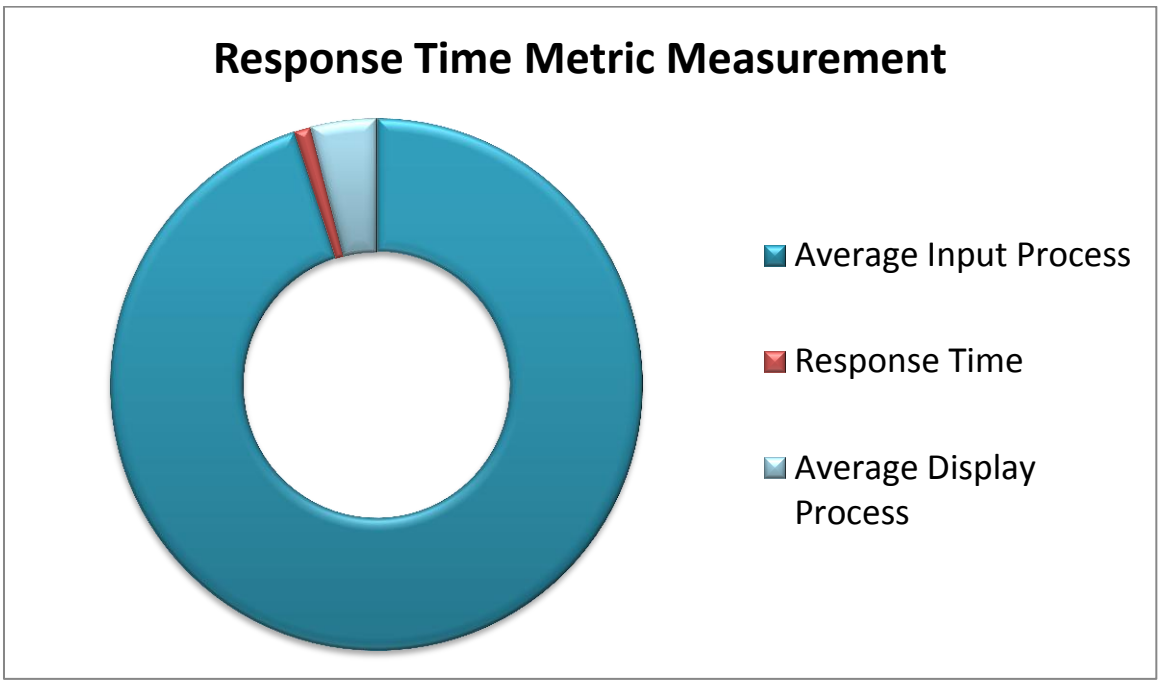
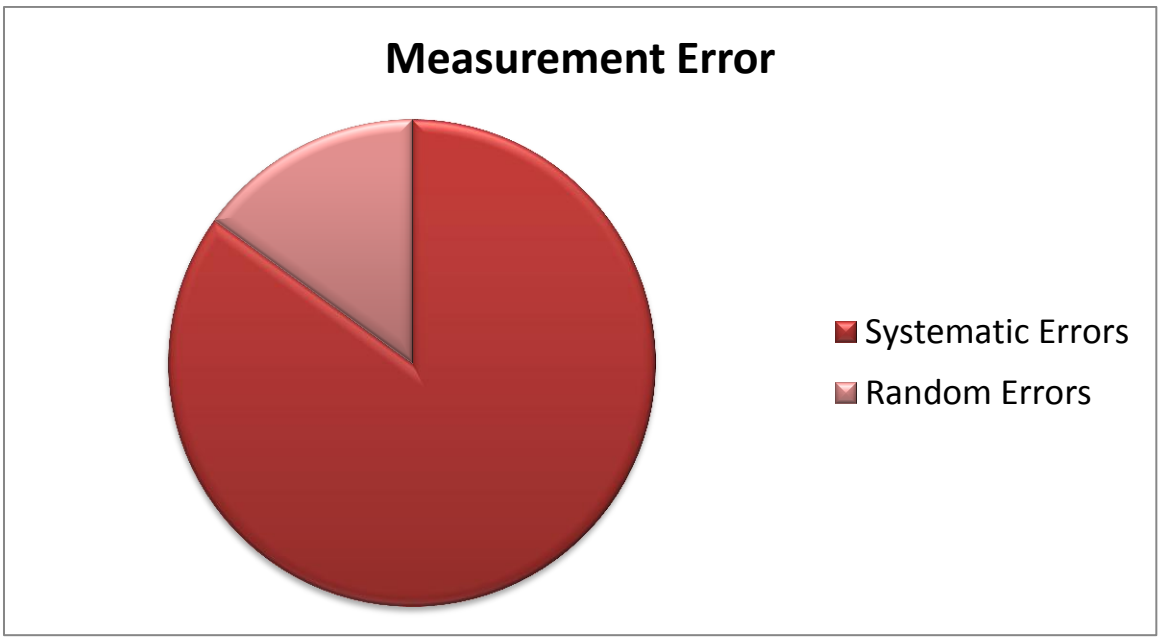
Calculating LOC

Project Name	Project Path	Project Lines	Project Blank Lines	Project Designer Lines	Project Comments
Library Management System	**C:\LMS**	**2.777**	**89**	**1.777**	**20**

File Name	Path	LOC	Blank	Designer	
itemdetadd.aspx.designer.cs	**Admin\itemdetadd.aspx.designer.cs**	**816**	**0**	**816**	**0**
Search.aspx.cs	Search.aspx.cs	174	10	0	0
editaccount.aspx.designer.cs	editaccount.aspx.designer.cs	105	0	105	0
main.Master.designer.cs	main.Master.designer.cs	96	0	96	0
borrowdet.aspx.designer.cs	Admin\borrowdet.aspx.designer.cs	78	0	78	0
request.aspx.designer.cs	request.aspx.designer.cs	78	0	78	0
itemdetadd.aspx.cs	Admin\itemdetadd.aspx.cs	75	6	0	0
borrowdet.aspx.cs	Admin\borrowdet.aspx.cs	73	3	0	1
itemadd.aspx.designer.cs	Admin\itemadd.aspx.designer.cs	69	0	69	0
login.aspx.designer.cs	Admin\login.aspx.designer.cs	69	0	69	0
Search.aspx.designer.cs	Search.aspx.designer.cs	69	0	69	0
borrow.aspx.cs	borrow.aspx.cs	64	3	0	1
Login.aspx.cs	Login.aspx.cs	58	2	0	1
Global.asax.cs	Global.asax.cs	53	14	0	0
request.aspx.cs	request.aspx.cs	52	4	0	0
Signup.aspx.cs	Signup.aspx.cs	48	2	0	0
itemadd.aspx.cs	Admin\itemadd.aspx.cs	45	5	0	0
ana.Master.designer.cs	Admin\ana.Master.designer.cs	42	0	42	0
Signup.aspx.designer.cs	Signup.aspx.designer.cs	42	0	42	0
main.Master.cs	main.Master.cs	42	5	0	0
power.aspx.cs	power.aspx.cs	41	6	0	1
AssemblyInfo.cs	Properties\AssemblyInfo.cs	35	4	0	16
borrow.aspx.designer.cs	Admin\borrow.aspx.designer.cs	33	0	33	0
item.aspx.designer.cs	Admin\item.aspx.designer.cs	33	0	33	0
itemshow.aspx.designer.cs	Admin\itemshow.aspx.designer.cs	33	0	33	0
power.aspx.designer.cs	Admin\power.aspx.designer.cs	33	0	33	0
default.aspx.cs	default.aspx.cs	28	1	0	0
borrow.aspx.designer.cs	borrow.aspx.designer.cs	26	0	26	0
logout.aspx.designer.cs	logout.aspx.designer.cs	26	0	26	0
power.aspx.designer.cs	power.aspx.designer.cs	26	0	26	0
Login.aspx.designer.cs	Login.aspx.designer.cs	24	0	24	0
login.aspx.cs	Admin\login.aspx.cs	23	3	0	0
logout.aspx.cs	logout.aspx.cs	19	1	0	0
ana.Master.cs	Admin\ana.Master.cs	17	2	0	0
borrow.aspx.cs	Admin\borrow.aspx.cs	17	2	0	0
chooseitem.aspx.cs	Admin\chooseitem.aspx.cs	17	2	0	0

default.aspx.cs	Admin\default.aspx.cs	17	2	0	0
item.aspx.cs	Admin\item.aspx.cs	17	2	0	0
itemshow.aspx.cs	Admin\itemshow.aspx.cs	17	2	0	0
power.aspx.cs	Admin\power.aspx.cs	17	2	0	0
editaccount.aspx.cs	editaccount.aspx.cs	17	2	0	0
login.ascx.cs	login.ascx.cs	17	2	0	0
login.ascx.designer.cs	login.ascx.designer.cs	17	0	17	0
category.ascx.cs	controls\category.ascx.cs	17	2	0	0
category.ascx.designer.cs	controls\category.ascx.designer.cs	17	0	17	0
chooseitem.aspx.designer.cs	Admin\chooseitem.aspx.designer.cs	15	0	15	0
default.aspx.designer.cs	Admin\default.aspx.designer.cs	15	0	15	0
default.aspx.designer.cs	default.aspx.designer.cs	15	0	15	0





1. Productivity
2. Quality
3. Documentation
4. Maurice Halstead Theory and Complexity
5. Function Points
6. Feature Points
7. Jones Rules
8. COCOMO and Alternative Estimations
9. Benchmark Data
10. Object Points

1.Productivity

Productivity=KLOC/person-month
Productivity=(2777+1777)/1*1000
Productivity=4.554 kloc per person

2.Quality

Quality=Person/KLOC
Quality=1/4.554
Quality=0.219587

3.Documentation

Documentation=lines of comments/KLOC
Documentation=0.02/4.554
Documentation=0.004391

4.Maurice Halstead Theory and Complexity

```
private void SearchMe(String SearchName, String Search)
        {
            OleDbConnection conn = new
OleDbConnection("Provider=Microsoft.Jet.OLEDB.4.0;Data Source=" +
Server.MapPath("App_Data/library.mdb"));
            if (SearchName == "Article")
            {
                OleDbCommand comm = new OleDbCommand("Select *
from BOOK where IS_JOURNAL=-1 and (NAME Like '%" + Search + "%' or
DESCRIPTION Like '%" + Search + "%' or AUTHOR Like '%" + Search +
"%' or ISBN Like '%" + Search + "%' or TRANSLATOR Like '%" +
Search + "%')", conn);
                OleDbDataAdapter odb = new
OleDbDataAdapter(comm.CommandText, conn.ConnectionString);
                DataTable veriTablosu = new DataTable();
                try
                {
                    conn.Open();
                    odb.Fill(veriTablosu);
                    DataList1.DataSource = veriTablosu;
                    DataList1.DataBind();
                }
                catch (Exception ex)
                {
                    Response.Write(ex.Message.ToString() +
"Connection Hatası");
                }
                finally
                {
                    conn.Close();
                }
            }
            else if (SearchName == "Movie")
            {
                OleDbCommand comm = new OleDbCommand("Select *
from VIDEO where NAME Like '%" + Search + "%' or PRODUCER Like '%"
+ Search + "%' or PLAYERS Like '%" + Search + "%' or DIRECTOR Like
'%" + Search + "%' or WRITER Like '%" + Search + "%' or YEAR Like
'%" + Search + "%'", conn);
                OleDbDataAdapter odb = new
OleDbDataAdapter(comm.CommandText, conn.ConnectionString);
                DataTable veriTablosu = new DataTable();
                try
                {
                    conn.Open();
                    odb.Fill(veriTablosu);
                    DataList2.DataSource = veriTablosu;
                    DataList2.DataBind();
                }
                catch (Exception ex)
                {
                    Response.Write(ex.Message.ToString() +
"Connection Hatası");
                }
                finally
                {
                    conn.Close();
                }
            }
            else if (SearchName == "Book")
            {
                OleDbCommand comm = new OleDbCommand("Select *
from BOOK where IS_JOURNAL=0 and (NAME Like '%" + Search + "%' or
DESCRIPTION Like '%" + Search + "%' or AUTHOR Like '%" + Search +
"%' or ISBN Like '%" + Search + "%' or TRANSLATOR Like '%" +
Search + "%')", conn);
                OleDbDataAdapter odb = new
OleDbDataAdapter(comm.CommandText, conn.ConnectionString);
                DataTable veriTablosu = new DataTable();
                try
                {
                    conn.Open();
                    odb.Fill(veriTablosu);
                    DataList1.DataSource = veriTablosu;
                    DataList1.DataBind();
                }
                catch (Exception ex)
                {
                    Response.Write(ex.Message.ToString() +
"Connection Hatası");
                }
                finally
                {
                    conn.Close();
                }
            }
            else if (SearchName == "Audio")
            {
                OleDbCommand comm = new OleDbCommand("Select *
from AUDIO where (FORMAT Like '%" + Search + "%' or SINGER_NAME
Like '%" + Search + "%' or AUDIO_NAME Like '%" + Search + "%')",
conn);
                OleDbDataAdapter odb = new
OleDbDataAdapter(comm.CommandText, conn.ConnectionString);
                DataTable veriTablosu = new DataTable();
                try
                {
                    conn.Open();
                    odb.Fill(veriTablosu);
                    DataList3.DataSource = veriTablosu;
                    DataList3.DataBind();
                }
                catch (Exception ex)
                {
                    Response.Write(ex.Message.ToString() +
"Connection Hatası");
                }
                finally
                {
                    conn.Close();
                }
            }
            else if (SearchName == "Magazine")
            {
                OleDbCommand comm = new OleDbCommand("Select *
from MAGAZINE where NAME Like '%" + Search + "%' or TYPE Like '%"
+ Search + "%'", conn);
                OleDbDataAdapter odb = new
OleDbDataAdapter(comm.CommandText, conn.ConnectionString);
                DataTable veriTablosu = new DataTable();
                try
                {
                    conn.Open();
                    odb.Fill(veriTablosu);
                    DataList4.DataSource = veriTablosu;
                    DataList4.DataBind();
                }
                catch (Exception ex)
                {
                    Response.Write(ex.Message.ToString() +
"Connection Hatası");
                }
                finally
                {
                    conn.Close();
                }
            }
        }
```

private Void **SearchMe**(String, String)

- class **Search**
- **{ }** *Library_Management_System*
- **Library Management System**, v1.0.0.0

IL instructions: 537
lines of code (LOC): 56
lines of comment: 0
Percentage Comment: 0%
Efferent coupling (MethodCe): 20
Afferent coupling (MethodCa): 1

Notes:

1. *Recommendations*: Types where TypeCe > 50 are types that depends on too many other types. They are complex and have more than one responsability. They are good candidate for refactoring**(Efferent Coupling)**

Methods	#Lines of code	#IL Instruction	CC	ILCC	Nesting	#Parameters	#Variables
SearchMe(String,String)	56	537	11	16	2	2	7

2. The **Afferent Coupling** for a particular type is the number of types that depends directly on it.

Notes:

1. *Recommendations*: Methods where **CC** is higher than 15 are hard to understand and maintain. Methods where CC is higher than 30 are extremely complex and should be split in smaller methods
2. *Recommendations*: Methods where **ILCyclomaticComplexity** is higher than 20 are hard to understand and maintain. Methods where ILCyclomaticComplexity is higher than 40 are extremely complex and should be split in smaller methods
3. *Recommendations*: Methods where **ILNestingDepth** is higher than 4 are hard to understand and maintain. Methods where ILNestingDepth is higher than 8 are extremely complex and should be split in smaller methods
4. *Recommendations*: Methods where **NbLinesOfCode** is higher than 20 are hard to understand and maintain. Methods where NbILInstructions is higher than 40 are extremely complex and should be split in smaller methods (except if they are automatically generated by a tool).
5. *Recommendations*: Methods where **NbILInstructions** is higher than 100 are hard to understand and maintain. Methods where NbILInstructions is higher than 200 are extremely complex and should be split in smaller methods (Compiler Complexity Lines)

Complete Project Measure

Name	#LOC	#IL	#Types	#Comment	%Comment	Coupling	Cohesion
LMS	272	2240	24	1310	82	55	0.08

Maurice Halstead Operator Operands & Calculations (Search Module)

Name	# of Operators	Name	# of Operators	Name	# of Operands
Private	1	Oledbcommand	10	SearchMe	1
void	1	Comm	10	SearchName	6
(	61	%	42	Search	26
)	61	Select	5	Movie	1
String	16	*	5	Name	2
,	16	From	5	Description	2
{	22	Like	21	Isbn	2
OleDbconnection	2	Or	12	Translator	1
conn	22	And	22	Audio	1
=	44	+	17	Book	1
New	16	‘	48	Magazine	1
“	76	OleDbDataAdapter	48	Format	1
Provider	1	ConnectionString	10	SingerName	1
Microsoft	1	}	5	Video	1
.	56	Try	22	Producer	1
Jet	1	Catch	5	Players	1
Oledb	23	Exception	5	Director	1
4	3	Ex	5	Writer	1
0	2	Response	5	Year	1
;	47	Write	5	ConnectionHatası	5
Data	1	Message	5	DataList1	1
Source	1	ToString	5	DataList2	1
if	5	Finally	5	DataList3	1
==	5	Fill	5	DataList4	1
Open	5	Close	5	DataList5	1
		Ele	4	Article	1
				odb	10

µ1: 51 N1:825
µ2: 26 N2:73
Program Vocabulary: µ = 77
Program length: N=N1+N2 =898
Program volume:1694,068

Difficulty:71.596
E=V*D=121.288,5405835852128381623908474
T=E/18=121.288,5/18=6738,2
B=4903,5/3000= 1.643333

Function Point Search Module

Inputs: 1 simple
DataFile: 4 simple datafiles
Outputs: 5 simple
Interfaces: 2 – 1 Simple 1 Average
Inquires: 1 Simple

Total UFPs: 1*3+4*7+5*4+5+7+3 = 66

VAF: 4*0+10*2.5(Average)=25
AFPs: 66*(0.65+0.01*25)=**59.40**

Feature Point Search Module

Algorithms:2
Inputs:2
Outputs:1
Inquiries:1
DataFiles:4
Interfaces:2
UFPs: 2*3+4*2+5*1+4*1+7*4+7*2=**55**

Jones Rules

Schedule=FP^A=59.40^0.32(Simple)=3,694 months
Staff=FP/150=59.40/150=0.396 staff number is not logical
Effort=3,694*0.396=1,462 staff month
QSM Data : C# Medium:53 LOC per FP AVG LOC will be :**53*59.40=3.1 KLOC**

Cocomo and other Estimations

COCOMOI: **E=2.4*4.554^1.05=9.535 D=2.5*E^0.38=26.68**
Walston-Felix: **E=5.2*4.554^0.91=20.66**
Bailey-Basili: **E=3.2*4.554^1.16*0.73=13.558**

Weighted Effort Estimation

WEE= 0.3*9.535+0.6*20.66+0.1*13.55/1=16.61 avg effort

Benchmark Data

For LOC:

Project is **4.54 KLOC** ; project is web business **avg productivity : 275**

4.54/275=0.016K=1.6 staff months

For FP:

59.40 FP /25 =2.376 staff months

FPs by platform type:15 FPs

59.40FP/15=3.96 staff months

53*59.40=3.1 KLOC

3.1KLOC/0.275=1.1 staff months

Object Points Search Module

1 input screen 5 views 5 data sources

1 output report that has 5 sections 4 data sources

5 existing 4 gl components

Reuse: **%60**

Productivity on past projects was **15 OPs** per SM

Total Ops= 2*1 + 1*8 + 5*10 = 60 OPS

NOP=60*(1-0.6)=24

E=24/131.846 staff months