Pipeline architecture

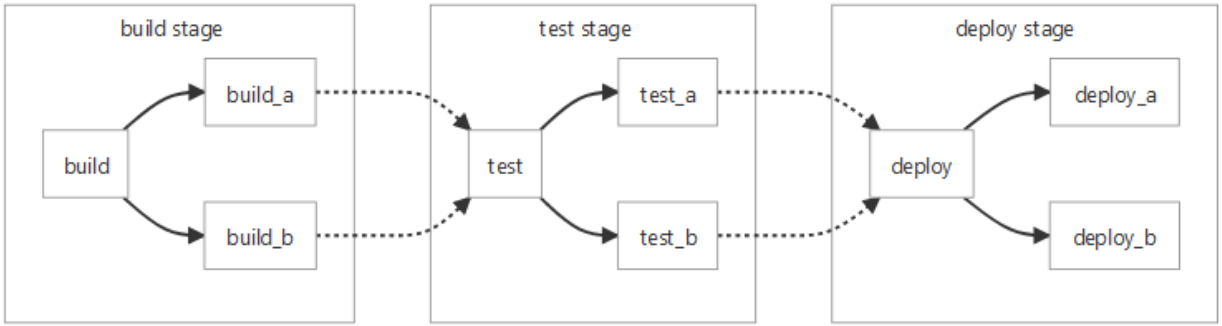
Basic

Directed Acyclic Graph

Child/Parent Pipelines

Basic Pipelines

This is the simplest pipeline in GitLab. It runs everything in the build stage concurrently, and once all of those finish, it runs everything in the test stage the same way, and so on. It's not the most efficient, and if you have lots of steps it can grow quite complex, but it's easier to maintain:



Example basic `/.gitlab-ci.yml` pipeline configuration matching the diagram:

```
stages:
  - build
  - test
  - deploy

image: alpine
```

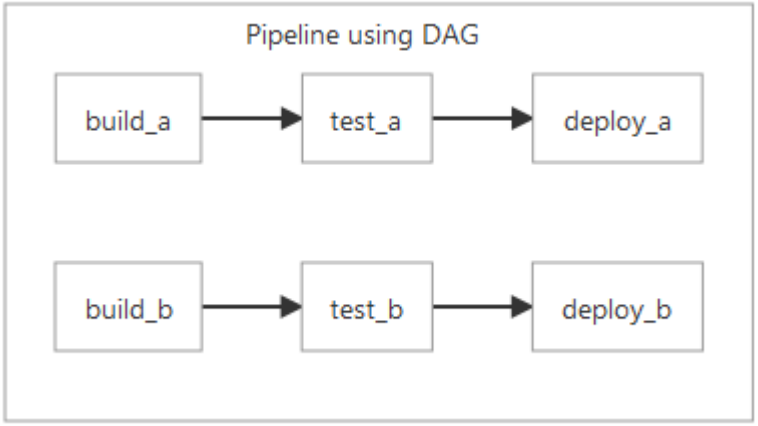
```
build_a:
  stage: build
  script:
    - echo "This job builds something."

build_b:
  stage: build
  script:
    - echo "This job builds something else."

test_a:
  stage: test
  script:
    - echo "This job tests something. It will only run when
all jobs in the"
    - echo "build stage are complete."

test_b:
  stage: test
  script:
```

```
    - echo "This job tests something else. It will only run
when all jobs in the"
    - echo "build stage are complete too. It will start at
about the same time as test_a."

deploy_a:
  stage: deploy
  script:
    - echo "This job deploys something. It will only run when
all jobs in the"
    - echo "test stage complete."

deploy_b:
  stage: deploy
  script:
    - echo "This job deploys something else. It will only run
when all jobs in the"
    - echo "test stage complete. It will start at about the
same time as deploy_a."
```

Directed Acyclic Graph Pipelines

If efficiency is important to you and you want everything to run as quickly as possible, you can use Directed Acyclic Graphs (DAG). Use the `needs` keyword to define dependency relationships between your jobs. When GitLab knows the relationships between your jobs, it can run everything as fast as possible, and even skips into subsequent stages when possible.

In the example below, if `build_a` and `test_a` are much faster than `build_b` and `test_b`, GitLab starts `deploy_a` even if `build_b` is still running.



Example DAG `/.gitlab-ci.yml` configuration matching the diagram:

```
stages:
  - build
  - test
  - deploy
```

```
image: alpine

build_a:
  stage: build
  script:
    - echo "This job builds something quickly."

build_b:
  stage: build
  script:
    - echo "This job builds something else slowly."

test_a:
  stage: test
  needs: [build_a]
  script:
    - echo "This test job will start as soon as build_a
finishes."
```

```
    - echo "It will not wait for build_b, or other jobs in the
build stage, to finish."

test_b:
  stage: test
  needs: [build_b]
  script:
    - echo "This test job will start as soon as build_b
finishes."
    - echo "It will not wait for other jobs in the build stage
to finish."

deploy_a:
  stage: deploy
  needs: [test_a]
  script:
    - echo "Since build_a and test_a run quickly, this deploy
job can run much earlier."
    - echo "It does not need to wait for build_b or test_b."
```

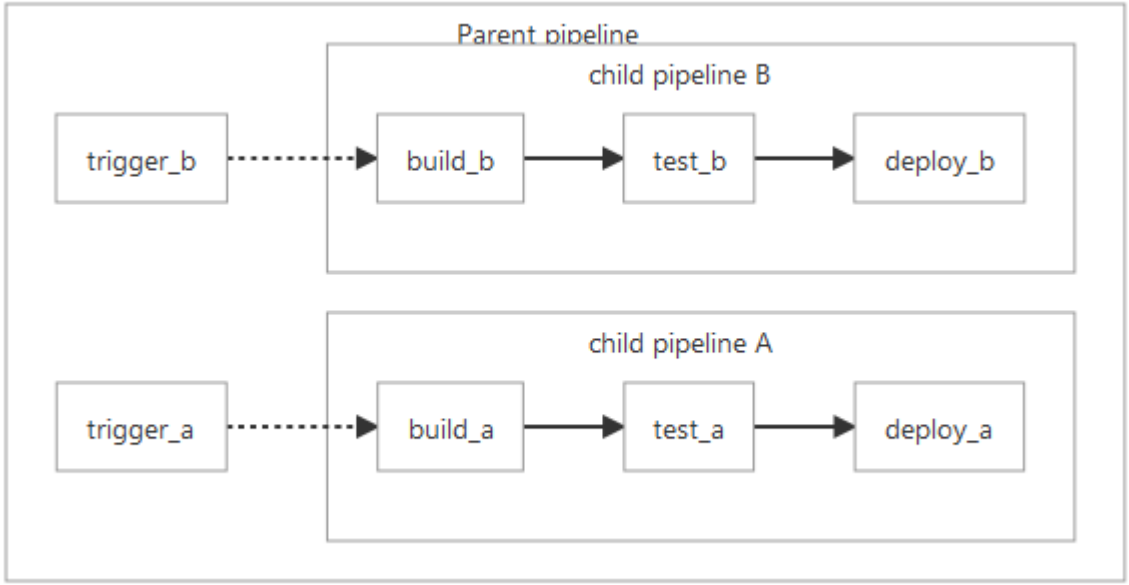
```
deploy_b:
  stage: deploy
  needs: [test_b]
  script:
    - echo "Since build_b and test_b run slowly, this deploy
job will run much later."
```

Child / Parent Pipelines

In the examples above, it's clear we've got two types of things that could be built independently. This is an ideal case for using Child / Parent Pipelines) via the `trigger` keyword. It separates out the configuration into multiple files, keeping things very simple. You can also combine this with:

- The `rules` keyword: For example, have the child pipelines triggered only when there are changes to that area.

- The `include` keyword: Bring in common behaviors, ensuring you are not repeating yourself.
- DAG pipelines inside of child pipelines, achieving the benefits of both.


Parent pipeline
child pipeline B
trigger_b
build_b
test_b
deploy_b
child pipeline A
trigger_a
build_a
test_a
deploy_a

Example `/.gitlab-ci.yml` configuration for the parent pipeline matching the diagram:

```
stages:
  - triggers

trigger_a:
  stage: triggers
  trigger:
    include: a/.gitlab-ci.yml
  rules:
    - changes:
        - a/*

trigger_b:
  stage: triggers
  trigger:
    include: b/.gitlab-ci.yml
  rules:
    - changes:
        - b/*
```

Example child `a` pipeline configuration, located in `/a/.gitlab-ci.yml`, making use of the DAG `needs` keyword:

```
stages:
  - build
  - test
  - deploy

image: alpine

build_a:
  stage: build
  script:
    - echo "This job builds something."

test_a:
  stage: test
  needs: [build_a]
  script:
    - echo "This job tests something."
```

```
deploy_a:
  stage: deploy
  needs: [test_a]
  script:
    - echo "This job deploys something."
```

Example child `b` pipeline configuration, located in `/b/.gitlab-ci.yml`, making use of the DAG `needs` keyword:

```
stages:
  - build
  - test
  - deploy

image: alpine

build_b:
  stage: build
  script:
```

```
    - echo "This job builds something else."

test_b:
  stage: test
  needs: [build_b]
  script:
    - echo "This job tests something else."

deploy_b:
  stage: deploy
  needs: [test_b]
  script:
    - echo "This job deploys something else."
```