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Abstract—There is a real need for SOA principles, such as those offering software as services, in the software industry. In this effort, databases (one of the most important artefacts in Information Systems) can be also seen as a set of services offering access to the stored information. This paper presents PRECISO, a reverse engineering tool to discover and generate Web Services automatically from relational databases. PRECISO makes it possible to modernize legacy databases by introducing them in an SOA context by means of the generated services. This tool was used in a real-life case study in the context of a software company.

Keywords: Database Reverse Engineering, Web Services, MDA, SOA and Pattern Matching.

I. INTRODUCTION

Today, organizations are increasingly forced to share more and more information as part of the basic activity in their daily operations. However, the heterogeneity of Information Systems (IS) is growing every day due to the appearance of new technological paradigms, standards, and environments, making it more and more difficult to share information [3]. Due to these facts and in order to keep their competitiveness level throughout their IS, organizations must be involved in a process of continuous renewal. Therefore, IS developers must constantly and quickly develop and maintain their products in order to meet market requirements [3]. Among all the artefacts that compose information systems, databases are possibly one of the most important elements since they contain all the organizational information and form the basis of decision-making.

This paper presents PRECISO [1], a tool for database re-engineering following the MDA (Model-Driven Architecture) principles [5] to extract Web Services (WS) that show the database as a set of services, offering easy access to the information. PRECISO offers several benefits: (i) it minimizes heterogeneity problems since databases can be integrated in SOA environments; (ii) it advocates the reuse of legacy databases, thus extending the lifecycle of databases; and (iii) it shortens development time because the WS generation is automatic and instantaneous.

II. THE RECOVERY PROCESS

Figure 1 depicts the database re-engineering process, which consists of three main activities broken down into several tasks. DMR is the first activity to create a PSM (Platform-Specific Model) which represents the input relational database. The DMR-1 task recovers metadata from the database and builds the PSM according to an SQL-92 metamodel based on [2]. The DMR-2 task simultaneously discovers the potential services by means of pattern matching [4]. Figure 2 shows the patterns recognized in the database schema and the associated service templates.

![Figure 1. The Web Services recovery process](image-url)
The PRECISO tool automates several tasks in the proposed recovery process (see Figure 1); but it also addresses other necessary issues such as remote database connection, connections to databases from different vendors, project management, graphic display of involved models, testing, reporting, and so on. The proposed architecture, taking into account the previous challenges, is shown in Figure 3.

![Figure 3. Architecture of PRECISO](image)

### III. THE ARCHITECTURE

The PRECISO tool automates several tasks in the proposed recovery process (see Figure 1); but it also addresses other necessary issues such as remote database connection, connections to databases from different vendors, project management, graphic display of involved models, testing, reporting, and so on. The proposed architecture, taking into account the previous challenges, is shown in Figure 3.

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