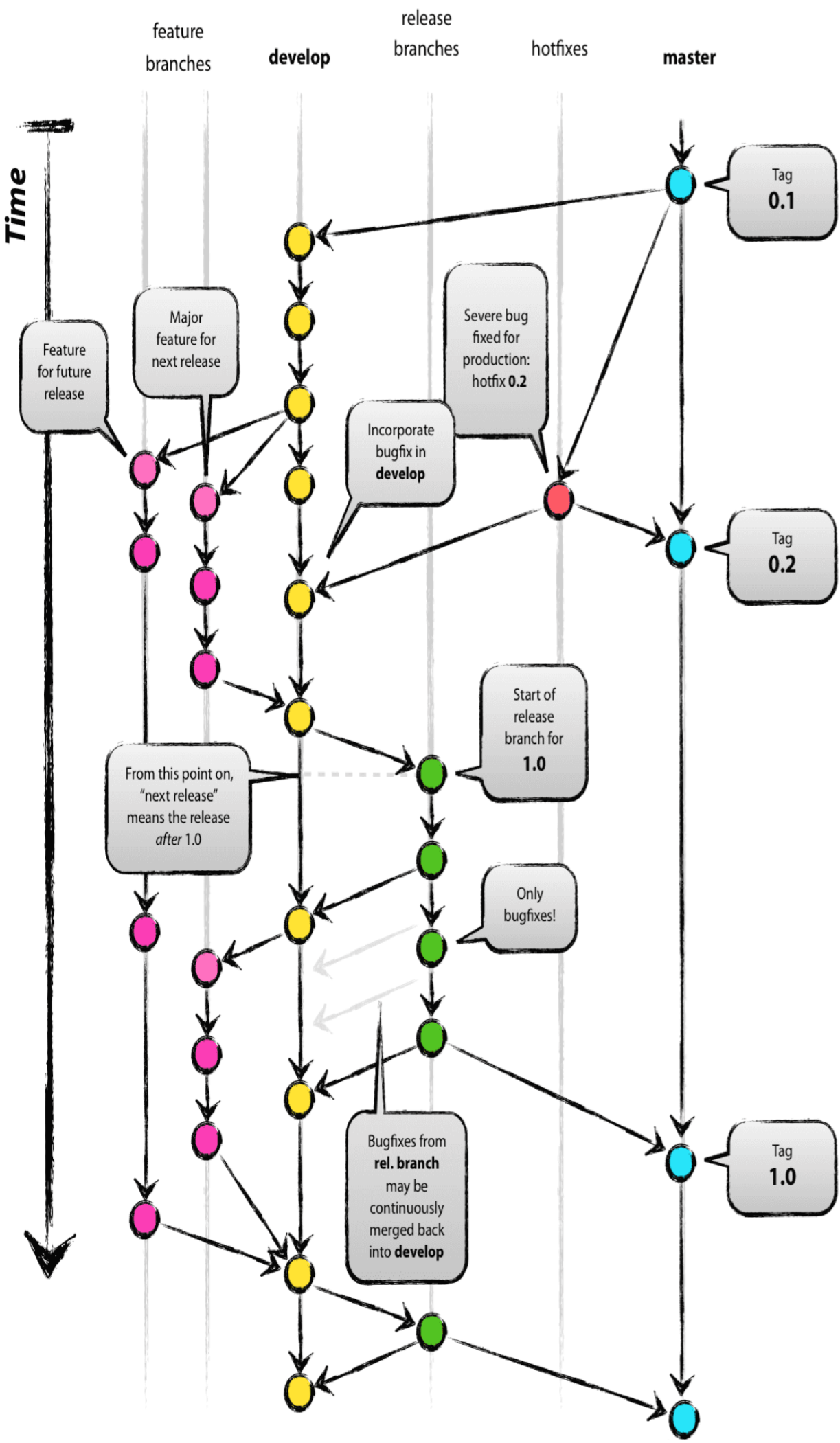
Basic Git Flow

Anthony J Souza

Content and images sourced by Vincent Driessen and Atlassian Tutorials

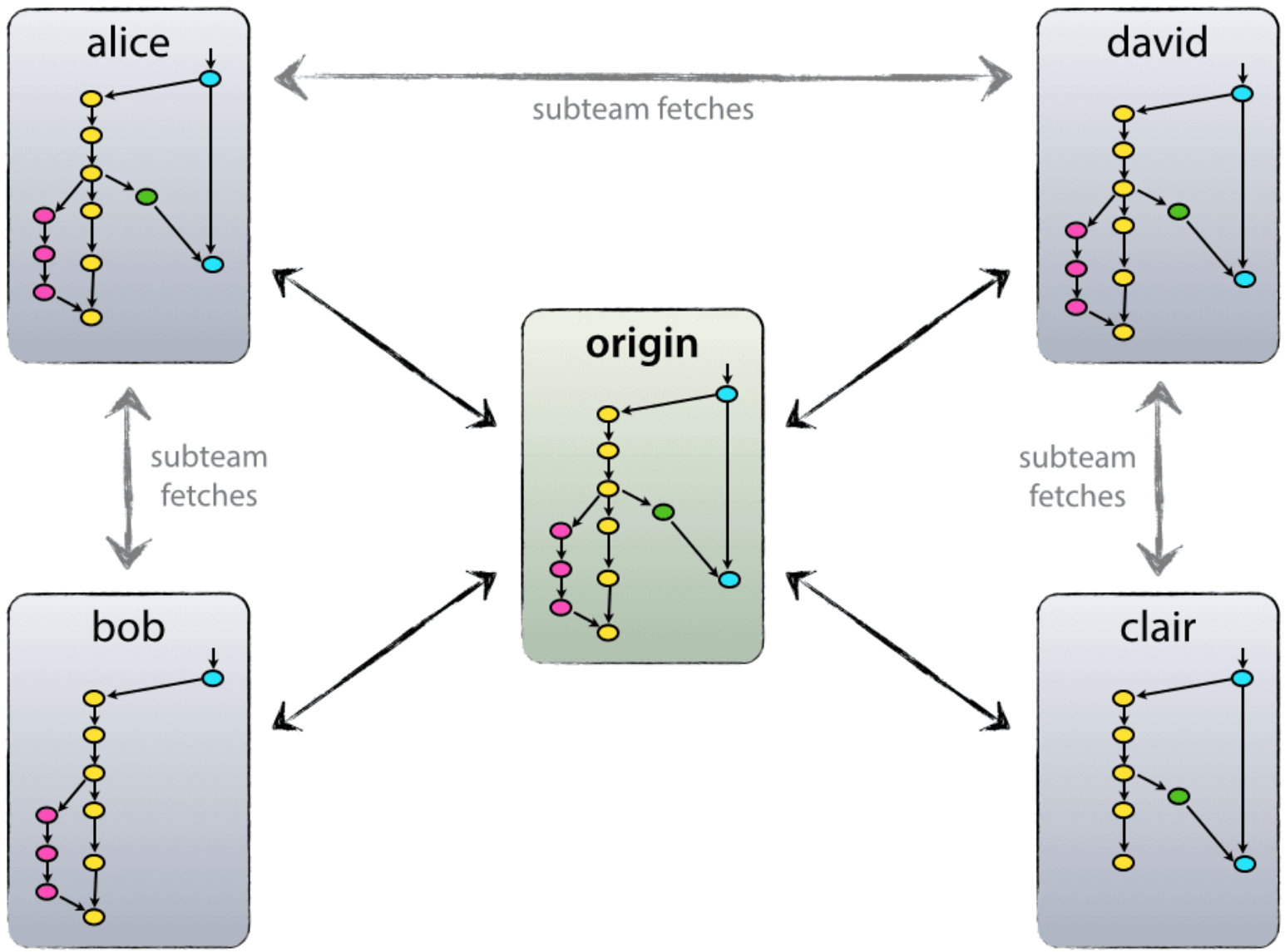
Introduction

- Git Decentralized VCS
  - Technically no main repo, but one can be assigned.
- Changed how developers think about merging and branching
- In other VCS merging and branching can be costly.
- Git branching and merging is simple and fast


feature branches
develop
release branches
hotfixes
master
Time
Tag 0.1
Feature for future release
Major feature for next release
Severe bug fixed for production: hotfix 0.2
Incorporate bugfix in develop
Tag 0.2
Start of release branch for 1.0
From this point on, "next release" means the release after 1.0
Only bugfixes!
Bugfixes from rel. branch may be continuously merged back into develop
Tag 1.0

Decentralized with a Centralized Repo

- With the git flow model being presented we have one “truth” central repository.
- Note that technically there is no actually central repo, but rather we consider it our central repo at the conceptual level.
- For the next few slides, we will call this repo origin.

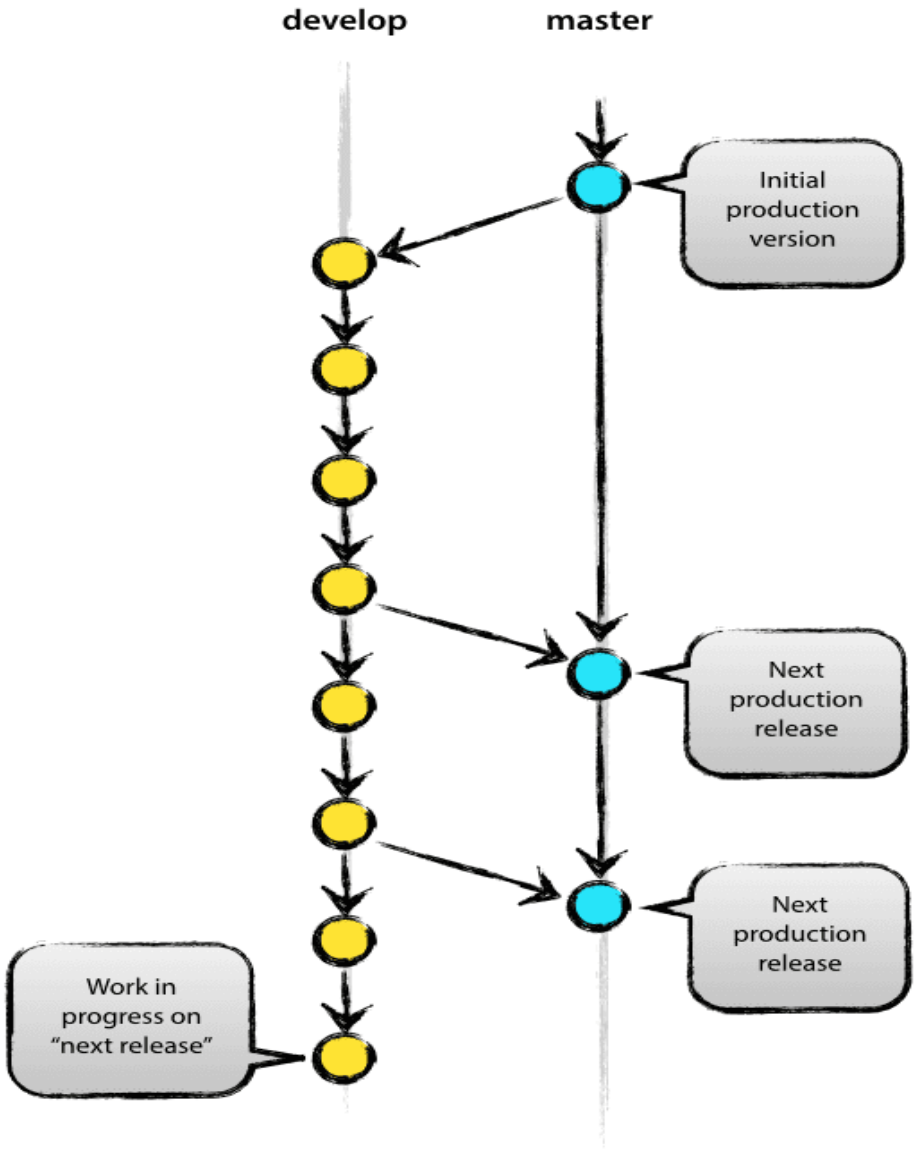

alice
david
subteam fetches
origin
subteam
fetches
subteam
fetches
bob
clair

Decentralized with a Centralized Repo

- Given the image on the previous slide, each developer has a push/pull relationship with origin.
- In addition each developer may develop push/pull relationships with other developers repo's to form teams.
  - This can be useful if more than 1 developer is working on one big feature.
  - Work on the feature can be completed without ever pushing code to origin till its complete.

Main Branches

- This model was influenced by many existing models.
- It has two main branches develop and master.



Main Branch

- The master branch should be familiar to every git user
- We consider origin/master to be the main branch where the head of the branch ALWAYS reflections a production read state of the code.
- Untested code should not be pushed here.
- Hot-fixes should be fixed here.
- Deployment or auto deployment will stem from this branch.

Develop Branch

- Develop branch will be the main branch where the HEAD of the branch always reflects a state of the source code where the latest delivered development changes are ready for the next release.
- Nightly automatic nightly builds can be performed on this branch.
- Code on this branch is never directly pushed to a production environment.
- It must be merged into master first.

Master / Develop branch

- When code on develop branch has reached a stable point it can be merged back into master.
- It should also be tagged with git tag for a version number.
- Anytime a merge is performed back into master, this is technically a new production release.
- Sticking this flow between master and develop makes using automatic build and deploy scripts fairly simple.
- It can also be automatically triggered on a master branch merge.

Supporting Branches

- In addition to the main branches we have a few supporting branches.
- These include :
  - Feature branches
  - Release branches
  - Hotfix Branches
- Each of these branches have a specific purpose.
- They “should” follow strict rules as to which branches they originate from, which branches must be their merge targets, and even how they should be named.
- They are not special branches but the way we use them makes them special.

Supporting Branch – Feature Branch

- Feature branches are used to develop new features for upcoming or distant releases.
- When developing a feature, its target release maybe unknown.
- The a branch for a specific feature exits as long as the feature is being developed.
- Then eventually will be merged back into develop.

Supporting Branch – Feature Branch

- Feature branches may branch off from:
  - develop
- ***Must*** back into:
  - develop.
- Branch naming convention:
  - Anything except master, develop, release-*, hotfix-*

- Creating a new feature branch:

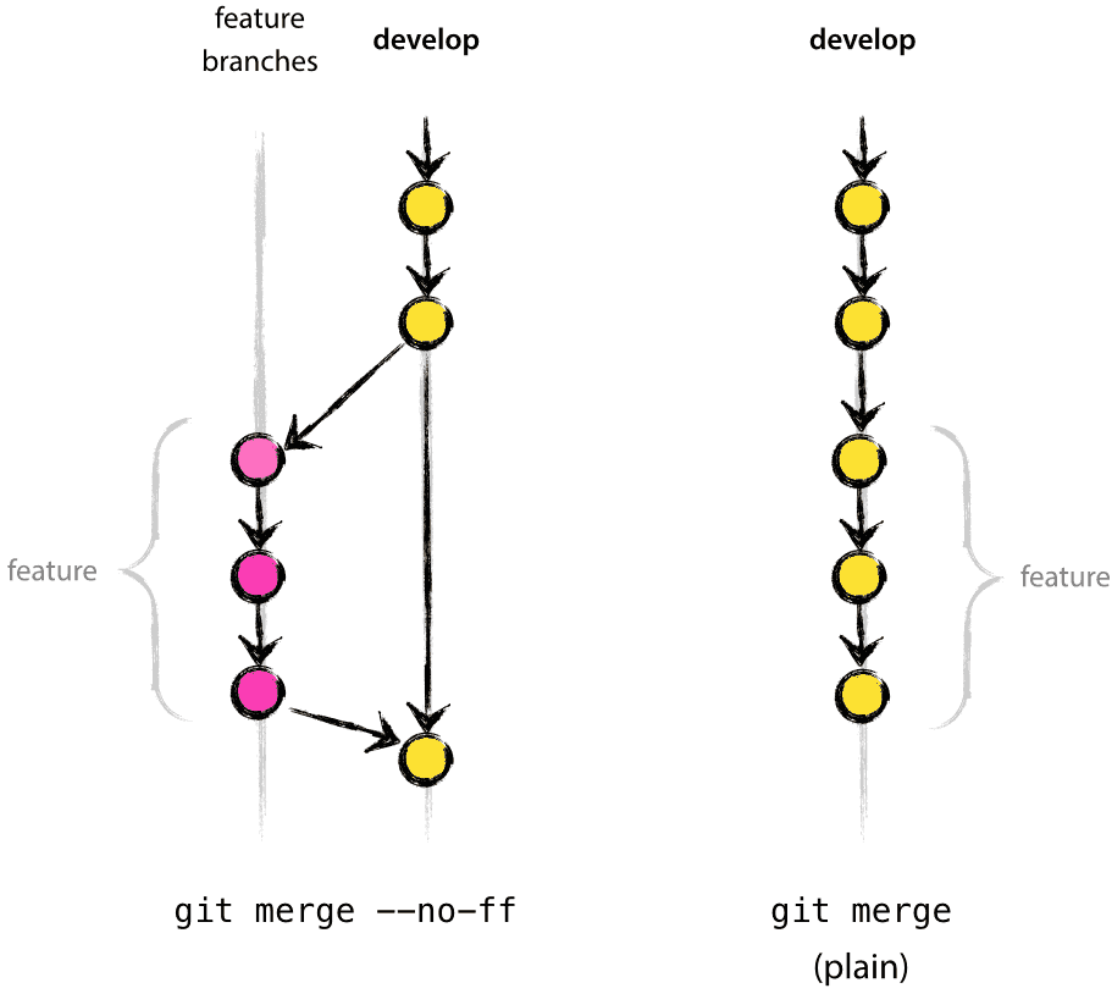
```
$ git checkout -b myfeature develop
Switched to a new branch "myfeature“
```

- Merging completed feature back into develop:

```
$ git checkout develop
Switched to branch 'develop'
$ git merge --no-ff myfeature
Updating ea1b82a..05e9557
(Summary of changes)
$ git branch -d myfeature
Deleted branch myfeature (was 05e9557).
$ git push origin develop
```

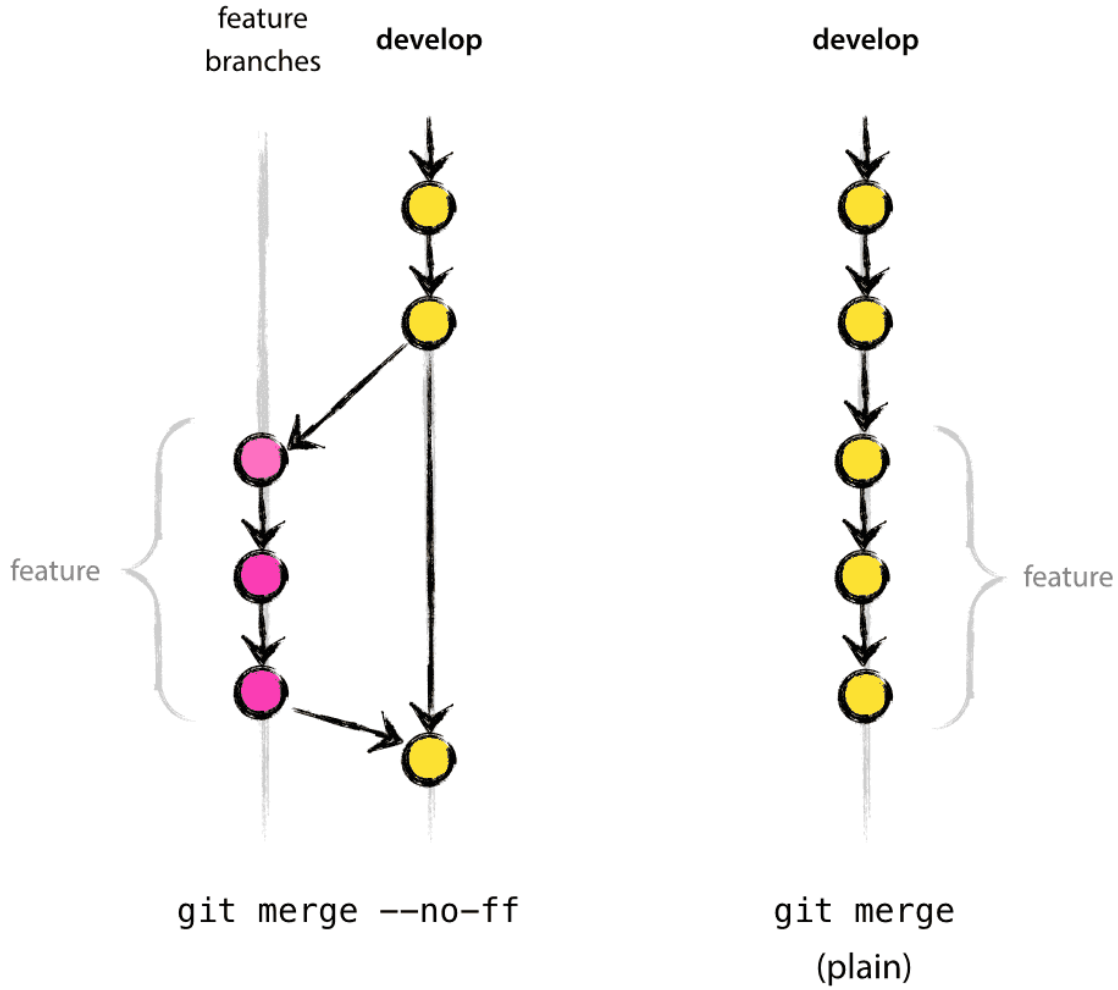
Supporting Branch - Feature

- The `--no-ff` flag causes the merge to always create a new commit object.
  - Even if the merge could be performed with a fast-forward.
  - This avoids losing information about the historical existence of a feature branch and groups together all commits that together added the feature.



Supporting Branch - Feature

- In the case without the `--no-ff`, it is impossible to see from Git History which of the commit objects together have implemented a given feature.
- You would need to manually read all log messages.
- Reverting entire features is tricky as well without the flag, while with the flag it is fairly simple.



Supporting Branch – Release Branch

- Release Branches support preparation of a new production release.
- Can be used for last minute SMALL changes.
- They allow for minor bug fixes and preparing meta-data for release
  - Things like version numbers, builds dates and the like.
- By doing all this work on the release branch, the develop branch is free to work on features for the next release.
- The time to branch off a new release branch is when the develop branch is in a state where it reflects a new release.
  - Sometimes you will see these as Release Candidates as well.

Supporting Branch – Release Branch

- All features that are targeted for the current release should be merged into develop.
- All future release features should merged into develop and may be merged AFTER the release branch is created.
- Version numbers should be assigned when creating the release branch.

Supporting Branch – Release Branch

- Release branches May branch off from:
  - develop
- ***Must*** merge back into:
  - develop and master
- Branch naming convention:
  - release-*

Supporting Branch – Release Branch

- Creating release branch. Assume Previous Release was 1.15 and it is decided the next version release is 1.2 (not 1.6 or 2.0)

```
$ git checkout -b release-1.2 develop
Switched to a new branch "release-1.2"
$ ./bump-version.sh 1.2
Files modified successfully, version bumped to 1.2.
$ git commit -a -m "Bumped version number to 1.2"
[release-1.2 74d9424] Bumped version number to 1.2
1 files changed, 1 insertions(+), 1 deletions(-)
```

- This new branch may exists for some time. Or until the release is rolled out.
- During this time, bug fixes may be applied (NOTE : this does not happen on develop branch
- Also, adding new features here is NOT ALLOWED.

Supporting Branch – Release Branch

- Finishing a release branch can be done when the state of the branch is at a production level.
- First we merge release into master
- Then tag the commit with the releaser version number.
  - Also need to merged any changes made on release back into develop as well.

- Merging Release into Master:

```
$ git checkout master
Switched to branch 'master'
$ git merge --no-ff release-1.2
Merge made by recursive.
(Summary of changes)
$ git tag -a 1.2
```

- Merging changes into Develop:

```
$ git checkout develop
Switched to branch 'develop'
$ git merge --no-ff release-1.2
Merge made by recursive.
(Summary of changes)
```

- Merging release-* back into develop may cause merge conflicts, these should be small and easy to handle.
- Note : You may use the -s or -u <key> flags to sign your tag cryptographically.

Supporting Branch – Release Branch

- When we are finished with the current release branch we can delete it.
- This can be done with feature branches as well.

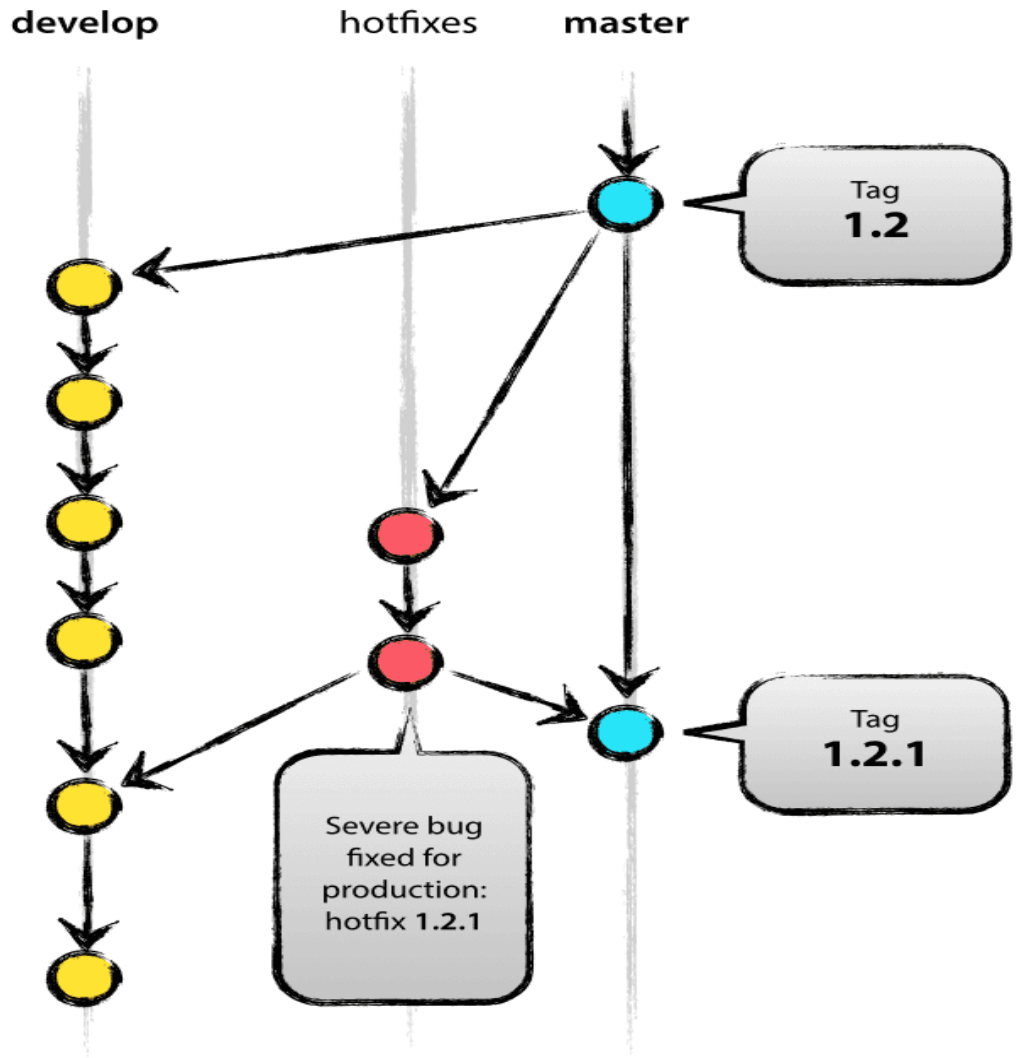
```
$ git branch -d release-1.2
Deleted branch release-1.2 (was ff452fe).
```

Supporting Branch – Hotfix Branch

- Hotfix branches are very similar to releases branches
- They are meant to prepare for a new production release, but these can be unplanned.
- They are created from the necessity to act quickly upon an undesired state of a live production version.
- When a critical bug in a production version must resolved quickly, a hotfix branch may be branched off from the corresponding tag on the master branch.
- The idea, is that the team can continue work on the develop branch, while another team member can work on preparing a quick production fix.

Supporting Branch – Hotfix Branch

- May branch off from:
  - master
- ***Must*** merge back into:
  - develop and master
- Branch naming convention:
  - hotfix-*



Supporting Branch – Hotfix Branch

- Creating hotfix branch:

```
$ git checkout -b hotfix-1.2.1 master
Switched to a new branch "hotfix-1.2.1"
$ ./bump-version.sh 1.2.1
Files modified successfully, version bumped to 1.2.1.
$ git commit -a -m "Bumped version number to 1.2.1"
[hotfix-1.2.1 41e61bb] Bumped version number to 1.2.1
1 files changed, 1 insertions(+), 1 deletions(-)
```

- Don’t forget to bump the version number.
  - For example if the current version is 1.2, the next version can be 1.2.1.

Supporting Branch – Hotfix Branch

- Committing bug fix to hotfix branch:

```
$ git commit -m "Fixed severe production problem"
[hotfix-1.2.1 abbe5d6] Fixed severe production problem
5 files changed, 32 insertions(+), 17 deletions(-)
```

Supporting Branch – Hotfix Branch

- When finished, the bugfix needs to be merged back into *master* , but also needs to merged back into *develop*
  - This is to ensure that the bugfix is included in the next release as well.
- Process is similar to how release branches are handled when we are done with them.

- Merge hotfix into master

```
$ git checkout master
Switched to branch 'master'
$ git merge --no-ff hotfix-1.2.1
Merge made by recursive.
(Summary of changes)
$ git tag -a 1.2.1
```

- Merge hotfix into develop

```
$ git checkout develop
Switched to branch 'develop'
$ git merge --no-ff hotfix-1.2.1
Merge made by recursive.
(Summary of changes)
```

Supporting Branch – Hotfix Branch

- The one exception to the rule, is that when a release branch currently exists, the hotfix changes need to be merged into that release branch, instead of develop.
- Back-merging the bugfix into the release branch will eventually result in the bugfix being merged into develop too, when the release branch is finished.
- If work in develop immediately requires this bugfix and cannot wait for the release branch to be finished, you may safely merge the bugfix into develop now already as well.

Supporting Branch – Hotfix Branch

- Finally we can remove or hotfix-* branch:

```
$ git branch -d hotfix-1.2.1
Deleted branch hotfix-1.2.1 (was abbe5d6).
```

References

- A successful Git branching model
- Git Book
- Feature branch Workflow