

# Algorithm

## 1. Construct $G(V, E)$ :

- $V$  is divided into 4 parts  $(start, V_{cube}, V_{char}, end)$ 
  - Think of each cube or each character in the word as a vertex
  - Add two nodes: start and end
- $E$  is divided into 3 parts  $(E_{s2cube}, E_{char2end}, E_{cube2char})$ 
  - Start has edges to any cube vertex
  - Any character vertex has an edge to end.
  - The cube vertex has an edge to the char vertex if it has the char in its list of letters.

## 2. Translate $G$ to a flow network:

- the capacity of each edge is 1
- the initial flow of each edge is 0

## 3. So judging whether the word can be formed is equivalent to compute whether the maximum flow in the graph equals the length of the word

## 4. Use Ford-Fulkerson algorithm to compute the maximum flow

## 5. In the case that maximum flow equals the length of the word, the cube forms the character if the flow between their nodes is 1

## 6. Output the result