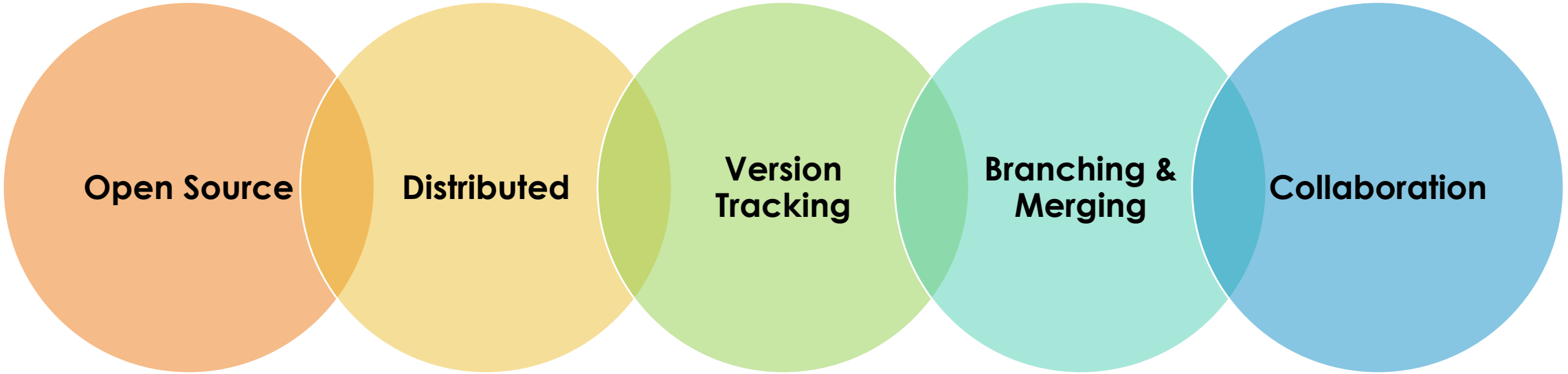
VERSION CONTROL

Git & Github

WHAT IS GIT

- A distributed version control system (VCS).
- Tracks changes in files and directories over time.
- Helps manage source code for software development.

KEY FEATURES



WHY GIT?

- Team Collaboration on a Web Development Project
- Let's Say, One team of developers is building a **React-based eCommerce application**.
- 3 developers are work on different requirement.

Cart Management

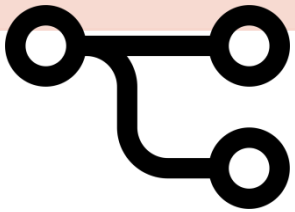
Product Catalog

User Authentication

HOW GIT HEPLS HERE?

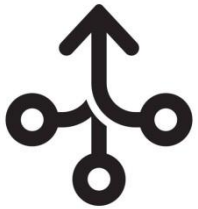
Branching

- Each developer can create their own branch
- feature/cart
- feature/product
- feature/authentication
- work independently.



Merging

- Once a feature is complete
- the changes can be merged into the main branch
- without disrupting others' work.



Conflict Resolution

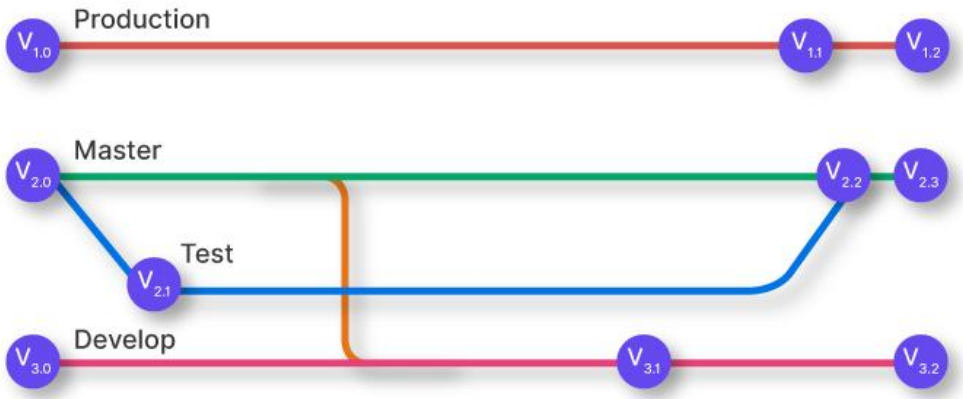
- If two developers modify the same file
- Git helps identify and resolve conflicts during merging.

Version History:

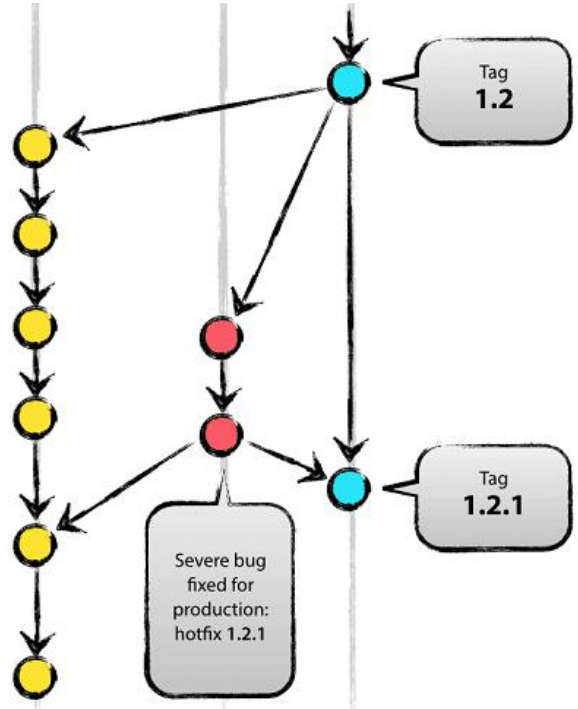
- The team can track
- who made what changes
- and revert to earlier versions if needed.

SCENARIO: BUG FIXING AND HOTFIXES

A live production system has a critical bug, and it needs an immediate fix.



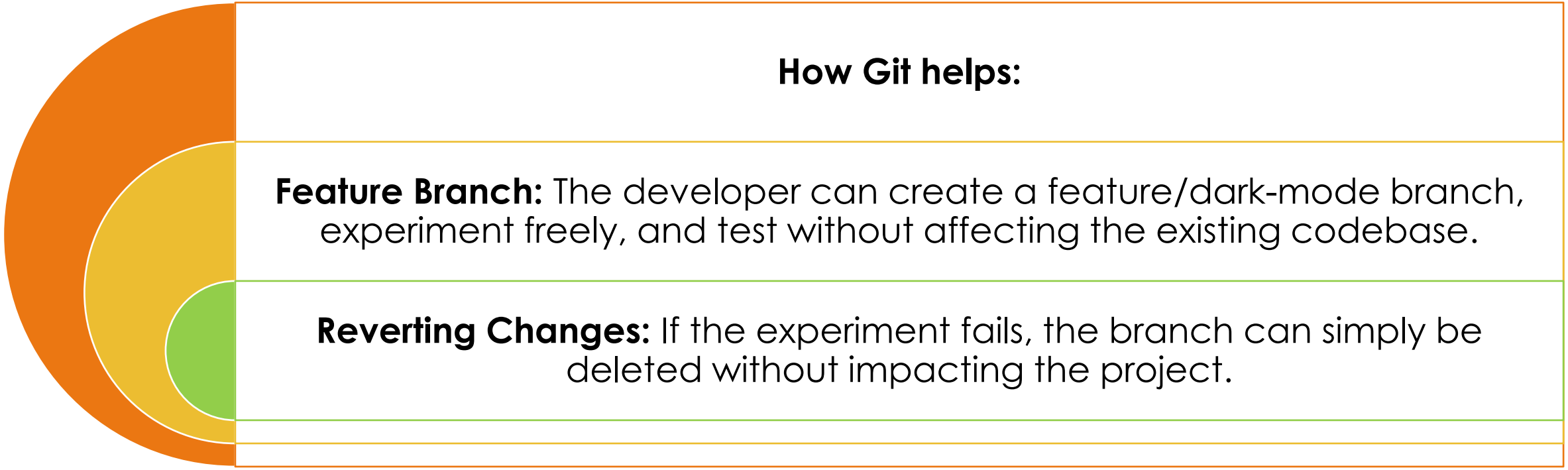
The production release is tagged (e.g., v1.0.0), ensuring the current stable version is well-documented.



Developers can create a hotfix branch from the production tag, fix the bug, and merge it back into the main branch and the development branch (dev) without disrupting ongoing development.

SCENARIO: EXPERIMENTATION AND PROTOTYPING

A developer wants to experiment with a new feature, like adding dark mode to a website.



SCENARIO: OPEN SOURCE CONTRIBUTION

You find a bug in an open-source project on GitHub and decide to fix it.

How Git Helps:

Fork and Clone: You fork the repository, clone it locally, and make your changes.

Pull Request: After fixing the bug, you push your changes to your fork and create a pull request to suggest the changes to the main repository.

SCENARIO: ROLLING BACK CHANGES

A recent deployment introduced a bug that broke the application

How Git helps?

Version History: Git allows you to view previous commits and identify which change introduced the bug.

Reverting Commits: You can use git revert or git reset to roll back to a stable commit.

SCENARIO: CODE REVIEWS

A senior developer reviews the code changes made by junior developers.

How Git helps?

Pull Requests: Developers can push their changes to a branch and create a pull request.

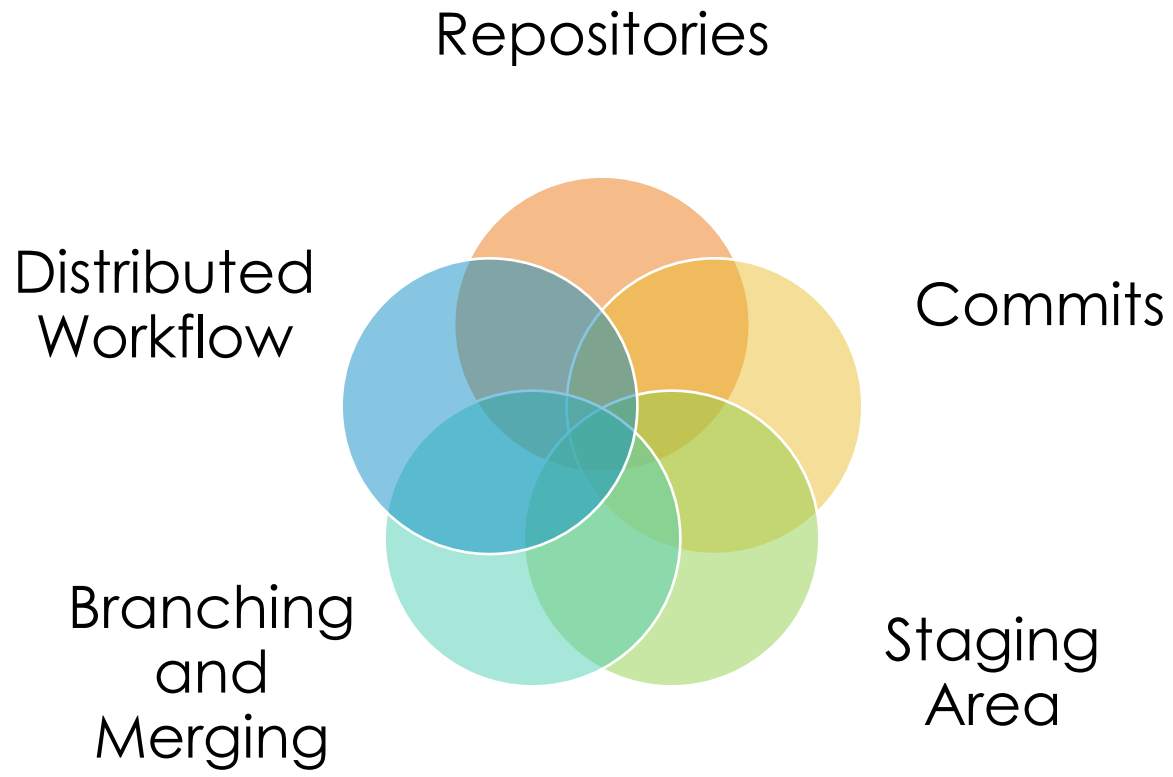
Review and Feedback: The senior developer can comment on specific lines of code, suggest improvements, and approve the merge.

POPULAR PLATFORMS

Azure Repos

Bitbucket

GIT TERMINOLOGY



WHAT IS REPOSITORY?

A Git project is stored in a **repository** (repo).

Can be **local** (on your computer)

remote (on platforms like GitHub).

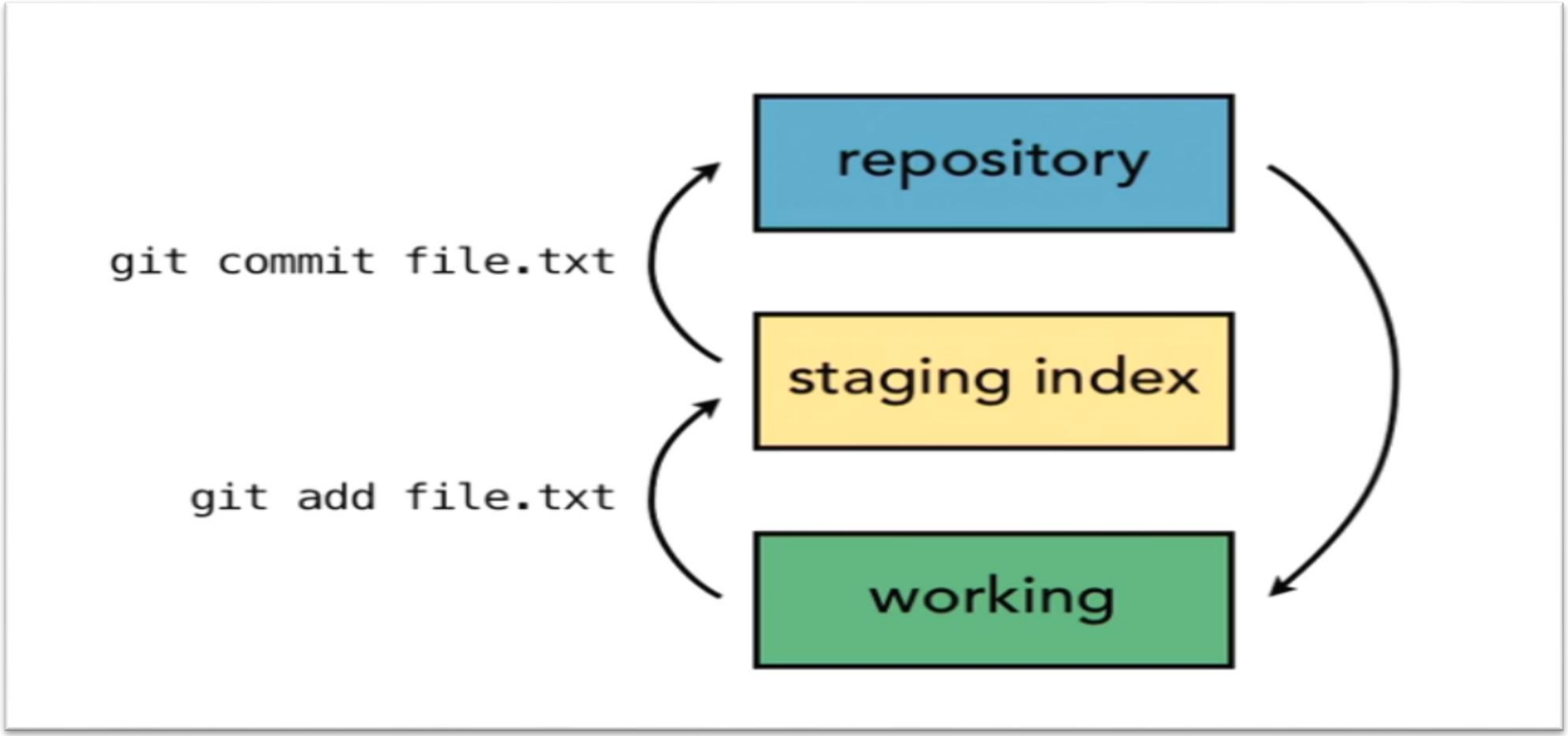
WHAT IS COMMITS?

Git tracks changes as **snapshots** of the project at specific points in time.

Each **commit** represents a snapshot and contains

- Changes made to files.
- Metadata (author, timestamp, message).

GIT ARCHITECTURE



ACTIVITY

- Install git on your system
- Verify installation: check version using command prompt
- Execute command
- git –version

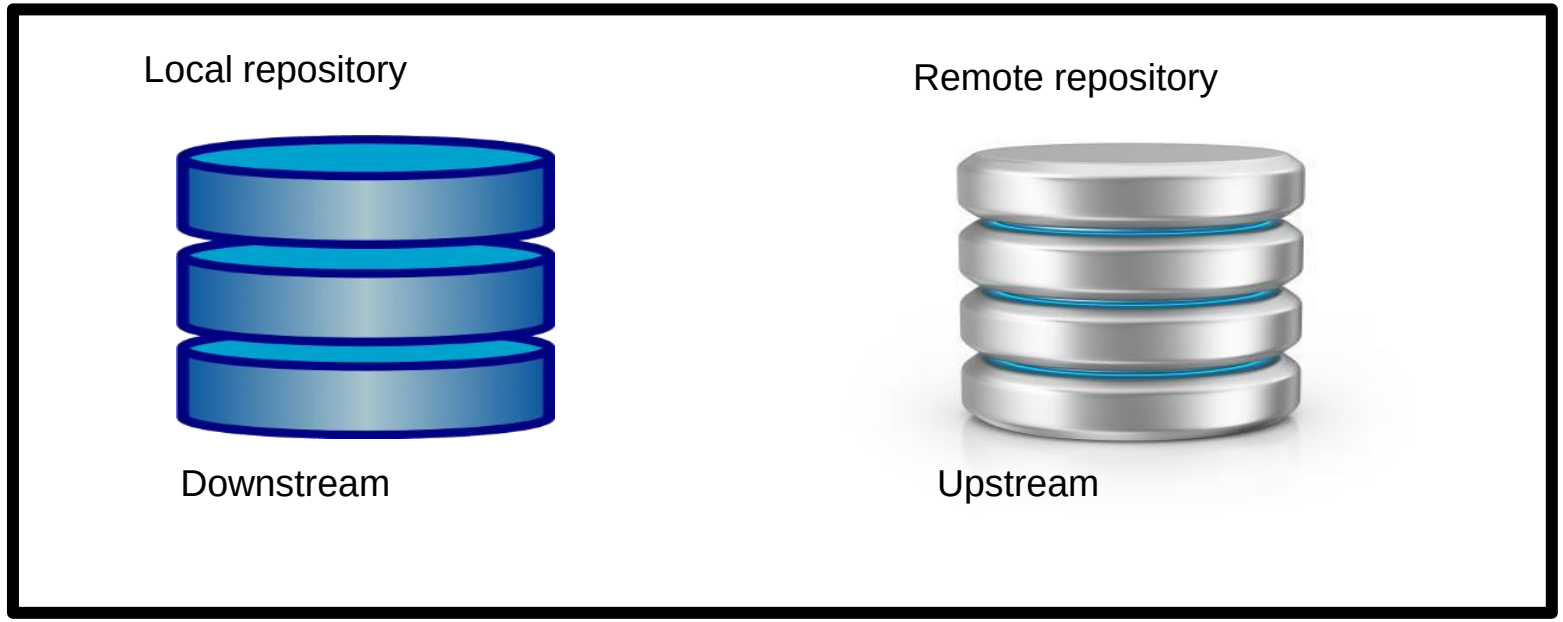
GIT BUZZWORDS

- Master:
  - It is a default branch.
  - It is used by CI tools for build and deployment.
  - It is followed by the other repositories.
- Branch:
  - It is a light weight working copy.
  - It has a staging area.
  - It works without impacting the master branch.

- Head:
  - It is a pointer to the latest commit of the working branch.
  - It is present on every repository.
  - It will point to the latest commit during branch switch.
- Remote Repo:
  - It is a git repository on a network outside the local machine.
  - It can have more than one remote repositories pointing from the local repository.
  - It can be managed and referenced with short names.
- Push:
  - It pushes changes from the local to the remote repository.
  - It is performed after committing the changes to the local repository.
  - It syncs the changes with the local and remote repository.

- Pull:
  - It transfers the updates from the local to the remote repository.
  - It syncs the changes from remote to the local repository.
  - It takes current code from remote repository and merges the change with the local repository.
- Fetch:
  - It will not merge the changes with a local repository.
  - It gives updates from remote to the local repository.
  - It syncs the changes from remote to the local repository.

- Origin:
  - It associates remote repository with names.
  - It is a local name set for the default repository.
  - It is useful to point the default repository when executing git commands.
- Clone:
  - It copies the existing repository from a remote repository.
  - It will get the complete repo, whereas checkout will only fetch the working copy.
  - It helps to replicate the repo on the local machine.



- When the data is flowing between repository A and B, repository A is upstream and B is downstream making B pull data from repository A.

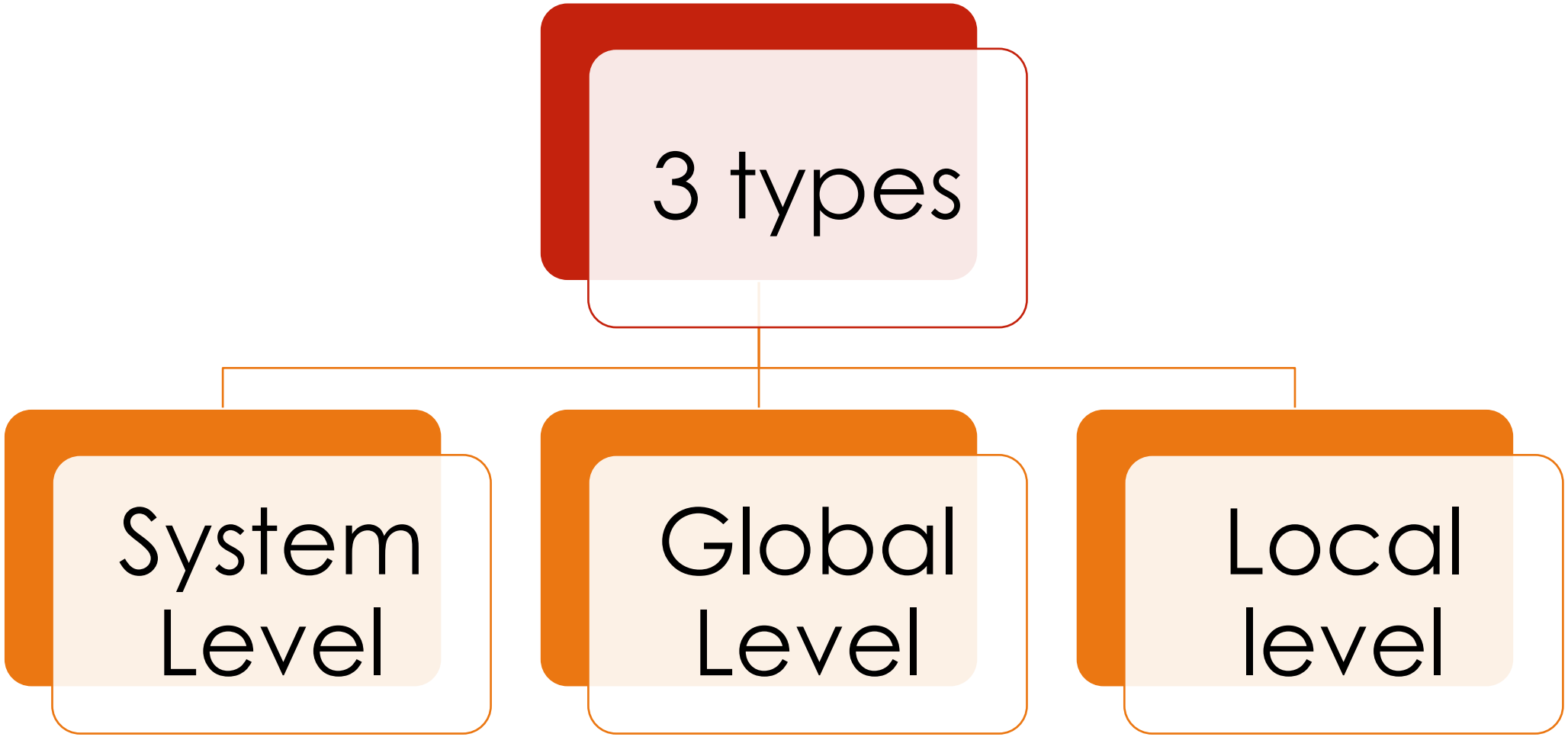
GIT VS GITHUB

Git	GitHub
It is installed and maintained on the local system.	It is hosted on the web.
It is a command line tool.	It is a graphical interface.
It is a tool to manage different versions of the file in a git repository.	It is a space to upload a copy of the git repository.

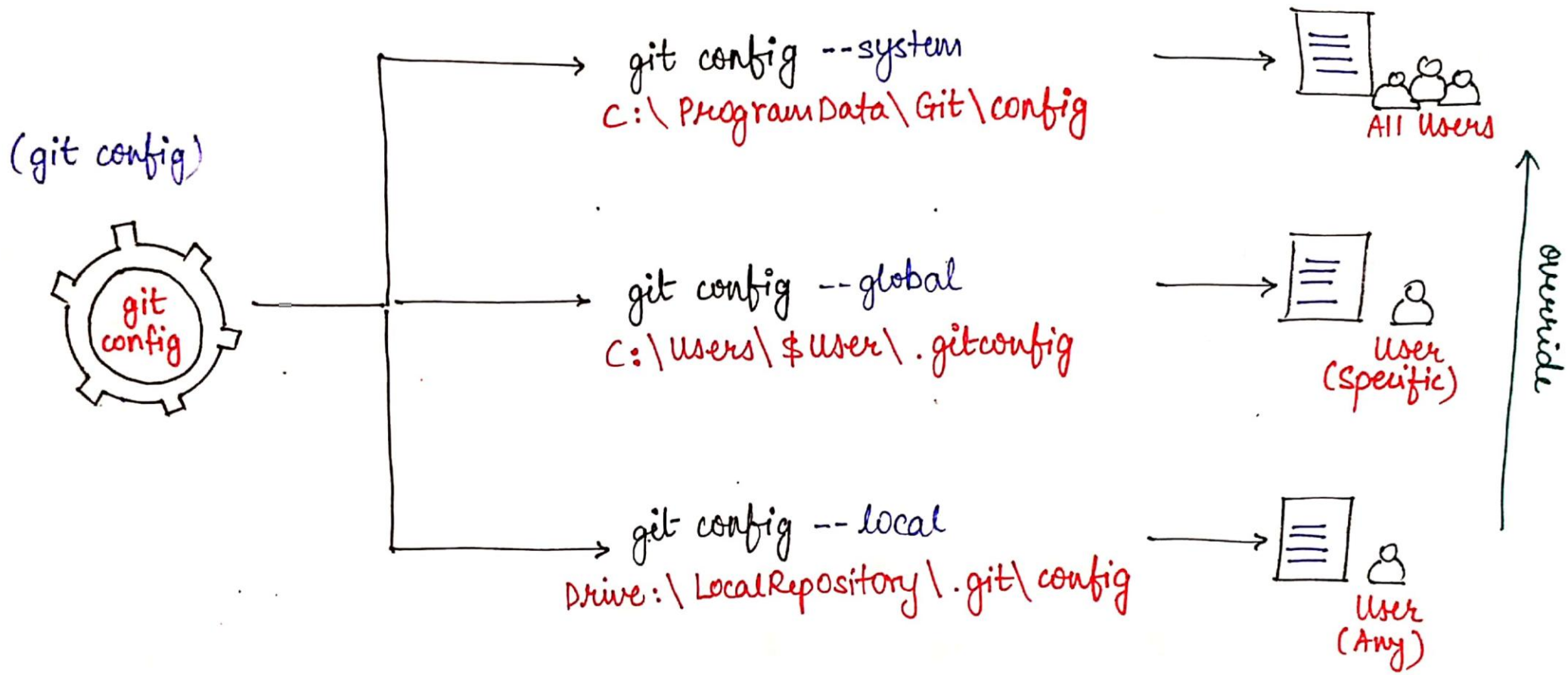
ACTIVITY

- Open www.github.com
- Create one account
- Remember username & password
- Login with the same

GIT CONFIGURATION



LET'S UNDERSTAND



GLOBAL LEVEL CONFIGURATION

Global level configurations in Git are user-specific settings.

It apply to all repositories for the current user.

These settings are stored in the ~/.gitconfig file

You can usually found at C:\Users\<YourUsername>\.gitconfig on Windows OS.

SYSTEM LEVEL CONFIGURATION

- Affects all users and all repositories on the system
- Stored in the $(prefix)/etc/gitconfig file.
- System level username
  - git config --system user.name "System User"
- System level email
  - sudo git config --system user.email "systemuser@example.com"
- System-Level Default Editor:
  - git config --system core.editor "notepad"
- Enable System-Level Colored Output:
  - git config --system color.ui auto
- Viewing System-Level Configurations:
  - git config --system --list

LOCAL CONFIGURATIONS

- Assume you want to set a specific username and email for a particular repository, different from your global settings, and create a few local aliases.
- Local user or email
- git config --local user.name "Your Local Name"
- git config --local user.email "local@example.com"

- Set Global Username:
  - git config --global user.name "Your Name"
- Set global Email:
  - git config --global user.email "you@example.com"
- Set global default editor
  - git config --global core.editor "notepad"
- Set global coloured output
  - git config --global color.ui auto
- Set global aliases:
  - git config --global alias.co checkout
  - git config --global alias.br branch
  - git config --global alias.ci commit
  - git config --global alias.st status
- View all configuration:
  - git config --global --list

LET'S UNDERSTAND GIT WORKFLOW

GIT COMMANDS

- **Initialize a Repository**
  - **Command:** git init
  - Initializes a new Git repository in your project folder.
    Creates a .git directory to track changes.
- **Check Repository Status**
  - **Command:** git status
  - Displays the state of the working directory and staging area.
    Shows untracked, modified, and staged files.
- **Add Files to Staging Area**
  - **Command:** git add <file> or git add .
  - Adds files to the staging area for the next commit.
    Use . to add all changes in the current directory.

- **Commit Changes**
  - git commit -m "Commit message"
  - Saves the staged changes as a new snapshot in the repository. Always use a meaningful commit message.
- **View Commit History**
  - git log
  - Shows a list of commits in the repository, including messages and authors.