COSC 499: Capstone Software Engineering Project

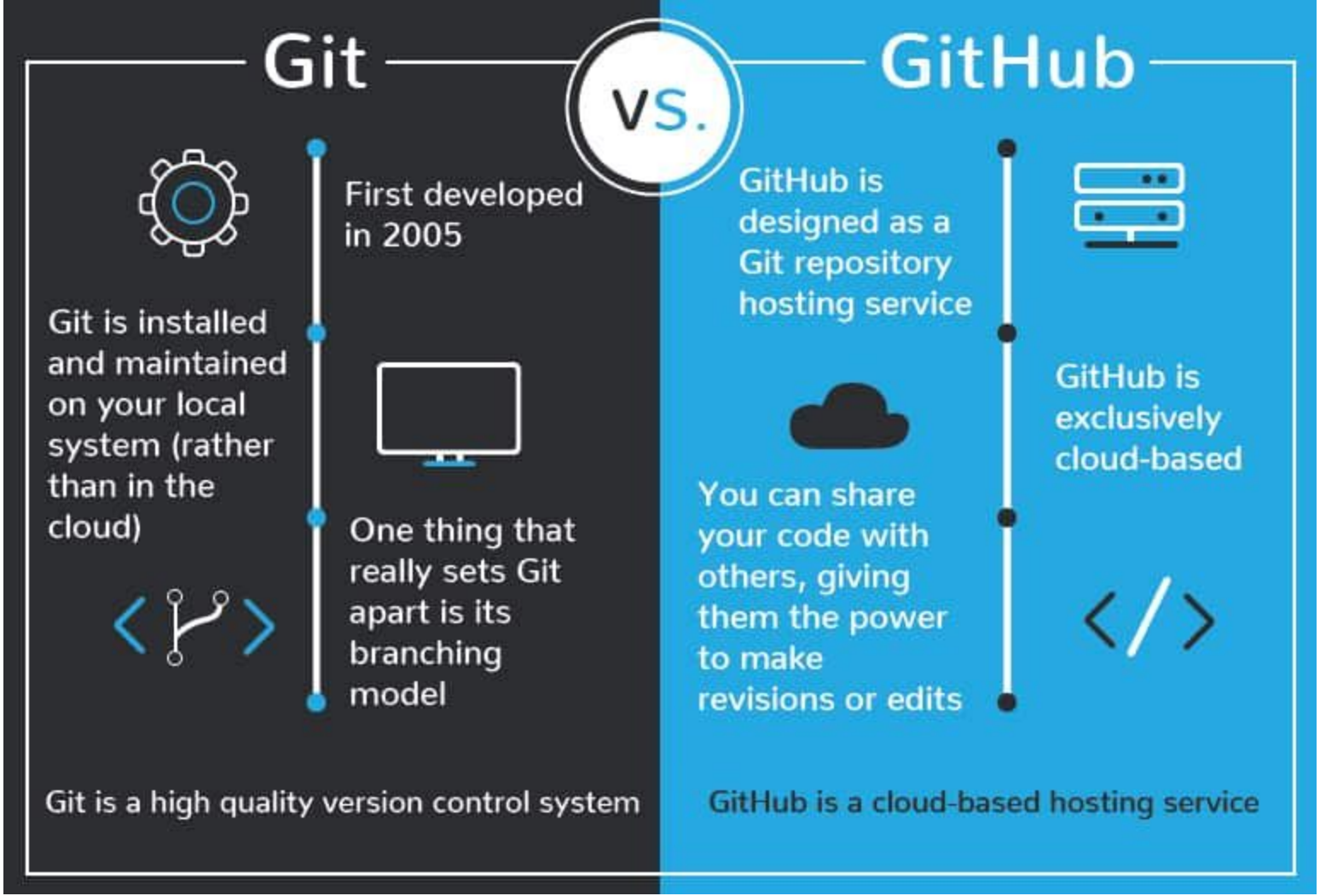

Image taken from https://devmountain.com/

Git and GitHub

- Git is a modern version control system for software developers
- GitHub is a public platform that supports Git in the cloud
  - Do not push files with secrets (use `.gitignore`)
- Using GitHub
  - GitHub CLI https://cli.github.com/
  - GitHub Desktop https://docs.github.com/en/desktop
  - Some IDEs also have Git integration
  - This course: GitHub classroom

Examples?

Development Process in Git Commands

- Common steps:

```
git clone
git pull origin master
git checkout -b new_branch_name
```

[create files, write tests, write code]

repeat

```
git add file_name
git status
git commit -m "string message describing change"
git push new_branch_name
```

[create pull request, wait for review, make fixes as needed, merge to master]

Development Process in Git Commands

- Common steps:

```
git clone
git pull origin master
git checkout -b new_branch_name
[create files, write tests, write code]
git add file_name
git status
git commit -m "string message describing change"
git push new_branch_name
[create pull request, wait for review, make fixes as needed, merge to master]
```

repeat

So important!

Why?

Basic Development Process: Alone

-

- Write new code
- Attempt to synch new code
- Merges branch to master

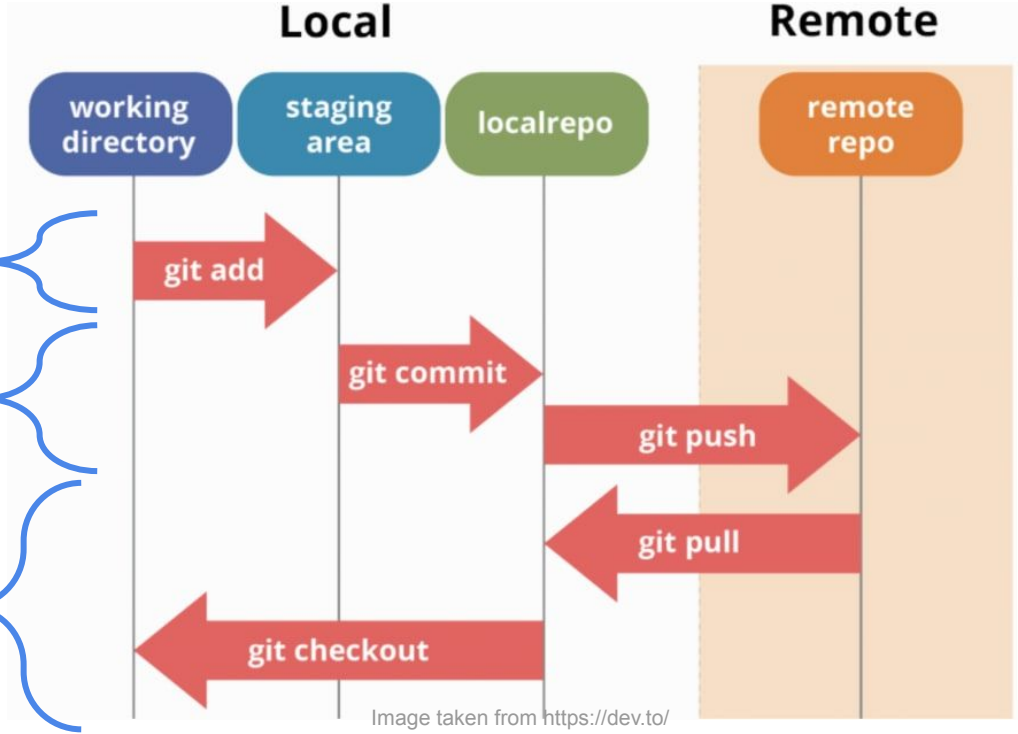

Image taken from https://dev.to/

Basic Development Process: In a Team

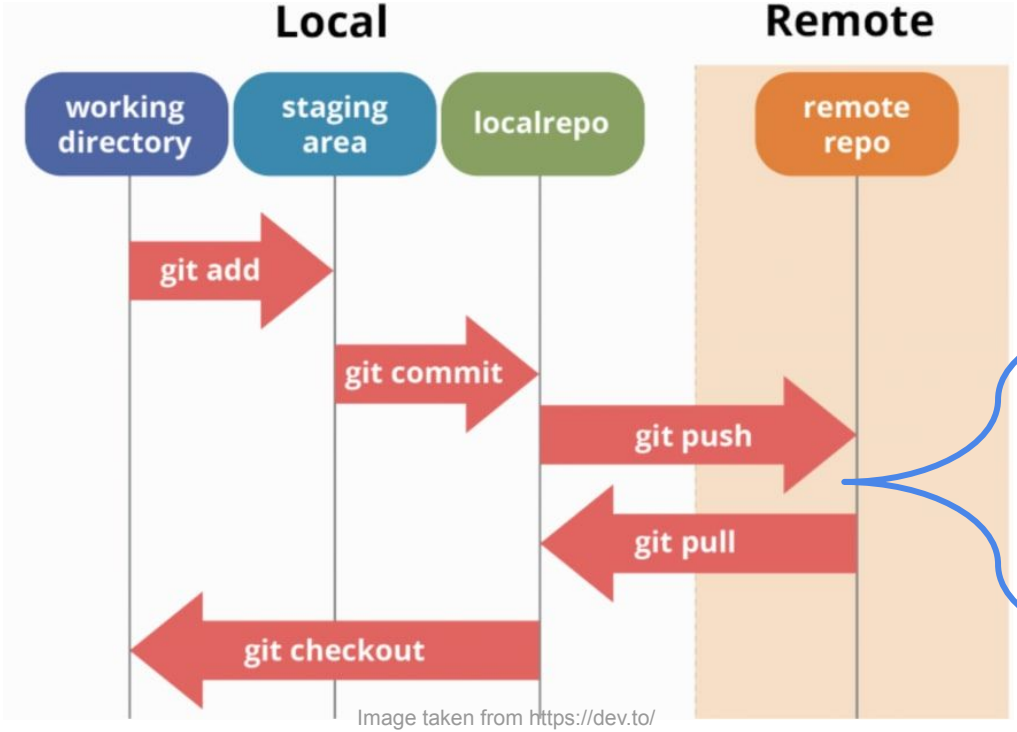

Image taken from https://dev.to/

- Create a pull request (PR)
- Assign reviewers (usually 2)
- Fix changes as needed
- Repo policy can auto merge if both reviewers approve

Branching and Merging

- What is a **branch**?
  - An independent line of development within a project
- Why?
  - Your edits don't immediately effect the original source code
  - Teams can work on parallel builds
- When?
  - Branch when you have a new feature
  - Name with a short representative description of the feature
  - Do NOT name it after yourself
- **Merging** your branches
  - Process of joining your branch with original source code (main/master) *after* fully tested and peer reviewed
  - Do NOT delete branch history

Visualizing Git Flow

- Master branch - stable code, ready to stage/deploy
- Develop branch - where features merge to

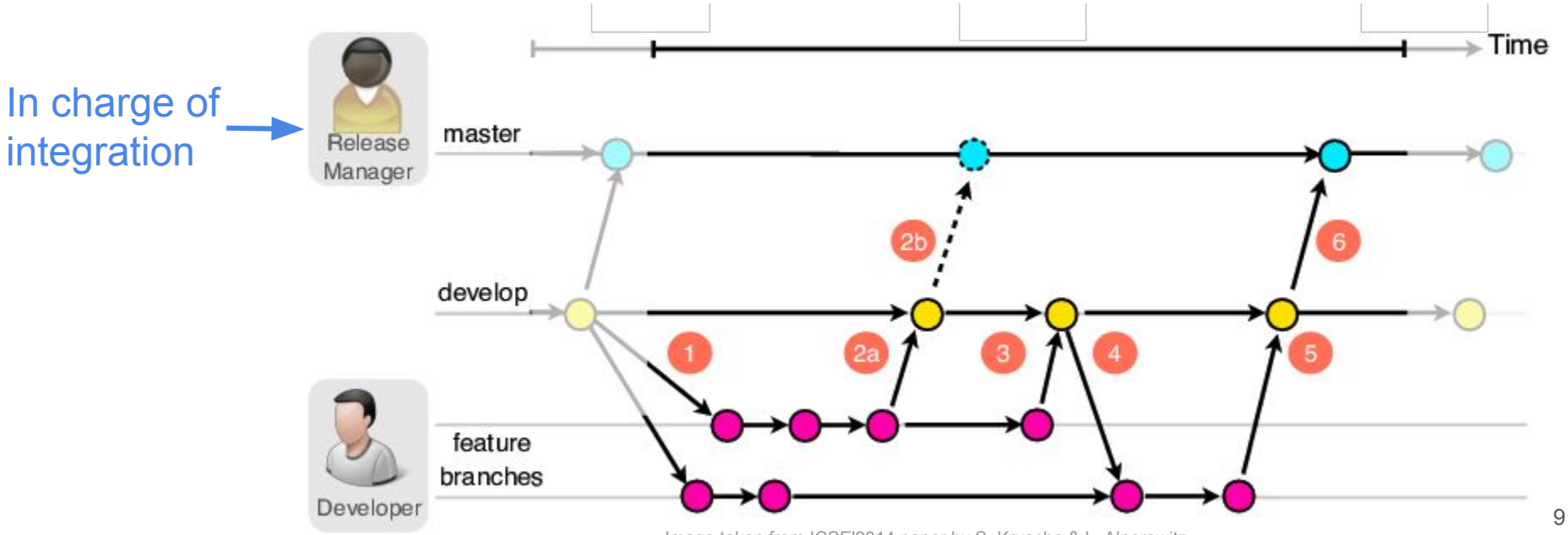

Image taken from ICSE'2014 paper by S. Krusche & L. Alperowitz

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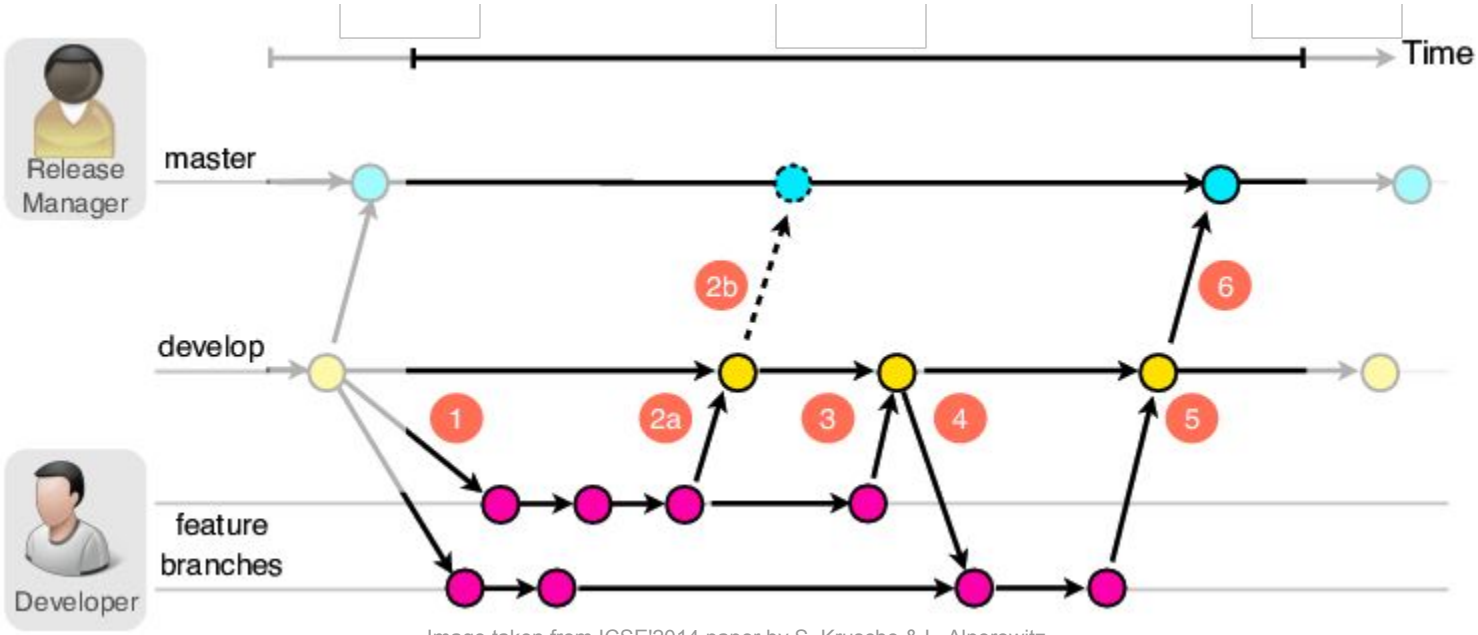


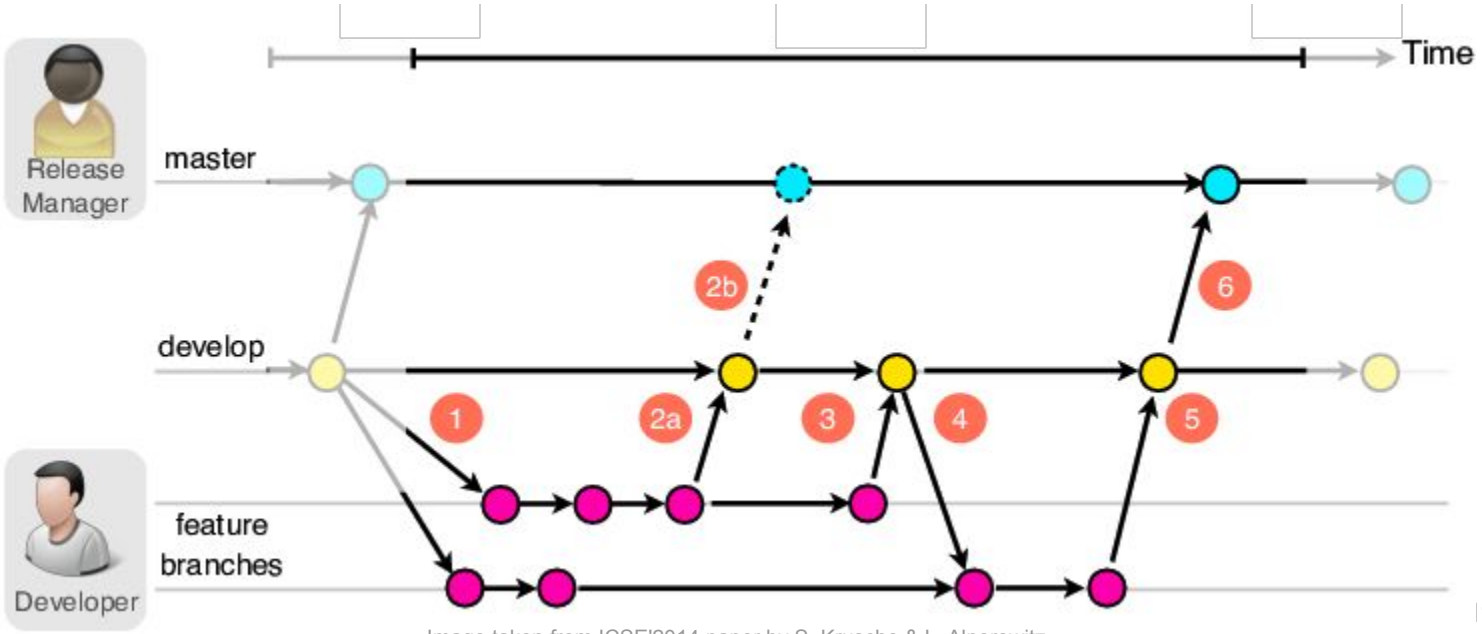
Features branch off of and merge into develop

Image taken from ICSE'2014 paper by S. Krusche & L. Alperowitz

Visualizing Git Flow

- Master branch - stable code, ready to stage/deploy
- Develop branch - where features merge to

How many features were merged to develop?



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Visualizing Git Flow

- Master branch - stable code, ready to stage/deploy
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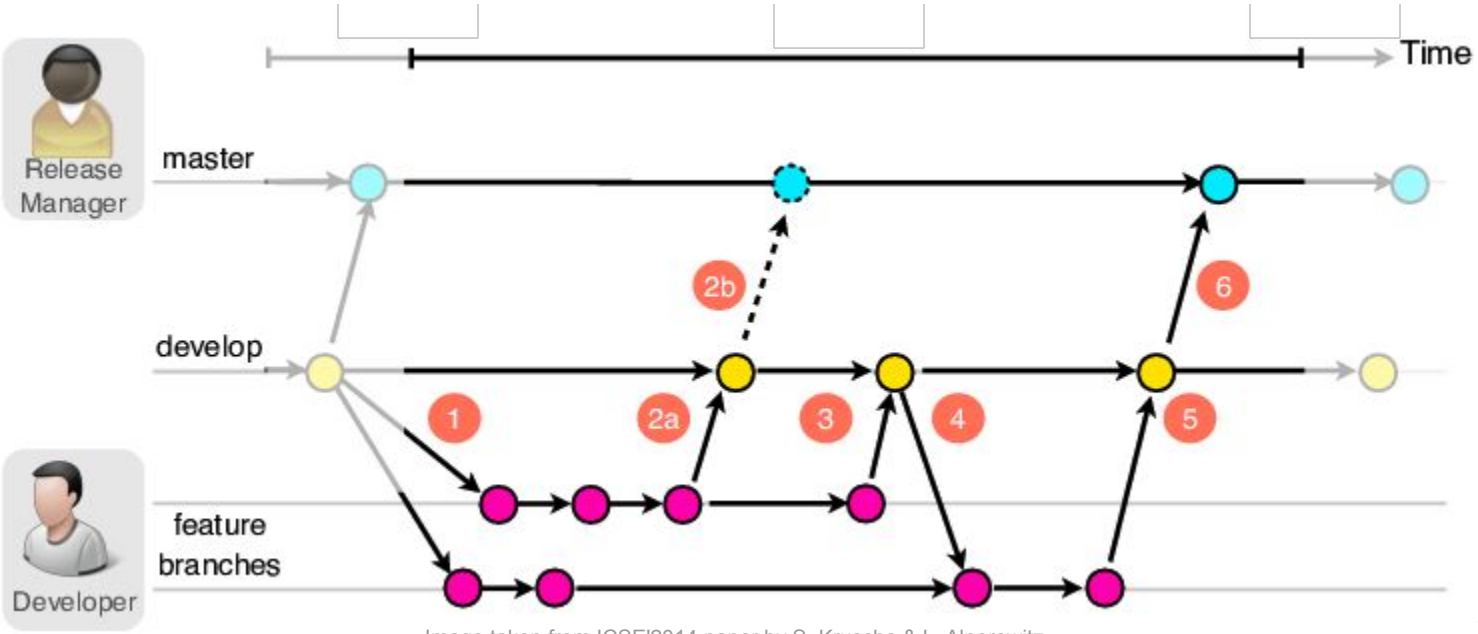
After the merge in 2a, why was there continued development that led to 3?



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Visualizing Git Flow

- Master branch - stable code, ready to stage/deploy
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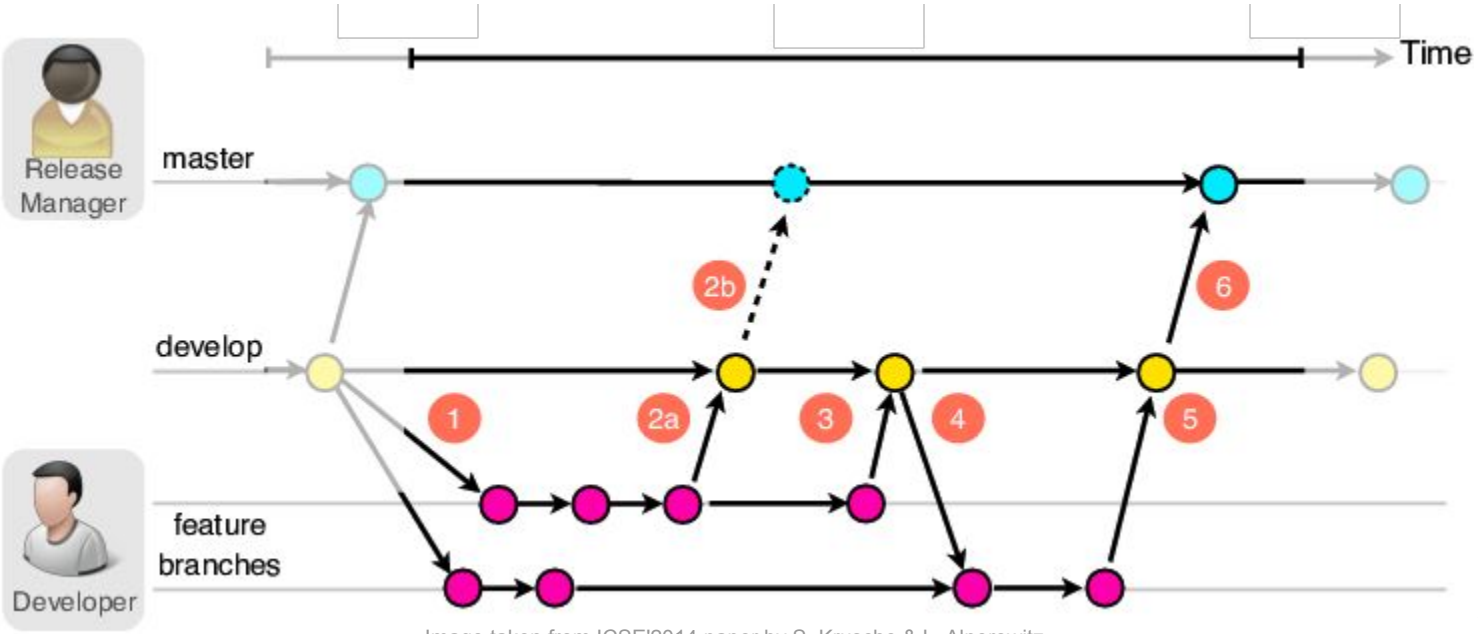
Why is there another pull from develop at 4?



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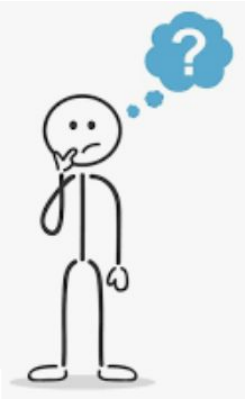
Branching Conventions for this Course

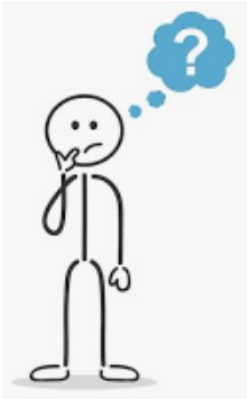
- Branches for your repo
  - master — for deployment / deployment-ready
  - develop — for active development
  - doc — for repo documentation only
  - log — for class logs only; irrelevant to client
  - **one per feature**
- In log branch:
  - student A indiv logs
  - student B indiv logs
  - …
  - team logs

"Can a Branch have more than One PR?"

- Like asking: "Can a feature have more than one PR?"
- "Should it?"



"Can a Branch have more than One PR?"



- Like asking: "Can a feature have more than one PR?"
- "Should it?"
- Process for reusing a branch for multiple PRs:
  - Open a PR from branch
  - When done, merge PR into main
  - Continue working on the same branch feature and push more commits
  - Open another PR from that same branch to main
- Each PR follows *after* the previous one is closed/merged

Branching Conventions for this Course

- Industry practice: **integration lead** is the only one who can merge develop to master
  - Promotes ownership across team members
  - You may want 2+ people assigned to integration
  - You may want individuals to merge their own approved code
  - Be careful: Must still test what you merge!
- **Every PR requires 2 reviewers**
  - Branch setting
  - Applies to all code and tests
  - Logs require 1 reviewer

Another Example

- More complex branching strategy

Organization dependent

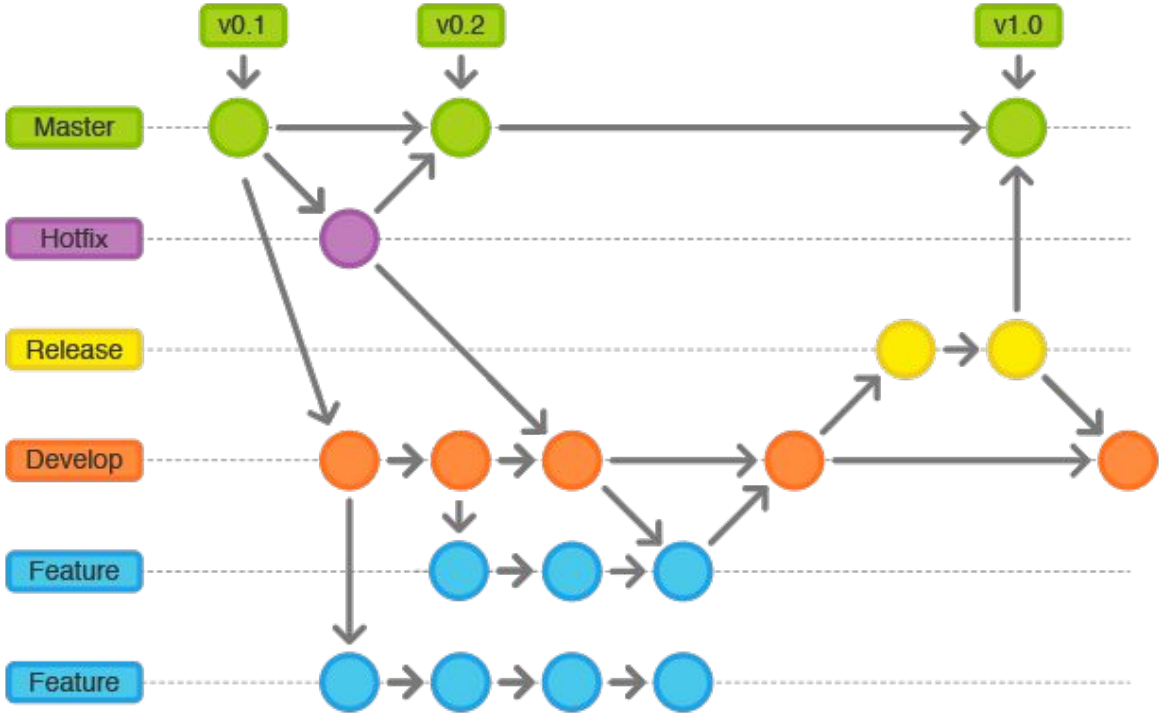
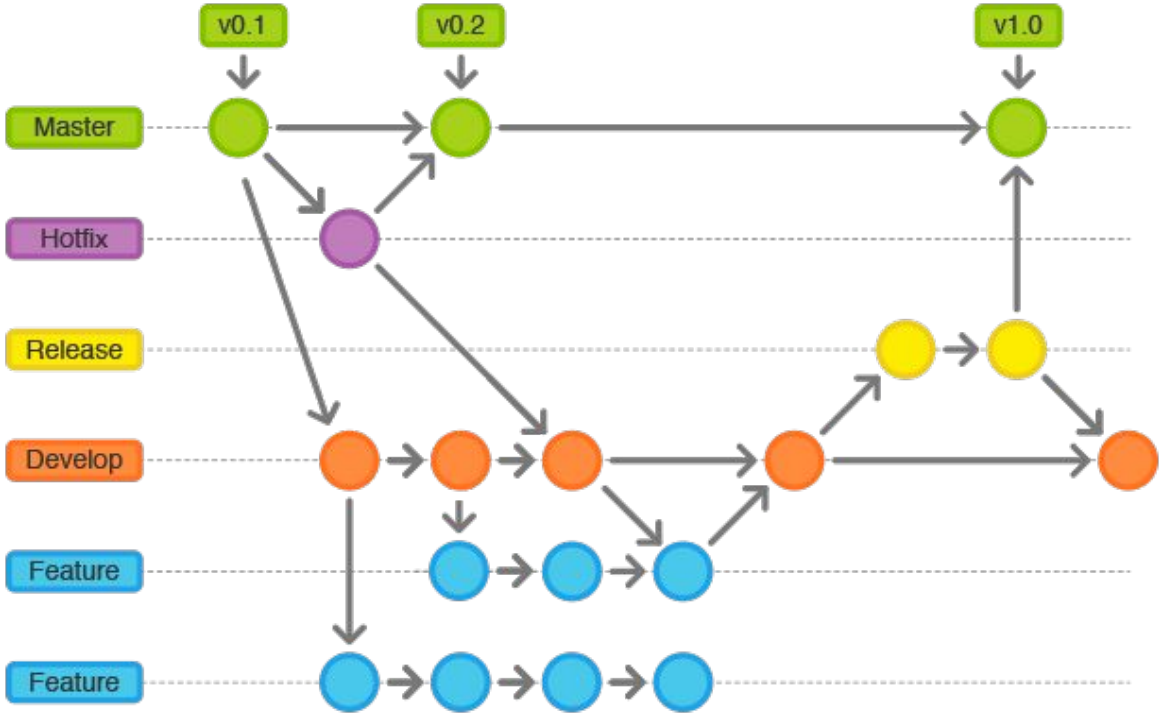


Image taken from https://lrtitecnologia.wordpress.com/

Another Example

- More complex branching strategy

Hotfix requires a synch with both master and develop



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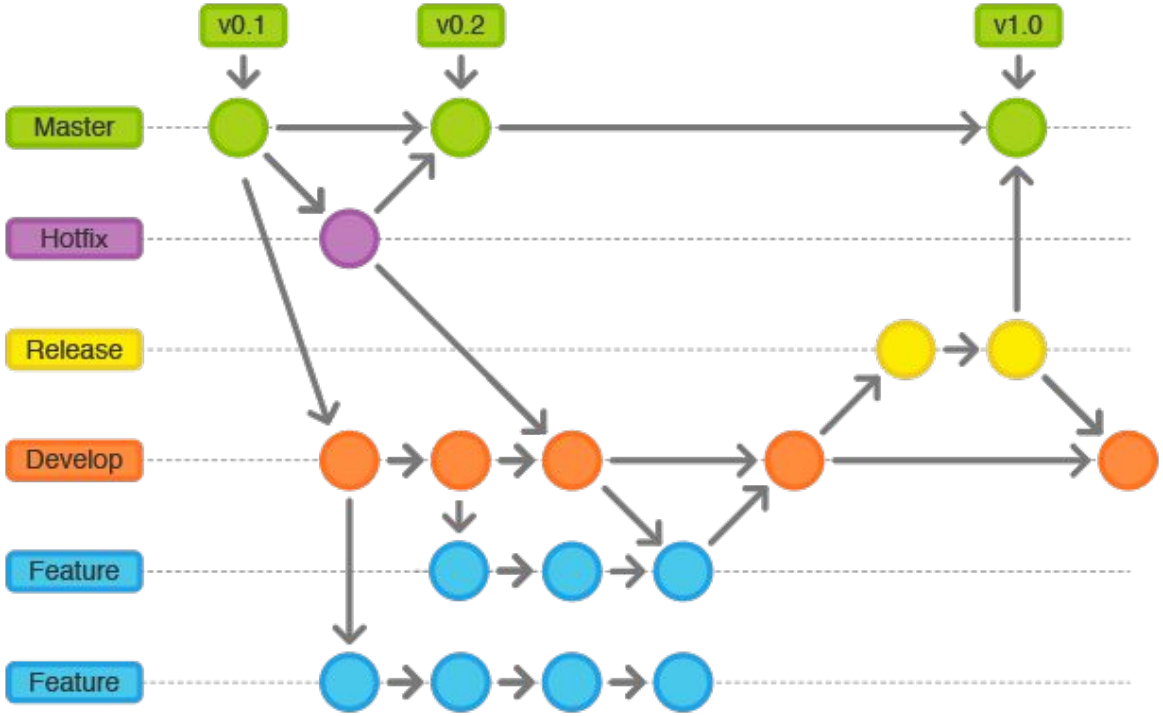
Another Example

- More complex branching strategy



What's happening with the bottom feature?

Image taken from https://lrtitecnologia.wordpress.com/

Developer Maxim: Merge Early and Often

- Merging is analogous to a "synch" action
- What happens if you develop your feature for a long time while everyone else is developing and merging their work?

Developer Maxim: Merge Early and Often

- Merging is analogous to a "synch" action
- What happens if you develop your feature for a long time while everyone else is developing and merging their work?
  - You get stuck handling all the merge conflicts

- Therefore: Pull changes and integrate frequently
  - Keep your PRs small
  - Avoid massive merge conflicts

Other Goodies: GitHub Student Developer Pack

- Available to students and offers a range of free services (optional) https://education.github.com/pack