Free Python Winter Internship Report on

"URL Shortener"

Prepared by

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| *Executive Summary* |
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| This report provides details of the Free Python Winter Internship provided by upskill Campus and The IoT Academy in collaboration with Industrial Partner UniConverge Technologies Pvt Ltd (UCT).

This internship was focused on a project/problem statement provided by UCT. We had to finish the project including the report in 6 weeks' time.

My project is a URL shortener built with Django, aimed at simplifying long URLs into shareable links. It offers a user-friendly interface for inputting URLs, storing them in a database, and generating shortened versions. I focused on improving user experience, refining design, fixing bugs, and learning Django's MVT architecture. Additionally, I utilized Django Rest Framework for API development, enhancing my skills in API creation. Overall, the project demonstrates proficiency in Django web development and database integration.

This internship gave me a very good opportunity to get exposure to Industrial problems and design/implement solution for that. It was an overall great experience to have this internship. |

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1   Preface

Over the course of six weeks, I dedicated myself to developing a URL shortener using Django. This involved various tasks such as enhancing user experience, refining design elements, troubleshooting bugs, and learning about Django's MVT architecture. Additionally, I explored Django Rest Framework for API development, broadening my skills in this area. Overall, the project showcased my proficiency in Django web development and database integration.

An internship relevant to one's career development is crucial as it provides practical exposure to industry practices, tools, and workflows. It offers an opportunity to apply theoretical knowledge to real-world scenarios, fostering skill development and professional growth. Moreover, internships allow individuals to network with professionals, gain insights into different career paths, and make informed decisions about their future endeavors.

My project involved developing a URL shortener using Django, a Python web framework. The goal was to create a user-friendly platform where users could input long URLs and receive shortened versions for easy sharing. The project also focused on database integration, ensuring data integrity, and exploring advanced concepts such as Django Rest Framework for API development.

The opportunity provided by USC/UCT enabled me to engage in hands-on learning and practical application of theoretical knowledge. It offered a platform to collaborate with peers, learn from experienced professionals, and gain exposure to industry-standard tools and practices. Additionally, the program provided mentorship and guidance, facilitating my growth and development as a python developer.

The program was meticulously planned to provide a structured learning experience encompassing theoretical concepts, practical exercises, and project-based learning. It included a combination of lectures, workshops, and hands-on coding sessions, allowing participants to build a strong foundation in python development and gain proficiency in relevant technologies and libraries.
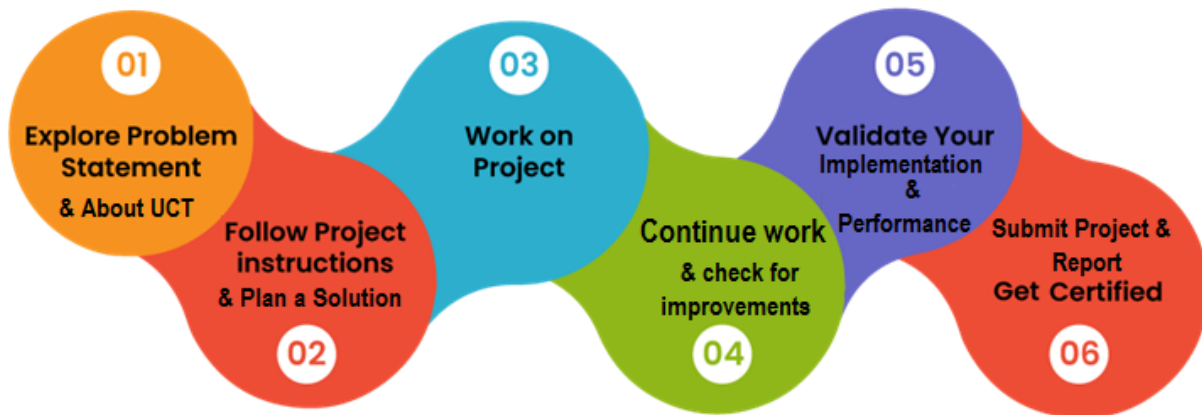
Throughout the program, I acquired valuable insights and skills that significantly enhanced my understanding of python development. I learned about Django's MVT architecture, database integration, front-end design principles, and API development using Django Rest Framework. Moreover, I developed problem-solving abilities, project management skills, and the confidence to tackle complex challenges in web development.

I would like to express my gratitude to all those who supported me throughout this journey. Special thanks to [Ankit, Apart, Kaushlendra Singh Sisoda] for their guidance, support and mentorship.

To my juniors and peers, I want to emphasize the importance of seizing opportunities like this program to gain valuable experience and enhance your skills. Participating in this program's internships not only provides hands-on learning but also offers the chance to earn a certificate that validates your qualifications and expertise. It's a great way to bolster your resume and demonstrate your readiness for professional roles in the industry. So, make the most of such opportunities, immerse yourself in learning, and pave the way for a successful career in web development.

Introduction

About UniConverge Technologies Pvt Ltd

A company established in 2013 and working in Digital Transformation domain and providing Industrial solutions with prime focus on sustainability and RoI.

For developing its products and solutions it is leveraging various **Cutting Edge Technologies e.g. Internet of Things (IoT), Cyber Security, Cloud computing (AWS, Azure), Machine Learning, Communication Technologies (4G/5G/LoRaWAN), Java Full Stack, Python, Front end** etc.

**i.** **UCT IoT Platform (** Insight **)**

UCT Insight is an IOT platform designed for quick deployment of IOT applications on the same time providing valuable "insight" for your process/business. It has been built in Java for backend and ReactJS for Front end. It has support for MySQL and various NoSql Databases.

- It enables device connectivity via industry standard IoT protocols - MQTT, CoAP, HTTP, Modbus TCP, OPC UA

- It supports both cloud and on-premises deployments.

It has features to
• Build Your own dashboard

- Analytics and Reporting
- Alert and Notification
- Integration with third party application(Power BI, SAP, ERP)
- Rule Engine
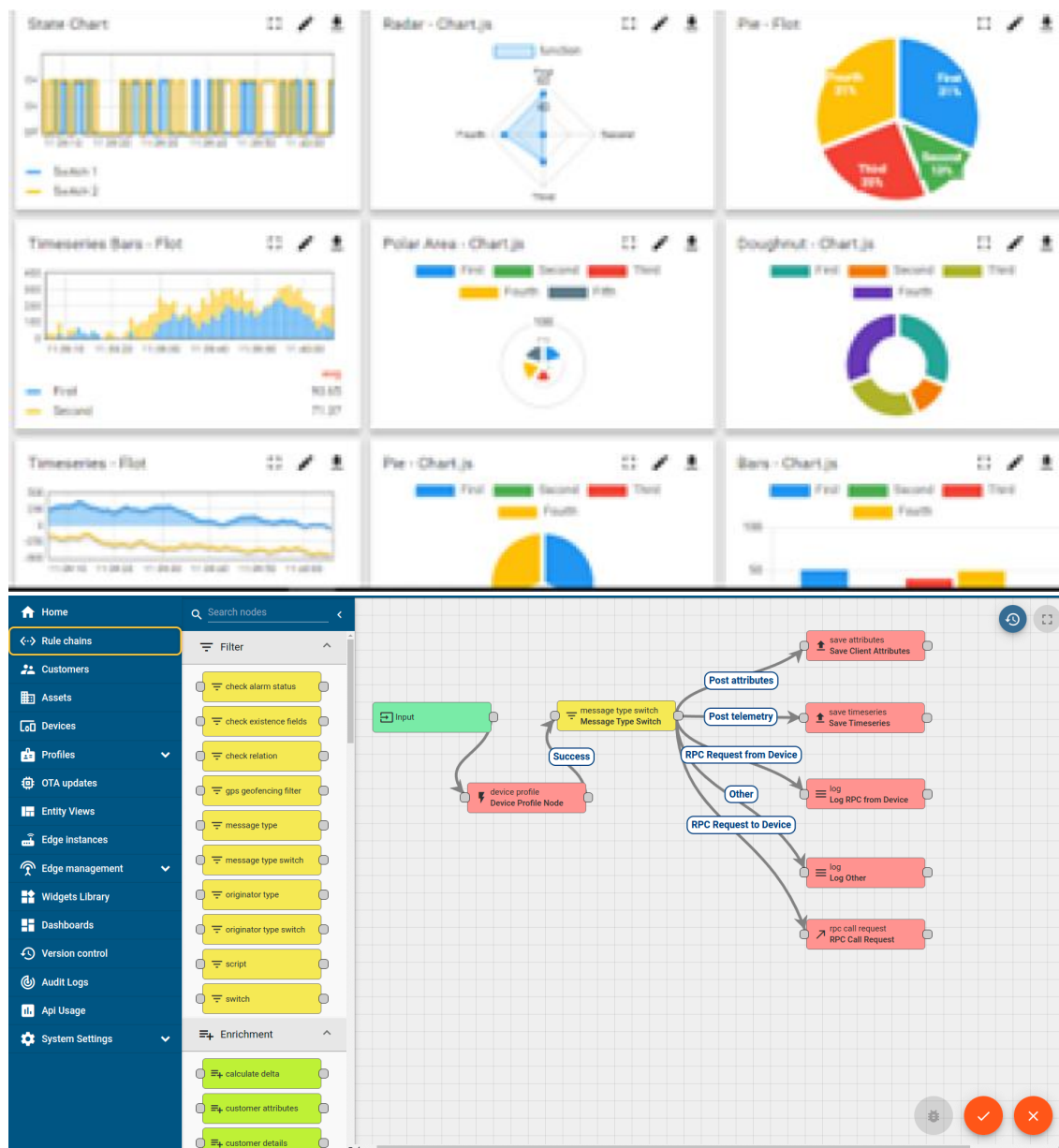
ii. Smart Factory Platform ( )

Factory watch is a platform for smart factory needs.

It provides Users/ Factory

- with a scalable solution for their Production and asset monitoring

- OEE and predictive maintenance solution scaling up to digital twin for your assets.

- to unleased the true potential of the data that their machines are generating and helps to identify the KPIs and also improve them.

- A modular architecture that allows users to choose the service that they what to start and then can scale to more complex solutions as per their demands.

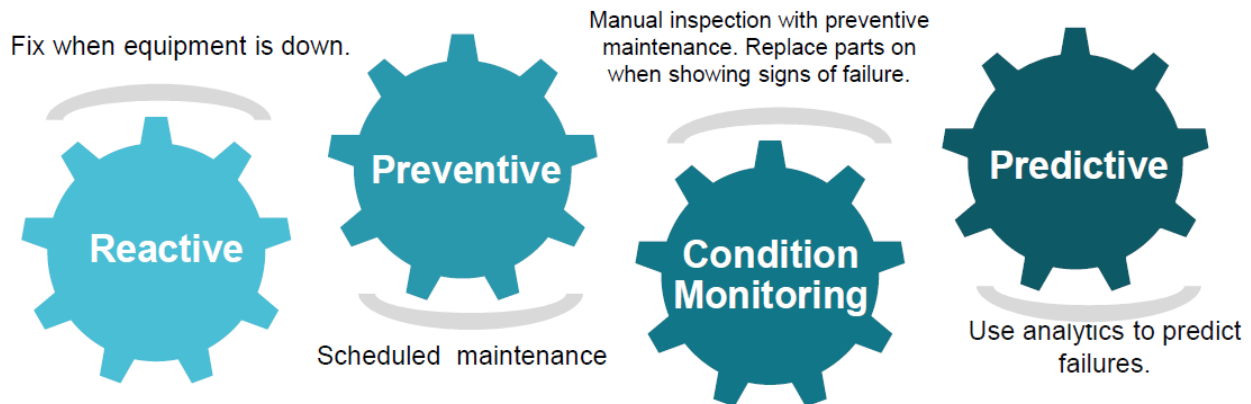Its unique SaaS model helps users to save time, cost and money.

iii. LoRaWAN™ based Solution

UCT is one of the early adopters of LoRAWAN teschnology and providing solution in Agritech, Smart cities, Industrial Monitoring, Smart Street Light, Smart Water/ Gas/ Electricity metering solutions etc.

iv. Predictive Maintenance

UCT is providing Industrial Machine health monitoring and Predictive maintenance solution leveraging Embedded system, Industrial IoT and Machine Learning Technologies by finding Remaining useful life time of various Machines used in production process.

Fix when equipment is down.

Manual inspection with preventive maintenance. Replace parts on when showing signs of failure.

Preventive

Reactive

Condition Monitoring

Predictive

Scheduled maintenance

Use analytics to predict failures.

About upskill Campus (USC)

upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.
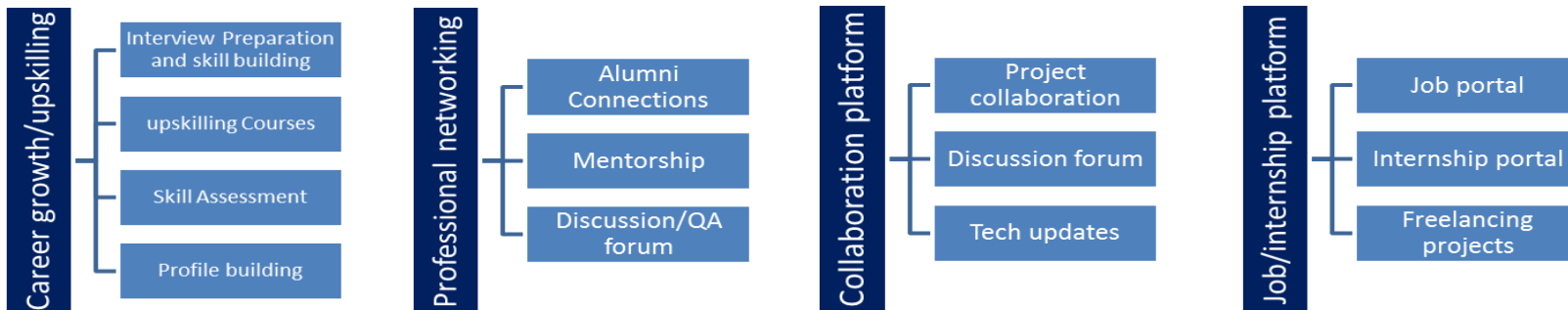
USC is a career development platform that delivers **personalized executive coaching** in a more affordable, scalable and measurable way.
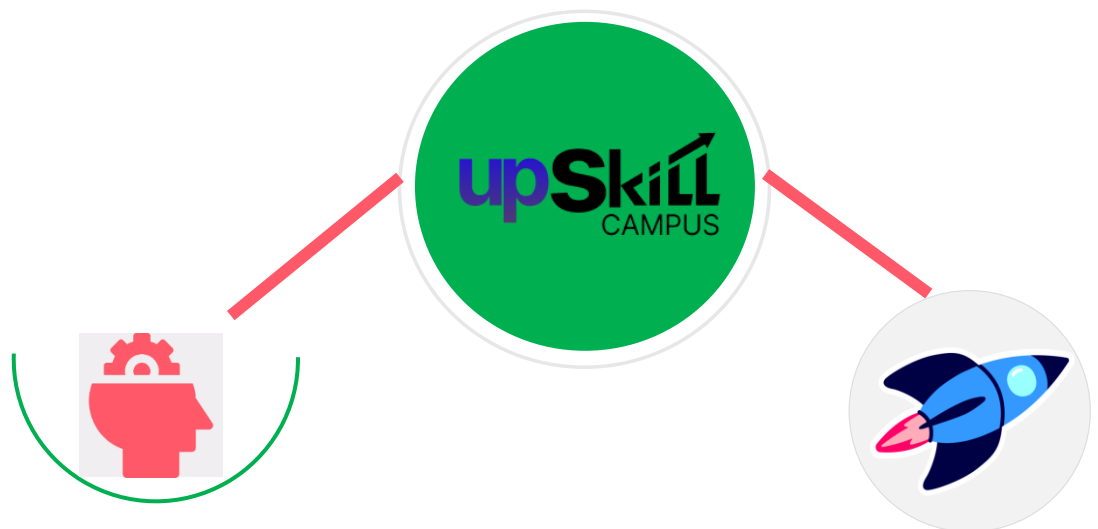
Seeing need of upskilling in self paced manner along-with additional support services e.g. Internship, projects, interaction with Industry experts, Career growth Services

upSkill Campus aiming to upskill 1 million learners in next 5 year

Career growth/upskilling	Professional networking	Collaboration platform	Job/internship platform
Interview Preparation and skill building	Alumni Connections	Project collaboration	Job portal
upskilling Courses	Mentorship	Discussion forum	Internship portal
Skill Assessment	Discussion/QA forum	Tech updates	Freelancing projects
Profile building			

The IoT Academy

The IoT academy is EdTech Division of UCT that is running long executive certification programs in collaboration with EICT Academy, IITK, IITR and IITG in multiple domains.

Objectives of this Internship program

The objective for this internship program was to

☛ get practical experience of working in the industry.

☛ to solve real world problems.

☛ to have improved job prospects.

☛ to have Improved understanding of our field and its applications.

☛ to have Personal growth like better communication and problem solving.

Reference

[1]

[2]

[3]

Glossary

Terms	Acronym

2   Problem Statement

The assigned problem statement revolves around the development of a URL shortener application using Django. The main objective is to create a user-friendly platform that allows users to input long URLs and receive shortened versions for convenient sharing. Additionally, the application should ensure data integrity, handle database operations efficiently, and potentially incorporate advanced features such as API development for further usability.

Existing and Proposed solution

Provide summary of existing solutions provided by others, what are their limitations?

Existing solutions provided by others typically involve building URL shortener applications using various frameworks and programming languages. These solutions often include basic functionality such as shortening URLs and redirecting users to the original links. However, they may have limitations in terms of scalability, performance, and security.

What is your proposed solution?

My proposed solution involves leveraging Django, a robust web framework, to develop the URL shortener application. This solution offers several advantages, including:
- Utilizing Django's built-in features for handling database operations, ensuring data integrity and security.
- Implementing Django Rest Framework for API development, enabling seamless integration with other applications and services.
- Designing a user-friendly interface with responsive design principles for optimal user experience across different devices.
- Employing best practices in web development to ensure scalability, performance, and maintainability of the application.

What value addition are you planning?

Some of the value additions I plan to incorporate include:

- Advanced Features: Introducing advanced functionalities such as analytics tracking, custom URL generation, and user authentication to provide users with more control and insights into their shortened URLs.
- Security Measures: Implementing security measures to safeguard user data and prevent misuse of the application, including measures such as CSRF protection, input validation, and secure database handling.
- Scalability and Performance: Designing the application architecture to be scalable and efficient, capable of handling a large volume of URL shortening requests while maintaining optimal performance.
- Integration Capabilities: Leveraging Django's extensibility to seamlessly integrate with other applications and services, enabling interoperability and enhancing the overall utility of the URL shortener application.

Code submission (Github link)

Github link: https://github.com/ernurtorekul/upskillcampus/tree/main/url_shortener.python

Report submission (Github link) : first make placeholder, copy the link.

Github link: https://github.com/ernurtorekul/upskillcampus/tree/main

3   Proposed Design/ Model

Given more details about design flow of your solution. This is applicable for all domains. DS/ML Students can cover it after they have their algorithm implementation. There is always a start, intermediate stages and then final outcome.
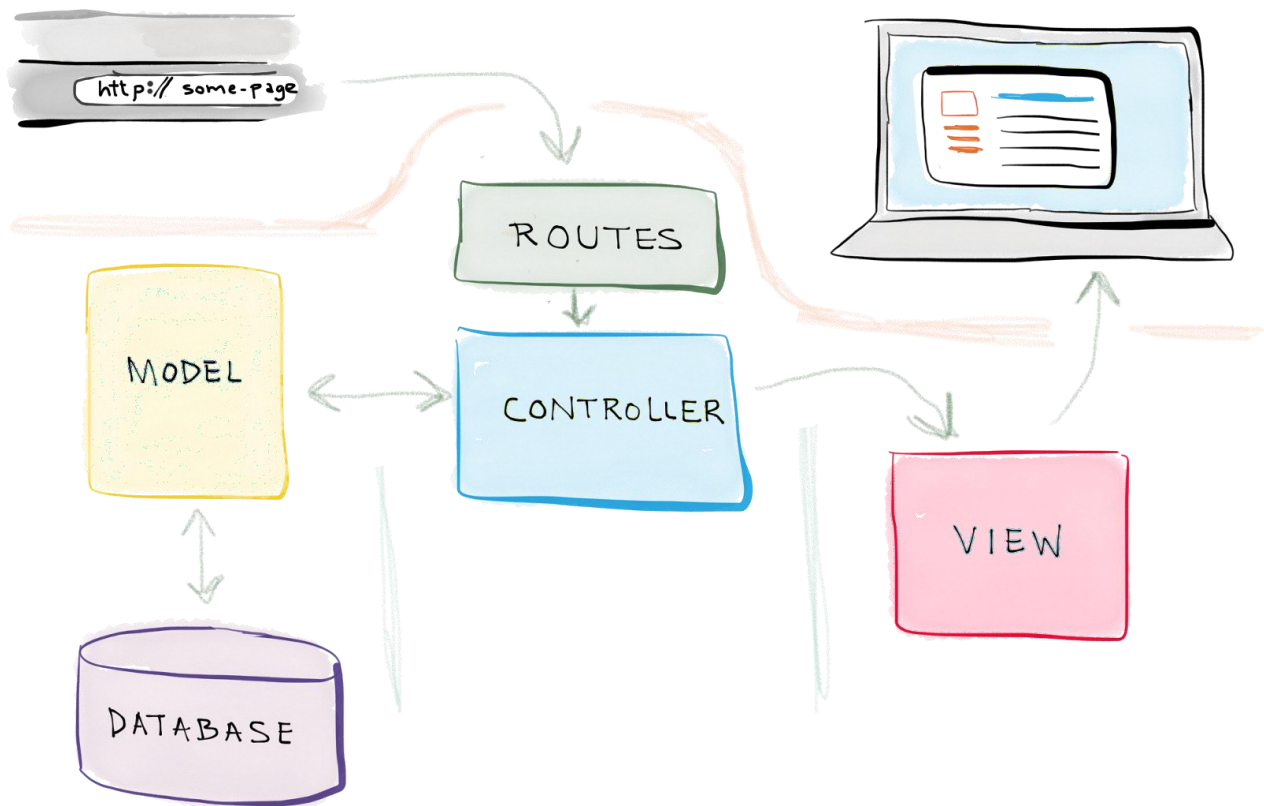
High Level Diagram (if applicable)

Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM
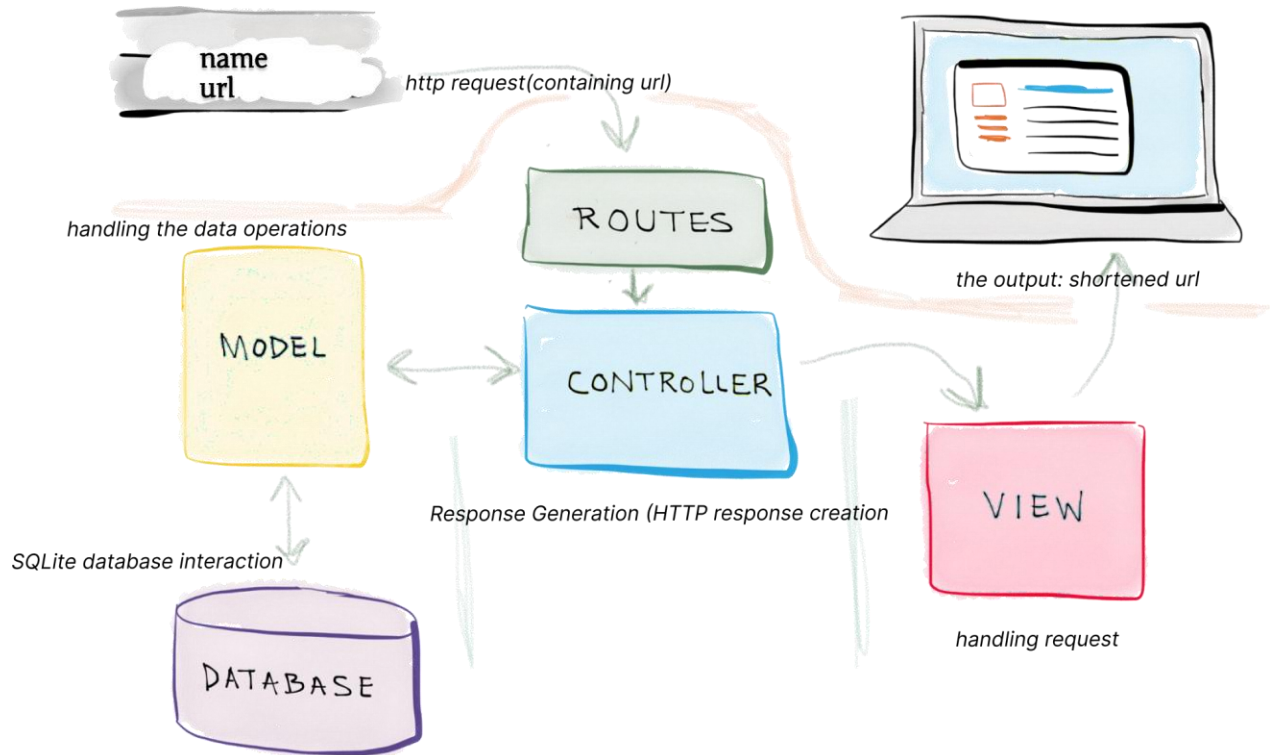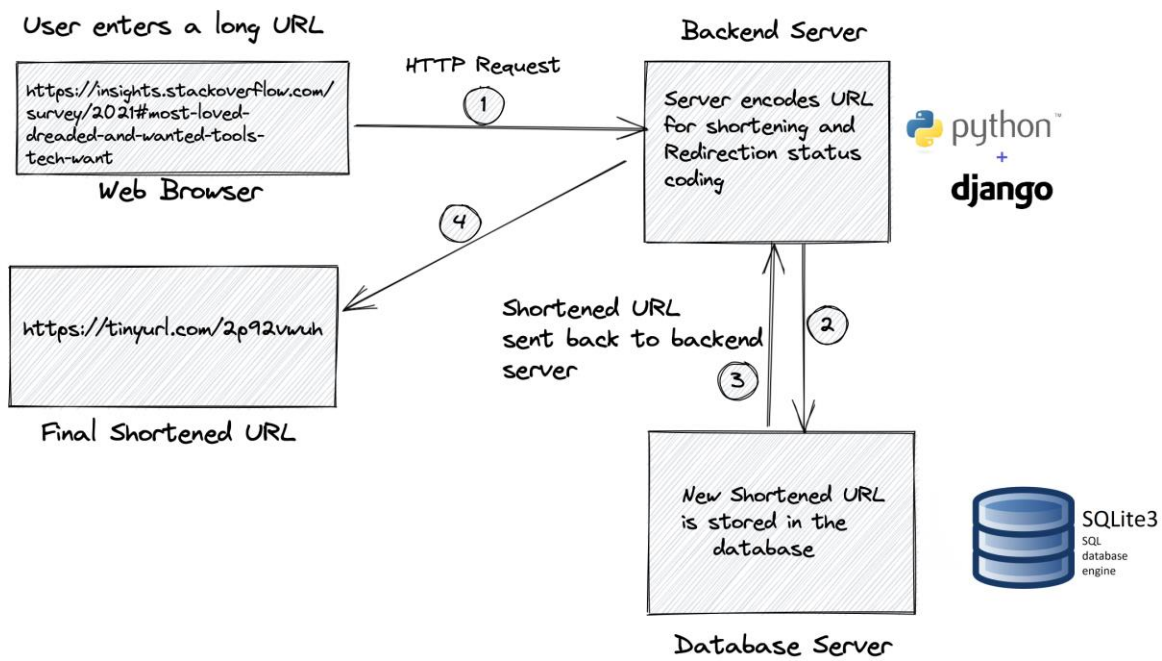
Low Level Diagram (if applicable)

Figure 2: LOW LEVEL DIAGRAM OF THE SYSTEM

Interfaces (if applicable)

Performance Test

- Constraints like memory usage and processing speed could slow down the system and limit scalability. For example, inefficient memory management may increase server load, causing delays in transaction processing. Limited throughput capacity could also hinder the system's ability to handle high volumes of concurrent users.

- To address these constraints, optimizing code efficiency, implementing caching mechanisms, and adopting scalable architecture designs like microservices can help. Robust monitoring and performance tuning practices are crucial for proactive identification and mitigation of performance issues.

- Scalability options include horizontal scaling techniques like load balancing and auto-scaling, as well as cloud-based infrastructure and containerization technologies. Continuous performance testing and capacity planning are essential for maintaining system performance as it grows.

My learnings

Throughout this project, I've gained invaluable insights into various aspects of python development, particularly within the Django framework. Understanding the MVC architecture and its practical implementation has deepened my comprehension of software design principles. Moreover, working on performance optimization and scalability considerations has honed my problem-solving skills and taught me the importance of efficient resource management.

These learnings are highly transferable and will undoubtedly contribute to my career growth. Not only have I enhanced my technical experience in Django and related technologies, but I've also cultivated essential skills in project planning, collaboration, and troubleshooting. This experience equips me with the capabilities to tackle complex challenges in future projects and pursue opportunities in software development with confidence.

Future work scope

Here are some potential future enhancements for the project:

- Integration of timestamps for requested URLs to track when they were generated.
- Implementation of a "copy to clipboard" functionality for users to easily copy the generated URL.
- Addition of sharing options, allowing users to share the shortened URLs via various platforms such as Instagram, Telegram, Gmail, etc.
- Incorporation of authentication and authorization mechanisms to enhance the security of the web application.
- Development of a dedicated account page for each user, providing personalized settings and a history of their actions.
- Creation of a comprehensive activity history feature, allowing users to review their previous URL shortening actions and related details.