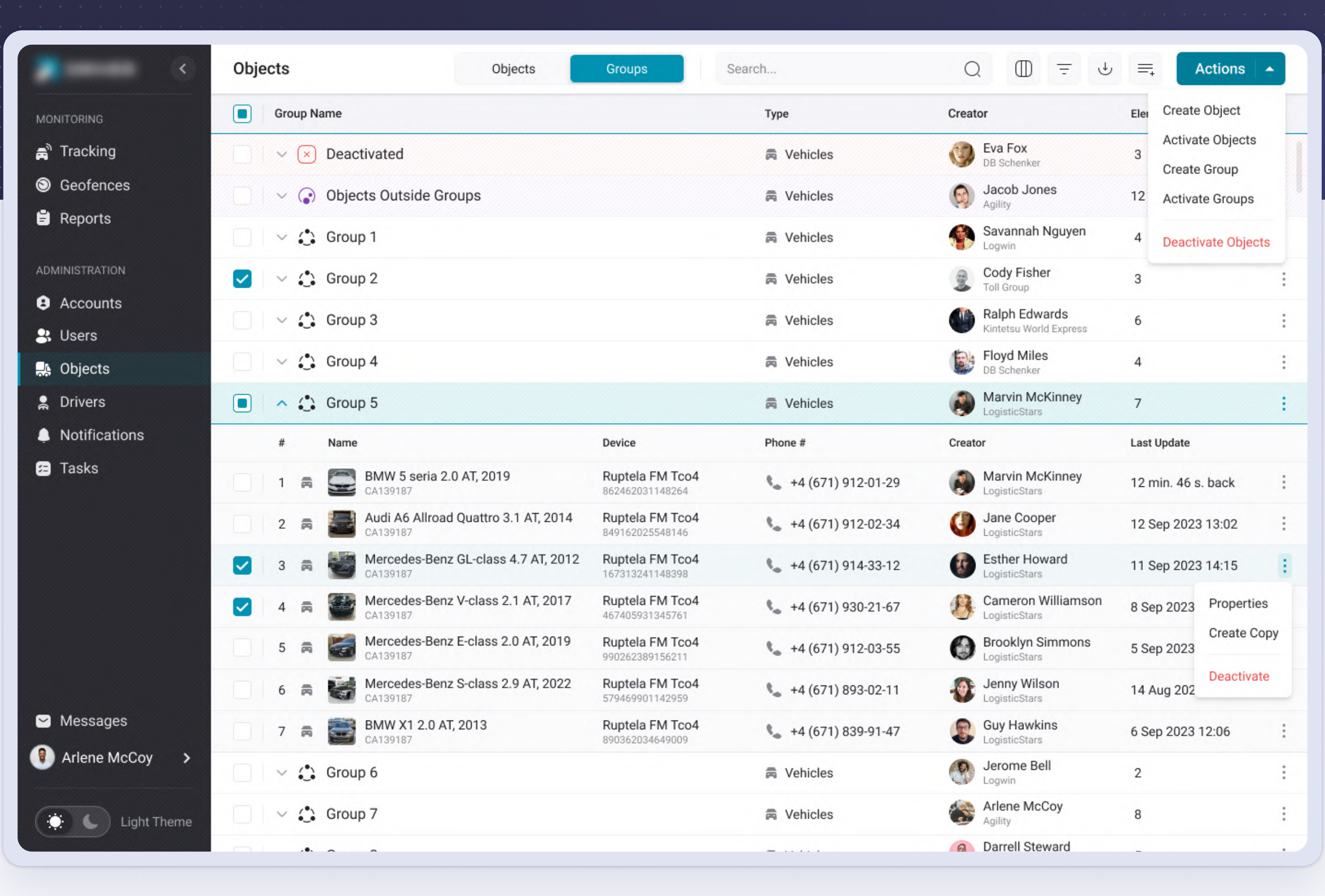
XB Software

We have successfully completed over 200 projects in 65+ countries across the globe. The majority of our clients reside in the United States, Canada and the European Union.

Traccar-Based GPS Tracking System

A GPS tracking system for commercial moving companies and other businesses that deal with monitoring, transportation, and relocation of different objects, including office furniture, lab equipment, animals, vehicles, warehouse items, etc., equipped with special sensors.



Group Name	Type	Creator	Ele
Deactivated	Vehicles	Eva Fox DB Schenker	3
Objects Outside Groups	Vehicles	Jacob Jones Agility	12
Group 1	Vehicles	Savannah Nguyen Logwin	4
Group 2	Vehicles	Cody Fisher Toll Group	3
Group 3	Vehicles	Ralph Edwards Kintetsu World Express	6
Group 4	Vehicles	Floyd Miles DB Schenker	4
Group 5	Vehicles	Marvin McKinney LogisticStars	7

#	Name	Device	Phone #	Creator	Last Update
1	BMW 5 seria 2.0 AT, 2019 CA139187	Ruptela FM Tco4 862462031148264	+4 (671) 912-01-29	Marvin McKinney LogisticStars	12 min. 46 s. back
2	Audi A6 Allroad Quattro 3.1 AT, 2014 CA139187	Ruptela FM Tco4 849162025548146	+4 (671) 912-02-34	Jane Cooper LogisticStars	12 Sep 2023 13:02
3	Mercedes-Benz GL-class 4.7 AT, 2012 CA139187	Ruptela FM Tco4 167313241148398	+4 (671) 914-33-12	Esther Howard LogisticStars	11 Sep 2023 14:15
4	Mercedes-Benz V-class 2.1 AT, 2017 CA139187	Ruptela FM Tco4 467405931345761	+4 (671) 930-21-67	Cameron Williamson LogisticStars	8 Sep 2023
5	Mercedes-Benz E-class 2.0 AT, 2019 CA139187	Ruptela FM Tco4 990262389156211	+4 (671) 912-03-55	Brooklyn Simmons LogisticStars	5 Sep 2023
6	Mercedes-Benz S-class 2.9 AT, 2022 CA139187	Ruptela FM Tco4 579469901142959	+4 (671) 893-02-11	Jenny Wilson LogisticStars	14 Aug 202
7	BMW X1 2.0 AT, 2013 CA139187	Ruptela FM Tco4 890362034649009	+4 (671) 839-91-47	Guy Hawkins LogisticStars	6 Sep 2023 12:06

Group Name	Type	Creator	Ele
Group 6	Vehicles	Jerome Bell Logwin	2
Group 7	Vehicles	Arlene McCoy Agility	8
		Darrell Steward	

Business Challenge

A customer from an investment company approached us with an idea of creating a GPS tracking application based on two popular systems:

- ✓ Wialon fleet management system, and
- ✓ Traccar, which is a free open-source GPS tracking system available on GitHub.

Both systems lack intuitive and logically structured frontend, which is why our client asked us to create a better version of them and add those features that will be game-changing for its users - the owners of the Logistic and Transportation companies, fleet managers, drivers, and other clients whose aim is to track moving objects.

The client wanted to take the **frontend from Wialon** as a reference, upgrade it and make the application operate on the **backend from Traccar**. They liked the server given by Traccar and wanted Traccar customization. Besides that, more than 140 companies in the world use Traccar, so it was a decision not meant for discussion.

Both systems are past their prime as they have been on the market for more than 14 years. Many of the improvements were made as customization added to the existing systems above the existing architecture and logic. Thus, **some of the features were illogical or disconnected** turning user experience into a long and tiresome journey each time. For example, the reporting feature was scattered across the entire app while it could be a lot easier to gather all the tasks relevant to reporting in one place. Also, the **new interface should have a modern UI & UX**, but the former customers should feel like they are working with the **familiar interface with the same functionality** of the controls.

After analyzing the best solutions on the market, we saw opportunities for improving frontend and user experience for the future application. Therefore, it was decided to create a new frontend based on Wialon and adapt it to the Traccar backend. By developing a brand new User Interface, we could put together the best practices initially and lay down a logically improved architecture without having the need to rebuild existing systems from the ground up.

Solution

To grasp the full idea of our client and reach the outcome they expected, we worked in a close collaboration, constantly communicating and exchanging our opinions. The thorough analysis of the possibilities for frontend implementation and the Traccar backend customization helped our team to get the full picture and know what we would be working with.

Traccar Customization

To know how to successfully implement all the changes we planned on frontend and adapt them to backend, our developers and business analysts investigated the existing Traccar backend. During the development process, we had to adapt some of the Traccar features to what we wanted to implement. Thus, for example, we had to **match available fields from Traccar with the Wialon fields**. In some cases, missing fields were created as additional custom fields.

Working with the Traccar backend gave us valuable experience, because there were also situations when we had to request the Traccar team to make some changes on the backend:

- ✓ Add an attribute “Administrative” for custom fields, so the creator could mark the fields with a relevant role (admin, manager, user) to let users control the fields they need from the backend;
- ✓ Tracar had an API for uploading images of the moving objects. We requested an API to store images of drivers and geofences;
- ✓ Add possibility to get the history of the driver assignments;
- ✓ API for list of the supported devices types;
- ✓ Add feature to return the driver along with the assigned device on demand;
- ✓ Implement possibility to receive the fuel level in the position attributes instead of the fuel consumption by period;
- ✓ Implement grouping for tables in report templates;
- ✓ Add an attribute “type” to Messages.

UI Changes

This is basically the side of an app that is accessible for all users depending on their roles. After logging into the user's application, all access rights come from the server to the frontend. Depending on these access rights and user role, only the content and functionality available for a particular user is displayed during the session.

The system for users with limited access now includes 3 tabs:

- ✓ **Tracking**. A user can monitor and manage Objects or be included in Groups to perform the tasks set for a group of users. Here, it’s also possible to build quick reports for each appropriate Object or Group, and the system quickly redirects users to the Reports tab.
- ✓ **Geofences**. Users can check relevant Geofences or those that were included in certain Groups.
- ✓ **Reports**. We completely reworked this feature to add logic and intuitively to the reporting process. Users can now use hardcoded or custom Report templates to get information about Tracks, check Messages, and create or display other Reports for any Object/Group for any period. Some of the reporting features were available for Admins only, but we decided to transfer them to the User side to let drivers and other employees create better reports including all required data.

Admin and Super Admin Module

As for the administrator side of the application, it also includes more logically structured functionality now. Our customer wanted to create an administrative module within their application that would be visible to users with certain rights without the need to launch a separate application. Also, after transferring all reporting features to the Monitoring Module, it gave us more space to improve other features. As a result, the Administration side of the app got the following tabs:

- ✓ **Accounts**. An account is a unity that usually contains a user, data on their access rights, and resources (data on geofences, notifications, etc.).
- ✓ **Users**. A user is a person who logs into the system and has access to its objects in accordance with the granted rights.
- ✓ **Objects**. These are all the objects with implemented sensors that are tracked by the system (tracked vehicles, moving and stationary machinery, people, animals, etc.).
- ✓ **Drivers**. Drivers are also considered as system objects, however they have specific features that differ from other objects. Drivers don’t use the app and don’t have accounts but are able to use some company benefits (for example, to use cards to pay for fuel). All the data on the objects they are assigned to and their activities are tracked by the system.
- ✓ **Notifications**. The tab helps to create, monitor, enable, and disable notifications, whether they are required for particular users, groups, or objects. They help to register and control different events, including object movement, sensor readings, driver assignments, and so on.
- ✓ **Tasks**. This is the tab with all active, inactive, new, completed, and planned assignments that allows admin to have more control over operations.

Some **React pattern complex components** were implemented on frontend to be used across the application. Mostly in the Administrative module, we added **tree-tables** for grouped objects and drivers. All of the data tables and tree-tables were supplemented with the following **pattern functionality**:

- ✓ Multi-level sorting;
- ✓ Popup with configurable frontend filters for all columns and the logic to configure a certain filter type depending on the value type in the column;
- ✓ Columns visibility setup;
- ✓ Checkboxes with specific interaction logic for bulk actions;
- ✓ Row sorting logic.

Traccar provided a functionality to transform raw data received from sensors. But we needed to provide users with a **converter** that has a familiar user interface for creating conversion rules. We also developed a **parsing panel** to let users preview row data in HTML or in data table view and parse them into the columns of the corresponding Report data table.

During the initial stage of the project, all components and their features were pre-designed in an integral style and added into a Storybook to be used across the application. Each new component was implemented the same way.

UX Changes

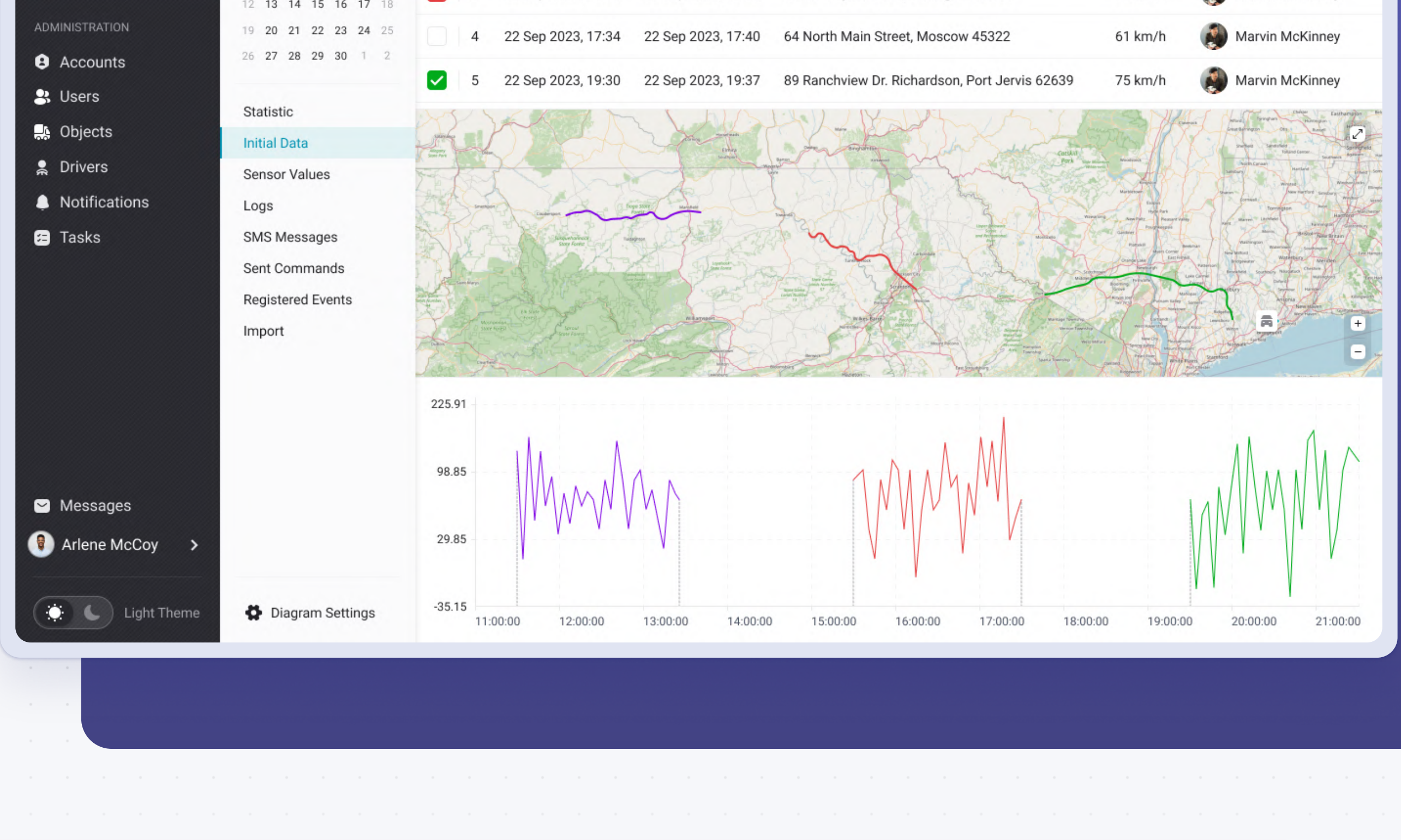
To improve user experience and decrease the amount of struggles, we added **Dynamic tables into the Reporting feature**. For managing dynamic data tables for Report templates, we created a **Data table wizard popup**. With its help, users with manager rights are now able to create, save, and update data tables. A user is now simply able to select data from various sources, group and sort data, and specify is a diagram will be available for the chosen data table.

We have arranged the modules in a **more logical and intuitive hierarchy**. Messages and tracks, which are also reports with a hard-coded template, were located separately in the menu. After analyzing the system design, we created the same two templates for ourselves, but included them in the list of templates, marked as *“standard report”*, which cannot be edited. This helped users to work with the reports they are used to or copy them to create new templates.

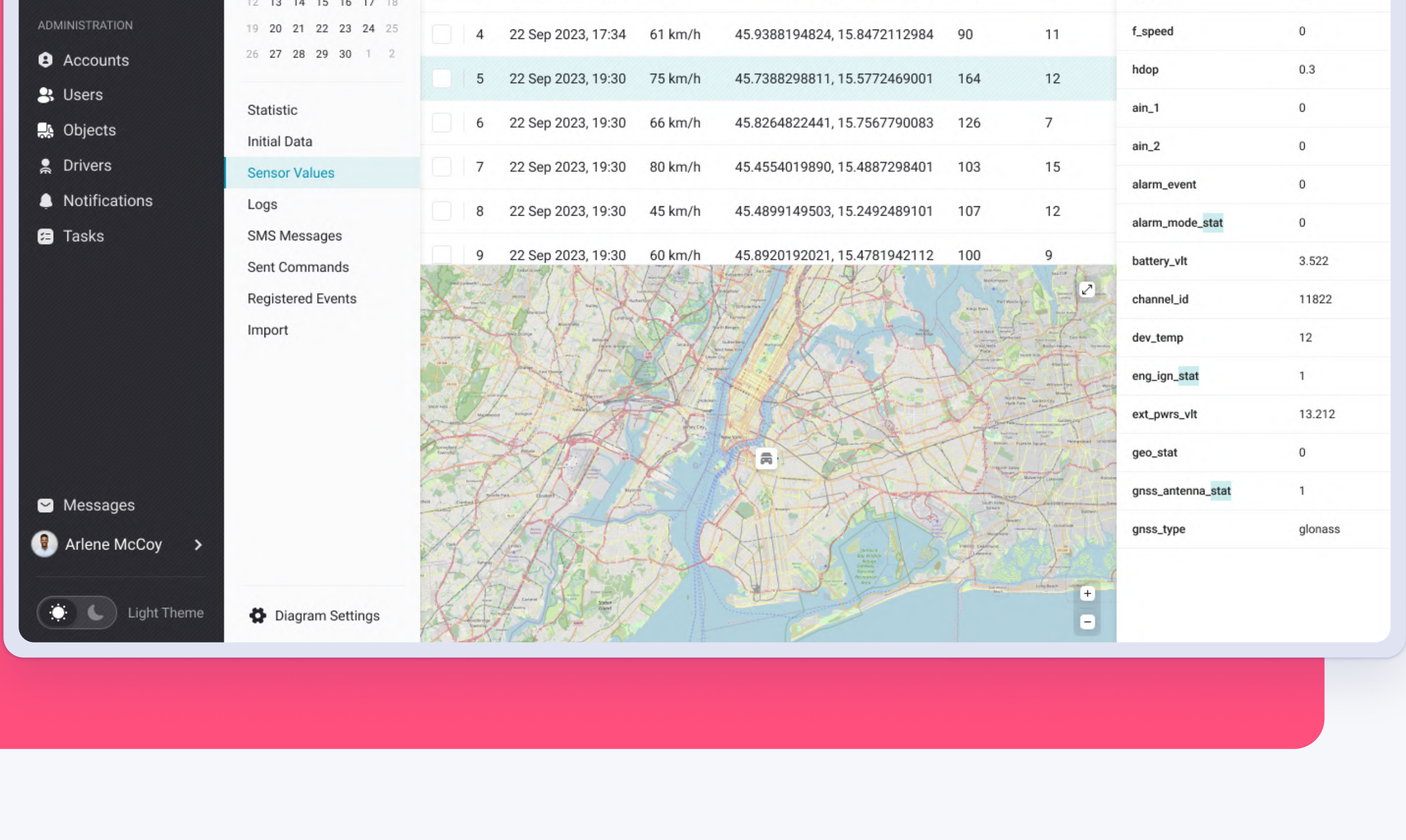
The executed Reports are now displayed on the **Dynamic report page** that contains three blocks interacting with each other: Map, Diagram, and the scope of data tables, displayed on the dynamic horizontal tabs. User actions on one of the blocks are reflected on the others.

Other Changes

The new application not only repeated the functionality familiar to Wialon, but also enriched it with new ones. To make the functionality consistent, we added the ability to make format conversion templates that could be saved and set up as visible for other users to reduce work time consumption.
Multi-language approach was also implemented on the new application architecture, so all text blocks on the frontend weren’t hardcoded but taken from the file with the English version. It will allow the customer to add files to the system with any other languages they need.



#	Time	Registration Time	Position	Speed	Driver
1	22 Sep 2023, 11:30	22 Sep 2023, 11:34	120 Westheimer Rd., Coudersport 54663	65 km/h	Marvin McKinney
2	22 Sep 2023, 13:30	22 Sep 2023, 13:36	25 Parker Rd. Allentown, Mensfield 74802	74 km/h	Marvin McKinney
3	22 Sep 2023, 15:31	22 Sep 2023, 15:34	41 W. Gray St. Utica, Burlington 49102	86 km/h	Marvin McKinney
4	22 Sep 2023, 17:34	22 Sep 2023, 17:40	64 North Main Street, Moscow 45322	61 km/h	Marvin McKinney
5	22 Sep 2023, 19:30	22 Sep 2023, 19:37	89 Ranchview Dr. Richardson, Port Jervis 62639	75 km/h	Marvin McKinney



#	Time	Speed	Coordinates	Altitude, m	Options
1	22 Sep 2023, 11:30	65 km/h	45.8265228271, 15.7356214523	120	15
2	22 Sep 2023, 13:30	74 km/h	45.6757559302, 15.7245672597	145	21
3	22 Sep 2023, 15:31	86 km/h	45.8594742811, 15.4459015321	162	17
4	22 Sep 2023, 17:34	61 km/h	45.9388194824, 15.8472112984	90	11
5	22 Sep 2023, 19:30	75 km/h	45.7388298811, 15.5772469001	164	12
6	22 Sep 2023, 19:30	66 km/h	45.8264822441, 15.7567790083	126	7
7	22 Sep 2023, 19:30	80 km/h	45.4554019890, 15.4887298401	103	15
8	22 Sep 2023, 19:30	45 km/h	45.4899149503, 15.2492489101	107	12
9	22 Sep 2023, 19:30	60 km/h	45.8920192021, 15.4781942112	100	9

f_course	102.1
f_speed	0
hdop	0.3
ain_1	0
ain_2	0
alarm_event	0
alarm_mode_stat	0
battery_vlt	3.522
channel_id	11822
dev_temp	12
eng_ign_stat	1
ext_pwrs_vlt	13.212
geo_stat	0
gnss_antenna_stat	1
gnss_type	glonass

Project in Figures

8 Month Duration

2300+ Estimated man-hours

5 Team Size

Applied Technologies

React

node JS

Results

Both our and customer’s teams were stunned by the outcome, because the application was successfully reworked and reanimated. The end result showed that the system can be optimized and customized to the client’s needs to bring a better and more logical user approach. The data is now clearly visualized granting users more understanding of the assigned tasks and letting them spend less time and struggles on deciphering all intricate and old-fashioned features that an application previously had.

Your questions and requests are always welcome!

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