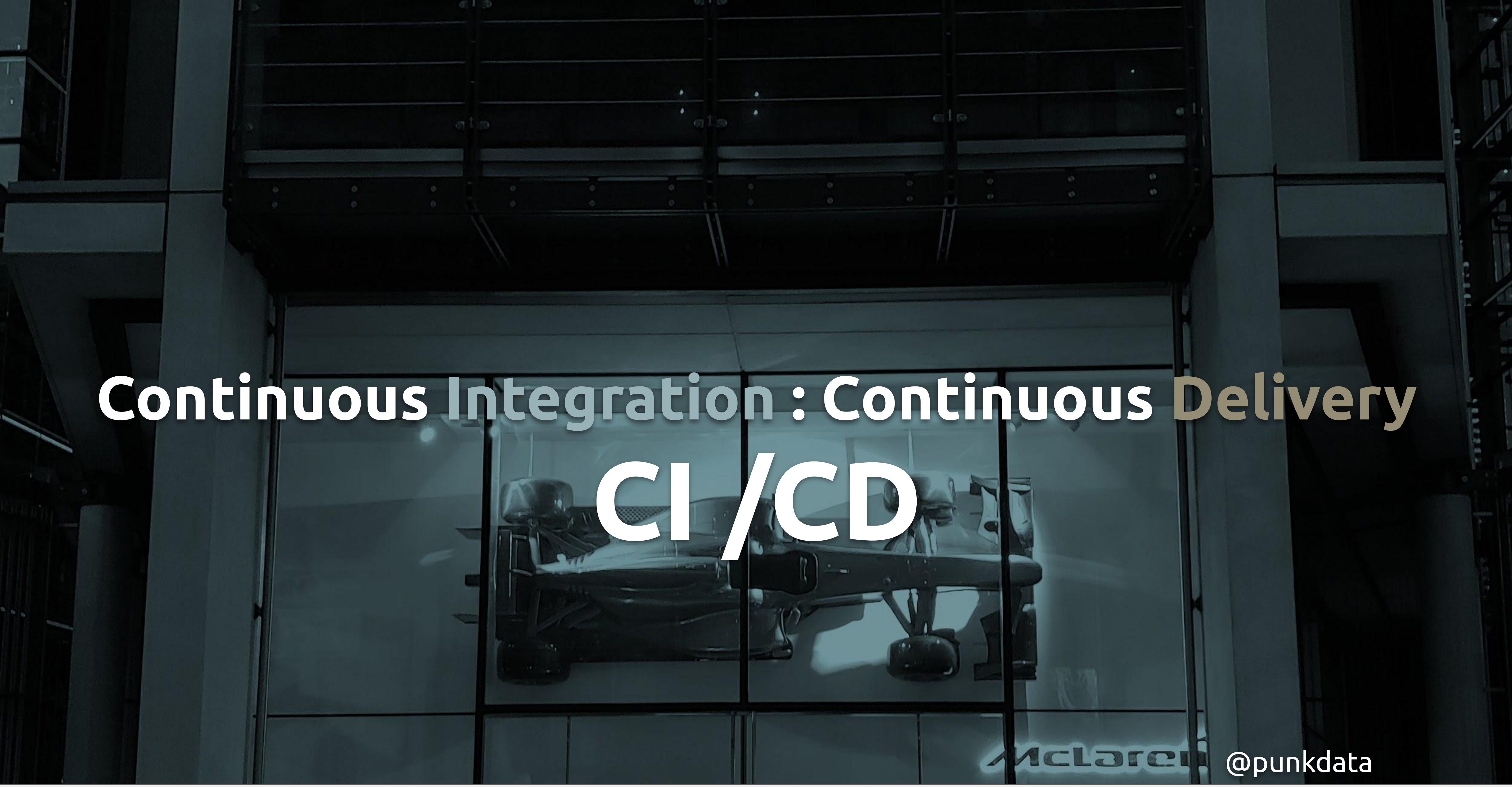

Continuous Integration : Continuous Delivery

CI /CD

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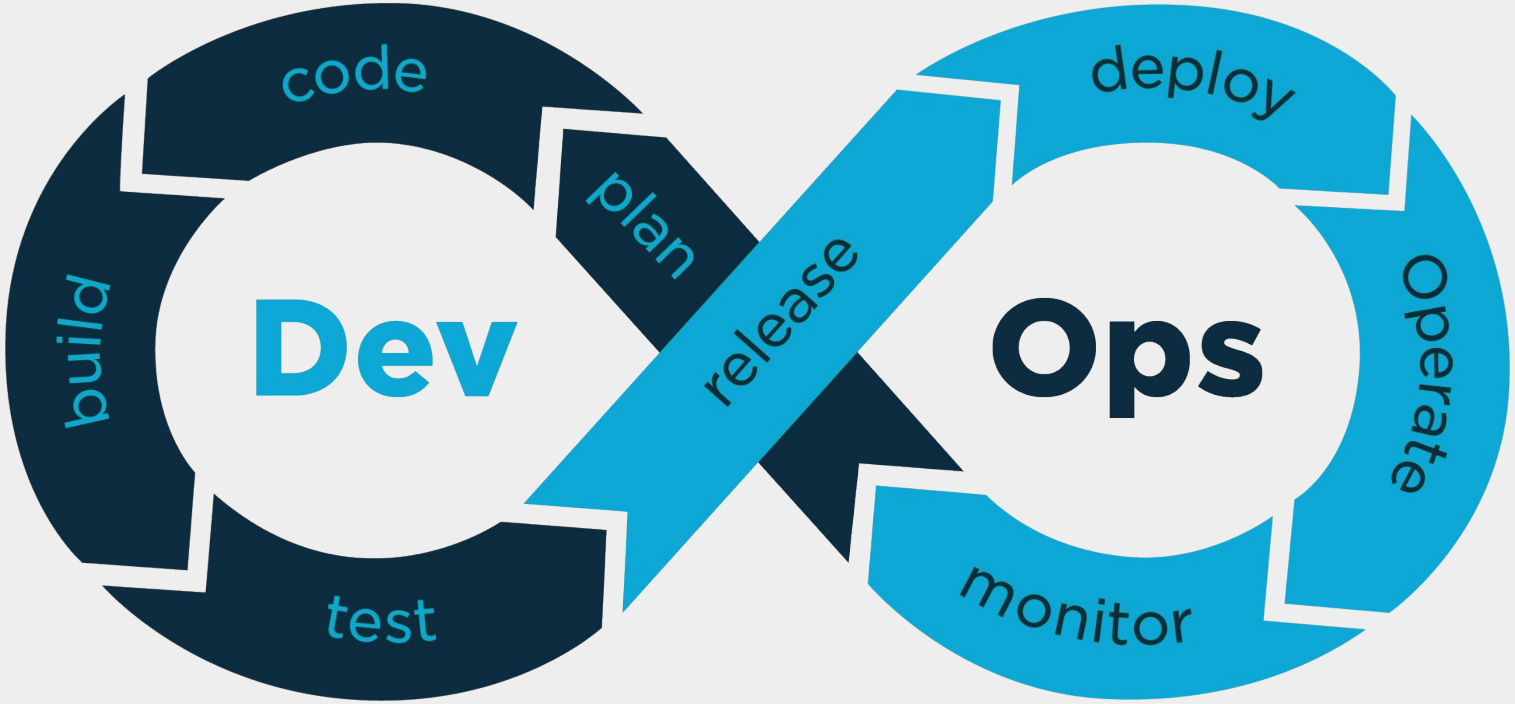
CI/CD + DevOps



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CI : Dev : Principles

- Write and commit code often
- Commit to a shared code repository
- Test code on every commit (unit + smoke level tests)
- Fast Feedback Loops

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CD : Ops : Principles

- Create release artifacts for CD process
- Deploy code artifacts to resources
- Validate apps and services are functioning
- Monitor to verify state and recover if failing

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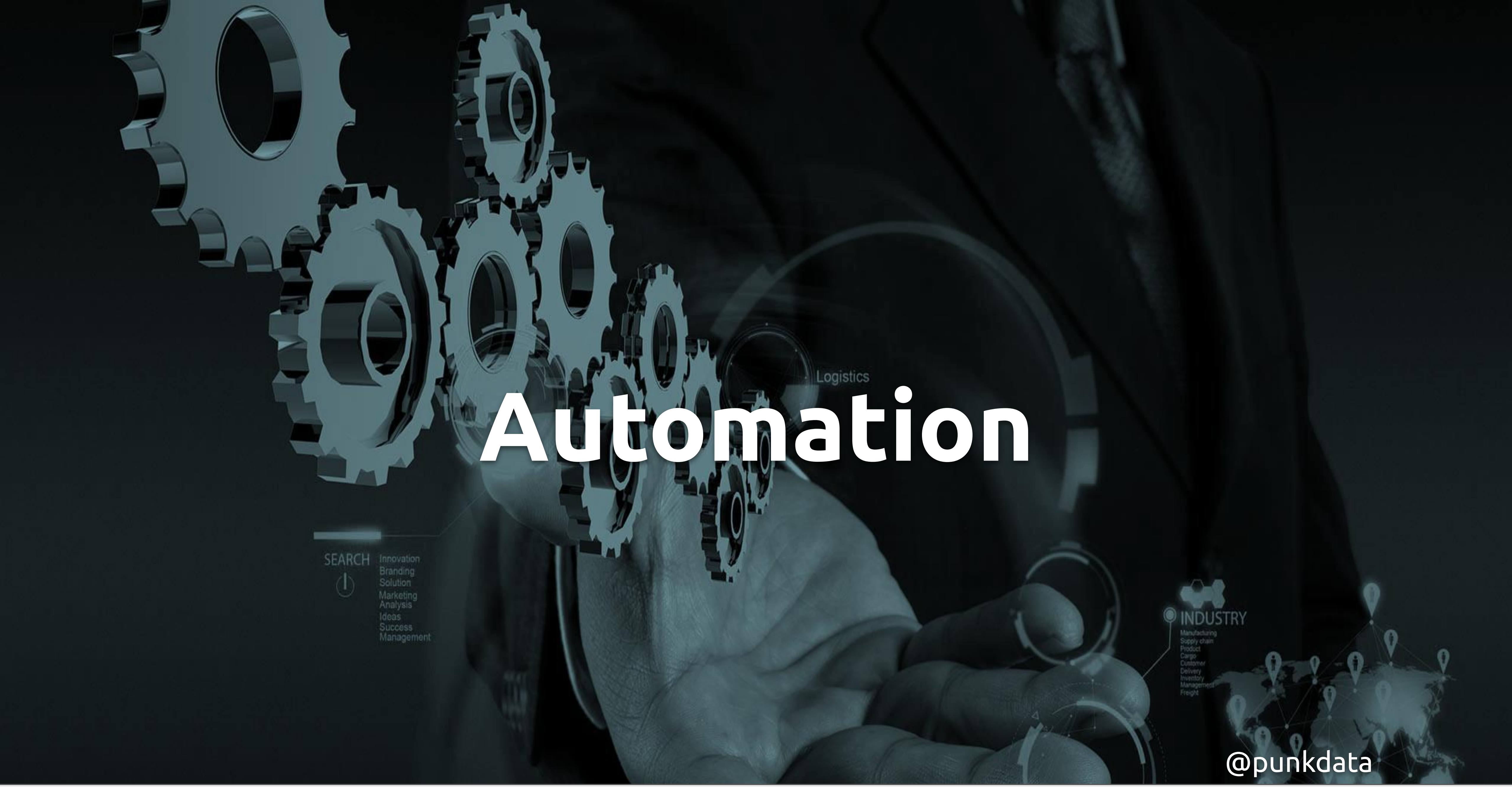

Automation

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CI/CD : Pipelines

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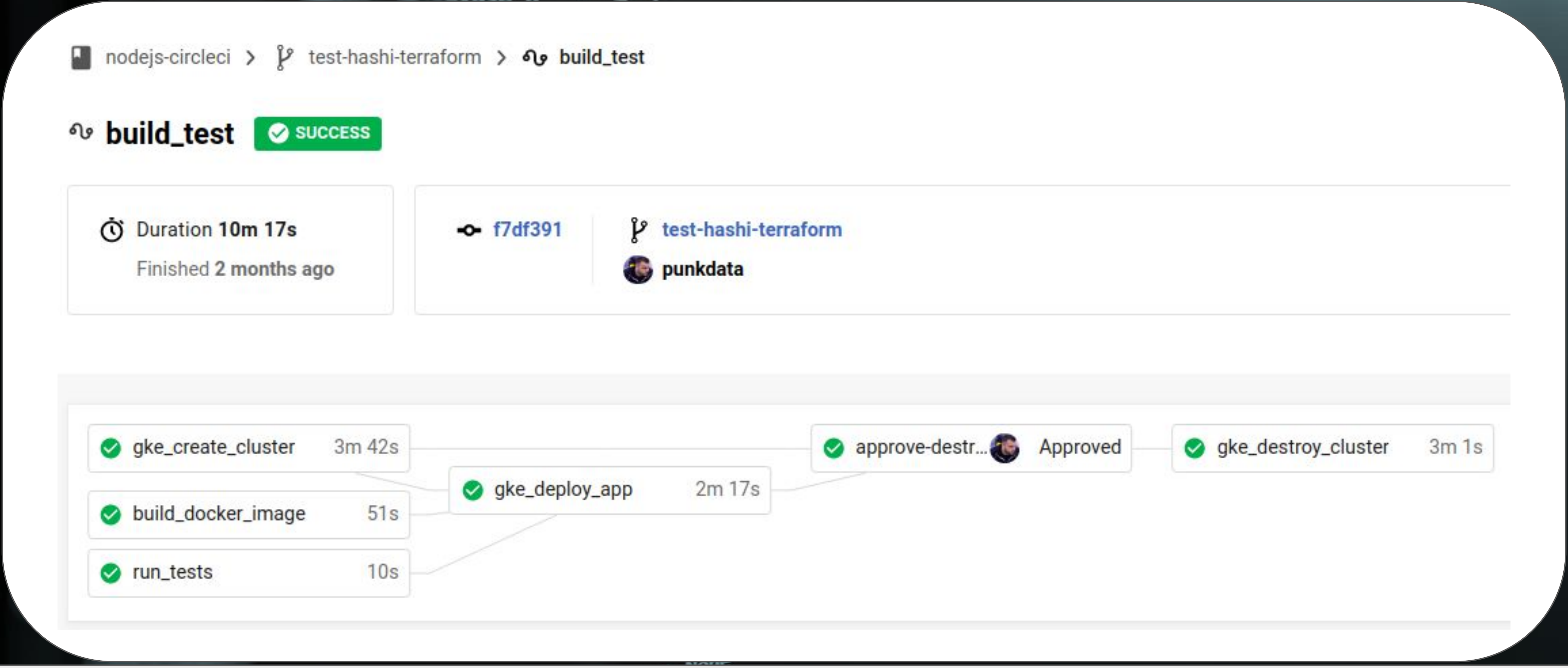
CI/CD : Pipelines



nodejs-circleci > test-hashi-terraform > build_test

build_test ✓ SUCCESS

Duration **10m 17s**

Finished **2 months ago**

f7df391

test-hashi-terraform

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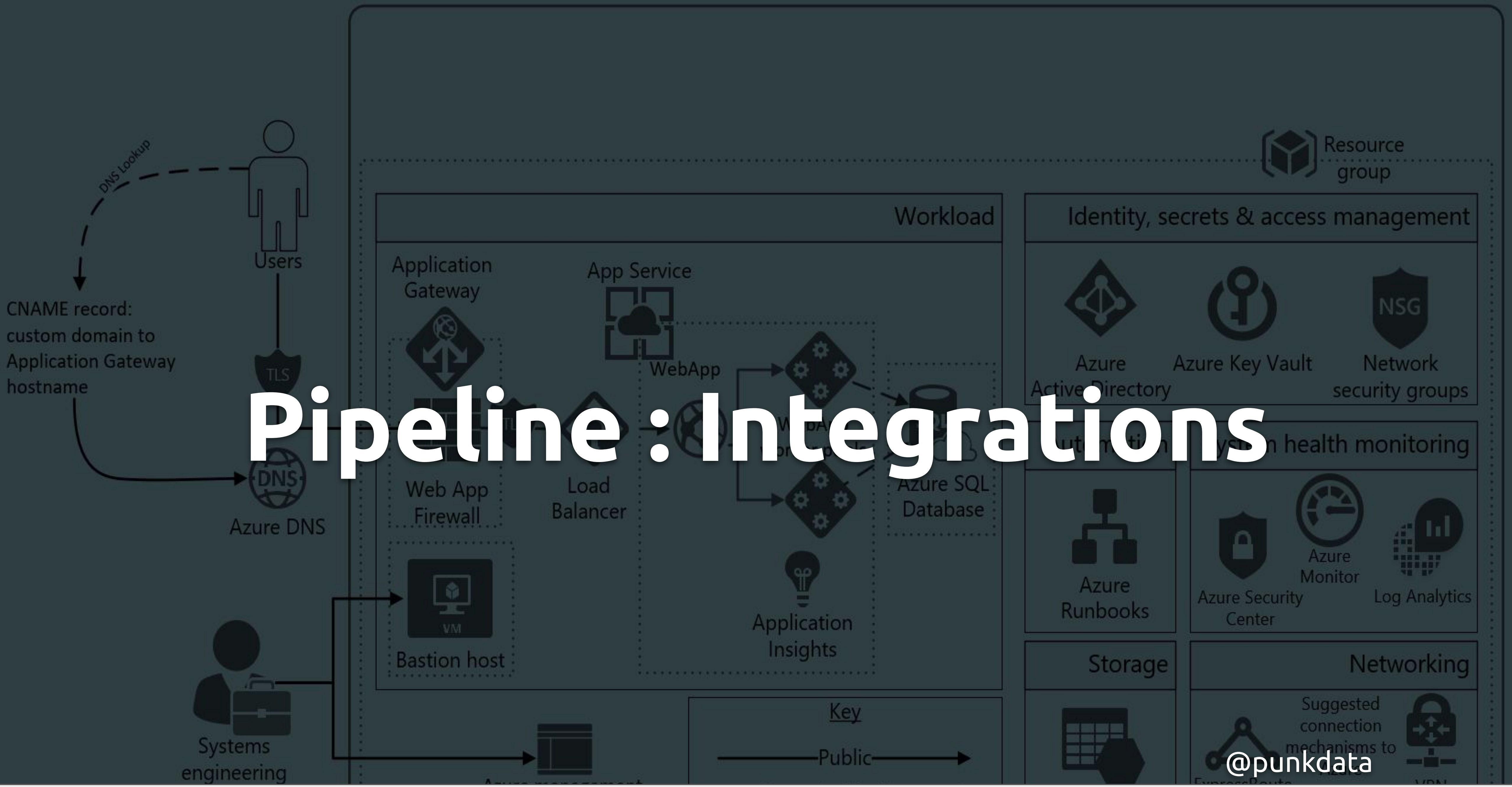
✓ gke_create_cluster	3m 42s
✓ build_docker_image	51s
✓ run_tests	10s
✓ gke_deploy_app	2m 17s
✓ approve-destr...	Approved
✓ gke_destroy_cluster	3m 1s

Pipeline : Integrations



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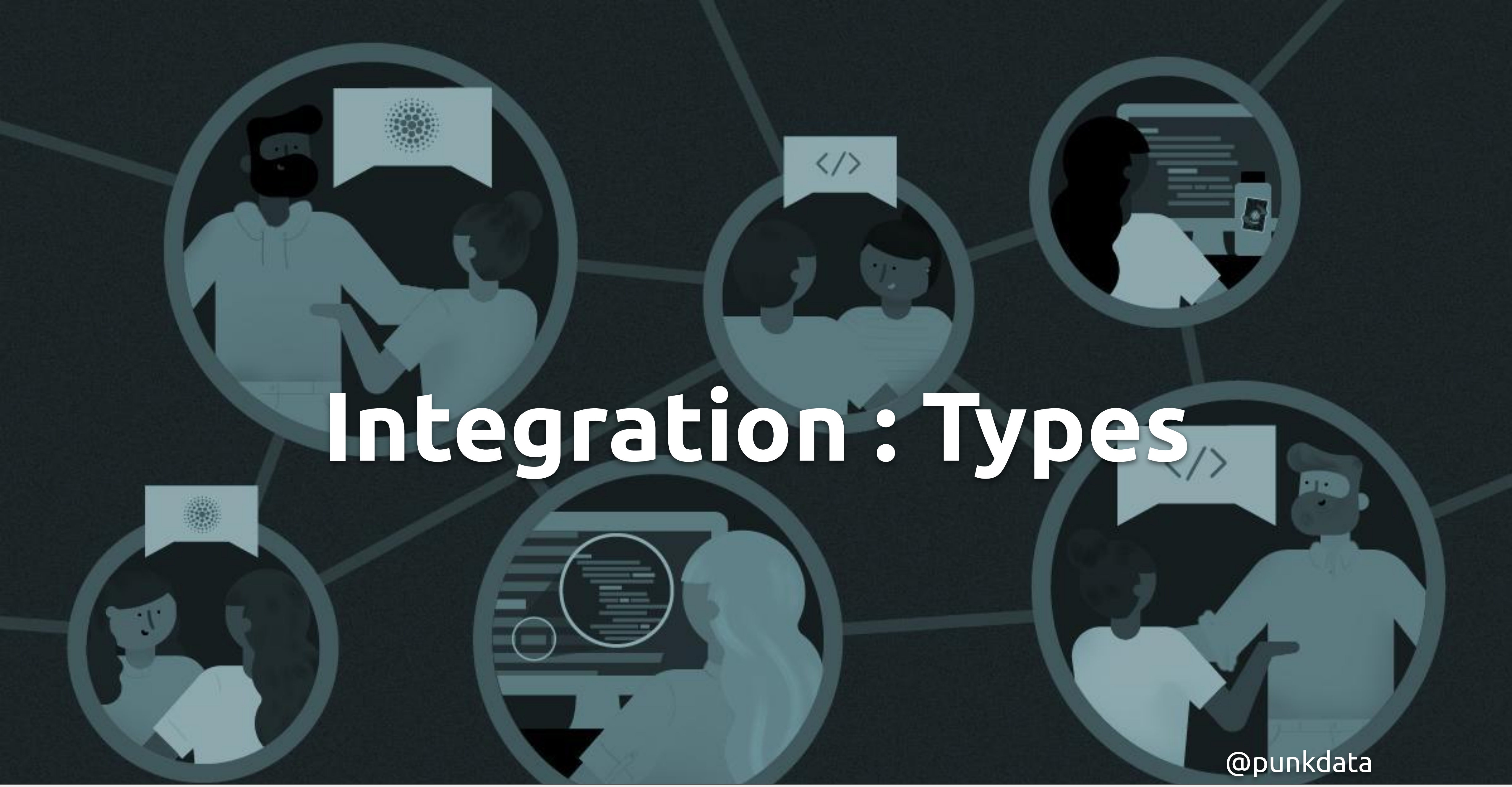

Integration : Types

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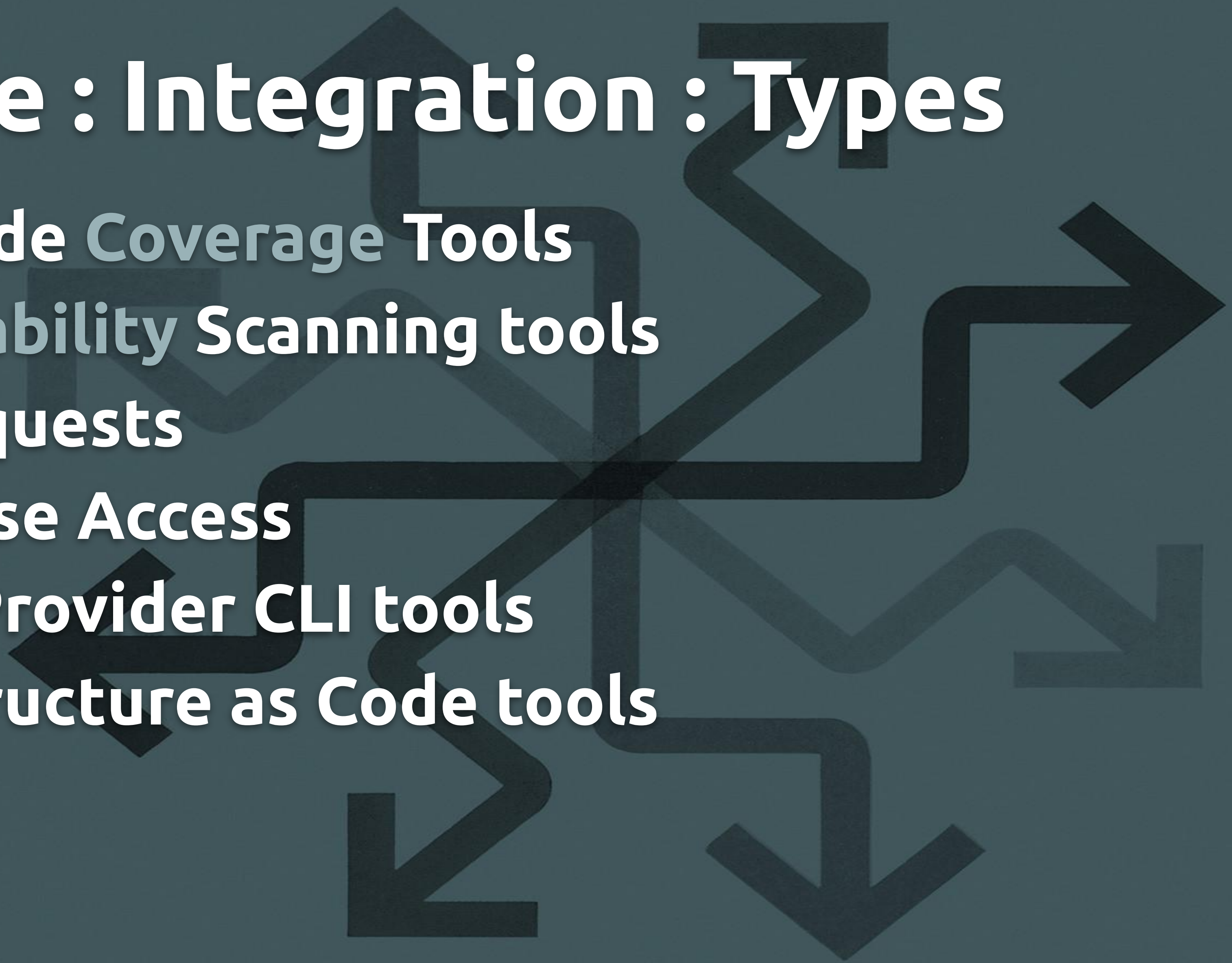
Pipeline : Integration : Types



- App Code Coverage Tools
- Vulnerability Scanning tools
- API Requests
- Database Access
- Cloud Provider CLI tools
- Infrastructure as Code tools

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Dev : Sec : Ops

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Shift : Security : Left

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Pipeline : Vulnerability : Scans

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App : Scanning : Pipelines

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Container : Scanning : Pipelines

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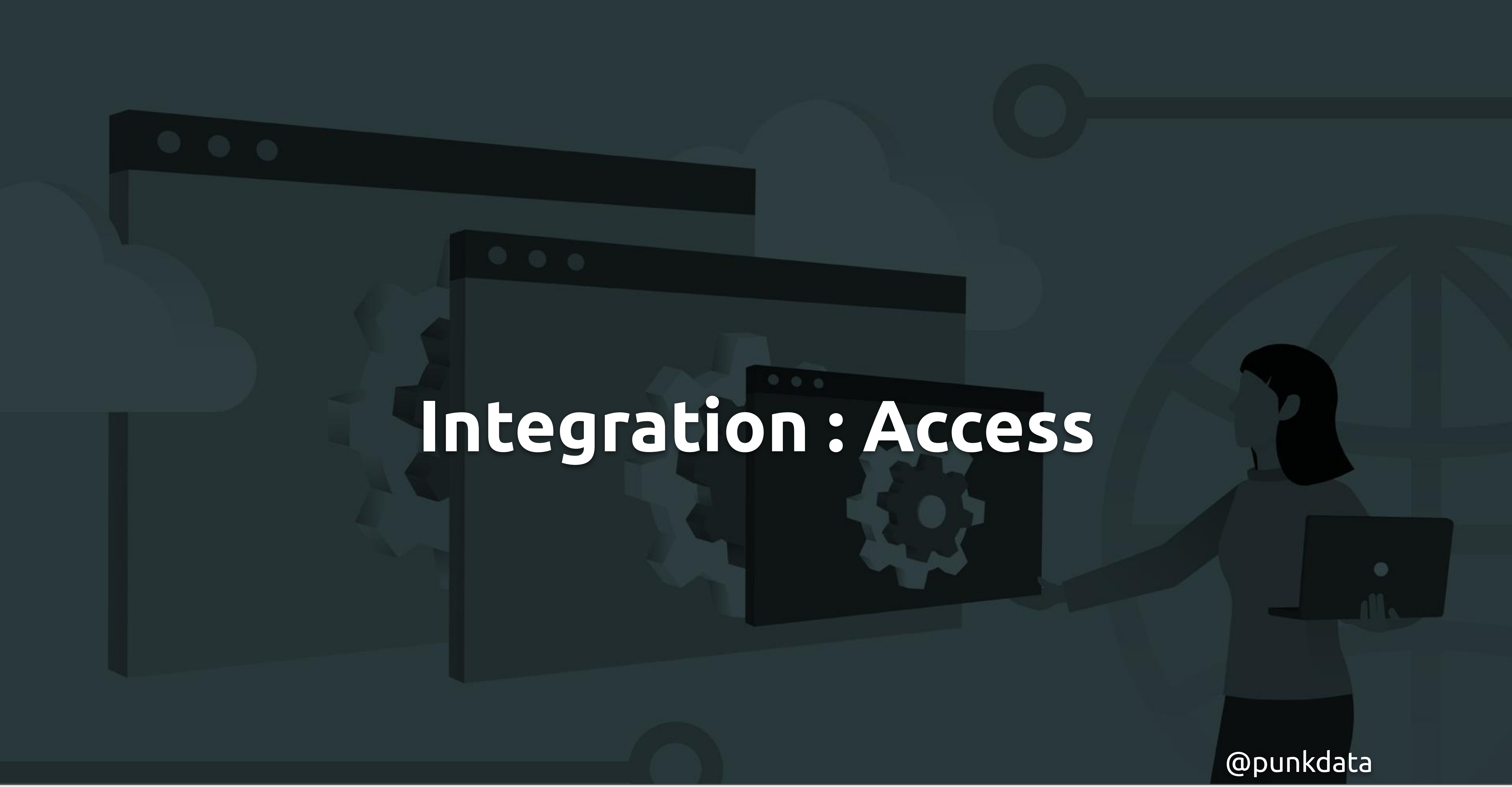

Integration : Access

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Integration : Access : Credentials

- OAuth
- Access Keys
- API Tokens
- Certificate-based authentication
- JWT - JSON Web Tokens
- Username + Password

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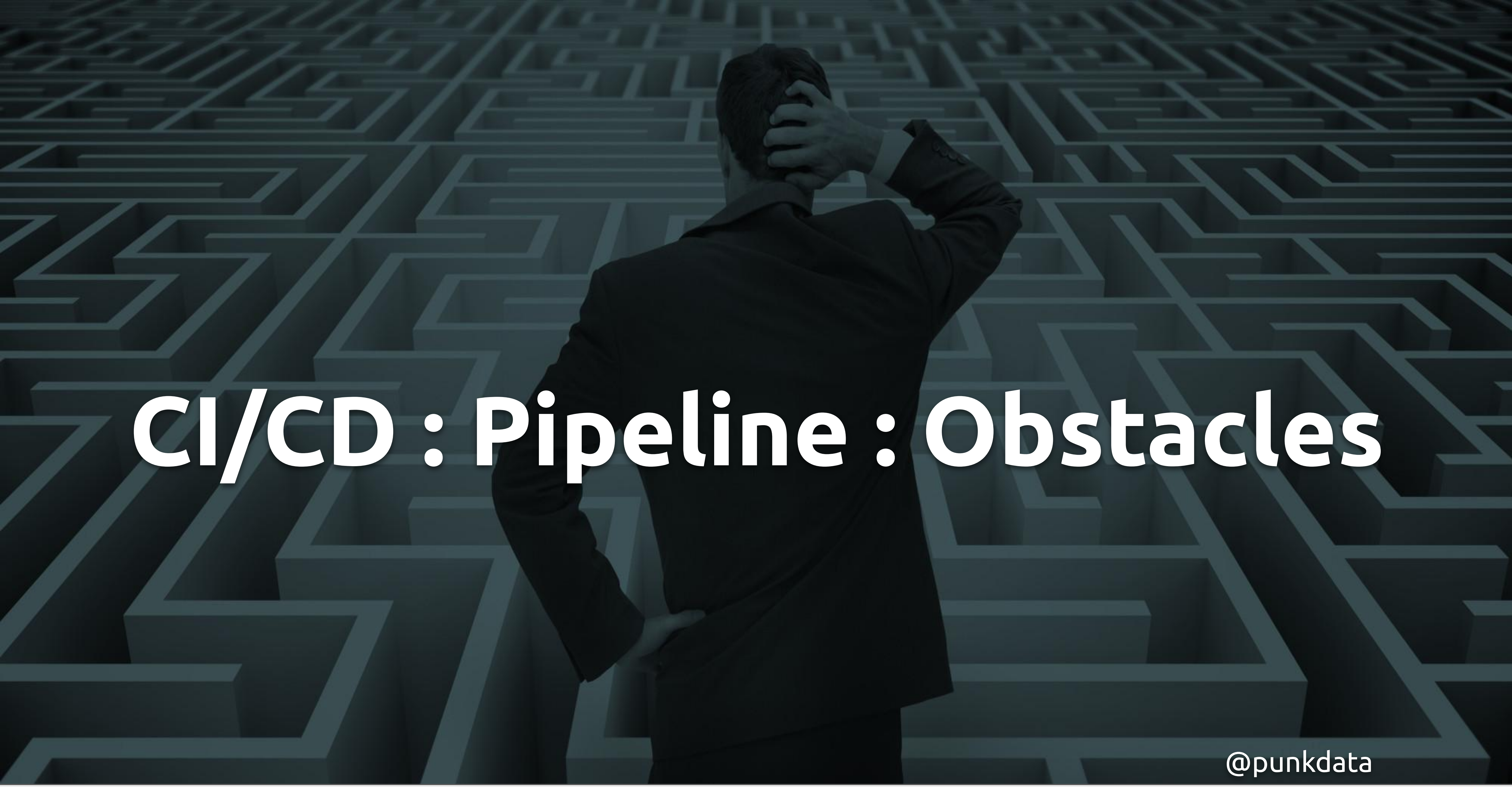

CI/CD : Pipeline : Obstacles

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Securing Pipelines

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Secrets

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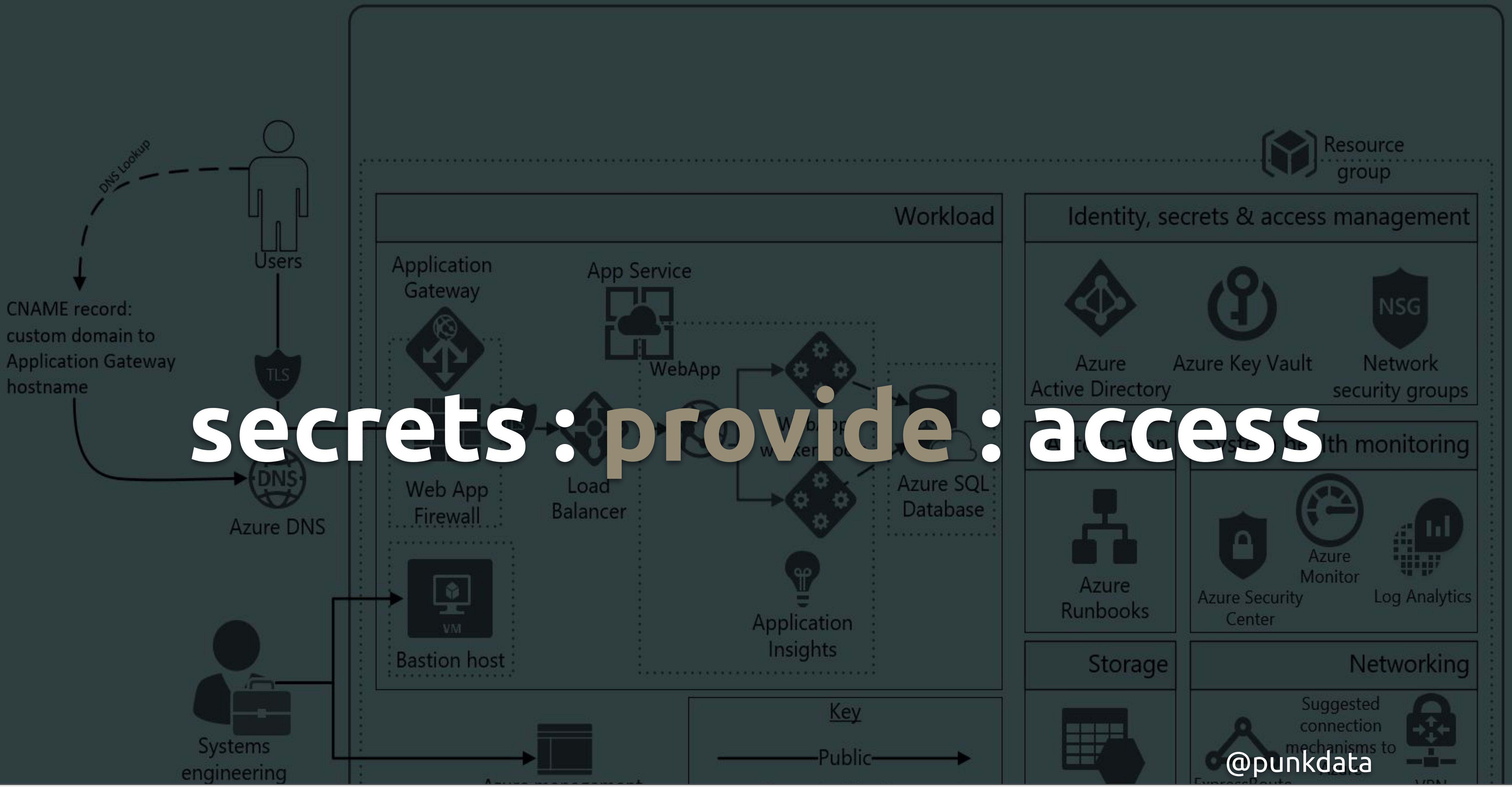
secrets : provide : access



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exposed : pipelines

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weak : stale : secrets

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clear text

inadequate : mechanisms

unencrypted

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secrets management

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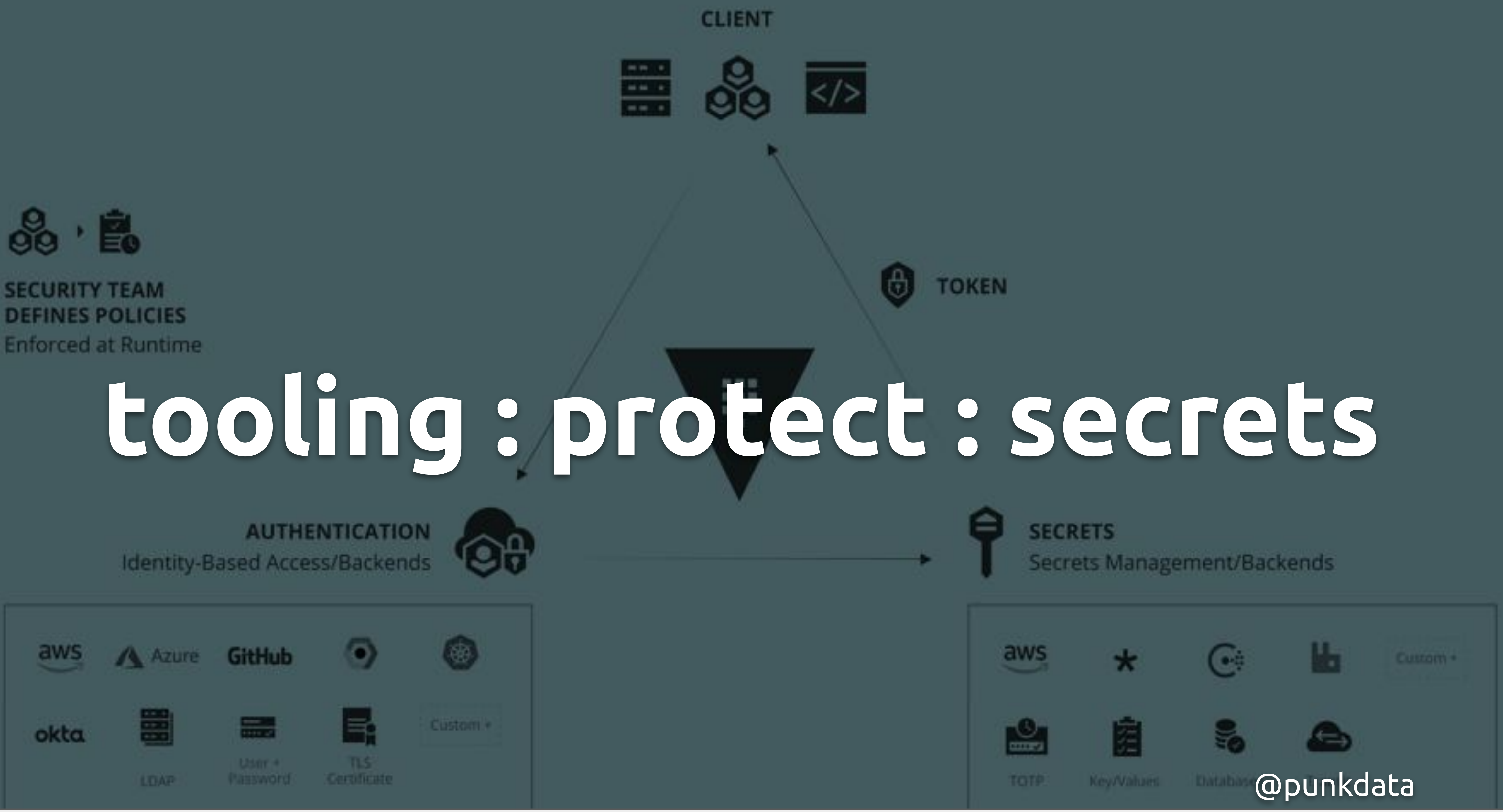
tooling : protect : secrets



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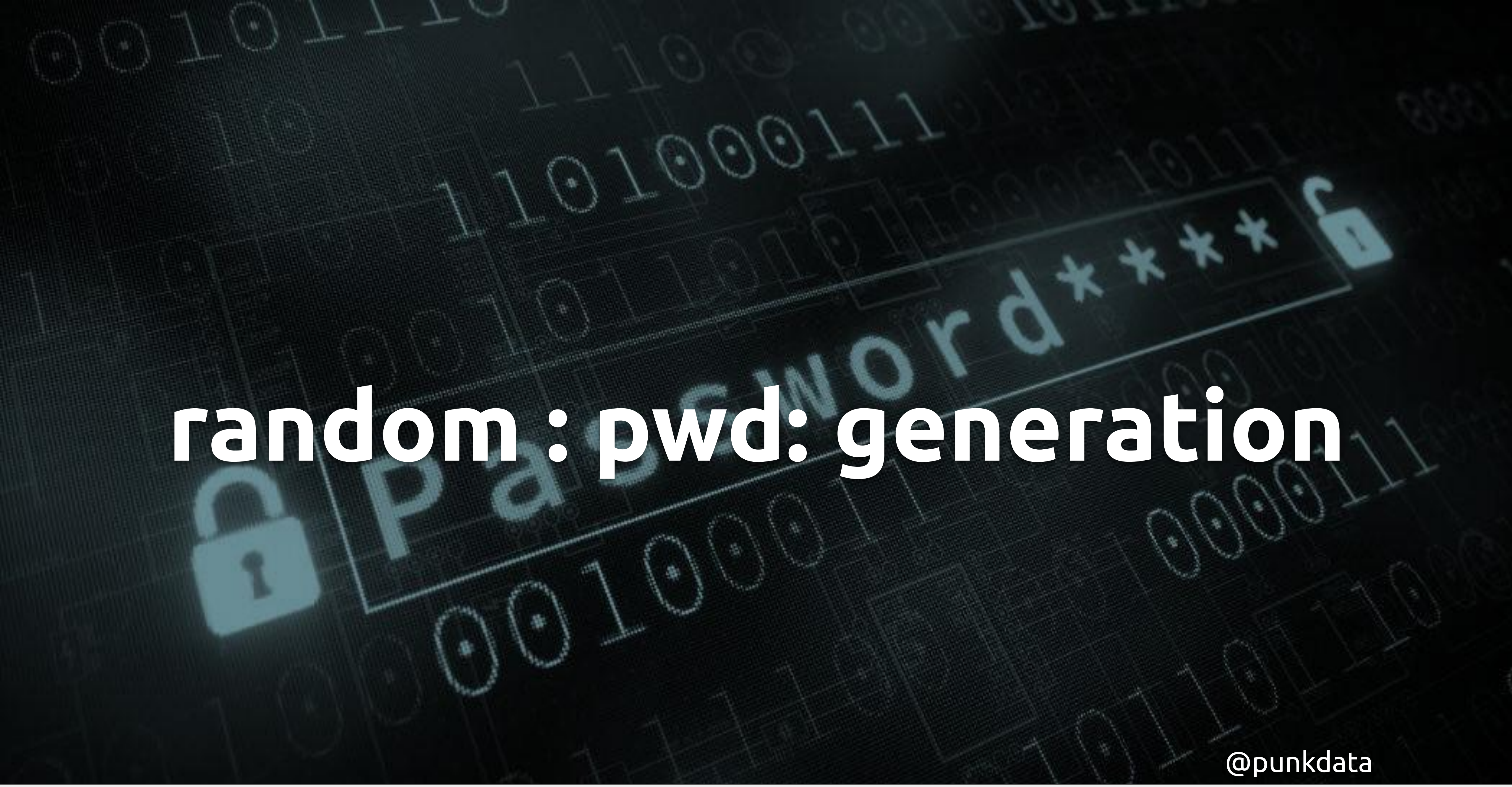

random : pwd: generation

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auto : rotate : passwords

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granular : access : controls

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recap

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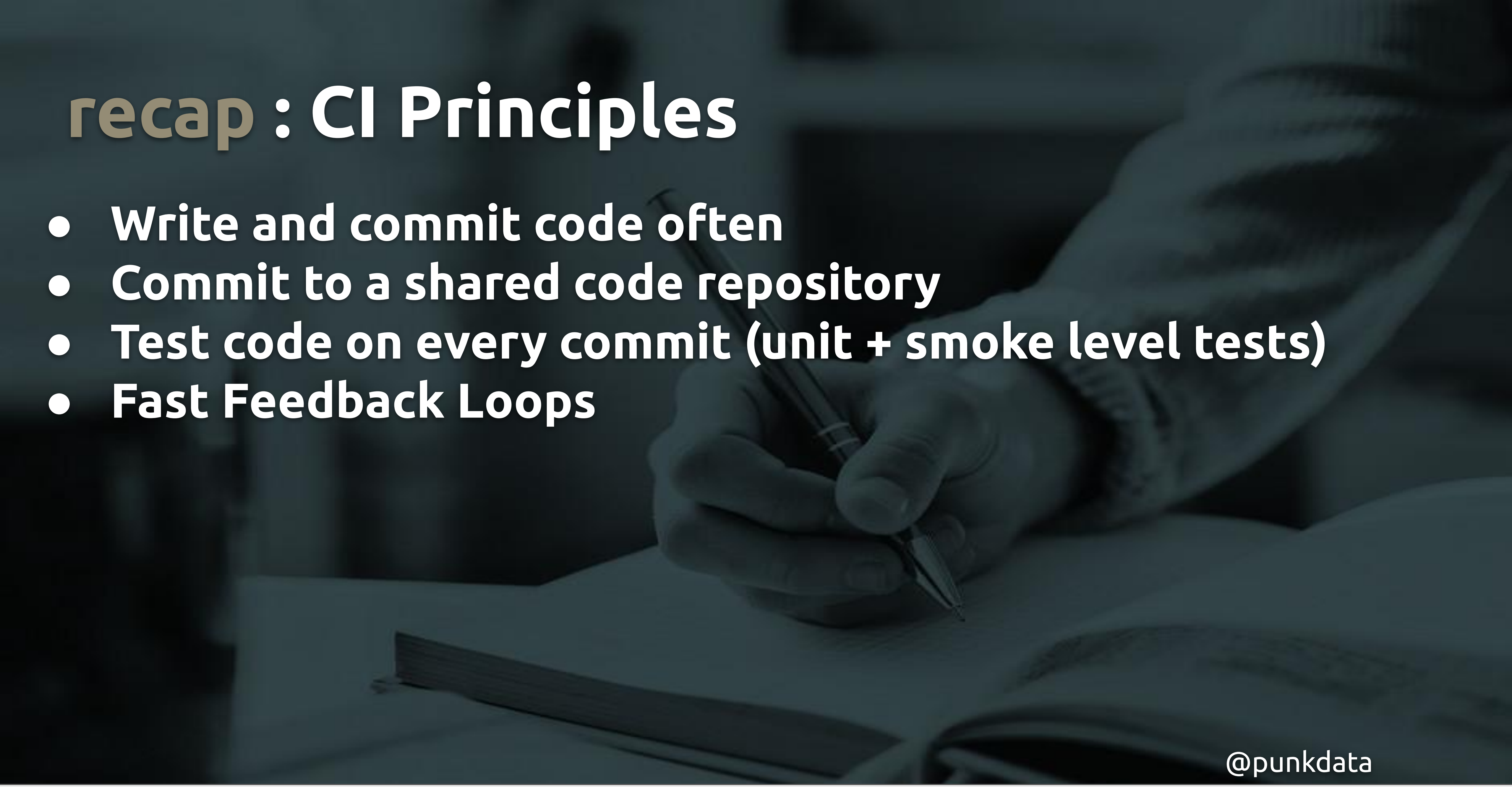

recap : CI Principles

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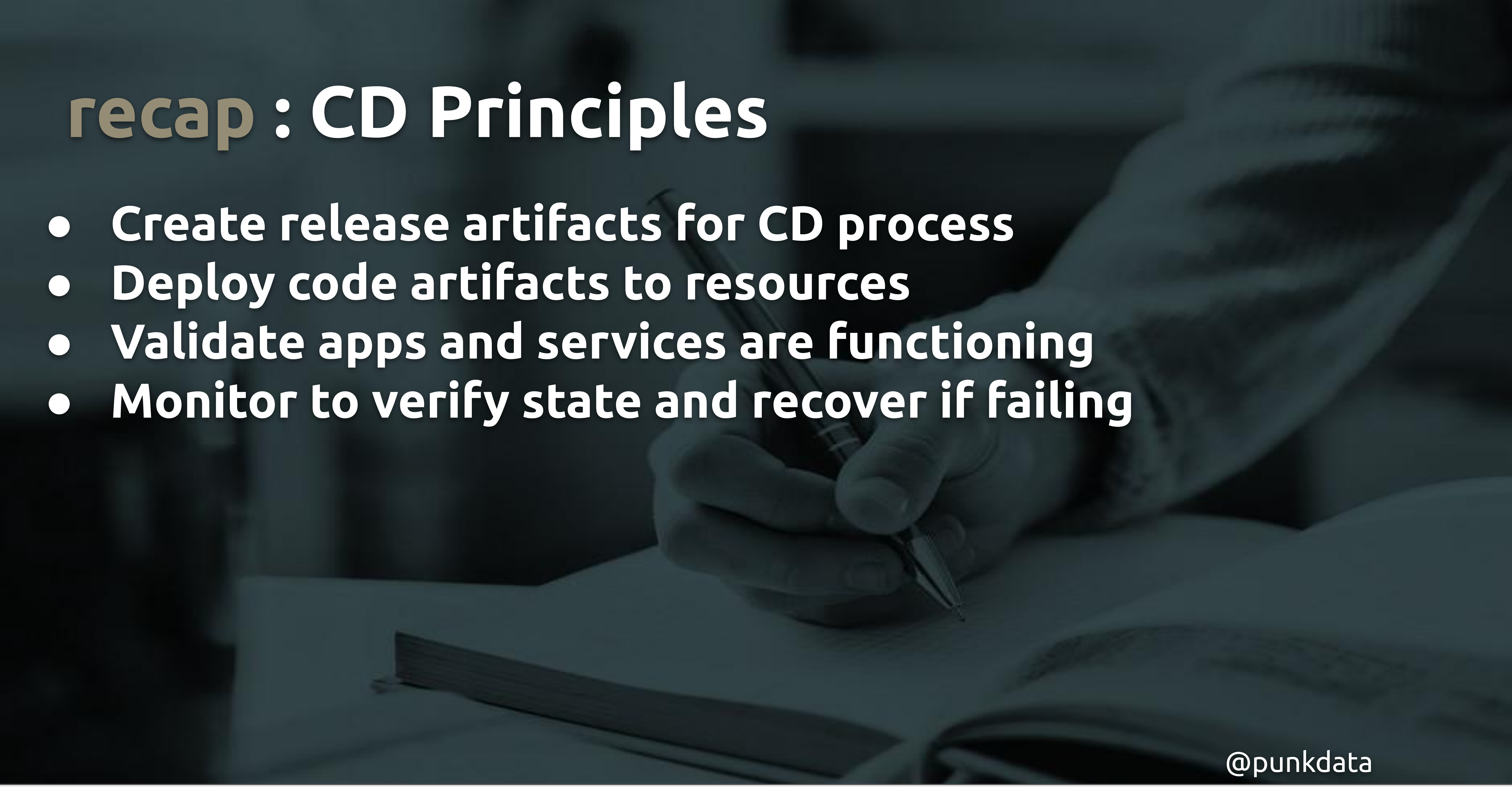

recap : CD Principles

- Create release artifacts for CD process
- Deploy code artifacts to resources
- Validate apps and services are functioning
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recap : DevSecOps

- Shift Security Left
- App Scanning within Pipelines
- Container Scanning within Pipelines

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recap : Securing : Pipelines

- implement secrets management policies and tooling
- integrate secrets management tools into pipelines
- generate strong random secrets + credentials
- auto rotate + replace secrets used in pipelines

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thank : you

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