Merge Practice

Some simple examples of merging and conflict resolution.

A Common Problem

1. Developer A clones a repo from Github, or "pulls" latest rev from github. Now his local copy is up to date!
2. Developer A starts work on his local copy.
3. Developer B (same person or other) directly edits a file on Github -- quite often its README.md, and saves it. That is a new commit.
4. Developer A finishes his work, commits it, and does "git push" to Github.

What Happens?

Understanding diffs

"**`diff`**" is a Unix command to show differences between text files. It show:

- lines changed (differences)
- lines added in one file
- lines deleted in one file

may show surrounding identical lines for *context*.

Example: make 2 copies of a text file. Change one copy (add lines, change lines, delete lines). Run diff:

```
cmd>  diff  a.txt  b.txt
```

Git diffs

Git displays differences between files using "diff" notation.

Example: Go to a repository you already have.

1. Verify your working copy is "clean": **`git status`**

2. Edit README.md (on any text file, including *.py).

2. What has changed?

```
cmd>  git diff
```

Output of git diff

```
diff --git a/README.md b/README.md
index ff3ac4b..1434aa0 100644
--- a/README.md
+++ b/README.md
@@ -1,6 +1,6 @@
 ## Unit Testing Assignment

-by Bill Gates.
+by Bill Gates.   ARE YOU REALLY BILL GATES???
```

Try It!

Use your `unittesting` repo on Github.

Dev A: On your own computer...

1. Make sure your local repo and Github are in sync.

```
cmd> cd workspace/unittesting  (wherever you cloned)
cmd> git status
```

```
On branch master
Your branch is up to date with 'origin/master'.
```

```
cmd> git push
```

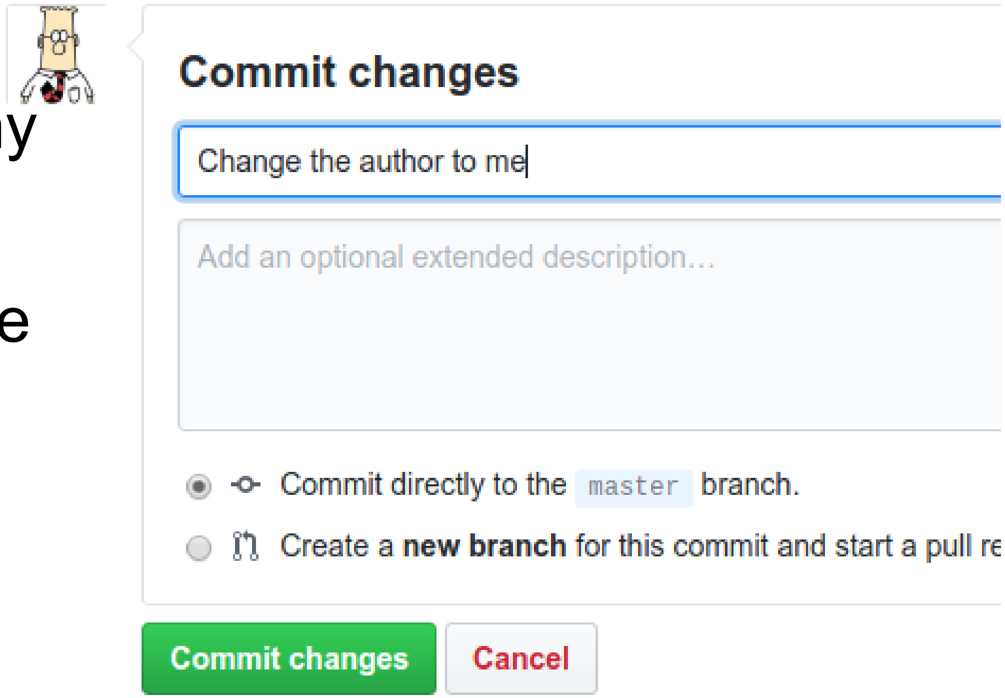
```
Everything up-to-date   (no changes to push)
```

Alternative: Create a fresh clone from Github

```
cmd> cd workspace
cmd> git clone [github-unittesting-url]   unittesting-merge
```

Dev B: Make a change on Github

1. Browse to https://github.com/ISP19/unittesting-your_github_id
2. The README.md file is shown at bottom. Click edit icon to edit it.
3. Change the author -- any change is OK.
4. Write a commit message and click [Commit changes]



Commit changes

Change the author to me

Add an optional extended description...

● Commit directly to the `master` branch.

○ Create a **new branch** for this commit and start a pull re

Dev A: Commit work your local repo

1. Edit README.md and change some lines:

```
## Unit Testing Assignment
Copyright by Bill Gates and Fatalai Jon
```

2. Commit the changes to your repo `git commit -a -m "..."`

3. Push your changes to Github

```
   cmd> git push
To https://github.com/ISP19/unittesting-fatalaijon.git
 ! [rejected]      master -> master (fetch first)
error: failed to push some refs to 'https://github.com/ISP19/
   unittesting-fatalaijon.git'
hint: Updates were rejected because the remote contains
hint: work that you do not have locally. This is usually
hint: caused by another repository pushing to the same ref.
```

What Happened? What to Do?

Your local "master" is "behind" the master on Github.

Your work is based on a previous commit to master.

Need to update your local repo before you can push.

```
cmd> git pull
remote: Total 3 (delta 2), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), done.
From https://github.com/ISP19/unittesting-fatalaijon
   81fcef6..855692a  master     -> origin/master
Auto-merging README.md
CONFLICT (content): Merge conflict in README.md
Automatic merge failed; fix conflicts and then commit the result.
```

Understand the conflict

"git status" might help...

```
cmd> git status
On branch master
Your branch and 'origin/master' have diverged,
and have 1 and 1 different commits each, respectively.
  (use "git pull" to merge the remote branch into yours)

You have unmerged paths.
  (fix conflicts and run "git commit")
  (use "git merge --abort" to abort the merge)

Unmerged paths:
  (use "git add <file>..." to mark resolution)
both modified:   README.md
```

Fixing conflicts

1. For text files, conflicts are written into your working copy. Example in next slide.

2. You have to edit the files and fix the conflicts.

   - or use a GUI merge tool and "`git mergetool`"

3. After fixing conflicts use "`git commit`" to resolve the conflict and save changes.

--- or ---

3b. If you can not fix conflicts, abort the merge operation:

```
git merge --abort
```

this resets your working copy to before the merge.

View the conflicts

Edit the file to see what has changed.

```
cmd> edit README.md
++<<<<<<< HEAD
+by Bill Gates and Fatalai Jon
++=======
+by Fatalai Jon.
++>>>>>>> 855692a4b30b46645e51999bb27e72adbfbaca9d
```

"git pull" = "git fetch" + "git merge"

"git pull" performs two commands:

`git fetch` - fetch updates from a remote repository. This changes your local repo.

`git merge` - merge two development histories.