



YAML

Yet Another Markup Language

.NET

*YAML is a human-readable data serialization standard for all programming languages.
It's a strict superset of JSON, with the addition of syntactically significant newlines and indentation.*

[HTTPS://YAML.ORG/](https://yaml.org/)

What is YAML?

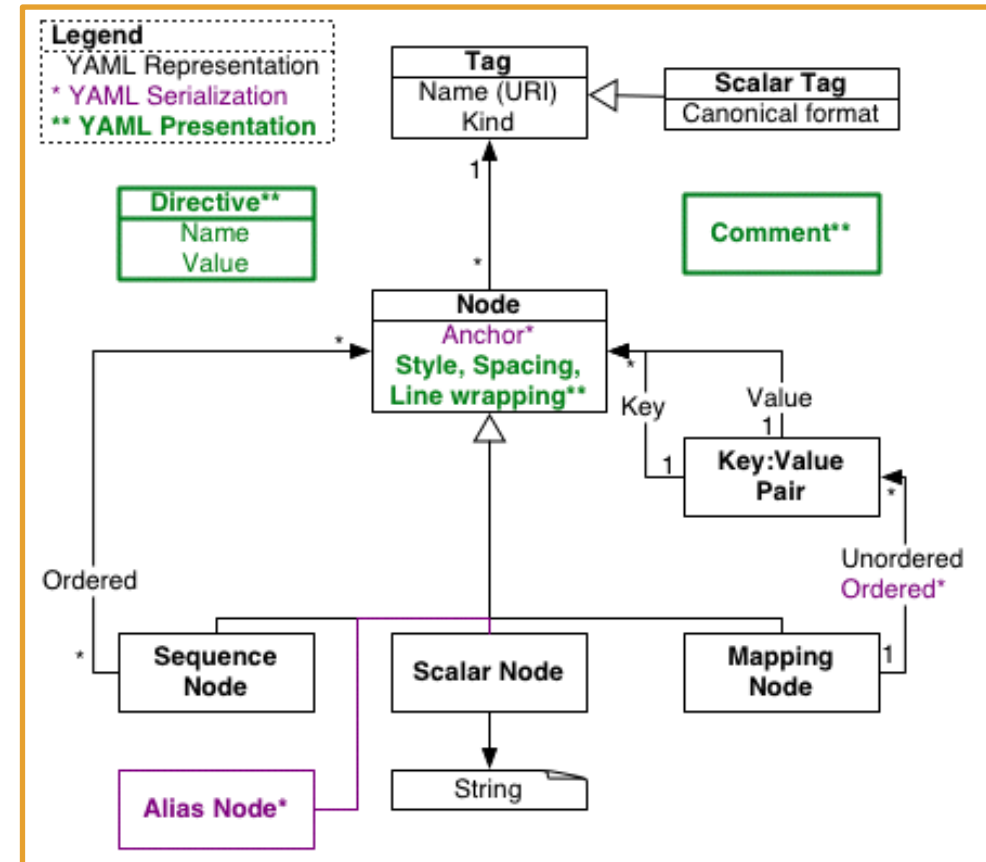
<https://yaml.org/spec/1.2/spec.html>
<http://www.yamllint.com/>

YAML is a Unicode-based data serialization language. It's designed around the common native data types of Agile programming languages.

YAML is useful for configuration, messaging, object persistence, and data auditing.

The design goals for **YAML**, in decreasing priority, are:

- Be easily readable by humans.
- Be portable between programming languages.
- Match the [native data structures](#) of Agile languages.
- Have a consistent model to support generic tools.
- Support one-pass processing.
- Be expressive and extensible.
- Be easy to implement and use.



Azure Pipelines and YAML

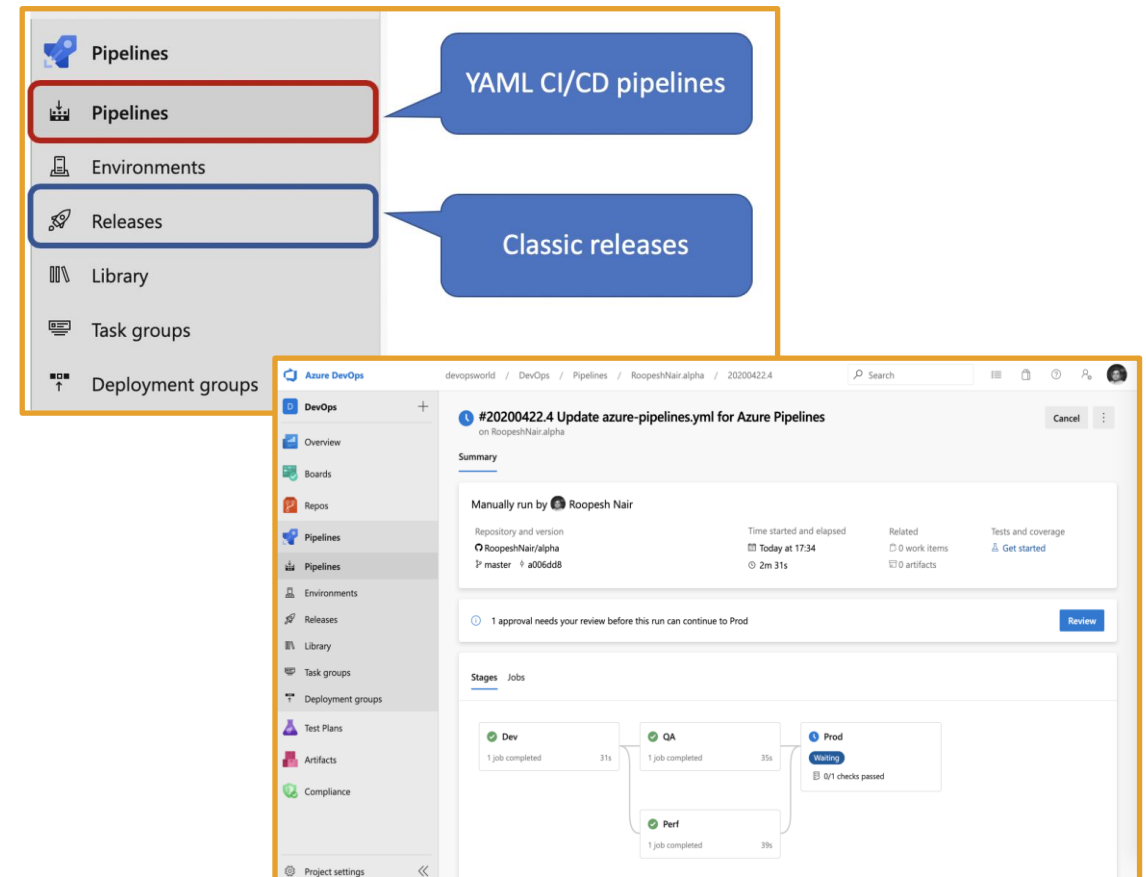
<https://devblogs.microsoft.com/devops/announcing-general-availability-of-azure-pipelines-yaml-cd/>
<https://azure.microsoft.com/en-us/services/devops/logout/?nav=min>

Microsoft's **Azure Pipelines** offers a way to use **.yaml** files to configure CI/CD Pipelines.

A **pipeline** is defined using a YAML file. This **.yaml** file is placed at the root of your project when you set up your Azure Pipeline.

The YAML file controls the build, test, and deploy stages of your application. It is started by a **trigger** activated when certain conditions are met in your repository.

The **trigger** knows about a push, PR, etc, to the repository because of a **Web Hook** on the repository.



YAML Triggers

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cyaml-example#push-trigger>
<https://docs.microsoft.com/en-us/azure/devops/pipelines/build/triggers?tabs=yaml&view=azure-devops#pr-triggers>

Triggers are how you automatically build your application. They are placed at the top of your YAML file. Azure Pipelines watches for your designated **trigger** and will automatically start running your YAML instructions when the **trigger** event is detected.

```
1  name: '$(date:yyyyMMdd)$(rev:rr)'  
2  #what branch we are watching  
3  trigger:  
4    - 'master'  
5  pr: 'none'  
6  pool:  
7    vmImage: 'ubuntu-latest'  
8  variables:  
9    instructor: 'Mark'  
10   sdkVersion: '3.1.x'  
11   solutionPath: 'pipelineMvcDemo/pipelineMvcDemo.csproj'  
12   buildConfiguration: 'Release'
```

A **push trigger** specifies that a **'git push'** to a particular branch will cause a build to run. If you specify a "no push" trigger, pushes to any branch trigger a build.

```
trigger:  
- master  
- develop
```

```
trigger: none # will disable CI builds (but not PR builds)
```

A **Pull Request Trigger** will start a build when a PR is made to the specified branch. You can also specify 'none', which will disable PR triggers.

```
pr:  
- master  
- develop
```

```
pr: none # will disable PR builds
```

YAML and Pipeline Structure

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=schema%2Cparameter-schema>
<https://docs.microsoft.com/en-us/azure/devops/pipelines/get-started/pipelines-get-started?view=azure-devops>

Azure Pipelines supports CI/CD using a **.yaml** file. The **.yaml** file (YAML) is written in **YAML** Syntax and contains instructions that **Azure Pipelines** uses to build, test, report, publish, and deploy an application.

A **pipeline** is made up of one or more “stages” that describe processes.

- Stages are the major divisions in the deployment process (building, testing and deployment).
- Each **Stage** is divided into **Jobs**.
- A **Job** is a unit of work assignable to one machine and is divided into **Steps**
- Each **Step** is a series of **Tasks**, scripts, or references to external templates.
- **Tasks** are the smallest units of work in the pipeline.

Simple **pipelines** can omit multiple stages and jobs as needed. **Azure Pipelines** does not support all **YAML** features.

- Pipeline
 - Stage A
 - Job 1
 - Step 1.1
 - Step 1.2
 - ...
 - Job 2
 - Step 2.1
 - Step 2.2
 - ...
 - Stage B
 - ...

YAML and Pipeline Structure

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=schema%2Cparameter-schema>

<https://docs.microsoft.com/en-us/azure/devops/pipelines/get-started/pipelines-get-started?view=azure-devops>

A **pipeline** is made up of one or more “stages” that describe processes.

- Stages are the major divisions in the deployment build, test and deploy process.
- Each **Stage** is divided into Jobs.
- A **Job** is a unit of work assignable to one machine.
- Each job is divided into steps
- Each **Step** is divided into **Tasks**. The Task is the smallest unit of work in the pipeline.
- If you have more than one Stage to list, they can be listed inside a “Stages” section. The same is for Jobs.

```
14  #stages group sequential actions
15  stages:
16    - stage: 'build'
17      jobs:
18        - job: 'buildjob'
19          pool:
20            vmImage: 'ubuntu-latest'
21          steps:
22            # NET build this downloads the correct SDK version for your build.
23            Settings
24            - task: UseDotNet@2
25              inputs:
26                packageType: 'sdk'
27                version: '$(sdkVersion)'
28                displayName: 'dotnet $(sdkVersion)'
29
```

YAML Stage

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#stage>

A **Stage** is a collection of related **Jobs**. By default, **Stages** run sequentially.

In this example:

- A region of **Stages** is declared then given a name.
- Each stage has a **Jobs** region where one or more **Jobs** are listed and named.
- Each **Job** has a **Steps** region where one or more **Tasks** can be listed.
- A script is a type of **Task** and represents what you could type in the command line.

```
stages:
- stage: Build
  jobs:
  - job: BuildJob
    steps:
    - script: echo Building!
- stage: Test
  jobs:
  - job: TestOnWindows
    steps:
    - script: echo Testing on Windows!
  - job: TestOnLinux
    steps:
    - script: echo Testing on Linux!
- stage: Deploy
  jobs:
  - job: Deploy
    steps:
    - script: echo Deploying the code!
```

```
stages:
- stage: BuildWin
  displayName: Build for Windows
- stage: BuildMac
  displayName: Build for Mac
  dependsOn: [] # by specifying a
```

This example shows how to run two stages in parallel (async). Specify an empty array with **'dependsOn:'** to run a stage without waiting for the preceding stage to complete.

YAML Job

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#job>

A **Job** is where you can add a reference to a container.

```
jobs:
- job: RunsInContainer
  container: ubuntu:16.04
# Docker Hub image reference
```

A **Job** is a collection of **Steps** run by an agent or on a server. **Jobs** can run conditionally and might depend on earlier **Jobs**.

```
jobs:
- job: MyJob
  displayName: My First Job
  continueOnError: true
  workspace:
    clean: outputs
  steps:
  - script: echo My first job
```

A **deployment job** is a special type of **job**. It is a collection of **steps** to run sequentially against the environment.

```
jobs:
  # track deployments on the environment
- deployment: DeployWeb
  displayName: deploy Web App
  pool:
    vmImage: 'Ubuntu-16.04'
  # creates an environment if it doesn't exist
  environment: 'smarthotel-dev'
  strategy:
    # default deployment strategy, more coming...
  runOnce:
    deploy:
      steps:
      - script: echo my first deployment
```

YAML Steps

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#steps>

A **job** is made up of one or more **steps**. Each **step** runs in its own process and has access to the pipeline workspace. Environment variables aren't preserved between **steps**, but file system changes are. Supported **Tasks** in Azure Pipelines are [Script](#), [Bash](#), [pwsh](#), [PowerShell](#), [Checkout](#), [Task](#), and [Step templates](#).

```
steps:
- script: echo This runs in the default shell on any machine
- bash: |
    echo This multiline script always runs in Bash.
    echo Even on Windows machines!
- pwsh: |
    Write-Host "This multiline script always runs in PowerShell Core."
    Write-Host "Even on non-Windows machines!"
```

YAML Variables

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#variables>

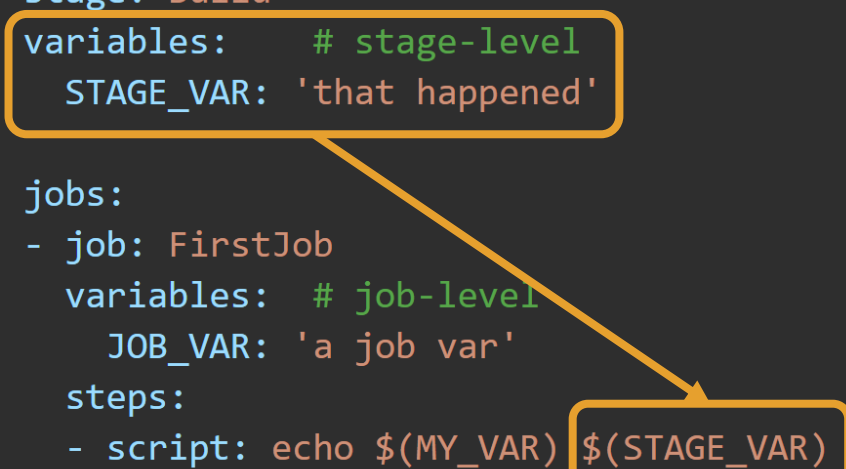
You can add hard-coded values directly or reference a variable group.

You can specify variables at the pipeline, stage, or job level by using the **'variables:'** keyword followed by the name and value of the variable in single quotes.

```
variables:      # pipeline-level
  MY_VAR: 'my value'
  ANOTHER_VAR: 'another value'

stages:
- stage: Build
  variables:    # stage-level
    STAGE_VAR: 'that happened'

jobs:
- job: FirstJob
  variables:    # job-level
    JOB_VAR: 'a job var'
  steps:
  - script: echo $(MY_VAR) $(STAGE_VAR) $(JOB_VAR)
```



Template References

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#template-references>

You can import reusable sections of your pipeline from a separate (*template*) file. These separate files are known as *templates*. *Templates* can include other *templates*.

Azure Pipelines supports four kinds of *templates*:

- [Stage](#)
- [Job](#)
- [Step](#)
- [Variable](#)

File: stages/test.yml

```
parameters:  
  name: ''  
  testFile: ''
```

Template
that accepts
parameters

```
stages:  
- stage: Test_${{ parameters.name }}  
  jobs:  
  - job: ${{ parameters.name }}_Windows  
    pool:  
      vmImage: vs2017-win2016  
    steps:  
    - script: npm install  
    - script: npm test -- --file=${{ parameters.testFile }}  
  - job: ${{ parameters.name }}_Mac  
    pool:  
      vmImage: macos-10.14  
    steps:  
    - script: npm install  
    - script: npm test -- --file=${{ parameters.testFile }}
```

File: azure-pipelines.yml

```
stages:  
- template: stages/test.yml # Template reference  
  parameters:  
    name: Mini  
    testFile: tests/miniSuite.js  
  
- template: stages/test.yml # Template reference  
  parameters:  
    name: Full  
    testFile: tests/fullSuite.js
```

.yml file which calls
the template using
parameters

Template References

<https://docs.microsoft.com/en-us/azure/devops/pipelines/yaml-schema?view=azure-devops&tabs=example%2Cparameter-schema#template-references>

In this example:

- The upper image shows the template **.yaml** file.
- The lower image is the **.yaml** file that called the template with arguments.
- The lower YAML file calls the template two times.
- The Template instantiates an object at the top with the keyword '**parameters**' to accept arguments passed in.
- It then references the values of the object while creating jobs and using npm commands.

File: stages/test.yaml

```
parameters:
  name: ''
  testFile: ''
```

Template
that accepts
parameters

```
stages:
```

```
- stage: Test_${{ parameters.name }}
  jobs:
    - job: ${{ parameters.name }}_Windows
      pool:
        vmImage: vs2017-win2016
      steps:
        - script: npm install
        - script: npm test -- --file=${{ parameters.testFile }}
    - job: ${{ parameters.name }}_Mac
      pool:
        vmImage: macos-10.14
      steps:
        - script: npm install
        - script: npm test -- --file=${{ parameters.testFile }}
```

File: azure-pipelines.yaml

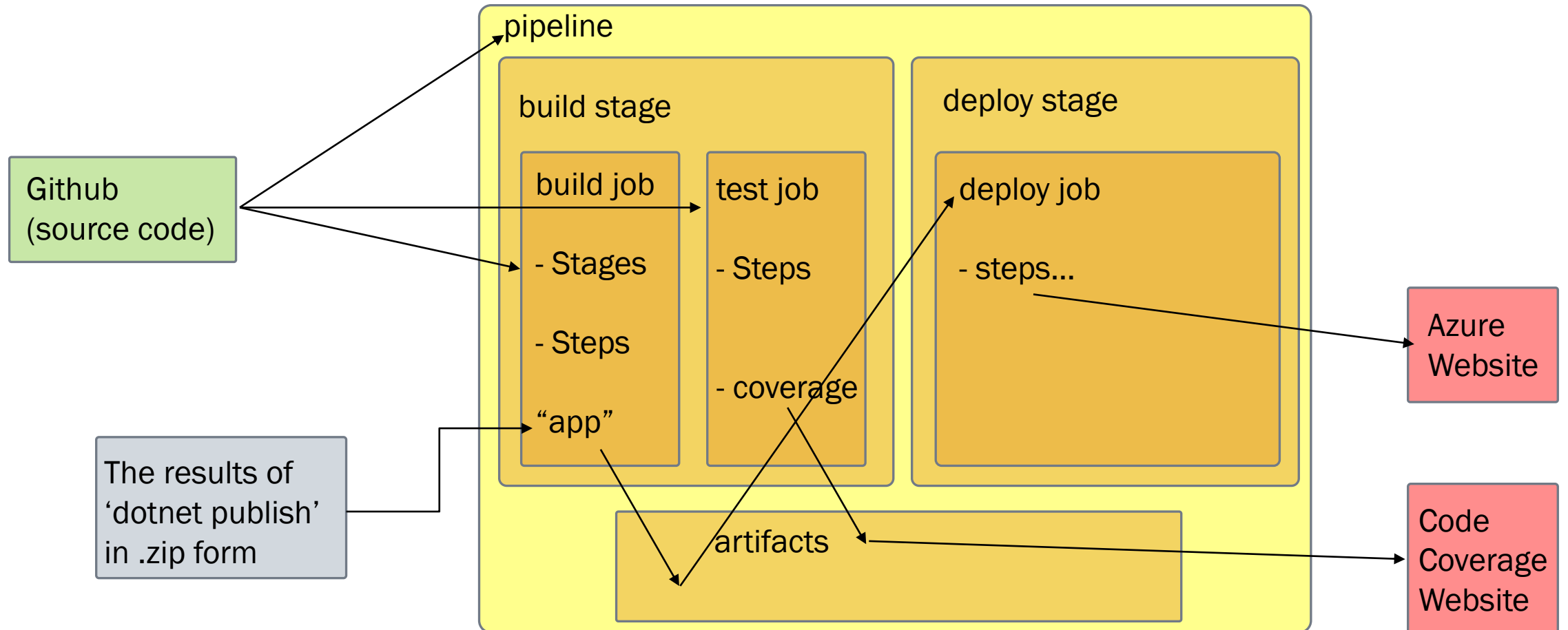
```
stages:
```

```
- template: stages/test.yaml # Template reference
  parameters:
    name: Mini
    testFile: tests/miniSuite.js

- template: stages/test.yaml # Template reference
  parameters:
    name: Full
    testFile: tests/fullSuite.js
```

.yaml file which calls
the template using
parameters

Pipeline Deployment Workflow



Additional Resources

- Build your first Azure Pipeline
 - <https://docs.microsoft.com/en-us/azure/devops/pipelines/ecosystems/dotnet-core?view=azure-devops>
- See code coverage in Azure Pipeline
 - <https://docs.microsoft.com/en-us/azure/devops/pipelines/test/review-code-coverage-results?view=azure-devops>
- Deploy to Azure App Service using Visual Studio Code
 - <https://docs.microsoft.com/en-us/azure/devops/pipelines/targets/deploy-to-azure-vscode?view=azure-devops>