

NodeGIS: A Container-based Web GIS Application Development Tool

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The Fifteenth International Conference
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Systems, Applications, and Services

Regarding the presenter



- **Mateus Queiroz Cunha**

- Master's student in Computer Science (UFCCG)
- Researcher and developer at Information Systems Laboratory (LSI/UFCCG)
- Topics of interest:
 - Geoprocessing and GIS
 - Natural Language Processing

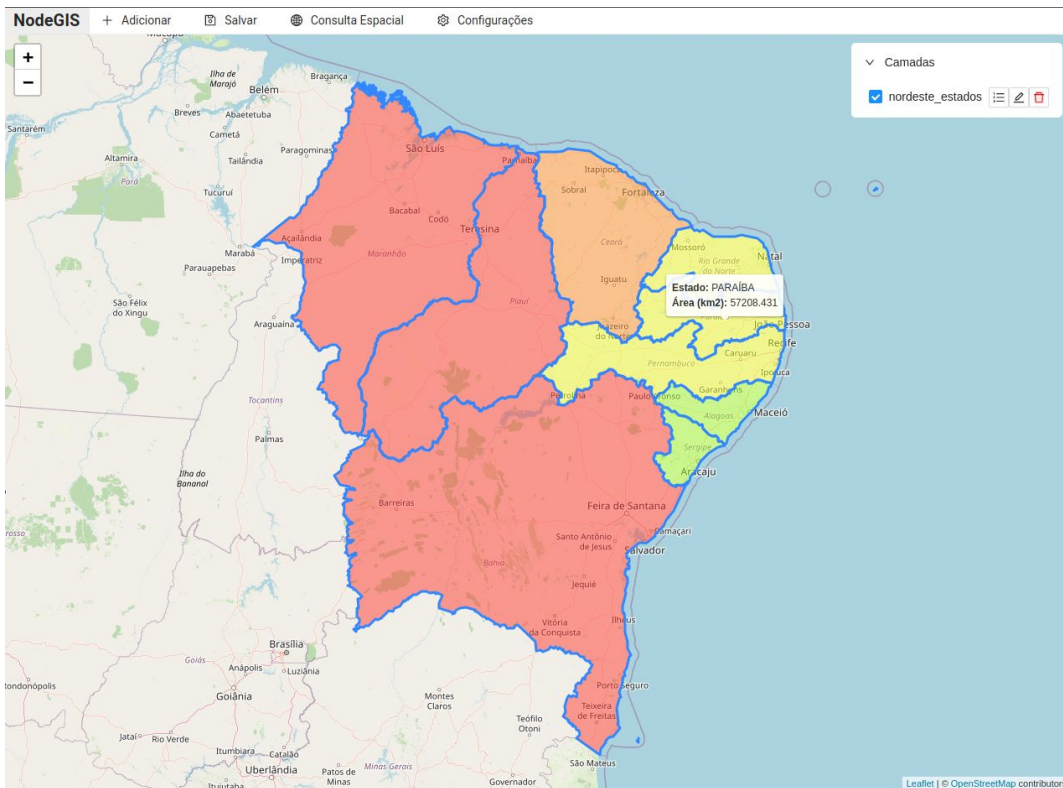




- Ubiquity of spatial information in current applications
- Promoting the development of Web Geographic Systems (Web GIS)
- Many highly capable solutions, associated with a diverse complexity
- Users need to address their domain-specific challenges associated with the complexity of GIS tools.

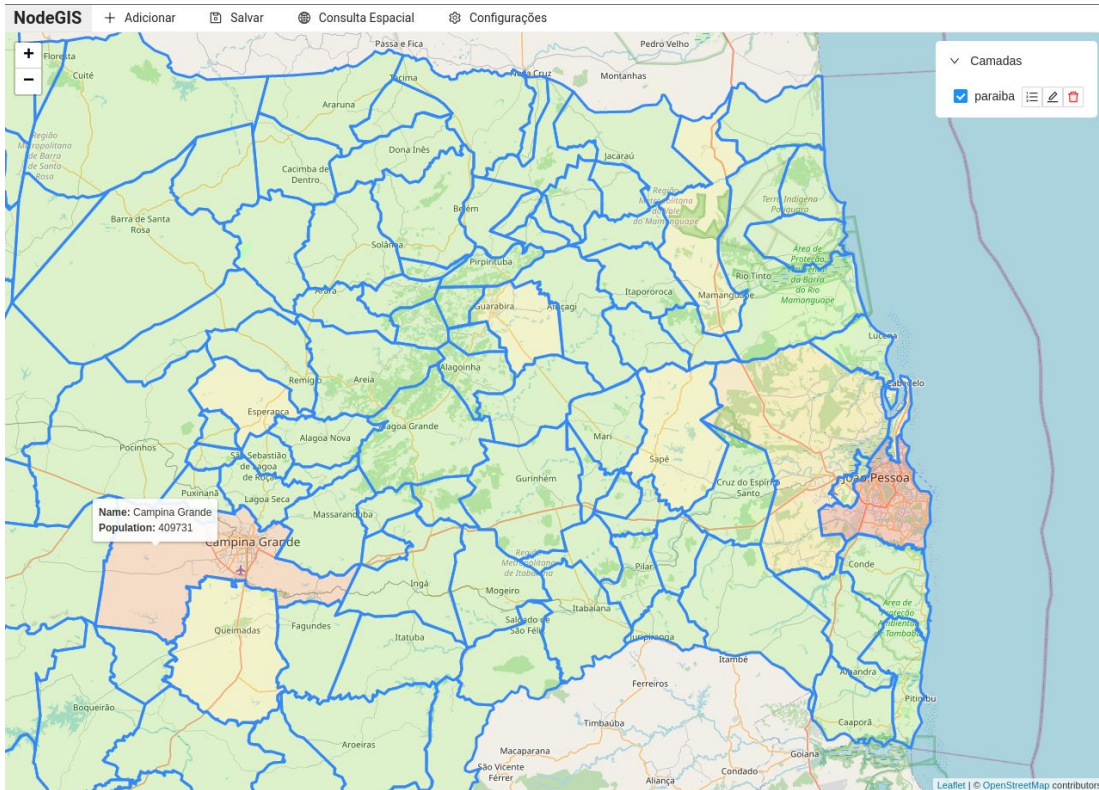
Motivation:

There is a need for a solution that simplifies the process of building Web GIS applications.



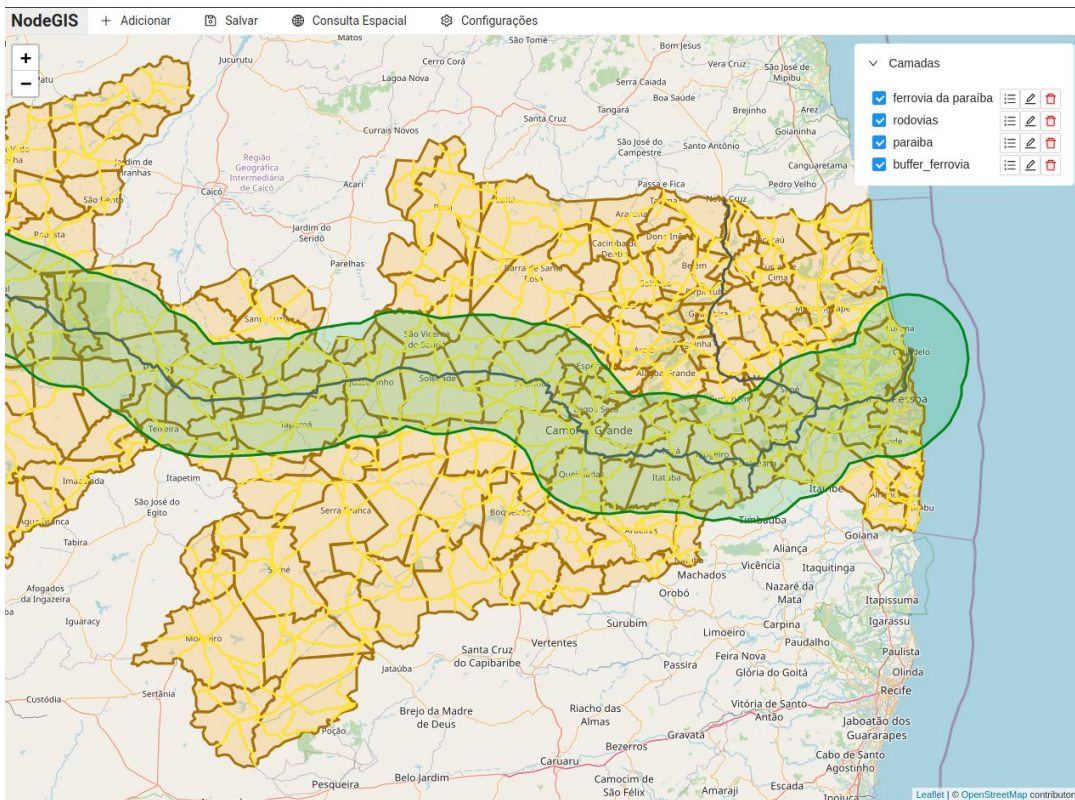
- Graphical interface for developing Web GIS;
- Easy deployment, no complex server configurations;
- Desktop GIS experience;
- Open-source;
- REST and container-based architectures.

Main Features

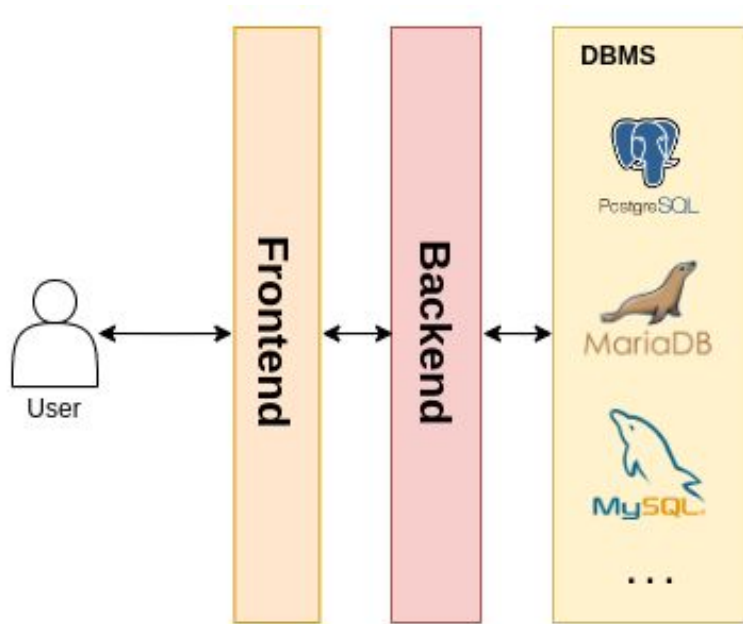


- Addition of vector layers;
- Customization of map layers;
- Overlay;
- Zooming;
- Panning;
- Tooltip;
- Conventional and spatial queries;
- Construction of thematic maps;

Main Features

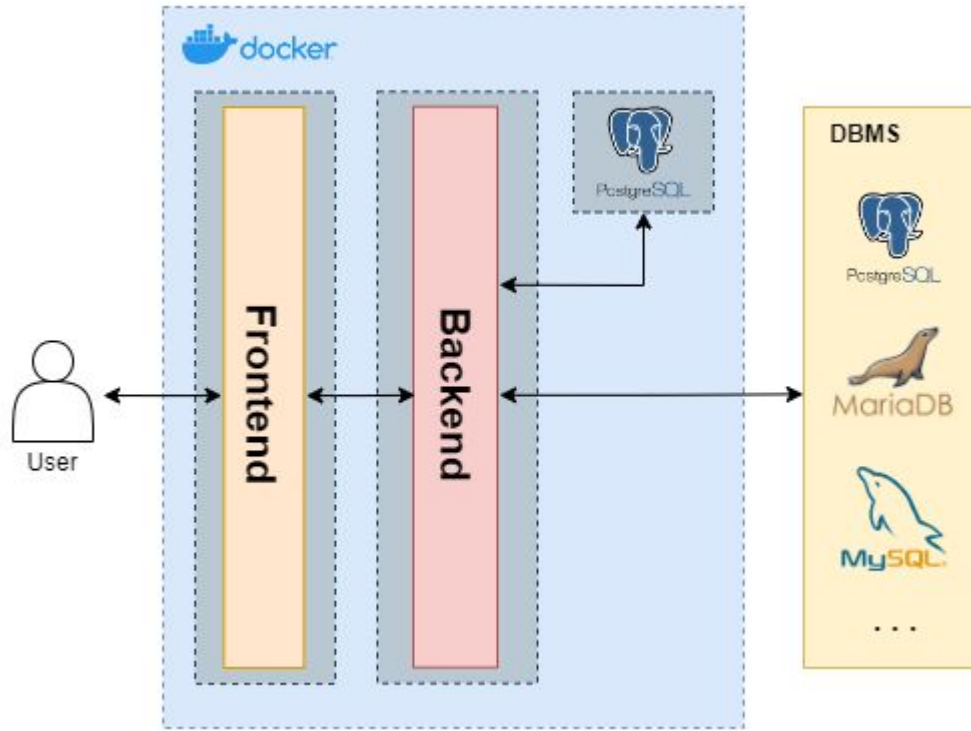


- Interactive spatial queries on the map;
- Search for map features;
- Use of multiple spatial databases;
- Visualization of data in table format.



- REST Architecture segmented into frontend, backend and DBMS;
- Frontend: React, Leaflet, MobX e Axios;
- Backend: express, SQLite instance and NodeJS database clients;
- Supported DBMS's:
 - PostgreSQL + PostGIS;
 - MySQL;
 - MariaDB;
 - SQLite + SpatiaLite;
 - CockroachDB.

Architectural Design



- Containerization (Docker);
 - *Frontend*;
 - *Backend*;
 - SGBD (optional);
- Deployment configuration scripts.

Usage of NodeGIS – Adding Vector Layers



The image shows a 'Add New Vector Layer' dialog box overlaid on a map. The dialog box has a title bar with a close button (X). It contains three main sections: 'Table' with a dropdown menu showing 'paraiba'; 'Layer Name' with a text input field containing 'paraiba'; and 'Geometric Column' with a dropdown menu showing 'geom'. Below these sections are two expandable options: '> Tooltip' and '> Layer Style'. At the bottom right are 'Cancel' and 'Add' buttons.

Add New Vector Layer [X]

Table

paraiba [v]

Layer Name

paraiba

Geometric Column

geom [v]

> Tooltip

> Layer Style

Cancel Add

Usage of NodeGIS – Adding Vector Layers



▼ Tooltip

+ New Column

Column	Label
nome	Name
pop_estim	Population

< 1 >

▼ Layer Style

Style Type

☒ Static ☐ Thematic

Line Opacity

1.0

Fill Opacity

0.2

Stroke Width (px)

3

Stroke Color

Fill Color

Usage of NodeGIS – Spatial Queries – Map Selection



Spatial Query - From Selection

Operation

Distance

Returns the smallest distance between geometries A and B.

Select A

Select B

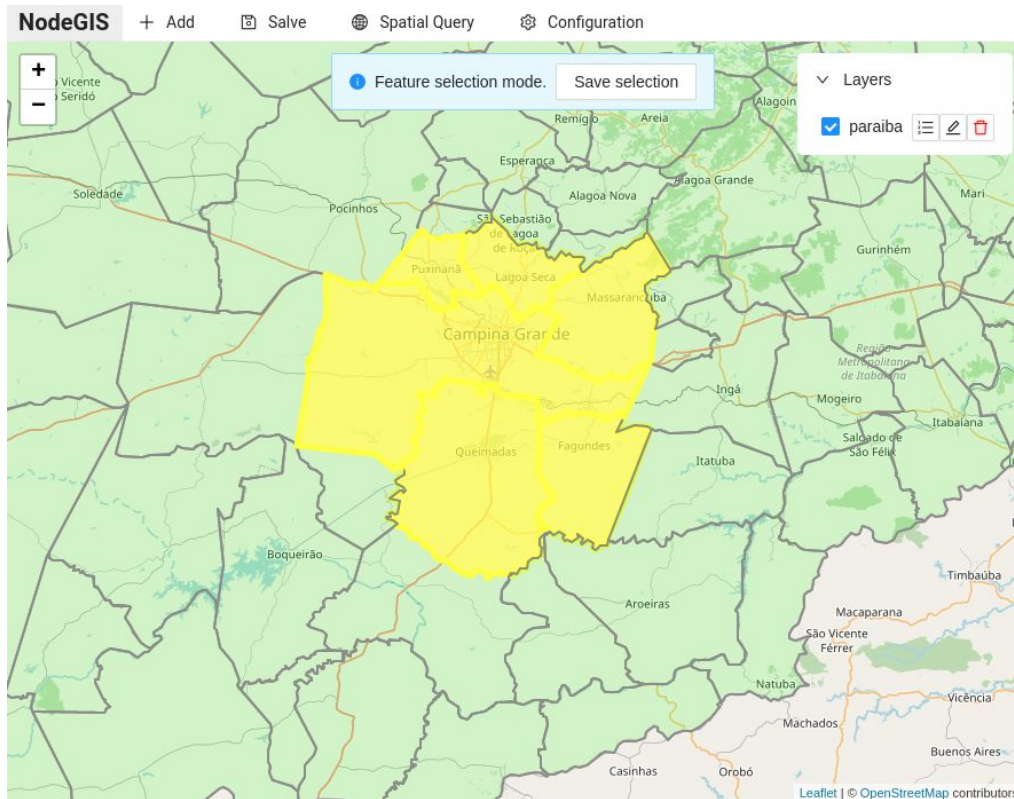
Query Result

dist_km: 416.31153089082005

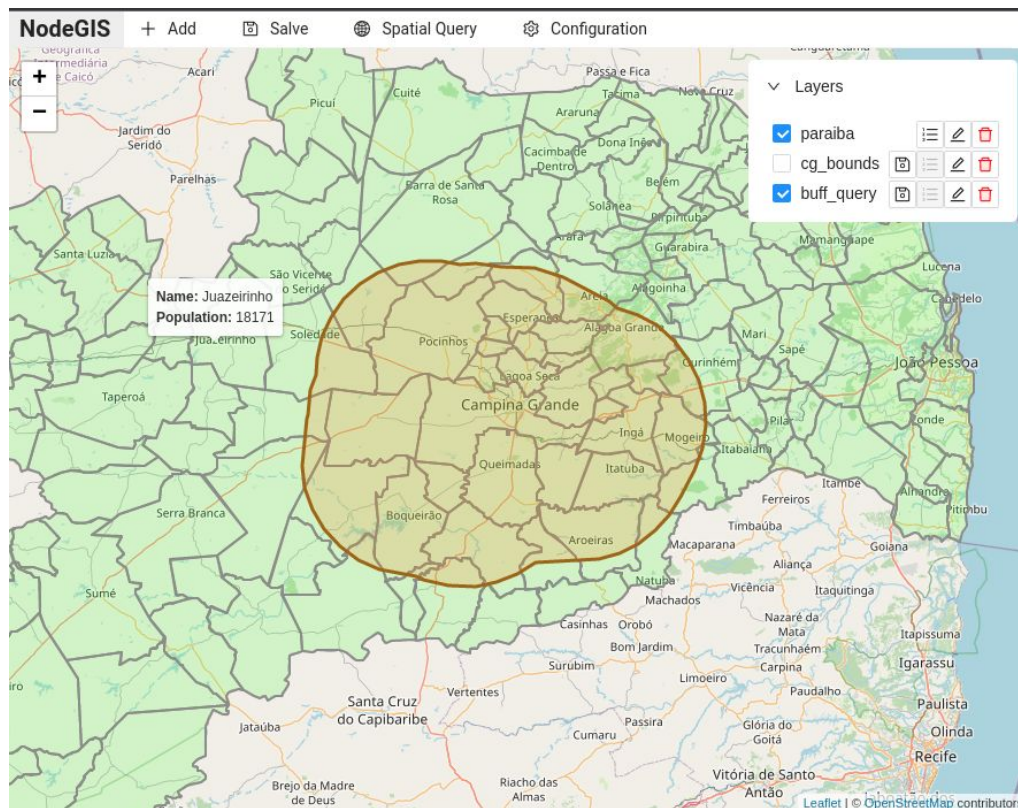
Close

Query

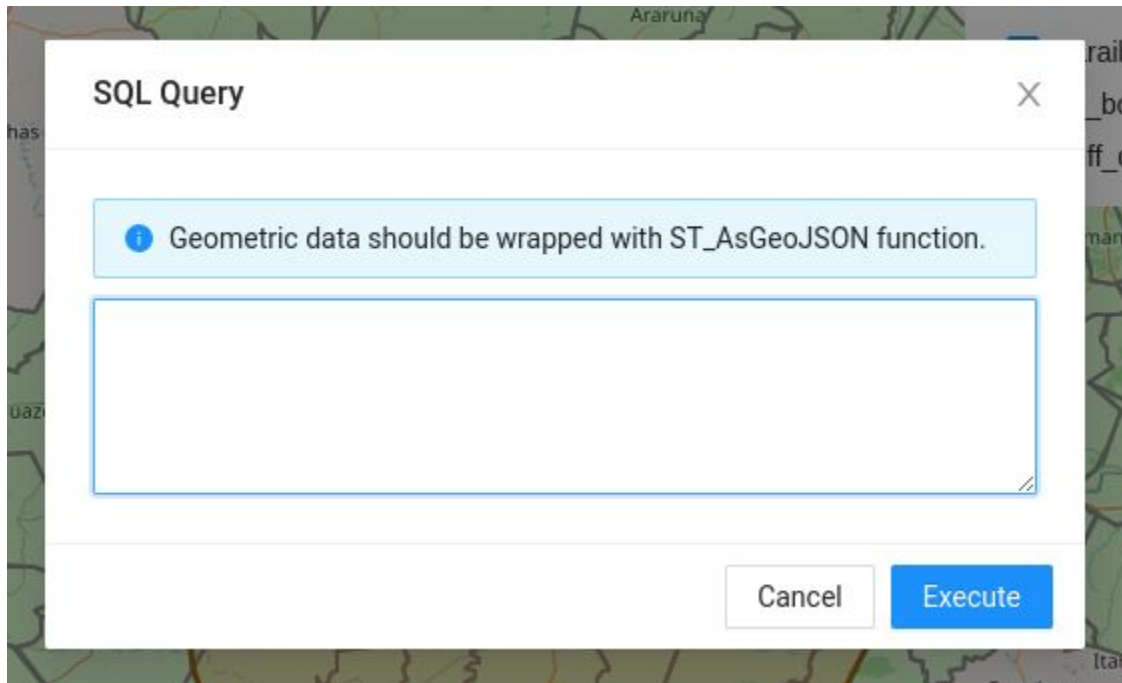
Usage of NodeGIS – Spatial Queries – Map Selection



Usage of NodeGIS – Spatial Queries – Map Selection



Usage of NodeGIS – Spatial Queries – SQL



- NodeGIS allows users to create Web GIS applications in a facilitated way;
- Easy to use interface, bringing a Desktop GIS experience to a Web GIS application;
- Users can focus on domain-specific challenges instead of dealing with deployment or application usage issues;
- Can be used to teach GIS without requiring software installation from students.

- Simple features:
 - Table editing, data exportation, multimedia data association;
- Complex features:
 - 3D visualizations;
 - Point cloud;
 - Raster.

Thank you!

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