

Лабораторная работа 1

Математическое моделирование

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Приобретение навыков работы с git

Получить практические навыки на примерах

Выполнение лабораторной работы

Создаем страницу hello, world.

```
yaroslav@vbox:~/hello$ git tag v1
yaroslav@vbox:~/hello$ git checkout v1^
Note: switching to 'v1^'.

You are in 'detached HEAD' state. You can look around, make experimental
changes and commit them, and you can discard any commits you make in this
state without impacting any branches by switching back to a branch.

If you want to create a new branch to retain commits you create, you may
do so (now or later) by using -c with the switch command. Example:

    git switch -c <new-branch-name>

Or undo this operation with:

    git switch -

Turn off this advice by setting config variable advice.detachedHead to false

HEAD is now at fa3e7d8 Added standard HTML page tags
yaroslav@vbox:~/hello$
```

Рис. 1: создание

Внесение изменений в созданную страницу.

```
yaroslav@vbox:~/hello$ mkdir lib
yaroslav@vbox:~/hello$ git mv hello.html lib
yaroslav@vbox:~/hello$ git status
On branch master
Changes to be committed:
  (use "git restore --staged <file>..." to unstage)
    renamed:    hello.html -> lib/hello.html

yaroslav@vbox:~/hello$ git commit -m "Moved hello.html to lib"
[master 339229c] Moved hello.html to lib
 1 file changed, 0 insertions(+), 0 deletions(-)
 rename hello.html => lib/hello.html (100%)
```

Рис. 2: Внесение изменений

Индексация и коммит изменений.

```
commit e1d2bd2081515144b9971733c625c33716fd6c6b (HEAD -> style)
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:46:54 2025 +0300

    Updated index.html

commit 4d356016bcbdd6ff15c81dd9d5c24fa75b1066b5
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:42:54 2025 +0300

    Added css stylesheet

commit 5e4a8b8f872c446888b4935c297e80ba3e1436ef (master)
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:33:27 2025 +0300

    Added index.html.

commit 339229c50dbcfbb023ea7392a8c47020685e7c63
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:30:38 2025 +0300

    Moved hello.html to lib
yaruslav@vbox:~/hello$
```

Рис. 3: Индексация

Получение старых версий и создание тегов (

```
* commit 7d15bff561b00df7b4592e1247aa0224472db56c (HEAD -> style)
| \
| Merge: e1d2bd2 c9ac965
| Author: yvgoloschapov <1132222003@pfur.ru>
| Date:   Fri Feb 14 16:49:27 2025 +0300
|
|     Merge branch 'master' into style
|
| * commit c9ac9652e6fa53108997a7354d445546ec7e3589 (master)
| | Author: yvgoloschapov <1132222003@pfur.ru>
| | Date:   Fri Feb 14 16:48:52 2025 +0300
| |
| |     Added README
| |
| | * commit e1d2bd2081515144b9971733c625c33716fd6c6b
| | | Author: yvgoloschapov <1132222003@pfur.ru>
| | | Date:   Fri Feb 14 16:46:54 2025 +0300
| | |
| | |     Updated index.html
| | |
| | * commit 4d356016bcbdd6ff15c81dd9d5c24fa75b1066b5
| | | Author: yvgoloschapov <1132222003@pfur.ru>
| | | Date:   Fri Feb 14 16:42:54 2025 +0300
| | |
| | |
```

Рис. 4: теги

Отмена локальных изменений (до индексации)

```
yaroslav@vbox:~$ git config --global core.quotepath off
yaroslav@vbox:~$ mkdir hello
yaroslav@vbox:~$ cd hello
yaroslav@vbox:~/hello$ touch hello.html
yaroslav@vbox:~/hello$ echo "Hello, World!" > hello.html
yaroslav@vbox:~/hello$ git init
hint: Using 'master' as the name for the initial branch. This default branch name
hint: is subject to change. To configure the initial branch name to use in all
hint: 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/yaroslav/hello/.git/
yaroslav@vbox:~/hello$ git add hello.html
yaroslav@vbox:~/hello$ git commit -m "Initial Commit"
[master (root-commit) b83a68e] Initial Commit
 1 file changed, 1 insertion(+)
 create mode 100644 hello.html
yaroslav@vbox:~/hello$ git statu
```

Рис. 5: Отмена локальных изменений

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

Рис. 6: Отмена проиндексированных изменений

```
yaroslav@vbox:~/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")
yaroslav@vbox:~/hello$ git add hello.html
yaroslav@vbox:~/hello$ git commit -m "Initial Commit"
[master 30010d2] Initial Commit
 1 file changed, 1 insertion(+), 1 deletion(-)
yaroslav@vbox:~/hello$ git status
On branch master
nothing to commit, working tree clean
yaroslav@vbox:~/hello$ git add hello.html
yaroslav@vbox:~/hello$
```

Рис. 7: Отмена коммитов

```
commit 3436ef6c8df973a79189c213ed05c2fde85aa8a4 (HEAD -> master)
```

```
Author: yvgoloschapov <1132222003@pfur.ru>
```

```
Date: Fri Feb 14 16:12:08 2025 +0300
```

```
Added HTML header
```

```
commit fa3e7d864e17cf92e4b6ddd49c75da7a3cd031ca
```

```
Author: yvgoloschapov <1132222003@pfur.ru>
```

```
Date: Fri Feb 14 16:11:24 2025 +0300
```

```
Added standard HTML page tags
```

```
commit 30010d246dbb696d2b7042e5effb52274d3ddf36
```

```
Author: yvgoloschapov <1132222003@pfur.ru>
```

```
Date: Fri Feb 14 16:08:25 2025 +0300
```

```
Initial Commit
```

```
commit b83a68eb3d95ec034ef10941a13549b51a152b7f
```

```
Author: yvgoloschapov <1132222003@pfur.ru>
```

```
Date: Fri Feb 14 16:05:29 2025 +0300
```

```
Initial Commit
```

```
(END)
```

Рис. 8: Удаление коммиттов из ветки

```
Previous HEAD position was fa3e7d8 Added standard HTML page tags
Switched to branch 'master'
yaroslav@vbox:~/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")
yaroslav@vbox:~/hello$ git checkout hello.html
Updated 1 path from the index
yaroslav@vbox:~/hello$ git status
On branch master
nothing to commit, working tree clean
yaroslav@vbox:~/hello$ cat hello.html
<html>
  <head>
  </head>
  <body>
    <h1>Hello, World!</h1>
  </body>
</html>
yaroslav@vbox:~/hello$
```

Рис. 9: Удаление тега oops

Внесение изменений в коммиты

```
yaroslav@vbox:~/hello$ git reset HEAD hello.html
Unstaged changes after reset:
M       hello.html
yaroslav@vbox:~/hello$ git checkout hello.htm
error: pathspec 'hello.htm' did not match any file(s) known to git
yaroslav@vbox:~/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")
yaroslav@vbox:~/hello$ git checkout hello.html
Updated 1 path from the index
yaroslav@vbox:~/hello$ git status
On branch master
nothing to commit, working tree clean
yaroslav@vbox:~/hello$
```

Рис. 10: Внесение изменений в коммиты


```
Date:   Fri Feb 14 16:23:55 2025 +0300

    Revert "Oops, we didn't want this commit"

    This reverts commit d8b766bbcc30deb15c009b6069169de6ee846b88.

commit d8b766bbcc30deb15c009b6069169de6ee846b88
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:23:41 2025 +0300

    Oops, we didn't want this commit

commit 3436ef6c8df973a79189c213ed05c2fde85aa8a4 (HEAD -> master, tag: v1)
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:12:08 2025 +0300

    Added HTML header

commit fa3e7d864e17cf92e4b6ddd49c75da7a3cd031ca (tag: v1-beta)
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:11:24 2025 +0300
yaroslav@vbox:~/hello$ git tag -d oops
Deleted tag 'oops' (was 555d703)
```

Рис. 11: Перемещение файлов

Второй способ перемещения файлов

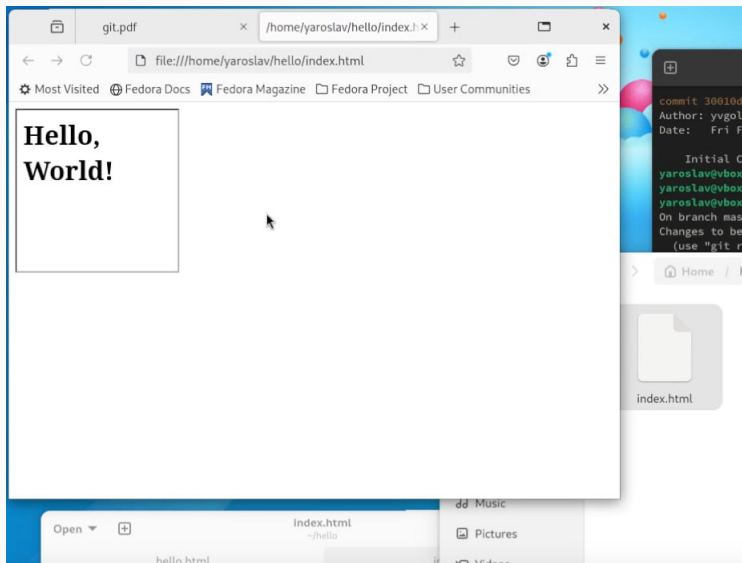
```
yaroslav@vbox:~/hello$ git add .
yaroslav@vbox:~/hello$ git commit -m "Add an author comment"
[master ddf495] Add an author comment
1 file changed, 1 insertion(+)
yaroslav@vbox:~/hello$ git add hello.html
yaroslav@vbox:~/hello$ git commit --amend -m "Add an author/email comment"
[master a3a7406] Add an author/email comment
Date: Fri Feb 14 16:27:24 2025 +0300
1 file changed, 1 insertion(+)
```

Рис. 12: Второй способ перемещения файлов

```
yaroslav@vbox:~/hello$ touch index.html
yaroslav@vbox:~/hello$ git add index.html
yaroslav@vbox:~/hello$ git commit -m "Added index.html."
[master 5e4a8b8] Added index.html.
 1 file changed, 5 insertions(+)
 create mode 100644 index.html
```

Рис. 13: Git внутри

Работа непосредственно с объектами git



```
yaroslav@vbox:~/hello$ git cat-file -p 5e4a8b8f872c446888b4935c297e80ba3e1436ef
tree 74b98423835510421135ad6ba558cc4822e9ace4
parent 339229c50dbcffb023ea7392a8c47020685e7c63
author yvgoloschapov <1132222003@pfur.ru> 1739540007 +0300
committer yvgoloschapov <1132222003@pfur.ru> 1739540007 +0300

Added index.html.
yaroslav@vbox:~/hello$ git cat-file -t 5e4a8b8f872c446888b4935c297e80ba3e1436ef
commit
yaroslav@vbox:~/hello$ git cat-file -p 74b98423835510421135ad6ba558cc4822e9ace4
100644 blob ae5b538cd0610f43516914c29faaae04e80a870d    index.html
040000 tree 1f9d4b7922d7d17c44db2e8f9174fc4881bc885e    lib
yaroslav@vbox:~/hello$ git cat-file -p <libhash>
bash: syntax error near unexpected token `newline'
yaroslav@vbox:~/hello$ git cat-file -p 1f9d4b7922d7d17c44db2e8f9174fc4881bc885e
100644 blob 850538236050a14e383ec970a0b468a987af07bc    hello.html
yaroslav@vbox:~/hello$ git cat-file 850538236050a14e383ec970a0b468a987af07bc
```

Рис. 15: Создание ветки

```
yaroslav@vbox:~/hello$ git checkout master
Switched to branch 'master'
yaroslav@vbox:~/hello$ cat lib/hello.htm
cat: lib/hello.htm: No such file or directory
yaroslav@vbox:~/hello$ cat lib/hello.html
<!-- Author: Goloschapov (1132222003@pfur.ru) -->
<html>
  <head>
</head>
  <body>
    <h1>Hello, World!</h1>
  </body>
</html>
yaroslav@vbox:~/hello$
```

Рис. 16: Навигация по веткам

```
yaroslav@vbox:~/hello$ git checkout style
Switched to branch 'style'
yaroslav@vbox:~/hello$ git merge master
Merge made by the 'ort' strategy.
 README.md | 1 +
 1 file changed, 1 insertion(+)
 create mode 100644 README.md
yaroslav@vbox:~/hello$ git log --graph --all
```

Рис. 17: Изменения в ветке master

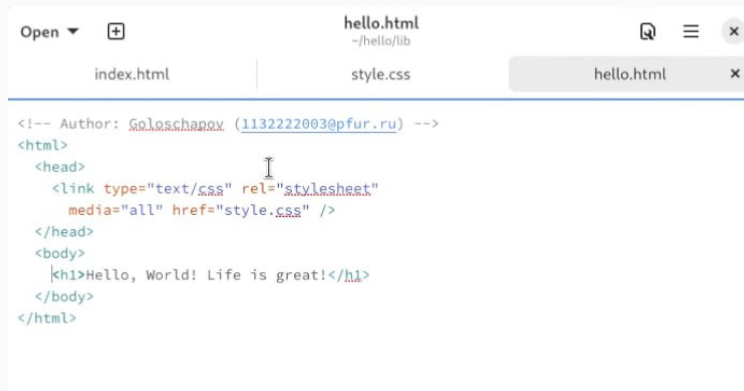
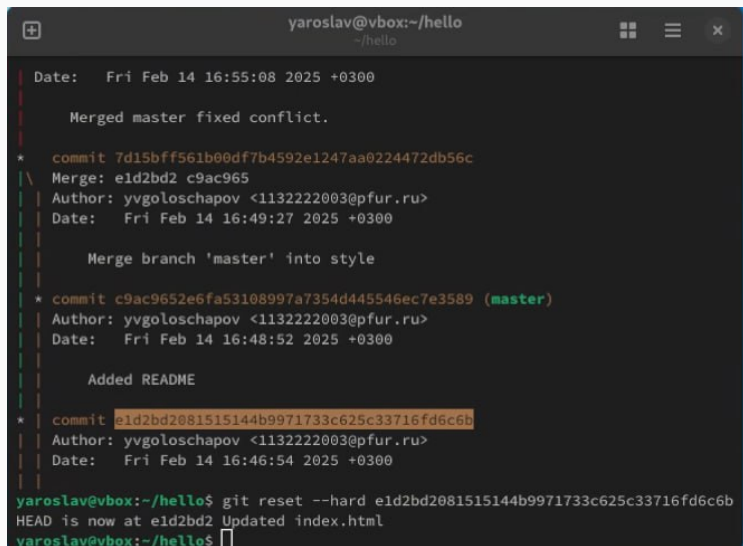


Рис. 18: Слияние веток



A terminal window titled 'yaroslav@vbox:~/hello' with a subtitle '~/.hello'. The window shows the output of a Git merge operation. It starts with the date 'Fri Feb 14 16:55:08 2025 +0300' and the message 'Merged master fixed conflict.'. This is followed by a commit log entry for a merge commit: 'commit 7d15bfff561b00df7b4592e1247aa0224472db56c', 'Merge: e1d2bd2 c9ac965', 'Author: yvgoloschapov <1132222003@pfur.ru>', and 'Date: Fri Feb 14 16:49:27 2025 +0300'. The message 'Merge branch 'master' into style' is shown. Then, another commit log entry for the master branch is shown: 'commit c9ac9652e6fa53108997a7354d445546ec7e3589 (master)', 'Author: yvgoloschapov <1132222003@pfur.ru>', and 'Date: Fri Feb 14 16:48:52 2025 +0300'. The message 'Added README' is shown. Finally, a commit log entry for the current commit is shown: 'commit e1d2bd2081515144b9971733c625c33716fd6c6b', 'Author: yvgoloschapov <1132222003@pfur.ru>', and 'Date: Fri Feb 14 16:46:54 2025 +0300'. The terminal prompt shows the user running 'git reset --hard e1d2bd2081515144b9971733c625c33716fd6c6b', which results in 'HEAD is now at e1d2bd2 Updated index.html'. The final prompt is 'yaroslav@vbox:~/hello\$'.

```
yaroslav@vbox:~/hello
~/.hello

Date:   Fri Feb 14 16:55:08 2025 +0300

    Merged master fixed conflict.

*   commit 7d15bfff561b00df7b4592e1247aa0224472db56c
    \   Merge: e1d2bd2 c9ac965
    |   Author: yvgoloschapov <1132222003@pfur.ru>
    |   Date:   Fri Feb 14 16:49:27 2025 +0300
    |
    |   Merge branch 'master' into style
    |
    *   commit c9ac9652e6fa53108997a7354d445546ec7e3589 (master)
    |   Author: yvgoloschapov <1132222003@pfur.ru>
    |   Date:   Fri Feb 14 16:48:52 2025 +0300
    |
    |   Added README
    |
    *   commit e1d2bd2081515144b9971733c625c33716fd6c6b
    |   Author: yvgoloschapov <1132222003@pfur.ru>
    |   Date:   Fri Feb 14 16:46:54 2025 +0300
    |
    |
yaroslav@vbox:~/hello$ git reset --hard e1d2bd2081515144b9971733c625c33716fd6c6b
HEAD is now at e1d2bd2 Updated index.html
yaroslav@vbox:~/hello$
```

```
yaroslav@vbox:~/hello
~/hello

Date:   Fri Feb 14 16:48:52 2025 +0300

    Added README

* commit 5e4a8b8f872c446888b4935c297e80ba3e1436ef
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:33:27 2025 +0300

    Added index.html.

* commit 339229c50dbcffb023ea7392a8c47020685e7c63
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:30:38 2025 +0300

    Moved hello.html to lib

* commit a3a74068e870901c31ef87cd15c5ffc78bb302a9
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:27:24 2025 +0300

    Add an author/email comment

yaroslav@vbox:~/hello$ git reset --hard c9ac9652e6fa53108997a7354d445546ec7e3589
HEAD is now at c9ac965 Added README
yaroslav@vbox:~/hello$
```

```
yaroslav@vbox:~/hello$ git checkout style
Switched to branch 'style'
yaroslav@vbox:~/hello$ git rebase master
Successfully rebased and updated refs/heads/style.
yaroslav@vbox:~/hello$ git log --graph
```

Рис. 21: Сброс ветки style

```
yaroslav@vbox:~/hello$ git checkout master
Switched to branch 'master'
yaroslav@vbox:~/hello$ git merge style
Updating c9ac965..2293d82
Fast-forward
 index.html      | 4 +++++
 lib/style.css   | 3 +++
 2 files changed, 7 insertions(+)
 create mode 100644 lib/style.css
yaroslav@vbox:~/hello$
```

Рис. 22: Сброс ветки master

```
yaroslav@vbox:~/hello$ cd ..
yaroslav@vbox:~$ pwd
/home/yaroslav
yaroslav@vbox:~$ ls
Desktop  hello      Public      Templates
Documents Music      study_2024-2025_mathmod Videos
Downloads Pictures  study_2024-2025_mip
yaroslav@vbox:~$ git clone hello cloned_hello
Cloning into 'cloned_hello'...
done.
yaroslav@vbox:~$ ls
cloned_hello Documents hello Pictures study_2024-2025_mathmod Templates
Desktop Downloads Music Public study_2024-2025_mip Videos
yaroslav@vbox:~$
```

Рис. 23: Перебазирование

```
yaroslav@vbox:~/cloned_hello$ git remote
origin
yaroslav@vbox:~/cloned_hello$ git remote show origin
* remote origin
  Fetch URL: /home/yaroslav/hello
  Push URL: /home/yaroslav/hello
  HEAD branch: master
  Remote branches:
    master tracked
    style tracked
  Local branch configured for 'git pull':
    master merges with remote master
  Local ref configured for 'git push':
    master pushes to master (up to date)
yaroslav@vbox:~/cloned_hello$
```

Рис. 24: Слияние в ветку master

```
yaroslav@vbox:~/cloned_hello$ git branch
* master
yaroslav@vbox:~/cloned_hello$ git branch -a
* master
  remotes/origin/HEAD -> origin/master
  remotes/origin/master
  remotes/origin/style
```

Рис. 25: Клонирование репозитория

A terminal window with a dark background. The prompt is 'yaroslav@vbox:~/cloned_hello\$'. The command entered is 'git merge origin/master'. The output is '\Already up to date.'.

```
yaroslav@vbox:~/cloned_hello$ git merge origin/master
\Already up to date.
```

Рис. 26: origin


```
yaroslav@vbox:~/cloned_hello$ git branch --track style origin/style
branch 'style' set up to track 'origin/style'.
yaroslav@vbox:~/cloned_hello$ git branch -a
* master
  style
remotes/origin/HEAD -> origin/master
remotes/origin/master
remotes/origin/style
yaroslav@vbox:~/cloned_hello$ git log --max-count=2
commit 2293d82905cc7d797cc1ed1c878c4ad35645987b (HEAD -> master, origin/style, o
rigin/master, origin/HEAD, style)
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:46:54 2025 +0300

    Updated index.html

commit 1c8d8bae7b62146b5f499f5150bcaca58aae9f5c
Author: yvgoloschapov <1132222003@pfur.ru>
Date:   Fri Feb 14 16:42:54 2025 +0300

    Added css stylesheet
yaroslav@vbox:~/cloned_hello$
```

Рис. 27: Удаленные ветки

Изменение оригинального репозитория

```
yaroslav@vbox:~/cloned_hello$ cd ..  
yaroslav@vbox:~$ git clone --bare hello hello.git  
Cloning into bare repository 'hello.git'...  
done.  
yaroslav@vbox:~$ ls hello.git  
branches  config  description  HEAD  hooks  info  objects  packed-refs  refs  
yaroslav@vbox:~$ cd hello  
yaroslav@vbox:~/hello$ git remote add shared ../hello.git  
yaroslav@vbox:~/hello$
```

Рис. 28: Изменение оригинального репозитория

Выводы

В этой лабораторной работе я приобрел навыки работы с git