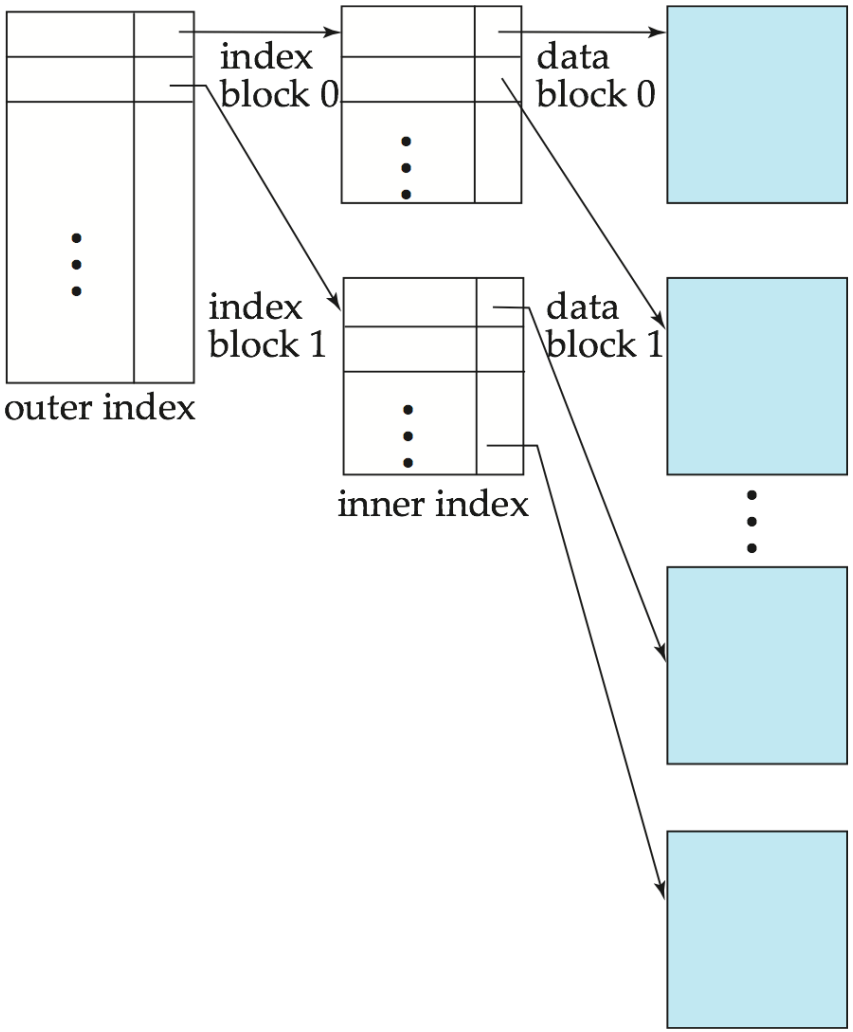
Multilevel Index

- Indexing the index!



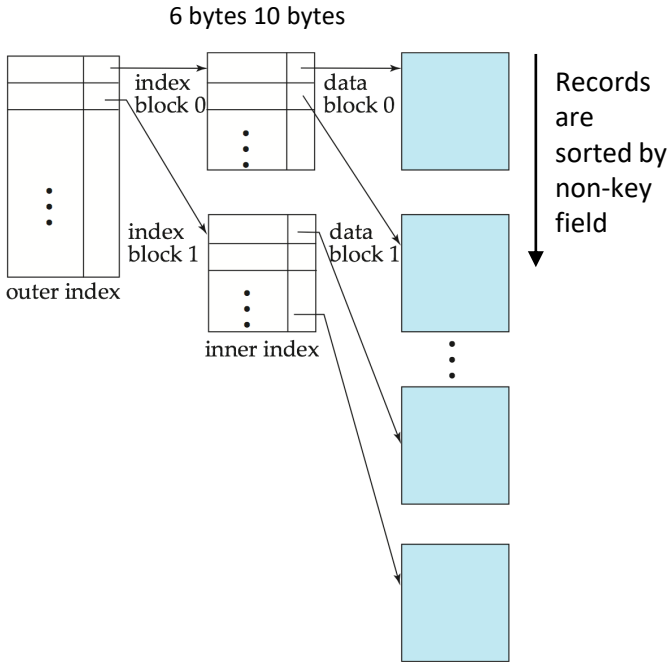
Indexing

- Consider a file of 16384 records. Each record is 32 bytes long and its key field is of size 6 bytes. The file is ordered on a non-key field, and the file organization is unspanned. The file is stored in a file system with block size 1024 bytes, and the size of a block pointer is 10 bytes. If the secondary index is built on the key field of the file, and a multi-level index scheme is used to store the secondary index, the number of first-level and second-level blocks in the multi-level index are respectively _____ .

Given Data

- The file organization is unspanned.
- Number of Records = 16384
- Record Size = 32 bytes
- Block Size = 1024 bytes

Search Key 6 bytes	Pointer 10 bytes

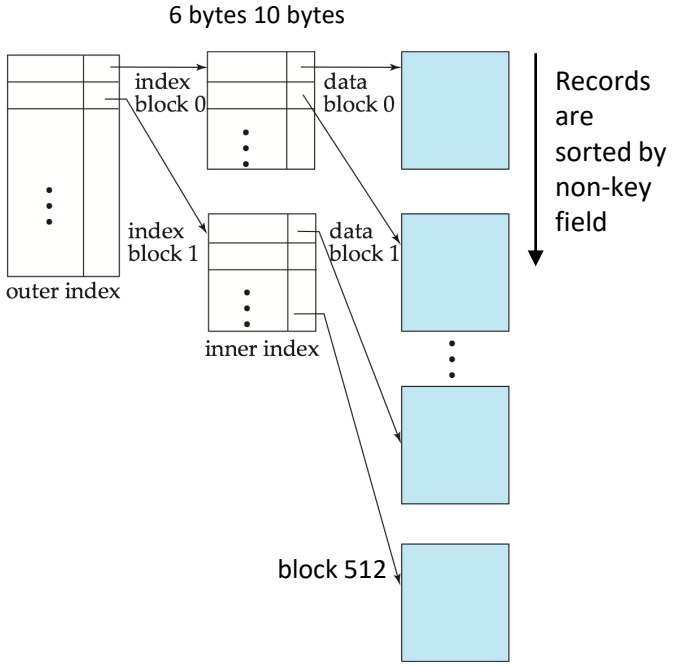


How many records per block?

1024/32 = 32 records per block

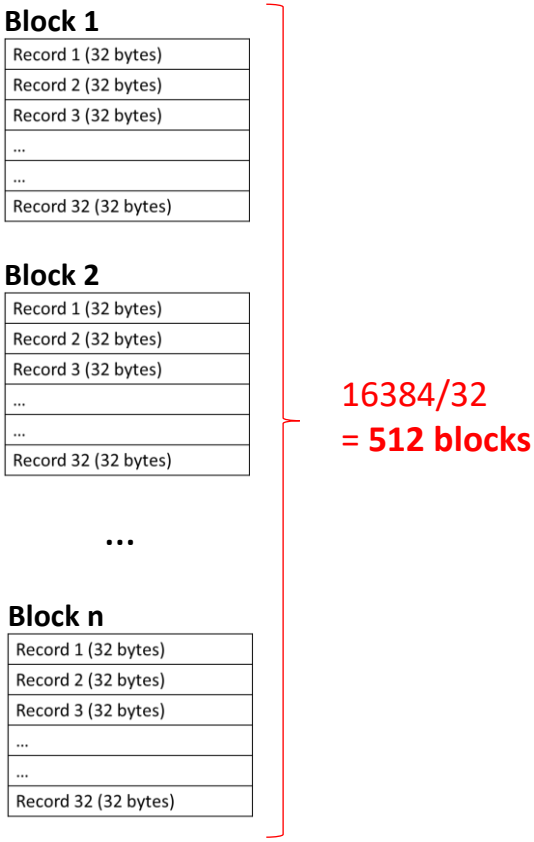
Block 1 (size = 1024 bytes)

Record 1 (32 bytes)
Record 2 (32 bytes)
Record 3 (32 bytes)
…
…
Record 32 (32 bytes)

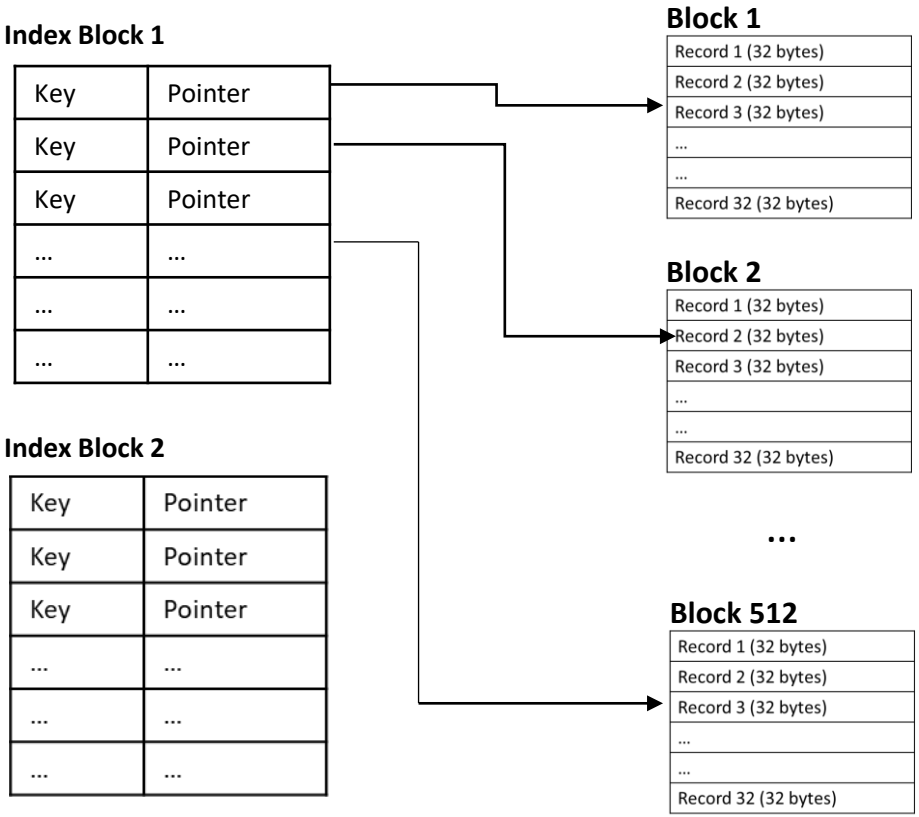


How many data blocks …

- … do we need if we have 16384 records?



How does the index block look like?



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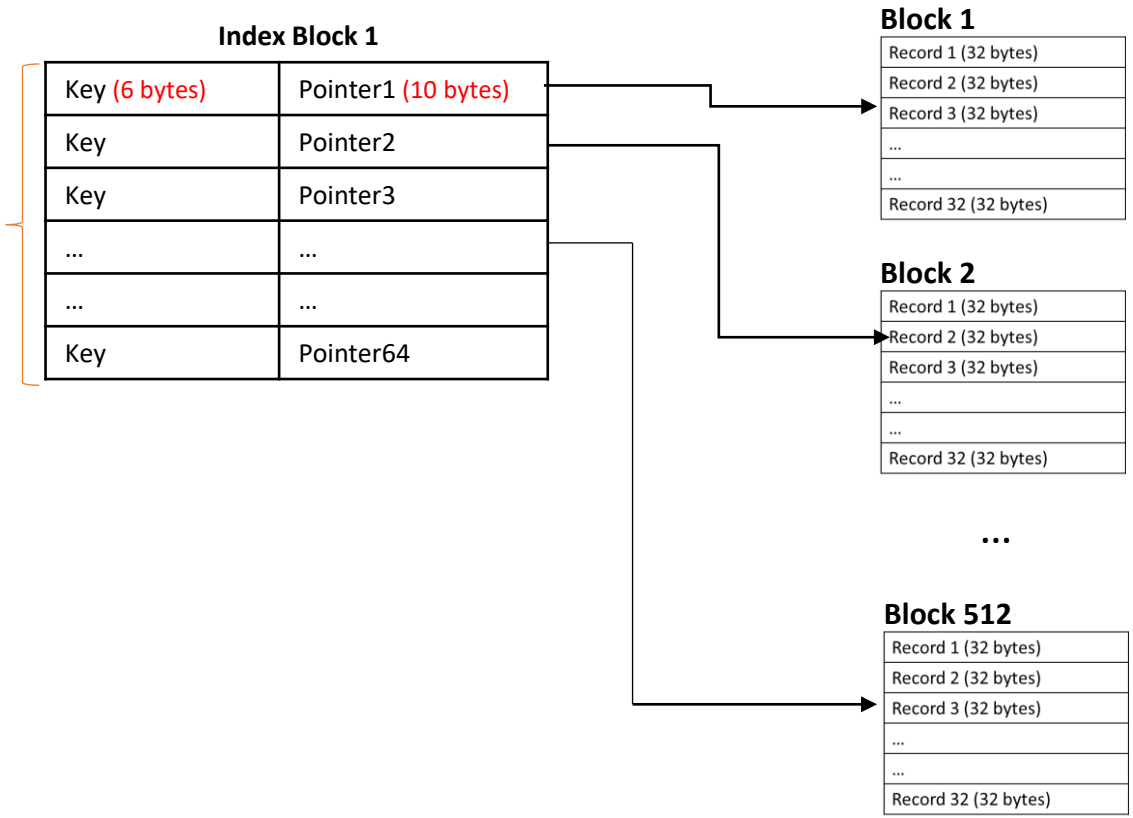
- How many index blocks exist?

So, 1024/16
= 64 records



How many levels of index do we need?

Index Block 1

Key (6 bytes)	Pointer1 (10 bytes)
Key	Pointer2
Key	Pointer3
…	…
…	…
Key	Pointer64

Index Block 2

Key (6 bytes)	Pointer65 (10 bytes)
Key	Pointer66
Key	Pointer67
…	…
…	…
Key	Pointer128

Totally, 16384/64 = 256 index blocks exist.

Block 1

Record 1 (32 bytes)
Record 2 (32 bytes)
Record 3 (32 bytes)
…
…
Record 32 (32 bytes)

Block 2

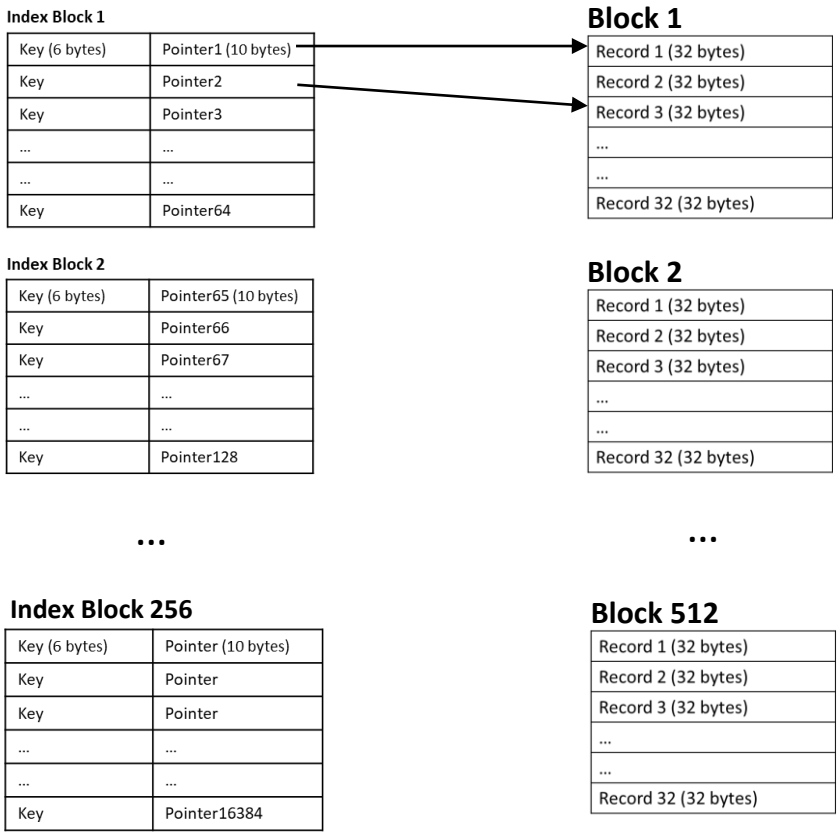
Record 1 (32 bytes)
Record 2 (32 bytes)
Record 3 (32 bytes)
…
…
Record 32 (32 bytes)

…

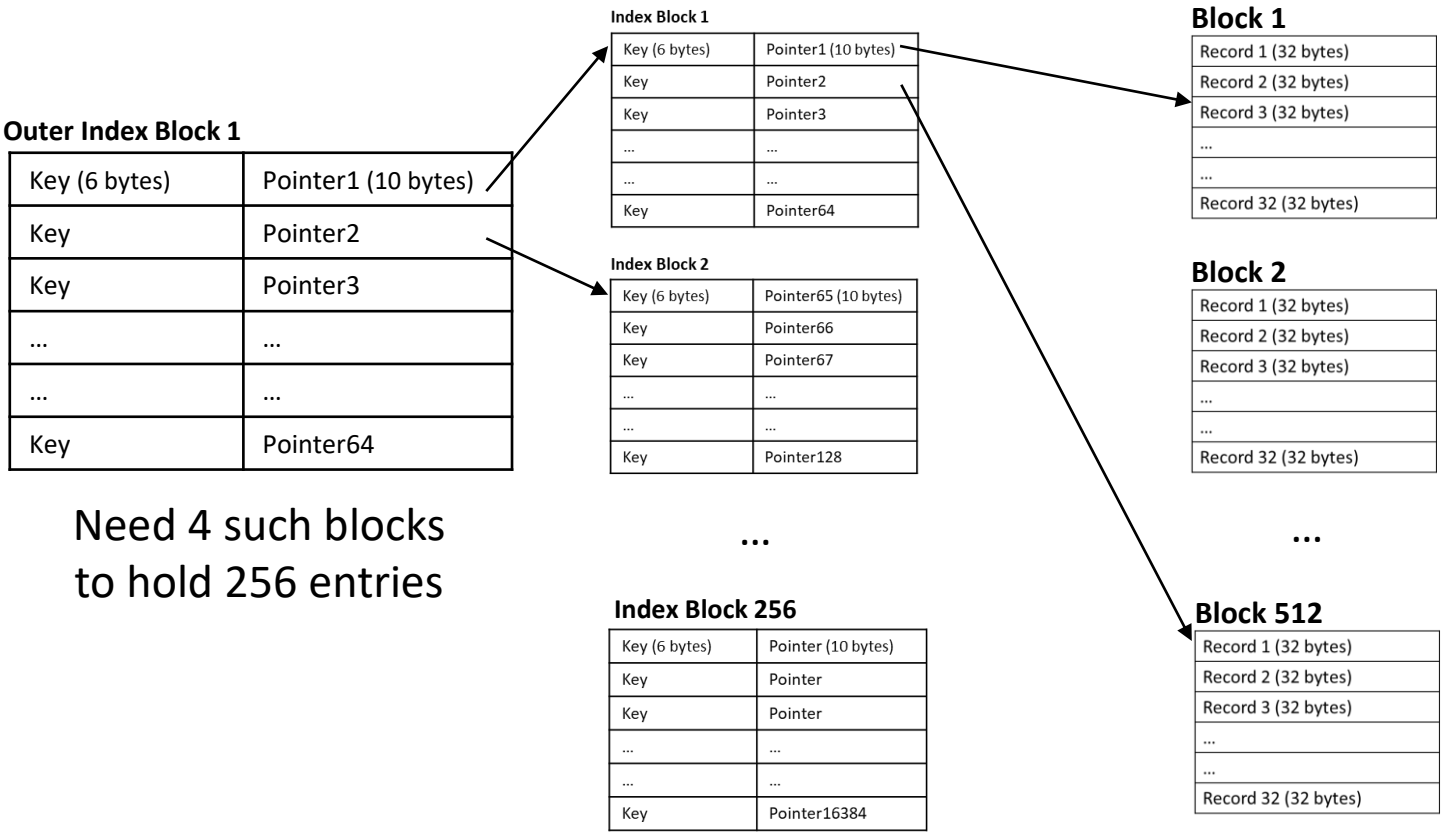
Block 512

Record 1 (32 bytes)
Record 2 (32 bytes)
Record 3 (32 bytes)
…
…
Record 32 (32 bytes)

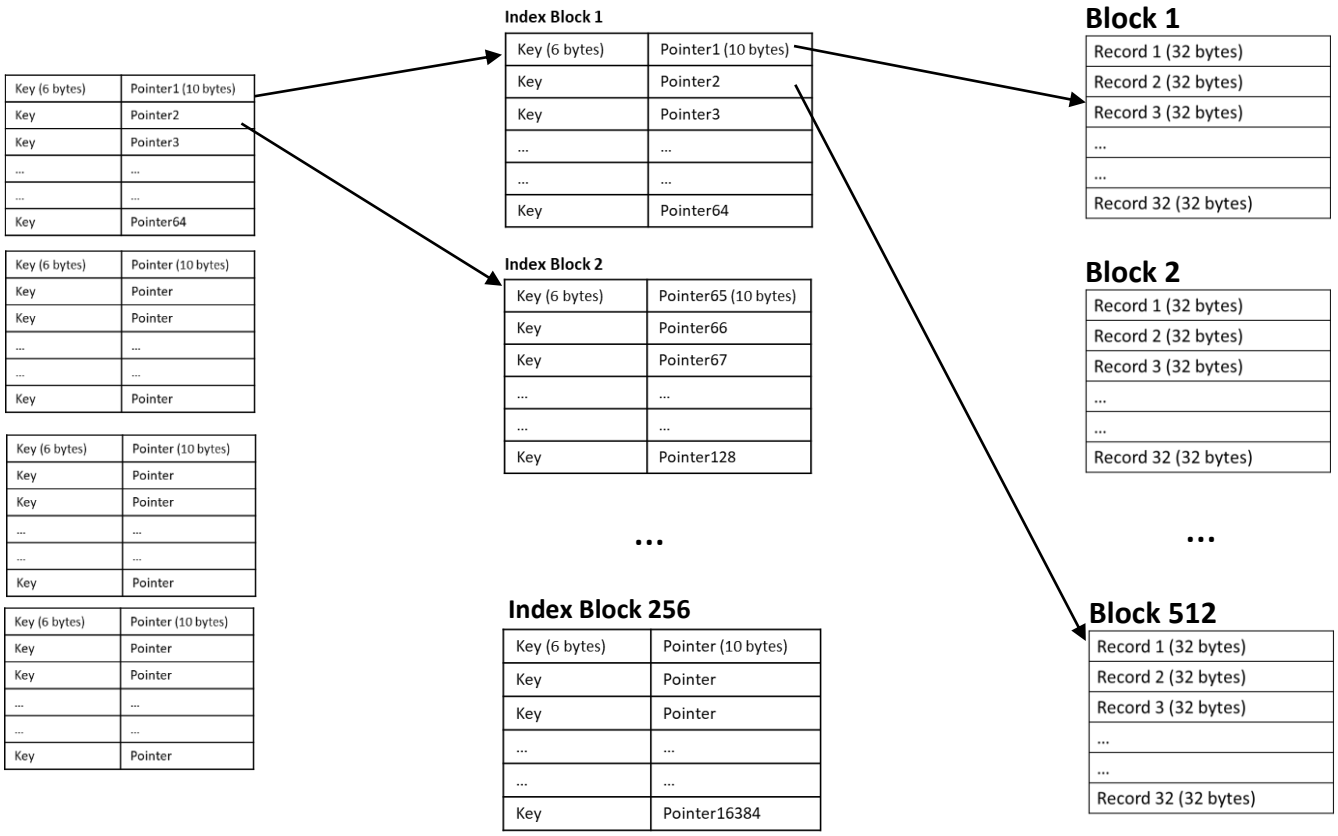
How many levels of index do we need?



How many levels of index do we need?



How many levels of index do we need?



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- **Answer: (256, 4)**