

## Integrating Git with Cadence Tools

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### 1. Cadence Tools Recapping

You, most probably, have cadence tools already installed on virtual machine with PDK included in it. We need to differentiate between:

- EDAs stuff
    - e.g. Cadence tools, Calibre, etc.
    - You may find them installed in this directory `"/etc/local/"`. Or hit `"which virtuoso"` in your terminal to find Virtuoso directory or any program else.
  - PDK
    - Process Design Kit provided by the Fab or educational version.
    - You DON'T have to copy the whole VM from your friend to run PDK, you can copy only the PDK to your machine that has cadence tools installed on it.
  - Working Directory
    - Virtuoso is run from terminal from the working directory. This working directory can be any directory you want to save your work at.
    - In general all you need is the PDK stored anywhere, and specific working directory you run cadence from and then you include your PDK in this new empty project.
    - Since it's not simple as mentioned, it's a bit headache to get everything ready to work together from your working directory. So you may find a template for working directory attached with your PDK, and all what you need is to copy, rename, then Go!
    - If you don't have this ready-made working directory and you are confused how to create one, you can run virtuoso from your PDK directory directly, but make sure you have a backup of the raw PDK before adding new libraries to it.
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## 2. Setting up Git repo

We need Git to allow multiple designers to work on the same project at same time, backing up our designs before tuning, having multiple branches and switch between them, etc. EDAs stuff and PDKs are shared offline once, then only working directory is updated by all designers.

Hence, our Git repo will be the working directory.

**NOTE:** Make sure you all have the PDK in same directory.

- Install Git on your virtual machine

- *sudo apt-get install git*
- You may change apt-get depending on your linux distro.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ sudo apt-get install git
Reading package lists... Done
Building dependency tree
Reading state information... Done
Suggested packages:
  git-daemon-run git-daemon-sysvinit git-doc git-el git-email git-gui gitk gitweb git-arch
  git-cvs git-mediawiki git-svn
The following NEW packages will be installed:
  git
0 upgraded, 1 newly installed, 0 to remove and 497 not upgraded.
Need to get 0 B/3227 kB of archives.
After this operation, 22.5 MB of additional disk space will be used.
Selecting previously unselected package git.
(Reading database ... 169305 files and directories currently installed.)
Preparing to unpack .../git_1%3a2.1.4-2.1+deb8u10_amd64.deb ...
Unpacking git (1:2.1.4-2.1+deb8u10) ...
Setting up git (1:2.1.4-2.1+deb8u10) ...
```

- cd to your working directory (or your PDK if you have no another working directory).

- Hit *git init* to initialize our local repo.

- *git status* to show our local repo status.

- Untracked files are files modified or added to our working directory but not “committed” to our repo.

- Before keep going we have to add *.gitignore* file to our repo

- *.gitignore* is a file including what we want to ignore, for example temporary files created by Cadence tools (e.g. cdsick files). These files are added to our working directory but we want to ignore (not sending to our repo) them.
- Another helpful use for *.gitignore*, if we are running Virtuoso from PDK directory directly this means that we have few GBs of model files, etc. we don't modify them and they are already there at all designers machines. So we need to ignore all these PDK files except our library directory.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ git init
Initialized empty Git repository in /home/cadence/git_tutorial/working_dir/local1/.git/
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ git status
On branch master
Initial commit

Untracked files:
  (use "git add <file>..." to include in what will be committed)

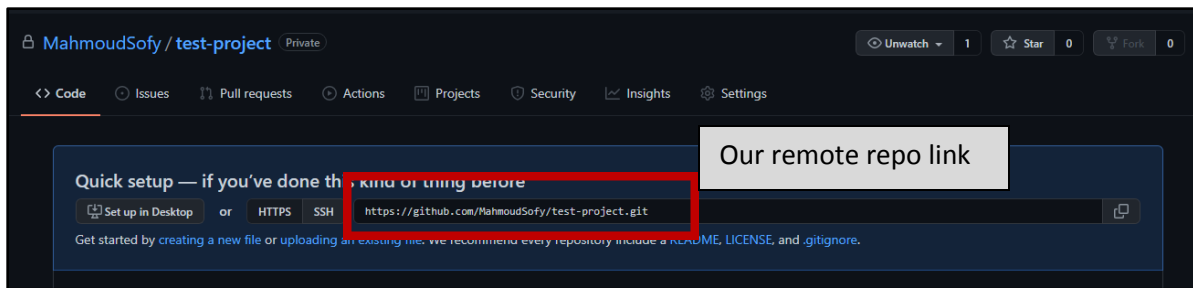
        .cadence/
        .cdsinit
        cds.lib
        lib.defs
        LibManager.log

nothing added to commit but untracked files present (use "git add" to track)
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$
```

Branch name: master

Untracked files





- Go back to command line to link remote and local repos hit *git remote add origin {remote repo link}*.
- Now push all local repo files to the remote repo using *git push origin master*.
- You will be asked to enter your Username and Password, but it's not your password literally, it's "personal access token" you can generate from (Account settings/Developer settings/Personal access tokens).
- Now everything is done and our repo is online.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ git remote add origin https://github.com/MahmoudSofy/test-project.git
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ git push origin master
Username for 'https://github.com': MahmoudSofy
Password for 'https://MahmoudSofy@github.com':
Counting objects: 13, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (10/10), done.
Writing objects: 100% (13/13), 3.23 KiB | 0 bytes/s, done.
Total 13 (delta 0), reused 0 (delta 0)
To https://github.com/MahmoudSofy/test-project.git
 * [new branch]      master -> master
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$
```

### 3. Accessing our remote repo

- Now, let's clone our repo on another designer's machine to work on it.
- Use *git clone {repo link}* to clone the repo to your machine.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local2$ git clone https://github.com/MahmoudSofy/test-project.git
Cloning into 'test-project'...
Username for 'https://github.com': MahmoudSofy
Password for 'https://MahmoudSofy@github.com':
remote: Enumerating objects: 13, done.
remote: Counting objects: 100% (13/13), done.
remote: Compressing objects: 100% (10/10), done.
remote: Total 13 (delta 0), reused 13 (delta 0), pack-reused 0
Unpacking objects: 100% (13/13), done.
Checking connectivity... done.
(base) cadence@berkeley:~/git_tutorial/working_dir/local2$ cd test-project/
(base) cadence@berkeley:~/git_tutorial/working_dir/local2/test-project$
```

- After finishing your work, it's assumed to be creating new library and designing an inverter, you can check your repo status again to see new files added.
- Edit your new library path at *cds.lib* to be written in *./* form to be compatible with different directories.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local2/test-project$ git status
On branch master
Your branch is up-to-date with 'origin/master'.
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:   cds.lib
    modified:   libManager.log

Untracked files:
  (use "git add <file>..." to include in what will be committed)

    .cadence/dfII/Navigator/
    .cadence/dfII/history/cadence.history
    new_project/

no changes added to commit (use "git add" and/or "git commit -a")
```

```
DEFINE new_project /home/cadence/git_tutorial/working_dir/local1/new_project
```



```
DEFINE new_project ./new_project
```



- We need to commit these changes to our local repo, and then pushing it to the remote so rest of the team can pull it to their machines.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local2/test-project$ git add --all
(base) cadence@berkeley:~/git_tutorial/working_dir/local2/test-project$ git commit -m "inverter"
[master 7344ec0] inverter
11 files changed, 93 insertions(+), 61 deletions(-)
create mode 100644 .cadence/dfII/Navigator/Options.xml
create mode 100644 .cadence/dfII/history/cadence.history
rewrite libManager.log (83%)
create mode 100644 new_project/.oalib
create mode 100644 new_project/cdsinfo.tag
create mode 100644 new_project/data.dm
create mode 100644 new_project/inverter/schematic/data.dm
create mode 100644 new_project/inverter/schematic/master.tag
create mode 100644 new_project/inverter/schematic/sch.oa
create mode 100644 new_project/inverter/schematic/thumbnail_128x128.png
(base) cadence@berkeley:~/git_tutorial/working_dir/local2/test-project$ git push origin master
Username for 'https://github.com': MahmoudSofy
Password for 'https://github.com':
Counting objects: 20, done.
Delta compression using up to 2 threads.
Compressing objects: 100% (15/15), done.
Writing objects: 100% (20/20), 7.44 KiB | 0 bytes/s, done.
Total 20 (delta 2), reused 0 (delta 0)
remote: Resolving deltas: 100% (2/2), completed with 1 local object.
To https://github.com/MahmoudSofy/test-project
9486f3e..7344ec0 master -> master
```

Committing changes

Pushing changes to remote repo

- Go back to the first designer and pull the changes.

```
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$ git pull origin master
Username for 'https://github.com': MahmoudSofy
Password for 'https://github.com':
From https://github.com/MahmoudSofy/test-project
* branch master -> FETCH_HEAD
Updating 9486f3e..7344ec0
Fast-forward
 .cadence/dfII/Navigator/Options.xml      | 0
 .cadence/dfII/history/cadence.history    | 1 +
 cds.lib                                  | 2 +
 libManager.log                           | 75 ++++++++-----
 new_project/.oalib                        | 6 ++
 new_project/cdsinfo.tag                   | 40 ++++++++
 new_project/data.dm                       | Bin 0 -> 3172 bytes
 new_project/inverter/schematic/data.dm    | Bin 0 -> 3308 bytes
 new_project/inverter/schematic/master.tag | 2 +
 new_project/inverter/schematic/sch.oa     | Bin 0 -> 21596 bytes
 new_project/inverter/schematic/thumbnail_128x128.png | Bin 0 -> 788 bytes
11 files changed, 79 insertions(+), 47 deletions(-)
create mode 100644 .cadence/dfII/Navigator/Options.xml
create mode 100644 .cadence/dfII/history/cadence.history
create mode 100644 new_project/.oalib
create mode 100644 new_project/cdsinfo.tag
create mode 100644 new_project/data.dm
create mode 100644 new_project/inverter/schematic/data.dm
create mode 100644 new_project/inverter/schematic/master.tag
create mode 100644 new_project/inverter/schematic/sch.oa
create mode 100644 new_project/inverter/schematic/thumbnail_128x128.png
(base) cadence@berkeley:~/git_tutorial/working_dir/local1$
```

Pulling changes

## 4. Appendix

Ignore list is copied from **cdsgit** tool ([github.com/cdsgit/cdsgit/blob/master/setup/cadence.gitignore](https://github.com/cdsgit/cdsgit/blob/master/setup/cadence.gitignore)), this tool is offering Git GUI integrated with Virtuoso but it has a lot of bugs so command line is better if you mastered it.

Ignore list:

\*.oa.cdsIck.\*

INCA\*

.nfs\*

\*.lock\*

\*pak

\*.cdsIck

\*cdslck\*

\*.cd%

\*.cd-

\*.oa-

\*.Cat%

\*.abstract.status

\*.abstract.messages

\*.inca\*

.cdsvmod

expand.cfg%

\*.oacache

.inca\*

zviadrag\*

ASSURA/

\#24unit\_0x

.assura\*

.lvs\*

ncvlog.log

ConnectedPinsLog.txt

UnconnectedPinsLog.txt

.SOS

sos.log

./history.out

audit\_trail.html

DM

update\_summary.out

.svn

.tmp\_\*

MonteCarlo.\*.log

MonteCarlo.\*.rdb