Geoscript Groovy Cookbook

Jared Erickson

Table of Contents

Geometry Recipes

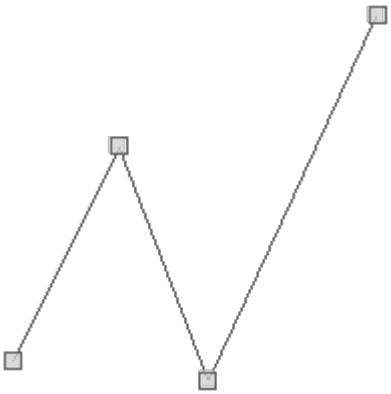
Creating Geometries

Create a Point with an XY

```
Point point = new Point(-123,46)
```

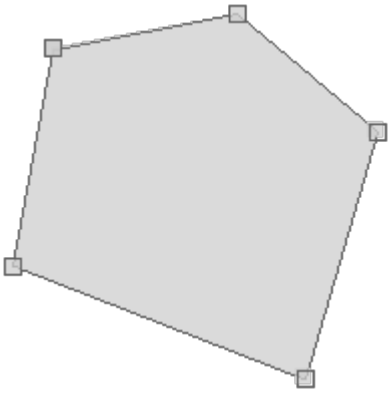
Create a LineString from Coordinates

```
LineString lineString = new LineString(
        [3.1982421875, 43.1640625],
        [6.7138671875, 49.755859375],
        [9.7021484375, 42.5927734375],
        [15.3271484375, 53.798828125]
)
```



Create a Polygon from a List of Coordinates

```
Polygon polygon = new Polygon([[
       [-101.35986328125, 47.754097979680026],
       [-101.5576171875, 46.93526088057719],
       [-100.12939453125, 46.51351558059737],
       [-99.77783203125, 47.44294999517949],
       [-100.45898437499999, 47.88688085106901],
       [-101.35986328125, 47.754097979680026]
]])
```

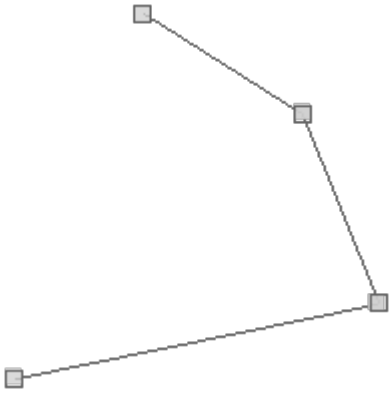


Create a MultiPoint with a List of Points

```
MultiPoint multiPoint = new MultiPoint([
        new Point(-122.3876953125, 47.5820839916191),
        new Point(-122.464599609375, 47.25686404408872),
        new Point(-122.48382568359374, 47.431803338643334)
])
```

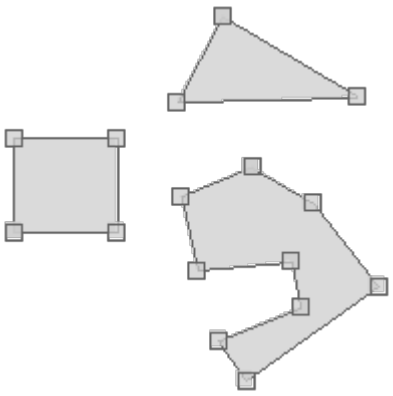
Create a MultiLineString with a List of LineStrings

```
MultiLineString multiLineString = new MultiLineString([
        new LineString (
                [-122.3822021484375, 47.57837853860192],
                [-122.32452392578125, 47.48380086737799]
        ),
        new LineString (
                [-122.32452392578125, 47.48380086737799],
                [-122.29705810546874, 47.303447043862626]
        ),
        new LineString (
                [-122.29705810546874, 47.303447043862626],
                [-122.42889404296875, 47.23262467463881]
        )
])
```



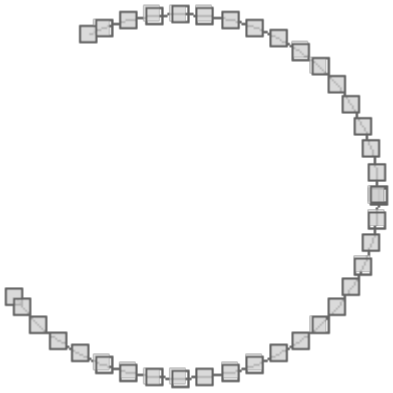
Create a MultiPolygon with a List of Polygons

```
MultiPolygon multiPolygon = new MultiPolygon(
    new Polygon ([[
            [-122.2723388671875,  47.818687628247105],
            [-122.37945556640624, 47.66168780332917],
            [-121.95373535156249, 47.67093619422418],
            [-122.2723388671875,  47.818687628247105]
    ]]),
    new Polygon ([[
            [-122.76672363281249, 47.42437092240516],
            [-122.76672363281249, 47.59505101193038],
            [-122.52227783203125, 47.59505101193038],
            [-122.52227783203125, 47.42437092240516],
            [-122.76672363281249, 47.42437092240516]
    ]]),
    new Polygon ([[
            [-122.20367431640624, 47.543163654317304],
            [-122.3712158203125,  47.489368981370724],
            [-122.33276367187499, 47.35371061951363],
            [-122.11029052734374, 47.3704545156932],
            [-122.08831787109375, 47.286681888764214],
            [-122.28332519531249, 47.2270293988673],
            [-122.2174072265625,  47.154237057576594],
            [-121.904296875,      47.32579231609051],
            [-122.06085205078125, 47.478232163128851],
            [-122.20367431640624, 47.543163654317304]
    ]])
)
```



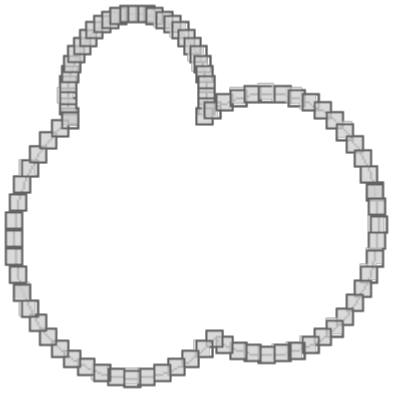
Create a CircularString with a List of Points

```
CircularString circularString = new CircularString([
        [-122.464599609375, 47.247542522268006],
        [-122.03613281249999, 47.37789454155521],
        [-122.37670898437499, 47.58393661978134]
])
```



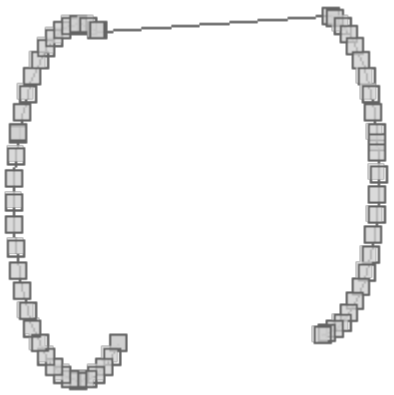
Create a CircularRing with a List of Points

```
CircularRing circularRing = new CircularRing([
        [-118.47656249999999, 41.508577297439324],
        [-109.6875, 57.51582286553883],
        [-93.8671875, 42.032974332441405],
        [-62.57812500000001, 30.14512718337613],
        [-92.10937499999999, 7.36246686553575],
        [ -127.265625, 14.604847155053898],
        [-118.47656249999999, 41.508577297439324]
])
```



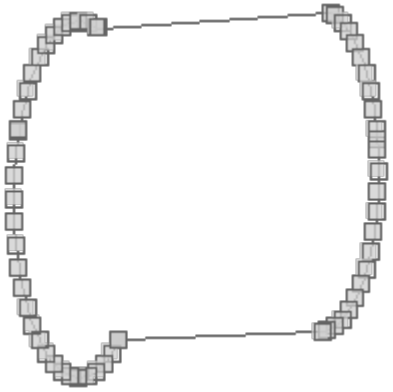
Create a CompoundCurve with a List of CircularStrings and LineStrings

```
CompoundCurve compoundCurve = new CompoundCurve([
    new CircularString([
            [27.0703125, 23.885837699862005],
            [5.9765625, 40.17887331434696],
            [22.5, 47.98992166741417],
    ]),
    new LineString([
            [22.5, 47.98992166741417],
            [71.71875, 49.15296965617039],
    ]),
    new CircularString([
            [71.71875, 49.15296965617039],
            [81.5625, 39.36827914916011],
            [69.9609375, 24.5271348225978]

    ])
])
```



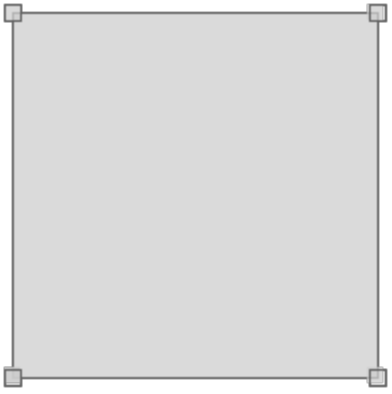
Create a CompoundRing with a connected List of CircularStrings and LineStrings

```
CompoundRing compoundRing = new CompoundRing([
        new CircularString([
                [27.0703125, 23.885837699862005],
                [5.9765625, 40.17887331434696],
                [22.5, 47.98992166741417],
        ]),
        new LineString([
                [22.5, 47.98992166741417],
                [71.71875, 49.15296965617039],
        ]),
        new CircularString([
                [71.71875, 49.15296965617039],
                [81.5625, 39.36827914916011],
                [69.9609375, 24.5271348225978]

        ]),
        new LineString([
                [69.9609375, 24.5271348225978],
                [27.0703125, 23.885837699862005],
        ])
])
```



Create a Bounds from four coordinates (minx, miny, maxx, maxy) and a projection.

```
Bounds bounds = new Bounds(-127.265, 43.068, -113.554, 50.289, "EPSG:4326")
```



Procesing Geometries

Get the area of a Geometry

```
Polygon polygon = new Polygon([[
    [-124.80, 48.92],
    [-126.21, 45.33],
    [-114.60, 45.08],
    [-115.31, 51.17],
    [-121.99, 52.05],
    [-124.80, 48.92]
]])
double area = polygon.area
println area
```

```
62.4026
```

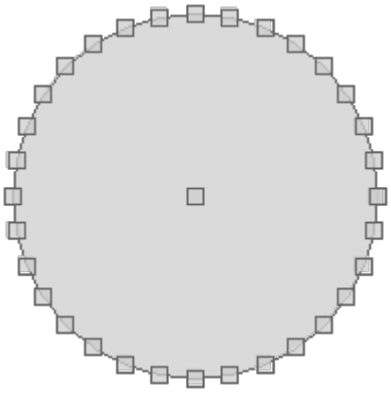
Get the length of a Geometry

```
LineString lineString = new LineString([-122.69, 49.61], [-99.84, 45.33])
double length = lineString.length
println length
```

```
23.24738479915536
```

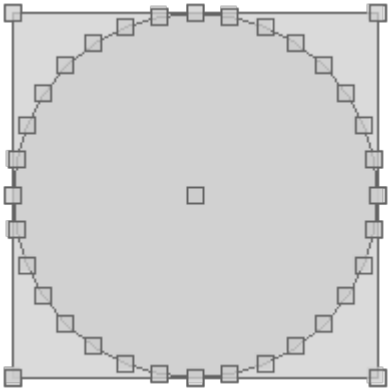
Buffer a Point

```
Point point = new Point(-123,46)
Geometry bufferedPoint = point.buffer(2)
```



Get Bounds from a Geometry

```
Point point = new Point(-123,46)
Polygon polygon = point.buffer(2)
Bounds bounds = polygon.bounds
```



Read and Write Geometries

The geoscript.geom.io package has several Readers and Writers for converting geoscript.geom.Geometry to and from strings.

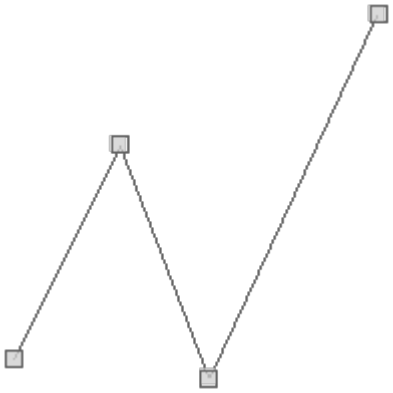
WKT

Read a Geometry from WKT using the WktReader

```
String wkt = "POINT (-123.15 46.237)"
WktReader reader = new WktReader()
Geometry geometry = reader.read(wkt)
```

Read a Geometry from WKT using the Geometry.fromWKT() static method

```
String wkt = "LINESTRING (3.198 43.164, 6.7138 49.755, 9.702 42.592, 15.327 53.798)"
Geometry geometry = Geometry.fromWKT(wkt)
```



Get the WKT of a Geometry

```
Geometry geometry = new Point(-123.15, 46.237)
String wkt = geometry.wkt
println wkt
```

```
POINT (-123.15 46.237)
```

Write a Geometry to WKT using the WktWriter

```
Geometry geometry = new LineString(
        [3.198, 43.164],
        [6.713, 49.755],
        [9.702, 42.592],
        [15.32, 53.798]
)
WktWriter writer = new WktWriter()
String wkt = writer.write(geometry)
println wkt
```

```
LINESTRING (3.198 43.164, 6.713 49.755, 9.702 42.592, 15.32 53.798)
```

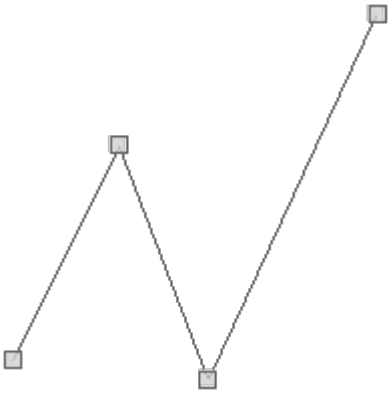
GeoJSON

Read a Geometry from GeoJSON using the GeoJSONReader

```
String json = '{"type":"Point","coordinates":[-123.15,46.237]}'
GeoJSONReader reader = new GeoJSONReader()
Geometry geometry = reader.read(json)
```

Read a Geometry from GeoJSON using the Geometry.fromGeoJSON() static method

```
String json =
'{"type":"LineString","coordinates":[[3.198,43.164],[6.713,49.755],[9.702,42.592],[15.
32,53.798]]}'
Geometry geometry = Geometry.fromGeoJSON(json)
```



Get the GeoJSON of a Geometry

```
Geometry geometry = new Point(-123.15, 46.237)
String json = geometry.geoJSON
println json
```

```
{"type":"Point","coordinates":[-123.15,46.237]}
```

Write a Geometry to GeoJSON using the GeoJSONWriter

```
Geometry geometry = new LineString(
        [3.198, 43.164],
        [6.713, 49.755],
        [9.702, 42.592],
        [15.32, 53.798]
)
GeoJSONWriter writer = new GeoJSONWriter()
String json = writer.write(geometry)
println json
```

```
{"type":"LineString","coordinates":[[3.198,43.164],[6.713,49.755],[9.702,42.592],[15.3
2,53.798]]}
```

Bounds Properties

Create a Bounds and view it's string representation

```
Bounds bounds = new Bounds(-127.265, 43.068, -113.554, 50.289, "EPSG:4326")
String boundsStr = bounds.toString()
println boundsStr
```

```
(-127.265,43.068,-113.554,50.289,EPSG:4326)
```

Get the minimum x coordinate

```
double minX = bounds.minX
println minX
```

```
-127.265
```

Get the minimum y coordinate

```
double minY = bounds.minY
println minY
```

```
43.068
```

Get the maximum x coordinate

```
double maxX = bounds.maxX
println maxX
```

```
-113.554
```

Get the maximum y coordinate

```
double maxY = bounds.maxY
println maxY
```

```
50.289
```

Projection Recipes

Creating Projections

Create a Projection from an EPSG Code

```
Projection proj = new Projection("EPSG:4326")
println proj.wkt
```

```
GEOGCS["WGS 84",
  DATUM["World Geodetic System 1984",
    SPHEROID["WGS 84", 6378137.0, 298.257223563, AUTHORITY["EPSG","7030"]],
    AUTHORITY["EPSG","6326"]],
  PRIMEM["Greenwich", 0.0, AUTHORITY["EPSG","8901"]],
  UNIT["degree", 0.017453292519943295],
  AXIS["Geodetic longitude", EAST],
  AXIS["Geodetic latitude", NORTH],
  AUTHORITY["EPSG","4326"]]
```

Create a Projection from a WKT Projection String

```
      Projection proj = new Projection("""GEOGCS["WGS 84",
DATUM["World Geodetic System 1984",
  SPHEROID["WGS 84", 6378137.0, 298.257223563, AUTHORITY["EPSG","7030"]],
  AUTHORITY["EPSG","6326"]],
PRIMEM["Greenwich", 0.0, AUTHORITY["EPSG","8901"]],
UNIT["degree", 0.017453292519943295],
AXIS["Geodetic longitude", EAST],
AXIS["Geodetic latitude", NORTH],
AUTHORITY["EPSG","4326"]]""")
```

```
GEOGCS["WGS 84",
  DATUM["World Geodetic System 1984",
    SPHEROID["WGS 84", 6378137.0, 298.257223563, AUTHORITY["EPSG","7030"]],
    AUTHORITY["EPSG","6326"]],
  PRIMEM["Greenwich", 0.0, AUTHORITY["EPSG","8901"]],
  UNIT["degree", 0.017453292519943295],
  AXIS["Geodetic longitude", EAST],
  AXIS["Geodetic latitude", NORTH],
  AUTHORITY["EPSG","4326"]]
```

Create a Projection from well known name

```
Projection proj = new Projection("Mollweide")
println proj.wkt
```

```
PROJCS["Mollweide",
  GEOGCS["WGS84",
    DATUM["WGS84",
      SPHEROID["WGS84", 6378137.0, 298.257223563]],
    PRIMEM["Greenwich", 0.0],
    UNIT["degree", 0.017453292519943295],
    AXIS["Longitude", EAST],
    AXIS["Latitude", NORTH]],
  PROJECTION["Mollweide"],
  PARAMETER["semi-minor axis", 6378137.0],
  PARAMETER["Longitude of natural origin", 0.0],
  UNIT["m", 1.0],
  AXIS["Easting", EAST],
  AXIS["Northing", NORTH]]
```

Using Projections

Transform a Geometry from one projection to another

```
Geometry epsg4326Geom = new Point(-122.440, 47.245)
Geometry epsg2927Geom = Projection.transform(epsg4326Geom, "EPSG:4326", "EPSG:2927")
println epsg2927Geom
```

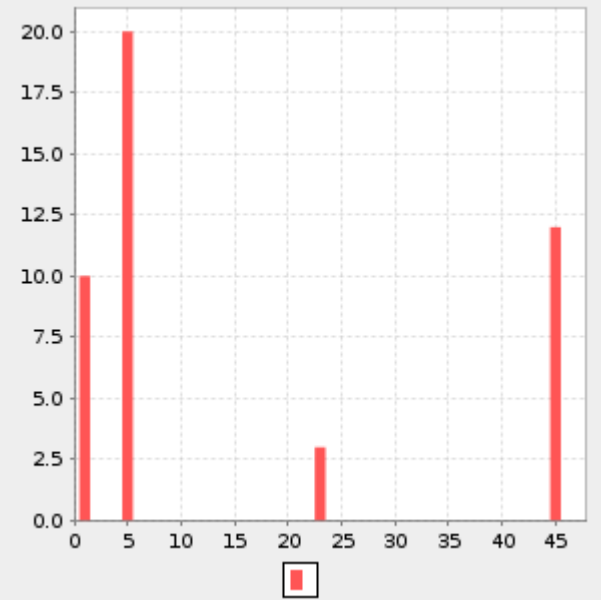
```
POINT (1158609.2040371667 703068.0661327887)
```

Plot Recipes

Creating a Bar Chart

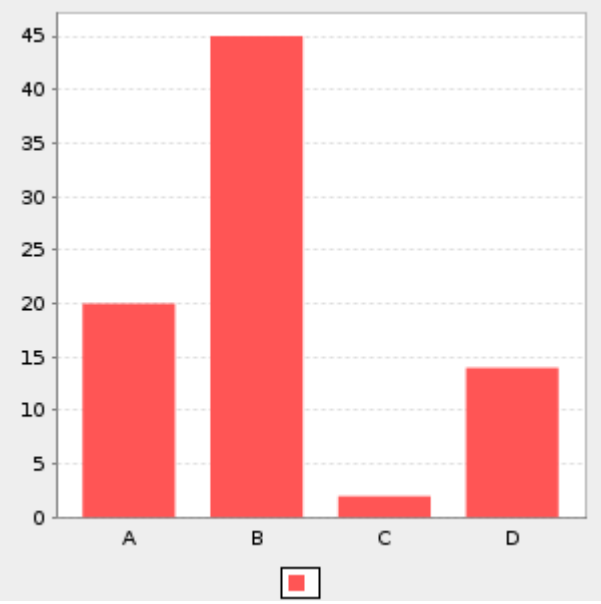
Create a basic bar chart

```
List data = [
        [1,10],[45,12],[23,3],[5,20]
]
Chart chart = Bar.xy(data)
```



Create a bar chart with categories

```
Map data = [
        "A":20,"B":45,"C":2,"D":14
]
Chart chart = Bar.category(data)
```


45
40
35
30
25
20
15
10
5
0
A
B
C
D