Chapter 19

Examples of System Designs and Implementations

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From the previous chapters it is evident that there are many different types of scheduling problems. It is not likely that a system can be designed in such a way that it could be made applicable to any scheduling problem with only minor customization. This suggests that there is room as well as a need for many different scheduling systems. The variety of available platforms, databases, Graphic User Interfaces (GUI’s) and networking capabilities enlarges the number of possibilities even more.

This chapter describes the architectures and implementations of seven scheduling systems. Some of these systems are commercially available and maintained and expanded on a regular basis. However, some of the others discussed are not being marketed and maintained any longer; they are included in this chapter because of their somewhat unusual architecture. The first section describes the Production Planning and Detailed Scheduling System (PP/DS) that is part of the Advanced Planning and Optimization (APO) software package developed by SAP. SAP, headquartered in Germany, is one of the leading ERP software development companies in the world. The PP/DS system is a flexible system that can be adapted easily to many industrial settings. The second system had been developed at IBM’s T.J. Watson Research Center. This system, which is based on a design that is quite unique, has been installed at a
number of sites, primarily in the paper industry. The third section describes an experimental scheduling architecture that had been developed by Advanced Micro Devices for its semiconductor manufacturing plants. The following three sections describe three commercial systems that are currently available on the market. These three systems are all somewhat generic; they have been designed in such a way that they are adaptable and suitable for implementation in a wide variety of industries. The fourth section describes the first one of these three systems, namely the Asprova APS system; this system is nowadays the most popular scheduling system in Japan. The fifth section describes a British system called Preactor which also has numerous implementations worldwide. The sixth section describes a system developed by Taylor Scheduling Software, a company based in Canada; this system is also quite generic and can be adapted to many different manufacturing settings. The last system considered in this chapter is an academic system that has been developed at New York University (NYU) for educational purposes. This system has been for many years in use at numerous universities all over the world.

19.1 SAP’s Production Planning and Detailed Scheduling System

SAP has been from the outset a company that specializes in the development of Enterprise Resource Planning (ERP) systems. The ERP2005 system is still one of their most important products. In 1998 the company started to develop decision support systems for manufacturing as well as for service industries. For example, they decided to develop their own supply chain planning and scheduling software rather than depend on alliances with third parties. This development resulted ultimately in a division that creates a suite of business solutions for Supply Chain Management (SCM) applications. This suite of solutions is referred to as SAP SCM. The supply chain planning and scheduling software is referred to in SAP as Applied Planning and Optimization (APO).

APO provides a set of specially tailored optimization routines that can be applied to all aspects of supply chain planning and scheduling. APO offers the following planning and scheduling steps:

(i) Supply Network Planning,
(ii) Production Planning and Material Requirements Planning, and
(iii) Detailed Scheduling.

The Supply Network Planning step (which is equivalent to a crude form of production planning) generates a production plan across the different production facilities (including subcontractors) in order to meet (customer) demand in the required time frames and according to the standards expected by the customer. This is accomplished either through their Capable-To-Match (CTM) planning procedure or through their optimizer. The CTM procedure uses constraint based heuristics to conduct multi-site checks of production capacities