Grid & Geographic Coordinate System

NOTE: There is no POPULAR system which can handle several & different coordinate systems for whole data at the same time.

But it’s possible to handle several & different systems.

Just the application would be MORE complicated.

# 1. What coordinate system should we use ?

For GPS/CSV data : WGS-84 (EPSG:4326) coordinate system (latitude & longitude : **degree**)

For OpenDRIVE content : must be any/certain projected coordinate system, that is **METER** coordinate system

For example, EPSG:3857, …

We have to convert from WGS-84 to certain projected coordinate system like EPSG:3857

The best ideal way to choose projected coordinate system for OpenDRIVE is to refer every countries GIS POLICY.

So, we can determine projected coordinate system for OpenDRIVE corresponding to WGS-84 coordinate system

using POLICY.

We chose EPSG:3112 for Australia

That is GDA94 / Geoscience Australia Lambert

Geographic Coordinate System is presented by several ways

- Name

- EPSG number

- WKT

- PROJ4 expression

For example, “GDA94 / Geoscience Australia Lambert” => EPSG:3112 => PROJ4 : "+proj=lcc +lat\_1=-18 +lat\_2=-36 +lat\_0=0 +lon\_0=134 +x\_0=0 +y\_0=0 +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +units=m +no\_defs"

In future, we can use different systems for the world. But there would be some problems/difficulty.

- Handling overlapped area between different systems’ grids

- Calculating distance between them

OpenDRIVE contains PROJ4 expression in specifications.

*<OpenDRIVE>*

*<header>*

*<geoReference>*

*<![CDATA[ +proj=lcc +lat\_1=-18 +lat\_2=-36 +lat\_0=0 +lon\_0=134 +x\_0=0 +y\_0=0 +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +units=m +no\_defs ]]>*

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We use PROJ4 library which supports transformation between any coordinate system.

# 2. Grid

We split the world by grid.

Grid is squared area

Grid is presented by row & col

Row = y / GRID\_SQUARE\_AREA\_SIZE

Col = x / GRID\_SQUARE\_AREA\_SIZE

We present every OpenDRIVE content by grid

So All OpenDRIVE concepts(roads, junction, objects, signals…) must be considered per grid

One Grid = One OpenDRIVE content

One OpenDRIVE content contains roads and junctions

Roads contains geometries, lanes, objects and signals

Juntions don’t belong to roads.

Once one grid is updated, then neighbour grids must be updated