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Real Time SW Sizing Model for FP-Based Fintech Software Development Project

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FP 기반의 핀테크 소프트웨어 개발 프로젝트 실시간 규모 산정 모델

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Abstract Estimation on SW Sizing applied to fintech is very difficult, a task requiring long time, it is difficult for client companies and developer companies to accurately calculate the size of software development. The size is generally estimated based on the experience of project managers and the general functional scoring method. In this paper, propose a model that can be applied to fintech development projects by quantitatively calculating the required functions from the user's point of view, measuring the scale, and calculating the scale in real time. Through the proposed model, the amount of work can be estimated prior to development and the size can be measured, and the M/M and the estimated quotation amount can be calculated based on the program list by each layer. In future studies, by securing size computation data on existing the Fintech Project in mass, research on accurate size computation would be required.

Key Words : Convergence, Fintech Project, Real Time Function Point, Framework, SW Sizing

요 약 핀테크에 적용되는 소프트웨어의 규모 추정은 매우 난해하며, 오랜 시간이 소요되는 작업이기에 발주 기업과 개발 업체들이 정확하게 소프트웨어 개발 규모를 산정하기 어려운 상황이다. 일반적으로 프로젝트 관리자들의 경험과, 일반적인 기능 점수 방식에 의하여 규모를 추정하고 있다. 본 논문에서는 기능 점수 모형을 사용자 관점에서 요구 기능들을 정량적으로 산정하고, 규모를 측정하여, 실시간으로 규모를 산정하여 핀테크 개발 프로젝트에 적용할 수 있는 모델을 제안한다. 제안 모델을 통하여 개발 전에 업무량을 예상하여 규모를 측정할 수 있으며, 레이어 별 프로그램 목록을 기준으로 M/M 및 견적 금액을 산출할 수 있다. 향후 연구에서는 기존 핀테크 프로젝트의 규모 산정 데이터를 다량 확보하여 정확한 규모 산정에 대한 연구가 필요하다.

주제어 : 융합, 핀테크 프로젝트, 실시간 기능점수, 프레임워크, 소프트웨어 규모 산정

1. Introduction

Recently, the new technological term, FinTech(Financial Technology), has appeared, meaning the company that combines innovative, modern technology with financial services[1,2]. This points to financial technology sector within the extensive operation areas of corporates and organizations, mainly using applications based on information technology,

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and is regarded as the classification system to achieve improvement in corporates' service quality[3]. Also, corporates are developing technologies required for FinTech development in various areas such as mobile network, data analysis for the purpose of sustained growth[4,5]. A study that explores industries where fintech technology can be applied through network analysis and topic modeling approaches[6], in order to suggest the direction of the development of the domestic fintech industry, various studies are being conducted, such as a study that analyzes the current state of the domestic fintech industry and can set the development direction through this[7].

That are developing abruptly due to the need for cost reduction, expectations on the market for business innovation, and the thrust including customers' demands. Also, FinTech company in the situation where customers are induced through transparent and efficient management with products and services further automated than in those currently in use[1].

While in the situation to proceed software development by application of compound technologies within diverse areas due to brisk development of information technology, corporates are much agonizing on the properness and feasibility of development cost.

Especially as application programs use mutually different tools and technology as well as diverse programming languages, computation of software size is acknowledged as the very important activity, and software is very important in controlling and deciding cost, quality, schedule, productivity[8]. Also, the most important activity in software development process is software size computation as one of the decision factors of project success[9]. Generally, computation of project cost etc. requires much time, and costs are mostly estimated based on the experience of developers.

Therefore, for the sake of estimating the size of the software applicable to fintech, the system capable of quick cost estimation is needed urgently. In this thesis, the rFP (Real-time Function Point) as real time size computation model that can be applicable to fintech software project based on the functional scoring model presented by IFPUG (International Function Point Users Group) for systemic and rational software size computation, is proposed. The proposed model, from the functional scoring model, computes required function quantitatively and measures size to derive project set-up cost from user's perspectives, and classifies programs list by layer, so that M/M (Man/Month) and software size can be computed in real time. Through the proposed model, quick software size computation is possible and is expected to contribute to decision making for enterprise management.

2. Related Works

2.1 Software Cost Estimation

For sustained growth, most corporates rely much on software development that grafting IT to core areas, but estimation of development cost is a very difficult issue. Software development cost shall be estimated in consideration of schedule, quality, efficiency[10] as shown in Fig. 1.

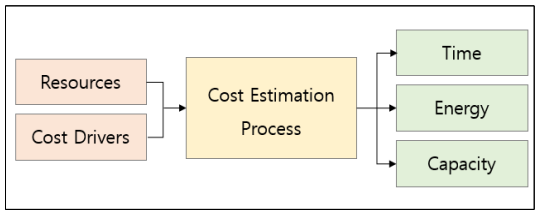

Fig. 1. Process of Cost Estimation

Generally, for software estimation, management is an important element, with cost estimation demanding basic issues such as resource, analysis, design, plan, coding, test[11]. Estimation of software development cost is a very important activity to which all proper technologies and methods shall be applied and affects the accuracy of software development greatly. Hence, the role of project management shall be regarded as the important point. Recently, research is under progress on effective cost estimation reflecting the need for high quality software[12,13]. Especially cost estimation of software development project is regarded as the activity that is continued from proposal stage, and software cost estimation method comprises diverse methods such as COCOMO model[14], Putnam's SLIM method[15], Function Point Analysis etc.

2.2 Function Point Analysis

While COCOMO and Putnam model requires the source code line to be estimated, in order to obtain the period estimate and MM(Man/Month), the Function Point is the method whereby the complexity and size of the system can be quantified and used from the various functional aspects that the system to be developed would be able to provide to users and contains the adjustment for treatment of complexity as well as various functional computation stages by users. Also, the Function Point is the method for better understanding and analysis of the system by dividing the project into small component elements[16]. By Function Point method, when trying to estimate software size, costs are efforts for software development are estimated by approaching with focus on complexity and function[17]. Function Point procedure comprises sending and receiving data to be processed by the system and has diverse transaction such as EI (External Input), EO (External Output), EQ (External Inquiries), ILF (Internal Logical Files), EIF (External Interface Files)[17]. This Function Point is well received and in use by key persons and the academy[18].

3. Proposed System

3.1 Proposed Model Structure

The following Fig. 2 shows the real time size computation process as the proposed model. First is the measurement method based on requirements from users' perspectives. Secondly, workload can be expected and measured before development. Thirdly, M/M and quotation amount can be computed with programs list by layer as the standard. Fourth, overall process from plan to operation is measured. Fifth, in case of already developed program, reuse can be applied for measurement. Sixth, the quotation amount warranting transparency is computed applying the unit labor costs for software technician announced annually by Korea Software Industry Association. Lastly, the architecture by area is computed based on the participation period by experts.

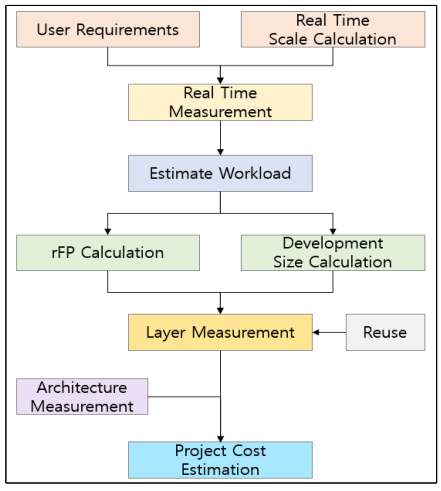

Fig. 2. Real Time Size Computation Process

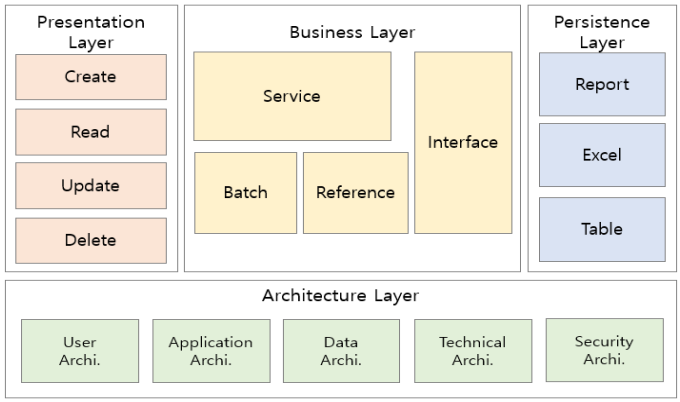

Fig. 3. rFP Framework

The following Fig. 3 shows the framework composed by layer for real time size computation, categorized into Presentation Layer from user perspectives, Business Layer in charge of service processing on size computation, and the Persistence Layer to process reporting and output. Also, the Architecture Layer for size computation of underlying technology is included. By the number of programs functions and FP formula, computation of FP and M/M is possible in real time. Presentation Layer is the layer that informs the result of input, correction, deletion, and reference from user's perspectives. Business Layer is the part to process business logic and divided into the service as the core of fintech technology focused on work processing, batch occurring periodically or repeatedly for batch processing, reference as the program used in reference for work processing, and the interface domain for connection to database or external treatment. Persistence Layer is the area managing the result continuously with report, excel, table classified for management. Architecture layer is the area of the base technology for the system, comprising architecture from users' perspectives (UA: User Architecture), architecture from application program aspect (AA: Application Architecture), architecture from data aspect(DA: Data Architecture), architecture from technology or infrastructure aspect (Technical Architecture), and architecture from security aspect (Security Architecture).

3.2 Real-time Calculation of Software Size

The following Fig. 4 shows the computation formula by area to compute software project size in real time. Classification system is composed of UI (Screen UI), SV(Service), PT(Report/ETC), AC(Architecture), for management based on peculiar Case ID. The following (formula 1) shows computation of real time rFP by each functional scoring.

$$rFP = (\text{if } FcT)\ CaseNum \times FPv \times WB \times WO \qquad (1)$$

This formula is based on the number of program functions that were input to compute size by classification category or as the development period. are types of function, classified as which is each FP computed per hour, indicating daily labor hours, as the number of average workdays per month, computed by function type, and also and as the weight granted to FP computed by function type, respectively. After real time size computation of rFP, M/M is computed as the following (Formula 2).

INDEX : UI(Screen), SV(Service), PT(Report/ETC), AC(Architecture)

No.	Index	Case ID	Case Name	Function Type	1FP (hour)	1Day (hour)	Working Days	FP Value	Weight		Calculation System	Remark
									Basic	Option		
1	UI	H	Handling	EI	5	8	21.3	4.3	1.1	0.8~1.0	Number of programs	
2		C	Create	EI	5	8	21.3	4.3	1.1	0.8~1.0	Number of programs	
3		U	Update	EI	5	8	21.3	4.3	1.1	0.8~1.0	Number of programs	
4		D	Delete	EI	5	8	21.3	4.3	1.0	0.8~1.0	Number of programs	
5		R	Read	EQ	5	8	21.3	3.4	0.9	0.8~1.0	Number of programs	
6	SV	S	Service	EI	5	8	21.3	4.3	1.1	0.8~1.0	Number of programs	
7		B	Batch	EO	5	8	21.3	5.8	1.1	0.8~1.0	Number of programs	
8		IF	Interface	EO	5	8	21.3	5.8	1.1	0.8~1.0	Number of programs	
9	PT	RP	Report	EO	5	8	21.3	5.8	0.9	0.8~1.0	Number of programs	
10		X	Excel	EQ	5	8	21.3	3.4	0.9	0.8~1.0	Number of programs	
11		T	Table	EQ	5	8	21.3	3.4	0.9	0.8~1.0	Number of programs	
12		E	ETC	EI	5	8	21.3	4.3	1.0	0.8~1.0	Number of programs	
13	AC	UA	User Architecture	EOX	5	8	21.3	8.7	0.9	0.9~1.0	Calculated by period	
14		AA	Application Architecture	EOX	5	8	21.3	8.7	1.1	1.1~1.2	Calculated by period	
15		DA	Data Architecture	EOX	5	8	21.3	8.7	0.9	1.1~1.2	Calculated by period	
16		TA	Technical Architecture	EOX	5	8	21.3	8.7	0.9	1.1~1.2	Calculated by period	
17		SA	Security Architecture	EOX	5	8	21.3	8.7	1.0	1.1~1.2	Calculated by period	

Fig. 4. Real-time Standard Computation Table

$$M/M = (rFP \times oFP) / (oDY \times wDY) \quad (2)$$

By (Formula 1) and (Formula 2) above, computation of rFP by each layer is possible. Through these, management is possible by predicting system size and deriving required M/M based on the rFP computed from earlier proposal stage.

3.3 Application of Size Computation Model

For application of size computation model, already established 5 fintech technology projects were selected in consideration of level of connected complexity, level of required function, connectivity of multiple interfaces, security level was considered. The following Table 1 shows the result of size prediction computation, real time rFP result based on respective IA of selected fintech technology project. After computing rFP by characteristics of each service derived from [Table 1] above, each M/M is computed and summed up to predict M/M.

Table 1. Size Prediction Computation Result

Division	rFP				Prediction M/M
	Remittance	Payment	Internet Banking	Asset Management	
V Fintech	1,082.69	898.59	1,084.49	809.10	219.80
W Fintech	1,103.83	925.88	1,122.75	837.27	225.00
X Fintech	1,106.93	987.34	1,129.24	928.12	234.40
Y Fintech	1,152.83	1,001.53	1,223.84	984.88	246.80
Z Fintech	1,228.68	1,034.64	1,370.32	1,003.80	263.40

4. Results and Discussion

4.1 Real time rFP realized

The following [Fig. 5] realized the model for real time size computation. In case of UI Handling, Service, Batch, Interface, Report, Excel, Table, Reference, by input on the number of functions by program type functional scoring and development size can be confirmed in real time through computation formula for size computation. Also, by ticking to elect reuse at the realization model, development size can be re-computed in real time. In case of architecture area, by inputting project period, functional scoring and development size are processed by internal computation method. Real time size computation model basically performs computation from perspectives of data area and transaction area, respectively. But in this thesis, size computation formula enables real time size computation by separating the system by layer based on external input in transaction area (EI), external output (EO), external reference (EQ).

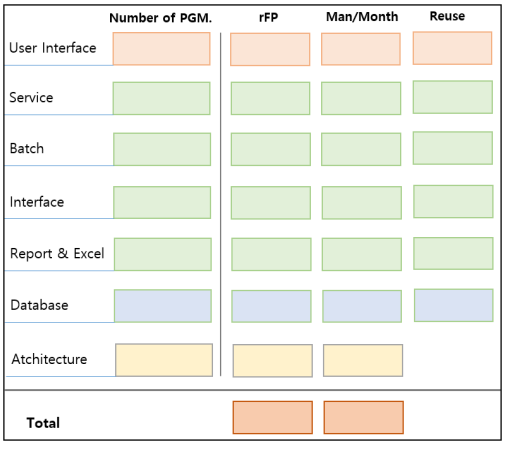

Fig. 5. Real Time rFP Realization Model

Especially, realization model was composed by compartmentalizing into screen, service, arrangement, report and Excel, database, architecture in consideration of connected complexity level, required function level, multiple interface connectivity, security level of applications. Lastly, size computation can be implemented through the total summed up from classification categories. The proposed model has mainly the following 7 functions.

Firstly, screen classification system is classified into input, correction, deletion into external input (EI), reference into external reference (EQ), so that inputting number of screens provokes automatic computation of FP and M/M, to be shown on the screen.

Secondly, by inputting the number of functions of service programs by type to be processed at server, service classification system classifies as external input (EI) and automatically compute FP and M/M.

Thirdly, batch classification system is classified as external output (EO) and computes FP and M/M of the batch programs that performs various summation and statistical work processing.

Fourth, interface classification system is classified as external output (EO) and by inputting the number of internal and external interface modules FP and M/M are automatically computed. Especially interface size was computed reflecting the complexity and the level of influence when realizing this model.

Fifth, report and Excel classification system are classified as external output (EO), and the quantity output in various kinds of reports or Excel is input on the screen.

Sixth, database classification system is classified by external reference (EQ) and, by inputting the number of tables used in the proposed model, can automatically computes FP and M/M.The database classification system can implement more accurate computation if input includes not only table but also various

scripts in order to process the work.

Seventh, architecture classification system is categorized into User Architecture, Application Architecture, Data Architecture, Technical Architecture, Security Architecture.

In this architecture field, by inputting development period for setting up relevant system on monthly basis rather than the number of programs functions such as program or module, FP and M/M can be computed from real time size computation standard table inside. Also, in case of setting up system for maintenance, by checking reuse, computation of M/M size can be adjusted by applying reuse ratio. As such, by inputting number of program functions or development period in the form suitable to each classification system, total sum of overall FP and M/M is available.

4.2 Evaluation Results

For system assessment on the proposed model, a questionnaire survey was implemented for the purpose of identifying any need for supplements or requirements in 30 days' period of use for the system service to fintech related project participants, managers, and developers. Through this survey, service assessment on the proposed model was implemented.

The following Table 2 is the general summary of service assessment from the questionnaire survey.

Table 2. General Matters in Service Assessment

Category	Contents
Survey Method	Questionnaire survey to parties related to the Fintech Project
Test Period	Apr 1, 2021 ~ Apr 30, 2021
Age of the Respondents to the Survey	20s ~ 40s
Respondents to the Survey	The Fintech Project's participants, managers, and developers

The questionnaire survey was implemented on 50 subjects to assess functional scoring based real time size computation model of the Fintech Project as the proposed model. For operational assessment, questionnaire items were classified as user satisfaction level, system efficiency and effectiveness, and operation results were checked through detailed assessment items.

The following [Table 3] shows the results of the survey. From the questionnaire survey result, opinions of 'Nomal', 'Good', 'Very good' occupy 85.5%, which is above expectations. These related parties participating in the Fintech Project were in good understanding of the system for real time size computation, and they generally opined that use of the proposed model is easy. Also, respondents replied that use of the proposed model resolved the burden of long duration usually required for size computation of complicated the Fintech Project and was much helpful to quotation work. As the required supplement in the future, the opinions were derived that mass acquisition of the Fintech Project size computation data is required.

Table 3. Questionnaire Survey Result

Category	User Satisfaction	System Efficiency	System Effectiveness
Very Unsatisfied	1	2	2
Unsatisfied	3	2	3
Normal	3	2	4
Good	15	21	17
Very Good	28	23	24

5. Conclusion

While abrupt, diverse developments are under progress in software, hardware's, base technologies applied to fusion compound

technologies within numerous areas according to most recent trends in information telecommunication technologies, enterprise are agonizing on the technical properness and feasibility of development cost. In this thesis, the real time size computation model which is applicable to fintech software project based on functional scoring model presented by IFPUG(International Function Point Users Group) for the purpose of systemic and rational computation of software size, is proposed. The proposed model is the realization of real time rFP by separating the system by layer based on transaction area, as the method to compute the project costs by quantifying required function of and measuring the size of functional scoring model from users' perspectives. By classification of programs list by layer real time, M/M and software size can be computed. Based on the proposed model, the system was offered to the parties related to the fintech project, and a questionnaire survey was implemented to assess satisfaction level on use on the service. According to the survey result, not less than 85.3% opined as 'Good' and hence the result was assessed as higher than expectations. As prompt project size computation is possible through use of real time rFP system as the proposed model, the model is anticipated to contribute much for quotation work on software development project. In subsequent studies, mass data on size computation from fintech software development projects already completed shall be secured, so that further research on accurate size computation shall be continued in application thereof.

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