

# ECE 461 – Internetworking

## Problem Sheet 4

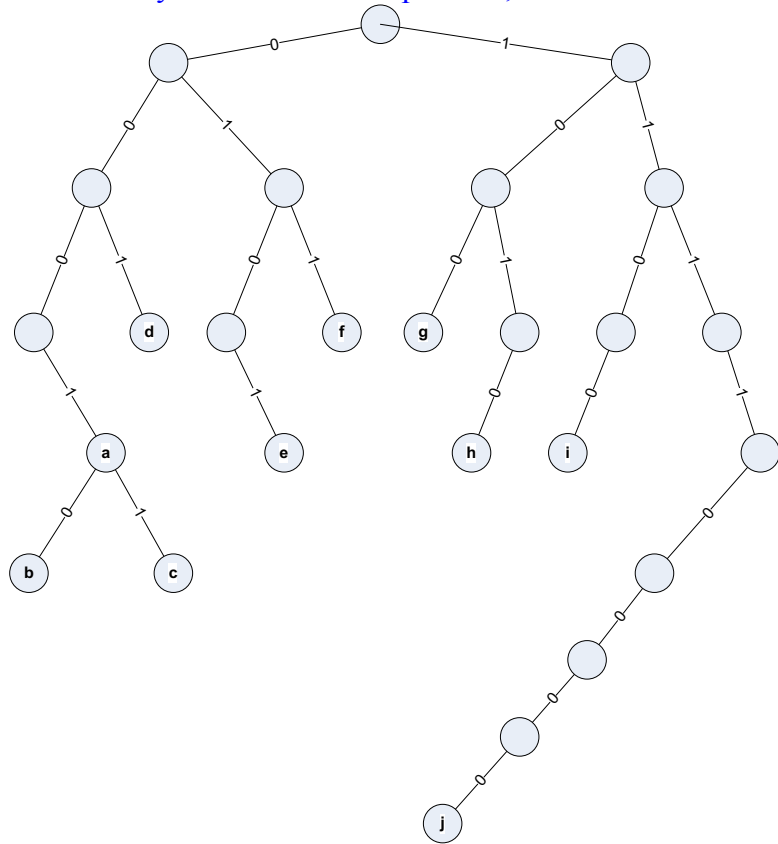
**Problem 1.** Consider the following set of prefixes

- a) 0001\*
- b) 00010\*
- c) 00011\*
- d) 001\*
- e) 0101\*
- f) 011\*
- g) 100\*
- h) 1010\*
- i) 1100\*
- j) 11110000\*

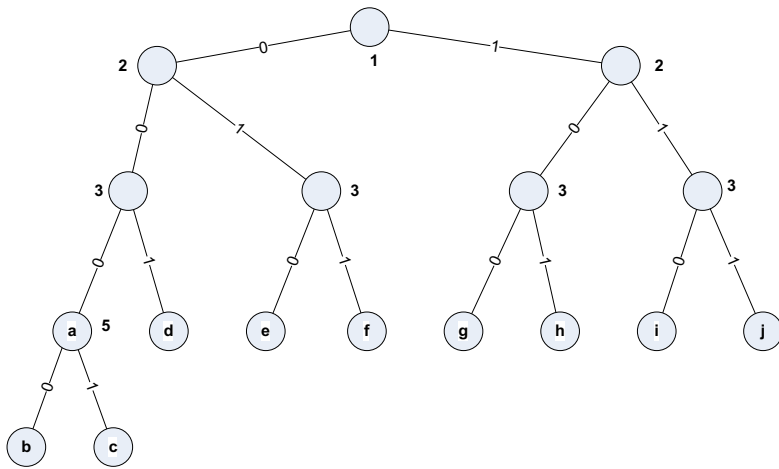
Construct the following tries and trees

- 1) a binary trie for the set of prefixes;
- 2) a path-compressed trie;
- 3) a disjoint-prefix binary trie;
- 4) a multibit trie with stride size 2;

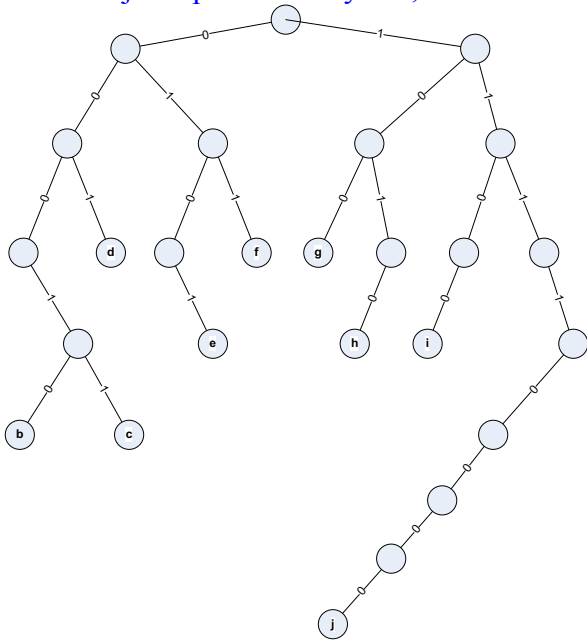
1. a binary trie for the set of prefixes;



2. a path-compressed trie;

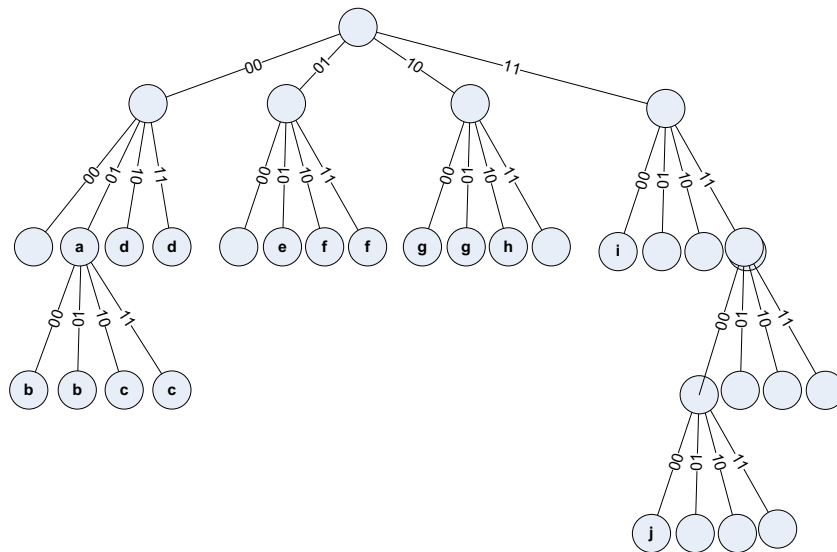


3. a disjoint-prefix binary trie;



4. a multibit trie with stride size 2;

(Solutions that have 1-bit on last hop are permitted. This gives a different structure of the tree)



## Problem 2. IPv6 Addresses

- a. Provide the full 16 byte address (using hexadecimals) of the following abbreviated IPv6 addresses:
- a1) 2001:DB8:65A3::5D2E:0:34
  - a2) ::1 ;
  - a3) FE80::E2F8:47FF:E44:2A08 .
- b. Explain why abbreviating an IPv6 address as 2001::DB8:65A3::EF:34 is not permitted.

### Solution:

- **Rule 1:** Omit leading zeros in a 16-bit field (hextet)
- **Rule 2:** Replace hextet of zeros with a single zero
- **Rule 3:** Use two-colon (::) notation to represent contiguous hextets of zeros (If there are multiple such contiguous hextets, apply Rule 1 to the longest sequence.)

a.

- a1) 2001:0DB8:65A3:0000:0000:5D2E:0000:0034
- a2) 0000:0000:0000:0000:0000:0000:0000:0001
- a3) FE80:0000:0000:0000:E2F8:47FF:0E44:2A08

b. (4 points) Explain why abbreviating an IPv6 address as 2001::DB8:65A3::EF:34 is not permitted.

The abbreviation is ambiguous. It could mean one of the following:

2001:0000:0000:0DB8:65A3:0000:00EF:0034

or

2001:0000:0DB8:65A3:0000:0000:00EF:0034