Open Source Engineering Report

Course Code: 24CS02EF

Name: T Deepak Kumar Patro
University: KL University
Branch: CSE 1 (HTE)
Year/Semester: Second Year, Odd Semester
Faculty: Dr. Sripath Roy

Submitted in partial fulfillment of the requirements for
Open Source Engineering

November 25, 2025

Contents

1 About the Linux Distro Used

For all course-related work and experimentation, I used **Ubuntu 24.02**, a widely used Debian-based Linux distribution known for stability, ease of installation, and strong community support.

Ubuntu 24.02 provided an accessible learning environment with tools like:

- Terminal and APT package manager

- Built-in security modules

- System monitoring tools

- Support for Python, JavaScript, and Docker

I also used Ubuntu for hosting the **Nextcloud self-hosted server** and performing encryption tasks. Its balance between simplicity and power made my workflow much easier.

2 Encryption and GPG

GPG (GNU Privacy Guard) is an open-source tool used for secure encryption and signing using asymmetric cryptography. I performed the following experiments:

Key Generation

```
gpg --full-generate-key
```

Listing Keys

```
gpg --list-keys
```

Exporting Public Key

```
gpg --export -a "Your Name" > publickey.asc
```

Encrypting a File

```
gpg -e -r "Recipient Name" file.txt
```

Decrypting a File

```
gpg -d file.txt.gpg
```

These steps helped me understand how secure communication works in real-world open-source systems.

3 Sending Encrypted Email

To send an encrypted email using GPG:

1. Exchanged public keys with the recipient.

2. Encrypted the message using:

   ```
   gpg -e -r "Recipient"
   ```

3. Sent the encrypted ASCII block through standard email.

This demonstrated how organizations communicate securely without leaking private data.

4 Five Privacy Tools from prism-break.org

I explored the following privacy-focused tools:

1. **ProtonMail** – End-to-end encrypted email service.

2. **Tor Browser** – Anonymous browsing using the Tor network.

3. **Signal** – Private and secure messaging.

4. **KeePassXC** – Offline encrypted password vault.

5. **DuckDuckGo** – Search engine with zero tracking.

These tools taught me the importance of decentralization and privacy protection.

5 Open Source License Used

For my self-hosted project **Nextcloud**, I chose the **MIT License**. It is:

- Simple and permissive

- Allows commercial and non-commercial reuse

- Easy to understand

- Very common in the open-source community

Thus, it was the best choice for an academic and open project.

6 Self Hosted Server: Nextcloud

6.1 About the Project

Nextcloud is an open-source self-hosted cloud platform similar to Google Drive, but with full data privacy and control. I hosted my personal cloud server to manage files, sync documents, and share content securely.

- Secure login and user accounts

- File upload and sharing

- Browser-based interface

- Calendar and notes sync

- Mobile and desktop support

This gave me practical experience in self-hosting, Docker usage, and privacy management.

6.2 Installation Steps

1. Install Docker and Docker Compose:

   ```
   sudo apt update
   sudo apt install docker.io docker-compose -y
   ```

2. Create project folder:

   ```
   mkdir nextcloud
   cd nextcloud
   ```

3. Create docker-compose.yml:

   ```
   version: '3'

   services:
     db:
       image: mariadb
       restart: always
   ```

```
      environment:
        MYSQL_ROOT_PASSWORD: example
        MYSQL_PASSWORD: example
        MYSQL_DATABASE: nextcloud
        MYSQL_USER: nextcloud
      volumes:
        - db:/var/lib/mysql

    app:
      image: nextcloud
      ports:
        - "7070:80"
      links:
        - db
      volumes:
        - nextcloud:/var/www/html
      restart: always

  volumes:
    db:
    nextcloud:
```

4. Start server:

```
sudo docker-compose up -d
```

5. Open in browser:

```
http://localhost:7070
```

6. Create admin account and complete setup.
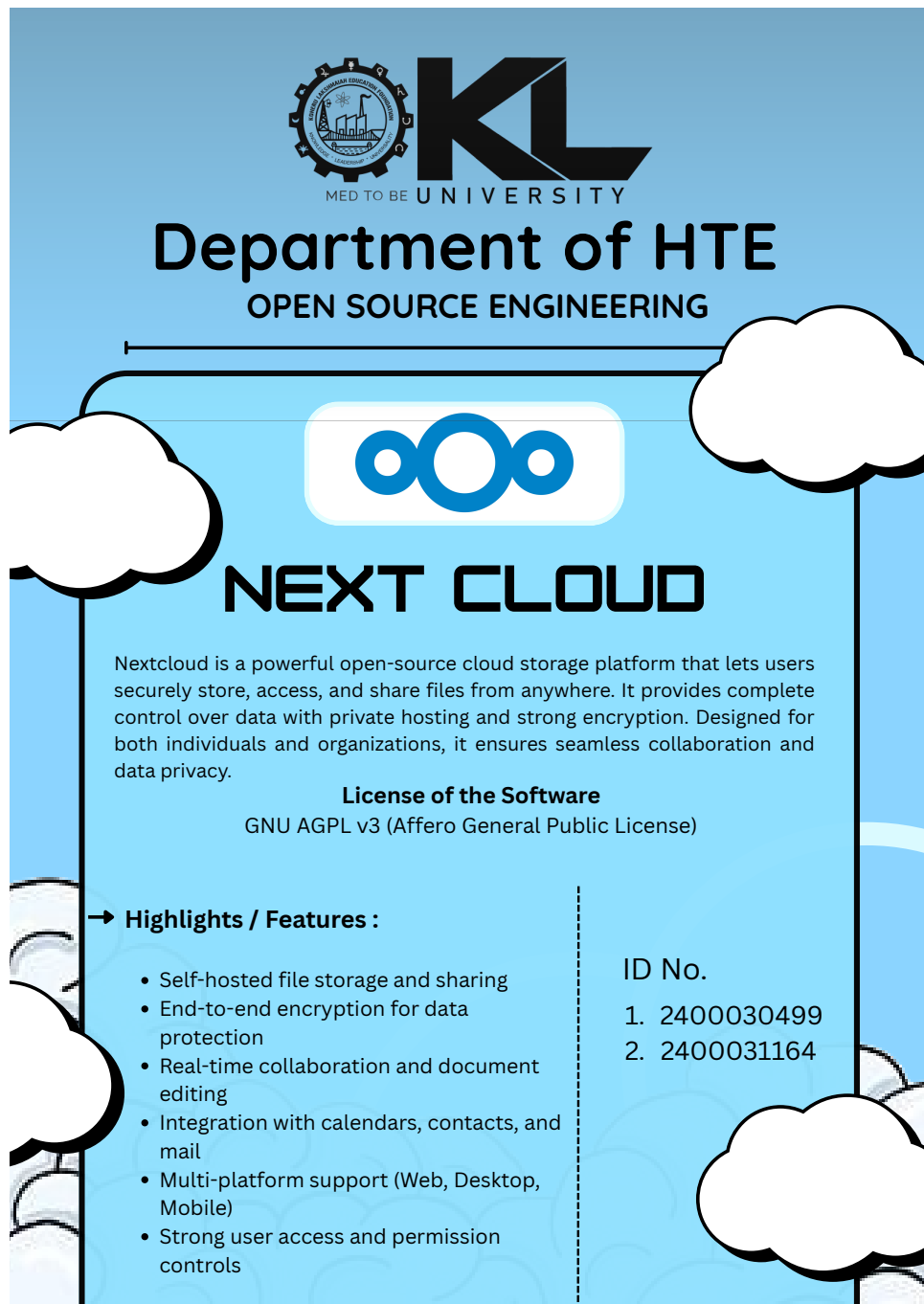
6.3 Poster

Figure 6.1: Poster for Nextcloud Self-Hosted Project

7 Open Source Contributions

I contributed a total of **12 pull requests** across multiple repositories:

- 6 Open

- 6 Closed

- 2 Issue fixes

- 1 Bug patch

These contributions involved fixing documentation, resolving bugs, UI improvements, and restructuring sections of codebases.
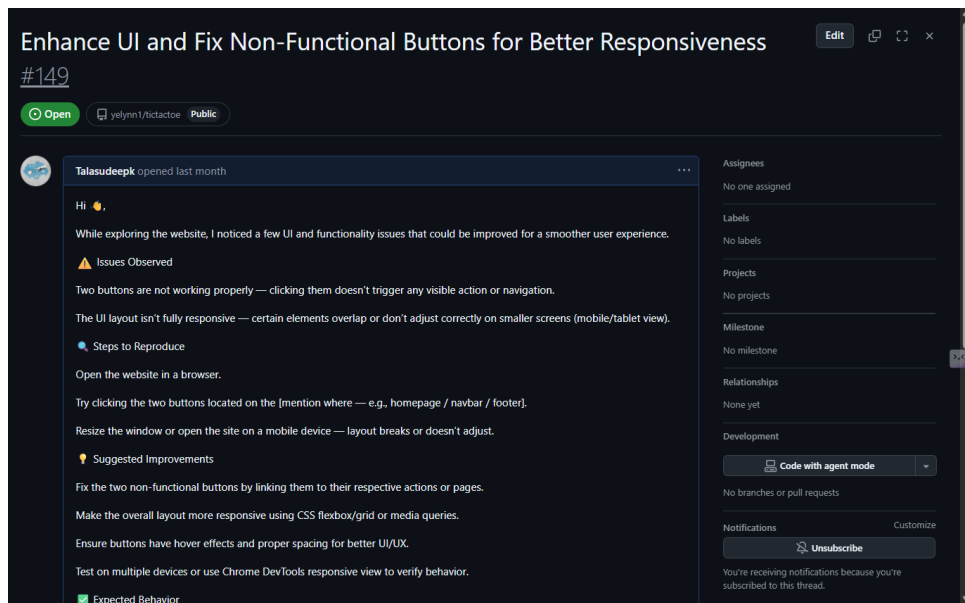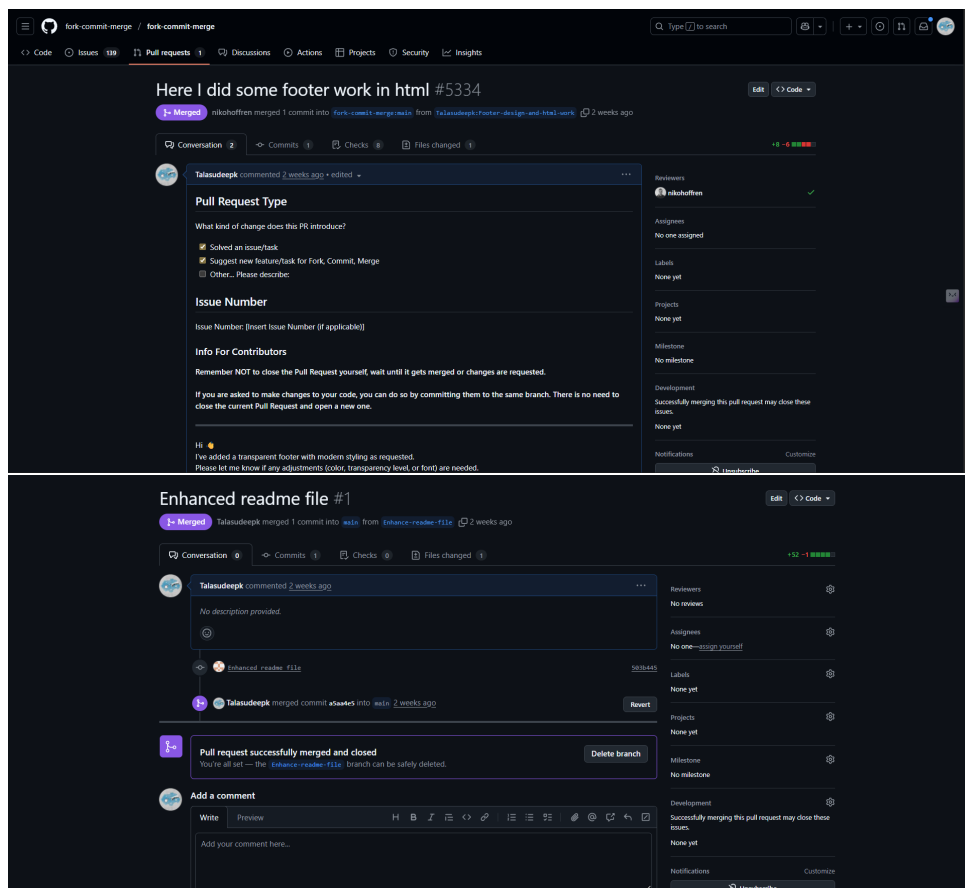
7.1 Screenshots

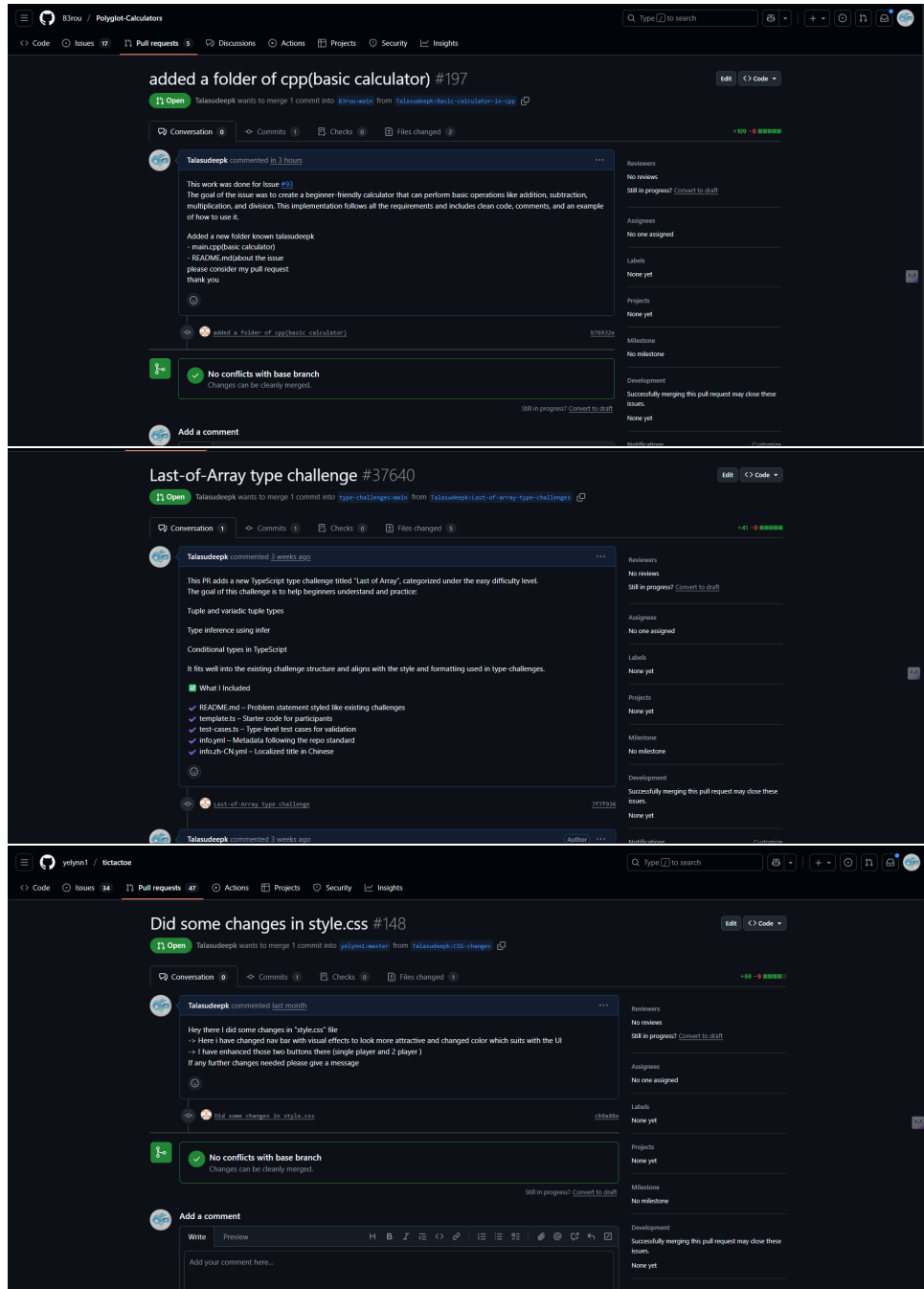Figure 7.1: Bug Identified

Figure 7.2: First Two PRs
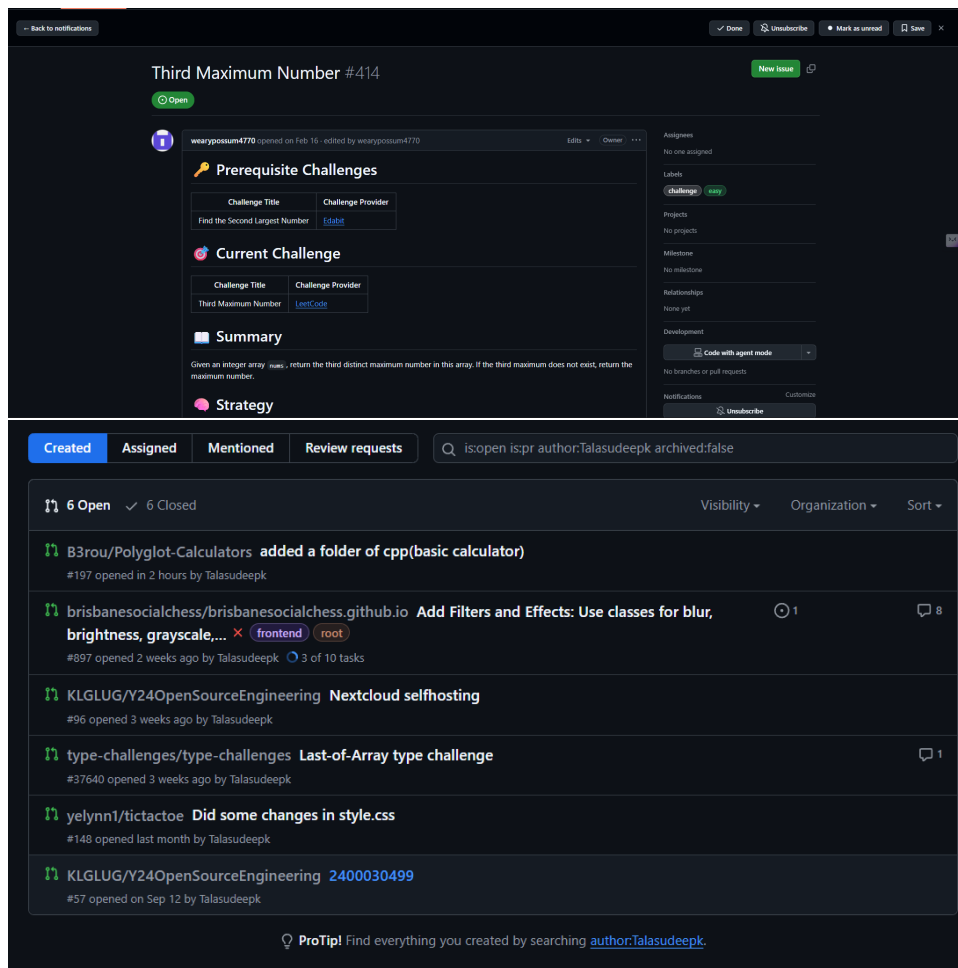
Figure 7.3: PR List Continued

Figure 7.4: Final PR Screenshots

8 LinkedIn Posts

1. Nextcloud Self-Hosting

https://www.linkedin.com/posts/t-deepak-kumar-patro-230753367$_selfhosting-nextcloud-opensource-activity-7399109870341455872-XD3F$

2. Open Source Journey

https://www.linkedin.com/pulse/from-zero-open-source-contributor-t-deepak-kumar-patro-301wc