

PRACTICAL - 6

AIM: Study and apply software effort estimation techniques.

Task:

1. Choose two estimation techniques from the list (e.g., Bottom-up estimating, Expert judgment, Function Point Analysis, COCOMO).
2. Draw up an outline program structure diagram for a given scenario. For each box on your diagram, estimate the number of lines of code needed to implement the routine in a programming language (eg.Java)
(Use External input types none, External output types the report, that is, 1, Logical internal file types none, External interface file types payroll file, staff file (timetabling), courses file (timetabling), that is, 3, External inquiry types none)
3. Calculation of SLOC from Albrecht function points.
4. Apply COCOMO to estimate the effort.(Use Table C.7 Assessing scale factors)

Solution:

Team Details:

Sr. No.	Name	Enrollment No.
Team Leader	Angat Shah	202203103510097
Team Member 1	Yash Patel	202203103510228
Team Member 2	Gati Shah	202203103510261
Team Member 3	Fenil Shilodre	202203103510041
Team Member 4	Sarth Chaudhari	202303103510106

Estimation Techniques Used

1. COCOMO (Constructive Cost Model)

- Used for estimating effort, time and cost in software projects.
- Formula : $Effort (E) = a \times (KLOC)^b$
- We determine whether the project falls under Organic, Semi-Detached or Embedded.

2. Function Point Analysis (FPA)

- Used for estimating the size and complexity of the software. (SLOC)
- Categories include External Inputs (EI), External Outputs (EO), Internal Logical Files (ILF), External Interface Files (EIF) and External Queries (EQ).
- Assigns weightage to components based on their complexity (Low, Average, High).

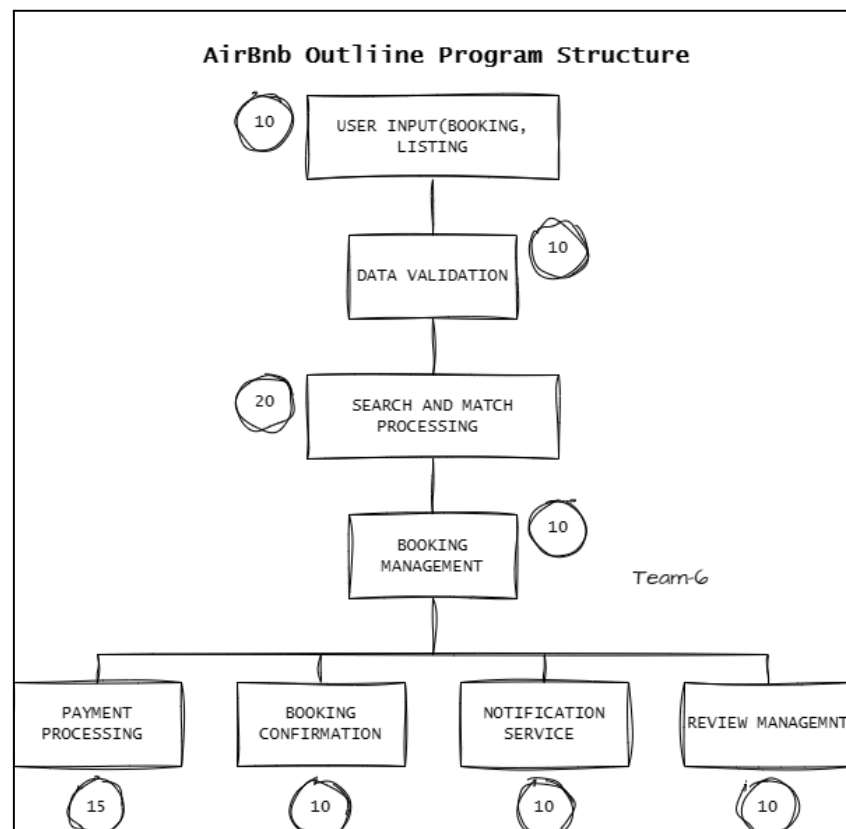
Albrecht Complexity Multipliers :

External User Type	Multiplier		
	Low	Average	High
External Input Type	3	4	6
External Output Type	4	5	7
External Inquiry Type	3	4	6
Logical Internal File Type	7	10	15
External Interface File Type	5	7	10

Project Title : Airbnb System

Program Structure Diagram

Here is the detailed program structure including blocks and the estimated LOC for each component :



- User Input (Booking, Listing) : 10 LOC
- Data Validation : 10 LOC
- Search and Match Processing : 20 LOC
- Booking Management : 10 LOC
- Payment Processing : 15 LOC
- Booking Confirmation : 10 LOC
- Notification Service : 10 LOC
- Review Management : 10 LOC

Total LOC : 95 LOC

Function Point Analysis (FPA) Calculation :

Component	Count	Complexity	Weight (Albrecht)	Total FP
External Input Type (EI)	3	Average	4	12
External Output Type (EO)	2	Average	5	10
External Inquiry Type (EQ)	2	Low	3	6
Internal Logical Files (ILF)	3	High	15	45
External Interface File Type (EIF)	1	Average	7	7
TOTAL FUNCTION POINTS				80

- **SLOC** = FP x 50 LOC (common for Java-based applications)
 = 80 x 50
 = **4000 SLOC**

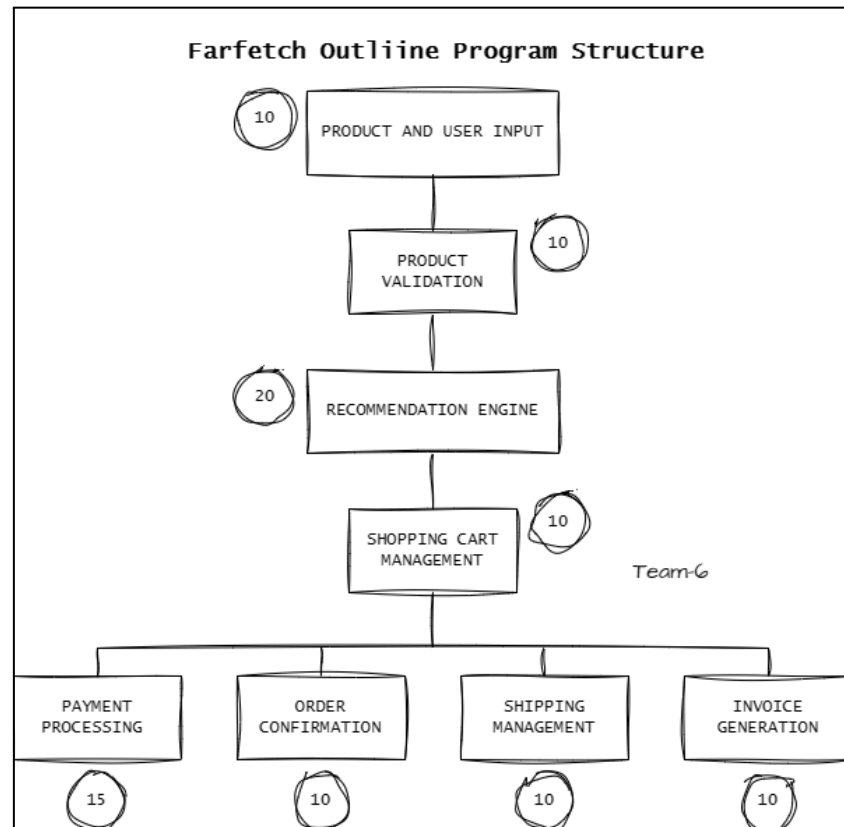
Effort Estimation Using COCOMO :

- **Effort (Person-Months)** = $3.0 \times \left(\frac{SLOC}{1000}\right)^b$
 = $3.0 \times \left(\frac{4000}{1000}\right)^{1.12}$
 = 3.0×4.72
 ≈ **14 Person-Months**

Project Title : Farfetch E-commerce System

Program Structure Diagram

Here is the detailed program structure including blocks and the estimated LOC for each component :



- Product & User Input : 10 LOC
- Product Validation : 10 LOC
- Recommendation Engine : 20 LOC
- Shopping Cart Management : 10 LOC
- Payment Processing : 15 LOC
- OrderConfirmation : 10 LOC
- Shipping Management : 10 LOC
- Invoice Generation : 10 LOC

Total LOC : 95 LOC

Function Point Analysis (FPA) Calculation :

Component	Count	Complexity	Weight (Albrecht)	Total FP
External Input Type (EI)	4	Average	4	16

External Output Type (EO)	3	Average	5	15
External Inquiry Type (EQ)	2	Low	3	6
Internal Logical Files (ILF)	3	High	15	45
External Interface File Type (EIF)	4	Average	7	28
TOTAL FUNCTION POINTS				110

- **SLOC** = FP x 50 LOC (common for Java-based applications)
 $= 110 \times 50$
 $= \mathbf{5500 \text{ SLOC}}$

Effort Estimation Using COCOMO :

- **Effort (Person-Months)** = $3.0 \times \left(\frac{SLOC}{1000}\right)^b$
 $= 3.0 \times \left(\frac{5500}{1000}\right)^{1.12}$
 $= 3.0 \times 6.75$
 $\approx \mathbf{20 \text{ Person-Months}}$

Conclusion

Effort estimation plays a crucial role in predicting the time, cost and resource allocation for software projects. Based on the analysis :

- **Airbnb requires fewer resources and effort** due to a lower function point count.
 - **Farfetch requires more effort** due to its complexity, larger dataset management and additional security needs.
 - The estimation methodologies used provide a realistic measure aligned with industry standards.
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