

# Extended Relational DBMS

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## Outline

1. Features
2. SQL History
3. Supports for extended/object relational data model
4. Fulltext search
5. Spatial Data

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## Features

- Extending the query language
- complex data types, which include user defined abstract data types
- Operation & Function

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## SQL's History

- SQL was specified in 1970s
- SQL was enhanced substantially in 1989 and 1992
- A new standard called SQL3 added object-oriented features
- A subset of SQL3 standard, now known as SQL-99 has been approved

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## Extended/Object relational Support

- Type constructors to specify complex objects
- Mechanism to specify object-identity
- Mechanism for encapsulation of operations
- Mechanism to support inheritance
  - I.e., specify specialization and generalization

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## Data Types in PostgreSQL

- Data Type in PostgreSQL
  - <https://www.postgresql.org/docs/14/datatype.html>
- Defining new data types in PostgreSQL
  - CREATE TYPE
  - <https://www.postgresql.org/docs/14/sql-createtype.html>

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## Fulltext Search

- <https://www.postgresql.org/docs/14/textsearch.html>
- `Tsvector`, `tsquery`  
<https://www.postgresql.org/docs/14/datatype-textsearch.html>
- `to_tsvector`, `to_tsquery`

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## Spatial Data

- <https://www.postgresql.org/docs/14/datatype-geometric.html>

Name	Storage Size	Description	Representation
point	16 bytes	Point on a plane	(x,y)
line	32 bytes	Infinite line	{A,B,C}
lseg	32 bytes	Finite line segment	((x1,y1),(x2,y2))
box	32 bytes	Rectangular box	((x1,y1),(x2,y2))
path	16+16n bytes	Closed path (similar to polygon)	((x1,y1),...)
path	16+16n bytes	Open path	[(x1,y1),...]
polygon	40+16n bytes	Polygon (similar to closed path)	((x1,y1),...)
circle	24 bytes	Circle	<(x,y),r> (center point and radius)

- <https://postgis.net/>
- <https://postgis.net/docs/index.html>

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