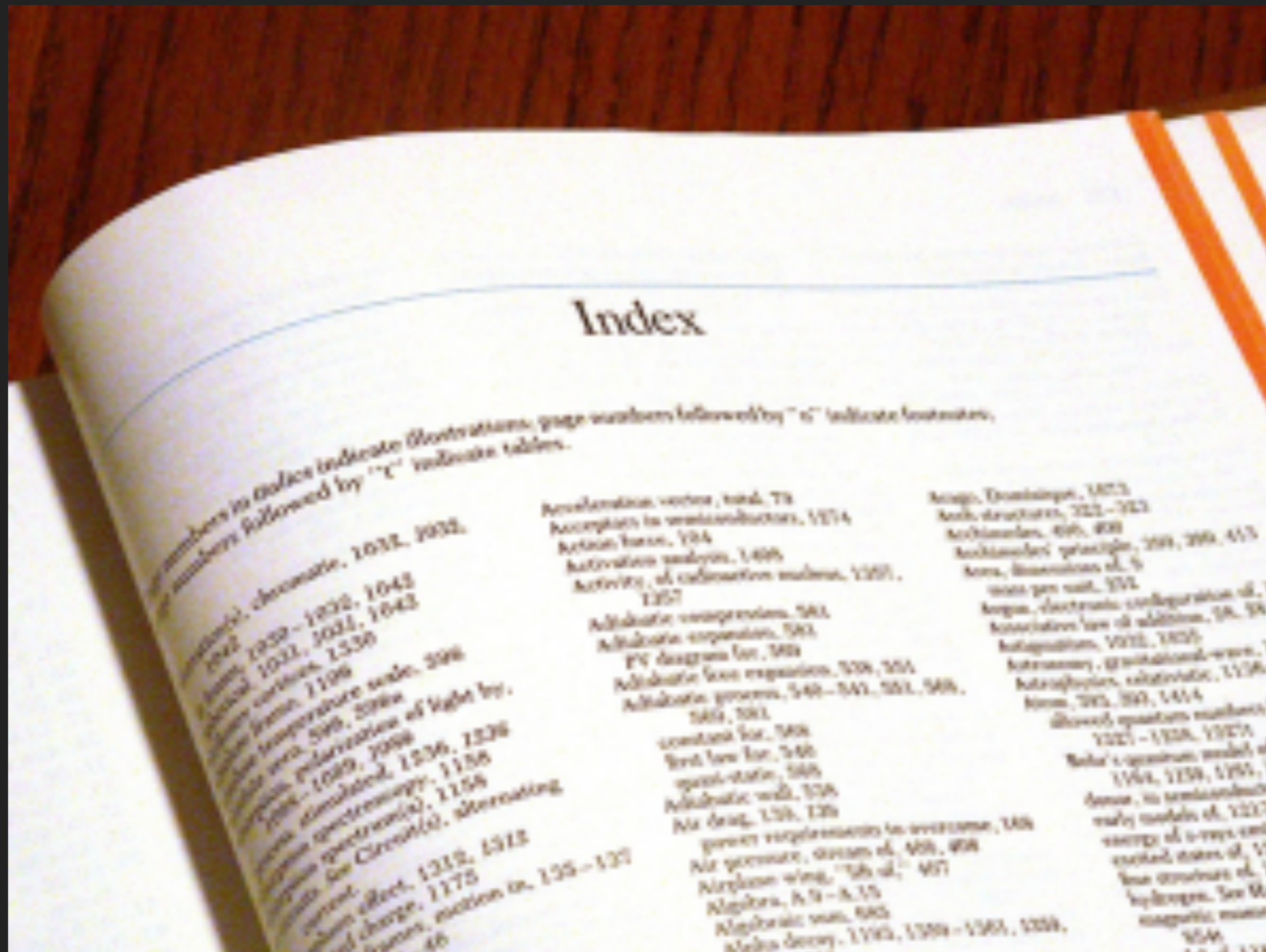


CSC 350

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# INDEXING

# What is an Index?



## INDEXING BASICS

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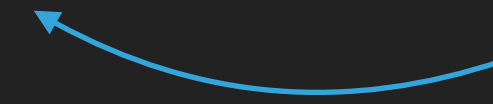
- ▶ **Access types:** The types of access that are supported efficiently. Access types can include finding records with a specified attribute value and finding records whose attribute values fall in a specified range.
- ▶ **Access time:** The time it takes to find a particular data item, or set of items, using the technique in question.
- ▶ **Insertion time:** The time it takes to insert a new data item. This value includes the time it takes to find the correct place to insert the new data item, as well as the time it takes to update the index structure.
- ▶ **Deletion time:** The time it takes to delete a data item. This value includes the time it takes to find the item to be deleted, as well as the time it takes to update the index structure.
- ▶ **Space overhead:** The additional space occupied by an index structure. Provided that the amount of additional space is moderate, it is usually worthwhile to sacrifice the space to achieve improved performance.

## INDEXING BASICS

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An attribute or set of attributes used to look up records in a file is called a **search key**.

Not the same as a primary key!



If the file containing the records is sequentially ordered, a **clustering index** is an index whose search key also defines the sequential order of the file.

AKA "Primary Index"



Indices whose search key specifies an order different from the sequential order of the file are called **nonclustering indices**.

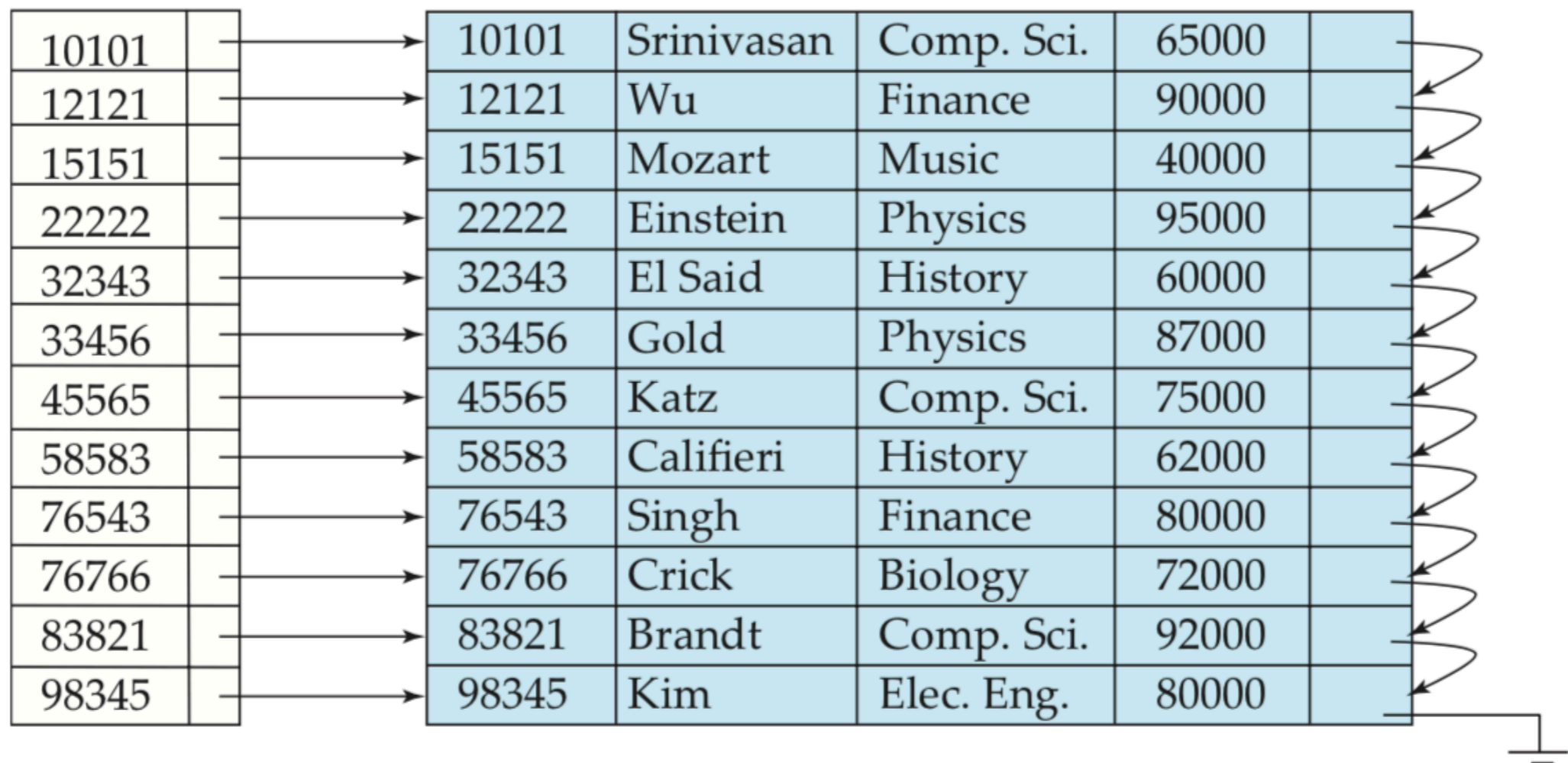
AKA "Secondary Index"



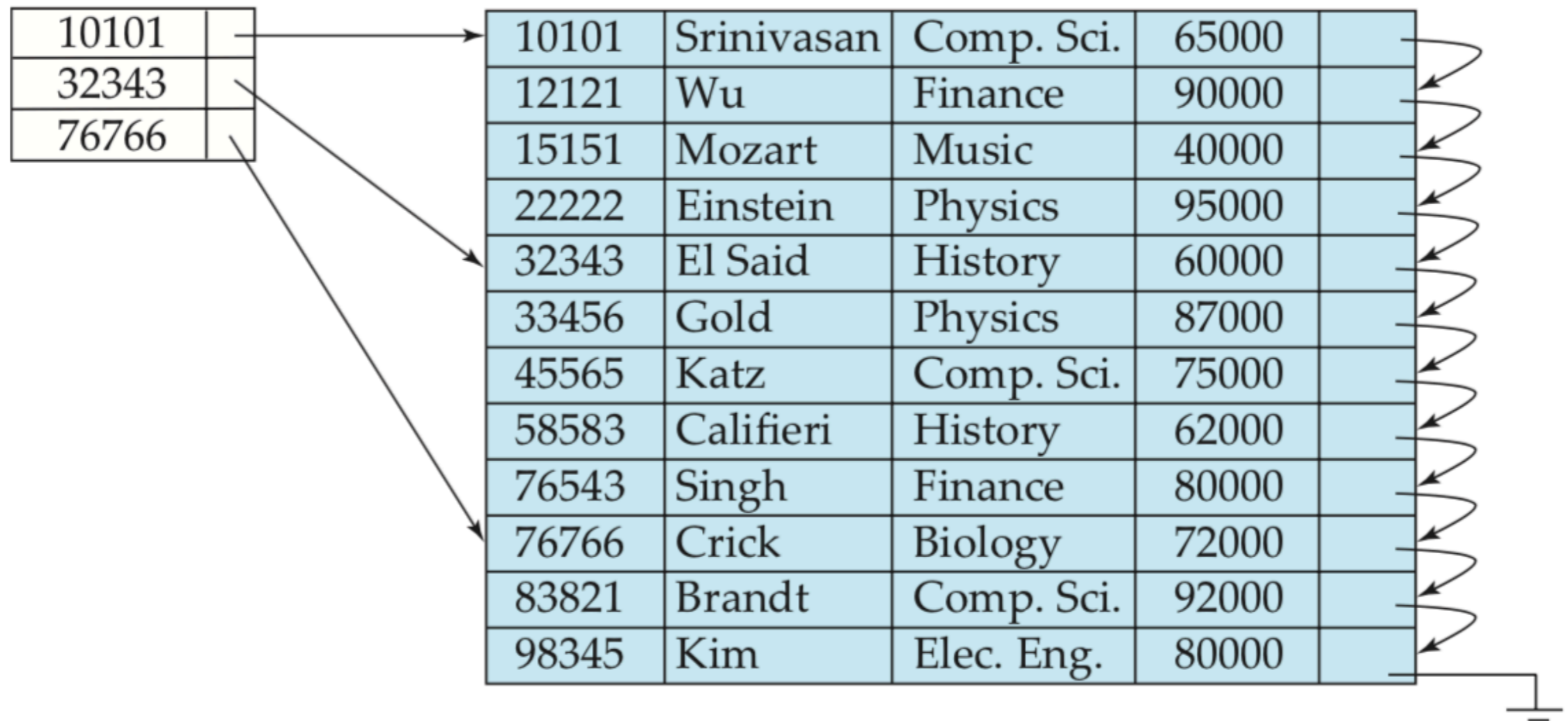
An **index entry, or index record**, consists of a search-key value and pointers to one or more records with that value as their search-key value.

# TYPES OF INDICES

## Dense Index



## Sparse Index



## TYPES OF INDICES

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Dense Index

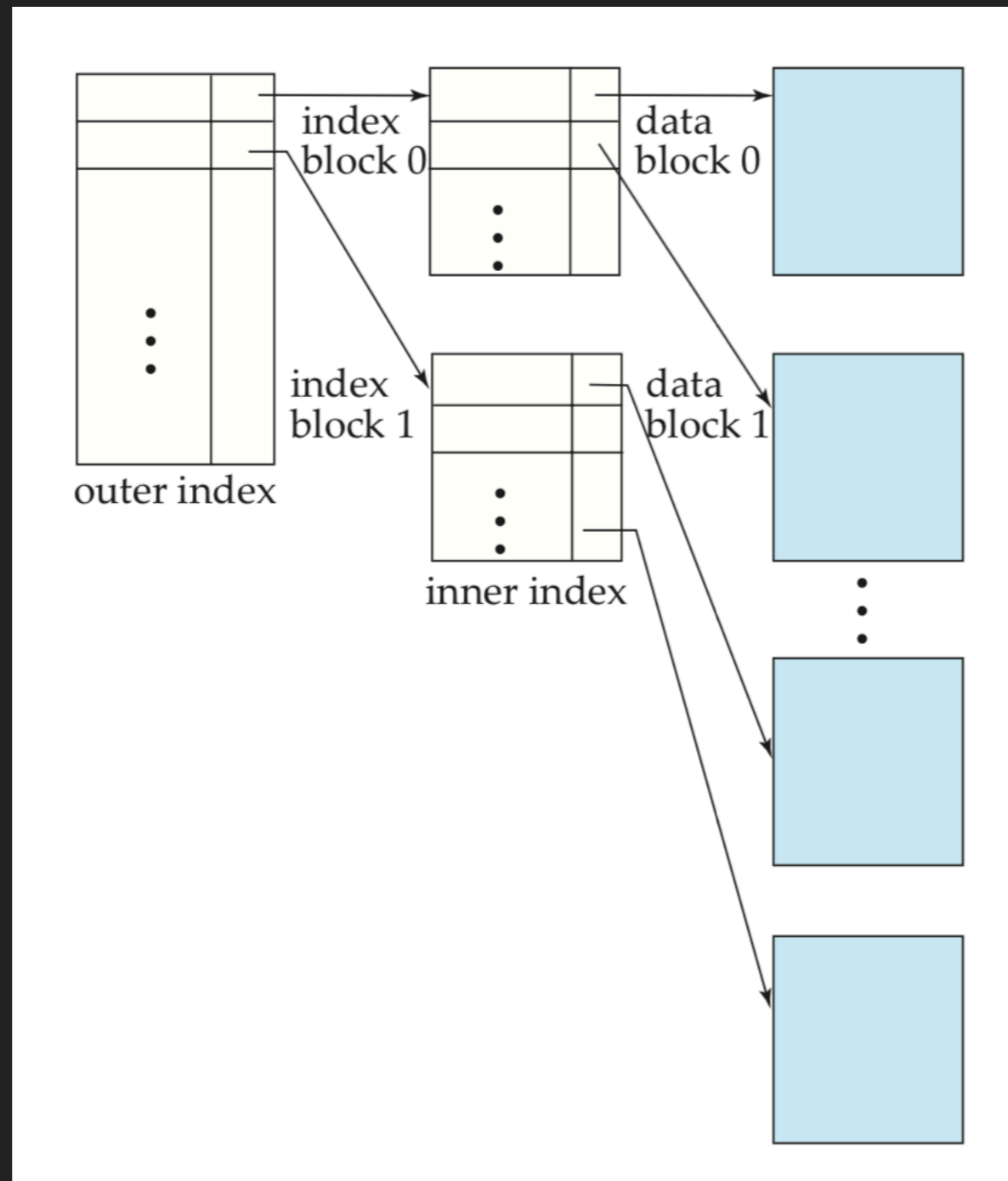
Faster Lookups

Sparse Index

Less Space

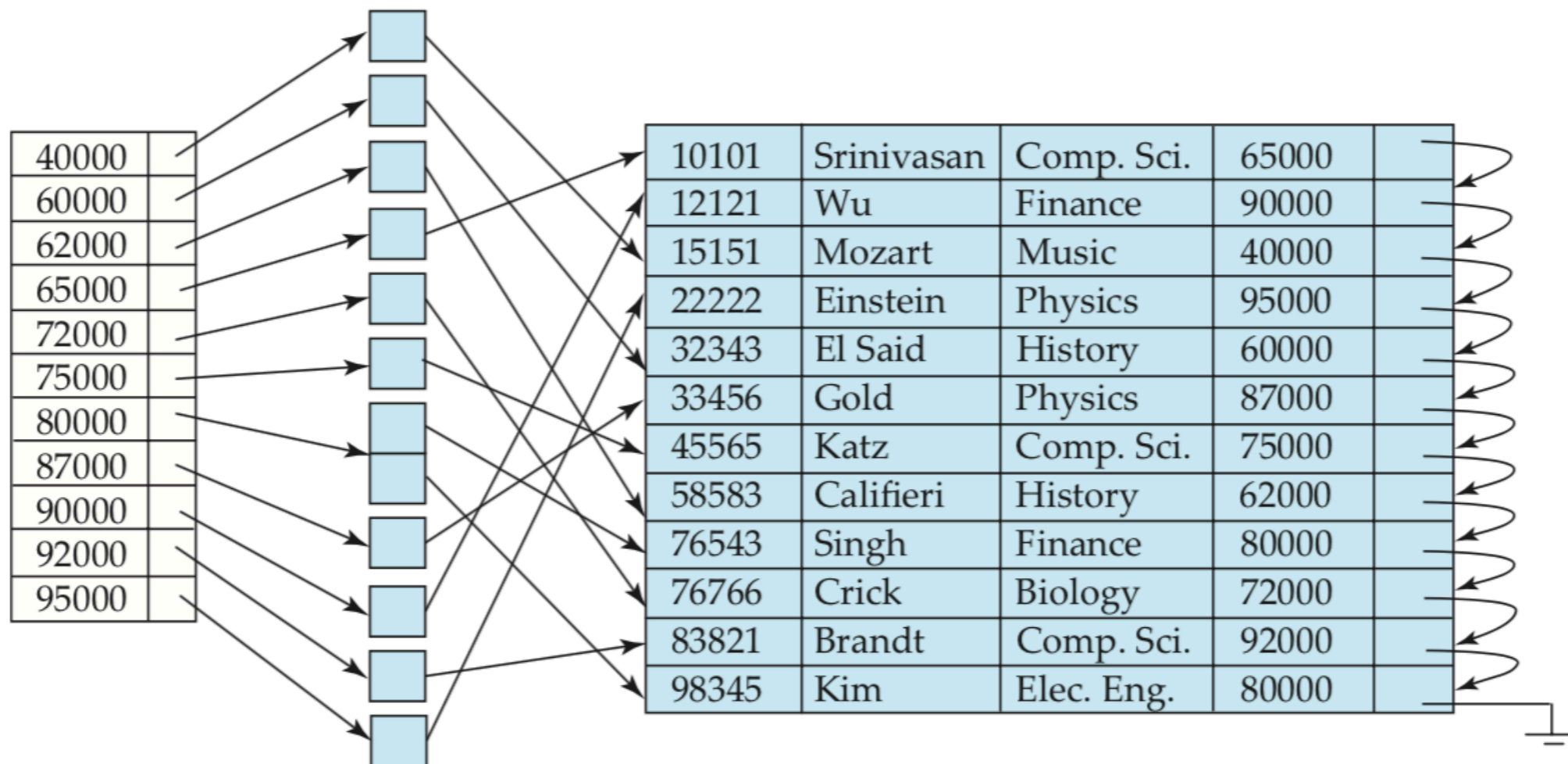
Less Maintenance Overhead

# Multilevel Index

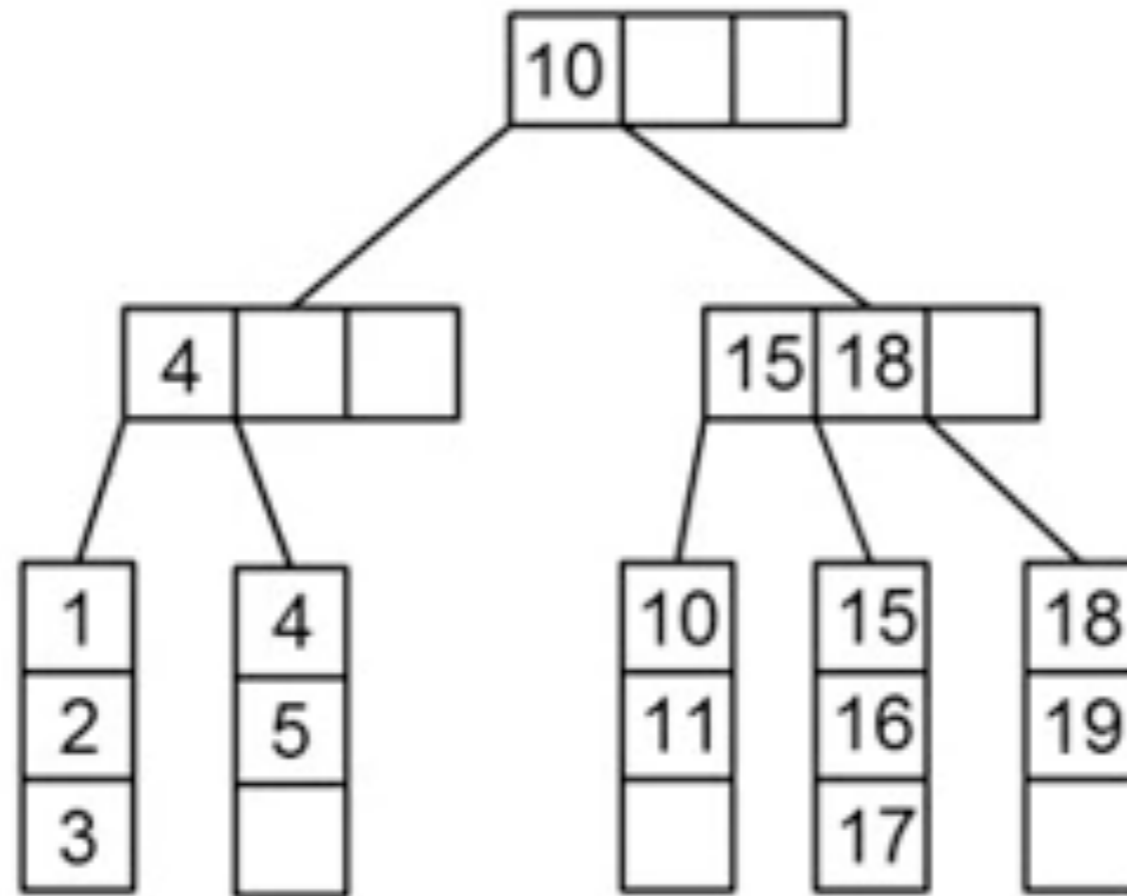




## Secondary Index



# B+ TREES



# B+ TREES - INSERTION

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## B+TREES - DELETIONS

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