

## **Open Apereo 2015**

Higher Education ... Open Source in a New Age

# Case Study: Course Timetabling with UniTime at Masaryk University

Zuzana Mullerova, Hana Rudova, Tomas Muller







- UniTime
- Course Timetabling
- Masaryk University
- Course Timetabling with UniTime at Masaryk University

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## UniTime

### What is UniTime?

- Comprehensive academic scheduling solution
- Four components
  - Course timetabling
  - Examination timetabling
  - Student scheduling
  - Event management
- Open source, web-based
- Started as a research project in 2001
- First used at Purdue University in 2005
- Apereo project since 2015



## Course Timetabling

#### What is Course Timetabling?

- The process of assigning times and rooms to classes
- Creating a course timetable for students
- Respecting various restrictions and preferences
  - Courses: size, room equipment, structure, ...
  - Instructors: availability, preferred times, ...
  - Students: curricula, pre-registrations, ...
  - Other: number of rooms available and their sizes, ...
- It is a difficult optimisation problem



## Course Timetabling in UniTime

#### Distributed or centralised data entry

- Rooms, instructors, courses, plans of study, ...
- Requirements and preferences

## Distributed or centralised timetabling

- Automatically generated timetable
- Computer aided manual modifications

### Course management

• Once a timetable is published



# Masaryk University



Masaryk University Brno, Czech Republic

- Since 1919
- 2nd largest university in the Czech Republic
- 38 000 students
- 9 colleges, 200 departments
- An early adopter of UniTime



# UniTime at Masaryk University

### Four colleges (49% of students)

- Faculty of Arts (2011)
- Faculty of Education (2011)
- Faculty of Sports Studies (2012)
- Faculty of Informatics (2013)

## Usage

- Centralized x decentralized data entry
- Centralized timetabling
- Differences in student course demands



## Student Course Demands

## Student conflict

- Two classes of a student overlap in time, or
- Two classes are back-to-back, but the locations are too far away from each other

### Student course demands

- Curricula
- Last year's enrolments
- Pre-registrations



# Faculty of Sports Studies

- 1400 students, 470 courses per semester
- Reason to adopt UniTime: Schedule manager left
- Centralised data entry, centralised timetabling
- Student course demands: Curricula
- Interesting issues
  - Travel times between sport facilities
  - Time patterns

#### 1 x 45 Old pattern

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# Faculty of Sports Studies

#### Time patterns help to better utilise rooms

- yellow and red highlight unused times in a room



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## Faculty of Informatics

- 2300 students, 240 courses
- Reason to adopt UniTime: Schedule manager left
- Centralised data entry, centralised timetabling
- Student course demands: Combination of curricula and pre-registrations
- Interesting issues
  - Majors with other colleges
  - Combining curricula with pre-registrations





# Faculty of Education

- 6000 students, 1820 courses
- Reasons to adopt UniTime
  - New vice-dean former scheduling manager
  - Substantial changes in curricula
  - Opportunity for data cleanup
- Decentralised data entry, centralised timetabling
- Student course demands: Curricula
- Interesting issues
  - Combined (distant) form of study
  - Shared resources between departments
  - Double majors



# Faculty of Education

#### • Combined form of study

- Continuing education and distance learning
- Irregular timetable for Fridays and Saturdays
- Each meeting needs to be timetabled separately
- Strict curricula, schedule compactness vital
- Much more complicated to timetable besides times and rooms they select weeks of instructions (instead of 5 days you timetable 26 days on average)

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## Faculty of Arts

- 9 000 students, 1920 courses per semester
- Reason to adopt UniTime: Renovation of a building
- (De)centralised data entry and centralised timetabling
- Student course demands: Last year's enrolments
- Interesting issues
  - UniTime implemented in eight weeks
  - Originally imported departmental timetables from Excel sheets, but now moving away from that





## Lessons Learned

- Input data are key to a good timetable
- Schedule managers ought to be
  - People who are going to stay at the university (it takes about four semesters to be an expert schedule manager)
  - Entitled to make decisions (they should not just listen to faculty)
- Help helps



## Conclusion

- Four colleges have good experience with UniTime no one went back to manual timetabling
- Further colleges have shown interest
- Plans for
  - Central timetabling support at a university level (not each college independently)
  - Continuous revisions and improvements of timetabling processes at individual colleges and at the university level
  - Better interface with the student information system
  - Research in fairness and compactness



#### Come explore UniTime at <u>www.unitime.org</u>

#### Thank you!





## Resources for UniTime

- UniTime project site: www.unitime.org
- Screen documentation: <u>http://help.unitime.org</u>
- Demo: <u>http://demo.unitime.org</u>
- Manuals for data entry and timetabling in demo, under Help
- <u>support@unitime.org</u>, <u>services@unitime.org</u>