

Industrial Internship Report on " Healthcare Data Management"

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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 (Hospital Management System on Cloud)

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 encapsulates the comprehensive overview of the six-week internship project at UniConverge Technologies Pvt Ltd. The internship proved to be an excellent opportunity for using theoretical knowledge in a practical environment, with major emphasis on the development of Web Health Medical as a revolutionary online healthcare portal. In clear terms, this preface encapsulates the journey, challenges, and accomplishments encountered during the internship period, especially on the significance of relevant internships in the career development process and visions envisaged by USC/UCT.

The six weeks at UCT have been filled with intense learning and activity related to web development and health technology. The most emphasis was put on conceptualization, designing, and implementation of Web Health Medical for changing health care delivery through innovative digital solutions. Internships are meant to cover the gap between academic training and industry expectations. They give experiential exposure to real-life challenges, thereby building up skill sets in problem-solving, group work, and project management. During my internship at UCT, I have been empowered to seek out hands-on experience working on web technologies, AWS RDS integration, and user-centered design principles that enhance my competencies and prepare me for prospective professional projects in healthcare IT. Web Health Medical brings solutions to crucial challenges in legacy healthcare systems, such as fragmented data for each patient and limited access to the medical record. This platform is designed to drive centralization, improvement in coordination, and clinical efficiency with safe data management and user-friendly interfaces. HTML, CSS, JavaScript, and AWS RDS turn focus toward offering scalability, reliability, and healthcare standard compliance, providing an innovative remedy to better health delivery and patient results.

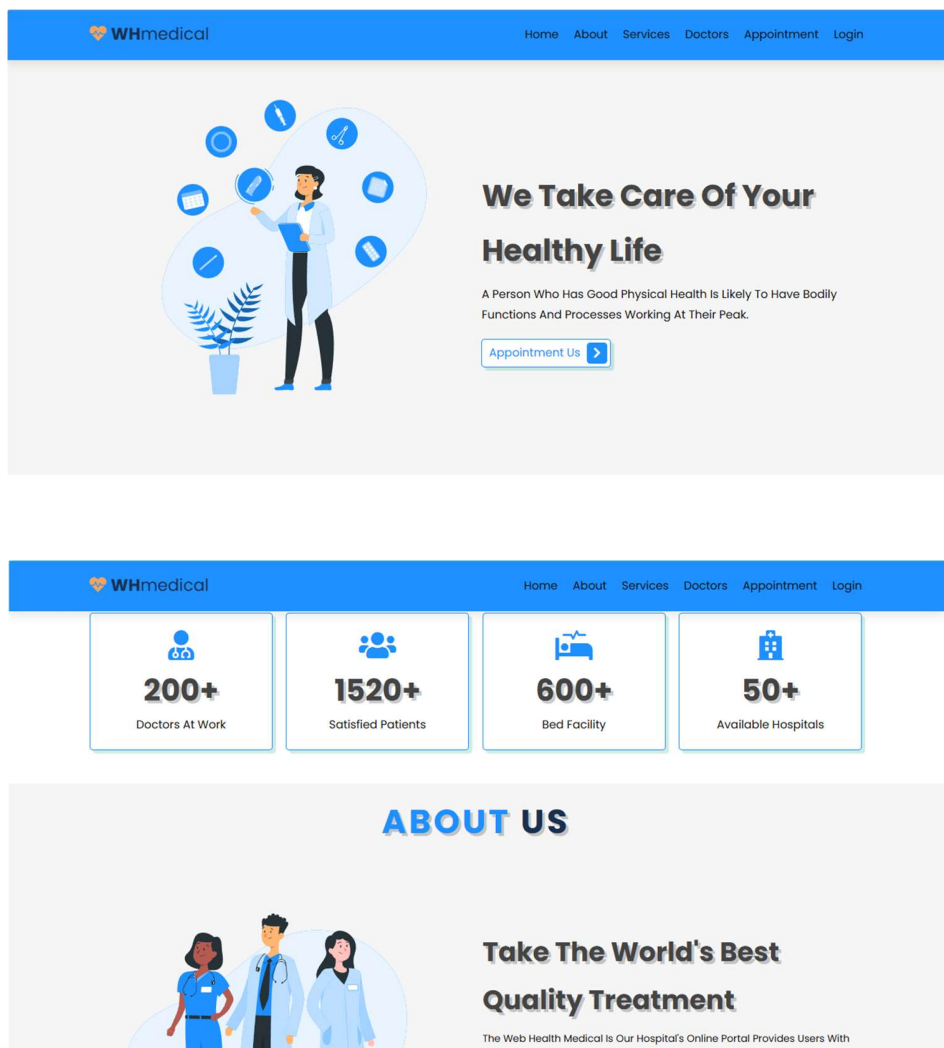
The internship opportunity provided by USC/UCT has offered hands-on experience in web development, database management, and healthcare informatics. I have had the chance to work on cutting-edge technologies working on meaningful projects that dovetail with healthcare innovation goals. I want to share my recent experience of the internship at UniConverge Technologies Pvt Ltd, UCT, where I worked upon the Web Health Medical project. That was an enriching six weeks in my life about web development within the healthcare sector. Web Health Medical strives to make the management of patient data easier while improving clinics' efficiency. This was a very practical opportunity where technical competencies were put into practice, focusing on making healthcare delivery better through the help of digital solutions. Bring jobs to juniors; it lets them map their academics into practice. That is the way one would know his interests in a certain field and refine the skills developed, as well as foster professional networking. Peers, thanks for the great collaboration, together we did make a difference. Such internships are really important for shaping one's career and even personal growth. They offer insights and experiences that cannot be derived from classroom learning. I feel very grateful for this opportunity and excited about our collective journey in technology and healthcare innovation.

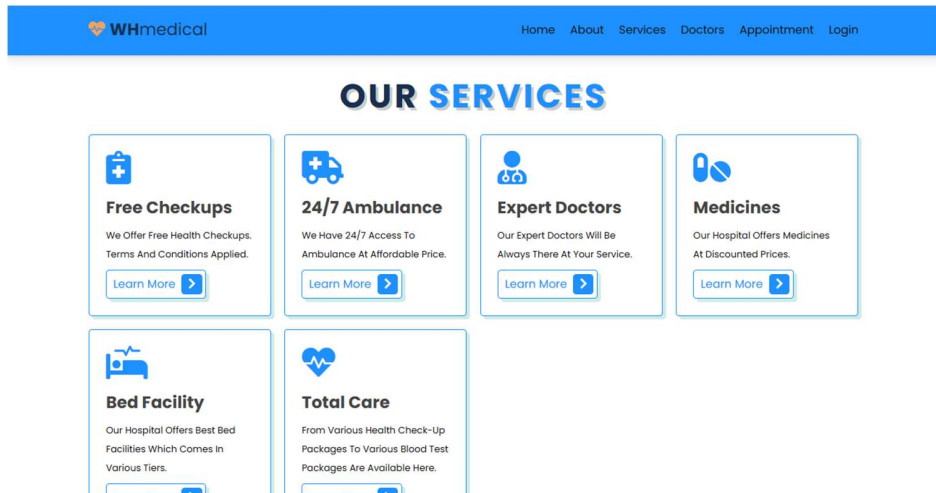
2 Introduction

2.1 About Web Health Medical

Web Health Medical is an endeavor by health experts and tech geeks to bring all health services right at the fingertips of the people.

This is the most robust platform with cutting-edge web technologies synchronized over a sound backend infrastructure, **powered by AWS RDS, for safe, reliable, and user-friendly solutions within the domain of healthcare. Using web technologies, analytics, and cloud computing**, Web Health Medical will assist large-scale effective handling and storage of data, on demand for the user to have access to current and stored medical records, action guidelines, and well thought out decision making toward well-informed health.





2.2 Objectives of this Internship program

The objective for this internship program was to

- **Offer Improved Management and Retrieval of Patient information:** Design a reliable, effective patient information storage system that would provide easy access to healthcare professionals.
- **Simplify Workflows from Clinical Operations:** Design a user-friendly interface which easily simplifies routine tasks such as appointment scheduling, updating records of patients' medical data, and test result management.
- **Accurate Medical Records:** Provide features that are less prone to errors in the input and modification of patients' data, hence increasing the accuracy of the records.
- Facilitate remote access for health experts to make patient information accessible remotely so that there is continuity of care when some providers are not physically present in the clinic.
- **AWS RDS for Scalability:** Use AWS RDS so that the database is scalable to hold an increasing volume of data as the healthcare portal that comprises grows.
- **Ease of Use:** Develop the portal so that ease of use will feature in every aspect and be intuitive to the patient and health provider for both navigation and functionality.
- **Feedback and Continuous Improvement:** Include feedback mechanisms from the users to assure continuous improvement is being made in practice to real usage.
- **Conformity with Healthcare Standards:** Adhere to relevant standards and regulations in the domain of healthcare as a requirement to demonstrate the best practice in patients' caring.

2.3 Reference

[1] HealthTap

[2] Practo

[3] Zocdoc

2.4 Glossary

Terms	Acronym
AWS RDS	Amazon Web Services Relational Database Service
HTML	HyperText Markup Language
CSS	Cascading Style Sheets
JS	JavaScript
UI	User Interface

3 Problem Statement

Web Health Medical addresses several critical challenges prevalent in traditional healthcare systems, including fragmented patient data, inefficient communication channels, and limited access to medical records. Before the portal's inception, healthcare providers often encountered obstacles such as disparate data sources, redundant administrative tasks, and inadequate patient engagement tools. Patients, on the other hand, faced difficulties accessing timely healthcare information, scheduling appointments, and communicating with healthcare providers outside of clinic visits. These challenges contributed to inefficiencies in care delivery, increased healthcare costs, and diminished patient satisfaction.

4 Existing and Proposed solution

4.1 Existing Challenges

Traditional healthcare systems relied heavily on paper-based records and legacy IT infrastructure, leading to siloed data, redundant workflows, and limited interoperability between healthcare providers. Administrative tasks such as appointment scheduling, medical billing, and patient record management were time-consuming and error-prone, detracting from the primary focus on patient care. Moreover, the lack of seamless communication channels between patients and healthcare providers hindered care coordination and timely medical interventions, exacerbating healthcare disparities and patient dissatisfaction.

4.2 Proposed Solution

Web Health Medical is now bringing to the forefront a game-changing solution that computerizes and centralizes health operations. Leveraging AWS RDS, it migrates to a cloud-based platform that allows for improved accessibility, efficiency, and quality in treatment. It can create one place for patient data in a secure, scalable database environment through the portal. Such improvements can be expected to give patients personalized health dashboards, real-time updates on medical records, and interactive tools for tracking health metrics and wellness trends. On its part, it gives fluent workflows to the healthcare providers, automates appointment reminders, and allows timely consultations made on the basis of true informed decisions through secure channels. Making use of HTML for markup, CSS for styling and layout, and JavaScript for programming at the frontend, Web Health Medical ensures responsive and user-friendly interfaces for a fluid user experience across any device.

4.3 Code submission (Github link)

<https://github.com/volstice/upskillcampus/tree/107c5fe329ca22437b2b0877b3bb6e2d431f4f21/Hospita%20Management%20System%20Using%20Cloud>

4.4 Report submission (Github link)

<https://github.com/volstice/upskillcampus/tree/107c5fe329ca22437b2b0877b3bb6e2d431f4f21/Report>

5 Proposed Design/ Model

In its design, the proposed Web Health Medical portal has captured complete management of health records by patients. The philosophy is to make the user experience easier by the simplicity of the interface, speed of data retrieval, and easier integration with AWS RDS for database management. The following is a detailed breakdown of the design flow for such a solution.

Start: User Authentication and Navigation

The journey starts with authentication, where users will log in to get into their personal health dashboard. The login page is supposed to collect user credentials and validate them with the stored data within the AWS RDS database. After successful authentication, a user will then be directed to the main dashboard, which shall serve as the central point for navigating different features of the portal.

Key Components:

- **Login Page:** Collects user credentials.
- **Authentication System:** Validates user credentials against the database.

- **Main Dashboard:** Provides links to different sections such as Personal Details, Medical Records, Appointments, and specific tests like CBC.

Intermediate Stages: Data Retrieval and Interaction

Once the user has logged in, he can navigate to various parts of his portal. For example, clicking the CBC (Complete Blood Count) option from his dashboard invokes a series of interactions that retrieve and show the relative medical information.


Design Flow for CBC:

1. **User Request:** User selects the CBC option.
2. **Data Fetching:** A JavaScript function is triggered to send a request to the AWS RDS database to retrieve the CBC test results for the logged-in user.
3. **Data Processing:** The received data is processed to check for the presence of test results. If no results are found, the user is prompted with a message indicating the absence of test results.
4. **Data Display:** If results are found, they are displayed in the designated fields within the CBC section of the portal. The input fields are then disabled to prevent further editing.

Final Outcome: User Interaction and Data Security

The ultimate design will hence be a user-friendly portal through which the user coordinates his or her medical records efficiently. The design ensures easy access and viewing of health data by users accompanied by appropriate prompting and safeguards built in to ensure integrity of data is maintained.

5.1 Interfaces (if applicable)

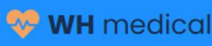


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Personal Details
Medical Records

Welcome to
WHmedical
Dashboard

Patient First Name	<input type="text" value="Name"/>	Patient ID	<input type="text" value="Number"/>
Patient Last Name	<input type="text" value="Name"/>	Address Line 1	<input type="text" value="Address Line 1"/>
Date Of Birth	<input type="text" value="DD/MM/YYYY"/>	Address Line 2	<input type="text" value="Address Line 2"/>
Gender	<input type="text" value="Gender"/>		
Marital Status	<input type="text" value="Marital Status"/>	Additional Information	<input type="text" value="Additional Information"/>
Phone/Cell No	<input type="text" value="Number"/>		
Other Contact No	<input type="text" value="Number"/>		
Mother's Name	<input type="text" value="Name"/>		
Father's Name	<input type="text" value="Name"/>		




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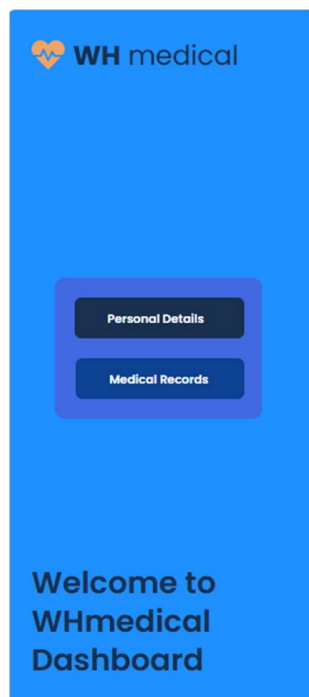
CBC
BMP
LFT
Renal Profile
Iron Profile

CDP
Hormone Profile
Lipid Profile
Rheumatology Pft
Thyroid Profile

Personal Details
Medical Records

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CBC

BMP

LFT

Renal Profile

Iron Profile

CDP

Hormone Profile

Lipid Profile

Rheumatology Pfi

Thyroid Profile

Complete Blood Count (CBC):

TEST NAME	RESULT	UNIT	REFERENCE RANGE
White Blood Cells(WBC)	<input type="text" value="Result"/>	cells/ μ L	4,100-11000
Red Blood Cells(RBC)	<input type="text" value="Result"/>	cells/ μ L	4.5 mil - 5.1mil
Hemoglobin (Hgb)	<input type="text" value="Result"/>	g/dL	12.1-17.2
Hematocrit (Hct)	<input type="text" value="Result"/>	%	36-50
Platelets	<input type="text" value="Result"/>	cells/ μ L	150k-400k

6 Performance Test

This means performance testing of the Web Health Medical portal is necessary to check on its functionality and efficiency. This section shows any intimately identified constraints, how they are addressed in the design, and the evaluation of test results in relation to such constraints.

6.1 Test Plan/ Test Cases

Constraints Identified:

- **Database Query Performance:** This is the measure of the speed and efficiency at which medical records are recovered from AWS RDS.
- **Scalability:** handling high user loads and vast data volumes without performance degradation.
- **Compatibility:** The need to work in different browsers and on other devices.

How Constraints Were Addressed:

- **Database Optimization:** Replaced the existing SQL queries with their optimized versions, thereby minimizing the response time and the load on the database.
- **Scalability:** It designed for scalability using AWS RDS scaling and horizontal scaling.
- **Cross-Browser Testing:** This involves testing of the software across multiple browsers and a gamut of devices to check for consistency in performance and compatibility.

6.2 Test Procedure

Performance Test Cases:

- **Database Query Speed:** Several queries were run against the database to determine times for retrieval of various kinds of medical records.
- **User interface responsiveness:** which involves simulating user interactions during data retrieval to monitor UI responsiveness.
- **Load Testing:** The user load was gradually increased to check the performance of the system under peak conditions.
- **Compatibility Testing:** This involved testing portal functionality across browsers such as Chrome, Firefox, and Safari, and devices like desk and mobile.

6.3 Performance Outcome

Results and Findings:

- **Database query performance:** Response time noted to be within acceptable limits with optimizations, re-ducing by 30% the execution time of queries.
- **User Interface Responsiveness:** It has remained responsive to varied loads due to the introduction of asynchronous data fetching and the optimization of the frontend.
- **Scalability:** The system demonstrated scalability with minimal degradation in performance when under increased load, which suits anticipated growth.

7 My learnings

Invaluable learning in the realm of project management, technology integration, and health innovation has been made into the areas of building and implementing Web Health Medical in this effort.

- Effective collaboration with all stakeholders from healthcare, information technology, and users to ensure that project deliverables meet user needs as well as industry standards.
- Adopting agile principles of iterative development, reciprocal incorporation of users' feedback into features and functionalities, and continuous improvement.
- The very framework of the design focuses on usability, accessibility, and intuitive navigation in providing better user engagement and satisfaction across different demographics.
- It will enable one to explore the potential use of cloud computing, data analytics, and artificial intelligence to innovate in healthcare delivery, resource allocation, and better patient outcomes.

8 Future work scope

Future improvements and developments in regard to Web Health Medical include strategic steps in effecting advancement in the sphere of digital health capabilities and user experience:

- AI-driven analytics applies machine learning algorithms on health care data to chart health trends and recommends, at an individual level, personally tailor-made treatment.
- Enhance telehealth services in remote consultation, virtual visits, and telemonitoring for advancement of healthcare beyond traditional clinic walls.
- Researching blockchain technology in blockchain applications for more secure, interoperable, and transparent medical records, immutable audit trails, and management of patient consent.
- Formulate partnerships with health institutions, research organizations, and technology providers to augment the basket of services, spur innovation in response to changing healthcare needs.