AUTOMATED EVALUATION OF EXPERIMENTAL DATA USING SQL SERVER

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Abstract: Data analysis is needed in almost every profession. Presentation of data in understandable form follows. Structure of reports is often the same, the only thing which changes are numbers when new data come up. This article describes process of evaluating experimental data from automated measuring station from text file to interactive reports available for viewing in internet browser.

Keywords: SQL Server, reporting services, lead accid batteries

1. INTRODUCTION

At the department Electrotechnology of BUT in laboratory of lead acid batteries we have two types of long term experiments. These experiments are measured on electrodes which work either in PSOC (Partial State of Charge – this mode is used in electrical or hybrid electrical vehicles) or these electrodes are charged and discharged deeply. According to type of experiment measuring station connected to these electrodes creates two types of text files with exactly the same structure for each new experiment. Evaluated measures are usually voltage, current, temperature, positive and negative electrodes potentials and oth-ers.

Due to repeating time consuming process of evaluation we wanted this process to be auto-mated. SQL Server was selected as a platform for storage of data and reporting for this purpose.

2. CURRENT SOLUTION

In laboratory of lead acid batteries we use automated measuring station. This station uses programs made in software Agilent VEE Pro and write measured data in text files. These text files were evaluated in MS Excel. Data are loaded, filtered, cleaned and charts are cre-ated manually. Text file for experiments dealing with deep cycling of batteries consists of 74 columns. Contains number of measurement, date and time and then 8 times measures for 8 different electrodes.

These measures are number of electrode, measuring mode, total voltage, current, temperature or positive electrode potential (according to type of experi-ment), negative electrode potential, gas pressure, thrust, state of charge/discharge. Such number of columns is difficult for manual evalu-ation and can take hours, especially when you need to do it every time again for new data. For the second type of experiments (PSOC) there are 42 columns. Recorded measures are cycle number, date and time, overall voltage, temperature or positive electrode potential (depends on experiment), gas pressure and thrust.

Another problem is storing history of experiments. Text files don't contain labels of col-umns, so finding which additives were used for different electrodes after several months is difficult. That's

why new solution counts with storage of finished experiments by creation of central data warehouse of finished experiments.

3. SOLUTION

First necessary thing was creation of database for storage of experimental data with struc-ture appropriate for reporting. Three tables were created one for measured data, one for storage of details about electrodes and one for details about experiment as you can see in fig. 1.
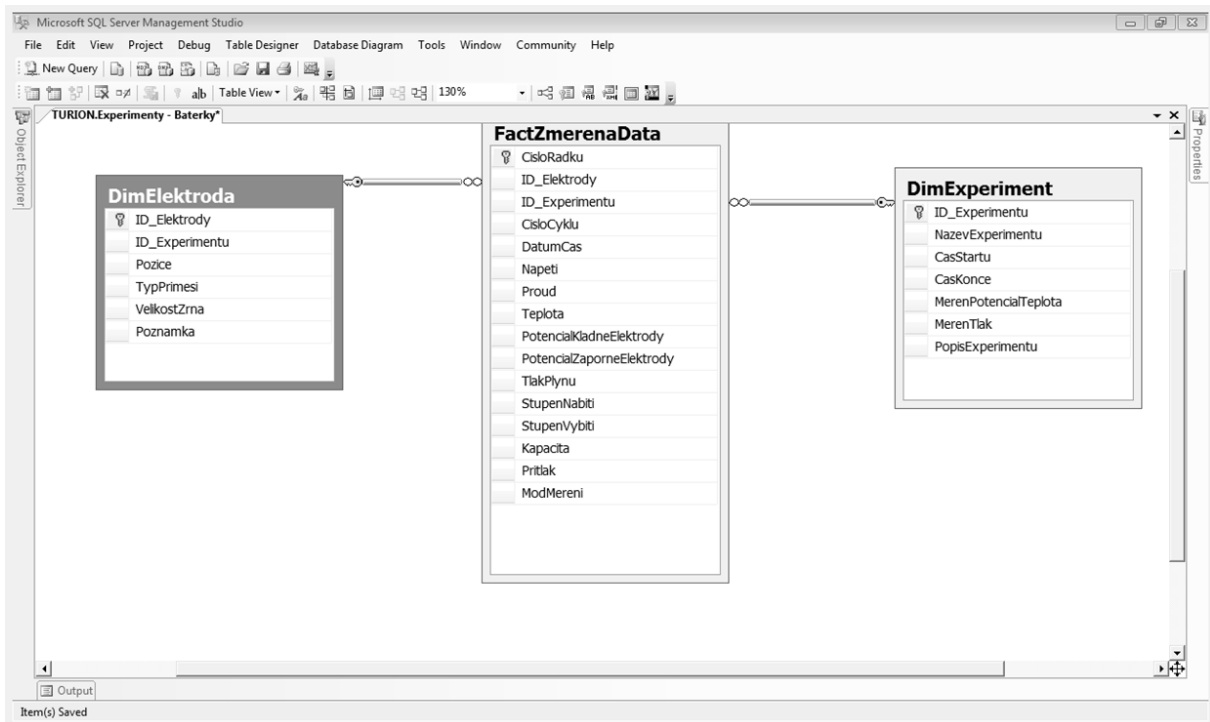

Figure 1:   Structure of tables.

For manual input of data about experiments and electrodes was created front end applica-tion in MS Access with forms which points to SQL Server database.

For data loading from text files to database was created SQL Server Integration Services (SSIS) package. SSIS is platform for ETL processes (Extract Transform Load). As the first step data are extracted from text file, then transformed and cleaned to structure necessary for reporting and loaded to destination database. This is done in cycle over all files existing in specified folder. You can see schema of tasks in data flow in Figure 2.
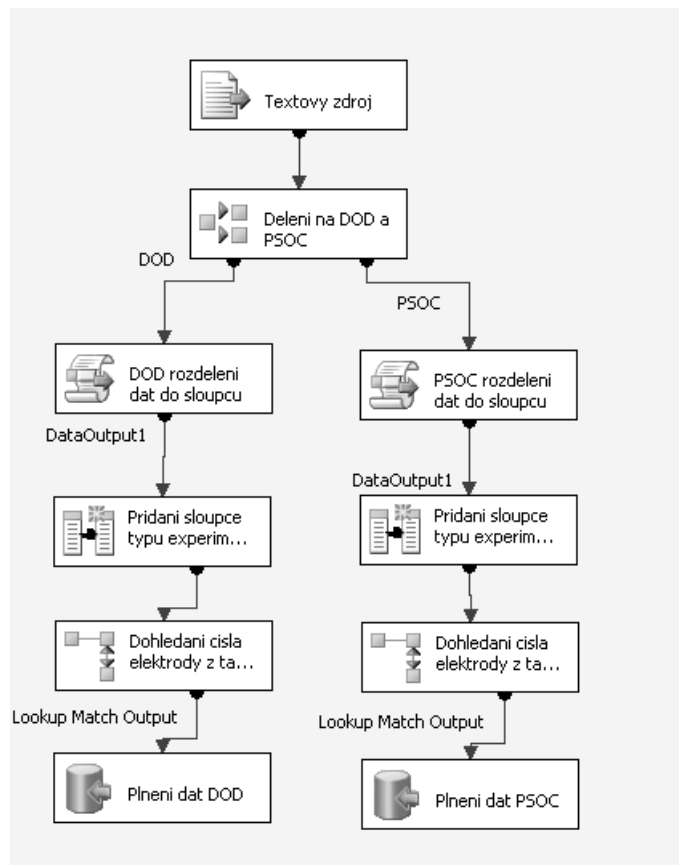
Figure 2: Data flow schema.

Several types of reports were created for both types of experiments. These reports are accessible from internet browser to all the students working on experiments in laboratory of lead acid batteries. Reports contain parameters for faster navigation and better evaluation of data. For further analysis there is an option to export report to Excel. Later reports could be delivered by email to students and teachers connected to research team.

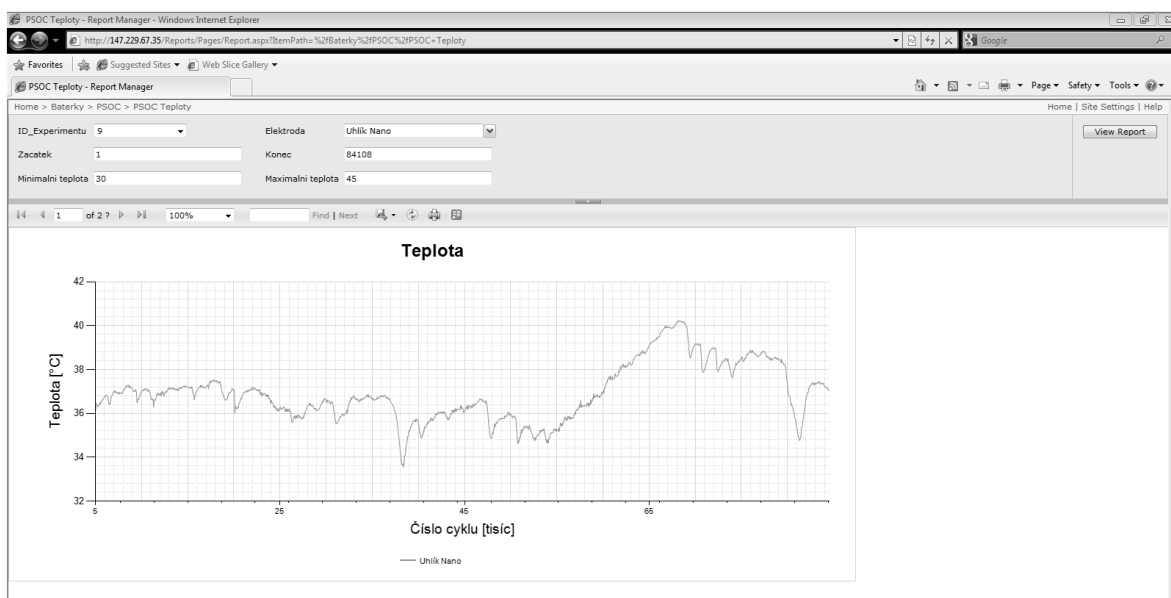Example of parameterized report you can see in figure 3.

Figure 3: Example of parametrized report

4. CONCLUSION

Paper describes previous and new way of evaluation of experiments in laboratory of lead acid batteries.

Database for storage of historical and new experiments was created, data transformation process to get data into proper format and also reports to deliver information to place were made.

Automated solution for evaluating experiments gets data closer to all students and teachers in laboratory of lead acid batteries. Instead of time consuming manual evaluation of text files in Excel, you can copy text file into appropriate folder, write data about experiment and electrodes. Then you run integration services package to load new data and watch the results in internet browser at home with intuitive parameters for ability to focus on what is necessary