

WEB MERCATOR AND RASTER TILE MAPS: TWO CORNERSTONES OF ONLINE MAP SERVICE PROVIDERS

Emmanuel Stefanakis

Department of Geodesy and Geomatics Engineering,
University of New Brunswick, Canada
estef@unb.ca

1. Introduction

The popularity of online map service providers, such as Google Maps, Bing Maps, ArcGIS Online, and OpenStreetMap, has rapidly grown in recent years. It is hard for younger people to imagine and for older people to remember a world without web maps (or, in the same way, without mobile phones), a world that was the reality less than a dozen years ago.

Throughout these years, the developers of online map service providers had to address numerous technological challenges. They were called to provide efficient solutions and increase the popularity of the services by delivering voluminous map data to an ever increasing number of web users; and all that over a web infrastructure with severe

limitations (low speed, compatibility issues, etc.). Apparently, they had to take important decisions that have eventually affected the technological developments and have imposed de facto standardizations on the online mapping domain. Inevitably, some of these decisions have also had an impact on well-established rules for visualization and delivery of digital maps over the Web. This article focuses onto two cornerstones of modern online map services: Web Mercator Projection and Raster Tile Maps.

Four hundred and fifty years after the Flemish geographer and cartographer Gerardus Mercator published the most popular map projection ever, Google introduced the Web Mercator variant, which, despite its initial rejection by cartographic committees as “an inappropriate geodesy and cartography,”

rapidly became a de facto standard and was adopted by most online map service providers.

The tiling of large maps is an old practice. Large paper maps have always been divided into a series of map sheets at various scales. With the increasing popularity of web mapping applications and the rapid growth of map data availability, the pre-computation and caching of map image tiles has become a common practice in online map services, as they use far fewer server resources than maps rendered on demand. The creation of map tiles depends on a series of properties (shape and size of tiles, numbering of zoom levels, subdivision scheme of a tile, etc.). Combining tiles from various servers, including online map providers, might involve some simple or complex transformations. Over the last decade,

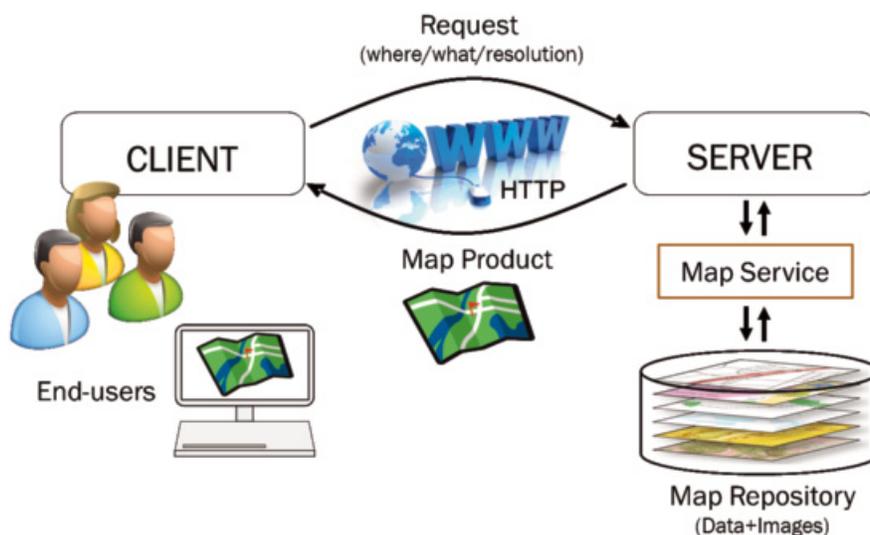


Figure 1: Abstract framework of interaction between online map service providers and end users.