**Day 22 Implement utility functions (user wants low cost + low latency, provider wants high profit).**

**Step 1: Define Utility Functions**

1. **User Utility** →  
   Users want:
   * **Low Cost** (pay less money 💰)
   * **Low Latency** (faster response ⚡)

A simple utility function can be:

Uuser=α⋅1cost+β⋅1latencyU\_{\text{user}} = \alpha \cdot \frac{1}{\text{cost}} + \beta \cdot \frac{1}{\text{latency}}Uuser​=α⋅cost1​+β⋅latency1​

where

* + cost = price charged to the user
  + latency = time delay assigned to user
  + α, β = weights (importance). Example: α = β = 0.5.

👉 Higher cost or higher latency → lower utility.

1. **Provider Utility** →  
   Providers want:
   * **High Profit** (price – resource cost)
   * **Efficient Resource Use** (no overloading).

A simple function:

Uprovider=price−resource\_costU\_{\text{provider}} = \text{price} - \text{resource\\_cost}Uprovider​=price−resource\_cost

👉 More users and higher prices → higher profit, but costs matter.