COMP 019 - Applications Development and Emerging Technologies

Full-Stack Python Development

SESSION 5: LOCAL DATABASE WITH SQLITE

ACTIVITY 5.1: SQLITE FUNDAMENTALS

Topic: Working with SQLite database directly

Description: Understand SQLite and perform database operations

INSTRUCTIONS:

Understand SQLite:
- File-based database (no server needed)
- Perfect for local/mobile applications
- Django uses SQLite by default

Work with SQLite directly:
- import sqlite3
- Connect to database file
- Create cursor for operations
- Execute SQL commands

SQL fundamentals:
- CREATE TABLE - define structure
- INSERT INTO - add data
- SELECT - query data
- UPDATE - modify data
- DELETE - remove data
- WHERE, ORDER BY, JOIN

Create standalone Python script:
- Create database and tables
- Insert sample data
- Query and display data
- Update and delete records

Deliverables: Submit Python script with all CRUD operations	**25 Points**

ACTIVITY 5.2: DJANGO ORM DEEP DIVE

Topic: Mastering Django's Object-Relational Mapper

Description: Use Django ORM for powerful database operations without raw SQL

INSTRUCTIONS:

Django ORM basics:
- Models map to database tables
- Objects map to rows

• Attributes map to columns
CRUD with ORM:
• Create: Post.objects.create(...) or post.save()
• Read: Post.objects.all(), .get(), .filter()
• Update: post.title = 'new'; post.save()
• Delete: post.delete()
Advanced queries:
• Filtering: filter(title__contains='Django')
• Excluding: exclude(author='admin')
• Ordering: order_by('-created_at')
• Limiting: [:5] for first 5
• Aggregation: Count, Sum, Avg
Relationships:
• ForeignKey queries: post.comment_set.all()
• Related name: comments.all()
• select_related, prefetch_related for optimization

Deliverables: Submit Django shell session showing all ORM operations	**30 Points**

ACTIVITY 5.3: SQLITE IN KIVY MOBILE APP

Topic: Integrating SQLite database in Kivy application

Description: Add persistent local storage to your Kivy mobile app

INSTRUCTIONS:

Create database helper class:
• __init__ - create connection and tables
• Methods for CRUD operations
• Close connection properly
Design database for mobile app:
• Table for main data (e.g., tasks, notes)
• Consider offline-first design
Integrate with Kivy app:
• Initialize database in App.build()
• Load data when screen opens
• Save data on user actions
• Refresh UI after database changes
Build a simple Task Manager app:
• Add new tasks
• List all tasks
• Mark tasks complete
• Delete tasks
• Data persists after app restart

Deliverables: Submit Kivy app with SQLite integration and demo	**35 Points**

TOTAL POINTS: 90