UNIVERSITY OF NAROBI

School of Computing and Informatics

Online Skilled Labor Hub

Project report prepared by: Okello Job Opiyo

P15/37353/2016

Supervisor: S. N. Ruhiu

June 2017

DECLARATION

This project is my original work and, to the best of my knowledge, has not been submitted for any other award in any University.

NAME: Okello Job Opiyo

REGISTRATION NUMBER: P15/37353/2016

SIGNATURE: _____

DATE: _____

This project has been submitted as partial fulfillment of the requirement of the Bachelor of Science in Computer Science of the University of Nairobi and has been done with the guidance of my supervisor.

NAME:- S. N. Ruhiu

SIGNATURE: _____

DATE: _____

ACKNOWLEGDGEMENT

I am grateful to God for the good health and strength he grants me to learn and for providing priceless people who without their effort and collaboration, this project wouldn't have been a success.

I would like to thank the following people for their contribution to my inspiration, knowledge and other help in working through this project.

1. My parents to make me believe that I could do it.
2. My supervisor Mr. S. N. Ruhiu for his support and guidance even where I thought I could not make it.
3. Felix Ongati, and Navik Bhundis who supported me and contributed a lot to the successful progress of this project.

ABSTRACT

Households experience a hard time in looking for trustworthy and experienced skilled individuals. The tendency is to use 'traditional methods' of word of mouth with neighbors or relatives. Search for house-helps can be greatly improved by use technology including web and mobile.

This project aimed at developing a modern solution to address the difficulties faced by house-holds while looking for assistance in their day to day challenges. An online skilled labor leasing system will therefore be developed to meet this challenges. The web application offers both ease of booking the workers and assures the workers to obtain their standard salary as per the Kenyan laws and regulations.

The application was developed using HTML, CSS, JavaScript, JQuery, PHP and MySQL. User involvement was an integral part of this project and it took place throughout the lifecycle. The result was an application that was very interactive and incorporating a friendly user interface which makes it very easy for the house-holds to use for booking hence providing an overall acceptable application for hiring skilled laborers.

Contents

1 INTRODUCTION

1.1 Background

We are living in a period in time in which the whole globe spins on the concept of the World Wide Web. Ever since the internet came into being late 1990s the world has slowly shrinking into smaller versions of the global village with communications being enhanced to be as simple as a simple finger-click away. With such an advancement the rate of industrializations has also been taking on an automated directions with people rapidly exiting the comfort of their offices and opting for far more mobile means of completing the same tasks thanks to the mobile technology of computers which never seizes to evolve with every day that goes by. That having been said there is a vast number of services that can be available based on the type of mobility experienced by the world thanks to the advent of technological advancement. This services range from educational, financial entertainment to skilled labor leasing services all of which could be availed to any individual in need of one.

Despite having all this services and the flexibility gained from the internet most of the existing systems connecting the *fundis* (skilled laborers) to the clients simply take the clients requests and then they match their needs to the available *fundi* within the system. As convenient as this sounds a lot is usually left unattended to by the system. For instance issues such as the locality of the client and the laborer and the depth of detail of the service to be given to the client are usually overlooked. This project is aimed at tackling such issues and ensuring that the *fundis* will offer services and the clients will get served in a manner in which both of them will be satisfied with what they all receive from each other.

1.2 PROBLEM DEFINITION

In our daily lives we live in households with tools, equipment, devices and services that are integrated to give some level of convenience that enables individuals and even to carry out tasks at with ease. This can range from your electric connection in your, your home's drainage system to the heavy farm equipment safely tucked within the confines of your workshop. This devices and services and devices have become part and parcel of our daily lives that we can't imagine going a day without them knowing the kind inconvenience that awaits us if this devices and service are suddenly omitted from our daily routines. At some point in time this smooth flow of activities is usually interrupted with the breakdown, malfunctioning of such systems in our houses. When such happens many are usually left helpless and desperate for any help that will get the problem fixed and restore the once existing state of balance in our homes. Out of desperation most home owners have ended seeking help from individuals who in one way or the other ended up worsening the situation by their insufficient knowledge of how to tackle the problem at hand. This has led to most of the home owners losing their devices or incurring losses due to failure of home based systems such as electric circuit failure, clogging of drainage systems, and damage to furniture or break down devices household equipment such as refrigerators, television sets and ovens.

Such situations usually require the attention of individuals with a technical knowledge of how the systems devise and equipment work in order to repair and restore them to their previous

working state. When such occurrences take place the home owner usually has to spend a good portion of time scouring browsing through their list of contacts and literally asking hoping to find someone who can offer repair services within a good period of time if luck is on their side. If this fails the home owners are usually forced to abandon all hope and opt to buy new devices, or spend the remaining period of time with the faulty device until their financial ability allows them to make new purchase or installations with respect to the situation at hand.

Home owners are not the only ones who are affected by this for we also have skilled individuals who due to the current economic constrain end up trying to find people in need of their services. In most cases this individuals end up concentrating at particular areas of interest and due to competition and favor most are forced to return home empty handed having taken their services to places where they were less and never getting to individuals who required their services due to being unaware of them.

In the instance where the client and the service provider (*fundis*) get connected through existing labor leasing platforms chances that the clients will be linked to the laborers who is not in their area of locality is also high. This will serve as a disadvantage since the clients will have to wait longer than expected to receive the desired service. The *fundis* might also be a disadvantaged by this since they will end up spending more to get to the clients and end up getting very little from the service they provided to the clients after payment. This can be very discouraging to the laborer.

There is also the issue of ambiguity in the service requested by the clients since most of the existing platforms offer requesting for service in text format. This will be a constraint since it will not provide room for clarity on the specific task to be tackled. This might in turn lead to the *fundi* showing up only to be presented by a task that is beyond the description that he/she received, hence leading to poor service due to misunderstanding and unpreparedness by the labor

The above are among the key areas that will be tackled by this project.

1.3 OBJECTIVES

1.3.1 Research Objectives

i. Research on online labor leasing services and existing platforms.

1.3.2 System development objectives

i. Creating a system that will enable users to login as either clients or workers.
ii. A system that will enable clients to connect to users within a similar geographical so as to save on time and cost of services between both parties.

iii. Creating a system that enables users to evaluate the workers prior to booking them for services.
iv. Workers should be notified once they have been booked for service by the client.
v. Workers should have an easier means of navigation to the premises so as to save on time and provide convenience in service delivery.
vi. Clients should be able to keep track of the services they received.
vii. Workers should also be able to keep a track on the service that they received.
viii. Workers should get equal job allocations once they occur

1.4 JUSTIFICATION

With the current technological advancement a lot of services are moving from traditional "go to the office" type of set-up to platform that can be access by individuals remotely using desktop computers and mobile devices such as laptops, tablets and smartphones. Currently as it stands, 88% of the Kenyan population have access to either mobile phone or internet services meaning approximately 8 out of every 10 Kenyans can gain access to the internet and the World Wide Web using the device of their choice based on their ability. Placing such a service on a web-based therefore ensure access a bigger portion of the population requiring these services. The number of people who will benefit with also increase with the level of urbanization of the individual's locality (Kenya, 2017). Another advantage of having of this service being web-based is that the access will be cross i.e. anyone with a device that has internet access capability will be able to access the services. This will also help in dealing with the vast unemployment currently being faced by youth in the country for they make up a bigger portion of skilled individuals who haven't been able to secure permanent jobs.

1.5 Project scope

This project mainly deals with the connection of skilled laborers and home owners who require their services. This is achieved by creating a meeting point for this two groups of individuals via a website platforms. The project also uses emailing as a main tool of communication during the transactions between the laborers and the homeowners. Mobile banking platform (M-pesa) is also used as the main tool of fund transfer (payment for services) in the system to be developed by the system. The system also focuses on geolocation of the users of the system and navigation using Google maps API for the enhancement of service delivery by the skilled laborers.

1.6 Basic assumptions

During the project the following assumptions of the system and its users had to be made:

- All the users of the system have devices with internet access capabilities.
- All users of the system are familiar with the Google maps API.
- Both the workers and home owners have M-pesa mobile banking accounts.
- All the users of the system have email accounts.

- All the workers of the system have some given level of qualification for the skills through which they serve the home owners.

2 LITRATURE REVIEW

2.1 Introduction

The technological advancement had brought with it a lot of that has been very helpful to the each and every individual that has crossed path with it. A lot of services ranging from educational, governmental, entertainment have moved from the traditional manner of delivery to and can now be accessed at just a click of a finger using mobile handsets (smartphones), computer desktop applications and websites. This and many more have been done with an aim of bring about efficiency and saving time in service delivery, something that was just concept sometime back.

2.2 Professional Employer Organizations (PEO)

Home based services have also taken on the same trend and this has also changed the way a lot of such services are delivered to those in need. This has been done through professional employer organizations which are basically organizations that have a pool of workers with different skills and own various platforms that assist in the deployment of their workers to clients requiring their services but have little or no knowledge on how to get their hands on individual with the professional skills for their day to day household needs. This organizations usually take responsibility of the workers their reporting for duty and payment of wages after each and every task handled by the employee. The workers (skilled laborer) usually gets into a contract with the company/organization which will then connect them to the client. After each task is completed the client will then make a payment to the PEO which will then make the required deduction as per the agreement with the worker before the worker gets the final payment. The PEO also has to ensure that each of its operations are legal as per the law dictated by the authority in the given area of operations (Anon., 2016). Most of the PEOs usually render their services on platform such as Websites and dedicated desktop and mobile applications Despite of the convenience that this brings there are also constrains that may come with it.

Advantages of PEOs

i. Managing certain critical HR service responsibilities such as payroll, benefits and workers' compensation
ii. Shouldering many common employer risks
iii. Provide access to high quality health care
iv. Providing IT infrastructure for HR management
v. Training your employees in both online and classroom venues
vi. Provide their workers with client and market exposure

Disadvantages PEOs

i. The systems might be affected by internet downtimes hence hinder efficient transfer of data between clients and servers in the network.
ii. People with no knowledge of computer and uses

2.3 Preview on existing systems

a) Juakali Kenya

Juakali Kenya is among the current existing systems providing services that link skilled laborers to clients. Their services are rendered on a website platform. Users get to login into the system either as laborers or clients. Once in the system a client will post his or her issue that requires the attention of skilled laborer. The system with then link the client and the best suited laborer. (kenya, 2017)

b) Nani

Nani Kenya is also another professional employer organization. It mainly though similar in mode of operations to Juakali Kenya, it uses a rather different approach when it comes to acquiring the laborers which is not conducted on the website but applications which are sent to the organization through emails and interviews to determine who to employ/manage. Only the clients get to interact which the website for a better part of the websites operation. (Nani, 2017)

c) Lynx Kenya

It's another existing similar system but now in Kenya. It is an online platform aiming at bridging the gap between the informal sector and households. (Lynk, n.d.)

An employer can go to site, inform them what kind of service he or she needs. They then match your needs / specifications to the professional most suitable to the task and presents them to the employer. The employer then chooses the professional that best fits him or her. The company then contacts the professional about the opportunity and give him/her the details. (Lynk, n.d.)

A pretty neat system. Though the domestic workers, though called Lynk professionals, lack a profile. Therefore, to get an accurate match to the employer's needs, the employer is forced to first extensively elaborate on the service he / she requires. Additionally, employers are unable to view the recommendations or even give recommendations to the domestic workers, instead are to believe in the company's opinion. (Kenya, 2017) (Anon., 2016)

.

2.4 Shortcomings of existing systems

All the above systems have contributed greatly towards bridging the gap that exists between home owners and the skilled laborers in the society. This therefore creates a basis for the development of similar systems with even better properties. The systems above however had a few critical areas that require some attention and they include the following:

i. **Geographical positioning of users -** the geographical positioning of both the worker and the clients is very key ensuring efficient service delivery in the system. On the clients side there is a lot that has been left out, for instance when a client is registering into these system or booking an employee for a given task he/she is given very little to clarify on his location of residence. Most of the professional employer organizations owned websites and mobile based systems basically just give the client or employee a list of options to pick from when specifying their locations. This normally include estates names, gate numbers and generalized administrative location term. This may therefore imply that that the platform was created with a specific group of individual in mind i.e. the financially well-off in most cases. This will therefore leave the individual from the suburbs feeling left out of place when it comes to signing up and joining such system as they feel that the system doesn't really represent them well.

ii. **Navigation of workers during order delivery -** From the above description we can clearly see that the navigational capabilities of employees will be somehow crippled since they will be issued with job orders with a vague knowledge of who they are going to serve and where exactly they are supposed to go (the client's premises). To supplement for this a good amount of time will be spent with the employee and the client being on phone or texting so as to aid the navigation of the worker to the worker to the client's premises. Most clients though after receiving an outstanding service, would rather for more traditional ways of seeking skilled labor services so as to avoid the repeat of such an experience. Workers may also be ferried from very distance locations only to come and deliver a service whose payment that may well be less than what they spend getting to the client's premises from own area of residence hence leading to losses.

iii. Equality in job allocation - Most of the existing employee leasing systems also base the quality of their services on the worker's level of experience. This mostly presents itself in the form of employee profiling. In such a scenario a worker with a higher level of experience gets booked for most of the job orders leaving most of the novice workers only getting to work on lucky picks. This is done forgetting that for one to gain experience he/she must get in the field and work. This will in

return dampen any willingness by a worker to learn and consequently leave the organization.

3 SYSTEM ANALYSIS AND DESIGN

3.1 SYSTEM ANALYSIS

3.1.1 INTRODUCTION

System analysis refers to the process of examining the proposed system to understand its constraints, procedures and functions. This involves gathering of information of how the system can be built to suit user needs and also defining the system requirements. Prior to all the above a feasibility study should be carried out on the system.

3.1.1 FEASIBILITY STUDY

Feasibility is the process of measuring how the development of the proposed system will be beneficial or practical to the target group or users.

3.1.1.1 Operational Feasibility

It is the measure of how well the solution will work and also of how people feel about the proposed system.

The process of acquiring a job item by a home is usually a tiring one if the given home owner does not have the knowledge professional employment organizations. Similarly the process of acquiring a job item for a skilled unemployed individual will be equally as straining. The proposed should be enable the ease this situation by creating an environment where this two groups of individuals get to interact in a seamless manner.

3.1.1.2 Technical Feasibility

It is the measure of the practicality of the proposed system with regard to availability of technical resources and expertise.

The proposed system is a web based and uses emailing technology for communication between the system (organization), the clients and the workers. To achieve all these existing web based technologies that are free to acquire and used will be utilized. These technologies and resources include HTML, CSS, JavaScript, PHP and MYSQL as the scripting languages which will be used alongside software resources that include PHP-Storm editor, WAMP-Server local web hosting software and Google Chrome browser as the testing environment for the website during development.

3.1.1.3 Schedule Feasibility

This is the measure of how reasonable the timeline for the proposed system is.

Thirteen weeks is adequate enough to build the web application and mobile application to completion. This is as there exists the technical expertise required for building the system.

3.1.1.4 Economic Feasibility

This is the measure of the cost-effectiveness of the proposed system in terms of building the system and the returns after the system is complete and functional.

The proposed system will be made by software tools which are open source hence free and this makes the system building cost to be almost negligible. No further personnel services will be required during the development of the system making the whole process easy to carry out to completion without any further constrains.

3.1.2 RESEARCH METHODOLOGY AND DATA GATHERING

This is the manner in which the problems to be solved while creating a new system will be identified and solved. In this case the internet will be of great use in providing the information on the existing systems and the problems being faced by the existing.

User based reviews on the existing platforms will also be useful in giving the general outlook of the systems and the level of satisfaction currently being given by the organizations to their users.

If need be the owners of the systems will be contacted and brief interviews conducted with an aim of gaining more clarity on how the systems are deployed and mode of functioning.

i. **Interviews**
   In this instance interviews were carried with a few casual laborers and regular home owners as key respondents in order to identify the type of services they require and how the laborers got and handled the casual jobs. This also enabled the evaluation of the payments received by each worker on a daily basis i.e. when they are presented with a job item.
ii. **Review of existing systems**
   The existing such as Juakali.coke were also visited so as to determine how they also worked and also identify the major points of weakness as described by the users during the interviews. This also enabled the acquisition of first-hand experience when it came to acquiring personal opinion on the system.
iii. **Online reviews by other sites**
   Reviews by other sites who are major stake holders in the market were also taken into consideration as they gave a better outlook of the system due to experience in the current market and the vast nature of their comparison with even more precision involved.

3.1.3 SYSTEM DEVELOPMENT METHODOLOGY

The system will be developed using the Waterfall Project Management model. The model will contain the following steps:

i. **Requirement specifications**
ii. **Analysis and System design**
iii. **System coding**
iv. **Testing and Debugging**
v. **Deployment and Maintenance**

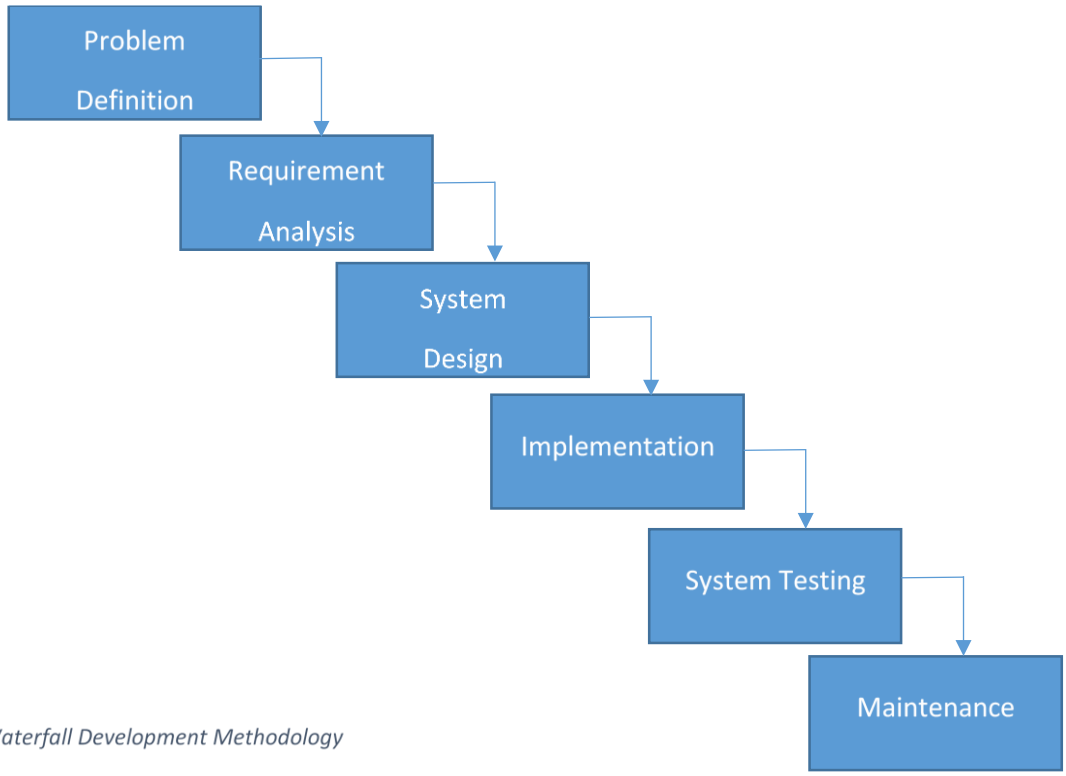


Figure 1: Waterfall Development Methodology

3.1.4 Data analysis

3.1.4.1 Requirement Specifications

At this stage, knowledge about the existing systems from the interviews and reviews of the existing systems will be used. This will define their demerits and any other extra information that the users would like included in the proposed system.

Functional requirements

The system should be able to meet the following functional requirements:

i. Give users the ability to create accounts based on their interests i.e. clients or skilled laborers
ii. The system should allow clients to request for services
iii. Allow the skilled laborers to post the services which they offer on the website
iv. The system should enable the notification of the laborers once there is a pending duty for them to attend to.
v. The system should enable the clients to make payments for their service and also enable the payment of the laborers upon the completion of each domestic task.
vi. The system should enable the cancellation of job orders by both the workers and the clients of need arises.
vii. The system should enable the clients to be refunded in the instance of job cancellation unavailability of the workers on the said date of the delivery of the job order.
viii. The system should enable the clients to keep track of all the services that they received and for the workers to also keep track of the clients that they have served.

Non-Functional Requirements

The system should be able to meet the following non-functional requirements:

i. Usability: The system should have a user interface that is easily usable by the clients.

ii. Security: The system should not allow the clients to be able to access data in the system without registering first.

iii. Reliability: The system should be accessible at any given time.

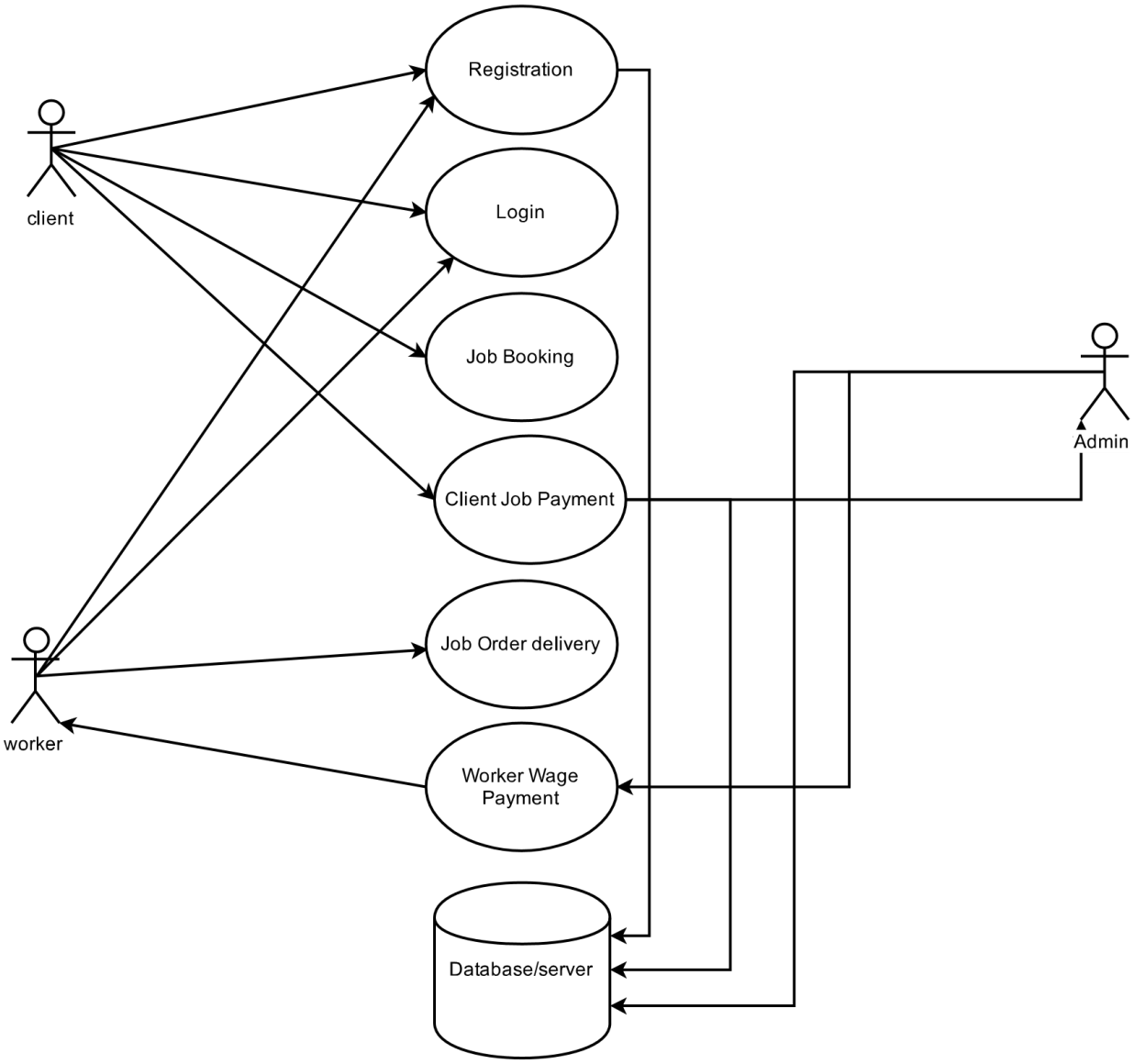
iv. Accuracy: The system should be able to send emails to the specific client and workers and allow emails to also be sent to the organization for communication purposes.

3.1.5 System analysis models

This is a problem solving method that involves looking at the wider system, breaking apart the parts and figuring how it works in order to achieve a particular goal as dictated by each portion of the system.

3.1.5.1 Use Case diagram

Use case models give high level description of system by outlining the interaction between the users of the system and the system itself. This enables the modelling of the systems functionalities to the system requirements collected during the requirements stage of the system development life cycle. Use case diagrams use cases which are the various functionalities of the system and the actors who are the entities that interact with the various uses cases found in the system.



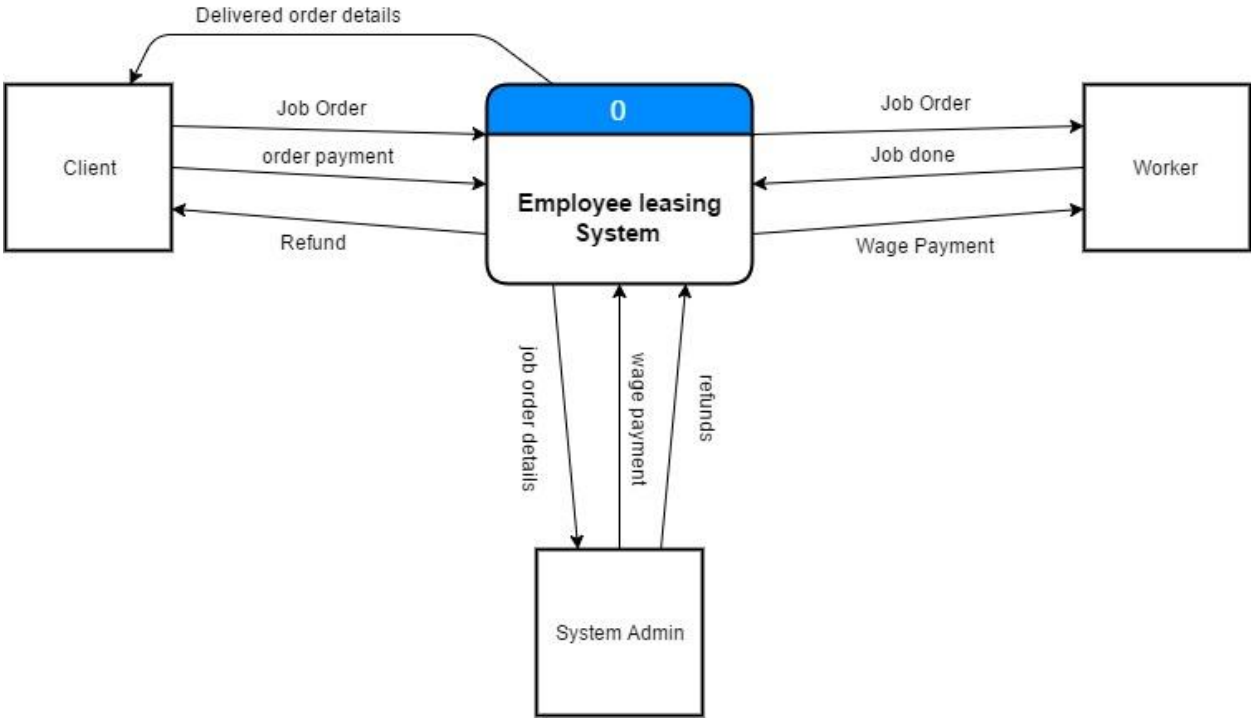
The table below shows the Use Case diagram description with respective actors.

USE CASE	ACTOR	DESCRIPTION
Register	Client Worker	This enables both the client and the worker to both to sign-up for services in the system by handing in their relevant personal information.
Login	Client worker	This enables both the client and the worker to log into their respective accounts and carry out their respective activities in the system
Job Booking	Client	This enables the client to make a booking for a worker available in his area of locality
Job Order Delivery	Worker	This informs the worker of a new job order and gives them instruct on how and where to deliver it
Client Job Payment	House-help Client	After receiving a match for the respective job order the clients is required to pay for the job order prior to receive the job order.
Worker Wage Payment	House-help system Admin	Once an order has been delivered the worker will get paid through the systems administrator.

3.1.5.2 Data flow Diagrams

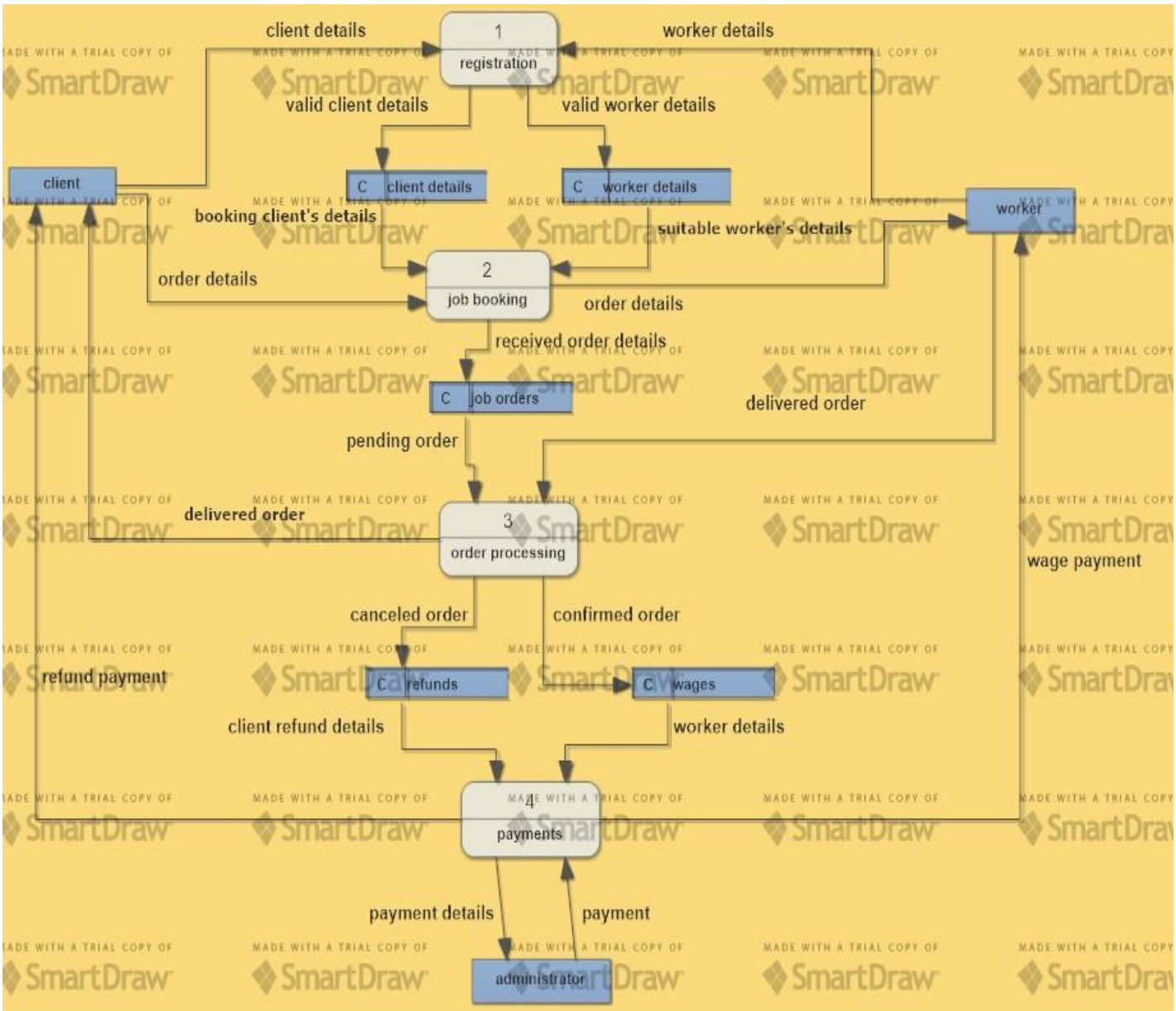
Context diagram

The diagram below shows a level 0 Data flow diagram which gives an impression of the major flow of data items through the system as the entities interact with the system.



Level 0 Diagram

This is dataflow diagram that explodes all the major processes of the system associated with all the data flows and data stores in the system as the users of the system get to interact with the system.



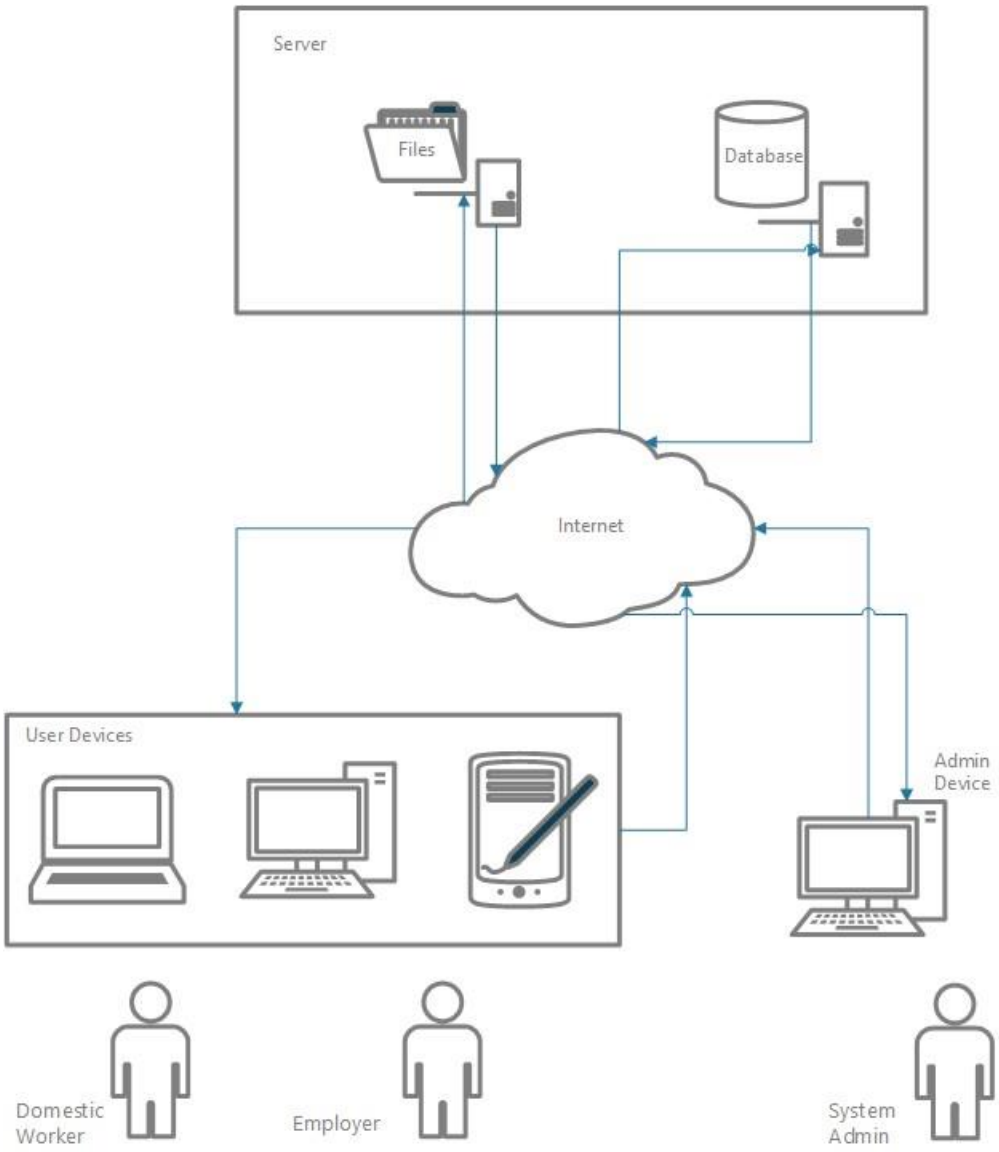
3.2 SYSTEM DESIGN

3.2.1 INTRODUCTION

System Design involves the conversion of the function models from System Analysis into models that represent the actual solution to the problem being solved.

From the functional requirements and non-functional requirements yielded from the analysis phase, designs for the system were made.

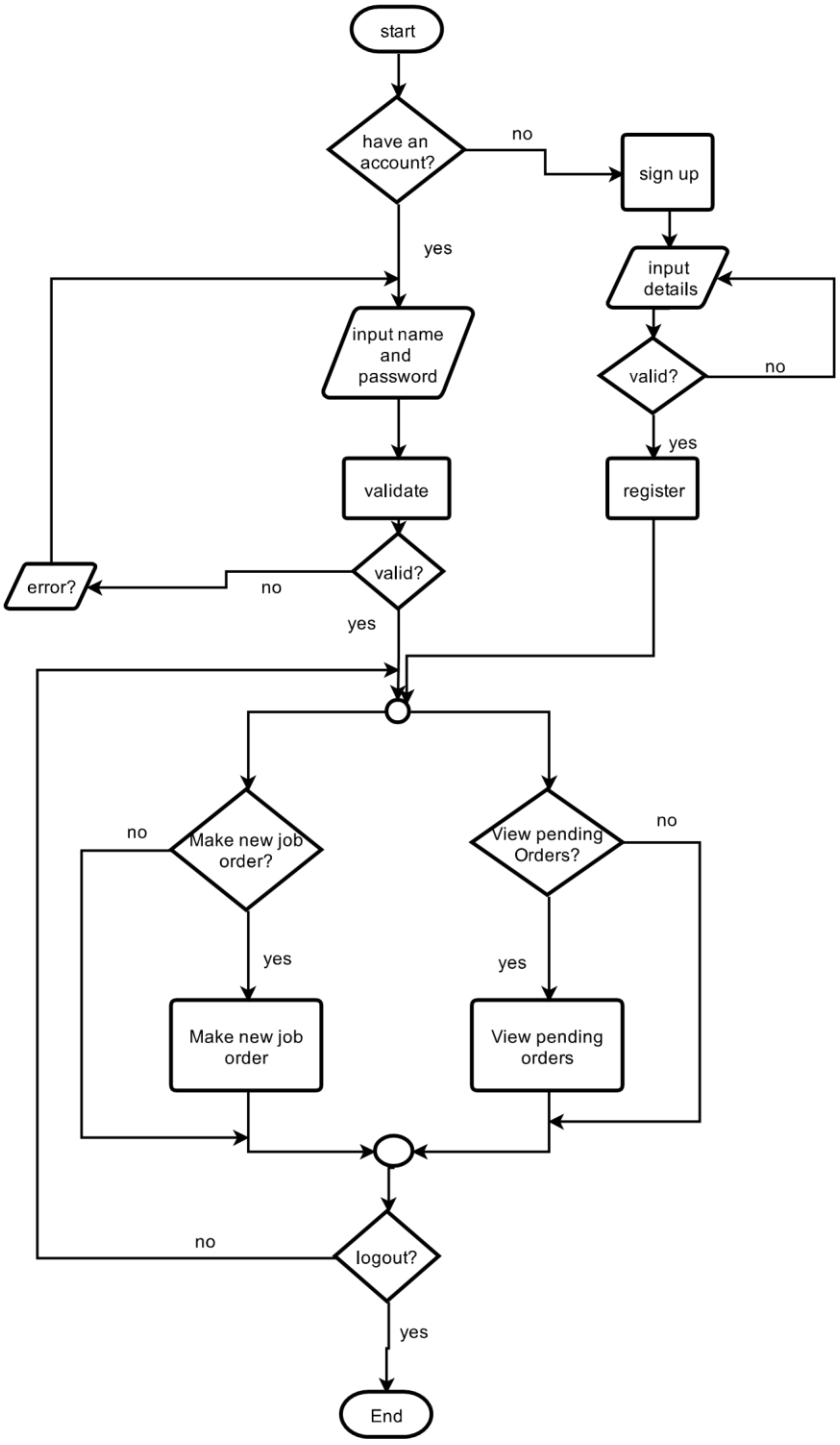
3.2.2 THE CONCEPTUAL MODEL



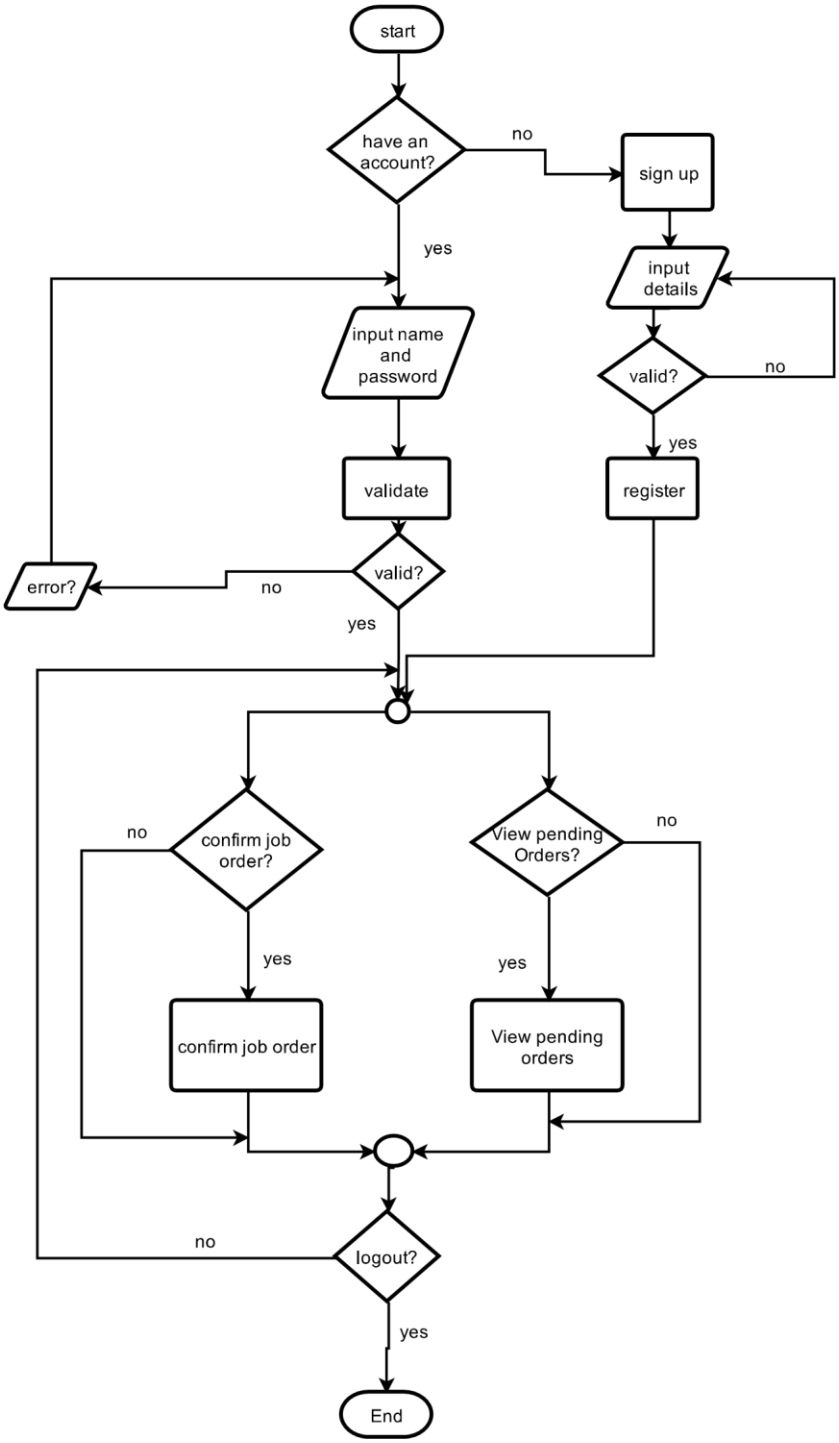
3.2.3 THE SYSTEM FLOW CHART

This are chart that represent the sequence of events that take place when the users of system get to interact with the system and carry out their various activities.

3.2.3.1 Client Flow Chart



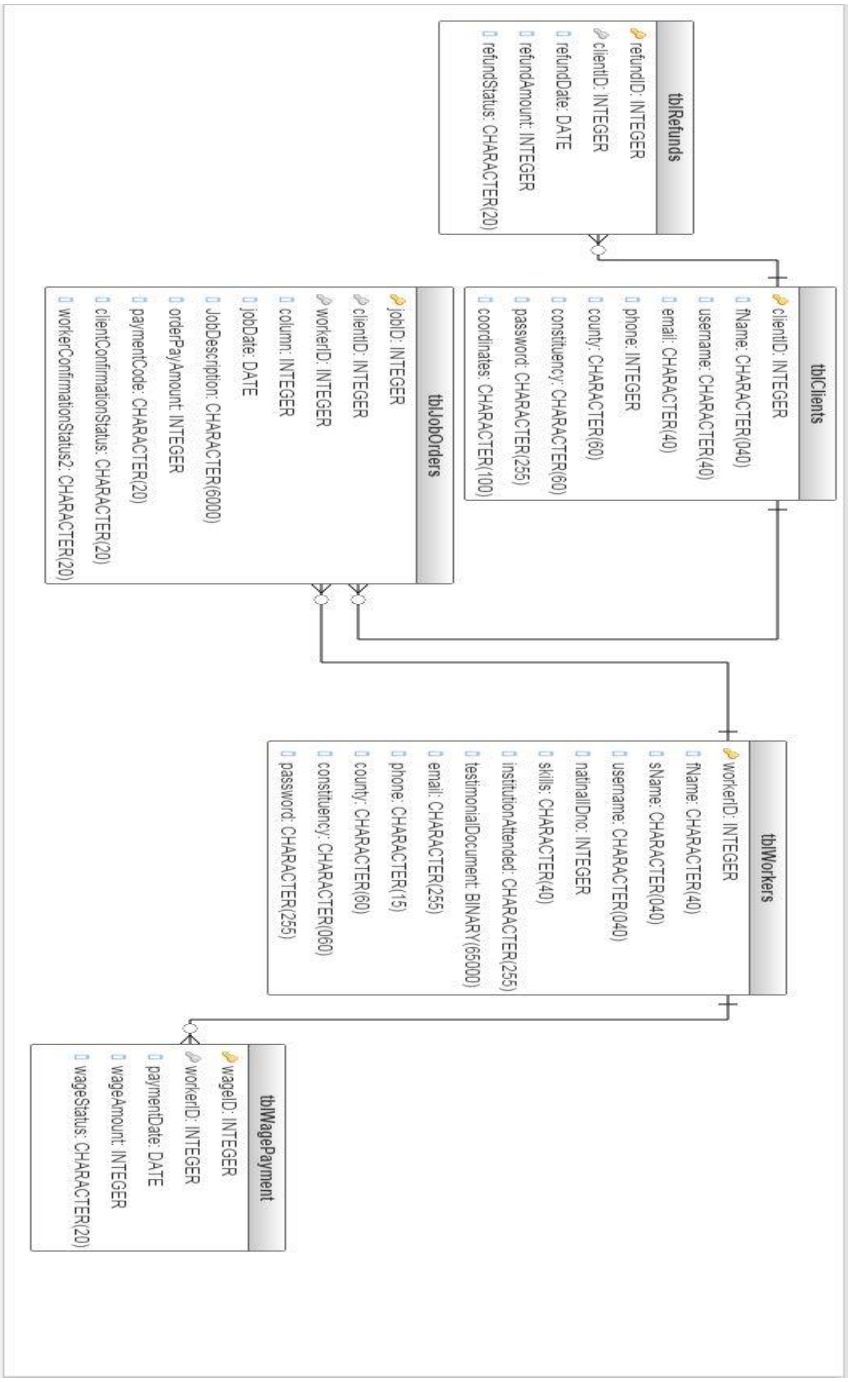
3.2.3.2 Worker flow chart



3.2.4 Database Design

3.2.4.1 Entity relationship diagram

This is diagram that gives a diagrammatic representation of the system's database. When the users of the system get to interact with the data entered or generated by the system is stored in the systems database with their relationship being as depicted in the figure below



3.2.4.2 Data dictionary – data elements

tblClients

Name	Description	Datatype	Length	Default value
clientID	Contains a unique identifier for a client in the system	integer	10	none
fName	Contains the client's first name	Variable character	50	none
sName	Contains the client's last name	Variable character	50	none
username	Contains the clients username as per the system	Variable character	50	none
email	Contains the client's email address	Variable character	50	none
phone	Contains the client's phone number	integer	15	none
county	Contains client's county of residence	Variable character	50	none
constituency	Contains client's constituency of residence	Variable character	50	none
coordinates	Contains the client's exact location on the map	Variable character	100	none
password	Contains the client's secret account access key	Variable character	255	none

tblWorkers

Name	Description	Datatype	Length	Default value
workerID	Contains the worker's unique identifier in the system	integer	10	none
fName	Contains the worker's first name	Variable character	50	none
sName	Contains the worker's last name	Variable character	50	none
username	Contains the worker's username in the system	Variable character	50	none
natinalIDno	Contains the worker's national identification card number	integer	8	none
skills	Contains the worker's service skills	Variable character	50	none
InstitutionAttended	Contains the tertiary institution attended by the worker to obtain the skills	Variable character	100	None
testimonialDocument	Contains a document for the verification of the skills and institution provided by the worker in the system	binary		none
email	Contains the workers email address	Variable character	100	none
county	Contains the worker's county of residence	Variable character	50	none
constituency	Contains the worker's constituency of residence	Variable character	50	none

passWord	Contains the worker's secret account access key	Variable character	255	none

tblJobOrders

Name	Description	Datatype	Length	Default value
jobID	Contains the unique identifier for a job order made by a client in the system	integer	10	none
clientID	Contains the unique identifier of the client who made a job booking in the system	integer	10	none
workerID	Contains the unique identifier for the worker in the system assigned the task of serve the client who made a job booking	integer	10	none
jobDate	Contains the set date for the delivery of service for job booking made	date	12	none
jobDecription	Contains the brief description of the task to be performed by the worker as given by the client who made the job booking	Variable character	6000	none
orderPaymentAmount	Contains the amount payable for the job order made by the client	integer	10	none
paymentCode	Contains the M-pesa payment confirmation code for the payment made for the job booking by the client	Variable character	10	none
clientConfirmationStatus	Contains the client's confirmation status on the delivery of service for the job booking made	Variable character	15	pending
workerConfirmationStatus	Contains the worker's confirmation status on the delivery of service for the job booking made	Variable character	15	pending

tblRefunds

Name	Description	Datatype	Length	Default value
refundID	Contains the unique identifier for the refund to be paid to the client upon cancelling of job order	integer	10	none
clientID	Contains the unique identifier of the client to be refunded	integer	10	none
refundDate	Contains the date on which the refund was given to the client	date	12	none
refundAmount	Contains the amount payable to the client as refund	integer	10	none
refundStatus	Contains the status of the refund payment	Variable character	12	pending

tblWagePayment

Name	Description	Datatype	Length	Default value
wageID	Contains the unique identifier for the wage payment to be made upon the successful completion of a job order	integer	10	none
workerID	Contains the unique identifier of the worker to be given wage payment	integer	10	none
paymentDate	Contains the date on which the wage was given to the worker	date	12	none
wageAmount	Contains the amount payable to the worker as wage	integer	10	none
wageStatus	Contains the status of the wage payment	Variable character	12	pending

3.2.5 System application design

3.2.5.1 Systems Homepage Framework

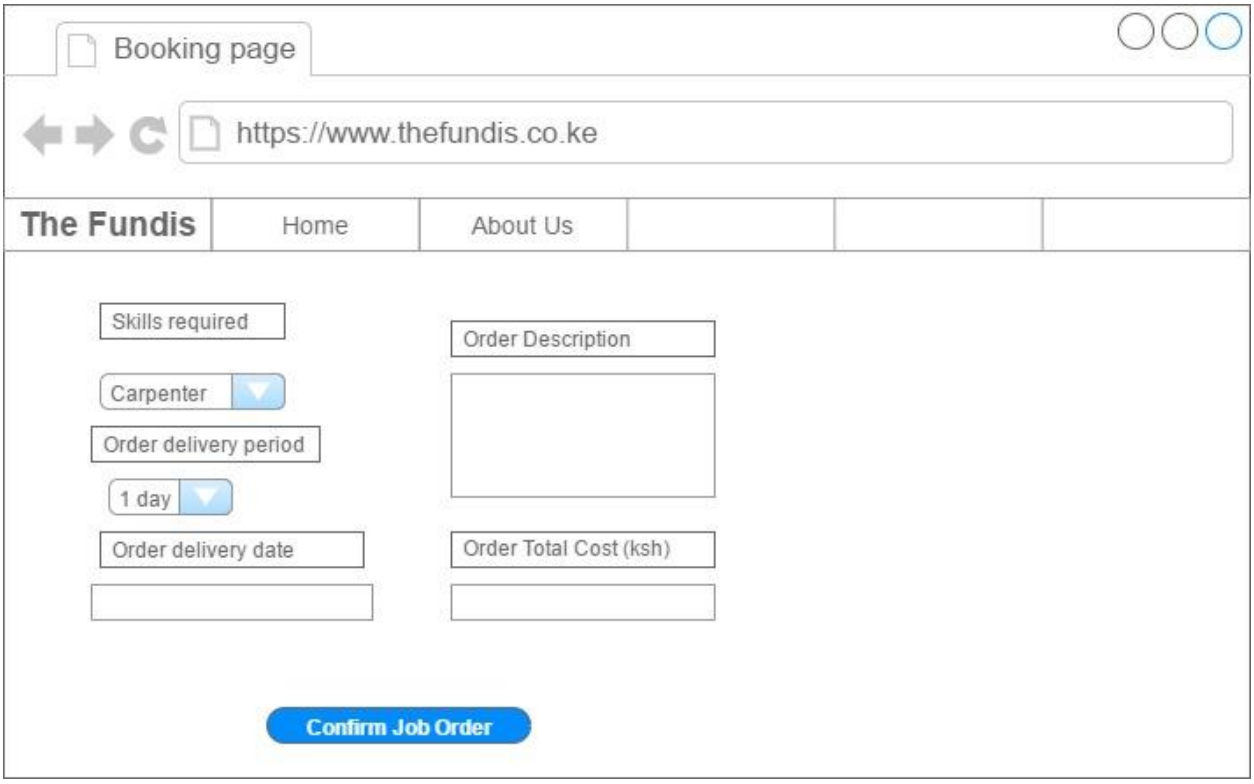
The diagram below shows the general design for the homepage and the successive pages making up the system. During the users (clients and workers) visit to the system they will get to interact with such an interface.

3.2.5.2 Systems User login page Framework

The diagram below shows the general design for the login page of the website. During the users (clients and workers) visit to the system they will get to interact with such an interface in order to log into their respective accounts.

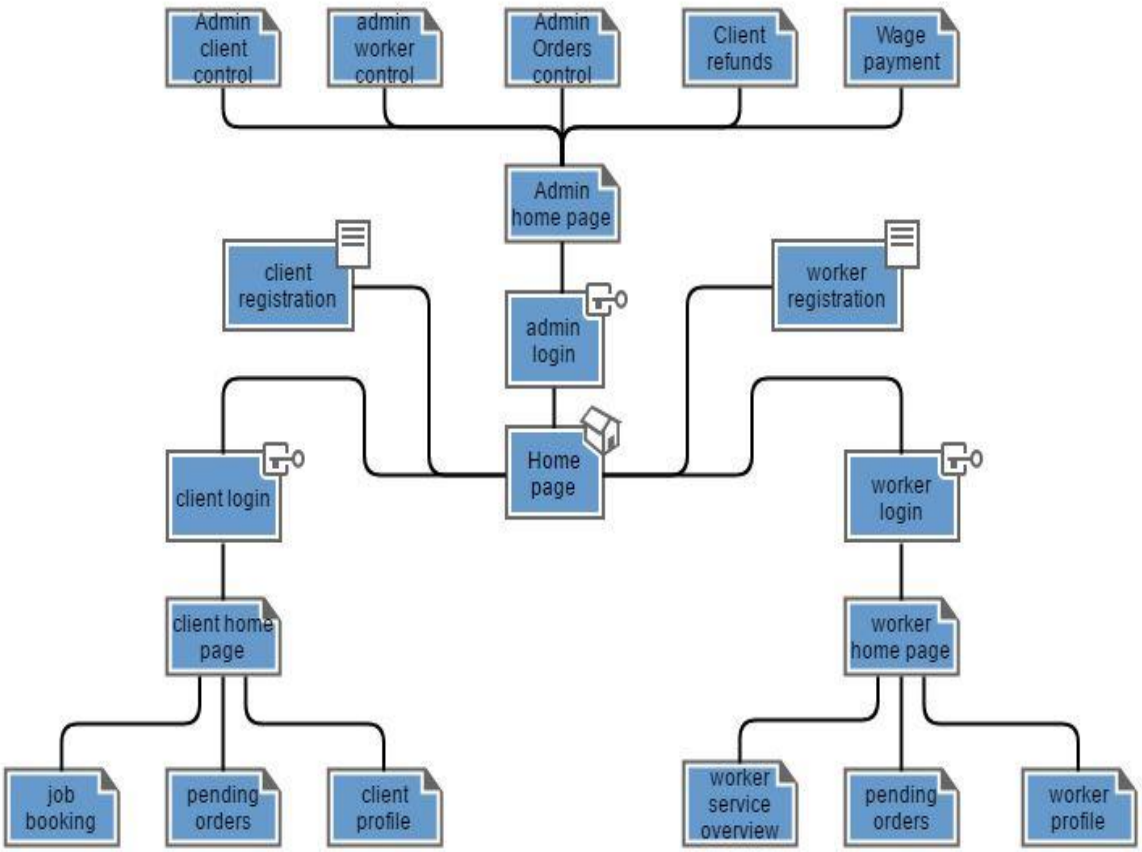
3.2.5.3 Systems Client job booking page Framework

The diagram below shows the general design for the client job booking page. During the client's visit to the web site he/she will get to interact with such an interface while making a new job booking for a worker in with the desired skills to match the job to be done.



3.2.6 System Sitemap

This is a diagram showing the list of pages that are available in a website to which users can access as they interact with the system. This diagram shows how each page is and its contains are related to other pages in the website and their respective components. The diagram below show sitemap of the Fundis website.



4 Implementation and testing

4.1 Resources required

The system will be developed using the following hardware and software resources

4.1.1 Hardware resources

The computer that will be used to develop the will have to meet the following requirements:

i. 4 Gigabytes of RAM.
ii. 300 Gigabytes of storage space.
iii. 1 Gigabytes of dedicated graphics card memory.
iv. 2 GHz CPU processing speed.

.

4.1.2 Software resources

The following software tools and scripting languages will be used to develop the system to completion:

i. **WAMP server** – this will be localhost software for the system
ii. **PHP storm** – this is the integrated development environment that supports HTML, CSS, JavaScript and PHP scripting languages.
iii. **MySQL** – this will be software where the system's database will reside.
iv. **Google Chrome browser** – this will be the testing browser for the system.
v. **Windows 10 operating system** – the operating system upon which the system will be deployed.
vi. **HTML and CSS** – languages for the front end design of the system's webpages
vii. **JavaScript** – language for enhancing interactivity and data entry validation on the webpages.
viii. **PHP** – the language for connecting the webpages to the database of the system.
ix. **MySQL** – the language implementing the system's database.
x. **Google maps API** – application programming interface for aiding the navigation capabilities during the communication of the systems users (workers).

.

4.2 System testing and debugging

4.2.1 System testing

After completing the development of the system testing will be done in order to ensure that the system functions as expected. The testing will be done in the following terms:

a. **Unit testing** – This will involve testing each module in the system for any error during performance.
b. **Integration testing** – this will involve the testing of how different in the system work when combined to work on a given task in the system.
c. **Data validation and exception testing** – this will done by entering both correct and incorrect data input into the system so as to see how the different modules will process data even in exceptional situations.
d. **System testing** – when all the above stages of testing are completed the whole of the system will be tested before being deployed.

4.2.2 Test cases

Test cases identify and communicate the conditions that will be implemented in test and are necessary to verify successful and acceptable implementation of the system's requirements.

Test case	Module	Description	input	Expected results	Actual output
1	Registration	This enables both the client and the worker to both to sign-up for services in the system by handing in their relevant personal information.	Enter valid personal details.	Success message and redirection to login page.	Success message and redirection to login page.
			Enter invalid personal details.	Error message displayed and prompt re-entry of personal details.	Error message displayed and prompt re-entry of personal details.
2	Login	This enables both the client and the worker to log into their respective accounts and carry out their respective activities in the system	Enter valid login details.	Success message and redirection to account home page.	Success message and redirection to account home page.
			Enter invalid login details.	Error message displayed with prompt to re-enter login details.	Error message displayed with prompt to re-enter login details.
3	Job booking	This enables the client to make a booking for a worker available in his area of locality fitting the required job requirement.	Enter valid booking details.	Success message with update of pending order list and receipt of acknowledgement email.	Success message with update of pending order list and receipt of acknowledgement email.
			Enter invalid booking details.	Error message displayed with prompt to re-enter the invalid booking detail.	Error message displayed with prompt to re-enter the invalid booking detail.
4	Job order cancellation	This enables the client cancel a job order prior to the set date of order delivery if the need arises. This also	Job order cancellation before the set date for the job order delivery.	Success message displayed with update of pending job orders list and acknowledgement email for the job cancellation.	Success message displayed with update of pending job orders list and acknowledgement email for the job cancellation.

		enables refund payment to the client	Job order cancellation on the set date for the job order delivery.	Error message displayed preventing job order cancellation by client.	Error message displayed preventing job order cancellation by client.

4.3 System deployment and Maintenance

After completion of the testing and debugging phase of the system development life cycle, the system will then be deployed to a few users for testing for a given period of time so as to get the overall response on the system from users. The feedback from the users will then be used to tweak the system further in order to fit the overall user liking.

5 CONCLUSION

5.1 Achievements

The successful completion of the project produced a working system based on the previously listed design specification and conceptual model. The working model was able to meet the following user requirements:

i. The system gave users the ability to create accounts based on their interests i.e. clients or skilled laborers
ii. The system enabled clients to request for services from the skilled laborers in the system.
iii. The system allowed the skilled laborers to post the services which they offer on the website.
iv. The system enabled the notification of the laborers once there is a pending duty for them to attend to.
v. The system enabled the clients to make payments for their service and also enabled the payment of the laborers upon the completion of each domestic task.
vi. The system enabled the cancellation of job orders by both the workers and the clients of need arises.
vii. The system enabled the clients to be refunded in case of a job cancellation due to unavailability of the workers on the said date of the delivery of the job order.
viii. The system enabled the clients to keep track of all the services that they received and for the workers to also keep track of the clients that they had served.

5.2 Constraints

Despite the successful completion of the project and the production of a working system a few challenges were met and this hindered the full implementation of some functionalities of the system. The challenges include:

- The acquisition of an M-pesa paybill account number was hindered by the high cost hence the payment process in the system had to be simulated through the system's database.

5.3 Recommendation

This web application can further be reviewed further and modified to incorporate M-pesa and ratings of services by the employees.

5.4 Conclusion

The main aim of this project was to develop a web based system that would allow the households to be able to book house-helps and assure that the house-helps obtain standard salary. This project has been successfully been completed and will go a long way changing the current operations in regards to the house-helps.

References

Anon., 2016. *The Entrepreneur.* [Online]
Available at: https://www.entrepreneur.com/encyclopedia/leased-employees

Kenya, C. A. o., 2017. *94 - News.* [Online]
Available at: http://www.ca.go.ke/index.php/what-we-do/94-news/366-kenya-s-mobile-penetration-hits-88-percent

kenya, J., 2017. *Juakali.com.* [Online]
Available at: http://juakali.co.ke/
[Accessed 28 May 2017].

Nani, 2017. *Nani.co.ke.* [Online]
Available at: http://www.nani.co.ke/
[Accessed 28 May 2017].

Appendix A: Sample Code

The appendix illustrates shows the main PHP code that is used for the allocation of workers to the client upon application

Booking.php:

```
<?php
	include('../html/check.php');
	require '../PHPMailer/PHPMailerAutoload.php';
		if (isset($_POST['submit'])){
			$curruser = $_SESSION['username'];
			$workerSkills = trim($_POST["workerSkills"]);
			$jobDescription = trim($_POST["jobDescription"]);
			$jobDate = trim($_POST["date"]);
			$totalCost = trim($_POST["totalCost"]);
			$ses_sql = mysqli_query($db,"SELECT clientID, fName, sName, email, phone, county, constituency, latitude, longitude  FROM myclientinfo WHERE username='$curruser' ");
			$row=mysqli_fetch_array($ses_sql,MYSQLI_ASSOC);
			$clientID=$row['clientID'];
			$clientFname=$row['fName'];
			$clientSname=$row['sName'];
			$clientEmail=$row['email'];
			$clientPhone=$row['phone'];
			$county=$row['county'];
			$constituency=$row['constituency'];
			$clientLocLatitude=$row['latitude'];
			$clientLocLongitude=$row['longitude'];
```

```
$sql = "SELECT workerID, fName, sName, username, email, phone FROM myworkersinfo WHERE workerSkills='$workerSkills' AND (county = '$county' OR constituency='$constituency') ORDER BY jobCount ASC LIMIT 1"

$result= mysqli_query($db,$sql);

$row= mysqli_fetch_assoc($result);

if(mysqli_num_rows($result) > 0)

{

    $workerID=$row['workerID'];

    $workerFname=$row['fName'];

    $workerSname=$row['sName'];

    $workerUsername=$row['username'];

    $workerEmail=$row['email'];

    $workerPhone=$row['phone'];

    $sql = "INSERT INTO tbljobOrders (clientID, clientUsername, clientFname, clientSname, clientEmail, workerID,workerUsername, workerFname, workerSname, workerEmail, jobDescription, jobDate,totalCost, clientLocLatitude, clientLocLongitude, clientPhone, workerPhone)

        VALUES ('$clientID','$curruser','$clientFname','$clientSname','$clientEmail','$workerID','$workerUsername','$workerFname','$workerSname','$workerEmail','$jobDescription',
    '$jobDate','$totalCost','$clientLocLatitude','$clientLocLongitude','$clientPhone','$workerPhone')";

    if (mysqli_query($db,$sql) == TRUE){

        echo  "New record created successfully";

    }else {

        echo "Error: " . $sql . "<br>" . $db->error;

    }
```

```
                $sql = "Update myworkersinfo set jobCount = jobCount + 1 where
workerID = '$workerID'";
                mysqli_query($db,$sql);
                header("location: mailer.php");
            }else{
                $mail = new PHPMailer;
                //$mail->SMTPDebug = 3;                               // Enable verbose debug
output
                $mail->isSMTP();                                      // Set mailer to use SMTP
                $mail->Host = 'smtp.gmail.com';  // Specify main and backup SMTP
servers
                $mail->SMTPAuth = true;                               // Enable SMTP
authentication
                $mail->Username = 'fundisfixem@gmail.com';                 // SMTP
username
                $mail->Password = 'workers2017';                           // SMTP password
                $mail->SMTPSecure = 'ssl';                            // Enable TLS encryption,
`ssl` also accepted
                $mail->Port = 465;                                    // TCP port to connect to
                $mail->setFrom('fundisfixem@gmail.com', 'The Fundis');
                $mail->addAddress($clientEmail);     // Add a recipient
                $mail->Subject = 'No match found';
                $mail->Body    = "<br>Dear $clientFname $clientSname this is to notify
you no match could be found for your job order. We are working increasing our worker database so to
deal with such issues in the future. kindly check in later to see if we might be having any free
workers.<br>Feel free to contact us with any complaints and quetsions.<br>Regards<br>
```

```
                    The Fundis.";
                    $mail->AltBody = 'This is the body in plain text for non-HTML mail
clients';
                    if(!$mail->send()) {
                        echo 'Message could not be sent.';
                        echo 'Mailer Error: ' . $mail->ErrorInfo;
                    } else {
                            header("location: ../html/home.php");
                    }
                }
}


?>
```