Expt No: 07

Date: 29/04/2022

Health Consultancy Service

Software Project Estimation

Aim

To compute the estimations for the software project - health Consultancy Service

Description

Loc based Estimation

As the name suggests, Loc based Estimation (Loc - Lines of Code) counts the total number of lines of source code in a project, Loc is a product size metric in software enginearing.

The problems of Loc are

* Different Languages lead to different lengths of Code
* GUI generator can generate thousands of lines of code in minutes.
* Depending on the application, the complexity of code is difficult.

Procedure to calculate Loc based estimation

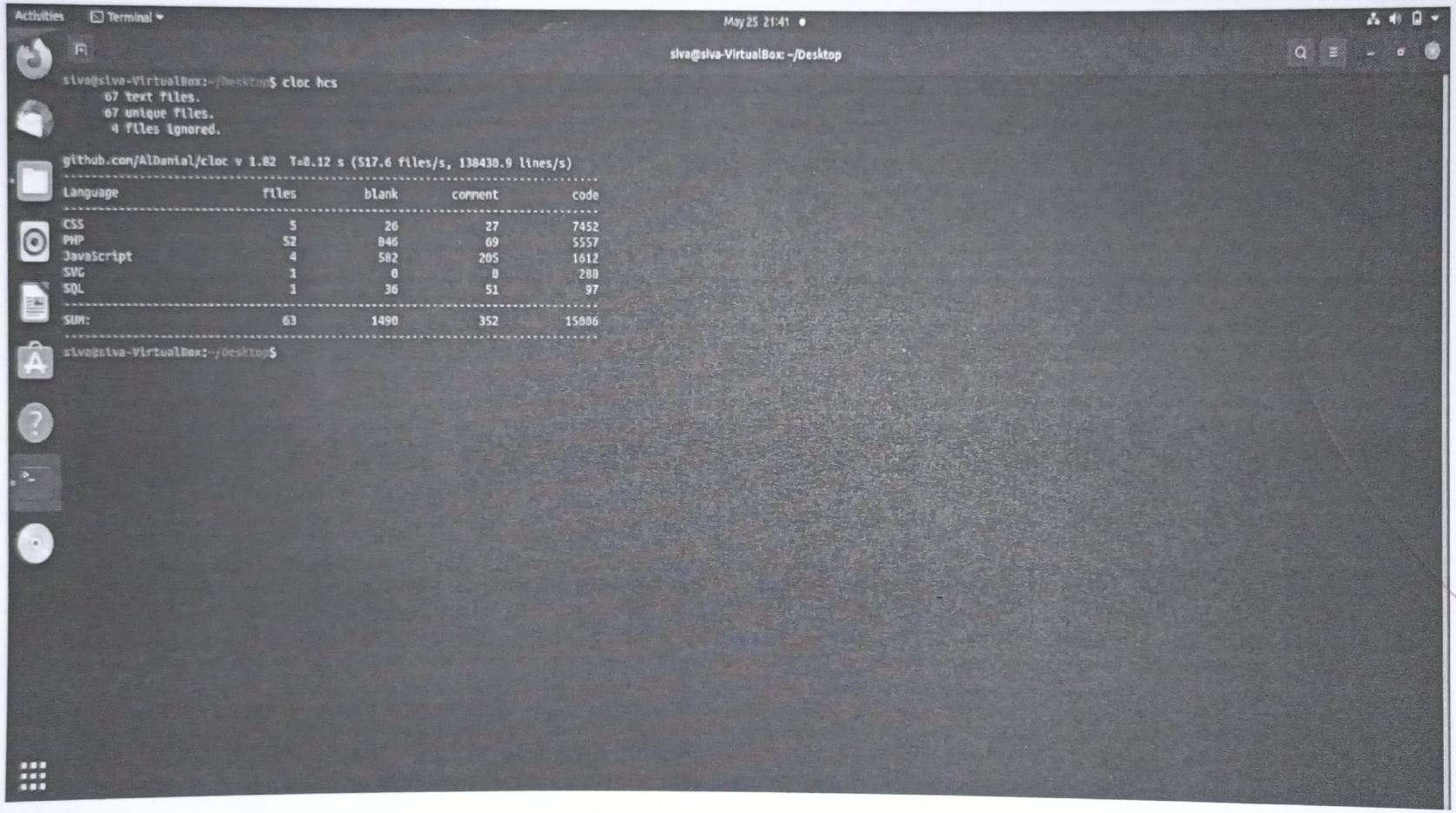
1) First, Compute the estimated Loc for the following functions

* User Interface & Control Facility (UICF)
* 2-Dimensional Geometric Analysis (2DGIA)
* 3-Dimensional Geometric Analysis (3DGIA)
* Database Management (DBM)
* Compute Graphics & Display Facilities (CGDF)
* Peripheral Control Function (PCF)
* Design Analysis Module

Loc based estimation Calculation

The total number of Lines of Code in project = 15006

Function	Estimated Loc
User Interface & Control Facility	1300
2-Dimensional Geometric Analysis	2300
3-Dimensional Geometric Analysis	2250
Database Management	2280
Computer Graphics Display Facilities	2250
Peripheral Control Function	2400
Design Analysis Module	2226
Total Estimated Loc	15006


Activities
Terminal
May 25 21:41
siva@siva-VirtualBox: ~/Desktop
siva@siva-VirtualBox:~/Desktop$ cloc hcs
67 text files.
67 unique files.
4 files ignored.
github.com/AlDanial/cloc v 1.82 T=0.12 s (517.6 files/s, 138430.9 lines/s)
Language files blank comment code
CSS 5 26 27 7452
PHP 52 846 69 5557
JavaScript 4 582 205 1612
SVG 1 0 0 288
SQL 1 36 51 97
SUM: 63 1490 352 15006
siva@siva-VirtualBox:~/Desktop$

FP based Estimation

Function Point (FP) based estimation can be used effectively as a means for measuring the functionality delivered by a system.

Function points are derived using an emprical relationship based on countable (direct) measures of software's information domain and qualitative assessments of software complexity.

Procedure to Calculate FP based estimation

1) Collect the information domain values and determine the complexity value or weighting factor (simple / average / complex) associated with each ~~other~~ count.

Information domain values:

Number of External Inputs (EI's)

Number of External output (EO)

Number of External Inqueries (EQ)

Number of Internal Logical Files (ILF)

Number of External Interface Files (EIF)

2) Calculate the count total from the above data.

3) Compute $\Sigma(f_i)$ from the following adjustments factors:

* Backup and Recovery
* Data Communication
* Distributed processing
* Performance Critical
* Existing operating Environment
* Online Data Entry,
* Input transaction over multiple Screens
* Internal Logical Files updated online
* Information Domain values complex
* Internal processing complex
* Code designed for Reuse
* Conversion or Installation in Design
* Multiple Installation
* Application designed for change.

Degree of Influence for adjustment factors is from 0 to 5

4) Calculate VAF - Value Adjustment Factor by the following formula.

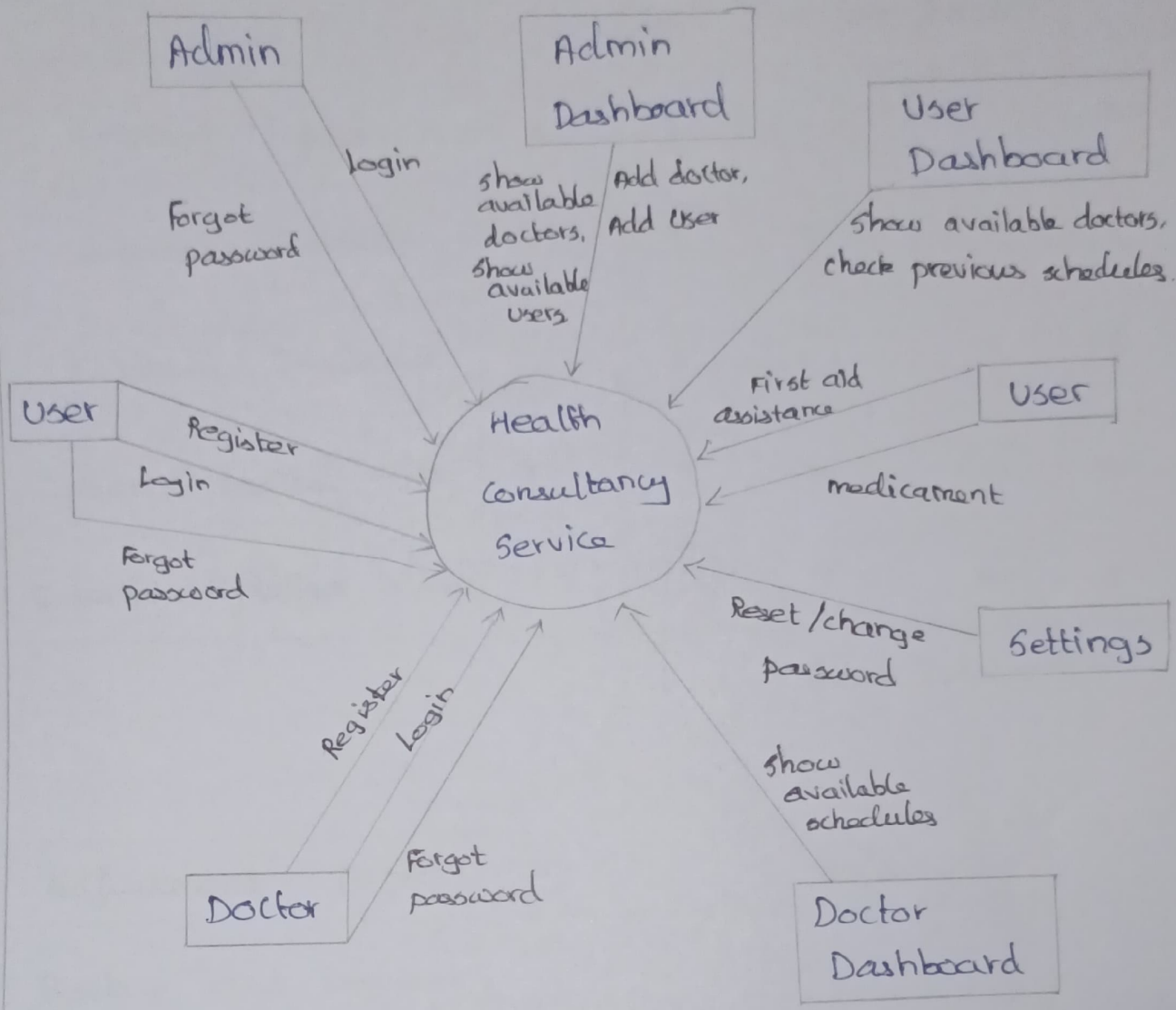
$$VAF = 0.65 + [0.01 \times \Sigma(F_i)]$$

Range : 0.65 to 1.35

5) Function point value is calculated by the following formula

$$FP = Count\ total \times VAF$$

FP based Estimation Calculation



Calculation:

Information domain values

Number of External Inputs (EI) : 5

Number of External Output (EO) : 2

Number of External Inquiries (EQ) : 3

Number of Internal Logical Files (ILE) : 3

Number of External Interface Files (EIF) : 1

Information Domain Value	Count	Weighting Factor			FP Count
		Simple	Average	Complex	
External Inputs	5	3	(4)	6	20
External Outputs	2	(4)	5	7	8
External Inqueries	3	3	(4)	6	12
Internal Logical Files	3	7	10	(15)	45
External Interface Files	1	(5)	7	10	5
				Count Total = 90	

Adjustment Factors	value
Backup and Recovery	4
Data Communication	1
Distributed processing	1
performance critical	0
Existing operating Environment	3
online Data Entry	1
Input Transactions over multiple Screens	0
Internal Logical Files updated online	4
Information domain values complex	5

Internal processing complex	3
Code designed for reuse	2
Conversion or Installation	2
Multiple Installation	1
Application designed for change	1

$\Sigma(Fi) = 30$

Now,

$$VAF = 0.65 + [0.01 \times \Sigma(Fi)]$$
$$= 0.65 + [0.01 \times 30]$$
$$= 0.95 \simeq 1$$

Function point = Count total × VAF

$$= 90 \times 0.95$$
$$= 85.5$$
$$\simeq 90$$

Cocomo model,

Cocomo - Constructive Cost model

It is a procedural cost estimate model for software projects and is often used as size, effort, cost, time and quality.

It is based on the total lines of codes (Loc) required to develop the system.

There are 3 types of Cocomo model.

i) Basic Cocomo model
ii) Intermediate cocomo model
iii) Detailed cocomo model

Basic cocomo model

It is the simplest estimation model.

It estimates the software roughly and quickly.

the accuracy is low.

It is mainly useful for small-medium sized software.

Procedure to calculate Basic Cocomo model estimation

1) First compute the KLOC (kilo lines of code) from LOC based estimation.

2) Calculate the effort by the following formula

$$E_i = a(KLOC)^b \text{ pm}$$

Calculate the development time for the project by the formula

$$T_{dev} = 2.5 (E_i)^c \text{ weeks or months}$$

The values of constants a, b, c are

	a	b	c
Organic model	2.4	1.05	0.38
Semi detached model	3.0	1.12	0.35
Embedded model	3.6	1.20	0.32

3) Compute persons required by the formula,

$$\text{persons Required} = E_i / T_{dev}$$

Basic cocomo model Calculation

Health Consultancy service comes under organic model.

$KLOC = 15$

$a = 2.4, \quad b = 1.05, \quad c = 0.38$

$E_i = a(KLOC)^b \text{ pm}$

$= 2.4(15)^{1.05} \text{ pm}$

$E_i = 41 \text{ person/month}$

Development Time

$T_{dev} = 2.5(41)^{0.38} \text{ months}$

$= 10.252 \text{ months}$

$T_{dev} = 10 \text{ months}$

persons Required or Average Staff Size

$= E_i / T_{dev}$

$= 41/10 \quad = 4.1$

$\simeq 4 \text{ persons}$

Intermediate Cocomo model

It takes the cost drivers into accocunt. It estimates software development effort in terms of size of the program and other related cost drivers parametor (product, hard-ware, personal and project attributes) of the project.

procedure to Calculate Intermediate Cocomo model Estimation

1) First compute the KLOC (kilo lines of Codes) from Loc based estimation

2) Calculate EAF - Effort adjustment factor by multiplying the parameters value of different cost drivers.

3) Using EAF, Calculate the effort by

$$E_i = [a(KLOC)^b] \times EAF$$

Time development by

$$T_{dev} = 2.5 (E_i)^c$$

The values for constants a, b, c are

	a	b	c
organic model	3.2	1.05	0.38
Semidetached model	3.0	1.12	0.35
Embedded model	2.8	1.20	0.32

4) Calculate Persons required / Average staff size by the following formula

$$\text{persons Requirement} = E_i / T_{dev}$$

Intermediate locomo model calculation

Health Consultancy Service comes under organic model.

KLOC = 15

a = 3.2

b = 1.05

C = 0.38

Effort, $E_i = [a (KLOC)^b] \times EAF$

$= [3.2 (15)^{1.05}] \times 0.97$

$E_i = 53$

Development Time,

$T_{dev} = 2.5 (E_i)^C$

$= 2.5 (53)^{0.38}$

$= 11$

Persons required = E_i / T_{dev}

$= 53/11$

$= 4.8$

$\simeq 5$ persons

Cost Drivers	Ratings					
	Very low	Low	Nominal	High	very high	Extra high
Product Attributes						
Required Software Reliability	0.75	0.88	1.00	1.00	1.15	
Size of application database		0.94	1.00	1.08	1.08	
Complexity of the product	0.70	0.85	1.00	1.15	1.15	1.65
Hardware Attributes						
Runtime Performance Constraints			1.00	1.11	1.30	1.66
Memory Constraints			1.00	1.06	1.21	1.56
Volatility of the virtual machine environment		0.87	1.00	1.15	1.30	
Required turnabout time		0.94	1.00	1.07	1.15	
Personal Attributes						
Analyze Capability	1.46	1.19	1.00	0.86	0.71	
Application experience	1.29	1.13	1.00	0.91	0.82	
Software engineering capability	1.42	1.17	1.00	0.86	0.70	
Virtual machine experience	1.21	1.10	1.00	0.90		
Programming language experience	1.14	1.07	1.00	0.95		
Project attributes						
Application Software Engineering methods	1.24	1.10	1.00	0.91	0.82	
Use of Software tools	1.24	1.10	1.00	0.91	0.83	
Required Development Schedule	1.23	1.08	1.00	1.04	1.10	

Σ EAF = 0.97

	Alloted marks	obtained marks
Preparation and viva	10	09
observation	10	08
Design and Implementation	10	09
output	10	08
Record	10	09
Total	50	

Result

Thus the estimations for the Software Health Consultancy Service System has been computed.