Contents of Files and Blocks

Files are files of Records

- Fixed Length Records
- Variable Length Records
  - Variable Length Fields
  - Repeating Fields
  - Optional Fields
- Mixed Record Types
Records Stored in Sectors

• Initial problem: Sector is just a bunch of bytes; how can we find the beginning of a record?
• Info in catalog can help
  – What does this kind of record look like
  – How is it stored in sector?

Fixed Length Records

• fixed length records neatly fill most of a sector
• possibly use spanned records
Easy to find $N^{th}$ Record

- New record starts every record.length bytes.
- Easy to get $N^{th}$ record or scan all.

Block 1

Block 2

Overflow

VARIABLE RECORD FORMATS

- Block is just a sequence of bytes
- Problem 1: How find beginning of variable length records?
- Problem 2: How find beginning of fields w/in record?
Finding field, record in block (1)

- Marker Byte Approach
  - Special marker byte for end of variable length field
  - Repeating fields: 2nd marker within field
  - Record Terminator: 3rd marker
- Would work if all variable fields were text but cannot count on that.
- Problem: variable length BLOB fields.

What’s a BLOB?

- Binary Large OBject
  - PNG graphic
  - MPG4 movie
  - ACC sound file
- Some byte in the BLOB will look just like an end-of-field or end-of-record marker
Finding field, record in block (2)

- record length in record header
- variable length field has own header
- Optional Field: header includes name

- To find N^{th} record:
  - Read first header; jump record length.
  - Read next header; jump; repeat.
## OPERATIONS ON FILES
What DB asks of FileManager

<table>
<thead>
<tr>
<th>Search for Records Meeting a Condition</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Find first</td>
<td>Update</td>
</tr>
<tr>
<td>• Find next</td>
<td>Insert</td>
</tr>
<tr>
<td>• Find all</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Retrieve in order</th>
<th>All operations require retrieval of file blocks.</th>
</tr>
</thead>
</table>