



## Carmenta Engine 5.3

### GENERAL

- Software Development Kit (SDK) for rapid development of interactive geographic applications.
- High performance visualisation and processing of geographic data.
- 32-bit and 64-bit versions. Supports development of native 64-bit applications on 64-bit Windows.
- Fast kernel developed in optimised C++.
- .Net, C++ and Java APIs.
- All APIs have fast direct access to the kernel, i.e. no middle layer such as COM is used.
- Optimised internally for multi core CPUs.
- Hardware accelerated map visualisation that offloads CPU.
- Parallel asynchronous processing that keeps the application's user interface responsive. Map layers may update in separate threads.
- Map controls for WPF <sup>1</sup>, WinForms <sup>1</sup>, Qt and QML, Win32 <sup>1</sup>, MFC <sup>1</sup> and X11 <sup>2</sup>.
- Optimised for moving large numbers of objects on top of map.
- Component based architecture built around intuitive data flow paradigm.
- Easy deployment using runtime merge modules (.msm) <sup>1</sup> or XCopy deployment.
- The kernel has a built-in Profiler for measuring and tuning the performance of map and application layers.
- Built-in tiled map image file cache, suitable for optimising vector layers on low-end hardware.
- Presentation of map layers and application layers is defined in map configuration files, and can be changed at runtime using the APIs.
- Map configurations are visually defined using the tool Carmenta Studio.
- Supports over 70 geographic data formats natively.
- Different layers can have different coordinate systems.
- Vector and raster data reprojection is done on the fly.
- Geographically correct spatial calculations such as projection, distance, great circle, scale factors, azimuth / angle calculations etc available for all reference systems.
- Maps can use locally stored GIS data, or use layers that are accessed via remote servers (OGC WMS, WMTS <sup>NEW</sup> and WCS).
- Multiple windows and views can present the same data with different visualisations simultaneously.
- Unicode support for rendering non western right-to-left text, such as Arabic. <sup>NEW</sup>

### VISUALISATION

- Visualises points, lines and polygons. Handles different kinds of line styles, pattern fills and textures.
- Built-in support for making advanced multicolored linestyles for road networks and similar. <sup>NEW</sup>
- Predefined common map symbols, line styles and patterns. <sup>NEW</sup>
- Transparency on all drawing operations, including raster data.
- Anti-aliasing of text, symbols, lines and polygons removes jaggedness in presentation.
- Raster filtering, bilinear or bicubic, improves visualisation of scanned maps etc.
- Off screen drawing to bitmaps, files or memory that can be further processed (PNG, GIF, JPEG and BMP).
- Raster symbols from file (TIFF, PNG, GIF, JPEG and BMP).
- Vector symbols (SVG) from file or string.
- Resizable, rotatable vector and font symbols. Halo and outline effects.
- Multiple visualisations 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.
- Flexible layer handling controls the drawing order of layers in run-time. Ability to mix raster and vector layers in arbitrary order.
- Attribute data controlled visualisation, selection and discrimination.
- Automatic label placement of text and symbols that prevents overlapping and duplication <sup>NEW</sup>.

### EXTENDING WITH CUSTOM COMPONENTS

- Developers can "plug-in" their own data reading, processing and visualisation code as components that fit seamlessly into the Carmenta Engine data-flow model.
- Custom visualisation can be developed either using native GDI or OpenGL or by using Carmenta Engine high-level graphics API.
- Custom processing written in Python script can be embedded into map configurations.

<sup>1</sup> Not available for Linux

<sup>2</sup> Not available for Windows

## SOFTWARE DEVELOPEMENT 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.
- Sample applications with source code for .Net C# WinForms and WPF, C++ for Qt, MFC, Win32 and X11.
- Sample maps and 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 and Stereographic.
- Projections for georeferencing using control points.

## GEOGRAPHIC DATABASES AND FORMATS

- Can generate low resolution variants ("pyramids") of raster data to improve reading performance.
- Support for spatial database queries.
- Indexing for efficient reading of large datasets.
- Reads directly (conversion is not needed) from a large number of formats:

ADRG	Erdas IMG	OGC WMS, WMTS <sup>NEW</sup>
ARINC <sup>2 4</sup>	Erdas LAN/GIS	OGC WCS
ASRP	GeoSoft raster	PolGASP
AutoCAD DXF <sup>4</sup>	GeoTIFF <sup>1</sup>	PNG <sup>1</sup>
AutoCAD DWG <sup>4</sup>	GIF <sup>1</sup>	Raw
AUX	GridASCII	RPF <sup>4</sup>
BIL, BSQ, BSP	HDR	S57 Nautical Charts <sup>2 3 4</sup>
BSB Nautical	Integrapp raster	SDTS DEM
BMP <sup>1</sup>	Japanese DEM	SQL Server 2008 <sup>4</sup>
CADRG <sup>4</sup>	C-MAP CM93 <sup>3 4 5 6</sup>	TIFF <sup>1</sup>
CEOS (Spot)	JPEG (.jpg) <sup>1</sup>	USGS ASCII
CIB <sup>4</sup>	JPEG2000 (.jpg2)	USGS DOQ
CMRG (PCMap) <sup>4</sup>	MapInfo TAB	USRP
DEM	MapInfo MIF	VTP BT elevation
DFAD <sup>4</sup>	MFF	VPF
DTED	MFF2	VMAP
ECW	MrSID	VVOD
Envisat N1	MySQL <sup>4</sup>	WVS
ESRI Shape (.shp) <sup>1 2</sup>	NITF	SRTM HGT
ESRI Binary ADF	NOAA	WMO GRIBI
ESRI ASCII Grid	Oracle Spatial <sup>4</sup>	WMO GRIB1

<sup>1</sup> Reads and writes

<sup>2</sup> Uses advanced spatial indexing technology for fast access of large files

<sup>3</sup> With optional S52 nautical chart presentation

<sup>4</sup> Functionality available as an additional Carmenta Engine Extension

<sup>5</sup> Not available in Carmenta Engine Linux version

<sup>6</sup> Not available in Carmenta Engine 64-bit version

## INTERACTION

- API calls for querying geographic objects on screen.
- High-level interaction tool interface that developers may use to "plug in" their own interaction handling.
- Developers may also handle low level event and use API to control interaction.
- Tool for panning, zooming and rotating 3D worlds.
- Tool for panning, zooming and editing in 2D.
- Tool for creating 2D objects.
- Overview window functionality.

## DATA PROCESSING "ON THE FLY"

- Add elevation (z) from elevation raster to 2D objects.
- 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".
- Filtering using attribute value logical expressions.
- Geographic and UTM/MGRS grid generation.
- Generate circle and ellipse objects from point + radius.
- Hill shading with dynamic sun position.
- Isoline, e.g. elevation contours calculation.
- Merging heterogenous rasterdata with different resolutions into homogenous data.
- Rasterising 2D vector layers.
- Raster value type.
- Reclassification of raster values and vector attributes.
- Reprojection of vector and raster data.
- Resampling of raster data.
- Size calculations - polygon area/perimeter and line length.
- Terrain accessibility analysis for terrain vehicles.
- Transformation of line objects to polygons and vice versa.
- Smoothing of line and polygon shapes.

## SYSTEM REQUIREMENTS

### Operating Systems:

Windows XP SP3 32-bit, or Windows 7 and Windows Vista SP2 both 32-bit or 64-bit (supports native 64-bit applications).

Linux: Red Hat Enterprise 6, Ubuntu 10.04 LTS and SUSE Linux Enterprise Server 11 SP1.

### Graphics devices:

Using OpenGL as renderer requires a device supporting OpenGL 1.1 and GLX 1.3 (Linux). Using DirectX renderer requires a device supporting DirectX 9.1 (Windows).

### Development tools:

Visual Studio 2005, 2008 or 2010 (Windows).



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