

Register of Vehicles and Vehicle Registration Certificates - MRVL

Towards the end of 2003, SRC took on the project of renewal of the Register of Vehicles and Vehicle Registration Certificates (MRVL).

The information contained in the Register has many purposes and is hence of interest to a wide range of users. Town constables use their access to the database to obtain details of drivers that have badly parked their cars, the police use it to verify circulating vehicles, the Tax Administration to collect taxes, the Ministry of Defence for insight into the potential reserve rolling stock, and the Ministry of the Environment to check on abandoned vehicles.

Among other users of information from the database are also detectives, lawyers, the Statistical Office of the Republic of Slovenia, Customs Administration of the Republic of Slovenia, AJPES (Agency of the Republic of Slovenia for Public Legal Records and Related Services), ISPO – informational data service, which allows insight into the vehicles of all employees in the public administration through the online portal.

What is the database?

In the first phase of the project, we started setting up the system architecture. The commissioner demanded a stable architecture which would support the technological platform of the renewed Register.

A register is an information system that accurately defines a certain type of basic entities. MRVL is a register that stores information on vehicles and that connects to other systems in order to obtain additional sources of necessary data on vehicles. In the Register are technical data of the vehicle, owner

and user of the vehicle, number plate, sticker, vehicle registration certificate, insurance, road tax, technical tests, limitations, notes, first registration, registration abroad, statement, declaration of location...

One characteristic of registers is that they are regulated according to laws and su-laws, in order to be comprehensive and reliable. In other words, we can trust them, as only authorised personnel and organisations can write and modify them.

The law hence prescribes how to list each vehicle in the Register and all the elements that complete the record. At the time of entering,

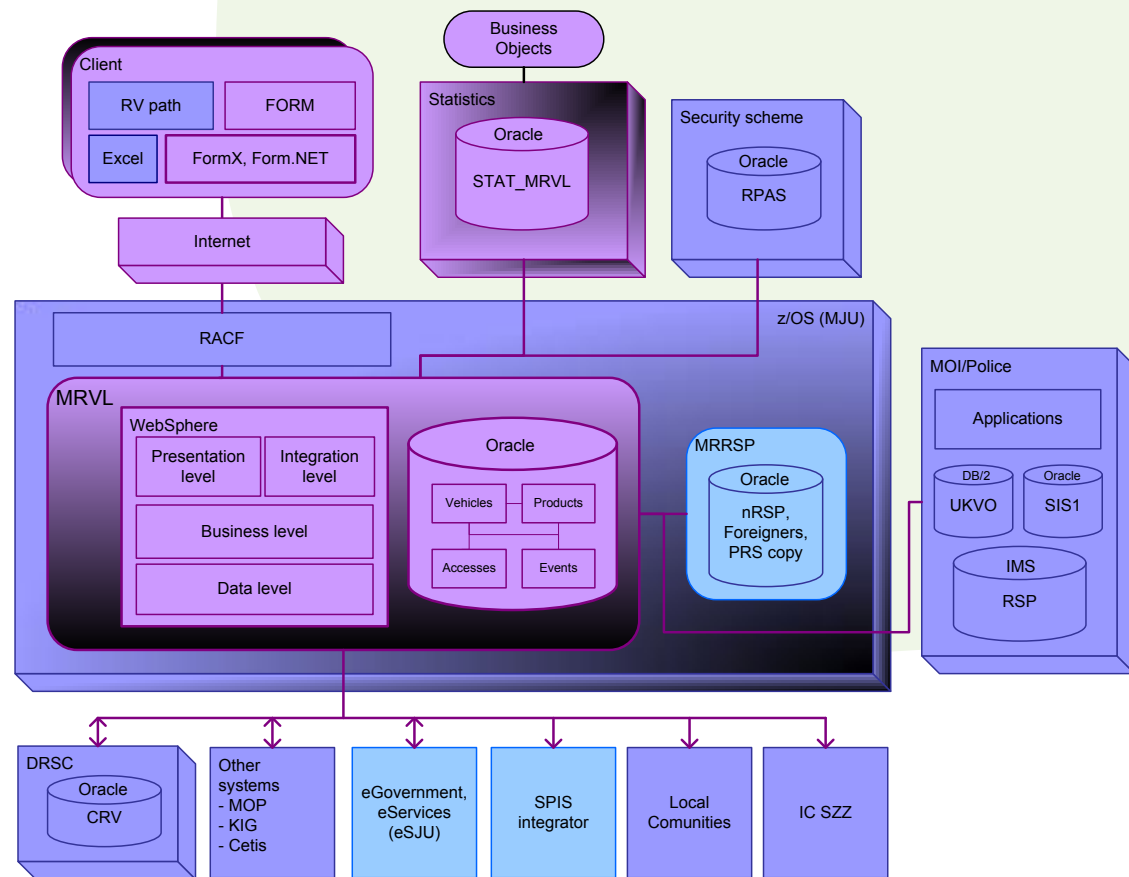
vehicles obtain a marker or identifier, which uniquely identifies the vehicle and is the starting point for integration with external systems. In the old vehicle register, the basic record entity was the vehicle registration number, while in the new register this is the vehicle itself. For each modification, a note for the event (or process) is added to the vehicle, instead of a new record. In this way we construct the history of the vehicle. The information contained in the Register has many purposes and is hence of interest to a wide range of users. Town constables use their access to the database to obtain details of drivers that have badly parked their cars, the police use it to verify circulating vehicles, the Tax Administration to collect taxes, the Ministry of Defence for an insight into the potential reserve rolling stock, and the Ministry of the Environments to check on abandoned vehicles. Among other users of information from the database are also detectives, lawyers, the Statistical Office of the Republic of Slovenia, Customs Administration of the Republic of Slovenia, AJPES (Agency of the Republic of Slovenia for Public Legal Records and Related Services), ISPO – informational data service, which allows insight into the vehicles of all employees in the public administration through the online portal.

Since the data handled is confidential, access to the database is strictly controlled. For the development of the Register we hence took particular care with regards to the preservation of personal information, data protection, authorised access and access logging. For each access to a vehicle record, a log is recorded containing the subject and time of the access, as well as the name of the operator and the reasons for accessing the record.

Architecture setup

In order to satisfy all demands, the following elements were included in the architecture: central register, service platform, client, security infrastructure, messaging platform, integration

Picture 1. MRVL system architecture



with external systems, supervision of the system, backup system, release distribution and troubleshooting procedures.

In order to verify the architecture, different architectural prototypes were generated. Most problems were encountered in the choice of a concept for integration with the existing "host" system of the Ministry of the Interior (RSP – permanent residence register, stolen vehicles database). We scrutinised new technologies (IBM MQSeries Integrator), and eventually chose the solution offer by 3GEN, which has already been successfully employed in other projects (ZPIZ-CVI-CRP in MDDSZ-CVI-CRP).

For security infrastructure, a similar process occurred, where the final choice of a tool was made as late as the end of 2004. IBM Tivoli Access Manager was evaluated, and then a cheaper and thoroughly tested solution was found in the RPAS system already employed by the Ministry of Public Administration. While awaiting the choice of RPAS/RACF, an alternative proprietary solution was developed and implemented until 2005. In this time span, digital certificates stored on smartcards by

users were also definitely ruled out.

Development of the first release

At the beginning of May 2004, the first release of the application MRVL 1.0, supporting the law on safety in road traffic (ZVCP) in force at the time, was ready. The local jurisdiction was applicable, the sticker was a condition for the registration, and number plates were bound to the driver and were marked by a green border. MOTs were carried out on the basis of the delegation made by the local administration. Due to limited time and resources, the functionality of release 1.0 was kept to a minimum. The existing system supported the entry into the EU and the satisfaction of the demands of European legislation. For citizens of the Republic of Slovenia, this meant that on 1.6.2004 we received a new (temporary) design for the number plates and a new 3-fold driver's licence. As part of the register renewal project, we got some additional time in order to

develop a specification for the development of MRVL 1.1. For this we had to take into account the newly set standards, as the existing system was not able to cope with all of the new demands; we also made some compromises, which had to be accepted by both parties. The undefined status of the security scheme demanded some additional adaptation, extension of the functions in the product module and complementing the vehicle module with certain less critical functions, as well as support of unstructured vehicle data, entry of owner independently of the citizen register, support of car alterations and modifications, communication to the customer of the approaching registration expiration, withdrawal of number plates, online access for constables, system expansion with data from the Ministry of the Environment, an overview of a vehicle's history, statistical notes, undoing of the last action, support of MNZ vehicles and archive of vehicle technical data.

Technology employed

The MRVL supplements an information system that was first put into place in 1983. In order to serve its purpose in subsequent years and survive the frequent changes in information technology, we chose the standard J2EE platform (Java 2 Enterprise Edition) for the system architecture. For the implementation platform we used the IBM WebSphere Application Server V5.02. All J2EE components of the MRVL system are in line with the standard specification J2EE release 1.3. The program code is developed in line with the guidelines of Java Sun Microsystems and the programming standard for Java at SRC. The Java program components of the MRVL system use the standard specification J2EE 1.3 release. For the development of the Java components (web applets) presentation, we used Jakarta Struts, which belongs to the open code domain (Apache Software Foundation). In the MRVL system, Struts release V1.1 is used.

The dynamic content of the web pages is generated through a combination of HTML+JSP (Java Server Pages).

The uniform look of all elements of the web application is guaranteed by CSS technology. JavaScript technology is used by the web client to validate the source data in the input forms and for the simpler algorithms performed by the client.

The data used by the MRVL system are stored in an Oracle10g database. The business level components access operational and statistical

data through stored procedures (PL/SQL) and a JDBC type 4 driver. For the purpose of statistical reporting, a separate statistical database, STAT_MRVL, receives data from the MRVL system. For reporting, Business Objects is used. IBM WebSphere MQ V5.3 is the reporting middleware, whose support allows asynchronous communication between the MRVL system and external systems (DRSC, MOP, Kig, Cetis). For efficient and simple manipulation of the XML documents, we used JDOM API V1.0. The current client version (FormX) is developed in Delphi. The purpose of FormX is to allow access to the MRVL register and integration with the local hardware and software. In this release we expanded the vehicle statistics with working and access statistics. We carried out a more complete integration with the external systems and designed the vehicle web area.

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The website is a mandatory access point through which we inform users about the operation of the system and news; we also offer user guidelines, FAQs and all relevant contacts and phone numbers.

Legal changes

In the summer of 2004, Parliament approved a new law on the safety of road traffic – ZVCP-1 (Official Gazette UL RS, No. 83/2004), which should come into force on 1. 1. 2005. The

development of MRVL release 1.1 and the renewal of the vehicle register were carried out in line with the old law. The changes imposed by ZVCP-1 were partially integrated into the existing system (ruling out of the local jurisdiction, a sticker no longer a condition for the vehicle's registration, elimination of the vehicle's production year, expansion of the evidence with new data, change in a vehicle's removal due to an expired sticker, changes in the procedure for the withdrawal of number plates).

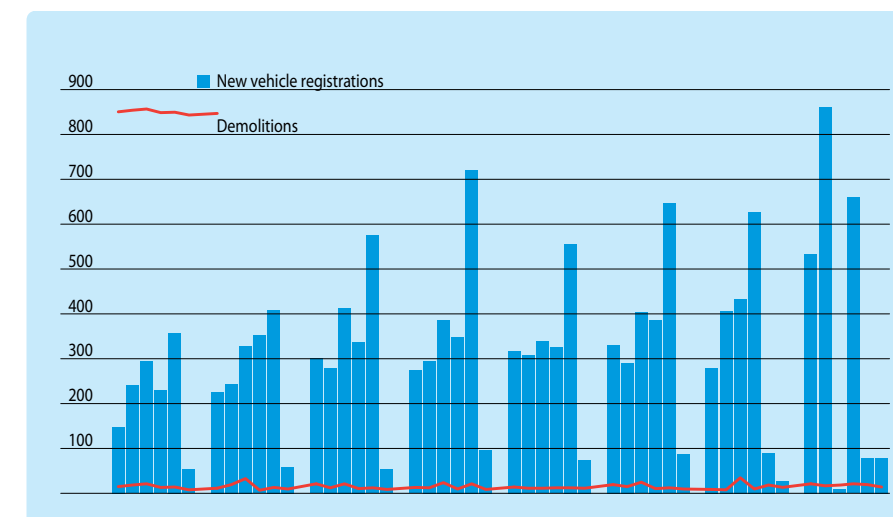
The change in government at the end of 2004 brought about a new change in the law – ZVCP-1A (Official Gazette UL RS, No. 35/2005). AS of 20.4.2005, the registration sticker was completely ruled out. Due to the extensive changes brought about by the new law and its appertaining sub-laws, we had to start developing a new application release.

The adaptation of the old system to the new demands brought into the system a growing number of noticeable inconsequentialities, as the original data migration grew from 19 to 32 hours. The transition into production was planned so that the data would be migrated from the old into the new system, after which the old system would be shut down.

Optimisation

In April 2005 we started the internal development of the new application MRVL release 1.2. Due to limited system resources of the mainframe server at the Ministry of Public Administration, we were obliged to spend a great deal of time on optimisation of the application. With the help of a foreign IBM expert and performance analysis, carried out with Eclipse TPTP (Test&Performance Tools Platform) and Jmeter, we achieved a 50% improvement in 2 months. The cost of this optimisation was a small loss of system flexibility in the adaptation to the changes, which increased the maintenance demands of the system. The greatest effect of the optimisation was marked by the decreasing number of calls to the database, replacement of the Struts implementation with a proprietary solution, a reduction in the number of returned columns in calls to the database, replacement of the XML reporting format as part of integration with the Police's mainframe system and by a conceptual change in the distributed transactions.

Graph 1. New vehicle registration versus demolitions trend



Finally it was time for production

Towards the end of 2005 we started the development of the new release of the register under the code MRVL 1.3, which supported all the new legal demands. After the lessons learned throughout the often announced start of production, on 6.3.2006 at 1:00 am we started the production of the new system. The transition scenario to the new MRVL system took all of 48 h. FINALLY! Behind us are two and a half years of development of the new register, which is only just at its beginning. Within this time, SRC's specialist team, together with contracted co-workers, specialists from other companies and employees of the national administration, implemented a system capable of tracking the entire lifecycle of a vehicle from its sale until its dismantlement. Under the current legislation, this is under the jurisdiction of three ministries: the Ministry of Transport, supervising the technical adequacy of the vehicles; the Ministry of the Interior, supervising traffic safety; and the Ministry of the Environment, ensuring that vehicles end up at a suitable final destination. Beside the aforementioned three ministries, the Ministry of Public Administration is active as the commissioner of the whole system.

System limitations

The system is structured so that registration can be carried out by car retailers, subject to the formal satisfaction of certain conditions. All in one place. I buy my car, register it and drive off in it.

The security scheme also allows any registering organisation delegated by the ministry to carry out operations that until yesterday were the competence of the local administration only. The system allows registering organisations to order additional number plates electronically directly from the supplier. The system supports the entire lifecycle of all products (number plate, driver's license) from order to issuance. Besides ruling out the local jurisdiction, which means that now someone from Ljubljana can freely drive a vehicle with an MB plate and vice versa, another novelty is centralised control over technical vehicle tests. In other words, it is no longer possible to try one's luck by choosing a particular technical centre where one might count on perfect results every time. Later, the system will be upgraded so the computer-controlled testing rig will produce results not only regarding the suitability or unsuitability of the vehicle, but also including all measured parameters. Centralised numbering of all technical tests and verification of stolen vehicles are reasons why it is now no longer possible to work offline. The system practically does not allow any procedures to take place on a vehicle if the vehicle is noted in the police database as stolen.

Web-based extension

The renewed MRVL register has laid the foundations for web-based applications responding to many vehicle-related demands. Soon it will be possible to extend the validity of the certificate of registration by using the public administration e-portal, eSJU, online. Users will be able to extend the validity of their certificates of registration by entering the certificate number, insurance policy number, the vehicle, the chosen validity period for the road tax, choose an office that will take care of the paperwork and pay the calculated amount through the ePlačila system. After successful payment, the system will register the electronic request. This will be all the user will have to do, though this is obviously only the tip of the iceberg! The core of the action is "underwater", where back-office systems ensure that the request is adequately taken care of (eSJU, RAZ, CIS, ePlačila, SPIS Integrator, MRVL, SPIS 1.45). The process of extension of the certificate of registration (issuing the classical certificate and attestation of road tax payment) is handled by a competent employee. Upon receipt of the new certificate, the old one has to be returned. Behind us are now two months of system operation. The system accounts for 1438 users from 169 different institutions. Almost a million operations have already taken place, of which 210,000 were registration extensions. Every fourth vehicle has been exempted from technical control. If the drivers of these vehicles have access to the Internet, they are potential candidates for on-line registration extension. Data show that, in the observed period, 21,098 vehicles were initially registered, 15,550 of which were new and 5,448 used.

The MRVL register also represents a source of information for car retailers, who can determine their market share against the number of first registrations. Figure 5 shows how satisfied drivers are with their new vehicles, as there are already many cancellations after only four days.

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Graph 2. New registration duration in march

