

Version Control with Git

- Research Software Group
- <http://rsg.southampton.ac.uk>
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What is Version Control?

(AKA revision control, source control)

- Tracks changes to files
- Any file can be tracked
- Text (.txt, .csv, .py, .c, .r etc.) works best
 - These allow smart *diff / merge* etc.

Why Use Version Control? #1

- A more efficient backup
- Reproducibility



Why Use Version Control? #2

- Teamwork

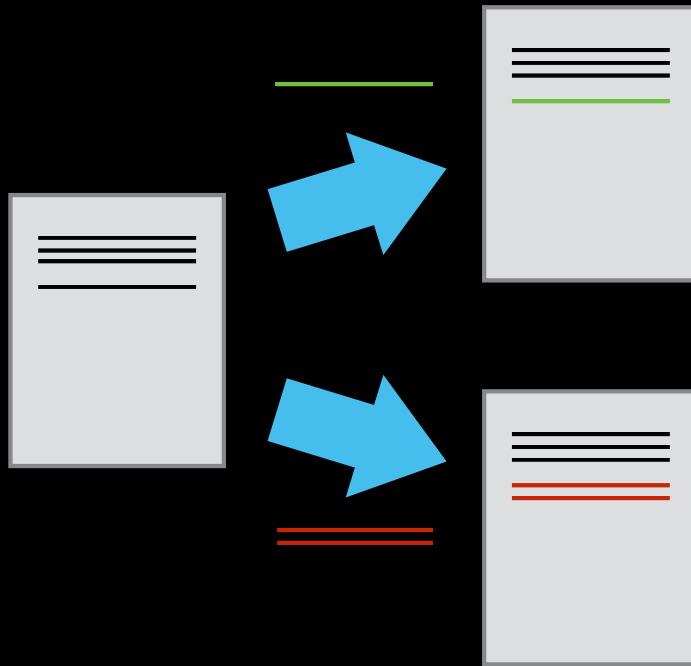


Version Control Tracks Changes



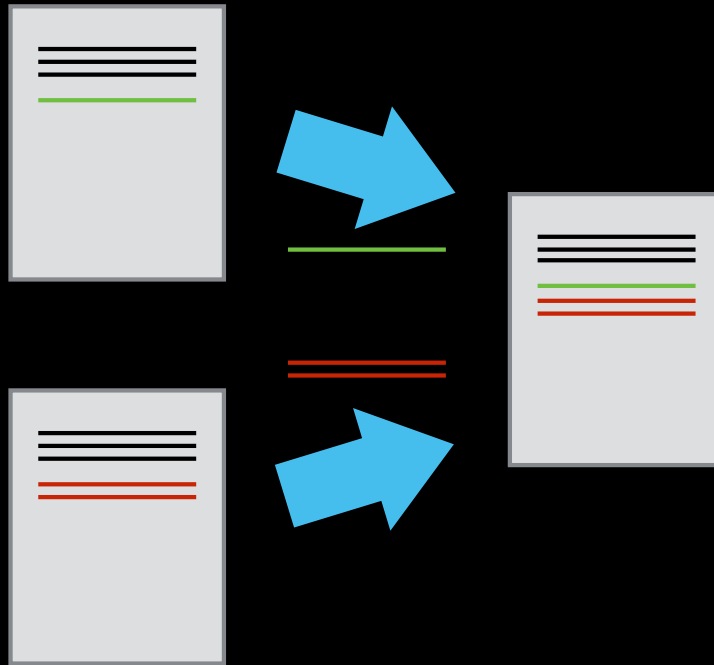
- Changes are tracked sequentially

Version Control Tracks Changes



- Different versions can be saved

Version Control Tracks Changes



- Multiple versions can be merged

Version Control Alternatives

- Subversion (svn) - Centralised
- Mercurial (hg) - Distributed
- Git (git) – Distributed

- N.B. GitHub != git

Local Configuration

- `git config`

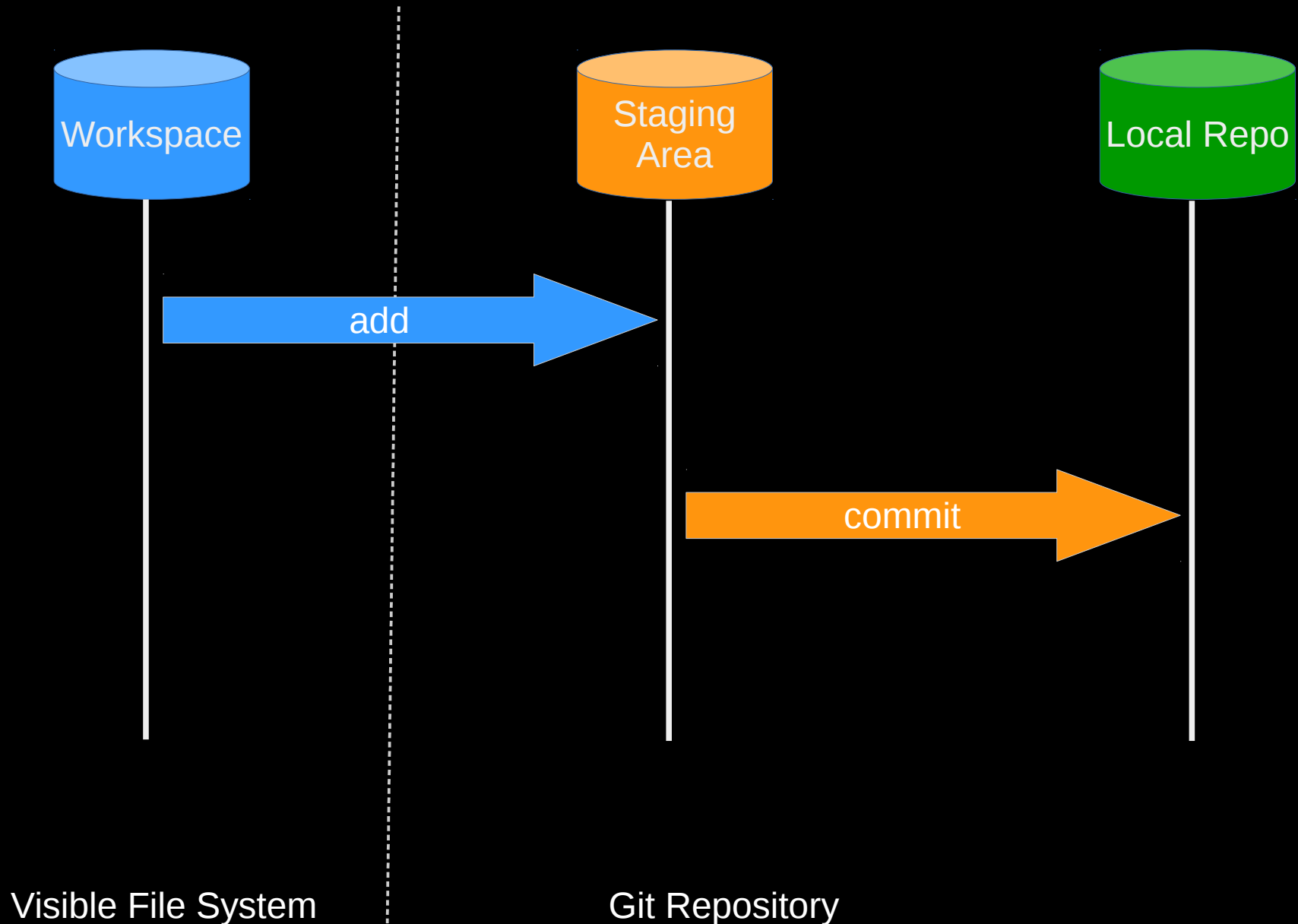
Creating a Repository

- `git init`
- `git status`

Tracking Changes to Files

- `git add`
- `git commit`

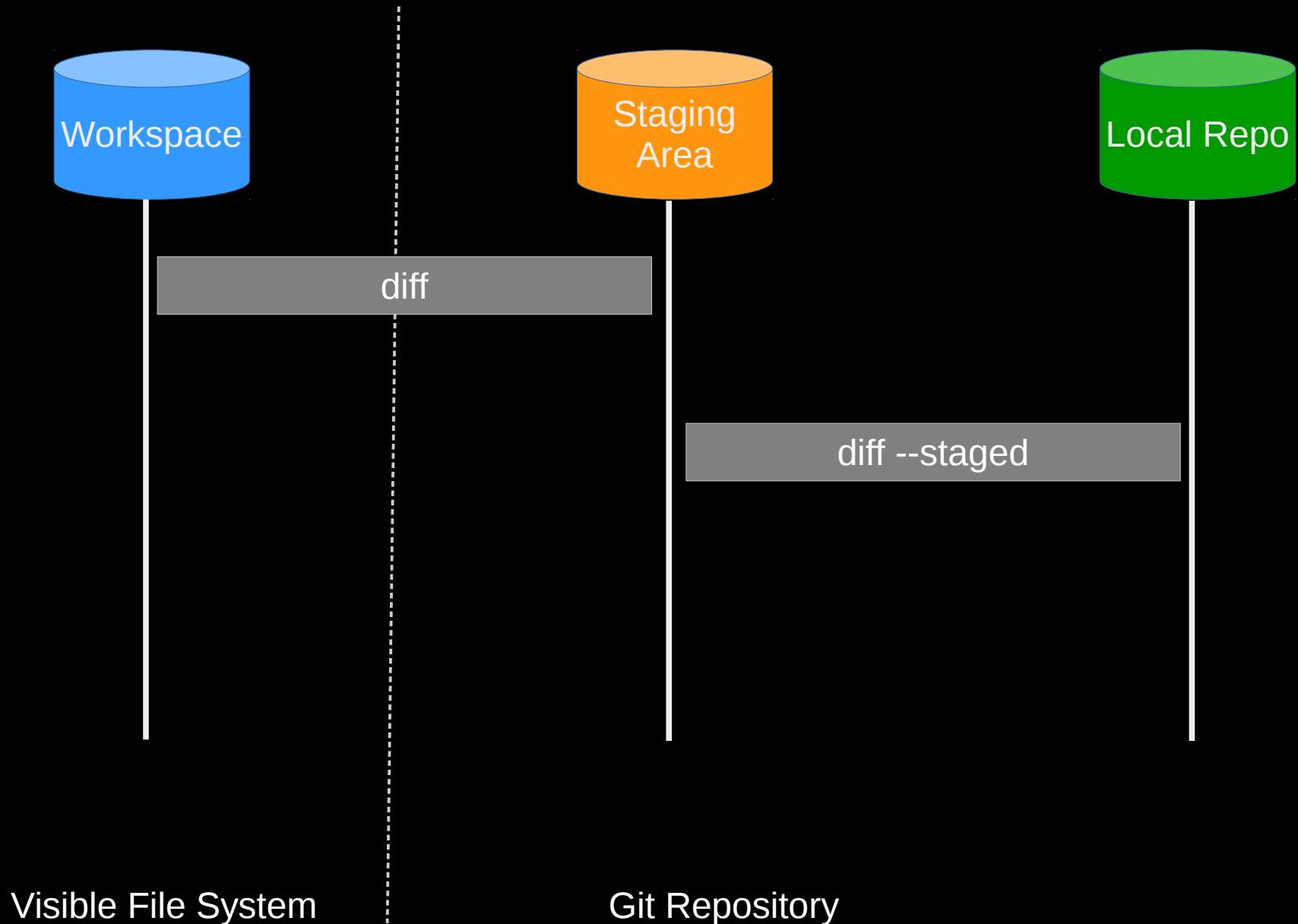
Git – add and commit



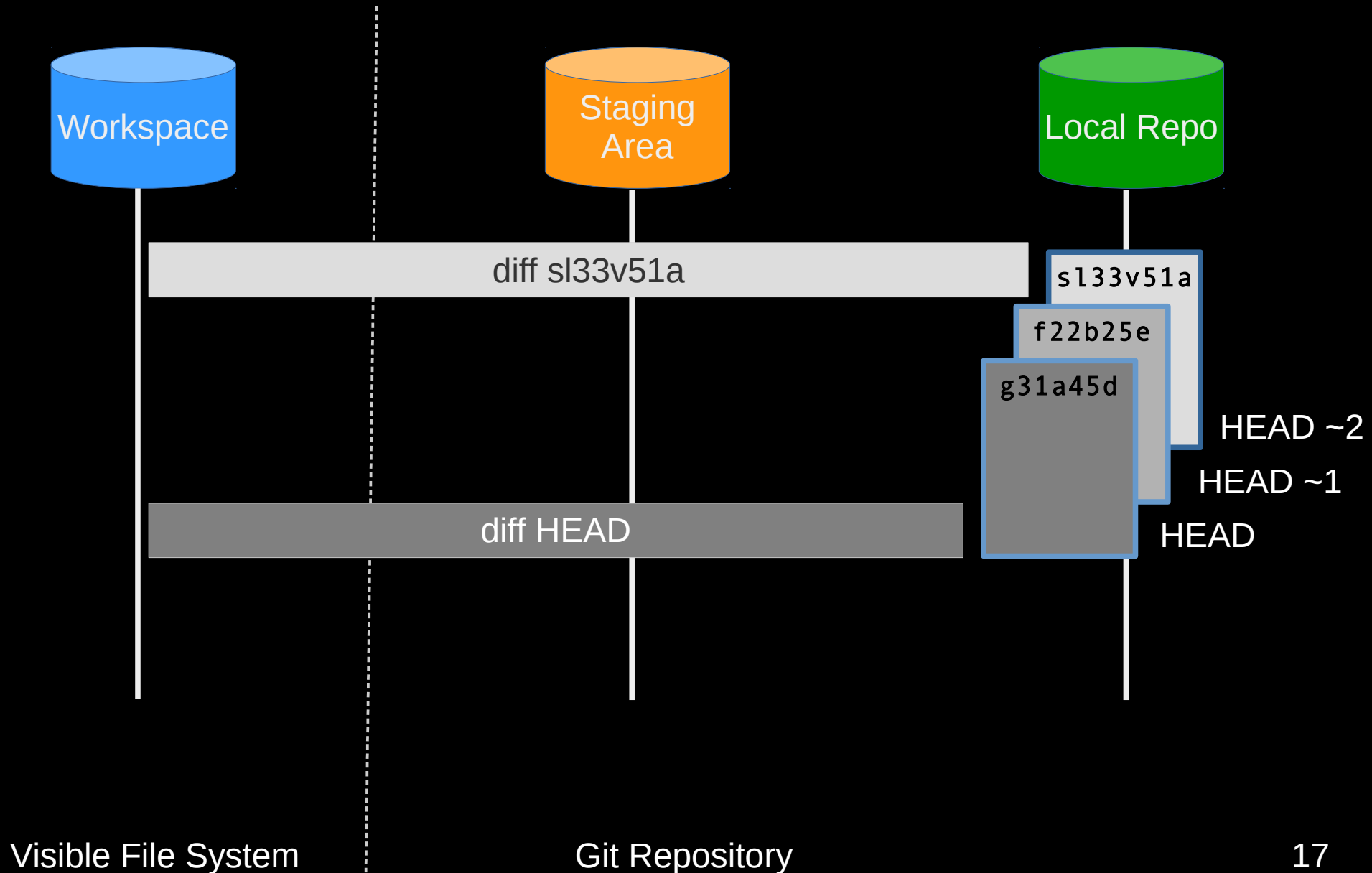
Exploring History #1

- `git log`
- `git diff`

Git – diff #1



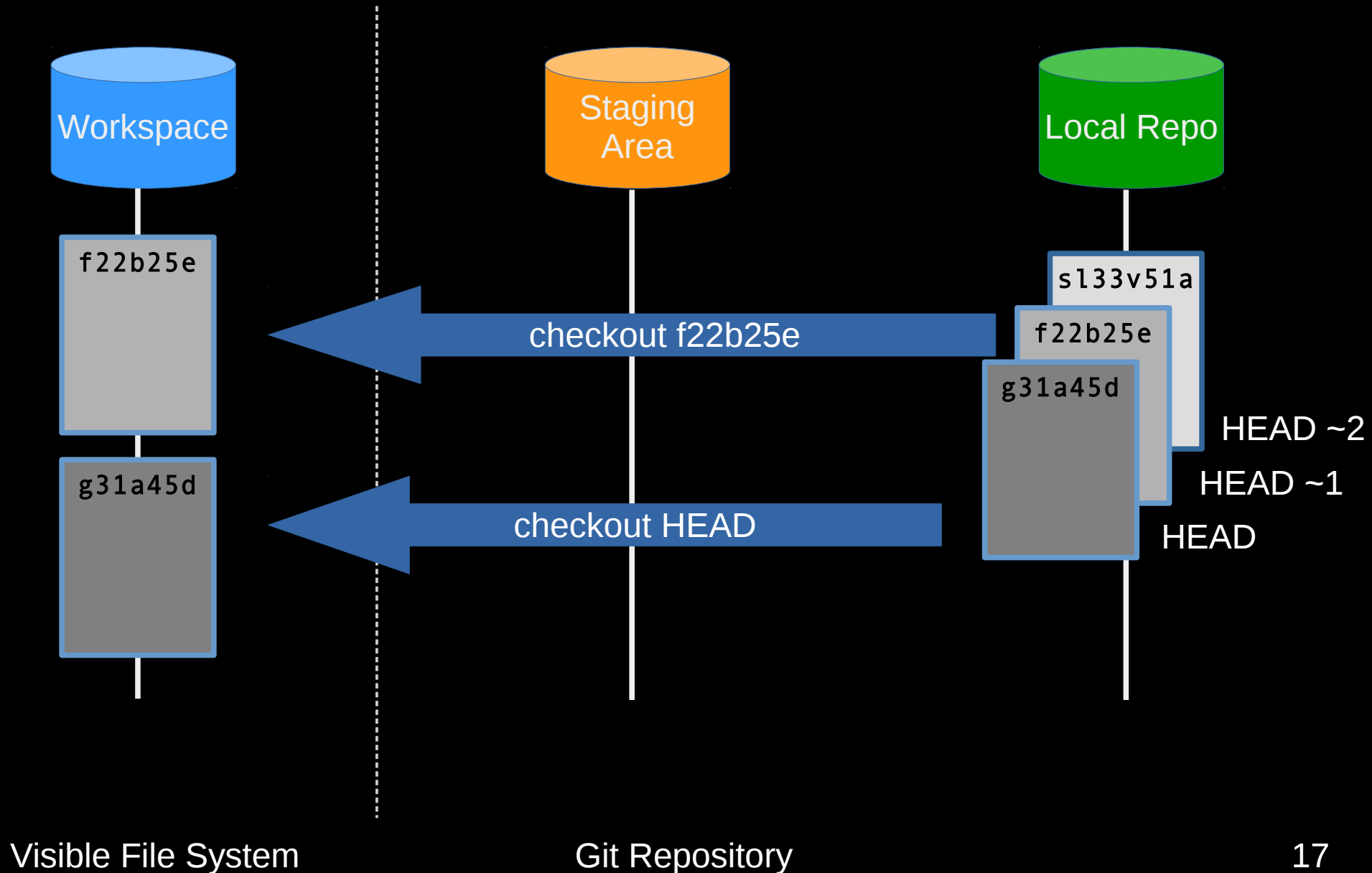
Git – diff #2



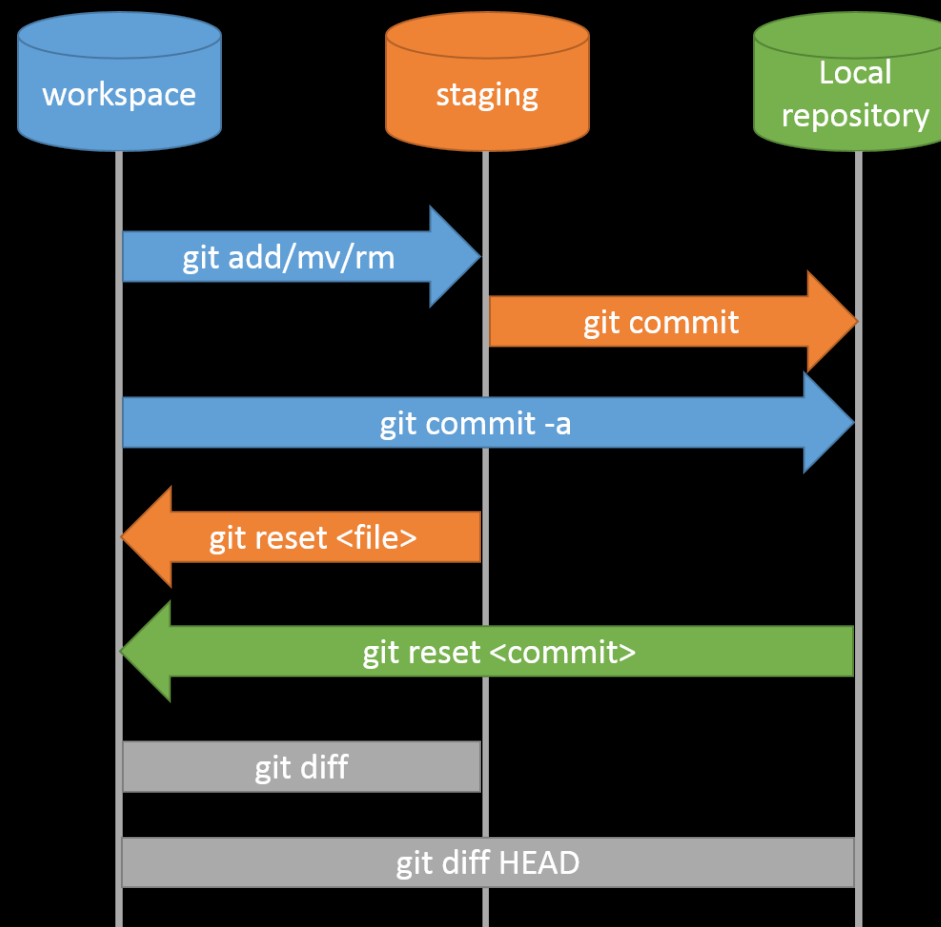
Restoring Files

- `git checkout`

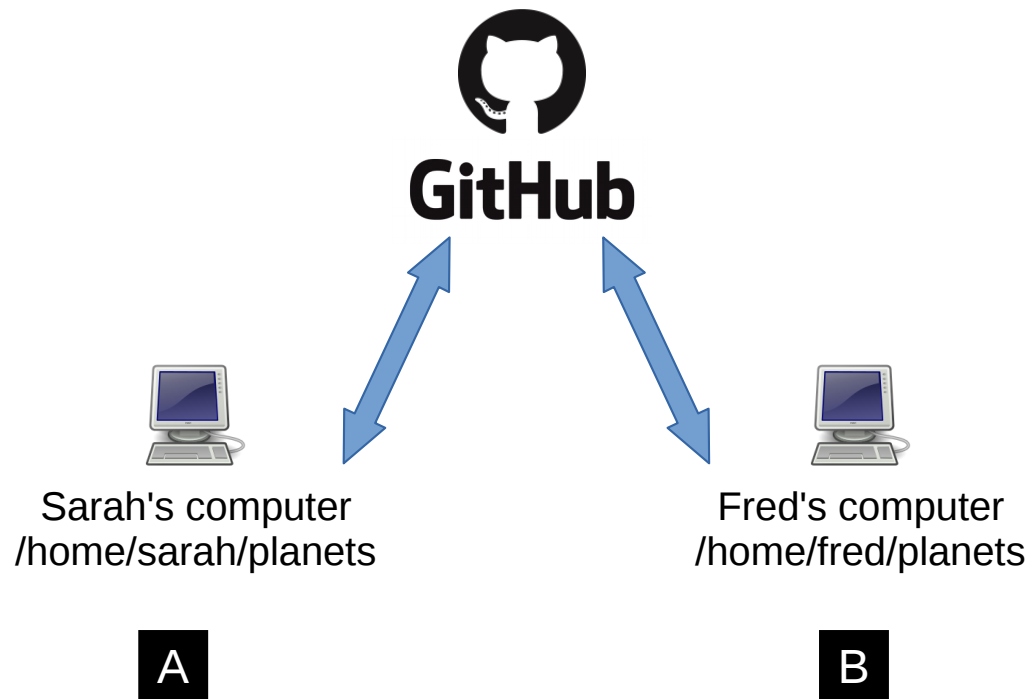
Git - restoration



Git Workflow – Local Repo.



Collaboration



Collaboration

- **Let's collaborate via remote repo**
- **Working in pairs:**
- **Developer A / Developer B**

Collaboration:

Remote Repositories #1

- Developer A
 - Sign in <https://github.com/>
 - Create repository
 - `git remote add`
 - `git push`
 - Add Developer B as a collaborator

Collaboration:

Remote Repositories #2

- **Developer B**
 - Clean up
 - git clone
 - git add
 - git commit
 - git push

Collaboration:

Remote Repositories #3

- **Developer A**
 - **git pull**

Collaboration:

Remote Repositories #4

- **Exercise**
 - **Developer A – Add README.md, (authors and info).**
 - **Developer B – sync up your repository**

Collaboration: Conflicts #1

```
mm = inches * 25.4  
return mm
```



```
mm = inches * 25.4  
return mm
```

```
# TODO(Sarah): Add fu
```

Collaboration: Conflicts #2

```
mm = inches * 25.4  
return mm
```



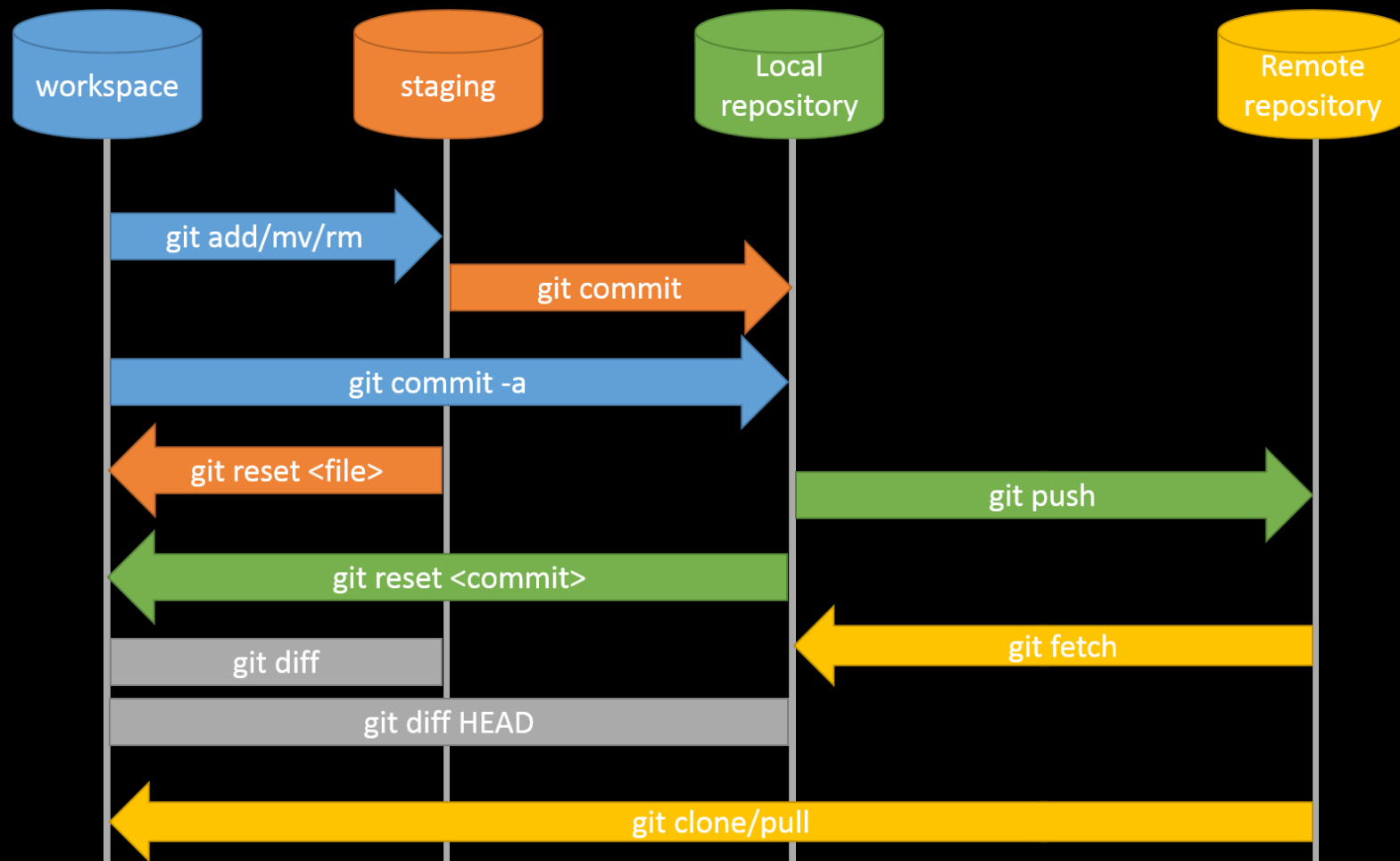
```
graph TD; A["mm = inches * 25.4<br/>return mm"] --> B["mm = inches * 25.4<br/>return mm<br/># TODO(Sarah): Add fu"]; A --> C["mm = inches * 25.4<br/>return mm<br/># TODO(Fred): Add fu"]; B --> D["?"]; C --> D;
```

```
mm = inches * 25.4  
return mm  
# TODO(Sarah): Add fu
```

```
mm = inches * 25.4  
return mm  
# TODO(Fred): Add fu
```

?

Git Workflow – Remote Repo.



What next?

- **Branching / Merging**
- **<https://software-carpentry.org>**