



分支開發流程和策略

<http://ihower.tw>  
2017/3

# 我是誰

- 張文鈞 a.k.a. ihower
  - <https://ihower.tw>
- Git user since 2008

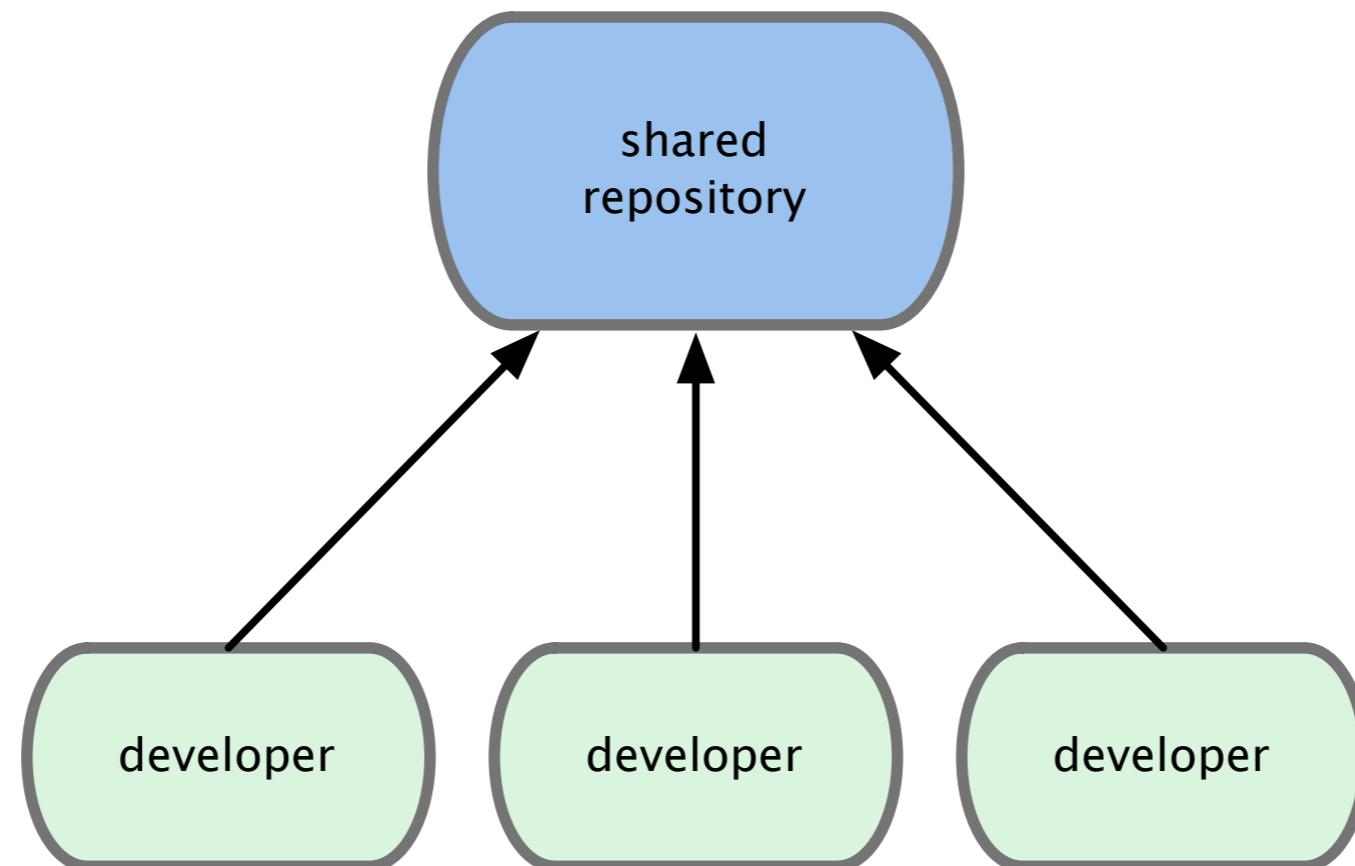


# Git 的分支開發流程和 策略

# I. 常見的 Remote Repositories 的管理方式

# 集中式工作流程

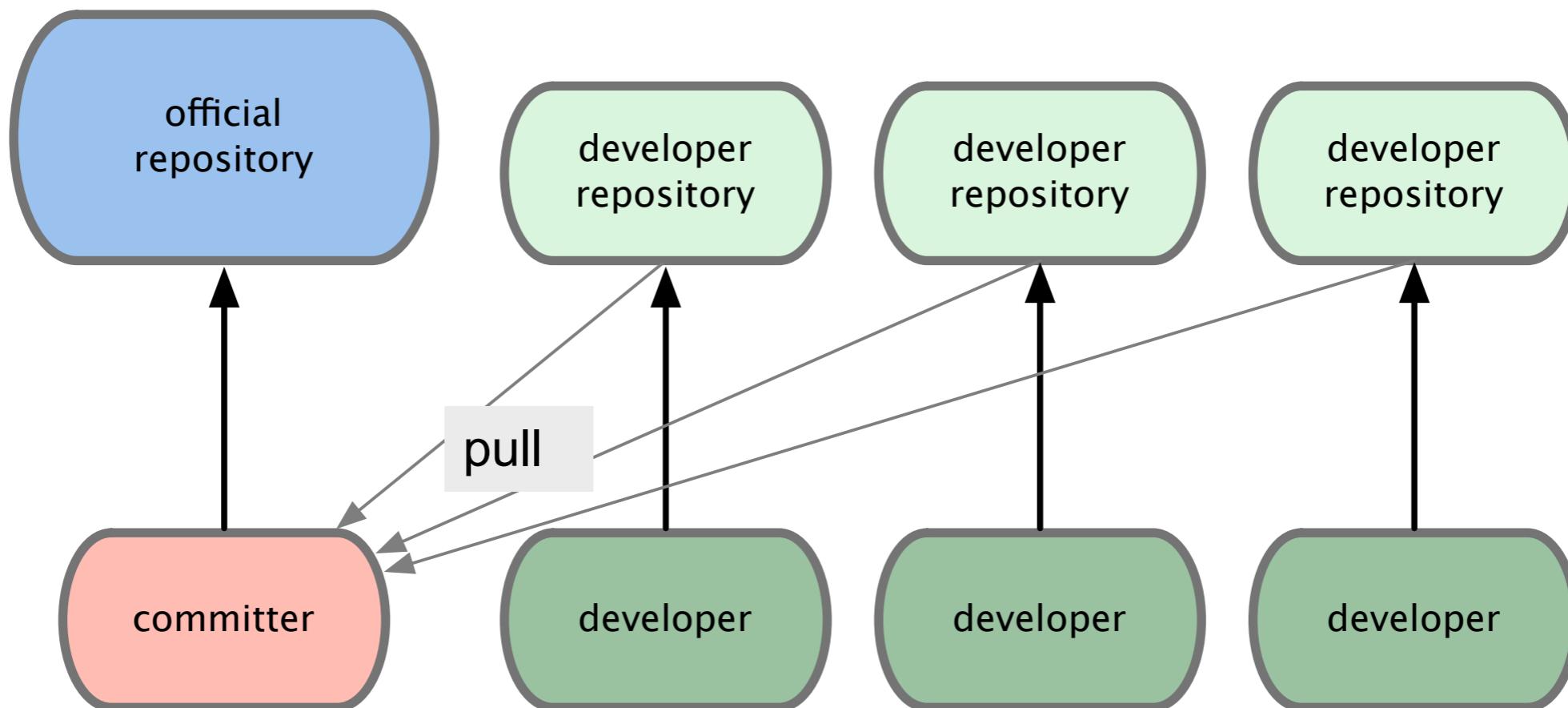
團隊內部私有專案，大家都有權限 Push 到共用的 Repository



# 集成管理員工作流程

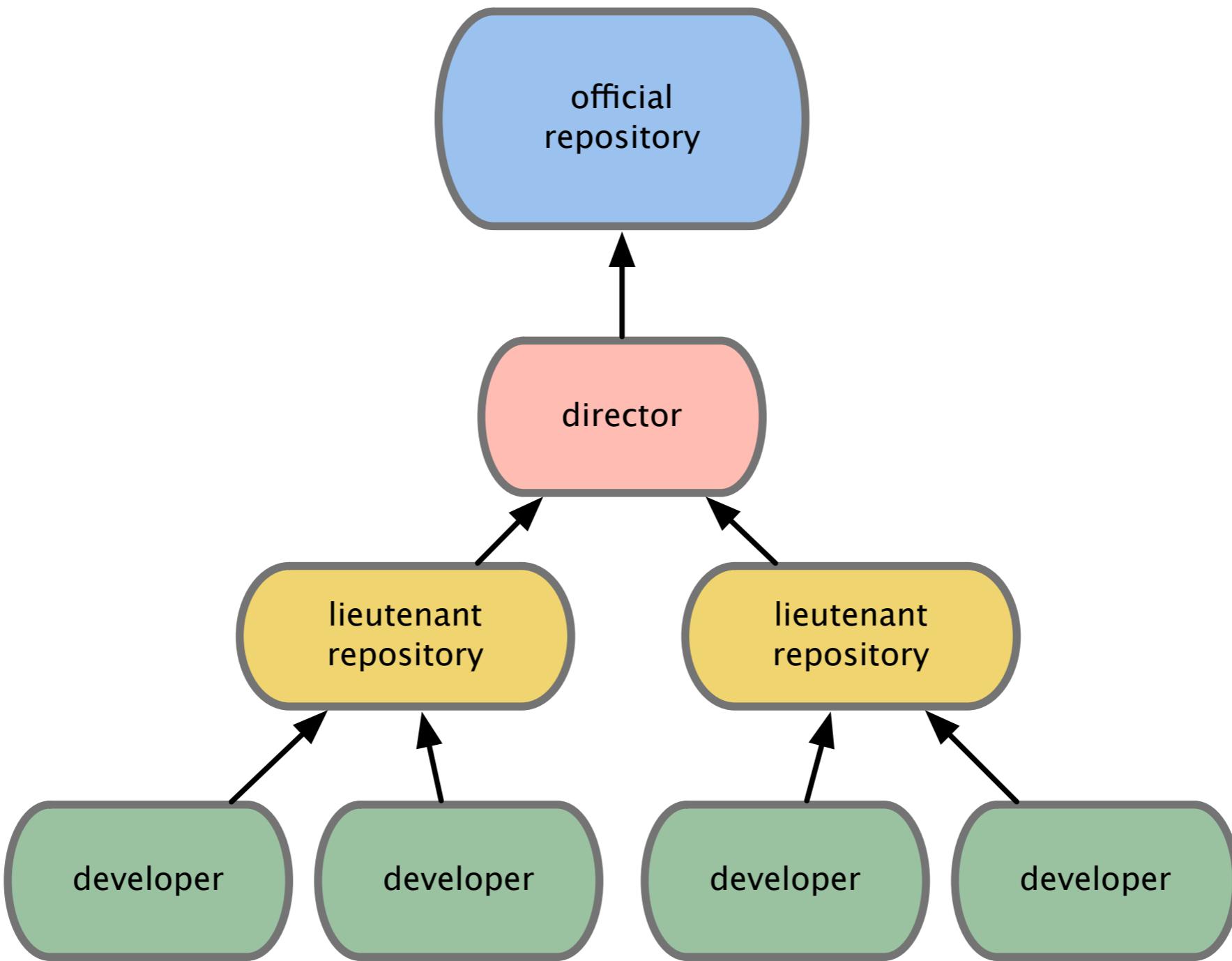
適合一般 Open Source 專案，只有少部分人有權限可以 Push 到 Repository，其他開發者用 request pull 請求合併。

例如 GitHub 提供的 Fork 和 Pull Request 功能



# 司令官與副官工作流程

多層權限控管，適合大型 Open Source 專案，例如 Linux Kernel



2. 專隊如何管理 Branches 分支?

# Case Study

- Github flow
- Rails
- CMake
- Gitflow

# Github flow

- master 是 stable/production 可佈署的版本
- 任何開發從 master branch 分支出 feature branch
- 送 pull request 開始進行討論、code review 和測試
- 最後合併回 master 代表可以佈署了

<https://guides.github.com/introduction/flow/index.html>

The screenshot shows a web browser window displaying the GitHub Guides page at [guides.github.com/introduction/flow/index.html](https://guides.github.com/introduction/flow/index.html). The page has a purple header with the GitHub logo and the title "GitHub Guides". Below the header, there are links for "Video Guides", "Support", "GitHub.com", and a feed icon. The main content features a large purple banner with the title "Understanding the GitHub Flow" and a subtitle "5 minute read". Below the banner, a paragraph explains what GitHub Flow is: "GitHub Flow is a lightweight, branch-based workflow that supports teams and projects where deployments are made regularly. This guide explains how and why GitHub Flow works." At the bottom, there is a diagram illustrating the GitHub Flow process. The diagram consists of a horizontal blue arrow pointing from left to right, representing the flow of work. Along this arrow, there are several circular nodes. The first node is purple with a white GitHub logo, representing the developer's local machine. Subsequent nodes are blue circles with white icons representing different stages of the workflow: a pull request icon, a merge icon, a deployment icon, and another merge icon. Small blue speech bubble icons are positioned between these nodes, suggesting communication or review steps. Dashed vertical lines connect the developer's local machine node to the pull request and deployment nodes, indicating the flow from local development to the pull request and deployment phases.

# pros and cons

- 簡單、清楚、容易了解
- 搭配 Github 的 Pull Request 介面
- 沒有 release branch，東西一進 master 就上 production
  - Web app 如果有問題很容易 revert，如果是 desktop/mobile 軟體就 GG 了

# Ruby on Rails

- Rails 目前的版本是 5.0
- master 是開發版本，開發下一次的主要版本 5.1
- feature branches 審核完後，合併進 master
- maintenance branches，用 cherry-pick 做 backporting
  - 2-3-stable 已停止維護
  - 3-2-stable security fixes
  - 4-0-stable 已停止維護
  - 4-1-stable bugs fixes
  - 4-2-stable bugs fixes

RAILS

Stage

All Local "master"

BRANCHES

- 2-3-stable
- 3-2-stable
- 4-1-stable
- master**

REMOTES

- origin

TAGS

SUBMODULES

OTHER

rai's (branch: master)

Subject Author Date

Subject	Author	Date
master origin/master Merge pull request #17408 from bf4/fix_rbx_test	Yves Senn	October
Fix rbx generated Gemfile regex	Benjamin Fleischer	October
Merge pull request #17310 from pabloh/optimize.strptime	Andrew White	October
Optimize TimeWithZoneTest#strftime	Pablo Herrero	October
Merge pull request #16229 from byroot/stoo-swallowing-url-generation-errors	Andrew White	October
UrlGenerationError are not catched as 404 anymore	Jean Boussier	October
Merge pull request #17405 from DanOlson/rewhere	Sean Griffin	October
Allow Relation.rewhere to work with infinite range values	Dan Olson	October
Merge pull request #17374 from maurogeorge/scope-exception	Yves Senn	October
Raises ArgumentError when try to define a scope without a callable	Mauro George	October
Merge pull request #14143 from derekprior/dp-compound-index-ordering	Yves Senn	October
Use type column first in multi-column indexes	Derek Prior	October
Merge pull request #17362 from bronzej/fix_debug_exceptions_app	Rafael Mendonça F...	October
Show the user's application in the source window and select the correct trace list. closes #17312	Byron Bischoff	October
Add back --skip-turbolinks and remove --skip-gems	Rafael Mendonça F...	October
Merge pull request #17330 from DanOlson/rewhere	Matthew Draper	October
Fix Relation.rewhere to work with Range values	Dan Olson	October
Merge pull request #17397 from prathmesh-sopatki/fix-type-boolean-error-msg-ci-skip	Rafael Mendonça F...	October
Fix typo in error message when non-boolean value is assigned to boolean column	Prathmesh Sopatki	October
Merge branch 'rishi Jain-update_docs_1'	Zachary Scott	October
Making the actionmailer docs more explicit to understand [ci skip]	Rishi Jain	October
Prefix internal method with _	Rafael Mendonça F...	October
Add CHANGELOG entry for #17084	Rafael Mendonça F...	October
Use new hash syntax	Rafael Mendonça F...	October
:scissors:	Rafael Mendonça F...	October
Merge pull request #17064 from frankel/fix_select_tag_include_blank	Rafael Mendonça F...	October

Gist It

Subject: **Merge pull request #17408 from bf4/fix\_rbx\_test**  
 Author:  Yves Senn <[yves.senn@gmail.com](mailto:yves.senn@gmail.com)>  
 Date:  Tue Oct 28 2014 16:29:28 GMT+0800 (CST)

SHA: [6c3bc9697641bu29959ca191c45e2d4a39c23d34](#)  
 Refs: [master](#) [origin/master](#)  
 Parent: [00de820f0c072c2139cd7cd8b73a534b75261f8b](#)  
 Parent: [a7fd386b63752df861398ec74ae2ad945ec33741](#)

Merge pull request #17408 from bf4/fix\_rbx\_test  
 Fix rbx generated Gemfile regex

66324 commits loaded

Console

GitHub This repository Search Explore Features Enterprise Blog Sign up Sign in

rails / rails ★ Star 23,641 Fork 9,039

Issues Pull requests Labels Milestones New pull request

is:pr is:open

	Author	Labels	Milestones	Assignee	Sort
432 Open ✓ 10,731 Closed					
<b>Fix stale nested transaction records ✓</b> #17422 opened 5 hours ago by jaredjenkins					0
<b>Fix guides snippet for registering a custom asset pipeline processor ✓ docs</b> #17420 opened 9 hours ago by pwnall		docs			2
<b>Add (failing) test for `:some_method.to_proc`-type callback filter ✘</b> #17413 opened 22 hours ago by janraasch					0
<b>document change_column and change_column_default for abstract_mysql_adapter [ci skip] ✓ docs</b> #17411 opened a day ago by mcfiredrill		docs			7
<b>Avoid TZInfo::AmbiguousTime exceptions on non-DST to non-DST transitions. ✓</b> #17409 opened a day ago by philr					3
<b>Specify in doc that `to_prepare` call back are run once in production</b> #17403 opened 2 days ago by bobbus					0
<b>Show correct routes prefix with namespace ✓</b> #17389 opened 4 days ago by takady					0
<b>ActionMailer https on URL with force_ssl = true ✓ actionmailer</b> #17388 opened 4 days ago by akampjes		actionmailer			9

# pros and cons

- 基本上就是 Github flow 加上 maintenance branches 維護舊版的設計
- 非常多的 Open Source 專案採用這種形式
- 版本號(Tag)打在 master 上，透過 preview 和 beta 的版本號進行提前釋出

# CMake

<http://public.kitware.com/Wiki/Git/Workflow/Topic>

- master 預備釋出的版本，feature branches 從這裡分支出去
- feature branch 完成後，合併進 next (或叫做 staging)
- next 整合版本，完成的 feature branch 先合併到這裡進行測試
  - 在 next 測好的 feature branch，才合併進 master
  - 可以將 master 合併進 next，減少之後的 code conflicts
  - 不會將 next 合併進 master
- nightly 每天 1:00 UTC 自動從 next branch 分支出來跑自動測試

CMake (branch: master)

**CMAKE**

Stage

All Local "master"

Subject Author Date

BRANCHES

master

REOTES

origin

TAGS

SUBMODULES

OTHER

origin/next Merge branch 'master' into next Brad King October 2014

Merge topic 'CTestCustom-suppress-sphinx-icon-warning' into next Brad King October 2014

CTestCustom: Suppress sphinx warning about missing favicon Brad King October 2014

Merge topic 'cpack-rpm-pre-post-install' into next Brad King October 2014

CPackRPM: Support PREUN and POSTUN requirements Evgeny Kalishenko October 2014

CPackRPM: Support pre(post) install scripts Evgeny Kalishenko October 2014

Merge topic 'osx-gnu-fortran-deployment' into next Brad King October 2014

OS X: Detect deployment target flags from GNU Fortran compilers Brad King October 2014

Merge topic 'wince-tests' into next Brad King October 2014

Tests: Run Tutorial steps 1-4 as tests for Windows CE Pascal Bach October 2014

Merge branch 'master' into next Brad King October 2014

Merge branch 'master' into next Brad King October 2014

master origin/master Merge topic 'autorcc-dependencies' Brad King October 2014

Merge branch 'release' Brad King October 2014

Merge topic 'FPHSA-deref' Brad King October 2014

Merge topic 'revert-definition-map-lookup' Brad King October 2014

CMake Nightly Date Stamp Kitware Robot October 2014

origin/rightly Merge topic 'find-boost-no-reroot' into next Chuck Atkins October 2014

FindBoost: fix find\_library call when using "re-rooting" Guillaume Papin October 2014

Merge topic 'refactor-search-path-construction' into next Brad King October 2014

Revert topic 'refactor-search-path-construction' Brad King October 2014

Merge topic 'FPHSA-deref' into next Rolf Eike Beer October 2014

FPHSA: remove unneeded variable dereferencing Rolf Eike Beer October 2014

Merge topic 'autorcc-dependencies' into next Stephen Kelly October 2014

QtAutogen: Regenerate qrc files if their input changes (#15074) Stephen Kelly October 2014

Merge topic 'revert-definition-map-lookup' into next Brad King October 2014

**Subject: Merge topic 'autorcc-dependencies'**

**Author:** Brad King <[brad.king@kitware.com](mailto:brad.king@kitware.com)>

**Date:** Mon Oct 27 2014 23:29:17 GMT+0800 (CST)

**Committer:** CMake Topic Stage <[kvrobot@kitware.com](mailto:kvrobot@kitware.com)>

**Date:** Mon Oct 27 2014 23:29:17 GMT+0800 (CST)

**SHA:** [a2456e157223255f0e2a71f2ddd510510e42b9e4](#)

**Refs:** master origin/master

**Parent:** [0f068c177c3834cacc1b27e32c318b53adcd06f9](#)

**Parent:** [6e1c359fe9bee71c421c671108176d47fb415d93](#)

**Merge topic 'autorcc-dependencies'**

6e1c359f QtAutogen: Regenerate qrc files if their input changes (#15074)  
 a2995318 QtAutogen: Expand rccfiles into a vector early in the autogen process.

26006 commits loaded

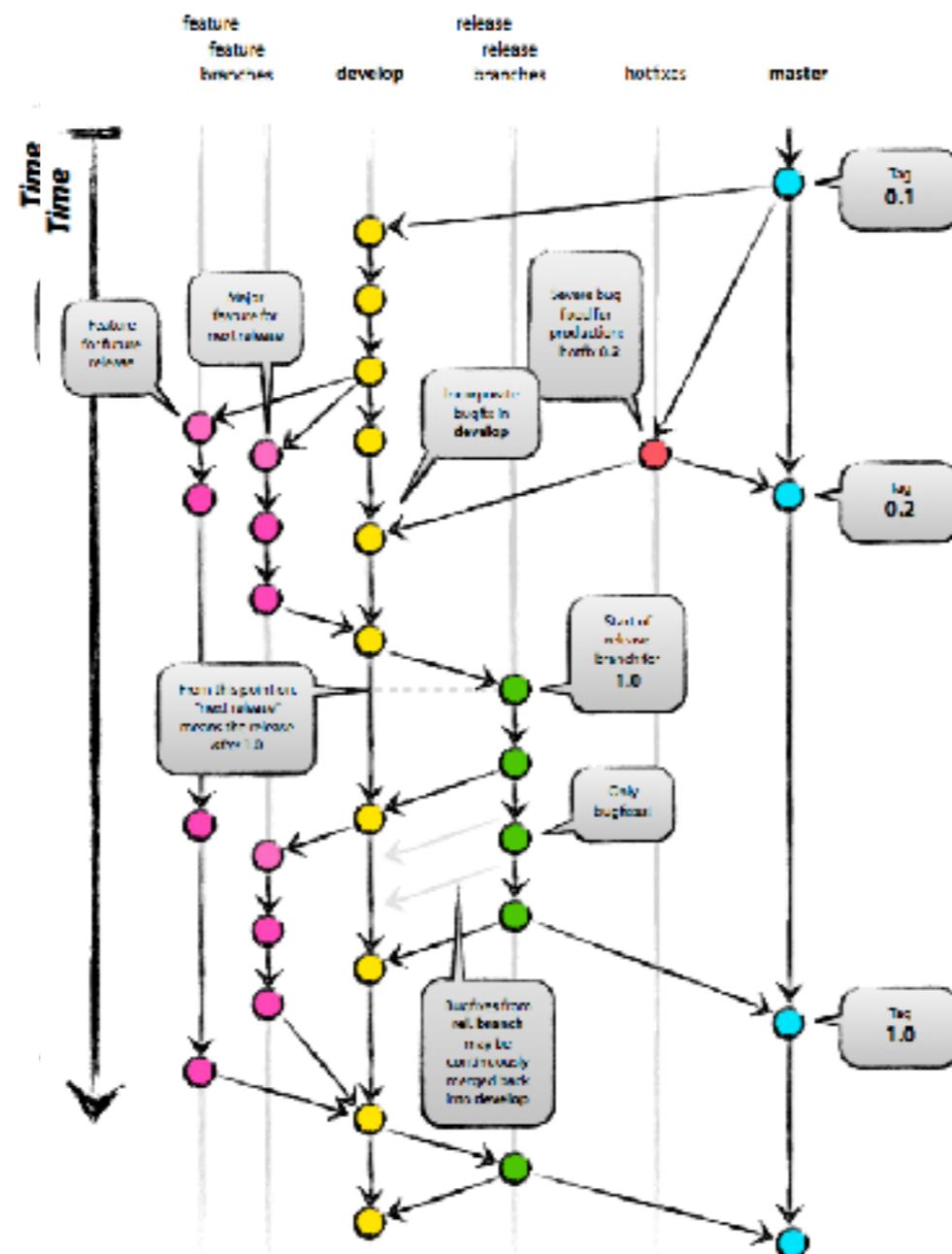
Console

# pros and cons

- 個別 feature branch 的狀態很清楚
- 需要發行 binary release 的軟體需要較正式、較花時間的釋出過程(feature branch -> next -> master -> release branch)。來確保釋出的軟體有足夠的測試。
- 但是線圖其實很不好追蹤，很多 merge commits 跟真正的 commits 混雜在一起
- Revert a merge commit 其實不好做

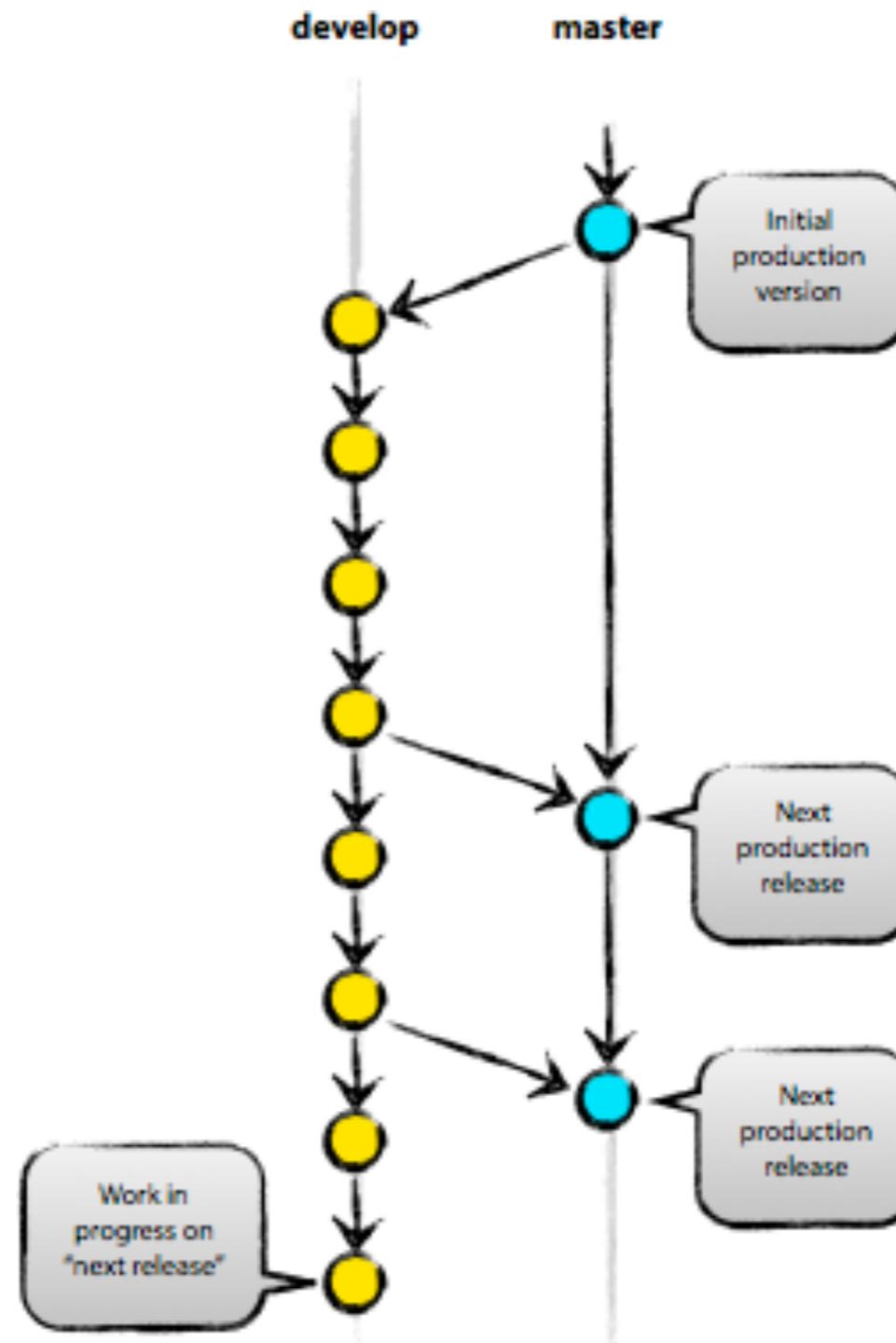
# Git flow

<http://nvie.com/posts/a-successful-git-branching-model/>



# 兩個主要分支

- master:
- 穩定的 production 版
- develop:
- 開發版本，從 master 分支出來

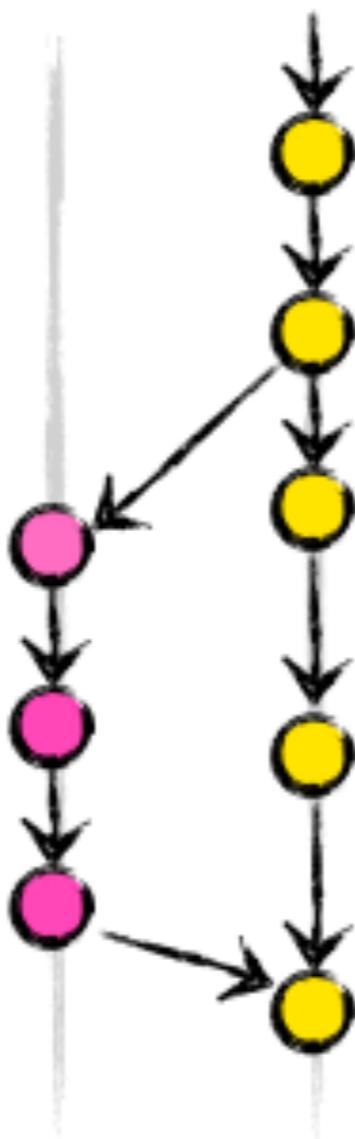


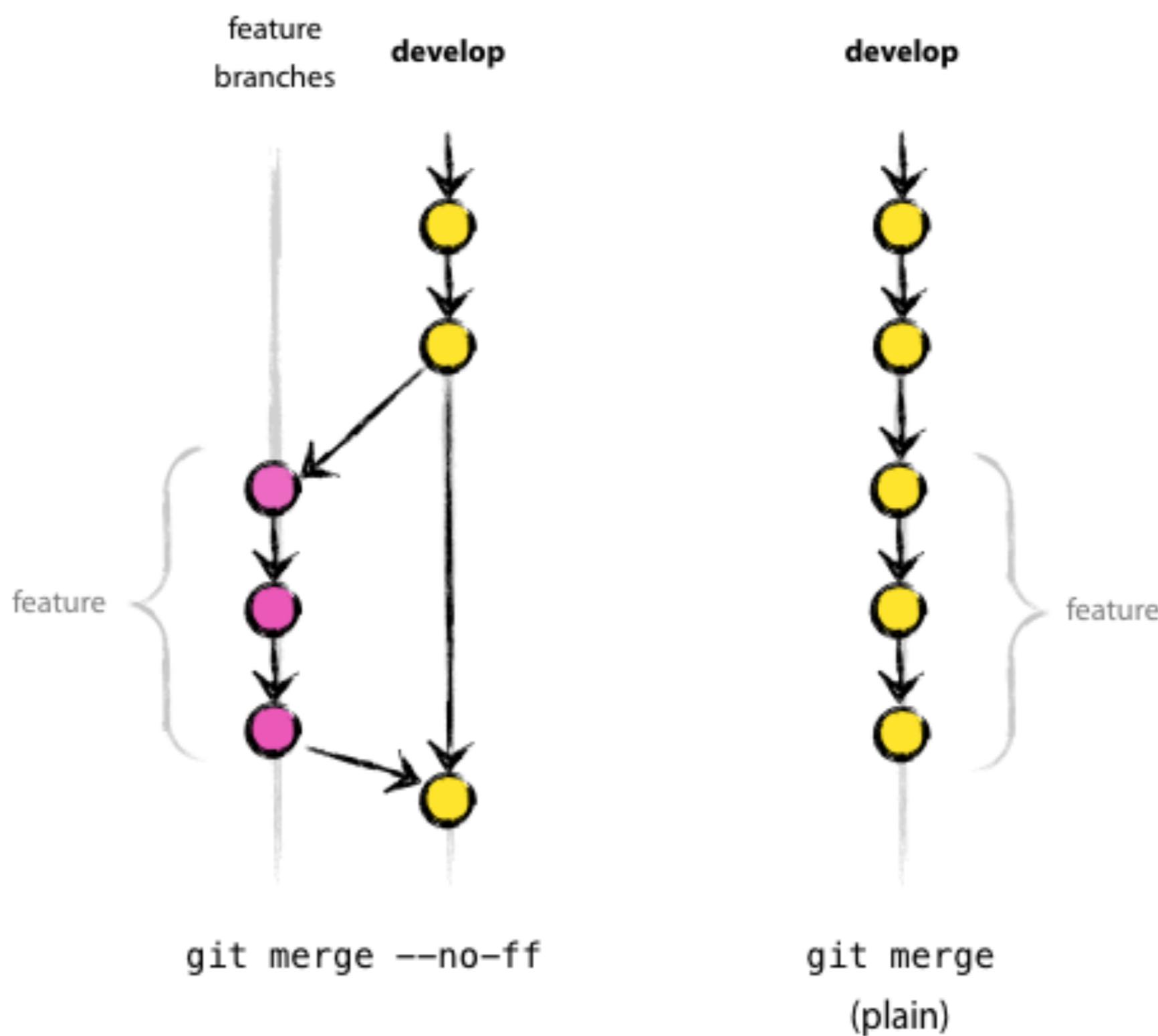
# 三種支援性分支(I)

- Feature branches
  - 開發新功能或修 bugs
  - 從 develop 分支出來
  - 完成後 merge 回 develop
  - 如果開發時間較長，則需定期同步 develop 主幹的程式(初學可用 merge，建議改用 rebase)，不然最後會合併不回去。

feature  
branches

**develop**



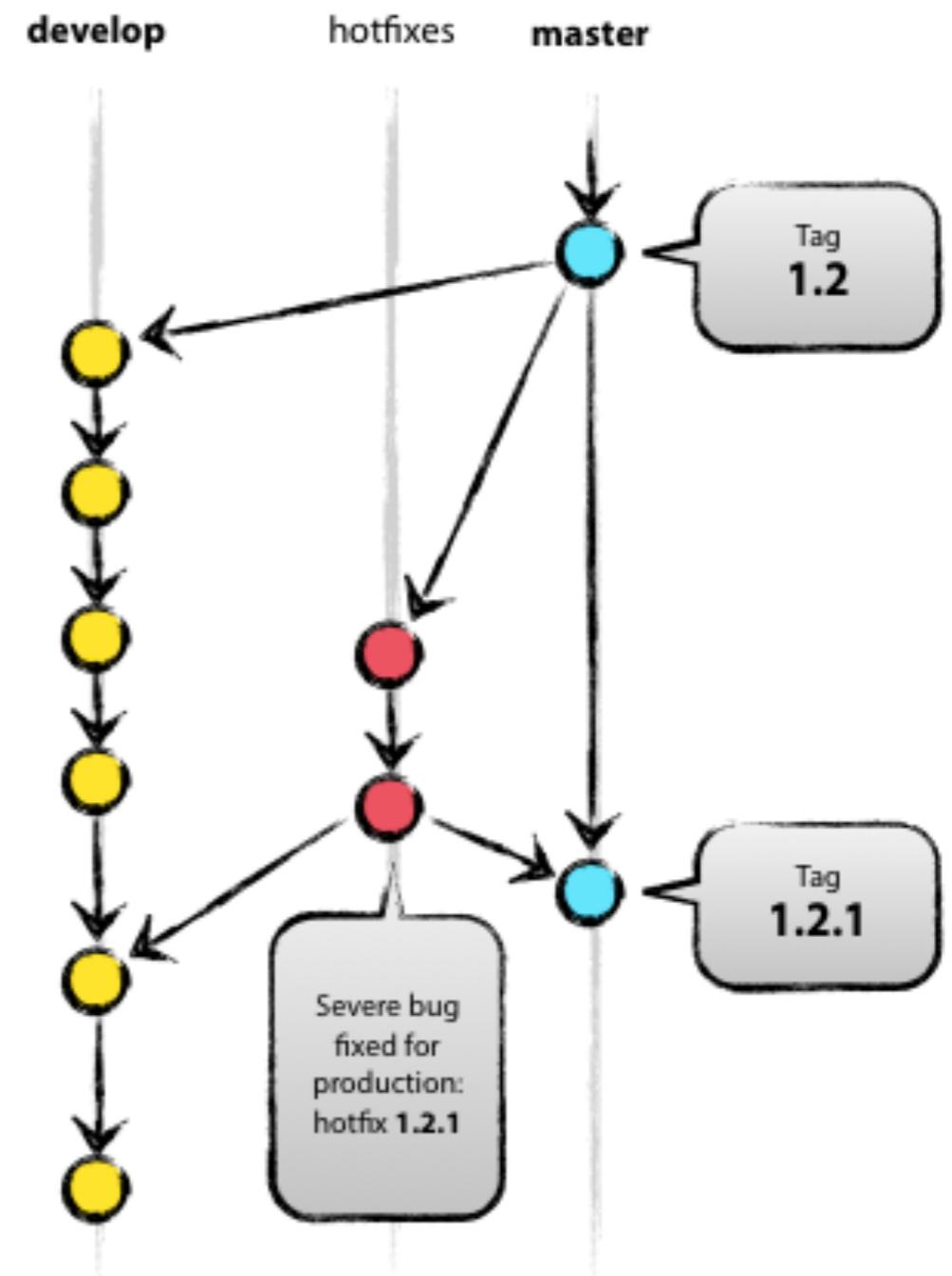


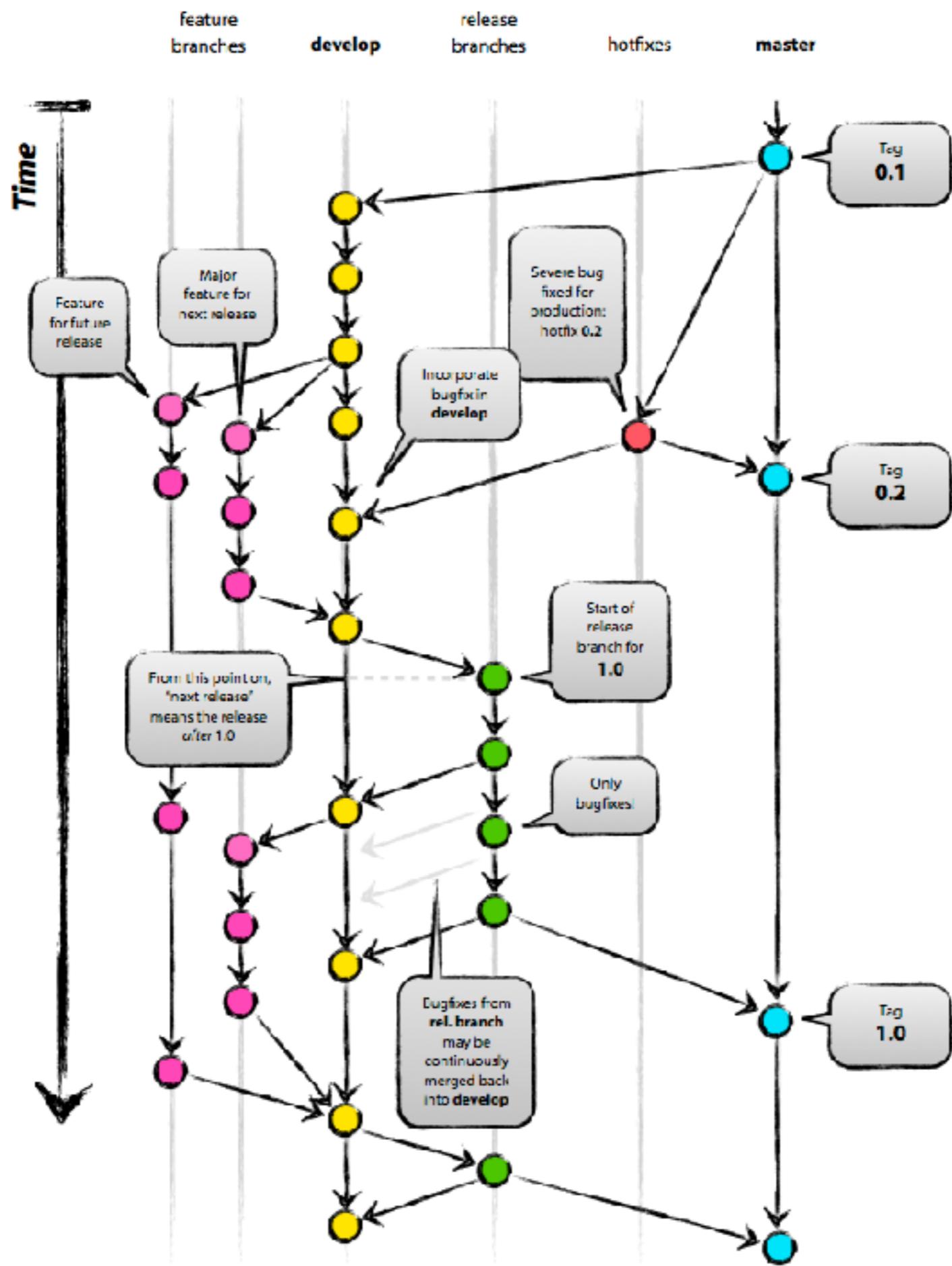
# 三種支援性分支(2)

- Release branches
  - 準備要 release 的版本，只修 bugs
  - 從 develop 分支出來
  - 完成後 merge 回 master 和 develop

# 三種支援性分支(3)

- Hotfix branches
  - 等不及 release 版本就必須馬上修 master 趕著上線
  - 會從 master 分支出來
  - 完成後 merge 回 master 和 develop





# pros and cons

- 第一個出名的、有形式的 Git 分支工作流  
程
- 很清楚的追蹤 feature, release, hotfix 等  
branches，確保釋出和審核流程
- 有點複雜，不適合小專案或 Open Source  
專案

# Discussions

- Rebase before merge
- Feature branch issue
- Code review policy
- Release branch

# I. Rebase before merge

- 在 merge 前，做不做 rebase 整理 commits?
- 建議能力和時間所及，就去做

# rebase + merge 的完美合併法

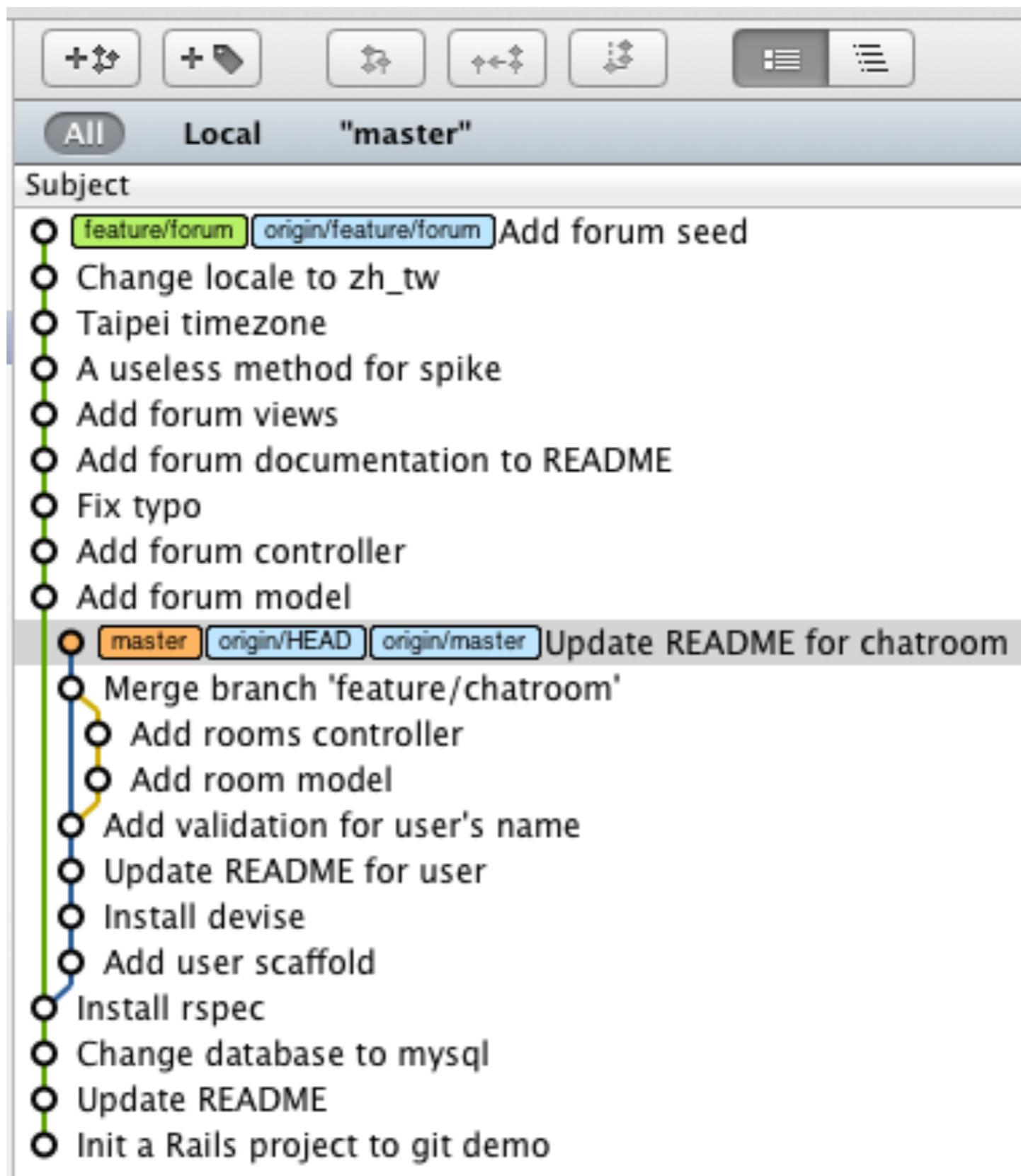
(假設我們要將 feature branch 合併回主幹 develop)

- 原因
  - feature branch 很亂，不時 merge 與主幹同步
  - feature branch 有 typo，commit 訊息想改
  - feature branch 有些 commits 想合併或拆開
- 作法
  - 先在 feature branch 做 git rebase develop -i
  - (反覆整理直到滿意) git rebase 分岔點 -i
  - 在從 develop branch 做 git merge feature --no-ff

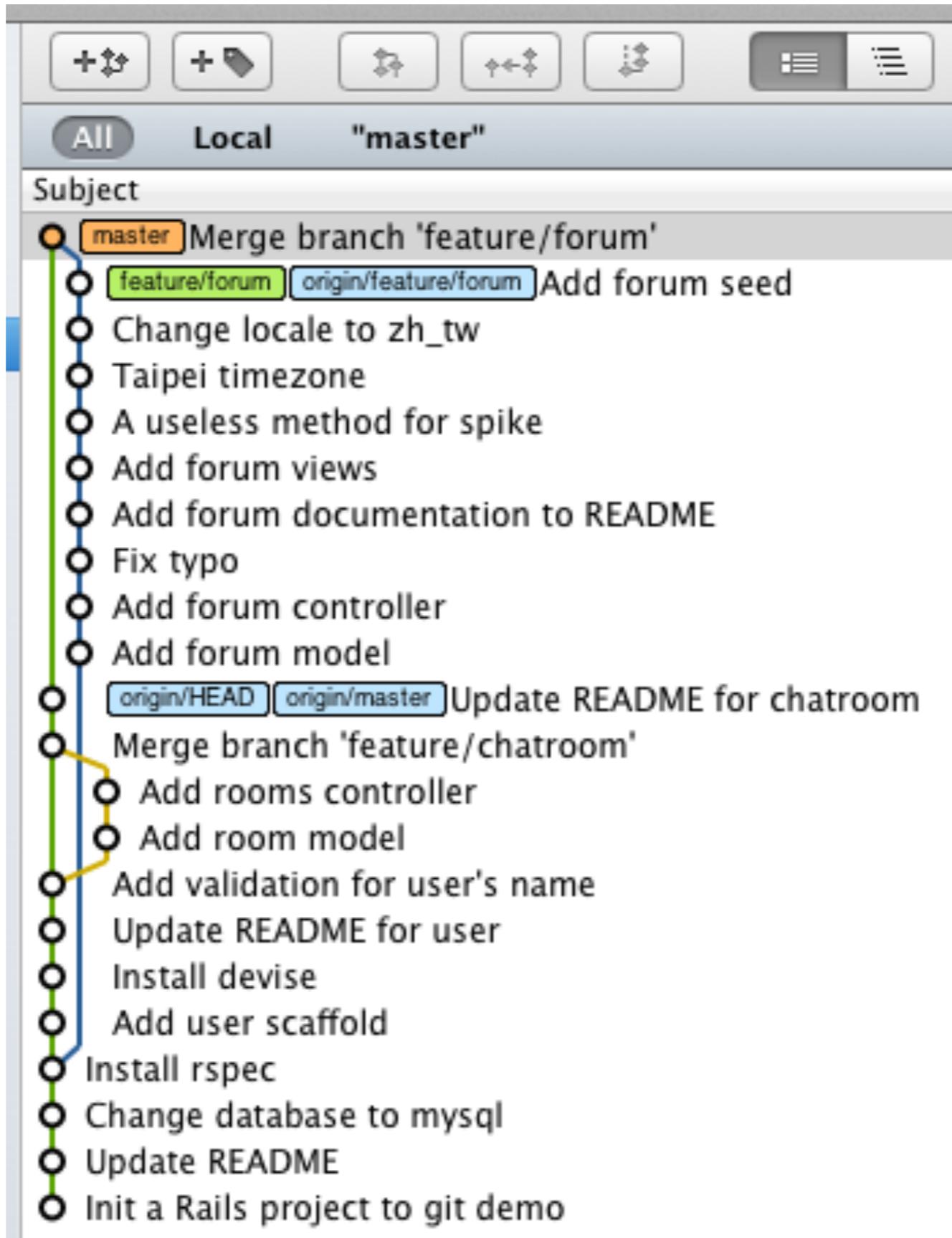
# 超級乾淨，每一次的 merge commit 就代表一個功能完成



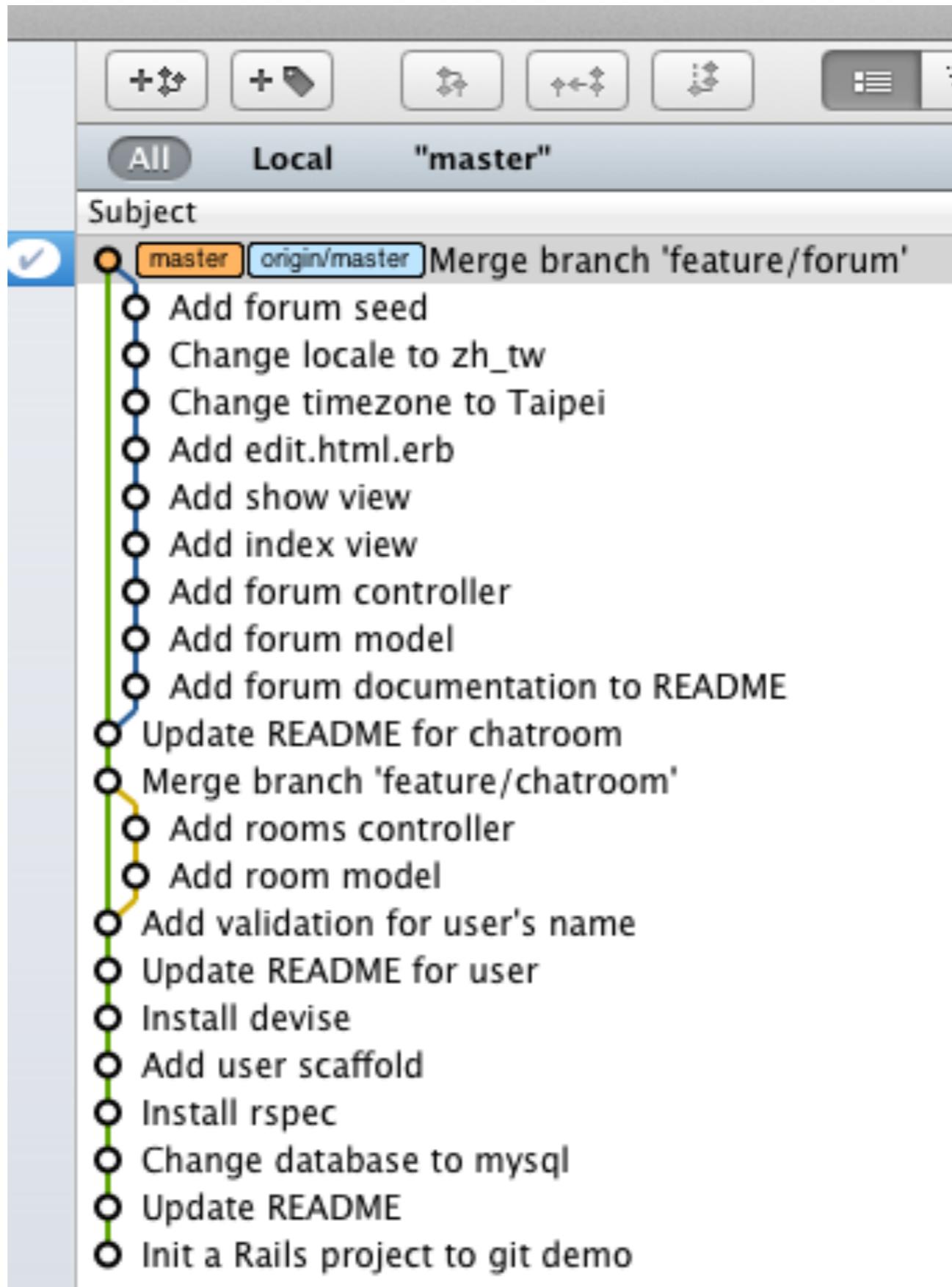
# Demo (before merge)



# Demo (normal merge)



# Demo (rebase + merge)



# 注意事項 (I)

- 必須要加 --no-ff 才會有 merge commit。不然會是 fast-forward。
- rebase 之後的 feature branch 就不要再 push 出去了
- 如果有遠端的 feature branch，合併完也砍掉

## 注意事項 (2)

- 不求一次 rebase 到完美，不然中間的 conflict 會搞混。
- 可以一次改點東西就 rebase 一次，然後開個臨時的 branch 存檔起來，再繼續 rebase 自己直到滿意為止。

# Rebase demo screencast

- <http://ihower.tw/blog/archives/6704>

# 2. Feature branch issue

- 根據 Feature 或 User Story 來建立 Branch 開發，直到 Branch 驗收完成才合併回主幹
- 可讓主幹總是 releasable
- 缺點是與主幹的分歧造成合併問題
  - 主幹的更新，Feature Branch 有依賴的話，需要合併回來
    - git merge master (線圖會很醜)
    - git checkout -b feature\_v2; git rebase master;  
(我偏好的做法，但需要 rebase 功力)
  - Feature Branch 週期越短越好，幾天到不超過一個開發週期 (Iteration)
  - 不要同時開太多 Feature Branch (避免半成品)
  - 需要 Tech Lead 來負責主幹的合併

# Feature Branch (cont.)

- 對 Open Source Project 來說非常有效率
  - Small core team 可以主導要不要接受 patch
  - Release date 不固定，可以慢慢考慮 patch
- 但對大型商業團隊來說，可能變成 Anti-pattern

(超長 branch 合併不回來)。團隊需要良好紀律：

- codebase 需要良好模組化
- 大家都乖乖定期更新主幹的 code，並且經常 commit 程式到主幹
- Delivery team 不能因為時程壓力而輕率 merge<sub>40</sub>

# 反思 Develop on Mainline ?

from Continuous Delivery ch.14

- 以唯一的 Mainline branch 作為開發用途
  - 還是可以開以不併為前提的 branch，例如 release branch 或 spike 實驗
- Continuous Integration 最好做，程式碼總是 integrated 的狀態
- 開發者總是拿到最新的 code
- 避免開發後期 merge hell 和 integration hell 的問題
- 缺點：releasable 程度可能降低，必須在架構設計上有增量式開發的能力和技巧。

# 在單一Branch 上做 增量式開發的技巧

- Feature Toggle

<http://martinfowler.com/bliki/FeatureToggle.html>

- Branch By Abstraction

<http://continuousdelivery.com/2011/05/make-large-scale-changes-incrementally-with-branch-by-abstraction/>

# Feature Toggle

- 功能完成，不代表業務面需要馬上上線
- 擔心 Feature branch 放太久臭掉?
- 建議先合併進主幹! 但是 UI 先藏起來即可!
  - 甚至是設計權限，讓 admin 可以提早看到做 production 的線上測試

# 3. Code Review Policy

- 規定只有 project leaders 可以 commit/merge 進 develop branch。
- 規定只有 release team 可以管理 master branch。
- 其他開發者都開 topic branches，完成後發 pull request，做完 code review 後，沒問題才 merge 進 develop。
- 例如：GitHub 的 pull request 可以作，但沒有強制性

Body attributes and some new Tag Helpers

<https://github.com/rails/rails/pull/30>

ihower 10 | Dashboard | Inbox 0 | Account Settings | Log Out

Explore GitHub | Gist | Blog | Help | Search...

rails / rails

Unwatch | Fork | 7,740 | 1,322

Source | Commits | Network | Pull Requests (18) | Graphs | Branch: master

Open chriseppstein wants someone to merge 3 commits into rails:master from chriseppstein:body\_attributes #30

Discussion 3 | Commits 3 | Diff 6

chrisseppstein opened this pull request September 19, 2010

**Body attributes and some new Tag Helpers**

Having a consistent convention for body classes makes styling easier :) This approach also let's the body live in the layout but still be modified by the template if necessary.

chrisseppstein and jeremy are participating in this pull request.

chrisseppstein added some commits December 21, 2010

- 739108c New helper methods for working with tag attributes:
- d299f22 Make it easier to manage the body tag in the layout from templates.
- d337d1b Convert the default scaffold to use the body\_tag helper.

jeremy commented January 10, 2011

I like this idea (and I use a similar low-tech helper) but I'm concerned it introduces a broad API for such a simple task. And the API is all at the view level despite being request-wide state, so you can't add attributes in your controller.

chrisseppstein commented January 10, 2011

Open | 239 additions | - 2 deletions

All Pull Requests

# GitLab

The image shows two screenshots of the GitLab interface. The top screenshot is the homepage at [about.gitlab.com](https://about.gitlab.com), featuring a purple header with the GitLab logo and navigation links for Products, Services, Company, Community, Blog, and Sign in. The main content area has a large white background with the text "Open source software to collaborate on code". Below this is a detailed description of GitLab's features and a section with three buttons: "Features" (blue), "Get a subscription" (green), and "Downloads" (orange). The bottom screenshot is the GitLab dashboard, showing a list of recent activity items such as merge requests and issues, and a sidebar with a list of projects under "GitLab / gitlab.com".

GitLab offers git repository management, code reviews, issue tracking, activity feeds, wikis. It has LDAP/AD integration, handles 25,000 users on a single server but can also run on a highly available active/active cluster. A subscription gives you access to our support team and to GitLab Enterprise Edition that contains extra features aimed at larger organizations.

Features   Get a subscription   Downloads

Dashboard | GitLab

Projects Issues (0) Merge Requests (0) Help

Dmitry Kapovits accepted merge request #48 of GitLab / gitlab.com 25 minutes ago

Dmitry Kapovits deleted branch dev-1.6 at GitLab / gitlab.com 25 minutes ago

Dmitry Kapovits pushed to branch master of GitLab / gitlab.com 25 minutes ago Merge branch 'dev-1.6' into 'master'

MATTHIAS WIESE commented on issue #1214 of GitLab / gitlab.com about 4 hours ago

GitLab / gitlab.com

GitLab is used in more than **100,000** organizations

gitlab.com

5 matches < > Q branch Done

## Permissions

Users have different abilities depending on the access level they have in a particular group or project.

If a user is both in a project group and in the project itself, the highest permission level is used.

If a user is a GitLab administrator they receive all permissions.

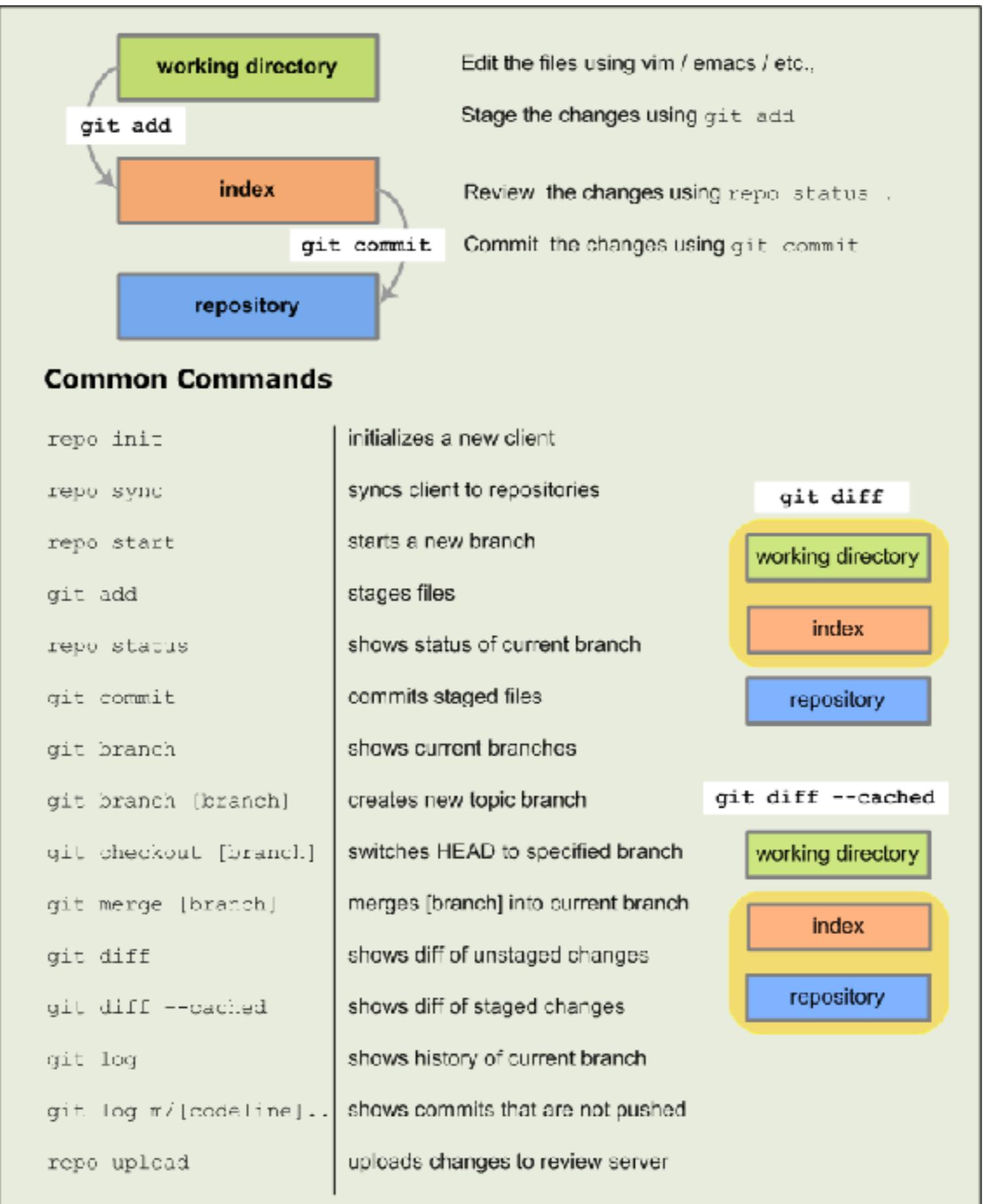
## Project

Action	Guest	Reporter	Developer	Master	Owner
Create new issue	✓	✓	✓	✓	✓
Leave comments	✓	✓	✓	✓	✓
Pull project code		✓	✓	✓	✓
Download project		✓	✓	✓	✓
Create code snippets		✓	✓	✓	✓
Create new merge request			✓	✓	✓
Create new branches			✓	✓	✓
Push to non-protected branches			✓	✓	✓
Remove non-protected branches			✓	✓	✓
Add tags			✓	✓	✓
Write a wiki			✓	✓	✓
Manage issue tracker			✓	✓	✓
Manage labels			✓	✓	✓
Create new milestones				✓	✓
Add new team members				✓	✓
Push to protected branches				✓	✓
Enable/disable branch protection				✓	✓
Rewrite/remove git tags				✓	✓
Edit project				✓	✓

# Android

- Repo is a repository management tool that we built on top of Git
- Gerrit is a web-based code review system for projects that use git

<https://source.android.com/source/developing.html>



# Facebook

- <http://phabricator.org/>

The screenshot shows the Phabricator web interface. On the left is a sidebar with icons and labels for:

- Differential (Review Code) - 105 items
- Manitest (Tasks and Bugs) - 20 items
- Pholio (Review Mocks and Design)
- ChatLog (IRC Logs)
- Feed (Review Recent Activity)
- Phriction (Wiki)
- Diffusion (Host and Browse Repositories)
- Audit (Browse and Audit Commits)

The main dashboard has two sections:

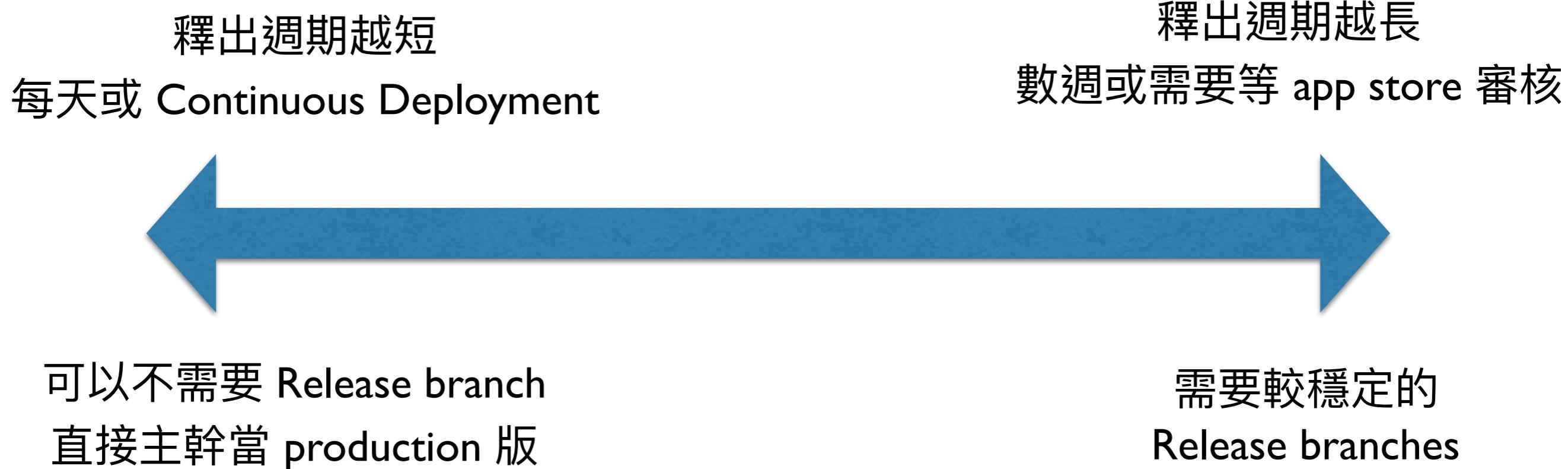
### My Eng Team

- D9672 Remove `welcome.html` config option** (Jun 23 2014, 8:22 PM)  
Accepted · Reviewers: chad · Author: epriestley
- D8685 Action submenus** (May 12 2014, 8:46 AM)  
Accepted · Reviewers: chad, btrahan · Author: epriestley

### Needs Triaged

- T6157 Failing to parse patch with binary delta** (Mon, Sep 22, 2:52 AM)  
No Projects
- T6155 Panels should be simply hidden to users without the permissions to see** (Mon, Sep 22, 11:19 AM)  
Dashboards
- T6154 XHPAST fails to recognise some syntax errors** (Sun, Sep 21, 1:17 PM)  
XHPAST  
Assigned: joshuaspence

# 4. Release branch?



# 開發與佈署流程

<http://ihower.tw/blog/archives/7798>

- 分支流程不只與開發相關，也與測試和軟體部署(釋出)流程相關
- 什麼時候，哪個分支跑 CI 自動測試？
- 什麼時候，哪個分支佈署到 Staging Server 進行人工測試？
  - 使用 Github flow 的話，需要讓每個 feature branch 都可以上 CI 和 staging server 環境
  - 或是採用 CMake 解法，有一個 next(staging) branch 專門用來整合跑 CI，這個 branch 不合併回 master

# 與專案管理的搭配

- Scrum (有 iteration 開發週期)
  - 比較適合搭配有 release branch 的 Git flow
- Kanban (沒有 iteration 開發週期)
  - 比較適合 Github flow 流程

# 結論

- Github flow 或 Gitflow 二選一
  - desktop/mobile software : 用 Gitflow
  - 想要嚴謹的流程 : 用 Gitflow
  - 頻繁釋出的 Web app: 用 Github flow

謝謝，請多指教

<http://ihower.tw>



# 參考資料

- <http://ihower.tw/blog/category/git>
- <http://pragprog.com/screencasts/v-jwsceeasy/source-control-made-easy>
- <http://www.youtube.com/watch?v=4XpnKHJAok8> Linux 的演講
- <http://www.softdevtube.com/2013/02/05/advanced-git/>
- <http://git-scm.com/book>
- Git from the bottom up  
<http://ftp.newartisans.com/pub/git.from.bottom.up.pdf>
- Version Control with Git, O'Reilly
- <http://nfarina.com/post/9868516270/git-is-simpler>
- <http://think-like-a-git.net/sections/graph-theory.html>

- Git in Practice, Manning
- <https://peepcode.com/products/git>
- <https://peepcode.com/products/advanced-git>
- Git Internals, Peepcode
- Pragmatic Version Control Using Git, Pragmatic
- Pragmatic Guide to Git, Pragmatic
- Continuous Delivery Ch.14
- <https://www.atlassian.com/git/tutorials/comparing-workflows>
- <https://guides.github.com/introduction/flow/index.html>