

The image shows the front cover of a spiral-bound notebook. The cover has a white central area with blue abstract, wavy patterns at the top and bottom. The text is printed in a bold, blue, sans-serif font. The title is arranged in five lines, centered on the white background. The spiral binding is visible on the left side.

Backend Development, API Testing and Selenium Testing



INTERNSHIP REPORT

Backend Development, API Testing and Selenium Testing

Dipesh Devanand Nemlekar

2041

Backend Development, API Testing and Selenium Testing

Completed by
Dipesh Devanand Nemlekar
2041

for the partial fulfilment of
MCA Degree for Semester VI
Discipline of Computer Science and Technology,
Goa Business School,
Goa University

At

AFour Technologies
Unit No. 701, 7th floor, Sunteck Kanaka Corporate Park, Patto, Panaji, Goa
403001

Under the guidance of

Dipali Pawar
(Senior Test Solution Architect, AFour Technologies Pvt. Ltd.)

&

Ashish Kulkarni
(Associate Software Test Solution Architect, AFour Technologies Pvt. Ltd.)

Date: 26 May 2023

TO WHOMSOEVER IT MAY CONCERN

This is to certify that **Mr. Dipesh Devanand Nemlekar**, student of Master of Computer Applications (MCA) of Goa University, Goa, is currently undergoing his final semester project (Semester VI) at our organization, **AFour Technologies Pvt. Ltd.**, since March 23 and will complete by August 23.

During his tenure so far, he met the expectations of his team lead/mentor/guide and was regular and sincere.

This certificate is being issued on his request to be submitted with the project report at Goa University.

The final internship completion certificate will be provided on completing his internship.

For AFour Technologies Pvt. Ltd.

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GST NO-27AAGCA5712Q1ZA

GOA UNIVERSITY



GOA BUSINESS SCHOOL

CERTIFICATE OF EVALUATION

This is to certify that Mr. **Dipesh Devanand Nemlekar** has successfully completed his internship at AFour Technologies Private Limited, Unit No. 701, 7th floor, Sunteck Kanaka Corporate Park, Patto, Panaji, Goa 403001, in partial fulfilment of the award of the degree in Master of Computer Application.

Examiner 1

Examiner 2

Dean, Goa Business School

Place: Goa University
Date: **Thursday, 15/06/2023**

Acknowledgement

During my internship, I had the privilege of working under the guidance of two exceptional mentors, Dipali Pawar and Ashish Kulkarni. I am immensely grateful for their invaluable support and mentorship.

I would like to express my sincere appreciation to Dipali Pawar. Their expertise, patience, and willingness to share their knowledge have been instrumental in shaping my understanding of Python with backend and API testing and enhancing my technical skills.

I also want to extend my deepest gratitude to Ashish Kulkarni. Their guidance, industry insights, and constructive feedback have broadened my perspective on Selenium testing and helped me refine my testing techniques.

I am indebted to both mentors for their continuous support and availability in answering my questions and providing guidance. Their passion and dedication to excellence have inspired me throughout my internship.

I would like to thank the entire team at AFour Technologies for creating a collaborative work environment and my colleagues for their willingness to share their expertise.

Last but not least, I would want to express my gratitude to my academic institution for arranging this internship and for their ongoing support all along the way.

In conclusion, I am deeply grateful to both Dipali Pawar and Ashish Kulkarni for their mentorship and guidance. Working under their supervision has been an honour and a significant contribution to my professional development.



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For AFour Technologies Pvt. Ltd.

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CHADH A NEHA RAVISH
Senior HR - Manager
Date: 26/05/2023

Neha Chaddha

Senior HR - Manager

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Table of Contents

Sr. No.	Content	Page No.
1	Introduction	1
2	Company Profile	2
3	My Designation in Company	4
4	Overview	5
5	Role and Responsibilities	6
6	Tools and Technologies Used	7
7	Other Additional Tasks	10
8	Self-Study	11
9	Conclusions/Summary	13
10	Internship Timeline	14
11	My reflections/experiences of internship	17
12	References	19

Introduction

This report outlines my internship experience, focusing on Python programming, backend development, API testing, and Selenium testing. Throughout the internship, I gained practical knowledge and hands-on experience in these areas, utilizing tools such as Marshmallow for backend development.

Python played a vital role in my internship, enabling me to develop robust backend solutions. I leveraged the Flask framework to create RESTful APIs, incorporating Marshmallow for data serialization and validation. Marshmallow proved to be a powerful tool for managing complex data structures and ensuring the integrity and consistency of data in the API.

API testing was a key component of my internship, where I utilized PyTest to design and execute comprehensive test cases. Marshmallow played a crucial role in validating and deserializing incoming API requests and serializing API responses, ensuring the accuracy and reliability of the API.

Additionally, I explored Selenium testing for end-to-end testing of web applications. This involved automating web browser interactions and validating the functionality of web interfaces.

Overall, this internship provided me with a solid foundation in Python programming, backend development, API testing, and Selenium testing. The utilization of Marshmallow for backend development enhanced my skills and understanding in these areas.

Company Profile

Leading software engineering and consulting company AFour Technologies focuses on giving organisations in numerous industries cutting-edge solutions. AFour Technologies has made a name for itself as a reliable partner for businesses looking for cutting-edge technology solutions thanks to its widespread presence and proven track record of providing high-quality software services.

Founded with the goal of transforming businesses via technology, AFour Technologies provides a wide range of services that are specifically crafted to satisfy the various requirements of its clients.

Product engineering, corporate software development, quality engineering, and digital transformation are the company's primary areas of expertise.

A team of highly qualified individuals with in-depth understanding of cutting-edge technology and industry best practises work for AFour technology. This skilled staff is committed to exceeding customer expectations and delivering outstanding results. The organisation encourages its staff to be at the forefront of technical breakthroughs by fostering a culture of constant learning and innovation.

A customer-centric company, AFour Technologies works to comprehend the particular needs and difficulties that each client has. The company offers specialised solutions that cater to certain business demands by utilising its technological proficiency and domain knowledge. The strict quality assurance procedures used by AFour Technologies, which guarantee that every deliverable satisfies the highest levels of excellence, show the company's dedication to quality.

With clients from a variety of industries, including healthcare, banking, e-commerce, manufacturing, and more, AFour Technologies has worked successfully. The business has a successful project delivery track record, from small-scale apps to large-scale business solutions.

AFour technology embraces new technology and promotes innovation as a forward-thinking company. The business keeps up with the most recent developments and trends in fields including DevOps, cloud computing, Big Data, machine learning, and the Internet of Things (IoT). By utilising these technologies, AFour Technologies assists its clients in achieving their goals for digital transformation and staying one step ahead of the competition.

My Designation in Company

During my internship at AFour Technologies, I self-studied and worked as a Test Automation and Backend Developer. My Main Responsibilities included:

- Python
- Backend Development
- API Testing using Pytest
- Selenium Testing(Python)

In addition to technical contributions, I actively pursued self-learning opportunities, exploring new libraries, frameworks, and staying up to date with advancements in test automation and backend development. This dedication allowed me to propose and implement innovative solutions, enhancing the efficiency and effectiveness of our development and testing processes.

My internship at AFour Technologies provided invaluable insights into the world of test automation and backend development. I developed proficiency in Python, Pytest, Selenium, Flask, REST API, data validation, database management, and API testing. Understanding the significance of quality assurance, I am eager to contribute these skills to future projects, ensuring high-quality software solutions and their successful delivery.

Overview

Duration: March to June 2023

Company Information:

AFour Technologies Private Limited is located at Unit No. 701, 7th floor, Sunteck Kanaka Corporate Park, Patto, Panaji, Goa 403001. AFour Technologies operates in the software engineering and consulting industry, providing innovative solutions and services to businesses across various sectors. Their core focus is on product engineering, enterprise software development, quality engineering, and digital transformation.

Internship Objective:

The primary objective of the internship was to achieve mastery in flask technology, Rest API's, pytest, and SQL databases. The internship aimed to provide a practical exposure to these technologies, enabling the development of skills and expertise in building robust web applications.

Key Learnings and Achievements:

Based on my internship experience, my future goals are to focus on leveraging my expertise in backend development, PyTest, and Selenium testing. I aspire to further enhance my skills in these areas and pursue opportunities that allow me to contribute to various projects. By staying updated with the latest technologies and industry trends, I aim to make a meaningful impact in software development & testing and work on diverse and innovative projects.

Role and Responsibilities:

During my internship as a Backend Developer and Tester, I played a crucial role in collaborating with the development team and actively contributing to various tasks and projects. My primary focus was on backend development and testing, utilizing my skills in backend development, pytest, and Selenium.

As a backend developer, I took responsibility for designing and implementing robust backend solutions. This involved developing RESTful APIs using frameworks like Flask and utilizing my expertise in Python programming. I worked solo under my mentor's guidance to understand project requirements and timelines, ensuring that the backend solutions met the specified objectives.

In addition to backend development, I specialized in testing the applications. Leveraging the power of pytest, I designed and executed comprehensive test cases to verify the functionality and performance of the developed APIs. This included writing test scripts, conducting API testing, and validating the accuracy and reliability of the API responses.

Furthermore, I started practical experience in Selenium testing, focusing on end-to-end testing of web applications. I automated web browser interactions and validated the functionality of web interfaces using Selenium. This allowed me to ensure the correct functioning of various features and scenarios within the web applications.

Throughout my internship, I actively collaborated with the mentors, participated in code reviews, and contributed to bug fixing and performance optimization efforts. I also documented the development and testing processes to maintain a comprehensive record of the project.

As an Internship Trainee, I focused on backend development, API testing with pytest, and Selenium testing, gaining practical skills for future projects.

Tools and Technologies Used

During my internship at AFour Technologies, I worked with a variety of tools and technologies as a Test Automation and Backend Developer. These included:

1. Python: I utilized Python as the primary programming language for developing backend solutions and writing test automation scripts. Python's versatility and extensive library ecosystem made it an excellent choice for these tasks.
2. pytest: I employed the pytest framework for writing and executing automated test cases. pytest is a widely-used testing framework in the Python ecosystem that offers simplicity, scalability, and powerful assertion capabilities.
3. Selenium: I used Selenium for web automation and testing. Selenium is a popular tool for automating browser interactions and performing end-to-end testing of web applications. It allows for simulating user interactions and validating the expected behaviour of web elements.
4. Flask: I worked with Flask, a lightweight Python web framework, to develop the backend system for the to-do list application. Flask provides a straightforward and flexible way to build RESTful APIs and web applications.
5. REST API: I designed and implemented RESTful APIs using Flask, adhering to the principles of Representational State Transfer (REST). REST APIs enable client-server communication over HTTP, allowing seamless integration between different systems.
6. HTTP methods: I utilized various HTTP methods, including GET, POST, PUT, and DELETE, to handle different operations on the RESTful APIs. These

methods allowed clients to interact with the backend and perform tasks such as creating, updating, retrieving, and deleting tasks.

7. JSON: I worked extensively with JSON (JavaScript Object Notation) for data exchange between the frontend and backend systems. JSON provides a lightweight and human-readable format for representing structured data.

8. Flask Blueprint: I utilized Flask Blueprint, a modular approach for organizing Flask applications, to structure the backend code into reusable components. Flask Blueprint helped in maintaining code scalability and maintainability.

9. Marshmallow schema: I used the Marshmallow library to implement data validation and serialization/deserialization of incoming and outgoing data. Marshmallow provides a simple and expressive way to validate and transform data using schemas.

10. pgAdmin: I worked with pgAdmin, a popular PostgreSQL administration and management tool, for managing the PostgreSQL database used in the project. I designed the database schema, created tables, and performed data management operations.

11. JWT (JSON Web Tokens): I implemented JWT-based authentication and authorization to secure access to the to-do list APIs. JWT provides a stateless and secure way to authenticate and authorize users by issuing and verifying tokens.

12. Postman: I used Postman, a comprehensive API testing tool, for manual testing and validation of the APIs during development and debugging. Postman allowed me to craft requests, inspect responses, and perform thorough API testing.

13. SHA256 encryption: I implemented SHA256 encryption to ensure the security and confidentiality of sensitive data. SHA256 is a cryptographic hash function used for encrypting sensitive information, such as passwords or other confidential data. It adds an additional layer of protection to the system.

These tools and technologies played a crucial role in developing the to-do list backend, implementing test automation, ensuring data validation, securing APIs, and facilitating efficient testing and encryption processes.

Other Additional Tasks

In addition to my primary responsibilities as a Test Automation and Backend Developer, I also took on various additional tasks during my internship at AFour Technologies. These tasks included:

1. **Code Reviews:** I actively participated in code reviews, providing feedback and suggestions to improve the quality and maintainability of the codebase. Code reviews helped ensure that the code followed best practices, adhered to coding standards, and promoted collaboration among team members.

2. **Bug Fixing:** I worked on identifying and fixing bugs reported during testing or discovered during the development process. This involved investigating the root cause of issues, implementing necessary code changes, and conducting regression testing to verify the fixes.

3. **Performance Optimization:** I contributed to optimizing the performance of the to-do list website by analysing bottlenecks and implementing improvements. This included optimizing database queries, caching frequently accessed data, and fine-tuning API response times to enhance the overall user experience.

4. **Documentation:** I actively maintained and updated project documentation, including API specifications, test plans, and user guides. Clear and up-to-date documentation helped the team and stakeholders understand the system functionalities, use cases, and potential issues.

These additional tasks allowed me to broaden my skill set and contribute to the overall success of the project. They provided me with a well-rounded experience, encompassing various aspects of software development, quality assurance, deployment, and teamwork.

Self-Study under Internship

During my internship at AFour Technologies and through self-study, I dedicated myself to expanding my knowledge and skills in various areas. Although I did not pursue formal certifications, I engaged in rigorous self-study and completed several online courses and projects. These self-study efforts allowed me to gain practical experience and expertise in different technologies and tools. Some of the areas I focused on include:

1. **Python Programming:** I extensively studied Python programming language, covering its core concepts, syntax, and advanced topics such as object-oriented programming, data structures, and algorithms. I worked on various coding exercises and projects to strengthen my Python skills.
2. **Test Automation with Python:** I delved into test automation using Python, exploring frameworks such as pytest and Selenium. Through online tutorials and hands-on projects, I learned to develop automated test scripts, handle browser interactions, and perform end-to-end testing for web applications.
3. **Flask and REST API Development:** I dived into Flask, a lightweight web framework, and learned to build RESTful APIs. I acquired knowledge on handling HTTP methods, designing API endpoints, implementing data validation, and managing database operations using Flask.
4. **Database Management:** I studied relational database management systems, with a focus on PostgreSQL. I learned SQL querying, database design, and management concepts, which I applied to store and retrieve data efficiently in projects.
5. **API Testing and Documentation:** I explored tools like Postman for API Testing, Selenium Testing and documentation. I gained proficiency in crafting API

requests, inspecting responses, and ensuring the functionality and performance of APIs through thorough testing.

6. Security and Encryption: I researched security practices and encryption techniques, including concepts like hash functions and encryption algorithms. I implemented sha256 encryption for sensitive data, adding an extra layer of protection.

Throughout my self-study journey, I worked on several hands-on projects to apply my knowledge practically. These projects involved building web applications, developing RESTful APIs, and creating automated test scripts. Although I didn't acquire formal certifications, my self-study efforts have equipped me with the skills and expertise necessary to excel in test automation and backend development.

Conclusions/Summary

During my internship at AFour Technologies, I played a crucial role as a Test Automation and Backend Developer. I successfully designed and developed the backend system for a to-do list application using Flask, creating robust RESTful APIs. By leveraging my expertise in Flask, HTTP methods, and JSON, I ensured seamless integration between the frontend and backend systems. I implemented data validation using Marshmallow schema and employed PostgreSQL and pgAdmin for efficient database management.

Security was a priority, and I implemented authentication and authorization using JWT, along with encryption techniques to protect sensitive data. In addition to backend development, I actively participated in test automation, bug fixing, performance optimization, and documentation. I collaborated with the DevOps team to streamline deployment and integrated the test automation suite into the continuous integration pipeline.

Through self-study, I expanded my knowledge and skills in Python programming, test automation with Selenium, Flask and REST API development, database management, API testing, and security practices. Although I didn't obtain formal certifications, my dedication to self-study and hands-on projects allowed me to gain practical experience and expertise in these areas.

As my internship concludes, I am equipped with a comprehensive skill set in test automation, backend development, and associated technologies. I am confident that the knowledge and experience gained during this internship will pave the way for a successful career in the field of software development.

Internship Timeline

January:

Learning material provided by AFour tech Stage 1 consist of basic knowledge about git, linux, SQL, etc.

February:

Started with React with Redux, Revising DBSM concepts.

March: Basic Python

Week 1:

Completed on boarding formalities

Week 2:

Discussing with the mentor and assigned to Phase 2 Learning.

Week 3:

Self-study and implementation of
Basics
Datatypes and Data Structures
Functions
Loops

Week4:

Self-study and Implementation of:
Modules and packages, setting up environments, and third party dependencies
Working with formatting libraries like Black, isort
Code linting tool like Flake8
Oops concepts
Exception Handling
Decorators
Iterators
I/O operations and serialization

April: Backend Development

Week 1:

Unit test framework

Pytest

Pytest Fixtures

Multiprocessing v/s Multithreading

Rest API and HTTP methods

Flask

Installation and Setting up of requirements

Assignments

Week 2:

Flask

Flask blueprint

Signup, login validation

basic frontend of todo

REST API, HTTP Methods

Json

Postman

Solving bugs

Lunch with MD and followed by meeting explaining about company.

Week 3:

Data validation using Marshmello Schema

Postgres DB, PgAdmin client

Automatic OPEN API doc generation using flask Smorest

Adding Rest API doc to to-do code

ORM: SQL Alchemy

Authentication/ Authorization using JWT extended

Passlib

Week 4:

Refresh token

Gunicorn

Python programming

Pytest

May: Pytest

Week 1:

API Testing in python
Writing different test cases
Coding API tests for users

Week 2:

Writing different test cases
Coding API tests for to-do tasks
Refactoring Backend with more HTTP status code.

Week 3:

Fixing errors occurred due to Python package conflicts.
Logging Added to the test cases

Week 4:

Pytest execution options

June: Selenium

Week 1:

Locators
Selenium IDE
Selenium Webdriver
Web Driver Elements like textbox, buttons etc.

My reflections/experiences of internship

During my internship at AFour Technologies, I had a valuable and enriching experience that greatly contributed to my personal and professional growth. Here are my reflections and key takeaways from my internship:

1. **Practical Application of Skills:** The internship provided me with an opportunity to apply the knowledge and skills I acquired during my academic studies. It was incredibly rewarding to see concepts and theories come to life through hands-on projects and real-world scenarios. The practical application helped solidify my understanding and gave me the confidence to tackle complex tasks.

2. **Collaboration and Teamwork:** Working as part of a development team allowed me to experience the importance of collaboration and effective teamwork. I had the chance to collaborate with developers, testers, and project managers, learning how to communicate ideas, share knowledge, and work towards a common goal. It was inspiring to witness the power of collaboration in achieving successful project outcomes.

3. **Problem-Solving and Adaptability:** Throughout the internship, I encountered various challenges and obstacles. These experiences taught me the importance of problem-solving and adaptability. I learned to analyze problems, break them down into smaller components, and find creative solutions. The ability to adapt quickly to changing circumstances and learn new technologies on the go proved to be invaluable.

4. **Continuous Learning:** The internship highlighted the significance of continuous learning in the rapidly evolving field of technology. I realized that staying updated with the latest trends, tools, and techniques is essential for professional growth. I actively pursued self-study and explored online resources to expand my knowledge beyond the scope of the internship. This thirst for knowledge has become an integral part of my professional journey.

5. Time and Project Management: The internship exposed me to real-world project management scenarios, where I had to juggle multiple tasks and meet deadlines. I learned to prioritize tasks, allocate resources efficiently, and manage my time effectively. These skills have proven beneficial in handling complex projects and meeting client expectations.

6. Professional Networking: The internship provided me with opportunities to network and connect with professionals in the industry. I attended industry events, participated in team-building activities, and engaged in discussions with experienced professionals. Building a professional network has opened doors to potential future collaborations and mentorship opportunities.

Overall, my internship at AFour Technologies was an invaluable experience that allowed me to grow both personally and professionally. It provided me with practical exposure, enhanced my technical skills, and instilled a strong work ethic. I am grateful for the opportunities, guidance, and support I received during my internship, as they have shaped me into a more confident and competent professional.

References

1. pytest:

- Official pytest Documentation: <https://docs.pytest.org/en/latest/>
- "Getting Started with pytest" by Real Python: <https://realpython.com/>

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<https://www.selenium.dev/documentation/>
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3. Python:

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4. HTTP Request:

<https://developer.mozilla.org/en-US/docs/Web/HTTP/Methods>
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5. Marshmallow Schema:

<https://marshmallow.readthedocs.io/>