Remotes

Working with a Remote Repo

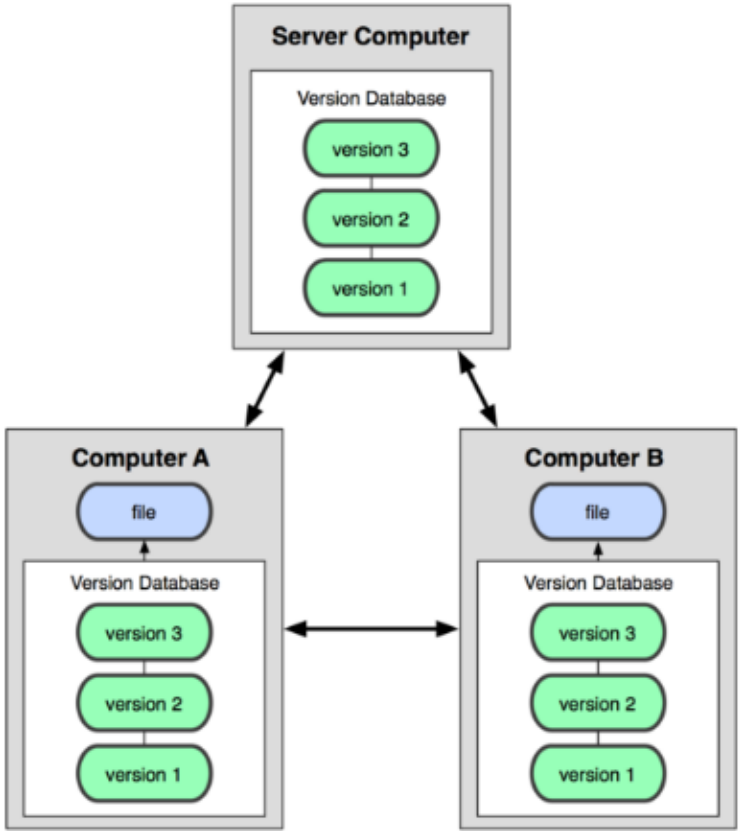
Git is a distributed version control system.

git was invented to manage the Linux kernel source code, with thousands of developers in over a hundred countries.

You can have many repositories on the net, called "remotes".

They may all be different!

No "master" repository
-- all repos are equal.



Git Hosting Sites

You can create free git repositories on these sites, for individual or team projects.

Github - https://github.com

Bitbucket - https://bitbucket.org

GitLab - https://gitlab.com

Commands for Remotes

Common commands for using a remote repo are:

`git clone` copy remote repo to your computer

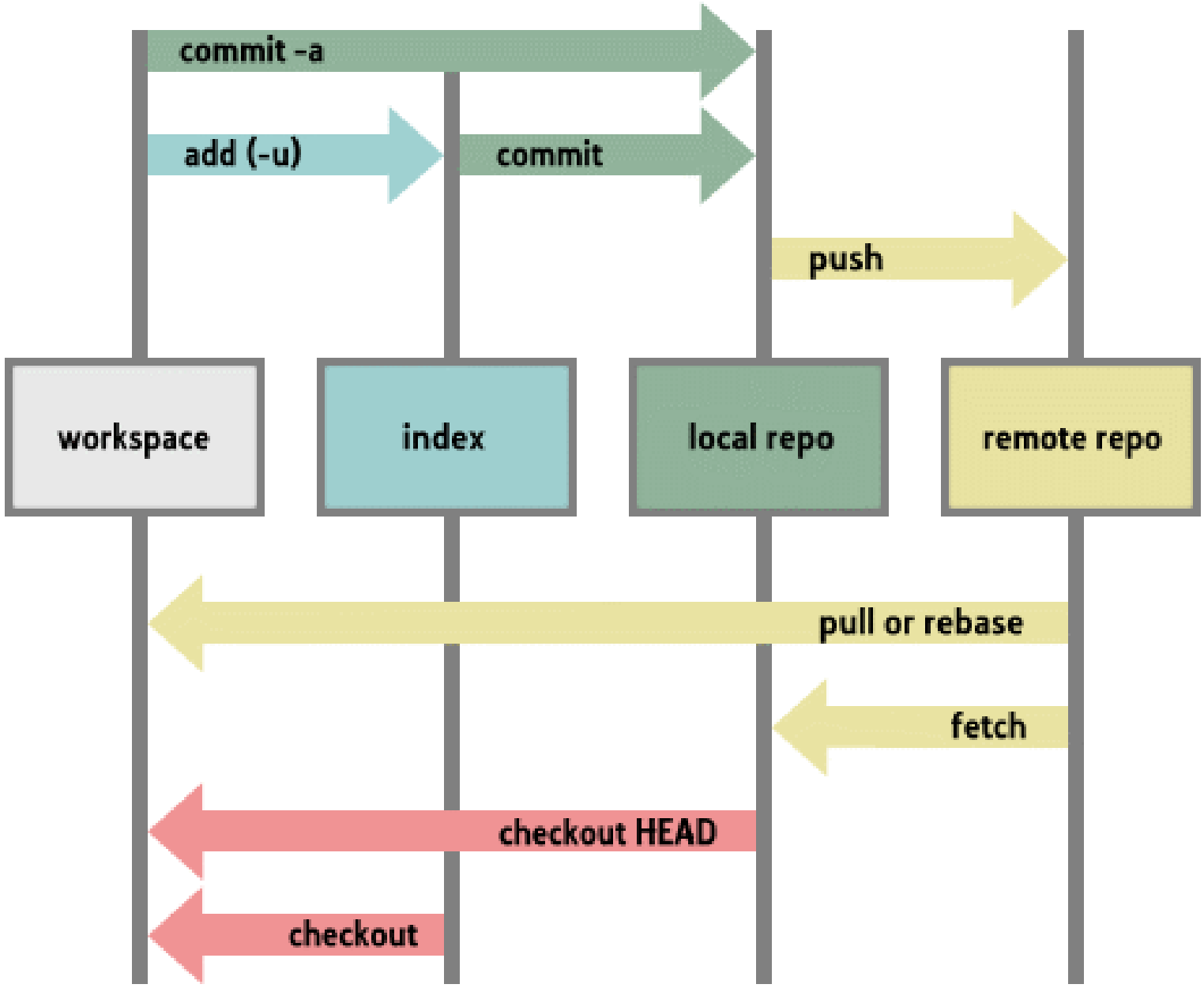
`git remote add` define URL of a remote repository

`git remote -v` list remotes, with URLS

`git push` "push" local updates to a remote

`git pull` download and merge remote updates

`git fetch` download remote updates, but don't merge into your working copy


commit -a
add (-u)
commit
push
workspace
index
local repo
remote repo
pull or rebase
fetch
checkout HEAD
checkout

Cloning a Remote Repository

Create a local copy of a Github repo. Assign the name "`origin`" to the remote repo.

```
cmd> git clone
          https://github.com/user/tictactoe
```

Cloning into "tictactoe" ...

(git creates a "tictactoe" directory for file)

Or, use the SSH protocol (requires SSH key)

```
cmd> git clone
          git@github.com:user/tictactoe
```

Viewing Your Remotes

View the names and URLs of "remotes" for a repo:

```
cmd> cd tictactoe
cmd> git remote -v
origin https://github.com/user/tictactoe (fetch)
origin https://github.com/user/tictactoe (pull)
```

You Can Have Several Remotes

Each remote has a different name (`origin`, `bbucket`).

The username and repo name can be different, too.

```
cmd> cd tictactoe
cmd> git remote -v
origin https://github.com/barz/tictactoe (fetch)
origin https://github.com/barz/tictactoe (pull)
bbucket git@bitbucket.com:fooz/ttt (fetch)
bbucket git@bitbucket.com:fooz/ttt (pull)
```

Syntax for all "remote" commands

```
git remote

git remote help

git remote -v

git remote add  remote_name URL

git remote show remote_name

git remote set-url remote_name new_url
```

Change remote URL

You make a copy of "git-commands" in your own Github account. Now change URL of the remote to "push" do:

```
cmd> git remote -v
```

origin https://github.com/ISP2020/git-commands-fatalai

```
cmd> git set-url origin
          https://github.com/fatalai/git-
commands
```

This does not move the repository on Github!

You must do that on Github (in Settings).

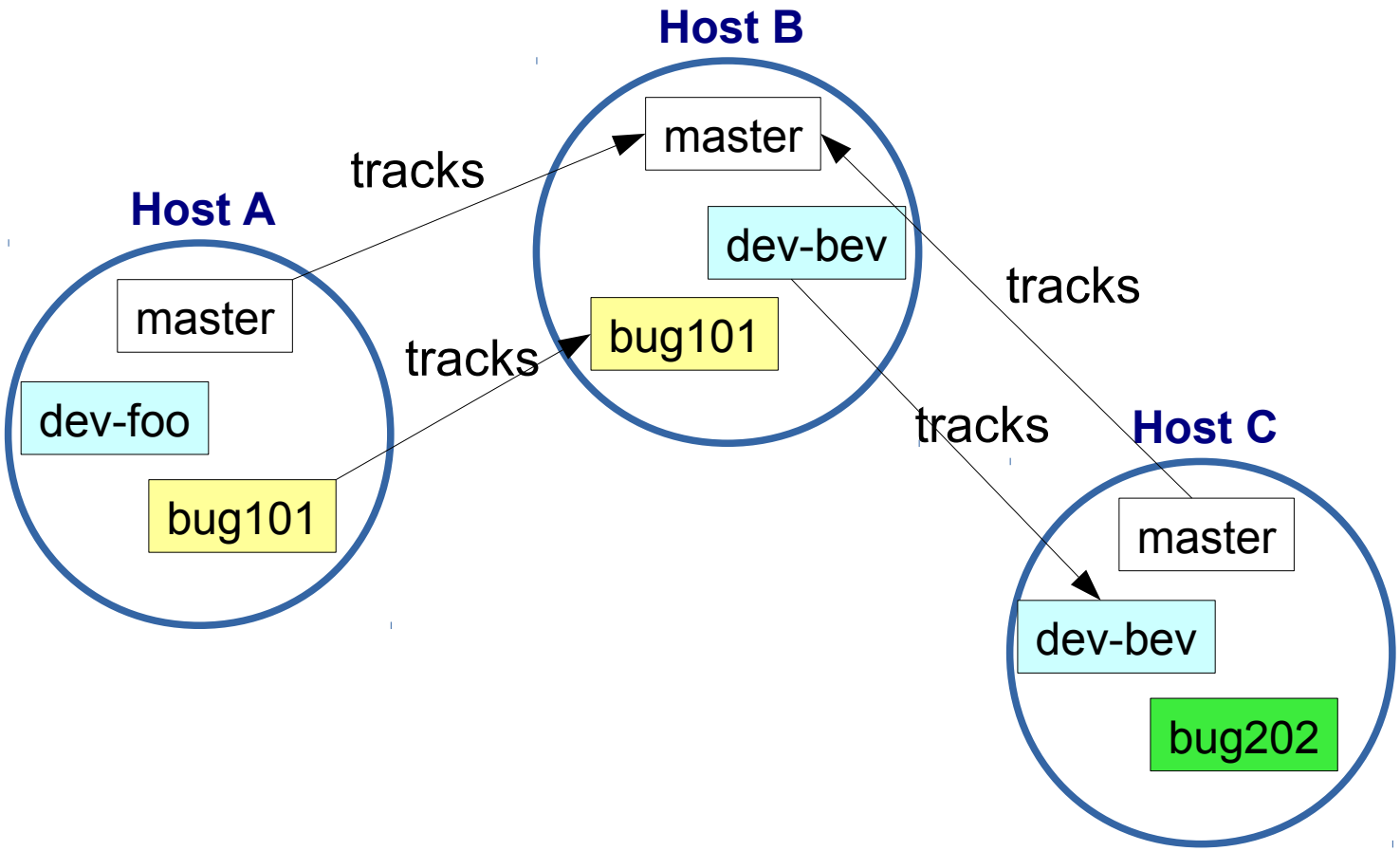
Detailed Info about a Remote

```
cmd> git remote show origin
* remote origin
  Fetch URL: https://github.com/fatalai/git-commands
  Push  URL: https://github.com/fatalai/git-commands
  HEAD branch: master
  Remote branches:
     master                              tracked
     dev-branch                          tracked
  Local branch configured for 'git pull':
     master merges with remote master
```

Remote Branches

Branches are not automatically synced between remotes.

A local branch may not have any remote branch.



Remote Branch Naming

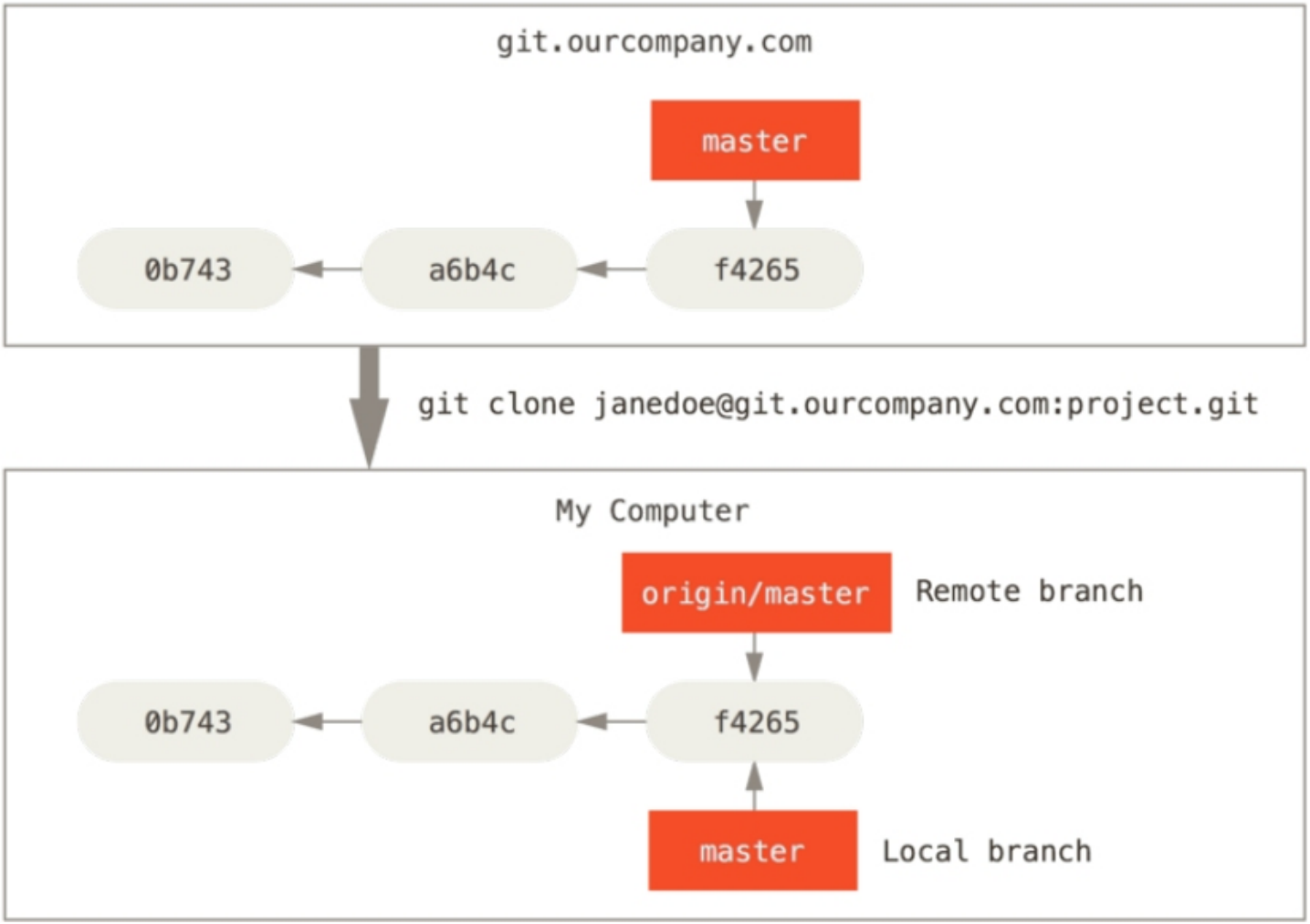
On your machine, refer to a remote branch as:

`remote_name/branch_name`

E.g. `origin/master - master` branch on `"origin"`

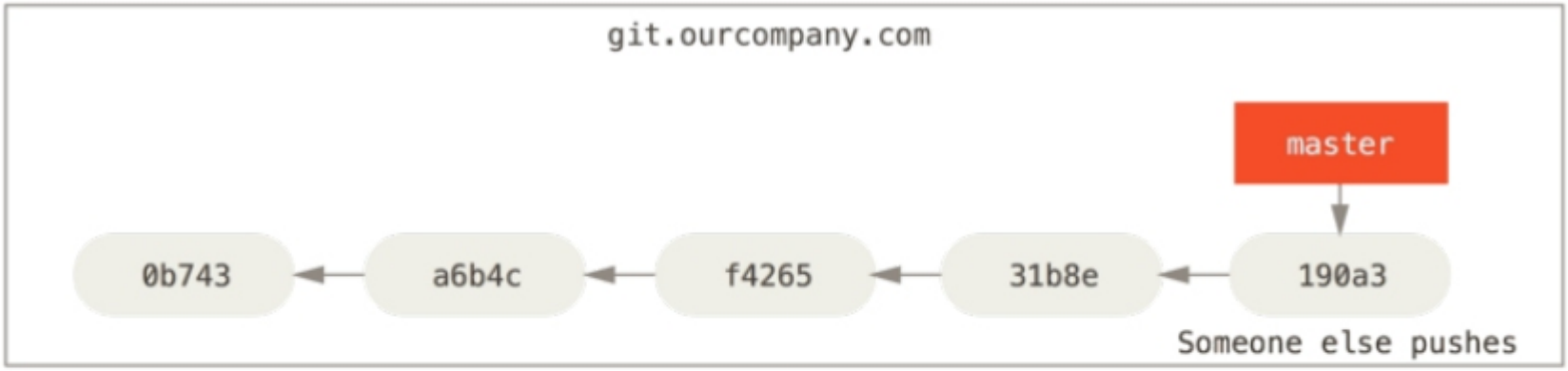
Example from Pro Git Book

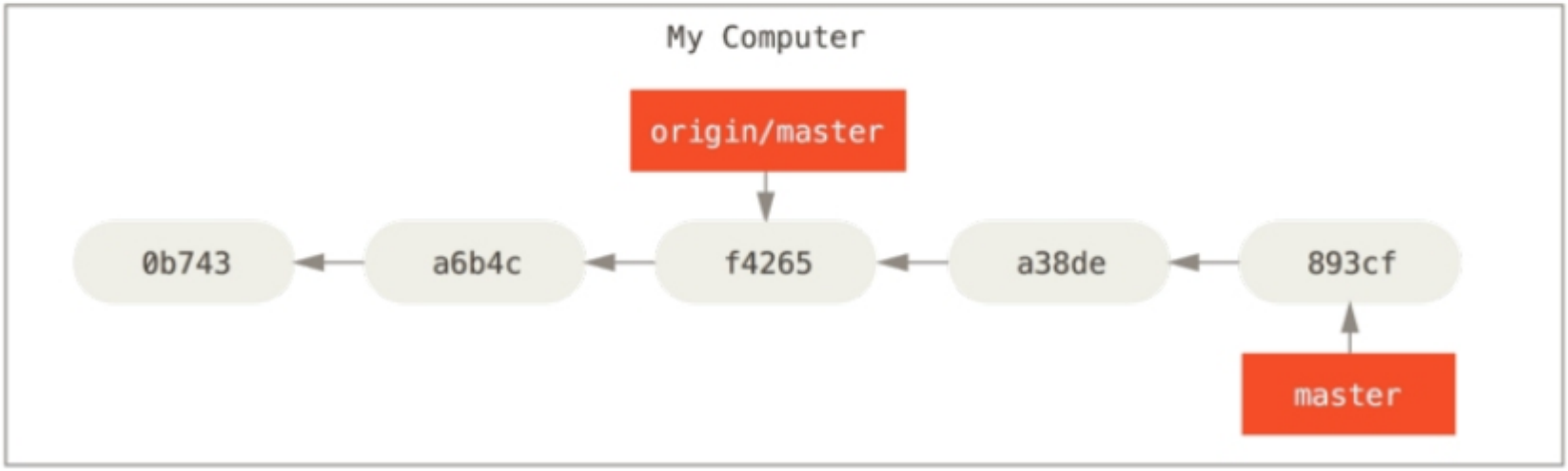
You clone a repo from git.ourcompany.com.
Your repo now has 2 labels: master and origin/master



After some commits, branches diverge

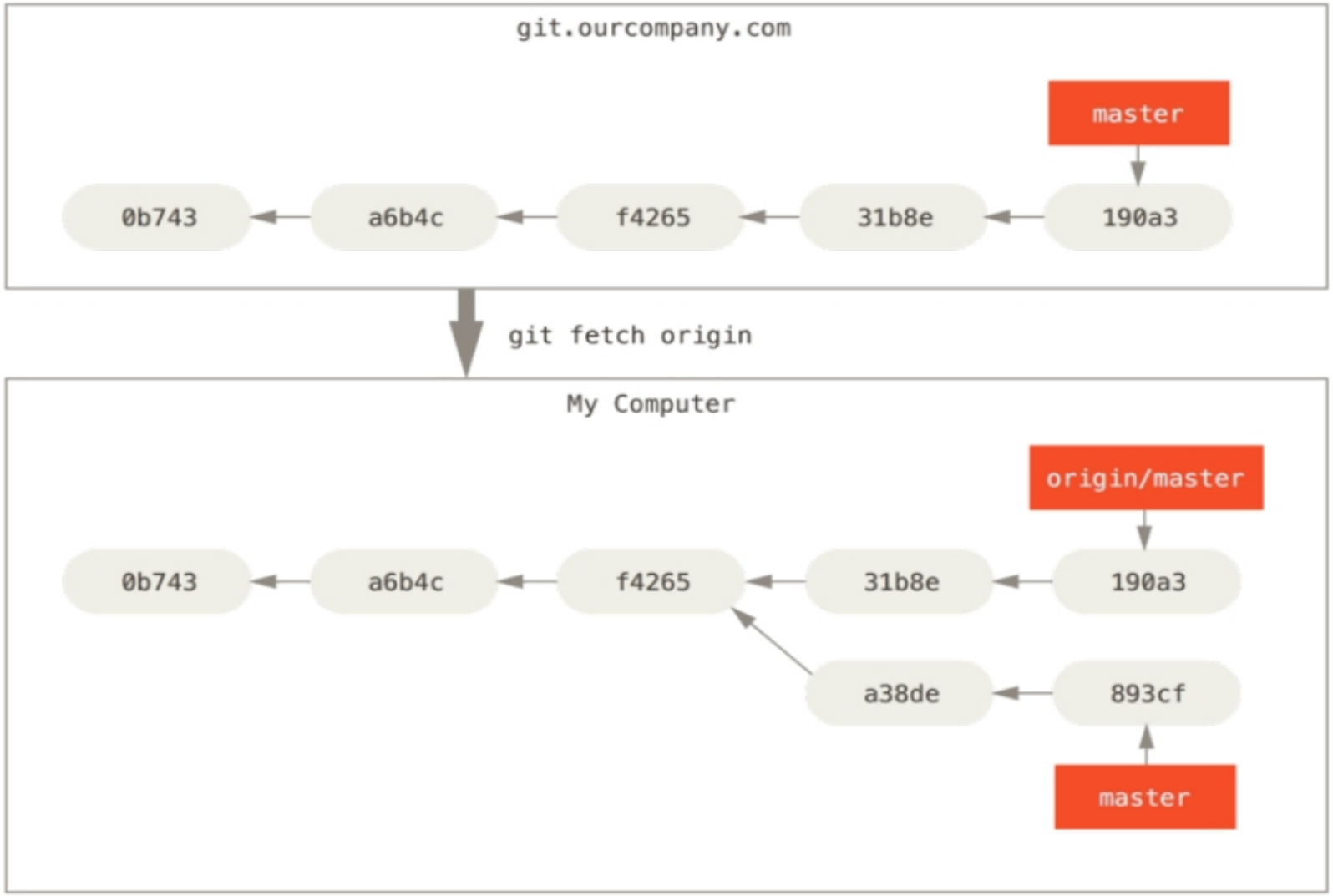
You commit some work locally - your local master moves ahead. Someone else pushes work to ourcompany.com





Fetch updates from remote

fetch copies the remote branch into your local repo.



What Has Changed?

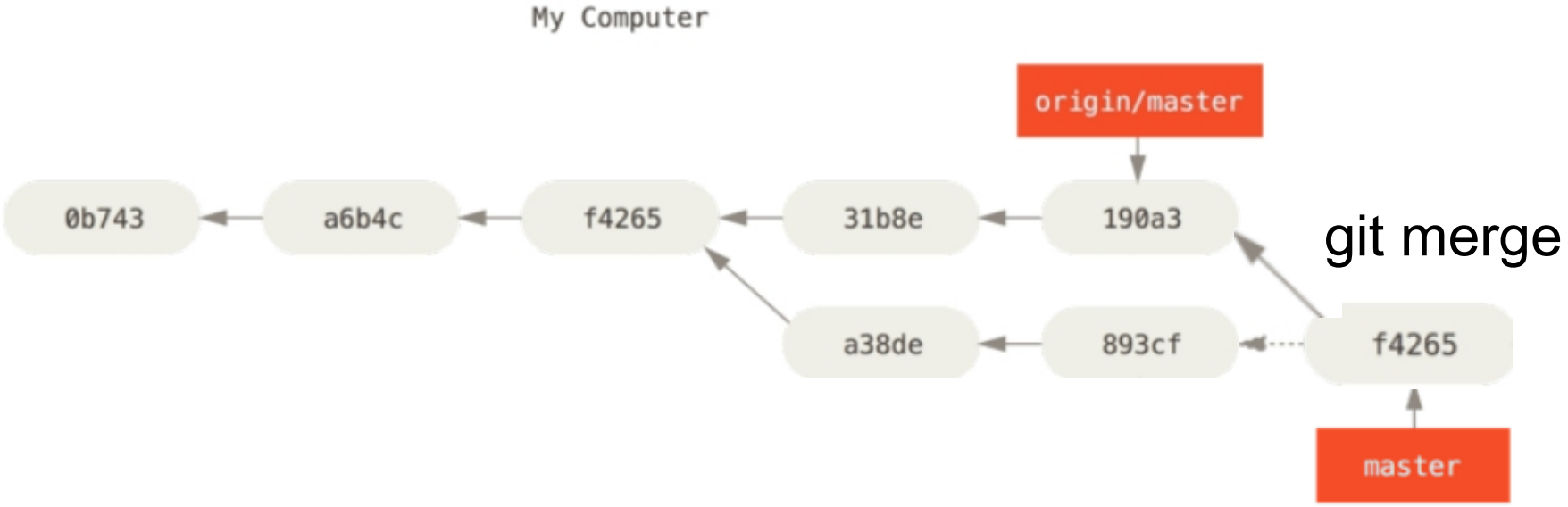
View the differences. There may be many:

```
cmd> git diff  master origin/master
diff --git a/README.md b/README.md
index ff3ac4b..1434aa0 100644
--- a/README.md
+++ b/README.md
@@ -1,6 +1,6 @@
 ## Unit Testing Procedure
diff --git a/ctl_test.py b/ctl_test.py
--- a/ctl_test.py
+++ b/ctl_test.py
```

Merge and resolve conflicts

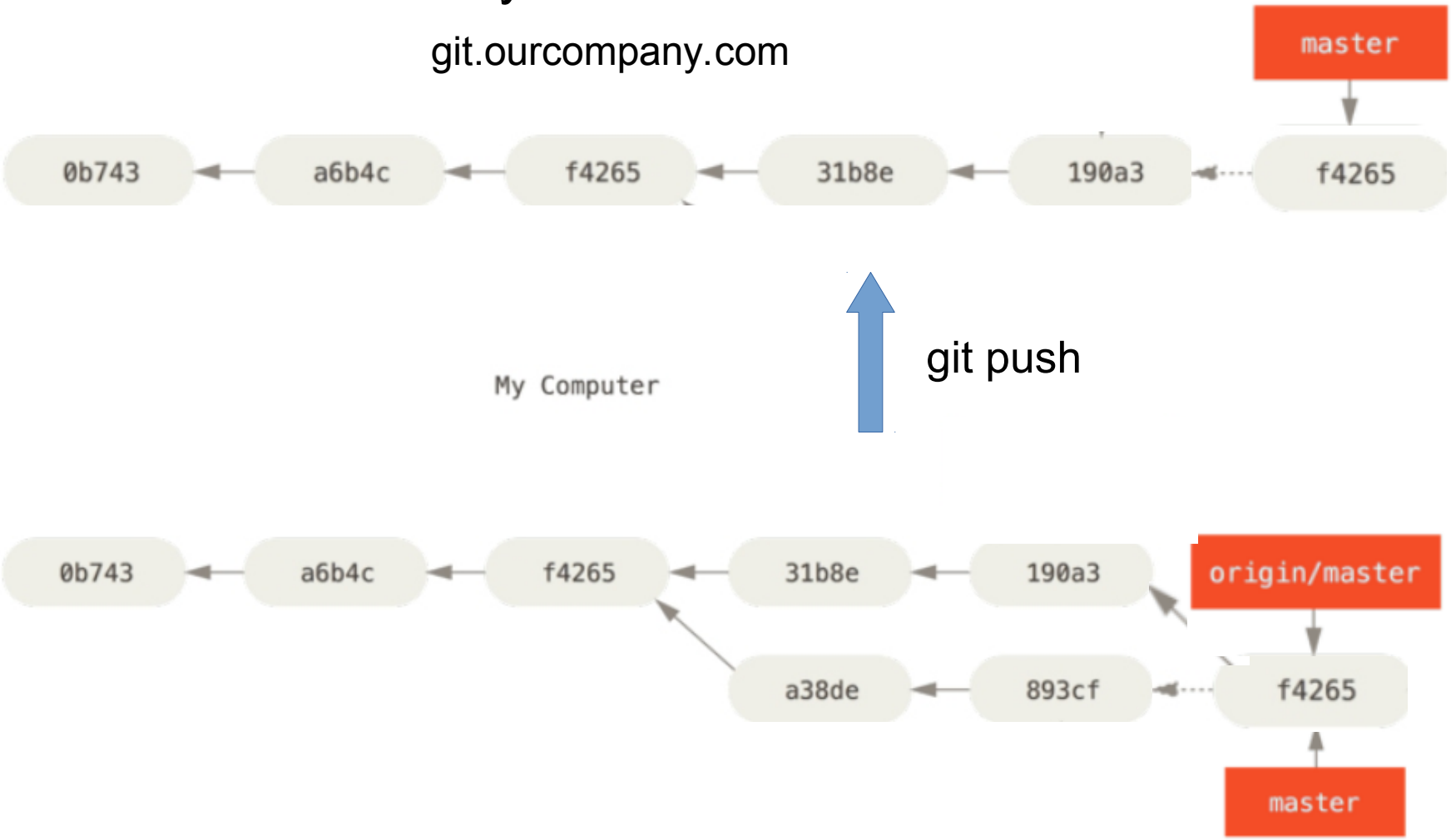
Merge the branches on your computer, resolve any conflicts, and commit.

Now your local master is ahead of the tracking branch.



Push your work to ourcompany

If nothing has changed on ourcompany master, it will advance to match your branch.



Questions

1. If you "push" when master on ourcompany.com has a commit that is not in your tracking branch, what happens?

2. If you "fetch" and there is no new work on ourcompany.com, what will happen?

Tracking Branch

Remote-tracking branch is a local branch that holds a reference to the state of a remote branch.

- tracking branches exist in your local repository
- they update automatically when you contact the remote (push, fetch, pull, remote show) -- you can't modify them yourself.
- name syntax: `remote_name/branch_name`

Tracking a Remote Branch

Two cases:

1. you checkout a remote branch and track it

2. you create a local branch, then push it to a remote (a tracking branch is created automatically)

Checkout a Remote & Track it

Many commands for this

these two do the same thing

cmd> **`git checkout --track origin/dev-foo`**

cmd> **`git checkout -b dev-foo origin/dev-foo`**

create branch with different name from remote branch

cmd> **`git branch -t foo origin/dev-foo`**

(`-t` is short form of `--track`)

Push a Local Branch

For a local branch that does not yet exist in the remote remote repository:

cmd> **`git checkout my-branch`**

cmd> **`git push -u origin my-branch`**

`-u` is short for `--set-upstream`

"my-branch" is name to assign to the new branch on origin.

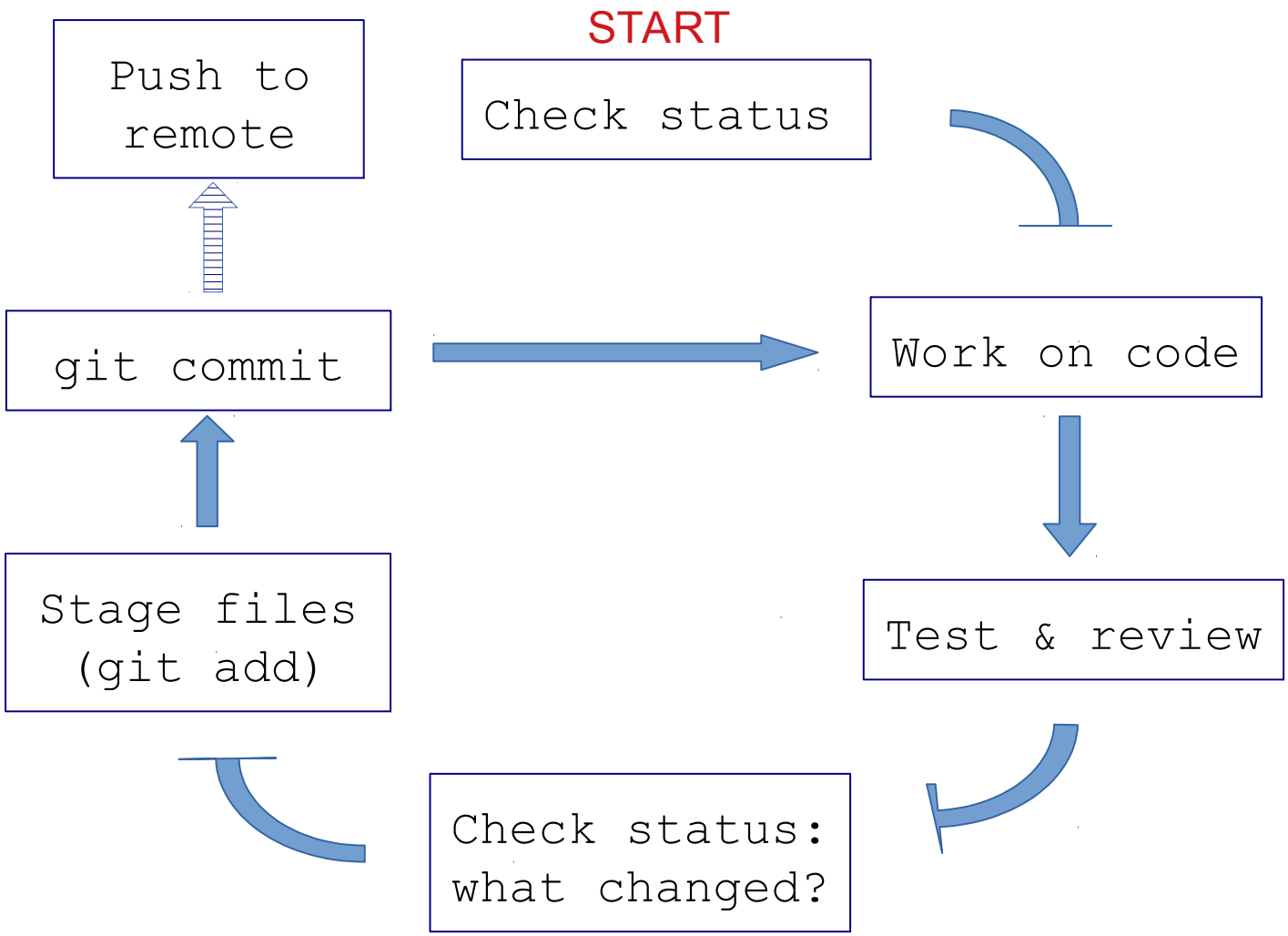
Who is Ahead? Me or Origin?

Useful command:

```
cmd>  git branch -vv
```

Working with a Remote on a Project

Workflow for an *individual* project



Git Workflow for an *Individual* project

1) Check status of your working copy (*)

```
cmd> git status
```

It should be clean. If not, do "git diff" and then...

2) Commit changes or update your working copy.

(`git diff, git add -u, git commit`)

3) Do some work:

Code, test. Code, test. Review.

(*) *if you work on more than one computer, you need to "fetch" or "pull" any work from Github that is not on this computer (i.e. this local repo).*

Git Workflow (cont'd)

4) After code-test-reivew: check status again

```
cmd> git status
Changes not staged for commit:
    modified: src/Problem2.java
Untracked files:
    src/Problem3.java
```

5) Add and commit your work to the local repository

```
cmd> git add src/Problem2.java src/Problem3.java
cmd> git commit -m "Solved problems 2 and 3"
[master 29abae0] Solved problem 2 and 3
2 files changed, 44 insertions(+), 5 deletions
```

Git Workflow (update remote)

6) Push the changes to Github

```
cmd> git push
Compressing objects: 100% (12/12), done.
Writing objects: 100% (12/12), 3.60 KiB,
done.
Total 12 (delta 9), reused 0 (delta 0)
remote: Resolving deltas: 100% (9/9), ...
To https://github.com/fatailaijon/demo.git
 468abdf..29abae0  master -> master
```

7) Take a break.

That's it! Repeat the cycle as you work.

Github Workflow for Team Projects

On a **team project**, other people will commit files to the **same** Github repository!

You should update your local repository from Github before trying to "push" your work to Github.

Use "Github Flow" as workflow in team projects.

"Github Flow" is a separate topic. Its good for both team and solo projects.

Github Flow is the convention for team work in this course.