1. **ESSAY (50%)**
2. Assume there are a total of 287 modules in the Version 1.25.221.11117 of a utility application. When the application is updated to version 1.25.221.11118, there are 21 modules fixed from several bugs, 10 modules added for user experience optimization, 8 modules added for security optimization, and 3 outdated modules deleted. On the version 1.25.221.11119, there are 38 modules fixed for bugs, no added modules, and 1 outdated module deleted.
3. **(5%)** **Calculate the Software Maturity Index (SMI) for the last 2 version releases**.

**Answer (SMI Value of 2 Versions):**

**SMI = [FM - (FC + FA + FD)] / FM**

**Calculating SMI for version 1.25.221.11118:**

FM= 287; FA= 18; FC= 21; FD= 3

SMI = [287 - (21 + 18 + 3)] / 287

= [287 - 42] / 287

= 245 / 287

= **0.8536 (approximately)**

**Calculating SMI for version 1.25.221.11119:**

FM= 302; FA= 0; FC= 38; FD= 1

SMI = [302 - (38 + 0 + 1)] / 302

= [302 - 39] / 302

= 263 / 302

= **0.8708 (approximately)**

1. **(5%)** Based on the SMI on the last 2 version releases, **is the product becoming more stable or less stable?** Explain **your answer in less than 50 words**!

**Answer (49 Words):**

SMI values tell about the stability of the software. **When the value of SMI tends close to 1 this means the software is more stable**. SMI for version 1.25.221.11119 is more than the SMI for version 1.25.221.11118 i.e. is more near to one. **Therefore the product is MORE STABLE**.

1. **(10%)** Any engineered product can be tested in one of two ways:

* By knowing that the specified function has perform as it was expected to perform
* By knowing that each internal unit inside a product are performed according to specification.

The first test is done with Black Box Testing, and the second test is done with White Box Testing. **Should you do both test in your testing process, or is it more preferable to pick one of the testing strategies?** Explain **your answer as clear and as concise as possible in less than 100 words**!

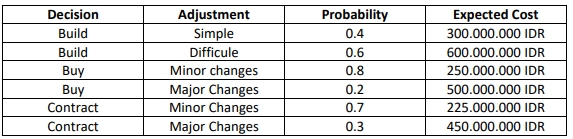
**Answer (99 Words):**

**Both testing are important to be implemented** because:

**When you do black box testing**, you do not have to consider how the functions are working, how they are processing data and giving the result. **Only have to focus on whether the function is doing what it was supposed to do**.

**When you perform white box testing**, you are **basically testing the internal functioning of the product like how data is received and output is being generated, testing the code, etc.** And there is always a possibility of errors which is not possible for the black box testing to identify.

1. **(10%)** To ensure that your company make an objective assessment before making purchasing decision, a decision tree can be made to further calculate and estimate all possible costs. **Build a decision tree and pick which option is more optimal** for build-buy-contract decision **of a CRM application** based on the information provided in this table:



**Answer (Decision Tree & Optimal Option):**

For a CRM base application, After all calculations, find the maximum expected output and consider that as the optimal solution.

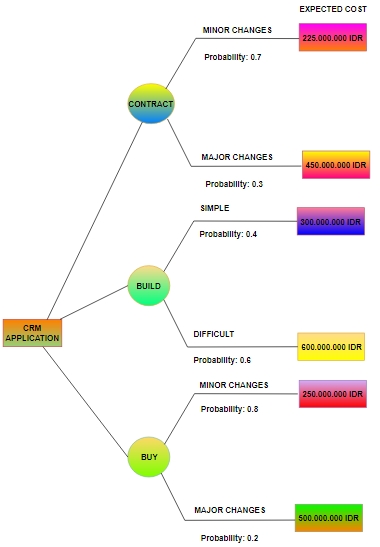
1. **Convert Table to Decision Tree**

Decision tree can have **two types of nodes**:

1. One is **Decision node**.
2. The other is Chance or **Event node**.
3. **Decision node is denoted by a square** **or rectangle** from which different decisions originates.
4. **Event nodes are represented by circles**, which indicates different types of outcomes.

**In the given table:**

1. Various decision are represented by 'decision' column.
2. Corresponding events are represented by 'Adjustment' column.



1. **Calculate Expected Value (EV)**
2. **Expected value of 'Build' is given as:**

(Probability of simple \* Cost of simple) + (Probability of difficult \* Cost of difficult) = (0.4\*300.000.000 + 0.6\*600.000.000)

= (120.000.000 + 360.000.000) = (480.000.000)

1. **Similarly, Expected value of 'Buy' is given as:**

(Probability of Minor Changes \* Cost of Minor Changes) + (Probability of Major Changes \* Cost of Major Changes)

= (0.8\*250.000.000 + 0.2\*500.000.000)

= (200.000.000 + 100.000.000) = (300.000.000)

1. **Also, Expected value of 'Contract' is given as:**

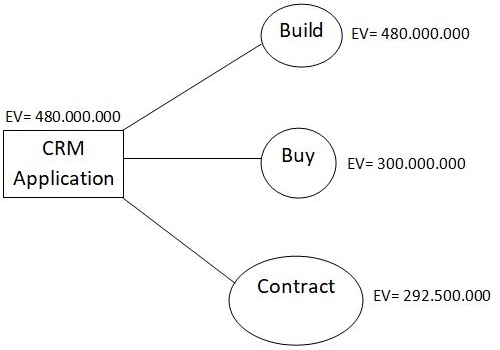
(Probability of Minor Changes \* Cost of Minor Changes) + (Probability of Major Changes \* Cost of Major Changes)

= (0.7\*225.000.000 + 0.3\*450.000.000)

= (157.500.000 + 135.000.000) = (292.500.000)

**Clearly, the highest expected value is from decision 'Build' (480.000.000)**. **So, the OPTIMAL SOLUTION of the CRM application is to go for the choice 'Build'**, which will give an expected value of 480000000 IDR.

1. **Final Result of Decision Tree ( “Build” is The OPTIMAL CHOICE)**

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1. **(10%)** Prototyping is a powerful tool for developing new Innovative business models. Please **describe your new innovative aspects from your final project prototype**.

**Answer:**

**Our final project is about the calendar app**, it **has friend and group features**. In personal features, **it will present a calendar that shows the schedule of the user while in the group feature**, **it will show each schedule of every person in the group**. It **also has maps to locate the group members by marking their locations when meeting** (to discover who is late for the meeting).

**Our Innovative Aspects:**

1. **Chat Feature With Member Who is Responsible for The Event in Calendar**

* Not Only Can See the Schedule of Calendar, You can also Chat with your Client or another Responsible for the Event.

1. **Access calendar from Your Phone**

* Doesn’t matter if don’t have your laptop, simply log in from smart phone to check and manage appointments.

1. **Create more than one calendar**

* If run several businesses, or have several clients, this is a fab tool that allows to create a calendar for each one, even color code them for ease of use, and manage them on an independent basis.

1. **Set appointments with RSVP’s**

* When invite multiple people to a meeting, can ask for a response to ensure all parties can attend.

1. **Set recurring meetings or appointments**

* Set the time and date once, and then simply choose when want it to recur.

1. **Share calendars with your clients with Detailed Location and Time Zone**

* It’s a great and easy way for managing workload, appointments and deadlines, and it overcomes any unnecessary toing and froing via email saving time and making more productive. Also provided with Detailed of Location Using Google Maps API.

1. **(10%)** **Explain about who your customer segment is in your final project**. Also **provide reason and analysis on how you decide on your customer segment**.

**Answer:**

**Our customer segmentation for all people both domestically and abroad**. We also **do not limit the age of use**, where both children, adolescents (teenager), and even adults can use this application. It also **does not specifically limit which industries can use this application**, it can be used for all groups, both education, business, commerce, and so on.

**The reason behind the choice of the customer segment** in my final project is **because my team realize different types of customer**, below some example of types of customers:

1. **Convenience Seekers**

* Value convenience in delivery, ordering
* High Income
* Long relationship, large referrals

1. **Brand Buyers**

* Not price sensitive
* Highest income, more often male
* Expensive to acquire, but most initially and refer more

1. **Casual Buyers**

* Not concerned with perishables or delivery time windows
* Small spending growth

1. **Relationship Seekers**

* Influenced by retailer brand, suggestion, and promotions
* Low income
* Small spending growth/referral

1. **Bargain Hunters**

* Price is primary and perishables are not important
* Low income
* Small purchases

1. **CASE (50%)**

Pop Solution Inc. is a small IT Solution company. They have just finished their sales pitch meeting with their latest potential client, an automobile sales company. The company was very satisfied with their portfolios, and asked them to provide a final quotation on the price that will be agreed upon.

As for the project detail, the client asked for a simple web application with 3 main functions: (1) a homepage showing the company’s credibility and location, (2) a page to list all cars the company is selling, and (3) a Contact Us page where future customers can fill their data to further be contacted by the company’s representatives. Since the transaction is too substantial to be handled in the application, all purchase will be done outside of the web application.

Every month, Pop Solution spends 30.000.000 IDR for the overhead cost of all its employees. The organizational average productivity for the system of similar type is 25 FP/person-month. This means that with one person doing the job of 50 Function Point, it will take one month, with 2 persons doing the job, it will take half a month to finish.

As the new member of the development team, you are asked to prove your expertise on software estimation by providing the team with Function Point Analysis (FPA) on your next internal meeting. Your tasks are:

1. **(20%) List all** the **External Inputs (EIs)**, **External Outputs (EOs)**, **External Inquiries (EQs)**, **Internal Logical Files (ILFs)**, and **External Interface Files (EIFs)** that you identify should be on the system. **You are allowed to add your assumptions** as long as it is relevant.
2. **(10%) Calculate** the **Unadjusted Function Point**, **Value Adjustment Factors**, and the **Function Point**.
3. a. **(10%)** **Provide estimation on project estimated cost** (in IDR) and **project estimated time (in person-month)**! **How long will it take to finish the project if there are 5 persons working for the project**?

b. **(10%)** **What should you do if the client rejects your estimated cost and time, and negotiates with you for a lower price**?

**Answer:**

1. In the question, **you are allowed to add your assumptions** as long as it is relevant.

**So, my assumptions:**

1. **Because this is web application**, **customer must Register and Login First** Before Using the Web Application.
2. **In the case explanation**, **all purchase will be done outside of the web application**. So, **the payment must be using Third-Party like PayPal, Credit Card, or Debit Card, Also Bank Transfer**.
3. **The application will show the remaining time to complete the payment**.
4. **The customer can inquiry the invoice to track the progress**.
5. **After** the customer **complete the payment** and the **status invoice** in apps **will change from process become paid**.
6. The **staff will checking the usability of the product** as requested in invoice.
7. The **staff will enter the AWB\_NO** and **change the status invoice become on delivery progress**.
8. **After** the **customer receive the product** then the customer will **change the status become finished**.
9. The **system will automatically change the status become finished if after two days no confirmation from the customer**.
10. The **customer can give comment for the product quality**.
11. The **customer can view the transaction history inquiry**.
12. The **Admin can inquiry all the transaction that have been done each months or certain period**.
13. The **Admin can inquiry the active customer each months or certain period**.
14. For **security purpose**, there are logically file to **encrypt the customer account password**.

**After I explain what I assumed with the case**, next thing is **I will List all the External Inputs** (EIs), **External Outputs** (EOs), **External Inquiries** (EQs), **Internal Logical Files** (ILFs), and **External Interface Files** (EIFs) that you identify should be on the system.

**FP Component List Table**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No** | **Component** | **FP Type** | **Complexity** | **Weighting Factor** |
| 1 | Input Email | EIs | Simple | 3 |
| 2 | Input Password | EIs | Simple | 3 |
| 3 | Choose Product | EIs | Simple | 3 |
| 4 | Choose Payment Option | EIs | Simple | 3 |
| 5 | Login to Bank Application | EIs | Simple | 3 |
| 6 | Choose Transfer | EIs | Simple | 3 |
| 7 | Fill virtual booking account Number | EIs | Simple | 3 |
| 8 | Staff enter AWB\_NO | EIs | Simple | 3 |
| 9 | Customer change status to Finished | EIs | Simple | 3 |
| 10 | Customer give Comment | EIs | Simple | 3 |
| 11 | Display total price include delivery fee | EOs | Average | 5 |
| 12 | Display remaining time to complete payment | EOs | Average | 5 |
| 13 | Display bank application in the website | EOs | Average | 5 |
| 14 | Display invoice from process to paid | EOs | Average | 5 |
| 15 | Display invoice from paid to delivery on progress | EOs | Average | 5 |
| 16 | Display progress status to finished after 2 days no confirmation | EOs | Average | 5 |
| 17 | Customer inquiry Invoice | EQs | Average | 4 |
| 18 | Staff see inquiry product as requested | EQs | Average | 4 |
| 19 | Customer view transaction history inquiry | EQs | Average | 4 |
| 20 | Admin inquiry active customer each month or certain period | EQs | Average | 4 |
| 21 | Admin inquiry all the transaction that have been done each months or certain period | EQs | Average | 4 |
| 22 | System validate username | ILFs | Average | 10 |
| 23 | System validate password | ILFs | Average | 10 |
| 24 | System check Amount of items left | ILFs | Average | 10 |
| 25 | System Calculate total price including delivery fee | ILFs | Average | 10 |
| 26 | System Changing status from process to paid | ILFs | Average | 10 |
| 27 | System Changing status to finished (if there is no confirmation) | ILFs | Average | 10 |
| 28 | Making Virtual banking account | EIFs | Complex | 10 |
| 29 | Login to user banking account (PayPal, Debit Card, Credit Card) | EIFs | Complex | 10 |
| 30 | Validating and transfer money to the virtual banking account | EIFs | Complex | 10 |
| 31 | Homepage showing the company’s location (Google Maps) | EIFs | Complex | 10 |
| Count Total | | | | 180 |

1. **(10%) Calculate** the **Unadjusted Function Point**, **Value Adjustment Factors**, and the **Function Point**
2. **First, calculate Unadjusted Function Point (UFP).**

**FP Calculation Table**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Information  Domain Value | Count | Weighting Factor | | | FP Count |
| Simple | Average | Complex |
| External Input (EIs) | 10 | 3 | 4 | 6 | 30 |
| External Output (EOs) | 6 | 4 | 5 | 7 | 30 |
| External Inquiries (EQs) | 5 | 3 | 4 | 6 | 20 |
| Internal Logical File (ILFs) | 6 | 7 | 10 | 15 | 60 |
| External Interface File (EIFs) | 4 | 5 | 7 | 10 | 40 |
| Count Total | | | | | 180 |

**The total of the total Unadjusted Function Point (UFP) is sum off all FP Count**

**UFP = (30 + 30 + 20 + 60 + 40) = 180**

**Therefore the Unadjusted Function Point (UFP) is 180.**

1. **Second, Calculate Value Adjustment Factors (VAF)**
2. **To Calculate VAF**, we **must know TDI Value**, that **can be got from Value Adjustment Factor Table**

|  |  |  |
| --- | --- | --- |
| No | General Systems Characteristics | Degree of Influence |
|
| 1 | Data Communications | 5 |
| 2 | Distributed Processing | 5 |
| 3 | Performance | 3 |
| 4 | Heavily Used Configuration | 2 |
| 5 | Transaction Rates | 3 |
| 6 | Online Data Entry | 5 |
| 7 | Design for End User Efficiency | 4 |
| 8 | Online Update | 5 |
| 9 | Complex Processing | 5 |
| 10 | Usable in Other Applications | 1 |
| 11 | Installation Ease | 1 |
| 12 | Operational Ease | 5 |
| 13 | Multiple Sites | 5 |
| 14 | Facilitate Change | 2 |
| **TDI VALUE** | | **51** |

**Therefore the TDI VALUE is 51.**

1. **After know the TDI Value**, **Calculate Value Adjustment Factors** (VAF)

**Value Adjustment Factor (VAF)’s formula:**

**Put the TDI Value to the formula:**

**Therefore the Value Adjustment Factors (VAF) is 1.16**

1. **Calculate Function Point (FP)**

**Function Point (FP)’s formula:**

**Put the UFP Value and VAF Value to the formula:**

**Therefore the Function Point (FP) is 208.8**

1. a. **(10%)** **Provide estimation on project estimated cost** (in IDR) and **project estimated time (in person-month)**! **How long will it take to finish the project if there are 5 persons working for the project**?
2. **First, Calculate Estimated Project Cost**
3. **Project Cost’s Formula**
4. **Cost per Function’s Formula**
5. **Put the Labor Cost Value and Productivity Value to the Cost per Function Formula**
6. **Put the Cost per Function Value and Function Point Value to the Project Cost Formula**

**Therefore the Estimated Project Cost is 1.392.000 IDR**

1. **Second, Calculate Estimated time (in person-month)**

* **Person is not defined**. I assume the number of **person is 10**.
* **Month is not defined**. I assume the number of **month is 12**.

**Therefore the Estimated Time (in person-month) is 120 person month**

1. **Third, Calculate Time if there are 5 persons working for the project**

**Therefore the Project Time if 5 person working for the project is 24 Month**

b. **(10%)** **What should you do if the client rejects your estimated cost and time, and negotiates with you for a lower price**?

**Answer:**

**Try to make customer satisfaction by telling some details about the project and some unique features that you can give in the same budget**. Don't get aggressive and don't make false promises. Else, it can leave a negative effect on your respect in the market. After all, not **all three things can be compromised from quality, time and cost**.

As the client is a god for the business try to convince them with the given price and time because, **and if the price is reduce the maintenance cost will be increased or post service charges will increase**, **choice is depend on client** but **our goal should be to keep our commitment with less lose in price**, rather we can do outsourcing at the end with less price to pay to the developer and give some modules with cheap price.