

Time:

About 1 week. Not too hard after understanding the structure of the system.

Design:

New class:

```
public class HeapFileIterator extends AbstractDbFileIterator
```

Be used in HeapFile.iterator(). This class is a iterator to read each page in each table.

HashMap in catalog:

```
private final HashMap<Integer, DbFile> id2file;  
private final HashMap<Integer, String> id2name, id2pkey;  
private final HashMap<String, Integer> name2id;
```

I used 4 HashMap for efficiency. When the table changed, the HashMap will update.

HashMap in Bufferpool:

```
private final HashMap<PageId, Page> pid2page;
```

Same as catalog. System can efficiently retrieve the page by id.

incomplete elements

About the transaction, and Permissions in BufferPool and other class.