**Q.1 For a project of 100,000 LOC embedded system, compute the effort and development time using intermediate COCOMO. Assume there are programmers of the low quality but a lot of experience with the programming language with all other attribute values being nominal. The following value of cost drivers are given below:For low quality=1.17, For lot of experience=0.95, Nominal value=1.**

Given:

**LOC** = 100 KLOC

**COCOMO Model used** = Intermediate

**Mode of implementation** = Embedded

**For low quality** = 1.17

**For lot of experience** = 0.95

**Nominal value** = 1

**Since, EAF (effort adjustment factor) = product of all attributes**

**EAF** = 1.0 × 1.0 × 1.0 × 1.0 × 1.0 × 1.0 × 1.0 × 1.0 × 1.0 × 1.17 × 1.0 × 0.95 × 1.0 × 1.0 × 1.0 = 1.1115

**E (Effort) = (a \*(KLOC)^b) \*EAF**

**for Intermediate Model and Embedded Mode**, a= 2.8 and b = 1.20

E = 1.1115 × 2.8 ×(100)^1.20 = 781.75 Person-Months

**Development time (D)** =2.5\*(KLOC)^k;

**for Intermediate Model and Embedded Mode**, k= 0.32

**So, Development Time** = 2.5 ×(781.75)^0.32 = 21.07 Months

**Q.2Consider an office automation system. There are 4 major modules: Data Entry 0.6 KLOC Data Update 0.6 KLOC Query 0.8 KLOC Reports 1.0 KLOC The various cost driver attributes are of high complexity, high storage, low experience and low programmer capability with all others being nominal. Use intermediate COCOMO to estimate final effort, average staff size and total development time. The following value of cost drivers are given below:Value for high complexity=1.15Value for high storage=1.06 Value for low experience=1.13Value for low programmer capability=1.17Nominal value=1.**

Given: Project size = 0.6 KLOC (Data Entry) + 0.6 KLOC (Data Update) + 0.8 KLOC (Query) + 1.0 KLOC (Reports) = 3.0 KLOC

**COCOMO Model used** = Intermediate

**Mode of implementation** = Organic (Size < 50 KLOC)

**Value for high complexity** = 1.15

**Value for high storage** = 1.06

**Value for low experience** = 1.13

**Value for low programmer capability** = 1.17

**Nominal value** = 1.

**EAF (effort adjustment factor)** = product of all attributes

**EAF** = 1.0 × 1.0 × 1.15 × 1.0 × 1.06 × 1.0 × 1.0 × 1.0 × 1.13 × 1.17 × 1.0 × 1.0 × 1.0 × 1.0 × 1.0 = 1.6116

**E (Effort)** =( a\*(KLOC)^b)\*EAF

**for Intermediate Model and Organic Mode,** a = 3.2 and b = 1.05

**E** = 1.6116 × 3.2 ×(3)^1.05 = 16.35 Person-Months

**Development time (D)** = 2.5 \*(E)^k

**for Intermediate Model and Organic Mode,** k= 0.38

**Development Time** = 2.5 ×(16.35)^0.38 = 7.23

**Months Average Staff Size** = E/D = 16.35/7.23 = 2.26 Persons 2 Persons

**Q.3 Write a program in C/C++/Java to compute the estimate of final effort, average staff size and total development timefor Q.2.**

**#include <bits//stdc++.h>**

**using namespace std;**

**int main() {**

**map<string,vector<double>> ValuesForConstants;**

**ValuesForConstants["organic"].push\_back(3.2);**

**ValuesForConstants["organic"].push\_back(1.05);**

**ValuesForConstants["organic"].push\_back(2.5);**

**ValuesForConstants["organic"].push\_back(0.38);**

**ValuesForConstants["Semi Detached"].push\_back(3.0);**

**ValuesForConstants["Semi Detached"].push\_back(1.12);**

**ValuesForConstants["Semi Detached"].push\_back(2.5);**

**ValuesForConstants["Semi Detached"].push\_back(0.35);**

**ValuesForConstants["Embedded"].push\_back(2.8);**

**ValuesForConstants["Embedded"].push\_back(1.20);**

**ValuesForConstants["Embedded"].push\_back(2.5);**

**ValuesForConstants["Embedded"].push\_back(0.32);**

**double KLOC;**

**double TotalSize = 0.0;**

**cout<<"Enter KLOC for data Entry"<<endl;**

**cin>>KLOC;**

**TotalSize+= KLOC;**

**cout<<"Enter KLOC for data update"<<endl;**

**cin>>KLOC;**

**TotalSize+= KLOC;**

**cout<<"Enter KLOC for Query"<<endl;**

**cin>>KLOC;**

**TotalSize+= KLOC;**

**cout<<"Enter KLOC for Report"<<endl;**

**cin>>KLOC;**

**TotalSize+= KLOC;**

**double Value\_for\_high\_complexity=1.15;**

**double Value\_for\_high\_storage=1.06;**

**double Value\_for\_low\_experience=1.13;**

**double Value\_for\_low\_programmer\_capability=1.17;**

**double Nominal\_value=1.0;**

**string Model = "";**

**if(TotalSize <50){**

**Model = "organic";**

**}**

**else if (TotalSize<200 and TotalSize>50){**

**Model = "Semi Detached";**

**}**

**else{**

**Model = "Embedded";**

**}**

**double EAF =**

**Value\_for\_high\_complexity\*Value\_for\_high\_storage\*Value\_for\_low\_programmer\_capability\*Value\_for\_low\_programmer\_capability;**

**double E = ValuesForConstants[Model][0]\***

**(double)pow(TotalSize,ValuesForConstants[Model][1])\*EAF;**

**cout<<"TOtal Effert Estimation"<<endl;**

**cout<<E<<endl;**

**cout<<"Developemt time"<<endl;**

**double d = ValuesForConstants[Model][2]\***

**(double)pow(E,ValuesForConstants[Model][3]);**

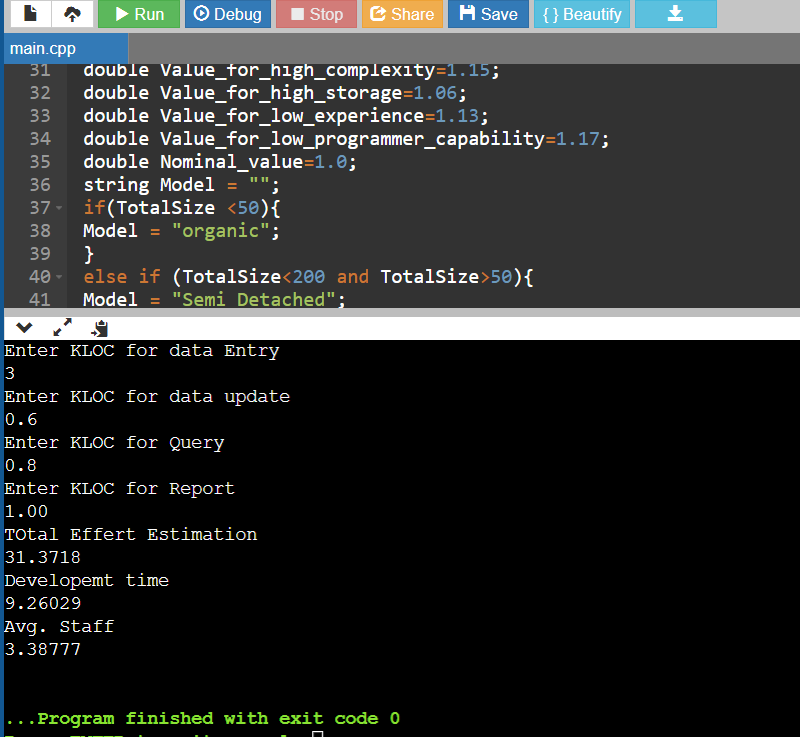
**cout<< d<<endl;**

**cout<<"Avg. Staff"<<endl;**

**cout<< E/d<<endl;**

**return 0;**

**}**

**Output::**