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An Exploratory Study to Assess the Need and Develop a Mobile Application to form a network of Big-Data Professionals for Outsourcing purposes.

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MSc (IT) Project

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ABSTRACT

Big-Data refers to huge amounts of data produced at the same time from diverse sources. It has become a crucial tool for discovering hidden patterns and essential for making new predictive models for both public and commercial sectors. Big-Data is of substantial value in the modern world. It improves the operations of an organisation since it has proved to be fast. By analysing Big-Data, industries collect numerous benefits, including improved usage of resources and enhanced business decision-making (Alam et al. 2014). Big-Data influences to transform research, innovation, and business marketing to promote achieving a competitive advantage (Alsghaier et al. 2017).

Consequently, there is a high demand for Big-Data experts. It is learnt that there is a deficiency of enough Big-Data professionals and businesses do encounter challenges when handling information with Big-Data causing the shortage (Vaghela 2018). Training new staff is a costlier affair for companies; hence, they may choose to stay without Big-Data professionals (Taylor 2017).

For this reason, they could not take advantage of the benefits that come up with the collection of large amounts of data. However, some companies have the option of outsourcing, which is an effective way of reducing labour costs (Patel 2017). Hence it would be a good idea to outsource the tasks for Big-Data professionals. The current project aims to make the outsourcing process easier by creating a platform that can bring together Big-Data professionals. Interested companies can acquire the application and locate their preferred expert. They can then begin communication based on the contact details available in the mobile application and hire the person that they find the best fit for the work. The professionals are also able to interact with one another and discuss various matters. This will enable them to deliver quality services since they can also team up to work as a group. The experts will also get a pleasant working environment since they can choose to work wherever they are comfortable with.

Moreover, this will also act as a platform to market these professionals and express their expertise since organizations are directly linked to them. Companies will be able to select an expert who meets the qualifications as the organisations' statutes to work with them. This system utilises an iterative model of system development. The iterative approach will enable the developer to test the system while developing and be able to change the requirements to suit the market niche or customers specification. Development is done on android studio and can fit up to version nine of an android phone. Flow charts, data flow diagrams and Unified Modeling Language diagrams are also used in developing this application. This system is developed and implemented within sixteen weeks.

CHAPTER ONE

INTRODUCTION

1.1 Background information:

Big-Data is an essential and vital area in every business or organisation. Poor handling of data has caused a tremendous loss that is difficult to recover for organizations. Huge losses continue to be incurred by businesses due to damages caused by poor handling and analysis of Big-Data in organizations (Alam et al. 2014). Costs incurred in recovering this data continue to threaten and scare away both employees and investors. Staffs spend much time trying to venture into a business and analyse the existing data for better output in the organisation. Besides, they face many difficulties in handling the data since they are not professionally trained hence causing more damage and data loss (Anuradha 2015, p. 313). While Big-Data professionals have emerged to clear up the mess, large organisations still incur huge costs while looking for these professionals. Moreover, most of these experts prove to be very expensive. Alternatively, one can think of having a central pool that brings all the experts together so that companies can get ready access to these experts and explore possibilities of getting the data analysed on a sub-contracting basis as and when needed, which minimise the financial burden.

Vulnerabilities caused by generating fake data had caused a significant drawback to big data. Hackers and cybercriminals can fake data and channelise it to the database storage. These criminals are capable of penetrating personal databases and alter the sensors to read wrong information, thus hiding their identity and hence remain unnoticeable (Terzi et al. 2015, p.206).

Presence of untrusted mappers also negatively affects Big-Data processes. When Big-Data is undergoing parallel processing, an outsider or criminal can have access to mappers code and thus can alter the settings on the mappers for their selfish gain hence able to access sensitive information (Zhang 2018,). However, the organisation may decide to apply perimeter security, which may not be able to get the root cause of the problem; thus, Big-Data becomes a low hanging fruit in most organisations. This perimeter security controls need to be applied by an expert who understands Big-Data in depth.

There are troubles incurred in cryptographically encrypting big data. Therefore it pulls in a Big-Data security threat that can only be handled by a professional with a deep understanding of Big-data. Big-Data widely stored in the cloud which limits data encryption since one of the main advantages of Big-

Data is speed, it is often limited to encrypting and encrypting processes which slow down the processing of data (Alharthi et al 2017,p. 287).

Historical records about Big-Data complicate it even more. Data provenance gets difficult In metadata manipulation performance processes. This is because changing metadata can lead to wrong data sets that directly affects the transfer of bulk data (Alipourfard et al. 2017, p.275). The in-availability of Big-Data security audits is another major problem faced in handling Big-Data. The companies and organisations are unable to view the progress of their companies hence be operating on wrong data and records (Dubey et al. 2016,p. 638). This caused manly by lack of Big-Data professionals.

Data of poor quality often caused by the use of multiple systems in an organisation. Most organisations rely on several systems/channels in passing their day to day business operations. Rekeying of information is a long and tedious process especially in large organisations that serve millions of customers, which results to multiple versions of the required data especially in cases where data does not need to be validated before use (Govindan 2018,). Mixed data entry from different users results in poor quality data. The breakdown of data and formats acceptable for the data results to suspending data in the database. Poor data migration and integration are also carried the inherent risk on Big-Data causing inconsistency in the structure and value of data since some fields may be missing out(Lee et al. 2015,p. 6). Business databases indeed deterioration at 22.5% every year**.** Data is generally dynamic since it is prone to change hence causing data decay, therefore, requires a timely update for proper Big-Data maintenance(Luciano et al. 2018,p. 610). It needs Big-Data processing knowledge and expertise to make a better decision.

Loss of data is a severe problem faced by all businesses of all sizes. This amounts to the loss of money and time that could have been spent focusing on increasing business output (Moniruzzaman et al. 2013). Big-Data can be lost by either accidentally deleting or corrupted data majorly caused by poor handling of big data. Resulting to profoundly affects the financial health of the organization since it draws back the productivity of the organisation and loss of customers especially if the loss was accompanied by security breaches (Obermeyer et al. 2016, p.1216). Such conditions require every organisation or company to have the employees trained on Big-Data processes.

Lousy analysis of Big-Data attracts additional overhead costs. The wrong analysis is a result of processing an incomplete data or incorrect data, which not only a waste of time but also leads to a wrong path of analytic hence giving the organisation adverse reports (Rajaraman 2016,p. 710). Therefore, the organisation deals with wrong reports and hence, poor resource management. Such mess calls for additional costs trying to fix the errors and the missing fields of data and hence tremendous loss in the organisation. Therefore there is a need to outsource Big-Data professionals.

Reputation damage and high fines are also attracted by poor handling of big data. Contacting clients by sending emails due to poor data management paints a lousy company reputation both in the physical and digital world (Salehan et al. 2016,p. 36). Poor management of data, mainly in the marketing sector, brings mistrust from the customers, financiers and stakeholders, which limits the rating of one's output in a business set up. It also attracts fines since most nations seek to protect the interests of the customers, thus going against the service charter specifications (Tiwari et al. 2018,p. 324). Across with the implementation of GDPR in May 2018, if marketing data is not managed precisely, and may well be in for a hefty fine from the ICO. Therefore, nearly every organisation needs a Big-Data expert to maintain the standards.

Over three billion Yahoo user accounts were affected by the most significant data breach in September 2016. The attack which was suspected to be from a state-sponsored actor compromised 500 million users details including names, contact details such as numbers, email addresses and even dates of birth (Vaghela 2018). The company explained that the Robust Bcrypt algorithm was used to hash the passwords involved in the attack. Later in December 2016, the company revealed that one billion accounts were compromised by a different group of hackers. In 2017, Yahoo revised the damage to 3 billion user accounts. The incident resulted in a loss of $350 millions off its sale price (Wang et al. 2016,p. 103). The breach was eventually attributed to the Chinese intelligence group who were gathering information on the US citizens. However, the recovery of the data was next to impossible.

Moreover, one of the biggest online auction company, eBay suffered a cyber attack in 2014 exposing details of its 145 million users including passwords through the accounts of three of its employees making full access for over 200 days in the company's user database(Ayed et al. 2015, p. 314). Despite the effort of the company to reach to its customers for password change, the reputation of the company was tainted due to poor communication and weak security measures. If the company had a timely check by Big-Data experts, the loss could not be incurred.

The devastating attack of the Heartland system brought a serious downfall after over 134 billion credit cards of merchants were exposed through an SQL injection to install spyware on the company's database. One hundred million cards that were on the process for payments at that time were affected. The hack brought both financial and economic loss to the company and nation at large(Najafabadi et al. 2015,p. 1).

Adobe incurred a $1.1 million loss in November 2016. The incident happened after 38 million user records got lost. Three million encrypted customer credit card records had been stolen. The hackers also accessed their Identification Numbers and therefore had control to change their passwords. Adobe was

then charged with violating customer record act and practising unfair business hence incurring a severe loss (Nguyen et al. 2018,p. 254).

The “Wanna Cry” Ransom attack, which spread globally, has severely affected the United Kingdom's National Health Service trust. Several hospitals were affected by the massive ransom attack. Many phones were affected in the Sultanate of Oman. Then Oman's National Computer Emergency Response Team warned that the ransom originated from China (Ramírez-Gallego et al. 2018, p.57).

Sony's PlayStation Network was gone down for a month after they incurred a data breach which is termed as the worst attack in the gaming community. Unencrypted credit card passwords were exposed, including customer details. The events led to an estimate of 77 million accounts affected. Sony, in 2015, underwent a loss of $15 million in compensation of the affected accounts (Rathore et al.2016, p. 71).

All the above incidences and occurrences would have been handled before the situation gets worse if the company had Big-Data professionals.

1.2 SCOPE OF THE RESEARCH STUDY:

Scope of this project is to come up with a mobile application that will create a direct link between companies and Big-Data professionals. Requirements are identified through a simple and basic approach to mobile application development. The proposed mobile application utilises Agile model of the system development life cycle. This proposed system has three basic modules; the expert’s module, company module and messaging module.

1.3 OBJECTIVES:

1.3.1 General objective:

The main objective of this project is to create a mobile application platform to link big-data professionals with organisations or businesses and to make the outsourcing of Big-Data professionals easier. Further, assess the need and Develop a Mobile Application to form a network of Big-Data Professionals for Outsourcing purposes. The project seeks to investigate the need for Big-Data professionals and to develop a mobile application that can connect Big-Data professionals so that it becomes easier for companies to outsource their requirements. The current project aims to make the outsourcing process easier by creating a platform that can bring together Big-Data professionals. Interested companies can acquire the application and locate their preferred expert. They can then begin communication based on the contact details available in the mobile application and hire the person that they find the best fit for the work. Referrals from other firms can also help to identify the best experts for the tasks.

In summary, the research aims to

- Develop a mobile application to connect expert Big-Data professionals as a proof of concept “PoC.”
- Make the outsourcing of Big-Data professionals easier

1.3.2 Specific objectives:

- To study and analyse the existing platforms for Big-Data experts
- To identify a suitable way of linking organisations with Big-Data experts
- To implement the mobile applications
- To test and validate the application

1.4 IMPORTANCE OF THE RESEARCH:

Big-Data is a crucial area that requires maximum attention to the prosperity of a business. This study empirically seeks to understand the root cause of the problems faced with Big-Data and the need for Big-Data professionals in organisations (Thakuriah et al. 2017,p. 34). It then evaluates on the most efficient ways of dealing or handling data by creating a platform to link the organisations and businesses with the service providers (Big-Data professionals). Data loss and damage will be eradicated, thus improving on the revenue generation in businesses. The security of organisational data will be enhanced by this system (Tomita 2018). It will transform research, innovation, and business marketing to promote achieving a competitive advantage in organisations and businesses. Moreover, this project will enable customers, and stakeholders to rebuild their trust to businesses with their personally identifiable information.

1.5 RESEARCH GAP:

'Big data' is no longer just an innovative technology because it stimulates the development of new technologies and facilitates their adoption in society. Therefore, it is diversely used in organisations. Big-Data experts are required to run different operations like Big-Data analytics. However, with the growing use of Big-Data in businesses and organisations, the number of bulk data experts does not match the existing demand. Therefore, it is difficult for organisations to get the necessary services required for handling this data. The few available experts are, however, not easily accessible since we do not have a known platform for these experts. Organisations find it costly to start training their staff on big data.

The research questions we need to answer are;

i. How is Big-Data useful, and how is it used in modern businesses and companies, and what is the need for Big-Data professionals?
ii. How and where from do the companies, and organisations get their Big-Data professionals?
iii. What are the ways and solutions possible to solve the problem faced by companies and businesses in finding and hiring Big-Data professionals?

1.6 STATEMENT OF THE PROBLEM:

Tremendous data loss is a critical issue in organisations and companies. High costs are being incurred to recover data. Essential and private information has been exposed to the public, while others use it for personal gain. Handling of data by untrained persons has led to waste of time and resources too hence bring more damage (Vaghela 2018). Lousy analysis of bulk data is attracting fines and losses to companies. Generation of fake data for use in organisations has landed them into the hands of cybercriminals. Presence of untrusted mappers is majorly affecting Big-Data operations breaking down bulk data transfer. Cryptographic encryption of Big-Data has proved to slow down the process of Big-Data processing. Data provenance is causing a significant security threat to Big-Data (Xie et al. 2016,p. 1042). The reliance on multiple systems, mixed entry of data from different users and reduced migration and integration of data has led to poor quality of data. It is damaging the reputation of the companies and organisations due to mistrust issues from customers, especially if security breaches are involved.

1.7 RESEARCH METHODOLOGY:

The research study of this project will be empirical research to answer the research questions. Therefore, it will rely on observations alone. Its relied on some data collection methods explained below.

1.7.1 Primary data collection

Primary data is a critical source of information for the research, which includes both qualitative and quantitative data.

1.7.1.1 Qualitative data collection

A random selection of individuals who have dealt with Big-Data or are knowledgeable in the area will be interviewed to answer the research study questions. More questions will be asked to gather plenty of useful data concerning Big-Data and its processes.

1.7.1.2 Quantitative data collection

The data collection achieved by formulating a questionnaire using Google Forms. Once the individuals respond to the questionnaire, it is considered as a consent. They shared their knowledge and opinion about Big-Data and the associated problems, giving an insight into the problems that companies face when dealing with Big-Data, as well as their views on what should have been done. This information was essential in creating a suitable mobile application for the user.

1.7.2 Secondary data collection

This data collected from publicly available sources for companies that use Big-Data, especially Google, as well as previous studies conducted, books, journals and articles concerning Big-Data and the need for experts.

1.7.3 Data analysis

When the observed data is collected, it was analysed to draw a conclusion concerning it.

1.7.4 Legal, social and Ethical effects:

When conducting the research, we did not face any objection since we had obtained the data from individuals who willingly gave the information which was gathered electronically in the form of response to the survey. Apart from this, secondary data collected from the publicly available sources for companies that use Big-Data, especially Google, as well as previous studies conducted, books, journals and articles.

1.8 Limitations of the study:

Every research has limitations. These limitations exist due to some complexity in the methodology or design of the research and may affect findings of the study thereby limiting the scope of the project (Côrte-Real et al. 2017,p. 389). Limitations of this research are from the inadequate understanding of Big-Data from some staff members in organisations. Some employees do not understand what miles they have taken in their company or organisations in the efficient use of Big-Data and therefore, unable to deliver useful information.

1.9 Summary of the chapter:

This project aims to achieve the set objectives. The background information gives the specific factors that led to research Big-Data and why to choose the topic of Big-Data. Guided by the research questions, the objectives of the study are seen to be clear and precise to guide in conducting a productive study. The methodology involved empirical research bringing on board both primary qualitative and quantitative data sources, not leaving behind secondary data sources. This study governed by the set of data collection

methods and analysis. However, when conducting research, there must be some shortcomings which are elaborated. To get more accurate data, it is preferred to get to persons with verse knowledge in Big-Data and who have dealt with it to have fruitful research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

2.1.1 BIG DATA

Data refers to facts or statistics collected together for processing or analysis. It can contain sets of values, different subjects concerning qualitative or quantitative aspects. Data can be in the form of a document, text, video, audio, software programs or other types of data (Dedić et al. 2016, p. 120). A collection of vast amounts of the data sets greats big data. Big-Data refers to humongous volumes of data that cannot be processed effectively with the traditional applications that exist. The processing of Big-Data begins with the raw data that is not aggregated and is most often impossible to store in the memory of a single computer (Diamantoulakis et al. 2015, p.97). Big-Data can be analysed computationally to reveal patterns, trends, associations relating to human behaviour and interactions. Big-Data is one of the most significant driving forces behind the growing technological waves in cloud computing, Internet of Things, Artificial intelligence and data science (Firmani et al. 2016, p. 13). It is a crucial area in every business around the world. The growth of the use of computers and the internet has been a steering wheel to the significant increase of data worldwide to five zettabytes of data today. Within one year, data will have grown to 50 zettabytes. In the current technological world, we generate data every time in every action we take, thus leaving behind digital trails (Groves 2016).

Big-Data workings on the standard that the additional knowledge about something or any circumstances, the further consistently it can increase new perceptions and make forecasts about what will occur in the forthcoming (Harrington et al. 2013). By relating further data points, associations begin to appear that were before concealed, and these relations allow us to absorb and create cleverer judgements. Most generally, this is done through a method that involves building models, based on the data we can collect, and then running simulations, alternating the value of data points each time and observing how it impacts our results (Khan et al. 2015, p. 2).

Until comparatively recently, knowledge was restricted to spreadsheets or databases – and it had been all perfectly ordered and neat. Something that was not merely organised into rows and columns was just too difficult to analyse with, and therefore, it remains unheeded (Loebbecke et al. 2015, p. 154). Now though, advances in storage and analytics mean that we will capture, store and work with several, many alternative forms of information. As a result, “data” will mean everything including but not limited to

databases to photos, videos, sound recordings, transcription and data readers or sensors. To form a sense of all of this unstructured information, Big-Data usually uses innovative analytics involving "AI" and machine learning (Naughton et al. 2016).

This ever-growing stream of detector data, images, text, voice and video information means that we will currently use information in ways in which it was not doable even some years ago. It is often revolutionising the planet of business across nearly each business area (Obermeyer et al. 2016,p. 1216). Companies will currently accurately predict what specific segments of consumers need to purchase what and when, into a high-level degree of accuracy. Big-Data is additionally serving firms to run their operations in a very much more economical means (Oweis et al. 2015, p. 111).

Even outside of business, Big-Data projects are already serving to alter our world during a range of how, such as:

- Improving aid – Data-driven drugs involves analysing large numbers of medical records and pictures for patterns that may facilitate spot illness early and develop new medicines.
- Predicting and responding to natural and synthetic with the help of disasters – Sensors the data may be analysed to predict wherever earthquakes area unit doubtless to strike next, and patterns of human behaviour offer clues that facilitate organisations offer relief to survivors. Big-Data technology is additionally accustomed to monitor and safeguards the flow of refugees off from war zones around the world.
- Preventing crime – Police forces progressively adopting information-driven methods supported their intelligence and public data sets to deploy resources more expeditiously and act as a deterrent wherever one is required.

Big-Data offers new insights and opportunities. However, it additionally raises considerations and queries that has got to be addressed:

- Information privacy – the Big-Data we tend to generate currently contains a great deal of data concerning our personal lives, a lot of of that we have a right to stay personal. Progressively, we have to strike a balance between the number of non-public information we have to give away, and the convenience that the Big Data-powered apps and services provide.
- Data security – even though we decide we are happy for somebody to own our information for a specific purpose, do we trust them to stay it safe?
- Data discrimination – once everything is thought, can it become acceptable to discriminate against individuals supported information we have on their lives? We already use credit grading

to decide who can borrow cash, and insurance is heavily data-driven. We will expect to be analysed and assessed in more extensive detail, and care should be taken that this is not worn out how that contributes to creating a life more onerous for those that have already got fewer resources and access to info.

Facing up to those challenges is an essential a part of Big Data, and that they should be addressed by organisations who wish to require advantage of knowledge. Failure to try and do therefore will leave businesses vulnerable, not merely in terms of their name, however additionally legally and financially (Salehan et al. 2016, p. 36).

Data is altering our world and the way we live at an extraordinary degree. If Big-Data can do all of this nowadays, one can only conceive what it will be capable of tomorrow. The volume of data available to us to utilise is just about to increase, and analytics technology can become a lot of advanced (Sampathkumaran et al. 2016).

For businesses, the flexibility to leverage Big-Data goes to become progressively crucial within the coming years. Those corporations that read information as a strategic quality are those who will survive and thrive. Businesses who ignore this revolution risks themselves of being left behind. (Verhoef et al. 2016).

2.1.2 BIG-DATA PROFESSIONALS

The rapid growth of Big-Data requires special attention and handling by qualified personnel. A Big-Data professional is personnel trained to handle and deal with the science of data with adequate and necessary Big-Data skills and knowledge (Verma 2018). Big-Data professionals can typically handle anything that pertains data. They are experts skilled with one or more advanced data analytics tools and methodologies. The traditional data analysis is unable to cope with the advent of Big-Data, which is both unstructured and structured. Big-Data involves drawing insights and patterns using statistical algorithms other than navigating in the relational database management system. It involves the use of modern technology with hands-on skills in Big-Data in combination with the traditional data analysis techniques(Wamba et al.2017, p. 366).

Big-Data professionals need to have verse skills in different areas. Programming skills are a vital requirement for any Big-Data scientist to be able to deal with unstructured data. At a minimum, one should be a fully-fledged programmer in java, python, R and Kotlin languages (Wang et al.2016,p. 98). The expert must be competent in data warehousing to be able to deal with non-relational databases like MySQL, Oracle and DB2. Good knowledge and familiarity with frameworks such as Apache storm,

apace spark, Apache Samza, Map-reduce framework and Hadoop (Moniruzzaman 2013). These computational frameworks assist in dealing with Big-Data processing and analytics. Good knowledge of statistics and linear algebra is another critical requirement for Big-Data experts. The statistic is a core building block to Big-Data experts. Business knowledge is also essential to keep the analysis focused and to help validate the required fields (Akter at al. 2016, p. 124).

2.1.3 NEED FOR BIG-DATA IN COMPANIES

Data is a resource and therefore, an asset in the modern world. Companies have vast amounts of data at their disposal. The quench of companies to be more objective and productive calls for embracing big-data and technology(Fan et al. 2015, p. 31). Converting or analysing this data into useful insights, knowledge, patterns and correlations is more said than done. Big-Data is a technology that is growing widely both in businesses and in the technological world(Galindo 2017). The analysis of this Big-Data is a significant investment for companies and businesses. Therefore companies need Big-Data in different areas for the following reasons;

2.1.3.1 Attaining their competitive advantage in business.

Big-Data analytics enables companies to draw patterns on their business progress. They can see the inputs of their customers, including their choices and preferences. By analysing their outputs against the set objectives, a company can notice the existing market niche. As per the consumer's taste, choice and preferences, the company will be able to implement new techniques of production. The patterns can show what their competitors offer, therefore, can go an extra mile in the competitive market through the following strategies (Gunasekaran et al. 2017, p. 315).

2.1.3.2 Acquiring and retaining customers.

Attaining competitive advantage, the company acquires and retains more customers. Understanding consumer insights enables a company to offer what is desired. The Coca-Cola company manages to strengthen its Big-Data analytics strategy through digital-led programs to drive customer retention (Hashem et al. 2015, p. 99).

2.1.3.3 Advertisements and marketing insights

Big-Data analytics boosts the marketing power of a company.

Companies have spent millions in fruitless campaigns of advertising their businesses. Skipping useful research of Big-Data analytics to understand the marketing strategies pulls business operations down. The analysis helps the company to keep up with the changing product line, meeting the expectations of

its customers and ensuring marketing strategies and unique and powerful. After years of cautious enthusiasm, marketing and advertising technology sector is now able to embrace Big-Data in a big way. Big-Data enables companies to dwell on a more target-oriented and personalised advertisement. Netflix is a multi-million subscribers company using targeted advertisements. It gathers enormous amounts of personalised data to get information notifying an individual on which movie to watch next, this is their most unique key to achieving their market status(Kache et al. 2017,p. 21).

2.1.3.4 Risk Management

The current business environment faces a lot of unpredictable risks and damages. A management plan and strategy to foresee risk and be able to mitigate it before it causes damage is a secret for success in companies. It can only be achieved by proper analysis of Big-Data through discovering and understanding the business patterns and insights. Big-Data improves the risk management strategy risk for smarter and better business decisions. The UOB bank of Singapore uses Big-Data for risk management to be able to calculate the minimum most time of the value at risk (Khan et al. 2015, p. 2).

2.1.3.5 Boosts business innovations and inventions

Big-Data is a significant avenue for generating more revenue in an organisation by promoting innovations and product improvements. It was made possible by collecting massive amounts and analysing the data from customers to know what fits them precisely (Patel, 2017). A company can know what they exactly need to produce to match the expectations. They can also restructure the existing products as per the customer's tastes. A company that dwells on the data collected from the market before producing can come up with significant innovations that boost their profit margins(Saltz 2015). Amazon is a great company that leverages on Big-Data analytics to venture into the vast market, therefore, enabling it to create new product lines and achieve higher value.

2.1.3.6 Big-Data in supply chain management

Analytics gives suppliers accurate insights and extensions in its supply network. It enables them to escape the difficulties and complexities incurred previously. Big-Data enables companies to build more complex networks with collaborations to gain higher profit margins. Contextual intelligence is a critical requirement in the supply chain that can only be achieved through Big-Data analysis. Alibaba is a big company using Big-Data for the efficient supply chain management. Alibaba relies on information from its customers concerning warehousing, quality of goods and their delivery services to ensure consistency in the business (Stephens et al. 2015).

2.2 CASE STUDY: GOOGLE

Google is a multinational publicly traded technology company that founded in 1998 with its headquarters in California. Google specialises in offering internet-related services and products. It was one of the biggest technology company which trades online advertising services, cloud computing, search engine, software and hardware (Taylor 2017).

2.2.1 Google Market Scope

The technology giant company has a capitalisation $108 billion. Google serves multi-billions of clients and users through its platforms and emerges the most future-oriented company. In May 2017, Google registered $80 billion in sales. Despite the rapid technological changes, Google has been able to cope with the pace and register high-profit margins regardless of spending on expansion of cloud platform and youtube. Google has managed to dominate the market at the expense of its competitors (Verma 2018).

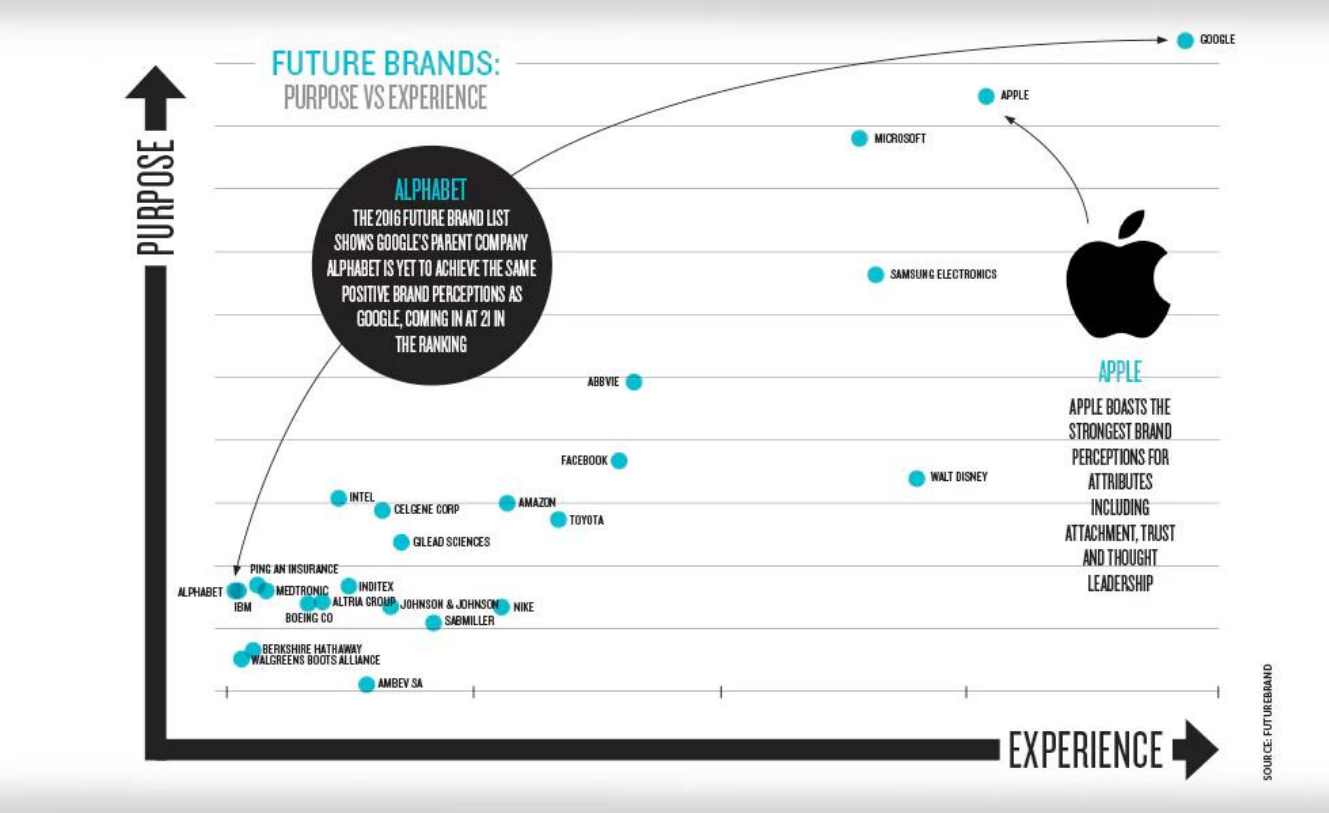

Figure 1: Future Brands: Purpose Vs Experience - www.marketingweek.com

2.2.2 Big-Data Management in Google

Google handles trillions of data from its customers, users and clients. Having developed many Big-Data platform, google is an indisputable champion of Big-Data with expertise in handling big data. Big-Data analytics has enabled it to explore millions of websites and get the right answers for its users efficiently within seconds(Xu et al. 2016, p. 1565). With trillions of data from its users, it can access, their location, history and likes, which is analytically used to understand what exactly they need when they search for anything. The parameters are then passed through sophisticated algorithms to sort the findings as per the relevancy and expectations of the user.

2.2.3 Big-Data personal identification in Google

The use of Big-Data analytics has enabled this giant company to be able to identify users. It can match their interests and expectations. Google uses Big-Data to be able to think and reason like human beings by understanding the context, aim and even logic of their search query (Zhong et al. 2016, p. 11). The accomplishment of personal identification has been made possible through a couple of Big-Data analysis techniques discussed below.

2.2.3.1 Page indexing

Indexed pages refer to a collection of some web pages to be responding to users search requests. Google gathers this data from users search habits. The process of adding these pages into the search index termed as indexing. The process involves collecting together data from a user, and in the parallel sorting process, meta tags are added on the web pages to the web page that is designed to get keywords (Dabab et al. 2018). It simplifies the process of retrieving data from the search engine. This process takes at least four days or a maximum of one month to analyse a user's data.

2.2.3.2 Real-time data capture

Google fetches data immediately as soon as the users type them. The data is analysed and therefore starts predicting users daily patterns in terms of location, weather, shopping habits, travelling and even their hobbies. This data then stored in a central pool for real-time data capture. Therefore, Google can give suggestions for shopping goods, weather reports, travel reports and even suggests to listen to certain music (Caldarola et al. 2017,p. 9). All this achieved through proper handling of big data.

2.2.3.3 Tools for sorting data

The analysis of Big-Data requires the use of appropriate tools to sort the massive data. When one key a search query, the Google algorithm performs a complex calculation to understand the expectations of the user. Big-Data analysis enables it to understand what exactly is needed whether it is statistical data, news, factual information, images or people and fetches the necessary information from the feeds (Botti 2019, p. 32).

2.2.3.4 Knowledge graph pages

It refers to a Big-Data tool that is used to collect detailed information and facts about people, places and things, their factual differences and the relationships that exist among them. This data is then analysed and used by Google to respond to the search queries given. The Google knowledge graph tool is static, and user-centric, therefore, able to fetch the most relevant and useful information searched (Bucker 2014).

2.2.3.5 Logical and semantic search

The search geared towards understanding the context and root of users search. The root of users search is determined using the words one has keyed in the search engine and from the multiple websites, Google uses Big-Data analytics to get perfect matches of the words used, semantically understanding users context. Therefore, they can fetch the direct answers needed(Cao et al. 2017, p. 385).

2.2.3.6 Use of cookies

Google can keep track of their users using cookies. All its registered users whenever they are browsing on other websites, they record the websites you are using through Google cookies. Therefore, Google can collect multiple data about its users. Through Big-Data analysis, this information is sorted and kept in the record (Ertan 2018). When one searches anything on the engine, this data is combined and integrated into users search. Therefore, they fetch search feeds and rank it according to user preferences, inclinations and requirements.

2.2.3.7 Google plus, synonyms and Google translate

Google+ is used to collect data concerning user frequently visited sites, user search words, search behaviour and content downloaded. This data is used to give accurate results using users Google history, location and trends. Synonyms are given by understanding the root of the search and the existing history and the relationships with each other (Erevelles et al. 2016, p. 897). For translation, Google uses other algorithms that apply Big-Data analysis to get the most precise translation.

2.2.4 GOOGLE SELF DRIVEN CARS

Google uses Big-Data in autonomous technology of driver-less cars. The cars fitted with sensors that collect data, which is then interpreted by Google Big-Data analysis software to enable safe drive of the vehicle. Big-Data analytics enables the vehicle to get patterns for road users, their movement behaviours and monitoring the road signs to adhere to them (PIERONI 2018).

2.2.5 CHALLENGES FACED WITH BIG DATA

2.2.5.1 Difficulty in dealing with widely growing volumes of big data.

A large percentage of the data is unstructured, therefore unable to be stored in databases. Managing this unstructured data is a big challenge. Some of the companies are trying to use different strategies such as No SQL databases and Hadoop to handle this Big-Data (Moniruzzaman 2013).

2.2.5.2 Lack of enough Big-Data Experts

The large amounts of Big-Data call for Big-Data professionals. However, these professionals do not match the existing demand. It calls for high costs to recruit the few available and a big budget to get the services (Salehan et al. 2016,p. 38).

2.2.5.3 Integrating data from different sources

A large percentage of data used by organisations to generate patterns comes from different sources that may be difficult to rely on. These sources include email streams, employee document platforms, social media platforms and also enterprise applications. Integrating all this information to draw patterns to generate reports is not an easy task for organisations (Xu et al. 2016, p. 1565).

2.2.5.4 Security of big data

Big-Data can be an excellent target for hackers and advanced persistent threats. Most companies have lost a lot of valuable data due to insecurity in Big-Data management. The use of Big-Data calls for very secure systems to store information. Therefore additional security measures apply for data integrity (Terzi et al. 2015, p. 203).

2.2.5.5 Resistance

Handling Big-Data faces many resistance challenges from people. It is caused by a lack of understanding, insufficient organisational alignment and poor management strategies. Most employees are unwilling to venture into a new field; therefore, do not understand the importance of Big-Data analytics.

2.2.6 CONCLUSION

Google knows all its users. It can monitor its data and draw correct patterns for the efficient operation of the company. The company has mastered Big-Data and come up with the appropriate tools and techniques to analyse this data. Google does not only focus on collecting its users, clients and customers details but also apply Big-Data analytics to ensure fast and accurate fetching of information. This way, it can thrive in the competitive technology market. Acquiring and maintaining its existing customers by reassuring them of data security and quality services. Google creates an innovative business since it keeps on coming up with new products and features that are tailored to meet the tastes and preferences of the clients. With multiple data analysis tools, one feels free and just a click away from assistance whenever in need of help.

However, keeping up with Big-Data is faced by several serious problems. They are therefore demanding a solid background of understanding technology and skilled labour. Big-Data requires secure storage and safe handling by trusted personnel. Therefore, Big-Data professionals are essential in the proper running of businesses.

2.3 REVIEW AND ANALYSIS OF RELATED WORK

2.3.1 AMERICAN MARKETING ASSOCIATION

The American marketing association is an association for marketing professionals. It is an association for individuals and organisations in the professional marketing industry. This association was founded in 1847 and was incorporated in 1897. AMA is termed to the largest of physicians and medical students(). The marketing organisation defines marketing as the activity and process of creating a communication link customers, clients, partners and societies at large.

Attaining membership in the American Marketing Association helps one to connect with marketers across enabling the individuals to network, collaborate and gain practical skills in their area of speciality. However, this association does not create a direct link between a company and the professionals. Covering all areas of specialisation AMA is quite unable to assist companies to get Big-Data professionals whenever needed. This association focuses more on the medical and teaching profession. Moreover, it is based in America, therefore unable to offer services for professionals in other nations.

2.3.2 LINKED-IN

Linkedin is a professional and employment service that operates through mobile applications and websites. It was founded in 2002 and launched in 2003 to facilitate professional networking. This platform enables employers to post their job vacancies and job seekers posting their qualifications. Linkedin has over five hundred million members where users can manage their professional identity, access knowledge, insights and opportunities. This platform is a search engine such as Google focused on finding professionals, job seekers, recruiters and job vacancies. It offered in four tiers ranging from a monthly fee of $29 to $48 for job seekers and $100 for recruiters. However, this platform does not cater for differences in states and nations in handling their services. This platform has errors that lead to the frustration of users since many people complain not to get jobs. Moreover, linked-in owns the individual professional data and decides who will be reading it. This platform has limited moderation to manage scams.

2.3.3 INDEED.COM

The site is a job search forum where one can search for millions of jobs worldwide which was launched in 2004. With tools for job searching, companies can review job seekers qualifications. Employers need to create a free employer account using their company contact details then post the job opportunity at no cost. Job seekers choose a bold job title on the site then click on a button to apply. However, indeed.com

is a no-frills site where employers do not have a direct link to the employees. Therefore, Big-Data professionals are unable to connect with companies.

2.3.4 CAREER BUILDER

Career Builder is an online employment website. For a company to use CareerBuilder, they are entitled to a monthly subscription fee of $199 for every fifty resumes. Posting a job costs $419 for a single advert. However, CareerBuilder does not give Big-Data companies a priority neither to the Big-Data experts, therefore unable to solve the existing market niche.

2.3.5 GOOGLE FOR JOBS

Google for Jobs is a platform created by Google to help job seekers find a job listing that suits them. It is a job search engine that helps users view job listing even from other search engines and websites. The engines simplify the task for users instead of navigating from one search engine to the other looking for jobs; they can search the job in google and get listings from all companies. However, it is difficult for google for jobs to assist companies to get professionals. Companies are unable to get experts to work for them just by searching. Therefore, this proves to be an unreliable source.

2.3.6 LINKED UP

Several sites had been facing inconveniences and fake advertisements. Linked up then was developed to solve the problem. This site only posts the jobs that a company itself has advertised on their sites. However, linked up basically caters for the job seekers needs, therefore unable to help companies.

SUMMARY

Data is growing at a fast rate with the digital world, making Big-Data becomes an essential area and topic of discussion in every organisation. Therefore Big-Data professionals are in very high demand in the world. Many technologists have not yet ventured into big data. It brings about a mismatch between the demand and availability of the Big-Data experts. With the scarce supply of their services, companies find it very difficult to find the experts of their choice. Some companies have sought options for educating and training their employees on Big-Data, which has proved to be costly since some employees are unwilling to learn.

Moreover, the outsourcing of Big-Data professionals is often not preferred since there is no convenient platform to get experts. There is some developed software to assist in Big-Data handling, which is easy to use and even convenient for non-technological employees. However, this software needs close monitoring and evaluation due to the changing technological environment. It is to avoid data corruption

and attack by hackers and Cybercriminals. Several sites have been developed to aid in getting jobs and also for companies to post their job listing. Most of the well-known sites are discussed in this paper. Job seekers can view existing jobs and apply for them. Linkedin is a well-known platform for updating resumes with individuals qualifications. However, these sites have control over one's data and therefore controls who is to view the individual resume, therefore unable to serve the need for Big-Data professionals in companies and businesses. The American Marketing Association is only dedicated to serving specific nations, thus not convenient in terms of location and cost. Some sites such as CareerBuilder and indeed.com may not be sure about the jobs posted, thus acting like a big frustration to both employers and job seekers. Google for Jobs is a better platform dedicated to fetching job vacancies that suit user from all search engines and websites.

In contrast, Google for jobs is not convenient for companies since it serves one way. Lastly, linked up tries to solve the above problems. However, linked in does not create a direct link between the employees and employers hence unsuitable for Big-Data professionals.

In conclusion, the existing platforms to not create a better solution for the outsourcing of Big-Data professionals hence no direct links between companies and the experts. Therefore this project seeks to come up with a mobile application that will help curb the problem by forming a direct link between companies and Big-Data professionals. The outsourcing of Big-Data experts will be made simple and cost-effective. Companies are also able to get recommendations for an excellent analytic to bring on board.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Research methodology defines the specific techniques and procedures carried out to collect, select, process and analyse information concerning a research area. It is a systematic analysis of the methods that are applied in the study field. It analyses the body of knowledge of the discussion topic. Therefore it is an important step in the writing of a report; the study methodologies must be carefully selected to ensure fruitful research. This chapter contains the methodology and methods applied in the study, the reasons for choosing the approach, the data collection tools and techniques and analysis of the data in use.

3.2 Research Methodology

This study aims to investigate the need for Big-Data professionals in businesses and companies and to develop a mobile application that will help in creating a link between the Big-Data experts and the companies. Its goal is to make the outsourcing of Big-Data professionals easier for companies. Big-Data research utilises a mixed methodologies research strategy. The methodology involves collecting and analysing both quantitative and qualitative data to provide a better understanding of the research problem. A mixed methodology brings a benefit of triangulation where one study phenomenon can be examined and discussed in a more than one technique broader and deeper understanding. It brings a more complete and comprehensive understanding of the research area.

3.3 Research Ethics

Research ethics refers to the guidelines that govern researchers by educating and monitoring them to ensure a high level of standards is kept in the research process. Using the information got from the research to ensure that a researcher understands the market niche. The data obtained from the study is analysed to lay a good background of the information and why there is a need to conduct the study. Data obtained will be used to find out the need for Big-Data professionals. This information should not be used for any other selfish gains.

3.4 Descriptive design

In quantitative research, the descriptive design seeks to explain the current status of a study area. A researcher is not entitled to formulate a hypothesis, but after the research, they can perform the task.

Collection of data is majorly based on observations. It involves observing and analysing a study subject without involving it. This type of research design utilises both qualitative and quantitative data sources. Descriptive involves three methods case study, observation and survey methods. A case study was conducted in Google concerning the use of big data, challenges and benefits of using it and what improvements should be made for proper processing of big data. In the survey research, a targeted population answers a formulated questionnaire or in an interview to answer the research questions. Google forms were used to formulate the questionnaires that were sent through mail and review collected back through the same channel.

3.5 Data collection methods

Data collection refers to the process of gathering and evaluating data, information or any statistical variables concerning a studied phenomenon. It is an important area in every research study since it affects the outcomes of the study. Big-Data research adopted a mixed collection method involving both primary and secondary collection for a better understanding of the problem.

3.6 Use of Questionnaires

Questionnaires refer to a series of formulated questions or equivalent aimed at gathering information about a study area or phenomenon by a targeted group of respondents. Questionnaires are an important research instrument in almost all types of research thus can be classified as both quantitative and qualitative. It is preferred since it is cost-effective, fast and has higher knowledge margins. Questionnaires are not considered to be a source of answers but to create a better understanding of the research problem. The respondents are usually representing their views; therefore, they may be biased. In the research, for Big-Data, computerised questionnaire approach was employed where questionnaires were formulated through Google forms and send to different groups of employees and experts from different companies. The targeted group reviewed the questionnaire and appropriately answered the questions.

3.7 Sampling

Sampling is a statistical analysis of a predetermined number of observed data is taken from a huge population. The type of methodology used for sampling depends on the type of analysis that should be performed. It may be simple random sampling or systematic sampling. For good research, sampling should be a presentation of the whole population; therefore, it should be done carefully based on time and costs. In this project study for big data, an organisation has many departments. However, the technological-based departments are given a greater priority since they have a greater experience with

the use and application of Big-Data; therefore, they can give the necessary recommendations on the use of big data.

3.8 Interviews

An interview refers to a one on one conversation where questions related to the study area asked, and the interviewee gives their response. The responses are recorded and would be evaluated later on. An interviewer in a research area seeks to discover more knowledge and facts concerning the study phenomenon. An interviewer coordinates the process by asking questions and recording the answers given. It is a compelling way of gathering information for an effective and efficient research study. Interviews are preferred since they collect in-depth information-carrying experiences, emotions, expressions, thoughts and opinions of the interviewee. When researching big data, six questions formulated for the interview. Different respondents were approached and interviewed, recording their response. These responses were later on combined and evaluated for a proper understanding of the need for Big-Data professionals.

3.9 Secondary data

Secondary data refers to the data that is collected by other parties apart from the researcher or users. This data can be information got from books, journals, websites, organisational data and statutes, governmental data and census. Secondary data can be both qualitative and quantitative. It is readily available thus easy to gather, and less time is spent analysing it. In Big-Data research, information regarding the use of Big-Data and the various challenges that are faced when using Big-Data obtained from secondary sources which properly cited in this document. This information helps to understand more about Big-Data and how its handled.

3.10 System Development methodology

There are several models under the System Development Life Cycle approach, and the model that will apply in this project is the Agile development model.

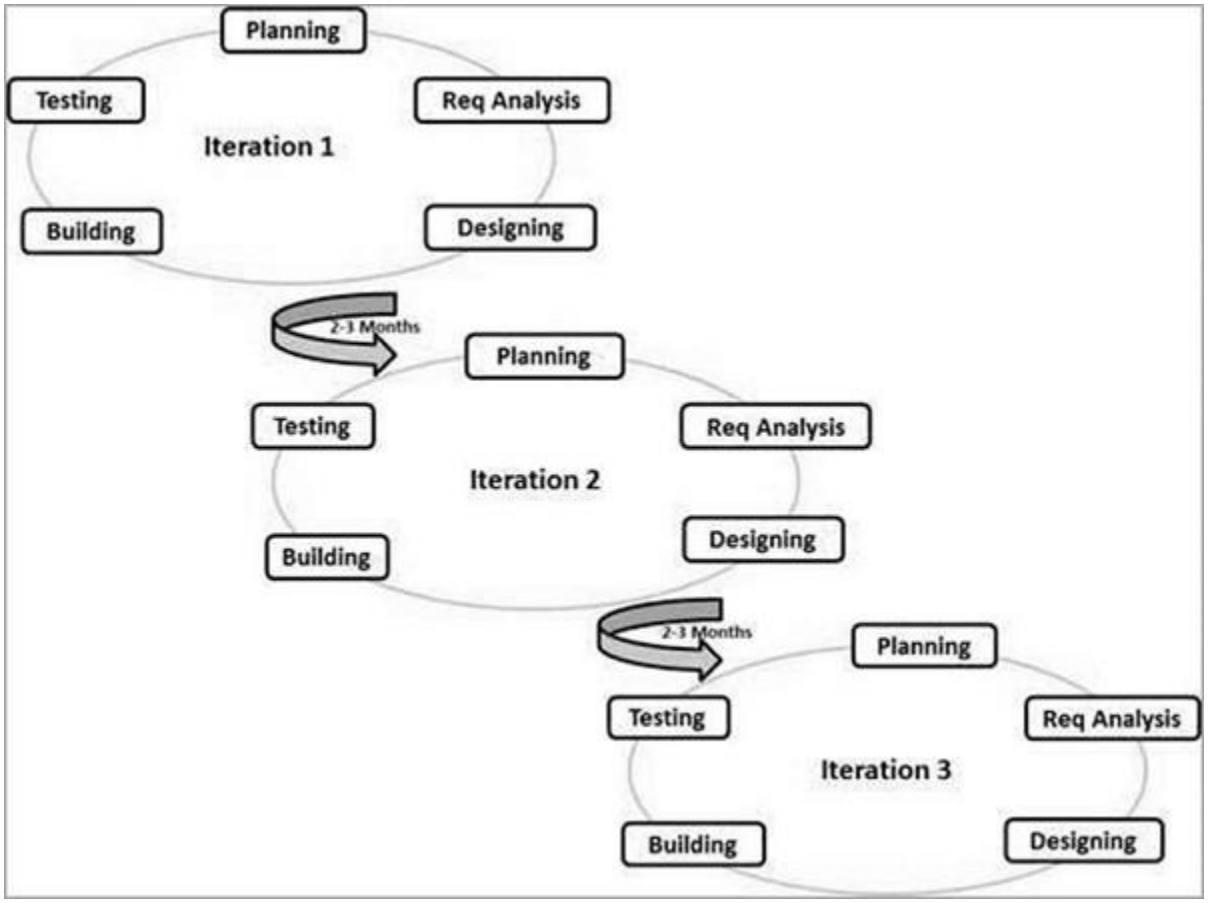

Figure 2: System Development Life Cycle

The Agile model of system development focuses on the adaptability of the system and customer satisfaction. It is a combination of the incremental and iterative model approach to system development. Agile subdivide the project into bits called iterations. Each build takes a period of one to four development weeks with different stages. These stages are repeated severally in the other builds for process execution. The stages implemented as follows;

3.10.1 Planning

Planning is the first step in an agile development model. Planning involves brainstorming the components for the work ahead, determining the strengths and weaknesses of the project and deliberating on the workflow. Here the components for developing Bigdatamadesimple application will be gathered and assigned from a backlog.

3.10.2 Requirements analysis

The second stage involves gathering the requirements for developing the application. The performance of the system laid across and the needed resources facilitate the same. In this system, we needed android studio IDE, knowledge of java and information concerning experts and companies.

3.10.3 System Design

After all the necessary resources made, the design of the project that forms the architectural component performed. This step equips the programmer with a skeleton of the project that sets standards for the project to be adhered to. The design of the system will be formulated later on in this chapter.

3.10.4 Building and implementing the system

In this phase, the actual work of coming up with a functioning system while adhering to the set instructions and standards. The system is then subjected to check whether it meets the minimum criteria for development and its functionality.

3.10.5 System testing and maintenance

In this stage, the system checked for errors and bugs. The identified errors are fixed and debugging is done. The system is then subjected to maintenance processes to upgrade and fit the changing technological world. It is done through several maintenance steps as per the programmer.

As per the agile development model, these steps then repeated in every iteration. If the requirements need to be added to suit the market, they are done and implemented in the right way.

3.10.6 Reasons for choosing Agile System Development methodology.

The development of an android application to link the Big-Data experts and companies requires much interactivity between the two parties. Customer interaction is a crucial component of agile development. It emphasises maximum communication with minimum documents. Secondly, the A working demonstration is the best communication between the clients and developers. It helps to understand the system requirements other than just dwelling on documentation. Thirdly, in agile development, it is focused on adaptability to the changing technology. The developer can reconsider the system requirements and fit them appropriately as per the customer demands. Lastly, this model of development calls for a collaboration between the customer and the developer. Since requirements cannot be gathered in one go, agile development allows continuous customer interaction and interaction in every iteration to fit into the competitive job market.

3.10.7 Advantages of using Agile Development model.

i. The functionality of a system can be developed rapidly.
ii. Agile model is a realistic development approach that boasts teamwork and cross-training.
iii. The resource requirements minimised with a maximum output suitable for fixed or changing technology.
iv. It is easy to develop and implement.
v. Allows for part of the work to be delivered timely.

3.11 Research project management

According to the scope of this project, completing it will take a period of six hundred and thirty-eight hours. It includes all the steps among them background research, gathering and analysing the requirements, designing, developing, evaluation and final report preparation as shown below. , sampling and interviews were used to collect the data for the study. To ensure that the concept of Big-Data is understood correctly, all these methods incorporated into the research. Information gathered from Google, and other companies combined from that gathered from the Big-Data professionals to form a better understanding of the phenomenon.

PROCESS	TIME IN HOURS
Background research and learning new skills	120
Requirement gathering and analysis	72
System design	120
System development	200
System evaluation, testing and validation	90
Final report writing	24
Final review of project requirements	12
Total number of hours	638

The following Gannt chart summarises the activities

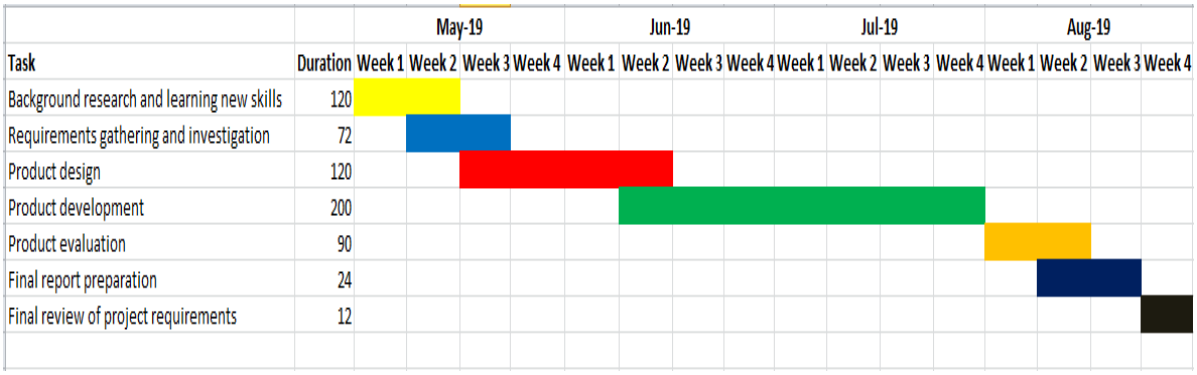

Figure 3: Project Gannt chart

3.10 Summary of the chapter

This chapter describes the research methodology used in this project. The project uses a descriptive method of research based on observations mainly. The data is collected through both primaries, which includes qualitative and quantitative methods and secondary data collection methods which are based on the previous study. The Agile model of the System Development Life Cycle used in the project to come up with a development technique. The project will take 638 hours, which is elaborated further in the table and a Gantt chart.

CHAPTER FOUR

SYSTEM ANALYSIS AND DESIGN

4.1 INTRODUCTION

This chapter contains an analysis of the system according to the information given in chapter three. It contains the design that will be used to implement the system, the development methodology, testing and validation of the system. This chapter checks to ensure that the requirements and objectives presented in chapter one are met by giving a procedural design of implementing the system.

4.2 SYSTEM ANALYSIS AND DESIGN

This application utilises an agile model of the system development life cycle. Big-Data application is capable of linking Big-Data experts with the companies. One can either sign up as a company or as an expert. The expert will state down their skills and expertise on their profile. An expert can view other experts their qualifications and skills. If interested in working together, the application gives a provision where they can communicate, through email addresses, cell phone contacts or the messaging chatbot provided in the application. The company on registering in the application, it can advertise their need for experts and the experts can apply. They can view all the available experts, and their qualification, therefore, can choose an expert based on their expertise, location and costs. Moreover, companies can recommend experts from other companies. They can communicate via emails or the chatbot available. The application allows for communication between all the concerned parties. A company can also get a quick fix in case pf an urgent occurrence that needs assistance from the professionals.

4.2.1 Sorting Algorithm

Big-Data mobile application utilises a sorting algorithm. The algorithm allows for the data and ideas to be arranged in a specific pattern depending on the requirements given. The experts can either be sorted in chronological alphabetic order of their names or through their expertise. A company may need a Hadoop expert; they can search using the qualification and list the employees with such qualifications. To aid in cutting costs, the location of an expert can be a contributing factor. A company can look for the nearest available expert by searching with their location. Sorting algorithm will help to facilitate this functionality.

4.3 SYSTEM DESIGN TECHNIQUES

The design of the system uses different design techniques, which include all activities that the transformation of the requirements and specifications into implementation. It includes all the functional and nonfunctional requirements of the system. The analysis and design stage is an intermediate stage that focuses on the transformation of the readable format of the requirements into actual code.

4.3.1 Flow charts

Flow charts are diagrams that represent the algorithm, flow of the tasks and processes. It represents the sequential flow of steps and decisions to perform a specific process. Flow charts will be used in this Big-Data application to show the flow of information and activities in the system. There will be different modules that will be represented by flow charts. The company's module must show how the activities initiated by a company trying to look for an expert who fits their demand. The company can check the list of available experts and eliminate them according to their expertise and qualifications. The professional’s level will also have its flow initiated by a post of available job in a company. According to their skills and qualifications, an expert will be able to identify the work they can do. It includes considering other contributing factors such as location and costs. Recommendation module will also be governed by information flow. The process initiated by a post from a company, depending on the experiences on the work done to another company they can recommend on an expert to work for the company as shown below.

Company's module

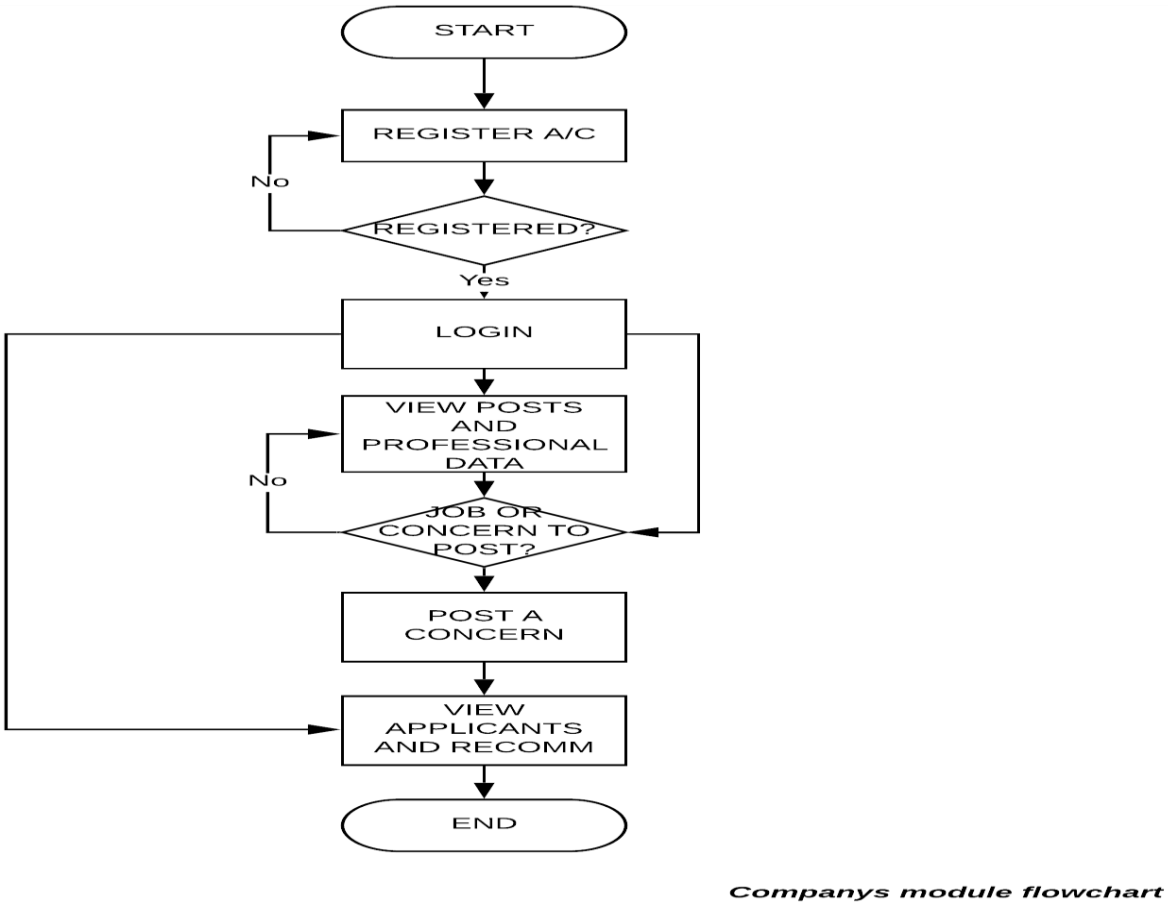

Figure 4: Company module Flowcharts

Big-Data professionals module

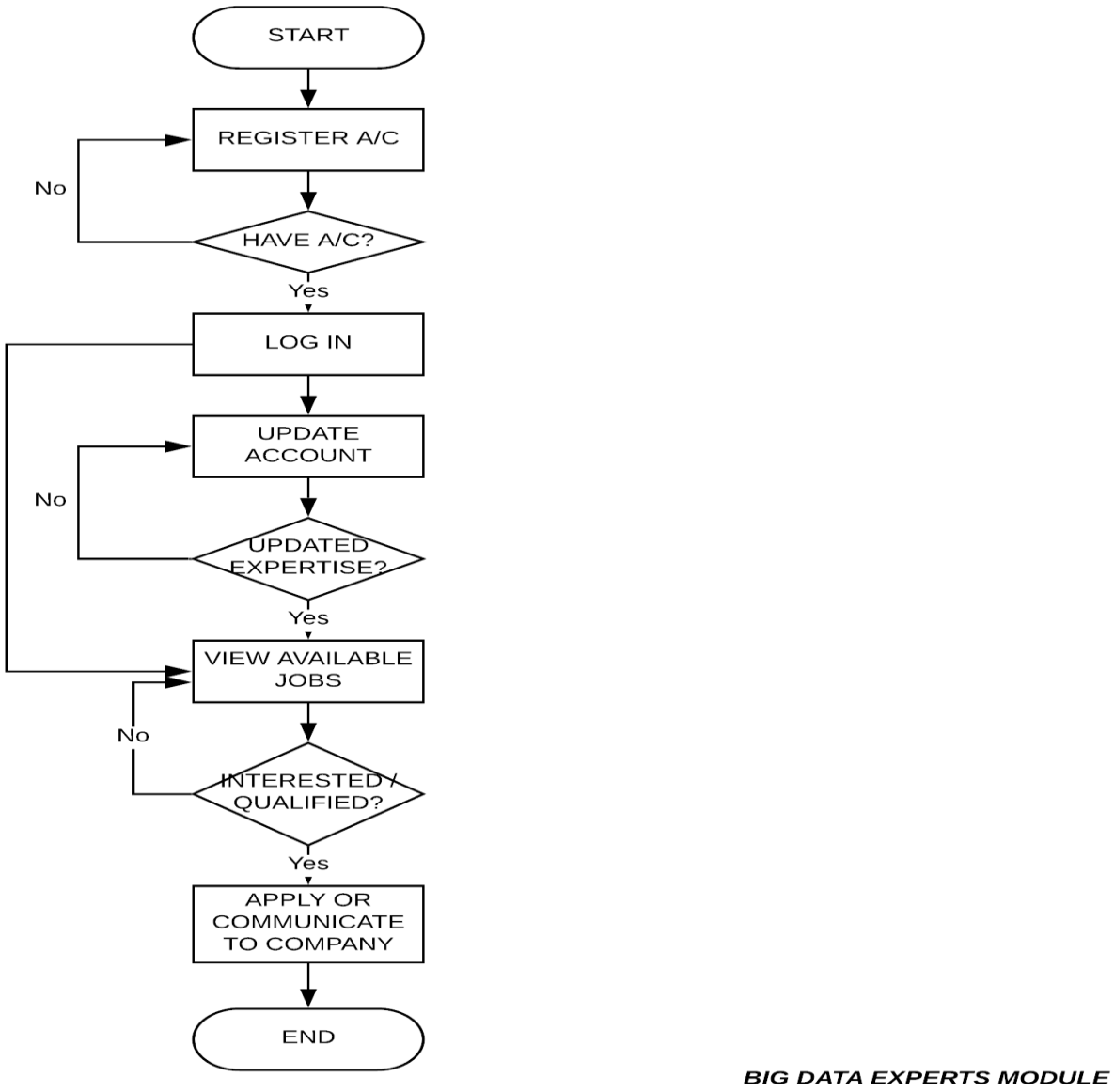

Figure 5: Big-Data professionals module flowchart

4.3.2 Data Flow Diagrams

Data flow diagrams are used to represent the system and processes, the flow of data inputs and outputs. The particular flow of information, a job post, an area of discussion or a recommendation, how the entities(experts and companies) will receive the information and how actions will be taken, where the

information will be stored and how it will be disseminated to the concerned entities. It is elaborated further in the diagram below.

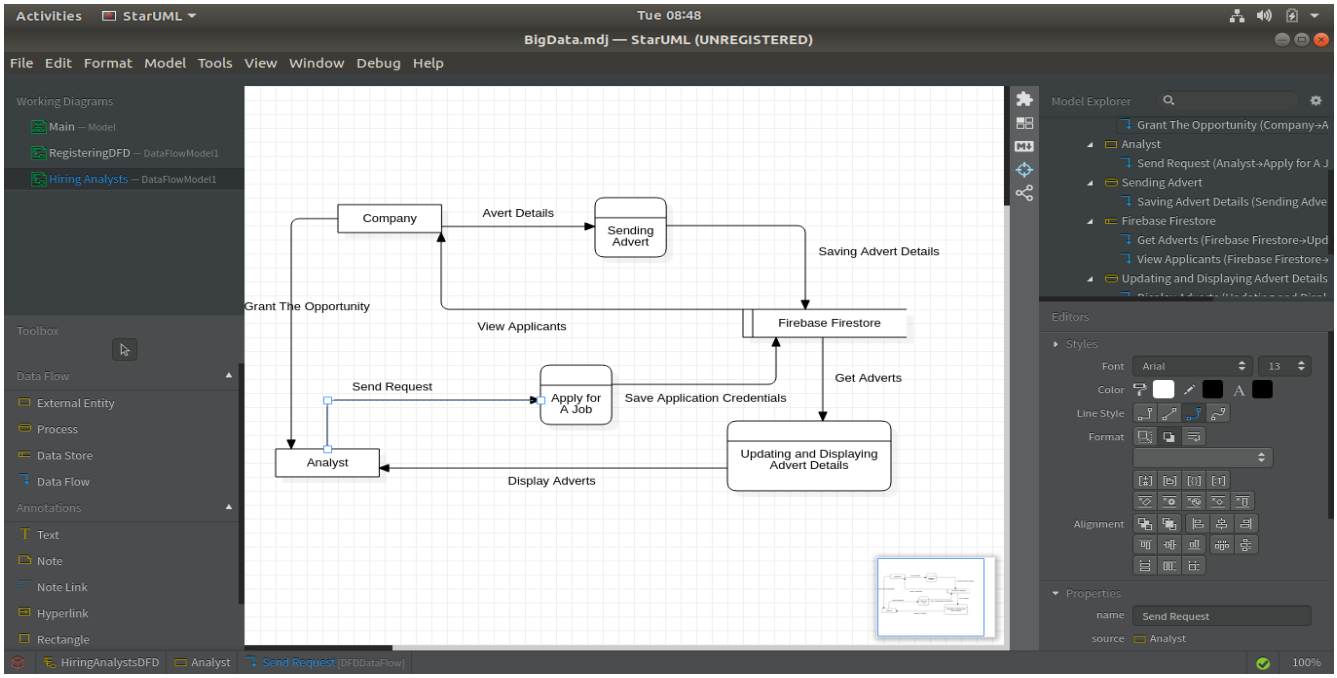

Figure 6: Data Flow Diagram1

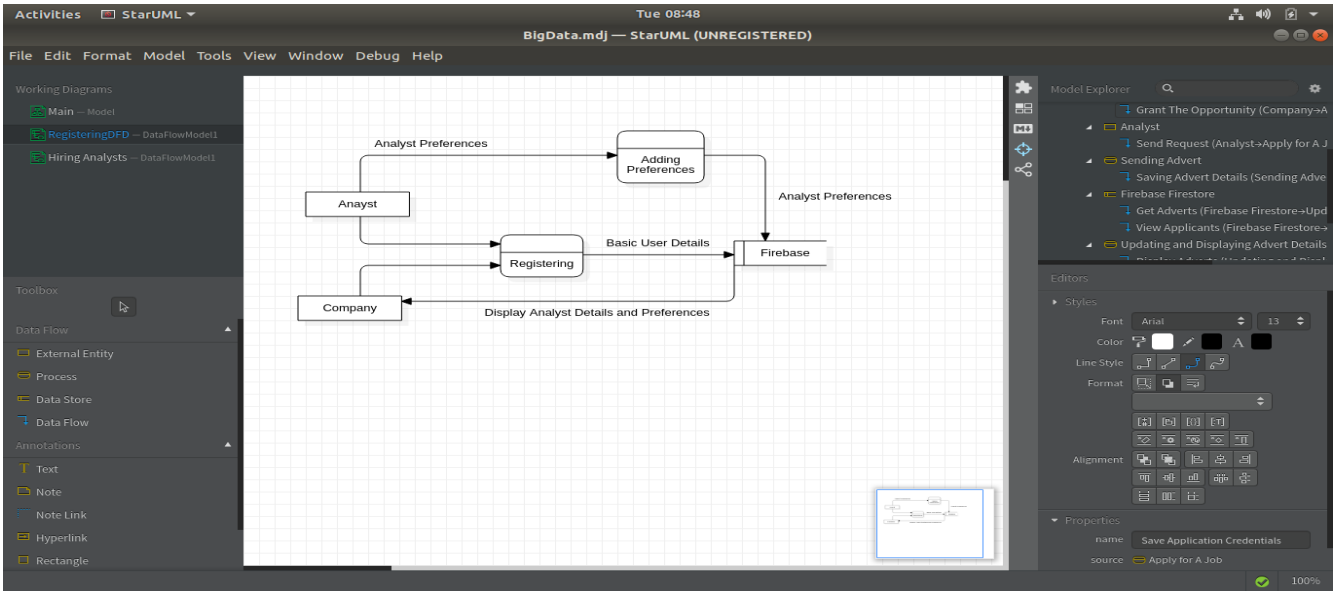

Figure 7: Data Flow Diagram2

4.3.3 Use case diagrams

These diagrams will be used to identify, clarify and organise the system requirements. It will show all the events in the system and how the actors will interact in the system to achieve the set objectives and user specifications. The actors are the experts, company looking for an expert and the company recommending an expert. It elaborates how the system involves its users for a productive workflow. The companies depend on the experts for services while the experts depend on the companies to get jobs to

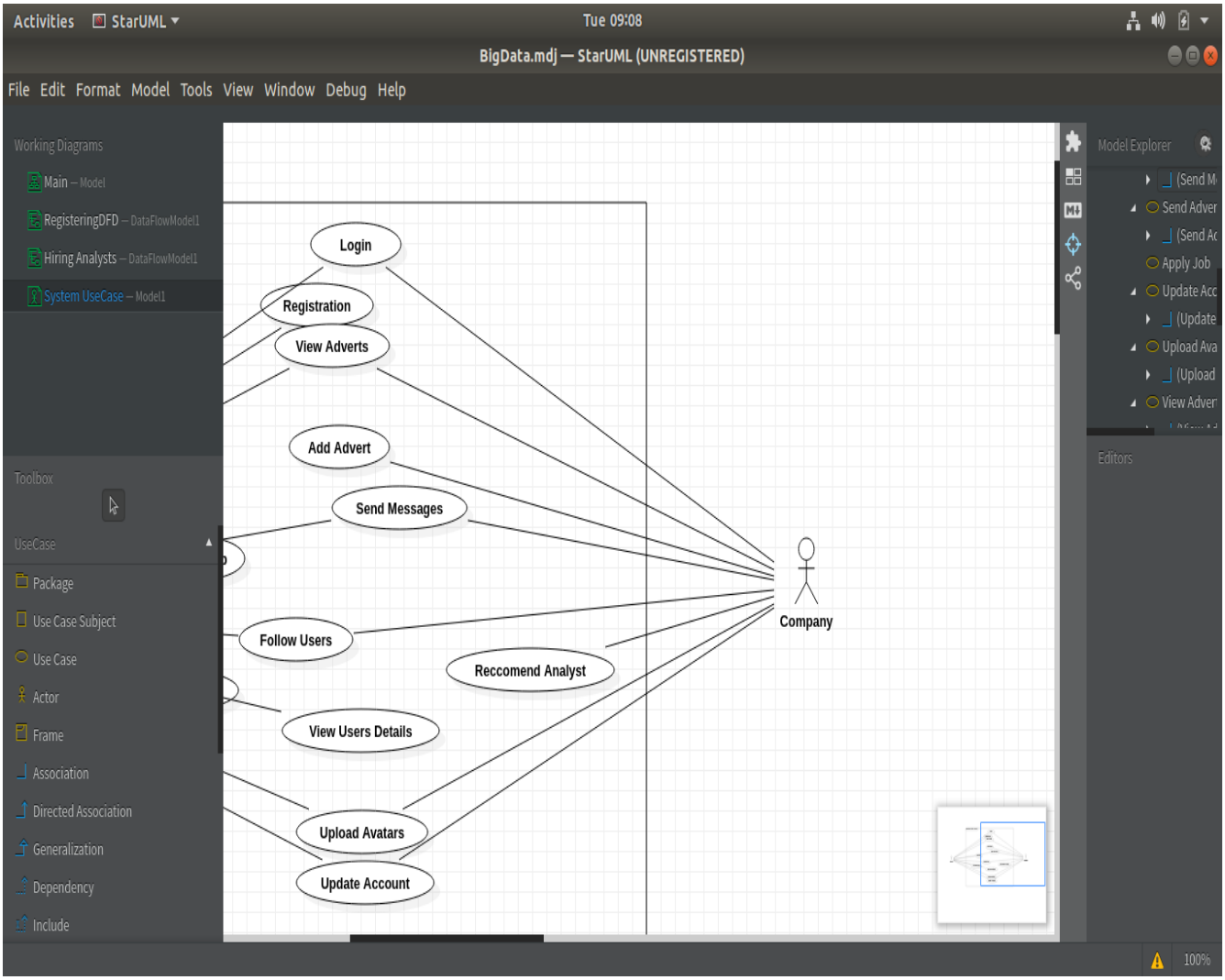

Figure 8: Company use case diagrams

have factors to be considered before been hired. A different company will be impact both the expert and the company in need positively in case of a recommendation.

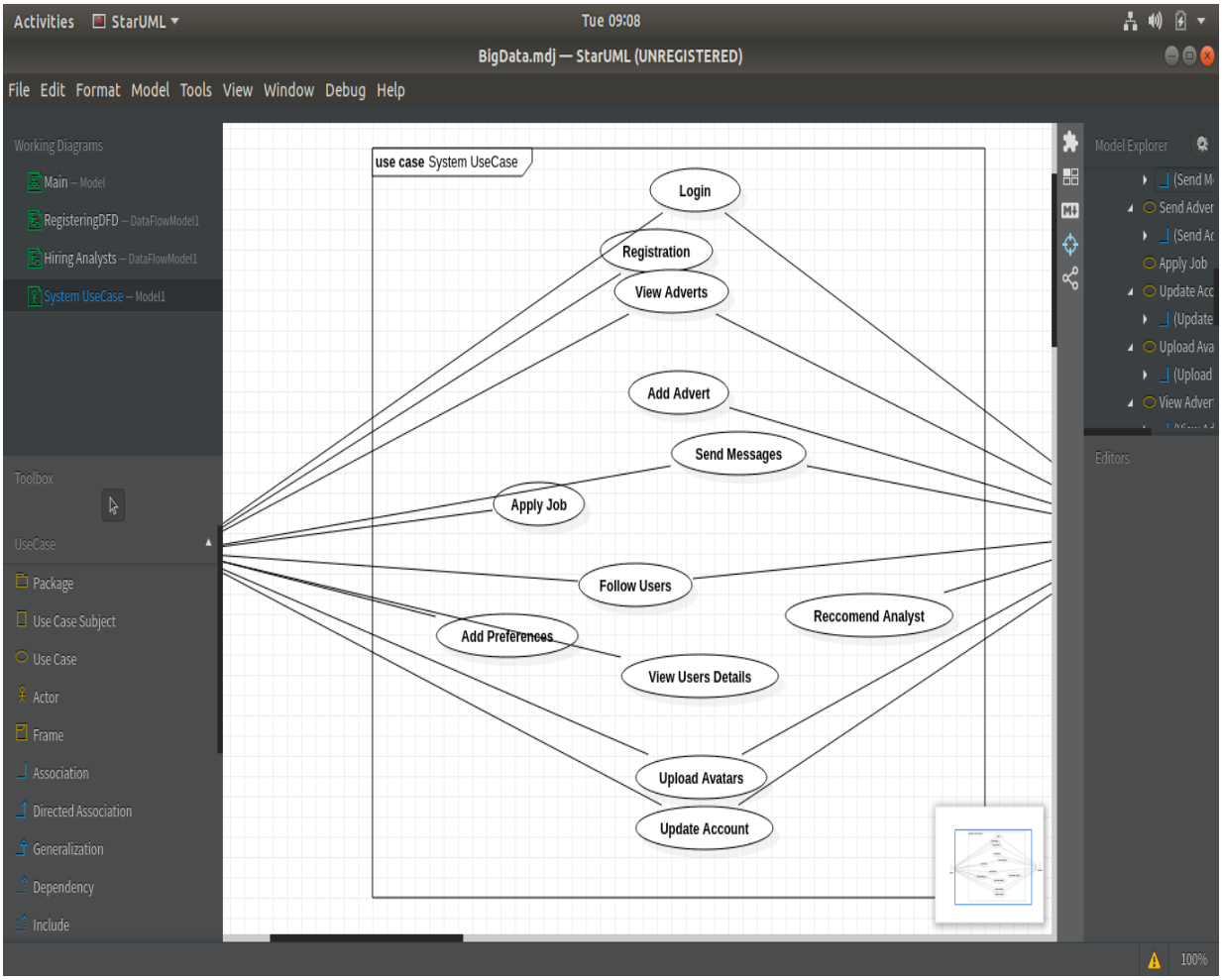

Figure 9: System use case diagram

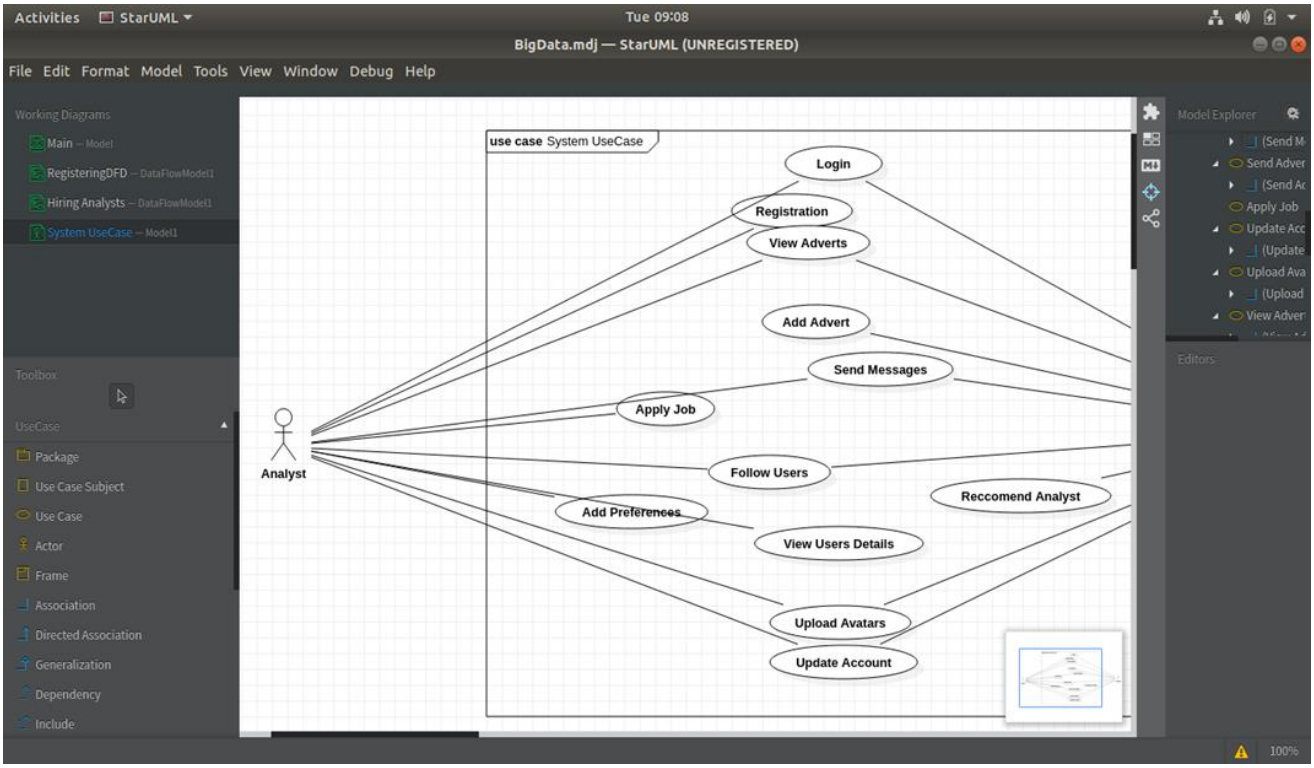

Figure 10: Analyst use case diagram

4.4 SYSTEM IMPLEMENTATION

Big-Data application implemented in Android studio. Different modules that have been put in place. The expert's module provides a platform for professional to register into the system and update their qualifications. The company's module allows the companies to register and look for experts. There a messaging module to facilitate the communication of the concerned parties.

The system uses a sorting algorithm which is represented in pseudo as follows

quickSort(table T, int begin, int end){··int left, right, pivot;··setLabel("read",0);··setLabel("write",0);··left = begin;··right = end;··if (left < right){····setLabel("sourceLine",3);····setLabel("left",left);····setLabel("right",right);····setLabel("pivot",-1);····setSpecial(left,right);····CC("Sort elements from left to right");····setLabel("sourceLine",4);····CC("Calculate pivot");····pivot = calculatePivot(left,right);····incrLabel("read",3);····setLabel("pivot",pivot);····setLabel("sourceLine",5);····CC("Start partitioning");····while (left <= right){·····setLabel("sourceLine",6);·····CC("Search forward from left");·····setMark(left);·····while (T[left] <

pivot){·····incrLabel("read",1);·····CC("Element less than pivot");·····clearMark(left);·····clearSpecial(left);·····left++;·····setLabel("left",left);·····setMark(left);·····}·····incrLabel("read",1);·····CC("Element not less than pivot");·····setLabel("sourceLine",7);·····CC("Search backward from right");·····setMark(right);·····clearSpecial(right);·····while (T[right] > pivot){ incrLabel("read",1);·····CC("Element greater than pivot");·····setSpecial(right);·····right--;·····setLabel("right",right);·····setMark(right);·····clearSpecial(right);·····}·····incrLabel("read",1);·····CC("Element not greater than pivot");·····clearMark(right);·····if (left <= right){·····setLabel("sourceLine",9);·····clearMark(left);·····setSpecial(right);·····CC("Swap elements [left] and [right]");·····swap(left,right);·····incrLabel("write",2);·····setMark(right);·····clearSpecial(left);·····left++;·····right--;·····setLabel("left",left);·····setLabel("right",right);·····}····}····setLabel("sourceLine",12);···· CC("left greater than right");····setLabel("left",-1);····setLabel("right",-1);····setMark(begin,right);····CC("Elements sorted per pivot");····clearMark(begin,end);····clearSpecial(left,end);····quickSort(begin,right);····quickSort(left, end);··}··CC("Return from recursive call");}

4.5 SYSTEM TESTING AND VALIDATION

In this phase, the system is tested. The process of testing the system during development and after development contributes much to satisfying the user requirements and specifications. Usually, the programs are written as a series of individual modules, which are subjected to separate and detailed testing. Validation testing defines whether the system meets its objectives when exposed to the user environment. Big-Data application validation testing is demonstrated in a V- model to show the workflow evaluation.

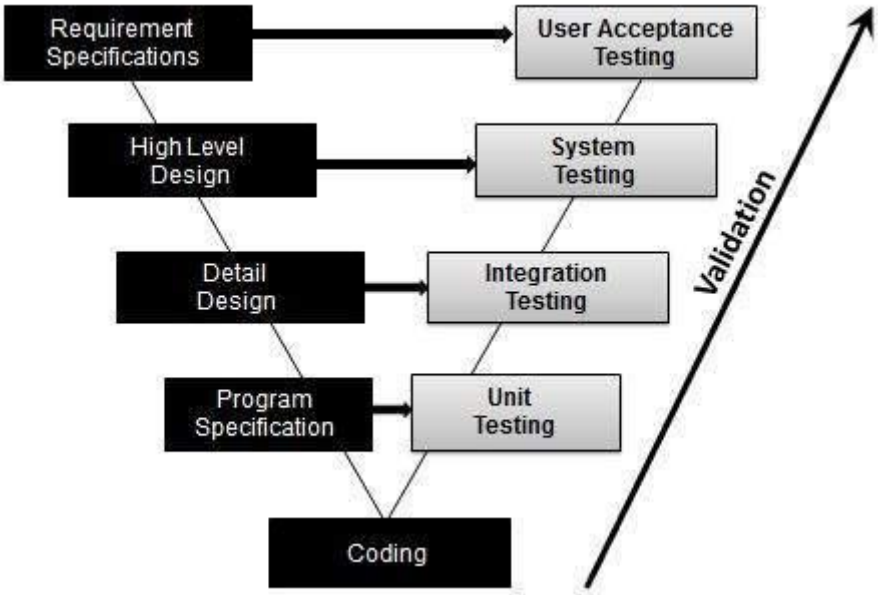

Figure 11: workflow evaluation.

4.5.1 Integration testing

This is a level of software testing where individual units are combined and tested together as a group. Integration testing purposes of exposing the complexities and faults in the integration between the combined units. Big-Data application tested as a whole. The modules brought together by the help of test drivers and stubs. The functionality of the whole system checked whether the system accepts to be combined as a single system. The system shows no error when it is combined; the modules accept to integrate and execute as one.

4.5.2 Component testing

This is a test performed by developers after unit testing. This test examines the compatibility of the system. It tests each module functionality as a single entity to ascertain if it executes its functions correctly after the system integrated. It will allow for proper coordination in execution between the modules since they rely on each other. The components should execute well without any interference by combining them. On testing the components of a Big-Data system, there is no any defect after integration.

4.5.3 Functional testing

This type of testing ignores the external components of the system and focuses on the internal operation of the system. Functional testing geared towards checking the functional requirements of the system. The system should be able to meet its objective. It is used to check whether the professional can successfully register into the system. If they register are they able to log in successfully without difficulties. The

system should not allow for login in of unregistered users. The passwords must comply to a standard of up to eight characters, and it should contain characters, numbers and symbols for safety. The company module should also allow for registration and successful login into the systems. A company cannot be able to tamper with data concerning another company. In the message module, it should allow for smooth communication between the parties. Once one sends a message, the recipient should view the message and reply successfully without complexity. Third parties should not gain access to the messages of another party. All the mentioned functionalities wee successfully tested and gave positive feedback.

4.5.4 Acceptance Testing

Acceptance testing checks whether the end to end the flow of the system of the software is as per the original requirements and if it meets the user specification. The system should work to meet the set objectives. It should be simple to understand and use. The graphic user interface of a Big-Data system is easy to use and simple to understand. This test revealed that the system is convenient to use. The screens are correctly linked to minimising coupling with a reasonable size. The cohesion functionality of the system is proved to be excellent. The program code is simple and easy to understand. Therefore, Big-Data application is acceptable.

CHAPTER FIVE

FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 FINDINGS

The purpose of the study was to investigate the need for Big-Data professionals in a company and to create a mobile application that will provide a link between the Big-Data professionals and the companies to simplify the process of Big-Data professionals outsourcing. The research process went through a couple of steps and procedures, including data collection methods, analysis, system development methodologies, and testing to come up with useful findings. Big-Data was found to be a severe area of discussion in every organisation. The proper handling and use of Big-Data yield good margins in most companies. Most companies use Big-Data as their business strategy for prediction and risk avoidance and management. However, Big-Data can also bring a business down if not handled and analysed correctly. Many organisations have suffered huge losses of valuable information/data and revenue. Big-Data is an acute centre of attraction for attackers, hackers and Cybercriminals. Questionnaires were given to a group of participants concerning Big-Data use, challenges and possible improvements. It was a requirement to get useful information. Interviews, sampling and observations were also made. This information was combined and used to conclude the study. Moreover, different software was used in developing the system. Android studio used for app development. In the research, it was found that in order to get an excellent design star UML software and clear diagrams had to be used for designing to come up with proper data flow diagrams, flow charts and UML diagrams.

5.2 Critical analysis

The study aims at investigating what is the real need for Big-Data in organisations, companies and business premises. Therefore, data were collected through various methods, and it was analysed for better understanding. The fact that Big-Data is rapidly growing at very high speed and that it is an essential requirement for the success of every business it was clear that Big-Data professionals are highly needed. The number of professionals available are, however, inadequate; thus, the current demand for the experts does not match the number of Big-Data professionals available.

Previous studies showed that there is software developed that can be used by persons with no expertise in big data. These applications can analyse and draw patterns from data. However, with the changing technology, it is clear that Big-Data attracts attackers. Therefore Big-Data professionals are needed to ensure that the data is protected and no unauthorised persons can try to corrupt the data.

Moreover, different platforms have been created to help companies acquire labour when needed. These platforms have proved to be expensive, inappropriate in terms of locations and trustworthiness and of no help to companies in need of Big-Data experts. The case called for the creation of an application that would instead provide a direct link between the companies and the Big-Data experts.

5.3 Limitations of the study

When conducting the study, the researcher faced some limitations which were not able to change but slightly affected the research. Some of the employees who contacted were not interested in Big-Data; therefore, not willing to give information concerning their experience with big data. The survey conducted through questionnaires that using google forms and the link sent through emails. Some employees ignored the mails due to lack of interest, which lowered the number of respondents.

Moreover, acquiring materials and references, talking about the need for Big-Data professionals was not easy. Several materials only talked about big data, analyses and used in modern society. However, this slightly affected the study since the researcher relied on other primary sources.

5.4 Conclusion

Big-Data is an essential area that every organisation, company or business must take it seriously. Big-Data professionals are of great importance to the business world. The number of Big-Data experts available does not match the real demand for their services. Therefore, organisations should outsource Big-Data professionals to work for them since employing them permanently may be difficult for organisations. The existing platforms do not help companies outsource experts. Therefore, Big-Data mobile application will help the organisations to gain a direct link with the professionals where they can check according to their qualifications and availability before they hire them. It will make the process of outsourcing Big-Data professionals easier.

5.5 Recommendations

Every organisation, business or company wants to soar into greater heights of success. Proper use and analysis of Big-Data will be a climbing ladder for companies. During the research, some employees did not believe in the power and growth of big data. It is recommended that the organisation should train their employees on big data, what it en tales, and how it affects business productivity. When every member of an organisation trained on Big-Data, then businesses will not have mishandling of information since everyone will handle it with much care.

It is also recommended that companies should schedule timely maintenance of their systems. Most of the businesses who rely on software for Big-Data management; always faced by troubles of errors, attacks

from hackers and Cybercriminals. Timely maintenance of systems will be able to check their functionality, any loopholes in the systems and to ensure that systems are adequately secured.

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Appendices

Appendix-A (Application Screen shotes)

1) Main Screen:

once the application installed then run the application to get the main screen and click on accounts

Figure 12: Application Main Screen

1) Singing Page:

User will get the sign-in page click on Big Data Analyst for next screen:

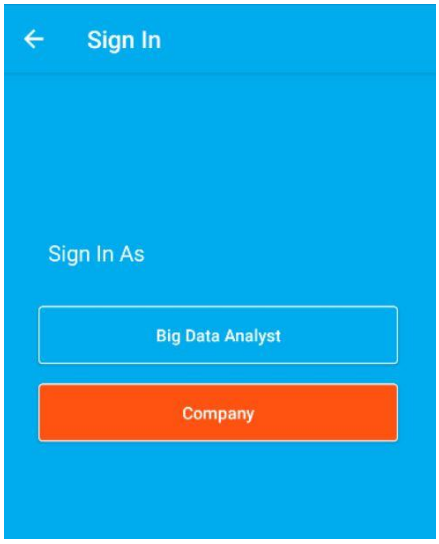


Figure 13: Singing Page

2) Create a new account for Big Data analyst:

From sing-in, page click on Big Data Analyst tap and select sing-up

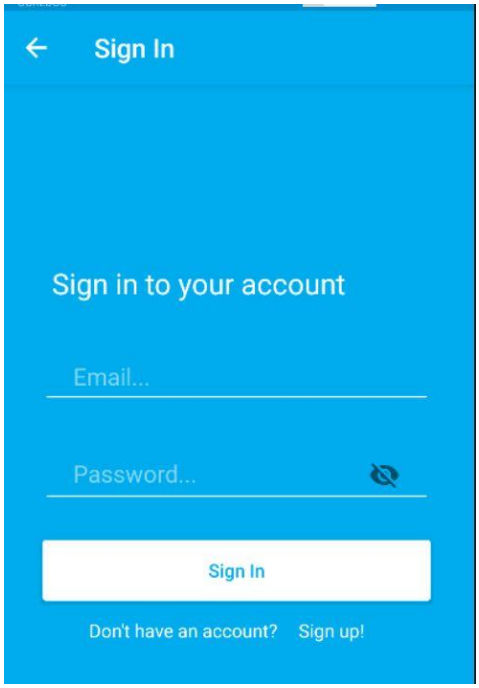


Figure 14: New account

3) Sign up page:

The sign-up page will be displayed option to type user email and password and tape to create account

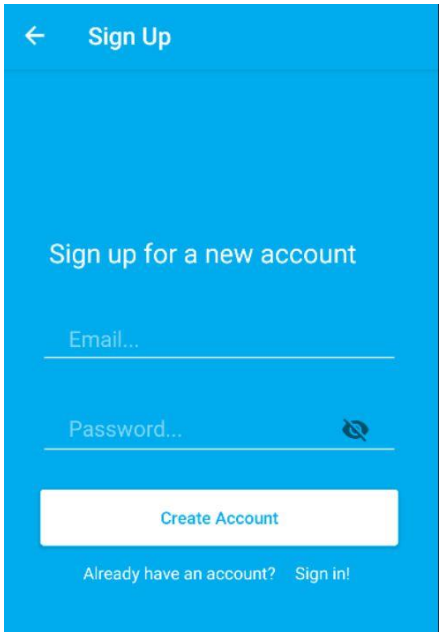


Figure 15: Sign up page

4) Create Account:

At the sing up page type the email address and password

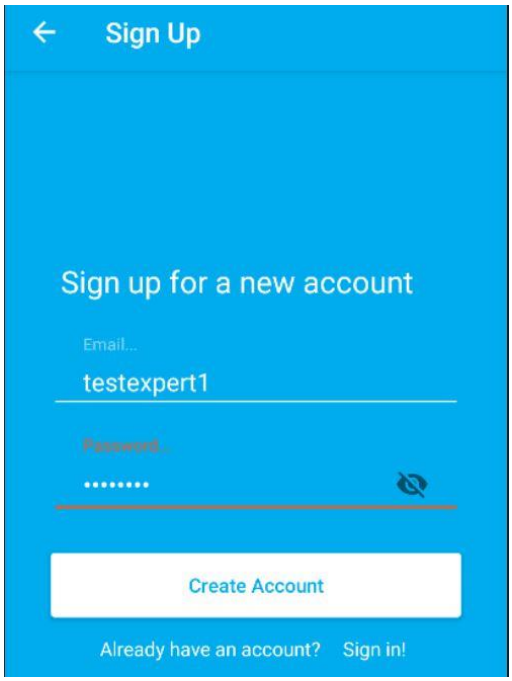


Figure 16: Create Account

5) Security check for password complexity and email validation

Make sure to type a full email address and meet the password complexity requirement and click on create an account.

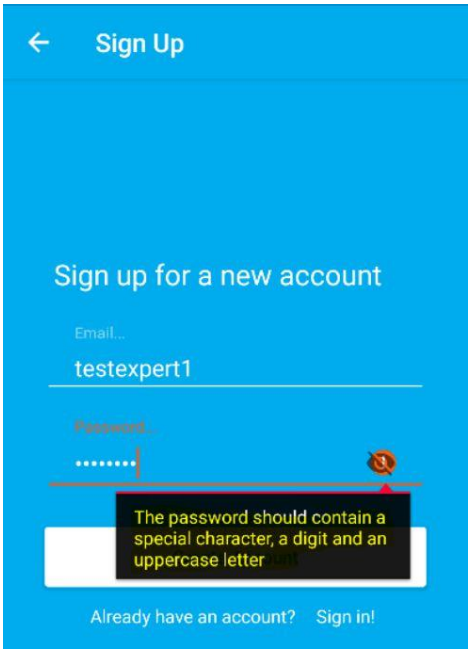


Figure 17: Security check

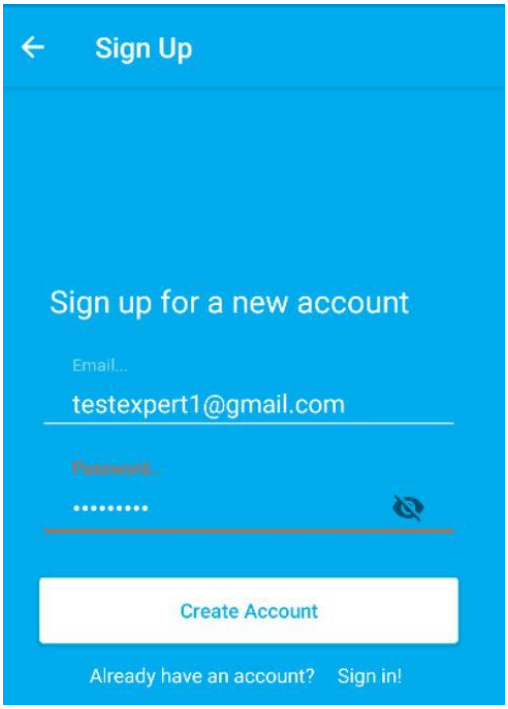
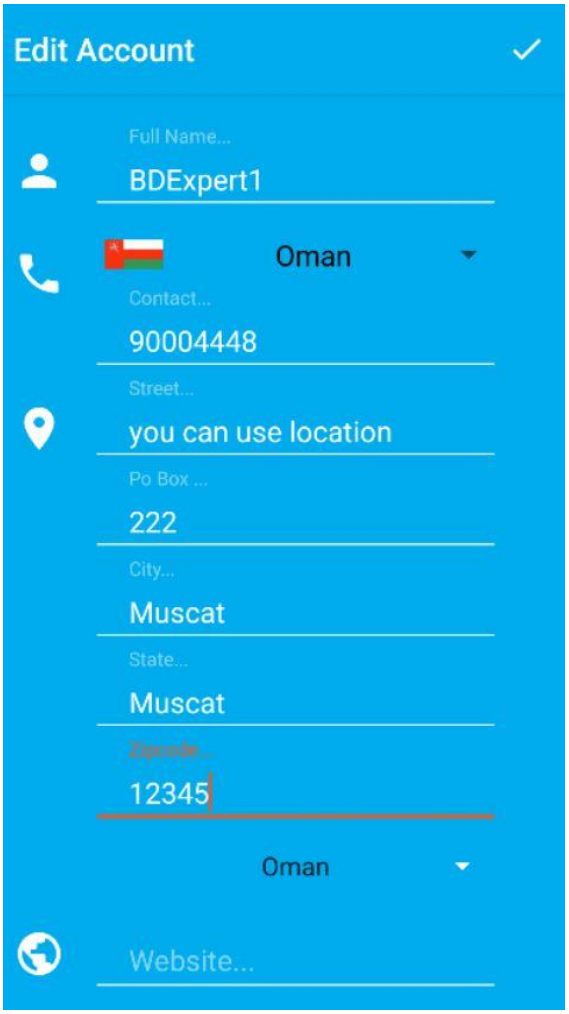


Figure 18: Account Creating

6) Adding More Preferences:

One account created now user can update their profile details such as name, country, and contact details

Figure 19: Adding More Preferences



7) Updating Account preferences

Click on preferences tape to update preferences such as Area of specific, work remotely(ON/OFF), Job type, and the preferred country to work→ Save and

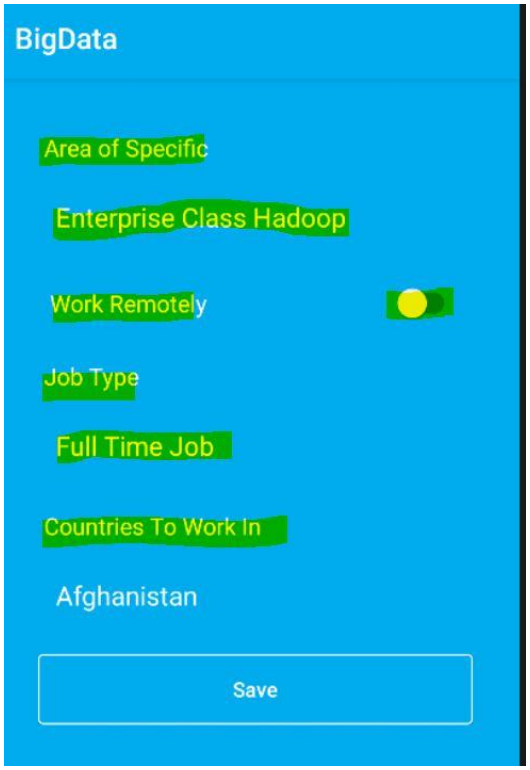


Figure 20: Updating Account preferences

Figure 21: Account preferences- Work Remotely

Figure 22: Account preferences- Area of Specific

Figure 23: Account perferances-Job Type

Figure 24: Account preferences- Countries to work

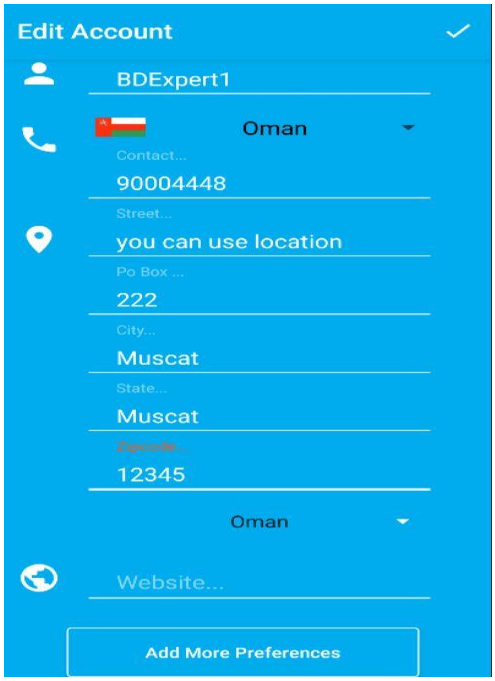


Figure 25:Account perferances-Save and Exit

8) Exploring the application:

Go to sign-in page and login with the newly created account

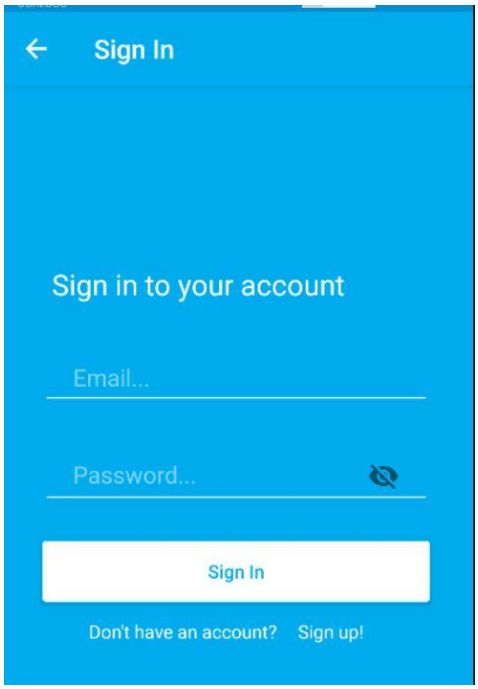


Figure 26: login page

At the main workspace area, the analyst can chat, view companies and generate an advertisement.

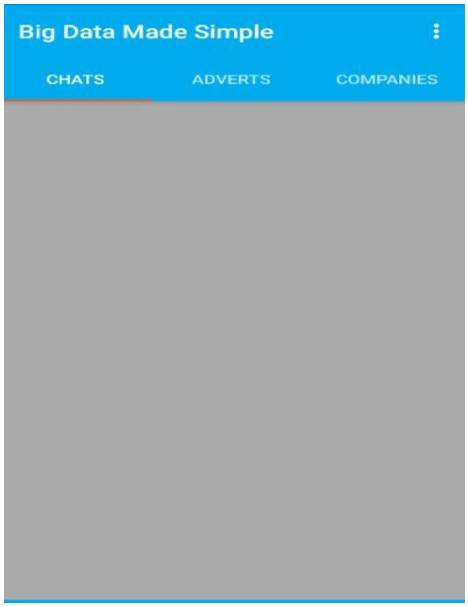


Figure 27: Main workspace

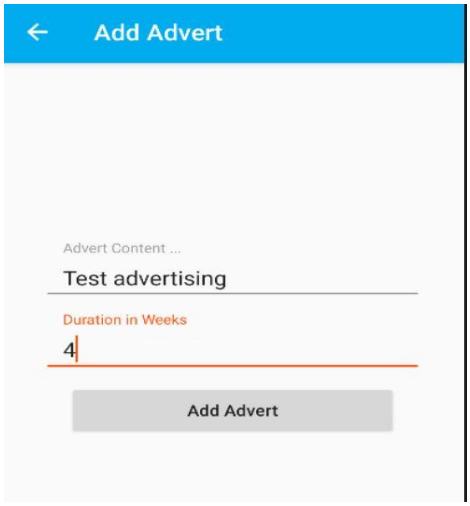


Figure 28: Add Advert page

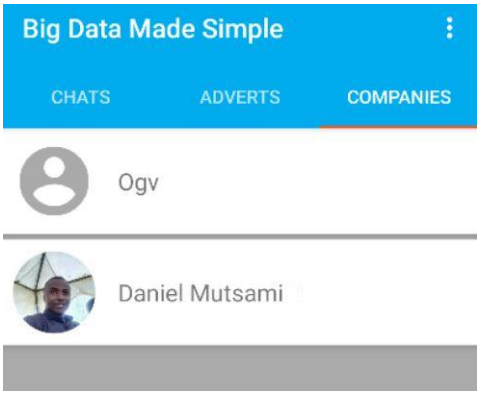


Figure 29: List of companies

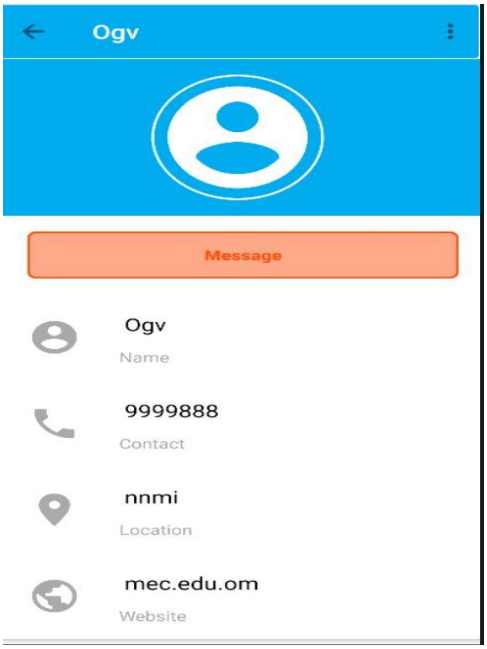


Figure 30: Company details

Analytics can also chat directly with registered companies:

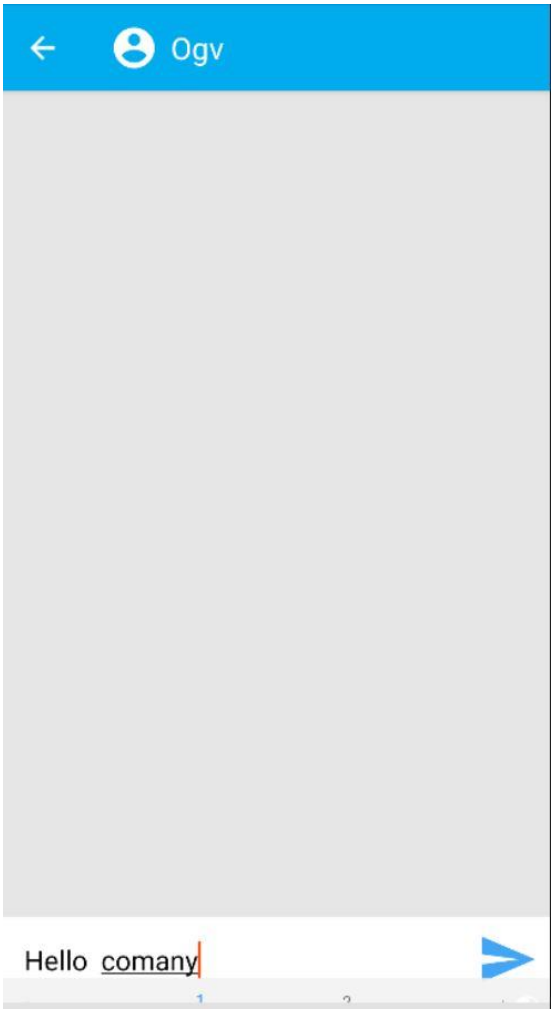


Figure 31: Chat screen with an organisation

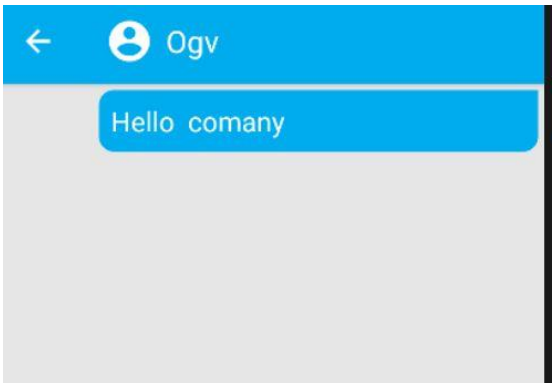


Figure 32: chate box appearance

User can also update his profile photo and his profile details from the right menu.

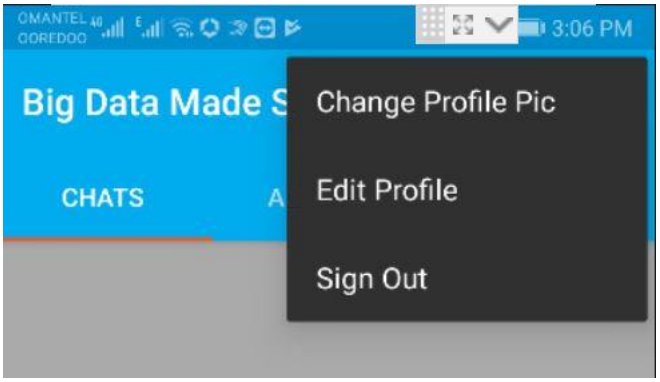


Figure 33: Menu option to update profile

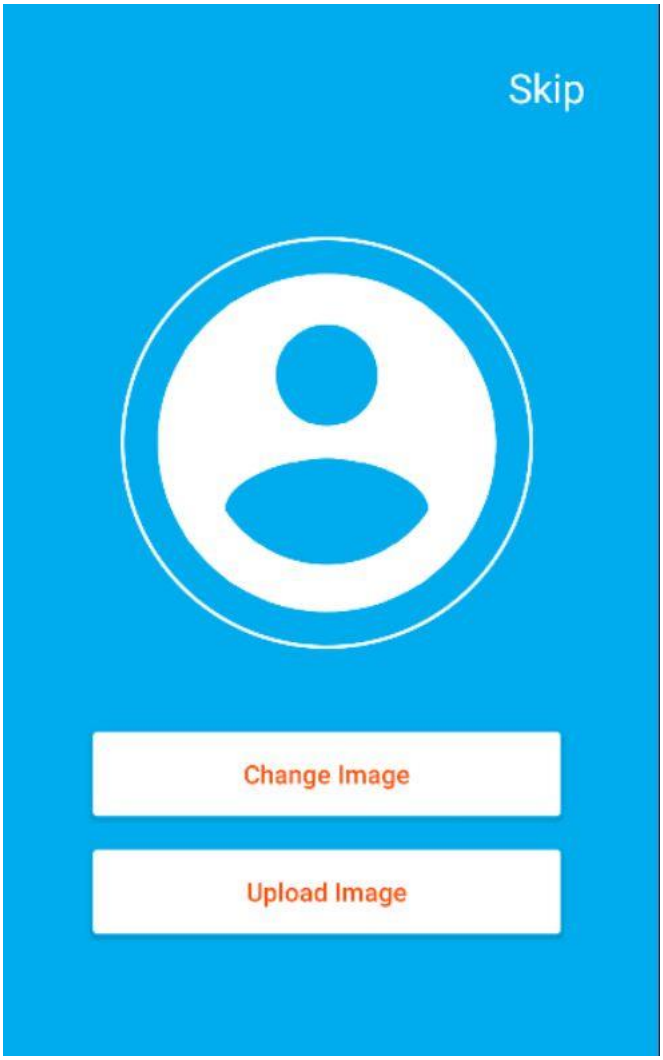


Figure 34: Update profile image

Appendix -B

Project diaries:

كلية الشرق الأوسط
Middle East College

Document Name & Type	MSc (EE/IT) Project Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	04/02/2019	Effective Date	04/02/2019
Review Date	17/01/2019	Next Review Date	16/01/2020

MSc-IT

Project Diary – Spring 2019

Name of Student: Ashraf AL Jafari	Week:
Name of Supervisor: Dr Syed Zakir Ali	
Project Title: Developing a Mobile Application to Connect Expert Big Data Professionals to Ease Service Outsourcing Suggestion: create a network of Big Data professionals for e	

Date/ Day: Wednesday 20th March 2019	Time: 5-6pm	Venue: IBK Discussion Room No 5

Tasks as per project plan	Actual tasks taken up / completed
First Meeting with Supervisor	• *Set the regular meeting's Schedules to take place on Monday's between five to six pm.* • *Brief discussing about the project idea.*

Comments / observations / remarks by the Student:
will have the subsequent meetings planned incoordinate to agreed time.
Need to define the scope of the user for the project.

Document Name & Type	MSc (EE/IT) Project Diary	Author/Department	Head, Centre for Postgraduate Studies
Approval Date	04/02/2019	Effective Date	04/02/2019
Review Date	17/01/2019	Next Review Date	16/01/2020

MSc-IT

Project Diary – Spring 2019

Name of Student: Ashraf AL Jafari	Week:
Name of Supervisor: Dr Syed Zakir Ali	
Project Title: Developing a Mobile Application to Connect Expert Big Data Professionals to Ease Service Outsourcing	

Date/ Day: Monday 25th March 2019	Time: 5-6pm	Venue:

Tasks as per project plan	Actual tasks taken up / completed
A subsequent meeting with Supervisor	• *Recap the last meeting update.*

Comments / observations / remarks by the Student:

Try to find one or two more new project titles. However, most of the comments can be part of the project report documents- "except to the project title"; moreover, at this time, there is an immediate deliverable for the project proposal. Therefore, I need to work on the proposal using only the templet provide by the college.

Interviews and Survey invitation and communications:

Ashraf Al-Jafari

From: Salim Al Wahaibi <salim.alwahaibi@oocep.com>
Sent: Tuesday, August 20, 2019 10:31 AM
To: Ashraf Al-Jafari
Subject: RE: Interview Questions-assessing the need for big data professionals in an organization or companies worldwide

Please find my replies in green.

From: Ashraf Al-Jafari <ashraf@oman-gas.com.om>
Sent: 19 August 2019 23:49
To: Salim Al Wahaibi <salim.alwahaibi@oocep.com>
Subject: Interview Questions-assessing the need for big data professionals in an organization or companies worldwide

Dear Salim,
This interview questions are part of the research project in partial fulfillment for the award of Master of Science in Information Technology. The research aims to gather information on the need for big data professionals in the business world with a goal of creating a mobile application to simplify the process of outsourcing big data experts.
The study is a part of the primary investigation process on the use, challenges and appropriate recommendation on issues pertaining big data in businesses with an aim of knowing the need for big data experts. Your input will be considered for the research and study process.
Thank you for your time and willingness to participate in the interview.
Your input will be of highly valued on our research.

1. How is big data perceived in your organization?
   There is no good understanding or appreciation for big data yet.
2. Why do you think big data is important in businesses?
   Because larger the data, the better the and more accurate the analysis, which leads to better decision and efficient investment.
3. How is big data used in your organization?
   Not used.
4. Who is involved in big data management in the organization?
   No one.
5. Why are big data professionals important in management of big data in organizations?
   The importance of data professionals is directly related to the value of the assets (data) they handle. Accordingly, to achieve real value out of data management, it must be carried out by real data professionals.
6. What challenges do you face in handling big data in the company?
   Haven't started to handle big data yet.
7. What do you think is the possible solution to the problems you face?
   Education and awareness of top management to the importance of big data and data management.
8. How can a mobile application help to solve the complexity?
   Mobile and mobile Apps have become default platform for almost every transaction and action on daily activities. Thus, using it for bringing awareness or education of the use of big data can have high impact how this matter is perceived.

Ashraf Al-Jafari

From: Ishaq Al Hadhrami <Ishaq.ALHadhrami@abrajoman.com>
Sent: Tuesday, August 20, 2019 2:31 PM
To: Ashraf Al-Jafari
Subject: RE: Invite to participate in in the survey to assess the need for Big-Data Professionals

Ashraf

Has been done and good luck

Regards

أبـــراج لخدمات الطاقة ش.م.ع.م.
Abraj Energy Services S.A.O.C.

Ishaq Al Hadhrami Senior IT Engineer
Mobile: 92922728 | Phone: 24120305

Al-Assalah Building, 3rd Floor, Building no. 223, Block no. 237 Way no. 3701, Al-Ghubrah,PO Box 1156, PC 130, Azaiba, Sultanate of Oman Fax: +968 24509998
Visit us at:

From: Ashraf Al-Jafari <ashraf@oman-gas.com.om>
Sent: Monday, August 19, 2019 11:26 PM
To: Ishaq Al Hadhrami <Ishaq.ALHadhrami@abrajoman.com>
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear Ishaq,

I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

The study is a part of the primary investigation process on the use, challenges and appropriate recommendation on issues about Big-Data in businesses to know the need for Big-Data experts. The results of this survey are essential, and the information will be used for research purposes only.

Your participation in this survey is entirely voluntary, and all of your responses are anonymous. None of the respondents will be connected to identifying information.

The survey Consist of 30 questions and will take 10-20 minutes to complete

Thank you in advance for providing this important feedback

To participate, please click on the following link:

https://forms.gle/6VZx3m3H5cxirG3J7

1

Ashraf Al-Jafari

From: Salim Ali Al-Harthy
Sent: Tuesday, August 20, 2019 11:34 AM
To: Ashraf Al-Jafari
Subject: RE: Invite to participate in in the survey to assess the need for Big-Data Professionals

Done and all the best

Salim Ali Al-Harthy

From: Ashraf Al-Jafari
Sent: Monday, August 19, 2019 11:52 PM
To: Salim Ali Al-Harthy <salim.a.harthy@oman-gas.com.om>
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear Salim,
I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

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The survey Consist of 30 questions and will take 10-20 minutes to complete

Thank you in advance for providing this important feedback

To participate, please click on the following link:

https://forms.gle/6VZx3m3H5cxirG3J7

If you have any questions about this survey, or difficulty in accessing the site or completing the survey, please contact Mr Ashraf AL Jafari Mobile: +968 97545454 Email: ashraf@oman-gas.com.om

Please feel free to forward this survey to anyone whom you think he/she can add a valuable contribution to this research.

Sincerely,

Ashraf Al-Jafari

Ashraf Al-Jafari

From: Ashraf Al-Jafari
Sent: Monday, August 19, 2019 11:35 PM
To: Adnan Albaram; Al-Khalil Al-Kharusi; Asaad Al-Busaidi; Ashraf Al-Jafari; Hakeem Al-Tauqi; Hamood Al-Siyabi; Huda Al-Nabhani; Kamran Ilyas; Mohammed Al-Harthi; Muhammad Baber; Musabah Al-Masuadi; Nasser Al-Balushi; Salim Al-Talie; Talal Al-Sakaiti
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear all,
I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

The study is a part of the primary investigation process on the use, challenges and appropriate recommendation on issues about Big-Data in businesses to know the need for Big-Data experts. The results of this survey are essential, and the information will be used for research purposes only.

Your participation in this survey is entirely voluntary, and all of your responses are anonymous. None of the respondents will be connected to identifying information.

The survey Consist of 30 questions and will take 10-20 minutes to complete

Thank you in advance for providing this important feedback

To participate, please click on the following link:

https://forms.gle/6VZx3m3H5cxirG3J7

If you have any questions about this survey, or difficulty in accessing the site or completing the survey, please contact Mr Ashraf AL Jafari Mobile: +968 97545454 Email: ashraf@oman-gas.com.om

Please feel free to forward this survey to anyone whom you think he/she can add a valuable contribution to this research.

Sincerely,

Ashraf Al-Jafari

Ashraf Al-Jafari

From: Ashraf Al-Jafari
Sent: Monday, August 19, 2019 11:51 PM
To: Wail Mohammed Said--(Abraj)
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear Wail,
I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

The study is a part of the primary investigation process on the use, challenges and appropriate recommendation on issues about Big-Data in businesses to know the need for Big-Data experts. The results of this survey are essential, and the information will be used for research purposes only.

Your participation in this survey is entirely voluntary, and all of your responses are anonymous. None of the respondents will be connected to identifying information.

The survey Consist of 30 questions and will take 10-20 minutes to complete

Thank you in advance for providing this important feedback

To participate, please click on the following link:

https://forms.gle/6VZx3m3H5cxirG3J7

If you have any questions about this survey, or difficulty in accessing the site or completing the survey, please contact Mr Ashraf AL Jafari Mobile: +968 97545454 Email: ashraf@oman-gas.com.om

Please feel free to forward this survey to anyone whom you think he/she can add a valuable contribution to this research.

Sincerely,

Ashraf Al-Jafari

From: Ashraf Al-Jafari
Sent: Monday, August 19, 2019 11:39 PM
To: Faiz AL JABRI--(Orpic)
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear Faiz,
I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

The study is a part of the primary investigation process on the use, challenges and appropriate recommendation on issues about Big-Data in businesses to know the need for Big-Data experts. The results of this survey are essential, and the information will be used for research purposes only.

Your participation in this survey is entirely voluntary, and all of your responses are anonymous. None of the respondents will be connected to identifying information.

The survey Consist of 30 questions and will take 10-20 minutes to complete

Thank you in advance for providing this important feedback

To participate, please click on the following link:

https://forms.gle/6VZx3m3H5cxirG3J7

If you have any questions about this survey, or difficulty in accessing the site or completing the survey, please contact Mr Ashraf AL Jafari Mobile: +968 97545454 Email: ashraf@oman-gas.com.om

Please feel free to forward this survey to anyone whom you think he/she can add a valuable contribution to this research.

Sincerely,

Ashraf Al-Jafari

From: Ashraf Al-Jafari
Sent: Monday, August 19, 2019 11:37 PM
To: Fahad Al Rashdi
Subject: Invite to participate in in the survey to assess the need for Big-Data Professionals

Dear Fahad,
I am writing to request your participation in the below survey link.

This survey is a part of the research project in partial fulfilment for the award of Master of Science in Information Technology. The research aims to gather information on the need for Big-Data professionals in the business world to create a mobile application to simplify the process of outsourcing Big-Data experts.

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Sincerely,

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The growing demand for Big-Data Analytics A case study for Outsourcing approach using a dedicated Platform

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***Abstract*— Big-Data has become a crucial tool for discovering hidden patterns and essential for making new predictive models for both public and commercial sectors. By analysing Big-Data, industries collect numerous benefits, including improved usage of resources and enhanced business decision-making [1]. Big-Data influences to transform research, innovation, and business marketing to promote achieving a competitive advantage [2].**

Consequently, there is a high demand for Big-Data experts; there is a deficiency in the numbers of Big-Data professionals and businesses do encounter challenges when handling information with Big-Data [3]. Training new staff is costly for companies; hence, they may choose to stay without Big-Data professionals. However, some companies have the option of outsourcing, which is an effective way of reducing labour costs [4]. Hence outsourcing may be considered a good alternative. The research aims to ease the outsourcing process with the help of developing a dedicated platform allowing to gather the Big-Data professionals with interested companies who can use the platform to locate their preferred expert.

Keywords—Big-Data; Outsourcing; Big-Data Analytic

I. INTRODUCTION

Big-Data is an essential and vital area in every business or organisation. Poor handling of data has caused a tremendous loss that is difficult to recover for organisations. Huge losses continue to be incurred by businesses due to damages caused by poor handling and analysis of Big-Data in organisations [1]. Costs incurred in recovering this data continue to threaten and scare away both employees and investors. Staffs spend much time trying to venture into a business and analyse the existing data for better output in the organisation. Besides, they face many difficulties in handling the data since they are not professionally trained hence causing more damage and data loss [4]. While Big-Data professionals have emerged to clear up the mess, large organisations still incur huge costs while looking for these professionals. Moreover, most of these experts prove to be very expensive. Alternatively, one can think of having a central pool that brings all the experts together so that companies can get ready access to these experts and explore possibilities of getting the data analysed on a sub-contracting basis as and when needed, which minimise the financial burden.

Vulnerabilities caused by generating fake data had caused a significant drawback to big data. Hackers and cybercriminals can fake data and channelise it to the database storage. These criminals are capable of penetrating personal databases and alter the sensors to read wrong information, thus hiding their identity and hence remain unnoticeable [5].

Presence of untrusted mappers also negatively affects Big-Data processes. When Big-Data is undergoing parallel processing, an outsider or criminal can have access to mappers code and thus can alter the settings on the mappers for their selfish gain hence able to access sensitive information [6]. However, the organisation may decide to apply perimeter security, which may not be able to get the root cause of the problem; thus, Big-Data becomes a low hanging fruit in most organisations. This perimeter security controls need to be applied by an expert who understands Big-Data in depth.

There are troubles incurred in cryptographically encrypting big data. Therefore, it pulls in a Big-Data security threat that can only be handled by a professional with a deep understanding of Big-data. Big-Data widely stored in the cloud which limits data encryption since one of the main advantages of Big-Data is speed, it is often limited to encrypting and encrypting processes which slow down the processing of data [7].

Data provenance gets difficult In metadata manipulation performance processes. It is because changing metadata can lead to wrong data sets that directly affects the transfer of bulk data [8]. The in-availability of Big-Data security audits is another major problem faced in handling Big-Data. The companies and organisations are unable to view the progress of their companies hence be operating on wrong data and records [9]. It is caused mainly by lack of Big-Data professionals.

II. LITERATURE REVIEW

Data refers to facts or statistics collected together for processing or analysis. It can contain sets of values, different subjects concerning qualitative or quantitative aspects. Data can exist in the form of a document, text, video, audio, software programs or other types of data [10]. A collection of vast amounts of the data sets greats big data.

A. BIG DATA

Big-Data refers to humongous volumes of data that cannot be processed effectively with the traditional applications that exist. The processing of Big-Data begins with the raw data that is not gathered and is often intolerable to store in the memory of a single computer [11]. Big-Data can be analysed computationally to reveal patterns, trends, associations relating to human behaviour and interactions. Big-Data is one of the most significant driving forces behind the growing technological waves in cloud computing, Internet of Things, Artificial intelligence and data science [12]. It is a crucial area in every business around the world. The growth of the use of computers and the internet has been a steering wheel to the significant increase of data worldwide to five zettabytes of data today. Within one year, data will have grown to 50 zettabytes. In the current technological world, we generate data every time in every action we take, thus leaving behind digital trails [13].

Big-Data workings on the standard that the additional knowledge about something or any circumstances, the further consistently it can increase new perceptions and make forecasts about what will occur in the forthcoming [14]. By relating further data points, associations begin to appear that were before concealed, and these relations allow us to absorb and create cleverer judgements. Most generally, this is done through a method that involves building models, based on the data we can collect, and then running simulations, alternating the value of data points each time and observing how it impacts our results [15].

Until comparatively recently, knowledge was restricted to spreadsheets or databases – and it had been all perfectly ordered and neat. Something that was not merely organised into rows and columns was just too difficult to analyse with, and therefore, it remains unheeded [16]. Now though, advances in storage and analytics mean that we will capture, store and work with several, many alternative forms of information. As a result, “data” will mean everything including but not limited to databases to photos, videos, sound recordings, transcription and data readers or sensors. To form a sense of all of this unstructured information, Big-Data usually uses innovative analytics involving "AI" and machine learning [17].

B. BIG-DATA PROFESSIONALS

The rapid growth of Big-Data requires special attention and handling by qualified personnel. A Big-Data professional is personnel trained to handle and deal with the science of data with adequate and necessary Big-Data skills and knowledge [18]. Big-Data professionals can typically handle anything that pertains data. They are experts skilled with one or more advanced data analytics tools and methodologies.

The traditional data analysis is unable to cope with the advent of Big-Data, which is both unstructured and structured. Big-Data involves drawing insights and patterns using statistical algorithms other than navigating in the relational database management system. It involves the use of modern technology with hands-on skills in Big-Data in combination with traditional data analysis techniques [19]. Big-Data professionals need to have verse skills in different areas. Programming skills are a vital requirement for any Big-Data scientist to be able to deal with unstructured data. At a minimum, one should be a fully-fledged programmer in java, python, R and Kotlin languages [20]. The expert must be competent in data warehousing to be able to deal with non-relational databases like MySQL, Oracle and DB2. Good knowledge and familiarity with frameworks such as Apache storm, apace spark, Apache Samza, Map-reduce framework and Hadoop [21]. These computational frameworks assist in dealing with Big-Data processing and analytics. Good knowledge of statistics and linear algebra is another critical requirement for Big-Data experts. The statistic is a core building block to Big-Data experts. Business knowledge is also essential to keep the analysis focused and to help validate the required fields [22].

C. NEED FOR BIG-DATA IN COMPANIES

Data is a resource and therefore, an asset in the modern world. Companies have vast amounts of data at their disposal. The quench of companies to be more objective and productive calls for embracing big-data and technology [23]. Converting or analysing this data into useful insights, knowledge, patterns and correlations is more said than done. Big-Data is a technology that is growing widely both in businesses and in the technological world [24]. The analysis of this Big-Data is a significant investment for companies and businesses. Therefore, companies need Big-Data in different areas for the following reasons;

1. Attaining their competitive advantage in business.

Big-Data analytics enables companies to draw patterns on their business progress. They can see the inputs of their customers, including their choices and preferences. By analysing their outputs against the set objectives, a company can notice the existing market niche. As per the consumer's taste, choice and preferences, the company will be able to implement new techniques of production. The patterns can show what their competitors offer, therefore, can go an extra mile in the competitive market through the following strategies [25].

2. Acquiring and retaining customers.

Attaining competitive advantage, the company acquires and retains more customers. Understanding consumer insights enables a company to offer what customers desired. The Coca-Cola company manages to strengthen its Big-Data analytics strategy through digital-led programs to drive customer retention [26].

3. Advertisements and marketing insights

Big-Data analytics boosts the marketing power of a company. Companies have spent millions in fruitless

campaigns of advertising their businesses. Skipping useful research of Big-Data analytics to understand the marketing strategies pulls business operations down. The analysis helps the company to keep up with the changing product line, meeting the expectations of its customers and ensuring marketing strategies and unique and powerful. After years of cautious enthusiasm, marketing and advertising technology sector is now able to embrace Big-Data in a big way. Big-Data enables companies to dwell on a more target-oriented and personalised advertisement. Netflix is a multi-million subscribers company using targeted advertisements. It gathers enormous amounts of personalised data to get information notifying an individual on which movie to watch; next, this is their most unique key to achieving their market status [27].

4. Risk Management

The current business environment faces a lot of unpredictable risks and damages. A management plan and strategy to foresee risk and be able to mitigate it before it causes damage is a secret for success in companies. It can only be achieved by proper analysis of Big-Data through discovering and understanding the business patterns and insights. Big-Data improves the risk management strategy risk for smarter and better business decisions. The UOB bank of Singapore uses Big-Data for risk management to be able to calculate the minimum most time of the value at risk [15].

5. Boosts business innovations and inventions

Big-Data is a significant avenue for generating more revenue in an organisation by promoting innovations and product improvements. It was made possible by collecting massive amounts and analysing the data from customers to know what fits them precisely [28]. A company can know what they exactly need to produce to match the expectations. They can also restructure the existing products as per the customer's tastes. A company that dwells on the data collected from the market before producing can come up with significant innovations that boost their profit margins [29]. Amazon is a great company that leverages on Big-Data analytics to venture into the vast market, therefore, enabling it to create new product lines and achieve higher value.

6. Big-Data in supply chain management

Analytics gives suppliers accurate insights and extensions in its supply network. It enables them to escape the difficulties and complexities incurred previously. Big-Data enables companies to build more complex networks with collaborations to gain higher profit margins. Contextual intelligence is a critical requirement in the supply chain that can only be achieved through Big-Data analysis. Alibaba is a big company using Big-Data for the efficient supply chain management. Alibaba relies on information from its customers concerning warehousing, quality of goods and their delivery services to ensure consistency in the business [30].

D. CHALLENGES FACED WITH BIG DATA

1. Difficulty in dealing with widely growing volumes of big data

A large percentage of the data is unstructured, therefore unable to be stored in databases. Managing this unstructured data is a big challenge. Some of the companies are trying to use different strategies such as No SQL databases and Hadoop to handle this Big-Data [21].

2. Lack of enough Big-Data Experts

The large amounts of Big-Data call for Big-Data professionals. However, these professionals do not match the existing demand. It calls for high costs to recruit the few available and a big budget to get the services [31].

3. Integrating data from different sources

A large percentage of data used by organisations to generate patterns comes from different sources that may be difficult to rely on. These sources include email streams, employee document platforms, social media platforms and also enterprise applications. Integrating all this information to draw patterns to generate reports is not an easy task for organisations [32].

4. Security of big data

Big-Data can be an excellent target for hackers and advanced persistent threats. Most companies have lost a lot of valuable data due to insecurity in Big-Data management. The use of Big-Data calls for very secure systems to store information. Therefore, additional security measures apply for data integrity [5].

III. OBJECTIVES

A. General objective

The main objective of this research is to create a mobile application platform to link big-data professionals with organisations or businesses and to make the outsourcing of Big-Data professionals easier. Further, assess the need and Develop a Mobile Application to form a network of Big-Data Professionals for Outsourcing purposes. The research seeks to investigate the need for Big-Data specialists and to come up with a dedicated platform that can connect Big-Data professionals so that it becomes easier for companies to outsource their requirements. The research aims to ease the outsourcing process with the help of developing a dedicated platform allowing to gather the Big-Data professionals with interested companies who can use the platform to locate their preferred expert. Therefore both types of users can then begin communication-based on the contact details available in this platform and hire the person that they find the best fit for the work. Referrals from other firms can also help to identify the best experts for the tasks.

In summary, the research aims to

- Develop a mobile application to connect expert Big-Data professionals as a proof of concept "PoC."
- Make the outsourcing of Big-Data professionals easier

B. Specific objectives

- To study and analyses the existing platforms for Big-Data experts

- To identify a suitable way of linking organisations with Big-Data experts
- To implement the mobile applications
- To test and validate the application.

IV. IMPORTANCE OF THE RESEARCH

Big-Data is a crucial area that requires maximum attention to the prosperity of a business. This study empirically seeks to understand the root cause of the problems faced with Big-Data and the need for Big-Data professionals in organisations [33]. It then evaluates on the most efficient ways of dealing or handling data by creating a platform to link the organisations and businesses with the service providers (Big-Data professionals). Data loss and damage will be eradicated, thus improving on the revenue generation in businesses. The security of organisational data will be enhanced by this system [34]. It will transform research, innovation, and business marketing to promote achieving a competitive advantage in organisations and businesses. Moreover, this project will enable customers, and stakeholders to rebuild their trust to businesses with their personally identifiable information.

V. RESEARCH GAP

'Big data' is no longer just an innovative technology because it stimulates the development of new technologies and facilitates their adoption in society. Therefore, it is diversely used in organisations. Big-Data experts are required to run different operations like Big-Data analytics. However, with the growing use of Big-Data in businesses and organisations, the number of bulk data experts does not match the existing demand. Therefore, it is difficult for organisations to get the necessary services required for handling this data. The few available experts are, however, not easily accessible since we do not have a known platform for these experts. Organisations find it costly to start training their staff on big data.

The research questions we need to answer are;

I. How is Big-Data useful, and how is it used in modern businesses and companies, and what is the need for Big-Data professionals?

II. How and where from do the companies, and organisations get their Big-Data professionals?

III. What are the ways and solutions possible to solve the problem faced by companies and businesses in finding and hiring Big-Data professionals?

VI. STATEMENT OF THE PROBLEM

Tremendous data loss is a critical issue in organisations and companies. High costs are being incurred to recover data. Essential and private information has been exposed to the public, while others use it for personal gain. Handling of data by untrained persons has led to waste of time and resources too hence bring more damage [3]. Lousy analysis of bulk data is attracting fines and losses to companies. Generation of fake data for use in organisations has landed them into the hands of cybercriminals. Presence of untrusted mappers is majorly affecting Big-Data operations breaking down bulk data transfer. Cryptographic encryption of Big-Data has proved to slow down the process of Big-Data processing. Data provenance is causing a significant security threat to Big-Data [35]. The reliance on multiple systems, mixed entry of data from different users and reduced migration and integration of data has led to poor quality of data. It is damaging the reputation of the companies and organisations due to mistrust issues from customers, especially if security breaches are involved.

VII. RESEARCH METHODOLOGY

This study aims to investigate the need for Big-Data professionals in businesses and companies and to develop a mobile application that will help in creating a link between the Big-Data experts and the companies. Its goal is to make the outsourcing of Big-Data professionals easier for companies. Big-Data research utilises a mixed methodologies research strategy. The methodology involves collecting and analysing both quantitative and qualitative data to provide a better understanding of the research problem. A mixed methodology brings a benefit of triangulation where one study phenomenon can be examined and discussed in a more than one technique broader and deeper understanding. It brings a more complete and comprehensive understanding of the research area.

A. Data collection methods

The research adopted a mixed collection method involving both primary and secondary collection for a better understanding of the problem.

B. Primary data collection

Primary data is a critical source of information for the research, which includes both qualitative and quantitative data.

1) Qualitative data collection

A random selection of individuals who have dealt with Big-Data or are knowledgeable in the area will be interviewed to answer the research study questions. More questions will be asked to gather plenty of useful data concerning Big-Data and its processes.

2) Quantitative data collection

The data collected in the research achieved by formulating, a computerised questionnaire where questionnaires were formulated through Google forms and send to different groups of employees and experts from different companies. The targeted group reviewed the questionnaire and appropriately answered the questions. They shared their knowledge and opinion about Big-Data and the associated problems, giving an insight into the difficulties that corporations encounter when dealing with Big-Data, as well as their views on what should have been done.

C. Secondary data collection

This data collected from publicly available sources for companies that use Big-Data, especially Google, as well as previous studies conducted, books, journals and articles concerning Big-Data and the need for experts.

VIII. CRITICAL ANALYSIS

The study aims at investigating the real need for Big-Data in an organisation. Therefore, data were collected through

various methods, and it was analysed for better understanding. The fact that Big-Data is rapidly growing at very high speed and that it is an essential requirement for the success of every business it was clear that Big-Data professionals are highly needed. The number of professionals available is, however, inadequate; thus, the current demand for the experts does not match the number of Big-Data professionals available.

Previous studies showed that there is software developed that can be used by persons with no expertise in big data. These applications can analyse and draw patterns from data. However, with the changing technology, it is clear that Big-Data attracts attackers. Therefore Big-Data professionals are needed to ensure that the data is protected and no unauthorised persons can try to corrupt the data.

Moreover, different platforms have been created to help companies acquire labour when needed. These platforms have proved to be expensive, inappropriate in terms of locations and trustworthiness and of no help to companies in need of Big-Data experts. The case called for the creation of an application that would instead provide a direct link between the companies and the Big-Data experts.

IX. Discussion

Companies who implement Big-Data can monitor their data and draw correct patterns for the efficient operation of the company. The company can master Big-Data and come up with the appropriate tools and techniques to analyse this data. Those company should not only focus on collecting its users, clients and customers details but also apply Big-Data analytics to ensure fast and accurate fetching of information. This way, it can thrive in a competitive market. Acquiring and maintaining its existing customers by reassuring them of data security and quality services. Therefore, companies can create an innovative business since and keep on coming up with new products and features that are tailored to meet the tastes and preferences of the clients. With multiple data analysis tools, one feels free and just a click away from assistance whenever in need of help.

However, keeping up with Big-Data is faced by several serious problems. They are therefore demanding a solid background of understanding technology and skilled labour. Big-Data requires secure storage and safe handling by trusted personnel. Therefore, Big-Data professionals are essential in the proper running of businesses.

X. Conclusion

Big-Data is an essential area that every organisation, company or business must take it seriously. Big-Data professionals are of great importance to the business world. The number of Big-Data experts available does not match the real demand for their services. Therefore, organisations should outsource Big-Data professionals to work for them since full-time employment may be difficult for organisations. The existing platforms do not help companies outsource experts. Therefore, Big-Data mobile application will help the organisations to gain a direct link with the professionals where they can check according to their qualifications and availability before they hire them. It will make the process of outsourcing Big-Data professionals easier

XI. Recommendations

Every organisation, business or company wants to soar into greater heights of success. Proper use and analysis of Big-Data will be a climbing ladder for companies. During the research, some employees did not believe in the power and growth of big data. It is recommended that the organisation should train their employees on big data, what it en tales, and how it affects business productivity. When every member of an organisation trained on Big-Data, then businesses will not have mishandling of information since everyone will handle it with much care.

It is also recommended that companies should schedule timely maintenance of their systems. Most of the businesses who rely on software for Big-Data management; always faced by troubles of errors, attacks from hackers and Cybercriminals. Timely maintenance of systems will be able to check their functionality, any loopholes in the systems and to ensure that systems are adequately secured.

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