How to improve the developer experience in Heptapod/GitLab

Automate the dull works to focus on development

Noé Gaumont : ngaumont@logilab.fr

Logilab

Summary

- Logilab presentation and our code management
- What problems are we facing within Logilab ?
- Existing solutions
- Tools designed and used internally:
  - assign-bot to have review
  - gitlab-ci-template to have fine-tuned job definition
  - release-new to have proper release (to pypi)
  - cube-doctor to update dependencies

Logilab

- small IT service and consulting company (~25 persons) focused on:
  - Web Semantic,
  - Scientific computing,
  - Python training.
- Work almost only with open source softwares
- Contribute either with code or money.


CubicWeb

Purpose:

- a semantic web application framework,
- developed in Python (LGPL),
- explicit data model,
- reusable components (called cubes),
- a front agnostic way to serve your data.

Our go-to tech stack is composed of :

Code organisation within Logilab

- **mercurial**, a vcs written in python
- **Heptapod**, a friendly fork of GitLab with mercurial support
- **multi-repo** approach:
  - CubicWeb
  - public cubes (**~200 repo**)
  - private cubes (mainly client related)
  - opensource project (~ 40 repos)
  - internal projects

Problems caused by the multi-repo approach

> *Keeping one repo tidy is ~~simple~~, keeping several hundred repos is ~~hard~~.*

Both are hard, problems occurs only **faster** within multi-repo architecture :

Problems caused by the multi-repo approach

> *Keeping one repo tidy is ~~simple~~, keeping several hundred repos is ~~hard~~.*

Both are hard, problems occurs only **faster** within multi-repo architecture :

- Make sure all the test/lint are **green**
- Assign a reviewer for each Merge request
- Coherent code everywhere
- Maintain good practices in CI configuration
- Properly release everything to Pypi, npm, …
- Up-to-date docker images with correct tag

Existing solutions

Within Github, there is the probot solution such as:

- Auto-Assign
- Dependabot
- Release-drafter
- PR-triage

Existing solutions

Within GitLab, custom CI or danger-bot which is good for :

- Coding style
- Database review
- Documentation review
- Merge request metrics
- Reviewer roulette
- Single codebase effort

A tale of a CubicWeb MergeRequest

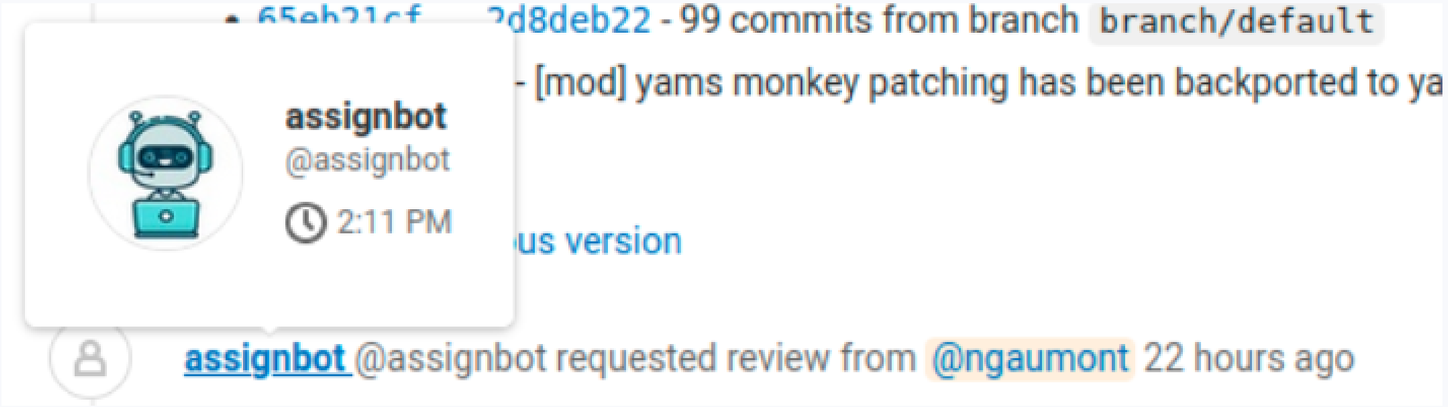
Classic use case: A new feature introduced in CubicWeb induced a deprecation warning.

Goal: The MR is reviewed, the tests pass and the repo depending on CubicWeb are updated, all version are published.

MergeRequest creation

A scheduled job of assign-bot will assign a reviewer base on user preferences:

```
naumont:
    max_auto_review_per_week: 15
    max_auto_review_per_day: 3
username_2:
    max_auto_review_per_week: ZZZ
    max_auto_review_per_day: WWW
```



It will also comment on the MR inactive for one week.

Running the correct set of tests

A coherent set of up-to-date jobs are run, thanks to a shared definition, gitlab-ci-template:

It takes care of:

- reducing the CI load by using custom image
- defining rules to prevent CI on some branches
- define some stages

```yaml
include:
  - project: "open-source/gitlab-ci-templates"
    ref: "branch/default"
    file:
      - "templates/no-duplicated-ci-pipelines.yml"  # use workflow to avoid duplicated pipelines
      - "templates/lint/black.yml"  # will do the equivalent of 'tox -e black'
      - "templates/tests/py3.yml"  # will do the equivalent of 'tox -e py3'
      - "templates/create-release-on-heptapod.yml"  # this will create a release on heptapod
      - "templates/build-docker-image.yml"
  # uncomment and uses to customize/extend the configuration here if needed
  # (it needs to be at the same level than "- project")
  - ".gitlab-ci-extended.yml"
```

It is always possible to customise the jobs within `.gitlab-ci-extended.yml`

Running the correct set of tests

A coherent set of up-to-date jobs are run, thanks to a shared definition, gitlab-ci-template:

It takes care of:

- reducing the CI load by using custom image
- defining rules to prevent CI on some branches
- define some stages

```yaml
include:
  - project: "open-source/gitlab-ci-templates"
    ref: "branch/default"
    file:
      - "templates/no-duplicated-ci-pipelines.yml"  # use workflow to avoid duplicated pipelines
      - "templates/lint/black.yml"  # will do the equivalent of 'tox -e black'
      - "templates/tests/py3.yml"  # will do the equivalent of 'tox -e py3'
      - "templates/create-release-on-heptapod.yml"  # this will create a release on heptapod
      - "templates/build-docker-image.yml"
  # uncomment and uses to customize/extend the configuration here if needed
  # (it needs to be at the same level than "- project")
  - ".gitlab-ci-extended.yml"
```

It is always possible to customise the jobs within `.gitlab-ci-extended.yml`

Exemple of a python test jobs

```
py3:
  interruptible: true
  image: ${CI_REGISTRY}/cubicweb/dockerfiles/buster-slim-pg11
  stage: tests
  script: tox -e py3 -- --junitxml=report.xml
  tags:
    - py3
  needs: []
  artifacts:
    when: always
    reports:
      junit: report.xml
    paths:
      - py3-deprecated-warnings.json
```

It uses:

- a custom docker image with all the dependencies already installed
- store some artifacts generated during the tests
- make the jobs interruptible

Pushing the image to the registry

Once the MR is accepted, another job defined in gitlab-ci-template is used to build and publish a Docker image:

```
image_build_latest:
  [...]
  image:
    name: gcr.io/kaniko-project/executor:debug
    entrypoint: [""]
  script:
    - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
    - /kaniko/executor
      --context $CI_PROJECT_DIR
      --dockerfile $CI_PROJECT_DIR/Dockerfile
      --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_HG_SHORT_SHA
      --destination $CI_REGISTRY_IMAGE:latest
  rules:
    - if: '$CI_COMMIT_REF_NAME == "branch/default"'

image_build_tag:
  [...]
  image:
    name: gcr.io/kaniko-project/executor:debug
    entrypoint: [""]
  script:
    - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
```

The image tag is **correctly tag** inside the job.

Pushing the image to the registry

Once the MR is accepted, another job defined in gitlab-ci-template is used to build and publish a Docker image:

```
1       image_build_latest:
2         [...]
3         image:
4           name: gcr.io/kaniko-project/executor:debug
5           entrypoint: [""]
6         script:
7           - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
8           - /kaniko/executor
9             --context $CI_PROJECT_DIR
10            --dockerfile $CI_PROJECT_DIR/Dockerfile
11            --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_HG_SHORT_SHA
12            --destination $CI_REGISTRY_IMAGE:latest
13        rules:
14          - if: '$CI_COMMIT_REF_NAME == "branch/default"'
15
16      image_build_tag:
17        [...]
18        image:
19          name: gcr.io/kaniko-project/executor:debug
20          entrypoint: [""]
21        script:
22          - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
```

The image tag is **correctly tag** inside the job.

Pushing the image to the registry

Once the MR is accepted, another job defined in gitlab-ci-template is used to build and publish a Docker image:

```
3           image:
4             name: gcr.io/kaniko-project/executor:debug
5             entrypoint: [""]
6           script:
7             - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
8             - /kaniko/executor
9               --context $CI_PROJECT_DIR
10              --dockerfile $CI_PROJECT_DIR/Dockerfile
11              --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_HG_SHORT_SHA
12              --destination $CI_REGISTRY_IMAGE:latest
13          rules:
14            - if: '$CI_COMMIT_REF_NAME == "branch/default"'
15
16        image_build_tag:
17          [...]
18          image:
19            name: gcr.io/kaniko-project/executor:debug
20            entrypoint: [""]
21          script:
22            - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
23            - /kaniko/executor
24              --context $CI_PROJECT_DIR
```

The image tag is **correctly tag** inside the job.

Pushing the image to the registry

Once the MR is accepted, another job defined in gitlab-ci-template is used to build and publish a Docker image:

```
11              --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_HG_SHORT_SHA
12              --destination $CI_REGISTRY_IMAGE:latest
13          rules:
14            - if: '$CI_COMMIT_REF_NAME == "branch/default"'
15
16        image_build_tag:
17          [...]
18          image:
19            name: gcr.io/kaniko-project/executor:debug
20            entrypoint: [""]
21          script:
22            - echo "{\"auths\":{\"$CI_REGISTRY\":{\"username\":\"$CI_REGISTRY_USER\",\"password\":\"$CI_REGISTRY_PASS
23            - /kaniko/executor
24              --context $CI_PROJECT_DIR
25              --dockerfile $CI_PROJECT_DIR/Dockerfile
26              --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_HG_SHORT_SHA
27              --destination $CI_REGISTRY_IMAGE:$CI_COMMIT_TAG
28          rules:
29            - if: "$CI_MERGE_REQUEST_ID"
30              when: never
31            - if: "$CI_COMMIT_TAG"
```

The image tag is **correctly tag** inside the job.

A new version is released

The MR is accepted and a new version has to be released. release-new is used for that :

```
$ release-new
Automatic release guesser decided to release the version '3.35.0' (minor)
Are you ok with that? [Y/n]: Y
🎉 Congratulation, we have made a new minor release 3.35.0 \o/ 🎆

✨ 🍰 ✨

Now you need to hg push the new commits
```

Under the hood, it :

- detects the version number using semantic versioning
- updates the version number in the source
- generates a changelog from commit message and let you modify it
- update packaging MANIFEST.in if needed
- create a commit and then tag it

A new version is released

Once pushed, a job on the tag releases to pypi, with gitlab-ci-template.

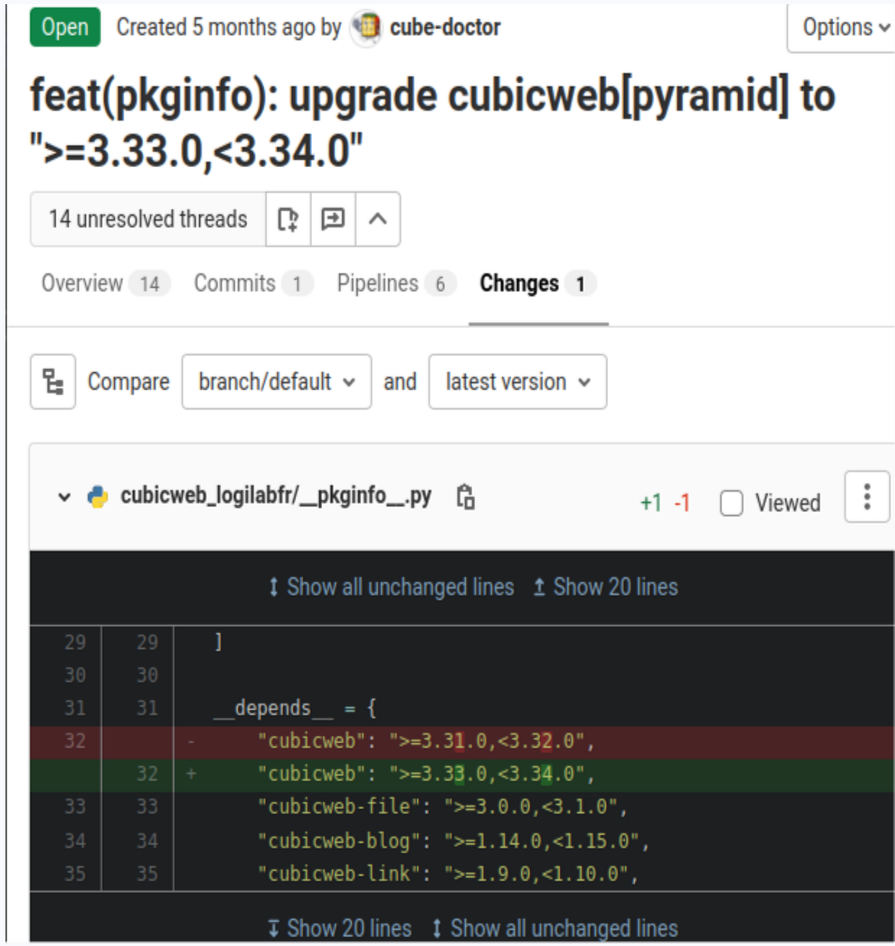
```
pypi-publish:
  [...]
    - if: '$CI_MERGE_REQUEST_ID'
      when: never
    - if: '$CI_COMMIT_TAG'
      when: on_success
  script:
    - tox -e pypi-publish
```

Repositories are updated

cube-doctor will update repositories:

- Rebase the MR in same project
- In other projcet, create MR updating the package version
- Create MR for lint configurations

Manually, it can run automatic refactoring (handle deprecation warning).



Conclusion

- GitLab/Heptapod are a great tools battery-included:
  - scheduled job
  - registry
  - shared job definition.
- A Good CI jobs helps **a lot** to keep repositories clean and up-to-date.
- However, manual effort are still needed. In our case:
  - forge.extranet.logilab.fr/open-source/**assign-bot**
  - forge.extranet.logilab.fr/open-source/**gitlab-ci-template**
  - forge.extranet.logilab.fr/open-source/**release-new**
  - forge.extranet.logilab.fr/cubicweb/**cube-doctor**

Noé Gaumont : ngaumont@logilab.fr