QBE (Query By Example)

- Mid-1970s creation of Moshe Zloof at IBM Research
- Associated with development of Domain Relational Calculus
- Still available within IBM’s QMF (Query Management Facility) component of DB2
- Most DBMSes offer a QBE-inspired interface
- Idea: Let users create queries by showing what they want to see
### QBE Templates and $\pi$

**Example(s):**

<table>
<thead>
<tr>
<th>SPJ</th>
<th>sno</th>
<th>pno</th>
<th>jno</th>
<th>qty</th>
</tr>
</thead>
</table>

### QBE and $\sigma$

**Example(s):**

<table>
<thead>
<tr>
<th>S</th>
<th>sno</th>
<th>sname</th>
<th>status</th>
<th>city</th>
</tr>
</thead>
</table>

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QBE and $\bowtie$ ⊳

Example(s):

\[
\begin{array}{|c|c|c|c|c|c|} \hline
P & pno & pname & color & weight & city \\
\hline
\end{array}
\]

\[
\begin{array}{|c|c|c|c|c|} \hline
SPJ & sno & pno & jno & qty \\
\hline
\end{array}
\]

QBE and $\cup$

Example(s):

\[
\begin{array}{|c|c|c|c|c|} \hline
S & sno & sname & status & city \\
\hline
\end{array}
\]
Example(s):

<table>
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<tr>
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QBE: Miscellaneous Notes

- Other \( \pi \) options: \( \Pi \quad \text{ALL}, \Pi \quad \text{AO}, \Pi \quad \text{DO} \)
  
  (\text{ALL} = \text{keep dups}, \text{AO} = \text{ascending order}, \text{DO} = \text{descending order})

- Aggregate functions include: \( \text{AVG}, \text{MIN}, \text{MAX}, \text{SUM}, \text{CNT} \)

  Example: \( \Pi \quad \text{SUM}.\quad \text{ALL} \quad (\text{The .ALL is required.}) \)

- Other actions:
  - D. under the relation name deletes tuples
  - I. inserts tuples
  - U. updates tuples

- IBM does have QBE documentation on-line, but it’s not easy to find!
Microsoft Access Demonstration

What is the name of the employee who is supervising building ‘A’?

<table>
<thead>
<tr>
<th>M</th>
<th>Num</th>
<th>Name</th>
<th>N</th>
<th>Building</th>
<th>Supervisor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Roy</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Amy</td>
<td></td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Joy</td>
<td></td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>D</td>
<td>NULL</td>
<td>NULL</td>
</tr>
</tbody>
</table>