

# ILIAS and its Integration with the University Information System

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**Abstract:** This paper gives a short overview about the basic steps necessary to integrate ILIAS with legacy university information system that covers almost all the tasks of the university study administration. Among others, the integration enables the existing authentication and authorization services of the university information system to be available for ILIAS. The second large group of problems concerns localization of ILIAS for the Czech language and the appropriate character encoding(s). Customization also means choosing an optimal runtime platform. Therefore, some configuration and optimization tests have been performed and their results are presented in this paper – together with some planned extensions using natural language processing tools.

**Keywords:** E-learning, ILIAS, System customization

## 1 CURRENT STATE

E-learning software usually comprises not only educational tools but also system and security infrastructure support and e-learning administration (student enrolment records, contact information, curricula ...). ILIAS offers a reasonable independence on the technical platform and implements many functions in the administration area. However, the last mentioned feature called for rather tricky “bypasses” in our case.

All the educational and research administration at the Masaryk University is integrated in the Administrative Information Server (IS MU). The information stored here covers all data needed by ILIAS administration modules. Moreover, IS MU better fits local conditions (e.g. students enrolled to a particular seminar group within one course) and also reflects specific needs and peculiarities of all 9 faculties and several organization units of MU.

The described situation has brought us to the decision to integrate ILIAS 2 with IS MU and to minimize the overlap in the information content between those two systems. Moreover, the chosen integration methodology must ensure future compatibility with coming ILIAS 3, to be able to quickly switch to this new ILIAS generation once it is ready for production use.

The backend of IS MU is currently Oracle 9. ILIAS can employ various database systems to store application data. Unfortunately, the obvious solution to “add” ILIAS database to those of IS MU could not be applied in our case because the database server is already overloaded and the “mission-critical” status of IS MU does not correspond to the current needs of our e-learning project.

Thus, two possibilities remained:

- 1) *to replace all ILIAS operations on the local database by remote calls* – this would need many modifications in the ILIAS source;
- 2) *to replicate relevant information from the IS MU databases to ILIAS.*

The acceptance of the first approach would probably limit our potential to upgrade ILIAS to its new version. The final decision has therefore run: “replication of data from ISMU”.

## 2 MAPPING THE DATA MODEL

Let us show one representative example of differences in the data models of IS MU and Ilias. Since the data model of Ilias 2 is well known, we show only the relevant part of the IS MU database, see Figures 1-6.

STUDIES
STUDY_ID
SUBJ_ID
...

**Figure 1:** Each record in the table *Studies* represents enrolment of one student (person) in one study program into one course run.

SUBJECT
SUBJ_ID
SUBJ_KOD
SEMESTER
SYLABUS
...

**Figure 2:** Each row in *Subject* holds data about one course run (typically one semester).

SUBJECT_TEACHER
SUBJ_ID
TEACHER_ID
ALTERNATE
NAME
...

**Figure 3:** Teachers – courses relation

SUBJ_SEMGR
SUBJ_ID
SEMGR_ID
NAME
...

**Figure 4:** Seminary groups in subjects (used typically for practice sessions)

SEMGR_TEACHER
SEMGR_ID
TEACHER_ID
NAME
...

**Figure 5:** Teachers and their seminary groups

SEMGR_STUDENT
SEMGR_ID
STUDENT_ID
...

**Figure 6:** Seminary groups and their students

For example, there is no one-to-one correspondence between *groups* and *subjects* in ILIAS and SUBJECTS in IS MU as there can be seminar groups (SUBJ\_SEMGR table) with responsible teachers (SEMGR\_TEACHER) and enrolled students (SEMGR\_STUDENT). As there could be e-learning material for a course as a whole as well as for a particular seminar group, the data from both relevant sources are merged in the transformation to the ILIAS database.

### **3 MAPPING THE DATA MODEL**

One of the fundamental requirements of the described integration is to work with up-to-date administration data in ILIAS or, at least, with data as actual as possible. This claim does not correspond to the replication mode too much. For that reason, we are currently working on the replication module that will transfer all relevant data in the beginning of each session and purge them in the end of it. The lifetime of the information carried from IS MU will be therefore limited and the possible inconsistencies will not hold out longer than a session.

### **4 LOCALIZATION INTO CZECH**

The ILIAS's philosophy of external language data modules enables easy localization to another language. The Czech localization file (ILIAS\_cz.lang) is being created. However, localization of the messages is not the main issue. Several problems with visualization of some Czech characters from ILIAS\_cz.lang using Windows-1250 encoding have been encountered. The problems were partially solved by changing httpd.conf file and adding support for windows-1250 in Apache and PHP.

Another problem with Czech characters was found in the preview mode. In this case, a modification of the script course.php helped in both Linux and Windows environments.

### **5 AUTHENTICATION**

The Kerberos authentication protocol is commonly used in large systems with many users. Main advantages are security, reliability and transparency for the users.

The main idea is to integrate ILIAS with legacy authentication model based on Kerberos. User will be able to use same passwords that they use for accessing the university information system. ILIAS will not have to store users' passwords. Thus, there is no risk of compromising the passwords in ILIAS. Also, there is no need to maintain another authentication server with secured functionality – it simply takes advantage of a pre-existing solution.

For the integration of ILIAS to the Kerberos authentication model, the web server where ILIAS is running must be recompiled with Kerberos support. Further, an ILIAS realm must be added to the Kerberos server. Joining ILIAS and Kerberos can be done either by the external authentication script or better by re-programming the ILIAS authentication function to use Kerberos. After the successful implementation ILIAS will be more competitive to commercial systems (namely WebCT) that already support Kerberos authentication.

## 6 ILIAS ON DIFFERENT PLATFORMS

We were interested in comparison between ILIAS speed on Windows and Linux and effect of Zend PHP optimizer. Therefore several installations on the same hardware were prepared to compare the speed of the Apache-PHP-MySQL subsystem. The results were surprising. The Zend optimizer influenced the speed of the system both positively and negatively in some cases.

However, the most surprising results were obtained between Windows – Linux. The Apache-PHP-MySQL subsystem ran significantly faster on Windows than on Linux, except of the modules `header.inc`, `get_languages`, `header.inc`, and `log_init`. The performance (speed) increased from 40% to 58%.

## 7 CONCLUSION AND FUTURE DIRECTIONS

ILIAS has been chosen as the primary e-learning platform for the Masaryk University – at least for the faculties involved in the development project co-financed by the Ministry of Education.

Thus, a broad integration with the university study administration system must be done relatively quickly. Once the systems are at least partially integrated, the following extensions will be done:

- “Teacher-friendly” editing and semi-automated publication of study materials prepared in DocBook and its derivatives (DocBook Slides).
- Integration with standalone system for semi-automated testing of students’ programs in Java and other languages.
- Natural language processing support for e-learning enabling to go beyond simple multiple-choice tests.
- Automatic linking of additional study materials available at MU based on intelligent text analysis.

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