



End of year project : Optimal train trajectory platform

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① Presentation of the project

② Conception and Analysis

③ Realization

④ Conclusion

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- **Introduction**

To travel by train is undoubtedly one of the most efficient means of transport for reasons of speed, security and comfort. Nowadays, online reservation of tickets has made it a lot easier to book a travel by train. For all that, this service still lacks many functionalities that we shall be discussing later on.

Problematic

While booking a train ticket online, we find that for long distance trajectories, the ONCF platform happens to only show two to three options for tickets per day, the thing that doesn't offer a practical flexibility of time. We have examined other train companies in other countries where the same problem occurs.



Figure 1 – Logos of verified train companies

- **Suggested Solution**

In order to solve this problem, we suggest making an automatized program that extracts all the possible and optimal combinations of two trajectories. the first one being from the departure station to the correspondence station that can be chosen from that main trajectory, and the second one from the intermediate station to the final destination, all while minimizing the waiting time between the two trajectories. The thing that will ultimately offer more time flexibility on the user's hands.

Objectives

- Dynamically scrape the trajectory data according to the desired travel by the user.
- Find the optimal combinations from the extracted data to create new travel options using correspondences.
- Displays the new data on a user-friendly platform that offers the possibility to filter the results by price, time, type of train and other parameters.

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② Conception and Analysis

UML diagrams

Analyzing the Moroccan railway network

③ Realization

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UML diagrams

Use case diagram

Class diagram

Sequence diagram

Analyzing the Moroccan railway network

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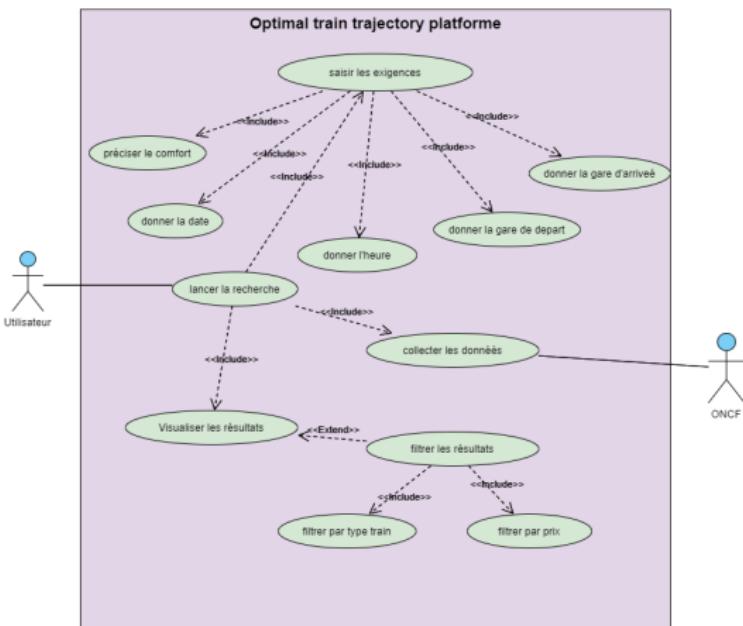


Figure 2 – Use Case Diagram

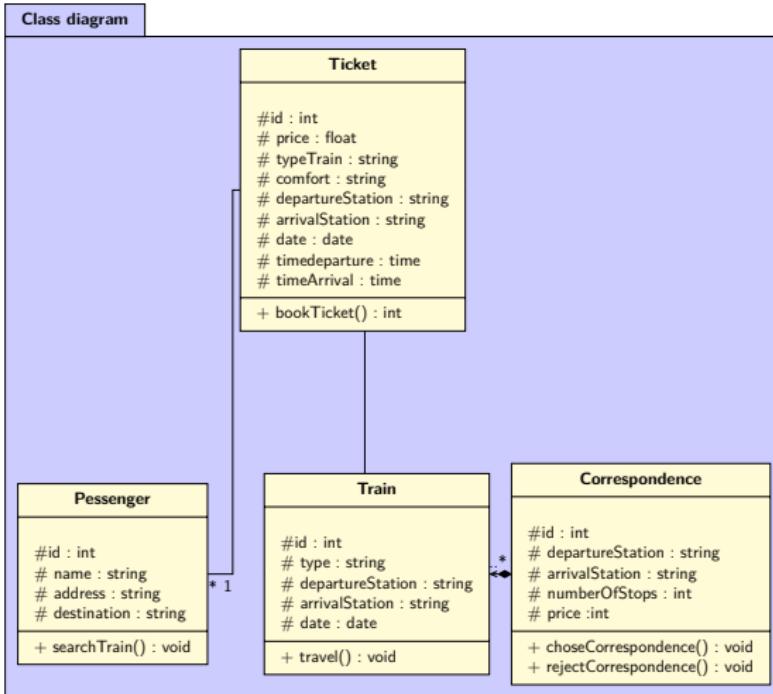


Figure 3 – Class Diagram

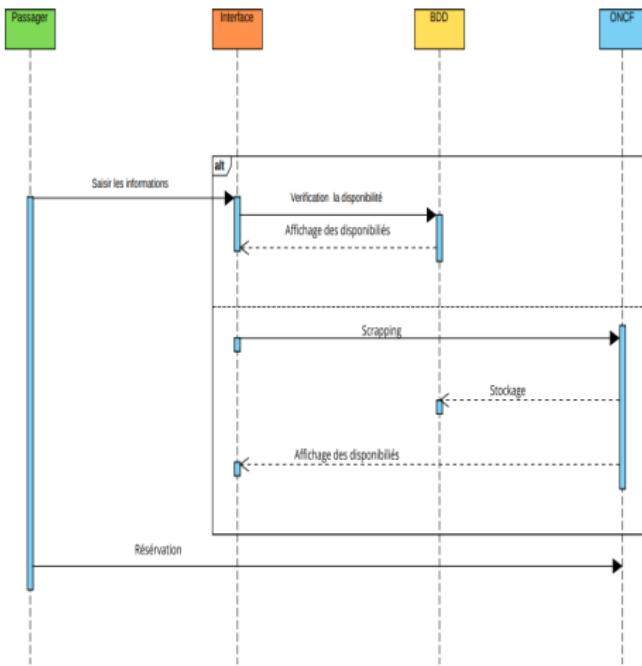


Figure 4 – Sequence Diagram

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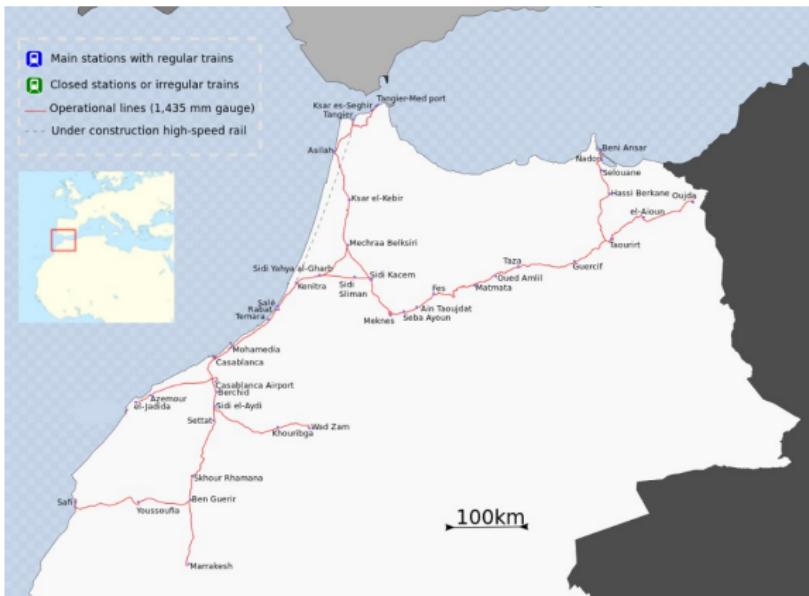


Figure 5 – Geographical distribution of train stations

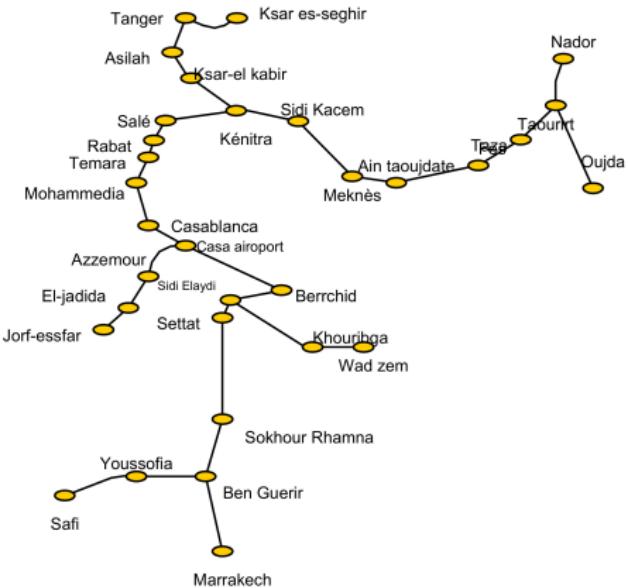


Figure 6 – Graph Model

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Scraping

Web Application

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- **Used tools**

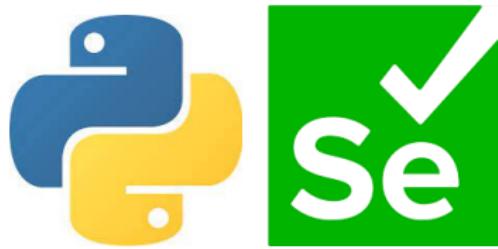


Figure 7 – Used tools

Procedure description

Départ	Arrivée	Service à bord	Gamme	
06h35min	10h38min	✳	TL TLR	ACHETER EN LIGNE
06h35min	11h08min	✳	TL TN	ACHETER EN LIGNE
07h00min	08h20min	✳	TL	ACHETER EN LIGNE
07h40min	12h38min	✳	TLR TLR	ACHETER EN LIGNE
09h00min	10h20min	✳	TL	ACHETER EN LIGNE
09h35min	13h38min	✳	TL TLR	ACHETER EN LIGNE
09h35min	14h08min	✳	TL TN	ACHETER EN LIGNE
10h00min	11h20min	✳	TL	ACHETER EN LIGNE
11h00min	12h20min	✳	TL	ACHETER EN LIGNE
11h35min	16h38min	✳	TLR TLR	ACHETER EN LIGNE
13h00min	14h20min	✳	TL	ACHETER EN LIGNE

Figure 8 – Screenshot of the first website (oncf.ma)

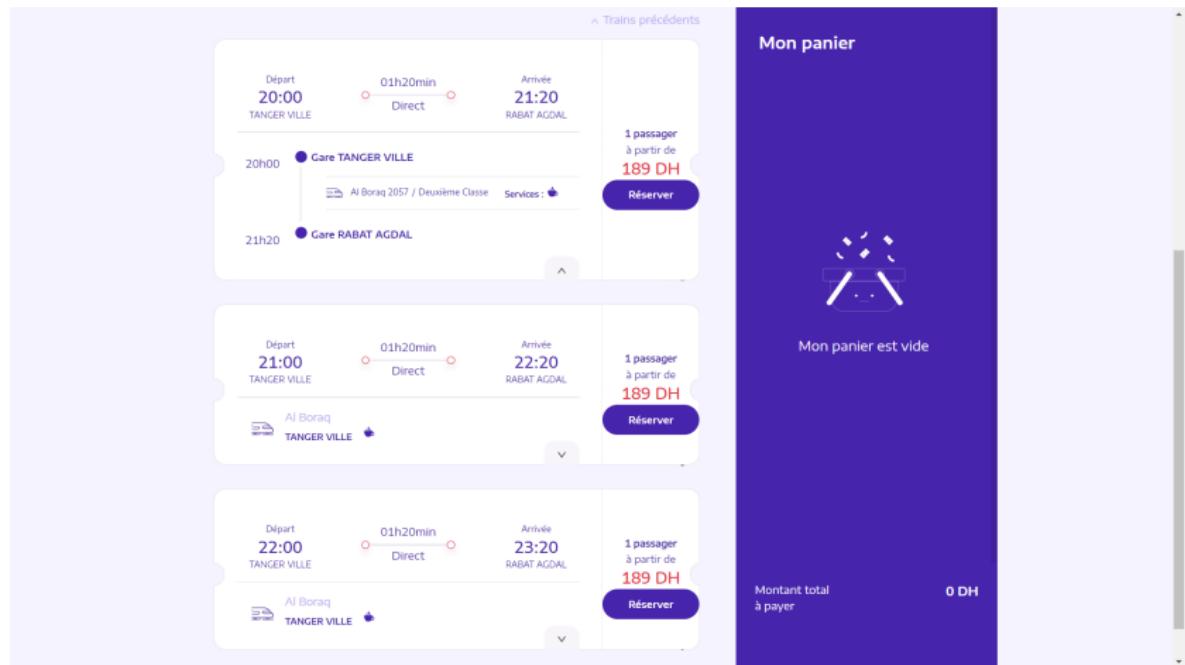


Figure 9 – Screenshot of the second website (oncf-voyages.ma)

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- Used tools



Figure 10 – Used tools

- **Web Application**



Figure 11 – Logo of our platform

Descriptive video

- Descriptive video



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Conclusion

- Strong points of our website :
 - ✓ Dynamic website powered by a scraping bot
 - ✓ Speed up the search process by storing the scraped data in a database
- Difficulties encountered :
 - ✗ ONCF websites showed signs of bugs, malfunctions and breakdowns

Thanks for your attention !