

Resource Leveling: The Complete Series

October 25, 2017 @ 12pm-1pm EST Daryl Deffler

Part I





Presenter Background

- Project Management 25+ Years
- Small Projects thru Large Programs
- Multiple Scheduling Tools,
 Project Server 2013 3+ Years
- Large Company
 - 240+ Project Mangers
 - 4,300+ Timesheet Users
 - 1700+ Schedules in Server
 - − ~400 Active Schedules
- Two Support Teams
 - Tool Environment
 - Tool Use





"I always give 110% to my job — 40% on Monday, 30% on Tuesday, 20% on Wednesday, 15% on Thursday and 5% on Friday."

Before We Start

- A <u>Lot</u> of Information
 - You won't remember everything
- Leveling Involves
 - Indicators
 - 4 -10 Hierarchy levels
 - 4 Leveling Mechanics options
 - 5 Resolution options
 - 2 Scheduling options
 - 2 Task override fields
 - 1 Resource override field
 - 3 Background fields
 - 3 Leveling functions
 - Errors, and Limitations
- Examine each individually



Before We Start

• 12 MPUG Companion Articles

Search "Daryl Deffler"

All Articles and Webinars by Daryl Deffler

Resource Leveling: Recommendations

Written on August 14, 2017, by Daryl Deffler

Welcome to the final article in the "Resource Leveling" series. If you've read the prior articles, you may have noticed a lack of recommendations. I did that purposely to keep those articles focused on the "black and white" aspects of tool functionality and so that I could present recommendations all together in one final article,...

Resource Leveling: The Leveling Cycle

Written on August 7, 2017, by Daryl Deffler

There's an old joke: How do you eat an elephant? The answer is: one bite at a time. While the joke may be goofy, it illustrates an important concept. A step-by-step ordered approach can be used to address any big problem. Leveling a new schedule for the first time can be just like that. The...

Resource Leveling: It's Time to Level Your Schedule

Written on July 31, 2017, by Daryl Deffler

You've hit that magical point. Your knees are weak, you're nervous and your palms are sweating. Yes, it's time to level your schedule. But there's different leveling buttons and beyond that there are also leveling controls. Which options should be set? Which leveling button should be used? The answers to those questions depend upon what...

Resource Leveling: Preparing to Level

Written on July 24, 2017, by Daryl Deffler



Who do you want to be?



- I have no idea if this target date is realistic
- Updates due, I'll be here till 8
- Why does this tool keep messing up my schedule?
- I haven't seen my family in two years



- Yup, that's the target date!
- Weekly schedule updates were done an hour ago
- Stress? What stress?
- This weekend the family's going on a mini-vacation



Objectives

- De-mystify resource leveling
- Explain individual leveling components
- Help you transition from fighting the tool to controlling the tool





Agenda

Part I – Today

- Scheduling vs. Leveling
- Problem Indicators
- Controlling Leveling
 - Leveling MechanicsWhat & When
 - Leveling Hierarchy
 Tie Breakers

Part II - 11/08/2017

- Controlling Leveling
 - Resolution OptionsResolving Over Allocations
 - Leveling Fields
 - Limitations
- Performing Leveling
 - Leveling Functions
 - Leveling Cycle
 - Guidelines & Recommendations
- Final Thoughts

Resource Leveling: The Complete Series

Scheduling vs. Leveling



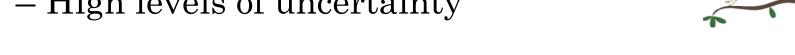
Scheduling and Leveling

- Two of the more complex, critical aspects of the tool
- Key to understanding any project scheduling tool
- Longer learning curve
- Used throughout the project schedule lifecycle

Scheduling and Leveling

- When you don't understand them
 - Constant frustration, fear of using the tool
 - Continuously fighting the tool

- Increased anxiety and stress
- High levels of uncertainty



- When you understand them
 - The tool becomes your friend
 - Reduced anxiety, stress, uncertainty
 - Schedule update cycles become easier





What is Scheduling?

- Timeline Oriented
- Focus: Create Shortest Schedule Duration Possible
- Based On: Dependency Relationships
- Occurs:
 - Click Calculate icon
 - Automatically after every change when "Calculate project after each edit" option is selected

Scheduling ignores resource over allocations

What is Scheduling?

- Moves Tasks in Either Timeline Direction
- No Predecessor:
 - Moves task to schedule start date or current date based on option

Scheduling Illustrated

Calcula	tion
Calcul	ate project after each edit:
	<u>O</u> n
0	O <u>f</u> f

- Tasks 1-3 are created.
- Resource "A" owns all
- All tasks start same day, "A" is over allocated
- With no predecessors, all tasks start at schedule start
- Task 1 successors are Tasks 2 and 3
- Nothing changes

- Calculate is clicked
- Tasks 2 and 3 move to honor dependency relationships but have same start date
- "A" is over allocated on Tasks 2 and 3

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1	5	■ Task 1	24 hrs	3 days		Work	8h	8h	8h									
		Α	24 hrs			Work	8h	8h	8h									
2	-5)	₄ Task 2	48 hrs	6 days		Work	8h	8h	8h	8h	8h			8h				
		Α	48 hrs			Work	8h	8h	8h	8h	8h			8h				
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3	ŧ	-5	₄ Task 3	8 hrs	1 day	1	Work				8h								
			Α	8 hrs			Work				8h								



What is Leveling?

- Resource Oriented
- Focus: Making the Most Effective Use

of Available Resources

- Based On: Scheduling Results
- Occurs:
 - Click a leveling icon such as Level All
 - Automatically after every change when
 "Leveling calculations" option is "Automatic"

What is Leveling?

- Only *Delays* Tasks within Timeline
- Adjusts Task Start/Finish Dates
- No Successor:
 - Can delay task up to schedule end

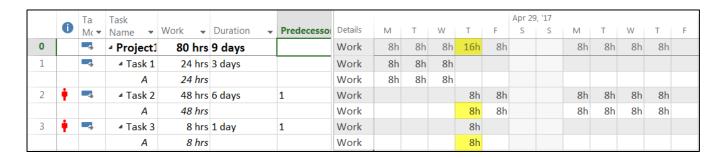
Leveling Illustrated

Leveling calculations

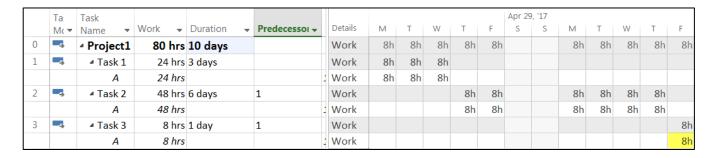
Automatic

Manual

• Results of Scheduling Illustrated examples



- Level All is clicked
- Task 3 is *delayed* until after Task 2



3 Aspects of Leveling

Leveling Mechanics

- When to Level: Auto or Manual
- What to Level: Date Ranges, Entire Schedule

Leveling Hierarchy

- Precedence Order to resolve Over Allocations
- Canned/Customizable Aspects
- Standard; Priority, Standard; ID

Resolution Options

- Options Project can use to resolve over allocations
- Ex: Only within available slack, etc.

Scheduling & Leveling Comparison

	Scheduling	Leveling
Primary Focus	Effectively using the timeline.	Effectively using available resources which in most, but not all cases, is removing resource over allocations.
Will Move Tasks?	Moves tasks in both timeline directions, based on task or dependency changes	Only delays tasks from the scheduling defined Start or Resume date
Adjusts Task Duration?	May adjust calendar duration based on changes to a predecessor task	May extend calendar duration, but only if "Leveling can create splits in remaining work" option is checked
Can Split a Task?	Yes, will spit all remaining work from actual work if the scheduling option "Split in-progress tasks" option is checked	Yes, will only split remaining work after the scheduling defined Resume date if the "Leveling can create splits in remaining work" option is checked
Fixes Resource Over Allocations?	No. Scheduling results will often create resource over allocations	Yes. But may not fix all over allocations

Note: Task level adjustments such as changing work, resource assignment units, or duration adjust the individual task immediately, regardless of the selected automatic schedule or level option

Resource Leveling: The Complete Series

Problem Indicators















Indicators

- Symbolically Convey Task Information
 - Graphical indicators display in the Indicator column
 - Non-graphical indicators display in cells or graphs
- Two Types of Indicators
 - Informational
 - Problem

List of all graphical indicators: https://support.office.com/en-us/article/Indicators-field-414e1168-ee9d-414c-b1fc-7520629a2739





Informational Indicators

- Purely Informational
 - Task is completed



– Task has a constraint



- Local Resource



- Something "Atypical"
 - Task has an inflexible constraint



- Task has an external dependency



- Task has a custom workload pattern



Problem Indicators

- Unresolved Issues
 - A scheduling or resource leveling constraint that could not be honored
- Overallocation (pre or post leveling)
 - Resource is allocated more work than can be completed in the time period such as an hour, day, or week

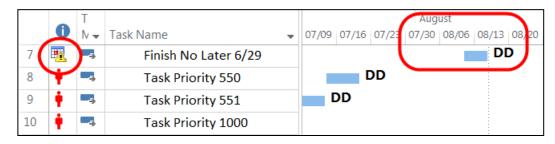
Problem Indicators

Unresolved Issues

• Constraint Violation



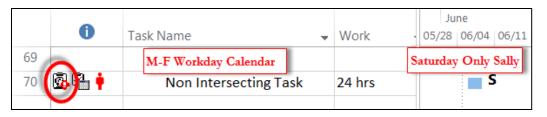
The task has not been started or completed as defined by the task's constraint



Non Intersecting



Task and resource calendars do not intersect



Problem Indicators Overallocation

Two Types

- Time Period:
 - Sum of multiple tasks in the same time period creates an overallocation
 - Leveling will *generally* fix these

Resource Name 🔻	Details	Т
■ Daryl Deffler	Work	14.45h
Meeting	Work	0.85h
Task 1	Work	6.8h
Task 2	Work	6.8h

Assignment Units = 85% Resource Max Units = 85%

- Task Specific:
 - Task configuration / resource assignment creates an overallocation within a task
 - May/May not cause a Time Period overallocation
 - Leveling does <u>not</u> fix these
 - Manually fixed by PM



1 hour Fixed Duration Assignment Units = 100% Resource Max Units = 85%

Problem Indicators

Overallocation

Burning Man

- Ÿ
- Appears in Task Views
- Indicates the task has an overallocated resource assigned
- Overallocation may be time period or task specific

	Γ	ask	Views	
	0	T. N -	Task Name	•
34	÷	- 5	Task 10	
35	÷	<u>_</u>	Task 11	
36	÷	*	Task 12	
37	ŧ		Task 13	

Warning Indicator



- Appears in Resource Views
- Indicates the resource is overallocated across one or more tasks

Re	esoi	urce Views
	0	Resource Name
1	(Daryl
2		Joe
3		Sue

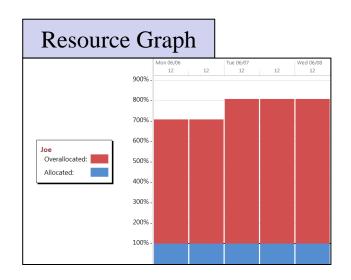
Problem Indicators Overallocation

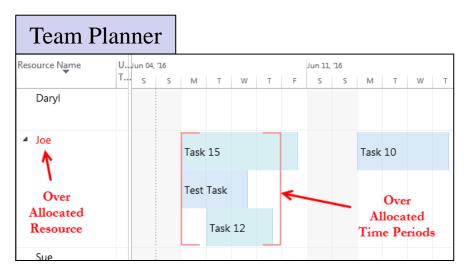
- Red Text
 - Resource views and Time-Phased data
 - Indicates an overallocated Resource,
 Time Period, or Specific Task

Re	sourc	e Usage								
	•	Resource Name	Work	•	Details	М	Т	W	Т	F
2		₫ Joe	242	hrs	Work	56.67h	64.67h	64.67h	48h	8h
	1 1	Task 10	32	hrs	Work	8h	8h	18b	01	
	1 /	Task 11	32	hrs	Work	8h	8h	8h		ime
1	Over	Task 13	32	? hrs	T 10	8h	8h	8h		d Over
1	ocated source	Task 14	32	? hrs	Task Over Allocations	- Xh	8h	8h	Alloc	ations
- Ke	source	Task 15	40) hrs	Anocations	8 h	8h	8h	8h	8h
		Test Task	50) hrs	Work	16.67h	16.67h	16.67h		
		Task 12	24	1 hrs	Work		8h	8h	8h	

Problem Indicators Overallocation

• Red Graphics





Resource Leveling: The Complete Series

Leveling Mechanics



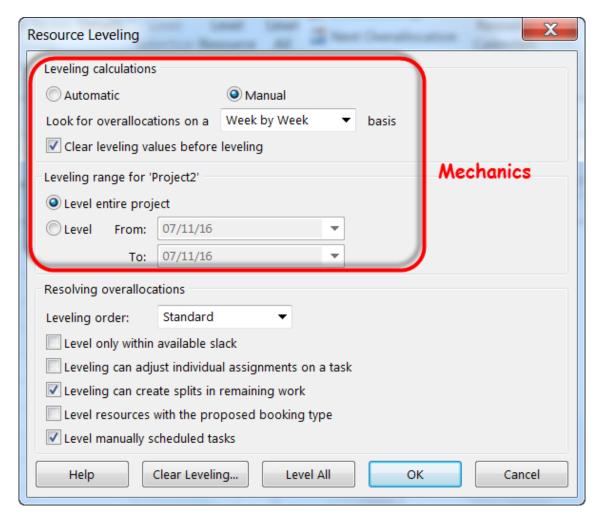




Leveling Mechanics

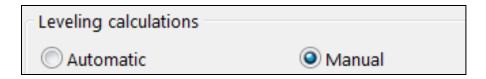
- Defines the <u>time frame</u> to examine for an over allocation
 - Day, Week, Month
- Controls <u>when</u> leveling runs
 - Manual, Automatically
- Determines *what* to level
 - Entire project
 - Specific date range

Resource Leveling Window



Accessed by clicking the Leveling Options icon in the Resource ribbon

Leveling calculations



• Automatic: Project performs "Level All"

after EVERY change

• Manual: Project levels only when told

· Recommendation: Manual

- You control when leveling occurs
- You can control who is leveled
- Aids in debugging Schedule vs. Level issues
- Better performance

Look for over allocations on a...

• Defines the timeframe in which Project looks for over allocations



- Longer periods
 - May mean fewer over allocations to resolve
 - May result in some goofy looking load patterns
- · Recommendation: Day/Week

Week by Week vs. Day by Day

Look for overalloo	cations on a	Day by	/ Day		_	,	Jun 1	11, '16						Jun :	18, '16	,				
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Start	Work	0h					-		_	_				_						
Task 1	Work	8h	8h	8h										_		otice			lay is	5
Task 4	Work									8h	8h							s and		
Task 2	Work				8h	8h			8h						do	y is	over	allo	ated	
Task 6	Work											8h	8h							
Task 3	Work																	8h	8h	8h
Task 5	Work															8h	8h			

Look for overallo	cations on a	Week	by W	eek	_		Jun 11	l, '16						Jun :	18, '1	5				
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Task 3	Work															8h	8h	8h		
Task 5	Work			N	lo F	ro	bler	n l	nd	icat	tors	5				8h	8h			

Clear leveling values before leveling

- · Resets "Leveling Delay" field values before leveling
- Resets Task Start/Finish to Preleveled Start/Finish
- Resets MS Project generated <u>or</u> PM entered values
- Not clearing could potentially compound leveling delays
- Recommendation: Checked

Dof	oro Cloor I	oveling	1		Preleveled	Preleveled	Leveling		May June
ser	ore Clear L	eveling	Start -	Finish 🔻	Start	Finish T	Delay	▼	04/22 04/29 05/06 05/13 05/20 05/27 06/0
0	⁴ Project1	160 hrs	04/28/17	05/25/17	04/28/17	05/03/17	0 edays		
1	Task 1	32 hrs	04/28/17	05/03/17	04/28/17	05/03/17	0 edays		DD
2	Task 2	32 hrs	05/04/17	05/09/17	04/28/17	05/03/17	6 edays		DD DD
3	Task 3	32 hrs	05/10/17	05/15/17	04/28/17	05/03/17	12 edays		DD DD
4	Task 4	32 hrs	05/16/17	05/19/17	04/28/17	05/03/17	18 edays		DD DD
5	Task 5	32 hrs	05/22/17	05/25/17	04/28/17	05/03/17	24 edays		DD
				'					
Afte	er Clear Le				Preleveled	Dealersaled	and the second second		h days
		evelina			Preleveled	Preleveled	Leveling		May June
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					Start	Finish	Delay	•	
	△ Project1	160 hrs	04/28/17	05/03/17	Start • 04/28/17	Finish • 05/03/17	Delay O edays	•	04/22 04/29 05/06 05/13 05/20 05/27 06/
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0 1 2	4 Project1 Task 1 Task 2	160 hrs 32 hrs 32 hrs	04/28/17 04/28/17 04/28/17	05/03/17 05/03/17 05/03/17	Start • 04/28/17 04/28/17 04/28/17	Finish • 05/03/17 05/03/17 05/03/17	Delay O edays O edays O edays	•	04/22 04/29 05/06 05/13 05/20 05/27 06/

Leveling Range

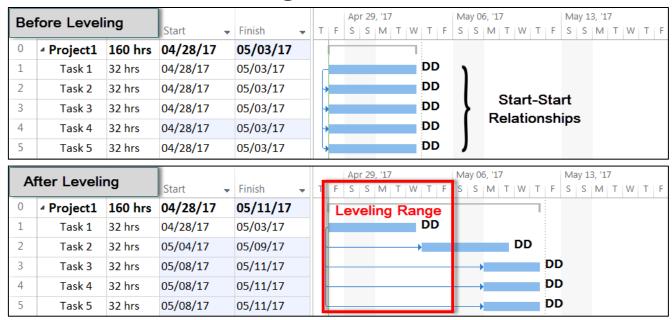
Leveling range for 'Project1'

○ Level entire project

○ Level From: 04/28/17

To: 05/05/17

- Entire Project
- Selected Date Range

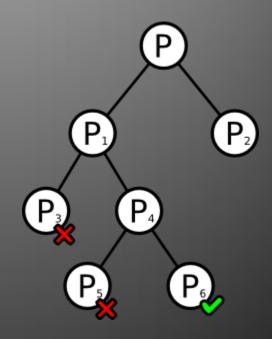


Example
Leveled only
4/28 thru 5/5

· Recommendation: Level entire project (generally)

Resource Leveling: The Complete Series

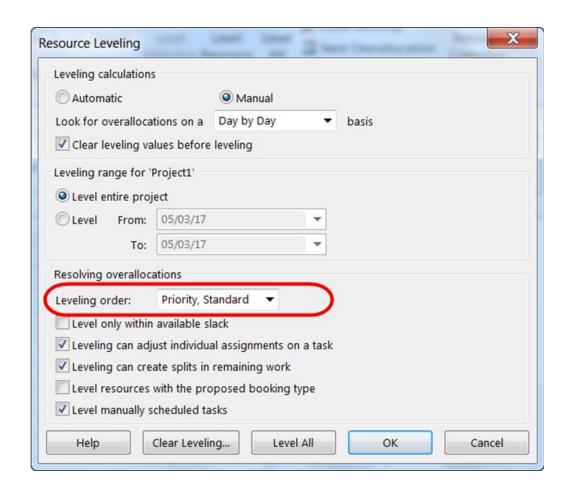
Leveling Hierarchy



What is the "Leveling Hierarchy"

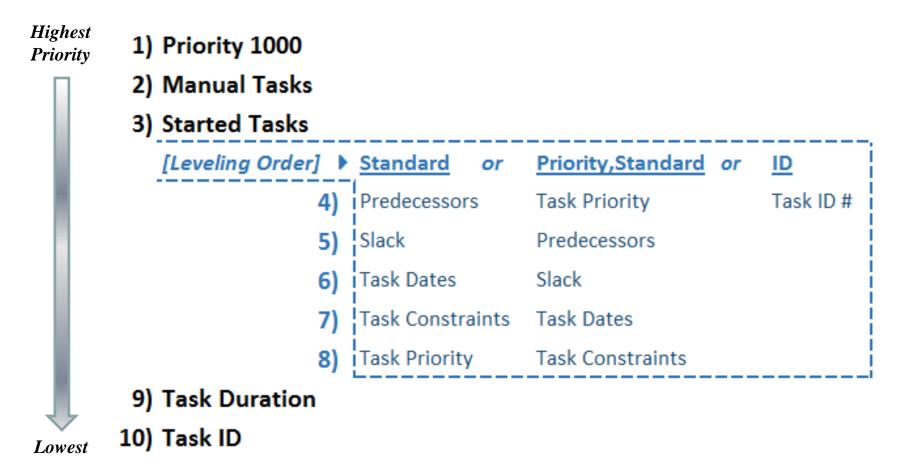
- A decision tree / tie-breaking hierarchy determining which task stays put(wins) and which task is delayed (loses)
- Top and bottom of the hierarchy are predetermined
- The hierarchy "core" sequence can be changed by the user using the "Leveling order" option

Resource Leveling Window



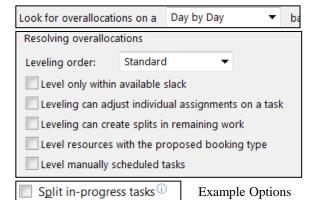
Accessed by clicking the Leveling Options icon in the Resource ribbon

Leveling Hierarchy



Priority 1000 / Manual

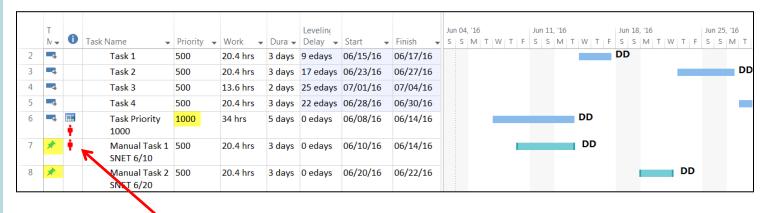
Tells Project to leave these alone But there is a slight difference in the two



Before Leveling



After Leveling



Still have an over allocation!

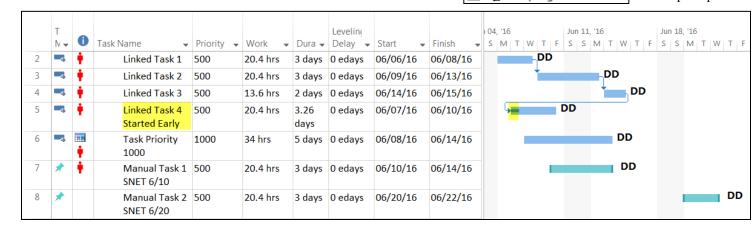


Started Tasks

Assumed more critical & need to finish

Look for overallocations on a Day by Day Resolving overallocations Leveling order: Standard Level only within available slack Leveling can adjust individual assignments on a task Leveling can create splits in remaining work Level resources with the proposed booking type Level manually scheduled tasks Split in-progress tasks (i) **Example Options**

Before Leveling



After Leveling



Leveling Order: Standard

1. Predecessors

Task Predecessor / successor relationships

2. Slack

Tasks with Less slack level before more slack

3. Task Dates

Earliest Start date

4. Task Constraints

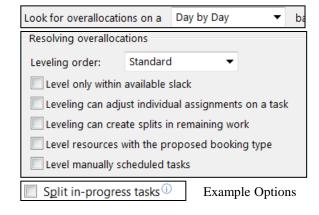
Such as "Start no earlier than"

5. Task Priority

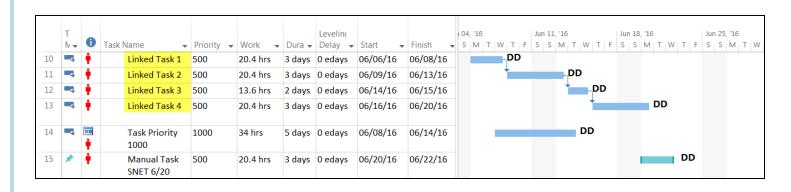
 $(\text{except } 1000) \ 1 = \text{low}, 999 = \text{high}$

Predecessors

Levels based on predecessor chain



Before Leveling



After Leveling

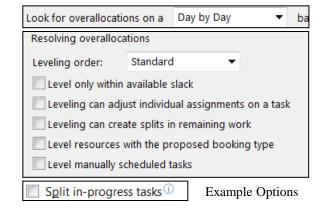




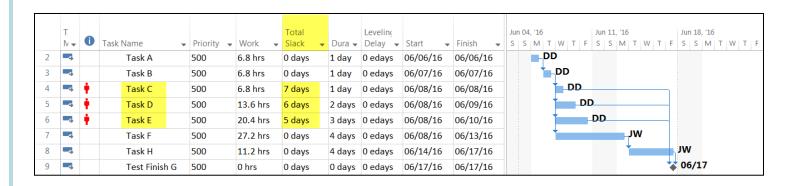


Slack

Smaller slack value levels before larger slack value



Before Leveling



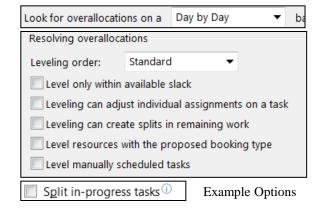
After Leveling





Dates

Earlier Task Start date levels first



Before Leveling



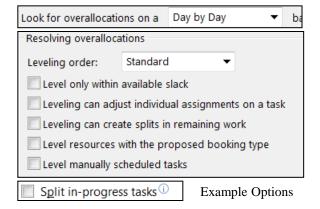
After Leveling





Constraints

Leveling will try to honor Task constraints



Before Leveling



After Leveling

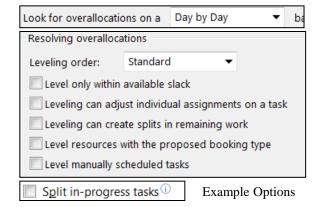


Task constraints may not always be honored

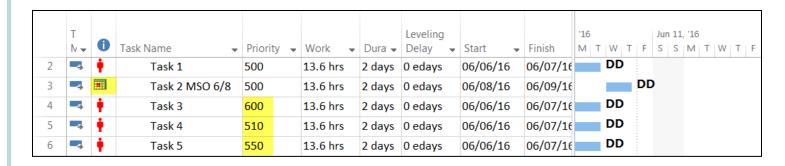


Priority

Priority 1 = low, 999 = high, 500 = default



Before Leveling



After Leveling



Leveling Order: Standard
Other criteria take precedence over priority

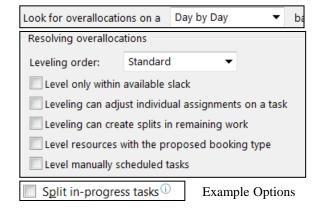


When all else fails...

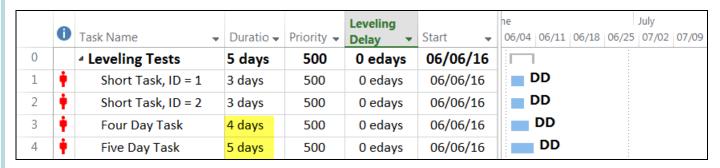
- Project uses two final levels of the hierarchy if all the above items cannot resolve an over allocation
 - Task Duration
 - -Task ID#

Duration

Longer tasks level first



Before Leveling



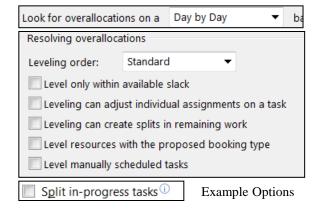
After Leveling

	0	Task Name ▼	Duratio ▼	Priority •	Leveling Delay	Start ▼	ne July 06/04 06/11 06/18 06/25 07/02 07/09
0			15 days	500	0 edays	06/06/16	
1		Short Task, ID = 1	3 days	500	11 edays	06/17/16	DD
2		Short Task, ID = 2	3 days	500	16 edays	06/22/16	■ DD
3		Four Day Task	4 days	500	7 edays	06/13/16	DD DD
4		Five Day Task	5 days	500	0 edays	06/06/16	DD DD



Task ID#

Lower Task ID #s level first



Before Leveling

	0	Task Name ▼	Duratio ▼	Priority •	Leveling Delay •	Start 🔻	ne July 06/04 06/11 06/18 06/25 07/02 07/09
0		^⁴ Leveling Tests	3 days	500	0 edays	06/06/16	П
1	Ť	Short Task, ID = 1	3 days	500	0 edays	06/06/16	■ DD
2	Ť	Short Task, ID = 2	3 days	500	0 edays	06/06/16	■ DD

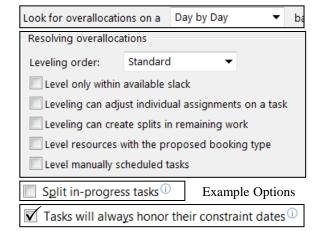
After Leveling

	0	Task Name ▼	Duratio ▼	Priority •	Leveling Delay ▼	Start 🔻	ne July 06/04 06/11 06/18 06/25 07/02 07/09
0			6 days	500	0 edays	06/06/16	
1		Short Task, ID = 1	3 days	500	0 edays	06/06/16	■ DD
2		Short Task, ID = 2	3 days	500	3 edays	06/09/16	DD

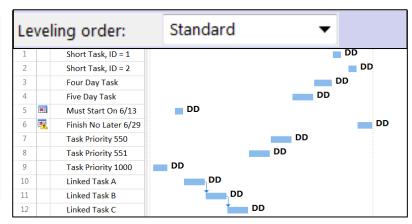


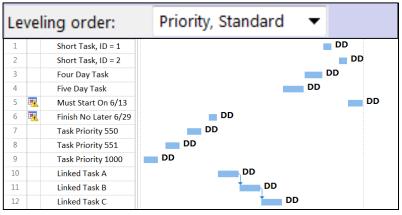
Leveling Orders

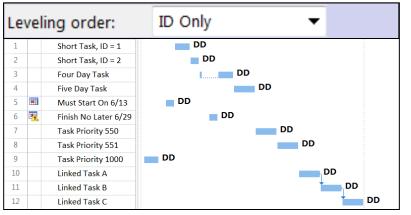
If you let Project determine task sequence



Standard Priority, Standard ID Only Predecessors Task Priority ID # Predecessors Slack Task Dates Slack Task Constraints Task Dates Task Priority Task Constraints







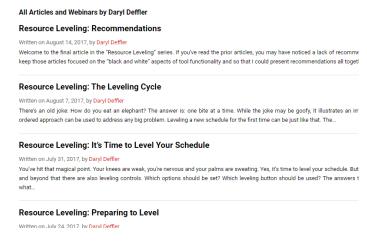




End of Part I

Part I – Today

- 12 Companion MPUG Articles
 - Search Daryl Deffler



Down loadable Cheat Sheet

Part II - 11/08/2017

- Controlling Leveling
 - Resolution Options
 Resolving Over Allocations
 - Leveling Fields
 - Limitations
- Performing Leveling
 - Leveling Functions
 - Leveling Cycle
 - Guidelines & Recommendations
- Final Thoughts



Resource Leveling: The Complete Series

November 8, 2017 @ 12pm-1pm EST Daryl Deffler

Thank You For Attending



