

BSE4101 Emerging Trends in Software Engineering

Capstone Project Timeline: Implementing a CI/CD Pipeline for a Web Application

This Group project is divided into five weeks. Each week will focus on a different CI/CD pipeline implementation aspect, with key deliverables and reports. Each group will use ClickUp as its task management tool throughout the project. Invite me to your Clickup spaces using emails kougaus@gmail.com and kasozivinentug507@gmail.com. Each group is responsible for setting up tasks, assigning responsibilities, and tracking progress in ClickUp. Each week, the group leader will submit a report to their Clickup Space summarizing their progress, issues, and future plans. At the end of the project, all weekly reports and deliverables will be zipped and uploaded to Muele.

Due Date: 10th/October/2025

Week 1 [ending 7th Sept 2025]: Project Setup and Version Control

Objectives:

- Select a simple web application (existing or newly developed).
- Set up version control with a Git repository.
- Collaborate using GitHub, GitLab, or Bitbucket.

Activities:

- 1. Select the Web Application:**
 - Choose a web application with both a front end (e.g., React) and a back end (e.g., Node.js/Express).
 - Optionally, create a new web application if necessary.
- 2. Set Up Version Control:**
 - Initialize a Git repository for the project.
 - If in teams, set up a remote repository (on GitHub, GitLab, or Bitbucket).
 - Add the appropriate suffix to the repository name (Group_BSE24-X).
 - Add README.md to document the repository setup.
- 3. ClickUp Setup:**
 - Create a ClickUp workspace for the group.
 - Assign tasks for setting up the repository, selecting the application, and initializing Git.
 - Each group member must have individual tasks related to their role, with deadlines.

Deliverables:

- Git repository with basic project structure and README.md.

- A ClickUp project setup, including all members' tasks for Week 1.

Report:

- Summarize the repository setup and initial project decisions in a 1-2 page report.
 - Include ClickUp screenshots showing task management and assignments.
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Week 2 [ending 14th Sept 2025]: Setting Up Continuous Integration (CI)

Objectives:

- Configure the CI using GitHub Actions.
- Implement automated build processes.
- Integrate automated testing and code quality checks.

Activities:

- 1. Configure CI Tool:**
 - Set up the CI tool to trigger automatic builds when code is pushed to the repository.
- 2. Automated Build Process:**
 - Define the build steps (e.g., installing dependencies, compiling code).
 - Create configuration files for the CI tool (e.g., .yml files for GitLab CI or CircleCI).
- 3. Automated Testing and Code Quality:**
 - Set up testing frameworks (e.g., Jest, Mocha) for unit and integration tests.
 - Integrate code quality tools (e.g., ESLint) for enforcing standards.
- 4. ClickUp Setup:**
 - Create detailed ClickUp tasks for configuring CI tools, testing setup, and code quality checks.
 - Assign roles for specific tasks like build configuration and test writing.

Deliverables:

- CI pipeline configured to run builds automatically.
- Automated tests and code quality checks included in the pipeline.
- ClickUp tasks updated for Week 2 activities.

Report:

- 1-2 page summary of the CI setup, challenges, and outcomes.
- Screenshots of CI pipeline in action and ClickUp task management.

Week 3 [ending 21th Sept 2025]: Continuous Deployment to Staging

Objectives:

- Set up a staging environment for deployment.
- Implement automated deployment to the staging environment.

Activities:

1. **Set Up Staging Environment:**
 - Choose a cloud service provider or platform for staging (e.g., AWS, Heroku).
 - Configure staging to mirror the production environment as closely as possible.
2. **Automate Deployment:**
 - Configure the CI/CD pipeline to deploy to the staging environment after passing all tests.
 - Test the deployment process to ensure successful staging releases.
3. **ClickUp Setup:**
 - Assign tasks for setting up staging, writing deployment scripts, and testing the deployment pipeline.
 - Ensure proper task distribution among group members with deadlines.

Deliverables:

- A fully functional CI/CD pipeline that deploys to staging automatically after tests.
- Staging environment up and running with a version of the web application.
- ClickUp tasks updated for Week 3.

Report:

- 1-2 page report detailing the staging setup and deployment configuration.
- Screenshots of successful staging deployment and task progress in ClickUp.

Week 4 [ending 28th Sept 2025]: Production Deployment and Monitoring

Objectives:

- Implement production deployment with rollback mechanisms.
- Integrate monitoring and logging tools for both staging and production environments.

Activities:

1. **Production Deployment:**

- Set up the production environment.
- Configure the CI/CD pipeline for production deployment with rollback strategies in case of failure.
- 2. **Monitoring and Logging:**
 - Integrate monitoring tools like Prometheus and Grafana to track performance.
 - Set up logging mechanisms to capture errors and deployment events.
- 3. **ClickUp Setup:**
 - Create tasks for setting up production deployment and monitoring tools.
 - Ensure that tasks are evenly distributed and deadlines are set.

Deliverables:

- A production-ready CI/CD pipeline with rollback capabilities.
- Monitoring and logging tools integrated into both staging and production environments.
- Updated ClickUp tasks reflecting Week 4 activities.

Report:

- 1-2 page summary of the production deployment setup, including rollback mechanisms and monitoring.
- Screenshots showing the monitoring dashboard and task progress in ClickUp.

Week 5 [ending 5th Oct 2025]: Optimization, Documentation, and Presentation

Objectives:

- Optimize the CI/CD pipeline for efficiency and reliability.
- Prepare final documentation and presentation.

Activities:

1. **Optimize CI/CD Pipeline:**
 - Review the entire pipeline and identify any bottlenecks.
 - Optimize the build, test, and deployment steps for speed and reliability.
2. **Documentation:**
 - Create detailed documentation of the CI/CD pipeline, including configuration files, testing, and deployment processes.
 - Write an overview of tools used, challenges, and solutions implemented.
3. **Final Presentation:**
 - Prepare a slide deck or video demonstrating the CI/CD pipeline in action.
 - Include key takeaways, lessons learned, and a live demo if possible.
4. **ClickUp Setup:**
 - Finalize all ClickUp tasks for the project and ensure that all tasks are marked as completed.

- Create tasks for documentation writing and presentation preparation.

Deliverables:

- Final optimized CI/CD pipeline.
- Comprehensive documentation.
- Final presentation (slide deck or video).
- Complete ClickUp tasks for the entire project.

Report:

- 2-page final project report summarizing all key activities, deliverables, and challenges.
- Link to the final ClickUp task board showing all completed tasks.