Faculty of Computer Science, Dalhousie University *12-Feb-2026*

DGIN 5201 — Digital Transformation

Lecture 10: Source Version Control

Location: McCain 2170 Instructor: Vlado Keselj
Time: 10:05–11:25

Previous Lecture

- Review of e2 form
  - touch typing
  - text editors, emacs
- Web server Apache
- Available material (e3)
- Concepts and tools
  - Iterative prototyping and rsync
  - Apache options
- Password protection (e4)
- Unix-style customization
  - .htaccess, .htpasswd, .bashrc, .emacs

Announcements: Assignment 2

- A2 part 1: by tomorrow (Fri 13-Feb-2026) 11:59pm
  - A2 part 1: e1 and e2 on timberlea
- A2 part 2: by Fri 27-Feb-2026
  - A2 part 2: what we finish this week, will be specified
- A2 part 3: by Fri 6-Mar-2026
  - A2 part 3: to be completed after reading week
  - will be specified

Heads-up: Second Half of the Term

- 1 lab and 1 lecture to finish CS part from 1st half
- Seminars and project meetings
- Team meetings with instructors
  - 20 min formative meetings
  - check schedule on Brightspace Week 7 to 12

Source Version Control

- Before continuing with e5 etc. let us see how to submit e1, e2, e3, e4 to GitLab
- We will use this as an introduction to git, GitLab, GitHub
- git is a Source Version Control tool
- We already have used making several incremental copies of the code
  - or may use saving a file version as a backup for later
  - saving relatively often, not to lose code accidentally

What is GitLab?

Slide notes:

What is GitLab?

- It is based on Git, a source version control system
- A source version control system is used
  - to store and manage different versions of code
  - to provide collaborative platform for software developers
- GitLab is based on Git and provides a web interface
- Similar to GitHub in this sense
- Provides Continuous Integration (CI) and Continuous Delivery (CD) of code
- A lot of material on Git and GitLab can be found on the Web

Most software development companies use some system for source version control which enables efficient storage and retrieval of different versions of the source code being developed and a way for different developers to collaboratively work on it. By collaborative work, we mean that they can write and test code independently at the same time, and there is a way to merge their changes easily in the final project. Git is an example of such version control system, which is widely used and very popular. Another example of such system is Subversion, or SVN for short. GitLab is a web-based system which is based on the Git source version control system and provides some additional functionality in a web-app style, similarly to another popular on-line platform — GitHub. Both GitHub and GitLab provide a Web interface to access and manage your Git repository.

GitLab is a Web-based DevOps platform, delivered as a single application, that provides a Git-repository manager providing wiki, issue-tracking and CI/CD pipeline features, using an open-source license, and developed by *GitLab Inc*. Continuous Integration (CI) is an established process to continuously provide integration of written code provided by a team in a shared repository. Developers share the new code in a Merge Request, also called a Pull Request. The request triggers a pipeline to build, test, and validate the new code prior to merging the changes within the repository. Continuous Delivery (CD) ensures the delivery of CI validated code to the app by means of a structured deployment pipeline. In general, CI helps the developers to catch and reduce bugs early in the development cycle, and CD moves verified code to the applications faster.

Some References

In this tutorial you should learn basic elements of Git and GitLab. For more information and tutorials on GitLab, you can refer to the official documentation:

`https://docs.gitlab.com/ee/README.html`

The following is a great interactive on-line tutorial for basic Git operations:

`https://learngitbranching.js.org`

We will start this hands-on lab of working with the Dal FCS GitLab site, and also using your `timberlea` account to submit your assignment files using Git.

Step 1. Logging into DalFCS GitLab Website

The Faculty of Computer Science (FCS) at Dalhousie provides an open-source version of GitLab, which we will use in this tutorial.

Open your Web browser and go to the Dalhousie FCS GitLab web site: `https://git.cs.dal.ca` You should be able to see the Login screen, as shown in Figure 1. Login with your CSID login and password.

A user of GitLab can participate in different *projects* and have different roles in them. All participants of a project

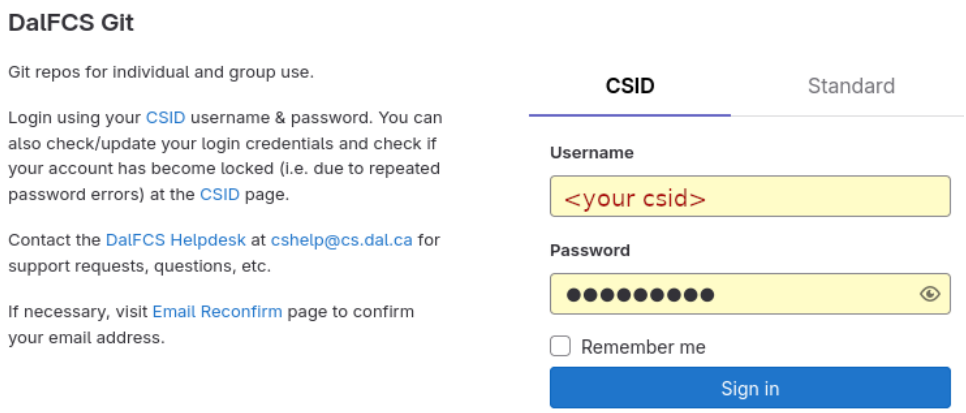


Figure 1: Dal GitLab login screen.

are called *members.* A member's role in a project can be: *Owner*, *Maintainer*, *Developer*, *Reporter*, or *Guest.* We will refer to the Dalhousie FCS GitLab installation as a repository of these projects, but we will also refer sometimes to your project as the repository. Since we use the term *course project* as the part of your coursework, we hope that this will not be confused with referring to the concept of *GitLab project*, which we will call sometimes a *repository* as well. It should always be clear from the context to which concept we are referring to.

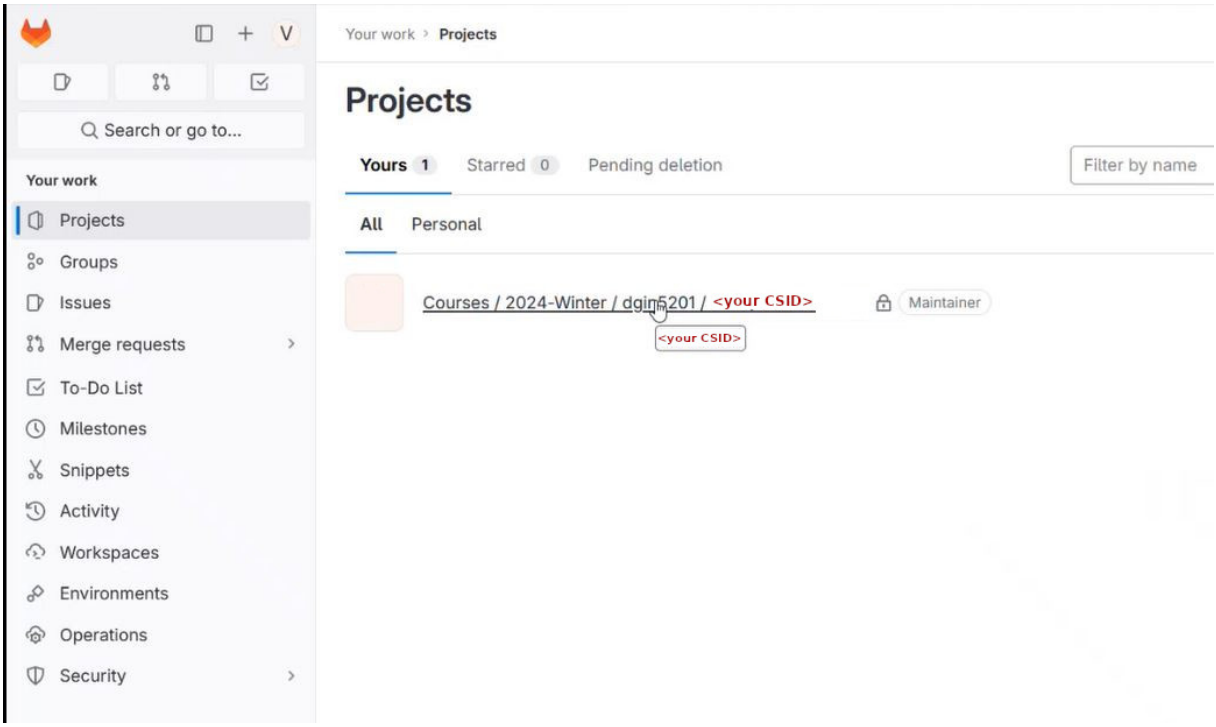
Step 2. Find your CSID Course Project in DGIN5201 Group

Since you can be a member of different projects in GitLab, you first need to find the project that is assigned to you within this course. This project has the same name as your CSID and it is within the course project group, within this term. In order to find it you can use the "Projects" or "Groups" menu option in the GitLab Web interface, or directly type in the URL of the project.

The following screenshots shows how the page which displays your projects may look like:

Approximate Page with Your Projects

– an approximate look of the page with your projects



Once you find it, the browser should show the following URL: `https://git.cs.dal.ca/courses/2026-winter/dgin-5201/<your_csid>` where `<your_csid>` is your CSID. Figure 2 shows how the front page of this project should look like, approximately, with some possible minor differences.

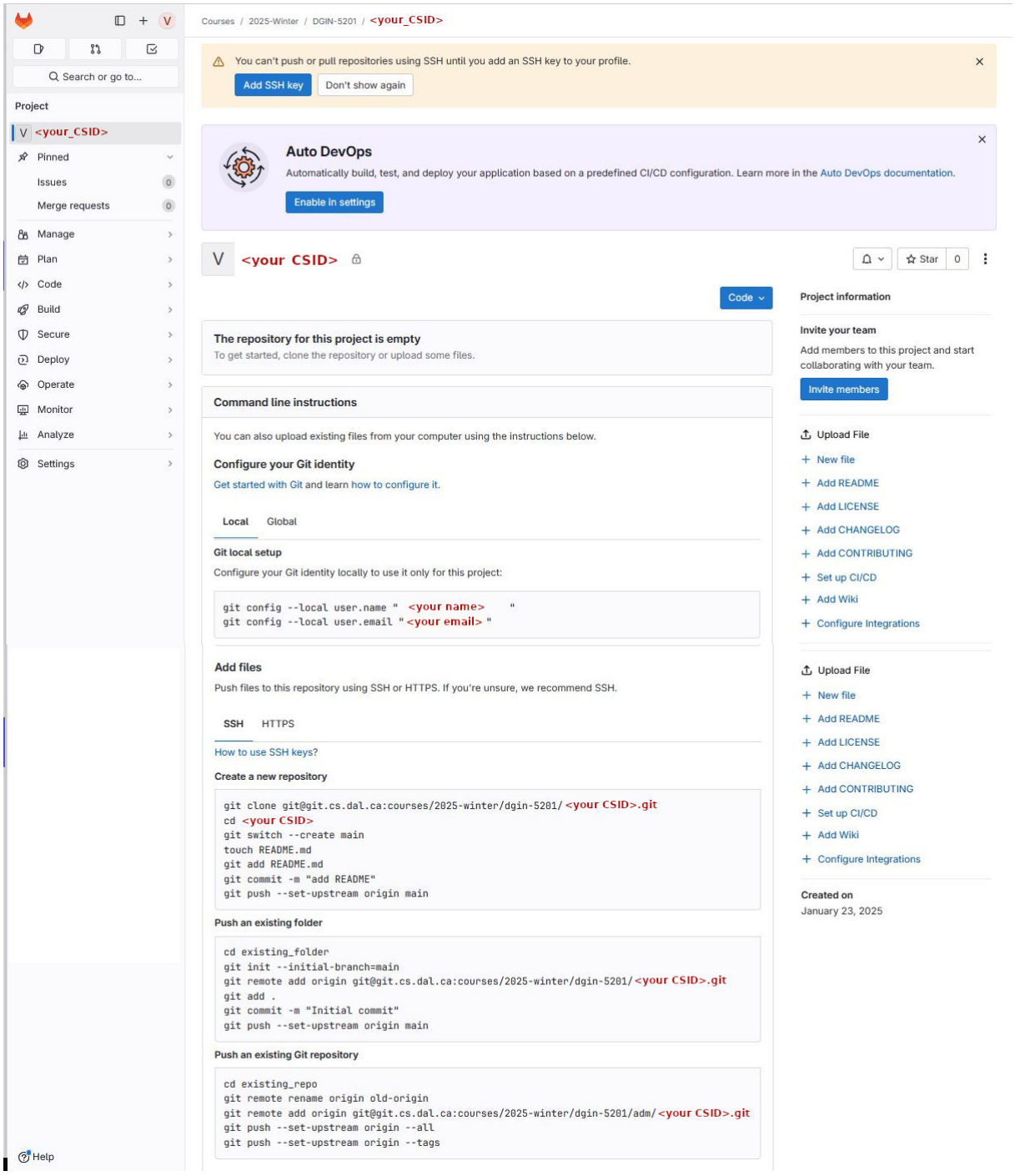


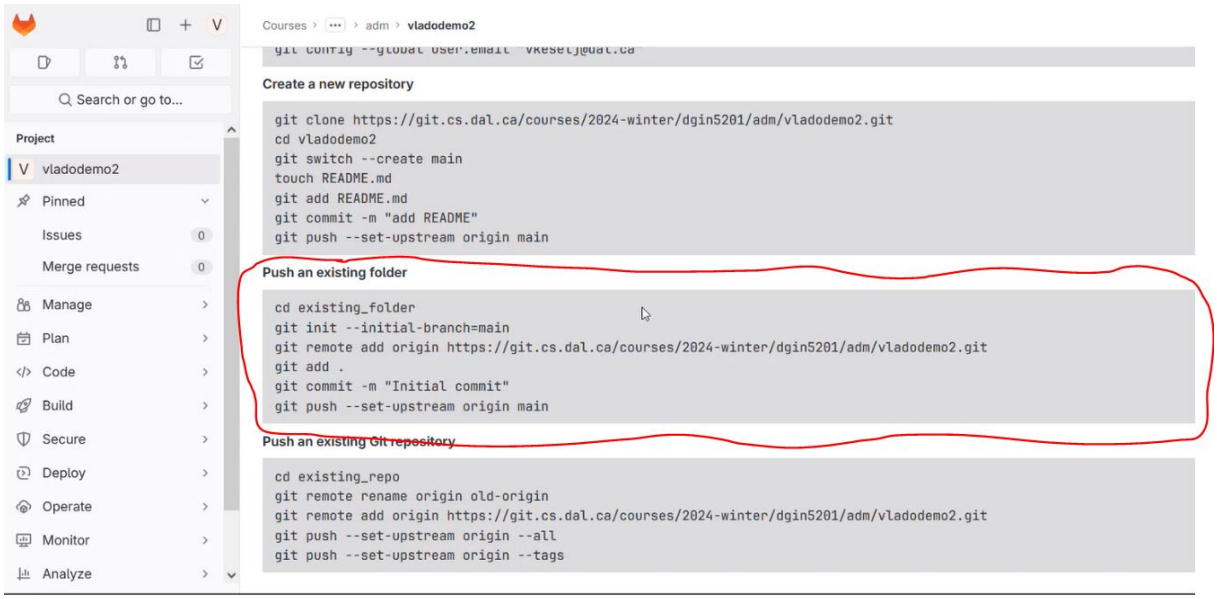
Figure 2: Front page of your GitLab course repository

Step 3: Uploading your Files from `timberlea`

- In this step you should upload your lab files from `timberlea` into the GitLab server
- The instructions are shown in the GitLab page
- You should also open another command-line window for ssh login to `timberlea`
- **Note:** The following slides will have some incorrect information based on previous years. I will point out differences and correct them after class.

The instructions that we will use to upload the lab files (i.e., the directories `e1`, ... `e4`), are shown in the project page:

Instructions to Upload our Files



Login to `timberlea` Server

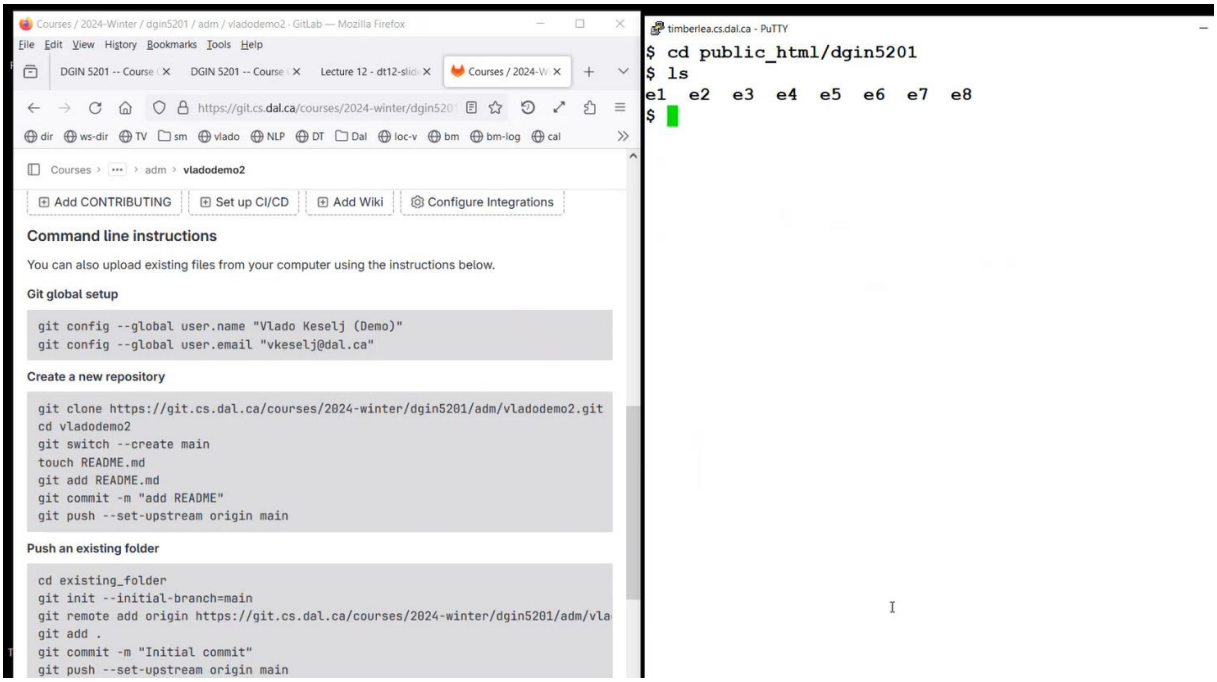
- In another window, we login to `timberlea` server
- It will probably be a command-line window or terminal window in which we type the command:

  ```
  ssh <your_csid>@timberlea.cs.dal.ca
  ```

  where instead of `<your_csid>` you should use your own CSID
- or maybe you can use PuTTY, mobaxterm, or other SSH application
- You should try to have two windows: the web browser with GitLab, and the command-line window

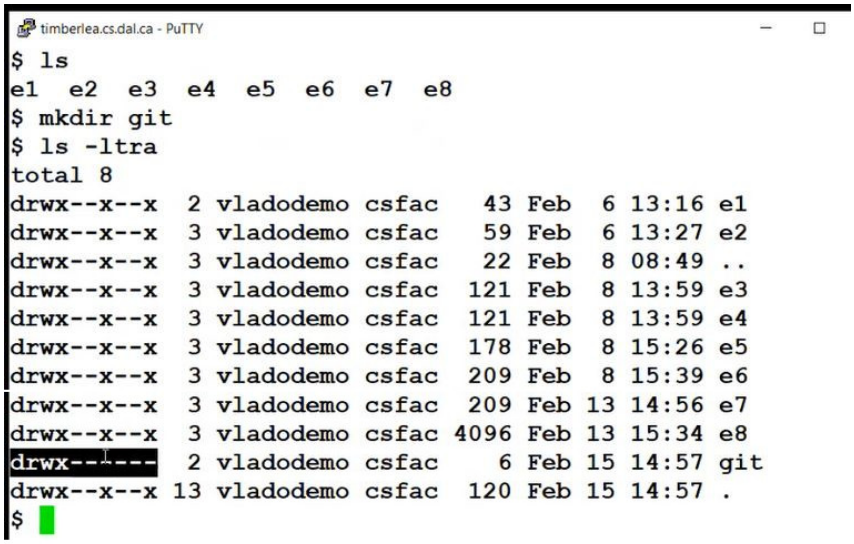
Going to your Labs Directory

- Change directory to `public_html/dgin5201` and list contents
- your screen with two windows could look as follows:



Create Directory `git`

- make directory `git`
- make sure that the directory has permissions `rwx` for for the user only (`rwx------`)
- the next screenshot shows how it would look on my screen



Copy directories `e1`...`e4` into directory `git`

- We first `rsync` directory `e1`:

```
timberlea.cs.dal.ca - PuTTY
$ ls
e1  e2  e3  e4  e5  e6  e7  e8
$ mkdir git
$ ls -ltra
total 8
drwx--x--x  2 vladodemo csfac   43 Feb  6 13:16 e1
drwx--x--x  3 vladodemo csfac   59 Feb  6 13:27 e2
drwx--x--x  3 vladodemo csfac   22 Feb  8 08:49 ..
drwx--x--x  3 vladodemo csfac  121 Feb  8 13:59 e3
drwx--x--x  3 vladodemo csfac  121 Feb  8 13:59 e4
drwx--x--x  3 vladodemo csfac  178 Feb  8 15:26 e5
drwx--x--x  3 vladodemo csfac  209 Feb  8 15:39 e6
drwx--x--x  3 vladodemo csfac  209 Feb 13 14:56 e7
drwx--x--x  3 vladodemo csfac 4096 Feb 13 15:34 e8
drwx------  2 vladodemo csfac    6 Feb 15 14:57 git
drwx--x--x 13 vladodemo csfac  120 Feb 15 14:57 .
$ rsync -av e1/ git/e1/
```

Copy other Directories with `rsync`: `e2`

```
$ rsync -av e2/ git/e2/
sending incremental file list
created directory git/e2
./
index.html
```

```
timberlea.cs.dal.ca - PuTTY
index.html~

sent 255 bytes  received 86 bytes  682.00 bytes/sec
total size is 70  speedup is 0.21
$ rsync -av e2/ git/e2/
sending incremental file list
created directory git/e2
./
index.html
index.html~
material/
material/.htaccess
material/MDI-page.pdf

sent 794,495 bytes  received 136 bytes  1,589,262.00 bytes/
sec
total size is 793,957  speedup is 1.00
$ rsync -av e3/ git/e3/
sending incremental file list
created directory git/e3
./
.htaccess
.htaccess~
.htpasswd
index.html
index.html~
pw
material/
material/.htaccess
material/MDI-page.pdf
```

```
$ rsync -av e4/ git/e4/
```

```
$ rsync -av e8/ git/e8/
sending incremental file list
created directory git/e8
./
.htaccess
```

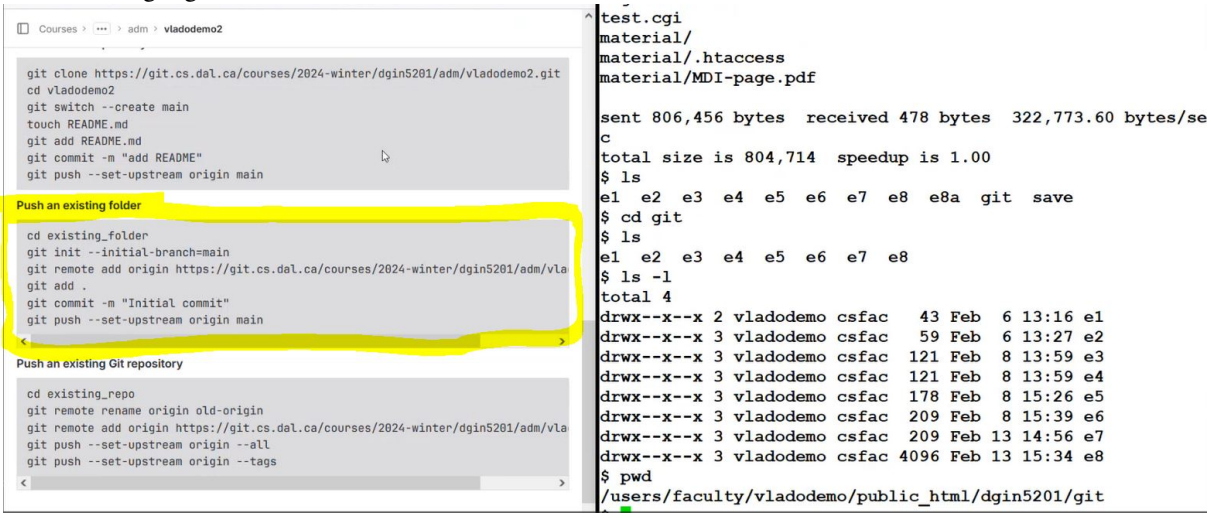
5

Use highlighted commands to check your git directory

```
$ ls
e1  e2  e3  e4  e5  e6  e7  e8       git
$ cd git
$ ls
e1  e2  e3  e4  e5  e6  e7  e8
$ ls -l
total 4
drwx--x--x 2 vladodemo csfac   43 Feb  6 13:16 e1
drwx--x--x 3 vladodemo csfac   59 Feb  6 13:27 e2
drwx--x--x 3 vladodemo csfac  121 Feb  8 13:59 e3
drwx--x--x 3 vladodemo csfac  121 Feb  8 13:59 e4
drwx--x--x 3 vladodemo csfac  178 Feb  8 15:26 e5
drwx--x--x 3 vladodemo csfac  209 Feb  8 15:39 e6
drwx--x--x 3 vladodemo csfac  209 Feb 13 14:56 e7
drwx--x--x 3 vladodemo csfac 4096 Feb 13 15:34 e8
$ pwd
<your home directory .....>  /public_html/dgin5201/git
```

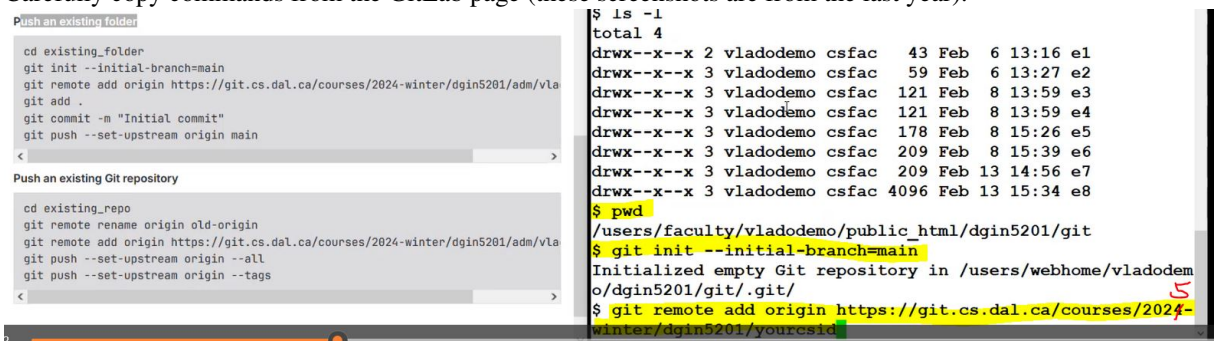
Follow `git` Commands for Upload

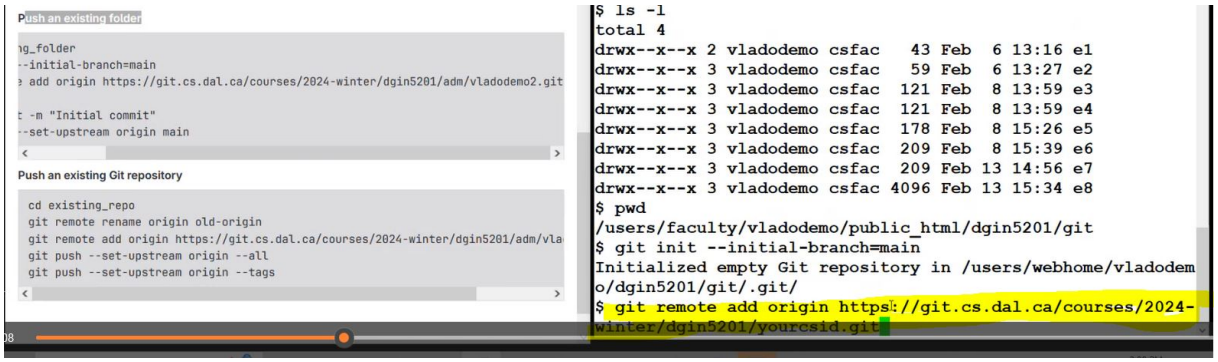
We now follow `git` commands shows on the GitLab page
First, let us highlight which ones we will use:

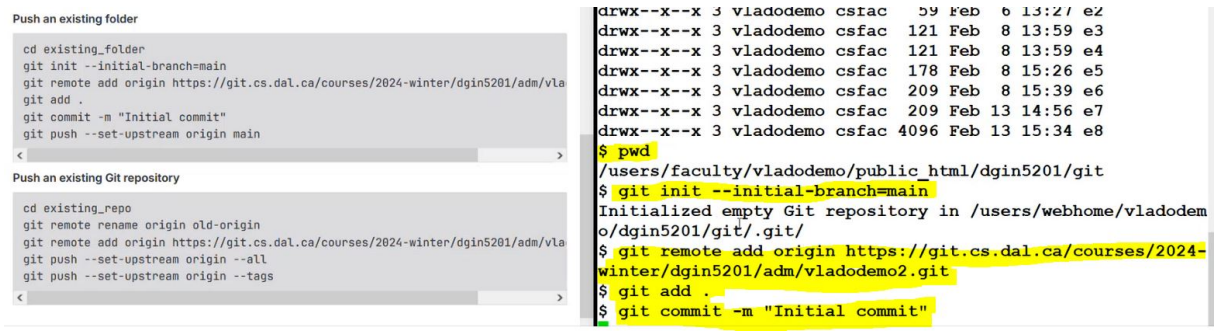


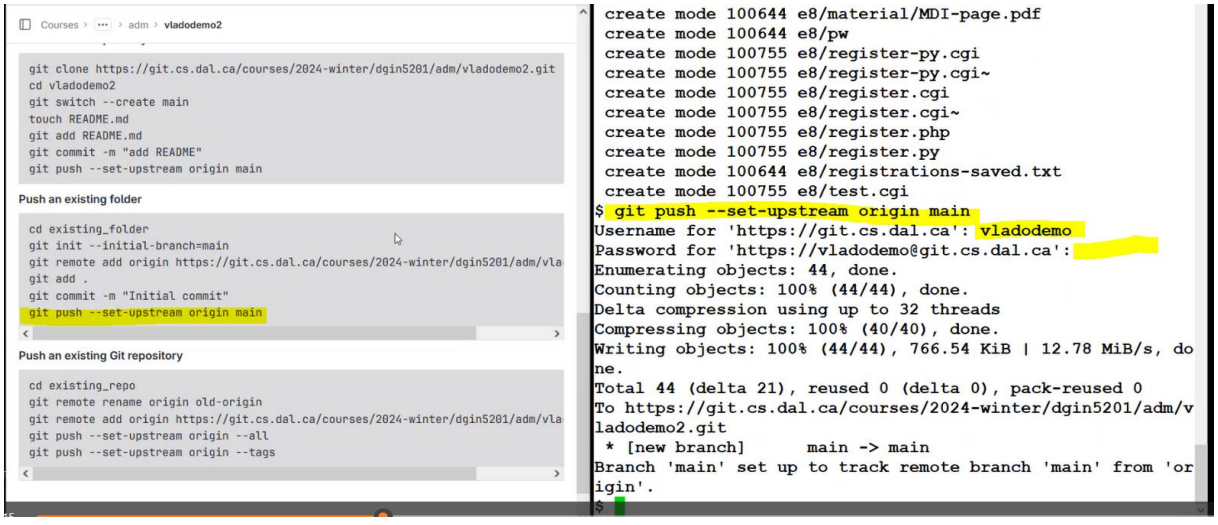
Type in Commands as Shown in GitLab page

Carefully copy commands from the GitLab page (these screenshots are from the last year):

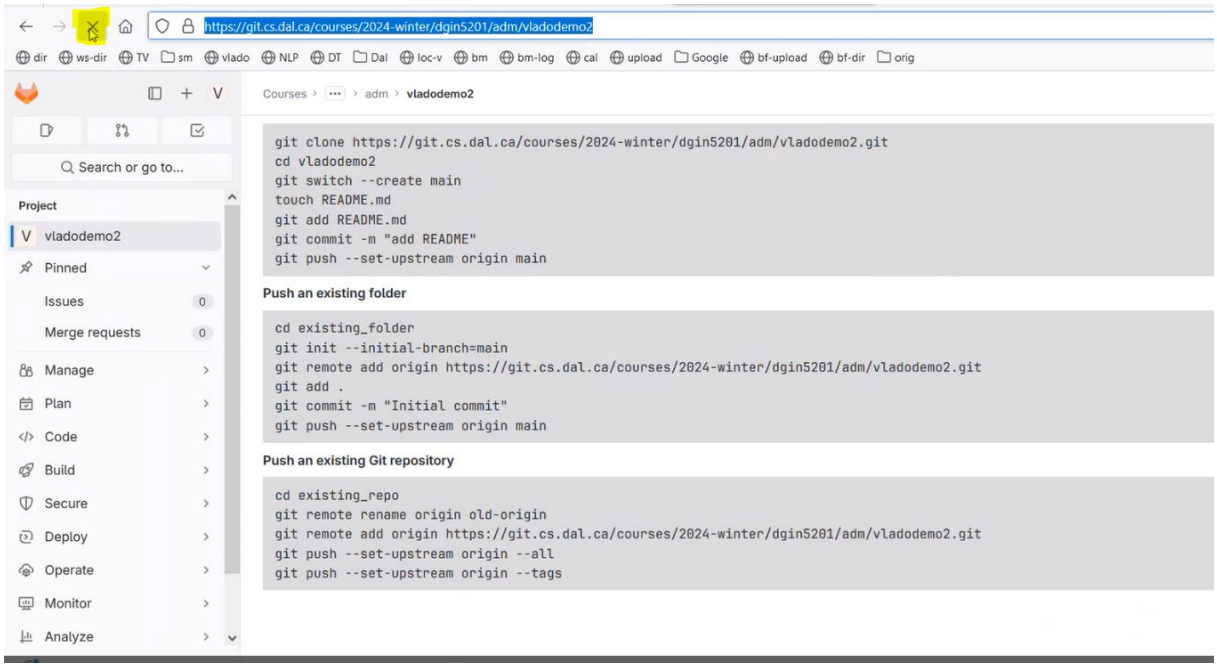




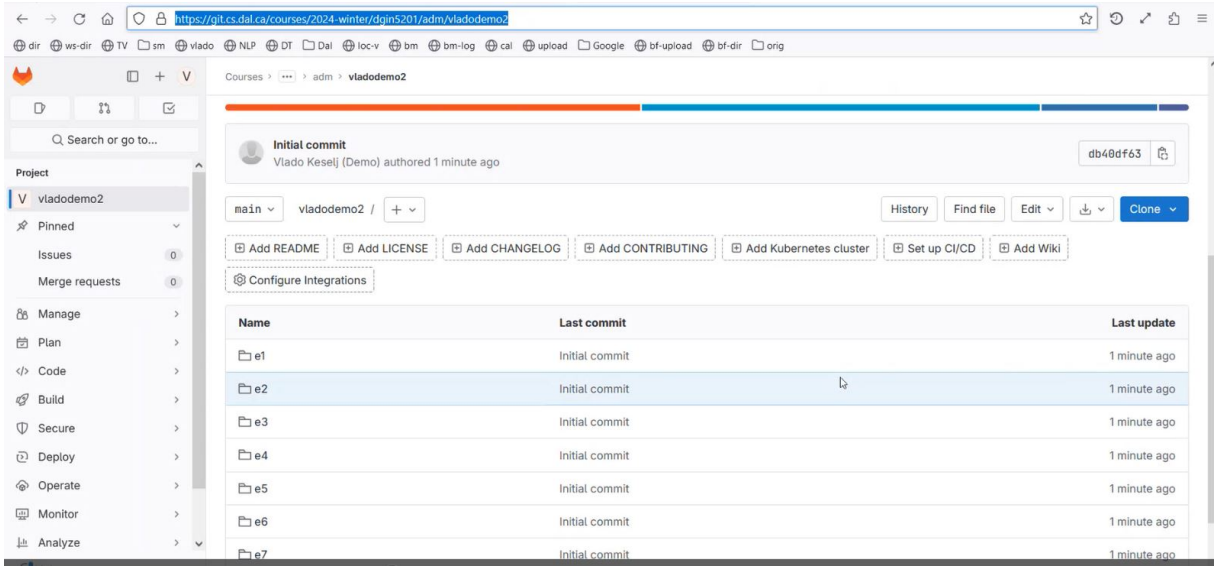


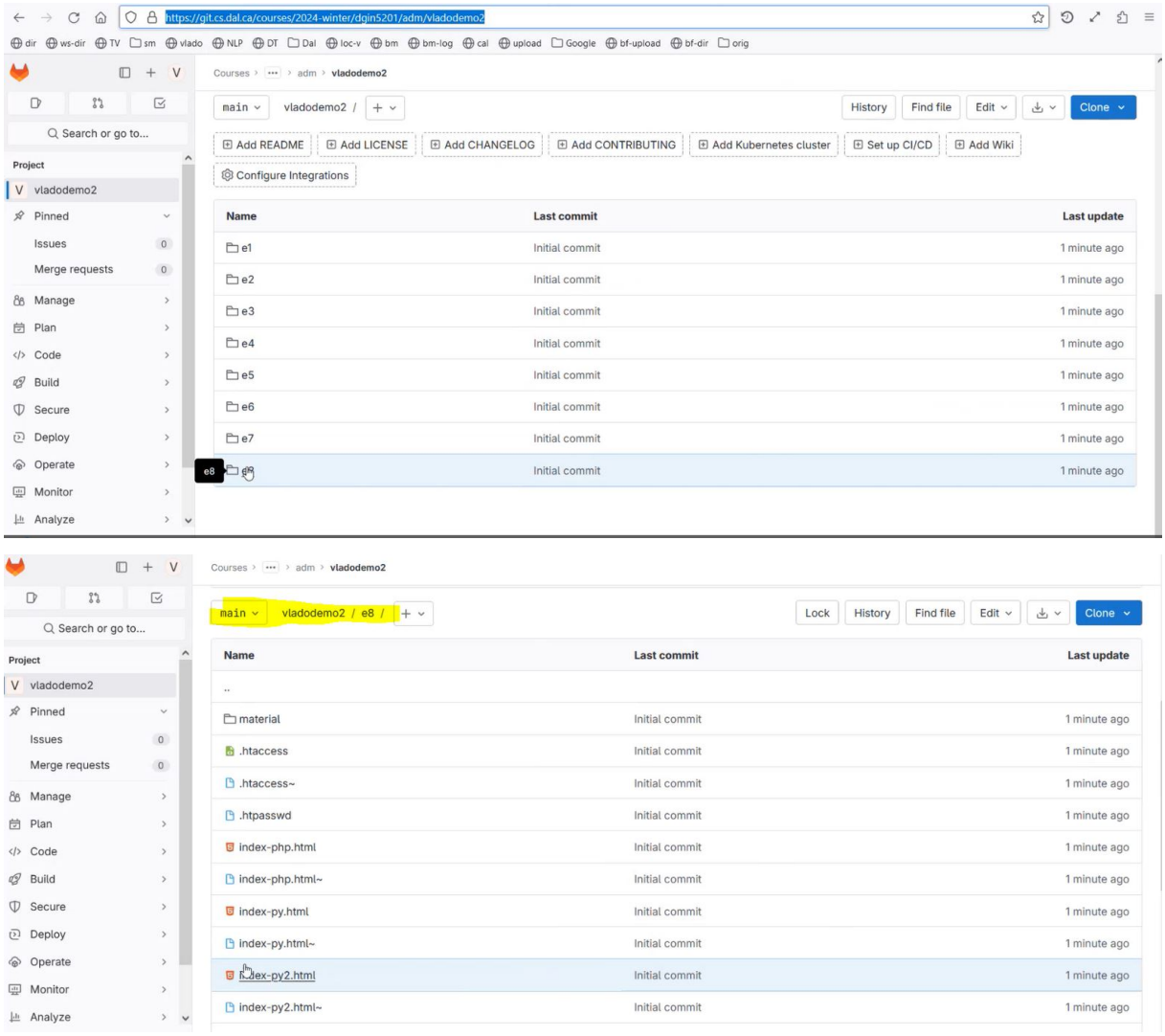


Refresh GitLab Page to Check Contents



Expected Contents in your GitLab Repository





GitLab Upload Completed

- With this, we finished uploading e1, e2, e3, e3 to GitLab
- Now, we go back to e5
- Change directory to `~/public_html/dgin5201/`