**Sample Project Description: Banking Software for Embedded Systems**

**Project Type:** The project involves developing banking software for embedded systems, specifically designed to be used in Automated Teller Machines (ATMs). The software will include features such as user authentication, transaction processing, cash dispensing, and receipt generation.

**Project Mode:** Since the project involves developing software for embedded systems, we classify it as "Embedded" mode in COCOMO.

**Project Size:** The estimated size of the project is 400 KLOC (Thousand Lines of Code), considering the complexity and functionality required for banking software.

**Project factors and justification of Attributes:**

1. **Product Attributes:**
   * Required Reliability: high reliability is crucial for banking software to ensure accuracy in transactions and data integrity.
   * Database Size: The software will require a moderate-sized database to store transaction records, user accounts, and other banking data.
   * Product Complexity: Banking software involves moderate to high complexity due to the various functionalities such as user authentication, transaction processing, and security features.
2. **Computer Attributes:**
   * Execution Time Constraint: ATMs require real-time processing capabilities to handle user transactions efficiently.
   * Main Storage Constraint: Embedded systems typically have limited memory resources, so memory constraints are significant.
3. **Personnel Attributes:**
   * Applications Experience: Experience in developing banking software or similar applications is essential for the project team.
   * Programmer Capability: Skilled programmers are required to develop efficient and secure software for embedded systems.
   * Programming Language and Tool Experience: Proficiency in programming languages and tools suitable for embedded systems development is vital.
4. **Project Attributes:**
   * Modern Programming Practices: Adoption of modern programming practices such as Agile methodologies and version control systems can enhance productivity and quality.
   * Use of Software Tools: Essential for enhancing efficiency and effectiveness in embedded systems development.
5. **New Attributes:**

* Required Reusability: Important for reducing development time and effort by leveraging reusable components and modules.
* Personnel Continuity: Essential for maintaining consistency and knowledge transfer within the project team, especially for long-term embedded system development.

**~~Note:~~** ~~All other properties of each attribute of the NASA COCOMO Calculator not mentioned above have been left on their default value (N = Nominal) for consistent results.~~

**Estimation Reports:**

**Report -1: [Sample Project Scenario]**

A screenshot of a computer program

Description automatically generated

Based on the above COCOMO RESULTS for our Banking Software designed for Embedded Systems, the following metrics can be deduced for our initial settings:

* The total effort required is approximately 5185.11 person-months.
* The total development time required is estimated to be 39 months (rounded up).
* Approximately 135 people (rounded up) would be needed to complete the project.

**Report -2: [Worst Case Scenario]**

A screenshot of a computer

Description automatically generated

In the worst-case scenario, all attributes have been set to their worst-case conditions, potentially leading to increased effort, cost, and schedule due to lower productivity, higher complexity, and greater uncertainty which can be observed from the obtained metrics:

* The total effort required is approximately 15364.36 person-months.
* The total development time required is estimated to be 55 months (rounded up).
* Approximately 282 people (rounded up) would be needed to complete the project.

**Ideal Conditions:** In ideal conditions, all attributes would be set to their best-case conditions, potentially resulting in decreased effort, cost, and schedule due to higher productivity, lower complexity, and greater predictability.

By adjusting the attributes and running the estimation under different scenarios, you can assess the potential impact of various factors on the project's effort, cost, and schedule.

**References:**

1. <https://youtu.be/PfD4G4ZZAMA?si=98UjmuY71hCcMfXQ> [COCOMO Model Tutorial]