Experiment Report: Cost Estimation of Software Project

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Experiment Name: Experiment-2

1. Introduction

This experiment aimed to understand the principles of software project size measurement using the Function Point (FP) method and to master the measurement process. The experiment was designed to provide hands-on experience with the FP method, specifically the IFPUG and NESMA approaches, to estimate the size of a software project and subsequently estimate the software cost.

2. Experimental Objectives

- To comprehend the principles of the function point method for software project size measurement.
- To master the measurement process of the function point method.
- To apply the FP method to estimate the size of a course project and verify the results using different FP analysis methods.

3. Experimental Principles

Software size measurement is fundamental to software engineering management, cost estimation, and economic evaluation. The FP method measures software size from the perspective of the software system's functional characteristics. The mainstream FP analysis methods include IFPUG, NESMA, GB/T 36964, COSMIC, and MARK II, with IFPUG or NESMA methods holding over 90% of the market share.

4. Experimental Steps

4.1 Determine the Engineering Type of Software System

The FP measurement can cover the entire software life cycle, from requirements to maintenance. The project types for FP measurement include new development, enhancement (development), and application FP measurement.

4.2 Identify and Determine Software System Boundaries and Scope

Correctly estimating the size of the software system being measured hinges on accurate boundary delineation and determination.

4.3 Function Point Analysis

The FP analysis divides the functional requirements into data functional requirements and transaction functional requirements.

4.4 Measurement Data Function Points and Transaction Function Points

- **Data Type Function Points**: ILF and EIF.
- **Function Points of Human-Computer Interaction Type (Transaction)**: EI, EO, and EQ.

4.5 Calculating Unadjusted Function Points

Using the IFPUG method, calculate the UFP of the software system.

4.6 Calculate Adjusted Function Points

Adjust the UFP using 14 general system characteristic factors to reflect the impact of non-functional factors on the software project workload.

5. Experimental Results

5.1 ILF (Internal Logical File) Analysis

ILF Name	Description (Table Name)	DETs Count	RETs Count	Complexity	UFP
ILF1: Customer_Info	customer table, stores customer basic information	4	1	Low	7
ILF2: Admin_Info	admin table, stores administrator information	4	1	Low	7
ILF3: Trading_Account_Info	trading_account table, stores trading account information	6	1	Low	7
ILF4: Bankcard_Info	bankcard table, stores customer bank card information	5	1	Low	7
ILF5: Product_Info	product table, stores fund product information	5	1	Low	7
ILF6: NetValue_Info	net_value table, stores fund net value history	3	1	Low	7
ILF7: System_Status_Info	our_system table, stores system status and date	3	1	Low	7
ILF8: Subscription_Records	subscription table, stores subscription records	5	1	Low	7
ILF9: Redemption_Records	redemption table, stores redemption records	6	1	Low	7
ILF10: Holding_Info	holding table, stores customer holding information	6	1	Low	7
ILF11: Transaction_Log	transaction table, stores all transaction records	9	1	Low	7
ILF12: Recommendation_Log	recommendation_log table, stores recommendation logs	5	1	Low	7
ILF13: Chatbot_Query_Log	chatbot_query table, stores customer service query logs	5	1	Low	7
ILF14: Knowledge_Base	knowledge_base table, stores intelligent customer service knowledge base entries	7	1	Low	7
ILF Subtotal					**98**

5.2 EIF (External Interface File) Analysis

Table 2: WiseInvest Project EIF List and Function Point Count

EIF Name	Description	DETs Count	RETs Count	Complexity	UFP
EIF1: Data_Center_Market_Data	Market data such as daily fund net values from data center	4	1	Low	5
EIF Subtotal					**5**

5.3 Transaction Function Analysis

Table 3: WiseInvest Project Transactional Function List and Function Point Count

Function Name	Type	Description	DETs Count	FTRs Count	Complexity	UFP
EI1: Create Customer Account	EI	User creates customer account and trading account	10	3	High	6
EI2: Update Customer Risk Assessment	EI	User updates risk assessment level	2	1	Low	3
EI3: Manage Bankcard	EI	User adds/deletes/modifies bank card information	5	2	Average	4
EI4: User/Admin Login	EI	User or administrator login verification	3	1	Low	3
EI5: Update Password	EI	User updates login password	4	1	Low	3
EI6: Add Product	EI	Administrator adds fund product	4	1	Low	3
EI7: Edit Product	EI	Administrator modifies fund product information	5	1	Low	3
EI8: Subscribe/Redeem Fund	EI	User submits fund subscription or redemption order	4	4	High	6
EI9: Cancel Order	EI	User cancels unprocessed order	2	2	Low	3
EI10: Daily Initialization	EI	System performs daily initialization operations	2	1	Low	3
EI11: Receive Market Data	EI	System receives and processes market data from data center	3	2	Low	3
EI12: User Inquiry to Chatbot	EI	User asks questions to intelligent customer service	2	2	Low	3
EI13: Knowledge Base Update	EI	Administrator updates knowledge base through knowledge editor	6	1	Low	3
EI14: Algorithm Optimization Input	EI	Administrator adjusts recommendation algorithm parameters	4	1	Low	3
EI15: Verify SMS Code	EI	User inputs SMS verification code for validation	2	0	Low	3

EI Subtotal						**52**
EO1: List Products	EO	System displays fund product list	10	1	Average	5
EO2: Trading Record Query Display	EO	System displays user trading records (with processing)	15	2	Average	5

Function Name	Type	Description	DETs Count	FTRs Count	Complexity	UFP
EO3: Settlement Data Export	EO	System exports settlement result data	25	4	High	7
EO4: Recommendation Display	EO	System displays fund recommendation results to users	8	2	Average	5
EO5: Chatbot Response	EO	Intelligent customer service replies to user questions	2	2	Low	4
EO6: Upload Data to Data Center	EO	System uploads trading and settlement data to data center	25	4	High	7
EO7: Transaction Confirmation	EO	System sends transaction status confirmation information	4	1	Low	4
EO8: Process Payment/Refund	EO	System processes payment or refund through cash management interface	6	1	Average	5
EO Subtotal						**42**
EQ1: View Customer Account Details	EQ	User views personal account detailed information	8	3	Average	4
EQ2: View Product Details	EQ	User views single product detailed information	10	2	Average	4
EQ3: View Current Holdings	EQ	User views current holding situation	10	2	Average	4
EQ4: Get System Status	EQ	Administrator or system queries current system status	2	1	Low	3
EQ Subtotal						**15**
Transactional Functions Total						**109**

6. Software Cost Estimation

6.1 Get Software Size

Using the functional point results obtained from the previous experiment as the basic data for this experiment.

6.2 Select a Suitable Productivity Standard

Recommendation: The software labor productivity data published on the website of the Beijing Software Cost Evaluation Technology Innovation Alliance (https://www.bscea.org/).

6.3 Convert to Calendar Time

Recommendation: The monthly working hours are calculated based on 22.5 days.

6.4 Obtain Software Cost

Recommendation: RMB measurement.

6.5 Verify Current Software Cost Estimation Results

Using another functional point method to verify the obtained results.

7. Experimental Results (Cost of Your Course Project)

Based on the analysis and calculations, the estimated cost of the course project is as follows:

-Total Function Points (UFP + EIF)**: 103
- Selected Productivity Standard**: [Insert the selected productivity standard from the BSCEA website]
- Converted Calendar Time**: [Insert the converted calendar time based on the productivity standard]
- Estimated Software Cost**: [Insert the estimated cost in RMB]

8. Learning Experiences

This experiment provided a practical understanding of how to estimate software project size using the FP method. It was enlightening to learn how to adjust the UFP based on non-functional factors to get a more accurate representation of the project workload. The experiment also highlighted the importance of understanding the differences between various FP analysis methods, such as IFPUG and NESMA.

9. Verification of Experimental Results

It is recommended to use the NESMA standard measurement model and method to measure the workload of this experimental case to verify the