Edmonds Karp Algorithm

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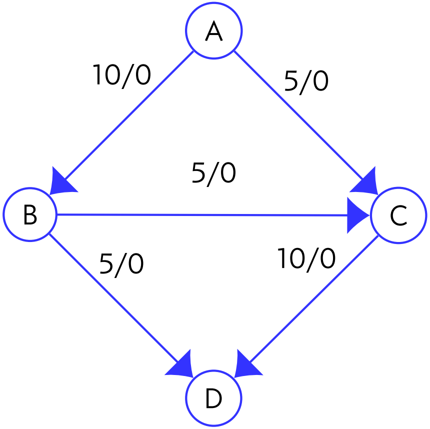
Objectives

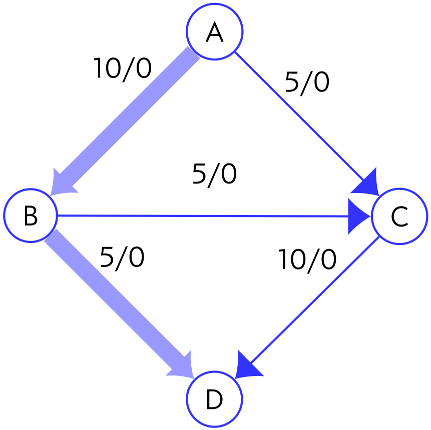
Your Objectives:

- Implement the Edmonds Karp algorithm for Network Flow

A simple example



A simple example



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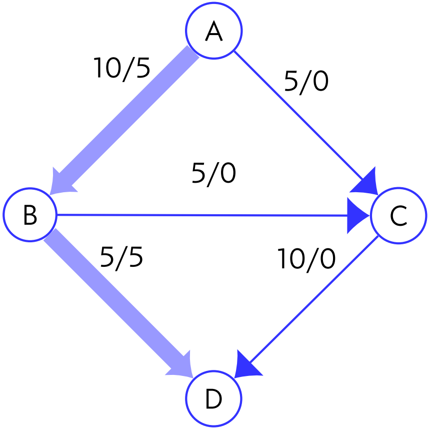
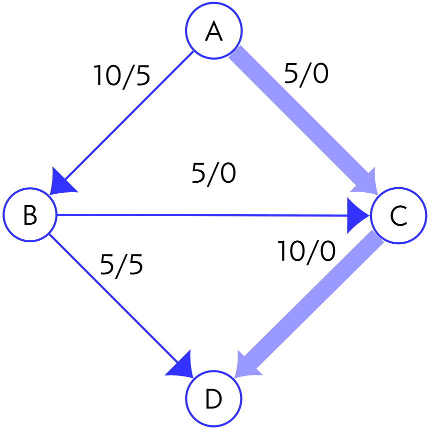


A simple example



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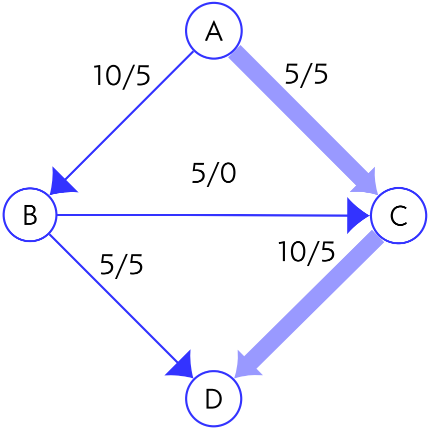

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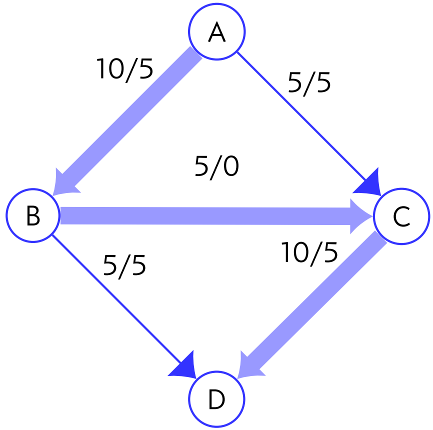

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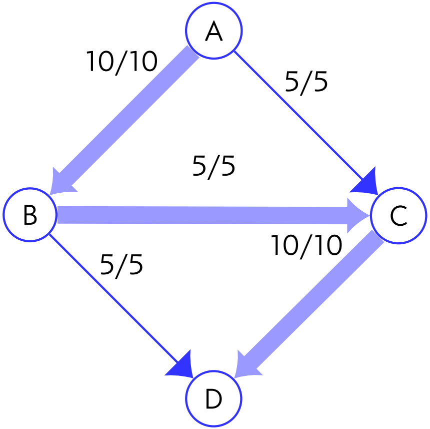
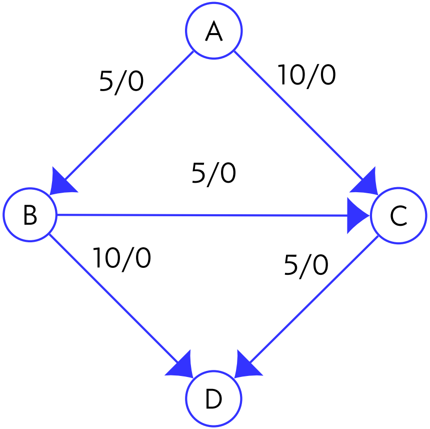


A second example



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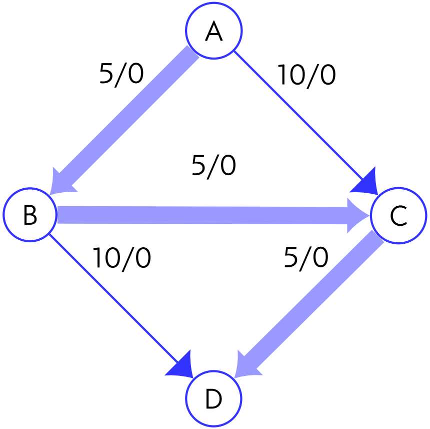

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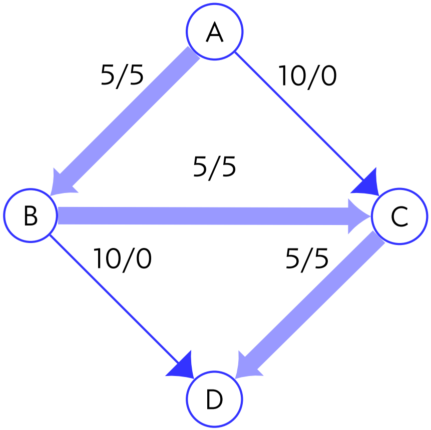

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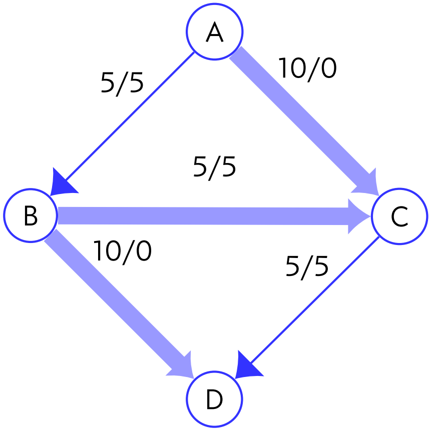

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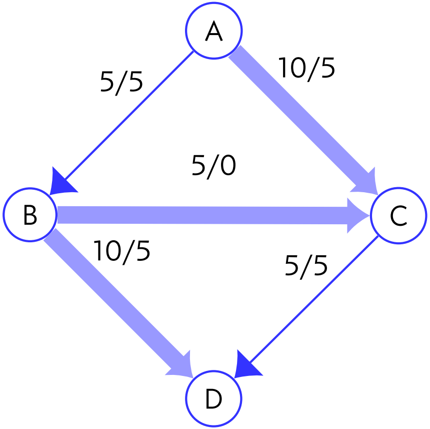

Implementation

```cpp
// Stolen from Competitive Programming 3
// global variables
int res[MAX_V][MAX_V], mf, f, s, t;
vi p; // p stores the BFS spanning tree from s

// traverse BFS spanning tree from s->t
void augment(int v, int minEdge) {
    if (v == s) {
        f = minEdge;
    return;
    } else if (p[v] != -1) {
        augment(p[v], min(minEdge, res[p[v]][v]));
        res[p[v]][v] -= f;
        res[v][p[v]] += f;
} }
```

Implementation, 2

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