Ministry of Public Health of Ukraine
"Ukrainian Medical Stomatological Academy"

"APPROVED"
at the meeting of the Department
of Medical Informatics, Medical Biophysics
«27» august 2020
Minutes №. 1 «27» august 2020
Head of department _____ O.V.Silkova

METHODICAL GUIDANCE

IRUW&HQWHG directed work when preparing and during the practical session

Academic Subject	Medical Information Science
Module No 1	Fundamentals of Information Technology in the Health Care System. Treatment and analysis of medical and biological data
Topic	Database management systems and its basic functions. Working out and creation of medical database.
Year of study	2
6SHFLDOLW\	Foreign Student Training (0HGFLQH6WRPDWRORJ\
Number of academic hours	2

Poltava – 2020

1. Relevance of the topic:

Base of any computing system is data repository containing set of different interconnected data of certain knowledge branch. Databases technologies lay in the base of all modern medical information systems: support of medical documentation maintenance, question-answering systems, archiving. Basic knowledge's on this technology are necessary for modenr doctor.

2. The specific aims:

To have general knowledge of the topic studied;
To know base technologic stages fo work with databases;
To know base principles of data search in databases;
To know to work with database management system (to fill, to search necessary information).
To form the professional experience by reviewing, training and authorizing it;
To be able to carry out laboratory and experimental work.

3. Basic knowledge and skills necessary to study the topic (inter-disciplinary integration).

Previous (providing disciplines)	**Obtainable skills**
Previous (providing disciplines): Informatics bases	To know concepts: database, database management system, relational database. To know main possibilities and assignment of DB and DBMS.
The subsequent disciplines: Social medicine	To know assignment of main commands of control menu of medical DBMS program. To know principles of information search in DB. To know how to insert data, to edit data, to determine data type, field length.

4. The tasks for students' individual work

4.1. The list of basic term, parameters, characteristics, which student should master while preparin for the class.

Term	Definition
Database	The database is the uniform, centralized data repository of the defined domain to which many programs have access.
Data domain	Data domain here understand, for example, educational institution, firm, hospital and so forth.
Database management system	Programs set, which are mediators between the database and each special program has access to the concrete data.
Data bank	A data bank is the database and a database management system.
Medical data bank	Medical data bank is medical information system.
Object	The real substance that is subject to the description.
Field	The characteristic of the object. Each column of the database
Attribute	Field of relational DB.
Record	A collection of values of the attributes those appropriate to the defined specimen of the object. Each row (string, line) of the database.
Tuple	The record of relational DB.
File	A collection of the records used for the description of group of one-type objects.
Database	A collection of the files used for the description of data domain.
Key attribute	The attribute is used for identification (recognition, discrimination) of different tuples and for associating them to the certain, fixed objects.
Ratio	Ratios are represented as bidimentional tables.

	The ratio (table) contains in a computer as a datafile.
Relational database	Database with internal links between separated tables (files) by key attributes.
Database administrator	The manager is an ideologist and the main designer of a DB. Sole person has right to make changes to structure and data: to change the name of a field, to delete or enter a new field.

4.2 Theoretical questions for the class (to the topic):

1. Define "data base" concept.
2. What is databases technologies?
3. What is database management system?
4. What is relational database and relational data representation?
5. List and define main objects and characteristics of database.
6. Types of DB users. Access levels.

4.3 Practical tasks pertaining to the topic and to be completed during the class:

1. To study assignment of main menu commands of a DBMS. To make the abstract of menu commands of a DBMS.

2. To study main types of fields of a DBMS. To know how to define the type and length of fields for the medical data.

3. To study fundamentals and working methods with the data in a DBMS. To know how to develop relational tables, to insert the data, to edit the data, to do fast searching the necessary data.

4. To develop relational model for representation of data on your group students: to define type of each field, length of each field. To indicate key field for two tables with individual information on students (table 1) and data about study results (table 2).

Task 1. DATA REPRESENTATION AS RELATIONAL MODEL

1. To create DB about students-donors(of your group). At first create relational model with follows information:

Sequence number , Surname, Name, Birthday, Age, Sex, Bloodgroup (conditionally to believe that each student is donor).

2. To insert all data in protocol (table):

Field number / Question	**1**	**2**	**3**	**4**	**5**	**6**
Field name	**Sequence number**					
Field type	**Number**					
Field length	**4**					
Quantity of signs after point	**0**					

*Note:*1. Birthday in field "DATA" is entered by next order: day, month, year: (for example, 17/13/87).

2. Standard notation of blood groups: O(I), A(II), B(III), AB(IV).

3. Field lengths' are recommended: for №1 – 4, for № 2 – 20, for № 3 – automatically, № 4 – 5, № 5 – 4 , "№ 6 – 7.

Task № 2. DATABASE CREATION.

1. Start MS Access. Start window will appear on screen.
2. Choose "Blank database".
3. On right side input your database name into input area and press "Create" button. New database table (modification window) will appear on screen.

4. Over text ***"AddNewField"*** input name of first field. In tab under names ***"Table Tool"-"Datasheet"*** choose field type into input area after title ***"Data Type"***.

5. If type will be "number", access to the area ***"Format"*** will appear. Set format if it is necessary. Press ***"Enter"*** button. New input area with text ***"AddNewField"*** will appear on right.

6. Set all field names and field types sequentially.

Task № 3. ***DATABASE MAINTENANCE.***

1. After finish of field setting input of data can be.

2. Input first record (data set about first student) into free row under the row with field names.

3. Input all records (data about all students) sequentially.

Note: 1. After data input in every field press ***"Enter"*** for pass to next field (with exception field of type ***DATA***).

4. For data input use input wizard to right input area. Look on tags attentively.

5. Press **Ctrl+W** for DB table saving. Or press button ***"Save"*** on ribbon.

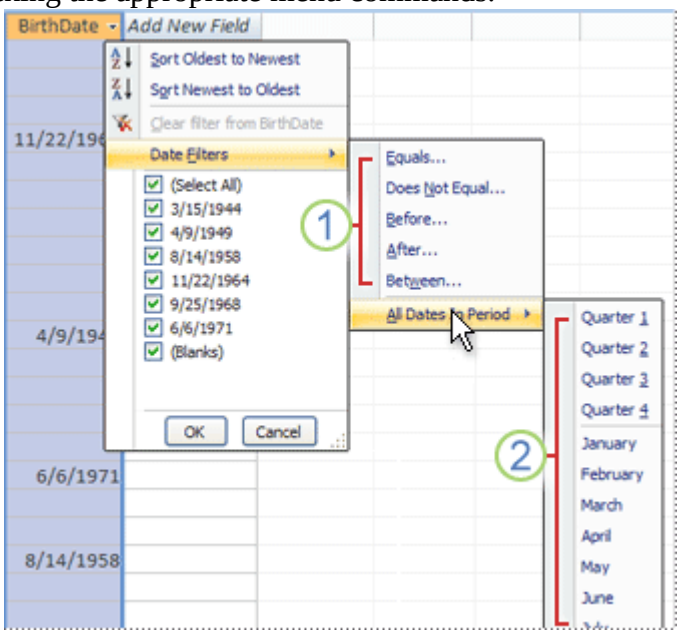
6. In query window input name of your DB.

Task № 4. ***SEARCH IN DATABASE.***

1. You need to find donor with certain blood group for urgent blood transfusion.

To find one or more specific records in a form, or to print specific records in a report, table, or query, you can use a filter. A filter limits a view of data to specific records without requiring you to alter the design of the underlying query, form, or report.

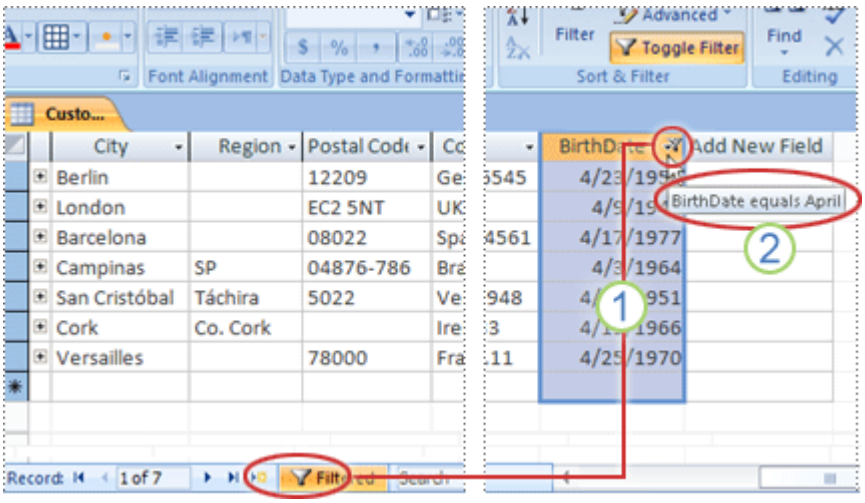
If you can view the records of only those people whose birthdays fall during a specific month by clicking the appropriate menu commands.



3.The filters that are available to you depend on the type of data that is in the selected column.

4. All Dates in Period filters ignore the day and year portion of the date values.

When a filter is applied, the view is updated to show only the records that match your criteria. In this case, you see only those customer records in which the month portion of the BirthDate field is set to April. All other records are hidden.



5. Icons in the column header and the ***record navigator bar*** indicate that the current view is filtered on the BirthDate column.

6. Hovering the mouse over the column heading displays a tip showing the current filter criterion.

When you apply a filter to a column that is already filtered, the previous filter is removed before the new filter is applied. For example, if the BirthDate field is already filtered to show birthdays that fall in April, when you apply a filter to see birthdays that fall in February, the result will include only birthdays that fall in February. Access automatically removes the filter that returned only birthdays in April before applying the second filter.

Though only a single filter will be in effect for any one field at any one time, you can specify a different filter for each field that is present in the view. For example, to see the names of those contacts who live in the UK whose birthdays fall in April, you can filter the Contacts table on the CountryRegion field and also on the BirthDate field.

When you filter multiple fields in a single view, the filters are combined by using the AND operator, like this:

CountryRegion = UK AND month of BirthDate = April

7. To find in new database student-donor men with blood group A(II) and with age more than 18 year.

This retrieval condition will have form:

sex = “men” AND age >18 AND bloodgroup = “A(1)”

Result of the work put into the work journal (copybook).

You can work with the filtered results in the same way that you work with the initial view — for example, you can edit the data, and you can navigate to other records.

You can revert to the unfiltered view by removing the filters. Removing a filter temporarily removes it from the view, so that you can switch back to the original, unfiltered view. In the **Sort & Filter** group on the **Home** tab, you can click **Toggle filter** to switch between filtered and unfiltered views.

8. To do the search of women with age less than 25 year with blood group B(III) independently.
9. Result of the work put into the work journal (copybook).

Task № 5. ***BD COMPLETION.***

1. Enter into your table.
2. Press ***“Filtered”*** button in ***record navigator bar***. In change on ***“No filter”***.
2. Add any new date into database.
3. To find in new database student-donor men with blood group O(I) and with age not more than 21 year.
5. Result of the work put into the work journal (copybook).

Task № 6. ***EXIT OUT PROGRAM***

1. Press ***“Filtered”*** button in ***record navigator bar***. In change on ***“No filter”***.
2. Press ***“Save”*** button (or ***Ctrl+S***).
3. In query window press “Yes” button for confirmation of your DB update .

Content of the topic:

ELEMENTS OF THE DATABASES THEORY

The process of solution of any task on the computer is a data processing on the set algorithm. The data, for example, can be: numbers, characters, words, surnames of students and their addresses, home telephone numbers, marks of all subjects; there are can be parameters of operation of enterprises or all qualitative and quantitative information about pharmaceutical storehouse and so forth.

Databases appearance at the end of 60th years.

The database (DB) is the uniform, centralized data repository of the defined domain (as data domain here understand, for example, educational institution, firm, hospital and so forth) to which many programs have access.

Each program has access to the concrete data of the database with the help of special programs set, which have received the name of **database management systems (DBMS)** (fig.1)**.**

Examples of databases: library catalogues, personal notepad, class journals, log-books of property and so forth.

Databases have some **levels of representation**.

1) The lowest level is physical on which the data are represented bytes on the memory devices of defined types. The physical level of representation of databases is accessible only to a narrow circle of experts.

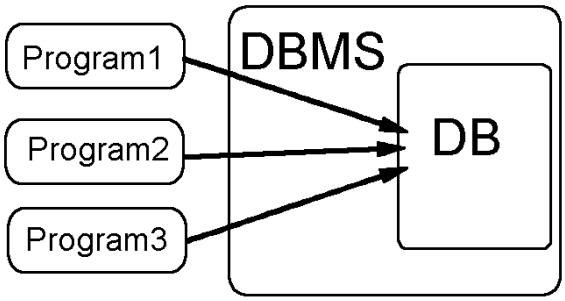


Fig.1. DBMS, DB and

programs operating DB.

2) The database is represented for broad audience of users with the help of the natural language, and also with the help of other ways accessible to the person.

The data in databases are developed and saved as uniform whole in interests of solution of all tasks of **data domain.**

Each program, that was created for this database, selects only those data that are necessary only for the given task from base.

For example, for charge of wages to teachers there will be selected surnames of teachers, their qualification, the pedagogical experience, an academic load, and for the program of compilation of the schedule – surnames of teachers, their academic load and so forth.

One more important advantage of the databases usage is the independence of applications from the data. It means that changes in the data do not cause behind themselves necessity of changes for the program. Similarly changes in logic of the program do not cause necessity of change of an access mechanism to the data.

The function of support of a data independence from programs is realized with a database management system.

The database contains the information necessary for solution of the whole complex of tasks of the given establishment, firm, ministry (branch) and so forth. The database can be enlarged by the new data, and earlier entered data can vary or absolutely be deleted. Thus changes in the database do not demand modification in applications.

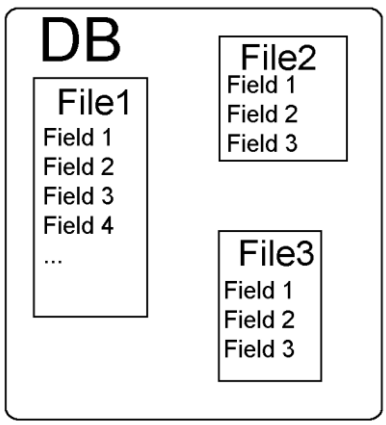


Fig.2. Database structure.

Except for concept of the database, use still concept of a **data bank**. As a data bank understand the database and a data base management system. In other words, data bank includes program (soft), language, technical and organizational means for centralized accumulation and collective usage of data as well as proper data that are kept in databases.

Medical data bank is medical information system. Medical data bank intended for use in public health. Its users can be doctors, hospital nurses, doctor's assistants, pharmaceutists, engineers,

technicians, mathematicians, programmers, researchers, managers and other specialists who work in public health. Information in medical data banks have very complex structure; it need with high protectability. As result, data has hierarchical structure, and users have different priority and volume of access.

Databases are organized usually on the basis of tabulared data presentation. Example of database data set:

Surname	Birthday	Home address	Average mark	Hobbies
Chan Hong Thaň	March 8	Kagamlyka, 3,fl.10	Good	Music, reading, skiing
Mahmud Abdalla	Juny 12	Kalinina,8,fl.2	Excellent	Heavy athletics
Heinz Petra	January 22	Navrotskogo,3,fl.90	Good	Guitar, mathematics
Kostev Lyubomir	August 3	Kagamlyka, 4,fl.5	Excellent	Detective stories
Liu Fan	May 1	Kagamlyka, 4,fl.5	Satisfactory	Tourism, volleyball
Tihonov Petr	October 9	Lisova,2,fl.11	Excellent	Photography

Surname, Birthday, Home address, Average mark, Hobbies – are attributes or fields. Every row of table is a record. Separate table can be written as separate file.

Each database is a set of the tables, which are isolated or bound among themselves by any rules (fig.2, 3).

Main terms

OBJECT – the real substance that is subject to the description.

ATTRIBUTE (FIELD) – the characteristic of the object.

RECORD – a collection of values of the attributes those appropriate to the defined specimen of the object.

FILE – a collection of the records used for the description of group of one-type objects.

DB (DATABASE) – a collection of the files used for the description of data domain.

Further each row (string, line) of the database we shall name as **record**, and each column – a **field**.

FIELD TYPES can be:

C (CHARACTER) (up to 254 bytes)

N (NUMERIC) (up to 17 bytes)

D (DATE) (8 bytes)

L (LOGICAL) (1 bit)

M (memo) (512-64000 bytes and more)

COUNTER

OLE object field

Numeric field can be:

byte — integer numberes in limits from 0 up to 255,

integer – numberes without decimal part:

* integer — integer numberes from -32 768 up to 32 767.

* long integer — integer numberes from -2 147 483 648 up to 2 147 483 647.

floating-point number (number with floated point):

* floating-point number (4 byte) — numberes in limits from –3.402823 E38 up to 3.402823 E38.

* floating-point number (8 byte) — numberes in limits from –1.79769313486232 E308 up to 1.79769313486232 E308.

In floating-point notation sign E is 10 base of power, for example:

3.402823 E38=3,402823•10^{38}.

In **LOGICAL** field can be present only “yes” or “no” (1 or 0, “true” or “false”) value. They are used for the data with only two kinds of value, for example, in questionnaires.

In **MEMO** fields very long text or number information can be stored.

COUNTER field is special counter of records; often it is used as ***key field***.

Field of OLE object. In such field reference to the object name is contained only. Object name can be appendix as Excel table, Word document, call of Word editor program or Excel table processor, picture file name, audio or video file name and others.

DB users

People, which use data that contain in databases, name user (sometimes – client).

Among many categories of users the special place is occupied with **database administrator (DBA).** The manager is an ideologist and the main designer of a DB. Anybody, except for the administrator, has no right to make changes to structure and data, that is to change the name of a field, to delete or enter a new field. For the big databases only DBA knows the name of all fields, but he can not know, that is concrete is written in each field. DBA is responsible for saving the data, develops actions on data protection from corrupting, to support of their reliability and an effective utilization.

At maintenance of the big databases for DBA there can be a defined staff of employees, including **system programmers** and **application programmers**. The main tasks of system programmers will consist in a control behind operation of a data bank, and also in development of programs which expand possibilities of a DBMS.

Application programmers develop processing programs for the data, which are contained in a DB, according to requirements which arise. At maintenance of simple databases the functions of the system and application programmers, and also DBA functions are realized by one person. Except for listed people, experts widely use the database, who, as a rule, not having good training in the field of programming, but use a DB in the daily work. For this category of people, as a matter of fact the DB are developed. To them carry, for example, workers of libraries, firms, staff departments, doctors and so forth. This category of people name as end users.

Let's mark, that in the database rather various data on the given data domain, for example, about firm can be saved. The database various categories of end users, for example administration of firms, workers of a consumer services, workers of accounts department can use. And it is natural, each category of end users should have access not to all database, and only to that, what there is an appropriate permission from DBA. In this connection in data banks there should be stipulated means and ways which provide protection of the defined areas of the data against unauthorized (unsanctioned, illegal) access.

The data bank from the point of view of an end user can answer to such main requirements:

- to have possibility of upgrade, addition and the extension of the database;
- to provide high reliability of information saving;
- to produce the complete and possible information on inquiries;
- to have ways which provide protection of a DB against unauthorized access.

Concept of the relational database

Between units of the database (fields and records) the defined links exist. Depending on character of these links three types of organization of databases are distinguished: hierarchical, network and relational. For PC relational databases are used in main.

The concept of the relational database is developed by E.F.Kodd in 1970. At the heart of this database the mathematical concept of the ratio lays. Ratios are represented as bidimentional tables.

The ratio (table) contains in a computer as a datafile. The table line corresponds to a record in a datafile, and a column – to a field. In the theory of relational databases of line name as tuples, and columns – attributes. Correspondence between the listed concepts for tables, ratioes and files resulted in scheme:

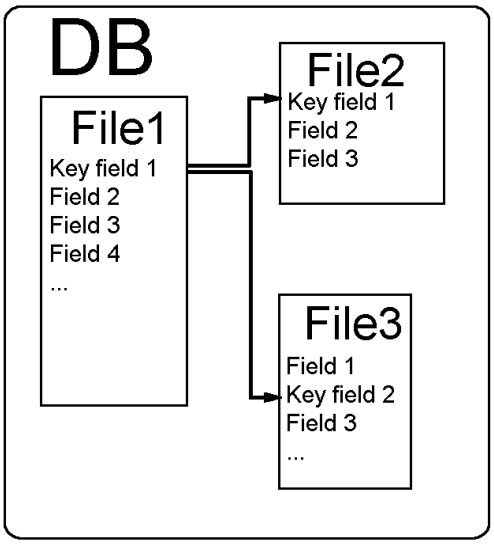


Fig.3. Relational database

The table → Row (string, line) – Column
The ratio → Tuple – Attribute
The file → Record – Field

The list of attribute names of the ratio term as the scheme of the ratio.

In each ratio one attribute is selected. It name key attribute, or simply – key. The key attribute is necessary unique, that is it should uniquely, unambiguously determine (to identify) tuples. *For example*, key field can be Surname.

Key attribute (key field) is used for identification (recognition, discrimination) of different tuples and for associating them to the certain, fixed objects.

Composite keys which contain some attributes can be used in some ratios. *For example*, in ratio with information about students composite keys can consist of Surname, Name, Birthday, Grade level, Group number.

Above ratios (tables) various operations, similarly to execution of arithmetic operations, can be fulfilled. It enables to receive other ratios from ratios which are saved in a computer. For example, you want to obtain list of one group students with marks from total institution information table (data base) and print this list. For this purpose it can be necessary to select necessary information into temporary table and then print it.

In DBMS there are special programming languages for execution of operations above ratios.

DBMS (DATABASE MANAGEMENT SYSTEM)

Main functions of DBMS

- Storage and data manipulation in a DB.
- Re-structuring of a DB without loss of the information.
- Simulation of data logical structures.
- Processing of the big text datafields.
- Sorting (ordering) or codeindexing of the data on several keys.
- Creation and output of reports.
- Calculations with using of set arithmetical and logical expressions.

The data base management system is a special software package which provides creation, support and usage of databases by many users.

Creation of the database starts from definition of the data list. It holds data content and data types which are used. Data type can be the numerical, text, string, ”date”, “time”, “money” and other. For each data item it is necessary to know its size (length) so that to allocate specific place in computer memory for every record.

For type declaration of the data in a DBMS usually use the own language named as a data description language (DDL).

Field names in many DBMS are written by latin characters.

The DBMS can provide introduction to a computer of the prepared data that are fields, their types and the value.

During data input DBMS check data. Value entry must to have necessary type. If type does not meet the specified type, system ignores this data.

At a stage of support and usage of databases, that is at a stage of their maintenance, the DBMS dissolves tasks of data editing and output of necessary messages.

Editing contains such main operations:

* Deleting out-of-date (obsolete) records.

* Replacement of some records with others.
* Change of the separate data in records.
* An insert in the defined places of new records.
* Addition by new records.
* Addition of new fields, change of their names and so forth.

The information is produced to the user according to inquiry which has arrived from user. Thus it can be produced both on the screen and on the printer in various, convenient and visual forms. It can be, for example, tables, diagrams, a graphics and so forth.

If the database is accessible simultaneously to several users the DBMS should provide that they did not prevent each other.

For example, if one user changes structure of DB (add, delete record of change its contents), DB must be blocked for similar access of other users.

Any DBMS can provide execution of the most used sorts of data processing. For example, it can fulfill sorting of the data in alphabetic order, count of the sum of numbers of a column, search of the necessary record and so forth.

DBMS must support of database integrity, for example, in case of machine failures, at unexpected disconnecting of electrosupply and in other situations.

All described DBMS functions are considered only from positions of end user. Managerial processes by the database at a physical level are developed and modified by DBMS manufacturer, and here are not considered.

For implementation of the need functions in each DBMS, except for the DDL language, data manipulation language (DML) and compilers or interpreters from these languages are used also.

DML is used for execution of various operations above the data. With the help of this language such operations can be fulfilled, for example: sampling of the data which answer the set conditions; deleting of the defined data and record new; finding of average value of the data of the defined type and so forth.

In some DBMS the special query languages oriented to users-programmers are used. Often they contain as component parts DML and DDL. For example, in FoxPro and its successor – Visual FoxPro – language with identical name is used. In Microsoft Access language Visual Basic for Access is used. It is version of Visual Basic adapted to DBMS needs and features.

The most widespread DBMS.

- FoxPro and its successor – Visual FoxPro. Originator of this system is Fox company. Now (after buying) this system is developed by Microsoft. It is constituent part of Visual Studio program set.
- Microsoft Access, which is focused on the solution of economic problems. Originator is Microsoft. Built-in programming language is Visual Basic for Application.

FoxPro has more versatile and potent built-in programming language, than Access. But both can use procedures built on power and versatile Visual C++ language that enlarges their abilities.

- Delphi. Built-in programming language is Pascal.
- Paradox.

Other methods of DBMS use

SQL (referred to as Structured Query Language) is a special-purpose programming language designed for managing data in ***relational database management systems*** (RDBMS). The most common operation in SQL is the query. Queries allow the user to describe desired data, leaving the database management system (DBMS) responsible for planning, optimizing, and performing the physical operations necessary to produce that result as it chooses.

ODBC (**Open Database Connectivity**) is a standard ***C programming language*** interface for accessing database management systems. The designers of ODBC aimed to make it independent of database systems and operating systems. An application can use ODBC to query data from a DBMS, regardless of the operating system or DBMS it uses.

ODBC accomplishes DBMS independence by using an *ODBC driver* as a translation layer between the application and the DBMS. ODBC drivers exist for most DBMSs.

Generalization

A DBMS is a complex set of software programs that controls the organization, storage, management, and retrieval of data in a database. A DBMS includes:

1. A modeling language to define the schema of each database hosted in the DBMS, according to the DBMS data model.

The four most common types of organizations are the hierarchical, network, relational and object models.

2. Data structures (fields, records, files and objects) optimized to deal with very large amounts of data stored on a permanent data storage device (which implies relatively slow access compared to volatile (energy-depended) main memory).

3. A database query language and report writer to allow users to interactively interrogate the database, analyze its data and update it according to the users privileges on data.

It also controls the security of the database.

Data security prevents unauthorized users from viewing or updating the database. Using passwords, users are allowed access to the entire database or subsets of it.

4. A transaction mechanism, in order to ensure data integrity, despite concurrent user accesses (concurrency control), and faults (fault tolerance). It also maintains the integrity of the data in the database. The DBMS can maintain the integrity of the database by not allowing more than one user to update the same record at the same time.

The DBMS accepts requests for data from the application program and instructs the operating system to transfer the appropriate data.

When a DBMS is used, information systems can be changed much more easily as the organization's information requirements change. New categories of data can be added to the database without disruption to the existing system.

Organizations may use one kind of DBMS for daily transaction processing and then move the detail onto another computer that uses another DBMS better suited for random inquiries and analysis. Overall systems design decisions are performed by data administrators and systems analysts. Detailed database design is performed by database administrators.

OBJECT – the real substance that is subject to the description.

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RECORD – a collection of values of the attributes those appropriate to the defined specimen of the object.

FILE – a collection of the records used for the description of group of one-type objects.

DB (DATABASE) – a collection of the files used for the description of data domain.

Further each row (string, line) of the database we shall name as **record**, and each column – a **field**.

FIELD TYPES can be:

C (CHARACTER) (up to 254 bytes)

N (NUMERIC) (up to 17 bytes)

D (DATE) (8 bytes)

L (LOGICAL) (1 bit)

M (memo) (512-64000 bytes and more)

COUNTER

OLE object field

Numeric field can be:

byte — integer numbers in limits from 0 up to 255,

***integer* –** numbers without decimal part:

* integer — integer numbers from -32 768 up to 32 767.

* long integer — integer numbers from -2 147 483 648 up to 2 147 483 647.

floating-point number (number with floated point):

* floating-point number (4 byte) — numbers in limits from –3.402823 E38 up to 3.402823 E38.

* floating-point number (8 byte) — numbers in limits from –1.79769313486232 E308 up to 1.79769313486232 E308.

In floating-point notation sign E is 10 base of power, for example: 3.402823 E38=3,402823•10^{38}.

In **LOGICAL** field can be present only “yes” or “no” (1 or 0, “true” or “false”) value. They are used for the data with only two kinds of value, for example, in questionnaires.

In **MEMO** fields very long text or number information can be stored.

COUNTER field is special counter of records; often it is used as ***key field***.

Tasks for self-check:

Task 1:

1.A DATABASE MAY CONTAIN

a) Only one table
b) At most two tables
c) At most three tables
d) All of the above
e) None of the above

2.WHICH OF THE FOLLOWING IS USED TO ANSWER A QUESTION ABOUT A DATABASE?

a) Form
b) Module
c) Query
d) Table
e) Report

3.WHICH OF THE FOLLOWING IS USED IN ACCESS TO AUTOMATE A SERIES OF COMMANDS?

a) Report
b) Table
c) Macro
d) Query
e) Form

4.AN ACCESS DATABASE YOU ARE WORKING ON CONTAINS A TABLE, FORM, QUERY, AND REPORT. HOW MANY FILES ARE NEEDED TO STORE THESE ELEMENTS?

a) One
b) Two
c) Three
d) Four
e) Many

5.WHICH OF THE FOLLOWING VIEWS WOULD YOU USE TO DEFINE A TABLE AND SPECIFY THE FIELDS IT WILL CONTAIN?

a) Define view
b) Datasheet view
c) Design view
d) Edit view
e) None of above

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Additional.

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