

Project Report: GitSync

Introduction

GitSync is a powerful and versatile tool designed to simplify file version control and sharing, combining a custom Git implementation with an FTP server. This innovative solution provides a seamless experience for managing project repositories and exchanging files, making it ideal for collaborative hackathon settings where time, efficiency, and teamwork are paramount.

Key Features

1. Custom Git Implementation

- *Version Control*: Tracks changes in project files, allowing teams to revert to previous versions.
- *Commit Logs*: Maintain a clear history of all changes with timestamps and commit messages.
- *Checkout*: Revert to any commit state effortlessly.
- *Lightweight and Simple*: Tailored for hackathons to provide essential version control functionality without complex dependencies.

2. Integrated FTP Server

- *File Sharing*: Share project files easily between team members across devices on the same network.
- *Cross-Platform Access*: Supports file uploads and downloads from any FTP client.
- *Custom Permissions*: Provides full access control to the shared folder.
- *Real-Time Sync*: Ensures all team members have up-to-date files.

3. Unified CLI with Typer

- User-friendly command-line interface (CLI) for both Git and FTP functionalities.
 - Single-entry tool to initialize repositories, commit changes, share files, and more.
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Hackathon Use Case

In a fast-paced hackathon environment, GitSync shines as a one-stop solution for:

1. Efficient Team Collaboration

- Enables version control to avoid conflicts during parallel development.
 - Provides real-time file sharing to ensure all team members are aligned with the latest changes.
 - 2. **Ease of Setup**
 - Minimal dependencies and a single Python-based installation make it hackathon-friendly.
 - No need for external Git or FTP software—GitSync handles it all.
 - 3. **Cross-Device Synchronization**
 - The integrated FTP server ensures smooth file sharing between laptops, desktops, and mobile devices.
 - 4. **Offline and Local Network Support**
 - Operates entirely within a local Wi-Fi or hotspot, ensuring reliability even without internet access.
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How GitSync Works

Custom Git Workflow

1. **Initialize Repository**
 - Create a `.custom_git` directory to manage objects and logs.
2. **Add Files**
 - Stage files for committing by hashing their content and storing them as objects.
3. **Commit Files**
 - Save a snapshot of the staged files with a descriptive message.
4. **Checkout**
 - Revert to any commit state for debugging or reverting changes.

FTP Server Workflow

1. **Start the FTP Server**
 - Launch the server with a shared folder and credentials.
 2. **Connect Clients**
 - Team members connect to the server using any FTP client (e.g., FileZilla, Solid Explorer).
 3. **Transfer Files**
 - Seamlessly upload/download files between devices.
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Implementation Overview

Custom Git

Written in Python, the custom Git module provides essential features for version control using:

- **SHA-1 Hashing:** For object identification.
- **JSON Logs:** To maintain commit history.
- **File Management:** To restore files from any commit.

FTP Server

Powered by `pyftplib`, the FTP server offers robust file-sharing capabilities with:

- User authentication.
- Permissions for uploading, downloading, and modifying files.

Command-Line Tool

Using `Typer`, a unified CLI provides commands for:

- Initializing repositories and FTP servers.
- Adding, committing, and logging changes.
- Checking out commit states.

How to Use GitSync

Setup

Install dependencies:

```
pip install -r requirement.txt
```

Run GitSync commands:

```
python main.py init <repo_path>
python main.py add <repo_path> <file_name>
python main.py commit <repo_path> "commit message"
python main.py start-ftp <shared_folder_path>
```

Hackathon Collaboration

1. Initialize GitSync in your project directory.
 2. Share files using the FTP server.
 3. Track changes and collaborate seamlessly.
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Advantages for Hackathons

- **Speed:** Rapid setup and minimal learning curve.
 - **Versatility:** Combines version control and file sharing in one tool.
 - **Collaboration:** Keeps teams aligned on project progress.
 - **Local Operation:** Works without internet dependency.
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Conclusion

GitSync is more than just a tool—it's an enabler for efficient collaboration in hackathons. By integrating a lightweight Git system with an FTP server, it ensures that teams can focus on what truly matters: solving problems and building innovative solutions.

GitSync is your all-in-one solution to win hackathons and beyond!