



CS-255 – Git Tutorial

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Outline

- What is git
- How to join CS255 group
- What are ssh keys and how to use them
- How to fork a project
- Make a project private and add TAs as members
- How to use private.py
- How to use git

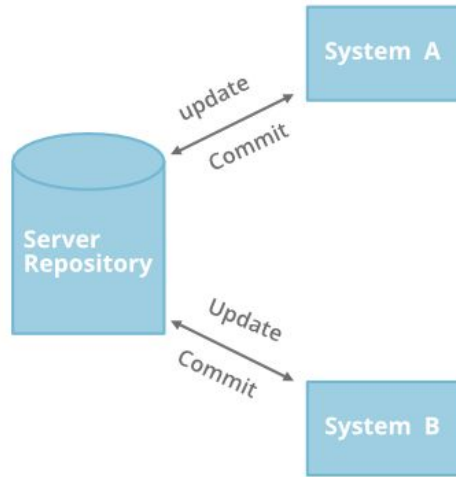
Version Control Systems (VCS)

- Collaboration on a project becomes easier by avoiding swapping files
- Ability to have unlimited number of developers working on the same code base
- Easily revert back your files if something happened

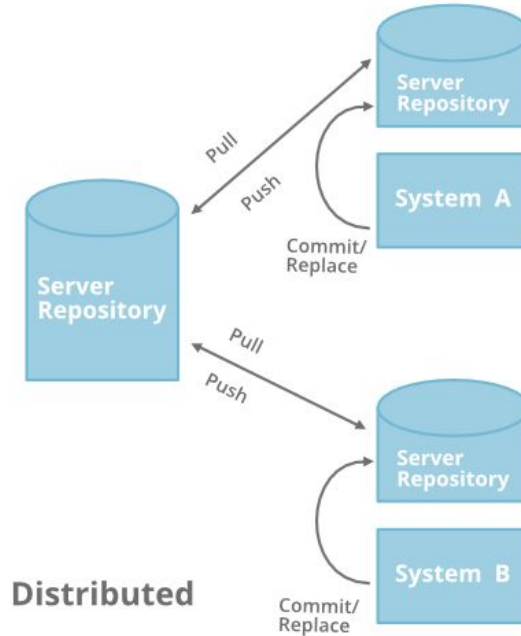
Version Control Systems (VCS)

- **There are two main categories of version control systems**
- Centralized version control systems
- Distributed version control systems

Version Control Systems (VCS)



Centralized



Distributed

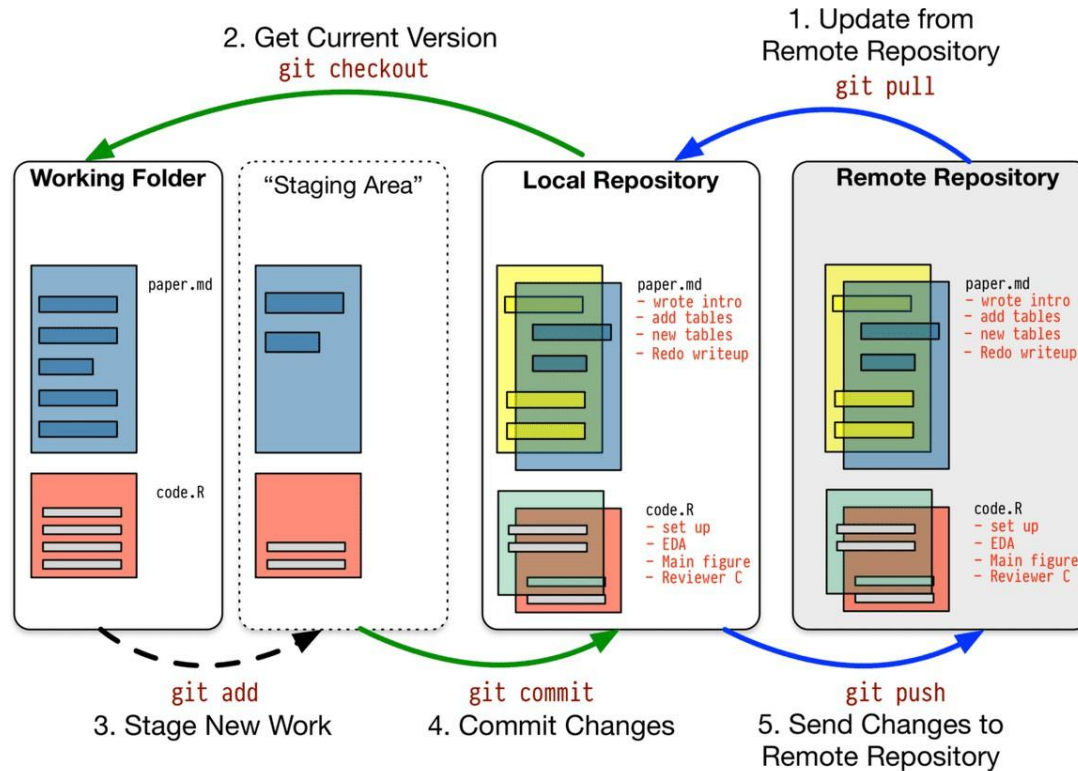
What is GIT?

- Git is a free and open source distributed system with the emphasis on speed and data integrity
- No centralized connectivity is needed
- Losing work in your project is hard (you must be careful)
- For more details on each git command look this [presentation](#)

Git directory structure

- |— .git
- |— HEAD/ (A pointer to your current branch)
- |— config/ (contains all configuration preferences)
- |— description/(description of your project)
- |— Index/ (is used as staging area between working directory and repo)
- |— logs/ (keeps records to changes that are made in ref)
- |— objects/ (all data are stored here: commits, trees and tags)
- |— hooks/ (shell scrips that are invoked after executing a command)
- |— refs/ (holds your local branch remote branch and tags)

How does Git Work?



How to Login to CSD Git?

- Go to csd gitlab: <https://gitlab-csd.datacenter.uoc.gr>



Computer Science Department, University of Crete

Pilot installation of GitLab, a web-based Git-repository manager.

GitLab Community Edition

Open source software to collaborate on code

Manage Git repositories with fine-grained access controls that keep your code secure. Perform code reviews and enhance collaboration with merge requests. Each project can also have an issue tracker and a wiki.

LDAP Standard

LDAP Username

Password

Remember me

Sign in

1

How to Join CS255 Group?

The image illustrates the steps to join the CS255 group on GitLab:

- Step 1:** Navigate to the GitLab dashboard. In the left sidebar, click on **Groups**.
- Step 2:** On the **Groups** page, click on **explore public group**.
- Step 3:** On the **CS255_25** group page, click on the **Request Access** button.

The final screenshot shows the group details for **CS255_25** (Group ID: 14776). The group description is: "CS255 Programming Lab Spring 2025, Department of Computer Science, University of Crete (<https://www.csd.uoc.gr/~hy255/>)" and the instructor is Prof. Angelos Bilas (<http://www.csd.uoc.gr/~bilas>).

Subgroups and projects	Shared projects	Archived projects
assign1_25 Assignment 1: "Translate" Program (https://www.csd.uoc.gr/~hy255/as1/)		
assign2_25 Assignment 2: A String Module (https://www.csd.uoc.gr/~hy255/as2)		
assign3_25 Assignment 3: ADTs: Abstract Data Types (Symbol Table) (https://www.csd.uoc.g...)		
assign4_25 Assignment 4: Sudoku checker, solver, and generator (https://www.csd.uoc.gr/~h...)		
assign5_25 Assignment 5: C and Assembly Code Tutorial: Computing Sums (https://www.csd...)		
assign6_25 Assignment 6: Systems Security: Buffer Overrun Attack (https://www.csd.uoc.gr/~...)		

Generating ssh-keys

- Run: `cd .ssh`
- Run: `ssh-keygen -t rsa -b 2048 -C "csd5178@csd.uoc.gr"`
- Press enter in the next three options
- Run: `cat ~/.ssh/id_rsa.pub`
- Copy the printed text

```
[root@desktop ~]# ssh-keygen -t rsa
Generating public/private rsa key pair.
Enter file in which to save the key (/root/.ssh/id_rsa):
Enter passphrase (empty for no passphrase):
Enter same passphrase again:
Your identification has been saved in /root/.ssh/id_rsa.
Your public key has been saved in /root/.ssh/id_rsa.pub.
The key fingerprint is:
SHA256:vvDbwVF2YHAoSCxnjhNojc4oEenLJCYgGcsGNyI2Gyw root@desktop.example.com
The key's randomart image is:
+----[RSA 2048]-----+
|B0o+ o.. .o+
|E=B.+ = . .o .
|*X B . o .
|*+o o . o .
|B . . S .
|o . . .
|. . o
|. . o o .
| . .
+-----[SHA256]-----+
```

Enter passphrase here, if required

Location of Public Key

Location of Private Key

Add ssh-keys in your Account

The image illustrates the process of adding SSH keys to a GitLab account through three sequential screenshots:

- Step 1:** The user is on the GitLab profile page for the group 'CS255_25'. The user profile menu is open, and the 'Preferences' option is highlighted with a red box and the number '1'.
- Step 2:** The user has navigated to the 'User Settings' page. The 'SSH Keys' option in the left-hand navigation menu is highlighted with a red box and the number '2'.
- Step 3:** The user is on the 'SSH Keys' page. The 'Add new SSH key' button is highlighted with a red box and the number '3'.

Add ssh-keys in your Account

The screenshot displays the GitLab 'User Settings' page for 'SSH Keys'. On the left is a sidebar with navigation options like Profile, Account, Applications, Chat, Access Tokens, Emails, Notifications, SSH Keys (highlighted), GPG Keys, Preferences, Active Sessions, and Authentication log. The main content area is titled 'SSH Keys' and includes a search bar, a search page input, and a search button. Below this, there are sections for 'SSH Keys' (explaining their purpose) and 'SSH Fingerprints'. The 'Add an SSH key' section contains a large text input field for the key, which is highlighted with a red box and the number '4'. To the right of this box is the text 'Paste your ssh here'. Below the input field are fields for 'Title' (with an example 'MacBook key'), 'Usage type' (set to 'Authentication & Signing'), and 'Expiration date' (with a date picker). The 'Add key' button is highlighted with a red box and the number '5'. At the bottom, there is a section for 'Your SSH keys (2)' showing a key named 'nickasp1' with its fingerprint and creation date.

How to Fork a Repository

1

2

A fork is a copy of a project. Forking a repository allows you to make changes without affecting the original project.

Name	Last commit	Last update
src	main.c	6 days ago
tests	test2.7	6 days ago
Makefile	Makefile	6 days ago
README.md	readme final	6 days ago
private.py	private.py	6 days ago

How to Fork a Repository

The screenshot shows the GitLab 'Fork project' form for a repository named 'assign_25'. The form includes fields for Project name, Project URL, Project slug, Project description (optional), and Visibility level. Red boxes and numbers highlight key steps: 1. The 'Project name' field containing 'assign_25'. 2. The 'Project URL' dropdown menu showing 'csd5178'. 3. The 'Project slug' field containing 'assign_25'. 4. The 'Visibility level' dropdown menu showing 'Private'. 5. The 'Fork project' button.

Computer Science Department x tool menu clarification x PDF Reader: H...Admin x Fork project - CS255_25 / assign_25 / forks/new x GIMP - Thank you for your... x High And Dry - YouTube Music

https://gitlab-csd.datacenter.uoc.gr/CS255_25/assign_25/forks/new

Search GitLab

assign_25

- Project information
- Repository
- Issues
- Merge requests
- Security & Compliance
- Deployments
- Packages and registries
- Infrastructure
- Monitor
- Analytics
- Wiki
- Snippets
- Settings

CS255_25 > assign_25 > Fork project

Fork project

A fork is a copy of a project. Forking a repository allows you to make changes without affecting the original project.

Project name
assign_25
Must start with a lowercase or uppercase letter, digit, emoji, or underscore. Can also contain dots, pluses, dashes, or spaces.

Project URL
https://gitlab-csd.datacenter.uoc.gr/assign_25
Want to organize several dependent projects? Create a namespace? Create a group

Project slug
assign_25

Project description (optional)
Assignment 1: "Translate" Program (https://www.csd.uoc.gr/~hy255/as1/)

Visibility level

- Private
Project access must be granted explicitly to each user. If this project is part of a group, access will be granted to members of the group.
- Internal
The project can be accessed by any logged in user.
- Public
The project can be accessed without any authentication.

Fork project Cancel

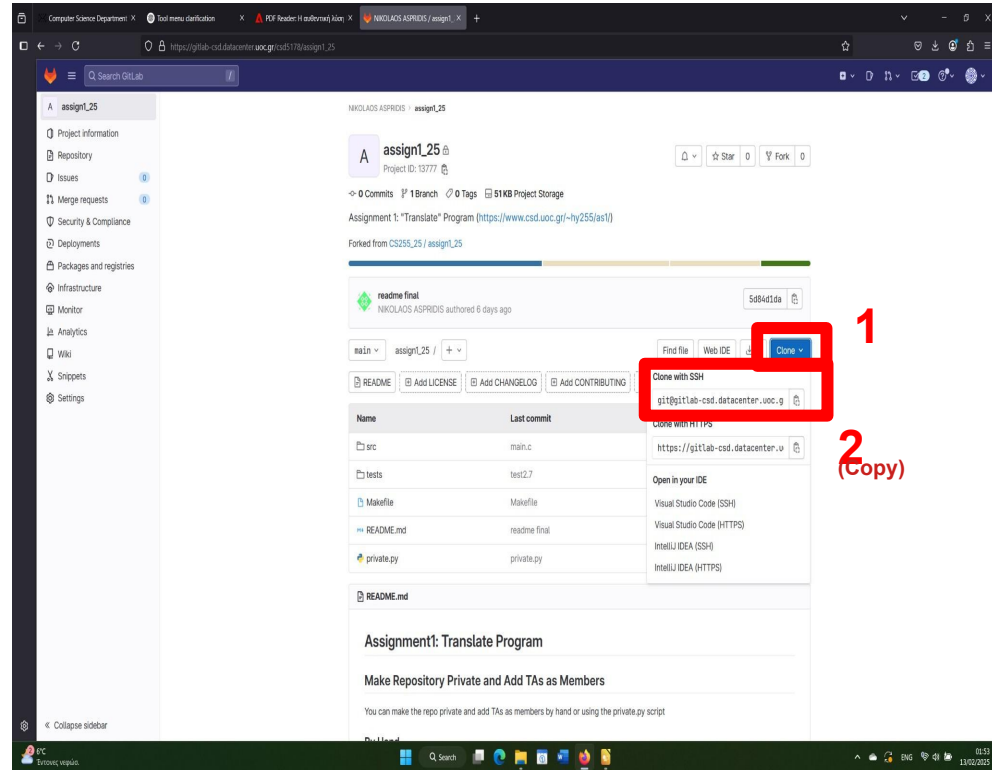
12°C
Ευρωπαϊκή Επιτροπή

Search

ENG 01:28
13/02/2025

Info About Fork

- You need to fork each assignment **only once!**
- If you want to download your project in different devices (e.g., laptop, desktop PC) you need to clone it
 - Open your terminal
 - Go to the directory where you want to clone your project
 - Run: `git clone <(paste)>`



Make your Project Private

- To make your project private
- Go to Project Settings -> General
- Visibility
- Change Project Visibility to Private (and save changes!)

- To add the TAs in your project
- Go to Project Information → Members → Invite members
- Invite GEORGIOS XANTHAKIS (csdp1246) as a Developer

- But we can avoid to do these steps on every assignment, using the python script given with each assignment

Using private.py

- Run `pip3 install --upgrade python-gitlab --user`
- Copy your access token and the assignment project id

```
python3 private.py -t <accessToken> -p <projectId>
```

The screenshot shows a GitLab repository page for a project named 'assign1'. The project ID is highlighted with a red box and labeled 'Project ID: 3278'. A red arrow points from this box to the command line in the README file, which is also highlighted with a red box. The README file contains instructions on how to make the repository private and add team members as members, and includes the command: `python3 private.py -t <personal tokens> -p <project_id>`.

CS100 > assign1

assign1 Project ID: 3278 🔔 ☆ Star 0 🍴 Fork 0

🔍 -> 1 Commit 1 Branch 0 Tags 164 KB Files 164 KB Storage

Hello World

master assign1 / + History Find file Web IDE 📄 Clone

Initial commit Jack Kolokasis authored 46 minutes ago 6647411b

📄 README ⚙️ Auto DevOps enabled 📄 Add LICENSE 📄 Add CHANGELOG 📄 Add CONTRIBUTING

Name	Last commit	Last update
📄 Makefile	Initial commit	46 minutes ago
📄 README.md	Initial commit	46 minutes ago
📄 private.py	Initial commit	46 minutes ago

README.md

Assignment1: Hello World

Make Repository Private and Add TAs as Members

When you fork the repo you have to run `private.py` script to make change the visibility of the project as private and add TAs as members in the project.

The `private.py` script is written in [Python 3](#). To run `private.py` script, please have **Python 3.4 or higher**, **Git 1.8 or higher** and **python-gitlab** installed.

To install `python-gitlab`, run: `pip3 install --upgrade python-gitlab --user`

```
python3 private.py -t <personal tokens> -p <project_id>
```

Generating an Access Token

The screenshot shows the GitLab web interface for a group named CS255_25. The user profile menu is open, and the 'Preferences' option is highlighted. Two red boxes and numbers indicate the steps: 1 points to the user profile menu icon, and 2 points to the 'Preferences' option.

CS255_25

CS255_25 @
Group ID: 14776 Leave group

CS255 Programming Lab Spring 2025, Department of Computer Science, University of Crete (<https://www.csd.uoc.gr/~hy255/>)
Instructor: Prof. Angelos Bilas (<http://www.csd.uoc.gr/~bilas>)

Subgroups and projects Shared projects Archived projects

Project	Shared projects	Archived projects	Updated	IF
assign1_25	Assignment 1: "Translate" Program (https://www.csd.uoc.gr/~hy255/as1/)		★ 0	6 days ago
assign6_25	Assignment 6: Systems Security: Buffer Overrun Attack (https://www.csd.uoc.gr/~hy255/as6/)		★ 0	6 days ago
assign5_25	Assignment 5: C and Assembly Code Tutorial: Computing Sums (https://www.csd.uoc.gr/~hy255/as5/)		★ 0	6 days ago
assign4_25	Assignment 4: Sudoku checker, solver, and generator (https://www.csd.uoc.gr/~hy255/as4/)		★ 0	6 days ago
assign3_25	Assignment 3: ADTs: Abstract Data Types (Symbol Table) (https://www.csd.uoc.gr/~hy255/as3/)		★ 0	6 days ago
assign2_25	Assignment 2: A String Module (https://www.csd.uoc.gr/~hy255/as2/)		★ 0	6 days ago

NIKOLAOS ASPRIDIS
@csd5178

Set status
Edit profile
Preferences
Sign out

Generating an Access Token

The screenshot shows the GitHub User Settings page for a user named 'CollinCidFaber'. The left sidebar contains the following navigation items: Profile, Account, Applications, Chat, Access Tokens (highlighted with a red box and the number 3), Emails, Notifications, SSH Keys, GPG Keys, Preferences (selected), Active Sessions, and Authentication log. The main content area is titled 'User Settings / Preferences' and includes a search bar. The 'Color theme' section offers options: Indigo (selected), Light Indigo, Blue, Light Blue, Green, Light Green, Red, Light Red, Gray, Light Gray, and Dark Mode (alpha). The 'Syntax highlighting theme' section shows a preview of code with various themes: Light (selected), Dark, Solarized Light, Solarized Dark, Monokai, and None. The 'Diff colors' section includes a preview of code with removed and added lines highlighted in different colors.

Generating an Access Token

User Settings > Access Tokens

Search page

Personal Access Tokens

You can generate a personal access token for each application you use that needs access to the GitLab API.

You can also use personal access tokens to authenticate against Git over HTTP. They are the only accepted password when you have Two-Factor Authentication (2FA) enabled.

Add a personal access token

Enter the name of your application, and we'll return a unique personal access token.

Token name

For example, the application using the token or the purpose of the token. Do not give sensitive information for the name of the token, as it will be visible to all project members.

Add your name e.g., Nikolaos Aspridis

Expiration date

Select scopes

Scopes set the permission levels granted to the token. [Learn more.](#)

- api**
Grants complete read/write access to the API, including all groups and projects, the container registry, and the package registry.
- read_api**
Grants read access to the API, including all groups and projects, the container registry, and the package registry.
- read_user**
Grants read-only access to the authenticated user's profile through the /user API endpoint, which includes username, public email, and full name. Also grants access to read-only API endpoints under /users.
- read_repository**
Grants read-only access to repositories on private projects using Git-over-HTTP or the Repository Files API.
- write_repository**
Grants read-write access to repositories on private projects using Git-over-HTTP (not using the API).

Select all the options

Create personal access token

How to Use Git?

- To download a git repo run: `git clone repo-url`
- To setup your credentials in the local git repo run:
`git config user.name "Giorgos Xanthakis"`
`git config user.email "gxanth@csd.uoc.gr"`
- To stage a file run: `git add file`
- To commit staged files run: `git commit -m "Your Message"`
- To save your code in the server run: `git push`

Guidelines

- Commit often – at least one commit for each step
- Pay attention to your commit messages
- Describe precisely the purpose of the commit
- Commit only relevant files and modifications!!
- Push frequently (In case something goes wrong with your PC/laptop)

Thank you for your attention

Giorgos Xanthakis

Nikolaos Aspridis

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