The British University in Cairo

Faculty of Informatics and Computer Science

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Introduction to Computer Networks and Data Communication

WS 2014/2015

Assignment I solution

Different network topologies

Question I:

For the following network topologies:

- Mesh topology
- Bus topology
- Ring topology
- Star topology
- Binary tree
- N-cube topology
- Matrix topology

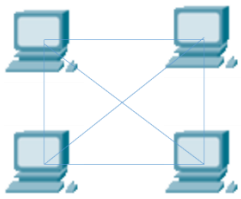
Find the following:

- Degree (d)
- Diameter (D)
- Cost
- Symmetry of the topology

Question I Answer:

- Degree (d): the number of channels incident on the node
- Diameter (D): the longest path out of all the shortest paths connecting any two nodes in the topology
- Cost: the number of links in the topology
- Symmetry: checks if the network looks the same from any node

1. Mesh topology



- Degree (d)= N-1 where N is the number of nodes in the network
- D= 1
- Cost= N(N-1)/2
- Sym = yes

2. Bus topology

- Degree (d)= 2
- D= N-1
- Cost=N-1
- Sym = No
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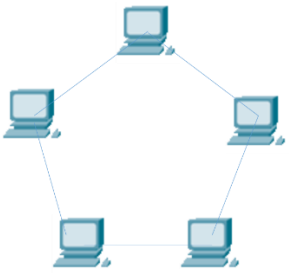
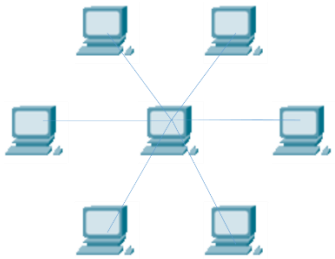
3. Ring topology



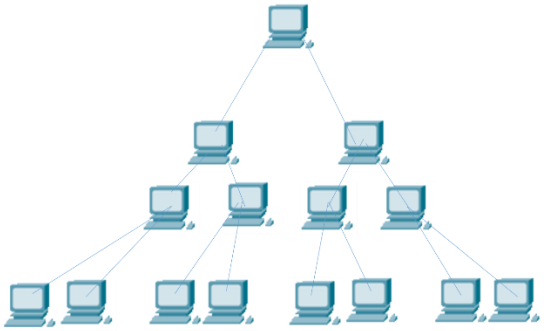
- Degree (d)= 2
- D= ceiling[(N-1)/2]
- Cost= N
- Symmetry= Yes

4. Star topology



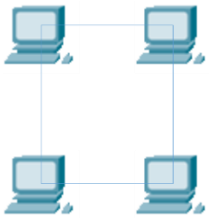
- Degree (d)= 1 for each node except the central node it will be N-1
- D=2
- Cost=N-1
- Sym= No

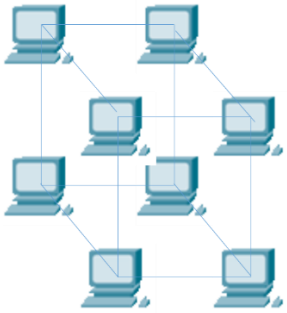
5. Binary tree



- Degree (d)=3
- D= 2 (ceiling[logN] -1)
- Cost= N-1
- Sym= No

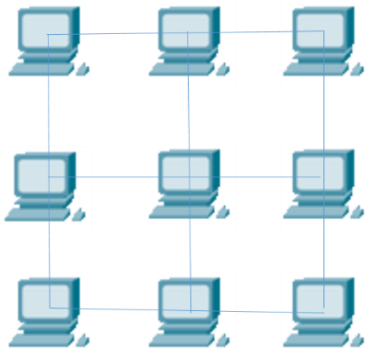
6. N-cube





- Degree (d)= n= log N where n is the number of bits
- D=n=log N
- Cost = nN/2
- Sym= yes

7. N-Matrix topology



- Degree (d)= 4
- D= 2 (n-1) where n is the degree of the matrix
- Cost= 2 (N-n)
- Sym=No

Note: any log in this assignment means **log to the base 2**