



**University of Diyala**  
**College of Science**  
**Department of Computer**

## **Improvement of Search Speed Using PSO Algorithm in Students Management System**

**Research Project Presented to the Department of  
Computers - College of Science - University of Diyala as a  
Part of the Requirements for Bs.c Degree in Computer  
Science**

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**1442 A.H.**

**2021 A.D.**

جامعة ديالى  
كلية العلوم  
قسم علوم الحاسوب



## تحسين سرعة البحث باستخدام خوارزمية PSO في نظام إدارة معلومات الطلبة

مشروع بحث مقدم الى قسم علوم الحاسوب - كلية العلوم - جامعة ديالى كجزء  
من متطلبات الحصول على شهادة البكالوريوس في علوم الحاسوب

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

يَرْفَعِ اللَّهُ الَّذِينَ ءَامَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ  
بِمَا تَعْمَلُونَ خَبِيرٌ ﴿11﴾

صَدَقَ اللهُ الْعَظِيمُ،

سورة المجادلة الآية [11]

## الإهداء

الى من حصدوا الأشواك عن دربي ليمهدوا لي طريق العلم والنجاح إلى من أحببتهم  
حبا لو مر على أرض قاحلة لتفجرت منها ينابيع المحبة.

(أمي أبي)

إلى من هم أقرب إلى من روحي إلى من شاركوني حزن الأم وحنان الأب.

(إخوتي وأخواتي)

إلى من دخل حياتي فأضاء لي الطريق.. إلى فرحت عمري وسر سعادتي إلى من  
دعمني وساندني في كل ظروفني إلى القلب المعطاء وأروع خلق الله في عيني

(رفيق دربي)

إلى أناس غيبهم الموت عنا فأصبحوا ذكرى جميلة لنا.

(جدي جدتي)

إلى من ساروا معي في درب العلم وتخطينا معاً عقبات الفشل حتى وصلنا إلى طريق  
النجاح.

(أصدقائي)

إلى شموع تحترق ليس من أجل الفناء إنما لتنير لنا طريق العلم والمعرفة.

(اساتذتنا الأعزاء)

اهدي لهم هذا البحث اعترافا مني بفضلهم وحسن توجيههم.

## شكر وتقدير

اشكر الله العلي القدير الذي أنعم عليّ بنعمة العقل والدين، فبعد شكر المولى عز وجل، المتفضل بجليل النعم، وعظيم الجزاء.. يجدر بي أن أتقدم ببالغ الامتنان، وجزيل العرفان إلى كل من وجهني، وعلمني، وأخذ بيدي في سبيل إنجاز هذا البحث.. وأخص بذلك مشرفي أ. د. زياد طارق مصطفى الذي أرشد، وتابع، وصوب، بحسن إرشاده لي في كل مرحلة من مراحل البحث.

كما أحمل الشكر والعرفان لكل من أمدني بالعلم، والمعرفة، وأسدى ليّ النصح، والتوجيه، وإلى ذلك الصرح العلمي الشامخ متمثلاً في جامعة ديالى، وأخص بالذكر كلية العلوم، قسم الحاسوب، والقائمين عليها. كما أتوجه بالشكر إلى كل من ساندني بدعواته الصادقة، أو تمنياته المخلصة وأتمنى من الله عز وجل أن يجعل ذلك في ميزان حسناتهم.

## ABSTRACT

The use of the student information management system has become an important matter in educational institutions because of the services they provide that contribute to the completion of the work quickly and accurately and save time and effort, so we need to create and design a student information management system in order to arrange data and ease of displaying, moving between and processing it, as well as searching it using an algorithm. PSO to increase and improve the speed of searching between records. This system depends on the student's name, sequence, code, address, gender, date of birth, phone number, e-mail, type of study, stage of study, and a personal photo of the student. Therefore, this research project provides a smooth and simple system for the educational institution in managing and organizing students' information and also the search speed is high and distinguished by using the **particle swarm optimization (PSO) algorithm**. This system was designed using the **visual Basic version 10** program, as well as connecting the system to a database of type Access in **Microsoft Access 2007** program so that this system is ready for use and dedicated to the Faculty of Science, Diyala University, as it was built and designed for the departments of Diyala University's College of Sciences. This system is characterized by accuracy, reliability and safety if every user, department manager, or college has a username and password for the department It cannot enter the system unless it is entered correctly. It also has good features such as printing, deleting, updating or modifying data and moving between its records.

This system was previously designed, but we, in turn, have developed and re-designed and added to it by adding new tools that make the system more flexible than the previous one.

## الخلاصة

إن استخدام نظام ادارة معلومات الطلبة أصبح أمرا مهم في المؤسسات التعميمية لما تقدمه من خدمات تساهم في انجاز العمل بسرعة ودقة وتوفير في الوقت والجهد ، لذلك نحتاج إلى انشاء وتصميم نظام ادارة معلومات الطلبة من اجل ترتيب البيانات وسهولة عرضها والتنقل بينها ومعالجتها وكذلك البحث فيها بأستخدام خوارزمية PSO لزيادة وتحسين سرعة البحث بين السجلات، ويعتمد هذا النظام على اسم الطالب وتسلسله والشفرة الخاصة به وعنوانه وجنسه وتاريخ ميلاده ورقم هاتفه وبريده الالكتروني ونوع دراسته والمرحلة الدراسية وصورة شخصية للطالب، لذلك يقدم مشروع البحث هذا نظاما سلسا وبسيطا للمؤسسة التعليمية في ادارة وتنظيم المعلومات الخاصة بالطلبة وايضا تكون سرعة البحث عاليا ومتميزة باستخدام خوارزمية **particle swarm optimization (PSO)** لقد تم تصميم هذا النظام بأستخدام برنامج الفجول بيسك الاصدار ١٠ وكذلك ربط النظام بقاعدة بيانات من نوع **Access** في برنامج **Microsoft Access 2007** ليكون هذا النظام جاهز للاستخدام ومخصص لكلية العلوم جامعة ديالى إذ تم بنائه وتصميمه لما تحتويه كلية العلوم جامعة ديالى من اقسام يتميز هذا النظام بالدقة والموثوقية والامان اذا يمتلك كل مستخدم او مدير قسم او كلية اسم مسخدم وكلمة مرور خاصة بالقسم فلا يمكنه الدخول الى النظام الا بعد ادخالها بشكل صحيح وايضا يتميز بخصائص جيدة مثل طباعة البيانات او حذفها او تحديثها او تعديلها والتنقل بين سجلاتها.

هذا النظام تم تصميمه سابقا ولاكن نحن بدورنا قمنا بتطويره واعادة التصميم والاضافة عليه من خلال اضافة ادوات جديدة تجعل النظام مرن أكثر من السابق.

## SUPERVISOR CERTIFICATION

---

**I certify that the preparation of this project entitled**  
Improvement of Search Speed Using PSO Algorithm in  
Students Management System

**Prepared by**

- 1. Aya Hazim Mohammed**
- 2. Omar Essam Mahdi**
- 3. Marwan Salim Qurgi**

Was made under my supervision in the Department of Computer  
Science/College of Science/University of Diyala and it is part of the  
requirements for obtaining a Bachelor's degree in Computer Science

**Signature:**

**Name:**

**Date:**

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# **CHAPTER 1**

## **INTRODUCTION**

# Chapter One

## Introduction

### 1.1 Overview

This project is a student information management system in the College of Science, Diyala University. This project is a simple desktop project programmed using the Visual Basic version10 programming language. This project works as follows: - The user logs in to the system and then the college's departments appear for him. The user logs into any department through the department's username and password. After that, the user logs into the intended section by adding data or student information or modifying information. There are two types of searches, the first is the regular search and the second is the search using the PSO algorithm. The PSO algorithm was used for the purpose of increasing the speed of searching between the entries or records. This project or system includes the student's name, sequence and code, as well as gender, staff, phone, e-mail, stage of study, year of study, and a personal photo of the student. The user can also update students' information every year they move to. The system provides the possibility of entering information or data easily, as it is an easy and simple system to use, as those who use this system will not face any difficulty in working on it. This system uses some external files and tools such as "an external database of the type of Access". In general, this project works on managing student files.

### 1.2 Work Requirements

- 1- Working in this system requires personal information of the student.
- 2- The information required for the student is (name, gender, address, phone number, email, stage of study, academic year, and a personal photo)
- 3- Managing all this information through the features (add, delete, amend, save, move between records or entries, search). Also change the font color, font size, and worksheet shape.

### **1.3 Problem**

The problem of this research lies in the design and implementation of the student information management system, the speed of search using the PSO algorithm. This system has the following requirements:

- 1- The system is a system for entering information for students, updating or modifying it at any time, and easy to manage.
- 2- Incorrectly entering information or data, mistakes may occur when searching.

### **1.4 Aim of Project**

The aim of this project is to build a system that manages student information without the need for paper files, as this system saves time and effort, as well as provides quick search for any entry or record for a specific student for the purpose of viewing the record, modifying it or deleting it. Using the PSO algorithm. And it is also easy to use.

### **1.5 Project Outlines**

The remaining chapters are:

**Chapter Two** which is entitled Theoretical Background

**Chapter Three** which is entitled The Proposed Platform and Results.

**Chapter Four** which is entitled Conclusions, and Suggestions for Future Work.

# CHAPTER 2

## Theoretical Background

# Chapter Two

## Theoretical Background

### 2.1 Introduction

The explosive growth of information technology and communication systems makes our life always changeable. But, this growth depends on theoretical basis. Therefore, this chapter presents the theory of the used software and programming languages.

### 2.2 Databases

The technological revolution that emerged at the end of the last century is one of the main drivers of the inflated volume of institutional information in all areas of work and various aspects. The increase in the emergence of different types of them is a reason for the increased need to use different information records, and given the difficulty of dealing with the huge amount of this data in terms of research, classification and keeping pace with technological development at the level of the computerized digital field; Database technology emerged to satisfy the needs of various data processing operations in digital form.

Database: It is a set of information organized in a way that allows access, amendment, and easy management. Databases are used by organizations to store, retrieve, and manage information.[13]

It is a collection of information organized in a way that allows it to be easily accessed, modified, and managed. Databases are used by organizations to store, retrieve, and manage information. With the development of databases around the middle of the last century, a new way was invented to facilitate database management, through special software called Database Management System (DBMS). [10][11][12]

Database management systems Database management systems are computer software specialized in creating and managing databases, and they provide both the user and the programmer with special ways to create, retrieve, and modify data. , or

between databases and application programs.[4] Database management systems depend on special programming languages called (Query Language).[13]

### **2.3 The importance of databases**

1. Databases help greatly in speeding up the process of accessing the data they contain, so instead of searching here and there, the necessary data are collected in order to facilitate the process of accessing it, processing it or employing it in various works in the future.
2. Databases greatly facilitate the process of amending this data in the future, and greatly facilitate the process of making the necessary updates, in addition to facilitating the operations of deletion or addition.
3. Databases help in answering any question or inquiry directly related to the data that has been saved and stored within these rules, at any time.
4. Helps to coordinate and collect big data in a hierarchical manner to facilitate management and retrieval.
5. The ability to handle large amounts of data.
6. Providing quick and easy access to data through specific reference points.
7. Working within a collaborative work environment through interconnected networks.
8. Provide adequate protection for the data from damage.
9. Provide sufficient flexibility to deal with data fields in terms of size and type.

### **2.4 Database creation steps**

1. Determine the purpose of the database and how to use it, and this includes familiarity with the information we want to obtain from the database and identifying the topics that we need to store information about in tables.
2. Determine the tables we need. Each table must contain information on one topic, that is, when each table contains facts about one topic, you can keep information about each topic separately from other topics.

3. Determine what fields we need Each table should contain information about the same topic. Each field in the table contains unique facts about the topic of that table.
4. Define fields by unique values (data field types).
5. Define relationships between tables.
6. Enter data and create database objects.

[10][11][12].

## **2.5 Microsoft Access**

One of the most famous databases, which is used in arranging databases, extracting results from them, and making the necessary inquiries. It is a graphic program that runs under the Windows graphical environment. This program contains a variety of objects that can be used to display and manage information such as tables, forms, reports, queries, macros, modules, and data access pages.

(Access) is an application for managing, organizing databases and making reports, that enables multiple users to work together at the same time in an (Access) database. It is a powerful software for managing business contacts and organizing employee task. With Access, you can create relational databases, which in turn store related data, for example, you can create a relational database to store all the data related to a job (data about employees, students), and so on. The relational database makes the process of searching, analyzing, maintaining and protecting data very easy as it stores all the data in one place only. [15]

- **Advantages of Microsoft Access databases**

1. Collecting all the base objects in one file that takes the MDB extension, and this is undoubtedly easier to deal with the rule, although it may represent a danger to the base on the one hand that damage to this file also leads to damage to all the base objects.

2. Import and export various types of data to Microsoft Office suite programs or to other databases and programs.
3. Multiple levels of security at the base and multiple users.
4. The possibility of placing the base on an internal communication network and operating it from multiple users simultaneously.
5. The presence of features and methods that enable the user to fully control the base and its data and prevent changing its design. [15]

- **Access database components**

Microsoft has developed in this program objects that help the user to enter and extract data from the base and print it, and these objects are:

1. Tables: It is the place to store data in the base, and tables consist of fields (columns) and records (rows).
2. Queries: It is, as its name indicates, a query for specific data in the rule to which specific criteria apply, or objects to perform operations on the data in tables, such as deleting or updating records, creating tables, or appending records to them.
3. Forms: This is where you record and edit the data you want to save in the table.
4. Reports: They are objects for displaying and printing data in a variety of shapes, methods, and formats .

[15]

## **2.6 Visual studio**

The Visual Studio *integrated development environment* is a creative launching pad that you can use to edit, debug, and build code, and then publish an app. An integrated development environment (IDE) is a feature-rich program that can be used for many aspects of software development. Over and above the standard editor and debugger that most IDEs provide, Visual Studio includes compilers, code completion tools, graphical designers, and many more features to ease the software development process. [16]

## **2.7 Visual Basic**

Visual Basic:- is a development environment and programming language from Microsoft Corporation based on the famous BASIC language. It is classified within the programming languages of objects. Since Microsoft began releasing Visual Basic, it has been very successful and popular among programmers due to the ease of use in exchange for the extreme complexity faced by any programmer seeking to program Windows using the C language or C ++ programming .

Visual Basic is suitable for database applications, applications for small businesses, and accounting programs. It is convenient, easy and performs the purpose in addition to allowing the programmer to focus on solving the problem, as he often finds technical difficulty while writing a program in Visual Basic. But it remains to be mentioned that Visual Basic programs are not fully translated into machine language, such as C ++ or Delphi programming language, but are translated into an intermediate code (code) that communicates with a link library called "Run Time library" whose name is MSVBM.dll with the replacement of the question marks. Version number. [16]

The Visual Basic programming language is a programming language with a visual design for a graphical interface, unlike some languages such as (Assembly) with a black screen. As this language contains many commands within it, and it is an easy to-implement language. This version of the program developed from the old version of the BASIC language that works under the DOS environment to this version that works under the Windows environment. The language depends in developing its . [16]

## **2.8 Particle swarm optimization (PSO)**

### **2.8.1 Introduction**

In order to survive, the main objective of all creatures is foraging. Foraging behavior is cooperative in the same species. Each agent in the swarm communicates with others in such a way to find the food in the shortest time and way. This capability of all lively beings gives inspiration to the human being in order to find solutions to the optimization problems. Collective foraging behaviors of the lively beings are called swarm intelligence. Most of the animals live as social groups in order to find foods easily and protect from the enemies to survive. Each individual lives in their habitat. Looking for food, they use their own experiences called cognitive movements as well as the experience of their leaders called social movements. Optimization is to find the best solution to a given problem under some constraints. All disciplines use optimization for finding the best solution for their problems. Optimization is the first and foremost objective for engineers too. So especially in the future engineering applications, optimization will be an indispensable part of the product. Optimization is everywhere. In the production of a new device, in a new artificial intelligence technique, in a big data application or in a deep learning network, optimization is the most important part of the application. To design a device with optimum sizes using minimum energy, to train a network, to minimize the error between the desired output and real output values, optimization is required. Because of the difficulties of classical optimization algorithms, scientists have started to find an easy way to solve their problems in the last 1960s. The development of the computers made the efforts of the scientists easy, and completely new problem solution techniques are Particle Swarm Optimization with Applications studied. These techniques using heuristic information were derivative free, easy to implement, and shorten the solution time. The first product of these studies is genetic algorithm (GA) developed by Holland [1]. The evolutionary idea has been applied to the solution of the optimization problems. Instead of the evolving only one solution, a group of solutions called population has been used in the algorithm. Each solution is called individual. By this way, running such

algorithms with multiple processors could be possible. After GA, simulated annealing [2] has been generally accepted as the second algorithm, inspired from the annealing process of physical materials. In high temperatures, particles move randomly in order to explore the solution space. While temperature is decreasing, particles try to create a perfect crystalline structure, only with local movements.

## **2. Particle swarm optimization**

Particle swarm optimization (PSO) is accepted as the second population-based algorithm inspired from animals. Since James Kennedy (a social psychologist) and Russell C. Eberhart simulated the bird flocking and fish schooling foraging behaviors, they have used this simulation to the solution of an optimization problem and published their idea in a conference in 1995 [3] for the optimization of continuous nonlinear functions. There are two main concepts in the algorithm: velocity and coordinate for each particle. Each particle has a coordinate and an initial velocity in a solution space. As the algorithm progresses, the particles converge toward the best solution coordinates. Since PSO is quite simple to implement, it requires less memory and has no operator. Due to this simplicity, PSO is also a fast algorithm. Different versions of PSO have been developed, using some operators since the first version of PSO was published. In the first versions of PSO, the velocity was calculated with a basic formula using current velocity, personal best and local best values in the formula, multiplying stochastic variables. The current particle updates its previous velocity, not only its previous best but also the global best. The total probability was distributed between local and global best using stochastic variables. In the next versions, in order to control the velocity, an inertia weight was introduced by Shi and Eberhart in 1998 . [4]

Inertia weight balances the local and global search ability of algorithm. Inertia weight specifies the rate of contribution of previous velocity to its current velocity. Researchers made different contributions to the inertia weight concept. Linearly, exponential or randomly decreasing or adaptive inertia weight was introduced by different researchers [5]. In the next version of PSO, a new parameter called

constriction factor was introduced by Clerc and Kennedy [6,7]. Constriction factor (K) was introduced in the studies on stability and convergence of PSO. Clerc indicates that the use of a constriction factor insured convergence of the PSO. A comparison between inertia weight and constriction factor was published by Shi and Eberhart [8].

# CHAPTER 3

## The Proposed System

## **Chapter Three**

### **Proposed System and Results**

#### **3.1 Introduction**

In this chapter the details of the proposed system is presented. Description and architecture of the proposed system are explained in this chapter. The results are given implicitly through sections of this chapter.

#### **3.2 Proposed System Description**

This system is special for the process of managing student information and contains tools that help the user to work on it easily such as saving, deleting, moving between records, searching, changing font, color, alignment and printing.

#### **3.3 Registration in the Proposed System**

The first step in the proposed system is to register in the system where you need to enter the user name and password. If the user name or password is written incorrectly or one of them is left blank, an error message will appear that the user name or password is wrong. Only the system can be accessed If you type the username and password correctly (3.1).

Also, each of the scientific departments has its own username and password (3.2)

مرحباً يرجى القيام بعملية تسجيل الدخول



أدخل اسم المستخدم

أدخل كلمة المرور

دخول

خروج

Figure 3.1: Registration Page



نظام ادارة معلومات الطلبة

يرجى ادخال اسم المستخدم وكلمة المرور بشكل صحيح

OK

أدخل كلمة المرور

دخول

خروج

Figure 3.2: Error message

### 3.4 The interface of sections in the system

When the process of logging in to the system is completed, we will move to the second step, which is the interface of the scientific departments. This interface contains seven sections, each section has a special button and a special image that represents it. When clicking on the button or the image, the system will lead us to the students' information belonging to the section that has been selected or clicked on as in the figure (3.3).



Figure 3.3: Sections interface

### 3.5 Enter the selected section

When you open one of the sections from the sections interface, the section shape will appear with the design or the following form (3.4).

The screenshot displays a web application interface. The main area contains a table with columns: 'ت' (No.), 'الكود' (Code), 'الاسم' (Name), 'الجنس' (Gender), 'الميلاد' (Date of Birth), 'العنوان' (Address), 'المرحلة الدراسية' (Study Level), 'الهاتف' (Phone), and 'الابمیل' (Email). The table lists 23 students with alternating yellow and white row backgrounds. To the right of the table is a sidebar titled 'حالی المعلومات' (Current Information) containing fields for 'السلسل:' (Series), 'كود:' (Code), 'الاسم:' (Name), 'الجنس:' (Gender), 'الميلاد:' (Date of Birth), 'العنوان:' (Address), 'المرحلة:' (Level), 'الدراسة:' (Study), 'الهاتف:' (Phone), and 'الابمیل:' (Email). Below the sidebar is a profile picture of a man wearing a black face mask, with a button labeled 'اضافة صورة' (Add Photo). At the bottom of the interface, there are several control panels: 'صندوق الخروج' (Exit Box) with 'رجوع' (Return) and 'خروج' (Exit) buttons; 'صندوق الخط والألوان والبحث' (Line, Color, and Search Box) with options for 'المحاذات' (Align), 'حجم الخط' (Font Size), 'لون الخط' (Line Color), 'خلفية بيضاء' (White Background), and 'اعادة الألوان الأصلية' (Restore Original Colors); 'صندوق التبغل بين السجلات' (Page Navigation Box) with buttons for 'السجل الأول' (First Page), 'السجل الأخير' (Last Page), 'السجل السابق' (Previous Page), and 'السجل التالي' (Next Page); and 'صندوق عناصر التحكم' (Control Elements Box) with buttons for 'اضافة' (Add), 'حذف' (Delete), 'حفظ' (Save), and 'طباعة' (Print). The Windows taskbar at the bottom shows the system clock as 10:49 AM on 2021/07/18.

ت	الكود	الاسم	الجنس	الميلاد	العنوان	المرحلة الدراسية	الهاتف	الابمیل
1	1001	عمر عصام مهدي محمد المحامي	ذكر	1999	ديالى	الرابعة	0099999990	q@yahoo.com
2	1002	علي احمد خالد حيدر حاسم	ذكر	1999	بغداد	الثانية	23456789	w@gmail.com
3	1003	احمد حيار سلمان مرتضى البيطار	ذكر	1998	ديالى	الثانية	45678901	a@gmail.com
4	1004	مروان سليم كرجي صيف الدليمي	ذكر	2000	ديالى	الرابعة	02345678	bb@gmail.com
5	1005	ابه حازم محمد ياس النذراي	انثى	2001	بابل	الرابعة	09456789	g@gmail.com
6	1006	مروة عبدالله علي محمد ناصر	انثى	1999	بغداد	الثانية	24567890	l@gmail.com
7	1007	خالد نعيم رشيد محمد حابر	ذكر	2000	ديالى	الثالثة	05678901	oo@gmail.com
8	1008	علي مصطفى وائل محيد خميس	ذكر	2000	ديالى	الثانية	87654321	nn@gmail.com
9	1009	مريم براق فالح محمد خليل	انثى	2002	بابل	الأولى	99998888	oiu@gmail.com
10	1010	مودة خلال مصطفى ناجي علي	انثى	2000	ديالى	الأولى	88997766	hh@gmail.com
11	1009	سما رشيد حميد سعيد مجيد	انثى	1999	واسط	الثانية	45678901	fg@gmail.com
12	1166	رشي سعدون عمار هميم رشاد	انثى	1999	ديالى	الثالثة	24567890	dd@gmail.com
13	1144	براء بدران سلمان مصطفى خليل	انثى	1998	بغداد	الرابعة	24567890	s@gmail.com
14	1124	علاء رسلان خلفان كريم محمد	ذكر	1997	ديالى	الثالثة	24567890	y@gmail.com
15	1123	سعد حمد حميد نوري حاسم	ذكر	1996	ديالى	الثانية	45678901	h@gmail.com
16	1123	خلال جميل نجسين نورالدين علي	ذكر	1996	ديالى	الأولى	87654321	ssw@yahoo.com
17	1123	مهي همام مراد جميل حواد	انثى	2000	كركوك	الثالثة	07890123	ee@yahoo.com
18	1100	سعيد حميد وليد محمد	ذكر	1998	بغداد	الثانية	66775544	.xc@gmail.com
19	1119	ناصر باقر محمد خليل علي	ذكر	1999/12/12	ديالى	الثانية	09876543	kk@gmail.com
20	1120	خالل ناجي جابر علاء سامي	ذكر	1990/11/12	دهوك	الثالثة	09987654	lk@yahoo.com
21	1121	ميس علي حسن هادي محسن	انثى	1999	ديالى	الأولى	09987777	mmn@yahoo.com
22	2322	عائش	انثى	2000	بغداد	الثالثة	09987777	mmn@yahoo.com

Figure 3.4: Section design shape

Note: The background color varies from one section to another, but the design is consistent in all sections.

### 3.6.1 System Tools Functions

After addressing the system interfaces, we will discuss the system tools and what the function of each part of it is. As we have noticed in Figure (3.4) that the system is divided into several boxes, and each box contains tools specialized in accomplishing a specific process.

#### 3.6.1 Information entry box

This part of the system is used to enter information or data about the student through the "TextBox" and "ComboBox" tools, whether the information entered is text or digital. As in Figure (3.5).

ادخال المعلومات	
التسلسل:	1
كود:	1001
الاسم:	عمر عصام مهدي محمد المحامي
الجنس:	ذكر
الميلاد:	1999
العنوان:	ديالى
المرحلة:	الرابعة
الدراسة:	صباحي
الهاتف:	0099999990
الابمیل:	q@yahoo.com

**Figure 3.5: Information entry box**

It also has another function. During the search process, information is displayed in it.

### 3.6.2 Add photo box

This part is responsible for uploading or adding a personal picture for each student record for the purpose of showing the student's appearance through the "Button" tool Also, when searching for a student, during the search process, the student's form will appear on the "ImageBox" tool as in Figure (3.6).



**Figure 3.6: Add photo**

We will face a problem in this part, which is that some of the images have a different extension, so the program cannot recognize them, so it was resolved as in Figure (3.7).



**Figure 3.7: photo filters**

### 3.6.3 Information table box

After completing the process of entering information and images, they will be displayed in the information table, which has been formatted in a simple and easy way that suits the user in terms of colors and field spacing. It is also capable of entering information through which information can be entered as well as in Figure (3.8).

ت	الرمز	الأسم	الجنس	الميلاد	العنوان	المرحلة الدراسية	الهاتف	الأيمل
١	١٠٠١	عمر عصام مهدي محمد المحامي	ذكر	١٩٩٩	ديالى	الرابعة	٠٠٩٩٩٩٩٩٩٠	q@yahoo.com
٢	١٠٠٢	علي احمد خالد حيدر حاسم	ذكر	١٩٩٩	بغداد	الثانية	٣٣٤٥٦٧٧٨٨٩	w@gmail.com
٣	١٠٠٣	احمد حيار سلمان مرتضى البيطار	ذكر	١٩٩٨	ديالى	الثالثة	٤٥٦٧٨٩٨٧٦٥	a@gmail.com
٤	١٠٠٤	مروان سليم كرحي نصيف الدليمي	ذكر	٢٠٠٠	ديالى	الرابعة	٠٢٣٤٥٦٧٨٥٦	bb@gmail.com
٥	١٠٠٥	اية حازم محمد ياس الندراني	انثى	٢٠٠١	بابل	الرابعة	٠٩٤٥٦٧٨٥٦٥	g@gmail.com
٦	١٠٠٦	مروة عبدالله علي محمد ناصر	انثى	١٩٩٩	بغداد	الثانية	٣٤٥٦٧٨٩٨٧٥	l@gmail.com
٧	١٠٠٧	خالد نعيم رشيد محمد خابر	ذكر	٢٠٠٠	ديالى	الثالثة	٠٥٦٧٢٣٦٦٦	oo@gmail.com
٨	١٠٠٨	علي مصطفى وائل محيد حميس	ذكر	٢٠٠٠	ديالى	الثالثة	٨٦٦٦٣٢٤٦٧٢	nn@gmail.com
٩	١٠٠٩	مريم براق فالح محمد خليل	انثى	٢٠٠٢	بابل	الأولى	٩٩٩٩٨٨٢٣٢	oiu@gmail.com
١٠	١٠١٠	مودة خلال مصطفى ناجي علي	انثى	٢٠٠٠	ديالى	الأولى	٨٨٩٩٧٧٦٦٤٤	hh@gmail.com
١١	١٠٠٩	سما رشيد حميد سعيد مجيد	انثى	١٩٩٩	واسط	الثانية	٤٥٦٧٨٠٠٩٢٤	fg@gmail.com
١٢	١١٦٦	رشى سعدون عمار هميم رشاد	انثى	١٩٩٩	ديالى	الثالثة	٣٤٥٦٧٧٧٥٦	dd@gmail.com
١٣	١١٤٤	براء بدران سلمان مصطفى خليل	انثى	١٩٩٨	بغداد	الرابعة	٣٤٥٦٧٧٢٧٦٧	s@gmail.com
١٤	١١٢٤	علاء رسلان خلفان كريم محمد	ذكر	١٩٩٧	ديالى	الثالثة	٣٤٥٦٧٥٥٠٦٧	y@gmail.com
١٥	١١٢٢	سعد حمد حميد نوري حاسم	ذكر	١٩٩٦	ديالى	الثالثة	٤٥٦٧٣٧٦٢٥٤	hj@gmail.com
١٦	١١٢٢	جلال جميل تحسين نورالدين علي	ذكر	١٩٩٦	ديالى	الأولى	٨٧٥٤٥٧٨٦٥	ssw@yahoo.com
١٧	١١٢٢	مهدي همام مراد جميل جواد	انثى	٢٠٠٠	كركوك	الثالثة	٠٧٨٧٧٧٦٦	ee@yahoo.com
١٨	١١٥٥	سعيد حميد مجيد وليد محمد	ذكر	١٩٩٨	بغداد	الثالثة	٦٦٧٧٥٨٤٩٠	.xc@gmail.com
١٩	١١١٩	ناصر باقر محمد خليل علي	ذكر	١٩٩٩/١٢/١٢	ديالى	الثانية	٠٩٨٦٥٥٤٦٦٤٧	kk@gmail.com
٢٠	١١٢٠	خالد ناجي جابر علاء سامي	ذكر	١٩٩٥/١١/١٢	دهوك	الثالثة	٠٩٩٨٧٦٦٤٥٦٢	lk@yahoo.com
٢١	١١٢١	ميس علي حسن هادي محسن	انثى	١٩٩٩	ديالى	الأولى	٠٩٩٨٧٧٧٧٥٥	mmn@yahoo.com
٢٢	٣٣٣٣	غلام	ذكر			الأولى		

Figure 3.8: Information table box

### 3.6.4 Control elements box

This box contains many functions, including saving, deleting, adding, printing, moving between records, the current position, and the number of saved records from the data. As in Figure (3.9).



**Figure 3.9: Control elements box**

When you click on one of the above-mentioned buttons, a message will be displayed as shown in Figure (3.10).



**Figure 3.10: Message**

### 3.6.5 Record navigation box

The navigation box between records helps in the process of moving from the first record to the last record and vice versa as well as moving downward and ascending as in Figure (3.11)



Figure 3.11: Record navigation box

### 3.6.5 Font, color and search box

This box is characterized by affecting the information table by controlling the color, font, background and alignment, and also contains the feature of regular search and search using the PSO algorithm.



Figure 3.12 Font, color and search box.



- ❖ The second part This part is for the process of searching for a record and contains two types of search, the first type is the search using the (PSO) algorithm, and the second type is the normal search as shown in the left side of the figure below (3.15).



Figure 3.15 Search Section.

As for the right side, it works on choosing colors before clicking on the search buttons. When choosing a color and then writing the information about one of the students and then clicking on one of the search buttons, the information table will change to the following figure (3.16)

ت	الرمز	الأسم	الجنس	الميلاد	العنوان	المرحلة الدراسية	الهاتف	الأيمل
1	1001	عمر كصاح مودك محمد المطاوع	ذكر	1999	ديالى	الرابعة	+999999999	g@yahoo.com
2	1002	علي احمد خالد حيدر حاسم	ذكر	1999	بغداد	الثانية	33256177889	w@gmail.com
3	1003	احمد حجاز سلطان مريضي النبطان	ذكر	1998	ديالى	الثالثة	256199876	a@gmail.com
4	1004	مروان سليم كرجي نصيف الدليمي	ذكر	2000	ديالى	الرابعة	+3325617856	bb@gmail.com
5	1005	خالد نعم رشيد محمد حازم	ذكر	2000	ديالى	الثالثة	+912322111	o@gmail.com
8	1008	علي مصطفى وائل محمد خميس	ذكر	2000	ديالى	الثالثة	86663324172	nn@gmail.com
12	1122	علاء ريسان حجاب كريم محمد	ذكر	1997	ديالى	الثانية	2561155-77	v@gmail.com
15	1122	سعد حمد حميد نوري حاسم	ذكر	1996	ديالى	الثالثة	25617371254	hj@gmail.com
17	1122	علاء جميل رحمن نور الدين عادي	ذكر	1993	ديالى	الأولى	8752578815	sow@yahoo.com
18	1155	سعيد حميد محمد وليد محمد	ذكر	1998	بغداد	الثالثة	6677588290	.xc@gmail.com
19	1118	ناصر باقر محمد خليل عادي	ذكر	1999/12/12	ديالى	الثالثة	19015521127	lk@gmail.com
20	1120	خالد نايجي جابر علاء سامي	ذكر	1995/11/12	دهوك	الثالثة	+99887662562	lk@yahoo.com
22	2222	علاء	ذكر			الأولى		

Figure 3.16: Search with changing colors.

### 3.7 system database

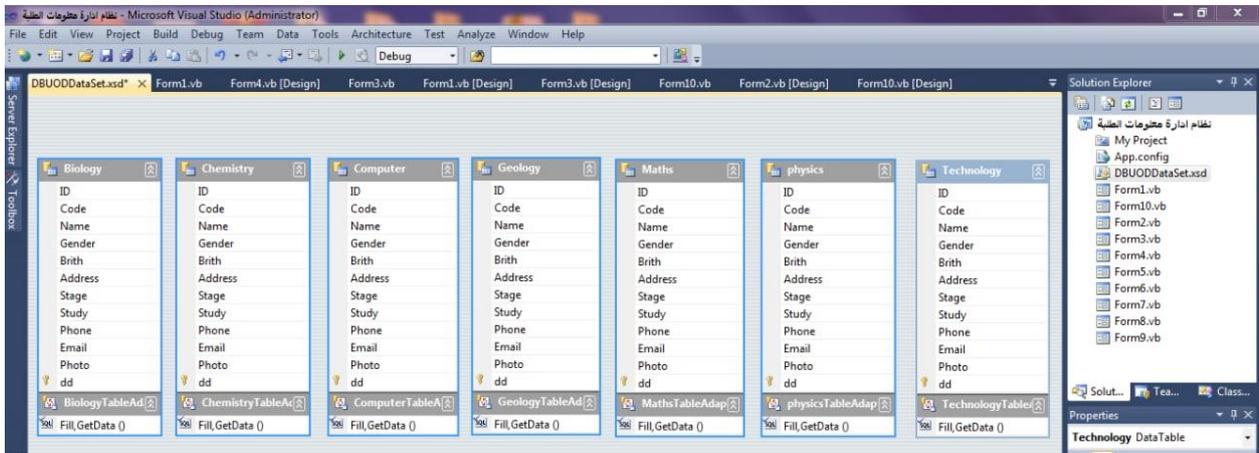
It is a collection of information organized in a way that allows it to be easily accessed, modified, and managed. Databases are used by organizations to store, retrieve, and manage information. With the development of databases around the middle of the last century, a new way was invented to facilitate database management, through special software called Database Management System (DBMS). [10][11][12]

The database in this system is designed to manage and organize student information in the College of Science, Diyala University for seven departments, and the database used in the system is of the Microsoft Access 2007 type, as shown in the following figure (3.17).

ID	Code	Name	Gender	Brith	Address	Stage	Study	Phone	Email	Photo
1	1001	عام مهدي محمد ال	ذكر	1999	ديالى	الرابعة	صاحي	0099999990	q@yahoo.com	ابنات ثنائية طوبا
2	1002	احمد خالد حيدر جا	ذكر	1999	بغداد	الثانية	صاحي	2345677889	w@gmail.com	
3	1003	خار سلمان مرتضى	ذكر	1998	ديالى	الثالثة	مساتي	4567898765	a@gmail.com	
4	1004	علي محمد ناصف ا	ذكر	2000	ديالى	الرابعة	صاحي	0234567856	bb@gmail.com	ابنات ثنائية طوبا
5	1005	تازم محمد ياسي البدر	انثى	2001	بابل	الرابعة	صاحي	0945678565	g@gmail.com	ابنات ثنائية طوبا
6	1006	عبدالله علي محمد	انثى	1999	بغداد	الثانية	صاحي	3456789875	l@gmail.com	ابنات ثنائية طوبا
7	1007	د نعيم رشيد محمد	ذكر	2000	ديالى	الثالثة	مساتي	0564723666	oo@gmail.com	
8	1008	مصطفى وائل مجيد	ذكر	2000	ديالى	الثانية	مساتي	8666334673	nn@gmail.com	
9	1009	م براف فالح محمد ح	انثى	2002	بابل	الأولى	مساتي	9999888333	ou@gmail.com	
10	1010	خلال مصطفى نايج	انثى	2000	ديالى	الأولى	صاحي	8899776644	nh@gmail.com	ابنات ثنائية طوبا
11	1009	رشيد حميد سعيد م	انثى	1999	واسط	الثانية	مساتي	4567800934	fg@gmail.com	
12	1166	سعدون عمار هفيم	انثى	1999	ديالى	الثالثة	صاحي	3456777756	dd@gmail.com	ابنات ثنائية طوبا
13	1144	إن سلمان مصطفى	انثى	1998	بغداد	الرابعة	مساتي	3456773767	s@gmail.com	
14	1124	رسلان خلفان كريم	ذكر	1997	ديالى	الثالثة	صاحي	3456755067	y@gmail.com	
15	1122	حمد حميد نوري جا	ذكر	1996	ديالى	الثالثة	صاحي	4567376354	hj@gmail.com	
16	1123	تميل تحسين نوراليد	ذكر	1996	ديالى	الأولى	صاحي	8754578865	sw@yahoo.com	
17	1133	ب همام مراد جميل	انثى	2000	كركوك	الثالثة	مساتي	078787766	te@yahoo.com	ابنات ثنائية طوبا
18	1155	د حميد مجيد وليد م	ذكر	1998	بغداد	الثالثة	صاحي	6677588490	cc@gmail.com	ابنات ثنائية طوبا
19	1119	بر باقر محمد خليل ع	ذكر	1999/12/12	ديالى	الثانية	صاحي	09865546647	kk@gmail.com	
20	1120	ناجي جابر علاء سا	ذكر	1995/11/12	دهوك	الثالثة	صاحي	09987664563	lk@yahoo.com	ابنات ثنائية طوبا
21	1121	علي حسي هادي م	انثى	1999	ديالى	الأولى	مساتي	09988777755	mn@yahoo.co	ابنات ثنائية طوبا
22	2222	عالم	ذكر			الأولى	صاحي			
23	3333	منار	انثى			الأولى	صاحي			

Figure 3.17: Microsoft Access Database

When you call the database of type Microsoft Access 2007 in Visual Basic 2010, it will look like this (3.18)



**Figure 3.18: Visual Basic Database**

The fields of each table in the database are linked in the Textbox, Combo Box and Image Box tools to migrate the data to the database through the Basic.

# CHAPTER 4

## CONCLUSIONS AND SUGGESTIONS FOR FUTURE WORK

# Chapter Four

## Conclusions and Suggestions for Future Work

### **4.1 Introduction**

In this chapter, some inferred conclusions are presented and some suggestions for future work are given.

### **4.2 Conclusions**

In this research, a proposed system was presented to manage student information and improve search speed using the Particle Swarm Optimization (PSO) algorithm. This system works only on computers. This system added high flexibility and ease in entering and managing student data through the tools used in it.

### **4.2 Suggestions for future work**

Although the proposed system works correctly, it needs some modifications, such as:

- Added new security tools.
- Add other ways to register in the system, for example through a Google account.
- Adding new entries eg notes each student's grades...etc.
- Add a new section.
- Add attachments such as pdf.
- Working on the system through computer networks to allow more than one user to use it.
- Programming the proposed system to work on telephone systems.

((إقرار المشرف))

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اشهد بأن اعداد هذا المشروع الموسوم  
تحسين سرعة البحث بأستخدام خوارزمية PSO في نظام إدارة معلومات الطلبة

والمعد من قبل الطلاب

(١) اية حازم محمد

(٢) عمر عصام مهدي

(٣) مروان سليم كرجي

قد تم تحت إشرافي في قسم علوم الحاسوب / كلية العلوم/جامعة ديالى وهي جزء من متطلبات  
نيــــل شهادة البكالوريوس في اختصاص علوم الحاسوب

التوقيع:

الاسم:

المرتبة العلمية:

التاريخ:

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