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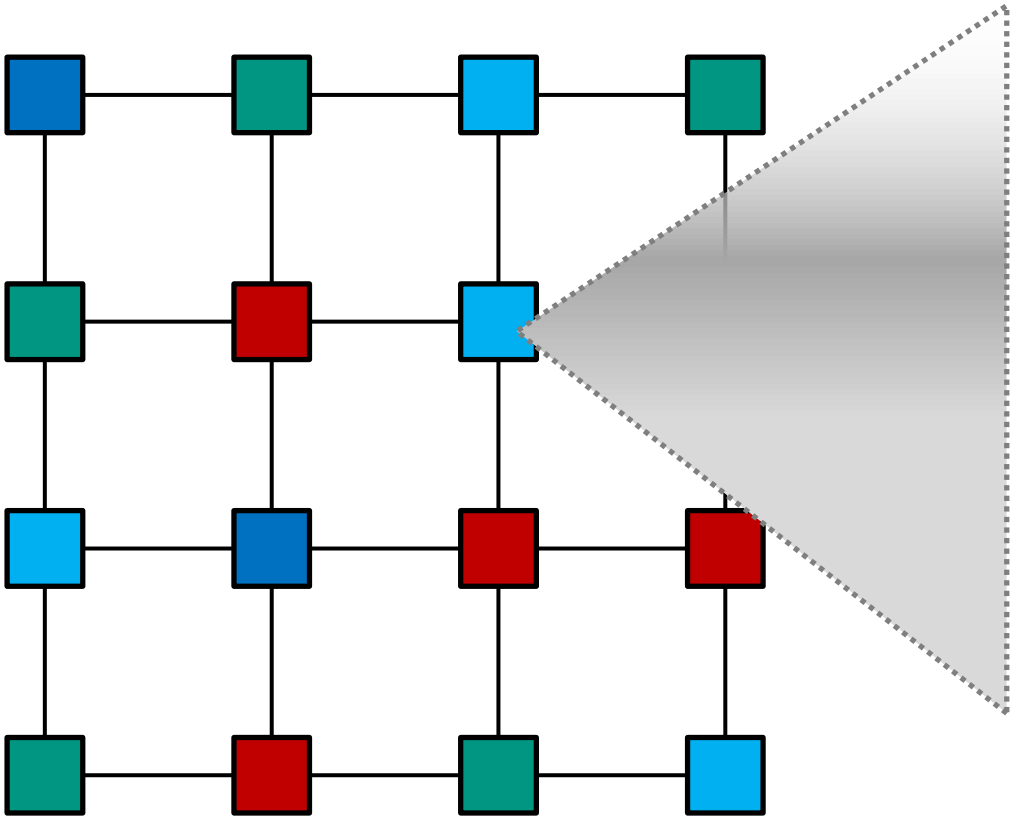
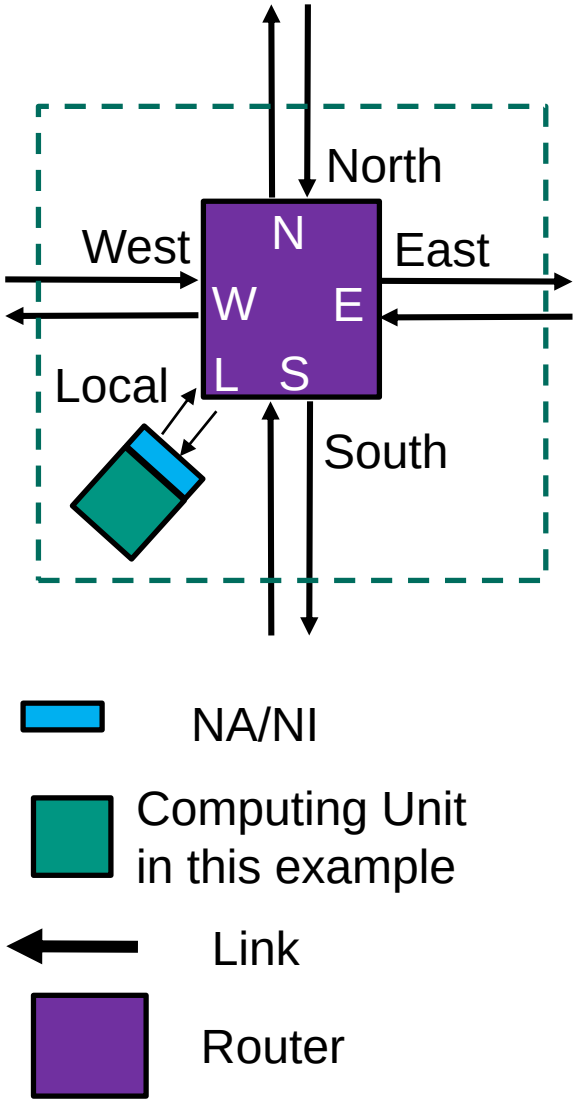
Institut für Technik der Informationsverarbeitung (ITIV)

# Communication Systems and Protocols

## Exercise 7

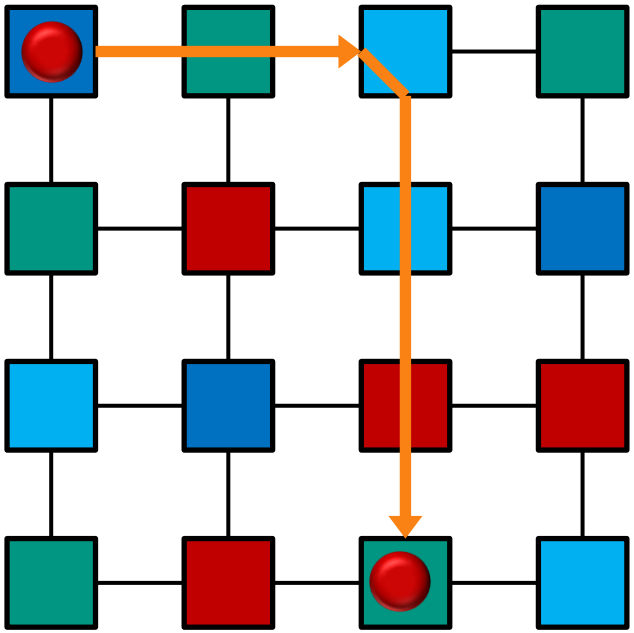
# Network Nodes – Basic Setup





# X-Y Routing

- Only applicable for mesh based networks
- Routing always towards destination
- First in X direction, then in Y direction

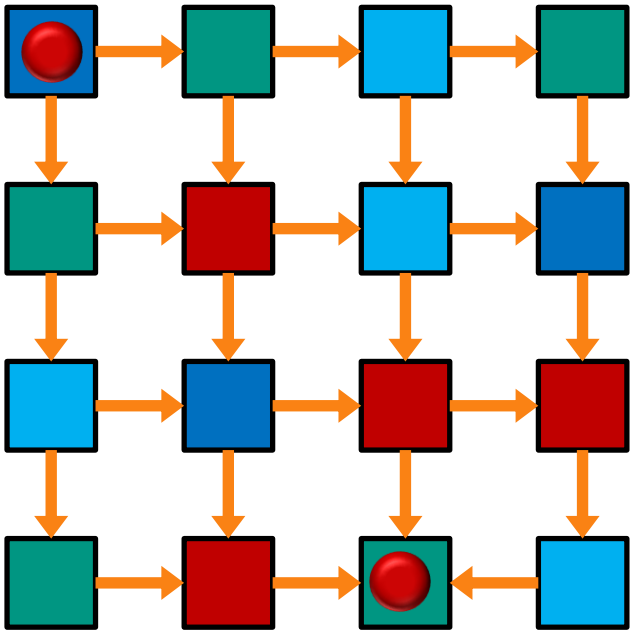


- Nodes have to know their position within the network
- Address has to be map able to the location within the network (coordinates)

- \+ Simple and small algorithm
- \+ Deadlock free
- − Only works for meshes (rectangular)

# Flooding

- Packets are forwarded to all ports except the receiving port
- Packet will eventually arrive at destination



- Time-to-live (TTL)
  - small number within a packet that is decreased by every router
  - if TTL = 0 packet is not forwarded
- Each packet is forwarded only once by a router
  - add Router ID to the packet when forwarding

\+ No need for routing table
\+ very robust
– May swamp network

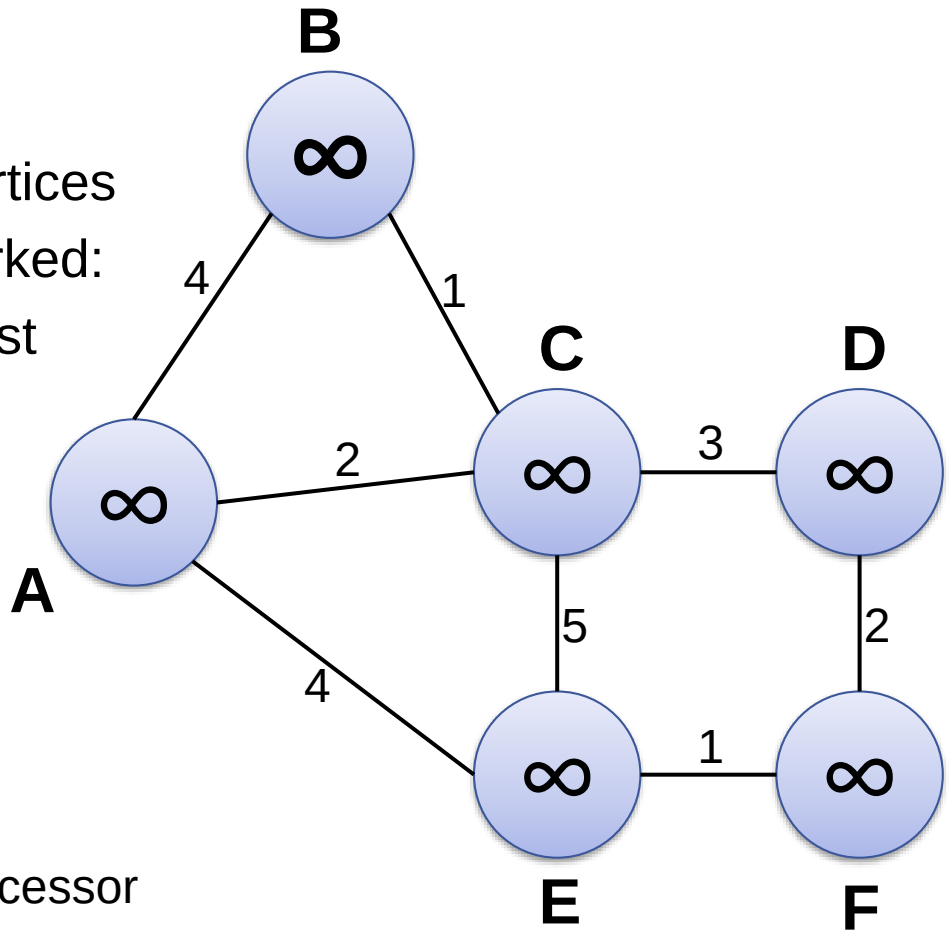
# Task 1: Networks

Time remaining ‘15

# Dijkstra-Algorithm

- Finds the shortest path from a starting node to all other nodes in a known topology

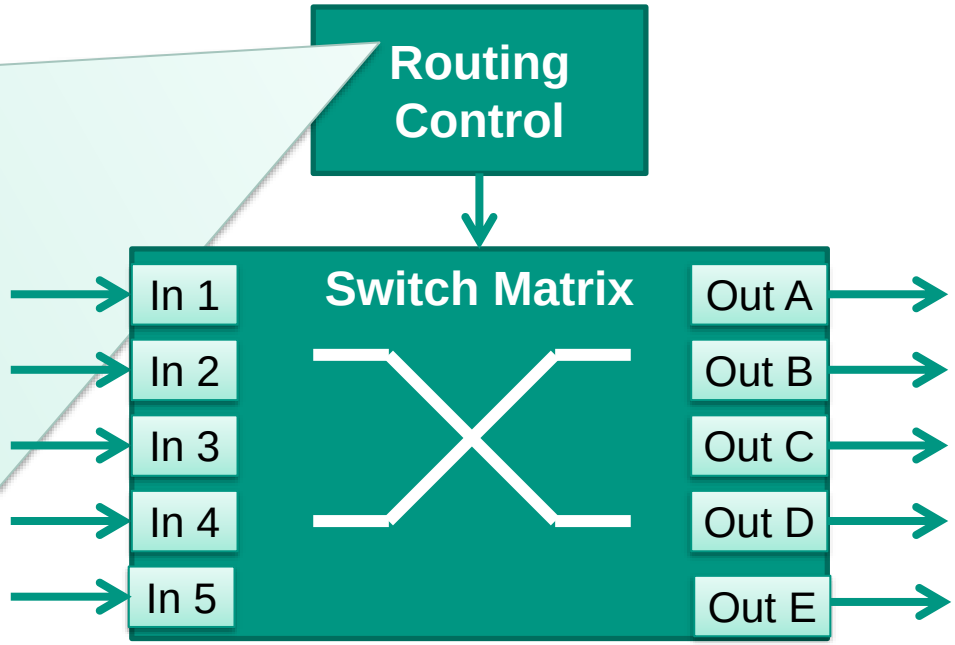
A. Set distance to infinity for all vertices
B. Repeat until all vertices are marked:
   1. Mark the vertex with smallest distance
   2. For all neighbors add current distance and edge weight
   3. If sum is smaller than current distance
      → update distance
      → set marked vertex as predecessor



# Example for Routing Control – Routing Table

- One row per destination address
- Content stores output port for a given destination
- Table can be static or dynamic

| Destination Address | Output |
|---|---|
| 0x0001 | Out C |
| 0x0002 | Out C |
| 0x0003 | Out A |
| 0x0004 | Out D |
| ⋮ | ⋮ |
| 0xFFFE | Out B |
| 0xFFFF | Out C |



# Task 2: Dijkstra

Time remaining

‘10