SUMMARY

This document gives a theoretical and algorithmically analysis of an assignment model in which jobs are assigned to capacity-units in couples, and a performance evaluation in relation to different conditions with the help of simulation.

The context of this study is the transport system. This deals with the transport of persons and goods in all modalities, with accessory activities like transfer, transshipment, stocking, grouping and distribution. An interface in the transport system is the matching of transportation jobs and vehicles. This study deals with single transportation jobs transporting one unit-load on one vehicle per operation.
Two algorithms, among others, known for capacity-allocation minimizing empty movements, are:

- greedy algorithms
- assignment algorithms

In this document is suggested to assign the transportation jobs (in common: *jobs*) in couples to specific vehicles (in common: *servers*). Jobs have to be matched optimally and in the same time assigned to servers minimizing empty movements.

Couples Assignment is formulated as a Minimum Cost Flow problem. Because not all restrictions can explicitly formulated, branch-and-bound techniques are used. New subproblems are made by developing Minimum Cost Flow problems in which jobs are forced in or banned from the first or second allocation round. The cost of the optimal solution of the Minimum Cost Flow problem are the bound of the accessory subproblem. Subproblems that won't lead to a optimal solution are pruned. To solve the Minimum Cost Flow problems the ε-Relaxation Algorithm with ε-scaling is used.

A simulation model is developed to evaluate the behavior of Couples Assignment in comparison to two other capacity allocation rules, in relation with different conditions. The object-system is a square surface with objects stacked on a grid and where jobs are generated to move these objects. In order to be able to model all possible situations the relevant parameters influencing the performance of the system, has to be able to be tuned. To suppress calculation-times time-frames and re-optimization of the last optimal solution can be used.