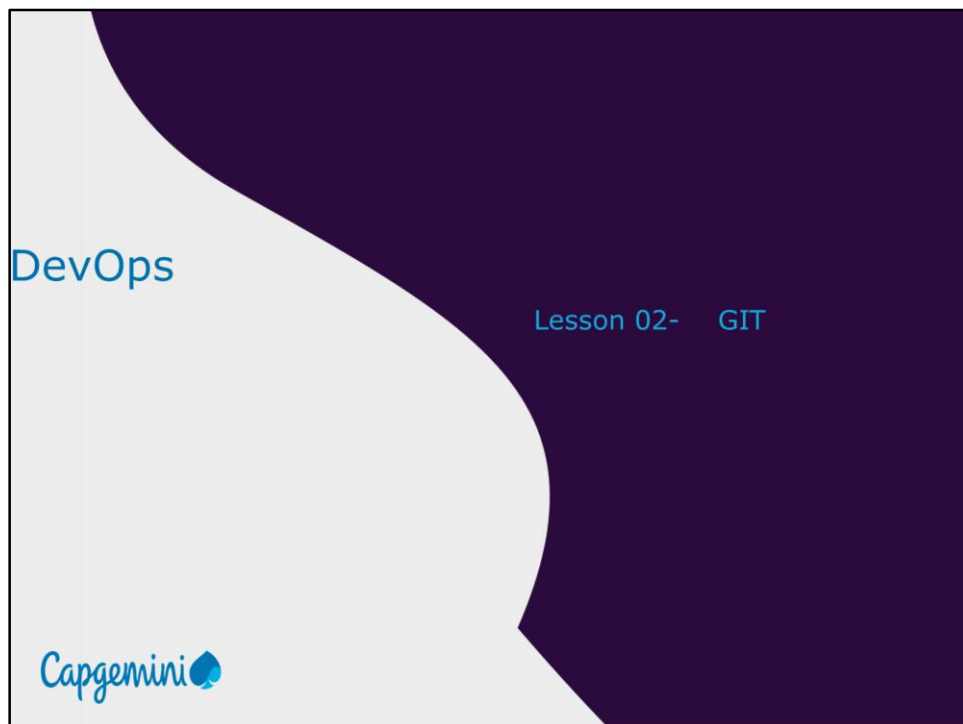


Instructor Notes:

Add instructor notes here.



Instructor Notes:

Add instructor notes here.

Lesson Objectives




- Introduction to GIT
- Version Control
- Repositories and Branches
- Working Locally with GIT
- Working Remotely with GIT

Instructor Notes:

Add instructor notes here.


Introduction to Git

Introduction



- Initially developed by Linus Torvalds, Git is a distributed version control system
- Git is a distributed revision control and source code management (SCM) system with an emphasis on speed, data integrity and support for distributed, non-linear workflows
- As with most other distributed revision control systems, and unlike most client-server systems, every Git working directory is a full-fledged repository with complete history and full version-tracking capabilities, independent of network access or a central server. Like the Linux kernel, Git is free software distributed under the terms of the GNU General Public License version 2

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Add the notes here.

Instructor Notes:

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Introduction to Git
Introduction

- Design Philosophy
 - Free & Open Source
 - Blazingly Fast
 - Distributed
 - Data Assurance
 - Strong support for non-linear development
 - Compatibility with existing systems/protocols
 - Toolkit-based design





Blazingly Fast

Torvalds has described Git as being very fast and scalable and performance tests done by [Mozilla](#) showed it was an [order of magnitude](#) faster than some version-control systems, and fetching version history from a locally stored repository can be one hundred times faster than fetching it from the remote server

Distributed development

Like [Darcs](#), [BitKeeper](#), [Mercurial](#), [SVK](#), [Bazaar](#) and [Monotone](#), Git gives each developer a local copy of the entire development history, and changes are copied from one such repository to another. These changes are imported as additional development branches, and can be merged in the same way as a locally developed branch.

Data Assurance

Aborting operations or backing out changes will leave useless dangling objects in the database. These are generally a small fraction of the continuously growing history of wanted objects. Git will automatically perform [garbage collection](#) when enough loose objects have been created in the repository.

Garbage collection can be called explicitly using `git gc --prun`.

Strong support for non-linear development

Git supports rapid branching and merging, and includes specific tools for visualizing and navigating a non-linear development history. A core assumption in Git is that a change will be merged more often than it is written, as it is passed around various reviewers.

Branches in git are very lightweight: A branch in git is only a reference to a single commit. With its parental commits, the full branch structure can be constructed.

Instructor Notes:

Add instructor notes here.

Version control

Version Control System

- Version control systems are software that manage changes to files e.g. documents, images, code etc.
- Benefits of Version Control
 - Saves from creating multiple backup files
 - Allow multiple people to work on same file
 - Track changes & see who had made changes
 - Easy to switch back to older version when needed
 - Increases productivity
- Two types of Version Control
 - Client sever Version Control- SVN, CVS, PerForce, IBM rational
 - Distributed Version Control -GIT

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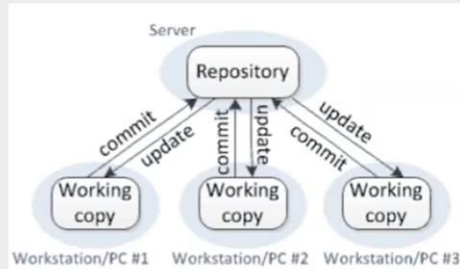
Instructor Notes:

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Version control

Problem with Client Server Version Control

- Client Server version control system works on a centralized model which has a single repository to which user check-in & check-out
- Some of the major benefits working with version control system are listed below:
 - Version control is not available on local system
 - If the central server get corrupted the entire history is lost



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Version control

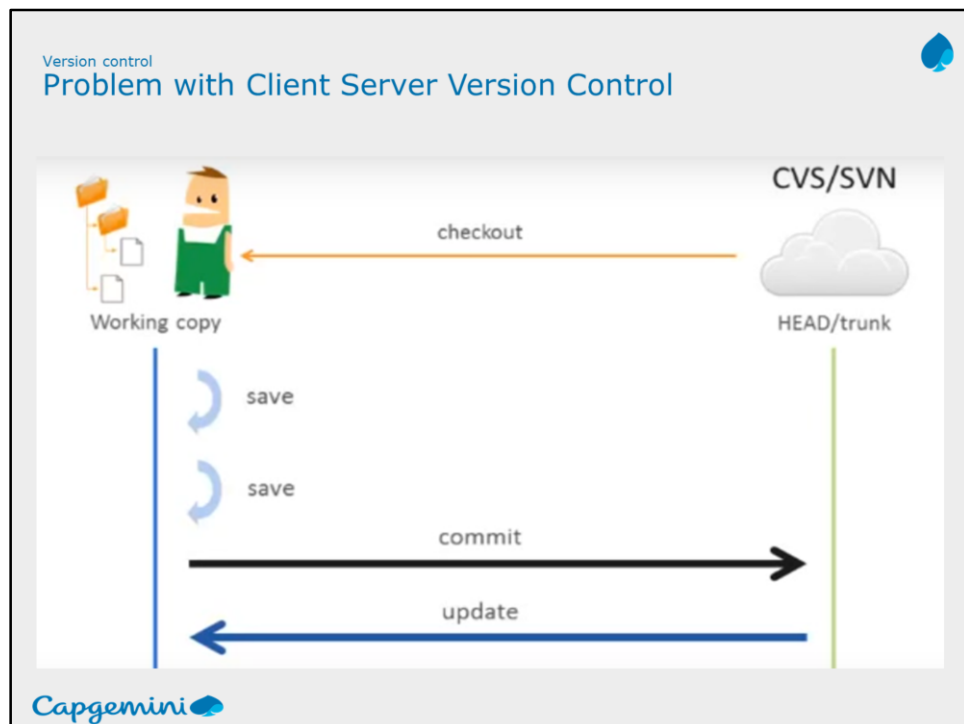
Problem with Client Server Version Control

- History in one Repository
- Client only gets a single revision per checkout
- All commits go into one repository

The diagram illustrates a client-server version control system. At the top, a blue cylinder labeled 'Repository' is connected to a central cloud. Below the cloud, three client boxes are shown, each containing a person icon and a local repository icon. Arrows indicate the flow of data: a single arrow points from the cloud to the Repository, and multiple arrows point from the cloud to each client, representing the distribution of a single revision to all clients. The Capgemini logo is visible in the bottom left corner.

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Add instructor notes here.



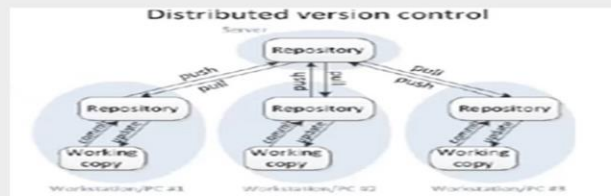
Instructor Notes:

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Version control

Advantage of Distributed Version Control-GIT

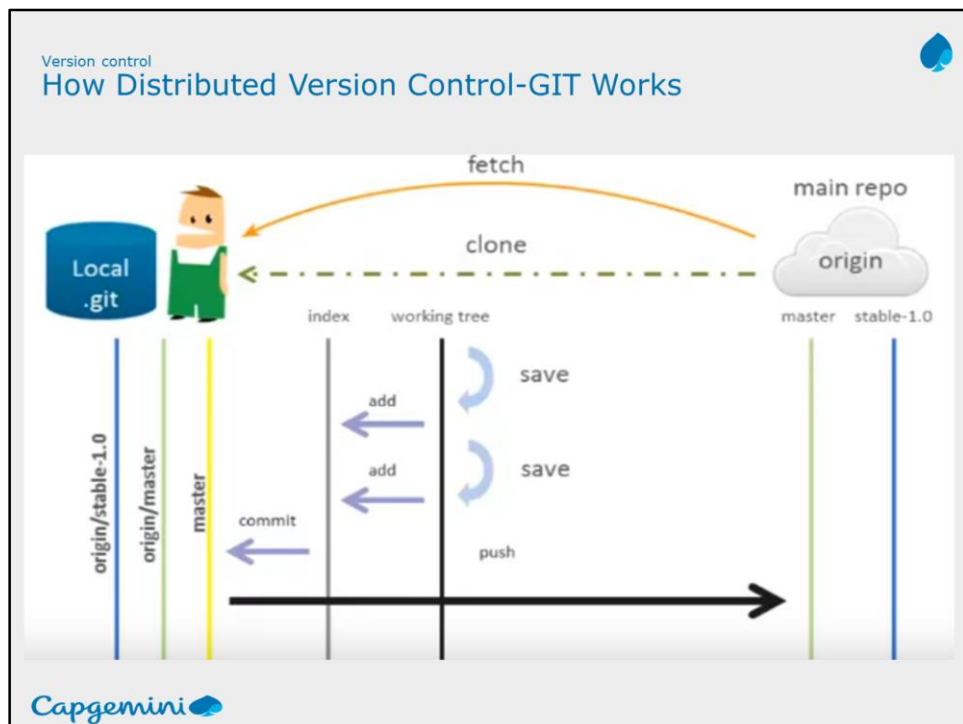
- Distributed version control system don't rely on central server. It allows one of the repository on their own drive with entire history of the project
- Benefits of Distributed version control :
 - DVCS is also available on local machine.
 - No single point of failure as each user has the repository with entire history
 - Performs all action locally , even when not connected to internet



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Instructor Notes:

Add instructor notes here.



Instructor Notes:

Add instructor notes here.

Version control

Version Control Parallel Development -GIT

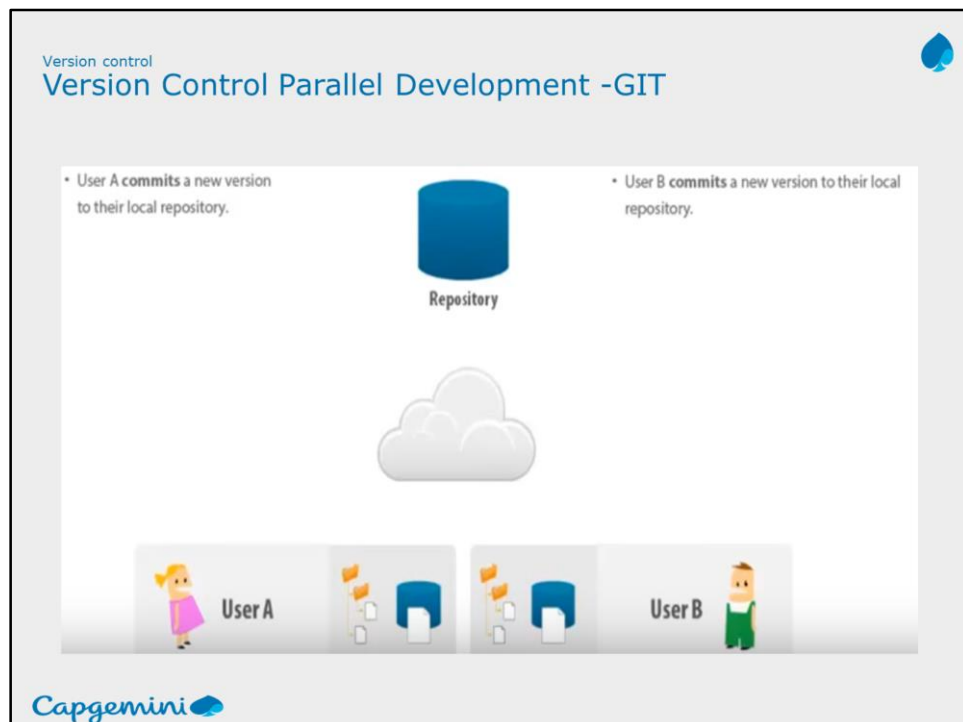


- Version control system helps in parallel development and preventing one user from overwriting the work of another
- Two ways to solve parallel development problem:
 - Copy-modify-merge –GIT uses this
 - Lock-modify-unlock(practically not possible)

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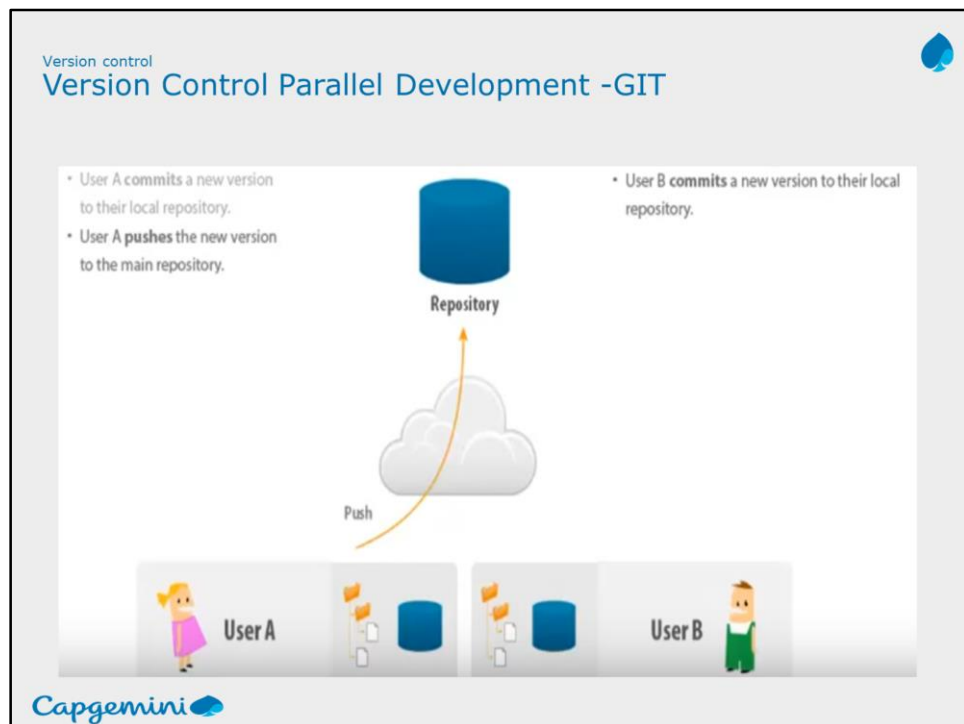
Instructor Notes:

Add instructor notes here.



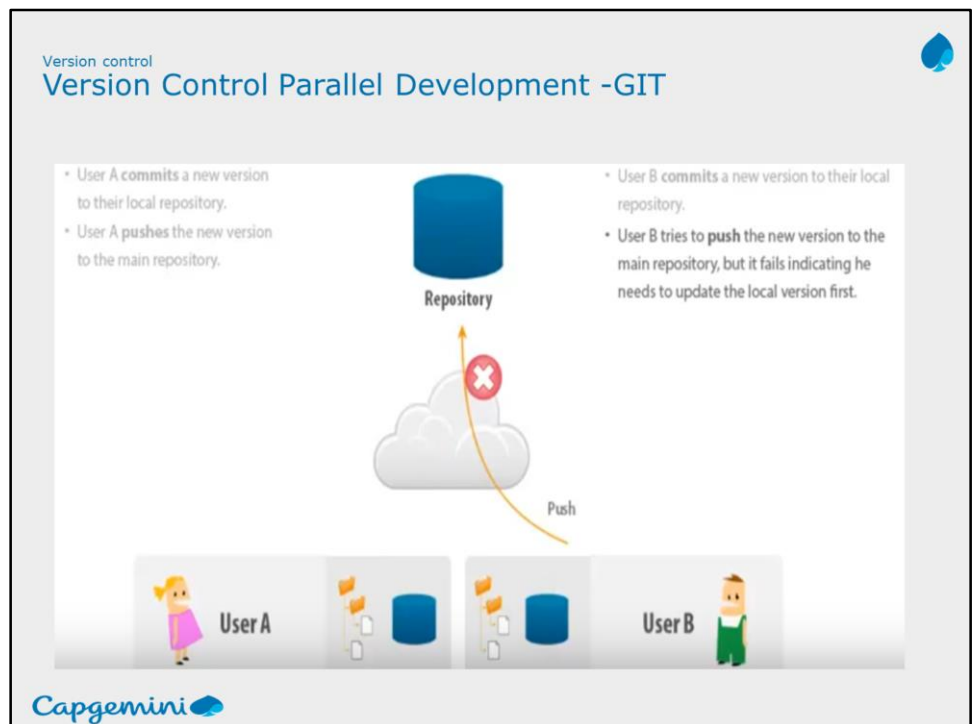
Instructor Notes:

Add instructor notes here.



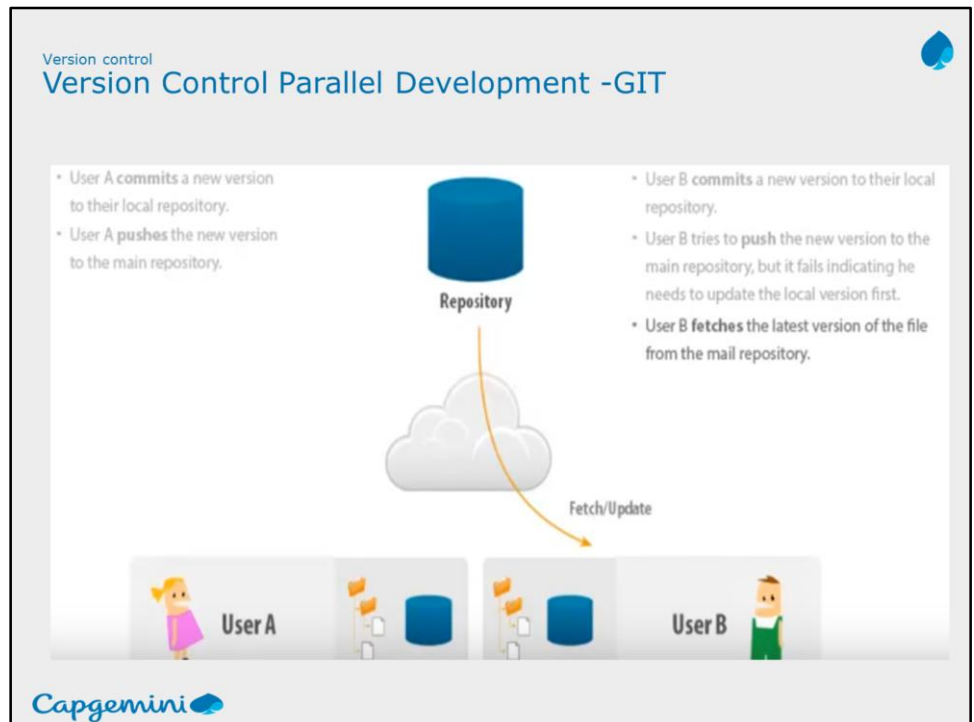
Instructor Notes:

Add instructor notes here.



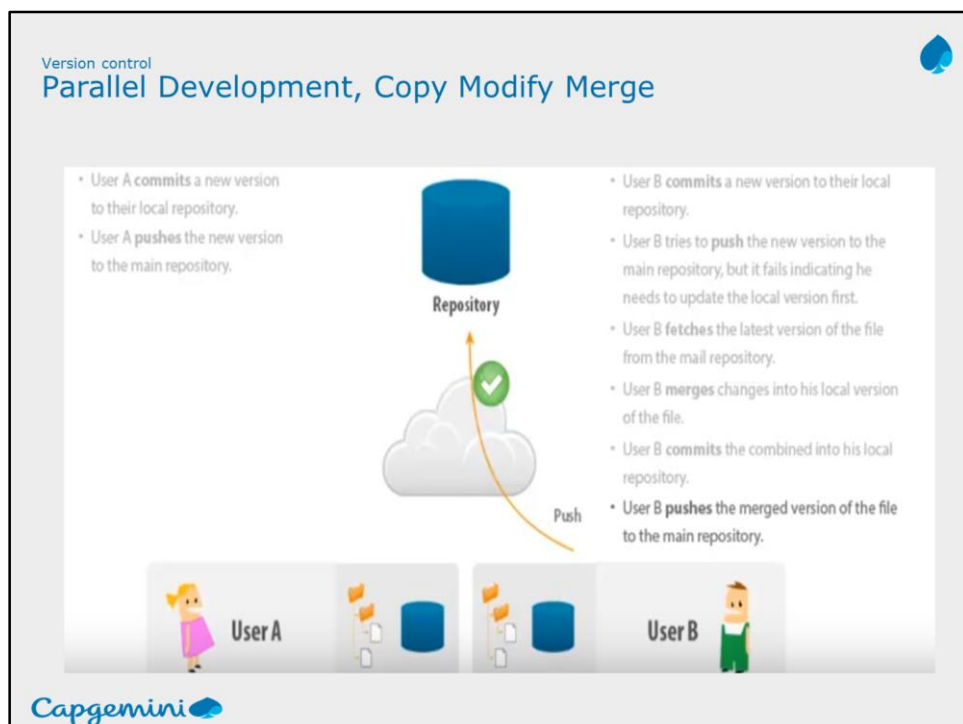
Instructor Notes:

Add instructor notes here.



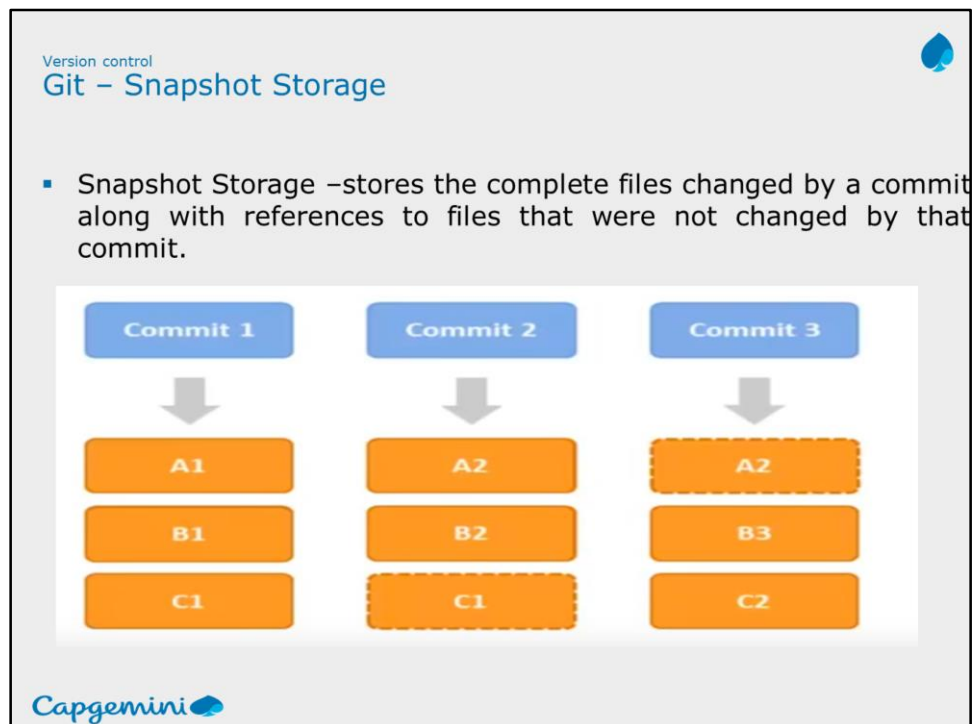
Instructor Notes:

Add instructor notes here.



Instructor Notes:

Add instructor notes here.



Instructor Notes:

Add instructor notes here.

Repositories and Branches

GIT-Repositories



- **Repositories:**
 - It is a collection of refs together with an object database containing all objects which are reachable from the refs, possibly accompanied by meta data from one or more porcelain. A repository can share an object database with other repositories via alternate mechanism.
- **What to store in repositories?**
 - Anything, however any sort of editable files are preferred.

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Add instructor notes here.

Repositories and Branches

Git – Snapshot Storage



- Creating repositories :
 - at default location
 - git init
 - at particular location
 - git init c:/testGIT
 - Bare repository
 - git init –bare
- How to get GIT repository:
 - \$ git clone git://git.kernel.org/pub/scm/git/git.git

It does approx. 225 MB download

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Add instructor notes here.

Repositories and Branches

Repositories and Branches



■ Branches:

- A "branch" is an active line of development.
- The most recent commit on a branch is referred to as the tip of that branch.
- The tip of the branch is referenced by a branch head, which moves forward as additional development is done on the branch.
- A single git repository can track an arbitrary number of branches, but working tree is associated with just one of them (the "current" or "checked out" branch), and HEAD points to that branch

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A bare repository is normally an appropriately named [directory](#) with a .git suffix that does not have a locally checked-out copy of any of the files under revision control. That is, all of the git administrative and control files that would normally be present in the hidden .git sub-directory are directly present in the repository. Git directory instead, and no other files are present and checked out. Usually publishers of public repositories make bare repositories available. master The default development [branch](#). Whenever you create a git [repository](#), a branch named "master" is created, and becomes the active branch. In most cases, this contains the local development, though that is purely by convention and is not required.

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Add instructor notes here.

Repositories and Branches

Repositories and Branches

- Getting different versions of project:
 - Git is best thought of as a tool for storing the history of a collection of files. It stores the history as a compressed collection of interrelated snapshots of the project's contents. In git each such version is called a commit.
 - Those snapshots aren't necessarily all arranged in a single line from oldest to newest; instead, work may simultaneously proceed along parallel lines of development, called branches, which may merge and diverge.
 - A single git repository can track development on multiple branches. It does this by keeping a list of heads which reference the latest commit on each branch; the `git-branch(1)` command shows you the list of branch heads:
- `$ git branch * master`
 - A freshly cloned repository contains a single branch head, by default named "master", with the working directory initialized to the state of the project referred to by that branch head.
 - Most projects also use tags. Tags, like heads, are references into the project's history, and can be listed using the `git-tag(1)` command:
 - `$ git tag -l`

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`git branch`

List all of the branches in our repository.

`git branch <branch>`

Create a new branch called <branch>. This does *not* check out the new branch.

`git branch -d <branch>`

Force delete the specified branch

`git branch -m <branch>`

Examples:

It's important to understand that branches are just *pointers* to commits. When you create a branch, all Git needs to do is create a new pointer—it doesn't change the repository in any other way.

create a branch using the following command:

`git branch branch-experiment`

The repository history remains unchanged. All you get is a new pointer to the current commit

Once we are finished working on a branch and have merged it into the main code base, we are free to delete the branch without losing any history

`git branch -d branch-experiment`

However, if the branch hasn't been merged, the above command will output an error message

`git checkout <existing-branch>`

Check out the specified branch, which should have already been created with `git branch`. This makes <existing-branch> the current branch, and updates the working directory to match.

`git checkout -b <new-branch>`

Create and check out <new-branch>. The `-b` option is a convenience flag that tells Git to run `git branch <new-branch>` before running `git checkout <new-branch>`. `git checkout -b <new-branch> <existing-branch>`

Same as the above invocation, but base the new branch off of <existing-branch> instead of the current branch.

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Repositories and Branches

Understanding History-Repositories



- **Commits:**
- Every change in the history of a project is represented by a commit. The `git-show(1)` command shows the most recent commit on the current branch:
- `$ git show`
- Every commit (except the very first commit in a project) also has a parent commit which shows what happened before this commit. Following the chain of parents will eventually take you back to the beginning of the project.
- However, the commits do not form a simple list; git allows lines of development to diverge and then reconverge, and the point where two lines of development reconverge is called a "merge". The commit representing a merge can therefore have more than one parent, with each parent representing the most recent commit on one of the lines of development leading to that point.
- The best way to see how this works is using the `gitk(1)` command; running `gitk` now on a git repository and looking for merge commits will help understand how the git organizes history.
- In the following, commit X is "reachable" from commit Y if commit X is an ancestor of commit Y. Equivalently, Y is a descendant of X, or that there is a chain of parents leading from commit Y to commit X.

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Repositories and Branches

Understanding History-Trees



- The working tree is the current view into the repository. It has all the files from your project: the source code, build files, unit tests, and so on.
- Some VCSs refer to this as your working copy. People coming to Git for the first time from another VCS often have trouble separating the working tree from the repository. In a VCS such as Subversion, your repository exists “over there” on another server.
- In Git, “over there” means in the `.git/` directory inside your project’s directory on your local computer. This means you can look at the history of the repository and see what has changed without having to communicate with a repository on another server.

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Working Locally with GIT

Locally Working with GIT

- Download GIT From <https://git-scm.com/downloads>
- First Repository :
 - Create Empty directory on system myrepoone
 - Create a repository
git init

```
rvikash@PUNHDCLT58 MINGW32 ~/Desktop
$ cd myrepoone
bash: cd: myrepoone: No such file or directory

rvikash@PUNHDCLT58 MINGW32 ~/Desktop
$ cd C:\myrepoone

rvikash@PUNHDCLT58 MINGW32 /c/myrepoone
$ git init
Initialized empty Git repository in C:/myrepoone/.git/

rvikash@PUNHDCLT58 MINGW32 /c/myrepoone (master)
$ ls -a
./ ../ .git/
```

Checking repository created or not

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Add instructor notes here.

Working Locally with GIT

Locally Working with GIT



- Setting Name & email Id

- Setting name

git config --global user.name "Rahul Vikash"

- Setting email

\$ git config --global user.mail rahul.vikash@capgemini.com

- Checking configuration

\$ git config --list

```
vikash@PUNHDC1T58 MINGW32 /C:/myrepoone (master)
$ git config --global user.name "Rahul Vikash"
vikash@PUNHDC1T58 MINGW32 /C:/myrepoone (master)
$ AC
vikash@PUNHDC1T58 MINGW32 /C:/myrepoone (master)
$ git config --global user.mail rahul.vikash@capgemini.com
vikash@PUNHDC1T58 MINGW32 /C:/myrepoone (master)
$ AC
vikash@PUNHDC1T58 MINGW32 /C:/myrepoone (master)
$ git config --list
core.symlinks=false
core.autocrlf=true
core.fsckcache=true
color.diff=auto
color.status=auto
color.branch=auto
color.interactive=true
pack.packsize=limit=2g
http.formatText=true
http.sslCAinfo=C:/Program Files/Git/mingw32/ssl/certs/ca-bundle.crt
rebase.autosquash=true
credential.helper=manager
user.name=Rahul Vikash
user.mail=rahul.vikash@capgemini.com
core.repositoryformatversion=0
core.filemode=false
core.bare=false
core.logallrefupdates=true
core.symlinks=false
core.ignorecase=true
```

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Instructor Notes:

Add instructor notes here.

Working Locally with GIT

Locally Working with GIT



- Adding File in repository
MyFirst.txt
- Check
\$ ls
- Know the status
\$ git status
- Add the file in staging
\$ git add MyFirst.txt
- Commit in git repository with lock message
\$ git commit -m "Added MyFirst File"
- See log
\$ git log


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Add instructor notes here.

Working Locally with GIT

Locally Working with GIT




```
rvikash@PUNHDCLT58 MINGW32 /c/myrepoone (master)
$ git commit -m "Added MyFirst File"
[master (root-commit) d06ddf1] Added MyFirst File
Committer: Rahul Vikash <rahul.vikash@capgemini.com>
Your name and email address were configured automatically based
on your username and hostname. Please check that they are accurate.
You can suppress this message by setting them explicitly:

    git config --global user.name "Your Name"
    git config --global user.email you@example.com

After doing this, you may fix the identity used for this commit with:

    git commit --amend --reset-author

1 file changed, 1 insertion(+)
create mode 100644 MyFirst.txt
```



Instructor Notes:

Add instructor notes here.

Working Locally with GIT

Locally Working with GIT-

Adding new data in MyFirst.txt
Now checking status \$git status

```
rvikash@PUNHDCLT58 MINGW32 /c/myrepoone (master)
$ git status
On branch 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:   MyFirst.txt

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

Commit \$ git commit -am "Added New MyFirst File"
Again check log --\$git log

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Add instructor notes here.

Working Locally with GIT

Locally Working with GIT-



- To check which line has changed
\$ git commit - -amend
- Add one more file -MyJava.txt
- Unstage the One File
\$ git reset HEAD MyFirst.txt
- Unchanged the work done --\$ git checkout -- MyJava.txt

```
rvikash@PUNHDCLT58 MINGW32 /c/myrepoone (master)  
$ git checkout -- MyJava.txt
```

```
rvikash@PUNHDCLT58 MINGW32 /c/myrepoone (master)  
$ git status  
On branch master  
changes to be committed:  
  (use "git reset HEAD <file>..." to unstage)  
  
    new file:   MyJava.txt
```

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Instructor Notes:

Add instructor notes here.

Working Locally with GIT

Locally Working with GIT

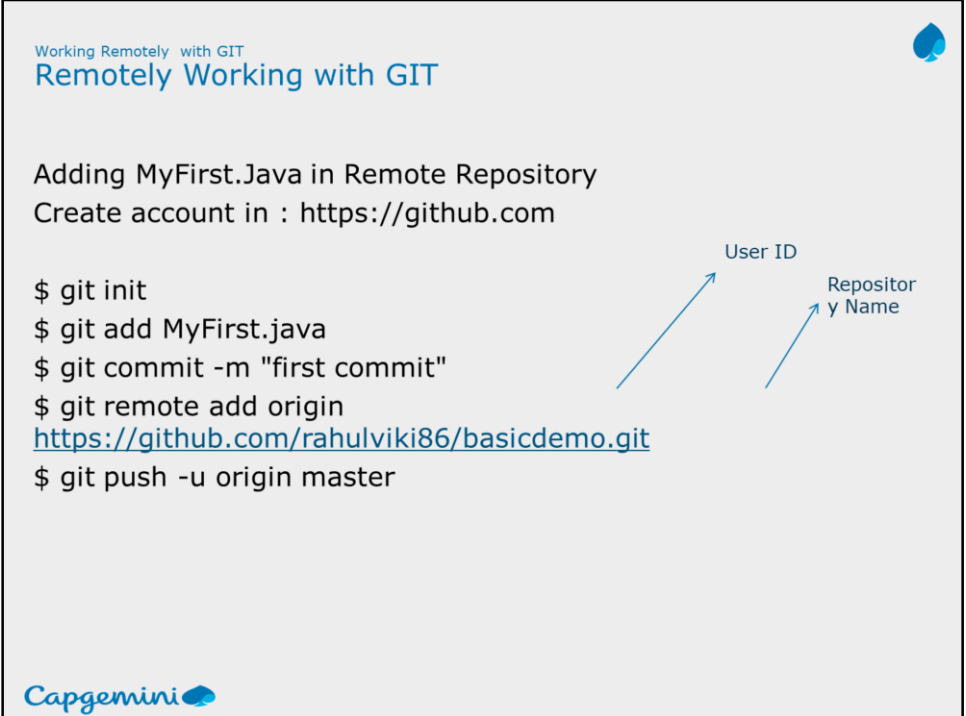


- Multiple Reset for n number of file ,Goes to last commit
\$ git reset -- hard

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Instructor Notes:

Add instructor notes here.



Working Remotely with GIT

Remotely Working with GIT

Adding MyFirst.Java in Remote Repository
Create account in : <https://github.com>

```
$ git init
$ git add MyFirst.java
$ git commit -m "first commit"
$ git remote add origin
https://github.com/rahulviki86/basicdemo.git
$ git push -u origin master
```

Annotations on the URL:

- User ID (points to `rahulviki86`)
- Repository Name (points to `basicdemo`)

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git clone [rahul.vikash@capgemini.com:myrepoone](https://github.com/rahul.vikash@capgemini.com:myrepoone)

git-remote - Manage set of tracked repositories, Manage the set of repositories ("remotes") whose branches you track.

git-push - Update remote refs along with associated objects, Updates remote refs using local refs, while sending objects necessary to complete the given refs.

git-fetch - Download objects and refs from another repository

git-pull - Fetch from and integrate with another repository or a local branch

git-merge - Join two or more development histories together

Instructor Notes:

2.5: Working Remotely with GIT

Remotely Working with GIT

After running

\$ git push -u origin master – Ask for username & Password

```
master (root-commit) 133a910J first commit
Committer: Rahul Vikash <rahul.vikash@cappgemini.com>
your name and email address were configured automatically based
on your username and hostname. To stop this automatic behavior,
you can suppress this message by adding
git config --global useAutosetup false
to your configuration. To see more about this message and how to
suppress it, run
git commit --amend --remessage
after doing this, you may want to
git commit --amend --remessage
1 file changed, 7 insertions(+)
create mode 100644 MyFirst.java
vikash@PUNHDCLT58 MINGW32 /c/Local (master)
$ git remote add origin https://github.com/rahulviki86/basicdemo.git
vikash@PUNHDCLT58 MINGW32 /c/Local (master)
$ git push -u origin master
```

Windows Security

Git Credential Manager for Windows

Enter your credentials for https://github.com/.

rahulviki86

OK

Cancel

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Instructor Notes:

Working Remotely with GIT

Remotely Working with GIT

Added in the Remote Repository

rahulviki86 / basicdemo

Watch 0 Star 0 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Pulse Graphs Settings

No description, website, or topics provided.

New Add topics

1 commit 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

rahulviki86 first commit Latest commit 133a910 12 minutes ago

MyFirst.java first commit 12 minutes ago

Help people interested in this repository understand your project by adding a README. Add a README

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Instructor Notes:

Add instructor notes here.

Working Remotely with GIT

Remotely Working with GIT



- Cloning the data ----git clone <repo> <directory>
- When you run git clone, the following actions occur:
 - A new folder called repo is made
 - It is initialized as a Git repository
 - A remote named origin is created, pointing to the URL you cloned from
 - All of the repository's files and commits are downloaded there
 - The default branch (usually called master) is checked out
 - For every branch foo in the remote repository, a corresponding remote-tracking branch refs/remotes/origin/foo is created in your local repository. You can usually abbreviate such remote-tracking branch names to origin/foo.

Syntax:

```
$git clone https://github.com/rahulviki86/basicdemo.git
```

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Instructor Notes:

Add instructor notes here.

Working Remotely with GIT

Remotely Working with GIT



- `git-fetch` - Download objects and refs from another repository, Use `git fetch` to retrieve new work done by other people. Fetching from a repository grabs all the new remote-tracking branches and tags *without* merging those changes into your own branches.

Syntax:

`$git fetch remotename`

- `git-pull` - Fetch from and integrate with another repository or a local branch, is a convenient shortcut for completing both `git fetch` and `git merge` in the same command.

Syntax:

`$git pull remotename branchname`

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Instructor Notes:

Add instructor notes here.

Working Remotely with GIT

Remotely Working with GIT



- `git-merge` - Join two or more development histories together. Merging combines your local changes with changes made by others.

Syntax:

`$git merge remotename/branchname`

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Instructor Notes:

Add instructor notes here.

Demo

- Demo on GIT –Locally using git init, add, status, log
- Demo on GIT- Remotelly using git remote, pull, push, fetch, clone

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Add the notes here.

Instructor Notes:

Add instructor notes here.

Lab

- Lab 01,02

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Add the notes here.

Instructor Notes:

Add instructor notes here.

Summary



- Git is a distributed revision control and source code management (SCM) system with an emphasis on speed, data integrity and support for distributed, non-linear workflows.
- Git working with local repository
- Git working with remote repository



Add the notes here.

Instructor Notes:

Q1 git diff master branch
name

Q2 pull

Q3

Review Question



- To see the difference between which two branches the following command can be used?
 - git diff master branch_name
 - git --diff master branch_name
 - git merge master branch_name
 - git --stat master branch_name
- The git _____ command performs a git fetch and git merge.
 - Push
 - Pull
 - Clone
 - branch



Add the notes here.

Instructor Notes:

Q3 \$ git add file1 file2
file3->\$ git diff --cached-
>\$ git status->\$ git
commit

Review Question

- Three files file1, file2 and file3 are modified. Identify the series of commands to view the modified files, then add their updated contents to the index and commit the changes.
 - '\$ git status ->\$ git commit
 - \$ git diff --cached->\$ git status->\$ git commit -a
 - \$ git add ->\$ git diff --cached->\$ git status->\$ git commit
 - \$ git add file1 file2 file3->\$ git diff --cached->\$ git status->\$ git commit

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Add the notes here.