IMPORTANCE OF OPEN SOURCE IN TEACHING GIS:

LET'S BUILD SOMETHING FROM SCRATCH

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why it's no longer enough to have only

Mainstream Proprietary Software Skills in GIS

"Professionalism is not the job you do, it's how you do the job"

- GIS has expanded significantly, and job requirements now often go beyond the capabilities of a single proprietary software package
- Customization and flexibility to innovation
- Interoperability and data integration between GIS and non-GIS applications/services
- Open data and open standard movement (especially in web GIS)
- Cost-effective way to scale systems
- Be able to build and maintain by your own (in-house)

GIS professional

Expectation vs Reality

Geospatial Intelligence Architect

I am geospatial intelligence architect specializing in GIS analysis, data visualization, and strategic decision-making. By turning complex spatial data into actionable insights, I drive innovation and optimize resource allocation across industries.
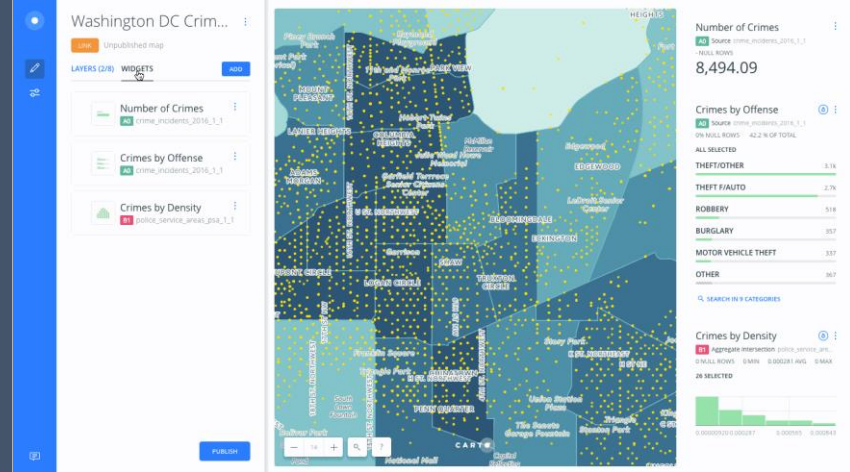
GIS professional

Expectation vs Reality

- create service that extracts last positions of vehicles from this non geographical table
- automatically get attributes from other tables after features are edited and then send email notification
- edit these features according to this specification using topological rules and these conditions
- periodically calculate statistics about field works, extract it as a geojson
- create feature editing form that contains field classifiers and calculates spatial intersection on the fly
- connect this feature service with Power BI reports and make it work fast
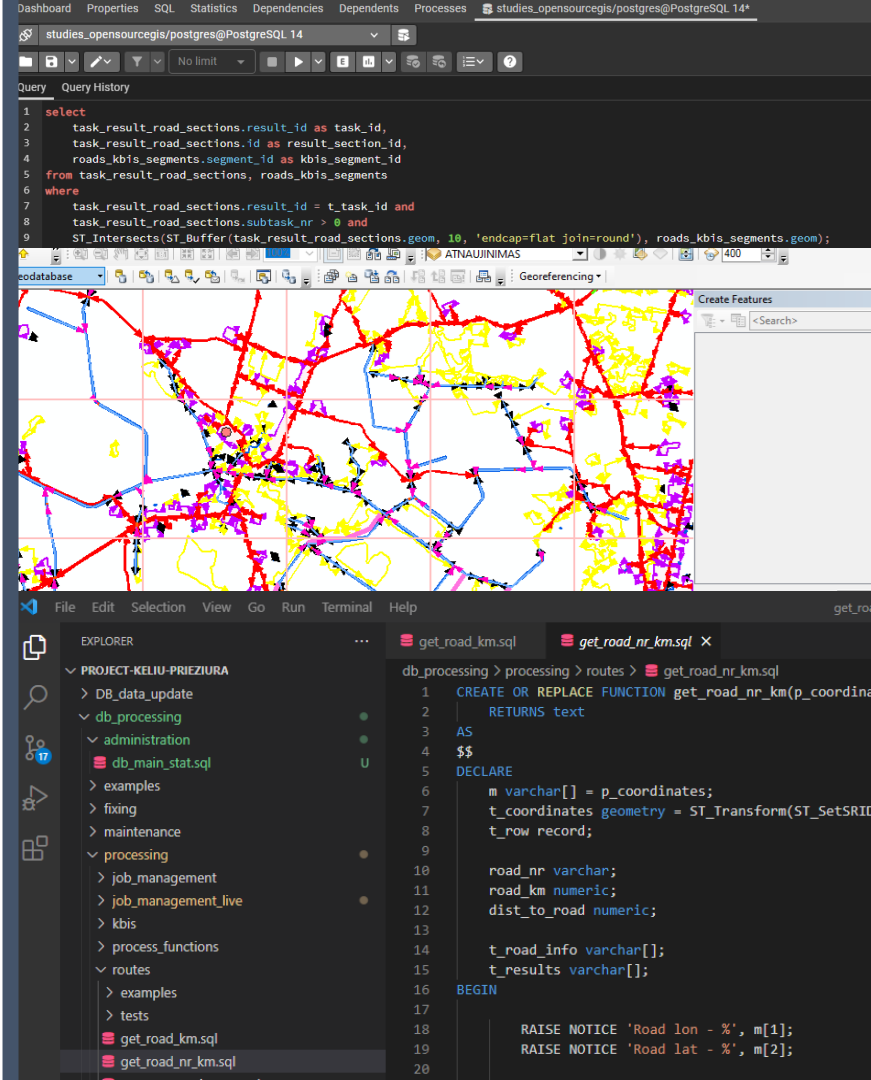
Mainstream proprietary GIS software - how this happens?

Standard list of conference speakers in annual proprietary GIS software conference

Centre of Registers

Lithuanian Post

State Data Agency

Vilnius Plan

Tartu City

Military Cartographic Centre

State Office for Protected Areas

Kaunas Plan

Agricultural data centre

RB Rail AS

Litgrid

Inland Waterways Authority

By the way: conference was very interesting

Mainstream proprietary GIS software - how this happens?

Teacher perspective

- High demand in the public sector and aim to provide students with skills and knowledge relevant to this sector
- Established partnerships for tech. support, training materials and other resources
- Perceived simplicity and user-friendliness, especially when it comes to more complex parts such as publishing services or building apps

Student perspective

- Needs of public sector in job market
- Perception of market dominance
- Lack of awareness or exposure
- Introduced at an early stage of their GIS education

Let's teach only mainstream GIS

What can possibly go wrong?

"Hi, we are creating business application and we need a map solution that could be scaled and be cost effective"

Why it's not good idea

- Teaching GIS using proprietary GIS software only, may unintentionally limit students' exposure to alternative tools and approaches
- High costs and accessibility issues in real life business scenarios
- Vendor lock-in, what businesses try to avoid
- Limited flexibility and customization resulting in limited abilities to experiment, modify, and adapt GIS tools to meet specific project requirements
- Limitations for use in different development environments

What can it end up with
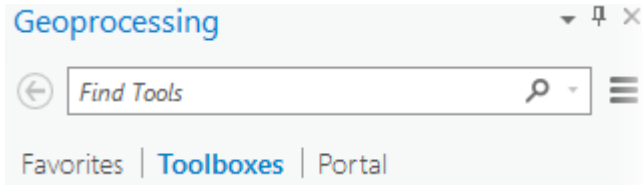
Buttons clicker

and that's ok for specialist, but not for student graduated in GIS
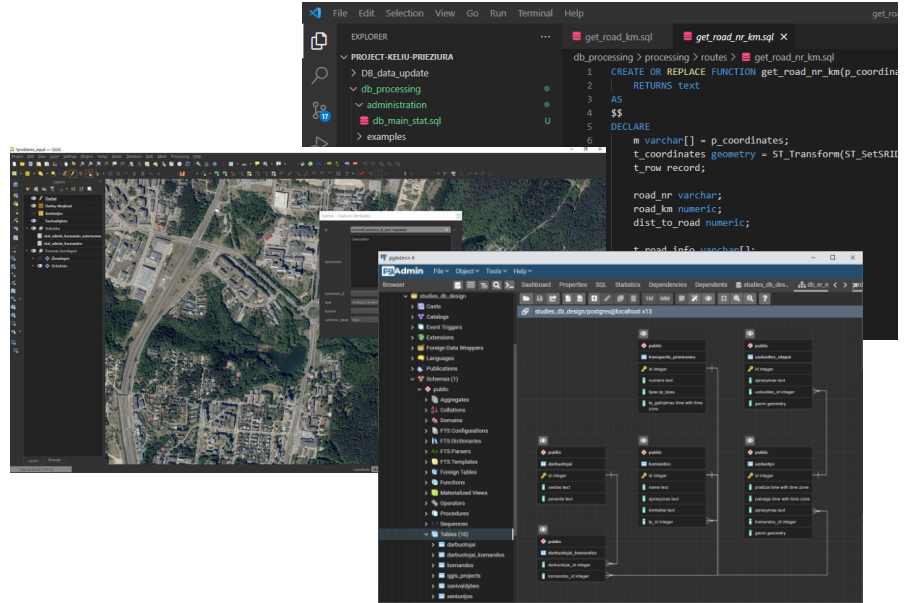
vs

Problems solver

understands GIS as a system not as a software

Biodiversity Information Platform

- More than 5 systems (and still growing) using the same open source GIS stack

- One data storing stack using PostgreSQL and PostGIS

- One data publishing stack using QGIS server

- One map viewer solution for web and mobile based on OpenLayers and vue js

- Extensively use of QGIS server custom WMS filters as well WFS filters (this works as API)
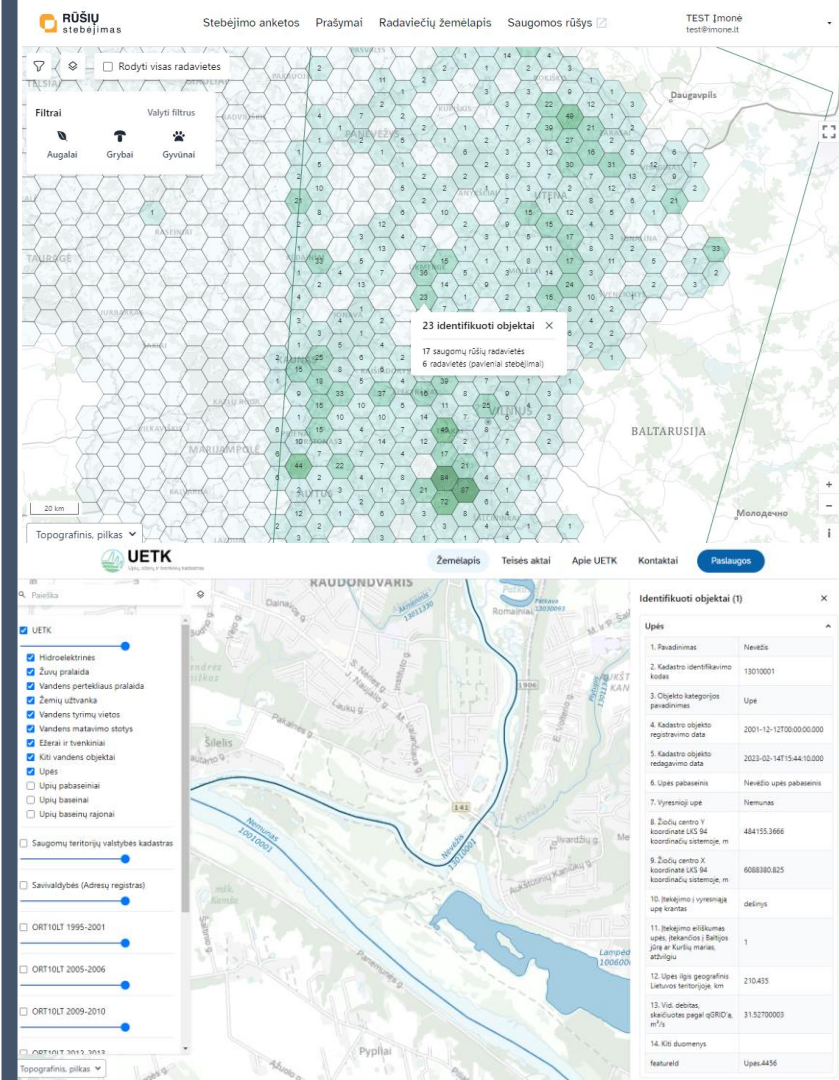
MoveIS - smart bus management system

- All the logic of real time data processing and publishing implemented in PostgreSQL and PostGIS
- No need for GIS server. PostGIS functions provides geojson for API
- Vector tiles for basemap
- MapLibre and vue js for building map viewer

teaching to understand GIS as a system by

Building GIS Solutions from Scratch

What we teach/learn?

Spatial
DB

Desktop
GIS

Mobile
GIS

WEB
SYSTEM

What we teach/learn?

1. Open source software, how it differs from commercial software, licensing, main open source trends and applications in GIS, main open source GIS projects. Desktop, mobile, web development using different server side technologies, solution architecture using specific open source GIS projects.

What we teach/learn?

2. PostGIS spatial database management system, key aspects of data collection, management and analysis.

- Installing PostgreSQL and PostGIS
- PostGIS database preparation
- Creating PostGIS database users, configuring their permissions, saving different QGIS projects in the database
- Creating data selections, spatial queries and data views using SQL
- Joining tables for information and statistics using SQL
- Database administration

What we teach/learn?

3. Spatial data management process, map creation and publishing using QGIS and QField.

- Project settings
- Loading different data sources and services
- Editing data, creating editing forms
- Data visualisation, notes, charts
- Rule based styling
- Data queries, join layers
- Creating and saving a map layout for printing

What we teach/learn?

4. Publishing spatial data using QGIS Server, types of e-services, sharing e-services.

- Introduction to QGIS server. As well GeoServer and other publishing possibilities
- Prepare map project for publishing
- Different services types and how to access them
- Where to use these services (provide to geoportal, add into QGIS and map applications)

What we create?

GIS for an enterprise that manages infrastructure and requires an information system to automate the work management and provision processes.

1. System Requirements Analysis Document
2. PostgreSQL + PostGIS based enterprise GIS database
3. QGIS projects for different users of organization: for data entry and data viewing
4. WEB map for data accessibility
5. Mobile GIS version for data entry

What will you create next?
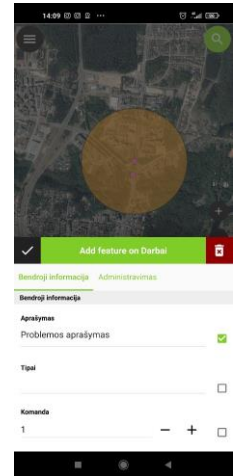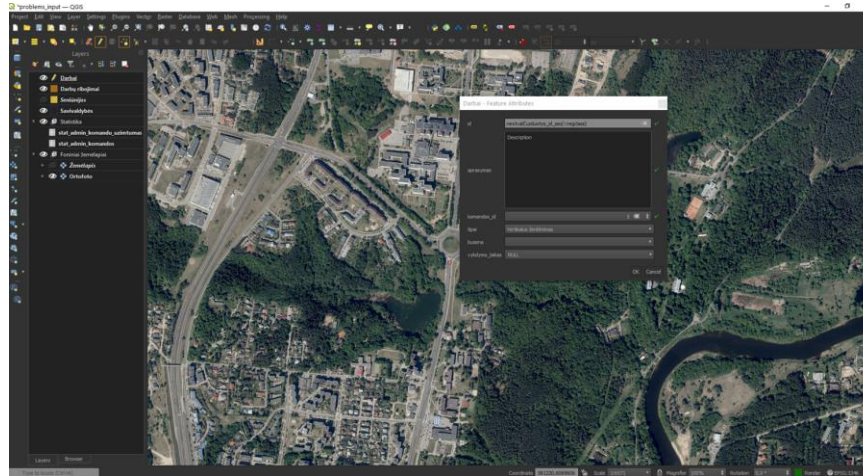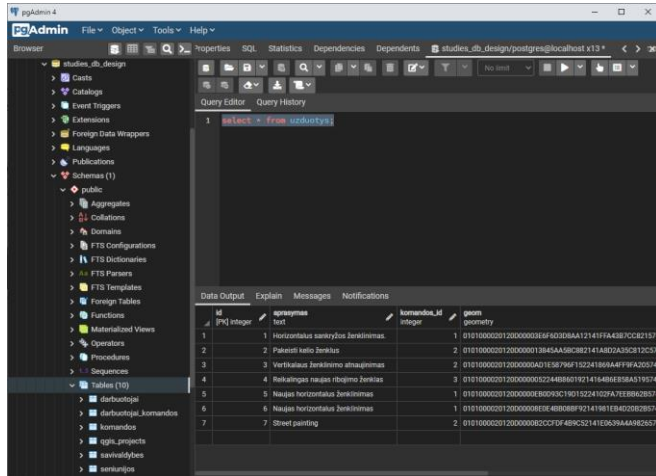
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