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WEB BASED APPROACH FOR STORAGING AND DISPLAYING DIAGNOSTIC MOTOR DATA

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Abstract: *This paper presents the procedure of storing, reading and displaying diagnostic motor data using web technology. Previous data obtained using the diagnostic algorithms are automatically stored in a MySQL database using the MATLAB script based on the ODBC connector. PHP is used for reading and displaying data from the database. Due to great popularity and wide application of web technology, web interface is designed to access the data. Only authorized persons using any web browser can access the data.*

Key Words: ***motor diagnostic, web, MySQL, PHP, ODBC***

1. INTRODUCTION

Today's society can be considered as information society. Under the information society we mean a society where the creation, manipulation and distribution of information is an important cultural and economic activity. In the information society, information technology occupies a central place and directly affecting the production and economics [1].

Since the information necessary to occupy a central place, an easy, simple and affordable way to access and exchange information is needed. Of course, these information technologies exist and are widely used in modern society only necessary to apply them in the field of motor diagnostics.

Without web technology cannot imagine modern life, widely embedded within all aspects of life, widespread, integrated with all modern communication devices are the perfect basis for the implementation of this technology in monitoring and control. For all these reasons, web technologies have been selected as a solution for storing, reading and displaying diagnostic motor data. A solution that is shown will take advantage of web technology. Taken care of a used technology to be easily accessible, open source solutions, widely used with a variety of applications.

I order to increase productivity, reliability and safety of an installation containing induction motors, monitoring techniques have been more and more investigated in industrial applications. There are many published techniques and many commercially available tools to monitor induction motors to insure a high degree of reliability uptime [2]

Emphasis is placed on displaying information while collecting data will be placed in the background. Data obtained from different kind of diagnostic algorithms such as [3][4][5] should be stored in database. Database represent central pace for storing and organizing data. Using web technology is created an interface for easy and comfortable access to this data.

This solution represents natural extension of above mentioned motor diagnostic researches and one of suggestion solution will be explained bellow.

2. APPLIED WEB TECHNOLOGY

To create a system for accessing, storing and displaying diagnostic motor data a modern web technology is used. It is basically a web server in the concrete implementation the Apache HTTP Server is used as a basis for implementation of web technologies. Data is stored in a database (MySQL database) and to create dynamic web pages PHP programming language used is. As can be seen in *Fig. 1*, users through the Internet and / or intranet access to the web server forwarding requests for information. Web server based on the client requests executes queries to the database and creates dynamic web pages based on the data from the database that the client sees inside their web browsers.

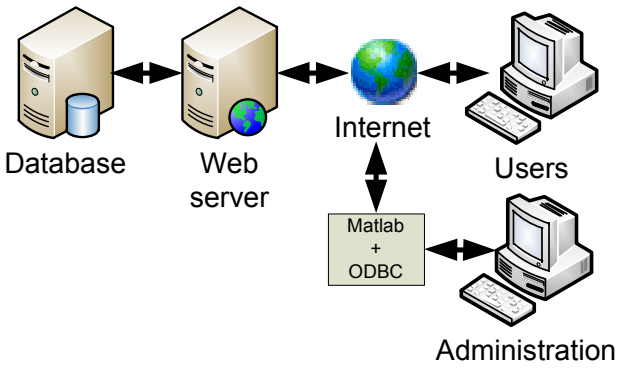

Fig. 1 *Data flow*

Fully implemented solution is based on open source software with a large customer base.

Web browser is integrated into many of today's commercial devices from mobile phones to personal computers. In this way, using widespread technology is enabled access to large number of users regardless of which device or operating system use.

3. MYSQL DATABASE

MySQL was chosen because it is popular in the field of web applications, free solution that enables affordable way to store the necessary data. Access and database management is possible using a standard SQL language for database management. SQL allows us to create databases, enter data into the database, read data and other manipulation of data in the database. For easier and more comfortable working with the database is used phpMyAdmin, a graphical interface tool, which can be seen in *Fig. 2* [6].

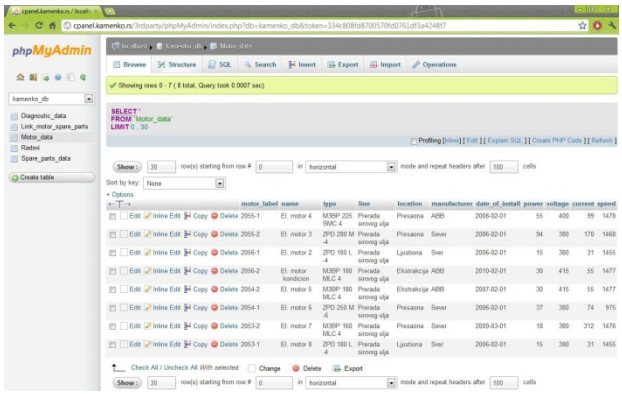

Fig. 2 *PHPMyAdmin*

Data are organized in four tables: Diagnostic_data, Motor_data, Spare_parts_data, Link_motor_spare_parts.

Data obtained using the diagnostic algorithms for each motor are stored in Diagnostic_data table. The table is organized in four columns that represent key information about obtained results, and these are:

- *motor_label*: unique motor label,
- *date_time*: date and time of recording,
- *fault_healthy*: fault presence,
- *faults_type*: one of three possible faults.

Data about motors are stored in Motor_data table. The table is organized in eleven columns that represent key information about motors, and these are:

- *motor_label*: unique motor label,
- *name*: motor position name,
- *type*: manufacturer label,
- *line*: process line in the plant,
- *location*: location of motor in the plant,
- *manufacturer*: name of manufacturer,
- *date_of_install:* date of motor installing,
- *power:* nominal motor power,
- *voltage:* nominal voltage,
- *current:* nominal current,
- *speed:* nominal speed.

Data about motor spare parts are stored in Spare_parts_data table. The table is organized in six columns that represent key information about spare parts, and these are:

- *spare_part_label*: unique spare part label,
- *name*: name of spare part,
- *position*: position,
- *manufacturer*: name of manufacturer,
- *type*: manufacturer label,
- *amount:* spare parts amount.

Data about a link between motor and appropriate spare parts are stored in Link_motor_spare_parts table. The table is organized in six columns that represent key information about motors and spare parts, and these are:

- *motor_label*: unique motor label,
- *spare_prat_1*: unique first spare part label,
- *spare_prat_2*: unique second spare part label,
- *spare_prat_3*: unique third spare part label,
- *spare_prat_4*: unique fourth spare part label,
- *spare_prat_5:* unique fifth spare part label.

4. MATLAB ODBC DRIVER

To enable the database and the MATLAB software package connection is used ODBC (Open Database Connectivity) driver. ODBC driver provides a standardized way to access databases. Developed by the SQL Access Group provides access to a standardized way to access databases, regardless of the used database. Configuring the driver is shown in *Fig. 3*.

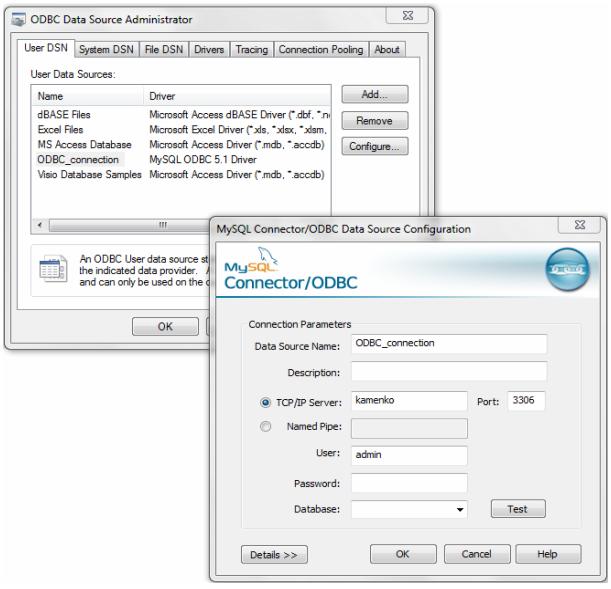

Fig. 3 *Configuring ODBC driver*

For storing data into database is used the embedded MATLAB functions *fastinsert (conn, 'tablename', colnames, exdata)*. The function is part of the MATLAB Database Toolbox.

Parameter *conn = database ('connector', 'username', 'password')* was formed using the above mentioned ODBC driver, user name and password to access the database. Other parameters are the table name and columns names as well as data need to be stored.

5. WEB INTERFACE

Web interface has been completely created using PHP programming language [8]. Communication with the database is generated using PHP structures that perform SQL queries. The resulting data is presented using dynamically created web pages. Page design is also done in the PHP programming language.

Access to system has only authorized persons as is checked on access (*Fig. 4*).

Fig. 4 *Login web page*

The navigation menu at the top of each page consists of links to the following web pages:

- *Home*: home page,
- *Motor data*: listing all motor data records (*Fig. 5*),
- *Diagnostic data*: listing all motor diagnostic data records (*Fig. 6*),
- *Spare parts data*: listing all spare parts data records (*Fig. 7*),
- *Help*: help page.

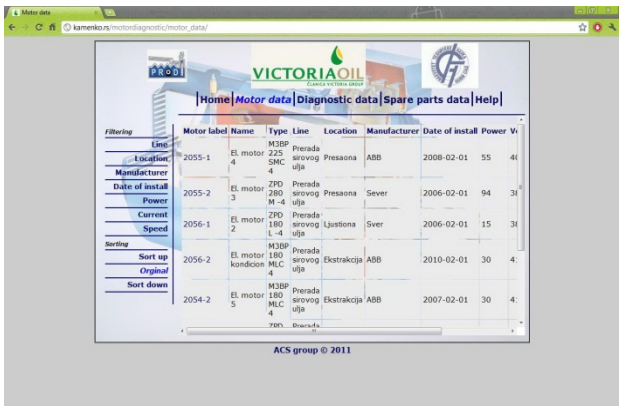

Fig. 5 *Motor data web page*

On the left side of each page, there are sorting and filtering tools. Clicking on header of each column in the current listing records is sorted in accordance with selected column and selected type of sorting.

Clicking on the motor label in the any listing opens web page with summary information view of selected motor. Design of that page is shown in *Fig. 8*.

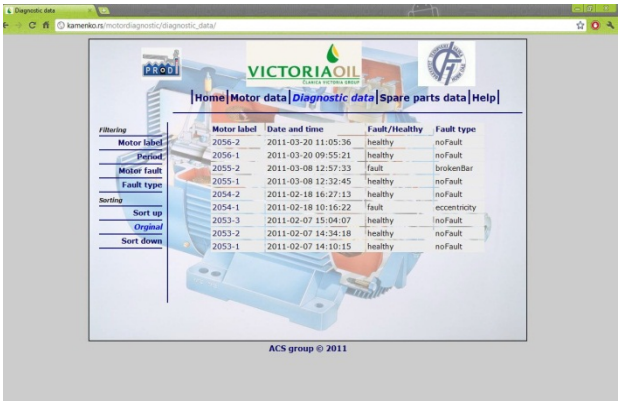

Fig. 6 *Diagnostic data web page*

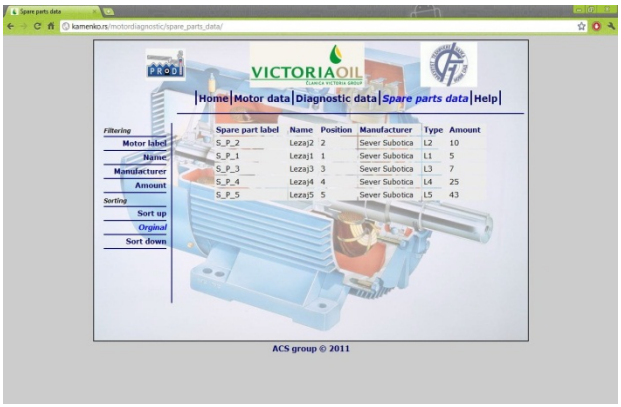

Fig. 7 *Spare parts data web page*

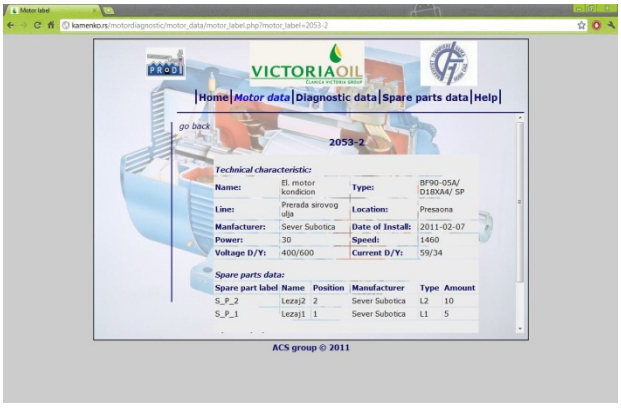

Fig. 8 *Motor summary information*

On the bottom of each page, there is a button for exporting current listing to MS Excel format. This is great functionality for further data management. Example of exporting to excel is shown in *Fig. 9*.

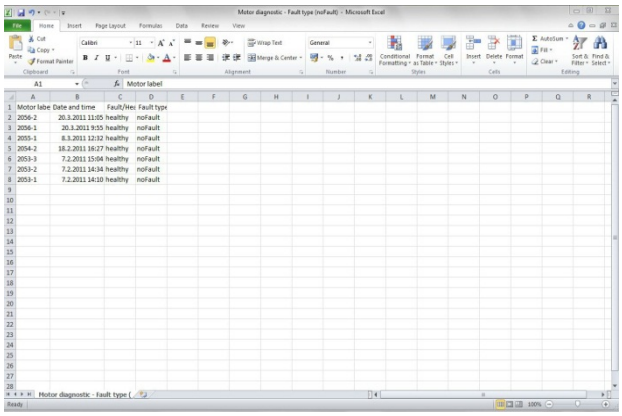

Fig. 9 *Excel export*

6. CONCLUSION

Using web technology is enabled the manipulation of motor diagnostic data regardless of physical distance using telecommunication channels i.e. Internet. It is also enabled a platform independence, i.e. use irrespective of the device or operating system, of course using the web browser as a tool for viewing data.

We used the popular open source software widely used in building web applications. This is just one example of the application web applications to store and access data in a similar way can be applied in other areas.

Automated storing, filtered data view and web access are a very efficient system for managing motor, diagnostic and spare parts data. Web access at any time can gain insight about the current state of motors in the plant and current state of spare parts stock.

7. REFERENCES

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