**ST PAUL’S UNIVERSITY**

**CONTINUOUS ASSESSMENT 2**

**BCS 4103: ADVANCED DATABASE SYSTEMS**

1. Query optimization depends on database statistics to evaluate properly the different options available to process a query efficiently. List THREE types of statistics the database may hold for purposes of query optimization (3 Marks)

table statistics,column statistics,index statistics,system

**Optimizer statistics are a collection of data that describe more details about the database and the objects in the database. These statistics are used by the query optimizer to choose the best execution plan for each SQL statement. Optimizer statistics include the following:**

* **Table statistics**
  + **Number of rows**
  + **Number of blocks**
  + **Average row length**
* **Column statistics**
  + **Number of distinct values (NDV) in column**
  + **Number of nulls in column**
  + **Data distribution (histogram)**
* **Index statistics**
  + **Number of leaf blocks**
  + **Levels**
  + **Clustering factor**
* **System statistics**
  + **I/O performance and utilization**
  + **CPU performance and utilization**

1. Using a type constructor, create a table of tourist information to hold the passport number, name, country and expiry date of the passport **(3 Marks)**

**CREATE TYPE tourist\_information AS OBJECT(**

**passport\_number NUMBER,**

**name VARCHAR2(50),**

**country VARCHAR2(50),**

**expiry\_date DATE,**

**CONSTRUCTOR FUNCTION tourist\_information (passport\_number NUMBER,name VARCHAR2,country VARCHAR2, expiry\_date DATE) RETURN SELF AS RESULT),**

**MEMBER PROCEDURE insert\_records,**

**MEMBER PROCEDURE display\_records);**

1. Briefly describe the following database architectures and for each provide a well labelled diagram (8 Marks)
   1. Centralized architecture

**The centralized database system consists of a single processor together with its associated data and other peripherals. It is physically confined to a single location. Data can be accessed from the multiple sites with the use of a computer network while the database is maintained at the central site.**

* 1. Parallel architectures

**Parallel database system architecture consists of a multiple Central Processing Units (CPUs) and data storage disk in parallel. Hence, they improve processing and Input/Output (I/O) speeds. Parallel database systems are used in the application that have to query extremely large databases or that have to process an extremely large number of transactions per second.**

* 1. Server system architecture

**Client/Server architecture of database system has two logical components namely client, and server. Clients are generally** [**personal computer**](http://ecomputernotes.com/fundamental/introduction-to-computer/personal-computer)**s or workstations whereas server is large workstations, mini range computer system or a** [**mainframe**](http://ecomputernotes.com/fundamental/introduction-to-computer/mainframe) **computer system. The applications and tools of DBMS run on one or more client platforms, while the DBMS soft wares reside on the server. The server computer is caned backend and the client's computer is called front end. These server and client computers are connected into a network. The applications and tools act as clients of the DBMS, making requests for its services. The DBMS, in turn, processes these requests and returns the results to the client(s). Client/Server architecture handles the Graphical User Interface (GUI) and does computations and other programming of interest to the end user. The server handles parts of the job that are common to many clients, for example, database access and updates.**

* 1. Distributed database architectures

**It consists of a single logical database that is split into a number of fragments. Each fragment is stored on one or more computers under the control of a separate DBMS, with the computers connected by a communications network. As shown, in distributed database system, data is spread across a variety of different databases. These are managed by a variety of different DBMS software running on a variety of different** [**operating system**](http://ecomputernotes.com/fundamental/disk-operating-system/what-is-operating-system)**s. These machines are spread (or distributed) geographically and connected together by a variety of communication networks.**

1. Briefly explain the following types of mapping: (6 Marks)
   1. Property mapping-persist an objecs property

**A mapping that describes how to persist an object’s property.**

* 1. Relationship mapping-describes how to persisit a relationship

**A mapping that describes how to persist a relationship (association, aggregation, or composition) between two or more objects.**

* 1. Object mapping-conversion of data between incompatible type using oop

**programming technique for converting data between incompatible type systems using object-oriented programming languages.**