Interactive Visualization and Analysis of the Ancient Greek Myths

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Abstract.

This paper presents a prototype educational framework for modeling, analyzing and visualizing the Ancient Greek Mythology. The ancient Greek Myths involve many heroes, characters and gods and consist of numerous parallel events. The events occur in the geographical space and, although the absolute time is missing, they are related to each other by temporal (topological) relations, inside a single myth or across myths. Additionally, apart from the myth descriptions, there is a series of multimedia items that accompany each myth, such as ancient statues and figurines, representations on the ancient vases and amphorae, as well as a series of modern paintings or poems.

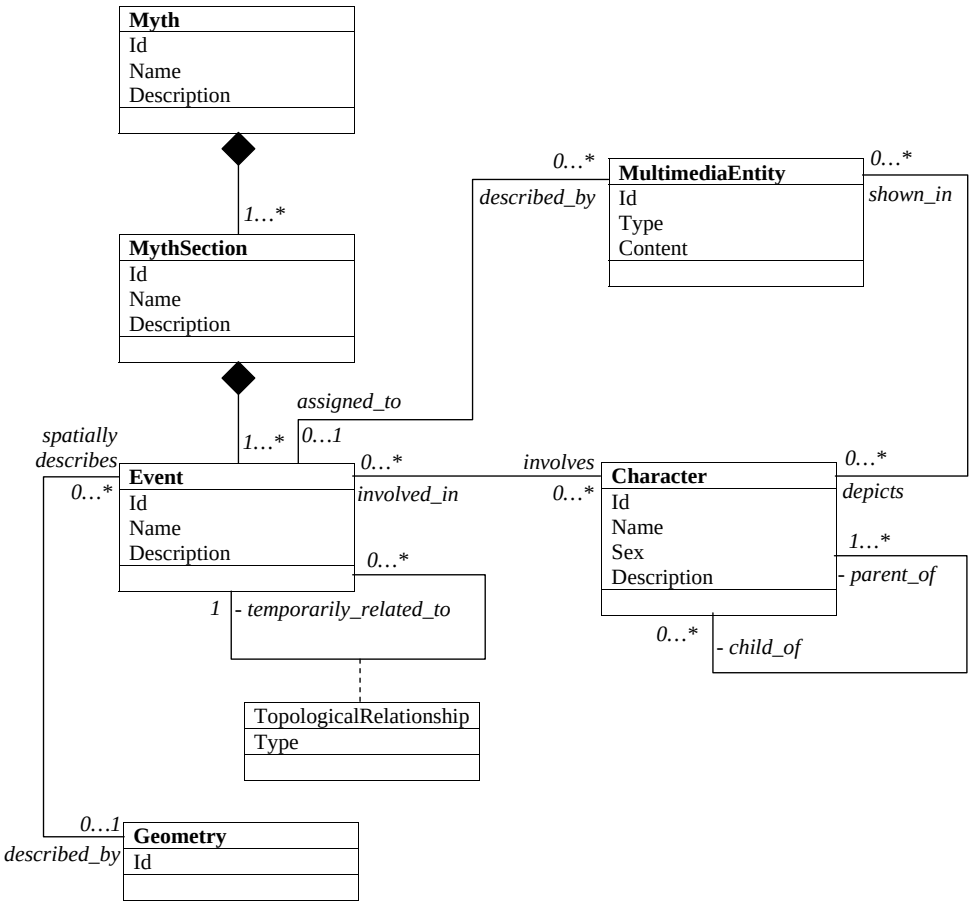
In this project we attempt to model a set of ancient Greek Myths as they are presented in the official school book compiled by the Pedagogical Institute of the Greek Ministry of Education. The modeling takes into consideration the spatial, temporal and thematic peculiarities of the events comprising the myths as well as the educational requirements for the analysis and visualization of the myths content in the class.

Figure 1 presents the basic classes of the prototype in UML. The spatial dimension is compatible with the OGC proposal ("Simple Features" Proposal). As for the temporal dimension, the individual events are interrelated via a reflective association with temporal topological relationships (Allen 1983).

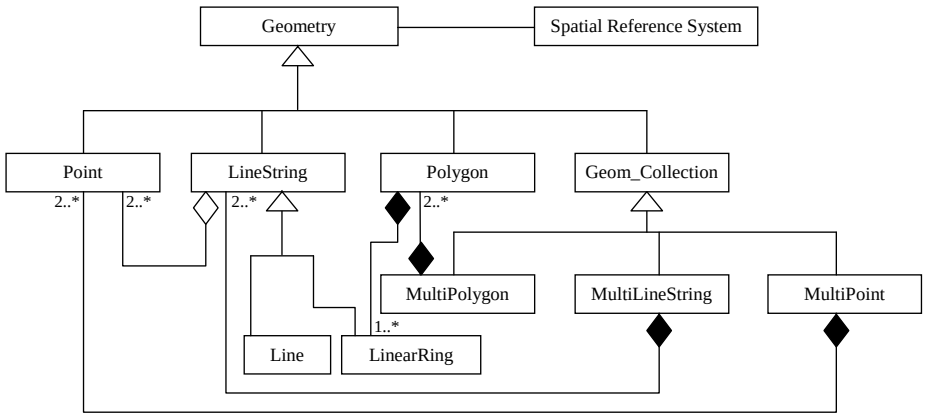
The implementation of the prototype supports the interactive visualization and analysis of the content through the web, by (a) remotely accessing the Database Server, (b) running a desktop client program or (c) running a web client application. A set of software packages and specifications have been adopted to support the implementation. Currently, all of them are Free / Open Source and OGC/W3C compatible.

Specifically, the PostgreSQL/PostGIS has been used to support the data storage, management and analysis; the Quantum GIS has been used in the role of the desktop client; the UMN

MapServer has been used to support the dissemination of the database server content on the web via WMS and WFS services; the OpenLayers Javascripts API has been used to build the web client application; the Adobe SVG Viewer Plugin has been adopted to visualize the animated content in the web browser. The architecture of the prototype is shown in Figure 2.



(a)



(b)

Figure 1. (a) The basic classes of the prototype (UML diagram); (b) The Geometry class according to the OGC proposal (part of).

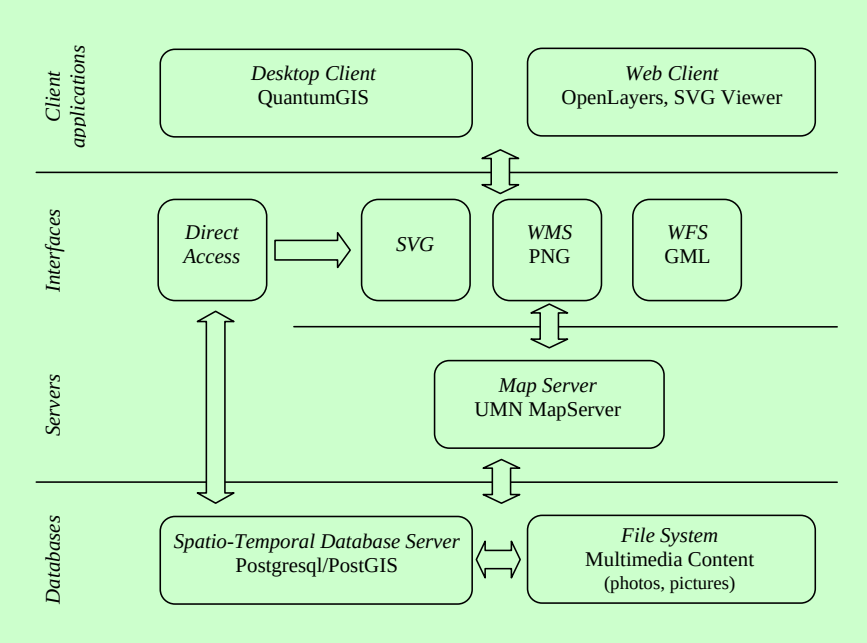


Figure 2. The architecture of the prototype educational framework for modeling, analyzing and visualizing the Ancient Greek Mythology.

The full paper to be submitted will be structured as follows. Section 1 will provide an introduction to the application domain by discussing the peculiarities of the content to be modeled, i.e., the ancient Greek Myths (Figure 1), and the educational requirements that the prototype aims to fulfill. Section 2 will present the prototype architecture and the software packages involved (Figure 2) in more details. Section 3 will focus on the bottom layer of the architecture and specifically the database schema in PostgreSQL/PostGIS as mapped from the UML class diagram (Figure 1). Section 4 will highlight the analysis capabilities of the prototype by presenting a series of representative spatio-temporal query examples expressed in SQL. Section 5 will focus on the visualization of the content residing in the prototype repository at the bottom layer or extracted from an advanced analysis (Section 4) giving special emphasis on the dynamics and movements. Two alternative visualization tools will be considered, an open source desktop GIS client program and a web client application developed and customized in JavaScripts.

References.

Allen, J.F., 1983. Maintaining knowledge about temporal intervals. Communications of the ACM. Vol. 26, pp. 832-843.

OGC – Open Geospatial Consortium, http://www.opengeospatial.org/

OSGeo – Open Source Geospatial Foundation, http://www.osgeo.org/

Paidagogical Institute, Greek Ministry of Education. http://pi-schools.gr/

SVG – Scalable Vector Graphics, http://www.w3.org/Graphics/SVG/

W3C – World Wide Web Consortium, http://www.w3.org/

WFS – Web Feature Service, http://www.opengeospatial.org/standards/wfs

WMS – Web Map Server, http://www.opengeospatial.org/standards/wms