Software Engineering Economics Tool - Technical Overview

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PART 01

Frontend Framework & Technologies

Frontend Framework & Technologies

- **Next.js** with **React** – Modern **full-stack** React framework

- **Fastapi** with **Python** – Fast & Modern **back-end** framework

- **Shadcn** – Powerful component **library** for Next.js

- **SQLAlchemy** in **Python**– Flexible & Powerful **library** for database interactions

Development Approach

- Interactive Web Application - Real-time calculations and visualizations

- Responsive Design - Mobile-first approach with gradient backgrounds

- State Management - React hooks (useState) for dynamic data handling

- Modular Structure - Separate modules for each economic analysis type

PART 02

Algorithms Used for Economic Analysis

Cost Estimation Module

COCOMO (Constructive Cost Model)

- Organic, Semi-detached, and Embedded project modes

- Effort = a × (KLOC)^b × EAF

- Duration = c × (Effort)^d

- Team Size calculation based on effort and duration

Function Points Analysis

- Weighted calculation of system components

- External Inputs/Outputs, Internal Files, External Interfaces

- Complexity adjustment factors

- LOC estimation from function points

Budgeting & Financial Analysis

ROI (Return on Investment)

- ROI = ((Total Cash Flows - Initial Investment) / Initial Investment) × 100

NPV (Net Present Value)

- NPV = Σ(Cash Flow_t / (1 + r)^t) - Initial Investment
- Discount rate consideration for time value of money

IRR (Internal Rate of Return)

- Newton-Raphson iterative method
- Finding rate where NPV = 0

Payback Period

- Cumulative cash flow analysis
- Break-even point calculation

Sensitivity Analysis

- Variable impact assessment on project outcomes

- Range-based scenario modeling

Monte Carlo Simulation

- Statistical modeling with multiple iterations (1000+ runs)

- Normal and uniform distribution support

- Risk probability calculations

PART 03

Achievements Display

THANKS

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