NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Dynamic Vector Bin Packing

for Virtual Machine Placement in Cloud

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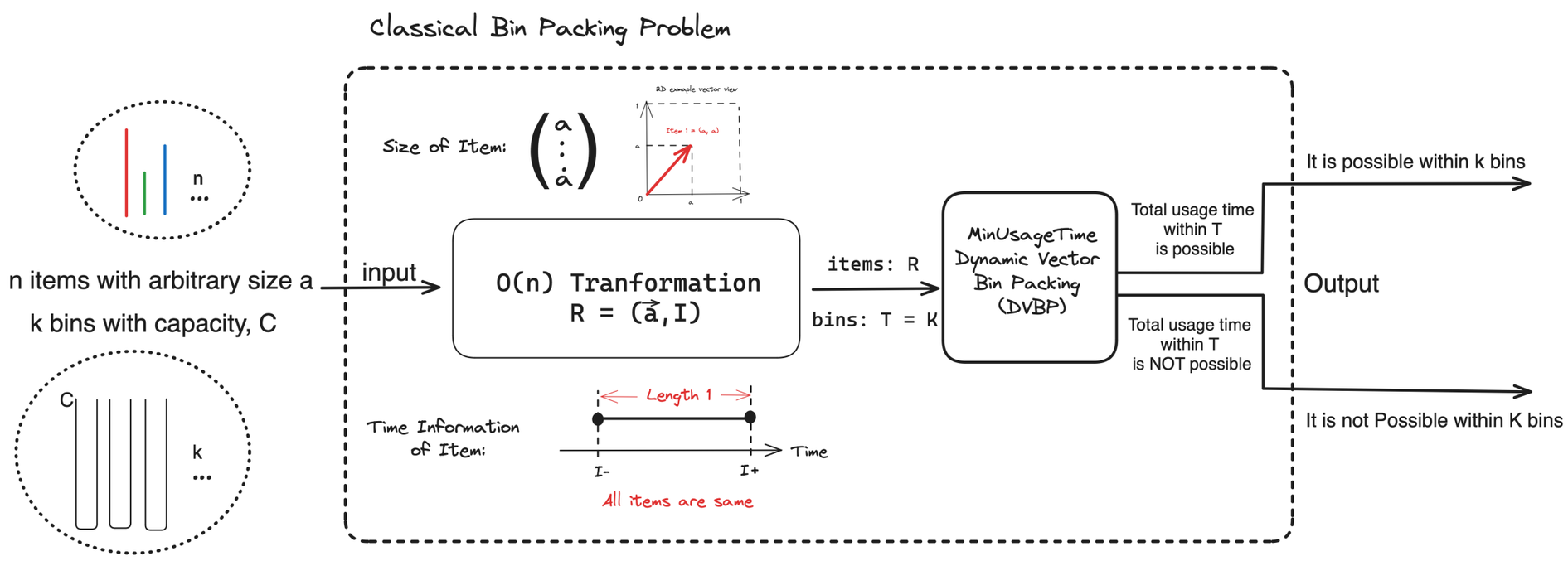
Problem Statement (*MinUsageTime* Dynamic Vector Bin Packing Problem (DVBP)) :

Minimizes the total usage time of all bins (physical machines) such that items (Virtual Machines) depart and arrive at certain times and are fit into valid bins that able to fit in all dimensions.

Theorectical Result:

Detailed Proof of *MinUsageTime* DVBP is NP-hard



Categories of Algorithms

Information Knowledge Level	Online Nonclairvoyant	Online Clairvoyant	Offline Clairvoyant
Departure time of arriving item	✗	○	○
Arrival time of future items	✗	✗	○

Competitive Ratio, α (CR)

Worst Case Ratio of Usage Time of an algorithm (A) over the optimal solution (OPT)

$$A \leq \alpha \cdot OPT$$

CR of any algorithm is bounded by the total number of items.

Results