

Exercise walk-through

# 9.3

## Routing

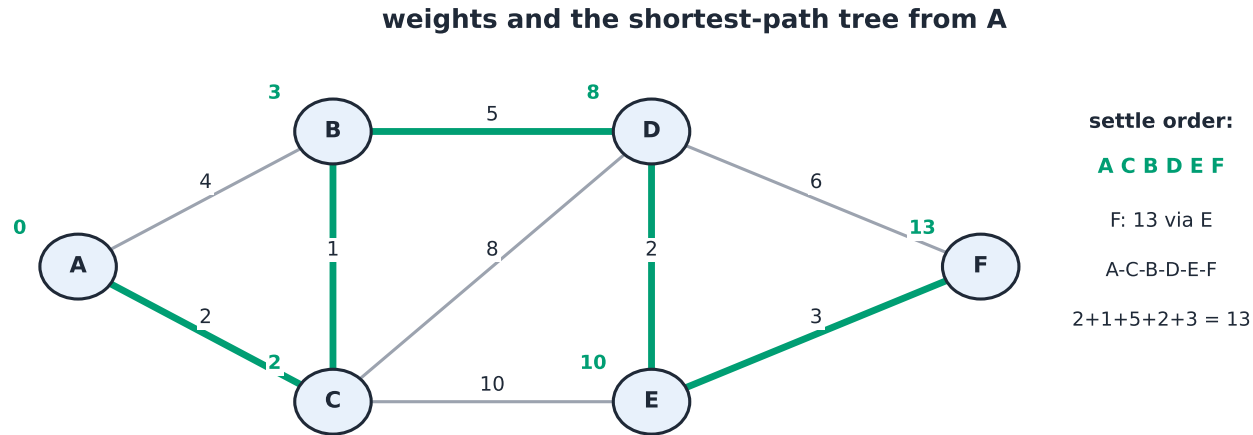
---

University Computer Science

## Routing: longest prefix, shortest path

- 1 **Match** 10.1.2.200 with /8, /16 and /24 entries present goes to the /24; 10.9.9.9 falls to the /8; the default catches the rest.
- 2 **Tree** Course weights from A settle C 2, B 3, D 8, E 10, F 13 - F via A C B D E F at  $2+1+5+2+3 = 13$ , beating D direct at 14.
- 3 **Aggregation** One /12 announcement covers  $2^{20}$  addresses: the table stays human-sized because host bits are thrown away.

# Routing graph



longest prefix match picks the /24 over the /16 over the /8; the default catches the rest

The course graph with weights; Dijkstra from A settles C, B, D, E, F.

## Exercises 2.1-2.3

---

**2.1** Only 10.0.0.0/8  $\rightarrow$  X and default  $\rightarrow$  W exist. Where does 10.2.3.4 go? [3]

---

**2.2** Course graph: what is the direct A–B cost, and what is A to B through C? [3]

---

**2.3** Which node settles second from A, at what distance? [3]

## Exercises 2.1-2.3

---

**2.1** Only  $10.0.0.0/8 \rightarrow X$  and default  $\rightarrow W$  exist. Where does  $10.2.3.4$  go? [3]

**2.1**

- $P$  – the  $/8$  matches; the default is only for non-matches ✓.
- 

**2.2** Course graph: what is the direct  $A-B$  cost, and what is  $A$  to  $B$  through  $C$ ? [3]

**2.2**

- Direct  $A-B = 4$ ; via  $C = 2 + 1 = 3$  ✓.
- 

**2.3** Which node settles second from  $A$ , at what distance? [3]

**2.3**

- $C$ , at 2 ✓.

## Exercise 3.1

---

**3.1** A routing table holds  $10.0.0.0/8 \rightarrow P$ ,  $10.4.0.0/16 \rightarrow Q$ ,  $10.4.7.0/24 \rightarrow R$ , plus a default route to D.

Give the next hop for each of: 10.4.7.9, 10.4.9.9, 10.9.9.9, 172.16.1.1, with the reason. Add one entry that hijacks 10.4.7.128 away from R; state its prefix length and why it wins. State what the default is for, in one line. [8]

## Exercise 3.1

---

**3.1** A routing table holds  $10.0.0.0/8 \rightarrow P$ ,  $10.4.0.0/16 \rightarrow Q$ ,  $10.4.7.0/24 \rightarrow R$ , plus a default route to D.

Give the next hop for each of:  $10.4.7.9$ ,  $10.4.9.9$ ,  $10.9.9.9$ ,  $172.16.1.1$ , with the reason. Add one entry that hijacks  $10.4.7.128$  away from R; state its prefix length and why it wins. State what the default is for, in one line. [8]

### 3.1

- $10.4.7.9 \rightarrow R$  (the  $/24$  matches and is longest) ✓.
- $10.4.9.9 \rightarrow Q$  (only the  $/16$  matches) ✓.
- $10.9.9.9 \rightarrow P$  (only the  $/8$ ) ✓.
- $172.16.1.1 \rightarrow D$  (nothing matches; the default) ✓.
- Hijack:  $10.4.7.128/25 \rightarrow H$  –  $/25 > /24$ , so it wins for addresses 128–255 of that block ✓.
- The default exists so the table need not hold a route for every possible destination ✓.

## Exercise 3.2

---

**3.2** Course graph, from A.

Give the settle order with each distance. Trace why B settles at 3, not 4. Give F's shortest path and its total. State which single edge deletion would change F's distance, and the new distance.

[7]

## Exercise 3.2

---

### 3.2 Course graph, from A.

Give the settle order with each distance. Trace why B settles at 3, not 4. Give F's shortest path and its total. State which single edge deletion would change F's distance, and the new distance. [7]

### 3.2

- Settle order: C 2, B 3, D 8, E 10, F 13 ✓.
- B settles at 3 because settling C (2) relaxes B through the C–B edge of weight 1:  $2 + 1 = 3 < 4$  ✓.
- F: A C B D E F, total  $2 + 1 + 5 + 2 + 3 = 13$  ✓.
- Deleting D–E (weight 2) forces E via C at 12, so F becomes  $\min(8 + 6, 12 + 3) = 14$  via D ✓.