Bridge Filtering

- bridges *learn* which hosts can be reached through which interfaces: maintain filtering tables
  - when frame received, bridge "learns" location of sender: incoming LAN segment
  - records sender location in filtering table
- filtering table entry:
  - (Node LAN Address, Bridge Interface, Time Stamp)
  - stale entries in Filtering Table dropped (TTL can be 60 minutes)

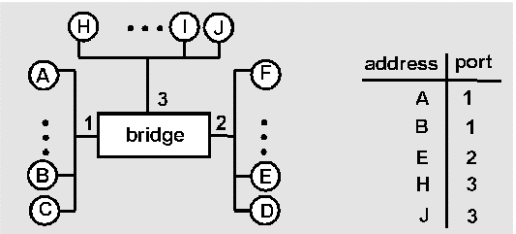
Bridge Filtering

- filtering procedure:

```
if destination is on LAN on which frame was received
    then drop the frame
    else { lookup dest in filtering table
           if entry found for destination
             then forward the frame on interface indicated;
             else flood;   /* forward on all but the interface
                              on                  which the frame
                              arrived*/
         }
```

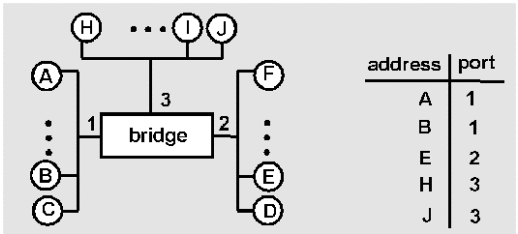

Bridge Learning: example

Suppose C sends frame to D and D replies back with frame to C



- C sends frame, bridge has no info about D, so floods to both LANs
  - bridge notes that C is on port 1
  - frame ignored on upper LAN
  - frame received by D

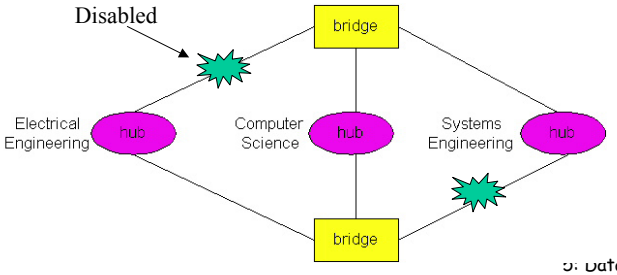
Bridge Learning: example



- D generates reply to C, sends
  - bridge sees frame from D
  - bridge notes that D is on interface 2
  - bridge knows C on interface 1, so *selectively* forwards frame out via interface 1

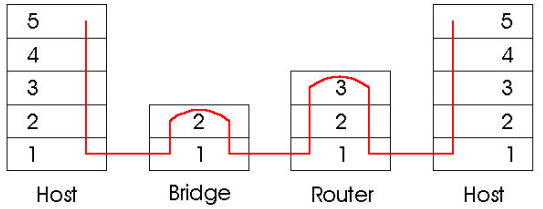
Bridges Spanning Tree

- for increased reliability, desirable to have redundant, alternate paths from source to dest
- with multiple simultaneous paths, cycles result - bridges may multiply and forward frame forever
- solution: organize bridges in a spanning tree by disabling subset of interfaces



Bridges vs. Routers

- both store-and-forward devices
  - routers: network layer devices (examine network layer headers)
  - bridges are Link Layer devices
- routers maintain routing tables, implement routing algorithms
- bridges maintain filtering tables, implement filtering, learning and spanning tree algorithms



Routers vs. Bridges

Bridges + and -

+ Bridge operation is simpler requiring less processing bandwidth
- Topologies are restricted with bridges: a spanning tree must be built to avoid cycles
- Bridges do not isolate broadcast domains
  - All hosts see all broadcasts

Routers vs. Bridges

Routers + and -

+ arbitrary topologies can be supported, cycling is limited by TTL counters (and good routing protocols)
+ isolate broadcast domains
  + reduce broadcast traffic seen by each host
- require IP address configuration (not plug and play)
- require higher processing bandwidth

- bridges do well in small (few hundred hosts) while routers used in large networks (thousands of hosts)