8as Jornadas SIG Libre

26, 27 y 28 marzo 2014

Girona

# PostgreSQL con PostGIS 2.0
## aplicados al mundo de la ingeniería hidráulica y fluvial

GISwater

**Xavier Torret i Vicente Medina**

Girona, March 28

# 1. Open source software

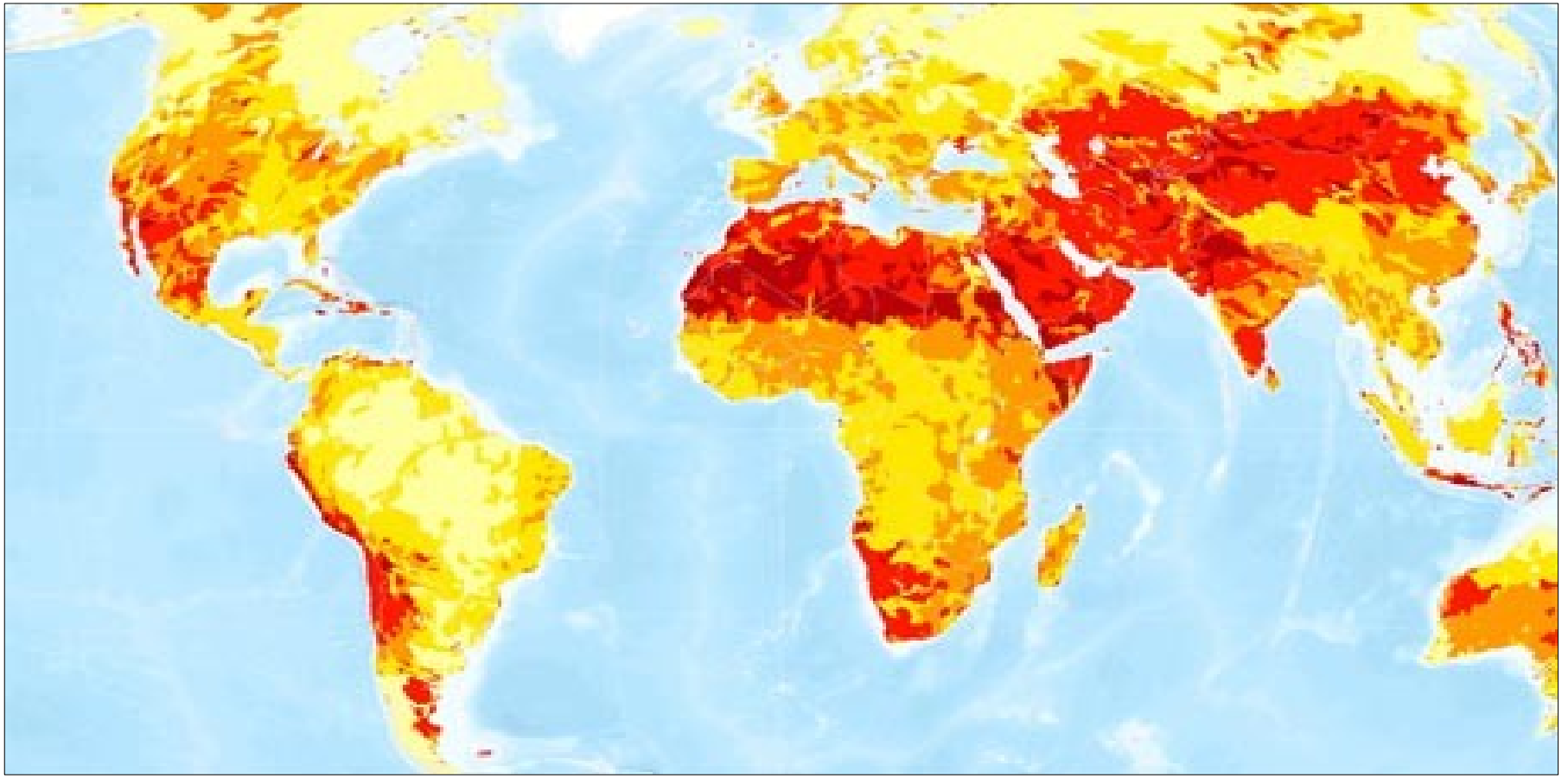
## The myts of open source

**1) Open software is poor quality.**

**2) Open software is not professional.**

**3) With open software you can not do everything.**

# 2. Water management. World situation



Aqueduct combines maps with 12 different water risk indicators, including water quality
Source: http://www.wri.org/our-work/project/aqueduct/aqueduct-atlas

# 2. Water management. World situation

**GIS SOFTWARE**

**DATABASE SOFTWARE**

**HIDRAULIC SOFTWARE**

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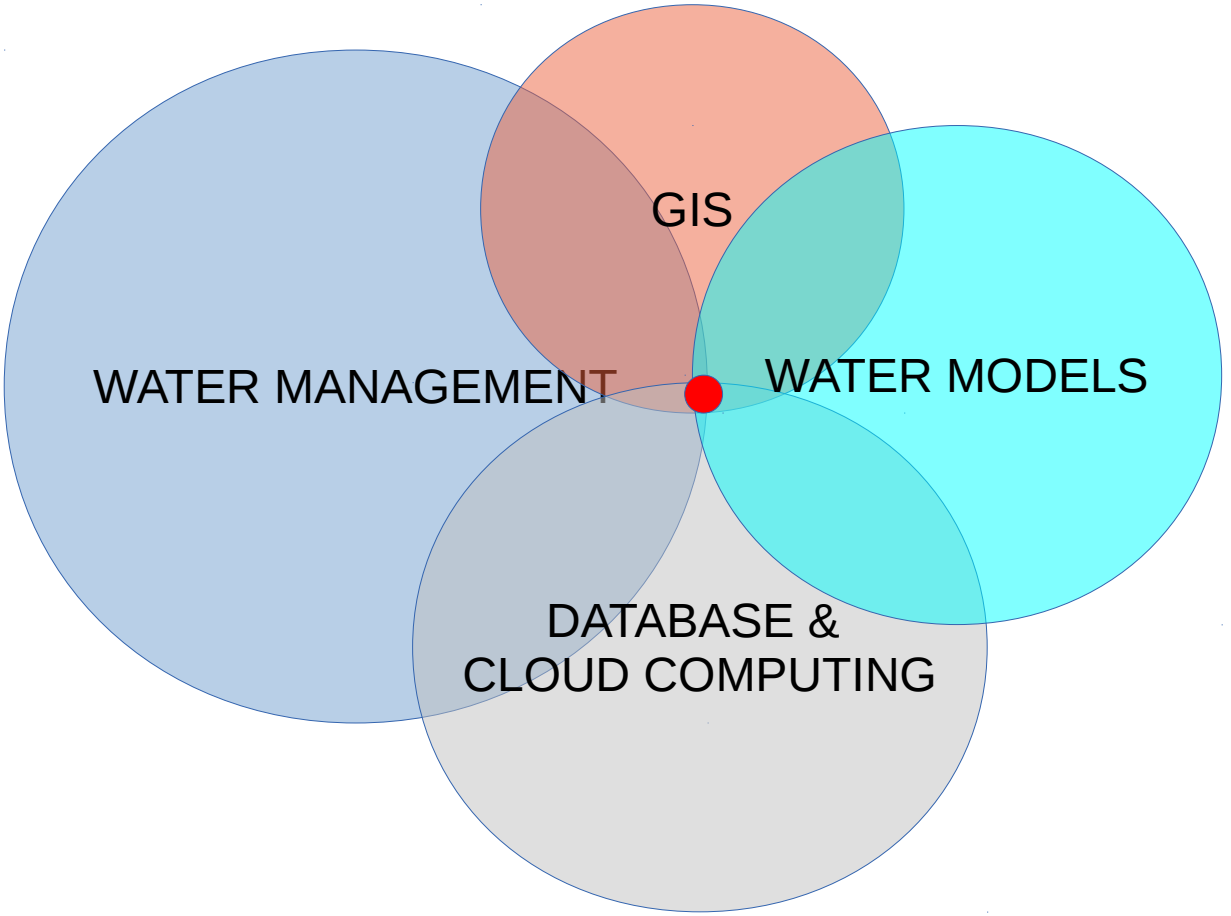
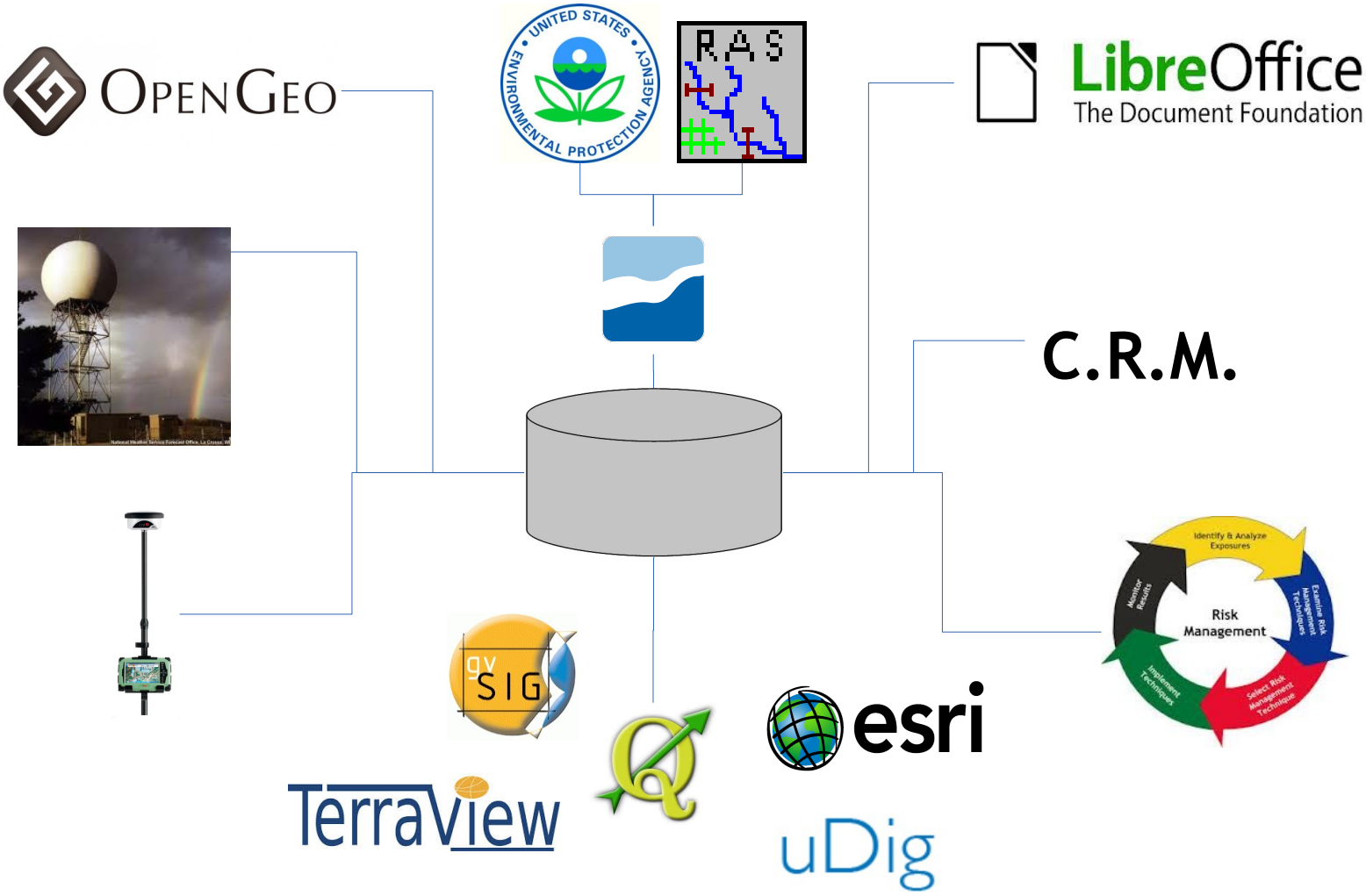
# 3. What is Giswater?



# 3. What is Giswater?



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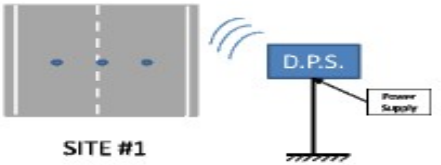






**Smart cities, smart countries, smart world**

# 4. Technical approach

Giswater is a wide software ecosystem with different technologies. The released versions are developed with:

- 'WATER' MODELS: EPANET, EPA SWMM, HEC-RAS
- GIS PROJECT: QGIS
- DATABASE STORAGE: PostgreSQL with spatial extension
- OPERATING SYSTEM: Windows XP / 7 / vista / 8.

# 4. Technical approach

## EPANET CAPABILITIES

- Places no limit on the size of the network that can be analyzed
- Models constant or variable speed pumps, with pumping energy and cost
- Allows storage tanks to have any shape (i.e., diameter can vary with height)
- Considers multiple demand categories at nodes
- Models pressure-dependent flow issuing from emitters (sprinkler heads)

- Models the age of water throughout a network
- Models reactions both in the bulk flow and at the pipe wall

# 4. Technical approach

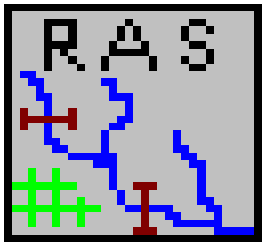
## EPA SWMM CAPABILITIES

- Networks of unlimited size
- Variety of standard conduit shapes
- External flows and water quality input
- Kinematic wave or full dynamic wave flow
-User-defined dynamic control rules

- Dry Weather flow  (DWF)
- Pollutants, (buildup, washoff, routing, reduction)

# 4. Technical approach

## HEC-RAS CAPABILITIES




Computer program that models the hydraulics of water flow through natural rivers and other channels.

Is one-dimensional (by the moment), meaning that there is no direct modeling of the hydraulic effect of cross section shape changes, bends, and other two- and three-dimensional aspects of flow.

Developed by the US Department of Defense, Army Corps of Engineers in order to manage the rivers, harbors, and other public works under their jurisdiction

# 4. Technical approach

## GIS INTERFACE

GIS O/S project

World wide comunity of users

Better than more propietary GIS software

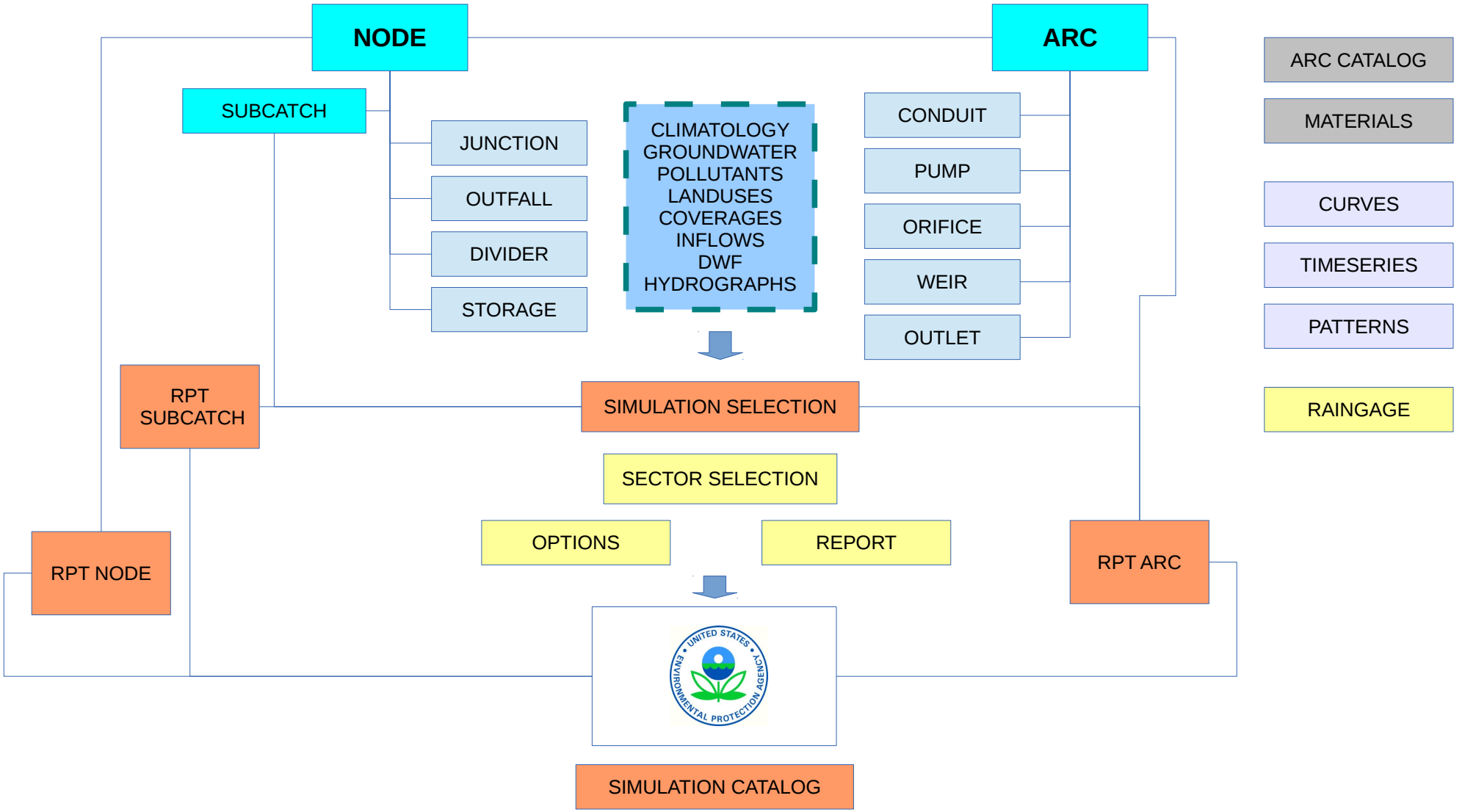
## DATABASE


+

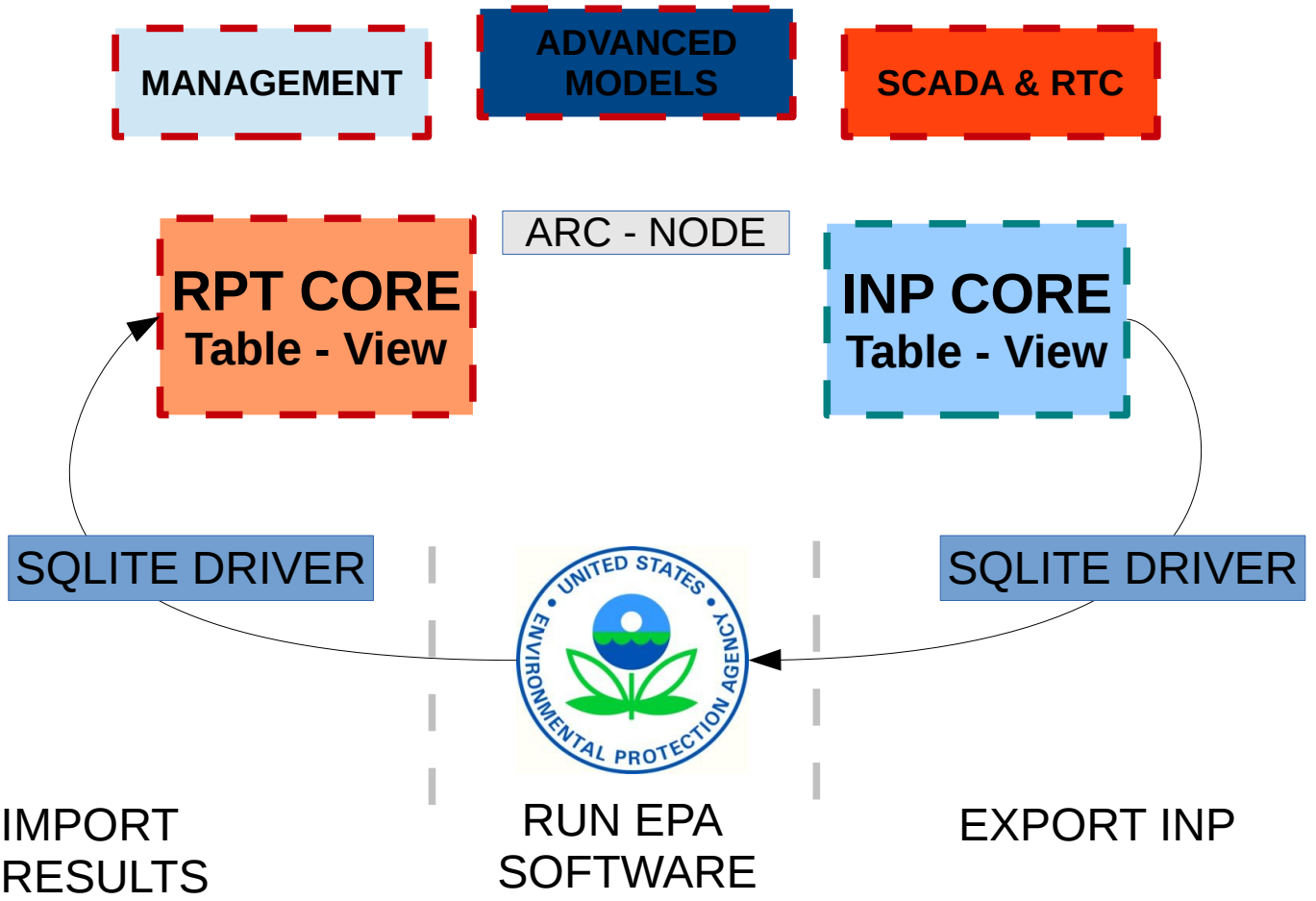

PostgreSQL: The World's Most Advanced

Open source database

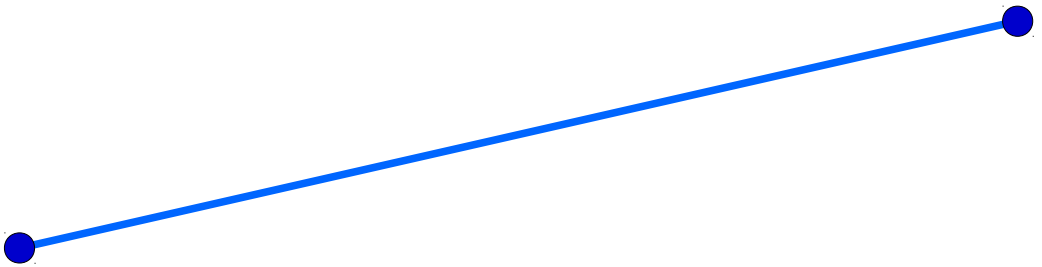
PostGIS OS4G project


NODE
ARC
SUBCATCH
JUNCTION
OUTFALL
DIVIDER
STORAGE
CLIMATOLOGY
GROUNDWATER
POLLUTANTS
LANDUSES
COVERAGES
INFLOWS
DWF
HYDROGRAPHS
CONDUIT
PUMP
ORIFICE
WEIR
OUTLET
ARC CATALOG
MATERIALS
CURVES
TIMESERIES
PATTERNS
RAINGAGE
RPT SUBCATCH
SIMULATION SELECTION
SECTOR SELECTION
OPTIONS
REPORT
RPT NODE
RPT ARC
SIMULATION CATALOG

# 4. Technical approach



# 4. Technical approach



# 4. Technical approach

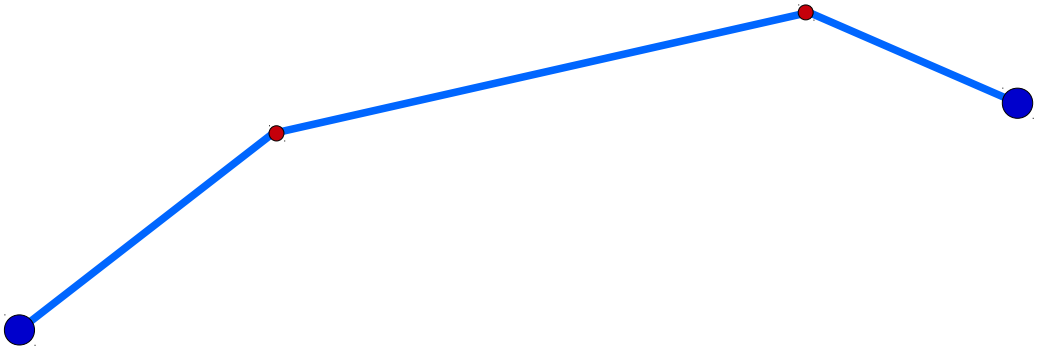
```
SELECT
node1.arc_id,
node1.node_1,
node2.node_2

FROM
    SELECT arc.arc_id,node.node_id AS node_1
    FROM epaswmm.arc,epaswmm.node
    WHERE(node.the_geom = st_startpoint (arc.the_geom))) node1,

    SELECT arc.arc_id, node.node_id AS node_2
    FROM epaswmm.arc, epaswmm.node
    WHERE(node.the_geom = st_endpoint (arc.the_geom))) node2

WHERE
((node1.arc_id) :: TEXT = (node2.arc_id) :: TEXT);
```

# 4. Technical approach



# 4. Technical approach

```
SELECT
nextval('epaswmm.inp_vertice_id_seq' :: regclass) AS id,
arc.arc_id,
(st_x(arc.point)) :: NUMERIC (16, 3) AS xcoord,
(st_y(arc.point)) :: NUMERIC (16, 3) AS ycoord

FROM
      SELECT
      st_dumppoints (arc.the_geom)).geom AS point,
      st_startpoint (arc.the_geom) AS startpoint,
      st_endpoint (arc.the_geom) AS endpoint,
      arc.sector_id,
      arc.arc_id
      FROM epaswmm.arc ) arc
JOIN  epaswmm.sector_selection ON arc.sector_id = sector_selection.sector_id
WHERE
arc.point < arc.startpoint OR arc.point > arc.startpoint AND
arc.point < arc.endpoint OR arc.point > arc.endpoint

ORDER BY id;
```

# 4. Technical approach

Node Results at 0:00:00 hrs:

| Node | Elevation m | Demand L/s | Head | Pressure |
|---|---|---|---|---|
| 1001 | 28.46 | 0.32 | [illegible] | 45.[illegible] |
| 1002 | 28.17 | 0.32 | 74.03 | 45.8 |

Link Results at 0:00:00 hrs:

| Link | Length m | Diameter mm | Flow L/s | [illegible]ocity m/s | Headloss /1000m | Setting | Reaction | F-Factor |
|---|---|---|---|---|---|---|---|---|
| 2041 | 63.05 | 110.00 | 1.12 | 0.12 | 0.16 | 150.00 | 0.00 | 0.025 |
| 2037 | 63.76 | 110.00 | 2.40 | 0.25 | 0.66 | 150.00 | 0.00 | 0.022 |

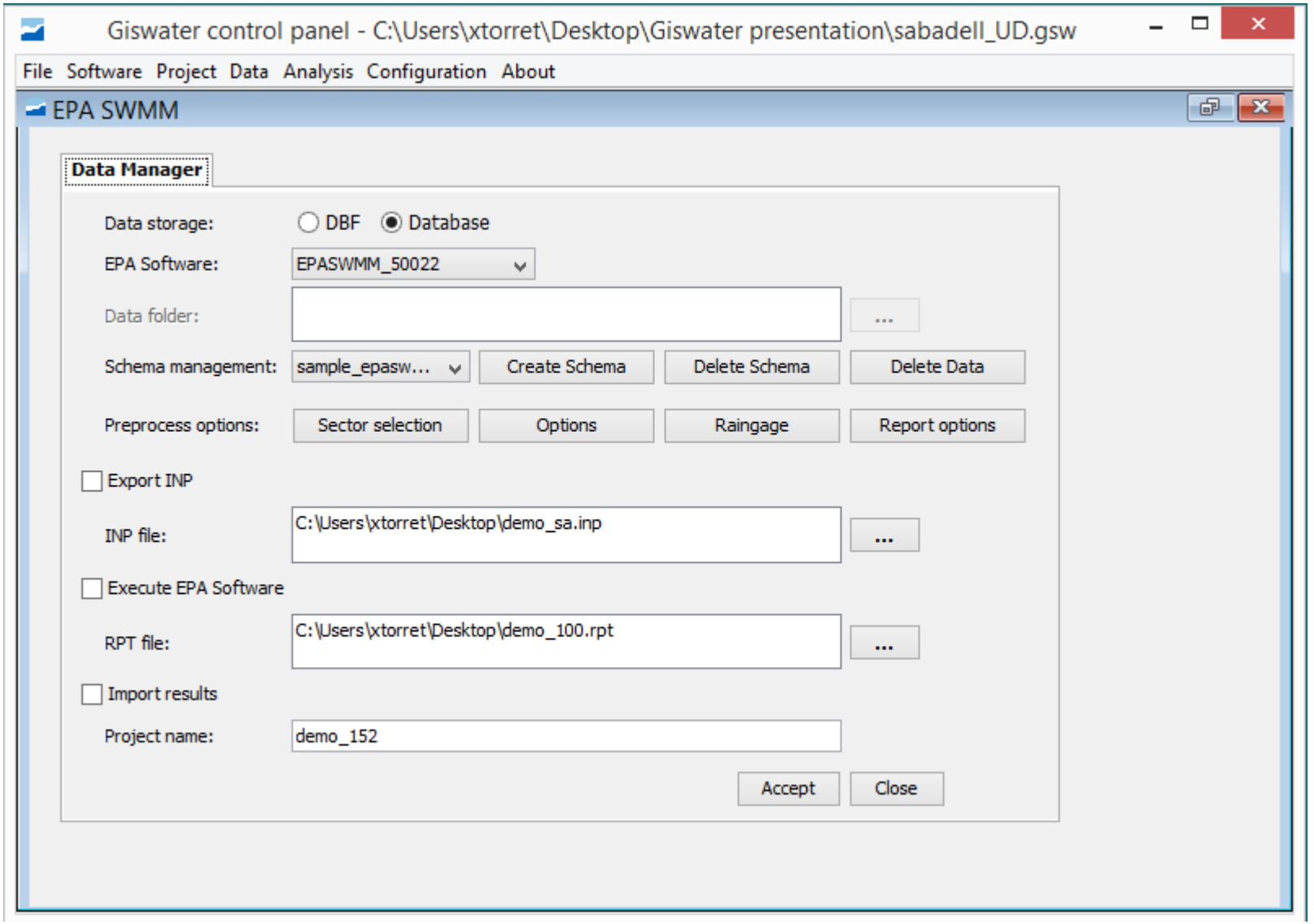
# 4. Technical approach

```
SELECT
node.node_id,
result_selection.result_id,
max(rpt_node.demand) AS max_demand,
min(rpt_node.demand) AS min_demand,
max(rpt_node.press) AS max_pressure,
min(rpt_node.press) AS min_pressure,
node.the_geom

FROM
epanet.node
JOIN epanet.rpt_node ON rpt_node.node_id = node.node_id
JOIN epanet.result_selection ON rpt_node.result_id = result_selection.result_id

GROUP BY
node.node_id,
result_selection.result_id,
node.the_geom

ORDER BY
node.node_id;
```


Giswater control panel - C:\Users\xtorret\Desktop\Giswater presentation\sabadell_UD.gsw
File Software Project Data Analysis Configuration About
EPA SWMM
Data Manager
Data storage:
DBF
Database
EPA Software:
EPASWMM_50022
Data folder:
...
Schema management:
sample_epasw...
Create Schema
Delete Schema
Delete Data
Preprocess options:
Sector selection
Options
Raingage
Report options
Export INP
INP file:
C:\Users\xtorret\Desktop\demo_sa.inp
...
Execute EPA Software
RPT file:
C:\Users\xtorret\Desktop\demo_100.rpt
...
Import results
Project name:
demo_152
Accept
Close

# Thank you

Source code: https://github/giswater/giswater
website: www.giswater.org

**Xavier Torret**
xtorret@giswater.org