SQL
Selection & projection

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Full selection

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies

id | title         | year | price
---+---------------+------+------
1  | Anchorman     | 2004 | 10
2  | Ghostbusters  | 1984 | 5.50
3  | Terminator    | 1984 | 8.50
```

Sorting - ascending

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
ORDER BY price ASC

id | title        | year | price
---+--------------+------+------
2  | Ghostbusters | 1984 | 5.50
3  | Terminator   | 1984 | 8.50
1  | Anchorman    | 2004 | 10
```

Sorting - descending

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
ORDER BY price DESC

id | title        | year | price
---+--------------+------+------
1  | Anchorman    | 2004 | 10
3  | Terminator   | 1984 | 8.50
2  | Ghostbusters | 1984 | 5.50
```

Sorting by multiple attributes

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
ORDER BY year DESC, price

id | title        | year | price
---+--------------+------+------
1  | Anchorman    | 2004 | 10
2  | Ghostbusters | 1984 | 5.50
3  | Terminator   | 1984 | 8.50
```

Elimination of duplicates

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT DISTINCT year
FROM movies

year
----
2004
1984
```

Getting subsets of results

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
LIMIT 2

id | title        | year | price
---+--------------+------+------
1  | Anchorman    | 2004 | 10
2  | Ghostbusters | 1984 | 5.50
```

Getting subsets of results - offset

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
LIMIT 2
OFFSET 1

id | title        | year | price
---+--------------+------+------
2  | Ghostbusters | 1984 | 5.50
3  | Terminator   | 1984 | 8.50
```

Filtering results

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
WHERE year = 1984

id | title        | year | price
---+--------------+------+------
2  | Ghostbusters | 1984 | 5.50
3  | Terminator   | 1984 | 8.50
```

Complex filters

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
WHERE year < 2000 AND price > 8

id | title        | year | price
---+--------------+------+------
3  | Terminator   | 1984 | 8.50
```

Functions in SQL

Math

- `ROUND(x)` - rounds the number
- `ROUND(x,s)` - rounds the number to s significant digits
- `ABS(x)` - absolute value
- `SQRT(x)` - square root

Text

- `LENGTH(s)` - length of a string
- `UPPER(s)/LOWER(s)` - makes the string s uppercase/lowercase
- `LEFT(s, x)/RIGHT(s, x)` - extracts a number of characters from a string s starting from left/right
- `CONCAT(s1, s2)` - concatenates (merges) two strings
- `POSITION(p IN s)` - returns position on which pattern p is found in string s
- `SUBSTRING(s FROM x TO y)` - returns a substring from s, starting from position x, with length y

Functions in SQL

Dates

- date - date $=$ integer of days
- timestamp - timestamp $=$ interval
- INTERVAL is a data type, that stores the difference between two days, i.e. '1 mon 3 days', '1 day 8 hours'
- AGE(timestamp, timestamp) - interval
- EXTRACT(part FROM date) - extracts part (day, month, hour, ...) from date
- NOW() - current timestamp

Pattern matching

- s LIKE 'something' - returns true, if s is equal to 'something'
- Underscore '_' represents any single character
- s LIKE '_smth' - returns true, if s begins with any single letter, followed by 'smth', for example 'asmth', '1smth' etc.
- s LIKE '_sm_th' - returns true, if s begins with any single letter, followed by 'sm', another single letter and 'th', for example 'asmbth'
- Asteriks '*' represents string of any length (can be zero)
- s LIKE 'abc*' - returns true, if s starts with 'abc' and then zero or more other characters, for example 'abcabc'

Selection with filters

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT *
FROM movies
WHERE LENGTH(title) <= 10
 AND SUBSTRING(title,1,2) = 'Te';

id | title        | year | price
---+--------------+------+------
3  | Terminator   | 1984 | 8.50
```

Projection

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

- Selections - which rows are in the result
- Projection - which columns are in the result

```
SELECT title , price
FROM movies

title         | price
--------------+------
Anchorman     | 10
Ghostbusters  | 5.50
Terminator    | 8.50
```

Projection with SQL function

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT UPPER(title), ROUND(price*1.22)
FROM movies

upper         | round
--------------+------
ANCHORMAN     | 12
GHOSTBUSTERS  | 7
TERMINATOR    | 10
```

Projection with aliases

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT UPPER(title), ROUND(price*1.22) AS price_with_tax
FROM movies

upper        | price_with_tax
-------------+------
ANCHORMAN    | 12
GHOSTBUSTERS | 7
TERMINATOR   | 10
```

Selection with projection

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT title, price
FROM movies
WHERE price > 6

title        | price
-------------+------
Anchorman    | 10
Terminator   | 8.50
```

Selection with projection

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT title || ', ' || year AS title
FROM movies
WHERE price > 6

title
----------------
Anchorman, 2004
Terminator, 1984
```

Selection with projection

Movies

movie_id	title	year	price
1	Anchorman	2004	10
2	Ghostbusters	1984	5.50
3	Terminator	1984	8.50

```
SELECT title, year
FROM movies
WHERE year > 2002 AND year < 2005;

title       | year
------------+------
Anchorman   | 2004
```