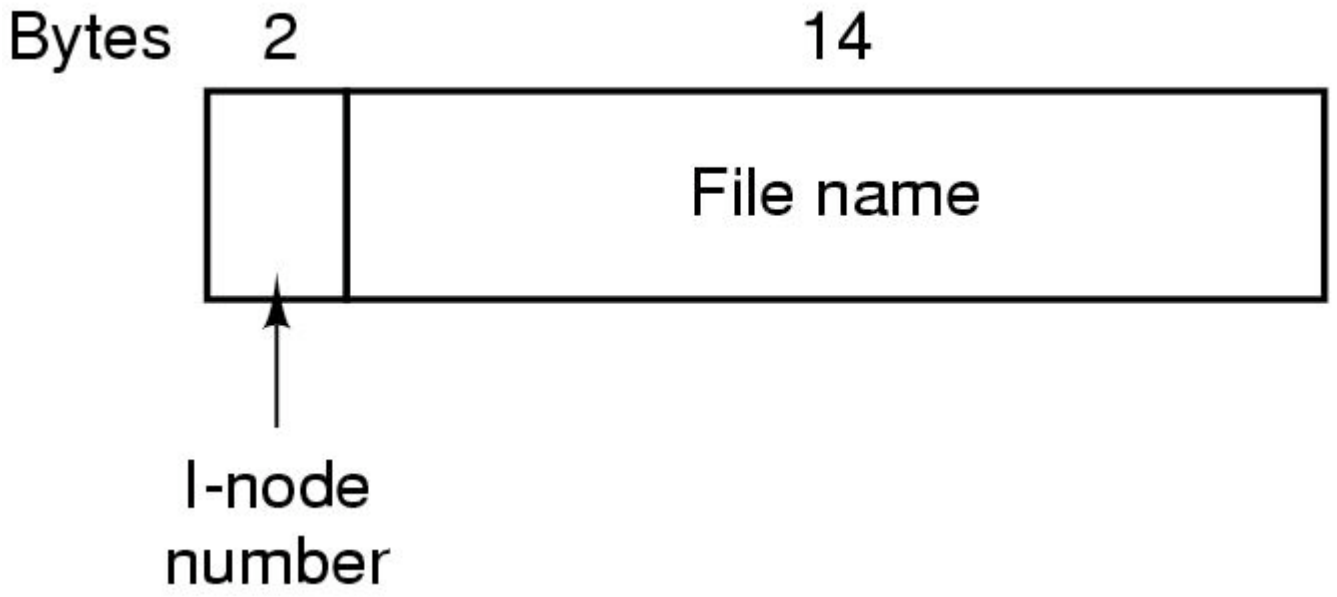
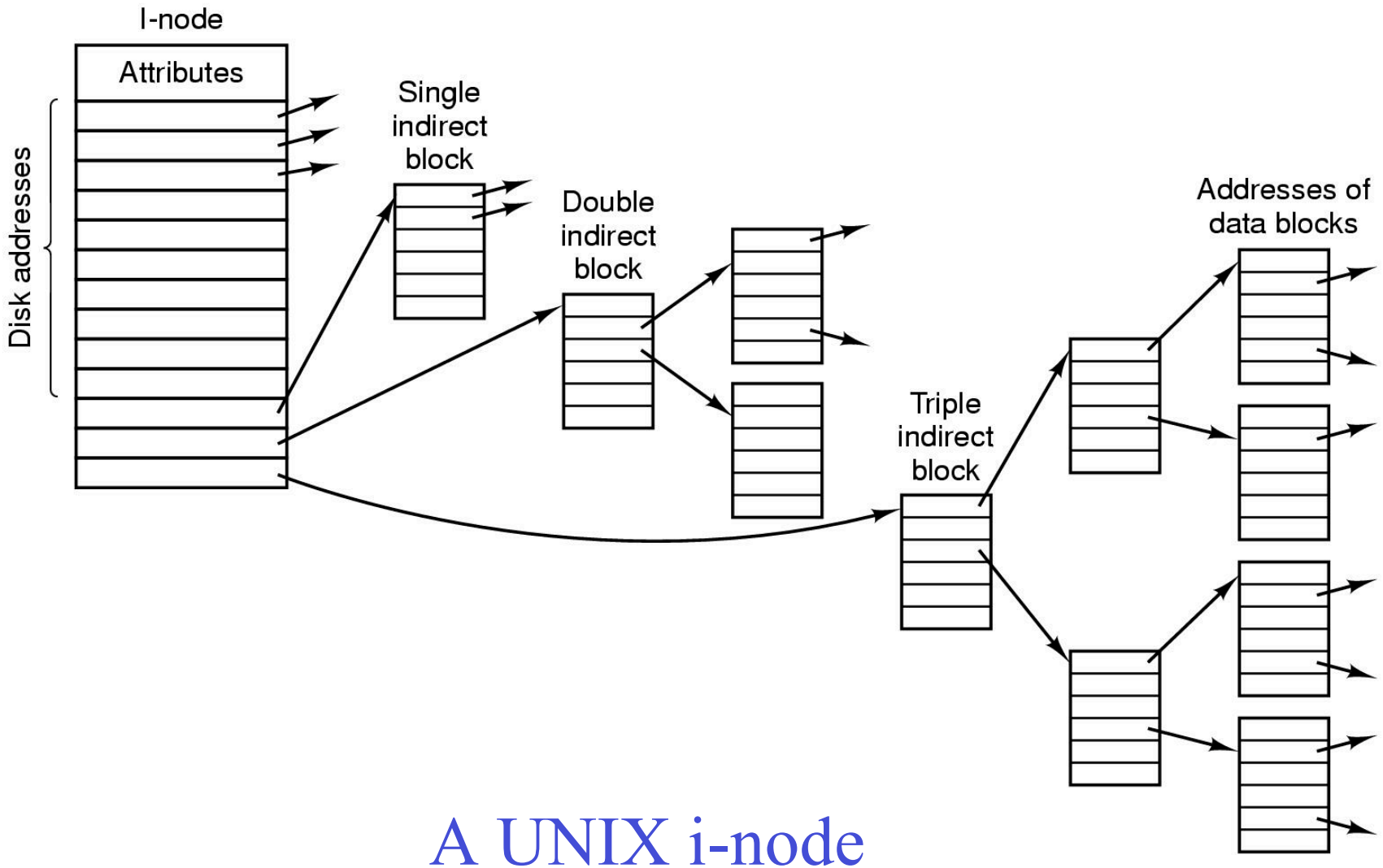
The UNIX V7 File System (1)



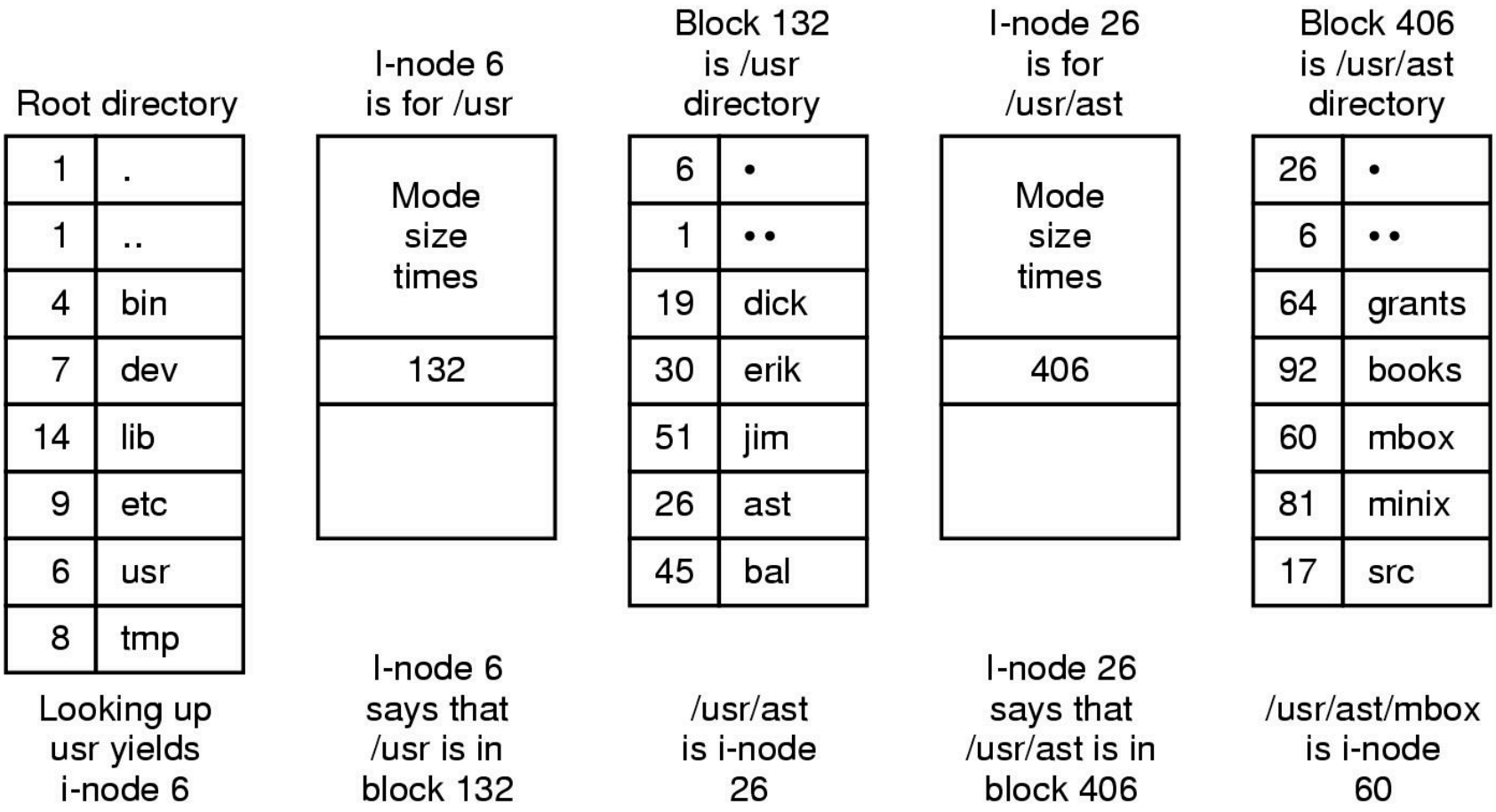
A UNIX V7 directory entry

The UNIX V7 File System (2)



A UNIX i-node

The UNIX V7 File System (3)



The steps in looking up */usr/ast/mbox*

Example1

- How many disk reads are needed to read the first block for the file /etc/passwd?

Solution

1. Read **root** I-node, determine **etc** I-node
2. Read **etc** I-node, determine **etc** block #
3. Read **etc** block #, determine **passwd** I-node
4. Read **passwd** I-node, determine **passwd** first block
5. Read **passwd** first block

Example 2

- A Unix file system has 1-KB blocks and 4-byte disk addresses. What is the maximum file size if each I-nodes contain 10 direct entries,1 single, 1 double and 1 triple indirect entries

Solution

- The 10 direct pointers can reference up to 10x1KB=10KB of data
- An indirect pointer references 256 pointers or 256x1KB=256KB
- A double indirect pointers references 256^2 pointers or 256^2 x1KB=65536KB
- A triple indirect pointer references 256^3 pointers or 256^3x1KB=16777220KB
- The maximum file size would be 16777220+65536+256+10=16843020KB approx 16MB

Example 3

- A disk has a single sided platter with 4000 tracks and 64 sectors per track. Each I-node contains 5 direct, 1 single, and 2 double indirect pointer each 4 bytes. A new file system is created with 512 byte blocks.

1. How many files can be created assuming that I-nodes are stored on the outer track only.
2. What is the maximum size of each file

Solution

- The outer track can store 64x512=32768 bytes=1024 I-nodes. Therefore the number of files that can be created is 1024.
- A 512 byte block can store 512/4=128 pointers. The maximum file size is 5+128+2*128*128=32901 blocks or approx 16MB