

***Digital libraries for Mathematics:
the achievements of the SIBA Coordination of the University of Lecce (Italy)***

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Full-paper

The SIBA Coordination of the University of Lecce (<http://siba2.unile.it>) coordinates the development of the Telematic Information System for research and education, as well as the development of the computerization of the University libraries.

It has various laboratories equipped with the latest technologies and facilities and coordinates numerous national and international projects for the cataloguing, the digitalization and the fruition of bibliographical and documentary material, for the publication and consultation of electronic journals, for the conversion in electronic format of the back volumes and for the development of the methodologies for the implementation of the digital technology in the field of cultural heritage.

In particular SIBA Coordination is the national coordinator of SINM (Sistema Informativo Nazionale per la Matematica).

SINM is the Italian National Information System for Mathematics, which includes all the Italian Mathematical Libraries.

It enables the Italian mathematical community to have easy access to a coordinated system of bibliographical, documentary, full-text and multimedia resources. It aims at the development, diffusion and sharing of electronic information resources regarding mathematics, at a less possible waste of technical and financial resources.

Within this Information System, SIBA Coordination has developed: the *SINM portal*, accessible at the URL <http://siba2.unile.it/sinm>; the *National Journals Catalogue of Mathematical, Physical, Computer and Technological Sciences*; the *OldenMath* System; the Italian National Index of Mathematical Preprints *SINM-MPRESS*; the *REIM* System; the *Italian Editorial Unit of Zentralblatt MATH*.

The **National Journals Catalogue of Mathematical, Physical, Computer and Technological Sciences** contains the bibliographical descriptions and holdings of the journals of the Italian scientific libraries belonging to SINM as well as the registry data of the same libraries; moreover, it contains the bibliographical descriptions of the journals available in electronic format and links to the relevant Web sites. It is integrated with the *Archive of Indexes* of journals of major interest for mathematicians (<http://siba2.unile.it/cgi-bin/waisidx>), with the *Electronic Journals Catalogue Directory* (<http://siba2.unile.it/ej-catalogue>) - both realized by the same SIBA Coordination - and with other network resources (databases and electronic journals full-text).

The Catalogue, accessible by Web at the URL <http://siba2.unile.it/archives/bibsearch.html>, allows the user to find the desired information in an extremely simple way, to request automatically copies of journal articles by e-mail (clicking on the library of interest and the relevant e-mail address), exclusively for scientific purposes, or to access directly the electronic version available on the Web servers of the publishers, on the *ScienceDirect OnSite Server* of CASPUR, Rome (<http://periodici.caspur.it>) and through the Digital Library of CILEA, Milano.

The more, dynamic links enable to extend to the Catalogue the searching on the databases shared on the *ERL-WebSpirs* server (<http://siba2.unile.it:8590>), on the *Electronic Journals Catalogue Directory* (<http://siba2.unile.it/ej-catalogue>) and on the *ZMATH* (<http://siba-sinmdb.unile.it/ZMATH>) and the *MATHDI* (<http://siba-sinmdb.unile.it/MATHDI>) Databases, in order to locate journals and to find documents.

The **OldenMath** System (<http://siba3.unile.it/archives/omsearch.html>) intends to catalogue rare and valuable editions in the mathematical area held by the Universities and research organizations belonging to SINM and to digitize the same editions, partially or completely, by use of the SIBA Coordination Laboratory for digital acquisition and processing of images (<http://siba2.unile.it/sedi/labim.html>).

This Laboratory, equipped with sophisticated hardware and software facilities, allows the acquisition of digital images at both low and high resolutions (7520x6000 pixel), in zenithal axis, on balancing platform, with HMI cold light lamps, in full compliance with the regulations for the preservation of documents.

The System for acquisition and digital processing guarantees the protection and the preservation of the documents of particular value, as well as the safeguard from further damage provoked by repeated consultation, while allowing its immediate assessment. It optimizes the quality and the quantity of information and guarantees the reading of informative data in a stable, unchanged and lasting way for what concerns the colour and the characters. It allows the acquisition of information, not perfectly visible for the naked eye, and increases the possibilities for study and research.

The software for the on-line management and consultation of the OldenMath Catalogue, developed ad hoc by SIBA Coordination, is based on the CDS/ISIS System. The Web interface being realized for an easy access to the catalogue uses the search engine WAIS-ISIS.

The search template allows the location of a specific work within the catalogue, searching for title, author and/or editor, publisher and/or typographer, publication place and date. It allows moreover to navigate on authors, publishers, typographers, publication place and date, series and/or collective titles.

By a common browser (such as Internet Explorer 4.0 or equivalent) the user can access bibliographical descriptions of documents and the relative digital images. Moreover, it can browse entirely digitized documents, get information about the libraries to which they belong and access their relative Web sites.

The current OldenMath Catalogue (<http://siba3.unile.it/archives/omsearch.html>), realized within the homonymous Project and the *I17 Initiative* of the *Coordinated Project of the Universities of Catania and Lecce*, contains bibliographical descriptions

of olden, rare and valuable editions, held by mathematic libraries of the University of Pisa, Bologna, Milano and Padova.

The bibliographical descriptions follow the ISBD(A) standard.

The images refer to the partial or entire reproduction of some editions and to the more significant pages of the other ones (title page, incipit, colophon, etc.). The resolution of the images stored (in JPEG format) in the on-line Catalogue, accessible by Internet, is of about 550x850 pixels; the resolution of images stored in the historical archive, for a more in-depth study by scholars, is of 2000x3000 pixels. On each image accessible by Internet a logo has been applied, indicating the name of the University of Lecce and of SIBA Coordination (who realized the images), in order to prevent somehow any embezzlement.

To cite some volumes present in the OldenMath Catalogue:

- ✓ the II Tome of the *Elements d'algèbre* of Euler, *De l'Analyse Indéterminée*, published at Lyon in 1774, held by the library of the Department of Mathematics, Computer Sciences and Physics of the Pisa University; the volume has been entirely digitized and it is possible to browse its pages one by one; to proceed skipping 20 pages at a time or to go directly to the desired image;
- ✓ a volume of the *Geometria* by Cartesio, held by the library of the Department of Mathematics of the Milano University, from which currently only the more significant pages have been digitized;
- ✓ two entirely digitized specimens of the library of the Mathematical Seminar of the Padova University: *Optice* by Isaac Newton and *Mathematicae Collectiones* by Pappus Alexandrinus;
- ✓ the 2nd edition of Algebra by Raffaele Bombelli, published at Bologna in 1579, volume that Riccardi defined as "rare and valuable". It is a very important work for the history of mathematics. The volume belongs to the "Bortolotti Fund" that takes its name from the Bolognese mathematician and historian who discovered, in the Library of the "Archiginnasio", a manuscript containing the IV and V volumes of the work, and he published it.

SINM-MPRESS (<http://siba-sinm.unile.it/mpress>) is the Italian National Index of Mathematical Preprints; it collects and indexes the preprints of Italian mathematicians, and is included in the international system MPRESS/MathNet.preprints (Mathematics Preprint Search System, <http://euler.zblmath.fiz-karlsruhe.de/MPRESS>). It is based on Harvest, a highly flexible software that works in a distributed way, giving the possibility to index both preprints entirely hosted on the SINM-MPRESS server and those stored on other Web sites. Moreover, SINM-MPRESS is interoperable with the ETRDL System (<http://www.iei.pi.cnr.it/DELOS/EDL/edl.htm>) of Computer Sciences and Applied Mathematics preprints of CNR and ERCIM (European Research Consortium for Informatics and Mathematics).

REIM (Riviste Elettroniche Italiane di Matematica = Italian Electronic Mathematical Journals) is a project aiming at the coordination and the development of

the National System for the Web publication and consultation of the Italian electronic mathematical journals.

The project aims also at the conversion in electronic format of the back volumes of the journals, based on the system developed by EMIS (European Mathematical Information Service, <http://siba-sinmemis.unile.it>) within the ERAM project (Electronic Research Archive for Mathematics, <http://www.emis.de/projects/JFM>).

The REIM System for the management and consultation of electronic journals has been implemented by SIBA Coordination in January 2000 with the publication of the electronic version of the Journal "Note di Matematica" (<http://siba2.unile.it/notemat>) by the University of Lecce. Like the ESE System (<http://siba2.unile.it/ese>), implemented by the same SIBA Coordination within the ESE project (Electronic Scientific Publishing of University of Lecce), REIM is based on standard and open technologies (SQL, PHP), on the use of standard formats for the access and electronic distribution of documents (PDF, PostScript, TeX) and on the use of standard communication protocols (HTTP). REIM enables the editorial management of electronic journals, the loading of full-text documents and the management of the relative metadata by means of a specific Web interface (<http://siba2.unile.it/sinm/reim>).

The more, it allows to consult journals by means of a sole Web interface (<http://siba2.unile.it/sinm/reim/search>). It enables to search by title, author, abstract, keywords, MSC classification (Mathematical Subject Classification) and DOI code (Digital Object Identifier) contemporaneously on one or more journals. Each indexed article in the REIM System has a DOI code (assigned by SIBA Coordination) automatically generated and registered by the same system in the international index (DOI Directory).

The DOI coding is universally acknowledged and enables the unequivocal and permanent identification of each document in electronic format through the assignment of an alphanumeric code to that document by the publisher.

The REIM System enables to control the access to full-text documents through the authentication of the user by IP address or by password.

The REIM System enables also to consult, through the same Web interface, the electronic journals of other publishers: the System indeed allows also to index the metadata concerning external electronic documents and to refer to the full-text on the relative publisher Web sites.

Since early 2000, together with the FIZ Karlsruhe, the European Mathematical Society and other European partners, SIBA Coordination cooperates to the *LIMES project (Large Infrastructure Mathematics-Enhanced Services)*, founded by the European Union for the scientific and technological development of *ZMATH Database* (<http://www.emis.de/projects/LIMES/>).

Within the LIMES project, SIBA Coordination is the **Italian Editorial Unit of ZMATH** (<http://siba-sinmlimes.unile.it/editZMATH/>), that deals with the reviewing of the Italian journals, monographs and proceedings and is actively involved in the development and the updating of the same database. In order to support the whole Editorial Unit workflow in the most linear, effective and "paperless" manner, SIBA Coordination has designed and developed the LIMES-NAIS (New Advanced Input

System). It is a full Web application which supports every step in the editorial unit workflow, including the reviewing process by external reviewers and the data transfer to the ZMATH central production system. NAIS has been designed to allow: a dynamic bibliographic database structure, based upon a *bibliographic database structure definition*; an effective user management, based on the concept of *user roles*; a fully multilingual Web interface for internal (editorial unit staff) and external (reviewers) system users.

NAIS has been built using MySQL 3.23 as SQL database engine and PHP 4.1 as server side scripting engine. PHP scripts generate HTML and Javascript code for the Web user interface, XML data for the XMLRPC interface and the data download interface. The generated Javascript code avoids the use of any browser specific feature, to guarantee, as most as possible, a complete cross browser compatibility.

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