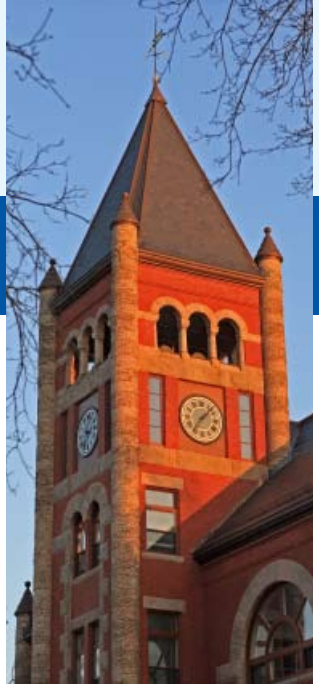
Space & Time Optimization



In an environment where space and time are dear, every room matters and every hour is significant. Space Management is simply about using your available space wisely and in a timely way.

White Mountain Technologies develops SIS and scheduling software for universities under the brand name UniversiTools. UniversiTools Course Scheduler automatically generates 100% conflict-free course timetables. UniversiTools Classroom Scheduler, in turn, automatically schedules rooms and facilities.

The Predicament

We have been looking at the timetable and space problems that universities face," says Ghassan Abboud, Director at White Mountain Technologies. "*Facing real shortage of space, universities start looking into construction: a new building, if at all possible, would resolve the issue. They had simply run out of rooms, or so they thought.*" Rooms are valuable university resources, and the room-hour matrix is a delicate balance.

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Space (and time) issue is all the more aggravated by the absence of any possibility to expand, which leaves a major impact. "Our lack of rooms reflects heavily on what we offer: we are not sure that we can add any more courses to our curriculum," is an acute university problem. Similar effects can go on, all ending in: "no time, no rooms".

Sometimes instructors, on their part, add to the issue by their tendency to teach at the same hours. This quickly consumes available resources and generates a highly clustered time-frame. Now, clustering is a main resource drain. See it this way:

A university would ideally, or normally, schedule its courses evenly across 10 hours a day. Suppose that this university now **"succumbs"** to its instructors' tendency to cluster their courses in a 5 - hour time frame. This would then require the university to double its rooms to fit this clustered schedule! The university "succumbs" because it is simply oblivious to, or cannot handle, this clustering! Or, if it were, it would think that there is no solution to it. Things just force themselves.

The Case

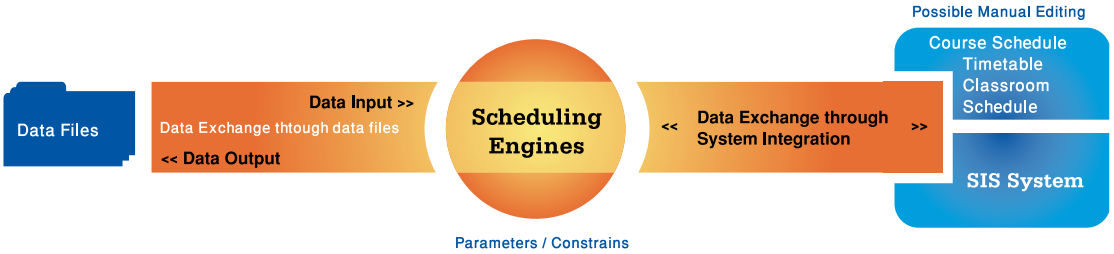
Space is a major issue," says Dr. Walid Shatila of **Beirut Arab University (BAU),** a leading university in the region. "Some of us started contemplating the need for a new building." BAU recruits 15,000 students and 500 instructors, and lists 250 courses in its catalog. "Then we looked at UniversiTools Course Scheduler and Classroom Scheduler, and implemented them. And in an hour the schedulers showed us that we can free 30% of our rooms! Imagine what you would do with 30% of your space free!"

... " in an hour UniversiTools schedulers showed us that we can free 30% of our rooms! "

"This is exactly what we set out to hear. This is our aim," says Ghassan Abboud of White Mountain, "We built UniversiTools Scheduler to free up valuable space and time."

The Solution Explained

A bird's eye view of the system helps:



As the diagram shows, the work flow of UniversiTools Course and Classroom Schedulers is simply put as follows:

Data Input/Parameters/Constraints → Automated Scheduling Engines → Course & Classroom Schedules Output

Data Input: constitutes the university's teaching hours, instructor information, course information, room information, and facilities information (such as labs, darkrooms, etc.)

This data reaches UniversiTools Scheduler (Course and Classroom) in either of two ways: (1) data files, or (2) system integration. In the first case, data is imported into the Scheduler in files having comma-separated value, text, or other format. In the second case - system integration - UniversiTools Classroom Scheduler integrates with UniversiTools SIS or other SIS system at place and exchange data seamlessly and instantaneously.

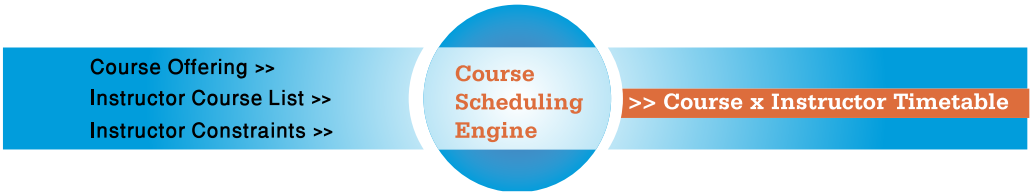
Beirut Arab University implemented UniversiTools and required that it be integrated with their SIS - Sungard Banner. When White Mountain completed the integration, UniversiTools and Banner exchanged information seamlessly.

Parameters: constitute the course requirements (such as projector, Internet, computers) and the availability of these requirements in the rooms, what we call "room features".

Constraints: constitute binding factors, such as instructor preferences for teaching hours. Constraints, as the term indicates, confine the freedom of the Scheduler to reach an optimal scheduling solution. But, since constraints are a matter of fact, they have to be taken into consideration whenever they impose themselves. If some instructors work part time, then their hours and rooms need to be scheduled as such.

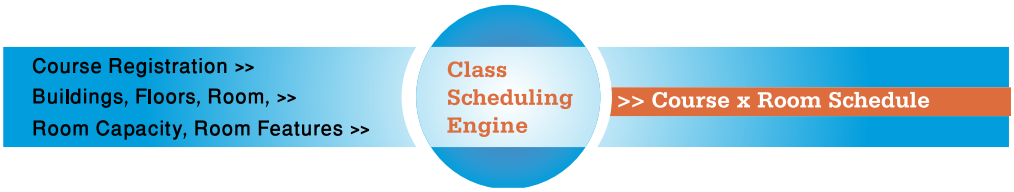
Automated Scheduling Engines: process the data, parameters, and constraints, and then automatically generate timetables for courses and instructors, and schedules that allocate rooms to courses in an optimized way. Then, in case you would like to swap a few things here and there, the Schedulers allow you to work manually on the timetables and schedules that they generated. Nevertheless, while you are doing so, the Schedulers would be monitoring your changes and auditing its validity. If your editing causes conflicts, the Schedulers would indicate so and reject your moves.

Below is a general look at the Course Scheduler:



Based on the courses being offered, which instructor is teaching which courses, and any constraints on their teaching loads or hours that some instructors might have, the Course Scheduler generates an optimal timetable, indicating which times are best for the instructors to teach their courses.

Below is a general look at the Classroom Scheduler:



Based on the rooms and course registration information, the Classroom Scheduler generates an optimal allocation. It matches course registration with room capacity and features. As a simplistic example, if 25 students are registered for a course, then the Scheduler opts to allocate for this course a room with capacity for 30 students rather than another one with capacity for 40 students.

Course & Classroom Schedules Output:

In looking at the resulting timetables and schedules, you will notice the following:

- There are no conflicts at all.
- Scheduling is distributed in a way that spreads the load across available time and space, as opposed to clustering things around limited resources.
- All conditions and constraints are taken into account.
- Contradictory constraints prohibit possible solutions. When this is case, instead of breaking down or generating conflicts, the Schedulers indicate that no solution is possible.
- You may edit the timetables and schedules manually. The engines will monitor and decide about the changes that you will make.

In Conclusion

Why do UniversiTools Schedulers optimize your use of time and space? Because they:

- Consider your requirements
- Distribute the load
- Find best fits
- Manage resources and constraints

UniversiTools is produced by **White Mountain Technologies** s.a.l. Ref, 091125
Tel: +961 - 1 - 422 765 | E-mail: info@UniversiTools.com | Web: www.UniversiTools.com