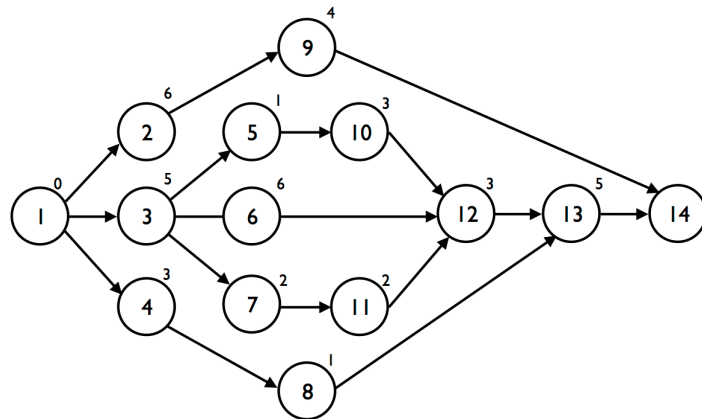


# SPSP Data files: The Patterson format

The datasets with instances for the **software project scheduling problem** make use of the .msrcp format to represent an activity-on-the-node network with renewable multi-skilled employee use. This is an extension of the well-known Patterson format. The format is a simple text file and its structure is explained on the illustrative project network of figure 1. Each integer above the node is assumed to be the task duration.

**Figure 1. An illustrative activity-on-the-node network**



(Source: Figure 7.1 of the book "Project Management with Dynamic Scheduling: Baseline Scheduling, Risk Analysis and Project Control")

The network of figure 1 has two dummy tasks, i.e. dummy start node 1 and dummy end node 14, and hence, the network contains 14 tasks in total, dummies inclusive. The format also makes use of start and end dummy nodes and is structured as follows:

## Sets line

Line 1:

- Number of tasks (starting with node 1 and two dummy nodes inclusive)
- Number of renewable multi-skilled employees
- Number of skill types

## Multi-skilled employees

The next block represents the complete multi-skilled workforce with all its employees (one line per multi-skilled employee and one number for each skill type).

Line 1 (= Employee 1):

- 1, if the employee masters skill type 1. 0, otherwise.
- 1, if the employee masters skill type 2. 0, otherwise.
- ...
- 1, if the employee masters skill type |SK|. 0, otherwise.
- Monthly salary of the employee

Line 2 (= Employee 2):

- 1, if the employee masters skill type 1. 0, otherwise.
- 1, if the employee masters skill type 2. 0, otherwise.
- ...
- 1, if the employee masters skill type |SK|. 0, otherwise.
- Monthly salary of the employee

Line 3: ...

## Task lines

The next block represents the tasks with all their characteristics (one line for each task, starting with a dummy start task and ending with a dummy end task).

Line 1 (= Task 1 (dummy)):

- Skill requirements for each skill type (|SK| values)
- Workload requirement of the task
- Number of successors
- Task ID for each successor

Line 2 (= Task 2):

- Skill requirements for each skill type (|SK| values)

- Workload requirement of the task
- Number of successors
- Task ID for each successor

Line 3: ...

It is assumed that the project network of figure 1 requires 4 skill types and the multi-skilled workforce consists of 8 multi-skilled employees. Consequently, the .msrcp text file for the network of the figure is as follows:

14	8	4							
1	0	1	1	7682.2					
0	1	0	1	5498.9					
0	0	1	0	2854.8					
1	0	0	0	2375.3					
1	0	0	1	5678.4					
0	0	1	1	5387.7					
1	1	1	1	11006.4					
1	1	0	0	4932.3					
0	0	0	0	0	3	2	3	4	
1	1	1	1	11	1	9			
1	1	1	1	9	3	5	6	7	
0	1	1	1	12	1	8			
0	1	1	0	10	1	10			
1	0	0	1	10	1	12			
1	0	1	0	8	1	11			
1	0	0	1	6	1	13			
1	1	1	1	12	1	14			
0	1	1	0	10	1	12			
1	1	1	0	9	1	12			
1	0	0	1	9	1	13			
0	1	0	1	10	1	14			
0	0	0	0	0					

As an example, task 2 of figure 1 needs 1 unit of every skill type. The availability of these skill types is maximum 5, 3, 4 and 5 units. Obviously, we also have to take into account the skill constraints. Activity 2 has a required workload of 11 person-months. Furthermore, task 2 has 1 successor: task 9.

As an example, employee 1 masters skill types 1, 3 and 4 and has a monthly salary of 7682.2 units.