### **QBE**

- Query-By-Example
  - provides a visual interface for queries and updates
  - a version supported by Microsoft Access (Graphical QBE)
- Examples: movie database queries
  - "Find the titles of currently playing movies"

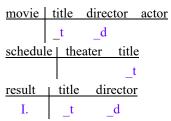
```
\begin{tabular}{lll} schedule & theater & title \\ & & & P. \\ & \cdot & P. : "print value" \\ \end{tabular}
```

- "Find the titles of all movies by Berto"

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## **QBE** (2)

- "Find the titles and directors of all currently playing movies"



- Note:
  - answer table explicitly specified
  - underscore \_x means \_x can take any value, like a variable
  - I. means insert

# **QBE** (3)

- "Find all actors playing in every movie by Berto"
  - requires multi-stage query, creating intermediate answers
  - analog of nested queries in SQL
- I stage:

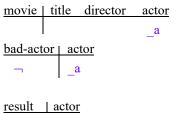
schedule	title	director	actor	bad-actor	actor
			_a	I.	_a
	_t	Berto		l	
$\neg$	_t		_a		

- Semantics of ¬
  - for \_t and \_a fixed, satisfying positive part of pattern, there is no tuple occurring with \_t and \_a as in the negated tuple

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# **QBE** (4)

- II stage
  - (complement of temp computed in stage I)



# Examples Beer drinker's database: frequents | drinker bar | serves | bar | beer | likes | drinker beer |

frequents	drinker bar	_	likes drinker beer
		ļ	answer drinke
		6	

Find the drinkers who frequent at least one bar serving a beer they like

frequents	drinker bar	serves	bar	beer	likes	drinker beer
answer	drinker					
answer	drinker					

frequents	drinker	bar	serves	bar	beer	likes dr	inker beer
	I			I		I	answer drink
							ı
				8			

# Updates in QBE

- Deletions: similar to inserts
  - D.
  - "Delete all movies by Berto":

movie	title	director	actor
D.		Berto	

- "Delete all movies by directors who are also actors":

movie	title	director	acto
D.		_d	
			_d

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# Updates in QBE (2)

- Updates: using primary key attributes
  - primary keys are explicitly declared
  - "Sally gets a 5% salary raise"

$$\begin{array}{c|ccc} \underline{employee} & \underline{name} & \underline{salary} \\ \hline U. & Sally & \underline{x} * 1.05 \\ Sally & \underline{x} \end{array}$$

# Updates in QBE (3)

• "All employees who make less than 2000 receive a 5% raise"

$$\begin{array}{c|cccc} \underline{employee} & \underline{name} & \underline{salary} \\ U. & \underline{-u} & \underline{-x*1.05} \\ \underline{-u} & \underline{-x} \end{array}$$

$$Condition box & \underline{-x<2000}$$

• Note: QBE allows explicit specification of conditions using condition boxes