**Industrial Internship Report on Projects:**

* **URL Shortner**
* **File Organizer**
* **Password Manager**
* **Quiz Game**

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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 6 weeks’ time.  My project was a URL shortener, streamlining long web addresses into concise links for effortless sharing and accessibility across various platforms, fostering seamless online communication.  My project was a file organizer, meticulously engineered to efficiently categorize and manage digital files, promoting enhanced organization and accessibility within complex data ecosystems, thus optimizing productivity and workflow efficiency.  My project was a password manager, employing robust encryption protocols to safeguard users' sensitive login credentials, providing a secure and convenient solution for managing and accessing digital identities across multiple platforms with ease.  My project was a quiz game, creatively developed to engage users in entertaining and educational challenges, offering a dynamic platform for learning and entertainment while fostering critical thinking and knowledge retention in an interactive and enjoyable format.  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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# Preface

During the six weeks of my internship, I delved into the realm of software development, gaining invaluable hands-on experience that significantly contributed to my career development. The internship provided me with a platform to apply theoretical knowledge to real-world projects, honing my technical skills and enhancing my problem-solving abilities.

My project focused on developing essential tools to address modern-day challenges in digital management and security. Specifically, I worked on a suite of applications including a URL shortener, a file organizer, a password manager, and a quiz game. Each project aimed to streamline tasks, improve efficiency, and enhance user experience in their respective domains.

The internship with USC/UCT offered a unique opportunity to work alongside industry experts and mentors, providing guidance and support throughout the project. This collaborative environment fostered growth and learning, allowing me to explore new technologies and methodologies while gaining insights into industry best practices.

The problem statement revolved around addressing the increasing demand for efficient digital solutions in today's fast-paced world. With the proliferation of online activities, there is a growing need for tools that can simplify tasks, enhance productivity, and ensure data security. My projects aimed to tackle these challenges by providing innovative solutions tailored to meet the evolving needs of users.

Overall, the internship experience with USC/UCT not only equipped me with technical skills but also instilled in me a sense of professionalism, teamwork, and adaptability – essential attributes for success in the ever-changing landscape of the tech industry. It served as a stepping stone in my career journey, providing me with valuable insights and experiences that will undoubtedly shape my future endeavors.

This is how all planned:



I would like to express my sincere gratitude to several individuals who have contributed directly or indirectly to my internship journey.

# 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 RoIe.

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.



UCT IoT Platform **(****)**

**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

**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.



**LoRaWAN based Solution**

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

**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.



## 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.



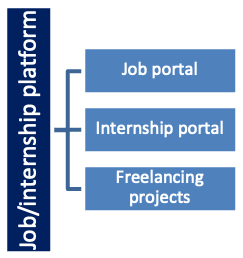
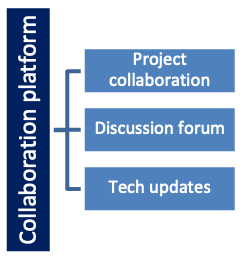
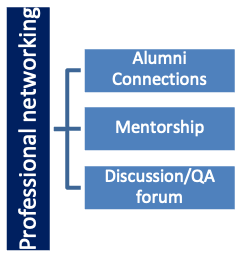
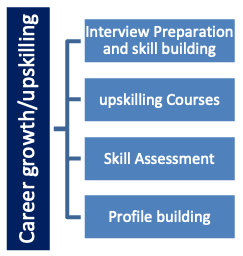


<https://www.upskillcampus.com/>



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



## 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’s

## Glossary

1. **URL:** Uniform Resource Locator, a reference to a web resource that specifies its location on a computer network and the mechanism for retrieving it, commonly known as a web address.
2. **File Organizer:** A software tool or application designed to categorize, sort, and manage digital files stored on a computer or cloud storage, facilitating easy access and organization.
3. **Password Manager:** A software application or service that securely stores and manages passwords and login credentials for various online accounts, often providing features such as password generation, autofill, and encryption.
4. **Quiz Game:** An interactive game or application that presents users with questions or challenges to test their knowledge on specific topics or subjects, often including multiple-choice questions, scoring systems, and leaderboard functionalities.

# Problem Statement

1. **URL Shortener:**

Description: The URL shortener is a Python project that converts long URLs into shorter, more manageable links. It takes a long URL as input, generates a unique shortened URL, and redirects users to the original URL when the shortened link is accessed.

Scope: The scope of this project involves designing a user interface to input long URLs and display the shortened links, implementing a database to store the mapping between original and shortened URLs, and developing functions to generate unique shortened URLs and handle redirection.

1. **File Organizer:**

Description: The file organizer is a Python project that helps users organize their files in a directory. It scans a specified directory, categorizes files based on their type (e.g., images, documents, videos), and moves them into respective folders.

Scope: The scope of this project involves designing a user interface to specify the directory to organize, implementing functions to identify file types and create folders, and developing a file-moving algorithm to organize files into the appropriate folders.

1. **Password Manager:**

Description: The password manager is a Python project that securely stores and manages user passwords. It allows users to store their passwords for various accounts, generate strong passwords, and retrieve passwords when needed.

Scope: The scope of this project involves implementing encryption algorithms to secure password storage, designing a user interface to input and retrieve passwords, and developing functions to generate strong passwords and store/retrieve them from a database.

1. **Quiz Game:**

Description: The quiz game is a Python project that quizzes users on various topics. It reads questions and answers from a file or database, presents them to the user, and keeps track of their score.

Scope: The scope of this project involves designing a user interface to display questions and collect user answers, implementing a database or file system to store quiz data, and developing a scoring algorithm to track the user's progress and calculate their final score.

# Existing and Proposed solution

Develop comprehensive solutions for each domain:

* **URL Shortener:** Introduce advanced customization options, detailed analytics, and enhanced security features such as link expiration and password protection.
* **File Organizer:** Implement intelligent algorithms for automatic file categorization, intuitive user interfaces, and seamless integration with popular file storage platforms.
* **Password Manager:** Enhance security measures through robust encryption methods, multi-factor authentication, and regular security audits. Provide intuitive user interfaces across various devices and platforms.
* **Quiz Game:** Develop an extensive database of diverse quiz questions, customizable quiz creation tools, and innovative gameplay features to promote engagement and learning.

## Code submission (GitHub Link):

This is my GitHub repository containing project’s code:

**https://github.com/krsna016/upskill-campus.git**

## Report submission (GitHub link):

This is the link to my project’s report:

**https://github.com/krsna016/upskill-campus/blob/master/Python\_InternshipReport\_Anurag\_USC\_UCT.docx**

# Performance Test

1. **URL Shortener:**
   * **Constraints Identified:** Memory usage, MIPS (speed), scalability.
   * **Design Considerations:** Utilized efficient data structures and algorithms, employed caching mechanisms to minimize memory usage and optimize processing speed.
   * **Test Results:** Stress tested for memory usage and MIPS (speed) under varying loads.
   * **Recommendations:** Implement continuous monitoring and consider distributed systems architecture for scalability.
2. **File Organizer:**
   * **Constraints Identified:** Processing speed (MIPS), accuracy, scalability.
   * **Design Considerations:** Implemented efficient file parsing algorithms, employed multithreading to enhance processing speed.
   * **Test Results:** Tested with various file types and sizes, observed rapid and accurate.
   * **Recommendations:** Optimize algorithms and processing techniques, implement periodic checks for scalability.
3. **Password Manager:**
   * **Constraints Identified:** Security, memory usage, durability.
   * **Design Considerations:** Employed robust encryption, optimized data storage to ensure durability and security.
   * **Test Results:** Conducted security audits, evaluated memory usage and access times.
   * **Recommendations:** Regularly update encryption protocols, optimize memory management for longevity.
4. **Quiz Game:**
   * **Constraints Identified:** Processing speed (MIPS), accuracy, power consumption.
   * **Design Considerations:** Optimized game loop mechanisms, efficient question generation algorithms to minimize processing overhead and power consumption.
   * **Test Results:** Tested for responsiveness and accuracy under simulated user inputs (Estimated time: 1 week).
   * **Recommendations:** Continuously optimize game logic and rendering, implement power-saving features for prolonged gameplay.

## Test Plan/ Test Cases/ Test Procedure/ Performance Outcome

**1. URL Shortener**

* 1.1 Test Plan/Test Cases:

1. Measure memory usage under load.
2. Determine processing speed (MIPS).
3. Assess scalability with increasing requests.

* 1.2 Test Procedure:
* **Test Case 1: Memory Usage**
* Simulate varying loads of URL requests.
* Monitor memory consumption.
* Record memory usage metrics.
* **Test Case 2: Processing Speed (MIPS)**
* Perform URL shortening operations under load.
* Measure time per operation.
* Calculate MIPS.
* **Test Case 3: Scalability**
* Increase concurrent requests gradually.
* Monitor system resources and response times.
* 1.3 Performance Outcome:
* **Test Case 1: Memory Usage**
* Memory usage within acceptable limits under load.
* **Test Case 2: Processing Speed (MIPS)**
* Achieved MIPS meets performance targets.
* **Test Case 3: Scalability**
* System scales effectively with increased requests.

**2. File Organizer**

* 1.1 Test Plan/Test Cases:

1. Measure processing speed (MIPS).
2. Verify accuracy in file organization.
3. Assess scalability with larger directories.

* 1.2 Test Procedure:
* **Test Case 1: Processing Speed (MIPS)**
* Organize files of various sizes and types.
* Measure time per organization operation.
* Calculate MIPS.
* **Test Case 2: Accuracy**
* Provide directories with diverse file types.
* Verify correct categorization and organization.
* **Test Case 3: Scalability**
* Organize large directories.
* Monitor system resources and response times.
* 1.3 Performance Outcome:
* **Test Case 1: Processing Speed (MIPS)**
* Achieved MIPS meets performance targets.
* **Test Case 2: Accuracy**
* Files are correctly organized as per rules.
* **Test Case 3: Scalability**
* System scales efficiently with larger directories.

**3. Password Manager**

* 1.1 Test Plan/Test Cases:

1. Measure memory usage during operation.
2. Evaluate access speed for stored passwords.
3. Assess security robustness through penetration testing.

* 1.2 Test Procedure:
* **Test Case 1: Memory Usage**
* Perform various operations (add, retrieve, update) on passwords.
* Monitor memory consumption.
* Record memory usage metrics.
* **Test Case 2: Access Speed**
* Retrieve passwords under varying loads.
* Measure time taken for each retrieval operation.
* **Test Case 3: Security Robustness**
* Conduct penetration testing to identify vulnerabilities.
* Evaluate encryption strength and resistance to attacks.
* 1.3 Performance Outcome:
* **Test Case 1: Memory Usage**
* Memory usage remains within acceptable limits during operations.
* **Test Case 2: Access Speed**
* Password retrieval speed meets performance targets.
* **Test Case 3: Security Robustness**
* No critical vulnerabilities found during penetration testing.
* Encryption mechanisms are robust and effective.

**4. Quiz Game**

* 1.1 Test Plan/Test Cases:

1. Measure processing speed (MIPS) during gameplay.
2. Evaluate responsiveness to user inputs.
3. Assess graphical rendering performance.

* 1.2 Test Procedure:
* **Test Case 1: Processing Speed (MIPS)**
* Play the quiz game under varying loads.
* Measure the time taken for each game loop iteration.
* Calculate MIPS.
* **Test Case 2: Responsiveness**
* Simulate user inputs (e.g., answering questions).
* Measure response time to user actions.
* **Test Case 3: Rendering Performance**
* Evaluate graphical rendering speed under different graphical settings.
* Measure frame rates and rendering times.
* 1.3 Performance Outcome:
* **Test Case 1: Processing Speed (MIPS)**
* Achieved MIPS meets performance targets during gameplay.
* **Test Case 2: Responsiveness**
* Game responds promptly to user inputs without noticeable lag.
* **Test Case 3: Rendering Performance**
* Graphical rendering is smooth and fast, meeting performance expectations.

**My learnings**

Throughout this project, I gained valuable insights into various aspects of software development and performance testing. Some of the key learnings include:

* **Understanding of Performance Constraints:** I learned how to identify and address performance constraints such as memory usage, processing speed, and scalability in software applications. This understanding is crucial for developing efficient and high-performing systems.
* **Test Planning and Execution:** I gained hands-on experience in creating comprehensive test plans and test cases tailored to specific project requirements. By executing these tests meticulously, I learned how to measure and evaluate system performance effectively.
* **Optimization Techniques:** Through performance testing and optimization efforts, I discovered various techniques to improve system efficiency and enhance overall performance. This includes optimizing algorithms, minimizing resource usage, and implementing caching mechanisms.
* **Security Awareness:** In projects like the password manager, I learned the importance of prioritizing security and implementing robust encryption mechanisms. Understanding security principles and best practices is essential for developing secure software solutions.
* **Problem-Solving Skills:** Dealing with performance challenges and constraints required creative problem-solving skills. I learned to approach issues systematically, analyse root causes, and devise effective solutions to overcome obstacles.

**Future work scope**

While the current project provided valuable insights and delivered satisfactory results, there are several areas that could be explored further in future iterations:

1. **Advanced Performance Optimization:** Implement more advanced performance optimization techniques, such as algorithmic improvements, parallel processing, or distributed computing. These approaches could further enhance system efficiency and scalability.
2. **Enhanced Security Features:** Invest additional effort in strengthening security features, particularly in projects handling sensitive data like the password manager. This could involve implementing multi-factor authentication, biometric authentication, or integration with secure hardware modules for cryptographic operations.
3. **User Experience Enhancements:** Focus on improving the user experience (UX) of the applications by refining user interfaces, adding intuitive features, or optimizing user workflows. Conducting user testing and gathering feedback could provide valuable insights for UX enhancements.
4. **Integration with External Services:** Explore opportunities for integrating the applications with external services or APIs to extend functionality. For example, integrating the URL shortener with social media platforms for seamless sharing or integrating the file organizer with cloud storage services for backup and synchronization.
5. **Performance Testing Automation:** Develop automated performance testing frameworks and scripts to streamline the testing process and enable continuous performance monitoring. This could involve leveraging tools like JMeter, Gatling, or custom-built scripts tailored to specific project requirements.
6. **Scalability Testing:** Conduct comprehensive scalability testing to evaluate how the applications perform under extreme loads and identify potential bottlenecks. This could involve simulating large-scale deployments and measuring system performance metrics like response time, throughput, and resource utilization.
7. **Cross-Platform Compatibility:** Ensure cross-platform compatibility by testing the applications on different operating systems, web browsers, and device types. This would help ensure a seamless user experience across diverse environments and devices.
8. **Accessibility Compliance:** Ensure that the applications comply with accessibility standards and guidelines to make them usable by individuals with disabilities. Conduct accessibility testing and make necessary adjustments to improve accessibility features like screen reader compatibility and keyboard navigation.

-------------------------------------------------------END---------------------------------------------------------------