Database

For

Second Class Students

Computer System Department

Commented [MF1]:

جمهورية العراق

وزارة التعليم العالي والبحث العلمي

الجامعة :الفرات الأوسط التقنية

الكلية : المعهد التقني /كربلاء

القسم : تقنيات أنظمة الحاسوب

المرحلة :الثانية

اسم المادة	**قواعد البيانات Database**
المحاضر	**منال هاشم سعود**
اهداف المادة	تعريف الطالب بمفاهيم قواعد البيانات ومصطلحاتها والتعامل مع قواعد البيانات والنماذج وبرمجتها بلغة Visual FoxPro
التفاصيل الدراسية للمادة	**اللغة المستخدمة الانكليزية وتستخدم لغة** Visual FoxPro **لكتابة البرامج**
الكتب المنهجية	**-------**
المصادر الخارجية	1-Deepak Naidu,"Foxpro for Windows",Gautam Rawat,2001 2- ملزمة فيجول فوكس برو عملي / 6 منهج عملي , اعداد المبرمج حافظ علي شباط والمبرمج خمائل راقم رحيم

مقدمة في قواعد البيانات

(Database)

What is the Database

What is a Database? Definition, Meaning, Types with Example

Before we learn about a database, let us understand –

What is Data?

In simple words, data can be facts related to any object in consideration. For example, your name, age, height, weight, etc. are some data related to you. A picture, image, file, pdf, etc. can also be considered data.

ما هي البيانات؟ بكلمات بسيطة ، يمكن أن تكون البيانات حقائق متعلقة بأي كائن قيد الدراسة. على سبيل المثال ، اسمك وعمرك وطولك ووزنك وما إلى ذلك هي بعض البيانات المتعلقة بك. يمكن أيضًا اعتبار صورة أو صورة أو ملف أو pdf وما إلى ذلك بيانات.

What is the Information? To understand these data, they need to translate or processing to become information . information is the meaning that is given to the data through interpreted appropriately.

ما هي المعلومات؟ لفهم هذه البيانات، يحتاجون إلى ترجمتها أو معالجتها لتصبح معلومات. المعلومات هي المعنى الذي يعُطى للبيانات من خلال تفسيرها بشكل مناسب.

What is Database?

A database is a systematic collection of data. They support electronic storage and manipulation of data. Databases make data management easy.

Let us discuss a database example: An online telephone directory uses a database to store data of people, phone numbers, and other contact details. Your electricity service provider uses a database to manage billing, client-related issues, handle fault data, etc.

Let us also consider Facebook. It needs to store, manipulate, and present data related to members, their friends, member activities, messages, advertisements, and a lot more. We can provide a countless number of examples for the usage of databases.

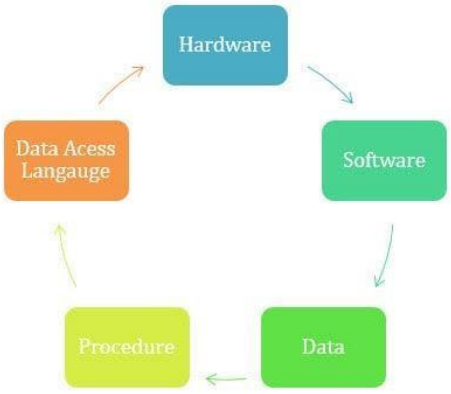
ما هي قاعدة البيانات؟

قاعدة البيانات هي مجموعة منهجية من البيانات. أنها تدعم التخزين الإلكتروني ومعالجة البيانات. قواعد البيانات تجعل إدارة البيانات سهلة.

دعونا نناقش مثال قاعدة بيانات: يستخدم دليل الهاتف عبر الإنترنت قاعدة بيانات لتخزين بيانات الأشخاص وأرقام الهواتف وتفاصيل الاتصال الأخرى. يستخدم مزود خدمة الكهرباء قاعدة بيانات لإدارة الفواتير ، والمشكلات المتعلقة بالعميل ، والتعامل مع بيانات الأعطال ، وما إلى ذلك.

دعونا نفكر أيضًا في Facebook. يحتاج إلى تخزين ومعالجة وتقديم البيانات المتعلقة بالأعضاء وأصدقائهم وأنشطة الأعضاء والرسائل والإعلانات وغير ذلك الكثير. يمكننا تقديم عدد لا يحصى من الأمثلة لاستخدام قواعد البيانات.

Database Components:



Database Components

There are five main components of a database:

- **Hardware:**

The hardware consists of physical, electronic devices like computers, I/O devices, storage devices, etc. This offers the interface between computers and real-world systems.

- **Software:**

This is a set of programs used to manage and control the overall database. This includes the database software itself, the Operating System, the network software used to share the data among users, and the application programs for accessing data in the database.

- **Data:**

Data is a raw and unorganized fact that is required to be processed to make it meaningful. Data can be simple at the same time unorganized unless it is organized. Generally, data comprises facts, observations, perceptions, numbers, characters, symbols, images, etc.

- **Procedure:**

Procedure are a set of instructions and rules that help you to use the DBMS. It is designing and running the database using documented methods, which allows you to guide the users who operate and manage it.

- **Database Access Language:**

Database Access language is used to access the data to and from the database, enter new data, update already existing data, or retrieve required data from DBMS. The user writes some specific commands in a database access language and submits these to the database.

المعدات:
تتكون الأجهزة من أجهزة مادية وإلكترونية مثل أجهزة الكمبيوتر وأجهزة الإدخال / الإخراج وأجهزة التخزين وما إلى ذلك. وهذا يوفر واجهة بين أجهزة الكمبيوتر وأنظمة العالم الحقيقي.

- برمجة:

هذه مجموعة من البرامج المستخدمة لإدارة قاعدة البيانات الكلية والتحكم فيها . يتضمن ذلك برنامج قاعدة البيانات نفسه ، ونظام التشغيل ، وبرنامج الشبكة المستخدم لمشاركة البيانات بين المستخدمين ، والبرامج التطبيقية للوصول إلى البيانات في قاعدة البيانات.

- بيانات:

البيانات هي حقيقة أولية وغير منظمة يجب معالجتها لجعلها ذات مغزى. يمكن أن تكون البيانات بسيطة في نفس الوقت غير منظمة ما لم تكن منظمة. بشكل عام ، تتكون البيانات من الحقائق والملاحظات والتصورات والأرقام والشخصيات والرموز والصور وما إلى ذلك.

- إجراء:

الإجراء عبارة عن مجموعة من الإرشادات والقواعد التي تساعدك على استخدام نظام إدارة قواعد البيانات. يقوم بتصميم قاعدة البيانات وتشغيلها باستخدام طرق موثقة ، مما يسمح لك بإرشاد المستخدمين الذين يقومون بتشغيلها وإدارتها.

•لغة الوصول إلى قاعدة البيانات:

تستخدم لغة الوصول إلى قاعدة البيانات للوصول إلى البيانات من وإلى قاعدة البيانات ، أو إدخال بيانات جديدة ، أو تحديث البيانات الموجودة بالفعل ، أو استرداد البيانات المطلوبة من .DBMSيكتب المستخدم بعض الأوامر المحددة بلغة الوصول إلى قاعدة البيانات ويرسلها إلى قاعدة البيانات.

What is a Database Management System (DBMS)?

Database Management System (DBMS) is a collection of programs that enable its users to access databases, manipulate data, report, and represent data. It also helps to control access to the database. Database Management Systems are not a new concept and, as such, had been first implemented in the 1960s.Charles Bachman's Integrated Data Store (IDS) is said to be the first DBMS in history. With time database, technologies evolved a lot, while usage and expected functionalities of databases increased immensely.

DBMS ؟ما هو نظام إدارة قواعد البيانات) (

نظام إدارة قواعد البيانات) (DBMSعبارة عن مجموعة من البرامج التي تمكن مستخدميها من الوصول إلى قواعد البيانات ومعالجة البيانات والإبلاغ عنها وتمثيلها. كما أنه يساعد في التحكم في الوصول إلى قاعدة البيانات. أنظمة إدارة قواعد البيانات ليست مفهومًا جديدًا ، وعلى هذا النحو ، تم تنفيذها لأول مرة في الستينيات.

يُقال إن مخزن البيانات المتكامل) (IDSالتابع لتشارلز باكمان هو أول نظم إدارة قواعد البيانات في التاريخ. مع قاعدة بيانات الوقت ، تطورت التقنيات كثيرًا ، مع الاستخدام والوظائف المتوقعة من قواعد البيانات زيادة هائلة.

Characteristics of Data in a Database:

1. Shared: Data should be sharable among different users and applications.
2. Persistence: Data should exist permanently in the database. ...
3. Validity/Integrity/Correctness: It should maintain integrity so that there is always correct data in the database.
4. Security: Data should be protected from unauthorized access.
5. Non-redundancy: Data should not be repeated.

خصائص البيانات في قاعدة البيانات:

1. مشتركة: يجب أن تكون البيانات قابلة للمشاركة بين مختلف المستخدمين والتطبيقات.
2. الثبات: يجب أن تكون البيانات موجودة بشكل دائم في قاعدة البيانات... .
3. الصلاحية / النزاهة / الصحة: يجب أن تحافظ على النزاهة بحيث تكون هناك دائمًا بيانات صحيحة في قاعدة البيانات.
4. الأمن: يجب حماية البيانات من الوصول غير المصرح به.
5. عدم التكرار: يجب عدم تكرار البيانات.

Features of Traditional Systems

ملامح عن النظم التقليدية

1- Data replication and the consequent high costs of storage and frequency of treatment and the difficulty of sustaining

2- Total reliability of data and software applications in addition to the burden of maintenance of the programs and files when changes

3- Non-data link where the link between data elements through the files and the logical relationships within the already identified in the data collection phase

4-Difficulty of access to data associated with the process of access to the data style used in the structuring and data storage

ميزات الأنظمة التقليدية ملامح عن النظم التقليدية

1- تكرار البيانات وما يترتب على ذلك من ارتفاع تكاليف التخزين وتكرار المعالجة وصعوبة استدامتها

- الموثوقية الكاملة لتطبيقات البيانات والبرمجيات بالإضافة إلى عبء صيانة

البرامج والملفات عند التغيير

3- ارتباط غير بيانات حيث يتم الربط بين عناصر البيانات من خلال الملفات والعلاقات المنطقية ضمن المحدد بالفعل في مرحلة جمع البيانات
4-صعوبة الوصول إلى البيانات المرتبطة بعملية الوصول إلى نمط البيانات المستخدم في الهيكلة وتخزين البيانات

Database Administrator

DBA: Is a person who is responsible for the environment aspects of DB **Responsible of database administrator**

1- Decide the contents of DB
2- Decide how data is to be stored
3- Decide which language to be provided to access db
4- Define authorized checks and security
5- Define recovery procedure
6- Monitor performance to ensure good level of performance
7- Restructuring of db
8- Initialize DB

DBهو الشخص المسؤول عن الجوانب البيئية لـ DBA :
- تحديد 2- تحديد محتويات قاعدة البيانات 1مسؤول قاعدة البيانات
- تحديد اللغة التي سيتم توفيرها للوصول إلى 3كيفية تخزين البيانات
- تحديد إجراءات 5- تحديد الشيكات المصرح بها والأمن 4 db

- إعادة هيكلة 7- مراقبة الأداء لضمان مستوى أداء جيد 6الاسترداد
DB- تهيئة 8ديسيبل

Source of data in an organization

1- Internal source
2- External source

Internal source: reflect when happen inside the organization **External source**: reflect what is likely to happen

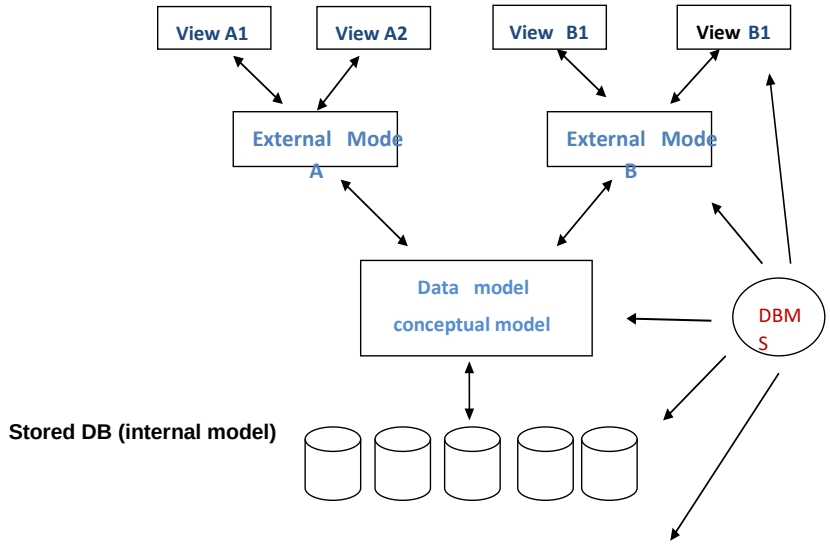
لمصدر الداخلي: انعكس عندما يحدث داخل المنظمة
المصدر الخارجي: يعكس ما يمكن أن يحدث

Database Architecture

Contains 3 levels

1- External level
2- Conceptual level
3- Internal level

1 المستوى الخارجي 2- المستوى المفاهيمي 3- المستوى الداخلي -



Database Operations Convert Data to Information

1- Data capturing and recording
2- Data verification
3- Data classification
4- Data arrangement and sorting
5- Data summarizing
6- Data storage
7- Data manipulation and computing
8- Data retrieval
9- Data reproduction 10-Data communication

1تقوم عمليات قاعدة البيانات بتحويل البيانات إلى معلومات - 2- التقاط وتسجيل البيانات 3التحقق من البيانات - 4- تصنيف البيانات وفرزها 5- ترتيب البيانات 6- تلخيص البيانات 7تخزين البيانات - 8- التلاعب بالبيانات والحوسبة 9- استرجاع البيانات - استنساخ البيانات 10 - اتصالات البيانات

Characteristics of Information

-accurate

-time

-completeness

-Top management required summery operation down management required details -relevant

-cost effective

Fields: are the smallest units of information you can access Such as name, address and job ,social security number.

-In DBMS, a field can be required, optional or calculated

Required field: is one in which you must enter data

Optional fields: is one you may leave blank

Calculated field: is one whose value is derived from some formula involving other fields, you do not enter data into calculated field,the system automatically determines the correct value

Record: A set of related fields

A record contains all the information entered about an entity (employee, customer or object).

خصائص المعلومات
-دقيق
-زمن الاكتمال
تتطلب الإدارة العليا العملية الصيفية إلى أسفل الإدارة المطلوبة التفاصيل -ذو صلة
-فعاله من حيث التكلفه

الحقول: هي أصغر وحدات المعلومات التي يمكنك الوصول إليها

مثل الاسم والعنوان والوظيفة ورقم الضمان الاجتماعي.

-في DBMS ، يمكن أن يكون الحقل مطلوًبا أو اختيارًيا أو محسوًبا
الحقل المطلوب: هو الحقل الذي يجب إدخال البيانات فيه
الحقول الاختيارية: حقل يمكنك تركه فارغًا
الحقل المحسوب: هو الحقل الذي يتم اشتقاق قيمته من بعض المعادلات التي تتضمن حقوًلا أخرى ، ولا تدخل البيانات في الحقل المحسوب ، بل يحدد النظام تلقائيًا القيمة
الصحيحة السجل: مجموعة من الحقول ذات الصلة يحتوي السجل على جميع المعلومات التي تم إدخالها حول كيان)موظف أو عميل أو كائن.(

Importance of Databases:

1- Store all data in ways that complete and accurate classification and organization of these data to easily retrieved in the future.
2- Tracking changes that occur in stored data and make the necessary adjustments, so that they are always in the picture appropriate for use upon request.
3- Complete confidentiality of data stored so as not to allow any person has no right to access to information and data.
4- Storing a large amount of data that go than human capabilities and then make some operations and processors that it is impossible to perform manually

أهمية قواعد البيانات:

1- تخزين جميع البيانات بطرق تصنيف كامل ودقيق وتنظيم لهذه البيانات لاسترجاعها بسهولة في المستقبل.

2- تتبع التغييرات التي تحدث في البيانات المخزنة وإجراء التعديلات اللازمة ، بحيث تكون دائمًا في الصورة مناسبة للاستخدام عند الطلب.

3- السرية التامة للبيانات المخزنة بحيث لا يسمح لأي شخص ليس له حق الوصول إلى المعلومات والبيانات.

4- تخزين كمية كبيرة من البيانات تتجاوز القدرات البشرية ومن ثم إجراء بعض العمليات والمعالجات التي يستحيل القيام بها يدويًا

Database limitations:

- Security can be compromised

- The lack of integrity and credibility leads to the database is incorrect.
- The system may sometimes become implicated.
- In some cases, the system needs additional hardware to work on the database.
- Performance is sometimes unclear.

قيود قاعدة البيانات:

- يمكن اختراق الأمن

الافتقار إلى النزاهة والمصداقية يؤدي إلى عدم صحة قاعدة البيانات.

- قد يتورط النظام أحيانًا.
- في بعض الحالات ، يحتاج النظام إلى أجهزة إضافية للعمل على قاعدة البيانات.

الأداء غير واضح في بعض الأحيان.

Database design steps:

1 -Determine the purpose of the databases.

2 -Determine the necessary tables.

3- Determine the required fields.

4- Determine relationships

خطوات تصميم قاعدة البيانات:

1- تحديد الغرض من قواعد البيانات.

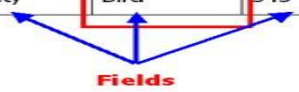
2- تحديد الجداول اللازمة.

3- تحديد الحقول المطلوبة.

4- تحديد العلاقات

Fields: are the smallest units of information you can access Such as name,
address and job, social security number

First Name	Last Name	Address	City	Age
Mickey	Mouse	123 Fantasy Way	Anaheim	73
Bat	Man	321 Cavern Ave	Gotham	54
Wonder	Woman	987 Truth Way	Paradise	39
Donald	Duck	555 Quack Street	Mallard	65
Bugs	Bunny	567 Carrot Street	Rascal	58
Wiley	Coyote	999 Acme Way	Canyon	61
Cat	Woman	234 Purrfect Street	Hairball	32
Tweety	Bird	543	Itotltaw	28



Record: A set of related fields ,A record contains all the information entered about an entity (employee, customer or object).

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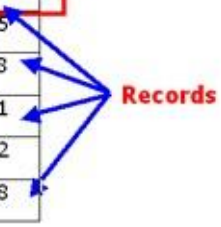


Entity : is a single person, place, or thing about which data can be stored.

Attribute : a property processed by a record or an entity.

Primary key

An attribute, or field, upon which all other fields are functionally dependent and which is chosen as the main direct access vehicle to individual records.

A primary key is defined on a single column at it is not uncommon to have it defined on two columns.

There are four basic rules that you should observe when defining primary keys:-

1- Every record must have a value in the primary key, it cannot be null.
2- Primary key values must be unique
3- Non redundancy, no attribute in the key can be discarded without destroy the property of unique identification
4- Primary key, a value should not be reused if a record is deleted, its primary key should not be re assigned to another record as this can create errors and confusion.

Secondary key: Which is the key that is used to identify one or more records and learned from this key in the access to the group of records that contain values in common?

File: A collection of related records

Entity: An independent to object that can be related to another in database scheme, it may be a person, place, organization grouping etc.

Relations: are the connection between two or more entities, relationship lines indicate that each instance of an entity may have a

relationship with instance of the connected entity and vice versa.

For example the relationship between the orders and customers table will normally be that an order is placed by one and only one customer, while a given customers may have placed one or more orders.

Logical Relationship Types

1- One to One Relationship (1:1): one record related to one record in another table, a relationship between two entities that have been defined correctly and are ready for implementation.

2- One to Many Relationship(1:N): a relationship between two tables in which a common field links the tables together, one record related to one or more records in another table.

1- Many to Many Relationship (M:N): Is used to relate many records in the table A with many records in the tables B , A record ("Parent") in table A can have many matching records ("children") in table B , and a record (child) in table B can have many matching records ("parent") in table A.

Q1- Define the Database and write the characteristics of it

Q2- Draw Database Architecture as a diagram and explain the levels of it?

Q3- Fill the blanks with suitable words:-

1- The types of fields are ------,-------,-------

2- The source of data in any organization is -----,-----

3- Database administrator (DBA) is ----------

Q4- Write the basic rules that you should observe when defining primary keys

Q5- Enumerate the types of logical relationships

Note:

Check your Answer in answer key at page (47)

Write the objectives of database?

Q1/ write (T) for true statement and (F) for false statement and correct the false if found:-

1-Record is the smallest unit in dbase system

2-Report is used to display the selected data from one table or more than one depending on selected method

3-Skip command used for jump to required record

4-In database architecture system, database stored in conceptual level

5- The relationship between Department and head of department is 1: N

Q2/ Fill the blanks with suitable words

1-Delete all used to delete all records ----------

2-(?) alone used to print ----------

3- -------- used to index the file again after edit

Note:

Check your Answer in answer key

Commands in V-Fox Pro

The user of system can dealing with data by execution many of commands that are supplied by (DBMS),in V-FoxPro there are many places are used to execute this commands because of existing different ways of dealing with data such as :

1. **Dealing with data directly that is mean using commands window.**
2. **Dealing with data indirectly that is mean using program file.**
3. **Execution commands inside FoxPro's object(Form ,report, Database …etc)**

Execution the commands on data

To execute the commands of fox pro correctly inside commands window or inside program file the general form of

command must be used which is mean the rule of using commands in v-fox pro

The general form of commands is :-

< Command>[<scope>][<field list>][<field list>][for<expr>][while<expr>].

Description parts of general form

< command >:- is mean one of VFP 's commands which is represent a different operations that are executed on data files like creat, use …etc.

[<scop>]:-is mean range of execution of commands on data i.e which records that should be involving in execution of command , this option (scop) must be replaced by four options in execution :-

1. **ALL:- is mean all records of file will be involved in execution of command .**
2. **Next:-is this option we must add number (N) this added number mean number of records that will be involved in execution from a current record to N-1 ,**

1- EDIT [<scope>][<field list>][<field list>][for<expr>][while<expr>].

2- Change [<scope>][fields<field list>][for<expr>][while <expr>].

3- Brows [fields<field list>] [<lock<expr>] [freeze<field>] [no follow]

[no menu][no append] [with<expr>] [no modify].

4- Replace [<scope>] <field> with <expr1> [,<field2> with <expr2>]....

[For<expr>][While<expr>].

5- Update on <key field> from <alias> replace <field1> with <expr1>

[,<field2> with <expr2>] [random].

6- Join with <alias> to <new file> for <expr>[field<field list>].

7- Delete file <file name>.

8- Recall [<scope>] [for<expr>] [while<expr>].

9- Pack

10- Zap

11- Brows [fields<field list>] [<lock<expr>] [freeze<field>] [no follow]

[no menu][no append] [with<expr>] [no modify].

12- Store <expr> to [<memvar list>]

13- Store <expr> to <array name>.

14- Release [<memvar>].

15- Release all.

16- Save to <file>.

17- Save screen [to<memvar>].

18- Restore form <memfile> [additve].

19- Sort to <new file> on <field> [/A] [/C] [/D] [,<field2>]....[<scope>]

[for<expr>] [while<expr>].

20- Index on <key expr> to <index file>.

21- Reindex.

22- Set index to <index file>.

23- Locate [<scope>] [for<expr>] [whlie<expr>]

Continue.

24- Go/Goto [Top] / [Bottom] [Record] [<expr>]

25- Seek <expr>.

26- set filter to [<expr>]

27- Rename <old file> to <new file>.

28- Close all

29-Display[<scope>] [field<field list>] [for<expr>] [while<expr>] [off][to print]

Display files, Display memory [to print]

Display status [to print],Display structure [to print]

30- list [<scope>] [fields<field list>] [for<expr>] [<while<expr>] [off] [to print]

list files

list memory

list status

list structure

31- Copy file <file1> to <file2>

Copy indexes <index file list> | All to <cdx file>

Copy memo <mem field> to <file> [additive]

Copy structure to <file> [field<field list>]

Copy to <file> [field <field list>]]

Copy tag <tag name> [of <cdx file>] to <index file>

32- Go/Goto [Top] / [Bottom] [Record] [<expr>]

33- Skip [<expr>]

The Functions

?Val("13.45") → 13.45 رقمي

?Type("BB") → c character

?Asc("M") → 77

?CHR(77) → M

? at("HAM" , "MAGDI MOHAM") → 9

?substr("my name is magid" ,4 , 4) → name

?left("his name is",3) → his

?right("name is Ali",3) → Ali

?len("I am happy now") → 14

?replicate("@",20) → @@@.....@@ مرة 20

?transform(1234567,"99,999,99") → 12,345,67

?int(10.23) → 10

?round(3.7415,1) → 3.7

?sqrt(100) → 10

?mod(72,9) → 0

?max(83,1) → 83 اكبر رقم

?min(83,1) → 1 اصغر رقم

?dbf() → يعطي مسار الملف واسمه

?BOF() → T. اذا وصل الى بداية الملف يطبع .

?EOF() → F. اذا وصل الى بداية الملف يطبع .

?recno() → يعطي رقم القيد

?reccount() → يعطي عدد القيود في الملف

?recsize() → عدد الحروف byte في كل قيد

?ABS(expr) → القيمة المطلقة

?space(expr)

?upper("kk") → KK capital يطبع الحروف الكبيرة

?lower("KK") → kk small يطبع الحروف الصغيرة

?Time() يعطي الوقت

?Date() يعطي التاريخ

?Day({^yyyy-mm-dd}) يعطي اليوم

ex: ?day({^1998-05-23}) → 23

?month({^yyyy-mm-dd}) يعطي الشهر

ex: ?month({^1998-05-23}) → 5

?year({^yyyy-mm-dd}) يعطي السنة

ex: ?year({^1998-05-23}) → 1998

?DMY({^yyyy-mm-dd}) يعطي يوم شهر سنة

ex: ?dmy({^1998-05-23}) →23 May 98

?DOW({^yyyy-mm-dd}) يعطي رقم اليوم في الاسبوع

ex: ?dow({^1998-05-23}) → 7

?CMONTH({^yyyy-mm-dd}) يعطي اسم الشهر

ex: ?CMONTH({^1998-05-23}) → May

?CTOD("GG") يحول النص الى تاريخ

?COL() يعطي رقم العامود

?ROW() يعطي رقم الصف

?SELECT() يعطي منطقة العمل الحالية

Assembly Commands

1- Average [<expr list>] [<scope>] [for<expr>][while<expr>]
[to<memvar list>].

ex: aver s1 to ms1
aver s1*s2 to ms4

2- Count [<scope>] [for<expr>] [while<expr>] [to<memvar>]

3- Sum [<scope>] [<expr list>] [to<memvar>] [for<expr>] [while<expr>]

4- Total to <newfile> on <key> [<scope>] [fields<field list>] [for<expr>] [while<expr>]

Statistical and Financial Commands

Calculate:يرجع هذا الايعاز مجموع القيم للعمود من النوع الرقمي كم في الصيغة:-

Sum( ) -1

Calcu sum (degree)

Calculate:يرجع هذا الايعاز المعدل لمجموع القيم في العمود
avg( ) -2

Calcu avg (degree)

Calculate cnt( ) – 3:يقوم هذا الايعاز بارجاع عدد القيود في الملف كالاتي

Calcu cnt(degree)

Calculate:يقوم هذا الايعاز بايجاد الانحراف المعياري لقيم العمود من النوع الرقمي
std(Calcu std(degree) -4

Calculate:يقوم هذا الايعاز بارجاع اصغر قيمة من قيم العمود من النوع الرقمي
min( ) -5

Calcu min(degree)

Calculat max()-6-:يقوم هذا الإيعاز بإرجاع اكبر قيمة من قيم العمود من النوع الرقمي

Calcu max(degree)

Program Writing with Fox pro

1- Modify Command <program name>

2- Do < program name>

Input Commands

1- INPUT [<expr>] To <mem var>

2- Accept [expc] to <memvar>

3- @ <row><col> GET <var> [picture <exprc>]

Read

Output Commands

1- @ <row><col> Say <expr> [picture <exprc>]

الحذف الوقتى والاسترجاع

1- Delete [<scope>][For<condition>][while<condition>]

Remove logically records from currently open dbf

Remove logically =Marks records for deletion

i.e. we can recover these records

ex:

```
use student
goto 10
delete                  && delete record 10
delete all              &&  remove all records
```

2- Recall: remove marker from (marked records)

Syntax

Recall [<scope>][For<condition>][while<condition>]

Ex:

Use std

Recall record 4

Recall all

الحذف الدائم

Pack : remove physically records from current open database file (all marked) records after this command no deleted records can be remover

Zap: delete physically all records from current open dbf

Ex:

Write instruction(s) command to perform zap function?

Ex:

Delete all

Zap = +

pack

Note: Zap is faster

Record pointer: pointer used by the dbase that indicates our position within the file

Use : 1-Close currently open dbf

2-Open new dbf

3-Move pointer to the top of the new file

Movement (position) commands

1/ **Go/Goto [Top] / [Bottom] [Record] [<expr>]**

Ex:

Goto top

Go bottom

Goto record 7

Go k*5 ; k must be known

2/ skip: jump towards top or bottom of a currently open file

Syntax:

Skip [<expr>]

Expr = constant either negative Top

Or positive Bottom

Ex:

Use stud

Goto 5

Skip 3 ; jump towards bottom (end of file)

Three record from the current

Ex2:

Current record= 8

Skip -4

Rec # 4

Note / skip = skip 1

3/ Locate [<scope>][For<condition>][while<condition>]

Continue

Note / scope include

All, next, rest, record <expr>

Put the record pointer on the first record that satisfies the condition

Locate for class="4A"

Disp

Continue

Continue: continue locate condition from current record

If no record match the condition the dbase return the message "end of locate scope "

Organized commands:

Index, sort, seek (find)

1- Index : an index is used to provide rapid access to records on the basis of the value of some field or combination of fields {sorted the data file}

Syntax:

Index on <key gist> to<index file>

EX

INDEX on F-Name to FNAME

To activate idx.file

- By use command

  Use student index FNAME

  Open student dbf (sorted on F-NAME)

  List FNAME, class

- By set command

- Use student

- Set Index To FNAME

  To create Index on more than one fields

  INDEX on F-NAME + L-name to F-NAME

2- Sort :

Syntax:

Sort to <mem file > on <field> [/A][/D][/C] [, <field2>]…

[<scope>][For<condition>][while<condition>]

Duplicate the database file [sorted according to fields]

A: Ascending

D: Descending

C: Don't care between (upper& lower case)

Ex:

Use stud

Sort to student on stnu/D

Sort on class/A to ss

3- Seek: used to search within indexed dbf about fields within records that match the key in index

Syntax

Seek <expr>

Q1/ Choose the correct answer:-
1-To change file name
A-Change B-Rename C-Save D-Save as
2-To return name of month from date
A-MONTH() B-CMONTH() C-DMY() D-DOW()
3-To choose another work area by
A-choose B-change C- transform D-Select
4-Sum D1,D3 to M1,M2 the result is
A-Summation of D1 B- summation of D2 C-Sum of D1+D2
D-Sum of D1 and D2
5- To see the contents of memory by
A- list B-display C-list all memo D- disp memo

Q2/ What is the differences between :-

1- Skip and Goto
2- Seek and locate

Note:

Check your Answer in answer key at page (47)

Write the general form for the following commands:-

Edit, index, delete, goto, count

Objective

After this unit student will be able to know

1- What is the Normalization?

2- What are the Data Models?

3- Advantage and Disadvantage of data models

Pre Test

Suppose you have the database file (student.dbf)that its fields is below:-

St-no رقم الطالب	St-na اسم الطالب	St-s جنس الطالب	St-A عمر الطالب	Av المعدل
3 N	20 C	1 C	2 N	10 N

Answer the following question:-

1- List record number (5-10) for St-s=''F''
2- Search for student their ages less than 20 using Locate command
3- Sort student.dbf according to Av Descending
4- Delete record (5-8) physically
5- Create a new database file from (student.dbf) with data record and with same structure for St-s="M"

Note:

Check your Answer in answer key at page (47)

Normalization

Is the process of structuring relation database scheme such that most ambiguity is removed the stage of normalization are referred to as normal forms:

1- First normal form

2- Second normal form

3- Third normal form

Un-

Pno	Pna	Padd	Ina	Status

Normal Form: The database is said to be in an un-normal form if there are repeating group of items in a database.

Normalization: is a process of altering the structure of the data base to make the database conform to one or more best practices to assist in performance and ease of data manipulation. The most common forms of normalization applied to database are called the normal form.

1NF: A relation is said to be in first normal form (1NF) if and only if each attribute of the relation is atomic.

More simply, to be in 1NF, each column must contain only a single value and each row must contain the same columns.

2NF: In order to be in second normal form, a relation must first fulfill the requirements to be in first normal form. Additionally, each non key attribute in the relation must be functionally dependent upon the primary key.

3NF: in order to be in third normal form a relation must first fulfill the requirements to be in 2NF. Additionally, all attributes that are not dependent upon the primary key must be eliminated.

Ex1:

P1	AA	Ba	S1	Good
	AA		S2	fair

Pno	Pna	Padd	Ina	Status
P1	AA	Ba	S1	Good
P2	BB	MO	S1	Fair
	AA		S2	Fair
			S2	V.Good
			S3	Good
P3	CC	Ki	S3	Good
P2	BB	MO	S1	Fair
P4	DD	Ki	S4	Fair
			S2	V.Good
P3	CC	Ki	S3	Good
P4	DD	Ki	S4	Fair

Ex2:

Pno	Pna	Eno	Ena	Pp	Pc	Dexe
1	M1	10	Zaid	Kirkuk	Million	One year
		11	Hasan			
		12	Shaker			
2	M2			Basra	2 Million	6 months
3	M3	14	Ali	Baghdad	10 Million	3 years
		15	Mohamed			
4	M4			Mosul	5 Million	5 years

Ex3:

Sno	Sna	Scity	Pno	QTY
S1	AA	KI	P1	200
			P2	100

S2	BB	Mo	P1	100
			P2	150
S3	CC	Ba	P3	250
S4	DD	Ba	P4	500

Data models

Is a theory or specification describing how a database is structured and used

Common models includes

1- **Hierarchical model**

2- **Network model**

3- **Relational model**

Hierarchical model

In a hierarchical data model, data is organized into a tree-like structure. The structure allows repeating information using parent/child relationship. Each parent can have many children but each child only has one parent. All attributes of a specific record are listed under an entity type. In a data base an entity type is the equivalent of atable, each individual record is represented as arrow and an attribute as a column. Entity type are related to each other using 1: N mapping, also known as one to many relationships

Hierarchical model advantage

1- Most common

2- Most concepts have been tried and proven

3- Simple to understand

4- Based on the concept of ordered tree

5- Consist of record type (entity type) and relationship.

Hierarchical model disadvantage

1- N:M can not be represented directly

Overhead in a space and consistency checks.

2- Problems with insertion and deletion because of strict hierarchical structure

3- Not flexible when restructuring

4- When application changes model must be change and when model changes application muse be changed.

Network model

The network model is a database model conceived as a flexible way of representing objects and their relationships. Its original inventor was Charles Bachman, and it was developed into a standard specification by the CODASYL consortium.

Where the Hierarchal model structures data as a tree of records, with each record having one parent record and many children , the network model allows each record to have multiple parent and child record, forming a lattice structure.

A network database model used pointers or links with the fields in the record to link the records together, this model allows for One-to-Many relationship as well as one-to-many, resulting in less redundancy than the hierarchical model.

Network Model Advantage

1- There are many database management systems effective Networking

2 - Allows the representation of compound relationships (M: N), which are often present within the structure of a graph database

Network Model Disadvantage

1- Due to its multiple the model contain some complex thing especially for the beneficiaries who have their use programming and follow-up, movement restrictions and their location in the structure

2- The operations of addition and deletion, and update requires a re-organization of the database and the exploitation of storage devices are optimal that this work is going as a result of complex networking between existing data base

Relational model

A database based on the relational model developed by E.F. codd.

A relational database allows the definition of data structures, storage and retrieval operations and integrity constrains.

In such a database the data and relations between them are organized in tables.

A table is a collection of records and each record in a table contains the same fields.

A relational model in which more than one table can share information, the tables can share information; the tables are linked or related with a common key field of information.

The relational model for database management is a database model based on predicate logic and set theory.

Relational Model Advantage

1- Simplicity: the model presenting relational flat file as a structure chart to represent the occurrences and relationships is very simple for the beneficiaries, where deals directly with al Qaeda statements and values nothing to do with the complexities of the calculator and how to store the data.

2- On-line retrieval: Since the relational model graph includes dealing with the data (attributes and values) as it is in flat files, which does not affect its position in the file on how to use them this means that the beneficiaries to deal with direct data do not need any programming effort

3- The independence of the data: mean independence of the organization of data on the way in which the programming and data storage this is one of the most important advantages of database systems

4- The theoretical foundation based relational model on the basis of mathematical theory and this is what makes it a scientific model is the most important results of the theoretical foundation is the ways to use tables and formulas derived nature of the three and get them on the form chart website.

Post test

Q1- Convert the following relation into a set of relation in the third normal form (3NF) showing steps for your conversion:-

Pno	Pna	Sn	Sna	Padd	Quy	Typ
1	Ahmed	M1	Chair	Kirkuk	600	Wood
		M2	Table		900	Iron
2	Nuha	M3	Computer	Baghdad	300	Dell
		M4	Printer		100	Laser
3	Ali			Kirkuk	700	

Q2- Define the relational model and write the advantage of it?

Q3-Draw a network structure for the entities (University, College, Department) and show the relationship between them?

Note:

Check your Answer in answer key at page (47)

Define Normal form & Un-Normal form

Q1- Below a structure of **(Subjects.DBF)** you need in this test

Subjects.DBF

Field name	type	Width	Dec
STN	N	3	0
SCODE	C	2	
DEGS	N	7	2

In Subjects **.dbf** we store student number, subject code and degree summation of student. Suppose there are n-records in this file, and for each student there are unknown number of records (depends upon number of subjects he took).Write a dbase program to Print STN of student with the average of the degrees.

Note:

Check your Answer in answer key at page (47)

Memory Variables (MVAR)

Special types of variable used to store data outside of the dbase file structure or temporary storage of data stored in RAM, deleted when quit from the program.

There are 4 types of MVAR:

1- **Character MVAR**
2- **Numeric MVAR**
3- **Date MVAR**
4- **Logical MVAR**

With MVAR we have the following commands:

1- Store
2- Release
3- Save
4- Restore
5- ?/??

1-Store: used to initialize create memory variable

Syntax: store <expr> to <MVAR List>

Example

```
Store    300 to M1
Store    0  to  MC1,MC2,MC3
Store    space(20)  to  Mname,Madd
Store    {12/20/92} to Md1,Md2
Store .T. to Mtrue
```

2- Release: delete MVAR from memory(make space in memory for further use)

Syntax

Release <MVAR> [ALL[Like/Except<Skelton>]]

? is Skelton marks one character

* is Skelton marks one or more character

Example

Release All

Release All like M*

Release Mv1,Mv2

Release All Except ??A*

3- SAVE : used to save the current MVAR to a disk file(.mem)

Syntax

SAVE [ALL[Like/Except<Skelton>]] to <Mem file>

Example

Save to M1

Store 0 to A,B,MA1,MA2

Release all like M*

Save to M1

4-Restore: used to recalled MVAR from memory file

Syntax

Restore from <memfile> [additive]

If no additive option is used

Copy from memory file to memory

Clear (delete) all active MVAR(s)

If additive option is used

Copy MVAR from memory file

Overwrite MVAR having the same name

Example

```
Val1=50
Val2=”kirkuk”
Save to temp
Clear memo
Val3=Date()
Restore from temp addititive
clear
Disp memory like V*
```

5-?/?? :display & evaluate the following expression

```
?A
?5*4/3
?evaluate +(CR+LF)
?? without (CR+LF) on the same line
A=1                    B=Ahmed
?"student number =",A
??"and student name is",B
```

المصفوفات

المصفوفة هي متغير له اسم متميز ويحتفظ بعدد من القيم ومن انواع مختلفة في مواقع مستقلة من الذاكرة تتميز باعطائها ارقاما متسلسلة

ايعاز تعريف المصفوفة

لتعريف مصفوفة نستخدم الايعاز التالي

Declare array name (exp)

اذا كانت ذات بعد واحد

Declare arrayname exp1,exp2

اذا كانت ذات بعدين

Declare arrayname1 exp1, arrayname2 exp2

اذا كانت لدينا اكثر من مصفوفة

Declare arra1(12), arra2 (5,2)

هنا تم تعريف مصفوفتين الاولى ذات بعد واحد والثانية ذات بعدين

ملاحظة /هنا من الممكن كل موقع من مواقع المصفوفة ممكن ان يحتوي على نوع مختلف مثلا

Arr1(1)=14

Arr2(2)="abcd"

Ex1: اكتب برنامج يقوم بطباعة الصف الاول لمصفوفة ذات بعدين (2,3)

```
clea
DIMENSION gaArray(3,2)
gaArray(1,1) = 'G'
? gaArray(1,1)
gaArray(1,2) = 'A'
?gaArray(1,2)
gaArray(1,3) = 'C'
?gaArray(1,3)
```

Ex2: اكتب برنامج يقوم عناصر مصفوفة ذات بعد واحد وتتألف من ثلاثة عناصر بطباعة

```
clea
i=0
declare a1(4)
a1(1)=3
a1(2)="abc"
a1(3)=date()
for i=1 to 3
?a1(i)
Endfor
```

Control Commands

1- IF…Endif Statement
IF….ELSE….Endif

This program structure selects one of two alternatives

The general form of this structure:

IF <condition>

<Program statements>

[ELSE

<Program statements>]

ENDIF

If the condition is true the statement s following if (which may include another if structure) are executed.

If the condition is false and

- The option else is included

- The statements between else and endif are executed
- With no else clause ,no action is taken

2- do case….endcase

If... Endif construction used when a program branch depending on one or two condition (s). its much simpler to use docase… endcase construction when a program include several conditions.(multi choices)

Syntax:

```
Do case
   Case exp1
      Commands
   Case exp2
      Commands
     …….
   Otherwise
      Commands
Endcase
```

Conditions

1- Docase & Endcase must be on separate line each

2- Each action must begin with the word case

Docase…endcase can include the option [otherwise]

Otherwise used to combine all other possible choices that need not to have their own case.

Ex: do case اكتب برنامج يستخدم

```
clear
m=0
*n=space(10)
*k=" "
*d={ / / }
@1,1 get m
read
do case
case m=1
@ 2,1 say"one"
case m=2
@ 2,1 say"two"
case m=3
@2,1say"three"
otherwise
@ 2,1 say"no"
      endcase
```

The Repetitions Commands

1- (Do while …. End Do)

This program structure repeats execution of a group of program statement as long as specific condition remain true

The general form of this command is:

Do while <condition>

<command>

<command>

:

[Exit]

:

[Loop]

:

Enddo

1- If the condition never be true then no program statement will be true

2- If the condition never become false then the program will be not stopped (condition repeat execution of program statement forever)

3- Do while start the loop

Enddo end the loop

Both of them must be on separate line

Exit: get out of do while …Enddo construction and continue execution the commands after ENDDO

Loop: Ignore any command after it and return control to Dowhile.

2-Scan & endscan

Like do while &enddo , are a matched pair ,also like do while &enddo, the scan & endscan commands let go create a repetitive loop in which operation are performed for a group or records in a dbase

The syntax for these commands is :

Scan [scope] [For <condition>] [while <condition>]

<commands..>

[Exit]

:

[Loop]

Endscan

The scan & endscan commands are simpler a alternative to the do while & enddo commands.

If you simply wish to use do while & enddo to perform repetitive processing you can often use scan & endscan instead, use slightly fewer lines of programming code.

```
Use member                          use member
Set print on                        set print on
Do while .not. eof()                scan for av>50
If av>50                            ? fname,lname
? fname,lname                       Endscan
Endif
Skip
Enddo
```

Combined the while & if clauses you can use fewer lines of program code to accomplish the save level.

FoxPro automatically skips to the next successfully records when it encountered endscan, unless you are at the end of the file. Once the end of the file is reached, program control drops out of the loop and moves on to the next command.

Note / program control may exit from the loop before the end of the file is reached if you include a while clauses as a part of the scan statement.

3- For var= initial to final

Commands
[Exit]
[Loop]
Endfor

Ex: **اكتب برنامج يقوم بطباعة محتويات جدول**

```
clea
use stu1
FOR n=1 TO 5
? no,name
skip
ENDFOR
```

Procedures and Functions

1- Procedures

The essential part of structure programming is divided the program up into smaller procedure or modules, this make the program easier to develop, maintain& debug.

Procedures File

Contain modules of program codes that stay in memory for the duration of your program.

Procedure is a sub-program starts instruct the following

Procedure (Procedure Name)

The program can contains more than one Procedure and all Procedure that must be a name different from the other, as well as we can use the command **Return** to end the Procedure where returns control to instruction that follows instruction that calls the procedure and the formula of procedure call are: -

Do (procedure name) with (parameter list)

The addendum with Used to send variables to the procedure of the main program to be dealt with within the subprogram.

Ex: اكتب برنامج يستخدم الاجراء لايجاد جمع عددين

```
clea
use stu1
do test with 20,30
proc test
parameters n,m
d=0
d=n+m
?d
Retu
```

2- Function

Function is a sub-program starts as the following

Function (function name)

Function returns a specific value by species that we studied previously by executing the following command

Return exp

Where the variable or expression, consisting of several variables and the values of fields, resulting in the value returned in the function itself.

If we did not use ***Return*** *at the* end of function or without followed by anything, the value returned would be logical and to call the function by gave her name followed by brackets only if we are to preserve the value returned by mention the name of a variable after the = and then call the function as in directing below:

Av= func1( )

Ex: اكتب برنامج يستخدم الدالة لايجاد جمع عددين

```
clea
s=0
s=myfunc(100,30)
?s
func myfunc
parameter n,m
s=n+m
retu s
```

Post Test

1- Below a structure of the (University.dbf) you need in this test:-

University.dbf

Field name	Type	width
Univ_no	N	3
Univ-name	C	15
Cno	N	3
Can	C	15
Nmale	N	5
Nfemale	N	5

Write a database program to print the total number of female student in Baghdad university?

Note:

Check your Answer in answer key at page (47)

Quiz

Delete are memory variable that second letter is (w)

Sources

1-Deepak Naidu,"Foxpro for Windows",Gautam Rawat,2001

2- ملزمة فيجول فوكس برو عملي / 6 منهج عملي , اعداد المبرمج حافظ علي شباط والمبرمج خمائل راقم رحيم

Key of Answers

(Post Test)

Q1/ ***Database*** is a collection of interrelated data stored together to serve multiple application without unnecessary redundancy.

The data is independent of the programs that use it.

Database organized to provide current and future needs.

Characteristics of Database

1- Non-redundancy (controlled redundancy)

2-Independency (data independence) data independent of the program that use it.

3-Data relationships and multiple usages of data controlling

- Integrity
- Security
- Privacy

4-Reflective all data (Internal and external)

Of the organized information needs (Both present and future)

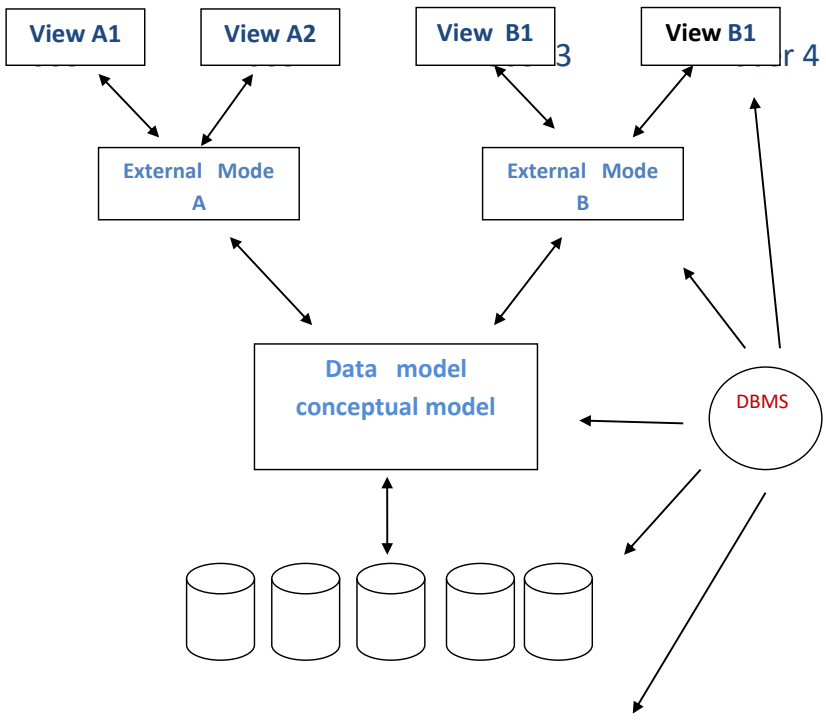
5-Level of performance must always be achieved

6-Flexibility in storing data

Q2/ Database Architecture

Contains 3 levels

1- External level
2- Conceptual level
3- Internal level



Stored DB (internal model)

Q3/

1- Required,optional,calculated

2- Internal,external

3- **DBA**: Is a person who is responsible for the environment aspects of DB

Q4/ There are four basic rules that you should observe when defining primary keys:-

5- Every record must have a value in the primary key, it cannot be null.

6- Primary key values must be unique

7- Non redundancy, no attribute in the key can be discarded without destroy the property of unique identification

8- Primary key, a value should not be reused if a record is deleted, its primary key should not be re assigned to another record as this can create errors and confusion.

Q5/ 1-One to one

2-One to many

3-Many to many

(Pre Test)

Q1/ T & F

1- F field

2- T

3- F goto

4- F internal level

5- T

Q2/ Blanks

1- Logically

2- Empty line
3- Reindex

(Post Test)

Q1/ choices
1- B
2- B
3- D
4- D
5- D

Q2/ Differences
1-Skip used to jump from the current record (+/-) n
N: is the no. of jumps
Goto used to jump to the required record directly

2-Locate +continue: used to search inside dbase file
Seek : used to search inside indexed dbase file

(Pre Test)

Q1/ 1- use student
goto 5
List next 6 for st-s="f"
2- use student
locate all for st-a<20
Display
Continue
3-use student
Sort on av/d to pp
4- use student
goto 5

Dele next 4
Pack
5- use student
Copy to mm for st-s="m"

(Post Test)

Q1/ Normalization

Pno	Pna	Sn	Sna	Padd	Quy	Typ
1	Ahmed	M1	Chair	Kirkuk	600	Wood
1	Ahmed	M2	Table	Kirkuk	900	Iron
2	Nuha	M3	Computer	Baghdad	300	Dell
2	Nuha	M4	Printer	Baghdad	100	Laser
3	Ali	M4	Printer	Kirkuk	700	Laser

1NF

Pno	Pna	Padd
1	Ahmed	Kirkuk
2	Nuha	Baghdad
3	Ali	Kirkuk

Key

Sn	Sna
M1	Chair
M2	Table
M3	Computer
M4	Printer

2NF

Key

Pno	Pna
1	Ahmed
2	Nuha
3	Ali

Pno	Padd
1	Kirkuk
2	Baghdad

Sn	Sna
M1	Chair
M2	Table
M3	Computer
M4	Printer

Pno	Sn	Quy	Typ
1	M1	600	Wood
1	M2	900	Iron
2	M3	300	Dell
2	M4	100	Laser
3	M4	700	Laser

3NF

Q2/ Relational model with advantage

A database based on the relational model developed by E.F. codd.

A relational database allows the definition of data structures, storage and retrieval operations and integrity constrains.

In such a database the data and relations between them are organized in tables.

A table is a collection of records and each record in a table contains the same fields.

A relational model in which more than one table can share information, the tables can share information; the tables are linked or related with a common key field of information.

The relational model for database management is a database model based on predicate logic and set theory.

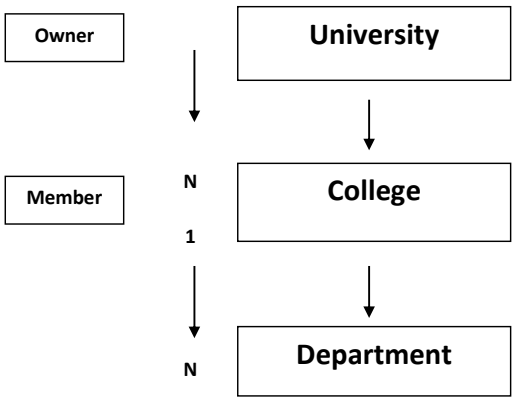
3- Simplicity: the model presenting relational flat file as a structure chart to represent the occurrences and relationships is very simple for the beneficiaries, where deals directly with al Qaeda statements and values nothing to do with the complexities of the calculator and how to store the data.

2- On-line retrieval: Since the relational model graph includes dealing with the data (attributes and values) as it is in flat files, which does not affect its position in the file on how to use them this means that the beneficiaries to deal with direct data do not need any programming effort

3- The independence of the data: mean independence of the organization of data on the way in which the programming and data storage this is one of the most important advantages of database systems

4- The theoretical foundation based relational model on the basis of mathematical theory and this is what makes it a scientific model is the most important results of the theoretical foundation is the ways to use tables and formulas derived nature of the three and get them on the form chart website.

Q3/ Network model



(Pre Test)

```
Use subjects
Index on stn to xx
Do while not eof()
S=0
S1=0
A=stn
Do while  stn=a
S=s+degs
S1=s1+1
Skip
Enddo
Av=s/s1
?stn
?av
enddo
```

(Post Test)

```
use university
    s=0
    Index on univ-name to xx
    Seek ''Baghdad''
Do while not eof() and univ-name=''Kirkuk''
S=s+Nfemale
Skip
Enddo
?s
```