

6.830 Lab 2: Operators

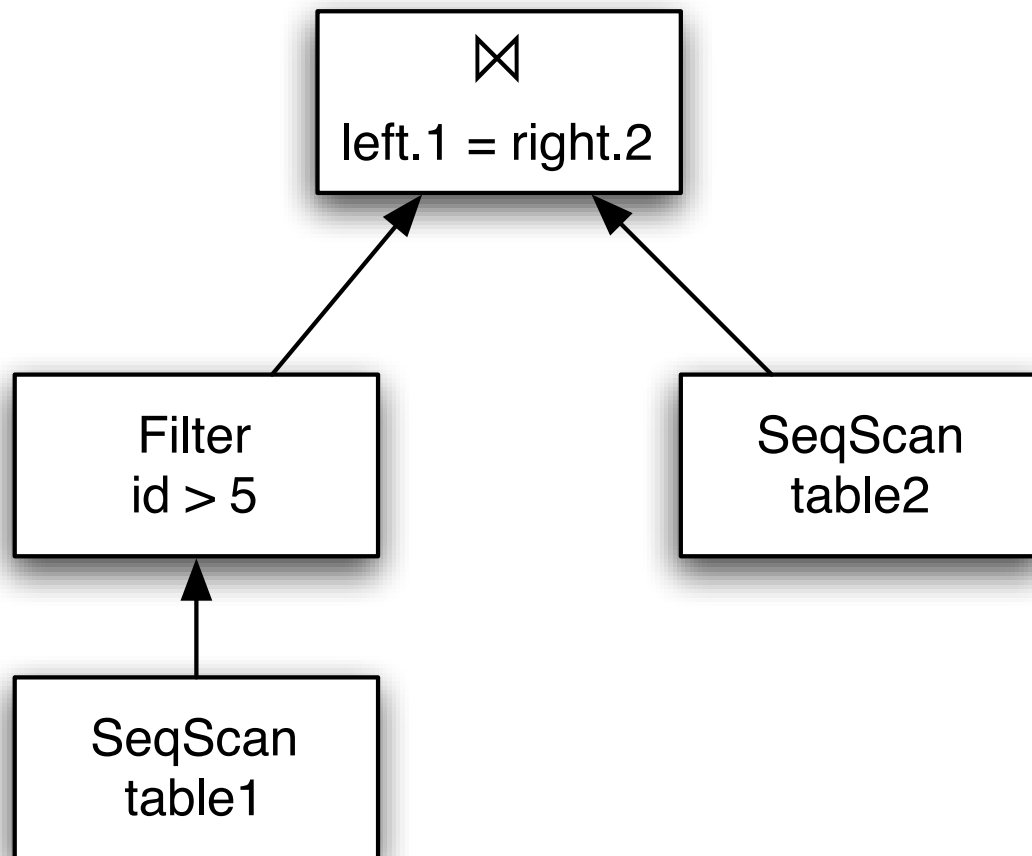
Goals

- Operators: Join, aggregate, filter, etc.
- Add and delete tuples
- Buffer pool eviction
- SQL parser

Example Query

```
SELECT * FROM table1, table2  
WHERE table1.field1 =  
      table2.field2  
AND table1.id > 5
```

Example Query



Operators = Iterators

- open: Called before using
- hasNext: Returns true if there are more results
- next: Returns the next tuple
- rewind: Repositions the iterator at the beginning
- close: Called when finished using

AbstractDbIterator

Abstract class to reduce duplication in
hasNext/next

- readNext: Returns the next tuple, or null if there are no more
- close: Call super.close()

Join Pseudocode

```
for left in leftIterator:  
    for right in rightIterator:  
        return left + right  
    rightIterator.rewind()
```

Join TupleDesc

Output of join: combined tuple

TupleDesc for join: combine the two
TupleDescs using TupleDesc.combine()

Aggregate Implementation

- Input: tuples
- Output:
 - (group, result) tuples
 - (result) tuples (if group == NO_GROUPING)

Must process all input before producing any output

TupleIterator may be useful

Aggregate TupleDesc

Output of Aggregate: (group, int) or (int)

TupleDesc for Aggregate: (type of group, int)
or (int)

Build a new TupleDesc with these types

Aggregate vs Aggregator

Aggregate:

- Operator in the query plan
- Handles any types

Aggregator:

- Interface used by Aggregate to handle specific types of values
- Implement both IntAggregator and StringAggregator

Insert

Inserts tuples from child iterator into the table

Returns one tuple: count of tuples inserted

Insert Pseudocode

for page in file:

 if page has empty slots:

 write tuple into slot

 return

write new page to file

read page via the BufferPool

Write tuple into page

HeapFile.addTuple

Returns: ArrayList<Page> of dirty pages

- Other table types (eg. B+Tree) may dirty more than one page

Delete

Removes tuples from child iterator from the table

Returns one tuple: count of tuples deleted

Delete Pseudocode

for tuple in child:

 page = file.pages[tuple.recordId.page]

 page.setSlot(tuple.recordId.slot, false)

 page.tuples[tuple.recordId.slot] = null

BufferPool Eviction

Must evict pages from BufferPool

Many policies will work

- Least Recently Used
- Most Recently Used
- Random

(comment out `EvictionTest.testAllDirtyFails`)

SQL Parser

Use your implementation to execute queries!

Performance contest: Win \$50!