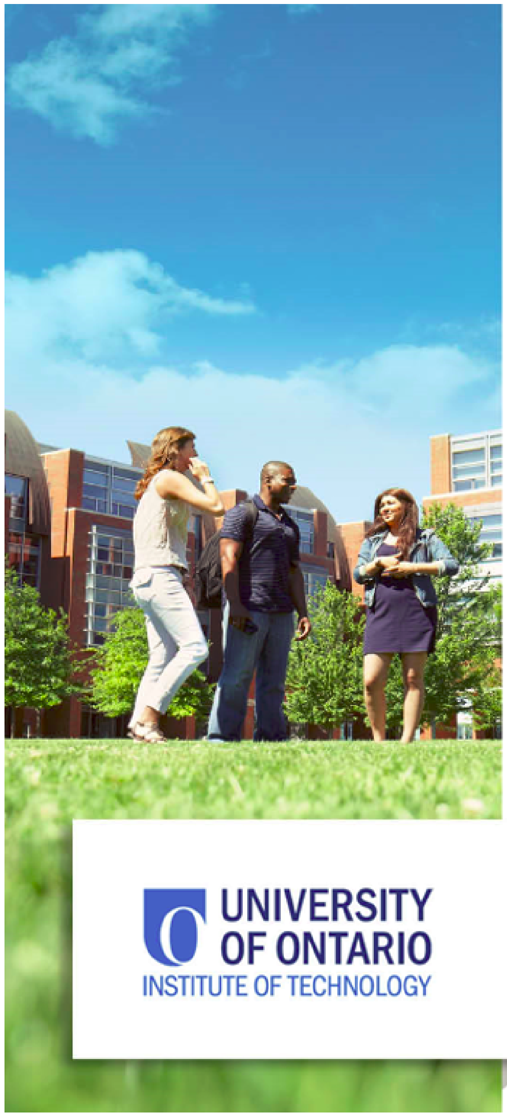

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Version Control

Sharing and protecting your work with Git

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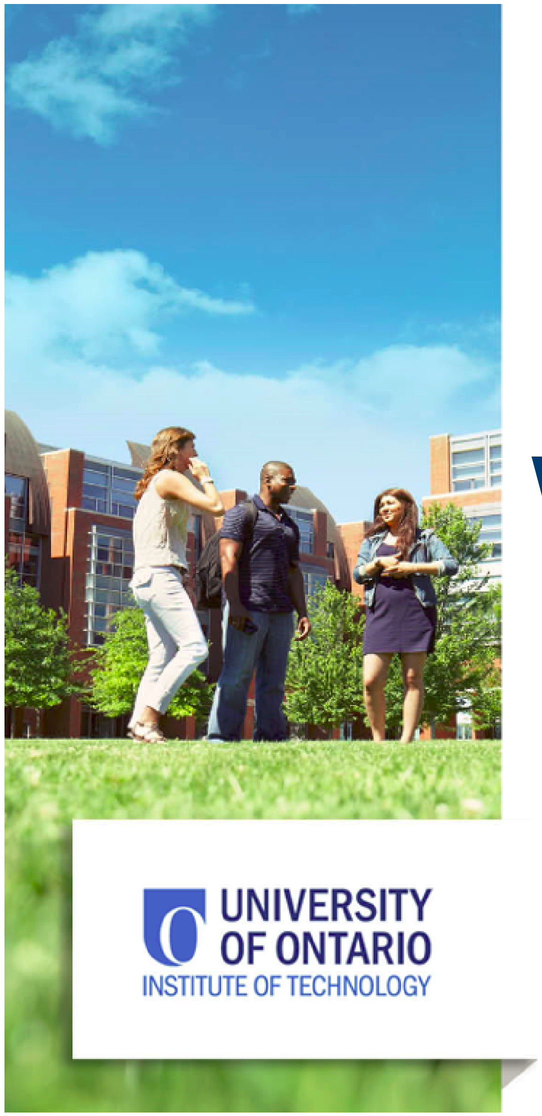
Outline

- What is version control?
  - Centralized
  - Decentralized
- How do we use version control?
  - Basic Operation of Git



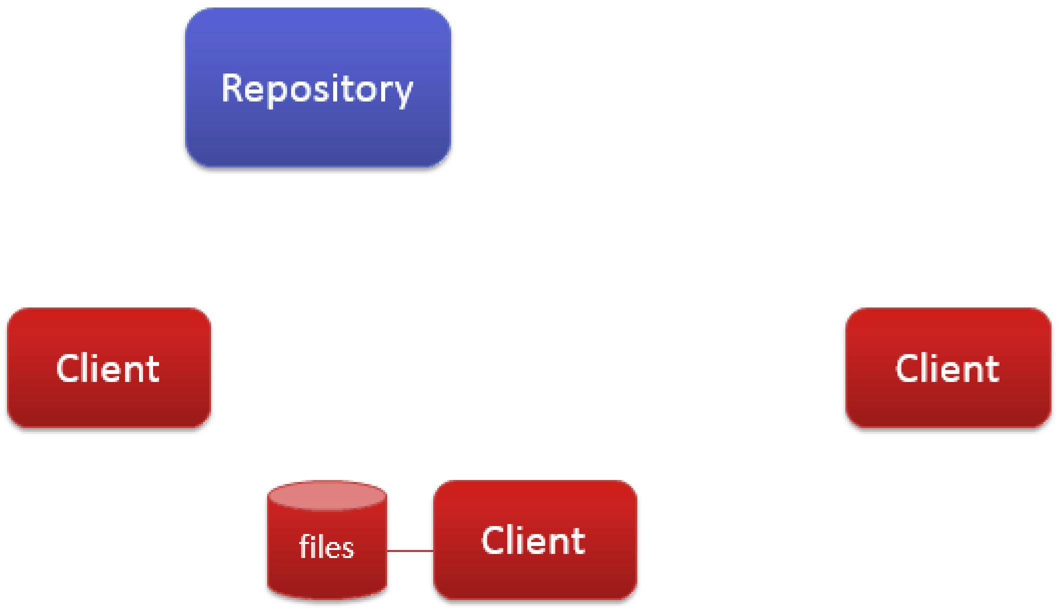
Why Version Control?

Motivation

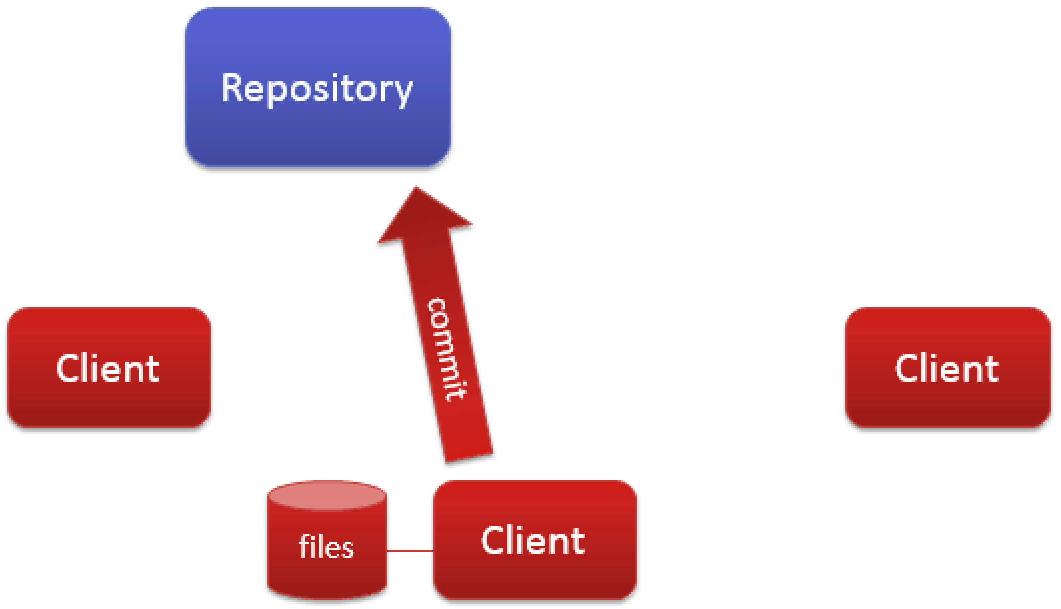
What is Version Control?

- Software that records changes to files
- Version control lets you:
  - Revert to previous versions
  - See the changes log
    - Along with messages, who submitted, etc.
  - Share your code with the rest of your team
    - Including merging your work
  - Backup/publish your work to a public repository
    - e.g. GitHub, BitBucket

Centralized Version Control



Centralized Version Control



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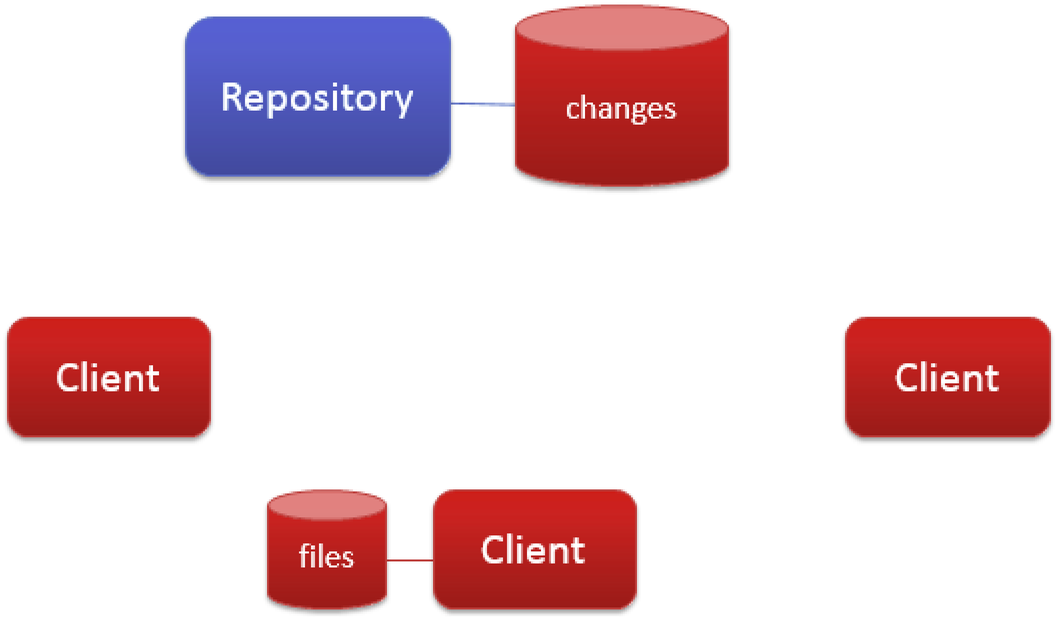
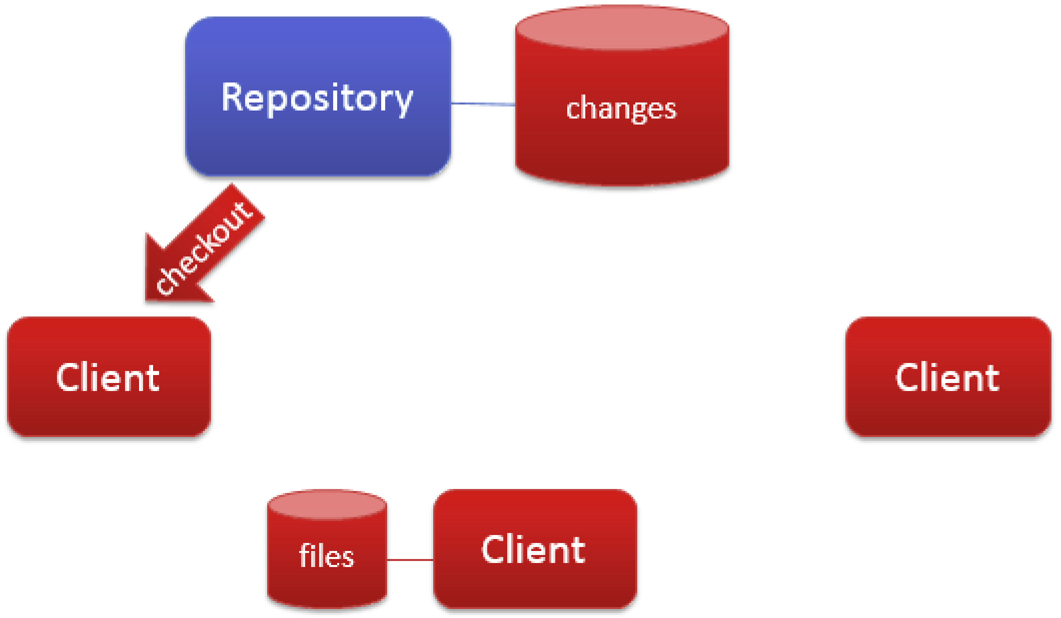


Centralized Version Control



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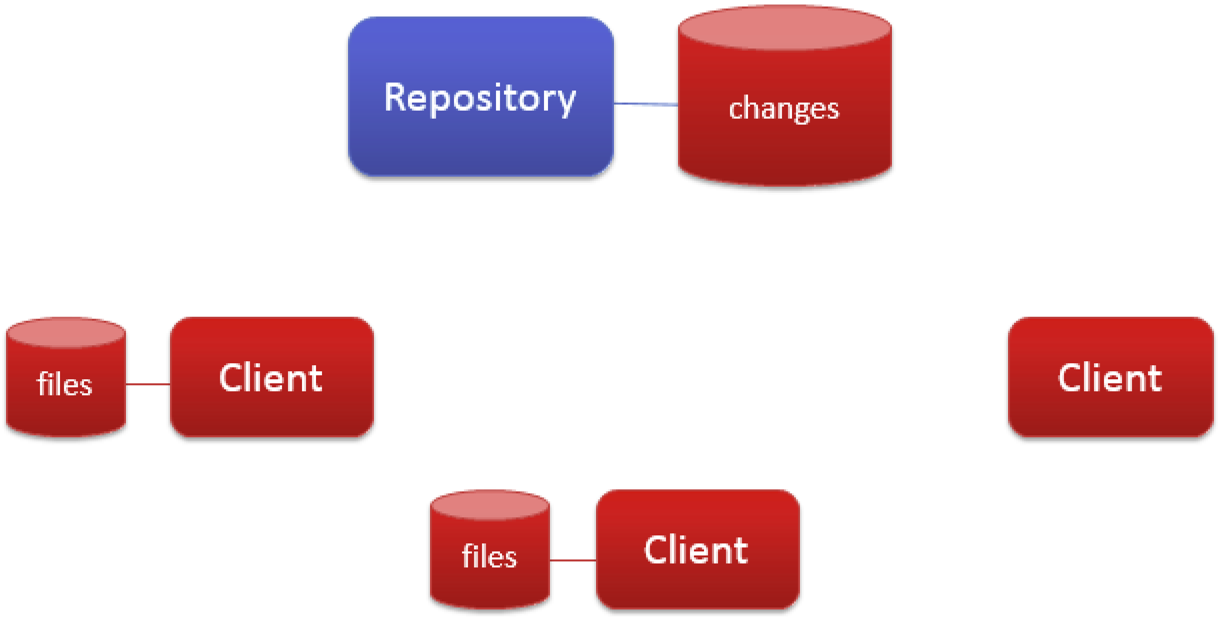
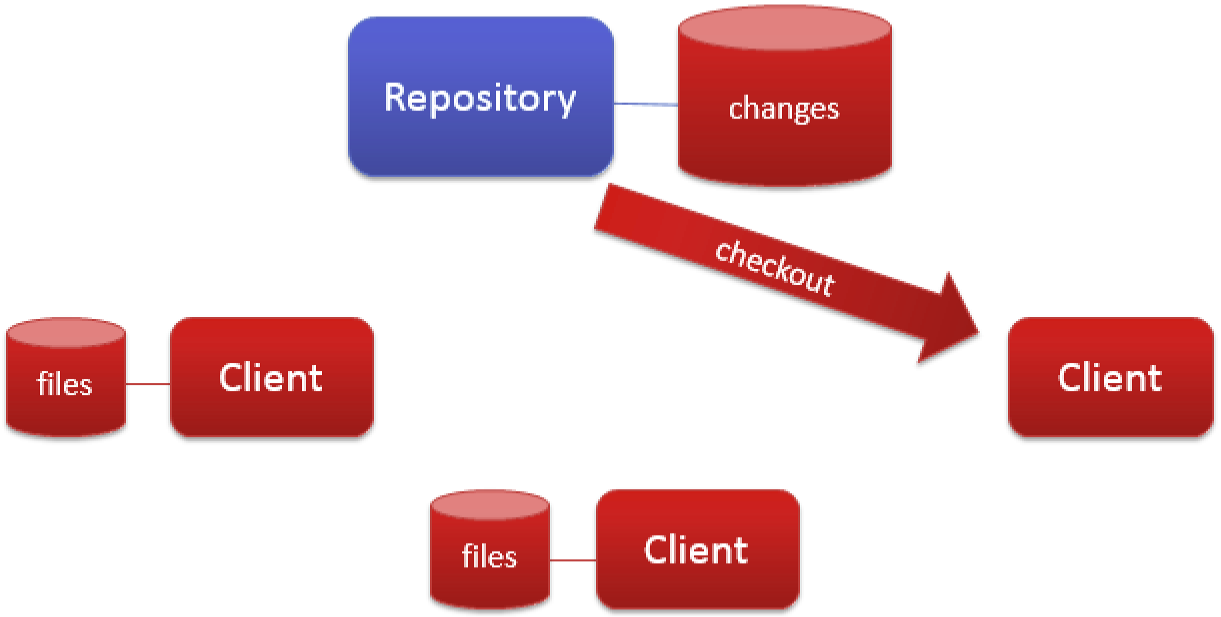


Centralized Version Control



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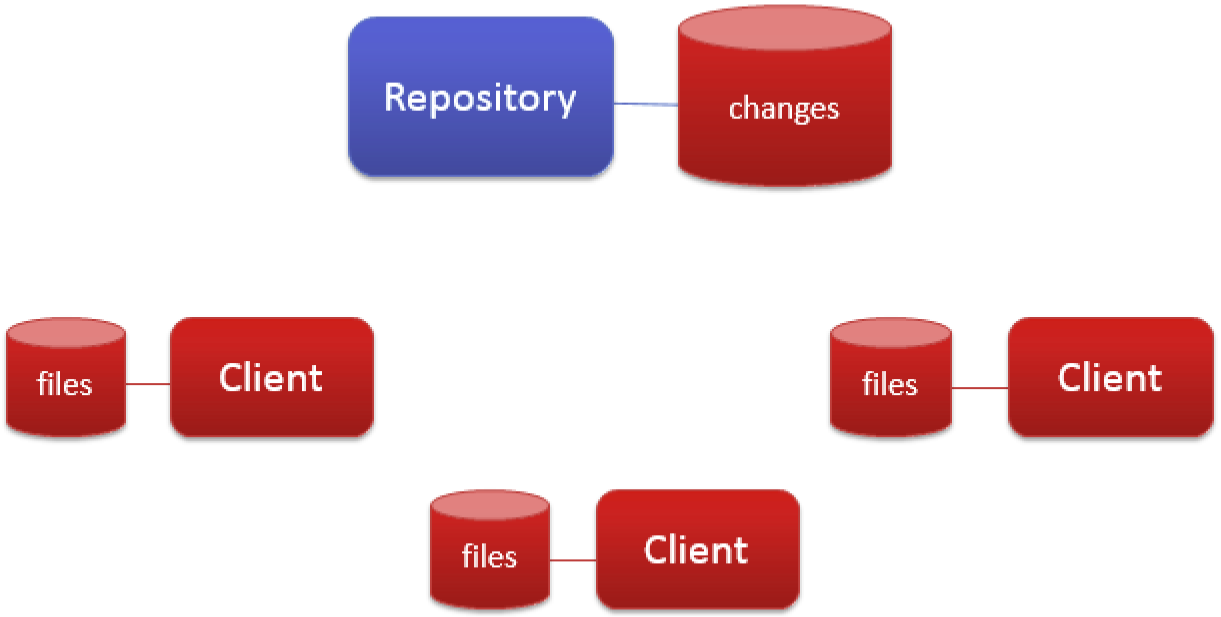

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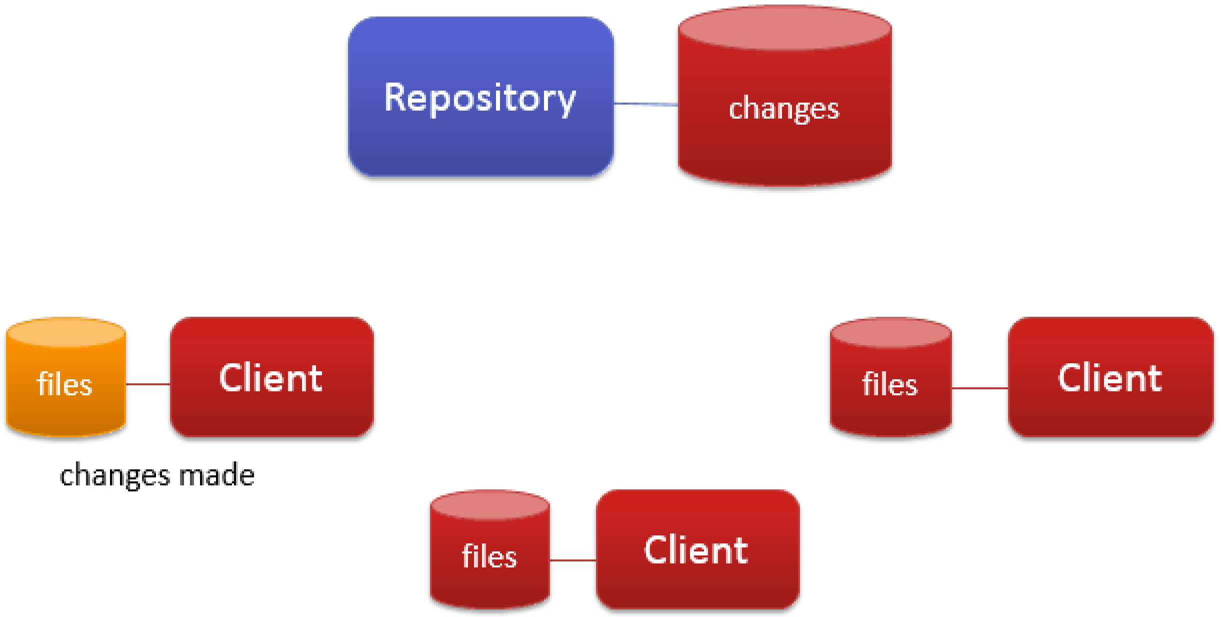

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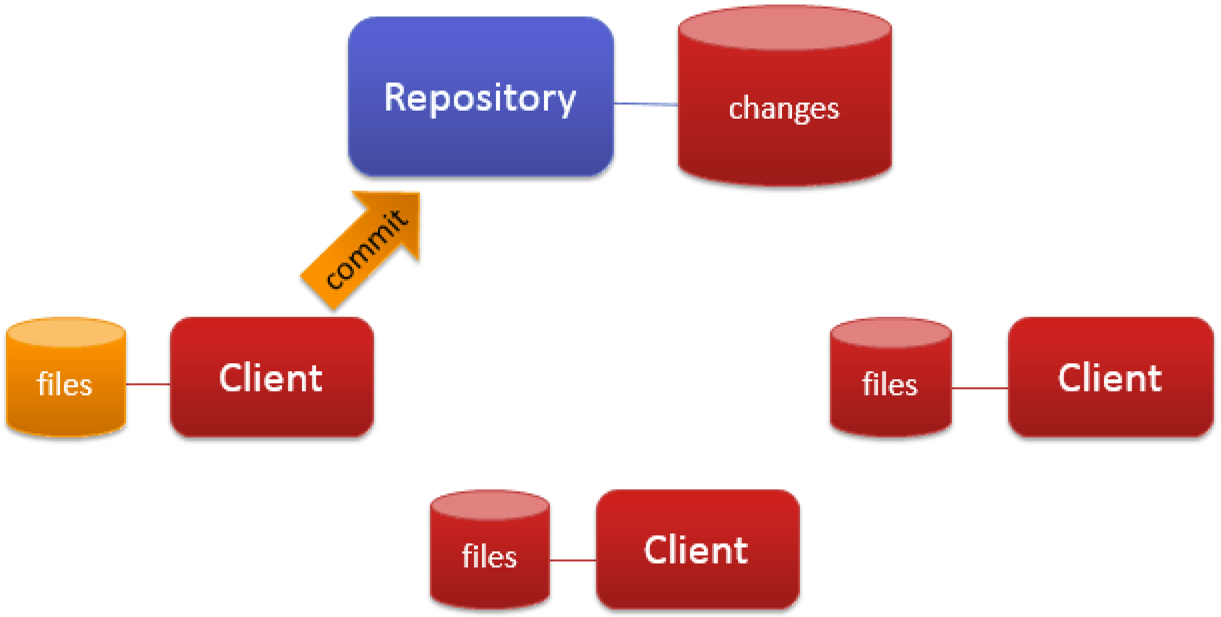

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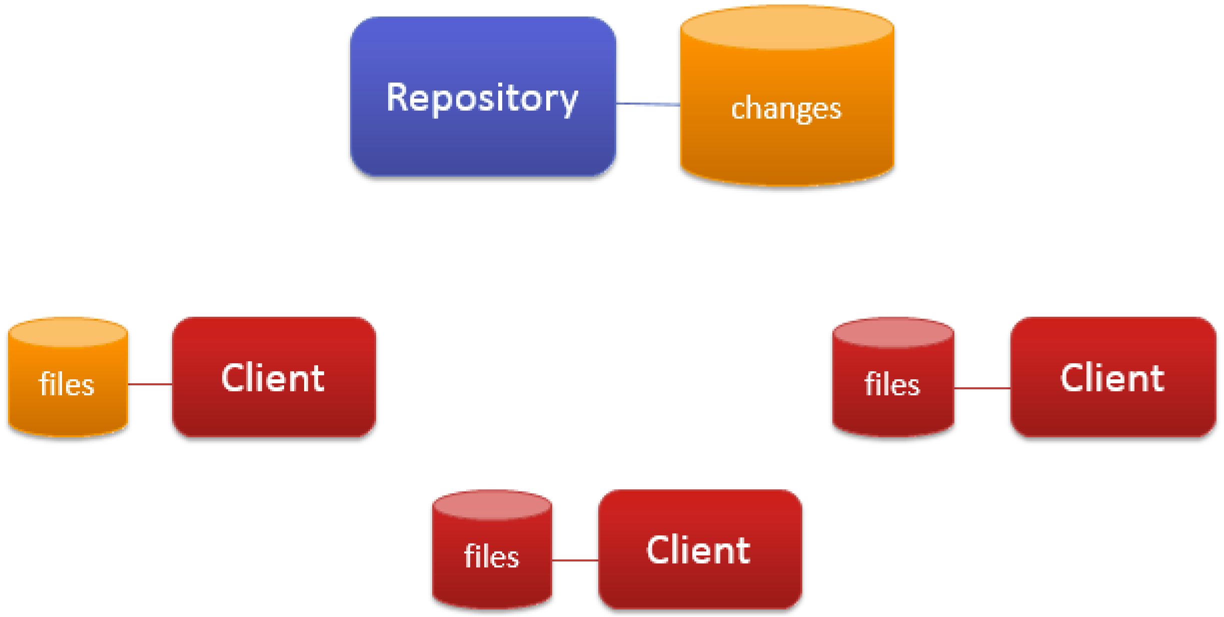

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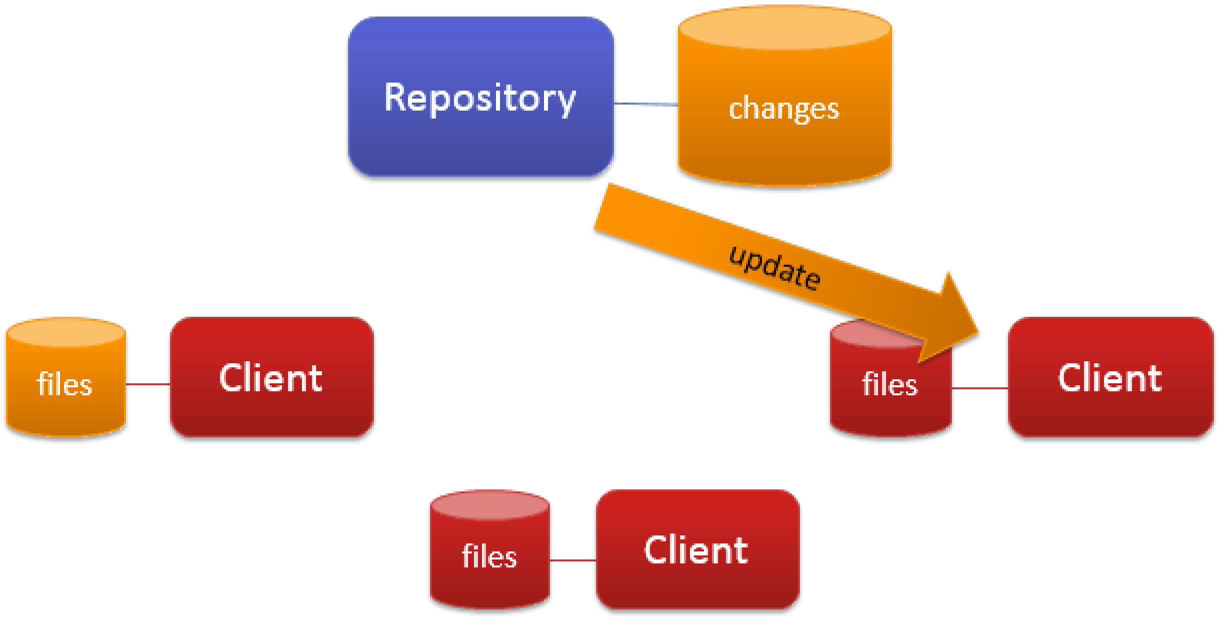

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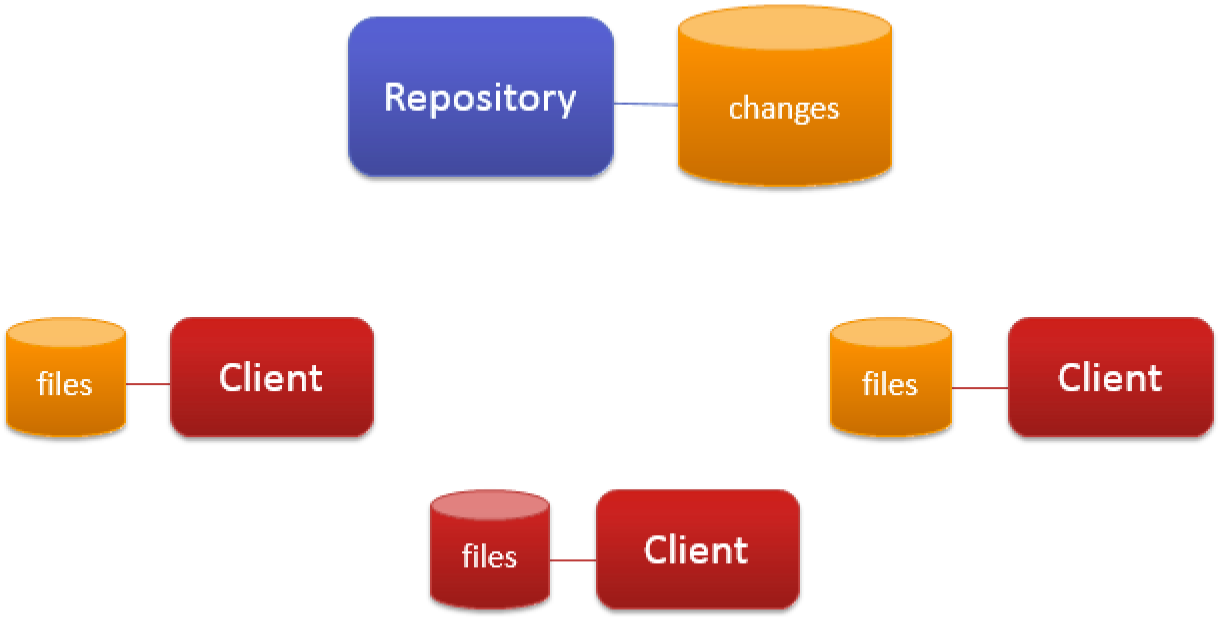

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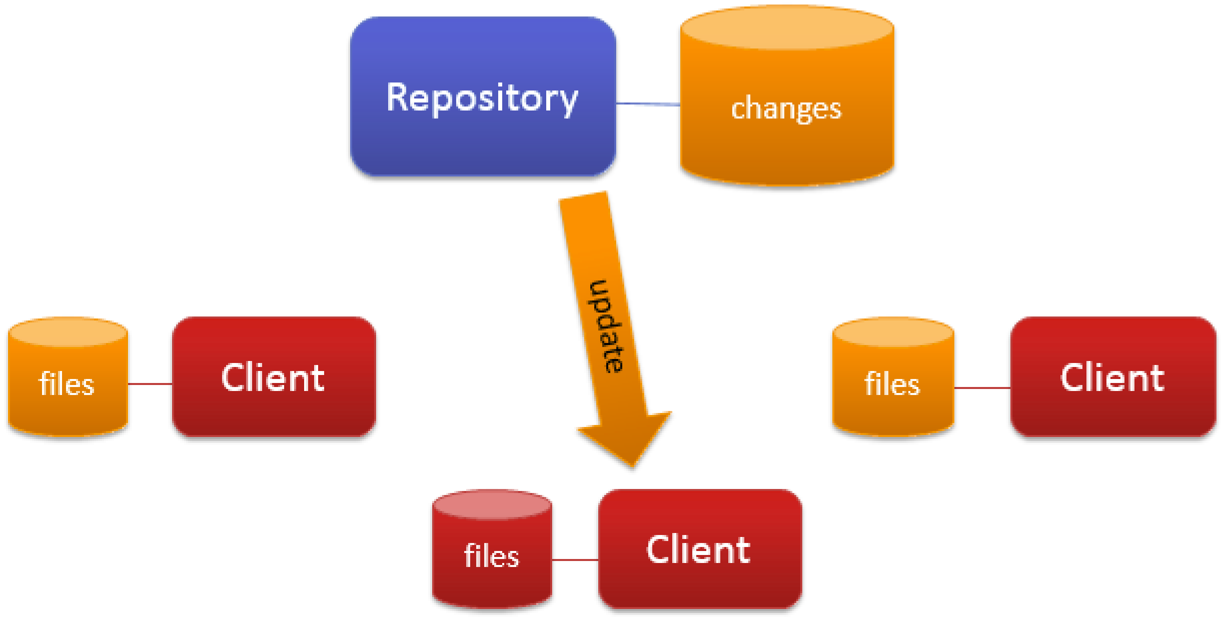

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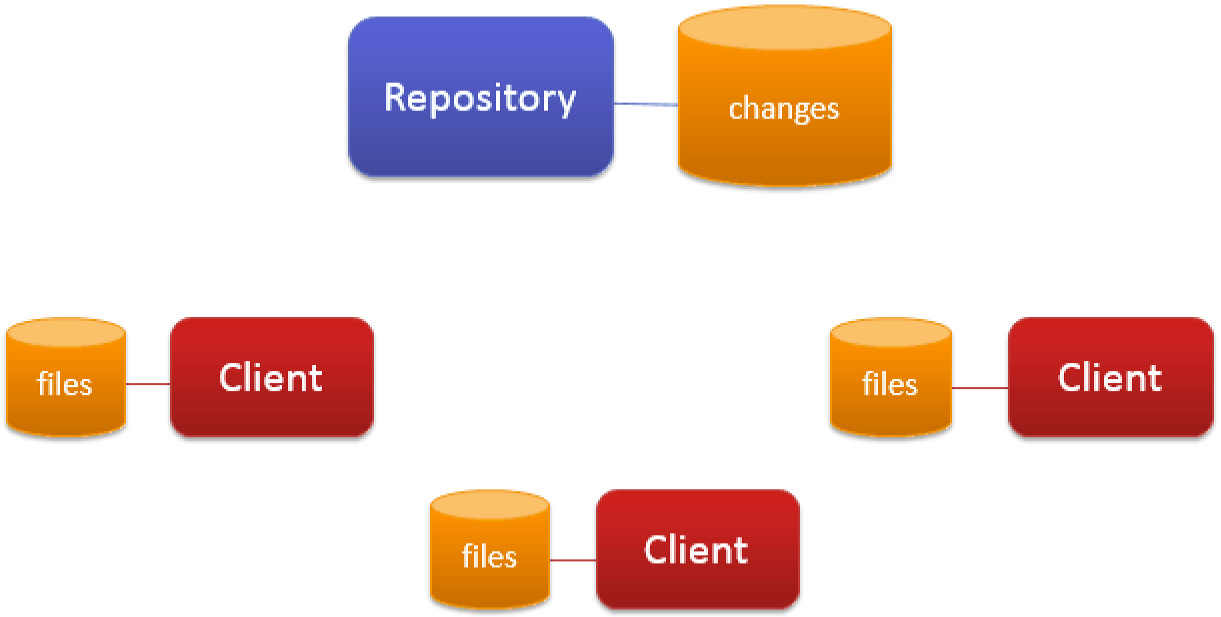
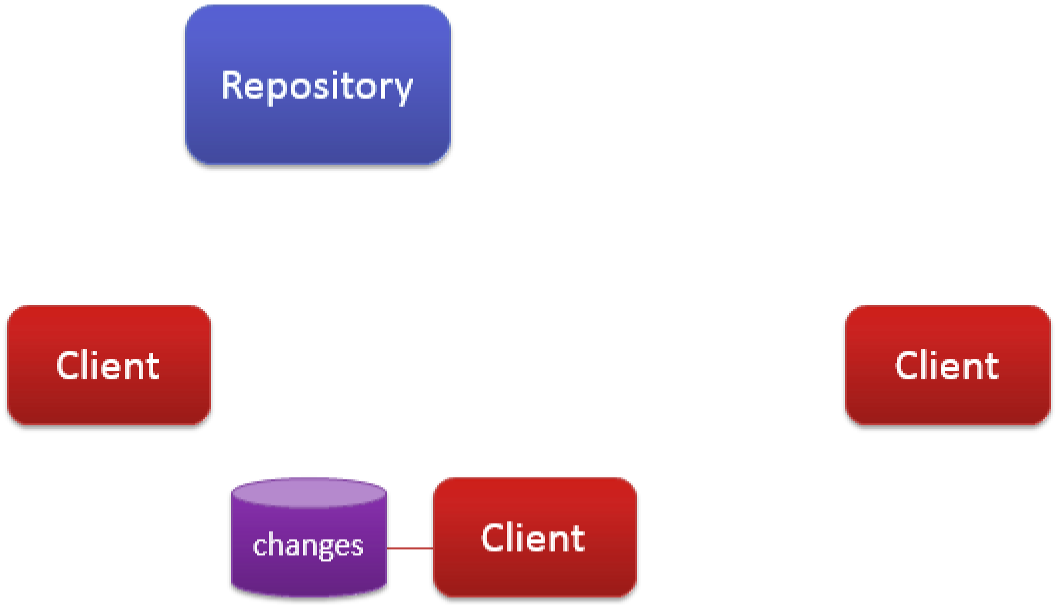


Decentralized Version Control



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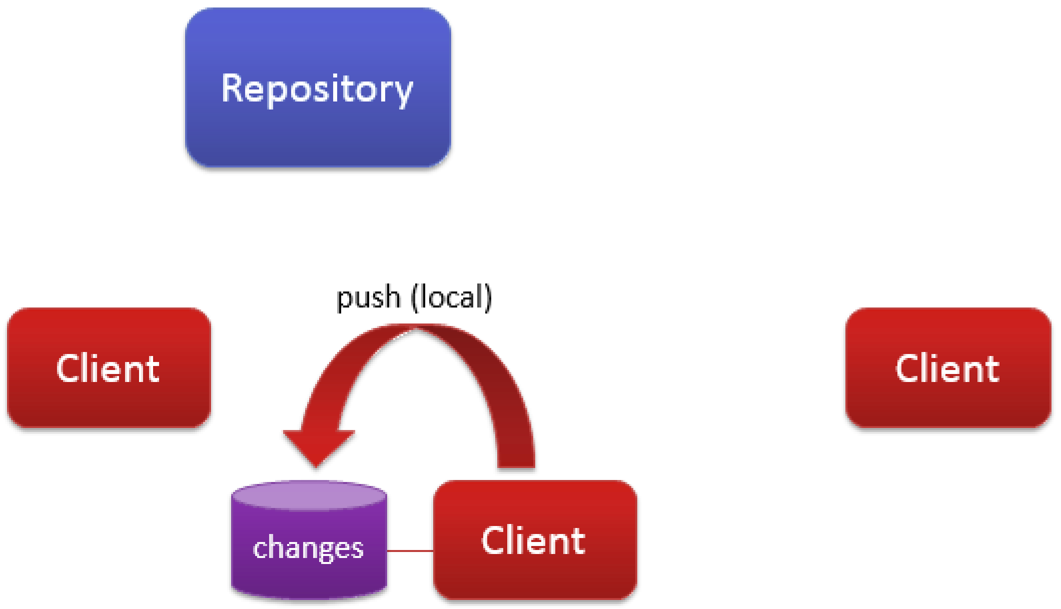

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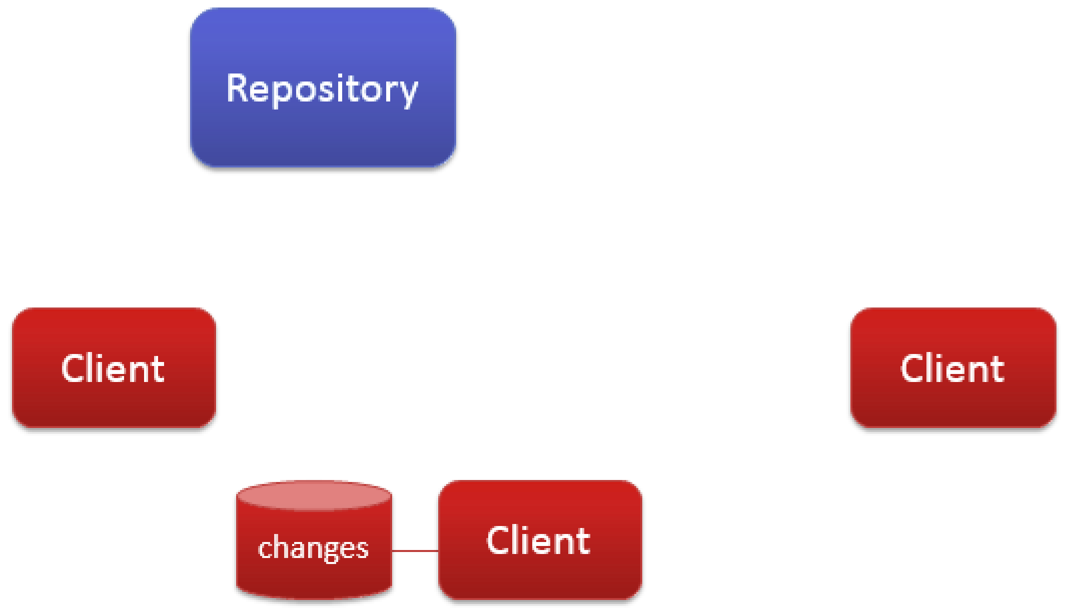

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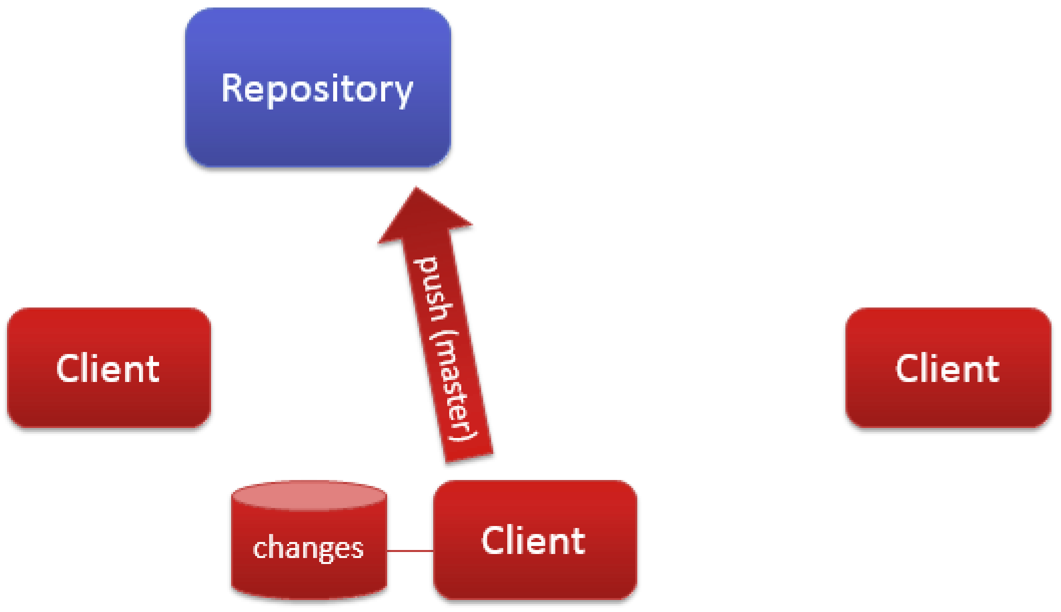

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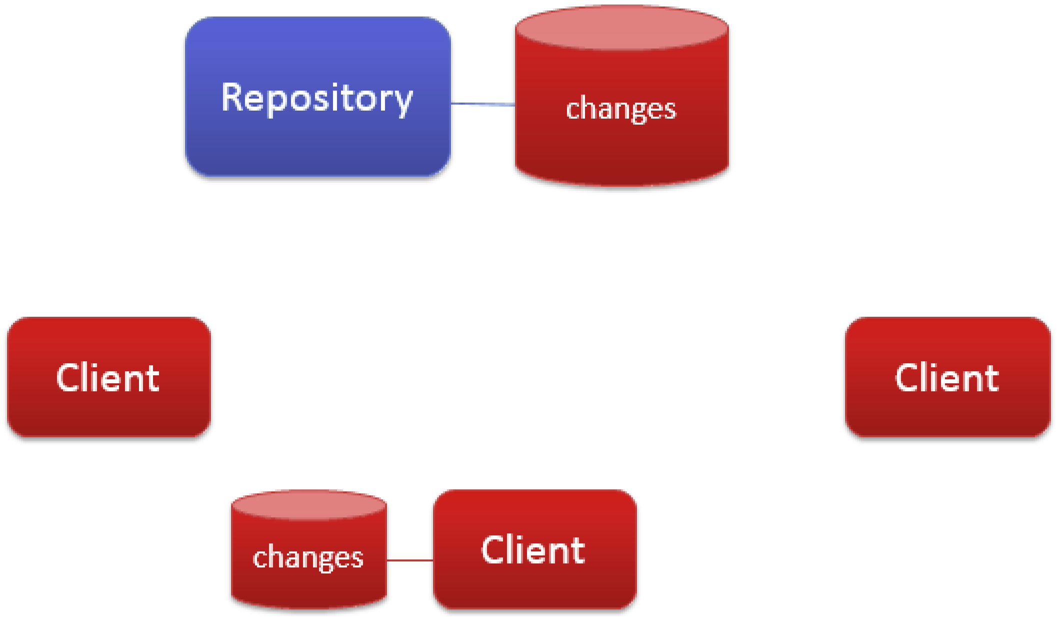
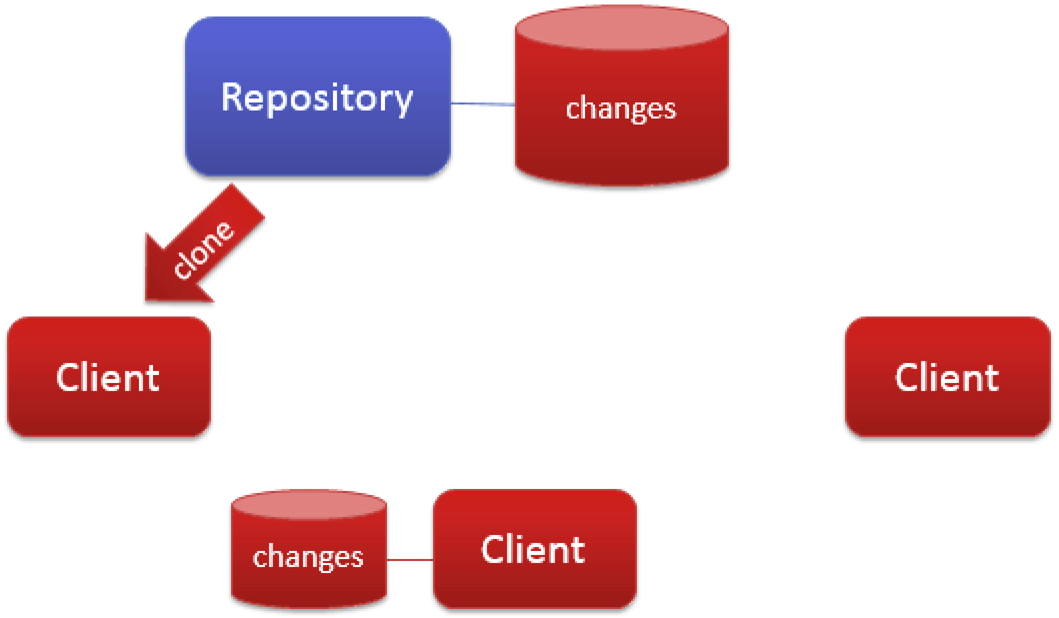


Decentralized Version Control



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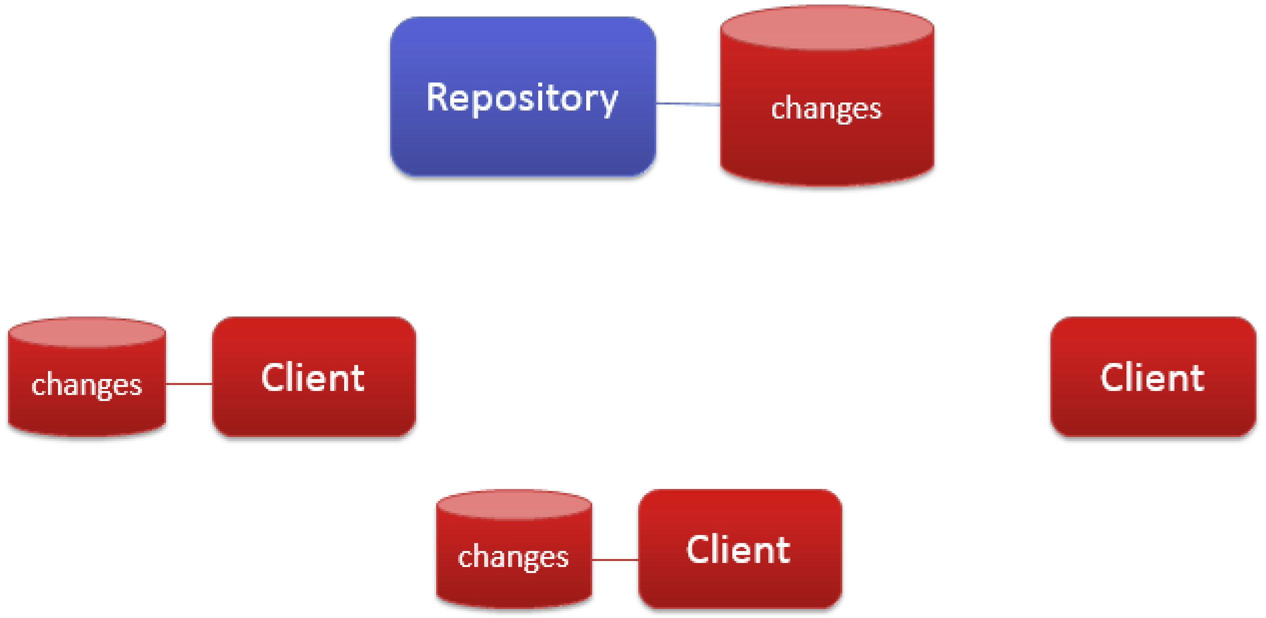

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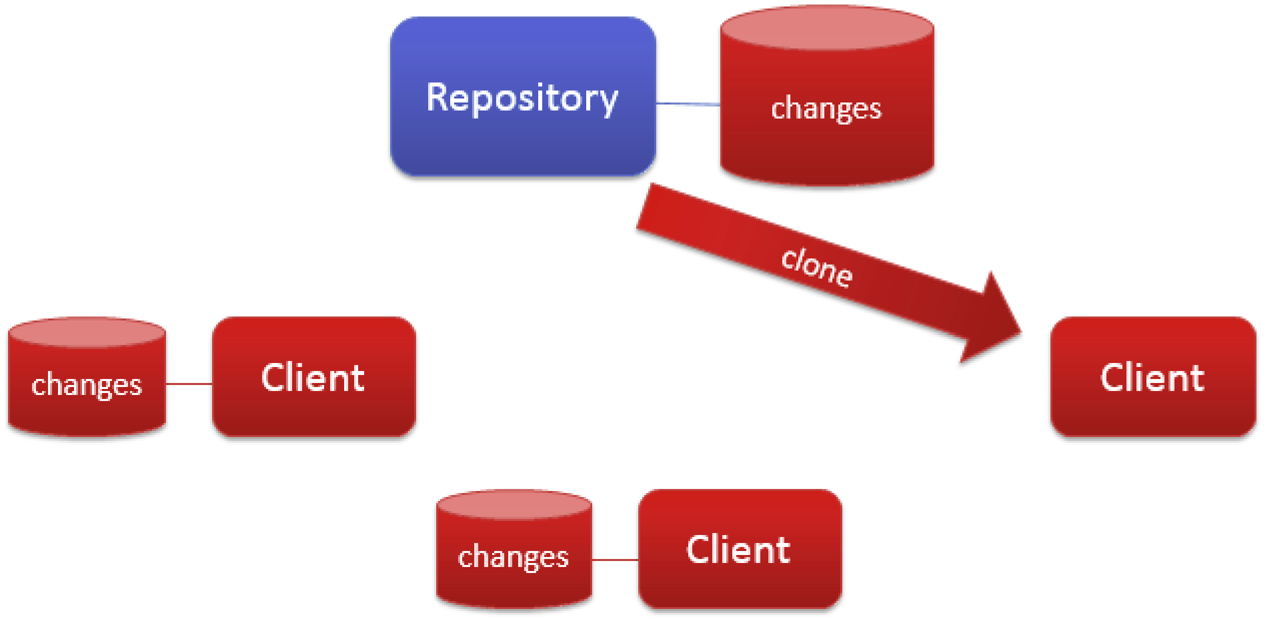

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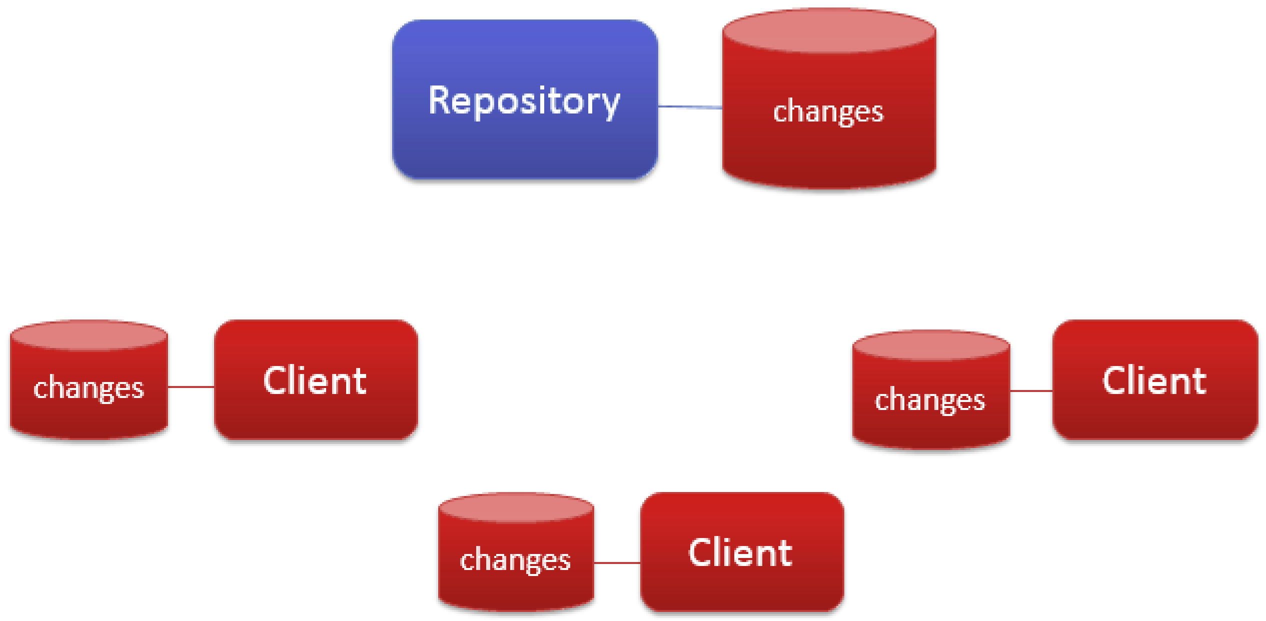

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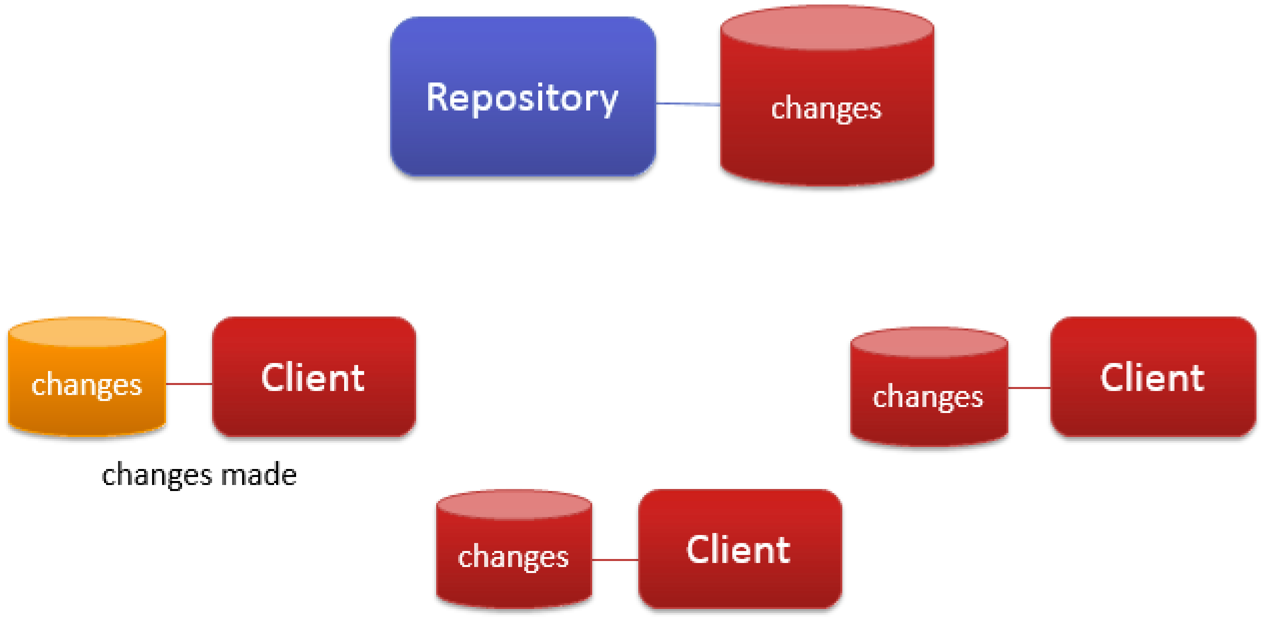

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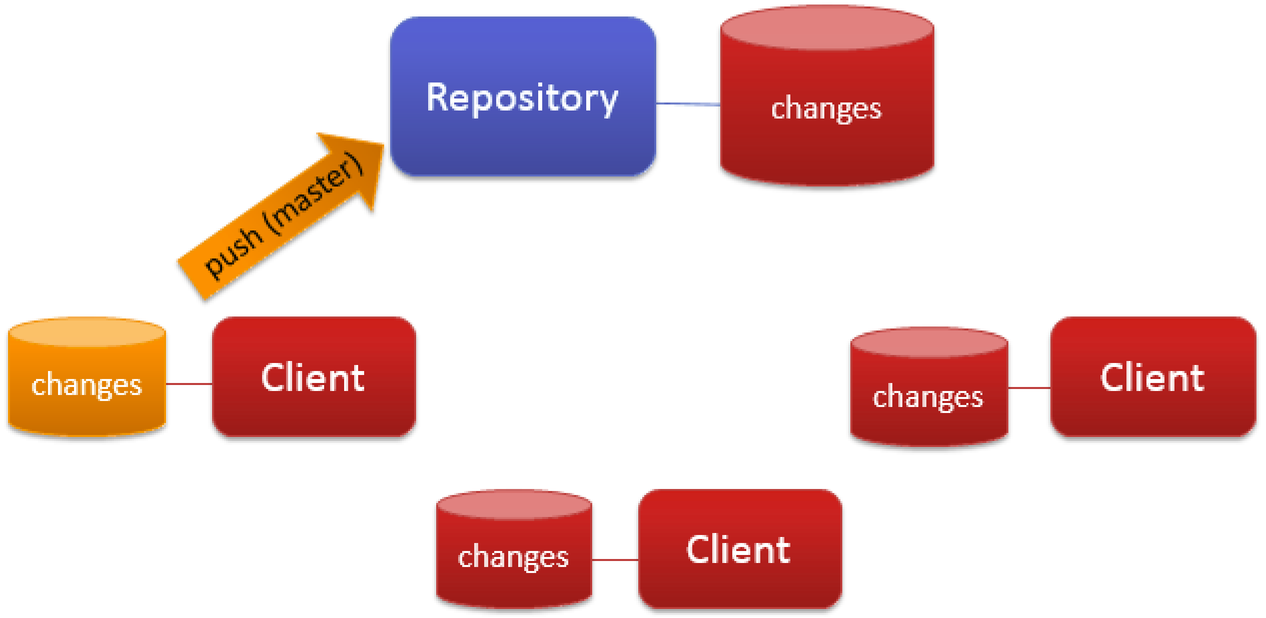

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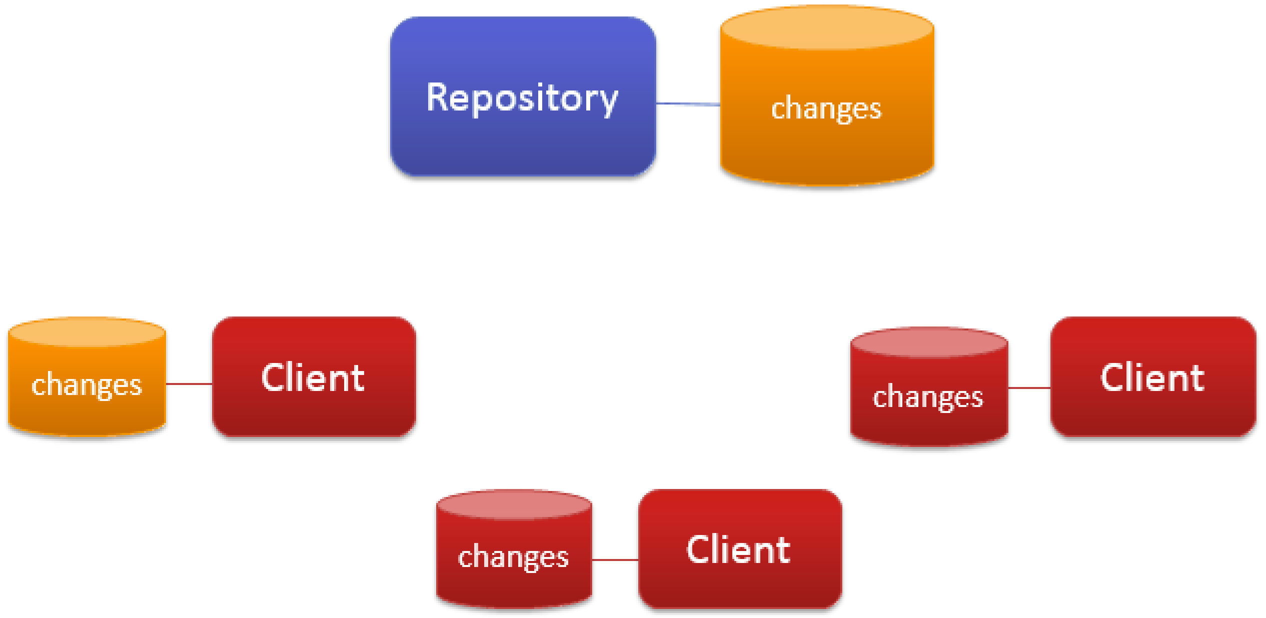

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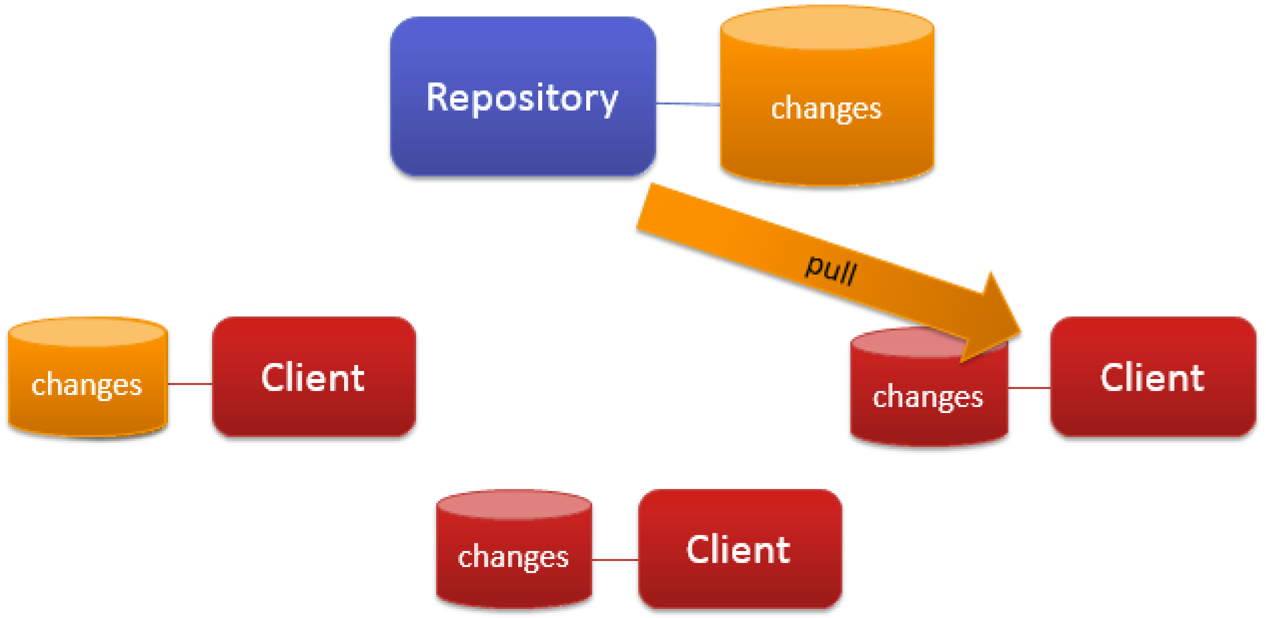

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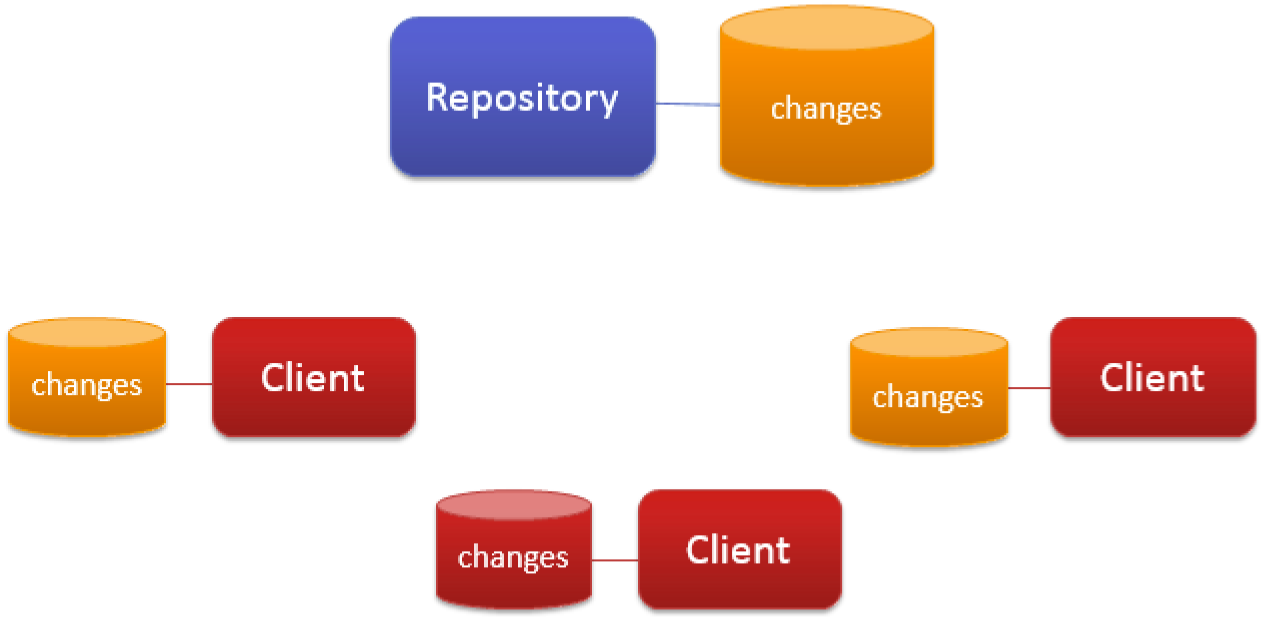

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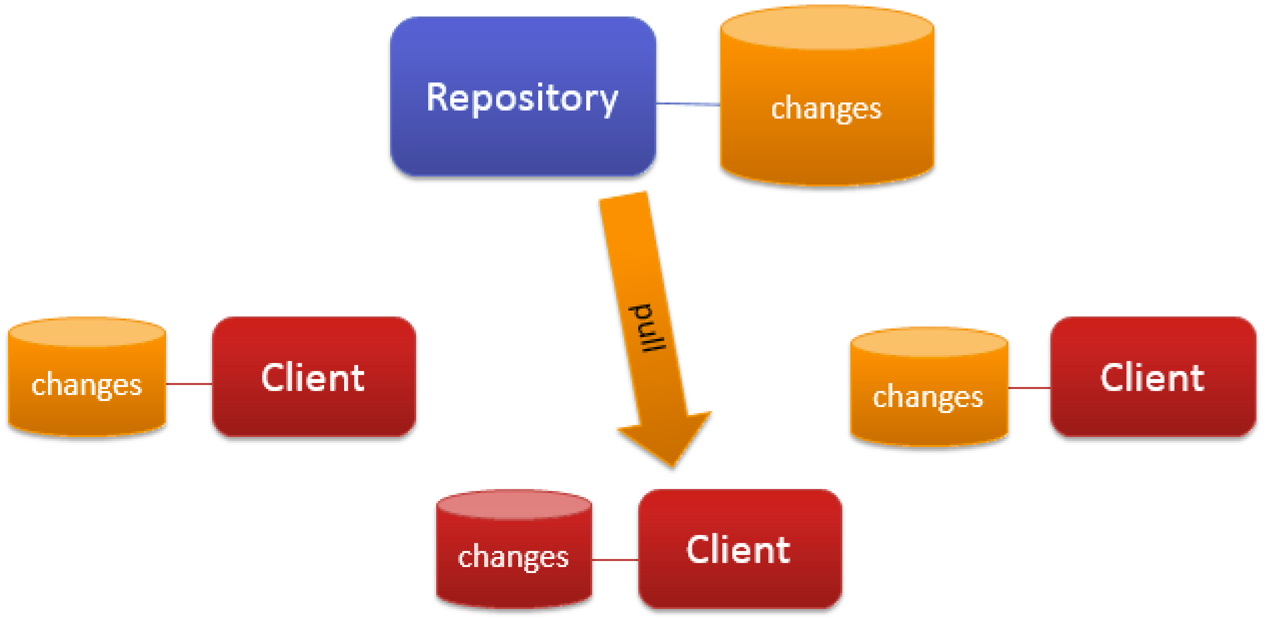

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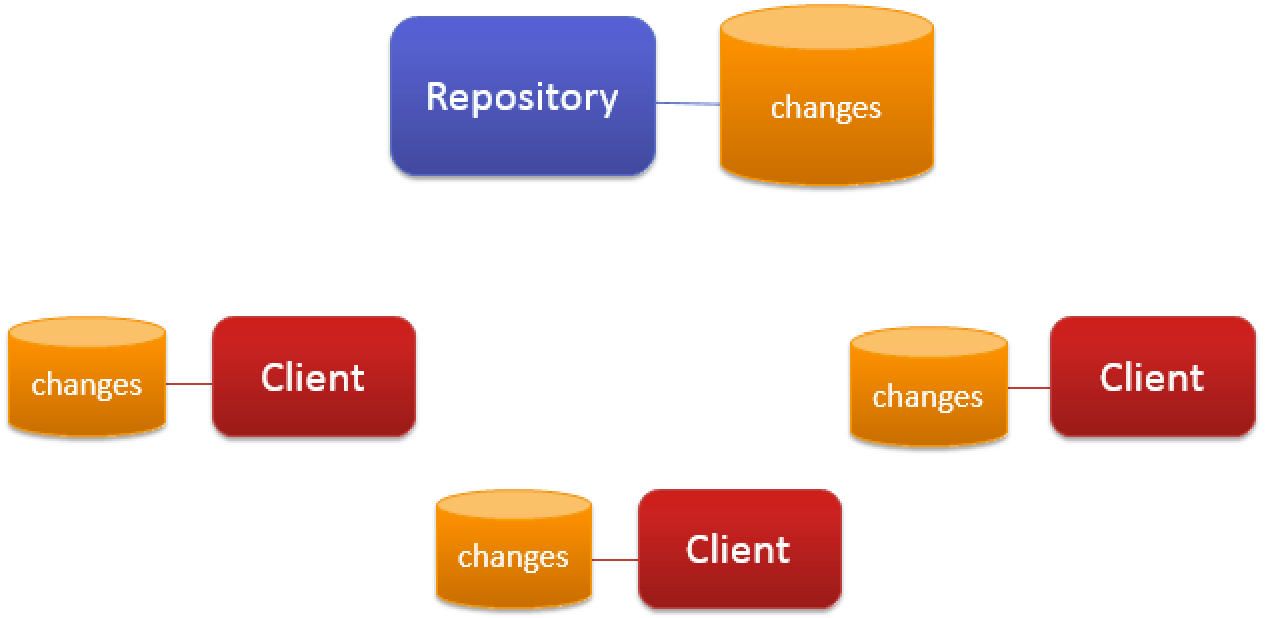
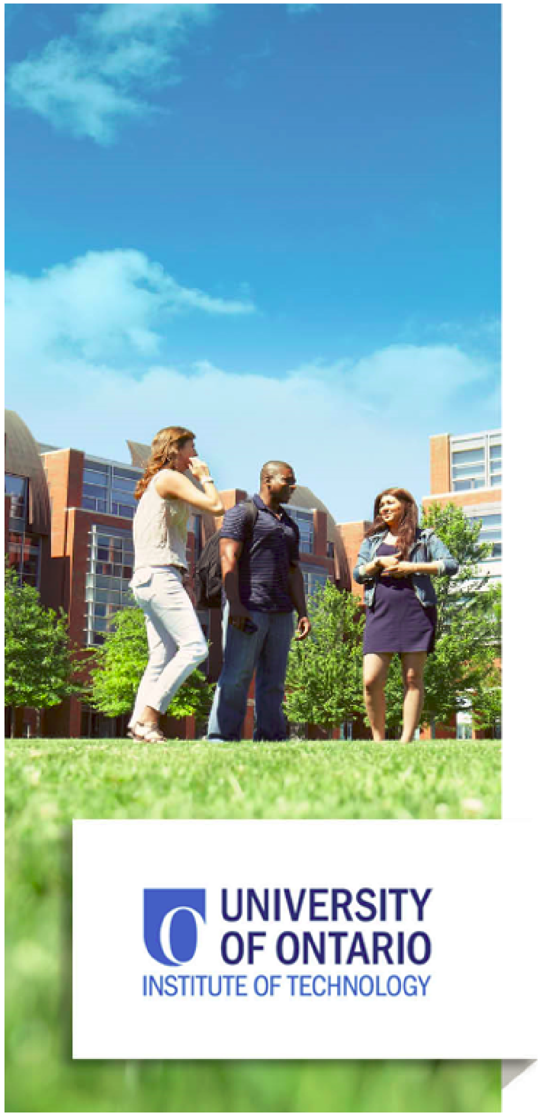




Using Git

Version Control Practicum

Getting Ready

- Create your work in a folder

```
$ cd /home/bsmith
$ mkdir myproj1
$ cd myproj1
…
```

Creating a Local Repository

- Tell git to manage the folder

```
$ git init
$ git add .
$ git commit -m "Initial commit"
```

Make Changes

- Add additional files:

```
$ git add myfile1.cpp
$ git add myfile2.cpp myfile3.cpp
$ git commit -m "Adding authorization"
```

Observing Changes

- Before commit, view pending changes (summary):

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

          new file:   library.cpp

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

          modified:    sample.cpp
```

Observing Changes

- Before commit, view pending changes (detail):

```
$ git add library.cpp
$ git diff --cached
  diff --git a/library.cpp b/library.cpp
  new file mode 100644
  index 0000000..55d5de0
  --- /dev/null
  +++ b/library.cpp
  @@ -0,0 +1,3 @@
  +void calculate(int a, int b) {
  +       return a + b;
  +}
```

Using a Remote Repository

- Create your repository on GitHub (or BitBucket)
- Tell git to clone the project

```
$ git clone https://github.com/user1/myproj2.git myproj2
```

Push to Remote Repository

- Push changes back to remote repository:

```
$ git commit -m "Added hashing"
$ git push -u origin master
```

Pushing Local to Remote

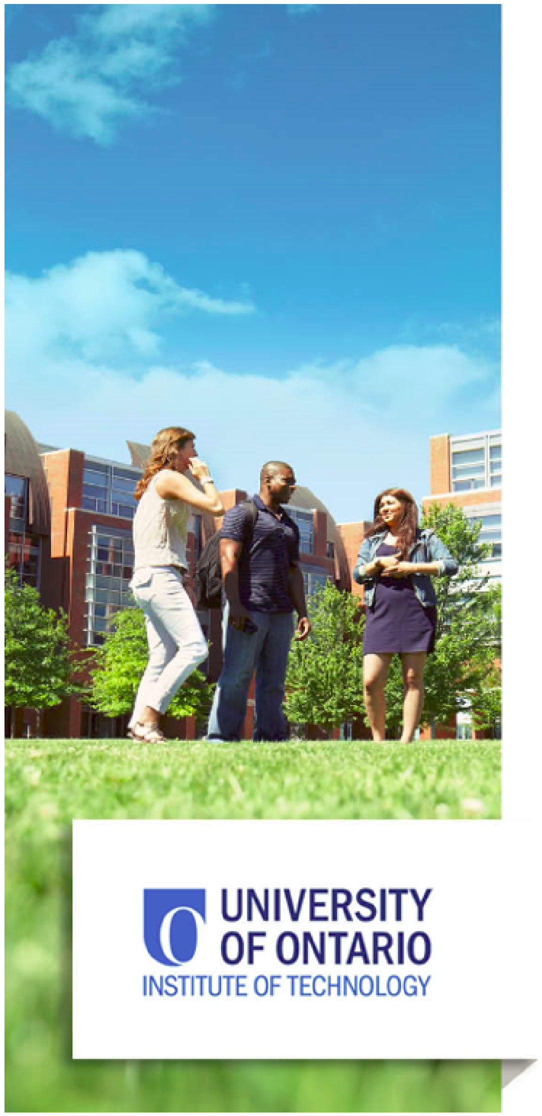
- Push changes back to remote repository:

```
$ git commit -m "Added hashing"
$ git remote add origin https://github.com/user1/myproj2.git
$ git push -u origin master
```

Downloading Changes

- If you are about to start work, it is best to update your code before you begin
- Download any changes in the remote repository:

```
$ git pull
```



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Using Git

Advanced Practicum

Branches

- A branch is a separate changelog
    - Any changes made to a branch do not affect other branches
    - Useful for experimental features
    - Sometimes branches are kept separate
        - e.g. Mobile-optimized kernel
    - Sometimes branches are merged
        - e.g. When an experimental feature becomes stable

Create a Branch

- Create a new branch:

```
$ git branch mobileOptimized
$ git branch
* master
 mobileOptimized
```

- Switch to our new branch:

```
$ git checkout mobileOptimized
```

Update Branch and Merge

- Make changes
- Switch to the master branch:

```
$ git checkout master
```

- Merge the branches:

```
$ git merge mobileOptimized
```

Handle Conflicts

- Find the conflicts (if any):

```
$ git diff
  diff --cc mobile.cpp
  index 366e2d1,26e7183..0000000
  --- a/mobile.cpp
  +++ b/mobile.cpp
  @@@ -1,1 -1,3 +1,7 @@@
  - /* nothing goes here for non-mobile systems */
  ++<<<<<<< HEAD
  ++/* nothing goes here for non-mobile systems */
  ++=======
  + void saveBattery() {
  +         return;
   -}
  ++}
  ++>>>>>>> mobileOptimized
```

View Logs

- View the commit history:

```
$ git log
```

View Logs - Graphical

- View the commit history in a graphical window:

```
$ gitk
```

Wrap-Up

- In this section, we learned about:
  - Centralized vs. decentralized version control
  - How to use git to manage your source code and other files