

Using Git and GitHub

Videogames Technology
Asignatura transversal

Departamento de Automática

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Untitled 158.docx
Untitled 241.doc
Untitled 138 copy.docx
Untitled 138 copy 2.docx
Untitled 139.docx
Untitled 40 MOM ADDRESS5.jpg
Untitled 242.doc
Untitled 243.doc
Untitled 243 IMPORTANT.doc
Untitled 41...
42
43
44
45

OH MY GOD.



PROTIP: NEVER LOOK IN SOMEONE ELSE'S DOCUMENTS FOLDER.

(Source)

"FINAL".doc



www.phdcomics.com

(Source)

Version control

Introduction

Version control systems

Version control systems (VCS) keep track of changes to source code. Allows multiple people to edit a project in a predictable manner.

Main open source VCS

- 1982 RCS
- 1990 CVS
- 2000 Subversion
- 2005 Git/Mercurial

There are many proprietary ones but Git is now the most popular one by far.
All software should be under a version control system, if not, it ain't software!

Git

What is Git?



Git is an open source distributed version control system, created by Linus Torvald.

<https://git-scm.com/>

(Interactive tutorial)



Git

Git sites

It is easier to start with free hosting sites instead of maintaining your own server.

- GitHub: public repositories (as many as you want), but private ones are not free (except for academia). It is now part of Microsoft
- Bitbucket: allow us to keep private repositories limiting the number of collaborators.
- GitLab: both public and private without limitations. It is becoming more popular.
- Others ...

It is typically used as central repository:

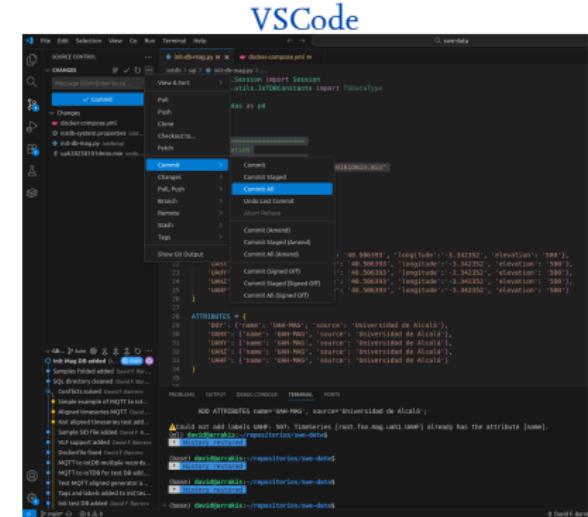
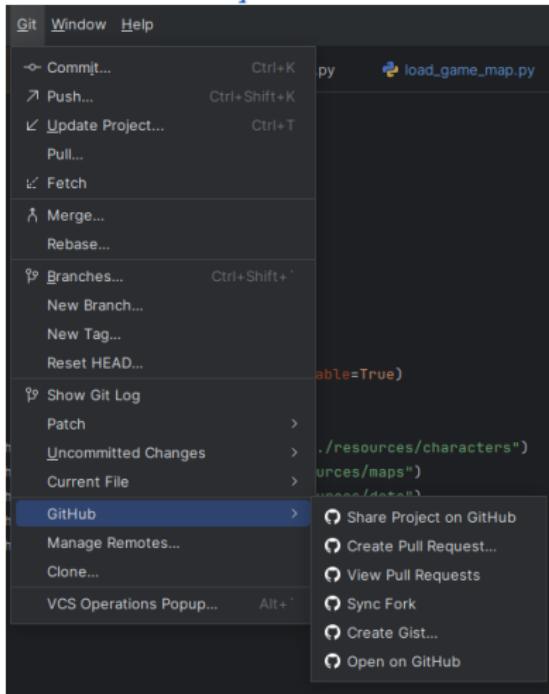
- from which everyone pulls other people's changes
- to which everyone pushes changes they have made



Git

Git in IDEs

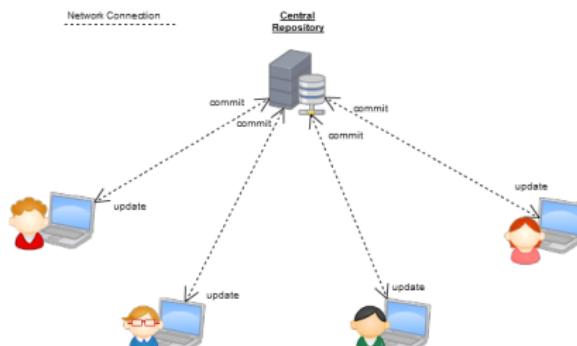
PyCharm



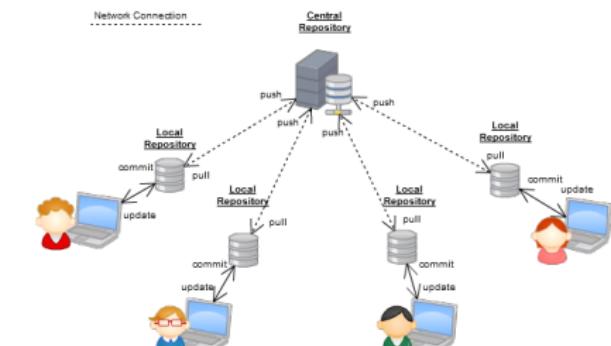
Git

Git vs. SVN (I)

Centralized (SVN)



Distributed (Git)



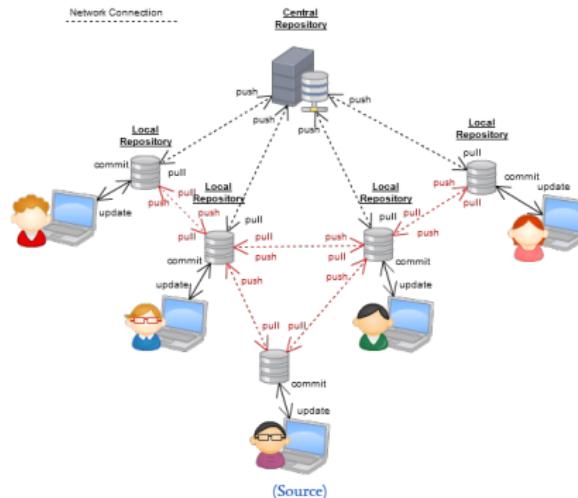
(Source)

Disclaimer: Do not pay attention to the labels of these diagrams

Git

Git vs. SVN (II)

Fully distributed (Git)



Git

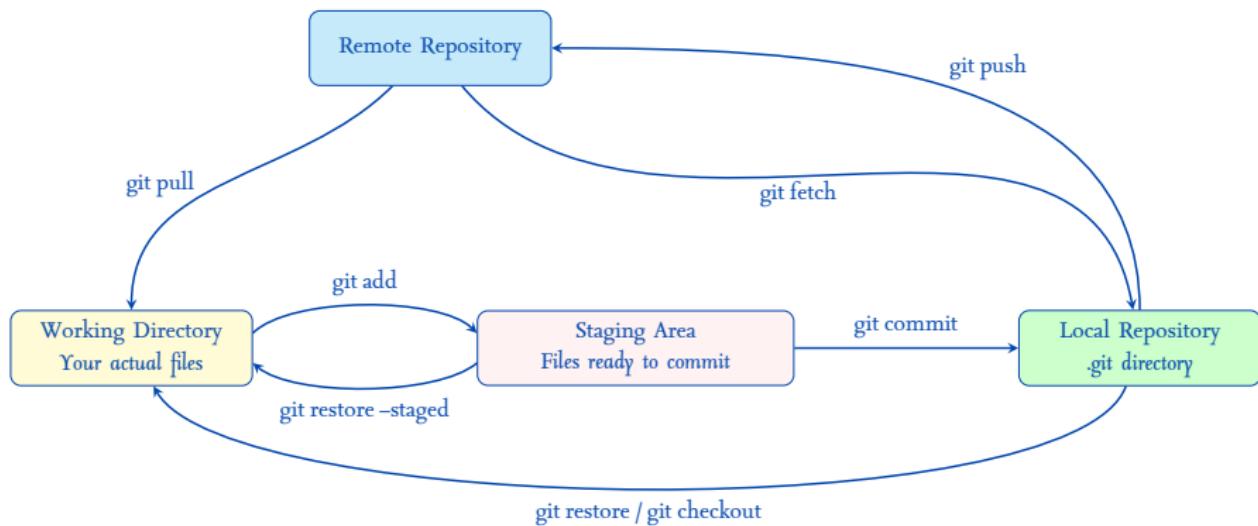
Local and remote repositories

Git concepts to know

- **Working directory:** The files we work on
- **Repository:** Project files + a database with history of all changes (or commits)
 - **Local repository:** A repository located in our computer
 - **Remote repository:** A repository located in a server
- **Staging area:** Intermediary space to prepare changes

Git

Git operations



Using Git

Git basic workflow

Given initialized local and remote repositories

Basic Git workflow

1. Pull changes from the remote
2. Edit your files
3. Add changes to staging area
4. Commit the staged changes
5. Push commits to the remote

Using Git

Initializing a repository

Using plain Git: `Git init`

- Creates a `.git` hidden in the working directory
- Safe operation: All Git data is contained in `.git`
- By default, there are no remotes
- Add remote

Using GitHub

1. We create a new repository in GitHub (which will be our remote)
2. **Clone** the remote repository

Using Git

Commits

Each commit has ...

- ... an author
- ... a comment: "Fix deprecated py36 black option"
- ... a date
- ... an ID (or hash)

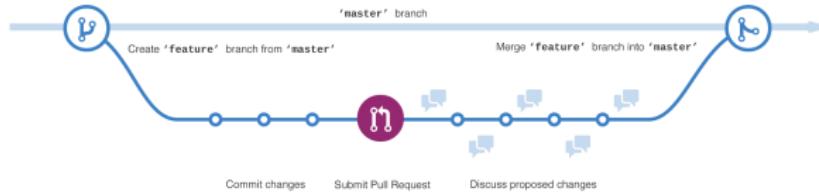
```
commit 44161dde6ea234f8cb997644f8e187123c3cc4af
```

```
Author: David <foo@foo.com>
```

```
Date: Fri Mar 9 14:57:32 2018 +0100
```

Issue with syntax highlighting solved

Using Git Branches



Branches are used extensively (e.g. some like feature branches).

- A repository (local and remote) can have explicit branches
- The default branch is called **master or main**
- A **merge** is a fusion between two branches
- There is a branch with name: **HEAD**
 - Pointer to the active branch
 - ... sometimes, it may point to a commit, but do not worry about it

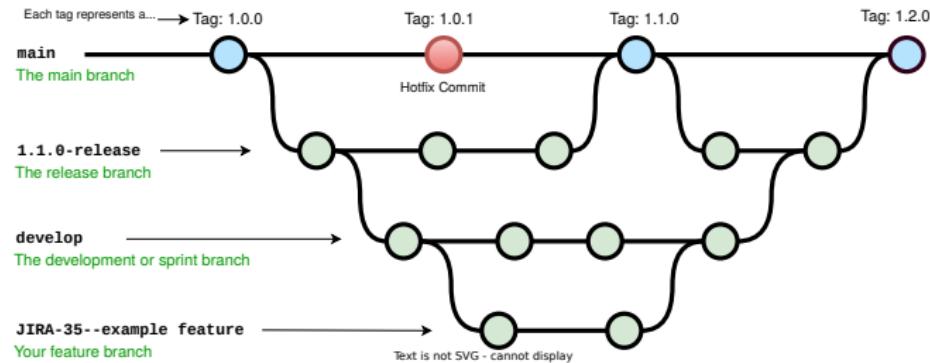
Do no use branches in the project!

Replace deprecated py36 black option	pushfoo	2/2/23, 4:24
Fix deprecated dash style attribute aliases	pushfoo	2/2/23, 4:05
Merge pull request #65 from DamianWilder/main	Paul V Craven*	27/5/22, 22:16
Merge branch 'main' of https://github.com/DamianWilder/community	Damian Wilder	27/5/22, 22:06
issue #53 fixed rapid footstep	Damian Wilder	27/5/22, 22:06
Merge pull request #60 from pushfoo/fix_discussion_link	Paul V Craven*	20/5/22, 18:42
Merge pull request #64 from pushfoo/fix_turtle_inclusion	Paul V Craven*	20/5/22, 18:42
Merge pull request #62 from pushfoo/reformat_controls_section	Paul V Craven*	20/5/22, 18:41
Remove unneeded and broken turtle import	pushfoo	20/5/22, 18:36
Match formatting styles for line errata	pushfoo	20/5/22, 18:15
Improve readability of controls in README.md	pushfoo	20/5/22, 18:12
(Issue #59) Update README discussion links	pushfoo	14/5/22, 9:13
Main Menu View Cleanup	Darren Eberly	7/5/22, 4:32
Fix for left-over menu buttons	Darren Eberly	7/5/22, 4:30
Fix pause menu crash	Darren Eberly	7/5/22, 4:23
Merge pull request #55 from bkui/random-walking-sprite	Darren Eberly*	7/5/22, 4:12
Merge pull request #57 from MC-open-source-401/main	Darren Eberly*	7/5/22, 4:09
Merge pull request #2 from MC-open-source-401/mike	Connor Boyce*	6/5/22, 5:01
Made the changes to the menu, finished	royce79-creator	6/5/22, 4:58
Update main_menu_view.py	micgreene*	5/5/22, 5:12
Made changes to MainMenuView	royce79-creator	5/5/22, 4:33
Made first change to code base	royce79-creator	4/5/22, 7:18
Adding a sprite that randomly walks around	Brendan Kiu	3/5/22, 19:03
Merge pull request #54 from benjamin-kirkbride/main	Darren Eberly*	3/5/22, 18:38
enable noclip	Benjamin Kirkbride	3/5/22, 18:27
Merge pull request #1 from pythonarcade/main	Benjamin Kirkbride*	3/5/22, 17:58
Merge branch 'main' into main	Benjamin Kirkbride*	3/5/22, 17:56
hvpermode works	Benjamin Kirkbride	3/5/22, 17:51

Using Git Tags

Example diagram for a GIT workflow:

See: <https://nvie.com/posts/a-successful-git-branching-model/>



A tag is a pointer to a specific point in the repository history

- Tags usually have names (e.g. “v1.1”)
- Widely used to keep and publish software releases

Using Git

Conflicts

Merging is quite a common operation in Git

- Changes in different parts of a file are automatically merged

Merging changes in the same part of a file cause **conflicts**

- Git is no longer able to automatically merge
- Human intervention is required

Conflict resolution

1. Identify conflicted files
2. Open files and choose changes to keep
3. Remove markers
4. Stage resolved files and commit

Merging HEAD and feature

```
def greet():
<<<<< HEAD
    return "Hello"
=====
    return "Hola"
>>>>> feature
```

Using Git

Good practices

Learn on the job: the best way to learn it is by using it.

Best practices

- Regularly push and pull (at least daily, in general)
- ⇒ Test before pushing! ⇐
- Don't push half-baked changes
- Don't pull if you're in the middle of a task
- Never commit temporal/intermediate files
- Keep commit descriptions short and informative
- The master must be a clean and functional version of the project

Remember: Git never overwrites local changes without an explicit order

- ... even with a `git pull`

GitHub

Features

Free Git hosting provider

- Free public repositories

Added value features

- Social network
- Collaborative tools
- Repository browser
- Pull requests
- Issue tracking
- Web hosting
- Markdown integration
- Organizations



GitHub

Key concepts

Key GitHub concepts to know

- Pull request
- Fork

The screenshot shows the GitHub repository page for the 'arcade' project. The repository is public, has 19 branches, and 149 tags. The main README file contains a note about GitHub stars on the home page. The repository uses a GitHub Action workflow named '.github/workflows'. It includes benchmarks, documentation, tests, and utility scripts. The 'About' section describes it as an easy-to-use Python library for creating 2D arcade games. It is associated with 'arcade.academy' and has labels for Python, OpenGL, and Python 3. The repository URL is <https://github.com/pythonarcade/arcade.git>. There are links to download the repository using the web URL or ZIP file.

GitHub

README

Special file: README.md

- Contains information about the project
- Automatically visualized
- md means Markdown

Markdown (I)



Markdown: Trivial markup

- Simple
- Very simple
- Extremely simple
- Did I say it's simple?

VERY powerful

- Several outputs
- Professional quality
- ... and simple!

Markdown (II)

Markdown example

```
# I am a header
## I am a subheader

Regular, *italic* and **bold**

- List item 1
- List item 2

[I am a link](http://foo.com)

![I am a pic](markdown.png)

~~~C
printf("Hello, world");
~~~
```

I am a header

I am a subheader

Regular, *italic* and **bold**

- List item 1
- List item 2

I am a link

I am a pic

```
printf("Hello, world");
```