Ulster University

COM410 Programming in Practice

T1. Source Code Management

Source Code Management

- As technology expands, so does the number of people working on software products
  - Important to coordinate activities between teams and people
  - CI/CD is a modern software development practice in which small changes are made frequently and reliably
  - SCM tools support collaborative programming by providing “safe” environments for developing new features, or amending existing ones – even while code is “live”

Git

- A distributed version control system that tracks changes in sets of computer files
  - Most often used for coordinating work between teams of developers
  - Originally developed 2005 by Linus Torvalds (Linux)
  - Command-line and graphical interfaces available (sometimes integrated into IDE packages)

Getting Started

- Git is designed to be used by multiple people – even on the same machine
  - First step is to identify yourself
  - Commands are entered from a terminal (command) prompt

```
git config --global user.name "Your Name"
git config --global user.email "your@email.address"
```

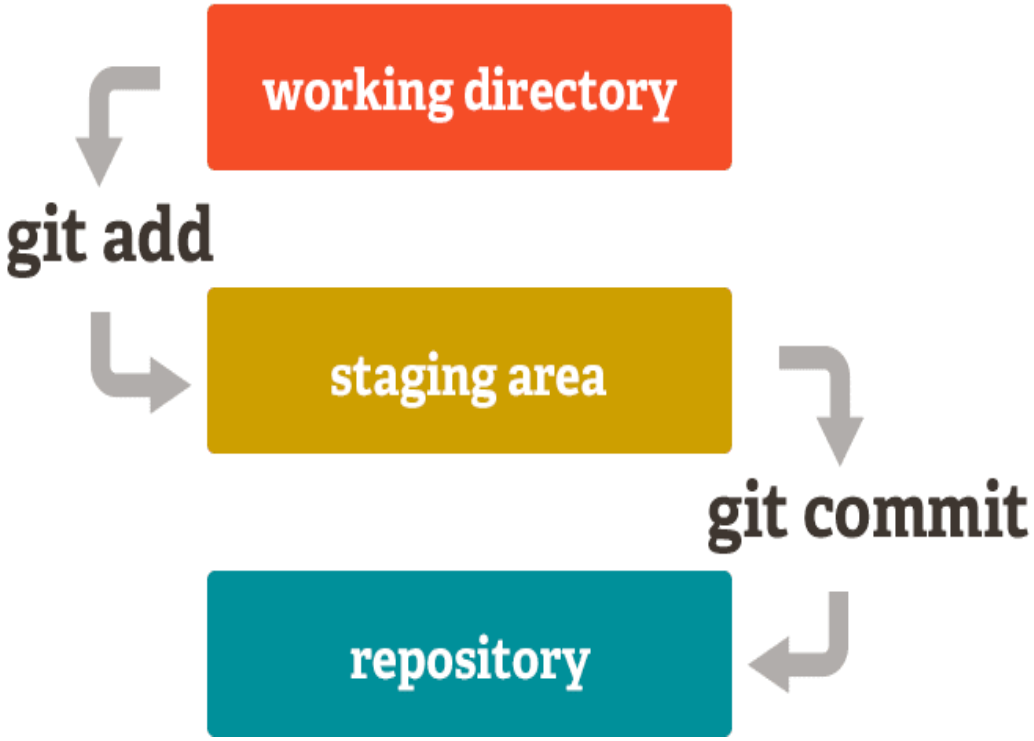
  - Then, in your application folder, you can initialize Git for your project.

```
git init
```

Download and install Git from https://git-scm.com/downloads

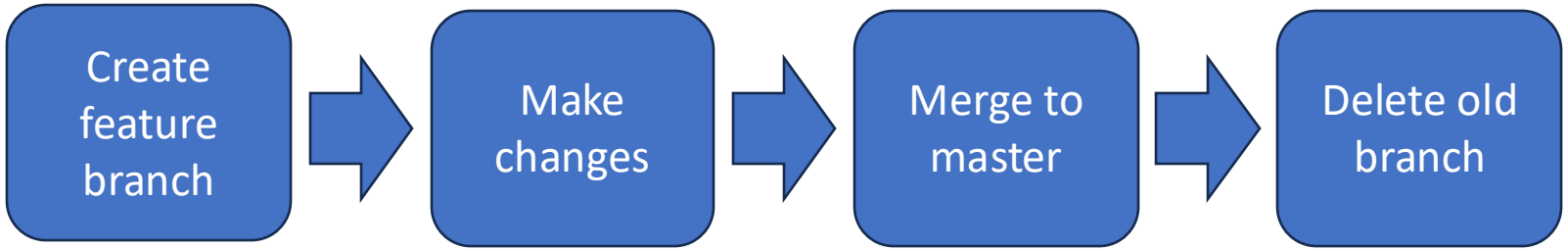
Analogy – A Box

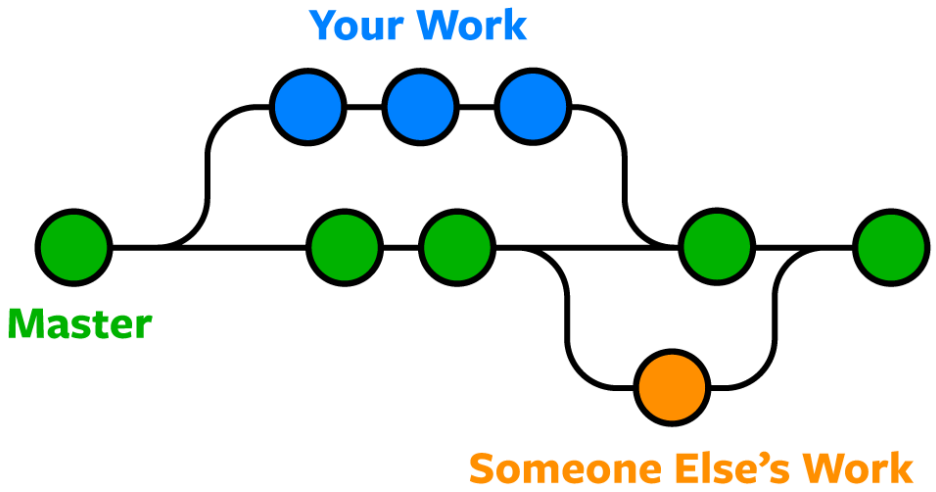
- The **working directory** is your work area, while the **repository** is the storage area. The **staging area** is where items are packed into boxes for storage.
- The `git init` command creates a new work area with an infinite supply of boxes
- Code files are packed into the box by the `git add` command
- The box is sealed and stored by the `git commit` command



Git Flow

- Managing branches to add new features to software
- Basic principle, no development is done directly on the master branch

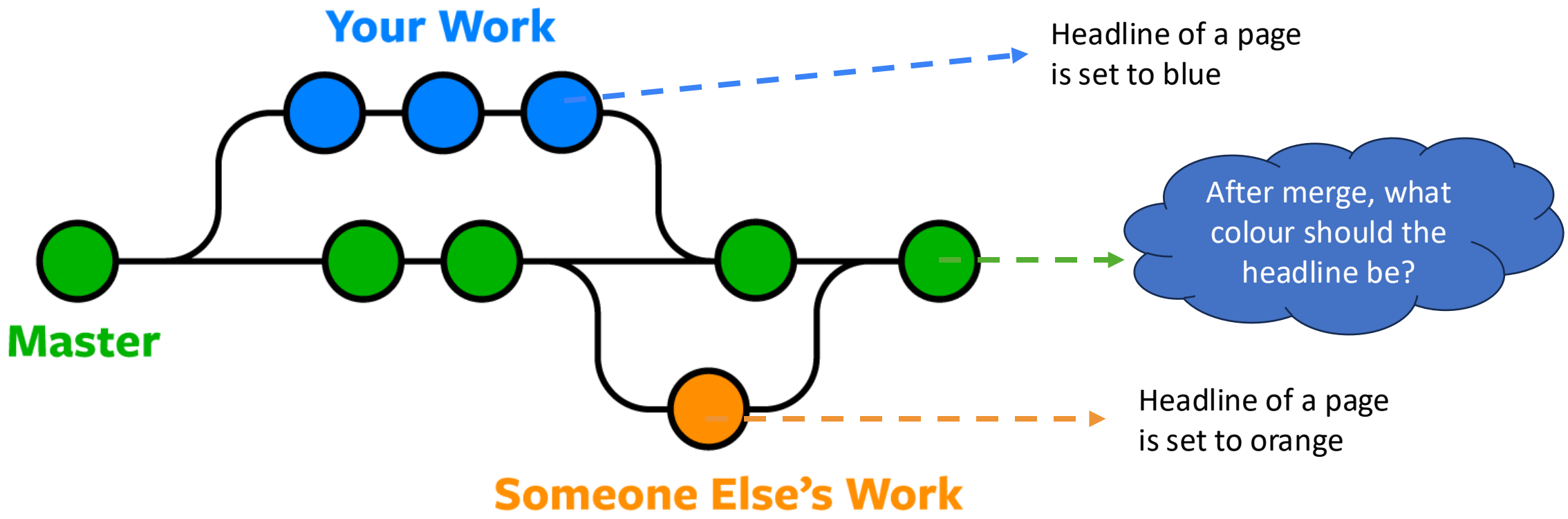





```
git switch -c new_branch
git add .
git commit -m "message"
git switch master
git merge new_branch
git branch -d new_branch
```

Merge Conflicts

- When a change is made on the master branch that is not reflected in another live branch
- Or, when conflicting changes are made on different live branches



GitHub

- A cloud-based service for software version control using Git
  - Provides distributed access control, allowing developers to share and manage their code
  - Commonly used to host open source development projects
  - As of 2023, GitHub hosts 100 million developers, 372 million repositories (projects)
  - Easy integration with Git to enable source code and version control to be hosted in the cloud

GitHub Flow

- Three-stage process
    1. Create repository (once only)
    2. Add repository URL as a remote origin for Git (once per machine/session)
    3. Push Git content to GitHub repository

```
git remote add origin https://github.com/user/repo.git
git push --all
```