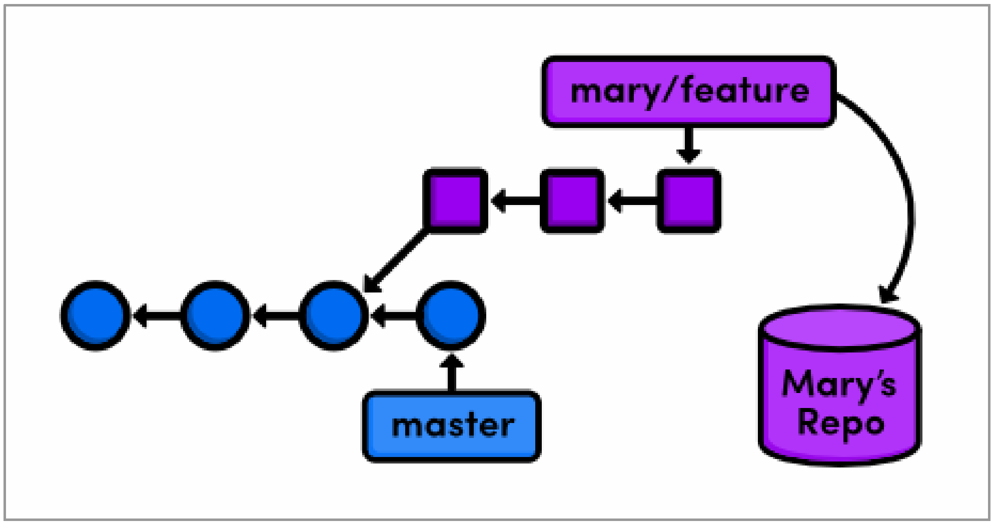
‹ Back to *Ry's Git Tutorial*

Remotes

Simply put, a **remote repository** is one that is not your own. It can be another Git repository that's on your company's network, the internet, or even your local filesystem, but the point is that it's a repository distinct from your `my-git-repo` project.

We've already seen how branches can streamline a workflow within a single repository, but they also happen to be Git's mechanism for sharing commits between repositories. **Remote branches** act just like the local branches that we've been using, only they represent a branch in someone else's repository.



Accessing a feature branch from a remote repository

This means that we can adapt our merging and rebasing skills to make Git a fantastic collaboration tool. Over the next few modules, we'll be exploring various multi-user workflows by pretending to be different developers working on our example website.

For several parts of this module, we're going to pretend to be Mary, the graphic designer for our website. Mary's actions are clearly denoted by including her name in the heading of each step.

Download the repository for this module

If you've been following along from the previous module, you already have everything you need. Otherwise, download the zipped Git repository from the above link, uncompress it, and you're good to go.

Clone the Repository (Mary)

First, Mary needs her own copy of the repository to work with. The Distributed Workflows module will discuss network-based remotes, but right now we're just going to store them on the local filesystem.

```
cd /path/to/my-git-repo
cd ..
git clone my-git-repo marys-repo
cd marys-repo
```

The first two lines navigate the command shell to the directory *above* `my-git-repo`. Make sure to change `/path/to/my-git-repo` to the actual path to your repository. The `git clone` command copies our repository into `marys-repo`, which will reside in the same directory as `my-git-repo`. Then, we navigate to Mary's repository so we can start pretending to be Mary.

Run `git log` to verify that Mary's repository is in fact a copy of our original repository.

Configure The Repository (Mary)

First off, Mary needs to configure her repository so that we know who contributed what to the project.

```
git config user.name "Mary"
git config user.email mary.example@rypress.com
```

You may recall from the first module that we used a `--global` flag to set the configuration for the entire Git installation. But since Mary's repository is on the local filesystem, she needs a *local* configuration.

Use a text editor to open up the file called `config` in the `.git` folder of Mary's project (you may need to enable hidden files to see `.git`). This is where local configurations are stored, and we see Mary's information at the bottom of the file. Note that this overrides the global configuration that we set in The Basics.

Start Mary's Day (Mary)

Today, Mary is going to be working on her bio page, which she should develop in a separate branch:

```
git checkout -b bio-page
```

Mary can create and check out branches just like we did in our copy of the project. Her repository is a completely isolated development environment, and she can do whatever she wants in here without worrying about what's going on in `my-git-repo`. Just as branches are an abstraction for the working directory, the staged snapshot, and a commit history, a repository is an abstraction for branches.

Create Mary's Bio Page (Mary)

Let's complete Mary's biography page. In `marys-repo`, change `about/mary.html` to:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <title>About Mary</title>
  <link rel="stylesheet" href="../style.css" />
  <meta charset="utf-8" />
</head>
<body>
  <h1>About Mary</h1>
  <p>I'm a graphic designer.</p>
  <h2>Interests</h2>
  <ul>
    <li>Oil Painting</li>
    <li>Web Design</li>
  </ul>

  <p><a href="index.html">Return to about page</a></p>
</body>
</html>
```

Again, we're developing this in a branch as a best-practice step: our `master` branch is only for stable, tested code. Stage and commit the snapshot, then take a look at the result.

```
git commit -a -m "Add bio page for Mary"
git log -n 1
```

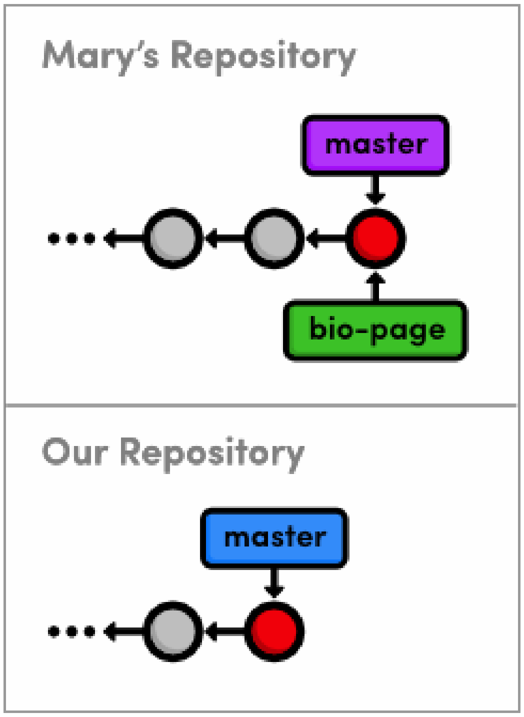
The `Author` field in the log output should reflect the local configurations we made for Mary's name and email. Remember that the `-n 1` flag limits history output to a single commit.

Publish the Bio Page (Mary)

Now, we can publish the bio page by merging into the `master` branch.

```
git checkout master
git merge bio-page
```

Of course, this results in a fast-forward merge. We'll eventually pull this update into `my-git-repo` once we stop pretending to be Mary. Here's what Mary's repository looks like compared to ours:



Merging Mary's `bio-page` *branch with her* `master`

Notice that both repositories have normal, local branches—we haven't had any interaction between the two repositories, so we don't see any remote branches yet. Before we switch back to `my-git-repo`, let's examine Mary's remote connections.

View Remote Repositories (Mary)

Mary can list the connections she has to other repositories using the following command.

```
git remote
```

Apparently, she has a remote called `origin`. When you clone a repository, Git automatically adds an `origin` remote pointing to the original repository, under the assumption that you'll probably want to interact with it down the road. We can request a little bit more information with the `-v` (verbose) flag:

```
git remote -v
```

This shows the full path to our original repository, verifying that `origin` is a remote connection to `my-git-repo`. The same path is designated as a "fetch" and a "push" location. We'll see what these mean in a moment.

Return to Your Repository (You)

Ok, we're done being Mary, and we can return to our own repository.

```
cd ../my-git-repo
```

Notice that Mary's bio page is still empty. It's very important to understand that this repository and Mary's repository are completely separate. While she was altering her bio page, we could have been doing all sorts of other things in `my-git-repo`. We could have even changed her bio page, which would result in a merge conflict when we try to pull her changes in.

Add Mary as a Remote (You)

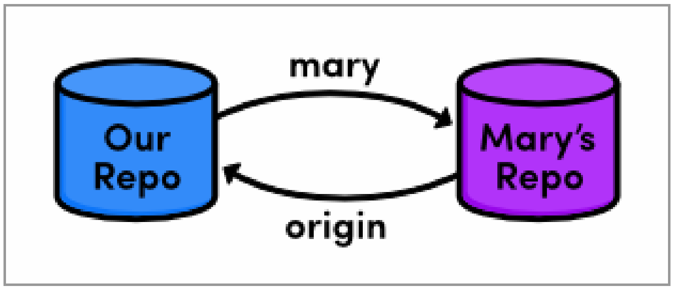
Before we can get ahold of Mary's bio page, we need access to her repository. Let's look at our current list of remotes:

```
git remote
```

We don't have any (`origin` was never created because we didn't clone from anywhere). So, let's add Mary as a remote repository.

```
git remote add mary ../marys-repo
git remote -v
```

We can now use `mary` to refer to Mary's repository, which is located at `../marys-repo`. The `git remote add` command is used to bookmark another Git repository for easy access, and our connections can be seen in the figure below.



Connections to remote repositories

Now that our remote *repositories* are setup, we'll spend the rest of the module discussing remote *branches*.

Fetch Mary's Branches (You)

As noted earlier, we can use remote branches to access snapshots from another repository. Let's take a look at our current remote branches with the `-r` flag:

```
git branch -r
```

Again, we don't have any. To populate our remote branch listing, we need to **fetch** the branches from Mary's repository:

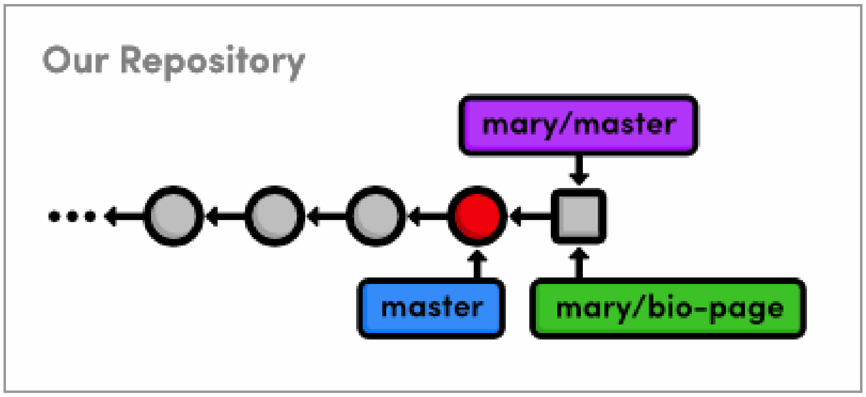
```
git fetch mary
git branch -r
```

This will go to the "fetch" location shown in `git remote -v` and download all of the branches it finds there into our repository. The resulting branches are shown below.

```
mary/bio-page
mary/master
```

Remote branches are always listed in the form `<remote-name>/<branch-name>` so that they will never be mistaken for local branches. The above listing reflects the state of Mary's repository at the time of the fetch, but they will not be automatically updated if Mary continues developing any of her branches.

That is to say, our remote branches are not *direct* links into Mary's repository—they are read-only copies of her branches, stored in our own repository. This means that we would have to do another fetch to access new updates.



Mary's remote branches in our repository

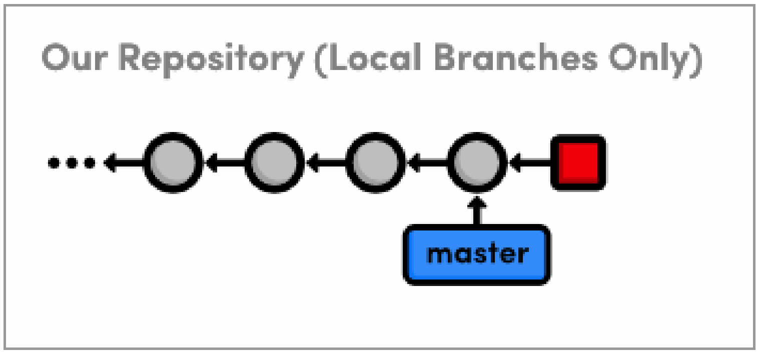
The above figure shows the state of *our* repository. We have access to Mary's snapshots (represented as squares) and her branches, even though we don't have a real-time connection to Mary's repository.

Check Out a Remote Branch

Let's check out a remote branch to review Mary's changes.

```
git checkout mary/master
```

This puts us in a `detached HEAD` state, just like we were in when we checked out a dangling commit. This shouldn't be that surprising, considering that our remote branches are *copies* of Mary's branches. Checking out a remote branch takes our `HEAD` off the tip of a local branch, illustrated by the following diagram.



Checking out Mary's `master` *branch*

We can't continue developing if we're not on a local branch. To build on `mary/master` we either need to merge it into our own local `master` or create another branch. We did the latter in Branches, Part I to build on an old commit and in the previous module to revive a "lost" commit, but right now we're just looking at what Mary did, so the `detached HEAD` state doesn't really affect us.

Find Mary's Changes

We can use the same log-filtering syntax from the previous module to view Mary's changes.

```
git log master..mary/master --stat
```

This shows us what Mary has added to her master branch, but it's also a good idea to see if we've added any new changes that aren't in Mary's repository:

```
git log mary/master..master --stat
```

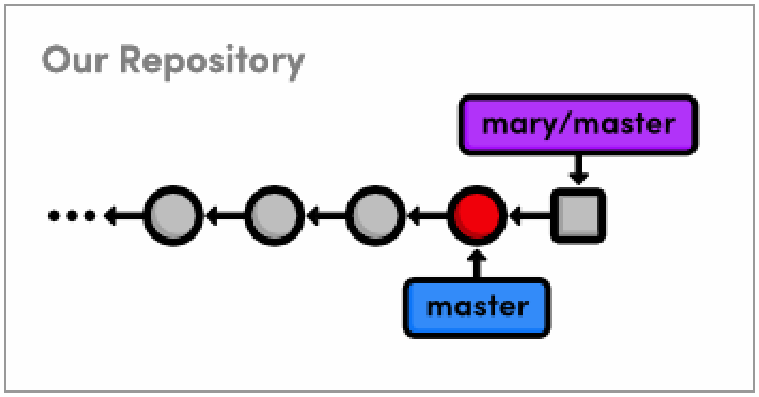
This won't output anything, since we haven't altered our database since Mary cloned it. In other words, our history hasn't *diverged*—we're just *behind* by a commit.

Merge Mary's Changes

Let's approve Mary's changes and integrate them into our own `master` branch.

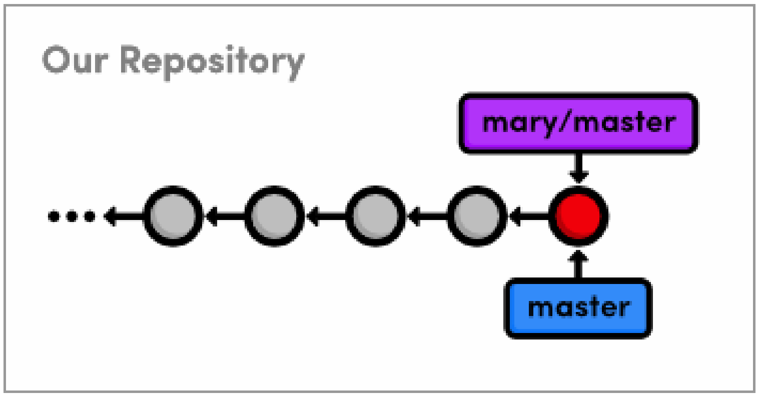
```
git checkout master
git merge mary/master
```

Even though `mary/master` is a remote branch, this still results in a fast-forward merge because there is a linear path from our `master` to the tip of `mary/master`:



Before merging Mary's `master` *branch into our own*

After the merge, the snapshots from Mary's remote branch become a part of our local `master` branch. As a result, our `master` is now synchronized with Mary's:



After merging Mary's master `branch` *into our own*

Notice that we only interacted with Mary's `master` branch, even though we had access to her `bio-page`. If we hadn't been pretending to be Mary, we wouldn't have known what this feature branch was for or if it was ready to be merged. But, since we've designated `master` as a stable branch for the project, it was safe to integrate those updates (assuming Mary was also aware of this convention).

Push a Dummy Branch

To complement our `git fetch` command, we'll take a brief look at **pushing**. Fetching and pushing are *almost* opposites, in that fetching imports branches, while pushing exports branches to another repository. Let's take a look:

```
git branch dummy
git push mary dummy
```

This creates a new branch called `dummy` and sends it to Mary. Switch into Mary's repository to see what we did:

```
cd ../marys-repo
git branch
```

You should find a new `dummy` branch in her *local* branch listing. I said that `git fetch` and `git push` are *almost* opposites because pushing creates a new *local* branch, while fetching imports commits into *remote* branches.

Now, put yourself in Mary's shoes. She was developing in her own repository when, all of a sudden, a new `dummy` branch appeared out of nowhere. Obviously, pushing branches into other people's repositories can make for a chaotic workflow. So, as a general rule, **you should never push into another developer's repository**. But then, why does `git push` even exist?

Over the next few modules, we'll see that pushing is a necessary tool for maintaining public repositories. Until then, just remember to never, ever push into one of your friend's repositories. Let's get rid of these dummy branches and return to our repository.

```
git branch -d dummy
cd ../my-git-repo
git branch -d dummy
```

Push a New Tag

An important property of `git push` is that it does not automatically push tags associated with a particular branch. Let's examine this by creating a new tag.

```
git tag -a v2.0 -m "An even stabler version of the website"
```

We now have a `v2.0` tag in `my-git-repo`, which we can see by running the `git tag` command. Now, let's try pushing the branch to Mary's repository.

```
git push mary master
```

Git will say her `master` branch is already up-to-date, and her repository will remain unchanged. Instead of pushing the branch that contains the tag, Git requires us to manually push the tag itself:

```
git push mary v2.0
```

You should now be able to see the `v2.0` tag in Mary's repository with a quick `git tag`. It's very easy to forget to push new tags, so if it seems like your project has lost a tag or two, it's most likely because you didn't to push them to the remote repository.

Conclusion

In this module, we learned how remote branches can be used to access content in someone else's repository. The remotes listed in `git remote` are merely bookmarks for a full path to another repository. We used a local path, but as we'll soon see, Git can use the SSH protocol to access repositories on another computer.

The convention of `master` as a stable branch allowed us to pull changes without consulting Mary, but this doesn't necessarily have to be the case. When implementing your own workflow, Git offers you a lot of flexibility about when and where you should pull from your team members. As long as you clearly define your project conventions, you can designate special uses or privileges to *any* branch.

That said, it's important to note that remotes are for *people*, whereas branches are for *topics*. Do *not* create separate branches for each of your developers—give them separate repositories and bookmark them with `git remote add`. Branches should always be for project development, not user management.

Now that we know how Git shares information between repositories, we can add some more structure to our multi-user development environment. The next module will show you how to set up and access a shared central repository.

Quick Reference

`git clone <remote-path>`

Create a copy of a remote Git repository.

```
git remote
```

List remote repositories.

```
git remote add <remote-name> <remote-path>
```

Add a remote repository.

```
git fetch <remote-name>
```

Download remote branch information, but do not merge anything.

```
git merge <remote-name>/<branch-name>
```

Merge a remote branch into the checked-out branch.

```
git branch -r
```

List remote branches.

```
git push <remote-name> <branch-name>
```

Push a local branch to another repository.

```
git push <remote-name> <tag-name>
```

Push a tag to another repository.

Continue to *Centralized Workflows* ›