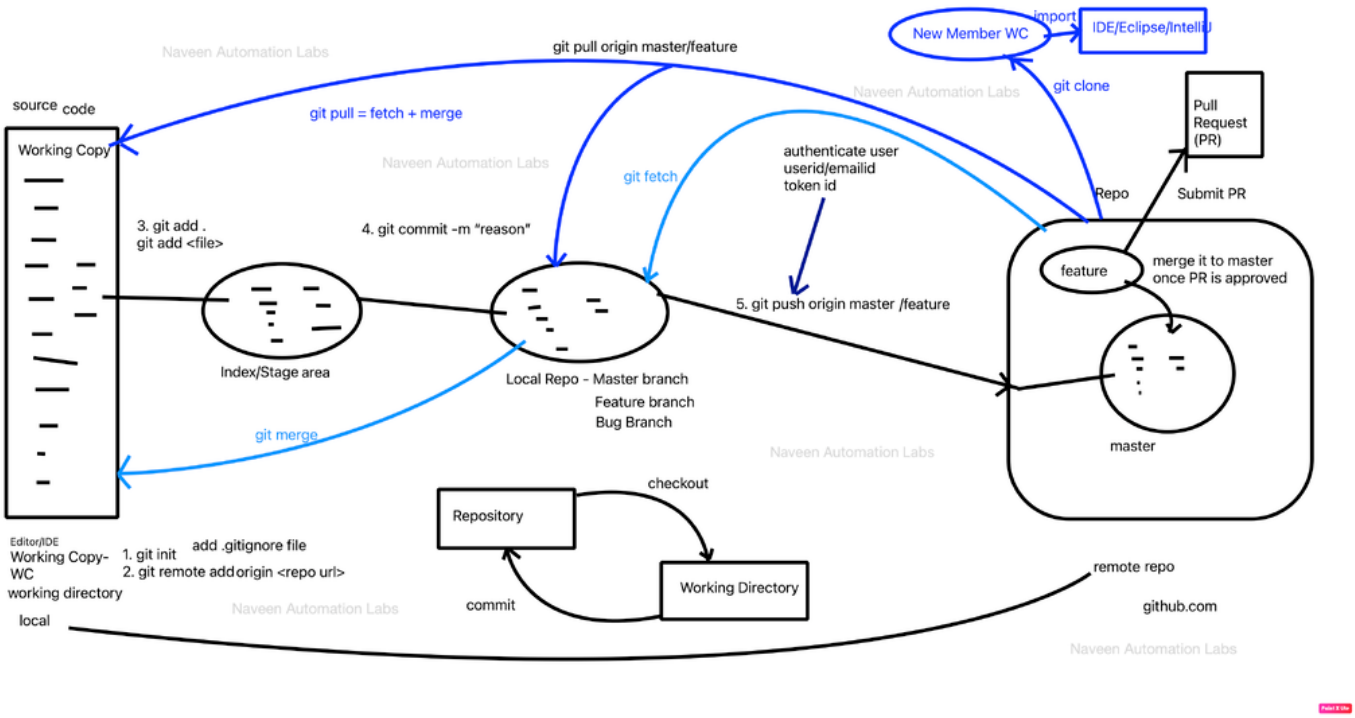
Git Architecture and Workflow



This diagram provides a visual representation of the Git workflow, detailing how local and remote repositories interact, how changes are staged, committed, and eventually merged into the main branch.

Breakdown of the key components and their relationships:

1. **Editor/IDE Working Copy (WC)**: This represents the local development environment where code changes are made.
2. **Initialization & Remote Setup**:
   - **git init**: Initializes a new Git repository and starts tracking an existing directory.
   - **add .gitignore file**: Used to specify intentionally untracked files that Git should ignore.
   - **git remote add origin <repo url>**: This links the local repository to a remote repository, typically hosted on platforms like GitHub.
3. **Staging and Committing**:
   - **Working Copy**: This is the developer's local copy of the code.
   - **Index/Stage area**: Before a commit, changes are added to this staging area using **git add .** or **git add <file>**. It represents a snapshot of the content that will go into the next commit.

- **git commit -m "reason"**: Commits the staged changes with a message describing the reason or the nature of the changes.

4. **Local Repo**:
   - **Local Repository**: Contains all the branches and their respective commits, including the master, feature, and bug branches.
   - **git merge**: Merges changes from one branch to another. It's visually depicted as an arrow merging into the master branch.
5. **Pushing to Remote**:
   - **git push origin master/feature**: Pushes the commits made on the local branch to a remote repository. Before this action, one would typically authenticate with a **userid/emailid** or a **token id**.
6. **Fetching and Pulling from Remote**:
   git fetch: Downloads new data from a remote repository without merging changes.**git pull = fetch + merge**: Fetches the changes from the remote repository and merges them.The diagram denotes **git pull origin master/feature**, indicating that the pull is targeting the master or feature branch.
7. **Working with Remote Repo**:
   New Member WC: Indicates that a new member or collaborator can clone the repository to their local system using **git clone**.**Pull Request (PR)**: Once changes are pushed to a feature branch on the remote repository, one can raise a PR. After review, it gets merged into the master branch.
8. **General Workflow**:
   The **Repository**, **Working Directory**, and **commit**, **checkout** concepts at the bottom are a high-level overview of the Git workflow.Code changes are made in the working directory.Changes are staged (added to the index) and then committed to the local repository.And from the local repository, they can be pushed to the remote repository.