



**Ministry of higher education and scientific research**

**University of Diyala**

**College of science**

**Department of computer science**

**The system of calculating tuition wages for the staff of  
the University of Diyala**

**This research was presented to the council of the College of  
Science - University of Diyala - Department of Computer  
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Computer Science**

**By:**

**Hind Basim Alwan**

**Anwar Husain khalf**

**Supervised by**

**Assist.Prof.Dr. Jamal Al-Tuwaijari**

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وزارة التعليم العالي والبحث العلمي

جامعة ديالى

كلية العلوم

قسم الحاسوب

## نظام حساب الأجور الدراسية للتدريسيين و المحاضرين في جامعة ديالى

تقديم هذا البحث الى مجلس كلية العلوم - جامعة ديالى - قسم علوم الحاسوب  
كجزء من متطلبات الحصول على درجة البكالوريوس في علوم الحاسوب

أعداد

هند باسم علوان

انوار حسين خلف

اشراف

أ.م.د جمال مصطفى التويجري

كلية العلوم / قسم علوم الحاسوب

2019-2018

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

{وما أوتئيم من العلم إلا قليلا} الإسراء (85)

{وقل ربي زدني علما} طه (114)

{وقل اعملوا فسمي الله عملكم ورسوله والمؤمنون}  
التوبة (105)

## الأهداء

الى رمز الحب والحنان وبلسم الشفاء ... الى القلب الناصح بالبياض (والدتي الحبيبة) ....  
الى من كلت انامله ليقدّم لنا لحظة سعادة.. الى من حصّد الأشواك عن دربي ليمهد لي طريق العلم ...  
الى القلب الكبير (والدي العزيز) ...

الآن تفتح الأشرعة وترفع المرساة لتنتقل السفينة في عرض بحر واسع مظلم هو بحر الحياة وفي هذه  
الظلمة لا يضيء الا قنديل الذكريات ذكريات اشخاص جعلوا لنا الحياة امل وسعادة..

## الشكر والتقدير

/ الحمد لله الذي انزل القرآن شفاء ورحمة للمؤمنين والصلوة والسلام على من اعطي السبع المثاني والقران العظيم  
وعلى اله اجمعين الذين رفعو بهمهم العالية اعلام الدين وعلى اصحابه الذين امنو به وازروه ونصروه واتبعوا تالنور  
الذي انزل معه الذين لوا البلاء الحسن نصرته واقامة دينه ...

وبعد...

الحمد لله والثناء عليه جلت قدرته على توفيقه باهذا الجهد العلمي المتواضع فيطيب لي ويهيج نفسي أن اتوجه  
بالشكروالامتنان الى الأهل الذين ساندونا وكانوا نعم العوز في كل الظروف والشكر والتقدير للأستاذ الدكتور  
جمال مصطفى التويجري نسأل الله ان يجازيه خير الجزاء ولن تفي الكلمات بحقه فقد كان نعم العون والشكر  
والتقدير للدكتور طه محمد حسن فقد ساعدنا وقدم لنا توجيهات للمشروع ونسأل الله أن يجعلها في ميزان حسناته

## Abstract

Database Management Systems are important and effective systems to facilitate the processing of large data stored in large files called Database. The data management system consists of a set of files in addition to the program or group of programs that combine to solve a problem or to convert a manual system to a computer system such as converting the system of customer accounts or payroll and payroll accounts from the manual records system to a system and files used by the computer. These programs with the system files are called a common database management system. The main aim of these systems is to obtain accurate and fast information and results that are used to serve the user and beneficiary of these systems.

The fees of lectures for lecturers and lecturers in the College are currently calculated manually, which causes many errors and problems, and requires considerable time and effort in addition to a specialized cadre for the multiplicity and complexity of the information required by the wage calculation procedures. The system is designed to calculate the fees of lectures for teachers and lecturers. Diyala University), which aims to calculate monthly fees for all lecturers and lecturers in all faculties and departments of the university and thus provide a great service to all colleges and financial departments at the university through the calculation of wages quickly and high accuracy.

This system takes into consideration all the data involved and affects the calculation of wages for teachers and lecturers in addition to the weekly lecture schedule, the days of the week and the month, and the intersections of events and events. Generally, these data include (college, department, teaching sequence, (Lecture title, lecture hour, number of weeks, number of weekly hours per lecture, public holidays, day of the month). All this information is recorded in forms by the department concerned to be stored and processed automatically to calculate the wages of each teaching quickly and accurately. Note that these forms and data are now being uploaded to the finance to calculate the wages of teachers manually.

# Context

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# **Chapter one**

## **Introduction**

## 1.1 Introduction

In the recent past, a manager of almost any small organization was able to keep track of necessary data by using a manual file system. Such a file system was traditionally composed of a collection of file folders; each properly tagged and kept in a filing cabinet. Organization of the data within the file folders was determined by the data's expected use. Ideally, the content of each file folder was logically related. For example, a file folder in a doctor's office might contain patient data, one folder for each patient. All the data in that file folder described only that particular patient's medical history.

As long as a data collection relatively small and an organization's managers had few reporting requirements, the manual system served its role well as a data repository. However, as organizations grew and as reporting requirements became more complex, keeping track of data in a manual file system became more difficult. In fact, finding and using data in growing collection of file folders became such a time-consuming and cumbersome task that it became less and less likely that such data would ever generate useful information. Unfortunately, report generation from a manual file system can be slow and cumbersome. In fact, some business managers faced government-imposed reporting requirements that require weeks of intensive effort each quarter, even when a well-designed manual system was used. Consequently, the pressure built design a computer based system that would track and produce required reports.

The problems inherent in file systems make using a database system very desirable. Unlike the file system, with its many separate and unrelated files, the database consists of logically related data stored in a single data repository. Therefore; the database represents a change in the way end user data are stored, accessed, and managed the database[1].

## **1.2 Related work: -**

The purpose of the Salary calculator is to provide the interested user estimates of average salaries and adjusted pay gaps based on the microdata from the 2010 Structure of earnings survey.

It is a simple interactive application designed to give users an easy method to access regression-based information on the impact of personal, job and enterprise characteristics on an individual's wages. Using results from regression analysis for this purpose has several advantages over the use of cross-tables. Apart from providing a much more detailed picture of gross salaries and an adjusted gender pay gap for specific groups in the population than available in currently published tables, it enables the user to easily see the impact of individual factors on wages and the pay gap, all else being equal.

This particular tool at hand also gives a quick visual impression of the estimated wages and adjusted gender pay gaps in the EU for any combination of characteristics chosen, gender[2].

## **1.3 Aim of project: -**

this system provides great service to the university and its colleges and financial departments by shortening the time and effort in addition to high accuracy in the calculation of wages by determining the number of weekly hours and official holidays automatically. Note that this system can be circulated to all universities of the Ministry of Higher Education and scientific research and financial departments after making some minor changes to the system.

## **1.4 Services provided by the system:-**

- 1- Calculation of tuition fees for lecturers and lecturers in a precise and rapid manner by linking the hourly wages for each scientific rank separately with the weekly lecture schedule.
- 2- as well as taking official holidays and events where there is no time to consider.
- 3- This system provides great service to the university and its colleges and financial departments by shortening the time and effort in addition to high accuracy in the calculation of wages.

## **1.5 Beneficiaries of the system:-**

Beneficiaries of the system (Faculty of Science) University of Diyala in various departments and (finance) in the first place as well as all the other faculties of the University and its financial services after the circulation of the system by the university. As well as the possibility of the system to all Iraqi universities and financial services because the system takes into account all the variables that can be conducted on the system in a simple manner.

# Chapter two

## Comprehensive project

## **2.1 Management system (DBMS): -**

provides numerous advantages over file system management, by making it possible to eliminate most of the file system's data inconsistency, data dependency, and structural dependency problems

Remember that the DBMS is just one of several crucial components of a database system

Perhaps it is even appropriate to refer to the DBMS as the database system's heart. However, just as it takes more than a heart alone to make a human being function, it takes more than a DBMS to make a database system function

Database is a collection of data or information that can be stored, sorted, organized and retrieved. Your local telephone book, your Rolodex file, and the card catalog at your local library are all examples of a database. Traditionally databases are organized by fields, records, and files tables

A is single piece of information; a record is a one complete set of fields; a file is a collection of records. For example, a telephone book is analogous to a file. It contains a list of records, each of which consists of three fields: name, address, and telephone number

To access information, form a database, you need a database management system (DBMS). This is a collection of programs that enables you to enter, organize, and select data in a database

## **2.2 Database management system (DBMS): -**

DBMS is a collection of programs that manages the database structure a controls access to the data stored in the database. The DBMS makes it possible to share the data in the database among multiple application or users. Because the data are the crucial raw material from which information is derived, there are many reasons why DBMSs are important in our information-based [1]

The goal of a DBMS is to provide an environment that is both convenient and efficient to use in

- Retrieving information from the database.
- Storing information into database.

In effect, the DBMS serves as the intermediary between the user and the database by translating user requests into the complex code required to fulfill those requests. The DBMS hides much of the database's internal complexity from the application programs that use the database. The application program might be written by a programmer, using a programming language such as COBOL, Microsoft Access, and Oracle or it might be created through a DBMS utility program.

**2.1.1 DBMS Functions:** - A DBMS perform several important functions guarantee the integrity consistency of the data in the database. Most of these functions are transparent to end users. These functions include

- **Data Dictionary Management:** - the DBMS requires that definitions of the data elements and their relationship (metadata: data about data) be stored in a data dictionary.
- **Data Storage Management:** - the DBMS creates the complex structure required for the data storage.
- **Data Transformation and presentation:** - the DBMS transforms entered to conform the data structures are required to store the data.
- **Security Management:** - the DBMS creates a security system that enforces user security and data privacy within the database. Security rules determine which users can access the database, which data item each user may access, and which data operations that user may perform.
- **Multi-User Access Control:** -the DBMS creates the complex structure that allows multi-user access to the data. In order to provide data integrity and data consistency, the DBMS uses sophisticated algorithms to ensure that multiple user can access to the database concurrently and still guarantee the integrity of the database.
- **Back and Recovery Management:** - the DBMS provides backup and data recovery procedures to ensure data and integrity.

- **Data Integrate Management:** - the DBMS prompts and enforce integrity rules to eliminate data integrate problems, thus minimizing data redundancy and maximizing data consistency.

- **Database Access Language (DLL and DML) and application:** - programming interface: the DBMS provides data access via a query language. A query language is a nonprocedural language; which contains two components: A Data Definition Language and a Data Manipulation Language (DML).

- **Database Communication Interfaces:** - Current-generation DBMSs provide special communications routines designed to allow the database to accept end user request within a computer network environment.

## 2.3 Database Models: -

*A database model* is a collection of logical construct used to represent the data structure and the data relationships found within the database. Database models can be grouped into two categories: *Conceptual Models and implementation models [1]*.

### 2.3.1 Conceptual Models: -

Use three types of relationship to describe association among data: 1: M, M: N, and 1:1 for them, respectively. (Although the M: N notation is a standard label for the many-to-many relationship, the label M: M may also be used.). The following examples illustrate the distinction among the three

- **One-to-many relationship:** Each record in a table is related to many records in another table. For example: a painter paints many different painting, but each one of them is painted by only that painter. Thus the painter (the “one”) is related to the paintings (the “many”). therefore; database designers label the relationship” PIANter paints PAINTING” as 1: M. similarly, a customer account (the “one”) might contain many invoices, but those invoices (the “many”) are related to only a single costumer account. The” CUSTOMER generates INVOICE” relationship would also label 1: M.



- **Many-to-many relationship:** many records in table are related to many records in another table. for example, Student can take many Course, and each course can be taken by many student, thus yielding

the M: N relationship label for the relationship expressed by “STUDENT takes COURSE.”

- **One-to-one relationship:** - each record in a table is related to one record in another table. Dean of the collage is related with collage in 1:1 relationship, each collage has one Dean and each Dean is managed one Collage. As seen this relation benefit, but in this project found that making this relationship between tables will add over head to the system. therefore; this relationship not used this project.

### 2.3.2 Implementation module: -

Places the emphasis on how the data are represented in the database or on how the data structures are implemented to represent what is modeled. Implementation models include the hierarchical database model, the network database model, the relational database model, and the object-oriented database model

In this project the module used is the relational database model, because this model provides the following basic Structure

- The relational database model is implemented through a very sophisticated relational database management system (RDMBS). The RDMBS performs the same basic function provided by the hierarchical and network DBMS system plus a host of other function that make the relational database module easier to understand and implemented.

- The data and relationship are represented by a collection of tables.

- Relational model does not use pointer or links but relates records by the value that contains (P.K., F.K.)

- Each table in matrix consisting of a series of row/column intersection. Tables, also called relations, are related to each other by sharing a common entry characteristic.

- Although the tables are completely independent of one another, we can easily connect the data between tables. The relational model thus provides a minimum level of controlled redundancy to eliminate most of the redundancies commonly found in file systems.

## 2.4 Database system: -

Is basically a communized record keeping system that is a system whose overall purpose is to maintain information and to take that information available on demand [3].

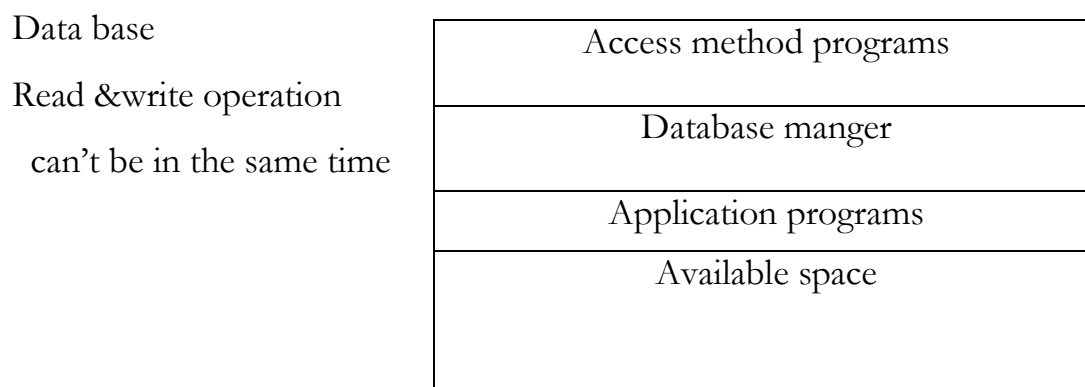


Fig. (2.1) simplified structure of database

The benefit of the database system manger (DBMS) appear when multitask processing exist [2].

## 2.5 Harmony search algorithm: -

Originally invented in (Gem et al. 2001), HS is a meta-heuristic optimizer inspired by the music improvisation process. In music improvisation

process, a predefined number of musicians attempt to tune the pitch of them instruct mints to achieve a pleasing harmony (best state). In nature, a harmony is defined by a special relation between several sound waves that have different frequencies The quality of the improvised harmony is determined

by aesthetic estimation. In order to improve the aesthetic estimation and find the best harmony, the musicians make practice after practice.

There are similarities between musician's improvisation and optimization processes in an optimization problem, the ultimate aim is to find the global optimum of the objective function under consideration by tuning a predefined number of decision variables. Indeed, in an optimization problem the decision variables make a solution vectors. Then, the values of the decision variables are put into the objective function and the quality of the solution vector is calculated. The solution vector is updated during the iterations until the global optimum is obtained. Comparison of musical and optimization processes reveals the following similarities laities:

- In musical process, the quality of a harmony is determined by aesthetic estimation

In an optimization process, the quality of a solution vector is determined- by the objective function value.

- In musical process, the ultimate goal is to obtain the best (fantastic) harmony.

In an optimization process, the ultimate goal is to obtain the global optimum.

- In musical process, musicians change the pitch of their instruments. An optimization

algorithm changes the values of the decision variables.

- In musical process, any attempt to play a harmony is called practice in an optimization, each attempt to update a solution vector is called iteration.

In general, when a musician wants to tune the pitch of his/her instrument (for example fiddle, saxophone, etc.) and sound a note, he/she utilizes one of the three possible ways. These rules are the main body of HS algorithm.

## **2.6 Object of algorithm Harmony: -**

As one of the powerful optimization algorithms, HS has attracted significant attention for solving different types of optimization problems during the recent years. The advantages of HS algorithm are easy implementation, simple concept, fast

convergence speed and few parameters to adjust. Owing to these merits, HS has been considerably used to solve various problems in different fields like power system, communication, software, civil, water engineering, and pattern recognition. Study of the literature indicates that HS can effectively and efficiently solve different types of engineering optimization problems. In the literature, various variants of HS algorithm can be found which focus on improving improvisation process, harmony memory consideration and parameter setting. There are other variants which try to enhance the performance of HS by borrowing some ideas from the other metaheuristic such

as GA, PSO, DE and chaotic search. By comparing the results obtained by HS and other algorithms it can be drawn that HS could be a good candidate to solve complex optimization problems [4].

**2.7 SAP crystal Report: -** is a system that is designed and developed to work in tandem with databases, and to provide users with data to allow for thorough and detailed analysis and interpretation. SAP Crystal Reports simplifies drastically the process of creating simple and even complicated or specialized with its rich set of features and comprehensive tools.

With SAP Crystal Reports, presenting data via reports is a breeze. The system not only helps users create detailed and clear reports and presentations, but it can generate reports based on information that is collected from virtually any data source. The system comes with built-in report wizards, guiding users in every step in building reports and completing common reporting tasks.

Reports are generated using formulas, cross-tabs, sub-reports, and conditional formatting which not only gives sense to data, but also discovers

essential relationships that may otherwise remain hidden. Geographic maps and graphs relay data visually when words and numbers are simply not adequate.

**2.7.1 Overview of SAP Crystal Reports Benefits:** - Trusted by main organizations across the globe, Crystal Reports has become a very popular report writing tool. The system brings in features and functionalities that enable companies to quickly and easily access essential data found in their databases with queries, and then present it in any number of drillable, multi-page reports: invoices, financial statements, and order forms. This very rich business intelligence application can be fused to a variety of mission-critical applications, enabling users to reach and derive insights from several data sources for complete reporting. Crystal Reports can be leveraged by organizations and companies that operate in just about any industry. Whether these parties are in the accounting, education, HR, manufacturing and real estate sectors, SAP Crystal Reports offers a high degree of flexibility and adaptability. More often than not, the platform is integrated into a larger business intelligence strategy like the SAP Business Objects stack. It can be hosted locally, or offered in the SaaS mode

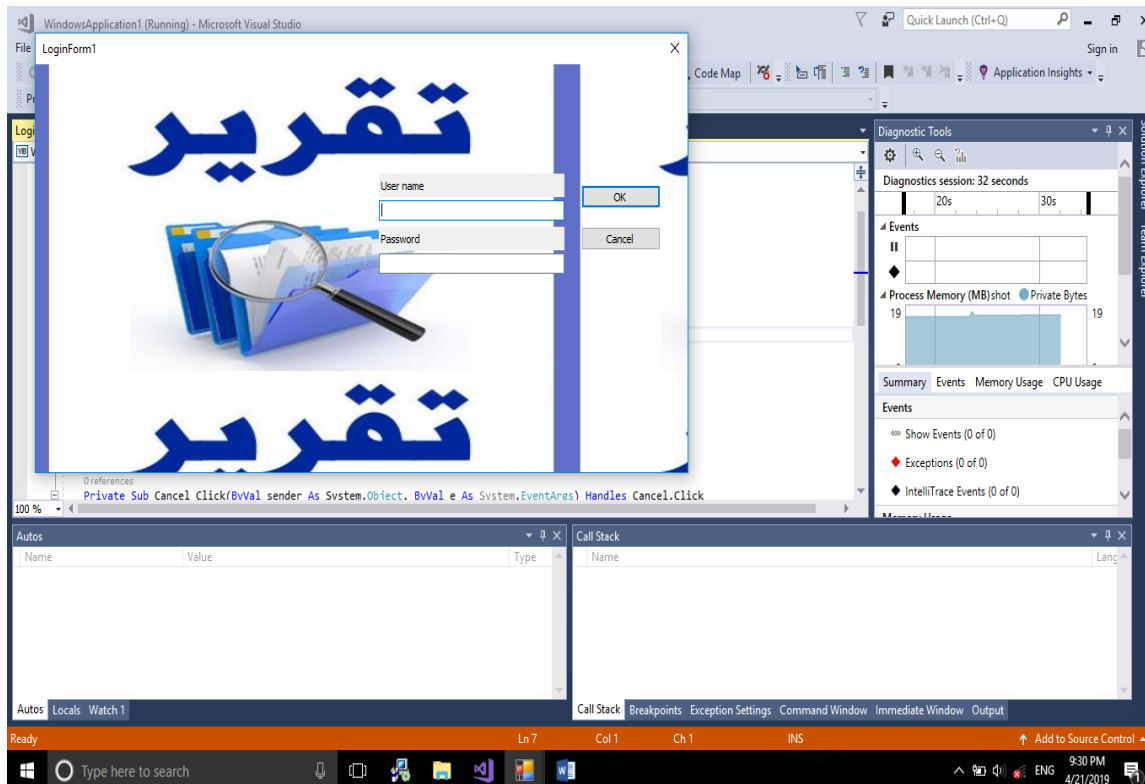
Reports created by Crystal Reports can be linked to almost any information source there is. These may also be reports that are representative of client invoices, which support barcodes at the same time. Aside from these, the system is also capable of generating income and revenue reports, giving users an excellent idea of how their businesses are performing.

With the ability to create and design professional reports that can be embedded with interactive charts and what-if scenario models, and then distribute these reports via multiple channels such as the Web, email, in PDF or even integrated into enterprise systems, Crystal Reports provides companies and organizations the leverage to create fast, accurate, and deliberate strategic decisions [5].

# **Chapter three**

## **Project interface**

### 3.1 System Login Interface: -



This interface includes: -

- 1-user name.
- 2-password.

the benefit of this interface to prevent unauthorized users from accessing .

### 3.2 Home or main interface: -

المعرف	الاسم	اللقب	القسم	الشهر	النصاب	عدد الساعات	النصاب التالي
1	عراق	م.م	حاسوب				
2	عراق	م.م	حاسوب		12		
3	عراق علي	م.م	حاسوب	4/2/2019 1:29 PM			
4	احمد	م	ع				

This interface or page includes: -

المعرف:	<input type="text" value="1"/>
الاسم:	<input type="text" value="عراق"/>
اللقب:	<input type="text" value="م.م"/>
القسم:	<input type="text" value="حاسوب"/>
الشهر:	<input type="text" value="Monday , April 22, 2019"/>
النصاب:	<input type="text"/>
عدد الساعات:	<input type="text"/>
النصاب التالي:	<input type="text"/>



- 1) -ID
- 2) -Name
- 3) -title
- 4) -Section
- 5) -month
- 6) - quorum
- 7) - Number of hours
- 8) - the current quorum

It includes the sequence number of the professor, the name and the title, and you are represented by a lecturer, a professor,

### 3.3 weekly schedule: -

The screenshot shows a Windows Application titled 'WindowsApplication1 (Running) - Microsoft Visual Studio'. The main window displays a form with a table and several modal dialogs. The table has the following data:

المعرف	اليوم	8 إلى 10	10 إلى 12	12 إلى 2
1	السميت	برفجه		
2	الاحد		كيان	
3	الاثنين			م
4	الثلاثاء			
5	الأربعاء			
6	الخميس		عزبي	

Below the table, there are several modal dialogs:

- الصفحة الرئيسية**: A dialog with a button labeled 'الصفحة الرئيسية'.
- اختر عدد الاسابيع**: A dialog with a list box containing 'اسبوع واحد', 'اسبوعين', 'اسابيع 3', and 'اسابيع 4'.
- عدد الساعات لكل محاضرة**: A dialog with a list box containing 'ساعة واحدة', 'ساعتان', '3 ساعات', and '4 ساعات'.
- ايام العطلة الرسمية**: A dialog with a button labeled 'اضافة عطلة' and a date picker showing 'Sunday , April 21, 2019'.
- الشهر يبدأ ب**: A dialog with a button labeled 'شهر يبدأ ب' and a date picker showing 'Sunday , April 21, 2019'.
- تقرير فائقة استاذ واحد**: A dialog with a button labeled 'تقرير فائقة استاذ واحد'.
- تقرير فائقة احصائي**: A dialog with a button labeled 'تقرير فائقة احصائي'.
- تقرير فائقة نهائي**: A dialog with a button labeled 'تقرير فائقة نهائي'.

Includes number of weeks: -

اختر عدد الاسبوع

☐ اسبوع واحد

☐ اسبوعين

☐ اسبوع 3

☐ اسبوع 4

- One week
- Two weeks
- Three weeks
- Four weeks

The number of weeks of lectures for each professor if the professor or lecturer includes a lecture schedule of one, two, three, or four weeks

**Number of hours per interviewer: -**

عدد الساعات لكل محاضرة

☐ ساعة واحدة

☐ ساعتان

☐ 3 ساعات

☐ 4 ساعات

- One hour
- Two hours
- Three hours
- Four hours

And here according to the professor or lecturer some take an hour and some others two hours and so have been used for this easy to determine the number of hours

ايام العطل الرسمية

اضافة عطلة

Monday , April 22, 2019

الشهر يبدأ بـ

شهر يبدأ بـ

Monday , April 22, 2019

It also includes the official holidays We used the calendar or the Khorasan for the speed of setting the holiday better than the handwriting that requires time and the same at the beginning of the month.

▼ Section1 (Report Header )

▼ Section2 (Page Header )

{Print Date }

{الاسم }

{تصايب الاسيوع }

{التصايب الشهرى }

{سعر الساعة }

{الراتب الشهرى }

▼ Section3 (Details )

{المعرف }

{الاسم }

{تصايب الاسيوع }

{@S }

{سعر الساعة }

{@J }

▼ Section4 (Report Footer )

{Sum of @J }

▼ Section5 (Page Footer )

{e Number }

t3		٢٠١٩، أيار، ٠٤				
		٠٤:٠١:٠٦ م				
المعرف	الاسم	تصايب الاسيوع	تصايب الشهر	سعر الساعة	الراتب	
1	عراق	10	24	د.ع. ٥,٠٠٠.٠٠	د.ع. ٢٤٠,٠٠٠.٠٠	
2	د جمال	12	24	د.ع. ١١,٠٠٠.٠٠	د.ع. ٤٥٠,٠٠٠.٠٠	
3	اسماعيل	4	12	د.ع. ٩,٠٠٠.٠٠	د.ع. ١١٨,٠٠٠.٠٠	
4	د طه	8	16	د.ع. ٦,٠٠٠.٠٠	د.ع. ٢٢٠,٠٠٠.٠٠	

After the introduction of a number of professors and taking into account the holidays and the number of hours per interviewer, the total salary of each professor was calculated according to the title if he was an assistant, doctor or assistant professor.

# **chapter Four**

**Conclusions and  
Suggestion for future work**

#### **4.1 Conclusions: -**

- 1 - This system calculates the wages of the observers for the teachers and the bidders
- 2 - This system provides great service for the college and university
- 3 - shorten the time and effort and you through the automatic input of data
- 4 - Through this system we can make any modification or addition in the future.

#### **4.2 Suggestion for future work :-**

- 1 - We propose to circulate this system to all sections of the college
- 2 - This system can be distributed to all faculties at the University of Diyala
- 3 - This system can be circulated to Iraqi public and private universities.

## References

[1] Nawaz Hussein, "database design and implementation using visual basic " college of engineering, 2009.

[2] Other examples of salary calculators based on regression analysis are available for [Switzerland](#) and Luxembourg; calculators based on cross tables are available for the [EU](#) (GPG only

[3] data base system C.J. Date Forth Edition

[4] Abhishek, K., Dutta, S., & Mahapatra, S. S. (2015). Multi-objective optimization in drilling of CFRP (polyester) composites: Application of a fuzzy embedded harmony-search (HS) algorithm. *Measurement*, 77, 222–239. doi: 10.1016/measure-ment.2015.09.015.

[5] Zobel, Justin (2013). "Algorithms". *Writing for Computer Science* (Second ed.). Springer. [ISBN 1-85233-802-4](#)