Table of Contents

Carto Recipes

The Carto classes are in the **geoscript.carto** package.

The Carto package contains classes for creating cartographic documents. All items are added to the document with x and y coordinates whose origin is the upper left and width and a height.

Items

Adding a Map

Add a map

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
    layers: [ocean, countries],
    bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
    projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 40).map
(map))
            .build(outputStream)

}
```

Adding an Overview Map

Add an overview map

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-166.436348,6.574916,-12.451973,60.715022, "EPSG:4326"
).reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)
Map overViewMap = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
        .create(pageSize)
        .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height - 1)
            .fillColor(Color.WHITE)
        )
        .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 40).map(map))
        .rectangle(new RectangleItem(20, 20, pageSize.width - 40, pageSize.height -
40))
        .overViewMap(new OverviewMapItem(40, pageSize.height - 240, 200, 200)
            .linkedMap(map)
            .overviewMap(overViewMap)
            .zoomIntoBounds(false)
        )
        .rectangle(new RectangleItem(40, pageSize.height - 240, 200,200))
        .build(outputStream)

}
```

Adding a Text

Add text

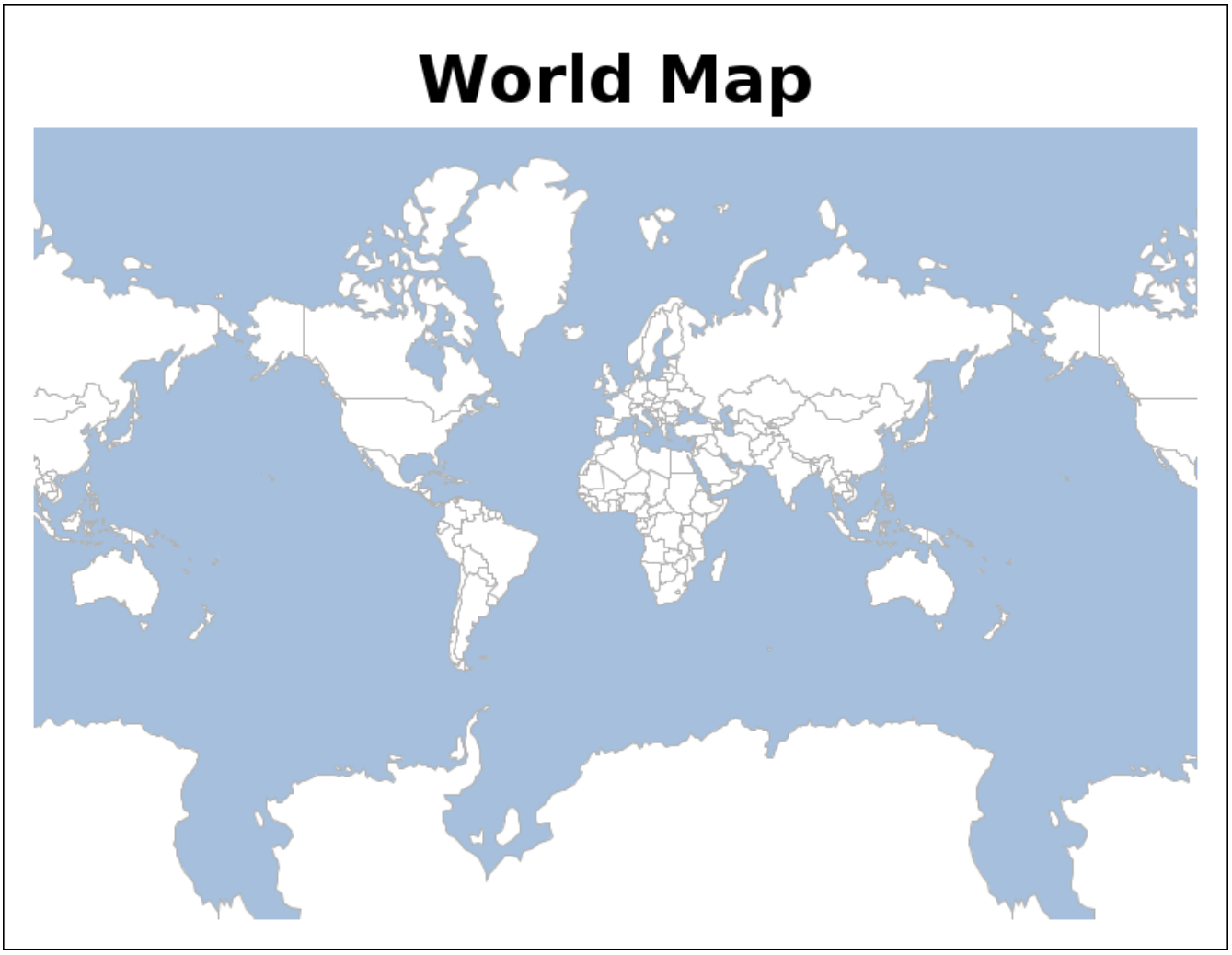
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .text(new TextItem(20,20, pageSize.width - 40, 60)
                .text("World Map")
                .font(new Font("Arial", Font.BOLD, 42))
                .verticalAlign(VerticalAlign.MIDDLE)
                .horizontalAlign(HorizontalAlign.CENTER)
            )
            .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map
(map))
            .build(outputStream)

}
```



Adding a Rectangle

Add a rectangle

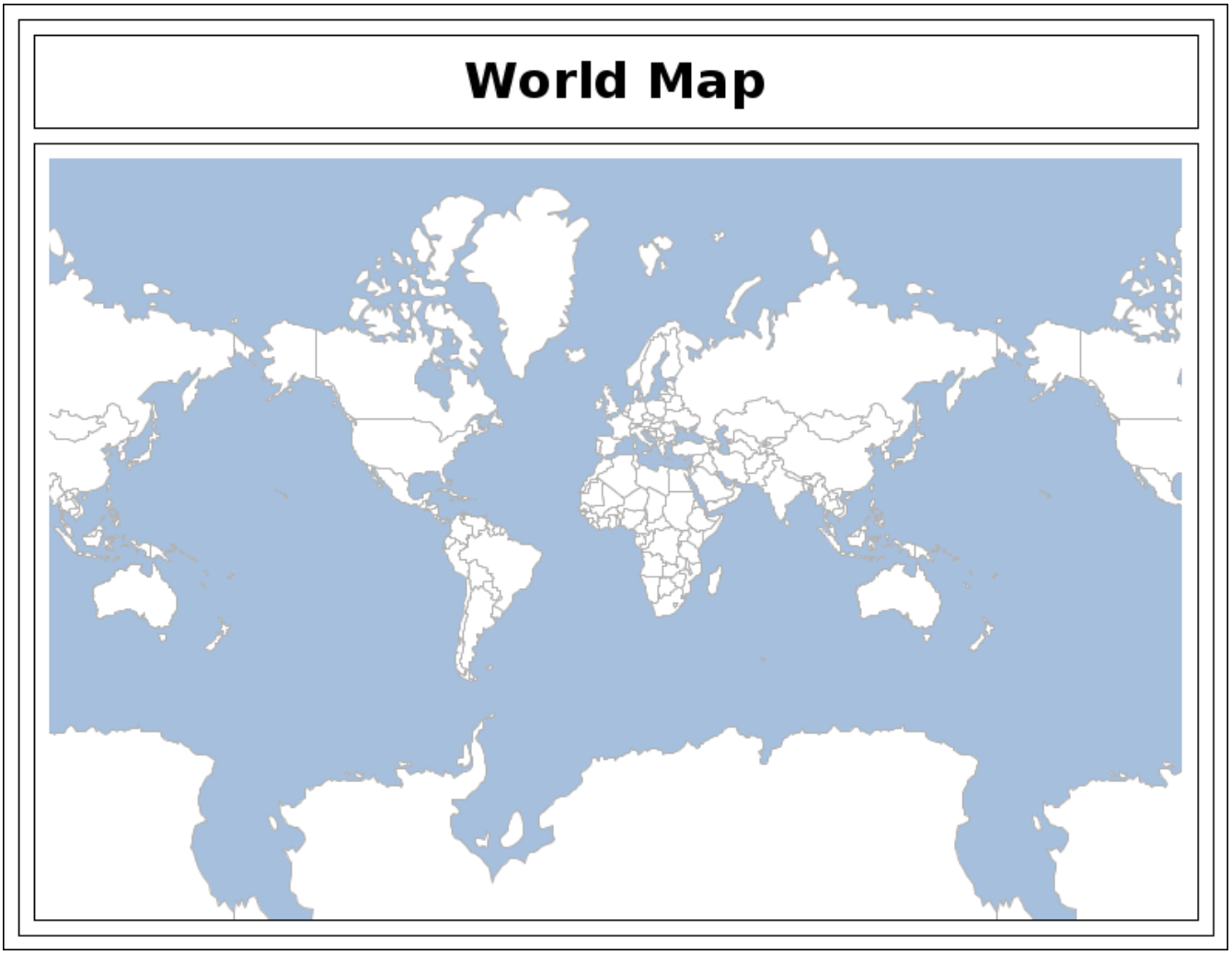
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .rectangle(new RectangleItem(10,10, pageSize.width - 20, pageSize.height -
20))
            .rectangle(new RectangleItem(20,20, pageSize.width - 40, 60))
            .rectangle(new RectangleItem(20,90, pageSize.width - 40, pageSize.height -
110))
            .text(new TextItem(20,20, pageSize.width - 40, 60)
                .text("World Map")
                .font(new Font("Arial", Font.BOLD, 32))
                .verticalAlign(VerticalAlign.MIDDLE)
                .horizontalAlign(HorizontalAlign.CENTER)
            )
            .map(new MapItem(30, 100, pageSize.width - 60, pageSize.height - 120).map
(map))
            .build(outputStream)

}
```



Adding a North Arrow

Add a north arrow

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
        .create(pageSize)
        .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height - 1)
            .fillColor(Color.WHITE)
        )
        .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 40).map(map))
        .northArrow(new NorthArrowItem(pageSize.width - 60, pageSize.height - 100, 40,
80)
            .font(new Font("Arial", Font.BOLD, 24))
            .drawText(true))
        .build(outputStream)

}
```

Adding a NESW North Arrow

Add a NESW north arrow

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                    .fillColor(Color.WHITE)
            )
            .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 40).map
(map))
            .northArrow(new NorthArrowItem(pageSize.width - 100, pageSize.height -
100, 80, 80)
                .style(NorthArrowStyle.NorthEastSouthWest)
                .font(new Font("Arial", Font.BOLD, 14))
                .drawText(true))
            .build(outputStream)

}
```

Adding a Legend

Add a legend for a Map

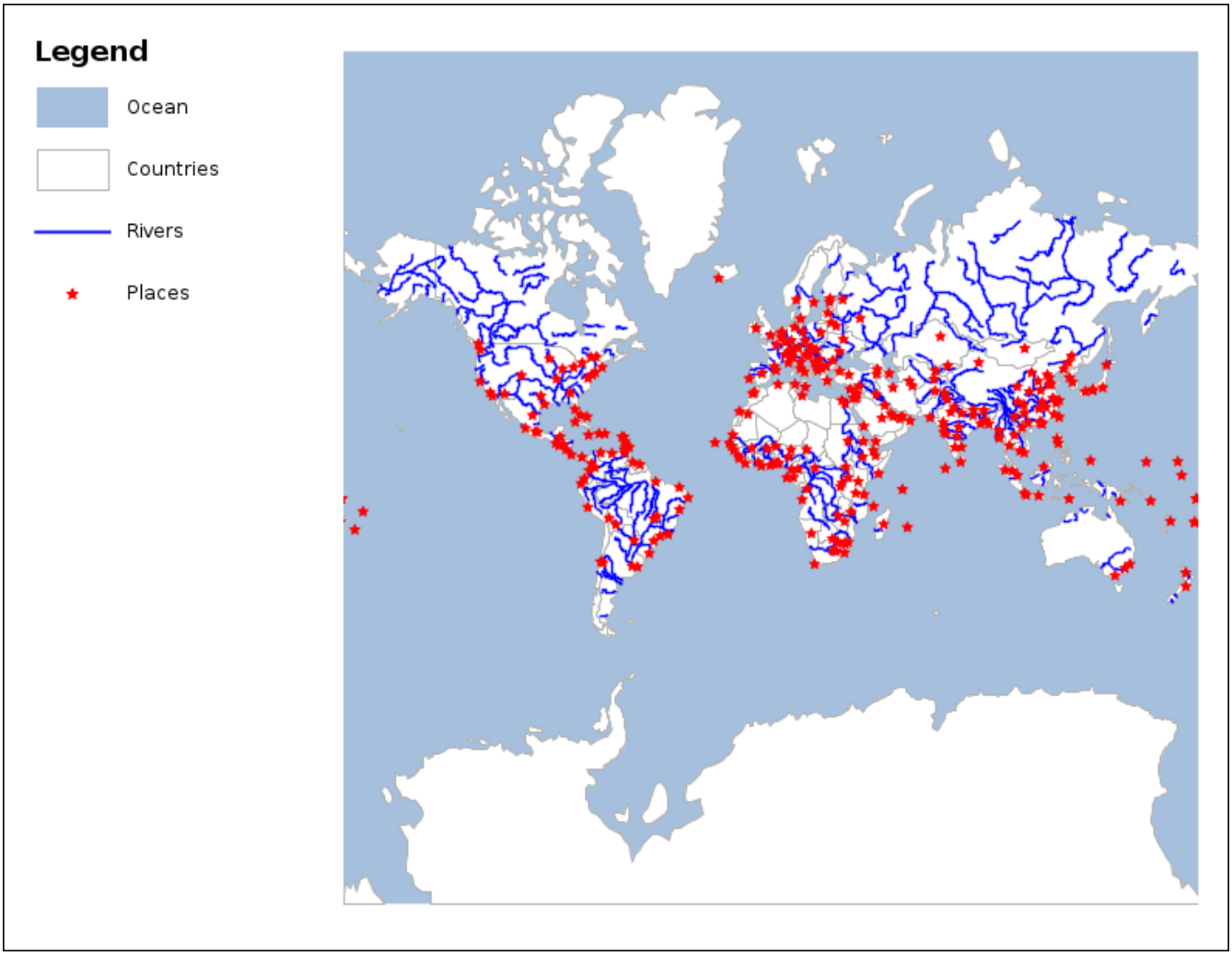
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Layer places = workspace.get("places")
places.style = new Shape("red", 8, "star")
Layer rivers = workspace.get("rivers")
rivers.style = new Stroke("blue", 1)
Map map = new Map(
        layers: [ocean, countries, rivers, places],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                    .fillColor(Color.WHITE)
            )
            .map(new MapItem(220, 20, pageSize.width - 240, pageSize.height - 40).map
(map))
            .legend(new LegendItem(20, 20, 200, pageSize.height - 40).addMap(map))
            .build(outputStream)

}
```



Adding a Date

Add a date

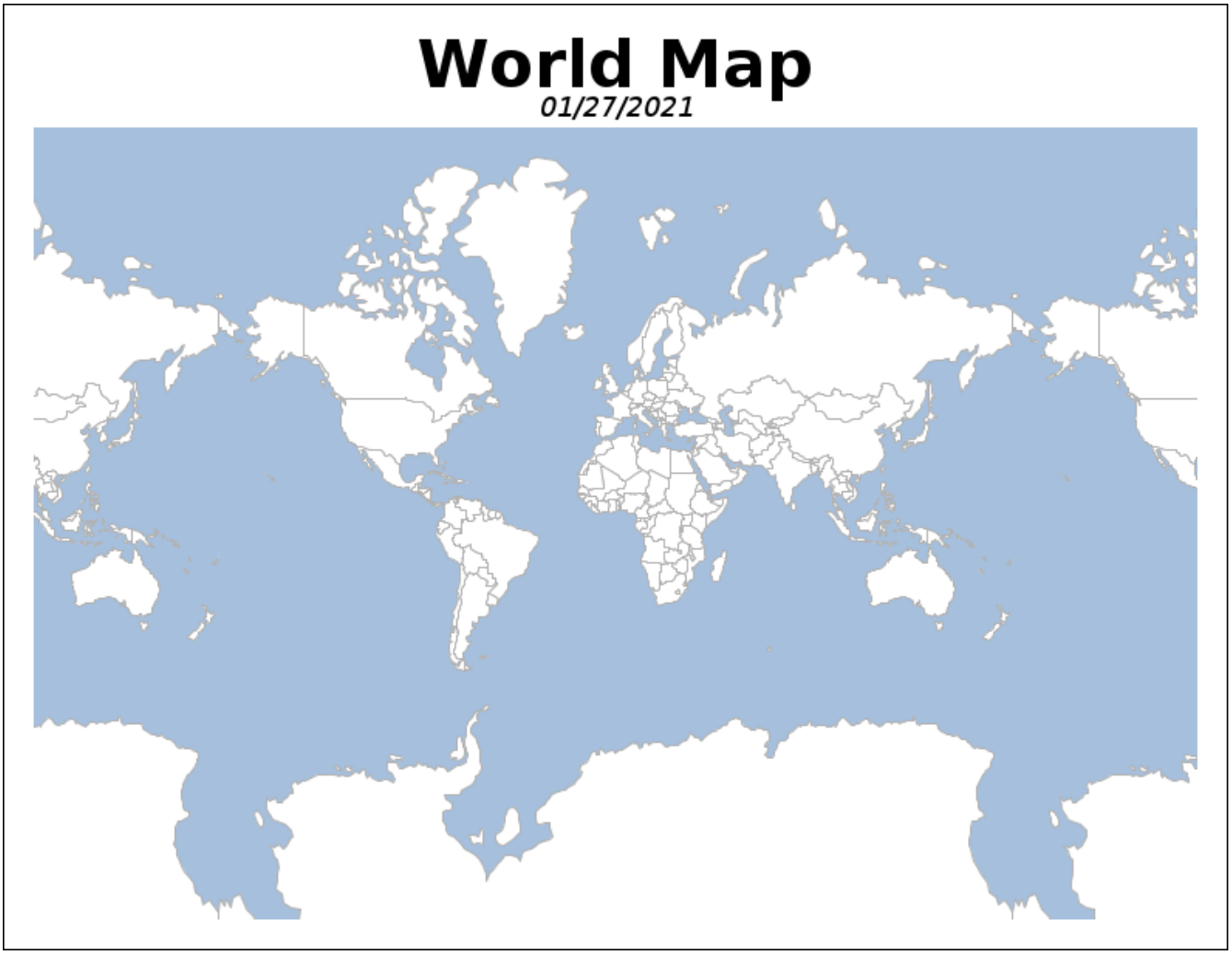
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
        .create(pageSize)
        .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height - 1)
            .fillColor(Color.WHITE)
        )
        .text(new TextItem(20,15, pageSize.width - 40, 60)
            .text("World Map")
            .font(new Font("Arial", Font.BOLD, 42))
            .verticalAlign(VerticalAlign.TOP)
            .horizontalAlign(HorizontalAlign.CENTER)
        )
        .dateText(new DateTextItem(20,58, pageSize.width - 40, 20)
            .font(new Font("Arial", Font.ITALIC, 18))
            .verticalAlign(VerticalAlign.BOTTOM)
            .horizontalAlign(HorizontalAlign.CENTER)
        )
        .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map(map))
        .build(outputStream)

}
```



Adding Scale Text

Add scale text

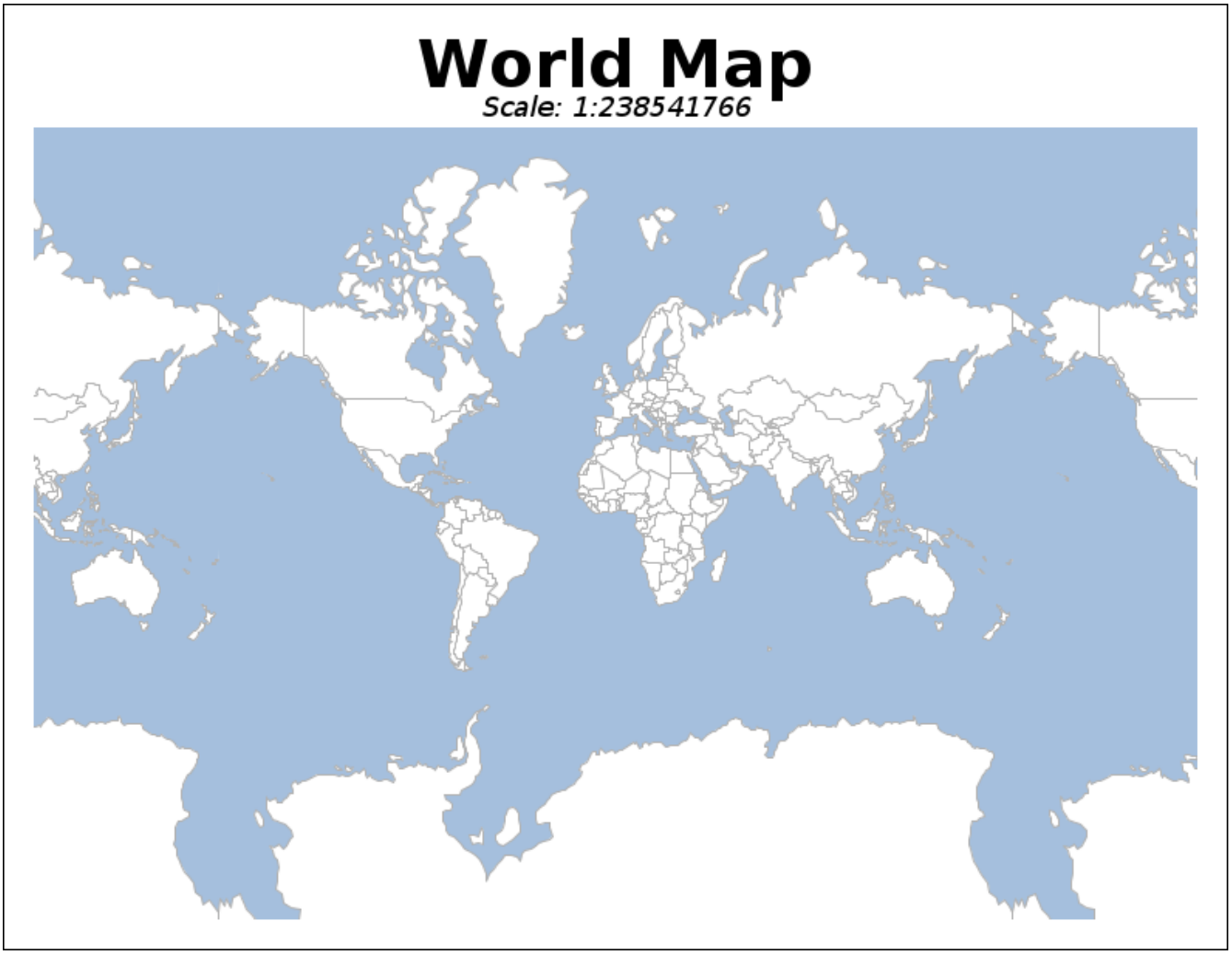
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
        .create(pageSize)
        .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height - 1)
            .fillColor(Color.WHITE)
        )
        .text(new TextItem(20,15, pageSize.width - 40, 60)
            .text("World Map")
            .font(new Font("Arial", Font.BOLD, 42))
            .verticalAlign(VerticalAlign.TOP)
            .horizontalAlign(HorizontalAlign.CENTER)
        )
        .scaleText(new ScaleTextItem(20,58, pageSize.width - 40, 20)
            .map(map)
            .format("#")
            .prefixText("Scale: ")
            .font(new Font("Arial", Font.ITALIC, 18))
            .verticalAlign(VerticalAlign.BOTTOM)
            .horizontalAlign(HorizontalAlign.CENTER)
        )
        .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map(map))
        .build(outputStream)

}
```



Adding Scale Bar

Add scale bar

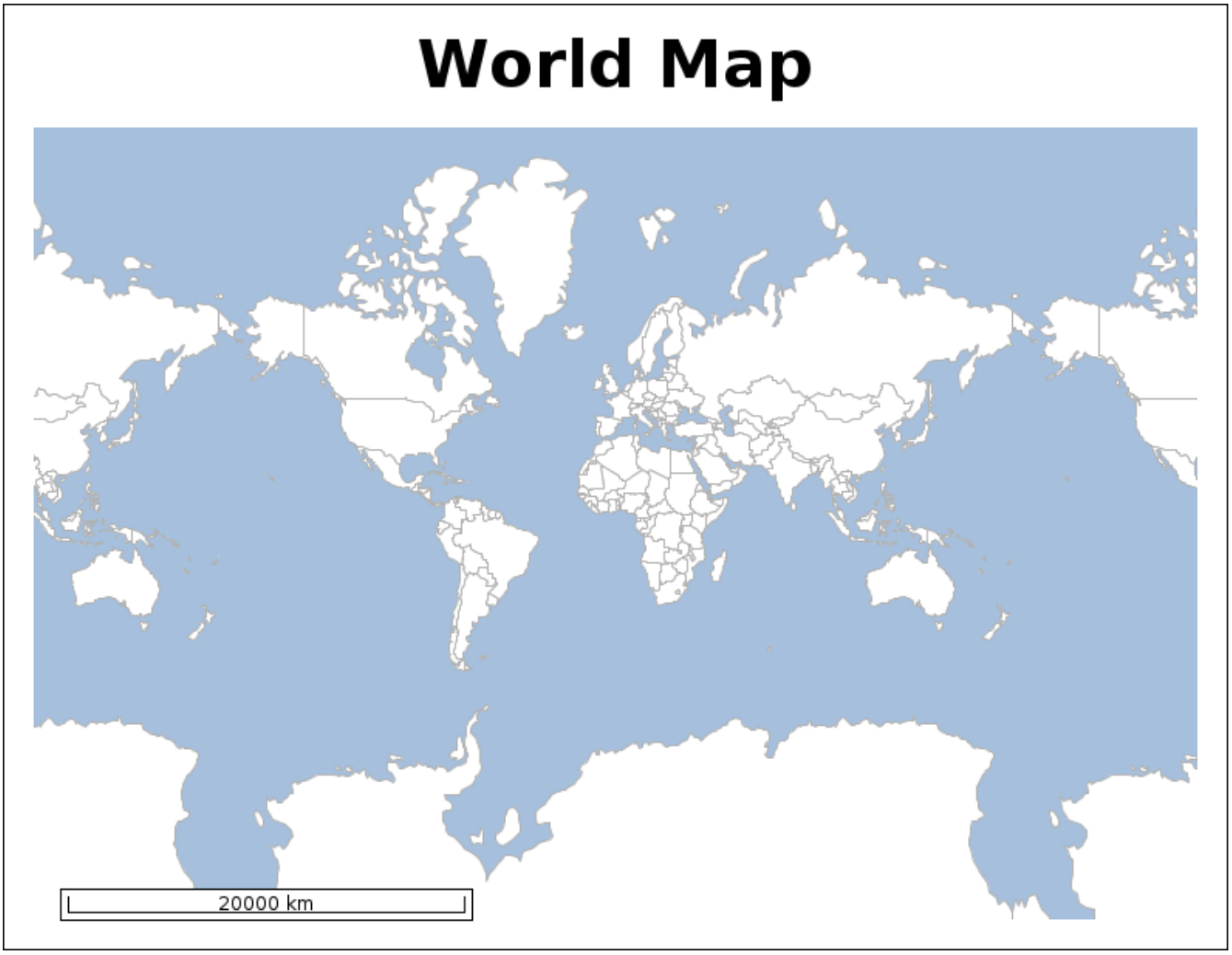
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                    .fillColor(Color.WHITE)
            )
            .text(new TextItem(20,15, pageSize.width - 40, 60)
                    .text("World Map")
                    .font(new Font("Arial", Font.BOLD, 42))
                    .verticalAlign(VerticalAlign.TOP)
                    .horizontalAlign(HorizontalAlign.CENTER)
            )
            .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map
(map))
            .scaleBar(new ScaleBarItem(20,pageSize.height - 40, 300, 20)
                    .map(map)
                    .units(ScaleBarItem.Units.METRIC)
            )
            .build(outputStream)

}
```



Adding a Line

Add a line

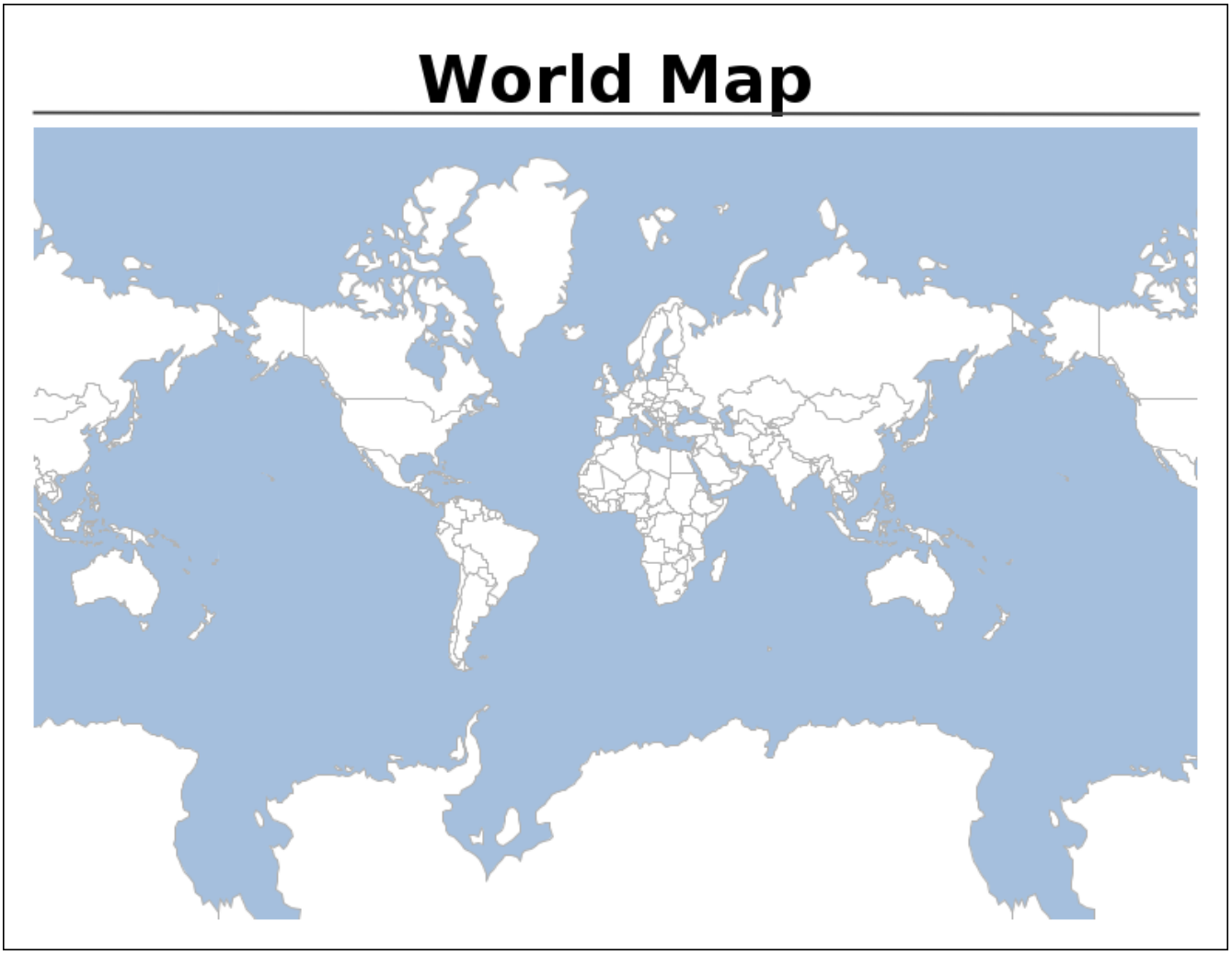
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .text(new TextItem(20,20, pageSize.width - 40, 60)
                .text("World Map")
                .font(new Font("Arial", Font.BOLD, 42))
                .verticalAlign(VerticalAlign.MIDDLE)
                .horizontalAlign(HorizontalAlign.CENTER)
            )
            .line(new LineItem(20, 70, pageSize.width - 40, 1)
                .strokeWidth(2)
                .strokeColor(Color.DARK_GRAY)
            )
            .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map
(map))
            .build(outputStream)

}
```



Adding a Grid

Adding a grid is a nice way to placing items.

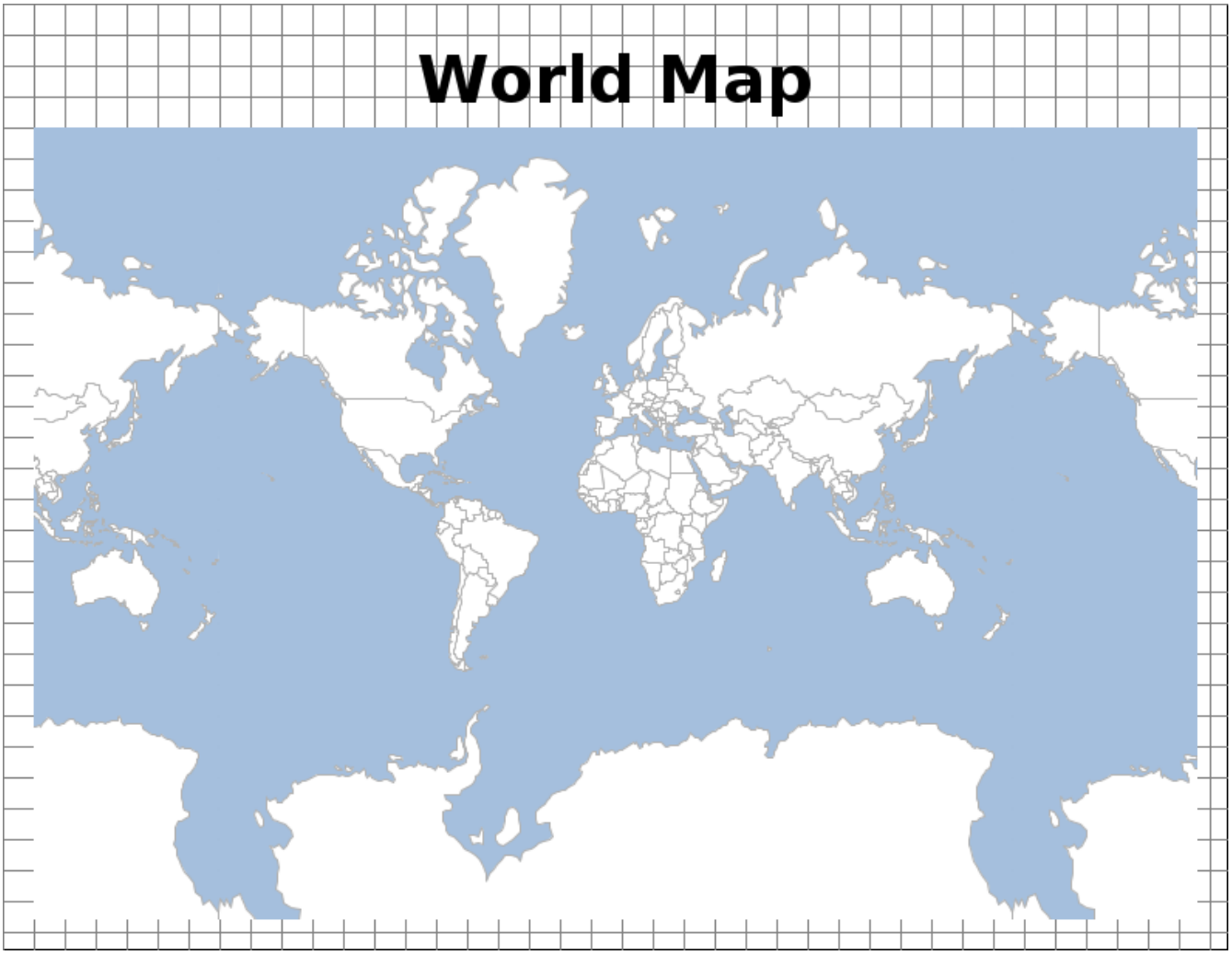
```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .grid(new GridItem(0,0,pageSize.width, pageSize.height)
                .size(20)
                .strokeColor(Color.GRAY)
                .strokeWidth(1.0)
            )
            .text(new TextItem(20,20, pageSize.width - 40, 60)
                .text("World Map")
                .font(new Font("Arial", Font.BOLD, 42))
                .verticalAlign(VerticalAlign.MIDDLE)
                .horizontalAlign(HorizontalAlign.CENTER)
            )
            .map(new MapItem(20, 80, pageSize.width - 40, pageSize.height - 100).map
(map))
            .build(outputStream)

}
```



Adding a Paragraph

Adding a paragraph of text

```
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = new SLDReader().read(new File
('src/main/resources/countries.sld'))
        Layer ocean = workspace.get("ocean")
        ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
        Map map = new Map(
                layers: [ocean, countries],
                bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject(
"EPSG:3857"),
                projection: new Projection("EPSG:3857")
        )

        File file = new File("map.png")
        file.withOutputStream { OutputStream outputStream ->

            PageSize pageSize = PageSize.LETTER_LANDSCAPE

            CartoFactories.findByName("png")
                .create(pageSize)
                .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height
- 1)
                    .fillColor(Color.WHITE)
                )
                .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 100
).map(map))
                .paragraph(new ParagraphItem(20, pageSize.height - 60, pageSize.width
- 40, 60)
                    .font(new Font("Arial", Font.PLAIN, 12))
                    .color(Color.BLACK)
                    .text("""Natural Earth is a public domain map dataset available at
1:10m, 1:50m, and 1:110 million scales.
Featuring tightly integrated vector and raster data, with Natural Earth you can make a
variety of visually pleasing,
well-crafted maps with cartography or GIS software.
""")
                )
                .build(outputStream)

        }
```

Natural Earth is a public domain map dataset available at 1:10m, 1:50m, and 1:110 million scales. Featuring tightly integrated vector and raster data, with Natural Earth you can make a variety of visually pleasing, well-crafted maps with cartography or GIS software.

Adding an Image

Adding an image

```
Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
Layer countries = workspace.get("countries")
countries.style = new SLDReader().read(new File('src/main/resources/countries.sld'))
Layer ocean = workspace.get("ocean")
ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
Map map = new Map(
        layers: [ocean, countries],
        bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject("EPSG:3857"),
        projection: new Projection("EPSG:3857")
)

File file = new File("map.png")
file.withOutputStream { OutputStream outputStream ->

    PageSize pageSize = PageSize.LETTER_LANDSCAPE

    CartoFactories.findByName("png")
            .create(pageSize)
            .rectangle(new RectangleItem(0, 0, pageSize.width - 1, pageSize.height -
1)
                .fillColor(Color.WHITE)
            )
            .map(new MapItem(20, 20, pageSize.width - 40, pageSize.height - 40).map
(map))
            .image(new ImageItem(pageSize.width - 100, pageSize.height - 100, 80, 80)
                .path(new File("src/main/resources/image.png"))
            )
            .build(outputStream)

}
```

Builders

CartoBuilders write cartographic documents to different formats. Images, PDFs, and SVGs are currently supported.

ImageCartoBuilder

The ImageCartoBuilder can produce PNG or JPEG images.

Use the ImageCartoBuilder to create a PNG image.

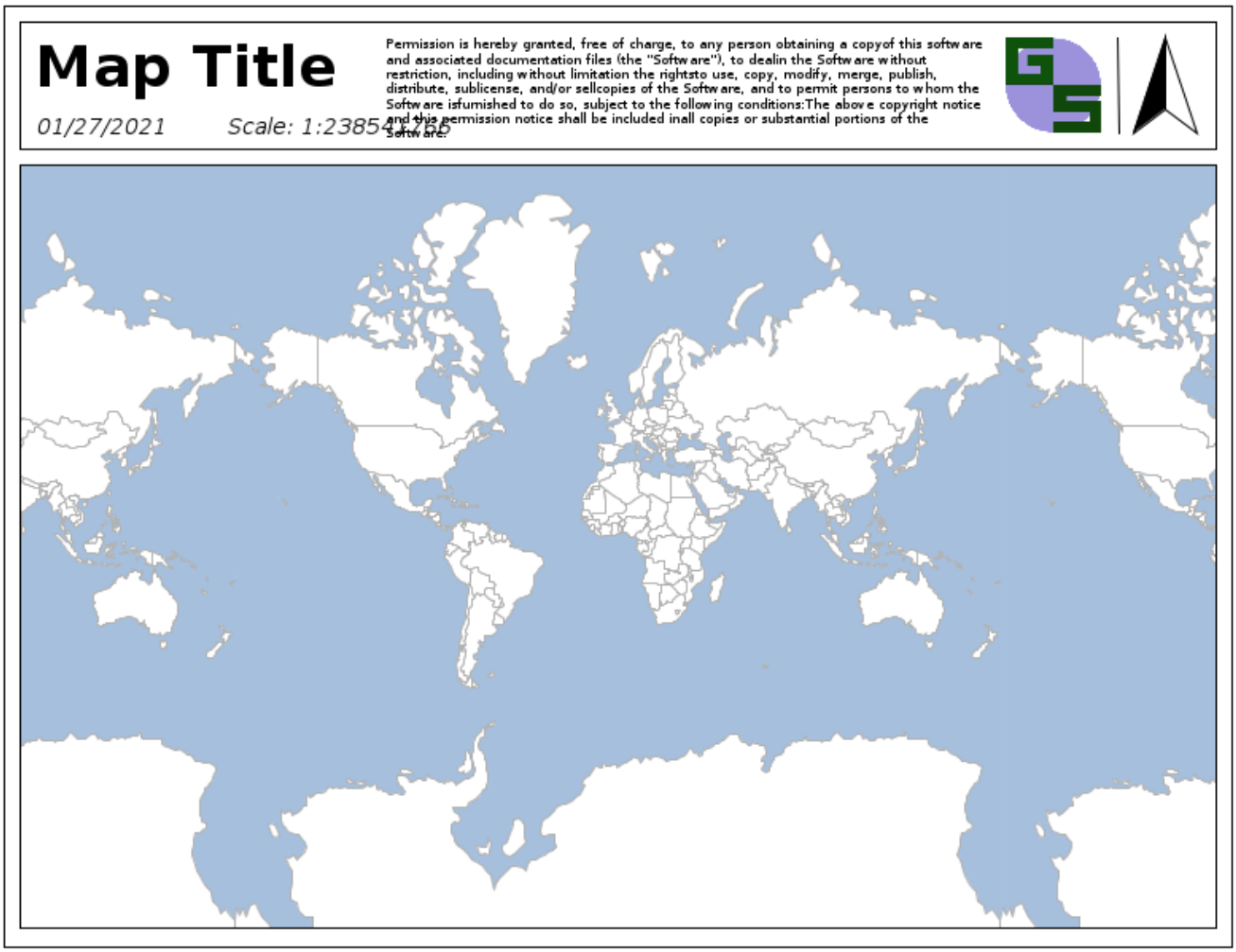
```
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = new SLDReader().read(new File
('src/main/resources/countries.sld'))
        Layer ocean = workspace.get("ocean")
        ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
        Map map = new Map(
                layers: [ocean, countries],
                bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject(
"EPSG:3857"),
                projection: new Projection("EPSG:3857")
        )

        File file = new File("map.png")
        file.withOutputStream { OutputStream outputStream ->

            new ImageCartoBuilder(PageSize.LETTER_LANDSCAPE, ImageCartoBuilder
.ImageType.PNG)
                .rectangle(new RectangleItem(0, 0, 792, 612).strokeColor(Color.WHITE
).fillColor(Color.WHITE))
                .rectangle(new RectangleItem(10, 10, 772, 592))
                .rectangle(new RectangleItem(20, 20, 752, 80))
                .text(new TextItem(30, 50, 200, 20).text("Map Title").font(new Font
("Arial", Font.BOLD, 36)))
                .dateText(new DateTextItem(30, 85, 200, 10).font(new Font("Arial",
Font.ITALIC, 14)))
                .scaleText(new ScaleTextItem(150, 85, 200, 10).map(map).font(new Font
("Arial", Font.ITALIC, 14)))
                .paragraph(new ParagraphItem(250, 30, 380, 70).text("""Permission is
hereby granted, free of charge, to any person obtaining a copy
of this software and associated documentation files (the "Software"), to deal
in the Software without restriction, including without limitation the rights
to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
copies of the Software, and to permit persons to whom the Software is
furnished to do so, subject to the following conditions:
The above copyright notice and this permission notice shall be included in
all copies or substantial portions of the Software.
""").font(new Font("Arial", Font.PLAIN, 8)))
                .line(new LineItem(710, 30, 1, 60))
                .image(new ImageItem(640, 30, 60, 60).path(new File(getClass
().getClassLoader().getResource("image.png").toURI())))
                .northArrow(new NorthArrowItem(720, 30, 40, 60))
                .map(new MapItem(20, 110, 752, 480).map(map))
                .rectangle(new RectangleItem(20, 110, 752, 480))

                .build(outputStream)

        }
```



PdfCartoBuilder

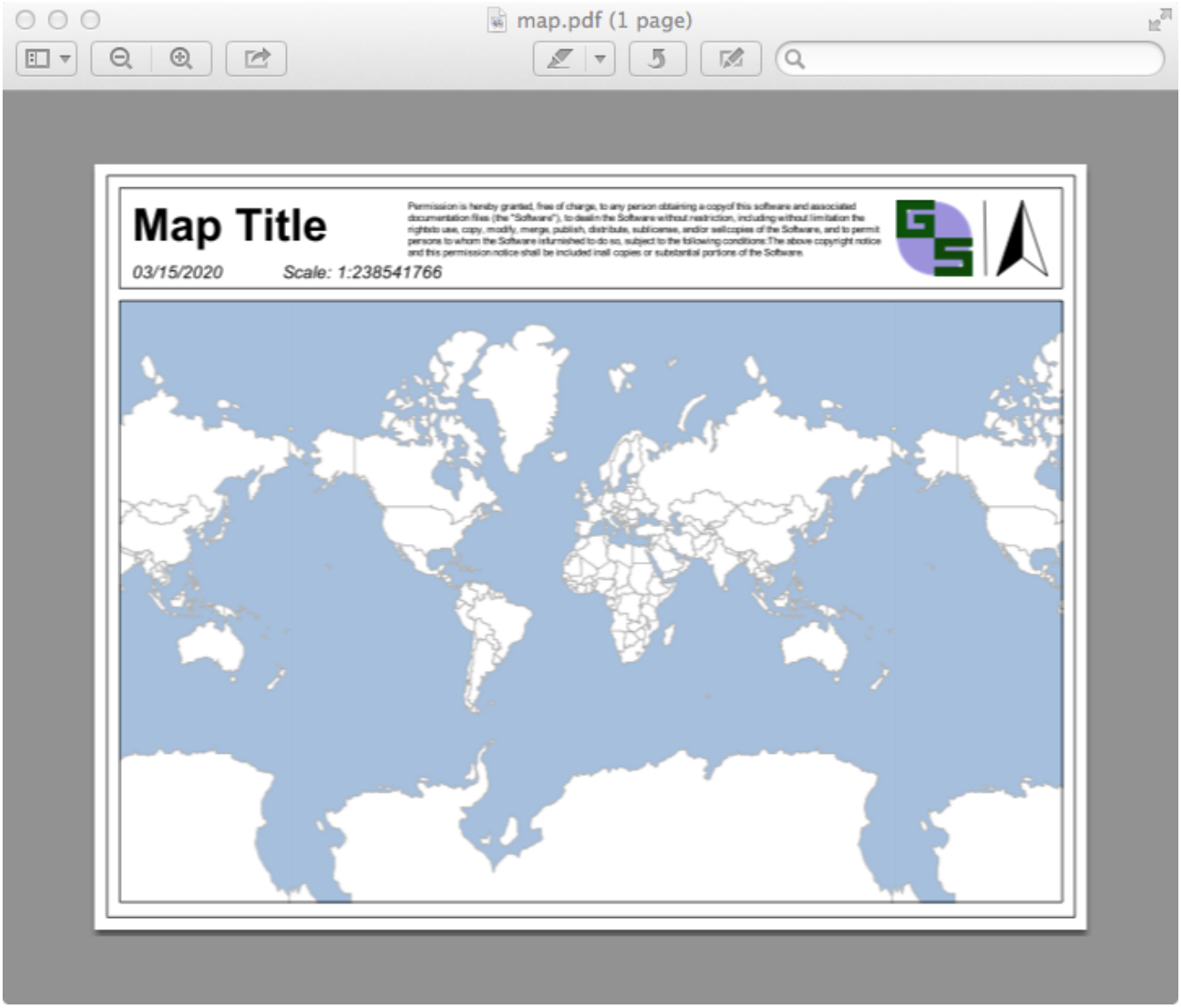
Use the PdfCartoBuilder to create a PDF.

```
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = new SLDReader().read(new File
('src/main/resources/countries.sld'))
        Layer ocean = workspace.get("ocean")
        ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
        Map map = new Map(
                layers: [ocean, countries],
                bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject(
"EPSG:3857"),
                projection: new Projection("EPSG:3857")
        )

        File file = new File("map.pdf")
        file.withOutputStream { OutputStream outputStream ->

            new PdfCartoBuilder(PageSize.LETTER_LANDSCAPE)
                .rectangle(new RectangleItem(0, 0, 792, 612).strokeColor(Color.WHITE
).fillColor(Color.WHITE))
                .rectangle(new RectangleItem(10, 10, 772, 592))
                .rectangle(new RectangleItem(20, 20, 752, 80))
                .text(new TextItem(30, 50, 200, 20).text("Map Title").font(new Font
("Arial", Font.BOLD, 36)))
                .dateText(new DateTextItem(30, 85, 200, 10).font(new Font("Arial",
Font.ITALIC, 14)))
                .scaleText(new ScaleTextItem(150, 85, 200, 10).map(map).font(new Font
("Arial", Font.ITALIC, 14)))
                .paragraph(new ParagraphItem(250, 30, 380, 70).text("""Permission is
hereby granted, free of charge, to any person obtaining a copy
of this software and associated documentation files (the "Software"), to deal
in the Software without restriction, including without limitation the rights
to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
copies of the Software, and to permit persons to whom the Software is
furnished to do so, subject to the following conditions:
The above copyright notice and this permission notice shall be included in
all copies or substantial portions of the Software.
""").font(new Font("Arial", Font.PLAIN, 8)))
                .line(new LineItem(710, 30, 1, 60))
                .image(new ImageItem(640, 30, 60, 60).path(new File(getClass
().getClassLoader().getResource("image.png").toURI())))
                .northArrow(new NorthArrowItem(720, 30, 40, 60))
                .map(new MapItem(20, 110, 752, 480).map(map))
                .rectangle(new RectangleItem(20, 110, 752, 480))
                .build(outputStream)

        }
```



SvgCartoBuilder

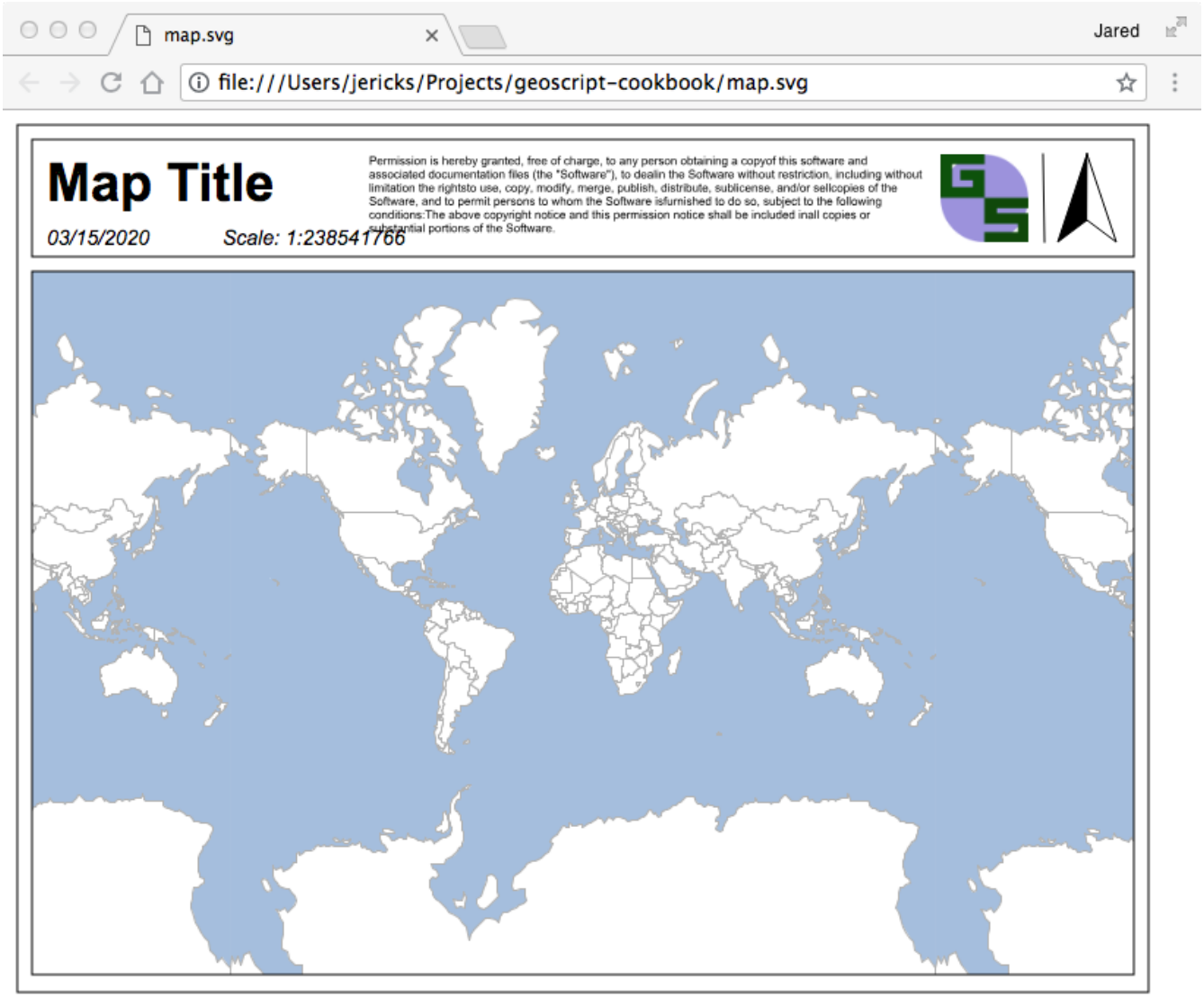
Use the SvgCartoBuilder to create a SVG document.

```
        Workspace workspace = new GeoPackage('src/main/resources/data.gpkg')
        Layer countries = workspace.get("countries")
        countries.style = new SLDReader().read(new File
('src/main/resources/countries.sld'))
        Layer ocean = workspace.get("ocean")
        ocean.style = new SLDReader().read(new File('src/main/resources/ocean.sld'))
        Map map = new Map(
                layers: [ocean, countries],
                bounds: new Bounds(-180,-85,180,85, "EPSG:4326").reproject(
"EPSG:3857"),
                projection: new Projection("EPSG:3857")
        )

        File file = new File("map.svg")
        file.withOutputStream { OutputStream outputStream ->

            new SvgCartoBuilder(PageSize.LETTER_LANDSCAPE)
                .rectangle(new RectangleItem(0, 0, 792, 612).strokeColor(Color.WHITE
).fillColor(Color.WHITE))
                .rectangle(new RectangleItem(10, 10, 772, 592))
                .rectangle(new RectangleItem(20, 20, 752, 80))
                .text(new TextItem(30, 50, 200, 20).text("Map Title").font(new Font
("Arial", Font.BOLD, 36)))
                .dateText(new DateTextItem(30, 85, 200, 10).font(new Font("Arial",
Font.ITALIC, 14)))
                .scaleText(new ScaleTextItem(150, 85, 200, 10).map(map).font(new Font
("Arial", Font.ITALIC, 14)))
                .paragraph(new ParagraphItem(250, 30, 380, 70).text("""Permission is
hereby granted, free of charge, to any person obtaining a copy
of this software and associated documentation files (the "Software"), to deal
in the Software without restriction, including without limitation the rights
to use, copy, modify, merge, publish, distribute, sublicense, and/or sell
copies of the Software, and to permit persons to whom the Software is
furnished to do so, subject to the following conditions:
The above copyright notice and this permission notice shall be included in
all copies or substantial portions of the Software.
""").font(new Font("Arial", Font.PLAIN, 8)))
                .line(new LineItem(710, 30, 1, 60))
                .image(new ImageItem(640, 30, 60, 60).path(new File(getClass
().getClassLoader().getResource("image.png").toURI())))
                .northArrow(new NorthArrowItem(720, 30, 40, 60))
                .map(new MapItem(20, 110, 752, 480).map(map))
                .rectangle(new RectangleItem(20, 110, 752, 480))
                .build(outputStream)

        }
```



Reading CartoBuilders

The IO module can read a CartoBuilder from JSON or XML documents.

Finding Carto Readers

List all Carto Readers

```
List<CartoReader> readers = CartoReaders.list()
readers.each { CartoReader reader ->
    println reader.name
}
```

```
json
xml
```

Find a Carto Reader

```
CartoReader reader = CartoReaders.find("json")
println reader.name
```

```
json
```

JSON

Read a CartoBuilder from a JSON String

```
        String json = """{
    "type": "png",
    "width": 400,
    "height": 400,
    "items": [
        {
            "x": 0,
            "y": 0,
            "width": 400,
            "height": 400,
            "type": "rectangle",
            "fillColor": "white",
            "strokeColor": "white"
        },
        {
            "x": 10,
            "y": 10,
            "width": 380,
            "height": 380,
            "type": "rectangle"
        },
        {
            "x": 20,
            "y": 20,
            "width": 360,
            "height": 360,
            "type": "map",
            "name": "mainMap",
            "proj": "EPSG:4326",
            "bounds": {
                "minX": -135.911779,
                "minY": 36.993573,
                "maxX": -96.536779,
                "maxY": 51.405899
            },
            "layers": [
                {
                    "layertype": "layer",
```

```
                "dbtype": "geopkg",
                "database": "src/main/resources/data.gpkg",
                "layername": "ocean",
                "style": "src/main/resources/ocean.sld"
            },
            {
                "layertype": "layer",
                "dbtype": "geopkg",
                "database": "src/main/resources/data.gpkg",
                "layername": "countries",
                "style": "src/main/resources/countries.sld"
            },
            {
                "layertype": "layer",
                "dbtype": "geopkg",
                "database": "src/main/resources/data.gpkg",
                "layername": "states",
                "style": "src/main/resources/states.sld"
            }
        ]
    },
    {
        "x": 20,
        "y": 20,
        "width": 30,
        "height": 40,
        "type": "northarrow"
    },
    {
        "x": 260,
        "y": 20,
        "width": 50,
        "height": 200,
        "type": "legend",
        "map": "mainMap"
    },
    {
        "x": 70,
        "y": 20,
        "width": 170,
        "height": 50,
        "type": "text",
        "text": "Western US",
        "font": {
            "name": "Arial",
            "style": "BOLD",
            "size": 24
        },
        "horizontalAlign": "CENTER",
        "verticalAlign": "MIDDLE"
    }
```

```
    ]
}
"""
        CartoReader cartoReader = new JsonCartoReader()
        CartoBuilder cartoBuilder = cartoReader.read(json)
        File file = new File("target/carto_from_json.png")
        file.withOutputStream { OutputStream outputStream ->
            cartoBuilder.build(outputStream)
        }
```

XML

Read a CartoBuilder from an XML String

```
        String json = """<carto>
    <type>png</type>
    <width>400</width>
    <height>400</height>
    <items>
        <item>
            <x>0</x>
            <y>0</y>
            <width>400</width>
            <height>400</height>
            <type>rectangle</type>
            <fillColor>white</fillColor>
            <strokeColor>white</strokeColor>
        </item>
        <item>
```

```
            <x>10</x>
            <y>10</y>
            <width>380</width>
            <height>380</height>
            <type>rectangle</type>
        </item>
        <item>
            <x>20</x>
            <y>20</y>
            <width>360</width>
            <height>360</height>
            <type>map</type>
            <name>mainMap</name>
            <proj>EPSG:4326</proj>
            <bounds>
                <minX>-135.911779</minX>
                <minY>36.993573</minY>
                <maxX>-96.536779</maxX>
                <maxY>51.40589</maxY>
            </bounds>
            <layers>
                <layer>
                    <layertype>layer</layertype>
                    <dbtype>geopkg</dbtype>
                    <database>src/main/resources/data.gpkg</database>
                    <layername>ocean</layername>
                    <style>src/main/resources/ocean.sld</style>
                </layer>
                <layer>
                    <layertype>layer</layertype>
                    <dbtype>geopkg</dbtype>
                    <database>src/main/resources/data.gpkg</database>
                    <layername>countries</layername>
                    <style>src/main/resources/countries.sld</style>
                </layer>
                <layer>
                    <layertype>layer</layertype>
                    <dbtype>geopkg</dbtype>
                    <database>src/main/resources/data.gpkg</database>
                    <layername>states</layername>
                    <style>src/main/resources/states.sld</style>
                </layer>
            </layers>
        </item>
        <item>
            <x>20</x>
            <y>20</y>
            <width>30</width>
            <height>40</height>
            <type>northarrow</type>
        </item>
```

```
        <item>
            <x>260</x>
            <y>20</y>
            <width>50</width>
            <height>200</height>
            <type>legend</type>
            <map>mainMap</map>
        </item>
        <item>
            <x>70</x>
            <y>20</y>
            <width>170</width>
            <height>50</height>
            <type>text</type>
            <text>Western US</text>
            <font>
                <name>Arial</name>
                <style>BOLD</style>
                <size>24</size>
            </font>
            <horizontalAlign>CENTER</horizontalAlign>
            <verticalAlign>MIDDLE</verticalAlign>
        </item>
    </items>
</carto>
"""
        CartoReader cartoReader = new XmlCartoReader()
        CartoBuilder cartoBuilder = cartoReader.read(json)
        File file = new File("target/carto_from_xml.png")
        file.withOutputStream { OutputStream outputStream ->
            cartoBuilder.build(outputStream)
        }
        BufferedImage image = ImageIO.read(file)
        saveImage("carto_io_xml", image)
        image
    }

}
```


Western US
Legend
Ocean
Countries
States