

CS3500 Software Engineering

Assignment 2b: Software Cost Estimation with COCOMO II

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This practical is part of the continuous assessment for CS3500. You will be marked on the answers you submit.

Submission details: This assignment should be done in **teams of three as per part a**. The team leader should submit a single Word or PDF document with the answers using Canvas. As well as answering the questions below, the PDF should include **screenshots** of both the COCOMO II model parameter values used and the summary results.

You should use the online COCOMO II tool at <http://softwarecost.org/tools/COCOMO/>

An overview of COCOMO II was given in the lecture slides. Also see <http://www.softstarsystems.com/overview.htm> for an overview. A more detailed description of COCOMO II is available in a document on my Canvas page directly below the assignment.

Task

Perform software cost estimation using the COCOMO II **Post-architecture model**. This model is used for cost estimation **after** the software architecture has already been defined.

You will need to enter values for size (in SLOCs), scaling factors — Precedentedness (PREC), Development Flexibility (FLEX), Architecture/Risk Resolution (RESL), Team Cohesion (TEAM), or Process Maturity (PMAT) —and cost drivers (also called effort multipliers) — attributes for product, platform, personnel, and project.

In your report give a one-line explanation for any scale factor or cost driver that is **not Nominal**.

Estimate the overall project effort in **person-months**, **schedule length** and **dollar cost**.

Assuming the Rational Unified Process (RUP) is the software development process used, what percentage of effort went into Requirements Engineering and Design activities respectively? Display the **Software Effort Distribution Function** for the project. You can run the Monte Carlo simulation — 1,000 iterations— to model uncertainty with a normal distribution. You will need to turn this on – top right on Webpage.

Relevant Information

From the requirements and software architecture, knowledge of the customer and developer organizations, and experience with similar projects the following information can be used to parameterize the model. If information is unknown, assume that a cost driver is *nominal*.

Software Application under development

A stock application for a medium-sized retailer is being reengineered and modernized. The application is of moderate complexity. The previous PC-based solution— implemented in C and an Oracle database — is to be reengineered as a Web-based application in Python/Django with the same Oracle database backend; some of the C code can be reused and called from the Python code. The database is not large by modern standards of big data. The system should have high availability and reliability. Code reusability is not a major requirement; this project is seen as a once off. In this project, there will be little scope for flexibility as the system must conform of established work practices at the customer organization and the formats of the data records in the customer organization. Ongoing maintenance will not be required.

Size estimates

Size estimates are all in source lines of code (SLOC). The project manager has experience working on a similar project previously. The estimates are that the project will consist of 46,000 SLOC in total (1,000 of which are comments and blank lines). Approx. 5,000 SLOC will be COTS that is unchanged, and 6,000 SLOC will be third-party library code, 10,000 SLOC will be reused code, and 4,000 SLOC modified code.

Developer organization

The developers have a lot of experience developing these types of systems, and working with C, Python and relational databases, but not Oracle. The development team includes programmers of considerable skill and experience. The customer is happy for the developers to set their own development schedule. The developer organization can be regarded as mature in terms of process maturity. Software labour costs at the developer's organization are €285 per day (developers have 20 days holidays per year).

Risk assessment

Overall, the project is considered low risk. A risk that was identified is the possibility of stakeholders holding different objectives. Another risk that was identified is that at some point in the future the existing data platform (Oracle) may need to be changed. One recent issue that could affect this and other project is that while morale at the developer organization is high, staff turnover is currently high due to competition for software engineers.

end.