Design of databases

Definitions

- **Database (DB)** — is a collection of interrelated data organized according to a database schema so user could work with it.

- A database management system (**DBMS**) –is a set of software, that provide database management.

Definitions

Each database contains information about a specific object class. The collection of such objects is called a **subject area** database (for example, products at the warehouses, the employees of the company, vehicles, businesses, and so on).

Information about these objects, that is presented in various documents, forms a **model of a subject area** (card inventory accounting, account cards and so on).

A description of these documents is called a **schema** (document titles, column, and the relationship between them).

Definitions

MS Access DBMS uses a **relational** data model, in which the subject area is presented in form of tables.

Names of columns and relationships between them form a scheme of database, and the contents of the table - is model.

Presentation of data in the form of a table that consists of a set of columns, and these columns are followed in a specific order from left to right **is a relation**. Hence the name of the model is called relational.

Definitions

- **Relational database** - data is presented in the form of related tables.
- **Record** — database table row.
- **Fields** — data columns of the table.
- **Field names** — the names of the columns of the table.
- **The primary key** - a field or set of fields that uniquely identify the table entry.
- **Foreign key** - a field that is used to link to another table.
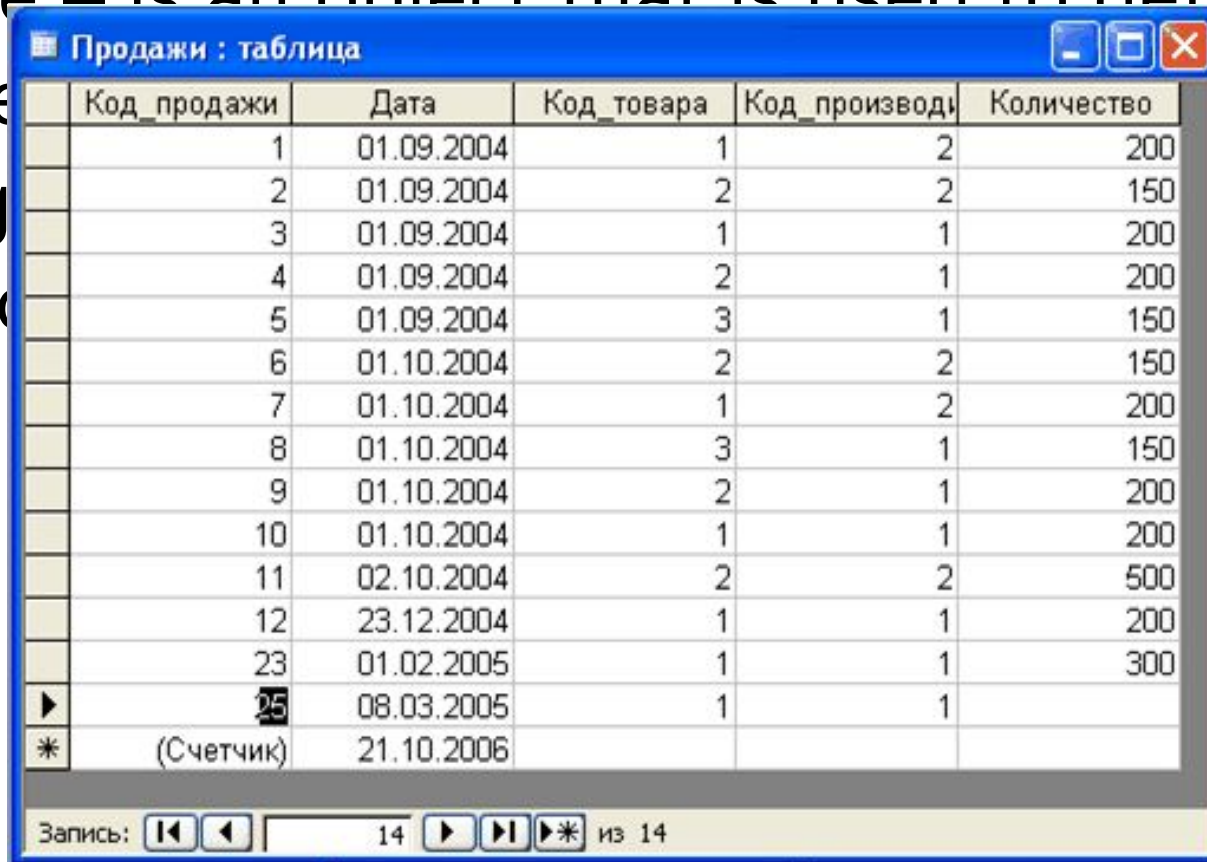
Access DBMS usage

- **Small business** (accounting, management information about orders, customers, products, business contacts, and so on);

- **Working groups** within large corporations (data exchange within the group and between groups through data servers that are controlled by a more powerful database, for example, MS SQL);

- **Personal Database** (list of phones numbers, addresses, catalogs, books, CDs, stamps, accounting for personal expenses and so on).

Table

- Table – is an object that is used to define and store ... prices of g... ormed, custo...

Продажи : таблица
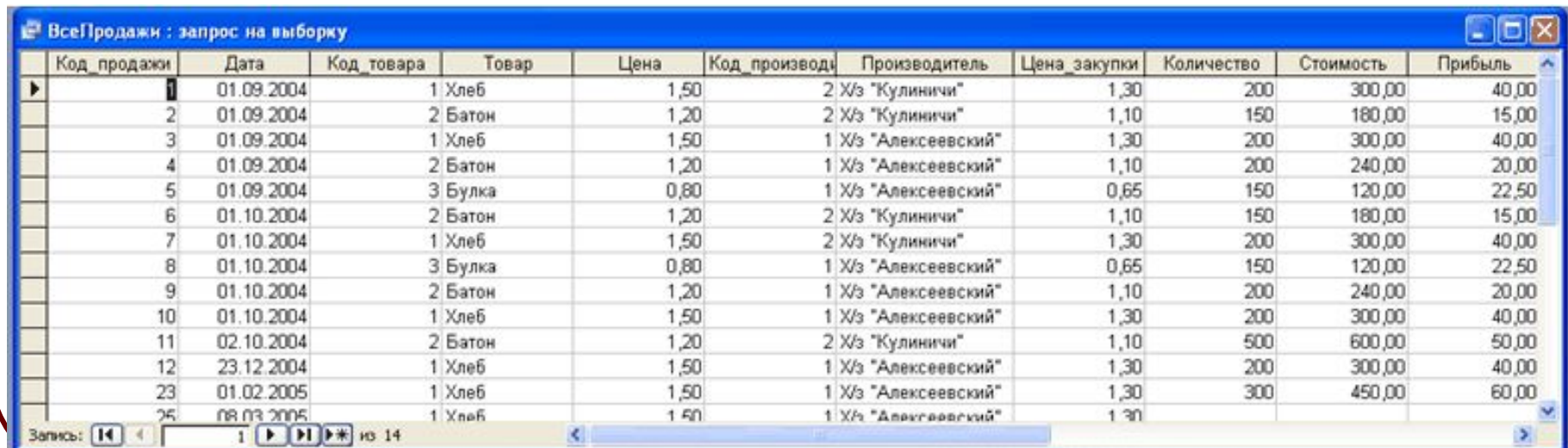
Код_продажи	Дата	Код_товара	Код_производи	Количество
1	01.09.2004	1	2	200
2	01.09.2004	2	2	150
3	01.09.2004	1	1	200
4	01.09.2004	2	1	200
5	01.09.2004	3	1	150
6	01.10.2004	2	2	150
7	01.10.2004	1	2	200
8	01.10.2004	3	1	150
9	01.10.2004	2	1	200
10	01.10.2004	1	1	200
11	02.10.2004	2	2	500
12	23.12.2004	1	1	200
23	01.02.2005	1	1	300
25	08.03.2005	1	1	
(Счетчик)	21.10.2006			

Запись: 14 из 14

Query

Query - is an object that can retrieve information from the database.

Form

Report

Re...ly ou...e da...

Отчет о продажах киоска "Колобок"

Дата	Производитель	Товар	Количество	Стоимость	Прибыль
01.09.2004					
	ХЈз "Алексеевский"				
		Батон	200	240,00	20,00
		Булка	150	120,00	22,50
		Хлеб	200	300,00	40,00
	Итого по ХЈз "Алексеевский"			660,00	82,50
	ХЈз "Купиничи"				
		Батон	150	180,00	15,00
		Хлеб	200	300,00	40,00
	Итого по ХЈз "Купиничи"			480,00	55,00
Итого за 01.09.2004				1 140,00	137,50
01.10.2004					
	ХЈз "Алексеевский"				
		Батон	200	240,00	20,00
		Булка	150	120,00	22,50
		Хлеб	200	300,00	40,00
	Итого по ХЈз "Алексеевский"			660,00	82,50

Macro

Macro - a facility designed for the automation of several actions that are performed using the menu commands or toolbar buttons.
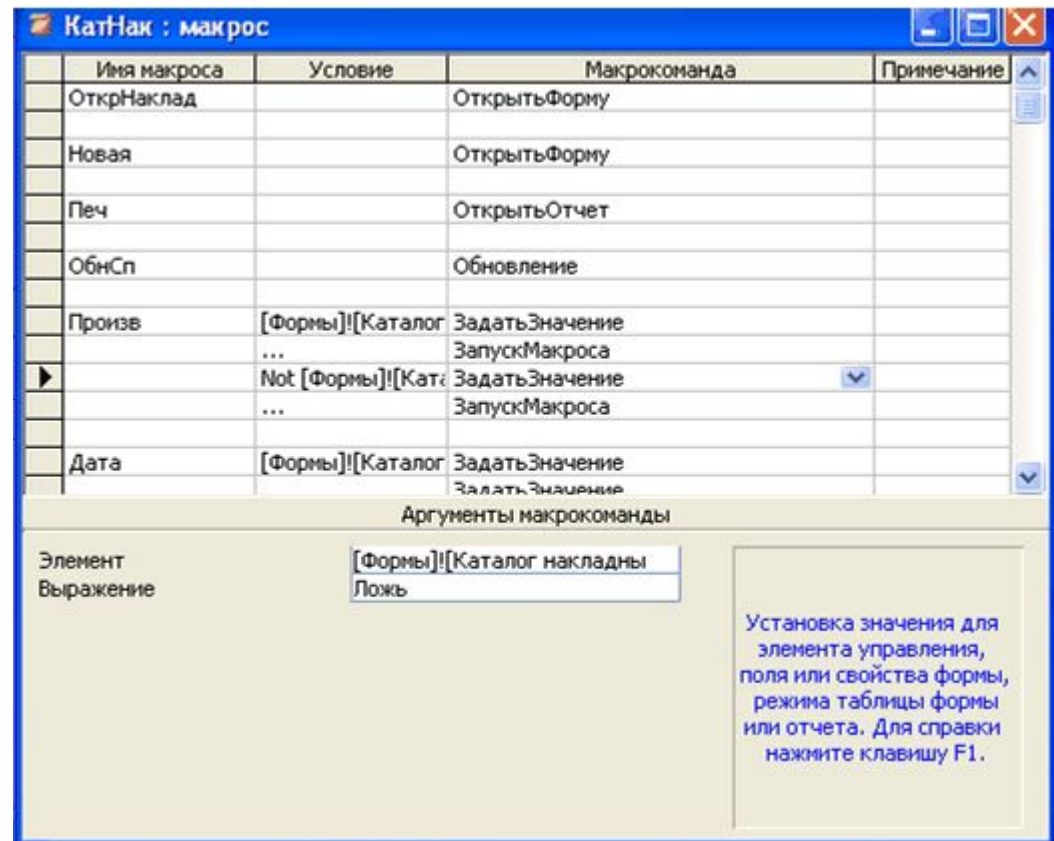
Module

Mo...
VBA

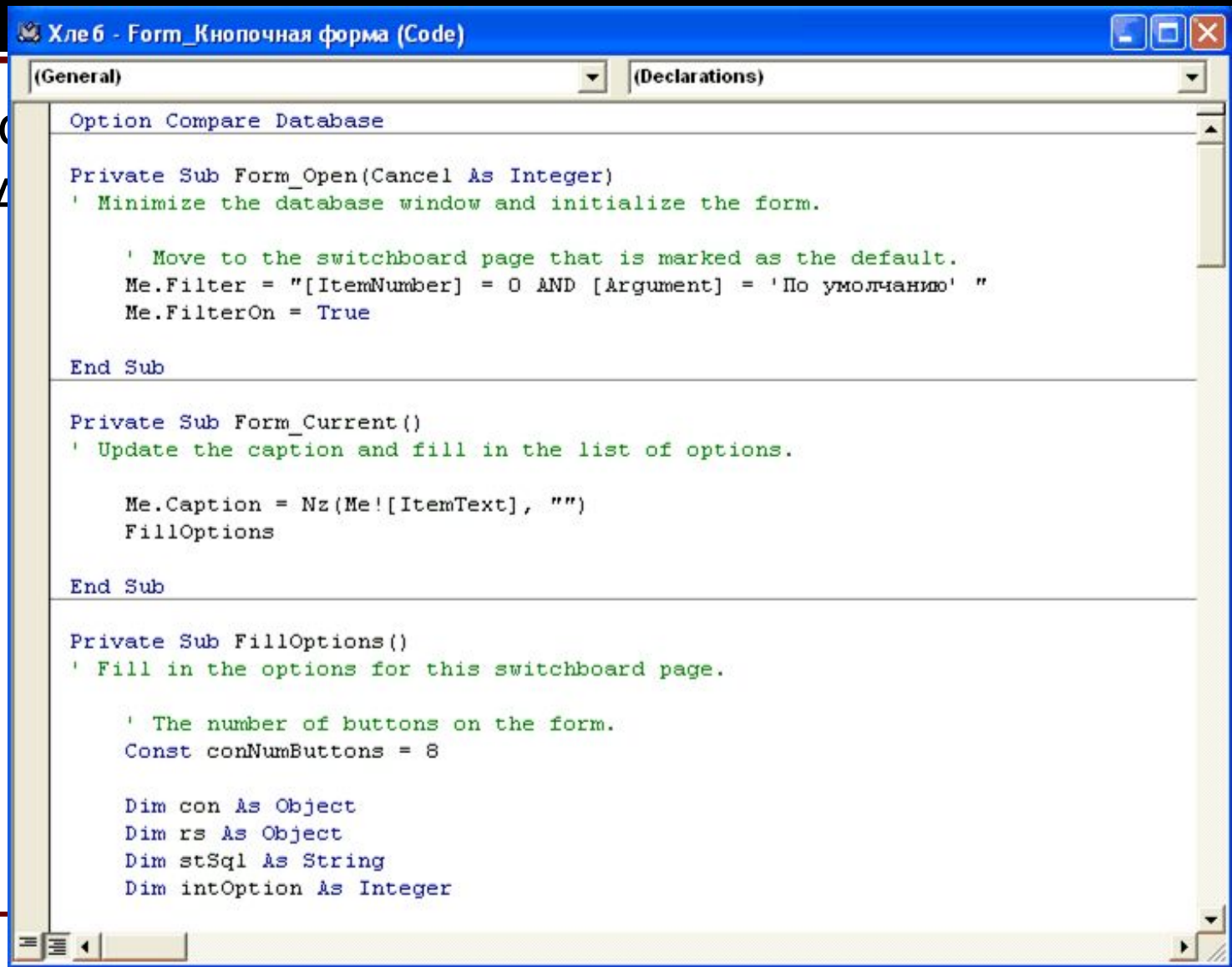

```
Хлеб - Form_Кнопочная форма (Code)

(General)                                    (Declarations)

Option Compare Database

Private Sub Form_Open(Cancel As Integer)
' Minimize the database window and initialize the form.

    ' Move to the switchboard page that is marked as the default.
    Me.Filter = "[ItemNumber] = 0 AND [Argument] = 'По умолчанию' "
    Me.FilterOn = True

End Sub

Private Sub Form_Current()
' Update the caption and fill in the list of options.

    Me.Caption = Nz(Me![ItemText], "")
    FillOptions

End Sub

Private Sub FillOptions()
' Fill in the options for this switchboard page.

    ' The number of buttons on the form.
    Const conNumButtons = 8

    Dim con As Object
    Dim rs As Object
    Dim stSql As String
    Dim intOption As Integer
```

Creation of objects

- Object may be created with:

  - **master (wizard);**

  - **constructor (manually).**

  Object may work in two modes:

  - working mode that produces result of an object;

  - constructor mode.

Access datatypes

- Text - the string of characters (from 0 to 255 characters - name, surname, address);

  MEMO field - like the type of text (up to 64,000 characters - sentences, paragraphs, letters);

  Money - the monetary data format (up to 4 digits in the fractional part - in financial values);

-

  Logical - data type "Yes" / "No" ("True" / "false");

Access datatypes

- Numeric –Byte, Integer, Long, Single.

- Date / Time - the date and / or time of day.

- Counter - unique long integer (up to 2 billion.), Automatically increases when you add a new record. When you delete records released numbers are not reused. The user can not change it.

Access datatypes

- Hyperlink - a reference to the location of another object database, Office document or Web-page.

-

- Substitution - contains a drop-down list of valid values of the field, which is taken from another table or enter in advance.

Database design steps

Formulation of the main problems that must be solved on the basis of the data contained in the database.

Drawing up a list of fields, including their type.

The distribution of tables and fields for primary and foreign keys.

Establishing links between tables.

Filling the tables with data.

Table creation

During grouping of fields in the table, use the following rules (rules of normalization).

1. Each field of any table must be unique, i.e. repeating fields should be located in separate tables.

2. Each table should have a primary key, each record in the table should be unique.

Table creation

- 3. For each primary key field values should fully describe record of a table.
4. The fields of the table must be independent, i. e. you can change the value of any field in a record without changing the values of other fields. This means that the table should not contain calculated fields.

Normal forms

■Database can consist of several tables, each of which must meet certain requirements, or the **normal forms**.

■In relational theory six normal forms exist, but in practice it is enough that each table corresponds to the first three normal forms: 1NF, 2NF and 3NF.

■The need to bring the table to normal forms is determined to achieve a data organization in which each fact is stored in one place and will not be repeated!

Normal forms

- 1NF (or universal relation) - is such a table, where each cell of each field keeps only one (atomic) value (not a list or set of values).

- Table is stored in the 2nd NF, if it is already in the 1NF and all non-key fields depend only on the primary key as a whole, and not from any part of it.

- The table stored in the third normal form (3NF) if it is already in 2NF and there is no transitive dependency between non-key fields.

Links between relation

- One to one.
- One to many.
- Many to many.