

# **Project Assignment**

Bin-packing problem

Algorithms and Data Structures – DV1538

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# Introduction

The bin packing problem is the endeavor to pack as many objects possible into a minimal number of bins. It can be considered as a scheduling problem and optimal results can be somewhat difficult to achieve, depending on expectations. This problem is divided into two versions, online and offline bin packing. The online version gets a portion of the total input each time and has to process and pack it into a bin before moving on to the next one, whereas the offline version gets the complete input which it can process as a whole before making any decisions. The focus in this report is the offline version, more specifically, the full bin version of the offline version.

Full bin packing strives for building sets of objects that fits exactly or almost exactly into each bin to minimize space wastage in each bin. This is of course done before the packing process and can be done in a few ways.

In this project, we attempt to schedule surgeries with different time frames to operation theaters that has limited capacity measured in time. Our intention is to schedule as many surgeries as possible into each operation theater. Every surgery has an id, duration, label and a status of whether it is planned or not. And every operation theater has a collection of surgeries, the number of planned surgery in that theater, an opening time and a closing time.

## Method

The method for building earlier mentioned subsets used in this report is called *subset sum problem*. This method works well in this case because a lower bound (number of bins) is predefined. The concept of the subset sum problem is to find subsets of a larger set that together adds up to a given sum.

Example: Consider  $A = \{1, 2, 3, 4, 5, 6\}$  and  $\text{sum} = 6$ .

If we glance at the set A above, we can see that the following subsets adds up to the sum 6:

- a {1, 2, 3}
- b {2, 4}
- c {1, 5}
- d {6}

This is not exactly how it is done in this project but rather an illustration of the concept. Since a lower bound is given, we are restricted to a limited number of bins. Our aim is to minimize the bin space wastage by processing the input in such way that it is easy to determine which subset fits in what bin, if the bins are different in size or capacity.

What needs paying attention to is that each surgery may and may only be scheduled once, meaning a surgery with id x can not be scheduled twice. Also, for convenience, the surgeries where sorted ascending.

The structure chosen to organize and relate the surgeries to the sum is a simple matrix, shown in figure 1.0, containing boolean values that indicates what sum can be achieved with a certain subset.

	0	1	2	3	4	5	6
1	T	F	F	F	F	F	F
2	T	F	F	F	F	F	F
3	T	F	F	F	F	F	F
4	T	F	F	F	F	F	F
5	T	F	F	F	F	F	F
6	T	F	F	F	F	F	F

Figure 1.0

The yellow column contains the objects to be packed and the brown row contains potential sums and acts as an indicator of which subsets adds up to what sum. The matrix is initialized with true values in the 0<sup>th</sup> column and false values in all other columns. The reason the 0<sup>th</sup> column is initialized with true values is because it is possible to create a subset that adds up to 0 simply but not including any objects in that subset.

We start constructing our subsets by starting with the first object in the yellow column and move to the right in the x-axis. The first stop (0) will be ignored since the value there is predefined so we continue traversing to the right. The next stop (1) is a sum our subset, which right now contains {1}, can add up to, therefore we mark it as true. Moving on to the next stop (2), our subset fails to add up to 2, therefore we mark it false and every stop further on. See figure 1.1

	0	1	2	3	4	5	6
1	T	T	F	F	F	F	F
2	T	F	F	F	F	F	F
3	T	F	F	F	F	F	F
4	T	F	F	F	F	F	F
5	T	F	F	F	F	F	F
6	T	F	F	F	F	F	F

Figure 1.1

Moving on to the next object (2) in the yellow column we traverse to the first stop (1) and we see that our subset do add up to 1 and we mark it as true.

The next stop (2) and we initially check the value 1 position above, if it is true then our current stop will also be true. However, if the value 1 position above is false, we subtract the sum of the position we are at with the object we are at, then we traverse up 1 unit in the y-axis and -(difference) in the x-axis and check if that value is true. If it is true, we return to our position before traversing 1 unit in the y-axis and -(difference) in the x-axis and mark it true. Our matrix should now look as illustrated in figure 1.2.

	0	1	2	3	4	5	6
1	T	T	F	F	F	F	F
2	T	T	T	F	F	F	F
3	T	F	F	F	F	F	F
4	T	F	F	F	F	F	F
5	T	F	F	F	F	F	F
6	T	F	F	F	F	F	F

Figure 1.2

Before moving on the the third object in the yellow column, we still need to traverse all the way to where the sum is equal to 6 in the 2<sup>nd</sup> row. Our next stop will be 3 and we use the same strategy here. We check if the value 1 position above us is true, if it is, then we mark our position as true and move on. If the value 1 position above us is false however, we need to temporarily move 1 unit up in the y-axis and -(difference) units in the x-axis and check if that value is true. Again, the difference is the sum we are at subtracted with the object we are at. In this case our sum is 3 and our object is 2 and  $3 - 2 = 1$ . So we move 1 unit up in the y-axis and to where sum is equal to our difference (1) and find that that position is marked true. We then return to our previous position and mark it true.

Now our matrix should look like shown in figure 1.3.

	0	1	2	3	4	5	6
1	T	T	F	F	F	F	F
2	T	T	T	T	F	F	F
3	T	F	F	F	F	F	F
4	T	F	F	F	F	F	F
5	T	F	F	F	F	F	F
6	T	F	F	F	F	F	F

Figure 1.3

Using the same strategy for the remaining objects in the yellow column should finally generate a matrix identical to figure 1.4.

	0	1	2	3	4	5	6
1	T	T	F	F	F	F	F
2	T	T	T	T	F	F	F
3	T	T	T	T	T	T	T
4	T	T	T	T	T	T	T
5	T	T	T	T	T	T	T
6	T	T	T	T	T	T	T

Figure 1.4

The matrix along with all its subsets is constructed and ready deliver subsets that adds up to desired sum, where sum has to be  $1 \leq \text{sum} \leq 6$ .

The subset sum selection algorithm primarily targets subsets that adds exactly up to given sum and later on constructs subsets that almost adds up to the given sum. The start point of the algorithm is from the lower right corner of the matrix at max-x and max-y as shown in figure 1.5.

Recursively, the algorithm checks if the value is true and if it is not, it will continue traverse to the left in the x-axis until it reaches a position marked true. If its current position is marked true, it will traverse 1 unit up in the y-axis as long as the position above is marked true. This technique tracks down the last object added to the subset. Once found, the algorithm schedules the object (surgery) and traverse to the second last object by moving 1 unit up in the y-axis and left in the x-axis as many steps as the cost of the element found previously. A fetch of a complete subset should look like shown in figure 1.5. The

	0	1	2	3	4	5	6
1	T	T	F	F	F	F	F
2	T	T	T	T	F	F	F
3	T	T	T	T	T	T	T
4	T	T	T	T	T	T	T
5	T	T	T	T	T	T	T
6	T	T	T	T	T	T	T

Figure 1.5

This iteration found the subset {3, 2, 1}, which adds up to 6 (sum). It continues doing so until no more perfect subsets longer exist and then it starts scheduling the remaining objects (surgeries) if there is space left.

## Pseudo code

Y = number of surgeries

X = timeCapacity of the greatest operation theater

T = precision while scheduling surgeries

S = the theater to be scheduled

M = matrix

A = surgery array

planSurgeries(S, Y, X, T)

```
{  
    IF X <= T  
        Theater is filled, exit  
    IF M[Y][X - A[Y]] && A[y] is not scheduled  
        schedule A[Y] in S  
        mark A[Y] as scheduled  
        Loop again but from 1 position above and A[Y] steps to the left  
    ELSE IF M[Y - 1][X] is scheduled  
        Loop again but from 1 position above  
    ELSE IF M[Y - 1][X] is not scheduled  
        traverse to the left in the x-axis  
}
```

## Analysis

The algorithm performs as initially intended and managed to schedule 100% of each operation theater in both solutions. However, the algorithm is dependent on a parameter which regulates the acceptable gap or space wastage in each operation theater and the operation theaters are only fully filled when the parameter value is assigned to 0. This may not always be the case, if the input varies then the output may vary as well.

Fully filling all operation theaters does not necessarily mean the scheduling is optimal as an optimal solution depends on various factors, such as whether it is good to schedule one operation at the same cost as two others combined. Let's have a look at third result in the second solution. We see that surgery with ID 9 could be replaced by 3 unscheduled surgeries (ID 36, 7 & 20). That would be a better solution.

##### Theater: 2 Total time Initially: 660 minutes Total time scheduled: 660 minutes Total time available: 0 minutes Number of surgeries : 9 ID: 9 Label: höft Duration: 115 ID: 10 Label: armbåge Duration: 90 ID: 18 Label: fot Duration: 80 ID: 26 Label: hand Duration: 75 ID: 2 Label: fot Duration: 75 ID: 31 Label: fot Duration: 60 ID: 28 Label: tå Duration: 60 ID: 35 Label: höft Duration: 60 ID: 12 Label: fot Duration: 45 #####	ID: 36 Label: hand Duration: 30 ID: 7 Label: axel Duration: 30 ID: 20 Label: axel Duration: 30 ID: 10 Label: armbåge Duration: 90	Not Scheduled! Not Scheduled! Not Scheduled!
---	--	--



Measuring both solutions execution times proportional to the space waste parameter we can see clear differences between both solutions. The second solution requires more time because of the number of objects processed. The second solution process 39 objects while the first one only processes 19 objects. Despite that, at least 2-3 results vary in each solution. Both solutions are being asked to try to spare 100 minutes in each operation theater and in the second solution they are being asked to try to spare 50 minutes. In the last solution however, both are asked to fully fill all operation theaters. Meanwhile the first solution preform better when asked to fully fill all operation theater, the second solution seem to run faster when being asked to spare 50 minutes in each operation theater. See figure 1.6.

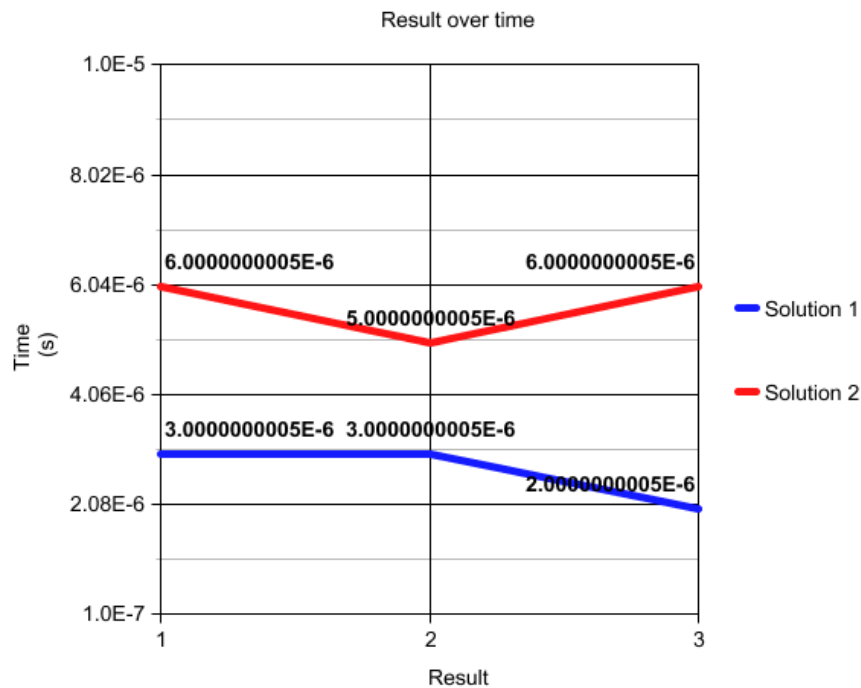


Figure 1.6

The algorithm will perform fairly good even when given a larger input thanks to the dynamic programming technique used (The matrix). The overlapping subsets makes it possible to almost always predict where the next relevant object is. With respect to current input's, the response times are fairly acceptable.

## References

Roy, T. [Tushar Roy - Coding Made Simple]. (2015, 19 03). Subset Sum Problem Dynamic Programming. Source: <https://www.youtube.com/watch?v=s6FhG--P7z0&t=10s>

IITians. [LogicHeap]. (2015, 24 07). Programming Interview : Dynamic Programming :Subset sum problem. Source: <https://www.youtube.com/watch?v=zKwwjAkaXLI&t=614s>

# Appendices

## Solution 1

### Result 1

Reserved amount of minutes: 100

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 560 minutes

Total time available: 100 minutes

Number of surgeries : 2

ID: 5 Label: rygg Duration: 360

ID: 14 Label: rygg Duration: 200

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 615 minutes

Total time available: 45 minutes

Number of surgeries : 3

ID: 6 Label: rygg Duration: 320

ID: 3 Label: hand Duration: 180

ID: 9 Label: höft Duration: 115

#####

#####

Theater: 3

Total time Initially: 660 minutes

Total time scheduled: 630 minutes

Total time available: 30 minutes

Number of surgeries : 5

ID: 17 Label: rygg Duration: 180

ID: 13 Label: fot Duration: 140

ID: 4 Label: höft Duration: 120

ID: 16 Label: knä Duration: 100

ID: 10 Label: armbåge Duration: 90

#####

ID: 7 Label: axel Duration: 30 Not Scheduled!

ID: 15 Label: arm Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45 Not Scheduled!

ID: 1 Label: knä Duration: 50 Not Scheduled!

ID: 8 Label: knä Duration: 50 Not Scheduled!

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 2 Label: fot Duration: 75 Not Scheduled!

ID: 10 Label: armbåge Duration: 90

ID: 16 Label: knä Duration: 100

ID: 9 Label: höft Duration: 115

ID: 4 Label: höft Duration: 120

ID: 13 Label: fot Duration: 140

ID: 17 Label: rygg Duration: 180

ID: 3 Label: hand Duration: 180

ID: 14 Label: rygg Duration: 200

ID: 6 Label: rygg Duration: 320

ID: 5 Label: rygg Duration: 360

#####

TIME: 0.0000030000s

#####

## Result 2

Reserved amount of minutes: 50

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 5 Label: rygg Duration: 360

ID: 14 Label: rygg Duration: 200

ID: 16 Label: knä Duration: 100

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 615 minutes

Total time available: 45 minutes

Number of surgeries : 3

ID: 6 Label: rygg Duration: 320

ID: 3 Label: hand Duration: 180

ID: 9 Label: höft Duration: 115

#####

#####

Theater: 3

Total time Initially: 660 minutes

Total time scheduled: 630 minutes

Total time available: 30 minutes

Number of surgeries : 6

ID: 17 Label: rygg Duration: 180

ID: 13 Label: fot Duration: 140

ID: 4 Label: höft Duration: 120

ID: 10 Label: armbåge Duration: 90

ID: 8 Label: knä Duration: 50

ID: 1 Label: knä Duration: 50

#####

ID: 7 Label: axel Duration: 30 Not Scheduled!

ID: 15 Label: arm Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45 Not Scheduled!

ID: 1 Label: knä Duration: 50

ID: 8 Label: knä Duration: 50

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 2 Label: fot Duration: 75 Not Scheduled!

ID: 10 Label: armbåge Duration: 90

ID: 16 Label: knä Duration: 100

ID: 9 Label: höft Duration: 115

ID: 4 Label: höft Duration: 120

ID: 13 Label: fot Duration: 140

ID: 17 Label: rygg Duration: 180

ID: 3 Label: hand Duration: 180

ID: 14 Label: rygg Duration: 200

ID: 6 Label: rygg Duration: 320

ID: 5 Label: rygg Duration: 360

#####

TIME: 0.0000030000s

#####

## Result 3

Reserved amount of minutes: 0

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 5 Label: rygg Duration: 360

ID: 14 Label: rygg Duration: 200

ID: 16 Label: knä Duration: 100

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 4

ID: 6 Label: rygg Duration: 320

ID: 3 Label: hand Duration: 180

ID: 9 Label: höft Duration: 115

ID: 12 Label: fot Duration: 45

#####

#####

Theater: 3

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes



Number of surgeries : 7

ID: 17 Label: rygg Duration: 180

ID: 13 Label: fot Duration: 140

ID: 4 Label: höft Duration: 120

ID: 10 Label: armbåge Duration: 90

ID: 8 Label: knä Duration: 50

ID: 1 Label: knä Duration: 50

ID: 7 Label: axel Duration: 30

#####

ID: 7 Label: axel Duration: 30

ID: 15 Label: arm Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45

ID: 1 Label: knä Duration: 50

ID: 8 Label: knä Duration: 50

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 2 Label: fot Duration: 75 Not Scheduled!

ID: 10 Label: armbåge Duration: 90

ID: 16 Label: knä Duration: 100

ID: 9 Label: höft Duration: 115

ID: 4 Label: höft Duration: 120

ID: 13 Label: fot Duration: 140

ID: 17 Label: rygg Duration: 180

ID: 3 Label: hand Duration: 180

ID: 14 Label: rygg Duration: 200

ID: 6 Label: rygg Duration: 320

ID: 5 Label: rygg Duration: 360

#####

TIME: 0.0000020000s

#####

## Solution 2

### Result 1

Reserved amount of minutes: 100

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 580 minutes

Total time available: 80 minutes

Number of surgeries : 5

ID: 32 Label: arm Duration: 120

ID: 30 Label: axel Duration: 120

ID: 4 Label: höft Duration: 120

ID: 24 Label: höft Duration: 120

ID: 16 Label: knä Duration: 100

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 615 minutes

Total time available: 45 minutes

Number of surgeries : 7

ID: 9 Label: höft Duration: 115

ID: 29 Label: knä Duration: 90

ID: 34 Label: knä Duration: 90

ID: 10 Label: armbåge Duration: 90

ID: 18 Label: fot Duration: 80

ID: 26 Label: hand Duration: 75

ID: 2 Label: fot Duration: 75

#####

#####

Theater: 3

Total time Initially: 840 minutes

Total time scheduled: 840 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 5 Label: rygg Duration: 360

ID: 25 Label: rygg Duration: 340

ID: 13 Label: fot Duration: 140

#####

#####

Theater: 4

Total time Initially: 840 minutes

Total time scheduled: 800 minutes

Total time available: 40 minutes

Number of surgeries : 3

ID: 6 Label: rygg Duration: 320

ID: 33 Label: rygg Duration: 300

ID: 3 Label: hand Duration: 180

#####

#####

Theater: 5

Total time Initially: 540 minutes

Total time scheduled: 440 minutes

Total time available: 100 minutes

Number of surgeries : 2

ID: 23 Label: höft Duration: 240

ID: 14 Label: rygg Duration: 200

#####

#####

Theater: 6

Total time Initially: 540 minutes

Total time scheduled: 445 minutes

Total time available: 95 minutes

Number of surgeries : 3

ID: 17 Label: rygg Duration: 180

ID: 39 Label: fot Duration: 140

ID: 27 Label: fot Duration: 125

#####

ID: 36 Label: hand Duration: 30 Not Scheduled!

ID: 7 Label: axel Duration: 30 Not Scheduled!

ID: 20 Label: axel Duration: 30 Not Scheduled!

ID: 21 Label: armbåge Duration: 30 Not Scheduled!

ID: 22 Label: knä Duration: 40 Not Scheduled!

ID: 38 Label: fot Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45 Not Scheduled!

ID: 15 Label: arm Duration: 45 Not Scheduled!

ID: 1 Label: knä Duration: 50 Not Scheduled!

ID: 8 Label: knä Duration: 50 Not Scheduled!

ID: 37 Label: knä Duration: 60 Not Scheduled!

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 19 Label: arm Duration: 60 Not Scheduled!

ID: 35 Label: höft Duration: 60 Not Scheduled!

ID: 28 Label: tå Duration: 60 Not Scheduled!

ID: 31 Label: fot Duration: 60 Not Scheduled!

ID: 2 Label: fot Duration: 75  
ID: 26 Label: hand Duration: 75  
ID: 18 Label: fot Duration: 80  
ID: 10 Label: armbåge Duration: 90  
ID: 34 Label: knä Duration: 90  
ID: 29 Label: knä Duration: 90  
ID: 16 Label: knä Duration: 100  
ID: 9 Label: höft Duration: 115  
ID: 24 Label: höft Duration: 120  
ID: 4 Label: höft Duration: 120  
ID: 30 Label: axel Duration: 120  
ID: 32 Label: arm Duration: 120  
ID: 27 Label: fot Duration: 125  
ID: 39 Label: fot Duration: 140  
ID: 13 Label: fot Duration: 140  
ID: 17 Label: rygg Duration: 180  
ID: 3 Label: hand Duration: 180  
ID: 14 Label: rygg Duration: 200  
ID: 23 Label: höft Duration: 240  
ID: 33 Label: rygg Duration: 300  
ID: 6 Label: rygg Duration: 320  
ID: 25 Label: rygg Duration: 340  
ID: 5 Label: rygg Duration: 360

#####

TIME: 0.0000060000s

#####

## Result 2

Reserved amount of minutes: 50

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 6

ID: 32 Label: arm Duration: 120

ID: 30 Label: axel Duration: 120

ID: 4 Label: höft Duration: 120

ID: 24 Label: höft Duration: 120

ID: 29 Label: knä Duration: 90

ID: 34 Label: knä Duration: 90

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 615 minutes

Total time available: 45 minutes

Number of surgeries : 8

ID: 9 Label: höft Duration: 115

ID: 10 Label: armbåge Duration: 90

ID: 18 Label: fot Duration: 80

ID: 26 Label: hand Duration: 75

ID: 2 Label: fot Duration: 75

ID: 31 Label: fot Duration: 60

ID: 28 Label: tå Duration: 60

ID: 35 Label: höft Duration: 60

#####

#####

Theater: 3

Total time Initially: 840 minutes

Total time scheduled: 840 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 5 Label: rygg Duration: 360

ID: 25 Label: rygg Duration: 340

ID: 13 Label: fot Duration: 140

#####

#####

Theater: 4

Total time Initially: 840 minutes

Total time scheduled: 800 minutes

Total time available: 40 minutes

Number of surgeries : 3

ID: 6 Label: rygg Duration: 320

ID: 33 Label: rygg Duration: 300

ID: 3 Label: hand Duration: 180

#####

#####

Theater: 5

Total time Initially: 540 minutes

Total time scheduled: 540 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 23 Label: höft Duration: 240

ID: 14 Label: rygg Duration: 200

ID: 16 Label: knä Duration: 100

#####

#####

Theater: 6

Total time Initially: 540 minutes

Total time scheduled: 495 minutes

Total time available: 45 minutes

Number of surgeries : 4

ID: 17 Label: rygg Duration: 180

ID: 39 Label: fot Duration: 140

ID: 27 Label: fot Duration: 125

ID: 8 Label: knä Duration: 50

#####

ID: 36 Label: hand Duration: 30 Not Scheduled!

ID: 7 Label: axel Duration: 30 Not Scheduled!

ID: 20 Label: axel Duration: 30 Not Scheduled!

ID: 21 Label: armbåge Duration: 30 Not Scheduled!

ID: 22 Label: knä Duration: 40 Not Scheduled!

ID: 38 Label: fot Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45 Not Scheduled!

ID: 15 Label: arm Duration: 45 Not Scheduled!

ID: 1 Label: knä Duration: 50 Not Scheduled!

ID: 8 Label: knä Duration: 50

ID: 37 Label: knä Duration: 60 Not Scheduled!

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 19 Label: arm Duration: 60 Not Scheduled!

ID: 35 Label: höft Duration: 60

ID: 28 Label: tå Duration: 60



ID: 31 Label: fot Duration: 60  
ID: 2 Label: fot Duration: 75  
ID: 26 Label: hand Duration: 75  
ID: 18 Label: fot Duration: 80  
ID: 10 Label: armbåge Duration: 90  
ID: 34 Label: knä Duration: 90  
ID: 29 Label: knä Duration: 90  
ID: 16 Label: knä Duration: 100  
ID: 9 Label: höft Duration: 115  
ID: 24 Label: höft Duration: 120  
ID: 4 Label: höft Duration: 120  
ID: 30 Label: axel Duration: 120  
ID: 32 Label: arm Duration: 120  
ID: 27 Label: fot Duration: 125  
ID: 39 Label: fot Duration: 140  
ID: 13 Label: fot Duration: 140  
ID: 17 Label: rygg Duration: 180  
ID: 3 Label: hand Duration: 180  
ID: 14 Label: rygg Duration: 200  
ID: 23 Label: höft Duration: 240  
ID: 33 Label: rygg Duration: 300  
ID: 6 Label: rygg Duration: 320  
ID: 25 Label: rygg Duration: 340  
ID: 5 Label: rygg Duration: 360

#####

TIME: 0.0000050000s

#####

## Result 3

Reserved amount of minutes: 0

#####

Theater: 1

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 6

ID: 32 Label: arm Duration: 120

ID: 30 Label: axel Duration: 120

ID: 4 Label: höft Duration: 120

ID: 24 Label: höft Duration: 120

ID: 29 Label: knä Duration: 90

ID: 34 Label: knä Duration: 90

#####

#####

Theater: 2

Total time Initially: 660 minutes

Total time scheduled: 660 minutes

Total time available: 0 minutes

Number of surgeries : 9

ID: 9 Label: höft Duration: 115

ID: 10 Label: armbåge Duration: 90

ID: 18 Label: fot Duration: 80

ID: 26 Label: hand Duration: 75

ID: 2 Label: fot Duration: 75

ID: 31 Label: fot Duration: 60

ID: 28 Label: tå Duration: 60

ID: 35 Label: höft Duration: 60

ID: 12 Label: fot Duration: 45

#####

#####

Theater: 3

Total time Initially: 840 minutes

Total time scheduled: 840 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 5 Label: rygg Duration: 360

ID: 25 Label: rygg Duration: 340

ID: 13 Label: fot Duration: 140

#####

#####

Theater: 4

Total time Initially: 840 minutes

Total time scheduled: 840 minutes

Total time available: 0 minutes

Number of surgeries : 4

ID: 6 Label: rygg Duration: 320

ID: 33 Label: rygg Duration: 300

ID: 3 Label: hand Duration: 180

ID: 22 Label: knä Duration: 40

#####

#####

Theater: 5

Total time Initially: 540 minutes

Total time scheduled: 540 minutes

Total time available: 0 minutes

Number of surgeries : 3

ID: 23 Label: höft Duration: 240

ID: 14 Label: rygg Duration: 200

ID: 16 Label: knä Duration: 100

#####

#####

Theater: 6

Total time Initially: 540 minutes

Total time scheduled: 540 minutes

Total time available: 0 minutes

Number of surgeries : 5

ID: 17 Label: rygg Duration: 180

ID: 39 Label: fot Duration: 140

ID: 27 Label: fot Duration: 125

ID: 8 Label: knä Duration: 50

ID: 15 Label: arm Duration: 45

#####

ID: 36 Label: hand Duration: 30 Not Scheduled!

ID: 7 Label: axel Duration: 30 Not Scheduled!

ID: 20 Label: axel Duration: 30 Not Scheduled!

ID: 21 Label: armbåge Duration: 30 Not Scheduled!

ID: 22 Label: knä Duration: 40

ID: 38 Label: fot Duration: 45 Not Scheduled!

ID: 12 Label: fot Duration: 45

ID: 15 Label: arm Duration: 45

ID: 1 Label: knä Duration: 50 Not Scheduled!

ID: 8 Label: knä Duration: 50

ID: 37 Label: knä Duration: 60 Not Scheduled!

ID: 11 Label: knä Duration: 60 Not Scheduled!

ID: 19 Label: arm Duration: 60 Not Scheduled!

ID: 35 Label: höft Duration: 60

ID: 28 Label: tå Duration: 60

ID: 31 Label: fot Duration: 60

ID: 2 Label: fot Duration: 75

ID: 26 Label: hand Duration: 75

ID: 18 Label: fot Duration: 80

ID: 10 Label: armbåge Duration: 90

ID: 34 Label: knä Duration: 90

ID: 29 Label: knä Duration: 90

ID: 16 Label: knä Duration: 100

ID: 9 Label: höft Duration: 115

ID: 24 Label: höft Duration: 120

ID: 4 Label: höft Duration: 120

ID: 30 Label: axel Duration: 120

ID: 32 Label: arm Duration: 120

ID: 27 Label: fot Duration: 125

ID: 39 Label: fot Duration: 140

ID: 13 Label: fot Duration: 140

ID: 17 Label: rygg Duration: 180

ID: 3 Label: hand Duration: 180

ID: 14 Label: rygg Duration: 200

ID: 23 Label: höft Duration: 240

ID: 33 Label: rygg Duration: 300

ID: 6 Label: rygg Duration: 320

ID: 25 Label: rygg Duration: 340

ID: 5 Label: rygg Duration: 360

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TIME: 0.0000060000s

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