

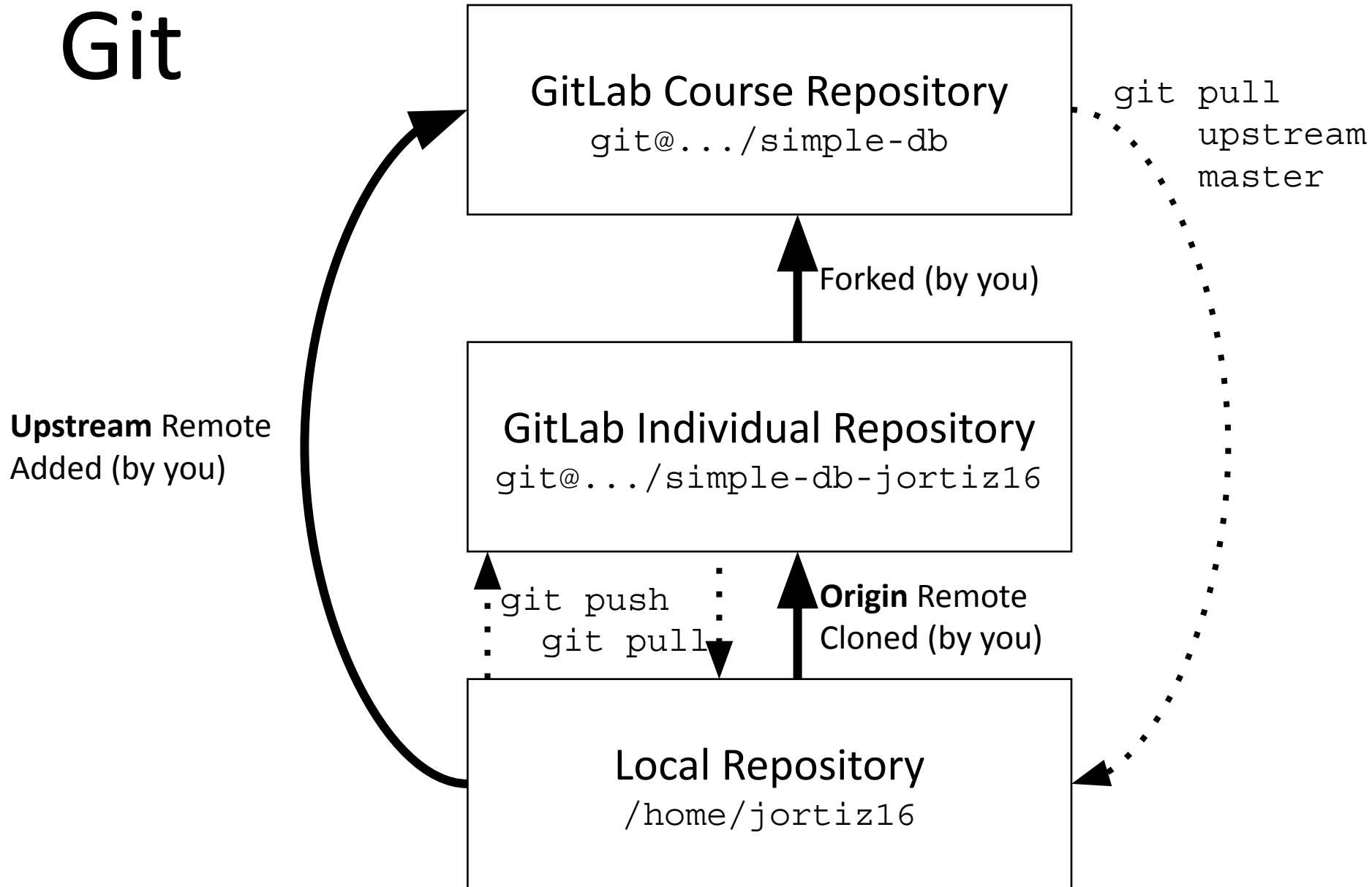
SimpleDB Overview

CSE 444 – Section 1

Today...

- Demo Git/Eclipse Setup
- Go through an overview of SimpleDB

Git



What you should NOT do:

- **Modify given classes**
 - Removing, renaming, relocating to other packages
- **Modify given methods**
 - Changing parameters or return types
- **Use third-party libraries**
 - Except the ones under lib/directory
 - You can do everything using regular Java libraries

What you CAN do:

- **Add new classes/interfaces/methods/packages**
 - Watch out for name conflicts with future labs!
 - Safer choice: use new packages (best) or inner classes (meh)
- **Re-implement provided methods**
 - Just don't destroy correctness or specification!
- **Find bugs!**

What you CAN do (continued):

- **System test cases**

- Under test/systemtest
- We'll grade using additional tests

- **Write up**

- Explain why do you implement in that way

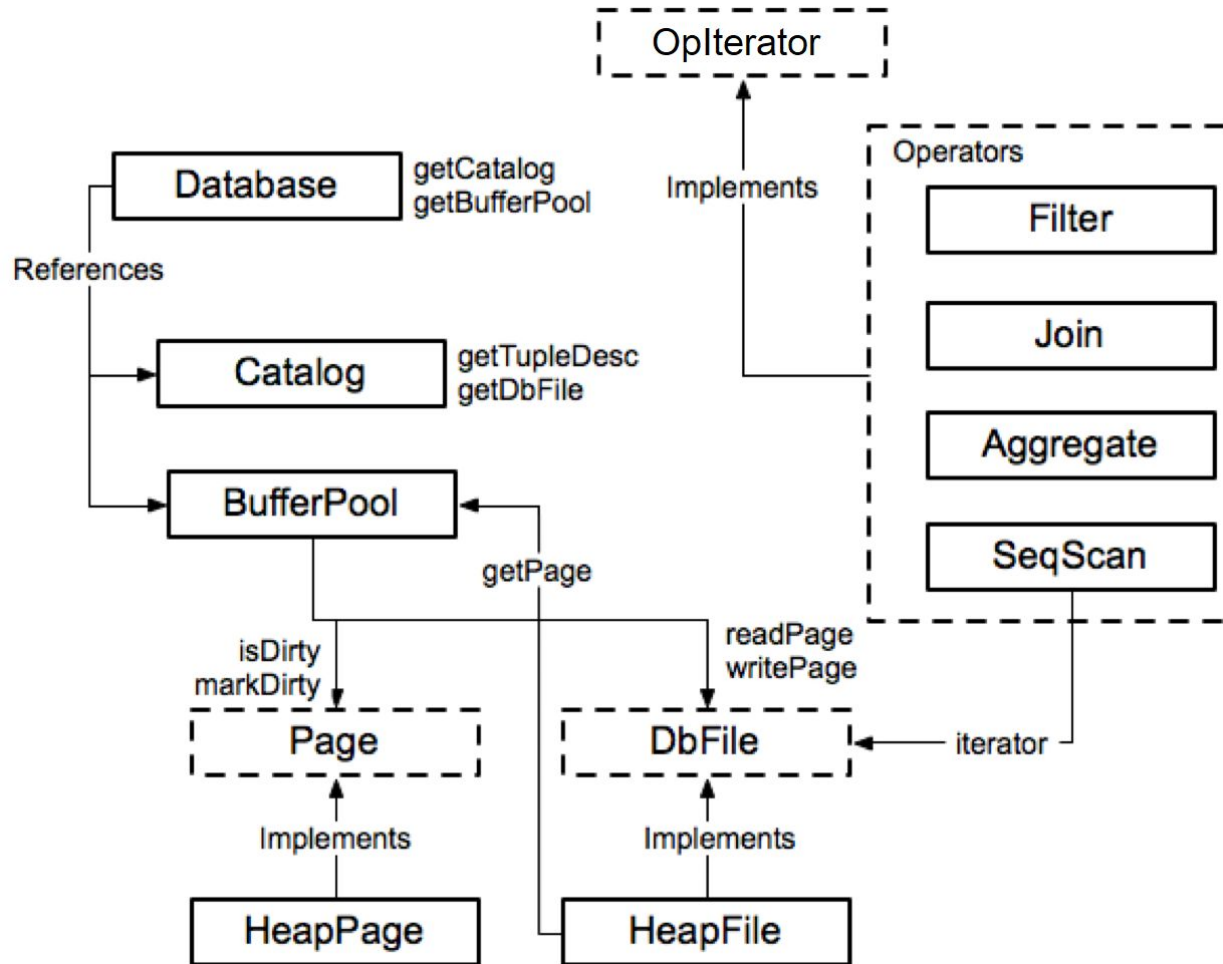
- **We'll read your code**

- Reading horrible code is horrible, so spend some time polishing
- Passing all the test cases may not necessary mean you'll get a high score
 - Sanity check, not a final grade

Setting up SimpleDB

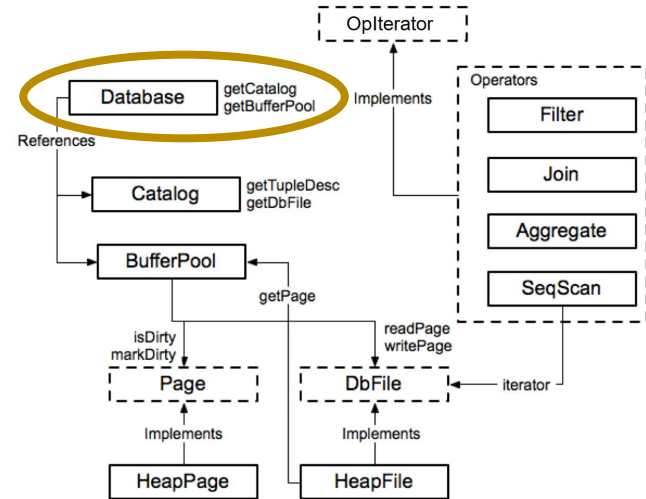
Any questions or concerns?

Overview of SimpleDB

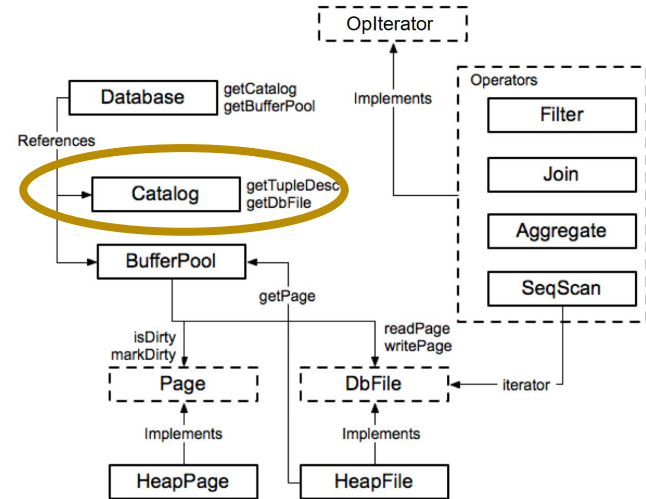


Database

- A single database
 - One schema
 - List of tables
- References to major components
 - Global instance of Catalog
 - Global instance of BufferPool

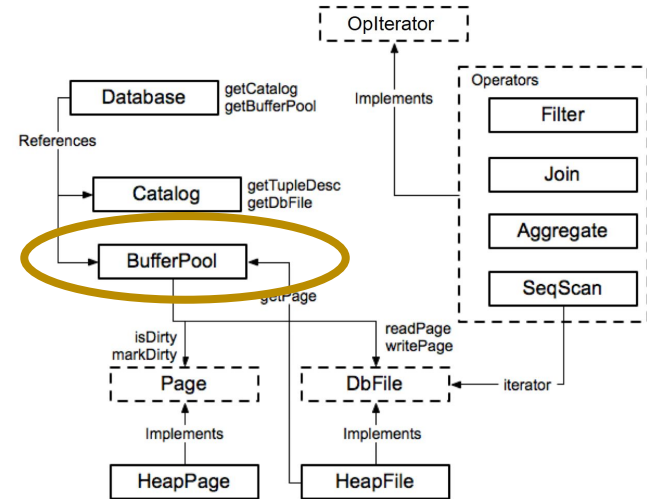


Catalog

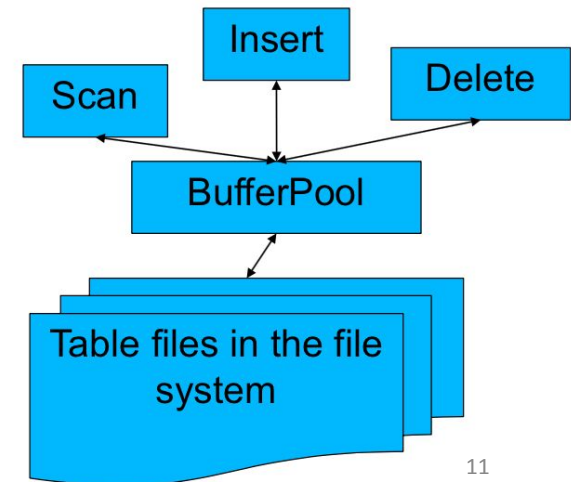


- Stores metadata about tables in the database
 - void addTable(DbFile d, TupleDesc d)
 - DbFile getTable(int tableid)
 - TupleDesc getTupleDesc(int tableid)
 - ...
- NOT persisted to disk
 - Catalog info is reloaded every time SimpleDB starts up

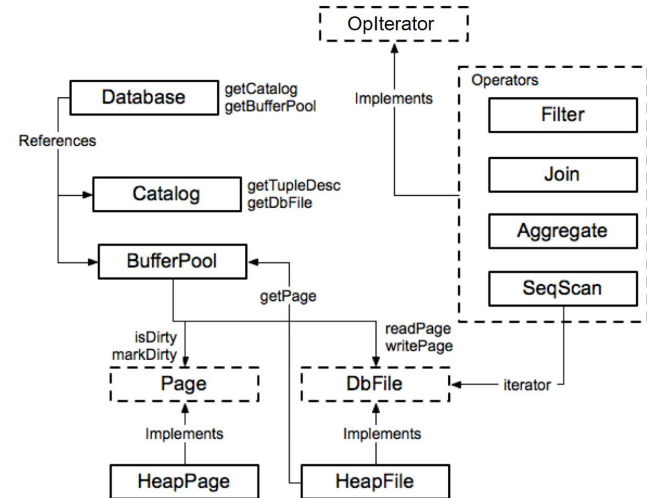
BufferPool



- The ONLY bridge between data-processing operators and actual data files
 - Strict interface for physical independence!
- Data files are never accessed directly
- Later labs:
 - Locking for transactions
 - Flushing pages for recovery

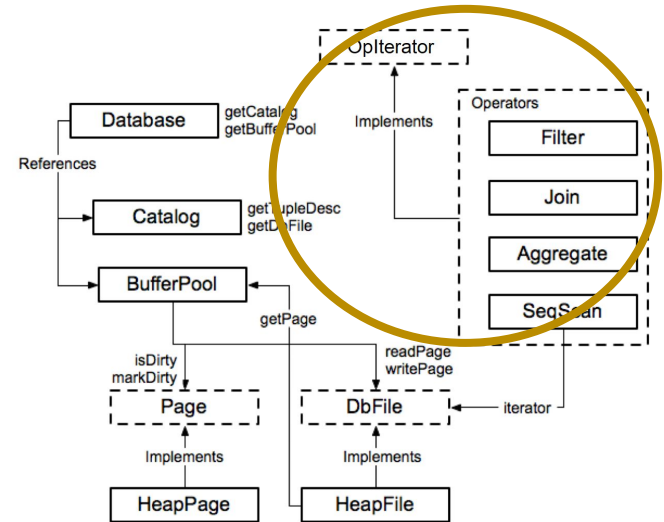


Data Types



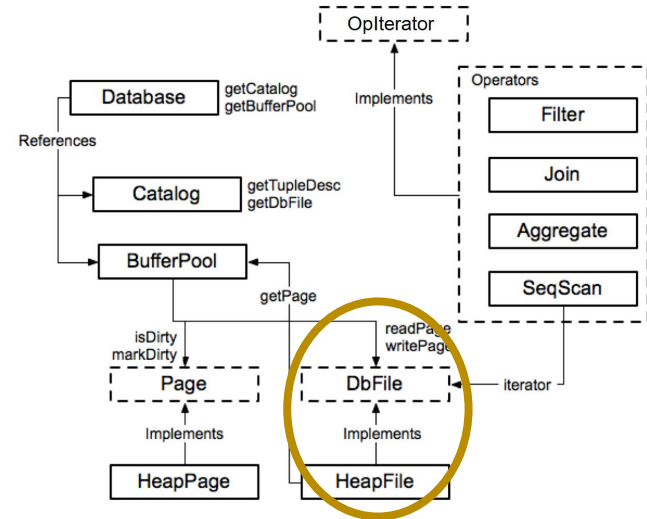
- Integer
 - Type.INT_TYPE
 - 4 byte width
- Fixed-length Strings
 - Type.STRING_TYPE
 - 128 bytes long (Type.STRING_LEN)
 - Do not change this constant!

OpIterator

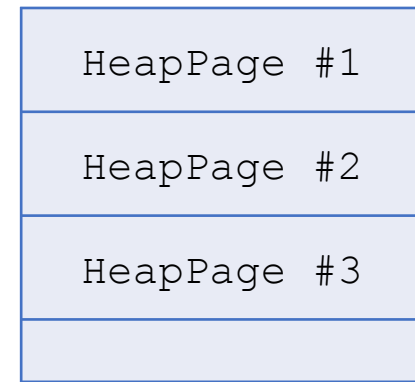


- Ancestor class for all operators
 - Join, Project, SeqScan, etc...
- Each operator has methods:
 - open(), close(), getTupleDesc(), hasNext(), next(), rewind()
- Iterator model: Chain iterators together

HeapFile



- Main class that organizes the physical storage of tables
- Collection of HeapPages on disk
 - One HeapFile for each table
 - Fixed-size pages means efficient lookup of pages



```

// construct a 3-column table schema
Type types[] = new Type[]{ Type.INT_TYPE, Type.INT_TYPE, Type.INT_TYPE };
String names[] = new String[]{"field0", "field1", "field2" };
TupleDesc descriptor = new TupleDesc(types, names);

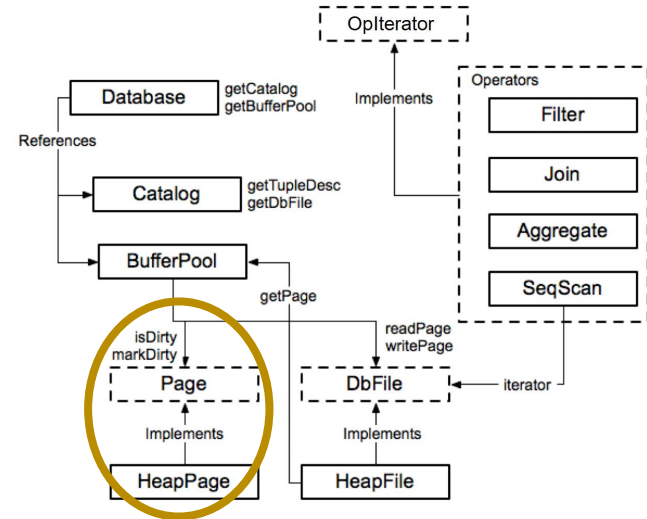
// create the table, associate it with some_data_file.dat
// and tell the catalog about the schema of this table.
HeapFile table1 = new HeapFile(new File("some_data_file.dat"), descriptor);
Database.getCatalog().addTable(table1);

// construct the query: we use a simple SeqScan, which spoonfeeds
// tuples via its iterator.
TransactionId tid = new TransactionId();
SeqScan f = new SeqScan(tid, table1.id());

// and run it
f.open();
while (f.hasNext()) {
    Tuple tup = f.next();
    System.out.println(tup);
}
f.close();
Database.getBufferPool().transactionComplete();

```

HeapPage



- A chunk of data that can reside in the BufferPool
- Format: Header + Tuples
 - # of 1 bits in Bitmap = # of active tuples on page
- Fixed size: BufferPool.PAGE_SIZE

| |
|---------------|
| Header Bitmap |
| Tuple #1 |
| Tuple #2 |
| ⋮ |
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Questions?