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InternaSUS: A Brazilian Public Health Geospatial Surveillance Platform

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Motivation

In the context of health, there is a growth in stored and generated data from health facilities. A large body of health data can provide relevant information, and can be applied to benefit public management. However, it can be a difficult task to analyse these data because of its size and complexity. In this project, we worked in collaboration with the São Paulo Municipal Health Secretariat (SMS-SP) to develop a surveillance platform for large scale data processing that enables data visualization analysis of different Hospital Information System databases (SIH-SUS).

Dataset

According to the 2013 National Health Survey (PNS), performed by the Brazilian Institute of Geography and Statistics (IBGE), 80% of the Brazilian population is dependent on SUS. The SUS datasets (such as SIH-SUS) becomes vital to the awareness of the health situation in Brazil.

Each hospitalization data at the SIH-SUS database contains information about many things, such as:

- The patient location, age, diagnosis, etc.
- The health facility he was admitted, its location, administration, etc.

The software we are developing uses the data structure shown in Figure 1.

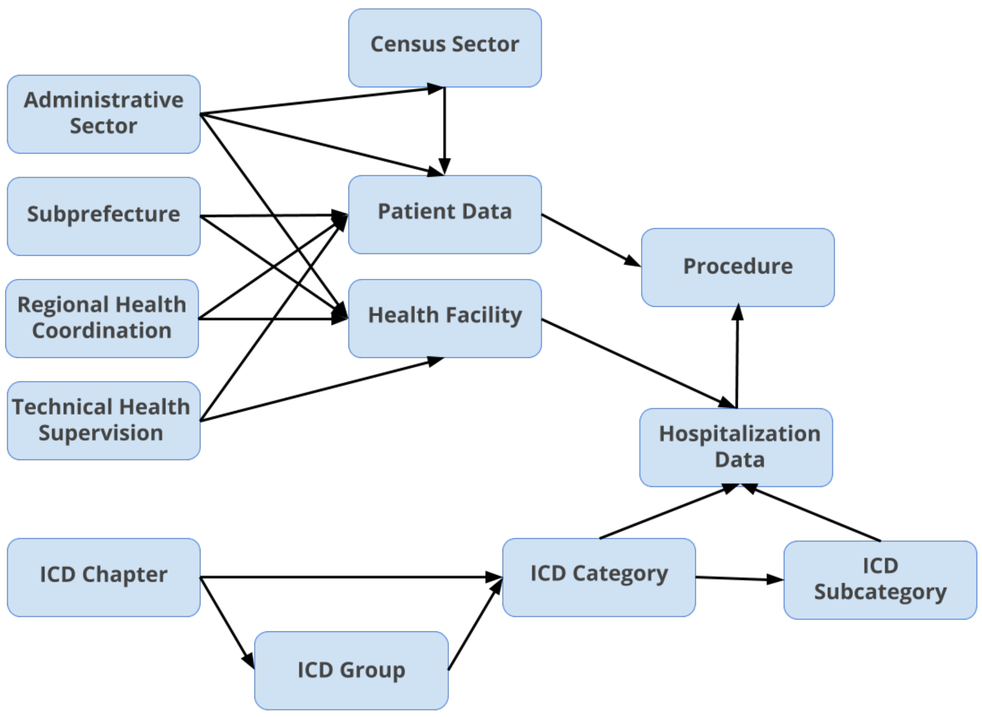

Figure 1: InternaSUS domain model for the SIH-SUS dataset.

The architecture

The implemented architecture aims to deal with any SIH-SUS dataset, making possible the analysis of public hospitalizations from any region of Brazil.

The use of microservices could be a good solution to adapt the platform to different databases. However, we faced two big problems through this solution:

- Public entities will not sustain multiple teams to manage the platform like companies do, and microservices usually ask for it.
- The limited available resources at public entities might be a infrastructure bottleneck for microservices implementation.

The final architecture intends to bring benefits over a monolithic version, and overcome the microservices disadvantages. To suit these conditions, the software design pattern Model–View–Controller (MVC) was selected as the core of the platform.

The InternaSUS Platform

Through this platform, the user can evaluate the health situation of specific areas, also the hospitalizations distribution on the map over the time, the area, the diagnosis, and over many others variables. Figure 2 shows a good usage example.

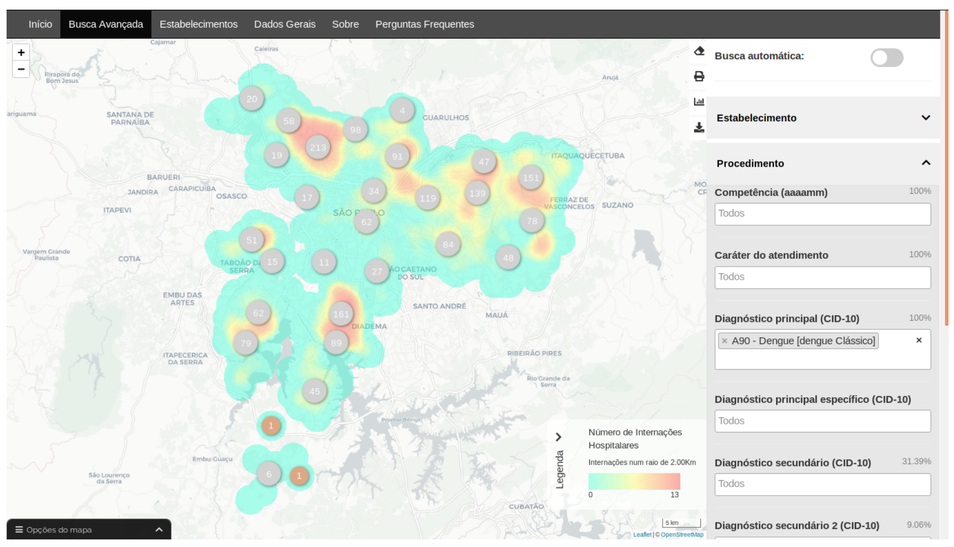

Figure 2: InternaSUS platform displaying the hospitalizations due to dengue, in 2015.

The user could also be aware of the distance traveled by the patient to be hospitalized. Figure 3 presents the distribution of patient serviced by a specific hospital.

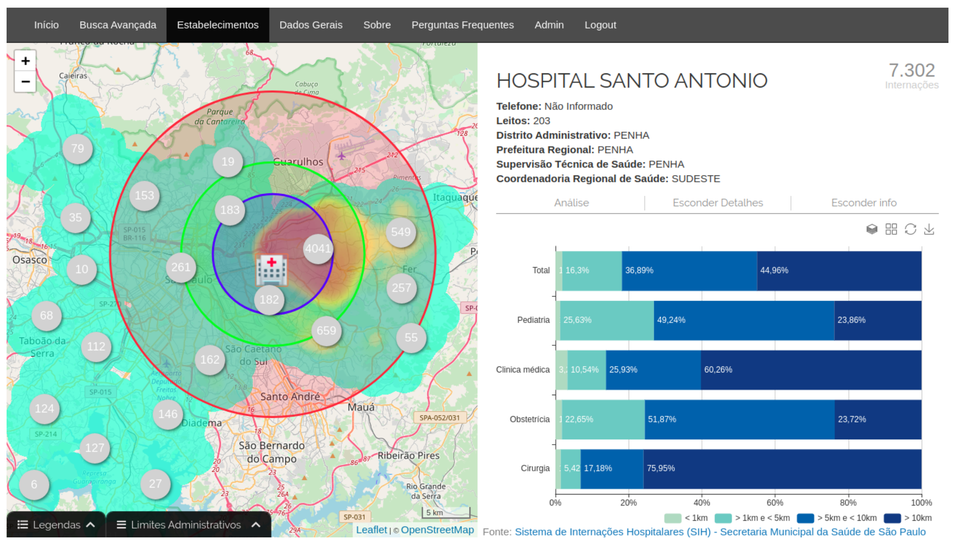

Figure 3: Health facilities page displaying Hospital Santo Antonio informations.

As a result, this rich platform could produce good evidences to establish eficient health policies in the country.

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