Parul® University
Vadodara, Gujarat
NAAC GRADE A++

Mobile App
Development

DATA STORAGE & TECHNIQUES

Dr. Bhasha Anjaria
Assistant Professor
PIT, CSE Department

Data Storage In Android

- **Shared Preferences:** Stores private primitive data using key-value pairs.
- **Internal Storage:** Stores private data directly on the device's memory.
- **External Storage:** Stores public data on a shared external storage location.
- **SQLite Databases:** Stores structured data in a private database.
- **Network Connection:** Stores data on the web using a network server.

Shared Prefences

- Useful for **storing and retrieving primitive data in key value pairs.**
- **Lightweight usage,** such as saving application settings**.**
- Typical usage of SharedPreferences is for saving application such as **username and password, auto login flag, remember-user flag etc.**

Shared Preferences

- The shared preferences **information is stored** in an XML file on the device
    - Typically in/data/data/<Your Application's package name>/shared_prefs
- SharedPreferences can be associated with the entire application, or to a specific activity.
- Use the getSharedPrefernces() method to get access to the preferences

Shared Preferences

- **Example:**
  - SharedPrefernces prefs = this.getSharedPrefernces('myPrefs, MODE_PRIVATE')
- **If the preferences XML file exist, it is opened, otherwise it is created.**
- **To Control access permission to the file:**
  - MODE_PRIVATE: private only to the application
  - MODE_WORLD_READABLE:all application can read XML file
  - MODE_WORLD_WRITABLE:all application can write XML file

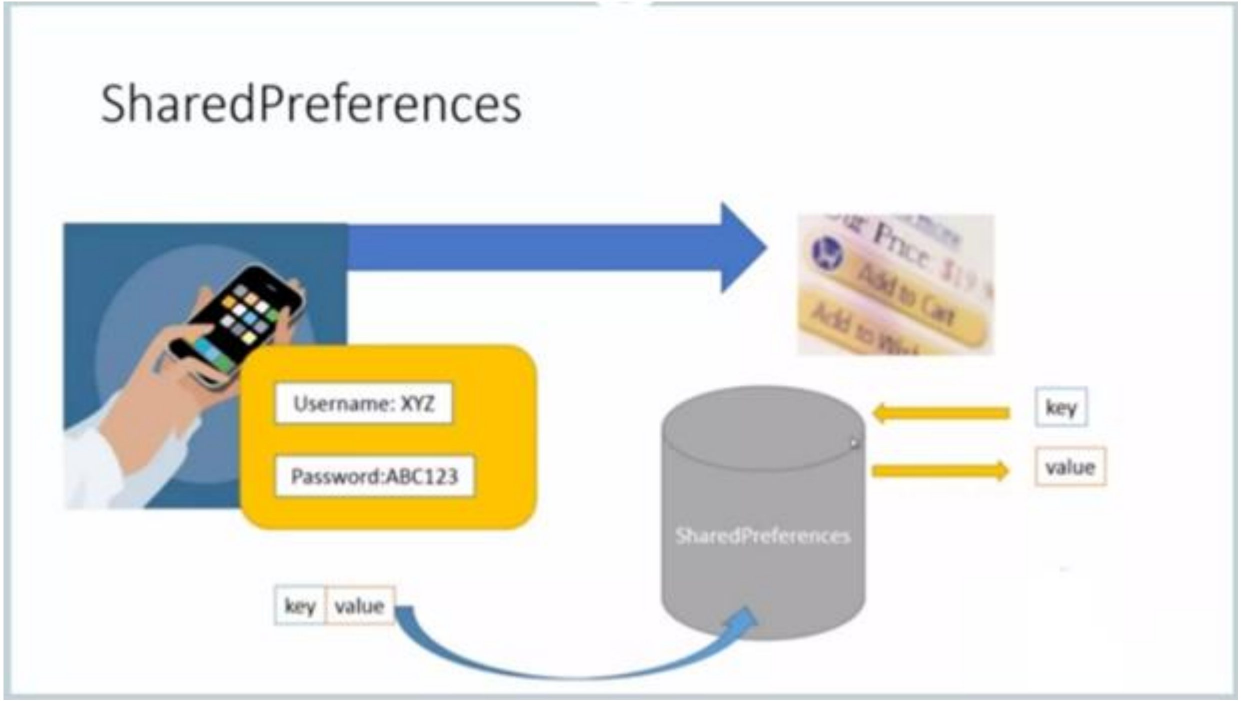
Shared Preferences

- To add Shared preferences, first an editor object is needed
  - Editor prefsEditor = prefs.edit();
- Then, use the put() method to add the key-value pairs
  - prefsEditor.putString("username", "D-Link");
  - prefsEditor.putString("password","vlsi#1@2");
  - prefsEditor.putint("times-login",1);
  - prefsEditor.commit();

Shared Preferences

- **To retrieve shared preferences data:**
  - String username = prefsEditor.getString("username"." ");
  - String password = prefsEditor.getString("password"." ");
- **If you are using SharedPrefernces for specific activity, then use getPreferences() method**
  - No need to specify the name of the preferences file

Example


SharedPreferences
Username: XYZ
Password:ABC123
Price
Add to Cart
Add to Wish
key
value
SharedPreferences
key
value

Internal Storage

- Android can save files **directly to the device internal storage**.
- These files are **private to the application** and will be removed if you uninstall the application.
- We can create a file using **openFileOutput()** with parameter as file name and the operating mode.
- Generally not recommended to use files.

Internal Storage

- Similarly, we can open the file using openFileInput() passing the parameter as the filename with extension.
- File are use to store large amount of data
- Use **I/O interfaces** provided by **java.io.*** libraries to read/write files.
- **Only local files** can be accessed.

File Operation(Read)

- Use **context.openFileInput(string name)** to open a private input file stream related to a program.
- Throw **FileNotFoundException** when file does not exist.
- Syntax:-

  fileinputStram.in=this.openfileinput("xyz.txt")
- In.close()://Close input stream

File Operation(Write)

- Use **context.openFileOutput(string name,int mode)** to open a private output file stream related to a program.
- The file will be created if it does not exist.
- Output stream can be opened in append mode, which means new data will be appended to end of the file.
- **String mystring="Hello World"**

File Operation(Write)

- Syntax:-

  FileOutputStream outfile = this.openFileOutput("myfile.txt", MODE_APPEND)

  //Open and Write in"myfile.txt", using append mode.
- Outfile.write(mystring.getBytes());
- Outfile.close();//close output stream

Extarnal Storage

- Every Android-compatible device supports a shared **"external storage"** that you can use to save files
  - Removable storage media (such as an SD card)
  - Internal (non-removable) storage
- File saved to the external storage are world readable and can be modified by the user when they enable USB mass storage to transfer files on computer.
- These files are **private to the application** and will be **removed** when the application is uninstalled.

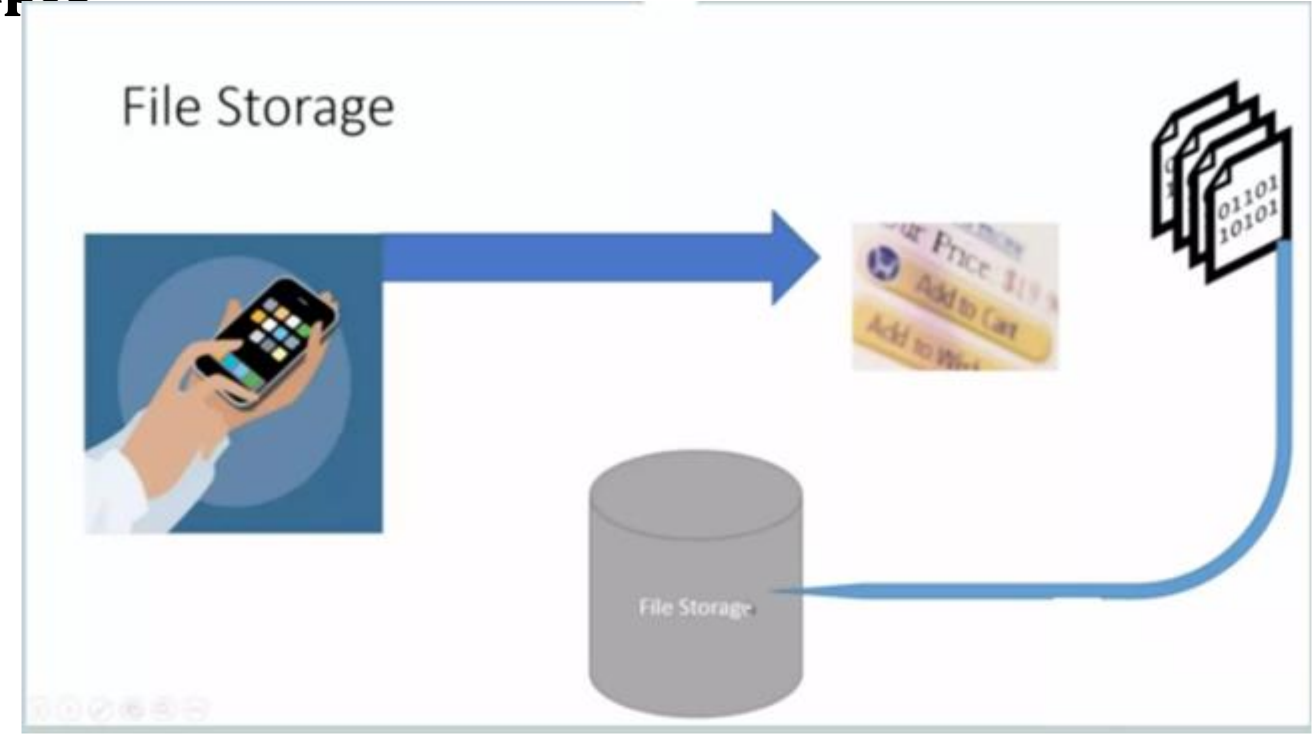
External Storage

- Must check whether external storage is available first by calling **getExternalStorageState()**
    - Also check whether it allows read/write before reading/writing on it
- getExternalFilesDir() takes a parameter such as DIRECTORY_MUSIC,DIRECTORY_RINGTONE etc, to open specific type of subdirectories.
- For **public** shared directories, use **getExternalStoragePublicDirectory()**

External Storage

- For **cache files**, use **getExternalCacheDir()**
- All these are applicable for **API level 8 or above**
- For API level 7 or below, use the method;
  - getExternalStorageDirectory()
  - Private files stored in//Android/data/<package_name>/files/
  - Cache files stored in//Android/data/<package_name>/cache/

Example


File Storage
Your Price $19
Add to Cart
Add to Wish
01101
10101
File Storage

SQLite Databases

- **android.database.sqlite** Contains the SQLite database management classes that an application would use to manage its own private database.
- **android.database.sqlite.SQLiteDatabase** Contains the methods for: creating, opening, closing, inserting, updating, deleting and quering an SQLite database.

Android.database.sqlite - classes

- SQLiteCloseable - An object created from a SQLiteDatabase that can be closed.
- SQLiteCursor - A Cursor implementation that exposes results from a query on a SQLiteDatabase.
- SQLiteDatabase - Exposes methods to manage a SQLite database.
- SQLiteOpenHelper - A helper class to manage database creation and version management.
- SQLite Program - A base class for compiled SQLite programs.
- SQLiteQuery - A SQLite program that represents a query that reads the resulting rows into a CursorWindow.
- SQLiteQueryBuilder - a convenience class that helps build SQL queries to be sent to SQLiteDatabase objects.
- SQLiteStatement - A pre-compiled statement against a SQLiteDatabase that can be reused.

OpenOrCreateDatabase

- **This method will open an existing database or create one in the application data area**
  - import android.database.sqlite.SQLiteDatabase;
  - SQLiteDatabase myDatabase;
  - myDatabase = openOrCreateDatabase ("my_sqlite_database.db",
  - SQLiteDatabase.CREATE_IF_NECESSARY, null);

Creating Tables

- **Create a static string containing the SQLite CREATE statement, use the execSQL() method to execute it.**

```
• String createAuthor = "CREAT TABLE authors (
                    id INTEGER PRIMARY KEY AUTOINCREMENT,
                    fname TEXT,
                    Iname TEXT);
myDatabase.execSQL(createAuthor);
```

Insert(), Delete()

- **long insert(String table, String nullColumnHack, ContentValues values)**

```
import android.content.ContentValues;
ContentValues values = new ContentValues();
values.put("firstname", "J.K.");
values.put("lastname", "Rowling");
long newAuthorID = myDatabase.insert("tbl_authors", "" values);
```

- **int delete(String table, String whereClause, String[] whereArgs)**

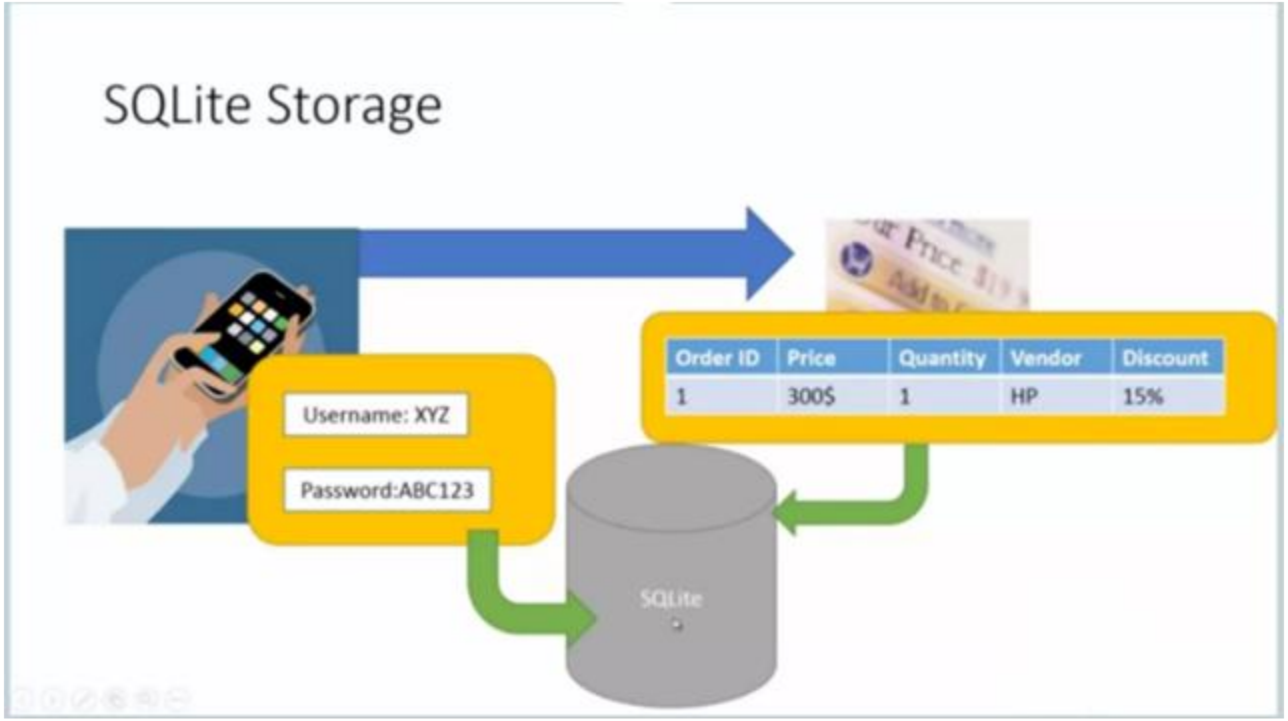
```
public void deleteBook(Integer bookId) {
myDatabase.delete("tbl_books", "id=?",
new String[] {bookId.toString()});
```

Update()

- **int update(String table, ContentValues values, String whereClause, String[] whereArgs)**

```
public void updateBookTitle(Integer bookId, String
newTitle) {
ContentValues values = new ContentValues();
values.put("title", newTitle);
myDatabase.update("tbl_books", values,
"id=?", new String[] {bookId.toString() });}
```

SQLite Storage

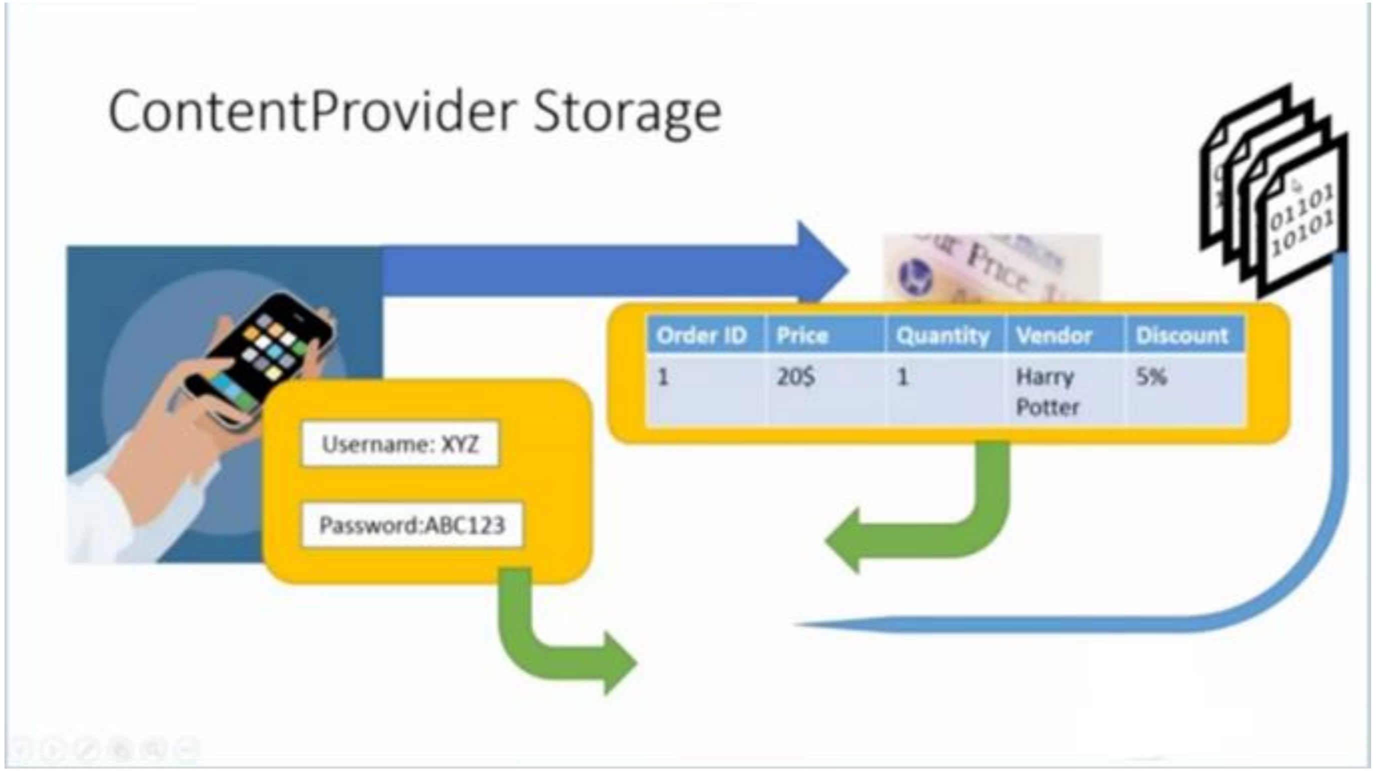

SQLite Storage

Order ID	Price	Quantity	Vendor	Discount
1	300$	1	HP	15%

Content Provider

- **Content Provider Storage:** This section shows a user interacting with an application on a phone. The application accesses and modifies data, such as an order table, which is stored using a Content Provider.

Content Provider



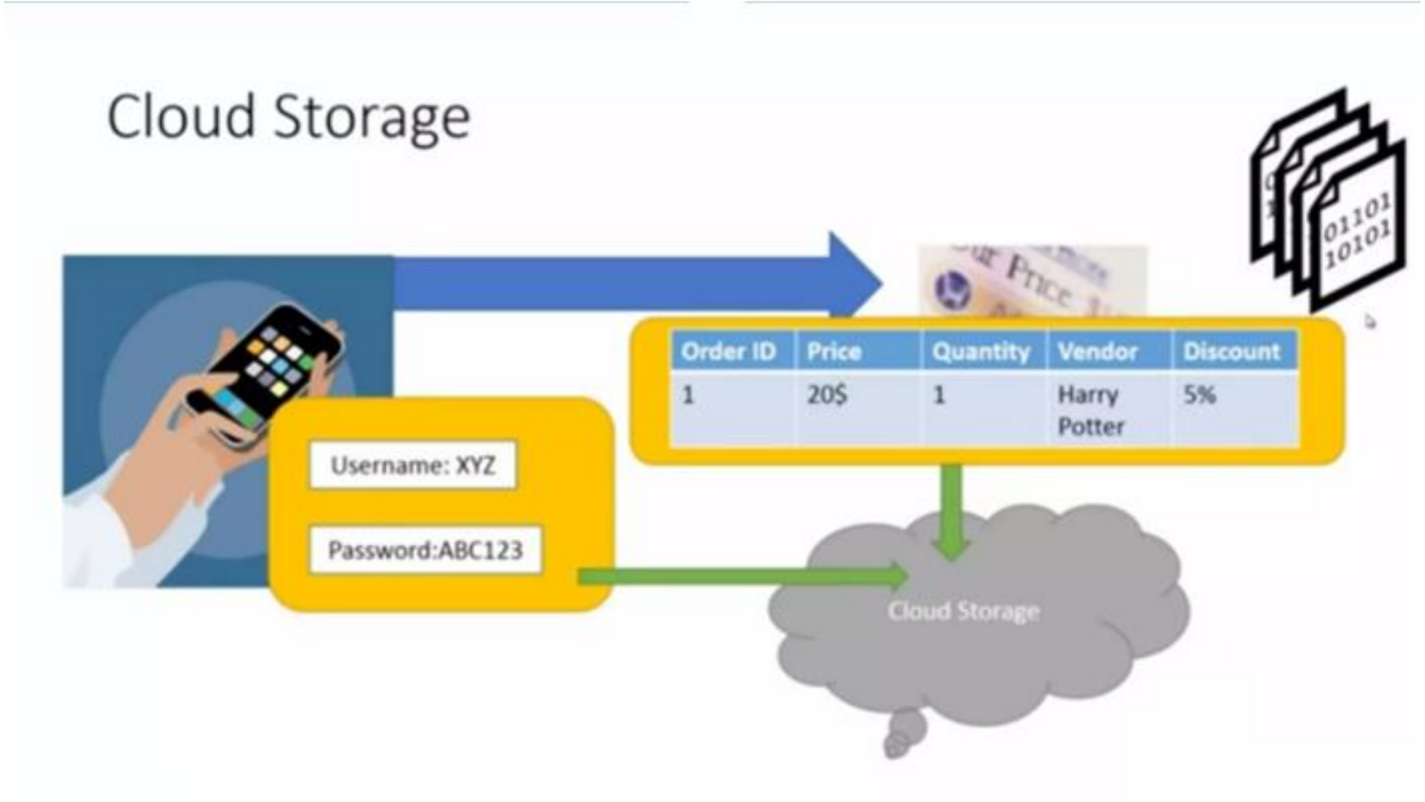
Order ID	Price	Quantity	Vendor	Discount
1	20$	1	Harry Potter	5%

Cloud Storage

- Online file storage centres or cloud storage providers allow you to safely upload your files to the Internet.

Cloud Storage

- **There are various providers of cloud storage**
- **Examples:**
  - **Apple iCloud**(Gives 5GB of free storage)
  - **Dropbox**(Gives 2GB of free storage)
  - **Google Drive**(Gives 15GB of free storage)
  - **Amazon Cloud Drive**(Gives 5GB of free storage
  - **Microsoft SkyDrive**(Gives 7GB of free storage)



Cloud Storage

Order ID	Price	Quantity	Vendor	Discount
1	20$	1	Harry Potter	5%

Username: XYZ

Password:ABC123

Thank you!