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2017402024

IE 442 Project Report

MRP (Material Requirement Planning) is a system for **planning material requirements** suitable for managing **components needed to produce finished products**.

In this project, the database designed for MRP calculation Company XX which assumed use the

the production process principles as:

-Company sells only finished products which is X and Y

- BOM, lot size and lead times are pre-determined and constant for finished products X and Y

- Company forecast the demand for a month before week ago and produce finished products independent from order-based production scheduled. In other words, Company has scheduled receipts at the beginning of the month.

- The Customer orders inserted to database one by one. It means there is 1 or 0 transaction in database systems.

- Company give priorities to orders according to order-date It means if there is a demand for t+5 at t this demand use resources on this demand even if there is demand at t+1 for t+3. Since, production orders given on t for t+5.

- Company decide the due date as at least max production time after the order date.

In calculations based on the principles below explained on .( https://www.modula.eu/blog/en/mrp-system-how-to-calculate-material-requirements/)

- **demand for these materials** cannot be predicted but must be **calculated on the basis of demand for the finished product**. Production must be scheduled according to the quantity of finished products to be produced, and from this quantity you can arrive at the actual requirements for materials that go into them
- The Bill of Materials is the document which defines the structure of a product, i.e. types and quantities of components (raw materials, components, intermediate products, sub-assemblies, auxiliary materials) that make up a finished product. A product's bill of materials has several levels (the finished product is generally "level zero", its components "level 1", its components' components "level 2", etc.). The bill of materials helps you **progress from production schedules for finished products to those for their components**. The operation through which an assembled product is transformed into a list of its components is called "explosion".
- The current stock level is the constantly updated record of what materials and components are currently lying in stock in the warehouse
- Gross first-level component requirements **are calculated using orders to be issued** (or launched) **for finished products** that they contain. This calculation is cascaded down through to the end of the bill of materials: from the first-level component orders to be issued we obtain the gross requirements for second-level components, and so on.
- You now need to calculate net requirements **for each finished product, component, assembly and sub-assembly**, taking into account **how many of each of these you**

**already have in stock**. The net requirement is therefore obtained by subtracting stock in hand at the end of the previous period from the gross requirement. Gross and net requirements must be accurately linked to a point in time: the date on which the finished products have to be available comes from the production plan, whilst the dates for components must be calculated backwards taking into account production or procurement lead times.

- Outgoing orders are the **quantities to be ordered** (or produced) **for each finished product, component, assembly and sub-assembly**. These quantities match those in the incoming orders but are expected during the lead time period.
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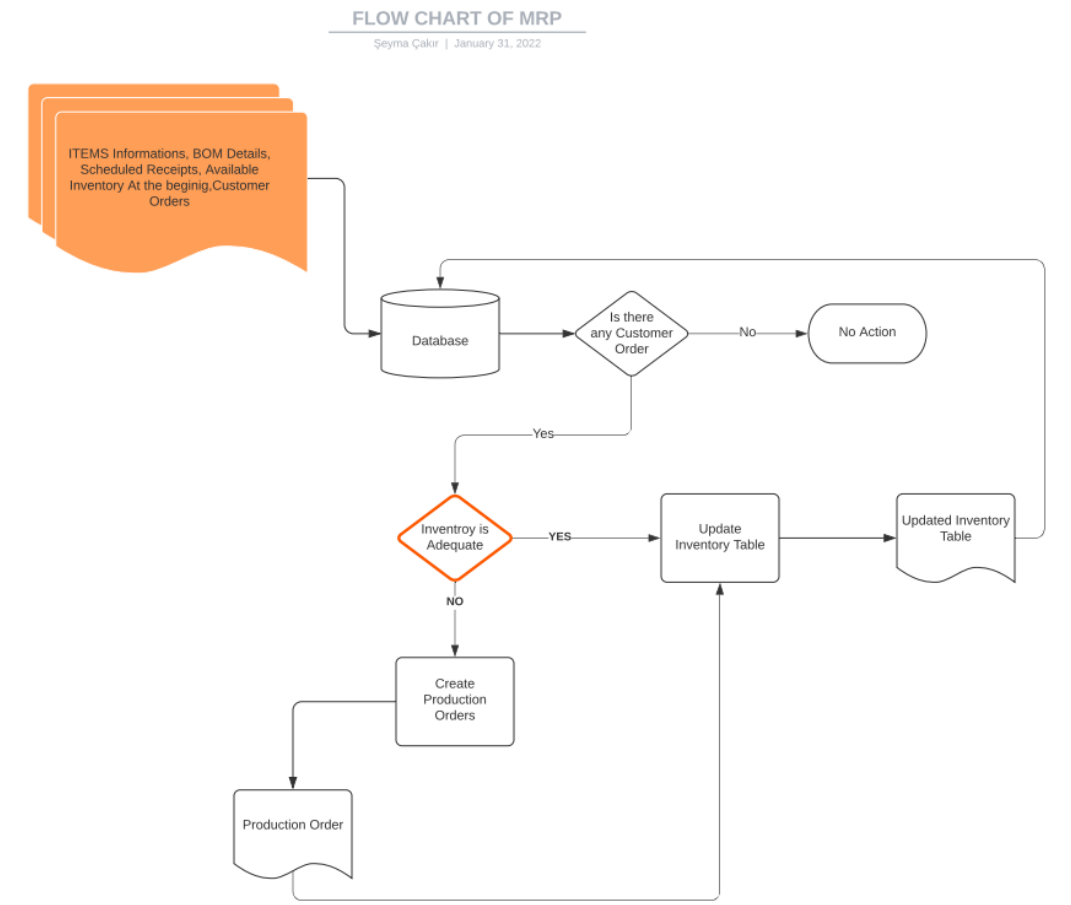
- The last step is to determine stock in hand at period end. This is obtained by adding incoming orders to stock available at period start and subtracting net requirements in the current period. This calculation must obviously be repeated for each product.

The flow chart of Process is given below:



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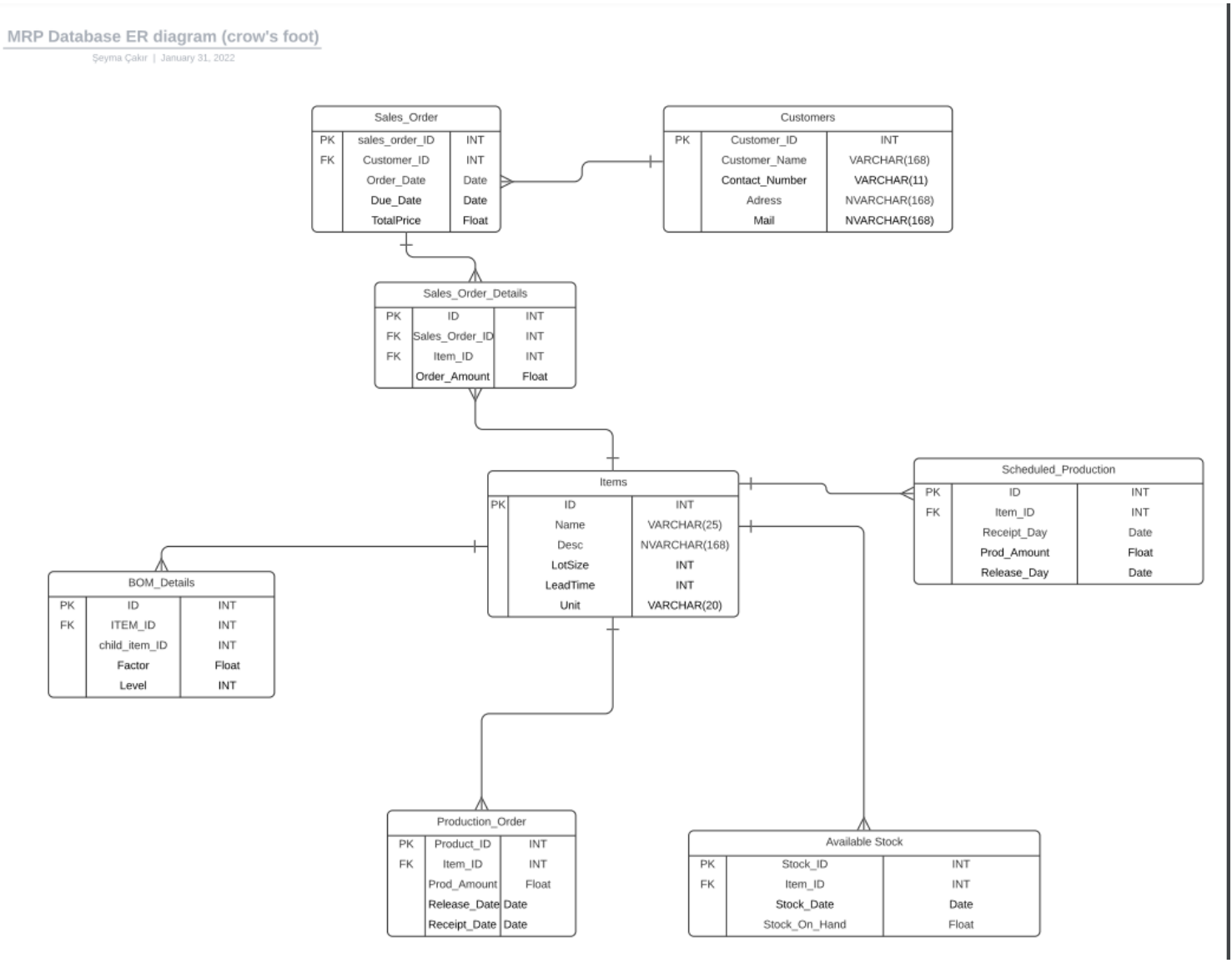
The Data-Base design is shown as ERP diagram below:




Item Table: Holds the product specified information

BOM_details: Holds the hierarchical dependent demand information for each item. It is input for mrp calculations. Not dynamic data, It is determined.

Scehuled_Production : Holds the information of scheduled productions, it is input of MRP. Not dynamic data, It is determined.

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Customers: Holds customer specified information

Sales_Order: Holds the customer orders without details (which item and how many) to avoid replications.

Sales_Order_Details: Holds the Item and Amount information and bound with Sales_Order table to get same informations about a order like date.

The Customers,Sales_Orders, Sales_Orders_Details are dynamic tables which updated and inserted by peoples.

Available_Stock: Holds available stock amount among a item in specified date. It needs to be initialized by people but after that it updated by mrp calculations. It is input and output MRP calculations.

Production_Order: It is main output of MRP calculations. It holds the work orders for production a component. It also can hold material purchase depend on the type of product needed. Which is specified in Items Table.

The all tables can be join by ITEM_ID in this MRP systems.

I used Azure Server and Database systems, the creation of database and test data insertion is given in the code,however, triggers and initialization of tables are given as sql command in file since they are complex and long codes to implement in code.