# Open Layer Example

## Project Structure

**A diagram of a diagram

Description automatically generated with medium confidence**

## Shapefile

A Shapefile is a geospatial vector data format. It consists three mandatory file

* .shp: geometry data (the shapes of the features).
* .shx: shape index data (for indexing the geometry data).
* .dbf: attribute data in a tabular format (like a spreadsheet).

It can have other auxiliary files like:

* .prj: Contains the coordinate system and projection information.
* .sbn and .sbx: Spatial index files.
* .cpg: Specifies the character encoding for the .dbf file

## Styled Layer Descriptor (SLD)

### Example

<?xml version="1.0" encoding="UTF-8"?>

<StyledLayerDescriptor version="1.0.0"

xsi:schemaLocation="http://www.opengis.net/sld StyledLayerDescriptor.xsd"

xmlns="http://www.opengis.net/sld"

xmlns:ogc="http://www.opengis.net/ogc"

xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">

<NamedLayer>

<Name>point-style</Name>

<UserStyle>

<Title>Point Style</Title>

<FeatureTypeStyle>

<Rule>

<PointSymbolizer>

<Graphic>

<Mark>

<WellKnownName>circle</WellKnownName>

<Fill>

<CssParameter name="fill">#FF0000</CssParameter>

</Fill>

<Stroke>

<CssParameter name="stroke">#000000</CssParameter>

<CssParameter name="stroke-width">1</CssParameter>

</Stroke>

</Mark>

<Size>6</Size>

</Graphic>

</PointSymbolizer>

</Rule>

</FeatureTypeStyle>

</UserStyle>

</NamedLayer>

</StyledLayerDescriptor>

### <WellKnownName>

The <WellKnownName> element within a <Mark> element specifies the shape of a point symbol. This is used when styling point features and allows you to use predefined geometric shapes to represent points on a map.

A black line with a red square

Description automatically generated

The most commonly used well-known names are:

* circle
* square
* triangle
* star
* cross
* x

## Comparison of GeoJSON, WKT, KML and SLD

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Feature** | **GeoJSON (Geographical JSON)** | **WKT (Well-Known Text)** | **KML (Keyhole Markup Language)** | **SLD (Styled Layer Descriptor)** |
| **Format** | JSON | Text | XML | XML |
| **Data** | Geodata & Basic Styles | Geodata only | Geodata & Styles | Geodata & Advanced Styles |
| **Styling** | Basic (via properties) | None | Extensive (colors, icons) | Advanced (color, width, rules) |
| **Complexity** | Lightweight, web-focused | Minimal, geometry only | Supports metadata and 3D models | Detailed styling, metadata |
| **Use Case** | Web apps, APIs | Simple geometry data | Rich visualizations (Google Earth) | Complex map styling (OGC services) |

### KML

<Placemark>

<name>Triangle</name>

<Style>

<LineStyle>

<color>ff0000ff</color> <!-- Red border -->

<width>2</width> <!-- Line width -->

</LineStyle>

<PolyStyle>

<color>7d00ff00</color> <!-- Green fill with 50% opacity -->

</PolyStyle>

</Style>

<Polygon>

<outerBoundaryIs>

<LinearRing>

<coordinates>

30.0,10.0,0

40.0,40.0,0

20.0,40.0,0

30.0,10.0,0

</coordinates>

</LinearRing>

</outerBoundaryIs>

</Polygon>

</Placemark>

### GeoJSON

{

"type": "Feature",

"geometry": {

"type": "Polygon",

"coordinates": [

[

[30.0, 10.0],

[40.0, 40.0],

[20.0, 40.0],

[30.0, 10.0]

]

]

},

"properties": {

"name": "Triangle",

"stroke": "#ff0000", // Red border

"stroke-width": 2, // Line width

"stroke-opacity": 1.0, // Border opacity

"fill": "#00ff00", // Green fill

"fill-opacity": 0.5 // Fill opacity

}

}

### WKT

POLYGON((30.0 10.0, 40.0 40.0, 20.0 40.0, 30.0 10.0))

### SLD

<StyledLayerDescriptor version="1.0.0">

<NamedLayer>

<Name>Triangle Layer</Name>

<UserStyle>

<Title>Styled Triangle</Title>

<FeatureTypeStyle>

<Rule>

<Name>Triangle Style</Name>

<PolygonSymbolizer>

<Fill>

<CssParameter name="fill">#00ff00</CssParameter> <!-- Green fill -->

<CssParameter name="fill-opacity">0.5</CssParameter> <!-- 50% opacity -->

</Fill>

<Stroke>

<CssParameter name="stroke">#ff0000</CssParameter> <!-- Red border -->

<CssParameter name="stroke-width">2</CssParameter> <!-- Line width -->

</Stroke>

</PolygonSymbolizer>

</Rule>

</FeatureTypeStyle>

</UserStyle>

</NamedLayer>

</StyledLayerDescriptor>

## WMS, WFS and WCS

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **WMS (Web Map Service)** | **WFS (Web Feature Service)** | **WCS (Web Coverage Service)** |
| **Data Type** | Raster (map images) | Vector (geometries and attributes) | Raster (gridded data) |
| **Output** | Images (e.g., PNG, JPEG) | GML (Geography Markup Language) | GeoTIFF, NetCDF, HDF, etc. |
| **Query Capabilities** | Query based on map view, but limited to image output | Query based on feature properties, spatial queries, and more detailed attributes | Query based on grid and spatial extent, allowing for complex raster queries |
| **Usage Example** | Displaying a map layer on a web application | Extracting feature data for analysis or display in GIS software | Accessing and analysing environmental data such as temperature or precipitation |