1 Optimal order sequencing in warehouses

A warehouse must satisfy a given set of orders. Each order specifies a list of items, from a given ground set. Items are picked-up from the warehouse by pickers. Each picker receives a pick-list, enters the warehouse, picks-up the requested items, puts them in a limited capacity box and carries them to the point where packages are prepared to be sent to the customers.

Assume that all orders are known. The main objective to increase the productivity of the warehouse is to minimize the number of trips of the pickers. This would imply solving a classical bin packing problem, where the items come from the union of all orders, the bins are the pick-lists and the bin capacity is the capacity of the boxes used by the pickers.

However, assume that a limited number of packages can be open at any point in time. Therefore a sequence of packages must be determined so that pick-lists can be composed with items of consecutive packages and a feasible sequence of a minimum number of pick-lists exists.

To further improve the productivity, it is also profitable to assign nearby items to the same pick-list.

Suitable for a master thesis.