Introducing

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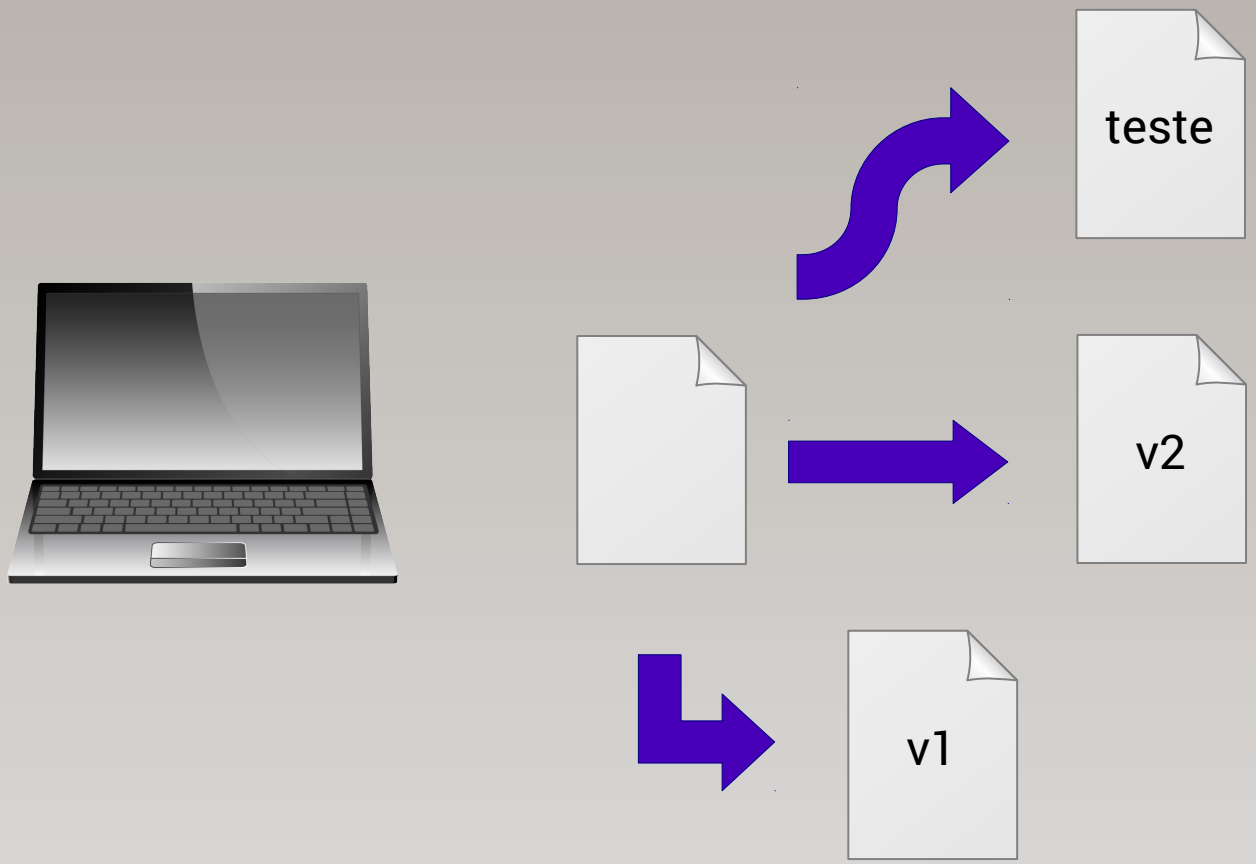
Outline

- What (is git)?
- Why (do we need git)?
- Who uses git?
- Concepts and hands on

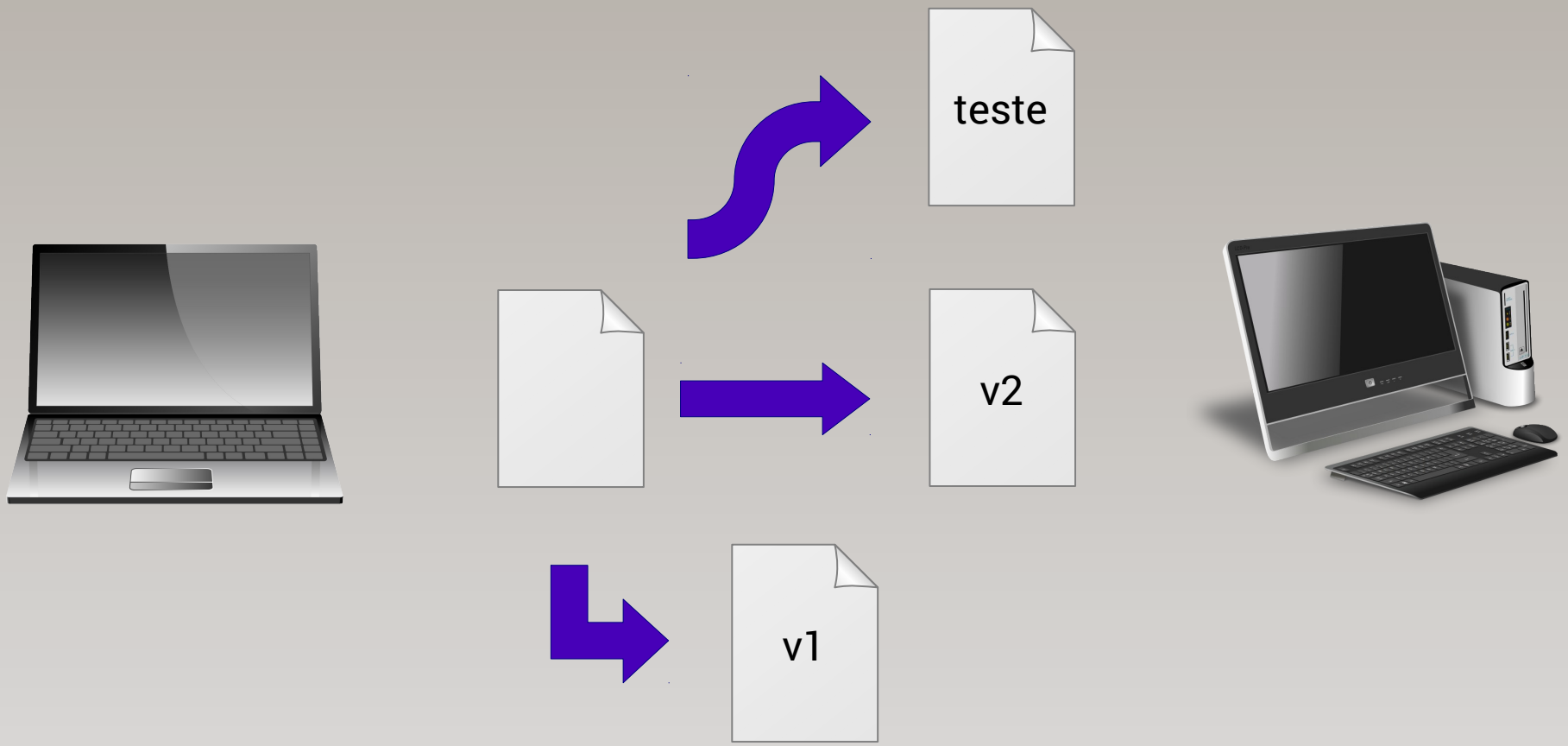
What (is git)?

- (Distributed) version control system;
- **Free** and open source;

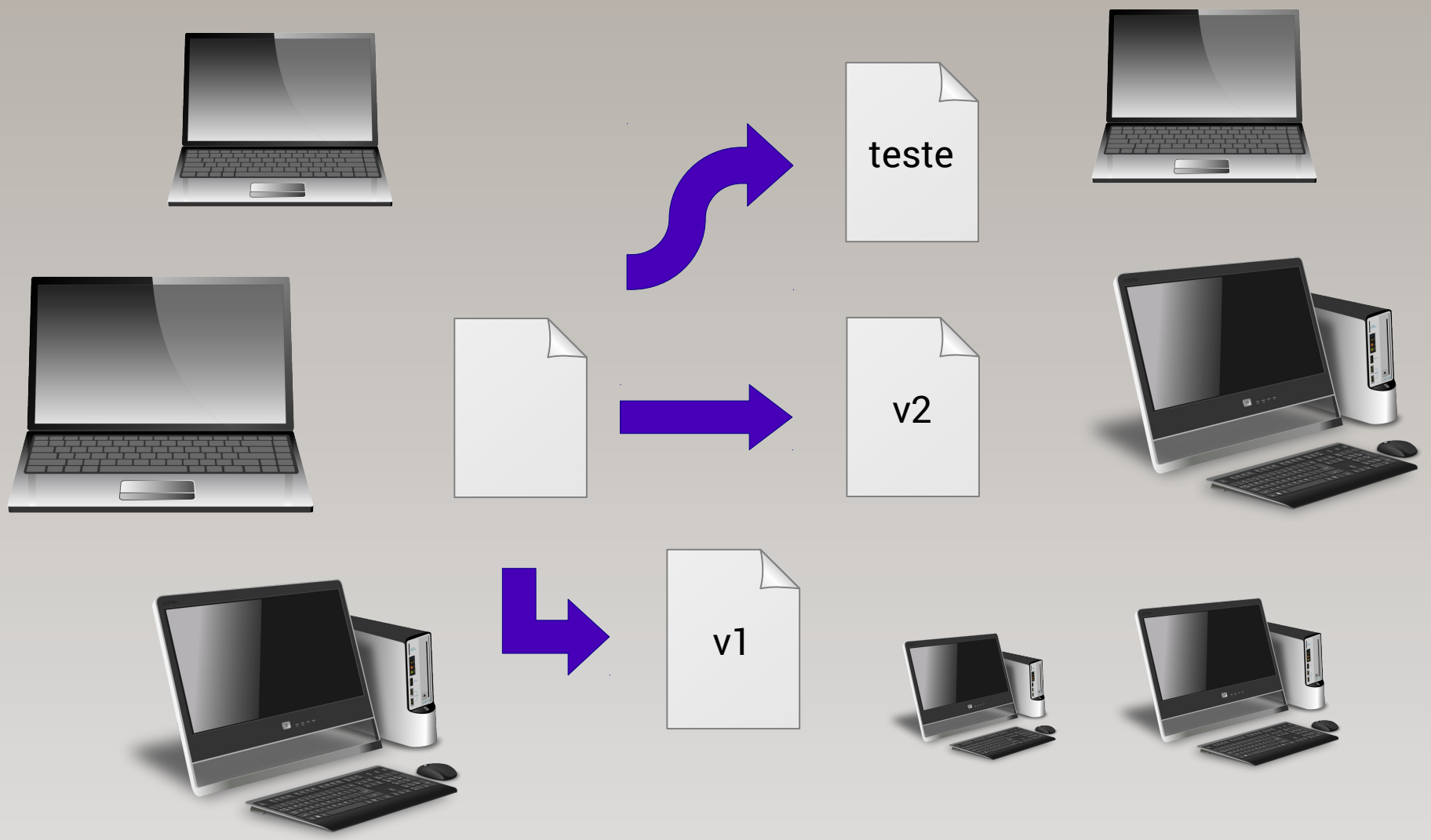
Why (do we need git)?



Why (do we need git)?

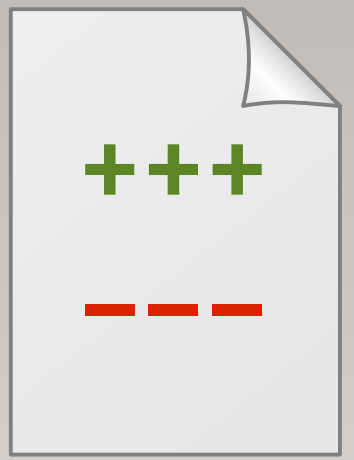


Why (do we need git)?

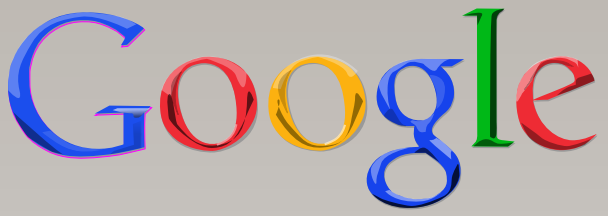


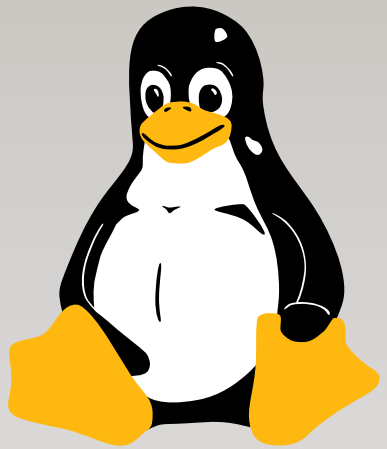
Why (do we need git)?

- What was changed?
- When?
- By whom?
- Why?



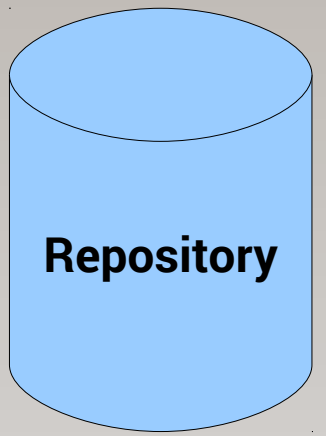
Who uses git?





Concepts – Repository

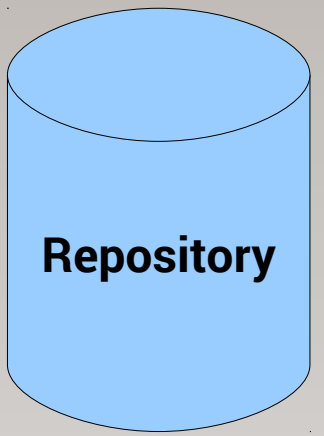
- Where all our work is stored;
- Contains every version of our work;
- Can be shared.



Hands On – Repository

- Okay, so let's create our repository;

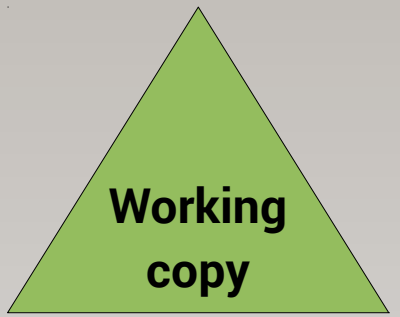
- Create/change to some directory:
  - e.g., gitworkshop;



- `$ git init`
  - Command to create a repository!

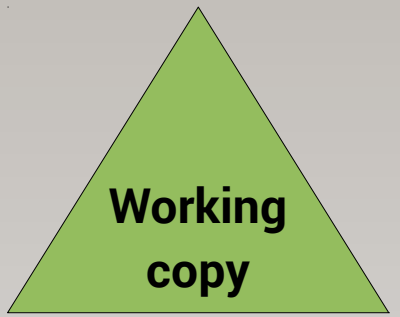
Concepts – Working Copy

- A snapshot of the repository;
- Where we work, i.e., change things;
- Private.



Hands On – Working Copy

- `$ git status`
  - Check the state of our working copy.

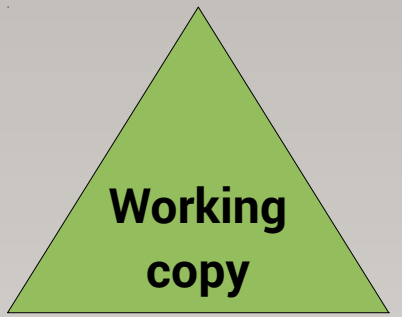



```
nothing to commit, working directory clean
```

Hands On – Working Copy

- Let's create our first file;

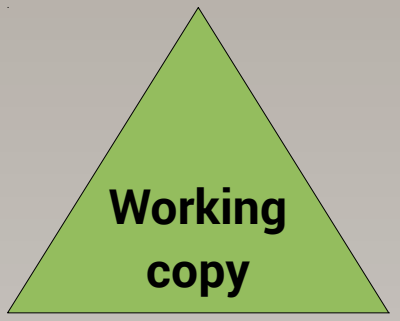
- Create the file `main.c`:




```
#include <stdio.h>
int main(int argc, char** argv)
{
   printf(“Hello world\n”);
   return 0;
}
```

Hands On – Working Copy

- `$ git status`
  - We created a new file.



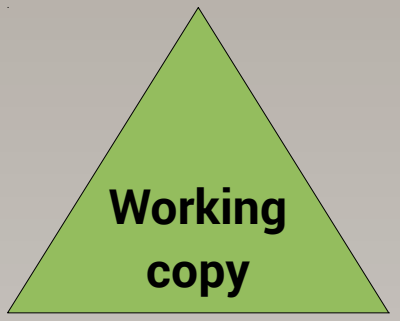

```
Untracked files:
  (use "git add <file>..." to include in what will be
committed)

   main.c

nothing added to commit but untracked files present
(use "git add" to track)
```

Hands On – Working Copy

- **$** `git add main.c`
  - We want git to track `main.c`.



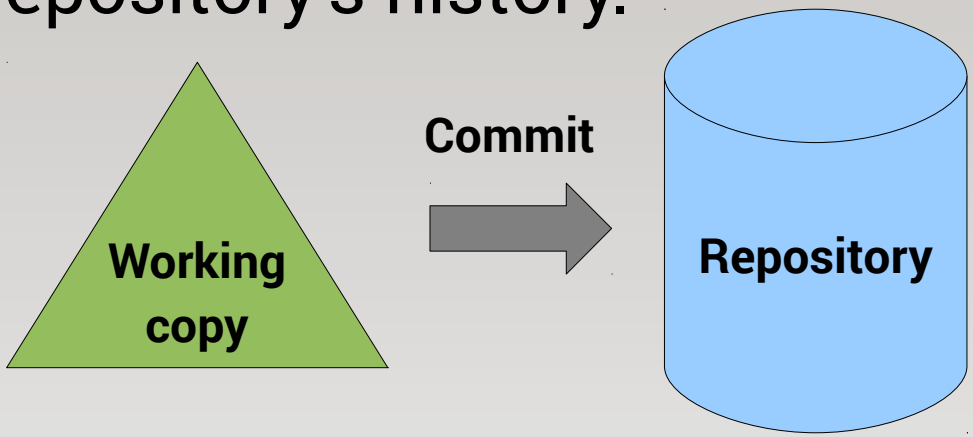

```
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

   new file:   main.c
```

Concepts – Commit

- Operation that modifies the repository;

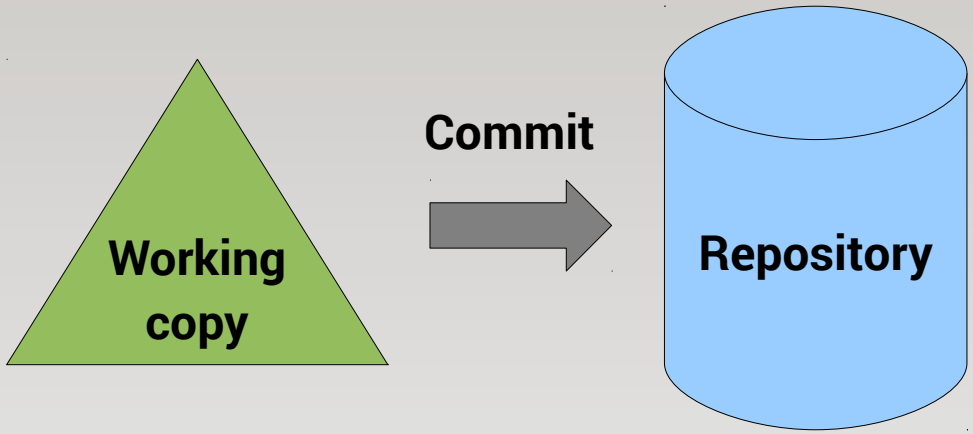
- Typically accompanied by a comment that:
  - explains the changes made;
  - becomes part of the repository's history.



Hands On – Commit

- `$ git commit --message “My first commit!”`

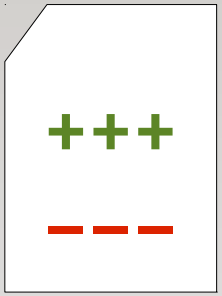
- `--message/-m` flag specifies the commit comment.



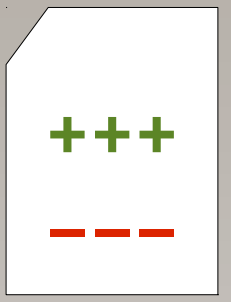
Concepts – Log

- History of the repository's evolution.

- Description of the modifications made, who made them, and when.



Hands On – Log



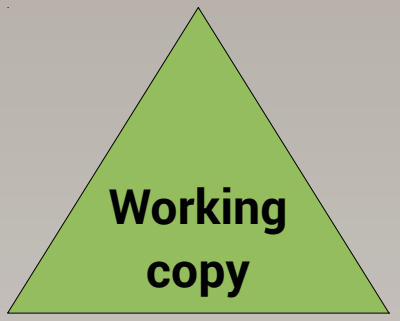
- `$ git log`
  - Summary containing the author, date and comment;
- `$ git show`
  - More detailed, includes actual changes.

```
commit 9c5c46b64c9470bf0e87cc63421cff23a226023b
Author: Tiago Vale <tiagomarquesvale@gmail.com>
Date:   Wed Feb 20 21:22:57 2013 +0000

    My first commit
```

Hands On

- Let's modify `main.c`.

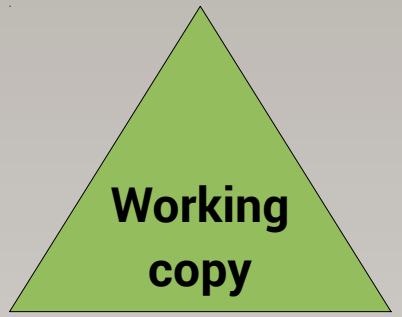


- And now, we want to commit.

```
#include <stdio.h>
int main(int argc, char** argv)
{
   printf(“Hello world, how are you?\n”);
   return 0;
}
```

Hands On

- `$ git commit -m “Modified string”`



- What happened? :-(

```
Changes not staged for commit:
    modified:   main.c

no changes added to commit
```

Concepts – Staging Area

- Sort of a loading dock;

- When we commit, we only apply the changes to files which are staged.

Concepts – Staging Area

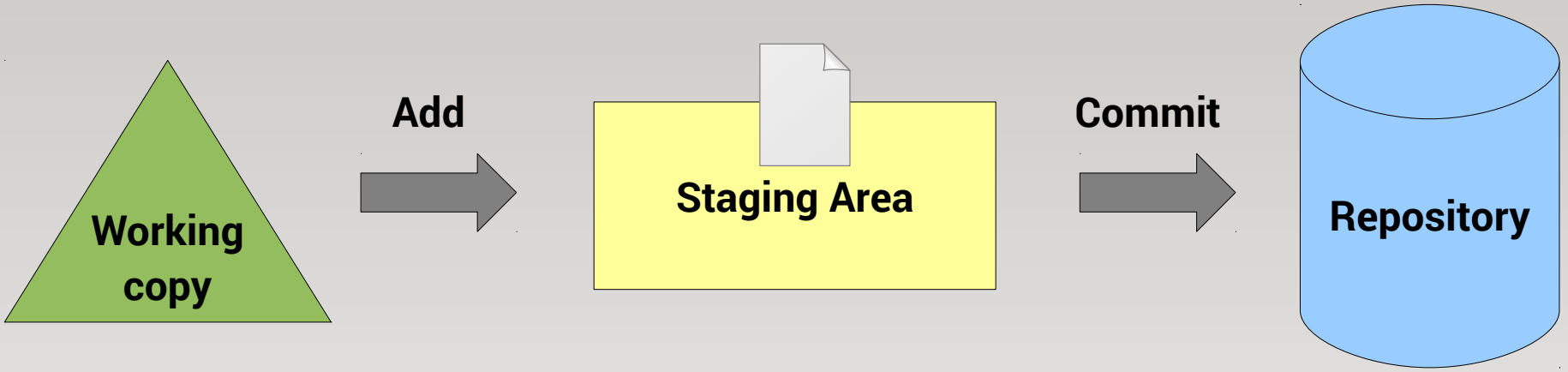
- When we modify a file in the working copy, it is marked as “modified.”

Concepts – Staging Area

- Before committing, the modified file needs to be “staged”
  - i.e., add a snapshot of it to the staging area;
- Modified data is marked in its current version to go in the next commit.

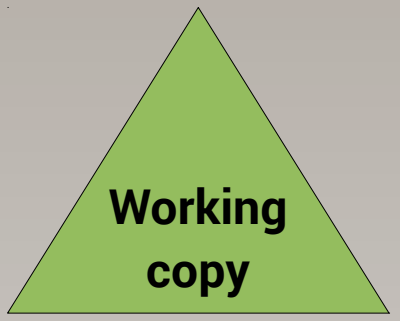
Concepts – Staging Area

- Staged changes can be committed!



Hands On – Let's Try Again

- `$ git add main.c`



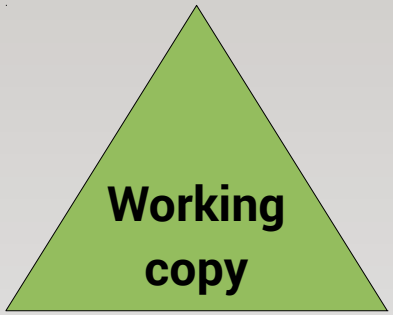
- `$ git commit -m “Modified string”`

```
[master cd9b797] Modified string
 1 file changed, 1 insertion(+), 1 deletion(-)
```

Hands On – Let's Try Again

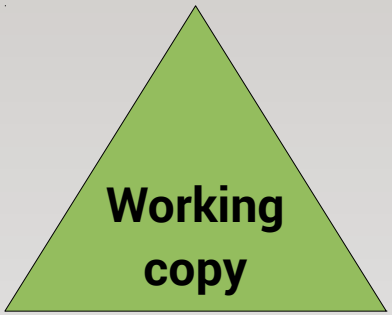
- The staging area can be bypassed with the `--all/-a` commit flag;
  - Commits all changed files in the working copy.

- `$ git commit --all --message "..."`



Hands On

- What if I modify something, and change my mind? How do I discard the changes?
  - i.e., revert to the current repository version.
- `$ git checkout <file>`
  - e.g., `$ git checkout main.c`



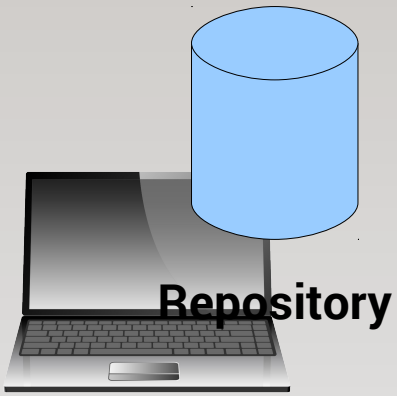
Commands, Revisited

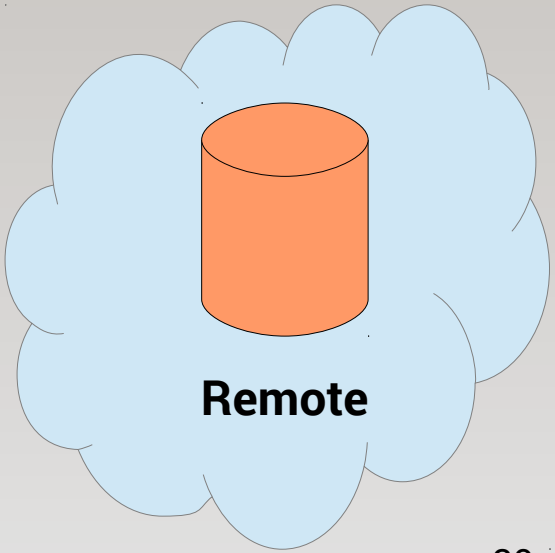
- `$ git init`
- `$ git status`
- `$ git add <file>`
- `$ git diff <file>`
- `$ git commit [-a] -m <message>`
- `$ git checkout <file>`
- `$ git log/show`

Concepts – Remote

- Other instance of this repository...

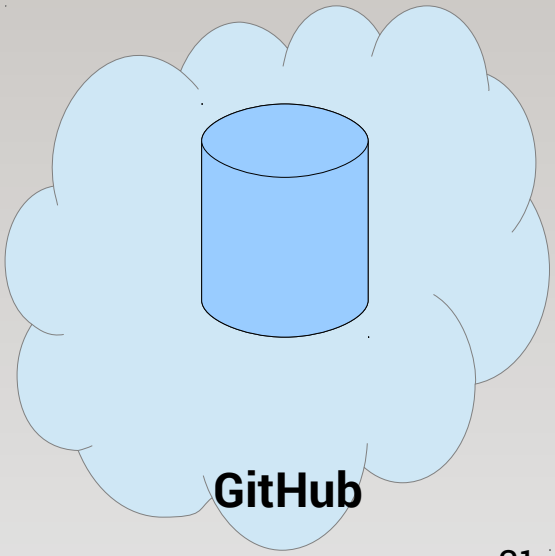
- ...on other computer!
  - e.g., on GitHub.





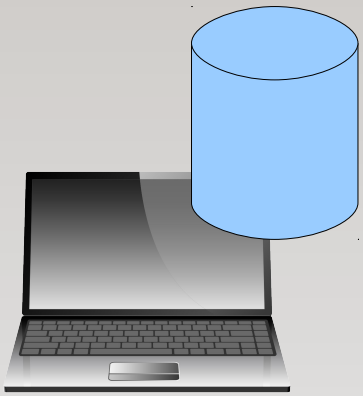
Hands On – Remote

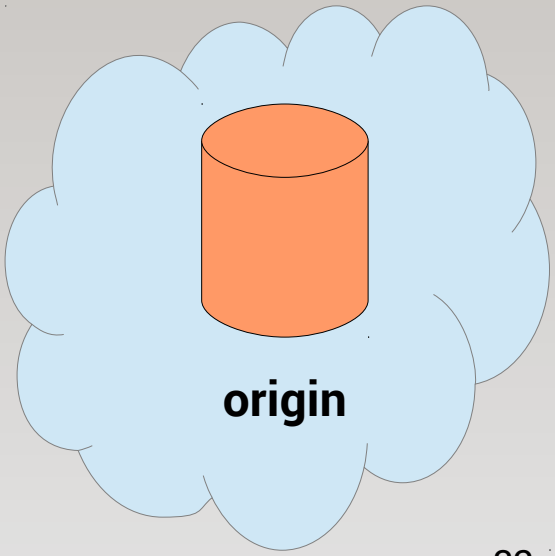
- Create a repository on GitHub;
- Now, we *clone* GitHub's repository to our machine
  - `$ git clone https://github.com/<user>/<repo>.git`



Hands On – Remote

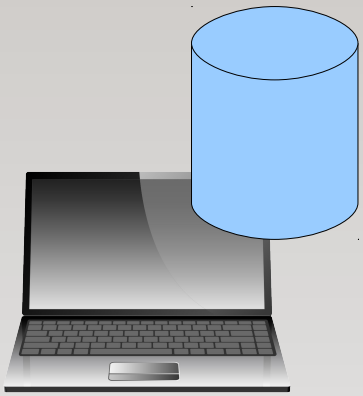
- We have our local instance of the repository;
- We always work on *our local instance*;
- The repository on GitHub is called *origin*.
- `$ git remote`

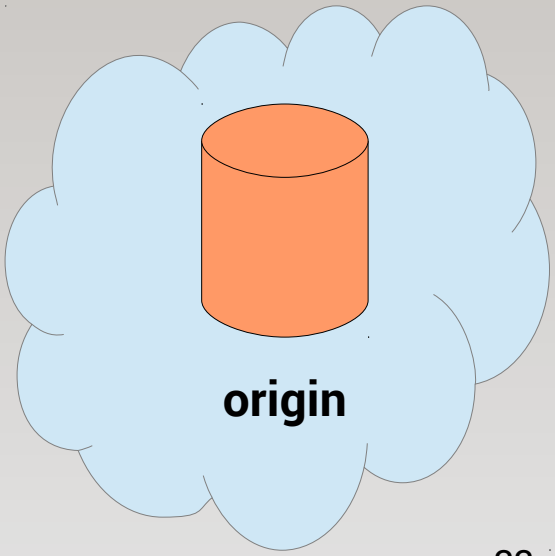




Hands On – Remote

- Let's put our `main.c` file in this repository;
- Check GitHub;
- Not there! :-(

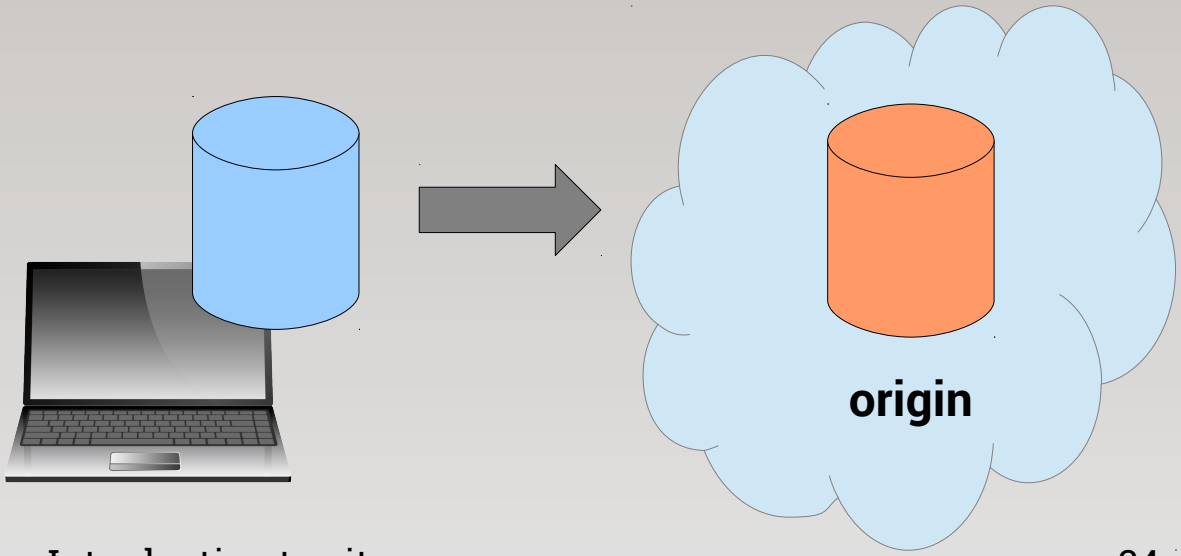




Concepts – Push

- Copy changes from the local repository instance to a remote one;

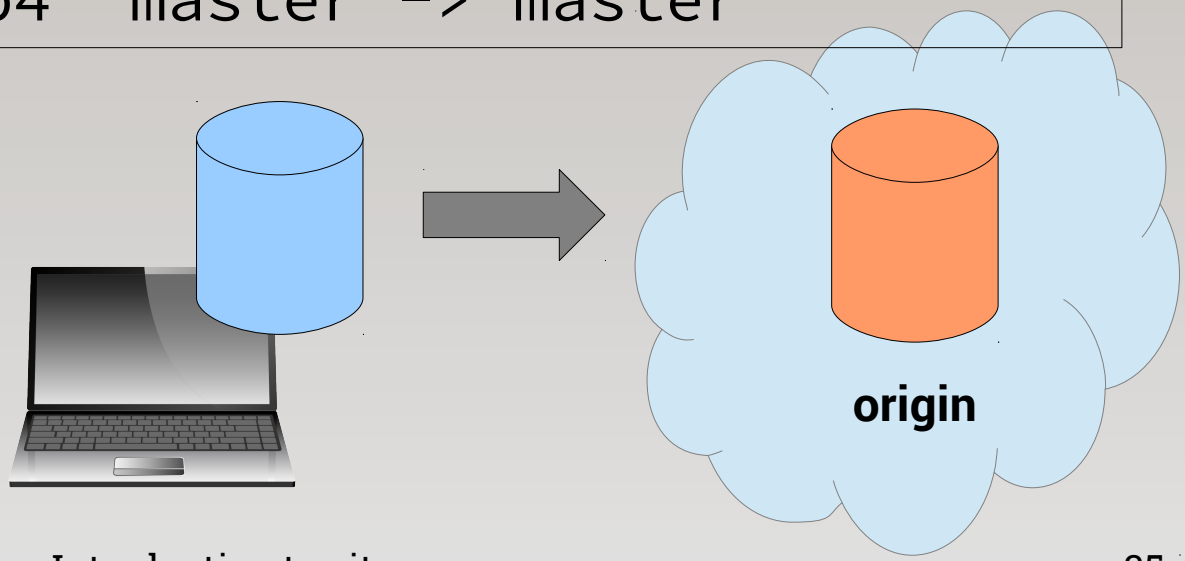
- Synchronization between two repository instances.



Hands On – Push

- We want to push our work to keep GitHub's repository up to date.
- `$ git push origin master:master`

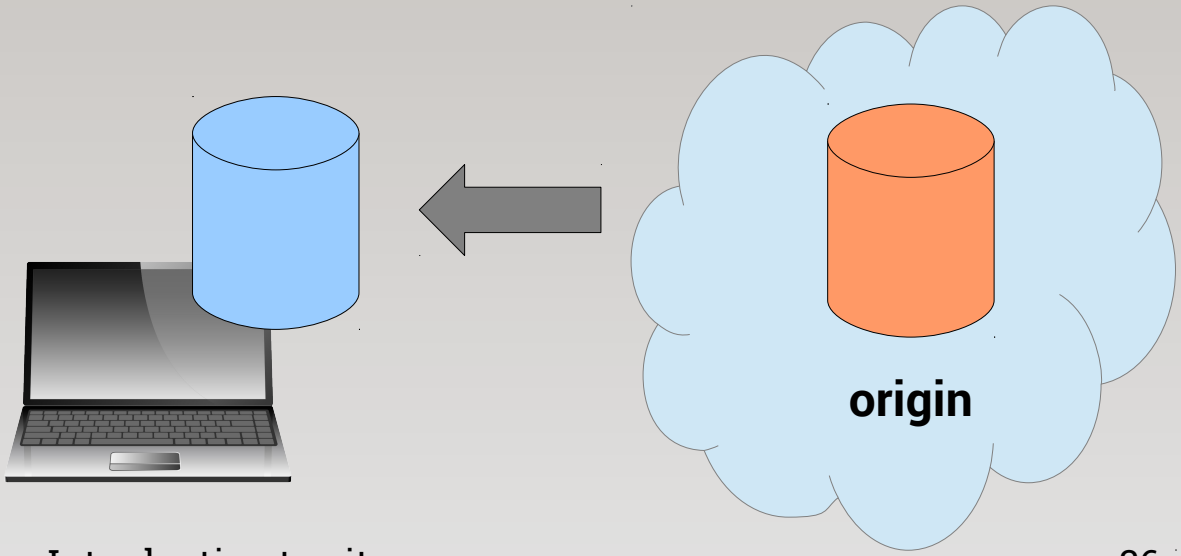
```
To https://github.com/tvale/git-workshop.git
   1c95c92..6284ab4  master -> master
```



Concepts – Pull

- Copy changes from a remote repository instance to the local one;

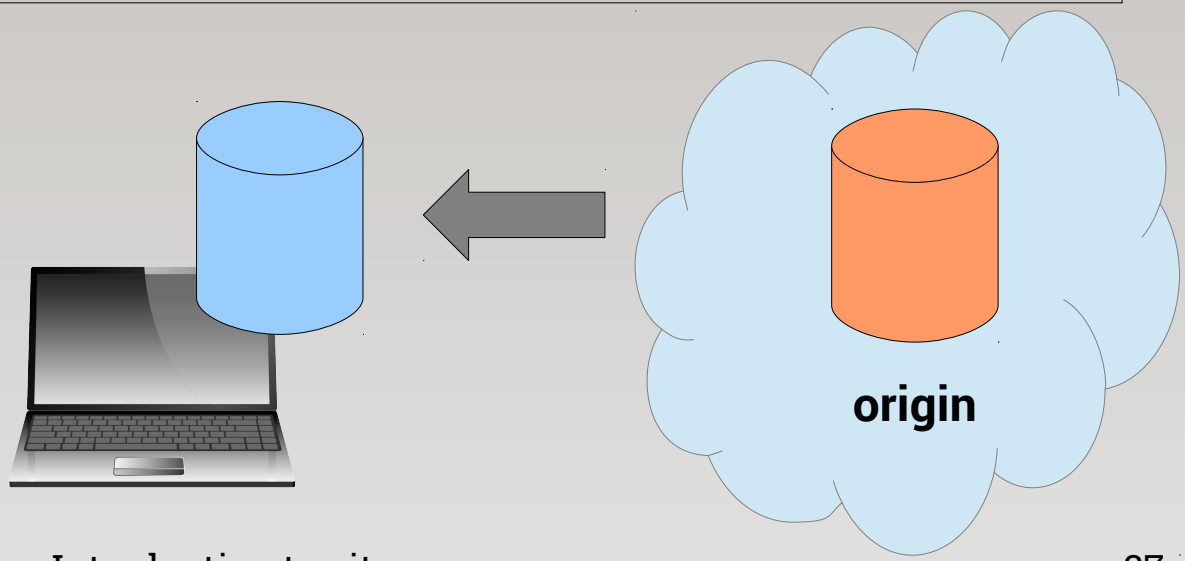
- The other way around!



Hands On – Pull

- Update your local repository instance.
- `$ git pull origin`

```
main.c | 2 +-
1 file changed, 1 insertion(+), 1 deletion(-)
```



Hands On

- Now one of you changes the string in `main.c`, then commits and pushes.
- Meanwhile, I also modified my copy of `main.c` and will push now.

```
To https://github.com/tvale/git-workshop.git
 ! [rejected]        master -> master (non-fast-forward)
error: failed to push some refs to
'https://github.com/tvale/git-workshop.git'
```

- What happened?

Hands On

- Git is not allowing me to push my changes because someone has already pushed theirs first;
- I must pull the changes before pushing my own modifications;
- Two possible scenarios:
  - Everything goes okay; or
  - My modifications conflict with the pulled changes!

Hands On

- If everything goes okay:

```
Auto-merging main.c
Merge made by the 'recursive' strategy.
 main.c | 2 +-
 1 file changed, 1 insertion(+), 1 deletion(-)
```

- **$** git push origin master:master

Hands On

- If there are conflicts:

```
Auto-merging main.c
CONFLICT (content): Merge conflict in main.c
Automatic merge failed; fix conflicts and then
commit the result.
```

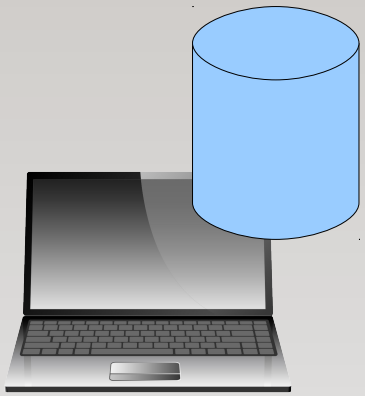
```
<<<<<<< HEAD
   My modifications
=======
   Changes in GitHub
>>>>>>> ...
```

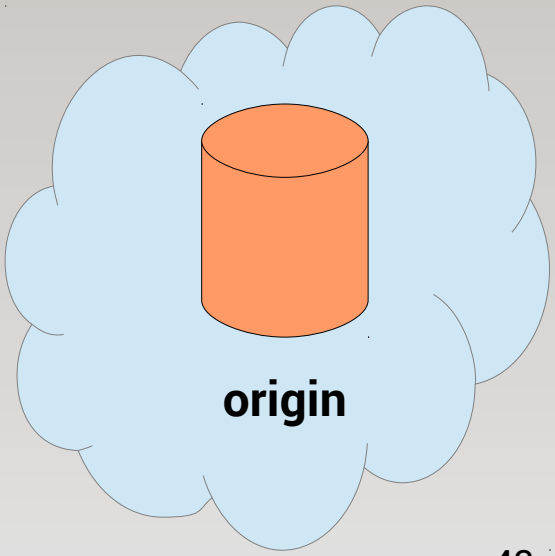
Hands On

- When we resolve the conflicts in a file, we mark as solved:
  - `$ git add <file>`
- After fixing all conflicts, we commit...
  - `$ git commit`
- ...and can push now.
  - `$ git push origin master:master`

Commands, Revisited

- `$ git clone`
- `$ git push`
- `$ git pull`





Conclusion

- Learned how to use git to manage the evolution of your projects, on your own;

- Learned how to use git and GitHub to work as a team on the same project.

References

- http://git-scm.com/
- https://github.com/
- http://git-scm.com/book
- http://www.ericsink.com/vcbe/

Thank you.