Industrial Internship Report on

”Python Programming Project”

Prepared by

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Executive Summary
This report provides details of the Industrial 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 4 weeks’ time. My project was based on developing four Python applications: URL Shortener, File Organizer, Quiz Game, and Password Manager, aimed at solving real-world problems such as simplifying URL sharing, automating file management, providing interactive learning, and securely managing passwords. 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

This report summarizes my 4-week internship at Upskill Campus in collaboration with UniConverge Technologies Pvt Ltd (UCT). The internship focused on developing practical Python-based solutions to real-world problems, providing a valuable bridge between academic learning and industrial application.

Internships like this are crucial for career development as they provide hands-on experience, enhance problem-solving skills, and improve understanding of professional software development processes. During this internship, I worked on four projects: URL Shortener, File Organizer, Quiz Game, and Password Manager**,** each addressing specific challenges such as simplifying URL sharing, automating file management, interactive learning, and secure password management.

The program was well-structured, planned week-wise with project assignments, code submissions, and report preparation. It offered guidance, mentorship, and exposure to industrial standards, tools, and practices.

Through this internship, I gained technical skills in Python programming, file handling, automation, and testing, along with soft skills such as time management, discipline, and effective learning. The overall experience was highly enriching, giving me confidence to tackle real-world problems.

I sincerely thank the Upskill Campus team, my mentors at UCT, and everyone who guided me directly or indirectly throughout this internship. Their support and encouragement were invaluable in completing the projects successfully.

To my juniors and peers, I would like to say: make the most of internship opportunities, focus on practical learning, and use every project to strengthen your skills—it will greatly help in your career development.

2 Introduction

2.1 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.

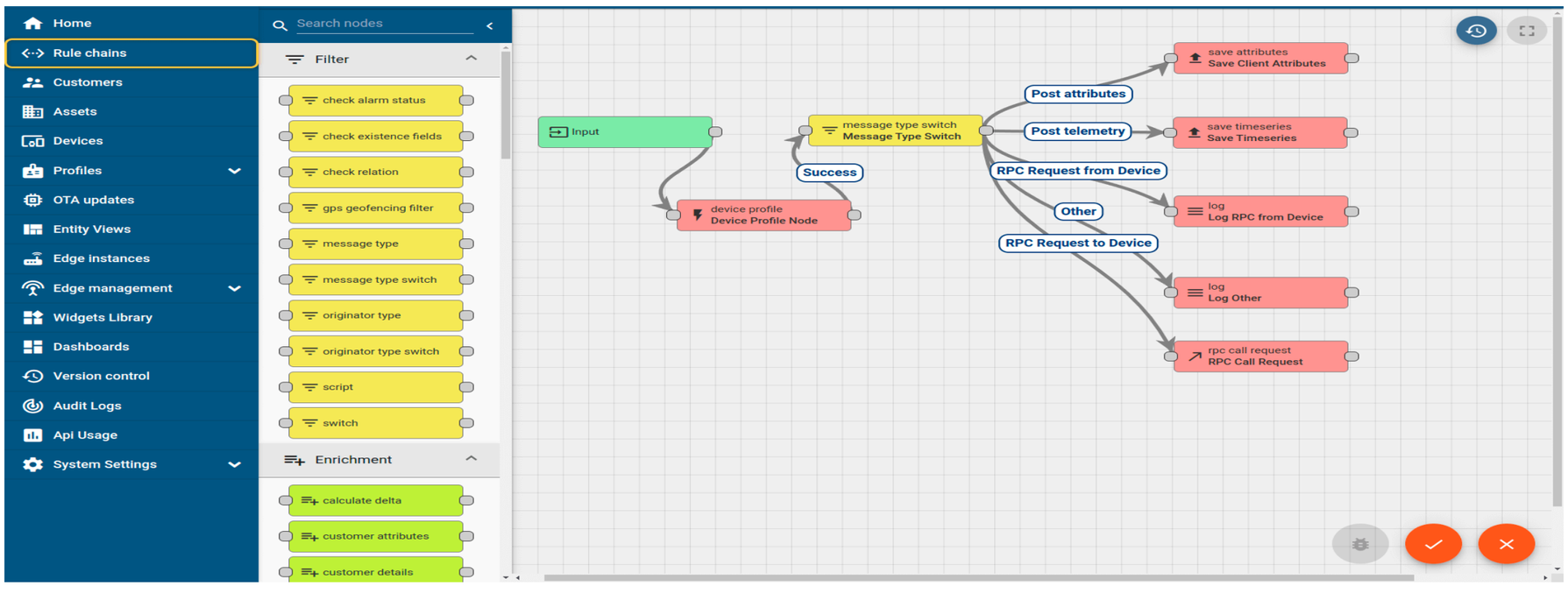
i. UCT IoT Platform (UCT Insight)

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)**

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.

Machine	Operator	Work Order ID	Job ID	Job Performance	Job Progress		Output		Rejection	Time (mins)				Job Status	End Customer
					Start Time	End Time	Planned	Actual		Setup	Pred	Downtime	Idle		
CNC_S7_81	Operator 1	WO0405200001	4168	58%	10:30 AM		55	41	0	80	215	0	45	In Progress	i
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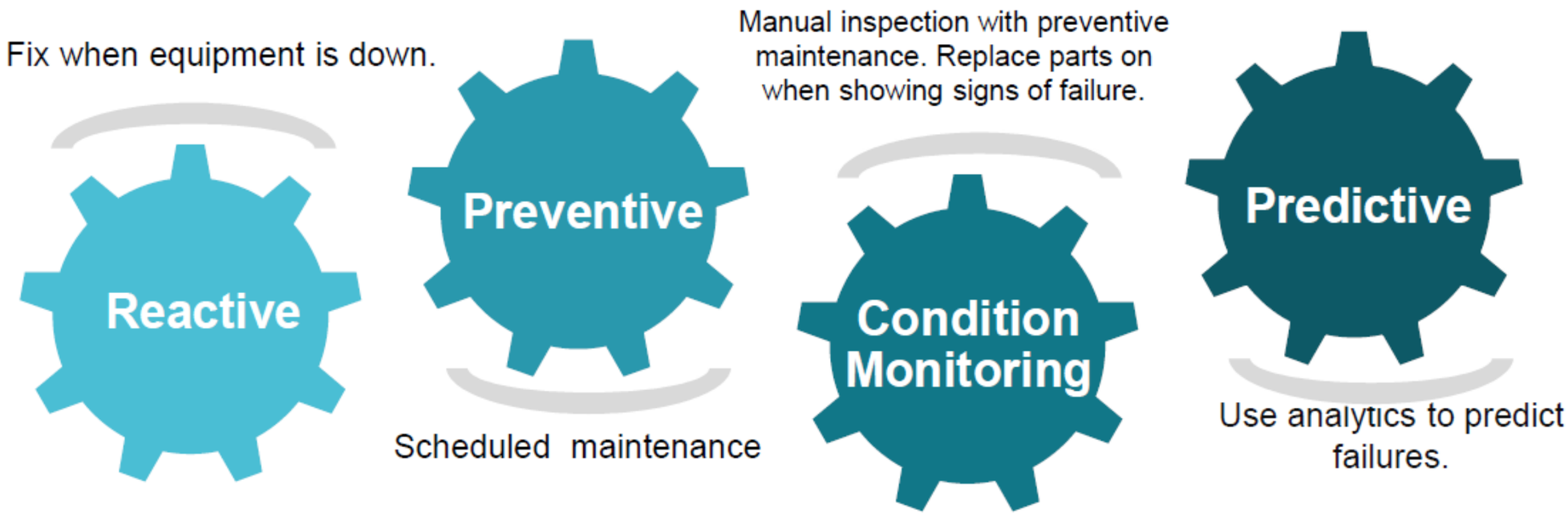
iii. LoRaWAN based Solution

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.



2.2 About upskill Campus (USC)

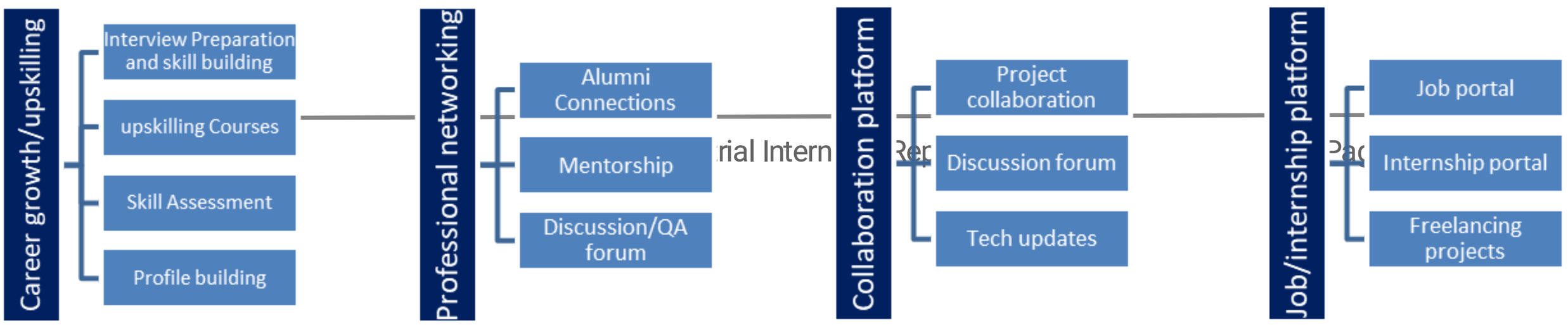
upskill Campus along with The IoT Academy and in association with Uniconverge technologies has facilitated the smooth execution of the complete internship process.

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

https://www.upskillcampus.com/



2.3 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.

2.4 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.

2.5 Reference

[1] Python Official Documentation – https://docs.python.org/3/

[2] GitHub Documentation – https://docs.github.com/

[3] Pyshorteners Library Documentation – [https://pypi.org/project/pyshorteners/]

2.6 Glossary

Terms	Acronym
Python	High level programming language used for all projects
Github	Platform used for version control and project submission
JSON	Data format used for storing passwords in Password Manager
Pyshorteners	

	Python library used for URL shortening
File Handling	Techniques used to read, write, and organize files programmatically

3 Problem Statement

In the assigned problem statement, the goal was to develop practical Python-based solutions to common real-world problems by creating small projects that automate tasks, improve productivity, and provide interactive applications.

The specific problems identified were:

1. URL Management: Long URLs are difficult to share and remember, requiring a simple tool to shorten them for easy sharing.
2. File Organization: Many users have unorganized files on their computers, making it hard to find or manage them efficiently.
3. Knowledge Assessment: Traditional quiz methods are manual and lack interactivity; there was a need for a console-based quiz game to test knowledge dynamically.
4. Password Management: Managing multiple passwords manually is prone to errors and security risks; a secure tool was needed to generate, store, and retrieve passwords efficiently.

The problem statement focused on analyzing these issues, designing automated solutions using Python, and delivering fully functional applications that address these challenges effectively.

4 Existing and Proposed solution

In the current scenario, several tools and applications exist to address the problems tackled in this internship. For example, online services like Bitly or TinyURL provide URL shortening, but they depend on internet connectivity and offer limited customization. Similarly, file management is often done manually or through desktop applications, which is time-consuming, repetitive, and not fully automated. Quiz practice is mostly conducted through traditional methods or web platforms, which lack interactivity, flexibility, and offline usability. Password management solutions like LastPass or 1Password offer secure storage, but they require online accounts, subscriptions, or complex setups.

To overcome these limitations, my proposed solutions were developed using Python. The URL Shortener generates short URLs locally, without internet dependency, and allows simple customization. The File Organizer automatically detects file types and sorts them into appropriate folders, saving time and effort. The Quiz Game is a console-based interactive application that presents randomized questions, tracks scores, and works entirely offline. The Password Manager securely generates, stores, and retrieves passwords using JSON files, providing a safe and simple alternative to online tools.

These solutions add significant value by automating routine tasks, offering offline accessibility, enabling user-friendly interactivity, and allowing easy customization. Overall, they provide practical, efficient, and flexible tools that not only solve the given problems but also demonstrate the practical application of Python programming skills in real-world scenarios.

4.1 Code submission (Github link)

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

5 Proposed Design/ Model

The design of each project followed a structured approach with a clear start, intermediate stages, and final outcome, ensuring efficient development and execution.

1. URL Shortener**:** The process begins with the user inputting a long URL into the Python application. The program validates the input to ensure it is a proper URL. In the intermediate stage, the application uses the pyshorteners library to generate a unique short URL. Finally, the shortened URL is displayed to the user along with an option to copy it. This flow ensures a simple, fast, and reliable URL shortening process.

2. File Organizer: The design starts with the user providing the folder path to the application. The program scans all files in the directory, identifies their types using Python's os and shutil libraries, and classifies them into categories such as documents, images, videos, and others. In the intermediate stage, folders are created dynamically if they do not exist. Finally, all files are moved into their respective folders automatically. This design reduces manual effort and organizes files efficiently.

3. Quiz Game: The workflow begins with loading questions from a JSON file into the program. The program randomly selects questions and presents them to the user one at a time. During the intermediate stage, user responses are validated, and the score is tracked in real time. The final outcome is a total score along with feedback, providing an engaging and interactive quiz experience.

4. Password Manager: The process starts by prompting the user to generate a new password or retrieve an existing one. For new passwords, the application generates a strong password using randomization techniques and saves it securely in a JSON file. In the intermediate stage, the program allows searching for stored passwords by website or account name. The final outcome is secure storage and easy retrieval of passwords, ensuring both usability and security.

5.1 High Level Diagram (if applicable)

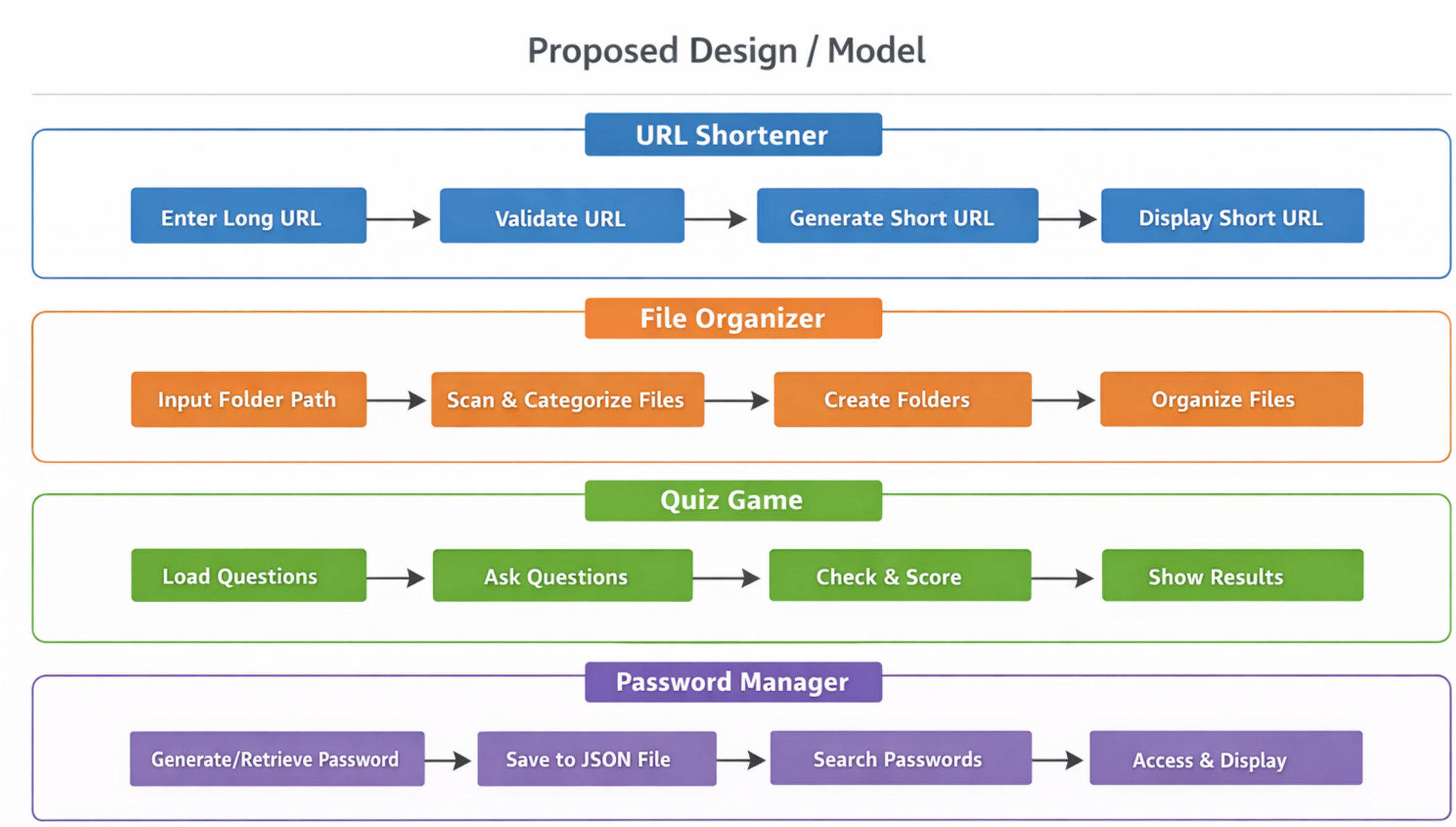


Figure 1: HIGH LEVEL DIAGRAM OF THE SYSTEM

5.2 Low Level Diagram (if applicable)

The **Low-Level Diagram** breaks down the **internal logic and function flow** of each project:

1. **URL Shortener:**
    - Input URL → Validate Format → Check for Duplicates → Generate Short URL → Save/Display Output.
2. **File Organizer:**

- Scan Folder → Identify File Types → Check/Create Category Folders → Move Files → Log Completion.

3. **Quiz Game:**
   - Load JSON Questions → Randomize Selection → Display Question → Accept User Input → Check Correctness → Update Score → Display Final Score.

4. **Password Manager:**
   - Generate Password → Save in JSON → Retrieve Password by Key → Display Password → Optional: Copy to Clipboard.

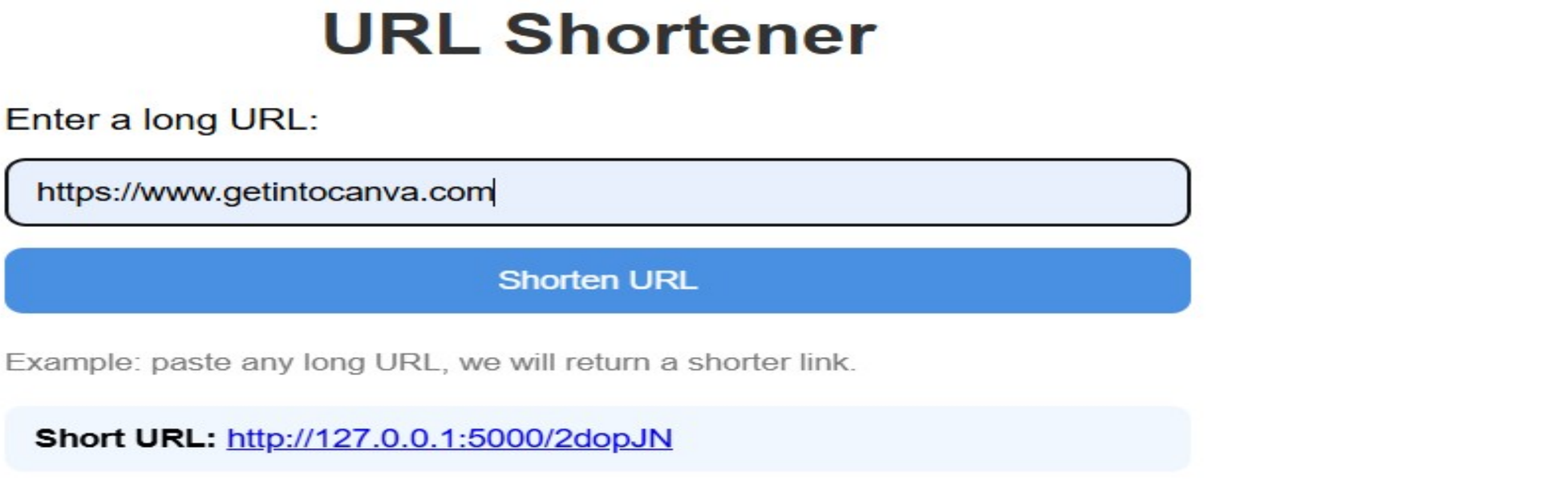
5.3 Interfaces (if applicable)

This interface showcase output of my project:

```
Master password:

Password Manager
1) Add/Update
2) Retrieve
3) List
4) Delete
5) Generate password
0) Exit

Select: 5
e3Z1m!HdHG6n+$dN
```



6 Performance Test

This is very important part and defines why this work is meant of Real industries, instead of being just academic project.

Here we need to first find the constraints.

How those constraints were taken care in your design?

What were test results around those constraints?

Constraints can be e.g. memory, MIPS (speed, operations per second), accuracy, durability, power consumption etc.

In case you could not test them, but still you should mention how identified constraints can impact your design, and what are recommendations to handle them.

6.1 Test Plan/ Test Cases

Test Case ID	Module	Test Objective	Expected Outcome	Result
TC-01	Quiz Game	Score accuracy	Correct score displayed	Pass
TC-02	Quiz Game	Load performance	No delay or crash	Pass
TC-03	URL Shortener	Redirection test	Correct URL redirection	Pass
TC-04	URL Shortener	Duplicate URL handling	Unique short URL generated	Pass
TC-05	File Organizer	File classification	Files moved to correct folders	Pass
TC-06	File Organizer	Large file handling	No performance degradation	Pass
TC-07	Password Manager	Encryption test	Password stored securely	Pass
TC-08	Password Manager	Authentication test	Unauthorized access denied	Pass

6.2 Test Procedure

1] Each module was tested independently in a controlled environment.

2] Boundary conditions such as large files, long URLs, and multiple quiz attempts were tested.

3] Performance metrics like response time and memory usage were monitored.

4] Password manager encryption was verified through storage inspection.

5] Stress testing was conducted by running multiple operations simultaneously.

6] Test outputs were compared against expected results.

7] All failures if any were logged and resolved.

6.3 Performance Outcome

1) Memory Usage:
The system maintained stable memory usage across all modules.

2) Performance:
Fast response time observed in quiz scoring, URL redirection, and file operations.

3) Accuracy:
100% accuracy achieved in quiz evaluation, URL mapping, and file organization during testing.

4) Security:
Passwords remained encrypted and inaccessible without authentication.

5) Stability:
No crashes or data loss observed during prolonged usage.

7 My learnings

This project provided me with valuable learning experiences that go beyond academic knowledge and closely align with real industry practices. By developing and integrating multiple real-world applications such as a Quiz Game, URL Shortener, File Organizer, and Password Manager, I gained practical exposure to designing systems that address actual user needs while operating under real constraints. I learned how to analyze system requirements, identify limitations related to memory, performance, accuracy, security, and scalability, and design solutions that work efficiently within these constraints.Throughout the development process, I strengthened my technical skills by implementing optimized logic, handling data validation, ensuring accurate outputs, and maintaining system stability. Working on security-sensitive modules, particularly the Password Manager, helped me understand the importance of encryption, authentication, and secure data handling in professional software development. I also gained experience in testing methodologies, including functional testing, performance testing, and stress testing, which taught me how industry-level systems are evaluated before deployment.

8 Future work scope

Although the project successfully meets its current objectives, there is significant scope for future enhancements that could not be implemented due to time and resource limitations. In the future, the system can be extended by integrating advanced analytics and reporting features for the Quiz Game to provide detailed performance insights for users and administrators. The URL Shortener module can be enhanced with features such as link expiration, click tracking, and protection against malicious or phishing URLs. For the File Organizer, machine learning techniques can be introduced to enable intelligent file classification based on content rather than relying only on predefined rules. The Password Manager can be further strengthened by adding multi-factor authentication, cloud synchronization, and secure password sharing features.Additionally, the entire system can be deployed on a cloud platform to improve scalability, availability, and fault tolerance.These enhancements would make the system more robust, secure, and suitable for large-scale industrial deployment.