



3D OpenSource software Stack

FOSS4G 2015 Seoul – Oslandia Team



2010

2013

2015

2016

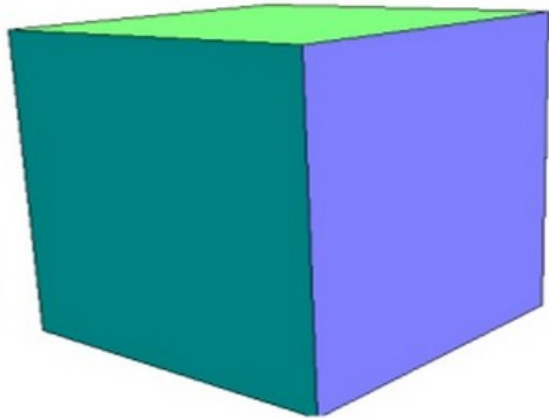
E-PLU project



Direccte Direction régionale des entreprises,
de la concurrence, de la consommation,
du travail et de l'emploi
ÎLE-DE-FRANCE



A 3D PolyhedralSurface example, enclosing a cube



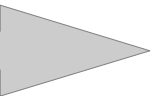
```
POLYHEDRALSURFACE (  
  ((0 0 0, 0 0 1, 0 1 1, 0 1 0, 0 0 0)),  
  ((0 0 0, 0 1 0, 1 1 0, 1 0 0, 0 0 0)),  
  ((0 0 0, 1 0 0, 1 0 1, 0 0 1, 0 0 0)),  
  ((1 1 0, 1 1 1, 1 0 1, 1 0 0, 1 1 0)),  
  ((0 1 0, 0 1 1, 1 1 1, 1 1 0, 0 1 0)),  
  ((0 0 1, 1 0 1, 1 1 1, 0 1 1, 0 0 1)))
```

PostGIS 2.0

2010

2013

2015





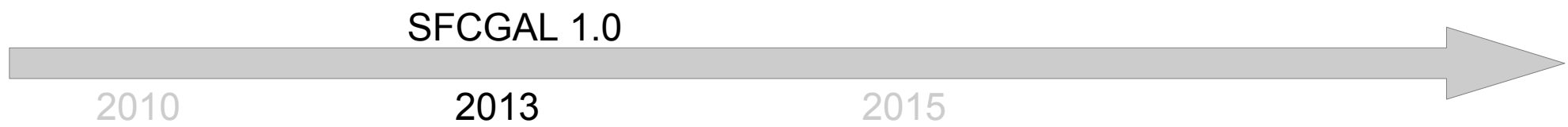
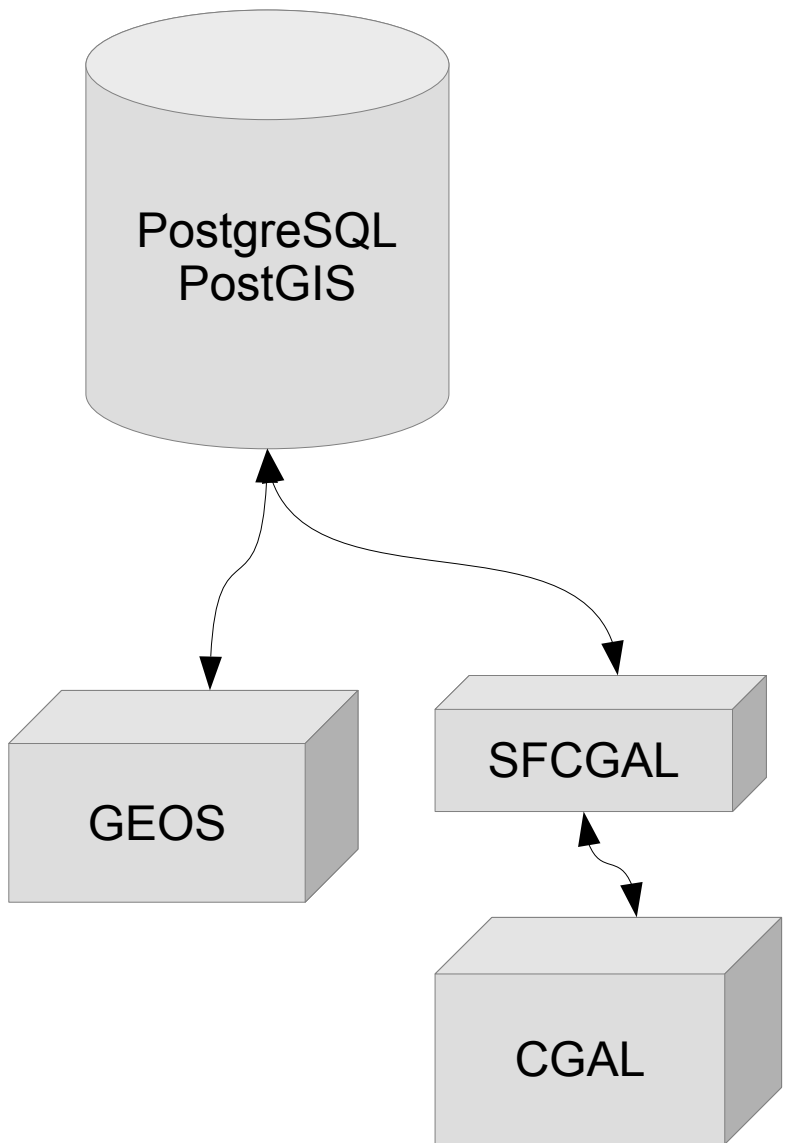
CGAL as GPL

2010

2012

2015





Regress tests PostGIS for GEOS

OK

GardenTest PostGIS

OK

3D Invalid geometry proof

OK

Wide user community

not yet

```
SET postgis.backend = 'geos' ;
```

```
SET postgis.backend = 'sfcgal' ;
```


ST_3DIntersects

ST_3DDistance

ST_3DIntersection

ST_3DUnion

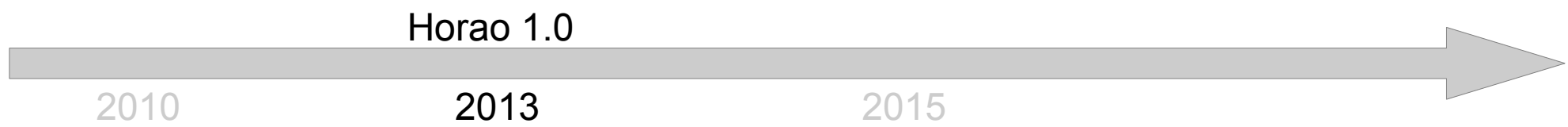
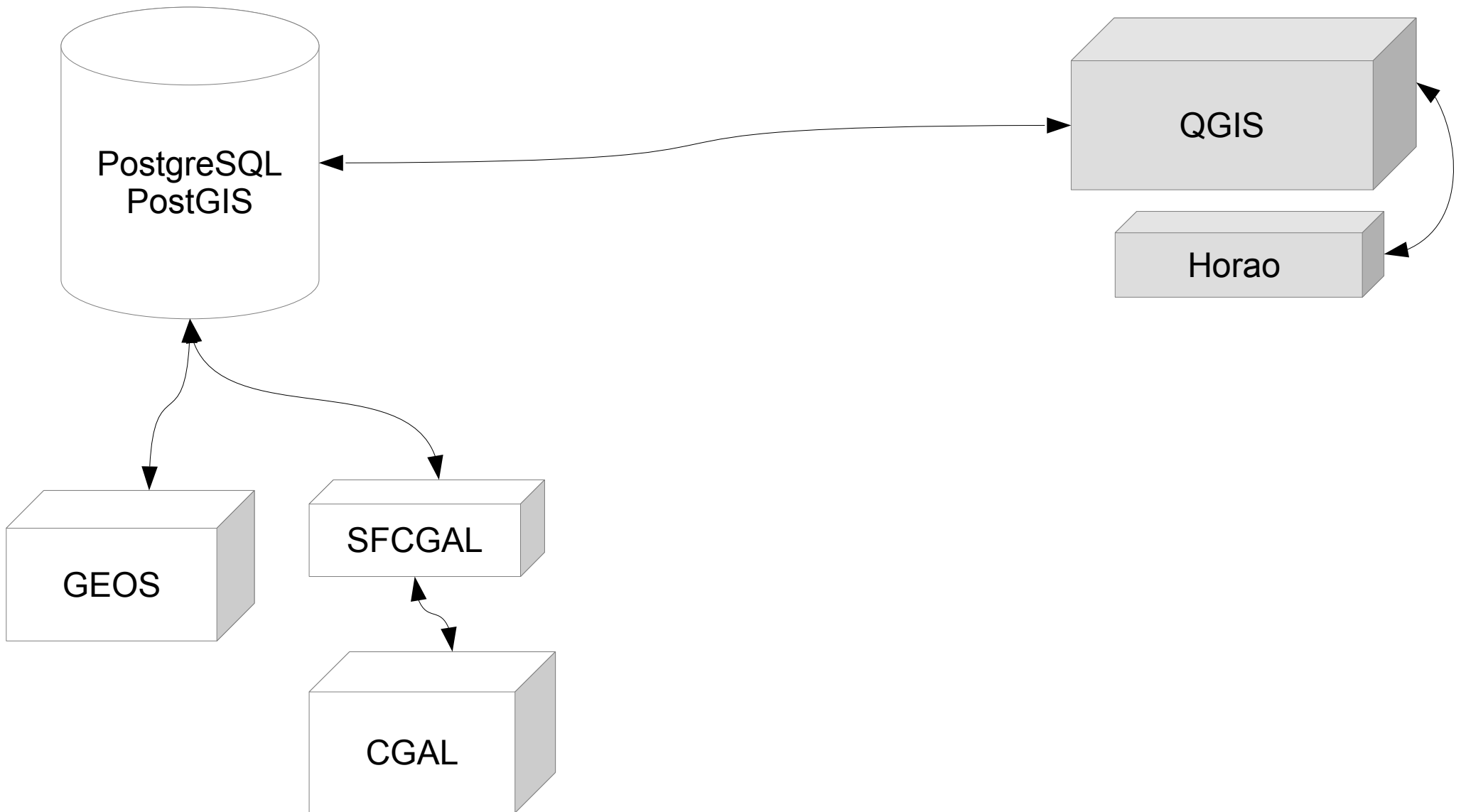
ST_Tesselate

ST_Extrude

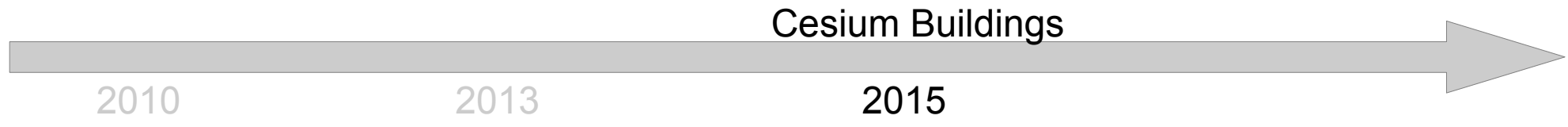
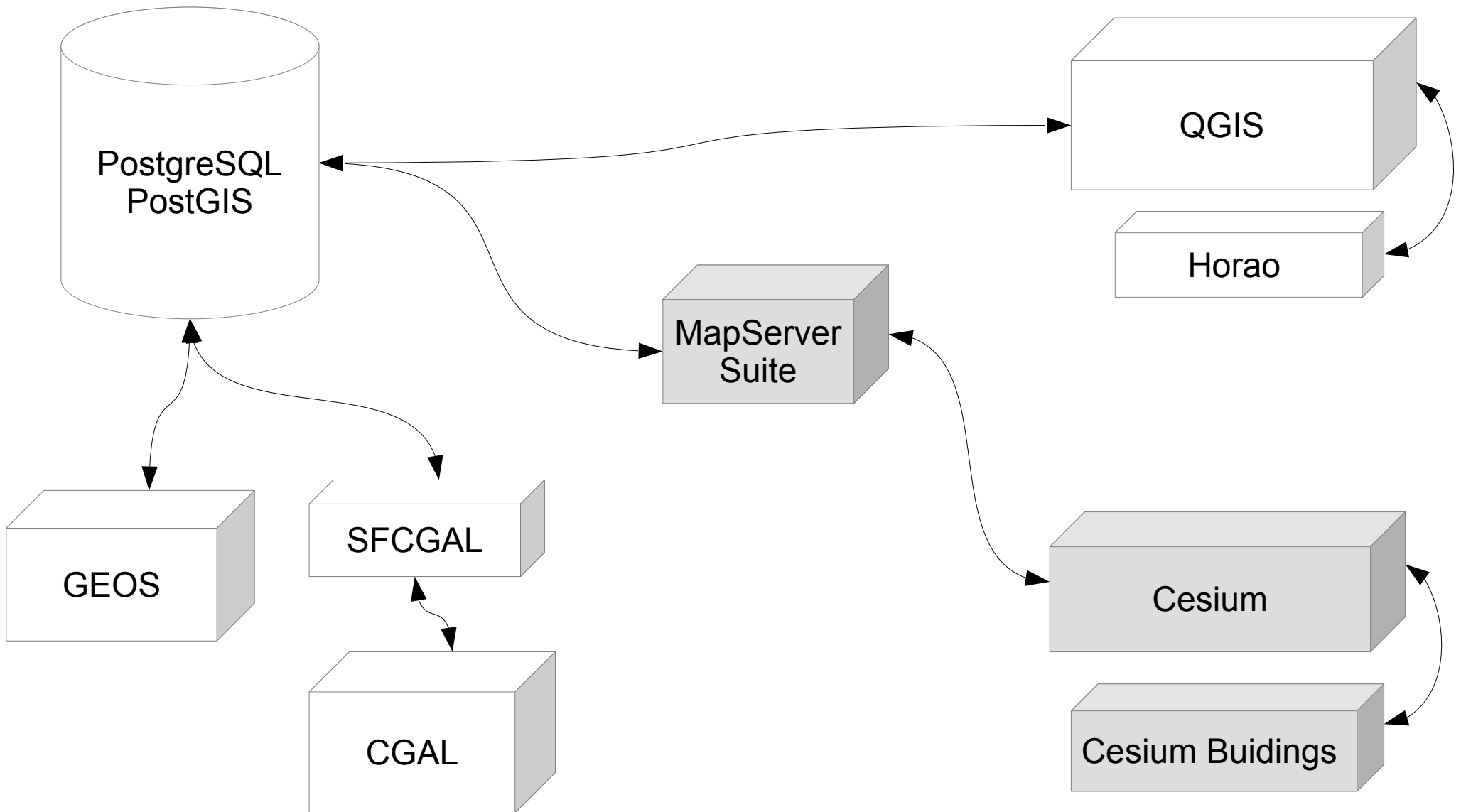
ST_StraightSkeleton

SFCGAL performances similar to GEOS ones for 2D
(but with SFCGAL we gain arbitrary precision)

But some 3D computation takes time.



<https://vimeo.com/74869530>



<https://vimeo.com/139319528>

Plain WFS is OK (but no tiling)

GeoJSON must be extended (for PS and TIN)

Cesium use geocentric coordinates system

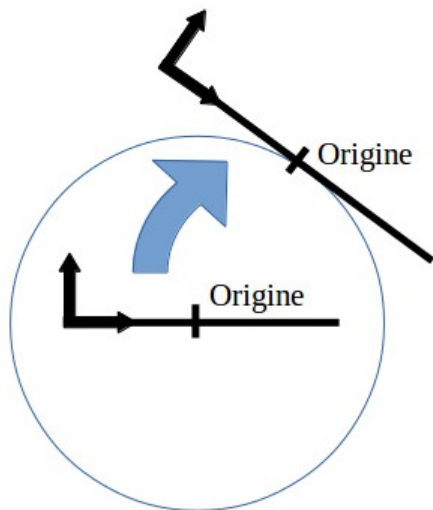
Cesium buildings imply using local coordinates

Real reprojection cost

Cesium use geocentric coordinates system

Cesium buildings imply using local coordinates

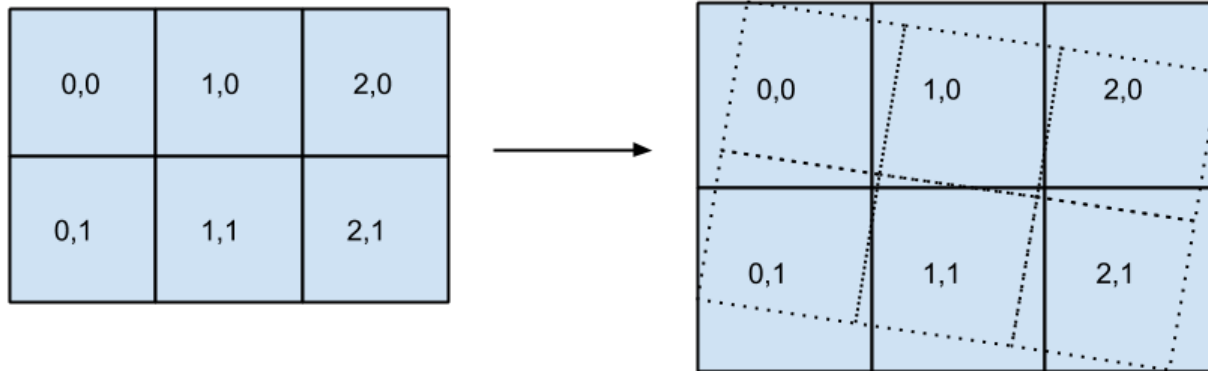
Real reprojection cost



Use only (simple) translation and rotation

Performed at rendering time

Imply to use small tiles to be accurate enough
(500m for centimetric precision)



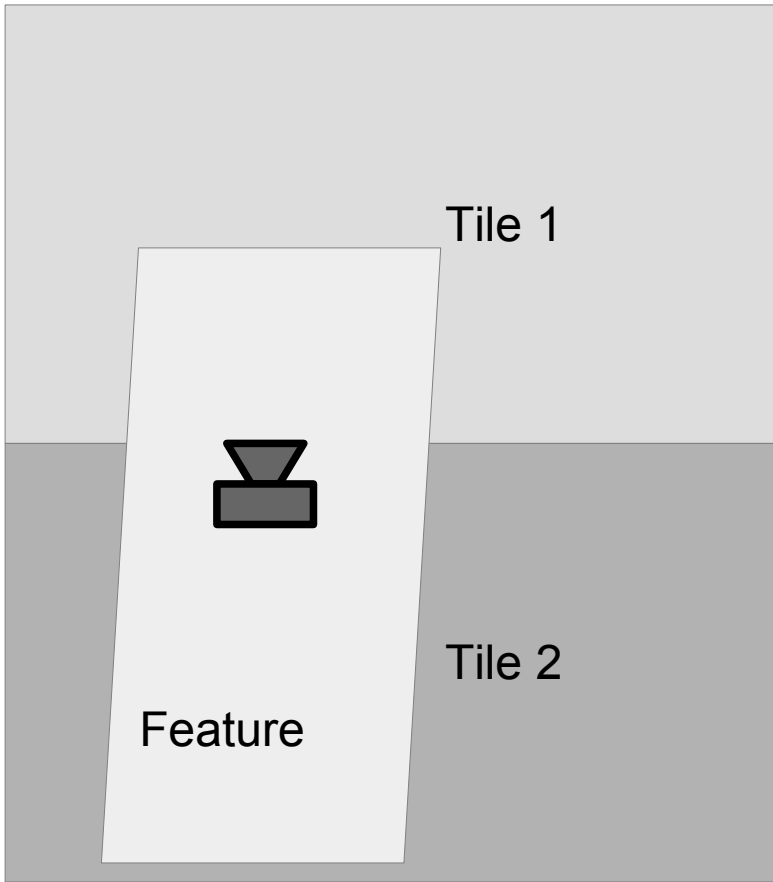
□

```
<script src="js/TileProvider.js"></script>
```

```
[...]
```

```
var tileProvider = new WfsTileProvider(  
  'http://192.168.56.101/cgi-bin/tinyows.fcgi',  
  'tows:roofs',  
  Cesium.Rectangle.fromDegrees(4.77038, 45.71661, 4.89976, 45.78991),  
  500,  
  3);
```

```
viewer.scene.primitives.add(new Cesium.QuadtreePrimitive(  
  {tileProvider : tileProvider}  
));
```



Tiling known issue:

Big feature behind you

MTR : Multiple Render Target

Rendering



Post Processing

Edge Effect



Compose



Keep real feature client side

Keep same stack for both 2D and 3D data

But hardware matters

<http://www.postgis.org>

<http://sfcgal.org>

<http://www.mapserver.org>

<http://qgis.org>

<http://oslandia.github.io/horao>

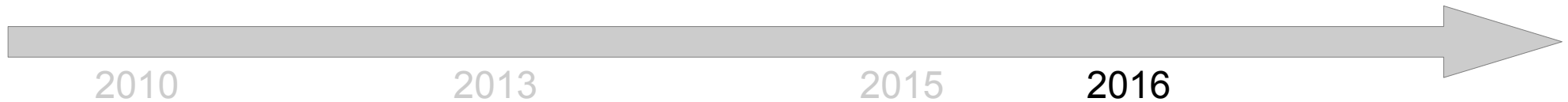
<http://cesiumjs.org>

<https://github.com/Oslandia/cesium-buildings>

<https://github.com/Oslandia/workshop-3d>

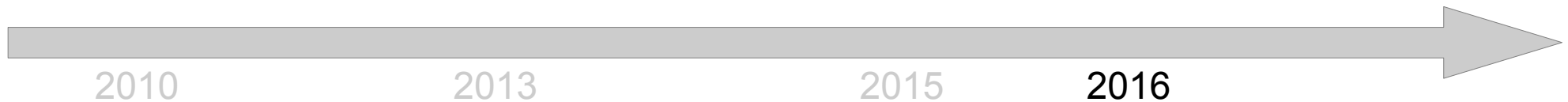
Keep increasing performances

Enhance WebGL client features

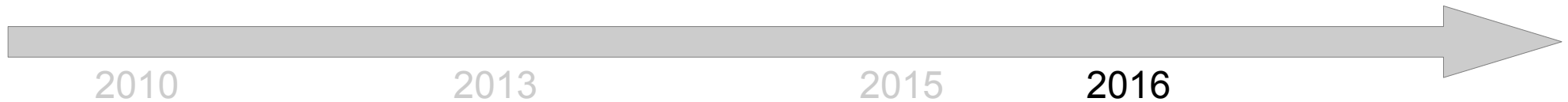


PostgreSQL/PostGIS nested function calls

Avoid to check geometry validity (if unneeded)



<https://github.com/AnalyticalGraphicsInc/3d-tiles>



Immersive 3D environment: ITowns

Oriented images

Point Cloud

Textured 3D volumes

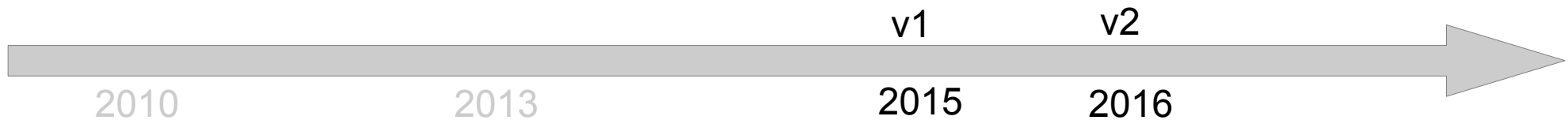
<https://vimeo.com/139352042>



PÔLE DE COMPÉTITIVITÉ
ET DE TRANSFORMATION NUMÉRIQUE



INSTITUT NATIONAL
DE L'INFORMATION
GÉOGRAPHIQUE
ET FORESTIÈRE



고맙습니다

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