The UNIX V7 File System (1)



A UNIX V7 directory entry

The UNIX V7 File System (2)



2

The UNIX V7 File System (3)

Root directory		l-node 6 is for /usr		Block 132 is /usr directory			I-node 26 is for /usr/ast	_	Block 406 is /usr/ast directory		
1			Mode		6	•		Mode size times		26	•
1			size		1	••				6	••
4	bin		times		19	dick				64	grants
7	dev		132		30	erik		406		92	books
14	lib				51	jim				60	mbox
9	etc				26	ast				81	minix
6	usr	12		-	45	bal				17	src
8	tmp		l-node 6					l-node 26			
Looking up usr yields i-node 6			says that /usr is in block 132		/usr/ast is i-node 26			says that /usr/ast is in block 406		/usr/a is	ast/mbox i-node 60

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 Inode
- 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 4byte 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 256² pointers or 256² x1KB=65536KB
- A triple indirect pointer references 256³ pointers or 256³x1KB=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