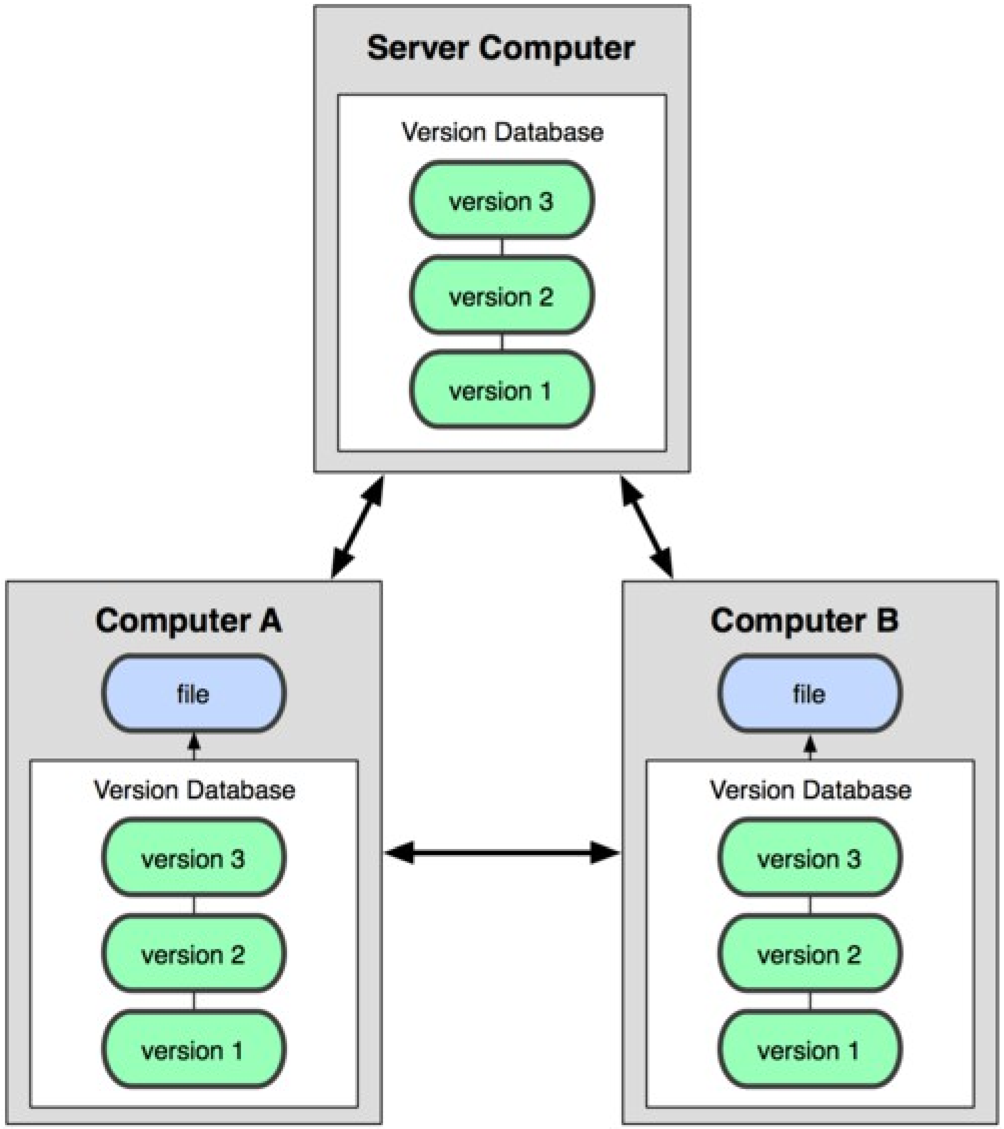
# Version control: basic Git tutorial

Preseted by
Victoria Rudakova

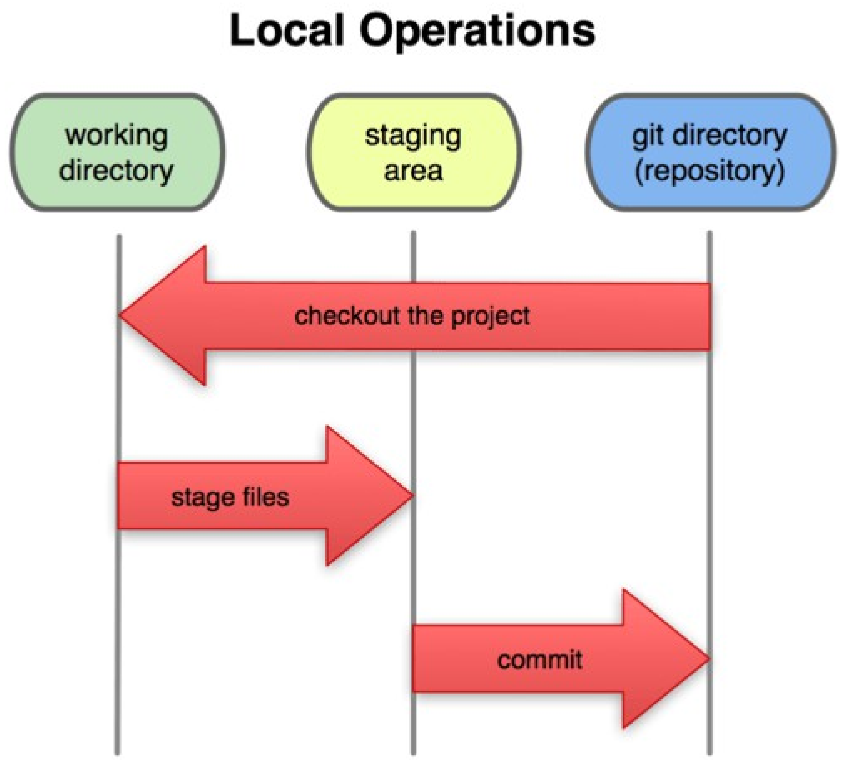
# What is "version control"

Version control is a system that records changes to a file or set of files over time so that you can recall specific versions later



# Git: the three states

- Commited (stored in local database)
- Modified (file changed but not commited to database)
- Staged (modified file is marked to go into the next commit snapshot)



# Git installation

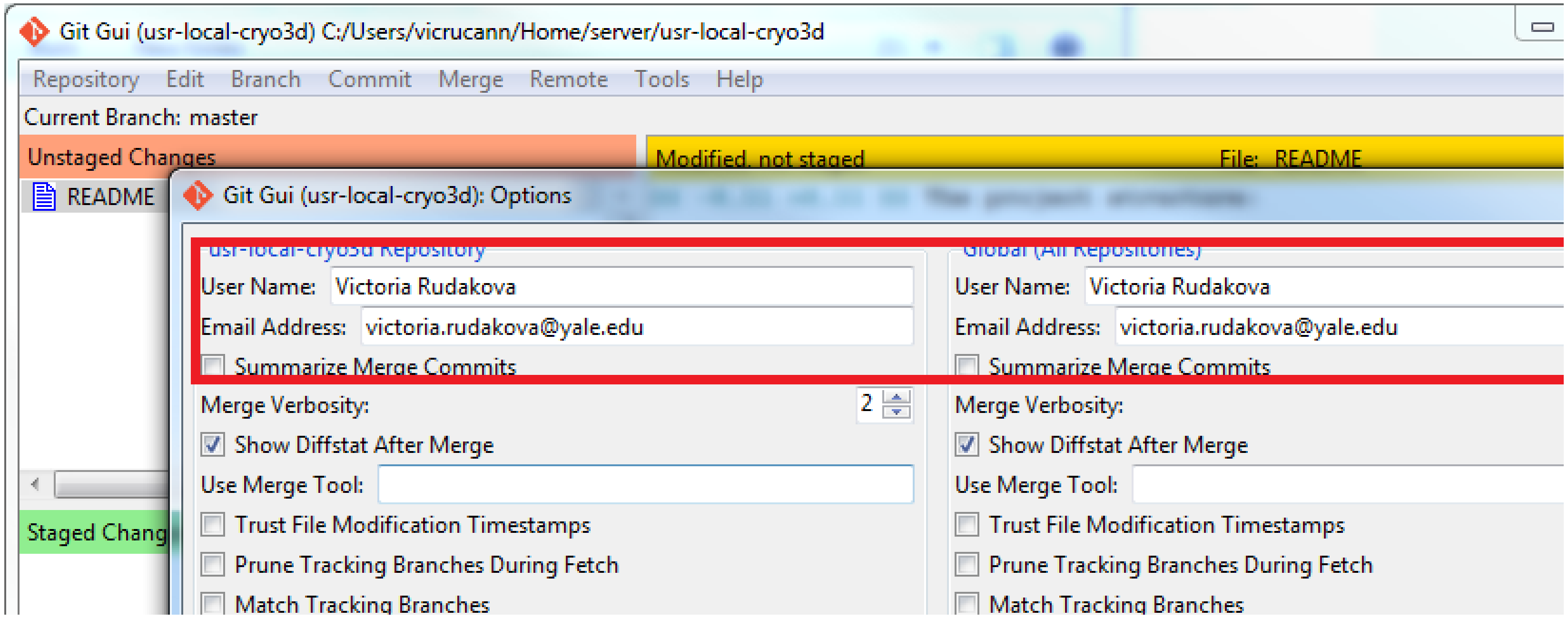
- Windows: http://www.git-scm.com
- Linux:
    - apt-get install git
    - yum install git
- Already installed in cygwin

# Git config

- Using Git Bash (command line):

```
$ git config --global user.name "Name Surname"
$ git config --global user.email name.surname@yale.edu
```

- Using Git GUI:



Git Gui (usr-local-cryo3d) C:/Users/vicrucann/Home/server/usr-local-cryo3d

Current Branch: master

Unstaged Changes

README

Modified, not staged    File: README

Staged Chang

Git Gui (usr-local-cryo3d): Options

usr-local-cryo3d Repository

User Name: Victoria Rudakova

Email Address: victoria.rudakova@yale.edu

☐ Summarize Merge Commits

Merge Verbosity: 2

☑ Show Diffstat After Merge

Use Merge Tool:

☐ Trust File Modification Timestamps

☐ Prune Tracking Branches During Fetch

☐ Match Tracking Branches

Global (All Repositories)

User Name: Victoria Rudakova

Email Address: victoria.rudakova@yale.edu

☐ Summarize Merge Commits

Merge Verbosity:

☑ Show Diffstat After Merge

Use Merge Tool:

☐ Trust File Modification Timestamps

☐ Prune Tracking Branches During Fetch

☐ Match Tracking Branches

# Getting git repository

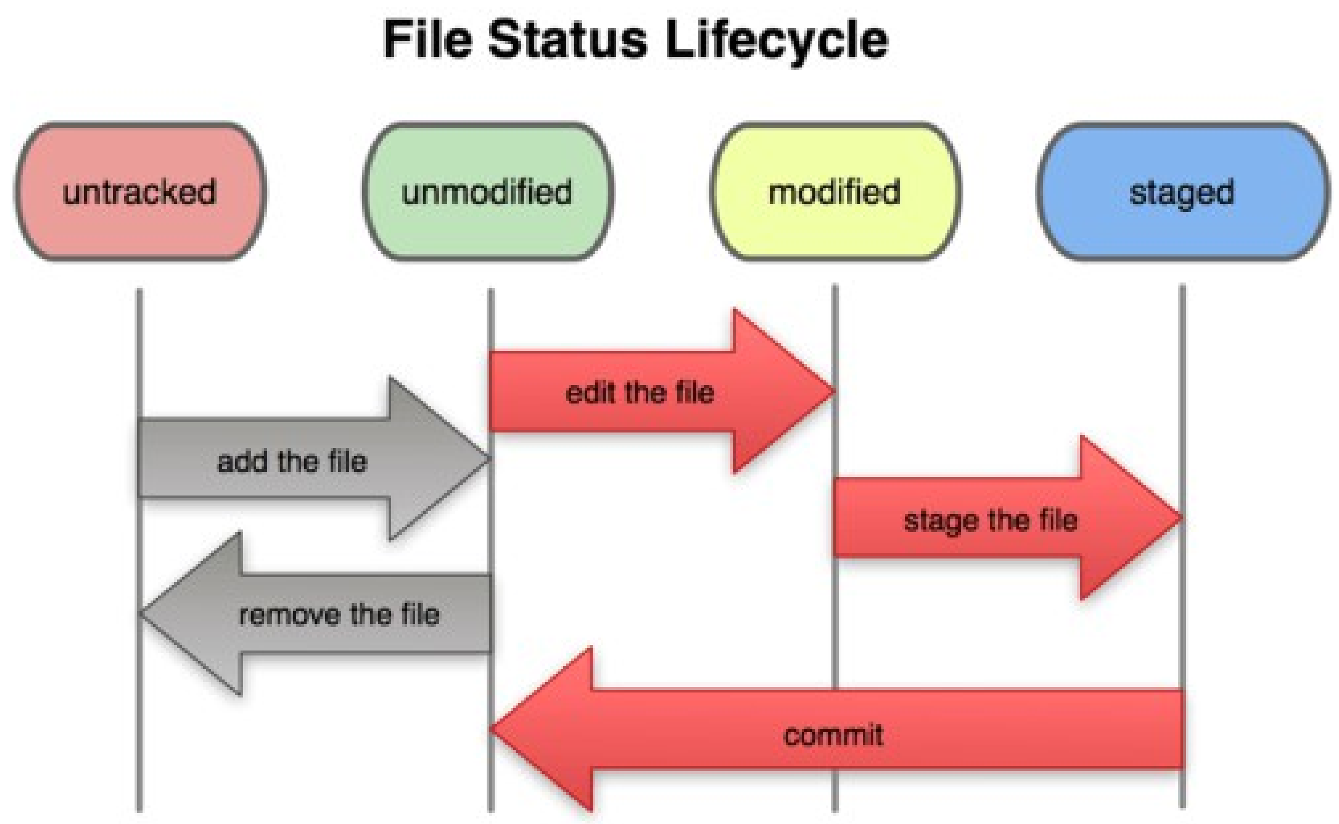
- To clone existing repository from server2:

```
$ git clone username@172.23.5.77:/usr/local/cryo3d/cryo3d.git
```

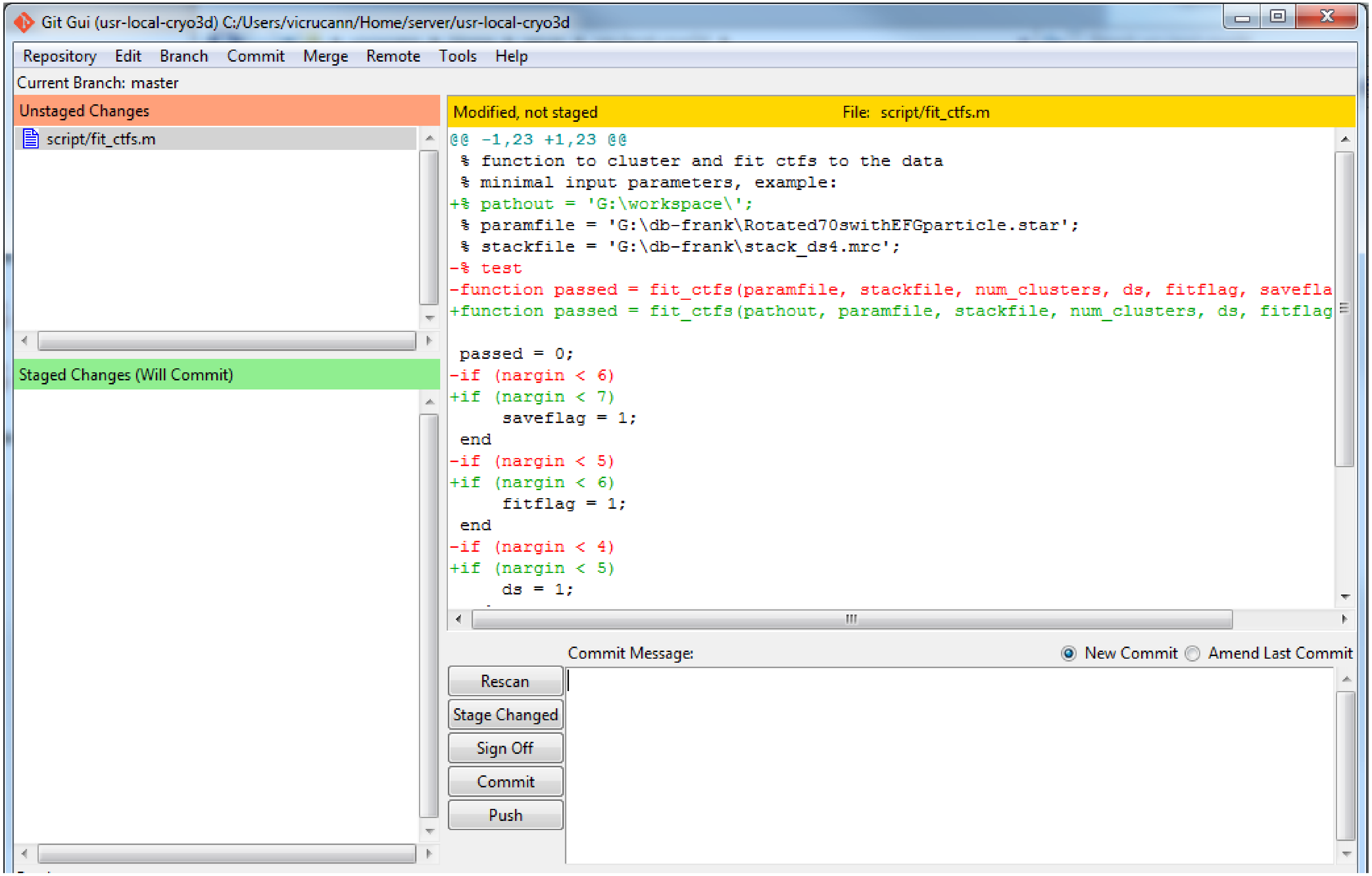
- To start version controlling edited existing (new) files (tracking and commiting to local repository):

```
$ git add filename                [start tracking new/edited filename]
$ git add .  (git add -A)         [start tracking all changed/new files]
$ git commit -m 'Commit message: what changes were introduced'
                                  [save changes to the local repository]
```

# Recording changes to the repository



# Recording changes to the repository (GUI version)



```
@@ -1,23 +1,23 @@
 % function to cluster and fit ctfs to the data
 % minimal input parameters, example:
+% pathout = 'G:\workspace\';
 % paramfile = 'G:\db-frank\Rotated70swithEFGparticle.star';
 % stackfile = 'G:\db-frank\stack_ds4.mrc';
-% test
-function passed = fit_ctfs(paramfile, stackfile, num_clusters, ds, fitflag, savefla
+function passed = fit_ctfs(pathout, paramfile, stackfile, num_clusters, ds, fitflag

 passed = 0;
-if (nargin < 6)
+if (nargin < 7)
     saveflag = 1;
 end
-if (nargin < 5)
+if (nargin < 6)
     fitflag = 1;
 end
-if (nargin < 4)
+if (nargin < 5)
     ds = 1;
```

# Recording changes to the repository: status

$ git status [Check status of your project]

```
$ git status
On branch master
nothing to commit, working directory clean
```

```
$ echo 'My Project' > README
$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be committed)

    README

nothing added to commit but untracked files present (use "git add" to track)
```

## Recording changes to the repository: status

$ git status [Check status of your project]

```
$ git status
On branch master
nothing to commit, working directory clean
```

```
$ echo 'My Project' > README
$ git status
On branch master
Untracked files:
  (use "git add <file>..." to include in what will be committed)

    README

nothing added to commit but untracked files present (use "git add" to track)
```

# Recording changes to the repository: tracking your files

$ git add [Begin tracking a new file (directory)]

```
$ git add README
```

```
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file:   README
```

# Recording changes to the repository: staging modified files

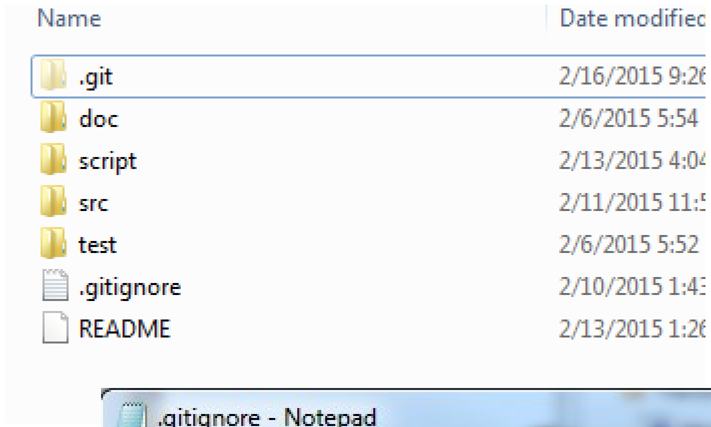
$ git add [Stage the file, add this content to the next commit]

```
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file:   README

Changes not staged for commit:
  (use "git add <file>..." to update what will be committed)
  (use "git checkout -- <file>..." to discard changes in working directory)

    modified:   CONTRIBUTING.md
```

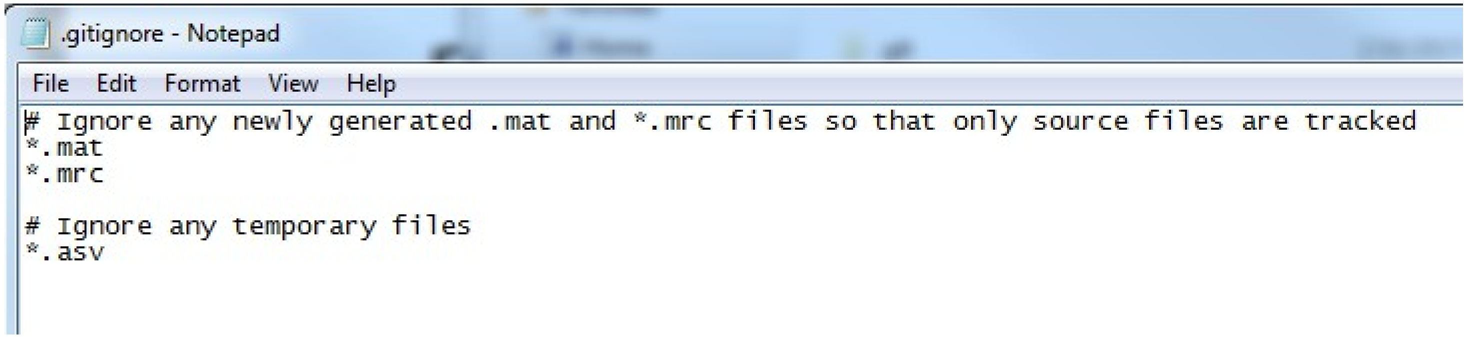
```
$ git add CONTRIBUTING.md
$ git status
On branch master
Changes to be committed:
  (use "git reset HEAD <file>..." to unstage)

    new file:   README
    modified:   CONTRIBUTING.md
```

# Recording changes to the repository: ignoring files

- If we do not want to track automatically generated files (e.g. Log files, build files etc)
- .gitignore file



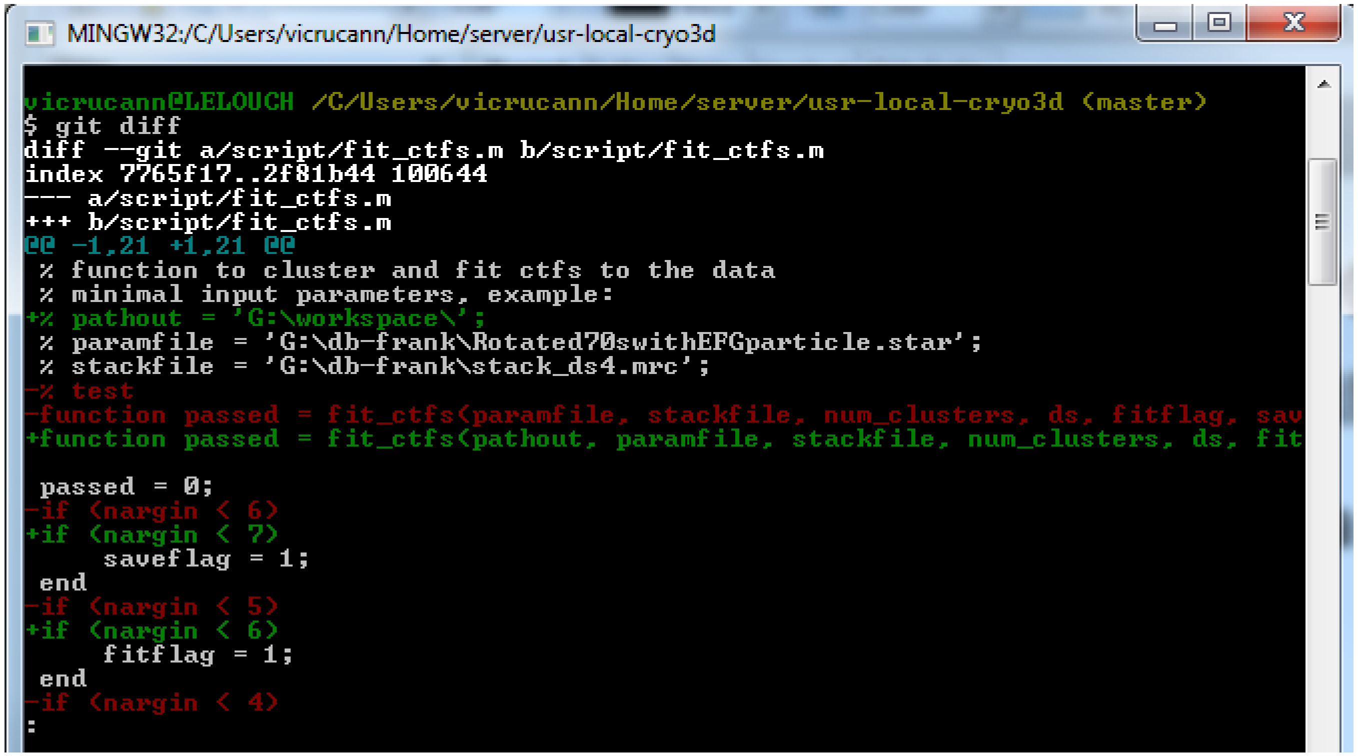
| Name | Date modifiec |
|---|---|
| .git | 2/16/2015 9:2 |
| doc | 2/6/2015 5:54 |
| script | 2/13/2015 4:0 |
| src | 2/11/2015 11: |
| test | 2/6/2015 5:52 |
| .gitignore | 2/10/2015 1:4 |
| README | 2/13/2015 1:2 |



```
# Ignore any newly generated .mat and *.mrc files so that only source files are tracked
*.mat
*.mrc

# Ignore any temporary files
*.asv
```

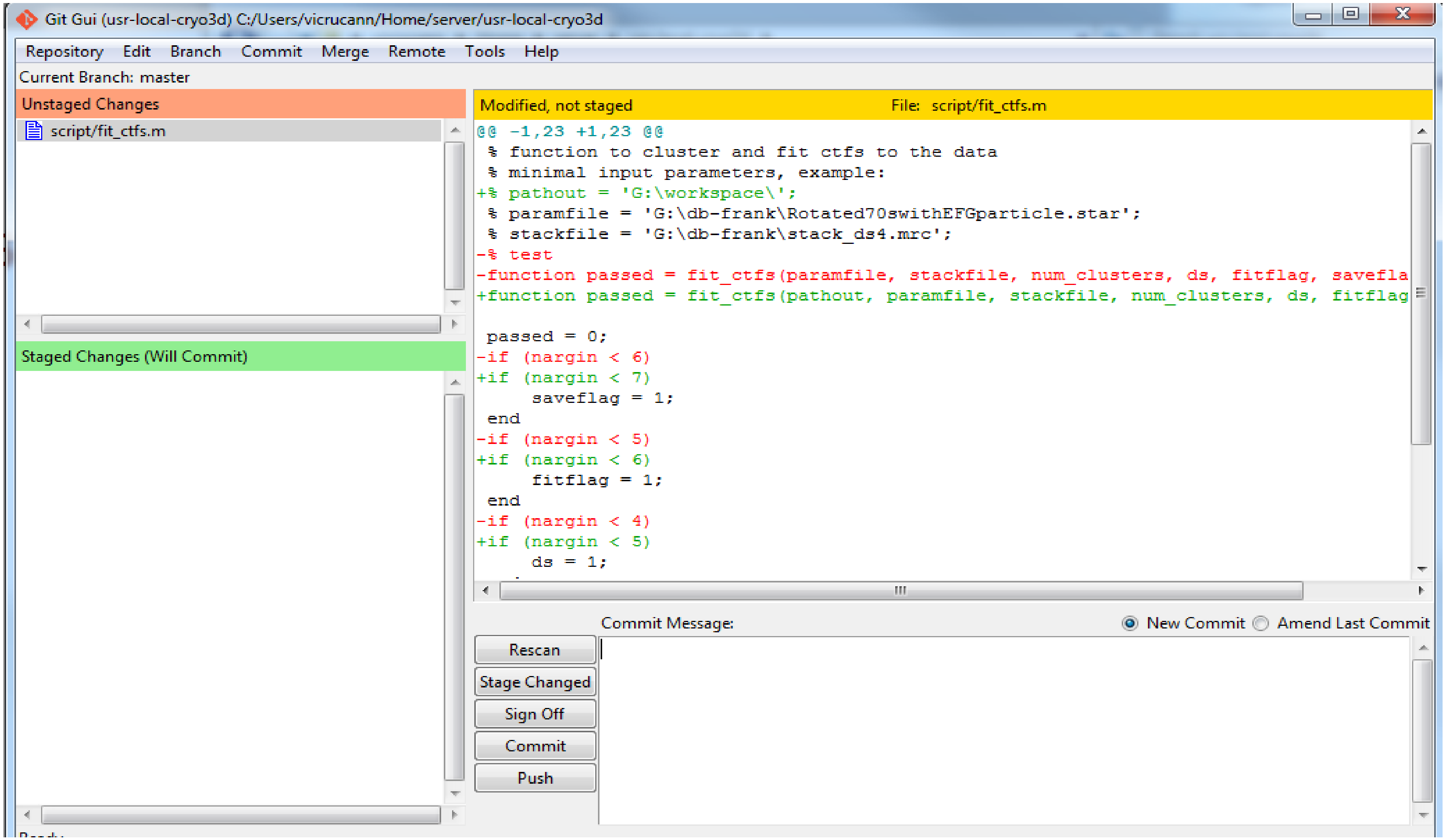
# Viewing staged and unstaged changes

$ git diff [what changed but not yet staged]



```
vicrucann@LELOUCH /C/Users/vicrucann/Home/server/usr-local-cryo3d (master)
$ git diff
diff --git a/script/fit_ctfs.m b/script/fit_ctfs.m
index 7765f17..2f81b44 100644
--- a/script/fit_ctfs.m
+++ b/script/fit_ctfs.m
@@ -1,21 +1,21 @@
 % function to cluster and fit ctfs to the data
 % minimal input parameters, example:
+% pathout = 'G:\workspace\';
 % paramfile = 'G:\db-frank\Rotated70swithEFGparticle.star';
 % stackfile = 'G:\db-frank\stack_ds4.mrc';
-% test
-function passed = fit_ctfs(paramfile, stackfile, num_clusters, ds, fitflag, sav
+function passed = fit_ctfs(pathout, paramfile, stackfile, num_clusters, ds, fit

 passed = 0;
-if (nargin < 6)
+if (nargin < 7)
     saveflag = 1;
 end
-if (nargin < 5)
+if (nargin < 6)
     fitflag = 1;
 end
-if (nargin < 4)
:
```

# Viewing staged and unstaged changes - GUI



Current Branch: master

Unstaged Changes: script/fit_ctfs.m

Modified, not staged File: script/fit_ctfs.m

```
@@ -1,23 +1,23 @@
 % function to cluster and fit ctfs to the data
 % minimal input parameters, example:
+% pathout = 'G:\workspace\';
 % paramfile = 'G:\db-frank\Rotated70swithEFGparticle.star';
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-if (nargin < 6)
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     saveflag = 1;
 end
-if (nargin < 5)
+if (nargin < 6)
     fitflag = 1;
 end
-if (nargin < 4)
+if (nargin < 5)
     ds = 1;
```
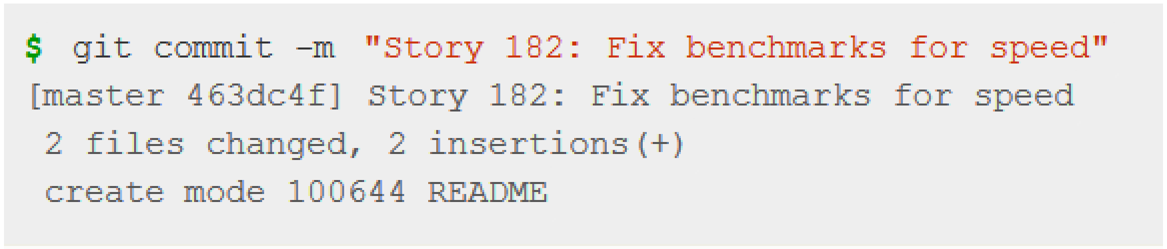

( New Commit [✓] ) Amend Last Commit

# Recording changes to the repository: commiting your changes

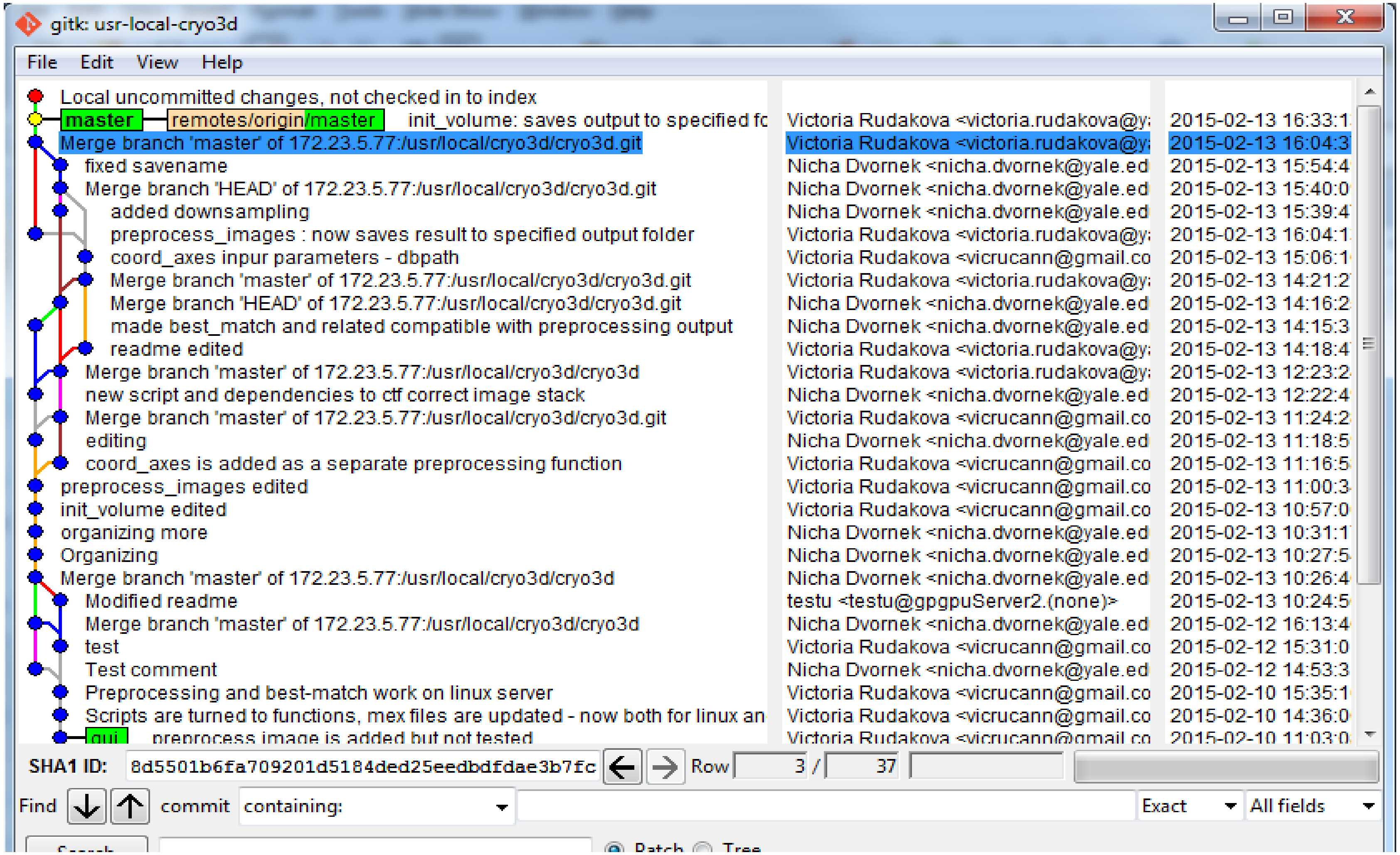
$ git commit [commit your changes to the local repository]



```
$ git commit -m "Story 182: Fix benchmarks for speed"
[master 463dc4f] Story 182: Fix benchmarks for speed
 2 files changed, 2 insertions(+)
 create mode 100644 README
```

# Viewing the commit history

$ git log



```
Local uncommitted changes, not checked in to index
master  remotes/origin/master  init_volume: saves output to specified fc   Victoria Rudakova <victoria.rudakova@y   2015-02-13 16:33:1
Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d.git            Victoria Rudakova <victoria.rudakova@y   2015-02-13 16:04:3
  fixed savename                                                             Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 15:54:4
  Merge branch 'HEAD' of 172.23.5.77:/usr/local/cryo3d/cryo3d.git            Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 15:40:0
    added downsampling                                                       Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 15:39:4
    preprocess_images : now saves result to specified output folder          Victoria Rudakova <victoria.rudakova@y   2015-02-13 16:04:1
    coord_axes inpur parameters - dbpath                                     Victoria Rudakova <vicrucann@gmail.co    2015-02-13 15:06:1
    Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d.git        Victoria Rudakova <victoria.rudakova@y   2015-02-13 14:21:2
    Merge branch 'HEAD' of 172.23.5.77:/usr/local/cryo3d/cryo3d.git          Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 14:16:2
    made best_match and related compatible with preprocessing output         Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 14:15:3
    readme edited                                                            Victoria Rudakova <victoria.rudakova@y   2015-02-13 14:18:4
  Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d              Victoria Rudakova <victoria.rudakova@y   2015-02-13 12:23:2
  new script and dependencies to ctf correct image stack                     Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 12:22:4
  Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d.git          Victoria Rudakova <vicrucann@gmail.co    2015-02-13 11:24:2
  editing                                                                    Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 11:18:5
  coord_axes is added as a separate preprocessing function                   Victoria Rudakova <vicrucann@gmail.co    2015-02-13 11:16:5
preprocess_images edited                                                     Victoria Rudakova <vicrucann@gmail.co    2015-02-13 11:00:3
init_volume edited                                                           Victoria Rudakova <vicrucann@gmail.co    2015-02-13 10:57:0
organizing more                                                              Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 10:31:1
Organizing                                                                   Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 10:27:5
Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d                Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-13 10:26:4
  Modified readme                                                            testu <testu@gpgpuServer2.(none)>        2015-02-13 10:24:5
  Merge branch 'master' of 172.23.5.77:/usr/local/cryo3d/cryo3d              Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-12 16:13:4
  test                                                                       Victoria Rudakova <vicrucann@gmail.co    2015-02-12 15:31:0
  Test comment                                                               Nicha Dvornek <nicha.dvornek@yale.ed     2015-02-12 14:53:3
  Preprocessing and best-match work on linux server                          Victoria Rudakova <vicrucann@gmail.co    2015-02-10 15:35:1
  Scripts are turned to functions, mex files are updated - now both for linux an  Victoria Rudakova <vicrucann@gmail.co    2015-02-10 14:36:0
  gui  preprocess image is added but not tested                              Victoria Rudakova <vicrucann@gmail.co    2015-02-10 11:03:0
```

```
SHA1 ID: 8d5501b6fa709201d5184ded25eedbdfdae3b7fc   Row  3 /  37
Find  commit  containing:                          Exact   All fields
Search                        Patch  Tree
```

# Working with remotes

$ git fetch [fetch all the info you don't have from remote repository, no automatical merging]

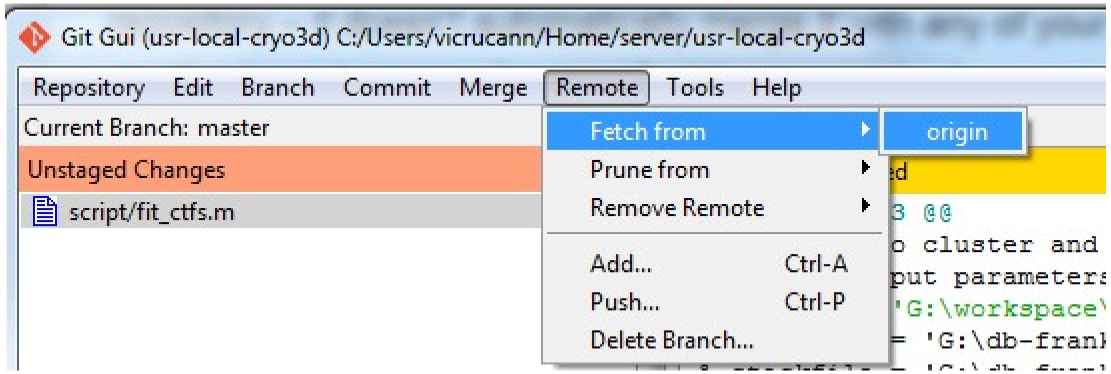
$ git merge [automatically merge data from remote with the your repository data]

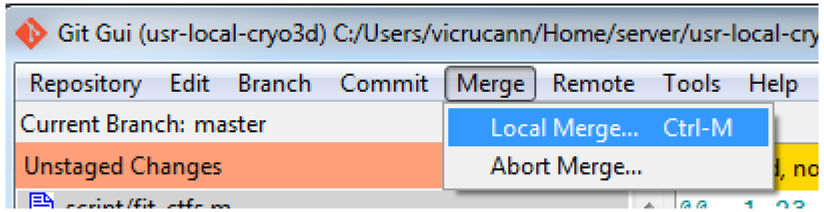
$ git pull [fetch and merge automatically]

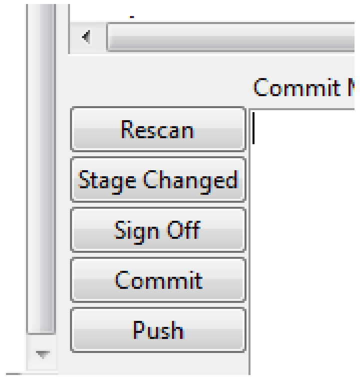
pull = fetch + merge

$ git push origin master [push your version to the server]

# Working with remotes - GUI

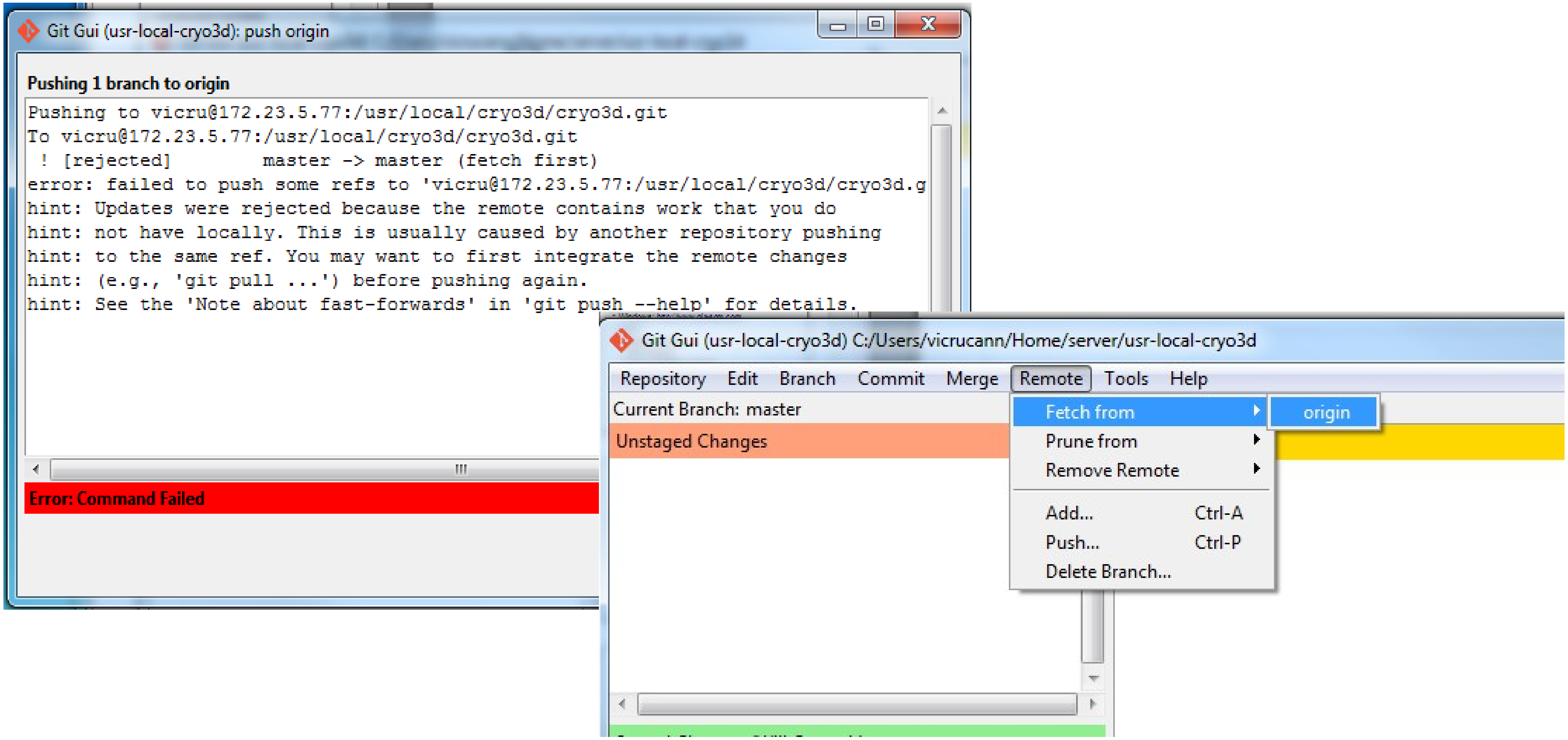






# Pushing to already changed remote

- Git won't allow to push to the remote which is ahead of your version: first need to fetch



Git Gui (usr-local-cryo3d): push origin

**Pushing 1 branch to origin**

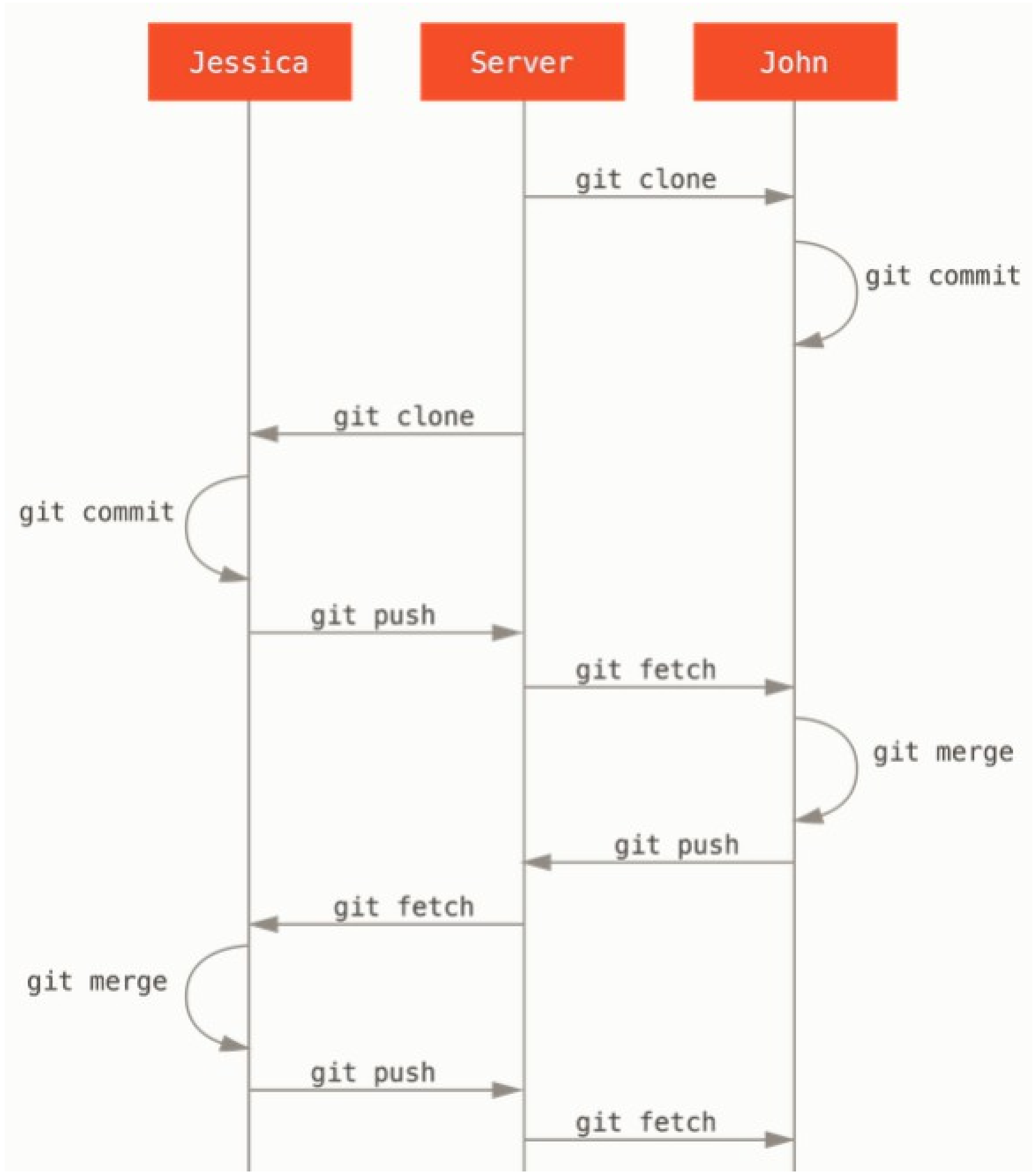
```
Pushing to vicru@172.23.5.77:/usr/local/cryo3d/cryo3d.git
To vicru@172.23.5.77:/usr/local/cryo3d/cryo3d.git
 ! [rejected]        master -> master (fetch first)
error: failed to push some refs to 'vicru@172.23.5.77:/usr/local/cryo3d/cryo3d.g
hint: Updates were rejected because the remote contains work that you do
hint: not have locally. This is usually caused by another repository pushing
hint: to the same ref. You may want to first integrate the remote changes
hint: (e.g., 'git pull ...') before pushing again.
hint: See the 'Note about fast-forwards' in 'git push --help' for details.
```

Error: Command Failed

Git Gui (usr-local-cryo3d) C:/Users/vicrucann/Home/server/usr-local-cryo3d

Current Branch: master

Unstaged Changes


Jessica
Server
John
git clone
git commit
git clone
git commit
git push
git fetch
git merge
git push
git fetch
git merge
git push
git fetch

## To know more

- http://www.git-scm.com/book/en/v2