



Information systems Conception of University of Ostrava

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Preface

Information systems (IS) complex at the University of Ostrava, which was a starting point for the system development, had been considerably fragmented and ill sorted. Individual systems had been operated in heterogeneous environment, IS hadn't had a possibility of intelligent communication.

All requirements for reciprocal data transfer had had to be solved in a complicated way of exports, manual data corrections and consequential imports. As a result there had been a kind of an off-line communication, which had been very ineffective. There hadn't been any effort to solve an integrated user authentication against the systems; it had been necessary to administer different set of users' accounts and passwords in every system with their rights.

Along with rising demands on speed and effectiveness of information processing the UO was obliged to reform gradually its internal IS so that these systems could communicate without major problems, whereby the necessity of registering one change (e.g. with a person) separately to every system could be removed. It was apparent that this step would require preferably utmost unification of individual systems and mainly as a necessary condition - reinforcement of the HW background.

All the University buildings, the current number of which is about twenty, have been interconnected with optical cables, some with microwave connections. A sufficient bandwidth enabled a radical change of the backbone network technology to GigabitEthernet with a central router, which routes twelve IP networks of class C. Structured cabling (app. one thousand ports RJ 45) has been built in all the buildings; according to demands on the bandwidth switched or shared Fast Ethernet (transfer rate 100 Mb/sec.) is employed.

We can state that there has been built a modern and concerning capacity sufficient information infrastructure for operating all the information systems that are currently installed or prospectively planned.

The IS being nowadays operated in the frame of UO see pic. 1. There is an effort to use Oracle, possibly other SQL databases as a main database environment.

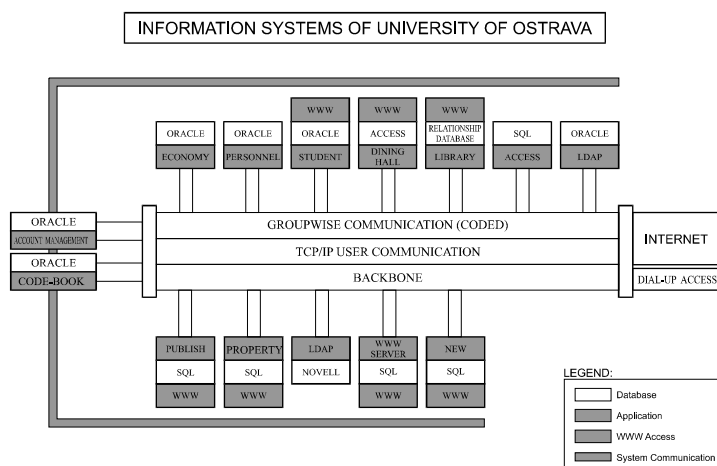
1 The Study IS Student

The IS/STAG built in CIV at the University of West Bohemia has been chosen as the IS for managing students agenda of UO.

The system currently covers these user functions:

- complete record of a student (both personal data and course of studies)





Picture 1 Information Systems of University of Ostrava

- entering and editing a subject syllabus (incl. bindings to conditional subjects, excluding subjects and subject capacities)
- entering and editing study programs (incl. bindings to a specialization, combinations of specializations and conditional branches)
- entering and editing study plans (incl. bindings to subject sets, obligatory subjects in the first term and globally obligatory subjects)
- entering and editing schedule (incl. collision check, data searching according to various criteria etc.)
- pre-enrolment of students (every student interactively makes his/her individual study plan for a following academic year on the ready-made schedule, there is a possibility to print the schedule, prospectively a possibility of the pre-enrolment via the Internet is taken into account)
- marks recording (implemented not centrally, but at places where the data arise, that is at the departments)
- publishing exam terms, enrolling in them
- printing information brochures on studying in TEX environment (not a condition)
- preparing groundwork for the enrolment of students (monitoring the study conditions fulfillment)
- a quantity of various printing sets (from the particular ones about a student or a subject and a schedule action to e.g. opening sheet v11, students register or a listing for General Health Insurance)

The database access is possible by means of distantly (locally) installed clients. Usual PCs under OS Windows 95, 98 and NT are employed for the clients' work. An automatic updating of new versions of local installations for all users has been resolved.

There is also implemented a passive access (enabling anonymous browsing and searching selected data) through WWW pages.

2 The Identification System Viking

The security of the access to some areas of UO is ensured with a Viking system above SQL database. Terminals and a computer with appropriate software form the access system. There is a possibility of defining an access right on the computer both for an individual and for a group, which enables generating pre-defined profiles. The profiles can be generated manually or in an automated way by means of a data transport from the subsystem of the access rights. The data are consecutively sent to the terminals and these take the physical control operation over individual access and identification devices. The data back-flow is again transparent, namely from a point where the data arise (a sensor, gate etc.) to a collecting terminal and by means of a batch stream through LAN into the central computer. A great advantage of the system is a fact that there is no need to maintain permanent connection among the terminals and a computer because the terminals are capable to operate independently.

2.1 Identification cards

Within the implementation of individual systems there occurred a requirement concerning establishing identification cards both for students (student's ID card) and for employees (employee's ID card) of UO. Use of contactless proximity cards proved to be the best solution. Concerning the students' cards a graphic format of the international student organization ISIC, which provides them with a number of other benefits, has been chosen. Currently the system is used especially for an authorized access to computer classrooms and labs, for an access to some restricted computers, for circulation operations in the university library, in the students' dining hall etc. We aren't considering the use of identification cards at the moment due to high costs of scanners for all the computer stations.

3 The Library IS TINLIB

University library has been processing publications in the automated library system TINLIB (since 1999 T-series) for four years now. The new version has brought improvement in all modules that are used in the UL with respect to processors and users.

The system employs hypertext techniques that enable a user to navigate fluently among individual entities; e.g. from a subject to a book, from the book to a publisher, from the publisher to another book, from the book to a borrowing etc. T-series can operate on MS-DOS, Windows and UNIX, in both cases both in single user and multi user version.

An automated circulation record was launched at the end of year 2000 and it is used to identify readers by means of contactless students' cards and books by means of inset bar codes.

A passive access is being implemented (enabling anonymous browsing and searching selected data) through WWW pages.

4 The Economy IS

An implementation of a new economic information system was in progress during 1999. The whole system is modular, at present it contains these modules: The double-entry

book-keeping, The obligations, The cash, The bank, The banker's orders, The manual book-keeping, The travelling reimbursements and The stock.

The system is parametrical, there is a possibility of analytical accounts segmentation according to an organization structure or activities. The security is resolved very well. The system of rights allocation enables individual employees to have rights for working only with those documents that are relevant to the particular workplace. It enables to monitor working with documents. The system provides a large scale of sets that enable responsible employees at individual departments to monitor turnovers and states of the relevant accounts and thus check drawings of the means. In addition to a simplification of routine activities (document pairing, account coding) it obviously enables to acquire all the legal outputs (the general ledger, the daybook, the income statement). A transition to fully electronic communication with a bank has been prepared.

5 The Personnel IS

An implementation of a personnel system of human resources management began during year 2000. The system operates above The Oracle database and contains following modules:

personal data processing (a new employee, active employees maintenance, job applicants stock book, creating documents for the personnel department)

training and certification of the employees (training, training actions, certification, employees' participation)

work safety and health examination

evaluating requirements for the employees, career regulations

selective proceedings (selective proceedings code book, selective proceedings participants)

school organization chart (levels of the centers and working positions, definitions of the centers and working positions, working positions placement, variants of an enterprise organization chart)

6 The Intranet

There has been a great development of the use of the address services, system of the electronic mail management, electronic conferences (lists), internal communication and others. These services are secured mainly with the Novell 5.1 with a support of the NetWare Directory Services (NDS) 8. Currently an implementation of the system Group Wise is under way, which is going to secure coded correspondence, document management, differentiated access to directories and other services. The access is going to run in the frame of a standard Novell account and password.

7 The Users authentication

Along with a growing amount of IS the number of accounts and passwords in various systems becomes complicated for the user and thus creates a potential security hazard. It is the application administrator who manages the accounts and access rights for supplier secured systems (The Student, The Economy, The Personnel). The other systems (science and research, publishing activity, property and software accounting etc.) required a central authentication mechanism that could be gradually transformed even to a certification authority.

After a number of tests and considering the fact that the Novell has been employed for address services and electronic mail at UO for a long time we have chosen The Novell's NDS as an authentication authority. An application, usually with WWW access written for instance in PHP script, where it is necessary to authenticate the user, employs Lightweight Directory Access Protocol (LDAP) service on the NDS and verifies his/her access and rights against usual account and password from the Novell. The rights are configured by the application administrator by means of the cluster mechanism in the NDS. Thus the users can access many systems with one account and password, which they have in the Novell.

This system requires mutual interlacement of the IS carrying primarily personal information and a cooperation with the NDS via integrated code book of persons (personnel classification).

8 The Integration of the existing IS

In the course of setting individual systems we managed to integrate database environment into the Oracle platform and SQL platform. In those systems where it wasn't possible the automated transition bridges have been created. There was a necessity to create an integrated code book of persons (personnel classification) with a unique ID number in the frame of the University, respectively to have a possibility of maintaining the code book in an up-to-date status automatically via individual systems. Two accounting subsystems are related, namely the specification of access rights of a particular person and user account parameters on the UO's servers. The access rights are defined in the user account database on the Oracle, information on accounts et al. will be deposited in the NDS and accessible via LDAP service. In practice it will look as following.

From a student's point of view: At a moment of his/her enrolment in studies there is automatically performed a record of his/her identification data into the integrated code book of persons (personnel classification) from IS Student, the following record is performed into a subsystem of user account parameters, where these parameters are set regarding a specialization the student has enrolled in. In addition, after collecting the ID card an allocation of the card and a record into the access rights subsystem is performed. In case of termination of studies a prompt for record cancellation is set automatically for the records of this nature.

From an employee's point of view: At a moment of registering the employee into the Personnel IS the system activity is analogical, access rights et al. are configured according to an executive and working position.

The WWW account administration client operates over the above mentioned subsystems. Through PHP it approaches information deposited in charts of access rights and account parameters, ensures topicality of configuration of individual user account parameters and generating alias files for the electronic mail.

Thereby the simplification of access rights administration in the frame of the UO will occur and last but not least the access to services provided in the frame of the University network for users themselves will be simplified. The idea of building the whole system is such that each employee or a student will be allocated with only one user name and password for the access to all services he/she is entitled to use regarding the working position (specialization).

Currently there is ongoing work on development and launching of an integrated WWW system that would present data provided by individual IS in an integrated way.

9 The security policy

An essential and often omitted component in IS implementation is defining the security policy. At the University of Ostrava the security policy implementation is in progress in two levels.

During a particular IS installation the access rights for users are set, backup, data archiving and data transfer coding are ensured, there is a power supply backup, the security of a computer itself and OS is preferably treated.

After finishing the installation and implementation the IS is included into the other employed systems, which are protected against network attacks, possibly against attacks from the Internet and a periodical training of users for working with information deposited in databases, with access rights and passwords treatment etc. is going to proceed.

10 The conclusion

In fine we can say that in the above mentioned way we have managed to integrate and interlace IS in the frame of the UO and to establish using contactless cards, according to which we have adapted the other systems so that the card could be used in the students' dining hall, in the library, for the access to specialized classrooms and labs and owing to the ISIC format the card can be used as a student's ID in the Czech Republic and in other countries to obtain various price reductions on the public transport system, accommodation, cultural events etc.

The users are authenticated to majority of the systems by means of account and password from the Novell, concerning supplier systems on the Oracle we are preparing the selfsame with regard to the LDAP Oracle.

References

- [1] Vrana, I., Bůřil, J., Černý, A.: Metody zavádění informačních systémů na univerzitách. Praha, VUTIU, 1999 Page 155, 80-214-1344-1.