Chapter 5:

Method of Information Search

Information searches

* Depth Limited, Limited Threshold.
  Climbing the Hill.
  First, the better.
  Branch and Bound.
  A *.

Information searches

* This search, also called heuristic search, expert rules, empirical, experimental to streamline the search engines.
  They are guesses or assumptions.
  Not have to guarantee optimality.
  Must work well in several problems.
  Can fail.

Función Heurística

Definition:

Π is a problem of artificial intelligence and its state space E, a function that associates each state of E a real number, that is:

$f: E \rightarrow R$

Is called heuristic function associated with Π.

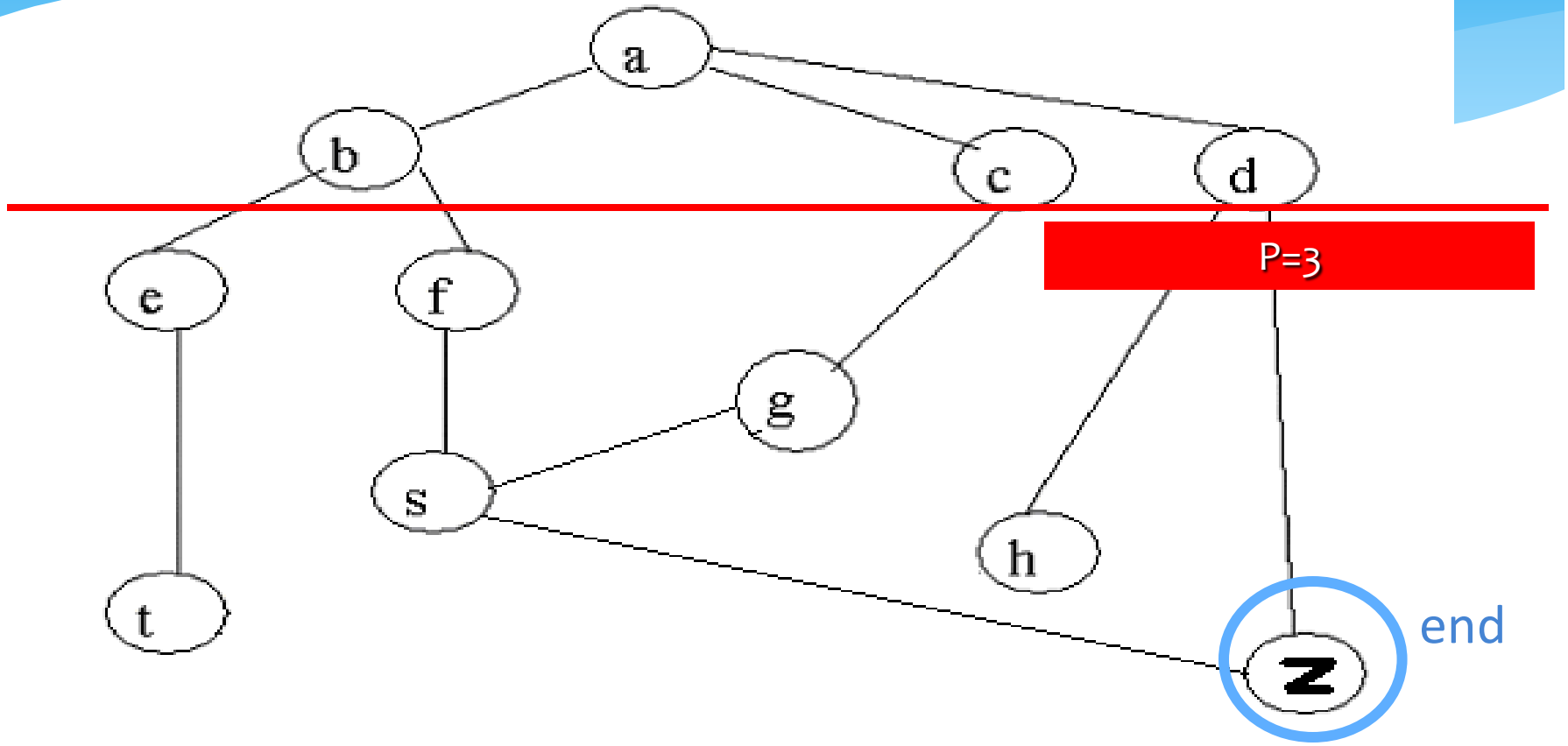
Depth Limited Search

* Your search is not necessary for states based heuristics.
* This search assumes that the path to the goal state is not too long, ifexploring the way it is, then you try to get another way.
* For this there is a depth limit.

Depth Limited Search

- It has only one road
- If the current state is the goal: FIN.
- If it is not:
- - If the depth is less than P, take the first road and continue the search.
- -But, to finished searching for that branch.
- Includes the ability to retract.

Depth Limited Search



P =3, travel:a,b,e,f,c,g,d,h,z road:a,d,z

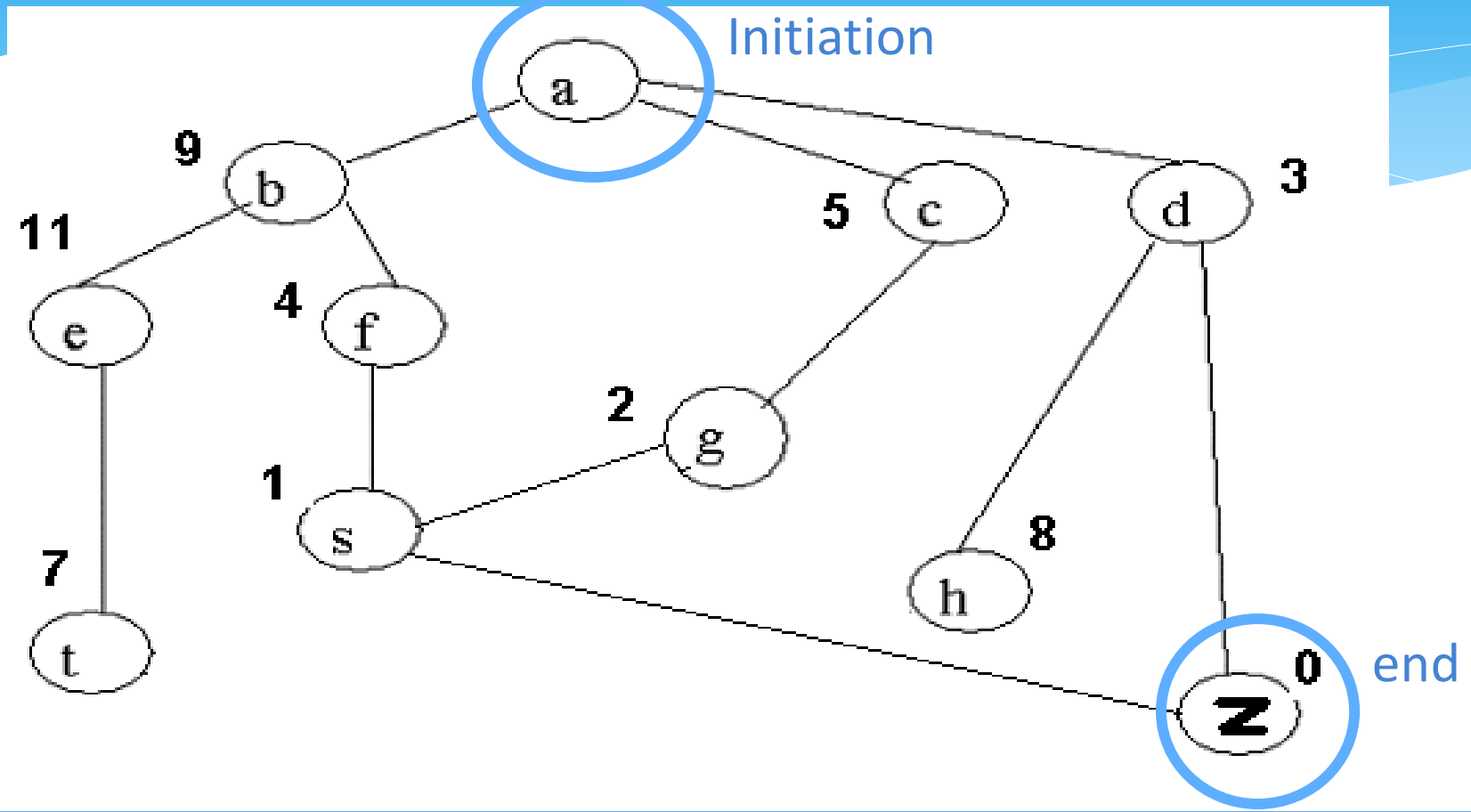
Threshold Limited Search

* This search is used when a function is defined heuristics states that give an estimate of its quality (proximity to the target).
* This search assumes that if the current node is very bad, then thatroad leads to the goal, therefore go another way.

Threshold Limited Search

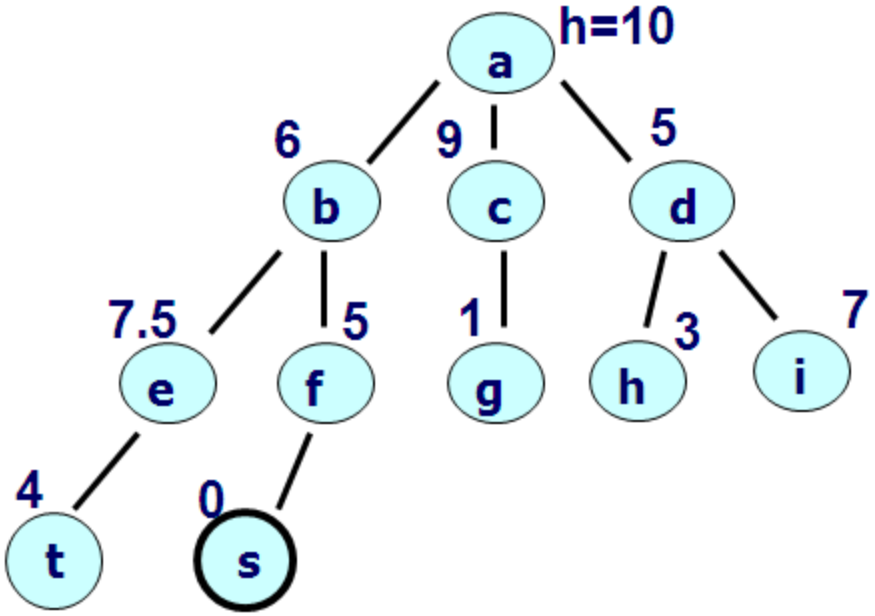
- It has only one road
  Each node has a heuristic value Rico.
  If the current state is the goal: FIN.
  If it is not:
  - If the node heuristic is less than U, take the first road and continuethe search.
  -But, to finished searching for that branch.
  Includes the ability
  to retractarseBúsqueda Threshold Limited.

Threshold Limited Search



U=6, Travel:a,b,c,g,s,z road:a,c,g,s,z

Threshold Limited Search



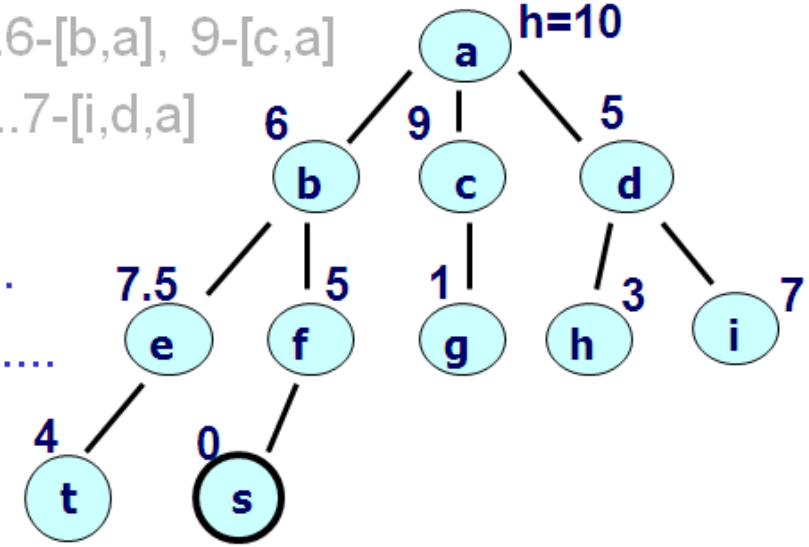
- threshold=6.5 Sequence: a, b, e, f, **s.**
- threshold=5.5 Sequence: a, b, c, d, h, i X

Hill Climbing Method

* It's similar to depth-first search with the difference that the successor nodes are ordered from best to worst value of merit function beforeadded to the list LE.
  That is, the node shall be processed according to the merit functionto the "best" successor node.

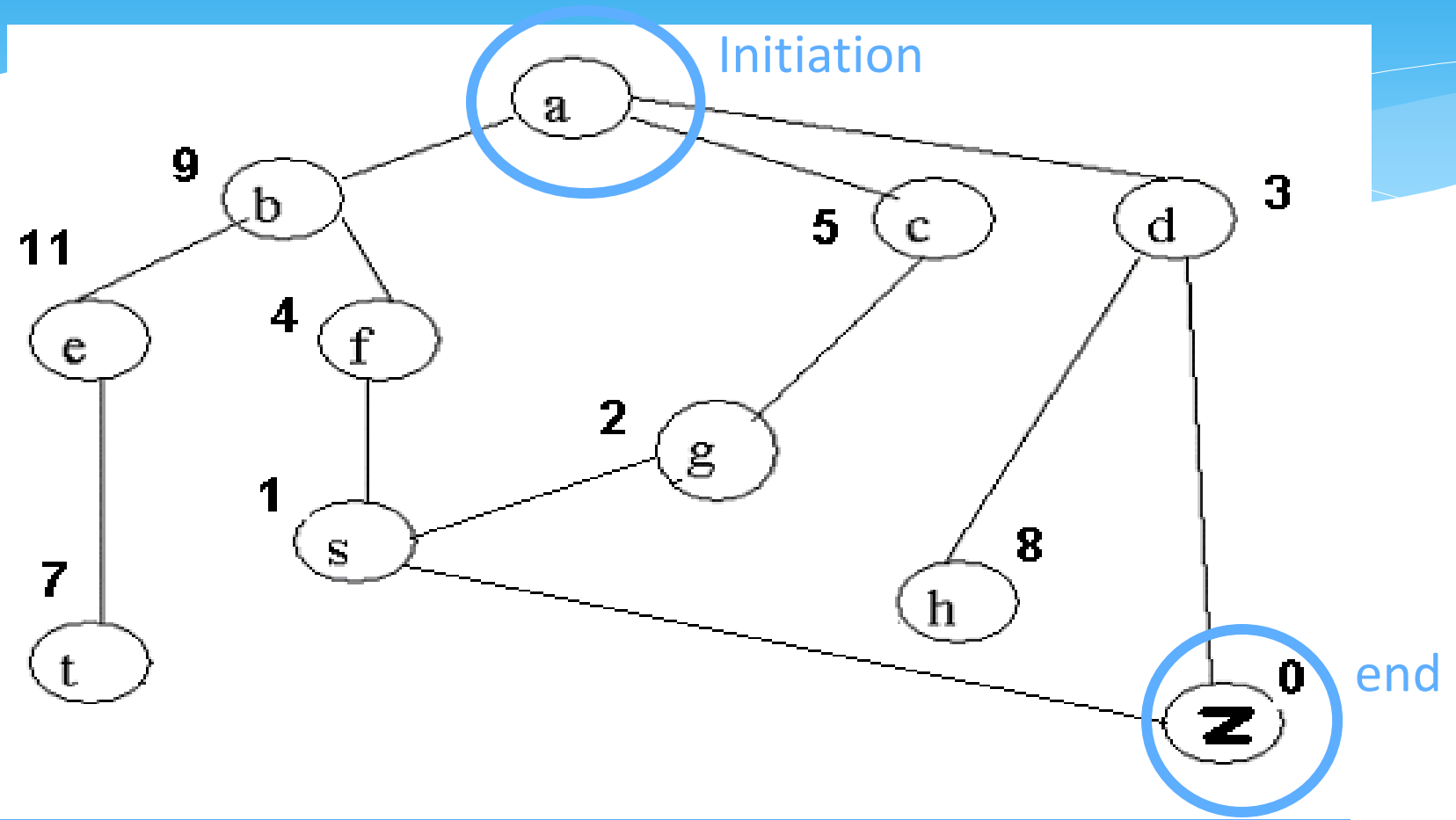
Hill Climbing Method

1. 10-[a]
2. 5-[d,a] ...6-[b,a], 9-[c,a]
3. 3-[h,d,a] ...7-[i,d,a]
4. 6-[b,a].....
5. 5-[f,b,a].....
6. 0-[s,f,b,a].....



[heuristica-[sucesor, expandido]]

Hill Climbing Method



travel:a,d,z Sequence:a,d,z

First the Best Method

- In this method the selection criterion is given by the LE node havingthe "best" (higher or lower) value of the merit function.
- The successor nodes and depth will be recorded at the beginning ofLE
- They can also be recorded at the end, as the selection criterion does not depend on the order as recorded successors.

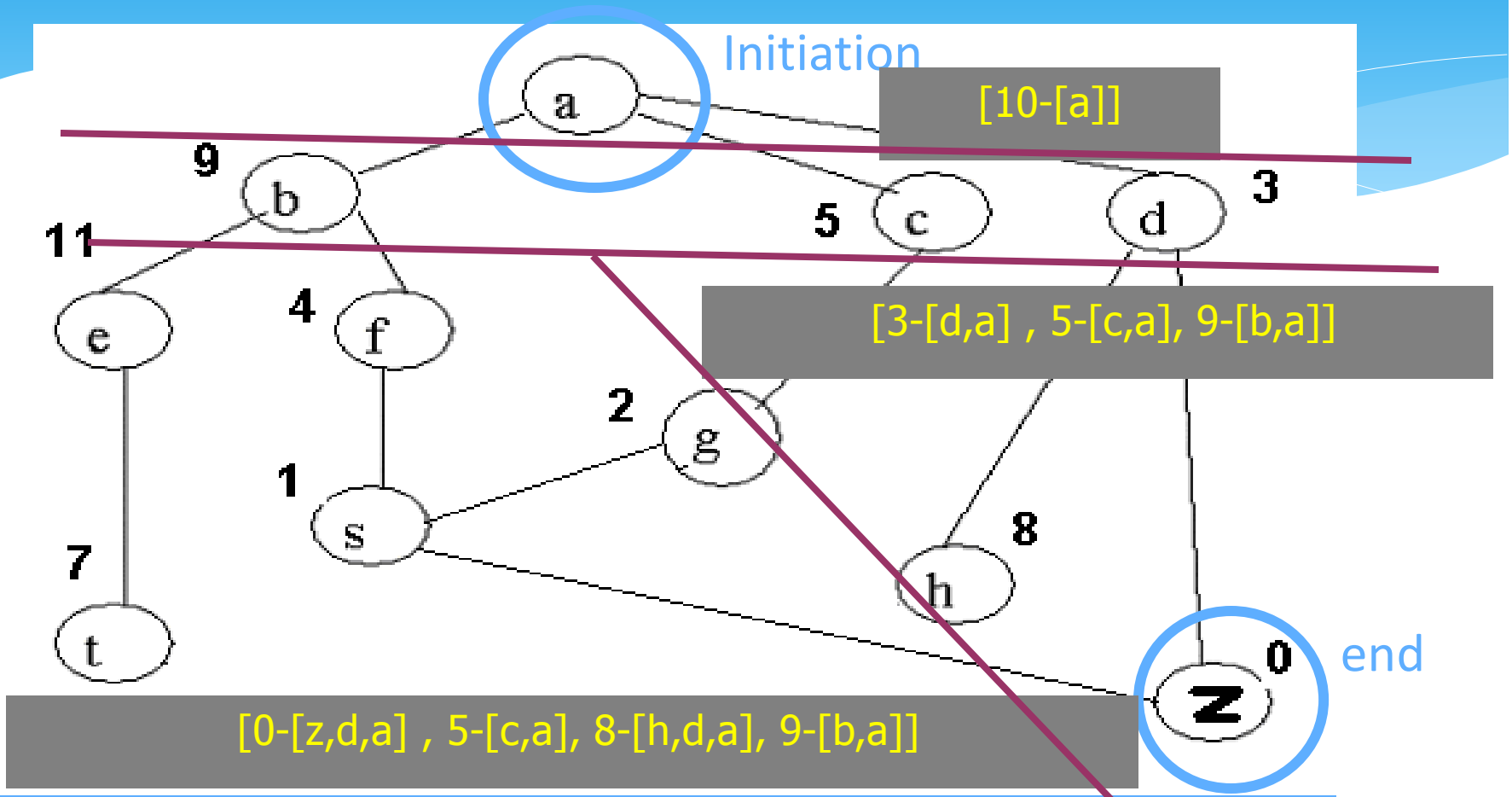
First the Best Method

* There is control of all terminal states and their heuristics.
* Take the state of best value among all states terminals.
* Amplitude are generated in all states children of the state of best value.
* Compare paths of different lengths.

First the Best Method

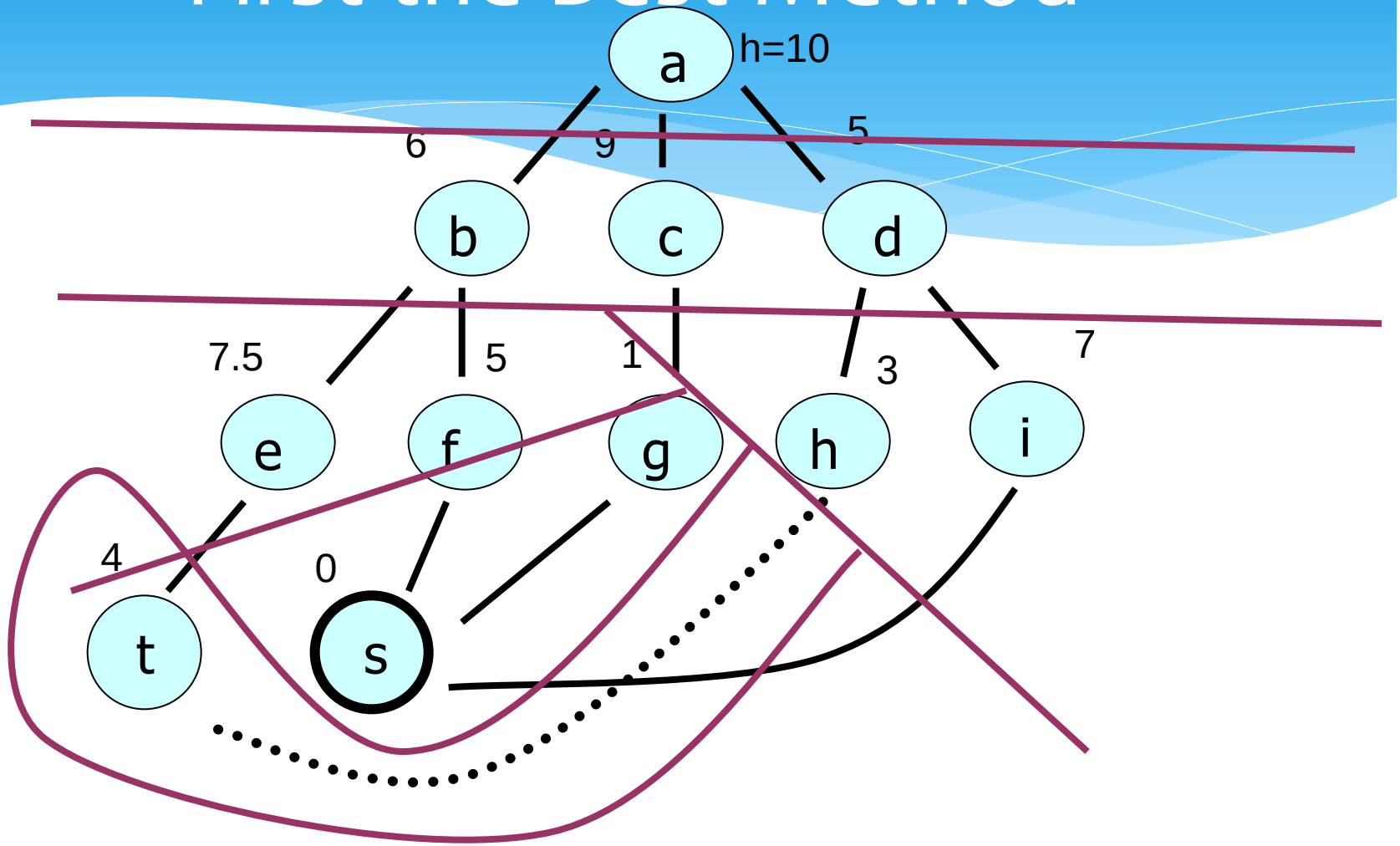
- They take several paths.
  Each node has a heuristic value Rico.
  If any of the current state is the goal: FIN.
  If none is:
  - Train all new roads (adding a path) from the best of the current nodes (less heuristic) and continue the search.
  No need possibility to withdraw.

First the Best Method



travel:a,b,c,d,h,z road:a,d,z

First the Best Method



sequence: a,b,c,d,h,i,t,e,f,s

Branch and Bound

* The process of generating the successor nodes of a node of a tree is called Branching.
* For example all searches blind and those who use information are methods of branching.
* The simplification process of the search by pruning tree branchesthat have been worst solutions is called dimensioning
* process.

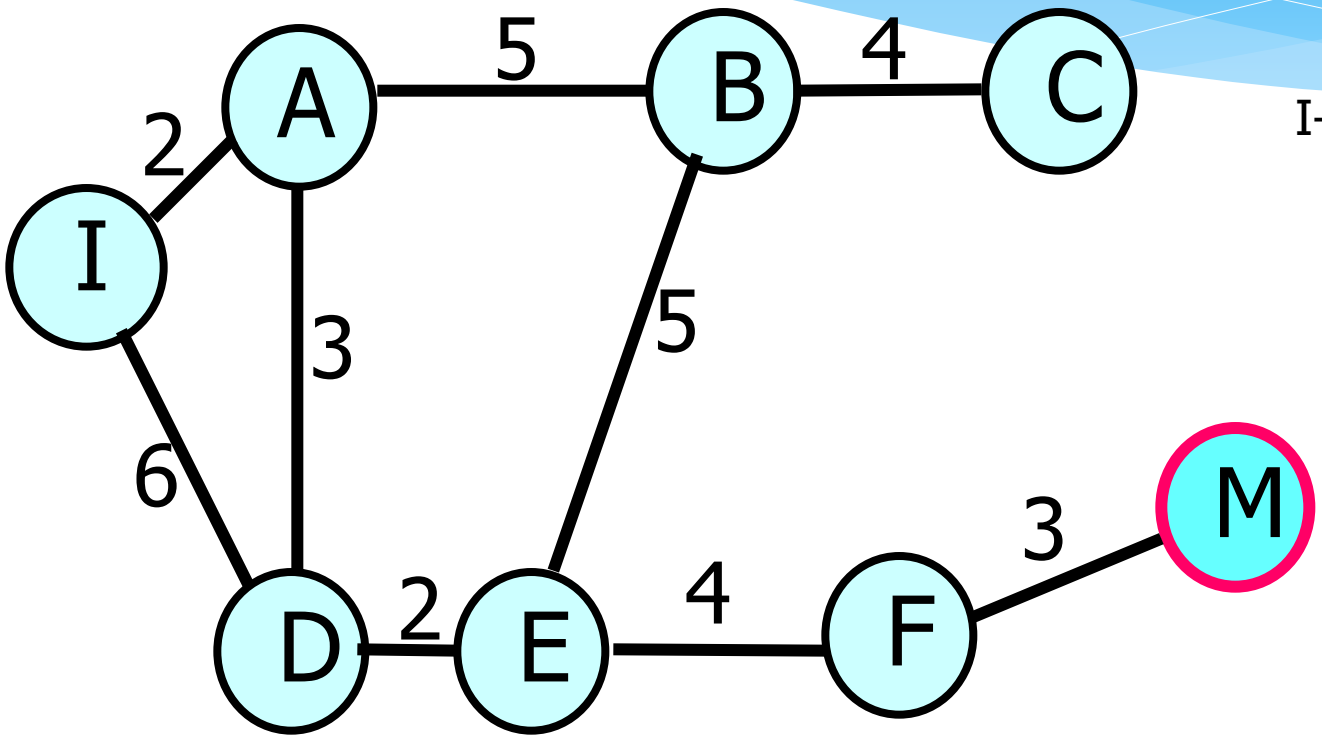
Branch and Bound

Update the dimension.

It is called the node bound to each value of the heuristic functionassociated with each processed state.

If in the process generates a branching node, and processing and better value than the dimension heuristic function associated with this, then the height of this node will not be updated by the function value heuristic.

Branch and Bound



Route

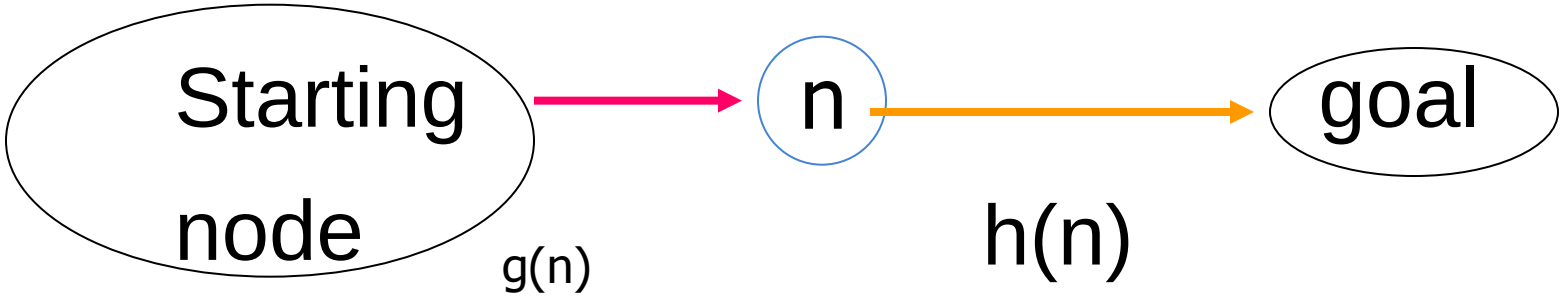
I-D-E-F-M=15

Algorithm A *

* This algorithm tries to avoid expanding paths that have already accumulated a high cost.
  Similar to the first method better.
  Consider what it cost to get the current node.

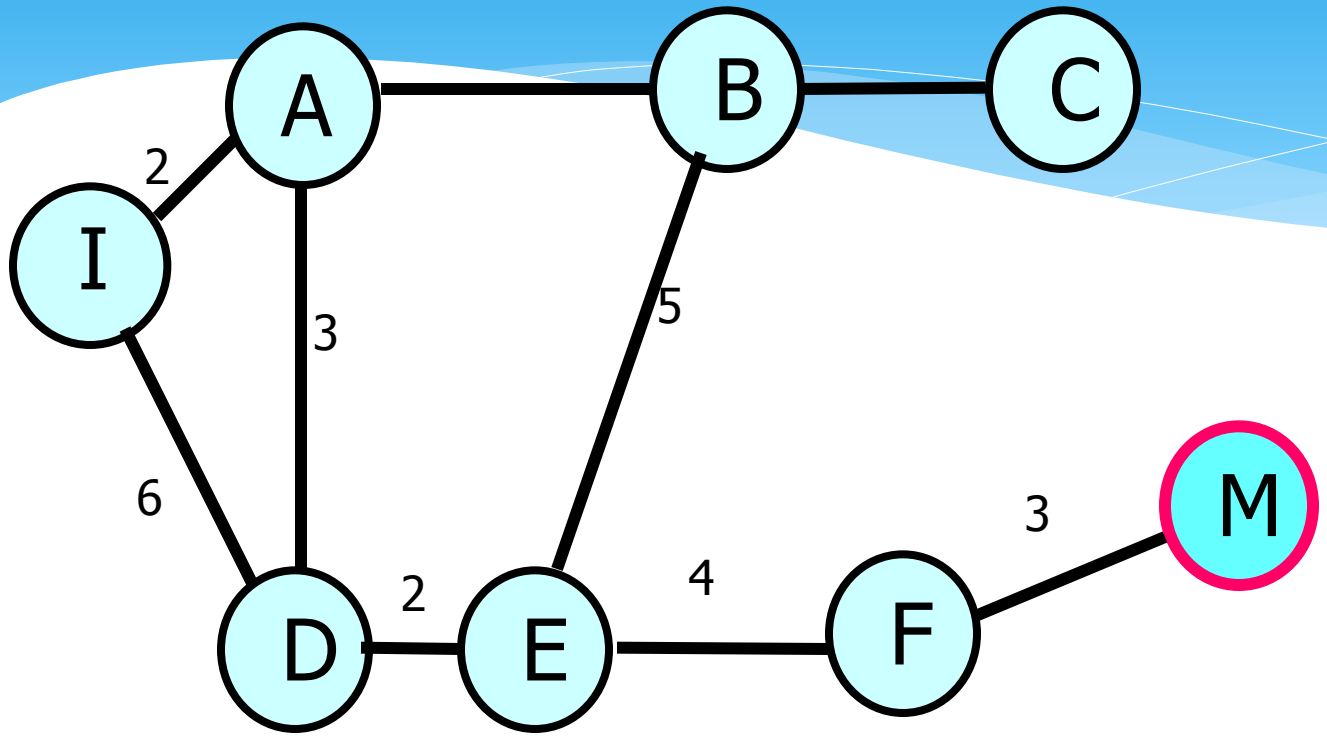
Algorithm A *

* It allows to minimize the cost of finding the goal h (n) (estimated cost of the cheapest route that goes from national target)



* Search uses f(n)=g(n)+h(n)

Algorithm A *



Route

I-D-E-F-M=15

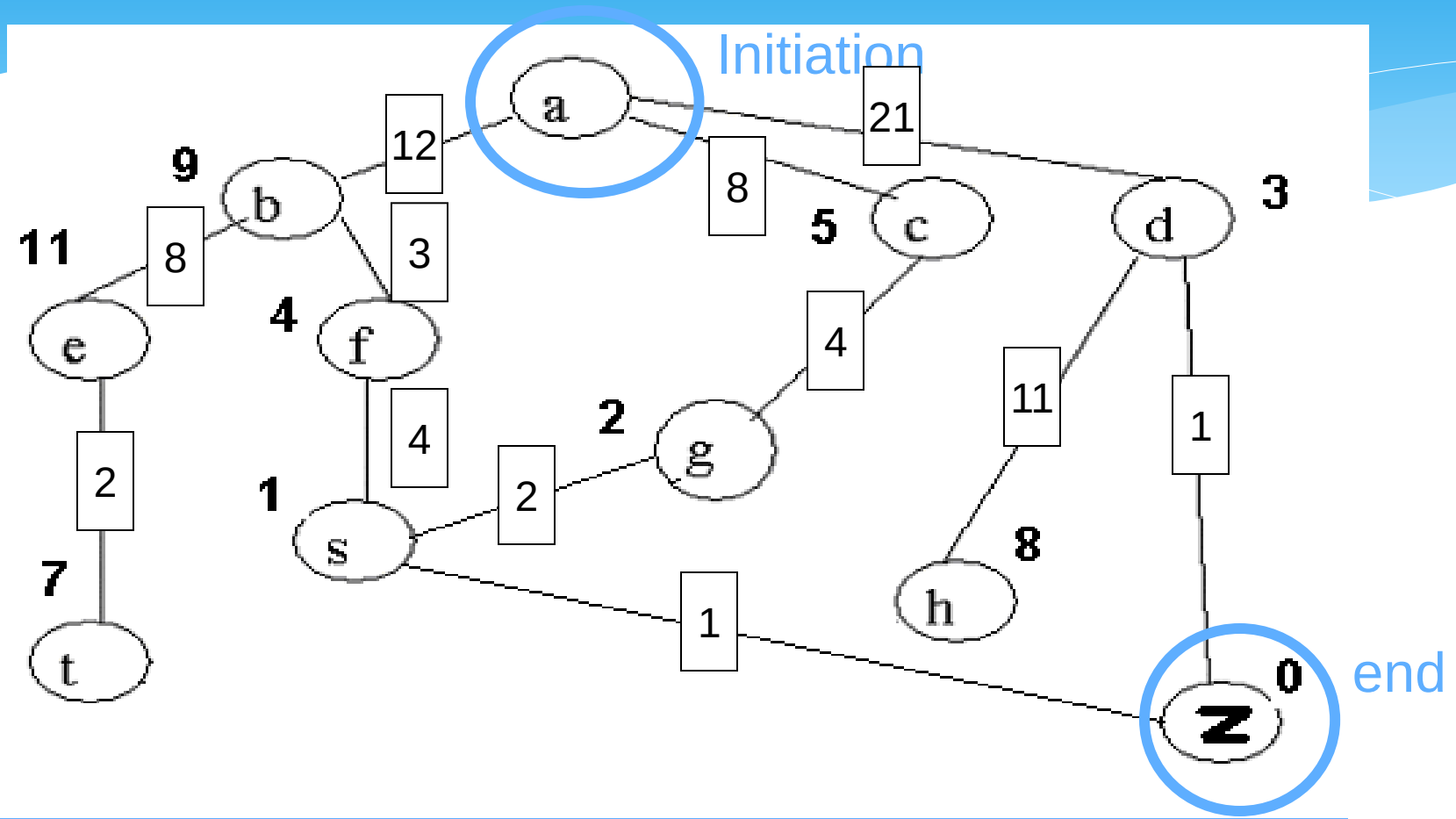
I→M =11 A→M =10.4 B→M=6.7 C→M=4.0

D→M=8.0 E→M=6.9 F→M=3.0 $h_{DLR}(n)$

This estimate must be <true

* Evaluation function f (n) = g (n) + h (n)
  g (n): cost to reach node n (the path).
  h (n): The estimated cost to reach
  a solution node from the node n
  (estimates of what remains to be done).
  f (n): estimated total cost to reach the
  target path through node n.

Algorithm A *



travel:a,b,c,d,g,s,z road:a,c,g,s,z

Algorithm A *

LE

E

(a)

a

((21 b a 12) (13 c a 8) (24 d a 21)) c

((14 g c a 12) (21 b a 12) (24 d a 21)) g

((15 s g c a 14) (21 b a 12) (24 d a 21)) s

((15 z s g c a 15) (21 b a 12) (24 d a 21)) z