

## **SUAS MapServer - an Open Source , SVG-oriented Framework for extended Web Map Services**

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### **Abstract**

In web cartography the Web Map Service Implementation Specification (WMS) developed by the Open Geospatial Consortium (OGC) has been published as ISO Standard 19128. According to this specification maps of spatially referenced data are produced dynamically from geographic information. Scalable Vector Graphics (SVG) standardized by W3C, with its capabilities of transformations, scalable geometries, and strong extensibility, is one of the recommended formats for WMS output.

An OGC compliant WMS applies to three different operations: GetCapabilities, GetMap and GetFeatureInfo, with the first two being mandatory. Sending a GetCapabilities request is the first step in the communication between client and server. On receiving such a request, the server returns a Capabilities file mostly encoded in XML, describing the service, including the map content available and which request parameters to use. Based on the information provided, the client can send a GetMap request. Afterwards, the GetFeatureInfo operation returns information about a map feature at a particular point on the map. For each of these requests, the parameters are described in the standard.

In this paper the development of a Web Map Server named SUAS MapServer, programmed in PHP, is described. It is part of an open source based Web Map Service and Web Feature Service framework, for publishing geographic data in both raster and vector image formats according to WMS and WFS specifications.

All tools and techniques used are open source, including Apache web server, PHP (with additional modules like GD, SWF, PDF, and ExpatXML Library), MySQL database management system, PHPMyAdmin, Ajax, SVG, X3D and KML.

SUAS MapServer can respond to the requests described above according to WMS specification. After having validated a user's GetMap request, required data are retrieved from the database. Depending on the format the user has required, a raster image or a vector dataset is generated. For SVG Tiny (SVGT) and SVG Basic (SVGB), KML, VRML and X3D, SUAS can directly generate the code in XML format, optionally compressed.

SUAS supports Styled Layer Descriptors (SLD) specification; it can produce map with different styles, allowing user-defined symbolization of feature data. With the additional operations DescribeLayer, GetLegendGraphic and GetStyles, this server can retrieve features from a Web Feature Service. This is suitable for style flexibility and vividness of SVG.

In contrast to other traditional Map Servers, SUAS can produce not only static map clients, but also a user-interactive map. SVG and JavaScript techniques combine both GetMap and GetFeatureInfo requests in one application. Users can browse attached attribute information of interesting features in form of popping up dialog containers or other information containers; can show or hide multilayers, or link to extended datasets, so that the map can contain multi-dimensional geo-information.

The server application offers several options to import different formats of spatial data into MySQL database momentarily; including using SVG formatted files directly, describing all geographic information by SVG geometry elements.

A prototype for a client especially able to use data provided in SVG and Raster format was also developed. Using Ajax techniques it can dynamically send map server requests, providing a map with navigation functions, such as zoom and pan. Additionally a client named MoWMS for mobile devices is available supporting WMS requests. With the Tinyline SVG engine, it can display SVGT maps on mobile devices.

The development proves that open, XML-based standards in combination with modern programming languages and integrated development environments allow rapid implementation of recommendations and standards in geo-informatics.

**Keywords:**

Internet/Web, Mapping, Services, SVG, Interoperability, Spatial Infrastructures, Standards, SVGT

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