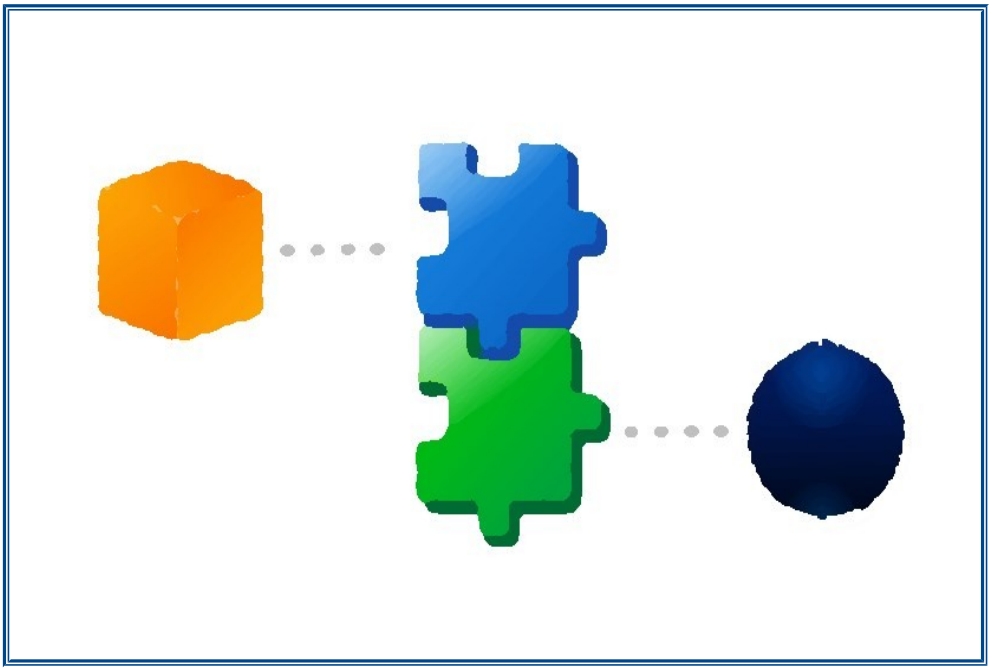
Starting to work with OGC Web Services

An introduction to work with OGC WMS/WFS from Geographic Information System applications



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Contents

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Preface

This book is for anyone who wants to extend the limits of working with a Geographic Information System (GIS) desktop application in complete isolation and take advantage of the nowadays more available cartographic resources on the Internet. It is intended to cross the bridge between a map server and a GIS desktop application to show what the OGC Web Services are and how to work with them.

The image on the cover of this book was created by the author and intends to represent a client request to a map server through the Internet in an abstract fashion way.

Introduction

Nowadays, there are a lot of resources on Internet like news, images or videos, and cartography can be found as well. Just as the Hypertext Markup Language (HTML) needs for a protocol to be transferred, raster and vectorial cartography also need of special protocols for being able to be transferred across the Internet.

Implementation of Spatial Data Infrastructures (SDI) by federal and local governments, or by another organizations from the public sector, provides discovery and access to cartography which can be consumed freely by users through web services, offering a new model to provide and to acquire geospatial data.

This book aims to understand the web services technology from the Open Geospatial Consortium (OGC) like the Web Map Service (WMS) and the Web Feature Service (WFS), and its use with Geographic Information System (GIS) applications. It does not pretend to be extensively technical for being appropriate for any reader.

Most of the text, directions and images shown in the following chapters are based on using Quantum GIS Desktop, one of the best free open source Geographic Information System application that can be downloaded directly from its web site. However, another free or commercial GIS application can be used to connect and retrieve cartography with the basics here exposed, always that it supports this technology.

The WMS service will be explained in the first chapter along with some examples to discover their contents and retrieve layers as images from a web browser and on Quantum GIS Desktop. A more advanced request as querying a WMS will be covered as well. Some exercises can be found at the end of this chapter for practising purposes and to reinforce the basic concepts here exposed.

In the second chapter, the WFS service will be explained along with some examples to discover their contents from a web browser and on Quantum GIS Desktop, and retrieve layers on Quantum GIS Desktop. A more advanced action as filtering a WFS layer will be equally covered. Some exercises can be found at the end of this chapter for practising purposes and to reinforce the basic concepts here exposed.

The NASA Earth Observation (NEO), the Meteorological Service of Environment Canada, and the mineral resource data of the United States Geological Survey (USGS) OGC web services are used for demonstration purposes. In the last chapter, a list of public resources can be found for self practice and as a future source for the user's cartography projects.

Prerequisites

This book presents directions and images based on the graphical user interface of Quantum GIS Desktop 2.10 called "Pisa". The free open source software (FOSS) advances so fast, more than its commercial counterpart, that when reading this book the current available version of this software surely will be more advanced. However, there will be no inconvenient at all when working with OGC web services.

Some knowledge about coordinate reference systems, codes and authorities are required to understand how to retrieve satellite imagery and vectorial cartography manually from a web browser. When using a Geographic Information System application as Quantum GIS Desktop the extents will be automatically handled and the available coordinate reference system codes will also be provided.

The current version of Quantum GIS Desktop can be downloaded directly from the Quantum GIS web site at http://www.qgis.org. If the current available online version is more advanced than the 2.10 which is used along this book, this can be found and downloaded at http://qgis.org/downloads.

Please make sure that the downloaded file is in accordance with your computer's operative system and processor architecture. Quantum GIS Desktop application runs on Microsoft Windows, Linux, Mac OS X and Android. Once that has been installed, several icons of additional applications appears in your desktop. The QGIS Desktop 2.10 icon shown in illustration 1 is the one which opens the application.

Illustration 1- Quantum GIS Desktop icon

The also installed Quantum GIS Browser application allows to work with OGC Web Services just for quick browsing purposes. However, due its lack of functionality, directions on this application were discarded in this book.

Web services

From the economics point of view, services are intangible goods. This simple but accurate definition states the main concepts for understanding the basis about what a web service is and what it provides: an infrastructure to deliver intangible goods over the Internet.

A web service can be requested and delivered from applications through the Hypertext Transfer Protocol (HTTP). Some protocols like the Simple Object Access Protocol (SOAP) relies on HTTP for establishing communication between applications mainly on remote machines.

An image, a tabular query result of a client's list, or a simple number which represents the balance of a bank account can be the goods delivered by a web service. Some of this goods must be coded to be processed by another application, so they are not directly or human readable but machine readable.

The requests are done through a Uniform Resource Locator (URL) and responses are coded typically in Extensible Markup Language (XML) as shown in illustration 2, but another more recent and lightweight formats like JavaScript Object Notation (JSON) can also be used.

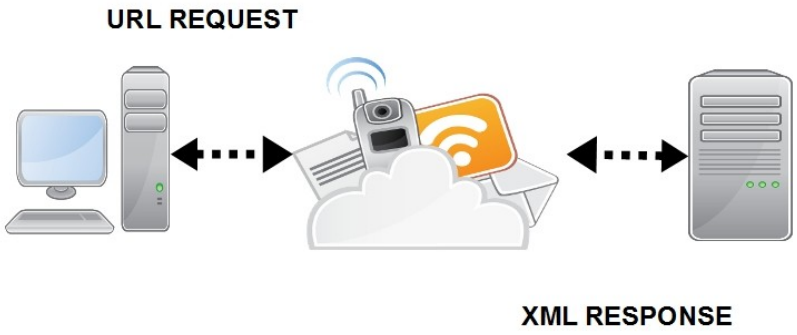

Illustration 2- Web service scheme

A web service is *consumed* by another application or system. Thus, an automatic teller machine (ATM) can request a balance inquiry to the bank through a web service to consume the response and allow the user to dispose of no more money than his current balance permits.

OGC web services

Raster or vectorial cartography are goods that can also be delivered by a web service, but geospatial data requires special applications, languages and protocols to be delivered and consumed properly.

The Open Geospatial Consortium (OGC) is an international organization which incorporates industries, government agencies, non-profit organizations and individuals from all over the world, that develops standards for geospatial data representation, storage, processing and exchange. When this book was written, it counts more than 500 members joined.

Web Map Service (WMS) and Web Feature Service (WFS), among other web services