Constraint Based Scheduler with Implicit Transport Activities Applied to Laboratory Automation *

Dorothea Schaefer, Reinhold Schaefer
Wiesbaden University of Applied Sciences
[dschaefer,schaefer]@informatik.fh-wiesbaden.de

Abstract

Besides performing experiments, the major objectives of laboratory automation are increasing the precision and traceability within the laboratory, and cuting costs. An essential part of this automatization process is a scheduler; a software component that manages the limited resources (e.g. devices). The presented work implements a scheduler utilizing a well-elaborated constraint solving system, which is backed by a preprocessor for implicit transports.

The specification of transport of samples between workflow activities is part of the information that is required by the work bench instruments. The static and the dynamic description of the process needs to be in place in a generic machine readable format. But the laboratory technicians should be relieved from the burden to define transportation in their workflows, they should focus on the primal "chemical" matters. Information about transport trajectories and devices may be entered separately by a system administrator and included automatically ahead of the scheduling process. Finally, our scheduler integrates transports automatically in an XML representation of workflows in a separated step.

The presented scheduler itself benefits from the fact that the used constraint solving system ECLiPSe has been especially designed for planning tasks. It delivers an elaborate plan in such a detail that the work bench can be operated fully automated. Nevertheless, further work has to be done to optimize the system towards complex workflow structures and big sample amounts, and to include the system into existing applications i.g. laboratory information management systems.

We will demonstrate our system with sample results on site.

*Poster presented at LabAutomaltion 2007, Palm Springs, California (2007)