Version Control with Git

March 2017, Winona State University

- Lesson plan taken from Software Carpentry: `http://swcarpentry.github.io/git-novice/`
- This presentation is on GitHub:
  - Direct download of PDF file: `https://github.com/christopherphan/Winona-SC-git/raw/master/slides/git-winona-slides.pdf`
  - GitHub repository: `https://github.com/christopherphan/Winona-SC-git/`

Motivating example[1]

- Wolfman and Dracula have been hired to investigate if it is possible to send a planetary lander to Mars.

[1] http://swcarpentry.github.io/git-novice/

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  - Work on their own copies and email changes back and forth. ✖ **Problem**: Things will be lost, overwritten, or duplicated.
  - Use a version control system, such as Git!

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- Wolfman and Dracula have been hired to investigate if it is possible to send a planetary lander to Mars.
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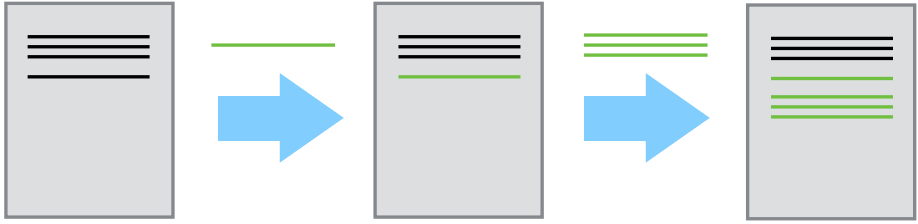
  - Take turns. ✖ **Problem**: Each one will spend a lot of time waiting for the other to finish.
  - Work on their own copies and email changes back and forth. ✖ **Problem**: Things will be lost, overwritten, or duplicated.
  - Use a version control system, such as Git! ✔ Solves these problems!

[1] `http://swcarpentry.github.io/git-novice/`

How it works[2]



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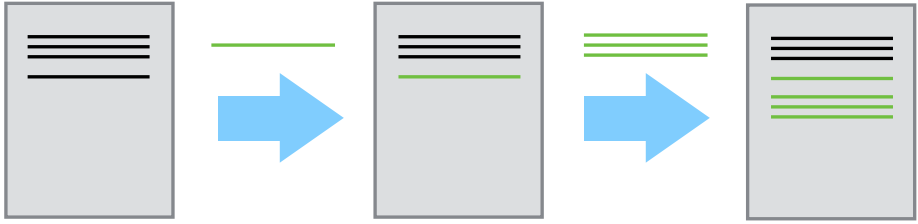
How it works[2]



"Unlimted undo!"

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Why version control?

[M]otivating git: You mostly collaborate with yourself, and me-from-two-months-ago never responds to email.—Karen Cranston[3]

[3] http://bit.ly/motivate_git

[4] Quoted at http://tex.stackexchange.com/a/1135/52

Why version control?

[M]otivating git: You mostly collaborate with yourself, and me-from-two-months-ago never responds to email.—Karen Cranston[3]

[Y]ou can now freely throw away bits and pieces, secure in the knowledge that if you actually want them back, they are there in the revision control system. Interestingly, almost nobody actually uses this feature. Revision control systems are not there to save your old work. They are there to give you permission to throw that old work away.
—Peter Boothe[4]

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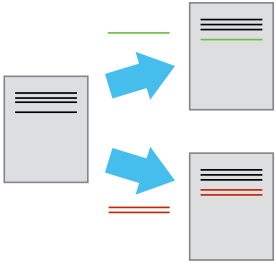
How it works[5]



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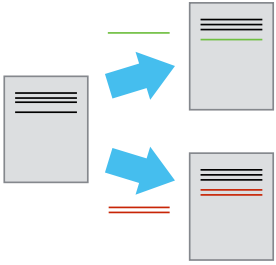

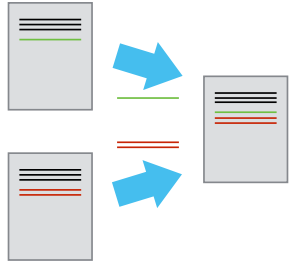

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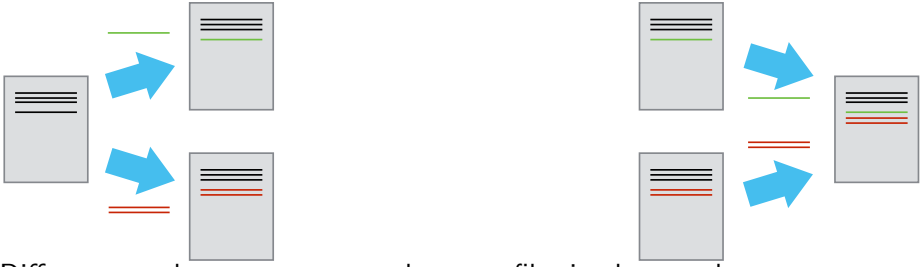

Different people can operate on the same file simultaneously.

[5] http://swcarpentry.github.io/git-novice/01-basics/

Set-up[6]

Don't type the $s!

Configure git (replace the name and email address with your own)

```
$ git config --global user.name "Vlad Dracula"
$ git config --global user.email "vlad@tran.sylvan.ia"
$ git config --global color.ui "auto"
$ git config --global core.editor "nano -w"
```

If you want to use Notepad instead, you can do:

```
$ git config core.editor notepad
```

[6] http://swcarpentry.github.io/git-novice/02-setup/

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If you want to use Notepad instead, you can do:

```
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Check all settings:

```
$ git config --list
```

[6] http://swcarpentry.github.io/git-novice/02-setup/

Set-up[7]

Can always get help, e.g.:

```
$ git config -h
$ git config --help
```

Or can consult: *Pro Git*, by Scott Chacon and Ben Straub, available for free at:
`https://git-scm.com/book/en/v2`

[7] `http://swcarpentry.github.io/git-novice/02-setup/`

Creating a repository[8]

Don't type the $s!

Create a directory:

```
$ mkdir planets
$ cd planets
$ ls -aF
```

[8] http://swcarpentry.github.io/git-novice/03-create/

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Turn it into a git repository:

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$ git init
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See that a new folder called `.git` has been created.

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Check the status of our repository:

```
$ git status
```

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Tracking changes[9]

Create a file called `mars.txt` (e.g. using `nano`) with the following content:

```
Cold and dry, but everything is my favorite color
```

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Verify the file exists and its contents:

```
$ ls
$ cat mars.txt
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Check the status of our repo:

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```

Add the file to our repo:

```
$ git add mars.txt
$ git status
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Tracking changes[10]

Commit to our repo:

```
$ git commit -m "Start notes on Mars as a base"
$ git status
```

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Verify in the log:

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$ git log
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Edit the file `mars.txt` so that it reads (e.g. using `nano`):

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Edit the file `mars.txt` so that it reads (e.g. using `nano`):

```
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Recheck the status:

```
$ git status
```

[10] http://swcarpentry.github.io/git-novice/04-changes/

Tracking changes[11]

See difference between the current folder contents and repo:

```
$ git diff
```

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Now, commit the new changes to your repo:

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$ git commit -m "Add concerns about effects of Mars' moons on Wolfman"
$ git status
```

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Now, commit the new changes to your repo:

```
$ git commit -m "Add concerns about effects of Mars' moons on Wolfman"
$ git status
```

This didn't work, because we have to add first:

```
$ git add mars.txt
$ git commit -m "Add concerns about effects of Mars' moons on Wolfman"
$ git status
```

[11] http://swcarpentry.github.io/git-novice/04-changes/

Exercise: Committing Changes to Git[12]

Which command(s) below would save the changes of `myfile.txt` to my local Git repository?

1. `$ git commit -m "my recent changes"`

2. ```
   $ git init myfile.txt
   $ git commit -m "my recent changes"
   ```

3. ```
   $ git add myfile.txt
   $ git commit -m "my recent changes"
   ```

4. `$ git commit -m myfile.txt "my recent changes"`

[12] http://swcarpentry.github.io/git-novice/04-changes/#committing-changes-to-git

Exercise: Committing Changes to Git[12]

Which command(s) below would save the changes of `myfile.txt` to my local Git repository?

1. `$ git commit -m "my recent changes"`

   ✖ Would only create a commit if files have already been staged.

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2. `$ git init myfile.txt`
   `$ git commit -m "my recent changes"`

   ✖ Would try to create a new repository.

3. `$ git add myfile.txt`
   `$ git commit -m "my recent changes"`

4. `$ git commit -m myfile.txt "my recent changes"`

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3. `$ git add myfile.txt`
   `$ git commit -m "my recent changes"`

   ✔ Is correct: first add the file to the staging area, then commit.

4. `$ git commit -m myfile.txt "my recent changes"`

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1. `$ git commit -m "my recent changes"`

   ✖ Would only create a commit if files have already been staged.

2. `$ git init myfile.txt`
   `$ git commit -m "my recent changes"`

   ✖ Would try to create a new repository.

3. `$ git add myfile.txt`
   `$ git commit -m "my recent changes"`

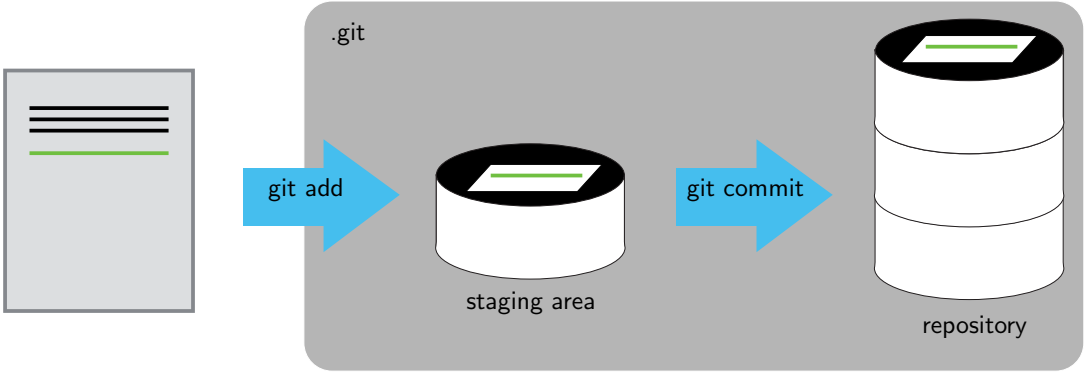
   ✔ Is correct: first add the file to the staging area, then commit.

4. `$ git commit -m myfile.txt "my recent changes"`

   ✖ Would try to commit a file "my recent changes" with the message `myfile.txt`.

[12] `http://swcarpentry.github.io/git-novice/04-changes/#committing-changes-to-git`

Staging area[13]



[13] http://swcarpentry.github.io/git-novice/04-changes/

Tracking changes[14]

Edit the file `mars.txt` so that it reads (e.g. using `nano`):

```
Cold and dry, but everything is my favorite color
The two moons may be a problem for Wolfman
But the Mummy will appreciate the lack of humidity
```

[14] http://swcarpentry.github.io/git-novice/04-changes/

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Edit the file `mars.txt` so that it reads (e.g. using `nano`):

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```

See the differences:

```
$ git diff
```

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See the differences:

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```

Re-stage the file, then look at differences again:

```
$ git add mars.txt
$ git diff
```

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See the differences:

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$ git diff
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Re-stage the file, then look at differences again:

```
$ git add mars.txt
$ git diff
```

To see the differences, we need the `--staged` flag:

```
$ git diff --staged
```

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Commit to the repo:

```
$ git commit -m "Discuss concerns about Mars' climate for Mummy"
$ git status
$ git log
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Directories in git[15]

Git does not automatically add directories:

```
$ mkdir directory
$ git status
```

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Directories in git[15]

Git does not automatically add directories:

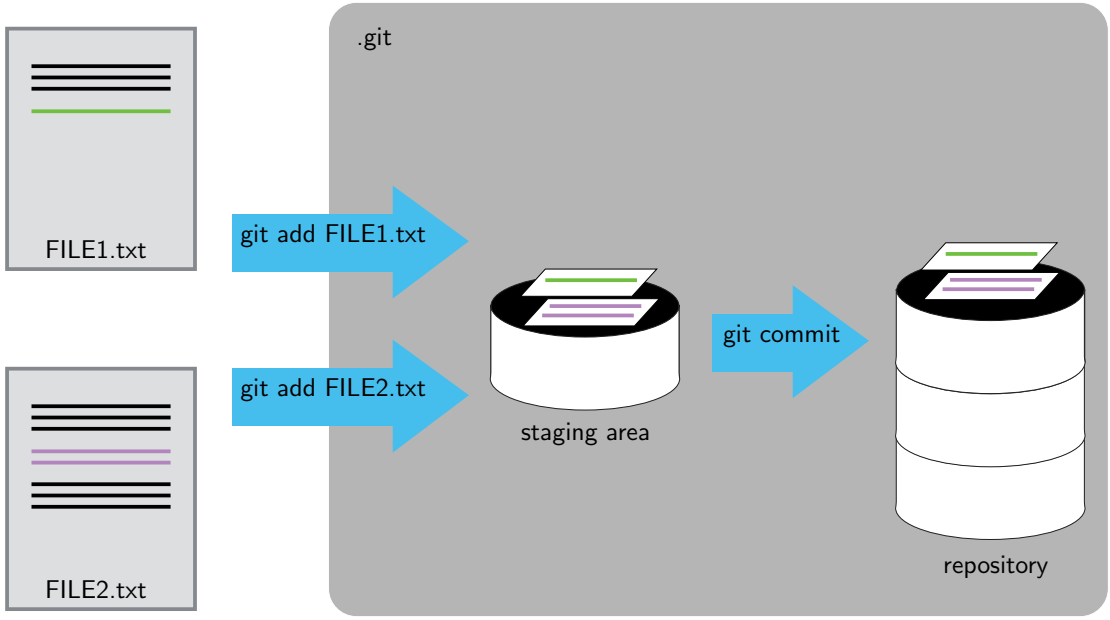
```
$ mkdir directory
$ git status
```

You have to add it explicitly:

```
$ git add directory
$ git status
```

[15] http://swcarpentry.github.io/git-novice/04-changes/

Committing[16]



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Exercise: Choosing a Commit Message[17]

Which of the following commit messages would be most appropriate for the last commit made to `mars.txt`?

1. "Changes"
2. "Added line 'But the Mummy will appreciate the lack of humidity' to mars.txt"
3. "Discuss effects of Mars climate on the Mummy"

[17] `http://swcarpentry.github.io/git-novice/04-changes/#choosing-a-commit-message`

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1. "Changes" ✖
2. "Added line 'But the Mummy will appreciate the lack of humidity' to mars.txt" ✖
3. "Discuss effects of Mars climate on the Mummy" ✔

Answer 1 is not descriptive enough, and answer 2 is too descriptive and redundant, but answer 3 is good: short but descriptive.

[17] `http://swcarpentry.github.io/git-novice/04-changes/#choosing-a-commit-message`

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