

# **Class Activity: Problem Identification & Solution Design**

## **Objective**

The objective of this nongraded/review-based activity is to help students develop problem-solving, analytical thinking, and basic research skills by identifying a real-life problem and proposing a structured solution based on existing ideas.

## **Question Statement**

You are required to identify a problem from daily life that affects individuals, students, or society (e.g., finance, health, education, transportation, time management, etc.). Based on the selected problem, perform the following tasks in sequence.

### **Part A: Problem Identification**

1. Identify one real-life problem that people commonly face in their daily routine.
2. Briefly explain why this problem is important and who is affected by it.

### **Part B: Literature / Existing Ideas Table**

Create a literature or idea comparison table based on at least five existing solutions, methods, or approaches related to your selected problem.

Your table must include the following columns:

- Existing Idea / Solution
- Core Concept
- Strengths
- Limitations
- Relevance to Your Problem

### **Part C: Problem Statement**

Write a complete and clear problem statement (1–2 paragraphs) that:

- Clearly describes the problem
- Explains the current challenges
- Highlights gaps or limitations in existing solutions
- Justifies the need for a better solution

## **Part D: Proposed Solution**

Propose a conceptual solution to the identified problem. Your solution should include:

- Name/title of the solution
- Brief explanation of how it works
- Key features or components
- How it improves upon existing solutions

## **Part E: Abstract**

Write an abstract (120–150 words) summarizing:

- The problem context
- Limitations of existing approaches
- Your proposed solution
- Expected benefits or impact

## **Submission Guidelines**

- Use clear headings for each part
  - Use tables where required
- Keep language simple and formal

## Model Solution:

### 1 Daily-life problem (chosen)

#### Problem chosen:

*Managing shared monthly expenses fairly and transparently among hostel/roommates (e.g., rent, utilities, groceries, ride-sharing, etc.).*

Why it's a good daily-life problem:

- Many students live in hostels / shared apartments.
- One person often pays first; others repay later (sometimes late, sometimes never 😊).
- Misunderstandings arise: "*I paid more this month*", "*You never sent me your share*", "*I don't remember this expense*".

We'll design everything around this.

### 2 Literature table – Existing ideas & solutions

Below is a **sample literature/idea table** summarising *types* of existing solutions, not exact papers (students can later replace these with real references).

#	Existing Idea / Solution Type	Key Concept / Approach	Strengths	Limitations	Relevance to Our Problem
1	<b>Manual tracking (notebooks / paper)</b>	One roommate writes all expenses in a diary and calculates shares at month end.	Very simple, no tech needed, offline.	Error-prone, easy to lose records, no transparency for others, time-consuming.	Shows very basic baseline; highlights need for digital, shared visibility.
2	<b>Spreadsheet-based tracking (Excel/Google Sheets)</b>	Shared sheet with columns: date, payer, category, amount, split. Summary formulas compute who owes whom.	More accurate, sharable, transparent, logs all expenses.	Needs some spreadsheet skills; not user-friendly on phones; risk of accidental edits.	Common workaround among students; inspires features like auto-calculation.
3	<b>Expense-sharing apps (e.g., Splitwise-type)</b>	Mobile apps where each expense is added; app calculates	Very user-friendly, good summaries, reminders,	Privacy concerns, requires internet, may not support local currencies or	Strong baseline; we can analyze gaps (e.g., hostel-specific features,

		balances and “simplifies” debts.	supports multiple groups.	custom rules (e.g., different rent shares).	offline mode).
4	<b>Mobile banking + payment apps (P2P transfers)</b>	People pay their share via mobile banking or wallets after someone posts amount in group chat.	Easy payments, widely available.	No integrated tracking; records scattered across chats & bank statements; reconciliation is manual.	Highlights gap between <i>payment</i> and <i>tracking</i> —opportunity to integrate both.
5	<b>Rule-based budgeting apps</b>	Apps that categorize expenses and set limits per category (food, bills, etc).	Helps control overspending, provides analytics.	Usually personal, not group-focused; does not handle who owes whom.	We can borrow analytics & budgeting ideas but add group-expense logic.
6	<b>Blockchain-based expense sharing (experimental)</b>	Using shared ledger/smart contract to record expenses, enforce rules, and keep immutable history.	High transparency, tamper-resistance, clear audit trail.	Complex for everyday users, gas fees, UX issues.	For advanced versions, can inspire transparent logging/audit features, even if we don't use full blockchain.

Students can later:

- Replace “solution type” with **actual papers + apps**;
- Add a **Citation** column once they find real sources.

### 3 Complete Problem Statement

#### Problem Statement

Students and young professionals living in shared accommodation (hostels or apartments) frequently struggle to manage common expenses such as rent, utilities, groceries, and shared transportation. Currently, many groups rely on informal methods—like WhatsApp messages, paper notes, or ad-hoc spreadsheets—to track who paid what and how much each person owes. These methods often lead to errors, missing records, delayed settlements, and perceptions of unfairness. There is typically no central, transparent, and user-friendly system that allows all roommates to view, verify, and settle shared expenses in real time. As a result, conflicts, mistrust, and financial stress may arise, especially

when monthly amounts are high or when some members frequently pay on behalf of others. There is a clear need for a simple, mobile-friendly solution that enables accurate tracking, fair splitting, and timely settlement of shared expenses among roommates.

## 4 Proposed Solution (Concept)

### Title (working):

#### **“RoomSplit”: A Simple Shared-Expense Management App for Roommates**

### Core Idea

Design a **web or mobile app** that allows a group of roommates to:

1. **Create a group** (e.g., “Hostel Room 12 – Block A”).
2. **Add members** with their names and (optional) payment details (e.g., bank/wallet numbers).

#### **3. Record expenses:**

- Fields: date, amount, category (rent, utility, grocery, ride, etc.), payer, how to split (equally / custom).

#### **4. Automatically calculate balances:**

- Show: “Ali should pay Rs. 1,200 to Sana”, “Usama is owed Rs. 900”, etc.

#### **5. Support custom rules:**

- Example: Rent split is not equal if one person has bigger room.
  - Option to exclude someone from specific expenses.

#### **6. Provide transparency & history:**

- Everyone in the group can see all expenses and their share.
  - Filter by category, date range, or payer.

#### **7. Generate monthly summary:**

- Graphs for expense categories.
- Downloadable report for the month (e.g., PDF/CSV).

For advanced/FinTech versions:

- Integrate with payment APIs (just conceptually).
- Add notifications: “You owe Rs. X this week.”
- Optionally log key actions in a simple tamper-evident log for transparency.

This solution transforms a messy, manual process into a **structured, transparent, and fair system.**

## 5 Abstract (for the proposed solution)

### Abstract

Shared living arrangements, such as student hostels or group apartments, often involve recurring common expenses for rent, utilities, groceries, and transportation. In many cases, these expenses are tracked informally through paper notes, messaging apps, or basic spreadsheets, leading to calculation errors, missing records, and perceptions of unfairness. This class activity proposes the design of “RoomSplit”, a lightweight shared-expense management application tailored to roommates. The system allows users to create a group, record expenses with categories and payers, define splitting rules (equal or custom), and automatically compute individual balances. All members can view a transparent expense history and monthly summaries, reducing misunderstandings and improving financial clarity. The abstract outlines the problem context, reviews common existing approaches, and presents the core features of the proposed solution. The activity helps students practice problem formulation, basic literature mapping, and solution design around a relatable daily-life scenario.