Simplifying Code Distribution with Databricks Asset Bundles

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- 15+ Years Microsoft Data Analytics
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- Data, Cloud & DevOps Enthusiast
- Microsoft Azure, Databricks (Spark), Terraform (HashiCorp) certified

Session Scope

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- Good **software engineering is critical** for Data & AI teams
- These **principles should be adopted** for Data & AI pipeline & workloads
- Most **successful customers** apply software engineering best practices to their data solutions.
- To **build reliable** and **efficient solutions** by applying software engineering best practices:
  - Code Review
  - Testing
  - Automated Deployment
  - Environment Separation

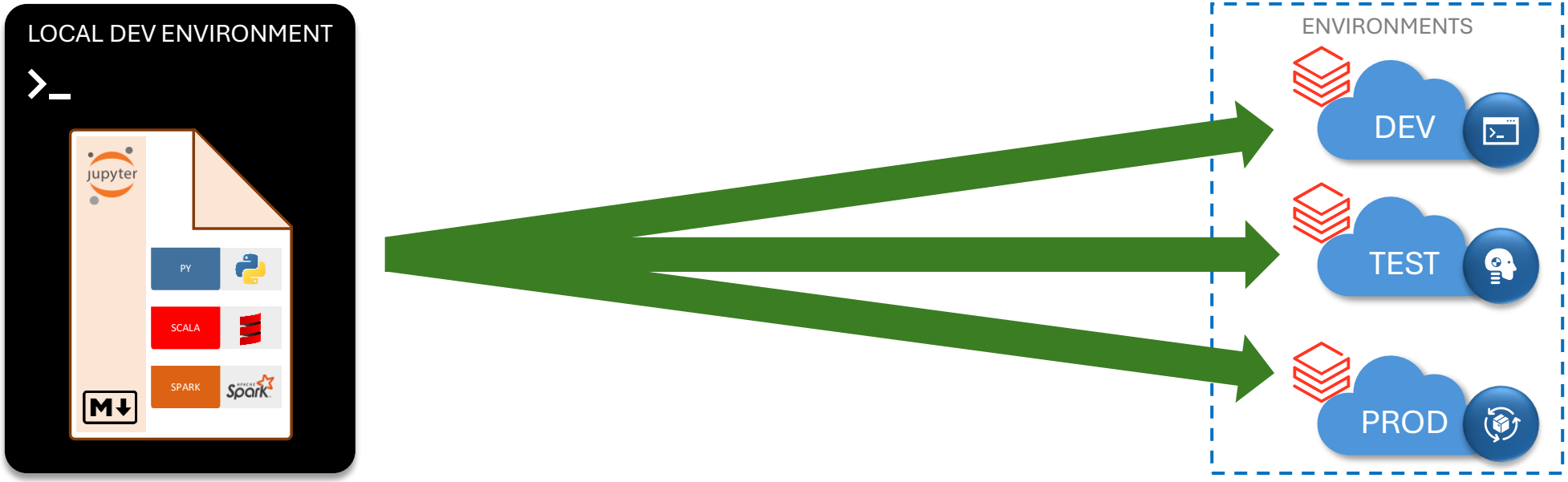
In this session:

- Code Distribution
- Python Wheels
- Databricks Asset Bundles

Code Distribution

Code Distribution

- Share Code Easily
- Improves Collaboration
- Ensures Consistency
- Facilitates Version Control
- Reduce Errors
- More Accessible, Maintainable & Scalable

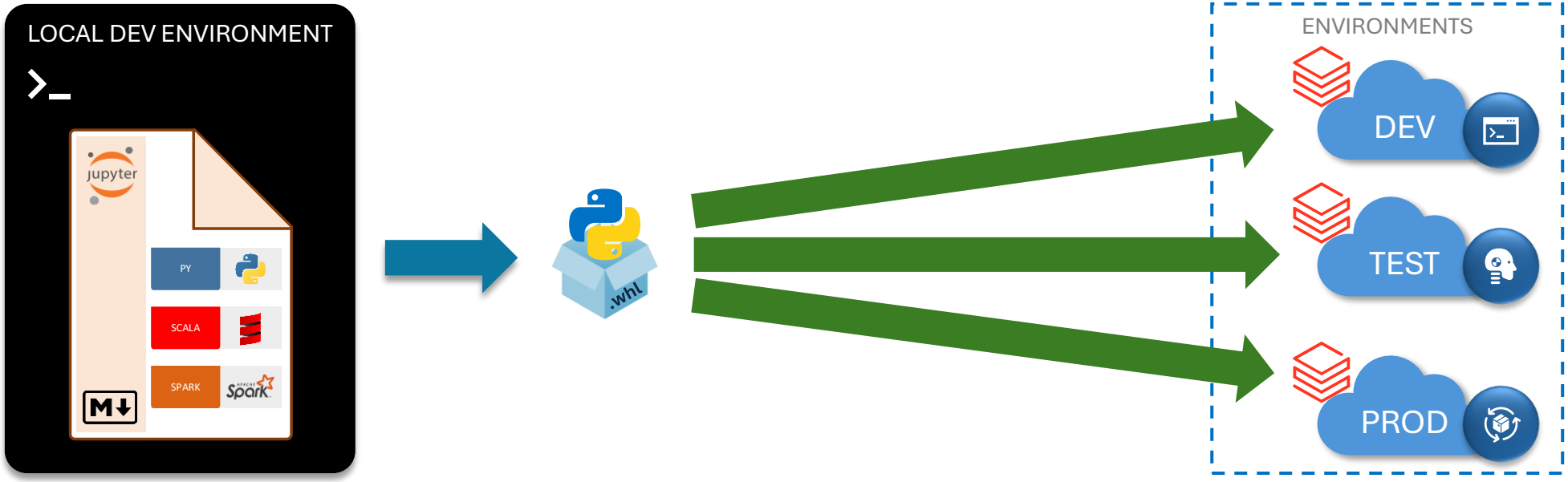


Python Wheel

Python Wheel

- Pre-Compiled Package
- Binary Format
- Single Objects Easy to Deploy
- Strong Community Support

- Keeps Code Structured
- Reuse Code Across Multiple Projects
- Manage Dependencies for Consistent Code
- Effective Testing Options
- Integrate with CI/CD Deployment Pipeline



Python Wheel - Configuration

- Project Directory Structure

```
my_project
   ├──── src
   │     ├──── my_package
   │           ├──── __init__.py
   │           └──── my_module.py
   ├──── tests
   │     ├──── __init__.py
   │     └──── my_automated_unit_test.py
   │
   ├──── pyproject.toml or setup.py
   │
   └──── README.md
```

Python Wheel - Configuration

- Project Directory Structure
- Dependency Management:
  - SetupTools
    - Traditional approach
    - Manual setup
    - Needs multiple files – (setup.py, requirements.txt)
    - Basic dependency handling
  - Poetry
    - Moden and recommended approach
    - Commands to setup
    - Easier to read, manage and more repeatable
    - Better dependency handling

```
# Create New Project
py -m poetry new my_project
```

```
# Add Dependencies/ Packages
py -m poetry add pytest
```

```
my_project
   ├──── src
   │     ├──── my_package
   │           ├──── __init__.py
   │           └──── my_module.py
   ├──── tests
   │     ├──── __init__.py
   │     └──── my_automated_unit_test.py
   │
   ├──── pyproject.toml or setup.py
   │
   └──── README.md
```

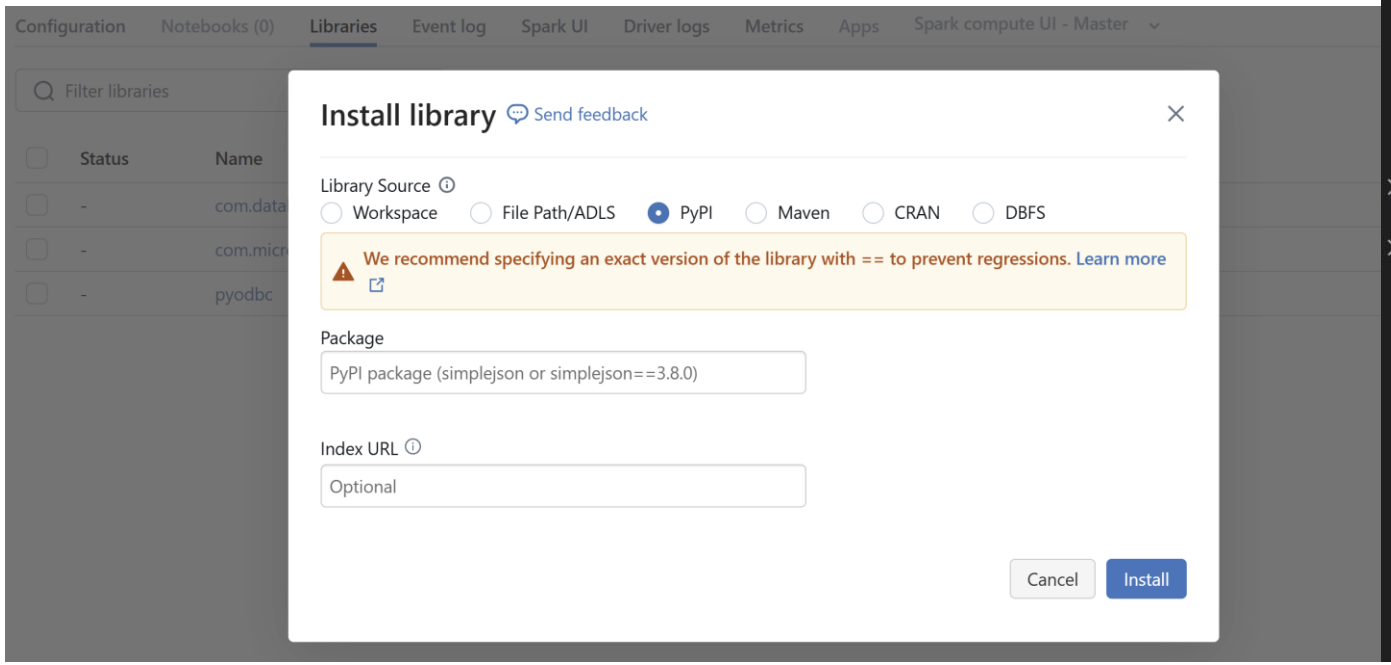
```toml
[project]
name = "my_project_app"
version = "0.1.0"
description = "A example python package"
authors = [
    {name = "me",email = "me@email.co.uk"}
     ]
readme = "README.md"
requires-python = ">=3.11"
dependencies = [
    "pytest"
     ]

[tool.poetry]
packages = [
     {include = "my_project_app", from = "src"}
     ]

[build-system]
requires = ["poetry-core>=2.0.0,<3.0.0"]
build-backend = "poetry.core.masonry.api"
```

Demo

- Develop Python Wheel

Python Wheel – Deployment

- Manual Deployment via UI
- Automated Deployment using CI/CD Pipelines
- Deploy via Databricks Asset Bundles (DAB)




```yaml
stages:
  - stage: Build
    displayName: "Build Wheel"
    jobs:
      - job: BuildWheel
        displayName: "Build Python Wheel"
        steps:
          - task: UsePythonVersion@0 ···

          - script: |
              python -m pip install --upgrade pip
              pip install poetry
              poetry install --no-dev
              poetry build
            displayName: 'Build Python Package with Poetry'

          - task: PublishBuildArtifacts@1 ···

  - stage: Deploy
    displayName: "Deploy to Databricks"
    dependsOn: Build
    jobs:
      - job: DeployWheel
        displayName: "Deploy Python Wheel to Databricks"
        steps:
          - task: DownloadBuildArtifacts@0 ···

          - task: AzureKeyVault@2 ···

          - script: |
              pip install databricks-cli
              WHEEL_PATH=$(ls $(Build.ArtifactStagingDirectory)/python-wheel/*.whl)
              databricks fs cp $WHEEL_PATH dbfs:/FileStore/wheels/ --overwrite
            env:
              DATABRICKS_HOST: $(databricksHost)
              DATABRICKS_TOKEN: $(databricksToken)
            displayName: "Upload Wheel to DBFS"

          - script: |
              WHEEL_FILE=$(ls $(Build.ArtifactStagingDirectory)/python-wheel/*.whl |
              databricks libraries install --cluster-id $(databricksClusterID) --whl
```

Databricks Asset Bundles (DAB)

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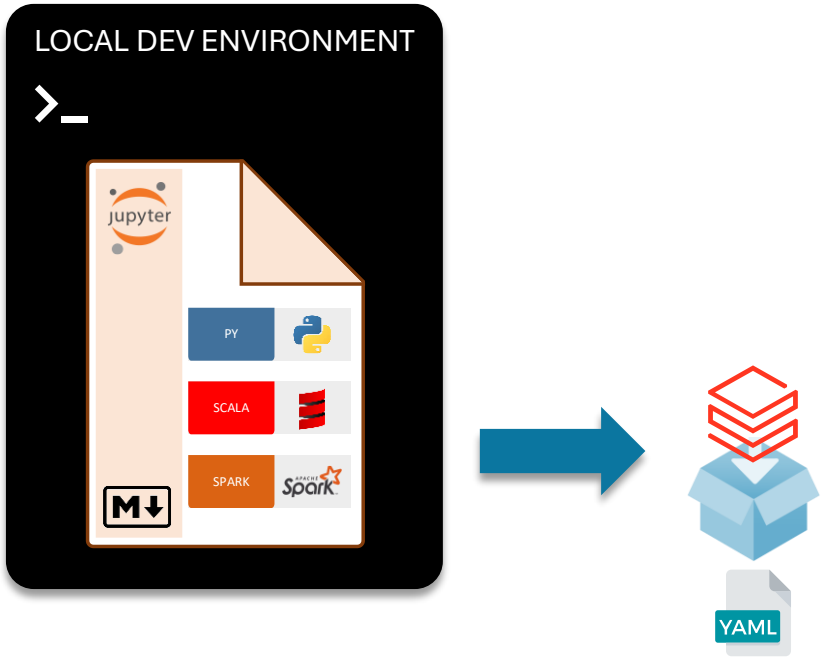
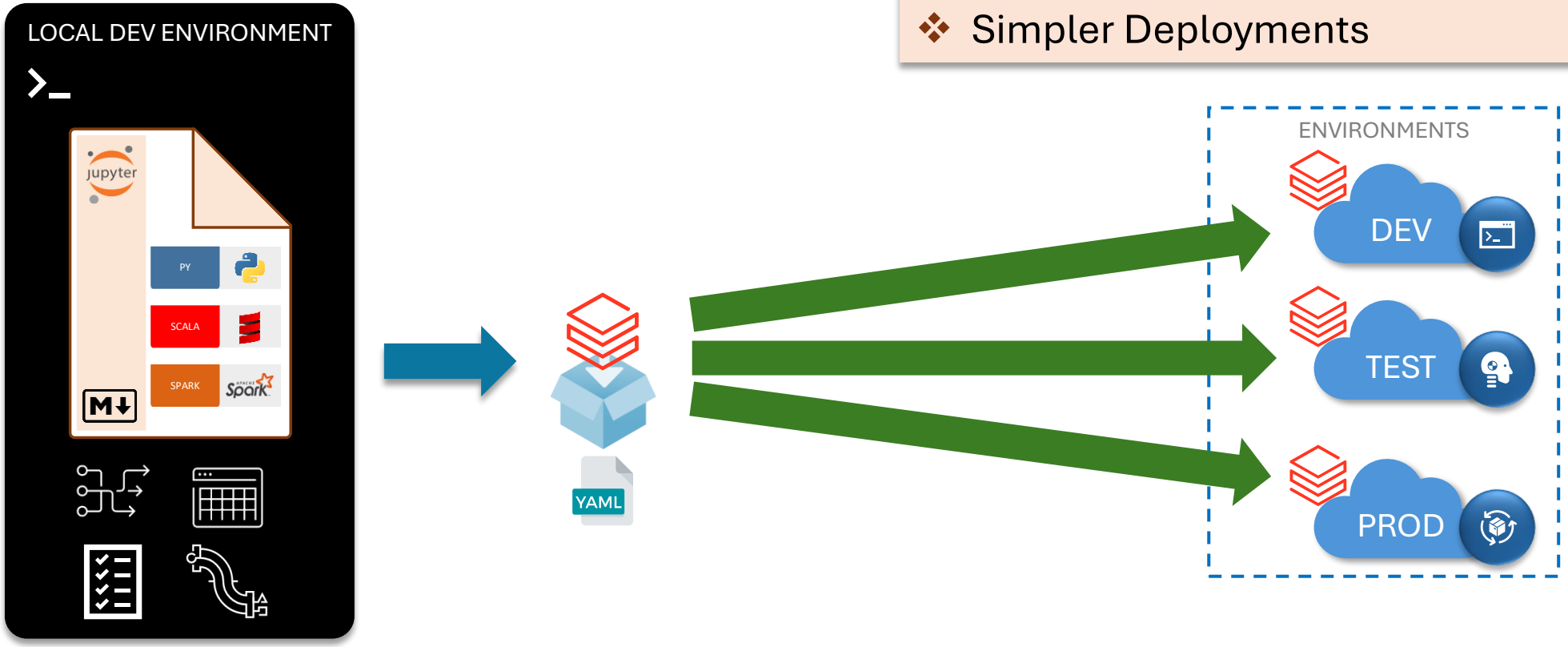
- Similar to Like Python Wheels



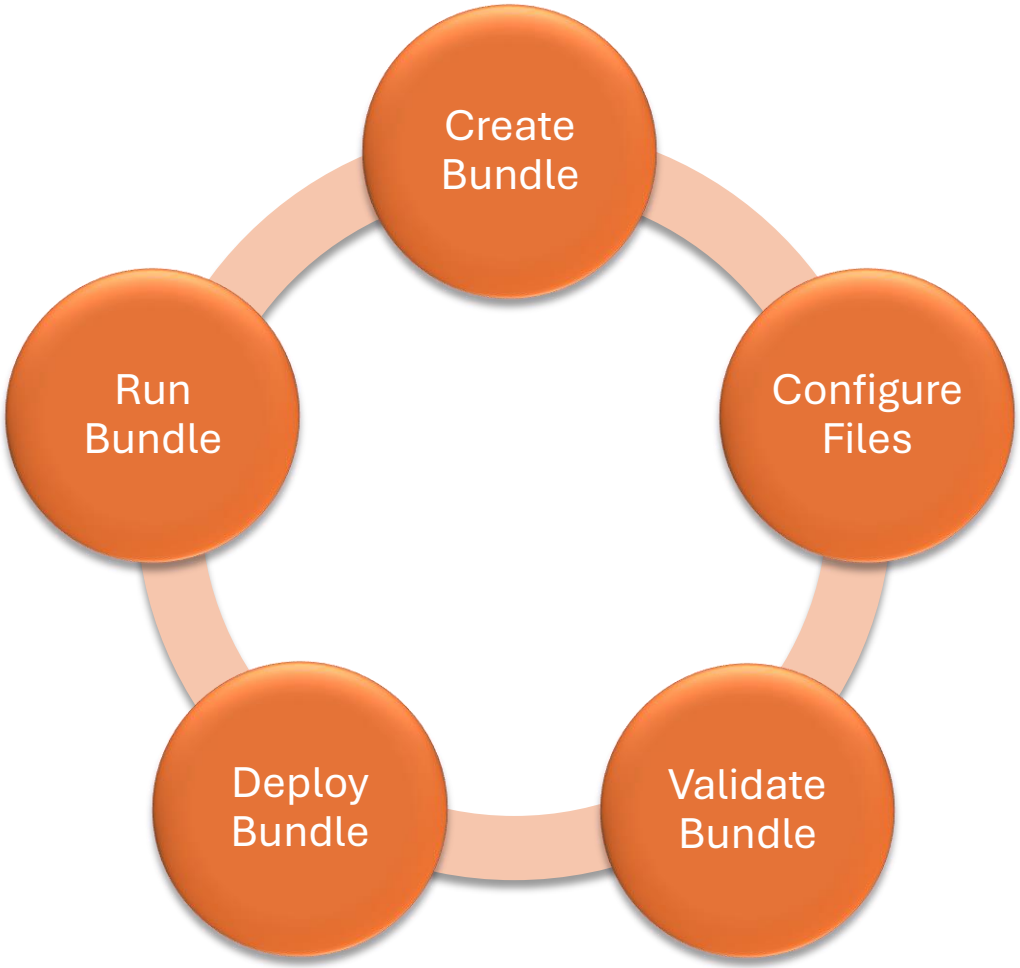
Databricks Asset Bundles (DAB)

- Similar to Like Python Wheels
- Deploy Workflows Pipelines, Jobs, DLT etc.

- Infrastructure-as-Code (IaC) & YAML
- Configure & Deploy a single Package
- Ensures Consistency
- Improves Collaboration
- Simpler Deployments



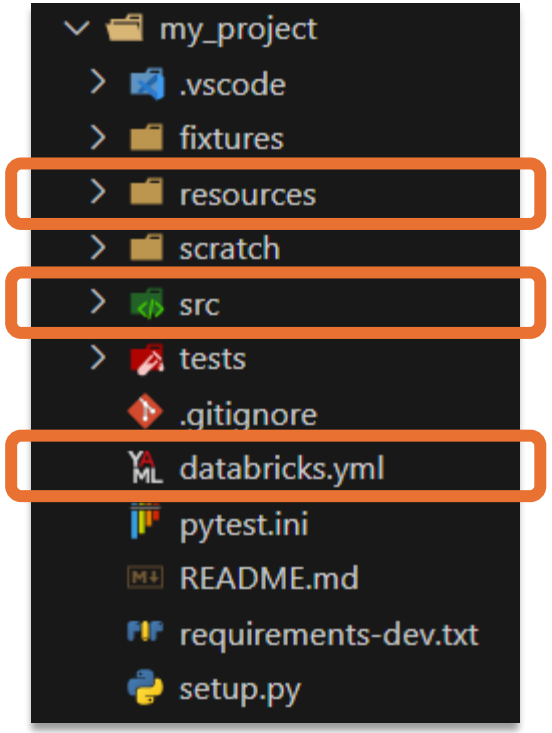
Databricks Asset Bundles – Overview



Uses Databricks CLI

To Validate, Deploy, and Run bundles

Databricks Asset Bundles – Create Bundle



Holds **Databricks Assets** like jobs and pipelines

Stores the **source code** (notebooks, python scripts, DLT etc.)

Contains the bundle **configuration & deployment**

```
databricks bundle init
```

Demo

- Create Databricks Asset Bundles

Databricks Asset Bundles vs Terraform

https://medium.com/@alexott_en/terraform-vs-databricks-asset-bundles-6256aa70e387

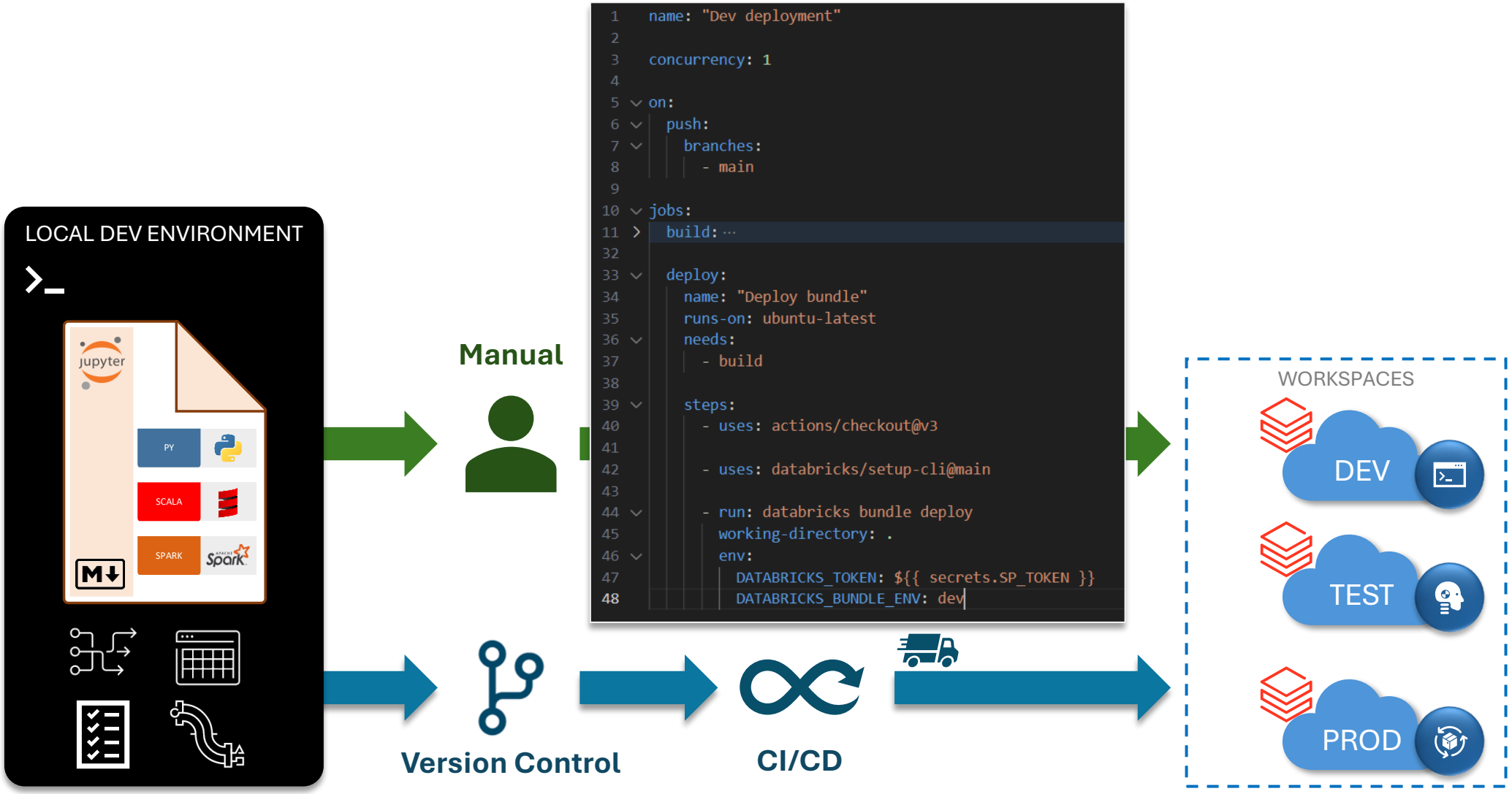
- Similarity to Terraform
  - DABs run Terraform code behind the scenes
- When should you use **Terraform vs Databricks Asset Bundles** for deployment?
  - DAB is to **manage** Databricks at **projects-level**
  - Terraform is **manage** Databricks at **infrastructure-level**

- **Infrastructure Setup** – Workspaces, Metastores, Catalogs, and Cloud resources.
- **Manages Access Control** – Users, groups, and resources permissions.
- **Great for Platform Teams** – Setting up the foundation & components for the DBX projects.

- **Project-Level Deployment** – Notebooks, Jobs, Workflows, Pipelines, and project configs.
- **Environment Promotion** – Promoting code & artifacts between environments
- **Great for Data & AI Teams** – Deploying and managing code without touching core infra.

Databricks Asset Bundles – Deployment

- Deployment methods
  - Manually deploy using IDEs or terminals
  - Automate deployment using CI/CD Pipelines




```yaml
name: "Dev deployment"

concurrency: 1

on:
  push:
    branches:
      - main

jobs:
  build: ...

  deploy:
    name: "Deploy bundle"
    runs-on: ubuntu-latest
    needs:
      - build

    steps:
      - uses: actions/checkout@v3

      - uses: databricks/setup-cli@main

      - run: databricks bundle deploy
        working-directory: .
        env:
          DATABRICKS_TOKEN: ${{ secrets.SP_TOKEN }}
          DATABRICKS_BUNDLE_ENV: dev
```

Final Thoughts & Takeaways

Final Thoughts & Takeaways

- Package your code
- Use Asset Bundles for end-to-end deployment
- Keep it clean and consistent
- Promote with confidence
- Know the deployment strategy & tools
- Automate deployments

Databricks
Asset
Bundles

Slide/ Demos

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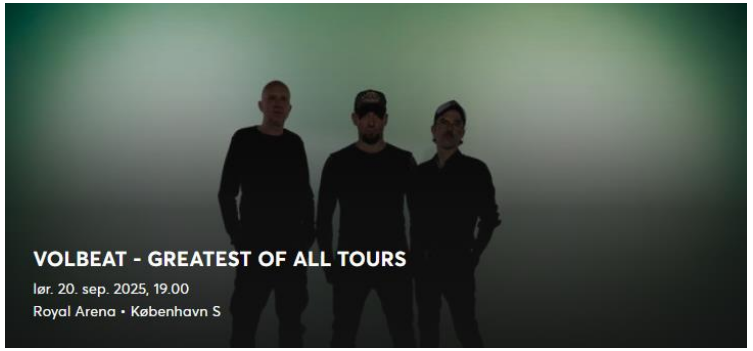

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