## Practical – 3.1

Aim: To perform function oriented diagram for the system:
Prepare Data Flow Diagram

Password Manager Data Flow Diagram

➢ A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination.

➕ **Context diagram (Level 0 DFD):**
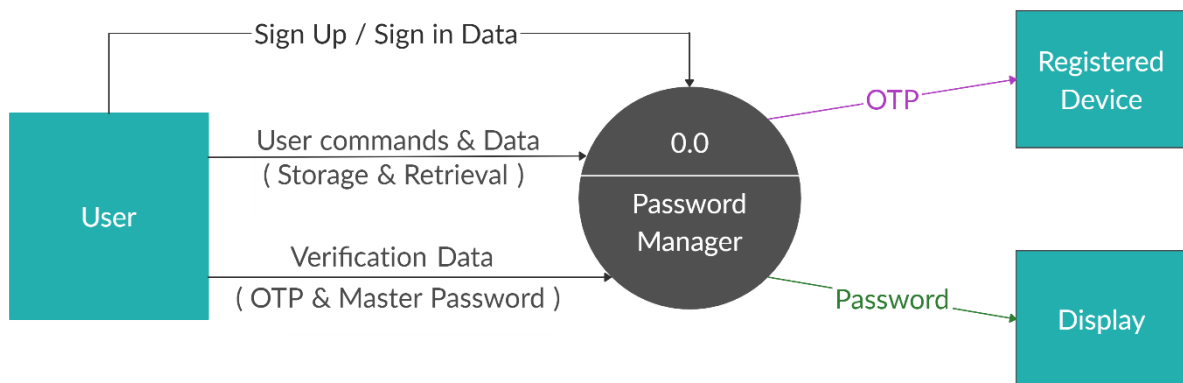
[Fig. 1 - Context diagram (Level 0 DFD)]

- The **Password Manager** is itself the main process in the context diagram. It takes input from the external entity *User* in the form of *Sign Up/ Sign in data* during registration and while accessing account, respectively.

- *User* also feeds as input, the desired operations to perform after gaining access, such as adding a new entry to store password, retrieving password as well as other valid operations.

- The main process then sends as output, an OTP to the *Registered Device* entity as programmed and if the verification data (Master Password and/or OTP) entered by user verifies, only then is the user able to gain permission to access his sensitive data through the entity *Display*. All the data are represented by labelled arrows.

➕ Level 1 DFD:
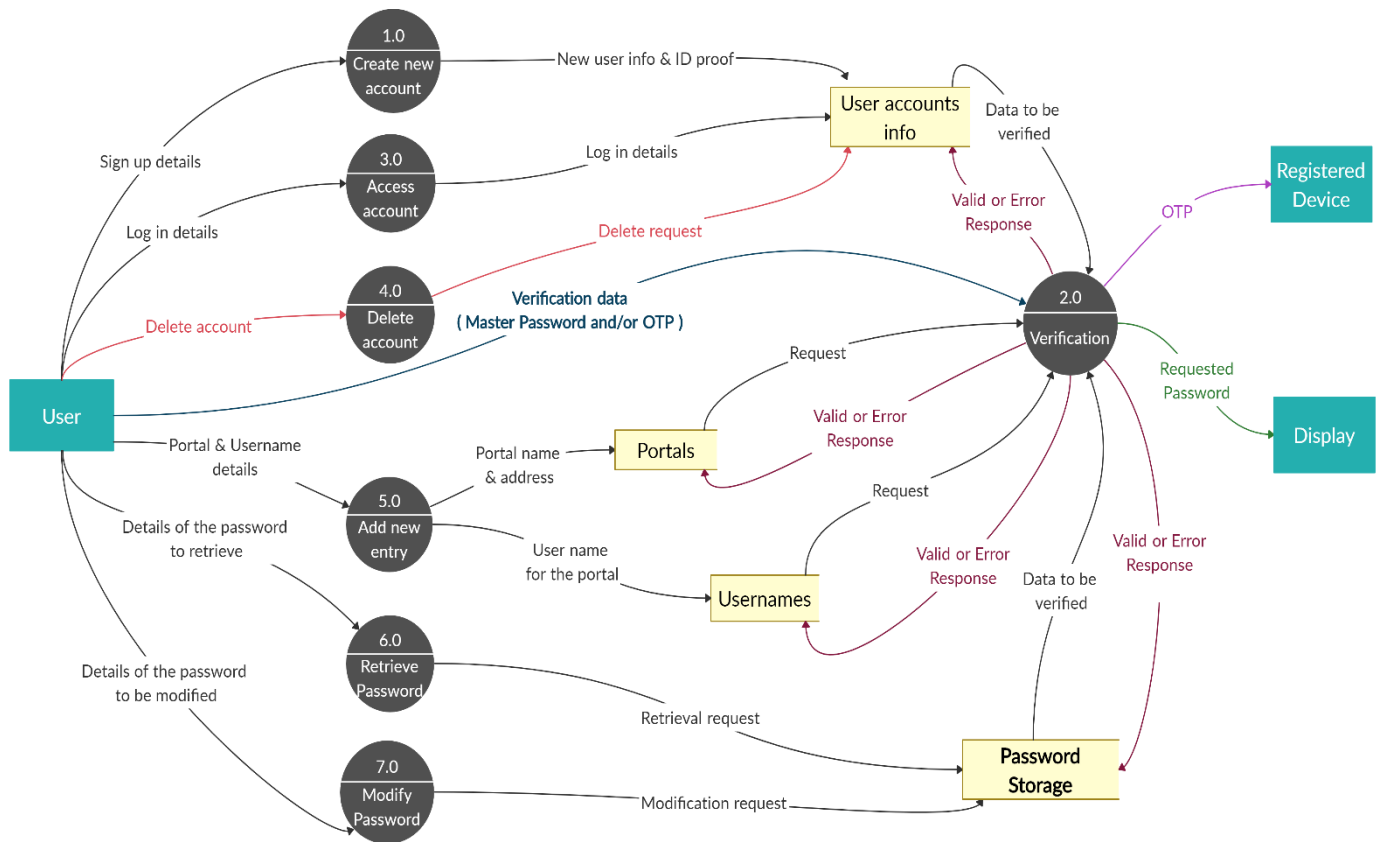
[Fig. 2 - Level 1 DFD)]

- The main process (i.e. the system) of level 0 is decomposed into a total of 7 processes in the level 1 diagram.

- As the process names suggest, the *User* is able to:
    - Create a new account (Registration)
    - Access his existing account (Log in)
    - Delete his account
    - Add a new entry for storing password
    - Modify password if needed
    - Retrieve password

- The remaining process, marked as 2.0 in the diagram, is the *Verification* process which is executed as a **requirement** along with all of the

processes listed. Thus, this process demands the needed verification data from the *User* which is shown by the labelled arrow.

- While processes like Registration, Log in and Delete account **require both Master Password and OTP** (which consequently triggers the OTP output to the registered device), the other processes, after logging in, ask only for the Master Password.

- Level 1 diagram also features 4 data stores:
    - *User accounts info* – for storing and sending for verification, the info received during registration and login process and while removing data during the deletion of account.
    - *Portals* – for storing the details like web addresses of various platforms on which the user holds an account.
    - *Usernames* – for storing the username / user ID or email ID pertaining to a portal.
    - *Password Storage* – the place where important sensitive data is housed.

- Upon receiving requests to meddle with the stored data, the referenced data is sent for *Verification* which returns the appropriate valid or error response to decide further procedure.

- In this way, the level 1 DFD gives us the big picture and explains the interrelation and flow of data between the members.

✚ Level 2 DFD:
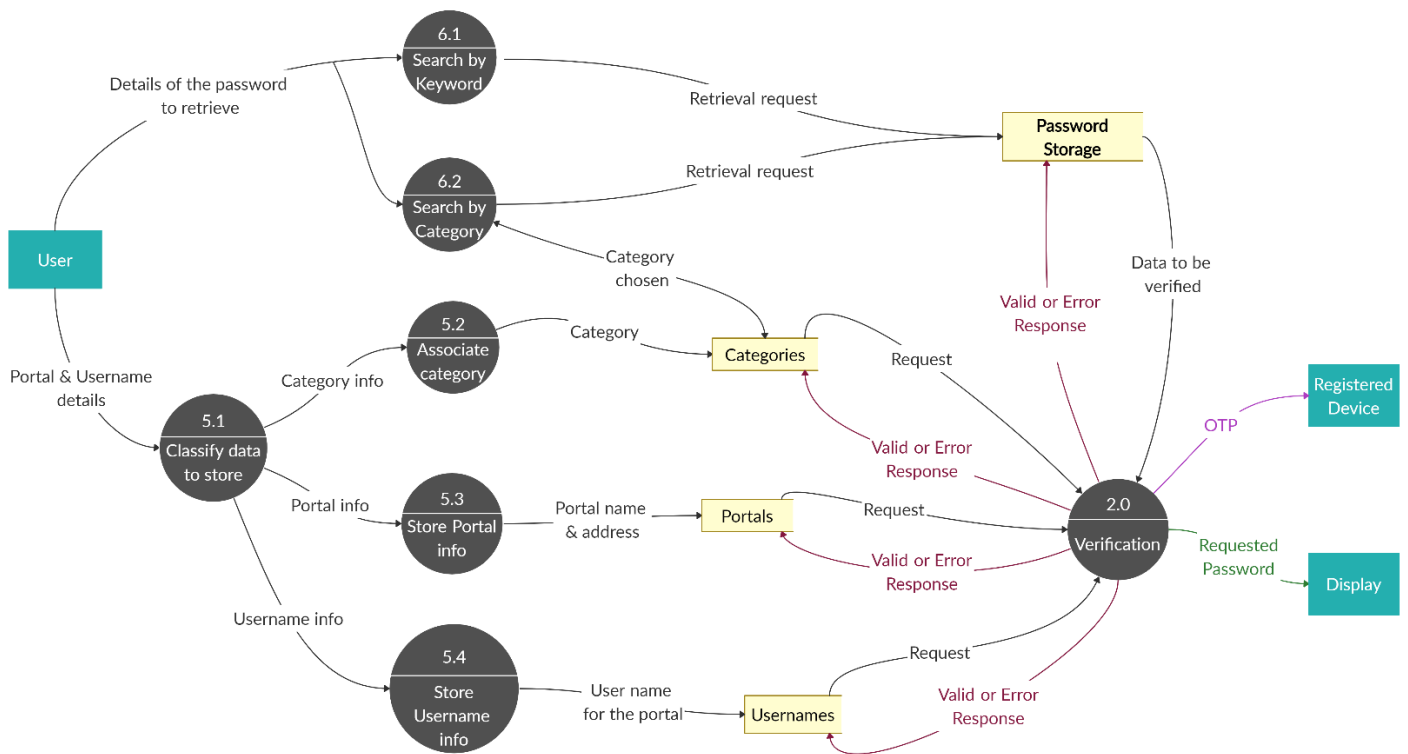
[Fig. 3 - Level 2 DFD)]

- Level 2 DFD expands upon one or more processes and provides us with an under the hood view of the working. Here, the processes *5.0 Create a new entry* and *6.0 Retrieve Password* from level 1 are further decomposed, as the main task of a password manager is to store and retrieve the desired password whenever needed.

- The process of storing password for a new portal can be bifurcated into sub-processes like *associating a category* (personal, professional, custom) using the *Categories* data store, and storing the corresponding portal and username details into their respective data stores.

- The retrieval process is backed by methods such as *searching a password by keywords* or *searching by category*, which makes the organization of password details a bit more neat. The category search process also sends and receive data from the *Categories* data store.

- And naturally, these processes require a green signal from the *Verification* process to perform the function successfully.

➢ Thus, the data flow diagram helps system designers and other stakeholders during initial analysis stages to visualize a current system or one that may be necessary to meet new requirements.