# COS6009-B Large Scale Data Driven Applications Coursework Specification

## Description: Implementation of the web-based application based on the design created in coursework 001.

## Weight: 50%

## Learning Outcomes Assessed

- Demonstrate a knowledge and understanding of the theory and practice of large-scale data-driven applications.
- Apply skills in the design, and implementation of large-scale data-driven applications.
- Demonstrate competence in applying theoretical skills to practical problems.

## Problem

Missed healthcare appointments, or "no-shows," represent a significant and costly issue in the healthcare industry. When patients fail to attend their scheduled appointments, it disrupts clinic workflows, leads to underutilisation of resources, and often results in delayed or compromised patient care. No-shows also increase the workload for administrative staff and affect the revenue streams of healthcare facilities, as gaps created by these missed appointments could otherwise be filled by other patients in need of care. Research shows that no-shows can be influenced by various factors, including patient demographics, medical conditions, socio-economic background, and even the lack of effective communication or reminders. For instance, patients with chronic conditions like hypertension or diabetes, or those who receive less frequent appointment reminders, are often at a higher risk of missing their appointments. The impact of no-shows is particularly pronounced in critical healthcare services where timely intervention can be crucial to a patient's health outcomes.

This coursework aims to tackle these challenges by developing a web-based platform that uses data-driven approaches to understand and mitigate no-show occurrences. By utilising **Relational Database Management System(RDBMS), MongoDB and PHP**, the system analyses key factors such as patient demographics, appointment history, SMS reminders, and health conditions to uncover patterns behind no-shows. Through interactive dashboards, healthcare providers will have access to real-time insights on no-show rates by neighbourhood, age group, medical condition, and the effectiveness of reminder systems.

## Further Information and Requirements

**IMPORTANT NOTE: This coursework builds upon the work completed in Coursework 1**

In Coursework 1, you analysed the **'Healthcare No Show Appointment Dataset'** and designed two separate databases: one using RDBMS and the other using MongoDB, each storing the same data in different formats. You also constructed and executed queries to obtain various results. However**, a web-based interactive dashboard or application has yet to be implemented** to execute these queries to display the results on the interactive platform. In this coursework, you will **focus on developing a web-based interactive platform/dashboard** that allows users to easily retrieve insights from the dataset, utilising the previously created MongoDB database. Please note that for this dashboard, **you will exclusively use the MongoDB version of the database**. The following section provides an overview of the technologies to be used and the tasks that need to be completed.

**Tools/Technologies to be used**: **MongoDB, PHP, and HTML**.

**Tasks Overview:**

1. **Design and Layout of the Dashboard:**

   You need to create an intuitive, user-friendly interface that allows users to select various parameters (e.g., patient demographics, gender, appointment details, or medical conditions) to generate insights. Ensure the dashboard is responsive, easy to navigate, and interactive. Design it to incorporate diverse visual elements, such as charts, tables, and filters, to enhance the user experience and present data effectively.

2. **Database Connectivity:**

   Connect the dashboard to the MongoDB database, ensuring reliable and efficient data retrieval. Configure connection settings to enable seamless interaction between the dashboard and the database, providing a smooth and responsive user experience.

3. **Implementation of Query Functionality:**

   Develop features that allow users to run predefined queries on the MongoDB database. Ensure users have the ability to filter and customise these queries to explore various aspects of the dataset, such as demographic insights and appointment trends, for a more tailored and insightful analysis.

4. **User Interaction Features:**

   Implement interactive elements, such as dropdown menus, sliders, and date pickers, to allow users to refine their queries and explore the data effectively. Include options for users to compare different metrics, such as no-show rates by demographic factors.

5. **Data Visualisation Integration:**

   Incorporate data visualisation libraries (e.g., Chart.js, D3.js, or others of your choice) to present query results in a visually engaging way. Design dynamic visualisations that update in real-time based on user inputs and selected parameters, providing an interactive and insightful experience..

6. **Testing and Quality Assurance:**

Conduct thorough testing of the dashboard to ensure all functionalities work as intended. Verify that data visualisations accurately represent the underlying data and respond correctly to user interactions.

7. **Documentation and User Guide:**

   Provide technical documentation outlining the dashboard's architecture and how it connects to the MongoDB database. Create comprehensive documentation detailing how to use the dashboard, including instructions for executing queries and interpreting visualisations. Include evidence of testing various features by adding relevant screenshots, demonstrating that the functionality works as expected.

## Deliverables and Submission Procedure

- A single report (in PDF format) containing technical documentation, results of testing and user guide should be submitted via Canvas.
- All the source code is to be submitted as a single compressed ZIP file.

**A demonstration of the developed dashboard/platform is mandatory. An individual demonstration session will be scheduled for each student. Please note that failure to participate in the demonstration will result in a zero mark for this coursework.**

**Marking Scheme:** is available at the end of this document.

**Submission Deadline: 18 December 2024 by 5:00 PM**

| Criteria | F<br>Incomplete:<br>0-29 | E<br>Unsatisfactory:<br>30-39 | D<br>Threshold:<br>40-49 | C<br>Good:<br>50-59 | B<br>Very Good:<br>60-69 | A<br>Excellent:<br>70-79 | A*<br>Outstanding:<br>80+ |
|---|---|---|---|---|---|---|---|
| **Dashboard Design and Usability**<br><br>**(15%)** | The dashboard is missing or severely lacks functionality.<br><br>No logical structure or organisation; navigation is confusing or impossible.<br><br>Aesthetic elements are absent or poorly executed, making the interface unappealing. | Minimal effort in design; the dashboard lacks clarity and coherence.<br><br>Navigation is difficult or unintuitive, with unclear pathways to access features.<br><br>Aesthetic appeal is poor, with inconsistent or distracting visual elements. | Basic design elements are present, but the dashboard lacks polish and organisation.<br><br>Some logical structure exists, but navigation may still be cumbersome.<br><br>Aesthetic elements are applied inconsistently, affecting user experience. | The dashboard is well-structured and easy to navigate, with a clear layout.<br><br>Most design elements are visually appealing and contribute to user experience.<br><br>Minor inconsistencies in design or usability may exist but do not significantly hinder functionality. | The dashboard is clearly organised and intuitive, allowing for easy navigation.<br><br>Aesthetic elements are polished and enhance the overall user experience.<br><br>The design effectively supports usability, with only a few minor improvements needed. | The dashboard features an excellent layout that prioritises user experience and ease of navigation.<br><br>Visual elements are consistently appealing and professionally designed.<br><br>The design is highly functional, with clear pathways for users to access all features seamlessly. | The dashboard design is exceptional, demonstrating a high level of creativity and usability.<br><br>Navigation is intuitive and fluid, providing an engaging and seamless user experience.<br><br>Aesthetic elements are flawlessly integrated, enhancing functionality while maintaining visual appeal. The design exceeds expectations and fully supports the needs of users. |
| **Database Connectivity and Query Functionality**<br><br>**(25%)** | No attempt to connect the dashboard to the MongoDB database.<br><br>Queries are not implemented or are entirely non-functional.<br><br>No data is retrieved, making the dashboard unusable. | Limited connectivity established, with frequent errors in database connection.<br><br>Queries may execute but return incorrect or irrelevant results.<br><br>Basic functionality is present, but data retrieval is inconsistent and unreliable. | Basic database connectivity is achieved, but there are occasional issues with connection stability.<br><br>Some queries are functional, but many return incomplete or incorrect results.<br><br>The overall ability to execute queries is limited, affecting the | Reliable connection to the MongoDB database with minimal issues.<br><br>Most queries execute correctly, returning relevant results for user queries.<br><br>Some advanced query functionality may be lacking, but the essential features work as | Strong and consistent connectivity to the MongoDB database.<br><br>Queries are mostly efficient and return accurate and meaningful results.<br><br>Good range of query functionality implemented, with only minor areas for improvement. | Excellent database connectivity, with no connection issues.<br><br>Queries execute efficiently, returning accurate results that meet user needs.<br><br>Advanced query functionality is well implemented, enhancing the dashboard's overall capability. | Exceptional connectivity to the MongoDB database, functioning flawlessly.<br><br>Queries are executed quickly and accurately, providing comprehensive and insightful results.<br><br>All intended query functionalities are fully implemented, |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | dashboard's usability. | intended. | | | showcasing advanced capabilities and enhancing the user experience significantly. |
| **User Interaction Features**<br><br>**(15%)** | No interactive features are implemented in the dashboard.<br><br>The user experience is static and unresponsive, with no means for user input or customisation.<br><br>The lack of interaction renders the dashboard unusable for exploring data. | Very few interactive features are present, and they may not function as intended.<br><br>Limited user input options result in minimal customisation or exploration of data.<br><br>Interaction elements may confuse users or fail to enhance the overall experience. | Basic interactive features are available, but they are poorly designed or implemented.<br><br>Some elements allow for user input, but the responsiveness and functionality are inconsistent.<br><br>User experience is somewhat engaging but lacks depth and sophistication. | A range of user interaction features are implemented effectively, allowing for moderate customisation and data exploration.<br><br>Most interactive elements function properly, providing a generally positive user experience.<br><br>The interface is user-friendly, but some interactions may require improvement for optimal engagement. | Strong implementation of interactive features that enhance user engagement and data exploration.<br><br>User input options are well-designed and responsive, allowing for meaningful customisation.<br><br>The overall user experience is intuitive and smooth, with only minor refinements needed. | Excellent user interaction features that facilitate seamless engagement with the dashboard.<br><br>All interactive elements function flawlessly, providing users with robust options for exploring and customising data.<br><br>The dashboard is highly user-friendly, with a well-thought-out design that enhances the overall experience. | Exceptional user interaction features that create an immersive and engaging user experience.<br><br>All interactive elements are innovative, intuitive, and enhance the functionality of the dashboard.<br><br>Users can easily navigate, customise, and explore data, resulting in a highly satisfying and effective user experience. |
| **Data Visualisation Quality**<br><br>**(15%)** | No data visualisations are provided in the dashboard.<br><br>The absence of visual aids makes it difficult to interpret the data.<br><br>There is no effort to represent information visually. | Very few visualisations are present, and they lack clarity or relevance to the data.<br><br>Visualisations are poorly designed, making it hard for users to understand the insights.<br><br>Misleading or incorrect representations of data are evident. | Basic visualisations are included, but they lack depth or meaningful interpretation.<br><br>Some effort is made to represent data visually, but clarity and effectiveness are lacking.<br><br>Visualisations may not fully support the analysis or insights derived from the data. | Adequate quality of visualisations that represent data clearly and accurately.<br><br>Visualisations are generally effective, allowing users to glean insights from the data.<br><br>There is a reasonable variety of visualisation types used, but some may lack polish or | High-quality visualisations that effectively convey key insights from the data.<br><br>The use of appropriate visualisation types enhances user understanding and engagement.<br><br>Visualisations are well-designed and clearly presented, contributing | Exceptional visualisations that are both aesthetically pleasing and highly informative.<br><br>The choice of visualisation types is appropriate and enhances the overall analysis.<br><br>Data is presented in a way that is easy to interpret, facilitating quick insights for users. | Outstanding quality of data visualisations that create a compelling and engaging user experience.<br><br>All visualisations are innovative, insightful, and perfectly tailored to represent the data.<br><br>The dashboard seamlessly integrates visual elements, providing users with an |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | refinement. | positively to the overall dashboard experience. | | intuitive understanding of complex information. |
| **Performance and Testing**<br><br>**(10%)** | No performance testing conducted, and the dashboard is not functional.<br><br>No assessment of responsiveness or load times, resulting in a non-usable application.<br><br>Lack of any metrics or benchmarks for performance evaluation. | Minimal performance testing performed, with significant issues remaining unaddressed.<br><br>The dashboard experiences frequent crashes, lag, or slow response times.<br><br>Little to no documentation provided regarding testing methods or results. | Basic performance testing completed, but several critical issues remain.<br><br>The dashboard functions, but response times are inconsistent and may hinder user experience.<br><br>Limited documentation on testing approaches, and findings may not be clearly presented. | Adequate performance testing conducted, with most functionalities operating smoothly.<br><br>The dashboard generally responds quickly, with only minor performance issues identified.<br><br>Documentation of testing methods and results is clear, though some details may be lacking. | Comprehensive performance testing carried out, addressing most major issues effectively.<br><br>The dashboard performs well under typical usage conditions, with good response times.<br><br>Thorough documentation provided on testing methodologies, results, and any optimisations made. | Extensive performance testing conducted, leading to a highly optimized and responsive dashboard.<br><br>Performance metrics are consistently within acceptable ranges, ensuring a smooth user experience.<br><br>Detailed documentation of testing processes, results, and improvements made based on findings. | Exceptional performance testing conducted, demonstrating thorough analysis and optimization of the dashboard.<br><br>The application performs flawlessly under various conditions, with outstanding response times.<br><br>Comprehensive and well-organised documentation that includes extensive testing methodologies, results, and insights for future improvements. |
| **Documentation and User Guide**<br><br>**(20%)** | No documentation or user guide is provided.<br><br>Lack of instructions or guidance on how to use the system.<br><br>The absence of documentation makes the system difficult or impossible to understand. | Minimal or incomplete documentation with key sections missing.<br><br>User guide lacks clarity, is hard to follow, or does not cover basic system functionalities.<br><br>Important information about system usage and features is absent or unclear. | Basic documentation and user guide are provided but lack detail and thoroughness.<br><br>The user guide covers core features but may be confusing or incomplete in some areas.<br><br>Some essential instructions are provided, but additional guidance is needed for full | Adequate documentation with clear descriptions of the system's structure and functionality.<br><br>The user guide provides reasonable instructions for using the system, covering most of the features.<br><br>Some minor details may be missing, but the documentation is generally | Well-organised and thorough documentation that covers the system's structure, features, and functionality.<br><br>The user guide is clear, easy to follow, and includes instructions for all major features.<br><br>Documentation is well-written and provides good support for users to | Comprehensive and well-structured documentation that explains the system in detail, including all relevant processes.<br><br>The user guide is highly informative, offering step-by-step instructions for all features, with helpful examples or illustrations.<br><br>The documentation provides an excellent | Exceptional documentation that is meticulously detailed, covering every aspect of the system in an organised and clear manner.<br><br>The user guide is exceptionally well-written, intuitive, and comprehensive, offering detailed instructions with visual aids or troubleshooting tips. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | system understanding. | understandable and helpful. | effectively operate the system. | user experience, making it easy to understand and use the system. | The documentation enhances user understanding to a level that makes the system easy to navigate and use effectively, setting a benchmark for best practices. |