PAST, PRESENT AND PERSPECTIVES OF INFORMATION SYSTEMS AT TECHNICAL UNIVERSITY OF KOŠICE

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Introduction

Technical University of Košice (TUKE) is a third largest university in Slovakia. The University consists of 9 faculties, located in two closely situated cities – Košice and Prešov (30km distance). Number of students – approx. 13000, staff – 1800. Thanks to its size and quite centralized campus, TUKE is one of the leaders in the area of applying information systems in the area of university management. The University is running several centralized information systems – financial, pedagogical IS, library IS and others.

The paper presents history and present state of development and implementation of various information technologies at the university.

History of modern information system at TUKE

History of the modern information system at TUKE, from the author's point of view, started in the middle of the 1990s. The University ran small standalone DBASE applications, with one exception, at that time. All applications were developed in house. The only SQL application at that time was a library information system, initially developed as a diploma work at the Department of Computers and Informatics and further developed and implemented at the Institute of Computer Technologies. It was implemented at the INGRES 1.1 platform, using INGRES 4GL language.

Pedagogical information system

Just at that time (middle of the 1990s), there was the first initiative to develop and implement Students' records information system. The first focus was on the development and implementation of processes realized at the students' offices – students' personal data, subscribed subjects, marks. The main service for academic community consisted of printing blank examination reports. Somewhere in 1997 first attempts of development of Web interface providing services for students and teachers started. It covers procedure for examination date publishing and subscription (just to explain generally – teachers are required to publish several examination dates during examination period and students are allowed to subscribe two attempts). Developed services were offered to the academic community on a voluntary basis.

After initial hesitation more and more teachers (and their students) were involved in the process. Students appreciated on-line opportunity to register (un-register) exam date which was previously performed manually in the registration forms located at the department (which means, a student had to visit the department in such cases). Using on-line service reduced problems connected with manual exam registration process – stolen registration forms, registration for more than allowed number of attempts just to reserve slot to himself/herself in the "crowded" date at the end of examination period, etc. With advent of mobile phone technology we experimented even with WAP interface to give

students opportunity to register/un-register from any place (i.e. in the case of illness). This approach was canceled by broad availability of the Internet in the country.

Besides students' record systems based on SQL technologies, admission procedure system was kept in the DBASE environment for a long time. Faculties used Department of Information System as data input office.

On the opposite site, teachers were not completely satisfied. IS gave opportunity to print examination form but because of midnight deadline of registration it was necessary to print it in the morning, just before examination. However, some not fully computerized departments did not allow performing this action at that time. As a result, new rules regarding exam registration were introduced.

Step by step implementation of information system led to new and new requirements regarding functionality. New global functionality include ranking for logging, support for process of subject registration, personalized schedule, etc. (for detailed description see bellow).

Payroll and accounting information system

In 1998 TUKE joined the previously formed TEMPUS project consortium (members: Sterling University – Scotland, UK; Ghent University – Belgium, University of Koblenz-Landau – Germany, University of Pavol Josef Safarik – Slovakia) and we resubmitted a previously unsuccessful project application. The application was successful and the TEMPUS project ISTOFIM (Information Systems as a Tool for Financial Management of University) became a starting point of the implementation of modern information technologies in the area of the university management. The goal of the project was to choose commercially developed accounting application and to try to start pilot implementation. Both Slovak consortia members, somewhere in year 2000, decided to implement centralized payroll system, based on SQL and client server architecture. Fortunately, both universities decided to implement the same application and we were able to cooperate in this area, too. We made a decision to integrate payroll application into TEMPUS project although it was not initially foreseen to deal with payroll system in the framework of the project.

The project of implementation of payroll system brought to the university a new culture in the area of information systems implementation. It was the first time in the history that a university decided to spend relatively large amount of money on the implementation of the information system. The requirement of the supplying company to follow their implementation methodology was accepted by the management of the university and we (IT department) gave the official frame to communicate daily information system implementation problem. At the same time, according to the initial goal of the TEMPUS project, commercial accounting application was chosen. Pilot implementation was successful and the result of the project was offered to university management. Initially, it was decided not to continue in the further implementation of accounting IS, because of financial requirement. However, at this time just new university law was passed and universities became independent bodies. After a strict and new requirement from the Ministry of Education regarding "yearly financial report" the university management realized usefulness of selected application and decided to support further implementation. As a result, pilot accounting application became standard university accounting IS. Further plans regarding close integration of payroll and accounting applications were canceled by the fact that the company supporting payroll application was bought by a competitor and the university was forced to implement a new payroll IS. We were involved in the painful process of information system implementation after a short period of time.

MIS

The experience of the supplying company in the area of OLAP (on-line analytical processing) results in the implementation of managerial information system after full implementation of accounting IS. It gave us an opportunity to provide any university "subject" (dean offices, accounting offices, departments, project coordinators) with one day delayed information about their budgets.

Library information system

As mentioned above, the library information system was the only SQL application in the middle of 1990s at TUKE. Consortium of several university libraries was formed at that time and a successfully applied foreign grant from the Carnegie foundation. A well-known APLEPH librarian application was chosen as a result. However, mainly librarian drove the process with no attention regarding technologies. As a result SQL solution was required at the beginning of the implementation only. It led to a delay in the process of implementation and delivered solution is not fully compliant to our requirements.

Underlying communication infrastructure

As mentioned above, university is centralized in the campus but some departments are located around the city of Kosice. One faculty is located in the city of Presov at a distance of 35 km. The University is member of SANET (Slovak Acedamic NETwork) – independent civil association providing the Internet connectivity to Slovak academic community and was a member of CANET (Cassoviensis Academy NETwork) – Association of Universities and Department of Slovak Academy of Science located in Kosice.

Fig. 1. SANET topology and supported bandwith (January 2001)

The main purpose of CANET was to develop an optical metropolitan network. Thanks to this initiative, there was no problem with connectivity in Kosice. However, SANET connectivity to Presov was limited and it posed limitation to utilize many of centrally operated information systems (see fig. 1 – 384 kbs for link from Kosice to Presov; link fulfilled mainly by students' traffic).

Another limitation was connectivity and configuration of computers at the departments on the campus. Many departments were using 10 Mb shared bandwith and not enough equipped computers, what was not sufficient to run clients of modern information systems.

Common problems of that period

There are many problems regarding development, implementation and maintenance of information system at any time. The main problems we solved at the described period of time can be divided into several areas:

- Technological – using DBASE database; standalone application; offline data exchange usually done by diskettes; no central data repository; congested link to Presov; etc.
- Organizational – in-house development of application; development have not strong support of management, ownership of data was not completely clear.
- Legislative – application developed by IT department without strong legislative support, very often by officers' interpretation of current legislative.
- Human resources – lack of qualified specialists.

CURRENT STATE OF IS AT TUKE

Current infrastructure

Somewhere in 2002 the Ministry of Education started with an initiative to support IT technology at the universities by a grant program. Although this money was cut from the total ministerial budget (targeted to universities in the past unstructured), it (virtually) created obligatory budget chapter devoted to IT. In this way the program gave to the university IT departments an opportunity to invest reasonable amount of money into area of IT without regard of "will" of university management.

As a result, there was a reasonable improvement in communication infrastructure at the university itself. IT department, not departments themselves, financed the process of communication infrastructure improvement. It gave an opportunity to spend extra money on equipment improvement for the departments.

SANET succeeded in the process of joining EU GEANT2 project, which gave an opportunity to build 1GB backbone throughout the whole country (Fig. 2).

As a result, we can say that communication infrastructure is convenient for the needs of information systems.

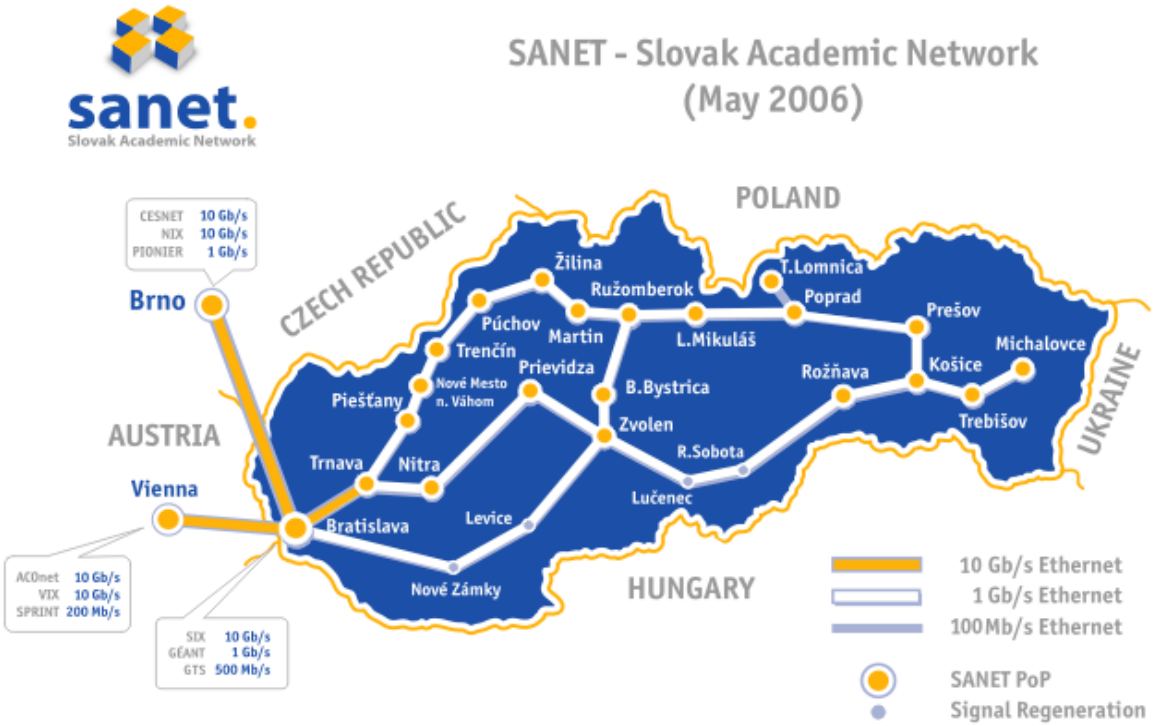

Fig. 2. Current SANET infrastructure (May 2006)

Current state of information systems

TUKE is running several centralized information systems:

- Pedagogical – in-house development;
- Financial – commercial application;
- Canteen information system – commercial application;
- Access information system – in-house development;
- Other (not so large) applications – in-house development – telephone directory, data regarding network resources, etc.

We will describe current functionality of particular information systems below.

Pedagogical information system

Pedagogical information system has developed to quite a large information system. Now it covers a broad functionality regarding:

- Admission procedure – registration of admission form; input of data from admission form to IS, ranking;
- Students offices at the faculties;
- Basic students' data;
- Students' registration for facultative subjects (several rounds process) with personalized timetable registration;
- Timetable reporting for students, teachers, subjects or rooms;
- Support of some semester processes (forming group of students, reporting)
- Examination period support – publishing dates of exams, registration of students; reports.

All students and teachers at all faculties use the pedagogical information system. Data input is distributed around the whole community, students have an opportunity to check their records.

The main current problems are insufficient performance of the server, application still based on CGI technology and remaining human resource problem. The last decision is to find a commercial company to redevelop pedagogical information system.

As a standalone application is information system "Study plans". The purpose of the system is to prepare the required documentation regarding each proposed subject. Departments create study plans for their students based on documented subjects, which are later approved by the faculty scientific board. Usefulness of the systems consists of well-documented subjects.

We are also experimenting with OLAP technologies in the area of analyzing students study results.

Financial information system

Approximately a year ago the management of the university decided to join a ministerial project of implementation of a centralized financial information system. SAP was chosen as a suitable application instead of current separate payroll and accounting IS. TUKE joined the project in July 2006. It has been the 4^{th} implementation of a financial information system at our university since 2001 and we believe the last one for the next 4–5 years.

The system is operated centrally at Bratislava (the capital city of Slovakia) and uses the infrastructure of SANET for communication.

Canteen information system

A canteen information system is a commercial application based on Windows SQL server. It uses smart cards and is built on MS Windows SQL and Web interface. Currently, all students and university employees can use the system.

Access information system

An access information system is an in-house developed application, which serves two purposes:

- Registration of smart cards issued to students and employees;
- Allow access to reserved places in the campus.

There are plans to implement the access system to monitor entrance to laboratories, in the future.

Other applications

There are several "simple" applications developed as an add-on to running information systems. One of them is a telephone directory application. There was a complaint about correctness of data in the former very simple (one table) application, in the past. IT department was asked for responsibility about incorrect data, although a relevant department should have reported changes (and usually it didn't). The decision was to develop a new version of a telephone directory with distributed input responsibility. Now, employees are imported to the telephone directory application from the payroll IS and each department defines person responsible to maintain data.

Common problems

Lack of people and lack of financial support are usual common problems of IT. However, besides these problems, we experience another one – a problem of application integration at the data level.

Every information system, as usual, communicates to several other systems, at present time. It requires developing ad-hoc communication channels. Theoretically, it represents n^2 communication channels, which have to be analyzed, programmed and maintained. With the increasing number of the systems, number of channels is increasing very quickly.

Perspectives of information systems

There is a wide gap in using information technologies in the private sector and at universities. The private sector has already implemented and uses technologies like OLAP, data warehousing, data mining, customer relationship management, production control. Slovak universities, but it seems not only Slovak, are implementing just OLTP system at the present time. One exception is large amount of experiments in the area of e-learning. This area can be regarded as attempts to make teaching process more productive, personalized and widely available.

At our university we started to experiment with the OLAP technologies. We implemented a running solution in the area of financial information system, which was stopped because of SAP at that time. We have prepared some OLAP analysis presentations regarding students' data in our information system, but there is no real interest among the management of faculties of university at this time. However, there are no needs regarding other widely used data processing technologies, either.

Поступила в редакцию 15 октября 2006 г.