

Electronic Data Interchange Framework for Financial Management System

Nora Aldowesh, Aljawharah Alfaleh, Manal Alhejazi, Heyam Baghdadi, Atta-ur-Rahman*,

Department of Computer Science (CS),
College of Computer Science and Information Technology (CCSIT),
Imam Abdulrahman Bin Faisal University, P.O. 1982, Dammam 31441, Saudi Arabia
Email: 218500211@iau.edu.sa, 218500212@iau.edu.sa, 218500173@iau.edu.sa, 218500243@iau.edu.sa,
*aaurrahman}@iau.edu.sa

Abstract

As a result, for the increasing expansion by the university faculties in the field of postgraduate studies, The Deanship of Graduate Studies at the university has been established in 1430 AH/2009 CE to specifically address the needs of the current and prospective graduate population to supervise postgraduate studies programs in coordination with the concerned faculties. This comes as a result for the university being certain of the importance of providing postgraduate studies opportunities that follow the bachelor's degree to qualify our ambitious youth appropriately. The University offers 72 different Graduate programs, awarding doctoral and master's degrees along with fellowships and diplomas in various disciplines like health, engineering, science, literary, and educational. Currently, the financial model for admission and students' payment is manual and paper based. This paper proposes to provide a user interface for Financial Management in Deanship of Graduate studies. The basic purpose of the system was to minimize human interference and reduce mistakes placed by human interference, also to have efficient and a fast performance, and perform Electronic Data Interchange (EDI) for various tasks such as billing and scheduling details.

Keywords:

EDI, Automated Information Exchange, Language, Grammar.

1. Introduction

Deanship of Graduate Studies (DGS) at the university was established in 2009. The university offers 72 different Graduate programs, awarding doctoral and master's degrees along with fellowships and diplomas in various health disciplines, engineering and scientific, literary, and educational. The Deanship of Graduate Studies identifies functions based on standards of quality and academic authorization, as well as the requirements of national development plans to strengthen the position of the University regionally and globally. Deanship of Graduate Studies offers Parallel System Educate, so each applicant should pay a fee to be able to study depending on the program, Deanship of Graduate

Studies have eleven departments working together with a great efficiency and discrete outcomes. The Deanship of Graduate Studies must communicate with multiple areas such as financial department, scholarship, student affairs and must communicate with students directly to perform the registration and paying fees to the university. However, these communications are done by the workers in the graduate studies department which takes a lot of time and sometimes could cause wrong data exchanging between the departments in the university.

One of the issues can be related to the financial data transactions where the student should send the bank receipt through the email of the department employees and the employee should take each receipt and write the information in the system manually and this task will take time and the information may get inserted with wrong data due to certain human errors. In this study we focus on Financial Management department which associated with further six departments, we will propose a system which reduce utilization of human resources also time and effort used in manual and traditional method, as well as minimize human errors. Rest of the paper is organized as follows: section 2 provides review of literature in the field of EDI; section 3 highlights the proposed system model. Section 4 and 5 provide complete grammar description while section 6 concludes the paper.

2. Review of Literature

The base idea behind EDI is to consider a theoretical framework that support the EDI implementation. EDI can be defined as a service of technology and administrative that provided to all businesses of all sizes[1]. The usage of the EDI can be benefited by different sectors such as

universities, hospitals, hotels etc. This paper [1] studies the usage of electronic data interchange (EDI) in hotel industry. The main two aspects of that study are to clarify the effectiveness of using EDI in hotels and in which area it might be used. The study results show that three areas in hotel can be influenced by EDI: purchasing, financing and strategy. The model specifies some profile and task variables which have impact on the EDI decision making in the hotels. This study has limitations regarding using the traditional EDI and examining very old data that leads to the conclusion of the study which cannot be practical implications for the hotel usage. Another usage of EDI is in healthcare industries where the data exchanging is facing many issues. One of the issues is related to workers in healthcare industry and how they deal with the patients' records. Also, the healthcare providers may not be willing to the idea of changing their data and the sensitivity of the data can be a reason of not having a standard format for exchanging the data[2]. Authors of paper [3] develop a software of a healthcare data interchange which is called Health Level 7 (HL7). HL7 is one of the models that grows to cover all the problems that are facing the healthcare providers in data interchanging because of different data definitions, types, and structures. This issue leads to the need of standard access data framework to provide the providers with a familiar data description. The authors developed a software tool by making XML is a middle layer between HL7 and healthcare database to allow the healthcare providers to interchange the data. In paper [4] the authors used HL7 and DICOM (Digital Imaging and Communications in Medicine) based integration between the radiology departments and healthcare enterprise information systems. The main reason of combining two systems is to figure out the capability of HL7 CDA (Clinical Document Architecture) to satisfy the Radiology Information System need to integration HL7 based healthcare information systems. The conclusion of this paper is that using DCM-CDA is easy and cost effective. Authors in [5] discussed HL7 V3 care transfer, care record message and care query, this is the core of the Care Provision Domain (CPDM) in the HL7. Also, they describe the structure of the CPDM. As the result the illustrate that HL7 V3 Care Record is considered as a flexible message structure that is be able to exchange the full Care Record also it allows the exchanging of dynamic data. HL7 V3 depends on Reference Information Model (RIM) that considers as a set of object-oriented class diagrams with its attributes[6]. Researchers in [7] mentioned that the development of better interface and tools for communication of effective information in a networking environment is the results of using and accepting HL7 standards that will have chance of making error free and effective healthcare information system. Also, they mentioned that the information will transfer with HL7 standards in an instant and secure way among healthcare

systems. In paper [8] Authors describe the importance of analyzing and understanding the challenges in the altered phases of life cycle of modifying software and explore entrancing solitons , algorithms and frameworks and requirements to abode them , also a diagram architectural patterns helps to develop adaptive systems exhibiting real-time performance. In a study in [9] authors exemplify challenging that achieve high quality, efficient that support semantic interoperability among healthcare services and applications, they present a service that focused on implementation of HL7 interfaces to integrate legacy systems, which aims to reducing limitations tools for HL7 interface , its includes three main important component and they are: conceptual model formalization component, ontology mapper component and automatic interface generator component. The approach under elaboration to evaluate its effectiveness, feasibility, quality of the semantic interoperability service of the matching process, accuracy of information exchanged, and automation level for implementing HL7. Authors in [10] made an survey about HL7 CDA which describe a XML-based standard markup expected to determine the encoding, semantics and structure of clinical reports for trade. Their aim was to combine CDA with standard HL7 and provide improved and better knowledge in the field of medical. CDA report arrange a clinical data standard planned to ensure interoperability between hospitals, its generate and incorporate framework in view of cloud server is more accommodating over existing administrations for CDA record if the assortment of CDA archive increments. A study in [11], presents a generic interface for HL7 in a web-based environment. Purpose of the study is to present a system that enables the healthcare stakeholders that are doctors/practitioners, hospitals/practices, laboratories, and pharmacies to develop their own generic interface by an easy wizard for better communication of patient health record (PHR). The proposed system is generic and smart enough to adapt the new versions of HL7 without any hassle.

EDI is closely related to information extraction (IE) that is a field of study in data/text mining [12-17] where the useful patterns are automatically extracted from the text based on some regular expressions (RE) and/or grammatical rule like context free grammars (CFG). In [18], authors proposed a novel ontological approach to IE equipped with fuzzy regular expressions, fuzzy rule-based system [19-20] and natural language processing (NLP) based algorithms such as word2vec and word sense disambiguation (WSD) to extract a fine tune information from published research articles. That information can further be used by semantic web and/or the digital libraries [21-25] to index, search and retrieve the information efficiently. In [26], authors proposed an EDI framework for educational institutes. The information was related to a student that transfers through various semesters and among the institutes. The complete information was comprised of

student’s basic information as well as his/her educational information. The prototype of adequately demonstrated the effectiveness of the model. In [27], authors proposed a metadata-based approach to extract research paper’s reference section. The technique was efficient in terms of accuracy and promising in terms of complexity. In [28][29], authors proposed efficient IE approaches to extract the meta data and table of contents (ToC) from PDF books for better retrieval and indexing. Similarly, authors in [30], comprehensively reviewed the effective schemes, methods, and approaches in IE and their pros and cons.

3. Proposed EDI System

This section specifies the Design Specification for the system it will describe the university and DGS structure, objectives, System Functionality, Data flow diagram, Data Design, Messages, and segment description.

3.1 University Structure

In this section we will illustrate the structure of the university to show the relationship between the departments that are involved in the transactions that are proposed in this study (Figure 1), we focused on the DGS and its related transaction with students and financial department (Figure 2). As we can see from the figure that the financial department is under the department of deanship of graduate studies department so we will consider the deanship as the admission department.

3.2 Objectives

The objectives are to covert paper-based exchanges to electronic records. Reduce paper-based exchange and human intervention in the data entry of the payment document, minimize human errors, saving time and efforts, reducing cost and faster processing of the transactions.

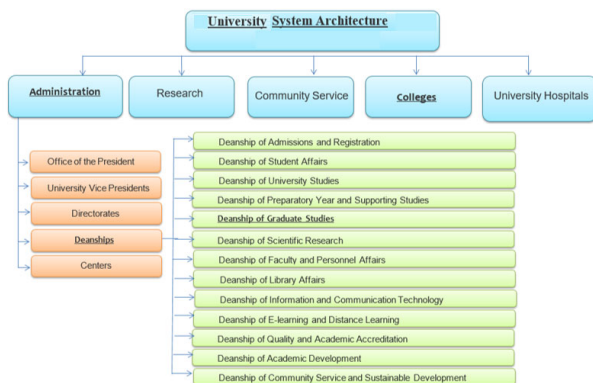


Figure 1: University structure



Figure 2: Financial department

3.3 System Users/Stakeholders

The main users of the system will be admin, student, and financier. The functionalities of this application are divided based on user types. User’s functionalities are described in Table 1.

Table 1: User Functionalities

Code	User	Functionalities
ADM	Admission	This user You will do: <ul style="list-style-type: none"> - Posting program in graduate admissions gate for student - Sending the first acceptance status to student who apply to program - Sending fees payment to the student who is been excepted in program for current semester - send the final acceptance status to the student how pay the fees - adding student to pay list for the current semester - activate in system the student has paid the fees
ST	Student	This user You will do: <ul style="list-style-type: none"> - apply graduate programs - receive accepting status - receive paying the fess from the admission - pay the fees for the financial - receive the final acceptance status with activation information from the admission
FIN	Financial	This user You will do: <ul style="list-style-type: none"> - pay list for the student in current semester - sending pay list status for admission

Moreover, every user had some command that he can initiate as describe in the Table 2.

Table 2: User Commands

Code	Command	Definition
ADM	Posting	ADM post program for the student
	Receive	ADM receive applying application from the graduate admissions gate
	Accept	ADM will send First acceptance status
	Accept	ADM will send Final acceptance status
	Adding	ADM will add student in pay list
	Send	ADM will send to student to pay
	Send	ADM will send pay list to financial
	Active	ADM will activate student in system

	Summary	ADM show summary table of ST applied list
	Detail	ADM show Detailed information of the ST in the list
	Apply	St will apply to program in graduate admissions gate
ST	Complete	St will send application to admission
	Acknowledgment	ST will Receive acknowledgment from ADM that the application had been Received
	Receive	St will receive the first acceptance from ADM if the ST meet the program condition
	Pay	St will receive pay fees from financial
	Receive	ST will receive the final acceptance from ADM if ST complete the pay fees
FIN	Receive	FIN will receive List from first accepted ST
	Receive	FIN will receive pay fees from ST
	Accept	FIN will accept ST how complete the pay
	Reject	FIN will reject ST how did not complete the pay
	Send	FIN will send pay status for admission
	Send	FIN will send pay fees information for ST
	Summary	FIN show summary table of ST first accepted list
	Detail	FIN show Detailed information of the ST in the list

3.4 Data flow

Here we will show the flow of data through the proposed system where the transaction happens between the users, we are interested in transaction in three entities the admission department, student, and financial department as depicted in data flow diagram (DFD) shown in Figure 3.

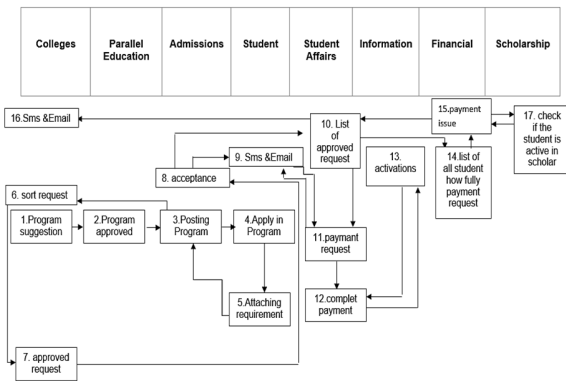


Figure 3: DFD

3.5 Data Design

This section provides a full description of the data, required fields and data types along with its constraints and the database description of the proposed application.

3.5.1 Data Description

The system will use database that contains all the data needed to provide full and complete functionalities. Data are

accessible based on the user’s privilege. Each user can access their own data. Although the admin has the highest privilege, he/she cannot receive the pay fees from the students. The entities required fields and data types of the database are shown in Table 3.

Table 3: Entities description

Entities	Fields	Data Types	Constrain
Student	Fname	string	Not null
	Mname	string	Not null
	LName	string	Not null
	statues	string	Not null
	gender	string	Not null
	DoB	Date	Not null
	Nationality	String	Not null
	Nationality number	Numeric	Not null, Primary key
	Email	String	Not null
	Mobile number	Numeric	Not null
	country	String	Not null
	city	String	Not null
	street	String	Not null
	GPA	Numeric	Not null
	Payment ID	Numeric	Allow null, foreign key
	Program name	String	Allow null, foreign key
	Program	year	Date
College name		string	Not null
Program requirement		Text file	Not null
Program name		string	Not null, Primary key
Payment information	Payment statues	string	Not null
	Payment requirement	Text file	Not null
	Payment ID	Numeric	Allow null, foreign key
Financial Department	Payment ID	Numeric	Not null, Primary key

3.5.2 Data Dictionary

This section describes all the required fields in each entity. Table 4 shows the data dictionary of the proposed EDI system.

Table 4: Data dictionary

Entities	Fields	Description
Student	Fname	Define the first name of the applier
	Mname	Define the middle name of the applier
	LName	Define the last name of the applier
	Statues	Identify the status in program active or not active.
	Gender	Identify the Gender of the student
	DoB	Identify the date of birth of student

	Nationality	Identify the nationality of the student
	Nationality number	Identify the national number of the student
	Email	Identify the EMAIL of the student
	Mobile number	Identify the mobile number of the student
	Country	Identify the country of the student
	City	Identify the city of the student
	Street	Identify the street the student lives in
	GPA	Identify the cumulative GPA of the student
Program	Year	Identify the message Date
	College name	Identify the college name
	Program Requirement	List of the requirement for the program
	Program name	Identify the program name
Payment information	Payment status	Define the payment status of the student paid the fees or not
	Payment requirement	Define the payment requirement

3.5.3 Database Description

The system database consists of many tables, each table contains data with their characteristics. Entity relationship diagram (ERD) describe the entities and their relationships. Schema diagrams describe the logical level of the database design. Figure 4 and Figure 5 shows ERD and Schema diagrams, respectively.

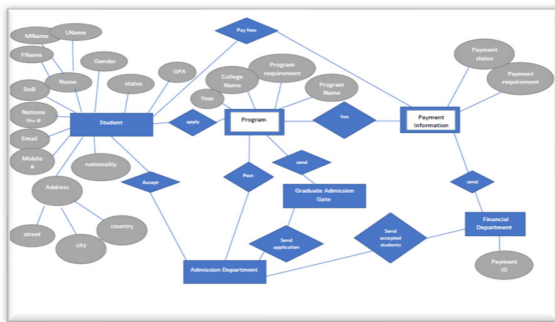


Figure 4: ERD

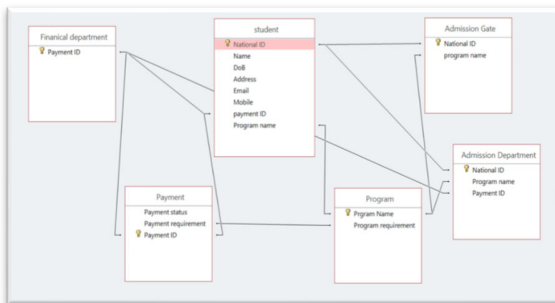


Figure 5: Schema

4. Electronic Data Interchange Grammar

This section describes the language structure of the proposed financial EDI system. The grammar comprised of several messages. The Figure 6 shows messages between admission and student and financial department.

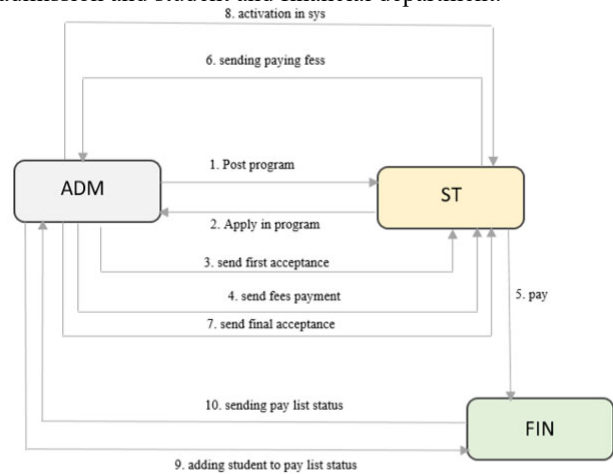


Figure 6: EDI messages

4.1 Message components

Each message consists of one or more segments, each segment consists of one or more filed, each field consists of one or more subfield. In this section we will explain the details of each message segment in our proposed system

4.2 Characters

In the Table 5, we explained each delimiter that separate each segment, segment field, subfield, sub-subfield, end of message and the end of the message these special characters are known as delimiters characters.

Table 5: Delimiter’s description

Delimiters Name	Delimiter’s character	Purpose
Segment separator (Default separator)	*	Separates components from each other
Field separator	\$	Separate two data fields in the segment
Sub field separator	#	Separate two data sub fields in the segment
Sub-subfield separator	%	Separate two data two sub fields in the segment
End of the Segment	@	Indicates the end of the segment
End of the message	^	Indicates the end of the message

4.3 Identifying Message transaction

Each message is used to transfer electronic data between the student, admission department and financial department. Each message sends info about a particular event.

4.3.1 Header Message (Message code: HDR)

This message is the header message for the ide to show the transaction. Its details are given in Table 6.

Table 6: Header message’s description

Fields	Description	Data type	Mandatory	Rule/Format	Example
Sending user	Define the name of the user that will send the message	string	Yes	50 characters	User 1
Receiving user	Define the name of the user that will receive the message	String	Yes	50 characters	User 2
Message-code	The code of the message	String	Yes	The message code defined.	POPR
Date	The date when the message was sent	Date	Yes	DDMM YYY	25022 017
Time	The date when the message was sent	Time	Yes	hhmmss	10300 5

4.3.2 Message #1: ADM Post program (Message code: ADMP)

This message is sent from the admission department throw the net to be seen from the student to apply for admission. It is comprised of two segment codes, namely posting a program by the admission department (POPR) and posting the program requirements (PORE). The segments of this message are mentioned in Tables 7.1 and 7.2 respectively. Here REP represents whether it is repeated or not.

4.3.3 Message #2: ST apply program (Message code: STAP)

This message is sent from the student to apply to the posted program from the admonition department. It is comprised of two segments namely Student personal information (STPI) and Student Academic information (STAC). The segments of this message are described in Table 8.1 and 8.2, respectively.

The sub-fields student name (Student_Name) and student address (Student_Address) are given in Table 8.1.1 and Table 8.1.2, respectively.

Table 7.1: Posting a program by the admission department (POPR)

ID	Field	Type	Description	Value	Mandatory	Rep.	Rule/Format	Example
POPR-1	Start Date	Date	Identify the message Date	Defined by the user	Yes	1	DD-MM- YYYY	20-09-2018
POPR-2	College	string	Identify the college name	Defined by the user	Yes	1	50 characters	Computer science & information
POPR-3	Program	string	Identify the program name	Defined by the user	Yes	1	50 characters	Computer Science
POPR-4	Studying Years	string	Identify the number of program years	Defined by the user	Yes	1	20 characters	2 years

Table 7.2: Posting the requirements for the program (PORE)

Example	Bachelor's Degree	Transcript	English Test Certificate	Applicer National ID
Rule/Format	50 characters	50 characters	50 characters	50 characters
Rep.	1	1	1	1
Mandatory	Yes	Yes	Yes	Yes
Value	Define by the user	Define by the user	Define by the user	Define by the user
Description	Define the first requirement	Define the second requirement	Define the third requirement	Define the fourth requirement
Type	string	string	string	string
Field	Requirement_1	Requirement_2	Requirement_3	Requirement_4
ID	PORE-1	PORE-2	PORE-3	PORE-4

Table 8.1: Student personal information (STPI)

Example	-	-	-	Female
Rule/Format	-	-	-	10 chars
Rep.	1	1	1	1
Mandatory	Yes	Yes	Yes	Yes
Value	Defined by the user	Defined by the user	Defined by the user	Male Female
Description	Identify the name of student	Identify the name of student	Identify Address of student	Identify Gender
Type	(Composite Field)	(Composite Field)	(Composite Field)	String
Field	Student_Name	Student_Name	Student_Address	Gender
ID	STPI -1	STPI -2	STPI -3	STPI -3

05/09/1991	Saudi	1108444777	(+966)-55311155	na@gmail.com
DD/MM/YYYY	20 chars	20 chars	15 chars	255 chars (xxx@xxxx)
1	1 or More	1	1	1
Yes	Yes	Yes	Yes	Yes
Defined by	Saudi, etc.	Defined by the user	Defined by the user	Defined by the user
Identify date	Identify national	Identify ID or Iqama	Identify Mobile	Identify student Email ID
Date	String	Numeric	Numeric	string
Date of Birth	Nationality	ID Number	Mobile	E-mail
STPI -4	STPI -5	STPI -6	STPI -7	STPI -7

8.1.1: Subfield of Name Field

Example	Heyam	Baker	Bagdadi
Rule/Format	50 characters	50 characters	50 characters
Rep.	1	1	1
Mand.	Yes	No	Yes
Value Description	Defined by the user	Defined by the user	Defined by the user
Description	Identify the first name of the student	Identify the second name of the student	Identify the last name of the student
Types	String	String	String
Fields	FName	MName	LName
ID	STPI -1.1	STPI -1.2	STPI -1.3

8.1.2: Subfield of Address Field

Example	-	Khobar	Saudi Arabia	7463
Rule/Format	-	50 characters	50 characters	50 numbers
Repetition	1	1	1	1
Mandatory	Yes	Yes	Yes	Yes
Value Description	Defined by the user	Defined by the user	Defined by the user	Defined by the user
Description	Identify the street in	Identify the city in address	Identify the country in	Identify the Postal Code of
Types	Composite Field	String	String	Numeric
Fields	Street	City	Country	Postal Code
ID	STPI -2.1	STPI -2.2	STPI -2.3	STPI -2.4

In Table 8.1.2 there is one further subfield that is composite. Namely, the street. Its description is given in Table 8.1.2.1.

8.1.2.1: Sub-Subfield of street field

Example	Saud Bin Fahad St	10 th street
Rule/Format	50 characters	10 characters
Repetition	1	1
Mandatory	Yes	Yes
Value Description	Defined by the user	Defined by the user
Description	Identify the street name of the student	Identify the city in address of the student
Types	String	String
Fields	Street_Name	Street_Number
ID	STPI -2.1.1	STPI -2.1.2

Table 8.2: Segment #3: Student academic information (STAC)

Example	IAU	CCSIT	CS	20/09/2017	4
Rule/Format	255 characters	255 characters	255 characters	DD/MM/Y YYY	4 digits
Rep.	1	1	1	1	1
Mandatory	Yes	Yes	Yes	Yes	Yes
Value Description	Defined by the user	Defined by the user	Defined by the user	Defined by the user	Defined by the user
Description	University name	Name of the College	Name of Department	Graduation Date	cumulative GPA of the student
Type	String	String	String	Date	Numeric
Field	University	College	Department	Graduation Date	Cumulative GPA
ID	STAC-1	STAC-2	STAC-3	STAC-4	STAC-5

4.3.4 Message #3: Sending pay list status for admission (Message code: FINS)

This message is sent from the financial department to admission department to get the final accepted student list. It is consisted of two segments namely payment List of all the applications (PALI) and payment information of a student (PAST). Description of both segments is given in Tables 9.1 and 9.2, respectively.

Table 9.1: Segment #1: Payment List of all the applications (PALI)

Example	Norah	Khaled	Ahmad	Paid
Rule/Format	50 characters	50 characters	50 characters	50 characters
Rep.	1	1	1	1
Mandatory	Yes	No	Yes	Yes
Value Description	Define by the user	Define by the user	Define by the user	Paid, not paid
Description	Define the first name of the applicant	Define the middle name of the applicant	Define the last name of the applicant	Define the payment status of the student
Type	string	string	string	string
Field	S-FName	S-MName	S-Name	P-status
ID	PALI-1	PALI-2	PALI-3	PALI-4

4.3.5: Message #4: sending acceptance letter to the student (Message code: ADAC)

This message is sent from the admission department to the student. It consists of two segments namely Sending initial accept to the student (INAC) and sending final acceptance after paying studying fees (FIAC). Their detail is given in Tables 10.1 and 10.2, respectively.

Table 9.2: Segment #2 send payment information of a student (PAST)

Example	Nora	Khaled	Ahmad
Rule/Format	50 character	50 character	50 character
Rep.	1	1	1
Mandatory	Yes	no	Yes
Value Description	Define by the user	Define by the user	Define by the user
Description	First name of the applicant	Middle name of the applicant	Last name of the applicant
Type	string	string	string
Field	S-FName	S-MName	S-Name
ID	PAST -1	PAST -2	PAST -3

Example	Norah	Khaled	Ahmad	20000
Rule/Format	50 characters	50 characters	50 characters	20 characters
Rep.	1	1	1	1
Mandatory	Yes	No	Yes	Yes
Value Description	Define by the user	Define by the user	Define by the user	Defined by the admin user
Description	Define the first name of the applicant	Define the middle name of the applicant	Define the last name of the applicant	Identify required payment amount for the studying
Type	string	string	string	numeric
Field	S-FName	S-MName	S-Name	Payment required
ID	INAC -1	INAC -2	INAC-3	INAC -1

Table 10.1: Segment #1 Initial Acceptance from the admission (INAC)

Example	Computer Science	Paid	20000	05/09/2018
Rule/Format	50 character	50 character	20 character	DD/MM/Y
Rep.	1	1	1	1
Mandatory	Yes	Yes	Yes	Yes
Value Description	Define by the user	Payed, not payed	Defined by the user	Defined by the user
Description	Identify the college name	Academic status of the student	Required payment amount for the studying	Identify the date of payment of fees
Type	string	string	numeric	Date
Field	College	Payment _status	Payment required	Payment ID
ID	PAST -4	PAST -5	PAST -6	PAST -7

Khaleed	Ahmad	Active in the program
50 characters	50 characters	50 characters
1	1	1
no	Yes	Yes
Define by the user	Define by the user	Active, not active
Define the middle name of the applicant	Define the last name of the applicant	Identify the status of the student in the program
string	string	string
S-MName	S-LName	Academic Status
FIAC -2	FIAC -3	FIAC -4

07/09/2018	2222 0000 4444 5555
DD/MM/YYYY	50 characters
1	1
Yes	Yes
Defined by the admin user	Defined by the admin user
Identify the last date to pay the fees for the acceptance	Identify the IBAN number of the bank to pay the fees
Date	numeric
Payment_LDate	IBAN
INAC -2	INAC-3

4.3.6 Message #5: Academic information after accepting (Message code: STAC)

This message is sent from the admission department to the student after the final acceptance. The segments of this message are mentioned in Table 11.

Table 10.2: Segment #2 Final Acceptance from the admission (FIAC)

Example	Nora
Rule/ Format	50 characters
Rep.	1
Mandatory	Yes
Value Description	Define by the user
Description	Define the first name of the applicant
Type	string
Field	S-FName
ID	FIAC -1

Table 11: Segment #1: Academic Information (ACIN)

ID	Field	Type	Description	Value	Mandatory	Rep.	Rule/Format	Example
ACIN -1	ID	numeric	Define the	Define by the	Yes	1	50 characters	2120007777
ACIN -2	S-FName	string	Define the	Define by the	Yes	1	50 characters	Nora
ACIN -3	S-MName	string	Define the	Define by the	no	1	50 characters	Khaled
ACIN -4	S-LName	string	Define the	Define by the	Yes	1	50 characters	Ahmad
ACIN -5	College	string	Identify the	Defined by	Yes	More than 1	50 characters	CCSIT
ACIN -6	Program	string	Define the	Define by the	Yes	1	50 characters	Computer
ACIN -4	Status	string	Define the	Active, not	Yes	1	50 characters	Active
ACIN -5	Date_Joined	Date	Identify the	Defined by	Yes	1	DD/MM/YY	05/09/2018
ACIN -6	Cumulative GPA	Numeric	Identify the cumulative	Defined by the user	Yes	1	4 digits	0

5 Encode and Decode

In this section provides an example on how to encode and decode the system information as depicted in Figures 7 when a student applies in the program.

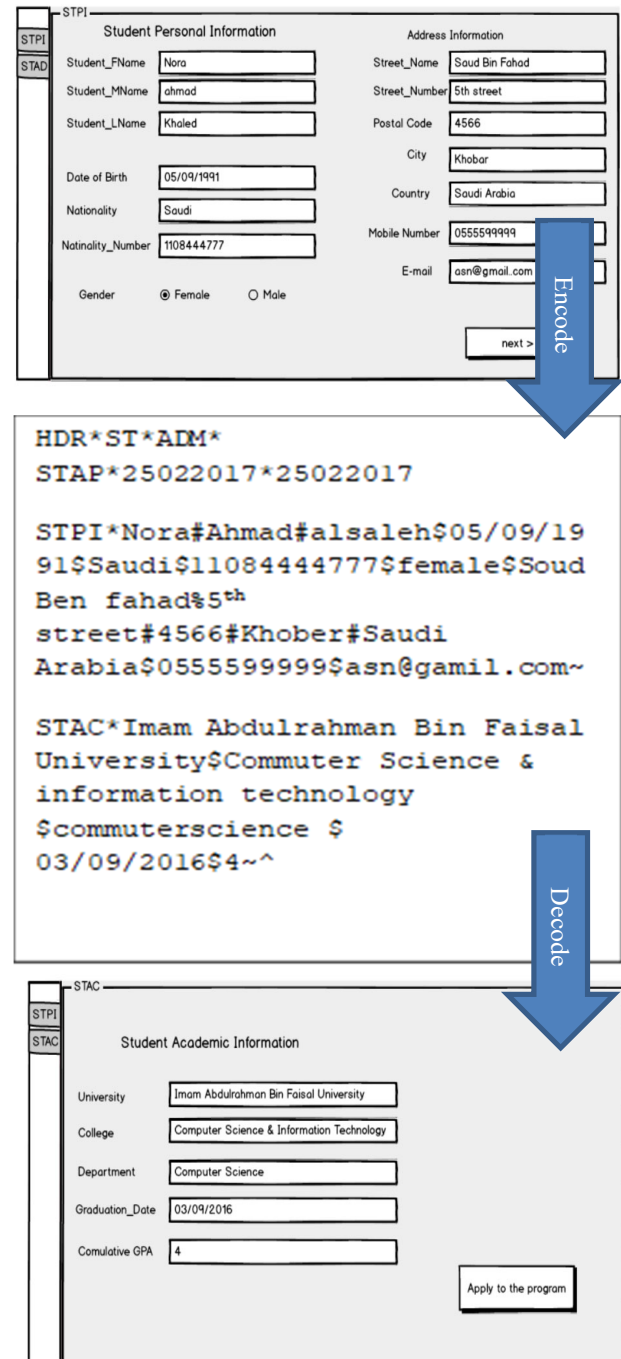


Figure 7: Student applies to the program

6 Comparisons between Proposed system and HL7

In this Section we will compare the proposed system with HL7 in the following aspects:

Usability: The HL7 is used in transferring electric data among healthcare systems however, our proposed system is used in education field.

Complexity: The proposed system has 5 primary messages without any trigger while HL7 has 4 primary messages with 313 triggers.

Extendibility: The HL7 can be expanded or reused in future also the proposed system can be expanded to more versions.

Stakeholders: The stakeholders of HL7 are medical centers that are hospitals, clinics, pharmacy, laboratory, and insurance, while the stakeholders of the proposed system are in education field such that universities and colleges that represented by the students, admission department and finance departments.

Delimiters and data type: In this regard, Table 12 and Table 13 provides a comparison between the delimiters of HL7 with the delimiters of proposed system and the data types used, respectively.

Table 12: Delimiter based comparison

Delimiters Name	Purpose	Delimiter's character of the proposed system	Delimiter's character of HL7
Segment separator (Default separator)	Separates components from each other	*	
Field separator	Separate two data fields in the segment	\$	
Sub field separator	Separate two data sub fields in the segment	#	^
Sub-subfield separator	Separate two data two sub fields in the segment	%	&
End of the Segment	Indicates the end of the segment	~	<CR>
End of the message	Indicates the end of the message	^	N/A

Table 13: Data type-based comparison

The proposed data types	The HL7 data types
Numeric	Numeric (Numeric-Money-Sequence ID, etc)
Date\Time	Date\Time
-	Identifier (Entity Identifier-Reference pointer, etc)
String -Text data	Alphanumeric (String, Text data, formatted Text)

7 Conclusion

In this research we propose an EDI system for financial department to move from paper-based payment method to an electronic system. The key benefits of the proposed system are cost reduction, faster processing, and error reduction, a process that allows information to be sent electronically instead of paper. Currently, it is proposed for university's admission system. however, this model can be extended to any organization involving financial transactions. Complete language grammar has been designed by starting with the basic system components like Data flow diagrams, database architecture including Entity Relation Diagrams (ERDs) and schema to be mapped on to the grammar. Further complete set of messages in accordance with all the fields of the system has been designed and import export mechanism is exemplified. The model is ready to be used in any compatible organization by adopting the proposed design strategies. In future, the system can be prototyped using any programming language and the concept of blockchain can be incorporated to make the financial transactions secure. More fields and messages can be added in the existing grammar to facilitate more operations on the fly.

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