Project Title: Linear Time Sorting in Practice

1. **Overview**

   This project is designed for undergraduate students to explore and apply linear time sorting algorithms in real-world scenarios. The project focuses on theoretically understanding and implementing these algorithms to address practical problems.

2. **Project Phases and Requirements**
   a. Phase One: Research and Conceptualization
      i. Deadline: [27 March, 2024]
      ii. Algorithm Selection: Choose a linear time sorting algorithm (Counting Sort, Radix Sort, Bucket Sort) for in-depth study.
      iii. Literature Review: Research the chosen algorithm's historical development, theoretical background, and applications.
      iv. Algorithmic Analysis: Investigate the design, complexity, and operational principles of the algorithm.
      v. Flowchart Development: Create a detailed flow chart illustrating the chosen algorithm's workflow.
   b. Phase Two: Implementation and Application
      i. Deadline: [3 April, 2024]
      ii. Implementation: Program the selected algorithm in Python or another preferred language, focusing on clarity and functionality.
      iii. Practical Application: Develop and document a real-life application where the algorithm can be effectively utilized.
      iv. Performance Evaluation: Assess the algorithm's performance in the application context.
   c. Phase Three: Documentation and Presentation
      i. Draft Deadline: [12 April,2024]
      ii. Final Deadline: [14 April,2024]

iii. Report Development: Write an in-depth report on your project, including your research, implementation process, and application findings.

iv. Poster Creation and Presentation: Prepare an A1 poster for the tech fest, highlighting key aspects and outcomes of your project.

d. Submission Guidelines

i. Required Files:

1. Code Files: Well-commented Python scripts or preferred language files.
2. Report: Following the provided Latex template.
3. Poster: Designed for tech fest presentation.

ii. Submission Format:

1. Extensions: .pdf (report and poster), .py (or other programming file), .zip (all files).
2. Naming Convention: GroupID_LinearSortApp_ID1_ID2_ID3_ID4_ID5
3. Group Size: Up to 5 members.
4. Individual Contributions: Submit on Google Classroom with details of each member's contribution.
5. Plagiarism Threshold: 20% similarity max to ensure originality

e. Evaluation Rubric

Criteria	Description	Weight (%)
Research Quality	Depth of literature review and algorithm analysis	20
Technical Execution	Clarity, accuracy, and practicality of code	30
Application and Creativity	Relevance and creativity in representation	25

Documentation	Coherence and thoroughness of the documents	15
Presentation	Effectiveness of poster in conveying project insights	10

Outcome-Based Education - KPA Mapping

Component	Knowledge Profile (K)	Complex Engineering Problem Solving (P)	Complex Engineering Activities (A)
Algorithm selection and analysis	K3, K4	P1, P3	A2, A3
Implementation in a programming language	K6	P1, P3	A1, A3
Practical application	K5, K6	P2, P4, P6	A1, A2, A4
Performance evaluation	K4, K6	P1, P3	A2, A3
Documentation and presentation	K7, K8	P5, P7	A1, A5

- Knowledge Profile (K):
    - K3 and K4 are addressed through the selection and analysis of the algorithm, requiring a deep understanding of engineering fundamentals and specialist knowledge.
    - K5 and K6 come into play during the practical application and implementation phases, involving knowledge supporting engineering design and practice.

    - K7 and K8 are reflected in the documentation and presentation stages, highlighting the importance of understanding engineering's role in society and engagement with research literature.
- Complex Engineering Problem Solving (P):
    - P1 and P3 are evident in the algorithm analysis and performance evaluation, necessitating in-depth knowledge and originality in analysis.
    - P2, P4, and P6 relate to the practical application, dealing with broad and conflicting technical issues and diverse stakeholder needs.
    - P5 and P7 are associated with the documentation and presentation, involving high-level problems and the application of standards and codes of practice.
- Complex Engineering Activities (A):
    - A1 and A3 are significant in the implementation and performance evaluation, involving diverse resources and creative use of engineering principles.
    - A2 and A4 are crucial during the practical application, requiring the resolution of significant problems and consideration of societal and environmental consequences.
    - A5 is linked to the documentation and presentation, pushing beyond previous experiences and applying principles-based approaches.