

CHAPTER THREE

3-1 Project methodology:

The project follows the methodology of the following steps:

- 1- Preliminary study from references, scientific papers and field visits.
- 2- Identified research sample.
- 3- Identified specifications of the CMMS system.
- 4- Programming the system.
- 5- Operating the system and evaluate its performance.

The figure (3-1) shows the project methodology

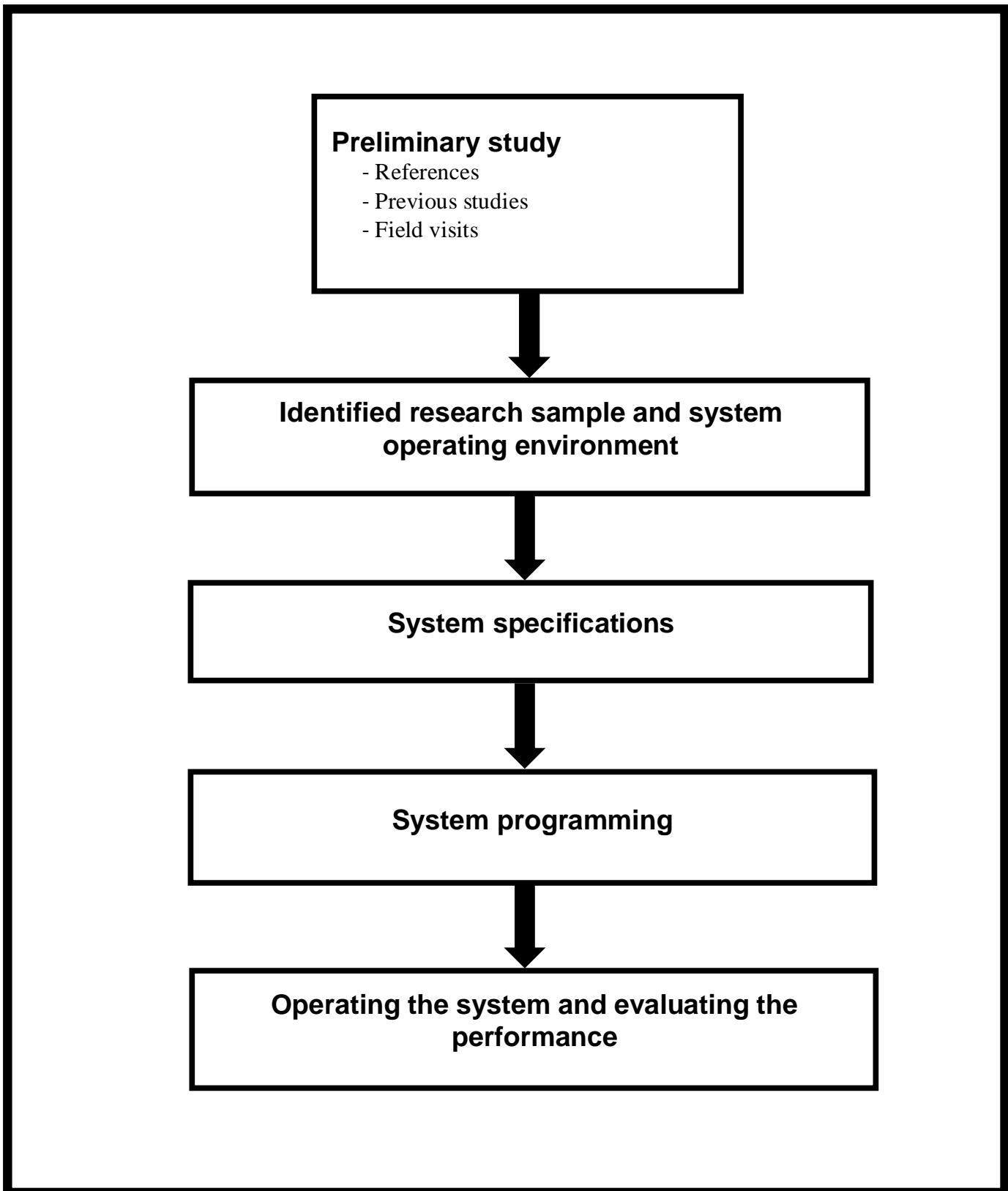


Figure (3-1) The project methodology

3-2 Field visits:

field visits are one of the important ways to collect the data, throughout this project number of visits has been perform in purpose of observing for maintenance systems to show its effectiveness and the work flow in addition to know how the communication between the maintenance department and other departments is done.

One of these visits was for leader technology for engineering products The visit concentrates on the working of maintenance department and the authority of each employee. The production lines equipped with screens on each machine. When the machine breaks down, it stops and defines the problem on the screen. Also shows all problems and its time but the dealing with the screen depends on authority of the employee. Every employee has a programmed key to open the screen that can show him the data according to his role in the factory.

The figures (3-2), (3-3), (3-4) and (3-5) show the inventory management, machine list, manual maintenance order and Daily maintenance report in leader technology for engineering products

شركة ليدر تكنولوجي للمنتجات الهندسية والفلادية

كارت صنف

رقم الكارت:	وحدة القياس:
اسم الصنف:	الحد الأقصى:
كود الصنف:	الحد الأدنى:
اسم/كود المخزن:	حد الطلب:
الموقع داخل المخزن:	كمية إعادة الطلب:

التاريخ	الاضافة			الصرف			الرصيد		أمين المخزن	
	الرقم	الكمية	سعر الوحدة	إجمالي السعر	الرقم	الكمية	السعر	مركز التكلفة		عدد

Figure (3-2) The inventory



ليدر تكنولوجي للمنتجات الهندسية Leader Technology for Engineering Products

مصنع الحديد

قائمة الماكينات والأجهزة

#	اسم الماكينة	استخدامها	سنة الصنع	بلد المنشأ	الموديل	تاريخ التشغيل
	P ₀ ماكينة مواسير	تصنيع المواسير		الهند		
	P ₁ ماكينة مواسير	تصنيع المواسير		الهند		
	P ₃ ماكينة مواسير	تصنيع المواسير		الصين		
	P ₄ ماكينة مواسير	تصنيع المواسير		الصين		
	P ₅ ماكينة مواسير	تصنيع المواسير		الصين		
	P ₆ ماكينة مواسير	تصنيع المواسير		الصين		
	E ₁ ماكينة زاوية	تصنيع الزاوية		الصين		
	S ₁ شراحة هندية	تشريح الصاج		الهند		
	S ₂ شراحة صينية	تشريح الصاج		الصين		
	H ₁ ماكينة صاج	قطع الصاج بمقاسات مختلفة		الصين		
	H ₂ ماكينة صاج	قطع الصاج بمقاسات مختلفة		الصين		
	H ₃ ماكينة صاج	قطع الصاج بمقاسات مختلفة		الصين		
	H ₄ ماكينة صاج	قطع الصاج بمقاسات مختلفة		الصين		
	PU ₁ ماكينة مداد	عمل مداد حرف Z		الصين		

Figure (3-3) machine list

تفصيلي توقيات الإنتاج لماكينات الموسير:

P6	P5	P4	P3	P1	P0	نوع التوقف
1.5	0.00	0.00	5.8	1.9	0.9	انحراف شريحة
0.67	0.00	0.17	0.17	0.00	0.0	أمبيتر
3.2	10.25	0.00	0	27	5.2	ايكاف جوده منتج
0.0	0.42	0.00	0.00	0.33	0.7	غيار طاره المنشار
16.7	1.6	1.83	0.2	4.00	7.08	ضبط
0.0	0.0	0.00	0.0	0.7	0.0	غيار نحاسه
0.0	16.00	0	32.0	44.6	0	غيار مقاس
0.0	0	0.3	0	0.00	0.00	لحام في الاحواض
0.0	0.3	0.0	0.0	0.0	0.0	لحام عريه المنشار
0	0	0.0	0.0	0.92	0.0	لحام الحامل والفرامل
22.00	28.58	2.25	38.1	79.17	13.83	الإجمالي

Figure (3-4) machine down times

التقرير اليومي لخط الموسير																	
ملاحظات	ساعات التشغيل	نسبة تنفيذ المستهدف %	الإنتاج المستهدف	الإحراق بين الخدم والإنتاج	الخام الداخل	الفرق بين الإنتاج والخدمة	الإنتاج عدد من الإنتاج	فوز ثالث (وزن)	قرز شتي (وزن)	الإنتاج السليم (وزن)	الإنتاج المعتم للخدمة	الطول	عرض الشريحة	السمك المفلس	الماتليه	اليوربه	
كهرباء عامه + انتظار تشريح	0:45	0%	0	58	1,888	-1	167	0	10	1,820	168	6	230	40x80	1	P0	1
انحراف شريحة + عطل كهربائي. كرين شريحت	5:50	68%	1,631	1,363	13,365	0	1,102	32	32	11,938	1,102	6	230	40x80	1	P0	2
	6:35	78%	1,631	1,421	15,253	-1	1,269	32	42	13,758	1,270			الإجمالي			
كهرباء عامه	6:40	60%	1,981	251	9,835	0	1,180	32	104	9,448	1,180	6	170	30x60	1	P1	1
عطل كهربائي. فصل لحام	6:35	71%	1,582	793	9,881	0	1,123	40	56	8,992	1,123	6	170	30x60	1	P1	2
	13:15	65%	3,563	1,044	19,716	0	2,303	72	160	18,440	2,303			الإجمالي			
عطل كهربائي. فصل لحام	0:00	0%	0	0	0	0	0	0	0	0	0	6	90	25x25	0.5	P3	1
عطل كهربائي. فصل لحام	0:00	0%	0	0	0	0	0	0	0	0	0	6	110	20x40	1	P3	2
	0:00	0%	0	0	0	0	0	0	0	0	0			الإجمالي			
كهرباء عامه + لحام كهرباء المبادل الحراري + كهرباء الطينون الرئيسي	5:30	50%	2,002	1,700	8,445	5	1,012	84	116	6,545	1,007	6	138	25x50	1	P4	1
عمدة	0:00	0%	0	0	0	0	0	0	0	0	0	6	138	25x50	1	P4	2
	5:30	50%	2,002	1,700	8,445	5	1,012	84	116	6,545	1,007			الإجمالي			
سبائك + كهرباء. فصل لحام	0:00	0%	0	0	0	0	0	0	0	0	0	6	124	1.25	1	P5	1
عطل كهربائي. محول	0:00	0%	0	0	0	0	0	0	0	0	0	6	75	0.75	1.4	P5	2
	0:00	0%	0	0	0	0	0	0	0	0	0			الإجمالي			
كهرباء. مفتاح تشغيل + ضبط + انحراف شريحة + أمبيتر + رولات بالمخرطة + فصل لحام + تحويل العصال	2:05	19%	1,120	-49	529	0	212	27	12	539	212	6	60	15x15	0.9	P6	1
عمدة	0:00	0%	0	0	0	0	0	0	0	0	0	6	90	1	1	P6	2
	2:05	19%	1,120	-49	529	0	212	27	12	539	212			الإجمالي			
انتظار تشريح	0:00	0%	0	0	0	0	0	0	0	0	0	6	50	1.25	1.4	E2	1
	0:00	0%	0	0	0	0	0	0	0	0	0			الإجمالي			
	27:25:00	58%	8,316	4,115	43,943	4	4,796	215	330	39,283	4,792			الإجمالي			

Figure (3-5) Daily maintenance report

3-3 The administrative structure:

The administrative structure of the factory consists of the board of directors and the general manager falls below all departments. The figure (3-6) below shows the administrative structure:

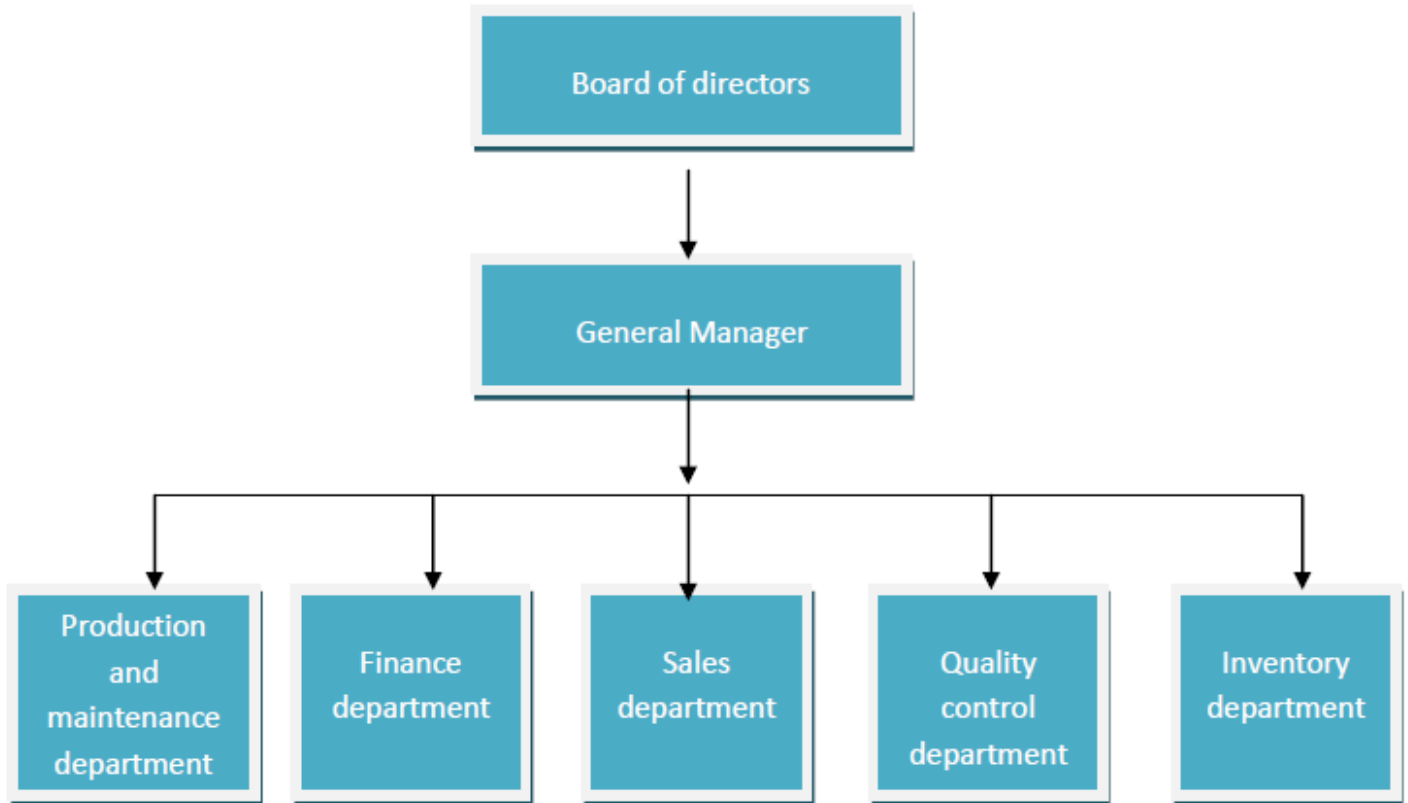


Figure (3-6) administrative structure

The board of directors is the factory owners who's responsible of funding and follow up the work according to the general manger reports General Manager is a person who lies on his shoulders all administrative burdens and resides permanently within the factory to follow the progress of work by daily reports from the department's managers. Production and maintenance departments are working together as one department, so the production manager is working as a maintenance

manager and the operator of each machine is working as a maintenance technician of his machine. The project focuses on the role of maintenance department and its relations with other departments. The departments of sale, financial and inventory are representing in one person for each department. The quality control department is working to ensure the products meet the specific standards.

3-4 The relations between maintenance department and other

Departments:

As known the maintenance department is working with other departments to accomplish the factory goals. It associated with the inventory department that provides spare parts for processes. It is working also with the production department to schedule the maintenance processes within the production time. The maintenance department reports the general manager for executed maintenance processes and assets history.

3-5 Maintenance processes in the factory:

The manufacturer train the technicians when it implemented the factory to operate and maintain the machines. The factory has three types of maintenance as:

- 1- Breakdown maintenance for unexpected failures that stops the production.
- 2- Weekly maintenance usually done in Friday to repair the problems that doesn't stop the production.
- 3- Yearly maintenance that stops the production for one month to review the status of machines and renew it. It is done by the manufacturer

3-6 System specifications:

After finishing the preliminary studies within identified where the system should be run that lead to know what the requirements to be met in the system. It can be summarized in these points:

- 1- Documentation of maintenance data and its files.
- 2- The system must be easy and simple for data workflow.
- 3- The system must help to improve the effectiveness of maintenance.
- 4- Contributing to increase oversight and control.
- 5- Contributing to reduce downtime and increase operating life by applying the preventive maintenance in the best way.
- 6- The system must find the optimal way to linking the departments that work with the maintenance department.

3-7 System programming:

3-7-1 Visual Basic Characteristics:

Visual Basic is used to create Windows Applications that work on windows; (means Graphical User Interface). Visual basic depends on elements; every element must have the following characteristics: Name, Properties, Method, Event.

Object:

1-Name:

The name of the element or the tool used to write the codes. Every declared element has a name, also called an identifier, which is what the code uses to refer to it. There are some examples of the names and their shortcuts shown below in

Table (3-1)

Object	Shortcut
Form	Frm
Command Button	Cmd
Textbox	Txt
Label	Lbl
Option Button	Opt
Listbox	Lst
Image	Img

Table (3-1) names and their shortcuts

2-Properties:

Show changes on the characteristics, or property settings, of one or more user interface elements on a page. A property setting is a quality of one of the objects in the program, such as its position on the screen, its size, the text displayed on it, change the text name, the background, the font, shape, the behavior, the window style and so on. Figure (3-7) shown the properties.

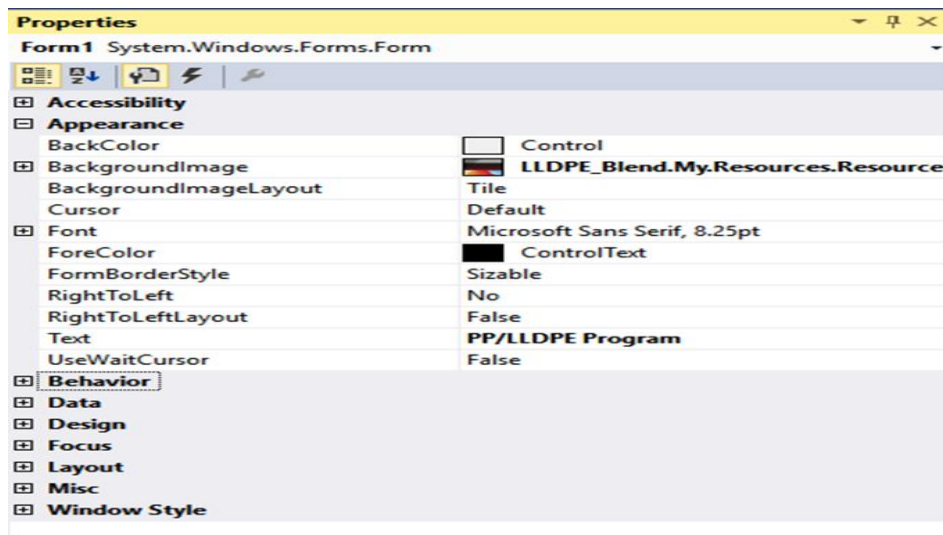


Figure (3-7) properties

3-Method:

It is an action done by the user or the operating system or the program itself. For example, pressing keys on the keyboard, clicking a mouse button, the expiration of a period of time, receive data from a computer ports.

4-Event:

An event is a signal that informs an application that something important has occurred. For example, when a user clicks a control on a form, the form can raise a Click event and call a procedure that handles the event. Events also allow separate tasks to communicate. for example, application performs a sort task separately from the main application. If a user cancels the sort, the application can send a cancel event instructing the sort process to stop.

Form:

Is a window that the software interface designed on it through Control mode tools. As shown in figure (3-8)

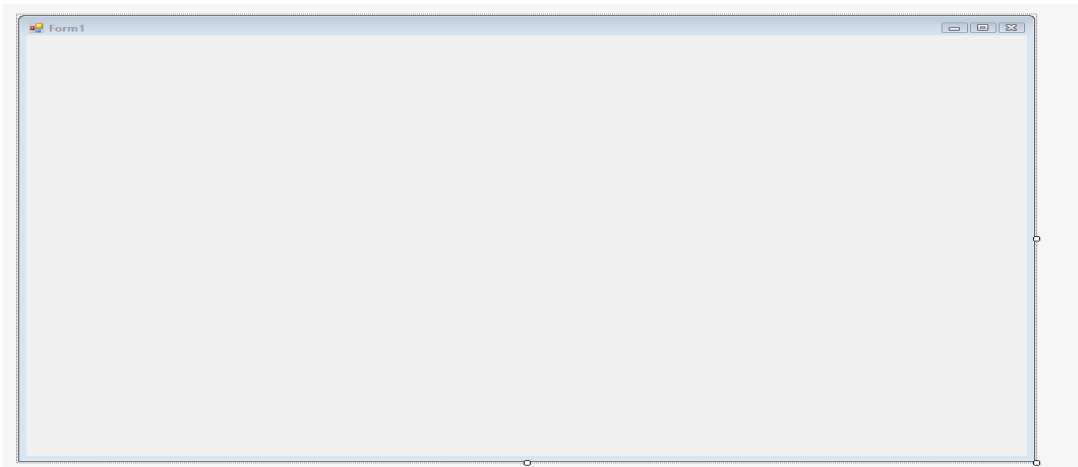


Figure (3-8) Form

Toolbox:

Contain control tools. These control tools are a components have been designed in Visual Basic to perform a particular function in the program, so that those control tools can perform function and must possess certain characteristics differ from other component has different characteristics and different function.

As shown in figure (3-9)

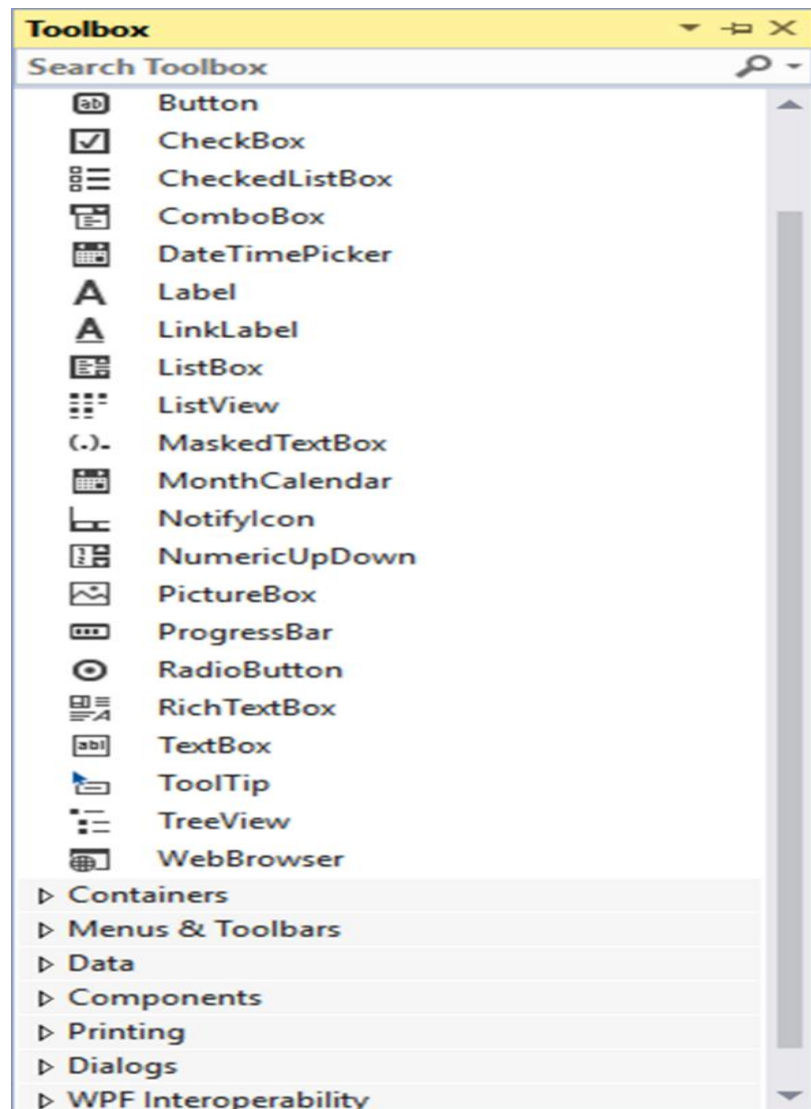


Figure (3-9) Toolbox

Button: As shown in figure (3-10)

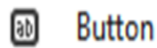


Figure (3-10) Button

Label: As shown in figure (3-11)



Figure (3-11) Label

PictureBox: As shown in figure (3-12)



Figure (3-12) picturebox

Textbox:

The Text Box control is the primary mechanism for displaying and entering text. It is a small text editor that provides all the basic text editing facilities: inserting and selecting text, scrolling if the text doesn't fit in the control's area, and even exchanging text with other applications through the Clipboard.

As shown in figure (3-13)



Figure (3-13) Textbox

Datagridview: As shown in figure (3-14)

Figure (3-14) Datagridview

Solution Explorer:

It displays the list of files and folders in the project or projects within the solution. As shown in figure (3-15)

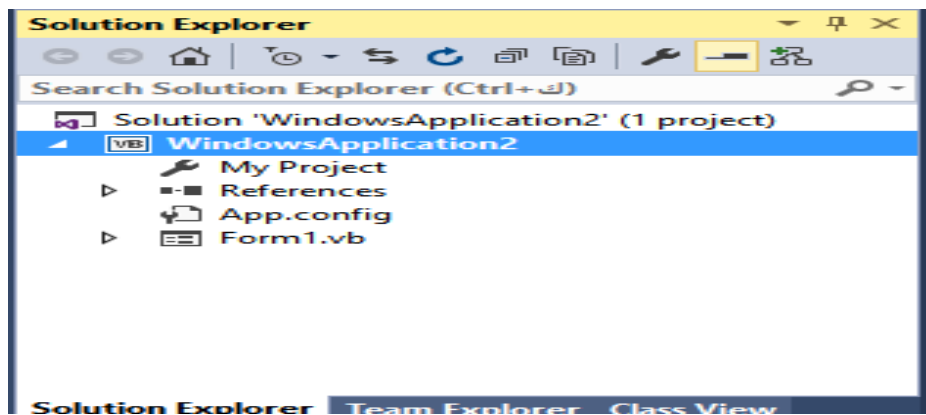


Figure (3-15) Solution Explorer

Code Window:

It is used to write software codes to access to this Window: double-clicking on the design or any object then it will open. As shown in figure (13-16)

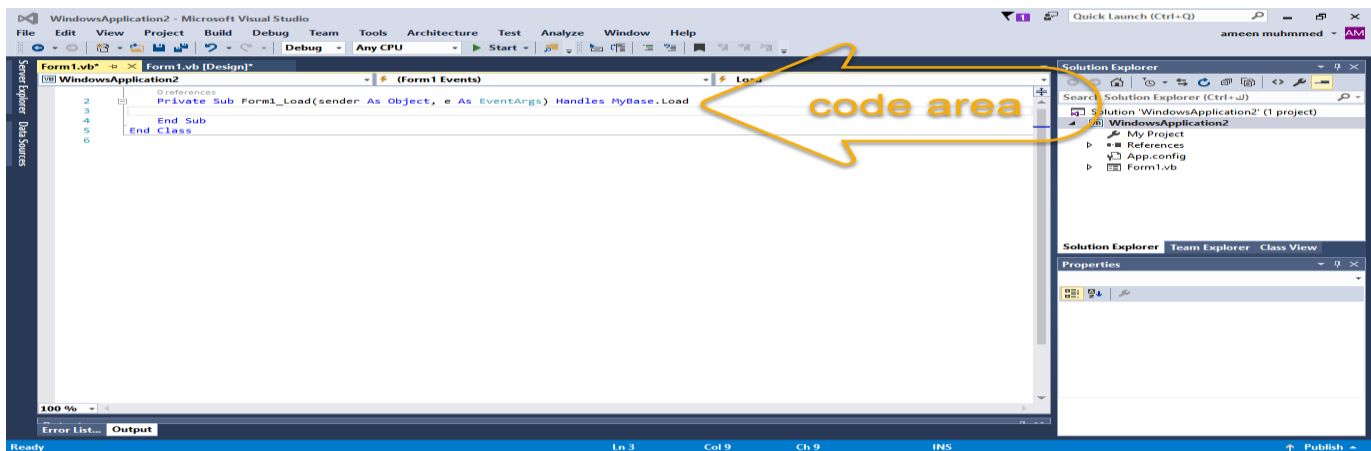


Figure (3-16) Code Window

3-7-2 The steps to create to a visual basic program:

Step 1: Create a Project in Visual Basic

Step 2: Create a User Interface and Customizing Looks and Behavior

Step 3: Add Visual Basic Code

Step 4: Run and Test Your Program

Step 5: Publishing the program

Step 1: Creating a project in visual basic As shown in figure (3-17)

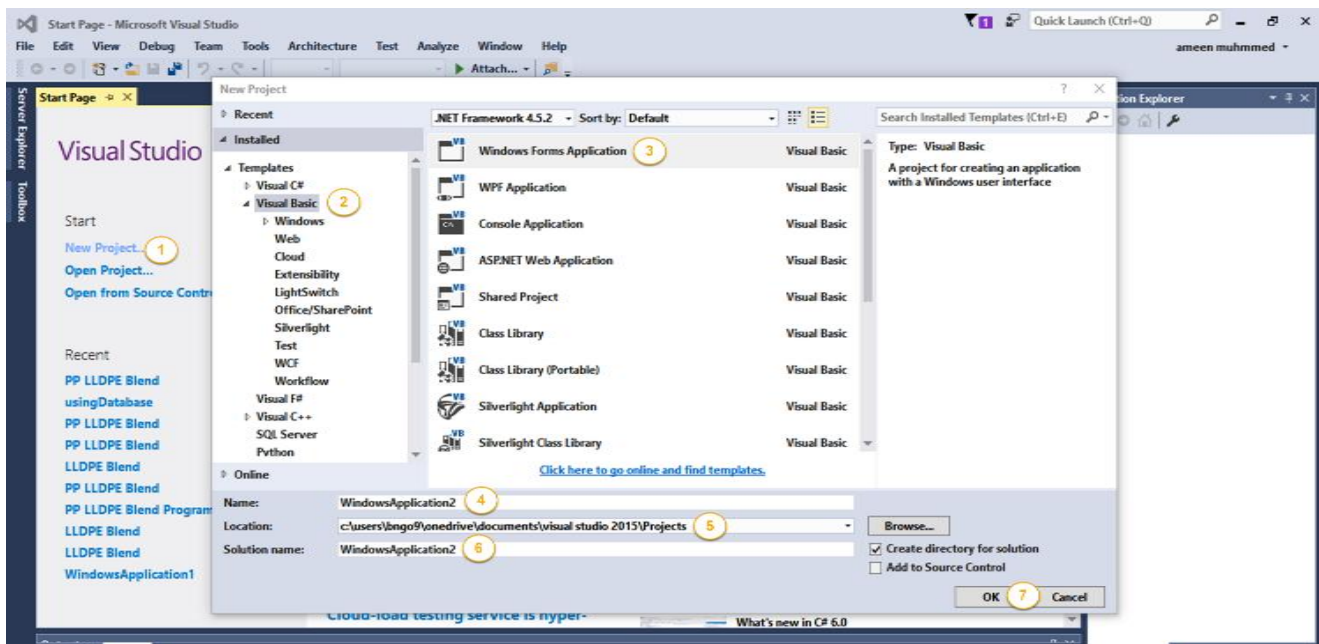


Figure (3-17) Create a Project

- 1-Click on new project.
- 2-Chose visual basic language.
- 3-Chose windows form application.
- 4-Write project name.
- 5-Chose the project location on the computer.
- 6-Write solution name.
- 7-Press ok to start.

Step 2: Create a User Interface and Customizing Looks and Behavior:

Designing the authority form:

- Combobox for selecting the user either manger or any other user.
- Textbox for user name and password.
- Two buttons for enter and exit.
- Adding Labels.

As shown in figure (3-18)

The screenshot shows a login form on a green background. On the left, there is a circular icon containing a black key. The form consists of a dropdown menu at the top with a blue border and a downward arrow, currently showing 'مدير' (Manager) and 'مستخدم' (User) as options. Below the dropdown are two white text input fields. To the right of these fields are labels in Arabic: 'الصلاحية:' (Authority), 'إسم المستخدم:' (User name), and 'كلمة المرور:' (Password). At the bottom of the form are two buttons: 'إلغاء' (Cancel) on the left and 'دخول' (Login) on the right.

Figure (3-18) authority

- Manger identity confirmation:

As shown in figure (3-19)

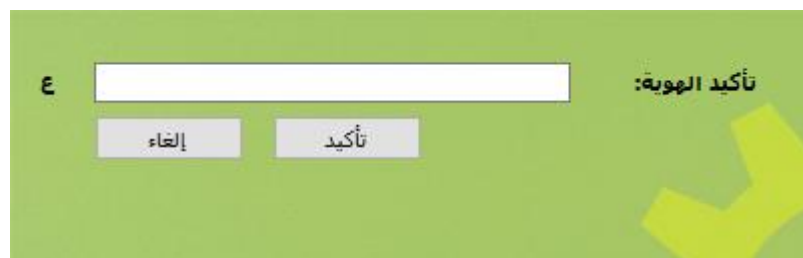
The screenshot shows a confirmation form on a green background. It features a single white text input field with a small 'ع' icon to its left. To the right of the field is the label 'تأكيد الهوية:' (Confirm identity). Below the input field are two buttons: 'إلغاء' (Cancel) on the left and 'تأكيد' (Confirm) on the right.

Figure (3-19) Identity confirmation

The main form design:

- From properties: Changing the form background, size.
- Adding logos using picturebox.

- Adding titles using label.

As shown in figure (3-20)



Figure (3-20) main form

Menu strip:

As shown in figure (3-21)



Figure (3-21) Menu strip

File menu:

As shown in figure (3-22)

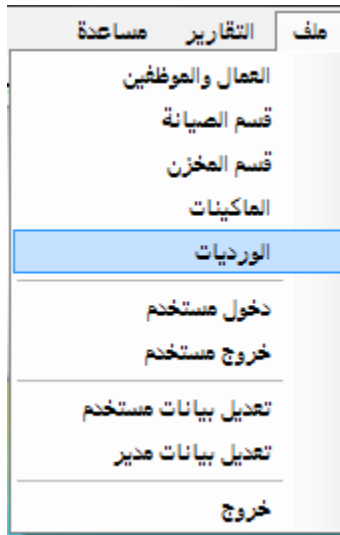


Figure (3-22) File menu

Reports menu:

As shown in figure (3-23)

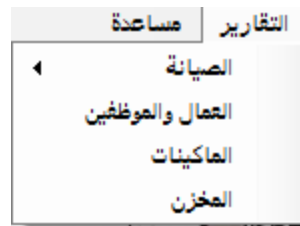


Figure (3-23) Reports menu

Help menu: As shown in figure (3-24)

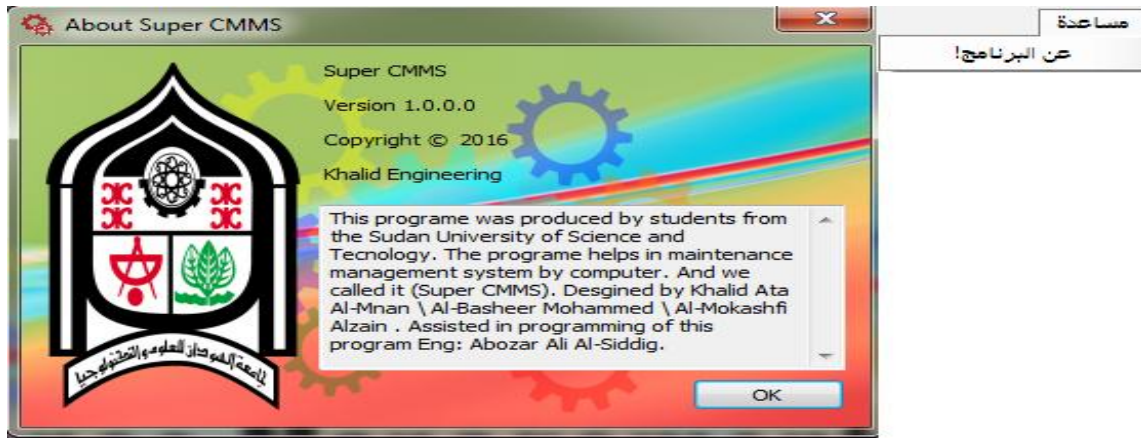


Figure (3-24) Help menu

Designing maintenance department form, inventory form, machines form, employers and workers form, shifts form, editing manger and user data form, and reports forms.

All forms have similar objects in form design:

Adding menustrip to create toolbar for all forms

As shown in figure (3-25)



Figure (3-25) menustrip

Adding labels, textboxes, combobox if it is found, buttons and datagridview

Maintenance order form: As shown in figure (3-26)

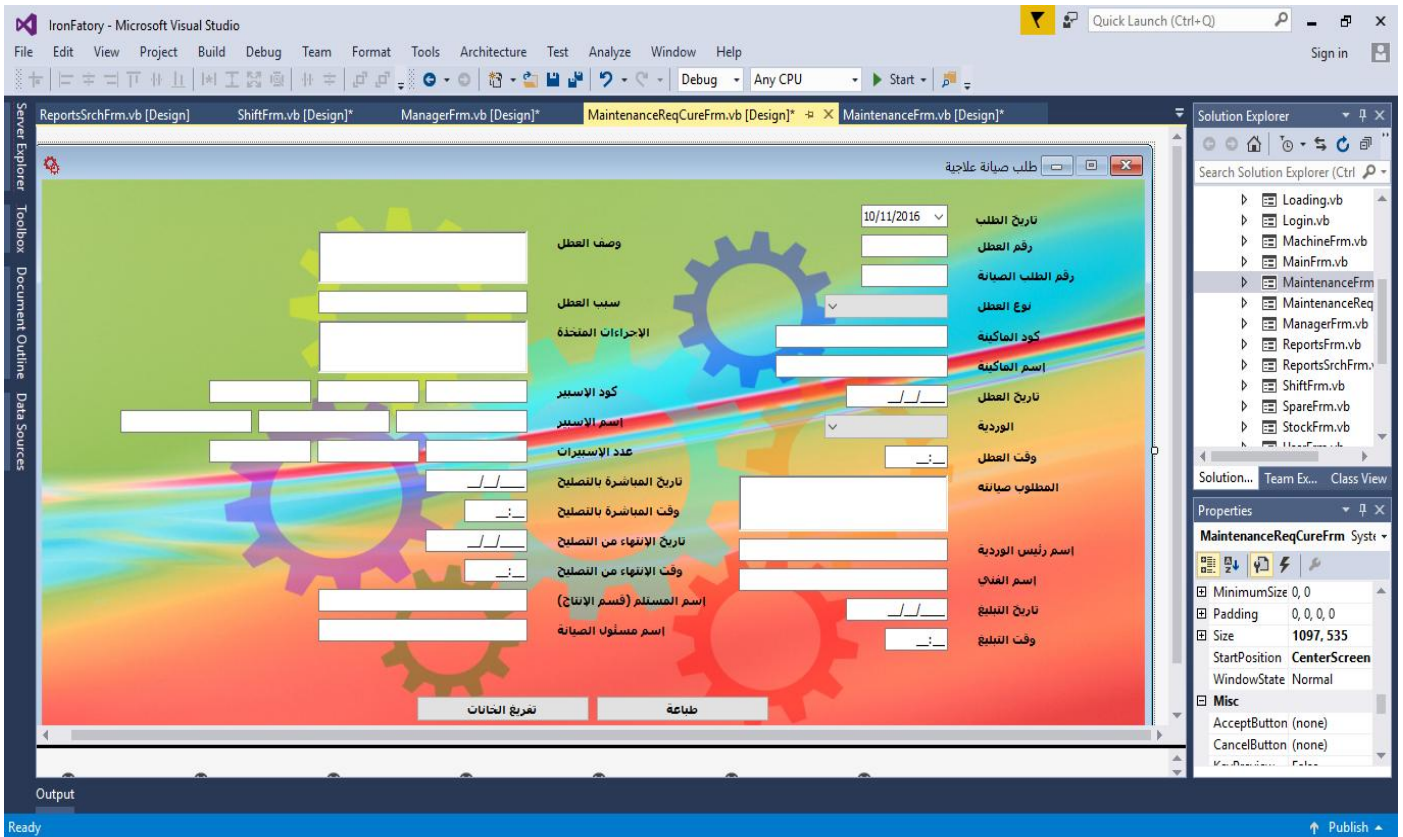


Figure (3-26) Maintenance order form

Inventory form: As shown in figure (3-27)



Figure (3-27) Inventory form

Machines form: As shown in figure (3-28)

Figure (3-28) Machines form

Employers and workers form: As shown in figure (3-29)

Figure (3-29) workers form

The other forms have the same object and design but different on labels name in some cases.

The Reports:

- Printing button
- Exporting button

- Zoom button

As shown in figure (3-30)

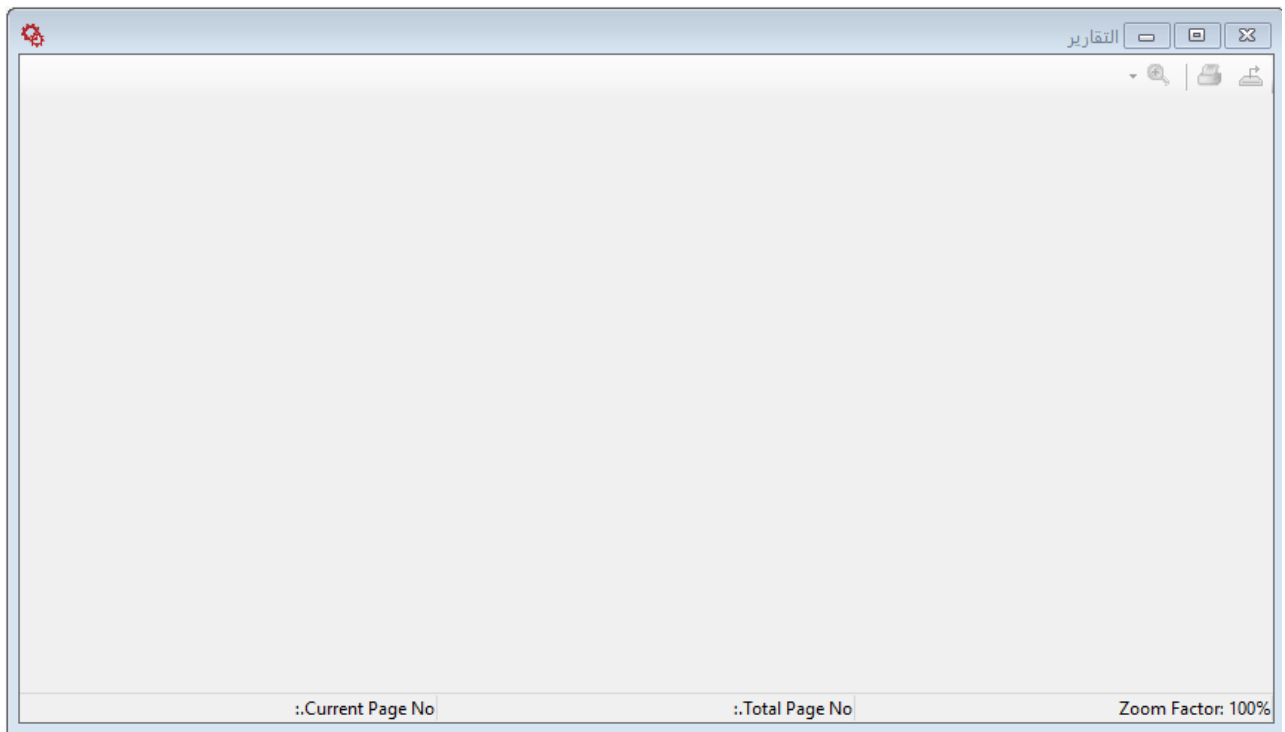


Figure (3-30) Reports form

Step 3: Add Visual Basic Code

Link and connect the database.

Step 4: Run and Test Your Program

Operate and evaluate the output system.

Pressing start on the program toolbar will start testing the program

As shown in figure (3-31)

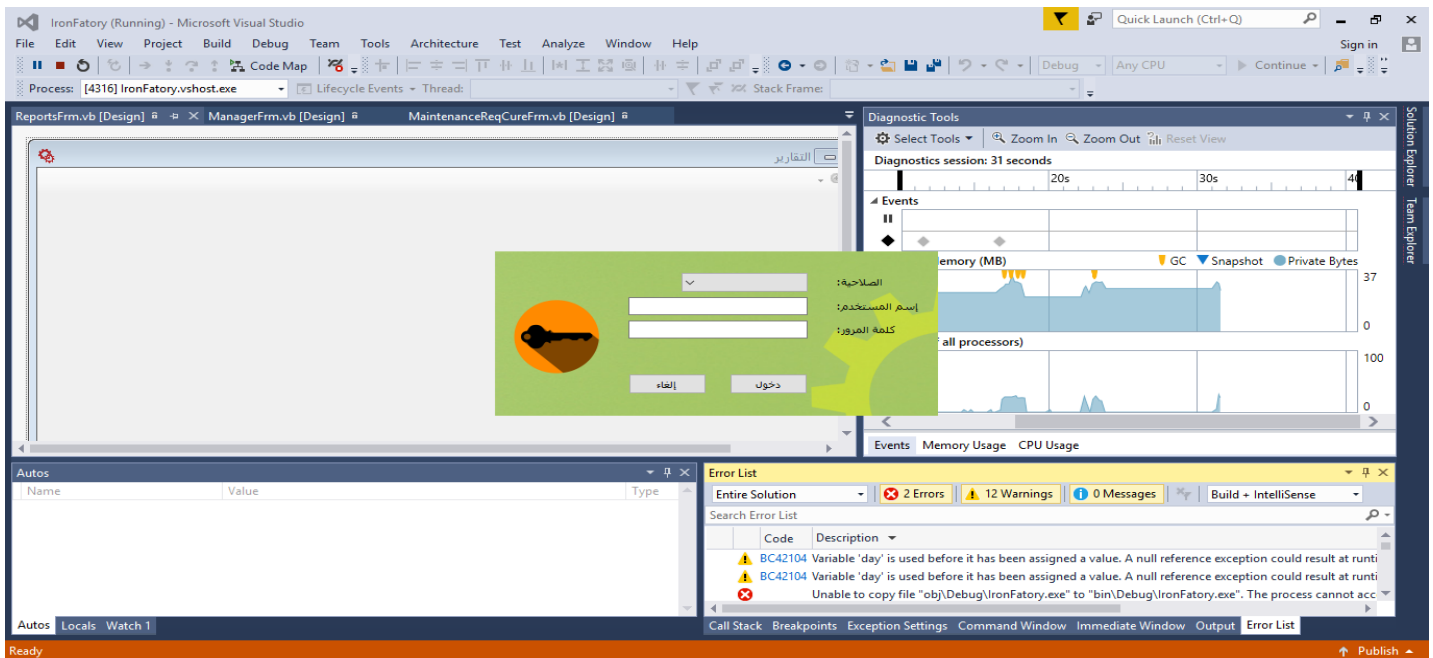


Figure (3-31) Run and Test Program

Step 5: Publishing the program:

- In toolbar click on build
- chose publish
- choose the file path to save it on computer
- Click finish

As shown in figure (3-32)

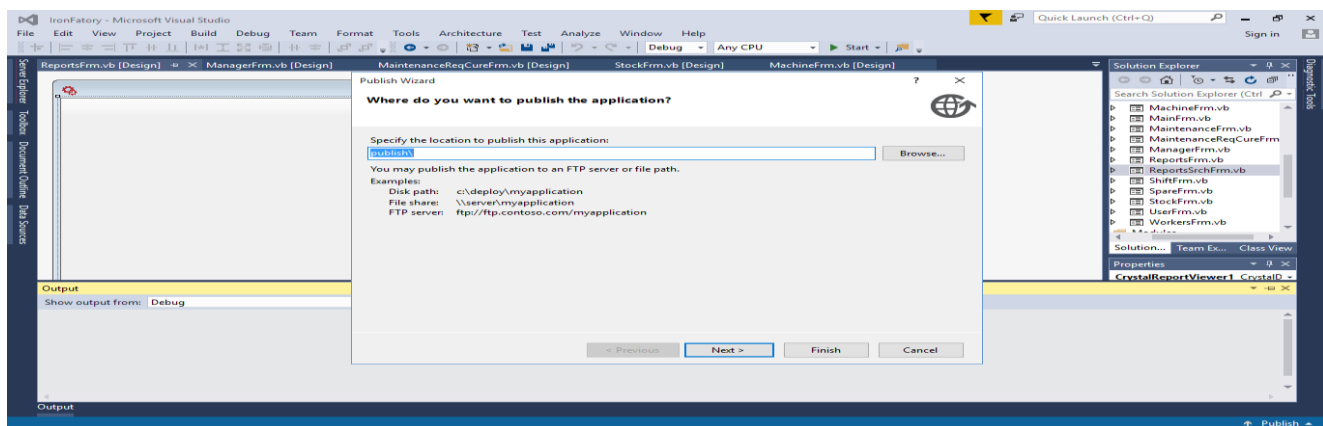


Figure (3-32) Publishing the program