YAML Terms for GitHub Actions

Workflow Syntax

Work flow triggers are events that cause a workflow to run:

- Events that occur in your workflow's repository
- Events that occur outside of GitHub and trigger a `repository_dispatch` event on GitHub
- Scheduled times
- Manual

`name` : The name of the GitHub Action

`on` : When or condition of when the workflow is triggered. There are different filters, branches, labels, that can be used to trigger the workflow.

`jobs` : A jobs runs in a runner environment as determined by `runs-on`

Course Notes

Workflow Components

Actions: Reusable tasks that perform specific jobs within a workflow

Workflows: Automated processes defined in your repository that coordinate one o more jobs, triggered by events or on a schedule

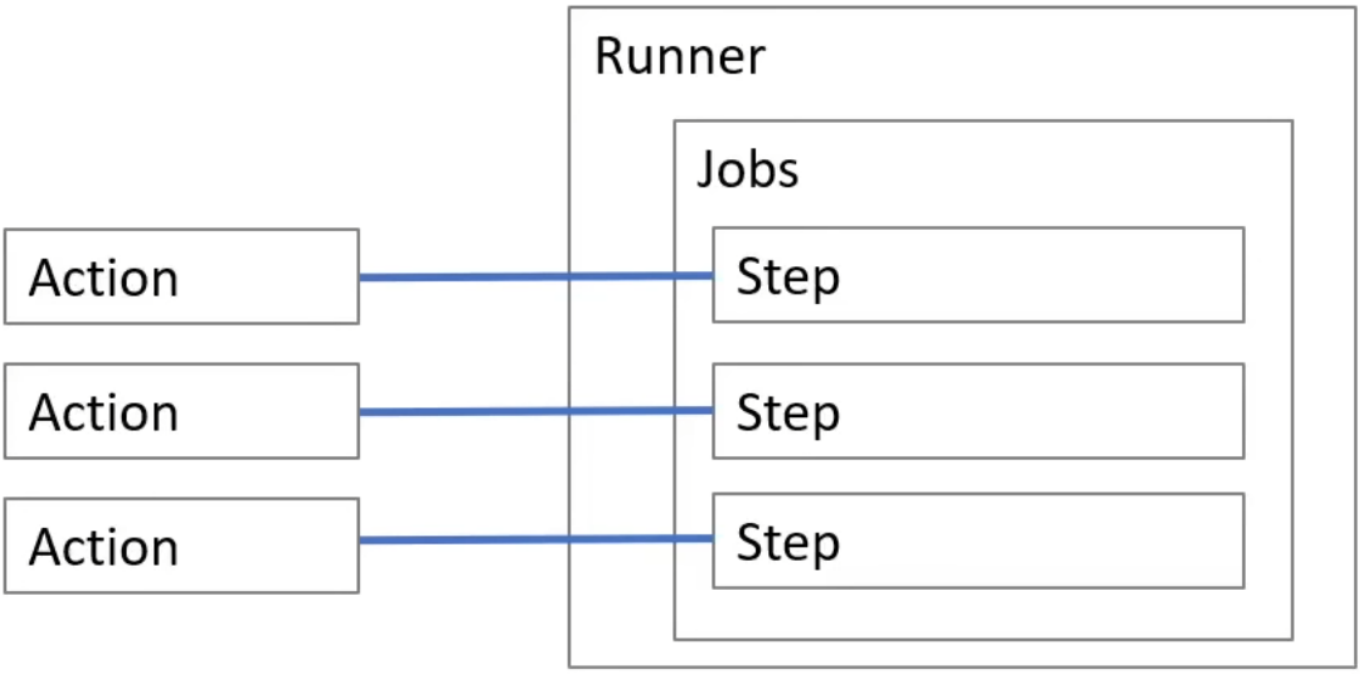
Jobs: Groups of steps that execute on the same runner, typically running in parallel unless configured otherwise

Steps: Individual tasks within a job that run commands or actions sequentially

Runs: Instances of workflow execution triggered by events, representing the complete run-through of a workflow

Runners: Servers that host the environment where the jobs are executed, available as GitHub-hosted or self-hosted options

Marketplace: A platform to find and share reusable actions



Scheduling Events

Schedule can us a **cron expression** to trigger a workflow at a specific time or day

For example:

```
on:
    schedule:
        - cron: '30 5 * * 1,3'
        - cron: '30 5 * * 2,4'

jobs:
    test_schedule:
        runs-on: ubuntu-latest
        steps:
            - name: Not on Monday or Wednesday
            if: github.event.schedule != '30 5 * * 1,3'
            run: echo "Skip this step on Monday and Wednesday"
            - name: Every time
            run: echo "This step will always run"
```

Triggering Single or Multiple Events

Single Event

For example on **Push**

```
```

```yaml
name: CI on Push

on:
    push:
        branches:
            - main

jobs:
    build:
        runs-on: ubuntu-latest
        steps:
            - uses: actions/checkout@v2
            - name: Run a one-line script
              run: echo "Hello world!"
```

Multiple Events

For example on **Push, Pull, Request, Release**

Note: If you specify multiple events, only one of those events needs to occur to trigger your workflow. If multiple triggering events for your workflow occur at the same time, multiple workflow runs will be triggered

```yaml

name: CI on Multiple Events

on:
    push:
        branches:
            - main
    pull_request:
        branches:
            - main
    release:
        types: [published, created]

jobs:
    build-and-test:
    runs-on: ubuntu-latest
    steps:
        - uses: actions/checkout@v2
        - name: Set up Python
```

Manual Events

Workflows can be triggered manually through Github UI, GitHub CLI, or GitHub REST API

```
```

```
gh workflow run greet.yml \
-f name=brian \
-f greeting=hello \
-F data=@myfile.txt
```

a `workflow_dispatch:` and `inputs:` event must be added to run manually

Webhook Events

Many of the listed GitHub Workflow Triggers are triggered by a **webhook**

Most of these webhooks will be triggered within GitHUb when users are interacting with GitHub which will in turn will trigger API actions. Users generally don't have to directly call the API to trigger the workflow

Using `repository_dispatch` with **webhook** type you can trigger the Workflow via an external HTTP endpoint.

- will only trigger a workflow run if the workflow file is on the default branch

For example:

```yaml
name: Workflow on Respository Dispatch

on:
    repository_dispatch:
        types:
            - webhook

jobs:
    respond-to-dispatch:
        runs-on: unbuntu-latest
        steps:
            - name: Checkout repository
              uses: actions/checkout@v2
            - name: Run a script
              run: echo "Event of type ${GITHUB_EVENT_NAME}"
```

When you **make the request to the webhook** you must:

- Send a POST request to the repo's dispatches endpoint
- Set the Accept type for application/vnd.github+json
- Provide Authorization to your Personal Access Token
- Pass the event type "webhook"

Conditional Keyword for Steps

jobs.<job_id>.if conditional can be used to **prevent a job from running unless a condition is met.**

For Example:

```
on:
    push:
        branches:
            - main

jobs:
    production-deploy:
        if: github.repository == 'brianopao/Github-Actions-Course'
        runs-on: ubuntu-latest
        steps:
            - uses: actions/checkout@v4
            - uses: actions/setup-node@v4
              with:
                node-version: '14'
            - run: npm install -g bats
```

Note: You must always use the ${{ }} expression syntax or escape with "","", or () when the expression starts with a !, since ! is a special character in YAML

For Example:

```
if: ${{ ! startsWith(github.ref, 'refs/tags/v') }}
```

Expressions

Functions

- `contains` : Check if a string contains another string
- - example: `if: contains(github.event.head_commit.message, 'skip ci')`
- `endsWith` : Check if a string ends with another string
- - example: `if: endsWith(github.event.head_commit.message, 'skip ci')`
- `startsWith` : Check if a string starts with another string
- - example: `if: startsWith(github.event.head_commit.message, 'skip ci')`
- `format` : Format a string using a format string
- - example: `if: format('refs/heads/{0}', github.ref) == 'refs/heads/main'`
- `join` : Join a list of strings into a single string
- - example: `if: join(github.event.labels.*.name, ',') == 'bug,enhancement'`
- `toJson` : Convert a value to a JSON string
- - example: `if: toJson(github.event) == '{"key": "value"}'`
- `fromJson` : Convert a JSON string to a value
- - example: `if: fromJson('{"key": "value"}').key == 'value'`

- `hashFiles` : Compute the hash of files
- - example: `if: hashFiles('**/*.js') == '123456'`

Status Check Functions

- `always` : Always true
- `cancelled` : Always false
- `failure` : True if the previous step failed
- `success` : True if the previous step succeeded
- `skipped` : True if the previous step was skipped
- `timedout` : True if the previous step timed out
- `neutral` : True if the previous step was

Runners

The Runner **determines the underlying computer and OS** that the workflow will run on

The runner can be:

- GitHub-hosted runner - GitHub provides runtime environments
- - Standard Size
- - - Linus, ubuntu, Windows
- - - MacOS
- - Larger Size
- - - Only available for organizations and enterprise using the GitHub Team or Github Enterprise Cloud plans
- - - More RAM, CPU, and storage
- Self-hosted - External compute connected to GitHub using the GitHub Actions self-hosted runner application

```
runs-on: ubuntu-latest
runs-on: windows-latest
runs-on: macos-latest


runs-on: [macos-14, macos-13, macos-12]

runs-on: self-hosted
```

GitHub-Hosted Runners

- No setup required; fully managed by GitHub
- Free with limits on usage; ch
- Automatically scales based on demand

- Predefined environments with limited control
- Windows, Linux, MacOS
- Secure but runs in a shared environment
- Fixed performance capabilities

Self-Hosted Runners

- Requires setup and maintenance
- No additional cost; you provide the hardware
- Full control over the environment
- Any OS, any hardware
- Potentially more secure, but you are responsible for security
- Performance depends on your hardware

Self Hosted Runners Setup

They can be:

- Physical machines
- Virtual machines
- Containers
- On-premises
- Cloud

You can add self-hosted runner at various levels in the management hierarchy:

- Repository Level
- - dedicated to a single repository
- Organization Level
- - shared across multiple repositories
- Enterprise Level
- - shared across multiple organizations

To setup self-hosted you need to add a runner and install the GitHub Actions Runner to connect the external compute to the external self-hosted runner

Worflow Commands

Actions can communicate with the runner machine to set environment variables, output values used by other actions, add debug messages to the log, and other tasks

Set Env Vars set an environment variables that will be available to subsequent actions in the job

```
steps:
    - name: Set an environment variable
      run: echo "::ACTION_ENV=production" >> $GITHUB_ENV
```

Adding to System Path Add a directory to the system PATH for subsequent steps in the job

```
steps:
    - name: Add directory to PATH
      run: echo "/pth/to/dir" >> $GITHUB_PATH
```

Setting Output Variables Set outputs that can be used by other jobs in a multi-job workflow

```
steps:
    - name: Set output
      id: exmaple-step
      run: echo "result=output_value" >> $GITHUB_OUTPUT

    - name: Use Output
      run: echo "The output was ${{ steps.example-step.outputs.result }}"
```

Debug Messages Add debug messages to the log

```
steps:
    - name: Debug message
      run: echo "::debug::This is a debug message"
```

Grouping Log Messages Makes logs easier to read by grouping messages together

```
steps:
    - name: Group messages
      run: echo "::group::My Group"
    - name: Step 1
      run: echo "This is step 1"
    - name: Step 2
      run: echo "This is step 2"
    - name: End Group
      run: echo "::endgroup::"
```

Masking Values in Logs Prevent sensitive information from being printed in logs

```
steps:
    - name: Mask a value
      run: echo "::add-mask::${{ secrets.SECRET_VALUE }}"
```

Stopping Failing Actions Can force a workflow to stop and fail using the error command

```
steps:
    - name: Fail the workflow
      run: echo "::error::This workflow has failed"
```

Workflow Context

Context are **a way to access information** about workflow runs, variables, runner environments, jobs, and steps. Each context is an object that contains properties, which can be strings or other objects

You can access contexts using the expression syntax `${{ }}`

github - info about the event that triggered the workflow run

env - Contains variables set in a workflow, job, or step

vars - Contains variables set at the repository, organization, or enterprise level

job - Contains information about the job that is running

jobs - For reusable workflows only, contains output of jobs from the reusable workflow

steps - information about the steps that is running the current job

runner - information about the runner that is running the job

secrets - Contains secrets set in the repository

strategy - Contains information about the matrix strategy

matrix - Contains information about the matrix strategy