**Tutorial 7**

1. Briefly explain TWO (2) abstract models of storage.

* **Cell Storage**
* This model reflects the physical organization of several storage media
* The primary memory of a computer is organized as an array of memory cells and a secondary storage device, e.g., a disk is organized in sectors or blocks read and written as a unit.
* **Journal Storage**
* System that keeps track of the changes that will be made in a journal (usually a circular log in a dedicated area of the file system) before committing them to the main file system.
* In the event of a system crash or power failure, such file systems are quicker to bring back online and less likely to become corrupted. Journal storage consists of a manager and cell storage

1. List THREE (3) classes of file systems.

* Network File System (NFSs)
* Storage Area Networks (SANs)
* Parallel file systems (PFSs)

1. Differentiate Storage Area Networks (SAN) and Parallel File Systems (PFS).

* **Storage Area Networks (SAN)** - Allow cloud servers to deal with non-disruptive changes in the storage configuration. The storage in a SAN can be pooled and then allocated based on the needs of the servers. A SAN-based implementation of a file system can be expensive, as each node must have a Fibre Channel adapter to connect to the network.
* **Parallel File Systems (PFS)** - Scalable and capable of distributing files across a large number of nodes, with a global naming space. Several I/O nodes serve data to all computational nodes; it also includes a metadata server which contains information about the data stored in the I/O nodes. The interconnection network of a PFS could be a SAN.

1. Define the terms Database, Database Management System (DBMS) and Query Language.

* **Database** - Database is a collection of logically related records
* **DataBase Management System (DBMS)** - DBMS is the software that controls the access to the database
* **Query Language** - Query language is a dedicated programming language used to develop database applications.

1. Give THREE (3) design objectives of Network File System (NFS)

* **Design Objectives**
* Provide the same semantics as a local Unix File System (UFS) to ensure compatibility with existing applications.
* Facilitate easy integration into existing UFS.
* Ensure that the system will be widely used; thus, support clients running on different operating systems.
* Accept a modest performance degradation due to remote access over a network with a bandwidth of several Mbps.