

NLPeace: [Github Repository](#)

Release1 Demo: [here !](#)

Release2 Demo: [here!](#)

Deployed App: [here!](#)

Poster: [Here !](#)

Grade for [Release 1](#)

 NLPeace 490 Grade for Release 2

Team members

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We count the story points by counting the story points of each issue the team member had committed to. The assignees on the issues give the specific issues members are getting credit for.

Project summary

NLPeace is a social networking app available both on desktop and mobile. We aim to connect people and foster a safe environment free of hate and offensive content. We are leveraging natural language processing to build a strong language model that will allow for our content moderation to be automatic. Hateful content is thus nipped at the bud. As our network grows, we aim to amass more data to create a stronger language model and ultimately, a safer, more peaceful experience.

Risk

- **Inaccurate Moderation:**
Harmless content might be inaccurately flagged as hate speech or we might fail to detect actual harmful speech which could lead to user frustration.
Risk Level: High
Mitigation Strategy: Regularly update and test the system using diverse examples, including false positives and negatives. Additionally, provide users with the ability to appeal content decisions. We will also add admin users that can perform QA on the moderation.
- **Avoidance Techniques:**
Users might try to bypass moderation by using coded language or through media to convey harmful speech.
Risk Level: Medium
Mitigation Strategy: Update the moderation rules regularly to adapt to new avoidance techniques. Additionally, implement keyword filtering to detect evasive content.
- **User Backlash and Public Relations Issues:**
Users may perceive the moderation efforts as either too strict or not strict enough, leading to public backlash and negative publicity for the app. Moreover, controversial content moderation decisions could spark outrage on social media.
Risk Level: Medium
Mitigation Strategy: Clearly communicate the app's moderation policies and guidelines to users and the public to manage expectations and minimize misunderstandings. Develop a crisis communication plan to manage potential PR issues and controversies effectively.

- **Potential technological obsolescence**

The AI algorithms and models are quickly evolving; newer, more advanced models and techniques emerge rapidly. This can result in the app's AI moderation system becoming less effective over time.

Risk Level: High

Mitigation Strategy: Adopt an agile development approach to allow quick iterations and updates. This flexibility will let us integrate newer AI models and techniques as they become available. Our AI models will continuously learn as our user-base grows and as more content is posted, it will be added to our NLP pipeline to train our models.

- **Security Vulnerabilities:**

Bad coding practices can lead to security vulnerabilities in the code of the application. When this happens attackers or even regular users may be able to gain access to privileged data or functions.

Risk Level: High

Mitigation Strategy: All developers should brush up on good coding practices and all code should be peer reviewed.

Legal and Ethical issues

- There might be an ethical and legal issue arising from our collection of user posts to build and train our NLP model. We aim to mitigate this by having clear terms of service that detail how we will use user data to make the platform safer and train our model. We will be transparent in our data usage.
- Handling user information such as emails and posts (if their account is private) is exposing us to some legal risks. This risk is explored above.

Rollout, Logging, and Feedback

Rollout

Our app was initially deployed on Heroku, however as we got feedback from users that we had issues with pictures persisting as well as messages not sending, we have decided to switch our hosting platform to Microsoft Azure. The NLP API itself is available on Heroku still and can be used by anyone on the web.

After release 1, we initially released the app to our stakeholders as well as us as users. Starting from release 2, we shared the app with our friends and family and each got around 2 users, making our user base reach around 20 users. We were able to directly collect feedback from them and make issues out of these.

Logging

We have an extensive logging system. Our main service has a logging system that would be seen in a typical social media platform and a separate telemetry service. The main backend gathers users' emails, messages, and their recipients as well as users' crypto wallet public keys.

This information is mainly used to allow the service to function. For example, we store emails so that we may authenticate users, and we store messages so that we may reload old chats between users. However, we also use this data to train our machine-learning models. Posts uploaded to the website can be used to train our model further increasing its accuracy.

The telemetry service gathers user data such as request and response data. It focuses on storing this data for training models or other endeavors. It also uses this data to deliver information about the main service, such as its most popular paths and whether it's running healthily.

This data can further be used to train other machine learning models. For example, if our service grows enough it could be used to train a large language model like ChatGPT. After all, other big tech companies are creating their LLMs based on the data they gather from their users. We have set out the base to do the same.

Furthermore, telemetry data can be used to understand how our users interact with the service by looking at the server's responses to their requests and where else the users go after visiting a certain endpoint.

Feedback

One way in which we incorporated user feedback into our design can be seen in the following example. When we released a beta version of our product and began to advertise it, users began to engage with the web app. When they did we began getting reports of bugs that had been previously missed by our team. We also got suggestions and recommendations for other features or quality-of-life improvements such as a different behavior when clicking on a button or a different colored background.

We also began to identify the most widely used parts of our system thanks to the use of the telemetry service. This allowed us to understand that these endpoints needed to be ironed out the fastest as they were more likely to be users who found bugs on these endpoints than others. However, it also allowed us to understand that the other endpoints that we use to obtain user attention might have been lacking which informed us that we needed to allocate more attention to those.

Some other feedback we also took into consideration was feedback from our stakeholder. For example, we implemented 2FA and SSO after a discussion with him . Also, we decided to use some readily available language models to get better accuracy.

Velocity

Project Total: 92 stories, 338 points over 24 weeks

Iteration 1 (13 stories, 46 points)

In this iteration, we worked on mainly technical tasks, like setting up the base of our project. This involved setting up the Django application and the developer databases. We added a CI pipeline as well as containerization of the project. Most importantly, we researched hate speech datasets and implemented a NLP model which reached 93% accuracy in detecting hate speech and offensive language.

Iteration 2 (9 stories, 25 points)

In this iteration, we worked on updating the containerization of the project and setting up the databases within the container. This task was arduous and took longer than expected. We also set up the CI pipeline to run the tests inside the container. We took care of account creation, log-in, log-out and the update of profile picture as well as profile banner.

Iteration 3 (14 stories, 25 points)

In this iteration, we worked on a few issues we pushed forward from iteration 2. Users can now update their bio, username and password. Users can also reset their passwords if they forget it. We implemented posts with text and images as well as replies to posts. We also fixed some frontend bugs.

Iteration 4 - Release 1 (18 stories, 52 points)

This iteration was focused on deployment, bug fixes and posting. We implemented the central features for posting such as, commenting, reposting , reporting , liking and disliking. We also fixed a few bugs both on the frontend and backend. Finally, our app is now deployed to Heroku and ready to use !

Iteration 5 (15 stories, 43 points)

In this iteration, we implemented the NLP monitoring of posts. We also fixed a few bugs and implemented features such as deleting posts, blocking and reporting users, and admin monitoring of reported users. We also implemented features for the user's profile, allowing them to now keep track of their media posts, reposted posts, and followers and following.

Iteration 6 (8 stories, 23 points)

In this iteration, we refactored our code to and introduced a business logic layer to make the code in the views easier to read and understand. We also implemented real-time direct-messaging from user to user. Users can now send text chats as well as files. We also fixed a few bugs on the frontend and some features that our TA mentioned as missing.

Iteration 7 (12 stories, 46 points)

This iteration was focused on completing dm features, such as sharing gifs and files. We also incorporated our model into dms so that it can moderate hate or violent speech. We also introduced video posts, pinned posts, and editing. Users can now unblock each other. A few technical tasks were also completed, such as a refactoring of our code base into services to aid views, and real-time notifications.

Iteration 8 - Release 2 (15 stories, 30 points)

As this iteration was the last for release 2, it was mostly focused on fixing different bugs in the frontend and backend of the app. DMs are now fully implemented and users can scroll up and load more messages, as well as see a history of conversations they have partook in. We also implemented advertisement integration into the app, which is currently filled with placeholder values. Finally, the user profile now has all tabs available.

Iteration 9 (13 stories, 36 points)

This iteration implemented the main functionalities related to communities, mainly creating one, joining, editing privacy configuration, and posting. Deployment was finalized and the syncing between the main branch and the deployment. Users can now add hashtags to their posts and delete DMs they've sent.

Iteration 10 (14 stories, 46 points)

In this iteration, we implemented the option for users to turn on and off the NLP monitoring of their content. Trending posts as well as interactions in communities were fully implemented. Several bugs related to DMs and posting were also resolved. Finally, a few of our team members worked on their 491 projects.

Iteration 11 (8 stories, 25 points)

In this iteration, we implemented support for different languages on our NLP model. We also added the option to see the list of joined and owned communities. Community admins can now ban users and a few profile and posting bugs were fixed. Some advancements were made on 491 projects, mainly the layout for telemetry services.

Iteration 12 (12 stories, 43 points)

This iteration, we upgraded our NLP models, reaching a performance of 96%. We implemented full support for turning monitoring on and off and laid the basis for content filtering by sentiment analysis. Blockchain chat implementation has begun and several bugs and features surrounding communities were implemented. SSO has been implemented.

Iteration 13 - Final release (11 stories, 43 points)

In this iteration, we implemented 2FA Authentication and poll posts with NLP monitoring of polls. Also, implementation of the Ethereum blockchain platform was done in this release. Bugs related to the deployed app were resolved, mainly a Redis bug, file upload as well as some privacy concerns. Finally, the app was migrated to Microsoft Azure instead of Heroku.

Overall Arch and Class diagram

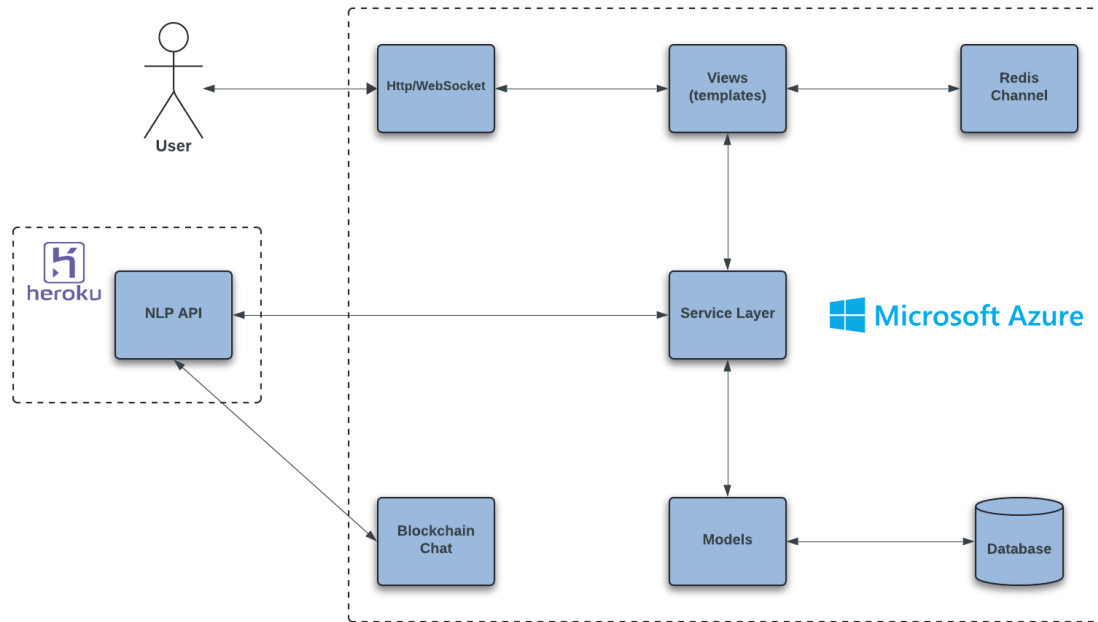


Figure 1: Architecture Diagram

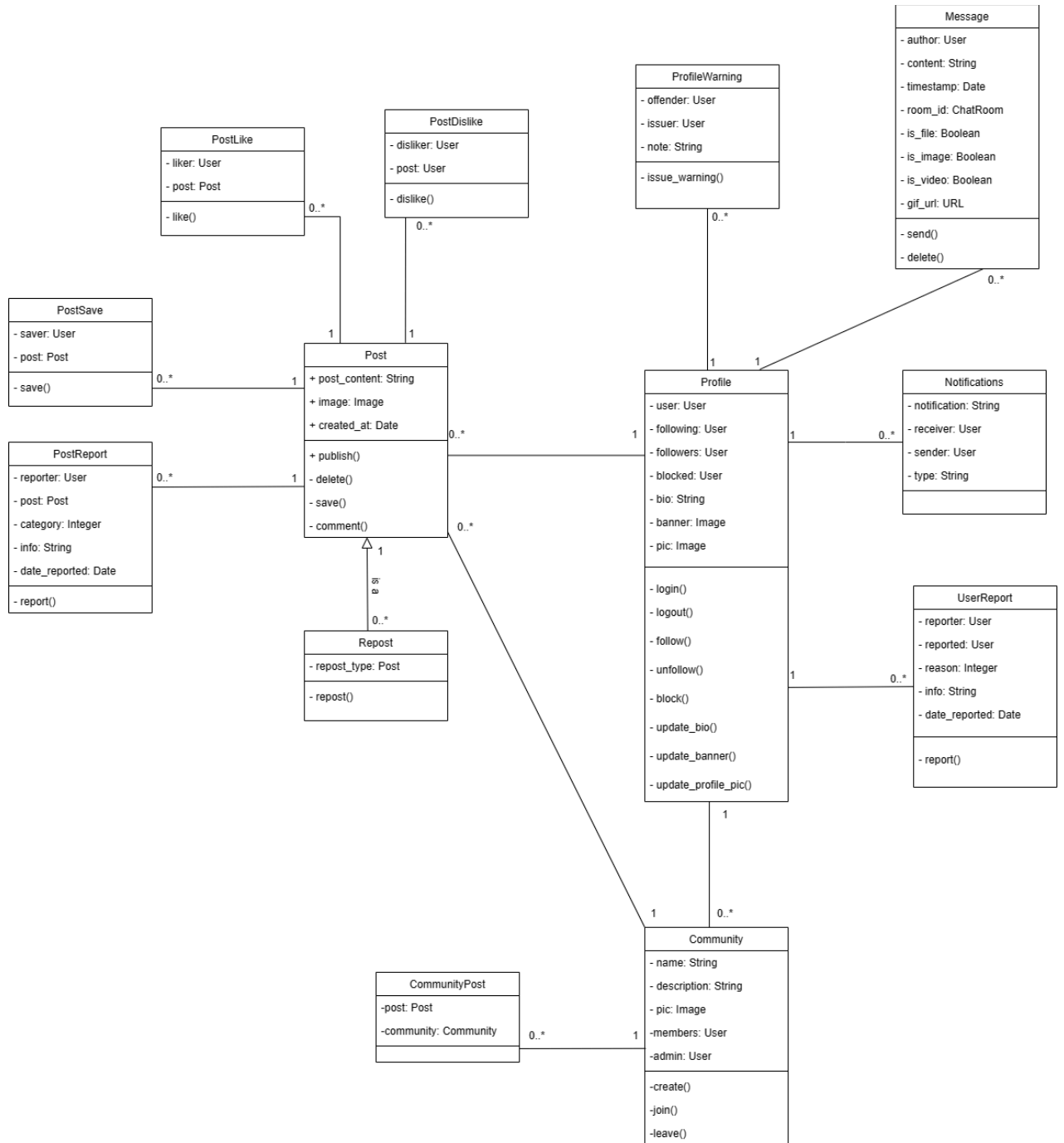


Figure 2: Class Diagram

Infrastructure

Django

Django is a Python web framework that streamlines web app development, handling tasks like database management and user authentication. In our app, Django will manage user accounts, posts, and interactions, providing a secure foundation for building dynamic web applications efficiently. This allows developers to focus on creating unique features while leveraging Django's powerful built-in functionalities.

Redis

Redis is an in-memory data structure store, used as a database, cache, and message broker. In our Django application, Redis is primarily utilized for managing real-time functionalities like WebSockets through Redis Channels. This enhances the application's capability to handle asynchronous communication and real-time features, such as live notifications or chat functions. Redis' fast in-memory operations ensure high performance and quick response times for these real-time features, making the user experience smoother and more interactive.

Pipenv

Pipenv is a Python packaging tool that combines dependency management and environment management. It automates the setup of virtual environments and uses a Pipfile to track dependencies. Deterministic builds are ensured through the Pipfile.lock, promoting consistent project reproduction across systems.

Pylint

Pylint is a static code analysis tool for Python that checks source code against a coding standard, looks for programming errors, and offers suggestions for code improvement. It can also help enforce a coding standard, detect code smells, and identify unused code. Pylint is highly customizable and integrates well with most development environments, making it a valuable tool for maintaining code quality in Python projects.

Name Conventions

Our preferred language is Python. The widely accepted style guide for that language is found [here](#). We may choose to include our linter as part of our CI/CD pipeline to enforce the conventions described by the linked document but will defer that decision until higher-priority matters have been addressed.

Code

Key files: top 5 most important files (full path). We will also be randomly checking the code quality of files. Please let us know if there are parts of the system that are stubs or a prototype so we grade these accordingly.

File path with clickable GitHub link	Purpose (1 line description)
backend/api/chat/consumers.py	This is the page containing the logic for the real-time chat
backend/api/core/views/services.py	This file holds the business logic for our views
backend/api/core/models/models.py	This file holds our core models
backend/api/core/forms/user_forms.py	This file holds user forms such as register, log-in and some profile modification.
backend/api/core/views/main_pages_views.py	This file hold the views for the main pages of our project.

Testing and Continuous Integration

Each story needs tests before it is complete. If some class/methods are missing unit tests, please describe why and how you are checking their quality. Please describe any unusual aspects of your testing approach.

List the 5 most important test with links below.

Test File path with clickable GitHub link	What is it testing (1 line description)
backend/api/core/tests/test_authentication.py	This tests users authentication
backend/api/core/tests/test_authentication.py	test_correct_login() tests that users can log-in
backend/api/core/tests/test_authentication.py	test_incorrect_login() tests that , given an incorrect password, a user cannot login
backend/api/core/tests/test_profile_modification.py	test_update_profile_pic_view_unauthenticated ensures only logged in users can edit profile pictures
backend/api/core/tests/test_backend.py	test_privacy_settings_authenticated() ensures authenticated users can update their privacy settings

api/urls.py	8	1	88%
chat/__init__.py	0	0	100%
chat/admin.py	1	0	100%
chat/apps.py	4	0	100%
chat/chat_service.py	73	20	73%
chat/consumers.py	66	43	35%
chat/forms.py	18	0	100%
chat/migrations/0001_initial.py	7	0	100%
chat/migrations/__init__.py	0	0	100%
chat/models.py	84	26	69%
chat/tests.py	66	53	20%
chat/urls.py	3	0	100%
chat/views.py	131	30	77%
core/__init__.py	0	0	100%
core/admin.py	49	5	90%
core/apps.py	4	0	100%
core/forms/__init__.py	0	0	100%
core/forms/community_forms.py	17	0	100%
core/forms/posting_forms.py	21	0	100%
core/forms/profile_forms.py	46	0	100%
core/forms/user_forms.py	34	3	91%
core/interest_resolver.py	22	3	86%
core/management/__init__.py	0	0	100%
core/management/commands/__init__.py	0	0	100%
core/management/commands/wait_for_db.py	16	3	81%
core/migrations/0001_initial.py	7	0	100%
core/migrations/0002_profile_is_2fa_enabled.py	4	0	100%
core/migrations/__init__.py	0	0	100%
core/models/__init__.py	0	0	100%
core/models/community_models.py	28	1	96%
core/models/post_models.py	123	8	93%
core/models/profile_models.py	76	6	92%
core/templatetags/__init__.py	0	0	100%
core/templatetags/nlpeace_core_filters.py	5	0	100%
core/tests/__init__.py	0	0	100%
core/tests/test_ads.py	42	0	100%
core/tests/test_authentication.py	98	4	96%
core/tests/test_block_user.py	23	0	100%
core/tests/test_chat.py	116	0	100%
core/tests/test_commands.py	9	0	100%
core/tests/test_community.py	210	0	100%
core/tests/test_error_pages.py	13	0	100%
core/tests/test_following.py	93	6	94%
core/tests/test_nlp_monitoring.py	95	29	69%
core/tests/test_polls.py	24	0	100%
core/tests/test_profile_modification.py	98	0	100%
core/tests/test_profile_warning.py	18	0	100%
core/tests/test_user_modification.py	36	0	100%
core/tests/test_user_posting.py	382	0	100%
core/tests/test_user_reporting.py	18	0	100%
core/tests/test_user_savingpost.py	31	0	100%
core/tests/test_user_search.py	34	0	100%
core/trends.py	33	0	100%
core/urls.py	10	0	100%
core/views/__init__.py	0	0	100%
core/views/auth_services.py	60	12	80%
core/views/authentication_views.py	88	33	62%
core/views/community_views.py	201	45	78%
core/views/main_pages_views.py	175	28	84%
core/views/posting_views.py	115	11	90%
core/views/profile_views.py	152	48	68%
core/views/services.py	564	108	81%
manage.py	13	2	85%

TOTAL	3751	536	86%

fatimaelfouladi@Fatimas-MacBook-Pro backend %

Figure 3: Code Coverage of 86%

Continuous integration enables code changes from multiple developers to be merged automatically, in which automated tools test and validate the code before it's integrated. Continuous integration for this Django application was set up using

GitHub Actions which is a CI platform provided by GitHub. It works by running a test whenever a pull request is made, and informing the developer whether the tests have passed or not.

Link to CI: [django.yml](#)