

Technical overview

This document provides a technical overview of the architecture and key features of the Frosmo Platform. For a high-level introduction to the platform, see [Introduction to the Frosmo Platform](#).

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Frosmo Platform architecture

The following figure shows the main components and subcomponents of the Frosmo Platform architecture and the information flows between them.

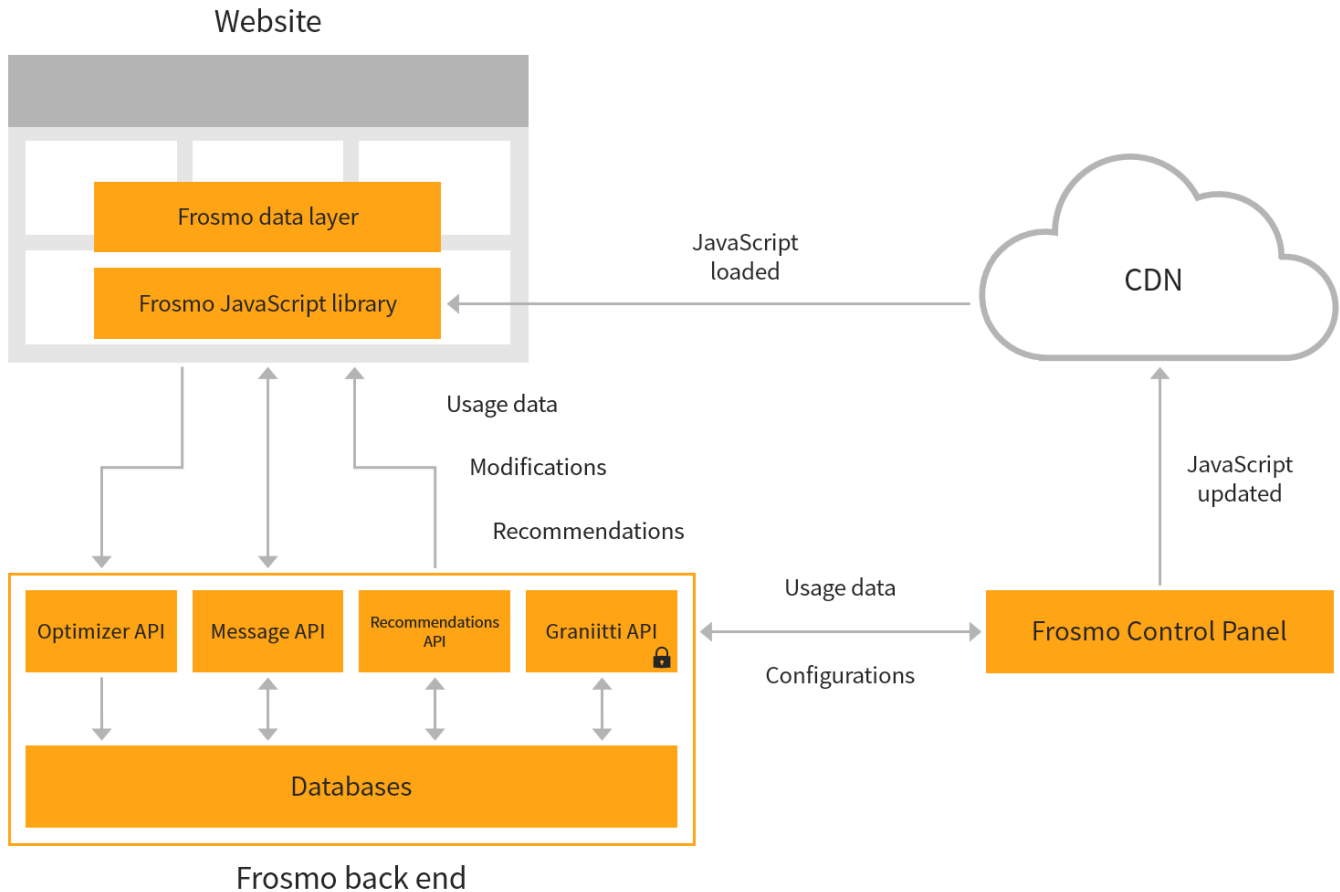


Figure: Frosmo Platform architecture and information flows

For more information, see:

- [Frosmo JavaScript library](#)
- [Frosmo data layer](#)
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Frosmo JavaScript library

The Frosmo JavaScript library is the Frosmo presence in the front end. The library runs on top of a customer site in the visitor's browser, integrating the site with the Frosmo Platform. The library provides both the framework for the platform to operate on the site and Frosmo's custom solutions for improving the site. The library is platform-independent and can be used together with existing web application frameworks, such as Angular and React.

The Frosmo JavaScript library consists of two script files:

- The **Frosmo Core library** implements the core functionality and services of the Frosmo JavaScript solution. The library manages modifications and segmentation, collects usage data, and fetches modification content from the back end. The library is the same for all customers and sites.
- The **Frosmo custom script** contains the configurations and custom code specific to a single site. These are used to modify the content and functionality of the site. The configurations include, for example, modifications whose content is preloaded, placements, segments, and triggers. The custom script runs on top of Frosmo Core and is unique to each site (or group of sites managed as a single site). Changes made to a site in the Frosmo Control Panel are automatically reflected in the custom script for that site.

The browser loads the Frosmo JavaScript library through two `<script>` elements placed directly in a web page's HTML code. The first element loads Frosmo Core and the second one loads the custom script for the site. The scripts are separated so that modifications can be pushed faster to your site without having to load the entire library every time.

The Frosmo JavaScript library is optimized for fast loading. Frosmo Core is only about 54 KB in size, while the custom script usually ranges between 16-32 KB. For more information about the Frosmo Platform and site performance, see [Measuring and improving website performance](#).



The Frosmo JavaScript library is often referred to simply as the "Frosmo scripts". The Frosmo Core library typically goes by "Frosmo Core".

Script hosting and delivery

The Frosmo Platform uses content delivery networks (CDNs) to deliver the Frosmo JavaScript library and any Frosmo-specific media files used on websites. A CDN is a network of global servers connected to each other and used to store and deliver web content, such as images, videos, style sheets, and JavaScript files. When a visitor browses a site, the content of the site is delivered by the CDN server geographically closest to the visitor, decreasing page load times.

By default, the Frosmo JavaScript library files are delivered through Amazon CloudFront, which serves the files using the CloudFront servers closest to the visitor. Frosmo can also use other CDNs based on customer requirements.

The Frosmo Platform uploads the custom script and associated media files (ones added directly to modifications) to the CDN every time they need to be updated, that is, every time something on the site is changed using the Control Panel. The files are always exported to CloudFront and, when needed, copied from CloudFront to other CDNs.

Frosmo data layer

Customers can use the Frosmo data layer to implement basic data tracking by themselves, rather than have Frosmo do it in the custom script.

The data layer allows you to pass data from a web page to the Frosmo JavaScript library. The library then sends that data to the Frosmo back end, where the data is stored in a database. The library can also use the data directly in the browser to, for example, display content or manage segmentation. The exact behavior depends on how the Frosmo Platform is configured for the site.

You can pass data about the following events and items through the data layer:

- Conversions
- Custom actions
- Products
- Transactions

For more information about the data layer, see [Frosmo data layer](#).

Frosmo Control Panel

The Control Panel is the main Frosmo application for customizing and monitoring websites. In a nutshell, the Control Panel allows you to:

- Configure how the Frosmo Platform modifies content and segments visitors for a site.
- Monitor how well the modifications and segmentation perform on the site.

The Control Panel is responsible for managing the Frosmo JavaScript library. Changes made to a site in the Control Panel are automatically reflected in the custom script for that site.

The Control Panel uses the Graniitti API to access the Frosmo back end, and to deploy the Frosmo custom script to the CDN.

For more information about the Control Panel, see [Introduction to the Frosmo Platform](#) and our [user guides](#).

Graniitti API

The Graniitti API provides secure access to the data in the Frosmo back end. The API allows client applications to, for example, retrieve and create modifications, and retrieve usage data collected by the Frosmo Platform.

Customers can use the API to, for example:

- Provide data to custom dashboards and management UIs.
- Provide an outside access point to usage data that is collected and stored by the Frosmo Platform.

The API uses token-based authentication for all requests.

For more information, see [Graniitti API](#).

Message API

The Message API retrieves modification content from the Frosmo back end, so that the content can be displayed in the browser. The Message API uses segmentation data and previous usage data to dynamically select suitable content for the visitor.

The Message API also tracks what content is shown to whom and how many times.

Optimizer API

The Optimizer API receives and stores usage data from websites. In other words, the Frosmo JavaScript library collects usage data in the visitor's browser and sends the data to the back end by calling the Optimizer API. In the back end, the Optimizer API stores the data for further processing.

To secure the data during transit between the site and the Frosmo back end, the Frosmo JavaScript library communicates with the Optimizer API over an HTTPS connection.

Recommendations API

The Recommendations API retrieves recommendation data from the Frosmo back end. This data is generated by the Frosmo Recommendations subsystem and describes one or more recommended items, such as products.

Frosmo Recommendations generates recommendations based on usage data collected from a site and using an algorithm or filter that produces relevant results from that data. The generation process is driven by recommendation configurations, which define from what usage data the recommendations are generated, how exactly the recommendations are generated, and how frequently the platform should regenerate the recommendations. You define the recommendation configurations in the Control Panel, and then retrieve the generated recommendations for display by calling the Recommendations API from a modification.

For more information, see [Feature: Recommendation](#) and [Recommendations API](#).

Frosmo Platform servers

The Frosmo Platform is hosted on multiple regional servers for improved availability. A customer's site is typically hosted on the server geographically closest to the majority of the site's visitors.

Frosmo has regional servers for:

- Americas
- Asia
- Europe
- Finland

Modifications

In the Frosmo context, a modification is a real-time change to a web page designed to personalize or otherwise improve the user experience of the website and to guide visitors to complete a conversion. For example, modifications can be used to improve the sales funnel of an ecommerce site, leading to an increased conversion rate. In technical terms, a modification is a managed piece of code that changes the content, appearance, or behavior of a page directly in the visitor's browser. The code can consist of HTML, CSS, and JavaScript, in any combination.

The Frosmo Platform can use the data stored in the browser's local storage and cookies, such as segmentation data, to determine which modifications to show to the visitor. Modifications can also use data stored in the Frosmo back end.

Here are a few examples of common modifications:

- Display personalized content based on the visitor's behavior or context.
- Add new content, such as product recommendations or content generated from data feeds.

- Modify existing content, such as banners.
- Remove unnecessary content, such as distracting elements, site navigation elements in shopping carts, or surplus elements in mobile-optimized layouts.
- Test the layout and styling of an element or a page.

Modifications are grouped into the following main cases:

- **A/B test:** Create two or more [content variations](#) to test which variation performs best.
- **Multi-armed bandit:** Select a multi-armed bandit algorithm that automatically decides the best-performing content variation and adjusts the [variation on distribution](#) accordingly.
- **Personalization:** Create a single piece of content that you can personalize.

Frosmo Platform administrators manage modifications in the Control Panel.

For more information about modifications, see [Feature: Modification](#).

For information about how conversions are attributed to modifications, see [Conversion attribution](#).

Data collection and storage

The Frosmo JavaScript library collects usage data in the visitor's browser and sends the data to the Frosmo back end over an HTTPS connection. The library sends the data in the background so as not to interfere with the visitor's user experience. The library also stores selected data locally in the browser.

The data can be categorized into:

- Modification performance data
- Product data
- Server logs
- Visitor data

By default, the Frosmo Platform collects and processes only anonymous and pseudonymous information about visitors and their behavior on a website. The platform does not collect data that in itself enables the identification of an individual data subject.

For more information about what data the Frosmo Platform collects and stores from websites, and how the platform processes and uses the data, see [Data collection and processing](#).

For information about how Frosmo protects the data it collects, see [Data protection and privacy](#).

Integration with external systems and services

The Frosmo Platform can integrate with other back-end systems and online services, such as analytics tools, marketing automation systems, and data management platforms (DMPs).

Integrations are typically used for synchronizing segmentation data between the Frosmo Platform and an external back-end system, or for using the collected usage data outside the site. Integrations also allow the Frosmo Platform to input data about displayed or clicked content directly into an analytics tool, such as Google Analytics.

You can integrate the Frosmo Platform with, for example:

- **Analytics tools.** If you want to use a separate web analytics tool, you should integrate it with the Frosmo Platform, since changes made to your site with Frosmo are not, by default, included in 3rd-party web analytics tracking. Integration ensures that you have a clear understanding of what is happening on your site.
- **Marketing automation systems.** The Frosmo Platform can gather and process segmentation and visitor data for marketing automation systems, which can then use the data to target the appropriate audiences. You can set up integrations with, for example, ad platforms and email services.
- **Data management platforms.** As with many other systems, extracting useful data from DMPs can be laborious and requires the use of multiple APIs. The Frosmo Platform can be used as a master API, an interface for all data calls between a DMP and a site.

For more information about integrations, see [System and service integrations](#).

Frosmo Platform security

The Frosmo Platform can limit user access to the Control Panel by IP address. This means that users can access the Control Panel only from the designated IP addresses and from Frosmo premises.

The Frosmo Platform can force all content that is provided through the Frosmo JavaScript library to a site to load resources only from specified domains. When this feature is enabled, the Frosmo Platform validates all modification content before it is saved to the Frosmo back end. If the content contains elements that could be used to load or inject resources from non-authorized domains, the content is rejected.

For more information, see [Security overview](#).

Browsers and other software

For information about how the Frosmo Platform works with browsers and other software, see:

Supported browsers

The following tables list the officially supported browsers for the Frosmo JavaScript library and the Control Panel. Both may work on other browsers and browser versions as well, but Frosmo does not officially support these.

Table: Browsers officially supported by the Frosmo JavaScript library

Browser	Version
Google Chrome	Latest version
Internet Explorer (IE)	11
Microsoft Edge	Latest version
Mozilla Firefox	Latest version
Opera	Latest version
Safari	8 or newer

Table: Browsers officially supported by the Frosmo Control Panel

Browser	Version
Google Chrome	Latest version
Microsoft Edge	Latest version
Mozilla Firefox	Latest version

Privacy technologies

While Frosmo never collects visitor data for its own purposes, or for the purpose of selling the data to a third party, the Frosmo scripts are technically third-party content on websites, and some privacy technologies therefore affect the Frosmo Platform.

For more information, see [Online privacy technologies and the Frosmo Platform](#).