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## **INTERNSHIP REPORT**

### **CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL**

Internship carried out from 1<sup>st</sup> June to 30<sup>th</sup> September 2021

In view of obtaining a **Higher Technician Diploma (HTD)** in Computer Sciences

Option: **Software Engineering**

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**ACADEMIC YEAR 2020 - 2021**



# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



Submitted by BAYERE LINUS PHINEHAS SUH, Software Engineering Level II,  
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Excellence Academic Year 2020/2021



## **DEDICATION**

I DEDICATE THIS WORK TO MY  
LOVING MOTHER Mrs. BAYERE  
LINER LUM ATANGCHO

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The accomplishment of this great work would have not been possible without the important contributions of a good number of people who gave me a huge support either academically, professionally, financially or spiritually. I then direct my special thanks to;

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- **Mr. Jean Pierre Chouangue**, the CEO of Groupe SIA technologies for having welcome us and validated our application in his structure.
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- All those who contributed in the realization of this project in one way or the other.



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## **LIST OF ABBREVIATIONS**

CEO: Chief Executive Officer

MVC: Model View controller

SME: Small and medium size entreprises

SIA: System Informatique d'application

HTML: Hyper Text Markup Language

MERISE: Méthode d'Etude et de Réalisation Informatique pour les Systèmes d'Entreprise

UML: Unified Modeling Language

2TUP: Two Track Unified Process

MVC: Model View Controller

TS: TypeScript

PDM: Physical Data Model

SQL: Structure Query Language

DBMS: Database Management System

API: Application Programming Interface



## ABSTRACT

In the current scenario, there is a rat race in each professional field in Cameroon. It is also true for job market. A job portal is a website dedicated for online information about recruiters as well as job seekers. A job portal helps both the job seekers and recruiters finding the right organization for the employees. We found that Cameroon jobs seekers have a lot of difficulties to find jobs which are caused by: Inadequate information about job vacancies, Complex and boring job application process and the difficulty to search for jobs. Our main objective here was to find a way we could ease the process of job search and job application. So we came up with a solution called “**goJobs**” which is a web application which helps to solve the problems stated above. The analysis of this project was carried out with the help of the two track unified process (2TUP) which has a Y shape; two branches which are the functional branch and the technical branch and helps to separate the functional needs from the technical needs. The realization branch merges these two branches to complete the project realization. The 2TUP process was used alongside with UML (Unified modeling Language) used to visualize the design of the system. The web application was built with the help of technologies like Next js, node js, graphql, PostgreSQL and Chakra UI.

### Keywords

- Job portal
- goJobs
- 2TUP
- UML



## RESUME

Dans le scénario actuel, il y a une course folle dans chaque domaine professionnel au Cameroun. C'est aussi vrai pour le marché du travail. Un portail de l'emploi est un site Web dédié à l'information en ligne sur les recruteurs ainsi que sur les demandeurs d'emploi. Un portail de l'emploi aide à la fois les demandeurs d'emploi et les recruteurs à trouver la bonne organisation pour les employés. Nous avons constaté que les demandeurs d'emploi camerounais ont beaucoup de difficultés à trouver un emploi qui sont causées par : Une information adéquate sur les offres d'emploi, un processus de demande d'emploi complexe et ennuyeux et la difficulté de rechercher un emploi. Notre objectif principal ici était de trouver un moyen de faciliter le processus de recherche d'emploi et de demande d'emploi. Nous avons donc proposé une solution appelée « goJobs » qui est une application Web qui aide à résoudre les problèmes mentionnés ci-dessus. L'analyse de ce projet a été réalisée à l'aide du processus unifié à deux voies (2TUP) qui est en forme de Y ; deux branches qui sont la branche fonctionnelle et la branche technique et permet de séparer les besoins fonctionnels des besoins techniques. La branche de réalisation les fusionne en branches pour terminer la réalisation du projet. Le processus 2TUP a été utilisé avec UML (Unified modelling Language) utilisé pour visualiser la conception du système. L'application Web a été créée à l'aide de technologies telles que Next js, node js, graphql, PostgreSQL et Charkra UI.

### Mots clés

- Portail de l'emploi
- goJobs
- 2TUP
- UML



## GENERAL INTRODUCTION

The expansion of the digital economy creates many new economic opportunities. Digital data can be used for development purposes and for solving societal problems, including those related to the SMEs. It can thus help improve economic and social outcomes and be a force for innovation and productivity growth. Digitalization has also helped in the growth of businesses in at a global level since most businesses now are days are based on the digital world.

In Cameroon, SMEs make up 90% of businesses and contribute about 36% of the GDP. The job application process still depends extensively on handwritten applications and the in-person deposit. It is for this purpose that an idea came up in mind for the development of a “**Online Job portal**” to help employers find potential workers easily by posting their job vacancies online and help job seekers easily search and apply for jobs.

This report is divided into five phases on which careful work was done to make this project a success. The phases are as follows:

1. **Specification book:** which identifies the needs of the users of the system to be realized and points out the different constraints and requirements of this system.
2. **The analysis phase,** during which the chosen analysis method is presented and the first modelling diagrams of the system to be realized are presented.
3. **The conception phase,** during which the analysed system is studied in detail to bring out its real-world constituents.
4. **The realization phase,** during which the analysed and conceived system is implemented and made available for the users.
5. **Installation and user guide,** which instructs the user on how to install and use the developed system.



## PART 1: INSERTION PHASE

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## Preamble

The insertion report presents the different steps that permitted us to successfully integrate the company, its working environment and functioning. It equally presents a brief description of the company and the theme that was given to us.

## CONTENT

### INTRODUCTION

- I- WELCOMING AND INTEGRATION**
- II- GENERAL PRESENTATION OF  
GROUPE SIA**
- III- PRESENTATION OF THE  
ADMINISTRATIVE AND FUNCTIONAL  
ORGANISATION OF GROUPE SIA**
- IV- ORGANISATIONAL CHART OF  
GROUPE SIA**
- V- HARDWARE AND SOFTWARE  
RESOURCES**
- VI- BRIEF PRESENTATION OF PROJECT  
CONCLUSION**

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## INTRODUCTION

This part that serves as the insertion report is a support containing all the information on the first two weeks spent within Groupe SIA. Groupe SIA is an engineering and integration company of information systems for businesses. For twenty years, he has been developing a sharp and multifaceted expertise: the study and deployment of complex integration projects, the administration of n-tier architectures, the development of specialized applications, training and reinforcement of customer capabilities. GROUP SIA is part of the ecosystem of major software integrators of management software vendors worldwide, with a high level of certification that is constantly updated. As such, the GROUP SIA is a competence center for SAGE France publishers, an approved Tom@te and Odoo partner. This document reviews the reception and integration into the structure as well as the presentation of the company.



### WELCOMING AND INTEGRATION

Tuesday 1<sup>st</sup> June 2021 at 8:00 am marked my entry to Groupe SIA. We were warmly welcomed by the company staff. Introduction among interns was done and it was a nice experience to meet aspiring software engineers from different schools. The presentation of the company was conducted by a staff. During this period of insertion in the company, professional supervisors were assigned to every intern and an introduction to the company's working style was presented to us which was that of working in person and working remotely.

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## 1.1 GENERAL PRESENTATION OF SIA TECHNOLOGIES

### 1.1.1 HISTORY OF GROUPE SIA

Groupe SIA was created M. Jean Pierre Chouangue in the year 1999 in the field of software engineering at Elig-Sonno when he signed the partnership with Sage France, Tom@te and AKANEA to help other enterprises improve on their ERP (enterprise resource planning). His aim was to bring an innovation in the management of enterprises and to ease the management of other enterprises. They became internationally known in the year 2001 when they were called in the national assembly to effectuate their first mission which was to manage their finances and their accounting.

### 1.1.2 MISSION

Expertise / Experience combined with the service of their customers

The satisfaction of their customers

The culture of service

Advice / local support.

### 1.1.3 ACTIVITIES

Groupe SIA has as activities:

- The study and deployment of complex integration projects,
- The administration of n-tier architectures,
- The development of specialized applications,
- Training and reinforcement of customer capabilities

## 1.1.4 GEOGRAPHICAL LOCATION OF GROUPE SIA

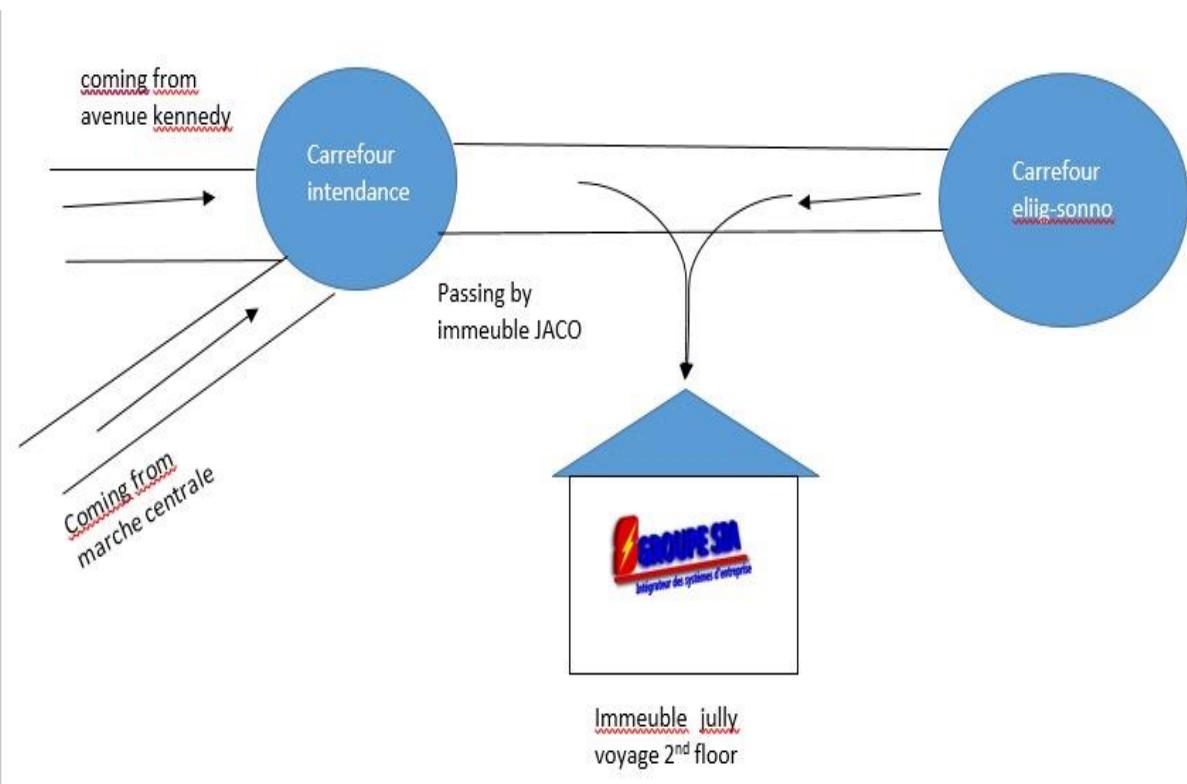


Figure 1: Geographical location of GROUPE SIA

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## 1.2 PRESENTATION OF ADMINISTRATIVE AND FUNCTIONAL ORGANISATION

Groupe SIA (Société Informatique d'application) technologies is composed of 3 different departments namely.

- The commercial department
- The Technical department
- The Accounting department

## 1.3 ORGANISATIONAL CHART OF GROUPE SIA

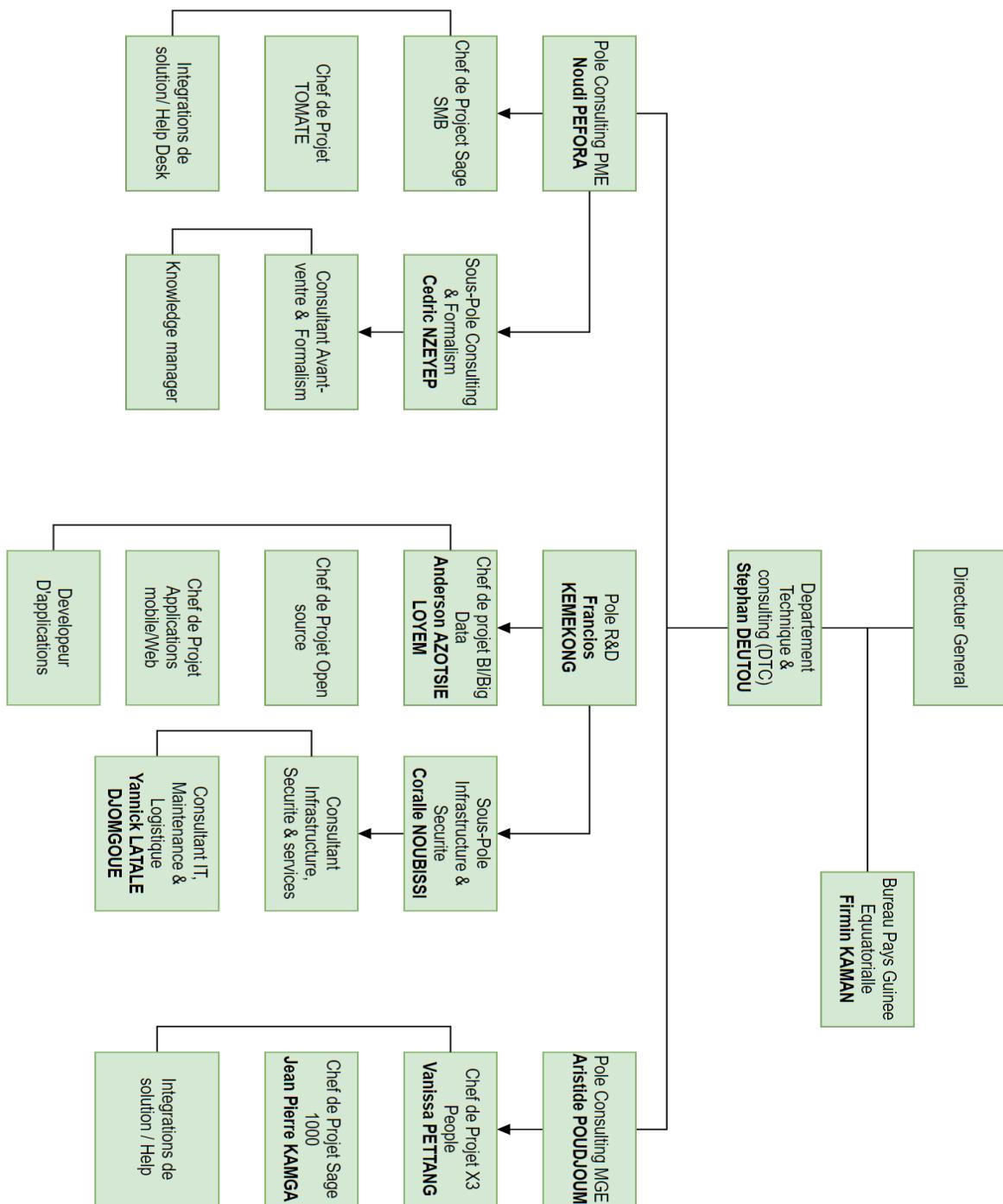


Figure 2: Administrative and Functional organisation

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## 1.4 HARDWARE AND SOFTWARE RESOURCES

Resources are the tools used by GROUPE SIA to accomplish its day-to-day tasks. These resources are either hardware or software. Hardware resources are the tangible materials that we can see and touch whereas software resources are the applications that we can see but not touch. Below are some of GROUPE SIA's resources:

### a. Hardware Resources:

Table 1: Hardware resources

N°	Designation	Quantity	Characteristics	Observations
1	Lenovo B50, core i7	1	8Go/1To/WIN10/ 64bits	Good
2	DELL E430, CORE i5	1	8 Go/1To/WIN 8/64bits	Good
3	DELL Pentium	1	4Go/500Go/Win 7 PRO SP1	Excellent
4	MSI NVIDIA, CORE i5	1	8Go/256Go SSD/1To HDD / WIN10 / 64bits	Good
5	MSI NVIDIA, CORE i7	1	12Go/1To/WIN 10/ 64 bit	Excellent
6	Application and Data server	1	14 Go/3To/ Win server 2012 /64 bit	Good
7	Dell INC Test server Wortman	1	8Go/250 Go / SP1 core I5	Good



## b. Characteristics of peripherals

Table 2: Characteristic Peripherals

N°	Designation	Quantity	Characteristics	Observations
1	PRINTER	2	RICOH Aficio 430 DN couleurs - HP Laser Jet Pro 400 M 401 DN noir sur blanc.	Average
2	SCANNER	1	HP color Laser Jet CM 1312 MFP	Good
3	PHOTOCOPIER	2	Ricoh Aficio MP 3350 - Rex.Rotary MP 3010	Very Good
4	ROUTER	1	cisco 2800	Excellent
5	SWITCH	2	CNet Power Switch CNSH-1600 - Catalyst 2950 series	Good
6	CAMTEL	2	CREOLINK arrow fibre - CAMTEL ADSL Huawei	Excellent
7	Inverter	5	Mercury 2000 VA – APC 650 VA – UPS 650 VA - TECH-COM 650 VA	Good
8	Current Regulator	2	Light Wave 5000 VA – Light Wave 3000 VA	

## c. Software Resources

Table 3: Software resources

N°	Designation	Quantity	Characteristics	Observations
1	Windows 7	3	Professional	Good
2	Windows 8	2	Professional	Good
3	Windows server 2012	11	R2 Datacenter 64 bits	Good
4	Suites Offices	1	2010 - 2013 - 2016	Good
5	Nitro	14	professional	Good

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



6	Browsers	16	Opéra mini V .5 - Internet explorer V.11 Google chrome V. 72.0 Mozilla Firefox V. 65	Good
7	Sage Entreprise - comptabilité	2	i7 pack+ pour SQL server Version 8.50	Good
8	Sage Entreprise – GESCOM	7	i7 pack+ pour SQL server Version 8.50	Good
9	Sage Paie RH 100 cloud V1	1	1 cloud & RH Premium version 1	

Nº	Designation	Quantity	Observations
1	Engineers in programming Sage, Tom@te, Akanea applications	3	Good
2	Engineers specialized in implementation and maintenance of Sage, Tom@te, Akanea applications	2	Excellent
3	Technicians specialized in perfecting the software, electronics and network of Groupe SIA	8	Excellent
4	Commercial and financial engineers specialized as consultants in the pre-sales of Sage Applications	5	Excellent

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## 1.5 BRIEF PRESENTATION OF PROJECT

By the end of the first two weeks at Groupe SIA I was able to get an idea for the topic “**THE CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL**”. A job portal, also known as a career portal, is a modern name for an online job board that helps applicants find jobs and aids employers in their quest to locate ideal candidates. This project is to conceive a web application which will permit job seekers to register, search jobs and apply for jobs, and will also permit an employer to register, search jobs, post jobs and manage applicants. It will help job seekers to get a centralized place online where they can search for jobs wherever they are found and help employers with vacant positions in their enterprises to post jobs certainly get the right employee.



### CONCLUSION

By the end of the insertion period at GROUPE SIA, I had a big picture of the structure, functioning and the organization of the company. I was also assigned a professional supervisor who forced me to work by giving a series of challenging tasks. This contributed to the completion of my project on time.



## PART 2: SPECIFICATION BOOK

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## Preamble:

The specification book is a document which presents a referential study; it sets the goals to be attained and outlines the overall process that transforms the primary user's functional requirements to a structural, analytic, and durable development of the results awaited. The specification book of a project gives the basis of what any developer will need for its realization.

## CONTENT

### INTRODUCTION

- I- CONTEXT AND PROBLEMATIC**
- OBJECTIVES OF THE PROJECT**
- II- EXPRESSION OF NEEDS**
- ESTIMATION AND COST**
- III- PROJECT PLANNING**
- DELIVERABLES**
- CONCLUSION**



## INTRODUCTION

To realize our project “**the conception and realization of an online job portal**” with utmost efficiency, it is important to realize a specification book. This is because it is in the specification book that we explain the services our software will provide and the constraints under which it will be submitted. In addition, it contains important information such as the project objectives, analysis of needs, cost, duration, and resources needed for the system’s realization and last but not the least, the planning of our project.



## 2.1 CONTEXT AND PROBLEMATIC

### 2.1.1 CONTEXT

The growth of Cameroon's economy is highly influenced by the creation of SMEs. SMEs play an important role in the eradication of poverty in our country which is one of the key visions of the Cameroon 2035 development plan. These enterprises face a lot of problems of which getting the right employees is among also job seekers have difficulty of knowing about these companies' vacancies. These problems are caused because of.

- Inadequate information about job vacancies: In Cameroon, most job vacancies are known through family relatives, social media, and few online job portals, which limits the number of people who may apply for the job.
- Difficulty in applying for jobs: Apart from some few companies who accept job applications through emails, most job applications in Cameroon are still done the traditional way which is by submitting handwritten applications attached to it a bunch of files like your resume, cv and photocopy of your identification card.
- Difficulty to search for jobs: Other than finding jobs on social media, and just browsing the web for vacant positions, most job searches in Cameroon are still done by walking on the street reading adverts about job vacancies.

### 2.1.2 PROBLEMATIC

One of the major problems is inadequate information. Information is key, if people are not informed about job vacancies, one will never be able to apply.

## 2.2 OBJECTIVES OF THE PROJECT

### 2.2.1 General objectives

The main objective of this project is to create and easy to use and well design web application facilitating both the Cameroonian candidates who are seeking jobs and the employers looking for employees for their companies.



## **2.2.2 Specific Objectives**

For the main objective of this project to be achieved, specific points must be stated to ensure that the problem is solved at the completion of the project. The platform will perform the following functionalities:

- Authentication system for employers (job providers)
- Authentication system for the job seekers
- Manage jobs and applicants.
- Add, update, delete and search jobs by the employer.
- Employer should be able to update the status of an applicant (job seeker)
- Contact applicant through a chat system
- Job seekers should be able to search jobs-based job title and location.
- Ability to delete their accounts.
- Create and update profile (employer and job seeker)



## **2.3 EXPRESSION OF NEEDS**

### **2.3.1 Functional needs**

The functional needs express the actions that must be realized by the application. The computerized management of the entry, exit and manipulation of the platform should permit:

#### **a. Job Provider**

- Register and login.
- Manage job category.
- Manage jobs.
- Manage applicants.
- View applicants' profile.
- Update profile

#### **b. Job seeker**

- Login and register
- Create/Update profile
- Search jobs on criteria
- Delete account.
- View available jobs.

#### **c. System Admin**

- Login
- Create/update Profile
- Manage accounts
- Update membership subscriptions

### **2.3.2 Non-functional needs**

The non-functional needs essentially specify how the system should behave and that it is a constraint upon the systems behaviour. They could be thought of as quality attributes of the system.

#### **a. Performance Requirement**

The system must perform what every user expects with no delay. Every action response of the system such as opening windows forms, displaying error messages and saving the forms or session should be fluent. A machine with a core i3 and a ram of 4Gb will be necessary for the good functioning of the system.

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## b. Software requirement specification

- Security: Users will be restricted to access some pages if they do not have the required privileges. This will be done by verifying the user authorization before granting access.

## c. Software Quality Attributes

- Availability: software is available globally to any person who has an internet connection.
- Usability: An easy-to-use software with a friendly user interface for its users.

## 2.3.3 Estimated cost.

It is of great need to specify the cost of the project, which is the total sum of all resources used to make this project come to existence. The cost of the resources is stated as follows:

### 2.3.3.1 Human Resources

*Price sources: Mercurial 2020, Microsoft.com*

Table 4: Human Resources

Resource type	Cost/ FCFA
<b>Analyst</b>	150,000
<b>Programmer</b>	150,000
<b>Total</b>	300,000

### 2.3.3.2 Material Resources

#### d. Software Resources

Table 5: Software Resources

Software	Function	Cost/ FCFA
<b>Windows 10 pro</b>	Operating System	112,000
<b>Visual Studio code</b>	IDE (integrated development environment)	Free
<b>Creatly</b>	UML diagramming tool	Free
<b>DBeaver</b>	SQL client software	Free
<b>Total</b>		112,000

#### e. Hardware Resources

Table 6: Hardware Resources

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Hardware	Quantity	Cost/ FCFA
Surface laptop 2 pc	1	500,000
Modem	1	15,000
<b>Total</b>		<b>515,000</b>

Total cost of Project = 300,000 + 112,000 + 515,000 = **927,000 FCFA**

## 2.4 Project Planning

This section gives and overview of the main actors of the project, their tasks, and the progress of every activity in the project from beginning to the end.

### 2.4.1.1 Actors of project

Table 7: Actors of the project

Actor	Task	Role
<b>Bayere Linus Phinehas Suh</b>	Analyst, Developer, and project head	2 <sup>nd</sup> year software engineering student at AICs Cameroon
		Professional Supervisor
<b>Mr. Agbor Anderson</b>	Teacher at AICs Cameroon	Academic Supervisor

### 2.4.1.2 Activity Chronology

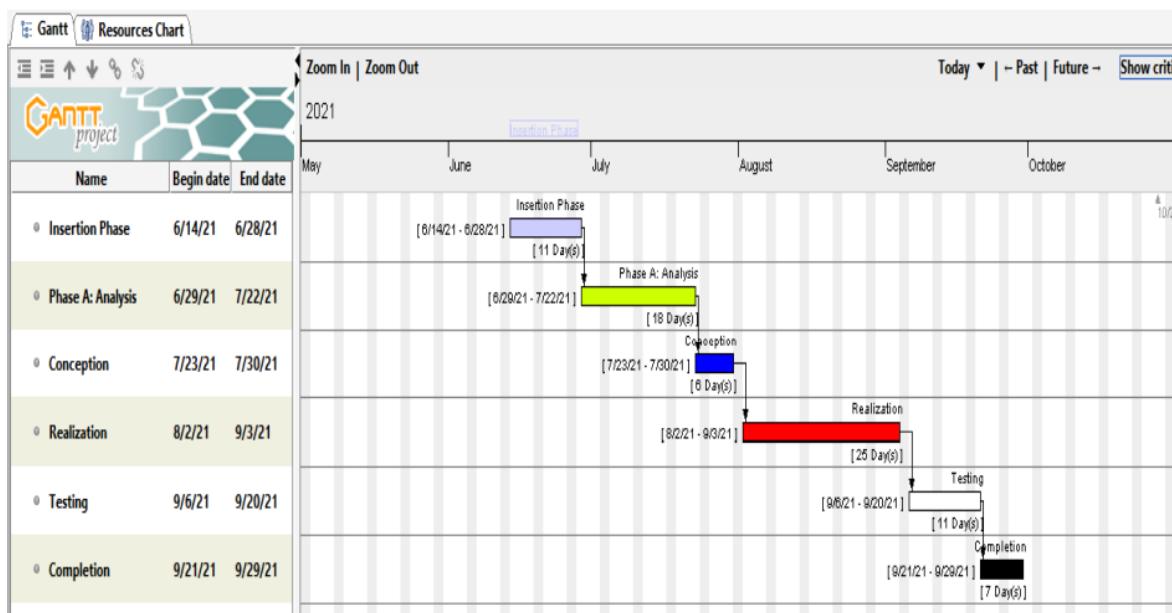


Figure 3: The GANTT Diagram of the project

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## 2.5 Deliverables

Once our objective is attained, the following result or output will be available:

- A complete report document containing the following component:
  - o An insertion phase.
  - o A specification book.
  - o Analysis document.
  - o A conception document.
  - o A user guides.
- A CD-ROM containing
  - o The better copy the project application
  - o Soft copy of project
  - o The copy of the report database
  - o Installation guide



## **CONCLUSION**

At the end of this document, we have a guide that permits to put boundaries to all functionalities of our application. In other words, we successfully identified all the needs of the customer, the resources necessary to realize the application, the cost, and the dateline to deliver the software. Now, we can proceed to the next phase, the analysis phase.



## PART 3: ANALYSIS PHASE

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## Preamble

The analysis documentation which appears following the specification book, allows us to present a detailed analysis of the problem and solution, the chosen analysis method and the reasons that motivated this choice. To achieve this, we will use UML2.5 (Unified Modelling Language) with 2TUP (2 Track Unified Process) as method applied to UML to analyses the system.

## CONTENT

- I- INTRODUCTION**
- II- STUDY OF THE EXISTING SYSTEM**
- III- LIMITS OF THE EXISTING SYSTEM**
- IV- PROPOSED SOLUTION**
- V- CRITICS, CONSEQUENCES AND THE PROPOSED SOLUTION OF THE EXISTING SYSTEM**
- VI- PRESENTATION OF ANALYSIS METHOD**
- VII- RISK ANALYSIS AND SOLUTION**
- VIII- MODELING OF PROPOSED SOLUTION**
- IX- CONCLUSION**

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## INTRODUCTION

The search of jobs and the search workers is a major problem in our economy now a days since most companies want to recruit people who will occupy the vacant position in their organization and help the company meet their growth objective. Also, most jobs searches in Cameroon are being done by mouth to mouth, through handwritten applications and most people are informed about job opportunities through social media sites like Facebook, WhatsApp Groups, and some websites which are not well structured. This section presents to us a detail study of existing online job portal systems, their functioning, and we will continue by stating out the problems faced by these systems and lastly describe the proposed solution.



## 3.1 STUDY OF THE EXISTING SYSTEM

### 3.1.1 Delimitation of the field of study

Building an online portal can be made so complex and huge. This project will implement specific features such as:

- Employers able to post, edit, delete jobs
- Employers manage applicants of a particular job
- Employer and applicant can communicate through a messaging system
- Job seeker can search and apply for a job
- Job seeker can create a personalized profile

### 3.1.2 Presentation of existing system

The process of the existing system can be briefly explained in the steps below for quick understanding

#### a. Jobs seekers

- Job seekers are informed of job opportunities through family relatives, friends, social media, announcements on the street, through some job portal sites like LinkedIn and akwajobs.
- To apply for a job, the job seeker will have to write a handwritten application, attached with your CV, photocopy of national Identification card, certificates and other necessary documents.
- Job seeker leaves from wherever he is to go and transports himself to go and deposit the job application.

#### b. Employers

- The employers collect the jobs seekers files and store in a cupboard where other application files are stored and will review later
- Employer searches for the files when he must review and read through them.
- Employer calls the job seeker for an interview if he is interested by his resume.
- Employer hires job seeker if interview is passed and they have a good salary negotiation



### 3.2 Limitations of the existing system

Table 8: Limitations of the existing system

Limitation	Consequences	Proposed solution
<b>Limited information about job offers</b>	The jobs seeker is limited about the job offers which are available.	Our application will permit employers to post jobs wherever they are and will enable job seekers have more job openings from many employers.
<b>Difficulty in applying for jobs</b>	<ul style="list-style-type: none"><li>- Handwritten application turns out to be difficult if you must do same for many jobs offers.</li><li>- Movement from long distances to drop application is very tiring discouraging.</li></ul>	Our application will permit you to search jobs easily based on the title and location. Also, job application will be done by a few clicks of a button.
<b>Difficulties to store and search hard-copy files</b>	<ul style="list-style-type: none"><li>- Most applications mix up or get lost because it is difficult to be organized with a huge pile of files.</li></ul>	In our application, we use a relational database which will help in the long-term storage and the organization of data in a way which be easy to search and to store data



### 3.3 PRESENTATION OF ANALYSIS METHOD

#### 3.3.1 Example of some analysis method

##### a. MERISE

MERISE means **Méthode d'Etude et de Réalisation Informatique pour les Systèmes d'Entreprise**. It is a method of designing, developing, and carrying out IT projects. The MERISE method is based on the separation of data and treatments to be performed into several conceptual and physical models. The separation of data and treatments ensures longevity to the model. Indeed, the layout of the data does not have to be often overhauled, while the treatments are more frequently. The two main companies that developed this method are the CTI (Technical Center of Computer Science) responsible for managing the project, and the CETE (Center for Technical Studies of Equipment) located in Aix-en-Provence.

##### b. SCRUM

SCRUM is a lightweight agile project management framework with broad applicability for managing and controlling iterative and incremental projects of all types. It is a term borrowed from rugby. It is designed to be ultra-productive, where working prototypes are delivered in thirty days “sprints” and no work is added during the sprint.

##### c. UP

UP means Unified Process. It is an iterative and incremental software development methodology controlled by the UML use cases. The engineering requirements present in the Unified Process are mostly technology centric and has only recently focused on user centered design.

##### d. XP

XP means Extreme Programming. It is a method or approach to software engineering. It is the popular of all agile methodologies. It is founded on a mechanism for total change, a style of development a style of development, a path to improvement, an attempt to reconcile humanity, productivity, and software development discipline. It can be regarded as a variation of 2TUP.

#### 3.3.2 Presentation of UML

UML, short for Unified Modelling Language, is a standardized modelling language consisting of an integrated set of diagrams, developed to help system and software developers for

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specifying, visualizing, constructing, and documenting the artifacts of software systems, as well as for business modelling and other non-software systems.

UML was born from the merge of the dominant object modelling languages namely OMT (Object Modeling Technique) of James Ram Baugh, OOSE of Grady Boosh and Ivar Jacobson.

UML was standardized in January 1997 by the OMG (Object Management Group) which is an American association created in 1989 which aims to promote and standardize the object model in all its forms. UML is now known and that since September 2013 in its version 2.5 Beta 2.

The Unified Modelling Language (UML) was created to forge a common, semantically, and syntactically rich visual modelling language for the architecture, design, and implementation of complex software systems both structurally and behaviourally. UML has applications beyond software development such as process flow in manufacturing.

It is analogous to the blueprints used in other fields and consists of different types of diagrams. In the aggregate, UML diagrams describe the boundary, structure and the behaviour of the system and the objects within it.

UML is not a programming language but there are tools that can be used to generate code in various languages using UML diagrams. UML has a direct relation with object-oriented analysis and design.

### 3.3.3 Advantages of UML

#### a. Visual Representation

A UML diagram is a visual representation of the relationships between classes and entities in a computer program. A class is an object in programming that organizes similar variables and functions in one location. To understand a program, it is essential to understand what each class object does, the information it stores and how it relates to other classes in the program. By showing this information in a diagram, it is easy to understand and visualize a program's relationships.

#### b. Readable and reusable

A UML diagram is beneficial in that it is very readable. The diagram is meant to be understood by any type of programmer and helps to explain relationships in a program in a straightforward manner. Traditionally, to understand a program, a programmer would read the code directly. This could be thousands or millions of lines of code in very large programs. Having a UML diagram running helps to quickly illustrate those relationships. Additionally, by using a

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diagram to show the code running in a program, a programmer is able to see redundant code and reuse portions of code that already exist rather than rewrite those functions.

### c. Standard

UML is the current standard for programming in object-oriented programming languages. When creating classes and other with relationships between each other, UML is what is used to visually describe these relationships. Because it is used as a standard, it is widely understood and well known. This makes it easy for a new programmer to step into a project and be productive from day one.

### d. Planning tool

UML helps to plan a program before the programming takes place. In some tools used to model UML, the tool will generate code based on the class's setup in the model. This can help reduce overhead during the implementation stage of any program. Additionally, a UML model diagram is easy to change, whereas reprogramming a section of code can be tedious and time consuming.

### 3.3.4 Organizational model of UML

There are in total 14 UML diagrams, which are grouped into two major types, which are structural diagrams and behavioral diagrams.

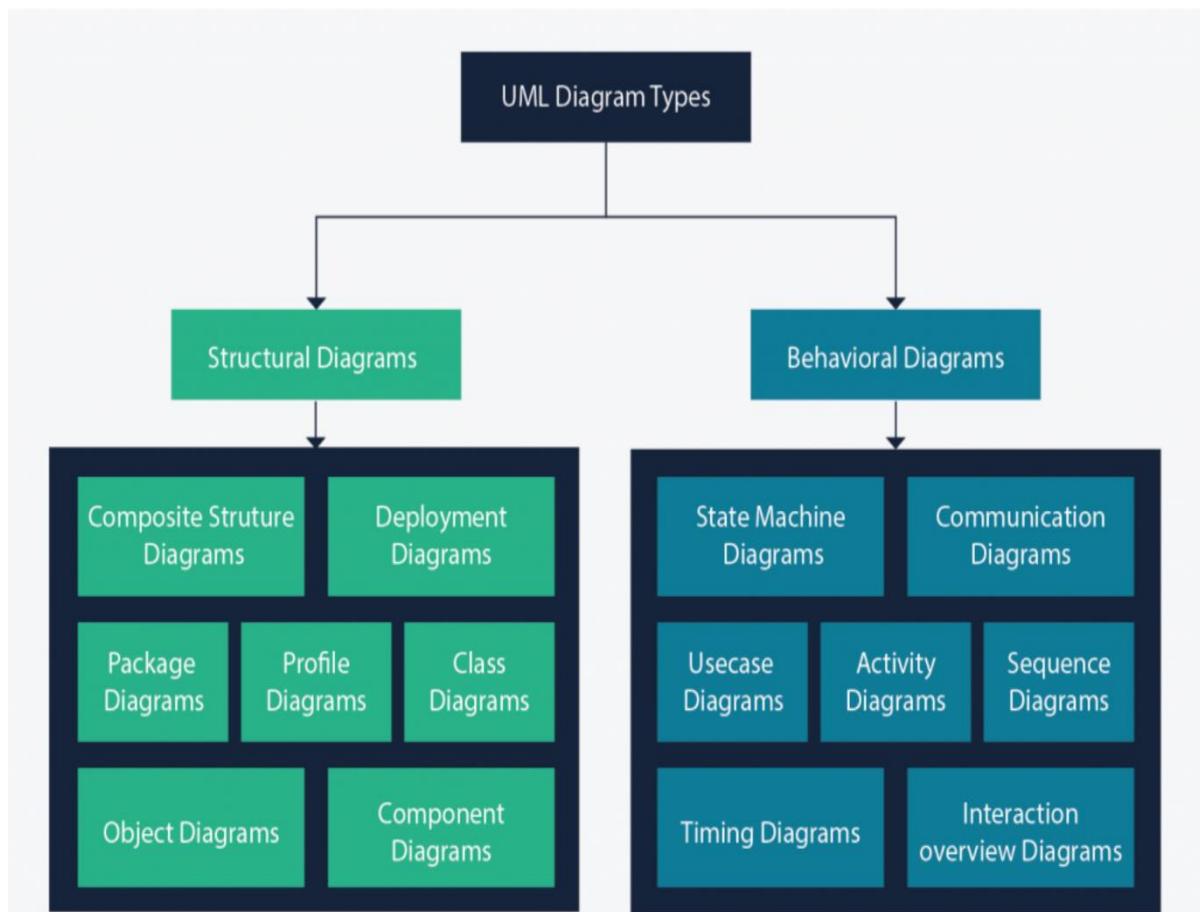


Figure 4: UML diagram types

It is important to note that UML is a modelling language and not a method or procedure. As such to give it an approach we need to associate UML to a Unified Process (UP) in order to give our conception a methodology to follow. A Unified Process is a generic method for developing software. The term generic signifies the fact that it is necessary to adapt UP to the context of the project, team, domain and/or the Organization. There exist several UPs but we are going to use the 2Track UP (2Track Unified Process) in the course of our project to implement the unified process.

### 3.3.5 Presentation of the 2Track Unified Process

#### a. Presentation

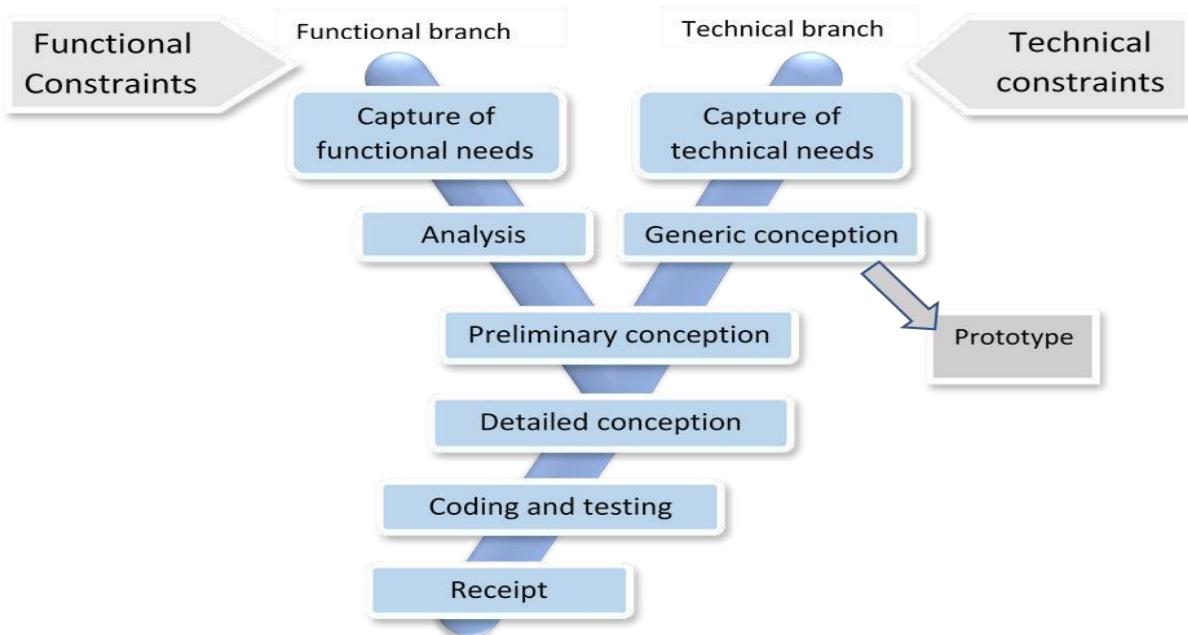


Figure 5: Representation of the 2TUP

#### b. Description of the different branches

##### i. Functional Branch

- Capture of Business (functional) needs: It leads to a model focused on the needs of business users. It minimizes the risk of producing an inadequate system with the needs of users and verifies its consistency and completeness.
- Analysis: Study of specifications to find out what the system will achieve in terms of trade. Cutting components. We have the following diagrams: Use case, Activity, State machine, communication and interaction overview diagrams.

##### ii. Technical Branch

- Capture of Technical Needs: Identification of tools, materials, and technologies to use; constraints (maximum response time, integration

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with the existing constraint) all these will lead to a first design of technical architecture.

- Generic design: Cutting components required for the construction of the technical architecture. This step minimizes the inability of the technical architecture to meet the operational constraints. We have the following diagrams: Mark-up Design, Navigation system and Patterns.

### iii. The Middle Branch (Implementation Branch)

- Preliminary Design: This is a delicate stage in which the analysis model is integrated into the technical architecture. The goal here is to know what technical component we put our features from the analysis. We have the following diagrams: Component, Deployment, Package and Composite structure diagrams.
- Detailed Design: This is the detailed design of each feature of the system. We have the following diagrams: Class, Object, Sequence and Timing diagrams.
- Coding and Tests: This is the programming phase of the designed features, alongside testing of the coded features.



### 3.3.6 Justification of choice of analysis method

Some developers have been successful at developing small software systems without the use of diagrams or other features of modelling languages. However, as their systems become larger and larger, such developers have an increasingly difficult time seeing the ‘big picture’ and are liable to create poor designs and take much longer in their work.

Most systems are therefore documented with the use of diagrams. These provide views of structure and functionality that would be difficult to grasp by looking at code or textual descriptions alone. In other words, diagrams provide abstraction.

A model goes beyond a mere set of diagrams. A model captures an interrelated set of information about the system: a diagram is simply one view of that information. Several diagrams can present the same information in slightly different ways, either with different notations or with different levels of detail. We can delete an element from a diagram and keep it in the model; if we delete an element from the model it should disappear from all diagrams. A model can lead software engineers to have insights about the system; they can analyse the model (manually or using tools) to discover problems and other properties of it. Simple diagrams generated from the model can also help communicate with clients and users. However, it is up to the modeler to generate these easy-to-understand views. Employing UML, a well-defined standard modelling language, adds additional advantages:

Since it is a standard notation, everybody who looks at the model will be able to interpret it the same way.



## 3.4 RISK ANALYSIS AND SOLUTION

### 3.4.1 Definition

Risk management involves understanding, analysing and addressing risk to make sure all the objectives of a project are achieved. Risk is a consequence of action taken despite uncertainty. It can also be defined as the probability of something happening multiplied by the resulting cost or benefit. Risk management is a very important activity in our project as it minimizes the chances of a negative outcome.

### 3.4.2 Risk and solution

The risks of our project can be classified mainly under two categories.

- **Security risks:** Since our system is in a computerized format security risks such as confidentiality violation, malicious programs, attacks from hackers, system intrusion may be encountered.

As proposed solution, we implement installation of firewalls, authentication mechanisms to give access to authorized users only.

- **Natural risks:** Natural disaster such as earthquakes, drastic temperature and climate change can lead to loss of information.

As proposed solution, storage of information in a database which can be derived at any point in time avoiding natural disasters.

## 3.5 MODELING OF PROPOSED SOLUTION

### 3.5.1 Functional Branch

#### 3.5.1.1 Use case diagram.

##### Definition:

A use case diagram is a graphic depiction of the interactions among the elements of a system. A use case is a methodology used in system analysis to identify, clarify, and organize system requirements. Use cases specify the expected behaviour (what), and not the exact method of making it happen (how). Use cases once specified can be denoted both textual and visual representation (i.e., use case diagram).

##### Formalism

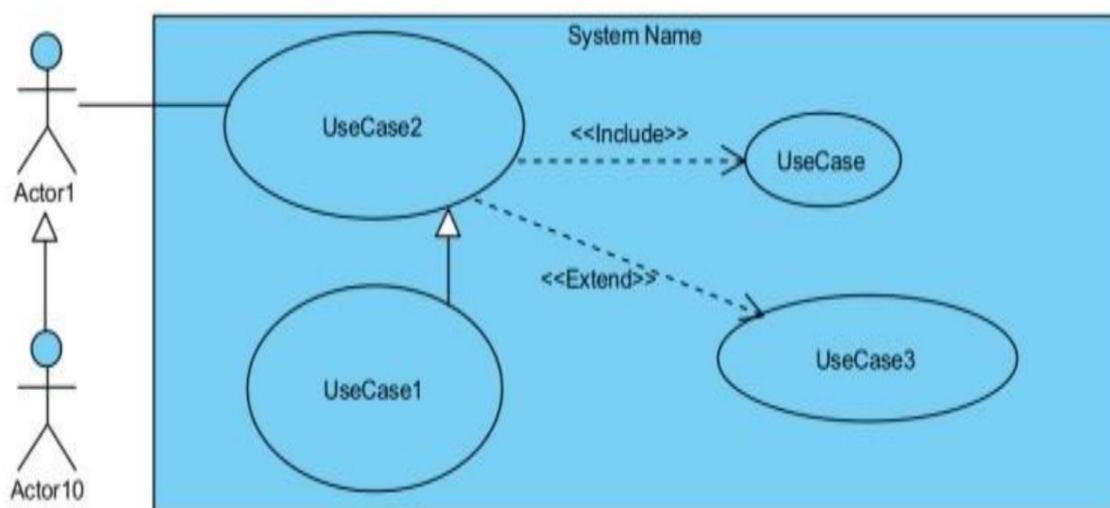


Figure 6: Representation of use case diagram

## Components of a use case diagram

Table 9: Components of use case diagram

Name	Notation	Description
<b>Actor</b>		Represents a user, organization, or external system that interacts with your application or system.
<b>Use case</b>		Represents the actions performed by one or more actors in the pursuit of a particular goal.
<b>Association</b>		Indicates that an actor takes part in a use case
<b>Include</b>		An including use case calls or invokes the included one. Inclusion is used to show how a use case breaks into smaller steps. The included use case is at the arrowhead end.
<b>Extend</b>		An extending use case adds goals and steps to the extended use case. The extensions operate only under certain conditions. The extended use case is at the arrowhead end.
<b>Generalization</b>		Relates a specialized and a generalized element. The generalized element is at the arrowhead end. A specialized use case inherits the goals and actors of its generalization and may add more specific goals and steps for achieving them. A specialized actor inherits the use cases, attributes and associations of its generalization and may add more.



### 3.5.1.2 Identification of actors

We will now list the actors likely to interact with the system, but at first, we will define an actor.

An actor represents the abstraction of a role played by external entities that interact directly with the system studied. The actors of the system identified at first are:

**Job Provider:** He is responsible for managing jobs and managing applicants of every job they posted.

**Job Seeker:** he searches for jobs, apply for jobs and creates a profile which can be used to know him more.

**Administrator:** manages all account and creates the different bundles used on the Platform.

- Identification of use cases

The different use cases in our system include:

Table 10: Actors and their use cases

Actors of the system	Use cases
<b>Employer</b>	<ul style="list-style-type: none"><li>- Register and Login</li><li>- Manage posted jobs.</li><li>- Search job</li><li>- Search resume</li><li>- Manage applicants</li><li>- Update applicant application status</li><li>- Manage Profile</li></ul>
<b>Job seeker</b>	<ul style="list-style-type: none"><li>- Register and login</li><li>- Search job</li><li>- Apply for jobs</li><li>- Create profile</li><li>- Update profile</li><li>- Delete account</li></ul>

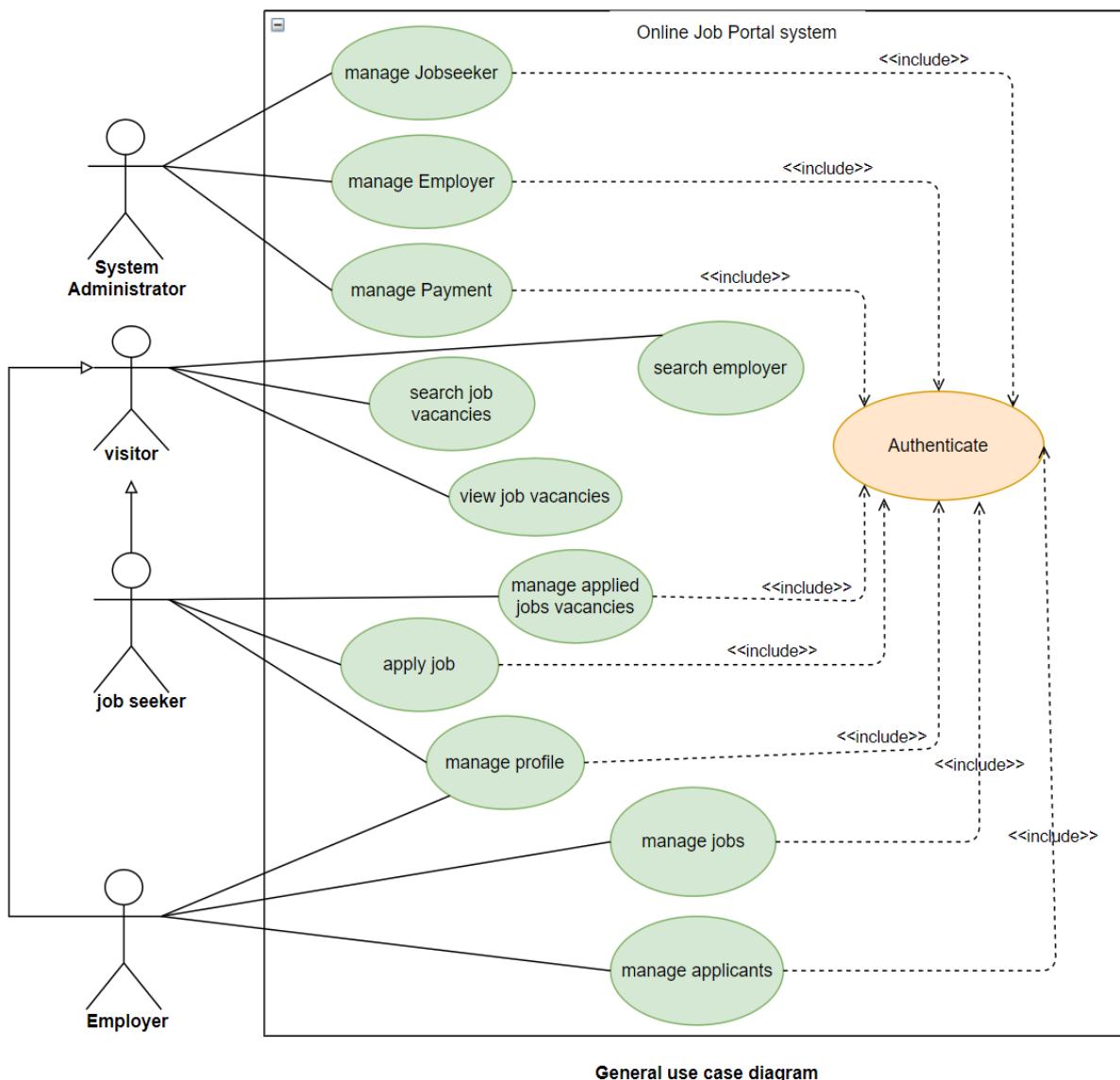


Figure 7: General use case diagram

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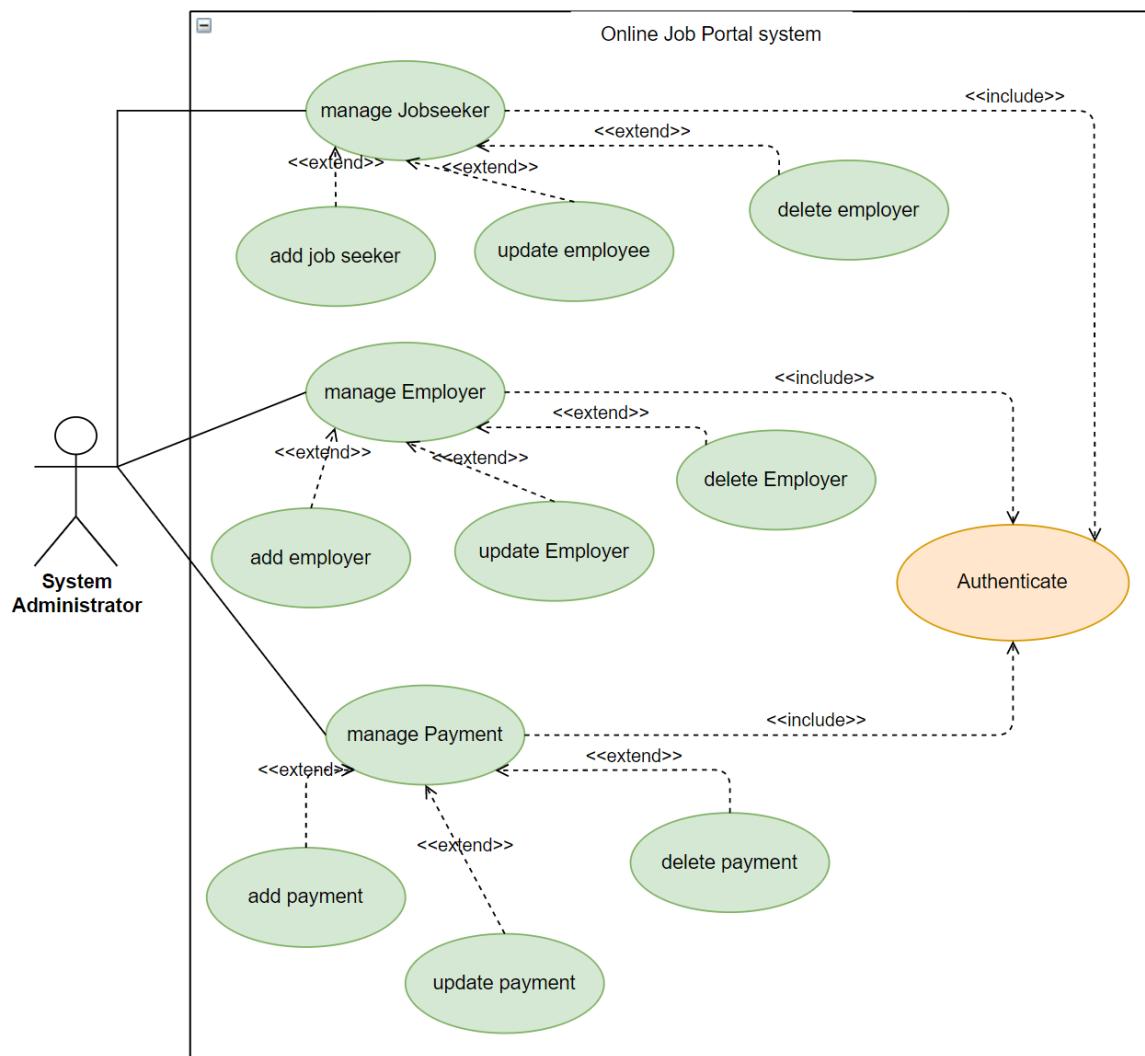


Figure 8: Detail Use case diagram for System administrator

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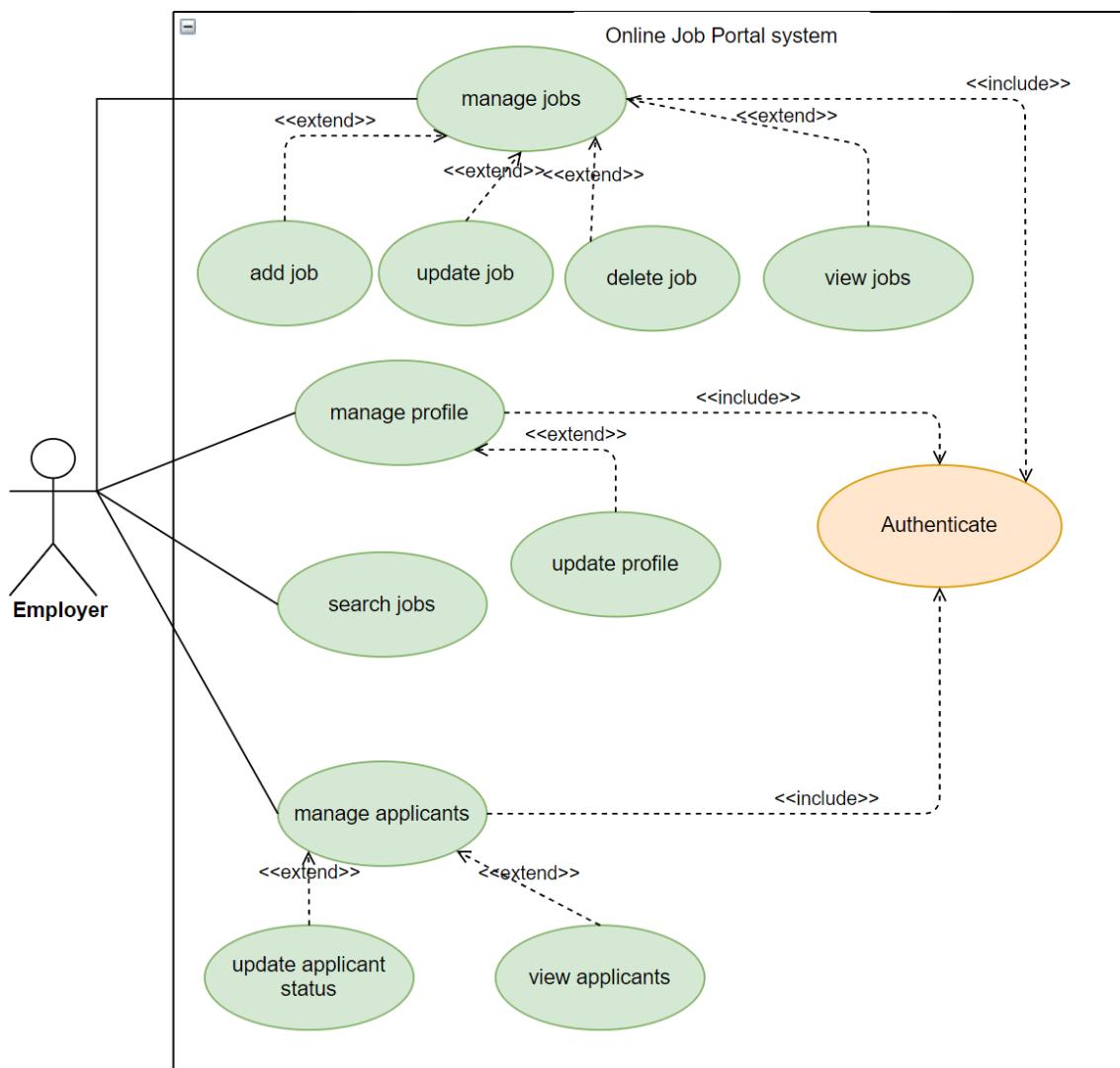


Figure 9: Detail use case diagram for Employer

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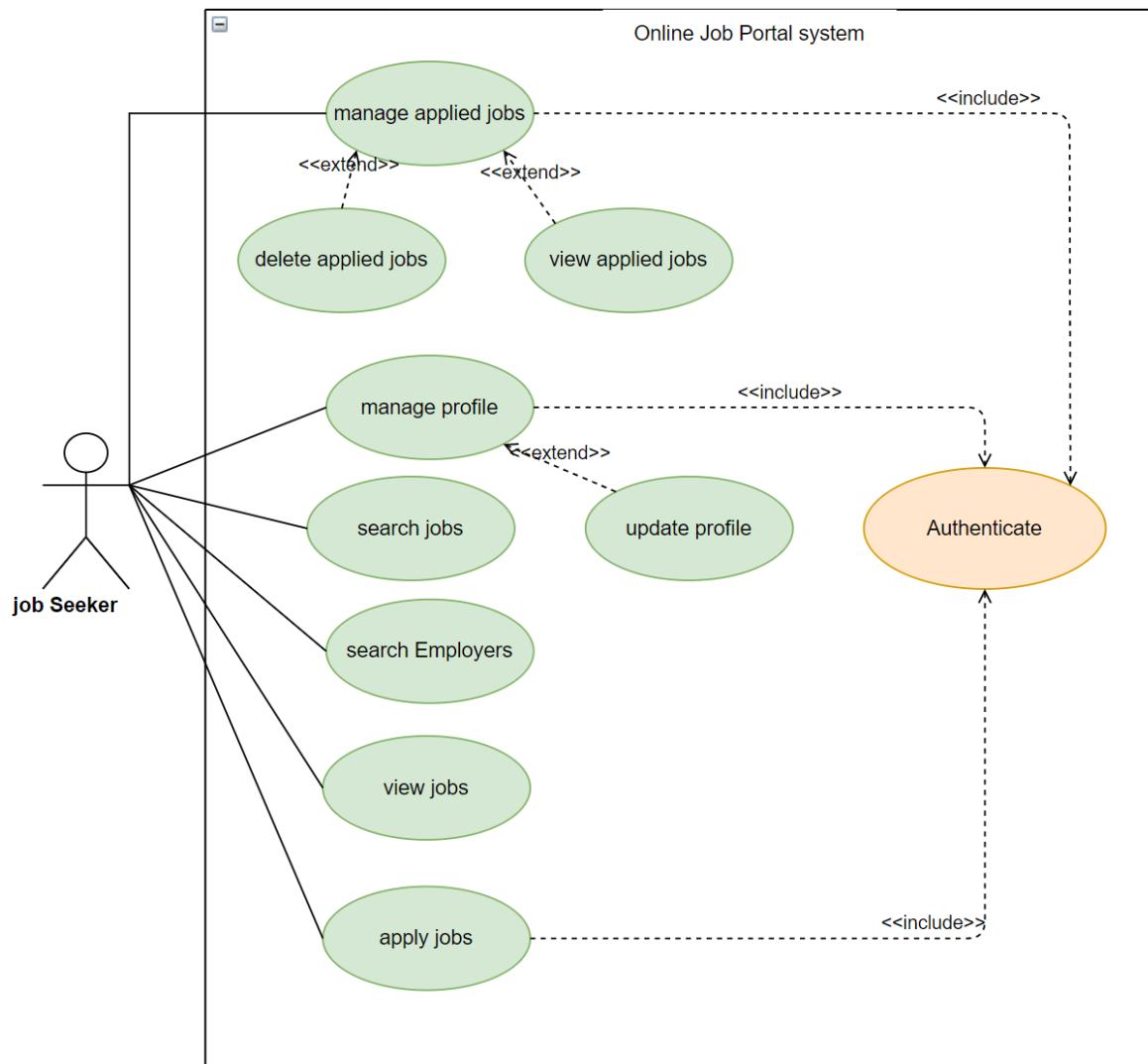


Figure 10: Detail use case diagram for Job seeker

### Use case textual description.

Table 11: Authentication

Actor: User	
<b>Objective</b>	Grant user access to the application
<b>Responsible</b>	Linus
<b>Version</b>	1.0
<b>Preconditions</b>	The home page should be open

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



<b>Normal scenario</b>	<ol style="list-style-type: none"><li>1. User clicks register / login button</li><li>2. The form opens</li><li>3. User fills and submit form</li><li>4. System verifies credentials</li><li>5. Systems opens required page</li></ol>
<b>Alternative scenario</b>	<ol style="list-style-type: none"><li>1. System sends error message</li><li>2. Go back to step '3' of normal scenario</li></ol>
<b>Post-condition(s)</b>	User successfully logged in

## Employer add Job

Table 12: Add job

<b>Actor: Employer</b>	
<b>Objective</b>	Add Job
<b>Responsible</b>	Linus
<b>Version</b>	1.0
<b>Preconditions</b>	Job provider home page open
<b>Normal scenario</b>	<ol style="list-style-type: none"><li>1. Job provider clicks on add job button</li><li>2. Add job page open</li><li>3. Employer fills and submits the form</li><li>4. System verifies entries and saves information</li></ol>
<b>Alternative scenario</b>	<ol style="list-style-type: none"><li>1. System sends error message</li><li>2. Go back to step '3' of normal scenario</li></ol>
<b>Post-condition(s)</b>	Job successfully added

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



Table 13: View applicants and applications

Actor: Employer	
<b>Objective</b>	View applicants
<b>Responsible</b>	Linus
<b>Version</b>	1.0
<b>Preconditions</b>	Employer home page open
<b>Normal scenario</b>	<ol style="list-style-type: none"><li>1. Employer clicks on show applicants</li><li>2. Applicant page open</li><li>3. Employer view applicants and update their application status</li></ol>
<b>Alternative scenario</b>	<ol style="list-style-type: none"><li>1. System sends error message</li><li>2. Refresh page and check internet connection</li></ol>
<b>Post-condition(s)</b>	Update applicant status

Table 14: Job application process

Actor: Job Seeker	
<b>Objective</b>	Apply for job
<b>Responsible</b>	Linus
<b>Version</b>	1.0
<b>Preconditions</b>	Job seeker home page is open
<b>Normal scenario</b>	<ol style="list-style-type: none"><li>1. Job seeker searches for jobs</li><li>2. Click on a job and read job description</li><li>3. Fill application form and apply for job</li><li>4. Verifies form input</li></ol>
<b>Alternative scenario</b>	<ol style="list-style-type: none"><li>3. System sends error message</li></ol>
<b>Post-condition(s)</b>	Return to Job seeker home page

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Actor: System admin	
<b>Objective</b>	add Users
<b>Responsible</b>	Linus
<b>Version</b>	1.0
<b>Preconditions</b>	System Administrator home page is open
<b>Normal scenario</b>	<ol style="list-style-type: none"><li>1. Click on add user button</li><li>2. Open user registration page</li><li>3. Fill Registration form and register user</li><li>4. Verifies form data</li></ol>
<b>Alternative scenario</b>	<ol style="list-style-type: none"><li>5. System sends error message</li></ol>
<b>Post-condition(s)</b>	Return to System Administrator home page

### 3.5.1.3 Activity Diagram

#### Definition

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modelling Language, activity diagrams are intended to model both computational and organizational processes. Activity diagrams show the overall flow of control. The basic purposes of activity diagram is to capture the dynamic behaviour of the system.

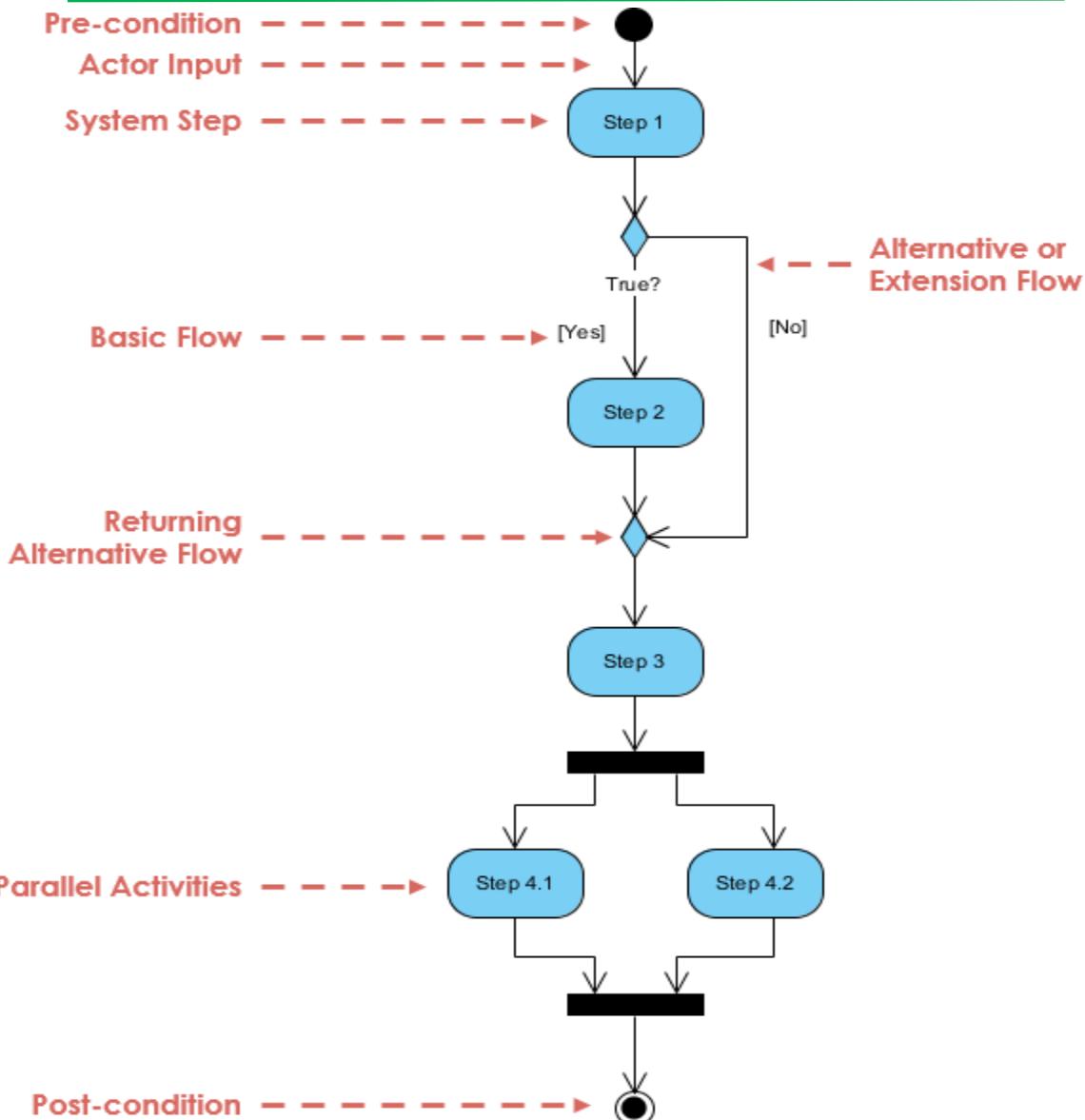


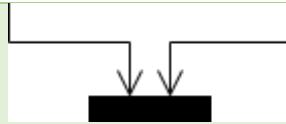
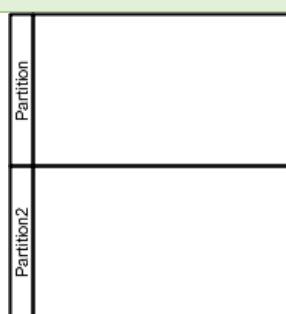
Figure 11: Formalism of activity diagram

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Table 15: Components of activity diagram

Notation	Description	UML notation
<b>Activity</b>	Is used to represent a set of actions.	
<b>Action</b>	A task to be performed	
<b>Control Flow</b>	Shows the sequence of execution	
<b>Object Flow</b>	Show the flow of an object from one activity (or action) to another activity (or action).	
<b>Initial Node</b>	Portrays the beginning of a set of actions or activities	
<b>Activity Final Node</b>	Stop all control flows and object flows in an activity (or action)	
<b>Object Node</b>	Represent an object that is connected to a set of Object Flows	
<b>Decision Node</b>	Represent a test condition to ensure that the control flow or object flow only goes down one path	
<b>Merge Node</b>	Bring back together different decision paths that were created using a decision-node.	
<b>Fork Node</b>	Split behaviour into a set of parallel or concurrent flows of activities (or actions)	

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<b>Join Node</b>	Bring back together a set of parallel or concurrent flows of activities (or actions).	
<b>Swimlane and Partition</b>	A way to group activities performed by the same actor on an activity diagram or to group activities in a single thread.	

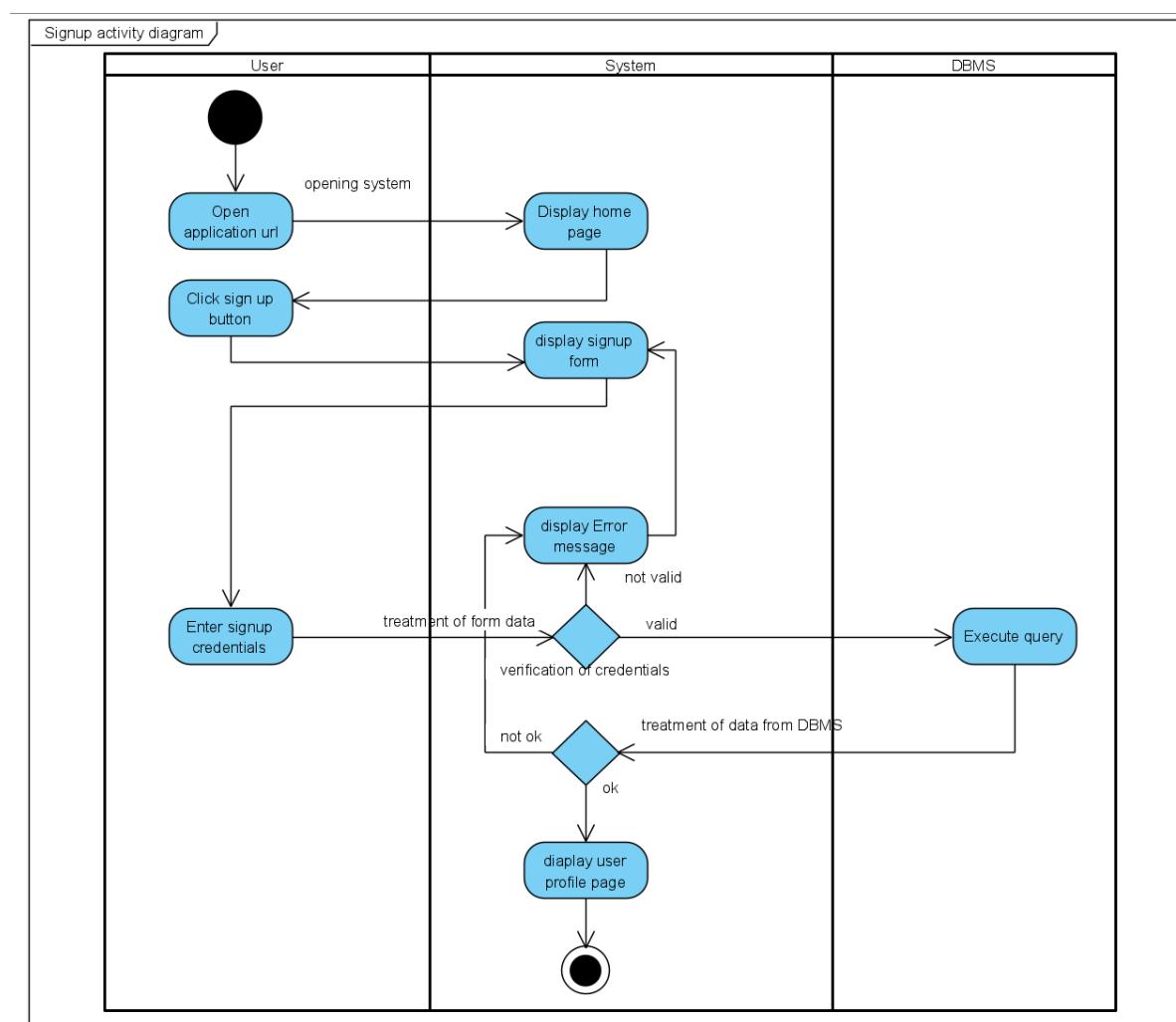


Figure 12: sign up activity diagram

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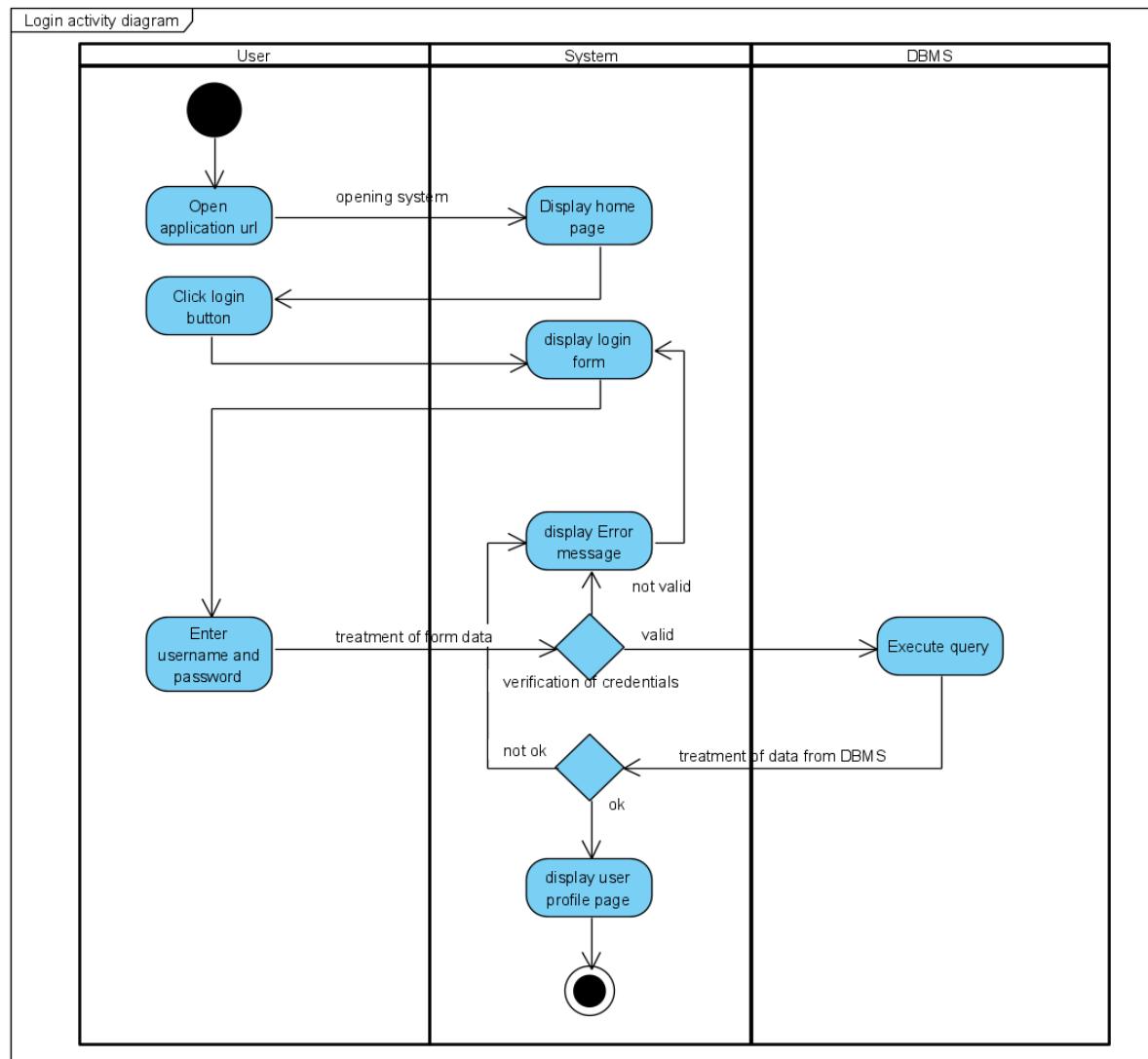


Figure 13: Login activity diagram

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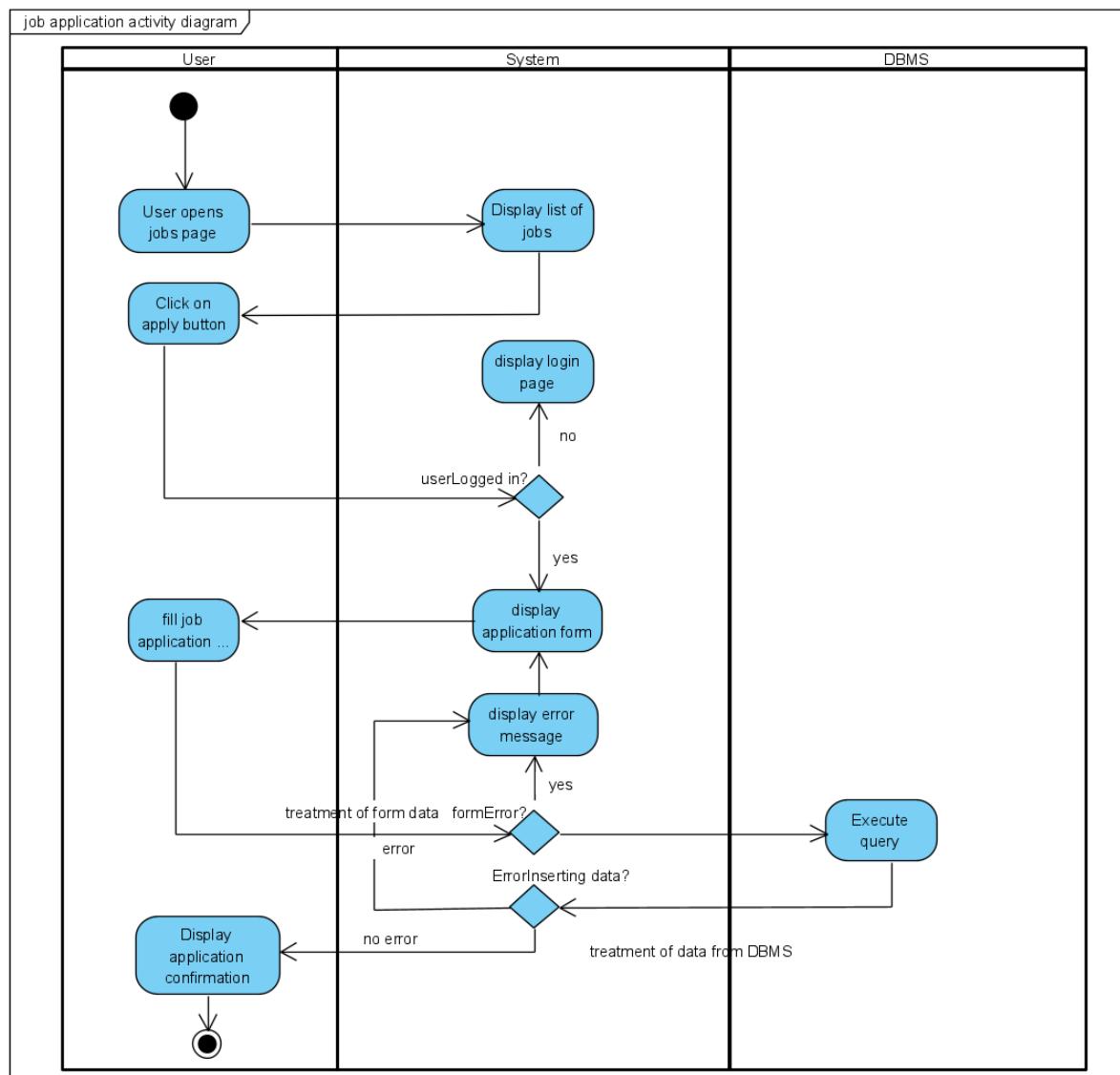


Figure 14: Job application activity diagram

### 3.5.1.4 State machine diagram

#### Definition

A State Machine Diagram describes the behaviour of a single object in respect to a series of events in a system. Also known as the State Chart diagram, it models the dynamic flow of control from state to state of a particular object within the system.

#### Formalism

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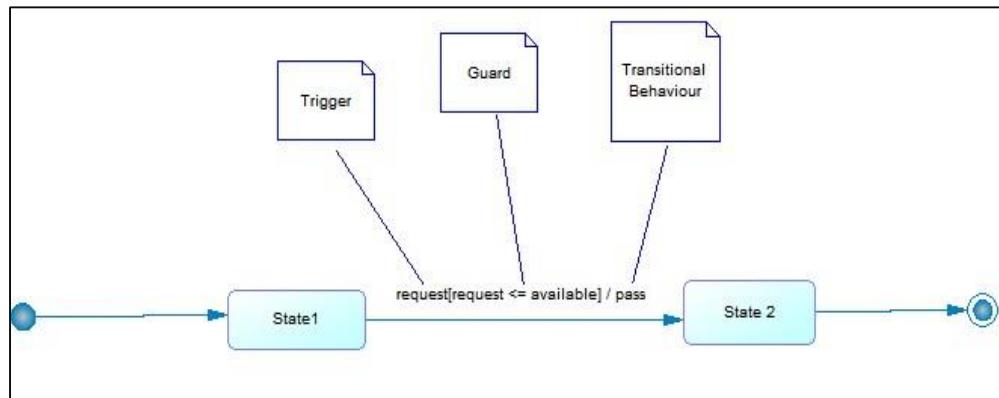


Figure 15: Formalism of state machine diagram

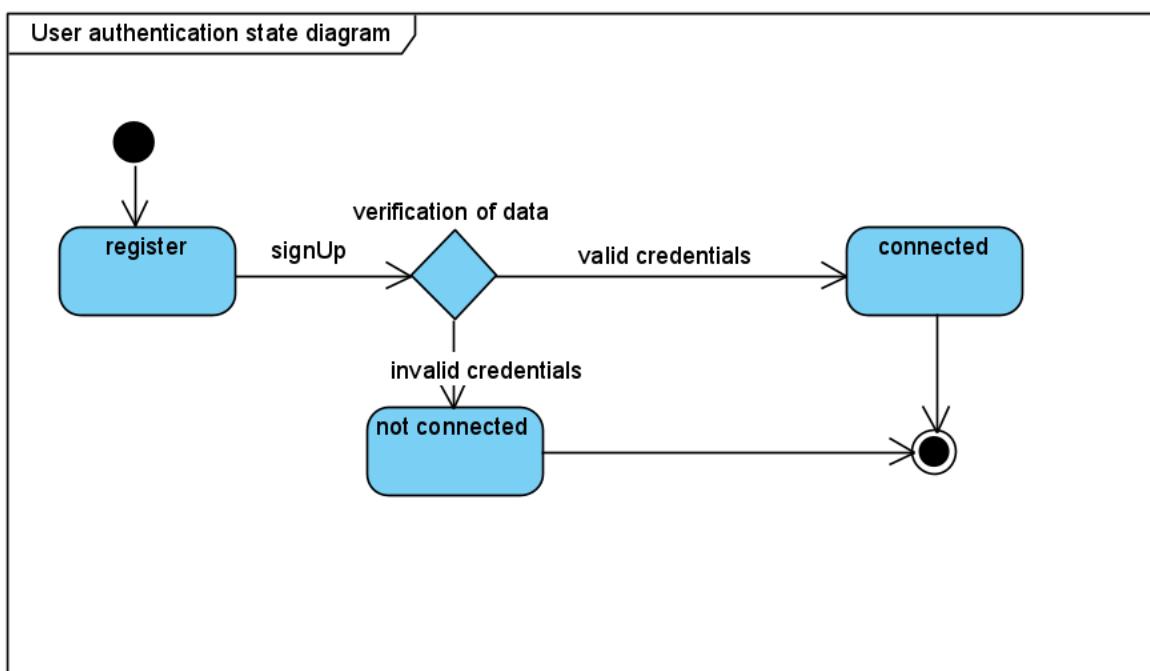


Figure 16: Authentication State machine diagram

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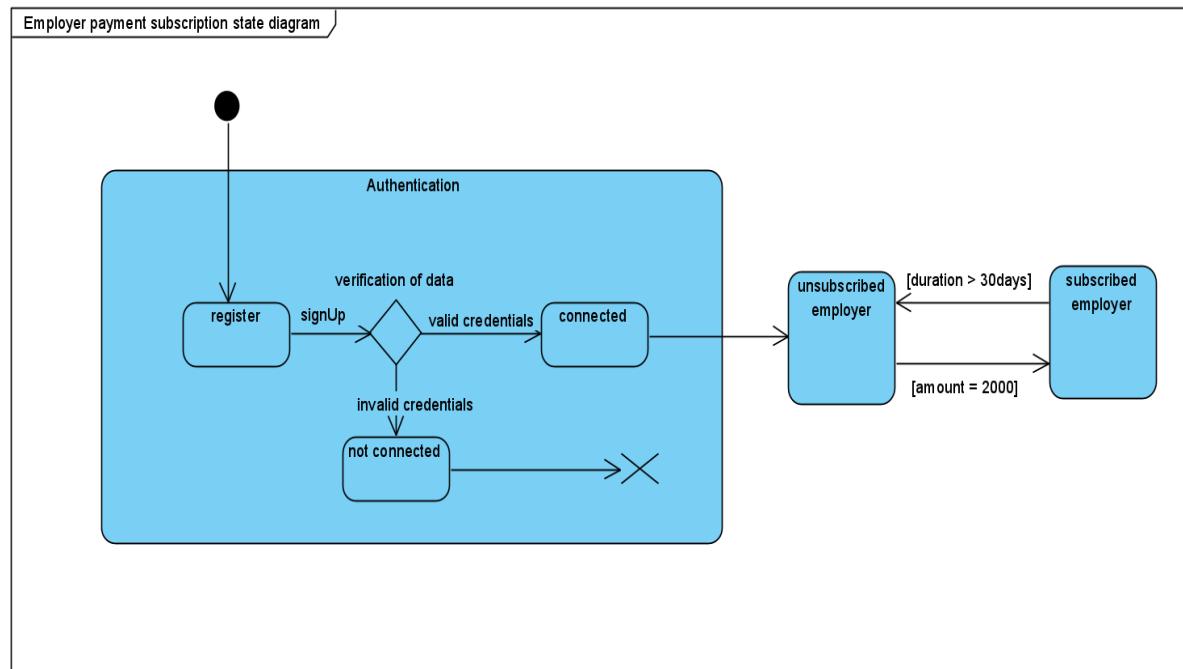


Figure 17: Subscription payment state machine

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## 3.5.2 Communication Diagram

### Definition

Communication diagrams formally called collaboration diagram is an interaction diagram that show the similar information to the sequence diagram but it's focus is on object relationship. In communication diagrams, objects are shown with association connectors between them, messages are added to the association and shown as short arrow pointing in the direction of the message flow. The sequence of message is shown through a numbering scheme.

### Formalism

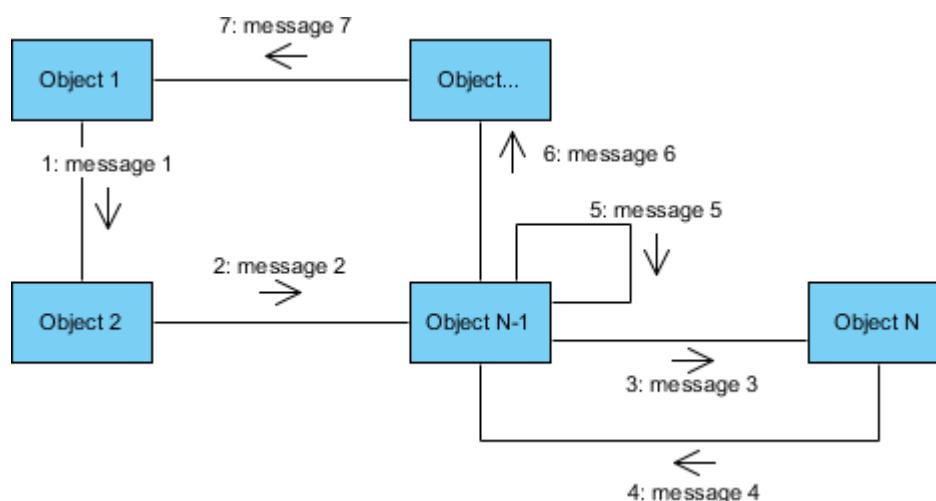


Figure 18: Formalism of communication diagram

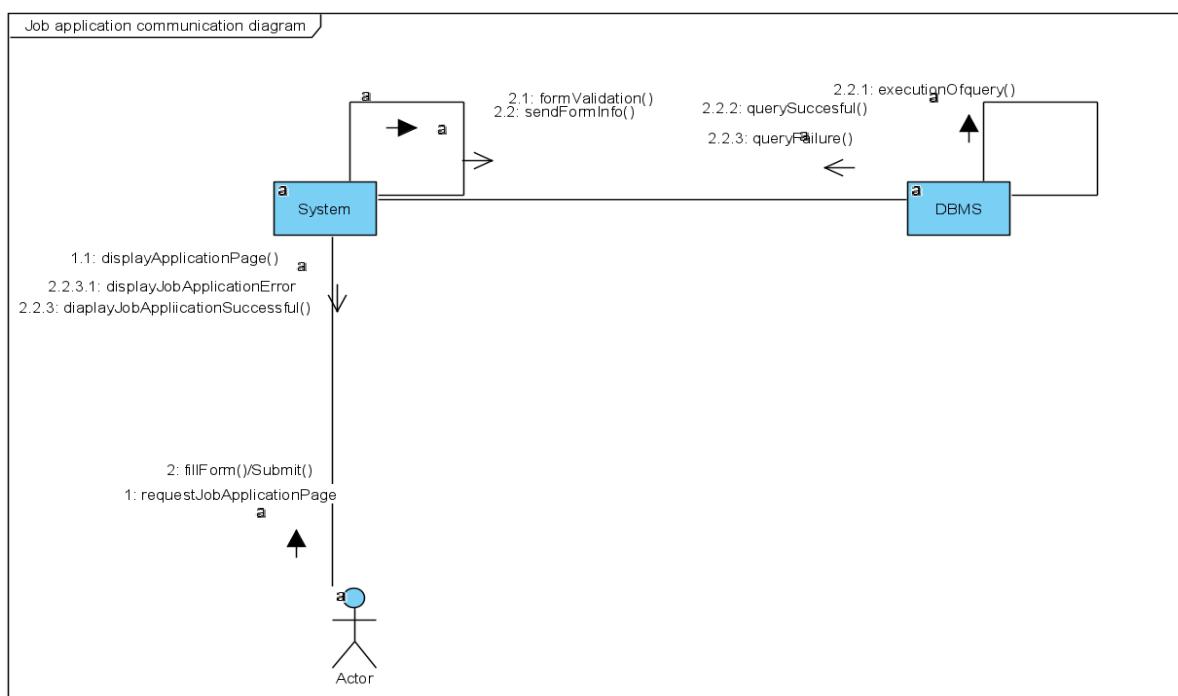


Figure 19: Job application Communication diagram

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL

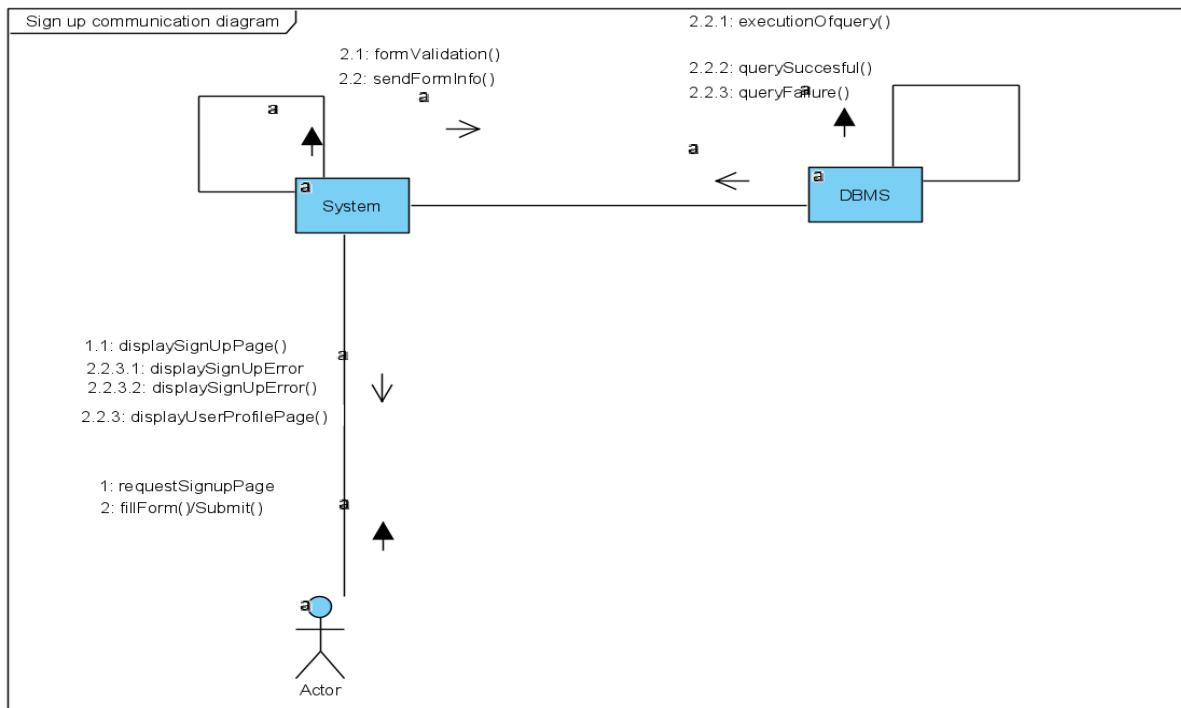


Figure 20: Signup communication diagram

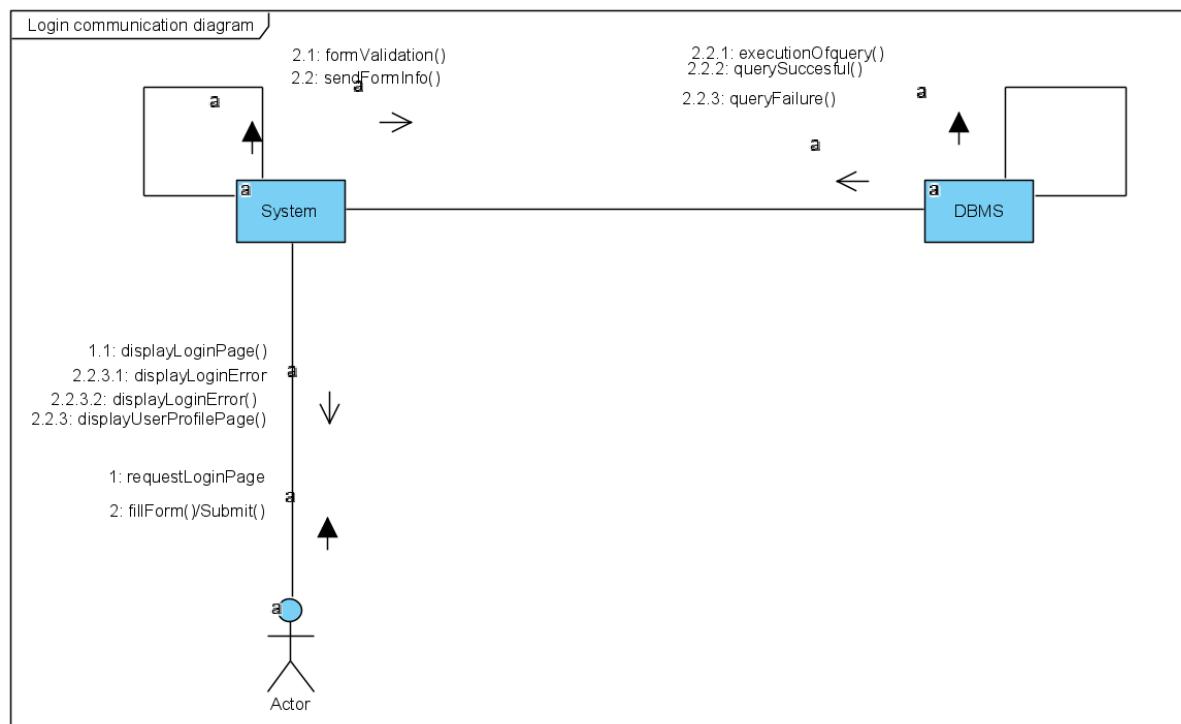


Figure 21: Login Communication diagram

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## **CONCLUSION**

The development of the analysis document will enable us to conceive in detail the proposed solution. The creation of the analysis document is of top priority since it serves the user to understand the complexity of the system to be developed. A good analysis document ensures the computer scientist that he has fully understood the system he is expected to develop. We will now proceed to the conception where we will see a detailed conception of the system.



## PART 4: CONCEPTION PHASE

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## Preamble

The conception phase is the part of the document that show the link between the analysis and the realization phases. It is a continuation of the analysis phase which represent the technical aspects used in modelling our system.

## CONTENT

### INTRODUCTION

- I- TECHNICAL BRANCH
- II- GENERIC CONCEPTION
- III- GENERIC DESIGN
- IV- IMPLEMENTATION  
BRANCH
  - a. PRELIMINARY CONCEPTION
  - b. DETAILED CONCEPTION

### CONCLUSION

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## **INTRODUCTION**

The conception report consists of defining the necessary components of the construction for the technical architecture. This conception is completely independent from the functional aspects. In this phase we are going to see technical branch of 2TUP which consists of technical needs and capture of the various UML diagrams that are going to model our system.

## 4.1 TECHNICAL BRANCH

### 4.1.1 Generic Conception

The generic conception consists of developing a solution that responds to the technical specification. This conception is independent of the functional aspect specified in the functional branch of the 2TUP.

### 4.1.2 Generic Design

Structure of some functionalities of the application

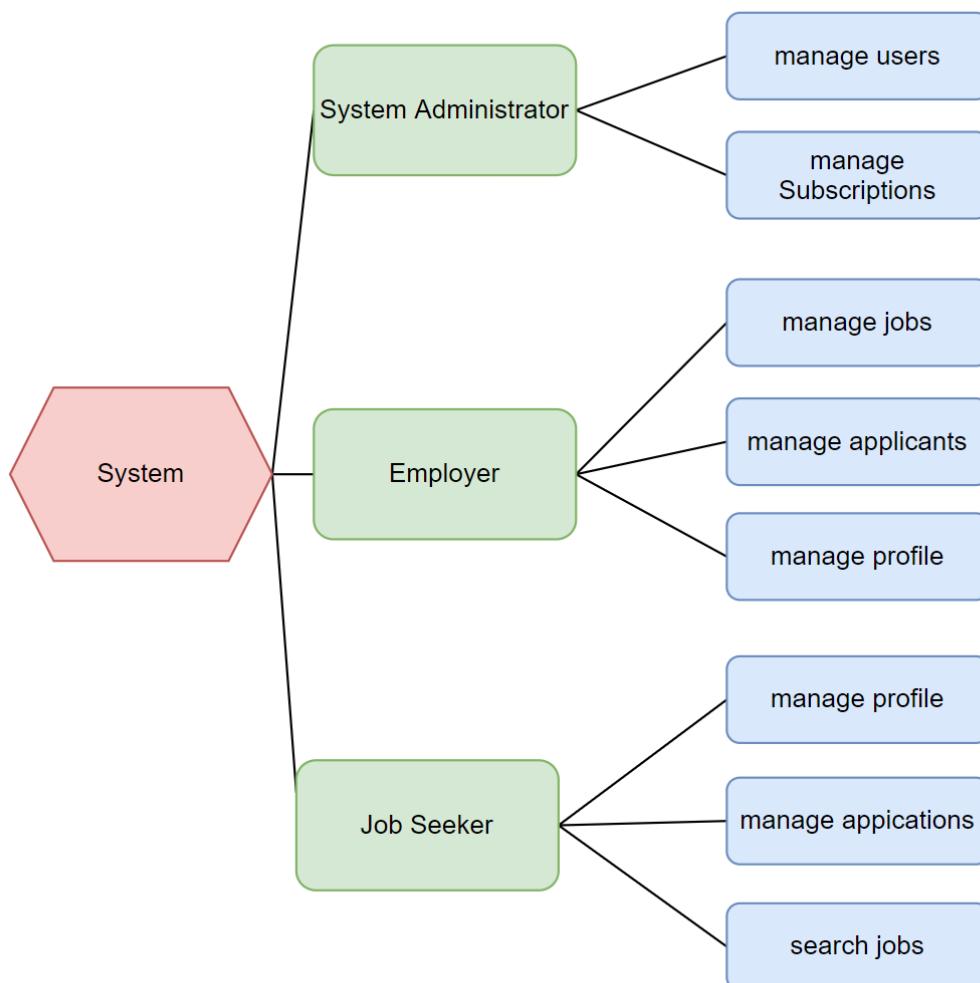


Figure 22: Generic design

## 4.2 IMPLEMENTATION BRANCH

Here, we will see the preliminary conception, detailed conception and documentation of the system.

### 4.2.1 Preliminary Design

#### 4.2.1.1 Component Diagram

##### Definition

A Component diagram describes the organization and wiring of physical components in a system. Physical components are elements such as executables, libraries, files, documents, etc. which reside in a node. Component diagrams are used to visualize the organization and relationships among components in a system. These diagrams are also used to make executable systems.

##### Formalism

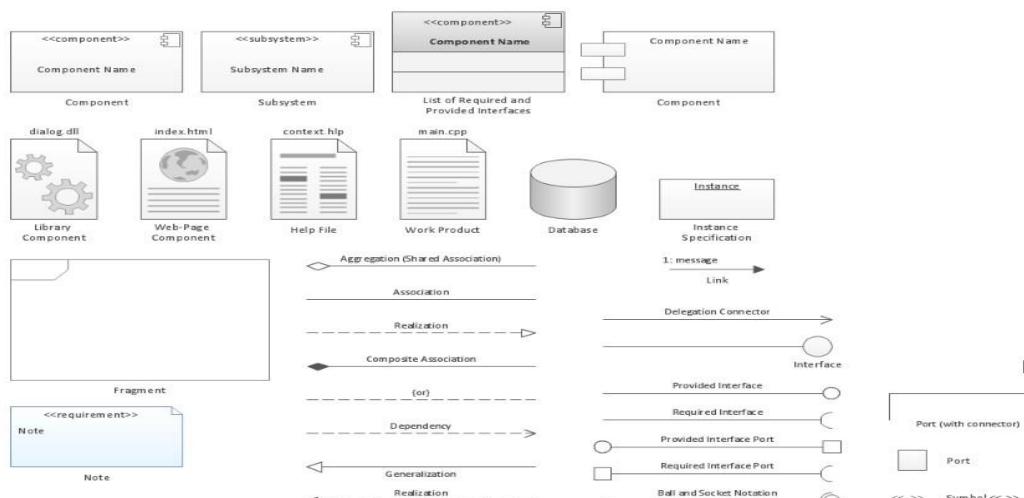


Figure 23: Component Diagram formalism



# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



Table 16: Components of component diagram

Element	Description and Main properties	Notation
<b>Component</b>	A component is a logical unit block of the system, a slightly higher abstraction than classes. It is represented as a rectangle with a smaller rectangle in the upper right corner with tabs or the word written above the name of the component to help distinguish it from a class.	 Component
<b>Interface</b>	An interface (small circle or semi-circle on a stick) describes a group of operations used (required) or created (provided) by components. A full circle represents an interface created or provided by the component. A semi-circle represents a required interface, like a person's input.	 Interface
<b>Port</b>	Ports are represented using a square along the edge of the system or a component. A port is often used to help expose required and provided interfaces of a component.	 Port

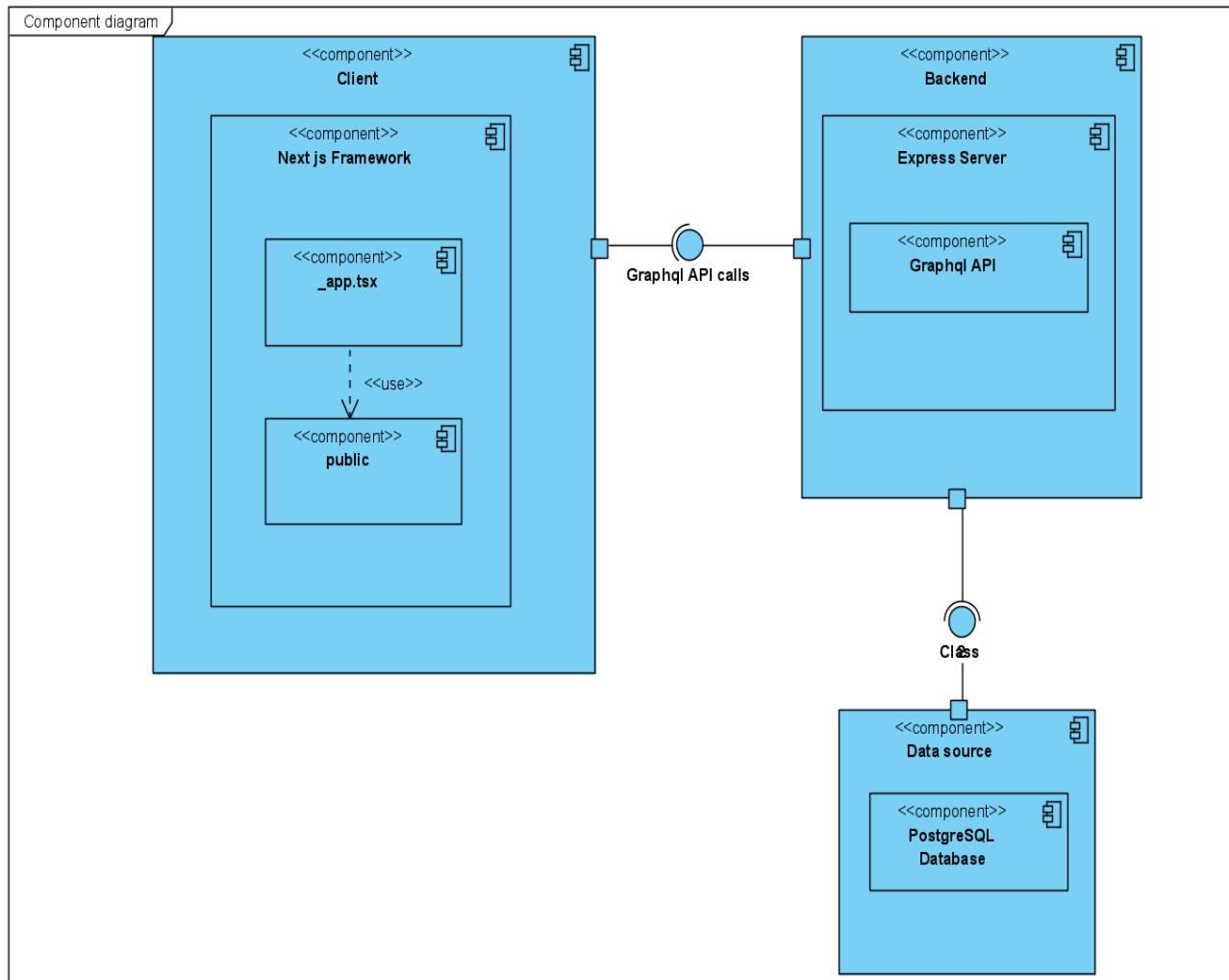


Figure 24: Component Diagram

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## 4.2.1.2 Deployment Diagram

### Definition

Deployment diagram is a structural diagram which shows architecture of the system as deployment (distribution) of software artifacts to deployment targets. Artifacts represent concrete elements in the physical world that are the result of a development process.

### Formalism

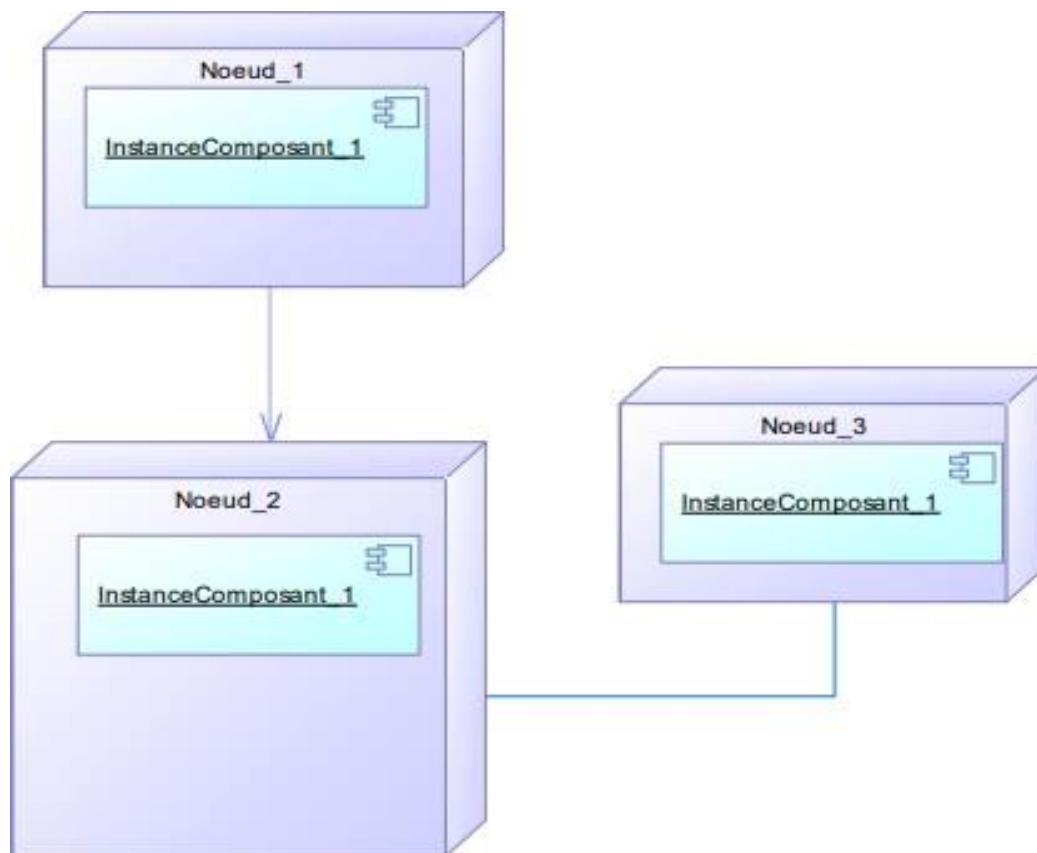


Figure 25: Formalism of deployment diagram



# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



Table 17: Components of a Deployment Diagram

Element	Description and Main properties	Notation
<b>Node</b>	A node is either a hardware or software component	
<b>Artifact</b>	An artifact is a product of software development process	 Interface
<b>Component</b>	It represents a modular part of a system that encapsulates its content and whose manifestation is replicable within its environment	 Port
<b>Association</b>	An association represent a communication path between node	

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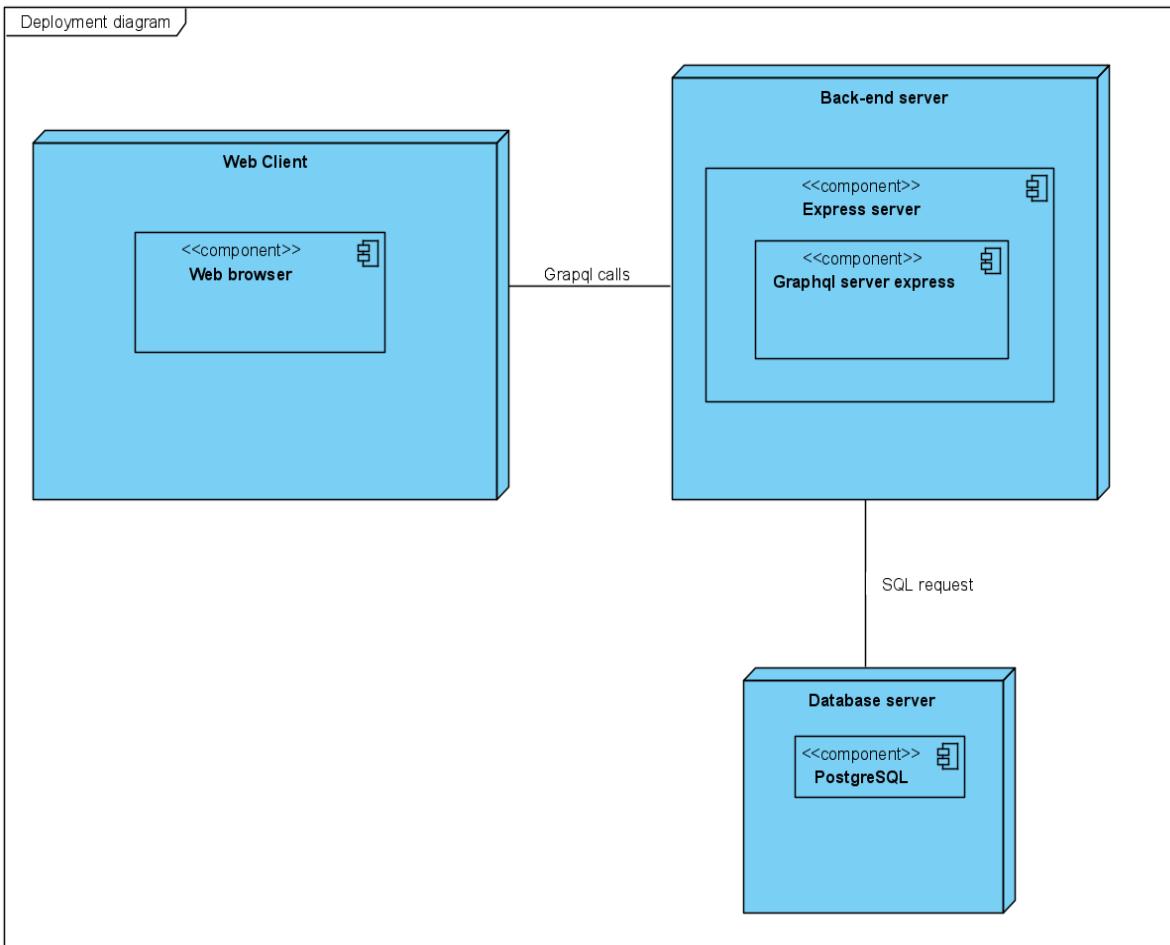


Figure 26: Deployment diagram

#### 4.2.1.3 Package Diagram

##### Definition

Package is a namespace used to group together elements that are semantically related and might change together. It is a general-purpose mechanism to organize elements into groups to provide better structure for system model. Owned members of a package should all be packageable elements. If a package is removed from a model, so are all the elements owned by the package. Package by itself is packageable element, so any package could also be a member of other packages.

##### Formalism

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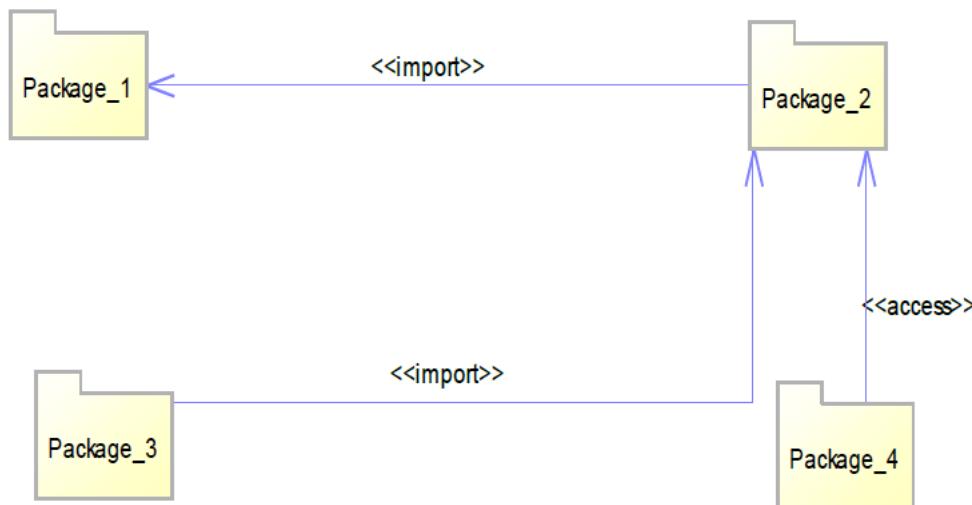


Figure 27: Package diagram formalism

## Components of Package diagram

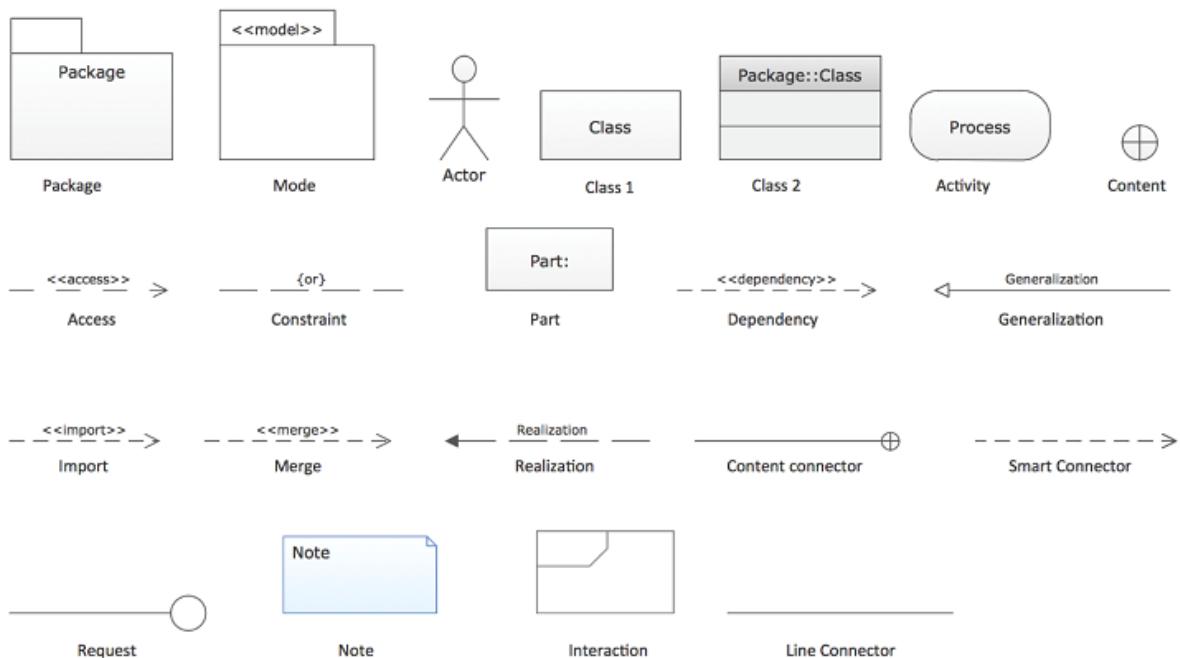


Figure 28: Components of package diagram

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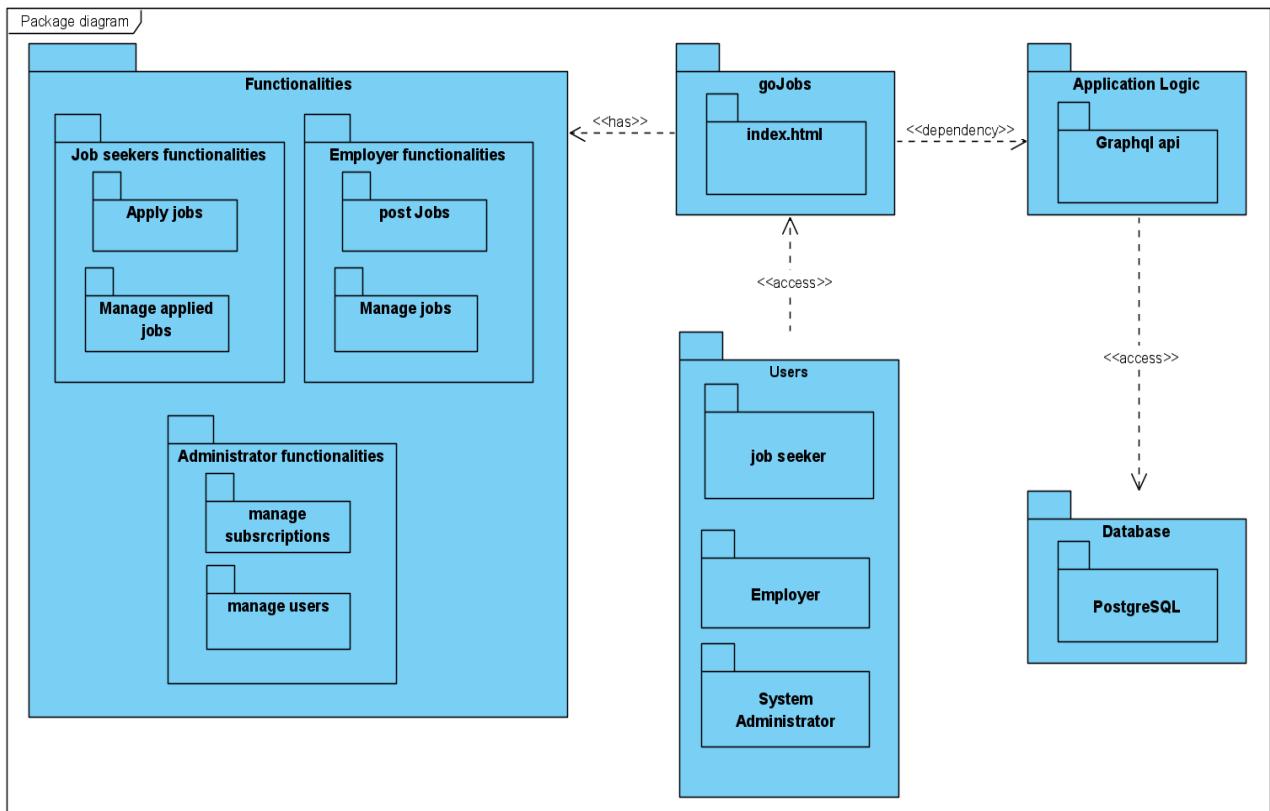


Figure 29: Package diagram of our solution

## 4.2.2 Detail Design

### 4.2.2.1 Sequence Diagram

#### Definition

A Sequence diagram describes interactions among classes in terms of an exchange of messages over time. They are also called event diagrams. A Sequence diagram is a good way to visualize and validate various runtime scenarios. These can help to predict how a system will behave and to discover responsibilities a class may need to have in process of modelling a new system.

#### Formalism

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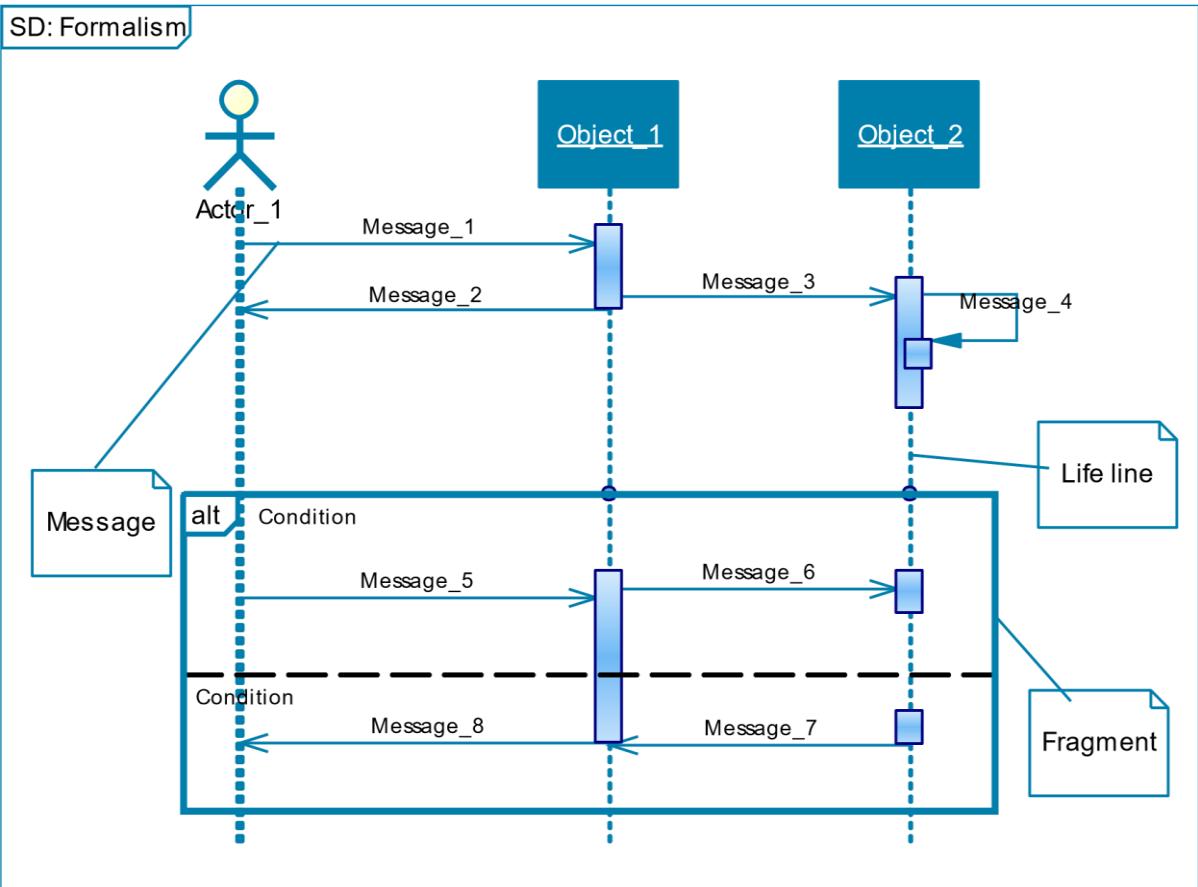


Figure 30: Formalism of sequence diagram

Name	Notation	Description And Main Properties
<b>Object</b>		It represents a participant (entity or a part of the system) that can send or receive messages.
<b>Lifeline</b>		A lifeline represents an individual participant in a sequence diagram. A lifeline will usually have a rectangle containing its object name.
<b>Activation</b>		It is used to show that a participant is active.
<b>Synchronous message</b>		A message sent and requires the sender to receive feedback before another message is sent.

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<b>Return message</b>		It represents the feedback of a synchronous message.
<b>Asynchronous message</b>		A message sent without the sender waiting for feedback.
<b>Self-message</b>		A self-message can represent a recursive call of an operation, or one method calling another method belonging to the same object.
<b>Fragment</b>		It is used to group sets of messages together to depending on a conditional flow. The UML 2.0 provides eleven types of interaction fragments. Some are loops, option.
<b>Destroy message</b>		It destroys a participant in the course of a process.
<b>Reference</b>		It used to represent a sequence diagram in another.



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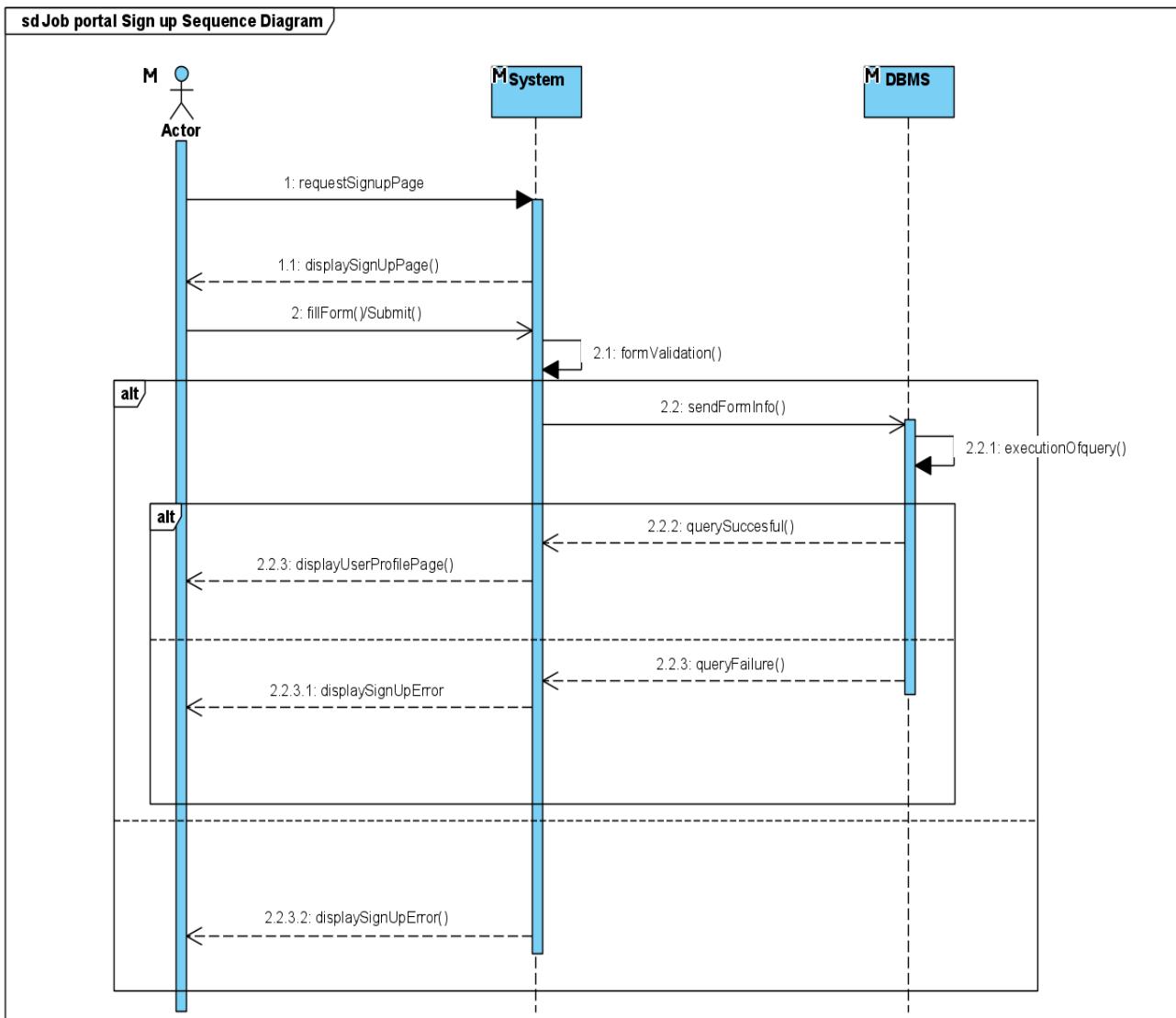


Figure 31: Sign up sequence diagram

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL

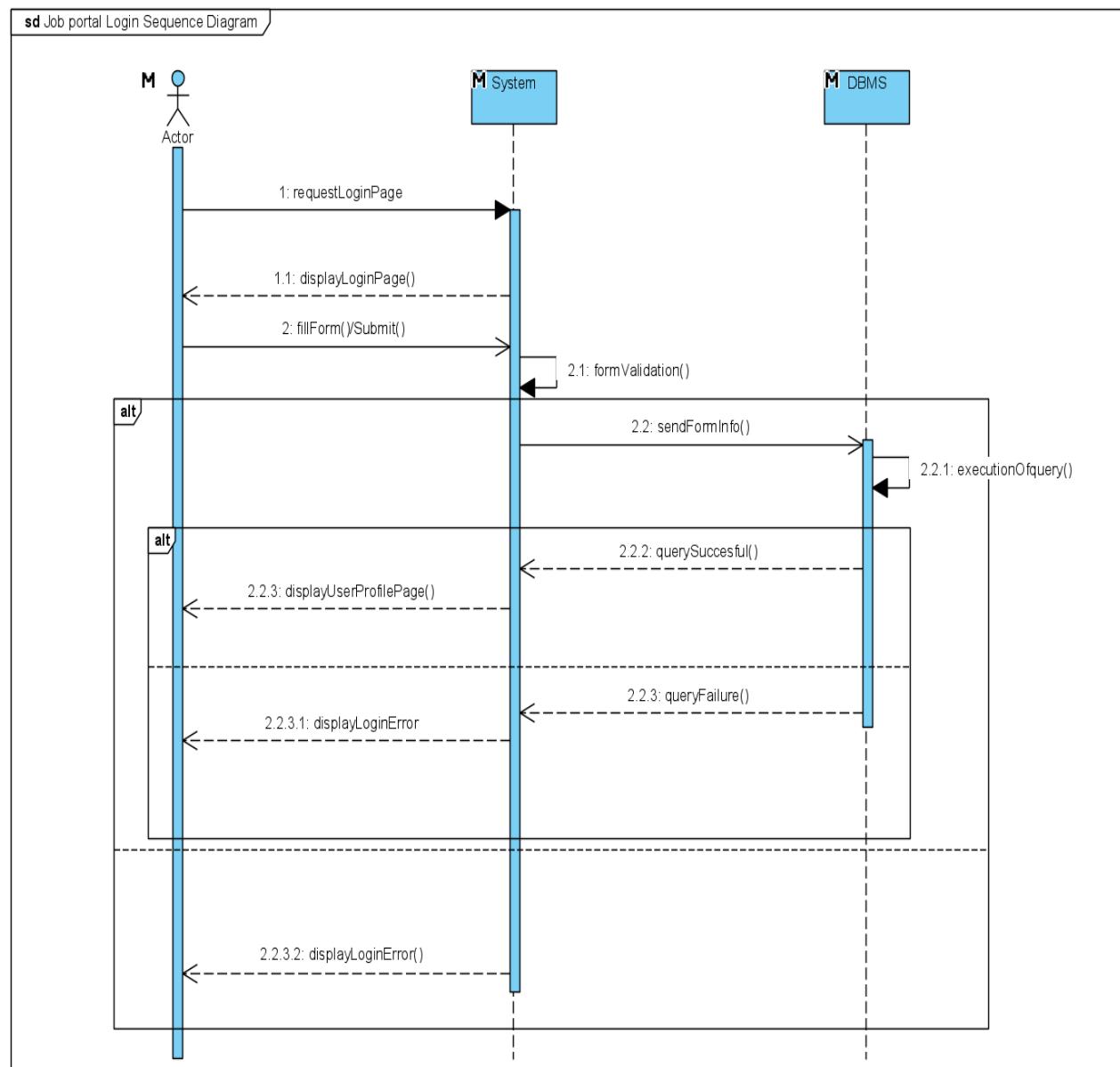


Figure 32: Login sequence diagram

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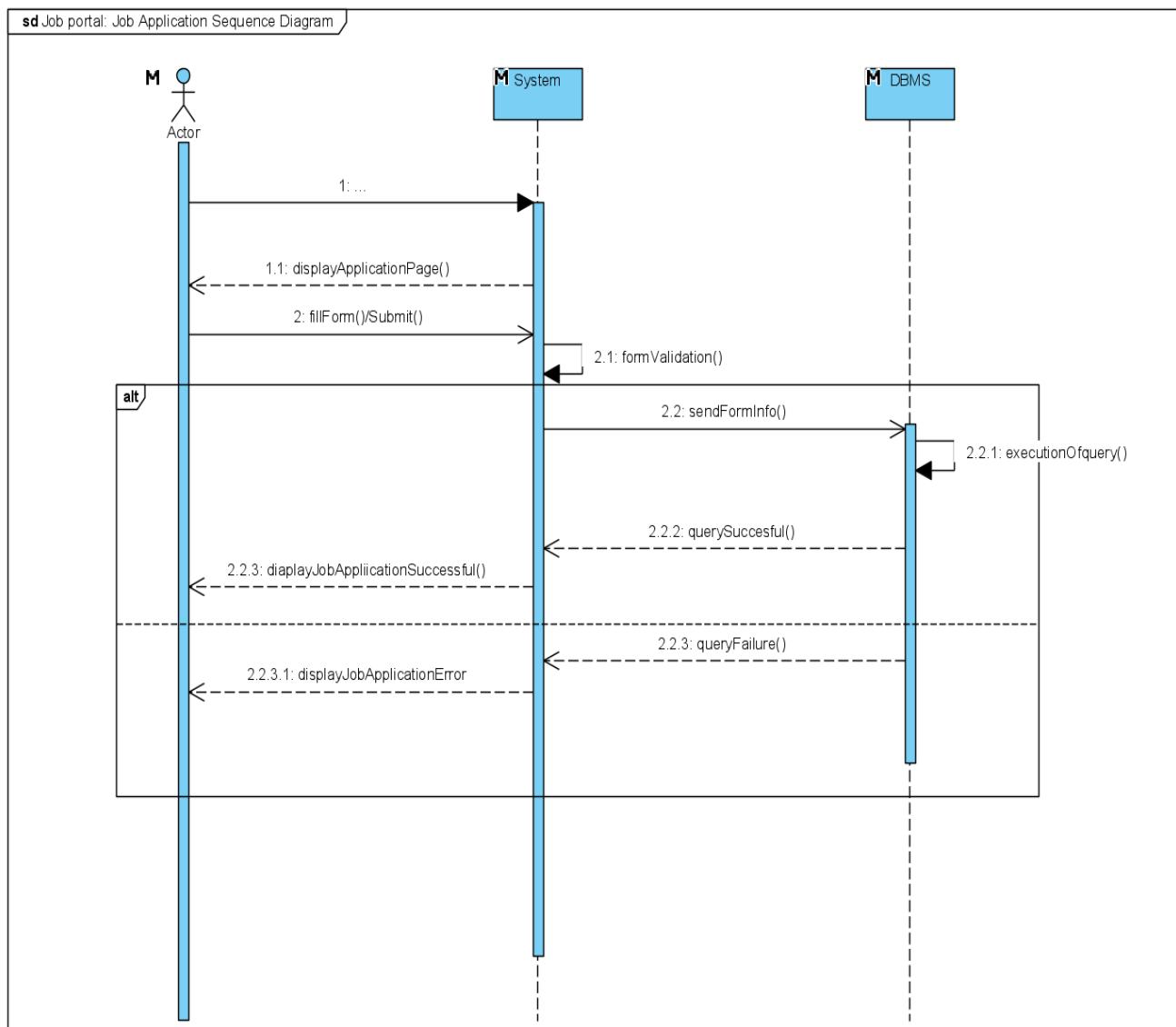


Figure 33: Job application sequence diagram

#### 4.2.2.2 Timing Diagram

Timing Diagram shows the behaviour of the object(s) in a given period of time. A timing diagram is a special form of a sequence diagram. Lifelines in timing diagrams are shown in separate compartments arranged vertically. Timing diagrams focus on conditions changing within and among lifelines along a linear time axis. Timing Diagrams focus on occurrence time of events that cause changes in the modelled conditions of the Lifelines.

Figure 34: Components of timing diagram

Name	Notation	Description And Main Properties
Frame		It contains all the components of a timing diagram. It is a rectangle with its name written at the top-left end.
Lifeline		These are the main participants (objects) involved in the interaction.
State		They define the state of a participant during a particular time interval.
Triggers and Messages		Triggers cause an object to change its state. Triggers are often used when some messages are to be invoked.
Time		This is the time taken by a participant to change from one state to another. Time measurements are placed on a timing diagram as a ruler along the bottom of the page.

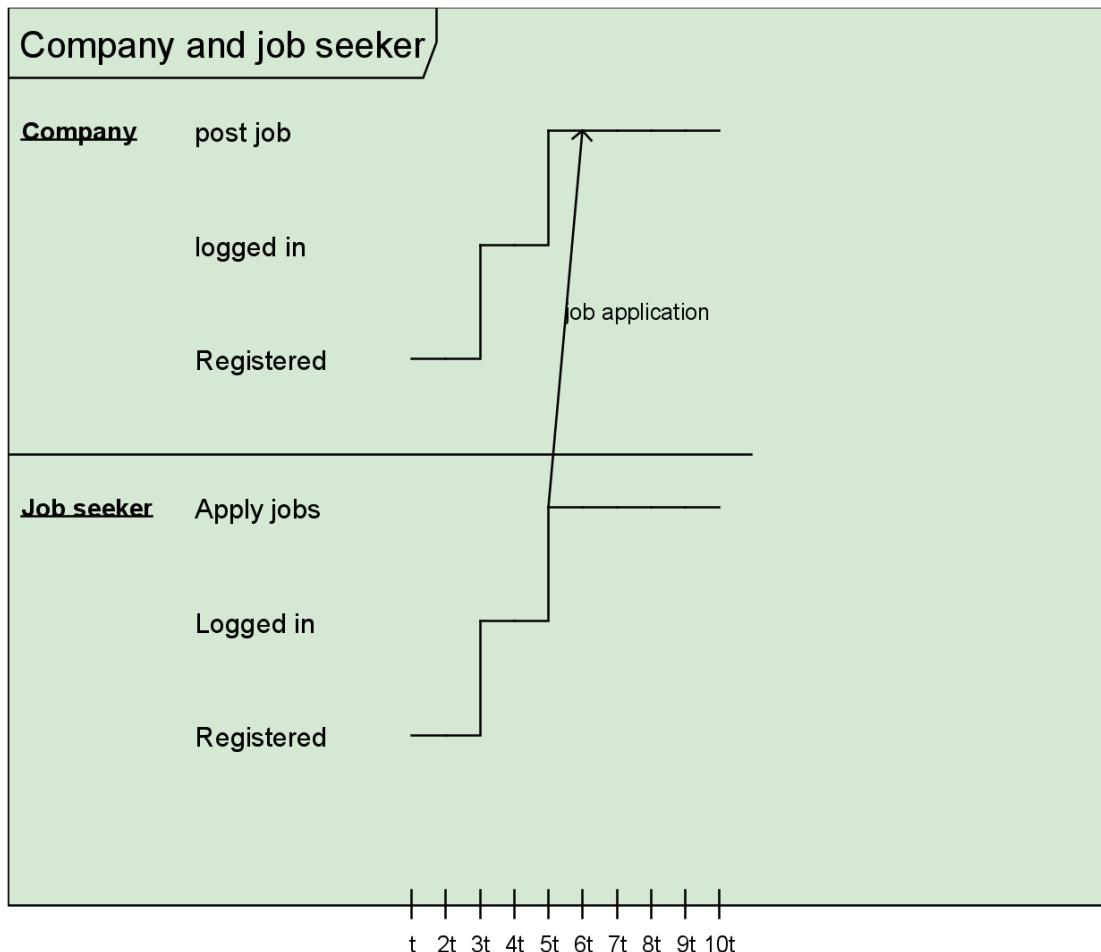


Figure 35: Job application timing diagram

#### 4.2.2.3 Class Diagram

##### Definition

A class diagram represents the static view of an application. A class describes the structure of a system by showing the system's classes, their attributes, operations, and the relationships among objects. Class diagrams are not only used for visualizing, describing, and documenting different aspects of a system but also for constructing executable code of the software applications. Class diagrams also describe the associations<sup>1</sup> and constraints<sup>2</sup> imposed on the system. The class diagram is widely used in the modelling of object-oriented

systems because it is the only UML diagrams which can be mapped directly with object-oriented languages.

## Formalism

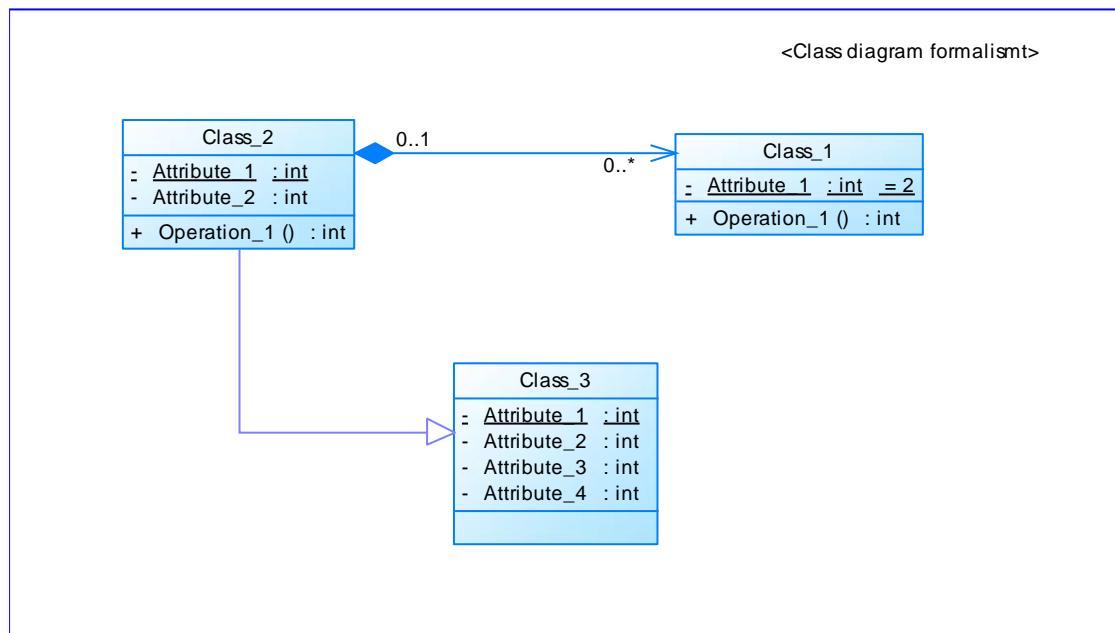
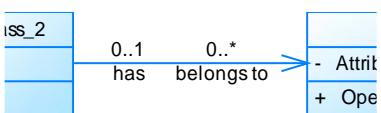


Figure 36: Class diagram formalism

## Components

Table 18: Component of a class diagram

Name	Notation	Description And Main Properties
<b>Class</b>	<div style="border: 1px solid blue; padding: 5px;"> <b>Class_1</b>  - Attribute_1 : int  + Operation_1 () : int </div>	A class is an element that defines the attributes and behaviours of an entity. Classes may also have constraints, values and stereotypes.
<b>Association</b>	<div style="border: 1px solid blue; padding: 5px;">  </div>	An association is the general relationship type between classes. Associations include named roles, cardinality at each end and a direction.

<b>Generalization</b>		A generalization is used to indicate inheritance. It shows a sub class inheriting properties from a super class.
<b>Aggregation</b>		It shows a detailed association between a parent class and a child class. If the parent of an aggregate is deleted, usually the children are not deleted.
<b>Composition</b>		It shows a detailed association between a parent class and a child class. If the parent of a composition is deleted, usually the children are also deleted.

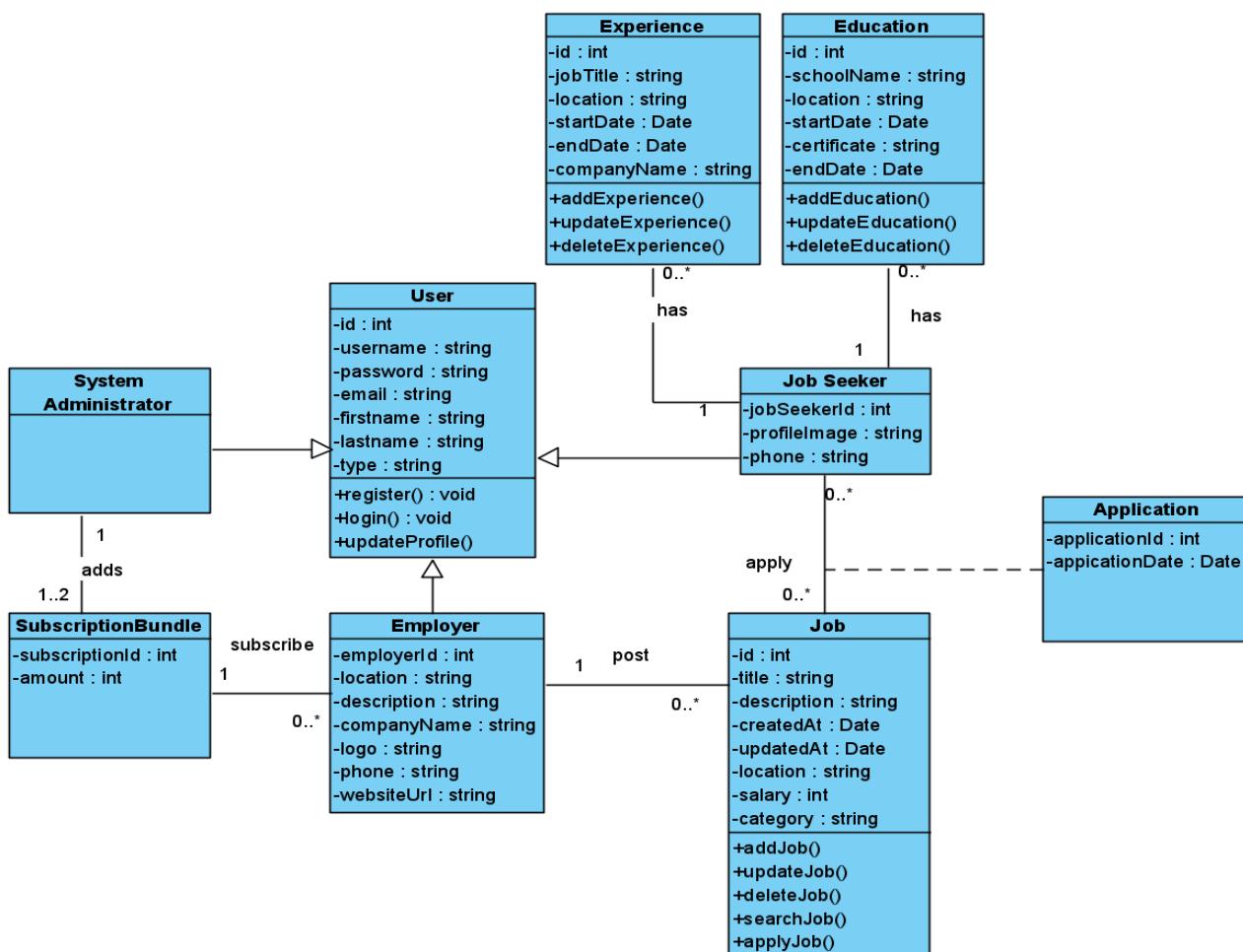


Figure 37: class diagram

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## 4.2.2.4 Object Diagram

### Definition

An object diagram is a graph of instances, including objects and data values. A static object diagram is an instance of a class diagram; it shows a snapshot of the detailed state of a system at a point in time. The difference is that a class diagram represents an abstract model consisting of classes and their relationships. However, an object diagram represents an instance at a particular moment which is concrete in nature.

### Formalism

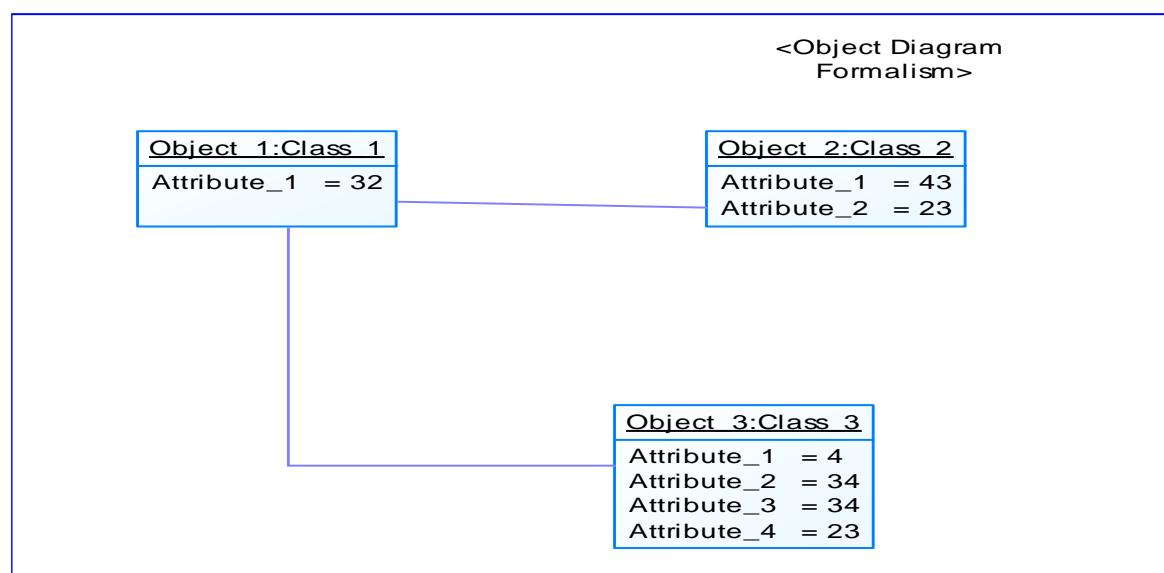


Figure 38: Formalism of object diagram

## Components

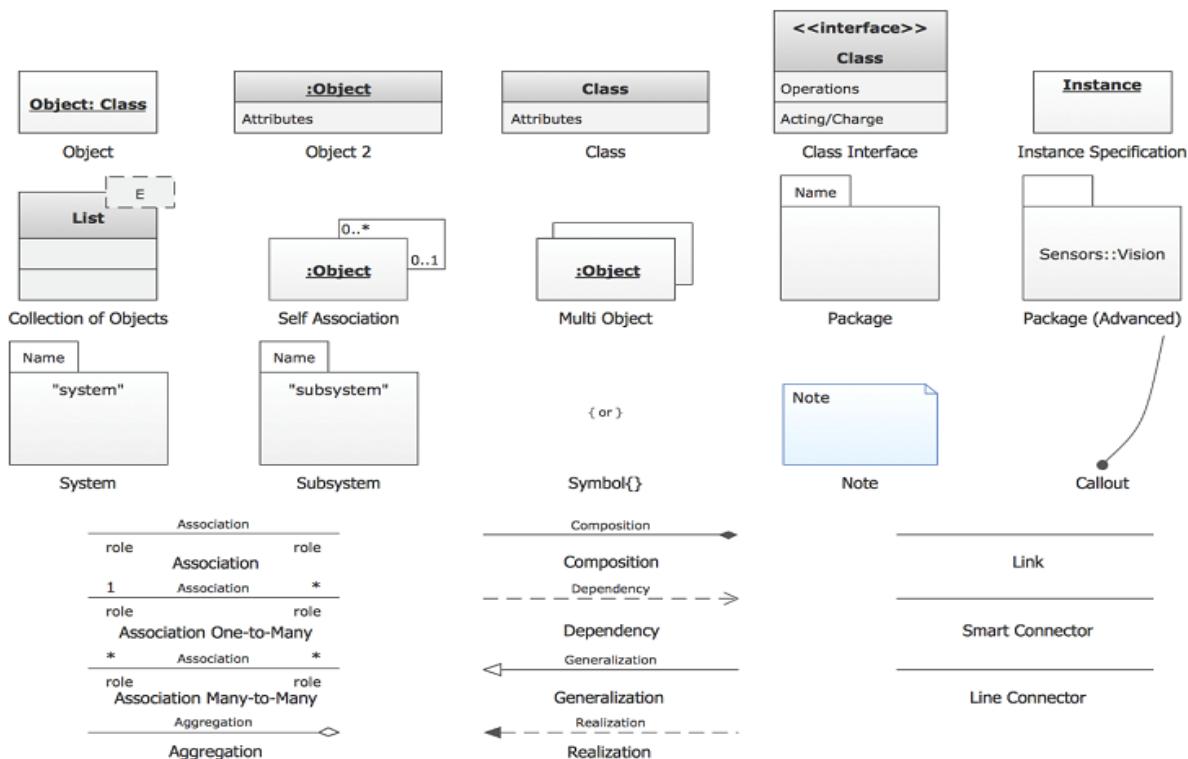


Figure 39: Components of Object diagram

Table 19: Components of Object diagram

Name	Notation	Description And Main Properties
<b>Object</b>	<code>Object_2:Class_2</code> Attribute_1 = 43 Attribute_2 = 23	An object is an instance of a class. Objects sometimes have values and methods.
<b>Instance link</b>	—	An instance link shows the relationship between objects as a result of their resulting cardinality,

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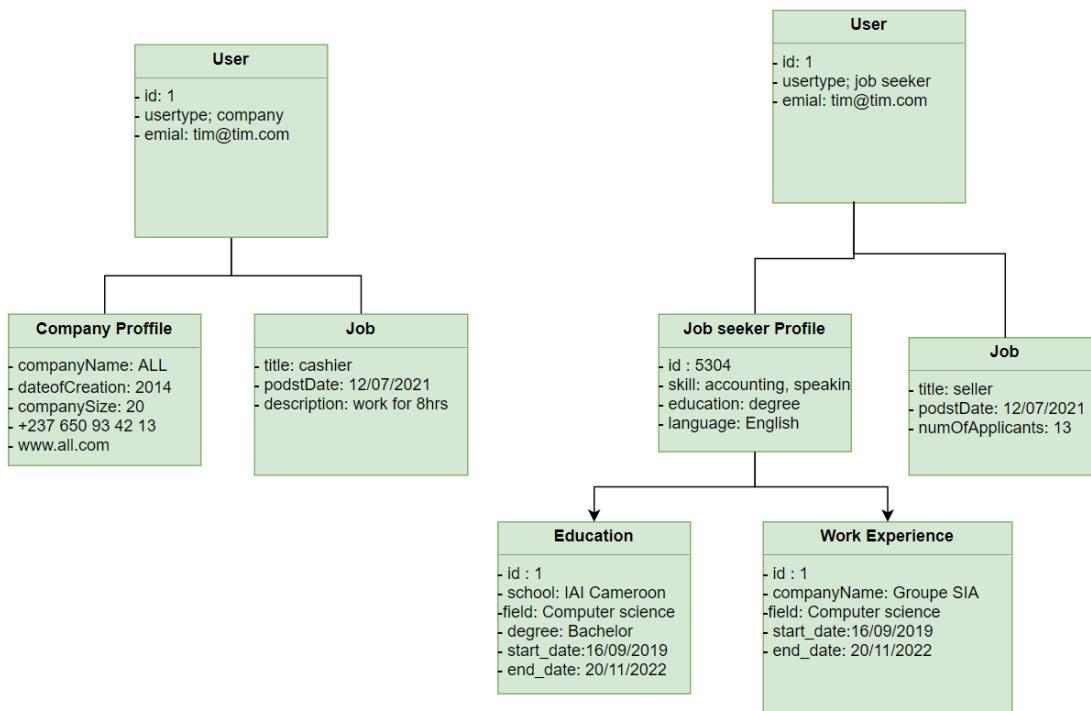


Figure 40: Object diagram for job seeker and Education

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## PART 5: REALISATION PHASE

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## Preamble

This part of the project constitutes the realization and implementation of the application studied in the conception phase. It permits us to describe the development tools and how they will be used to implement the software.

## CONTENT

### INTRODUCTION

- I- PRESENTATION OF DEVELOPMENT TOOLS**
- II- THE PHYSICAL DATA MODEL**
- III- ARCHITECTURE OF APPLICATION**

### CONCLUSION

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## **INTRODUCTION**

The realisation document shows the phase where visions and plans for the project becomes reality. This is the phase where the documented system functionalities of the software are developed. After visualizing the functional and technical aspects of the system, we need to make those aspects become reality by developing the software. In this phase we will present the development tool together with their roles and the physical data model which helps us to estimate the size of the database.

## 5.1 ARCHITECTURE OF THE APPLICATION

### a. Logical Architecture

The logical architecture of an application refers to the structural design that gives as much detail as possible without defining the system technology or environment. The architecture we have chosen for our application is the Model-View-Controller (MVC).

The MVC architecture divides an interactive application into 3 components which are:

- The model: this component corresponds to all the data-related logic of the application. It directly manages the data, logic and rules of the application.
- The view: It is used for all the UI logic of the application. It obtains its data from the model via the controller and each view has an associated controller component.
- The controller: it acts as an interface between Model and View components to process all the business logic and incoming requests, manipulate data using the Model component and interact with views to render final output.

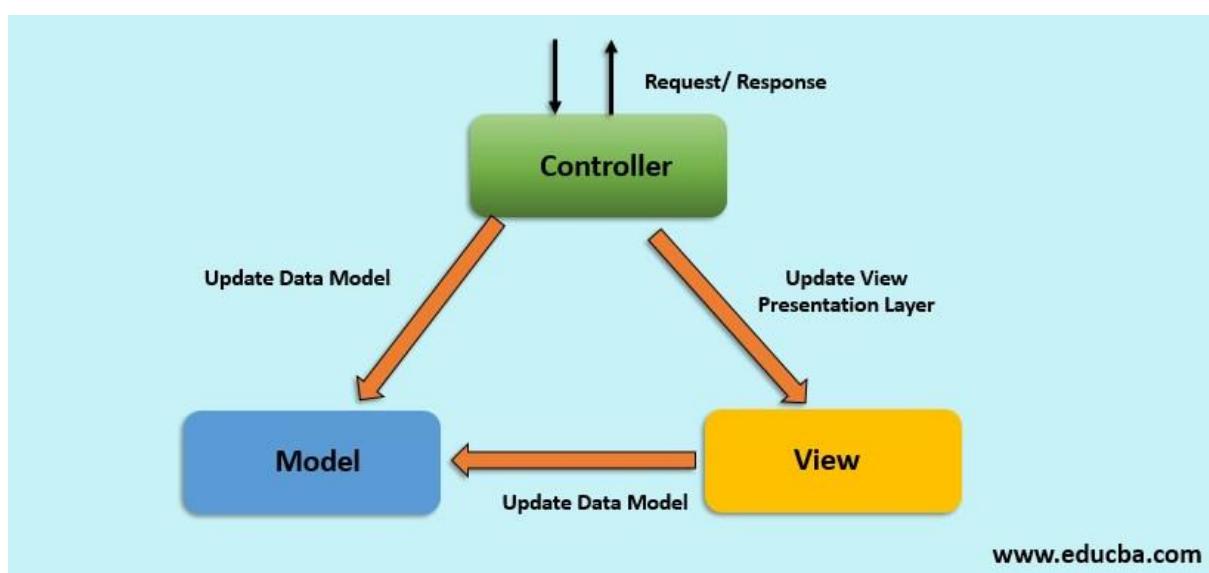


Figure 41: MVC design pattern

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## b. Physical Architecture

The physical architecture represents the physical layout of the system and its components. We implemented a three-tier architecture system.

The three-tier architecture is a client-server software architecture which consists of the user interface (presentation tier), business rules (application tier) and data access/storage tier (data tier).

### 1. Presentation tier:

It is the user interface and communication layer of the application, where the end user interacts with the application. Its main purpose is to display information to and collect information from the user.

### 2. Application tier

The application tier, also known as the logic tier or middle tier, is the heart of the application. In this tier, information collected in the presentation tier is processed - sometimes against other information in the data tier – using business logic, a specific set of business rules. The application tier can also add, delete or modify data in the data tier.

### 3. Data tier

The data tier, sometimes called database tier, data access tier or back-end, is where the information processed by the application is stored and managed. This can be a relational database management system such as PostgreSQL, MySQL, MariaDB, Oracle, DB2, Informix or Microsoft SQL Server, or in a NoSQL Database server such as Cassandra, CouchDB or MongoDB.

In a three-tier application, all communication goes through the application tier. The presentation tier and the data tier cannot communicate directly with one another.

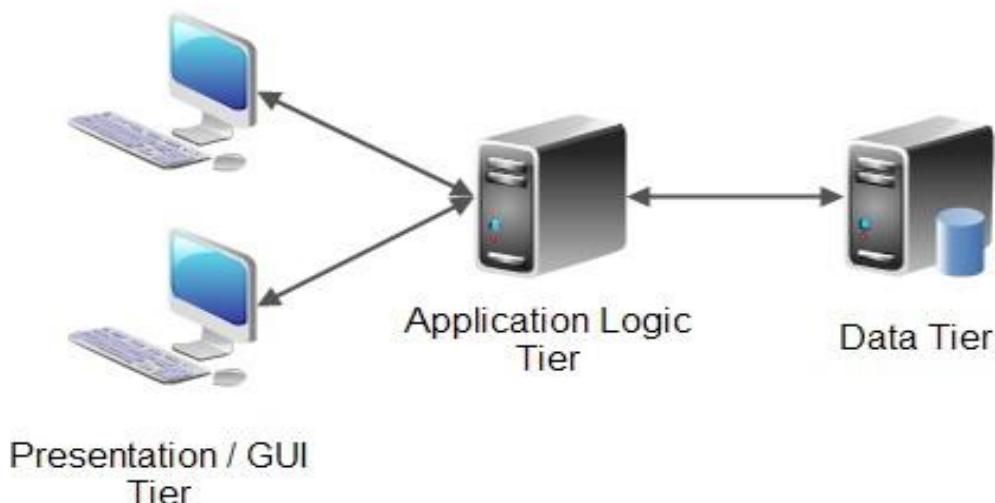


Figure 42: The 3 tier Architecture (source [www.managementmania.com](http://www.managementmania.com))

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## 5.2 PHYSICAL DATA MODEL

The Physical Data Model (PDM) is a schematic representation whose aim is to propose a technical and optimal solution for the physical implementation of data. It permits to describe the data and their links in the form of a specific language of the database management system (DBMS) used.

### 5.2.1 Description of Data types used

Table 20: Description of data types used

Data type	Min	Max	Storage	Type
int	-2,147,483,648	2,147,483,648	4 bytes	Integer
float	-1.79E + 308	1.79E + 308	4 bytes when precision is less than 25 and 8 bytes when precision is 25 through 53	Real number
datetime	1753-01-01 00:00:00.000	9999-12-31 23:59:59:997	8 bytes	Datetime
varchar	0 characters	8000 characters	2 bytes + number of characters	String
Boolean	0	255	1 byte	Exact
text	0 characters	65, 535 characters	4 bytes + number of characters	String
long text	0 characters	4,294,967,295 characters		String



# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL

**GROUPE SIA**  
Intégrateur des systèmes d'entreprise

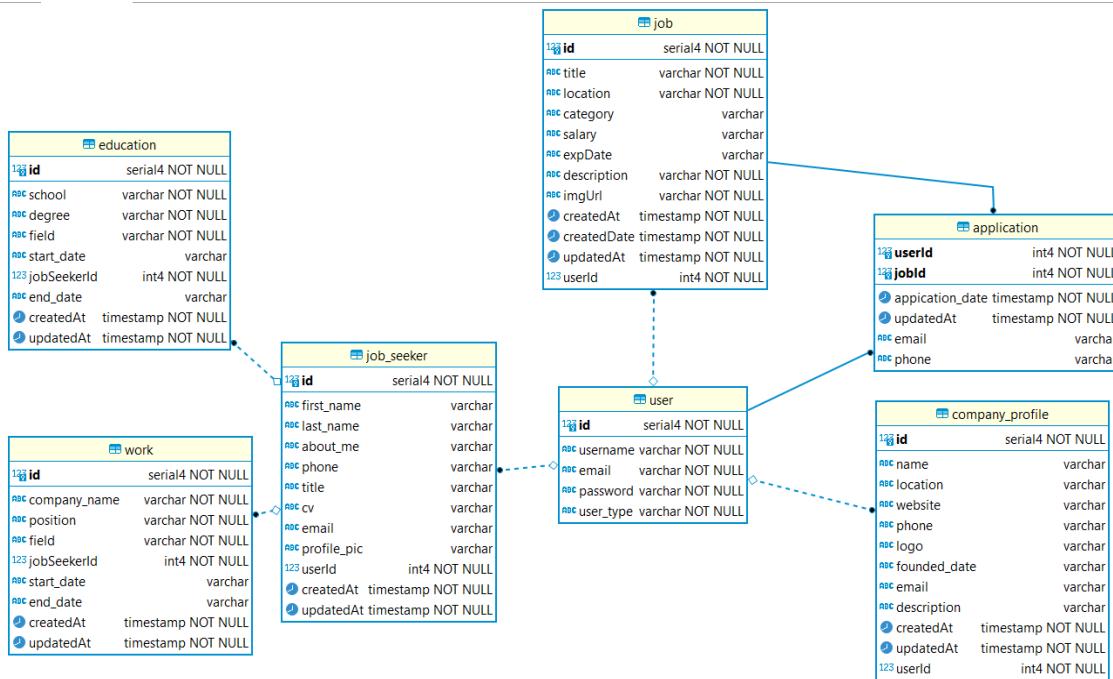


Figure 43: Physical Data model

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## 5.3 PRESENTATION OF DEVELOPMENT TOOLS

A *development tool* is a computer hardware or a software (an application or program) that software designers and developers can use in order to create, maintain, debug, or support other applications. Several software *development tools* can often be combined in order to complete a specific task. The various tools used for the realization of our project are shown below.

### a. Hardware tools

Table 21: Hardware used to realize the system

NAME	SPECIFICATIONS
<b>Computer</b>	Surface Laptop 2, intel core i5 6GB RAM.
<b>Printer</b>	HP Laser Jet P2054dn

### b. Software tools

Table 22: Software used for the realization of project

Software	Roles
<b>OS windows 10</b>	Manages the resources of our computers
<b>Chromium or any browser</b>	Web navigator that is used by the client to have access to the software
<b>Sybase Power Designer</b>	Software engineering tool used for the modelling of the solution
<b>PostgreSQL</b>	Used to manage our database
<b>Gantt project</b>	Used to generate the working time table (state)
<b>Microsoft office word</b>	Software for the treatment of text. Used to produce the final report
<b>Visual Studio code</b>	Development tool that permits to edit the application's code
<b>DBeaver</b>	DBeaver is a SQL client software application and a database administration tool.

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Table 23: Technologies used development of our project

Software	Definition	Logo
<b>Node js</b>	Node.js is a back-end JavaScript runtime environment it brings event-driven programming to web servers, enabling development of fast web servers in JavaScript.	
<b>Next js</b>	Next.js is an open-source development framework built on top of Node.js enabling React based web applications functionalities such as server-side rendering and generating static websites.	
<b>Chakra UI</b>	Chakra UI is a simple, modular and accessible component library that gives you the building blocks you need to build your React applications.	
<b>JavaScript</b>	A programming language commonly used to create interactive effects within web browsers.	
<b>TypeScript</b>	TypeScript is a strongly typed programming language which builds on JavaScript giving you better tooling at any scale	
<b>Graphql</b>	GraphQL is a query language and a server-side runtime (typically served over HTTP). GraphQL lets you ask for what you want in a single query, saving bandwidth and reducing waterfall requests.	

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## CONCLUSION

In this phase of the project, we produced the database script, presented the tools we used to implement the project, described the architecture of our system and presented the main interfaces of the application. In the proceeding phase, we shall describe the installation procedure and provide a user guide.



## PART 6: USER GUIDE

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## **Preamble**

The user guide is document that shows how the application will be installed, deployed and how it should be used. Thus, it enables the users to easily use the application in order to be familiarized with the software and discover all the functionalities.

## **CONTENT**

### **INTRODUCTION**

#### **I- INSTALLATION GUIDE**

#### **II- USER GUIDE**

### **CONCLUSION**

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## **INTRODUCTION**

The user guide's objective is to help the user in installing and using the application smoothly. As such we will be presenting the general view of the application in this part of our project, this part of the report will provide detailed instructions on how to install and use the application.



## 6.1 INSTALLATION GUIDE

This part describes how the application will be installed by the end users. To deploy the application, we need a Database Management System (preferably PostgreSQL). The following steps describe how this application will be installed on Windows 10 operating systems

### 6.1.1 Requirements

1. Node js 14 or higher
2. PostgreSQL
3. Redis
4. Git
5. A web browser with JavaScript support
6. Internet connection

### 6.1.2 Setting up working environment

Installing node js 14.18

#### 6.1.2.1 Installing Node js

1. Open browser and navigate to <https://nodejs.org/en/download/>
2. Select a link to download either Windows 32-bit or 64-bit installer

#### Downloads

Latest LTS Version: 14.18.0 (includes npm 6.14.15)

Download the Node.js source code or a pre-built installer for your platform, and start developing today.

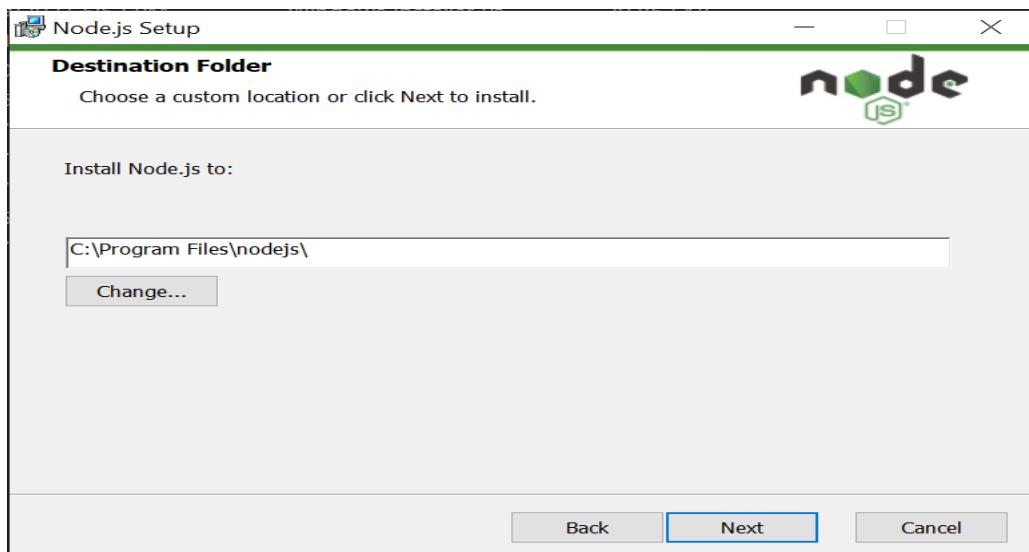
LTS Recommended For Most Users	Current Latest Features
 Windows Installer	 macOS Installer
node-v14.18.0-x64.msi	node-v14.18.0.pkg
<a href="#">Windows Installer (.msi)</a>	32-bit ↗
<a href="#">Windows Binary (.zip)</a>	64-bit ↗
<a href="#">macOS Installer (.pkg)</a>	32-bit
<a href="#">macOS Binary (.tar.gz)</a>	64-bit
<a href="#">Linux Binaries (x64)</a>	64-bit
<a href="#">Linux Binaries (ARM)</a>	ARMv7
<a href="#">Source Code</a>	ARMv8
	node-v14.18.0.tar.gz

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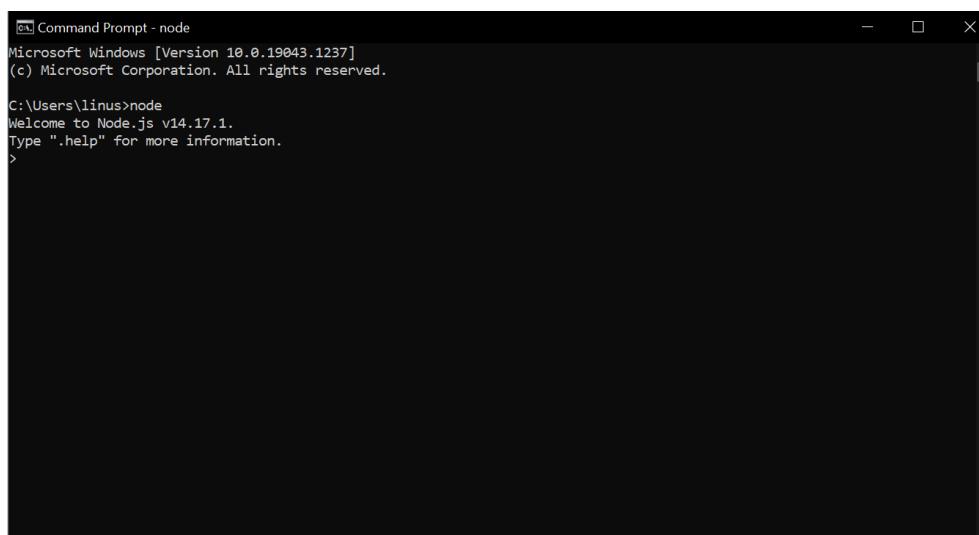


Figure 44: Downloading node js 14 for windows

- Run node js installer once downloaded. Just follow the instructions until installation complete.



- To test installation, type “node” in command line and you will see a prompt like this



## 6.1.3 Installing Application

- Create a folder and clone the git repository from this link:  
<https://github.com/linus5304/job-portal>
- Navigate into the server folder and client folder using the commands

```
$ cd serever && npm install
```

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



\$ cd client && npm install

3. In each of the directories (client and server) run the command

\$ npm dev

## 6.1.4 Usage

1. Home page

Find Your Next Job  
And Make Your  
own Goal.

We are the best global job portal agency and millions  
of people like and trust our platform

Search Type      Location

Job Title      Location

Explore Now

Jobs      Companies      Login      Register

Figure 45: goJobs Home page

2. Register page

Register

Username

Email

Password

User Type

Register

Already have account? [Login](#)

Figure 46: User registration page

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



## 3. Job list page

The screenshot shows the goJobs job list page. At the top, there is a search bar with fields for 'Job Title' and 'Location', and a 'Search' button. Below the search bar, there are three job card snippets:

- Dental Hygienist** by Bob the big, located in Ohio, Full time, Invalid date.
- Chief Design Engineer** by Bob the big, located in California, Full time, Invalid date.
- Pharmacist** by Bob the big.

Each job card includes a green bookmark icon.

Figure 47: Jobs list page

## 4. Employer Profile

The screenshot shows the goJobs employer profile page for a company named 'Bob the big'. On the left, there is a sidebar with icons for Company Profile, Post A Job, Manage Jobs, and Logout. The main area displays the 'Company Profile' section with the following details:

Company name	Email
Bob the big	bob@bob.com
Phone	Location
680553819	Yaounde
Website Link	Founded Date
<a href="https://www.lydewahejiwavy.com">https://www.lydewahejiwavy.com</a>	27/09/2021
Description	
We work with diligence	

At the bottom right of the profile section is a 'Update Profile' button.

Figure 48: Employer Profile page

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# CONCEPTION AND REALISATION OF AN ONLINE JOB PORTAL



## 5. Manage Applications page

The screenshot shows the user interface for managing job applications. At the top, there is a navigation bar with the 'goJobs' logo, 'Jobs', 'Companies', and a 'Profile' button. On the left, a sidebar displays a profile picture of a woman, the handle '@bob', and four menu options: 'Company Profile', 'Post A Job', 'Manage Jobs', and 'Logout'. The main content area is divided into three columns: 'New Application' (containing a card for 'Bayere' dated 'Oct 02 2021'), 'Interview' (empty), and 'Rejected' (empty).

Figure 49: Manage jobs page

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## **CONCLUSION**

During this section of my report, we provided an in-depth guide to installing the dependencies of our application and to run the application. We are confident that this document will help students or other developers to get started with our application. The application's user interface is user friendly and thus requires minimal experience to use.



## **GENERAL CONCLUSION**

Arriving at the end of our project and our internship period, we can say with absolute certainty that the internship was beneficial to us both professionally and personally. The tasks assigned, problems solved and knowledge acquired in the professional environment has given us a better understanding of the day-to-day activities of a software engineer in an organization. We look forward to carrying the experience, knowledge and expertise obtained from this experience to our next projects and assignments.

Our theme “Computerized Management of an Online Job Portal” helped us to get acquainted with analysis, realization and deployment of software applications as well as useful technologies and tools such as JavaScript, TypeScript, Graphql, Next js, Node and PostgreSQL. The analysis was done using UML coupled with the 2TUP process. We then used Visual Paradigm, a modeling software to draw the diagrams of the analysis and conception phase. The application’s backend was coded with Node js, graphql and TypeScript, the frontend with Next js, Chakra UI and TypeScript and we used Visual Studio Code as our text editor. We carried out deployment locally using the node js server (express server). We tested the different pages on the site on Google Chrome, Microsoft Edge and Safari.



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<https://nextjs.org/>: For the definition and documentation on how to work with Next js

<https://www.apollographql.com/blog/graphql/basics/why-use-graphql/>: For definition and documentation on how to work with graphql and apollo

<https://www.typescriptlang.org/>: for the definition and work with types in typescript

<https://reactjs.org/> for documentation on how to work with react react js.

<https://www.youtube.com/watch?v=I6ypD7qv3Z8&t=25183s>: Full Stack tutorial by Ben Awad to explain how to use graphql and other technologies in a project

<https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-uml/>: this site helped us to get the definition and formalism of the different UML diagrams depicted in this report. (Visited throughout the duration of this report's creation).

<https://www.ibm.com/cloud/learn/three-tier-architecture#:~:text=Three%2Dtier%20architecture%20is%20a,associated%20with%20the%20application%20is>: this site helped to give a detailed explanation of the 3-tier architecture

<https://www.linkedin.com/> : helped to understand how most job portals work.

<https://www.smartjobboard.com/>: this site helped by giving me ideas functionalities of my application and the design.



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## **ANNEXES**

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