Essay Assignment: MMT Application for Winter Semester 2025/26

Dear applicants for the "*Master in Management and Digital Technologies*",

as part of your application, we ask you to solve two exercises that test prerequisite knowledge and capabilities that are pivotal to succeed in the MMT program. This assignment includes a business-related exercise concerning digital business models and an informatics-related exercise concerning programming. Both exercises must be answered.

With these essays, we can ensure that applicants with a business-related background have the necessary informatics skills required for the digital technologies part of the MMT and vice versa for the management part of the program. Therefore, if you fail to answer one of the exercises, your application cannot be considered.

Please make sure to comply with the following instructions:

- Please provide your answers in **English** and in **full sentences.**
- No **plagiarism** will be tolerated. Please **refrain from the use of direct quotes**.
- Provide all sources used for both assignments.
- The answer to Exercise 1 should not exceed **2000 words**.
- The answer to Exercise 2 should be **as lean as possible**.
- Please submit the answer to Exercise 1 as a singular file in **.pdf format**.
- Please provide the answer to Exercise 2 in the form of an **executable code** (Java, JavaScript or Python). The **required files are to be integrated into a zip directory**.

Good luck.

Yours sincerely

The MMT Coordination Team

Exercise 1: Digital Business Models

You are planning on founding the software platform company "TalentBridge". It offers the app SkillMatch, a platform that connects freelance professionals with companies in need of specialized project-based work. Companies can post projects, specifying their requirements, budgets, and timelines, while freelancers create profiles showcasing their skills, experience, and availability. Freelancers can bid on posted projects, or companies can directly invite professionals based on SkillMatch's AI-powered recommendations. The platform uses an AI-powered matching algorithm to connect the most relevant freelancers with available projects based on skills, experience, and client needs. SkillMatch generates revenue through a combination of commissions and advertising. Freelancers are charged a 20% commission on their earnings, while companies pay a small fee for premium job postings to increase their visibility. Additionally, the platform features targeted, non-intrusive advertising tailored to users, such as professional tools for freelancers or business solutions for companies, creating an additional revenue stream.

a) Please provide a concise explanation of **multi-sided platform markets**. Then, use a **table** to clearly differentiate between **direct and indirect network effects**.

   Subsequently **describe how TalentBridge's business model fits into the understanding of multi-sided markets and illustrate network effects**. Please refer to the following actors: TalentBridge, companies, freelancers and advertisers. You may use an illustration if you like.

b) How do TalentBridge's **users benefit** from the multi-sided platform model? Please refer to direct and indirect network effects.

c) TalentBridge wants to expand its operations and looks for innovative ideas for new revenue streams. Based on its current platform business model, please briefly outline **two possibilities for new revenue streams**.

- It is mandatory to use a minimum of 3 and a maximum of 5 **scientific sources** to your explanations. Please cite all used sources in Harvard Style.
- You are required to create one **visualization**. Please ensure the visualization is your original work and not generated using AI tools.

Exercise 2: Programming

The carsharing company **"ShareMyCar"** requires a management system to handle its vehicle fleet, bookings, returns, and associated financial metrics. Your task is to design and implement a system that satisfies the following requirements.

System Requirements:

1. Vehicle Inventory Management

- Maintain a database of vehicles with the following attributes:
- Vehicle ID
- Brand and model
- Mileage (kilometers driven)
- Daily rental price
- Maintenance cost per kilometer
- Availability status (available/unavailable)
- Start with at least 10 vehicles.
- Allow users to:
    - View the complete inventory with all details.
    - Add new vehicles to the fleet.
    - Update availability when a vehicle is booked or returned.

2. Booking Functionality

- Users can book a vehicle by providing:
    - Vehicle ID
    - Rental duration (days)
    - Estimated kilometers to be driven
- Once booked:
    - Mark the vehicle as unavailable during the rental period.
    - Calculate the estimated cost based on the rental duration and kilometers.

3. Return Processing

- Process vehicle returns by recording:
    - Actual kilometers driven.
    - Late fees (if the return exceeds the rental duration, 10 € per Day).
    - Cleaning fees (a fixed cost, e.g., €20 per return).
    - Maintenance costs based on the kilometers driven (1€ per Kilometer).
    - Update the vehicle's availability to available.

4. Maintenance Scheduling

- Automatically mark a vehicle for maintenance when:
  - It exceeds a certain mileage threshold (e.g., every 10,000 km).
  - Calculate and log maintenance costs for affected vehicles.

5. Transaction Logs

- Keep a log of all transactions, including:
  - Customer name
  - Vehicle ID
  - Rental duration
  - Revenue generated
  - Additional costs (cleaning, maintenance, late fees)

6. Financial Metrics

- Provide real-time calculations for:
  - Total revenue (from bookings).
  - Total operational costs (maintenance, cleaning, and late fees).
  - Total profit (revenue - costs).
  - Average mileage per vehicle.
- Allow users to query specific metrics or generate a full financial report.

The following guidelines are crucial to pass the assignment:

1. Please **annotate each line of code** with a comment explaining its purpose. **Each method should have documentation on what it does, how it works (in your own words), and what parameters are expected.**

2**.** The program should be standalone and executable from a standard computer with a **minimal amount of dependencies (Preferably it can be run from one single data file or .exe file).** The interaction can be via a graphical user interface or a terminal. The **selection of the interaction method does not influence** our evaluation of your code.

3. The program **has** to be written in **Java, JavaScript or Python.**

4. The program has to **shut down gracefully without any error messages.**

5. The final deliverable should be submitted as a **Zip directory containing all necessary files** and be **ready for execution and evaluation**.

6. All **system requirements 1-6** need to be mirrored in the program. You can't compensate for a missing system requirement by excelling in another one.