

Point Cloud - Erfahrungen mit PostgreSQL und Big Data

8. November 2013

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PointCloud - Postgres Extension! (1.11.13 Zoo Rapperswil)



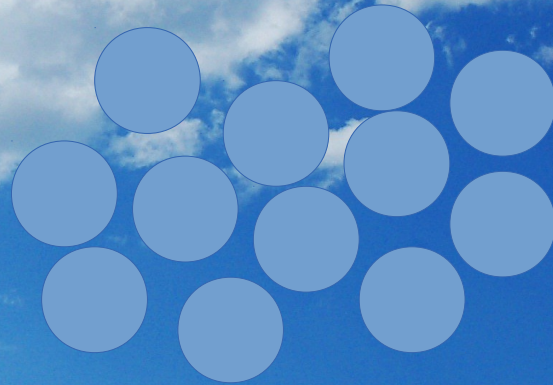


Pointcloud Extension

- **PostgreSQL extension for storing point cloud data**
- **<https://github.com/pramsey/pointcloud>**
- **Datentypen und Funktionen**
- **Hintergrund**
 - **Von Paul Ramsey 2013, boundlessgeo.com**
 - **>5 Monate Entwicklungszeit**
 - **Finanziert von Natural Resources Canada**



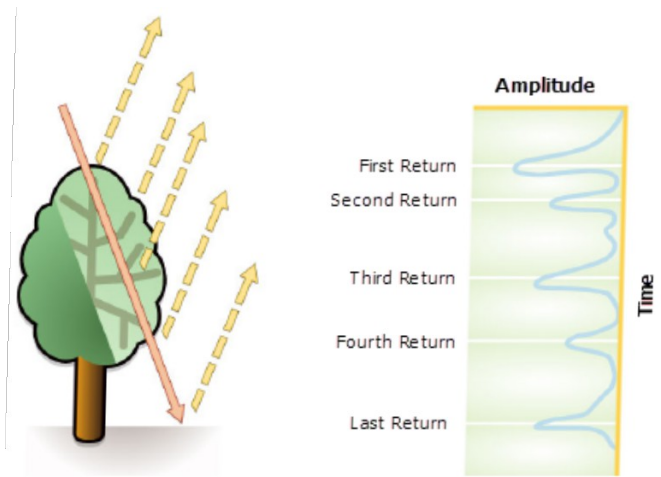
Was ist Point Cloud?



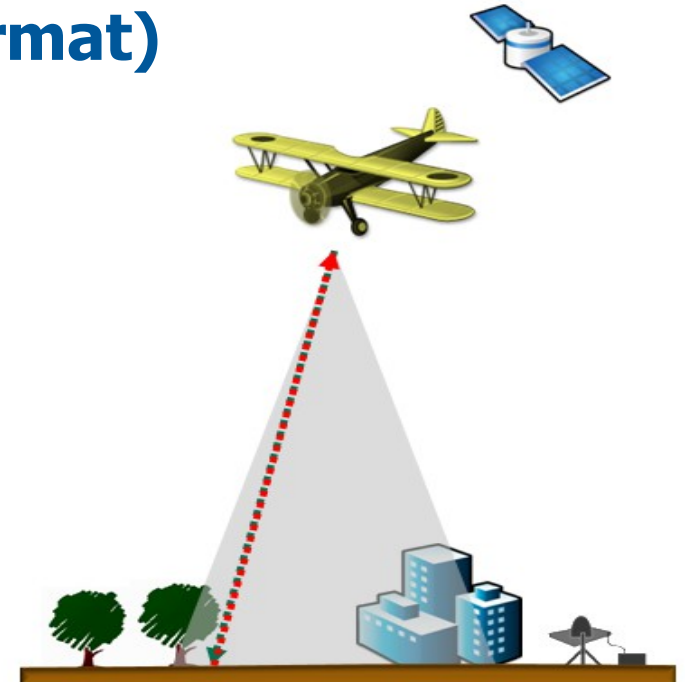


Point Cloud = LIDAR-Daten

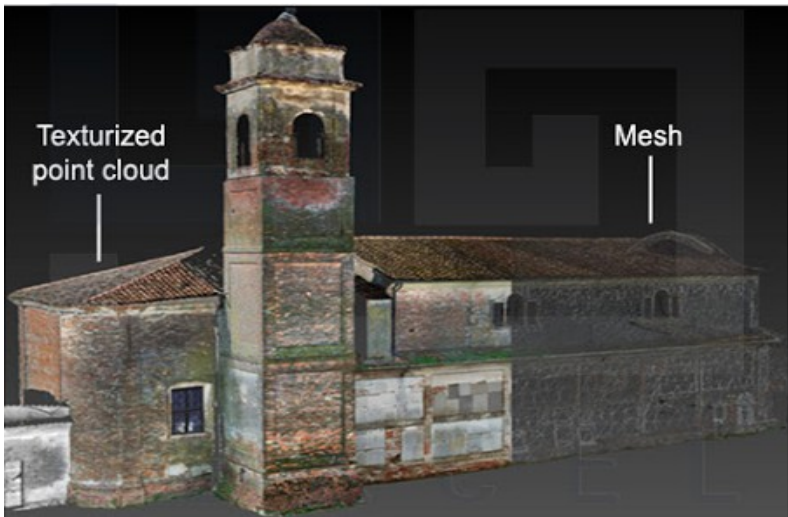
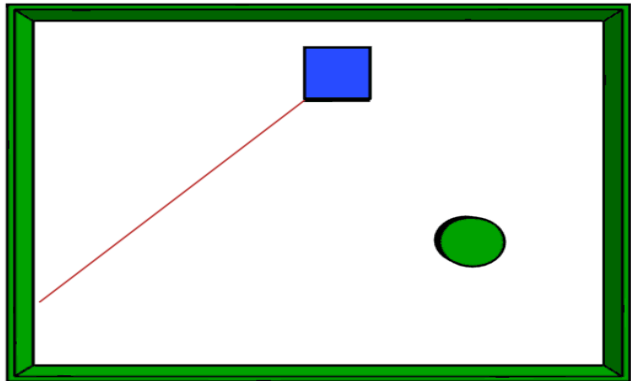
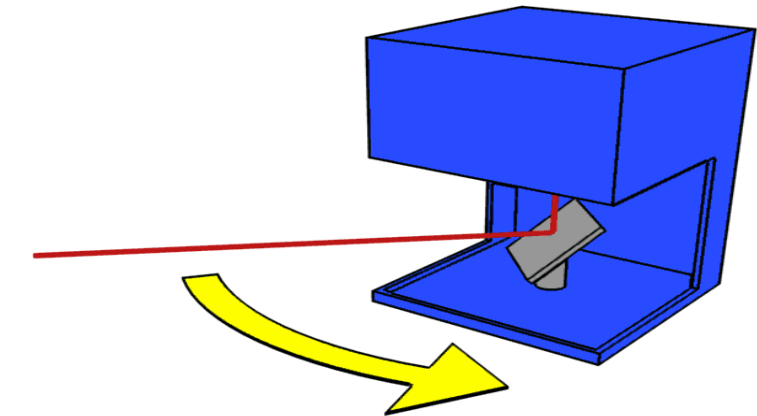
- **Mehrdim. Daten von LIDAR-Sensoren**
- **LIDAR: „Light Detection and Ranging“**
- **Grosse Datenmengen innert kürzester Zeit**
- **z.B. 500 GB in 15 min. (LAS-Format)**



Credits: <http://resources.arcgis.com/>



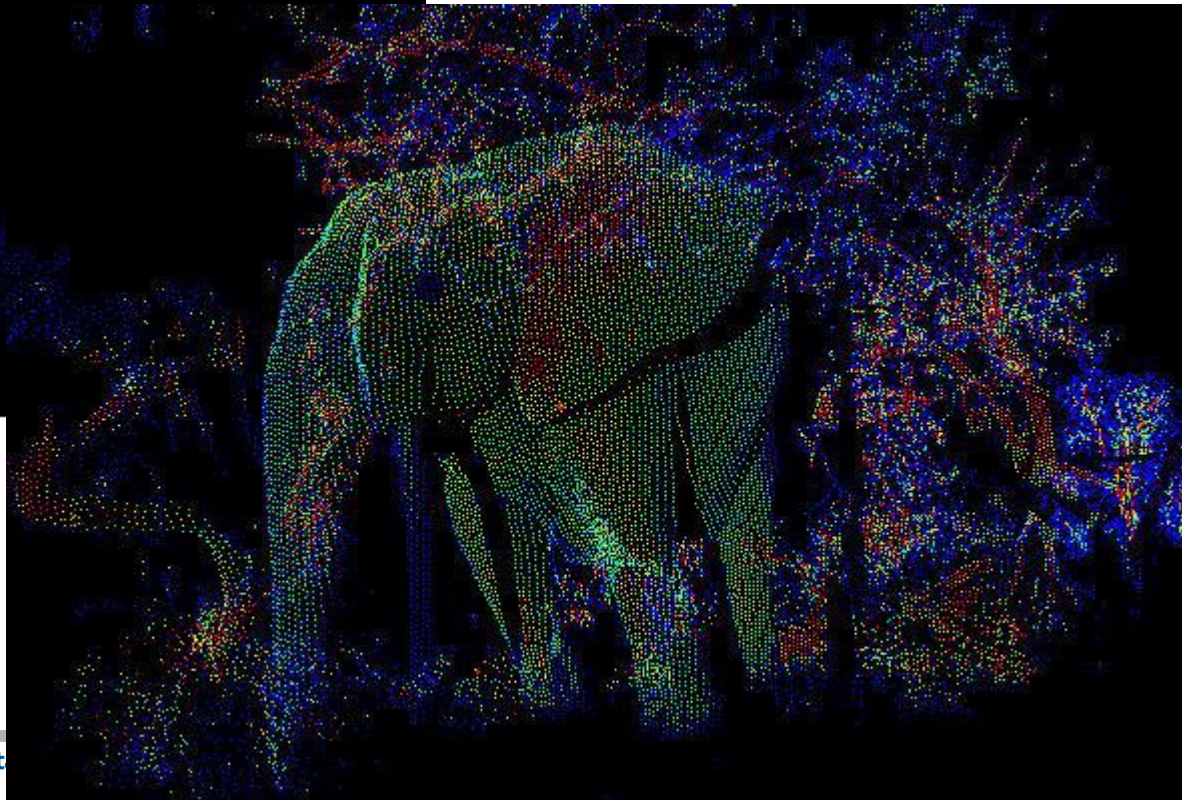
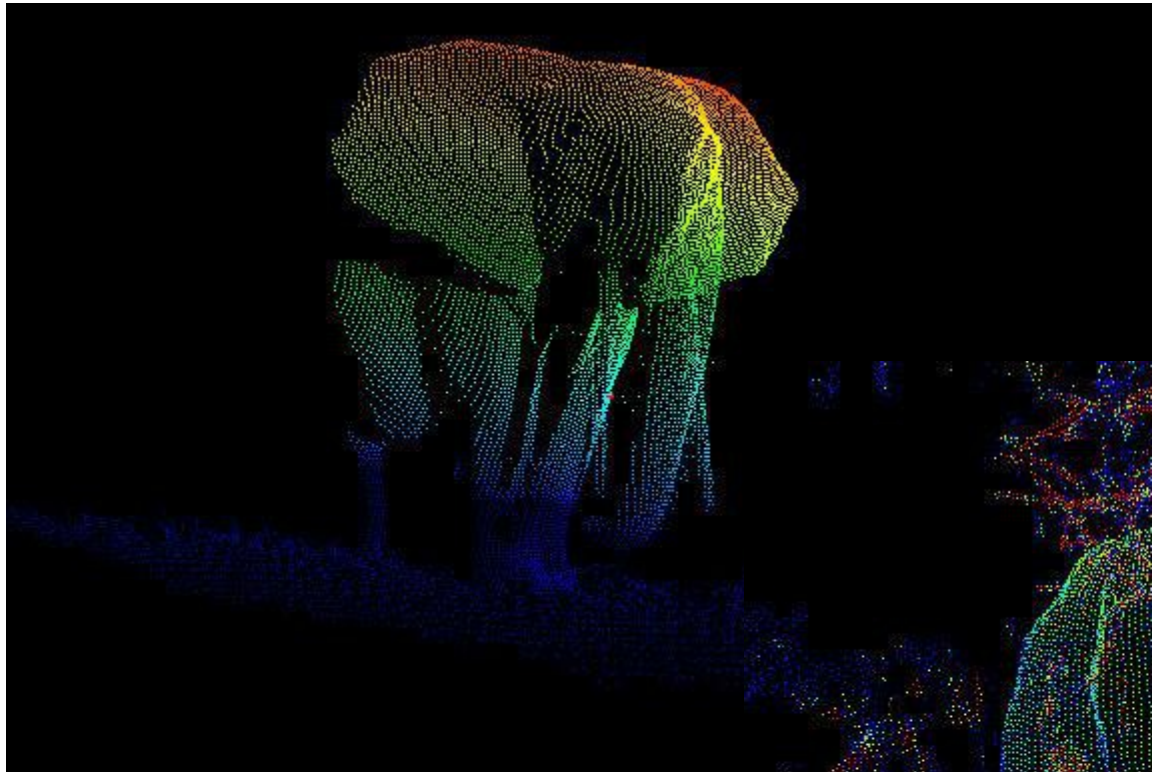
LIDAR ff.



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The LIDAR Elephant



LIDAR Daten



**(X, Y, Z, Intensity,
ReturnNumber,
NumberOfReturns,
Classification,
ScanAngleRank, Red,
Green, Blue)**

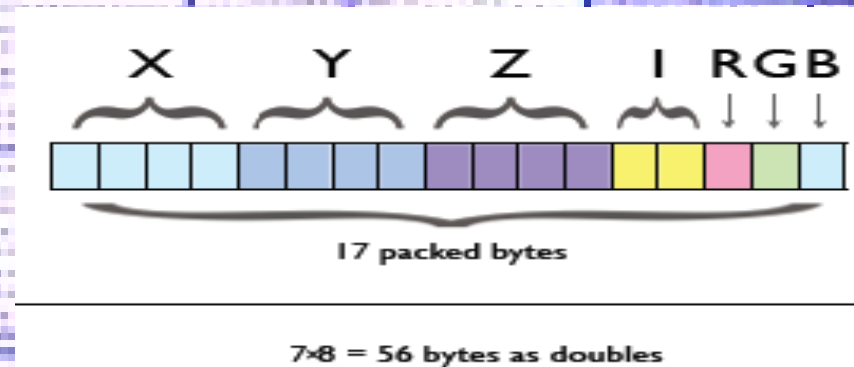


The background of the image is a vibrant blue sky filled with numerous white, fluffy clouds of varying sizes. The clouds are scattered across the frame, with some appearing closer and more detailed, while others are smaller and further away. The overall lighting is bright, suggesting a clear, sunny day.

**Warum ein
eigener
Datentyp?**

PcPoint (pcid)

PcPatch (pcid)





Pointcloud Extension

- **PcPatch** ist eine **Collection** von
- ... **PcPoint**
- ... **beschrieben** in einem **XML Schema**
- ... **gespeichert** in Tabelle **pointcloud_formats**
(und View **pointcloud_columns**)
- ... **verknüpft** mit **pcid**

```
CREATE EXTENSION  
pointcloud;
```

```
CREATE EXTENSION  
postgis;
```

```
CREATE EXTENSION  
pointcloud_postgis;
```

depends on

depends on



pointcloud Extension



```
INSERT INTO pointcloud_formats (pcid, srid, schema)
VALUES (1, 0,
'<?xml version="1.0" encoding="UTF-8"?>
<pc:PointCloudSchema
  xmlns:pc="http://pointcloud.org/schemas/PC/1.1"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <pc:dimension>
    <pc:position>1</pc:position>
    <pc:size>4</pc:size>
    <pc:description>X coordinate.</pc:description>
    <pc:name>X</pc:name>
    <pc:interpretation>int32_t</pc:interpretation>
    <pc:scale>0.01</pc:scale>
  </pc:dimension>
  <pc:dimension>
    <pc:position>2</pc:position>
    <pc:size>4</pc:size>
    <pc:description>Y coordinate.</pc:description>
    <pc:name>Y</pc:name>
    <pc:interpretation>int32_t</pc:interpretation>
    <pc:scale>0.01</pc:scale>
  </pc:dimension>
```



pointcloud Extension



```
CREATE TABLE pcpoints (  
    id SERIAL PRIMARY KEY,  
    pt PcPoint(1)  
);  
  
INSERT INTO pcpoints (pt)  
VALUES (  
    PC_MakePoint(1,  
        ARRAY[-126, 45, 34, 4]  
    )  
);
```



pointcloud Extension



```
SELECT pt FROM pcpoints;
```

```
0101000000C8CEFFFF94110000  
480D000000400
```

```
SELECT PC_AsText(pt)  
FROM pcpoints;
```

```
{"pcid":1,  
  "pt": [-126, 45, 34, 4]}
```







pointcloud Extension



```
SELECT
  Count (*)
  Sum(PC_NumPoints(pa))
FROM mtsthelens;
```

count		sum
-----+-----		
30971		12388139





Benchmark it!

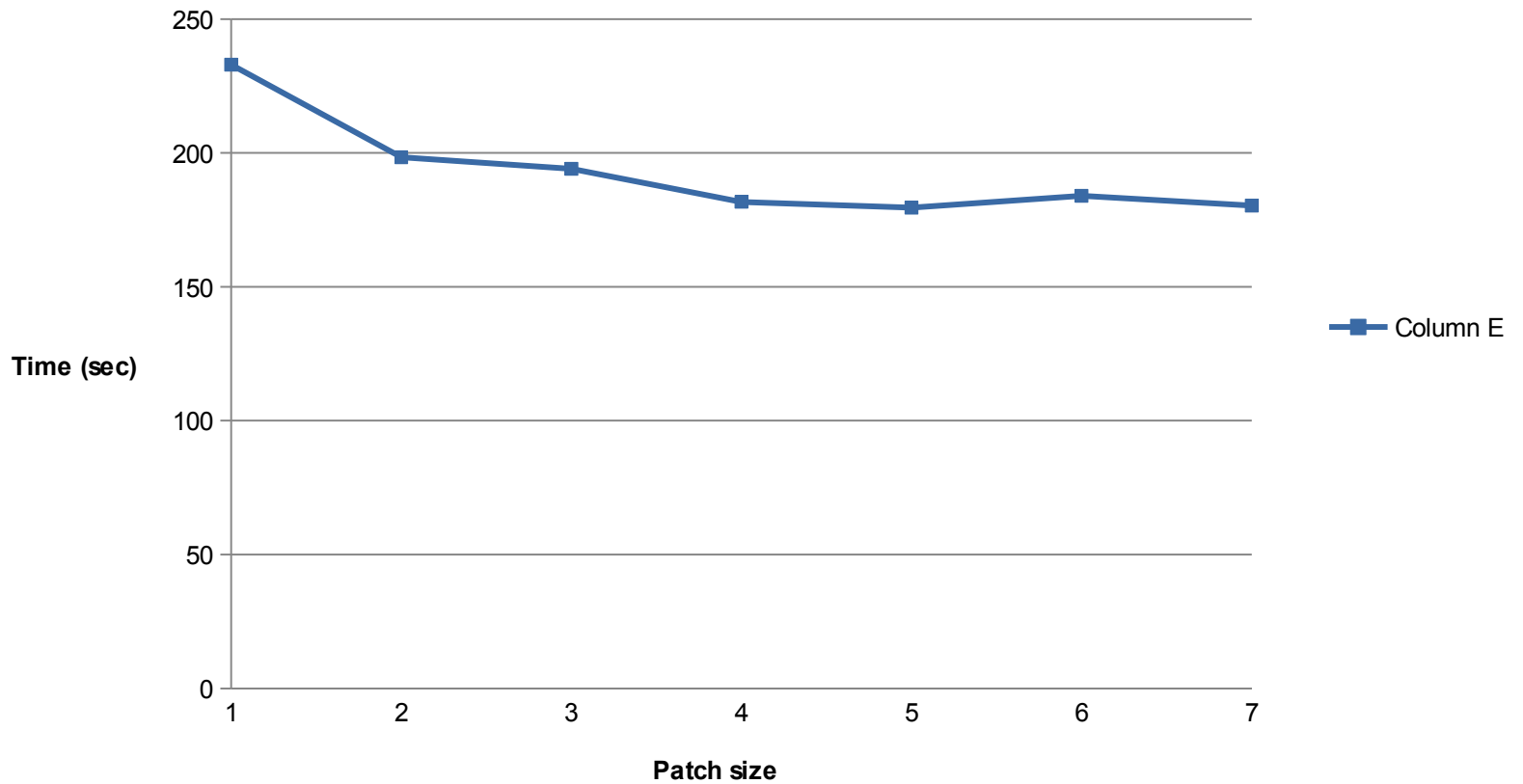
- **Load**
 - **No compression, compression**
- **Query BBox**
 - **Bbox size: 200m x 200m, 400m x, 600m x, 800m x, 1000m x**
- **Query BBox w/Filter**
 - **BBox as above**
 - **WHERE elevation ('Z') > 1800**



Benchmark Load



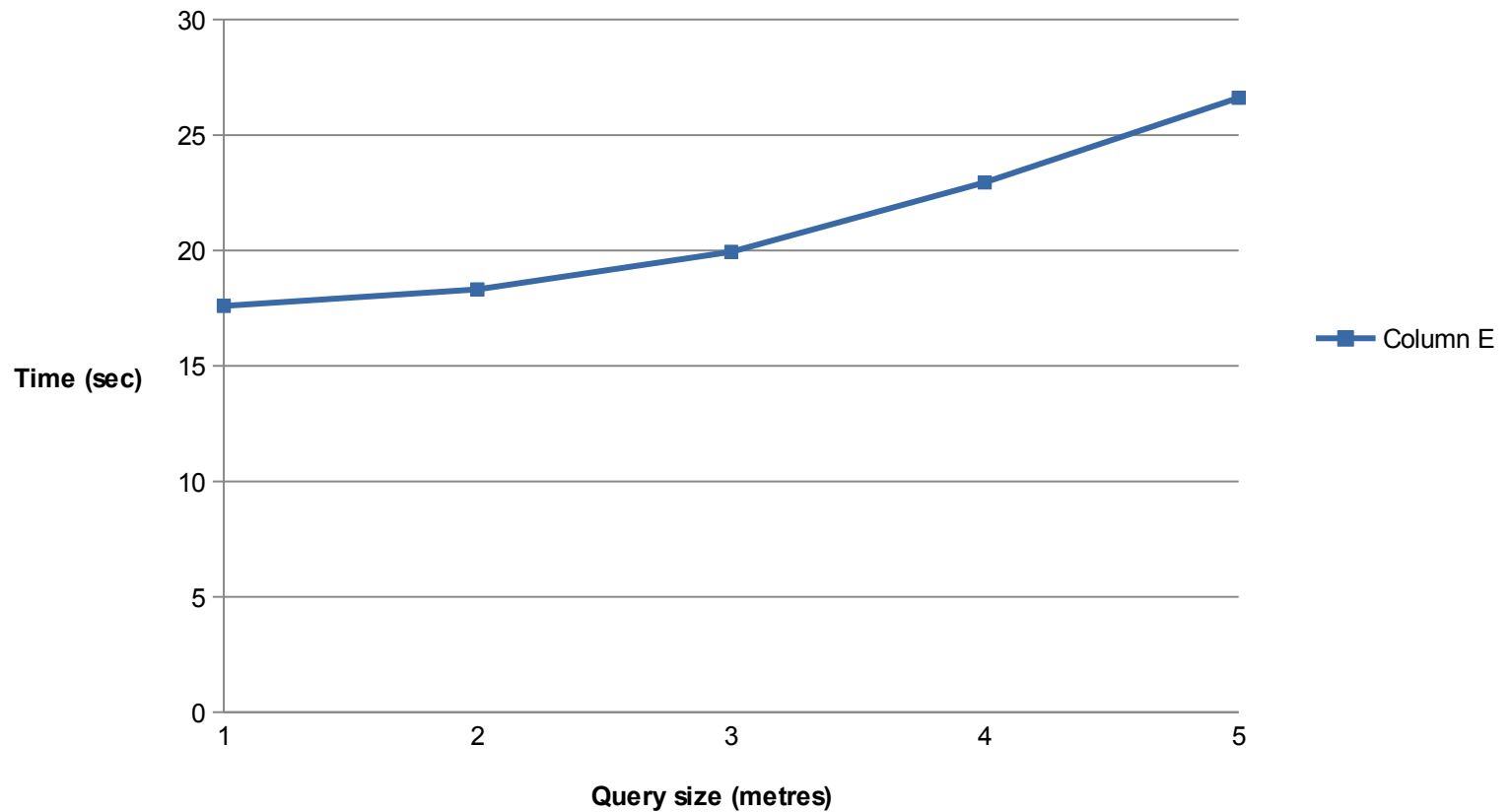
Compression: None



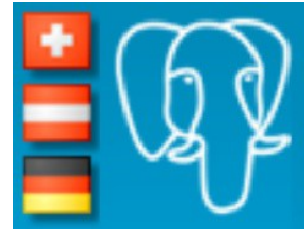
Benchmark Query BBox



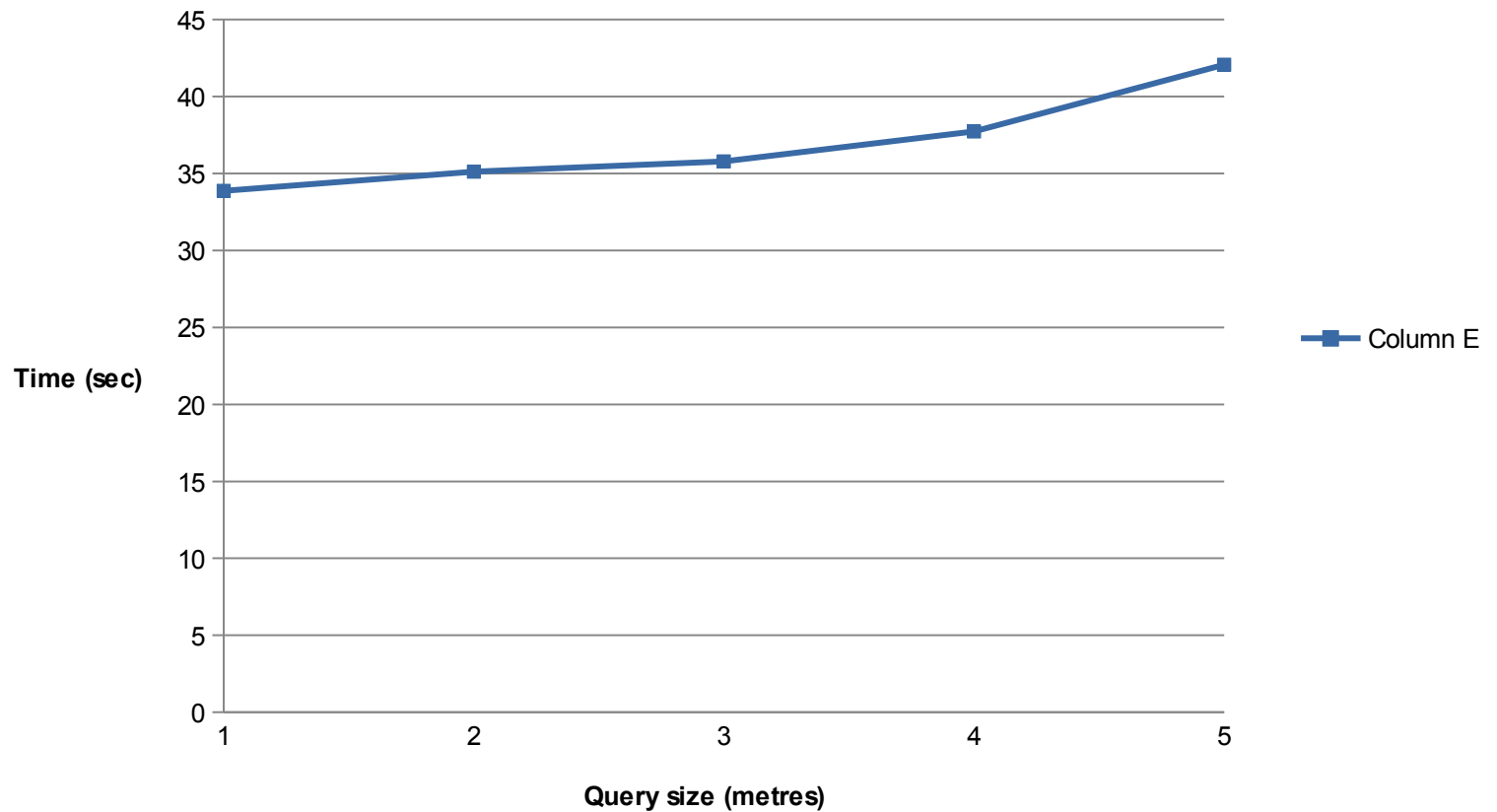
Query time - bounding box



Benchmark Query BBox w/Filter



Query time - bounding box w/ filter



Zusammenfassung



- ...



Kontakt



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