Edmonds Karp Algorithm

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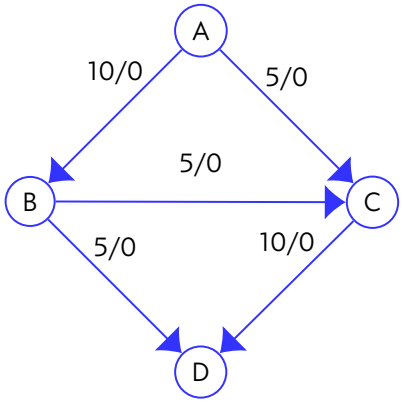
Objectives

Your Objectives:

- Implement the Edmonds Karp algorithm for Network Flow

A simple example



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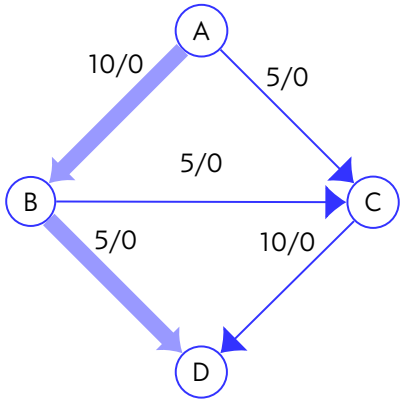

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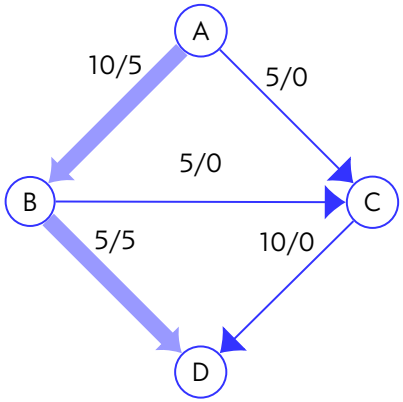
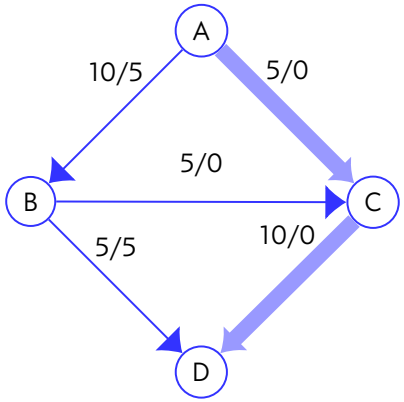


Introduction

A simple example



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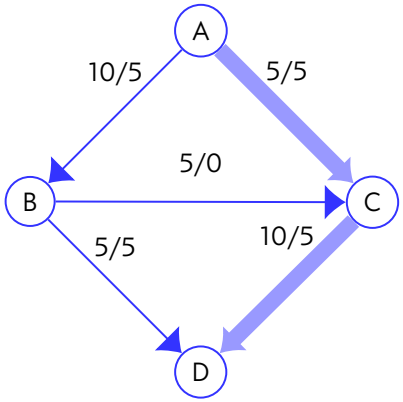

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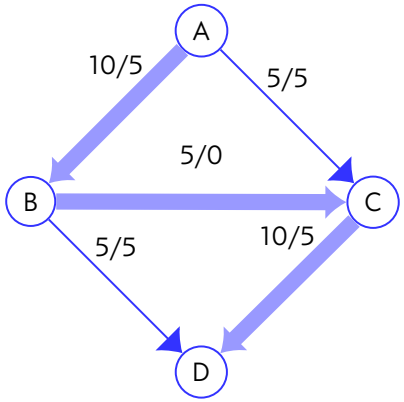

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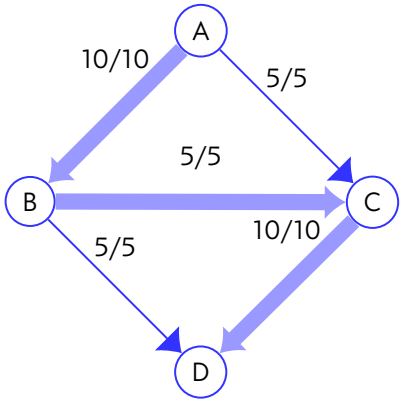
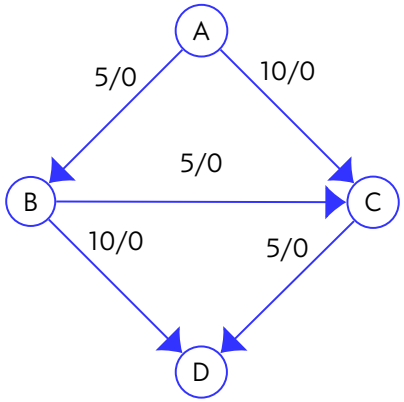


A second example



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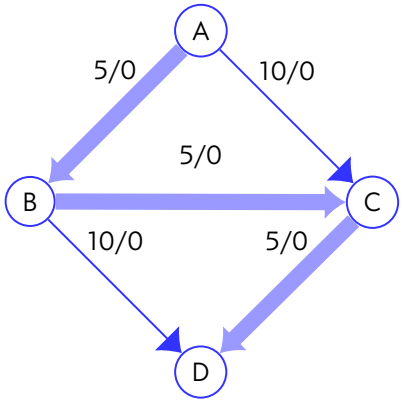

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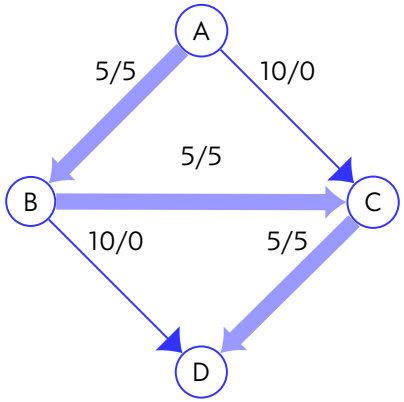

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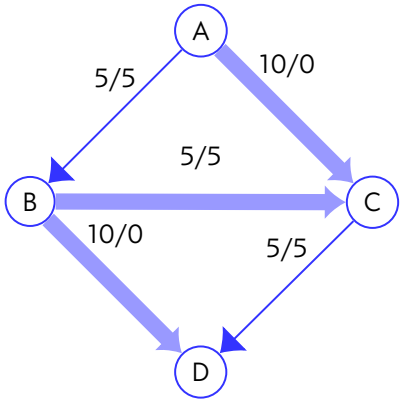

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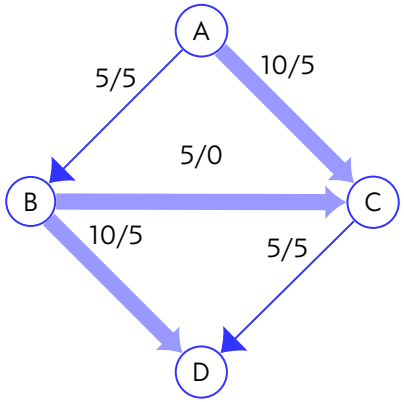

Implementation

```
0 // Stolen from Competitive Programming 3
1 // global variables
2 int res[MAX_V][MAX_V], mf, f, s, t;
3 vi p; // p stores the BFS spanning tree from s
4
5 // traverse BFS spanning tree from s->t
6 void augment(int v, int minEdge) {
7   if (v == s) {
8     f = minEdge;
9   return;
10  } else if (p[v] != -1) {
11    augment(p[v], min(minEdge, res[p[v]][v]));
12    res[p[v]][v] -= f;
13    res[v][p[v]] += f;
14 } }
```


Implementation, 2

```
0 mf = 0;
1 while (1) {// O(VE^2) (actually O(V^3 E) Edmonds Karp's algorithm
2   f = 0;
3   vi dist(MAX_V, INF); dist[s] = 0; queue<int> q; q.push(s);
4   p.assign(MAX_V, -1);
5   while (!q.empty()) {
6     int u = q.front(); q.pop();
7     if (u == t) break; // stop when we reach sink t
8     for (int v = 0; v < MAX_V; v++)
9       if (res[u][v] > 0 && dist[v] == INF)
10        dist[v] = dist[u] + 1, q.push(v), p[v] = u;  }
11  augment(t, INF);
12  if (f == 0) break; // we cannot send any more flow
13  mf += f;
14 }
```