Article

Journal Computer Technology

December 2022, Vol.6 No.17 27-31

Online store: integrative activity in computer engineering in times of pandemic

Tienda en línea: actividad integradora en ingeniería en computación en tiempos de pandemia

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DOI: 10.35429/JCT.2022.17.6.27.31 Received: July 30, 2022; Accepted December 30, 2021

Abstract

This paper presents the Integrative Activity of an online store that has been worked with students over three semesters: fifth, sixth and seventh, the idea of making an online store arises because this project began at the time of confinement due to the COVID-19 pandemic. The Activity was divided into three phases, the first phase covering the subjects of: Requirements Engineering and Estimation, Database Consultations and Optimization and Human-Computer Interaction. The second phase covers the subjects of Design and Modeling of Software, Design of Virtual Environments and Computing for mobile devices. The project ends with the third phase with the subject of Software Testing and Implementation. The main contribution is the joint realization of different subjects in three semesters for the construction of a quality online store under quality practices.

Integrative Activity, Online Store, CMMi

Resumen

En este artículo se presenta la Actividad Integradora de una tienda en línea que se ha trabajado con estudiantes de Ing. en Computación a lo largo de tres semestres: quinto, sexto y séptimo. La idea de desarrollar una tienda en línea surge debido a que este proyecto se inició en época de confinamiento por la pandemia de COVID-19 y como parte de la formación de su licenciatura. La Actividad quedó dividida en tres fases, la primera fase cubriendo las materias de: Ingeniería de Requerimientos y Estimación, Consultas y Optimización de Bases de Datos e Interacción Humano Computadora. La segunda fase abarcó las materias de Diseño y Modelado de Software, Diseño de Ambientes Virtuales y Cómputo para dispositivos móviles. El proyecto se finaliza con la tercera fase con la materia de Pruebas e Implantación de Software. La contribución principal es la realización en conjunto de diferentes materias en tres semestres para la construcción de una tienda en línea siguiendo prácticas de calidad.

Actividad Integradora, Tienda en línea, CMMi

Citation: MORA-LUMBRERAS, Marva Angélica, SÁNCHEZ-PÉREZ, Carolina Rocío, PORTILLA-FLORES, Alberto and SÁNCHEZ-SÁNCHEZ, Norma. Online store: integrative activity in computer engineering in times of pandemic. Journal Computer Technology. 2022. 6-17:27-31.

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Introduction

Carrying out Integrating Activities at the Autonomous University of Tlaxcala is an important part of complementing student learning, so it has been implemented in the Bachelor's Degree in Computer Engineering that in the fifth, sixth and seventh semesters they carry out the development of a software project that has three subjects in the area of Software Engineering as its axis. In the Software Engineering subjects, the complete software development life cycle is studied, applying good documentation and programming practices throughout the development process. At the same time, the CMMi level 2 model is used, resulting in quality software. In this case we worked on an online shop, taking advantage of the boom that the pandemic gave to this type of systems.

Integrating activity

The IA Integrating Activity is a pedagogical strategy that favours active learning through the convergence of knowledge from different disciplines (know what), processes and procedures (know how and know how to do), and the application of knowledge and learning of students to solve a problem situation in the national context (know how to be). Therefore, the Integrating Activity demands reflection, dialogue, critical capacity and sensitivity to the social context of all participants [1].

The integrative activity at the Autonomous University of Tlaxcala involves both the formation of student work teams and collegiate groups of teachers whose main purpose is the integration of declarative, procedural and attitudinal learning from the different learning units in an interdisciplinary work that generates situated learning by confronting students with problems of social relevance and, consequently, contributing to the development of the competences set out [2] [2].

Description of the method

The CMMI model for development defines a set of specific practices oriented to the development of software products, the model in its level 2 defines practices for requirements management, project planning, monitoring and control, quality assurance, measurement and analysis, configuration management and follow-up with suppliers [3], in this work we present the experience in the development of a software project in the framework of the integrative activity with the application of practices of the CMMI Dev level 2 model.

Integrating Activity: Online Shop

First phase:

The first phase consisted of developing and applying knowledge related to the analysis, design and construction of an online shop, integrating concepts of query construction and database optimisation, requirements engineering and estimation, as well as interface design. In addition, knowledge was applied that allowed the student to identify good practices in the definition of requirements of a software system under a quality approach.

Subjects involved and work carried out

- In the subject of Requirements Engineering and Estimation, the Requirements Specification and Detailed Project Planning document was worked on.
- In the subject of Database Queries and Optimisation, the E/R model to be used in the project was designed, as well as a list of 10 queries of the shop.
- In the Human Computer Interaction subject, the Online Shop Interfaces were designed.

During this Integrating Activity 14 teams participated, belonging to two groups: 5A and 5B, each developing a different online shop. As an example, the project Mingo's Pizzas will be used to show some deliverables:

ISSN: 2531-2197

In the subject of Requirements Engineering and Estimation, the Requirements Specification and Detailed Project Planning document was worked on. This article shows the System Functionality Listing consisting of 17 use cases of the Mingo's Pizzas project.

No.	Use case name	Priority	Complexity	Actor to whom it is addressed
1	CU01_Log in	Essential	Simple	User
2	CU02_Register users	Essential	Simple	Customer
3	CU03_Arm your pizza	Essential	Medium	User and Client
4	CU04_Select promotions	Essential	Simple	User and Client
5	CU05_Pay by credit card	Essential	Medium	User and Client
6	CU06_Generate purchase ticket	Essential	Simple	User and Client
7	CU07_Modify profile	Esencial	Simple	User
8	CU08_Consult shopping cart	Essential	Medium	User and Client
9	CU09_Select extra products	Essential	Medium	User and Client
10	CU10_Close session	Útil	Simple	User
11	CU11_Add pizzas	Esencial	Simple	Administrator
12	CU12_Manage pizzas	Essential	Simple	Administrator
13	CU13_Add extra products	Essential	Simple	Administrator
14	CU14_Manage extras	Essential	Simple	Administrator
15	CU15_Add promotions	Essential	Simple	Administrator
16	CU16_Admin_Administer promotions	Essential	Simple	Administrator
17	CU17_Close administrator session	Útil	Simple	Administrator

Table 1 List of system functionality

For the subject of Database Queries and Optimisation, the E/R model is presented. It is worth mentioning that MYSQL was used to create the tables: Users, Pizzas, Extra products, Inventory products, Suppliers, Offers and Orders, the corresponding relationship is indicated in the model.

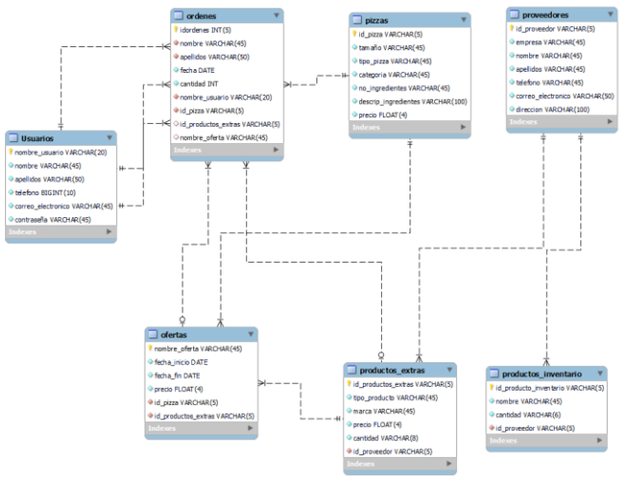

Figure 1 Model E/R

In the subject of Human Computer Interaction the Online Shop Interfaces were designed. This section presents the home interface for the customer view.

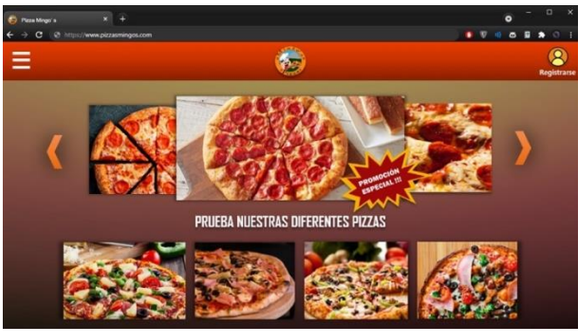

Figure 2 Client interface

Second phase:

For the second phase it was established that the student should know and apply tools for the design and development of a software system, including an activity on the design of virtual environments and another on mobile devices.

Subjects involved

- In the subject of Software Design and Modelling, the student carried out the logical design with different UML diagrams, as well as the construction of the same.
- In the subject of Virtual Environment Design, the modelling of 3D objects in the online shop was carried out, as well as their holograms for the dissemination of the items on sale.
- In the subject of Computing for Mobile Devices, an Augmented Reality application was developed.

Figure 4 shows how Mingo's Pizzas allows you to assemble the pizza, Figure 5 shows that it has payment options, and Figure 6 shows the Mingo's Pizzas administrator options.

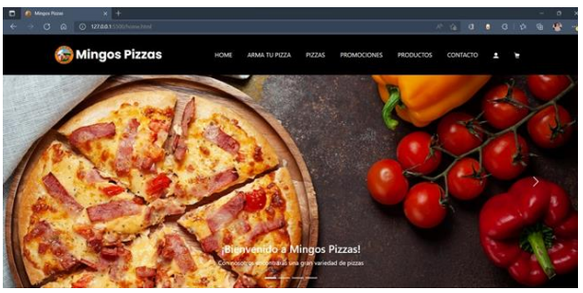

Figure 3 Mingo's pizzas online system

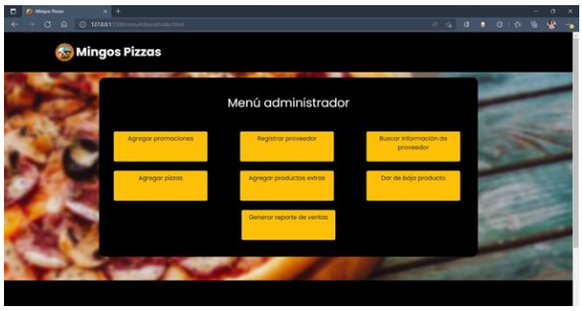

Figure 4 Mingo's Pizzas allows you to assemble the pizza

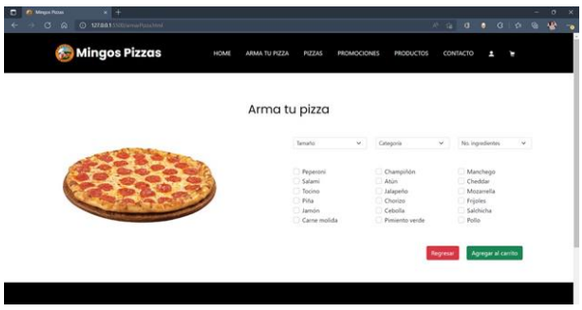

Figure 5 Mingo's Pizzas payment method

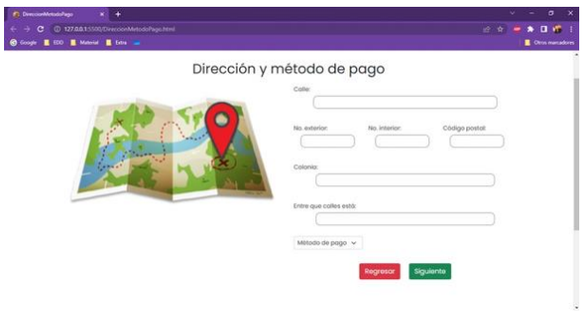

Figure 6 Administrator section

In the Virtual Environment Design course we worked on the 3D modelling of the products of the online shop using Blender [4] and the Virtual Reality methodology of [5], Figure 7 shows a 3D pizza, Figure 8 shows how the 3D pizza is prepared to be presented holographically, to be used in an acetate or glass pyramid.

Figure 7 3D modelling of a pizza

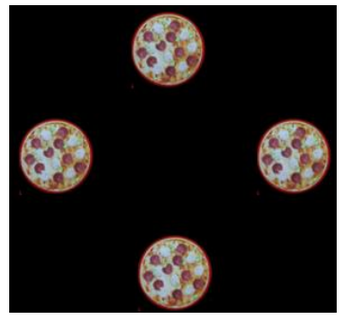

Figure 8 Modelling of a pizza ready for pyramid holography

In the subject of Computing for Mobile Devices, an application was developed using augmented reality. For the creation of the application, the video game engine Unity [6] and Vuforia Engine were used.

For the Augmented Reality application, targets, 3D objects were used, an illustrative video, name and price were added, so that when the target was displayed, this information would be shown.

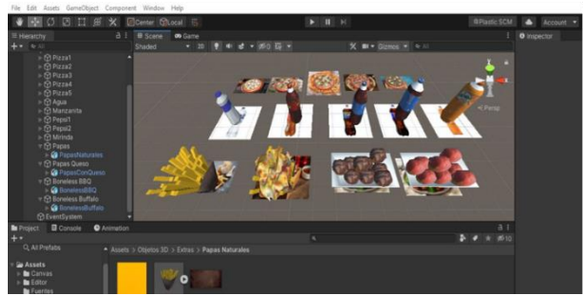

Figure 9 Building Augmented Reality from Unity

Figure 10 Augmented Reality of Mingo's Pizzas

Third phase

In the seventh semester, the completion of the system is planned with the elaboration of supporting documents such as user manuals, operation manuals and maintenance manuals. As well as a letter of completion of the system and a letter of satisfaction and recommendation to the work team.

Conclusion

Currently the software development industry requires software development professionals who know and apply all the phases involved in the implementation of a software system, in this case an online shop, covering the most demanding activities of the software life cycle in a real context.

- The development of a software system from its initial phases to its construction allows the student to understand the requirements involved in the analysis, modelling, design and implementation of computer systems for the construction of quality systems.

- Quality standards were used in modelling, design and construction using software engineering methods and practices, in a professional and relevant manner for the implementation of computer systems.

- Relevant solutions were built using design aspects and implementation alternatives under different computational paradigms for technological innovation.

- The ability to work collaboratively for the development of computational projects was developed.

Funding

This work has been internally funded by the Autonomous University of Tlaxcala.

Acknowledgements

It is acknowledged that the project chosen for this article called Mingo's Pizzas was developed by the students José María Aguilar Guarneros, Ana Aurelia Muñiz Brito and Alexis Sánchez Briones, students of Computer Engineering at the Universidad Autónoma de Tlaxcala.

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