

## WEBOVÉ SLUŽBY – KARTOGRAFICKÁ VIZUALIZACE

## Vizualizace ve webových službách OGC

- Styled Layer Descriptor (SLD)
  - vytvořeno jako vizualizační rozšíření WMS
  - popis stylů
  - verze 1.0, 1.1, 1.1.0
- Symbology Encoding (SE)
  - doprovodná OGC specifikace k SLD
  - stylovací jazyk pro zapsání vizualizace
  - využití nejen ve WMS, ale i WFS/WCS
  - verze 1.1.0

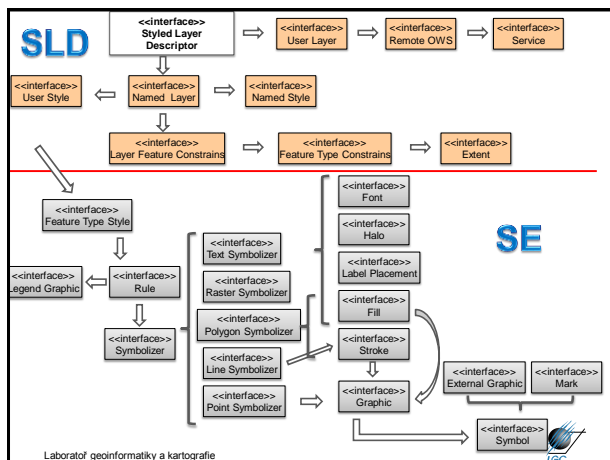
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## Vizualizace ve webových službách OGC

- SLD umožňuje
  - stylovat všechny prvky stejně
    - používá se **FeatureTypeStyle** element
  - stylovat prvky odlišně na základě určitého atributu
    - operace **DescribeLayer** vrací typy prvků vrstvy (nebo přímo vrstvy) – přidáno navíc k podkladové WMS specifikaci
    - operace **DescribeFeatureType** (WFS) nebo **DescribeCoverageType** (WCS) pro zjištění atributů
  - poslat legendu pomocí volitelné operace **GetLegendGraphic**

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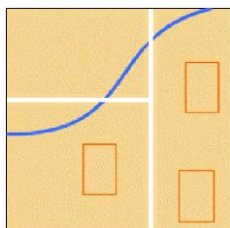


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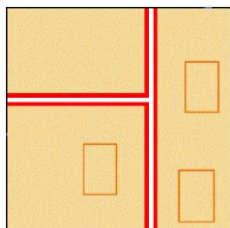


## Kombinace SLD s WMS

<http://yourfavoritesite.com/WMS?REQUEST=GetMap&BBOX=0.0,0.0,1.0,1.0&LAYERS=Rivers,Roads,Houses&STYLES=CenterLine,CenterLine,Outline>



<http://yourfavoritesite.com/WMS?REQUEST=GetMap&BBOX=0.0,0.0,1.0,1.0&LAYERS=Roads,Roads,Houses&STYLES=Casing,CenterLine,Outline>



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Příklad z OGC Styled Layer Descriptor profile of the Web Map Service Implementation Specification 2007



## Definice kartografického stylu

```
<StyledLayerDescriptor version="1.0.0" xmlns="http://www.opengis.net/sld" xmlns:ogc="http://www.opengis.net/ogc"
xmlns:xlink="http://www.w3.org/1999/xlink" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.opengis.net/sld http://schemas.opengis.net/sld/1.0.0/StyledLayerDescriptor.xsd">
  <Name>layer</Name>
  <UserStyle>
    <Name>france_VDC/Name</Name>
    <Title>france vojenského újezdu</Title>
    <FeatureTypeStyle>
      <Rule>
        <PolygonSymbolizer>
          <Fill>
            <CssParameter name="fill">#db00da</CssParameter>
            <CssParameter name="fill-opacity">0.1</CssParameter>
          </Fill>
          <Stroke>
            <CssParameter name="stroke">#db8ad8</CssParameter>
            <CssParameter name="stroke-width">2</CssParameter>
          </Stroke>
        </PolygonSymbolizer>
      </Rule>
    </FeatureTypeStyle>
  </UserStyle>
</Name>
</StyledLayerDescriptor>
</StyledLayerDescriptor>
```

Název stylu	Vojenský újezd
Geometrie	polygon
Výplň (RGB)	#db00da
Průhlednost	0,1 (tj. 10%)
Hraniční čára	#db8ad8
Šířka hraniční čáry	2 pixely



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## Symbology Encoding (SE)

### FeatureTypeStyle

```
<xs:element name="FeatureTypeStyle">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="sld:Name" minOccurs="0"/>
      <xs:element ref="sld:Title" minOccurs="0"/>
      <xs:element ref="sld:Abstract" minOccurs="0"/>
      <xs:element ref="sld:FeatureTypeName" minOccurs="0"/>
      <xs:element ref="sld:SemanticTypeIdentifier" minOccurs="0"
        maxOccurs="unbounded"/>
      <xs:element ref="sld:Rule" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>

<xs:element name="SemanticTypeIdentifier" type="xs:string"/>
```

Name  
Title  
Abstract  
FeatureTypeName  
SemanticTypeIdentifier  
Rule

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## SE – definice vizualizačních pravidel

### Rule

```
<xs:element name="Rule">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="sld:Name" minOccurs="0"/>
      <xs:element ref="sld:Title" minOccurs="0"/>
      <xs:element ref="sld:Abstract" minOccurs="0"/>
      <xs:element ref="sld:LegendGraphic" minOccurs="0"/>
      <xs:choice minOccurs="0">
        <xs:element ref="ogc:Filter"/>
        <xs:element ref="sld:ElseFilter"/>
      </xs:choice>
      <xs:element ref="sld:MinScaleDenominator" minOccurs="0"/>
      <xs:element ref="sld:MaxScaleDenominator" minOccurs="0"/>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element ref="sld:LineSymbolizer"/>
        <xs:element ref="sld:PolygonSymbolizer"/>
        <xs:element ref="sld:PointSymbolizer"/>
        <xs:element ref="sld:TextSymbolizer"/>
        <xs:element ref="sld:RasterSymbolizer"/>
      </xs:choice>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Name  
Title  
Abstract  
LegendGraphic  
Filter  
ElseFilter  
MinScaleDenominator  
MaxScaleDenominator  
LineSymbolizer  
PolygonSymbolizer  
PointSymbolizer  
TextSymbolizer  
RasterSymbolizer

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## SE – LineSymbolizer

### LineSymbolizer

```
<xs:element name="LineSymbolizer">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="sld:Geometry" minOccurs="0"/>
      <xs:element ref="sld:Stroke" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

Geometry  
Stroke

Geometry

PropertyName

Stroke

GraphicFill  
GraphicStroke  
CssParameter

```
<xs:element name="Geometry">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="ogc:PropertyName"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

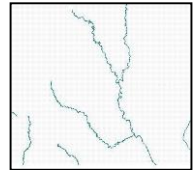
```
<xs:element name="Stroke">
  <xs:complexType>
    <xs:sequence>
      <xs:choice minOccurs="0">
        <xs:element ref="sld:GraphicFill"/>
        <xs:element ref="sld:GraphicStroke"/>
      </xs:choice>
      <xs:element ref="sld:CssParameter" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

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## SE – LineSymbolizer

```
<LineSymbolizer>
  <Geometry>
    <ogc:PropertyName>centerline</ogc:PropertyName>
  </Geometry>
  <Stroke>
    <CssParameter name="stroke" value="#0000ff"/>
    <CssParameter name="stroke-width" value="2"/>
  </Stroke>
</LineSymbolizer>
```



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## SE – PolygonSymbolizer

### PolygonSymbolizer

Geometry  
Fill  
Stroke

Fill

GraphicFill  
CssParameter

```
<xs:element name="PolygonSymbolizer">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="sld:Geometry" minOccurs="0"/>
      <xs:element ref="sld:Fill" minOccurs="0"/>
      <xs:element ref="sld:Stroke" minOccurs="0"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

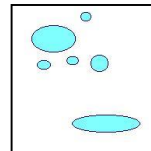
```
<xs:element name="Fill">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="sld:GraphicFill" minOccurs="0"/>
      <xs:element ref="sld:CssParameter" minOccurs="0"
        maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
</xs:element>
```

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## SE – PolygonSymbolizer

```
<PolygonSymbolizer>
  <Geometry>
    <ogc:PropertyName>the_area</ogc:PropertyName>
  </Geometry>
  <Fill>
    <CssParameter name="fill" value="#aaaaff"/>
  </Fill>
  <Stroke>
    <CssParameter name="stroke" value="#0000aa"/>
  </Stroke>
</PolygonSymbolizer>
```



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## SE – TextSymbolizer

**TextSymbolizer**

- Geometry
- Label
- Font
- LabelPlacement
- Halo
- Fill

---

**LabelPlacement**

- PointPlacement
- LinePlacement

---

**PointPlacement**

- AnchorPoint
- Displacement
- Rotation

```
<xs:element name="TextSymbolizer">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="#id:Geometry" minOccurs="0"/>
      <xs:element ref="#id:Label" minOccurs="0"/>
      <xs:element ref="#id:Font" minOccurs="0"/>
      <xs:element ref="#id:LabelPlacement" minOccurs="0"/>
      <xs:element ref="#id:Halo" minOccurs="0"/>
      <xs:element ref="#id:Fill" minOccurs="0"/>
    /xs:sequence>
  /xs:complexType>
</xs:element>


<xs:element name="LabelPlacement">
  <xs:complexType>
    <xs:choice>
      <xs:element ref="#id:PointPlacement"/>
      <xs:element ref="#id:LinePlacement"/>
    /xs:choice>
  /xs:complexType>
</xs:element>

<xs:element name="PointPlacement">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="#id:AnchorPoint" minOccurs="0"/>
      <xs:element ref="#id:Displacement" minOccurs="0"/>
      <xs:element ref="#id:Rotation" minOccurs="0"/>
    /xs:sequence>
  /xs:complexType>
</xs:element>
```

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## SE – TextSymbolizer

```
<TextSymbolizer>
  <Geometry>
    <ogc:PropertyName>locatedAt</ogc:PropertyName>
  </Geometry>
  <Label>
    <ogc:PropertyName>hospitalName</ogc:PropertyName>
  </Label>
  <Font>
    <CssParameter name="font-family">Arial</CssParameter>
    <CssParameter name="font-family">Sans-Serif</CssParameter>
    <CssParameter name="font-style">italic</CssParameter>
    <CssParameter name="font-size">10</CssParameter>
  </Font>
  <Fill>
    <CssParameter name="fill">#000000</CssParameter>
  </Fill>
  <Halo/>
</TextSymbolizer>
```



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## SE – RasterSymbolizer

**RasterSymbolizer**

- Geometry
- Opacity
- ChannelSelection
- OverlapBehavior
- ColorMap
- ContrastEnhancement
- ShadedRelief
- ImageOutline


---

**ChannelSelection**

- RedChannel
- GreenChannel
- BlueChannel
- GrayChannel

```
<xs:element name="RasterSymbolizer">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="#id:Geometry" minOccurs="0"/>
      <xs:element ref="#id:Opacity" minOccurs="0"/>
      <xs:element ref="#id:ChannelSelection" minOccurs="0"/>
      <xs:element ref="#id:OverlapBehavior" minOccurs="0"/>
      <xs:element ref="#id:ContrastEnhancement" minOccurs="0"/>
      <xs:element ref="#id:ShadeRelief" minOccurs="0"/>
      <xs:element ref="#id:ImageOutline" minOccurs="0"/>
    /xs:sequence>
  /xs:complexType>
</xs:element>


<xs:element name="ChannelSelection">
  <xs:complexType>
    <xs:choice>
      <xs:sequence>
        <xs:element ref="#id:RedChannel"/>
        <xs:element ref="#id:GreenChannel"/>
        <xs:element ref="#id:BlueChannel"/>
      /xs:sequence>
      <xs:element ref="#id:GrayChannel"/>
    /xs:choice>
  /xs:complexType>
</xs:element>
```



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## SE – RasterSymbolizer

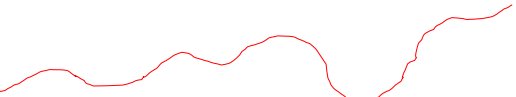
```
<?xml version="1.0" encoding="UTF-8"?>
<StyleLayerDescriptor xmlns="http://www.opengis.net/sld"
  xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:xlink="http://www.w3.org/1999/xlink"
  xmlns:se="http://www.w3.org/2001/XMLSchema-instance"
  xsi:schemaLocation="http://www.opengis.net/sld
    http://schemas.opengis.net/sld/1.0.0/StyleLayerDescriptor.xsd" version="1.0.0">
  <UserLayer>
    <LayerFeatureConstraints/>
    <UserStyle>
      <RasterSymbolizer />
    /UserStyle>
  /UserLayer>
</StyleLayerDescriptor>
```



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## Výsledný ukázkový zápis v SLD

```
<?xml version="1.0" encoding="UTF-8"?>
<StyleLayerDescriptor xmlns="http://www.w3.org/2001/XMLSchema-instance" xmlns:ogc="http://www.opengis.net/ogc"
  xmlns:se="http://www.opengis.net/sld" xsi:schemaLocation="http://www.opengis.net/sld StyleLayerDescriptor.xsd" version="1.0.0">
  <NamedLayer>
    <Name>topp:ac_silnice</Name>
    <UserStyle>
      <Name>obyc</Name>
      <FeatureTypeStyle>
        <Rule>
          <Name>all</Name>
          <LineSymbolizer>
            <Stroke>
              <CssParameter name="stroke">#FF0000</CssParameter>
              <CssParameter name="stroke-width">1</CssParameter>
            /Stroke>
          /LineSymbolizer>
        /Rule>
      /FeatureTypeStyle>
    /UserStyle>
  /NamedLayer>
</StyleLayerDescriptor>
```



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## Ukázka zdrojového kódu mapové kompozice

```
<?xml version="1.0"?>
<ViewContext xmlns="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.opengis.net/context
  http://schemas.opengis.net/context/1.1.0/context.xsd" id="34197d8-b2e-44e1-997c-392c0a08137" version="1.1.0">
  <General>
    <Window height="422" width="948"/>
    <ChordBox style="SPGC:10967" x="64655.92514799987" y="89563.590135649975" minx="1132044.8748520082" miny="...">
      <Map>
        <Title>...</Title>
        <ContextInformation/>
        <ContactInformation/>
        <ContactPerson/>
        <ContactOrganization/>
        <ContactParameters/>
        <ContactAddress/>
        <ContactType/>
        <City/>
        <StreetName/>
        <PostCode/>
        <Country/>
        <ContactAddress/>
        <ContactInformation/>
      /Map>
    /ChordBox>
  /General>
  <MapStructure xmlns="http://www.w3.org/2001/XMLSchema-instance" id="1" style="display: inline-block; vertical-align: top; margin-right: 10px; border: 1px solid gray; padding: 2px;">
    <Name>Katastrální mapy</Name>
    <LayerStructure>
      <Layer>
        <Name>Katastrální mapy</Name>
        <StyleLayerDescriptor>
          <UserStyle>
            <Rule>
              <Name>Katastrální mapy</Name>
              <LineSymbolizer>
                <Stroke>
                  <CssParameter name="stroke">#FF0000</CssParameter>
                  <CssParameter name="stroke-width">1</CssParameter>
                /Stroke>
              /LineSymbolizer>
            /Rule>
          /UserStyle>
        /StyleLayerDescriptor>
      /Layer>
    /LayerStructure>
  /MapStructure>
```

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