

LEARNING POSTGIS USING SQLTUTOR

Martin Landa¹, Ales Cepek²

¹CTU in Prague, Faculty of Civil Engineering, Prague, Czech Republic, martin.landa@fsv.cvut.cz

²CTU in Prague, Faculty of Civil Engineering, Prague, Czech Republic, cepek@fsv.cvut.cz

Abstract

GNU Sqltutor is a web based interactive tutorial of Structured Query Language (SQL). Sqltutor is implemented on the top of a relational database system PostgreSQL. The project consists in part of a C++ program released under the GNU General Public License. The sqltutor program is a CGI script that selects SQL questions from its database, checks the answers and evaluates the final score. The second part of the project is a free collection of SQL questions and answers representing SQL tutorials.

The aim of the paper is to describe geospatial-enabled version of Sqltutor as a web based interactive tutorial of PostGIS. This version of Sqltutor is able to process spatial SQL queries and to display results in tabular or graphical form. Sqltutor also comes with a collection of spatial-oriented SQL questions and answers in the frame of spatial SQL tutorials based on OpenStreetMap data.

1. GNU Sqltutor

GNU Sqltutor (<http://www.gnu.org/software/sqltutor>) is a web based interactive tutorial of *Structured Query Language* (SQL). Sqltutor has been originally developed by Ales Cepek in 2007 at the Czech Technical University in Prague (CTU). The aim of the project was to create a simple and user-friendly tool for teaching SQL language which could be used in the database-oriented courses at the CTU, namely in the study branch Geodesy and cartography (Cepek A., Pytel J. 2009). The project was partly inspired by an interactive tutorial SQLzoo by Andrew Cumming from the School of Computing, Napier University, Edinburg, UK. Later, in 2009, Sqltutor has become an official GNU project, and it's released under the GNU General Public License (GNU GPL) and is copyrighted by the FSF.

Sqltutor's interface is implemented as a CGI script *sqltutor* in C++ programming language which *randomly* selects SQL questions from its database (the project is based on the relational database system PostgreSQL), checks the answers and evaluates the final score.

The hart of the project is a free collection of SQL questions and answers represented as *datasets*. Datasets are grouped in *tutorials*. Currently two basic tutorials are distributed with Sqltutor – “SQLtutor” (in Czech) and “SQLzoo” (in English) with a bunch of the datasets. Sqltutor enables to run

one or more tutorials in different languages from a single database. Datasets can be shared by different tutorials. The SQLzoo tutorial is based on the collection of SQL questions and answers and datasets from <http://sqlzoo.net>.

Sqltutor dialog consists of three main pages: *opening dialog*, *tutorial* and *final evaluation page*. The dialog is designed to be as simple as possible and is based on the very basic HTML construct so it hopefully should run safely on any web browser. First, a tutorial must be selected from the opening page and started (fig. 1).

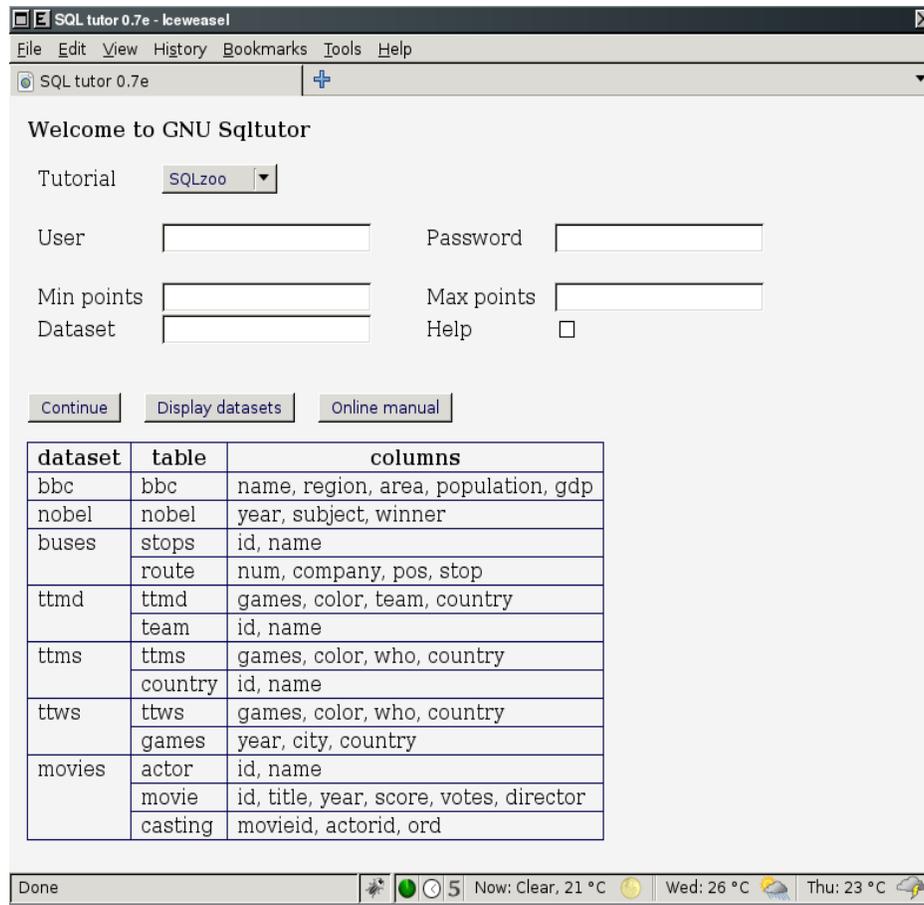


Figure 1. Opening dialog – display datasets for the given tutorial.

A series of tutorial questions follows in a simple tutorial dialog (fig. 2). Each question registered in the tutorial database has a point evaluation. Trivial questions are rated by 1 point, nontrivial questions can have by a convention point rating up to 15 points. For each question one or more correct answer is stored in the database. Sqltutor selects questions in a random manner, starting from easy ones to nontrivial.

When finished Sqltutor displays final evaluation with the review of all questions asked during the session together with user's SQL queries and correct answers for wrong solutions (fig. 3). The page

also presents the basic review of the closed session: elapsed time, session number, number of questions, correct answers, total points from correct answers and session evaluation. The final evaluation is calculated as the number of correct points multiplied by ratio of correct to all questions. All questions from the session dataset tables and answers are shown at the evaluation page. For wrong answers correct solution is also given. For each question internal id and the number of points is displayed in green font for correct answers and red for wrong or missing answers (Cepek A. 2009).

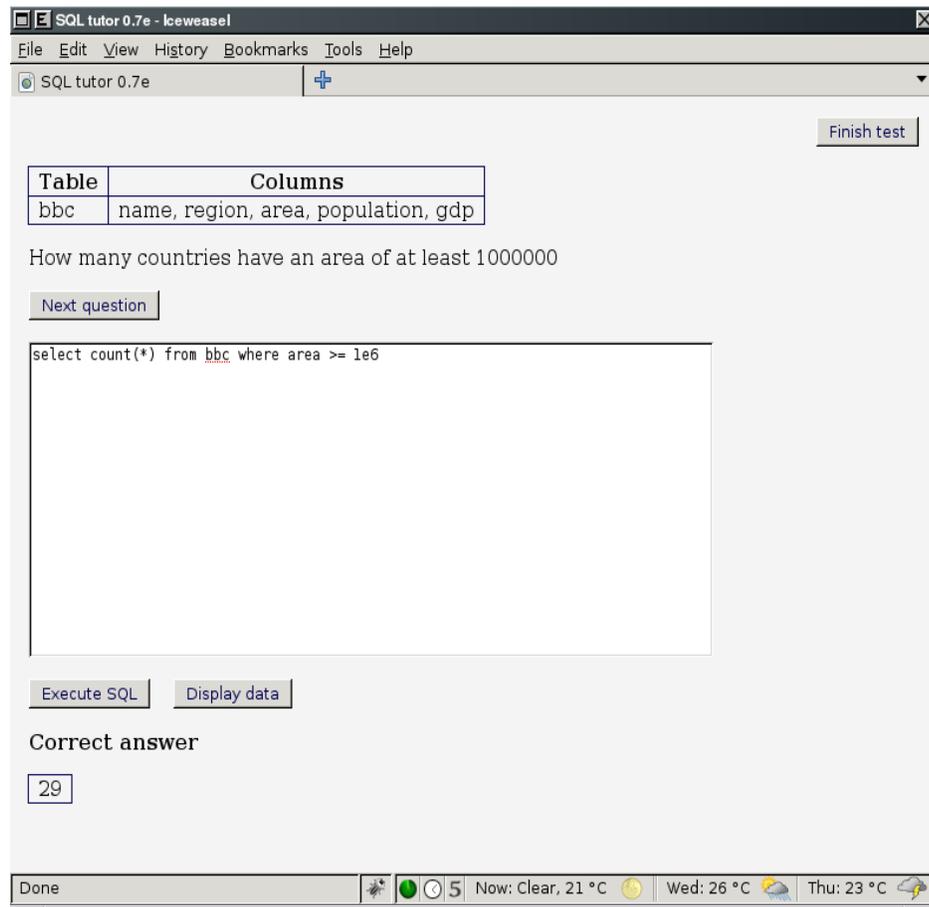


Figure 2. Tutorial dialog – selected tutorial question.

2. Development of Geospatial Sqltutor

2.1 Background

Sqltutor is currently used in the course “Introduction into database systems” at the CTU, study branch Geodesy and cartography. The motivation for developing geospatial Sqltutor was to extend the field where Sqltutor is used also to the geoinformatics courses, namely “Introduction into spatial data processing” and “Free Software GIS”. Sqltutor is built on the top of PostgreSQL database system, so PostGIS was a natural choice for geospatial-enabled branch of Sqltutor.

2.2 Development

The development of the geospatial Sqltutor started in May 2010. The project consists of three main parts:

1. *sqltutor* C++ CGI script was practically rewritten from the scratch,
2. creation of geospatial datasets and tutorials,
3. design of build-in visualization environment for geospatial data (including data related to the questions and also to the answers).

Currently two geospatial datasets are being developed – the first or the initial one is called *gis1*. This dataset is based on the data (including questions) taken from the “GIS1” course (CTU, study branch Geodesy and cartography) and it's localized in the Czech language. The second, international dataset is developed on the top of OpenStreetMap (OSM) data. The development is currently focused on the customization of the *sqltutor* CGI script and mainly on the creation of the geospatial datasets.

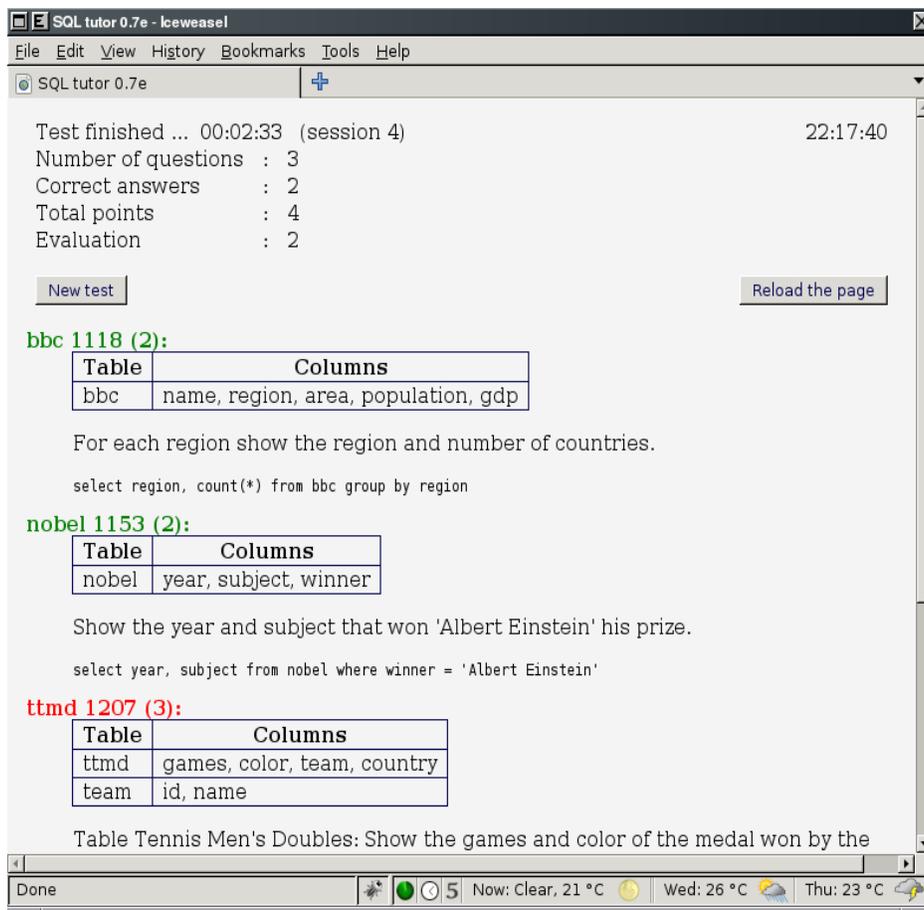


Figure 3. Evaluation dialog – show final score.

Sqltutor currently checks the answers and evaluates the results in the tabular (or text) form. The

roadmap for development of the geospatial Sqltutor optionally comes also with the possibility to visualize geospatial data related to the questions and to the answers (i.e. user data, results of the geospatial queries) as an interactive map environment using OpenLayer and MapServer.

3. Conclusion

GNU Sqltutor is successfully used as a teaching tool at the Czech Technical University in Prague since 2008. The project is being actively developed. The number of the datasets is also increasing.

The authors would be happy to host tutorials for interested users if they should not want to run their own implementation of their tutorial. And last but not least, the authors would be happy to collaborate with other colleagues from the free software world, namely on enhancing geospatial tutorials based on PostGIS.

This article was created with the aid of the project FRVS grant 968 / 2010.

References

Cepek A. 2009, GNU Sqltutor manual, viewed 30 July 2010, <<http://www.gnu.org/software/sqltutor/manual/>>.

Cepek, A., Pytel, J. 2009, 'Sqltutor', *Vermessung & Geoinformation*, 1/2009, ISSN 0029-9650, <http://www.fig.net/commission2/vienna_2009_proc/papers/15_cepek_pytel.pdf>.