

RedBD: the Database Research Community in Spain

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1 Introduction

During the last decade, the Database research community in Spain has grown significantly in the quantity of groups interested in the area, and especially in the quality of those groups. Those database research groups are not in general very large; usually five or six full-time researchers compose them. The economic resources for supporting the researching activity came from public organisms like the Spanish government, the European Union or local governments, and in a less rate from the industry. Research is carried out mainly at the Informatics Departments of the Universities. As the different groups usually share research topics and also fields of applications, in the last years there has been an important movement to join research efforts.

Since 1996 the Database community has been sharing its experiences in the Spanish Software Engineering and Database Conference, called JISBD. In this conference, in addition of presenting the main results of the research projects, the groups have had the opportunity of discussing at round tables, and of participating at specific workshops. Moreover, well known invited lecturers coming from both industry and university, such as Alex Buchman, Hugh Darwen, Klaus Dittrich, Pitter Lockeman, R. Elmasri, Jim Melton, or Alberto Mendelzon, have participated on the conference. In the JISBD'2002 that took place in Almagro (a nice city of Castilla la Mancha), a group of database researchers decided to promote the research in this field by means of a Network of Excellence (NoE, for short). This was the birth of RedBD.

RedBD is a Spanish Database NoE, originally composed by fifteen universities (*A Coruña, Alicante, Almería, Castilla-La Mancha, Extremadura, Granada, Jaime I of Castellón, Málaga, Basque Country, Technical University of Catalonia, Technical University of Madrid, Valencia University of Technology, Rey Juan*

Carlos, Sevilla and Zaragoza) and three companies (*Oracle Ibérica, Cronos Ibérica and CRC Information Technologies*). Nowadays almost all Spanish research groups in the Database field are involved in the RedBD activities.

This NoE is supported by the Spanish Ministry of Science and Technology [TIC 2001-5079-E]. Its aim is to promote an active collaboration among different Spanish research groups in the Database and Information Management field. This collaboration is oriented in four directions: first, to improve the joint work in research projects and publications; second, to allow a fluent knowledge interchange of research topics; third, to create a group of reference for the database companies in Spain; and, finally, to achieve an international high level position in database research.

In this paper we sum up the groups that belong to RedBD as well as their main research topics and projects.

We do not need to remark the importance and impact of the database market. The IDC market research firm reported a global sales revenue of \$11.1 billion for relational and object-relational databases and \$211 million for object databases in 1999. Through 2004, IDC predicts annual growth rates of 18.2 percent for relational and object-relational databases and 12.5 percent for object databases (further details can be found in <http://www.idc.com>).

Additional information about projects and publications of all the research groups can be found at their respective web sites.

2 Research Groups of RedBD

As mentioned in the introduction, in the rest of this paper we are going to present the seventeen groups that belong to RedBD as well as their main research topics and projects.

2.1. Alarcos Research Group



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Alarcos is a research group of the University of Castilla-La Mancha, sited in the Escuela Superior de Informatica of Ciudad Real. The group was founded in 1997 and it is led by Prof. Mario Piattini. 14 faculty members and 8 students form it. Alarcos has a long record of successful projects combining state of the art research with the practical needs of software organisations.

Alarcos research focuses on IS Quality: mainly database design methodologies and metrics for conceptual and logical database/data warehouse models. Action Research and Empirical Software Engineering are used as research methods.

Alarcos research is supported by different projects from the Spanish Ministries of Industry and Science & Technology, and Castilla-La Mancha Regional Government.

2.2. BDI: Interoperable Databases



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The members of the BDI group are distributed in two universities, Basque Country University (Languages and Information Systems department) and University of Zaragoza (Computer Science and System Engineering department). Nowadays five faculty researchers and eight Ph.D. students belong to the BDI group, whose leader is Prof. Arantza Illarramendi.

The research of the BDI group is focused on the data management issues. Some of the topics currently being investigated are Information Integration, Semantic Web, and Data Services for Mobile Computing. The vision of the group is to combine fundamental and practically applicable research. In the area of Information Integration the research is mainly focused on ontology-based query processing for Global Information Systems. Concerning Semantic Web, the work of the group is oriented to the development of a framework that allows the interoperability of heterogeneous systems. Finally, in the area of Mobile Computing, the research is carried out in the aspects related with

the location dependent queries and in using PDAs (Personal Digital Assistants) as execution platforms for different applications. Moreover, nowadays application domains related with Telemedicine are of special interest for the group.

The group receives financial support from national and local governments.

2.3. BLOOM Research Group



<http://www-lsi.upc.es/bloom/>
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BLOOM research group was founded at the Technical University of Catalonia in 1988. Now it is a federated group composed by two subgroups: one in Catalonia, led by Prof. Fèlix Saltor, also leader of the whole group; and another in Andalusia, led by Dr. José Samos. Most of the members of the subgroup from Catalonia belong to the Technical University of Catalonia, but there are also members from the University of Lleida and from the University of Jaume I. The majority of the members of the Andalusian subgroup work at the University of Granada, but there are also members from the University of Almería and University of Jaén.

BLOOM'S main research topic is Information Integration, initially centred on Federated Database Systems, but now also focused on Object Oriented Databases, Data Warehousing, Security, and Information Integration using Ontologies. Publications on these topics can be found in the group web page. The Spanish Government supports the research carried out by this group.

2.4. Databases Group



[http://www.dsic.upv.es/
users/bdd/bdd.html](http://www.dsic.upv.es/users/bdd/bdd.html)
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The "Databases" group is a research group in the Valencia University of Technology sited in Valencia. The group was founded in 1996 and Dr. Matilde Celma leads it. It is a group of 6 faculty researchers and several students. The group has a long experience in Deductive Databases (knowledge revision, integrity checking and integrity enforcement). Currently, the group has centred its research effort on the fields of Conceptual Modelling

(design driven by constraints) and Data Warehouses (modeling techniques, formal models).

The Spanish government and the Valencia University of Technology mainly support the research.

2.5. Database Research Group



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The SINBAD research group belongs to the High Technical School of Telecommunication Engineering at the Technical University of Madrid (UPM). The group was established in 1982 and it is led by Dr. Carmen Costilla. Information Systems and Database are the main research fields (see their web for details).

The group has built many Spanish Industrial Information Systems by applying different integration and interoperable database techniques (mirrors, federation, replication and distribution), and workflow systems interoperating with many pre-existing ones. Of special relevance is the Parliamentary Management System this group has built for the regional Parliament of Madrid, that has been successfully running since 1999.

Currently, the group research is focused on Heterogeneous Web Data Sources Integration and Semantic Web, applied to the Web Digital Archives integration in order to define a virtual web integrated architecture through a unified semantic mediator layer (formed by ontologies, mappings and data repositories) and wrappers (coupling the heterogeneity between data sources and using XML). The final idea is the implementation of different web services (as Java libraries).

Currently the research is supported by national and local governments (90 %) and by Spanish industry (10 %).

2.6. DMKD: Data Mining and Knowledge Discovery Lab



<http://nova.lsi.fi.upm.es/DBDMLab>
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DMKD is the Data Mining and Knowledge Discovery Lab of the Facultad de Informática (Technical University of Madrid) led by Dr. Javier

Segovia. This Lab main research is related to Data Mining. In this sense all the aspects (theoretical and practical) related to the discovery of hidden knowledge in big volumes of data are covered. The main lines of research are: Business Mapping, Web Mining, Methodologies to develop Data Mining Projects, Data Warehousing, Data Mining and Data Visualization.

The research is supported in a 50% by the Spanish Government and in a 50% by the industry.

2.7. EKIN Research Group



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The EKIN group was established at Basque Country University in 1991, having Active Database Management Systems as the main research topic. Prof. Oscar Díaz leads the group and 6 faculty members and 5 students form it. From 1998 onwards, the group attempts to foster the links with industry, and so has rendered a gradual transition from Databases to Information Systems (IS) in general, and Web-based IS in particular. Current research topics include the use of active rules in web applications, model-based Portal development, and document engineering.

The research is supported in a 70% by the Spanish government and in a 30% by local industries.

2.8. FOLRE: Facing On towards Logical database Rule Enforcement

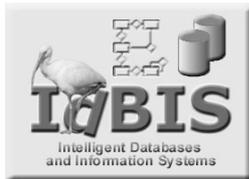


<http://www.lsi.upc.es/~folre>
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The FOLRE group (Technical University of Catalonia) is formed by 4 faculty members and 2 students and led by Dr. Ernest Teniente. People from the group have extensively contributed to the field of deductive databases for about ten years. At present, its research is mainly devoted to problems related to database updating, query containment and database schema validation in databases that allow the definition of intensional information by means of views, integrity constraints and conditions to monitor. In particular, the group is involved in a project

granted by Microsoft Research to provide a tool for database schema validation in SQL Server©. The group is supported in a 70% by R&D national competitive projects and in a 30% by industry.

2.9. IDBIS: Intelligent Database and Information Systems



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IdBIS is a research group in the area of Information Technology and Systems founded in January 1998 by 12 researchers and teaching staff belonging to the Department of Computer Science and Artificial Intelligence of Granada University (Spain). At present, the group is constituted by 16 members (13 Ph doctors and 3 students) and it is led by Dr. M. A. Vila. The research of the group is mainly focused in representing and processing imprecise information in Logic, Deductive and Object Oriented Models by means of the Fuzzy Logic. The group is also interested in using Soft Computing techniques in Information Retrieval Systems as well as in Data, Text and Web Mining problems. Significant publications of the group are listed in the web.

Currently, the research of the group is supported by the Spanish Government and the EU.

2.10. IWAD: Web Engineering and Data Warehouse Research Group



<http://gplsi.dlsi.ua.es/iwad/>
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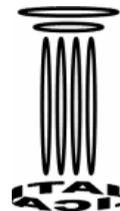
IWAD is a research group of the Language and Information Systems Department in the University of Alicante. The group has two main research lines: Web Engineering and Data Warehouses. The group was founded in 2000 by Dr. Jaime Gómez and is currently formed by 8 faculty members and 6 granted students; Dr. Juan Trujillo is the responsible of the Data Warehouse area and Dr. Cristina Cachero of the Web Engineering one.

The main topics regarding Data Warehouses are database modeling, conceptual design of data warehouses, multidimensional databases, OLAP (On-Line Analytical Processing), object oriented analysis and design with UML, Common

Warehouse Metamodel (CWM) and Multidimensional databases with XML. On the other hand, the main topics regarding web engineering are the conceptual modeling of web applications, web personalization and services, PKI (Public Key Infrastructure) and digital signatures.

The group receives financial support from national and local governments as well as from private projects carried out with companies. Additional information about projects and publications can be found at the web.

2.11. Italica Research Group



<http://www.lsi.us.es/italica/index.html>
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Italica is a research group in the Dept. of Languages and Computer Systems in the High Technical School of Computing (University of Seville). The group was founded in 2000 and is composed by 8 researches (6 faculty members and 2 students) and Dr. F.J.Galán leads it. The main research topics of the group are related to Web-based Information Systems, in particular to the study of ontologies and the expressivity problem through different languages such a OWL, the study of the query problem (not only to identify web data, but also web services), and the study of terminological knowledge and approximate reasoning to overcome non-ideal conditions in the web. Information about publications can be found at the web.

At the moment, the Spanish Government supports the research.

2.12. Khaos



<http://khaos.uma.es>
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Khaos is a research group of the University of Málaga. Founded in 2001; it is led by Dr. José F. Aldana. It is a group of 8 researchers (4 faculty members and 4 students). The research is mainly focused in the amalgamation of database and knowledge representation and reasoning technologies in the context of the Semantic Web (mainly in semantic mediation and scalability issues).

The research is supported in a 15% - 45% - 40% by the Regional, National and EU Governments respectively.

From a practical point of view Khaos is interested (and actively working) in biological (genomic) database integration and in the conceptual mediation in digital libraries. Khaos is also involved in European-wide educational initiatives like in DBTechPro project (founded by the Leonardo da Vinci EU program).

2.13. Kybele Research Group



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Kybele is a research group of the Rey Juan Carlos University sited in Móstoles, a town in the metropolitan area of Madrid. The group was founded in 1999 and Dr. Esperanza Marcos leads it. It is integrated by 12 researchers (8 faculty members and 4 students).

The research of the group is mainly focused on Web Information System Modeling, including conceptual modeling, database, Object-Oriented, Object-Relational and XML database design; Data Warehouse design; Web service design, etc. The main application domains of the group are currently medical image managing and Web portal integration.

A secondary line of the group concerns philosophical foundations of Information Systems and Software Engineering.

The research is supported in an 80% by the Spanish government and in a 20% by Commerce and Industry.

2.14. Laboratorio de BD (Database Lab)



<http://emilia.dc.fi.udc.es/labBD>
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The Database Lab (Computer Science department, University of A Coruña) is formed by 13 researchers (9 of them faculty, 6 having a Ph.D. degree), and is led by Dr. Nieves R. Brisaboa.

This group has achieved important results on theoretical aspects of database management, mainly semantic and syntactic optimization of queries, but

has lately moved to new two areas: Spatio-Temporal Databases and Geographical Information Systems, and Documental Databases in the Web.

Regarding Spatio-Temporal Databases and GIS, the group is doing theoretical research as well as development of practical applications.

Concerning Documental Databases and the Web, the group is currently doing research at three different levels: physical management of data, integration of documental databases, and the study of the design of user interfaces, especially Web interfaces for documental databases. The research on the first level is currently aimed at the search for compression and indexing methods for texts that allow searching directly on the compressed texts, leaving decompression only for displaying purposes. Regarding the two remaining levels, the group is studying the use of ontologies to federate digital libraries and to dynamically design Web user interfaces to query the federation and display the results.

National and local governments support the group. Information about its publications and research projects can be found at the web.

2.15. Minerva Research Group



Data Mining Group
University of Seville

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Minerva is a research group located in the Southwest of Spain. 12 researchers, all faculties from the University of Seville and the University of Huelva, form the group. Four of them have a Ph.D. in Computer Science and the leader is Dr. José C. Riquelme. The main area of research of Minerva group is Machine Learning, especially in works related with Data Mining techniques. The group develops tools for rule based supervised learning, techniques of feature selection in very high-dimensional databases, learning on data-streams and applications for biological data. The Spanish Research Agency CICYT and the Andalusian Research Plan of the Local Government basically support the research. Additional information concerning projects and publications of the group can be downloaded from web site.

2.16. TKBG: Temporal Knowledge Bases Group



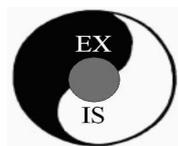
<http://www3.uji.es/~berlanga/berlanga@lsi.uji.es>

TKBG is a research group of the Jaume I University sited in Castellón at the Mediterranean coast of Spain. The group was founded in 1997, and Dr. Rafael Berlanga leads it. TKBG consists of 8 researchers (3 faculties and 5 PhD students).

The main research areas of the group are Temporal Modeling, Storage and Retrieval of Structured Documents, Analysis and Exploitation of Temporal Information in Digital Libraries, XML and the Semantic Web. Recent research results of the group include the following: XML schemata inference and evolution for heterogeneous repositories; Methods for the automatic summarization of topic-based clusters of documents; Temporal-semantic clustering of newspaper articles for event detection; Techniques for text mining using the hierarchical syntactical structure of documents; Extraction of temporal references to automatically assign document event-time periods; Techniques and tools for the temporal analysis of retrieved information; Analysis and exploitation of spatiotemporal knowledge in a semantic Web; Application to the research on Archaeology. Information about publications can be found at the web.

The research of the group is supported 50% by the government and 50% by private companies.

2.17. UEX Database Research Group



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The members of the EXIS group are working in the University of Extremadura (Dep. of Computer Science). One research line, led by Dr. Antonio Polo Marquez, is focused on the data management and processing of documents issues. Some of the topics currently being investigated are Information Integration, Data Versioning, Temporal Databases, Multidimensional Indexing and applications of XML related with e-learning and Digital Libraries.

Another prominent research line is the Q-tree project, headed by Dr. Manuel Barrena, whose main goal is to make evolve a multidimensional access method in order to give efficient answer to searches in low- and medium-dimensional feature spaces. The Q-tree is currently being used as a motor search in Xerka.net, a commercial application to catalog text documents.

3 Conclusions and Main Activities in RedBD



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In this paper we have presented RedBD, the Spanish network of excellence in database research. As can be observed, the Spanish research in DB includes a wide range of topics related with DB Modeling and Design, DB integration, Deductive and Intelligent DB, Mobile DB, DB Quality, Data Warehouse, XML DB, Digital Libraries, etc.

To promote the collaboration among the different database research groups in Spain, RedBD has carried out some activities including, workshops, invited lectures and round tables. In addition to support database research, RedBD has also teaching initiatives. At this moment, Spain is suffering an important change in the educational system to be adapted to the European Union System. With this aim, RedBD has elaborated a proposal of database curricula based on the well-known curricula. More information about that proposal can be found in the RedBD main Web page at <http://kybele.escet.urjc.es/RedBd>. Finally, we would be very pleased if we could join our RedBD in a World-RedBD.

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