

A2.1 Specification of requirements and documentation



SOFTWARE REQUIREMENTS SPECIFICATION



e-Learning Certifox

Review: 3.0

Ficha del documento

Date	Review	Description	Author
10/05/2021	1.0	Initial review of requirements specifications.	Eduardo Morgado, Oscar Piña, César Ramírez, Elden Cruz, Abner Perales
11/05/2021	2.0	Development of functional and non-functional user requirements.	Eduardo Jacome, César Ramírez, Elden Cruz
12/05/2021	3.0	Development of the requirements of the external interfaces and appendix.	Oscar Piña, Abner Perales

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Customer	Supplier
FOXCONN	CODE DEVELOPERS

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1. Introduction

This document is a Software Requirements Specification (SRS) for the learning management system. This specification has been structured based on the guidelines given by the IEEE Standard Recommended Practice for Software Requirements Specifications ANSI/IEEE 830, 1998.

1.1 Purpose

The purpose of this document is to define the functional and non-functional specifications for the development of a web-based information system to manage the process of training courses and their certification. This system will be used by employees, trainers and course coordinators.

1.2 Scope

Certifox is a web-based system that will allow users to view their course catalog, take a course and print their certificate, thus reducing the time required for this process considerably. It is also expected that the system will only be accessible from the company's network and notify the person in charge when a user does not have a certification or must revalidate a course already taken.

1.3 Personnel involved

Name	Leonardo Enriquez
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Name	Oscar Andrés Piña Meza
Role	Analyst, designer and programmer
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Responsibility	Information analysis, design and programming
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Name	Cesar Manuel Ramírez Cervantes
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1.4 Definitions, acronyms and abbreviations

Name	Definition
Empleado	Person who will use the system to take the theoretical training through the courses.
Entrenador	Person who will use the system to administer courses and assign certifications.
Coordinador de entrenamiento	Person who will use the system to administer certifications and notify employees.
ERS	Specification of software requirements
RF	Functional Requirement
RNF	Non-functional requirement
Certificado	Document that endorses the accreditation of a course.
LMS	Learning Managment System
RU	User requirement

1.5 References

References	Title
Standard IEEE 830-1998	IEEE

1.6 Summary

This document consists of three sections. The first section introduces the document and provides an overview of the specification of the system resources, the second section of the document provides a general description of the system, in order to know the main functions to be performed, the associated data and the factors, constraints, assumptions and dependencies that affect the development, without going into too much detail, and the third section of the document defines in detail the requirements to be satisfied by the system.

2. General description

2.1 Product perspective

A web-based LMS system will be developed that will allow employees to log in and take training and theoretical exams on the same platform. These exams will be graded by the system and the trainer in charge of such course, once such course has been passed a certificate will be issued by the system. Likewise, the system will inform the relevant persons about the employees who have not been certified or whose certification is about to expire.

2.2 Product features

An online LMS (Learning Management System) system that can be accessed only from the company's network, where three different types of users, **regular users**, **trainers** and **training coordinators**, perform functions such as:

- enroll in courses, take courses, take evaluations and receive certifications,
- create courses, evaluate users and ensure user certifications,
- validate and approve courses, receive notifications about users with expiring certifications, and keep track of the users under their care.

2.3 User characteristics

Type of user	Employee
Formation	From elementary school to higher education.
Activities	Operator - Machinery handling - Technician
Type of user	Trainer
Formation	From high school to higher education.
Activities	Recruitment of personnel, provision of practical and theoretical training, evaluation of employees and assignment of certifications.
Type of user	Training Coordinator
Formation	From high school to higher education.
Activities	Recruitment of personnel, provision of practical and theoretical training, approval of courses, management of trainers and employee positions.

2.4 Restrictions

The constraints affecting project performance are:

- Experience on the part of the development team is limited.
- Each member has a different work schedule, which could make it difficult to hold feedback meetings for the project.
- There is a time limit for the development of the project proposal.
- For the training of the users, the current courses of the company, in addition to a digital presentation, have training and oral teaching, which cannot be captured in a digital course.
- To ensure the security of the company's data with tokenization of APIs, the target company needs to develop the latter in its application programming interfaces.

2.5 Assumptions and dependencies

Circumstances or events outside the project that may affect its success and that we as a team believe may happen, but are beyond our control are:

- That the training staff does not give the user the hands-on course.
- Failure to update the course in the system if the operation process has changed.
- The company's network bandwidth is not sufficient to satisfy the system.
- It takes the user more time than estimated to finish a course.
- The company requires more functionalities for the proposed system, so more time is needed for development.

3. Requirements

3.1 List of user requirements

Number	RU-001		
Name	Availability, usability and security of system		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Offer users a platform that is available at all times, that is easy to use and attractive. And that guarantees the security of the information that is registered there.		
Priority	<input checked="" type="checkbox"/> High / Essential	<input type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

Number	RU-002		
Name	Course catalog		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Offer users to enroll in any course through a catalog and / or a courses route map, based on an established profile.		
Priority	<input checked="" type="checkbox"/> High / Essential	<input type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

Number	RU-003		
Name	Format and division of courses		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Allow the courses that are published and offered to be created using different formats such as videos or presentations, and separated by topics with a maximum limit of size and duration.		
Priority	<input type="checkbox"/> High / Essential	<input checked="" type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

Number	RU-004		
Name	User certification		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Offer the user the progress made by each course. Upon completion through a successful assessment, provide proof of certification.		
Priority	<input checked="" type="checkbox"/> High / Essential	<input type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

Number	RU-005		
Name	Course analytics		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Provide data analytics on the courses that are most requested, the courses that users have enrolled in and completed, as well as users whose certification is about to expire or expired.		
Priority	<input checked="" type="checkbox"/> High / Essential	<input type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

Number	RU-006		

Name	Answering exams		
Type	<input type="checkbox"/> Requirement	<input checked="" type="checkbox"/> Restriction	
Description	Prevent the user from arbitrarily answering the exam after the development of a course.		
Priority	<input type="checkbox"/> High / Essential	<input checked="" type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional
Number	RU-007		
Name	Certifications about to expire		
Type	<input checked="" type="checkbox"/> Requirement	<input type="checkbox"/> Restriction	
Description	Show managers a list of users who have certifications that are about to expire.		
Priority	<input checked="" type="checkbox"/> High / Essential	<input type="checkbox"/> Half/ Desired	<input type="checkbox"/> Low / Optional

4. External interface requirements

4.1 User Interfaces

The user interfaces will be designed and implemented under [ASP.NET](#) technology, using the MVC pattern with fluid navigation and a remarkable delegation of responsibilities on the browser, ensuring that the system responds efficiently to user requests. Of course, all this accompanied by a friendly, modern and intuitive appearance.

4.2 Hardware Interfaces

- Platform: Windows 8.1 or higher with the latest updates installed
- RAM: 4GB or more.
- Video: graphics output capability
- Sound: sound output capacity

4.3 Software Interfaces

- The latest versions of Chrome, Firefox, Safari, Edge or Opera for desktop/laptop computers.
- Broadband connection with a minimum speed of 5 Mbit or 800 kbps

4.4 Communication interfaces

The communication with the database will be done through API's consumption, on the other hand the servers will communicate through internet standards and protocols such as TCP/IP and FTP for the transfer of files or documents.

5. System Requirements

5.1 Functional requirements

Number	RF-01	
Name	Login	
Description	When accessing the page, the module is displayed for the user to enter their username and password to log in.	
Precondiciones	Login to the site and have an account.	
Normal sequence	Step	Action
	1	User accesses the website
	2	The system displays the module to enter username and password.iko
	3	User enters his username and password, click on 'login'.
	4	System searches for data entered in the database.
	5	If the data is found, the system proceeds to the next module.
Postcondition	User must have entered the correct data	

Exceptions	Step	Action	
	1	User enters incorrect data	
	2	User does not enter any data	
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-02		
Name	Certification		
Description	A proof of certification is given to the user (employee) if he/she completes a course. This certificate must be printable.		
Postcondition	The user must complete the course in its entirety with a passing grade.		
Normal sequence	Step	Action	
	1	The user completes the evaluation (exam) of the course.	
	2	The system automatically grades the exam and if necessary the trainer finishes the evaluation.	
	3	The user is shown his obtained grade and his certification with his data.	
Postcondition	The user visualizes his certification digitally, and the system gives him the option to print it or return to the course catalog screen.		
Exceptions	Step	Action	
	1	The user does not pass the course exam.	
	2	The system shows the user a pop-up indicating their grade and that they did not pass the course.	
	3	The user is returned to the course start screen to retake the course.	
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-03		
Name	Visualization of certifications.		
Description	The user (employee) must be able to consult in a special section his certifications obtained with additional information (date obtained, qualification, etc.).		
Preconditions	Functional requirement RF-02 must be fulfilled at least once.		
Normal sequence	Step	Action	
	1	The user must click on the "My Certifications" button in the side menu.	
	2	The system displays a table with their certifications and search and sort filters..	
	3	The user would select a row to receive more information about the certification.	
Postcondition	The system gives the option to print a certificate or return to the main screen.		
Exceptions	Step	Action	
	1	The user does not have any current certification.	
	2	You would see the table of certifications empty with a box informing you of the above.	
Priority	<input type="checkbox"/> High/Esencial	<input checked="" type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-04		
Name	Notification of certifications		
Description	Training coordinators will receive notifications of expiring certificates 15 days in advance so that they can contact the person who has the expiring certificate.		
Preconditions	There should be users (employees) with expiring certifications in the system.		
Normal sequence	Step	Action	
	1	The coordinator logs into the system.	
	2	The system displays in the top bar a bell icon with a circle indicating the number of user (employee) certifications to expire.	
	3	The coordinator presses the bell icon described above.	
	4	The system displays a dialog box indicating to the coordinator the number of certifications to expire..	

Postcondition	The system gives the coordinator the option to print the list of employees with expiring certifications in order to search for the person.	
Exceptions	Step	Action
	1	The training coordinator does not press the bell icon described above.
	2	At 99 unanswered notifications, the system displays a pop-up prompting you to review your notifications.
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional

Number	RF-05	
Name	Display of expiring certificates.	
Description	The training coordinator consults the users (employees) in his area with expired certifications and those that are about to expire.	
Preconditions	Functional requirement RF-04 must be fulfilled.	
Normal sequence	Step	Action
	1	The training coordinator must press the "Certifications" button on the side control menu.
	2	The system displays a table with the expired or soon to expire certifications of the users along with search and sort filters.
Postcondition	The coordinator can select a record to learn more about it or return to the main screen.	
Exceptions	Step	Action
	1	There are no expired or expiring certifications.
	2	You would see the table of expired or expiring certifications empty with a box informing you of the above.
Priority	<input checked="" type="checkbox"/> High/Essential <input type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional	

Number	RF-06	
Name	Viewing user information (employees)	
Description	The training coordinator visualizes, only for the users (employees) in his area, the courses they are enrolled in, which ones have been approved and which ones are about to expire.	
Preconditions	The logged in user must be a training coordinator type to enjoy this feature.	
Normal sequence	Step	Action
	1	The training coordinator should press the "Employees and courses" button on the side control menu.
	2	The system displays a table with the employees and their courses taken along with search and sort filters.
Postcondition	The coordinator can select a record to learn more about it or return to the main screen.	
Exceptions	Step	Action
	1	There is no information on the employees in its charge.
	2	You would see the table of employees and courses empty with a box informing you of the above.
Priority	<input type="checkbox"/> High/Essential <input checked="" type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional	

Number	RF-07	
Name	Approval of practical courses	
Description	The system must contain some option where the trainer indicates that "such" user received and successfully passed the practical training.	
Preconditions	The trainer should have given the practical training to the employee and the employee should have approved it.	
Normal sequence	Step	Action
	1	The trainer searches for the employee in question in the "Employees and courses" section of the side control menu.
	2	The trainer selects the employee's course.
	3	The system displays a new screen with course information and the option to certify the employee for practical training.
	4	The trainer checks the above box and saves the changes.

Postcondition	The system returns the user to the "Employees" screen.		
Exceptions	Step	Action	
	1	The trainer selected a course that has no practical training.	
	2	In the course information screen there is no option to certify the employee for practical training.	
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-08		
Name	Course catalog		
Description	The user (employee) visualizes the available courses in the form of a catalog, according to the position they hold in the company. There are courses of general interest which are insensitive to the job position.		
Preconditions	The registered user must be of type "employee" and there must be training materials (courses) in the system database.		
Normal sequence	Step	Action	
	1	The user logs into the system with valid "employee" credentials.	
	2	The system displays on the main screen to the user (employee) a catalog of courses along with search and sort filters at the top.	
	3	The system displays a type of carousel showing the most popular courses offered.	
Postcondition	The user (employee) can select a course to learn more about it or navigate through the top menu options.		
Exceptions	Step	Action	
	1	No movement is registered in the next 5 minutes in the system.	
	2	The system will automatically log you out for security.	
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-09		
Name	Course administration		
Description	Trainers can edit and/or update courses.		
Preconditions	The user registered in the system must have "trainer" privileges and must have courses on the platform.		
Normal sequence	Step	Action	
	1	The trainer selects the "Courses" option from the side control menu.	
	2	The system displays a table with the current courses on the platform, as well as those that have not yet been approved, and search and sort filters.	
	3	The trainer selects the course to edit.	
	4	The system displays a new screen where the course information fields are editable.	
	5	The trainer at the end of the edition would save the changes.	
Postcondition	Starts the normal sequence of the functional requirement RF-10.		
Exceptions	Step	Action	
	1	The trainer attempts to exit the course editing screen without saving changes.	
	2	The system displays a modal window asking the trainer if he/she wants to save the changes or exit without saving.	
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-10		
Name	Course updates		
Description	If a course is updated, it should display an option to trainers when it is loaded into the system that indicates whether or not users of that course should be recertified and, if it is a major change, force staff to retake the course to recertify.		
Preconditions	Functional requirement RF-09 must be fulfilled.		
Normal sequence	Step	Action	
	1	When the trainer finishes editing a course, the system immediately displays a modal window to the trainer.	

	2	The modal window indicates whether it is necessary to recertify employees or whether it is necessary to force employees to retake the updated course.
	3	The trainer chooses the desired option and a pop-up window is displayed indicating that the changes will be applied when approved by the training coordinator.
Postcondition	The system returns the trainer to the "Employees" screen.	
Exceptions	Step	Action
	1	The trainer closes the web page without choosing any option from the modal window.
	2	The trainer re-enters the platform and selects the "Courses" option from the side control menu.
	3	The system displays the modal window and does not close until the trainer chooses an option.
Priority	<input type="checkbox"/> High/Essential <input type="checkbox"/> Half/Desired <input checked="" type="checkbox"/> Low/Optional	

Number	RF-11	
Name	Launching of the course	
Description	Each course/training material uploaded by trainers must be published by their supervisor (training coordinator) so that it can be viewed on the platform.	
Preconditions	The functional requirement RF-10 must be fulfilled at least once or there must be courses that trainers have uploaded to the platform for the first time.	
Normal sequence	Step	Action
	1	The training coordinator presses the "Release Course" option in the side control menu.
	2	The system displays a table with courses awaiting publication created or edited by trainers along with search and sort filters.
	3	The system displays a new screen showing all the course information and, if necessary, the old and new information of the edited course.
	4	The course coordinator makes the course known if he/she deems it appropriate.
Postcondition	The system returns the coordinator to the "Course Release" screen and displays a pop-up window indicating that the course has been approved and will now be visible to users.	
Exceptions	Step	Action
	1	The coordinator decides not to approve the course.
	2	You are shown a container below the screen where you are passing the course where you must write the reason why you are not passing the course.
	3	The system sends to the trainer the changes proposed by the coordinator that must be made for the course to be approved.
Priority	<input type="checkbox"/> High/Essential <input checked="" type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional	

Number	RF-12	
Name	Course road map	
Description	The system should provide a course roadmap to show the flow of user/employee training.	
Preconditions	The user must be active with the work to be done.	
Normal sequence	Step	Action
	1	The user must log in with his credentials.
	2	The system displays the user's home page with the course roadmap.
	3	The user will manage by courses and evaluations within the roadmap.
Postcondition	The system will display the progress of the road map as it progresses.	
Exceptions	Step	Action
	1	The user does not have an active job.
	2	The system displays a pop-up window warning the user that he/she does not have a role.
Priority	<input type="checkbox"/> High/Essential <input checked="" type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional	

Number	RF-13	
Name	Define privileges by user role	
Description	The system must grant permissions to specific users for the creation of topics: Person who teaches the courses, person who prepares the courses, coordinator of the training department.	
Preconditions	Users must be active with the required role	
Normal sequence	Step	Action
	1	The system shall display a module to grant privileges to special users, to be defined by the moderators.
	2	The moderator must register users who require the following privileges.
	3	The system will notify and update the permissions of users who have been granted privileges.
Postcondition	Privileged users will have the options in their system account.	
Exceptions	Step	Action
	1	A user is no longer active
	2	The user's role does not match the privilege profile.
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional

Number	RF-14	
Name	Data analysis	
Description	The system should provide lists of courses that are becoming obsolete, courses that are in high demand and those whose certificates are due to expire soon.	
Preconditions	The data must have been collected, i.e., the platform must have been in operation for some time for data collection.	
Normal sequence	Step	Action
	1	The behavioral data system is based on the behavior of the users accounts.
	2	The system performs an analysis and filtering of the data it collects.
	3	The most requested courses and expiring certifications should be displayed on the main screen according to the analysis.
Postcondition	The user sees in his account a section of the courses with the highest demand and if he has any certification that is about to expire.	
Exceptions	Step	Action
	1	The system has not collected the necessary amount of data to be able to analyze it and provide a projection of the courses.
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional

Number	RF-15	
Name	Course progress	
Description	The system saves the user's current progress when he/she decides to pause the course, allowing him/her to resume the course when necessary.	
Preconditions	The user must start a course.	
Normal sequence	Step	Action
	1	While in a course, the user selects the "pause course" option.
	2	The system closes the current course and saves in the database the progress in which the course was paused.
Postcondition	When the user logs in again, the system displays the courses that have been stopped first, followed by the courses that have expired.	
Exceptions	Step	Action
	1	The system does not allow you to pause courses that have expired and are of great importance to the user's work.
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired <input type="checkbox"/> Low/Optional

Number	RF-16	
Name	Theoretical evaluation	

Description	The system must allow the user to take an evaluation test for the course for which he/she is being trained.		
Preconditions	The user must conclude with a course.		
Normal sequence	Step	Action	
	1	The user presses the "perform theoretical evaluation" button.	
	2	The system redirects the user to a form with open-ended multiple choice questions.	
	3	The user answers all the questions in the exam.	
	4	The user presses the "send answers" button.	
Postcondition	The system allows the user to return to the course catalog while the instructor is grading the exam.		
Exceptions	Step	Action	
	1	The user closes the system before the end of the examination.	
	2	The system should present a message alerting the user that the exam will automatically be graded as failed.	
Priority	<input checked="" type="checkbox"/> High/Essential	<input type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-17		
Name	Course information		
Description	When entering a course, the user sees the following course information: who the course is for, what type of information is expected in the course title, and the most current revision to see if the user is in the most recent course.		
Preconditions	The employee must be enrolled in a course before they can view their information.		
Normal sequence	Step	Action	
	1	The employee searches for the course in the course catalog.	
	2	The employee selects the desired course.	
	3	The system displays the course information.	
Postcondition	The system returns to the previous screen		
Exceptions	Step	Action	
	1	Displays a message if the selected course is not found.	
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

Number	RF-18		
Name	Notification of new course		
Description	The system will notify users when a new course of their interest is published.		
Preconditions	The employee must be registered in the platform.		
Normal sequence	Step	Action	
	1	The trainer publishes a new course.	
	2	The type of employees for whom the course is intended is checked.	
	3	The employee receives notification of the new course.	
Postcondition	The notification window closes.		
Exceptions	Step	Action	
	1	The notification is not sent if the employee is no longer working for the company.	
Priority	<input type="checkbox"/> High/Essential	<input checked="" type="checkbox"/> Half/Desired	<input type="checkbox"/> Low/Optional

5.2 Non-functional requirements

5.2.1 Performance

- The system must support the connection of 3,000 simultaneous users.

- All system functionality and business transactions must respond to the user in less than 5 seconds.
- Modified data in the database must be updated for all accessing users in less than 5 seconds.

5.2.2 Design constraints

- The system must be designed at LAN level.
- Course formats must respect a maximum size and duration limit.
- Courses can be published in different formats (plain text, videos, presentations).

5.2.3 System attributes

- The system must be accessible from any platform in the company by company employees.
- The employee information used by the system is obtained by a series of external routines to the system (APIs) promoting security in the manipulation of this data.
- The system must be intuitive and created to be used by both young and adult users.
- System access permissions can be changed only by the development team.
- All systems should be backed up weekly. Backups should be stored in a different location.

5.2.4 Other requirements

- The system must be available 98.99% of the time a user attempts to access it.
- The time to start or restart the system shall not exceed 5 minutes.
- The average fault duration shall not exceed 15 minutes.

6. Appendices

- **Cost analysis:**

Since the project to be developed is planned to be implemented in an already functional productive environment, which has the servers and infrastructure necessary for the smooth implementation of the proposed project, the preliminary cost estimate only takes into account the software development costs.

The cost of software development by the company "The vid of knowledge" is **20dlrs** per hour of work, so, the project is projected to **4 months** of development, with **6hrs of work** per day, a total of **480hrs**, where **480hrs x 20dlrs** gives a result of **9,600dlrs**, which is approximately **192,000 Mexican pesos**.

- **Technologies to be used for the development of the system:**

- [ASP.NET](#) MVC Framework
- SSMS (SQL Server Managment Studio)
- IIS (Internet Information Services)
- Versioning control git
- Postman for the evaluation of external system routines (APIs)