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UIS-SCHEDULER

An Asynchronous Web Enabled Collaborative Course Scheduling Tool

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Abstract

Course scheduling is often a labor intensive, manual process that is governed by heuristics. UIS-SCHEDULER, a WEB enabled collaborative planning tool under development at the University of Illinois, can be used to perform asynchronous planning and course scheduling. The asynchronous environment and optimization methodology for UIS-SCHEDULER are described. This new scheduling tool is expected to save time and compress the planning cycle as a result of the reduction in the number of face-to-face meetings required during the planning process. Higher individual and group productivity and satisfaction with the scheduling process and outcomes are also expected as a result of the use of asynchronous technology.

Introduction

The process of course scheduling is often localized, cumbersome, and iterative in nature. Manual scheduling is by definition error prone and time consuming especially when one is trying to deal with a scheduling problem of any consequence.

In addition, using a "best guess approach" or heuristic model to select course offerings each semester can result in "problems" such as schedule conflicts, under scheduling of key courses, over scheduling of lecturers, and haphazard provision of special materials required by the instructors (i.e. computer technology, labs, and audio visual equipment). UIS-SCHEDULER can be used to resolve some of these problems and to develop optimal schedules of course offerings.

The WEB Enabled Groupware

Course scheduling is a collaborative effort where the needs of students, availability of faculty, classrooms, labs, and equipment must be considered by the group whose responsibility is planning the "best" schedule of course offerings. The proposed system, UIS-SCHEDULER will be embedded within Lotus NOTES, a collaborative support system (Larson-Hughes and Skalle, 1995; Kraut and Allen, 1995), where individuals can work together asynchronously.

Collaborative technologies such as UIS-SCHEDULER hold the promise of more democratic and better decision making, synergy, more objective evaluation, stimulation, and learning (Hiltz et al., 1989). Group support systems may also be able to level influence, reduce conformance pressure, domination of a group by one or two members, and information overload (Nunamaker et al., 1991).

Further, the decision to develop UIS-SCHEDULER using a WEB enabled, asynchronous groupware platform, Lotus NOTES with DOMINO as the WEB interface, was a direct result of the need for increased productivity, shorter planning cycles, and resolution of some of the problem areas listed above. The time required for face-to-face meetings will be reduced as a result of the asynchronous nature of the product (Hiltz et al., 1991; Dufner, Hiltz, and Turoff, 1994). Much work can be completed using UIS-SCHEDULER

without having to attend meetings. Any team member having a standard WEB browser and access to the Internet will be able to work with UIS-SCHEDULER.

The Architecture

The architecture of the system is both client server and WEB enabled. UIS-SCHEDULER can be used as a client server application where the client software resides on the planner's own PC. UIS-SCHEDULER can also be accessed via the Internet using standard WEB browsers such as Netscape. Individual group members may choose the method of access they prefer.

To create the WEB enabled portion of the architecture the NOTES software is implemented as "middleware" with DOMINO™ as the Internet interface. For this method of access no client software is needed on the user side.

The course preferences of students and faculty will be collected asynchronously. Student and faculty participation is expected to enhance satisfaction with course offerings and the planning process itself (Sampson, Freeland and Weiss, 1995). The asynchronous collection of data will not require students to have NOTES clients since access to UIS-SCHEDULER is convenient using standard WEB browsers.

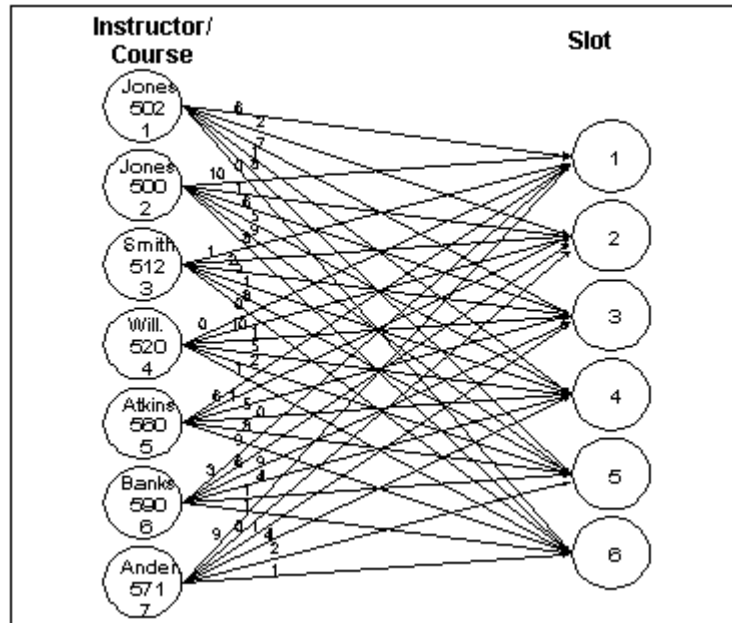
Schedule Optimization Methodology

The heart of UIS-SCHEDULER is the network flow model that will be used to optimize the course schedules (Anderson, Sweeney, and Williams, 1991). A network flow model was chosen for its ability to solve extremely large problems and for its parsimony (Mulvey, 1982).

The optimization algorithms will be designed based on the following general model:

$$\begin{aligned} \min & \sum_{i=1}^m \sum_{j=1}^n c_{ij} x_{ij} \\ \text{s.t.} & \\ & \sum_{j=1}^n x_{ij} \leq 1 \quad i=1, 2, \dots, m \text{ Agents} \\ & \sum_{i=1}^m x_{ij} = 1 \quad j=1, 2, \dots, n \text{ Tasks} \\ & x_{ij} \geq 0 \quad \text{for all } i \text{ and } j \end{aligned}$$

We can assign a preference ranking from 0 to 10 for each course in each time slot. A network flow model can then be developed as shown in figure 1 below.



**Figure 1. Network Model for Course-Slot Preferences
Conclusion**

UIS_SCHEDULER will facilitate asynchronous collaborative planning efforts. Consideration can be given to the variables mentioned above to generate a more satisfying offering of courses. Students, faculty, and administration are expected to be more satisfied with schedules generated using UIS-SCHEDULER because they will have had an opportunity to participate in the planning process.

References

- Anderson, David R., Sweeney, Dennis J. and Williams, Thomas A., *An Introduction to Management Science: Quantitative Approaches to Decision Making*. 6th edition. St. Paul, Minnesota: West Publishing Co., 1991.
- Dufner, D.K., Hiltz, S.R., and Turoff, M. "Distributed Group Support: A Preliminary Analysis of the Effects of the Use of Voting Tools and Sequential Procedures," *Proceedings of the 27th Annual Conference on System Sciences*, Maui, Hawaii, 1994.
- Ferland, Jacques A. and Charles Fleurent "A Decision Support System for Course Scheduling," *INTERFACES* 24 (March-April), 1995, 104-115.
- Hiltz, S. R.; Dufner, D.; Holmes, M. E.; and Poole, M. S. "Distributed Group Support Systems: Social Dynamics and Design Dilemmas." *Journal of Organizational Computing*, 2(1), 1991, 135-159.
- Mulvey, J. M. : 1982, "A Classroom/Time Assignment Model," *European Journal of Operational Research* 9, 1982, 64-70.
- Nunamaker, Jr. J.F.; Dennis, A.R.; Valacich, J.S.; and Vogel, D.R. "Information Technology for Negotiating Groups: Generating Options for Mutual Gain." *Management Science* 37(10), 1991.
- Kraut, Carolyn and Allen, Mitch *Programming the Lotus NOTES API*, John Wiley & Sons, Inc., New York, 1995.

Larson-Hughes, Robert and Hans J. Skalle *Lotus Notes Application Development*, Prentice Hall, Englewood Cliffs, New Jersey, 1995.

Sampson, Scott E., Freeland, James R. and Elliott N. Weiss "Class Scheduling to Maximize Participant Satisfaction," *INTERFACES* 25 (May-June), 1995, 30-41.