



# HUST

**ĐẠI HỌC BÁCH KHOA HÀ NỘI**  
HANOI UNIVERSITY OF SCIENCE AND TECHNOLOGY

ONE LOVE. ONE FUTURE.



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# Applied Algorithm Lab

Warehouse

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- $N$  stations located on a straight line
  - Station  $i$  has amount of goods  $a_i$ , located at  $i$ , pick-up time  $t_i$
- **Objective:** Find a route for a truck to pick-up goods at stations
  - two consecutive stations: has distance  $\leq D$
  - total time to pick up  $\leq T$
  - maximize the total amount of goods
- Output: the total amount of goods
- Example:

**Input:**

6 6 2  
6 8 5 10 11 6  
1 2 2 3 3 2

**Output:**

24

ex

!

pick: 6-8-10

- Idea to solve: dynamic programming
  - Let  $f[i][k]$  be the maximal amounts of good if we choose some stations in  $1 \rightarrow i - 1$ , and **choose station  $i$**  and the total time is  $\leq k$ .
  - Formula:
    - If  $k < t[i] : f[i][k] = 0;$
    - If  $k \geq t[i] : f[i][k] = \max(f[j][k - t[i]] + a[i]), j = i - D \rightarrow i - 1;$
  - return:
    - $\max(f[i][k]), i = 1 \rightarrow n, k = 1 \rightarrow T;$
  - Complexity:
    - $O(n * T * D).$

A large graphic on the left side of the slide. It features a dark blue background with a circular pattern of red dots of varying sizes, creating a sense of depth and movement. The word "HUST" is centered within this graphic in a bold, white, sans-serif font.

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# THANK YOU !