MANIPAL UNIVERSITY
JAIPUR
(University under Section 2(f) of the UGC Act)

FIRST STATE PRIVATE UNIVERSITY IN RAJASTHAN
A+ NAAC
3.28 SCORE

B.TECH. SECOND YEAR

(III SEM. CSE/IT/CCE)

ACADEMIC YEAR: 2020-2021

COURSE NAME: ENGINEERING MATHEMATICS III

COURSE CODE : MA 2101

LECTURE SERIES NO : UNIT-III (LECTURE NO. 14- 22)

CREDITS : 3

MODE OF DELIVERY : ONLINE (POWER POINT PRESENTATION)

FACULTY : DR. REEMA JAIN

EMAIL-ID : reema.jain@jaipur.manipal.edu

PROPOSED DATE OF DELIVERY: August 17, 2020

MANIPAL UNIVERSITY
JAIPUR

VISION

Global Leadership in Higher Education and Human Development

MISSION

- Be the most preferred University for innovative and interdisciplinary learning
- Foster academic, research and professional excellence in all domains
- Transform young minds into competent professionals with good human values

VALUES

Integrity, Transparency, Quality,
Team Work, Execution with Passion, Humane Touch

SESSION OUTCOME

"TO UNDERSTAND THE CONCEPT OF TREES AND APPLY THE TREE ALGORITHMS TO ANALYZE THE SHORTEST PATH PROBLEMS"

ASSIGNMENT

QUIZ

MID TERM EXAMINATION –I & II

END TERM EXAMINATION

ASSESSMENT CRITERIA

PROGRAM OUTCOMES MAPPING WITH CO3

PO1

ENGINEERING KNOWLEDGE: APPLY THE KNOWLEDGE OF MATHEMATICS, SCIENCE, ENGINEERING FUNDAMENTALS, AND AN ENGINEERING SPECIALIZATION TO THE SOLUTION OF COMPLEX ENGINEERING PROBLEMS.

Approach of Dijkstra's Algorithm

- The algorithm computes for each vertex u the distance to u from the start vertex v, that is, the weight of a shortest path between v and u.
- The algorithm keeps track of the set of vertices for which the distance has been computed, called the cloud C.
- Every vertex has a label D associated with it. For any vertex u, D[u] stores an approximation of the distance between v and u. The algorithm will update a D[u] value when it finds a shorter path from v to u.
- When a vertex u is added to the cloud, its label D[u] is equal to the actual (final) distance between the starting vertex v and vertex u.

Dijkstra's Algorithm Pseudocode

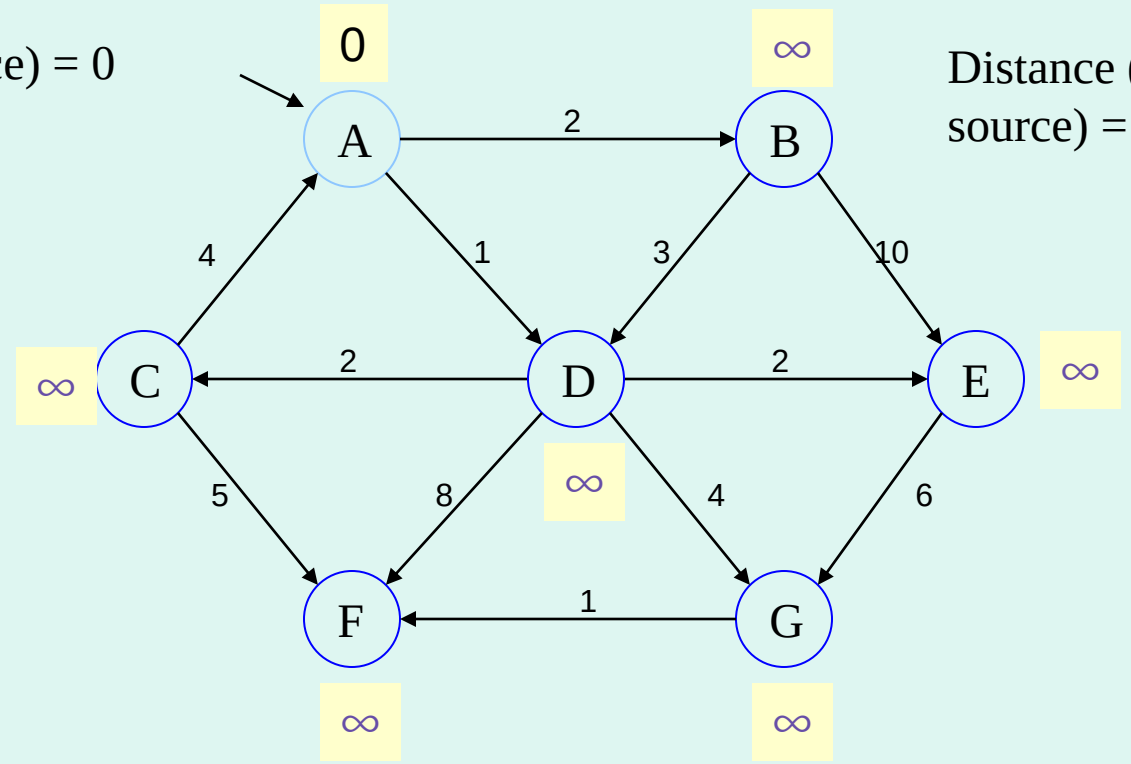
```
Dijkstra(v1, v2):
    for each vertex v:                          // Initialization
        v's distance := infinity.
        v's previous := none.
    v1's distance := 0.
    List := {all vertices}.

    while List is not empty:
        v := remove List vertex with minimum distance.
             mark v as known.
        for each unknown neighbor n of v:
            dist := v's distance + edge (v, n)'s weight.

            if dist is smaller than n's distance:
                n's distance := dist.
                n's previous := v.

    reconstruct path from v2 back to v1,
    following previous pointers.
```

Example: Dijkstra's Algorithm

- Initialization

Distance(source) = 0

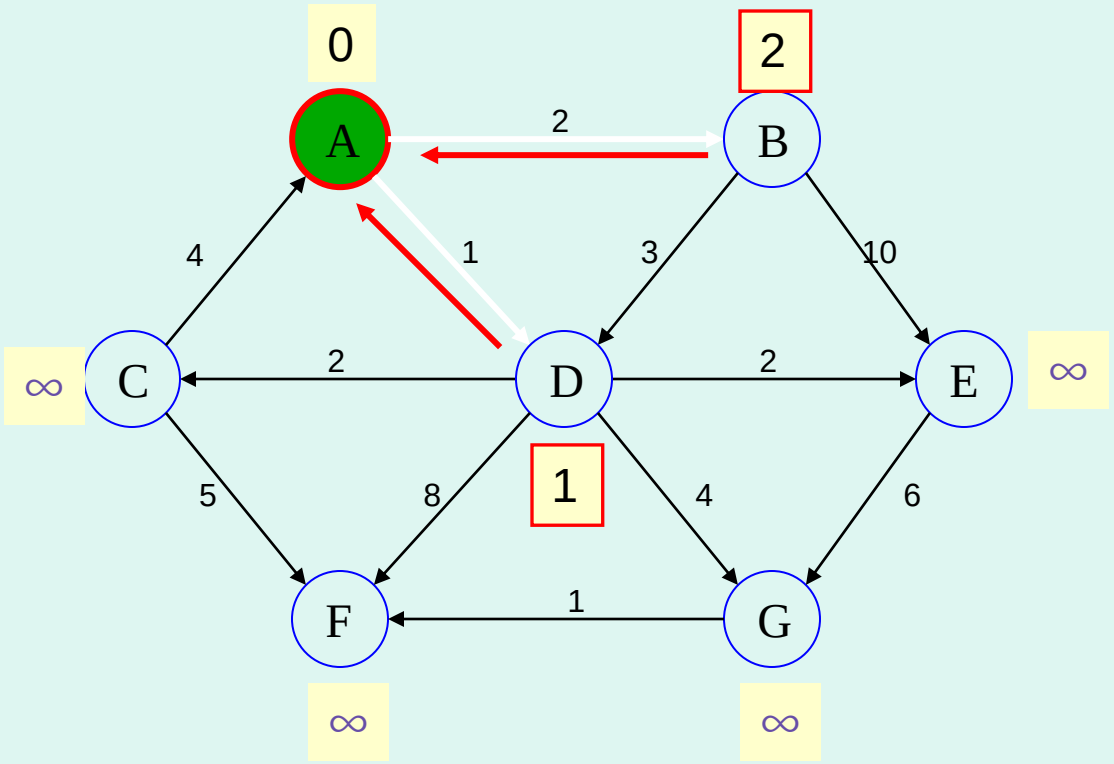
Distance (all vertices but source) = ∞



Pick vertex in List with minimum distance

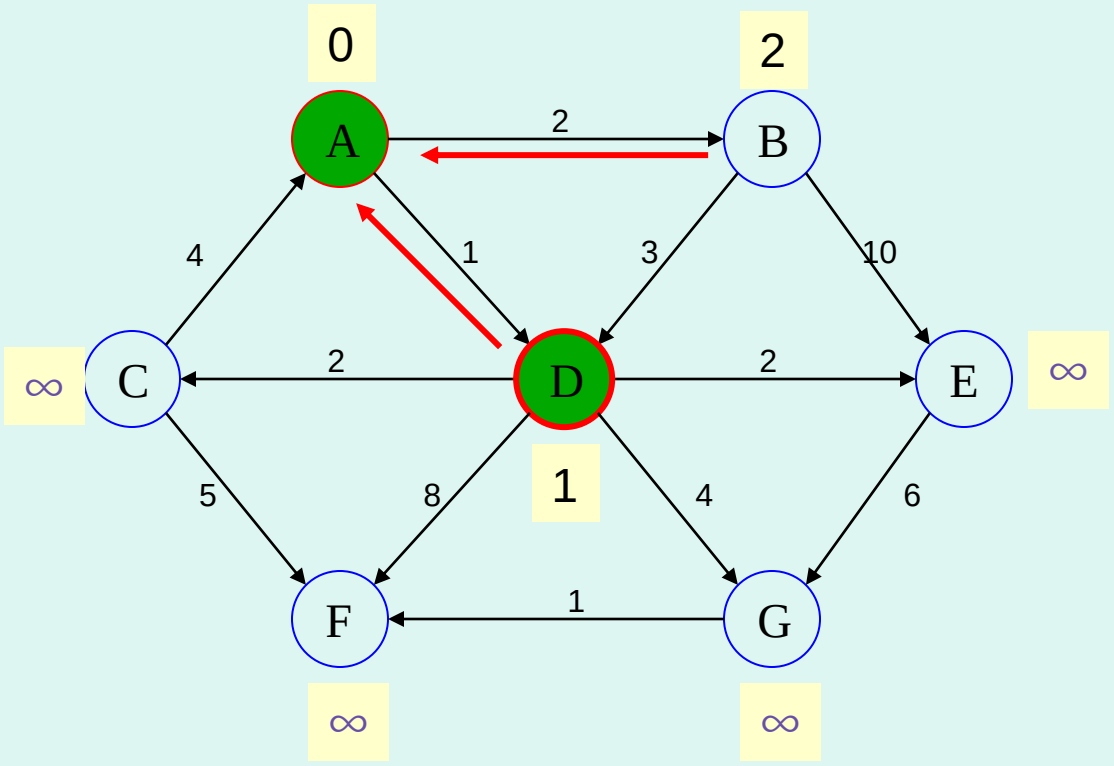
Example: Dijkstra's Algorithm

- Update neighbours' distance



Example: Dijkstra's Algorithm

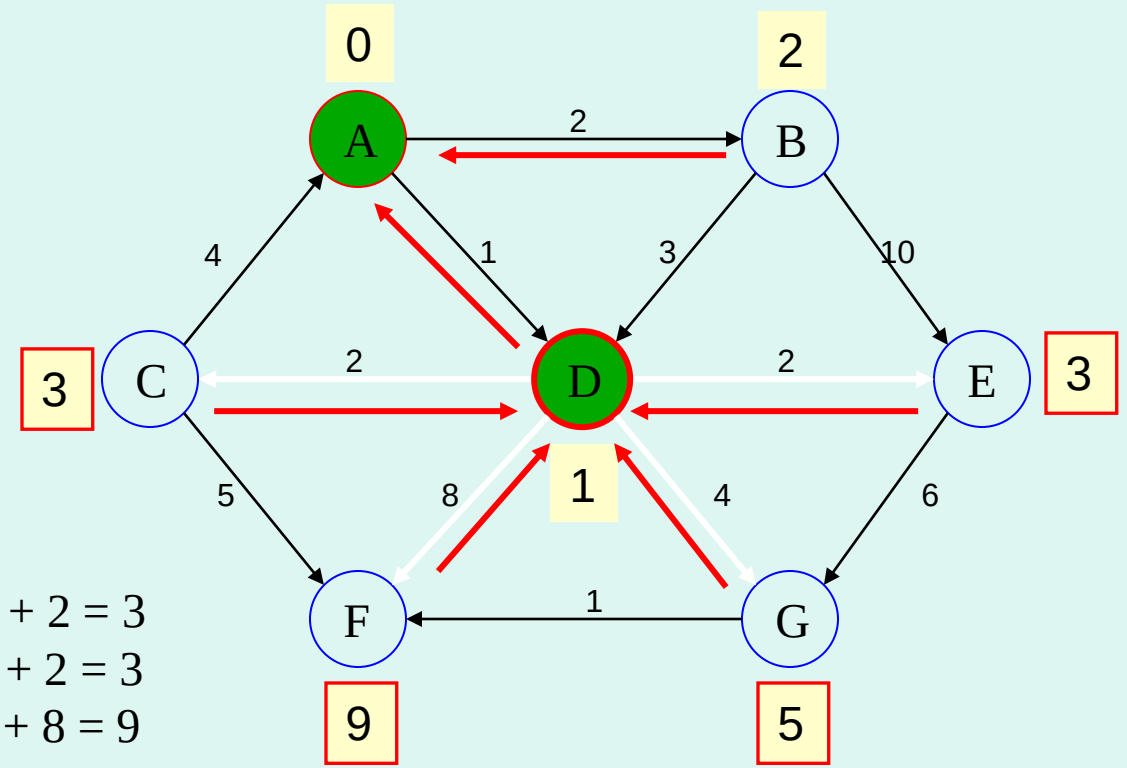
- Remove vertex with minimum distance



Pick vertex in List with minimum distance i.e. D

Example: Dijkstra's Algorithm

- Update neighbors



Distance(C) = 1 + 2 = 3
Distance(E) = 1 + 2 = 3
Distance(F) = 1 + 8 = 9
Distance(G) = 1 + 4 = 5

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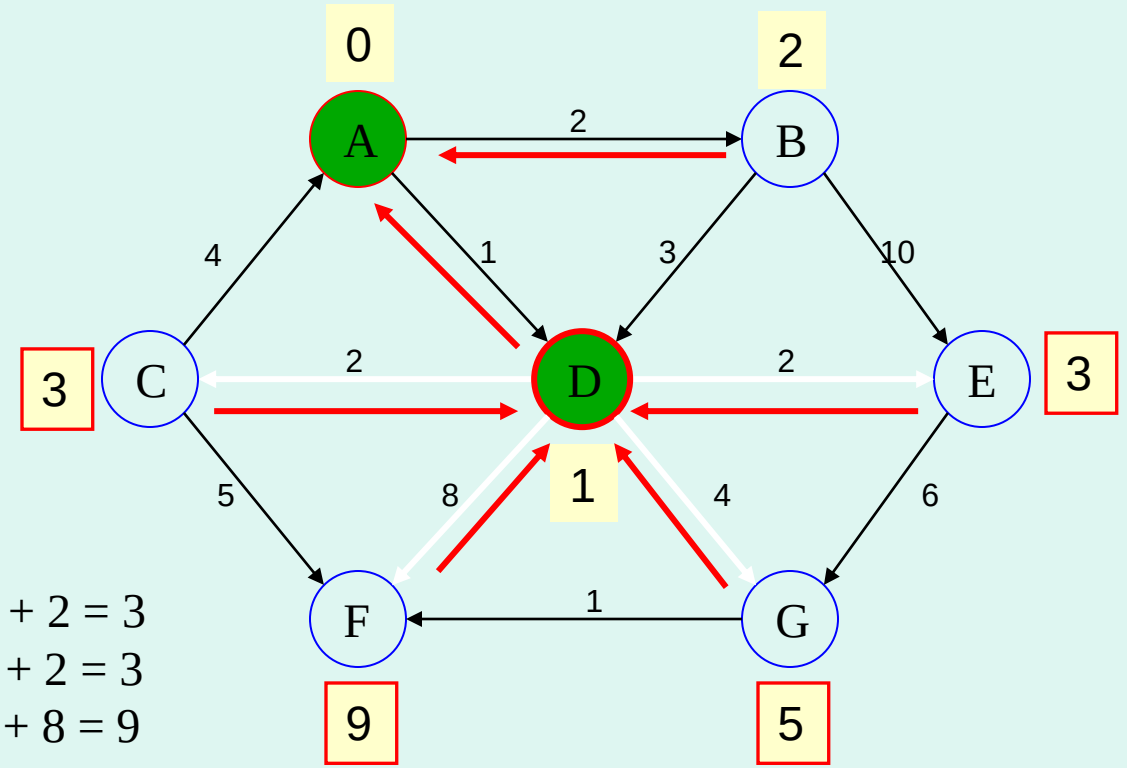
Example: Dijkstra's Algorithm

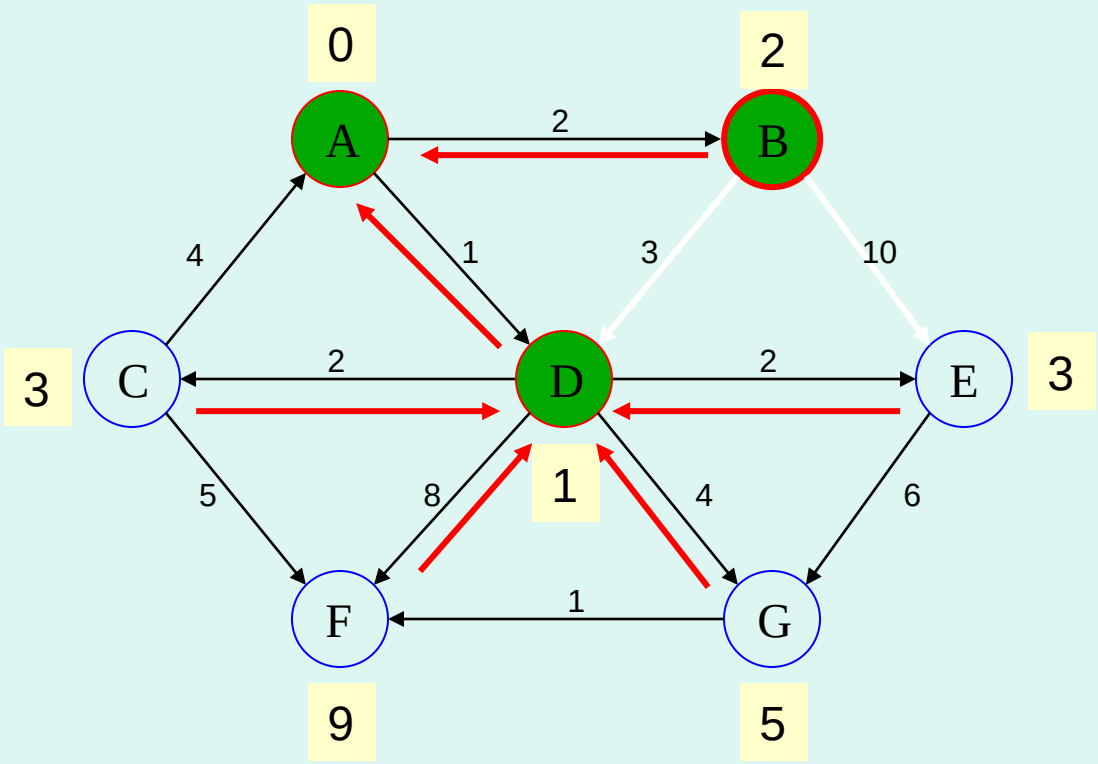
- Update neighbors



Distance(C) = 1 + 2 = 3
Distance(E) = 1 + 2 = 3
Distance(F) = 1 + 8 = 9
Distance(G) = 1 + 4 = 5

Example: Dijkstra's Algorithm

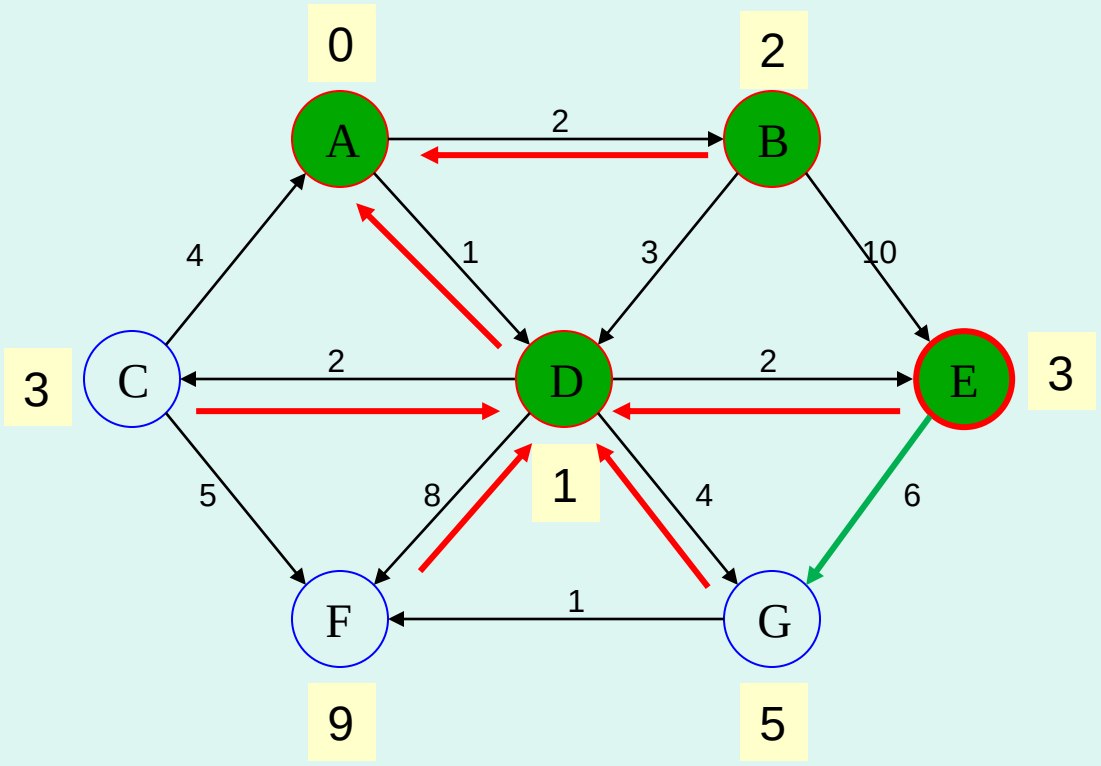
- Pick vertex in List with minimum distance (B) and update neighbors



Note : distance(D) not updated since D is already known and distance(E) not updated since it is larger than previously computed

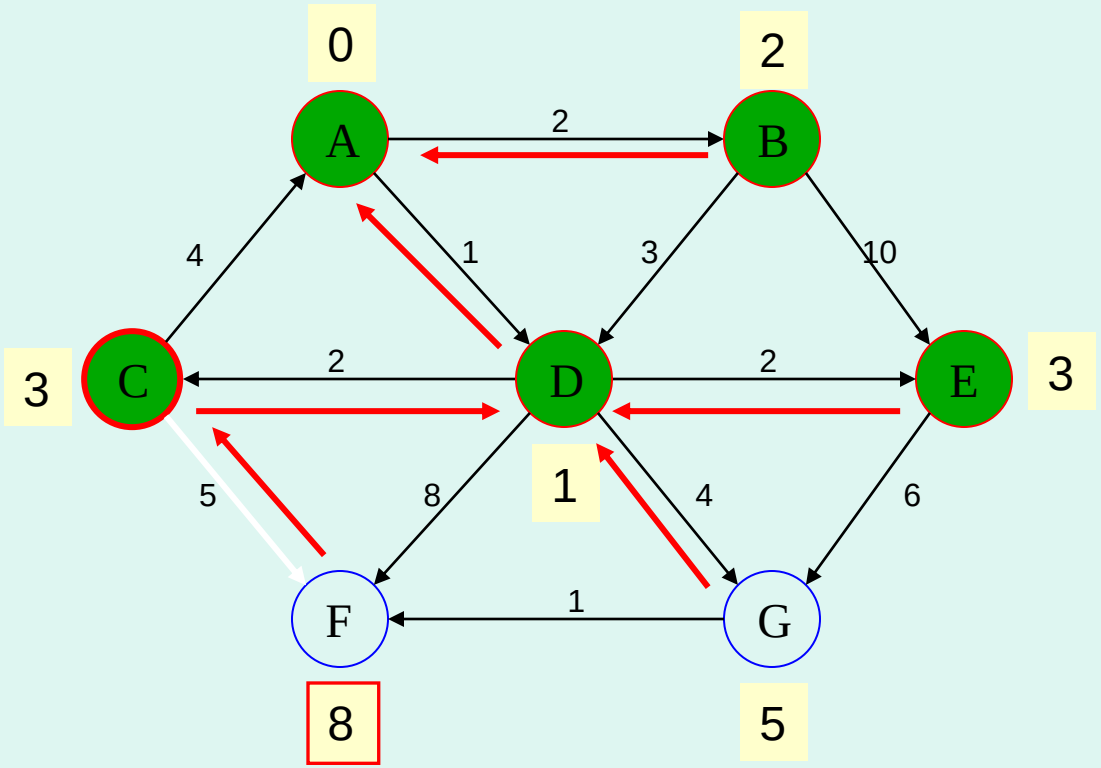
Example: Dijkstra's Algorithm

Pick vertex List with minimum distance (E) and update neighbors



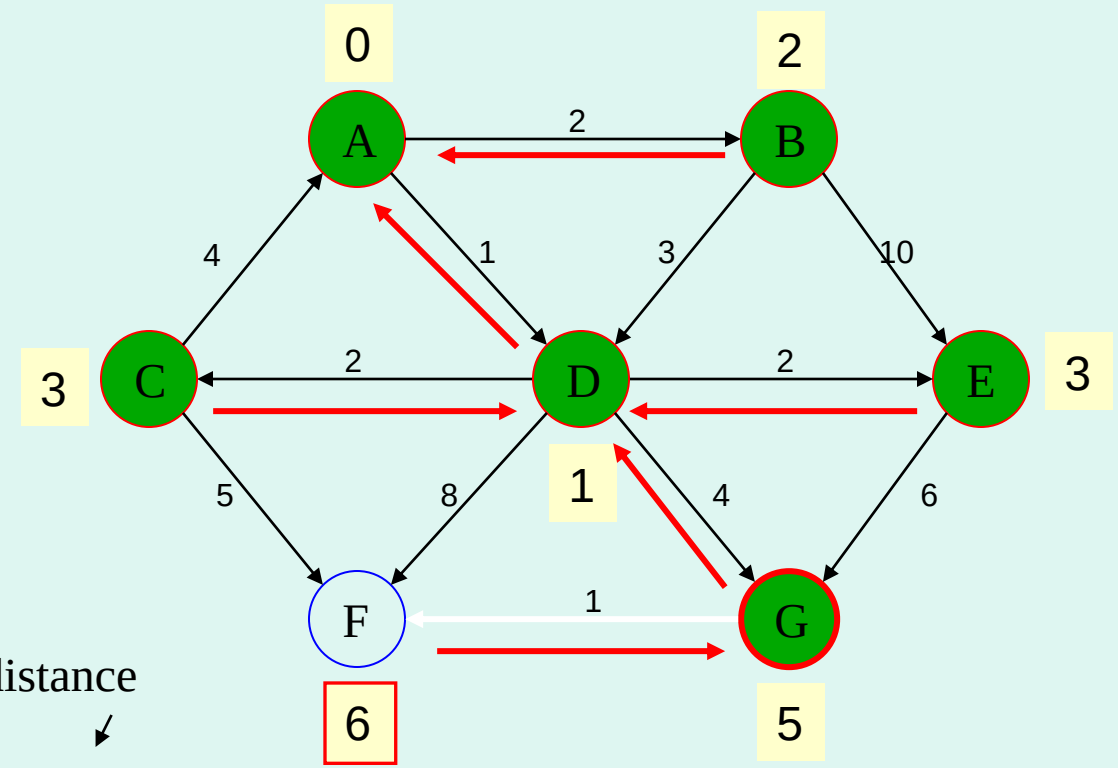
Example: Dijkstra's Algorithm

Pick vertex List with minimum distance (C) and update neighbors



Example: Dijkstra's Algorithm

Pick vertex List with minimum distance (G) and update neighbors

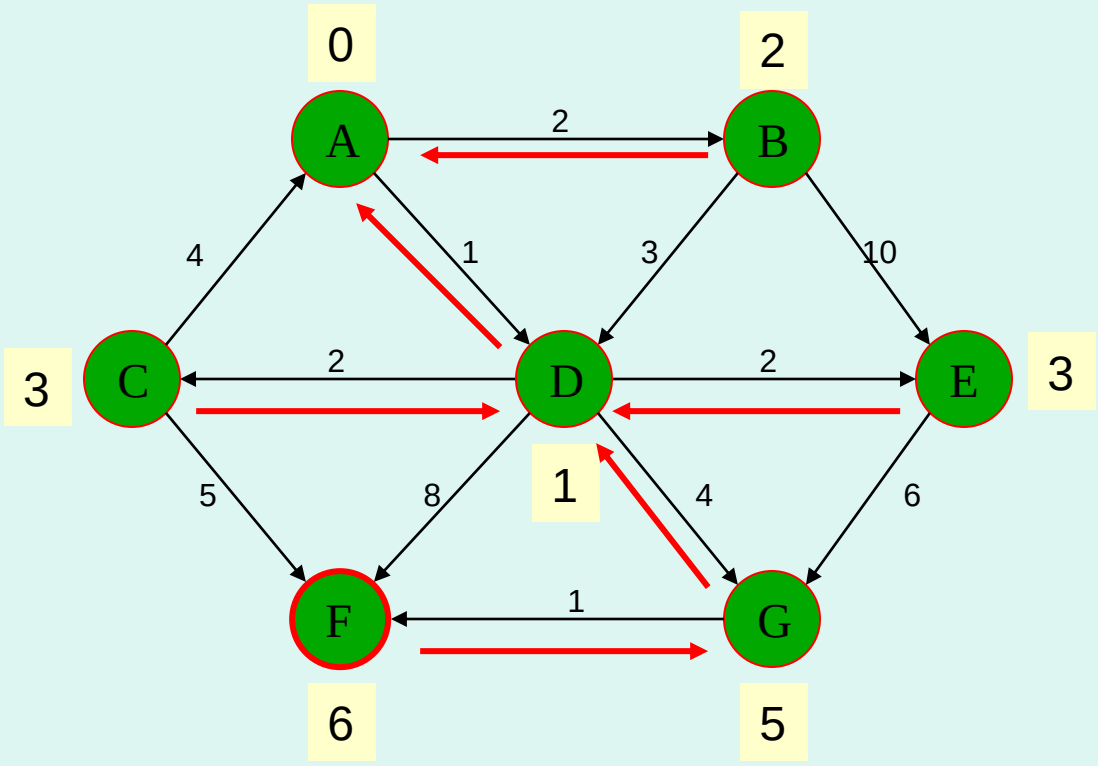


Previous distance

Distance(F) = min (8, 5+1) = 6

Example: Dijkstra's Algorithm

- Example (end)



Pick vertex not in S with lowest cost (F) and update neighbors

THANK YOU