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# Calculate the Geographical Distance Between Two Cities in SQL Server

By: [Daniel Calbimonte](#) | Last Updated: 2012-08-06 | [Comments \(6\)](#) | Related Tips: [More > Spatial Data Storage](#)

## Problem

Some SQL Server DBAs complain that it is hard to start working with the [Spatial Data Types](#) without using a real world example. In today's tip I am going to show how to find the distance between different cities using the [SQL Server geography data type](#) and Google Earth.

## Solution

### Requirements for calculating the distance between two cities

In this tip I am using SQL Server 2012, but this sample code should work with SQL Server 2008 as well. Earlier versions of SQL Server did not include the geography data type. Another tool that I've installed for this tip is [Google Earth](#), but you can use other tools like [findlatitudelongitud.com](#), [itouchmap.com](#), etc.

### Getting started with the calculations in SQL Server

1. Let's first create a table to store the cities and coordinates:

```
CREATE TABLE [dbo].[CitiesWorld](
  [Id] [smallint] IDENTITY(1,1) NOT NULL,
  [City] [nchar](40) NULL,
  [Coordinates] [geography] NULL,
  CONSTRAINT [PK_CitiesWorld] PRIMARY KEY CLUSTERED
(
  [Id] ASC
)WITH (PAD_INDEX = OFF, STATISTICS_NORECOMPUTE = OFF, IGNORE_DUP_KEY = OFF, ALLOW_ROW_LOCKS = ON, ALLOW_PAGE_LOCKS = ON) ON [PRIMARY]
) ON [PRIMARY] TEXTIMAGE_ON [PRIMARY]
GO
```

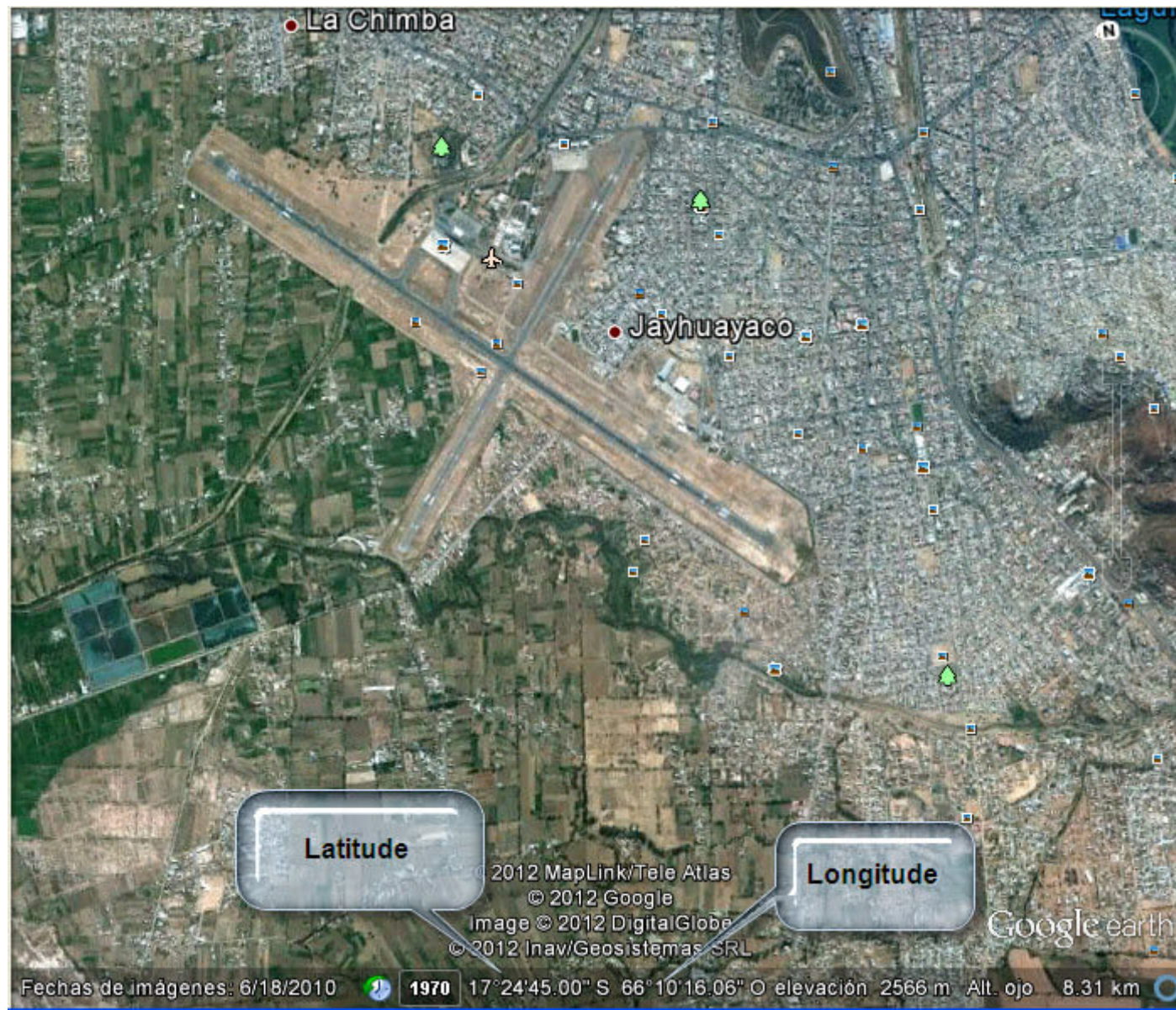
The only special thing in this example is that we are using a geography data type in the column named Coordinates. In this example we are going to work with 2 cities: Cochabamba (where I live) and London.

2. In order to find the coordinates for each city, I am going to use [Google Earth](#)



3. Now let's move to Cochabamba, Bolivia. I am going to zoom in until I can see the airport:





4. Verify the [latitude](#) and [longitude](#). As you can see in the picture, the Latitude of Cochabamba is 17°24'45.00 S and the Longitude is 66°10'16.06\" W.
5. We need to convert this coordinates to a SQL Server format. There are many ways to do this. In this example I am going to use the [earthpoint.us](#) site.
6. In the site write the latitude and longitude and press the Calc button:

## Convert Coordinates - Calculate a position in a variety of formats.

A user account is **not** needed for the features on this web page.

Enter latitude/longitude or position. Click the corresponding "Calc" button. Lat/Lon, UTM, UPS, MGRS, USNG, Conref, Maidenhead, and State Plane are supported. WGS84 datum.

**Write the latitude and longitude**

**NEW:** State Plane coordinates for the United States are supported. [Accepted formats...](#)

**HINT:** If you have many coordinates to convert, try [Batch Convert](#).

Latitude:  Longitude:

Calc

View on Google Earth

Free. User account is not needed.

OR

Position:

Calc

View on Google Earth

Free. User account is not needed.

**Latitude** S17°24'45.00"  
**Longitude** W66°10'16.06"

**Use the Degrees Lat Long**

Calculated Values - based on Degrees Lat Long to seven decimal places

Position Type	Lat Lon
<b>Degrees Lat Long</b>	-17.4125000°, -066.1711278°
<b>Degrees Minutes</b>	-17°24.75000', -066°10.26767'
<b>Degrees Minutes Seconds</b>	-17°24'45.0000", -066°10'16.0600"

7. Let's insert the **"Degrees Lat Long"** information in our CitiesWorld table:

```
INSERT INTO [dbo].[CitiesWorld] ([City],[Coordinates])
VALUES ('Cochabamba', geography::STGeomFromText('POINT(-66.1711278 -17.4125)', 4326));
GO
```



8. Now let's move to London:



9. I am going to Zoom in until I can see the airport:



10. The latitude is 51°30'23.29" N and the Longitude is 00°01'39.13 E".

11. If we repeat the step 5 and 6 with the London coordinates we will have the following results:

Latitude:  Longitude:



Free. User account is not needed.

OR

Position:



Free. User account is not needed.

**Latitude**  
**Longitude**

N51°30'23.29"  
E00°01'39.13"

**Use this  
information**

Calculated Values - based on Degrees Lat Long to seven decimal places.

Position Type	Lat Lon
<b>Degrees Lat Long</b>	51.5064694°, 000.0275361°

12. Now we are going to insert this information in the table:

```
INSERT INTO [dbo].[CitiesWorld]([City],[Coordinates])
VALUES('London', geography::STGeomFromText('POINT(0.0275361 51.5064694)', 4326));
GO
```

13. Now, let's find the distance by plane between London and Cochabamba. To do this I created the following stored procedure:

```
CREATE PROCEDURE Distance
@cityor varchar(50),@citydest varchar(50),@unit varchar(5)
as
    declare @or geography, @dest geography
    SET @or = (select coordinates from [dbo].[CitiesWorld] where city=@cityor)
    SET @dest = (select coordinates from [dbo].[CitiesWorld] where city=@citydest)
    IF @unit='miles'
        SELECT @or.STDistance(@dest)/1609.344
```

```
ELSE  
--Else show the distance in km  
SELECT @or.STDistance(@dest)/1000
```

14. The following procedure finds the distance between two points stored in the CitiesWorld table. This stored procedure is using the [STDistance](#) function. You can find the distance in Kilometers or Miles. To find the distance in miles use the following code:

```
EXECUTE Distance 'Cochabamba', 'London', 'miles'
```

15. The distance between these two cities in miles is: **6186.99**  
16. In order to find the distance in kilometers, use this sentence:

```
EXECUTE Distance 'Cochabamba', 'London', 'km'
```

17. The distance in Km is: **9957.01**

## Next Steps

- There are some pretty nice SQL Server functions to find the distance and areas using geography points. There are new applications created to find areas, perimeters and the distance between two points. If you want you can find distance between your home and your office and more.
- Review the following resources for more information:
  - [STDistance function](#)
  - [STArea function](#)
  - [How to convert the coordinates](#)
  - [Using the Google Earth](#)
  - [Check out all of the tips on working with spatial data](#)

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## About the author



Daniel Calbimonte is a Microsoft SQL Server MVP, Microsoft Certified Trainer and Microsoft Certified IT Professional.

[View all my tips](#)

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