Leveling a Simple Manufacturing Process
Using Microsoft Project and Oracle Primavera

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Abstract

The present paper main objective is to put forward two software application tools: Microsoft Project 2013 and Oracle Primavera P6 Professional, used for the management process planning, especially for industrial projects. Second goals is to compare some feature of the two software and emphasize some aspects used for an easier use. The presentation and comparison considered four small processes with a total of 38 activities. The two software are used for the leveling of seven labor resources defined for the achievement of the activities. The results of the analyzes point out that even the two tools have the same purpose, Microsoft Project can be used for general simple to average processes' complexity and size, Oracle Primavera has more specialized possibilities (libraries and specific project plans) and more possibilities to model the actions needed for better leveling.

Key words: project management, MSProject, Oracle Primavera
J.E.L. classification: M11

1. Introduction

The planning of processes and the phases or tasks or material is at the base of every business in terms of time reduction and, in the end, for the main goal of lowering the costs. The theory of planning have at its basis the schedule and leveling of tasks and resources on criteria like constrains or lacks etc. For this to be managed in programs and software were developed for easier, better planning and for dealing with complex systems and plans.

So, starting from this, the main objective of the present research is to put forward two software application tools: Microsoft Project 2013 and Oracle Primavera P6 Professional, used for the project management, especially for industrial projects. Second goals is to compare some features of the two software and emphasize some aspects used for an easier use of them.

The relevance of the present work rises from the need to understand how to work with different software and which are the specific characteristics of those software for the resources leveling process.

For the present paper the authors chosen two common and known software: Microsoft Project 2013 and Oracle Primavera P6 Professional.

2. Data

The data used are represented by 38 coded tasks with durations between 2 and 7 days, representing 4 items and using 7 resources, also coded.

For easier representation and analysis the tasks were named with letters and were coded as follows: *Axy*, where: A is the code for the task, x – the number of the item and y – the number of the tasks type A that are used for the item x. Also, the resources were coded as Rn, where n – the attributed to the resources.

For the data used an example is presented in table 1 where, for paper space reason, only two items are presented. The table shows the task name, the task duration, the start day, the finish day, the resource name, the predecessors of the task and the item that the task are belonging to and gives it the code.

Table no. 1 Example of tasks for the items P1 and P2.

| Nr. Crt.	Task Name	Duration	Start	Finish	Resource Names	Predecessors	Item
1	A11	5 days	Wed 03.01.18	Tue 09.01.18	R1		P1
2	B11	5 days	Tue 09.01.18	Mon 15.01.18	R2	1FS-1 day	P1
3	B12	7 days	Fri 12.01.18	Mon 22.01.18	R2	2FS-2 days	P1
4	C11	5 days	Fri 19.01.18	Thu 25.01.18	R3	3FS-2 days	P1
5	C12	5 days	Tue 23.01.18	Mon 29.01.18	R3	4FS-3 days	P1
6	D11	6 days	Mon 29.01.18	Mon 05.02.18	R4	5FS-1 day	P1
7	E11	2 days	Mon 05.02.18	Tue 06.02.18	R5	6FS-1 day	P1
8	A21	5 days	Wed 03.01.18	Tue 09.01.18	R1		P2
9	A22	6 days	Fri 05.01.18	Fri 12.01.18	R1	8FS-3 days	P2
10	B21	4 days	Wed 10.01.18	Mon 15.01.18	R2	9FS-3 days	P2
11	B22	4 days	Fri 12.01.18	Wed 17.01.18	R2	10FS-2 days	P2
12	C21	5 days	Tue 16.01.18	Mon 22.01.18	R3	11FS-2 days	P2
13	D21	5 days	Fri 19.01.18	Thu 25.01.18	R4	12FS-2 days	P2
14	D22	5 days	Thu 25.01.18	Wed 31.01.18	R4	13FS-1 day	P2
15	F21	4 days	Wed 31.01.18	Mon 05.02.18	R6	14FS-1 day	P2
16	E21	3 days	Mon 05.02.18	Wed 07.02.18	R5	15FS-1 day	P2

Source: Author's work.

For the type of the organization of production the authors choose the mixed planning with finish-to-start lags between the tasks.

3. Software application

The first step of any production planning is introduction of data and the first schedule of that data. In figure 1 and 2 the authors shows how the Microsoft project 2013 schedule the tasks fed to the software.
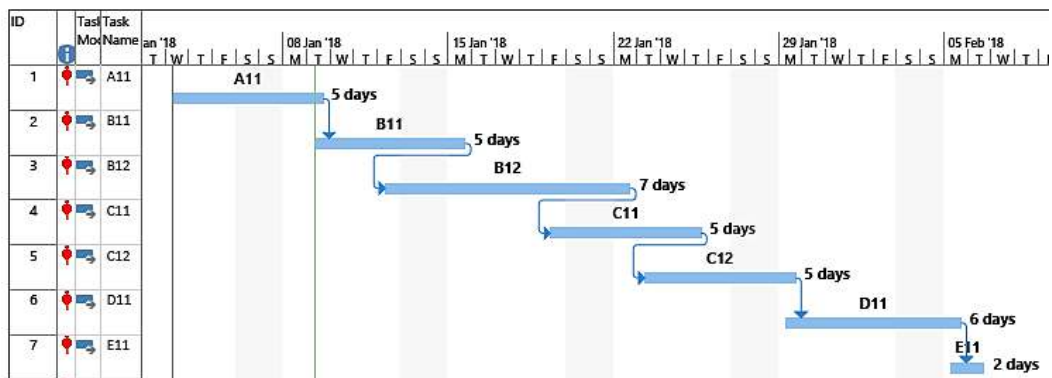
In figure 3 and 4 the authors shows how the Oracle Primavera P6 Professional schedule the tasks fed to the software.

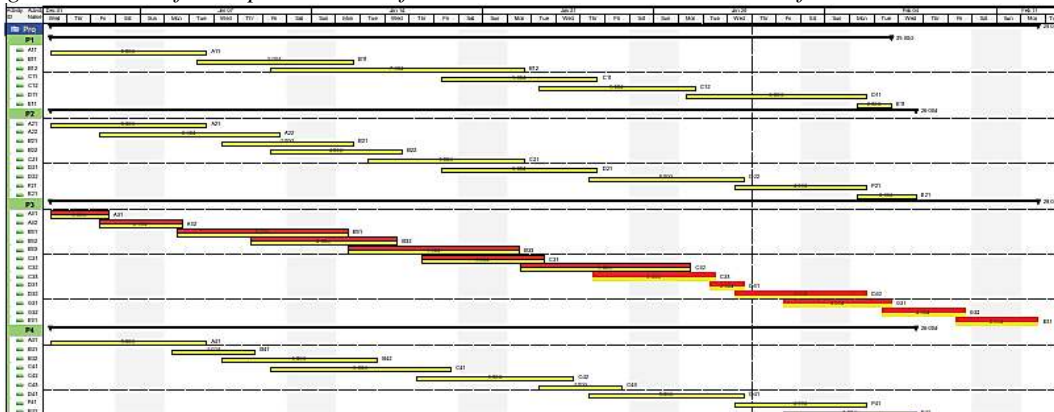*Figure no. 1. The first representation of the tasks. Microsoft project 2013.*
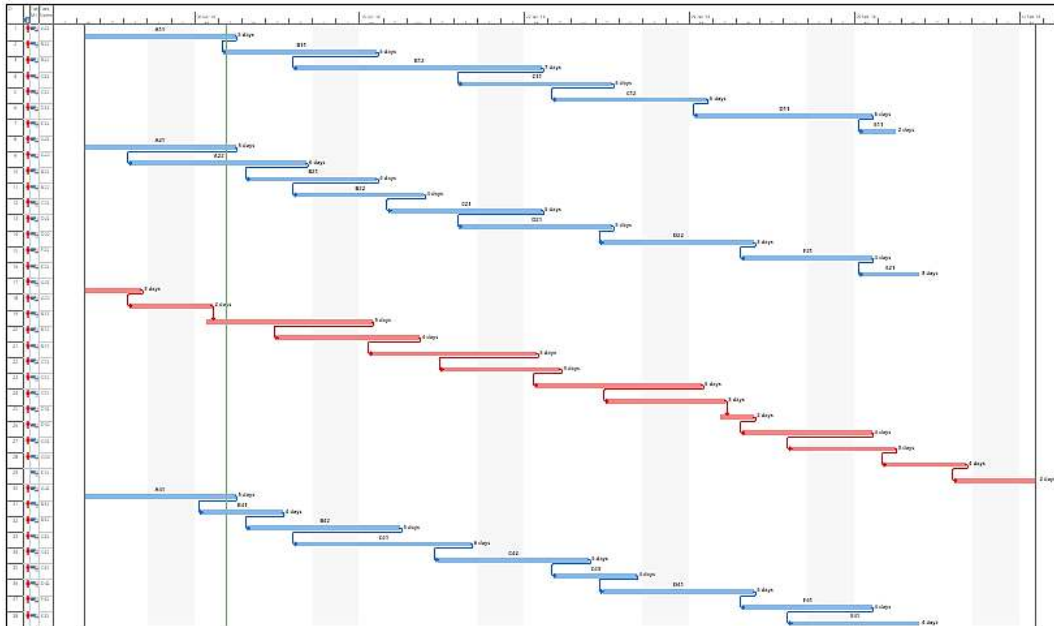
Source: Author's representation using Microsoft project 2013.

*Figure no. 2. The first representation of the tasks. Microsoft project 2013. Bigger figure for better view.*

Source: Author's representation using Microsoft project 2013.

Figure no. 3. The first representation of the tasks. Oracle Primavera P6 Professional.

Source: Author's representation using Oracle Primavera P6 Professional. (See references)

Figure no. 4. The first representation of the tasks. Oracle Primavera P6 Professional. Bigger figure for better view
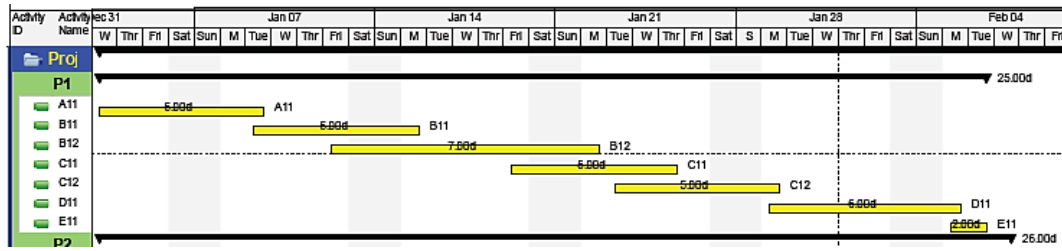
Source: Author's representation using Oracle Primavera P6 Professional.

The second step is to add constrains particular to the project, to the planning, to the task or to the resources. Constrain can imposed on the task regarding the time and the way the task behaves or can be imposed to the resources as their calendar or units. In figure 5 tasks C21 was delayed with 5 days from the previous start and tasks C41 was delayed with 4 days from the previous start.

Figure no. 5. Task representation with constrains.
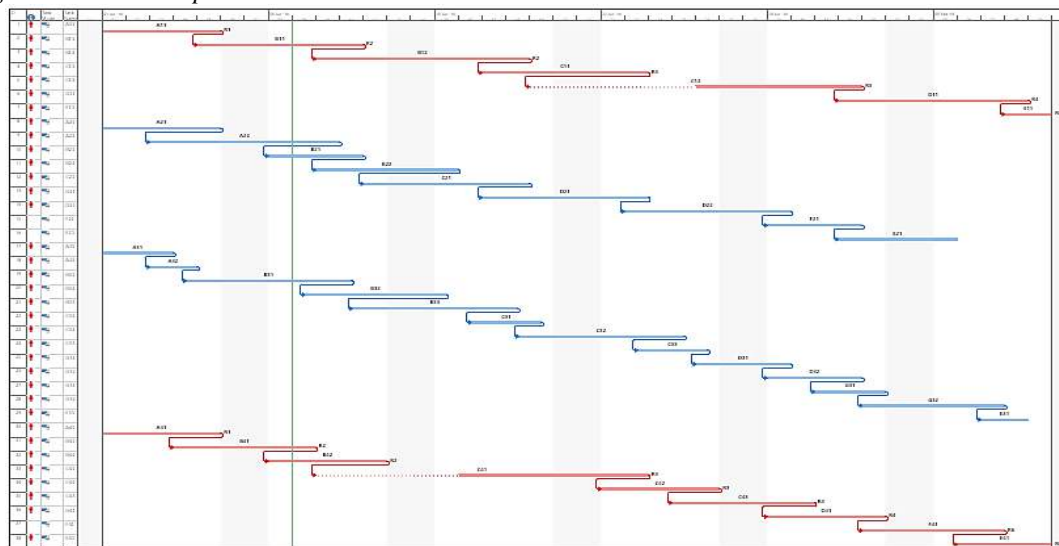
Source: Author's representation using Microsoft project 2013.

The next step consist in the analysis of the resource allocation graph that shows the critical resources and the over-allocations. In figure 6 the authors shows the representations for both software of the R1 resource over-allocation.

*Figure no. 6. Resource allocation graph.*
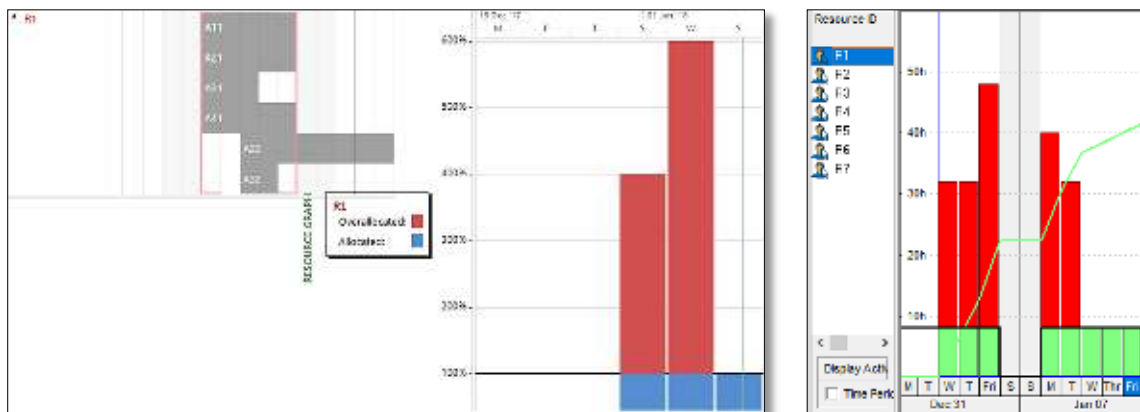
| *a)* | *b)* |

Source: Author's representation using a) Microsoft project 2013; b) Oracle Primavera P6 Professional. (see references)

The final step of the planning before the analysis of the planning results and effectiveness is the leveling. In figure 7 the leveling of resources. The result of the leveling must be the removal of the over-allocations.

Figure no. 7. Resource leveling.
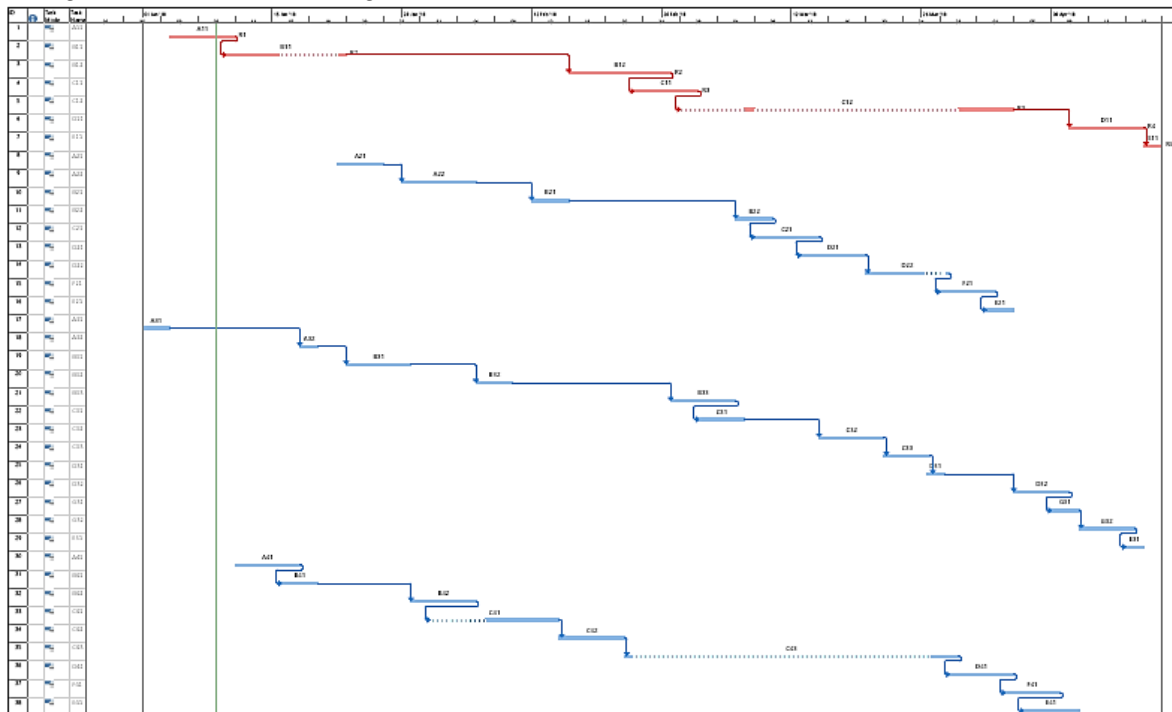
Source: Author's representation using Microsoft project 2013. (See references)

4. Acknowledgement

For better understanding of how the two software works the authors analyzed few differences. Because is one of the most important (if not the most important), the way the data are fed in. As tasks can be defined with very few differences between the two software the authors turn the attention to the resources.

Considering the Oracle Primavera the new resources can be defined as labor, material or nonlabor, but the most important feature is the predefined library with many types of resources belonging to certain industries and domain of manufacturing.

In the case of Microsoft Project the resources are not defined as different types or presented in a library.

The leveling is also essential so the difference about the approach of how the process can be adjusted through the requirements of the user.

Microsoft Project offer the possibility to level the resources using the following conditions:
- Level only within available slack;
- Leveling can adjust individual assignment on a task;
- Leveling can create splits in remaining work;
- Level resources with the proposed booking type;
- Level manually scheduled tasks.
- Leveling order (that is the main condition):
  - Task ID only;
  - Standard
  - Priority, Standard.

Oracle Primavera P6 Professional give almost the same options, but also add more possibilities to level the resources, suing conditions like:

- Consider assignment in other projects with equal/higher than …;
- Preserve schedule early and late dates;
- Level resources only within Total float;
- Leveling priorities: here the specialist can define different priorities from several variants (more than the 3 ones from the Microsoft Project).

5. Conclusions

The authors considered the following conclusions based on the work and experiences with the two software analyzed in the present paper.

Even that both software are giving the same results the Microsoft Project looks more close to small and medium number of task, while the Oracle Primavera P6 is more interested to big planning with the possibility of largely internet implication in the cooperation between different parts or projects from different regions of the world.

The Microsoft Project improved greatly from the previous versions, especially reporting and different type of viewing and is strong point on the way the software is revealing the view of different forms or graphs or diagrams. The Oracle Primavera P6 also have new features (as against Primavera P3 for example) and the way the user interact with the software is changed and looks more easy to use.

Both software offers the possibility to change or create graphical representation in concordance with the user's needs.

Another strong difference is that Primavera looks more specialized and more accurate from the business planning point of view, giving more possibilities of panning like Cost accounts, funding resources, projects portfolios etc.

For new users

6. References

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- https://docs.oracle.com/cd/E68202_01/client_help//en_US/helpmain.htm?toc.htm?resources_window.htm (for figure no.6.a);
- https://support.office.com/en-us/article/view-your-team-s-work-with-team-planner-2ff8816a-c332-45b9-8c53-633ec7db6a8a (for figure no.6.b);
- https://support.office.com/en-us/article/level-resource-assignments-49fb52d5-ff4a-4b1f-b5c1-af057ab38ba2 (for figure no.7).