



## Design and Analysis of Algorithms (COM336)

Second Semester 2024/2025

Project # 1

### Optimal Strategy for Minimum cost from city1 to city1 using Dynamic Programming

Write a program that solve minimum cost for traveling from city 1 to city2 Problem using Dynamic Programming technique.

#### Problem definition:

1. Travelling from home in city1 to a hotel in city2.
2. N stopovers on the way
  - a. a number of choices of towns for each stop,
  - b. a number of hotels to choose from in each city.
3. Each trip has a different distance resulting in a different cost (petrol).
4. Hotels have different costs.
5. The goal is to select a route to and a hotel in city2 so that the overall cost of the **trip is minimized**.

#### Your program should print out the following:

1. Read the input data from a file

File format:

Number of cities

Start city, end city

List of adjacent cities

Example:

14

Start, End

Start, [A,22,70], [B,8,80], [C,12,80]

A, [D,8,50], [E,10,70]

B, [D, 25, 50], [E,10,70]

C, [D,13,50], [E,13,70]

Petrol cost

Hotel cost

D, [F,25,50], [G,30,70], [H,18,70], [I, 27,60]

E, [F,12,50], [G,10,70], [H,8,70], [I, 7,60]

F, [J,26,50], [K,13,70], [L,15,60]

G, [J,8,50], [K,10,70], [L,10,60]

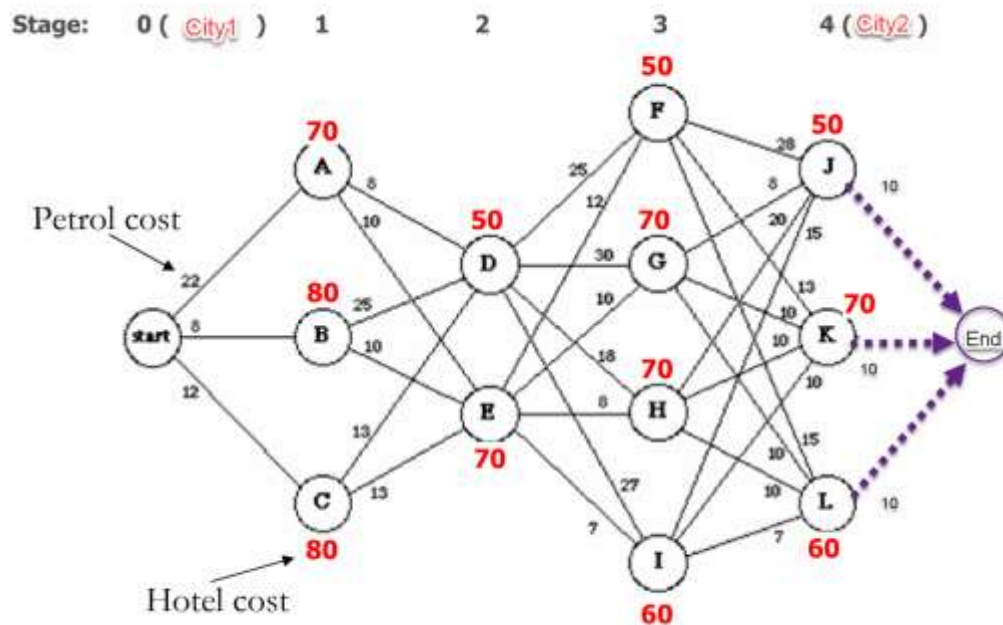
H, [J,20,50], [K,10,70], [L,10,60]

L, [J,15,50], [K,10,70], [L,7,60]

J, [End,10,0]

K, [End,10,0]

L, [End,10,0]



**Solution\_1** → {Start, B, E, I, J, End}

**Cost** = 310

**Alternative solutions** → ?

**Cost** = ?

2. The expected result (path and cost)
3. The alternatives result (second solution, third solution...)
4. The DP table.
5. Demonstrate the result in a good user interface

**Good luck!!**