

## Test CLP mit A\*: erstes Beispiel:

(60, 50, 50) Kapazitäten  
 [[60, []], [50, [30]], [50, []]] leere Container  
 [30, 20, 20, 20, 10] Stücke  
 Geschätzte Gesamtkosten **100**

### Ausgabe der Prioritätswarteschlange

[[[60, []], [50, [30]], [50, []], [20, 20, 20, 10]]  
 [[60, [30]], [50, []], [50, []], [20, 20, 20, 10]] **120, 120, 130**

[[[60, []], [50, [30, 20]], [50, []], [20, 20, 10]]  
 [[60, [30]], [50, []], [50, []], [20, 20, 20, 10]]  
 (((60 (20)) (50 (30)) (50 ())) (20 20 10)))  
 [[60, []], [50, [], [50, [30]]], [20, 20, 20, 10]]  
 [[60, [], [50, [30]], [50, [20]]], [20, 20, 10]]  
**100, 120, 130, 150, 160**

[[60, [], [50, [30, 20]], [50, [20]]], [20, 10]]  
 [[60, [], [50, [30]], [50, [20]]], [20, 20, 10]]  
**120, 130, 130, 140, 150, 160**

[[60, [30]], [50, [], [50, []]], [20, 20, 20, 10]]  
 [[60, [20]], [50, [30, 20]], [50, []], [20, 10]]  
 [[60, [20]], [50, [30]], [50, []], [20, 20, 10]]  
**100, 130, 130, 140, 150, 150, 160, 160**

[[60, [30]], [50, [], [50, []]], [20, 20, 20, 10]]  
 [[60, [], [50, [20]], [50, [30, 20]]], [20, 10]]  
 [[60, [20]], [50, [], [50, [30, 20]]], [20, 10]]  
 [[60, [], [50, [20]], [50, [30]]], [20, 20, 10]]  
 [[60, [20]], [50, [], [50, [30]]], [20, 20, 10]]  
**130, 130, 130, 140, 140, 150, 150, 160, 160**

[[60, [30, 20]], [50, [], [50, []]], [20, 20, 10]]  
 [[60, [], [50, [20]], [50, [30, 20]]], [20, 10]]  
 [[60, [20]], [50, [], [50, [30, 20]]], [20, 10]]  
 [[60, [], [50, [20]], [50, [30]]], [20, 20, 10]]  
 [[60, [20]], [50, [], [50, [30]]], [20, 20, 10]]  
 [[60, [30]], [50, [], [50, [20]]], [20, 20, 10]]  
**110, 130, 130, 140, 140, 150, 150, 160, 160, 160**

[[60, [30, 20]], [50, [20]], [50, []], [20, 10]]  
 [[60, [20]], [50, [30, 20]], [50, []], [20, 10]]  
 [[60, [30, 20]], [50, [20]], [50, []], [20, 10]]  
 [[60, [], [50, [30]], [50, [20]]], [20, 20, 10]]  
 [[60, [20]], [50, [30]], [50, []], [20, 20, 10]]  
 [[60, [30]], [50, [20]], [50, []], [20, 20, 10]]  
**130, 130, 140, 140, 140, 140, 150, 150, 160, 160, 160, 160**

[[[60, []], [50, [30, 20]], [50, [20, 20]]], [10]]	[[[60, []], [50, [20]], [50, [30, 20]]], [20, 10]]
[[[60, [20]], [50, [30, 20]], [50, []], [20, 10]]	[[[60, [20]], [50, []], [50, [30, 20]]], [20, 10]]
[[[60, [30, 20]], [50, [20]], [50, []], [20, 10]]	[[[60, [30, 20]], [50, []], [50, [20]]], [20, 10]]
[[[60, []], [50, [30]], [50, [20]]], [20, 20, 10]]	[[[60, []], [50, [20]], [50, [30]]], [20, 20, 10]]
[[[60, [20]], [50, [30]], [50, []], [20, 20, 10]]	[[[60, [20]], [50, []], [50, [30]]], [20, 20, 10]]
[[[60, [30]], [50, [20]], [50, []], [20, 20, 10]]	[[[60, [30]], [50, []], [50, [20]]], [20, 20, 10]]
[[[60, [20]], [50, [30, 20]], [50, [20]]], [10]]	

**110, 130, 140, 140, 140, 140, 140, 150, 150, 160, 160, 160, 160, 170**

[[[60, []], [50, [30, 20]], [50, [20, 20, 10]]], []]	[[[60, []], [50, [20]], [50, [30, 20]]], [20, 10]]
[[[60, [20]], [50, [30, 20]], [50, []], [20, 10]]	[[[60, [20]], [50, []], [50, [30, 20]]], [20, 10]]
[[[60, [30, 20]], [50, [20]], [50, []], [20, 10]]	[[[60, [30, 20]], [50, []], [50, [20]]], [20, 10]]
[[[60, []], [50, [30]], [50, [20]]], [20, 20, 10]]	[[[60, []], [50, [20]], [50, [30]]], [20, 20, 10]]
[[[60, [20]], [50, [30]], [50, []], [20, 20, 10]]	[[[60, [20]], [50, []], [50, [30]]], [20, 20, 10]]
[[[60, [30]], [50, [20]], [50, []], [20, 20, 10]]	[[[60, [30]], [50, []], [50, [20]]], [20, 20, 10]]
[[[60, [10]], [50, [30, 20]], [50, [20, 20]]], []]	[[[60, [20]], [50, [30, 20]], [50, [20]]], [10]]

**100, 130, 140, 140, 140, 140, 140, 150, 150, 160, 160, 160, 160, 160, 170**

**Lösung:**

[ [60, []], [50, [30, 20]], [50, [20, 20, 10]] ]  
 mit den minimalen realen Kosten von 100.

**Weitere Erläuterung**

Es wird jeweils das erste Element der Prioritätswarteschlange expandiert, da es die aktuell geringsten geschätzten Gesamtkosten hat. Die neu eingebauten Elemente der Prioritätswarteschlange sind farblich hervorgehoben.

Beim Expandieren wird versucht, das erste Element der Stückeliste in jeden der Container einzubauen, was in einigen Fällen nicht gelingt, da das Stück nicht mehr in den Container passt. In diesen Fällen findet man daher nicht drei Hervorhebungen im Block sondern nur zwei.