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# Beta release guide

LuciadCPillar 2024.0

13 May 2024



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## About this release

The 2024.0 release of LuciadCPillar adds support for vector tiles, a new data type that boosts the performance of contextual vector layers. Moreover, with technology updates and the completion of the multi-language documentation we keep improving the developer experience. This release also includes some format-specific improvements.

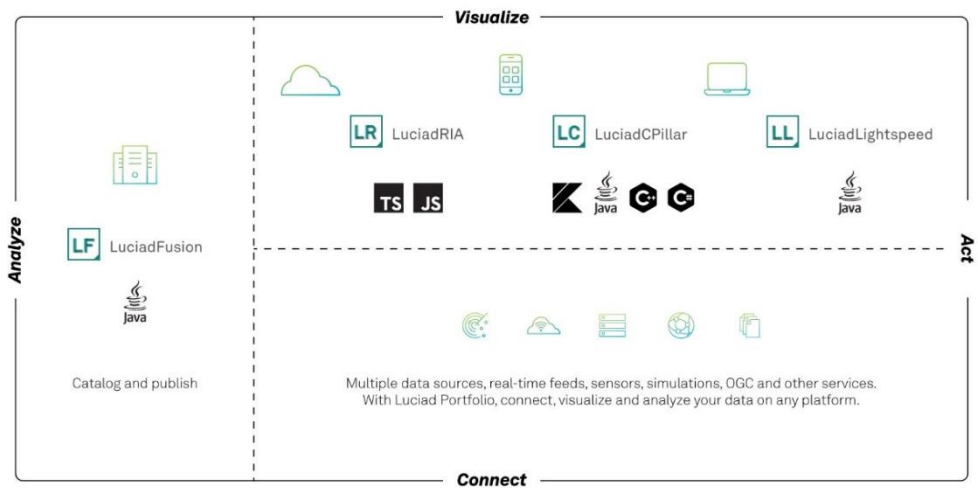


Figure 1: The Luciad portfolio

## Benefits of new features

This section provides an overview and introduction of new features that are available in LuciadCPillar 2024.0. The new features are available for all the supported platforms and programming languages currently offered for LuciadCPillar.

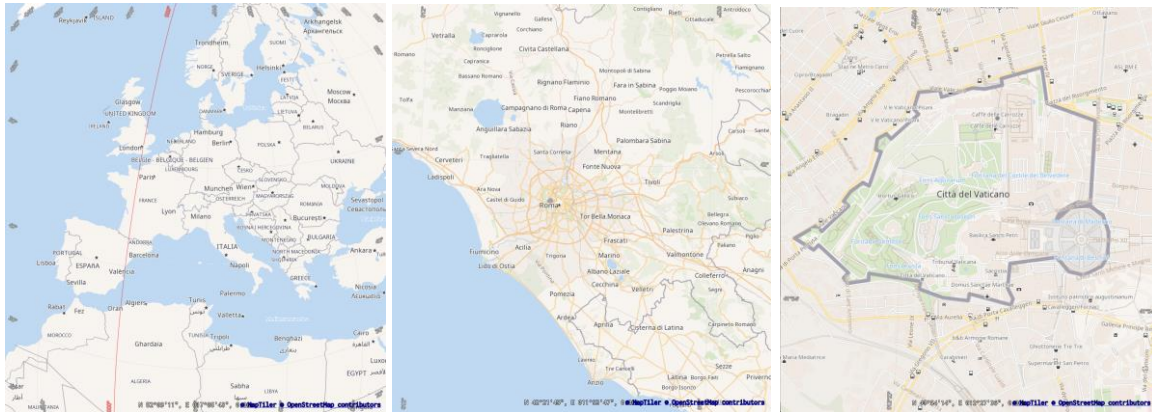


Figure 2: LuciadCPillar can now connect to and display vector tiles data

### Support for vector tiles

A lot of business data is modeled as vector data or feature data. Most of this data can be loaded as-is. For larger data sources, the use of scale ranges and smart filtering<sup>1</sup> ensures a smooth experience. However, a few types of vector data cover large areas, offer very detailed information and serve as context or background information. Because of the detail and the large average size of the individual objects, filtering and scale ranges are not sufficient. Examples of such data are world shorelines, country borders or contour lines.

Similar to how 3D data is processed into 3D Tiles, these contextual feature layers can be processed into vector tiles or feature tiles (in LuciadCPillar we use the term `FeatureTileLayer`). A common format is MBTiles<sup>2</sup>. MBTiles is a container format for tile sets of 2D data. The specification is open, which makes it a good exchange format. The format is based on the SQLite database engine. MBTiles data can contain raster or vector tiles.

LuciadCPillar now supports MBTiles data, either from files or streamed as MBTiles service. The MBTiles model decoder allows accessing MBTiles data according to the MBTiles 1.3 and TileJSON 3.0.0 specifications. Both raster and vector data are supported.

Note that LuciadFusion can serve MBTiles raster and vector data as a MBTiles service. This new service type was added to LuciadFusion for this 2024.0 release.

#### Loading vector tiles

Vector tiles are represented by a `FeatureTileModel`. The data can be styled using the MapBox Style format<sup>3</sup>. You can use the `FeatureTileLayer` to apply such styling. Style files can be loaded from the file system or can be loaded from a web service.

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<sup>1</sup> The article “Visualizing feature data on the Map” explains this

<sup>2</sup> <https://docs.mapbox.com/help/glossary/mbtiles/>

<sup>3</sup> <https://docs.mapbox.com/style-spec/guides/>

For this release, we started with a sensible subset of the MapBox Style format and will extend this over time. The API documentation of `FeatureTileLayer` documents the supported styles. Additional styling options will still be added to the final 2024.0 release, among others line styling options such as dashed lines, fill style options, and labeling improvements. Don't hesitate to contact our product support if your data requires a non-supported style that you would like to see added.

### Loading raster tiles

Loading raster MBTiles in LuciadCPillar is straightforward and like loading any of the already supported raster data formats.

### Sample code and documentation to get you started

The guide "Working with MBTiles data" is your starting point in the documentation (see Figure 4). You can try out MBTiles data yourself using the Data Formats sample.

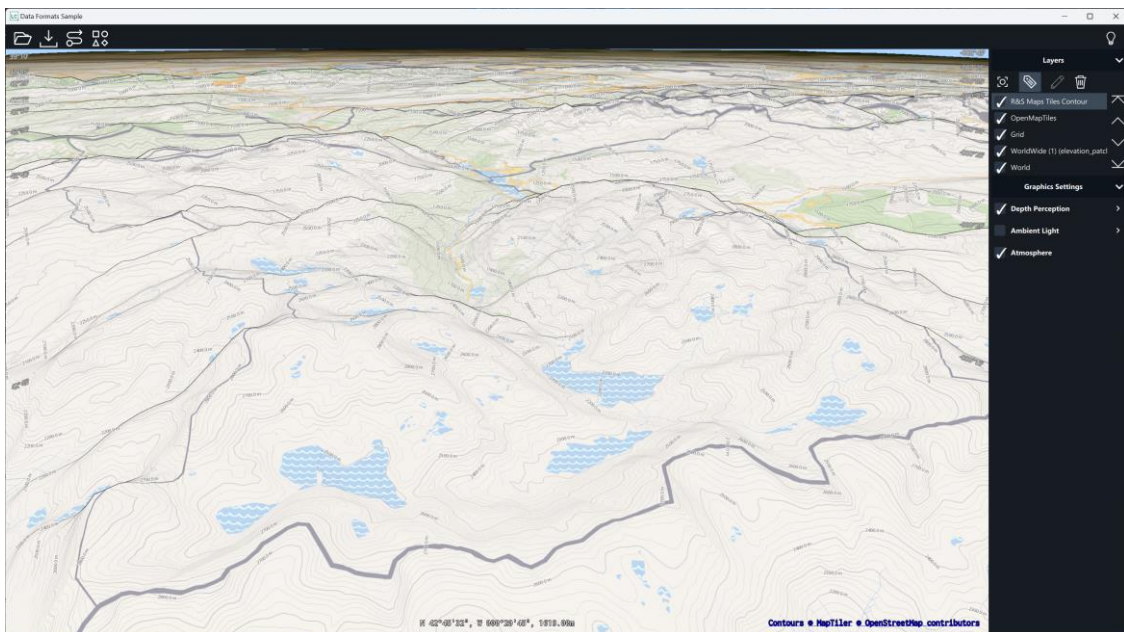


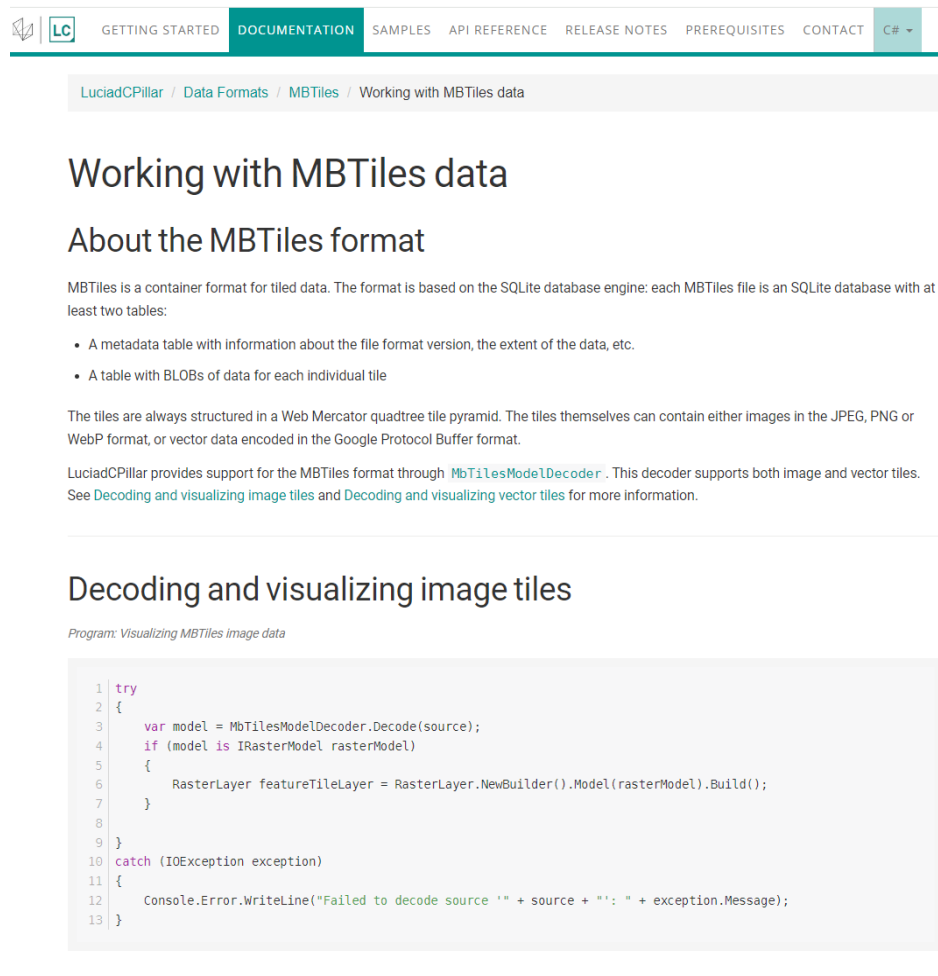
Figure 3: Contour lines are a typical example of data that benefits from vector tiling. This picture depicts a combination of Open Street Map data and contour lines that were visualized using LuciadCPillar 2024.0.

## Improved Developer Experience

As we are offering an SDK, it is important for us that you can intuitively work with LuciadCPillar, easily find the right information, and smoothly integrate LuciadCPillar into your system. For this release we focused on the following areas.

### Complete C# API documentation

This release completes the initiative to offer focused documentation. Based on a choice of programming language, you can see Desktop C++, Desktop C# or Android developer documentation. Developer articles adapt to the selected profile, with code snippets in either C++, C# or Kotlin. API reference documentation is available in C++, C# or Java. All code snippets and articles are now available for the three profiles, where applicable. We refer to Figure 4 for an illustration.



The screenshot shows the LuciadCPillar documentation website. The navigation bar includes links for GETTING STARTED, DOCUMENTATION (selected), SAMPLES, API REFERENCE, RELEASE NOTES, PREREQUISITES, CONTACT, and C# (dropdown). The breadcrumb trail is LuciadCPillar / Data Formats / MBTiles / Working with MBTiles data. The main heading is "Working with MBTiles data". Below it is the sub-heading "About the MBTiles format". The text explains that MBTiles is a container format for tiled data based on the SQLite database engine. It lists two tables: a metadata table and a table with BLOBs of data for each individual tile. It also mentions that tiles are structured in a Web Mercator quadtree tile pyramid and can contain images or vector data. A code snippet for decoding and visualizing image tiles is shown, using the MbTilesModelDecoder class. The code snippet is as follows:

```
1 | try
2 | {
3 |     var model = MbTilesModelDecoder.Decode(source);
4 |     if (model is IRasterModel rasterModel)
5 |     {
6 |         RasterLayer featureTileLayer = RasterLayer.NewBuilder().Model(rasterModel).Build();
7 |     }
8 | }
9 | }
10 | catch (IOException exception)
11 | {
12 |     Console.Error.WriteLine("Failed to decode source '" + source + "': " + exception.Message);
13 | }
```

Figure 4: The code snippets adapt to the programming language selected in the dropdown box at the top of the page



## NuGet packages

To support your DevOps setup, LuciadCPillar will now be delivered as NuGet<sup>4</sup> Packages for .NET development. This simplifies including LuciadCPillar into your C# project and allows you to publish LuciadCPillar to your own private NuGet feed. Refer to the “Installing LuciadCPillar for C# development” tutorial for more information.

## Samples now use Qt 6

The C++ samples in the LuciadCPillar release have been updated from Qt 5 to Qt 6, which is more modern than its predecessor: Qt 6 is based on C++ 17 and introduces a new graphics architecture that among others leverages the GPU to render the UI components and renders a sharp user interface regardless of screen size and screen resolution. The articles “Installing LuciadCPillar for C++ development on Windows” and “Installing LuciadCPillar for C++ development on Linux” have been upgraded to reflect the use of Qt 6. The required version of Qt is documented in the article “Hardware and software requirements.” Currently you need Qt 6.5.x (LTS). The online installer can be found here: <https://www.qt.io/download>

## Upgrade considerations

Dependencies for LuciadCPillar development on Linux systems have been updated to glibc (GNU C Library) 2.28 and gcc 11.

The gcc 11 update is an update for the compiler and affects you as a developer. This may require code changes on your side but will not affect the deployment environment. This update will offer a better and more stable developer experience, for example when debugging.

As previously announced (see Figure 5), the supported Android level has now been updated to level 30. The next update will be with our 2025.0 major release.

|                       |                           |                           |                                    |                                    |                           |     |
|-----------------------|---------------------------|---------------------------|------------------------------------|------------------------------------|---------------------------|-----|
| LuciadCPillar version | 2024.0                    | 2024.1                    | 2025.0                             | 2025.1                             | 2026.0                    | ... |
| Supported API version | API Level 30 (Android 11) | API Level 30 (Android 11) | API Level 31/32 (Android 12, 12.1) | API Level 31/32 (Android 12, 12.1) | API Level 33 (Android 13) | ... |

Figure 5: The section “Requirements for Android development” in the product documentation announces the planned evolutions

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<sup>4</sup> <https://www.nuget.org/>

## Other improvements

- **OGC GeoPackage encoder:** The support for GeoPackage is now complete from the perspective that you can create a new GeoPackage file, open an existing one and store modifications. All information is available in the topic “Data Formats: OGC GeoPackage,” and the new article “Encode feature data to GeoPackage” was added there.
- **Attribution:** Some services, such as HERE Maps<sup>5</sup>, require you to display attributions when using their data on the map. LuciadCPillar now keeps track of the attributions from all layers that provide attribution data and exposes an API to retrieve these attributions. For more info, please consult the article “How to provide and retrieve attribution data.” You can also have a look at the HERE maps support in the Data formats sample and the articles “How to provide access to HERE Maps data” and “Visualizing Google 3D Tiles” for an illustration.

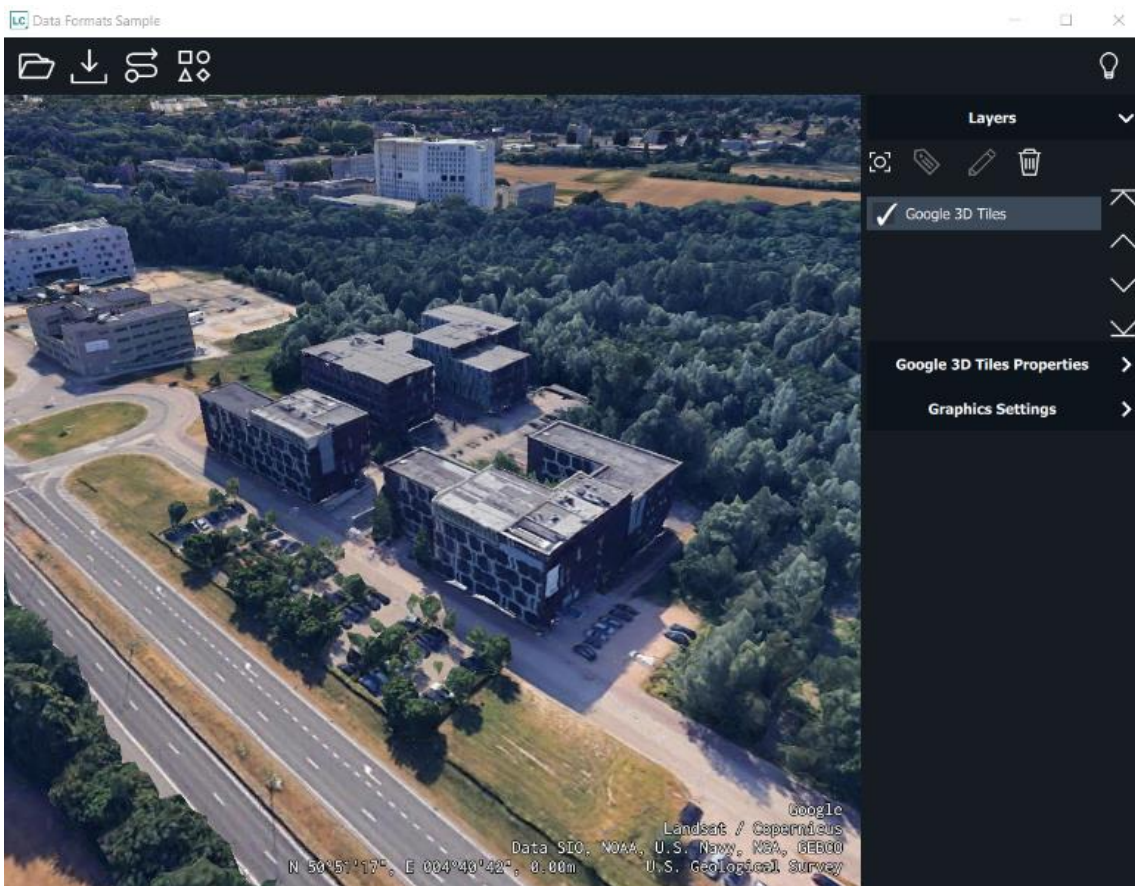


Figure 6: A LuciadCPillar view of the Leuven Hexagon office in Google 3D Tiles

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<sup>5</sup> <https://maps.here.com/>





# About Hexagon

Hexagon is the global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous — ensuring a scalable, sustainable future.

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