

Digitization, and Coding, with Optimizing, of Iraqi Personnel Home Addresses forward, minimizing Storage Space, and Processing time

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Abstract. Individual Home Address is considered as an important sub set of attributes, and never find personnel record, whether a person is student, patient, or employee, etc. without having a home address. It is required to be recorded, registered, and documented in all personnel information systems, whether the system is manual or computerized. This research concern on the Coding, and Digitization of home address of Iraqi personnel in order to enhancing storage efficiency and reduce processing time. The conventional method of maintaining paper-based records for personnel home addresses has proven to be costly, and time-consuming, and in most cases inefficient. The proposed solution involves the conversion of physical addresses into digital formats, allowing for streamlined data storage and faster retrieval, and update processes. The work starting by indicate the current challenges related to the paper-based address systems, including the demands on physical storage space and the delays incurred during information retrieval. Subsequently, it explores the potential benefits of digitizing home addresses, such as reduced storage requirements, improved data accessibility, and enhanced overall organizational efficiency. To implement this digitization process, the research investigates various technological solutions, including geographic information systems (GIS), databases, and data management protocols. The study also addresses potential concerns related to data security and privacy, proposing measures to safeguard sensitive information. The proposed solution for Digitization, Coding, with Optimizing the Personnel Home Address provide at least 85% of Optimizing Factor for each individual personnel record required storage space and processing time, this solution subsequently lead to better daily decision-making process in most business organizations.

1 Introduction

Since the early date of using computer technology in business that was on mid of twenty centuries. Most modern business organizations management in both sectors governmental, or private, they give more attention, and considerations to make use of computer technology in daily management, therefore the managers started to build and use a computerized system to manage their organization resources by designing and establishing either an integrated database system for all resources, or design a separate sub system for each resource. Each one of these two approaches has advantages and disadvantages. All Iraqi organizations follow the second approach to design a subsystem for each resource, which lead to redundancy and inconsistency in the information, and poor accuracy which effect the quality of decision making. It is clear in the human resources management system will find these problems are existed, and requires to look and redesign these systems to optimize, and enhance the usage of this resource.

Most Human Resources Mangers in all organization around the world, especially the modern countries, they aspire to have a power full system to document the personnel information, to offer a good tool for decision making, taking into account offering the required information in short time and less cost.

Usually, the person home address in Iraq, is consists of many parts, these parts in most applications are unstandardized attributes, and they are varying from one application to another, even though, they are varying in names, which then lead to confuse, and produce bad management, administration difficulties, and made a weak decision making.

Furthermore, the research assesses the socio-economic impact of adopting a digitized address system, considering factors such as cost savings, resource optimization, and the potential for broader technological advancements within the organization.

In this research an attempt to introduce a better solution and giving a well person home address structure through which can provide a typical solution for exiting difficulties related for usage of this attributes during the daily working time. The paper organized into five paragraphs: Introduction, Iraqi Accommodation Living System, Research Problem, Proposed Work, Result Discussion, Conclusion, Future work with Recommendation, and References.

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2 Related Works

Increasing data volumes, and tightening with highlighting, the requirements for time for data processing, led to finding an efficient algorithm for optimizing queries and data structures in applications of information systems [1].

The high speed of growth in information in most human live fields, requires to use an efficient techniques and algorithms, in order to store, update, and retrieve the required information in a reasonable time to meet the users' requirements [2].

In recent years many researchers in their papers emphasize that: The database systems have been expanded extremely in the data size, usage, and dealing with various media types. This approach increases the user's attention to have an efficient database systems performance to support daily decision making in appropriate time [3]

Big data approach has been continued to grow rapidly, therefor dealing with this very large data volume require an efficient algorithm, data structure, and programs to be designed well to provide short processing time, and optimize the usage of this resource [4].

3 Problem Definition

In most Iraqi business organizations Personnel Information Systems, when computerized did not analyzed well, therefor when implemented, they suffer with many problems. These problems lead to bad, resources utilization, and decision making. Individual Home Address, can be considered as main attribute within person record, and it is unstructured, and if it is left as it is, it will cause waste storage, and more processing time, therefor this attribute requires more investigation and analysis and need to be structured, and well defined. In this research an attempt to digitized, coded, and optimized Person Home Address attribute to reduce the storage space required, and processing time.

3.1 Iraqi Accommodation living system

Accommodations of Iraqi people community living divided into two main parts: Urban (Hather) part which represent 60% their accommodations in Governates, Districts, and Subdistricts, and Rural (Reef) part represent 40% their accommodations in the countries and deserts. See Table-1 Estimation of Iraqi Population According to Environmental, Governorates, and Gender for Year 2021[5].

Table 1. Estimation of Iraq Population According to: Governorates, Environmental, and Gender for Year 2021[5]

Governorate		Urban			Rural			Total		
#	Name	Male	Female	Total	Male	Female	Total	Male	Female	Total
1	Anbar	492725	464668	957393	490661	466111	956772	983386	930779	1914165
2	Basrah	1284035	1268090	2552125	294623	295701	590324	1578658	1563791	3142449
3	Muthana	209406	201247	408653	234738	236483	471221	442144	437730	879874
4	Qadissiya	402325	396756	799081	300719	295085	595804	703044	691841	1394885
5	Sulaymaniyah	988411	991065	1979476	180260	176455	356715	1168671	1167520	2336191
6	Babylon	541805	535259	1077064	585548	568524	1154072	1127353	1103783	2231136
7	Baghdad	3889652	3792484	7682136	565658	532628	1098286	4455310	4325112	8780422
8	Dahuk	517657	516458	1034115	182103	180262	362365	699760	696720	1396480
9	Thi-Qar	728409	724565	1452974	407809	402912	810721	1136218	1127477	2263695
10	Diyala	437140	433186	870326	456435	442159	898594	893575	875345	1768920
11	Erbil	843573	824708	1668281	168125	167557	335682	1011698	992265	2003963
12	Kerbala	443438	436967	880405	220808	215537	436345	664246	652504	1316750
13	Tameem	641118	634996	1276114	227945	222350	450295	869063	857346	1726409
14	Missan	444288	443672	887960	154608	159607	314215	598896	603279	1202175
15	Ninewa	1251327	1192534	2443861	807323	778822	1586145	2058650	1971356	4030006
16	Wassit	452743	443793	896536	299274	293821	593095	752017	737614	1489631
17	Najaf	566366	569135	1135501	230807	223653	454460	797173	792788	1589961
18	Salah al-Din	391667	385533	777200	478950	467396	946346	870617	852929	1723546
Iraq Population Total		14526085	14255116	28779201	6286394	6125063	12411457	20810479	20380179	41190658

The Iraqi administration hierarchy consist of 18 Governorates, and usually each Governorate subdivided into Districts locally called (Kadah) and each District further subdivided into between (3-8) Subdistricts called (Nahia), and each subdistrict consist of number areas locally called mahalla, in the Urban part, and number Villages in the Rural part Figure-1: Illustrate the Iraqi Governorates and Districts Map [6].

Usually (Areas) Mahallas, and Villages which often are given names un standards and consists of variables length of characters some time accede 40 characters of (Alphabetic, Number, and Special characters). The writing home address may affect a whole service will be given by various administration offices.

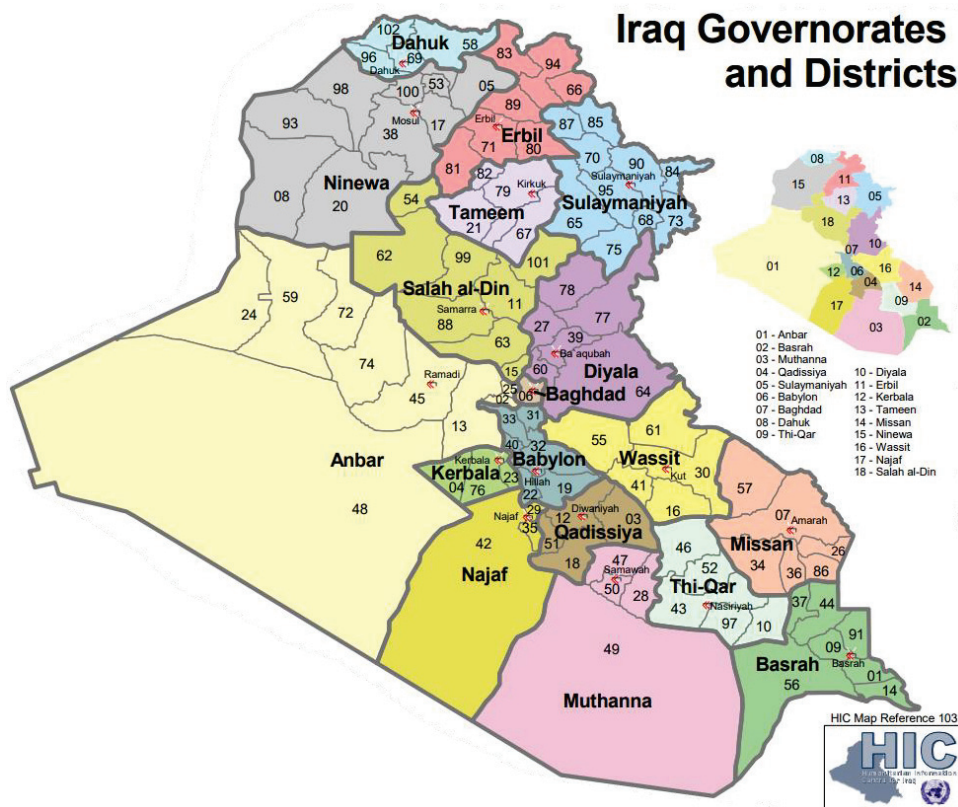


Fig.1. Illustrate the Iraqi Governorates and Districts Map [6]

3.2 Iraq Postal Code

Iraq's postal code was first implemented, and used in 2007 and is now in use. It was used, in order to provide a simpler usage for Iraqis to receive deliveries of various commodities. With no uniform postal code system in place in Iraq, the introduction of the new postal code is intended to make it simpler for foreign commodities to enter the country. The postal code format as indicated in Figure-3, Postal Code structure and format [7].

Useful Information: -

- Total Postal Code in Country: - **Total 356 Postal Code in Iraq**
- Postal Code Type: - **5-digit**
- Toal Population: - **45.5 million (May2023)**
- Capital Name: - **Baghdad**
- Time Zone: -
- Dialing Code: - **964**

6 1 0 0 2

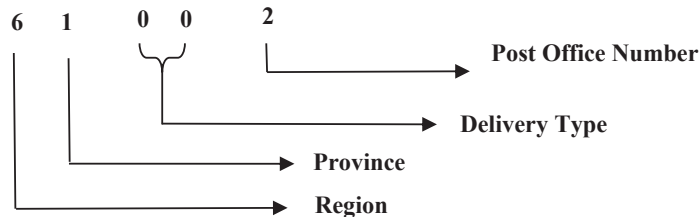


Fig. 2. The Postal Code Format [7]

4 Contribution, and Proposed work

Through the combination of investigation, with theoretical analysis, case studies, and practical implementation strategies, this paper aims to provide a comprehensive, and adequate framework for the digitization of Iraqi personnel home addresses. The findings offer valuable insights for government agencies, military organizations, private organization, and other entities involved in personnel management systems, shedding light on the transformative potential of leveraging digital technologies to optimize storage space and processing time.

As long as of Iraq population living system families, spread out within the Iraq whole either Urban part or Rural part. figure-1 indicate the hierarchy administration structure system, starting from governorates cities center, then districts, subdistricts, and areas/villages. Therefor, and according to this structure, the Individual Home Address must indicate this level of administration structure, Therefor the proposed coding and optimizing the home address attribute must be normalized by giving code to each level of accommodation living family system, and must recover all varieties address parts.

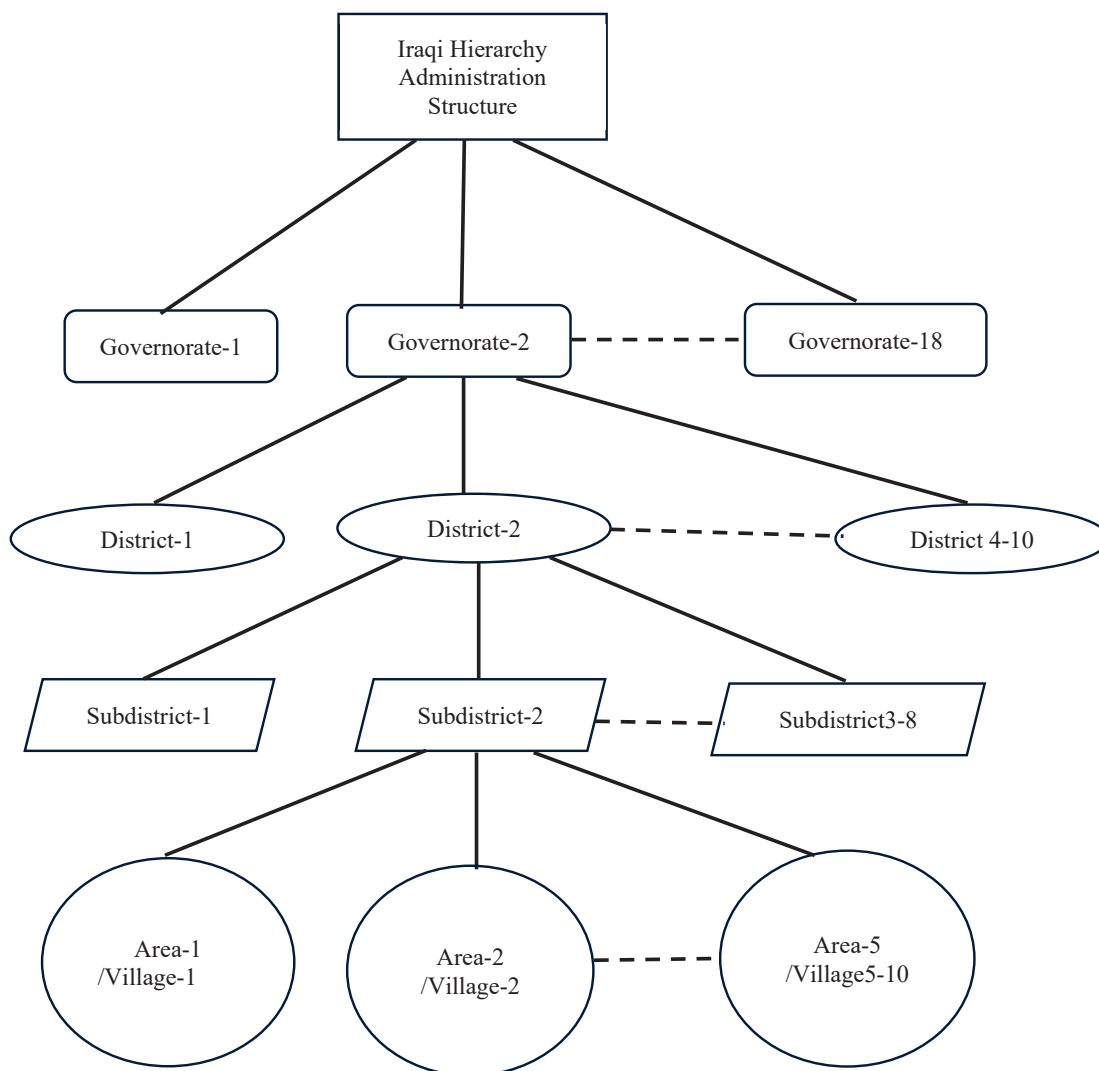


Fig. 3. The Iraqi Hierarchy Administration Structure

Table 2. Home Address Part name Coding

Address Part Name	أسم العنوان باللغة العربية	Required Size in Bytes	Possible Given Code
Governorate	محافظة	1	10-67
District Centre/or Subdistrict	قضاء/ناحية	1	01-20
Mahala/Hai/ Residential Complex/ or Village	محلة/حي/مجمع سكني/قرية	2	001-999
Building/Block/Main Street, or Street	عمارة/بلوك/شارع/زقاق	1	01-255
Home No/Apartment No/ or Flat No	رقم الدار/رقم الممثل/رقم الشقة	1	01-255
Total Bytes		6	

5 Result Analysis

As already mentioned in this research, the Human Resources Information System in most Business organization can be considered as backbone for the success of the organization, if it given well management. As usual when a new organization is newly established, whether it is in a governmental, or private sector, the management wish to have a well-designed, and implemented an information system for the organization resources capable to provide the required information to all levels of management. This requested information should be available in the right place and right time.

Unfortunately, this objective in most organizations in Iraq is not available now, because the Information system when analyzed and designed using an inefficient technique, which lead to waste storage and long processing time. Usually, Personal Record consists of number of attributes, one of them the person home address which is complex attribute and its size required between 30-40 bytes to be stored in a file or in the RAM. Our solution for this problem to use structure Person Home Address as illustrated in Table-2: Home Address Part name Coding.

Table-2 depict proposed coding home address parts. Therefore, instead of store full Person Home Address, which requires in most cases between 30-40 bytes of each individual record of Iraqi Population, our approach only require 6 Bytes instead, by using equation (1), which give

$optimization\ Factor = (1 - (6 / 40)) * 100 = 85\%$ saving storage space, and processing time.

$$Optimization\ Factor = \left(1 - \left(\frac{New\ Code\ Size\ in\ Bytes}{Old\ Home\ Address\ Size\ in\ Bytes} \right) \right) * 100 \quad (1)$$

6 Conclusion, Recommendation, and future work

The human resource information system for any organization management can give a very high priority for building a database system to manage such information. One can notice that the Person Home Address attribute in these applications represents very high percent of the person record size and importance.

Since all business organizations management aspire to have such adequate application to manage the employee's information, also, these applications are repeated and duplicated in most organizations, where these duplications are causing wastages in storage space, and processing time. Therefor it is very argent need to find a solution of these problems. The final conclusion of this paper is providing the solution by digitizing and coding the person home address to achieve 85% optimization factor.

To make actual use and explore this work, it necessary to investigate with full analysis, and redesign all personnel information systems in all Iraqi Organizations (Governmental or Private). It necessary to apply, and implement for all human resources information applications, as integrated system in order to minimize data redundancy that will reduce the storage space, and processing time required, then provide well managing organization resources.

References

1. Ogbonnaya Jr. Njiolenaka Akpara, and Alexander Sverdlov, "Database Speed"2018.
2. Ridwan Andi Kambau, and Zainal Arifin Hasibuan "Evolution of Information Retrieval System: Critical Review of Multimedia Information Retrieval System Based on Content, Context, and Concept" International Conference on Information & Communication Technology and System (ICTS), 2017.
3. Dmitri Korotkevitch , "SQL Server Advanced Troubleshooting and Performance Tuning 2021".
4. "Big Data, Fast Processing Speeds", (Kevin McGowan SAS Solution on Demand, and Cary NC 2018.
5. HIC website: www.humanitarianinfo.org.

6. <https://www.cosit.gov.iq/ar/2013-01-31-08-43-38>.
7. [Iraq Wikipedia Page Iraqi Telecommunications And Post Company Postal Format Iraq Current Time In Iraq](#).
8. SCO Central Statistical Organization, IRAQ/<https://www.cosit.gov.iq/ar/1129-aas>.
9. Alan Beaulieu "Learning SQL, Second Edition", Published by O'Reilly Media, Inc. 2009.
10. Microsoft Access expert, Student version" Course Orientation" 2019.
11. Yulia Shichkina ,” Approaches to Speed up Data Processing in Relational Databases”13th International Symposium “Intelligent Systems 2019” (INTELS’18).
12. Oracle® Database,” Database Performance Tuning Guide’, 2022.
13. Thanuskodi Shanmugam" Information Search Strategies among LIS Professionals:
14. A Case Study of Selected Institutions in India, 2019”.
15. Charles T. Meadow, Bert R. Boyce, Bert R. Boyce, and Carol Barry, “Text Information Retrieval Systems Third Edition 2007”.
16. Jessie McGowan, Margaret Sampson, and Carol Lefebvre,” Evidence Based Library and Information Practice 2010”.
17. Francois Charvet, and Ashish Pande, “Database Performance Study”.
18. Kaushik Donkena, and Subbarayudu Gannamani “Performance Evaluation of Cloud Database and Traditional Database in terms of Response Time while Retrieving the Data” Master Thesis Electrical Engineering December 2012.
19. Abraham Silberschatz, *Yale* University, Henry F. Korth, Lehigh University, and S. Sudarshan, Indian Institute of Technology, Bombay “DATABASE SYSTEM CONCEPTS, SIXTH EDITION”,2011.
20. Ramez Elmasri, Department of Computer Science and Engineering, The University of Texas at Arlington, an Shamkant B. Navathe, College of Computing, Georgia Institute of Technology. “FUNDAMENTALS OF Database Systems, SIXTH EDITION”, 2010.