



UniTime: State of the Project

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Credit: Photo by Tourisme Montréal, Stéphan Pouli

#### Agenda

- Short introduction of UniTime
- State of the Project
- UniTime 4.2 (Current Version)
- UniTime 4.3 (New Version, to be released in June 2018)
- Plans for next release & long term

This presentation is available at www.unitime.org/present/apereo18-unitime.pdf



## Course Timetabling

## What is UniTime?

- Comprehensive academic scheduling solution
- Four components: course timetabling, examination timetabling, student scheduling and 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
- Apereo project since March 2015



## State of the Project

#### **Releases / Achievements**

UNITIME

- UniTime 4.2 released in June 2017
  - Instructor Scheduling, Mobile, Student Groups, Point in Time, Event Management
- UniTime 4.3 to be released in June 2018
  - Course Request Validation & Batch Student Scheduling
  - More to follow in this presentation...
- UniTime 4.4 specs are being defined
- 55 institutions from 33 countries filled our voluntary registration form during the last 12 months
- 63 institutions indicated that they use UniTime in production
- Steady increase in interest and adoption from literally around the world
  - But still very little outside contributions
- Both sides of the interface with Ellucian Banner are now available



## UniTime Users

Word cloud from our voluntary registrations (all of them)



14



## ITC 2019

## International Timetabling Competition 2019

- To be announced at PATAT 2018 this August (winners at PATAT 2020)
- Course timetabling problem
  - Assignment of classes to times and rooms, students to classes
  - Course structure, classes with available times and rooms, student course demands, distribution constraints
  - Optimization: time and room penalties, (soft) distributions, minimization of student conflicts
- Based on real-life data collected using UniTime
  - Anonymized, a slightly simplified problem model
  - 10+ institutions from around the world
- Organization
  - Looking for best solutions, commercial solvers allowed, no time limit
  - Three groups of data will be published during the competition
  - Competition website with solution validator, best known results, etc.



# Current Release: UniTime 4.2

## UniTime 4.2

UNITIME

- Released June 2017
- Brand new Instructor Scheduling component
  - Automatic assignment of instructors (TAs) to classes
- Mobile-friendly user interface
  - Using responsive design
- Improved ability to keep students of a particular group together
  - Both course timetabling and student scheduling
- Point in time reports
  - E.g., census date limits & enrollment data
- Event Management

- automatic approval, service providers, meeting contacts
- Many other improvements across the whole application

See https://goo.gl/4g1XQV (UniTime 4.2 Release Docs) for more details.



# New Release: UniTime 4.3

#### UniTime 4.3

- To be released in June 2018
- Batch Student Scheduling
  - Custom Course Requests Validation
  - Scheduling Dashboard
- Course Timetabling
  - Solver pages rewritten to GWT
  - Improved localization and internationalization
  - A number of new features and improvements
- Scripting & Reporting

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- API, new parameters, Task Scheduler
- Many other improvements across the whole application

See https://bit.ly/2IBrbAs (UniTime 4.3 Release Notes) for more details.



## **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





#### Course Requ

- Custom Valid
  - eligibility, overrides
- Status Icons

Request Overrides

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registration in them please select Request Overrides	-	Tip: Enter a free time to aviod getting classes in time yo		
consult with your advisor before coming back to you	r Course Request page.	(used only if a course requested above is not available)		
	Request Overrides & Submit Cancel	e not available.	০×↑ ০×↑	
	3. Alternate		>×↑	
	Degree Plan Current Registration	Total Credit: 14 - 17	Submit Re	
	You have made some changes in	n your course requests. Please click the Submit Requests button to update yo	our submis	asion.



## Student Scheduling Dashboard

- Advisor access
  - My Students, Change Status, Change Group
- More information
  - Overlaps, Distances
  - Request Credit
  - Alternatives
  - Student Details (requests, grid)
- Student statuses
  - Assistant / Request
  - Effective Dates
  - Fallback Status

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#### **Student Scheduling Solver**

- Custom validation & overrides
- Custom save (e.g., using Banner XE API to enroll students)
- Short distances (for students with accommodation)
- Student group types
  - Keep students together
  - Allow disabled sections (may require a group reservation)
- Custom overrides
  - Ability to request time/space conflict when needed

Code	Name	Keep Students Together	Disabled Sections	Advisors Can Set
Advisor	Advisor Managed Groups	*	Not Allowed	<b>~</b>
LC	Learning Communities	<b>~</b>	Allowed With Group Reservation	*
MGMT	Management Teams	<b>~</b>	Not Allowed	*
STAR	STAR Students	*	Not Allowed	*

## Course Timetabling

Placement

Same Time

MWF 8:30a - 9:20a

Solver stopped

MWF 7:30a, MWF 8:30a, MWF 9:30a, MWF 10:30a, MWF 11:30a, MWF 12:30p, MWF 1:30p, MWF 2:30p, MWF 3:30p, MWF 4:30p, TTh 7:30a, TTh 9:00a, TTh 10:30a, TTh 12:00p, TTh 1:30p,

Root, Abraham

Allow Break Hard

MWF 9:30a - 10:20a

## **Course Solver Pages**

UNITIME

- Rewritten to GWT
  - Localizable, First day of week
  - Customizations
- New Features
  - Filter on Suggestions page
  - Export to Excel

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Monday	CALC 10100 Lec 1 Calculus 7:30a - 8:20a Doe Joe	CALC 10100 Lec 3 Calculus 8:30a - 9:20a	BIOL 10100 Lec 3 Introduction to Biology 9:30a - 10:20a Newman, George	CALC 10100 Lec 2 Calculus 10:30a - 11:20a	ECON 10100 Lec 1 Micoeconomics 11:30a - 12:20p	+3.6	BIOL 101 SIZE M PSY 101 Lec BIOL 101 Lec			UC 101 + F (C+T) UC 101 Broken Time	e Patterns: +2	
Tuesday	Introduction to Biology Seminars in Pharmacy Chemistry I Principles of Microbiology Chemi		CHM 10100 Lec 3 Chemistry I 11:30a - 12:20p	+3.6	BIOL 101 Pso PSY 101 Lec	Lec 1 Full Term MWF 2:30p → MWF 11:30a EDUC 101 +1 (c+1)						
Wednesday	CALC 10100 Lec 1 Calculus 7:30a - 8:20a	CALC 10100 Lec 3 Calculus 8:30a - 9:20a	BIOL 10100 Pso 2 Introduction to Biology 9:30a - 10:20a	CALC 10100 Lec 2 Calculus 10:30a - 11:20a	ECON 10100 Lec 1 Micoeconomics 11:30a - 12:20p	1	BIOL 101 Lec BIOL 101 Pso 2:30p - 1:20p			UC 101 Student Cor UC 101 3:30p - 5:20p	nmitted Conflict:	
Thursday	Doe, Joe BIOL 10100 Lec 2 Introduction to Biology	Doe, Joe BIOL 10100 Pso 3 Introduction to Biology	Newman, George CHM 10100 Lec 2 Chemistry I	Doe, Joe MBIO 10100 Lec 1 Principles of Microbiology	CHM 10100 Lec 3 Chemistry I			PHYS 10100 Lec 2 Physics	Newman, George ENGR 10100 Lec 1 Freshman Engineering	BAND 10100 Leo Band	: 1	
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Friday	CALC 10100 Lec 1 Calculus 7:30a - 8:20a	CALC 10100 Lec 3 Calculus 8:30a - 9:20a	BIOL 10100 Lec 3 Introduction to Biology 9:30a - 10:20a	CALC 10100 Lec 2 Calculus 10:30a - 11:20a	ECON 10100 Lec 1 Micoeconomics 11:30a - 12:20p			PSY 10100 Lec 1 Psychology 1:30p - 2:20p	BIOL 10100 Lec 1 Introduction to Biology 2:30p - 3:20p	BAND 10100 Leo Band 3:30p - 5:20p	:1	

UNITIME

Date:

Time

Room

Filter

+2

Available Times

Available Rooms

Minimum Room Size:

Suggestions

**PSY 10** 

ECON 1

ECON 10

Score Class

Current Assignment of PSY 101 Lec 1

Full Term MWF 2:30p - 3:20p

**EDUC 101** 

EDUC 101

4

Suggestions

Same Room

MWF 7:30a - 8:20a

TTh 3:00p, TTh 4:30p

Suggestions @

Fal 2010 (woebegon)

<u>U</u>nassign

<u>S</u>earch

ed Conflict: +2

AX



# Reporting & Scripting

#### Reporting

- New parameters for HQL reports
- Report API

		ays, by hour, selected opera	-			
Name:	Scheduling Assistant Usage [las	st N days, by hour, selected o	perations]			
Description:	This report shows the Student	Scheduling Assistant usage du	iring the last N days.			
						/_
Query:	to_char(max(I.apiPostTime),'9 to_char(avg(I.cpuTime/100000 to_char(100.0 * count(case w) to_char(100.0 * count(case w) from	00), '999,990.000') as CPU_T hen l.apiGetTime is not null th	ien 1 end) / count(I),'990.0			
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Address May Brown and



# Reporting & Scripting

## Scripts

- Send email when done
- Clustering
- Script API
- New parameter types
  - (e.g., time, date, or timestamp)
- Automation

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#### Scheduled Tasks for Fall 2018 (PWL) Add New Refresh **Task Name** Date Time Status Script Parameters Owner DRC: Export Rooms Muller, Tomas DRC: Export Rooms Thu 05/17, 2018 6:00a Failed Fri 05/18, 2018 6:00a Finished Fri 05/25 - 07/27, 2018 6:00a Created STAR: Update VSTAR Muller, Tomas STAR: Update VSTAR Student Group: VSTAR - VSTA... Thu 05/17, 2018 5:00a Failed MTF 05/18 - 05/22, 2018 5:00a Finished MTWThF 05/23 - 05/31, 2018 5:00a Created Add New Refresh

Albert M. B. W.



# Other Improvements

#### **Other Improvements**

- Added ability to use OpenStreetMap
- Course Offering XML: create if not exists
- Course Requests XML: add / drop requests
- Test HQL: Export CSV, table formatting & pagination
- Instructor API: export instructor preferences
- Room Availability: include events from other academic sessions
- Events: first day of week can be changed
- New manuals (see Help > Manuals)
- Branding (using custom CSS)







## Next Release: UniTime 4.4

## UniTime 4.4

- Planned release: mid 2019
- TBD, most likely student scheduling
  - Ability to request pairs of courses
  - Avoid/minimize online courses
  - Interfaces, student schedule quality / fairness, ...
- Continue the effort of making the user interface look & feel more modern, mobile friendly, and better localizable



## Conclusion

#### Long Term

- Constraint Solver: instructor and student scheduling, team building
- UI: moving from Struts to GWT, localization, documentation, mobile
- Interfaces: IMS Course Planning & Scheduling, more APIs and XMLs

#### For more details, please see us at the conference

- Getting Started with UniTime (Sunday, 9 am in Liszt)
- UniTime: State of the Project (Monday, 2:30 pm in Debussy)
- UniTime Introduction (Monday, 5:30 pm, Showcase Reception)
- Student Scheduling at Purdue University (Tuesday, 11:15am in Debussy)
- Internationalization of UniTime (Wednesday 11:00 am in Debussy)
- Or visit <u>www.unitime.org</u>

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