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Department of Computer Engineering and Industrial Engineering

BIM213 & ENM308 Project
SOFTWARE PROJECT ANALYSIS REPORT
MRP PROBLEM

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CONTENTS

1. Introduction.....	1
2. Differences Between Planned Program In First Report and Final Report	2
3. Used Data Structures	2
4. MRP Outputs	3
5. References	10

TABLE OF FIGURES

1. Schematic for MRP	1
2. Tree Structure of Project	2
3. Output of Product Code 1605	3
4. Output of Product Code 13122	4
5. Output of Product Code 048	4
6. Output of Product Code 118	5
7. Output of Product Code 062	5
8. Output of Product Code 14127	6
9. Output of Product Code 314	6
10. Output of Product Code 11495	7
11. Output of Product Code 1118	7
12. Output of Product Code 2142	8
13. Output of Product Code 129	8
14. Output of Product Code 457	9
15. Output of Product Code 019	9

1. Introduction

At the heart of the production plan are the forecasts of demand for the end items produced over the planning horizon. An end item is the output of the productive system. Components are items in intermediate stages of production, and raw materials are resources that enter the system. It is important to bear in mind that raw materials, components, and end items are defined in a relative and not an absolute sense. Hence, we may wish to isolate a portion of a company's operation as a productive system. End items associated with one portion of the company may be raw materials for another portion. A single productive system may be the entire manufacturing operation of the firm or only a small part of it.

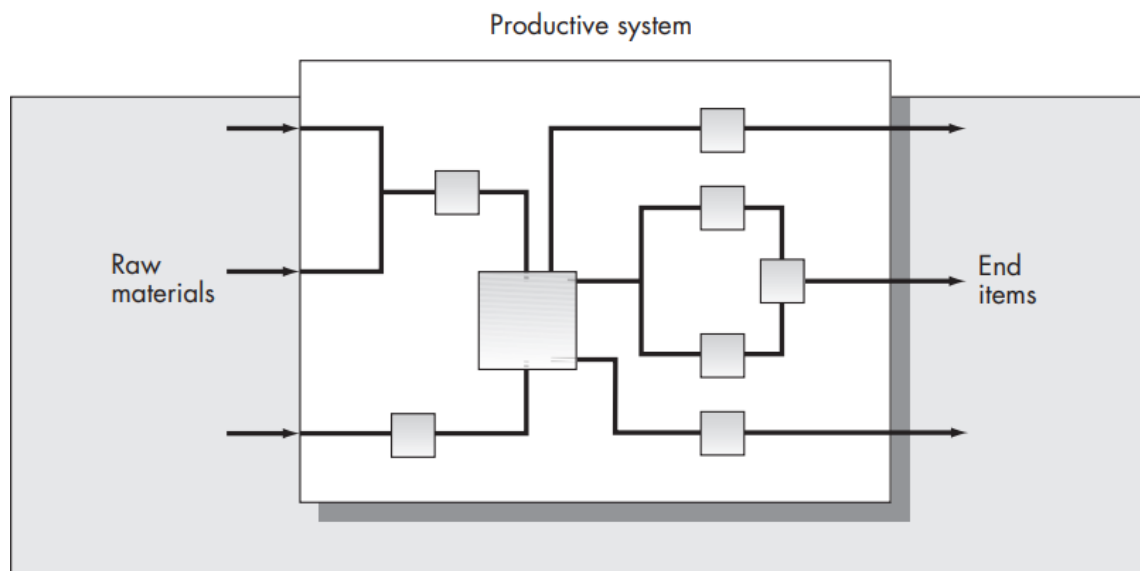


Figure 1 Schematic for MRP

Today, most companies are facing these problems and need software programs to solve these problems. Such software programs solve the problem both quickly and safely. On the other hand, it is more logical to prefer software programs because the manual solution takes a long time and may give erroneous results. In the interface designed in this interdisciplinary project, the user enters the requests according to the weeks they want to receive. By applying the solution algorithm, the desired data is obtained as output. Thus, both fast and accurate results are obtained.

2. Differences Between Planned Program In First Report and Final Report

There were some errors in the solution of the problem given in the first report and the solution of the problem was wrong. The main factor in the wrong solution is the attention deficit caused by people. When the computer solves the problem with a program, these errors are eliminated, and the correct result is reached. Correct results of the problem are given in the section titled "MRP Outputs".

Also, since the solution of the problem is long, errors may occur during manual solution due to many factors. However, when a solution is made in a computer program, these problems are not encountered, and the correct result is achieved.

3. Used Data Structures

Tree data structure is a data structure in which its elements are connected to each other via references, just like in the list data structure. The difference of this data structure from lists is that it is possible for an element to be connected to more than one element, unlike the list data structure. In this way, it is possible to provide a hierarchical sequence between the elements in the tree data structure. In a tree data structure, it indicates the order of that tree data structure, how many elements an element can be linked to at most.

The root is the topmost node in a tree. It is the only node without a parent. The product coded 1605 is the root representing all. Another term is child. It is a node immediately below and directly connected to a given node. A node can have more than one child. As an example, linked products under product code 1605 are its child. The last term is used in the program is parent. The parent is a node immediately above and directly connected to a given node. A node can have only one parent. Product code 13122 is the parent of the product code 457. Since the given problem fits the conditions mentioned above, the tree data structure was used.

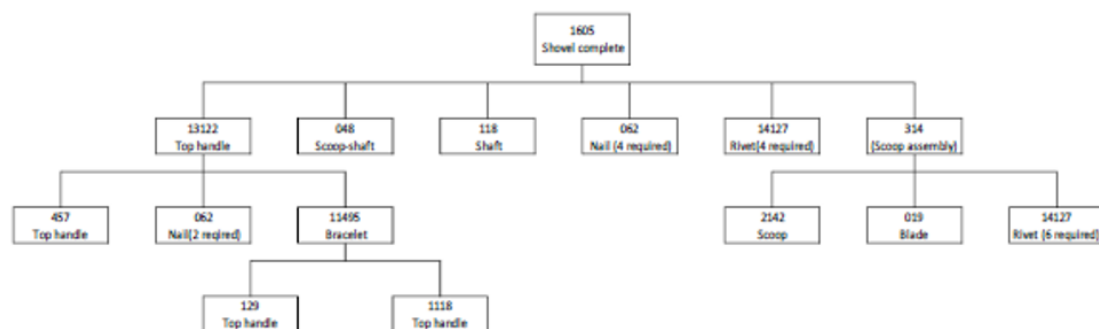


Figure 2 Tree Structure of Project

Another data structure is ArrayList. ArrayList data structure provided us a resizable array. An array could be created to store objects. However, once the array is created, its size is fixed but Java provides the ArrayList class, which can be used to store an unlimited number of objects. ArrayList is part of the Collections Framework. It provides dynamic arrays in Java. Although it can be slower than standard arrays, this structure helps in programs where a lot of manipulations are required on an array.

There are structures that should be dynamic in solving the problem. For example, the number of children of parents differs. For this reason, ArrayList structure is also used in the content of the program.

4. MRP OUTPUTS

The outputs of the problem involving the project subject are as follows.

MRP SYSTEM

Weeks

1	2	3	4	5	6	7	8	9	10
0	0	0	60	100	0	50	0	30	0

Apply the Demands

Print All MRPs

Apply Default Demands

1605

You can see the all output on the system output!!

Get MRP of Item

Get Constants of Item

ID: 1605 Lead Time: 1 Lot Sizing Rule:1

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	0	60	100	0	50	0	30	0
Scheduled Receipts:	0	0	0	0	0	0	0	0	0	0
On Hand From Prior Period:	30	30	30	30	0	0	0	0	0	0
Net Requirements:	0	0	0	30	100	0	50	0	30	0
Time Phased Net Requirements:	0	0	30	100	0	50	0	30	0	0
Planned Order Releases:	0	0	30	100	0	50	0	30	0	0
Planned Order Delivery:	0	0	0	30	100	0	50	0	30	0

Figure 3 Output of Product Code 1605

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 13122 Lead Time: 1 Lot Sizing Rule:40

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	30	100	0	50	0	30	0	0
Scheduled Receipts:	0	0	70	0	0	0	0	0	0	0
On Hand From Prior Period:	0	0	0	40	20	20	10	10	20	20
Net Requirements:	0	0	0	60	0	30	0	20	0	0
Time Phased Net Requirements:	0	0	60	0	30	0	20	0	0	0
Planned Order Releases:	0	0	80	0	40	0	40	0	0	0
Planned Order Delivery:	0	0	0	80	0	40	0	40	0	0

Figure 4 Output of Product Code 13122

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 48 Lead Time: 3 Lot Sizing Rule:30

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	30	100	0	50	0	30	0	0
Scheduled Receipts:	0	0	0	0	0	0	0	0	0	0
On Hand From Prior Period:	30	30	30	0	20	20	0	0	0	0
Net Requirements:	0	0	0	100	0	30	0	30	0	0
Time Phased Net Requirements:	100	0	30	0	30	0	0	0	0	0
Planned Order Releases:	120	0	30	0	30	0	0	0	0	0
Planned Order Delivery:	0	0	0	120	0	30	0	30	0	0

Figure 5 Output of Product Code 048

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 118 Lead Time: 2 Lot Sizing Rule:1

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	30	100	0	50	0	30	0	0
Scheduled Receipts:	0	50	0	0	0	0	0	0	0	0
On Hand From Prior Period:	0	0	50	20	0	0	0	0	0	0
Net Requirements:	0	0	0	80	0	50	0	30	0	0
Time Phased Net Requirements:	0	80	0	50	0	30	0	0	0	0
Planned Order Releases:	0	80	0	50	0	30	0	0	0	0
Planned Order Delivery:	0	0	0	80	0	50	0	30	0	0

Figure 6 Output of Product Code 118

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 62 Lead Time: 2 Lot Sizing Rule:1

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	280	400	80	200	80	120	0	0
Scheduled Receipts:	0	0	0	0	0	100	0	0	0	0
On Hand From Prior Period:	50	50	50	0	0	0	0	0	0	0
Net Requirements:	0	0	230	400	80	100	80	120	0	0
Time Phased Net Requirements:	230	400	80	100	80	120	0	0	0	0
Planned Order Releases:	230	400	80	100	80	120	0	0	0	0
Planned Order Delivery:	0	0	230	400	80	100	80	120	0	0

Figure 7 Output of Product Code 062

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 14127 Lead Time: 1 Lot Sizing Rule:100

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	300	720	400	0	200	300	120	0	0
Scheduled Receipts:	0	0	0	0	0	0	0	0	0	0
On Hand From Prior Period:	60	60	60	40	40	40	40	40	20	20
Net Requirements:	0	240	660	360	0	160	260	80	0	0
Time Phased Net Requirements:	240	660	360	0	160	260	80	0	0	0
Planned Order Releases:	300	700	400	0	200	300	100	0	0	0
Planned Order Delivery:	0	300	700	400	0	200	300	100	0	0

Figure 8 Output of Product Code 14127

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 314 Lead Time: 1 Lot Sizing Rule:50

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	30	100	0	50	0	30	0	0
Scheduled Receipts:	0	0	0	0	50	0	0	0	0	0
On Hand From Prior Period:	0	0	0	20	20	70	20	20	40	40
Net Requirements:	0	0	30	80	0	0	0	10	0	0
Time Phased Net Requirements:	0	30	80	0	0	0	10	0	0	0
Planned Order Releases:	0	50	100	0	0	0	50	0	0	0
Planned Order Delivery:	0	0	50	100	0	0	0	50	0	0

Figure 9 Output of Product Code 314

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 11495 Lead Time: 1 Lot Sizing Rule:50

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	80	0	40	0	40	0	0	0
Scheduled Receipts:	0	0	0	0	0	0	0	0	0	0
On Hand From Prior Period:	120	120	120	40	40	0	0	10	10	10
Net Requirements:	0	0	0	0	0	0	40	0	0	0
Time Phased Net Requirements:	0	0	0	0	0	40	0	0	0	0
Planned Order Releases:	0	0	0	0	0	50	0	0	0	0
Planned Order Delivery:	0	0	0	0	0	0	50	0	0	0

Figure 10 Output of Product Code 11495

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 1118 Lead Time: 3 Lot Sizing Rule:1

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	0	0	0	50	0	0	0	0
Scheduled Receipts:	0	0	0	0	0	0	0	0	0	0
On Hand From Prior Period:	30	30	30	30	30	30	0	0	0	0
Net Requirements:	0	0	0	0	0	20	0	0	0	0
Time Phased Net Requirements:	0	0	20	0	0	0	0	0	0	0
Planned Order Releases:	0	0	20	0	0	0	0	0	0	0
Planned Order Delivery:	0	0	0	0	0	20	0	0	0	0

Figure 11 Output of Product Code 1118

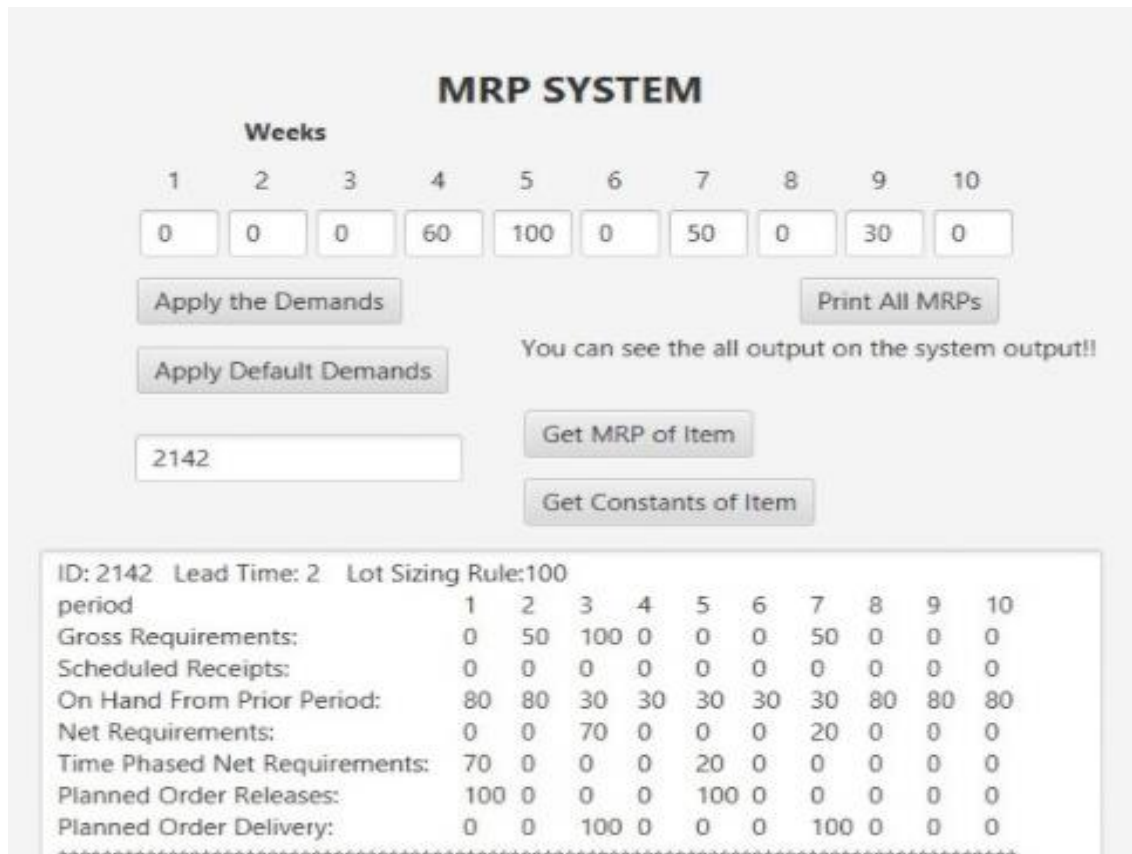


Figure 12 Output of Product Code 2142

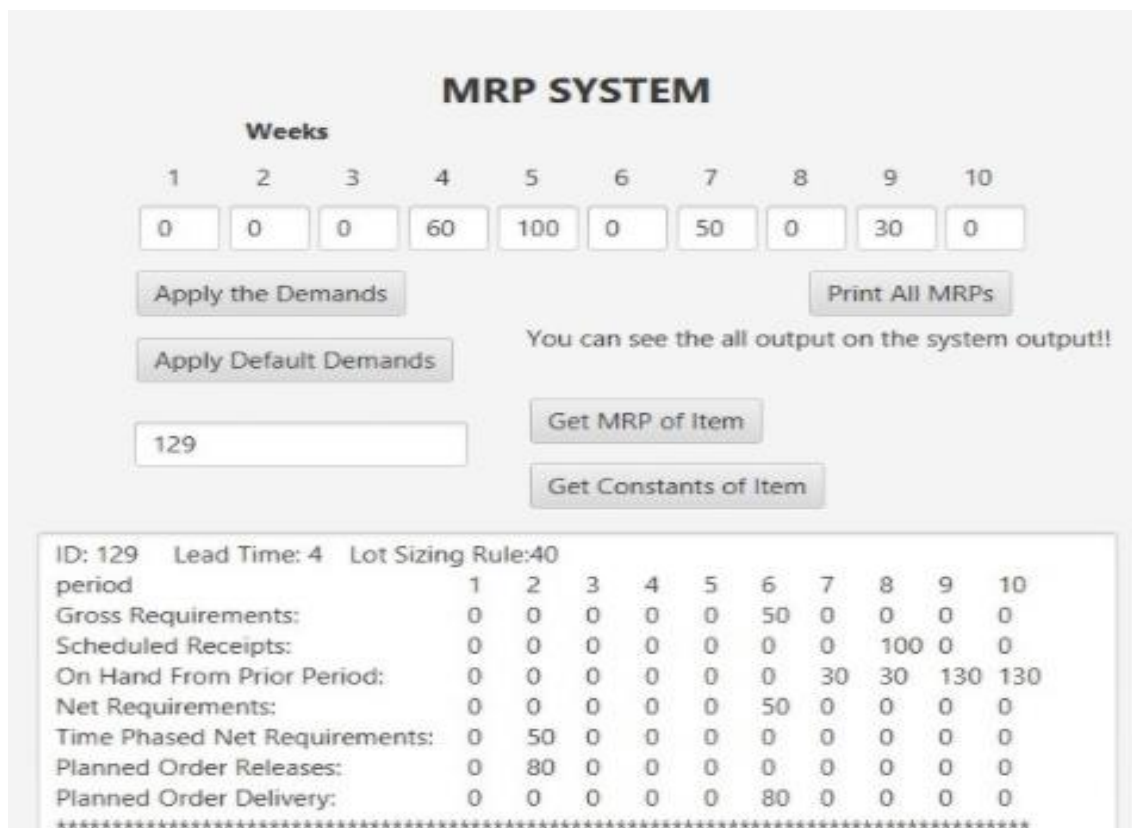


Figure 13 Output of Product Code 129

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 457 Lead Time: 2 Lot Sizing Rule:1

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	0	80	0	40	0	40	0	0	0
Scheduled Receipts:	0	20	0	0	0	0	0	0	0	0
On Hand From Prior Period:	0	0	20	0	0	0	0	0	0	0
Net Requirements:	0	0	60	0	40	0	40	0	0	0
Time Phased Net Requirements:	60	0	40	0	40	0	0	0	0	0
Planned Order Releases:	60	0	40	0	40	0	0	0	0	0
Planned Order Delivery:	0	0	60	0	40	0	40	0	0	0

Figure 14 Output of Product Code 457

MRP SYSTEM

Weeks

	1	2	3	4	5	6	7	8	9	10
	0	0	0	60	100	0	50	0	30	0

You can see the all output on the system output!!

ID: 19 Lead Time: 2 Lot Sizing Rule:50

period	1	2	3	4	5	6	7	8	9	10
Gross Requirements:	0	50	100	0	0	0	50	0	0	0
Scheduled Receipts:	0	0	0	0	40	0	0	0	0	0
On Hand From Prior Period:	50	50	0	0	0	40	40	40	40	40
Net Requirements:	0	0	100	0	0	0	10	0	0	0
Time Phased Net Requirements:	100	0	0	0	10	0	0	0	0	0
Planned Order Releases:	100	0	0	0	50	0	0	0	0	0
Planned Order Delivery:	0	0	100	0	0	0	50	0	0	0

Figure 15 Output of Product Code 19

REFERENCES

Nahmias, Steven, and Tava Lennon Olsen. *Production and Operation Analysis*. 7 ed., Chicago, Waveland Press, Inc, 2015.

Weiss, Mark Allen. *Data Structures & Problem-Solving Using Java*. 4 ed., Florida, Pearson Inc., 2012.