Chapter III

Fundamentals of Enterprise Resource Planning (ERP)

Learning Outcomes

- Understand the interrelationship between MRP, MRP II, and ERP
- Be able to explain the components of an ERP system
- Have a basic understanding of the technical architecture of an ERP system
- Be familiar with the main players in the ERP market
- Know why SAP is a market leader

Historical Basis of ERP

Businesses first began to use IT technologies and computers on a routine basis in the 1950s and 1960s. The introduction of computers into the business environment required new systems that combined IT and business processes. In the early days, the most important systems in manufacturing companies were known as MRP (Material Requirements Planning) based systems. After two decades, MRP systems evolved into MRP II (Manufacturing Resource Planning), but it was many years before ERP (Enterprise Resource Planning) systems were first implemented, and these systems continue to evolve. To understand how today’s ERP systems developed, let’s first discuss MRP.
Material Requirements Planning

In the 1960s, Material Requirements Planning (MRP) emerged with the rapid evolution of computers. The main emphasis of these systems was to manage inventory, and the use of MRP helped companies control their inventory based on actual demand rather than reorder points. To do this, MRP used a set of techniques that took into account bills of material data, inventory data, and the master production schedule to predict future requirements for materials. The idea behind this was actually very simple. A finished product was subdivided into its components, and for every component a time schedule was developed. Based on this list, all necessary information required for the production of this specific product could be obtained in a very short time. The critical subcomponents could be tracked easily and, if necessary, could be obtained quickly to support on-time production. The critical time path could be defined and orders could be organized in order to prevent time delays in receipt of materials. However, even this simple procedure became tedious once the number of parts increased. Thus, a computer was essential to carry out these features of MRP. To sum up the benefits of MRP, it reduced the level of inventory a company needed to maintain, reduced production times by improving coordination and avoiding delays, and increased the company’s overall efficiency.

Manufacturing Resource Planning

Unfortunately, with the simultaneous development of Information Systems, MRP was no longer sufficient to meet the new requirements of many companies. In the 1980s, companies transitioned to Manufacturing Resource Planning (MRP II). This system allowed manufacturers to optimize materials, procurement, manufacturing processes, and so forth, while at the same time providing financial and planning reports. The underlying idea behind the MRP II concept was to integrate MRP with further manufacturing functions and other business units. MRP II was designed to assist in the effective planning of all the resources available to a manufacturing company. Ideally, it addressed operational planning in units, financial planning in dollars, and included a simulation capability with which to answer “what if” questions. It included business planning, sales and operations planning, production scheduling, material requirements planning (as in the original MRP), and capacity requirements planning, along with executive support systems that could be used to balance capacities and materials (The Free Dictionary, 2005).

Integration posed a major challenge in the evolution from MRP to MRP II. Towards the end of the 1980s, many business processes such as logistics,
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