Faculty of Computer Science, Dalhousie University DGIN 5201 — Digital Transformation

# Lab 4: GitLab and Git Assignment Submission

Lab TA: Tymon Wranik-Lohrenz Location: Goldberg CS 134 and 143 Time: 11:35–12:25 and 13:05–13:55 Notes author: Vlado Keselj

# GitLab and Git Assignment Submission

## Lab Overview: GitLab and Git

- Introduction to Git, GitLab, and GitHub
- Hands-on exercise with GitLab server in FCS
- Finalizing submission of labs to GitLab
- Last step of Assignment 1
- Your project repositories will be set up, and you will be encouraged to use it
- Some project deliverables will be required using your project repository in 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.

31-Jan-2025

#### 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.

#### DalFCS Git

Git repos for individual and group use.	CSID	Standard
Login using your CSID username & password. You can also check/update your login credentials and check if your account has become locked (i.e. due to repeated password errors) at the CSID page.	Username	
Contact the DalFCS Helpdesk at cshelp@cs.dal.ca for support requests, questions, etc.	Password	
If necessary, visit Email Reconfirm page to confirm your email address.	Remember me	۲
	Si	ign in

Figure 1: Dal GitLab login screen.

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

•	🗆 + <mark>V</mark>	Your work > Projects	
C	) :: C	Projects	
	Q Search or go to	··· <b>·</b>	
Your	work	Yours 1 Starred 0 Pending deletion Filter by nar	ne
0	Projects	All Personal	
80 (	Groups		
	ssues	Courses / 2024-Winter / dgina201 / <your csid=""></your>	
11 I	Merge requests >	<your csid=""></your>	
☑ ·	To-Do List		
<b>(</b> )	Milestones		
Χ :	Snippets		
5	Activity		
Q 1	Workspaces		
ا ¢	Environments		
6	Operations		
Φ :	Security >		

### Once you find it, the browser should show the following URL:

https://git.cs.dal.ca/courses/2025-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

The instructions that we will use to upload the lab files (i.e., the directories  $e1, \dots e8$ ), are shown in the project page:

#### **Instructions to Upload our Files**

⊌			+	V	Courses > ··· > adm > vladodemo2
	D 13		Ø		Arr coultààronar osei, emarr akeserlíónar ca
	O Search ar				Create a new repository
	C Search or	go to.			git clone https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
Pro	ject			^	cd vladodemo2
V	vladodemo2				git switchcreate main touch README.md
Ŕ	Pinned		~		git add README.md git commit -m "add README"
	Issues		0		git pushset-upstream origin main
	Merge requests		0		Push an existing folder
රිරි	Manage		>		cd existing_folder
₫	Plan		>		git initinitial-branch=main git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
	Code		>		git add . git commit -m "Tnitial commit"
2	Build		>		git pushset-upstream origin main
Φ	Secure		>		Push an existing Git repository
0	Deploy		>		cd existing_repo
6	Operate		>		git remote rename origin olo-origin git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
<u></u>	Monitor		>		git pushset-upstream originall git pushset-upstream origintags
<u>l-h</u>	Analyze		>	~	

### 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
- the next screenshot shows how it would look on my screen

```
Imberlea.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 el
                                       6 13:27 e2
drwx--x--x 3 vladodemo csfac
                               59 Feb
drwx--x--x 3 vladodemo csfac
                                       8 08:49 ..
                               22 Feb
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 .
$
```

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Copy directories e1...e8 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
                                          I
created directory git/e2
./
ndoy html
  A 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~
                                     T
  .htpasswd
  index.html
  index.html~
  pw
  material/
  material/.htaccess
 material/MDI-page.pdf
```

\$ rsync -av e4/ git/e4/

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```
. . . , . . .
                       ----- -----
 $ rsync -av e5/ git/e5/
sending incremental file list
created directory git/e5
./
 .htaccess
 .htaccess~
 .htpasswd
 index.html
 inder html~
 $ rsync -av e6/ git/e6/
 sending incremental file list
 created directory git/e6
 ./
 .htaccess
 .htaccess~
 .htpasswd
$ rsync -av e7/ git/e7/
sending incremental file list
created directory git/e7
.1
.htaccess
.htaccess~
.htpasswd
$ rsync -av e8/ git/e8/
sending incremental file list
created directory git/e8
.1
.htaccess
htaggagg
```

Use highlighted commands to check your git directory

```
$ ls
e1 e2 e3 e4 e5 e6 e7 e8
                                      git
$ cd git
<mark>$ ls -</mark>
e1 e2 e3 e4 e5 e6 e7 e8
$ ls -1
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:

Courses > [] > adm > vladodemo2	<pre>^ test.cgi material/</pre>
git clone https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git cd vladodemo2	material/.ntaccess material/MDI-page.pdf
git switchcreate main touch READHE.md git add READHE.md	sent 806,456 bytes received 478 bytes 322,773.60 bytes/se c
git commit -m "add README" ि git pushset-upstream origin main	total size is 804,714 speedup is 1.00 \$ ls
Push an existing folder	el e2 e3 e4 e5 e6 e7 e8 e8a git save
cd existing_folder git initinitial-branch=main git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git add . git commit -m "Initial commit" git pushset-upstream origin main	<pre>\$ 1s \$ 1s e1 e2 e3 e4 e5 e6 e7 e8 \$ 1s -1 total 4 drwxxx 2 vladodemo csfac 43 Feb 6 13:16 e1 drwx-xx 3 vladodemo csfac 59 Feb 6 13:27 e2</pre>
Push an existing Git repository	drwxxx 3 vladodemo csfac 121 Feb 8 13:59 e3 drwxxx 3 vladodemo csfac 121 Feb 8 13:59 e4
cd existing_repo git remote rename origin old-origin git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git pushset-upstream originall git pushset-upstream origintags	drwxxx 3 vladodemo csfac 178 Feb 8 15:26 e5 drwxxx 3 vladodemo csfac 209 Feb 8 15:26 e5 drwxxx 3 vladodemo csfac 209 Feb 8 15:39 e6 drwxxx 3 vladodemo csfac 209 Feb 13 14:56 e7 drwxxx 3 vladodemo csfac 4096 Feb 13 15:34 e8 \$ pwd
, , , , , , , , , , , , , , , , , , , ,	/users/faculty/vladodemo/public_html/dgin5201/git

## Type in Commands as Shown in GitLab page

Carefully copy commands from the GitLab page (these screenshots are from the last year):  $|^{S \ 1S \ -1}$ 

	S I S - I
Rush an existing folder	total A
cd evisting folder	drug $-x = x^2$ windedome as from 42 Feb 6 12:16 of
git initinitial-branch=main	drwx - x - x 2 viadodemo csiac 45 reb 6 13.10 el
git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla	drwxxx 3 vladodemo csiac 39 Feb 6 13:27 ez
git add .	drwx - x - x 3 vladodemo csiac 121 Feb 6 13:59 e3
git commit -m "Initial commit"	drwx-xx 3 vladodemo csiac 121 Feb 8 15:39 e4
git pushset-upstream origin main	drwxxx 3 viadodemo csiac 178 Feb 8 15:26 e5
< >>	drwxxx 3 vladodemo csiac 209 Feb 8 15:39 e6
Push an existing Git repository	drwxxx 3 vladodemo csiac 209 Feb 13 14:56 e7
ed evicting pape	drwxxx 3 Vladodemo Csiac 4096 Feb 13 15:34 e8
git remote rename origin old-origin	<b>pwd</b>
git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla	/users/faculty/viadodemo/public_ntml/dgin5201/git
git pushset-upstream originall	ș git initinitial-branch=main
git pushset-upstream origintags	Initialized empty Git repository in /users/webhome/vladodem
( )	o/dgin5201/git/.git/
	<pre>\$ git remote add origin https://git.cs.dal.ca/courses/2024-</pre>
	winter/dgin5201/yourcsid
	IS le _1
Push an existing folder	total 4
na folder	drwyyy 2 wladodemo csfac 43 Feb 6 13:16 el
initial-branch=main	drux x x 2 vladodemo csiac 45 Feb 6 13:10 el
add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git	druxxx 3 vladodemo csfac 121 Feb 8 13:59 e3
	drwx - x - x 3 vladodemo csfac 121 Feb 0 13.59 es
t -m "Initial commit"	drwx - x - x 3 vladodemo csiac 121 reb 8 15:35 e4
set-upstream origin main	drwx-x-x 3 vladodemo csiac 176 Feb 6 15.20 e5
( )	drwxxx 3 vladodemo csiac 209 Feb 8 13:39 e6
Push an existing Git repository	drww w w 2 wladademo cofac 4006 Tab 12 15:24 a9
cd existing pape	drwxxx 5 viadodemo Csiac 4096 Feb 15 15:54 e6
ait remote rename origin old-origin	ş pwa
git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla	/users/faculty/viadodemo/public_ntml/dgin5201/git
git pushset-upstream originall	\$ git initinitial-branch=main
with much mark market and the same	Initialized ompty (it repository in /users/webbers/webbers
git pushset-upstream origintags	initialized empty dit repository in /users/webnome/viadodem
git pushset-upstream origintags	o/dgin5201/git/.git/
git pushset-upstream origintags	o/dgin5201/git/.git/ \$ git remote add origin https://git.cs.dal.ca/courses/2024-
git pushset-upstream origintags	o/dgin5201/git/. \$ git remote add origin https://git.cs.dal.ca/courses/2024- winter/dgin5201/yourcsid.git

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Push an existing folder	drwxxx 3 vladodemo csiac 59 Feb 6 13:27 e2
cd existing_folder git initinitial-branch=main git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git add . git commit -m "Initial commit" git pushset-upstream origin main < Push an existing Git repository	drwxxx 3 vladodemo csfac 121 Feb 8 13:59 e4 drwxxx 3 vladodemo csfac 121 Feb 8 13:59 e4 drwxxx 3 vladodemo csfac 209 Feb 8 15:39 e6 drwxxx 3 vladodemo csfac 209 Feb 8 15:39 e6 drwxxx 3 vladodemo csfac 209 Feb 13 14:56 e7 drwxxx 3 vladodemo csfac 4096 Feb 13 15:34 e8 \$ pwd /users/faculty/vladodemo/public_html/dgin5201/git
cd existing_repo git remote rename origin old-origin git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git pushset-upstream originall git pushset-upstream origintags <	<pre>\$ git InitInitial-branch=main Initialized empty Git repository in /users/webhome/vladodem o/dgin5201/git/.git/ \$ git remote add origin https://git.cs.dal.ca/courses/2024- winter/dgin5201/adm/vladodemo2.git \$ git add . \$ git commit -m "Initial commit"</pre>
<pre>Courses &gt; ··· &gt; adm &gt; vladodemo2 git clone https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git cd vladodemo2 git switchcreate main touch README.nd git add README.nd git commit -m "add README" git pushset-upstream origin main</pre>	<pre>^ create mode 100644 e8/material/MDI-page.pdf create mode 100644 e8/pw create mode 100755 e8/register-py.cgi create mode 100755 e8/register-cgi~ create mode 100755 e8/register.cgi create mode 100755 e8/register.cgi~ create mode 100755 e8/register.php create mode 100755 e8/register.py create mode 100654 e8/register.txt</pre>
Push an existing folder cd existing_folder git initinitial-branch=main git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git add . git commit -m "Initial commit" git pushset-upstream origin main <	create mode 100755 e8/test.cgi \$ git pushset-upstream origin main Username for 'https://git.cs.dal.ca': vladodemo Password for 'https://vladodemo@git.cs.dal.ca': Enumerating objects: 44, done. Counting objects: 100% (44/44), done. Delta compression using up to 32 threads Compressing objects: 100% (40/40), done.
Push an existing Git repository cd existing_repo git remote rename origin old-origin git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vla git pushset-upstream originall git pushset-upstream origintags <	<pre>Writing objects: 100% (44/44), 766.54 KiB   12.78 MiB/s, do ne. Total 44 (delta 21), reused 0 (delta 0), pack-reused 0 To https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/v ladodemo2.git * [new branch] main -&gt; main Branch 'main' set up to track remote branch 'main' from 'or igin'.</pre>

## Refresh GitLab Page to Check Contents

	gitcs:dalca/courses/2024=winter/dgin52017/adm/vladodemo2
⊕ dir ⊕ ws-dir ⊕ TV □ sm ⊕ vlade	> 🕀 NLP 🕀 DT 🗋 Dal 🕀 loc-v 🕀 bm 🕀 bm-log 🕀 cal 🕀 upload 🗋 Google 🕀 bf-upload 🕀 bf-dir 🗋 orig
₩ D + V	Courses > > adm > vladodemo2
D 3.7 G	git clone https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
Q Search or go to	cd vladodemo2
Project	touch README.md
V vladodemo2	git commit -m "add README"
🖈 Pinned 🗸 🗸	git pushset-upstream origin main
Issues 0	Push an existing folder
Merge requests 0	cd existing_folder nit initinitial-branch=main
රී Manage >	git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
🔁 Plan >	git commit -m "Initial commit"
Code >	git pushset-upstream origin main
@ Build >	Push an existing Git repository
♥ Secure >	cd existing_repo qit remote rename origin old-origin
Deploy >	git remote add origin https://git.cs.dal.ca/courses/2024-winter/dgin5201/adm/vladodemo2.git
	git pushset-upstream origintags
Monitor >	
⊥n Analyze > ✔	

	tps://git.cs.dal.ca/courses/2024-winter/dgin5	201/adm/vladodemo2			ය ව ⁄ ව =
⊕ dir ⊕ ws-dir ⊕ TV □ sm ⊕	viado 🌐 NLP 🌐 DT 🗀 Dai 🌐 loc-v 🌐	bm 🕀 bm-log 🕀 cal 🕀 upload 🗋 Google 🕀 bf-upload 🕀 bf-di	r 🗋 orig		
₩ □ + 0	Courses > ··· > adm > vladodemo	2			
D :: C					
Q Search or go to	Initial commit				db/0df63
Project	<ul> <li>Vlado Keselj (Demo) aut</li> </ul>	hored 1 minute ago			00400103
V vladodemo2	main ~ vladodemo2 / +	. •	History	Find file Edit ~	u → Clone →
🖈 Pinned 🗸					
Issues	Add README     Add LIC	ENSE 🕒 Add CHANGELOG 🕀 Add CONTRIBUTING 🗠	Add Kubernetes cluster 🛛 🖽 Set up	CI/CD Add Wiki	
Merge requests 0	Configure Integrations				
å Manage →	Name	Last commit			Last update
	🕒 e1	Initial commit			1 minute ago
Ruild	🖻 e2	Initial commit	ß		1 minute ago
♥ Secure >	🖻 e3	Initial commit			1 minute ago
ত Deploy >	🗅 e4	Initial commit			1 minute ago
Operate >	🖻 e5	Initial commit			1 minute ago
📖 Monitor >	🗅 e6	Initial commit			1 minute ago
h Analyze >	× ⊡ e7	Initial commit			1 minute ago
← → C @ O A m ⊕ dir ⊕ ws-dir ⊕ TV □ sm ⊕ ➡ □ + V	ps://git.cs.dal.ca/courses/2024-winter/dgin5 viado ⊕ NLP ⊕ DT □ Dai ⊕ loc-v ⊕ / Courses > > adm > viadodemo:	201/adm/vladodemoz bm ⊕bm-log ⊕cal ⊕upload □Google ⊕bf-upload ⊕bf-dir 2	C orig		☆ ව ↗ එ ≡
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# Expected Contents in your GitLab Repository

## DGIN 5201

# Lab 4 p.12

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## Lab 4 Finished

- With this you have finished Lab 4 and Assignment 1