Databases

Brief Summary
Relational databases

• Tables

<table>
<thead>
<tr>
<th>title</th>
<th>director</th>
<th>year</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Angry Men</td>
<td>Sidney Lumet</td>
<td>1957</td>
</tr>
<tr>
<td>Raiders of the Lost Ark</td>
<td>Steven Spielberg</td>
<td>1981</td>
</tr>
<tr>
<td>War of the Worlds</td>
<td>Steven Spielberg</td>
<td>2005</td>
</tr>
<tr>
<td>Manos: The Hands of Fate</td>
<td>Harold P. Warren</td>
<td>1966</td>
</tr>
</tbody>
</table>

• Modeling – ER diagram
SQL Language

1. Creating databases

• Data types for fields (eg. CHARACTER($m$), INTEGER)

• CREATE database, table

• Enforce constraints (eg. UNIQUE, FOREIGN KEY)
SQL Language

2. Various operations

• SELECT fields or rows
• INSERT rows
• UPDATE rows
• DELETE rows
3. More complex queries

- Conditions (WHERE)
- Search for regexp (LIKE)
- Ordering results (ORDER BY)
- LIMIT number of results
- GROUP BY
- JOIN multiple tables
Many further challenges

• Indexing – fast access to records
  • Hash tables
  • B+ trees
    • Balanced (→ has to be maintained after operations)
    • Entries in leaves

• Transactions
  • Atomic execution vs. Concurrency
  • SQL isolation levels
Verification cheatsheet for SQL exercises

• Exercise 3

1. Starts with "A Good Old..."
2. "xXx", "tom thumb"
   (note: because of case sensitivity)
3. 6300
4. 87
5. 2524
6. 100/0/59.051
7. 1924, 1939, ...
8. 12 movies, "Xenia" is the first
9. 7 and 24
10. 10 movies

• Exercise 5

1. 11 rows
2. 577
3. 20 rows
4. "Clouds of..." by 642
5. 74.94/642/1
6. 2 rows
7. 9 rows