

Kapitel 4 (4b)

# PostGIS Geometrie-Typen

Stefan Keller

Dank an Dr. Andreas Neumann

# Überblick

- ◆ **PostGIS Geometrietypen**
- ◆ **PostGIS Administration**
- **PostGIS System-Views**
- **Räumlicher Index**

# PostGIS Geometrietypen

**PostGIS EWKT/EWKB: 3D, 4D, M-Werte, etc.**

**SQL/MM Part 3 (tw. Implementiert): div. Kurven, Surface, etc.**

**OpenGIS Simple Features for SQL (WKB, WKT)**

## **Legende:**

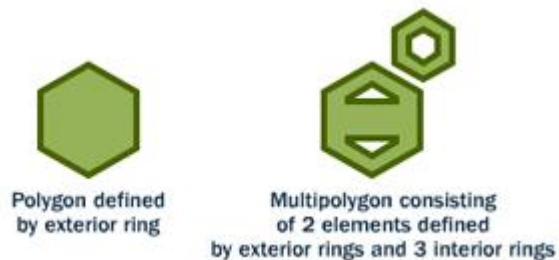
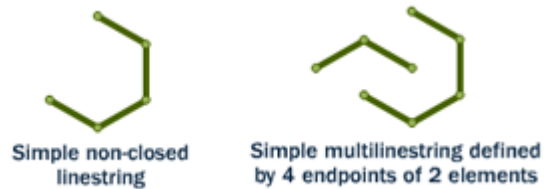
**WKT: Well-Known Text (OGC)**

**WKB: Well-Known Binary (OGC)**

**EWKT/EWKB: Extended WKT und WKB (PostGIS-spezifisch); plus 3d + plus M-Werte**

**SQL-MM: SQL Multimedia Applications Spatial specification: Curve Extensions**

# Simple Features for SQL



Source: <http://workshops.boundlessgeo.com/postgis-intro/geometries.html>

# Beispiele Simple Features for SQL

`POINT(0 0)`

`LINESTRING(0 0,1 1,1 2)`

`POLYGON((0 0,4 0,4 4,0 4,0 0),(1 1, 2 1, 2 2, 1 2,1 1))`

`MULTIPOINT(0 0,1 2)`

`MULTILINESTRING((0 0,1 1,1 2),(2 3,3 2,5 4))`

`MULTIPOLYGON(((0 0,4 0,4 4,0 4,0 0),(1 1,2 1,2 2,1 2,1 1)),  
((-1 -1,-1 -2,-2 -2,-2 -1,-1 -1)))`

`GEOMETRYCOLLECTION(POINT(2 3),LINESTRING((2 3,3 4)))`

# Beispiele PostGIS EWKT

```
POINT(0 0 0) -- XYZ
```

```
SRID=32632;POINT(0 0) -- XY with SRID
```

```
POINTM(0 0 0) -- XYM
```

```
POINT(0 0 0 0) -- XYZM
```

```
SRID=4326;MULTIPOINTM(0 0 0,1 2 1) -- XYM with SRID
```

```
MULTILINESTRING((0 0 0,1 1 0,1 2 1),(2 3 1,3 2 1,5 4 1))
```

```
POLYGON((0 0 0,4 0 0,4 4 0,0 4 0,0 0 0),(1 1 0,2 1 0,2 2 0,1  
2 0,1 1 0))
```

```
MULTIPOLYGON(((0 0 0,4 0 0,4 4 0,0 4 0,0 0 0),(1 1 0,2 1 0,2  
2 0,1 2 0,1 1 0)),((-1 -1 0,-1 -2 0,-2 -2 0,-2 -1 0,-1 -1  
0)))
```

```
GEOMETRYCOLLECTIONM(POINTM(2 3 9), LINESTRINGM(2 3 4, 3 4 5))
```

# SQL/MM Geometrien

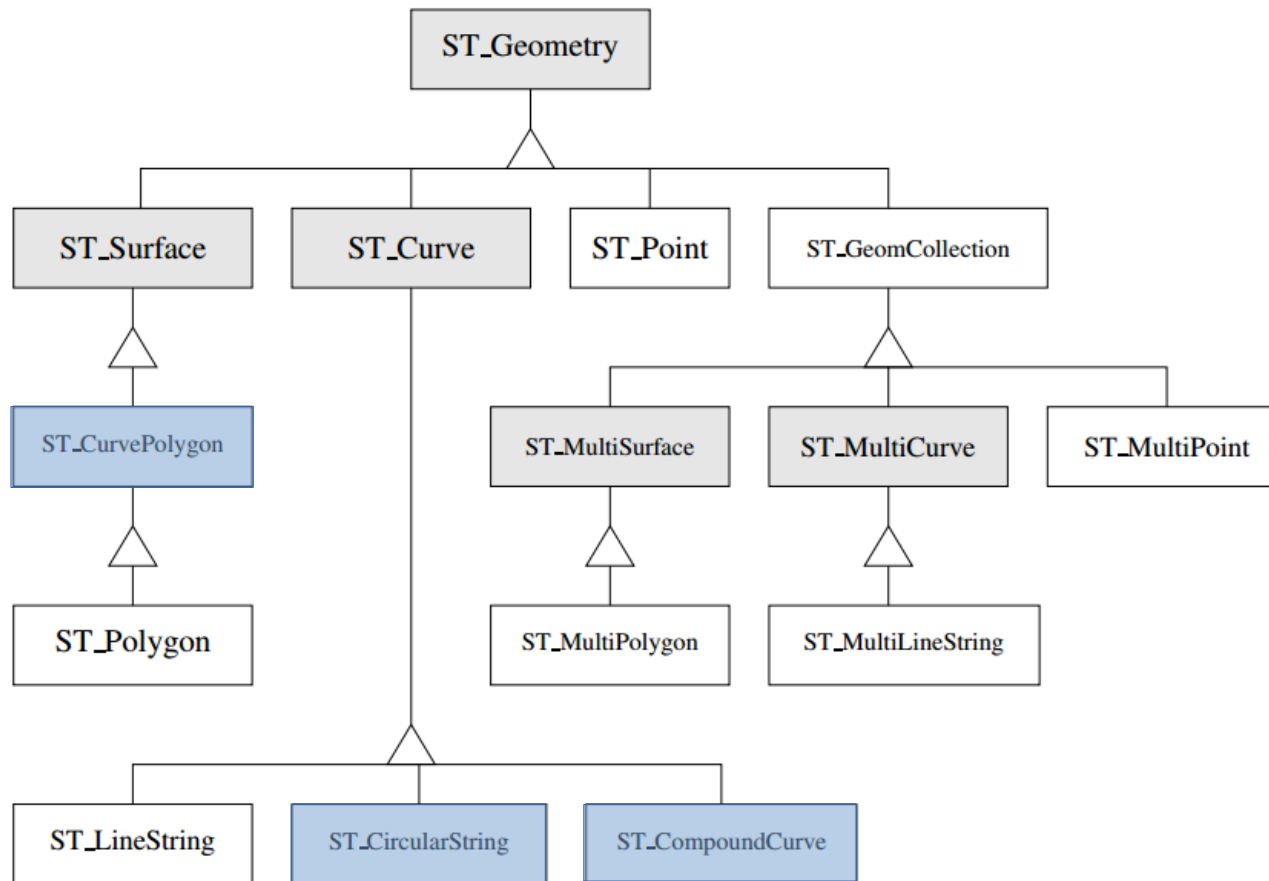
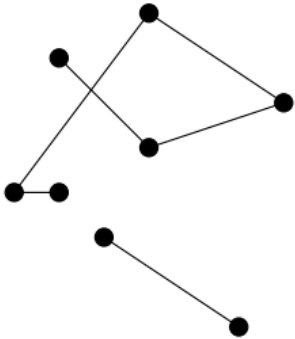


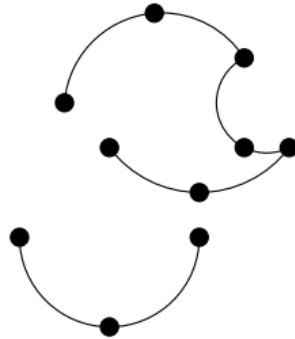
Figure 2: SQL Type Hierarchy

**Source:**  
Knut Stolze (SQL-MM paper)

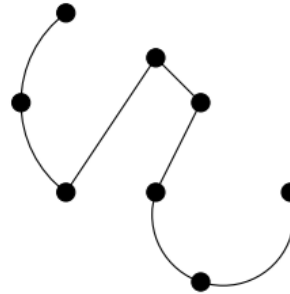
# SQL/MM Geometrien



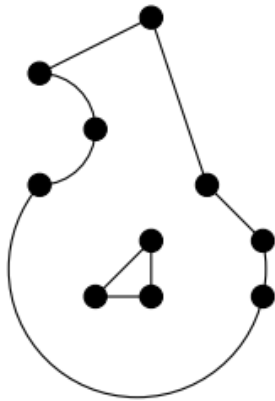
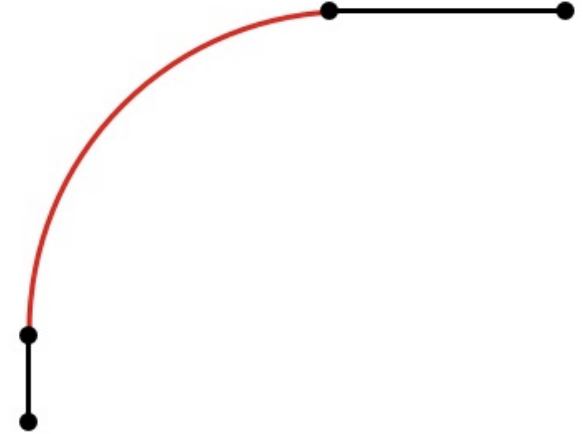
(a) Linear Strings



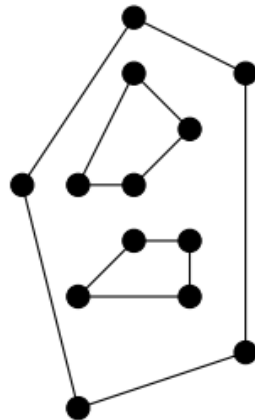
(b) Circular Strings



(c) Compounds



(a) Curve Polygon



(b) Polygon

Sources:  
Knut Stolze (SQL-MM paper)  
and BoundlessGeo



# Beispiele SQL-MM Geometrien

```
CIRCULARSTRING(0 0, 1 1, 1 0)
```

```
COMPOUNDCURVE(CIRCULARSTRING(0 0, 1 1, 1 0), (1 0, 0 1))
```

```
CURVEPOLYGON(CIRCULARSTRING(0 0, 4 0, 4 4, 0 4, 0 0), (1 1, 3  
3, 3 1, 1 1))
```

```
MULTICURVE((0 0, 5 5), CIRCULARSTRING(4 0, 4 4, 8 4))
```

```
MULTISURFACE(CURVEPOLYGON(CIRCULARSTRING(0 0, 4 0, 4 4, 0 4,  
0 0), (1 1, 3 3, 3 1, 1 1)), ((10 10, 14 12, 11 10, 10 10), (11  
11, 11.5 11, 11 11.5, 11 11)))
```

```
GEOMETRYCOLLECTIONM(POINTM(2 3 9), LINESTRINGM(2 3 4, 3 4 5))
```

# PostGIS Systemtabellen

## ◆ public.geometry\_columns

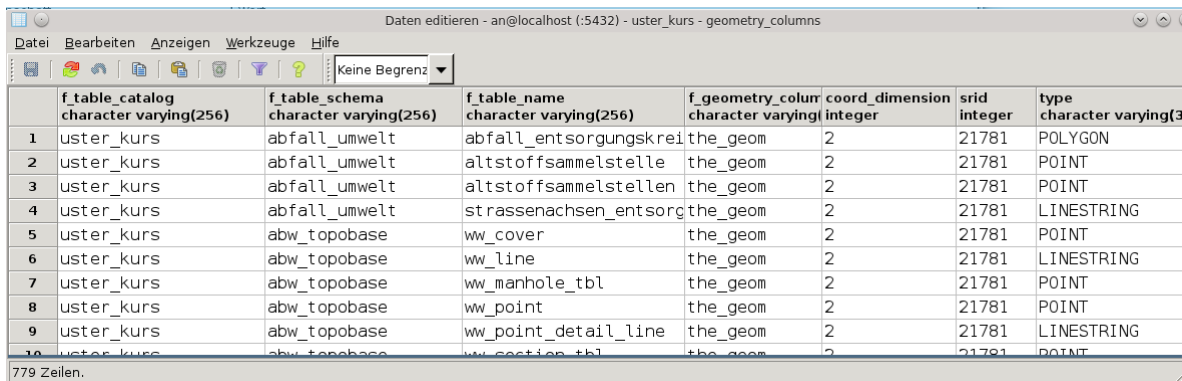
- View aller Tabellen mit Geometry-Spalten
- mehrere Geometrie-Spalten pro Tabelle zulässig
  - > Mehrfacheinträge in public.geometry\_columns

## ◆ public.geography\_columns

- View aller Tabellen mit Geography-Spalten
- mehrere Geography-Spalten pro Tabelle zulässig
  - > Mehrfacheinträge in public.geography\_columns

## ◆ public.spatial\_ref\_sys

- Tabelle mit allen Definitionen der Koordinatensysteme mit SRID, Beschreibung und proj4-Parametern



The screenshot shows a PostgreSQL database editor window titled "Daten editieren - an@localhost (:5432) - uster\_kurs - geometry\_columns". The window displays a table with 7 columns: f\_table\_catalog, f\_table\_schema, f\_table\_name, f\_geometry\_column, coord\_dimension, srid, and type. The table contains 10 rows of data, showing various tables in the uster\_kurs database with geometry columns.

	f_table_catalog	f_table_schema	f_table_name	f_geometry_column	coord_dimension	srid	type
1	uster_kurs	abfall_umwelt	abfall_entsorgungskreis	the_geom	2	21781	POLYGON
2	uster_kurs	abfall_umwelt	altstoffsammelstelle	the_geom	2	21781	POINT
3	uster_kurs	abfall_umwelt	altstoffsammelstellen	the_geom	2	21781	POINT
4	uster_kurs	abfall_umwelt	strassenachsen_entsorgung	the_geom	2	21781	LINestring
5	uster_kurs	abw_topobase	ww_cover	the_geom	2	21781	POINT
6	uster_kurs	abw_topobase	ww_line	the_geom	2	21781	LINestring
7	uster_kurs	abw_topobase	ww_manhole_tbl	the_geom	2	21781	POINT
8	uster_kurs	abw_topobase	ww_point	the_geom	2	21781	POINT
9	uster_kurs	abw_topobase	ww_point_detail_line	the_geom	2	21781	LINestring
10	uster_kurs	abw_topobase	ww_section_tbl	the_geom	2	21781	POINT

779 Zeilen.

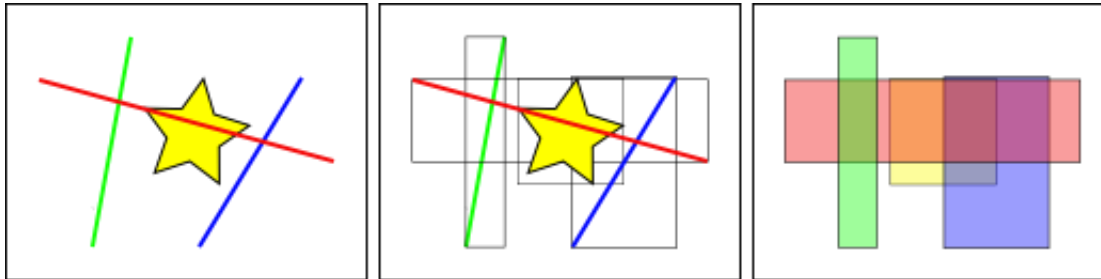
- public
  - Aggregate (17)
    - Sortierfolgen (0)
    - Konversionen (0)
  - Domänen (1)
    - Volltextsuche - Konfigurationen (0)
    - Volltextsuche - Wörterbücher (0)
    - Volltextsuche - Parser (0)
    - Volltextsuche - Vorlagen (0)
  - Funktionen (652)
  - Operatoren (26)
  - Operatorklassen (5)
  - Operatorfamilien (5)
  - Sequenzen (2)
  - Tabellen (3)
    - spatial\_ref\_sys
    - table\_last\_updates
    - table\_updates\_archive
  - Triggerfunktionen (7)
  - Typen (14)
  - Sichten (2)
    - geography\_columns
    - geometry\_columns

# Räumlicher Index

- ◆ Beschleunigung von räumlichen Abfragen
- ◆ Basierend auf Bounding-Boxen und rtree

Beispiel:

```
CREATE INDEX in_av_parzellen_geom  
ON av.parzellen USING GIST (geom) ;
```



R-tree Hierarchy

