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Subject

**Design and implementation of a web
application for property rental and
artisan search**

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Dedication

To my parents, I would like to dedicate this thesis.

Thanks for your love, sacrifice, counsel, and education, as well as for always being there to listen, encourage, and most importantly believe in me, mom and dad. I am so grateful and proud to call you both my parents. I will always and forever love you both.

I love you, my sister. I can't express how much you mean to me or how special you are, but I can say that you make my world happy whenever you are around.

To my brothers, thank you for being a part of my life.

To my sister's husband who is like my brother, thank you for encouraging and motivating me. Thank you for everything.

To my nieces and nephews, I love you.





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I would like to express my gratitude to everyone who provided assistance and support while I was working on this thesis.

*First and foremost, I want to express my gratitude to my supervisor, **Mr. LAROUM Toufik**, for going above and beyond to help me with this work and for doing so with such skill and patience.*

*Then I thank **Mr. SELLAMI Samir** and special thanks to **Ms. TAIBI Siham** to help her to me.*

My mother has always supported and encouraged me, and she has worked hard to give me the best working environment possible. Without her, I would not have been able to get to where I am today. I appreciate it, mom!

I want to thank all of my teachers over the past five years who have consistently challenged us to push our boundaries and go beyond what we thought was possible.

Abstract

Nowadays, the Internet occupies a primordial place as a modern communication channel that is of crucial importance in our society. Its use has become widespread in all sectors, with a particularly marked presence in the field of electronic commerce.

It is by observing this evolution that we came up with the idea of this project. Indeed, we have noticed a significant increase in the demand for renting houses and apartments in Algeria, especially in coastal cities during the summer period such as Skikda, Jijel... unfortunately, the management of these rentals often remains tinged with traditional methods and a certain anarchy, both on the side of the owners and the tenants. This awareness therefore motivated us to undertake this project aimed at providing a more modern and structured solution.

At the same time, the search for qualified craftsmen to perform maintenance, renovation and maintenance tasks in various fields has become an increasing necessity in recent years. Unfortunately, the research and collaboration processes between artisans and customers often remain rooted in traditional practices.

It is in this context that we had the idea of creating a web service platform. This platform aims to bring together all the actors involved in the rental of real estate as well as in research and collaboration with qualified craftsmen. By facilitating communication and managing interactions between owners, tenants, craftsmen and customers, our platform seeks to modernize these sectors by offering an integrated and user-friendly solution for all users.

By combining the power of the Internet and the robustness of the Odoo framework, our web service platform will improve the real estate rental experience as well as the research and collaboration processes with craftsmen, for the mutual benefit of all stakeholders. And from an economic point of view it will encourage internal tourism, and help to create more work opportunities for people.

Key words: electronic commerce, real estate rentals, search for craftsmen, ERP Odoo.

Résumé

De nos jours, Internet occupe une place primordiale en tant que canal de communication moderne qui revêt une importance cruciale dans notre société. Son utilisation s'est généralisée à tous les secteurs, avec une présence particulièrement marquée dans le domaine du commerce électronique.

C'est en observant cette évolution que nous avons eu l'idée de ce projet. En effet, nous avons constaté une augmentation significative de la demande de location de maisons et d'appartements en Algérie, surtout dans les villes côtières pendant la période estivale comme Skikda, Jijel ... etc. Malheureusement, la gestion de ces locations reste souvent empreinte de méthodes traditionnelles et d'une certaine anarchie, tant du côté des propriétaires que des locataires. Cette prise de conscience nous a donc motivés à entreprendre ce projet visant à apporter une solution plus moderne et structurée.

Parallèlement, la recherche d'artisans qualifiés pour effectuer des tâches de maintenance, de rénovation et d'entretien dans divers domaines est devenue une nécessité croissante ces dernières années. Malheureusement, les processus de recherche et de collaboration entre les artisans et les clients restent souvent ancrés dans des pratiques traditionnelles.

C'est dans ce contexte que nous avons eu l'idée de créer une plateforme web de services. Cette plateforme vise à regrouper tous les acteurs impliqués dans la location de biens immobiliers ainsi que dans la recherche et la collaboration avec des artisans qualifiés. En facilitant la communication et la gestion des interactions entre propriétaires, locataires, artisans et clients, notre plateforme cherche à moderniser ces secteurs en offrant une solution intégrée et conviviale pour tous les utilisateurs.

En combinant la puissance d'Internet et la robustesse du framework Odoo, notre plateforme web de service va améliorer l'expérience de location immobilière ainsi que les processus de recherche et de collaboration avec des artisans, pour le bénéfice mutuel de toutes les parties prenantes. Et d'un point de vue économique ça va encourager le tourisme interne, et aider à créer plus d'opportunités de travail aux gens.

Mots clé: commerce électronique, location immobilières, recherche des artisans, ERP Odoo.

ملخص

في الوقت الحاضر ، تحتل الإنترنت مكانا أساسيا كقناة اتصال حديثة ذات أهمية حاسمة في مجتمعنا. أصبح استخدامه واسع الانتشار في جميع القطاعات ، مع وجود ملحوظ بشكل خاص في مجال التجارة الإلكترونية.

من خلال مراقبة هذا التطور توصلنا إلى فكرة هذا المشروع. في الواقع ، لاحظنا زيادة كبيرة في الطلب على تأجير المنازل والشقق في الجزائر ، وخاصة في المدن الساحلية خلال فترة الصيف مثل سكيكدة وجيجل... لسوء الحظ ، غالبا ما تظل إدارة هذه الإيجارات مشوبة بالطرق التقليدية وفوضى معينة ، سواء من جانب المالكين أو المستأجرين. لذلك دفعنا هذا الوعي إلى تنفيذ هذا المشروع الذي يهدف إلى توفير حل أكثر حداثة وتنظيما.

في الوقت نفسه ، أصبح البحث عن حرفيين مؤهلين لأداء مهام الصيانة والتجديد في مختلف المجالات ضرورة متزايدة في السنوات الأخيرة. لسوء الحظ ، غالبا ما تظل عمليات البحث والتعاون بين الحرفيين والعملاء متجذرة في الممارسات التقليدية.

في هذا السياق كانت لدينا فكرة إنشاء منصة خدمة ويب. تهدف هذه المنصة إلى الجمع بين جميع الجهات الفاعلة المشاركة في تأجير العقارات وكذلك في البحث والتعاون مع الحرفيين المؤهلين. من خلال تسهيل التواصل وإدارة التفاعلات بين المالكين والمستأجرين والحرفيين والعملاء ، تسعى منصتنا إلى تحديث هذه القطاعات من خلال تقديم حل متكامل وسهل الاستخدام لجميع المستخدمين.

من خلال الجمع بين قوة الإنترنت وقوة إطار عمل أودو ، ستعمل منصة خدمة الويب الخاصة بنا على تحسين تجربة تأجير العقارات بالإضافة إلى عمليات البحث والتعاون مع الحرفيين ، من أجل المنفعة المتبادلة لجميع أصحاب المصلحة. ومن وجهة نظر اقتصادية ، ستشجع السياحة الداخلية ، وتساعد على خلق المزيد من فرص العمل للناس.

الكلمات المفتاحية: التجارة الإلكترونية ، تأجير العقارات ، البحث عن الحرفيين ، تخطيط موارد المؤسسات أودو.

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General Introduction

The communication era has been completely transformed by the Internet. It is an improvement over conventional methods in that it gives anyone with a computer the chance to communicate globally and is not geographically constrained. Large doors have been opened for the general public and businesses with the introduction of the World Wide Web, the most widely used service on the Internet. A new way of conducting business has emerged as a result of it and the advancement of information processing and telecommunication technologies. E-commerce enables the online exchange of contractual and legal documents as well as the buying and selling of goods and services.

In order to draw customers, numerous e-commerce sites today provide complete product ranges on appealing and promising websites. As a result, there is no need to visit the store in order to buy a specific item. Simply make your selection on the retailer's website, add items to your shopping cart, send your order, and choose your preferred method of payment. The products you've chosen will reach their destination within the allotted time with just a few mouse clicks.

E-commerce has evolved over time as the idea has grown in importance, with tools, regulations, and development environments being put in place to ensure a smooth transition.

The real estate industry has also undergone significant changes over the years, thanks to advances in technology. In particular, the internet has revolutionised the way people search for and rent real estate. Today, it is common for people to use online platforms to find and rent real estate quickly and easily. However, despite the convenience of such platforms, finding reliable craftsmen for repairs and maintenance is still quite a challenge for realtors. To address this issue, this graduation thesis proposes to develop a website that will allow realtors to not only search for and rent real estate but also find reliable and skilled craftsmen for repairs and maintenance.

The Unified Modelling Language (UML) and the Odoo platform will be used to develop the website. Developers can describe, visualise, and document the architecture and design of software systems using the modelling language known as UML. An open-source enterprise resource planning (ERP) system called the Odoo system is used to control business operations like sales, accounting, and inventory control. This project aims to provide a comprehensive

solution that streamlines the procedures involved in renting real estate and locating trustworthy craftsmen by utilising the capabilities of these technologies.

Objectives

The main goal of this graduation thesis is to create a website that allows landlords to look for and rent out real estate while also locating trustworthy tradespeople for repairs and maintenance. The website will be created using the Odoo system and the UML modelling language, which will offer a scalable and reliable solution for managing the intricate business processes involved in property maintenance and rental.

The project's secondary objectives include the following:

1. To carry out a thorough analysis of the specifications for a website that enables property owners to look for and rent real estate as well as locate trustworthy craftsmen for repairs and maintenance.
2. To create a working website prototype that complies with the specified requirements.
3. To assess the website's effectiveness and usability through testing and user feedback.

Our work is constructed as follows:

1. In the first chapter, we will look at notions about the Internet, the web and web applications.
2. The second chapter, we will look at the concepts of e-commerce, its different types of relationships, its advantages and disadvantages, and trade in Algeria.
3. The third chapter is an analysis and design of our web application using the UML.
4. Finally, the last chapter will show the different tools and interfaces realised to reach our goal.

1. Chapter 01: The internet, the web and web application

1. Introduction :

The web has become an important part of our lives because it is the most global source of information. The evolution of computing led to the emergence of the internet, which offers considerable possibilities for interaction and communication through a virtual space that hosts internet pages presented by individuals or organizations. One of the applications that popularized the internet is the World Wide Web, which we will discuss in this chapter.

2. Internet :

2.1. Definition :

The internet, and more broadly any "open" use of electronic networks, has had and will continue to have a significant influence on society and its future. The open exchange of digital data via websites, computerized file transfer methods, and electronic messaging is undoubtedly a crucial component in the advancement of contemporary societies. The public can access the entire global computer network known as the internet, which had more than 91,000 autonomous networks in 2019. It is a network of networks that is packet-switched and decentralized, without a single nerve center. The internet is composed of millions of public and private, academic, commercial, and government networks. Due to a set of standard data transfer protocols, applications can transmit data over the internet, including teleconferencing, peer-to-peer streaming, instant messaging, the World Wide Web, and email. In the 1990s, the internet became more widely used thanks to the appearance of the World Wide Web. In the 2010s, an increasing number of devices connected to the internet, creating the "Internet of Things." [1]



Figure 1.1: Internet

2.2. Historical :

The history of the internet can be presented as follows: [2]

1961: The US Air Force requests the creation of a military communication network capable of withstanding a nuclear attack.

1968: JCR Licklider, the director of the Office of Information Processing Techniques at ARPA, introduces the idea that computers could communicate with each other.

1969: The first computers are connected between four American universities for a project supported by ARPA.

1971: Ray Tomlinson develops a new mode of communication: email.

1974: Vint Cerf and Robert Kahn publish the first internet protocols (TCP/IP, FTP, Telnet), thus creating the word "internet".

1981: The Minitel appears in France, and towards the end of the 1980s, it becomes popular in Europe, Japan, Australia, and New Zealand.

1990: The first Archie server is created.

1991: The first "surf" on the net is performed.

1995: onwards: Private companies compete with each other to improve the quality and cost of internet services.

2.3. Internet protocols :

Internet protocols are used to define how data will be sent. Several types of protocols are used: [3]

The "TCP" protocol: (Transmission Control Protocol). It ensures that the sending of information is accompanied by an automatic response from the recipient to ensure the arrival of the data sent.

The "UDP" Protocol: (User Datagram Protocol). It just sends data over the network.

Here, there is no verification regarding the receipt of information.

The "ICMP" Protocol: (Internet Control Message Protocol). It is used to retrieve information about the state of your connection. By sending a "ping" or a "traceroute" to your

machine, it is very easy to know if you are connected. If your machine answers the request, it means that it is presently and therefore accessible.

The "SMTP" Protocol: (Simple Mail Transfer Protocol). It is an electronic message transfer protocol. An SMTP server allows the sending of emails.

The "POP" Protocol: (Post Office Protocol). It is an electronic message transfer protocol. The POP protocol allows users with client software to retrieve and read their email from a server.

The "FTP" Protocol: (File Transfer Protocol). It is a file transfer protocol. The FTP protocol allows files to be saved between computers on the "client-server" model.

The "HTTP" Protocol: (HyperText Transport Protocol). It allows the transfer of Hypertext documents.

The "HTTPS" Protocol (with "S" for secured, or "secured") is the variant of HTTP secured by the use of the SSL or TLS protocols.

The "GOPHER" protocol: Based on a client-server model, it allows remote menus to be read by a machine. It is a protocol made obsolete by FTP and HTTP. We are talking here about the ancestor of the Internet!

The "TELNET" Protocol: This is a terminal emulation protocol, which allows users to communicate remotely with host computers over the Internet. There are TELNET applications for all operating systems.

2.4. The main advantages of the internet:

The first benefit that the Internet can provide is that, due to its quick information flow, it is a fantastic tool for seeking knowledge and information. It is also considered a tool for entertainment. We can use the Internet as a communication tool to stay in touch with our friends and contacts around the globe. Innovative services such as high definition television, teleconferencing, virtual tours, etc. are accessible through the Internet. It also encourages electronic commerce, a brand-new type of trade.

The user of the Internet has access to a wide range of services, including bookings, electronic administration, electronic banking, and digital libraries, among others. If we only mention the rise of telework, the Internet has also changed how we think about exchange and work.

Moreover, the Internet provides businesses with additional ways to expand their markets and revenue. [4]

3. World Wide Web :

3.1. Definition – What does the World Wide Web (www) mean?

A network of online content accessible via HTTP and formatted in HTML is known as the World Wide Web (WWW). All connected HTML pages that are available on the Internet are referred to by this term. Tim Berners-Lee first had the idea for the World Wide Web in 1991 while working as an entrepreneur at CERN. Most frequently, "the Web" is used to refer to the World Wide Web. [5]



Figure 1.2 : World Wide Web

3.2. The basic mechanisms of the web:

The web is based on three main mechanisms; these mechanisms will be represented in the following:

3.2.1. Naming scheme (URL) :

URL stands for "Uniform Resource Locator," which is a character string that allows the indication of a communication protocol and a location for any web resource. [2]

3.2.2. Client/server (http):

HTTP (Hypertext Transfer Protocol) is the communication protocol that is used for the following operations : [2]

- Loading text (HTML) or binary (GIF, JPG, sound, etc.) documents.
- Sending information to the web server.
- Uploading text or binary documents to the web server.
- Uploading/downloading any type of file.

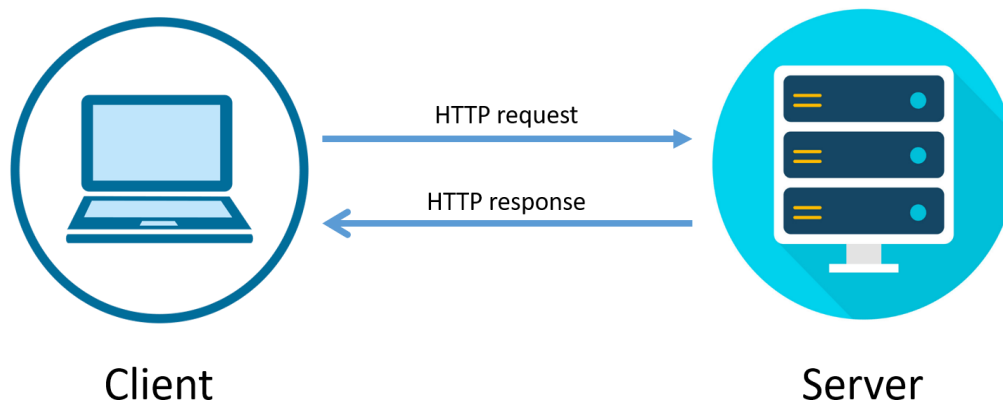


Figure 1.3 : Client/Server

3.2.3. Hypertext (HTML) :

HTML is a computer language that allows one to describe the content of a document (titles, paragraphs, layout of images, etc.) and to include hyperlinks. Hyperlinks are underlined or highlighted words that can be used to display another document or web page. [2]

3.3. The web page :

A web page is a resource on the World Wide Web that is made to be viewed by users of web browsers. It is accessible online. Technically speaking, an HTML document and images make up the majority of a web page. [6]

3.4. The website :

A coordinated collection of HTML (HyperText Markup Language) pages that are dispersed throughout the internet and each have a unique address (URL) is called a website. Using a special program called a browser, links to pages on the same website or on other sites can be created. We distinguish between two types of web pages: static and dynamic, based on how they function. [6]

- **Static website:** A static website is a website made up of fixed-content static webpages. The server sends the requested page to the client after receiving a request from them to view a particular web page. [7]
- **Dynamic website:** A website that is connected to a database and whose pages are created at the request of an Internet user is said to be dynamic. This one transmits requests to the web server, which then processes them and retransmits the results to the user's browser. [7]
 - When the website is dynamic, the operation is as described below :
 - The user requests the web page.
 - The server prepares the page especially for the client.
 - The server sends the generated page to the client's browser.

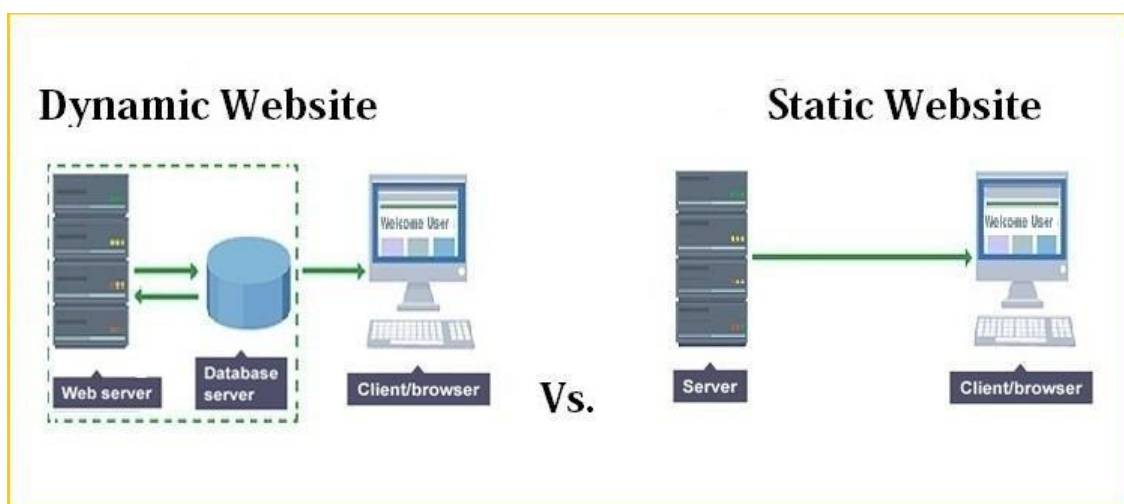


Figure 1.4: Dynamic vs Static Website

4. Web Application :

4.1. What is a web application?

A web application (web app) is an application program that is delivered via the internet using a browser interface and is kept on a remote server. By definition, web services are web apps, and most websites—though not all—contain web apps. Web application designers create them

for a wide range of purposes and users, from businesses to individuals. Webmail, online calculators, and online stores can all be examples of frequently used web applications. While some web apps can only be accessed by a certain browser, the majority is accessible in any browser. [8]

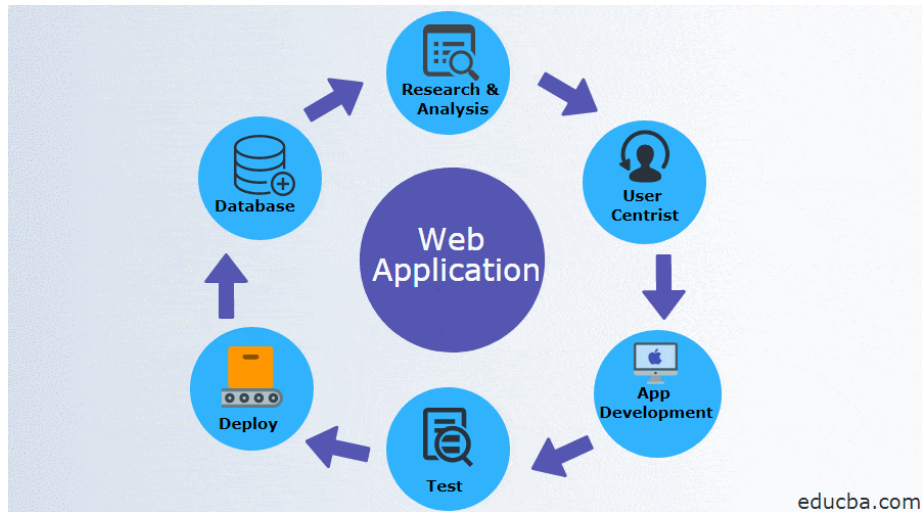


Figure 1.5 : Web application

4.2. How web application work ?

Since web applications are accessed through a network, downloading is not necessary. Through a web browser like Google Chrome, Mozilla Firefox, or Safari, users can access a web application. A web server, application server, and database are required for a web application to function. While the application server completes the requested task, web servers handle client requests. Information of any kind is kept in a database. Small development teams and quick development cycles are typical for web applications. Most web apps are created by developers using JavaScript, HTML5, or CSS. These languages are typically used for client-side programming, which aids in creating an application's user interface. The scripts that a web app will use are made by server-side programming. Ruby, Java, and Python are frequently used in server-side programming. [8]

4.3. Benefits :

Web applications have a variety of advantages. Among the common advantages are the following: The same version of an application can be accessed by numerous users. The app doesn't need to be installed by users. The app is available on a variety of devices, including desktop, laptop, and mobile. The app is accessible through a variety of browsers. [8]

5. Web application domains :

There are many different areas in the world of web applications that make use of the strength and adaptability of the web. Enterprise resource planning is one of them. Examining the various web application domains and their relevance is crucial for my graduation thesis. One of the most impressive web applications is ERP. To streamline and improve resource management and operational procedures within organisations, these systems make use of web technologies. ERP solutions make it easier to make wise decisions and increase overall productivity by integrating a number of processes, including finance, human resources, inventory, and customer relationship management. SAP, Oracle ERP, and Microsoft Dynamics are notable ERP platforms. In order to comprehend the broader scope and impact of web-based technologies in contemporary business environments, it is crucial to comprehend the role of ERP as a crucial area for using web applications.

5.1. ERP :

5.1.1. ERP presentation :

ERP, which stands for "Enterprise Resource Planning," is a frequently used acronym that is also known as "Progiciel de Gestion Intégré" (PGI) in French.

An information system called an ERP controls all business operations. Additionally, it integrates all of its operations, including production, distribution, stock and supply management, human resources management, maintenance management, financial and accounting management, project management, decision support, and so forth.

Information systems within a company were previously centred on managing activities in a company-specific manner with little to no integration before the advent of ERP (Enterprise Resource Planning) systems. There are one or more applications with separate databases in each department. A modular, integrated, coherent, and homogenous information system is obviously required to address the problems caused by this architecture, which include data redundancy, costs, and significant delays for integrating and interacting between the various applications and databases with a high risk of error and inconsistent data. This system will also help the business grow and evolve.

The basic idea behind this tool (ERP) is to give the business modular computer applications that correspond to the various functions (such as supply, production, and sales) while sharing a single, shared database that makes logical sense. The use of a workflow engine, which enables actions to be triggered automatically or alerts and information to be sent according to clearly defined criteria, is another crucial element of ERP that has revolutionised the use of these tools in an impressive way. In conclusion, an IT system that consists of multiple modules that share a single database and a predefined and programmable automated system (workflow engine) qualifies as an ERP.

It's also crucial to keep in mind that these ERPs were initially created with large corporations and multinationals in mind due to their prohibitive acquisition and implementation costs for SMBs. The development of information technology has lessened this trend, and it is now simpler to access these tools, especially since open-source ERP first appeared. [26]

5.1.2. Evolution of ERP systems :

The rapid advancements in hardware and software systems were closely followed by the development of ERP systems. Most businesses created, developed, and put computer systems into use in the 1960s. The 1970s saw the development of materials planning systems (MRP), which mainly involved scheduling product requirements in accordance with the primary production schedule. Following this path, new software called Manufacturing Resource Planning (MRP II), focusing on the optimisation of manufacturing processes, was released in the 1980s. Distribution management, project management, finance, human resources, and engineering were all included in MRP II. ERP systems first appeared in the late 1980s and early 1990s, bringing with them the ability for cross-functional integration and enterprise-wide coordination. ERP vendors expanded on the basic modules and functions in the 1990s, creating what are known as "extended ERPs." [27]

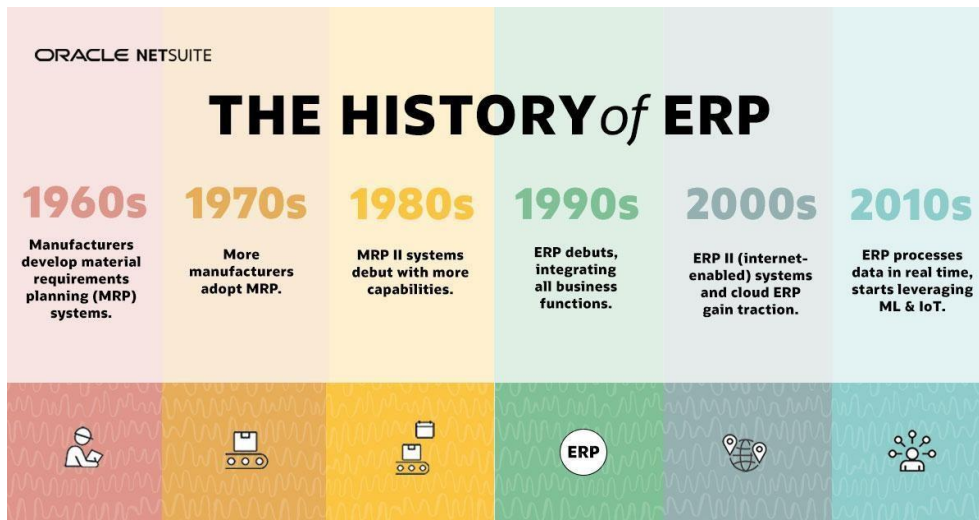


Figure 1.6 : ERP Evolution

5.1.3. Purpose of ERP :

An ERP implementation requires a sizable financial investment from the company, so it goes without saying that the latter will seek to maximise their return on investment. Therefore, a company's goal in implementing an ERP is to give its business a crucial growth lever. In the digital age, it is crucial to have a variety of tools at your disposal, like those offered by an ERP, to manage and improve production, lower costs and losses, and boost profit margins. ERPs give businesses the flexibility to customise the functionalities offered to their working processes and to enhance their operations thanks to their modular architecture. Therefore, it's crucial to determine your needs in advance.

5.1.4. The different working environments of an ERP:

An ERP generally contains three working environments: [28]

- A "development environment" that allows the standard software to be adapted to specific company needs.
- An environment that enables simulations is referred to as a "recipe environment" or a "test environment." Through these simulations, new parameters can be tested, and the proper operation of the software programme in relation to a particular management process (a sale, a purchase, a stock withdrawal, etc.) can be confirmed.
- A "production environment," which corresponds to the software package used by the company's managers on a daily basis.

5.1.5. The advantages and disadvantages of an ERP:

5.1.5.1. The benefits of an ERP:

ERPs have several advantages [29]:

- Integration of management processes, widely used by organisations to optimise financial monitoring and management control;
- consistency and homogeneity of information (a single item file, a single customerfile, etc.);
- Integrity and uniqueness of the information system
- sharing the same information system to facilitate internal and external communication;
- Reliability: a company opting for an ERP system generally benefits from a tool that has been tried and tested by many companies in its sector of activity and is therefore continually being made more reliable through maintenance;
- Scalability is guaranteed by the consistency of the data model that forms the basis of all processes.

5.1.5.2. The disadvantages of an ERP:

However, ERPs are not without their drawbacks [29] :

- Implementation can be complex if the functional scope is poorly determined, too fluid, or the project is poorly managed.
- The cost is high and can increase rapidly, depending on the industry and the complexity of the project.
- Functional scope not adapted to the real needs of the organisation: the software package may be oversized and therefore underused if it is broader than the actual needs of the organisation, or on the contrary, it may be undersized if it is not capable of covering all the proven needs;
- Need for good knowledge of the company's processes.

5.1.6. Types of ERP :

Two main families of ERP are available on the market:

A proprietary ERP: is the software package sold under licence to the company; this too is divided into two main types:

- Generalist: which offer standard functionality.
- Verticals: which offer functionalities adapted to very specific needs.

Examples of proprietary ERPs on the market:



Figure 1.7 : Proprietary ERP

Open-source ERP: is a free software package whose open-source code can be modified and distributed freely.

Examples of open-source ERP on the market:



Figure 1.8 : ERP open-source

6. Conclusion :

In this chapter, we have presented a general overview of the Internet and Web services and technologies in order to gain a vision for the tools and protocols that can be used for the development of our project. We have outlined our objectives for the realization of this thesis. In the next chapter, we will provide a study on E-Commerce.

2. Chapter 02 :E-commerce

1. Introduction :

Technological advances are evolving at such a speed that it would be unwise to ignore them. Faced with this, electronic commerce or e-commerce has imposed itself as a new form of commerce, this new form has brought about new customer-supplier relations, new management methods and new forms of organization or just appropriating existing practices to this new form.

2. Definition of e-commerce :

- All commercial transactions that take place remotely over electronic and digital interfaces are referred to as "e-commerce" or "electronic commerce." Transactions that happen remotely over digital and electronic interfaces. E-commerce essentially includes both financial transactions made through specialized applications (mobile applications) as well as those made through the Internet using a variety of terminals (computers, tablets, smartphones, gaming consoles, and connected TVs). The term "distance selling" has replaced the term "mail order" as the primary channel for distance selling due to the rise of e-commerce. [19]
- According to the OECD (Organisation for Economic Co-operation and Development): E-commerce should be more broadly understood as "all commercial transactions to individuals (B to C: Business to Customer) or between companies (B to B: Business to Business) using exclusively the Internet or an electronic medium as a means of ordering, while payment and delivery can be made by traditional methods." [20]
- And according to the AFTEL (French Telematics Association)

Electronic commerce is the term used to describe all commercial transactions in which the purchase is made using a telecommunications network. It includes both the simple act of placing an order and the act of making a purchase with payment, and it refers to the acquisition of goods and services, whether or not they are ultimately used online. The term "electronic commerce" also refers to all commercial

uses of networks, including those in which a business only advertises its goods and an order is placed off-line. [20]

3. E-commerce evolution :

Contrary to popular belief, the idea for e-commerce was developed in the 1980s. Electronic exchanges have actually been around since the 1980s, largely because of the EDI (Electronic Data Interchange) standards. The 1985 EDI (Electronic Data Interchange) specifications. Originating in 1985. At the time, it involved the transmission of standardized messages from one business to another via a telecommunications network. Its primary concern was the automation of document exchanges, such as order taking, follow-up, or invoicing, to avoid the risks and delays associated with the mail as well as manual and manual re-entry.

The main drawback is the significant investment needed to implement EDI, which has prompted a shift to a new form of electronic commerce, namely the Internet. But when the Web was created in the early 1990s, things started to change. Arrived at being. The Web, which was user-friendly and concentrated on graphic presentation, left behind browsers and search tools that allowed users to quickly switch between websites and search for information using key words or phrases. Many businesses have created online presences as a result of the Internet's popularity.

Major software developers have created standards whose primary purpose is to facilitate communication between merchants and customers in response to the growing number of businesses that want to conduct business online. The technologies were ready for electronic commerce on the Internet at the start of 1997.

The protocols for communication that permit the execution of compressed and transactions are prepared. And as a result of software innovations like Java, ActiveX, RealAudio, and others, e-commerce are becoming more interactive and "alive." [21]

Here are some dates to remember that have marked the history of e-commerce :

- 1979: Michael Aldrich invents the online transaction.
- 1981: Citibank launches the first banking services.
- 1981: First B2B transaction in the UK.

- 1991: The National Science Foundation authorizes the commercial web.
- 1992: Charles M. Stack founded the first online bookstore (Book Stacks Unlimited) and created the COM site.
- 1994: Phil Brandenberger performs the first fully secure online transaction with encryption software (an album by the artist Sting cost \$12.48).
- 1994: Pizza Hut launches the first online ordering and payment system.
- 1995: Amazon, eBay and Dell open their website.
- 1997: Birth of mobile commerce (the Finns invent m-commerce. By sending an SMS, they buy their cans from a connected Coca-Cola dispenser)
- 1998: Launch of PayPal, thanks to the merger between Cofinity and X.COM.
- 2001: Birth of iTunes Store.
- 2003: Google launches Google AdWords.
- 2006: Appearance of Google Checkout.
- 2008: Launch of Groupon.
- 2008: Appearance of Magento to facilitate the creation of online stores.

The history of e-commerce sites as we know them today may have really started with the adoption of secure online payments. E-commerce is expanding its market share and never stops changing in order to meet contemporary needs. [22]

4. Traditional commerce vs E-Commerce :

The following table illustrates the differences between traditional and electronic commerce.

4.1. Traditional commerce : [19]

- The substantial reliance on information flowing from one person to another.
- Synchronous operations are used for communications and transactions. Each communication or transaction requires manual intervention.

- In traditional commerce, it is challenging to create and maintain standards of conduct.
- Individual skill sets are crucial in business.
- There isn't a standardized platform for information sharing because interpersonal communication is so important.

4.2. E-commerce : [19]

- Through electronic communication channels, information sharing is made simple.
- Asynchronous communication and transaction are both possible. They are automatically managed by the electronic system.
- In e-commerce, a consistent strategy can be easily established and maintained.
- There is no human involvement in electronic markets or e-commerce.
- E-commerce offers a global platform to support business operations everywhere.

5. The different representations of e-commerce:

There are several forms of e-commerce sites, we will mention:

- Business to Business (B2B).
- Business to Consumer (B2C).
- Business to Employee (B2E).
- Business to Government (B2G).
- Business to Institutions (B2I).

Consumer to Consumer (C2C).

5.1. Business to Business (B2B) :

Said in reference to a professional activity (exchanges or business transactions) carried out between companies. For instance, the B to B trade refers to transactions between a producer

who distributes to the final consumer and a supplier of intermediate products. A small pool of clients and prospects is the main attribute of business-to-business transactions. The core of the business strategies is the growth of customer loyalty. [21]

ex: *Intel selling processors to Dell

*Heinz selling ketchup to Mc Donalds

5.2. Business to consumer(B2C) :

It is about the online trade towards the private individuals, whether it is advertising, presentation of the catalog, online, order, electronic payment, distribution, or service after –sale. [21]

ex: Dell selling me a laptop

5.3. Business to employe (B2E) :

It is the entire set of exchanges, services, and products that a company intends for its own employees. It is the electronic exchange between a company and its employees. [21]

5.4. Business to government (B2G) :

It is the electronic communication between businesses and governments. B2G, in its broadest sense, refers to any commercial venture in which a local government serves as the client. A variation of B2B is B2G. [21]

ex: Payment of taxes, submission of records, or sale of goods and services to government agencies.

5.5. Business to Institutions(B2I) :

It is the electronic communication between businesses and organizations like associations, schools, etc. It relates to actors who are subject to unusual payment schedules and deadlines. These customers' purchasing patterns are also unique. [21]

5.6. Consumer to Consumer C2C :

It concerns electronic trade between private parties, i.e., online marketplaces for private sales of goods like real estate, advertisements, and exchanges. For instance : e-bay, bon coin. [21]

6. The advantages and disadvantages of E-commerce: [23]

First, we will analyze the advantages that e-commerce provides to the company as well as to its customers.

6.1. The advantages :

6.1.1. For the company :

According to a recent survey that was published in the magazine "Challenge," 44% of SMEs want to first improve their image by giving their business a more contemporary presentation. The appearance of new prospects (26%) is followed by an increase in customer satisfaction(20%) and time savings (10%). It appears that the real revolution in e-commerce is not in the growth of sales, but rather in its impact on how other distribution channels are organized. In fact, e-commerce provides new Internet sellers with a number of benefits:

- It opens a new distribution channel, a complementary circuit for certain products and services of the company.
- It offers a cross-border or at least a very large catchment area for a relatively low cost of presence. The potential market of the company can easily be multiplied by 10, 100 or 1000 while reducing costs to a maximum.
- It both pushes the boundaries of competition and activates new strategic thinking.
- It makes it possible to cover market niches that would be too costly to reach using traditional marketing methods.
- It brings a stronger user-friendliness compared to the mail order and the traditional remote control thanks to the multimedia which gathers the sound, the image, the color, the text and the animation.
- It promotes interactivity by developing a personal relationship with the consumer or customer, facilitating "one to one" sales (personalized) and customization.
- It allows to consider customer loyalty policies through an offer of services and high added value.

- It facilitates transactions by avoiding the buyer to move (thus saving him time) while offering him an identical and comfortable service.
- It gives the possibility to reduce the public prices of the products by eliminating the margin usually left to the intermediaries, like some structural costs.
- The registration of data via the Internet is almost automatic and requires little effort.
- It collects a precious mass of information on the habits and needs of the Internet user. Thus, the more the user visits the site, the more we get to know him through the series of clicks, i.e. the information he requests with the mouse of his computer. By deconstructing the click sessions (or), it becomes possible to establish consumer profiles allowing us to progressively adapt the e-marketing of the site in order to get the maximum profit.

6.1.2. For customers :

- E-commerce is an extraordinary pre-selection tool;
- The search for the best price;
- No pressure from vendors;
- A flea market on a global scale;
- A saving of time and an updated offer (we find the latest models).

6.2. The disadvantages :

6.2.1. For the company :

- It is clear that the brakes on the development of e-commerce are still numerous in France, particularly because of a still relatively low penetration rate and a psychological resistance.
- The uncertainty and the lack of confidence around the security of the means of payment, in spite of the fact that from now on the methods of data encryption ensure a quasi perfect confidentiality at the time of the transaction. The resistance of the intermediaries (wholesalers, distributors) which fear a destruction of employment accompanied by a loss of sales turnover.

6.2.2. For customers :

- Computer tracking using cookies, i.e. small files that uniquely identify the calling computer in order to trace all calling and consumption habits.
- The insecurity of payments and the fear of running into a dishonest online merchant who does not deliver.
- The lack of human relations and the feeling of isolation in front of his machine (case of the not very experienced Internet users).
- Lack of contact with the product.
- Telephone costs.
- Delivery details and rates.
- Difficulties of recourse in case of trouble.

7. The challenges of e-commerce :

The growth of electronic sales of goods and services by businesses to consumers is the most significant development in business-to-consumer sales today.

The most widely reported occurrence. Nevertheless, in 2000, business-to-business trade constituted more than 80% of all electronic commerce.

Commercial transactions. An estimated 40 billion dollars were spent on electronic commerce in total in 2000, according to estimates.

The volume of commercial exchanges, their globalization on networks, and the variety of factors involved have called into question the rules and customs that are in place in commercial exchanges.
[24]

8. Future of e-commerce in Algeria :

The electronic commerce in Algeria has a great future. Only with ePay.dz (for the Online payment in Algeria), this company has 4 million subscribers on Facebook, 10 million internet

users in Algeria. This electronic payment system can therefore give its fruits and e-commerce can fill the current gap. [25]

8.1. Possibility of development :

Algeria is one of the emerging countries in the era of the market economy. With the progressive liberation of its market, the country begins to seduce more and more foreign investors, especially in the energy sector. But today FDI (Foreign direct investment) starts to expand to other areas: tourism, industry and telecoms. Concerning telecoms or ICT, the sector is experiencing a clear improvement, since 2000, the beginning of the opening of the market and the creation of the ARPT (Post and Telecommunications Regulatory Authority). This should not make us forget the "Algerian delay" in terms of ICT and their introduction in the economy. The situation becomes urgent. A strategy must be implemented to integrate the information society because today, a new economy is built on the new economy is being built on NICTs. The transition to the information economy and e-commerce will be a real engine of recovery. [25]

9. Example of an e-commerce system:

There are many instances of e-commerce systems that highlight the many different uses of this technology. E-commerce integration in real estate management is one such instance. In the current digital era, real estate firms make use of e-commerce platforms to streamline property listings, enable online transactions for buying, selling, or renting properties, and facilitate virtual property tours. This enables a smooth and effective experience for real estate agents as well as potential purchasers or tenants. The use of e-commerce platforms in Craftsman's management is another illustration. E-commerce solutions are embraced by craft-based companies like independent craftsmen and artisans to market and sell their distinctive goods to a global clientele. These systems offer a digital marketplace where artisans can sell their products, fulfil orders, keep track of their inventory, and accept safe online payments. Craftsmen can broaden their customer base, boost sales, and build a solid online presence by embracing e-commerce. These instances show how e-commerce systems can be applied to a variety of industries, revolutionising conventional business models and creating fresh possibilities for development and success.

9.1. Real estate management :

9.1.1. Definition of real estate:

Real estate is a term used to describe tangible property, such as land, structures, air rights above the land, and underground rights beneath the land. Real estate is a term used in business to describe the creation, acquisition, and sale of real estate. [9]

9.1.2. The development of real estate sites in Algeria:

Algerian real estate websites are growing rapidly, as the internet has made it easier for real estate investors to disseminate information and connect buyers and sellers at a lower cost. These investors want to increase the quantity, relevance, and presentation quality of their information in order to be more visible by improving their referencing with search engines.

The first website to specialize in everything related to real estate and housing in Algeria was "Lkeria," which assessed the real estate market on the internet in Algeria in 2012. It helps to meet the needs of all those who wish to buy or sell any type of real estate according to their financial capacity, without intermediaries.

In 2015, new real estate websites were introduced to the market, which established a field of justification and competition between these websites. This competition enhances their offerings and boosts their clientele compared to 2012. Following, we will outline a few of these sites' various types: [2]

- Real Estate Agency Bouzid
- Oued Kniss
- Real Estate Alliance
- Reavimo National Real Estate Network.

9.1.3. Real estate transaction :

9.1.3.1. Definition :

Real estate transactions are actions taken in the real estate market, including renting and selling properties. They facilitate the transfer of property rights between a buyer and a seller. These transactions can be conducted between individuals or by a professional, such as an agent duly authorized by a professional body, who holds a card bearing the mention "Transactions

on real estate and goodwill". Typically, buyers who purchase real estate use bank credit through their bank. [10]

9.1.3.2. The process of an online transaction:

We take a step-by-step look at the transaction phases:

Selling

This process is done in the following steps : [2]

- First step: Develop a website that allows potential customers to find the products and services.
- Second step: Prepare a marketing plan to make the real estate distinct and attract buyers.
- Third step: Determine the price of the real estate.
- Fourth step: Add the real estate listing to the site.
- Fifth step: Protect yourself by requesting the identity of the real estate visitor.
- Sixth step: Complete the agreement/sign the contract. Consider that the buyer has made an offer on the price of the property, and it is time to negotiate.

Buying and renting

These two processes are done in the following steps: [2]

- The first step: identify the type of real estate you want.
- Second step: Determine the price of the real estate you want.
- Third step: start the search for the real estate you want to find.
- Fourth step: registering and submitting the financial offer for the real estate.
- Fifth step: approval and completion of the transaction.

9.2. Craftsman's management :

9.2.1. Craftsman definition :

- "A person, especially a man, who practices a trade or handicraft as a job." [11]
- "A person, especially a man, who is skilled in a craft." [11]

9.2.2. Change in Algeria :

Despite the enormous potential opportunities that exist in the building industry, we can say that the platforms for connecting craftsmen and individuals in Algeria are still in their infancy. In fact, the websites in this industry in Algeria are happy to merely publish announcements of services being offered and/or to do so without providing any assurances regarding the supervision of the craftsman (i.e., building a relationship of trust between the customer and craftsman) to ensure a higher level of service quality.

More specifically, the website originally dedicated to the sale and purchase of "Ouedkniss" is the only platform that permits the expression of a service in the form of an advertisement. In addition, "Allo" and other platforms that have attempted to break into this industry have not been as successful as anticipated. [1]

10. Means of payment :

We exchange money every day, in a very natural way. Everyone has a preference for their favorite payment method, and sometimes this one is chosen by default or due to a lack of information on the possibilities offered by other existing payment solutions. [26]

The different means of payment:

We can categorize payment methods into two streams: the more traditional ones, which we have been using on a daily basis for a long time, and the more recent ones, which benefit from the advances in technology and adapt to current issues. [26]

10.1. Traditional means of payment :

These are the most widely used payment methods to date.

10.1.1. Credit card :

The blue card, as it is called in France. It can be for withdrawal only, for description or for credit.

There are different ranges of bank cards, depending on the use you make of it, your income, your pace of life. This solution is the most used and allows you to buy in stores, online, or to withdraw money. Very practical, it is often paying and runs the risk of piracy on the Internet. [26]

10.1.2. Bank transfer :

To send money from your account to another bank account. All you need is your correspondent's bank account number or IBAN and you can make a one-time or permanent transfer to that account, in complete security. [26]

10.1.3. Direct debit :

Often used for monthly bills, gas bills or phone bills, direct debit is an automatic withdrawal from your account to pay a recipient on a specific date. It is also called Direct Debit. [26]

10.1.4. The species :

Our coins and euro bills, as far as Europe is concerned. This means, of payment is the oldest and the most natural for us, since we exchange real currency for one or more products. It is a solution that is suitable especially for small purchases. [26]

10.1.5. The check :

A paper-based form of payment, where the signature acts as good faith. The amount written on the check is debited from the issuer's account, once the beneficiary whose name is written on the check cashes it. It is rarely used outside of France (except in the United Kingdom and the United States), and merchants sometimes refuse it for fear of non-payment if the account is not funded. [26]

10.2. New payment methods :

Although they can or must be associated with traditional payment methods, these new payment solutions are commonly referred to as new payment methods. [26]

10.2.1. Virtual account :

It allows to secure online payments, being used only for purchases on the Internet. Via this intermediary, you will have a solution that allows you to make your transactions without having to disclose your bank details. It is enough that the merchant site accepts this means of payment. [26]

10.2.2. Contactless payment :

A little novelty among the payment methods, it offers you the possibility to pay with your smartphone. To do this, you must have a phone with NFC functionality and the merchant must also have activated the contactless function of its payment terminal. You just have to

bring your smartphone closest to the terminal, which will detect the device, and the payment will be made automatically via the application that you have configured beforehand. [26]

10.2.3. blue card :

This payment method allows you to generate an ephemeral virtual card, and banks usually offer this feature for free. When you make a purchase, you just have to use the application or the website of your bank, to enter the amount you want to put on this virtual card, and its validity period. You will get a card number with almost unique use that allows you to conclude your purchase without communicating your banking coordinates online. You should also know that some banks like Fortuna offer this service for free. [26]

10.2.4. Virtual currency :

Less widespread, this means of payment remains in the minority since it is not yet fully regulated by a legal framework. The most famous virtual currency is Bitcoin, which can be exchanged for traditional monetary currencies, sometimes at a high price. Some merchant sites accept payment by virtual currency. [26]

11. Conclusion :

E-commerce has diversified and evolved at an impressive rate. It has become a key issue in the modern consumer society. In order to offer a new way of exchanging goods and services, e-commerce sites are constantly growing: companies are developing their own offers and are forced to respond to this new market or else they will not meet the customer's requirements. This is why it is important to improve the performance of the e-commerce site by adapting it to the expectations of the e-consumer, hence the need to follow a precise approach to the development of these e-commerce sites which will integrate the development of the site, the technology used, the marketing aspect, the , a knowledge of the market and the environment...

In the next chapter, we will provide a study on the modeling language and its importance for our project.

3. Chapter 03: Analysis and design

1. Introduction :

The realization of a website must be preceded by a methodology of analysis and design that has the objective of formalizing the preliminary stages of the site's development to make it more faithful to the customer's needs. The analysis phase allows listing the expected results in terms of functionalities, and the design phase describes the future operation of the system unambiguously, often by using a modeling language, to facilitate the realization. To carry out these two phases in an IT project, methods, conventions, and notations are used. UML is one of the most commonly used notations today.

2. What is modeling ?

Before your team begins coding, you can use modeling to visualize your software application design and compare it to the requirements. Developers can use modeling diagrams to clarify and test what they are going to create before they start writing code, much like architects do before building a skyscraper. The first step in any project is to map out a plan, and modeling is a crucial component of any software project, no matter how big or small. Scalability, security, and execution must all be supported by an application's architecture for it to work effectively.

You can visualize and validate the designs of your software systems using Unified Modeling Language (UML) diagrams before implementing code, which makes changes difficult and expensive to implement. [12]

3. UML :

3.1. Definition :

Unified Modeling Language is known as UML. It is a general-purpose development modeling language used for software system analysis, design, and implementation. The goal of UML is to offer a straightforward and widely used method to visualize the inherent architectural characteristics of a software system. UML has evolved into the industry standard for creating object-oriented software. Business users, developers, and anyone else who needs to model data can use UML diagrams. UML is not a development approach or a programming language. [13]

3.2. History of UML:

While working at Rational Software in 1995, Grady Booch, Ivar Jacobson, and James Rumbaugh developed the Unified Modeling Language. The Object Management Group, which is composed of companies such as Hewlett-Packard, IBM, and Apple Computer, adopted UML as a standard in 1997, ensuring that UML would remain a common visual language with interoperability in mind for a long time. The International Organization for Standardization (ISO) released the language in 2005, and it has since been updated with new revisions and reviews. The most recent version, UML 2.5, was made available in 2015.

UML diagrams are less common today because many software teams work in an Agile environment. However, they are still useful for several reasons. Teammates can consistently document and communicate ideas by using UML diagrams, and this kind of effective communication keeps everyone on task. [14]

3.3. Object Oriented Concepts Used in UML: [15]

- ✓ Class : The blueprint, or structure and functions, of an object are defined by a class.
- ✓ Objects: Using objects, we can break down complex systems and modularize our system. In order to build our system piece by piece, modularity helps us break it down into manageable parts. The fundamental component (building block) of a system that is used to represent an entity is called an object.
- ✓ Inheritance : Child classes can acquire the traits of their parent classes through inheritance.
- ✓ Abstraction : Mechanism for hiding implementation specifics from the user.
- ✓ Encapsulation: Encapsulation is the process of tying information together and shielding it from the outside world.
- ✓ Polymorphism: A mechanism that allows for the existence of functions or entities in various forms.

3.4. Why UML :

The most popular and well-known modeling language is UML. By far, the most widely used modeling language today is UML. Because UML diagrams are so common, most developers, regardless of their specialties or employment histories, will be at least somewhat familiar with

them. Additionally, their utility does not depend on the user being able to read a particular programming language because they are designed to be understood by all types of programmers.

The majority of your modeling requirements can be met by three of the most common UML diagrams. Despite the fact that there are 14 different kinds of UML diagrams available for modeling applications, in reality, software developers only use a select few to describe their software systems. Class diagrams, sequence diagrams, and use case diagrams are the most typical UML diagrams you'll encounter and use. That means that for the majority of your projects, being able to create and read only 20% of this language will be sufficient. [12]

3.5. Advantages and disadvantages of UML:

3.5.1. The strengths of UML : [6]

- UML is a formal and standardized language.
 - Gain of precision and guarantee of stability are ensured, and it encourages the use of tools.
- UML is a powerful communication support.
 - It frames the analysis and facilitates the understanding of complex abstract representations.
 - Its versatile character and flexibility make it a universal language.

3.5.2. The weak points of UML: [6]

- Putting UML into practice requires learning and goes through a period of adaptation.
- Process (not covered by UML) is another key to a successful project.

3.6. The use of diagrams :

3.6.1. Definition of a diagram:

A UML diagram is a graphical representation that isolates a specific model component. It is not "the model" itself, but rather a view of it. Each UML diagram type has a specific structure that conveys precise semantics. By extending and utilizing the language, the different types of UML diagrams collectively provide all of the static and dynamic aspects of a system. Additionally, a UML diagram serves as a model. [16]

3.6.2. Characteristics of UML diagrams:

The UML diagrams support abstraction. Their level of detail corresponds to the level of abstraction of the model. The structure of UML diagrams and the graphic notation of modeling elements are both standardized, according to the "UML Notation Guide" document. Keep in mind that the semantics of the modeling elements and their appropriate usage are defined by the UML metamodel (document "UML Semantics"). [16]

3.6.3. Views in UML:

Through views, UML offers a clever way to display different projections of the same representation. Diagrams can be found in one or more views. There are two distinct viewpoints:

3.6.3.1. Static views :

They represent the system abstractly. We then find the following diagrams: [17]

- The Class Diagram: represents the static structure of the system in terms of classes, interfaces, and their relationships.
- The Object Diagram or Instance Diagram: represents a snapshot of the system's instances and their relationships.
- The Component Diagram: shows the architecture of the system in terms of the components that make up the application, including subsystems, modules, programs, processes, and tasks. It also illustrates the interfaces of these components.
- The Deployment Diagram: shows how the components of a distributed system are physically deployed, including the nodes, processes, and connections between them.

3.6.3.2. Dynamic views :

The five behavioral (or dynamic) diagrams represent dynamic views of the system: [17]

- ✓ The Use Case Diagrams: are views that describe the interactions between the different external actors (users of the case) and the system functionalities. The description of the interaction is done from the user's point of view. Their purpose is to identify the actors of the domain, their respective responsibilities and to describe their needs.

- ✓ The Collaboration Diagram: depicts the interaction represented by message exchanges between actors and objects or between objects and other objects.
- ✓ The Sequence Diagram: adds a temporal dimension by detailing the chronology of message exchanges between objects, which makes it slightly different from the Collaboration Diagram.
- ✓ The transition state diagram: shows all the states that the system's objects can be in as well as the transitions that cause one state to give way to another.
- ✓ The Activity Diagram: is a variant of the State-Transition diagrams. It describes all the activities performed by the actors in the system by breaking them down into sub-activities and specifying the constraints relating to the sequence of the latter.

4. Definition of Visual Paradigm Online :

Visual Paradigm Online is a tool for creating online diagrams with programming in mind. It can handle many different commercial and technical diagrams, including UML, BPMN, URD, DFD, and SysML. This platform has a graphic user interface that makes it easier to use its features and adapts to the way you work. Additionally, it works on a variety of applications. Visual Paradigm Online offers three different monthly subscription packages, including Starter, Advance, and Combo. These subscriptions range in price from \$4 to \$15, depending on the features used. Additionally, this software offers a "free" plan with basic modules. [18]

5. Needs analysis and design :

5.1. User cas diagram :

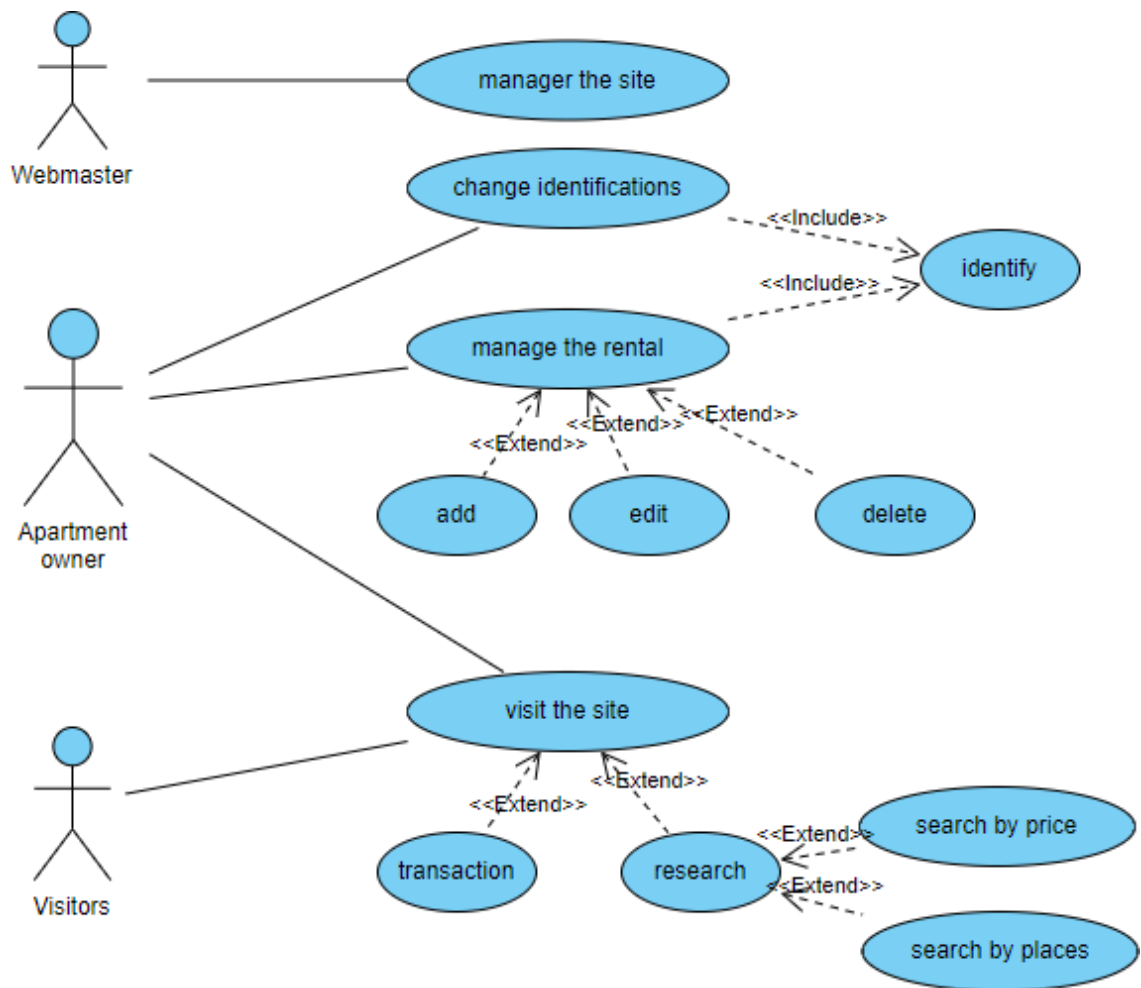


Figure 3.1: use case diagram for real estate

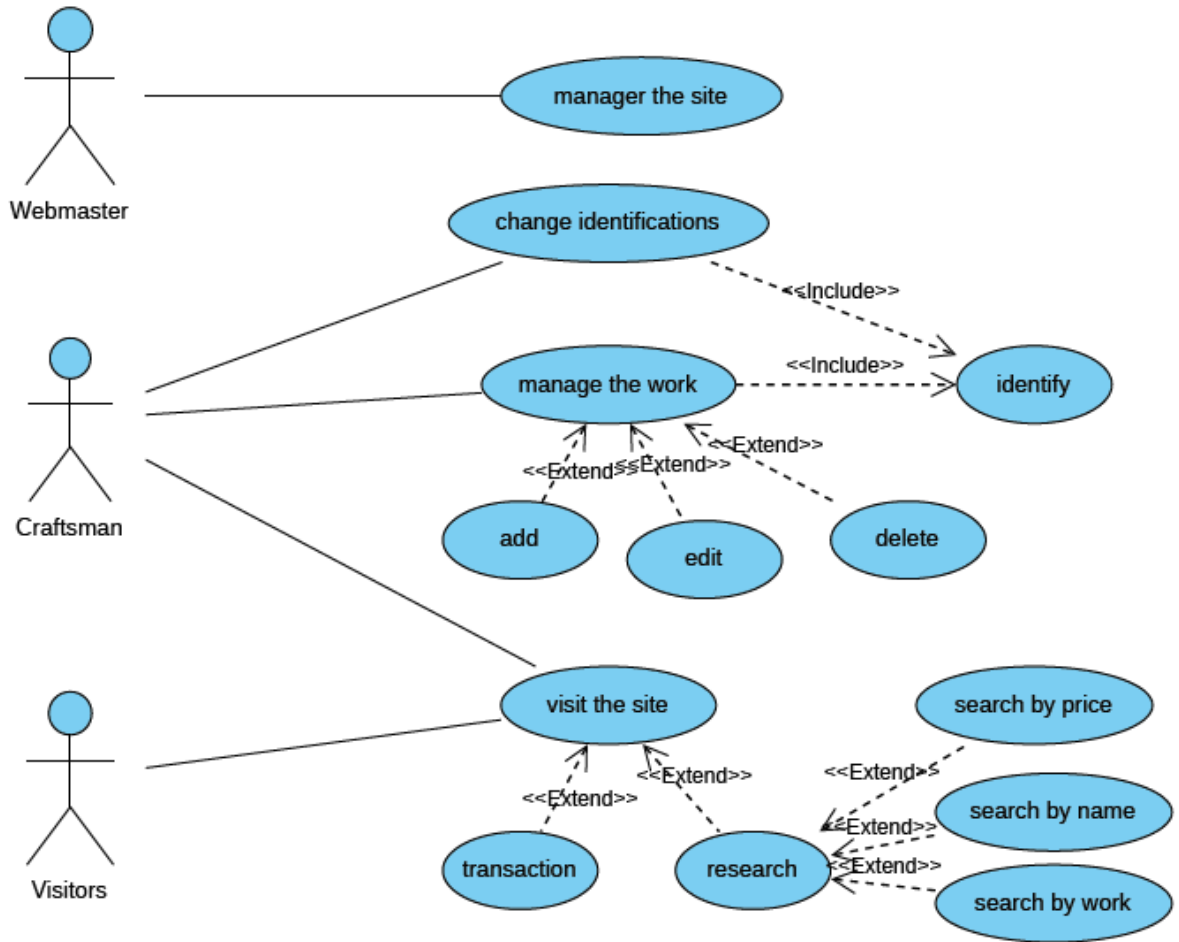


Figure 3.2: use case diagram for search craftsman

5.2. Sequence diagram :

5.2.1. Identify :

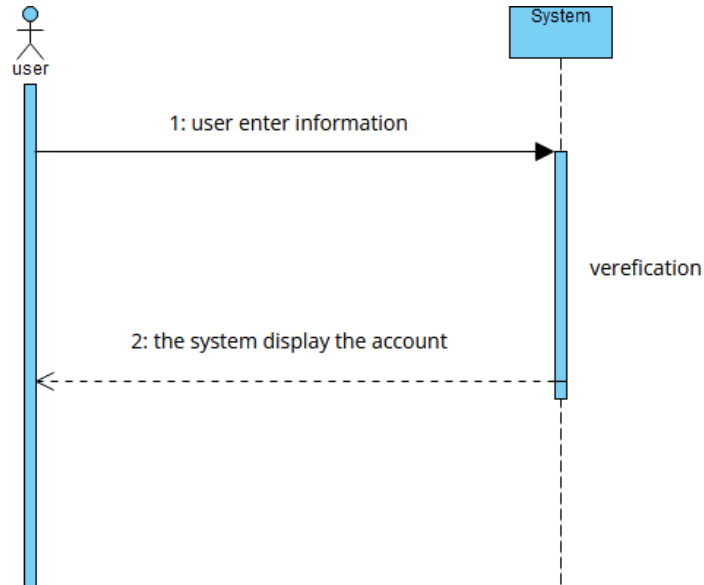


Figure 3.3 : Sequence diagram for identification

5.2.2. Change identification :

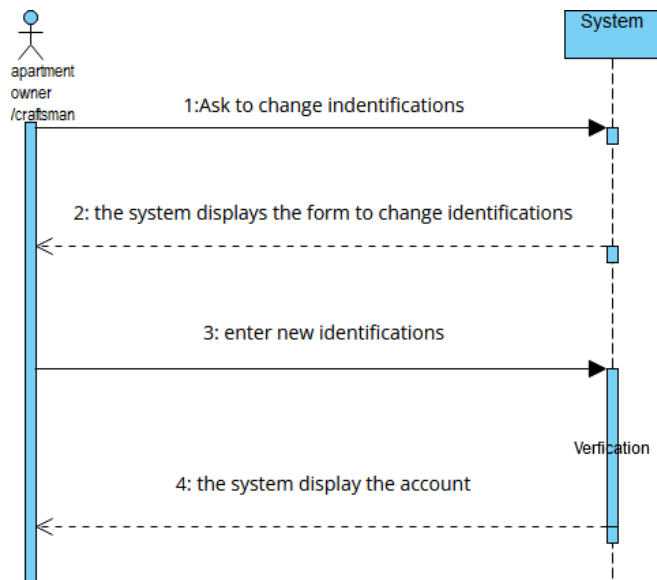


Figure 3.4: Sequece diagram for change identification

5.2.3. Add a real estate or craftsman sheet:

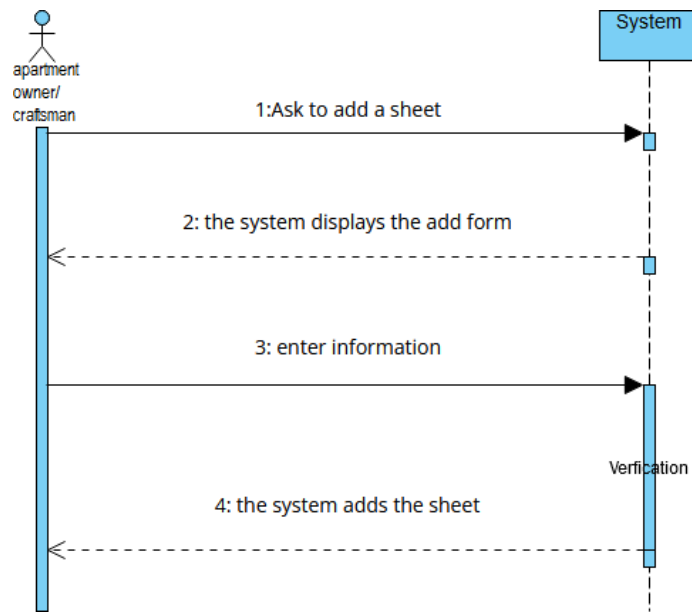


Figure 3.5: Sequence diagram for add a real estate or craftsman sheet

5.2.4. Modifies a real estate or craftsman sheet:

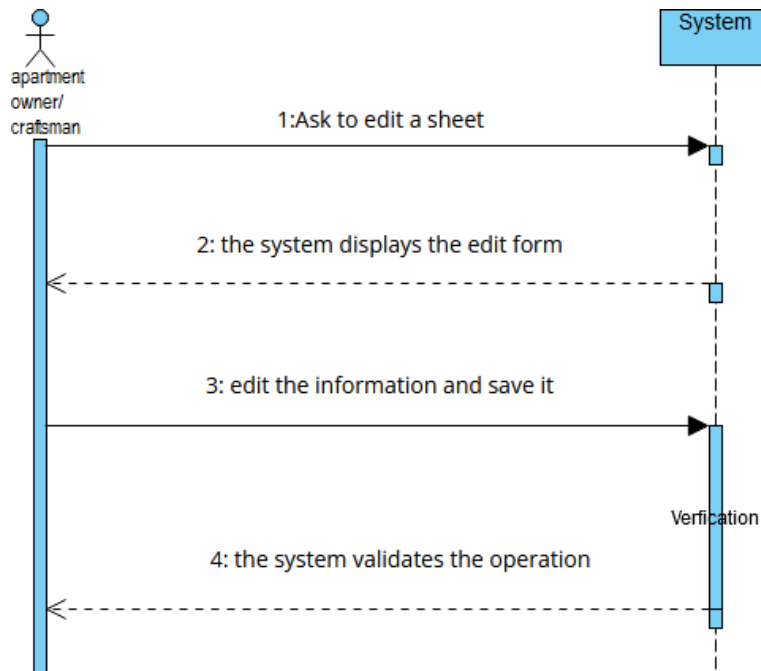


Figure 3.6: Sequence diagram for modifies a real estate or craftsman sheet

5.2.5. Delete a real estate or craftsman sheet:

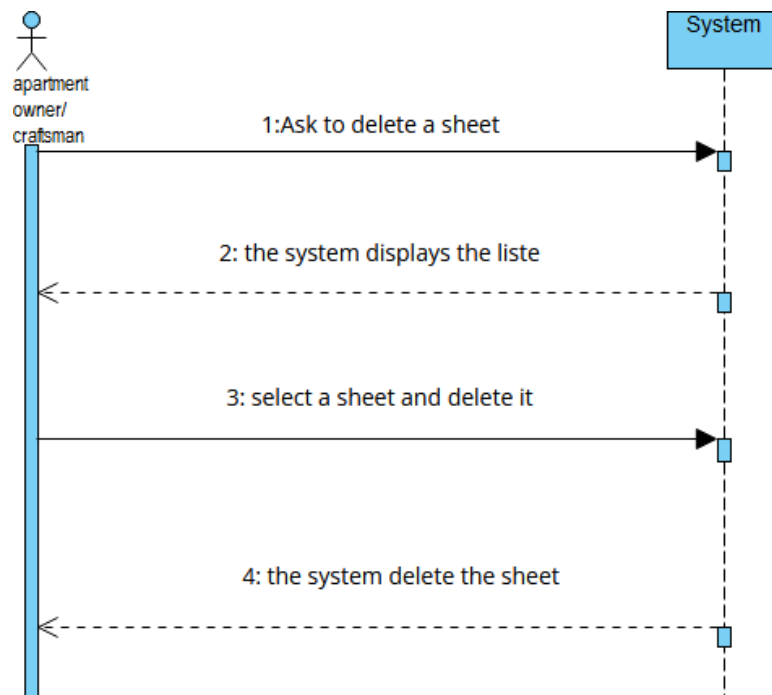


Figure 3.7: Sequece diagram for delete a real estate or craftsman sheet

5.2.6. Reasearch :

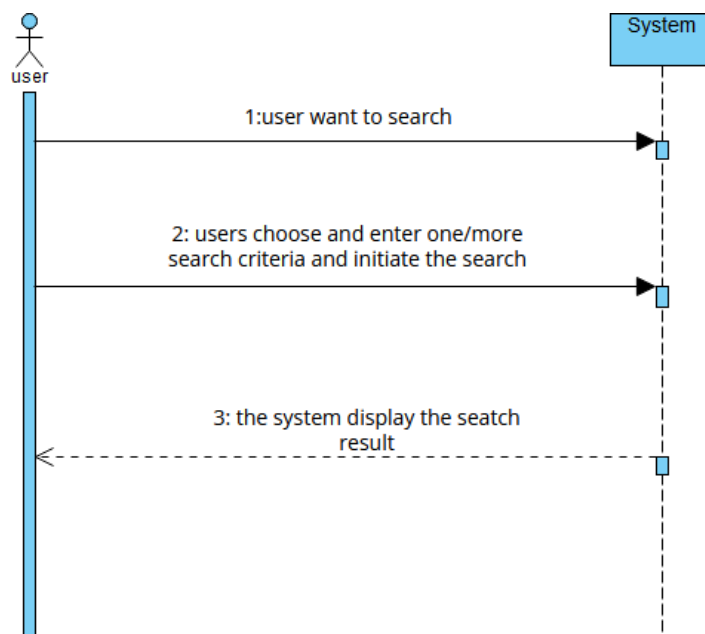


Figure 3.8: Sequece diagram for research

5.2.7. Transaction :

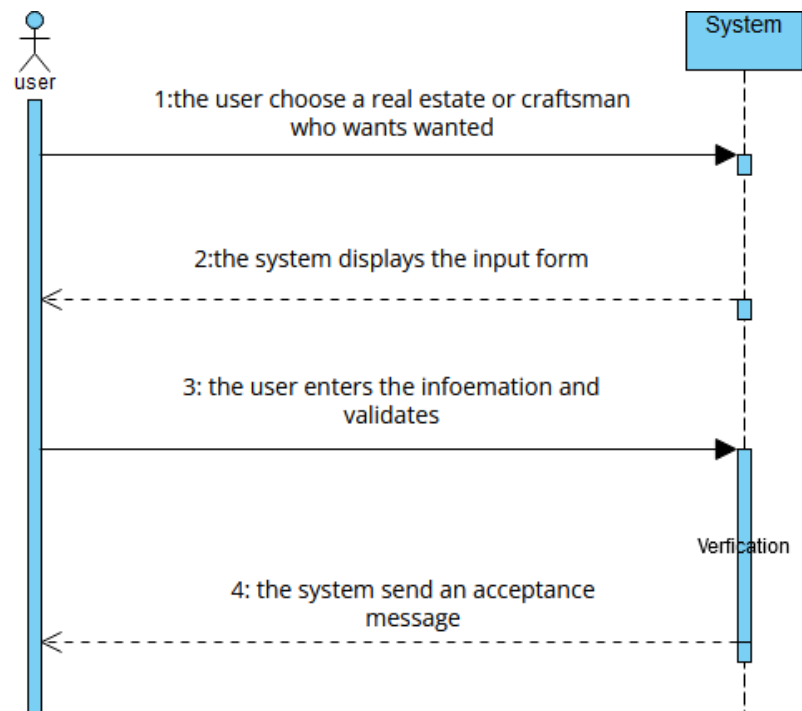


Figure 3.9: Sequece diagram for transaction

5.3. Class diagram:

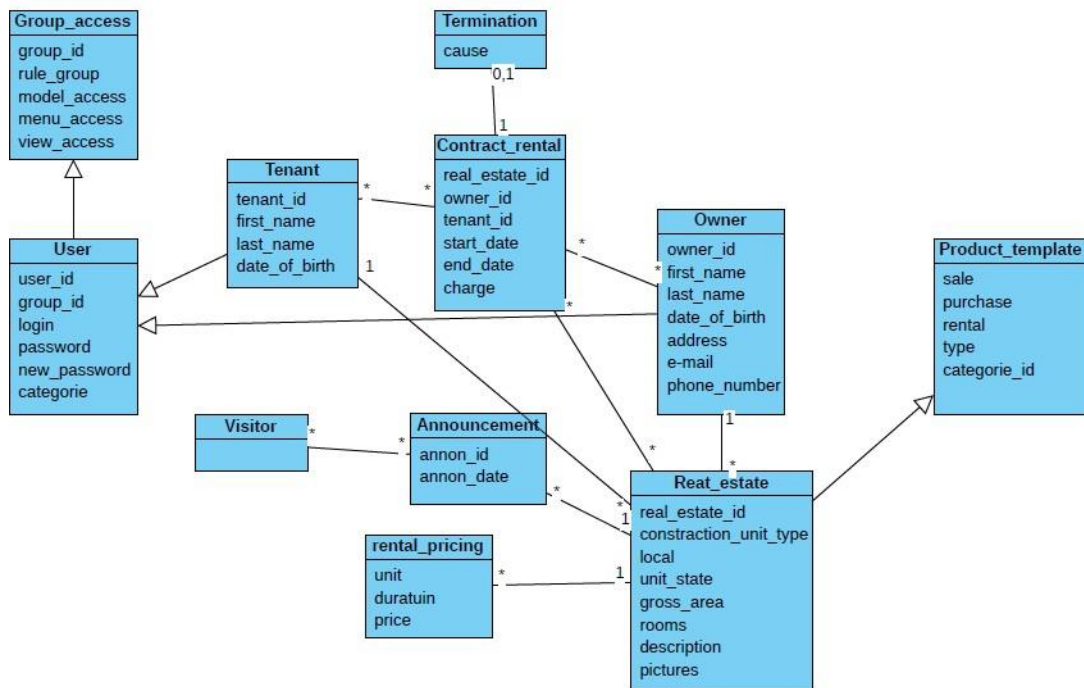


Figure 3.10: Class diagram for a real estate

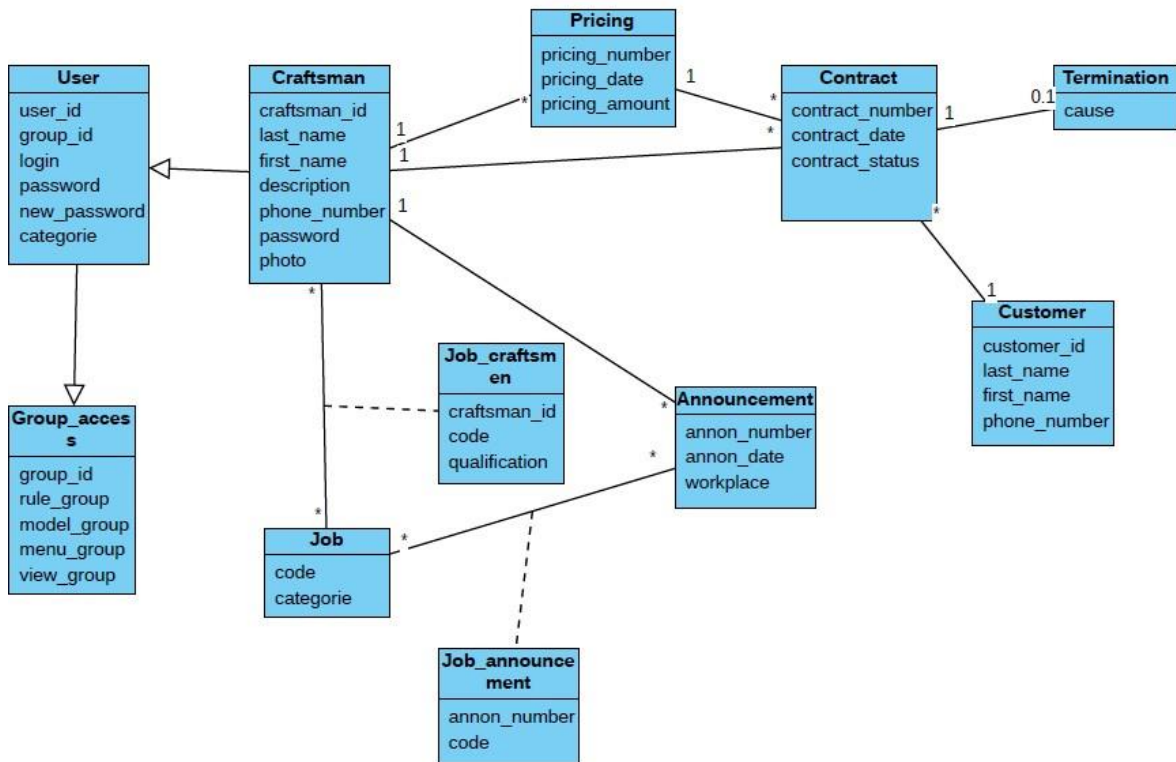


Figure 3.11: Class diagram for a craftsman

5.4. Logical data model resulting:

This is the transformation from a class diagram to a relational model, which allows modeling the structure in which data will be stored in the database.

5.4.1. Real estate:

- Tenant (tenant_id, first_name, last_name, date_of_birth)
- Contract_rental (real_estate_id, #owner_id, #tenant_id, start_date, end_date, charge)
- Owner (owner_id, first_name, last_name, date_of_birth, address, e-mail, phone_number)
- Termination (cause)
- Announcement (annon_id, anon_date, #real_estate_id)
- Rental_pricing (unit, duration, price, #real_estate_id)
- Real_estate (real_estate_id, construction_unit_type, local, unit_state, gross_area, rooms, description, pictures, #tenant_id)

5.4.2. Craftsmen:

- Craftsman (craftsman_id, last_name, first_name, description, phone_number, password, photo)
- Pricing (pricing_number, pricing_date, pricing_amount, #craftsman_id)
- Contract (contract_id, contract_date, contract_status, #pricing_number, #craftsman_id, #customer_id)
- Termination (cause)
- Job (code, categorie)
- Job_craftsman (#craftsman_id, #code, qualification)
- Announcement (annon_number, anon_date, workplace, #craftsman_id)
- Job_announcement (#annon_number, #code)

- Customer (customer_id, last_name, first_name, phone_number)

6. Conclusion :

This chapter allowed us to present the approach we followed to solve the problem, and we were able to demonstrate the power of the UML modeling language in terms of web application development through its diagrams that allow us to view an application from different angles. We still have the concrete part: the realization which will be the subject of the following chapter.

4. Chapter 04: Implementation

1. Introduction :

This graduate thesis' final chapter delves deeply into a thorough examination of Odoo, a potent and adaptable open-source business management tool. Odoo has established itself as a top-tier option for companies of all sizes, providing a vast array of integrated modules and features to streamline operations across different departments. Using the specifications and design outlined in the previous chapter, we will talk about how our application was actually implemented in this chapter. We will start by introducing the various tools and programming languages that were used to create our system. This will enable us to contextualise the development of the application and justify the technological decisions made. We'll go into detail about the steps we took for development next. Using a sequential approach will enable us to describe the key developmental milestones and the choices that were made along the way.

2. Odoo:

2.1. What is Odoo ERP?

Enterprise resource planning software, such as the Odoo ERP system, is used throughout the entire organisation to manage business processes. Odoo offers functional business apps that are seamlessly integrated and can be combined to create an ERP solution. The enterprise edition of the open-source programme Odoo is offered with SaaS subscription pricing, as is the community edition, which is free.

2.2. History :

What is the history of Odoo? In 2002, Fabien Pinckaers founded Odoo. A fully open-source software product was Fabien's vision for dominating the enterprise management market. Prior to turning 30 years old, he also desired to have a self-funded business with 100 employees. Except for a few months, he was successful in doing this.

Fabien began in 2005 with his initial implementation of Odoo, known as TinyERP (a small ERP system). Three years later, Fabien learned that being "small" does not allow you to make a difference in the world. It is preferable to be a big ERP rather than a tiny ERP in this world, especially if the United States is a part of it. Can you picture yourself feeling insignificant in front of the directors of Danone and saying, "But why should we pay millions of dollars for a small software package?" Therefore, Fabien changed TinyERP to OpenERP.

The growth of OpenERP was slow. Odoo raised \$10 million in funding in 2014 to expand its marketing and sales efforts. It was necessary to change the name in order to support the vision, which is not just limited to ERP functions. A new name that could support the goals was required: a user-centric, straightforward software package for customers and other system users. The name of the business and the product were changed to Odoo in May 2014.

The decision to rename the business Odoo was another crucial one. Odoo has chosen to charge a portion of the price for the programme. There are now two versions of Odoo. Both the paid enterprise version and the free community version. Due to this choice, Odoo's growth has been explosive. The paid version served as the main source of funding for the product's and the Odoo company's future expansion.

Nearly 3000 people will work for Odoo in offices all over the world by the end of 2022. Currently, Odoo is adding 3 new employees per day through 2022. [31]

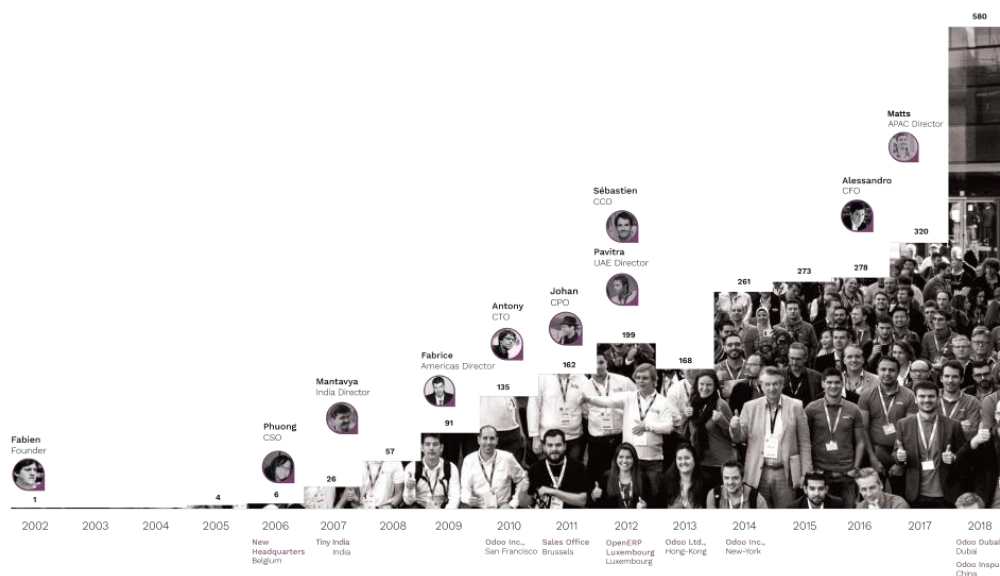


Figure 4.1 : History of Odoo

2.3. Why Odoo is chosen ?

Odoo combines user friendliness and a broad range of functionality for efficient business management. For managing all business operations of the company, including production, sales, warehouse management, logistics, accounting, reporting, and more, the platform offers a wide range of practical tools.

One of the system's biggest benefits is the abundance of applications that let you customise Odoo to meet the unique needs of your business and quickly expand functionality when necessary.

Odoo is an open-source programme that is frequently updated and enhanced by thousands of experts worldwide. The system is constantly being improved, and with each new version, it becomes even more reliable, useful, and practical. [32]

2.4. Why business choose Odoo ? [32]

- **All-in-one solution:** With the aid of Odoo, you can control a wide range of business operations and marketing initiatives, build websites, evaluate key performance indicators, organise your belongings, and enhance communication between departments. And it's all accessible from one convenient location.
- **Add-ons for any needs:** Systems built on the Odoo platform can be customised to meet the requirements of various businesses. Odoo will be a great solution for any business, whether it be a large manufacturer of everyday consumer goods, an IT firm, or a passenger carrier.
- **User-friendly experience:** Odoo combines its many features with its simplicity of use. To teach your staff how to use Odoo, there is no need to pay for protracted and costly training. The system has built-in mobile support and functions with any operating system.
- **Low total cost of ownership:** Odoo is an open-source platform, so you do not have to pay licencing fees for using it. Odoo will allow you to significantly reduce the cost of implementing the ERP system.

2.5. ODOO and its main modules:

The main modules of the business application suite ODOO are shared by the majority of for-profit and nonprofit organizations.

The CRM (Customer Relationship Management) module allows for the development and upkeep of a relationship with customers that is mutually beneficial.

The ODOO open-source solution offers a wide range of human resources-related features in its human resources module.

The ODOO open-source solution enables you to manage the entire logistics chain, from the procurement and storage of goods to the creation and delivery of orders. This is done through the logistics module to arrange for delivery and preparation.

The cost and financial accounting module in ODOO has a section for experts in accounting and finance.

The module for commercial management: You can manage sales, marketing operations, and relationships with business partners with the help of ODOO, a free and comprehensive software package. [28]

2.6. Different Odoo architectures:

There are different architectures of Odoo which we will see next:

2.6.1. Technical Architecture:

The three-tier architecture of Odoo includes a database tier for data storage, a presentation tier that the client runs as a JavaScript application in the browser, and a processing tier that connects to the server using the JSON-RPC or XML-RPC protocol. [30]

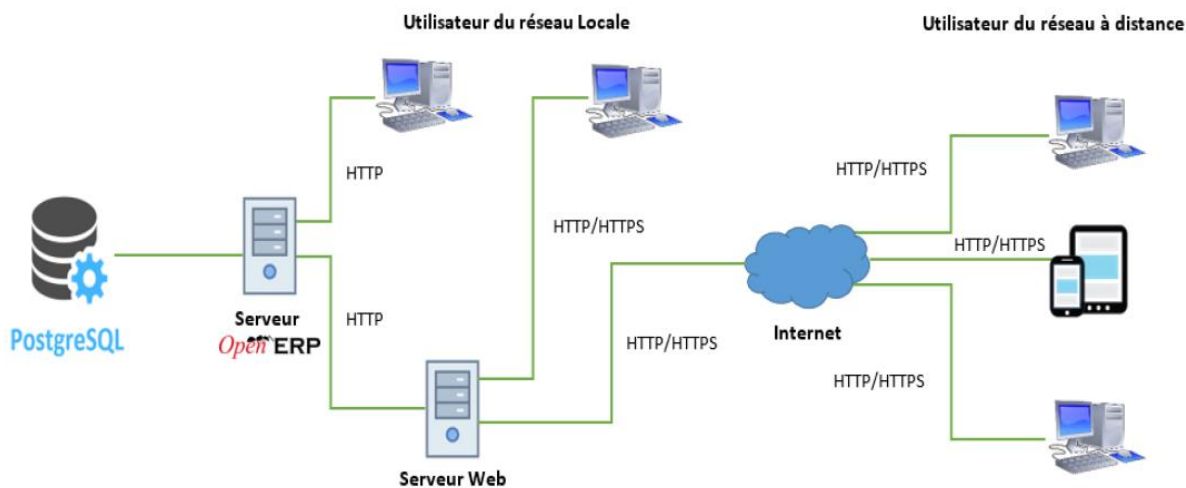


Figure 4.2 : Architecteur Odoo.

2.6.2. Modular Architecture:

It makes sense to have multiple applications share a single database (modules that are independent of one another), as this eliminates the need for multiple entries and redundant data and enables simple addition and enhancement while maintaining consistency in the information systems. [30]

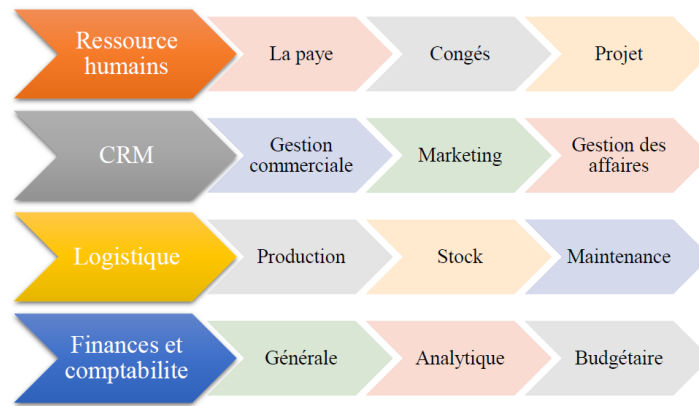


Figure 4.3: Modular architecture of Odoo.

2.7. Structure of an Odoo module:

Here is the structure diagram for the Odoo module [33]

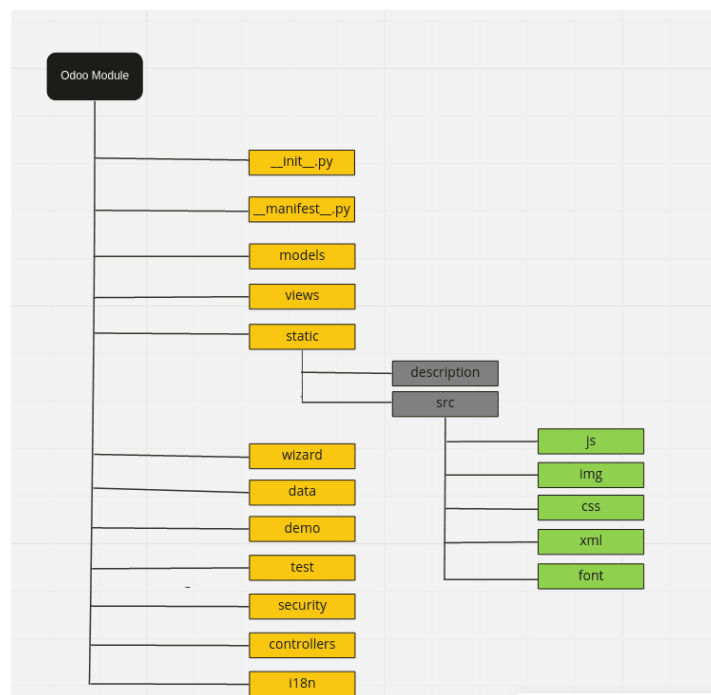


Figure 4.4: structure of an Odoo module

`__init__.py`: As a module initializer, this file is employed. Usually, assistance with importing packages and files is required for Odoo.

```
from . import product_package
From . import inherit_stock_rule
```

The module name and other metadata can be defined in the file `__manifest__.py`. It includes various additional details about the module, including its version, category, author, and dependent modules, among others.

```

{
  'name': 'Product Package',
  'version': '16.0.1.0.0',
  'summary': """"This app is managing product as the bundle""",
  'description': """"This app is managing the product as the bundle""",
  'category': 'product',
  'author': 'Cybrosys Techno Solutions',
  'company': 'Cybrosys Techno Solutions',
  'maintainer': 'Cybrosys Techno Solutions',
  'depends': ['base', 'sale_management', 'sale_stock', 'purchase',
'purchase_stock'],
  'website': 'https://www.cybrosys.com',
  'data': [
    'security/ir.model.access.csv',
    'views/product_package.xml',
    'views/inherit_sale_menu.xml',
  ],
  'images': [],
  'license': 'OPL-1',
  'price': 9.99,
  'currency': 'EUR',
  'installable': True,
  'auto_install': False,
  'application': False,
}

```

name: Name of the module

version: module version

summary: Summary of this module

description: The module's brief explanation

author: Whoever developed this module

website: The website URL for the module

depends: These modules are installed before our module install.

Data: This is the data file that came with the module when it was installed or upgraded.

Listed there are the locations of the module directory.

image: It contains the path of the image for our module. The file is located in

Application: Here, we specify whether or not the module is an application.

installable: The user must specify whether this module is installed from the Web UI or not

Models: This folder consists of all python files for the module

Eg: sale_order.py

Views: This folder houses the module's XML files. applied to user interfaces such as kanban, lists, forms, trees, menus, etc.

Eg: sale_order.xml

Static: All of the assets are contained in this directory. These files can be accessed by anyone, publicly, and without a username or password. This consists of various things like JavaScript, CSS files, and images. These specifics are provided under the web template rather than being shown in the module manifest.

The JavaScript, CSS, Images, XML, etc, are given to the directory src.

Wizard: It consists of all files related to the wizard

Data: It contains all data files along with the module's initial data.

Demo: It contains demo data, which is used for testing, training, or evaluation.

i18n: This file contains .po and .pot files. Used for the translations.

Security: It is made up of the XML files required for the record, group, and access rights rules. In a file, we can specify the access rights.

Eg: ir.model.access.csv

Controllers: contains the file that gives functionality to website controllers.

3. Development languages and environments:

Using dynamic languages like Python and Bootstrap as well as the relational database manager PostgreSQL, Odoo is built on contemporary technology.

3.1. PyCharm :



Python programming is done in an integrated development environment (IDE). Both a graphical debugger and code analysis are features. Additionally, it offers the ability to write and modify code, integrate version control software, and manage unit tests. [29]

3.2. Python :



For computer scientists, Python is the most popular open-source programming language. It has emerged as the standard language for software development, data analysis, and infrastructure management. Python's ability to let developers concentrate on what they do rather than how they do it is undoubtedly one of its benefits. It has released programmers from the formal restrictions that older languages forced them to work under. Python allows for quicker code development than other languages.

If they take the time to learn how to use it, it is also usable by beginners. Numerous tutorials can be found on specialised websites or YouTube channels. Since many experts use them, it is always possible to find answers on computer forums. [34]

3.3. PostgreSQL :



The Department of Computer Science at the University of California, Berkeley created POSTGRES, Version 4.2, which serves as the foundation for PostgreSQL, an object-relational database management system (ORDBMS). Many concepts were first introduced by POSTGRES and later made available in a number of commercial database systems. An open-source offspring of the original Berkeley code is PostgreSQL. While offering many contemporary features like complex queries, foreign keys, triggers, views, transaction integrity, and multiversion concurrency control (MVCC), it also supports SQL92 and SQL99. [35]

3.4. XML:

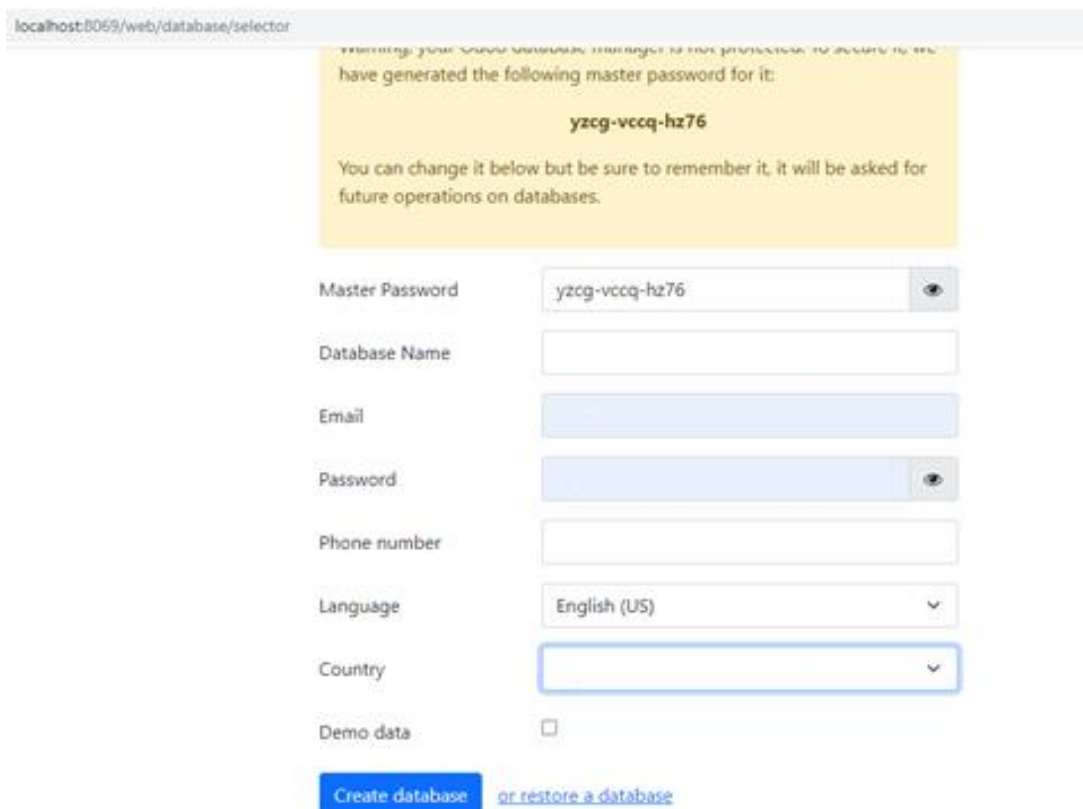
eXtensible Markup Language, also known as XML, is a computer language used to store textual data. A computer language called markup language (ML) is used to store textual data. The W3C standardised this language in February 1998, and it is now very well-liked. This language, which is employed to speed up the exchange of information on the Internet, has a markup system that is largely similar to that of HTML. In contrast to HTML, which has a limited number of tags, XML permits the addition of new tags whenever necessary. [36]

4. The development stages of the "real estate rental" module:

4.1. Creating a new database:

Odoo applications are based on the MVC design pattern. To manage the data, Odoo uses the robust and open-source RDBMS PostgreSQL with the ORM layer to secure and facilitate access to the stored data and, at the same time, simplify the various queries on the data. Creating a database on Odoo is done after authentication with the default user, "Admin."

Figure 4.5 shows the form for creating an Odoo database.



The screenshot shows the Odoo database creation form at the URL localhost:8069/web/database/selector. A yellow warning box at the top states: "Warning: your Odoo database manager is not protected by access rights. We have generated the following master password for it: yzcg-vccq-hz76. You can change it below but be sure to remember it, it will be asked for future operations on databases." Below this, the form includes fields for Master Password (pre-filled with yzcg-vccq-hz76), Database Name, Email, Password, Phone number, Language (English (US)), Country, and Demo data (checkbox). At the bottom, there is a blue "Create database" button and a link "or restore a database".

Figure 4.5: Odoo database creation form

Figure 4.6 shows the Odoo database created.



Figure 4.6: The Odoo database

Figure 4.7 demonstrates the existence of the Odoo database in the PostgreSQL instance.

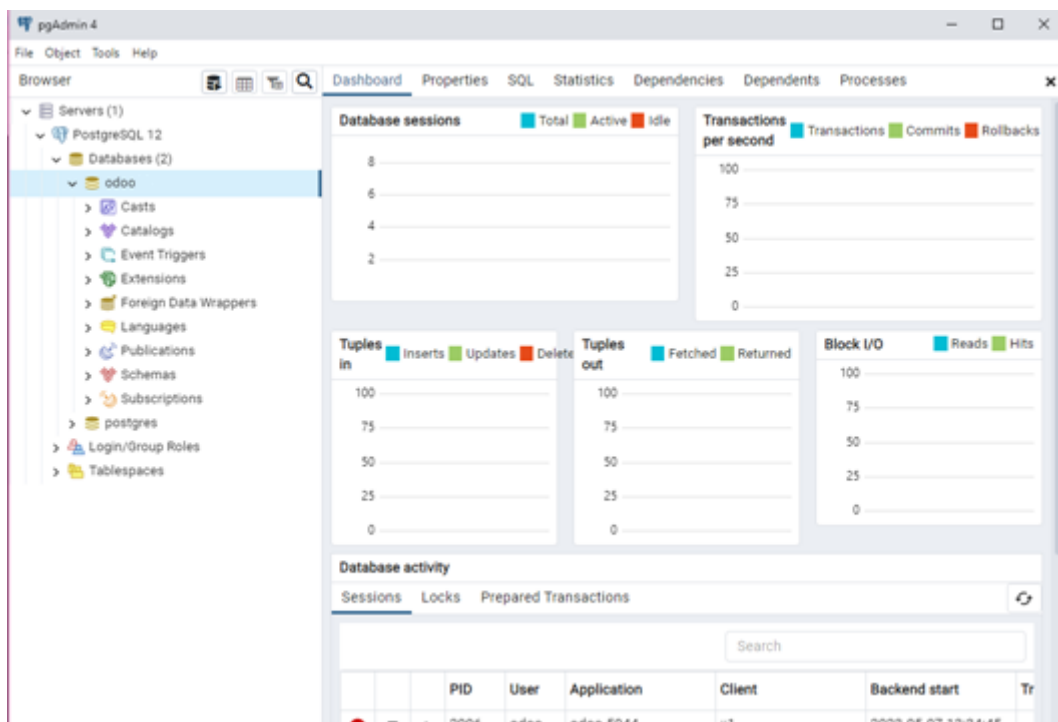


Figure 4.7: The existence of the Odoo database.

4.2. The different modules available in Odoo:

Odoo provides a variety of modules to automate and streamline business processes, allowing businesses to create custom solutions that fit their workflows and sector requirements.

Here are the various Odoo modules:

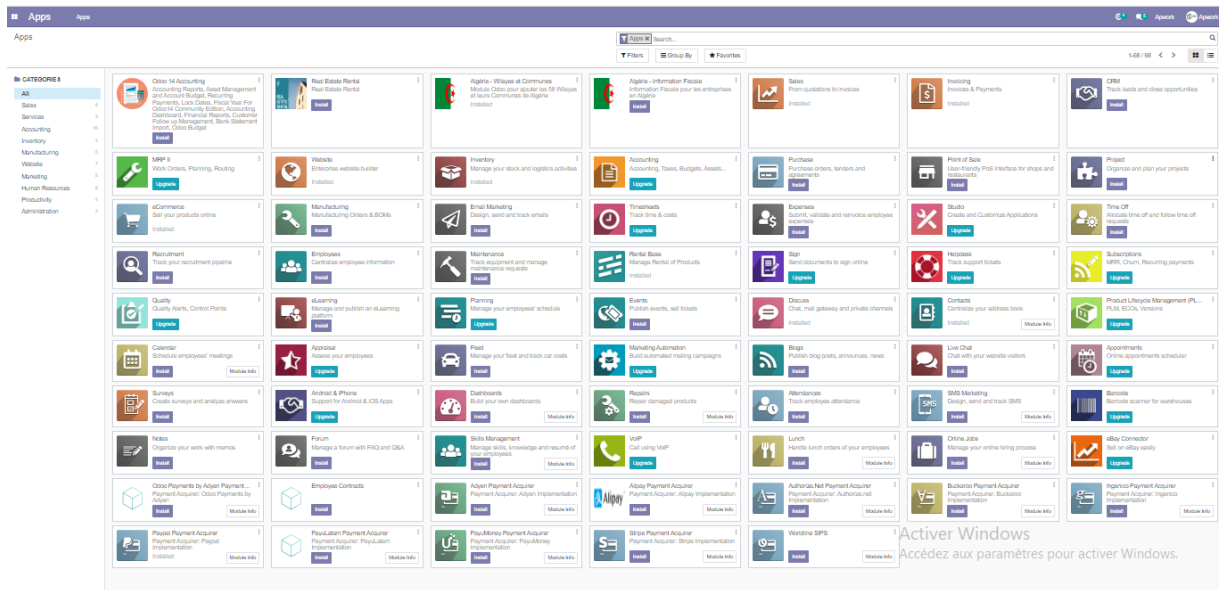


Figure 4.8: The different modules available in Odoo

Among these modules, I used the modules shown in the picture with the addition of the rentals module

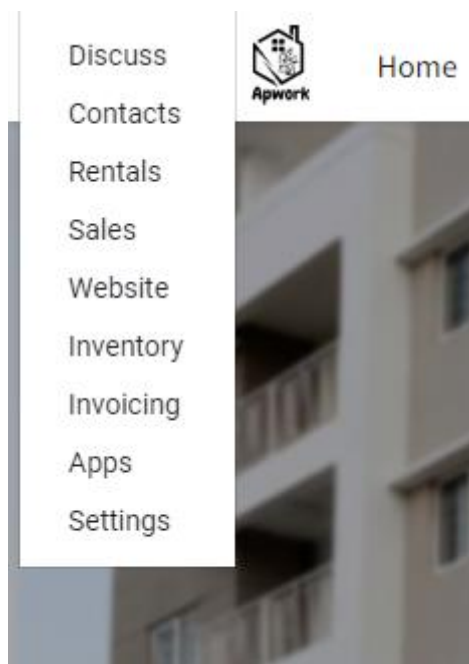


Figure 4.9: Used modules

5. Application graphic interfaces:

5.1. Authentication :

This is the first page that appears, allowing users to log in to the system.

Database

odoo Select

Email

admin

Password

.....

Log in

[Don't have an account?](#) [Reset Password](#)

Figure 4.10 : Authentication.

5.2. Home page :

The site offers an easy and pleasant user experience for apartment renters and skilled craftsmen. It also offers a large selection of available apartments and the search for skilled craftsmen in various fields. And also translation into three languages to facilitate the use of our site.

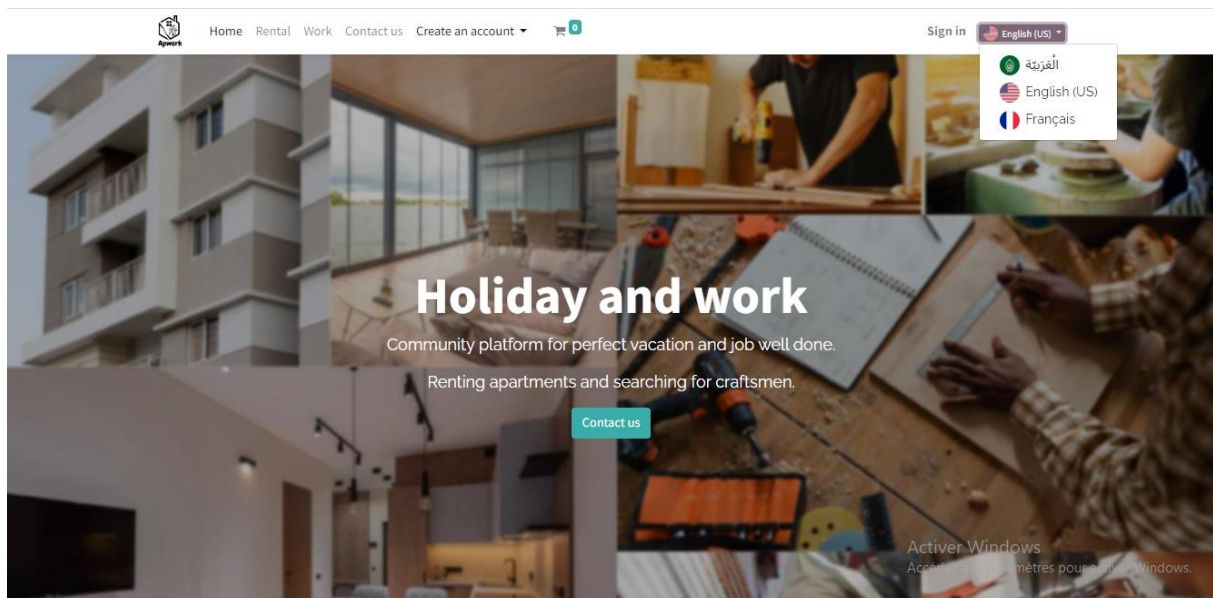


Figure 4.11: cover of website.

Here, we have explained our services to provide an overview to the visitor.

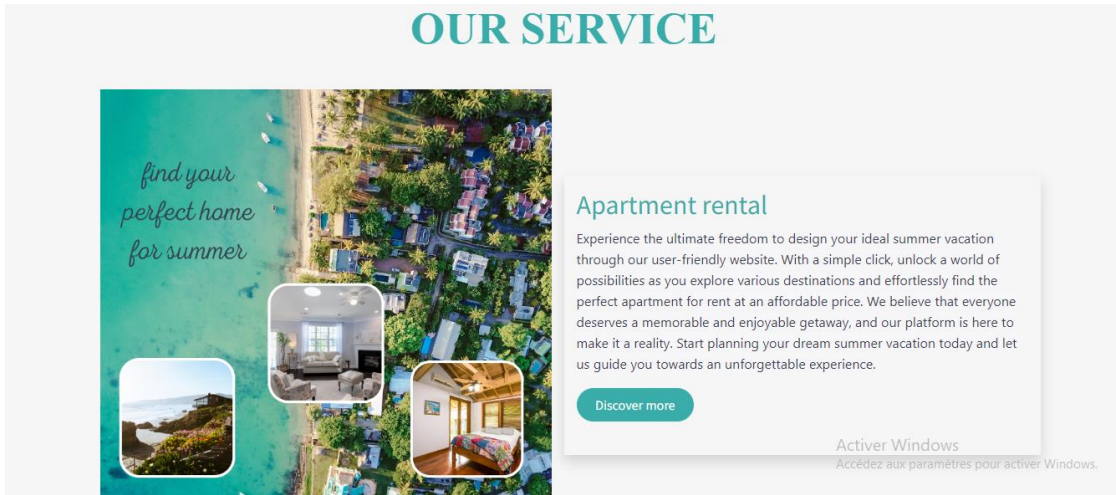


Figure 4.12: service of apartment rental.

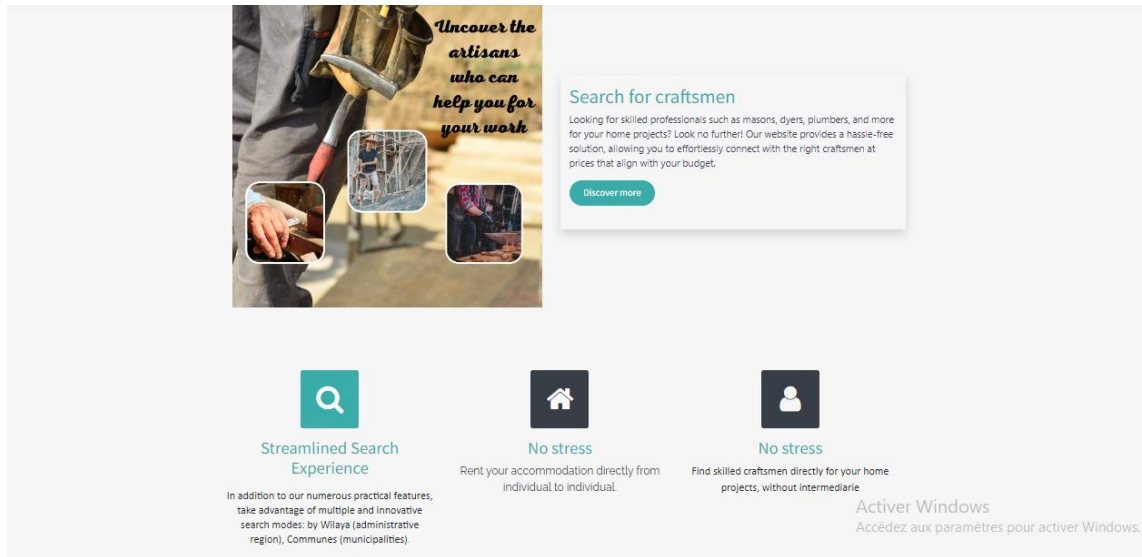


Figure 4.13: service of search for craftsmen.

Here we have explained the method of sending information to us:

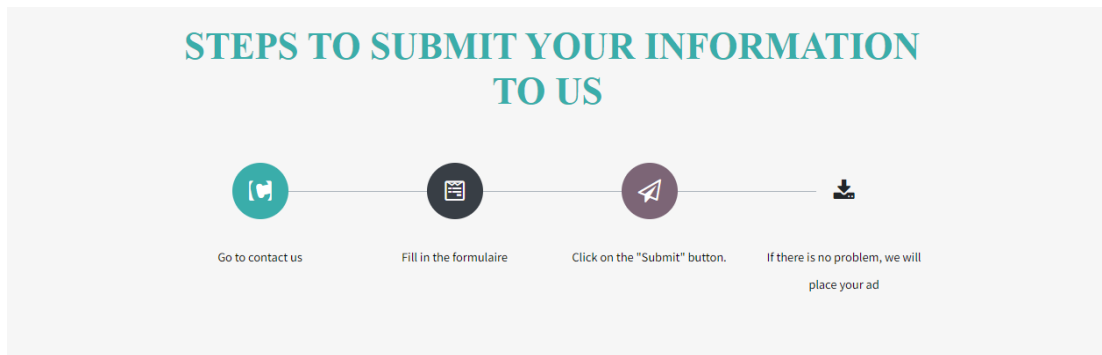


Figure 4.14: steps to submit the information.

Here are the opinions of our customers:

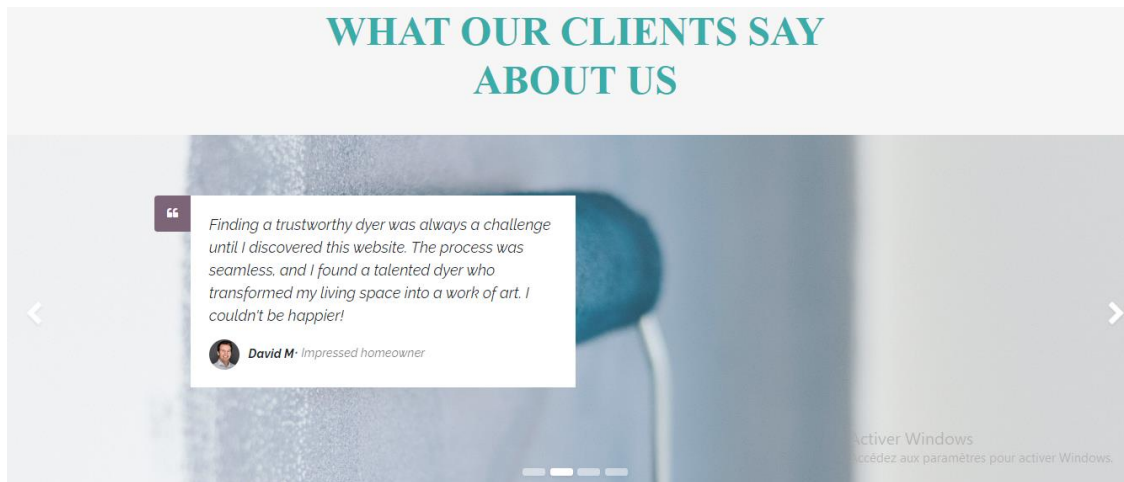


Figure 4.15: Feedback.

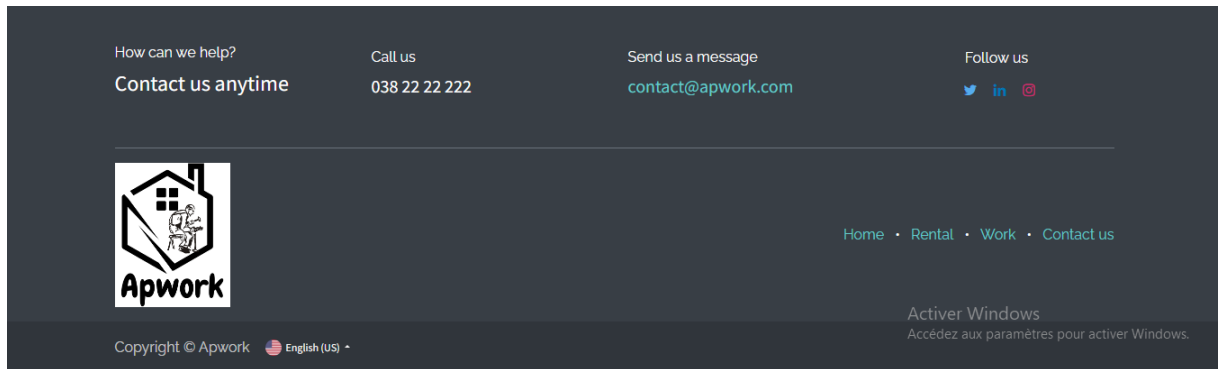


Figure 4.16: footer to our website.

5.3. Rental page:

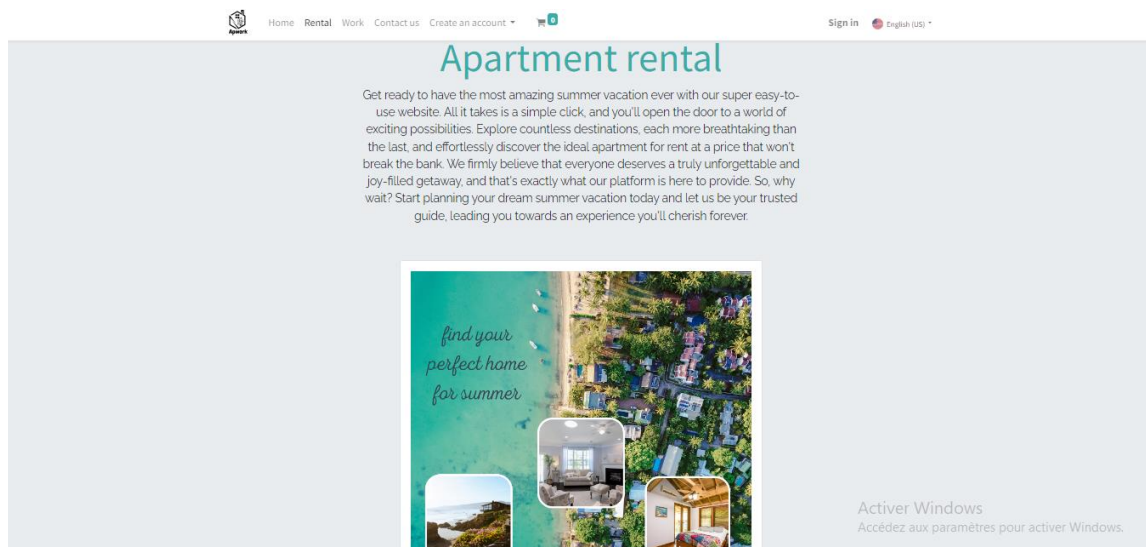


Figure 4.17: cover of rental page.

Here you will find a variety of houses and apartments offered for rent:

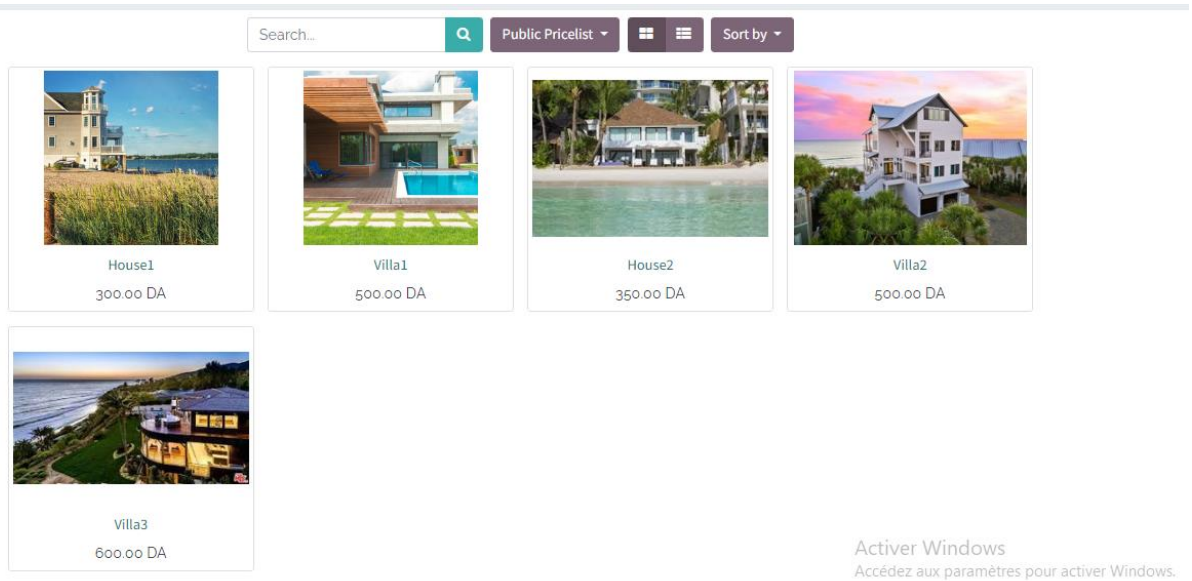


Figure 4.18: A selection of houses and apartments offered for rent.

When you click on a specific house, you will see information about this house:

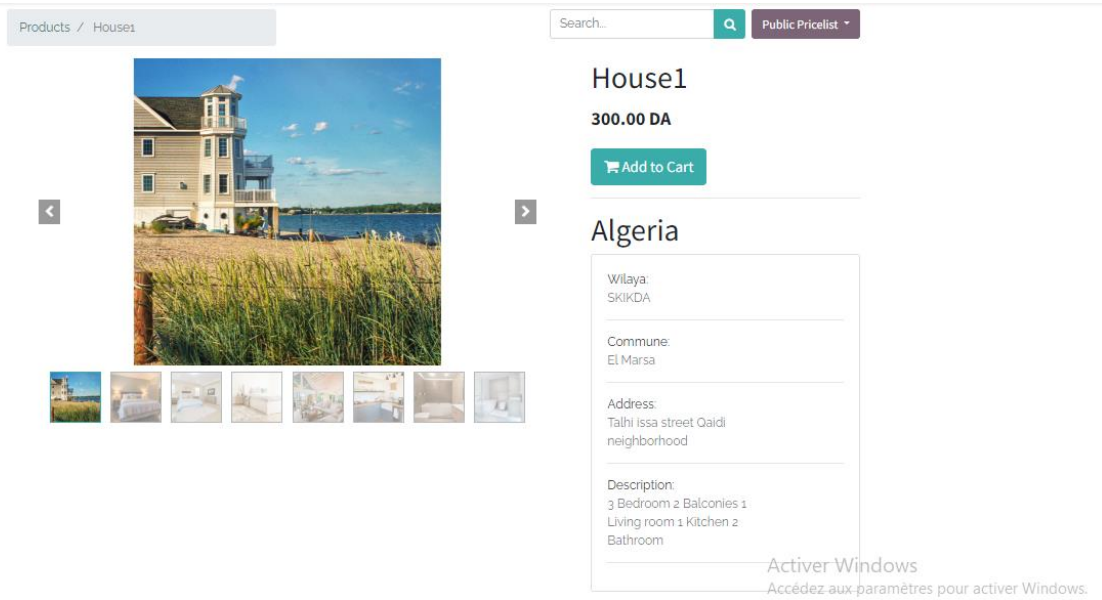


Figure 4.19: House information.

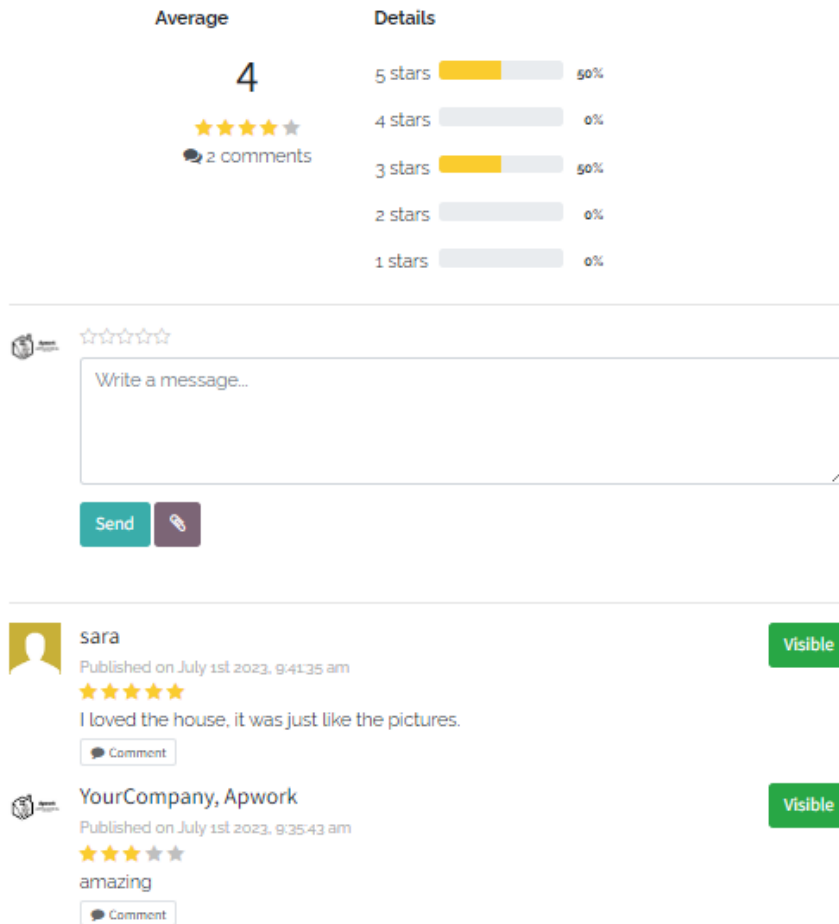


Figure 4.20: Customer voice: testimonials of satisfaction in the home World

When you click Add to cart, it will be transferred directly to the order:

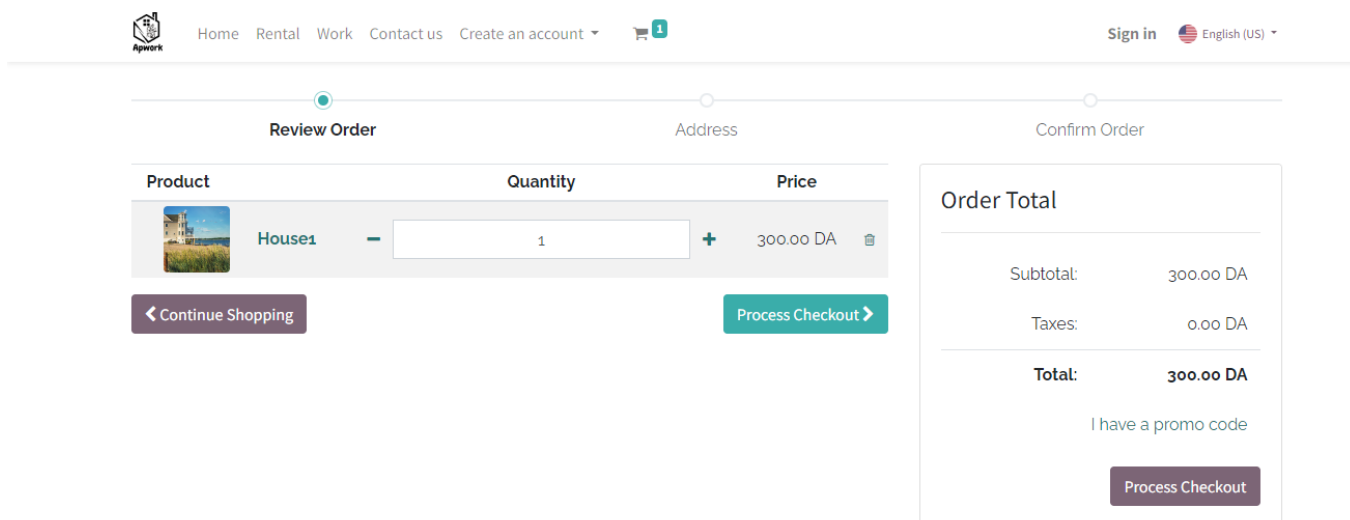


Figure 4.21: Seamless Checkout Experience

Upon confirmation of the order, you will be shown a form that you will fill in with your information:

Review Order Address Confirm Order

Your Address or [Log In](#)

Name

Email Phone

Company Name TIN / VAT

Street and Number

Street 2

City Zip Code

Country

Country_...

[Back](#) [Next](#)

Product	Quantity	Price
Houses	1.0	300.00 DA
Subtotal:		300.00 DA
Taxes:		0.00 DA
Total:		300.00 DA

Activer Windows
Accédez aux paramètres pour activer Windows.

Figure 4.22: Order Confirmation Form: Personal Information Submission

Review Order Address Confirm Order

Billing Address

apwork, rayan
talhi issa
quidi
el marsa 21 21000
Algeria

[Return to Cart](#) [Confirm](#)


Product	Quantity	Price
House1	1.0	300.00 DA
Subtotal:		300.00 DA
Taxes:		0.00 DA
Total:		300.00 DA

I have a promo code

Activer Windows
Accédez aux paramètres pour activer Windows.

Figure 4.23 : Editable Pre-Confirmation Information Format

After confirmation the request will be sent

Product	Quantity	Price
 House1	1.0	300.00 DA
Subtotal:		300.00 DA
Taxes:		0.00 DA
Total:		300.00 DA

I have a promo code

Figure 4.24: Request Confirmation Dispatch

Here in the backend, we will find the information you entered in the request, and we can create a rental agreement between you and the property owner.

From here we can make a rental quotations:

Product	Description	Start Date	End Date	Quantity	UoM	Unit Price	Taxes	Subtotal
Add a product Add a section Add a note								

Terms and conditions...

Untaxed Amount: 0.00
Taxes: 0.00
Total: 0.00

Figure 4.25: Rental Agreement Generation and Quotation Form

When clicked on send by email:

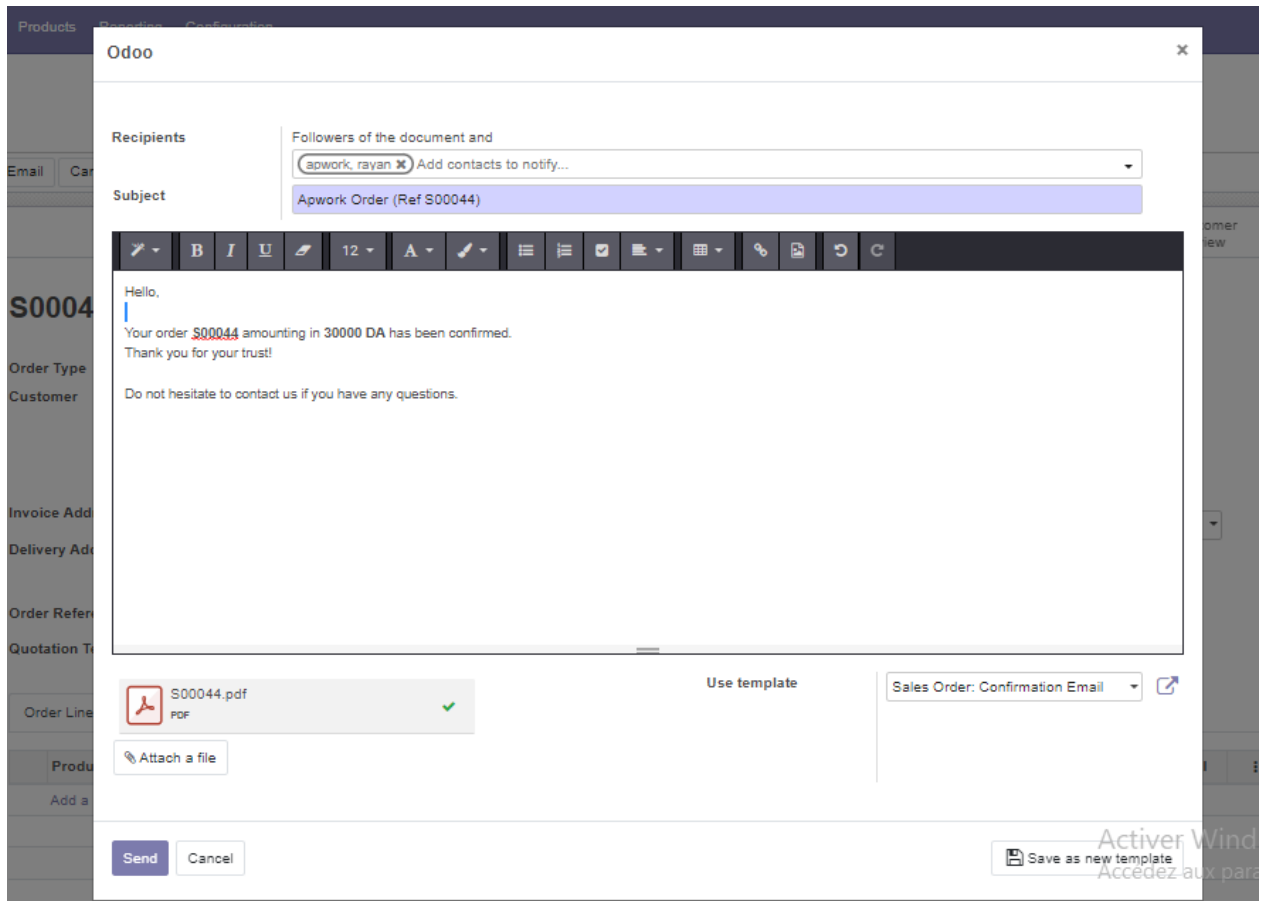


Figure 4.26: Email Delivery of Rental Agreement and Quotation

And this the resultat that is sent to tenant:



[Date]

[Landlord's Name]
[Landlord's Address]
[City, State, Zip Code]

[Tenant's Name]
[Tenant's Address]
[City, State, Zip Code]

Property Details:
Address: [Apartment Address]
Type: [Number of Bedrooms, Bathrooms]
Rent Amount: [Monthly Rent Amount]
Lease Term: [Start Date] to [End Date]

Terms of Tenancy:
The Tenant agrees to rent the above-mentioned property from the Landlord for the duration of the lease term specified above
Rent Payment: The Tenant shall pay the monthly rent on or before [Due Date] of each month
Security Deposit: The Tenant shall provide a security deposit of [Amount] upon signing this agreement, which will be returned .at the end of the tenancy, minus any deductions for damages
Utilities: The Tenant shall be responsible for the payment of utilities such as electricity, water, gas, and any other applicable charges unless stated otherwise

Maintenance and Repairs:
The Tenant shall promptly notify the Landlord of any repairs or maintenance required on the property
The Landlord shall be responsible for ensuring that the property is kept in a safe and habitable condition

Termination:
Either party may terminate this agreement with written notice of [Number of Days/Months] prior to the intended termination date
In the event of early termination by the Tenant, the Tenant shall be responsible for paying rent until a suitable replacement tenant is found or until the lease term expires, whichever comes first

Governing Law:
This agreement shall be governed and interpreted under the laws of [State/Algeria]

Entire Agreement:
This rental contract constitutes the entire agreement between the Landlord and the Tenant and supersedes any previous agreements or understandings, whether written or oral

Printed Name _____

Printed Name _____

Landlord's Signature

Tenant's Signature

Apwork
Talhi issa street
Qaidi neighborhood
EL Marsa 21

☎ 038 22 22 222
✉ contact@apwork.com
🌐 www.apwork.dz

Figure 4.27: Rental Agreement Contract Form

5.4. Work page :

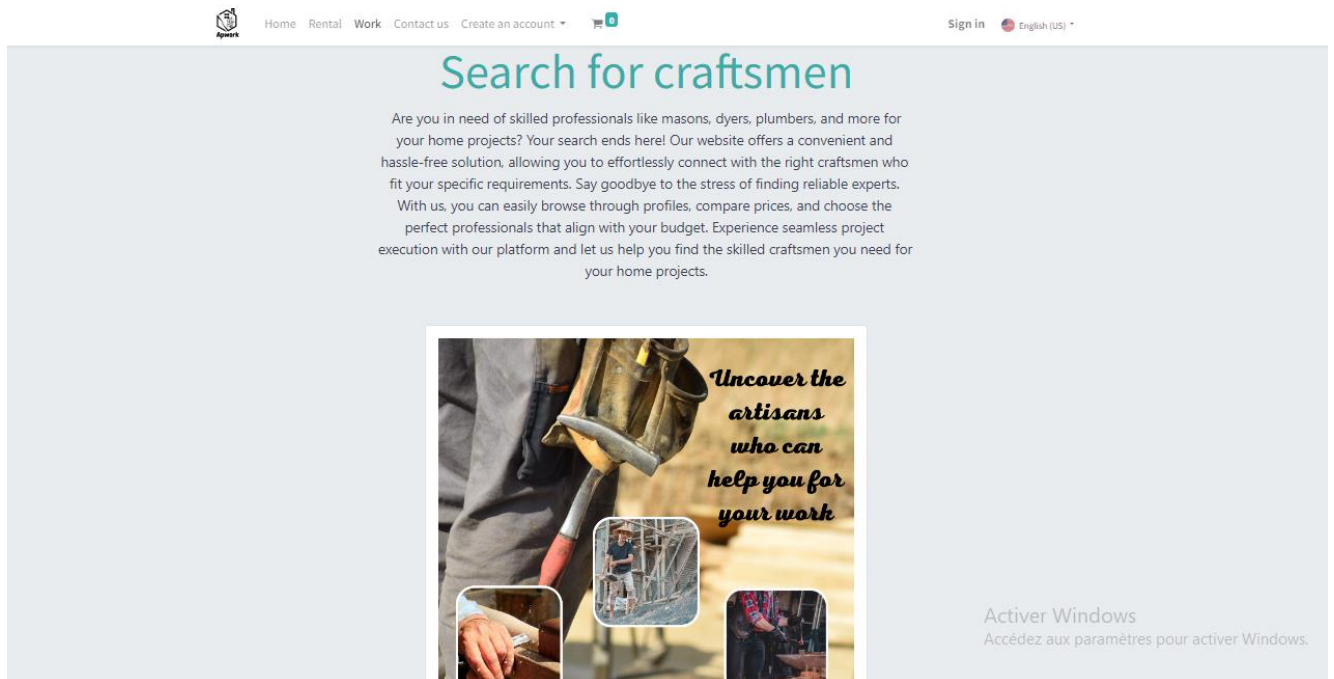


Figure 4.28: cover of work page.

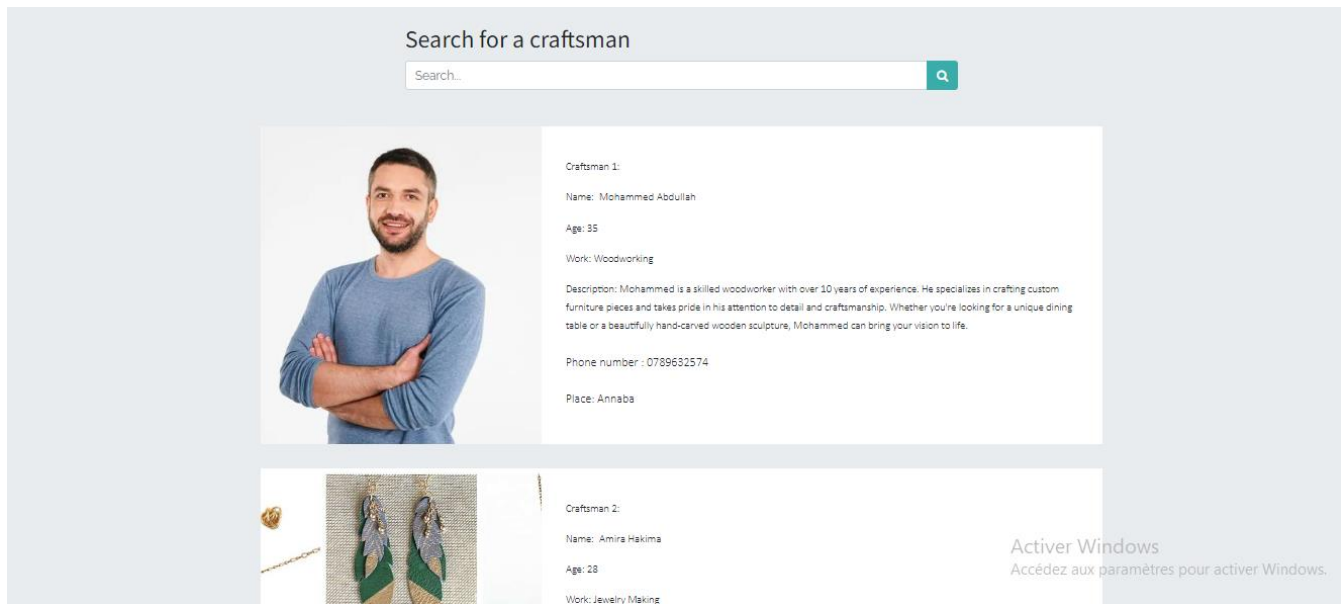


Figure 4.29: Craftsmen information.

5.5. Contact us page:

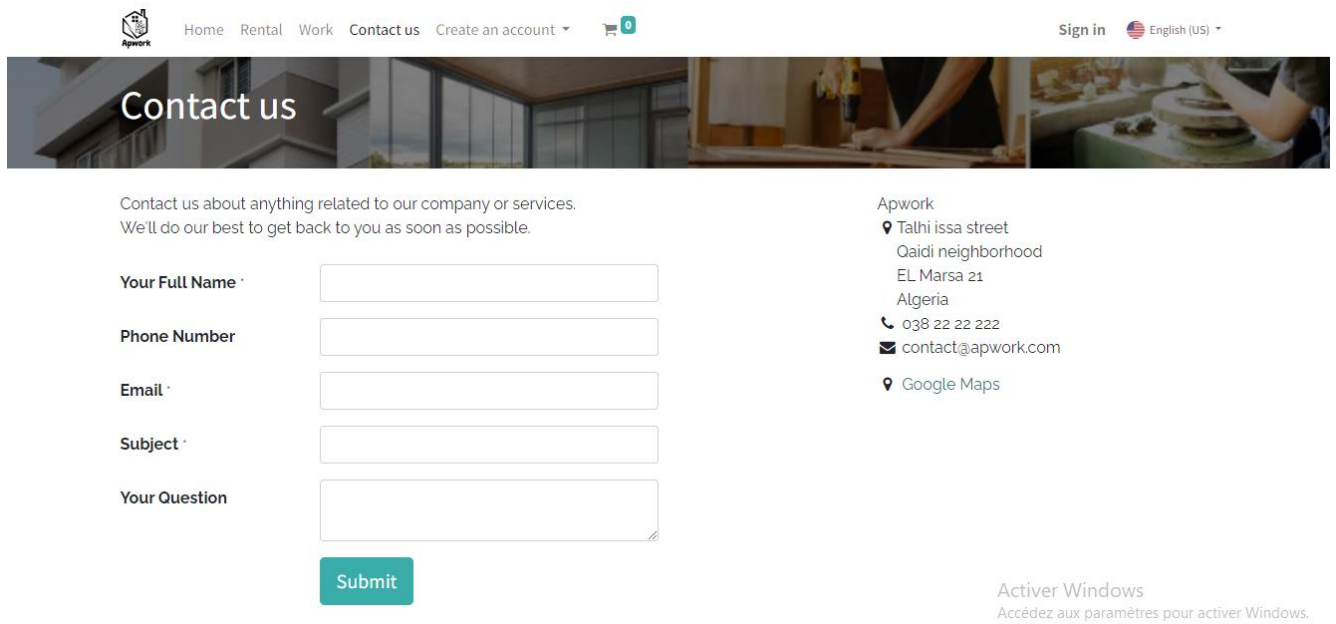


Figure 4.30: Contact us page

5.6. Back-end :

Configuration of the company profile:

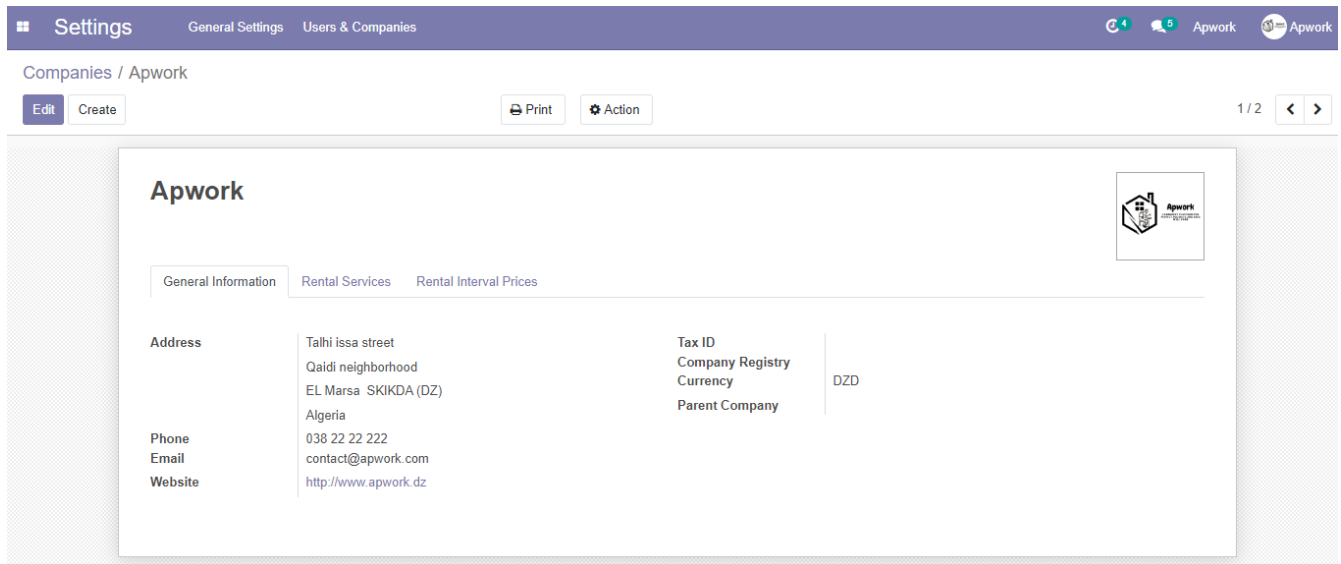


Figure 4.31: Company Profile Configuration

User management:

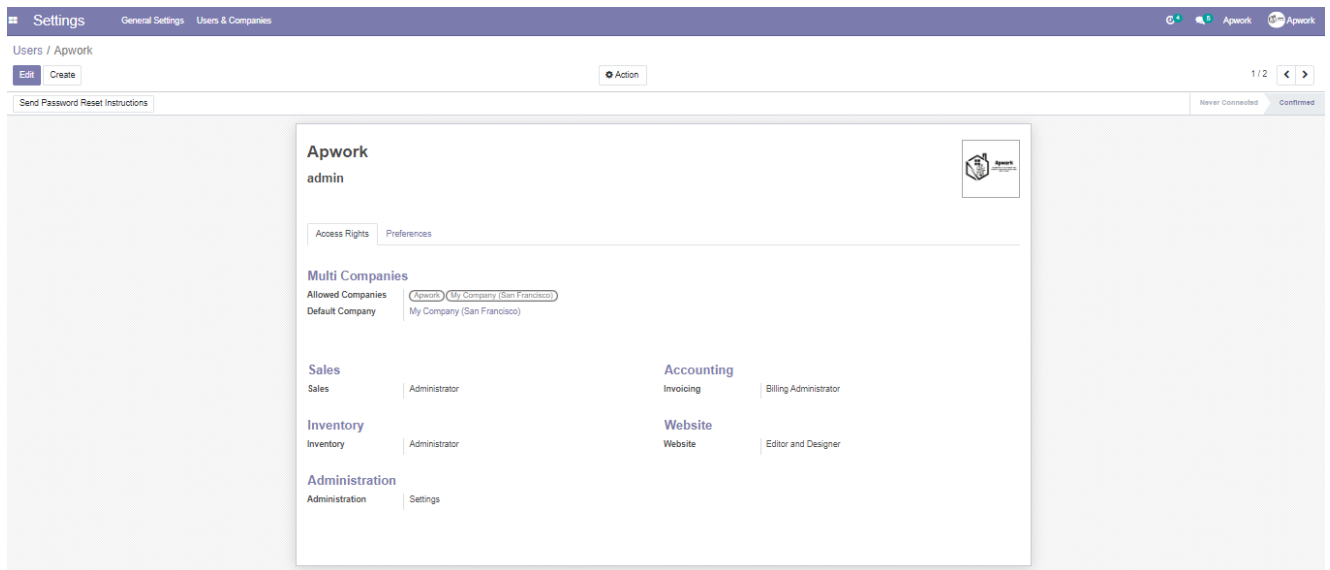


Figure 4.32: User Management System

Rentals module

Here we can add information about houses and apartments for rent:

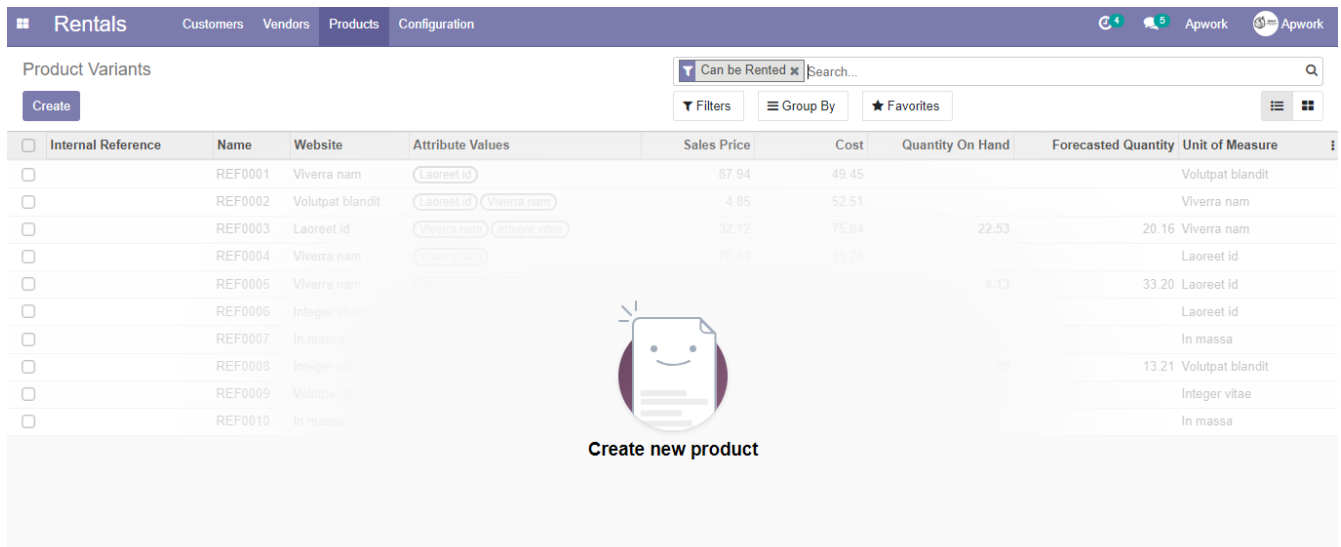


Figure 4.33: Property Listing Management

This is the model through which we can add a house or a new apartment for rent

The screenshot shows a web application interface for adding a property listing. At the top right, there are navigation links: 'Go to Website', '0.00 Units Sold', and 'Product Moves'. The main form is titled 'Product Name' and has a language selector 'EN'. Below the title, there are four checkboxes: 'Can be Sold' (checked), 'Can be Purchased' (unchecked), 'Can be Rent' (checked), and 'Is Peak?' (unchecked). A 'General Information' tab is selected, with other tabs for 'Sales', 'eCommerce', 'Inventory', and 'Rental'. The 'Product Type' is set to 'Consumable'. The 'Internal Reference' and 'Barcode' fields are empty. The 'Product Category' is set to 'All'. The 'Public Price' is 1.00 DA, and there is a link to 'Extra Prices'. The 'Customer Taxes' field is empty. The 'Cost' is 0.00 DA. The 'Company' field is empty. The 'Unit of Measure' and 'Purchase Unit of Measure' are both set to 'Units'. The 'Internal Notes' section contains a placeholder text: 'This note is only for internal purposes.' The 'Features' section includes fields for 'Building Unit Type', 'Local', 'Unit Status', 'Gross Area', 'Bedroom', 'Bathroom', 'Living room', and 'Kitchen'. The 'Adresse' section includes fields for 'Street...', 'Street 2...', 'City', 'State', 'ZIP', and 'Country'. The 'Media' section has an 'Add a Media' button.

Figure 4.34: Property Listing Addition Form

6. Conclusion:

In this chapter we have described the development environment, as well as the different IT tools and techniques that were used. We have presented the detailed implementation steps. We have also illustrated the various screenshots of our module and which presents part of the functionalities of the designed system.

General Conclusion

Using the UML modelling language and the Odoo system, the creation of a real estate rental website and the hunt for artisans represent a significant advancement for the real estate sector. The website's main objective is to make it possible for property owners to look for and rent properties while also locating trustworthy craftsmen for maintenance and repairs. The UML modelling language, which assisted in describing, visualising, and documenting the structure and design of a software system, served as a guide for the development of the website. The business processes involved in website development have also been managed by the open- source ERP system Odoo.

The project did not include creating a fully functional and scalable website that could be made available to the public; instead, the site's scope was restricted to the creation of a working prototype. Similar to that, the project didn't involve creating a mobile application for the website; instead, the emphasis was on creating a website that could be viewed on both desktop and mobile web browsers.

The site's development has been a huge success overall because it solves a major problem for the real estate sector. The platform offers landlords a complete solution for managing their rental property requirements and a dependable network of qualified tradespeople for repairs and maintenance. The Odoo system and the on-site UML modelling language offer a potent and scalable solution that can be developed and improved to meet industry requirements. Additionally, the platform is user-friendly, intuitive, and efficient for all of its users thanks to the website's user-centric design and development approach.

This capstone project demonstrated how the UML modelling language and the ODOO system could be used to create a website for finding craftsmen and renting out real estate. The project's functional prototype represents a significant advancement in addressing the challenges facing the real estate industry, and additional research and development could strengthen and expand the platform's capabilities. In the end, the creation of the website presents a fresh chance for tradespeople and real estate agents to communicate and collaborate, enhancing the effectiveness and efficiency of the rental housing market.

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