

Lab 4: Downstream Pipelines with the 'Trigger' Keyword

Overview

This lab covers:

1. **How and when to use downstream pipelines** to break workflows into manageable stages.
2. **Using the `trigger` keyword** to initiate downstream pipelines from within a primary pipeline.

By the end, you will understand how to set up downstream pipelines and manage dependencies between stages using triggers.

Prerequisites

1. Basic familiarity with GitLab CI/CD pipeline configuration.
 2. A GitLab repository with CI/CD enabled.
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Part 1: Introduction to Downstream Pipelines

1.1 What are Downstream Pipelines?

Downstream pipelines allow you to split large workflows into separate, modular pipelines that are triggered by a main, or "upstream," pipeline. This modular approach:

- Helps in organizing complex workflows.
- Reduces interdependence between jobs.
- Allows for independent retries of specific pipelines.

1.2 When to Use Downstream Pipelines

- When you need to **divide complex workflows** into smaller segments.
 - When some jobs or stages need to **wait for prior pipelines** to complete.
 - To **manage dependencies** and only execute certain steps based on conditions met in a prior pipeline.
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Part 2: Using the `trigger` Keyword

The `trigger` keyword in GitLab allows you to start a downstream pipeline from within a job in the current pipeline. When combined with rules, you can control when and how these downstream pipelines execute.

2.1 Basic Configuration

The `trigger` job definition includes:

- **`trigger` keyword:** Defines the target project and pipeline to trigger.
 - **`include` keyword** (optional): Allows you to include files defining the downstream pipeline jobs.
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Part 3: Demo – Creating a Downstream Pipeline with `trigger`


In this demo, you will:

1. Set up an upstream pipeline with jobs to deploy code.
2. Define a downstream pipeline for tasks like running integration tests.

3.1 Setting Up the Downstream Pipeline

Important: Create `downstream-project` in the same group and make sure to disable shared runner for this project as well.

devgroup2922244 / New project / Create blank project



Create blank project

Create a blank project to store your files, plan your work, and collaborate on code, among other things.

Project name

Must start with a lowercase or uppercase letter, digit, emoji, or underscore. Can also contain dots, pluses, dashes, or spaces.

Project URL

 / **Project slug**

Project deployment target (optional)

Visibility Level ⓘ

☒ **Private**
Project access must be granted explicitly to each user. If this project is part of a group, access is granted to members of the group.

☐ **Internal** ⓘ
The project can be accessed by any logged in user except external users.

☐ **Public** ⓘ
The project can be accessed without any authentication.

Project Configuration

☒ **Initialize repository with a README**
Allows you to immediately clone this project's repository. Skip this if you plan to push up an existing repository.

☐ **Enable Static Application Security Testing (SAST)**
Analyze your source code for known security vulnerabilities. [Learn more.](#)

> Experimental settings

Project runners

These runners are assigned to this project.

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Instance runners

These runners are available to all groups and projects.

Each CI/CD job runs on a separate, isolated virtual machine.

Enable instance runners for this project

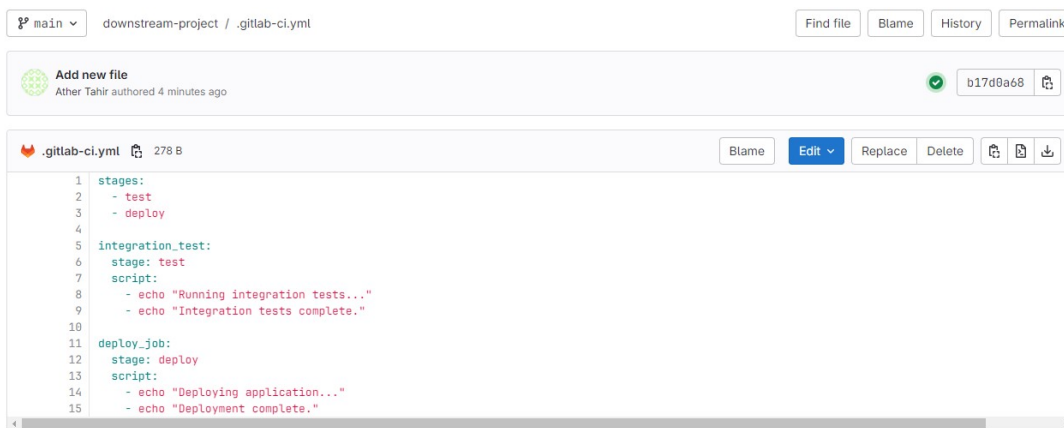
☒

In the downstream repository (`your-group/downstream-project`), create the `.gitlab-ci.yml` file with the following configuration:

```
stages:
  - test
  - deploy

integration_test:
  stage: test
  script:
    - echo "Running integration tests..."
    - echo "Integration tests complete."

deploy_job:
  stage: deploy
  script:
    - echo "Deploying application..."
    - echo "Deployment complete."
```



3.2 Setting Up the Upstream Pipeline

1. Create the main pipeline configuration in `.gitlab-ci.yml` in your repository.

```
stages:
  - build
  - trigger_tests

build_job:
  stage: build
  script:
    - echo "Building application..."
    - echo "Build complete."

trigger_downstream:
  stage: trigger_tests
  trigger:
    project: "your-group/your-downstream-project" # Replace with actual group and
downstream project path
    branch: "main" # Specify the branch for the downstream pipeline
```

Explanation:

- In project: `"your-group/your-downstream-project"`, replace `your-group` with your actual GitLab group name and `your-downstream-project` with the downstream project name.
 - This configuration will initiate the downstream pipeline located within the specified group.
2. **Commit and Push Changes** to trigger the upstream pipeline.

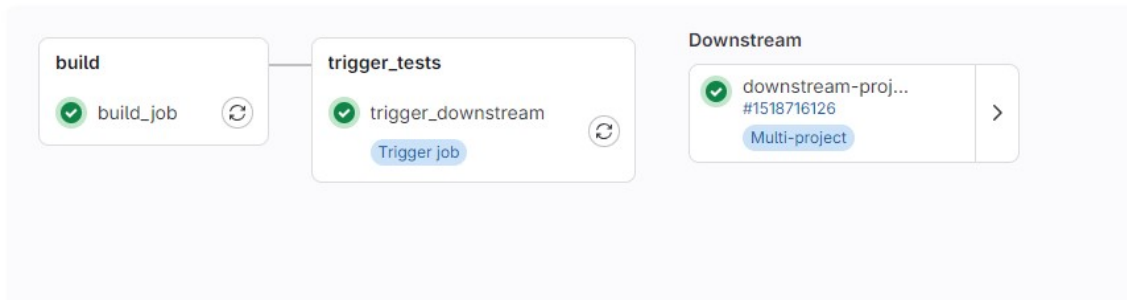
new test

✓ Passed Ather Tahir created pipeline for commit 3f91e81b just now, finished just now

For main

latest 2 jobs 11 seconds, queued for 0 seconds

Pipeline Jobs 2 Tests 0



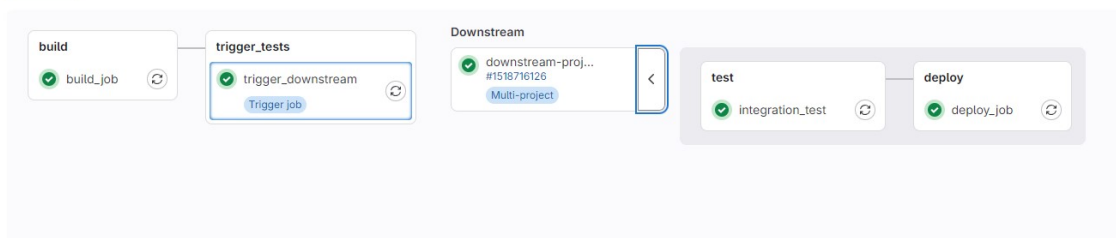
new test

✓ Passed Ather Tahir created pipeline for commit 3f91e81b just now, finished just now

For main

latest 2 jobs 11 seconds, queued for 0 seconds

Pipeline Jobs 2 Tests 0



Part 4: Advanced Configuration with Conditional Triggers

Sometimes you may want to only trigger the downstream pipeline under specific conditions, such as:

- Changes in specific files or folders.
- Only in certain branches.

4.1 Configuring Conditional Trigger

To only trigger the downstream pipeline if changes were made to a specific directory, modify the trigger job as follows:

```

stages:
  - build
  - trigger_tests

build_job:

```

```
stage: build
script:
  - echo "Building application..."
  - echo "Build complete."

trigger_downstream:
  stage: trigger_tests
  trigger:
    project: "your-group/your-downstream-project"
    branch: "main"
  rules:
    - changes:
      - src/** # Only trigger if changes are made in the src directory
```

Part 5: Running and Observing the Pipeline

1. Push changes to your upstream repository.
2. Observe the following:
 - The `build_job` runs first.
 - Upon successful completion, `trigger_downstream` initiates the downstream pipeline (if changes are made in `src` directory).
3. Check the downstream project's pipeline to see the triggered jobs.

Summary

This lab covered:

1. How to set up and configure downstream pipelines.
2. Practical examples of using the `trigger` keyword to manage multi-project workflows.
3. Conditional downstream triggers to optimize workflow efficiency.