

Project: Dealership Management System

CSE 5325 – Fall 2019

Project Management

Module: COCOMO

Deliverable: COCOMO Estimate Report

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1. Introduction

The following is a proposal for the development, implementation and testing of an Website – Dealership Management Systems. The website will have all the details about the Maker's, Model's of the vehicles, Customer's Information, Sales and Inventories and also the Employee Portal which is integrated to the website.

This project involves the specification of the requirements, designing the wireframe and implementation of features. Testing is done at every stage to ensure a robust application and to reduce defect leaking. Key features to be implemented include a employee login, easy to update and modify the databases containing all the information about the sales, maker's, model's, etc... Data gathered from users can also be used to analyze patterns and forecast trends in the market.

The project is estimated to be completed in 6 months and will cost the client \$349,600

2. Estimating Factors

2.1 SOURCE OF LINES OF CODE

The following is the number of lines of code delivered as part of this project, A justification for the total amount of LOC is provided.

SLOC Source Lines Of Code	Value Chosen: 5000
Justification: The project is done in Waterfall model. The employee portal is integrated into the website. The code is written in modules for User Registration, Login, Customer's information, Maker's and Model's information, Sales, Inventory, Search and notes. There are many queries to retrieve, modify and update the data. The data is sorted and categorized. Each code module is also tested individually through unit tests and after wholly after integration.	

2.2 SCALE DRIVERS

The following is the list of scale drivers, the values applicable to this project and a justification for each value chosen:

PREC Precendentedness	Value Chosen: Largely Familiar
Justification: It measures the similarity of the current project with the ones that have been undertaken by the team earlier. Since it is web development project and the team has good experience in web development and database in the past, the precedentedness is marked as Largely Familiar.	

Development Flexibility	Value Chosen: Some conformity
Justification: This measures the flexibility of the requirements that are supposed to be met by the team. Since most of the requirements are stable and only some are expected to change, I have marked development flexibility as Some Conformity.	

RESL Architecture/Risk resolution	Value Chosen: Mostly (90%)
Justification: This is the degree to which the architecture has been defined. As the architecture is designed well and the majority of risks and resolved, I have marked it as Mostly (90%)	

TEAM Team Cohession	Value Chosen: Highly Cooperative
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Justification: This is the professionalism and ease of communication between the stakeholder and the team. Since the interactions are going to be systematical with clear presentations, there would be no problem. Also this is waterfall model, thus much interaction from the clients are not needed. Thus, I kept the team cohesion as Highly cooperative

PMAT Process Maturity	Value Chosen: SEI CMM Level 4
Justification: It depends on the SEI Maturity Scale of the company like how the company manages different process and standards. Since the company has well set of processes and documentation of processes thorough, the process maturity is SEI CMM Level 4	

2.3 COST DRIVERS

The following is the list of cost drivers, the values applicable to this project and a justification for each value chosen:

ACAP Analyst Capability	Value Chosen: Very High
Justification: This is the measure of analyst. I have very well experienced Analysts with excellent technical and communication skills. They are well trained and have continuously showed excellent results . ACAP – Very High	

AEXP Applications Experience	Value Chosen: Very High
Justification: This is the experience of the team held on such type of projects. My team is very well experienced in web development and database we have kept it as Very High – 6-8 years of experience	

PCAP Programmer Capability	Value Chosen: Very High
Justification: This is the experience of the programmers working, communicating and coordinating with one another. Since this team has been together for about Two and a half years working on the same projects together, the PCAP is Very High.	

PLEX Platform Experience	Value Chosen: Very High
Justification: This is dependent on the team's understanding of using powerful platforms, databases, networking servers, etc... Since my team has more than 6 yrs of experience in Web data development and management, PLEX – Very High	

LTEX Language and Tool Experience	Value Chosen: Very High
Justification: This is a measure of the level of programming language and software tool experience of the project team developing the software system or subsystem. My team has 6 yrs of experience in such projects. LTEX – Very High	

PCON Personal Continuity	Value Chosen: High
Justification: It is a cost driver related to continuity of the person with the organization and is measured in terms of turnover per year. Since all of the team members are with this company from over three years and their annual turnover is around 6%, PCON - High	

TOOL Use of Software Tools	Value Chosen: Very High
Justification: It is a cost driver which provides the measure on the complexity of the tools that the team will use for the development of the project. Since the team uses basic development tools like Xampp which are simple and they have experience in using them, TOOL – Very High	

SITE Multisite Development	Value Chosen: Very High
Justification: This is dependent on :- site collocation (from fully collocated to international distribution) and communication support (from surface mail and some phone access to full interactive multimedia). My team has Wideband electronic communication and occasional video conferences with the clients weekly. SITE – Very High	

SCED Development Schedule	Value Chosen: Nominal
Justification: This rating measures the schedule constraint imposed on the project team developing the software. We have the target of completing the project on time and we are following normal development schedule as Nominal	

TIME Execution Time Constraint	Value Chosen: Nominal
Justification: This is a measure of the execution time constraint imposed upon a software system. Since it is uses Xampp and MySQL, it will use very nominal execution time. TIME - Nominal	

STOR Main Storage Constraint	Value Chosen: Nominal
Justification: This rating represents the degree of main storage constraint imposed on a software system or subsystem. Since the tools do not consume all the available resources, STOR - Nominal	

PVOL Platform Volatility	Value Chosen: Low
Justification: This is the complex of hardware and software (OS, DBMS, etc.) the software product calls on to perform its tasks. Since we are using DBMS, it uses both the hardware and OS. Major changes can be expected once in 12 months or so. PVOL - Low	

RELY Required Reliability	Value Chosen: Nominal
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Justification: This is the measure of the extent to which the software must perform its intended function over a period of time. Since there won't be much of severe consequences because of software failure, we have marked required reliability as Nominal.

DATA Database Size	Value Chosen: High
Justification: This measure attempts to capture the affect large data requirements have on product development. Since we will require large data for Customers, Makers, Models, Sales and inventories and also testing purposes, we have marked database size as High	

CPLX Product Complexity	Value Chosen: Nominal
Justification: It is a cost driver which provides an measure based on the complexity of the software being developed. Since our system will have good number of loop codes, multiple files with user, sales and vehicle datas, attractive Webpages. CPLX - Nominal.	

RUSE Required Reusability	Value Chosen: Nominal
Justification: This cost driver accounts for the additional effort needed to construct components intended for reuse on the current or future projects. This effort is consumed with creating more generic design of software, more elaborate documentation, and more extensive testing to ensure components are ready for use in other applications. As a team are going to have contract with the stakeholder for only this project. Hence, we have kept it as Nominal	

DOCU Documentation Match to Life Cycle Needs	Value Chosen: High
Justification: It is a measure which is largely dependent upon the documentation that we are creating in the product development. As we are following a Waterfall model and comprehensive documentation is required for this project. DOCU - High	

3 Project Final Timeline and Cost Structure

- Previous Cost, Work and Duration (From Microsoft Project planner)

Task		Task Name	Duration	Start	Finish	Predecessors	Resource Names	Cost	Work	Add New Column
1		Dealership Management Systems	73 days?	Tue 9/3/19	Thu 12/12/15			\$201,262.00	3,160 hrs	
2		Requirement analysis and specifications	10 days	Tue 9/3/19	Mon 9/16/19		Project Manager	\$29,600.00	512 hrs	
3		Task 1 : Requirements gatehering and analysis - Meet with client and gather requirements for the project.	5 days	Tue 9/3/19	Mon 9/9/19		Eapen Ittiyera,Jane, Mayank	\$6,000.00	120 hrs	
4		Task 2 : Requirements specification - The requirements gathered are used to create a Software Requirements Document and to define high level requirements.	5 days	Tue 9/3/19	Mon 9/9/19		Jane,Navneet,Vindhya	\$6,000.00	120 hrs	
5		Task 3 : Plan testing activities to be performed to verify high level requirements	3 days	Tue 9/10/19	Thu 9/12/19	3	Eapen Ittiyera,Navneet, Vindhya	\$3,600.00	72 hrs	
6		Task 4 : Establish the pre-defined conditions that will have to be tested to verify the high level requirements	5 days	Tue 9/10/19	Mon 9/16/19	4	Eapen Ittiyera,Jane, Navneet	\$6,000.00	120 hrs	
7		High Level design and integration testing	10 days?	Tue 9/17/19	Mon 9/30/19	2	Project Manager	\$27,200.00	464 hrs	
8		Task 5 : Refine high level requirements to a more granular level	4 days	Tue 9/17/19	Fri 9/20/19		Jane,Mayank,Navneet, Vindhya	\$6,400.00	128 hrs	
9		Task 6 : Creating a high level solution design and general flow	3 days?	Mon 9/23/19	Wed 9/25/19	8	Jane,Mayank,Navneet, Eapen Ittiyera	\$4,800.00	96 hrs	
10		Task 7 : Planning testing activities for system integration	10 days?	Tue 9/17/19	Mon 9/30/19		Eapen Ittiyera,Vindhya	\$8,000.00	160 hrs	
11		Low level design and unit testing	8 days?	Tue 10/1/19	Thu 10/10/19		Project Manager	\$20,000.00	336 hrs	
12		Task 8 : Listing out software and other technologies used in development.	8 days	Tue 10/1/19	Thu 10/10/19		Jane,Navneet	\$6,400.00	128 hrs	

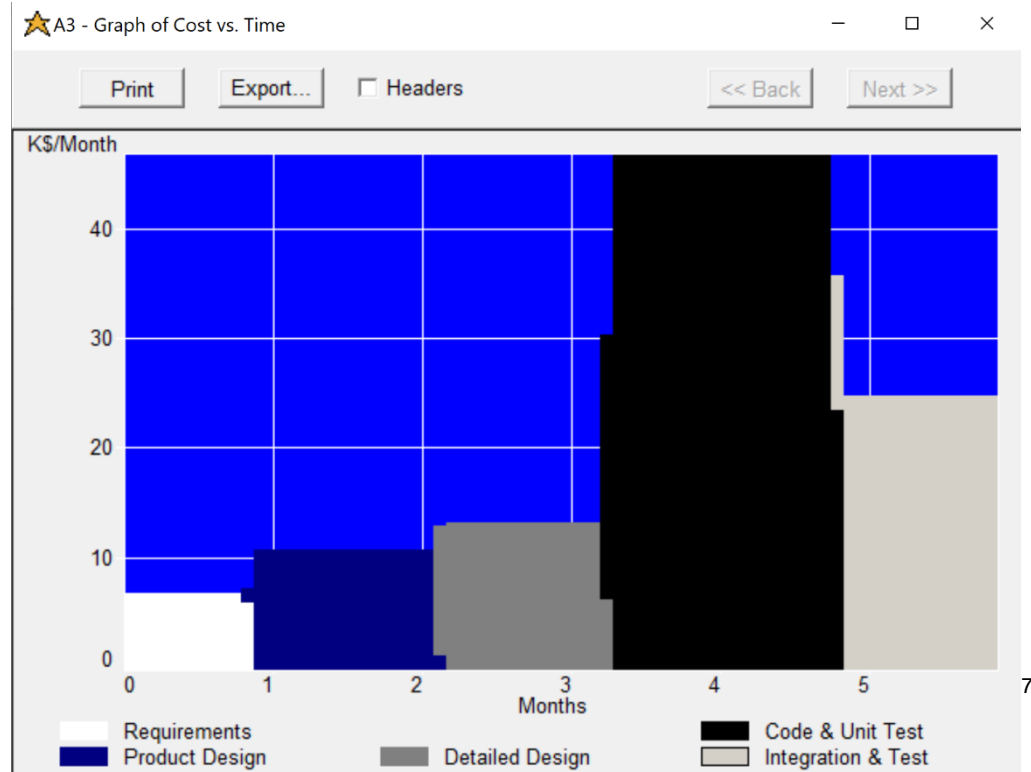
Cost : \$201,262

Hours of Work: 3160

Duration : 3 months 2 weeks.

- New Schedule (Duration)

New Schedule duration estimated by Cocomo is 5.9 i.e 6 months.



- **COCOMO estimated costs (Human Resources)**

Estimated Human Resources cost by Cocomo is \$134,600

SystemStar - A3 (Component1)

File View Reports Components Tools Preferences Monte Carlo Help

Estimate: A3 ID: Model: COCOMO® II 2000

Component: Component1 ID: Increment: 1

ACT ARC CBR CDF CDR CMP CST DET EBR EFF EQS GCS GMI GST IDT ISM MSZ NAM PDF RSK SCH SZ SSM STR

Totals for entire Project		Effort (PM)	Duration (Mo)	Cost (K\$)	Productivity	Equivalent Size
Requirements	RQ:	0.2	0.9	6.1		Total Size: 5,000
Development	PD+DD+CT+IT:	2.9	5.0	128.6	1,712	
Total	RQ+PD+DD+CT+IT:	3.1	5.9	134.6	1,600	

COCOMO II Cost Drivers for Component: Component1

Personnel

ACAP... Very High

APEX... Very High

PCAP... Very High

PLEX... Very High

LTEX... Very High

PCON... High

Platform

TIME... Nominal

STOR... Nominal

PVOL... Low

Product

RELY... Nominal

DATA... High

CPLX... Nominal

RUSE... Nominal

DOCU... High

Project

TOOL... Very High

SITE... Very High

SCED... Nominal

Size Summary

Size: 5000

Method: SLOC

User Defined

USR1... Undefined

USR2... Undefined

USR3... Undefined

USR4... Undefined

Drivers & Size / Model / REVL / Reuse / Function Points / Increments / Breakage / Costs / Rates / Maint. / Filter / Descr.

A3: 3.1 PM, 5.9 Months Component1: 3.1 PM EAF: 0.2074 Level: 1

SystemStar - A3 (Component1)

File View Reports Components Tools Preferences Monte Carlo Help

Estimate: A3 ID: Model: COCOMO® II 2000

Component: Component1 ID: Increment: 1

ACT ARC CBR CDF CDR CMP CST DET EBR EFF EQS GCS GMI GST IDT ISM MSZ NAM PDF RSK SCH SIZ SSM STR

Totals for entire Project		Effort (PM)	Duration (Mo)	Cost (K\$)	Productivity	Equivalent Size
Requirements	RQ:	0.2	0.9	6.1		Total Size: 5,000
Development	PD+DD+CT+IT:	2.9	5.0	128.6	1,712	
Total	RQ+PD+DD+CT+IT:	3.1	5.9	134.6	1,600	

COCOMO II Scale Factors for Estimate: A3

Model: COCOMO® II 2000	Precedentedness: Largely Familiar
Model ID: 2000	Development Flexibility: Some Conformity
Phases: Waterfall	Architecture / Risk Resolution: Mostly (90%)
Model Type: COCOMO II	Team Cohesion: Highly Cooperative
Select Model...	Process Maturity: SEI CMM Level 4
Show Equations	
APM Settings...	

Drivers & Size Model REVL Reuse Function Points Increments Breakage Costs Rates Maint. Filter Descr.

A3: 3.1 PM, 5.9 Months Component1: 3.1 PM EAF: 0.2074 Level: 1

- **Non-Human Resources**

Database, Servers and Primary Storage - \$53,000

Selenium Testing Software - \$13,000

Laptops - \$8000

Utilities and Insurance – \$26,4000

Total: \$10,0400

- **Any other costs**

Taxes and Misc - \$14,000

- **Profit (50 %) = 50% Of \$23,2400**

Profit: \$11,7200

- **Total cost = \$349600**

4. Conclusion and Recommendations

The duration of the project is 6 months and it is not feasible to complete the project within 3 months of given time period due to functionalities and expected size of the project. Coding along with unit testing will consume the maximum amount of time. The project is estimated to cost \$349,600 which includes all the costs to the company and profit at 50%.

I would recommend you to add a few extra features to beautify the website for maximum user satisfaction. Our team has excellent Web designers and UX designers. This would cost extra time but I feel it would be a nice finish to the product.

I would also suggest you to start advertising the website online for maximum business.

Some more recommendations which can be included in future are as follows:

1. Schedule appointment to visit online.
2. Show approximate pricing of a particular car based on the user's interest. It can include all the information about the car like mileage, model, pictures, etc...
3. Add a Chat Now tab in the website, where the customers can instantly chat with your staffs.
4. Add a feedback tab.

Appendices

- http://sunset.usc.edu/research/COCOMOII/expert_cocomo/drivers.html - cocomo scale drivers reference
- <https://www.altexsoft.com/blog/engineering/comparing-automated-testing-tools-selenium-testcomplete-ranorex-and-more/> - selenium cost reference
- <https://neilpatel.com/blog/how-to-increase-website-traffic-without-seo/>
- http://buy-static.norton.com/norton/ps/ad/pages/us/1up_nsbu_us_en_fluid_notw_brnf.html?om_sem_cid=hh_o_sem_sy:us:pla:en:l%7ckw0000492973%7c48028927396%7cc%7cgoogle%7c318255916%7c15425864236%7caud-452923453197:pla-437695511405&nortoncountry=US&pgrid=15425864236&ptaid=aud-452923453197:pla-437695511405&gclid=CjwKCAjw4LfkBRBDEiwAc2DSlGHKoigWOhtFUHoXq_ZKL0tpdMnC6a_YpbwNRT5sbzGFL8nORtMb6hoCKJEQAvD_BwE&gclsrc=aw.ds - security software reference
- https://www.lenovo.com/us/en/laptops/thinkpad/thinkpad-x/ThinkPad-X1-Carbon-6th-Gen/p/22TP2TXX16G?gclid=CjwKCAjw4LfkBRBDEiwAc2DSlKnMiBC9pgva0qUHhUaG317zKAVH-b3NEoCjpfzeN46RdUYQGGvIBoCkCYQAvD_BwE&cid=us:sem|se|google|304162709701|Lenovo_ThinkPad+X1+carbon|IIP_NX_Lenovo+Thinkpad+X1+Carbon_Similar+Audience|951617945&s_kwid=AL!4030!3!285420156141!e!!g!!lenovo%20thinkpad%20x1%20carbon%20price&kw=lenovo%20thinkpad%20x1%20carbon%20price&adid=285420156141&addistype=g&ef_id=CjwKCAjw4LfkBRBDEiwAc2DSlKnMiBC9pgva0qUHhUaG317zKAVH-b3NEoCjpfzeN46RdUYQGGvIBoCkCYQAvD_BwE:G:s&s_kwid=AL!4030!3!285420156141!e!!g!!lenovo%20thinkpad%20x1%20carbon%20price&kw=lenovo%20thinkpad%20x1%20carbon%20price&adid=285420156141&addistype=g - lenovo laptop price reference