Tutorial 5 - Feb 11

Advanced SQL and Indexing

Agenda

- Aggregation Function
- Group by/ Having/ Joins/Views
- Indexes
- Questions

Aggregation Functions

- Max, Sum, Count, Min, Avg
- Used with a select clause on a particular attribute

```
select max(grade)

from student

where id = ‘234’;
```

Aggregation functions

```
select avg(age)
from student
where grade >= 11;
```

Having Clause

```
Select * from Student
group by age,
Having max(age)> 22 ;
```

Group by

- The Group by clause can be used to collect data across multiple records and group the results by one or more columns.
- It can be used with a Select- From- Where format query.
- Often used with Aggregation and Having queries

Group By

- select name, id
- from student
- where id IN (‘234’, ‘456’, ‘567’, ‘678’,’789’)
- AND name Like ‘A%’
- group by name;

Order By

- To get the data in a particular column in a sorted manner order by is used
- You can sort in ascending or descending using the syntaxes as follows:
- order by asc;
- order by desc;

Views

- Views are tables created which are generally used to obtain and view intermediary results.

- Views are very helpful while working on large sets of data involving multiple transformations before obtaining the final output.

- Syntax for Views are :

```
Create VIEW Stud AS
Select name
From Student
Where id =‘234’;
```

Views

- There may be cases where you may not want another user to see your data. A view can be used in such an instance.
- The view provides a mechanism to hide certain data from other users.
- Treat a view as a normal table while querying from it.

Views

- Example of querying from views:

Select Name From Stud

Where id =‘234’;

This will return the result from the view as long as the view still exists.

There are two types of views:

- Materialized
- Virtual

Inner Joins

Student

NAME	ID	Address	Grade
Ron	123	12, broadway	10
James	234	32,emerson	11
Andy	345	45, leland	12
Lester	456	56, westdale	10

TA

ID	Salary	Age
123	4000	34
234	2000	23
345	8000	45
456	5500	20

Inner Joins

```
SELECT name, address, age,salary
FROM student

INNER JOIN TA

ON  Student.ID = TA.TID;
```

Inner Joins

NAME	ID	Address	Age	Salary
Ron	123	12, broadway	34	4000
James	234	32,emerson	23	2000
Priya	345	45, leland	45	8000
Lester	456	56, westdale	20	5500

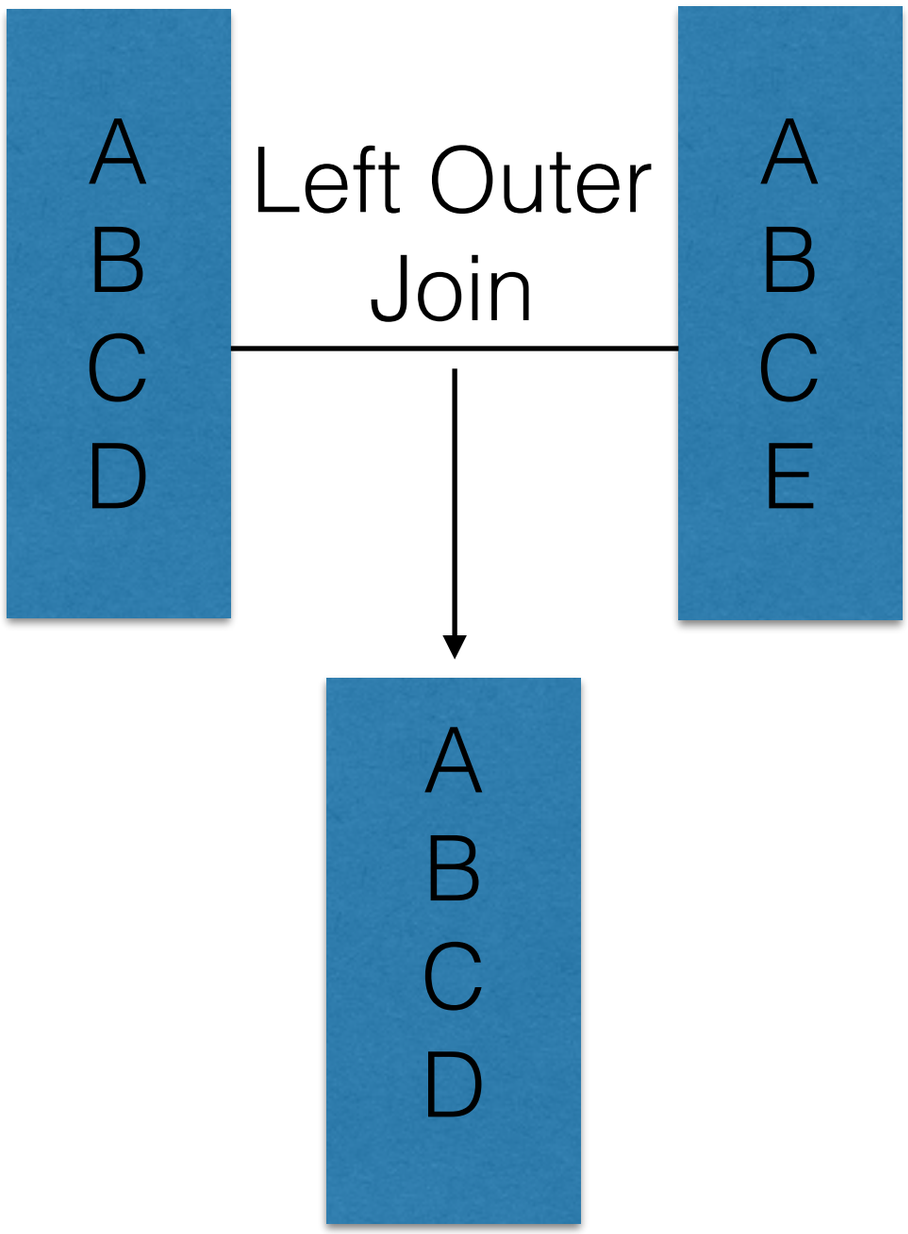
Outer Joins

- There are 3 types of outer joins
- Left
- Right
- Full
- What are the “left” and “right” tables? The “left” table is simply the table that comes first in the join statement

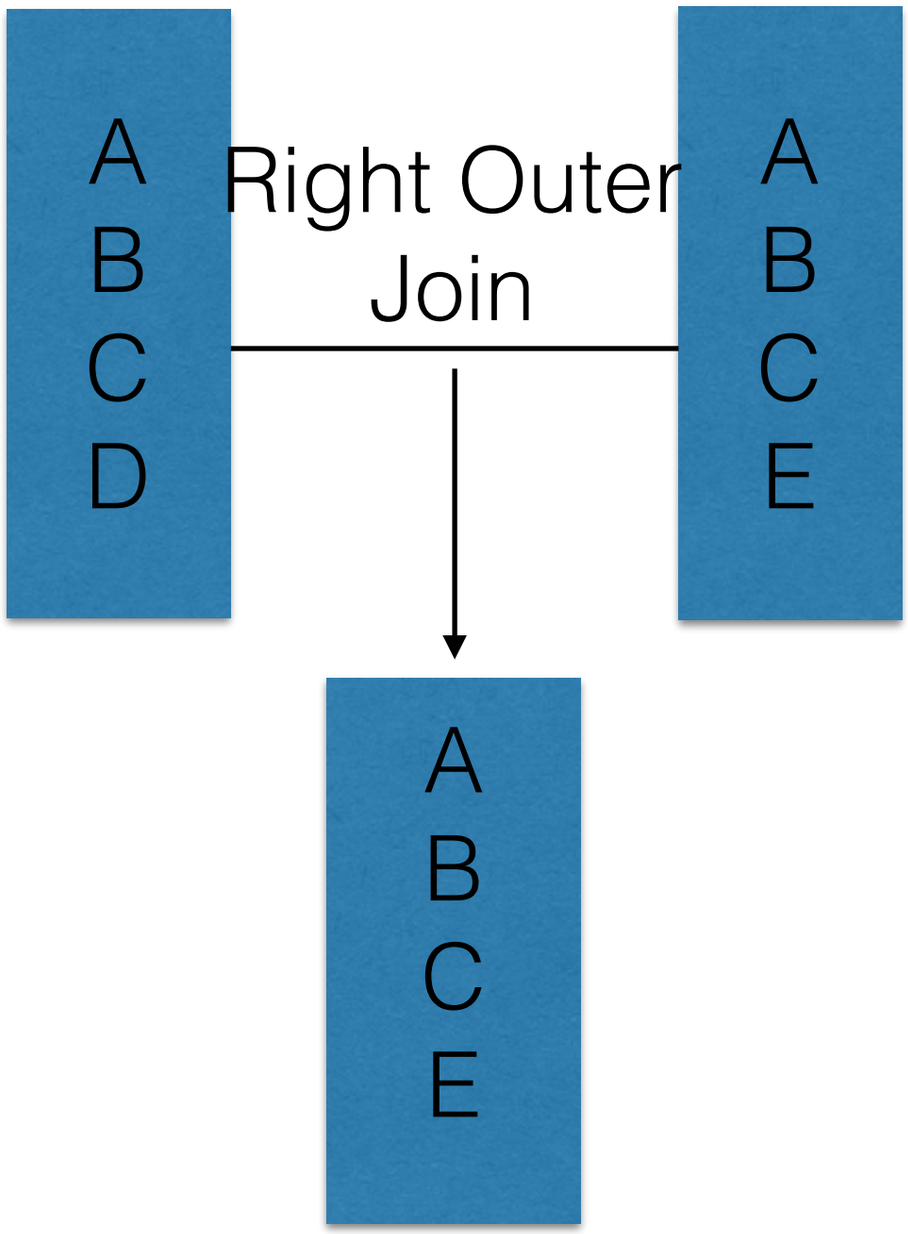
Outer Joins

- The outer join on its on is considered as a natural outer join
- The left outer join is when all the contents from the left table is kept as is and the right table is joined to it.
- The vice-versa happens for the right outer join.
- The full outer join returns all the values from both the left and right tables.

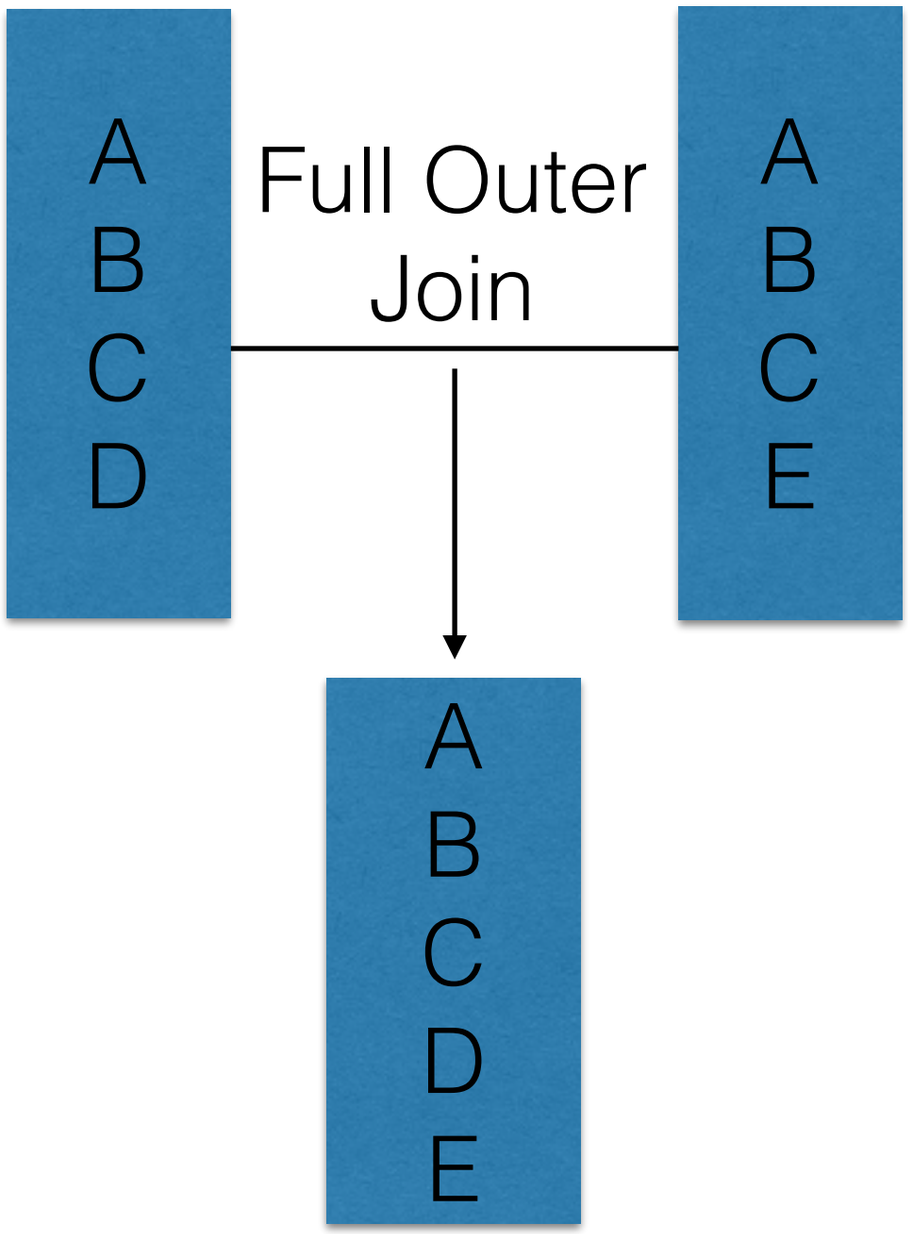
Left Outer Joins



Right Outer Join



Full outer Join



Indexing

- Indexes are data structures used to increase the speed of accessing the tuples.
- It searches the attributes by the value specified.
- Records are organized by trees or hashing.

Index

- Syntax:

CREATE INDEX Student ON TA(id);

CREATE INDEX Student ON TA(name,

id);

Where not to use indexes?

- Indexes should not be used on small tables.

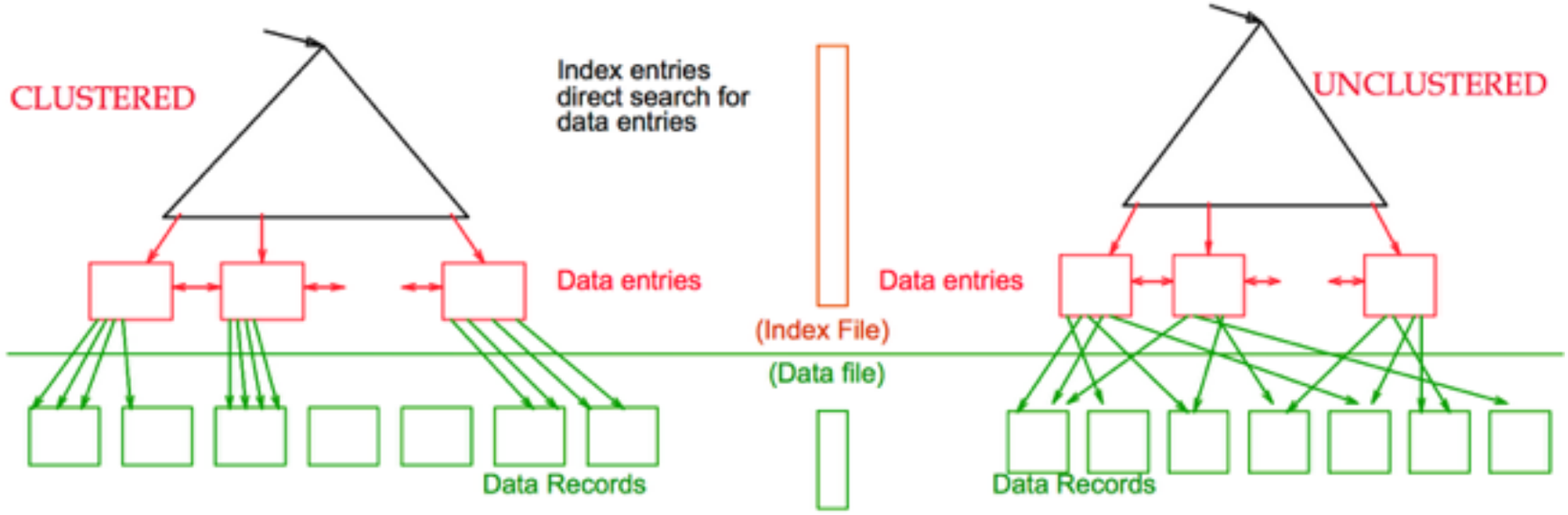
- Tables that have frequent, large batch update or insert operations.

- Indexes should not be used on columns that contain a high number of NULL values.

- Columns that are frequently manipulated should not be indexed.

Types of Index

- Clustered vs Unclustered Index

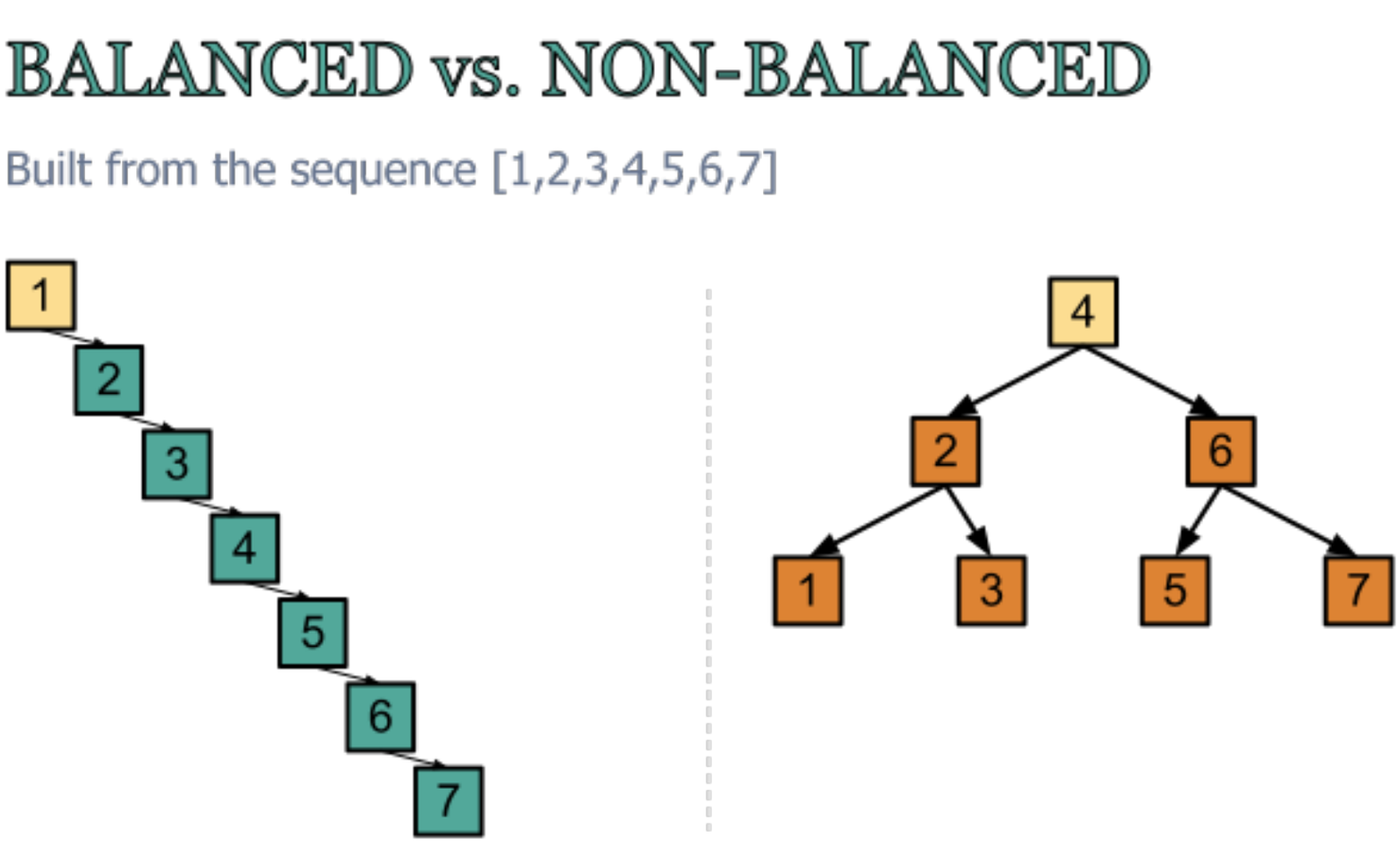


- Primary vs Secondary Index: If search key contains primary key, then called primary index.

Credit : Dr. Fei Chiang

Balanced vs Unbalanced Trees

- Every leaf node in every path is at the same distance from the root node.



Credit: www.stoimen.com

Hash Indexes

- Indexes are collected in buckets.
- Hashing Function h(r):
- h(r) = bucket in which (data
- entry for) record r belongs. h looks at the search
- key fields of r.

Questions?

Thank You!

ITB 223, 3-4 pm Thursdays
No tutorials or TA hours for reading week
You can always mail for queries at:
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