CS422 Principles of Database Systems

Record Management

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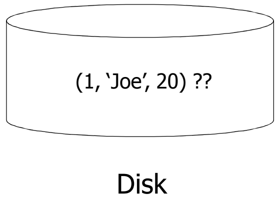
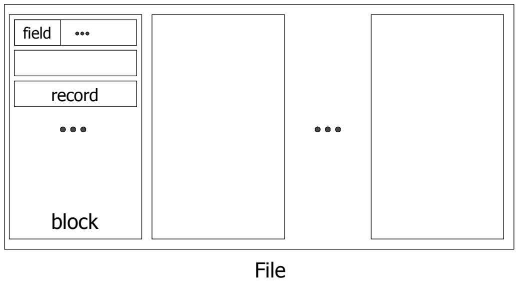
Record Management



Records on Disk

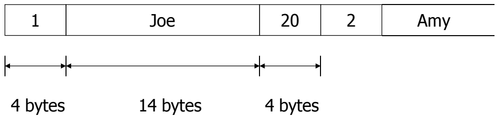


Simple(DB) Assumptions

- Each table is stored in its own file
- All fields are fixed-length
- Each record is contained in one block

Records in a File

- Record <int, varchar(10), int>
  - <1,'Joe',20> and <2, 'Amy', 10>
- *Would this work??*

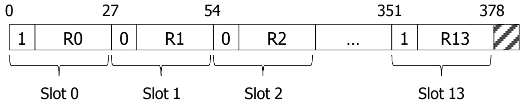


Supported Operations

- Retrieve
- Insert
- Update
- Delete

Record Block

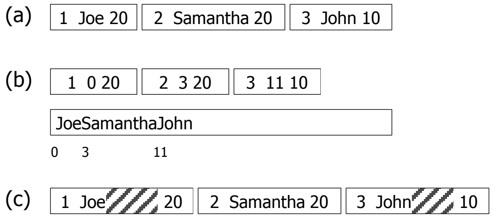
- A block is formatted into *slots*
- Slot = Record + 1 byte (empty flag)
- Example
  - Record length 26 bytes
  - Block size 400 bytes



Extend the Basic Scheme

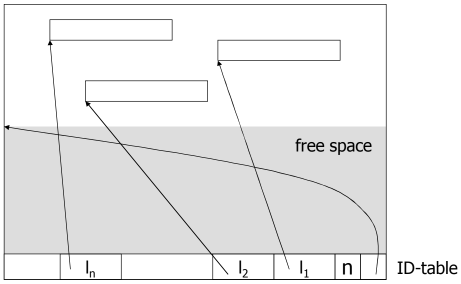
- Variable-length fields
- Spanned records
- Non-homogeneous files

Store Variable-Length Fields



Appropriate approach for char(n), varchar(n), clob??

Block Organization



Why ID-table is stored at the end of a block??

Support Operations for Variable-length Fields

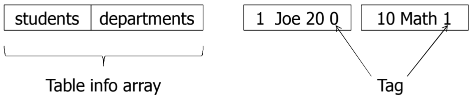
- Retrieve
- Insert
- Delete
- Update
  - Overflow block

Spanned Records

- Records that span multiple blocks
- Record header
  - Indicates whether the record is a fragment
  - Pointers to the next/previous fragment

Non-homogeneous Files

- A file contains records from different tables
  - Records within a block are from the same table
  - Records within a block are from different tables
- Implement non-homogeneous files
  - Table-block directory
  - Table info array and record tag, e.g.



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1 Joe 20 0

10 Math 1

Table info array

Tag

System Catalog

- A.K.A. data catalog, data dictionary
- "Tables about tables" - a set of *tables* containing metadata about the schema elements and data statistics
  - Table, field, view, index information
  - Data statistics
    - E.g. total number of rows in a table and distinct values in a column
    - Used for query optimization

System Catalog in SimpleDB

- tblcat (TblName, RecLength)
- fldcat (TblName, FldName, Type, Length, Offset)
- viewcat(ViewName, ViewDef)
- indexcat(TableName, FieldName, IndexName)

Readings

- Textbook Chapter 15, 16
- SimpleDB source code
  - `simpledb.record`