



INFORMATICS  
INSTITUTE OF  
TECHNOLOGY

## CM 2602 - Artificial Intelligence

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SOLVING PROBLEMS BY SEARCHING  
INFORMED SEARCH

# What is Informed (Heuristic) Search?

- Informed (Heuristic) search strategies use problem-specific knowledge beyond the definition of the problem itself.
- Informed search can find solutions more efficiently than an uninformed strategy.
- It can solve much complex problems which could not be solved in another way.

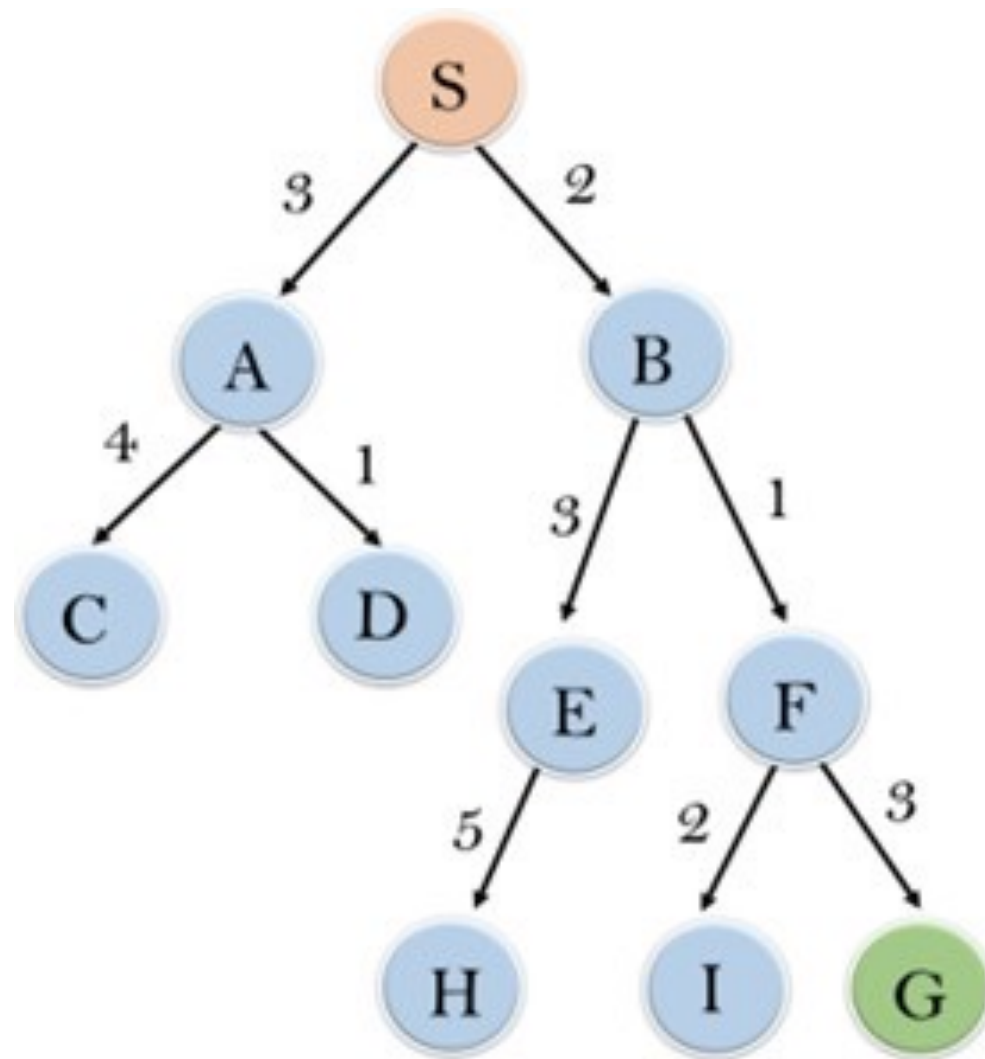
# Types of Informed Search

- Best First Search
- A\* Search

# Best First Search (Greedy Search)

- It always selects the path which appears best at the moment.
- It is a combination of Depth First Search (DFS) and Breadth First Search (BFS).
- It uses the heuristic function  $h(n) \leq h^*(n)$ .
  - $h(n)$  = Heuristic Cost
  - $h^*(n)$  = Cost
  - If  $n$  is a goal node,  $h(n) = 0$

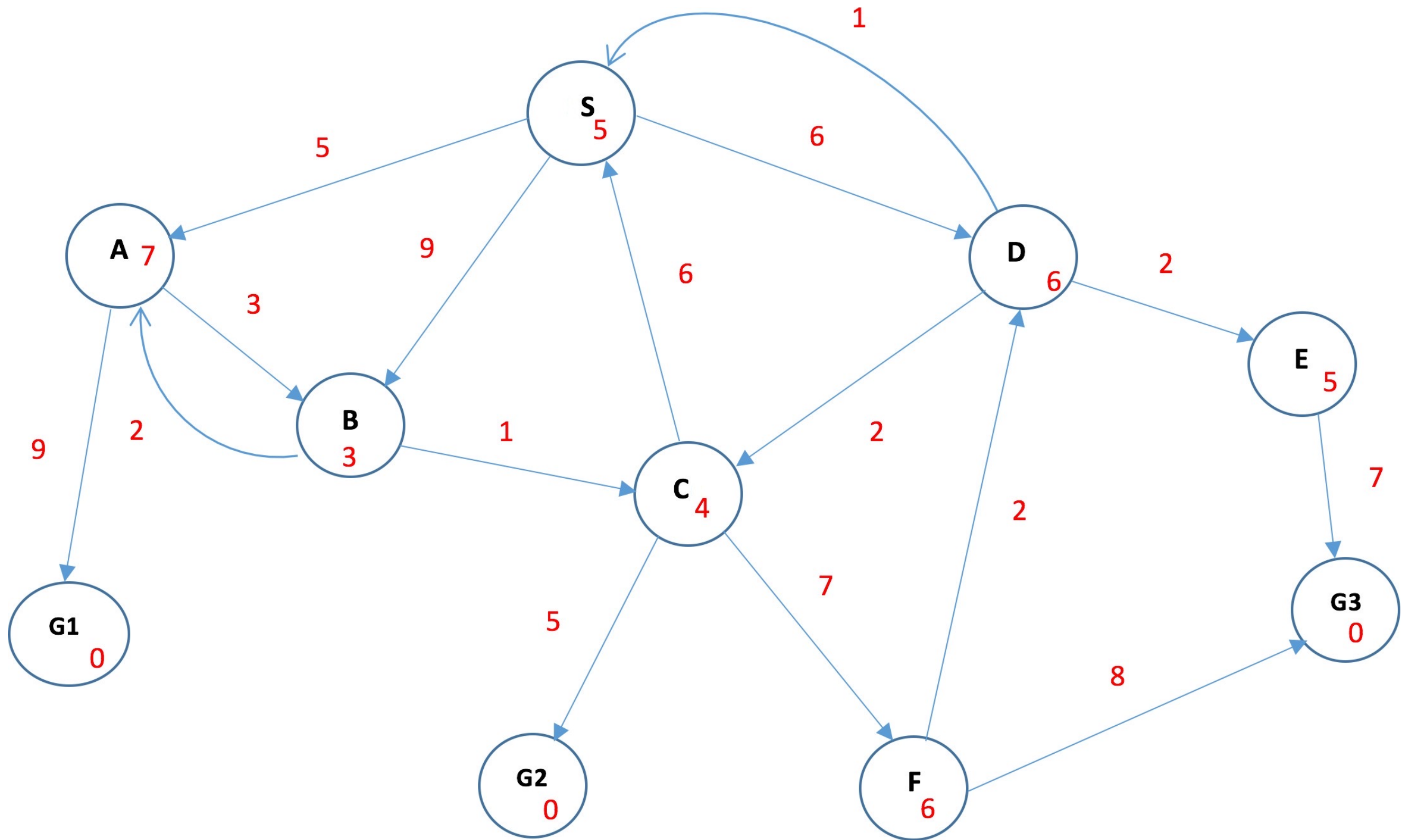
# Best First Search - Example



node	H (n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
S	13
G	0

\* Only uses heuristic value while traversal

# Best First Search - Example



# Best First Search

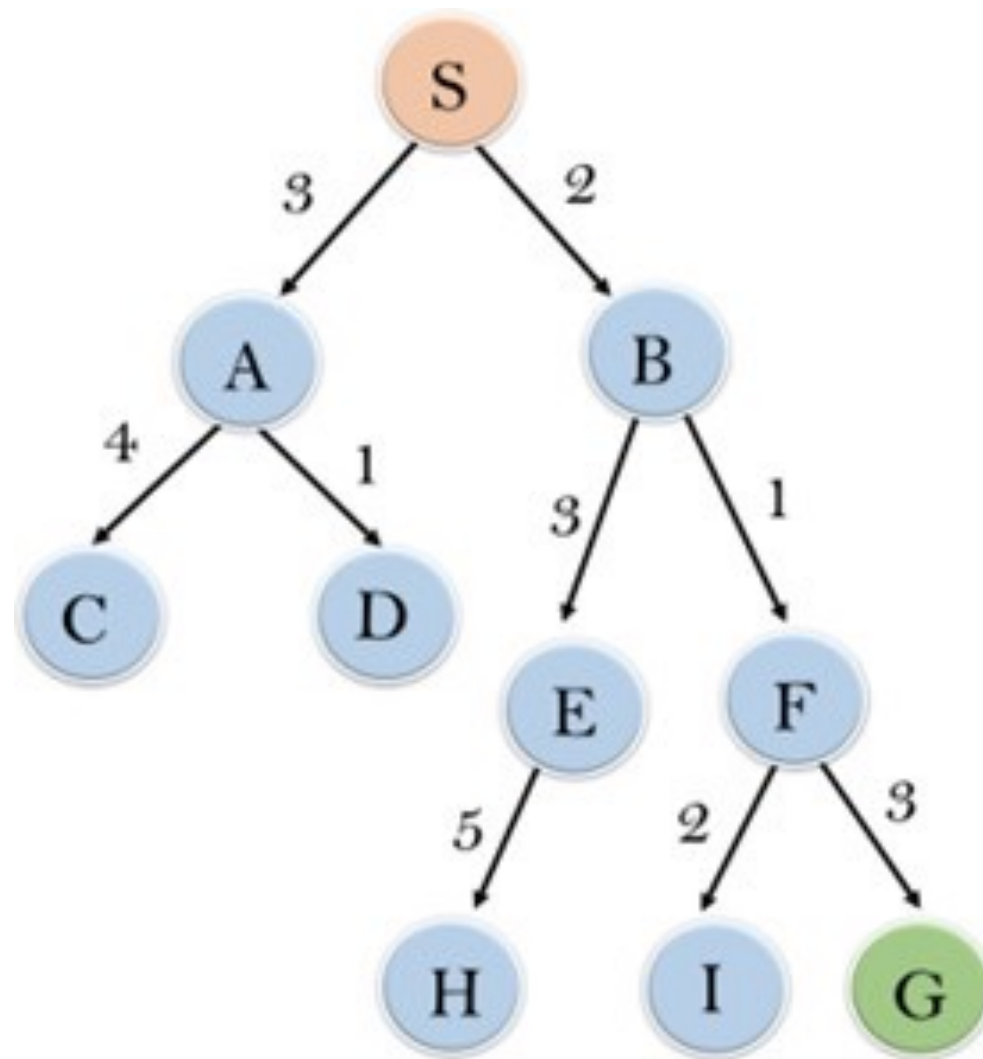
- Pros:
  - Efficient than BFS and DFS
- Cons:
  - Might lead to infinite loops
  - Not optimal

# A\* Search

- A\* search finds the shortest path using heuristic function ( $h(n)$ ) and the cost to reach the node  $n$  ( $g(n)$ ).
- It is similar to Uniform Cost Search except that it uses  $g(n) + h(n)$  instead of  $g(n)$ .
- A\* Score ( $n$ ) =  $g(n) + h(n)$



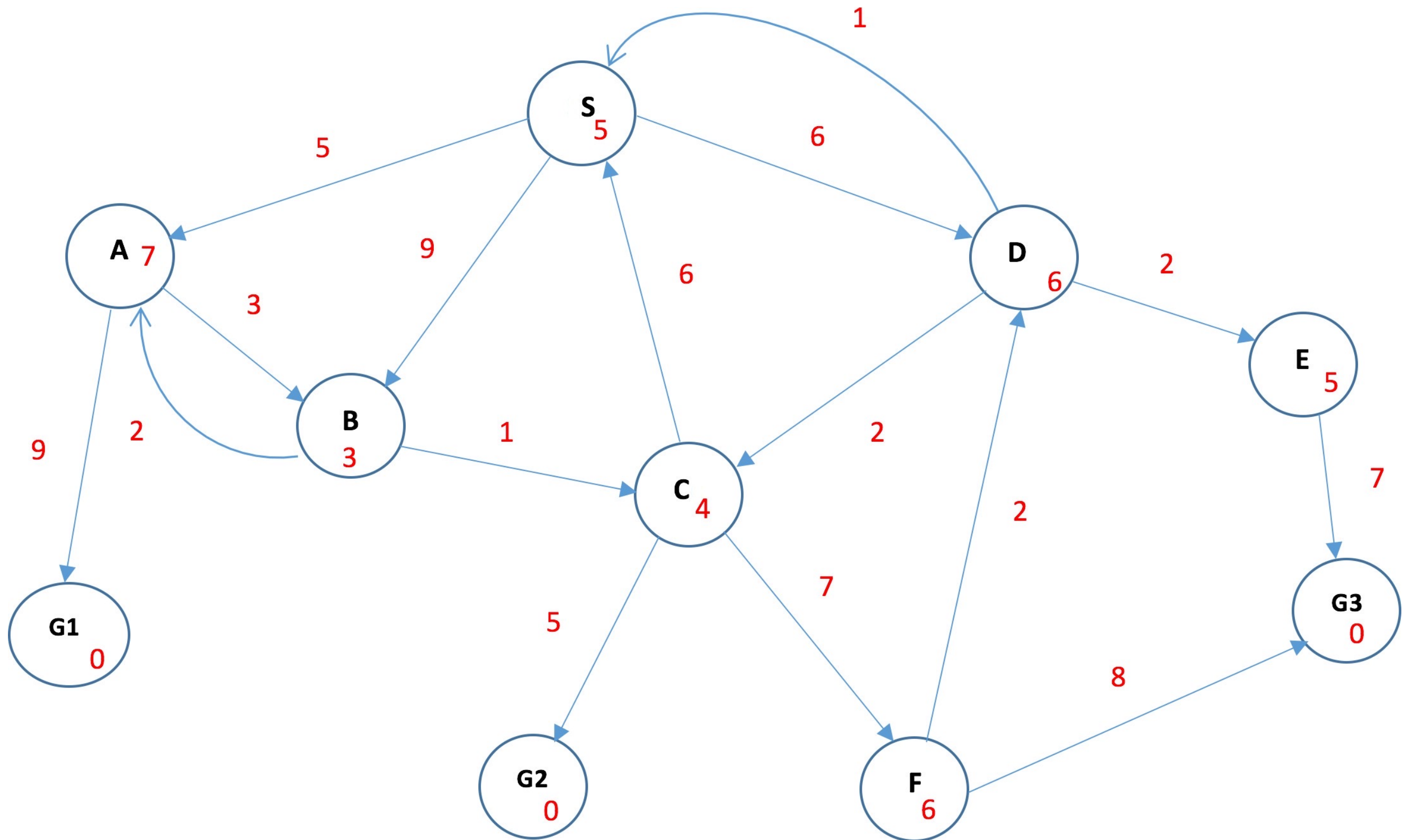
# A\* Search - Example



node	H (n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
S	13
G	0

\* Uses the sum of actual path cost and the heuristic value while traversal

# A\* Search - Example



# A\* Search

- Pros:
  - It is optimal and complete
  - It can solve very complex problems.
- Cons:
  - It does not always produce shortest path
  - Not practical for large scale problems