RELEASE FLOW PROPOSAL

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ABSTRACT. In this document software product release process is proposed and discussed.

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1. Introduction

Release flow is a set of steps to perform to release upcoming version of software product. Main aim of this document is to present simple and working model of software release using semantic versioning [1], azure pipelines, and mainline development [2]. Mainline development is also known as GitHub flow. Current document is motivated by Microsoft's "Adopt a Git branching strategy", see [3]. Below picture shows main idea of GitHub flow itself

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Key words and phrases. Software engineering, DevOps, Software release, GitHub flow, GitLab flow, Azure DevOps, Azure pipelines, Semantic versioning, GitVersion, CI/CD.

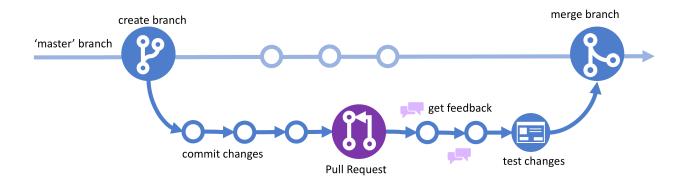


Figure 1. GitHub Flow diagram.

- Master branch that contains tested, validated and verified code, ready to be released.
- Feature branch that contains implementation of new feature according to sprint plan. Feature is branched from the master HEAD.
- Bugfix branch that contains non-critical bug fix. Bugfix is branched from the master HEAD.
- Release/v* branch that contains upcoming release state of software product. Release engineer decides what commit to be base of release branch. Release/v* is branched from the master. Release/v* is considered to be long-living branch, it should not be deleted after code is deployed. Release/v* branch is used to support current release of software product, after new release occurs team decides whereas to keep or to delete old release branch. After release complete master branch cherrypicks [4] from it.
- **Hotfix** branch that contains critical bug fix. It is used to patch production environment and must be released as quick as possible.
- 1.1. **Release process.** Having all above, assume we have initial semantic version on our master branch as v0.1.1, and we must release upcoming version, our steps to perform are:

- (1) Software engineer creates pull request from recent feature branch to master branch, this pull request triggers Continuous Integration (CI) to start, CI runs tests, code quality checks etc., but deployment won't be started yet, only CI.
- (2) After all CI checks passed, pull request reviewed by team and every comment from code review is fixed – it is ready to be merged from feature branch to master branch. No CI/CD pipeline triggered by the merge.
- (3) Next, release engineer reviews software product changes using CHANGELOG or git compare. Release engineer makes decision which part of semantic version to increment. For example, release engineer decided that minor version should be incremented then our version becomes, for example v0.1.1 -> v0.2.0
- (4) Release engineer creates new release as follows
 - Checkout to release branch: git checkout -b release/v0.2.0
 - Work on release committing some minor fixes
 - Push release branch to remote: git push origin release/v0.2.0
 - Create tag: git tag -a v0.2.0 -m "Release v0.2.0"
 - Push tag: git push origin v0.2.0
- (5) After new tag is pushed the CI/CD pipeline is triggered by that event [5]. There are three deployments scheduled: DEV, QA, UAT. Environments QA and UAT are to be approved by designated personnel before deployment starts, DEV to be deployed without manual approve.
- (6) Finally, master branch cherry-picks [4] from release/v0.2.0 after deployment is complete.

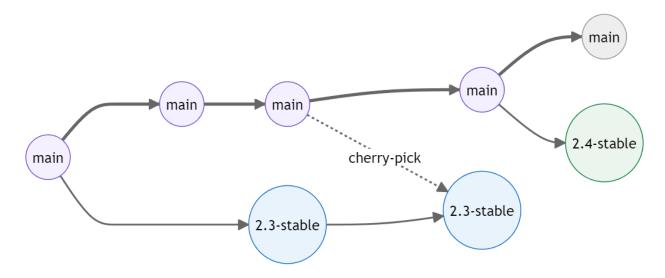


Figure 2. GitLab Flow diagram [6].

- 1.2. **Hotfix strategy.** Assume that our current released version of software product is v0.2.0 and there is a critical bug appears. In order to release a hotfix the following set of steps to be executed:
 - (1) Hotfix to be assigned to a software engineer.
 - (2) Software engineer fixes critical bug and creates a pull request: hotfix/id -> master.

 Yes, pull request is done to the master branch.
 - (3) Pull request hotfix/id -> master is reviewed by team and merged.
 - (4) Release engineer cherry-picks [4] recently merged hotfix from the master branch to the release/v0.2.0 branch. Note that branch release/v0.2.0 is long-living and kept minimum until next release.
 - (5) Release engineer increments patch part of semantic version, e.g v0.2.0 -> v0.2.1.
 - (6) Release engineer creates and pushes new tag v0.2.1.
 - (7) Hotfix deployment process is started after new tag is pushed.

2. Conclusions

In this document software product release process is proposed and discussed. Few useful GIT commands worth to remember:

- git tag -a v0.1.0 -m "my version 0.1.0"
- git tag -d <tag_name>
- git push origin <tag_name>
- git push --delete origin <tag_name>

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