Simply one Geometry ...
... but so many different *notations*: what a big chaos !!!

a short survival guide

The most recent SpatiaLite's versions does actually support a quite wide range of *textual notations* intended to represent Geometry objects for *neutral* and *cross platform* data exchange purposes.
All this may easily be quite confusing for beginners (and for experienced users as well): so I suppose this short note may help you to quickly focus this specific matter in the most painless way.

Geometry Objects:

The *internal* representation of any Geometry object is a *binary* one. This ensure high efficiency and robustness, but (unhappily) is strictly application-dependent.
i.e. it's not at all intended to support any kind of data exchange between different platforms.
The preferred way to support painless cross platform data exchange is using some appropriate *standard textual notation*: and SpatiaLite allows you to handle any required conversion from internal Geometries into their corresponding textual representations, and from textual representations into internal Geometries.

Geometry Classes:

Accordingly to the standard OGC-SFS data model, the following Geometry Classes are supported:

- POINT: a single Point
- LINESTRING: a single Linestring aka PolyLine (an ordered succession of vertices: a valid Linestring **must** have at least two vertices)
- RING: more or less like a Linestring: but with the special constraint to be **closed**. i.e. first and last vertices must exactly coincide (so, a valid Ring **must** have at least four vertices).
- POLYGON: a valid Polygon **must** have an *exterior* Ring: and can optionally have an arbitrary number of *interior* Rings (*holes*) as well.
- MULTIPOINT: an arbitrary collection of Points (at least one Point is required).
- MULTILINESTRING: an arbitrary collection of Linestrings (at least one Linestring is required).
- MULTIPOLYGON: an arbitrary collection of Polygons (at least one Polygon is required).
- GEOMETRYCOLLECTION: an arbitrary collection of the above elementary classes (at least one item is required).

Dimensions:

The OGC-SFS standard defines the following dimensional models:

- XY: aka 2D – two cartesian coordinates for each point / vertex
- XYM: same as above + a *measure value* **M** for each point / vertex
- XYZ: aka 3D – three cartesian coordinates for each point / vertex
- XYZM: same as above + a *measure value* **M** for each point / vertex

Supported Textual Notations:

SpatiaLite supports the following standard textual notations:

- WKT (*Well Known Text*): the standard OGC notation.
  - Please note well: you can safely assume this one to be really standard for 2D [XY].
  - Unhappily this doesn't necessarily applies to other dimension models [XYZ, XYM and XYZM]
  - No real standard definitions exists in this case, and you must be prepared to face very poor and problematic cross platform portability.
- EWKT (*Extended WKT*): a not-at-all-standard WKT variant introduced by PostGIS.
  - Please note well: EWKT offers real support for 3D [XYZ, XYM and XYZM], and is quite widely supported, most notably by open source sw.
  - So you can safely assume this one to be a *de facto* standard.
  - Not at all surprisingly, EWKT can often offer better cross platform portability than *pure* WKT (not an absolute rule, anyway ...)
- GML (*Geography Markup Language*): an XML-based OGC-supported standard notation. Required by WMS and WFS *standard* web-services.
  - Please note well: although GML is a strongly structured and well defined format, it has several flaws and pitfalls.
  - At least two different definitions exist: the v.2.x.x and the v.3.x.x specifications are strongly different.
  - GML is quite complex and obnoxiously verbose.
- KML (*Keyhole Markup Language*): kind-of simplified GML introduced by Google.
  - Supported by Google Maps and Google Earth.
- GeoJSON (*geo JavaScript Object Notation*): an alternative JavaScript-based notation.
  - Widely used by WMS and WGS web services.
  - Really much more simplest and concise than GML.

Mapping internal Geometries into their corresponding text notations (and the opposite) isn't always supported in a 1:1 fashion: sometimes several language-specific constraints and/or limitations impose some kind of accommodation (aka *information loss*).
Be aware and well conscious of this.

Supported SQL functions:

From internal Geometry to text	From text to internal Geometry	Target textual notation
AsText() / AsWKT()	GeomFromText()	standard WKT
AsEWKT()	GeomFromEWKT()	PostGIS-own Extended-WKT
AsGML()	GeomFromGML()	GML v.2.x.x and v.3.x.x
AsKML()	GeomFromKML()	Google KML
AsGeoJSON()	GeomFromGeoJSON()	GeoJSON

You can find into the following sections lots and lots of practical examples.
The same identical Geometries will be consistently used, so to simply reading and unserstanding.

Standard WKT

POINT [XY]

```
AsText(GeomFromText('POINT(-1.234556789 +9.87654321)', 4326))
-----
POINT(-1.234557 9.876543)
```

POINT [XYM]

```
AsText(GeomFromText('POINT M(-1.234556789 +9.87654321 -0.123456789)', 4326))
-----
POINT M(-1.234557 9.876543 -0.123457)
```

POINT [XYZ]

```
AsText(GeomFromText('POINTZ(1.234556789 9.87654321 10.123456789)', 4326))
-----
POINT Z(1.234557 9.876543 10.123457)
```

POINT [XYZM]

```
AsText(GeomFromText('POINT ZM(1.234556789 -9.87654321 10.123456789
0.123456789)', 4326))
-----
POINT ZM(1.234557 -9.876543 10.123457 0.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromText('LINESTRINGZ(1.23456789 -9.891234567 10.123456789,
2.34567891 -8.91234567 11.123456789,
3.45678912 -7.678912345 12.123456789)', 4326))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromText('POLYGON((-1.23 -2.87,-11.23 -2.87,-11.23 -19.87,
-1.23 -19.87,-1.23 -2.87),(-4.56 -6.78,-5.56 -6.78,
-5.56 -7.78,-4.56 -7.78,-4.56 -6.78))', 4326))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromText('GEOMETRYCOLLECTION Z(
POINTZ(111.923455678 -9.87654321 10.123456789),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02,11.23 -19.87 +10.03,
+1.23 -19.87 +10.04,+1.23 -2.87 +10.01),
(4.56 -6.78 11.01, 5.56 -6.78 11.02,5.56 -7.78 11.03, 4.56 -7.78 11.04,
4.56 -6.78 +11.01)))', 4326))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

PostGIS EWKT

POINT [XY]

```
AsText(GeomFromEWKT('SRID=4326;POINT(-1.234557 9.876543)'))
-----
POINT(-1.234557 9.876543)
```

POINT [XYM]

```
AsText(GeomFromEWKT('SRID=4326;POINTM(-1.234557 9.876543 -0.123457)'))
-----
POINT M(-1.234557 9.876543 -0.123457)
```

POINT [XYZ]

```
AsText(GeomFromEWKT('SRID=4326;POINT(1.234557 9.876543 10.123457)'))
-----
POINT Z(1.234557 9.876543 10.123457)
```

POINT [XYZM]

```
AsText(GeomFromEWKT('SRID=4326;POINT(1.234557 -9.876543 10.123457 0.123457)'))
-----
POINT ZM(1.234557 -9.876543 10.123457 0.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromEWKT('SRID=4326;LINESTRING(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457,3.456789 -7.678912 12.123457)'))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromEWKT('SRID=4326;POLYGON((-1.23 -2.87,-11.23 -2.87,
-11.23 -19.87,-1.23 -19.87,-1.23 -2.87),(-4.56 -6.78,-5.56 -6.78,
-5.56 -7.78,-4.56 -7.78,-4.56 -6.78))'))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromEWKT('SRID=4326;GEOMETRYCOLLECTION(
POINT(111.923456 -9.876543 10.123457),POLYGON((1.23 -2.87 10.01,
11.23 -2.87 10.02,11.23 -19.87 10.03,1.23 -19.87 10.04,1.23 -2.87 10.01),
(4.56 -6.78 11.01,5.56 -6.78 11.02,5.56 -7.78 11.03,4.56 -7.78 11.04,
4.56 -6.78 11.01)))'))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

GeoJSON

POINT [XY]

```
AsText(GeomFromGeoJSON('{"type":"Point","crs":{"type":"name",
"properties":{"name":"EPSG:4326"}},
"bbox":[-1.23455679,9.87654321,-1.23455679,9.87654321],
"coordinates":[-1.23455679,9.87654321]}'))
-----
POINT(-1.234557 9.876543)
```

POINT [XYZ]

```
AsText(GeomFromGeoJSON('{"type":"Point","crs":{"type":"name",
"properties":{"name":"EPSG:4326"}},
"bbox":[1.23455679,9.87654321,1.23455679,9.87654321],
"coordinates":[1.23455679,9.87654321,10.12345679]}'))
-----
POINT Z(1.234557 9.876543 10.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromGeoJSON('{"type":"LineString",
"crs":{"type":"name","properties":{"name":"EPSG:4326"}},
"bbox":[1.23456789,-9.89123457,3.45678912,-7.67891234],
"coordinates":[[1.23456789,-9.89123457,10.12345679],
[2.34567891,-8.91234567,11.12345679],[3.45678912,-7.67891234,12.12345679]]}'))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromGeoJSON('{"type":"Polygon",
"crs":{"type":"name","properties":{"name":"EPSG:4326"}},
"bbox":[-11.23,-19.87,-1.23,-2.87],
"coordinates":[[[-1.23,-2.87],[-11.23,-2.87],[-11.23,-19.87],[-1.23,-19.87],
[-1.23,-2.87]],[[-4.56,-6.78],[-5.56,-6.78],[-5.56,-7.78],
[-4.56,-7.78],[-4.56,-6.78]]]}'))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromGeoJSON('{"type":"GeometryCollection",
"crs":{"type":"name","properties":{"name":"EPSG:4326"}},
"bbox":[1.23,-19.87,111.92345568,-2.87],"geometries":
[{"type":"Point","coordinates":[111.92345568,-9.87654321,10.12345679]},
{"type":"Polygon","coordinates":
[[[1.23,-2.87,10.01],[11.23,-2.87,10.02],[11.23,-19.87,10.03],
[1.23,-19.87,10.04],[1.23,-2.87,10.01]],[[4.56,-6.78,11.01],
[5.56,-6.78,11.02],[5.56,-7.78,11.03],[4.56,-7.78,11.04],
[4.56,-6.78,11.01]]]}]}'))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

GML v2.x.x

POINT [XY]

```
AsText(GeomFromGML('<gml:Point srsName="EPSG:4326">
<gml:coordinates>-1.234556789,9.87654321</gml:coordinates></gml:Point>'))
-----
POINT(-1.234557 9.876543)
```

POINT [XYZ]

```
AsText(GeomFromGML('<gml:Point srsName="EPSG:4326">
<gml:coordinates>1.234556789,9.87654321,10.123456789</gml:coordinates>
</gml:Point>'))
-----
POINT Z(1.234557 9.876543 10.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromGML('<gml:LineString srsName="EPSG:4326">
<gml:coordinates>1.23456789,-9.891234567,10.123456789
2.34567891,-8.912345670000001,11.123456789
3.45678912,-7.678912345,12.123456789</gml:coordinates></gml:LineString>'))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromGML('<gml:Polygon srsName="EPSG:4326">
<gml:outerBoundaryIs><gml:LinearRing><gml:coordinates>
-1.23,-2.87 -11.23,-2.87 -11.23,-19.870000000000001
-1.23,-19.870000000000001 -1.23,-2.87
</gml:coordinates></gml:LinearRing></gml:outerBoundaryIs>
<gml:innerBoundaryIs><gml:LinearRing><gml:coordinates>
-4.56,-6.78 -5.56,-6.78 -5.56,-7.78 -4.56,-7.78 -
4.56,6.78
</gml:coordinates></gml:LinearRing></gml:innerBoundaryIs></gml:Polygon>'))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromGML('<gml:MultiGeometry srsName="EPSG:4326">
<gml:geometryMember><gml:Point><gml:coordinates>
111.923455678,-9.87654321,10.123456789</gml:coordinates></gml:Point>
</gml:geometryMember><gml:geometryMember><gml:Polygon><gml:outerBoundaryIs>
<gml:LinearRing><gml:coordinates>1.23,-2.87,10.01 11.23,-2.87,10.02
11.23,-19.870000000000001,10.029999999999999
1.23,19.870000000000001,10.039999999999999 1.23,-2.87,10.01</gml:coordinates>
</gml:LinearRing></gml:outerBoundaryIs>
<gml:innerBoundaryIs><gml:LinearRing><gml:coordinates>
4.56,-6.78,11.01 5.56,-6.78,11.02 5.56,-7.78,11.029999999999999
4.56,-7.78,11.039999999999999 4.56,-6.78,11.01</gml:coordinates>
</gml:LinearRing></gml:innerBoundaryIs></gml:Polygon></gml:geometryMember>
</gml:MultiGeometry>'))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

GML v3.x.x

POINT [XY]

```
AsText(GeomFromGML('<gml:Point srsName="EPSG:4326">
<gml:pos>-1.234556789 9.87654321</gml:pos></gml:Point>'))
-----
POINT(-1.234557 9.876543)
```

POINT [XYZ]

```
AsText(GeomFromGML('<gml:Point srsName="EPSG:4326">
<gml:pos srsDimension="3">1.234556789 9.87654321 10.123456789</gml:pos>
</gml:Point>'))
-----
POINT Z(1.234557 9.876543 10.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromGML('<gml:Curve srsName="EPSG:4326">
<gml:segments><gml:LineStringSegment>
<gml:posList srsDimension="3">1.23456789 -9.891234567 10.123456789
2.34567891 -8.912345670000001 11.123456789
3.45678912 -7.678912345 12.123456789</gml:posList>
</gml:LineStringSegment></gml:segments></gml:Curve>'))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromGML('<gml:Polygon srsName="EPSG:4326">
<gml:exterior><gml:LinearRing><gml:posList srsDimension="2">
-1.23 -2.87 -11.23 -2.87 -11.23 -19.870000000000001
-1.23 -19.870000000000001 -1.23 -2.87
</gml:posList></gml:LinearRing></gml:exterior>
<gml:interior><gml:LinearRing><gml:posList>
-4.56 -6.78 -5.56 -6.78 -5.56 -7.78 -4.56 -7.78 -4.56 -6.78
</gml:posList></gml:LinearRing></gml:interior></gml:Polygon>'))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromGML('<gml:MultiGeometry srsName="EPSG:4326">
<gml:geometryMember><gml:Point>
<gml:pos srsDimension="3">111.923455678 -9.87654321 10.123456789</gml:pos>
</gml:Point></gml:geometryMember><gml:geometryMember><gml:Polygon>
<gml:exterior><gml:LinearRing><gml:posList srsDimension="3">
1.23 -2.87 10.01 11.23 -2.87 10.02 11.23 -19.870000000000001
10.029999999999999 1.23 -19.870000000000001 10.039999999999999 1.23
-2.87 10.01</gml:posList></gml:LinearRing></gml:exterior>
<gml:interior><gml:LinearRing><gml:posList srsDimension="3">
4.56 -6.78 11.01 5.56 -6.78 11.02 5.56 -7.78 11.029999999999999 4.56
-7.78 11.039999999999999 4.56 -6.78 11.01
</gml:posList></gml:LinearRing></gml:interior></gml:Polygon>
</gml:geometryMember></gml:MultiGeometry>'))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

KML

POINT [XY]

```
AsText(GeomFromKML('<Point>
<coordinates>-1.234556789,9.87654321</coordinates></Point>'))
-----
POINT(-1.234557 9.876543)
```

POINT [XYZ]

```
AsText(GeomFromKML('<Point>
<coordinates>1.234556789,9.87654321,10.123456789</coordinates></Point>'))
-----
POINT Z(1.234557 9.876543 10.123457)
```

LINESTRING [XYZ] (3 vertices)

```
AsText(GeomFromKML('<LineString><coordinates>
1.23456789,-9.891234567,10.123456789
2.34567891,-8.912345670000001,11.123456789
3.45678912,-7.678912345,12.123456789</coordinates></LineString>'))
-----
LINESTRING Z(1.234568 -9.891235 10.123457,
2.345679 -8.912346 11.123457, 3.456789 -7.678912 12.123457)
```

POLYGON [XY] (one interior Ring)

```
AsText(GeomFromKML('<Polygon><outerBoundaryIs><LinearRing><coordinates>
-1.23,-2.87 -11.23,-2.87 -11.23,-19.870000000000001 -1.23,
-19.870000000000001 -1.23,-2.87</coordinates></LinearRing></outerBoundaryIs>
<innerBoundaryIs><LinearRing><coordinates>-4.56,-6.78 -5.56,
-6.78 -5.56,-7.78 -4.56,-7.78 -4.56,-6.78
</coordinates></LinearRing></innerBoundaryIs></Polygon>'))
-----
POLYGON((-1.23 -2.87, -11.23 -2.87, -11.23 -19.87, -1.23 -19.87, -1.23 -2.87),
(-4.56 -6.78, -5.56 -6.78, -5.56 -7.78, -4.56 -7.78, -4.56 -6.78))
```

COLLECTION [XYZ] (Point and Polygon)

```
AsText(GeomFromKML('<MultiGeometry><Point><coordinates>
111.923455678,-9.87654321,10.123456789</coordinates></Point>
<Polygon><outerBoundaryIs><LinearRing><coordinates>1.23,-2.87,10.01
11.23,-2.87,10.02 11.23,-19.870000000000001,10.029999999999999
1.23,-19.870000000000001,10.039999999999999 1.23,-2.87,10.01
</coordinates></LinearRing></outerBoundaryIs>
<innerBoundaryIs><LinearRing><coordinates>4.56,-6.78,11.01 5.56,-6.78,11.02
5.56,-7.78,11.029999999999999 4.56,-7.78,11.039999999999999 4.56,-6.78,11.01
</coordinates></LinearRing></innerBoundaryIs></Polygon></MultiGeometry>'))
-----
GEOMETRYCOLLECTION Z(POINT Z(111.923456 -9.876543 10.123457),
POLYGON Z((1.23 -2.87 10.01, 11.23 -2.87 10.02, 11.23 -19.87 10.03,
1.23 -19.87 10.04, 1.23 -2.87 10.01), (4.56 -6.78 11.01, 5.56 -6.78 11.02,
5.56 -7.78 11.03, 4.56 -7.78 11.04, 4.56 -6.78 11.01)))
```

Output samples

sample ?

```
GeomFromText('MULTIPOINTZ(-1.23456789 +9.891234567 -10.123456789,
-2.34567891 +8.91234567 -11.123456789,
-3.45678912 +7.678912345 -12.123456789)', 4326)
```

AsText(?)

```
MULTIPOINT Z(-1.234568 9.891235 -10.123457,
-2.345679 8.912346 -11.123457, -3.456789 7.678912 -12.123457)
```

AsWKT(?) *precision=default*

```
MULTIPOINT(-1.23456789 9.891234567,
-2.34567891 8.912345670000001,-3.45678912 7.678912345)
```

AsWKT(?, 3) *precision=3*

```
MULTIPOINT(-1.235 9.891,-2.346 8.912,-3.457 7.679)
```

AsEWKT(?)

```
SRID=4326;MULTIPOINT(-1.23456789 9.891234567 -10.123456789,
-2.34567891 8.912345670000001 -11.123456789,
-3.45678912 7.678912345 -12.123456789)
```

AsGeoJSON(?) *precision=default, no options*

```
{"type":"MultiPoint","coordinates":[[-1.23456789,9.891234567,-10.123456789],
[-2.34567891,8.912345670000001,-11.123456789],
[-3.45678912,7.678912345,-12.123456789]]}
```

AsGeoJSON(?, 3) *precision=3, no options*

```
{"type":"MultiPoint","coordinates":[[-1.235,9.891,-10.123],
[-2.346,8.912,-11.123],[-3.457,7.679,-12.123]]}
```

AsGeoJSON(?, 3, 1) *precision=3, options=BBOX*

```
{"type":"MultiPoint","bbox":[-3.457,7.679,-1.235,9.891],
"coordinates":[[-1.235,9.891,-10.123],[-2.346,8.912,-11.123],
[-3.457,7.679,-12.123]]}
```

AsGeoJSON(?, 3, 4) *precision=3, options=long-form CRS*

```
{"type":"MultiPoint","crs":{"type":"name","properties":
{"name":"urn:ogc:def:crs:EPSG:4326"}},
"coordinates":[[-1.235,9.891,-10.123],[-2.346,8.912,-11.123],
[-3.457,7.679,-12.123]]}
```

AsGeoJSON(?, 3, 3) *precision=3, options=BBOX & short-form CRS*

```
{"type":"MultiPoint","crs":{"type":"name","properties":{"name":"EPSG:4326"}},
"bbox":[-3.457,7.679,-1.235,9.891],
"coordinates":[[-1.235,9.891,-10.123],[-2.346,8.912,-11.123],
[-3.457,7.679,-12.123]]}
```

AsGML(?) *v.2.x.x. precision=default*

```
<gml:MultiPoint srsName="EPSG:4326"><gml:pointMember><gml:Point>
<gml:coordinates>-1.23456789,9.891234567,-10.123456789
</gml:coordinates></gml:Point></gml:pointMember>
<gml:pointMember><gml:Point><gml:coordinates>
-2.34567891,8.912345670000001,-11.123456789</gml:coordinates></gml:Point>
</gml:pointMember><gml:pointMember><gml:Point>
<gml:coordinates>-3.45678912,7.678912345,-12.123456789</gml:coordinates>
</gml:Point></gml:pointMember></gml:MultiPoint>
```

AsGML(2, ?, 3) *v.2.x.x precision=3*

```
<gml:MultiPoint srsName="EPSG:4326"><gml:pointMember><gml:Point>
<gml:coordinates>-1.235,9.891,-10.123</gml:coordinates></gml:Point>
</gml:pointMember><gml:pointMember><gml:Point><gml:coordinates>
-2.346,8.912,-11.123</gml:coordinates></gml:Point></gml:pointMember>
<gml:pointMember><gml:Point><gml:coordinates>-3.457,7.679,-12.123
</gml:coordinates></gml:Point></gml:pointMember></gml:MultiPoint>
```

AsGML(3, ?) *v.3.x.x. precision=default*

```
<gml:MultiPoint srsName="EPSG:4326"><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-1.23456789 9.891234567 -10.123456789</gml:pos>
</gml:Point></gml:pointMember><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-2.34567891 8.912345670000001 -11.123456789</gml:pos>
</gml:Point></gml:pointMember><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-3.45678912 7.678912345 -12.123456789</gml:pos>
</gml:Point></gml:pointMember></gml:MultiPoint>
```

AsGML(3, ?, 3) *v.3.x.x precision=3*

```
<gml:MultiPoint srsName="EPSG:4326"><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-1.235 9.891 -10.123</gml:pos>
</gml:Point></gml:pointMember><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-2.346 8.912 -11.123</gml:pos>
</gml:Point></gml:pointMember><gml:pointMember><gml:Point>
<gml:pos srsDimension="3">-3.457 7.679 -12.123</gml:pos>
</gml:Point></gml:pointMember></gml:MultiPoint>
```

AsKML(?) *precision=default*

```
<MultiGeometry><Point><coordinates>-1.23456789,9.891234567,-10.123456789
</coordinates></Point><Point><coordinates>-2.34567891,8.912345670000001,
-11.123456789</coordinates></Point><Point><coordinates>-3.45678912,
7.678912345,-12.123456789</coordinates></Point></MultiGeometry>
```

AsKML(?, 3) *precision=3*

```
<MultiGeometry><Point><coordinates>-1.235,9.891,-10.123
</coordinates></Point><Point><coordinates>-2.346,8.912,-11.123
</coordinates></Point><Point><coordinates>-3.457,7.679,-12.123
</coordinates></Point></MultiGeometry>
```

AsKML('utopia', 'a nice place', ?, 3) *placemark, precision=3*

```
<Placemark><name>utopia</name>
<description>a nice place</description><MultiGeometry>
<Point><coordinates>-1.235,9.891,-10.123</coordinates></Point>
<Point><coordinates>-2.346,8.912,-11.123</coordinates></Point>
<Point><coordinates>-3.457,7.679,-12.123</coordinates></Point>
</MultiGeometry></Placemark>
```