DIS08 – Data Modeling

03 – git + GitHub – Tutorial Session

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Topics for Today

1. Q&A
2. Resolving conflicts
3. Undoing things

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Open Questions

Quiz!

What does `git init` do?

a) Commit your files to the repository
b) Delete a git project
c) Initialize a new git project
d) Add all files to the staging area

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Quiz!

The output below is typical of which command?

```
commit bda95786432d142bbff996ad32045fa4f32ec619
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date: on Nov 16 13:13:33 2015 -0500
First commit
```

a) git diff
b) git log
c) git status
d) git add filename

Quiz!

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Quiz!

The command `git status` shows

a) A git project's commit history
b) Untracked files only
c) Untracked files and file changes staged for commit
d) File changes staged for commit

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What's wrong with the code below?

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git commit -m Add new scene to screenplay
```

a) The commit message lacks quotation marks
b) The "-m" option is not necessary here
c) The commit message should be in all caps
d) The "-m" option goes before the word "commit"

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Quiz!

The command below

```
git branch new_branch
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a) Changes the name of a branch
b) Lists the commit history of the new branch
c) Switches you over to a new branch
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Quiz!

A Git project has a branch “bug-fix”. How do you switch to it?

a) `git branch bug-fix`
b) `git switch master bug-fix`
c) `git checkout bug-fix`
d) `git switch bug-switch`

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Why is the branch name “my branch” invalid?

a) The word “my” cannot be used
b) Valid branch names must contain a dash
c) Branch names cannot contain whitespace
d) Branch names must be capitalized

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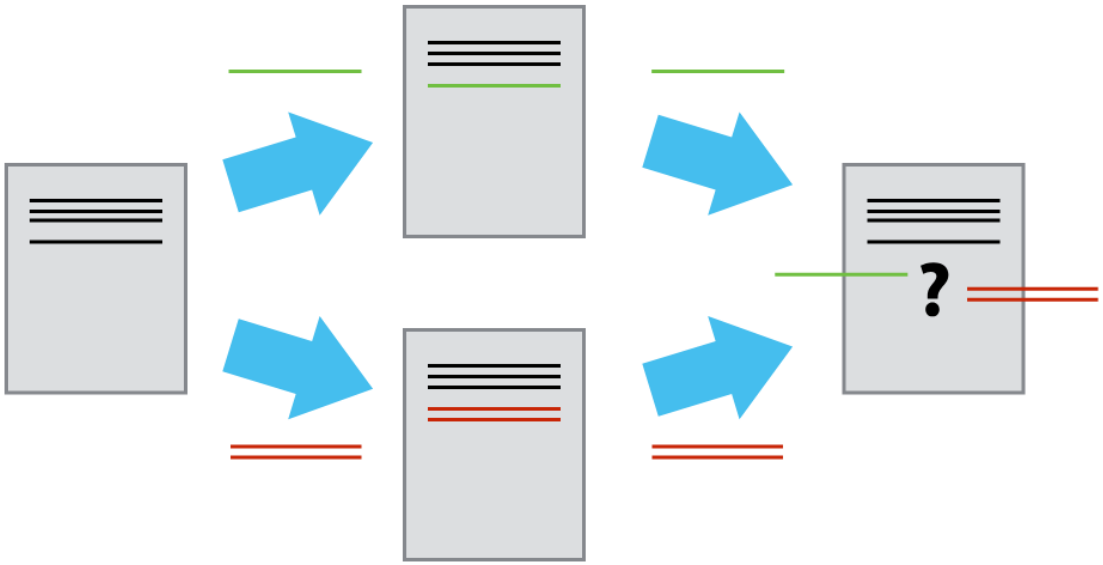
GIT MERGE WITHOUT CONFLICTS
WHAT
DID I DO WRONG?
quickmeme.com

The Feared Merge Conflict

- Conflicts occur when..
  - .. two or more people change the same file(s) at the same time
  - .. one person changes the same file(s) from several machines
  - .. one changes the same file(s) on different branches.
- git does not allow people to overwrite each other's changes blindly, but highlights conflicts so that they can be resolved.



The Feared Merge Conflict

Merge conflicts are git-speak for "I need a human to make a decision".

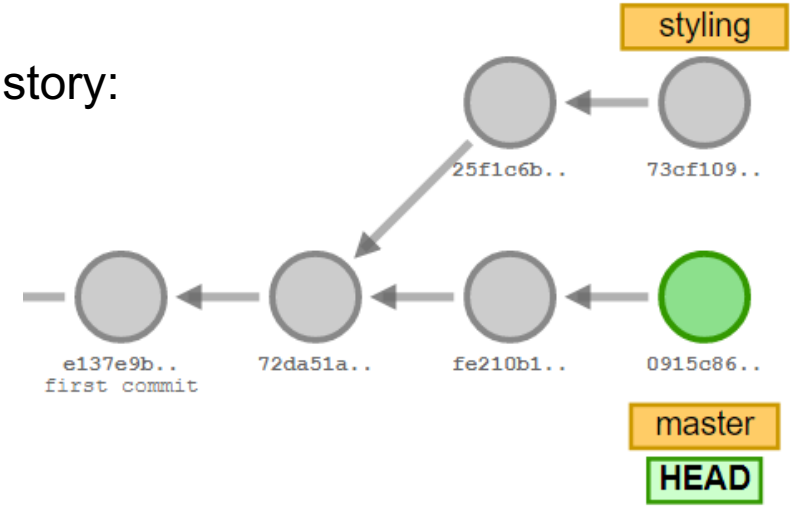
There's nothing to worry about them.

git will indicate the conflicting lines in your files.

git's status output will also guide you through the process.

Example

- Suppose you have this project history:



- There are two lines of work with one common anchestor (72da51a..).

- You happen to have modified the same file in both branches.

- You want to integrate your changes from `styling` into `master`.

Example

```
Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (master)
$ git checkout styling
Switched to branch 'styling'

Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (styling)
$ git log -n 2
commit 22bb113e7633c65c5dd9f6e43cb472457e893422 (HEAD -> styling)
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 11:03:52 2019 +0200

    Introduce some CSS styling

commit a938ad039397b875c2ae4bb9b3a008a0ce19abf3
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 10:56:01 2019 +0200

    Add index.html

Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (styling)
$ git checkout master
Switched to branch 'master'

Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (master)
$ git log -n 2
commit 5bf1fbfa7052f540ab4ecace9bec50a0b403772d (HEAD -> master)
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 11:04:41 2019 +0200

    Change page title

commit a938ad039397b875c2ae4bb9b3a008a0ce19abf3
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 10:56:01 2019 +0200

    Add index.html
```

Commit a938a… is the last one that both branches share.

After that, each branch created a commit separately.

Both changed the same file though!

Example

- Automatic merge will fail, because git cannot know which changes you want to keep in the merged version:

```
Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (master)
$ git merge styling
Auto-merging index.html
CONFLICT (content): Merge conflict in index.html
Automatic merge failed; fix conflicts and then commit the result.
```

- Conflicting lines are indicated by `<<<<<<<`, `=======` and `>>>>>>>`:

```
15    </head>
16    <body>
17  <<<<<<< HEAD
18      <h1>All about cats</h1>
19  =======
20      <h1 class="red-text">The best page ever</h1>
21  >>>>>>> styling
22      <p>Cat ipsum dolor sit amet, jump launch to pou
23  litter box until treats are fed. Go into a room to
```

Example

- Now you need to decide which lines / changes to keep – modify the file accordingly and also delete the conflict markers.
- Tell git that you have resolved the conflict by adding the file.
- Then commit – git will automatically create a commit message in this case.

```
Mandy@DESKTOP-N81SCAQ MINGW64 ~/dis08/testproject (master)
$ git log -n 4
commit bfcf261f9e39de70ca256a781a57966bed8a02fb (HEAD -> master)
Merge: 5bf1fbf 22bb113
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 11:19:28 2019 +0200

    Merge branch 'styling'

commit 5bf1fbfa7052f540ab4ecace9bec50a0b403772d
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 11:04:41 2019 +0200

    Change page title

commit 22bb113e7633c65c5dd9f6e43cb472457e893422 (styling)
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 11:03:52 2019 +0200

    Introduce some CSS styling

commit a938ad039397b875c2ae4bb9b3a008a0ce19abf3
Author: Mandy Neumann <Mandy.Neumann@th-koeln.de>
Date:   Wed Apr 17 10:56:01 2019 +0200

    Add index.html
```

Now it‘s your turn:

- Create a conflict on purpose: Modify the same part of a file on two different branches. Try to merge one branch into the other. Resolve the conflict.
- Here‘s a refresher on basic git commands:

git command	Action
`git init <name>`	Initialize new repository with a name
`git add <file>`	Add file(s) to staging area
`git status`	Check status
`git commit`	Create a snapshot of staging area (opens configured editor for commit message)
`git commit -m`	Same as before, but enter commit message directly
`git log`	Show commit history
`git branch <newbranch>`	Create a branch named „newbranch“
`git checkout <branch>`	Checkout a branch
`git merge <branch>`	Merge „branch“ into current branch

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Scenarios to undo Things

- You forgot to include a file/change in your recent snapshot.
- You want to change the commit message of a snapshot.
- You accidentally staged a file you didn‘t want to include.
- You really messed something up and need to go back in time…

Change your most recent commit

- The --amend option allows to redo the most recent commit.

```
$ git commit --amend
```

- It can be used to both include additional changes, or just edit the commit message.

- This command is most useful if you only need to make minor improvements to your commit, without cluttering your history.

Un-stage files

- You accidentally staged a change you need to un-stage before doing a commit.

- Use reset to remove that change from the staging area:

```
$ git reset HEAD <file>
```

Reset files

- You realize you made some changes that you need to revert, maybe you broke your code.
- You want to get the version of the file back as it was in the previous commit.
- Make use of the checkout command to get back a specific version from the history:

```
$ git checkout -- <file>
```

- Beware that git will replace your file, so use this command with caution!

Now it‘s your turn again:

- Try to do and undo something..
- Here‘s a refresher on related git commands:

git command	Action
`git commit --amend`	Replace the most recent commit
`git reset HEAD <file>`	Un-stage a file
`git checkout -- <file>`	Undo all local changes to a file by getting its version from the HEAD commit
`git checkout HEAD <file>`	(same as above)

References

- Official docs:
  https://git-scm.com/doc
- More details on undoing things with git reset:
  https://git-scm.com/book/en/v2/Git-Tools-Reset-Demystified
- Some useful advice on how to get out of messy situations:
  http://ohshitgit.com