



BROCHURE

Octave Alto Browser

Situational awareness in the browser

Octave Alto Browser (formerly LuciadRIA) is the answer to the growing demand for powerful, lightweight applications in the browser. Driven by technologies including Web Assembly, Javascript, Typescript, WebGPU and HTML 5, Alto Browser delivers desktop-like performance for your web applications.

Developers can create interactive C2 and location intelligence applications thanks to the clean design, modular structure and powerful visual analytics capabilities that can be plugged in. Using its configurable SDK, you can add support for custom data feeds, add your own symbology or match user interaction and look and feel to your company's needs and style. Alto Browser offers a single visualization API for 2D and 3D.

With Octave's browser solution, you can expect high performance and accurate visualization of all types of 2D information, as well as 3D data and dynamic content, such as tracks and 360-degree panoramas. Connect to your data via OGC web services or drag and drop common file formats. Data can be explored in a 2D or 3D map view or vertical intersection view. Combine with a timeline view for 4D analysis.

Who needs the Alto Browser browser solution?

These are just a few examples of why users turn to Alto Browser for their geospatial data challenges:

- Build a mission-critical, web-based solution that handles geospatial data with the accuracy required for mission planning
- Bring in 3D data like point clouds, 3D meshes and 360-degree panoramas in a single view, resulting in a high-quality and operationally relevant digital twin of your area of interest
- Build a standards-based, interoperable, web-based solution that handles 2D and 3D
- Work with defense symbology, including MS2525 and APP6, in a browser application
- Visually analyze millions of events or locations
- Handle real-time dynamic data, such as flights, vessels or people with tens of thousands of moving assets
- Perform client-side analytics with the interactivity of a desktop solution
- Work with data and maps in different projections (including 3D, but also 2D polar projections) without going through the process of extract-transform-load (ETL)

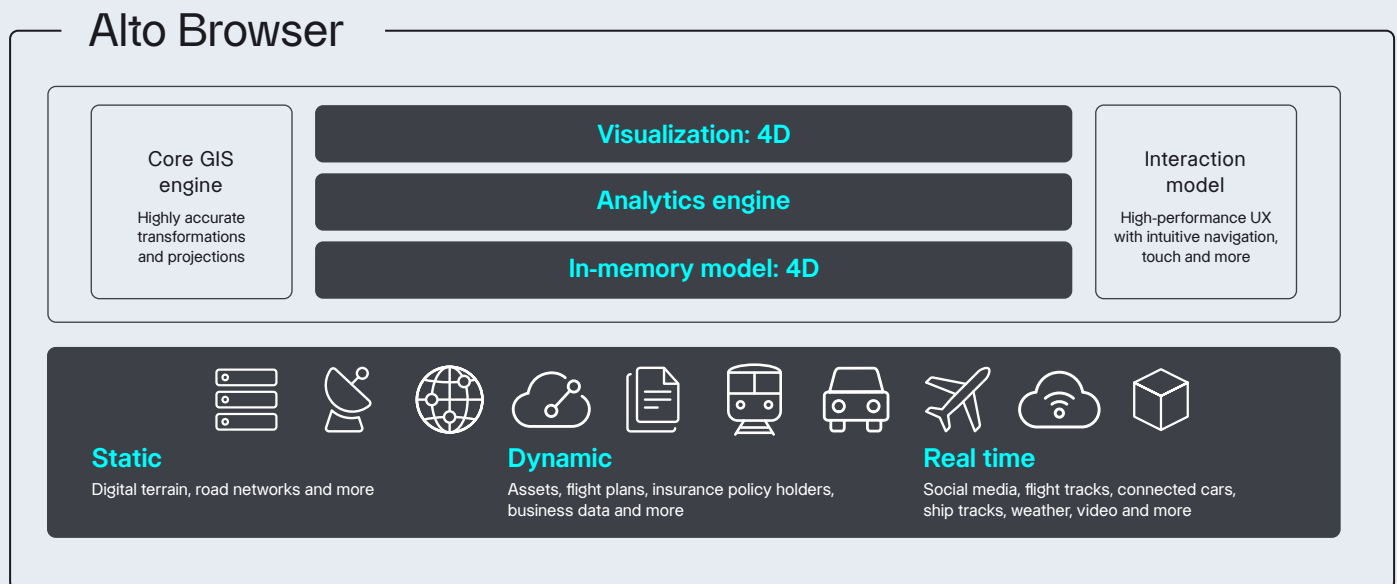


Figure 1: Alto Browser can connect to hundreds of data sources. The solution is compatible with HTML5, WebGL, Web Assembly, Typescript and Javascript.



Figure 2: Add realism to your 3D scene by adding shading and visual effects to your data. To try it out yourself, take a look at these [Alto Browser samples](#).

Key benefits

Best-in-class performance	Enjoy an unprecedented user experience driven by technologies including Web Assembly, WebGPU and HTML5
High geospatial positioning accuracy	Visualize and interact with data with precision, even after transformation or reprojection; all geodetic calculations are performed on the client side
Desktop-like experience	Enjoy a desktop-like experience that includes visualization of imagery, feature data, 3D data and dynamic content, such as tracks or annotations
Builds on web standards	Use any HTML5-capable browser, including mobile browsers; the browser needs to support WebGPU and WebAssembly; delivered as EcmaScript6 (ES6) modules
Customizable	Easily develop browser-based user interfaces, edit content and make map annotations; a single API allows configuration for 2D and 3D WebGPU-based rendering, depending on the target platform

Overview

Alto Browser is offered in the Pro Product Tier and includes functionality listed in the table below. All programming languages and platforms are supported with the same Alto Browser developer license.

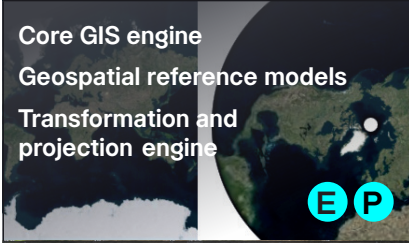
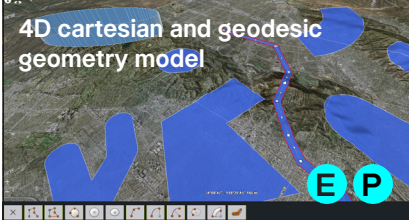
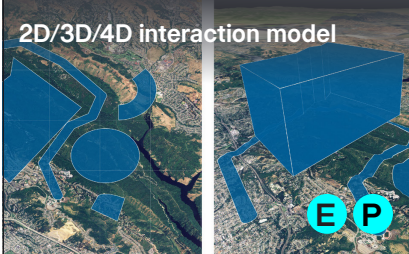
Functionality	Essential	Pro
Core GIS engine	✓	✓
Geospatial reference models	✓	✓
Transformation and projection engine	✓	✓
4D cartesian and geodesic geometry model	✓	✓
GPU 2D/3D visualization engine	✓	✓
Customizable styling	✓	✓
2D/3D/4D interaction model	✓	✓
Vertical, profile and timeline views	✓	✓
Visual analytics	✓	✓
Raster connectors	✓	✓
Vector connectors	✓	✓
Point clouds and reality meshes	✓	✓
OGC standards	✓	✓
360 panoramic imagery		✓
Advanced GIS engine		✓
Defense symbology		○

Legend

✓ Feature included ○ Optional feature

Functional specification

Below is a high-level, non-exhaustive overview of the functionality available in Alto Browser. You can use the functionality it offers out of the box or extend it to meet user-specific requirements.

Core GIS engine Geospatial reference models Transformation and projection engine 	• Perform on-the-fly map transformations in the browser • Visualize data in any EPSG map projection; visualize accurate geodetic lines and warp raster data • Configure your 2D map to pan across the dateline
4D cartesian and geodesic geometry model 	• Model any vector data • Load big data sets asynchronously • Represent complex geodetic object geometries with their metadata; supported geometries include points, polylines, polygons, circles, ellipses, circular arcs, elliptical arcs, circular arc bands, buffers and bézier curves • Benefit from support for static data, as well as dynamic data feeds
GPU 2D/3D visualization engine Customizable styling 	• Visualize data in a multilayered 2D or 3D view, and add a lon-lat grid • Benefit from a modern and high-performance rendering engine powered by WebGPU • Apply flexible styling (2D and 3D icons, meshes, line styles, fill styles, transparency and video) to your data (2D or 3D) • Customize data using the OGC-defined Styled Layer Descriptor/Symbology Encoding (SLD/SE) standards • Create versatile labels, with options for styling and decluttering • Benefit from integrated high-performance imagery rendering in the view, exploiting multileveling and tiling structures • Drape any data, including vector data and dynamic data, on terrain or 3D meshes • Apply lighting effects to realistically simulate light sources • Dynamically display thousands of moving tracks and generate interactive and dynamic heat maps • Include a non-georeferenced and orthographic view configuration for asset viewing or statistics
2D/3D/4D interaction model 	• Start off with a ready-to-use controller that includes standard controls (zoom, pan and select), freehand drawing and editing, multi-touch support (including Microsoft Pointer events and Gesture events) and snapping • Fine-tune navigation using the configurable 3D camera • Discover changes between two data sets with the swipe and flicker visual change detection controllers • Easily create other controllers for custom interaction
Vertical, profile and timeline views 	• Use cartesian views in 2D or 3D with the ability to display any kind of quantitative data (for example, altitudes, distances, speed values or time) • Configure these views with a reference that displays these quantities in a certain unit of measure (for example, flight level, meters and nautical miles) • Benefit from a wide range of customizing options for the annotation of the view axes; concrete examples of cartesian views are provided in the form of a vertical view and a timeline view

E Included in Essential **P** Included in Pro

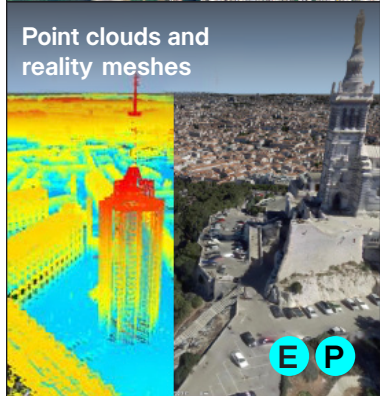
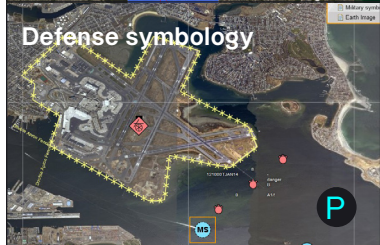
	• Rapidly gain a thorough understanding of your geospatial data using advanced visual analytics tools • Configure clustering algorithms to aggregate a multitude of data objects into easily distinguishable clusters based on their properties • Analyze trajectory information and plot information by applying filters and parameterized styles, or interactively and visually explore them simulated over time • Create heat maps based on static and dynamic data • Apply any expression to 3D meshes (for example, show cross-sections of buildings)
	• Access raster and vector data in a variety of formats • Raster data: • Alto Server (formerly LuciadFusion) Tile Service, Azure Maps, Google 2D Map Tiles, OGC WMS, OGC WMTS, HERE maps and Open Street Map • Direct support for georeferenced raster data • Vector data: • GeoJSON, glTF, GML, OGC WFS and KML
	• Connect to and visualize unlimited point clouds and reality meshes • Load 3D tiles optimally. Draco, CRN and WebP compression are supported. Tune point cloud rendering performance and quality for optimal user experience. • Style and filter point clouds and reality meshes • Apply shading, depth of field, PBR and shadow effects to 3D meshes • Easily access mesh and point cloud metadata • Add custom and dynamic metadata to 3D meshes data at runtime • Combine 3D data with terrain, other geodata, annotations and measurements • Drape vector data and imagery data over 3D meshes • Get support for: • OSGB, LAS, LAZ, E57, OGC 3D Tiles, Google 3D Tiles and HSPC
	• Access data through OGC data exchange standards: • GML, KML, filter, simple features, symbology encoding (SE), WFS, WMS, WMTS and 3D Tiles
	• Connect to and visualize 360-degree panoramic image data sets • Integrate with other data sources in the 3D view • Load multiple panoramic data sets • Measure off the panoramic image • Combine with 3D data like terrain, 3D structures, meshes and point clouds for accurate positioning and realistic transitions • Get support for: • E57, Leica Pegasus • Add other formats via the Alto Server API • Drape georeferenced video over the terrain or 3D meshes
	• Perform constructive geometry calculations on the client side • Create and visualize the union, intersection and difference between (sets of) shapes
	• Create, visualize and edit all unit symbols and tactical graphics from military standards on the client side, with configurable and customizable symbol styling and graphics stroking; embedded look-up for the specification of tactical graphics • Access dynamic display of a labeled MGRS grid, including support for MGRS references • Symbology standards: • APP-6A, APP-6B, APP-6C, APP-6D, MS2525b, MS2525c and MS2525d



Figure 3: Visually comparing layers with the swipe controller

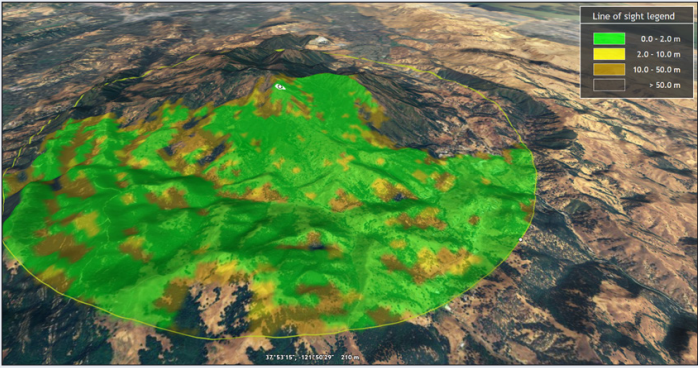


Figure 4: Streaming and visualizing high-resolution terrain with the result of an LOS calculation draped over the terrain

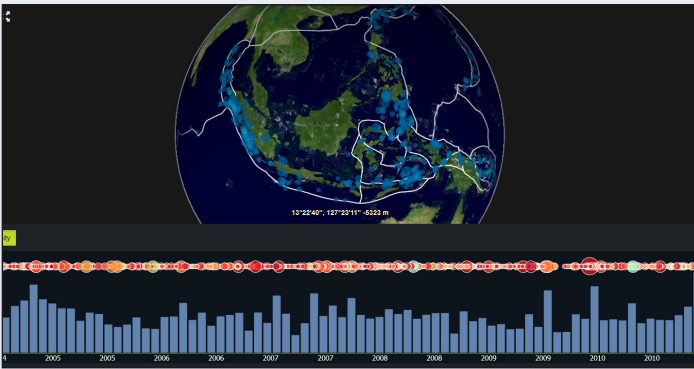


Figure 5: Visualizing the density of earthquake events with time filtering

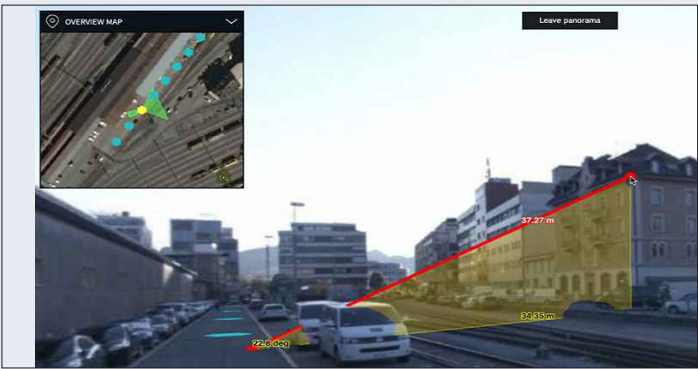


Figure 6: Performing accurate measurements of 3D imagery



Figure 7: Model, visualize, edit and create military icons and tactical graphics.



Figure 8: Monitor editable building information through selection and expression-based styling on 3D data.



Figure 9: Attract the user's attention by using bloom effects to highlight airspaces.

More information

Alto Browser requires:

- WebGPU- and WebAssembly-enabled browser

Alto Browser comes with:

- Code samples for all components, running live on dev.luciad.com
- A convenient sample launcher
- Developer guides with clear explanations, how-to guides and descriptions of best practices
- API reference offering detailed description of all interfaces and classes
- Release notes to see what's new
- Technical notes describing technical requirements and device support reporting tool
- A declaration file and instructions for TypeScript development
- The Alto Browser toolbox, a set of ready-to-use tools containing source codes

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property and assets – for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.

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