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The Virtual Geometry Model

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In order for physicist to easily benefit from the different existing geometry tools used within the community, the Virtual Geometry Model (VGM) has been designed. In the VGM we introduce the abstract interfaces to geometry objects and an abstract factory for geometry construction, import and export. The interfaces to geometry objects were defined to be suitable to describe “geant-like” geometries with a hierarchical volume structure.

The implementation of the VGM for a concrete geometry model represents a small layer between the VGM and the particular native geometry. At the present time this implementation is provided for the Geant4 and the Root TGeo geometry models.

Using the VGM factory, geometry can first be defined independently from a concrete geometry model, and then built by choosing a concrete instantiation of it. Alternatively, the import function of the VGM factory makes it possible to use VGM directly with native geometries (Geant4, TGeo). The export functions provide conversion into other native geometries or the XML format.

In this way, the VGM surpasses one-directional geometry converters within Geant4 VMC (Virtual Monte Carlo): roottog4 and g4toxml, and automatically provides missing directions: g4toroot, roottoxml. To port a third geometry model, then providing the VGM layer for it is sufficient to obtain all the converters between this third geometry and already ported geometries (Geant4, Root).

The design and implementation of the VGM classes, the status of existing implementations for Geant4 and TGeo, and simple examples of usage will be presented.

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