

 European  
Power Platform  
Conference



**DUBLIN**  
**20-22 JUNE . 23**



# Best Practices for Application Lifecycle Management (ALM) in the Microsoft Power Platform

**Daniel Laskewitz**  
**Gomolemo Mohapi**  
**Kartik Kanakasabesan**  
**Gomolemo Mohapi**

# Agenda

| Time          | Activity                    | Who       |
|---------------|-----------------------------|-----------|
| 09:00 – 09:30 | Introduction                | All       |
| 09:30 – 10:00 | Lab 1 – Setup tenant        | Attendees |
| 10:00 – 10:30 | Lab 2 Intro                 | All       |
| 10:30 – 11:00 | Morning break               | All       |
| 11:00 – 11:45 | Lab 2 – Work with solutions | Attendees |
| 11:45 – 12:45 | Lab 3 Start                 | All       |
| 12:45 – 14:00 | Lunch                       | All       |
| 14:00 – 14:15 | Lab 3 Wrap Up               | Attendees |
| 14:15 – 15:15 | Lab 4                       | All       |
| 15:15 – 15:45 | Afternoon break             | All       |
| 15:45 – 16:45 | Lab 5                       | Attendees |
| 16:45 – 17:00 | Wrap up                     | All       |

# Introduction

# Who are we?

April Dunnam

Principal Cloud Advocate



Gomolemo Mohapi

Cloud Advocate



Kartik Kanakasabesan

Principal Product Manager



Daniel Laskewitz

Senior Cloud Advocate



# What are we going to do today?

- Lab 1: Log in and create dev environments
- Lab 2: Import a solution / export + unpack + clone solution
- Lab 3: Sync solution / branching / commit changes / create pull request
- Lab 4: Deploy to test and prod
- Lab 5: Add an approval step before deploy to prod

The screenshot shows the 'Deployment Pipeline Configuration' page in the Microsoft Power Apps portal. The pipeline is titled 'My first pipeline'. The 'General' tab is selected. The 'Linked Development Environments' section shows one environment named 'Dev' of type 'Development Environment' with ID 'cad4087f-473e-e8d4-9d7f-e1117da59e4f' and status 'Success'. The 'Deployment Stages (Deployment Pipeline)' section shows two stages: 'Deploy to test' and 'Deploy to prod'. The 'Deploy to prod' stage has its 'Pre-Deployment Step Required' field set to 'Yes', which is highlighted with a red box. The page includes standard navigation and search tools.

# Logistics

- Connect to WIFI
  - EPPC23
  - Password: EPPCDub23
- Access the Labs: <https://aka.ms/EPPC23-ALM>
- Download the Whova App: <https://aka.ms/EPPC/App>

# Application Lifecycle Fundamentals

- Application Lifecycle Management of a software includes plan and track, develop, build and test, deploy, operate, monitor, and learn from discovery.
- For a healthy ALM, there should be separate Dev, QA and Prod environments.
- Source control should be your source of truth for storing and collaborating on your components.
- Automated deployment mechanisms are preferred over manual.

# Power Platform ALM Landscape

Various  
Approaches to  
Choose from

- Manual deployment with export / import of solutions
- Repeatable deployments with Pipelines for Power Platform
- Automated deployment with Tools and Automation
- Automated deployment with ALM Accelerator for Power Platform

# GitHub Codespaces

- Write code, build your applications, run test suites, debug issues, and deploy all in your browser
- Use web-based Visual Studio Code or your favorite IDE
- Customize with extensions, settings, scripts, and features
- Customize further using Docker and Docker Compose
- Onboard new developers quickly with environments that are ready in minutes
- Standardize developer environments within your organization
- Distribute developer environment configuration as part of your demos

# Lab 01 – Tenant Setup

30 mins

Connect to WIFI

- EPPC23
- Password: EPPCDub23

<https://aka.ms/EPPC23-ALM/Lab01>

# Tenant Setup

**In this lab, you will go through the following tasks:**

- Creating a new browser profile
- Log into the account you are going to use during the workshop
- Create developer environments
- Install the Creator Kit
- Create a GitHub account
- Create a fork of the EPPC23-ALM repository
- Create a codespace
- Install the Power Platform Tools extension
- Connect to the Power Platform environment

<https://aka.ms/EPPC23-ALM/Lab01>

# Environments

## Definition:

Container to store, manage, and share your organization's business data, apps, flows, chatbots and other Power Platform resources.

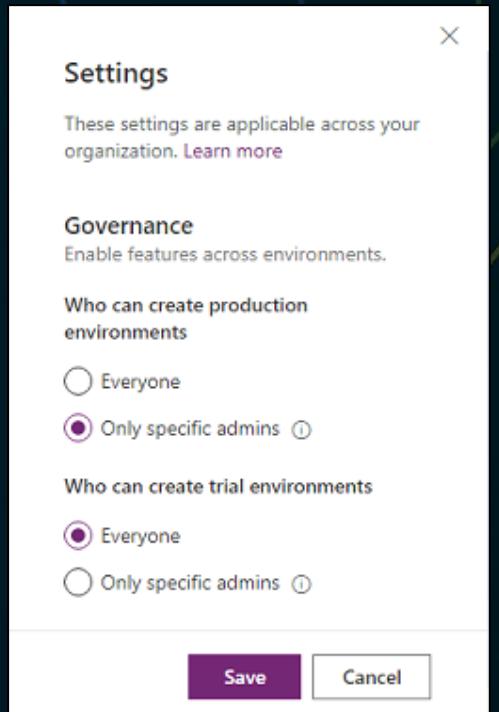
Serves as a container to separate apps that might have different roles, security requirements, or target audiences.

## Key facts:

- Created under an AAD tenant, resources can only be accessed by tenant users.
- Tied to a geographic location
- Different types of environment exists
- Can have either **zero** or **one** Dataverse database
- Every tenant has a Default environment where all licensed Power Apps and Power Automate users can create apps & flows.

## Security tips:

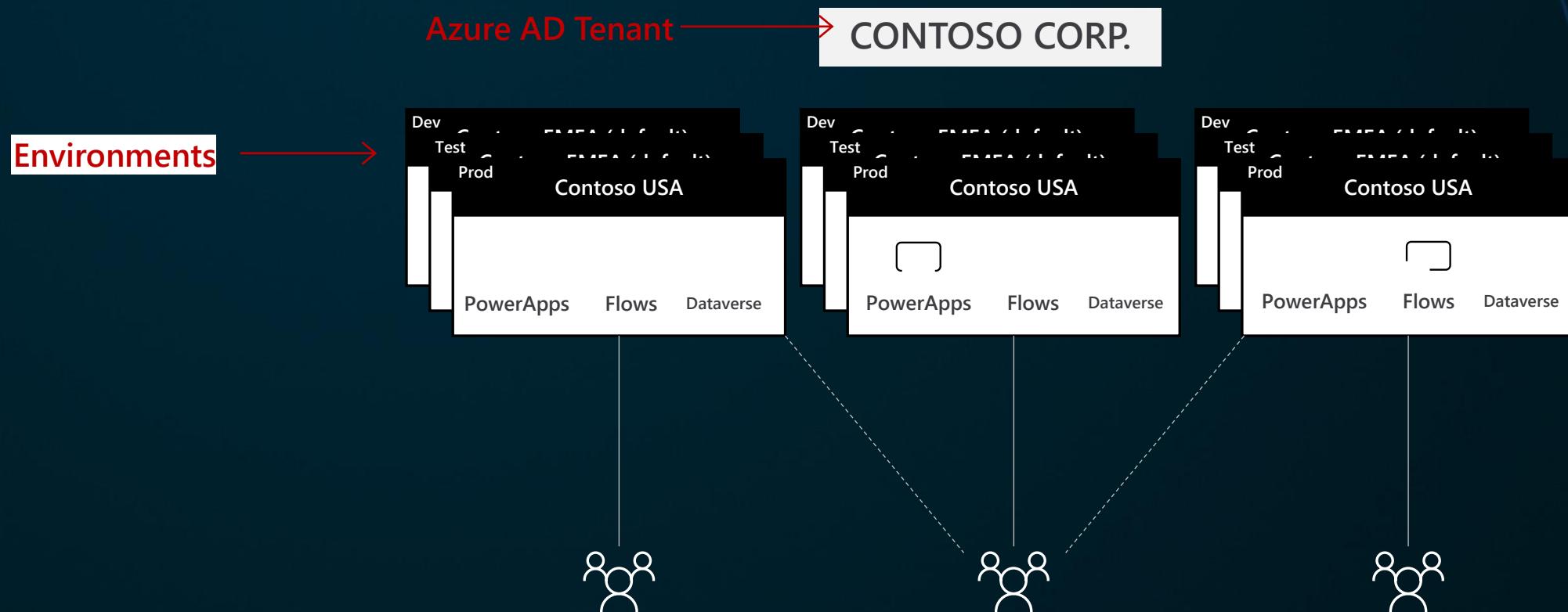
- Non-default environments offer more permission controls.
- Non-default environment creation can be restricted to specific admins.
- Non-default and non-developer environments with Dataverse can be restrict access to a specific AAD security group.



| Environment | Type       |
|-------------|------------|
| Production  | Production |
| Sandbox     | Sandbox    |

# Develop Your Environment Strategy

Environments are containers that administrators can use to manage apps, flows, connections, and other assets; along with permissions to allow organization users to use the resources



# Create an environment

You can create environments in the Power Platform Admin Center or using PowerShell

Environment can be created either with or without Dataverse database

To create an environment, all the following must be **true**:

- The user has a license that allows environment creation
- Environment creation is allowed in tenant level (if user is not Global, Power Platform or Dynamics Admin)
- For production and sandbox environments, the tenant must have at least 1GB of database storage capacity available
- For trial (subscription-based) environments, each offer-based trial (also known as "admin trial") subscription entitles the tenant to three subscription-based trial environments. Only tenant-level admins are able to provision trial (subscription-based) environments.
- For trial (standard) environments, the user needs a license providing per-user entitlement for trial environments. This applies to tenant-level admins, as well.
- All users can create max three Developer (personal) environments even without having Power Platform Developer Plan

| License                         | Trial     | Production | Developer |
|---------------------------------|-----------|------------|-----------|
| Microsoft 365 Plans             | No        | No         | Yes       |
| Dynamics 365 Teams Plans        | No        | No         | Yes       |
| Power Apps Developer Plan       | No        | No         | Yes       |
| Dynamics 365 trial              | Yes (one) | No         | Yes       |
| Dynamics 365 Plans              | Yes (one) | Yes        | Yes       |
| Power Apps plan                 | Yes (one) | Yes        | Yes       |
| Power Apps trial                | Yes (one) | Yes        | Yes       |
| Power Virtual Agents trial plan | Yes       | No         | Yes       |
| Power Virtual Agents plan       | No        | Yes        | Yes       |

**NOTE!** Global and Power Platform Administrators can create environments without any license

# Default environment

## Definition:

A single default environment is automatically created for each tenant and is shared by all users in the tenant (who are Environment Makers). Learn more [here](#).

## Key facts:

- Auto-created for every tenant
- Can't be disabled or deleted
- Whenever a new user creates their first Power App or Flow, they're automatically added to the Environment Maker role
- Default is not for development of critical apps.
- You can't backup and restore the default environment.
- Limited to max 1TB of storage capacity and following included capacity.
  - 3 GB Database Capacity
  - 3 GB File Capacity
  - 1 GB Log Capacity

## Security tips:

- Rename the environment to make the purpose of that environment self-explanatory like "Personal Productivity"
- Configure a Data Loss Prevention policy to control the connectors that can be used by apps and flows in the default environment.

| Environments          |        |         |       |
|-----------------------|--------|---------|-------|
| Environment           | Type ↑ | State   |       |
| Personal Productivity | ...    | Default | Ready |

# Developer environment (Developer Plan)

## Definition:

You get a free developer environment to develop and test apps, including support for premium and custom connectors and Dataverse. Learn more [here](#).

## Key facts:

- Create apps and flows and share and collaborate on these solutions with others.
- Connect to any data source by using OOB connectors or by creating custom connectors.
- Use a fully managed, scalable data platform with Dataverse
- Offers backup/restore, reset and copy functionalities
- Not meant for production use
- Environment capacity limits are:
  - Flow runs/month – 750
  - Database size – 2GB

The screenshot shows a user interface for managing environments. At the top, there's a navigation bar with icons for 'Open environment', 'Settings', 'Resources', 'Delete', and 'History'. Below the navigation, the path 'Environments > 's Environment' is visible. The main area is titled 'Details' and contains the following information:

| Environment URL               | State           |
|-------------------------------|-----------------|
| orgff694029.crm4.dynamics.com | Ready           |
| Region                        | Refresh cadence |
| Europe                        | Frequent        |
| Type                          | Security group  |
| Developer                     | Not assigned    |

# Developer environment (Personal)

## Definition:

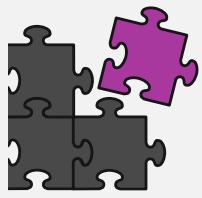
Developer environments (Personal) can be created also without having Power Platform Developer plan

## Key facts:

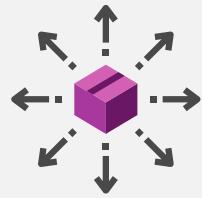
- Same features and limits as Developer environments created by the system when user has Power Platform Developer plan
- All users having seeded or standalone Power Platform license can create up to three Developer environments if not blocked in tenant level
- Can be created in Power Platform Admin Center or Power Apps Studio ([make.powerapps.com](https://make.powerapps.com)) in environment picker

The screenshot shows the Power Platform Admin Center interface for creating a new environment. At the top, there are fields for 'Name \*' (My Developer Env), 'Region \*' (Europe - Default), and 'Type' (Developer, highlighted with a red border). Below these, a modal window titled 'Select environment' provides information about developer environments and offers a 'Try it now' button. Another modal window titled 'New environment' asks for an 'Environment name' (Demol) and 'Region' (United States). A third window titled 'Developer environment assignments' discusses the overview and management of developer environments, with options for 'Everyone' (selected) and 'Only specific admins'. A status message at the bottom right indicates that the region cannot be changed once the environment is created.

# What is a solution?



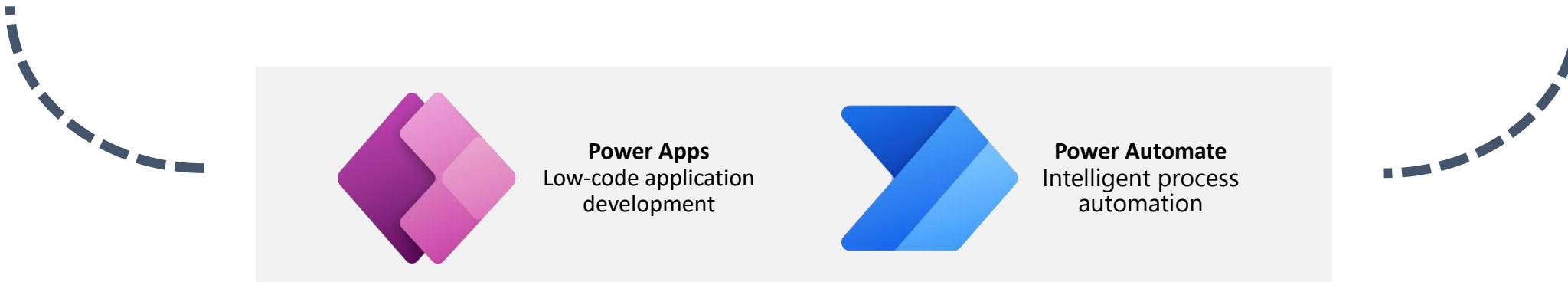
**Solutions** are *authored, packaged, and maintained* by a **publisher** allowing customizations to components that extend your Power Platform organization



**Solutions** allow *distribution* of business functionality across Dynamics 365 Customer Engagement environments

# What goes into a solution?

| Schema  | User Interface   | Analytics   | Process / Code  | Templates  | Security  | System Settings  |
|---|--|---|---|--|---|--|
| <ul style="list-style-type: none"><li>• Entities</li><li>• Attributes</li><li>• Relationships</li><li>• Global Options Sets</li></ul> | <ul style="list-style-type: none"><li>• Application Ribbon</li><li>• SiteMap</li><li>• Forms</li><li>• Table Ribbons</li><li>• Web Resources</li></ul> | <ul style="list-style-type: none"><li>• Dashboards</li><li>• Reports</li><li>• Visualizations</li></ul> | <ul style="list-style-type: none"><li>• Processes<ul style="list-style-type: none"><li>• Dialogs &amp; Workflows</li></ul></li><li>• Plugins<ul style="list-style-type: none"><li>• Assemblies</li><li>• Processing Steps</li></ul></li></ul> | <ul style="list-style-type: none"><li>• Mail merge</li><li>• Email</li></ul> | <ul style="list-style-type: none"><li>• Security Roles</li><li>• Column Level Security Profiles</li></ul> | <ul style="list-style-type: none"><li>• Formatting Options</li><li>• Other System Settings</li></ul> |



# What are unmanaged and managed solutions?



## Unmanaged Solution

Collection of references to components  
No restrictions on what can be added, removed, or modified  
Recommended only during development of the solution

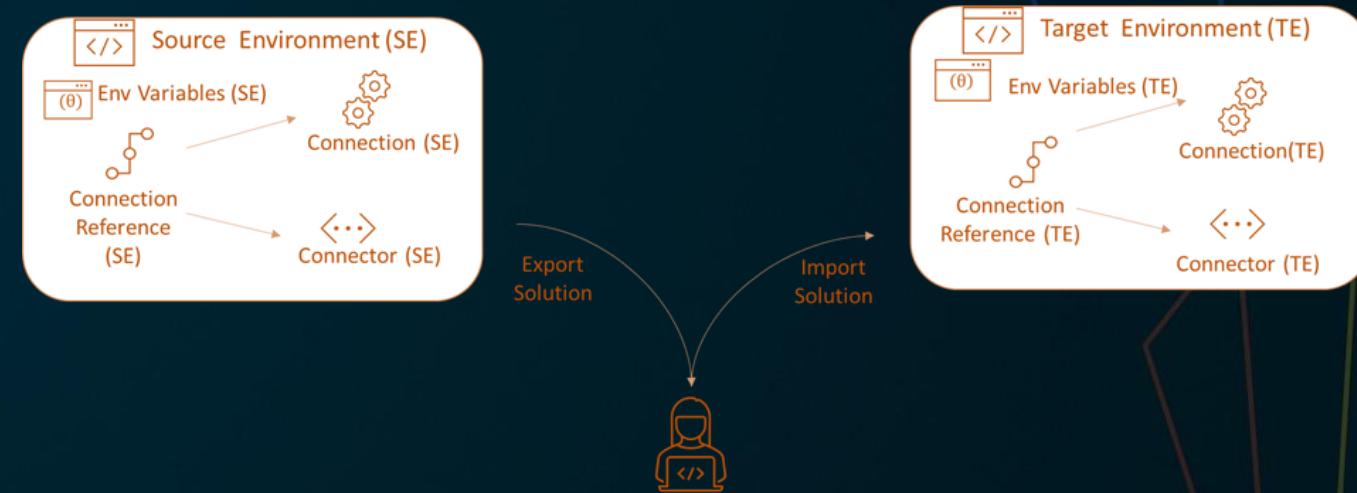


## Managed Solution

Sealed "binary"  
Components can't be added or removed  
Cannot be exported  
Recommended when a solution is not actively being customized\*

# Environment Variables and Connection References

- Environment variables allow you to transport application configuration data with solutions and optionally manipulate the values in your Application Lifecycle Management (ALM) pipeline.
- Connection references ensure that connections can participate in ALM by removing hard-coded identifiers within components and allowing new connections to be associated as you migrate solutions across environments.



# Manage Canvas Apps Data Sources with Environment Variables

- **Environment variables are automatically created to store data source parameters when connecting to data within canvas apps by enabling the setting to “Automatically create environment variables when adding data sources” in the canvas app designer**
- **Reuse the same environment variables across canvas apps, flows, and other components.**
- **Update the Environment variable value after importing Solution to the new Environment, everything will be connected to the new data source, no need to modify or turn on anything.**

# Connection reference in a solution

- **Canvas apps and flows handle connections differently. Flows use connection references for all connectors, whereas canvas apps only use them for implicitly shared (non-OAuth) connections, such as SQL Server Authentication.**
- **You can import your connection reference into a target environment with no further configuration needed after the import completes. To change a specific connection associated with a canvas app or flow, you edit the connection reference component within the solution.**

# Version Control for Solutions

# Version Control for Solutions



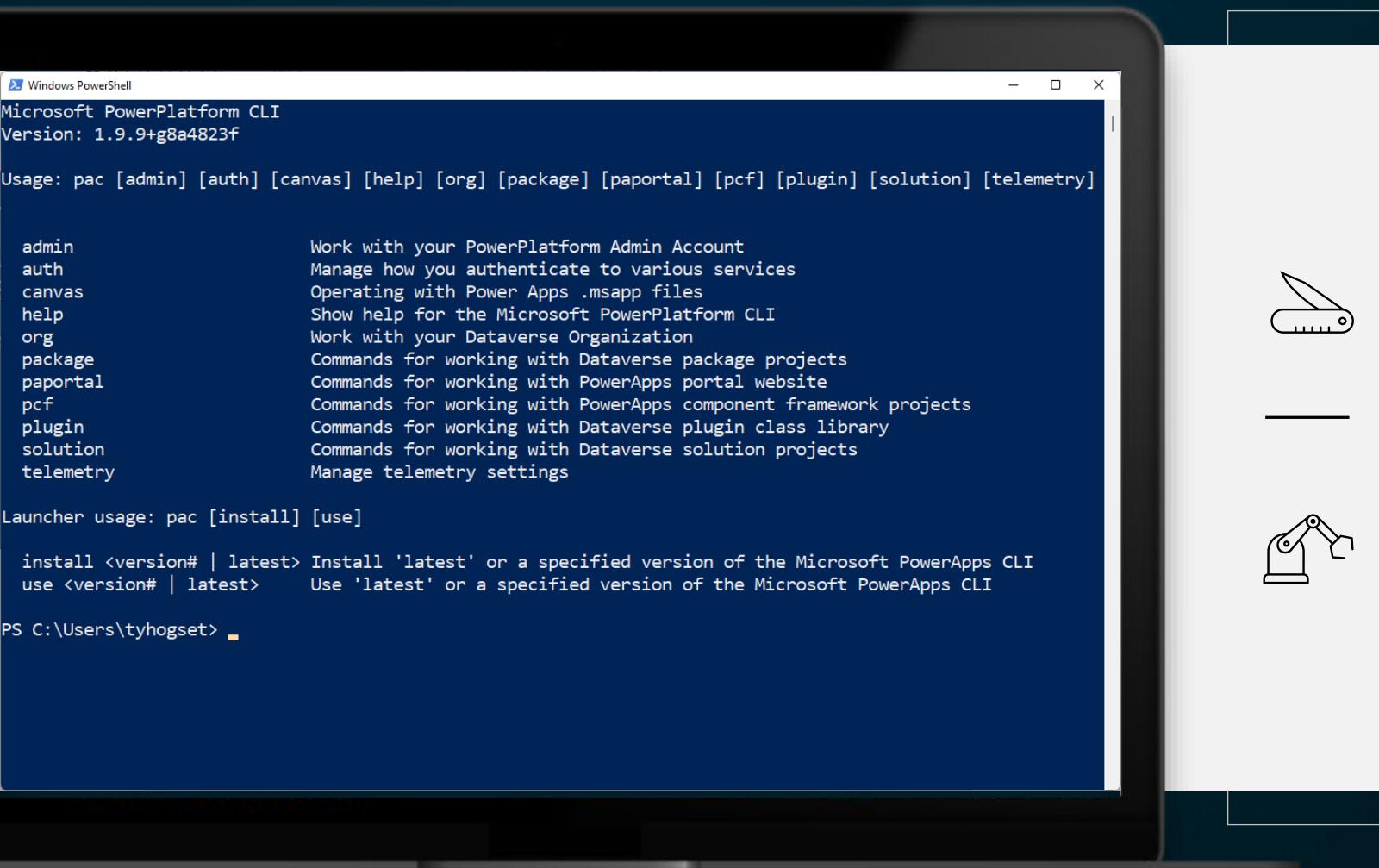
When exported from an environment, solutions are in the form of a zip file.



In the zipped format, our schema definition is contained in one massive file (**customizations.xml**).

| Name                | Date modified      | Type         | Size   |
|---------------------|--------------------|--------------|--------|
| PluginAssemblies    | 8/26/2019 10:18 AM | File folder  | 3 KB   |
| WebResources        | 8/26/2019 10:18 AM | File folder  | 624 KB |
| Workflows           | 8/26/2019 10:18 AM | File folder  | 12 KB  |
| [Content_Types].xml | 8/26/2019 10:14 AM | XML Document |        |
| customizations.xml  | 8/26/2019 10:14 AM | XML Document |        |
| solution.xml        | 8/26/2019 10:14 AM | XML Document |        |

# Power Platform CLI



Power Platform CLI provides a collection of ALM-related tasks for Power Platform.



Compatible with Linux, Mac, and Windows and can be installed through automation, making it ideal for DevOps processes.



# solution unpack Command



Solution unpack **reversibly decomposes** a solution **.zip file** by breaking it out into a logical folder structure.

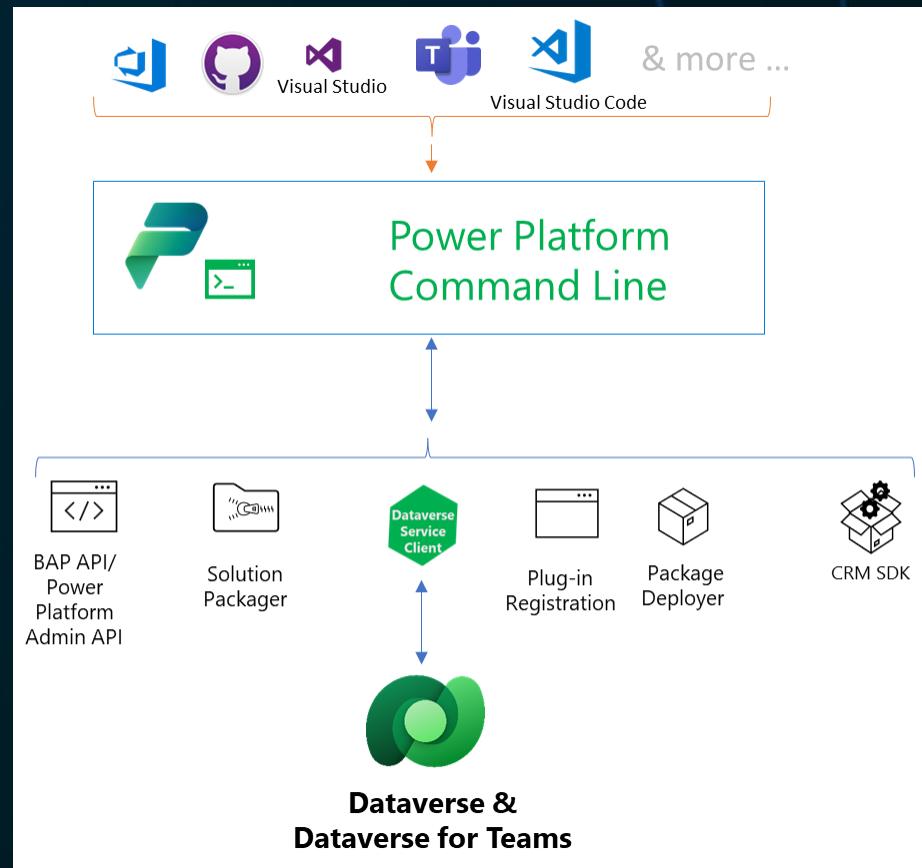


Resulting output can be more readily maintained by a source control system.

| Name                      | Date modified      | Type        | Size |
|---------------------------|--------------------|-------------|------|
| AppModules                | 2/13/2019 10:04 AM | File folder |      |
| AppModuleSiteMaps         | 2/13/2019 10:04 AM | File folder |      |
| Entities                  | 2/13/2019 10:04 AM | File folder |      |
| OptionSets                | 2/13/2019 10:04 AM | File folder |      |
| Other                     | 2/13/2019 10:04 AM | File folder |      |
| PluginAssemblies          | 2/13/2019 10:04 AM | File folder |      |
| Roles                     | 2/13/2019 10:04 AM | File folder |      |
| SdkMessageProcessingSteps | 2/13/2019 10:04 AM | File folder |      |
| Templates                 | 2/13/2019 10:04 AM | File folder |      |
| WebResources              | 2/13/2019 10:04 AM | File folder |      |
| Workflows                 | 2/13/2019 10:04 AM | File folder |      |

# Power Platform CLI : Simplified to access many things

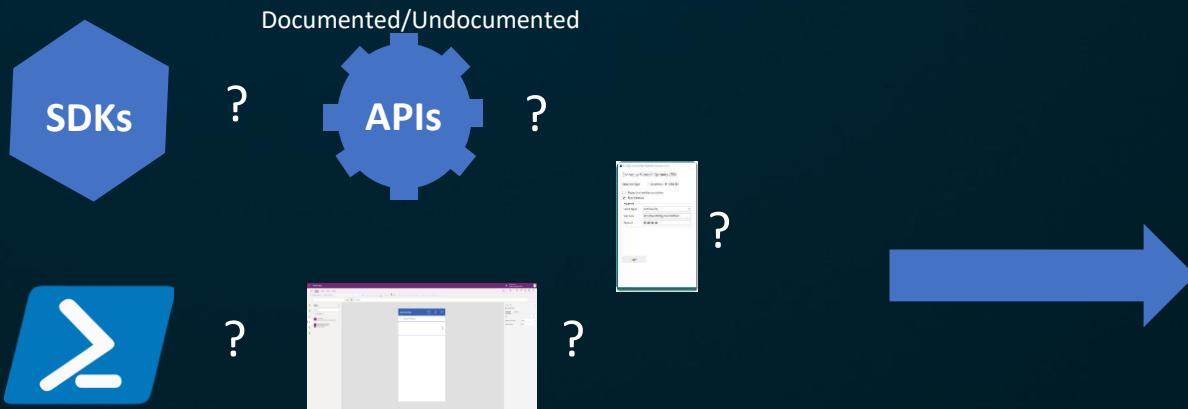
- **Single command line focused on developer use cases**
  - Multi-platform works on Windows, Linux, and Mac
- **Integration focal point for the developer experiences**
  - Visual Studio Code
  - GitHub Codespaces
  - GitHub Actions
  - Azure DevOps
- **High fidelity developer experience for code first components**
  - Power Pages
  - Power Apps Component Framework
  - Custom connectors
  - Solutions
  - Packages
  - Application installs
  - And many more ....



# Why Power Platform CLI?

For a developer to get started faster.....

- We offered many options but no single path to success
- Tooling was fragmented, combination of PowerShell modules and D365 specific tools



So many ways to accomplish things, yet it is hard to get started



Something that works with them for the things they really need to get started

# Power Platform CLI : interaction details

- Targeted nouns for the various components
- Not every component qualifies for a noun
- Not every noun makes it into the CI/CD functions or other integrations



```
kartikka@OCAMPA-1 ~ pwsh no config pac help
Microsoft PowerPlatform CLI
Version: 1.19.3+g34b8262

Usage: pac [admin] [application] [auth] [canvas] [connector] [data] [help] [org] [package] [paportal] [pcf] [pipeline] [plugin] [solution] [telemetry] [tool]

admin                                Work with your Power Platform Admin Account
application                         Commands for listing and installing available Dataverse applications from AppSource
auth                                 Manage how you authenticate to various services
canvas                               Operating with Power Apps .msapp files
connector                           (Preview) Commands for working with Power Platform Connectors
data                                 Import and export data from Dataverse.
help                                 Show help for the Microsoft Power Platform CLI
org                                  Work with your Dataverse Organization
package                             Commands for working with Dataverse package projects
paportal                            Commands for working with Power Apps portal website
pcf                                 Commands for working with Power Apps component framework projects
pipeline                            Work with Pipelines
plugin                             Commands for working with Dataverse plug-in class library
solution                            Commands for working with Dataverse solution projects
telemetry                           Manage telemetry settings
tool                                Power Platform tools that can be installed and launched
```

# Power Platform CLI: Principles

- Focus on the developer experience
- Get feedback early and quickly on capability
- Customer (internal or external) comes first
- Drive consistency (as much as possible)
- First Party == Third Party
- Focus on the cloud
- Work with documented APIs only
- Cross platform support (as much as possible)
- Simplify Developer Gestures
- Release Monthly
- When it comes between a Feature or Quality, Quality always wins!
- If there is a problem, don't waste time, fix it!
- Every feature has a proper business justification and value i.e., will it be used ?



# CLI architecture

pac.exe (CLI)

msbuild tasks

PS cmdlets  
(hypothetical)

bolt.cli

bolt.module.\*

bolt.system

bolt.auth

bolt.cds

# Latest Release

1.24.3:

admin

- Added new command to allow for setting backup retention period of environments with managed environment enabled.
- Added new --skip-audit-data flag to allow for skipping audit data during environment copy and restore.
- Added new create-service-principal command to provide alternative for separate PowerShell script which creates Azure AD app.

catalog

- New catalog update command to update settings for a catalog

solution

- Fixed unpack command when solution contains canvas apps

pipeline

- Improved deployment wait flag and environment selection

application

- Added new "Application Id" column to list command
- Added application argument to list command which will accept app id/app name

copilot

- (Preview) New: "copilot" for tools and utilities in copilot scenarios
- (Preview) prepare-fetch: takes FetchXML file from AI LLM and prepares it for execution against Dataverse environment

Misc

- telemetry status now shows log file location
- Updated Dataverse Service Client to 1.1.9
- Updated Microsoft.PowerPlatform.Formulas.Tools to 0.6.2-preview
- Nuget packages for CLI.Core\* include all resource assemblies
- Updated Microsoft.CrmSdk.XrmTooling.PackageDeployment.Core to 9.1.0.142



## Lab 02 – Start with a solution

20 mins

<https://aka.ms/EPPC23-ALM/Lab02>

# Lab 02 – Start with a solution

In this lab you will learn the following:

- Uploading assets to OneDrive
- Import a solution zip file
- Export a solution from an environment
- Unpack a solution
- Inspect the solution folders
- Clone a solution

<https://aka.ms/EPPC23-ALM/Lab02>

# Lab 2 - Wrap Up

Show what you learned

# Work with solutions with a team

# What is Continuous Integration (CI)?



The process of automating the build and testing of code when a team member commits changes to version control



CI encourages developers to share their code and unit tests by merging their changes into a shared version control repository after every small task completion.

# The benefits of continuous integration?

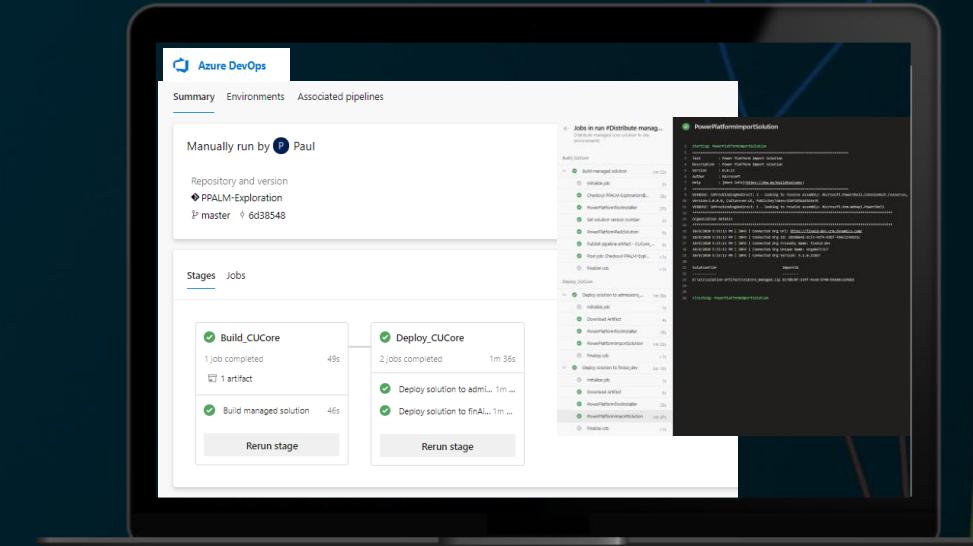
→ Anyone can queue a build

↓  
Consistency

📋 Increased use of automated test  
Includes tests and build quality metrics

↺ Fast feedback

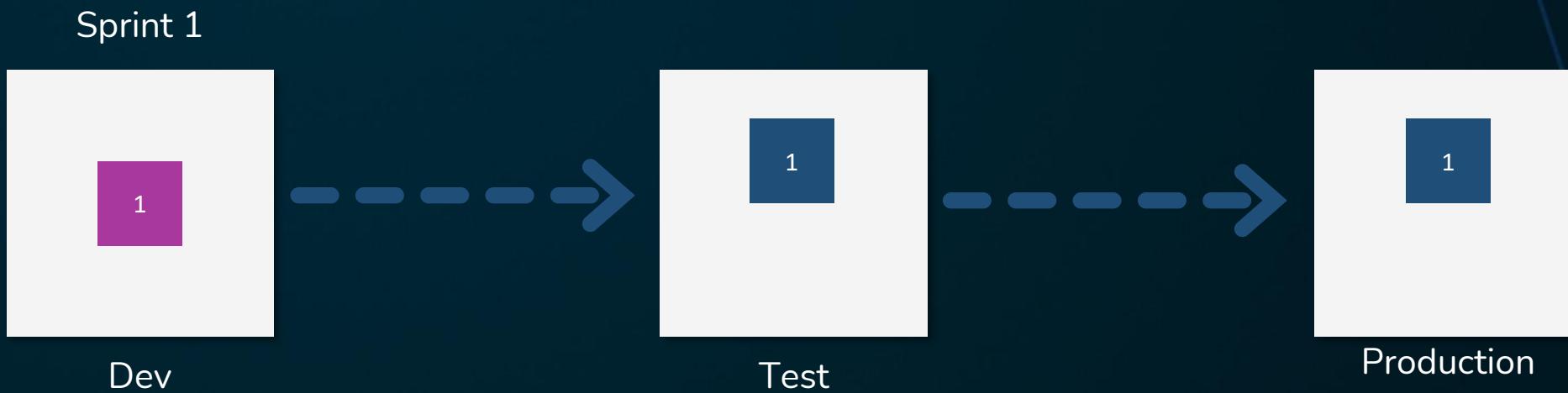
→ Merging code when it's fresh  
Faster check-in cadence



# Team development – common patterns

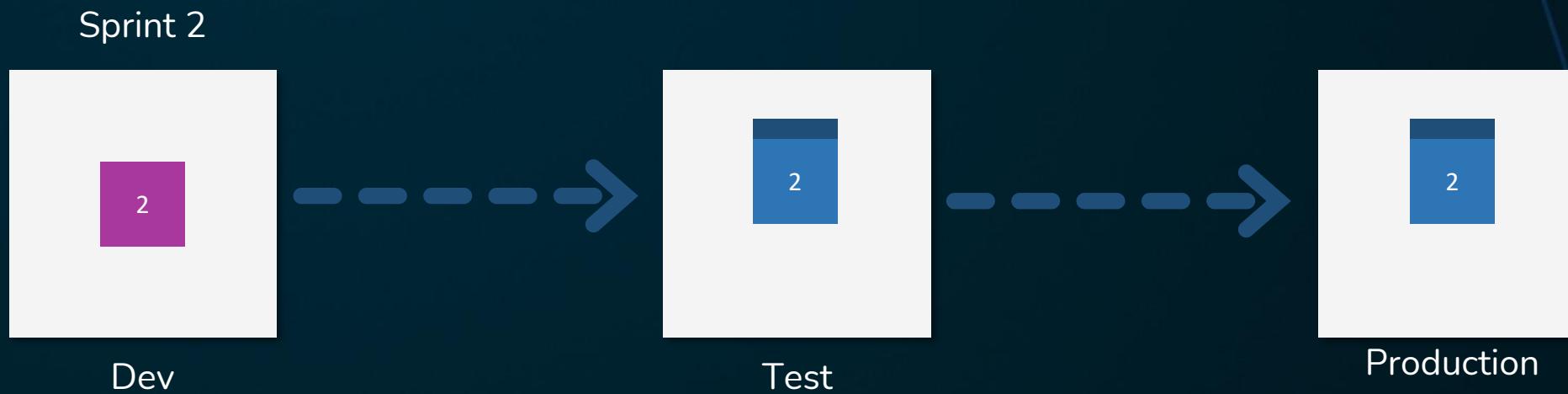
# Common pattern

Deploying a new unmanaged solution with each sprint



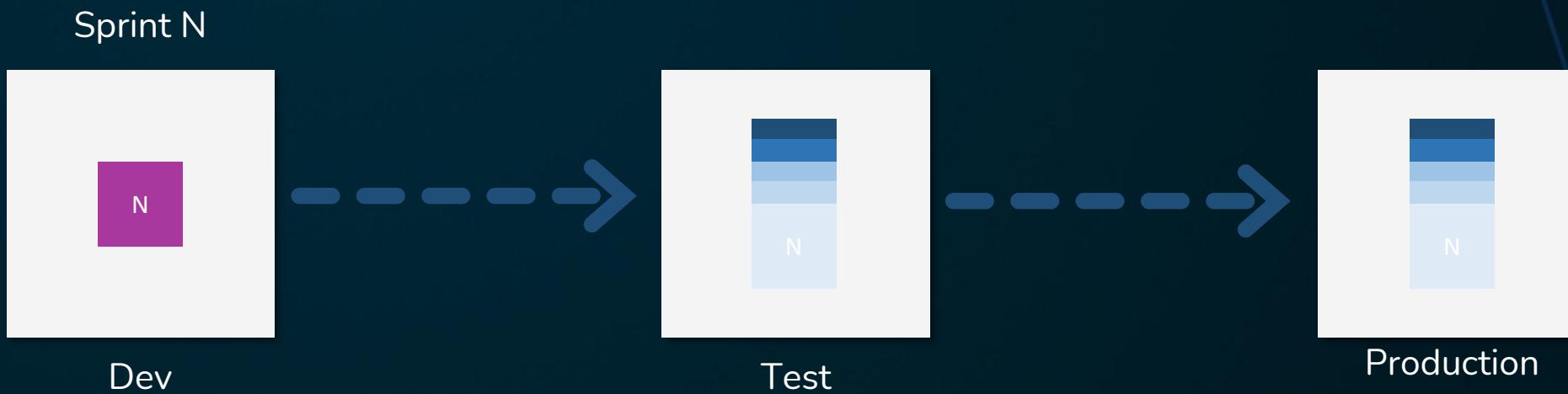
# Common pattern

Deploying a new unmanaged solution with each sprint



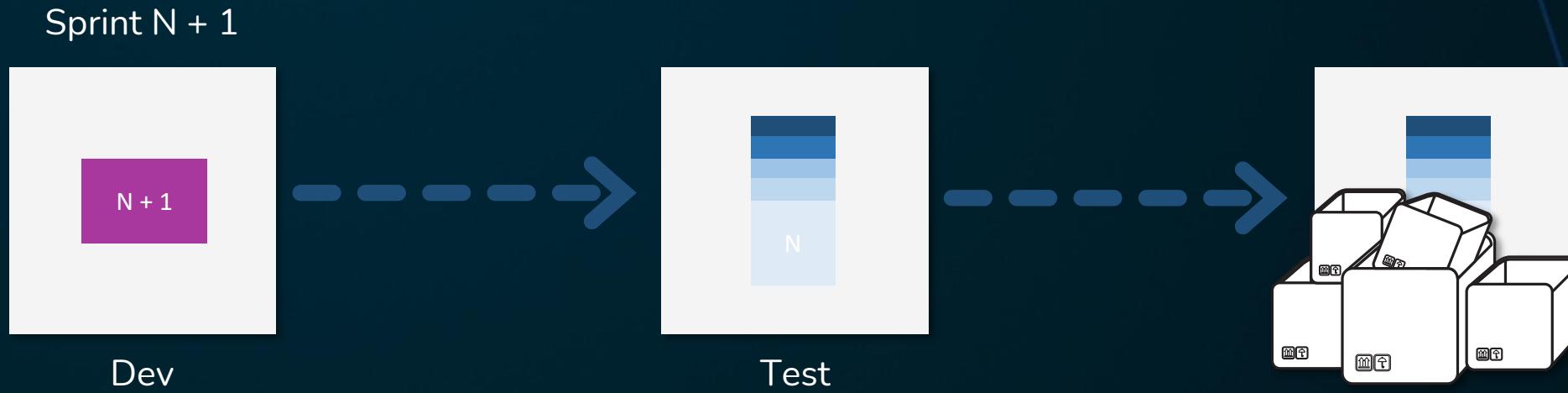
# Common pattern

Deploying a new unmanaged solution with each sprint

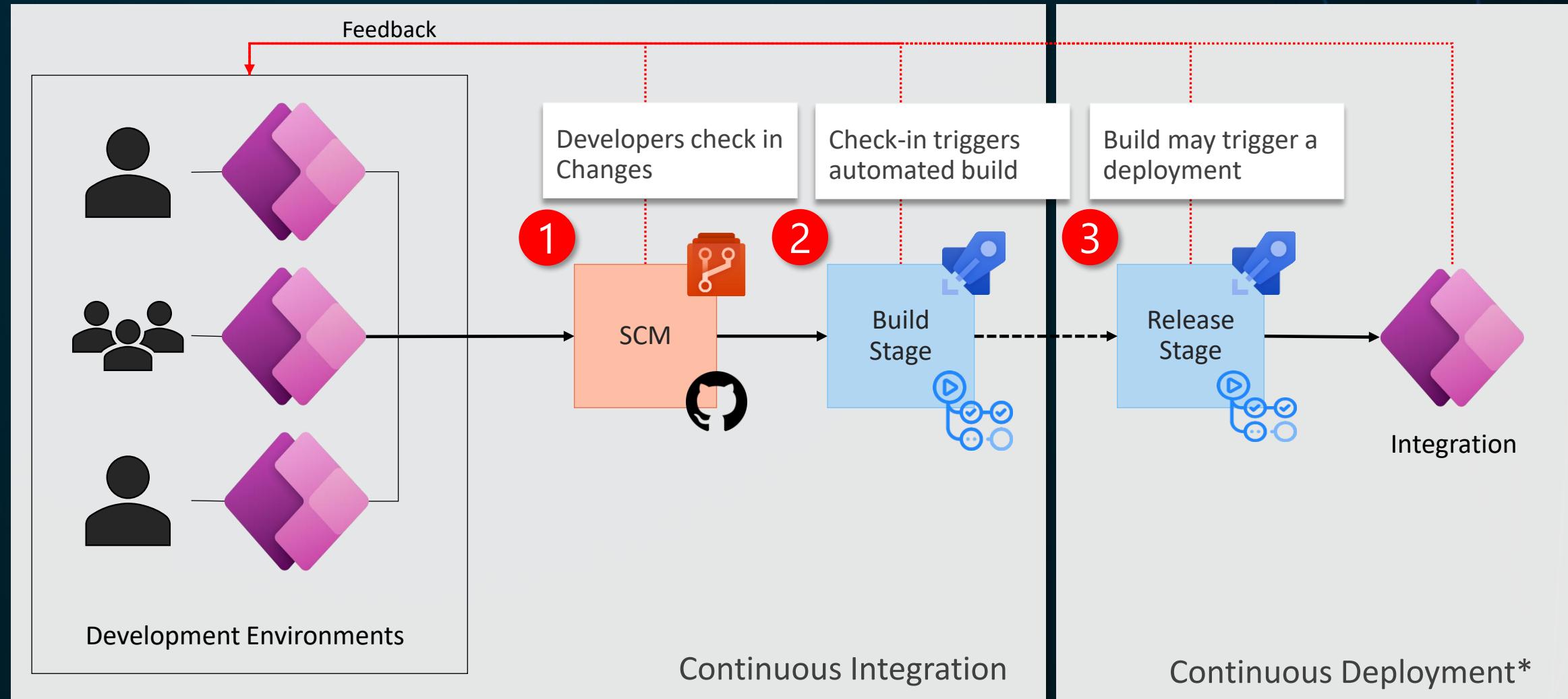


# Common pattern

Deploying a new unmanaged solution with each sprint



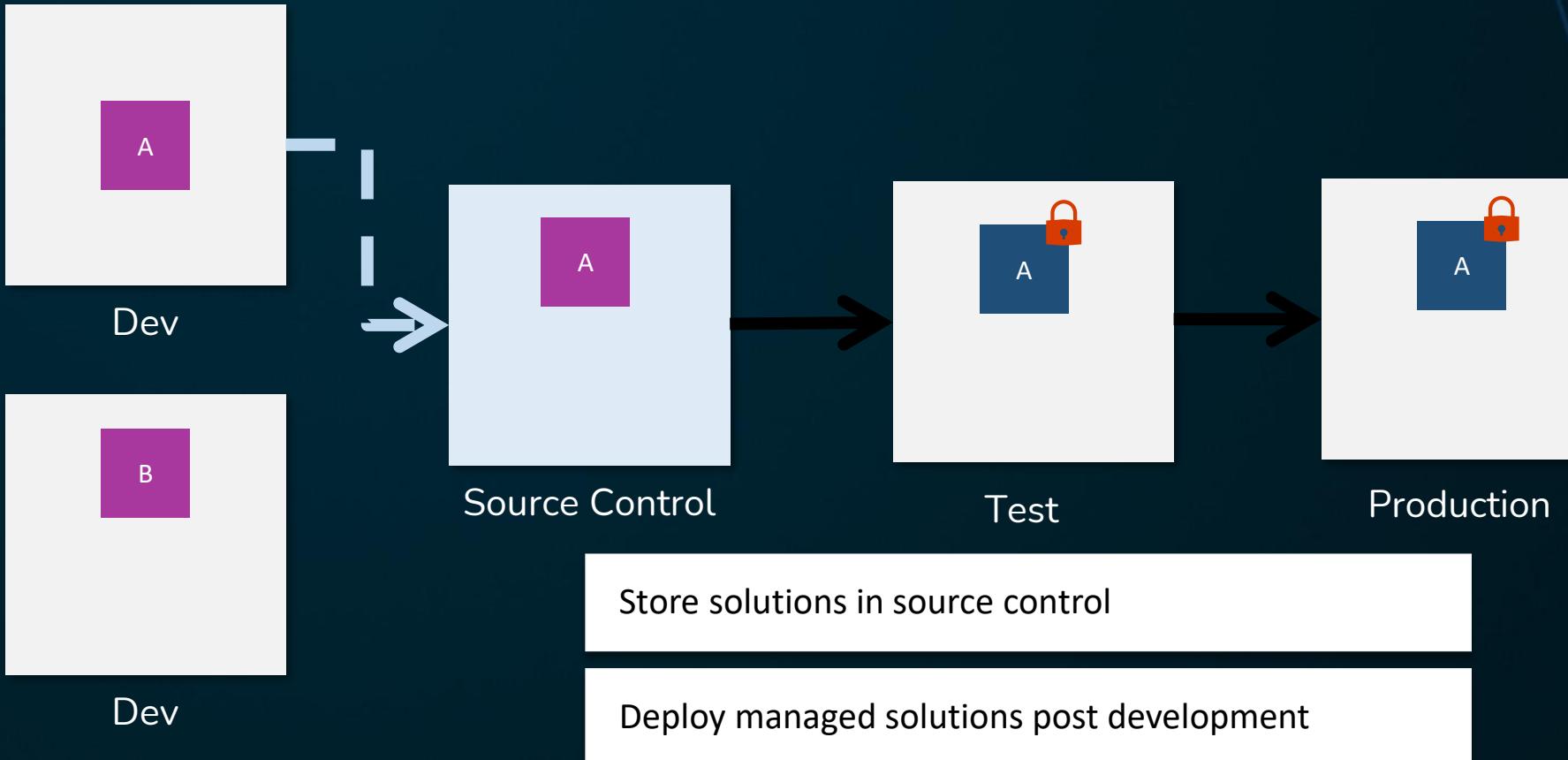
# Team development overview



# Team development – a better way

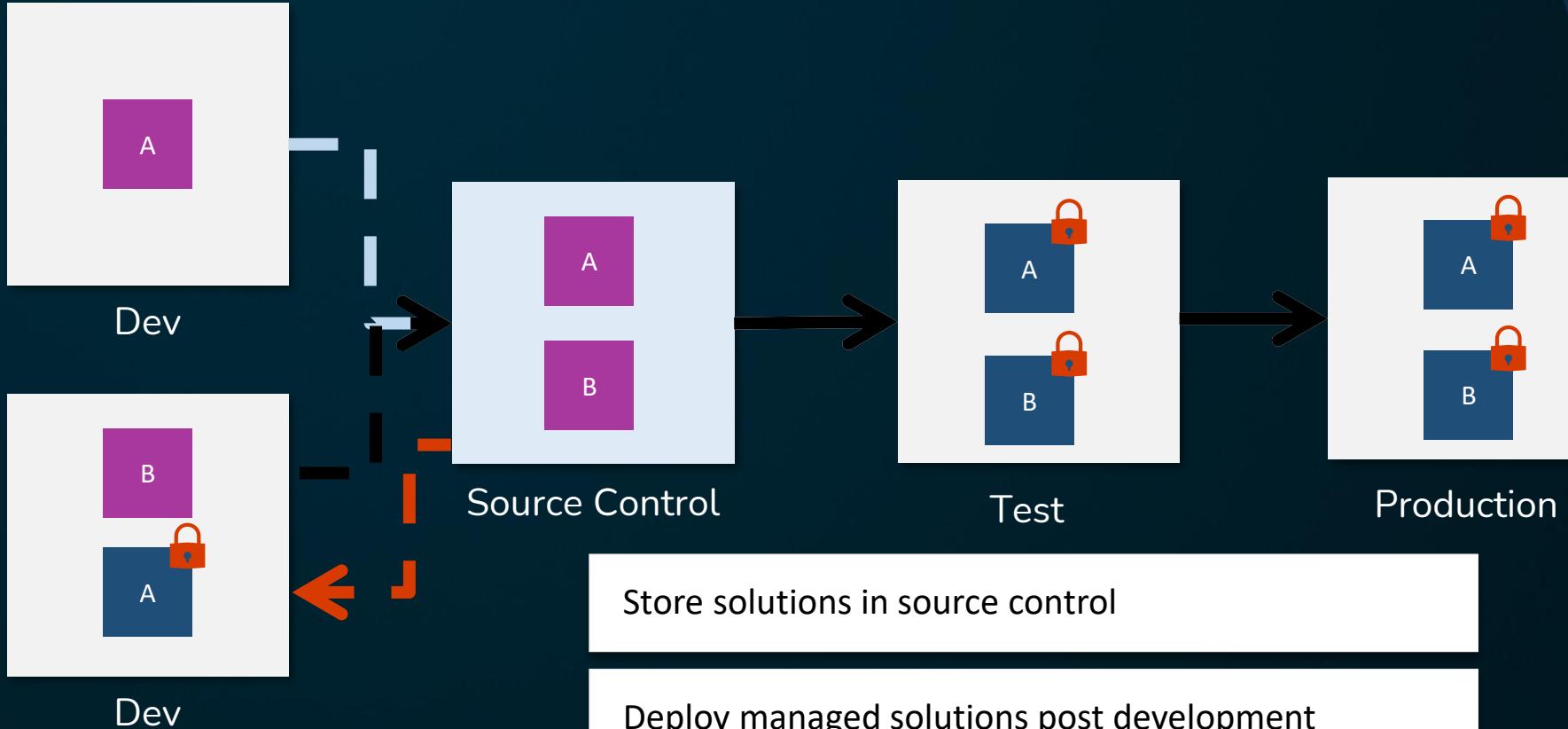
# A better way

Solution development: a modern approach



# A better way

Solution development: a modern approach



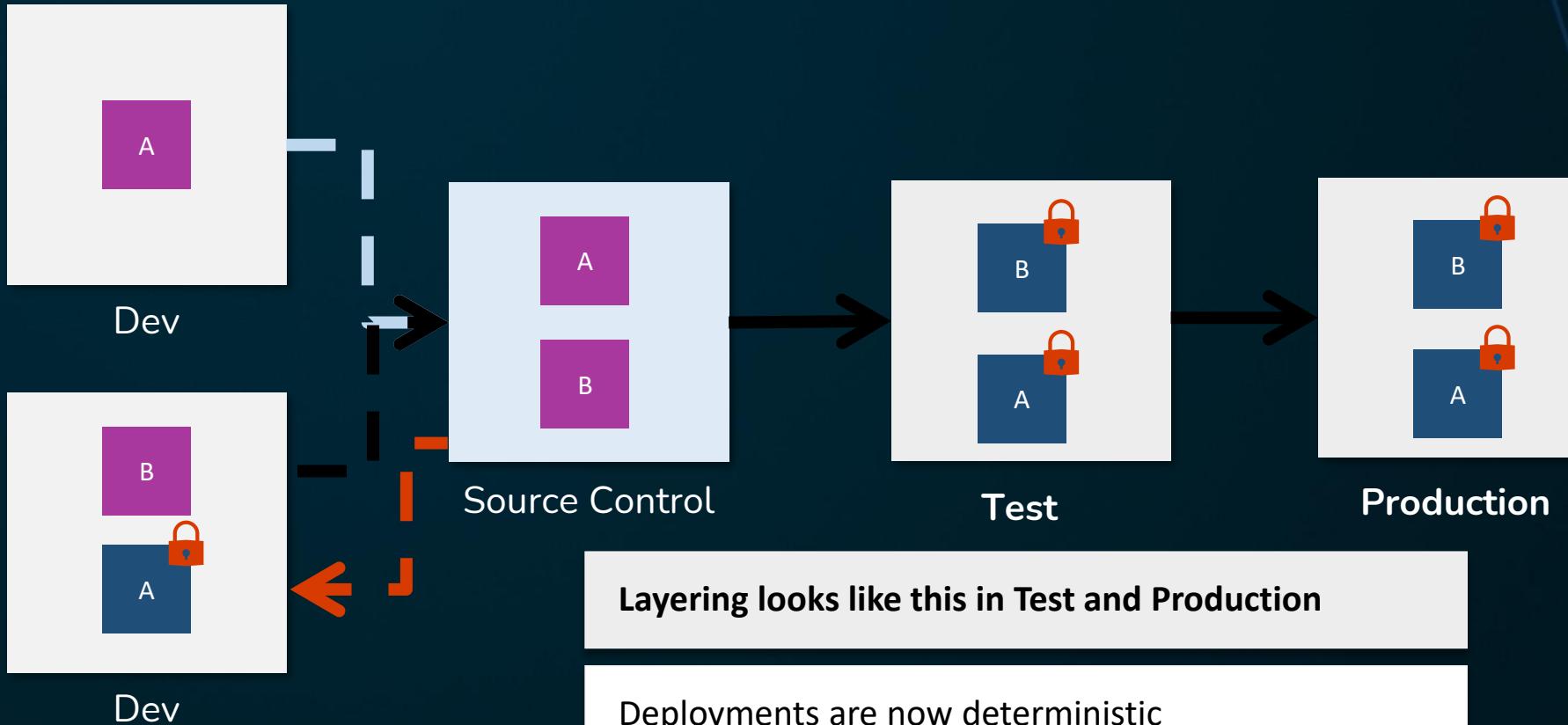
Store solutions in source control

Deploy managed solutions post development

Satisfy dependencies with managed solutions

# A better way

Solution development: a modern approach

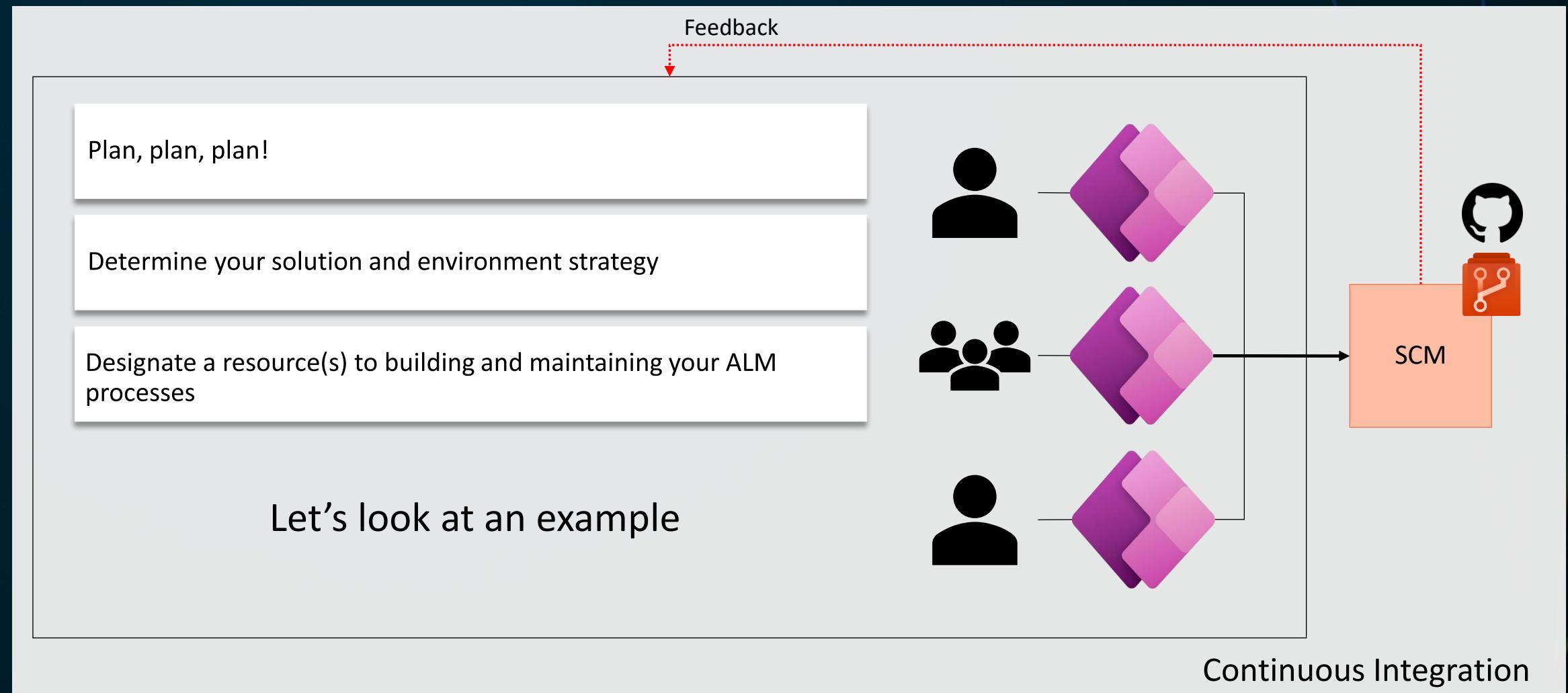


**Layering looks like this in Test and Production**

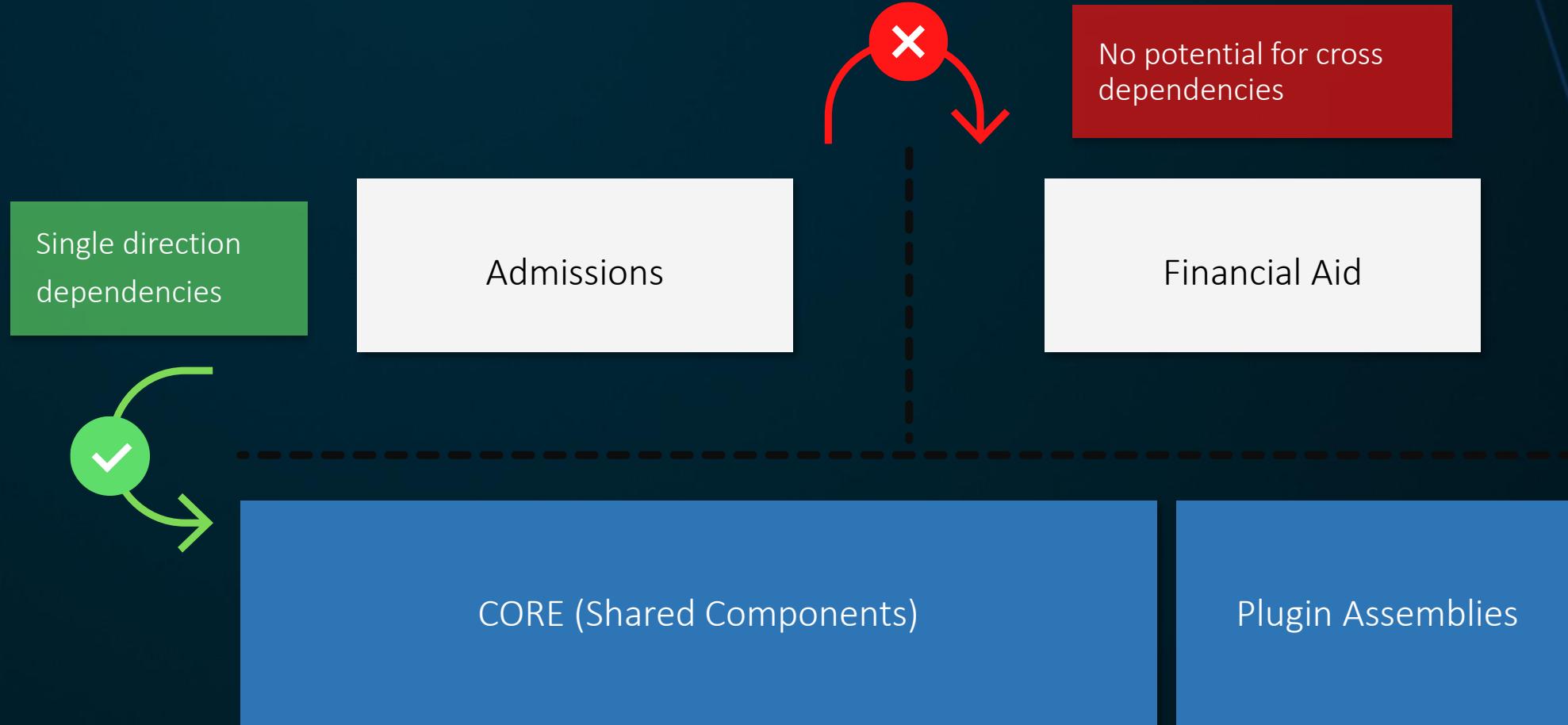
Deployments are now deterministic

Each solution can be deployed on a separate lifecycle

# Supporting Team Development

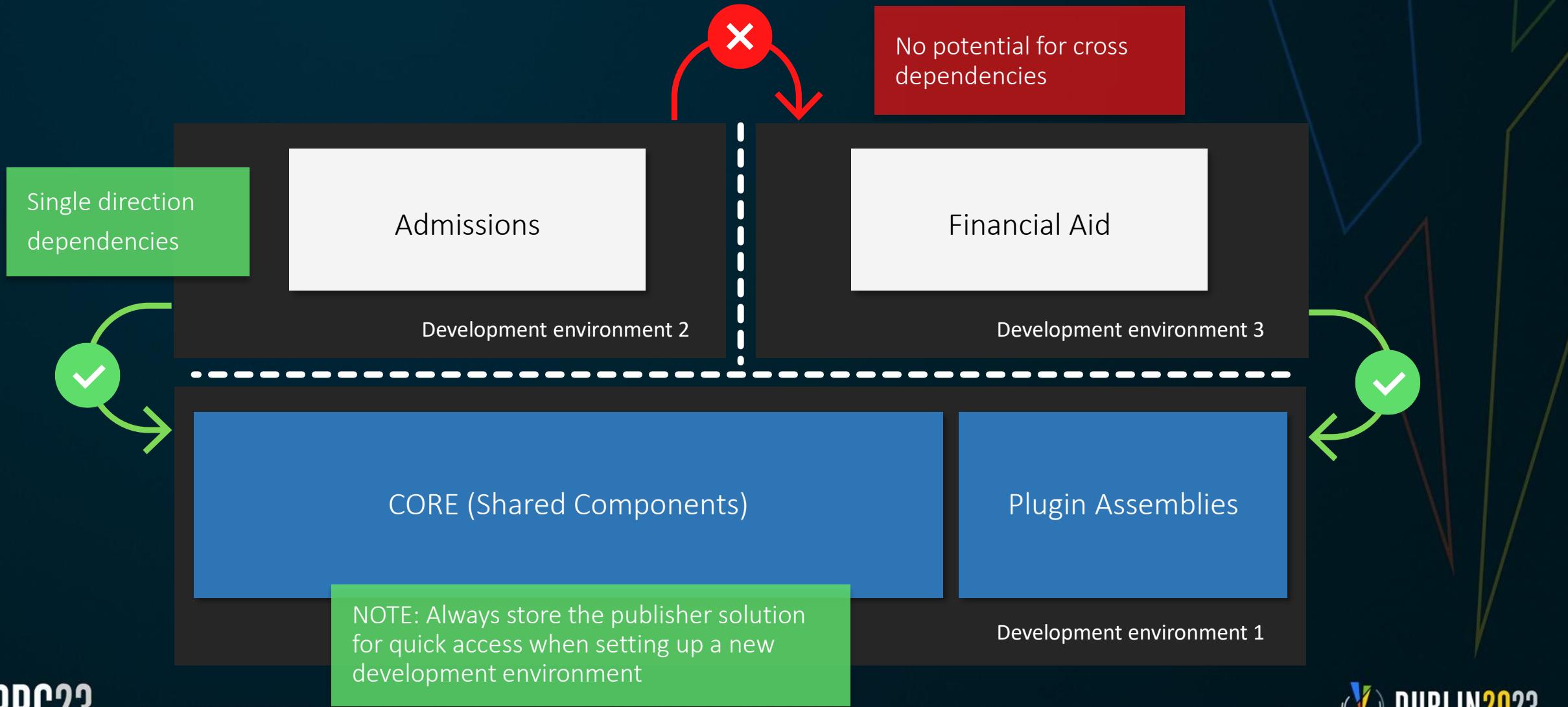


# Solution Strategy



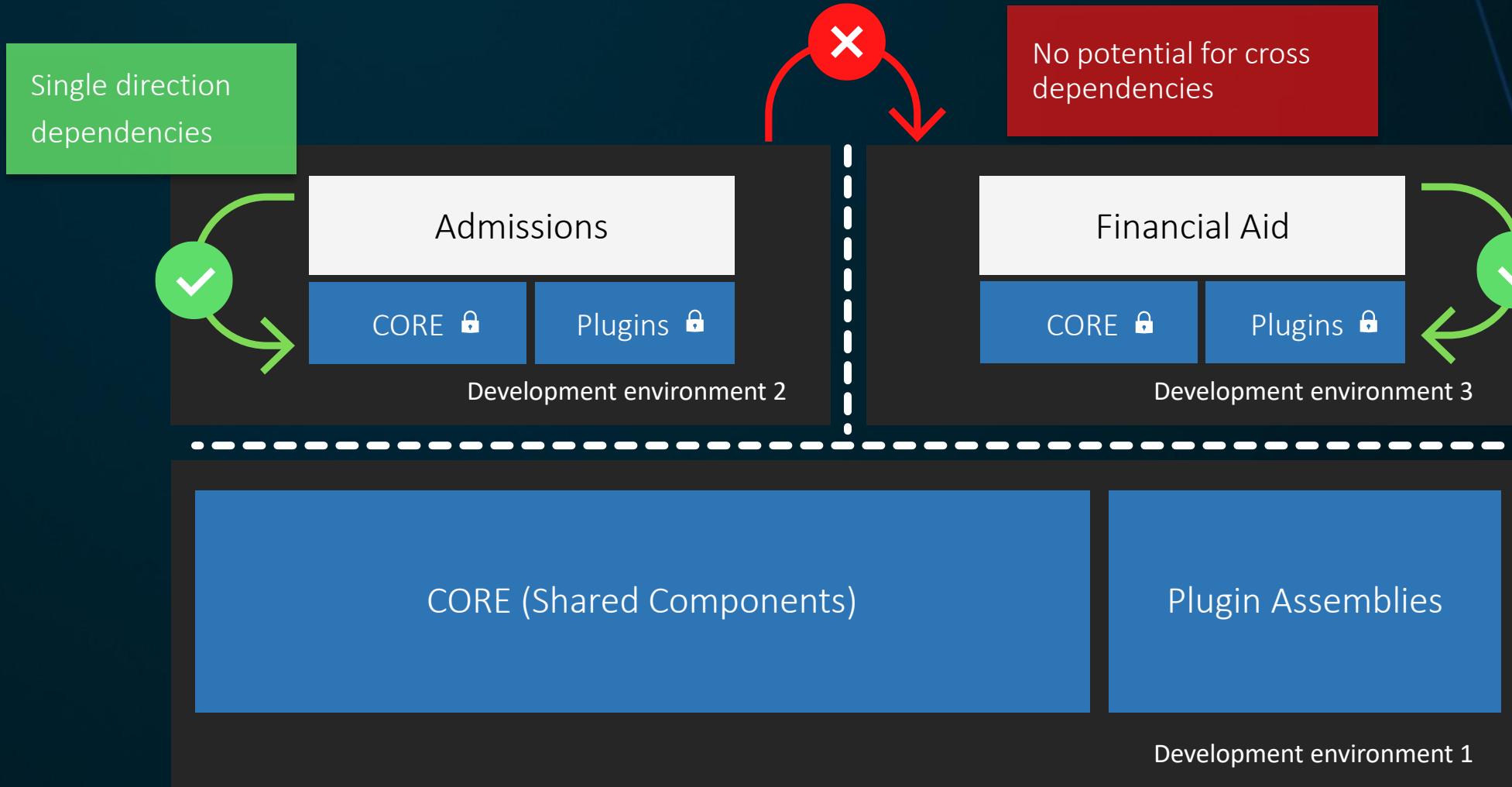
# Solution and environment strategy

Applying an environment strategy to align with solution architecture



# Solution and environment strategy

Applying an environment strategy to align with solution architecture



# Solution layering

Layering as seen post deployment when using managed solutions

Note that Plugin assemblies generally come first\*

Initially import order of Financial Aid and Admissions doesn't matter

Once deployment occurs your solution order is set in place

Financial Aid

Admissions

CORE (Shared Components)

Plugin Assemblies

# Team development

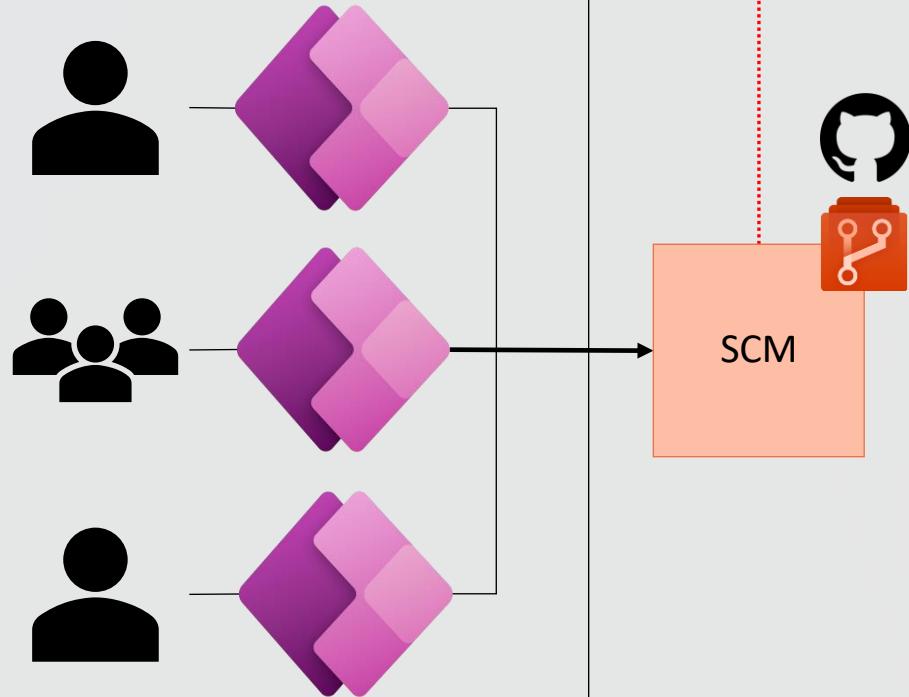
Let's look at an example  
Solution and environment strategy in practice

Solution: Core  
Depends On: None

Solution: Admissions  
Depends On: Core

Solution:  
Financial Aid  
Depends On: Core

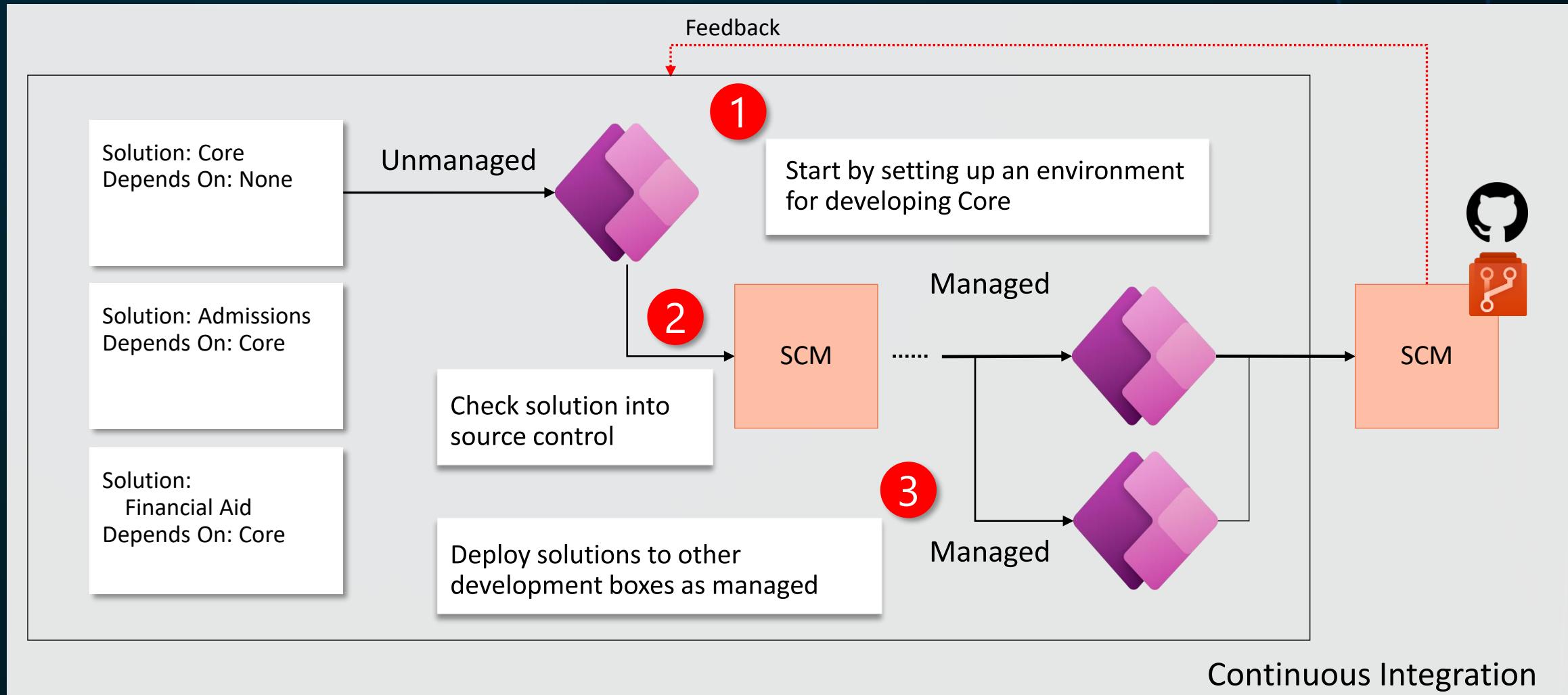
Feedback



Continuous Integration

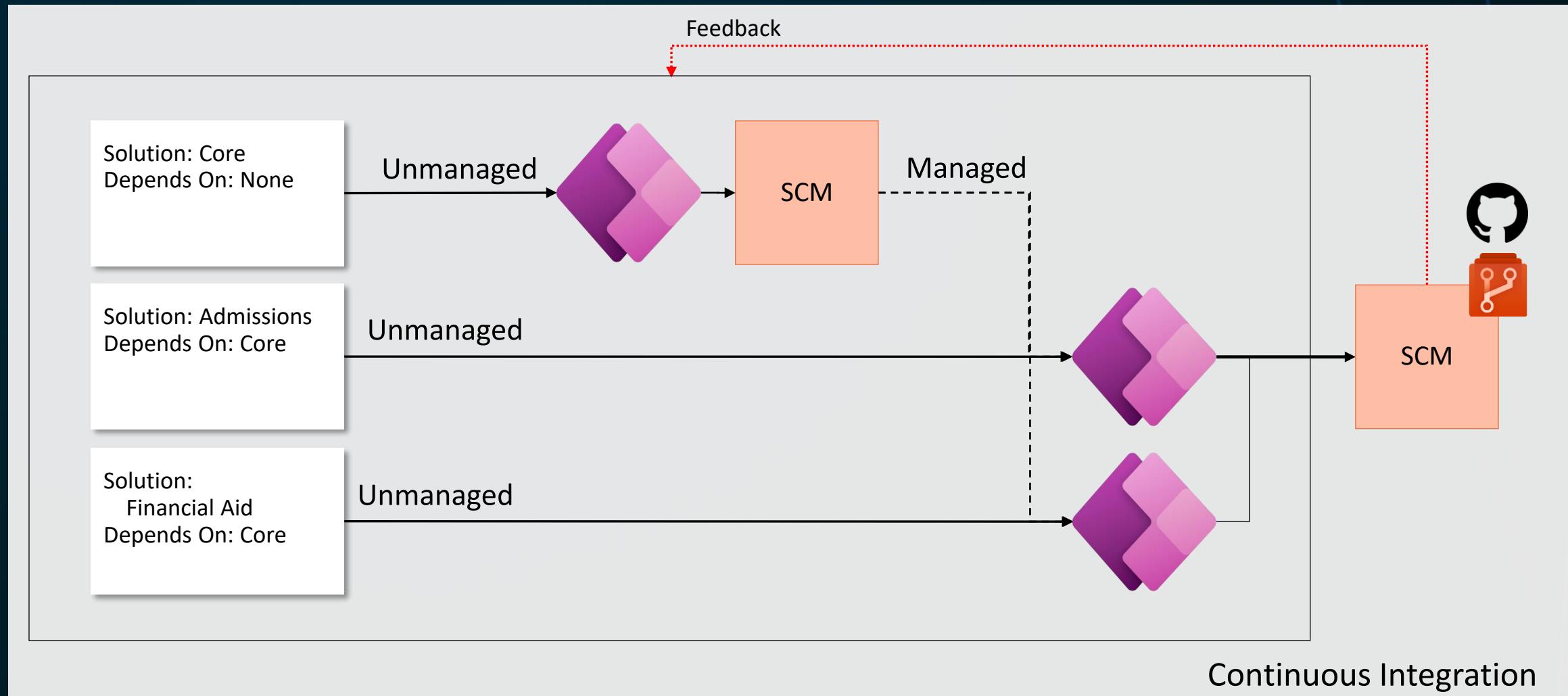
# Team development

Example: Development process setup



# Team development

Example: Development process setup - continued





# Lab 03 - Work with solutions with a team

20 min

<https://aka.ms/EPPC23-ALM/Lab03>

# Lab 03 - Work with solutions with a team

In Lab 02 you learned how to work with solutions. Now we are going to focus on building solutions when you're in a team.

- What do you need to do when you were working on another project in the mean time and your team member has improved the solution in the dev environment? (pac solution clone / pac solution sync)
- What do you need to do when a team member updated the solution in source control and you want to get the latest version from that? (pac solution pack + pac solution import)
- We are all team players, so we all want to make sure our solution works. Lets run a check for errors before we deploy the solution to production (pac solution check)

<https://aka.ms/EPPC23-ALM/Lab03>

# Lab 03 - Wrap Up

Show what you learned

# Power Platform Pipelines

#EPPC23

 DUBLIN2023

# Pipelines simplify ALM for all makers

The screenshot shows the 'Deployment Pipeline Configuration' page in the Power Apps portal. It displays a 'General' section with the pipeline name, description (using it for all deployments except hot fixes), and owner ('Casey Burke (Available)'). Below this is a 'Linked Development Environments' table listing three environments: 'calibur Dev', 'Dev Env-2', and 'Dev Env-3'. At the bottom, a 'Deployment Stages' table shows a single stage named 'Test'.

The screenshot shows the 'Pipelines' page in the Power Apps portal. It lists a pipeline named 'Contoso Standard Pipeline'. Three stages are shown: 'Development' (status: Success), 'Deploy to Test' (status: Success), and 'Deploy to Production' (status: Success). Each stage has a 'Deploy here' button.

```
Administrator: Windows PowerShell
Windows PowerShell
Copyright (C) Microsoft Corporation. All rights reserved.

Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
PS C:\Windows\system32> cd ..\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC> cd ..\Microsoft\PowerApps\CLI\1.18.x-daily-220908\bin\tools
PS C:\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC\Microsoft\PowerApps\CLI\1.18.x-daily-220908\bin\tools> .\spac.exe auth create --client Tip2
calibur@Tip2:~> spac.exe auth create
Authentication profile created
  * (INTERNAL)           : calibur@microsoft.com          Tip2
PS C:\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC\Microsoft.PowerApps\CLI\1.18.x-daily-220908\bin\tools> .\spac.exe org list --filter Contoso
Contoso Development Environment (Pipelines) f06cc07d-7110-ed45-b04b-768096... https://org946129b.crm4.dynamics.com unsp8863f5fc1c443bd8121fecc1f04
Contoso Most Environment (Pipelines) 246b532-41e0-edab-9a6a-92a02d351d3 https://org994d91b.crm4.dynamics.com unsp16942d461a0bb0b3c7a7bd5d2
Contoso Test Environment (Pipelines) 4f11b9e-1a39-ed1b-aef7-d2c7f2041fc https://org97c73d9.crm4.dynamics.com unsp100f975d4990848f1c5deec7
Contoso Production Environment (Pipelines) f0b0c12e-5af2-e4a1-b5d-471085db2a01 https://org98d1a6.crm4.dynamics.com unsp10a0d310974310804d070bae5
Contoso Test Environment (Pipelines) 4f11b9e-1a39-ed1b-aef7-d2c7f2041fc https://org97c73d9.crm4.dynamics.com unsp100f975d4990848f1c5deec7
Contoso Development Environment (Pipelines) 246b532-41e0-edab-9a6a-92a02d351d3 https://org946129b.crm4.dynamics.com unsp8863f5fc1c443bd8121fecc1f04
PS C:\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC\Microsoft.PowerApps\CLI\1.18.x-daily-220908\bin\tools> .\spac.exe org select unsp246b532-41e0-edab-9a6a-92a02d351d3
Looking for environment '246b532-41e0-edab-9a6a-92a02d351d3'
Selected org 'contoso most environment (Pipelines)': https://org946129b.crm4.dynamics.com for current authentication profile.
PS C:\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC\Microsoft.PowerApps\CLI\1.18.x-daily-220908\bin\tools> .\spac.exe pipeline list - contoso
Contoso Standard Pipeline
Deployment Stages:
  Deployment Stage      Description      ID
  Deploy to Production environment      14
  Deploy to Production environment      15
  Deploy to Test      for quality assurance testing      16
  Deploy to Test      for quality assurance testing      17
PS C:\Users\calibur\OneDrive - Microsoft\Documents\daily Build\PAC\Microsoft.PowerApps\CLI\1.18.x-daily-220908\bin\tools>
```



Admins

Setup Pipeline in < 2 min

#EPPC23

Full governance and visibility



Citizen devs

Initiate one click deployment

Democratizes ALM for citizen makers



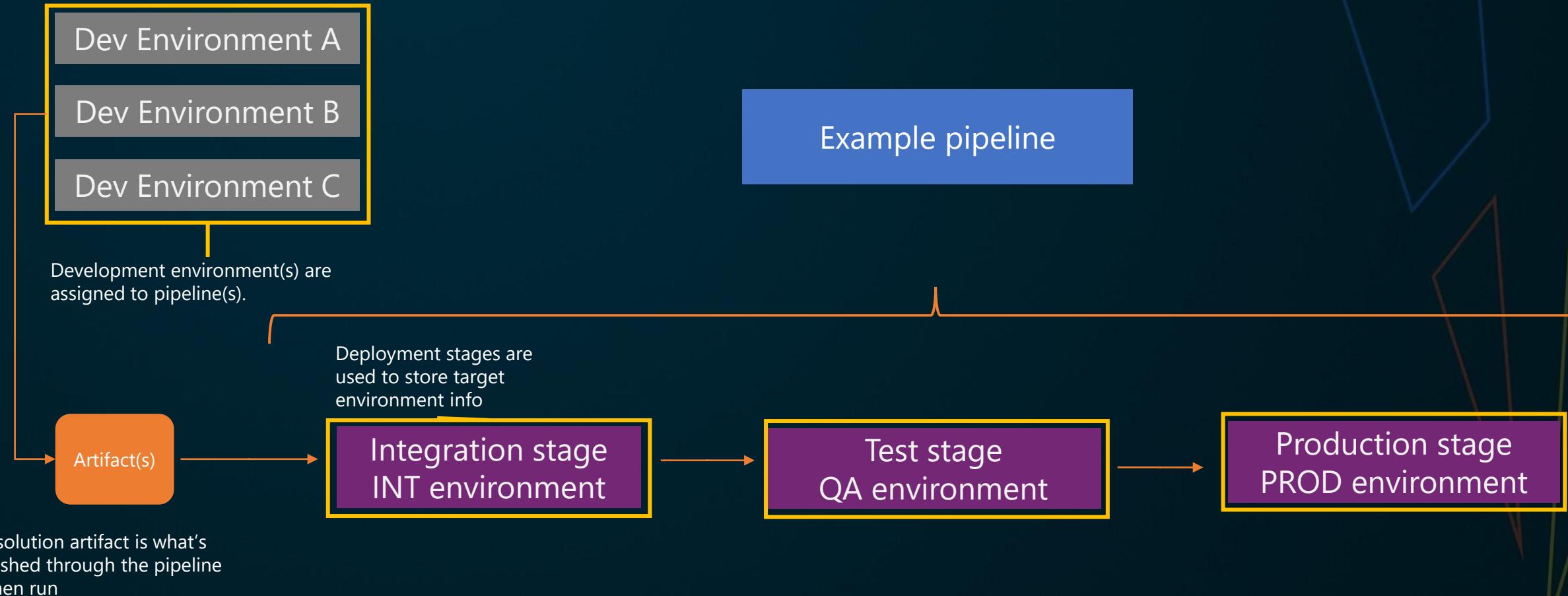
Developers

Run pipelines via CLI

Fusion development & automation

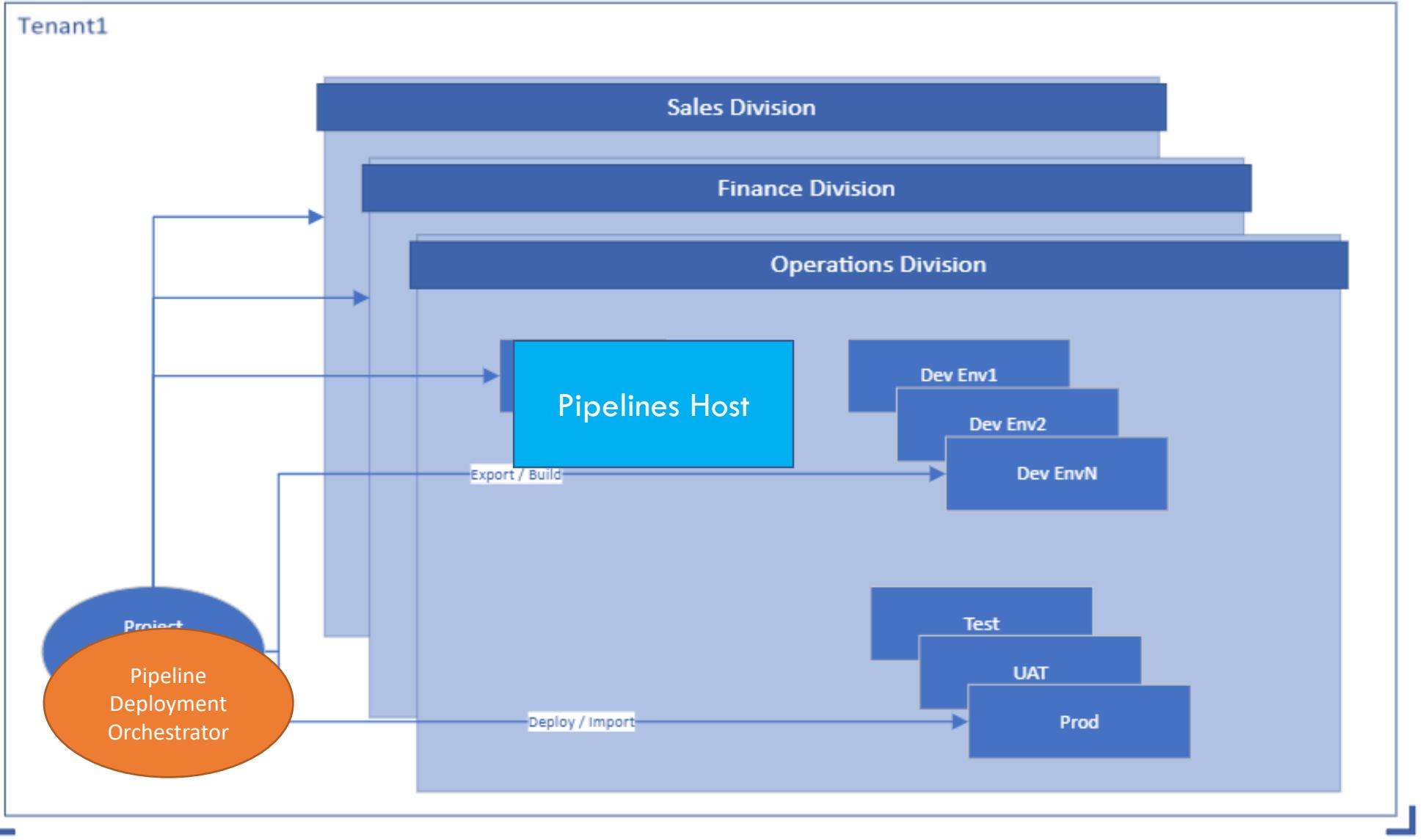
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# Pipelines Topology



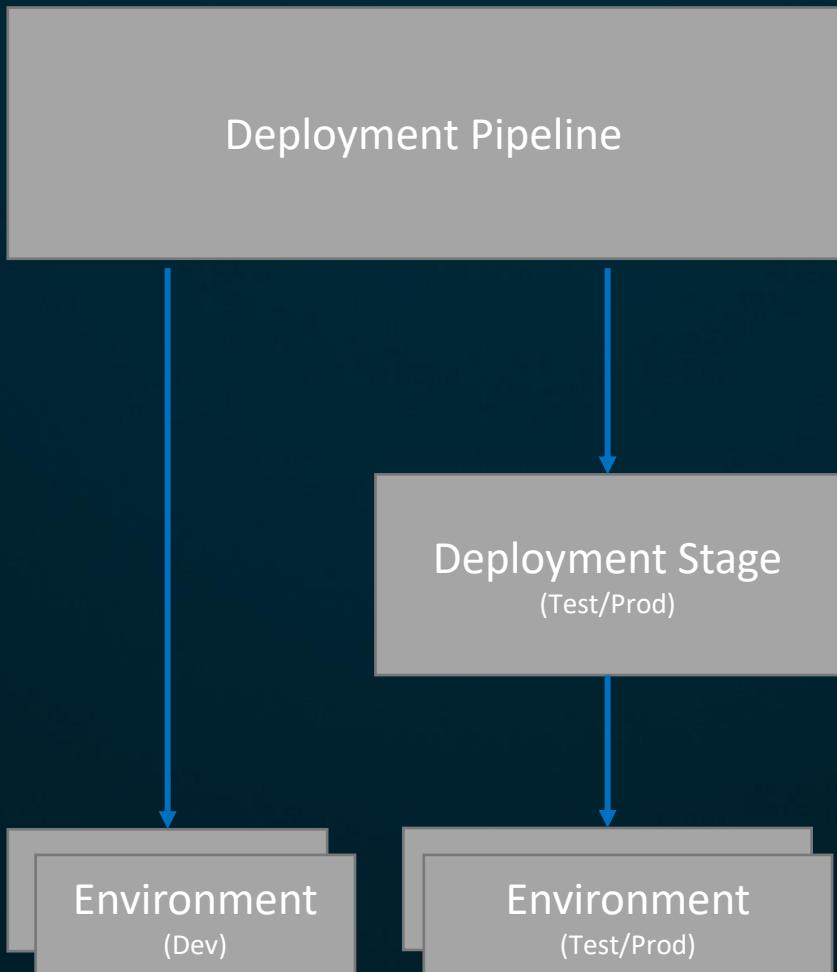
# Pipelines Architecture

Geo1

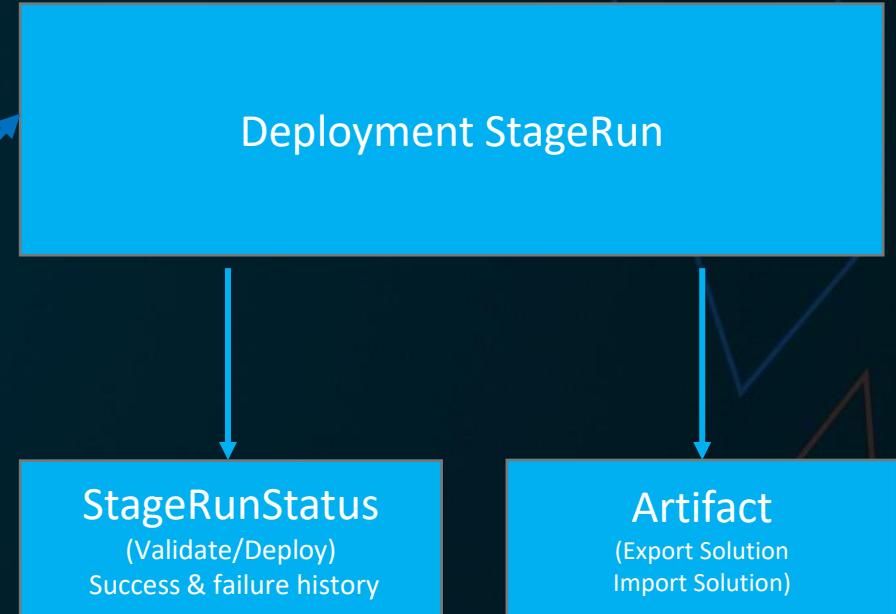


# Pipelines Tables

Pipeline Configuration (Model App)



Run Pipeline Deployment (Maker Portal)



Pipeline Admin Role: Deployment Pipeline Administrator

Maker persona Role: Deployment Pipeline User

## Pipelines Fusion development support

We recommend =>

- Use Pipeline Configuration app (Pipeline Admin)
- Use Maker Portal (Citizen Maker or Advance Maker)
- Use PAC CLI to Deploy (**Fusion development** for – Pro Devs or Advance Maker)

# Pipelines PAC CLI

//PAC CLI Commands for Pipelines - You should be in Host context to be able to deploy to target env

## //Initial setup

- pac auth list => Who is authenticated through current authentication profile
- pac org list => List of orgs and env id detail
- pac org select --environment **contosohost** => Select your Pipelines Host env from where you will orchestrate deployments for various pipelines
- pac org who => Check if your Pipelines Host env is selected for current auth profile

## //pac pipeline commands => list & deploy

- pac pipeline help
- pac pipeline list help
- pac pipeline deploy help

# Pipelines PAC CLI

**//Get list of Deployment Stages of a pipeline**

- pac pipeline list

**//Get Stage details of chosen Pipeline which is needed for deployment**

- pac pipeline list -p "Awesome Pipeline"

**//Deploy to QA**

- pac pipeline deploy -sn "EventRegistration" -cv 1.0.0.11 -nv 1.0.0.12 -sid 986fb1ce-83b7-ed11-83fe-000d3a59ccda -env "ContosoSalesDev" -w

**//Deploy to Prod**

- pac pipeline deploy -sn "EventRegistration" -cv 1.0.0.11 -nv 1.0.0.12 -sid 53c19be5-83b7-ed11-83fe-000d3a59ccda -env "ContosoSalesDev" -w



# Managed Environments

Streamline governance at scale



## More visibility

- Usage insights
- Admin digest
- License reports
- Data policy view



## More control

- Sharing limits
- Solution checker
- Maker onboarding



## Less effort

- Easy activation
- Pipelines



# Managed Environments

Feature availability

Learn more at:

[aka.ms/managedenvforpower](http://aka.ms/managedenvforpower)

<https://thelowcodeapproach.podbean.com/>

<https://www.youtube.com/watch?v=BXGKF42YXJE>

| Q1 CY2023       |   |
|-----------------|---|
| More visibility | Usage insights <span style="color: yellow;">(✓)</span><br>Private Preview   |
| More control    | Admin digest <span style="color: yellow;">(✓)</span><br>License reports <span style="color: yellow;">(✓)</span><br>Data policy view <span style="color: yellow;">(✓)</span><br>Apps Sharing limits <span style="color: yellow;">(✓)</span><br>Flows Sharing limits <span style="color: yellow;">(✓)</span><br>Private Preview<br>Solution checker <span style="color: yellow;">(✓)</span> |
| Less effort     | + Maker onboarding <span style="color: yellow;">(✓)</span><br>Private Preview<br>Easy activation <span style="color: yellow;">(✓)</span><br>Pipelines <span style="color: yellow;">(✓)</span>   |

# Easy Activation

The screenshot shows the Microsoft Power Platform admin center interface. On the left, there's a navigation sidebar with options like Home, Environments, Analytics, Resources, Help + support, Data integration, Data (preview), Policies, and Admin centers. The main area is titled "Environments" and lists several environment entries:

| Name                    | Type                | Managed | State | Region        | Created on      | Created by |
|-------------------------|---------------------|---------|-------|---------------|-----------------|------------|
| ContosoOps              | Production          | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| ContosoITProduction     | Production          | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| Default                 | Production          | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| Contoso announcements   | Microsoft Teams     | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| ContosoITTest           | Developer           | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| ContosoITDev            | Development         | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |
| North American Pipeline | Deployment pipeline | No      | Ready | United States | 1/11/20 2:05 PM | Mona Kane  |

A tooltip is displayed over the "Add environment management" button, reading "Enable Managed Environments (Preview)". The browser address bar shows the URL <https://admin.powerplatform.microsoft.com/>. The system tray at the bottom right shows the date and time as 1/11/2021 1:58 PM.

# Weekly Digest

The screenshot shows the Power Platform admin center interface. On the left, the sidebar includes sections like Home, Environments, Analytics, Resources, Help + support, Data integration, Data (preview), Policies, and Admin centers. The main area displays a table of environments:

| Name                    | Type                | Managed | State | Region        |
|-------------------------|---------------------|---------|-------|---------------|
| ContosoOps              | Production          | No      | Ready | United States |
| ContosoITProduction     | Production          | No      | Ready | United States |
| Default                 | Production          | No      | Ready | United States |
| Contoso announcements   | Microsoft Teams     | No      | Ready | United States |
| ContosoITTest           | Developer           | No      | Ready | United States |
| ContosoITDev            |                     | No      | Ready | United States |
| North American Pipeline | Deployment pipeline | No      | Ready | United States |

A modal dialog titled "Add environment management" is open for the "ContosoOps" environment. The dialog has a header "Enable Managed Environments". It contains the following sections:

- Weekly digest**: Includes a note about increasing visibility and control for ContosoOps, a toggle switch for "Include this environment" (which is turned on), and a recipient input field containing "someone@contoso.com".
- Limit sharing**: Includes a note about reducing risk by limiting canvas app sharing, a toggle switch for "Exclude security groups" (off), and a dropdown for "Limit total individuals who can be shared to" set to "No limit".
- Data policies**: Includes a note about safeguarding organizational data by limiting available connectors, and a link to "See active data policies for this environment".

At the bottom of the dialog are "Add" and "Cancel" buttons.

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# Sharing Controls

The screenshot shows the Power Platform admin center interface. A modal window titled "Share hello world" is open, prompting the user to add people as Users and Co-owners to the app. It includes fields for entering names or email addresses, a list of users (Adele Vance selected), and permission levels (New users). Below this, a "Data permissions" section is visible. The background shows a table of environments with columns for Name, Type, Managed, State, Region, and Unit ID. On the right, there are sections for "Add environment management", "Weekly digest", "Limit sharing", and "Data policies". The bottom of the screen shows a taskbar with the "#EPPC18" hashtag.

Power Platform admin center

https://admin.powerplatform.microsoft.com/

Power Platform admin center

Search

New environment Refresh Recover deleted environments Learn about managed environments

Environments

| Name | Type | Managed | State | Region        | Unit ID |
|------|------|---------|-------|---------------|---------|
|      |      |         | Ready | United States | Unit 1  |
|      |      |         | Ready | United States | Unit 2  |
|      |      |         | Ready | United States | Unit 3  |
|      |      |         | Ready | United States | Unit 4  |
|      |      |         | Ready | United States | Unit 5  |
|      |      |         | Ready | United States | Unit 6  |
|      |      |         | Ready | United States | Unit 7  |
|      |      |         | Ready | United States | Unit 8  |
|      |      |         | Ready | United States | Unit 9  |
|      |      |         | Ready | United States | Unit 10 |
|      |      |         | Ready | United States | Unit 11 |
|      |      |         | Ready | United States | Unit 12 |
|      |      |         | Ready | United States | Unit 13 |
|      |      |         | Ready | United States | Unit 14 |
|      |      |         | Ready | United States | Unit 15 |
|      |      |         | Ready | United States | Unit 16 |
|      |      |         | Ready | United States | Unit 17 |
|      |      |         | Ready | United States | Unit 18 |
|      |      |         | Ready | United States | Unit 19 |
|      |      |         | Ready | United States | Unit 20 |

Add environment management

Increase visibility and control for ContosoOps. [Learn more](#)

Once added, end users will need standalone Power Apps or Power Automate licenses to run apps and flows in this environment. [Learn more](#)

Share hello world

Add people as Users and Co-owners to your app. Make sure your data connections have been shared with all users.

Apps in this environment cannot be shared with security groups or more than 20 users. [Learn more about your organization's governance policies or contact your admin](#)

Enter a name, email address, or Everyone

New users

Adele Vance User

Shared with Sort by Name

Co-owner

This user can use this app.

Can use, edit, share app but not delete or change owner.

Data permissions

Make sure your users have access to the data used in your app, including gateways, APIs, connectors, and tables.

Share Cancel

Weekly digest

Include data on most- and least-used resources in this environment in a weekly email summary for tenant admins. For richer data analysis, make sure tenant-level analytics are turned on. [Learn more](#)

Include this environment

Also send to

someone@contoso.com

All tenant admins receive the weekly digest. [Manage additional recipients here](#).

Limit sharing

Help reduce risk by limiting how widely canvas apps can be shared. [Learn more](#)

Exclude security groups

Off

Limit total individuals who can be shared to

Off No limit

Data policies

Help safeguard your organizational data by limiting the connectors available. [Learn more](#)

See active data policies for this environment

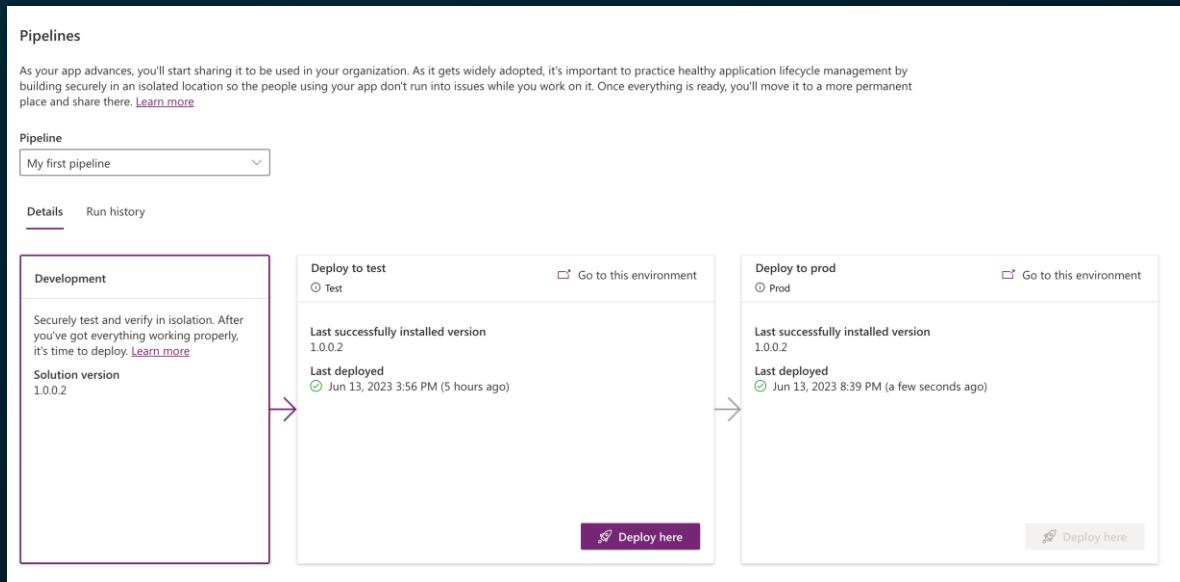
#EPPC18

Search files or web

1:58 PM 7/27/2021

# Lab 4 – Build your first pipeline with pipelines for Power Platform

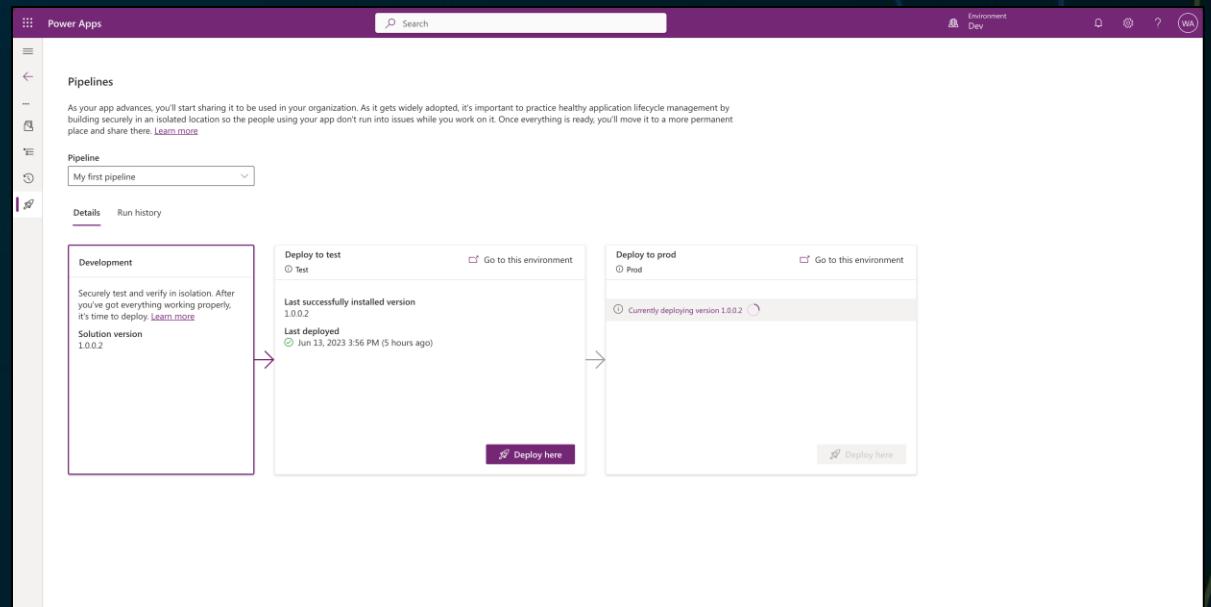
<https://aka.ms/EPPC23-ALM/Lab04>



# Lab 4 – Build your first pipeline with pipelines for Power Platform

In this lab, you will:

- Deploy the pipelines app
- Setup your first pipeline
- Run your first pipeline



<https://aka.ms/EPPC23-ALM/Lab04>

# Lab 4 – Build your first pipeline with pipelines for Power Platform

## Resources:

Overview of pipelines in Power Platform

<https://learn.microsoft.com/en-us/power-platform/alm/pipelines>

Set up pipelines in Power Platform

<https://learn.microsoft.com/en-us/power-platform/alm/set-up-pipelines>

Run pipelines in Power Platform

<https://learn.microsoft.com/en-us/power-platform/alm/run-pipeline>

# Lab 04 - Wrap Up

Show what you learned

# Power Platform Build Tools for Azure DevOps

**Use Power Platform Build Tools to automate common build and deployment tasks related to Power Platform.**

This includes:

- provisioning/de-provisioning of environments
- synchronization of solution metadata (a.k.a. solutions) between development environments and source control
- generating build artifacts
- deploying to downstream environments
- performing static analysis checks against your solution using the PowerApps checker service.

The screenshot shows the Azure DevOps Pipeline Editor interface. On the left, there's a sidebar with various icons for repository, triggers, pool, and steps. The main area displays an `azure-pipelines.yml` file with the following content:

```
1 # Starter pipeline
2 # Start with a minimal pipeline that you can customize to build and deploy your code.
3 # Add steps that build, run tests, deploy, and more:
4 # https://aka.ms/yaml
5
6 trigger:
7 - master
8
9 pool:
10   vmImage: ubuntu-latest
11
12 steps:
13 - script: echo Hello, world!
14   displayName: 'Run a one-line script'
15
16 - script: |
17   echo Add other tasks to build, test, and deploy your project.
18   echo See https://aka.ms/yaml
19   displayName: 'Run a multi-line script'
20
```

To the right, there's a "Tasks" pane with a search bar and a list of available tasks under the heading "power platform". The tasks listed are:

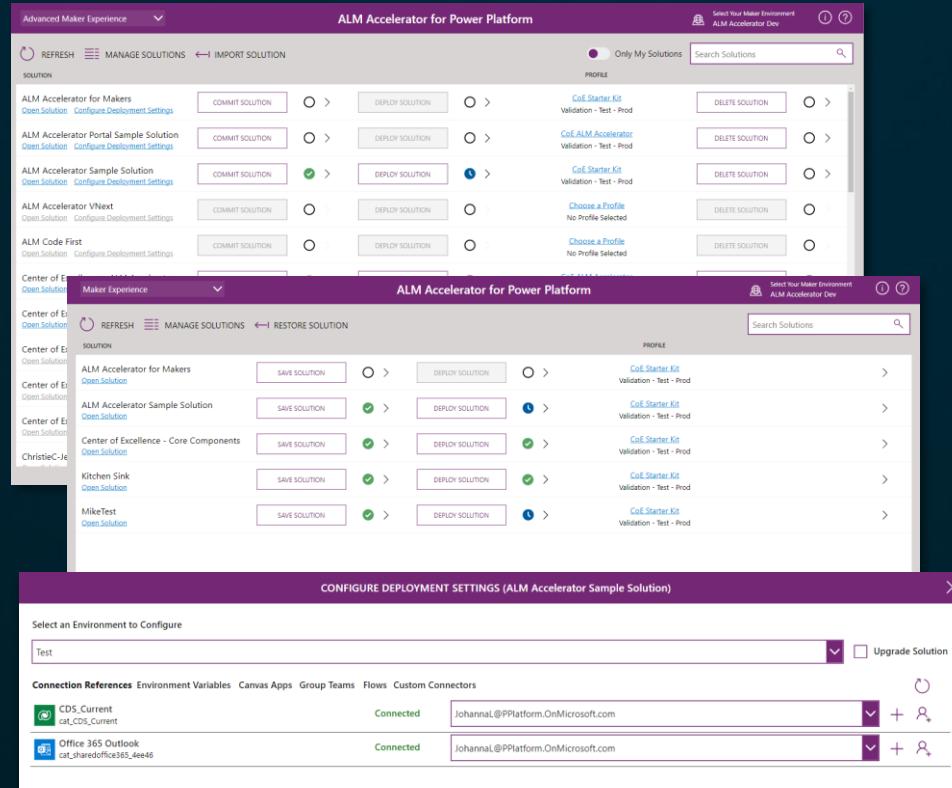
- Power Platform Apply Solution Upgrade [BETA]
- Power Platform Backup Environment [BETA]
- Power Platform Backup Environment [BETA]
- Power Platform Checker [BETA]
- Power Platform Checker [BETA]
- Power Platform Copy Environment

# ALM Accelerator For Power Platform

The screenshot shows the 'Power Platform ALM Accelerator' interface. On the left, a list of 'SOLUTION' items is displayed, each with 'COMMIT SOLUTION' and 'DEPLOY SOLUTION' buttons. To the right, there's a 'PROFILE' section with three entries: 'Azure DevOps Test Validation - Test - Prod', 'Azure DevOps Test Validation - Test - Prod', and 'GitHub Production Validation - Test - Prod'. Below this is a navigation bar with 'jeschro-cdx / ALMAcceleratorSampleSolu...' and 'Pipelines'. The main area is titled 'Pipelines' and shows a 'Recent' tab with five recently run pipelines: 'deploy-test-ALMAcceleratorSampleSolution', 'deploy-validation-ALMAcceleratorSample...', 'export-solution-to-git', 'deploy-prod-ALMAcceleratorSampleSolut...', and 'import-unmanaged-to-dev-environment'. Each pipeline entry includes a status icon, the pipeline name, the last run ID, and a 'Manually trigger' button.

- Open-Source project maintained by Power CAT.
- Aligned with latest in-product features and tools.
- Customizable to suit the needs of an organization through configuration or extensions.
- Monthly releases [github.com/microsoft/coe-starter-kit](https://github.com/microsoft/coe-starter-kit).
- Active Issues, Discussions Forum and Backlog.
- Extensive documentation on [learn.microsoft.com](https://learn.microsoft.com).

# ALM Accelerator For Power Platform



- **User Profile Configuration**
  - Customize UI and available capabilities per user / team
- **Deployment Profile configuration**
  - Configure downstream environments for deployment of Solution
  - Link Solution to Azure DevOps Project / Repository
- **Configuration of downstream deployment settings**
  - Connection References
  - Environment Variables
  - Canvas App Sharing
  - Dataverse Teams and Security Roles
  - Flow ownership, sharing and activation
  - Custom Connector sharing

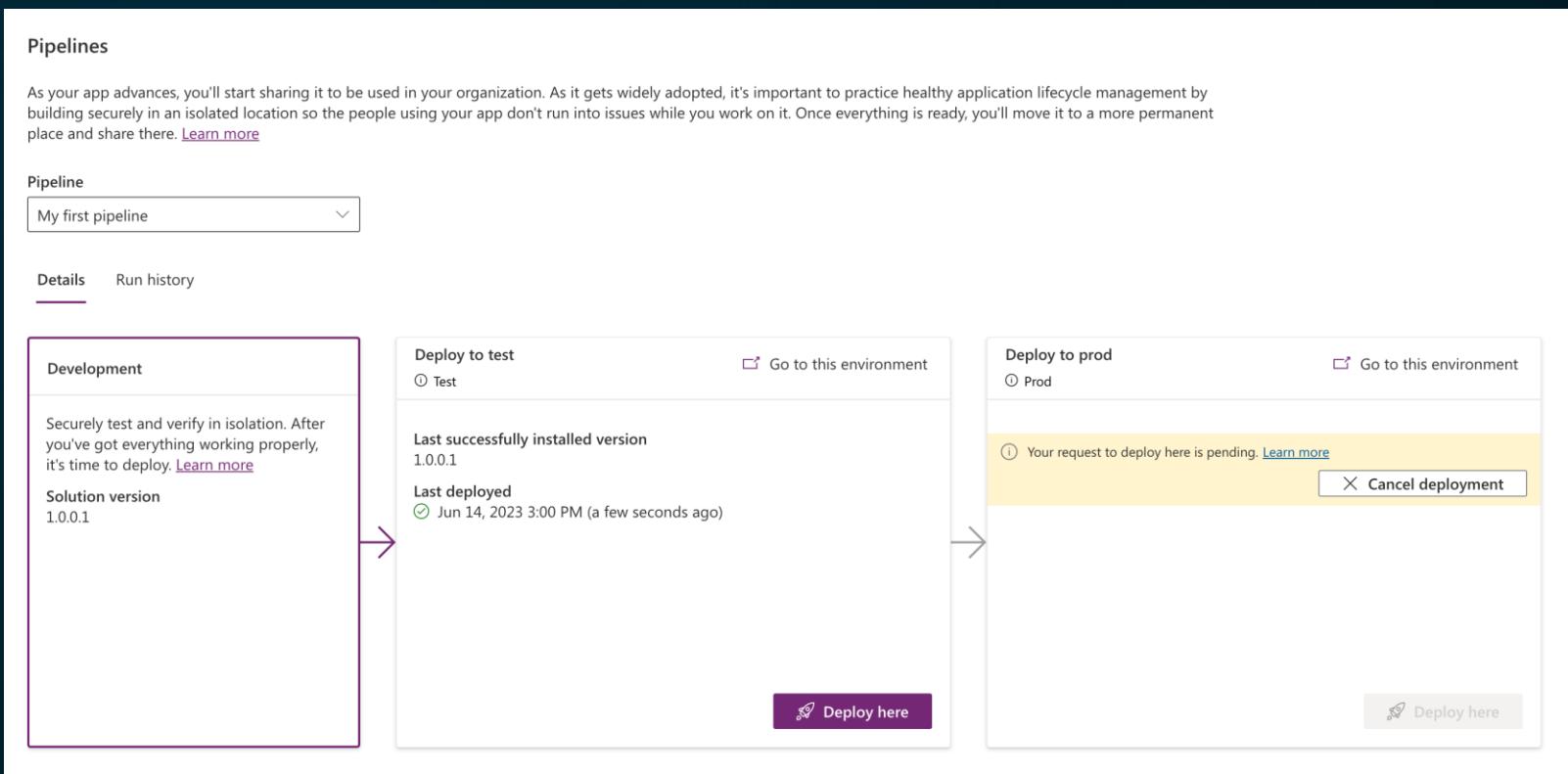
# ALM Accelerator For Power Platform

The screenshot shows the ALM Accelerator for Power Platform's Pipelines page. On the left is a vertical toolbar with icons for Home, Pipelines, Components, Solutions, Data, and Help. The main area has tabs for Pipelines, Recent, All, and Runs. A 'New pipeline' button and a 'Filter pipelines' search bar are at the top right. The 'Recently run pipelines' section lists ten pipelines with their names, descriptions, last run status, and timestamps. Each pipeline entry includes a star icon for favoriting and three dots for more options.

| Pipeline                                     | Last run   | Time Ago  |
|--|--|-----------|
| create-release-CoEStarterKit                 | #20220907.2 • CoE Starter Kit September: Adding D4T files (#3591)                              | 2h ago    |
| deploy-prod-ALMAcceleratorSampleSolut...     | #20220906.3 • CoE Starter Kit September: Adding D4T files (#3591)                              | Yesterday |
| deploy-test-ALMAcceleratorSampleSoluti...    | #1.0.20220906.1 • CoE Starter Kit: fixed metadata flow (#3590)                                 | Yesterday |
| deploy-prod-CenterofExcellenceALMAcce...     | #20220906.1 • CoE Starter Kit: fixed metadata flow (#3590)                                     | Yesterday |
| deploy-prod-CenterofExcellenceCoreCom...     | #3.44 • CoE Starter Kit: fixed metadata flow (#3590)   | Monday    |
| deploy-test-CenterofExcellenceCoreComp...    | #3.0.20220905.3 • CoE Starter Kit: fixed metadata flow (#3590)                                 | Monday    |
| deploy-validation-CenterofExcellenceCore...  | #3.0.20220905.2 • CoE Starter Kit: fixed metadata flow (#3590)                                 | Monday    |
| export-solution-to-git-CenterofExcellence... | #export-CenterofExcellenceCoreComponents-to-git-branch • Fix for TriggerSolutionUpgrade (#182) | Monday    |
| deploy-prod-CenterofExcellenceNurtureC...    | #2.15 • CoE Starter Kit: September release (#3582)   | Monday    |
| deploy-prod-CenterofExcellenceAuditCo...     | #2.20 • CoE Starter Kit: September release (#3582)   | Monday    |

- Predefined Pipelines
  - Export Solution
  - Import Solution
  - Delete Solution
  - Deploy Solution
- Modular YAML templates
  - Deployment settings for connections, component sharing and ownership, and permissions
  - Power Pages deployment
  - UI Test Automation
  - Data Ingestion
  - Extension Points for customization

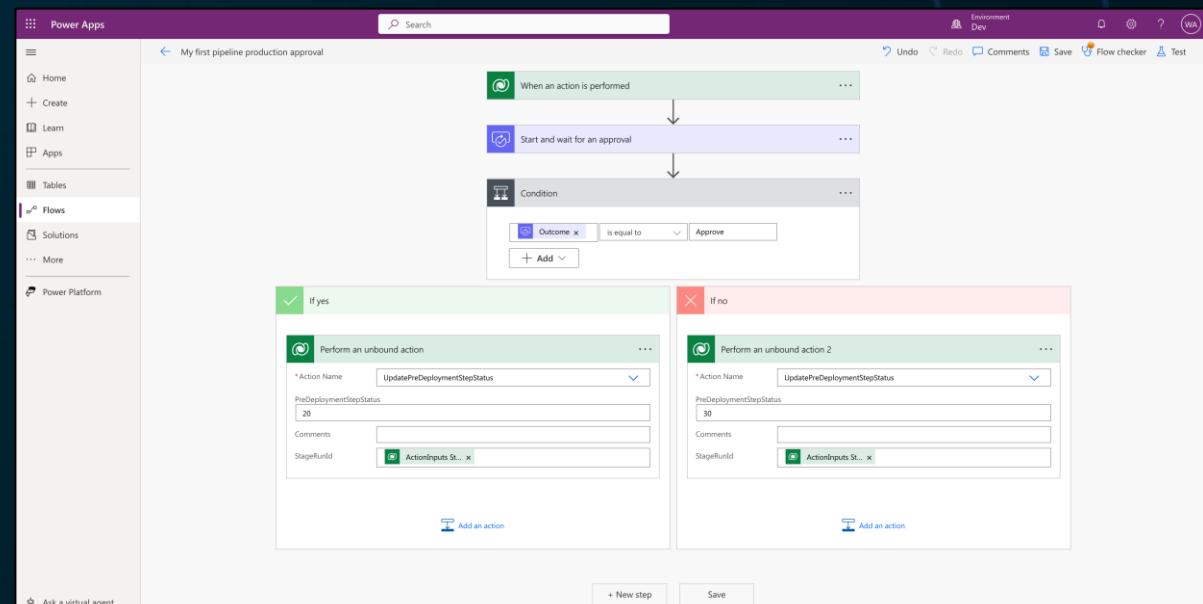
# Lab 05 – Add an approval before deploying to production



# Lab 05 – Add an approval before deploying to production

In this lab, you will:

- Add a Pre-Deployment Step to the “Deploy to prod” stage
- Create a cloud flow that handles the approval when deployment to production is started



<https://aka.ms/EPPC23-ALM/Lab05>

# Lab 05 – Add an approval before deploying to production

Resources:

Extend pipelines in Power Platform

<https://learn.microsoft.com/en-us/power-platform/alm/extend-pipelines>

<https://aka.ms/EPPC23-ALM/Lab05>

# Lab 05 - Wrap Up

Show what you learned



# Resources

## Get Started

[Low-Code Application Development](#)  
(aka.ms/AzureLCAD)

## Hands on lab

- [GitHub Actions](#)
- [Azure DevOps and Power Platform](#)
- [App in a Day](#)

## Webinars

- [Drive Agility with Low Code Application on Azure](#)
- [GitHub Actions Webinar](#)
- [All Power Apps Webinars](#)

## Fusion teams

- [Ebook: Fusion development approach to building apps](#)
- [Transform business applications with fusion development](#)

## Documentation

- [Azure DevOps](#)
- [GitHub Actions](#)
- [Platform for Power Pipelines](#)
- [Extend pipelines](#)

# More Sessions

WEDNESDAY 21 JUNE

12:30 - 13:15 SESSIONS

W15 DEV / IT PRO / MAKER

💻 Power Pipelines, Power Platform Build Tools, ALM Accelerator. Oh My!

LEVEL 200

POWER PLATFORM

👤 Jens Schrøder, Microsoft, Denmark 🤤 Michael Ochs, MVP, Exalents Solutions, United States

WEDNESDAY 21 JUNE

17:30 - 18:15 SESSIONS

W37

💻 Microsoft AMA

👤 Heather Cook, Microsoft, USA 🤤 April Dunnam, Microsoft, USA 🤤 Tom Marsh, Microsoft, United States 🤤 Priya Vaidyanathan, Microsoft 🤤 Marysol Mantilla, Microsoft, United Kingdom 🤤 Jason Himmelstein, Microsoft, USA 🤤 Reuben Krippner, Microsoft EMEA, United Kingdom 🤤 Kendra Springer, Microsoft, United States 🤤 Kartik Kanakasabesan, Microsoft, United States