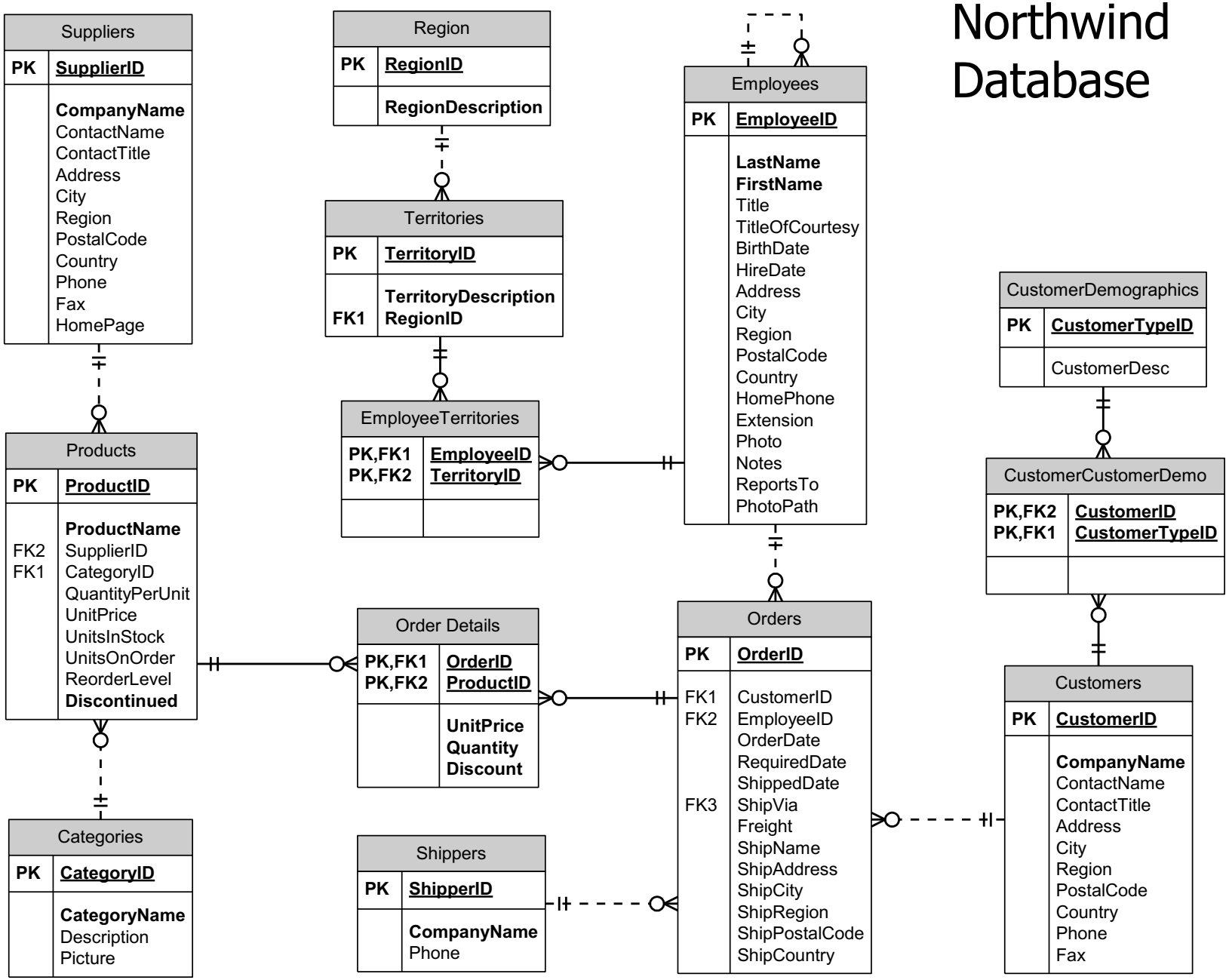
SQL

- **Structured Query Language**
  - MS SQL Server

Northwind Database



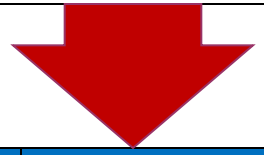
SELECT

- **Select List specifies the columns**
- **WHERE Clause specifies the condition restricting the query**
- **FROM clause specifies the table**

```
SELECT [ALL | DISTINCT] <select_list>
 FROM {<table>}
 WHERE <search_condition>
```

Specifying columns

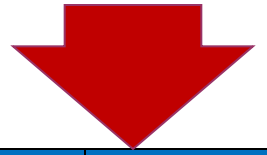
```
SELECT employeeid, lastname, firstname, title
FROM employees
```



employeeid	lastname	firstname	title
1	Davolio	Nancy	Sales Representative
2	Fuller	Andrew	Vice President, Sales
3	Leverling	Janet	Sales Representative
4	Peacock	Margaret	Sales Representative
5	Buchanan	Steven	Sales Manager
6	Suyama	Michael	Sales Representative
7	King	Robert	Sales Representative
8	Callahan	Laura	Inside Sales Coordinator
9	Dodsworth	Anne	Sales Representative

Using the WHERE clause to specify rows

```
SELECT employeeid, lastname, firstname, title
FROM employees
WHERE employeeid = 5
```



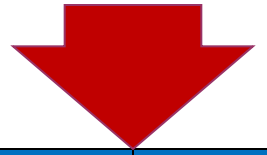
employeeid	lastname	firstname	title
5	Buchanan	Steven	Sales Manager

Conditional operators

- =,>,<,>=,<=,<>
- LIKE, NOT LIKE
- AND, OR
- NOT
- BETWEEN, NOT BETWEEN
- IN, NOT IN
- IS NULL, IS NOT NULL
- ( )

Using comparison operators

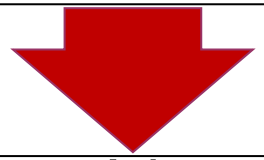
```
SELECT lastname, city
FROM employees
WHERE country = 'USA'
```



lastname	city
Davolio	Seattle
Fuller	Tacoma
Leverling	Kirkland
Peacock	Redmond
Callahan	Seattle

Using comparison operators

This example retrieves the orderid and customerid columns with order dates that are older than 8/1/96 from the orders table.



```
SELECT orderid, customerid
FROM orders
WHERE orderdate < '8/1/96'


SELECT orderid, customerid
FROM orders
WHERE orderdate < '1996-08-01'
```

Using string comparisons - LIKE

- **LIKE can be used only with data of the char, nchar, varchar, nvarchar, or datetime data types.**

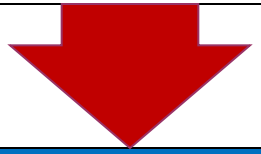
Wildcard	Description
%	Any string of zero or more characters
_	Any single character
[ ]	Any single character within the specified range or set
[^]	Any single character *not* within the specified range or set

Examples of the use of wildcard characters

LIKE ‘BR%’	Every name beginning with the letters BR
LIKE ‘Br%’	Every name beginning with the letters Br
LIKE ‘%een’	Every name ending with the letters een
LIKE ‘%en%’	Every name containing the letters en
LIKE ‘_en’	Every three-letter name ending in the letters en
LIKE ‘[CK]%’	Every name beginning with the letter C or K
LIKE ‘[S-V]%’	Every four-letter name ending in the letters ing and beginning with any single letter from S to V
LIKE ‘M[^c]%’	Every name beginning with the letter M that does not have the letter c as the second letter

Examples of the use of wildcard characters

```
SELECT companyname
FROM customers
WHERE companyname LIKE '%Restaurant%'
```



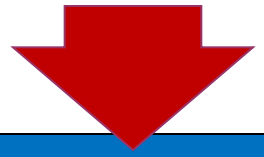
companyname
GROSELLA-Restaurante
Lonesome Pine Restaurant
Tortuga Restaurante

Examples of the use of wildcard characters

```
SELECT * FROM products
WHERE QuantityPerUnit LIKE '%bottle%'
```

Using logical operators

```
SELECT productid, productname, supplierid, unitprice
 FROM  products
 WHERE (productname LIKE 'T%' OR productid = 46)
  AND  (unitprice > 16.00)
```



productid	productname	supplierid	unitprice
14	Tofu	6	23.25
29	Thüringer Rostbratwurst	12	123.79
62	Tarte au sucre	29	49.3

Using logical operators

Compare results

```
SELECT productid, productname, supplierid, unitprice
 FROM  products
 WHERE (productname LIKE 'T%' OR productid = 46)
      AND  (unitprice > 16.00)
```

```
SELECT productid, productname, supplierid, unitprice
 FROM  products
 WHERE (productname LIKE 'T%')
      OR productid = 46 AND  unitprice > 16.00
```

Using logical operators

- **The following example retrieves all products with product names that begin with the letter T or have a product identification number of 46, and that have a price greater than $16.00.**

```
SELECT productid, productname, supplierid, unitprice
 FROM  products
 WHERE (productname LIKE 'T%' OR productid = 46)
      AND  (unitprice > 16.00)
```

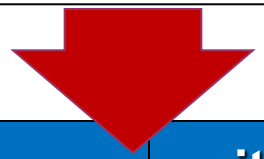
Using logical operators

- **The following example retrieves products with product names that begin with the letter T or that have a product identification number of 46 and a price greater than $16.00.**

```
SELECT productid, productname, supplierid, unitprice
 FROM  products
 WHERE (productname LIKE 'T%')
      OR productid = 46 AND  unitprice > 16.00
```

Retrieving a range of values

```
SELECT productname, unitprice
FROM products
WHERE unitprice BETWEEN 10 AND 20
```



productname	unitprice
Chai	18
Chang	19
Aniseed Syrup	10
Genen Shouyu	15.5
Pavlova	17.45
Sir Rodney's Scones	10
…	…

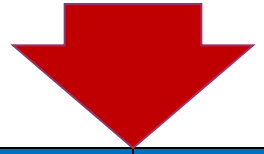
Retrieving a range of values

```
SELECT productname, unitprice
FROM products
WHERE unitprice BETWEEN 10 AND 20
```

- **Write with <, > ,<=,>=**

List of values

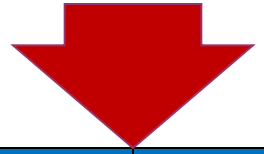
```
SELECT companyname, country
FROM suppliers
WHERE country IN ('Japan', 'Italy')
```



companyname	country
Tokyo Traders	Japan
Mayumi's	Japan
Formaggi Fortini s.r.l.	Italy
Pasta Buttini s.r.l.	Italy

OR

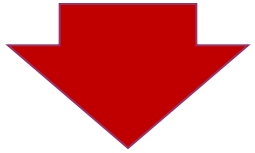
```
SELECT companyname, country
FROM suppliers
WHERE country = 'Japan' OR country = 'Italy'
```



companyname	country
Tokyo Traders	Japan
Mayumi’s	Japan
Formaggi Fortini s.r.l.	Italy
Pasta Buttini s.r.l.	Italy

NULL values

```
SELECT companyname, fax
FROM suppliers
WHERE fax IS NULL
```



companyname	fax
Exotic Liquids	NULL
New Orleans Cajun Delights	NULL
Tokyo Traders	NULL
Cooperativa de Quesos ‘Las Cabras’	NULL
…	…

ORDER BY

```
SELECT productid, productname, unitprice
 FROM products
 ORDER BY unitprice
```

```
SELECT productid, productname, unitprice
 FROM products
 ORDER BY unitprice DESC
```

ORDER BY

```
SELECT productid, productname, categoryid, unitprice
 FROM products
 ORDER BY categoryid, unitprice DESC
```

productid	productname	categoryid	unitprice
38	Cote de Blaye	1	263.5000
43	Ipoh Coffee	1	46.0000
2	Chang	1	19.0000
…	…	…	…
63	Vegie-spread	2	43.9000
8	Northwoods Cranberry Sauce	2	40.0000
61	Sirop d'érable	2	28.5000
…	…	…	…

ORDER BY

```
SELECT productid, productname, categoryid, unitprice
 FROM products
 ORDER BY 3,4 DESC
```

Duplicates

```
SELECT country
 FROM suppliers
 ORDER BY country
```

Eliminating duplicates

```
SELECT DISTINCT country
 FROM suppliers
 ORDER BY country
```

country
Australia
Brazil
Canada
Denmark
Finland
France
Germany
Italy
Japan
Netherlands
Norway
Singapore
Spain
Sweden
UK
USA

Changing Column Names

```
SELECT  firstname AS First, lastname AS Last
       ,employeeid AS 'Employee ID:'
FROM employees
```

First	Last	Employee ID:
Nancy	Davolio	1
Andrew	Fuller	2
Janet	Leverling	3
Margaret	Peacock	4
Steven	Buchanan	5
Michael	Suyama	6
Robert	King	7
Laura	Callahan	8
Anne	Dodsworth	9

Using literals

```
SELECT  firstname, lastname
        ,'Identification number:', employeeid
FROM employees
```

First	Last	Employee ID:
Nancy	Davolio	Identification Number: 1
Andrew	Fuller	Identification Number: 2
Janet	Leverling	Identification Number: 3
Margaret	Peacock	Identification Number: 4
Steven	Buchanan	Identification Number: 5
Michael	Suyama	Identification Number: 6
Robert	King	Identification Number: 7
Laura	Callahan	Identification Number: 8
Anne	Dodsworth	Identification Number: 9

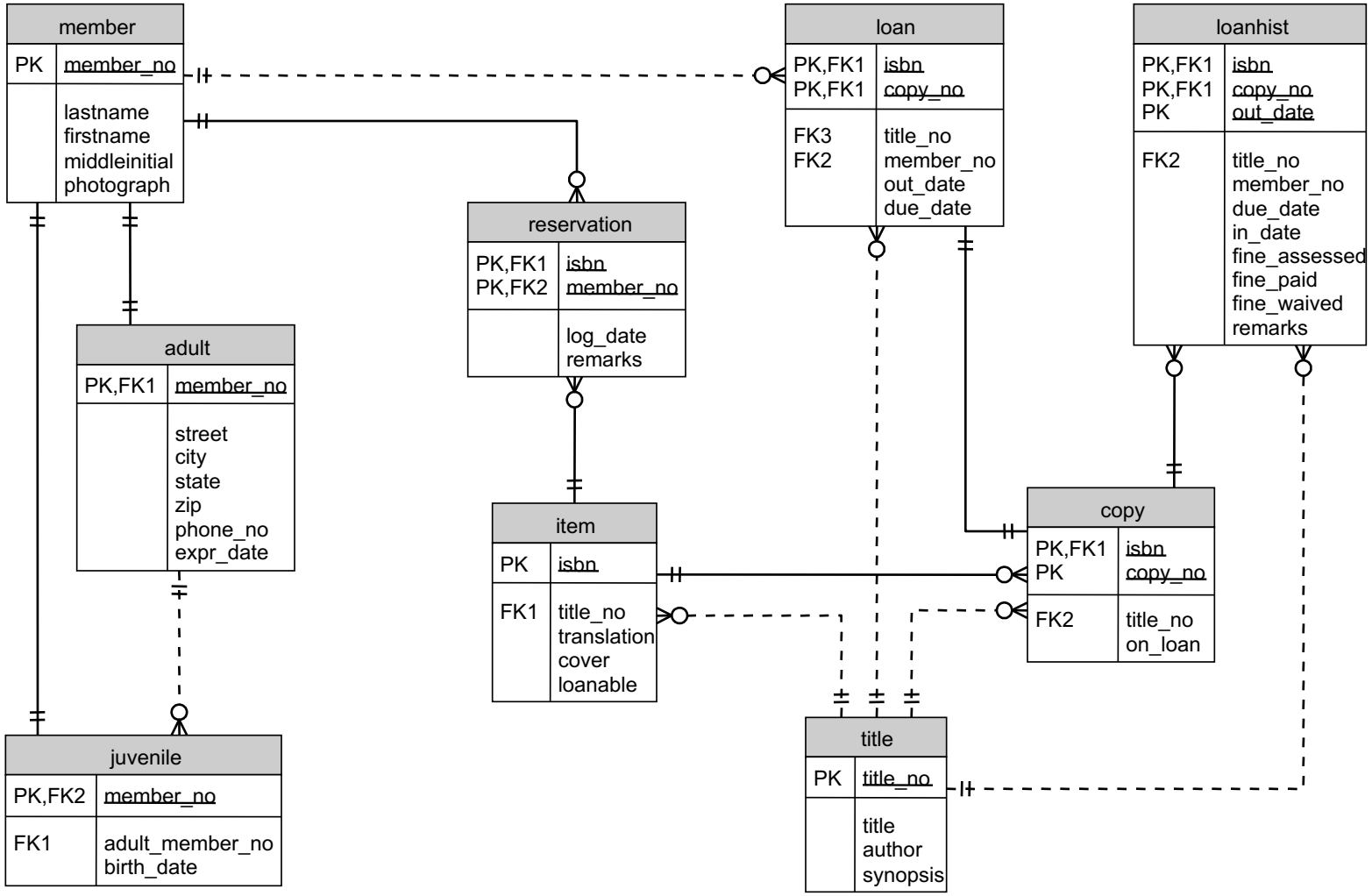
Calculations

```
SELECT  orderid, unitprice * 1.05 as newunitprice
FROM [order details]
```

String concatenation

```
SELECT  firstname + ‘ ‘ + lastname as imie_nazwisko
FROM employees
```

Build in functions

- **String functions**
  - SUBSTRING, LEFT, RIGHT, LEN, DATALENGTH
  - REPLACE, REPLICATE
  - UPPER, LOWER, RTRIM, LTRIM
- **Date and time functions**
  - GETDATE, SYSDATETIME, GETUTCDATE
  - DATEADD, DATEDIFF
  - YEAR, MONTH, DAY
- **Mathematical functions**
  - RAND, ROUND, POWER, ABS
  - CEILING, FLOOR

Library Database