

Overview

Short Description

The application is a Web application making use of cloud services to track the whereabouts of almost any type of physical asset (unit).

Potential users are fleet managers who would subscribe to the service for keeping track of their assets.

Features

- Enables users to track business assets containing GPS devices showing current and historical asset locations in tables and Google Maps.
- Enables users to define landmarks that can be used for issuing notifications upon asset arrival and departure.
- Implemented to use JSON Web Token security.
- Implemented as a single application to manage many accounts, where user management is separately controlled by the account managers.
- Developed to work with both small and large screen sizes.
- Lightweight serverless implementation taking advantage of Google cloud services.
- Allows application administrators to limit individual account utilizations by parameters such as time, transaction load, etc.

Devices

An android application, LayTrax, has been developed to work with this application, no OBD GPS devices, are currently available.

Supported Browsers

Google Chrome

Operational Costs

Google's Firestore charging algorithms take database writes, reads, storage, and network egress into account.

Income Potential

Customers pay for time-limited account service subscriptions. Customers may also be given free trial periods with strict resource limitations.

User Access

Sign In

Sign In with Google

or

Email
lars@exelor.com

Password

Sign In with Email

[Create or Reset Password](#)

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Sign In with Google

or

Email
lars@exelor.com

Password

Sign In with Email

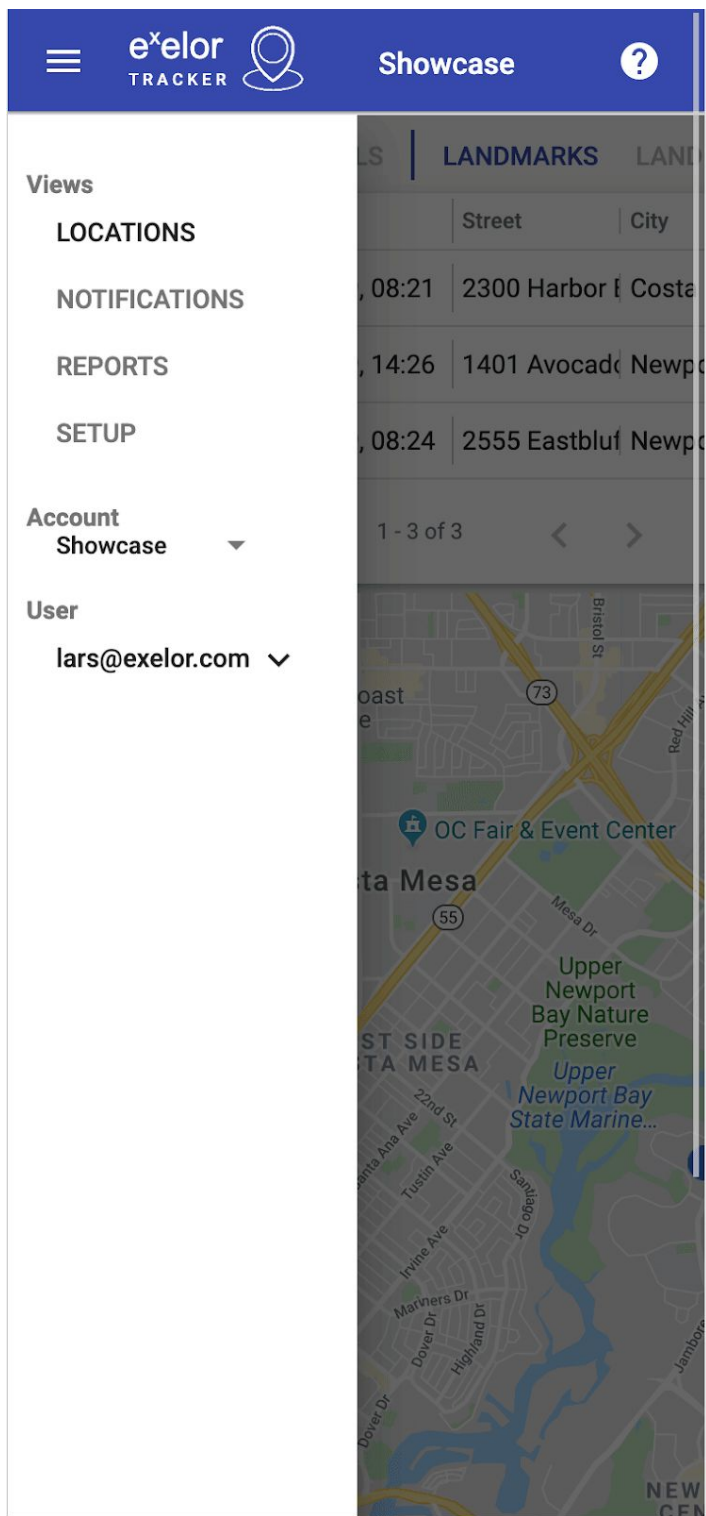
[Create or Reset Password](#)

Having been given account access by an account administrator users can sign in with Google or by using their email addresses. First-time users signing in with email must use the Create or Reset Password link to create their initial passwords. When creating or resetting the passwords, it is necessary that the users have access to the email account for the email address.

In addition to providing a user with access to the account, the administrator also specifies the user's role permissions, such as read, create, and update.

A given user may be given access to multiple accounts and with different role permissions on the different accounts.

Mobile Device Interface



To accommodate smaller devices the user interface is made to respond to the screen width. In such cases, the items on the top navigation bar may appear inside a collapsible side drawer and tables and maps may be stacked vertically as opposed to be positioned side by side.

Locations Module

Unit Locations View

| UNITS | UNIT | DETAILS | LANDMARKS | LANDMARK |
|---------------|-------------------|------------------|---------------|----------|
| Name | Time | Street | City | Lat |
| Pixel 3 | 11-02-2019, 08:21 | 2300 Harbor Bou | Costa Mesa | |
| Pixel 3a XL | 11-08-2019, 20:01 | 300 Avenida Carl | Newport Beach | Bl |
| Galaxy Note 4 | 11-07-2019, 14:26 | 1401 Avocado A | Newport Beach | |
| Simulator One | 11-05-2019, 08:24 | 2555 Eastbluff D | Newport Beach | |

Items per page: 20 1 - 4 of 4

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| UNITS | UNIT | DETAILS | LANDMARKS | LAND |
|---------------|-------------------|-------------------|-----------|------|
| Name | Time | Street | | |
| Pixel 3 | 11-02-2019, 08:21 | 2300 Harbor Bou | | |
| Galaxy Note 4 | 11-05-2019, 13:19 | 1981 Vista Cauda | | |
| Simulator One | 11-05-2019, 08:24 | 2555 Eastbluff Dr | | |

Items per page: 20 1 - 3 of 3

Showing the current location of all units for account Showcase.

The selected unit has the red marker on the map.

[Work is needed to, instead of PNGs, create an SVG marker, which can be pointed correctly with respect to the bearing from one map point to the next (some issues with SVGs and the map library). Also, the selected marker should have the color of the selected row.]

A double-click on the table row for a given unit brings up the Unit History View for that unit.

Users with access to multiple accounts can switch between their accounts using a drop-down menu on the top navigation bar.

Unit History View

Tracker

localhost:4200/tracker/locations/lg/unit-history/e986aaf40fb5ce52

e*elox TRACKER

LOCATIONS NOTIFICATIONS REPORTS SETUP SIMULATOR Showcase

lars@exelox.com

UNITS UNIT DETAILS LANDMARKS LANDMARK

Galaxy Note 4 History

11/7/2019 to 11/7/2019

| Time | Street | City | Landmarks |
|-------------------|-------------------|---------------|-------------|
| 11-07-2019, 14:26 | 1401 Avocado Av | Newport Beach | |
| 11-07-2019, 14:25 | 567 San Nicolas C | Newport Beach | |
| 11-07-2019, 14:25 | 550 Newport Cent | Newport Beach | |
| 11-07-2019, 14:22 | 906 Spring Tide D | Newport Beach | |
| 11-07-2019, 14:20 | 2022 Barranca | Newport Beach | Bluffs 1000 |

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UNITS UNIT DETAILS LANDMARKS LAND

Galaxy Note 4 History

11/5/2019 to 11/5/2019

| Time | Street | City |
|-------------------|-------------------|---------------|
| 11-05-2019, 13:19 | 1981 Vista Caudal | Newport Beach |
| 11-05-2019, 13:18 | 1419 Sea Ridge Dr | Newport Beach |
| 11-05-2019, 13:01 | 1419 Sea Ridge Dr | Newport Beach |
| 11-05-2019, 12:44 | 302 Avenida Carlo | Newport Beach |
| 11-05-2019, 12:34 | 1419 Sea Ridge Dr | Newport Beach |
| 11-05-2019, 12:04 | 302 Avenida Carlo | Newport Beach |
| 11-05-2019, 12:01 | 1419 Sea Ridge Dr | Newport Beach |
| 11-05-2019, 11:37 | 302 Avenida Carlo | Newport Beach |
| 11-05-2019, 11:31 | 1121 Back Bay Dri | Newport Beach |
| 11-05-2019, 11:21 | 302 Avenida Carlo | Newport Beach |
| 11-05-2019, 11:19 | 1121 Back Bay Dri | Newport Beach |

Items per page: 20 1 - 11 of 11

Costa Mesa Newport Beach

Showing a particular unit's whereabouts over time.

The table content is filtered by date range, is paginated, and, in addition to time and location, shows any landmarks visited.

A double-click on the table row for a given history point in time brings up the Unit Details View for that unit.

Unit Details View

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| Account | Showcase |
|-----------------|-------------------|
| Accuracy | 58.01300048828125 |
| Address | |
| Street | 1401 |
| Locality | Avocado Avenue |
| Postal Code | 92660 |
| County | Orange County |
| Country | United States |
| Altitude | 38.29999923706055 |
| Altitude Given | true |
| Bearing | 0 |
| Bearing Given | false |
| Bearing Forward | |

| e*elorr TRACKER Showcase | |
|---------------------------|----------------------|
| UNITS | UNIT DETAILS |
| Galaxy Note 4 | |
| Account | Showcase |
| Accuracy | 23.02899932861328 |
| Address | |
| Street | 1981 |
| Locality | Vista Caudal |
| Postal Code | 92660 |
| County | Orange County |
| Country | United States |
| Altitude | -13.199999809265137 |
| Altitude Given | true |
| Bearing | 0 |
| Bearing Given | false |
| Bearing Forward | |
| Device ID | e986aaf40fb5ce52 |
| Device Time | 2019-11-05, 13:19:27 |
| Document ID | E8SIYad7m0DgFRxa97yH |
| Email | lars@exelor.com |
| Landmarks | Bluffs |
| | Bluffs 1000 |
| Latitude | 33.6345154 |
| Longitude | -117.8848439 |
| Previous Location Bearing | -0.408827006816864 |

The table shows all data received from the device transmitting from the unit at a particular time of the monitored history.

Landmarks View

| Name (ID) | Fence Radius | Units Present |
|--------------|--------------|---------------|
| Bluffs | 10 | |
| Bluffs 1000 | 1000 | |
| Gardena | 100 | |
| Gardena 1000 | 1000 | |
| Toluca | 100 | |
| Toluca 1000 | 1000 | |

Items per page: 10 0 of 0

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| Name (ID) | Fence Radius | Units Present |
|---------------------|--------------|---------------|
| Bluffs | 10 | |
| Bluffs 1000 | 1000 | |
| Gardena | 100 | |
| Gardena 1000 | 1000 | |
| Toluca | 100 | |
| Toluca 1000 | 1000 | |

Items per page: 10 0 of 0

Map showing: Lake Hughes, Lancaster, Quartz Hill, Palmdale, Lake Los Angeles

Showing all landmarks defined for the account. Selecting a landmark row in the table makes the map flag bounce a few times and assume the color of the selected row.

All landmarks are circular with colors and radius lengths controlled by the users.

The number of units present, if any, at the landmarks are shown in the table.

For further details on a selected landmark, click the **LANDMARK** link.

Landmark View

Tracker

localhost:4200/tracker/locations/lg/(place//map:place-map)

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LOCATIONS NOTIFICATIONS REPORTS SETUP SIMULATOR Showcase

lars@exelorr.com

UNITS UNIT DETAILS LANDMARKS LANDMARK

Gardena

| | |
|-----------------------|----------------------|
| Landmark ID | Gardena |
| Units Present | |
| Fence Radius (meters) | 100 |
| Latitude | 33.8929929 |
| Longitude | -118.2950048999998 |
| Last Modified | 2019-10-30, 15:06:41 |
| comment | |

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e*elorr TRACKER

Showcase

UNITS UNIT DETAILS LANDMARKS LANDMARK

Gardena

| | |
|-----------------------|----------------------|
| Landmark ID | Gardena |
| Units Present | |
| Fence Radius (meters) | 100 |
| Latitude | 33.8929929 |
| Longitude | -118.2950048999998 |
| Last Modified | 2019-10-30, 15:06:41 |
| comment | |

Showing the details for the selected landmark.

Notifications Module

Notifications

| Subscription | Time | Type | Landmark | Device Name |
|---|-------------------|-----------|-------------|---------------|
| <input checked="" type="checkbox"/> Bluffs 1000 Arrival | 11/8/19, 8:01 PM | Arrival | Bluffs 1000 | Pixel 3a XL |
| <input checked="" type="checkbox"/> Gardena Arrival | 11/8/19, 8:30 AM | Arrival | Gardena | Pixel 3a XL |
| <input checked="" type="checkbox"/> Bluffs 1000 Arrival | 11/7/19, 6:10 PM | Arrival | Bluffs 1000 | Pixel 3a XL |
| <input checked="" type="checkbox"/> Bluffs Departure | 11/7/19, 2:20 PM | Departure | Bluffs | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs Arrival | 11/5/19, 1:19 PM | Arrival | Bluffs | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 1:19 PM | Arrival | Bluffs 1000 | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs Departure | 11/5/19, 1:01 PM | Departure | Bluffs | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 12:44 PM | Arrival | Bluffs 1000 | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs Arrival | 11/5/19, 12:44 PM | Arrival | Bluffs | Galaxy Note 4 |
| <input checked="" type="checkbox"/> Bluffs Departure | 11/5/19, 12:34 PM | Departure | Bluffs | Galaxy Note 4 |

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| Subscription | Time | Type | Landmark |
|--|-------------------|-----------|-------------|
| <input type="checkbox"/> Bluffs Departure | 11/7/19, 2:20 PM | Departure | Bluffs |
| <input type="checkbox"/> Bluffs Arrival | 11/5/19, 1:19 PM | Arrival | Bluffs |
| <input type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 1:19 PM | Arrival | Bluffs 1000 |
| <input type="checkbox"/> Bluffs Departure | 11/5/19, 1:01 PM | Departure | Bluffs |
| <input type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 12:44 PM | Arrival | Bluffs 1000 |
| <input type="checkbox"/> Bluffs Arrival | 11/5/19, 12:44 PM | Arrival | Bluffs |
| <input type="checkbox"/> Bluffs Departure | 11/5/19, 12:34 PM | Departure | Bluffs |
| <input type="checkbox"/> Bluffs Arrival | 11/5/19, 12:04 PM | Arrival | Bluffs |
| <input type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 12:04 PM | Arrival | Bluffs 1000 |
| <input type="checkbox"/> Bluffs Departure | 11/5/19, 12:01 PM | Departure | Bluffs |
| <input type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 11:37 AM | Arrival | Bluffs 1000 |
| <input type="checkbox"/> Bluffs Arrival | 11/5/19, 11:37 AM | Arrival | Bluffs |
| <input type="checkbox"/> Bluffs Departure | 11/5/19, 11:31 AM | Departure | Bluffs |
| <input type="checkbox"/> Bluffs 1000 Arrival | 11/5/19, 11:21 AM | Arrival | Bluffs 1000 |
| <input type="checkbox"/> Bluffs Arrival | 11/5/19, 11:21 AM | Arrival | Bluffs |

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Showing notifications issued based upon conditions specified by users.

Currently, only landmark arrival and departure notifications are supported.

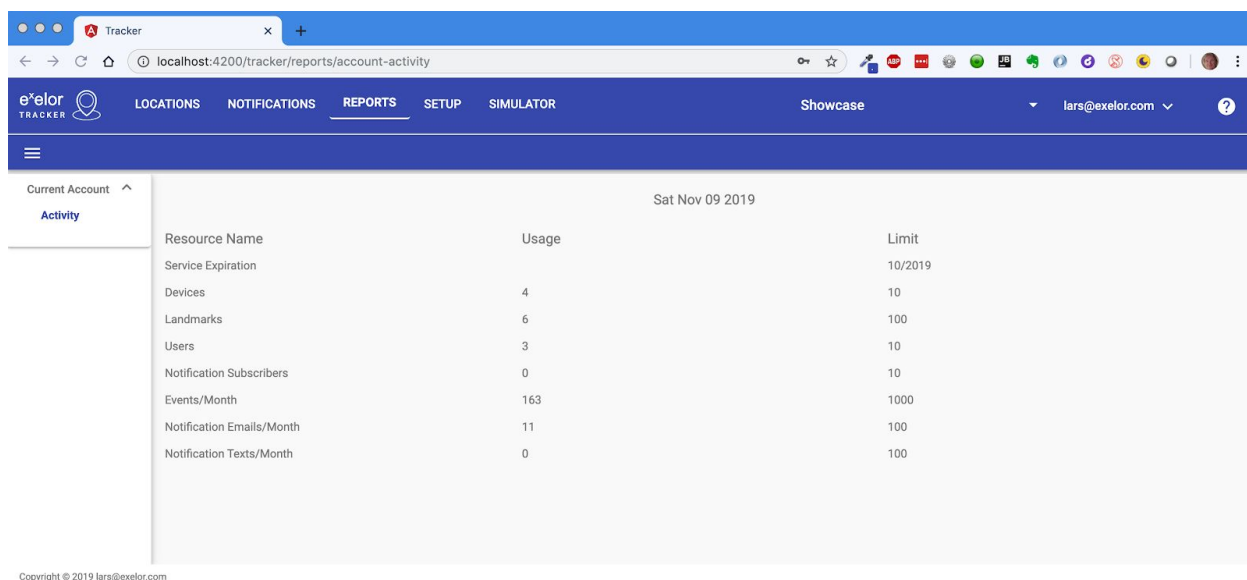
Notifications may also be issued in the form of email and text messages.

Reports Module

This module is intended to support various reporting functions. Report may be displayed on the screen and/or exported as CSV files.

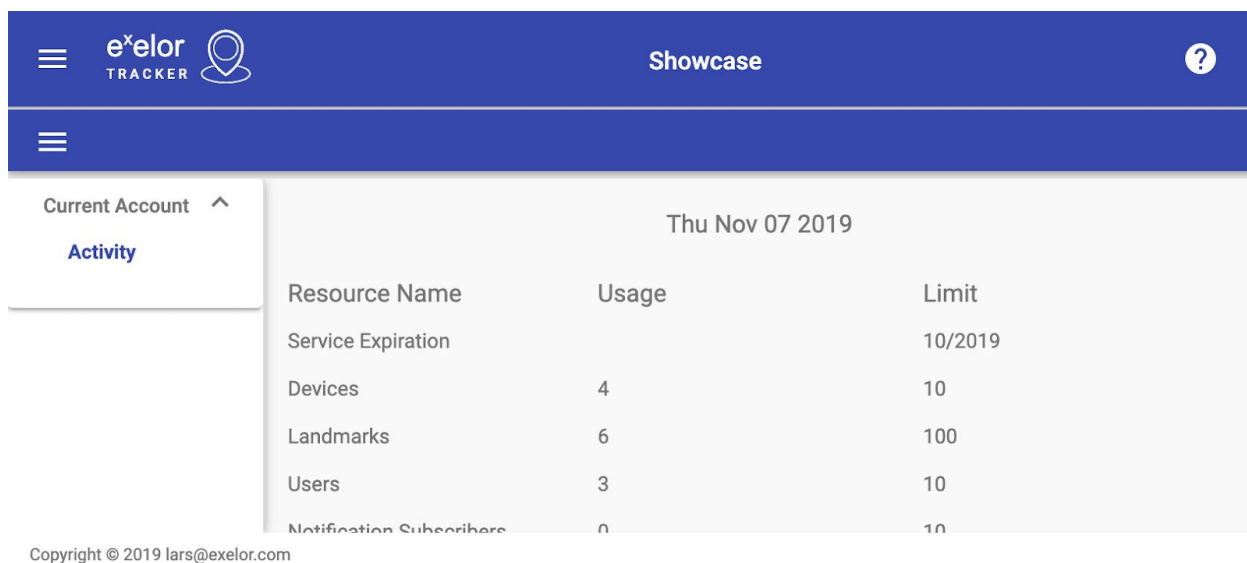
Report implementations may be restricted on mobile devices.

Account Activity



| Resource Name | Usage | Limit |
|---------------------------|-------|---------|
| Service Expiration | | 10/2019 |
| Devices | 4 | 10 |
| Landmarks | 6 | 100 |
| Users | 3 | 10 |
| Notification Subscribers | 0 | 10 |
| Events/Month | 163 | 1000 |
| Notification Emails/Month | 11 | 100 |
| Notification Texts/Month | 0 | 100 |

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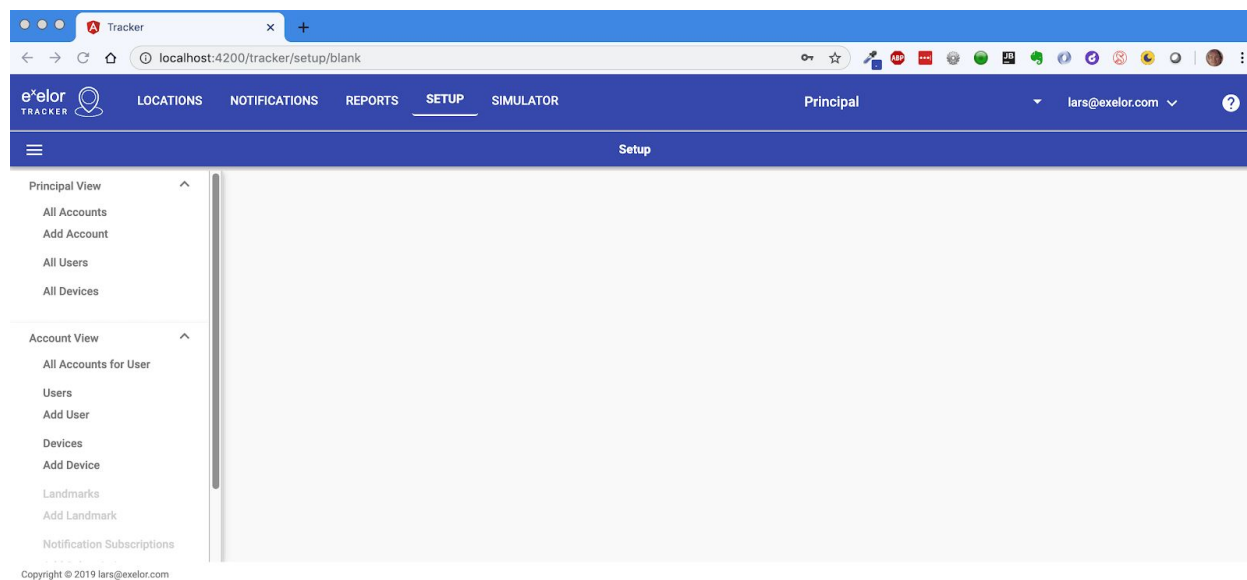
| Resource Name | Usage | Limit |
|--------------------------|-------|---------|
| Service Expiration | | 10/2019 |
| Devices | 4 | 10 |
| Landmarks | 6 | 100 |
| Users | 3 | 10 |
| Notification Subscribers | 0 | 10 |

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Setup Module

The Setup Module is used for creating and setting up user accounts. The user interface supports both desktop and mobile size screens, but we will show only the desktop screenshots in the following.

Principal Account



The two views, Principal and Account, separates system users from account users. Only Principal account users with special user roles can create new accounts and deactivate existing accounts. A Principal user must also create the initial account administrator for a new account.

Other than that, Principal users can view all accounts as well as all users and devices regardless of their user account assignments.

Add Account

The following steps are needed to create a new account.

Tracker

localhost:4200/tracker/setup/create-principal-account

e*elOR TRACKER

LOCATIONS NOTIFICATIONS REPORTS **SETUP** SIMULATOR

Principal lars@exelor.com

Add Account

☐ Active

Name *
Sample

Address 1

Address 2

City

State

Postal Code

Modified

Created

Description

Principal View

- All Accounts
- Add Account**
- All Users
- All Devices

Account View

- All Accounts for User
- Users
- Add User
- Devices
- Add Device
- Landmarks
- Add Landmark
- Notification Subscriptions
- Add Subscription
- Notification Subscribers
- Add Subscriber

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After Save the new account appears in the account list:

Tracker

localhost:4200/tracker/setup/principal-accounts-list

e*elOR TRACKER

LOCATIONS NOTIFICATIONS REPORTS **SETUP** SIMULATOR

Principal lars@exelor.com

All Accounts

| Name | Active | Service Constraints |
|---------------|--------|---------------------|
| BMW | false | ... |
| Principal | true | ... |
| Sample | true | ... |
| Shakedown | false | ... |
| Showcase | true | ... |
| Tracking Demo | true | ... |

Items per page: 10 0 of 0 < >

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Click the “more” button in the Service Constraints column to view and edit the service constraints for the account. The application will refuse requests that exceed the set resource limits.

The screenshot shows the 'eXelOR TRACKER' web application interface. The top navigation bar includes 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP' (active), and 'SIMULATOR'. The user is logged in as 'Principal' with email 'lars@exelcor.com'. The left sidebar shows a tree view with 'Principal View' (All Accounts, Add Account, All Users, All Devices) and 'Account View' (All Accounts for User, Users, Add User, Devices, Add Device, Landmarks, Add Landmark, Notification Subscriptions, Add Subscription, Notification Subscribers, Add Subscriber). The main content area is titled 'Account Constraints' and shows the 'Sample Account' configuration. Fields include: Max Devices * (10), Max Users * (10), Max Landmarks * (100), Max Notification Subscriptions * (100), Max Notification Subscribers * (10), Max Monthly Events * (1500), Max Monthly Notification Emails * (100), Max Monthly Notification Texts * (100), Service Expiration (MM/YYYY) * (2019/11), Time Last Modified (November 7, 2019 at 5:48:41 PM GMT-8), and a Comment field. 'Cancel' and 'Save' buttons are at the bottom.

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Finally, switch to the new account and create a user that can act as an administrator for the account:

The screenshot shows the 'eXelOR TRACKER' web application interface. The top navigation bar includes 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP' (active), and 'SIMULATOR'. The user is logged in as 'Sample' with email 'lars@exelcor.com'. The left sidebar is the same as the previous screenshot. The main content area is titled 'Add User' and shows the 'Sample' account configuration. Fields include: Email (User ID) * (jdoe@exelcor.com), Account Roles * (Creator), Name * (John Doe), Phone, and Comment. There are two checkboxes: 'User can log in' (checked) and 'User can access current account' (checked). 'Cancel', 'Clear', and 'Save' buttons are at the bottom.

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Clicking Save creates the new user and, if the user is not already a member of another account, switches the login to this user. The user is now able to manage the account.

Note that, since the Principal account is no longer selected, the sidebar selections for Principal are no longer enabled. They could alternatively be hidden altogether.

User Accounts

Each user account has its own set of users for monitoring units and landmarks and administrators for managing the accounts.

All Accounts for User

The screenshot shows a web browser window with the URL `localhost:4200/tracker/setup/user-accounts-list`. The application is titled "eXelOR TRACKER" and has a navigation bar with tabs: LOCATIONS, NOTIFICATIONS, REPORTS, **SETUP**, and SIMULATOR. The user is logged in as "jdoe@exelor.com" with the role "Sample".

The main content area is titled "All Accounts for User". It features a sidebar with a "Principal View" section containing links for "All Accounts", "Add Account", "All Users", and "All Devices". Below this is an "Account View" section with a dropdown arrow, containing links for "All Accounts for User" (which is selected), "Users", "Add User", "Devices", "Add Device", "Landmarks", "Add Landmark", "Notification Subscriptions", "Add Subscription", "Notification Subscribers", and "Add Subscriber".

The main table displays a list of accounts. The table has two columns: "Name" and "Active". The first row shows the account "Sample" with the "Active" status set to "true".

| Name | Active |
|--------|--------|
| Sample | true |

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Showing all accounts for the currently signed in user. A double-click on a table row will bring up the previously shown details form for that account.

Users

The screenshot shows the 'e*lor TRACKER' web application. The top navigation bar includes 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP' (active), and 'SIMULATOR'. The user is logged in as 'jdoe@exelor.com'. The 'Users' section is selected in the sidebar. The main table lists the following users:

| Email | Name | Phone | Roles | Active | Signed In |
|-----------------|----------|-------|---------|--------|------------|
| jdoe@exelor.com | John Doe | | Creator | true | 2019-11-09 |
| lars@exelor.com | Lars H | | Creator | true | 2019-11-09 |

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Showing all users having access to the current account. Double-clicking on a table row brings up the user details form, which is also used for adding new users.

The screenshot shows the 'User Details' form for the user 'jdoe@exelor.com'. The form includes the following fields and options:

- Email (User ID) *: jdoe@exelor.com
- Account Roles *: Creator
- Name *: John Doe
- Phone:
- Last Signin: November 7, 2019 at 8:57:40 PM GMT-8
- Modified: November 7, 2019 at 8:57:40 PM GMT-8
- Created: November 7, 2019 at 8:57:40 PM GMT-8
- Comment:
- ☒ User can log in
- ☒ User can access current account
- Buttons: Cancel, Clear, Save

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Users have no access rights outside of the account of which they are created, but a given user may be added as user inside any number of accounts.

Devices

The screenshot shows a web browser window with the URL `localhost:4200/tracker/setup/account-devices-list`. The application has a dark blue header with the 'exelior TRACKER' logo and navigation tabs: 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP' (active), and 'SIMULATOR'. On the right of the header, it shows 'Sample' and the user email 'jdoe@exelior.com'. A sidebar on the left contains a menu with 'Principal View' (All Accounts, Add Account, All Users, All Devices) and 'Account View' (All Accounts for User, Users, Add User, **Devices**, Add Device, Landmarks, Add Landmark, Notification Subscriptions, Add Subscription, Notification Subscribers, Add Subscriber). The main content area is titled 'Devices' and contains a table with the following data:

| Name | ID | Active |
|---------------|------------------|--------|
| Galaxy Note 4 | e986aaf40fb5ce52 | true |

At the bottom left of the page, there is a copyright notice: 'Copyright © 2019 lars@exelior.com'.

Showing all devices registered with the account. The application will accept input only from registered devices. Double-clicking a device row brings up the details form for that device.

Device Details

The screenshot shows a web browser window with the URL `localhost:4200/tracker/setup/account-device-add`. The application is 'eXelor TRACKER' and the user is 'lars@exelor.com'. The 'SETUP' tab is active, and the 'Add Device' form is displayed.

Form Fields and Options:

- Active:** A checked checkbox.
- Name ***: A text input field.
- Device ID ***: A text input field.
- Map Marker Icon:** A map showing the area around Santa Ana, CA, with a blue arrow icon selected.
- Shape:** A dropdown menu set to 'Closed Arrow'.
- Scale:** A text input field set to '4'.
- Fill Color (CSS3):** A text input field set to 'skyblue'.
- Fill Opacity (0.0 - 1):** A text input field set to '1'.
- Outline Color (CSS3):** A text input field set to 'black'.
- Outline Opacity (0.0 - 1):** A text input field set to '1'.
- Outline Weight:** A text input field set to '2'.
- Buttons:** 'Use Icon Default' and 'Make this Icon Default'.
- Notes:** A text area for additional information.
- Footer Buttons:** 'Cancel', 'Clear', and 'Save'.

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This form is also used for adding new devices.

Landmarks

The screenshot shows the eXelOR Tracker web application interface. The top navigation bar includes links for LOCATIONS, NOTIFICATIONS, REPORTS, SETUP, and SIMULATOR. The current page is titled 'Landmarks' and shows a list of landmarks for a specific account. The landmark 'Wedge 300' is highlighted in the list. The background of the page features a map of Corona Del Mar, California, with various landmarks and points of interest marked.

| Name (ID) | Active |
|-----------|--------|
| Wedge 300 | true |

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Showing all landmarks defined for the account. Double-clicking a landmark row brings up the details form for that landmark.

Tracker

localhost:4200/tracker/setup/account-landmark/Sample:Wedge%20300

eXelOR TRACKER

LOCATIONS NOTIFICATIONS REPORTS **SETUP** SIMULATOR

Sample jdoe@exel.or.com

Landmark

Principal View

- All Accounts
- Add Account
- All Users
- All Devices

Account View

- All Accounts for User
- Users
- Add User
- Devices
- Add Device
- Landmarks
- Add Landmark
- Notification Subscriptions
- Add Subscription
- Notification Subscribers
- Add Subscriber

☒ Active

Name (ID) *

Wedge 300

Latitude *

33.59477354271358

Longitude *

-117.88311416842276

Fence Radius (meters) *

300

Color *

red

- Address (Use with Preview to obtain coordinates)

Street Number

Street

City

State

Postal Code

Country

Modified

11/8/19, 8:47 AM

Created

11/8/19, 8:47 AM

Comment

Cancel Delete Preview Save

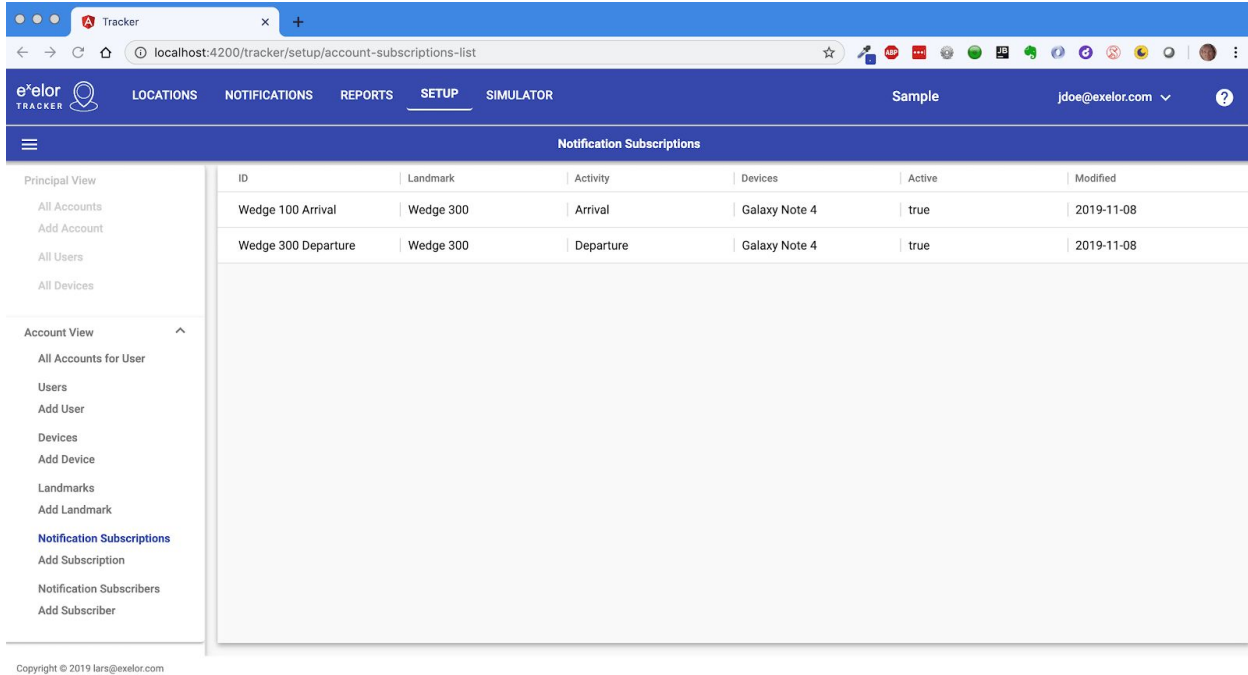
Map data ©2019 Google Terms of Use Report a map error

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This form is also used for setting up new landmarks. Users can position landmarks either by clicking on a map location or by filling in the address box. Clicking the Preview button will render the landmark on the map.

Any number of landmarks can be overlapping.

Notification Subscriptions

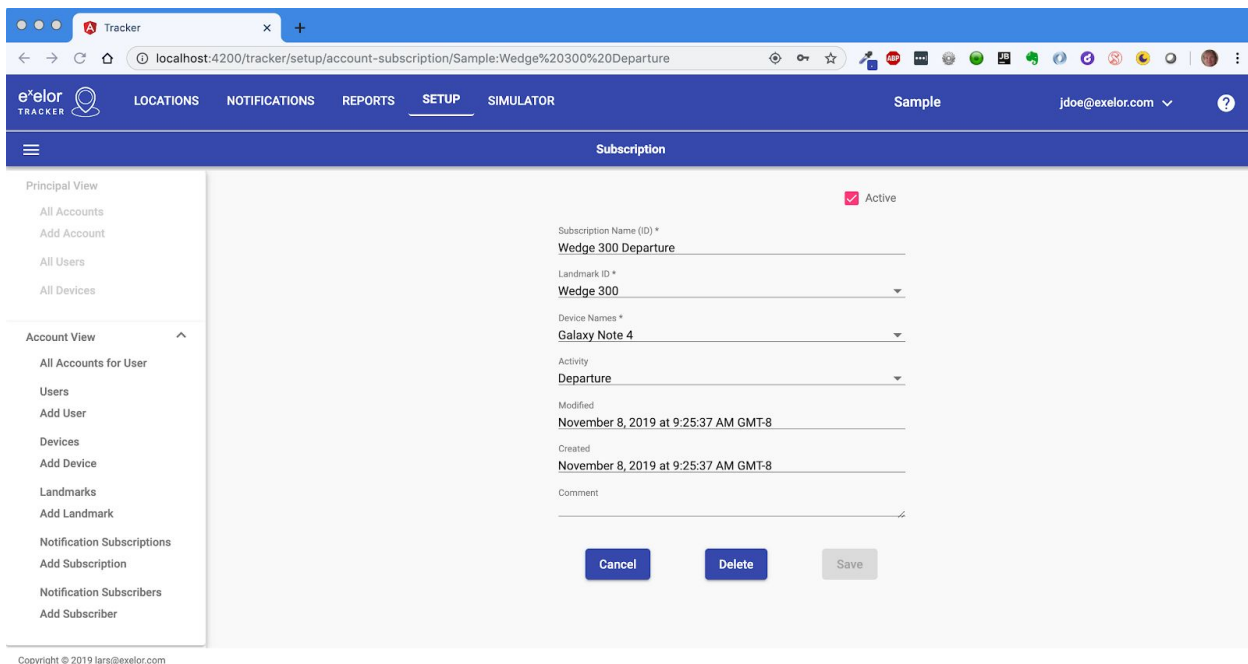


The screenshot shows the 'e*elox TRACKER' web application interface. The top navigation bar includes 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP', and 'SIMULATOR'. The 'SETUP' tab is active, and the 'Notification Subscriptions' page is displayed. The left sidebar shows a menu with 'Principal View' and 'Account View' sections. The main content area shows a table with the following data:

| ID | Landmark | Activity | Devices | Active | Modified |
|---------------------|-----------|-----------|---------------|--------|------------|
| Wedge 100 Arrival | Wedge 300 | Arrival | Galaxy Note 4 | true | 2019-11-08 |
| Wedge 300 Departure | Wedge 300 | Departure | Galaxy Note 4 | true | 2019-11-08 |

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Showing the conditions to be met for the NOTIFICATIONS page to display notifications as the conditions are met. Currently, notifications can be generated only for landmark arrivals and departures. Double-clicking a notification subscription row brings up the details for that subscription.



The screenshot shows the 'e*elox TRACKER' web application interface. The top navigation bar includes 'LOCATIONS', 'NOTIFICATIONS', 'REPORTS', 'SETUP', and 'SIMULATOR'. The 'SETUP' tab is active, and the 'Subscription' page is displayed. The left sidebar shows a menu with 'Principal View' and 'Account View' sections. The main content area shows the details for a subscription:

☒ Active

Subscription Name (ID) *
Wedge 300 Departure

Landmark ID *
Wedge 300

Device Names *
Galaxy Note 4

Activity
Departure

Modified
November 8, 2019 at 9:25:37 AM GMT-8

Created
November 8, 2019 at 9:25:37 AM GMT-8

Comment

Buttons: Cancel, Delete, Save

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This form is also used for creating new subscriptions.

Notification Subscribers

| Subscriber | Subscription | Email Msg | Text Msg | Active | Modified |
|---------------|-------------------|-----------|----------|--------|------------|
| jdoe@exel.com | Wedge 100 Arrival | true | false | true | 2019-11-08 |

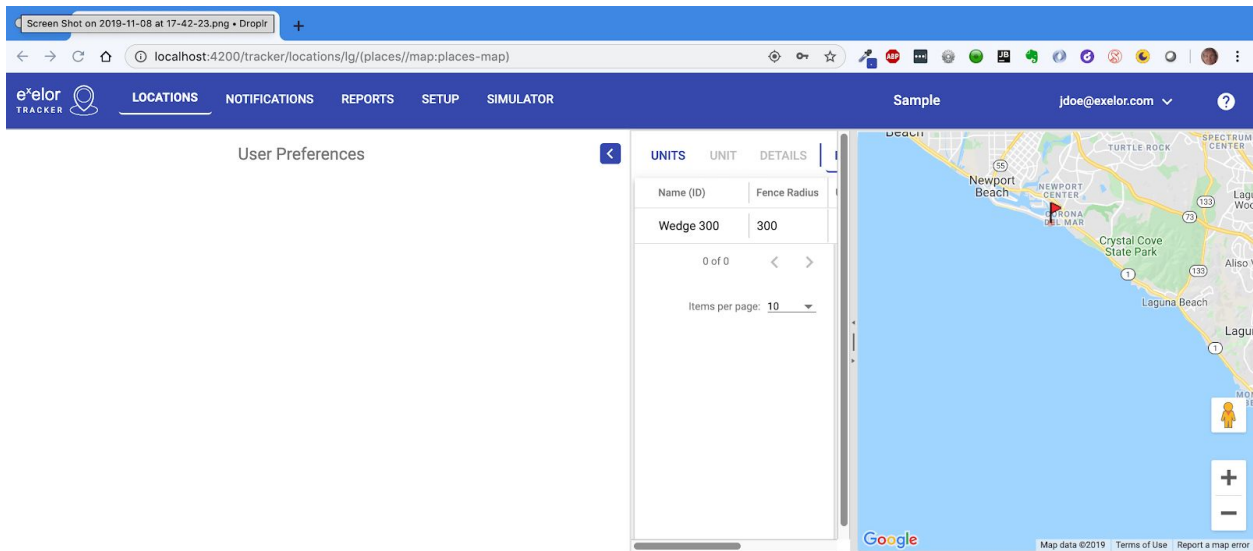
Showing the notification subscribers list. A notification subscriber is notified personally if a particular condition as defined in Notification Subscriptions has been met. Personal notifications can be sent as email and text messages. Double-clicking a subscriber brings up the details form for that subscription.

This form is also used for creating new subscribers.

User Preferences

Preferences Drawer

User preferences, such as localization settings are yet to be implemented. However, a currently empty side drawer has been implemented for this purpose. It is reachable from the user drop-down menu on the top navigation bar.

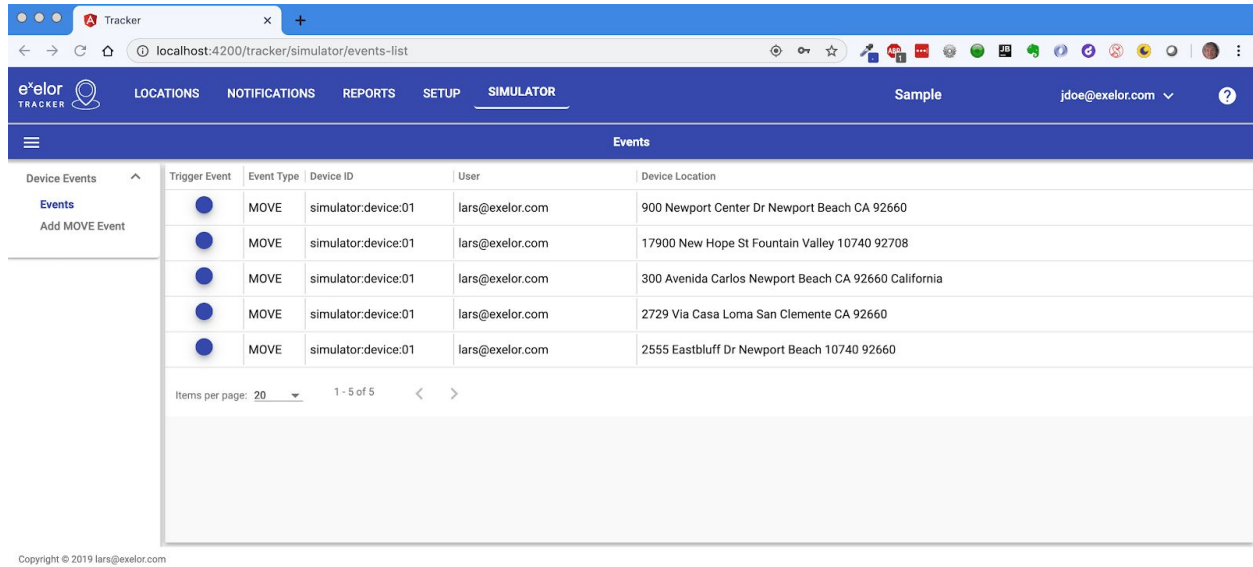


User Documentation






Context sensitive user documentation is displayed by clicking the question mark icon on the top navigation bar.

Simulator

Device Events



The screenshot shows a web browser window with the URL `localhost:4200/tracker/simulator/events-list`. The application is titled "e*elOR TRACKER" and has a navigation bar with links for LOCATIONS, NOTIFICATIONS, REPORTS, SETUP, and SIMULATOR. The SIMULATOR tab is active. On the right side of the header, there is a "Sample" button and a user profile "jdoe@exelor.com". A sidebar on the left shows "Device Events" with a sub-menu "Events" and a button "Add MOVE Event". The main content area displays a table of events.

| Trigger Event | Event Type | Device ID | User | Device Location |
|---|------------|---------------------|-----------------|--|
|  | MOVE | simulator:device:01 | lars@exelor.com | 900 Newport Center Dr Newport Beach CA 92660 |
|  | MOVE | simulator:device:01 | lars@exelor.com | 17900 New Hope St Fountain Valley 10740 92708 |
|  | MOVE | simulator:device:01 | lars@exelor.com | 300 Avenida Carlos Newport Beach CA 92660 California |
|  | MOVE | simulator:device:01 | lars@exelor.com | 2729 Via Casa Loma San Clemente CA 92660 |
|  | MOVE | simulator:device:01 | lars@exelor.com | 2555 Eastbluff Dr Newport Beach 10740 92660 |

Items per page: 20 1 - 5 of 5

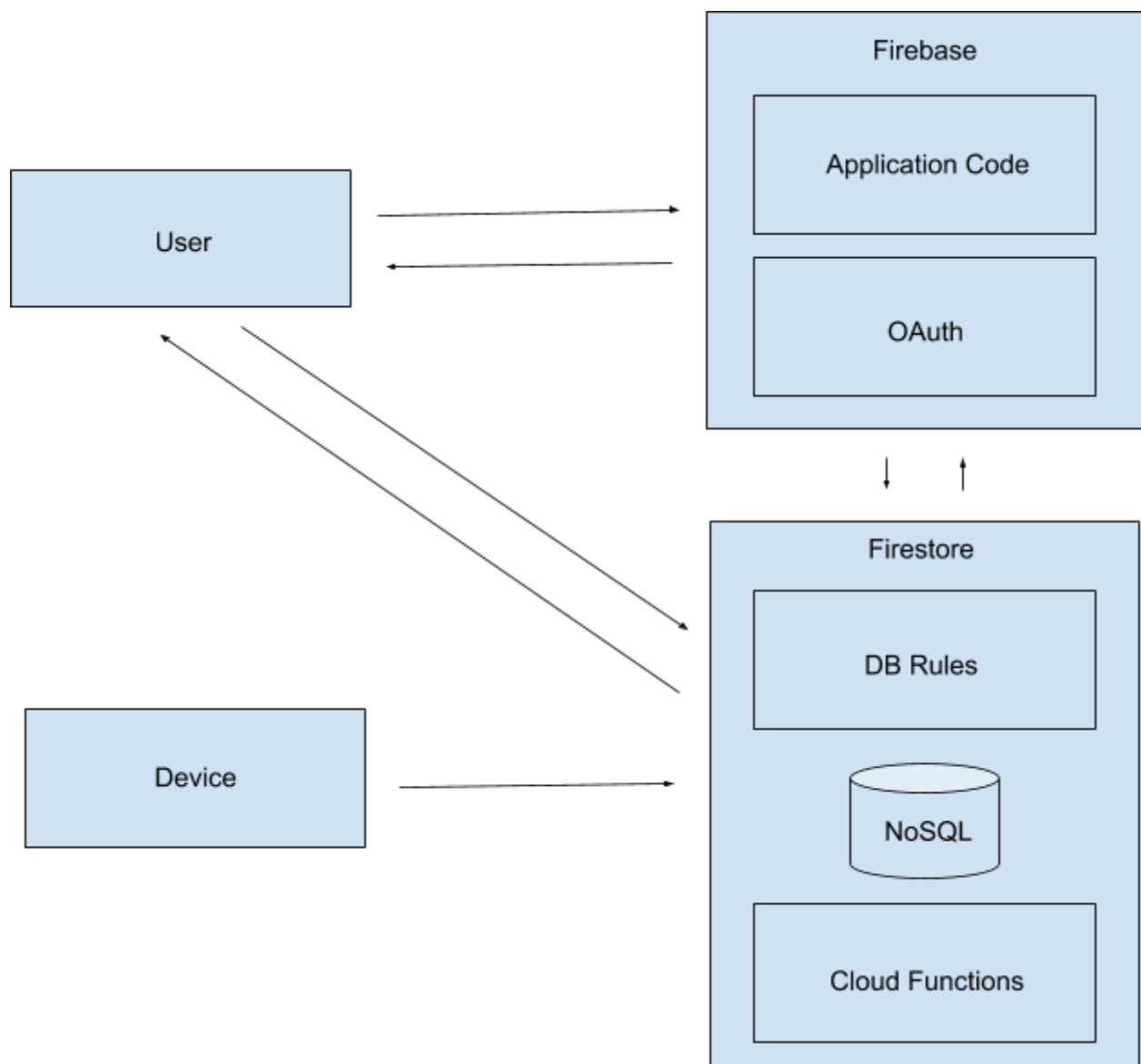
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The Simulator can be used for sending device events to the backend for testing purposes. It is available in the development build only.

Architecture

The application is designed for modular development. The Core module provides sign-in capability and basic features for use by other modules. The Setup module manages users and accounts as well as the relationships between these entities. Specific application functionality is implemented through the Units, Places, and Notifications pages.

The application is hosted on Google Firebase but aside from some database functions runs entirely in the user's Web browser. It is written in Angular and makes use of several public libraries developed for Angular. Use of the Firebase OAuth implementation provides both authentication and authorization security.



Registered devices send their events directly into the Firestore NoSQL database, which also holds all configurational data. Database storage requirements are automatically scaled by Google.

The Firestore DB rules handles all device event and user access control as well as the enforcement of all user account service constraints.

The Firestore cloud functions are invoked by Node.js servers to handle individual database requests and are used to augment and measure the requests. Functions of this type can also be defined for regular database management activities.

The application currently makes use of one proprietary user interface control from Kendo UI Core.