University Mohammed VI Polytechnic

College of Computing

# Final report
# Deliverable 3 - Data Management I -


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# 1. Project Overview:

Project Focus:

- Development of a flight booking system based on Data Management 1 course concepts.
- Objectives include designing an efficient database structure using ERDs, implementing indexes, creating procedural logic through stored procedures, and ensuring transactional integrity.

Scope:

- Creation of a robust and scalable database for a comprehensive flight booking system.
- Manages information related to flights, passengers, reservations, and associated details.

Relevance to Course:

- Applies foundational data management principles for hands-on experience.
- Emphasizes designing, implementing, and optimizing a real-world database system.

Purpose:

- Streamlines the flight booking process for accurate and timely information retrieval.
- Maintains data consistency and facilitates secure transactions.

Key Concepts Applied:

- Utilizes normalization, indexing, stored procedures, and transactions for practical application.
- Demonstrates the real-world application of theoretical knowledge acquired in the data management course.

Presentation:

- Project presented as a web application with PHP backend.

- Basic HTML/CSS and Javascript used for a user-friendly interface.
- Emphasizes a streamlined and clean flight booking process.

# 2. Team Responsibilities:

We opted, when dividing tasks, to take into consideration the capabilities of each one of us and to value them. Thus task division went as follows:

- ## Data generation:

  *Othmane and Safae:*Led the data generation phase utilizing Python and CSV for efficient and structured data creation. Their collaborative efforts laid the foundation for the dataset.

  *Mounia and Kawtar:* Providedoversight and quality assurance, correcting and refining the generated data. Collaborated closely with Othmane and Safae to enhance the dataset using Python scripts.

- ## Database Design:

  DDL : Data DefinitionLanguage:

  *Mounia and Kawtar:* Spearheaded the DDL, crafting the database schema and defining the structure of tables. Proficiently used MySQL to create a robust foundation for data storage.

  DCL : Data Control Language:

  *Othmane and Safae:* Automated access control and permissions, ensuring data security and business rules. Implemented DCL policies to regulate user access with precision.

- ## Database Optimization:

  Indexes and Triggers:

  *Othmane and Safae:* Implemented indexes and triggers to enhance query performance and enforce data integrity.

  DML: Data Manipulation Language:

*Mounia and Kawtar:*Executed complex and insightful queries, transforming raw data into valuable insights.

- ## Stored Procedures:

*PassengerProcedures:*

*Othmane and Safae:* Developed and maintained procedures related to passenger data, ensuring seamless handling and retrieval.

*Ticket and Flight Procedures:*

*Mounia and Kawtar:* Specialized in procedures related to tickets and flights, contributing to efficient data processing and retrieval.

- ## Transactions:

*Mounia and Kawtar:* Implemented and managed transactions, ensuring data consistency and integrity throughout the database.

- ## Interface Development

*Front-End:*

*Mounia, Kawtar and Safae:* Designed and implemented the user-friendly front-end interface, ensuring a seamless and intuitive user experience.

*JavaScript:*

*Safae:* Utilized JavaScript to enhance the interactivity of the interface, contributing to a dynamic and responsive user experience.

*Back-End (PHP):*

*Othmane:* Developed the back-end functionality using PHP, connecting the front-end interface with the database seamlessly.

- ## Integration:

Final Project Assembly:

*Entire Team:* Collaborated to integrate individual components into the final project, ensuring a cohesive and fully functional data management system.

# 3. Challenges Faced:

- ## Technical Challenges:

**1. Real-life Data Acquisition:**

Acquiring authentic, real-life data proved especially challenging, as it introduced the intricacies related to data availability, quality, and relevance to the desired final product. Overcoming these challenges required meticulous planning and resourcefulness to ensure the data met the project's requirements.

**2. Unfamiliar Programming Languages:**

Proficiency in new programming languages, including PHP and JavaScript, became a crucial requirement for project success. The team navigated a learning curve, adapting to unfamiliar syntax and structures.

- ## Group-Related Challenges:

**1. SchedulingConflicts:**

Coordinating team members' schedules proved challenging due to conflicting commitments. The team had to navigate the complexities of balancing conflicting schedules to find mutually convenient time slots for collaborative work. This balancing act impacted the project's pace and progress, requiring effective communication and compromise.

**2. Remote Work Dynamics:**

The necessity for remote work introduced communication and coordination challenges. Some team members had to work remotely, occasionally leading to

difficulties in maintaining synchronous collaboration. This situation could potentially result in delays and misalignments, emphasizing the need for robust communication channels and coordination strategies in a remote work setting.

# 4. Adressing the challenges:

## - Technical Challenges:

**1. Real-life Data Acquisition:**

- **Data Source Exploration:** Conducted thorough research to identify potential sources of real-life data and explore public datasets.

- **Data Quality Assessment:** Established criteria for assessing data quality, ensuring that the acquired data aligns with project objectives. Implemented data cleansing and validation processes to enhance quality.

**2. MySQL Configuration:**

- **Standardized Setup Procedures:** Developed a step-by-step guide for configuring MySQL environments to ensure consistency across team members' personal laptops.

- **Collaborative Troubleshooting:** Established a communication channel for discussing and resolving MySQL-related issues. Encouraged team members to share challenges and solutions.

- Group-Related Challenges:

**1. Scheduling Conflicts:**

- **Establish Clear Communication Channels:** Utilized communication tools to share schedules, commitments, and preferred time slots.

- **Flexibility and Compromise:** Encouraged a flexible approach to scheduling and emphasized the importance of compromise. Rotated meeting times to accommodate different commitments, ensuring equitable participation.

**2. Remote Work Dynamics:**

- **Regular Check-ins:** Conductedregular virtual check-ins to maintain team cohesion. Discuss progress, challenges, and align on tasks to mitigate potential misalignments.

# 5. Lessons Learned:

**1. Quality Assurance is Continuous:**

- The data correction phase taught us the importance of continuous quality assurance. Even with meticulous data generation, ongoing validation and refinement are essential for ensuring accuracy and reliability in the database.

**2. Documentation Facilitates Collaboration:**

- The experience emphasized the necessity of thorough and accessible documentation. Clear documentation not only streamlines collaboration within the team but also aids future development, maintenance, and troubleshooting efforts.

**3. Optimization is a Continuous Process:**

- Implementing indexes and triggers underscored that database optimization is not a one-time task. Regularly evaluating and fine-tuning the database structure and performance is necessary for sustained efficiency, especially as the dataset evolves.

# 6. Successes and Achievements:

**1. Innovative Data Generation Techniques:**

- We showcased creativity in data generation, implementing innovative techniques using Python and CSV. This resulted in a diverse and representative dataset, laying the foundation for insightful analysis.

**2. Precision in Database Design (DDL):**

- Our group demonstrated precision in the Data Definition Language (DDL) phase, architecting a well-structured database schema. This meticulous approach ensured an organized and scalable foundation for data storage.

**3. Data Manipulation Mastery (DML):**

- The execution of complex Data Manipulation Language (DML) queries demonstrated mastery in extracting valuable insights. Our analytical skills enriched the project with meaningful data interpretations.

**4. Efficient Transaction Management:**

- We efficiently managed transactions, ensuring data consistency and reliability. Our approach to transaction handling played a pivotal role in maintaining a seamless database operation.

**5. Structured Procedures for Data Handling:**

- Safae and Othmane's creation of structured procedures for passenger-related data and Kawtar and Mounia's work on ticket and flight procedures showcased a

systematic approach to data handling. These procedures enhanced the overall efficiency of the project.

**6. Intuitive User Interface Design:**

- Kawtar, Mounia and Safae's design of the front-end, Safae's strategic use of JavaScript, and Othmane's PHP development collectively resulted in an intuitive user interface. The user-centric design contributed significantly to a positive and engaging user experience.

**7. Effective Collaboration in Integration:**

- The team's successful integration of components demonstrated effective collaboration. Each team member contributed their expertise during the assembly phase, resulting in a seamlessly integrated final project.

**8. Project Presentation and Documentation:**

- The team excelled in presenting the project coherently and providing comprehensive documentation. Clear project presentation and documentation served as valuable assets for stakeholders, facilitating understanding and future development.

# 7. Recommendations for future projects

**1. Prioritize Early Discussion and Resolution of Challenges:**

- Establish a proactive approach to identify and discuss potential challenges at the onset of the project. Early collaboration in problem-solving ensures that issues are addressed promptly, preventing delays and enhancing overall project efficiency.

**2. Explore Automation for Repetitive Tasks:**

- Identify opportunities to automate repetitive data management tasks, such as routine data processing or quality control checks. Automation not only accelerates project timelines but also minimizes the risk of human error.

**3. Explore Recommendation Systems in our Application:**

- Think of the possibility of integrating a flight recommendation system to ease and optimize the user's experience in our application. This idea might be a plus to our application, and would put in the spotlight our recommending / fetching queries.

# 8. Conclusion:

Achievements:

- Flight booking system development showcases expertise, adaptability, and innovative problem-solving.

Technical Challenges:

- Successfully tackled real-life data acquisition, MySQL configuration complexities, and new programming languages.

Group Challenges:

- Effectively managed group-related issues, including scheduling conflicts and remote work dynamics.

Overall Impact:

- Reflects a harmonious blend of technical prowess and collaborative teamwork.
- Highlights adaptability and resilience in overcoming diverse challenges.