

*database, programming tools,  
information about accidents*

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## A TELEMETRIC SYSTEM SUPPORTING DATABASE OF INFORMATION ABOUT ACCIDENTS

The system's purpose is to collect information about road accidents in Katowice, and as a target, also over the entire Silesian State territory.

The information collected will enable creation of a workshop to produce a full situation on the road in respect of safety. This will allow determining what factors participated in the appearance of hazard in the road traffic. It will also enable follow up and planning, designing and performance of road investment project taking them from safety point of view. Also monitoring of road traffic safety improvement will be possible to evaluate the efficiency of measures taken.

## SYSTEM TELEMETRYCZNY WSPOMAGAJĄCY BAZĘ DANYCH INFORMACJI O WYPADKACH

System będzie miał na celu zbieranie informacji o wypadkach drogowych w Katowicach, a docelowo na terenie całego województwa Śląskiego.

Zbrane informacje pozwolą stworzyć warsztat, dzięki któremu uzyska się pełny obraz sytuacji na drogach pod względem bezpieczeństwa. Pozwoli to określić, jakie czynniki miały wpływ na powstawanie zagrożenia w ruchu drogowym. Umożliwi również kontrolowanie i planowanie, projektowanie i wykonanie inwestycji drogowych pod względem bezpieczeństwa ruchu oraz prowadzenie monitoringu procesu poprawy brd i ocen efektywności stosowanych środków.

### 1. INTRODUCTION

The system's purpose is to collect information about road accidents in Katowice, and as a target, also over the entire Silesian State territory.

The services responsible (Police) would collect information necessary for construction of a database during accident site visit. After preparation of documentation in an electronic form, the data about accident will be sent to a central database. In order to make this system work, the Police, besides information collected during site visit, i.e. circumstances of the accident and weather conditions, should also give a full description of road that was the theater of accident. For this purpose it is possible to use data contained in the electronic system of road and bridge database with detailed description of each section (Dz. U. No 17 item. 225 of 2000 and Dz. U. 32 item. 393 of 2000).

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and performance of road investment project taking them from safety point of view. Also monitoring of road traffic safety improvement will be possible to evaluate the efficiency of measures taken.

## 2. PROGRAMMING TOOLS

### Borland Delphi

The database will be built using Delphi – a tool that allows creating applications (both database and Internet-related) for Windows. Delphi is one of the best compilers with result code optimization. The programmer has at his disposal an integrated environment consisting of all tools enabling designing, debugging and testing of applications. Delphi is a perfect solution everywhere, where optimum solutions are needed, mainly related with databases. It is provided with BDE (Borland Database Engine) enabling handling of databases of Paradox and dBase as well as ODBC (Open Database Connectivity) i.e. open communication between bases, supporting other database formats available in the Windows environment. For the purpose of efficient base management, Delphi has SQL i.e. Structured Query Language. Database Desktop application enables designing of databases in many popular formats.

### ASP and PHP

Active Server Pages is a script programming environment integrated with Microsoft IIS, to be used for creation of dynamic WWW pages and advanced applications using databases, where the user's interface is Internet search tool.

ASP pages are composed of HTML language elements, text and commands of script language. They are performed entirely on WWW server (so called server-side scripting) processing the script commands and sending a ready-made page to the search tool, containing but "pure" HTML format. For this reason, the entire burden of processing remains with the server, where in addition ASP scripts may communicate with the databases using ActiveX mechanisms, as well as perform other tasks that require large capacity or central processing. ASP is provided with a full XML object service, which makes it a perfect tool for remote database application service using dynamic loading.

PHP is a simple and efficient tool constituting an interesting alternative for ASP. Similarly as ASP, PHP is programming language for WWW programmers and creation of dynamic pages, and its code is nested directly in the document. The official meaning of PHP is „PHP: Hypertext Preprocessor". It is a programming language nested in HTML. Similarly as ASP, the PHP preprocessor carries out the task contained in the script and return the result in a text form. This code is performed by the WWW server and not the customer's one.

Selection of script language depends of WWW server used.

## 3. SYSTEM

As a science, the statistics enables estimation of a percentage result of phenomenon being investigated. Statistics of road accidents reflects only the numeric index of their occurrence but says nothing about the causes of accidents.

For this reason, a question arises: is it possible to use appropriate prevention measures to improve road safety, using only statistics as indication?

No. Using only statistics as guidance, it is possible to take improper preventive actions that may bring poor effects.

Having a proper tool that gives a possibility of an adequate interpretation of causes for accidents and events that have happened on the roads, it is possible to counteract hazards in a proper way. The solution to the problem might be brought by presented database of car accidents.

For this purpose it would be necessary to use the information resources that are already in place as well as services that update these data in a continuous manner. Having a tool and using a commonly available Internet access, Police would be able to update the database with data concerning of accidents on the roads that are hitherto prepared on special forms. Whereas data from the road and bridge recording system with their detailed description and markings could be updated with streets that have been theater of accident.

After completion of these data and appropriate time as needed with regard to the amount of data contained therein, by way of using SQL query in the database it is possible to retrieve statistical information about the accidents, but also circumstances of these events. Result of such a query would show a reason for accidents happening on a particular road section and would indicate places with the most frequently repeated cause for accidents. Use of queries gives many possibilities to obtain a desired result. Appropriate interpretation of this result would enable use proper preventive measures and counteract further existence of hazardous conditions on the selected road sections.

This method of maintaining accident record and retrieval of result could greatly improve safety on the roads of Katowice City.

The system basically consists of three parts:

- Database describing the road accidents, nested on a server,
- User interface based on WWW pages using internet connections to update database with information provided by the police collecting data upon arrival to the accident site,
- Application for generation of SQL queries with all necessary parameters and display and printing of required information.

#### 4. DATABASE

The database will be based upon one of the database server existing on the market such as Microsoft SQL Serwer, with an additional mechanism of ASP or PHP script service, to be contacted by each system user (police departments) for introduction of new data.

The database will contain all information about the accidents that have happened on the roads of Katowice City.

Its resources will describe:

- Sender of data i.e. ID of police department,
- Data contained in the system of records about roads and bridges, information about streets and signals installed within them, lighting etc.,
- Circumstances that have lead to the road accidents i.e. weather conditions and street condition. These data describe also braking distance of vehicle and the accident's causes (such as where the pedestrian came from) etc.,

- Accident participants,
- Situation on the road before the accident,
- Accident effects describe condition of the vehicle and its damage (protocol of inspection), injuries of pedestrians etc.

## 5. USER INTERFACE – DATA TRANSFER SYSTEM

The operator's station would be connected to Internet. Interface of the information system user would be Internet search engine to contact our WWW web site and enabling remote operation of a database installed on the server to be contacted by the web site.

Upon loading of homepage, the operator has to be logged in to perform any further actions.

As first information, the user shall enter a unique police department identifier (assuming that the users logged in are authorized to amend the tables he tries to use). The user's interface will be made in such a way that the description of accident's circumstances will be selected from a pattern library, to unify the description; such method of description is presently used by PD in the documents describing visits on the accident site and inspection of vehicle.

During introduction of information, the information about the street being a theater for the event will be also entered from the data made available by the server.

Information about road infrastructure would be supplemented in a regular way from the street description system used by the manager of roads and bridges. This system was created because of an ordinance obliging the manager of the roads to keep such detailed records.

Information about the streets would be split up between police departments they are subject to. This means that the police department in question, after entry of ID, would receive for selection only the streets that are assigned to it as a part of its region. Besides description of circumstances and place of accident, the database would be supplemented with data describing the accident's participants, vehicle inspection, description of weather conditions, braking distance etc. By calling the command to send the data to the server, the user causes retrieval of a script with parameters describing the data entered. If they were correct, a new record would be added to the table, otherwise the operator would be asked to correct or complete the entered data. All revisions will be reflected in the database and in the client's search engine.

## 6. APPLICATION FOR GENERATION OF SQL QUERIES AND PRINTING OF DESIRED INFORMATION

This application was written in such a way that the persons not knowing SQL language would be able to obtain desired information. Using descriptive names of conditions to be met by the desired information and prompting the user to enter manually such data as date and time, other conditions will be selected from the selection lists prepared by the programmer and supplemented when necessary. Next task of the application will be to translate all the requirements from user-friendly language to that of SQL and then displaying the information received from SQL server on the screen in a form appropriate for further use.

## 7. SUMMARY

The accident recording system will perform a role of a database containing information about accidents that have happened on the roads of Katowice. When implemented in this city, it may constitute a good testing field for testing and verification of road safety improvement process.

Information contained in the database enable creation of SQL queries, giving a possibility to retrieve various types of information, for example about circumstances leading to the accident. Having such accurate data about the accidents will make easier talking appropriate measures to counteract and prevent the accidents. Using this system it would be possible to interpret properly the causes of accidents and to react correspondingly. This should improve the safety on the roads.

Reviewer: Prof. Romuald Szopa

## W KIERUNKU TELEMATYKI

## 1. WSTĘP