

AZURE DEVOPS



AGENDA

01 WHAT IS DEVOPS

02 WHAT IS AZURE DEVOPS

03 BENEFITS OF AZURE DEVOPS

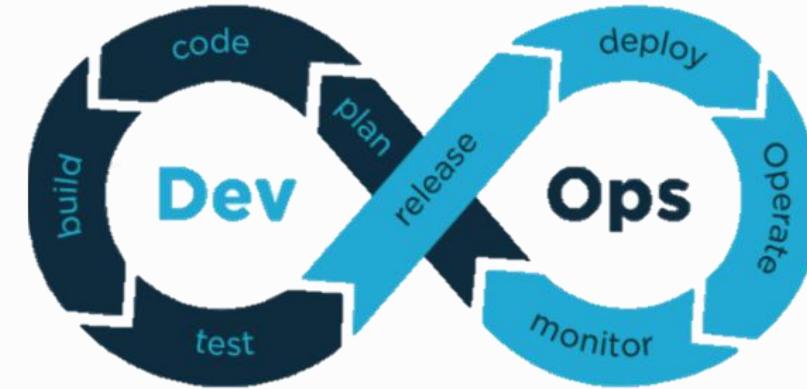
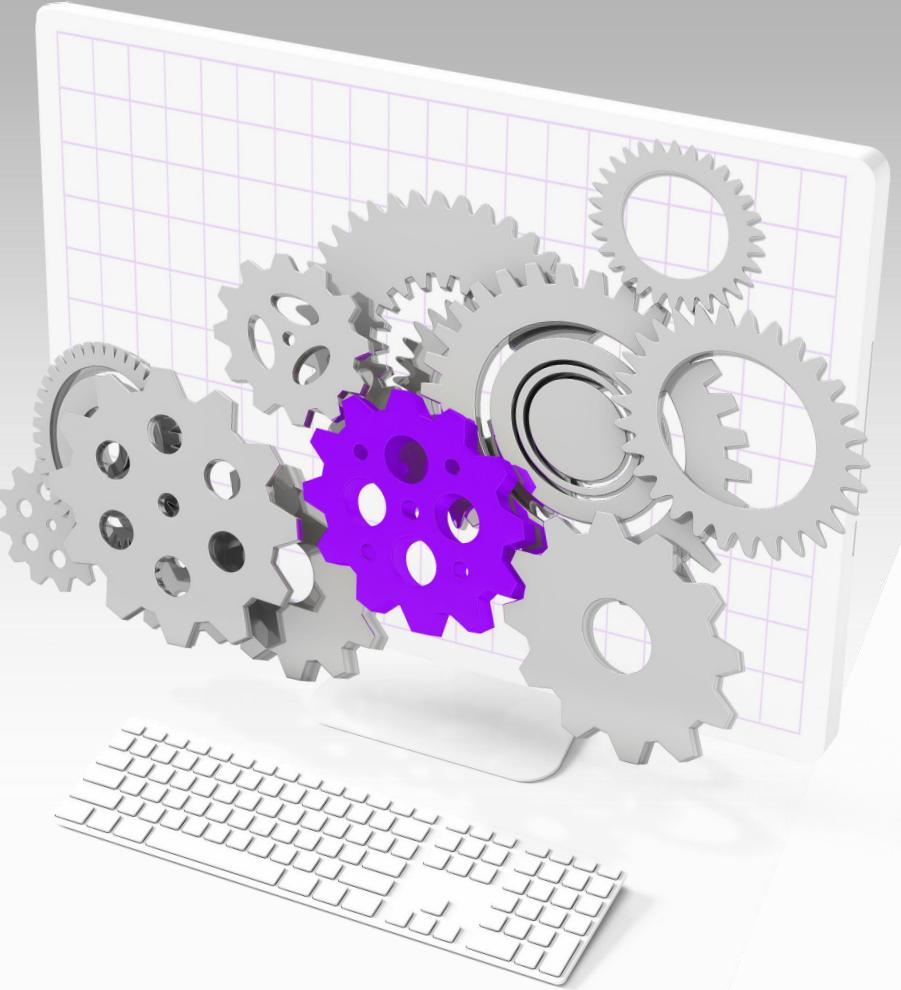
04 PRICING FOR AZURE DEVOPS

05 TOOLS FOR AZURE DEVOPS

06 WHAT IS CI/CD

07 DEMO – CICD PIPELINE

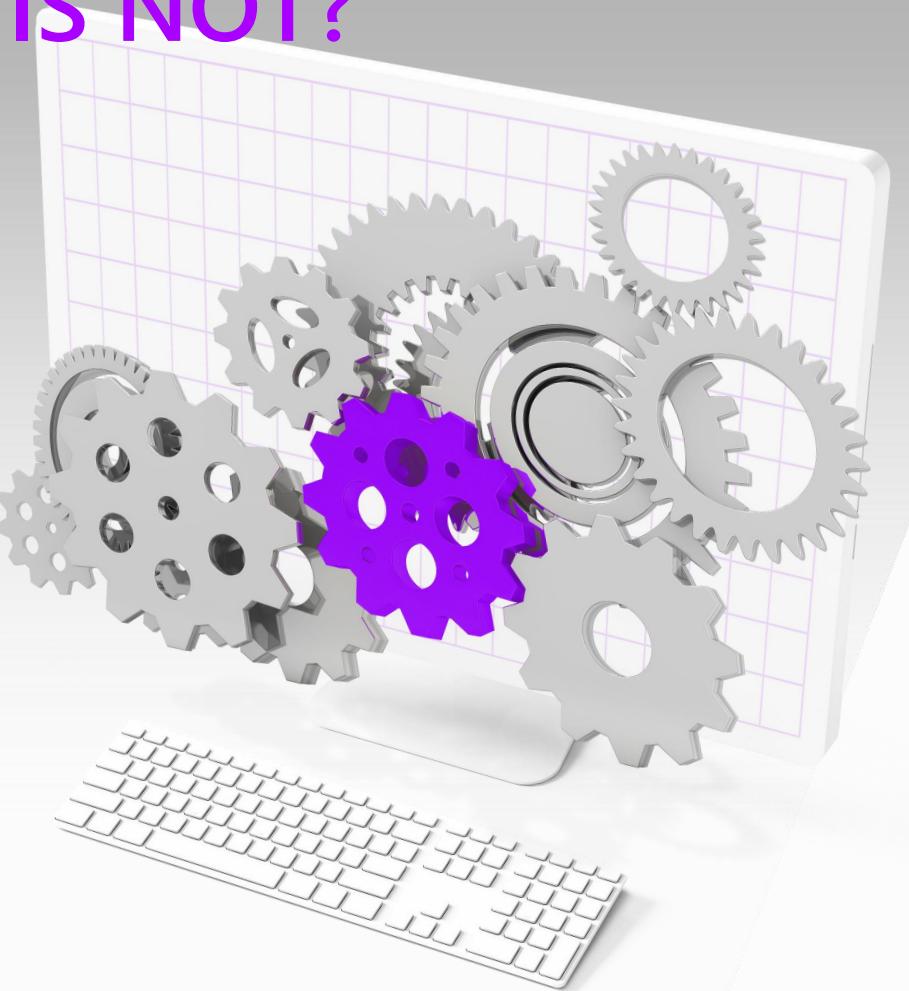
WHAT IS DEVOPS?



"DevOps is the union of people, process, and products to enable continuous delivery of value to our end users."

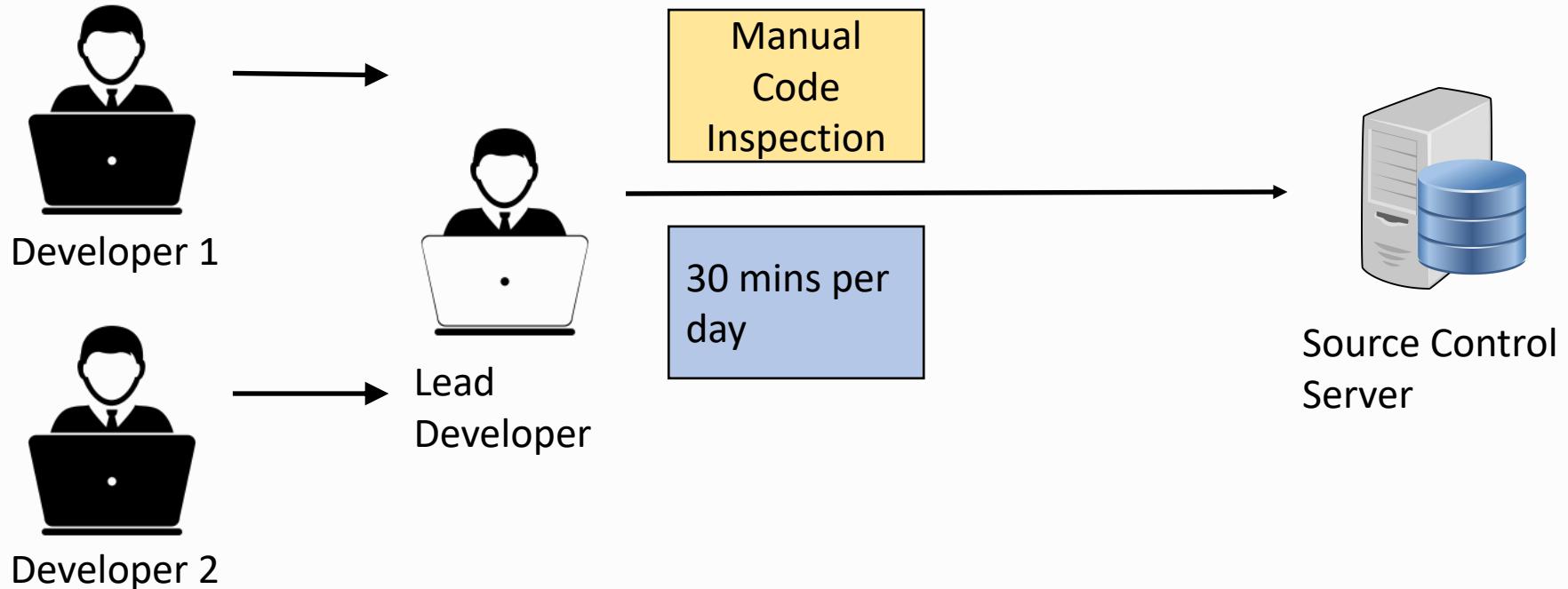
- Donovan Brown
Microsoft Senior DevOps Program Manager

WHAT DEVOPS IS NOT?



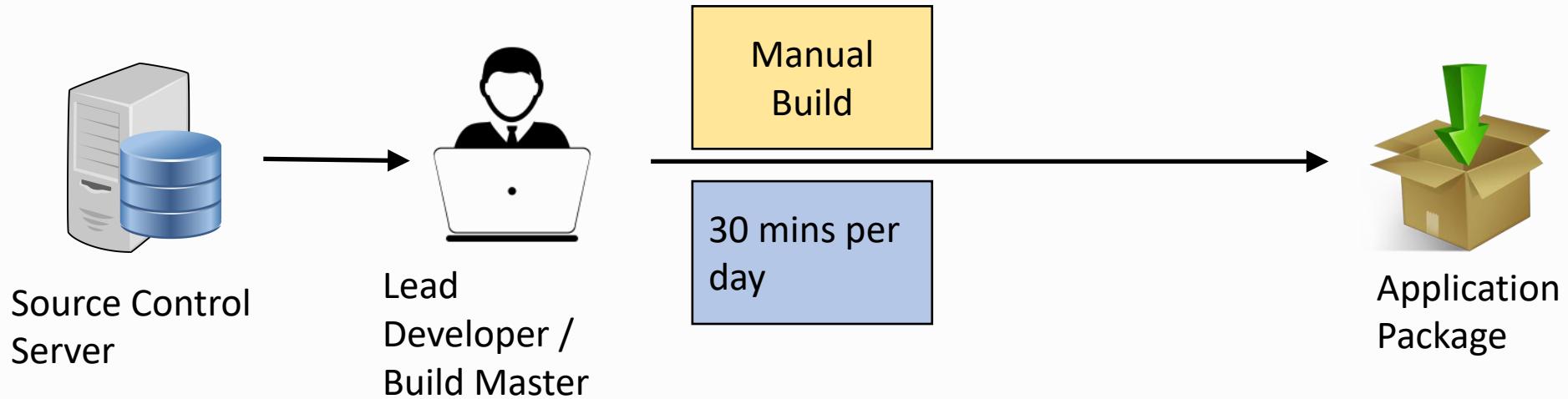
- **NOT** - A methodology
- **NOT** - A specific piece of software
- **NOT** - A quick fix for an organization's challenges
- **NOT** - Just a team or a job title (although these titles are reasonably common in the industry)

Manual Approach: Code Quality

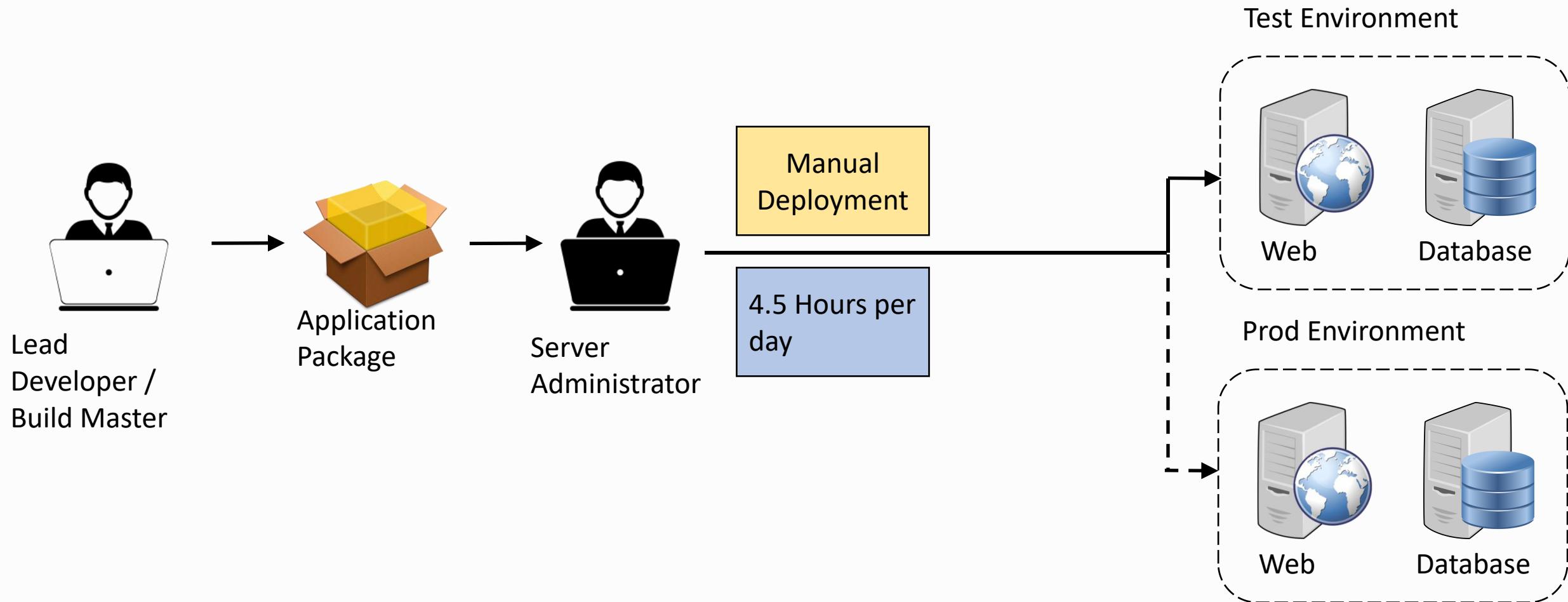


Overall Development Capability: 88%

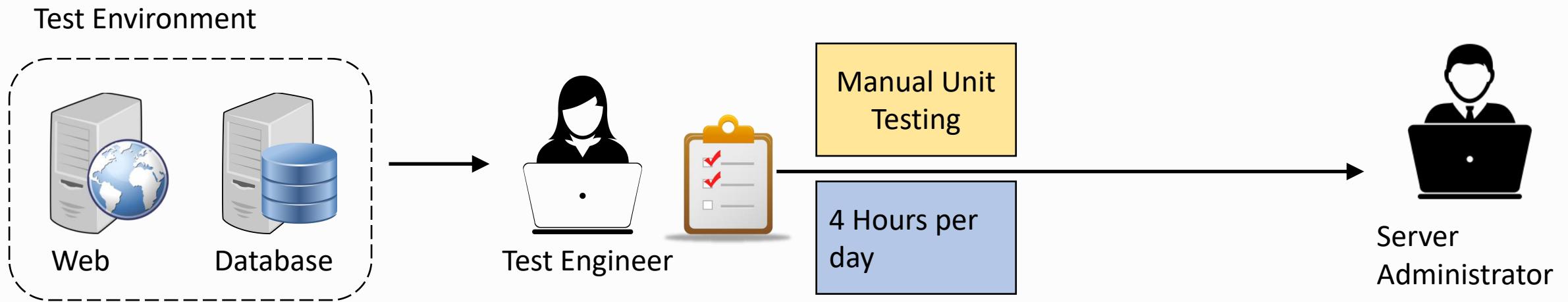
Manual Approach: Application Build



Manual Approach: Application Deployment

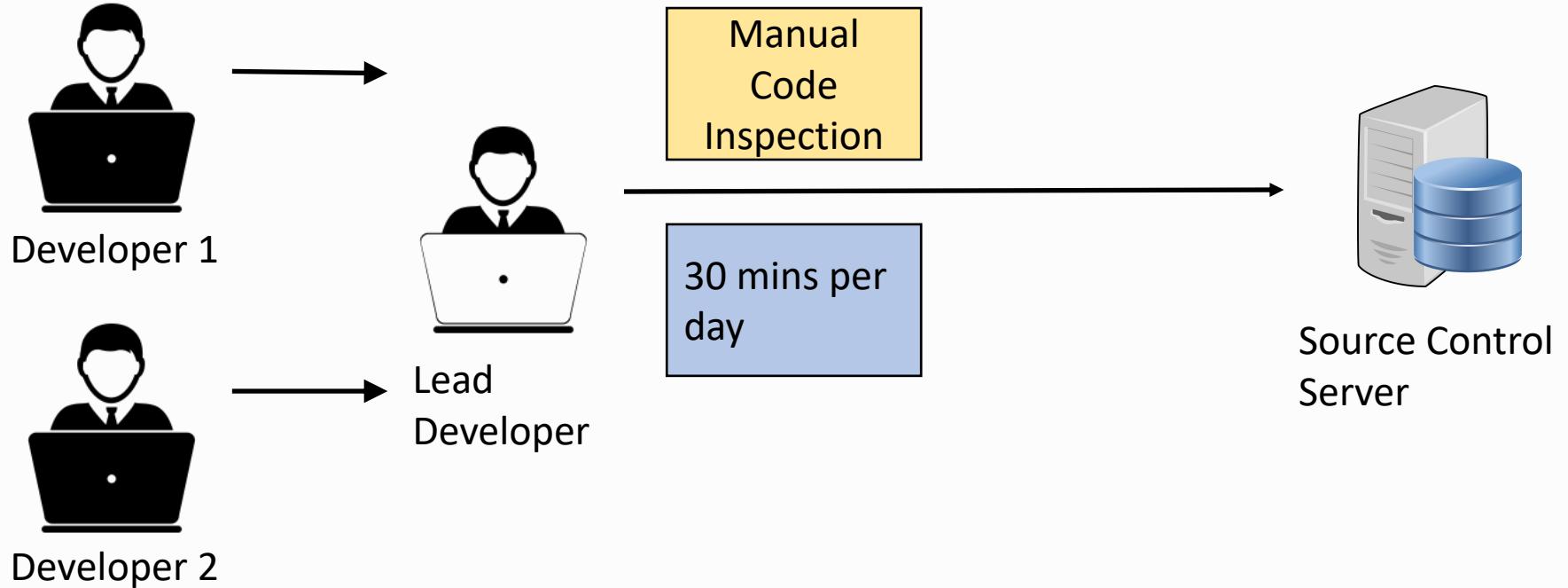


Manual Approach: Application Test



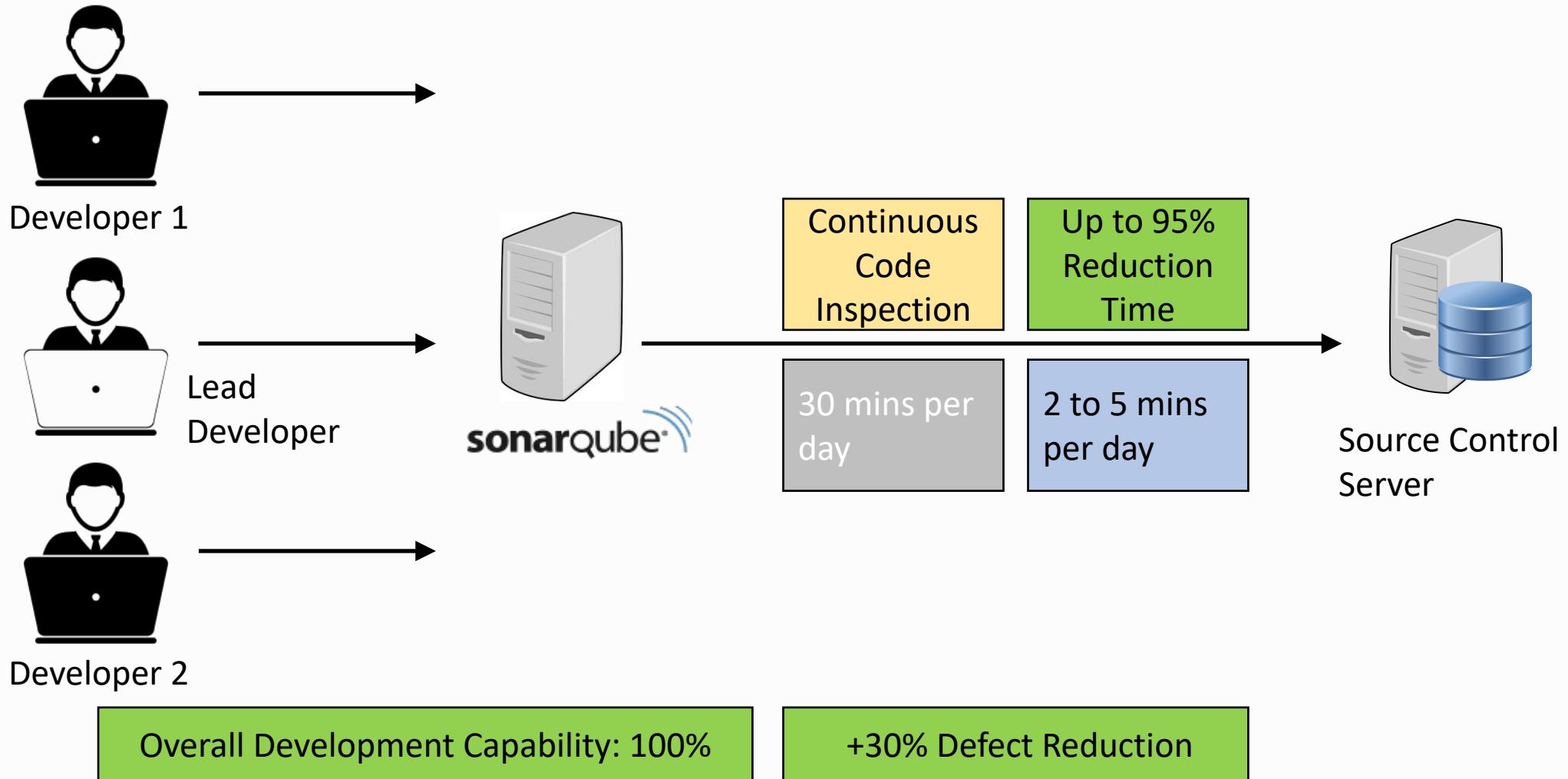
IMPLEMENTING DEVOPS

DevOps Approach: Code Quality

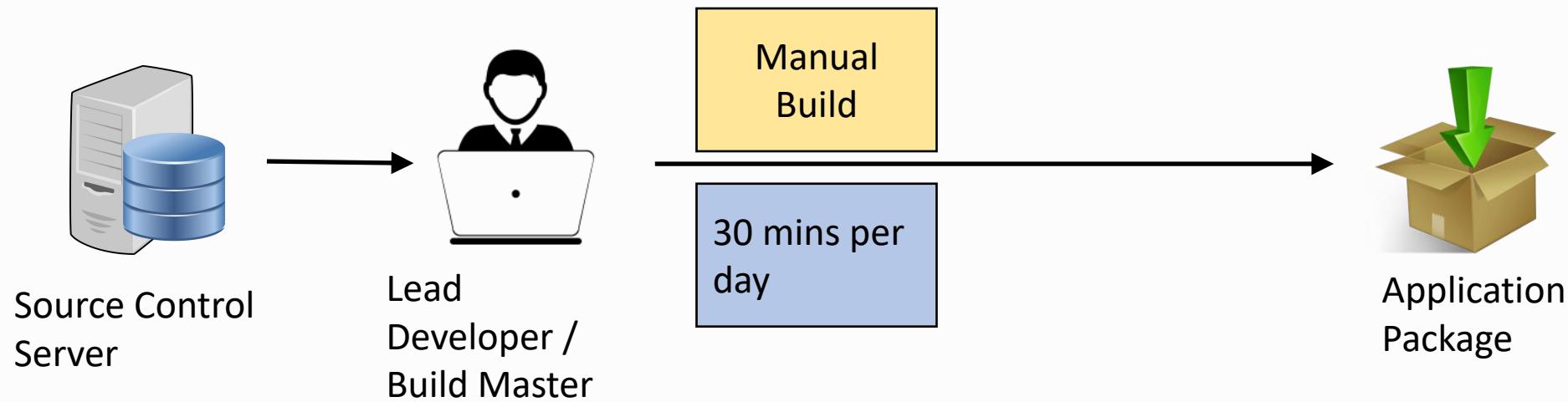


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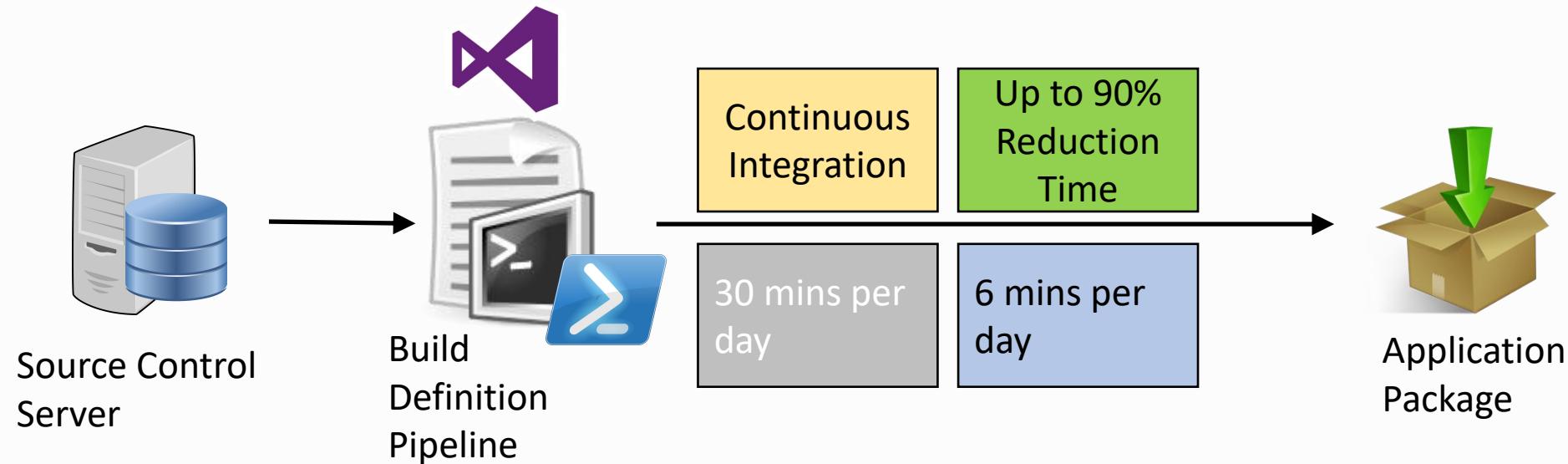
DevOps Approach: Code Quality



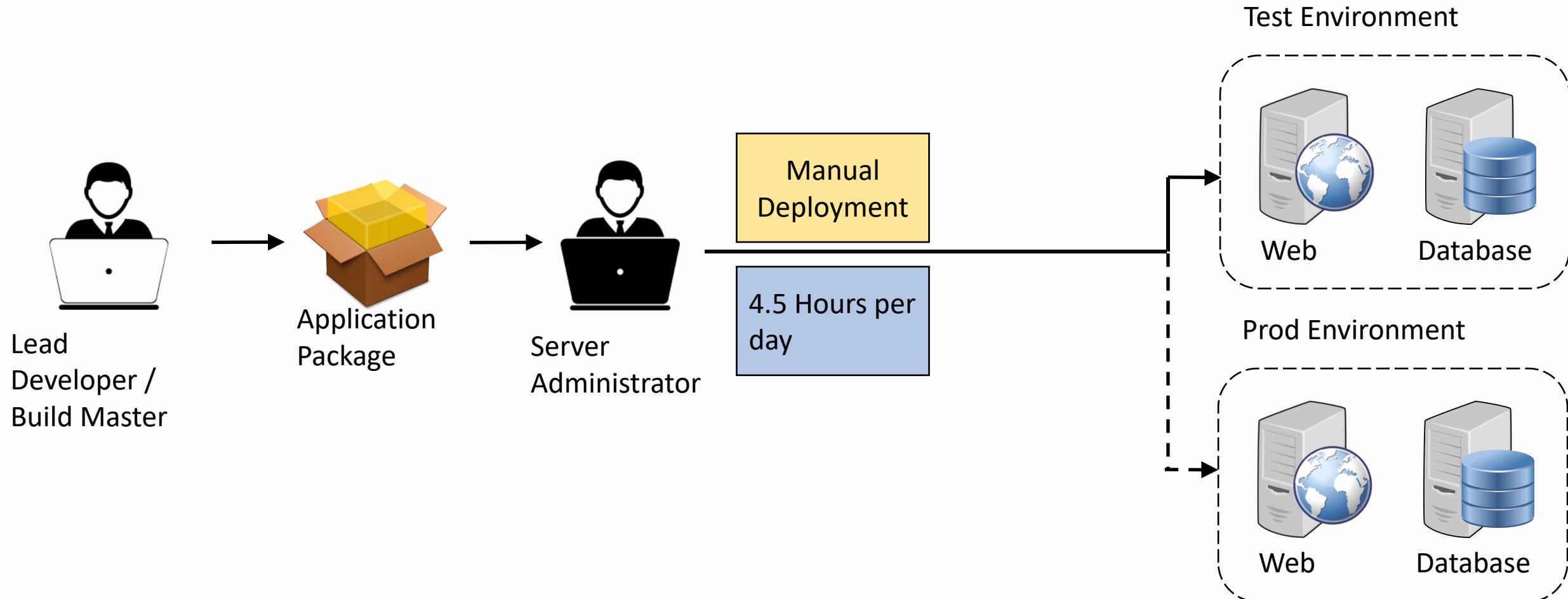
DevOps Approach: Application Build



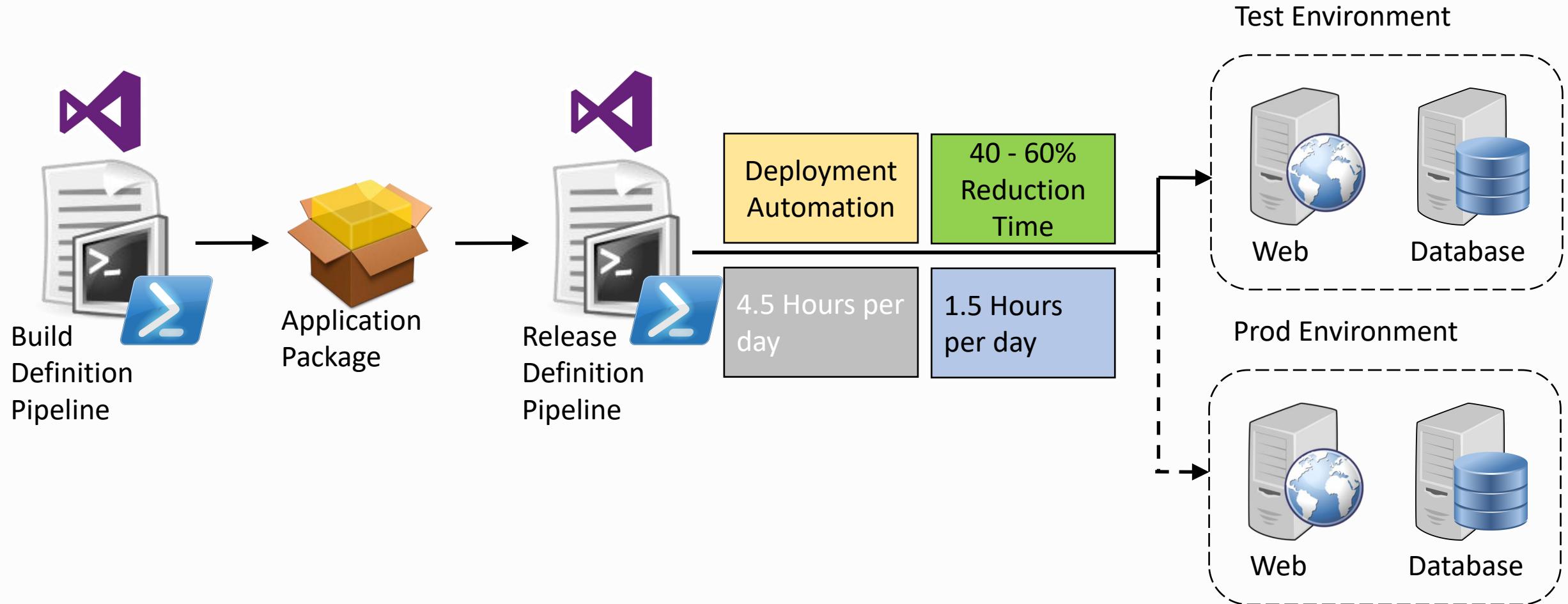
DevOps Approach: Application Build



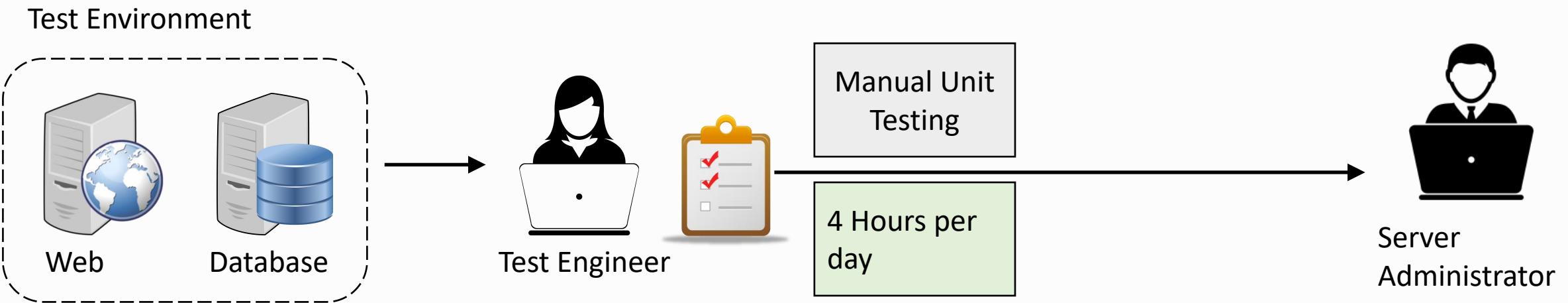
DevOps Approach: Application Deployment



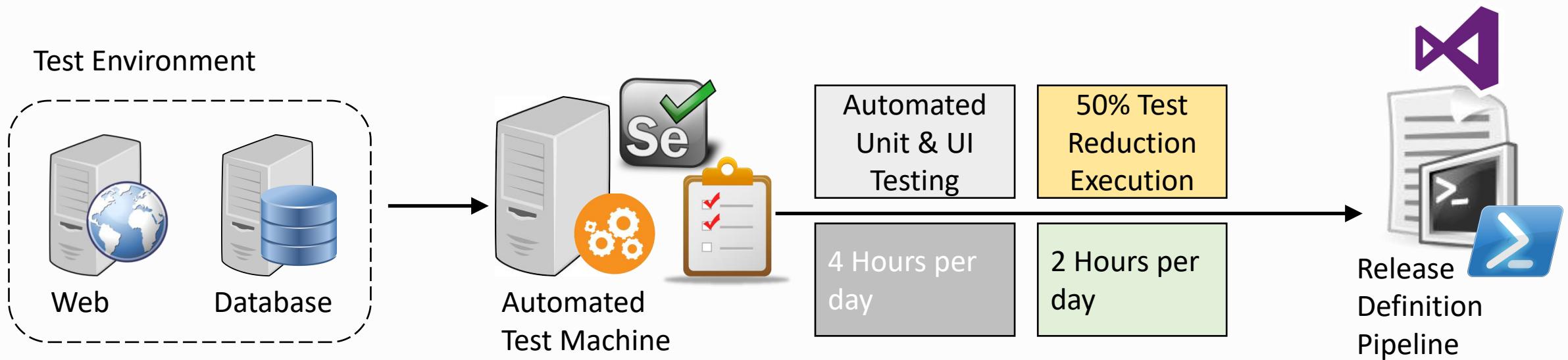
DevOps Approach: Application Deployment



DevOps Approach: Application Test



DevOps Approach: Application Test



BENEFITS OF DEVOPS?



Technical Benefits

- Continuous software delivery
- Less complexity to manage
- Faster resolution of problems

Business Benefits

- Faster delivery of features
- More stable operating environments
- More time to innovate (rather than fix/maintain)

Cultural Benefits

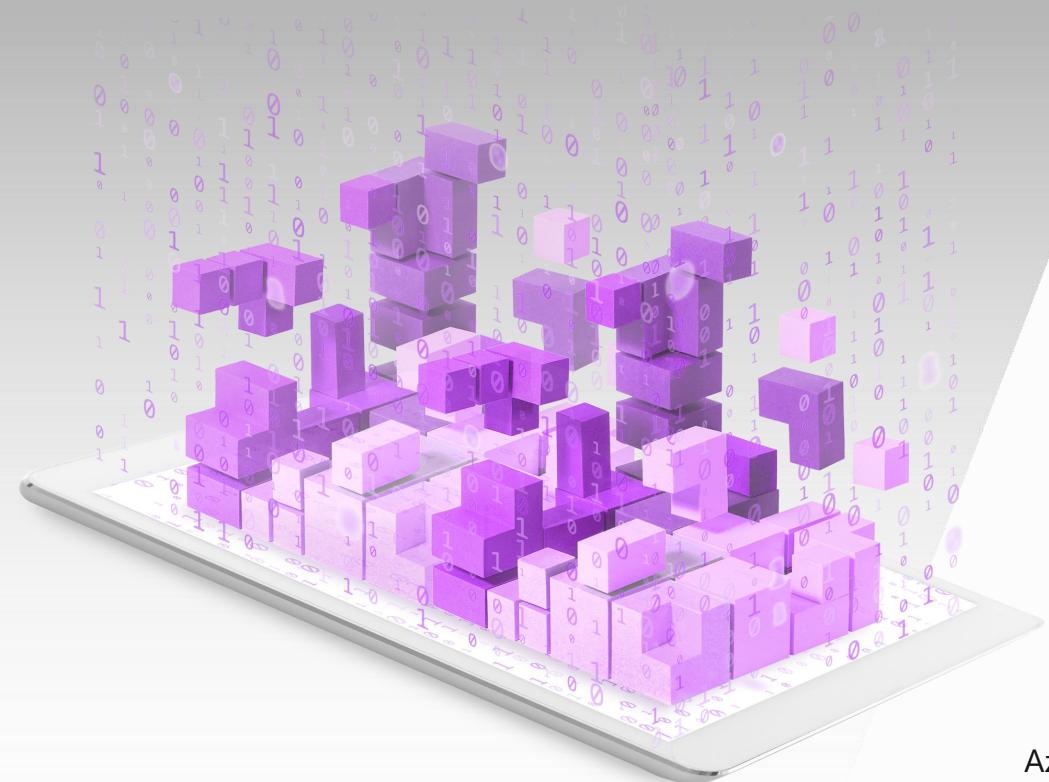
- Happier, more productive teams
- Higher employee engagement

WHAT IS AZURE DEVOPS?

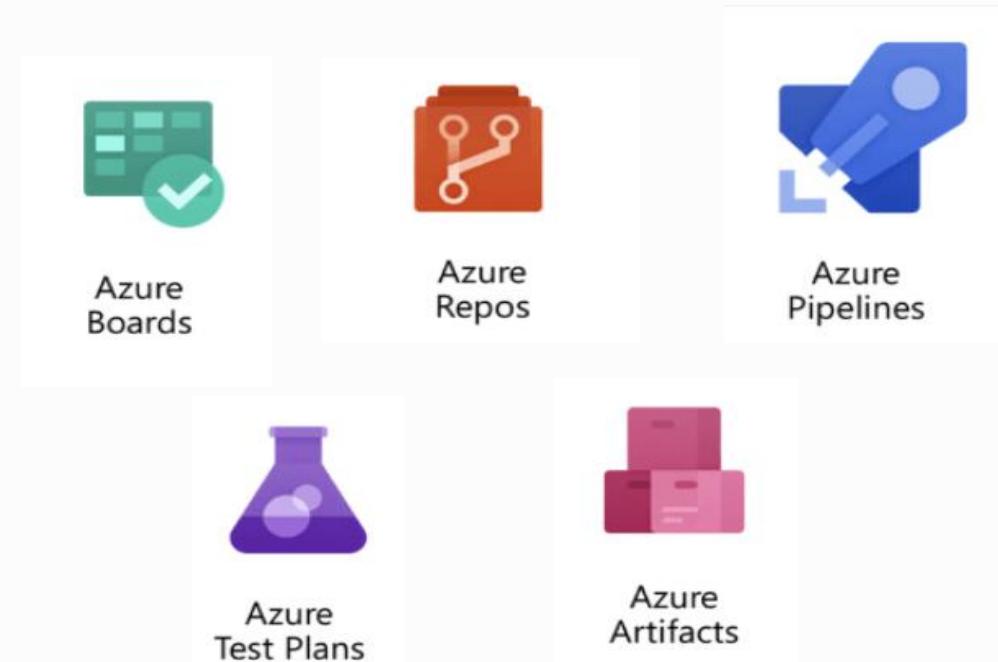


Azure DevOps, a modern DevOps tool of planning, developing, testing and deploying modern apps with optimized release cycle for quality delivery of applications. Azure DevOps provides a tool which can help you to track software building progress and help you to take decision to deliver great software to end users.

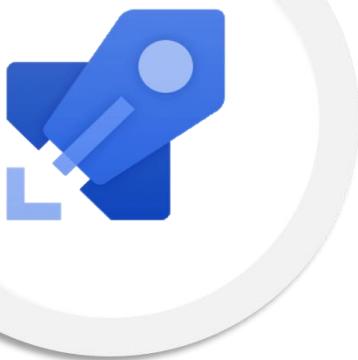
WHAT IS AZURE DEVOPS?



Azure DevOps services are not dependent on cloud or platform.
Azure DevOps includes the following services :



Azure DevOps includes Git repositories as source control, build and release management tools, work planning and tracking tools, testing tools and support services like Slack, Trello and Azure services.



AZURE PIPELINES

Azure Pipeline is a cloud-hosted pipelines for fast CI/CD that works with any language, platform, and cloud. By connecting to any source control like GitHub, this service can release changes continuously to any cloud.

YAML files are very useful in writing build and release definitions. Azure Pipelines has components like build, release, library, task groups, deployment groups. Azure Pipelines has advance workflows with native container support and features which allow monitoring CI/CD stages.

The screenshot displays the Azure DevOps interface for managing pipelines. On the left, the 'Pipelines' section is selected, showing a list of builds (Windows Job, Linux Job, macOS Job) and releases. A specific pipeline named 'Enabling feature flags for Preview Attachment and Grid Views' is highlighted. This pipeline's summary page shows a 'Test' step (0 errors / 0 warnings), a 'Build Linux Packages' step (0 errors / 0 warnings), and a 'Build Windows Packages' step (0 errors / 0 warnings). The 'Logs' tab is active, showing the command-line output of the build process, which includes yarn install, node build, and tsc run compile. The 'Grid' tab shows the detailed steps and their execution times. Below the pipeline summary, a preview of the CI/CD pipeline shows three stages: 'Code' (PackageFramework), 'Build' (mobile-tests), and 'Production' (web-deploy). The 'Production' stage is currently in progress. At the bottom, a link to 'Azure resources' leads to the URL <http://fabrikamfiber.azurewebsites.net>.



AZURE BOARDS

Azure Boards helps to plan, track, and discuss work across the team. Azure Boards is a powerful agile tool for managing Kanban board, reporting, product backlog.

- Azure boards have components like work items, backlogs, Boards, queries, sprints details.
- Work item can be bug, epic, issue, task or features. This service is sprint ready and built for insights to improve productivity.
- We can manage user authentication and authorization, team, project, and organization-level settings.

The screenshot displays the Azure DevOps Boards interface. On the left, a sidebar menu includes options like Overview, Boards, Work Items, Boards (selected), Backlogs, Sprints, Queries, Plans, Repos, Pipelines, Test Plans, and Artifacts. The main area shows a Kanban board titled "FabrikamFiber Board" with columns for New, Active, Staging, and Deployed. Below the board is a table with columns for ID, Title, Assign to, and State. Several work items are listed, each with a small icon, title, assignee, and status indicator (green checkmark).

ID	Title	Assign to	State
1253506	[Mobile] Add support for MFA across...	Cecil Folk	Green checkmark
1253502	Creating new folders can spike to 900ms	Allan Munger	Green checkmark
1284560	Create perf dashboard for upload scenarios	Cecil Folk	Green checkmark
1253504	DTS: [Billing] - Customer needs report of all...	Cecil Folk	Green checkmark



AZURE ARTIFACT

Azure Artifact service manages the dependencies used in source code. Azure Artifacts can host and share package (like NPM, Nuget, Maven) feeds from public and private sources.

- These artifacts simplify job building process.
- These stored artifacts are easy to integrate with Azure Pipelines.
- Azure Artifacts are managed package hosted on cloud and indexed.

The screenshot shows the Azure DevOps Artifacts interface for the project 'AdventureWorks Mobile'. On the left, there's a sidebar with 'Overview', 'Boards', 'Repos', 'Pipelines', 'Test Plans', and 'Artifacts' selected. The main area displays a list of packages under 'Packages'. A modal window titled 'NuGet restore ***.sln' is open, showing configuration options: 'Display name' (NuGet restore ***.sln), 'Command' (restore), 'Path to solution, packages.config, or project.json' (**.sln), 'Feeds and authentication' (using 'AdventureWorks' feed), and 'Feeds to use' (selecting 'Use packages from NuGet.org'). The package list includes:

Package	Source	Last Updated	Description
AdventureWorks.Framework Version 1.1.0	MyFeed	2 days ago	An object classifier for AdvWorks
adv-lib Version 1.3.3	MyFeed	2 days ago	Extensions to the standard Python datetime module
com.adworks.app Version 2.0.2	MyFeed	2 days ago	AdvWorks Android app package
adventure-classifier-model Version 2.2	MyFeed	3 days ago	An object classifier for AdvWorks
adworks-build-tools Version 5.0.3	MyFeed	4 days ago	Fundamental package for array computing with Python
NUnit Version 3.11.0	NuGet Gallery	6 months ago	Unit testing framework for .NET
Newtonsoft.JSON Version 12.0.2-beta1	prerelease	NuGet Gallery	High-performance JSON framework for .NET
grunt Version 1.0.4	npmjs	13 days ago	The JavaScript task runner

Below the main list, four specific packages are highlighted with callout boxes:

- AdventureWorks.Framework** Version 1.1.0: Add APIs for the Material Design specification
- adv-lib** Version 1.3.3: Extensions to the standard Python datetime module
- adworks-build-tools** Version 5.0.3: Fundamental package for array computing with Python
- com.adworks.app** Version 2.0.2: AdvWorks Android app package
- adventure-classifier-model** Version 2.2: An object classifier for AdvWorks



AZURE Repos

Includes unlimited cloud-hosted private Git repository for your project. This is standard Git service and works as distributed source controls.

- Azure Repos supports all Git clients and all IDEs, all editor.
- You may do effective Git code review, can raise pull requests.
- Azure Repos supports branching strategy, so that you can we can merge the code after successful build and passing all the test case to maintain high code quality.
- Access to the repositories are managed by Azure AD, hence source code access management is fast and easy.

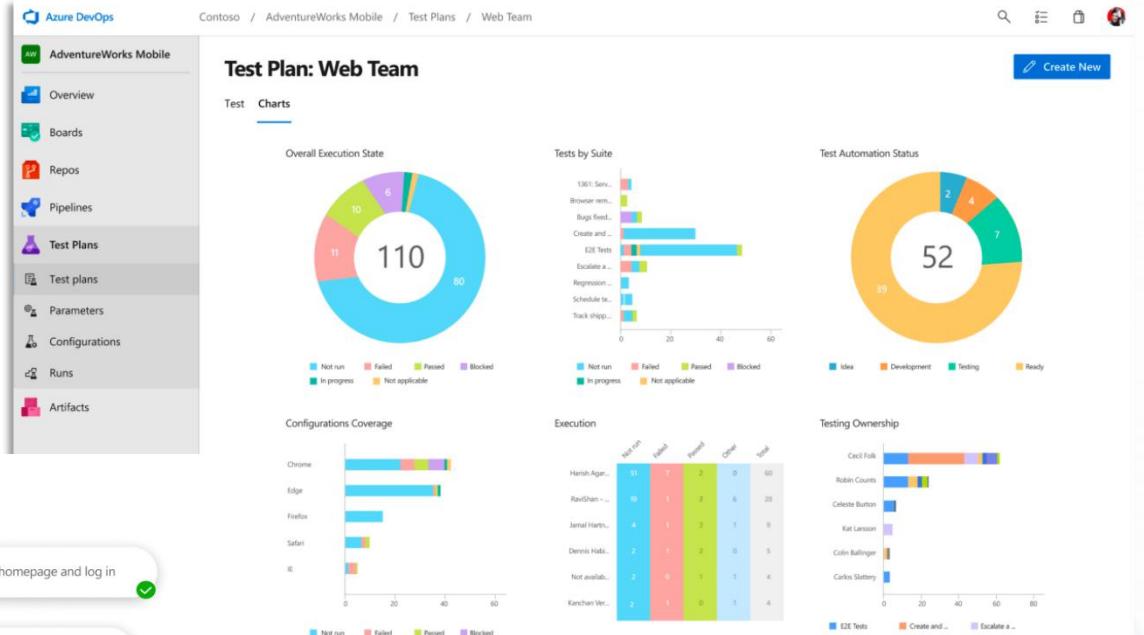
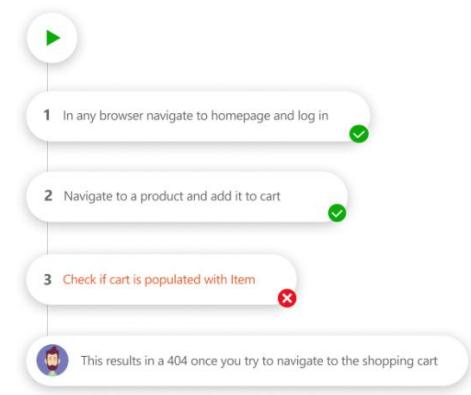
A screenshot of the Azure Repos interface. The top navigation bar shows 'Fabrikam-fiber / FabrikamFiber / Repos / Files / FabrikamFiber'. A dropdown menu is open over the 'FabrikamFiber' link. A search bar below it says 'Filter repositories'. On the left, there's a tree view of files and folders: '.vs', 'MyApp', '.gitattributes', '.gitignore', and 'MyApp.sln'. On the right, a list of repositories is shown: 'FabrikamFiber' (selected and highlighted with a yellow star), 'FabrikamFiber.jamal.fork', 'FabrikamTesting', and a new repository entry 'New repository' which is also highlighted with a red box. Other options include 'Import repository' and 'Manage repositories'.



AZURE TEST PLANS

Azure test plan service helps to do automated and manual testing. Testing of an app is integral part of CI/CD and agile process. Simple XML files can be used for load testing as well.

- Azure Test Plans provides manual and exploratory testing tools. Hence, executing multiple scenario based scripted test gives end to end traceability.
- Test results are beneficial to record software bugs and defects.
- Automated tests will typically execute in a Pipeline.
- Stakeholder's feedback can be captured in work items.



BENEFITS OF AZURE DEVOPS



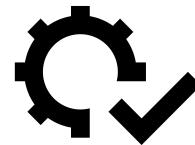
Continuous Integration & Continuous Delivery (CI - CD)

When the code is committed, it automatically builds and is tested for errors, enabling bugs detection early. Business organizations can achieve fast and identical deployment to the production environment at any given time.



Any Platform, Any Language

It supports various platforms and runs on multiple frameworks. The developers using Java, Node, PHP, .NET, and Python can efficiently work on it.



Automation Testing

The use of automated tests, such as security and compliance tests identify problems at the testing phase. We can quickly provision resources and configures the entire production environment in a quick time.



App Insights

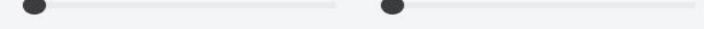
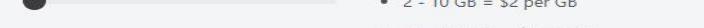
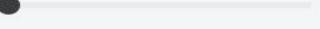
Azure Application Insights provides insights through application performance management and instant analytics. You can monitor infrastructure health with Azure Log Analytics and Azure Monitor.

PRICING FOR AZURE DEVOPS

Maximum five open source developers working on a project can use Azure DevOps for free. Cost of Azure DevOps services starts from \$30 per month for 10 users to \$6,150 per month for 1,000 users.



PRICING FOR AZURE DEVOPS

Azure DevOps Services		Azure DevOps Server	
INDIVIDUAL SERVICES		USER LICENSES	
Azure Pipelines  1 Free Microsoft-hosted CI/CD 1 Free Self-Hosted CI/CD <ul style="list-style-type: none">• 1 Microsoft-hosted job with 1,800 minutes per month for CI/CD and 1 self-hosted job with unlimited minutes per month• \$40 per extra Microsoft-hosted CI/CD parallel job and \$15 per extra self-hosted CI/CD parallel job with unlimited minutes Microsoft-hosted Free  1,800 minutes free with 1 free parallel job Self-hosted 1  1 free parallel job with unlimited minutes		Azure Artifacts  2 GB free, then starting at \$2 per GB <ul style="list-style-type: none">• Industry-leading NuGet Server• Support for Maven, npm, and Python packages• Upstream sources to help protect open-source dependancies• Integrated with Azure Pipelines• Sophisticated access controls First 2 GB free 0  Rate card <ul style="list-style-type: none">• 0 - 2 GB = Free• 2 - 10 GB = \$2 per GB• 10 - 100 GB = \$1 per GB• 100 - 1,000 GB = \$0.50 per GB• 1,000+ GB = \$0.25 per GB	
\$0/mo	\$0/extra gigabyte	\$0/mo	\$0/mo
Basic Plan  First 5 users free, then \$6 per user per month		Basic + Test Plans  \$52 per user per month	
<ul style="list-style-type: none">• Azure Pipelines: Includes the free offer from INDIVIDUAL SERVICES• Azure Boards: Work item tracking and Kanban boards• Azure Repos: Unlimited private Git repos• Azure Artifacts: 2 GB free per organization• Load testing (20,000 VUMs/month)		<ul style="list-style-type: none">• Includes all Basic plan features• Test planning, tracking & execution• Browser-based tests with annotation• Rich-client test execution• User acceptance testing• Centralized reporting	
 First 5 users free 1  \$6/user/month		 1 1  \$52/user/month	
\$0/mo		\$52/mo	

PRICING FOR AZURE DEVOPS

Azure DevOps Services

Azure DevOps Server

Azure DevOps Server 2019 licensing

With Azure DevOps Server 2019 you can either pay month-to-month through Azure or you can buy classic software licenses which requires a 3-year commitment. Buying through Azure provides bonus of entitling you to use our cloud service, so you can move to the cloud at your own pace. With either option, you'll also need Windows or Windows Server licenses for the servers running Azure DevOps Server 2019.

Pay through Azure

No three-year purchasing commitment – just pay month-to-month and you can cancel at any time. Here's how:

Step 1: Buy Visual Studio subscriptions

£33.539 per user per month

[Visual Studio Professional >](#)

or

£186.328 per user per month

[Visual Studio Enterprise >](#)

- Visual Studio subscriptions include one server licence plus a user CAL for the subscriber.

Step 2: Buy Azure DevOps Basic or Basic + Test Plans for your other users

£4.472 per user per month

[Basic Plan licence >](#)

or

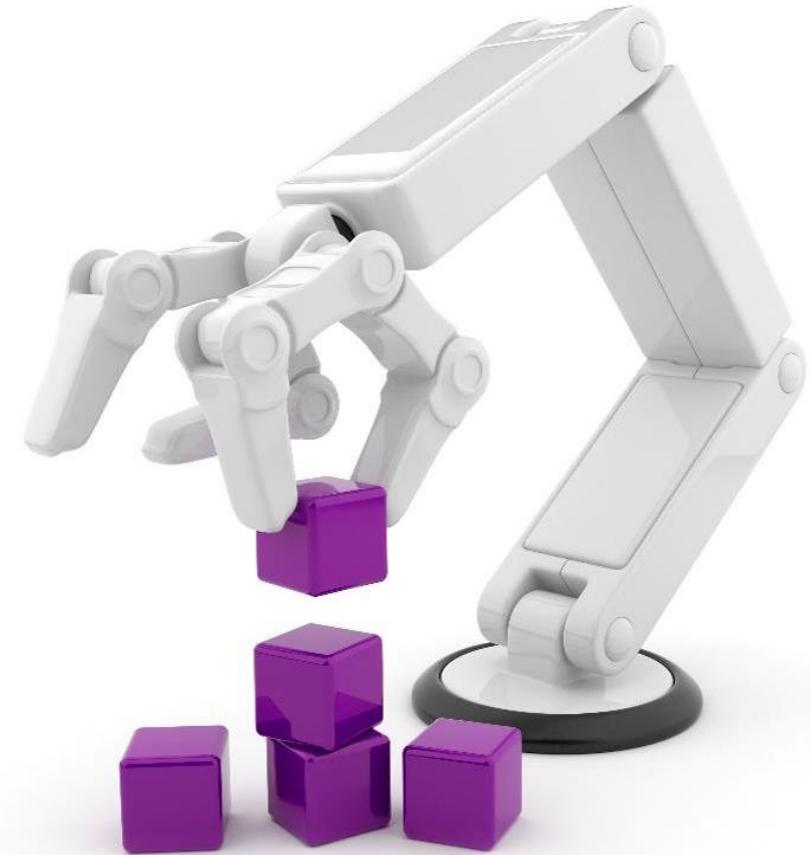
£38.757 per user per month

[Basic + Test Plans licence >](#)

- Buying through Azure entitles you to use both Azure DevOps in the cloud and Azure DevOps Server, so you can move to the cloud when you're ready.

TOOLS FOR AZURE DEVOPS

Azure DevOps works well with most of the DevOps tools.



TOOLS FOR AZURE DEVOPS

CONFIGURATION TOOLS



ANSIBLE



CHEF



CONTINUOUS INTEGRATION



Jenkins

COLLABORATION



slack



Trello

MONITORING



kibana



Grafana

MICROSERVICES



docker

DEVELOPMENT



Visual Studio

Team Foundation Server

TOOLS FOR AZURE DEVOPS

CODE ANALYSIS TOOLS



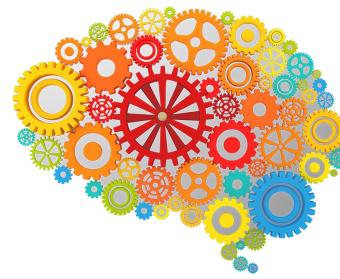
ARTIFACT MANAGEMENT



RESOURCE PROVISIONING



CHECK YOUR KNOWLEDGE



1. What is DevOps?

- A job title for QA engineers
- The union of people, process, and products to enable continuous delivery of value to our customers
- A methodology that teams implement quickly to solve all their challenges

2. DevOps is:

- A gradual process
- Only for startups
- A piece of specialized software

3. Azure DevOps is:

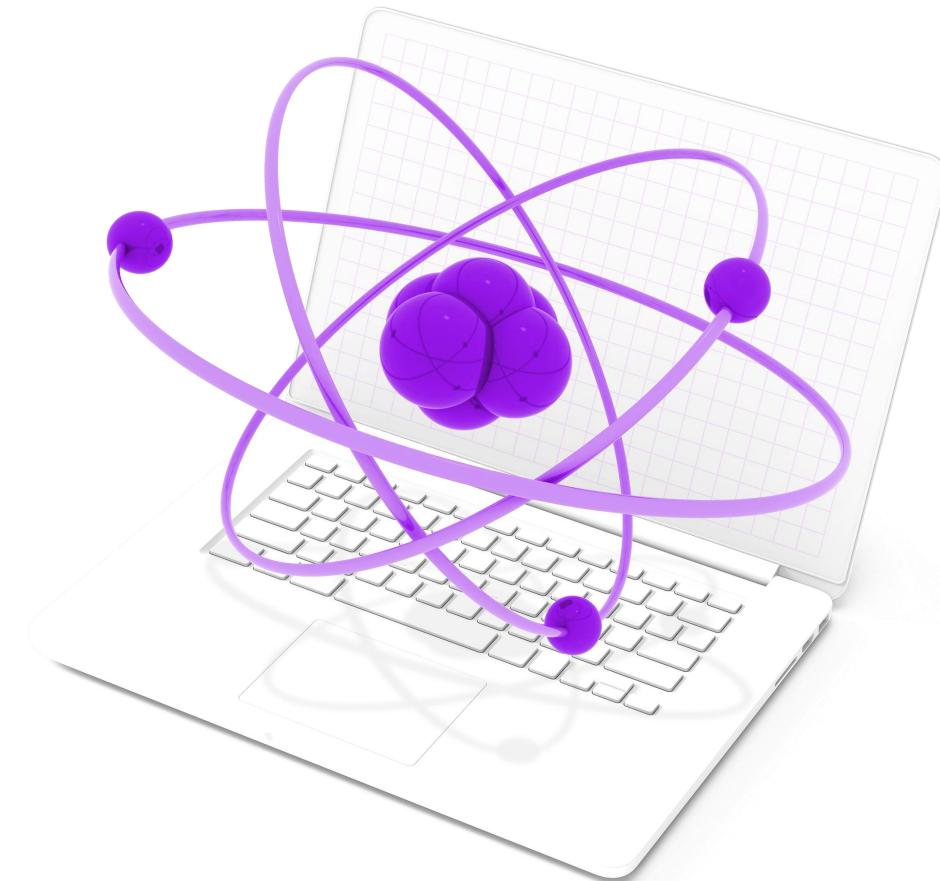
- Meant for teams that deploy to Azure
- A suite of services that provide an end-to-end tool chain
- A DevOps course offered by Microsoft

WHAT IS CI?

Continuous integration is the process of automating the build and testing of code every time a team member commits changes to version control. These builds are passed as inputs to the CD pipeline.

WHAT IS CD?

Continuous delivery helps software teams deliver reliable software updates to their customers at a rapid cadence. CD also helps ensure that both customers and stakeholders have the latest features and fixes quickly.

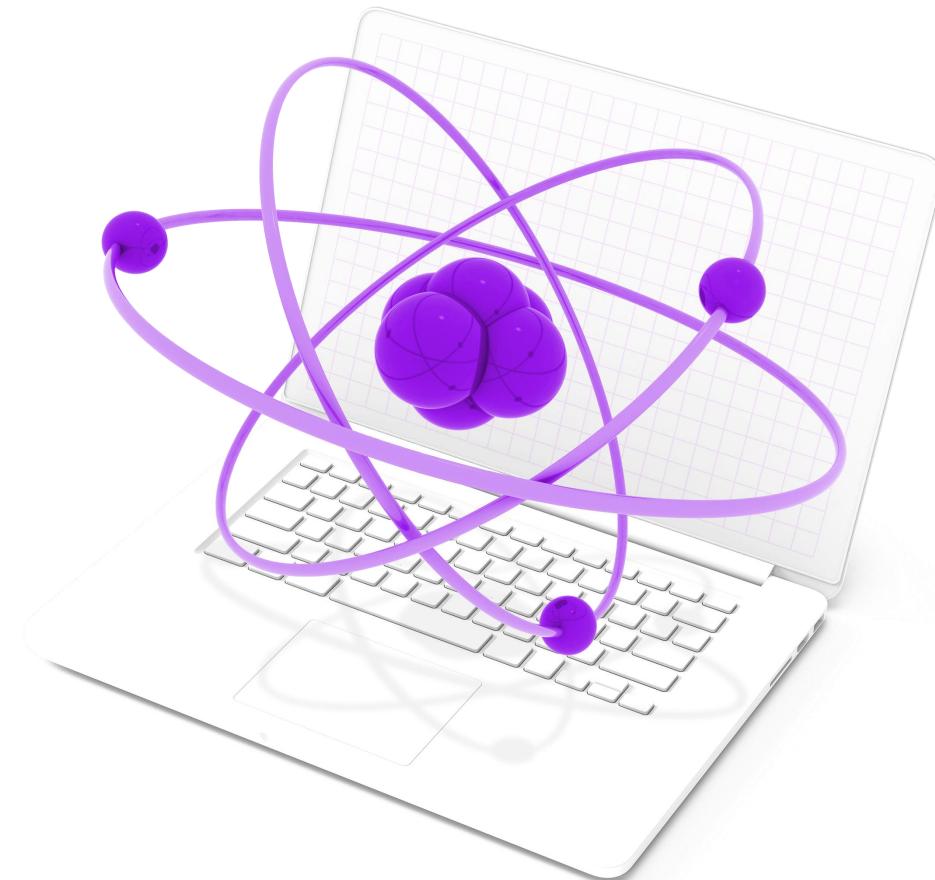


WHAT IS CI/ CD?

Continuous integration and continuous delivery (CI/CD) is backbone of DevOps. It helps fast software development and deployment to enable continuous delivery of value to end users by achieving incremental software delivery.

What is continuous deployment?

The ultimate goal on which every build pass to quality gates and does deployed all the way to production.



DEMO

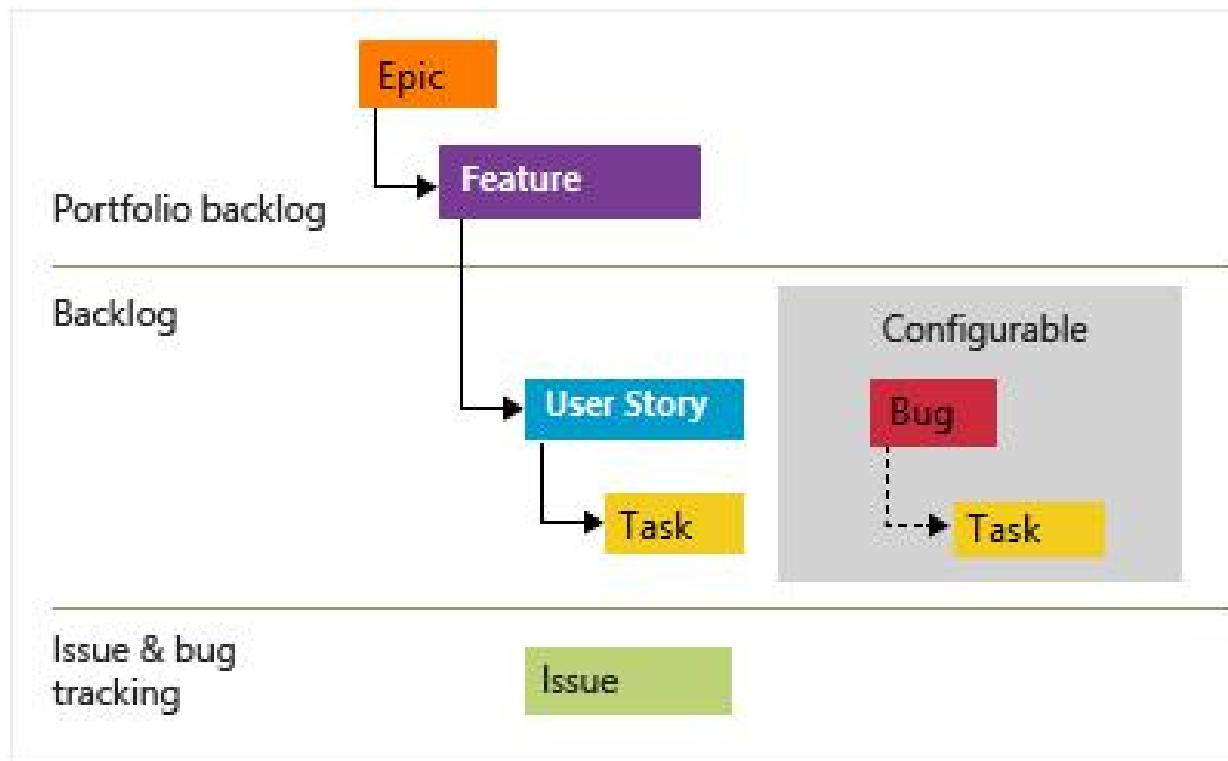
DEMO

Plan work using Azure boards

- Create the Project
- Create a Team and add team members
- Create the board
- Define a Sprint
- Assign tasks and set the iteration

DEMO

Azure boards – Agile Process



DEMO

Setting up our code to Azure Repo

- Set Azure Repo
 - Create master branch
- Verify our application is running and push code to Azure Repo
 - Build and Run application locally
 - Pushed the code to master branch
 - Create a dev branch
 - Set policy for master branch and dev branch

DEMO

Creating build pipeline with Azure Pipelines

- Azure Pipeline Tasks

A **task** is the building block for defining automation in a pipeline. A task is simply a packaged script or procedure that has been abstracted with a set of inputs.

- Create the Build Pipeline
- Publish the result to the pipeline

DEMO

Host your own build agent in Azure Pipelines

What are build agents and agent pools?

A *build agent* is a system that performs build tasks. Think of it as a dedicated server that runs your build process.

Azure Pipeline Agents

Microsoft-hosted agents

Maintenance and upgrades are taken care of for you. Each time you run a pipeline, you get a fresh virtual machine. The virtual machine is discarded after one use.

Self-hosted agents

An agent that you set up and manage on your own to run jobs. Self-hosted agents give you more control to install dependent software needed for your builds and deployments.

DEMO

Creating release pipeline with Azure Pipelines

- Create the App Service instance
- Deploy the web application to Azure App Service
- Promote to the Test stage
- Promote to the Staging stage
- Promote to the Prod stage

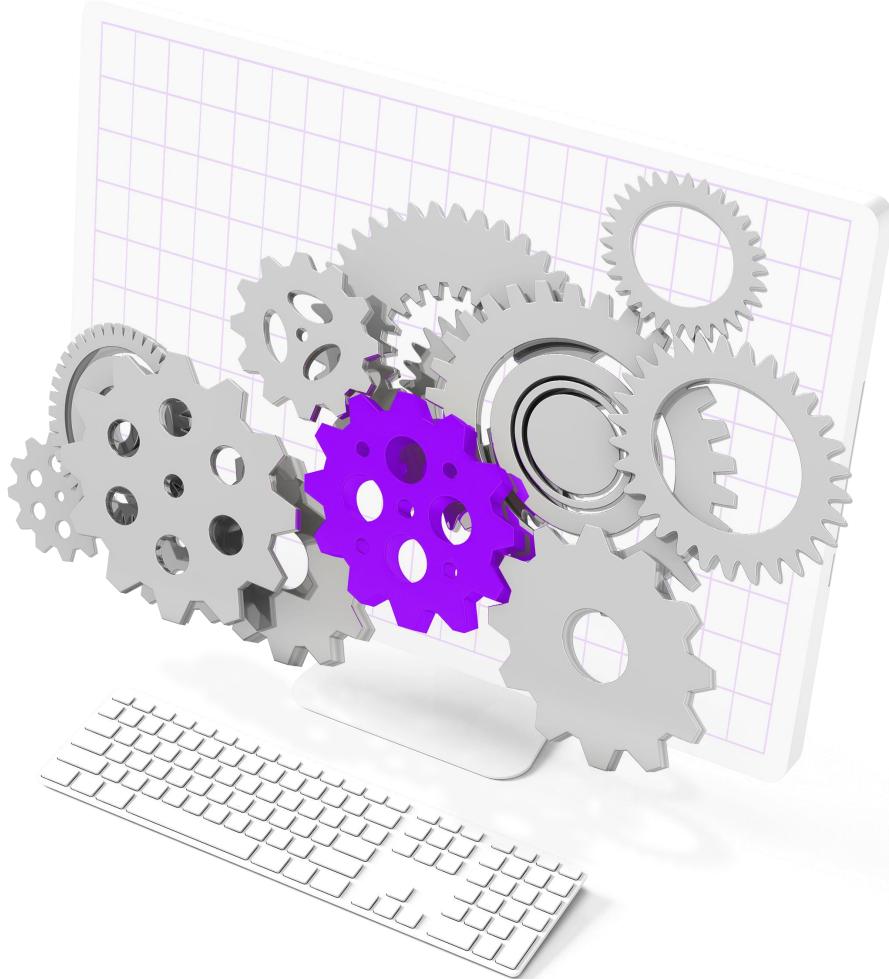
DEMO

Run functional testing in Azure Pipelines

- What is functional testing and kinds of functional testing
- Configure and Run the test in the pipeline

WHAT IS FUNCTIONAL TESTING?

Functional tests verify that each function of the software does what it should. How the software implements each function isn't important in these tests. What's important is that the software behaves correctly. You provide an input and check that the output is what you expect.



KINDS OF FUNCTIONAL TESTING



Smoke testing

Smoke testing verifies the most basic functionality of your application or service. These tests are often run before more complete and exhaustive tests. Smoke tests should run quickly.



Unit testing

Unit testing verifies the most fundamental components of your program or library, such as an individual function or method. You specify one or more inputs along with the expected results. The test runner performs each test and checks to see whether the actual results match the expected results.



Integration testing

Integration testing verifies that multiple software components work together to form a complete system. The test verifies that the web application can connect to the products database and then fulfill the order.



Regression testing

A *regression* occurs when existing behavior either changes or breaks after you add or change a feature. *Regression testing* helps determine whether code, configuration, or other changes affect the software's overall behavior.

KINDS OF FUNCTIONAL TESTING



Sanity testing

Sanity testing involves testing each major component of a piece of software to verify that the software appears to be working and can undergo more thorough testing.



User interface testing

User interface (UI) testing verifies the behavior of an application's user interface. UI tests help verify that the sequence, or order, of user interactions leads to the expected result. These tests also help verify that input devices, such as the keyboard or mouse, affect the user interface properly.



Usability testing

Usability testing is a form of manual testing that verifies an application's behavior from the user's perspective. Usability testing is typically done by the team that builds the software.



User acceptance testing

User acceptance testing (UAT), like usability testing, focuses on an application's behavior from the user's perspective. Unlike acceptance testing, UAT is typically done by real end users.

DEMO

Run functional testing in Azure Pipelines

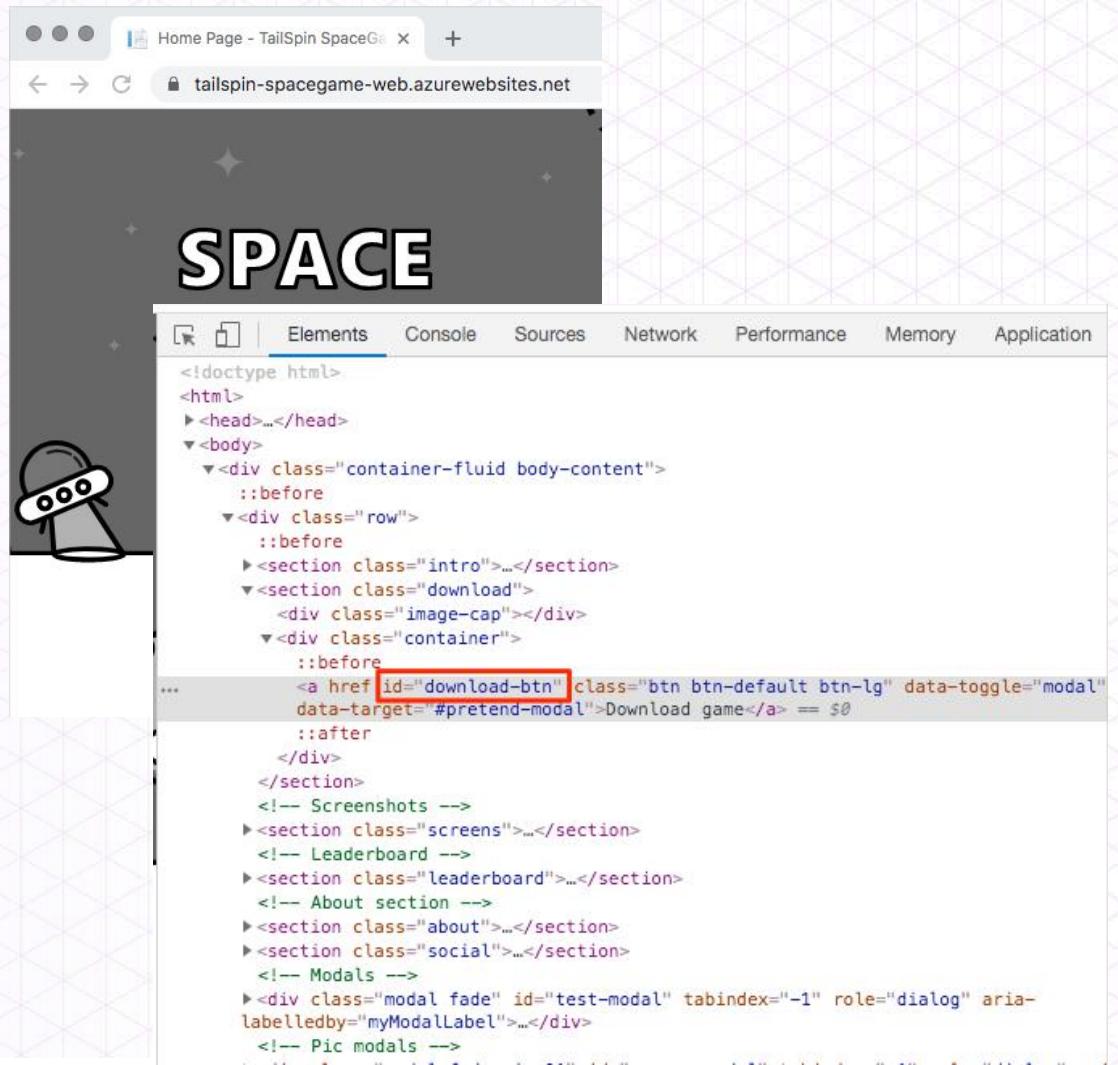
- What is functional testing and kinds of functional testing
- Configure and Run the test in the pipeline

WHAT ARE LOCATORS IN SELENIUM?

In a Selenium test, a locator selects an HTML element from the DOM (Document Object Model) to act on. Think of the DOM as a tree or graph representation of an HTML document. Each node in the DOM represents a part of the document.

In a Selenium test, you can locate an HTML element by its:

- id attribute.
- name attribute.
- XPath expression.
- Link text or partial link text.
- Tag name, such as body or h1.
- CSS class name.
- CSS selector.



MANAGE RELEASE CADENCE IN AZURE PIPELINE BY USING DEPLOYMENT PATTERNS

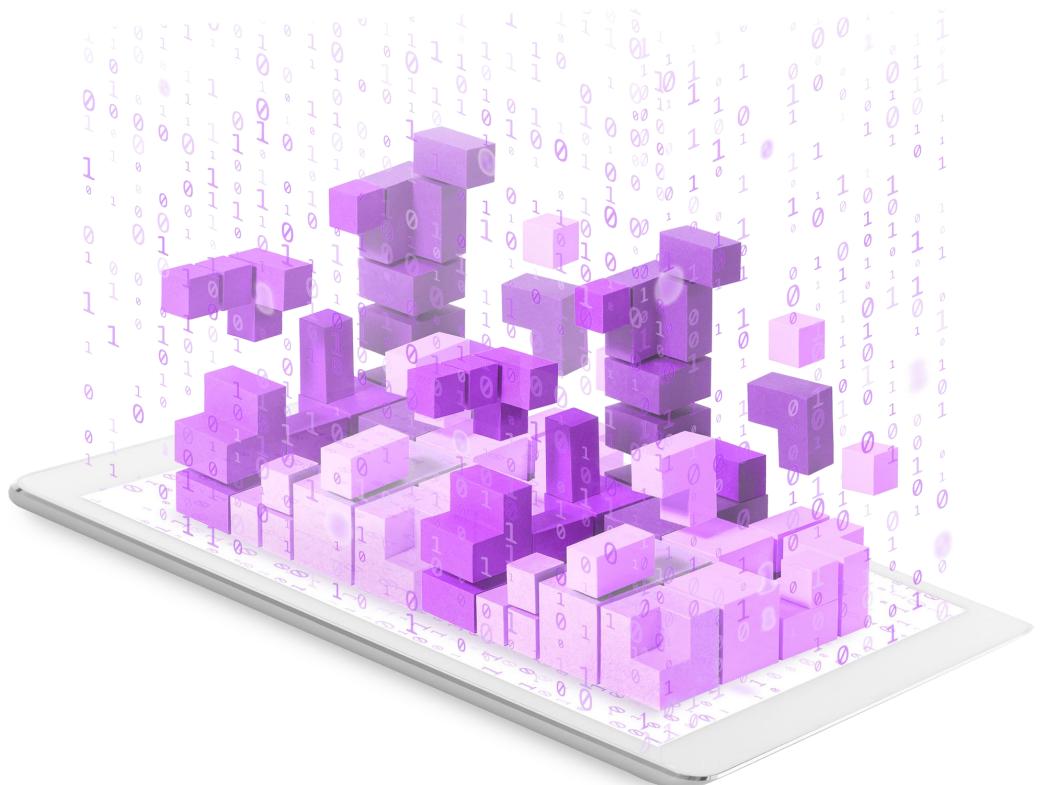
DEMO

Manage release cadence in Azure Pipelines by using deployment patterns

- What are deployment patterns?

WHAT ARE DEPLOYMENT PATTERNS?

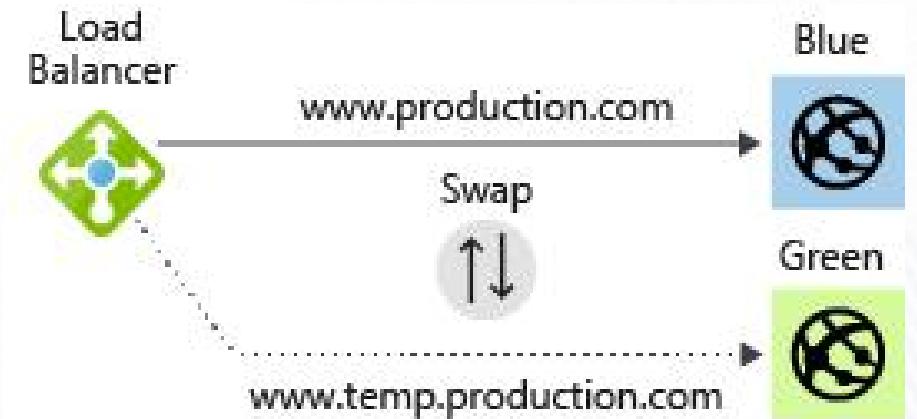
A *deployment pattern* is an automated way to smoothly roll out new application features to your users. An appropriate deployment pattern helps you minimize downtime. Some patterns also enable you to roll out new features progressively. That way, you can validate new features with select users before you make those features available to everyone.



Deployment Patterns

Blue-green deployments

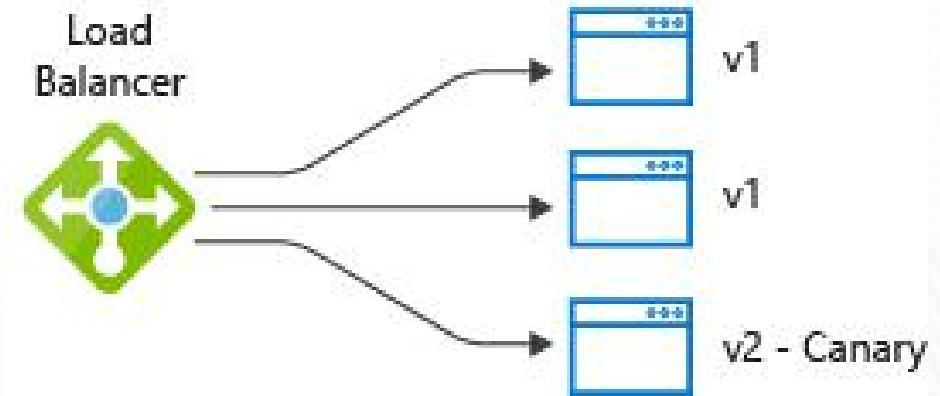
A blue-green deployment reduces risk and downtime by running two identical environments. These environments are called blue and green. At any time, only one of the environments is live. A blue-green deployment typically involves a router or load balancer that helps control the flow of traffic.



Deployment Patterns

Canary releases

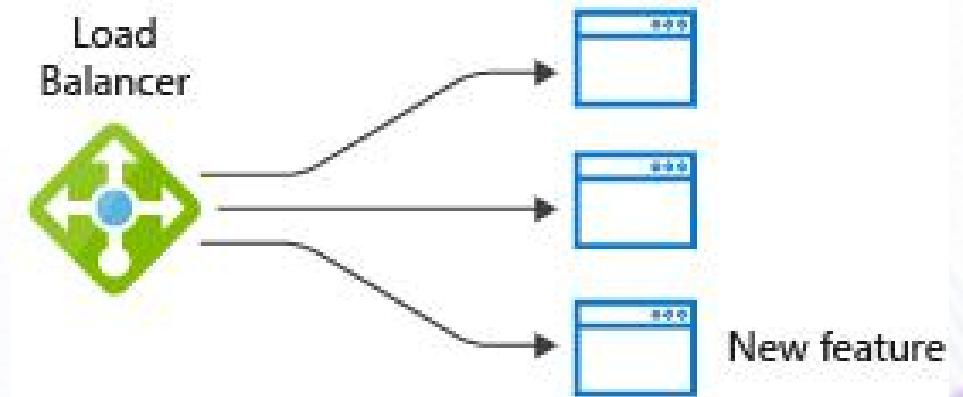
A canary release is a way to identify potential problems early without exposing all users to the issue. The idea is that we expose a new feature to only a small subset of users before we make it available to everyone.



Deployment Patterns

Dark launches

A dark launch is similar to a canary release or switching a feature toggle. Rather than expose a new feature to everyone, in a dark launch we release the feature to a small set of users.

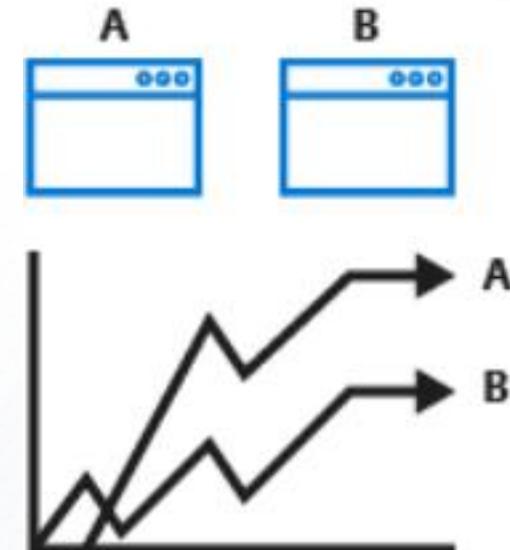


Deployment Patterns

A/B testing

A/B testing compares two versions of a webpage or app to determine which one performs better. A/B testing is like an experiment.

In A/B testing, we randomly show users two or more variations of a page. Then we use statistical analysis to decide which variation performs better for our goals.

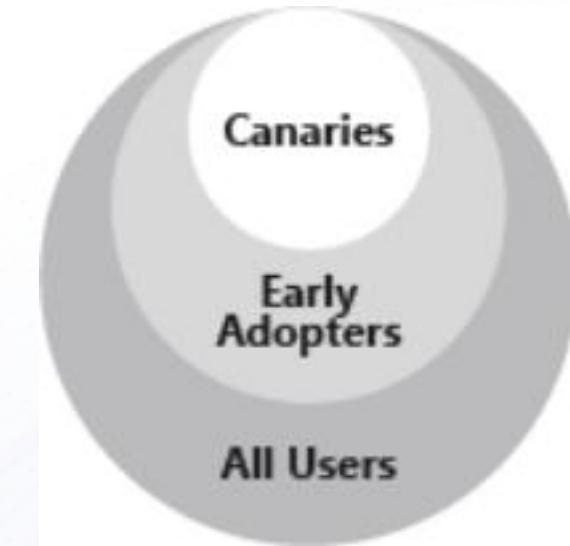


Deployment Patterns

Progressive-exposure deployment

Progressive-exposure deployment is sometimes called ring-based deployment. It's another way to limit how changes affect users while making sure that those changes are valid in a production environment.

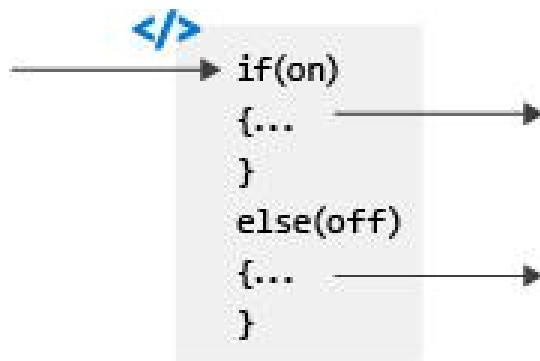
Rings are basically an extension of the canary stage. The canary release releases to a stage to measure effect. Adding another ring is essentially the same idea. In a ring-based deployment, we deploy changes to risk-tolerant customers first. Then we progressively roll out to a larger set of customers.



Deployment Patterns

Feature toggles

Feature toggles let us "flip a switch" at runtime. We can deploy new software without exposing any other new or changed functionality to our users.



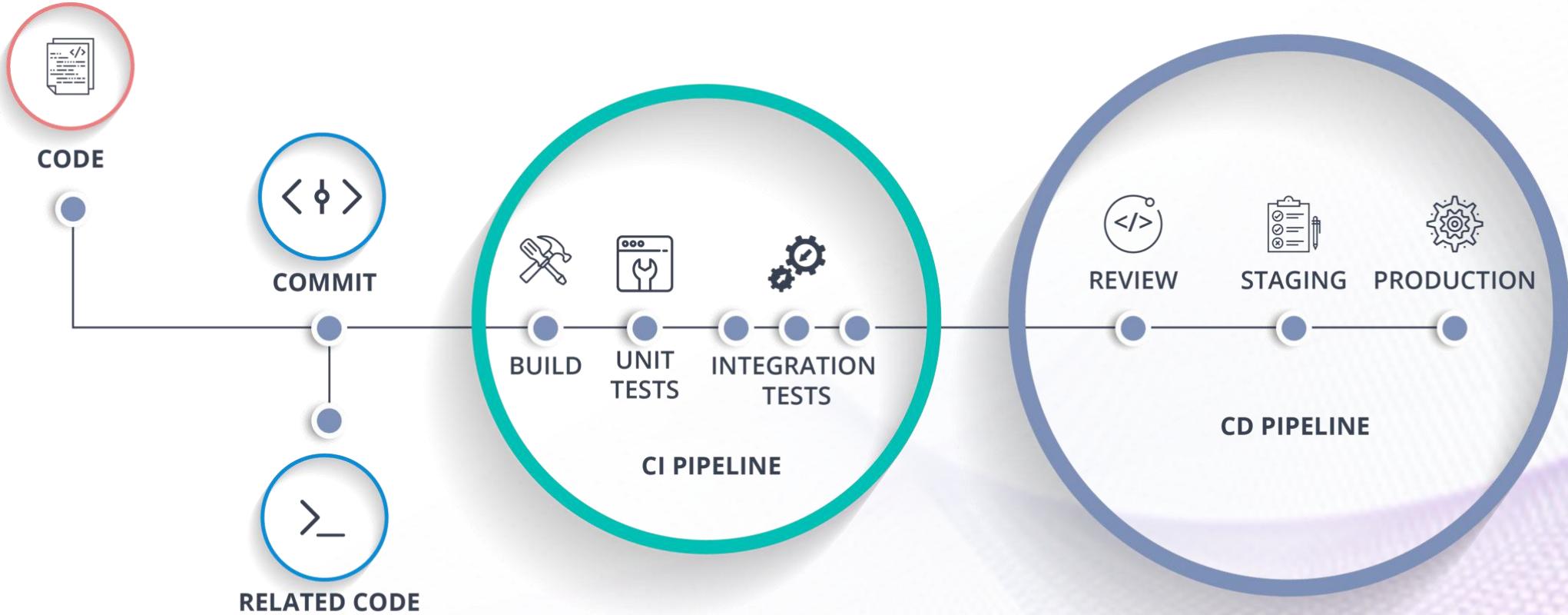
For example, we could expose the feature first to a small number of users to see how they react. That random sample of users sees the feature. Or we could just let the feature go live to everyone.

DEMO

Manage release cadence in Azure Pipelines by using deployment patterns

- What are deployment patterns?
- Implement the blue-green deployment pattern
- Push a change through the pipeline

CICD Pipeline



CHECK YOUR KNOWLEDGE



1. The marketing team has asked you to add a banner to your company's website. They have two versions of this banner. They want to know which version produces more clickthrough. Which deployment pattern might you use to help the marketing team identify the better version?
 - Blue-green deployment
 - A/B testing
 - Feature toggles
2. You have a new feature for your website, and you're ready to deploy it. However, this feature is risky because it changes the way your users interact with the site. Which deployment patterns might you use to release to a small group of early adopters who have signed up to see new features?
 - Canary release or progressive-exposure deployment
 - A/B testing or a dark launch
 - Blue-green deployment or feature toggles
3. You're not sure how your users will react to your new feature. You want to release your feature to a small, random sample of users to see how they react. Which deployment pattern might you use?
 - Blue-green deployment
 - Dark launch
 - A/B testing

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