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# Spatial Support in MySQL 8.0

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# Agenda

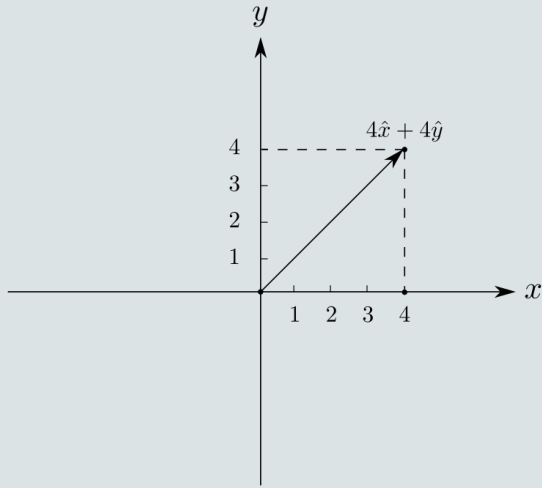
- 1 Coordinate Reference Systems (CRSs)
- 2 Geography
- 3 Upgrade Issues

# Coordinate Reference Systems (CRSs)

- Called Spatial Reference Systems (SRSs) in SQL/MM and MySQL
  - 5107 predefined CRSs from the EPSG Dataset 9.2 (MySQL 8.0.4)
    - 4628 projected
    - 479 geographic
  - CREATE/DROP SPATIAL REFERENCE SYSTEM statements to create your own
- MySQL 8.0 will refuse to do computations unless it knows the CRS definition
  - Property of each geometric object
  - MySQL 5.7 and earlier ignores the SRID (assumes SRID 0)

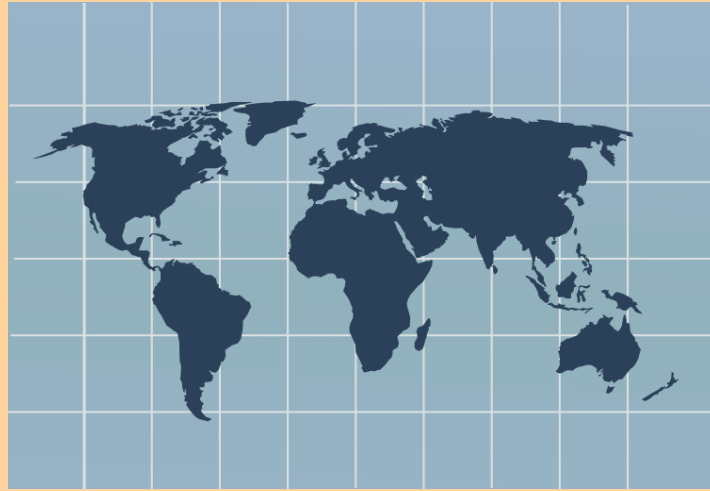
# Coordinate Reference Systems (CRSs)

5.7



SRID 0

8.0



Projected CRS



Geographic CRS

Cartesian CRS



www.tolnews.com/science-technology/flat-earth-believer-launches-homemade-rocket

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Geography

plans to launch himself 550 meters above California's Mojave Desert on Saturday. Associated Press reported

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The science is pretty well settled when it comes to the shape of Earth — it's roughly spherical like all other planets. A dedicated group of people known as "flat earthers" dispute this seemingly obvious fact of life, and one of them has built a steam-powered rocket to prove it. Sixty-one-year-old limo driver and stuntman "Mad Mike" Hughes was blocked from launching his contraption a few months ago, but he's now preparing for a slightly modified launch in order to prove once and for all that the earth is flat. His opinion on whether the earth is flat or not is unclear.

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# Geography

- Ellipsoidal CRSs
  - Full freedom: Arbitrary semi-major and semi-minor axes, any unit, any axis direction and axis order
- All geometries are supported
  - Point, linestring, polygon, geometry collection, multipoint, multilinestring, multipolygon
- InnoDB R-tree indexes support geography



# Geography

- CRSs is decided by SRID
  - No special data types or functions
    - The same types and functions are used for all CRSs
- Many functions support geography
  - Some don't take CRS into account (ST\_SRID, ST\_StartPoint, ST\_NumPoints, etc.)
  - ST\_Distance, ST\_Length
  - Spatial relations (ST\_Within, ST\_Overlaps, etc.)
  - Geography support is added piece by piece, function by function
    - Your favorite function may be next
  - A few functions only make sense in Cartesian or geographic settings

A dramatic scene of two firefighters in full silver heat-reflective suits and helmets. They are positioned on the left, facing right, and are using a high-pressure hose to spray water onto a massive, intense fire that fills the upper right portion of the frame. The fire is a bright, turbulent orange and red. A thick plume of white steam or smoke rises from the base of the fire, partially obscuring it. The ground is a light-colored, possibly concrete or stone surface. The overall atmosphere is one of intense action and danger.

# Upgrade Issues

# Upgrade Issues

- **YES, there are upgrade issues!**
  - We're sorry, but we have to ...
- All EPSG CRSs are latitude first, longitude second
  - WKT and WKB input/output uses CRS axis order by default
  - Earlier MySQL versions don't understand axis order, X=X and Y=Y
  - Queries and/or scripts must be changed
- Storage format is still longitude first, latitude second
  - Compatible with the limited geography support in 5.7

# Upgrade Issues

- SRID 0 is the safe choice if using MySQL pre 8.0
  - Set correct CRS after upgrading
- Indexes must be recreated after upgrade
  - Column definition must be modified to use SRID type modifier first
    - The type modifier is not available in 5.7
  - Indexes on columns without SRID type modifier will never be used
    - Allowed to preserve dump-restore compatibility, warnings will be issued





Feature descriptions and design details  
directly from the source.

<http://mysqlserverteam.com/>

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