The Navarchos Fleet Management Platform

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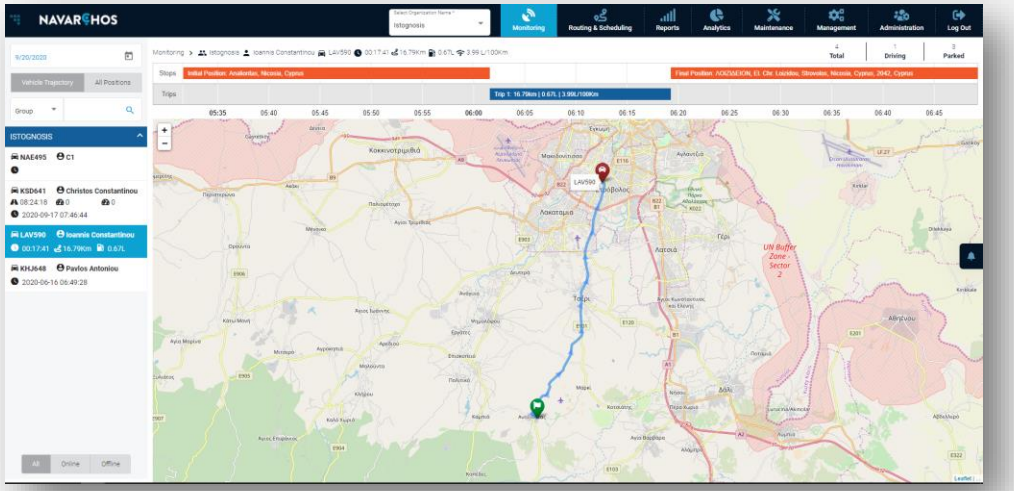
NAVARCHOS

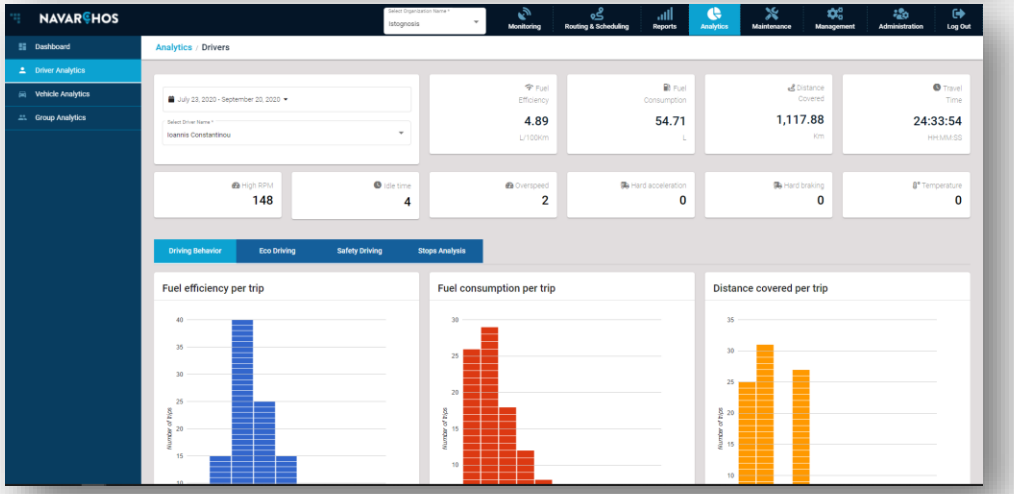
istognosis

power through knowledge

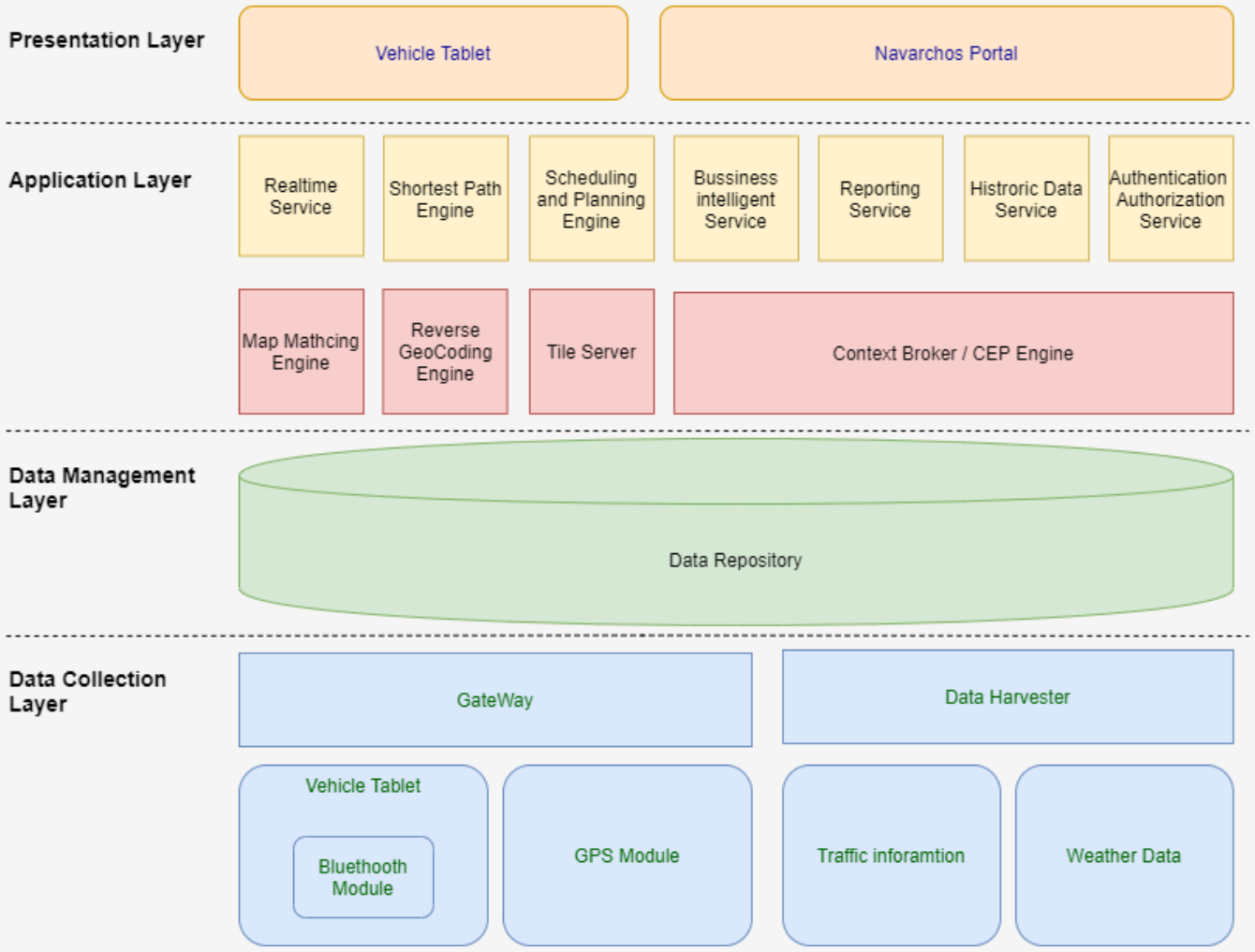
Navarchos Features and Functionalities

- Cloud-based, scalable, highly available architecture based on **microservices** design pattern
- Efficient aggregation of **multi-source data**
- Facilitation of **complex event processing** over (potentially big) data warehousing
- **Real-time, driver-centric notifications** and **recommendations** algorithm for **safe-driving and eco-driving**
- Fleet-centric **and driver-centric** intelligent **metrics and analytics**
- Historical Vehicle Tracking System **Data Analytics**
- **Routing optimization and route planning** (scheduling) engine
- Navarchos FMS **is currently installed in 30 small fleets** in Cyprus supporting 180 vehicles

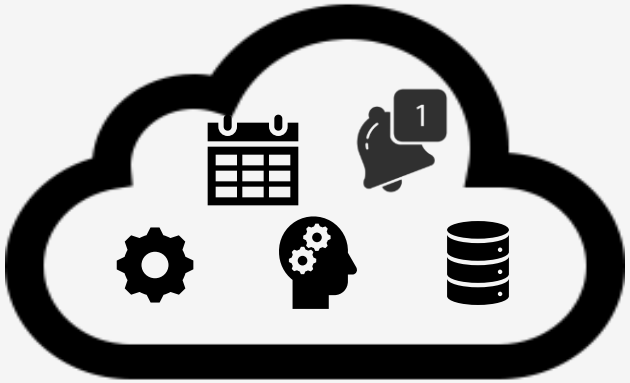




Navarchos Architecture



15 Microservices



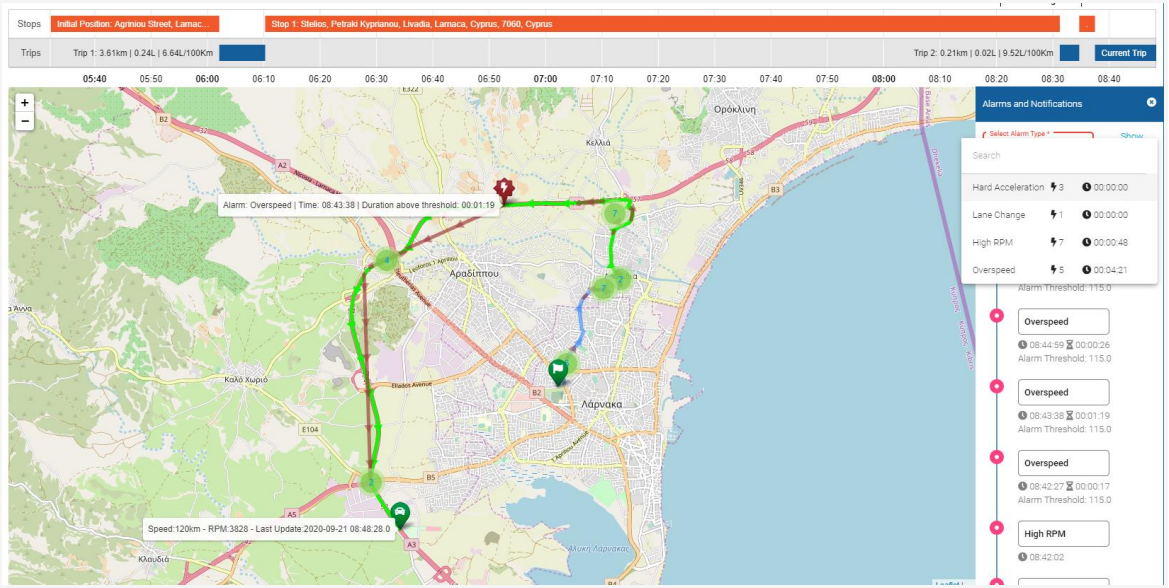
Driving behavior, vehicle diagnostics

Current traffic conditions

Current weather & weather forecast

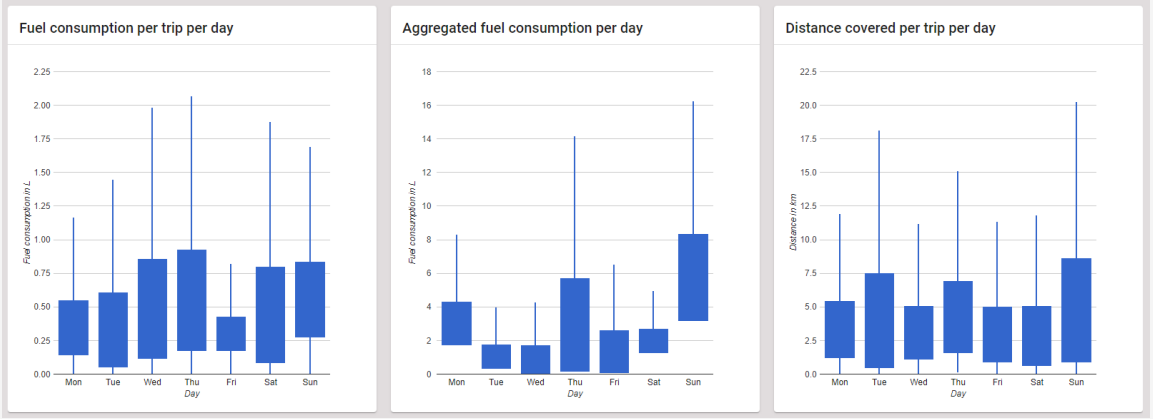
Navarchos Realtime Notifications

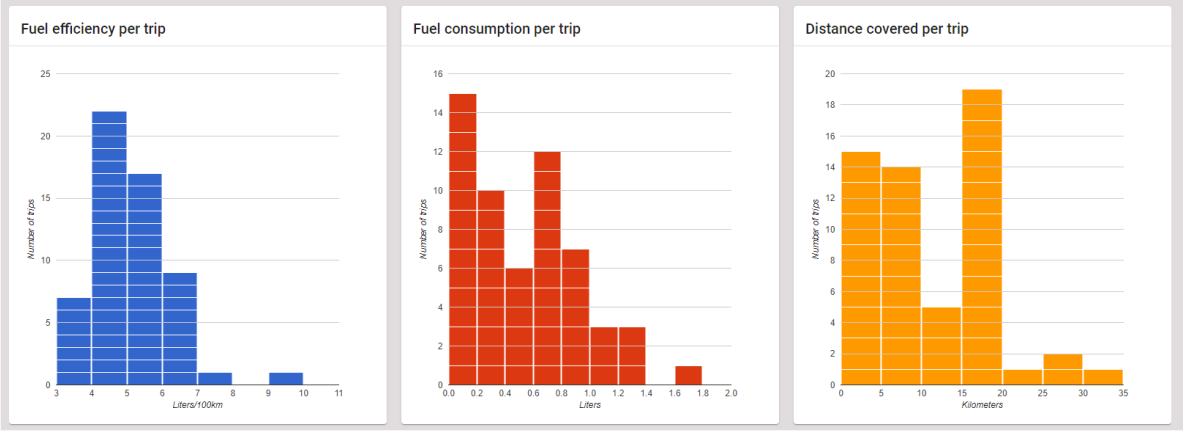
- Real time Notifications based on thresholds
  - Overspeed
  - High RPM
  - Hard Cornering
  - Hard Acceleration
  - Hard Braking
  - Towing
  - Quick Lane change
  - Sharp Turn
  - Long Idling
  - High Temperature
  - Low Voltage
- Real time notifications provided by CEP engine
  - A driver is in traffic jam. Notify other drivers in the area for the traffic jam in the specific route.
  - Weather is windy and/or rainy and/or snowy. Notify drivers in the area.

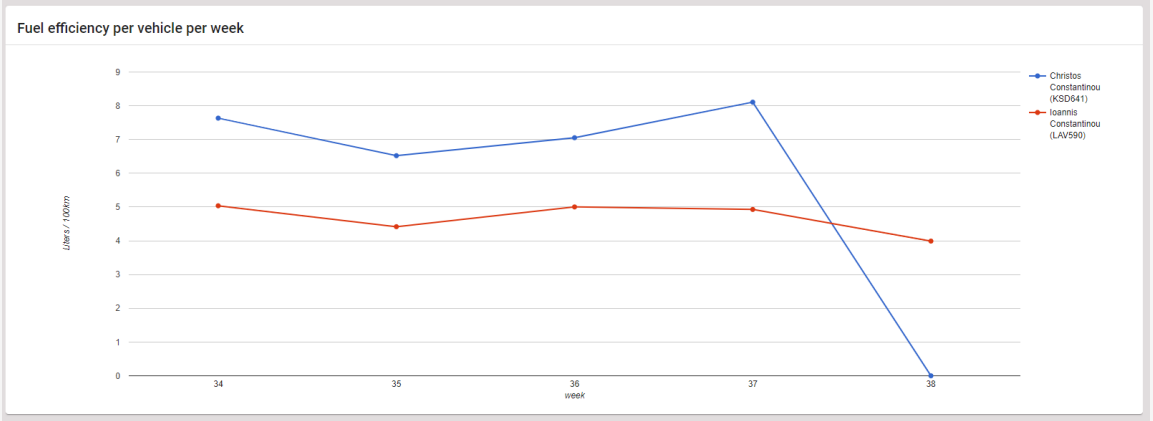


Navarchos Data Analytics and Driving Behavior Metrics

- More than **140 charts** of statistics and measurements
  - Individual driver analysis for **eco** and **safety** driving
  - Driver **comparison** for driver benchmarking
  - **Regression analysis** for investigating driver performance and providing recommendations

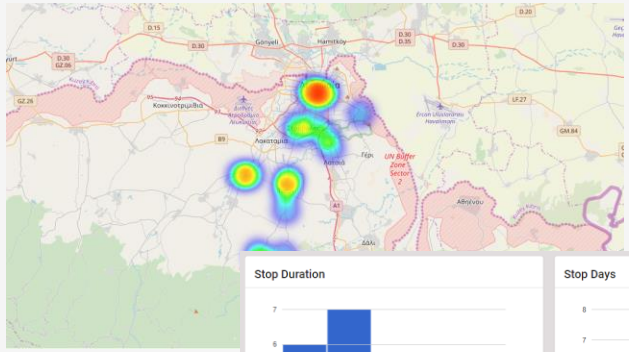


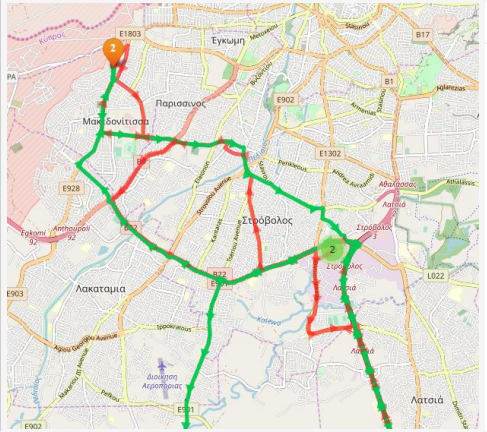


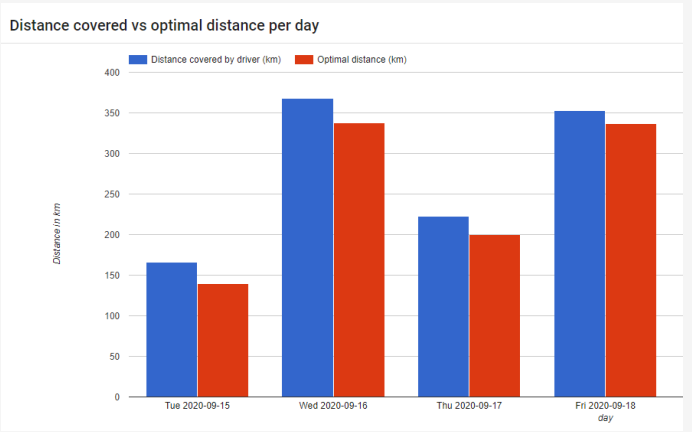


Navarchos Data Analytics and Driving Behavior Metrics

- **Automatic points of interest (POI) detection**
  - Spatial data Clustering using DBSCAN (density-based spatial clustering of applications with noise) algorithm.
- **POI analytics**
  - Histogram of time of arrival at each POI
  - Histogram of day of arrival at each POI
  - Histogram of stop duration at each POI
- **Actual Route Vs Optimal Route**
  - Distance covered (Km)
  - Trip duration (min)





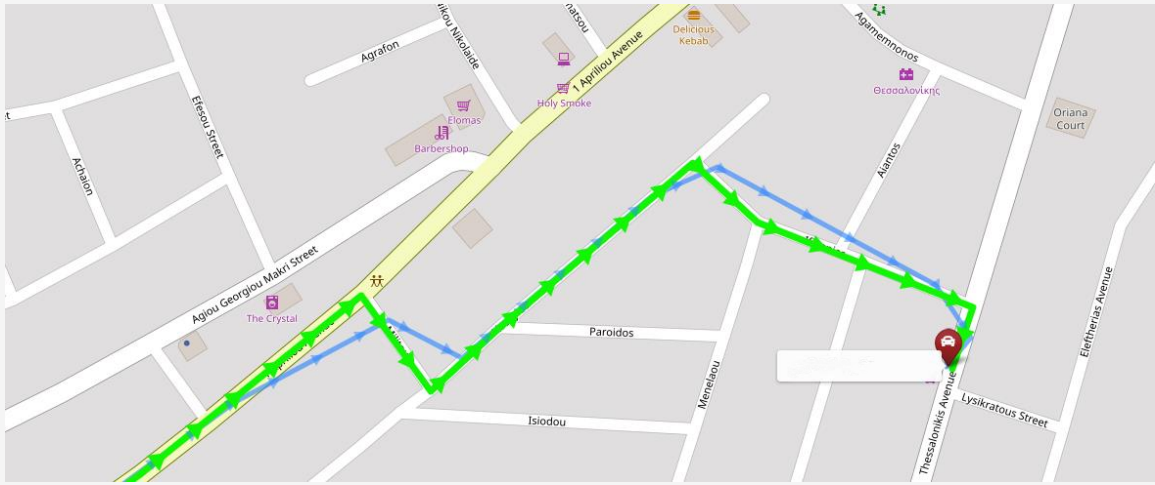


Navarchos Map Matching and Trajectory Clustering Analytics

Trajectory Clustering based on Map Matching algorithm*

This algorithm works as follows:

- For each input GPS position, a number of map matching candidates **within a certain radius around the GPS position is computed. The number of map matching candidates is computed based on the direction and the speed of the vehicle.**
- The Viterbi algorithm is then used to compute the most likely sequence of map matching candidates.
- Thereby, the distances between GPS positions and map matching candidates as well as the routing distances between consecutive map matching candidates are taken into account.
- The **GraphHopper** routing engine is used to find candidates and to compute routing distances.
- The map matching **trajectories are clustered** using **spatial algebra functions**



*Newson, Paul, and John Krumm. "Hidden Markov map matching through noise and sparseness." Proceedings of the 17th ACM SIGSPATIAL International Conference on Advances in Geographic Information Systems. ACM, 2009.

Navarchos Routing Optimization and Scheduling Engine

USE CASE A

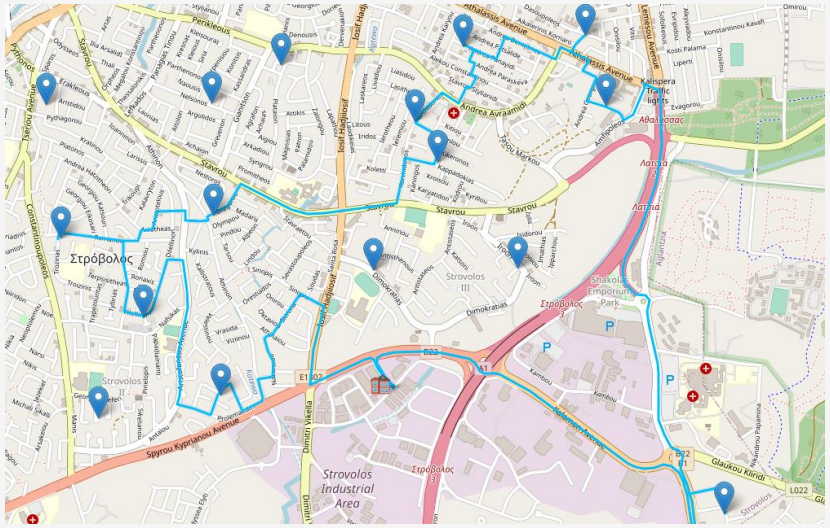
- **X vehicles** available having **Xi capacity**
- **Y customers** with **Yi demand, Service Time**.
- **Z warehouses** working time window.
- Products must be delivered to all customers within the time window of warehouse.

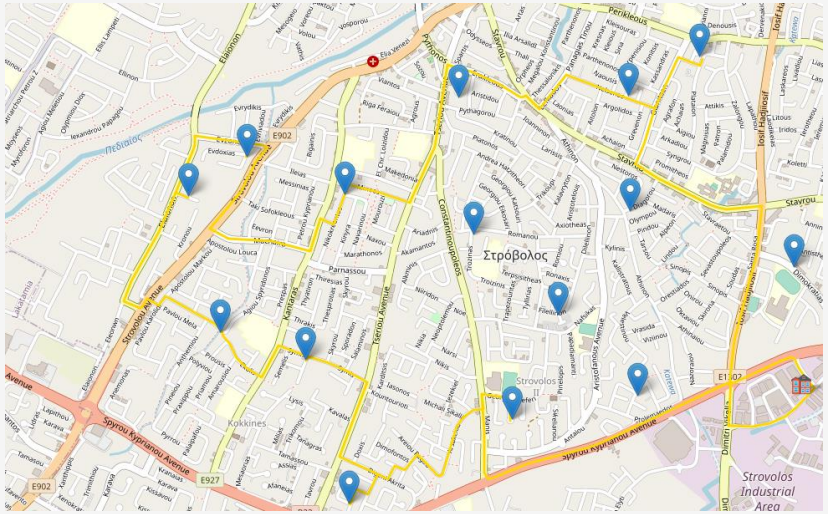
- Which is the minimum number of vehicles and their routes to cover the Y customers.

USE CASE B

- X vehicles available having **Xi capacity**
- Y customers with **Yi demand, Ready Time, Due Time, Service Time**.
- **Z warehouses** working time window.
- Products must be delivered to all customers within the time window of warehouse and each customers.

- Which is the minimum number of vehicles and their routes to cover the Y customers.





More questions about Navarchos?

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