Open Apereo 2016

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UniTime 101

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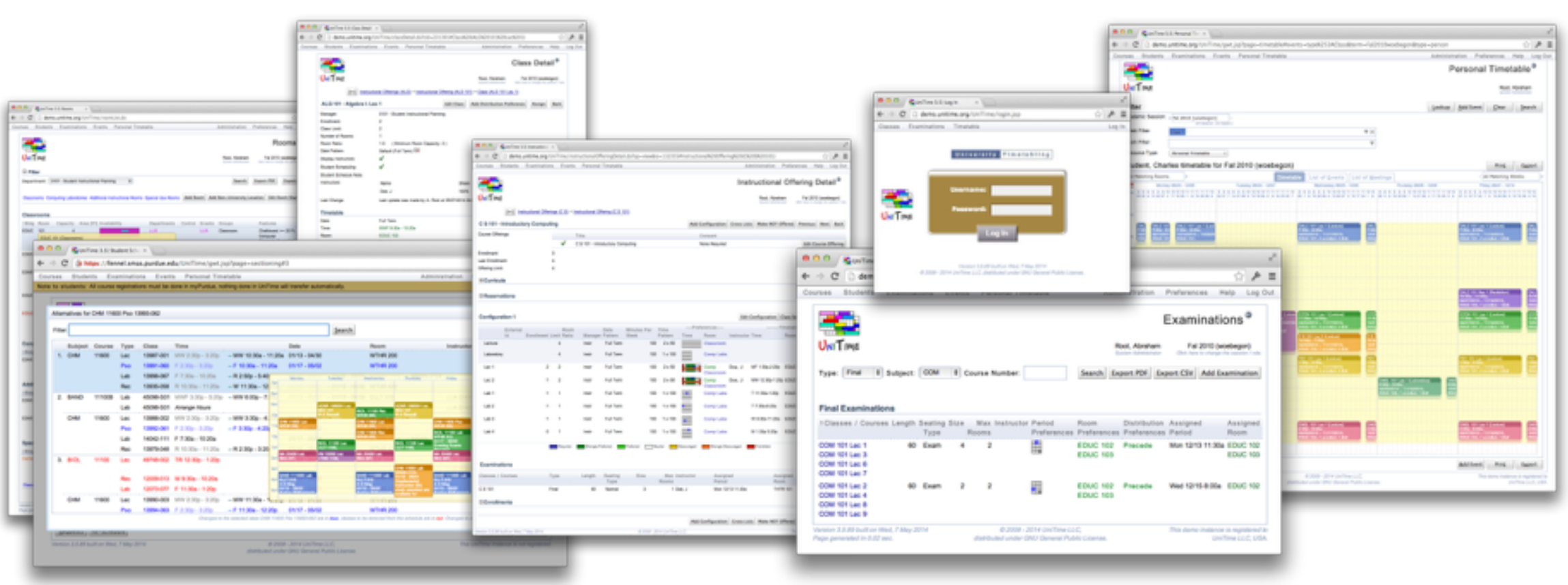
Workshop Plan

- UniTime
- Introduction of the four modules
- Administration



The UniTime 101 presentation is available at http://goo.gl/aCINuy

What is UniTime?

- Comprehensive academic scheduling solution
- Four components
  - Course timetabling
  - Examination timetabling
  - Student scheduling
  - Event management
- Open source, web-based, written in Java using modern technologies
- Using state-of-the-art optimization algorithms
- Distributed data entry and timetabling in multi-user environments
- First used at Purdue University in 2005
- Apereo project since 2015

Course Timetabling

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 optimization problem

Course Timetabling

Why is it needed?

- Minimize student conflicts to help students receive degrees on time
- Help use limited resources more effectively
- Make process more transparent and sustainable
- Fairness and satisfaction with the timetable
- What-if scenarios
- Ability to adapt to changes (curriculum, facilities, etc.)

Course Timetabling in UniTime

1. Distributed or centralized data entry

- Rooms, instructors, courses
- Requirements and preferences

2. Distributed or centralized timetabling

- Automatically generated timetable
- Manual computer aided modifications

3. Course management

- Once a timetable is published

Data Entry

Administrative Tasks

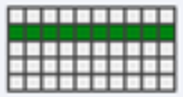
- Academic session setup
- Roll-forward

Data Entry

- Courses
- Instructors
- Rooms
- Relations between courses / classes (distribution preferences)
- Curricula (plans of study)

Data Entry: Courses

Instructional Offering

	Limit	Date Pattern	Minutes Per Week	Time Pattern	Time	Room	Distribution	Instructor
						----Preferences----		
MA 170	40	**Statistics I**						
STAT 170		Introductory statistics						
Lecture	40	Full Term	50	1 x 50		Classroom		
Laboratory	40	Full Term	150	3 x 50		EDUC CompPr	Same Room	
Lec 1	40	Full Term	50	1 x 50		ThtrSeat Classroom		G. Newman
Lab 1	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith
Lab 2	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith

Data Entry: Courses

Instructional Offering

Course Offerings

	Limit	Date Pattern	Minutes Per Week	Time Pattern	Time	----Preferences---- Room	Distribution	Instructor
MA 170 STAT 170	40	Statistics I Introductory statistics						
Lecture	40	Full Term	50	1 x 50		Classroom		
Laboratory	40	Full Term	150	3 x 50		EDUC CompPr	Same Room	
Lec 1	40	Full Term	50	1 x 50		ThtrSeat Classroom		G. Newman
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Data Entry: Courses

Instructional Offering

Course Offerings

Scheduling Subparts

	Limit	Date Pattern	Minutes Per Week	Time Pattern	Time	----Preferences---- Room	Distribution	Instructor
MA 170 STAT 170	40	**Statistics I** Introductory statistics						
Lecture	40	Full Term	50	1 x 50		Classroom		
Laboratory	40	Full Term	150	3 x 50		EDUC CompPr	Same Room	
Lec 1	40	Full Term	50	1 x 50		ThtrSeat Classroom		G. Newman
Lab 1	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith
Lab 2	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith

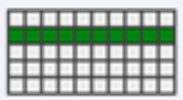
Data Entry: Courses

Instructional Offering

Course Offerings

Scheduling Subparts

Classes

	Limit	Date Pattern	Minutes Per Week	Time Pattern	Time	----Preferences---- Room	Distribution	Instructor
MA 170 Statistics I STAT 170 Introductory statistics	40							
Lecture	40	Full Term	50	1 x 50		Classroom		
Laboratory	40	Full Term	150	3 x 50		EDUC CompPr	Same Room	
Lec 1	40	Full Term	50	1 x 50		ThtrSeat Classroom		G. Newman
Lab 1	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith
Lab 2	20	Full Term	150	3 x 50		EDUC CompPr	Same Room	J. Smith

Data Entry: Dates and Times

Date Patterns

- Weeks of instructions (All weeks, Even/Odd weeks, Week 5, …)

March 2015

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
10	1	2	3	4	5	6	7
11	8	9	10	11	12	13	14
12	15	16	17	18	19	20	21
13	22	23	24	25	26	27	28
14	29	30	31				

April 2015

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
14				1	2	3	4
15	5	6	7	8	9	10	11
16	12	13	14	15	16	17	18
17	19	20	21	22	23	24	25
18	26	27	28	29	30		

May 2015

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
18						1	2
19	3	4	5	6	7	8	9
20	10	11	12	13	14	15	16
21	17	18	19	20	21	22	23
22	24	25	26	27	28	29	30
23	31						

Time Patterns

- Possible time slots within a week

2h

from: / to:	7:30a 9:10a	8:25a 10:05a	9:20a 11:00a	10:15a 11:55a	11:10a 12:50p	12:05p 1:45p	1:00p 2:40p	1:55p 3:35p	2:50p 4:30p	3:45p 5:25p	4:40p 6:20p	5:35p 7:15p	6:30p 8:10p
Mon													
Tue													
Wed													
Thu													

Required
Strongly Preferred
Preferred
Neutral
Discouraged
Strongly Discouraged
Prohibited

Data Entry: Rooms

Rooms

- Each department may have a different set of rooms
- Some times may be unavailable or given to a different department

K 73

Workdays × Daytime

from: / to:	7:30a 8:00a	8:00a 8:30a	8:30a 9:00a	9:00a 9:30a	9:30a 10:00a	10:00a 10:30a	10:30a 11:00a	11:00a 11:30a	11:30a 12:00p	12:00p 12:30p	12:30p 1:00p	1:00p 1:30p	1:30p 2:00p	2:00p 2:30p	2:30p 3:00p	3:00p 3:30p	3:30p 4:00p	4:00p 4:30p	4:30p 5:00p	5:00p 5:30p	5:30p 6:00p	6:00p 6:30p
Mon																						
Tue	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL	BIOL
Wed	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC													
Thu	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC	CIVC													
Fri	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

- Room coordinates, travel times

	A 50	D 20	K 73	140A	JAMU	
A 50		5	5	19	22	A 50
D 20	5		0	17	20	D 20
K 73	5	0		17	22	K 73
140A	19	17	17		10	140A
JAMU	22	20	22	10		JAMU
	A 50	D 20	K 73	140A	JAMU	

Data Entry: Room Preferences

Minimal Room Size

- Calculated from class limit and room ratio

Room Preferences

- Particular room or building
- Room group
- Room feature

Room Groups:	Geology Classroom (Department) Classroom
Rooms:	B 11
Buildings:	Y - Porici 7, budova Y
Room Features:	Data Projector
Available Rooms:	34 (A 51, A 53, A 54, A 55, ...)

Required | Strongly Preferred | Preferred | Neutral | Discouraged | Strongly Discouraged | Prohibited

Data Entry: Distributions

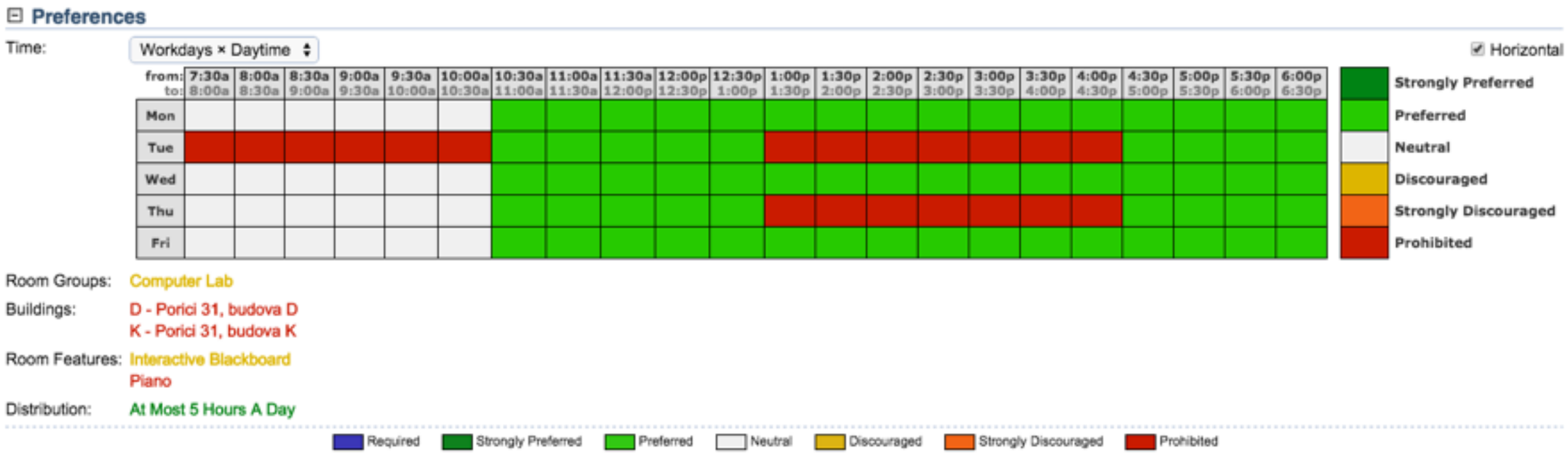
Distribution Preferences

- Relationship between two or more classes
- Examples
  - Back-To-Back
  - Same Room
  - Same Days
  - Meet Together
  - At Most 6 Hours A Day
  - Can Share Room
- Set directly between classes / subparts or on an instructor

Data Entry: Instructors

Instructors

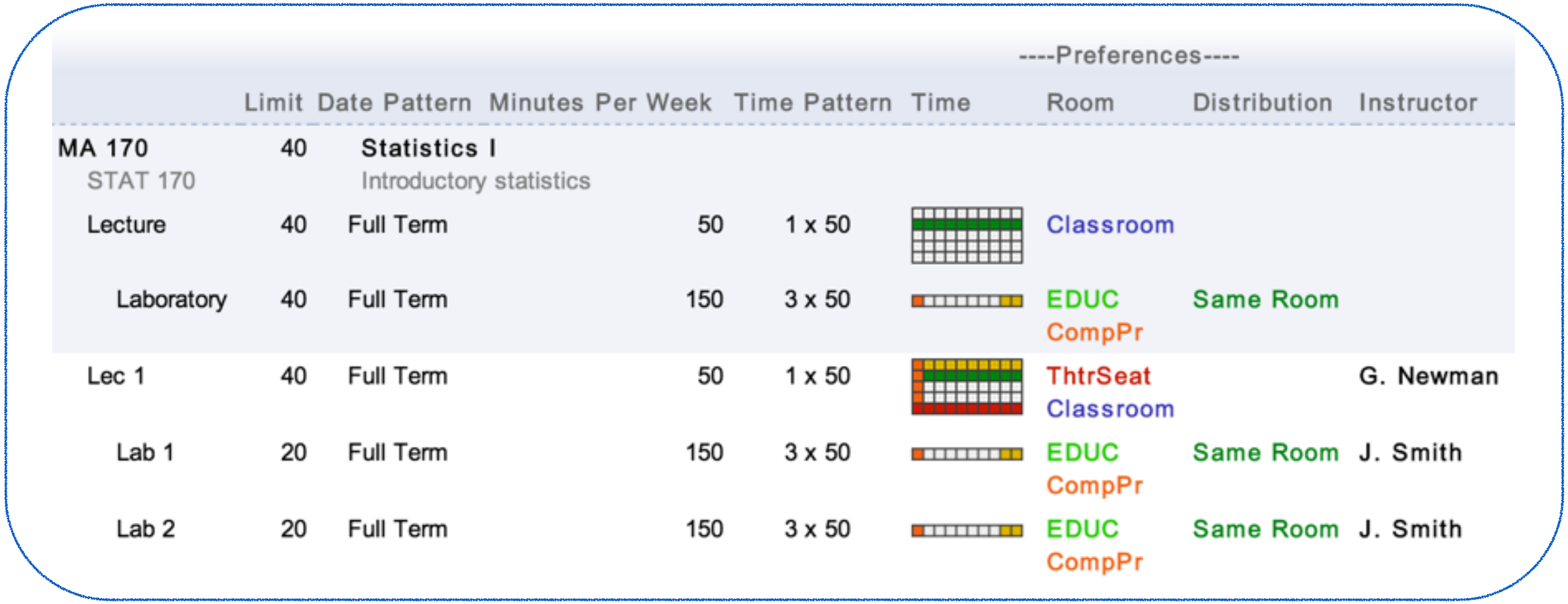
- Each department has a list of instructors
  - Connection between departments through external id
- Instructor availability (prohibited times)
- Instructor preferences & requirements
  - Time, room, distribution



Data Entry: Preferences

Combination of preferences

- Preferences can be set on scheduling subpart, class, or instructor
- The end result is displayed on the class and used by the solver



	Limit	Date Pattern	Minutes Per Week	Time Pattern	Time	----Preferences---- Room	Distribution	Instructor
MA 170	40	Statistics I						
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Student Course Demands

Curricula

- For a group of students of the same major and classification
- Requested enrollment
- List of courses and their expected attendance
- Courses can be grouped together (same / different students)

Course Projections

Group	Course	01
Required	ALG 101	100.0%
Required	CALC 101	100.0%
Elective	ENGL 101	60.0%
Elective	SPAN 101	40.0%
	BIOL 101	10.0%
	CHM 101	20.0%

Course Projections

Group	Course	01
M1 and M2 M or N or O	M1	50.0%
M1 and M2	M2	50.0%
N1 and N2 M or N or O	N1	30.0%
N1 and N2	N2	30.0%
O1 and O2 M or N or O	O1	20.0%
O1 and O2	O2	20.0%

Last year's enrollments

Pre-registration

Other possible sources: historical enrolments, pre-registrations, or their combination

Data Entry: Input Data

Importance of having good input data

- The solution will only be as good as the input data
- No preferences
  - A class can end up anywhere (unpopular time, wrong room)
- Too many requirements
  - Impossible to find a complete timetable
  - Too many student conflicts
  - Difficult to make modifications

Timetabling: Solver

Constraint-based Solver

- Can be used in modes between manual and fully automated
- State of the art
  - Work published a number of research papers
  - Winner of the International Timetabling Competition 2007
- Easy to extend

Suggestions

Score	Class	Date	Time	Room	Students
+15.2	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 7:30a	BRNG 2280	+11
+31.7	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 10:30a	BRNG 2280	+36 (h+3)
	HIST 342 Lec 1	Full Term	TTh 10:30a → TTh 1:30p	BRNG 2280 → BRNG 2290	
+36.6	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 10:30a	BRNG 2280	+36 (h+4)
	HIST 342 Lec 1	Full Term	TTh 10:30a → TTh 7:30a	BRNG 2280	
+44.1	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 10:30a	BRNG 2280	+34 (h+2)
	HIST 342 Lec 1	Full Term	TTh 10:30a → TTh 3:00p	BRNG 2280 → BRNG 2290	
	OBHR 330 Lec 4	Full Term	TTh 3:00p	BRNG 2290 → LWSN B155	

(all 1571 possibilities up to 3 changes were considered, top 4 of 17 suggestions displayed)

Search Deeper

Timetabling: Problem

Model

- Variable: class
- Value: time and room placement
- Constraints: hard and soft

Timetabling: Problem

Model

- Variable: class
- Value: time and room placement

Hard Constraints

- Room size, sharing, availability
- No instructor / room can have two classes at the same time
- Required or prohibited preferences

Timetabling: Problem

Model

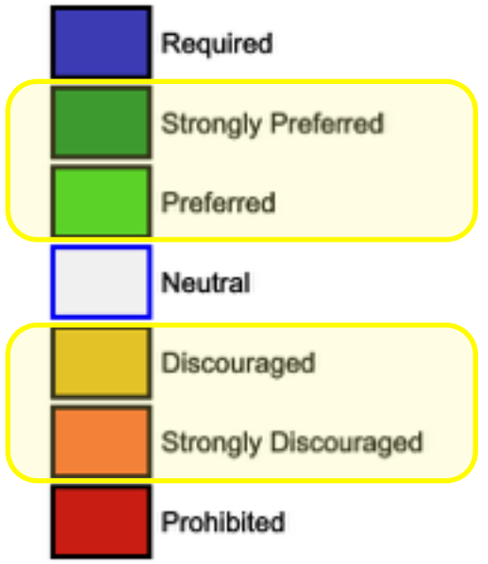
- Variable: class
- Value: time and room placement

Hard Constraints

- Room size, sharing, availability
- No instructor / room can have two classes at the same time
- Required or prohibited preferences

Soft Constraint (Objectives)

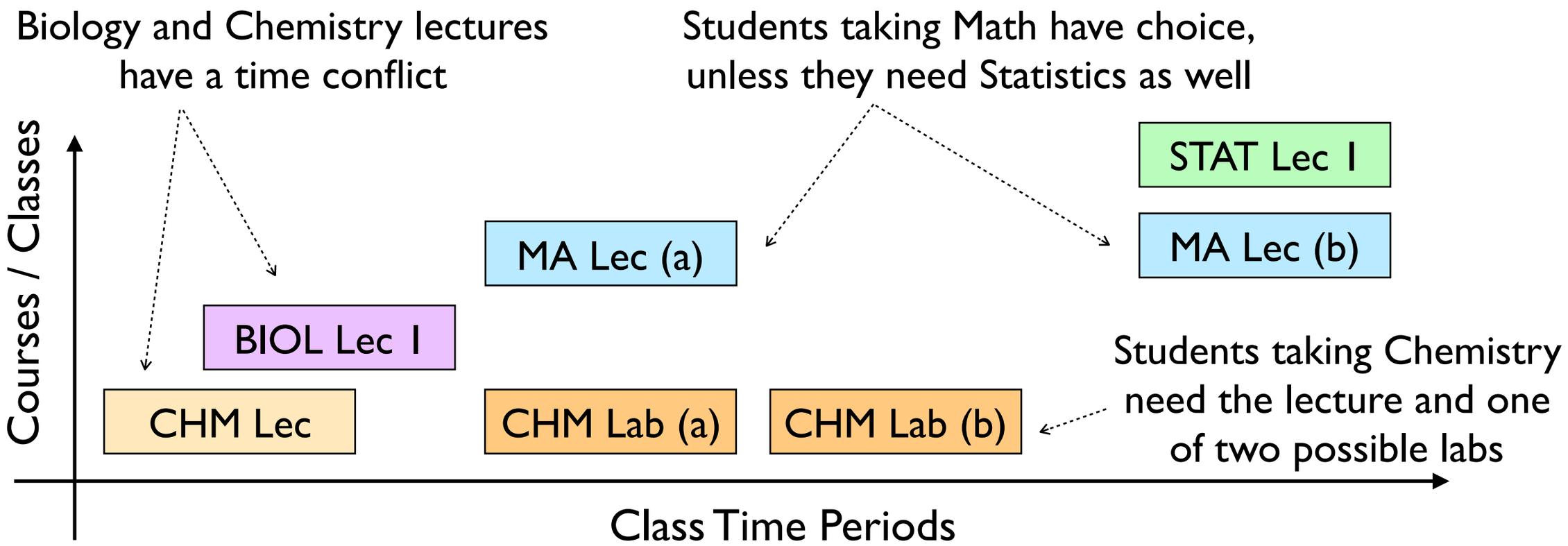
- Time, room, and distribution preferences
- Student conflicts
- Additional criteria (too big rooms, back-to-back instructors, …)



Timetabling: Student Conflicts

A student cannot take a combination of courses

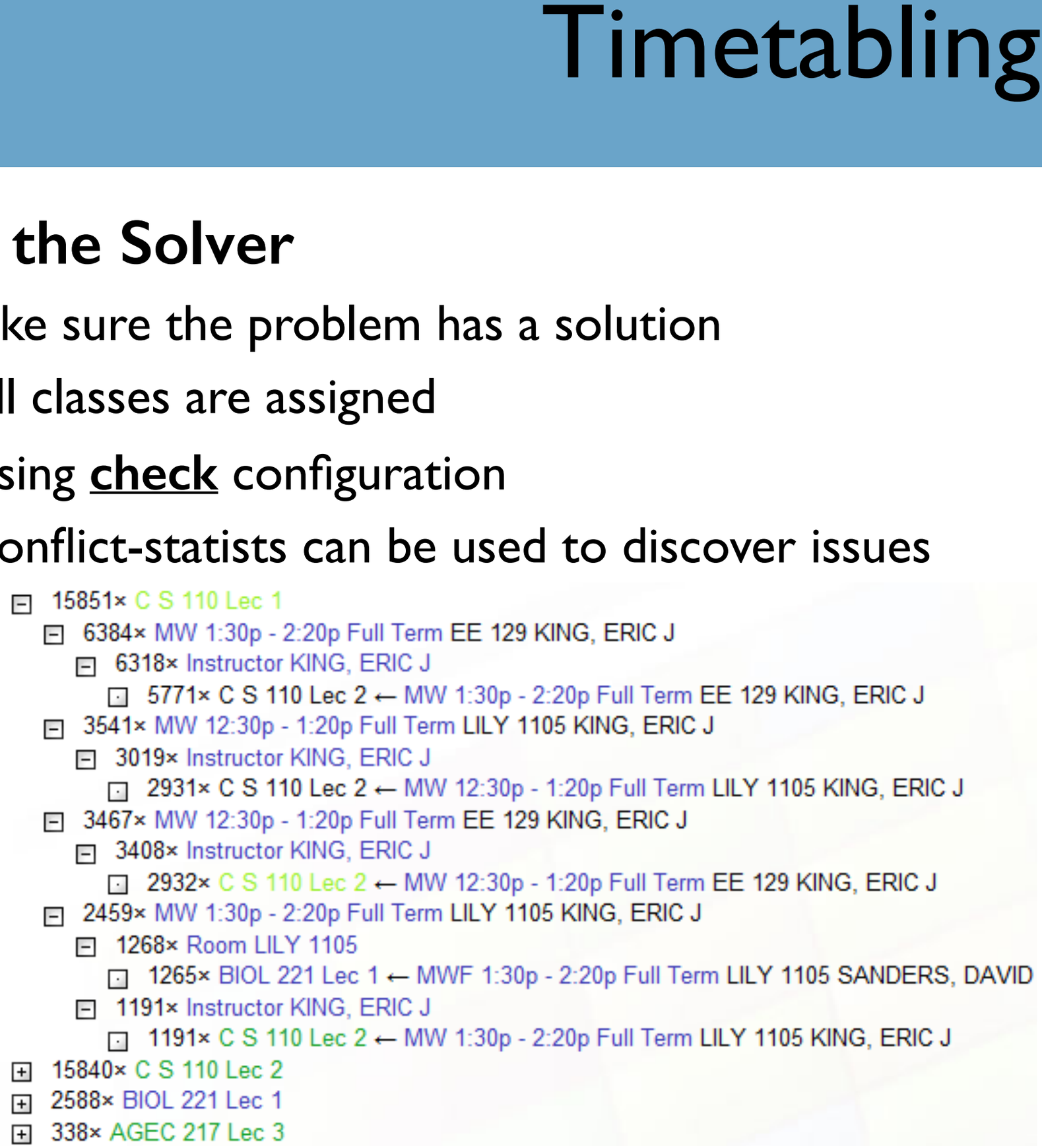
1. Classes overlap in time
   - *or one after the other in rooms that are too far apart*
2. There is not enough space in a non-overlapping combination of classes



Timetabling: Solver

Using the Solver

1. Make sure the problem has a solution
   - All classes are assigned
   - Using **check** configuration
   - Conflict-statists can be used to discover issues



Timetabling: Solver

Using the Solver

1. Make sure the problem has a solution
2. Run the solver to produce a timetable
   - Using **default** configuration
   - It is possible to iterate (if needed), or start the solver from the previous timetable

Type	Course Timetabling Solver
Solver	Solving problem ...
Phase	Improving found solution ...
Progress	5 of 100 (5.0%)
Owner	A. Root as ART & BIOL & CIVC & CZ & ENG & FRN &...
Host	local
Session	Spring 2015 (ED)
Version	4.0.16
Assigned variables	100.00% (1613/1613)
Overall solution value	-17554.24
Time preferences	91.26% (-36722.00)
Student conflicts	807 [committed:0, distance:1, hard:177]
Room preferences	93.31% (-1385)
Distribution preferences	96.37% (-525.00)
Back-to-back instructor preferences	99.98% (1)
Too big rooms	19.84% (1280)
Useless half-hours	0.63% (0 + 1316)
Same subpart balancing penalty	36.58
Room Size Penalty	17.36
Perturbation variables	9.60% (154 + 8)
Perturbations: Total penalty	330.10
Time	0.06 min
Iteration	1940
Memory usage	1791.38M
Speed	520.45 it/s
Block Constraints	100% (0)
Important student conflicts	495 [hard: 34]

Timetabling: Solver

Using the Solver

1. Make sure the problem has a solution
2. Run the solver to produce a timetable
3. Once there is a decent timetable
   - Make manual changes, using **interactive** configuration

Suggestions

Score	Class	Date	Time	Room	Students
+15.2	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 7:30a	BRNG 2280	+11
+31.7	POL 101 Lec 3	Full Term	TTh 12:00p → TTh 10:30a	BRNG 2280	+36 (h+3)
	HIST 342 Lec 1	Full Term	TTh 10:30a → TTh 1:30p	BRNG 2280 → BRNG 2290	
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(all 1571 possibilities up to 3 changes were considered, top 4 of 17 suggestions displayed) Search Deeper

Solver Configuration: it is possible to tweak solver parameters if needed
(there is a tradeoff between times, rooms, distributions, and student conflicts)

Timetabling: Making Changes

Making changes

1. Minimal Perturbation Mode (MPP)
   - When many changes are needed
   - Fully automated (**default** configuration with the mode set to **MPP**)
   - Additional criterion: changes from the initial solution
   - Different weights, e.g., time changes are usually more penalized
2. Once there is a timetable saved, use the **interactive** configuration
   - Can break some constraints
   - Solver provides suggestions, but does not make any decisions
3. When the timetable is published
   - Changes can be made without loading the data into the solver

Timetabling: Cooperation

Decentralized Timetabling

- Defined by solver groups
  - One or more departments that are to be solved together
- Committed solutions of other problems are used as basis
- Multiple problems can be solved together, manual changes can be made separately

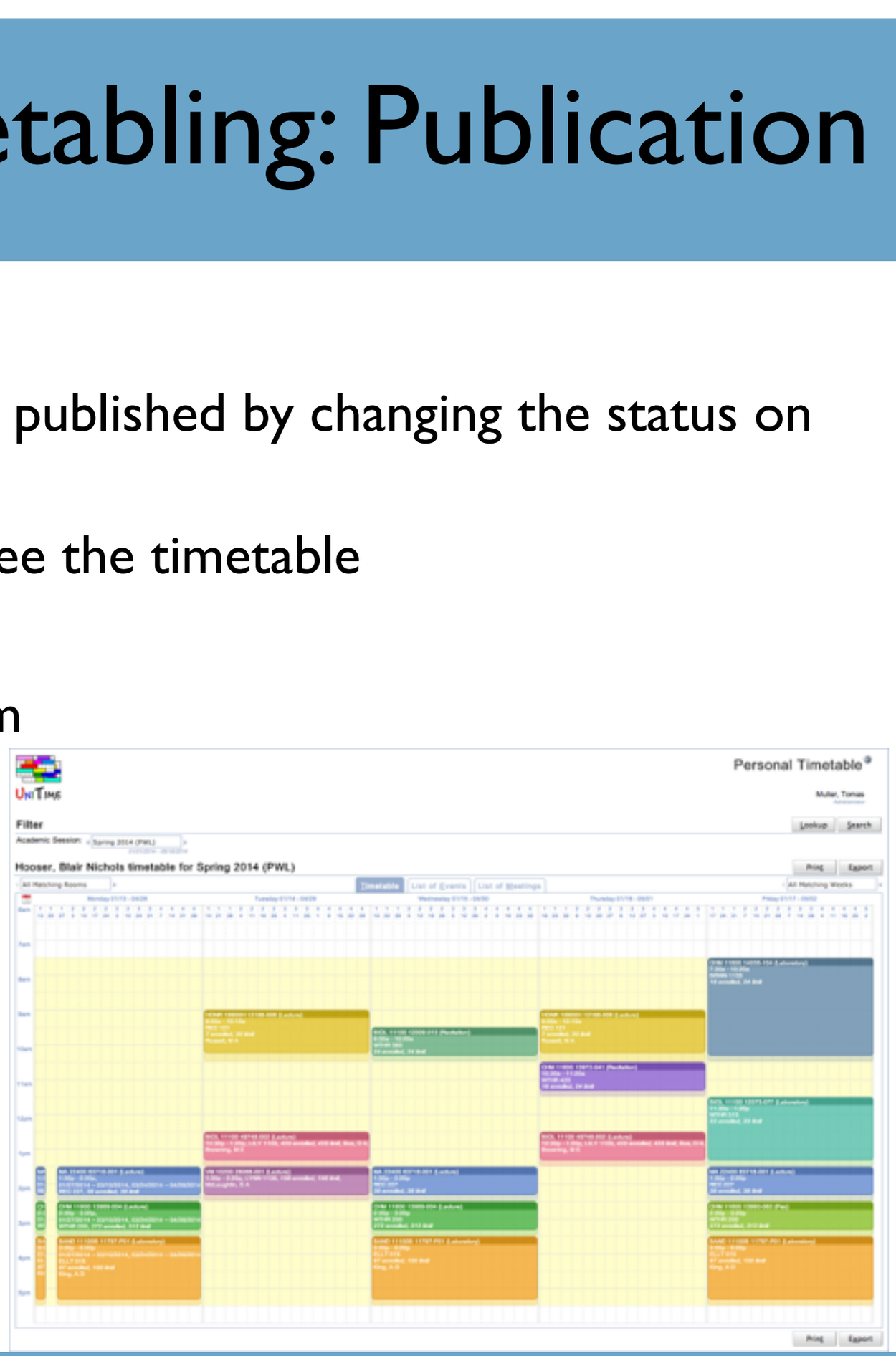
Externally Managed Classes

- For instance, distance learning classes are solved separately
- Different set of rooms
- Timetabled before or after the departmental problems
- Other examples: large lecture rooms, computing labs, need room

Timetabling: Publication

Publication

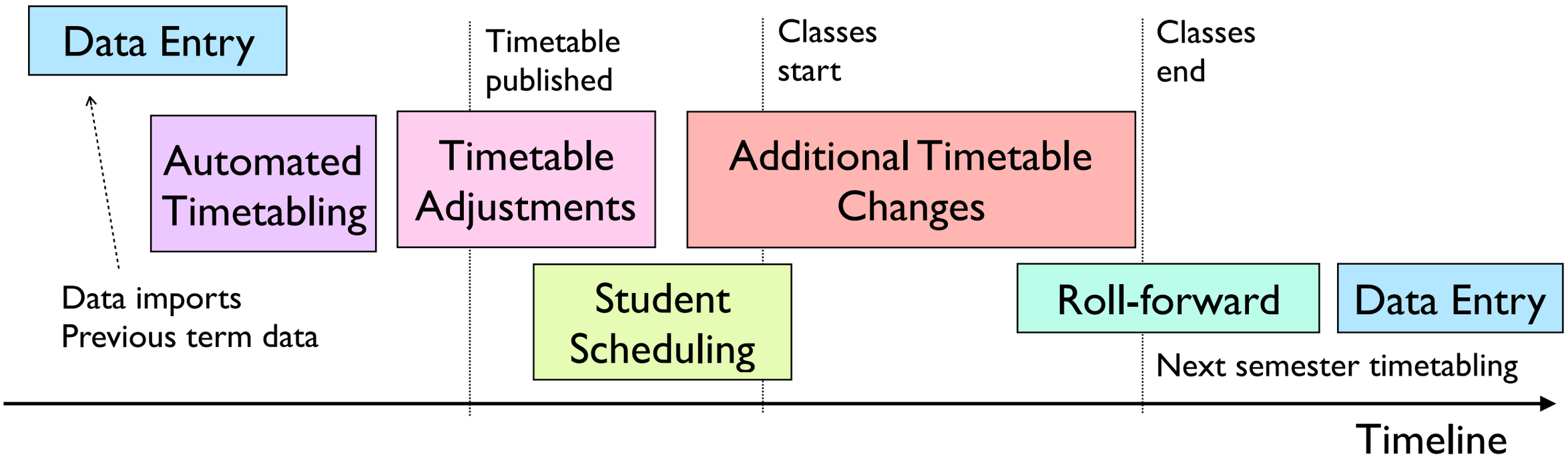
- A committed timetable can be published by changing the status on the academic session
- Instructors and students can see the timetable
- Next steps
  - Export to an external system
  - Student scheduling
  - Examination timetabling
  - Event management



Course Management

Lifecycle of a Course Timetable

1. Data entry
2. Automated timetabling (solver is used to compute a timetable)
3. Timetabling adjustments (interactive changes)
4. Student scheduling, classes start
5. Additional, ad-hoc (mostly room) changes made throughout the term
6. Roll-forward of selected data into the next like term



Demonstration

Workshop Demo Instance

- A college with about 6,000 students
- 24 departments entering the data
- Distributed data entry, centralized timetabling
  - Distance learning timetabled separately
  - For this workshop, the timetabling has been decentralized
- Shared resources (especially rooms)
- Student demands based on curricula
- Loosely based on the College of Education, Masaryk University
- Web: **demo.unitime.org/workshop**
- Accounts: user001/pwd001 … user051/pwd051

demo.unitime.org/workshop

User	Department	Courses	Classes	Instructors
20, 26, 48	Art	57	154	43
38, 40	Biology	33	111	41
14, 49	Civics	58	95	21
17, 18, 28, 42	Czech	114	225	32
15, 30, 36	English	157	250	50
1, 22	French	56	81	18
24, 33	Geography	25	43	19
8, 12, 34	German	78	133	20
27, 47	Health Ed	21	39	17
6, 32	History	39	93	49
4, 45	IT	49	95	20
9, 10	Language	23	89	14
23, 25, 29	Mathematics	53	104	27
41, 51	Music	59	196	17
37, 46	Pedagogy	17	76	28
2, 7, 31, 35, 43	Physics	170	416	84
5, 19	Prime Ped	34	99	16
16	Psychology	40	109	14
21, 39	Physical Ed	24	64	16
11, 50	Russian	83	156	18
13	Social Ed	89	136	75
3, 44	Special Ed	135	231	74

Username:
user001

Password:
pwd001

Username:
user051

Password:
pwd051

Examination Timetabling

Examination Timetabling

What is Examination Timetabling?

- The process of assigning examinations to time periods and locations
- A difficult optimization problem with many competing objectives
  - Student conflicts, faculty requirements, space constraints

Why is it needed?

- The traditional process of mapping lecture times to examination periods does not really work
- More choices for courses mean more potential scheduling conflicts
- Make process easier to manage, fairness and satisfaction, what-ifs

Many flavors

- Final examinations, evening examinations, mid-terms, …
- Additional objectives

Examination Data

Input Data

- Examinations *(with students enrolled in them)*
- Periods *(not overlapping, can have various durations)*
- Rooms *(with capacities, availabilities, and period preferences)*
- Individual examination requirements and preferences
- Distribution constraints *(same/different room, same/different period, precedence)*

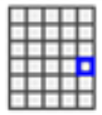
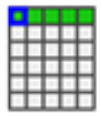
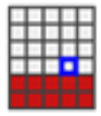
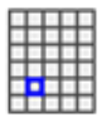
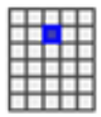
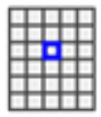
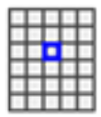
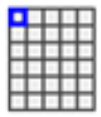
from: / to:	8:00a 10:00a	10:30a 12:30p	1:00p 3:00p	3:30p 5:30p	7:00p 9:00p
Mon 12/09					
Tue 12/10					
Wed 12/11					
Thu 12/12					
Fri 12/13					
Sat 12/14					

Evening Examinations

- Mondays - Thursdays
- 6:30p - 7:30p or 8p - 10p
- 3 days & early / late
- 2-3 exams for a course
- Student availability

Example Data Entry

Final Examinations

↑Classes / Courses	Length	Seating Type	Size	Max Rooms	Instructor	Period Preferences	Room Preferences	Distribution Preferences	Assigned Period	Assigned Room
MGMT 20000	120	Exam	881	4					Thu 12/12 7:00p	LAMB F101
MGMT 20010 50874-T01	120	Exam	205	4			PHYS 114 PHYS		Mon 12/09 8:00a	WTHR 200
MGMT 20100	120	Exam	437	4					Thu 12/12 3:30p	STEW 183
MGMT 29000B 23766-002	120	Exam	36	4			KRAN		Fri 12/13 10:30a	KRAN G016
MGMT 30400	120	Exam	115	4					Tue 12/10 1:00p	LILY 1105
MGMT 30500 23769-001 MGMT 30500 23771-003 MGMT 30500 23772-004 MGMT 30500 23770-002	120	Exam	280	4			RAWL 1086 Same Per RAWL		Wed 12/11 1:00p	WTHR 200 WTHR 104
MGMT 30500 23773-005	120	Exam	70	4			RAWL 1062 Same Per RAWL		Wed 12/11 1:00p	WTHR 172
MGMT 30600	120	Exam	236	4					Mon 12/09 8:00a	STEW 183

Required | Strongly Preferred | Preferred | Neutral | Discouraged | Strongly Discouraged | Prohibited

Examination Problem

Hard Constraints

- No two exams in the same period and room
- Examination must fit the period and room (or rooms)
- Room must be available
- An exam cannot be placed in a period or a room that is prohibited
- Required *(hard)* distribution constraints must be satisfied

Examination Problem

Soft Constraints / Objectives

- Direct conflicts
- More than two exams on a day
- Back-to-backs

} student conflicts

- Period, room, and distribution penalties

… and a few others

- Minimize room splits *(and the distance between these rooms, if an exam is split)*
- Distance to original room *(i.e., the room where the class took place)*
- Large exams first
- Rotation *(average period)*

Examination Solver

Solver

- Same solver as in course timetabling, different model
  (variable: exam, value: period and room placement)
- Can handle large problems
  (e.g., Purdue has around 1900 exams with 120k enrollments and 29 periods)
- Easy to extend and customize

- It is possible to use just the solver (without UniTime user interface)
  - See http://www.unitime.org/cpsolver_examples.php

- It is possible to use UniTime just for exams
- However, because exams take student data from courses and/or classes
  - A course structure with classes is needed (but can be simplified)
  - Students and their class enrollments

Student Scheduling

Student Scheduling

What is Student Scheduling?

- Enrollment of student into classes in a way that maximizes the ability for students to get the courses they need

Why is it needed?

- To ensure that students will be able to get the courses they need in a multi-section environment
- Students who come early may block later students from being able to get the courses they need
- Getting a workable schedule can be a tedious process for a student

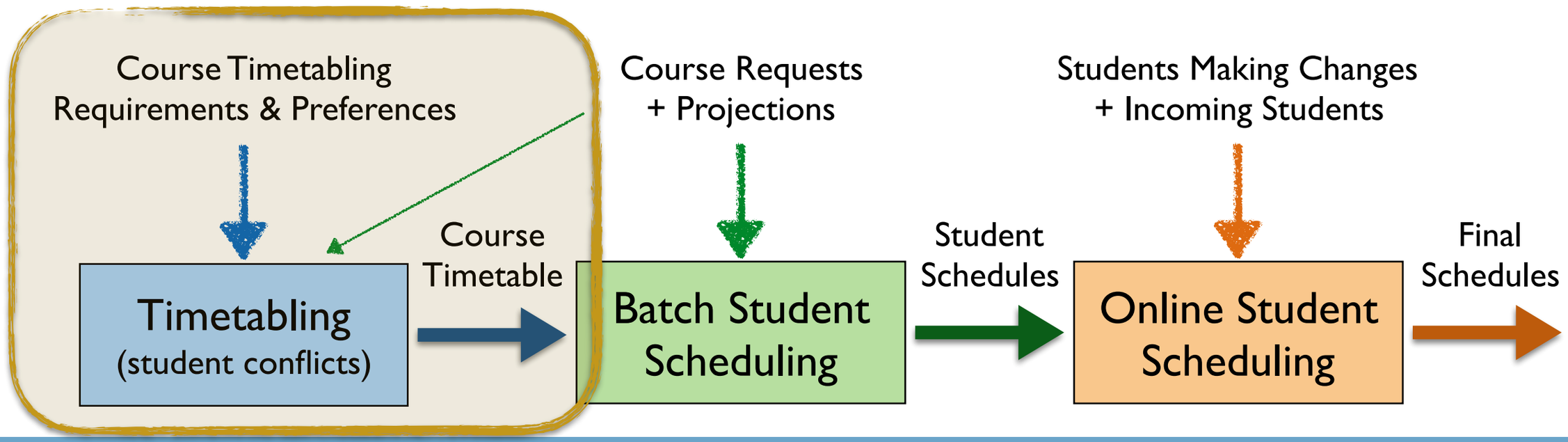
Goal

- Student fills in course requests, including alternatives, free times, etc.
- System provides a schedule that meets student needs
- Students have the ability to modify their schedule

Student Scheduling Process

Step 1: Course Timetabling

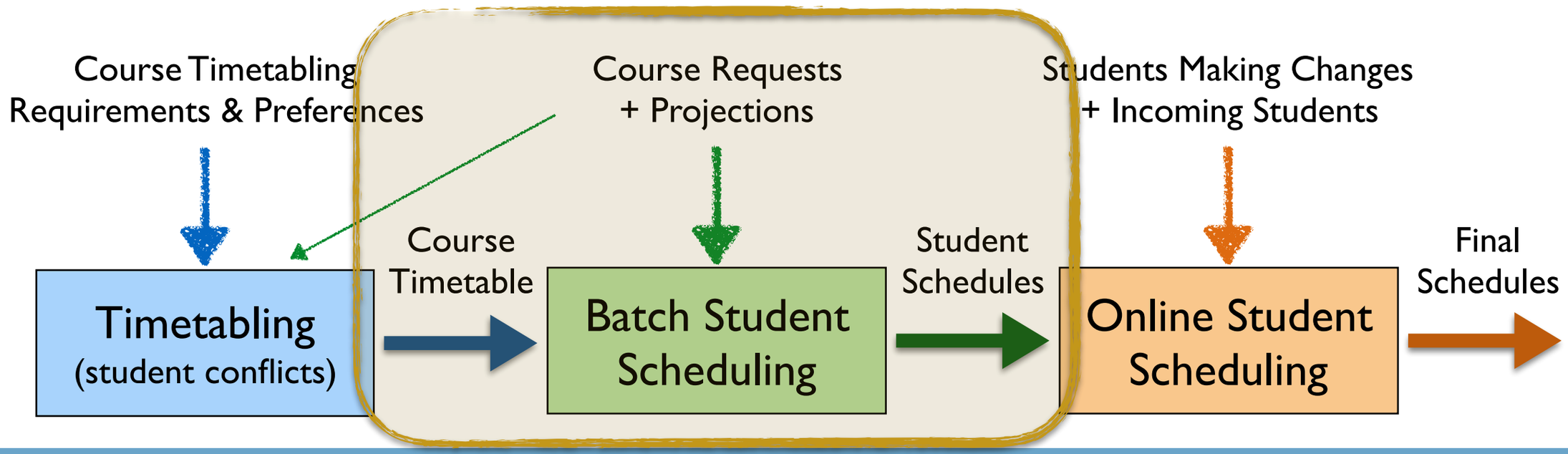
- Minimizing student conflicts together with faculty preferences
  - Last-like student course enrollments
  - Curricula *(e.g., list of courses for each program and year)*
  - Courses Requests (pre-registration)
  - A combination of these



Student Scheduling Process

Step 2: Batch Student Scheduling

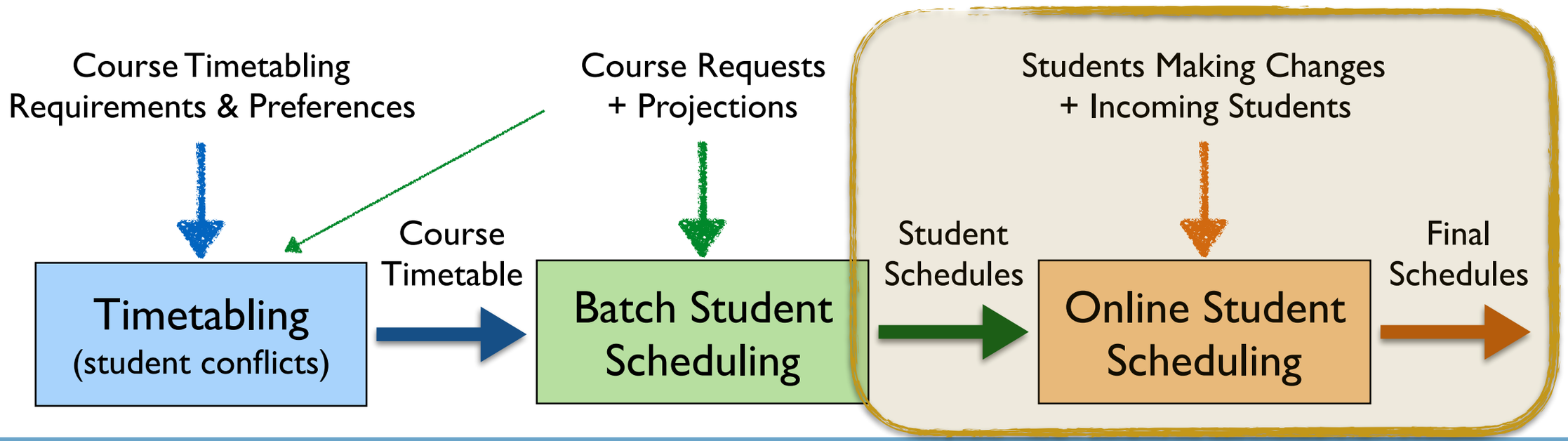
- After a timetable is produced
- Using pre-registrations and student course demand projections
- To provide students with initial schedules
- An optimization process, using the (student scheduling) solver
- It is possible to iterate
  - With the ability to keep already enrolled students unchanged or to minimize changes



Student Scheduling Process

Step 3: Online Student Scheduling

- Students without pre-registration can enroll online
  (incoming freshmen and students that did not register)
- All students can make adjustments to their schedules
- Automatically reserve space in sections based on historical data
- Solver provides suggestions
  - Ordered by their quality, with the ability to filter through

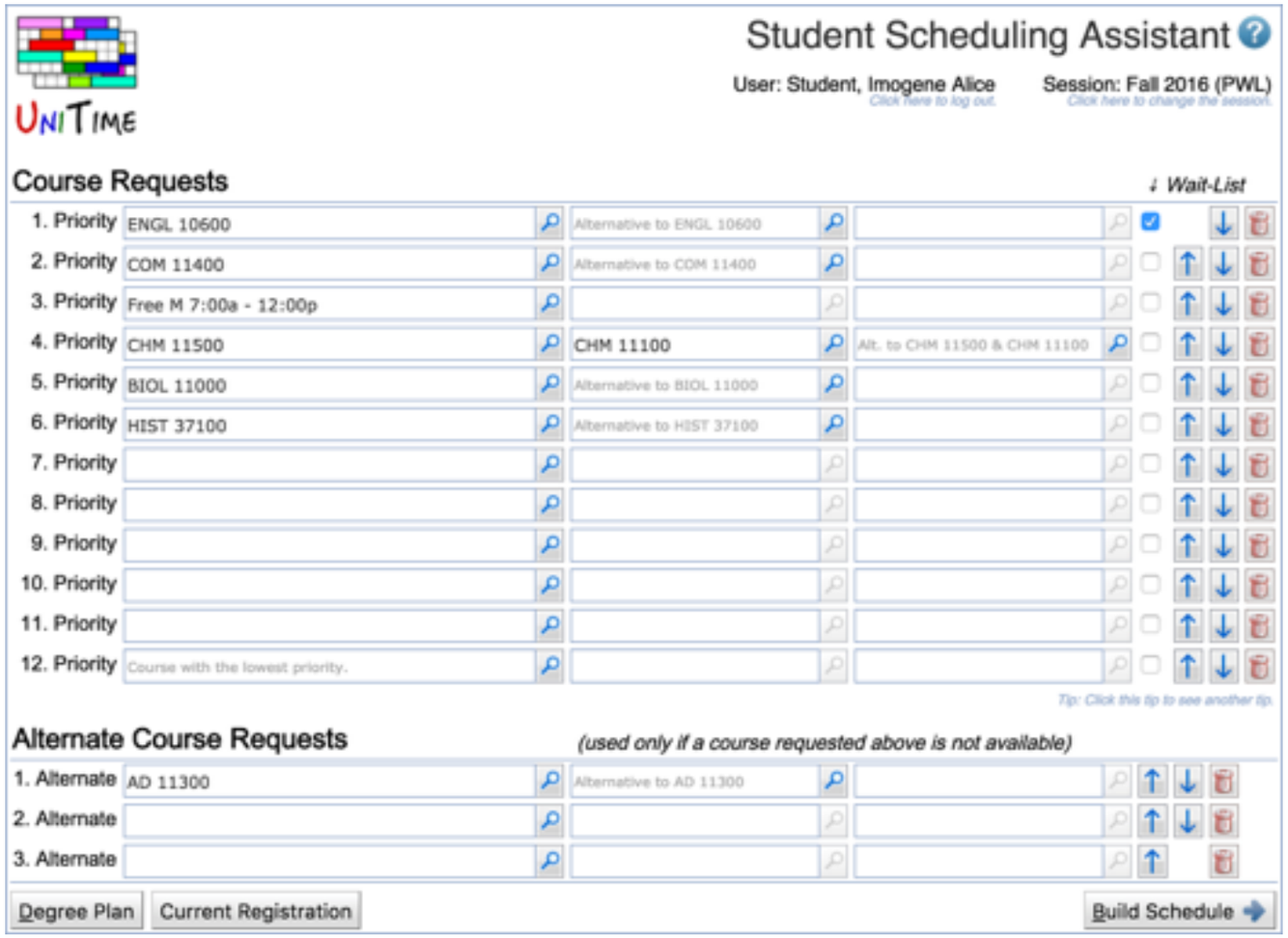


Course Requests

Course Requests

- Each requested course can have up to two alternatives (or it can be wait-listed)
- There can also be additional alternate course requests to get the desired number of courses
- There can be free time requests in the list

+ Course Structure
+ Reservations
+ Other Constraints



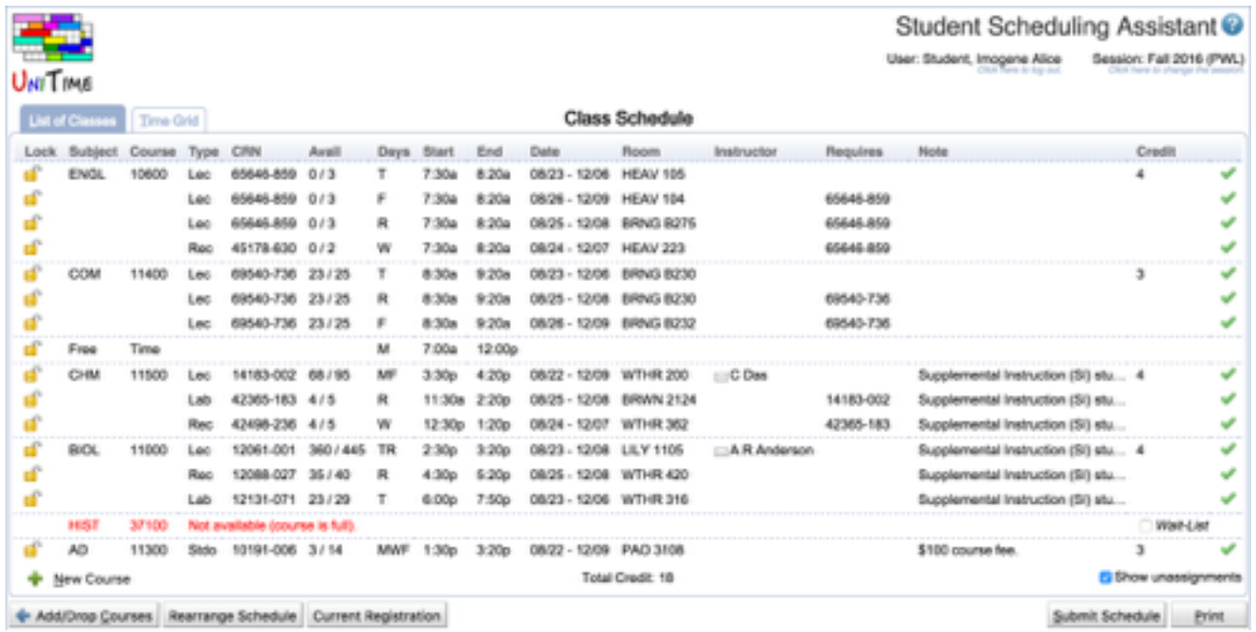
Student Schedule

Student Schedule

- As complete as possible
  (alternatives are used when a course is not available)
- Priorities are used to resolve conflicts
- The amount of overlapping time is minimized (where allowed)
- Distance conflicts are minimized (consequent classes too far)

Additional Criteria

- Avoid over-expected classes
- Keep previous schedule
- Section balancing
- Avoid arrange hour classes
- Keep students of the same group together (batch)



Other Features

Other Features

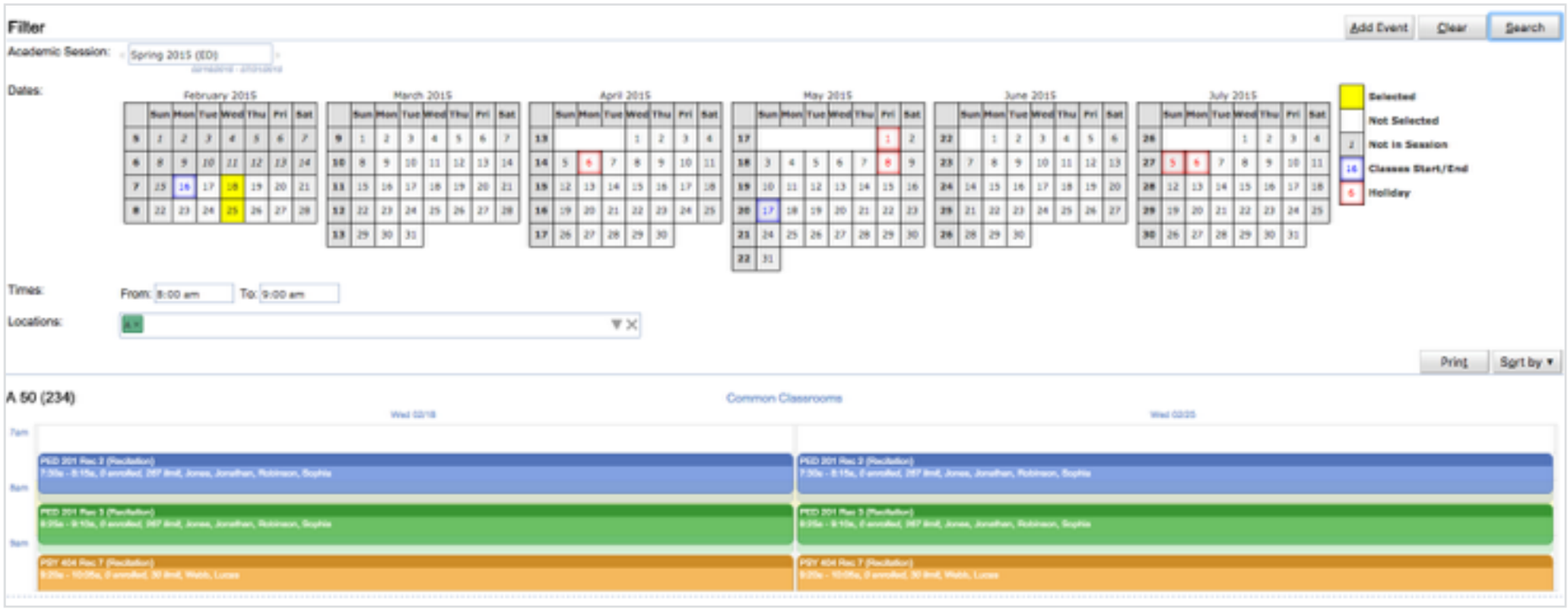
- Expectations (avoid over-expected classes, if possible)
- Automated wait-listing
- Consent of instructor, department
- Linked classes
- Reservations (individual, student group, course, curriculum)
- Allow time conflicts (for a course, for a request, between classes)
- Course management (locking)
- Enrollment deadlines
- Email notifications
- Dashboard, student change logs
- Reports
- User roles, student statuses, mass cancel, customizations, …

Event Management

Event Management

What is Event Management?

- Booking rooms for events
- Process
  - Anybody can enter a request for reservation
  - Event manager approves / rejects / inquires further



Event Management

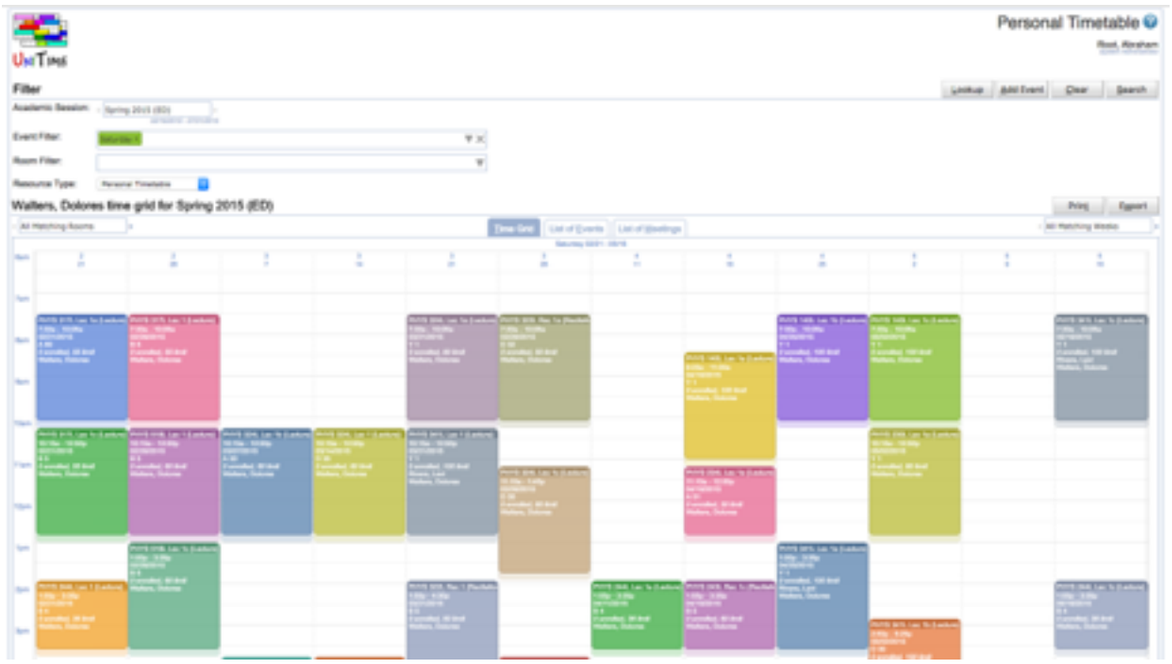
Why is it needed?

- Accurate information about room availability
- Searchable information about scheduled student's or instructor's activities in one place
  - Course timetable
  - Course related events
  - Examinations
  - Student's room reservations

Event Management

Features

- Committed timetables are displayed here
- Lookup of available rooms by certain criteria
- Extensive filtering capabilities
- Personal timetables (students, instructors)
- Export to ical or other formats



Administration

Administration

Installation

- Java
- Tomcat
- MySQL or Oracle
- UniTime
- Instructions at http://help.unitime.org/Timetabling_Installation

Authentication

- LDAP, CAS, …

Administration

Initial setup of the system

- Instructional types
  - Lecture, Recitation, …
- Status types
  - Possible statuses of the academic session
- Room types
  - Rooms are sorted by their types in Rooms pages
- Position types
  - Positions of instructors; not essential for timetabling
- There are some defaults in the woebegon database

Administration

Academic session setup - new session

- Add a new academic session with important dates

Academic session setup - XML

- Departments
- Subject areas
- Buildings and rooms
- Staff
- Courses
- (Academic areas, classifications, majors, curricula)

Information available at http://www.unitime.org/uct_interfaces.php

Administration

Academic session setup - manual

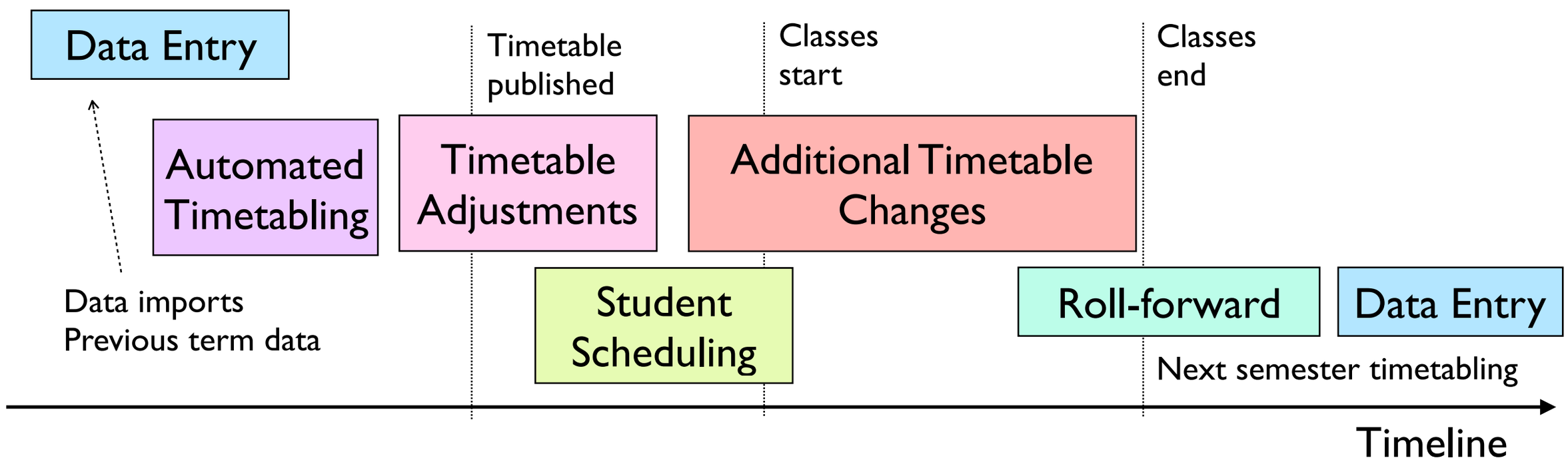
- Solver groups
- Managers
- Date patterns
- Time patterns

And you can start!

Administration

Academic session roll-forward

- When there already are academic sessions in UniTime
- Roll-forward most of a session's data
- Possible to combine data from different sessions
- After roll-forward, it is possible to still use XMLs to update the data



Conclusion

UniTime

- Comprehensive system
- We have covered only the basics

For more details, please see us at the conference

- UniTime: State of the Project (Tuesday, 3pm - 3:45pm in KC 912)
- Student Scheduling in UniTime (Wednesday, 11:45am - 12:30pm in KC 912)
- Or visit www.unitime.org

An online demo is available at https://demo.unitime.org