DATA SHEET

carmenta

Carmenta Engine 5.16

GENERAL

- Software Development Kit (SDK) for rapid development of interactive geographic applications on Windows, Linux and Android.
- High performance visualization and processing of geographic data, both in 2D and 3D.
- Native 64-bit version with an add-on available for 32-bit development on Windows.
- Fast kernel developed in optimized C++.
- Individually optimized .NET, C++ and Java APIs.
- The .NET API supports both .NET Framework and .NET.
- The Linux and Android SDKs support both x86-64 and ARMv8 64-bit CPUs.
- **NEW!** The Windows and Linux SDKs support cross-platform development (Windows, Linux, Embedded Linux, Android).
- Optimized internally for multi core CPUs.
- Hardware accelerated map rendering that offloads the CPU.
- Parallel asynchronous processing that keeps the application's user interface responsive.
- Map controls for MAUI, WPF, Xamarin, Windows Forms, Qt, Qt Quick, Win32, MFC, X11, Java and Android.
- Supports over 100 geographic data formats natively.
- Different layers can have different coordinate systems, reprojection is done on the fly.
- Maps can be accessed via remote servers (OGC WMS, WMTS, WCS, WFS and CSW).
- Efficient cache mechanism for handling large numbers of moving objects on the map.
- Flexible API for smoothly animating object movements.
- Dedicated radar plot and radar video functionality can handle millions of dynamic plots and be used to create real-time PPI displays.
- Component based architecture built around intuitive data flow paradigm.
- Easy deployment using runtime merge modules (.msm) or simple XCopy deployment.
- Built-in profiler for measuring and tuning the performance of map and application layers.
- Built-in tiled map image file cache, suitable for optimizing vector layers on low-end hardware.
- Integrated read/write support for OGC GeoPackage files enables efficient, single-file geodata distribution.
- Presentation of map layers and application layers can be defined in map configuration files using Carmenta Studio, or in runtime using the APIs.
- Geographically correct spatial calculations such as projection, distance, great circle, scale factors, azimuth/angle calculations etc. available for all reference systems.
- Multiple windows and views can present the same data with different visualizations simultaneously.
- Supports internationalization - titles, descriptions and other metadata can be specified in multiple languages.
- Unicode support for rendering non-western right-to-left text, such as Arabic.
- Supports scale-correct, high-resolution printing of any map.

VISUALIZATION

- Supports custom line styles, pattern fills and textures.
- Predefined common map symbols, line styles and patterns.
- Semitransparency is supported on all drawing operations.
- Hardware accelerated map layer effects can perform color adjustments (brightness, contrast, hue, saturation etc.) as well as glow, halos and ambient occlusion.
- Elements such as scale bars, compasses and north arrows can easily be added to the map.
- Support for animating the visualization, e.g. to create blinking or pulsating objects.
- Anti-aliasing of text, symbols, lines and polygons removes jaggedness in presentation.
- Raster filtering, bilinear or bicubic, improves visualization of scanned maps etc.
- Hardware accelerated configurable multi-sample antialiasing and anisotropic filtering for maximum legibility in 2D and 3D.
- Off-screen drawing to file or memory.
- Raster symbols from common image files.
- Vector symbols from SVG or font files with halo and outline effects.
- 3D symbols and corridors from common 3D shapes or 3D models.
- Multiple visualizations on objects such as multiple texts and symbols at a point or line.
- Complex line styles with auto-placement of symbols or labels along lines or in nodes, texts or symbols that clip lines etc.
- Level of detail in 2D with automatic switching on/off of map layers based on scale and/or geographic area.
- Vector and raster layers can be arbitrarily mixed. Layers can be combined using normal or multiply blend modes.

- Attribute data-controlled visualization, selection and discrimination.
- Automatic label placement of text and symbols that prevents overlapping and duplication.
- Automatic scale-based aggregation of hierarchical data, e.g. tactical ORBAT structures.
- Visualization can be configured to automatically adapt to displays with very high pixel density.
- Supports military tactical symbology (NATO App-6, DOD MIL-STD-2525).
- Supports nautical symbology (IHO S-52, NATO AML Portrayal).
- Supports meteorological visualization (wind barbs, pressure charts etc.)

EXTENSIBILITY

- Possibility to "plug-in" custom data reading, processing and visualization code as components that fit seamlessly into the Carmenta Engine data-flow model.
- Custom visualization can be developed either using native GDI or OpenGL or by using Carmenta Engine's high-level drawing API.
- Custom processing written in Python script can be embedded into map configurations.

COORDINATE SYSTEMS AND PROJECTIONS

- Configurable reference systems, projections and geodetic datums, support for EPSG IDs.
- Handles embedded reference system information.
- Supports more than 15 types of projections, including Mercator, Transverse Mercator, UTM, Lambert, Albers, Stereographic, Azimuthal Equidistant and Orthographic.
- Projections for georeferencing using ground control points.

INTERACTION

- Flexible API for querying geographic objects on screen.
- High-level interaction tool interface that developers may use to "plug in" their own interaction handling.
- Separate visualization can be configured for selected and hovered map objects.
- Tools for navigating 2D and 3D maps.
- Tools for creating and editing 2D and 3D points, lines and polygons.
- Tools for creating and editing circles, ellipses, circle sectors, rings etc.
- Tools for multi-touch interactions such as pinch-to-zoom and twist-to-rotate.
- Overview window functionality.

DATA PROCESSING "ON THE FLY"

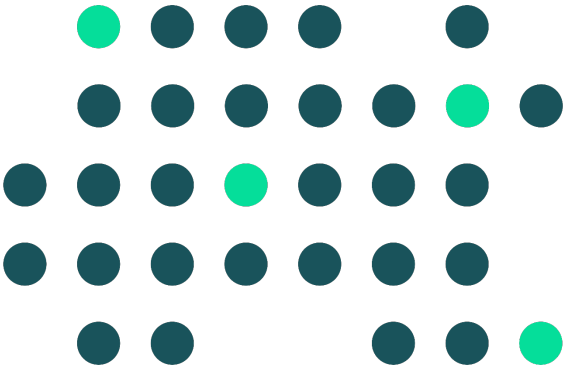
- Buffer zone generation for raster data and vector data.
- Clipping of geographic points, lines, polygons and meshes by geographic polygons or viewing area.
- Connection / desegmentation of lines and polygons.
- Data reduction through line and polygon "thinning".
- Geographic, UTM/MGRS and GARS grid generation.
- Generate circle and ellipse objects from point + radius.
- Generate concentric range circles and radial lines around objects or at the centre of the map.
- Generate 3D volumes (e.g. boxes, spheres and pipes) from 2D objects.
- Hill shading with dynamic sun position.
- Slope and aspect calculations.
- Detection of ridges, valleys, peaks and basins.
- Isoline, e.g. elevation contours calculation.
- Real-time line-of-sight calculation in both 2D maps and 3D city environments.
- Rapid calculation of visibility of defined target areas from one or more observation areas.
- Volumetric line-of-sight with multi-sensor airspace coverage analysis.
- **NEW!** Support for custom propagation models, e.g. radio propagation, in the line-of-sight calculation.
- Merging heterogenous raster data with different resolutions into homogenous data.
- Rasterization of 2D vector layers.
- Reprojection of vector and raster data.
- Resampling of raster data.
- Accessibility analysis and routing calculations for terrain vehicles.
- **NEW!** Nap-of-the-earth routing calculations for rotary-wing aircrafts, e.g. drones.
- Transformation of line objects to polygons and vice versa.
- Smoothing of line and polygon shapes.
- Vertical Profile Calculation which can cut through both terrain, land use and vector data.
- Vertical clearance and terrain warning calculation for flight routes based on terrain and vector obstacles.
- Projection of full motion video onto the ground or onto detailed 3D environments based on camera parameters.
- Dynamic generation of point density rasters for heat map presentation.

SOFTWARE DEVELOPMENT KIT CONTENTS

- Carmenta Studio – a visual editor for map configurations.
- Carmenta Explorer – a map configuration viewer.
- Comprehensive documentation, including tutorials, technical articles and API documentation.
- Many sample applications with source code in C# for Windows Forms, WPF and Xamarin, C++ for Qt, MFC, Win32 and X11 as well as Java for Swing and Android.
- Sample maps and map configurations.

GEOGRAPHIC DATABASES AND FORMATS

- Can generate low resolution variants ("pyramids") for all raster data sources to improve performance.
- Support for spatial database queries.
- Spatial indexing for efficient reading of large datasets.
- Geographic data and other resources can be read directly from zip archives.
- **NEW!** Support for monitoring folders and automatically updating the map when data is added or removed.
- Full-text attribute indexing for fast text search functionality, e.g. address search.
- Supports reading Raster Attribute Tables for thematic data sources.
- Supports reading geospatial metadata according to the French GéoBase Défense and TopoBase Défense standards.
- **NEW!** Efficient conversion of vector data to and from GeoJSON.
- Reads directly (conversion is not needed) from a large number of formats:



ADGR	Erdas LAN/GIS	OGC KML
AIXM [2,4]	GeoJSON	OGC WCS
AML [2,4]	GeoSoft Raster	OGC WFS
ARINC 424 [2,4]	GeoTIFF [1]	OGC WMS
ASRP	GIF [1]	OGC WMTS
AutoCAD DXF [6]	GridASCII	OpenFlight
AutoCAD DWG [6]	GPX	Oracle Spatial [6]
AUX	HDR	PNG [1]
BIL, BSQ, BSP	IHO S-57 [2,3,4]	PolGASP
Bing Maps	IHO S-63 [2,3,4]	PostGIS [6]
BSB Nautical	Intergraph raster	Raw
BMP [1]	Japanese DEM	RPF [4]
CADRG	CM93 C-MAP [3,4,5,6]	SDTS DEM
CEOS (Spot)	JPEG (.jpg) [1]	SQL Server [6]
CIB	JPEG2000 (.jp2)	SRTM HGT
CMRG (PCMap)	Mapbox Vector Tiles (MVT)	TIFF [1]
COLLADA	MapInfo TAB	Tiled Map Servers
DEM	MapInfo MIF	USGS ASCII
DFAD	MBTiles	USGS DOQ
DTED	MFF	USRP
ECW	MFF 2	VTP BT elevation
Envisat N1	MrSID [6]	VPF [2]
ESRI Shape (.shp)[1,2]	MySQL [6]	VMAP [2]
ESRI Binary ADF	NITF	VVOD [2]
ESRI ASCII Grid	NOAA	WVS [2]
ESRI File Geodatabase	OGC 3D Tiles	WMO GRIB
Erdas IMG	OGC GeoPackage	

1. *Reads and writes.*
2. *Uses advanced spatial indexing technology for fast access of large files.*
3. *With optional IHO S-52 nautical chart presentation.*
4. *Functionality available as an additional Carmenta Engine Extension.*
5. *Not available in Carmenta Engine Linux version.*
6. *Not available in Carmenta Engine for Android.*

ABOUT CARMENTA

Carmenta provides software tools to empower visualization and analysis of dynamic geospatial information in time-critical applications. Our powerful technology is deployed across the world, by system providers in defense, unmanned systems, maritime, and public safety sectors.

For further information, please contact us at info@carmenta.com

carmenta.com

carmenta