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# **Style Recipes**

Styles are found in the **geoscript.style** package.

Styles are made up Symbolizers and Composites. A Symbolizer is a particular style like Stroke or Fill. Symbolizers also have methods for controlling the drawing order (zindex), the min and max scale (range), and filtering (where).

## **Creating Basic Styles**

```
Fill fill = new Fill("#6B8E23")
```



A Composite is simply two or more Symbolizers. So, a Composite would be a combination of a Stroke symbolizer (to style the boundary) and a Fill Symbolizer (to style the interior).

```
Composite composite = new Fill("#6B8E23") + new Stroke("black", 0.75)
```



A Symbolizer can use the where method to restrict which features are styled.

```
Symbolizer symbolizer = new Fill("#ffffcc").where("PEOPLE < 4504128.33") +
    new Fill("#41b6c4").where("PEOPLE BETWEEN 4504128.33 AND 16639804.33") +
    new Fill("#253494").where("PEOPLE > 16639804.33")
```



The zindex method is used to order Symbolizers on top of each other. In this recipe we use it to create line casings.

```
Symbolizer symbolizer = new Stroke("black", 2.0).zindex(0) + new Stroke("white", 0.1
).zindex(1)
```



The scale method is used to create Symbolizers that are dependent on map scale.





# **Creating Strokes**

Create a Stroke Symbolizer with a Color

```
Stroke stroke = new Stroke("#1E90FF")
```



Create a Stroke Symbolizer with a Color and Width

```
Stroke stroke = new Stroke("#1E90FF", 0.5)
```



Create a Stroke Symbolizer with casing

```
Symbolizer stroke = new Stroke(color: "#333333", width: 5, cap: "round").zindex(0) +
    new Stroke(color: "#6699FF", width: 3, cap: "round").zindex(1)
```



Create a Stroke Symbolizer with Dashes

```
Stroke stroke = new Stroke("#1E90FF", 0.75, [5,5], "round", "bevel")
```



Create a Stroke Symbolizer with railroad Hatching

```
Symbolizer stroke = new Stroke("#1E90FF", 1) + new Hatch("vertline", new Stroke
("#1E90FF", 0.5), 6).zindex(1)
```



Create a Stroke Symbolizer with spaced Shape symbols

```
Symbolizer stroke = new Stroke(width: 0, dash: [4, 4]).shape(new Shape("#1E90FF", 6,
"circle").stroke("navy", 0.75))
```



Create a Stroke Symbolizer with alternating spaced Shape symbols



# **Creating Fills**

Create a Fill Symbolizer with a Color

```
Fill fill = new Fill("#6B8E23")
```



Create a Fill Symbolizer with a Color and a Stroke

```
Symbolizer symbolizer = new Fill("#6B8E23") + new Stroke("black", 0.1)
```



Create a Fill Symbolizer with a Color and Opacity

```
Fill fill = new Fill("#6B8E23", 0.35)
```



Create a Fill Symbolizer from named parameters

```
Fill fill = new Fill(color: "wheat", opacity: 0.75)
```



Create a Fill Symbolizer with an Icon

```
Fill fill = new Fill("green").icon('src/main/resources/trees.png', 'image/png')
```



Create a Fill Symbolizer with a Hatch

```
Fill fill = new Fill("green").hatch("slash", new Stroke("green", 0.25), 8)
```



### Create a Fill Symbolizer with a random fill

```
Symbolizer symbolizer = new Fill("white").hatch("circle", new Fill("black"), 2).
random(
    random: "free",
    seed: 0,
    symbolCount: 50,
    tileSize: 50,
    rotation: "none"
) + new Stroke("black", 0.25)
```



# **Creating Shapes**

Create a Shape Symbolizer with a Color

```
Shape shape = new Shape("navy")
```



Create a Shape Symbolizer with a color, size, type, opacity and angle

```
Shape shape = new Shape("#9370DB", 8, "triangle", 0.75, 45)
```



### Create a Shape Symbolizer with named parameters

```
Shape shape = new Shape(color: "#8B4513", size: 10, type: "star", opacity: 1.0,
rotation: 0)
```



## Create a Shape Symbolizer with Stroke outline

```
Symbolizer symbolizer = new Shape("white", 10).stroke("navy", 0.5)
```



# **Creating Icons**

Create an Icon Symbolizer

```
Symbolizer symbolizer = new Icon("src/main/resources/place.png", "image/png", 12)
```



### Create an Icon Symbolizer

```
Symbolizer symbolizer = new Icon(url: "src/main/resources/place.png", format:
"image/png", size: 10)
```



# **Creating Labels**

Create a Label for a Point Layer

- 1 anchor
- ② displacement
- 3 rotation



- 1 style (normal, italic, oblique)
- ② weight (normal, bold)
- 3 size (8,12,16,ect..)
- 4 family (serif, arial, verdana)



Create a Label for a Point Layer with Halo

```
Symbolizer symbolizer = new Shape("blue", 6).stroke("navy", 0.5) + new Label("NAME"
).point(
       [0.5,0.5],
       [0, 5.0],
       0
).fill(new Fill("white")) + new Halo(new Fill("navy"), 2.5)
```



#### Create a Label for a Polygon Layer

```
Symbolizer symbolizer = new Fill("white") + new Stroke("black", 0.1) + new Label
("NAME_1")
    .point(anchor: [0.5,0.5])
    .polygonAlign("mbr")
```



#### Create a Label for a Line Layer



# **Creating Transforms**

Create a normal Transform symbolizer that styles a polygon as a point by calculating it's centroid



```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer places = workspace.get("places")
Process process = new Process("convexhull",
        "Create a convexhull around the features",
        [features: geoscript.layer.Cursor],
        [result: geoscript.layer.Cursor],
        { inputs ->
            def geoms = new GeometryCollection(inputs.features.collect{ f -> f.geom})
            def output = new Layer()
            output.add([geoms.convexHull])
            [result: output]
        }
Function function = new Function(process, new Function("parameter", new Expression
("features")))
Symbolizer symbolizer = new Transform(function, Transform.RENDERING) + new Fill
("aqua", 0.75) + new Stroke("navy", 0.5)
places.style = symbolizer
```



# **Creating Gradients**

Create a Gradient Symbolizer from a Layer's Field using quantile method

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
Gradient gradient = new Gradient(countries, "PEOPLE", "quantile", 8, "Greens")
countries.style = gradient
```



### Create a Gradient Symbolizer from a Layer's Field using equal interval method

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
Gradient gradient = new Gradient(countries, "PEOPLE", "equalinterval", 3, "Reds")
countries.style = gradient
```



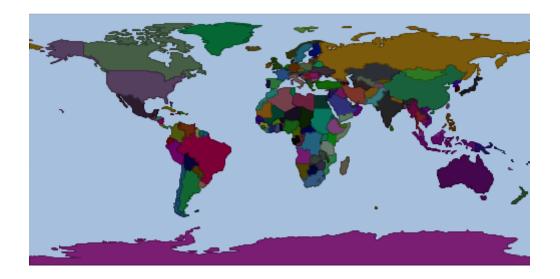
Create a custom Gradient Symbolizer between Symbolizers and values



## **Creating Unique Values**

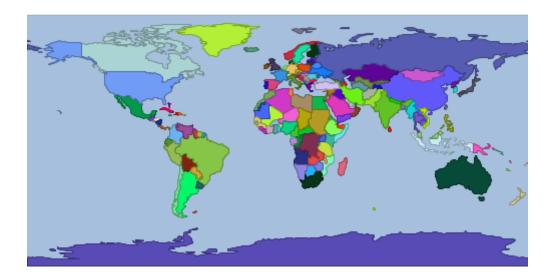
Create a Unique Values Symbolizer from a Layer's Field

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
UniqueValues uniqueValues = new UniqueValues(countries, "NAME")
countries.style = uniqueValues
```



#### Create a Unique Values Symbolizer from a Layer's Field and a Closure

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
UniqueValues uniqueValues = new UniqueValues(countries, "NAME", {int index, String value -> Color.getRandom()})
countries.style = uniqueValues
```



#### Create a Unique Values Symbolizer from a Layer's Field and a color palette

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
UniqueValues uniqueValues = new UniqueValues(countries, "NAME",
"LightPurpleToDarkPurpleHeatMap")
countries.style = uniqueValues
```



# **Creating Color Maps**

Create a ColorMap Symbolizer for a Raster using a list of Colors



#### Create a ColorMap Symbolizer for a Raster using a list of Colors with opacity



#### Create a ColorMap Symbolizer for a Raster using a color palette

- 1 min value
- 2 max value
- 3 color palette name
- 4 number of categories



Create a ColorMap Symbolizer with intervals for a Raster using a list of Colors



## **Creating Channel Selection and Contrast Enhancement**

Create a Raster Symbolizer using ChannelSelection and ContrastEnhancement using the normalize method



Create a Raster Symbolizer using ChannelSelection and ContrastEnhancement using the histogram method



## **Reading and Writing Styles**

Style Readers and Writers are found in the **geoscript.style.io** package.

## **Finding Style Readers and Writers**

List all Style Writers

```
List<Writer> writers = Writers.list()
writers.each { Writer writer ->
    println writer.class.simpleName
}
```

```
SLDWriter
ColorTableWriter
YSLDWriter
```

#### Find a Style Writer

```
Writer writer = Writers.find("sld")
println writer.class.simpleName
```

```
SLDWriter
```

#### List all Style Readers

```
List<Reader> readers = Readers.list()
readers.each { Reader reader ->
    println reader.class.simpleName
}
```

```
SLDReader
CSSReader
ColorTableReader
YSLDReader
SimpleStyleReader
```

#### Find a Style Reader

```
Reader reader = Readers.find("sld")
println reader.class.simpleName
```

SLDReader

#### **SLD**

GeoScript Groovy can read and write Style Layer Descriptor (SLD) documents.

Write a Symbolizer to SLD

```
Symbolizer symbolizer = new Fill("white") + new Stroke("black", 0.5)
SLDWriter writer = new SLDWriter()
String sld = writer.write(symbolizer)
println sld
```

```
<?xml version="1.0" encoding="UTF-8"?>
<sld:StyledLayerDescriptor xmlns="http://www.opengis.net/sld"
xmlns:sld="http://www.opengis.net/sld" xmlns:ogc="http://www.opengis.net/ogc"
xmlns:gml="http://www.opengis.net/gml" version="1.0.0">
 <sld:UserLayer>
    <sld:LayerFeatureConstraints>
     <sld:FeatureTypeConstraint/>
   </sld:LayerFeatureConstraints>
    <sld:UserStyle>
     <sld:Name>Default Styler</sld:Name>
     <sld:FeatureTypeStyle>
        <sld:Name>name</sld:Name>
        <sld:Rule>
          <sld:PolygonSymbolizer>
            <sld:Fill>
              <sld:CssParameter name="fill">#ffffff</sld:CssParameter>
            </sld:Fill>
          </sld:PolygonSymbolizer>
          <sld:LineSymbolizer>
            <sld:Stroke>
              <sld:CssParameter name="stroke-width">0.5</sld:CssParameter>
            </sld:Stroke>
          </sld:LineSymbolizer>
        </sld:Rule>
     </sld:FeatureTypeStyle>
    </sld:UserStyle>
 </sld:UserLayer>
</sld:StyledLayerDescriptor>
```

```
String sld = """<?xml version="1.0" encoding="UTF-8"?>
<sld:StyledLayerDescriptor xmlns="http://www.opengis.net/sld"
xmlns:sld="http://www.opengis.net/sld" xmlns:ogc="http://www.opengis.net/ogc"
xmlns:gml="http://www.opengis.net/gml" version="1.0.0">
 <sld:UserLayer>
    <sld:LayerFeatureConstraints>
     <sld:FeatureTypeConstraint/>
    </sld:LayerFeatureConstraints>
    <sld:UserStyle>
     <sld:Name>Default Styler</sld:Name>
     <sld:FeatureTypeStyle>
        <sld:Name>name</sld:Name>
        <sld:Rule>
         <sld:PolygonSymbolizer>
            <sld:Fill>
              <sld:CssParameter name="fill">#ffffff</sld:CssParameter>
            </sld:Fill>
         </sld:PolygonSymbolizer>
         <sld:LineSymbolizer>
            <sld:Stroke>
              <sld:CssParameter name="stroke">#000000</sld:CssParameter>
              <sld:CssParameter name="stroke-width">0.5</sld:CssParameter>
            </sld:Stroke>
         </sld:LineSymbolizer>
        </sld:Rule>
     </sld:FeatureTypeStyle>
    </sld:UserStyle>
 </sld:UserLayer>
</sld:StyledLayerDescriptor>
        SLDReader reader = new SLDReader()
        Style style = reader.read(sld)
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = style
```



### **CSS**

GeoScript Groovy can only read CSS documents.

Read a Style from an CSS String

```
String css = """

* {
    fill: #eeeeee;
    fill-opacity: 1.0;
    stroke: #000000;
    stroke-width: 1.2;
}
"""

CSSReader reader = new CSSReader()
    Style style = reader.read(css)

Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
    Layer countries = workspace.get("countries")
    countries.style = style
```



#### **YSLD**

GeoScript Groovy can read and write YAML Style Layer Descriptors (YSLD) documents.

Write a Symbolizer to YSLD

```
Symbolizer symbolizer = new Fill("white") + new Stroke("black", 0.5)
YSLDWriter writer = new YSLDWriter()
String ysld = writer.write(symbolizer)
println ysld
```

```
name: Default Styler
feature-styles:
- name: name
rules:
- scale: [min, max]
    symbolizers:
- polygon:
        fill-color: '#FFFFFFF'
- line:
        stroke-color: '#000000'
        stroke-width: 0.5
```

```
String ysld = """
name: Default Styler
feature-styles:
- name: name
 rules:
  - scale: [min, max]
    symbolizers:
    - polygon:
        fill-color: '#FFFFFF'
    - line:
        stroke-color: '#000000'
        stroke-width: 0.5
0.00
        YSLDReader reader = new YSLDReader()
        Style style = reader.read(ysld)
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = style
```



## Simple Style Reader

A SimpleStyleReader that can easily create simple Styles using Maps or Strings.

- Fill properties: fill and fill-opacity
- Stroke properties: stroke, stroke-width, stroke-opacity
- Shape properties: shape, shape-size, shape-type
- Label properties: label-size, label-style, label-weight, label-family

```
String str = "fill=#555555 fill-opacity=0.6 stroke=#555555 stroke-width=0.5"
SimpleStyleReader reader = new SimpleStyleReader()
Style style = reader.read(str)

Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = style
```



Read a Style with fill, stroke, and label properties from a Simple Style String

```
String str = "fill=white stroke=navy label=NAME label-size=10"
SimpleStyleReader reader = new SimpleStyleReader()
Style style = reader.read(str)

Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = style
```



Read a Style with shape properties from a Simple Style String

```
String str = "shape-type=circle shape-size=8 shape=orange"
SimpleStyleReader reader = new SimpleStyleReader()
Style style = reader.read(str)
println style

Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer places = workspace.get("places")
places.style = style
```





#### **Color Table**

GeoScript Groovy can read and write color table strings and files. This format can be used with ColorMaps to style Rasters.

Write a ColorMap to a color table string

```
ColorMap colorMap = new ColorMap(25, 1820, "BoldLandUse", 5)
ColorTableWriter writer = new ColorTableWriter()
String str = writer.write(colorMap)
println str
```

```
25.0 178 156 195
473.75 79 142 187
922.5 143 146 56
1371.25 193 132 55
1820.0 181 214 177
```

### Read a ColorMap from a color table string

```
Format format = new GeoTIFF(new File('src/main/resources/pc.tif'))
Raster raster = format.read()
ColorTableReader reader = new ColorTableReader()
ColorMap colorMap = reader.read("""25.0 178 156 195

473.75 79 142 187
922.5 143 146 56
1371.25 193 132 55
1820.0 181 214 177
""")
raster.style = colorMap
```

