IT-632-Software Engineering

Cafeteria Management System (Cashless Canteen)

Cost Estimation 1.0

Team-2

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Document Revision History

Version	Primary Author(s)	Description	Reviewer(s)	Date
1.0	Team #2	First Draft	Aakash Thakkar	25 October, 2013
1.1	Aakash Thakkar	Changes Updated	Accepted as it is	20 November, 2013

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Cost Estimation Document

Brief Description of the cost estimation method used:

Use case modeling is an accepted and prevalent technique to capture the business processes and requirements of a software application. Since they provide the functional scope of the application, analyzing their contents provides valuable insight into the effort and size needed to design and implement the application. In general, applications with large, complicated use cases take more effort to design and implement than small applications with less complicated use cases. Moreover, the time to complete the application is affected by:

- The number of steps to complete the use case.
- The number and complexity of the actors.
- The technical requirements of the use case such as concurrency, security and performance.
- Various environmental factors such as the development teams' experience and knowledge.

Use Case Points (UCP) is an estimation method that provides the ability to estimate an application's size and effort from its use cases.

The equation is composed of five variables:

1. Technical Complexity Factor (TCF).
2. Environment Complexity Factor (ECF).
3. Unadjusted Actor Weight (UAW).
4. Unadjusted Use Case Weight (UUCW).
5. Productivity Factor (PF).

Each variable is defined and computed separately, using perceived values and various constants. The complete equation is:

UCP = (UUCW + UAW) x TCF x ECF
UCP = UCP * PF

The necessary steps to generate the estimate based on the UCP method are:
1. Determine and compute the Technical Factors.
2. Determine and compute the Environmental Factors.
3. Compute the Unadjusted Use Case Points.
4. Determine the Productivity Factor.
5. Compute the product of the variables.

Unadjusted Use case Points (UUCP):

Unadjusted Use Case Weight (UUCW):

	Unadjusted Use Case Points	Multiplier	Number of Use Cases	Description
1	Simple	5	13	Simple Use Case - up to 3 transactions.
2	Average	10	5	Average Use Case - 4 to 7 transactions.
3	Complex	15	0	Complex Use Case - more than 7 transactions.
	Calculated UUCW		115	

UUCW = (Total No. of Simple Use Cases x 5) + (Total No. Average Use Case x 10) + (Total No.Complex Use Cases x 15)

	Individual Use Cases	Multiplier	Use Case Name
1	Simple	5	Login View Transaction log by User Check Balance by User Post feedback and complaint Disable the card View Canteen Menu Pay to canteen View the sales of all Canteen Check total deposit balance Edit user details View customer details Edit Menu View Transaction Log and balance by Canteen
2	Average	10	Place an order to canteen Transfer Balance to other account Sign up Recharge an account Take an Order by canteen
3	Complex	15	None

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Unadjusted Actor Weight (UAW):

	Actor Summary	Multiplier	Number of Actors	Description
1	Simple	1	2	Simple actors are other systems that communicate with your software through Application Programming Interface.
2	Average	2	1	Average actors can either be human beings interacting in a well-defined protocol.
3	Complex	3	3	The original definition of complex actors specifies that users who interact with the software through a graphical user interface are complex actors. While that is true, the same classification should apply to users who interact with the system in unpredictable ways.
	Calculated UAW		13	

UAW = (Total No. of Simple actors x 1) + (Total No. Average actors x 2) + (Total No. Complex actors x 3)

	Individual Actor	Multiplier	Actor Name
1	Simple	1	Database, RFID Reader
2	Average	2	Customer
3	Complex	3	Admin, CMC Members, Canteen Owners

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Technical Complexity Factor (TCF):

Description	Weight	Relevance (0-5)	Calculated Factor (Weight*Relevance)
Distributed System	2	2	4
Performance	1	2	2
End User Efficiency	1	2	2
Complex Internal Processing	1	3	3
Reusability	1	2	2
Easy to Install	0.5	2	1
Easy to Use	0.5	2	1
Portable	2	2	4
Easy to Change	1	2	2
Concurrent	1	1	1
Special Security features	1	2	2
Provides Direct access to third parties	1	2	2
Special user training facilities are required	1	2	2
Total Factor (TF)		28	

TCF = 0.6 + (TF/100) = 0.6 + 0.28 = 0.88

Environmental Complexity Factor (ECF)

Description	Weight	Past Experience (0-5)	Calculated Factor (Weight*Past Experience)
Familiarity with development process used	1.5	2	3
Application Experience	0.5	3	1.5
Object Oriented Experience	1	3	3
Lead analyst capability	0.5	3	1.5
Motivation	1	4	4
Stable Requirements	2	4	8
Part-time workers	-1	0	0
Difficult Programming language	-1	0	0
Total Factor (EF)		21	

ECF = 1.4 + (-0.03 x EF) = 1.4 – 0.63 = 0.77

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UCP = (UUCW + UAW) x TCF x ECF
= (115 + 13) * 0.88 * 0.77
= 86.73

Productivity Factor (PF)

It is the number of hours per Use Case Point (UCP).
The "complex projects" have a higher PF (28 to 1) than "simpler projects" (20 to 1).
The following calculation determines if a project is complex:
For each of the following environmental factors that have a value below 3, add a point.

1. Familiarity with the project.
2. Application experience.
3. Object oriented programming experience.
4. Lead analyst capability.
5. Motivation.
6. Stable requirements.

For each of the remaining environmental factors that have a value above 3, add a point.

7. Part time staff.
8. Difficult programming language.

Add up the points. If you have fewer than 3 points, use 20 hrs. per UCP. If you have 3 or 4 points, use 28 hrs. per UCP. If you have 5 or more points, restructure the project.

We have 2 points, suggesting our project to be simple.
So, PF = 20

Estimated Effort = **UCP x PF**
= **86.73 * 20**
= **1734.6**

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