Emerging Health Threats Journal 2011, **4**:s129. **doi:** 10.3134/ehtj.10.129

www.eht-journal.org

ABSTRACT

EpiScape: a map generation service for spatial temporal visualization

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Objective
This paper describes EpiScape, our map generation service. It generates three-dimensional static or animated maps as Keyhole Markup Language (KML) files that can be used to display epidemiologic data over time and space using Google Earth or Google Maps software.

Introduction
The KML format has become a recognized standard for the distribution of geographic information system data.[1] In most recent versions of the Real-Time and Outbreak Disease Surveillance (RODS) system, we standardized on KML as our mapping solution. This decision obviates the need for commercial GIS servers and clients, and permits users to easily overlay RODS map output with other websites and software that output KML, for example, EPA, NASA, and NOAA.

We quickly recognized that the mapping tools in RODS have broad applicability in public health and other domains where there is a requirement to display spatial temporal data as it relates to state, county, and zip code geographies. To facilitate these needs, we created the EpiScape map generation service for public use.

Methods
EpiScape comprises a spatial database, map generation server, and Google Earth. We utilize the open source PostgreSQL database to store the spatial data. The map generation server is implemented in Java Enterprise Edition and makes significant use of the PostGIS Java libraries. The

Figure 1 Stores monitored by the National Retail Data Monitor for over the counter medication sales aggregated by county as of 22 April 1999.

client for viewing the output of the EpiScape service is Google Earth. Both free and commercial versions of Google Earth are compatible with the EpiScape output.

We programmed the map generation server so that users can define the:

- title for their map
- spatial or spatial temporal data
- labels for each geographic area
- the number for bins and binning method
- a color scheme
- a map type
- transparency levels
- the magnitude of the three-dimensional effect
- the degree of detail for polygons

The service is accessible from a web page or through an http-based application programming interface (API) (API documentation is available at http://betaweb.rods.pitt.edu/wiki/index.php/KML_Generator). For confidentiality, the service deletes map data immediately after the users download their file. In addition, the source code for the service is available from the RODS Open Source Project.

We deployed the EpiScape service on the Apache Tomcat Servlet Engine and Apache web server. The service utilizes SSL encryption when transferring data to and from the user. We loaded the PostgreSQL database with state, county, and zip code tabulation area polygon data from the United States Census.

Results

We use the EpiScape service as the map generation tool for multiple software projects at our laboratory. These projects include the RODS system, National Retail Data Monitor, and Allegheny County influenza monitoring system. Figure 1 is an example map from the EpiScape service showing the number of stores monitored by the National Retail Data Monitor by county.

Conclusions

The EpiScape map generation service has become an indispensable tool at our laboratory. Its web accessibility makes it easy for users to create high quality maps with minimal effort. As it has a web-based API, we have been able to easily incorporate it into other software projects. We hope that users outside our laboratory will find it useful.

Acknowledgements

This paper was presented as a poster at the 2010 International Society for Disease Surveillance Conference, held in Park City, UT, USA on 1–2 December 2010.

Reference

1 http://www.opengeospatial.org/standards/kml/.