17-313: Foundations of Software Engineering

Homework 1: Joining the team

Learning goals:

- Familiarize yourself with an existing software project
- Download, install and run an existing software project.
- Run an evaluation tool and collect metrics
- Evaluate the results of these metrics

Background

Git Documentation
Git Flow
GitHub Basics
GitHub's Flow
GitHub Cross-Referencing

Welcome to the team! To start your journey on this project, your first task is to become familiar with an existing piece of software. Eventually, you will add new features, but the first step is simply downloading, running, evaluating, and exploring the current software product. The project we will be building on this semester is an open-source document management system, the Mayan EDMS (https://www.mayan-edms.com/) system.

We will use a class-specific fork of Mayan, whose repository is at https://github.com/CMU-17313Q/Mayan-EDMS. This fork is based on v4.0.7 (released June 11, 2021) and contains minor tweaks to make it easier to modify and debug. Forking from this repository will also allow you to send pull requests to the instructors, which is the primary way of submitting code deliverables.

Your first step should be to read the documentation from Mayan EDMS, and review the contents of the repository. Note, there is documentation both for users and for developers: https://docs.mayan-edms.com/

Your first task is to download and run the system. There are several ways to do this, but we strongly suggest you **run a local install**. We have already installed all the required dependencies on your Linux Virtual Machine. We strongly recommend using the VMs because they have all the needed dependencies preinstalled.

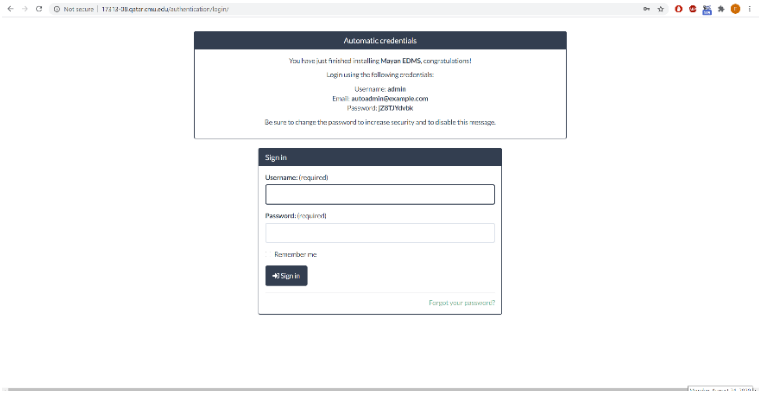
To get started, you should:

1. Fork the class-specific Mayan https://github.com/CMU-17313Q/Mayan-EDMS
2. Now that you have your fork under your GitHub account, clone it in your home directory. Make sure you clone your fork.
3. In a terminal, switch to the Mayan directory of the cloned repository and initialize Mayan with `./manage.py initialsetup`

Finally, you are ready to launch Mayan. In a terminal inside the Mayan codebase, run `make runserver`

If you ran Mayan EDMS successfully, you should be able to navigate to http://17313-<your-andrew-id>.qatar.cmu.edu:8000 and see a web page with a login screen. You may customize Mayan's port number (the default is 8000).

NOTE: If you use the virtual machines outside campus, you must be connected through the VPN in order to access the application.



Automatic credentials

You have just finished installing Mayan EDMS, congratulations!

Login using the following credentials:

Username: admin
Email: autoadmin@example.com
Password: JZ8TJYdvbk

Be sure to change the password to increase security and to disable this message.

Sign in

Username: (required)

Password: (required)

□ Remember me

Once you have Mayan EDMS up and running locally, proceed to evaluate it using the Google Lighthouse tool: https://developers.google.com/web/tools/lighthouse/ . You can run Lighthouse as a standalone application, using the audit tab of google developer tools, or from a web-UI. After you run Lighthouse, it will give you a score for various dimensions: Performance, Accessibility, Best Practices , and SEO.

After looking over the metrics, pick one metric to improve. The Lighthouse reports will give you some suggestions on how to accomplish this. The only requirements are that your change should affect the top-level score, and that the change should involve a commit to the repo.
HINT: Because of this, you might want to avoid trying to change the performance score.

First, open an issue in the parent repository to declare what aspect of Mayan you will be improving. You should look through existing issues, if any, to avoid duplicates. In the issue description, mention the current lighthouse score you observed and the warning you are targeting. Tag the issue with one or more existing labels, add it to milestone “HW1”, and assign it yourself.

Create a feature branch in your fork of Mayan, implement the change, test it locally, and commit your changes. Your commit message(s) must clearly describe what’s changing.

Once you are satisfied, open a pull request in the parent repository. The PR should link the issue that you previously opened (e.g., using the “resolve(s)” keyword), summarize the changes, and describe how much the Lighthouse score improved due to your change.

After you have completed this task, we will ask you to reflect on the nature of the metrics. To do this, you will answer the following questions about metrics, specifically in the context of Mayan EDMS. It would help if you focused your answers for each question on the one top-level metric in Lighthouse that you chose to improve.

- What properties do we care about, and how do we measure them?
- What is being measured? Does it (to what degree) capture the thing you care about? What are its limitations?
- How should this metric be incorporated into the process? Check-in gate? Once a month? Etc.
- What are potentially harmful side effects or incentives?

Deliverables and Deadlines

There is one (1) deliverable and one (1) deadline for this homework.

Individual Component – 100 points – due Thursday, August 11th, 23:59

Create and submit a single **PDF document** containing the following:

- A link to the commit where you improved one of the lighthouse scores.
- A prose description of which metric you chose to improve, why you chose that metric, and how you went about improving it.
- You should then answer the following questions about the metric you chose:
    - What properties do we care about, and how do we measure them?
    - What is being measured? Does it (to what degree) capture the thing you care about? What are its limitations?
    - How should it be incorporated into the process? Check in gate? Once a month? Etc.
    - What are potentially adverse side effects or incentives?

Your reflection document should be under two pages (soft limit). Submit the result as PDF document via **Gradescope**

Grading

This homework is worth 100 points. Running the project, making the change, and committing it properly constitutes 50 points (50%), and the reflection document constitutes 50 points (50%).
To receive full credit for the group component, we expect:

- The correct use of tools and technology, including Git, GitHub, and Lighthouse.
- Answers to the questions demonstrate an understanding of the benefits and limitations of software metrics, specifically in the context of Mayan EDMS. This analysis should go beyond simple statements, mere descriptions, and truisms, which ties specifically to the context of this assignment.

Notes:

The Mayan EDMS is built on top of Django, with most of its core logic written in Python. Learning to use new or unfamiliar frameworks, languages, and technologies is a core skill you will repeatedly reuse as a software engineer. So, if you've never built a Django app before, don't worry (and if you've never programmed in Python before, it is a *very* accessible language)! Navigating unfamiliar code is one of the learning goals of this assignment. There are tutorials and templates online for Django apps in general:
https://docs.djangoproject.com/en/3.1/intro/tutorial01/
https://realpython.com/courses/django-portfolio-project/

While learning Django could be helpful in this course, you probably need a few concepts to understand Mayan's code and do this homework.