Case Study: Course Timetabling with UniTime at Masaryk University

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Case Study

- UniTime
- Course Timetabling
- Masaryk University
- Course Timetabling with UniTime at Masaryk University
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
- Aperio project since 2015
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
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

![Old pattern](chart1.png)  ![New pattern](chart2.png)
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)
Faculty of Arts

- 9000 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
• 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 www.unitime.org

Thank you!
Resources for UniTime

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