

# Лабораторная работа №1

Математическое моделирование

---

Зиязетдинов А.Р.

23 июня 2025 г.

- Зиязетдинов Алмаз Радикович
- НПИбд-01-22

## Цели и задачи

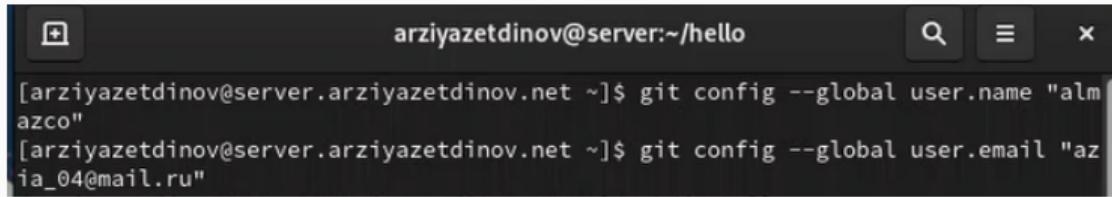
---

- Приобрести практические навыки работы с системой управления версиями Git.

## Выполнение лабораторной работы

---

## Подготовка



The screenshot shows a terminal window with the following content:

```
arziyazetdinov@server:~/hello
[arziyazetdinov@server.arziyazetdinov.net ~]$ git config --global user.name "almazco"
[arziyazetdinov@server.arziyazetdinov.net ~]$ git config --global user.email "azia_04@mail.ru"
```

Рис. 1: Настройка git

## Создание проекта

```
ra_04@mail.ru
[arziyazetdinov@server.arziyazetdinov.net ~]$ mkdir hello
[arziyazetdinov@server.arziyazetdinov.net ~]$ cd hello
[arziyazetdinov@server.arziyazetdinov.net hello]$ touch hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ echo "Hello, World!" > hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
      is subject to change. To configure the initial branch name to use in all
      of your new repositories, which will suppress this warning, call:
      hint:
      hint:   git config --global init.defaultBranch <name>
      hint:
      hint: Names commonly chosen instead of 'master' are 'main', 'trunk' and
      hint: 'development'. The just-created branch can be renamed via this command:
      hint:
      hint:   git branch -m <name>
Initialized empty Git repository in /home/arziyazetdinov/hello/.git/
[arziyazetdinov@server.arziyazetdinov.net hello]$ █ █ █
```

Рис. 2: Создание файла и репозитория. Добавление файла в репозиторий

## Внесение изменений

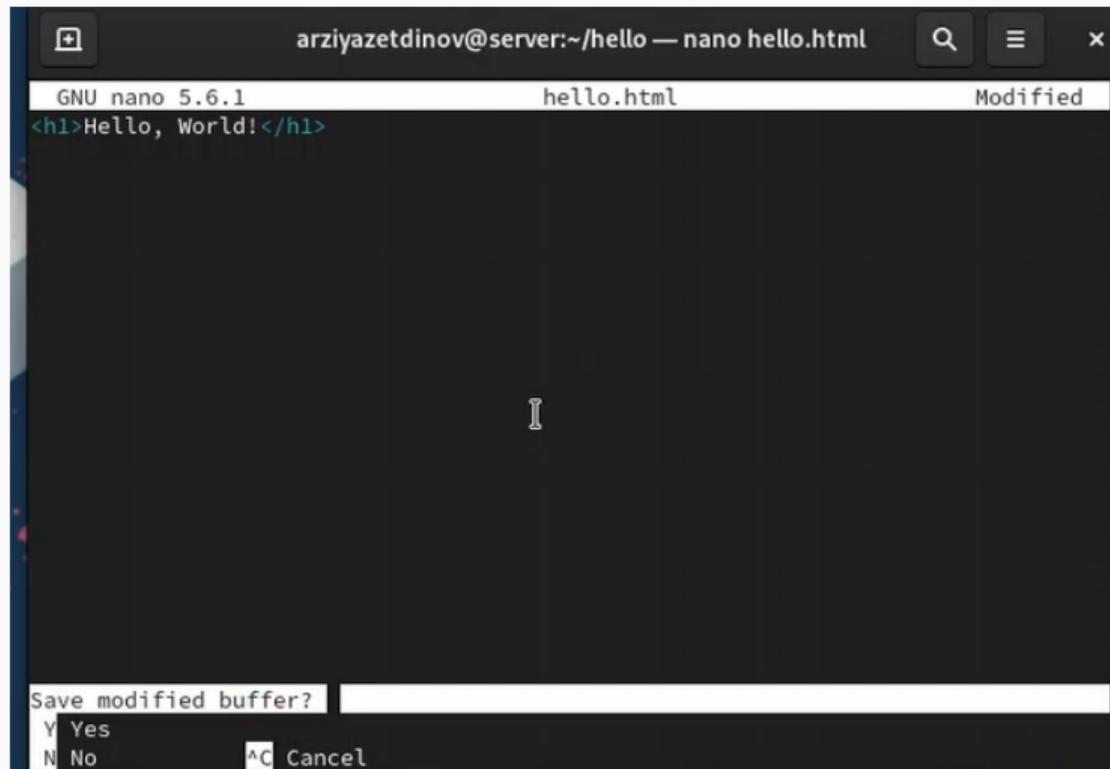


Рис. 3: Файл hello.html

## Индексация изменений

The screenshot shows a terminal window with the following session:

```
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   hello.html

no changes added to commit (use "git add" and/or "git commit -a")
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
    modified:   hello.html

no changes added to commit (use "git add" and/or "git commit -a")
[arziyazetdinov@server.arziyazetdinov.net hello]$ git add hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    modified:   hello.html

[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 4: Индексация и коммит изменений

## Индексация изменений

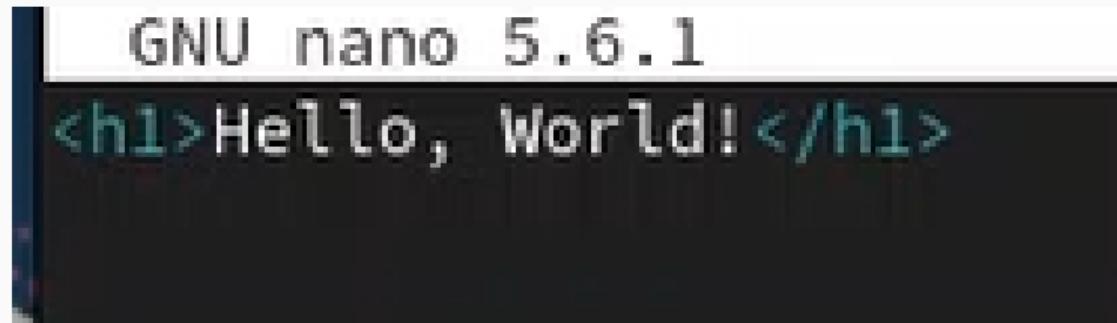
The screenshot shows a terminal window with the following content:

```
arziyazetdinov@server:~/hello — git commit
```

# Please enter the commit message for your changes. Lines starting  
# with '#' will be ignored, and an empty message aborts the commit.  
#  
# On branch master  
# Changes to be committed:  
# modified: hello.html

'~/hello/.git/COMMIT\_EDITMSG' 8L, 211B 1,0-1 All

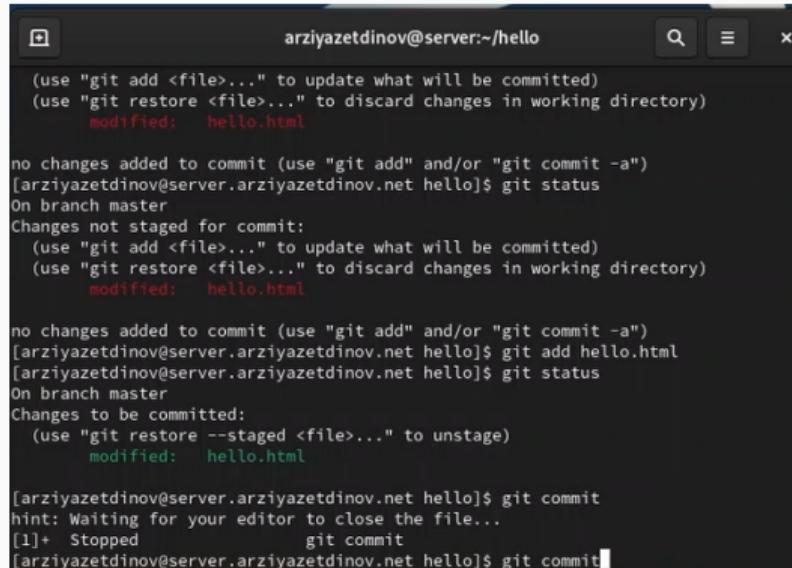
Рис. 5: Редактор



The screenshot shows a terminal window with a dark background and light-colored text. At the top, it displays "GNU nano 5.6.1". Below this, the content of a file is shown: "<h1>Hello, World!</h1>". The text is in white, with the opening and closing tags in green.

Рис. 6: Файл hello.html

## Индексация изменений



```
arziyazetdinov@server:~/hello
(use "git add <file>..." to update what will be committed)
(use "git restore <file>..." to discard changes in working directory)
 modified: hello.html

no changes added to commit (use "git add" and/or "git commit -a")
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git restore <file>..." to discard changes in working directory)
 modified: hello.html

no changes added to commit (use "git add" and/or "git commit -a")
[arziyazetdinov@server.arziyazetdinov.net hello]$ git add hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
 modified: hello.html

[arziyazetdinov@server.arziyazetdinov.net hello]$ git commit
hint: Waiting for your editor to close the file...
[1]+  Stopped                  git commit
[arziyazetdinov@server.arziyazetdinov.net hello]$ git commit
```

Рис. 7: Индексация и коммит изменений

## Индексация изменений

The screenshot shows a terminal window with the following details:

- Terminal title: arziyazetdinov@server:~/hello — nano hello.html
- File name: hello.html
- Editor status: Modified
- Content of the file:

```
GNU nano 5.6.1
<html>
<head>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>
```
- Bottom status bar: Save modified buffer?
- Action buttons: Y Yes, N No, ^C Cancel

Рис. 8: Файл hello.html

# История

```
nothing to commit, working tree clean
[arziyazetdinov@server.arziyazetdinov.net hello]$ git commit -m "Added HTML header"
On branch master
nothing to commit, working tree clean
[arziyazetdinov@server.arziyazetdinov.net hello]$ git log
commit 2580f5e8e53166dbc2fdb891ae84de9a21b8b2a3 (HEAD -> master)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:59:58 2025 +0000

    Added standard HTML page tags

commit 2c77740690435ff6c4c9fbdea74728e9aad16889
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:53:49 2025 +0000

    Initial Commit
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 9: История

# История

```
[arziyazetdinov@server.arziyazetdinov.net hello]$ git log
commit 2580f5e8e53166dbc2fdb891ae84de9a21b8b2a3 (HEAD -> master)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:59:58 2025 +0000

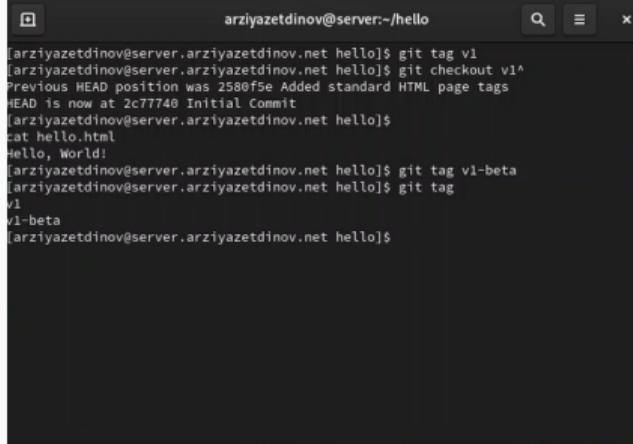
    Added standard HTML page tags

commit 2c77740690435ff6c4c9fbdea74728e9aad16889
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:53:49 2025 +0000

    Initial Commit
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 10: Просмотр разных версий репозитория

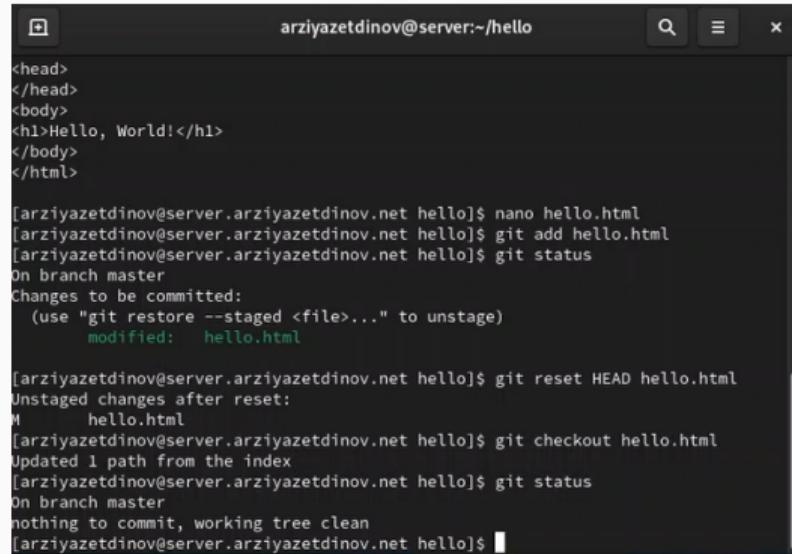
## Создание тегов версий



```
arziyazetdinov@server:~/hello$ git tag v1
[arziyazetdinov@server.arziyazetdinov.net hello]$ git checkout v1^
Previous HEAD position was 2580f5e Added standard HTML page tags
HEAD is now at 2c77740 Initial Commit
[arziyazetdinov@server.arziyazetdinov.net hello]$
cat hello.html
Hello, World!
[arziyazetdinov@server.arziyazetdinov.net hello]$ git tag v1-beta
[arziyazetdinov@server.arziyazetdinov.net hello]$ git tag
v1
v1-beta
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 11: Создание тегов версий, переключение между ними

## Создание тегов версий



The screenshot shows a terminal window with the following session:

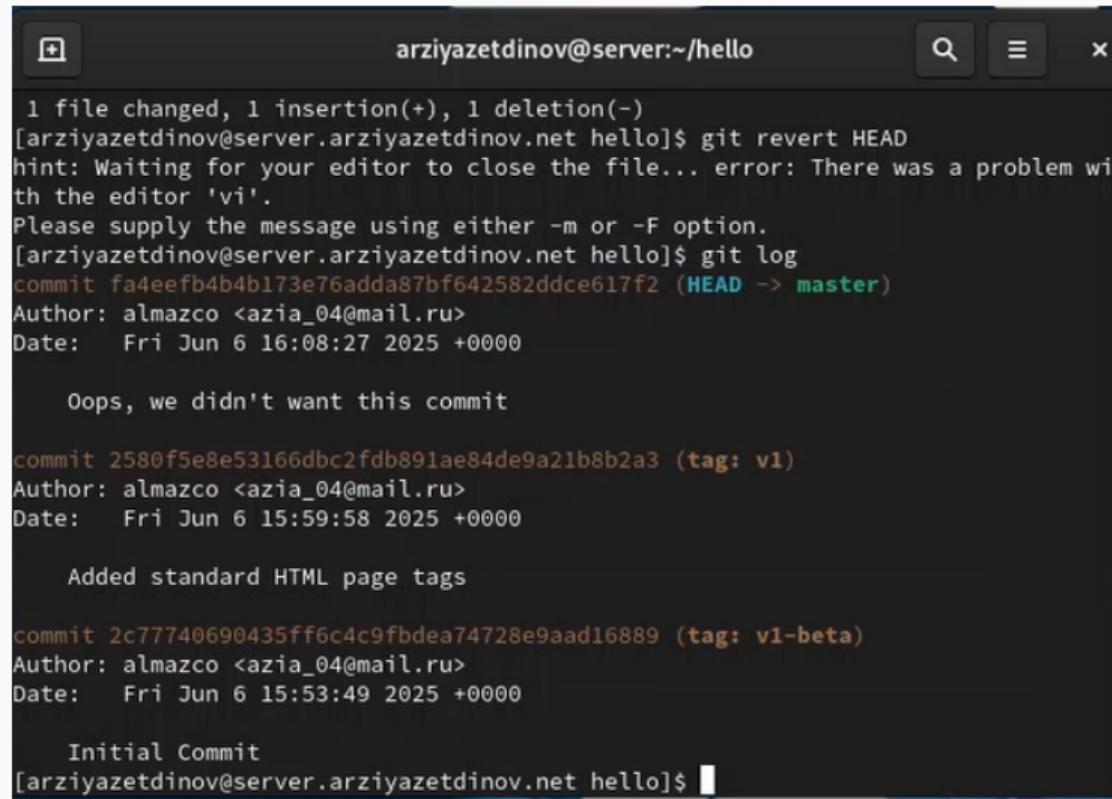
```
arziyazetdinov@server:~/hello
<head>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>

[arziyazetdinov@server.arziyazetdinov.net hello]$ nano hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git add hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    modified:   hello.html

[arziyazetdinov@server.arziyazetdinov.net hello]$ git reset HEAD hello.html
Unstaged changes after reset:
M       hello.html
[arziyazetdinov@server.arziyazetdinov.net hello]$ git checkout hello.html
Updated 1 path from the index
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
nothing to commit, working tree clean
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 12: Доступные теги

## Отмена локальных изменений (до индексации)



The screenshot shows a terminal window with the following session:

```
arziyazetdinov@server:~/hello
1 file changed, 1 insertion(+), 1 deletion(-)
[arziyazetdinov@server.arziyazetdinov.net hello]$ git revert HEAD
hint: Waiting for your editor to close the file... error: There was a problem with the editor 'vi'.
Please supply the message using either -m or -F option.
[arziyazetdinov@server.arziyazetdinov.net hello]$ git log
commit fa4eefb4b4b173e76adda87bf642582ddce617f2 (HEAD -> master)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:08:27 2025 +0000

    Oops, we didn't want this commit

commit 2580f5e8e53166dbc2fdb891ae84de9a21b8b2a3 (tag: v1)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:59:58 2025 +0000

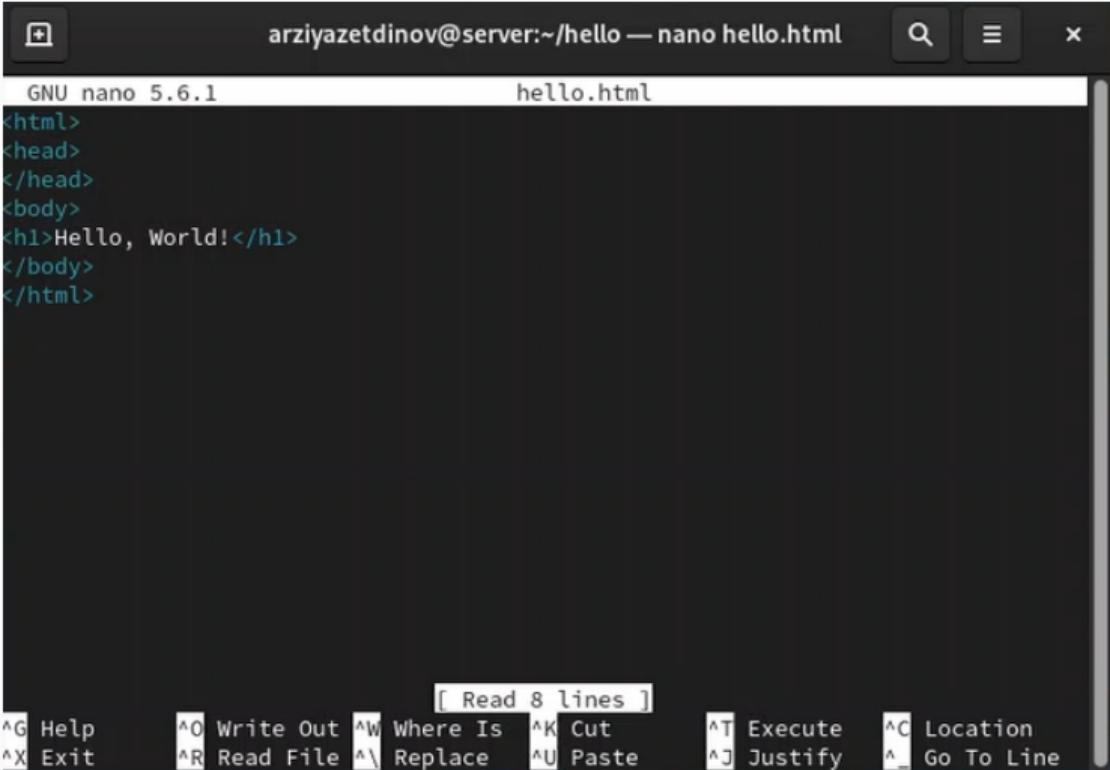
    Added standard HTML page tags

commit 2c77740690435ff6c4c9fbdea74728e9aad16889 (tag: v1-beta)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:53:49 2025 +0000

    Initial Commit
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 13: Отмена локальных изменений (до индексации)

## Отмена локальных изменений (до индексации)



arziyazetdinov@server:~/hello — nano hello.html

GNU nano 5.6.1

```
<html>
<head>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>
```

[ Read 8 lines ]

**^G** Help      **^O** Write Out      **^W** Where Is      **^K** Cut      **^T** Execute      **^C** Location  
**^X** Exit      **^R** Read File      **^\\** Replace      **^U** Paste      **^J** Justify      **^L** Go To Line

Рис. 14: Изменения в файле hello.html

## Отмена проиндексированных изменений (перед коммитом)

```
<html>
  <head>
    <!-- This is an unwanted but staged comment --&gt;
  &lt;/head&gt;
  &lt;body&gt;
    &lt;h1&gt;Hello, World!&lt;/h1&gt;
  &lt;/body&gt;
&lt;/html&gt;</pre>
```

Рис. 15: Изменения в файле hello.html

## Отмена проиндексированных изменений (перед коммитом)

```
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    renamed:   hello.html -> lib/hello.html

[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 16: Отмена локальных изменений (перед коммитом)

## Отмена коммитов

---

Отмена коммитов

Рис. 17: Отмена коммитов

## Отмена коммитов

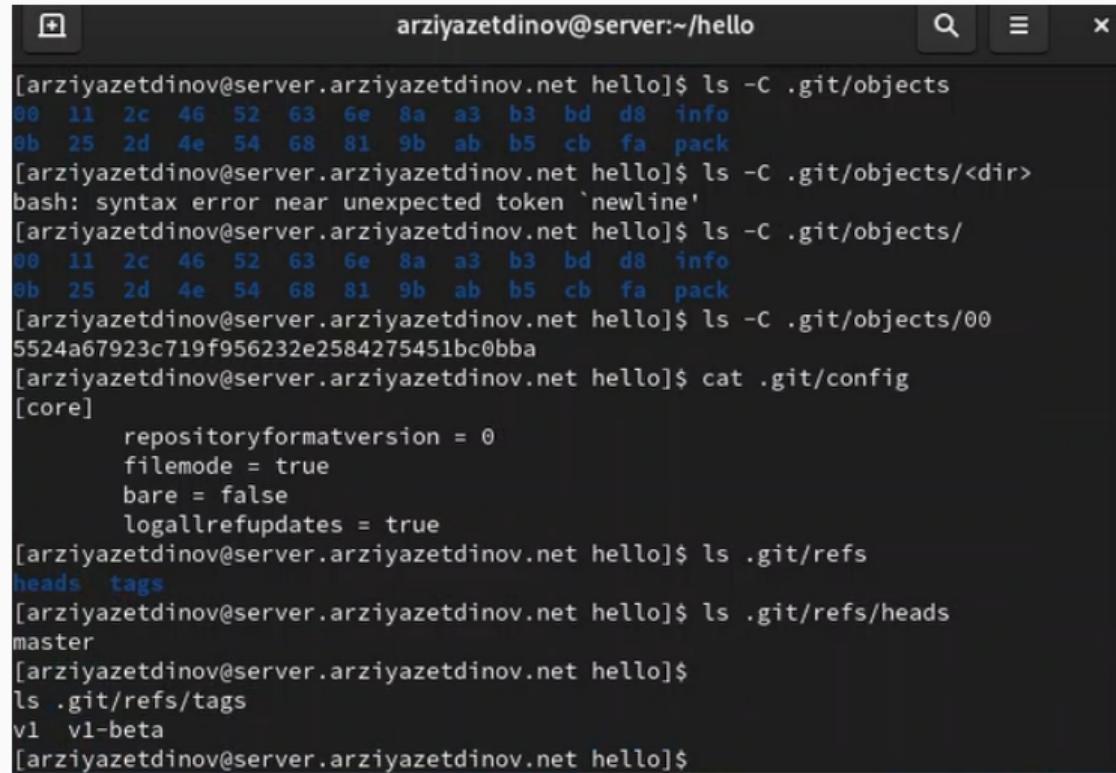
---

![Редактор]

## Удаление коммиттов из ветки

---

## Git внутри: Каталог .git



The screenshot shows a terminal window with the following session:

```
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls -C .git/objects
00 11 2c 46 52 63 6e 8a a3 b3 bd d8 info
0b 25 2d 4e 54 68 81 9b ab b5 cb fa pack
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls -C .git/objects/<dir>
bash: syntax error near unexpected token `newline'
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls -C .git/objects/
00 11 2c 46 52 63 6e 8a a3 b3 bd d8 info
0b 25 2d 4e 54 68 81 9b ab b5 cb fa pack
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls -C .git/objects/00
5524a67923c719f956232e2584275451bc0bba
[arziyazetdinov@server.arziyazetdinov.net hello]$ cat .git/config
[core]
    repositoryformatversion = 0
    filemode = true
    bare = false
    logallrefupdates = true
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls .git/refs
heads tags
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls .git/refs/heads
master
[arziyazetdinov@server.arziyazetdinov.net hello]$
ls .git/refs/tags
v1 v1-beta
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 18: Git внутри: Каталог .git

## Работа непосредственно с объектами git

```
master
[arziyazetdinov@server.arziyazetdinov.net hello]$ ls .git/refs/tags
v1 v1-beta
[arziyazetdinov@server.arziyazetdinov.net hello]$ cat .git/refs/tags/v1
2580f5e8e53166dbc2fdb891ae84de9a21b8b2a3
[arziyazetdinov@server.arziyazetdinov.net hello]$ cat .git/HEAD
ref: refs/heads/master
[arziyazetdinov@server.arziyazetdinov.net hello]$ git log --max-count=1
commit 815ba8ac361b4cb889cccd7a0c3alebbeb2c89f59 (HEAD -> master)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:16:45 2025 +0000

    Added index.html.
[arziyazetdinov@server.arziyazetdinov.net hello]$ git cat-file -t <hash>^C
[arziyazetdinov@server.arziyazetdinov.net hello]$ ^C
[arziyazetdinov@server.arziyazetdinov.net hello]$ git log --max-count=1
```

Рис. 19: Работа с объектами git

## Создание ветки

```
[arziyazetdinov@server.arziyazetdinov.net hello]$ git checkout -b style
Switched to a new branch 'style'
[arziyazetdinov@server.arziyazetdinov.net hello]$ git status
On branch style
nothing to commit, working tree clean
[arziyazetdinov@server.arziyazetdinov.net hello]$ touch lib/style.css
[arziyazetdinov@server.arziyazetdinov.net hello]$ nano style.css
[arziyazetdinov@server.arziyazetdinov.net hello]$ git add lib/style.css
[arziyazetdinov@server.arziyazetdinov.net hello]$ git commit -m "Added css style
sheet"
[style 027e001] Added css stylesheet
 1 file changed, 0 insertions(+), 0 deletions(-)
 create mode 100644 lib/style.css
[arziyazetdinov@server.arziyazetdinov.net hello]$ nano
```

Рис. 20: Создание ветки style и файла style.css

## Создание ветки

The screenshot shows a terminal window with the following details:

- Terminal title: arziyazetdinov@server:~/hello — nano style.css
- File path: style.css
- File status: Modified
- Editor title: GNU nano 5.6.1
- Content of style.css:

```
h1 {  
color: red;  
}
```
- Bottom status bar: "Save modified buffer?"
- Buttons in the bottom status bar:
  - Y Yes
  - N No
  - ^C Cancel

Рис. 21: Файл hello.html

## Создание ветки

The screenshot shows a terminal window with two tabs open. The active tab is titled "nano hello.html". The file content is:

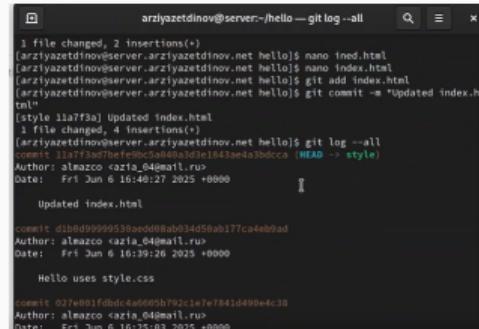
```
GNU nano 5.6.1          hello.html
<!-- Author: Almaz R. Ziyazetdinov (azia_04@mail.ru)-->
<html>
<head>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>
```

The bottom of the terminal window displays a menu bar with the following options:

- [ Read 8 lines ]
- ^G Help
- ^O Write Out
- ^W Where Is
- ^K Cut
- ^T Execute
- ^C Location
- ^X Exit
- ^R Read File
- ^\\ Replace
- ^U Paste
- ^J Justify
- ^\_ Go To Line

Рис. 22: Файлы hello.html и index.html

## Навигация по веткам



```
arziyazetdinov@server:~/hello$ git log --all
commit 11a7f3a [HEAD -> style]
Author: almanzo karina_0@mail.ru
Date:   Fri Jun 6 16:40:27 2025 +0000

    Updated index.html

    1 file changed, 2 insertions(+)
    (arziyazetdinov@server:~/hello)$ nano index.html
[arziyazetdinov@server:~/hello]$ git add index.html
[arziyazetdinov@server:~/hello]$ git commit -m "Updated index.html"
[style 11a7f3a] Updated index.html
1 file changed, 4 insertions(+)
(arziyazetdinov@server:~/hello)$ git log --all
commit 11a7f3a [HEAD -> style] [REBASE-apply: rebasing onto 034d8ab177ca4eb9ad]
Author: almanzo karina_0@mail.ru
Date:   Fri Jun 6 16:40:27 2025 +0000

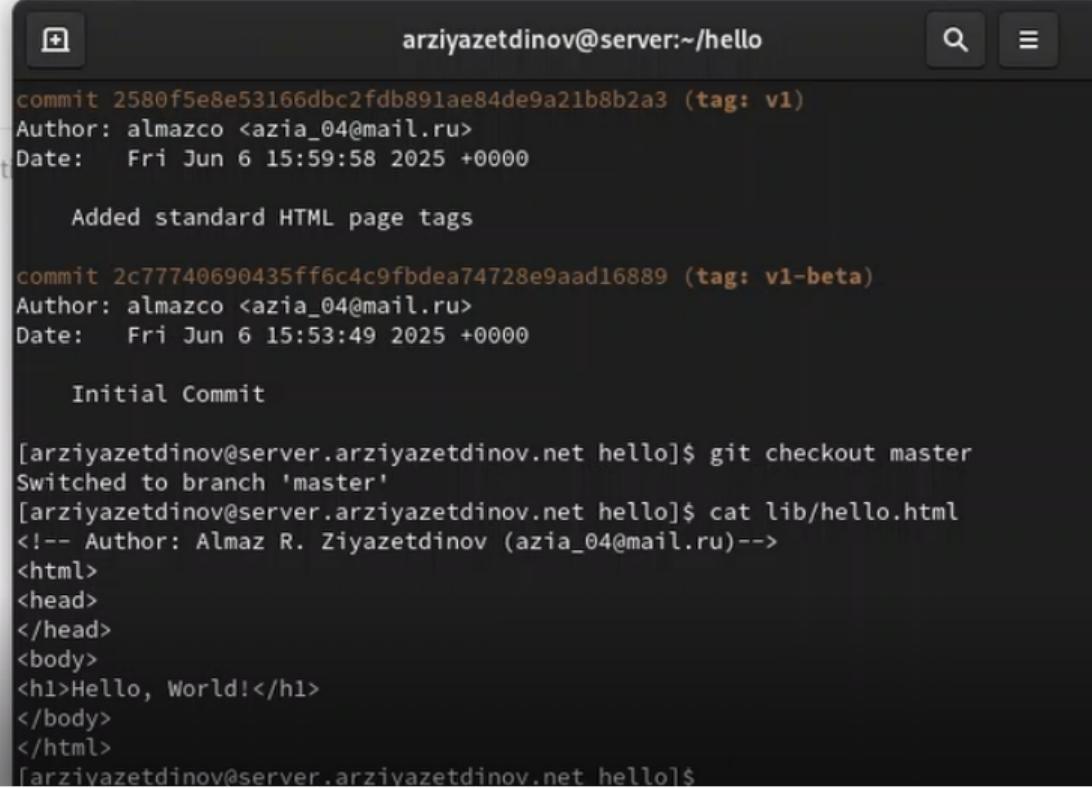
    Hello uses style.css

commit d1bb0d9999530aeddd0ab034d8ab177ca4eb9ad
Author: almanzo karina_0@mail.ru
Date:   Fri Jun 6 16:39:26 2025 +0000

    Hello uses style.css
```

Рис. 23: Логи

## Навигация по веткам



arziyazetdinov@server:~/hello

```
commit 2580f5e8e53166dbc2fdb891ae84de9a21b8b2a3 (tag: v1)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:59:58 2025 +0000

    Added standard HTML page tags

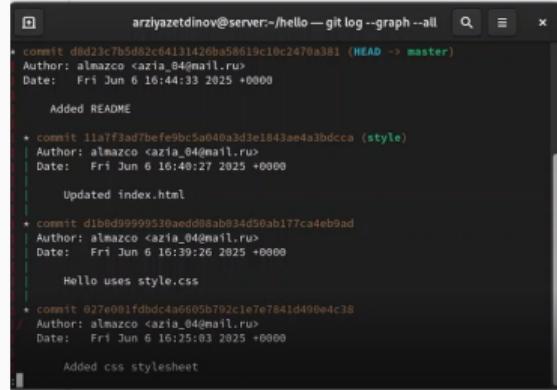
commit 2c77740690435ff6c4c9fbdea74728e9aad16889 (tag: v1-beta)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 15:53:49 2025 +0000

    Initial Commit

[arziyazetdinov@server.arziyazetdinov.net hello]$ git checkout master
Switched to branch 'master'
[arziyazetdinov@server.arziyazetdinov.net hello]$ cat lib/hello.html
<!-- Author: Almaz R. Ziyazetdinov (azia_04@mail.ru)-->
<html>
<head>
</head>
<body>
<h1>Hello, World!</h1>
</body>
</html>
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 24: Навигация по веткам

## Изменения в ветке main



```
arziyazetdinov@server:~/hello -- git log --graph --all
```

```
* commit d8d23c7b5d82c64131426ba58619c10c2470a381 (HEAD -> master)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:44:33 2025 +0000

    Added README

* commit 11a1f7ad7bef9bc5a040a3d3e1843ae4a3bdcca (style)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:40:27 2025 +0000

    Updated index.html

* commit d1b8d9999530aedd08ab034d50ab177ca4eb9ad
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:39:26 2025 +0000

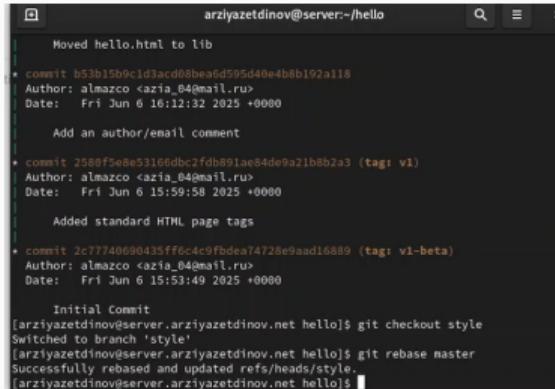
    Hello uses style.css

* commit 027e001fdbdc4a6605b792c1e7e7841d490e4c38
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:25:03 2025 +0000

    Added css stylesheet
```

Рис. 25: Изменения в ветке main

# Слияние



arziyazetdinov@server:~/hello

```
Moved hello.html to lib
commit b53b15b9c1d3acd08beafdf595d40e4b8b192a118
Author: almazzo <azia_04@mail.ru>
Date:   Fri Jun 6 16:12:32 2025 +0000

    Add an author/email comment

commit 2588f5e8e53166dbc2fdb891e84de9a21b8b2a3 (tag: v1)
Author: almazzo <azia_04@mail.ru>
Date:   Fri Jun 6 15:59:58 2025 +0000

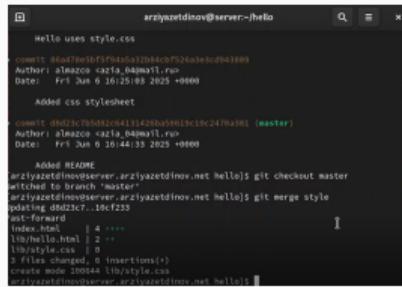
    Added standard HTML page tags

commit 2c77740690435ff6c4c9fbde74728e9aad16889 (tag: v1-beta)
Author: almazzo <azia_04@mail.ru>
Date:   Fri Jun 6 15:53:49 2025 +0000

    Initial Commit
[arziyazetdinov@server.arziyazetdinov.net hello]$ git checkout style
Switched to branch 'style'
[arziyazetdinov@server.arziyazetdinov.net hello]$ git rebase master
Successfully rebased and updated refs/heads/style.
[arziyazetdinov@server.arziyazetdinov.net hello]$
```

Рис. 26: Слияние main c style

# Сброс ветки main



```
arziyazetdinov@server:~/hello
Hello uses style.css
commit d8d23c7c95d82c941314242bba5619c19c2479a381
Author: aleksey cazzia.04@mail.ru
Date:   Fri Jun 6 16:25:08 2025 +0000

    Added css stylesheet

commit d8d23c7c95d82c941314242bba5619c19c2479a381 (master)
Author: aleksey cazzia.04@mail.ru
Date:   Fri Jun 6 16:44:35 2025 +0000

    Added README

arziyazetdinov@server:~/hello$ git checkout master
switched to branch 'master'
arziyazetdinov@server:~/hello$ git merge style
Updating d8d23c7..10cf25
fast-forward
 index.html | 4 +---
 lib/html.html | 2 ++
 lib/style.css | 0
 2 files changed, 6 insertions(+)
 create mode 100644 lib/style.css
arziyazetdinov@server:~/hello$
```

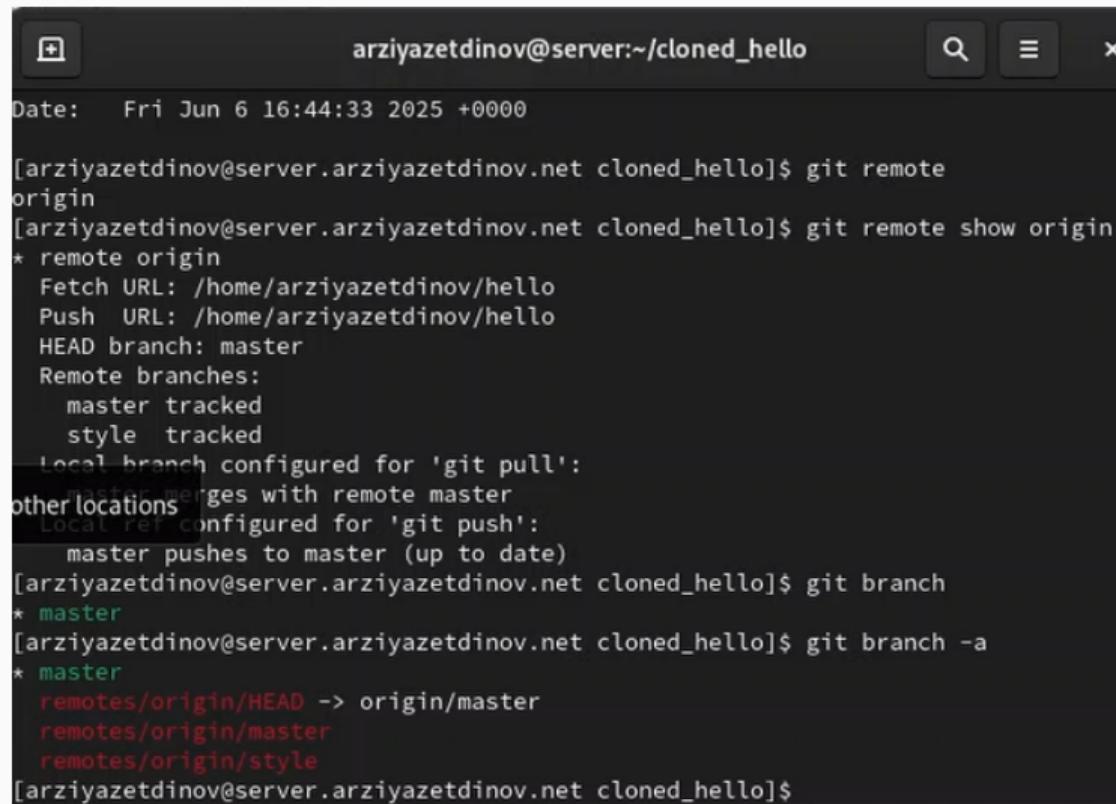
Рис. 27: Ветка main

## Сброс ветки main

```
Date: Fri Jun 6 16:44:33 2025 +0000
Added README
[arziyazetdinov@server.arziyazetdinov.net hello]$ cd ..
[arziyazetdinov@server.arziyazetdinov.net ~]$ cd ..
[arziyazetdinov@server.arziyazetdinov.net home]$ pwd
/home
[arziyazetdinov@server.arziyazetdinov.net home]$ ls
arziyazetdinov user vagrant
[arziyazetdinov@server.arziyazetdinov.net home]$ cd /hello
bash: cd: /hello: No such file or directory
[arziyazetdinov@server.arziyazetdinov.net home]$ cd hello
bash: cd: hello: No such file or directory
[arziyazetdinov@server.arziyazetdinov.net home]$ cd
```

Рис. 28: Информация о репозитории и ветках

## Изменение оригинального репозитория



```
arziyazetdinov@server:~/cloned_hello
Date: Fri Jun 6 16:44:33 2025 +0000

[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git remote
origin

[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git remote show origin
* remote origin
  Fetch URL: /home/arziyazetdinov/hello
  Push URL: /home/arziyazetdinov/hello
  HEAD branch: master
  Remote branches:
    master tracked
    style tracked
  Local branch configured for 'git pull':
    master merges with remote master
  other locations
    Local ref configured for 'git push':
      master pushes to master (up to date)

[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git branch
* master

[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git branch -a
* master
  remotes/origin/HEAD -> origin/master
  remotes/origin/master
  remotes/origin/style

[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$
```

## Создайте чистый репозиторий

```
arziyazetdinov@server:~/cloned_hello — git log --all

[master 010b503] Changed README in original repo
 1 file changed, 1 insertion(+), 1 deletion(-)
[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ cd ../cloned_hello
[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git fetch
remote: Enumerating objects: 5, done.
remote: Counting objects: 100% (5/5), done.
remote: Compressing objects: 100% (3/3), done.
remote: Total 3 (delta 0), reused 0 (delta 0), pack-reused 0
Unpacking objects: 100% (3/3), 351 bytes | 29.00 KiB/s, done.
From /home/arziyazetdinov/hello
  10cf233..010b503 master      -> origin/master
[arziyazetdinov@server.arziyazetdinov.net cloned_hello]$ git log --all
commit 010b503f5edba9ea4d23f0425da7b0b604e2cd6a (origin/master, origin/HEAD)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 17:08:23 2025 +0000

    Changed README in original repo

commit 10cf23319725de09e7f94f84ea33f1b9edb26452 (HEAD -> master, origin/style)
Author: almazco <azia_04@mail.ru>
Date:   Fri Jun 6 16:40:27 2025 +0000

    Updated index.html
```

Рис. 30: Извлечение общих изменений

## Вывод

---

- В ходе выполнения данной лабораторной работы я приобрела практические навыки работы с системой управления версиями Git.