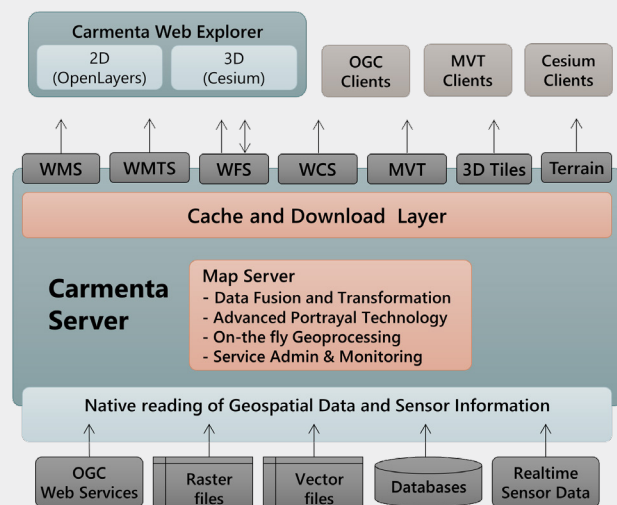carmenta

Carmenta Server Core 2021.0

GENERAL

- Carmenta Server Core provides a complete solution for making geospatial data available through **standard web services on Docker containers or Podman**.
- It has broad support for open industry and de-facto standards with certified compliance for many **Open Geospatial Consortium (OGC) interface specifications**.
- Designed for use in mission-critical solutions, it has a **proven record of reliability** and is used in a number of 24/7 installations.
- Powered by a very fast map engine core and with efficient use of hardware resources, it delivers **excellent performance** when deployed in high-capacity websites and cloud environments.

TECHNICAL FEATURES

- **Native reading** of geospatial data from more than 70 GIS file formats, spatial databases and sensor data sources. No need for offline format transformations.
- Built on top of the powerful map engine Carmenta Engine capable of performing advanced **on-the-fly geoprocessing**. Terrain analysis functions such as Slope and Line-of-Sight calculations are performed server-side with high performance, using both raster and vector data from multiple data sources simultaneously.
- All system administration tasks are carried out either with a scriptable settings interface, used when creating new container images based on Carmenta Server Core or at run time when containers are started, or with a powerful REST API.
- A service list web page allows monitoring and verification of published services. Maps created and maintained by common desktop GIS tools are easily imported and published. **ISO metadata** is automatically generated when publishing new services.
- A smart **disk and memory tile caching utility** is fully integrated that allow map tiles to be dynamically generated from any geodata source. All settings, such as tile-size and tiling schemes are easily configured and time constraints can be set on the cache to automatically re-load tiles.
- A built-in **proxy utility** can be used to "cascade" data from external OGC services and re-publish as hosted services. "White-lists" of authorised services are used to ensure that only trusted sources are connected.
- Support for Kubernetes readiness and liveness probes, as well as various resource metrics for use with Prometheus and Grafana.

- Carmenta Server Core comes bundled with **Carmenta Web Explorer**, a JavaScript-based web browser application based on the open-source libraries OpenLayers for 2D maps and Cesium for 3D maps. The map application is used for previewing published map services and also contains sample tools for interaction with analysis services.
- Below is an **overview of the Carmenta Server Core Architecture** sketching out important system parts and

- A full-featured **Software Development Kit (SDK)** is available for rapid map website development and configuration. It contains documentation, sample projects and "Carmenta Studio", Carmenta's powerful map configuration tool that is used to set all parameters that control map rendering and connections to data sources. The tool is also used to set scale intervals for layer visibility in clients and uses a graphical data-flow tool to setup and configure geoprocessing "pipelines" for more advanced services.
- Visualisation of vector features and symbols defined in the server-side configuration can be re-used in the map client by using symbol and visualisation services in the map server.
- The SDK is also used to test and fine tune map configurations before deployment in production environments.

emphasising the dataflow from source to user.

REALIABILITY AND SECURITY

- The **security framework** is a vital part of the Carmenta Server Core product. It uses a central administration server to handle the login process for all Carmenta Server Core components. It can also be connected to various backend authentication servers locally or over TCP/IP.
- Several types of login from a web client can be used, including a **forms login** with ticket/cookie based sessions or a challenge-based login such as NTLM, depending on availability in the different web server/Operating System versions used.
- All security settings are easily managed from the scriptable settings interface. It is possible to **restrict user access** to map services, or even layers in a service based on user roles. Services that are unavailable to a user are hidden and don't appear in any of the web interfaces. The tile cache utility is integrated in the security system to allow the cache to be part of the overall security solution.
- Extensive **logging and data collection** is performed in runtime to monitor server performance, with the possibility to log and trace server usage and cache performance.
- Published services can be **monitored** via the service list web page. Services can be published and unpublished by simple file copying to a running container's mapped file volume, without the need to restart the map server container.
- Carmenta Server Core is optimised to take full advantage of **multithreading and multi-core processor** architectures. It is well adapted for deployment in virtual and cloud environments and supports both Linux and Windows container Operating Systems.

INTEROPERABILITY AND STANDARDS

- Carmenta Server Core offers compliant support for the

WCS 1.1.1	WMS 1.1.1
WFS 1.1.0	WMS 1.3.0
WFS 2.0	WMTS 1.0.0

following OGC standards:

- A high-performance **Web Map Service (WMS)** can be setup for publishing geodata from any GIS data source. Carmenta Server Core has compliant support for OGC WMS1.1.1 and 1.3.0 with flexible layer control and auto-publishing of dynamic legends. It has an integrated **Feature Portrayal Service (FPS)** capable of rendering features from external feature services. **Styled Layer Descriptor/Symbol Encoding (SLD/SE)** can be used to update map portrayal from clients.
- **Tiled Map Services** are fully supported with the OGC WMS-C and WMTS interfaces, as well as a general XYZ interface supporting OpenStreetMap Slippy Maps. These interfaces benefit greatly from Carmenta Server Core's built-in tile caching utility.
- Geodata from any vector data source can be published through a very flexible **Web Feature Service (WFS)**. It has compliant support for the OGC WFS 1.1.0 and 2.0 service interfaces. The WFS can publish feature data, either as GeoJSON, GML or binary objects, which is easily controlled via settings in the map configuration. Multiple vector data sources can be read simultaneously and all data model and coordinate transformations are done on-the-fly. **Automatic GZIP compression** can be invoked in the service to reduce package size.

- INSPIRE compliant download services can be easily launched through the WFS interface, and the product contains a framework for setting up automatic transformations from customer specific data models to the Data Theme models mandated by INSPIRE requirements. Downloading of features packaged in the **ESRI Shapefile format** is also supported.
- A **Transactional Web Feature Service (WFS-T)** is also included in the Carmenta Server Core's WFS. This enables creation, deletion and updating of feature data on the server, typically stored in a relational database. The WFS-T service is fully integrated with the overall login handling in Carmenta Server Core with single-sign-on and possibility to restrict access based on users and roles.
- **Web Coverage Services (WCS)** can be used to retrieve or download raster or matrix data such as elevation data, meteorological grids or maritime depth data. Carmenta Server Core has compliant support for the OGC WCS 1.1.1 interface, but also supports the 1.1.2 specification. It automatically transforms any source raster format to those mandated by the WCS specification. GeoTIFF is normally used as a transport format.
- An advanced bookmark function, based on the **OGC OWS Context** standard, can be used to save client status and settings. An **Atom/RSS** service for news feed can then be used to distribute the settings.
- Carmenta Server Core offers an **OGC Web Map Context (WMC)** service that allow clients to retrieve comprehensive information about all published services, including their endpoints, map layers, keywords, coordinate reference systems, extent and many other metadata information.
- For high performance vector maps, Carmenta Server Core supports tiled vector data following the **Mapbox Vector Tile (MVT)** specification. The transfer of tiled vector data is compressed and encoded using the Google Protobuf (PBF) format, while still being fully cacheable by the Carmenta Server Core disk and memory caching utility.
- **Cesium 3D Tiles** and **Terrain** mesh services allow 3D web map clients based on the Cesium open-source library to render realistic and high resolution 3D maps, including detailed city models.
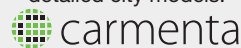
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