(DEEMED TO BE UNIVERSITY) HTE HONORS THROUGH EXPERIENTIAL LEARNING

EXPERIENTIAL LEARNING & GLOBAL ENGAGEMENT

Open Source Engineering Report

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Branch: B.Tech – Electronics and Communication Engineering (ECE)

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Submitted To:

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Contents

1 About Linux Distro Used: Ubuntu

Ubuntu is one of the most popular Linux distributions used by developers, students and beginners. It is based on Debian and is known for its stability, regular updates and a friendly graphical interface. Ubuntu is widely used in software development, cloud computing and open-source learning labs.

Ubuntu provides thousands of free and open-source packages through the `apt` package manager. Using simple commands, we can install compilers, editors, servers and security tools. This makes it a very good choice for students who are just starting with Linux.

A key advantage of Ubuntu is its Long-Term Support (LTS) releases. LTS versions receive security and bug fix updates for five years, so they are trusted by companies and universities. Most major cloud platforms like AWS, Azure and Google Cloud support Ubuntu images by default.

In this course, Ubuntu helped me learn:

- Basic terminal commands for navigation and file handling
- Installing and updating software using `apt`
- Managing users, permissions and executable files
- Using Git and GitHub directly from the terminal
- Running and testing self-hosted services such as HedgeDoc

Overall, Ubuntu gave me a strong foundation in using Linux as a development environment for open source engineering.

2 Encryption and GPG

GNU Privacy Guard (GPG) is a free and open-source implementation of the OpenPGP standard. It is used for encrypting files, signing data and verifying signatures. The main idea is public-key cryptography: each user has a **public key** (can be shared) and a **private key** (kept secret).

When someone wants to send us a secret message, they encrypt it with our public key. Only our private key can decrypt that message. In the same way, if we sign a file with our private key, others can verify the signature with our public key and confirm that it really came from us and has not been modified.

Common GPG Commands

- `gpg --full-generate-key` – Generate a new key pair (public + private)
- `gpg --list-keys` – Show the public keys stored in our keyring
- `gpg --export --armor > publickey.asc` – Export our public key so that we can share it
- `gpg --encrypt --recipient <email> file.txt` – Encrypt `file.txt` for a specific user

- `gpg --decrypt file.txt.gpg` – Decrypt an encrypted file using our private key

In the lab we practised generating keys, exporting the public key and encrypting and decrypting sample files. This helped me understand how many open-source projects sign their releases and how users can verify authenticity.

3 Sending Encrypted Email

Normal email is like sending a postcard: anyone on the path can read the content. To protect privacy, we can combine email with GPG encryption. For this we can use tools such as Thunderbird with built-in OpenPGP support or browser plugins like Mailvelope.

Steps for Encrypted Email

- Both sender and receiver generate their own GPG key pairs.
- Each person shares their **public key** with the other, usually as a `.asc` file or via a key server.
- In the email client, we import the other person's public key and mark it as trusted.
- While composing a mail, we select the option "Encrypt" (and optionally "Sign").
- The email body is encrypted with the recipient's public key and sent over the internet.
- The recipient opens the mail, enters their passphrase and decrypts the message using their private key.

This activity showed me how encryption is used in real life for secure communication and how public-key infrastructure works beyond theory.

4 Privacy Tools (PRISM-BREAK)

PRISM-BREAK is a community-driven website that lists privacy-respecting alternatives to many popular services. Its goal is to help users avoid mass surveillance and tracking by using open-source and decentralised software.

Some tools we explored are:

- **Brave Browser** – A privacy-focused web browser that blocks ads and trackers by default, supports Tor integration, and rewards users with cryptocurrency for opting into privacy-respecting ads.
- **ProtonMail** – An end-to-end encrypted email service based in Switzerland, offering zero-access encryption where even the service provider cannot read user emails.
- **Bitwarden** – An open-source password manager that stores credentials in an encrypted vault, supports self-hosting, and offers cross-platform synchronization.

- **Nextcloud** – A self-hosted cloud storage and collaboration platform that provides file sync, calendar, contacts, and document editing as alternatives to Google Drive and Dropbox.
- **Element (Matrix)** – A decentralized, end-to-end encrypted messaging platform based on the Matrix protocol, allowing users to communicate across different servers.

These examples helped me see that privacy is not only a theory topic. There are real open-source tools available for almost every daily use-case.

5 Open Source License Used – AGPLv3

The GNU Affero General Public License version 3 (AGPLv3) is a strong copyleft open-source license designed to ensure maximum software freedom and transparency. It extends the principles of the GPL to network-based applications.

- Allows anyone to freely use, study, modify, and distribute the software
- Requires that any modified version must also be released under the same AGPLv3 license
- Ensures that users who interact with the software over a network can access its complete source code
- Prevents incorporation of modified versions into closed-source or proprietary systems
- Promotes openness, collaboration, and community-driven development

AGPLv3 is commonly chosen for web applications where maintaining openness of server-side code is important.

6 Self Hosted Server – HedgeDoc

HedgeDoc is an open-source, real-time collaborative Markdown editor. It is widely used for documentation, note-sharing, meeting notes, and team collaboration.

Features

- Real-time collaborative editing with multiple users
- Clean and powerful Markdown editor with live preview
- Supports embedding diagrams, charts, videos, and rich media
- Easy sharing using unique URLs
- Can be accessed from any device on the same network

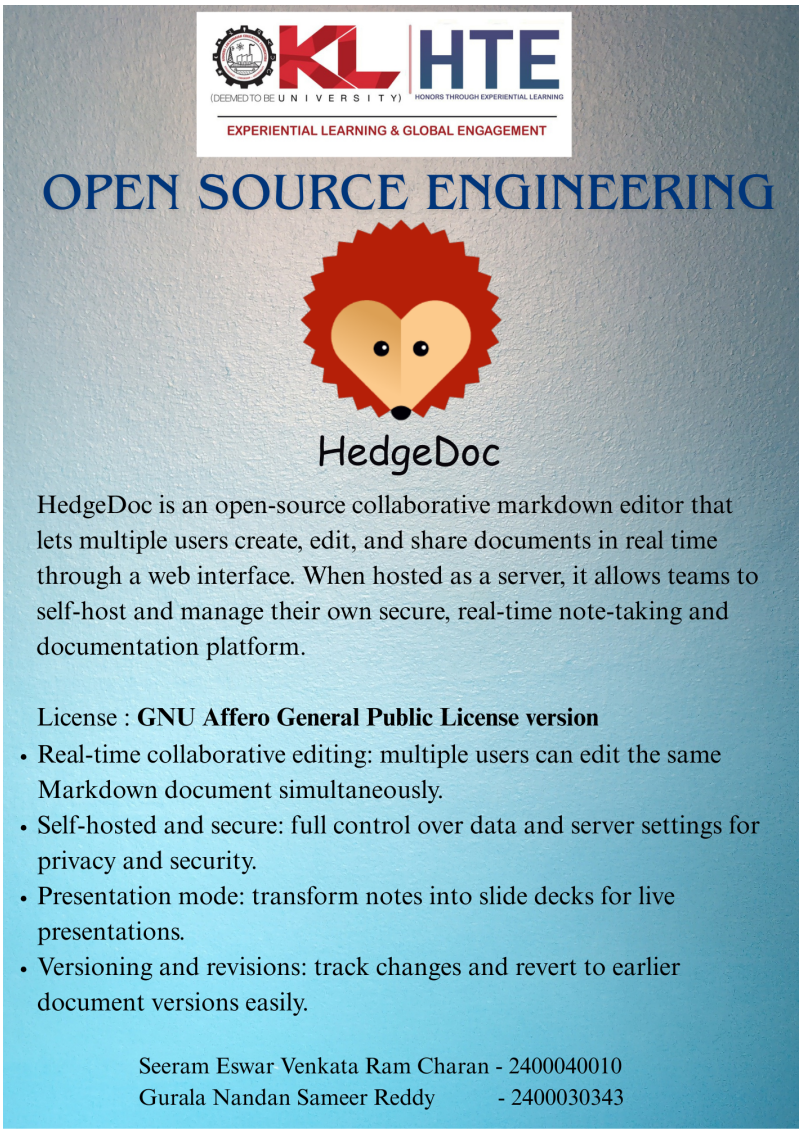
How I Self-Hosted HedgeDoc

- Installed Docker and Docker Compose on my Ubuntu system.
- Created and configured the `docker-compose.yml` file with necessary environment variables such as:
  - `CMD_DOMAIN` for domain/localhost
  - `CMD_PORT` to set the service port
- Started the HedgeDoc service using `docker-compose up -d`.
- Accessed HedgeDoc through the browser via `http://localhost:<port>`.

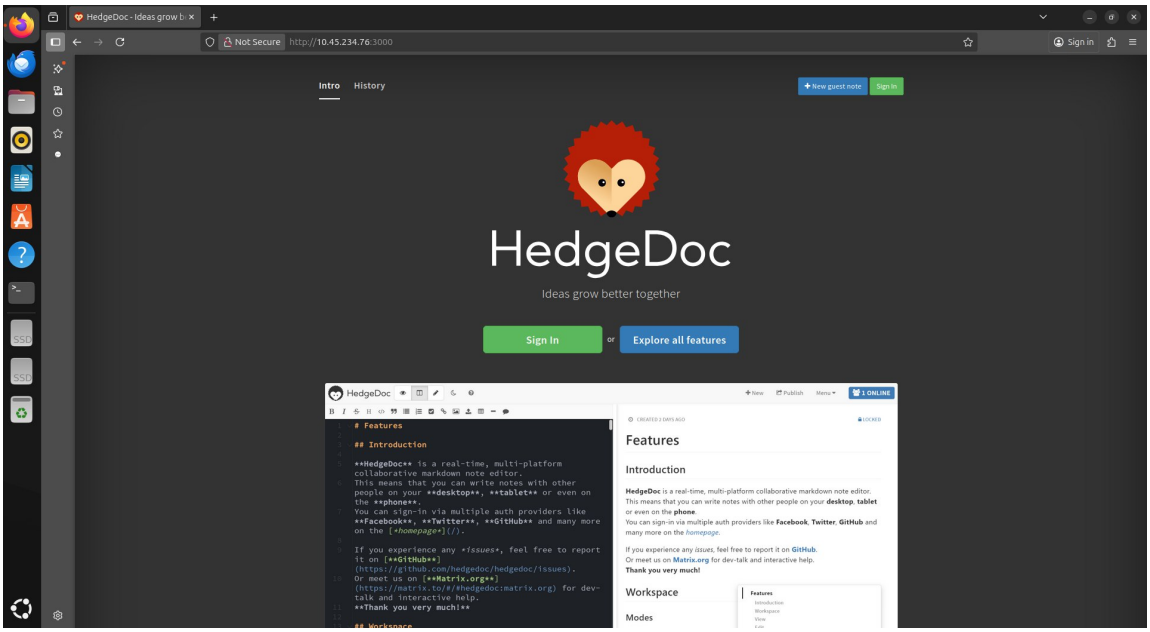
Localized(Translated) Document

`https://drive.google.com/file/d/1MXE12sFSqHrETCQ80DFTkMw-1vdpkqE4/view?usp=sharing`

Poster



Server Screenshot



7 Open Source Contributions

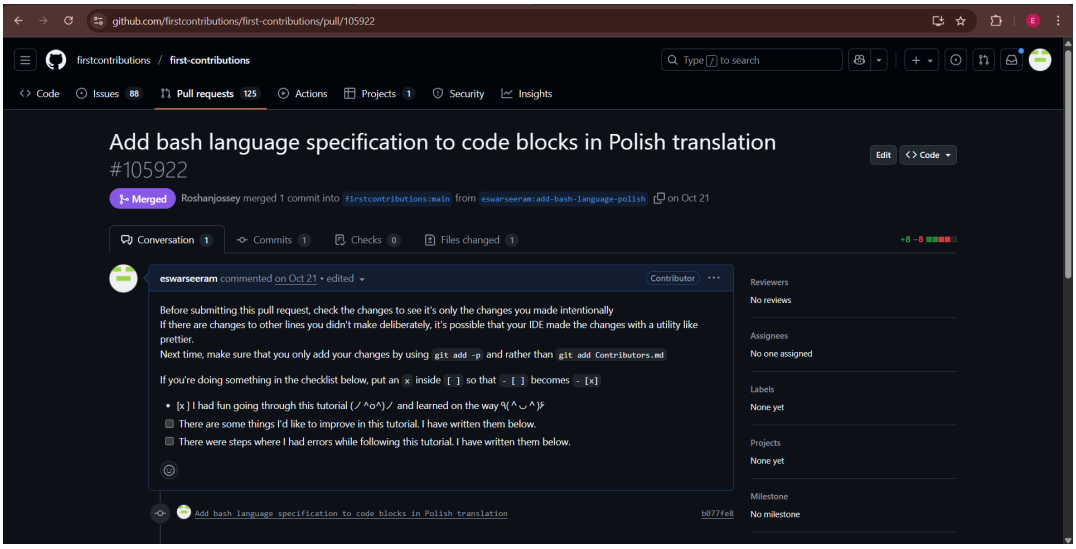
GitHub Username: **eswarseeram**

In this course we were asked to contribute to real open-source projects. The following is a list of my successfully merged pull requests:

List of Pull Requests

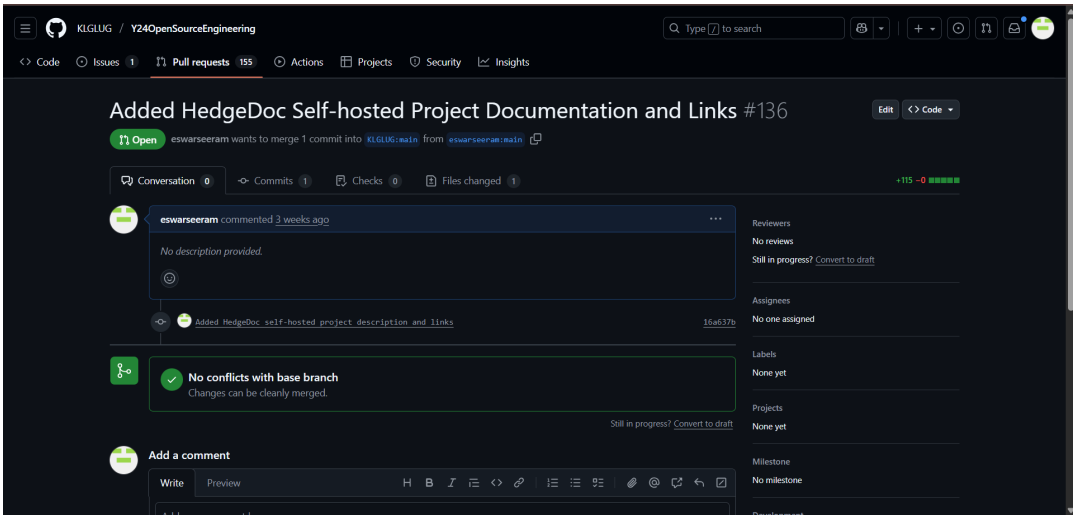
- **PR1: firstcontributions / first-contributions** – "Add bash language specification to code blocks in Polish translation"

  This pull request added bash language specification to code blocks in the Polish translation file of the "first-contributions" repository. This fix improves syntax highlighting and clarity for bash commands in documentation, making it more readable and easier to follow for contributors. The PR was reviewed, approved, and successfully merged.



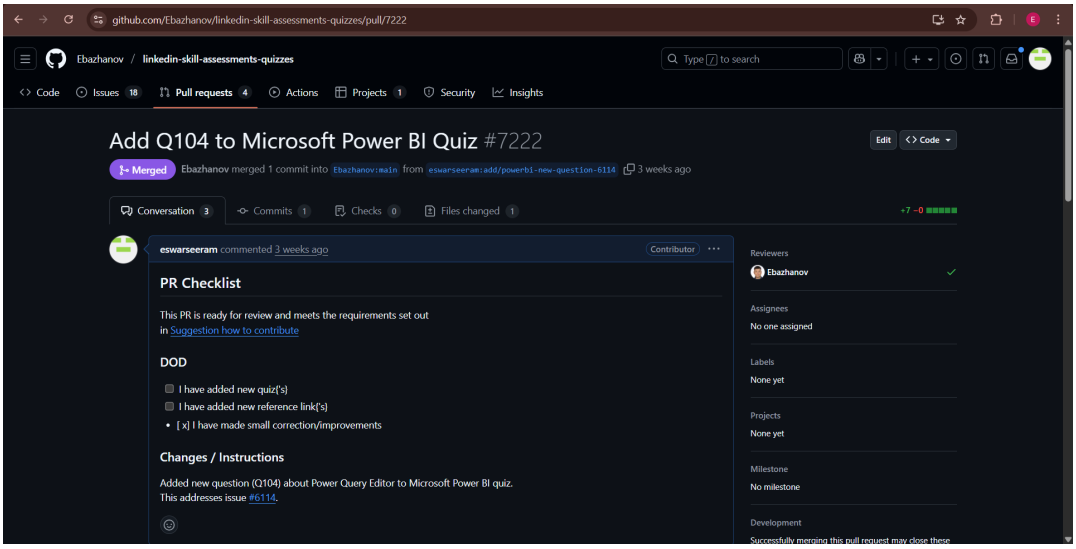
- **PR2: KLGLUG / Y24OpenSourceEngineering** – "Added HedgeDoc self-hosted project documentation in Telugu"

  In this pull request, I wrote detailed documentation in Telugu explaining how to self-host HedgeDoc, along with a video demonstrating the installation steps through screen recording with voiceover in the local language. My aim was to help Telugu-speaking students easily understand the steps and try self-hosting on their own systems.



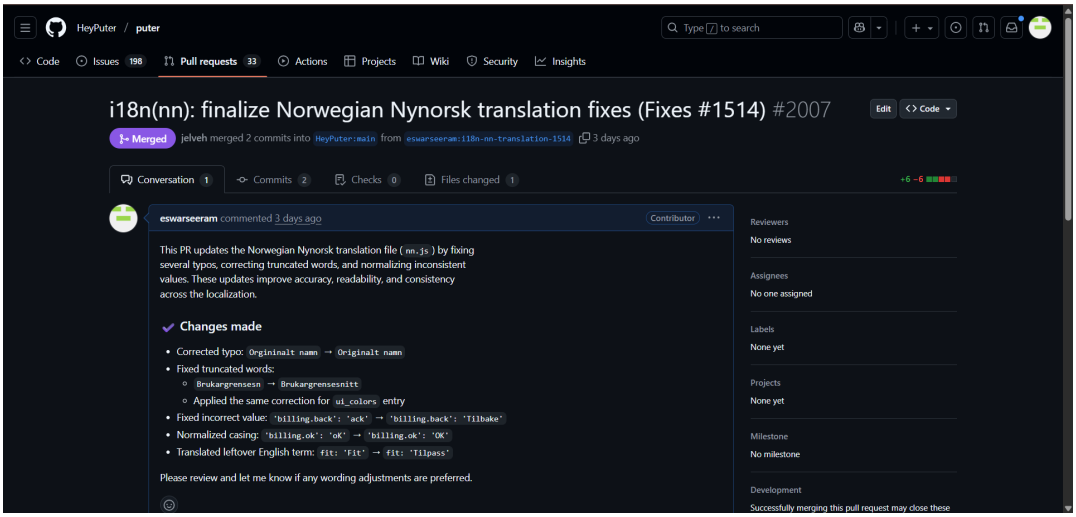
- **PR3: Ebazhanov/linkedin-skill-assessments-quizzes** – "Add Q104 to Microsoft Power BI Quiz"

  This pull request added a new question (Q104) about Power Query Editor to the Microsoft Power BI quiz in the "linkedin-skill-assessments-quizzes" repository. The PR was reviewed, approved, and successfully merged.



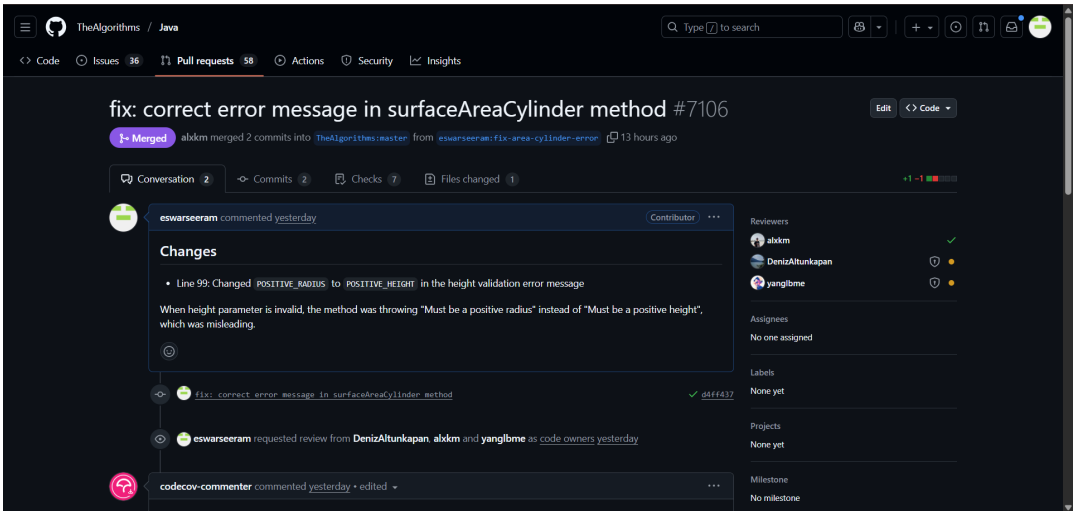
- **PR4: HeyPuter/puter** – "i18n(nn): finalize Norwegian Nynorsk translation fixes"

  This pull request finalized and fixed the Norwegian Nynorsk translation for the "puter" project. I corrected several typos, fixed truncated words, normalized inconsistent values, improved casing, and translated leftover English terms in the nn.js file. These updates improved accuracy, readability, and consistency of the localization. The PR was reviewed, approved, and successfully merged.



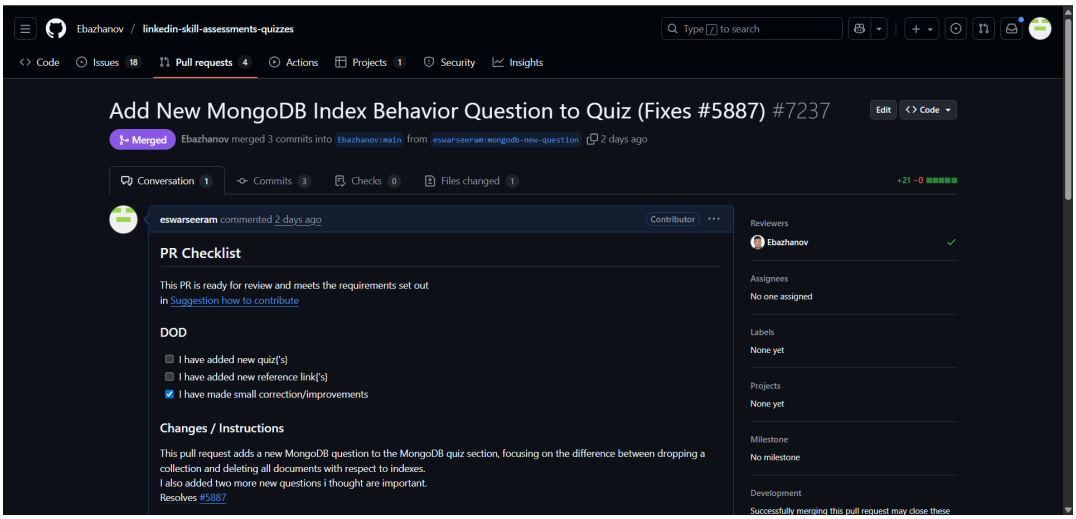
- **PR5: TheAlgorithms/Java** – "i18n(nn): fix: correct error message in surfaceAreaCylinder method"

  This pull request corrected the error message in the surfaceAreaCylinder method. Previously, when the height parameter was invalid, the method incorrectly showed "Must be a positive radius." You fixed this to display "Must be a positive height," making the error message accurate and clear. The PR was reviewed, approved, and successfully merged.



- **PR6: Ebazhanov/linkedin-skill-assessments-quizzes** – "Add New MongoDB Index Behavior Question to Quiz "

  This pull request added a new MongoDB question to the quiz section. It specifically covers the difference between dropping a collection and deleting all documents, focusing on their impact on indexes. The PR also introduced two more MongoDB questions seemed important. The PR was reviewed, approved, and successfully merged.



8 LinkedIn Posts

I have shared my open-source journey on LinkedIn. These posts helped me explain my learning and connect with other developers.

- Self Hosting Post – https://www.linkedin.com/posts/eswar-venkata-ram-charan-seeram-66bab9364_opensource-kluniversity-foss-activity-7383074250808807425-Y_4t?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFqTc3MBpjVIRebnNtW-EFX8YUI8DBtHBxY
- PR Merge Post – https://www.linkedin.com/posts/eswar-venkata-ram-charan-seeram-66bab9364_hacktoberfest2025-opensource-hacktoberfest-activity-7392264505759584256-1u-B?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFqTc3MBpjVIRebnNtW-EFX8YUI8DBtHBxY
- Blog Post – https://www.linkedin.com/posts/eswar-venkata-ram-charan-seeram-66bab9364_my-journey-through-open-source-engineering-activity-7398367113138286592-2iBv?utm_source=share&utm_medium=member_desktop&rcm=ACoAAFqTc3MBpjVIRebnNtW-EFX8YUI8DBtHBxY