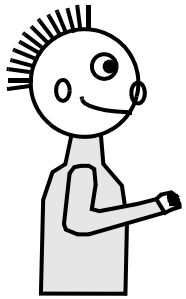
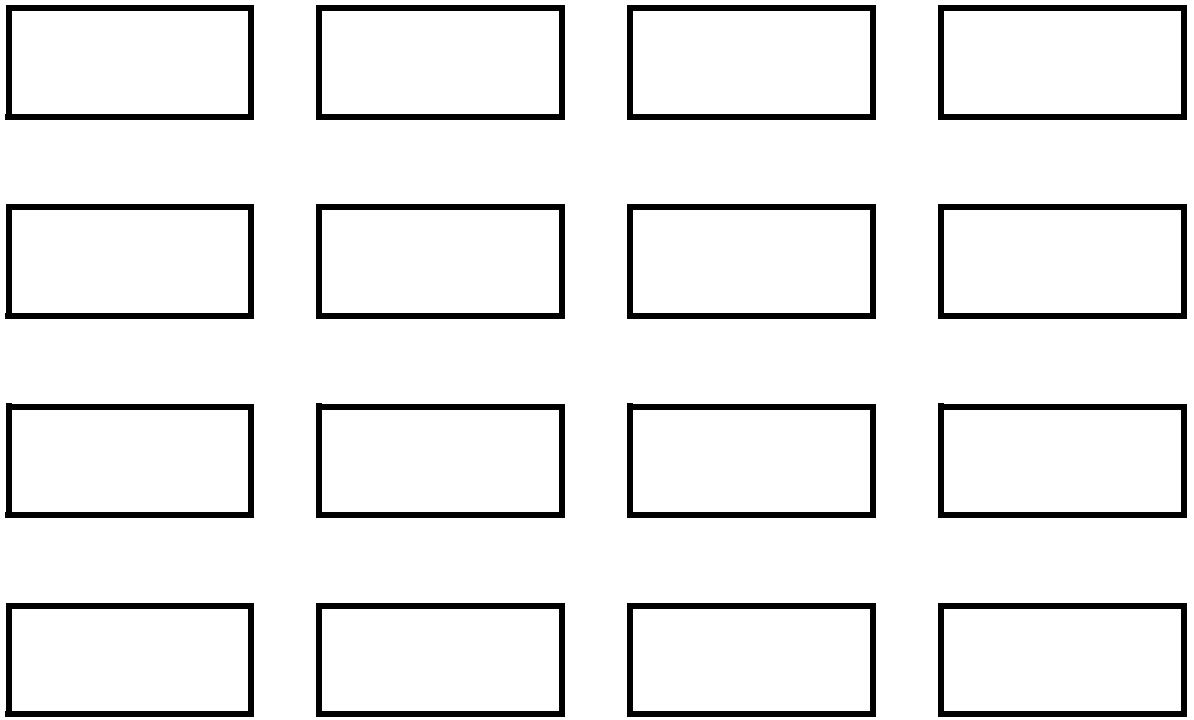
1.) Fully-Associative Cache: An Everyday-Life Example

A lecture room with tables in rows:

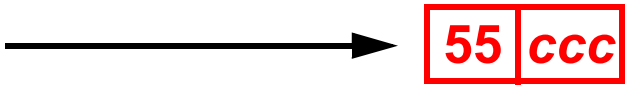


Student John Doe may sit anywhere he likes



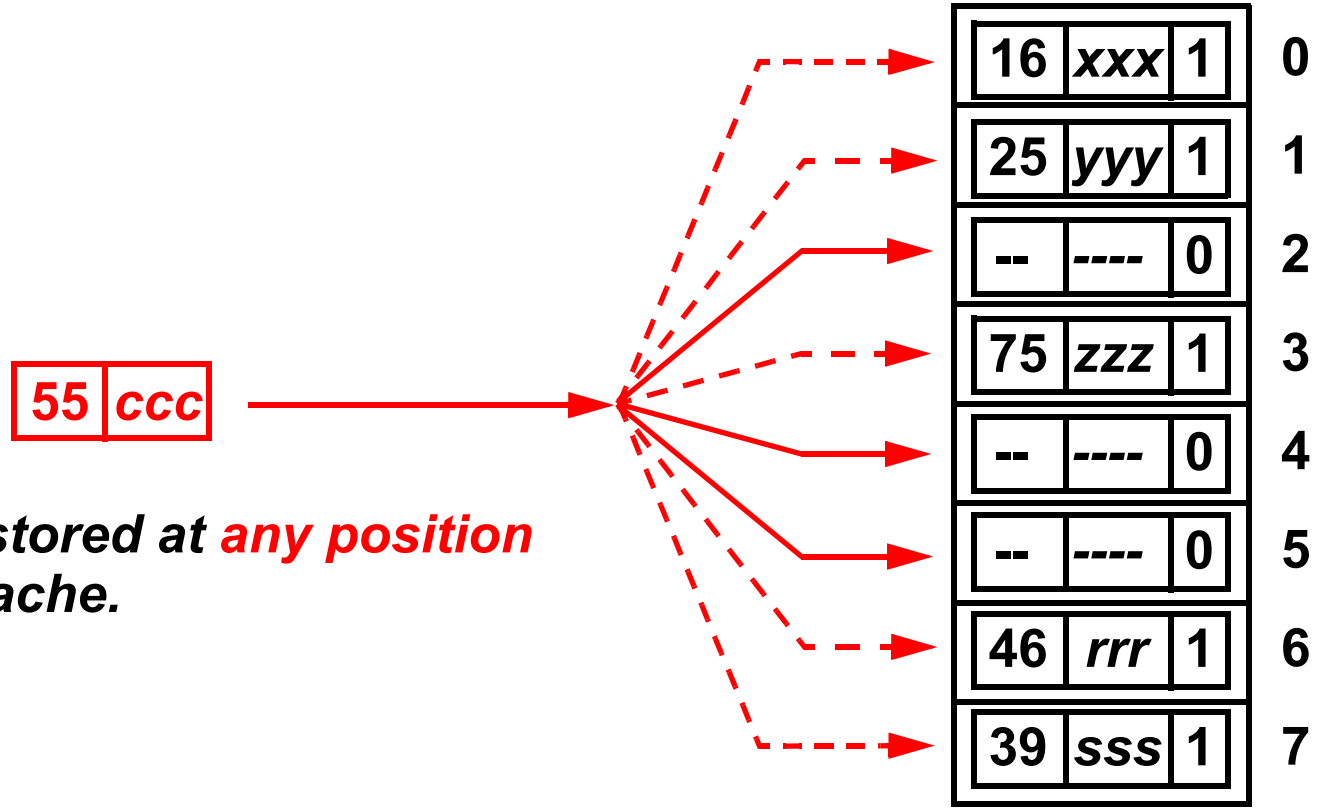
1.) Fully-Associative Cache:

A block
coming from main memory ...



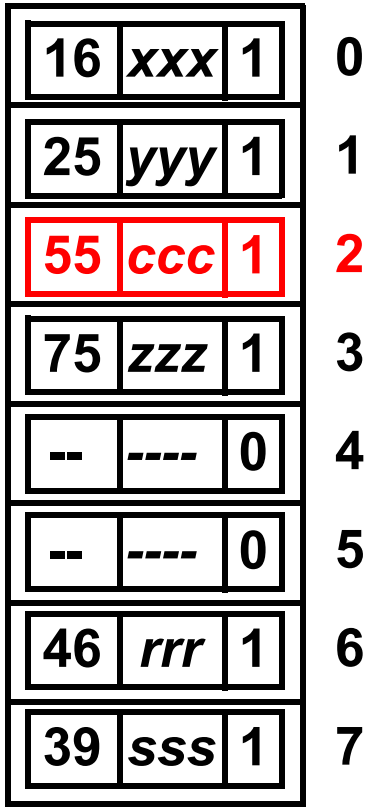
16	xxx	1	0
25	yyy	1	1
--	----	0	2
75	zzz	1	3
--	----	0	4
--	----	0	5
46	rrr	1	6
39	sss	1	7

1.) Fully-Associative Cache:



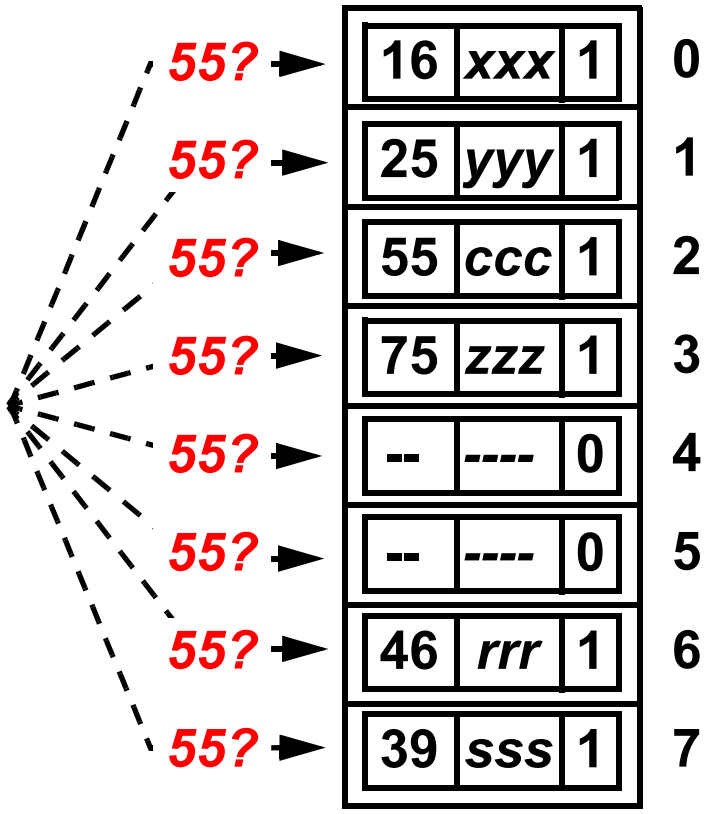
... can be stored at any position of the cache.

1.) Fully-Associative Cache:

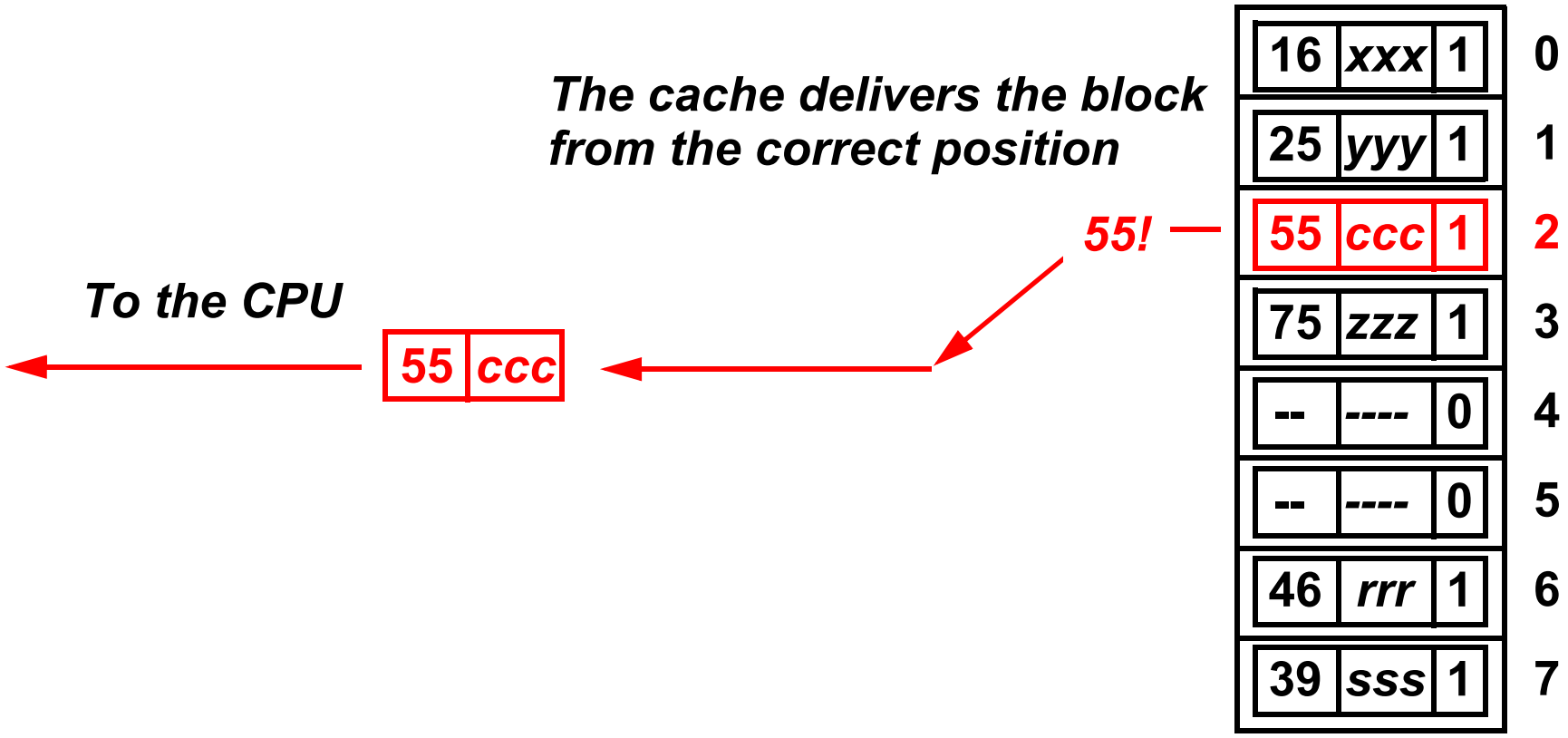


1.) Fully-Associative Cache:

To be accessed, the block must be searched for in the whole cache.

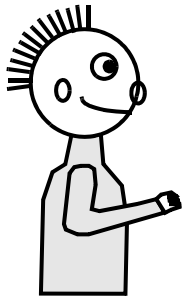


1.) Fully-Associative Cache:

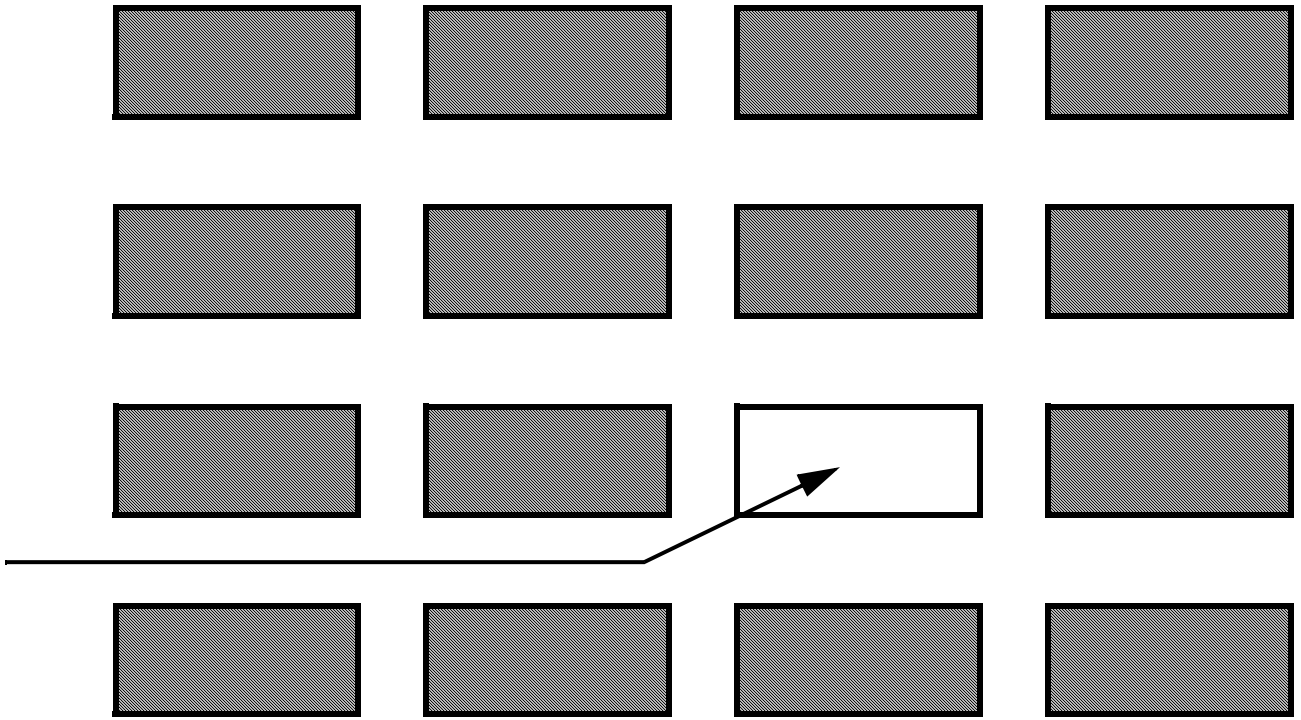


2.) Direct-Mapped Cache: An Everyday-Life Example

A lecture room with tables in rows:

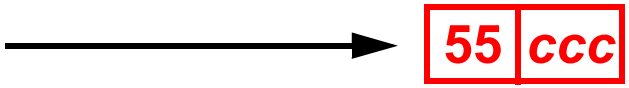


Student John Doe may sit at a designated table only



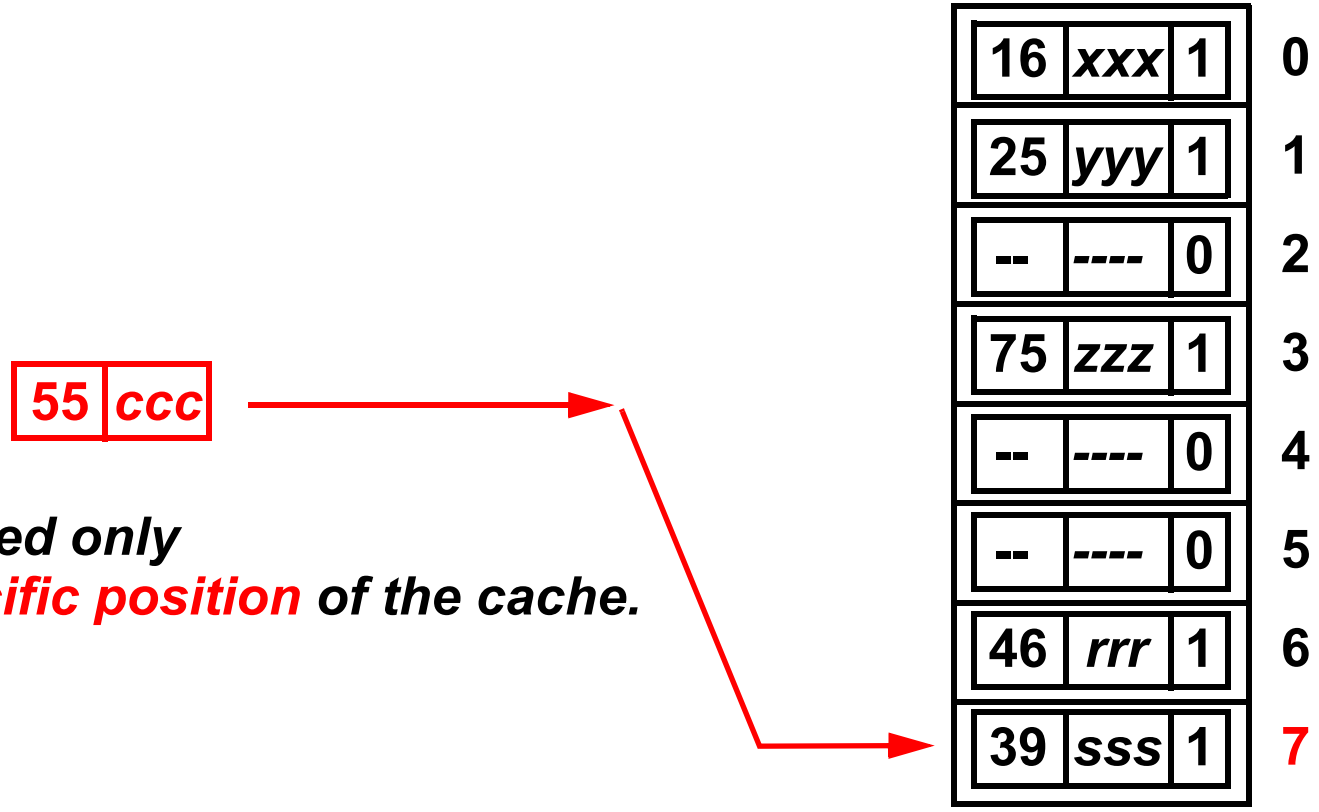
2.) Direct-Mapped Cache:

A block
coming from main memory ...



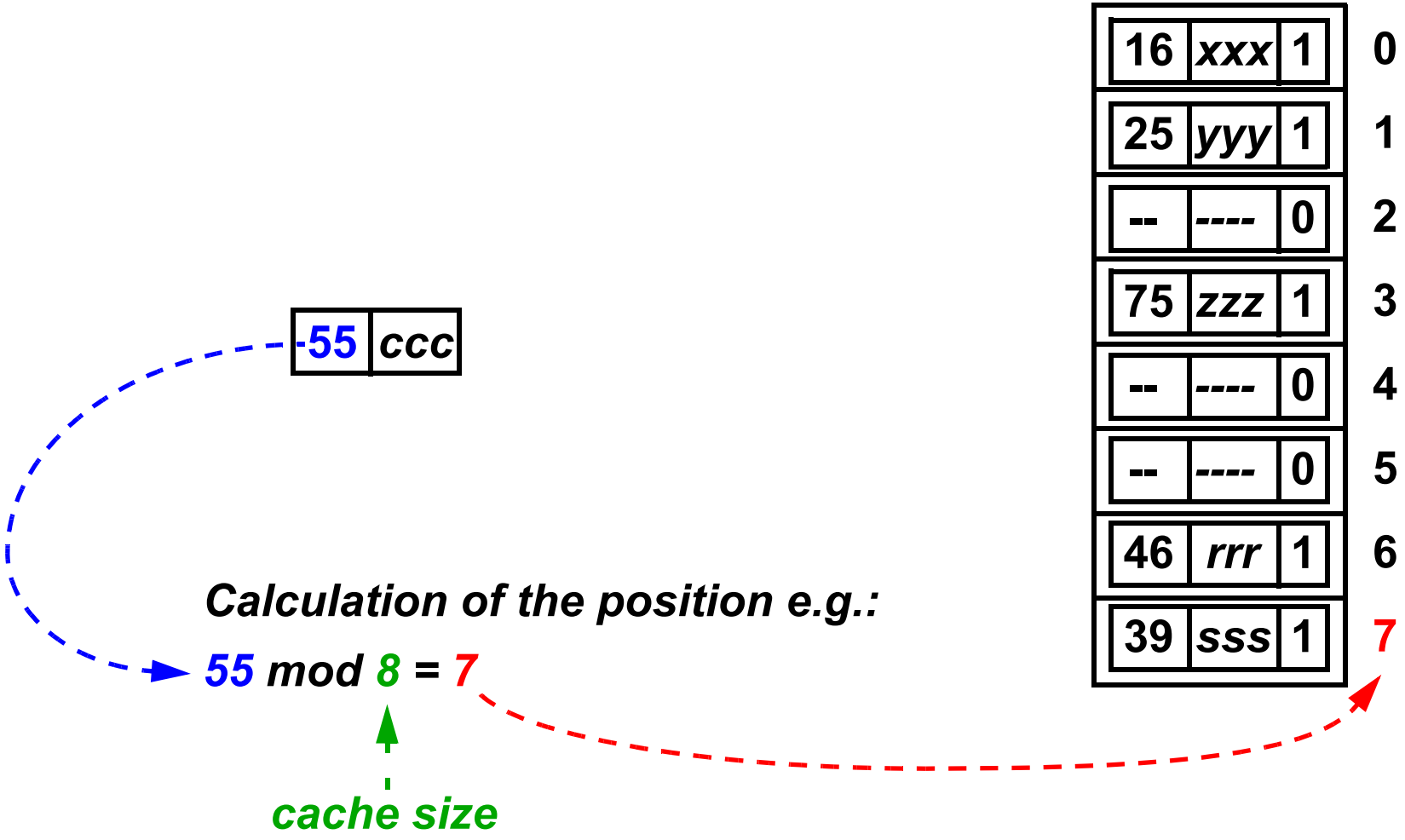
16	xxx	1	0
25	yyy	1	1
--	----	0	2
75	zzz	1	3
--	----	0	4
--	----	0	5
46	rrr	1	6
39	sss	1	7

2.) Direct-Mapped Cache:

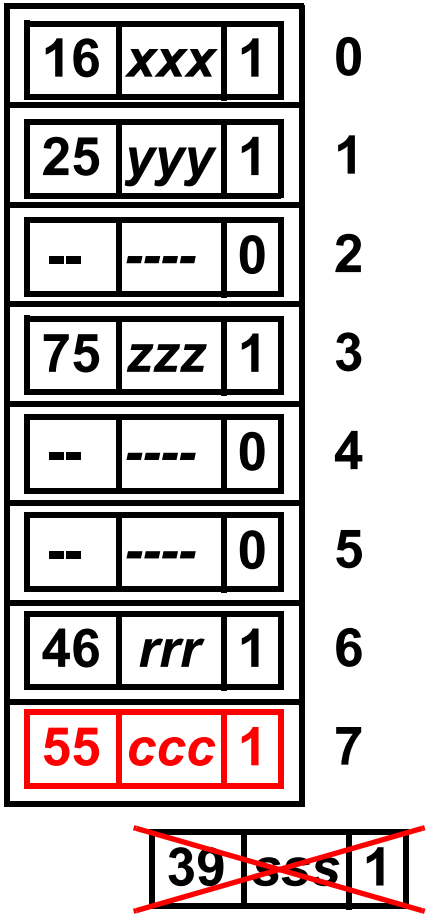


... can be stored only
at one specific position of the cache.

2.) Direct-Mapped Cache:



2.) Direct-Mapped Cache:



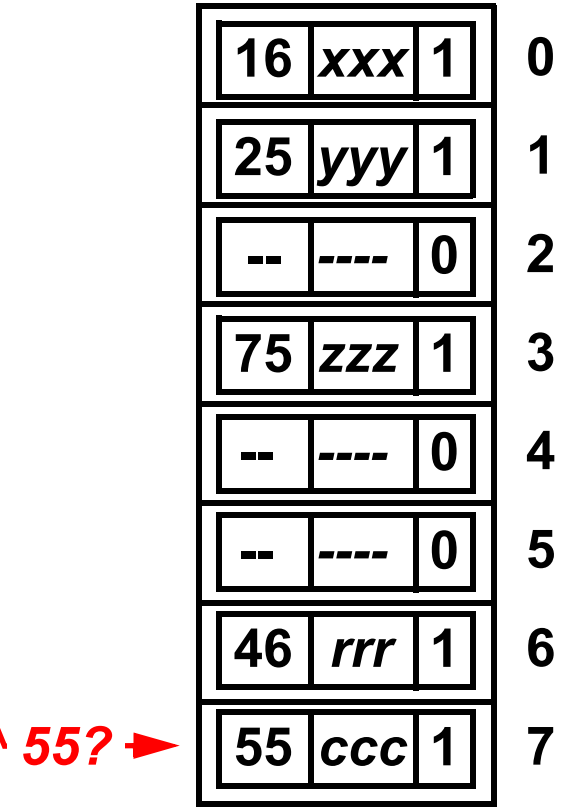
Current block at this position is replaced.

2.) Direct-Mapped Cache:

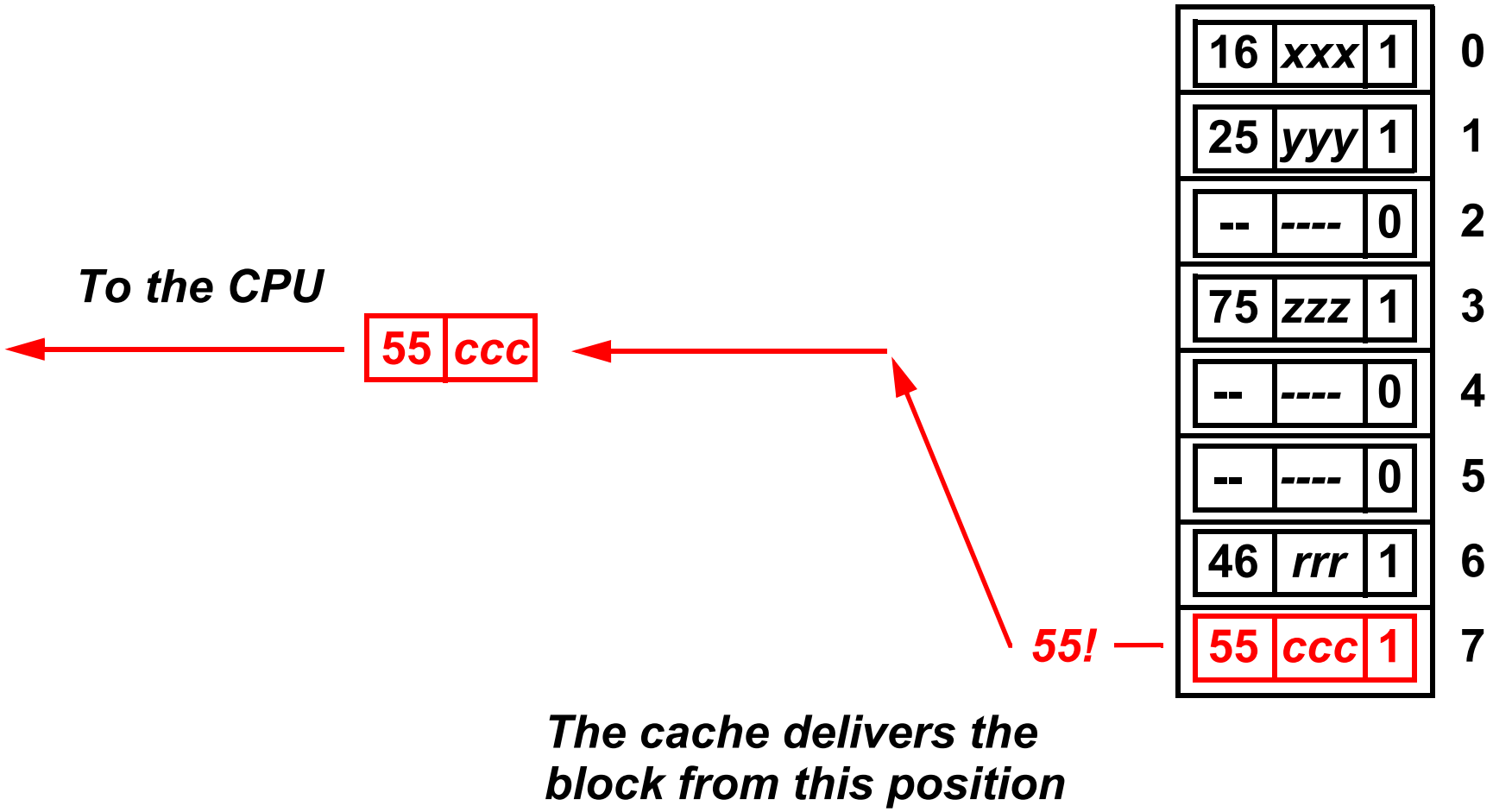
At access time, the position of the block can be calculated.

Calculation again: 55 mod 8 = 7

If the block is in the cache at all, it can be only at this position.

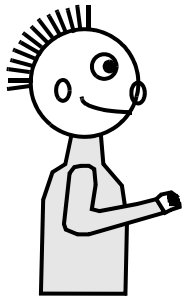


2.) Direct-Mapped Cache:

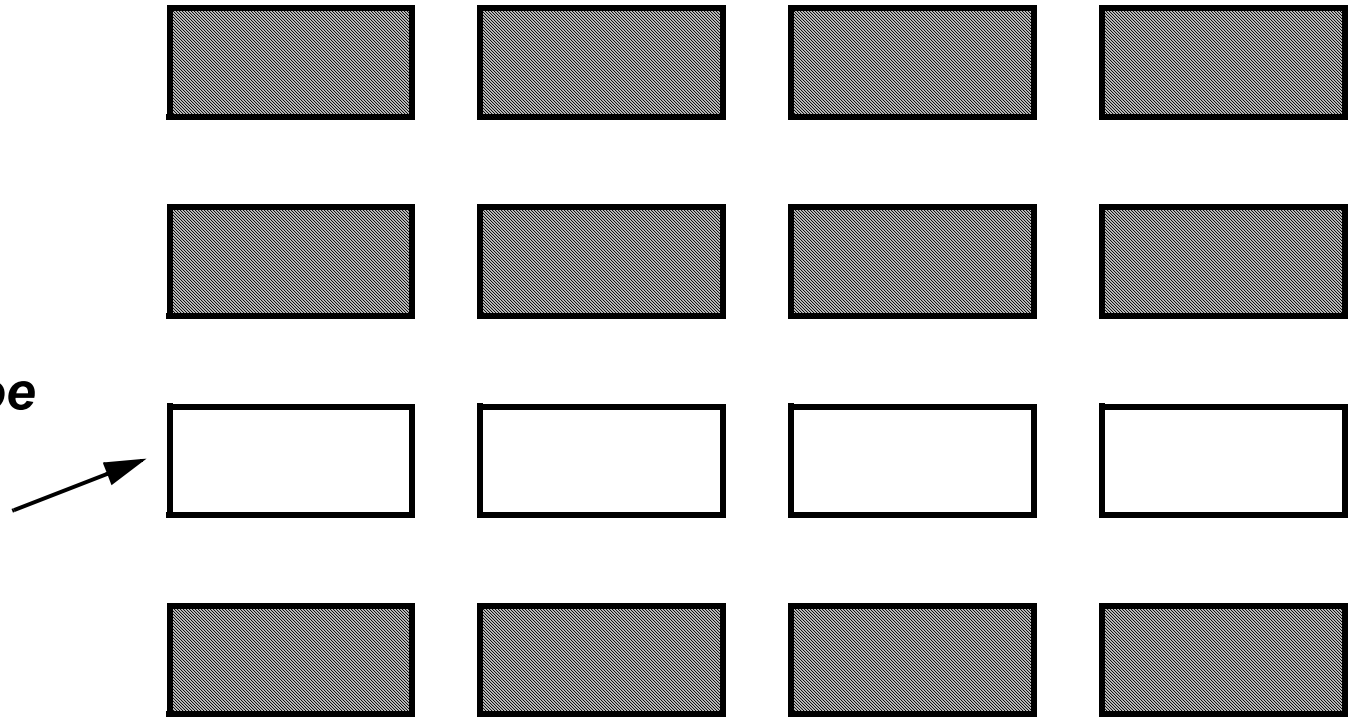


3.) Set-Associative Cache: An Everyday-Life Example

A lecture room with tables in rows:

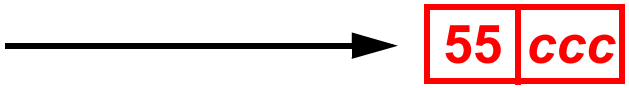


Student John Doe may sit in a designated row only



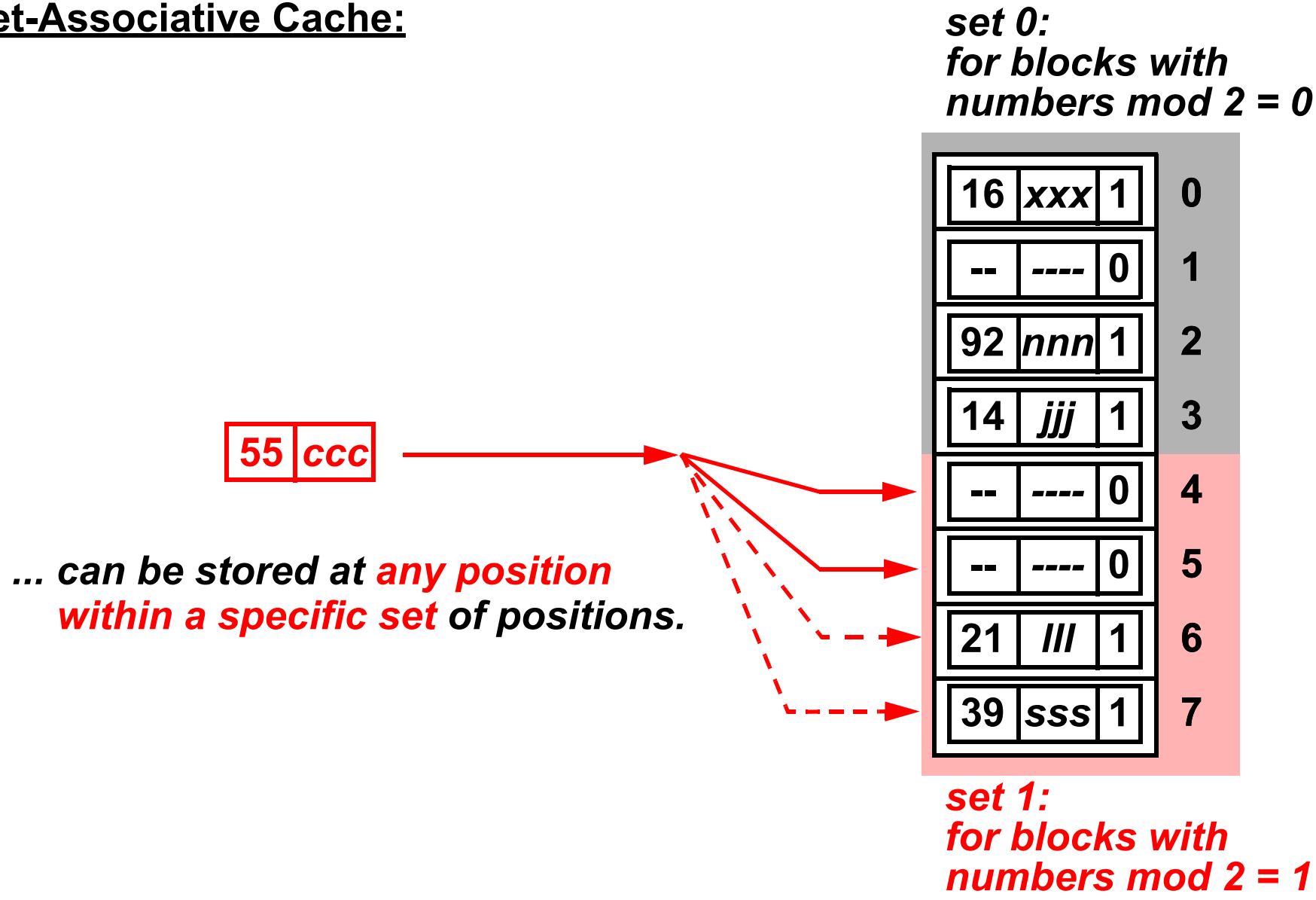
3.) Set-Associative Cache:

A block
coming from main memory ...

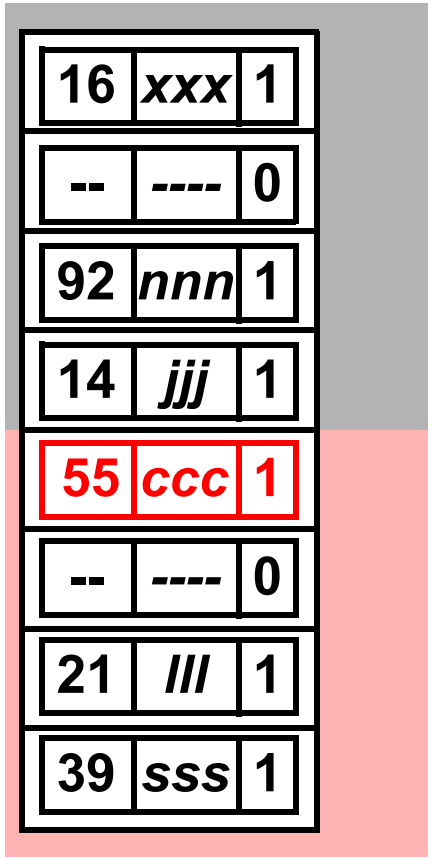


16	xxx	1	0
--	----	0	1
92	nnn	1	2
14	jjj	1	3
--	----	0	4
--	----	0	5
21	lll	1	6
39	sss	1	7

3.) Set-Associative Cache:

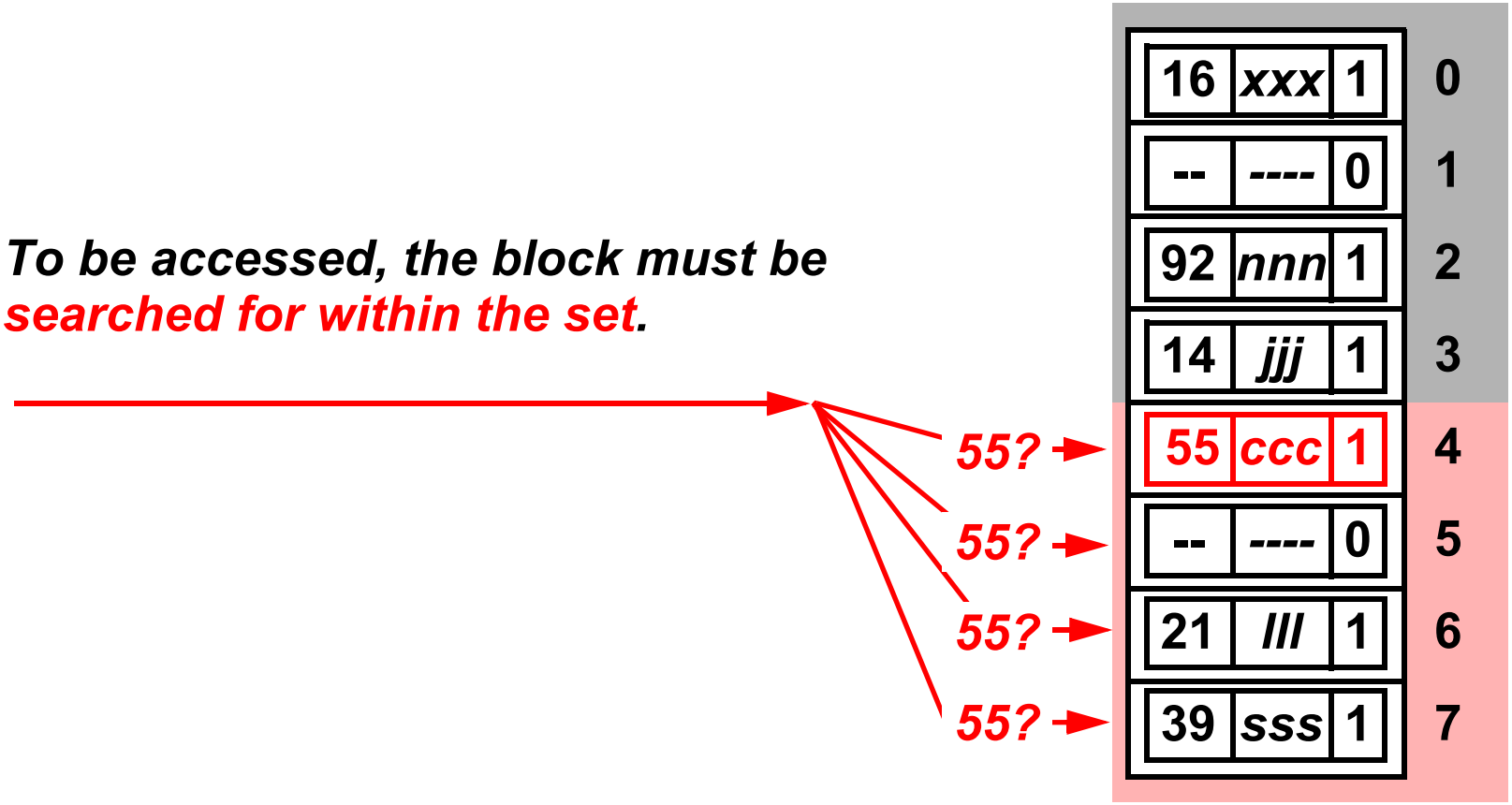


3.) Set-Associative Cache:



3.) Set-Associative Cache:

To be accessed, the block must be searched for within the set.



3.) Set-Associative Cache: