COCOMO II

Main technologies used:

- **Backend**: Python (70%)
- **Frontend**: JavaScript (React) (30%)

1. Convert Function Points to SLOC (Source Lines of Code)

Language	% Usage	FP Allocation	SLOC/FP	Estimated SLOC
Python	50%	85 FP	53	4,505
JavaScript	50%	85 FP	47	3,995
Total	100%	**170**		**8,500**

Total Estimated SLOC = 8,500.

2. Determine Scale Drivers (5 factors)

Each one rated from **Very Low to Extra High**, affecting the exponential factor E.

Driver	Estimate	Rationale
PREC (Precedentedness)	Low	New system, innovative features
FLEX (Development Flexibility)	Nominal	Some flexibility, but user needs must be met
RESL (Architecture/Risk Resolution)	Nominal	Basic architecture assumed, no major risk management detailed
TEAM (Team Cohesion)	Nominal	Assuming student team or moderate cohesion
PMAT (Process Maturity)	Low	Likely student-level or early development phase

COCOMO II assigns numeric values to these. For now, let's assume this leads to an **E value around 1.10–1.15**.

3. Effort Multipliers (EM)

These are 7 cost drivers like:

- **Product Reliability**
- **Platform Difficulty**
- **Personnel Capability**
- **Tool Support**

- **Schedule Constraints**

Let's take **Nominal values** for now across the board → total **Effort Adjustment Factor (EAF) ≈ 1.0** (we can refine this if needed).

4. COCOMO II Estimation – Early Design Model

Model Assumptions

- **COCOMO II Model**: Early Design
- **A (constant)**: 2.94
- **EAF (Effort Adjustment Factor)**: Initially assumed as 1.0 (nominal)
- **Scale Exponent (E)**: 1.12 (typical assumption)
- **Size**: 9.524 KSLOC

Using default COCOMO II values:

- **Effort**:

$$\text{Effort} = 2.94 \times (8.5)^{1.12} \approx 2.94 \times 11.57 \approx 34.01 \text{ person-months}$$

- **Schedule (TDEV)**:

$$\text{TDEV} = 3.67 \times (34.01)^{0.304} \approx 3.67 \times 2.88 \approx 10.57 \text{ months}$$

- **Average Team Size**:

$$\text{TeamSize} = 10.5734.01 \approx 3.22 \text{ developers}$$

6. Real-World Project Data

Metric	Value
Team Size →	2 developers
Time Duration →	4 months
Total Effort →	8 person-months
Actual Productivity →	8500/8 = 1062 SLOC/person-month

This real-world effort is significantly lower than the COCOMO II estimate.

7. Reverse Engineering the COCOMO II Model

To understand this gap, we reverse-calculated the COCOMO II exponent E to align with the actual effort. From:

$$8 = 2.94 \times (8.5)^{E} \Rightarrow E \approx 0.468$$

The discrepancy between estimated and actual effort highlights the importance of contextualizing COCOMO II predictions, particularly for small, agile teams working with modern technologies. While COCOMO II is a powerful early estimation tool, real-world productivity may vary significantly.