

Project Report: COCOMO Cost Estimation Tool

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Project :

Academic Project of Software Engineering (CSC_702)

1. Project Overview

1.1 Project Name: COCOMO Cost Estimation Tool

1.2 Objective:

To design a **user-friendly software tool** that calculates **software development effort, duration, and staffing** using the **COCOMO model**. The tool provides a **GUI for input**, generates a **tabular result, graphs**, and a **well-structured DOCX report**.

1.3 Scope:

- Helps project managers estimate software development effort.
- Provides visualization of results.
- Generates professional reports for documentation and presentation.

1.4 Technologies Used:

Technology	Purpose
Python	Programming language
Tkinter	GUI framework
python-docx	DOCX report generation

Matplotlib	Graphical representation of outputs
Math library	Calculations
datetime	Timestamp in reports

2. Abbreviations & Definitions

Abbreviation	Full Form	Description
KLOC	Thousand Lines of Code	Size of the software project in thousands of lines of code
EAF	Effort Adjustment Factor	Product of all cost driver multipliers
PM	Person-Month	Unit of effort (1 person working for 1 month)
COCOMO	Constructive Cost Model	Software cost estimation model developed by Barry Boehm
GUI	Graphical User Interface	Allows user-friendly interaction
Avg Staff	Average Staff	Average number of staff required during the project

3. Software Flow & Screenshots

3.1 Application Launch

The screenshot shows the COCOMO Calculator application window. The title bar reads "COCOMO CALCULATOR". The window is divided into two main sections: "ESTIMATE YOUR PROJECT" (blue header) and "ESTIMATED VALUES" (green header). Under "ESTIMATE YOUR PROJECT", there is a "PROJECT NAME" input field with the placeholder "Enter Project Name:". Below this is an "Enter Project Size (KLOC):" input field. Further down is a "Select Project Type:" dropdown menu with "organic" selected. A section titled "Cost Drivers (EAF Inputs)" contains a grid of 12 dropdown menus for RELY, DATA, CPLX, TIME, STOR, VIRT, TURN, ACAP, AEXP, PCAP, VEXP, and LEXP, all set to "Nominal". There are also dropdowns for MODP and SCED, both set to "Nominal". At the bottom of the input section is a "Calculate" button and a "Know About COCOMO" link. A footer section contains a small disclaimer: "COCOMO (Constructive Cost Model) is a software cost estimation model developed by Barry Boehm. It helps predict effort, development time, and cost based on project size and complexity. Product From CodeEra! All rights are reserved!"

- The application initializes and opens in **fullscreen mode**.

3.2 Project Input Section

This screenshot shows the same COCOMO Calculator application window, but with the input fields populated. The "PROJECT NAME" field now contains "CodeCrusher". The "Enter Project Size (KLOC):" field contains "101". The "Select Project Type:" dropdown menu now shows "embedded" selected. In the "Cost Drivers (EAF Inputs)" section, the dropdown menus have been updated: RELY is "Nominal", DATA is "High", CPLX is "Nominal", TIME is "High", STOR is "Nominal", VIRT is "Nominal", TURN is "Low", ACAP is "Nominal", AEXP is "High", PCAP is "Nominal", VEXP is "High", LEXP is "Nominal", MODP is "Nominal", and SCED is "Very Low". The "Calculate" button and "Know About COCOMO" link remain at the bottom. The footer disclaimer is also present.

- Enter **Project Name**, **KLOC**, and select **Project Type** (organic, semi-detached, embedded).
- Select **Cost Driver values** for EAF calculation from dropdown menus.

3.3 Results Display

COCOMO CALCULATOR

ESTIMATE YOUR PROJECT

PROJECT NAME: Enter Project Name: CodeCrusher

Enter Project Size (KLOC): 101

Select Project Type: embedded

Cost Drivers (EAF Inputs)

RELY	Nominal	VIRT	Nominal	VEXP	High
DATA	High	TURN	Low	LEXP	Nominal
CPLX	Nominal	ACAP	Nominal	MODP	Nominal
TIME	High	AEXP	High	TOOL	Low
STOR	Nominal	PCAP	Nominal	SCED	Very Low

Calculate

[Know About COCOMO](#)

ESTIMATED VALUES

RESULTS - CodeCrusher

Metric	Value	Ceiling Value
Effort (PM)	1057.64	1058
Development Time (Months)	23.21	24
Average Staff	45.56	46
EAF	1.156	2

KNOW IT!

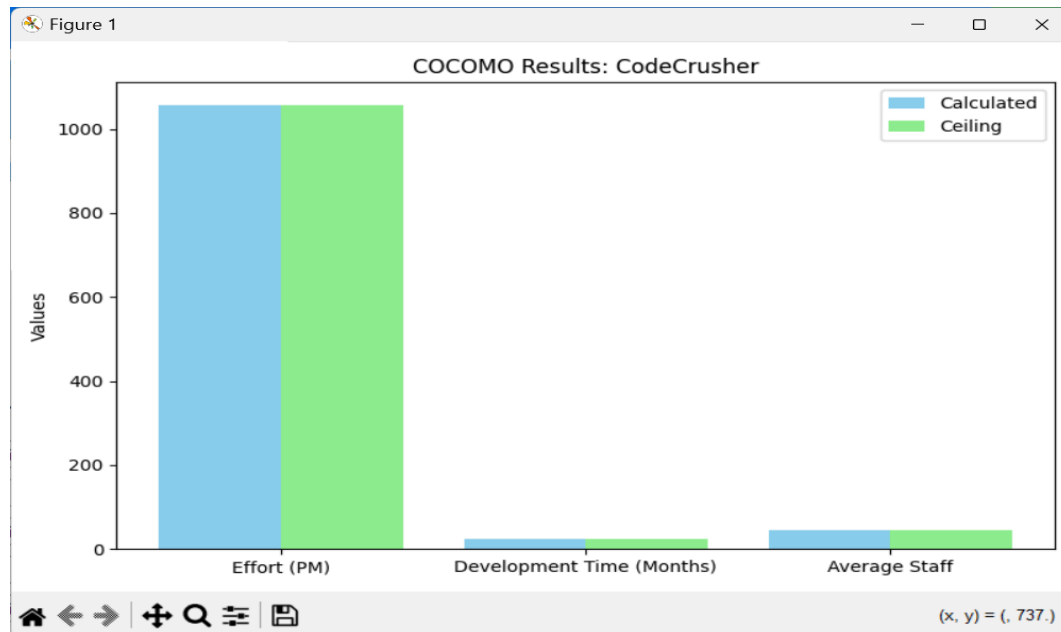
RELY: Nominal → 1.0 VIRT: Nominal → 1.0 VEXP: High → 0.9
 DATA: High → 1.08 TURN: Low → 0.87 LEXP: Nominal → 1.0
 CPLX: Nominal → 1.0 ACAP: Nominal → 1.0 MODP: Nominal → 1.0
 TIME: High → 1.11 AEXP: High → 0.91 TOOL: Low → 1.1
 STOR: Nominal → 1.0 PCAP: Nominal → 1.0 SCED: Very Low → 1.23

[Generate Report](#) [Generate Graph](#)

COCOMO (Constructive Cost Model) is a software cost estimation model developed by Barry Boehm. It helps predict effort, development time, and cost based on project size and complexity. Product From CodeStar! All rights are reserved.

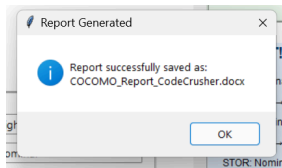
- Tabular display of **Effort (PM)**, **Development Time**, **Average Staff**, and **EAF**.
- Color-coded rows for readability.

3.4 Graphical Representation



Graph shows **Effort**, **Duration**, and **Average Staff** for quick visualization.

3.5 DOCX Report Generation



COCOMO Report: CodeCrusher

Date & Time: 18-08-2025 07:06:24

PROJECT INFORMATION

Project Name: CodeCrusher

Type of Project: embedded

KLOC: 101.0

Coefficients Used:

⋮ A = 3.6, B = 1.2, C = 2.5, D = 0.32

OUTPUTS

Metric	Calculated	Ceiling Value
Effort (PM)	1057.64	1058
Development Time (Months)	23.21	24
Average Staff	45.56	46

Formulas Used:

$$\text{Effort} = A * (\text{KLOC} ^ B) * \text{EAF} = 3.6 * (101.0 ^ 1.2) * \text{EAF}$$

$$\text{Duration} = C * (\text{Effort} ^ D) = 2.5 * (\text{Effort} ^ 0.32)$$

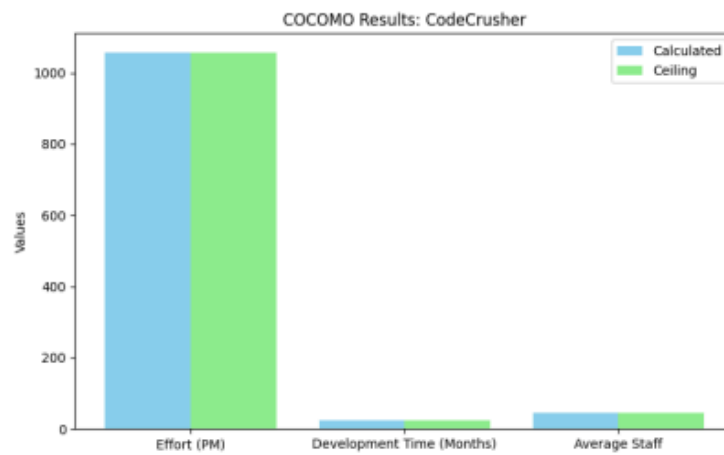
$$\text{Staff} = \text{Effort} / \text{Duration}$$

Summary: The project requires approximately 1058 person-months, with an estimated duration of 24 months and average staffing of 46 persons.

COST DRIVERS (EAF)

Cost Driver	Multiplier Value
RELY	1.0
DATA	1.08
CPLX	1.0
TIME	1.11
STOR	1.0
VIRT	1.0
TURN	0.87
ACAP	1.0
AEXP	0.91
PCAP	1.0
VEXP	0.9
LEXP	1.0
MODP	1.0
TOOL	1.1
SCED	1.23

Graphical Representation



- Generates a **well-structured report** with sections:
 - Project Information
 - Outputs Table
 - Cost Drivers (EAF)
 - Formulas
 - Summary
 - Graph (optional)

KNOW MORE ABOUT COCOMO

COCOMO Information
COCOMO CALCULATOR INFO

COCOMO (Constructive Cost Model) is a procedural software cost estimation model developed by Barry Boehm. It estimates effort, development time, and team size based on project size and cost drivers.

There are three main types of projects:

1. Organic:
 - Small teams, familiar environments
 - Simple software with low complexity
2. Semi-Detached:
 - Medium teams, mixed experience
 - Medium complexity software
3. Embedded:
 - Large teams, tight constraints
 - Complex software with strict requirements

COCOMO Formulas:

1. $\text{Effort} = a * (\text{KLOC}^b) * \text{EAF}$
2. $\text{Time} = c * (\text{Effort}^d)$
3. $\text{Staff} = \text{Effort} / \text{Time}$

Without EAF:

$$\text{Effort} = a * (\text{KLOC}^b)$$

$$\text{Time} = c * (\text{Effort}^d)$$

Project Type	a	b	c	d
Organic	2.4	1.05	2.5	0.38
Semi-Detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.2	2.5	0.32

Cost Drivers and Multipliers

RELY (Required Software Reliability)

Very Low: 0.75
Low: 0.88
Nominal: 1.0
High: 1.15

4. Project Information

Field	Value
Project Name	[CodeCrusher]
Type of Project	[Embedded]
KLOC	[101]
Coefficients Used	[A= 3.6, B= 1.2,C= 2.5, D= 0.32]
Date & Time	[18-08-2025 07:06:24]

5. Outputs Table

Metric	Calculated Value	Ceiling Value
Effort (PM)	[1057.64]	1058
Development Time (Months)	[23.21]	24
Average Staff	[45.56]	46
EAF	[1.155]	2

Formulas Used:

- **Effort (PM) = A × (KLOC^B) × EAF**
- **Duration (Months) = C × (Effort^D)**
- **Average Staff = Effort / Duration**

Summary:

The project requires approximately **[Effort] PM**, with an estimated duration of **[Months]**, and average staffing of **[Avg Staff] persons**.

6. Cost Drivers (EAF Table)

S.No	Cost Driver	Selected Value	Multiplier
1	RELY	[value]	[multiplier]
2	DATA	[value]	[multiplier]
3	CPLX	[value]	[multiplier]
...
15	SCED	[value]	[multiplier]

7. Step-by-Step Process

1. Launch the **GUI application** (fullscreen mode).
2. Enter **Project Name** and **KLOC**.
3. Select **Project Type**.
4. Set **Cost Driver ratings** using dropdown menus.
5. Click **Calculate** → results are displayed in **tabular form**.
6. Click **Generate Graph** (optional) to visualize results.
7. Click **Generate Report** → DOCX is generated with all **details and screenshots**.

8. Future Scope

- Support for **multiple projects** in one report.
- Add **COCOMO II** model for **modern projects**.
- Include **Excel/CSV input** for bulk KLOC and cost drivers.
- Generate **interactive dashboards** with charts for multiple projects.