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E-Commerce System Size using User Based Function Points

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Abstract

The accurate Size estimation of the logical product like software is a difficult task to the estimator. Now a days, many new unique featured and complex software are developing. To estimate the size of the software requires a unique and specialized approach. So the complex software like E-Commerce also required a new focused size estimation technique. ECSSIZE: E-Commerce System Size is a new technique to calculate the size of an E-Commerce software using User Based Function Points (UBFP).

Keywords: ECSSIZE (E-Commerce System Size), UBFP (User Based Function Points), E-Commerce (Electronic Commerce).

INTRODUCTION

Software Engineering is an experimental and logical technique for developing any software project. Size estimation of the software product is one of the concepts of Software Engineering. Line of Code (LOC), Constructive Cost Model (COCOMO), Agile (Story Points) and Function Points (FP) are the leading techniques for estimating the size of the software. From the size, we can easily calculate the cost and price of the software product.

Function Points :

Function Point method is independent of the language, tools, or methodologies used for implementation; i.e., they do not take into consideration of programming languages, database management systems, processing hardware, any other database technology or any platform. Function points can be expectable from requirement specifications or design specifications, thus creating it possible to guess development effort in premature phases of development. Function points are directly linked to the statement of requirements; any alter of requirements can simply be followed by a re-estimate. Function points are founded on the system user's external opinion of the system; non-technical users of the software system have a greater understanding of what function points are computing.

Limitations of Function Point [1-4] :

a) The correctness in function point calculation is very difficult for modern software like E-Commerce system. As on International Function Point Users Group (IFPUG) study, defects per function point are 4.5.

b) Complex algorithms and heavy calculations that are part of a transaction's processing logic are not separately considered as part of the functional sizing.

c) Functionality enabled/disabled through 'application configuration' type of work does not fetch additional size.

d) FP only considers interactions between the (external) user and the application. Interactions between various internal parts of the application are not considered by the FP model.

e) Repositioning of User Interface (UI) elements without adding/deleting/modifying any of them is not included in the sizing process.

f) If the same output is created in multiple formats or methods (e.g. MS-Excel and PDF), no additional size is calculated for the multiple formats (i.e., only one format is included for the size calculation).

E-COMMERCE

E-Commerce refers to the paperless exchange of business information using electronic data exchange, E-mail, electronic bulletin boards, electronic money transfer, World Wide Web, and other network based technologies.

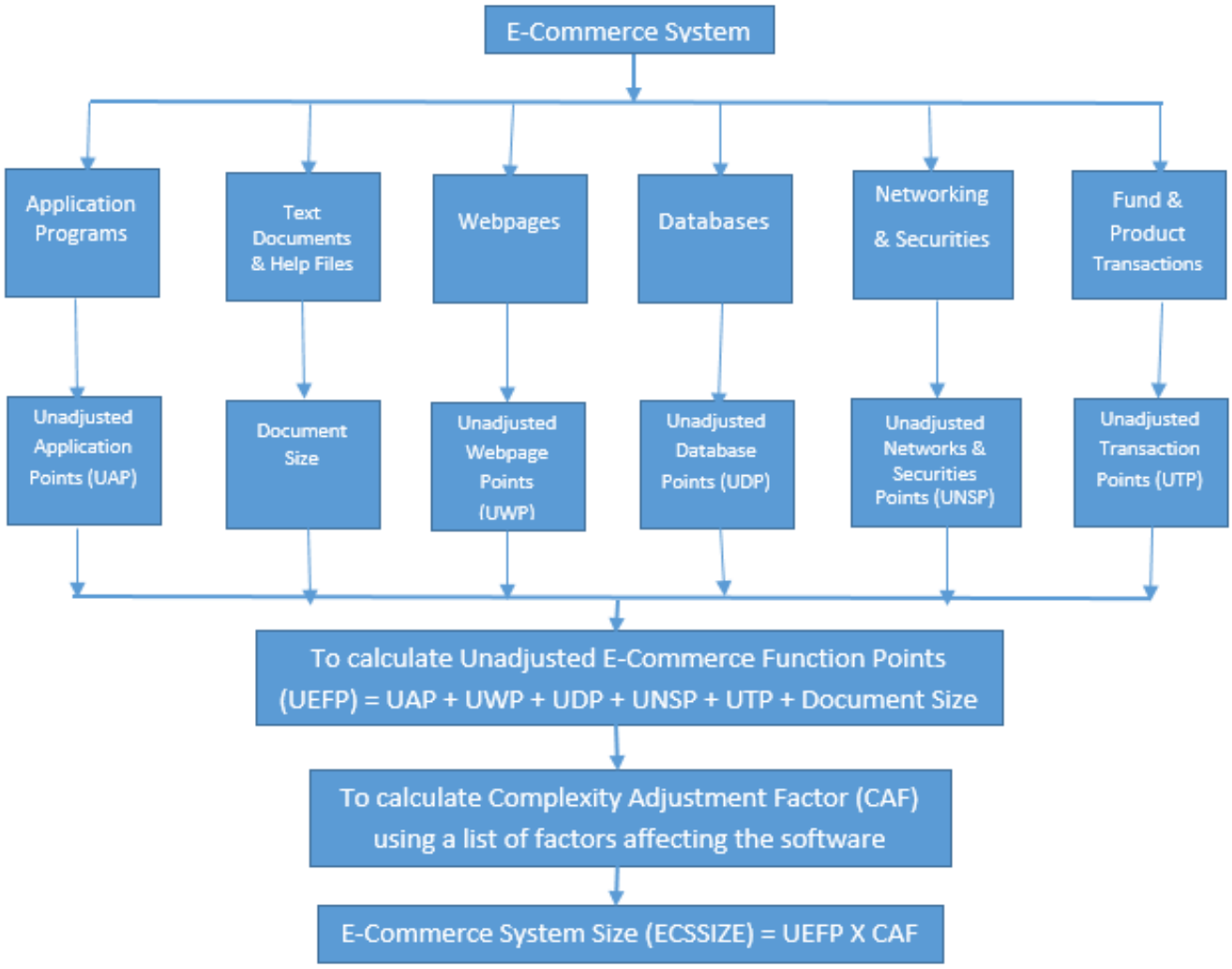

Figure i: ECSSIZE Architecture

ECSSIZE – E-Commerce System Size :

E-Commerce is a complex software structure includes Application Programs, Text Documents and help files, WebPages, Databases, Networking and Security Software and Fund and Product Transaction. So a single size estimation technique is not sufficient to estimate the size of the E-Commerce system accurately. So that, we need a specific and specialized technique to E-Commerce system for measuring the size. That is why, we are using a new technique ECSSIZE.

ECSSIZE System Architecture [1-39] :

The following Figure i shows the architecture of ECSSIZE.

New Functional Unit for E-Commerce System :

A new functional unit is required for counting internal inputs like the values of List box, combo box, Input from the database etc. It is named as Internal Inputs (II).

Functional Units for E-Commerce System :

The six functional units are present with the E-Commerce System

a) External Input (EI)

b) Internal Input (II)

c) External Output (EO)

d) External Inquiry (EQ)

e) Internal Logical Files (ILF)

f) External Interface Files (EIF)

Different function Point types of E-Commerce System :

The following table i list out all the function point types and its functional units of E-Commerce system.

Table i: E-Commerce Function Points

S.No	Application Type	Functional Type	Functional Unit
1	Application Programs	Application External Inputs (AEI)	EI
		Application Internal Inputs (AII)	II
		Application External Output (AEO)	EO
		Application External Inquiries (AEQ)	EQ
		Application Internal Logical Files (AILF)	ILF
		Application External Interface Files (AEIF)	EIF
2	Web Pages	Webpage External Inputs (WEI)	EI
		Webpage Internal Inputs (WII)	II
		Webpage External Outputs (WEO)	EO
		Webpage External Inquiries (WEQ)	EQ
		Webpage Multimedia System Files (WMSF)	II
		Webpage Multimedia Drivers (WMD)	ILF
		Webpage Navigation Points (WNP)	EIF
		Webpage Dynamic Points (WDP)	ILF
3	Database	Database External Input (DEI)	EI
		Database Internal Inputs (DII)	II
		Database External Outputs (DEO)	EO
		Database External Queries (DEQ)	EQ
		Database Size (DS)	II
		Database Keys (DK)	ILF
		Database Table Relationships (DTR)	ILF
		Database Remote Accessing (DRA)	EIF
4	Networking & Securities	Security User Names (SUN)	EI
		Security Passwords (SP)	EI
		Security Outputs (SO)	EO
		Security Algorithms (SA)	ILF
		Security Encryption Keys (SEK)	ILF
		Security Decryption Keys (SDK)	ILF
		Networking System Distribution (NSD)	EIF
5	Transactions	Commodity Information Inputs (CII)	EI
		Money Transaction Inputs (MTI)	EI
		Commodity Information Outputs (CIO)	EO
		Money Transaction Outputs (MTO)	EO
		Number of Banks Involved (NBI)	ILF
		Number of Logistic Units (NLU)	ILF
		Number of Insurance Agencies (NIA)	ILF
		Transaction Inquiries (TQ)	EQ
		External Agents Involved (EAI)	EIF
6	Documents	Document External Inputs (DEI)	EI
		Document External Inquiries (DEQ)	EQ

Counting Function Points :

The Six functional units are ranked according to their complexity i.e., Low, Average, High, or Very High using a set of prescriptive standards.

Table ii: Functional units with weighting factors

Functional Units		Weighting factors			
		Low	Average	High	Very High
Inputs	External(EI)	3	4	6	10
	Internal(II)				
External Output (EO)		4	5	7	11
External Inquiries (EQ)		3	4	6	10
Internal Logical Files (ILF)		7	10	15	20
External Interface Files (EIF)		5	7	10	15

Count Data Functions :

The values of the metrics of Internal and External Input (II & EI), External Output (EO) and External Inquiries (EQ) are calculated by the following reference.

Internal Input (II) :

Table iii: II weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -4	**5-15**	**16-25**	**>=26**
0-1	Low	Low	Average	High
2	Low	Average	High	Very High
>=3	Average	High	High	Very High

External Input (EI):

Table iv: EI weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -10	**11-25**	**26-50**	**>=51**
0-1	Low	Low	Average	High
2	Low	Average	High	Very High
>=3	Average	High	High	Very High

Count Transactional Function :

The values of the metrics of Internal and External Input (II & EI), External Output (EO) and External Inquiries (EQ) are calculated by the following reference.

External Quarries (EQ) :

Table v: EQ weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -5	**6-19**	**20-30**	**>=31**
1	Low	Low	Average	High
2-3	Low	Average	High	Very High
>=4	Average	High	High	Very High

External Outputs (EO) :

Table vi: EO weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -5	**6-19**	**20-40**	**>=41**
1	Low	Low	Average	High
2-3	Low	Average	High	Very High
>=4	Average	High	High	Very High

Internal Logical File (ILF):

Table vii: ILF weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -10	**11-25**	**26-50**	**>=51**
1	Low	Low	Average	High
2-5	Low	Average	High	Very High
>=6	Average	High	High	Very High

External Interface File (EIF) :

Table viii: ELF weightage

Average Functional Reference (AFR)	Functional Element (FE)			
	1 -10	**11-20**	**21-40**	**>=41**
1	Low	Low	Average	High
2-5	Low	Average	High	Very High
>=6	Average	High	High	Very High

Unadjusted E-Commerce Function Points (UEFP) :

UEFP = the sum of the product of Average Functional References (AFR) and Weightage of the Function Points. The UEFP is calculated using following Table ix.

Table ix: UEFP

S.No	**Functional Type**	**Average Functional References (AFR)**	**Average Individual Function Points (AFP)**	**Weighting Factor**	**Weightage (W)**	**UEFP (AFR * W)**
1	EI					
2	II					
3	EO					
4	EQ					
5	ILF					
6	EIF					
Total UEFP						

Average Functional Reference (AFR) = Total Functional Reference/6.

Average Individual Function Points (AFP) = Total Individual Function Points/

Total Functional Reference.

Functional References: Number of files referred in each functional type.

Individual Function Point: The sum of particular function point in each type of application in the E-Commerce system.

Functional Element: Number of Functional Units in a Functional Reference.

Calculate E-Commerce System Size (ECSSIZE) :

The ECSSIZE count is obtained using the following relationship

ECSSIZE = UEFP * CAF

Where CAF is complexity adjustment factor and is equal to

[0.65 + 0.01 * Fi]

The Fi (i= 1 to 14) are the degrees of influence and are based on responses to questions noted in Table x.

Table x: CAF

S. No	Factors	Scale of Factors						
		Nil (0)	Secondary (1)	Moderate (2)	Average (3)	Important (4)	Essential (5)	Value
1	Does the system need unfailing backup and resurgence?							
2	Is data communication necessary?							
3	Are there distributed processing jobs?							
4	Is act dangerous?							
5	Will the system work in an existing greatly utilized operational milieu?							
6	Does the system need on line data entry?							
7	Does the on line data entry needs the input operation to be built over many screens or operations?							
8	Is the original file updated on line?							
9	Is the inputs, outputs, files, or inquiries multifaceted?							
10	Is the internal processing multifaceted?							
11	Is the code designed to be reusable?							
12	Are change and installation included in the plan?							
13	Is the system designed for many installations in diverse organizations?							
14	Is the application designed to ease change and ease of use by the user?							
Total								

EXPECTING SIZE OF A SOFTWARE PROJECT

Table xi: Expecting Software size

S.No	Type of Software	ECSIZE
1	Micro and Mini Projects (around 500 MB)	<= 500
2	Medium size Application Projects (around 3 GB)	>500 & <= 2000
3	Large size Application Projects (around 10 GB)	>2000 & <= 4500
4	Very Large size Application Projects (above 10 GB)	>4500

CONCLUSION

E-Commerce system is a web based secured analytical application software. It is a combination of web pages, data base management systems, application programs, high level security software and online financial and commodity transactions and tracking. That is why; E-Commerce system is a versatile one, so any single method or the existing metrics and measures won't give the actual software size.

But the function point based estimation technique is independent of the language, tools, or methodologies used for implementation; i.e., they do not take into consideration programming languages, database management systems, processing hardware or any other database technology. So some updating with the existing metrics and measures of the function point will give actual size of the E-Commerce system.

REFERENCE

[1] Capers Jones, "High Efficiency Defect Removal for Software Projects", IFPUG Metric views February 2016, Vol-10, Issue-1, Pg: 5-8.

[2] Amit Javedekar, "SNAP: Going beyond Sizing non Functional Requirements", IFPUG Metric views August 2015, Vol-9, Issue-2, Pg: 16-18.

[3] Luís M. Alves, Sérgio Oliveira, Pedro Ribeiro, Ricardo J. Machado "An Empirical Study on the Estimation of Size and Complexity of Software Applications with Function Points Analysis" 2014 14th International Conference on Computational Science and Its Applications, IEEE, Pg: 27 – 34.

[4] Sushmitha Anantha, Amolkumar Keote, "Aligning Productivity Measurement with Agile Delivery", IFPUG Metric views January 2015, Vol-9, Issue-1, Pg: 4-6.

[5] Noureldin A.Z Adem, Zarinah M. Kasirun, "Automating Function Points Analysis Based on Functional and non-Functional Requirements Text", 978-1-4244-5586-7/10/$26.00 C 2010 IEEE, Pg: 664-668.

[6] Juan J. Cuadrado-Gallego, Pablo Rodríguez-Soria, Saahil Hakimuddin, "Early functional size estimation with IFPUG unit modified", 9th IEEE/ACIS International Conference on Computer and Information Science, IEEE, 2010, Pg: 729-733.

[7] Erika Corona, Michele Marchesi, Giulio Barabino, Daniele Grechi, Laura Piccinno, "Size Estimation of Web Applications through Web CMF Object", 978-1-4673-1762-7/12/$31.0, 2012 IEEE, Pg: 14-20.

[8] Edilson J. D. Cândido, Rosely Sanches, "Estimating the size of web applications by using a simplified function point method", 0-7695-2237-8/04 $20.00 © 2004 IEEE.

[9] John T Mesia Dhas, Dr. C.R. Bharathi, "Relative Analysis of Sizing Methods in the Sense of E-Commerce System", IJAER, Nov-2015, Volume-10, Number-18, Pg: 39808-39816.

[10] John T Mesia Dhas, Dr. C.R. Bharathi, "Risks Associated to Size Estimation of E-Commerce System using Function Point based Estimation Techniques", IndJST, Feb-2016, Vol- 9(7), Pg: 1-6.

[11] Richard D. Stutzke, "Estimating Software – Intensive systems", Addison Wesley, 2005.

[12] Kamlesh K Bajaj, Debjani Nag, "E- Commerce", 2nd Edition, TaTaMcGrawHill 2009.

[13] Capers Jones, "Applied Software Measurement-Global Analysis of Productivity and Quality",Tata McGraw Hill, Third Edition,2008, pg 71-182.

[14] Richard D. Stutzke, "Estimating Software-Intensive Systems: Projects, Products and processes",SEI Series in Software Engineering, Addison Wesley Edition,2005, pg 1-786.

[15] Capers Jones, "Estimating Software Costs: Bringing Realism to Estimating", Tata McGraw Hill, Second Edition,2007, pg 3-629.

[16] Capers Jones, "Software Engineering Best Practices: Lessons from Successful projects in the top companies", Tata McGraw Hill Edition,2010, pg 1-643

[17] Robert T. Futrell, Donald F. Shafer, Linda I. Shafer, "Quality software project management", Pearson Education, 2008, pg 1-600

[18] Mehwish Nasir, H. Farooq Ahmad, "An Empirical Study to Investigate Software Estimation Trend in Organizations Targeting CMMISM", Proceedings of the 5th IEEE/ACIS International Conference on Computer and Information Science and 1st IEEE/ACIS International Workshop on Component-Based Software Engineering, Software Architecture and Reuse (ICIS-COMSAR'06), IEEE, 2006.

[19] Kenneth Lind, Rogardt Heldal, "Estimation of Real-Time Software Code Size using COSMIC FSM", IEEE International Symposium on Object/Component/Service-Oriented Real-Time Distributed Computing, 2009, pg 244-248

[20] Mahir Kaya, Onur Demirörs, "E-Cosmic: A Business Process Model Based Functional Size Estimation Approach", 37th EUROMICRO Conference on Software Engineering and Advanced Applications, IEEE, 2011, pg 404-408.

[21] Ursula Passing, Martin Shepperd, "An experiment on software project size and effort estimation", International Symposium on Empirical Software Engineering (ISESE'03), IEEE, 2003

[22] Daniel V. Ferens, "Softwafe Size Estimation Techniques", Air Force Institute of Technology (AFIT/ISY) , Wriqht-Patterson AEB, Ohio 45433, pg 701-706

[23] Kjetil Moløkken , Magne Jørgensen, "A Review of Surveys on Software Effort Estimation", International Symposium on Empirical Software Engineering (ISESE'03), IEEE, 2003

[24] Z. Zia, A. Rashid, K. uz Zaman, "Software cost estimation for component based fourth-generation-language", IET Software, 2010,pg 103-110

[25] Md. Forhad Rabbi,Shailendra Natraj , Olorisade Babatunde Kazeem, "Evaluation Of Convertibility Issues Between IFPUG And COSMIC Function Points", Fourth International Conference on Software Engineering Advances, IEEE, 2009, pp 277-281

[26] Noureldin A.Z Adem , Zarinah M. Kasirun ,"Automating Function Points Analysis Based on Functional and non-Functional Requirements Text", IEEE, 2010, pp 664-669

[27] A. Ferchichi , J.P. Bourey , M. Bigand, M. Barron ,"Design Systems Engineering Of Software Products: Implementation Of A Software Estimation Model" IMACS Multi conference on "Computational Engineering in Systems Applications"(CESA), October 4-6, 2006, Beijing, China, pp1181-1188.

[28] Juan J. Cuadrado-Gallego, Pablo Rodríguez-Soria, Saahil Hakimuddin, "Early functional size estimation with IFPUG unit modified", 9th IEEE/ACIS International Conference on Computer and Information Science, IEEE, 2010

[29] June Verner and Graham Tate, "A Software Size Model", IEEE Transactions on Software Engineering, VOL. 18, NO. 4, APRIL 1, 1992, pp 265-278

[30] Linda M. Laird, "The Limitations of Estimation", IT Pro November | December 2006 Publ i s h ed by t h e IEEE Compu t e r So c i e t y IEEE, 2006, pp 40 – 45

[31] Steven Fraser, Barry Boehm, Hakan Erdogmus, Magne Jørgensen, Stan Rifkin, Mike Ross,"The Role of Judgment in Software Estimation", ICSE'09, Vancouver, Canada, 2009 IEEE,pp 13-17.

[32] Rodrigo C. Barros, Duncan D. Ruiz,Nelson N. Tenório Jr., Márcio P. Basgalupp,"Issues on Estimating Software Metrics in a Large Software Operation", 32nd Annual IEEE Software Engineering Workshop, IEEE, 2009, pp 152-159

[33] Cigdem Gencel, Rogardt Heldal, Kenneth Lind, "On the Relationship between Different Size Measures in the Software Life Cycle", 2009 16th Asia-Pacific Software Engineering Conference, IEEE, 2009, pp 19-26

[34] Iman Attarzadeh, Siew Hock Ow,"Proposing a New High Performance Model for Software Cost Estimation", Second International Conference on Computer and Electrical Engineering, IEEE, 2009 pp 112-116

[35] Gustavo Bestetti Ibarra, Patrícia Vilain, "Software Estimation Based on Use Case Size", Brazilian Symposium on Software Engineering, IEEE,2011, pp178 -187

[36] Erika Corona, Michele Marchesi, Giulio Barabino, Daniele Grechi, Laura Piccinno, "Size Estimation of Web Applications through Web CMF Object", IEEE 2012,14-20.

[37] Boehm, Barry W. "Software Engineering Economics", Tutorial, Software Management:Third Edition, Washington, DC, IEEE Computer Society Press: 1986, p. 148

[38] Boehm, Barry W. "Software EngineeringEconomics",Englewood Cliffs, NJ,Prentice Hall, 1981

[39] L. H. Putnam, "A General Empirical Solution to the Macro Software Sizing and Estimating Problem," IEEE Transactions on Software Engineering, 1978, pp. 345-361.