UNIVERSITY OF GHANA
DEPARTMENT OF COMPUTER SCIENCE
DCIT308: DATA STRUCTURES AND ALGORITHMS 2
SECOND SEMESTER 2022/2023
SEMESTER PROJECT (GROUP)

Expenditure Management System for Nkwa Real Estate Ltd

Nkwa Real Estate is a growing construction firm focused on delivering low-cost housing solutions across peri-urban communities in Ghana. As the company expands, financial monitoring during construction and post-sales activities has become increasingly challenging. Accountants must now track multiple bank accounts, fluctuating supplier costs, and a maze of construction-phase spending.

The company lacks a digital solution. You've been invited to build a locally stored, offline-first Expenditure Tracking Application—built from the ground up using fundamental data structures. Your system should simulate accountant workflows, not just automate them.

Project Tasks

Develop a menu-driven command-line system that leverages data structures including: arrays, stacks, queues, linked lists, sets, maps, trees, hash maps, and graphs. Avoid external libraries, databases, or prebuilt sorting/searching modules.

Functional Requirements

1. Expenditure Records
    - Record each expenditure with details:
        - Code, amount, date, phase (e.g., construction, marketing, sales), category, account used.
    - Store in hash maps or linked lists, allowing retrieval by expenditure code.
2. Category Management
    - Create a dynamic list of expenditure categories (e.g., "Cement", "Printing", "TV Adverts").
    - Implement sets or hash tables to ensure category uniqueness and support category searches.
3. Bank Account Ledger

- Store and update information about different company bank accounts, each with:
    - Account ID, bank name, balance, list of related expenditures.
- Use maps or dictionaries and create a relationship graph if accounts are internally related.

4. Search & Sort
    - Sort expenditures by:
        - Alphabetical order of category
        - Chronological order of transaction
    - Search by:
        - Time range (e.g., "all expenses in April 2025")
        - Category
        - Cost range
        - Bank account used
5. Invoice/Receipt Handling
    - Link each expenditure to a receipt/invoice record stored in a file or internal pointer-like structure.
    - Use a queue or stack to simulate upload and review queues for accounting validation.
6. Bank Tracker
    - Every expenditure draws funds from a selected bank account.
    - The application must update balances, log expenditures, and notify if an account is low on funds using a min-heap.
7. Cash Flow & Financial Analysis
    - Implement logic to:
        - Track monthly burn rate.
        - Forecast profitability based on spending patterns.

- Analyze how building material prices affect house affordability.

Output and Documentation

- Command-line interface with menus: Add/View/Search Expenditure, Manage Categories, Bank Overview, Generate Reports.
- Store persistent data in text files (expenditures.txt, accounts.txt, categories.txt, receipts.txt).
- Create reports that:
  - Justify choice of each data structure.
  - Explain sorting/searching techniques.
  - Include complexity analysis using Big O and Omega notation.

Rate the group members

Name	Activities	%Contribution	Attendance