System Analysis and Design for ISeek

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# 

# 1 INTRODUCTION

Our Company is a Software Development Company providing software solutions for business’. Our Mission is to provide software solutions to business problems and expansions in a reasonable time frame with the highest quality, Group 7 also strives to be as customer friendly as possible as we understand our clients may not have the deepest understanding of systems analyst and design so we aim to have a transparent operation to our clients and we also aim to be very perceptive to issues of our clients in order to provide the greatest product possible for our clients. Our motto is Fast & Quality Development, our motto is simple and gets straight to the point which embodies Group 7 as I mentioned previously Group 7 values transparency and the perspicacity to solve problems with our software solutions.

Logo, company name

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## 1.1 PROJECT INTRODUCTION

The project that Group 7 is tasked with is with the client iSeek a job recruitment operating in Nottingham, currently iSeek manually matches employers’ vacancies that they receive through emails, calls, and walk-ins with applicants they receive via the same methods. When suitable match is made iSeek receives a small finder’s fee. In the systems we will be developing the client wants an online recruitment system where employers can create pages with job positions, description and required qualifications for their company vacancies and advertise them on the online system. Applicants in this system will register accounts with their details such as experience and qualifications and update these whenever. When a match is made notifications will be sent to both parties to set up an interview through the iSeek system. This software solution is a real business need for the client as an online system will allow the client to take on more customers as the whole process will be much more efficient being automised cutting the clerks from the old system in iSeek. This online system will also allow iSeek to expand out of Nottingham as they can take on clients much easier outside of Nottingham with the online system being available to anyone with an internet connection. At Group 7 we have a software development team comprising of Brandan Mincher, Justin Taylor, Rob Pugh and Vikas Attili. Each member in the team serves a vital part of the team with each having different roles in the software development process.

* Brandan Mincher - Team Lead
* Justin Taylor – UX&UI Designer
* Vikas Attili – Software Developer
* Rob Pugh – Software Developer

(Ovcharenko, 2022)

## 1.2 METHODOLOGY

Table

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(Dr. Meskaran, 2015)

Choosing a methodology for a project is a very important step as it affects the rest of the development throughout our time with the client, so it is crucial that an efficient and appropriate methodology is chosen to aid us in our development. The methodology we chose for iSeeks online recruitment system is the Waterfall Methodology. As a team we chose the waterfall methodology because we believe its advantages fits with the projects characteristics and will make for a better product. Firstly, the waterfall methodology is great when the requirements are clear from the start which we believe is the case in this project with the requirements iSeek has provided us in the project brief. The Waterfalls disadvantage of changes being difficult to make during the process is minimised as the requirements and desires of the client and online system respectfully are details and clearly listed. Next, the waterfall methodology allows the team to make more detailed documentation to help the client follow along with the process and to be transparent in the process which as I mentioned in the company introduction is valued highly by Group 7. Also, in the waterfall methodology the start and end points for the project’s phases are set clearly so it’s easy to measure the progress of the project. Considering all these and other methodologies we concluded that the waterfall methodology would fit the project the best (Livity Team, 2022).

# 

# 2. FEASABILITY AND RISK ASSESSMENT

Technical feasibility: Can We Build It?

1. Lack of Experience in software development technology:

* Risk Description: The risk that the project will be worse quality or fail completely due to the inexperience of the developers with the systems they will be using to make the project.
* Severity: medium, we believe the risk to be at a medium level at this will be the first project for group 7 however the project isn’t large of size, and we can mitigate this risk by implemented different strategies.
* Ways to mitigate: We will mitigate the risk via in-depth research to familiarise with project development and we also believe the clarity of the requirements also mitigate this risk.

1. Project Size:

* Risk Description: The risk that the project size will be too great or increase during development due to scope creep.
* Severity: low, we believe that this risk is of low severity because the requirements of the client are clear and concise, and the project is already a small system so even if the project increased, we would still have the resources to complete the project.
* Ways to mitigate: We will mitigate this by planning properly and allocating resources and time correctly for the given project size.

1. Compatibility:

* Risk Description: The risk that the projects outcome will not work efficiently with the current systems iSeek use.
* Severity: low, due to the iSeek system currently being all manual an online recruitment system will not have to be compatible with other online systems or programs used by the client.
* Ways to mitigate: Ensure that the project meets all the functional requirements of the iSeek system.

Economic feasibility: Should we Build it?

The New online recruitment system has a high likely hood of increasing iSeeks bottom-line by increasing efficiency, decreasing operational costs, and widening the reach of iSeek out of Nottingham.

Cost- Benefit:

* Improve customer satisfaction.
* Increased reach to new customers
* Decreased operational costs (less employees required)
* More efficient system

iSeek has allocated £60,000 for the project which is a sizable budget for an application of this size which means success is more likely. The ROI in this application much out-weighs the costs as we estimate it to exponentially increase profit for the client as their previous system being manual and local location limited were significantly holding back our client in the market.

Organisational feasibility: Will They Use it?

The organisational risk is low, the requirements are clear from the client and the system fits their currently business model and makes their system much more efficient and cost effective is why the people at iSeek are strongly interested in a software solution for their job recruitment system. The Online system will automatically match the applicants with jobs they are qualified for which was done manually previously and it also allows iSeek to expand further out of Nottingham.

# 

# 3 PROJECT SCHEDULING

## 3.1 SCHEDULING EXPLANATION

Our chosen methodology being waterfall when it came to project scheduling, we ensured that we followed the planned methodology closely to improve work efficiency. We split each task into the main stages of the waterfall method, Requirements phase, Design phase and the implementations phase. We set adequate amount of time for each task so that each step was of highest quality. Of course, the waterfall methodology requires the previous phase to have been completed to move on to the next phase. For a four-person team we involved every person in weekly tasks to stay on top of the workload.

For the project scheduling we decided to use a Gannt chart to improve team cohesion and staying organised with the Gannt chart will allow us to stick to schedule and complete the project in the allocated time. The Gannt chart also allows us to keep track during overlapping tasks to avoid any confusion.

Graphical user interface, table

Description automatically generated Graphical user interface, text, application

Description automatically generated

Timeline

Description automatically generated

Graphical user interface, application, table, Excel

Description automatically generated

# 4 REQUIREMENTS ANALYSIS

## 4.1 REQUIREMENTS GATHERING

Table

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(Dr. Meskaran, 2015)

We have carefully considered each of the information/requirement gathering technique and applied their strengths and weaknesses to the context of the job recruitment system project for iSeek to fully understand what would be most beneficial for the project and its success. Our team concluded that an interview with the stakeholders would be a perfect fit for the project as we would like to keep the stakeholders closely involved to ensure we meek all the client’s requirements and make a software solution for their business that is easily integrated to increase the likelihood of a large return on investment for the client. An interview allows us to get detailed information out of the client to understand the requirements in great depths. An interview while applied to the context of the iSeek case we believe will be very successful we also believe a questionnaire would also be most appropriate to understand what users would like in the new software solution for iSeek. The questionnaire allows us to get a larger sample-base and greater breadth of information which we cannot achieve with only an interview.

## 4.2 INTERVIEWS

When conducting the interviews in order to make when a success gathering technique, we need to set them up in the proper way. Firstly, we must understand the purpose of the interview with the stakeholders, to get a better understanding of the stakeholders wants to research requirements for the future system. Next, to establish a friendly and open relationship with the stakeholders so that we can keep them involved with the proposed system to meet the requirements which will reduce the chance of failure. The groups of people we consider to be stakeholders and are conducting interviews with is managers, users, investors, and the owner/client.

To get the most information out of the interviews we will ask slightly different questions depending on the type of stakeholder as each has a different yet valued perspective. Below is a sample interview with managers of iSeek.

|  |
| --- |
| INTERVIEW WITH MANAGER OF ISEEK  Overall Project:   * What would be a successful application for the iSeek system look like? * What would a successful application include? * What do you believe to be the aspects of the old system that held it back? * What would be the most important features of a successful outcome? * What about the old system was most frustrating when managing?   Interactions with the user-base:   * Describe your most common user in general terms. * Who are your target users? * What is the most common critique/issue users have with your current system? * How do you believe an online system could reduce these issues   Management:   * What are the difficulties with managing the current manual system? * What is it that employees struggle with when newly employed? * What is majority of man hours spent on in the current system?   Conclusion:   * Is there anything that we hadn’t asked today that you believe we should have? * Who else within your organisation would we most benefit by talking with? |

## 4.3 QUESTIONNAIRES

When conducting the questionnaire, we would like to target the users of the system as they are the largest group of stakeholders so a questionnaire could be more easily conducted to get information from the stakeholder group. Getting large amounts of data is much more difficult for our precious method of interviews which is why majority of our requirements gathering when it comes to users/customers of iSeeks system will be questionnaires.

Below is a sample questionnaire we will conduct with the customers of the iSeek system for requirement gathering for further analysis.

|  |
| --- |
| **QUESTIONNAIRE FOR CUSTOMERS**  **Full Name:**  **Email Address:**  **Phone Number:**   * **Have you used an online recruitment system before?**   Yes  No  **If yes…**   * **What was the best feature about the system?** * **How did the system being an online application improve your experience?** * **Would you be more likely to use an online system than a manual recruitment system?**   Yes  No   * **What feature do you believe an online recruitment system should have which you haven’t yet seen in other systems?** * **Have you had greater success on online recruitment systems than a manual system?**   Yes  No  **To what extent do you agree/disagree with the statements?**  **You CARRY YOUR PHONE WITH YOU EVERYWHERE.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree  **You check your notifications requently.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree  **I believe online recruitement systems are easy to use.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree  **i will spend more time looking for a job if its on my phone compared to in person.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree  **i believe online recruitment systems give me more options for job positions.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree  **I BELIEVE I GET BETTER QUALITY JOB POSITIONS ON AN ONLINE RECRUITMENT SYSTEM COMPARED TO A MANUAL ONE.**  Strongly Agree  Slightly Agree  Agree  Disagree  Slightly Disagree  Strongly Disagree |

## 4.4 REQUIREMENT TABLE

In the requirement analysis we set out the requirements for the project both functional and non-functional and assign priorities of the requirements and descriptions. The requirements are also split into Process-oriented, Information-oriented, Operational, Performance, Security and Cultural, political and legal. Each requirement also has descriptions to fully understand each requirement and this table with be referred back to in the further developing of the project as it will be an important metric of success to meet the requirements of the project.

|  |  |  |  |
| --- | --- | --- | --- |
| No | Functional  Requirement Type | Description | Priority (F1>F2>F3) |
| 1. | Process-Oriented | * The system provides personal employer accounts to employers | F1 |
| 2. | Process-Oriented | * Payments from employers (finder’s fee) must be able to be made through the system | F1 |
| 3. | Process-Oriented | * The system must have a portal where the employer can edit their advertisement | F1 |
| 4. | Process-Oriented | * An employees must be able to fill in an online form with their details | F1 |
| 5. | Process-Oriented | * An employee must be able to register with the iSeek system for an account | F1 |
| 6. | Process-Oriented | * An employer must be able to see the responses to their ads | F2 |
| 7. | Process-Oriented | * The employees must be able to check and update their details | F2 |
| 8. | Process-Oriented | * The employer must be notified when they receive a “match” for their job position | F2 |
| 9. | Process-Oriented | * The applicant must be notified when the employee has accepted their “match” | F2 |
| 10.1 | Process-Oriented | * Must hold information of number of applicants and vacancies | F3 |
| 11. | Information-Oriented | * The employers advertised job position must contain “job position”,” description”,” required qualification”, “offered remunerations” | F1 |
| 12. | Information-Oriented | * Personal Data mustn’t be authorised to change by the admin of the system | F1 |
| 13. | Information-Oriented | * The online form filled in my employee accounts must contain “education”, “work experience” | F2 |

|  |  |  |  |
| --- | --- | --- | --- |
| No | Non-Functional  Requirement Type | Description | Priority (NF1>NF2>NF3) |
| 1. | Operational | * The system should be able to be run on different browsers | NF1 |
| 2. | Operational | * The system should have a UI that accommodates mobile devises | NF1 |
| 3. | Operational | * The system should be able to accommodate different operating systems. Example: Windows, Android, Apple, Linux | NF1 |
| 4. | Performance | * The system’s user interface should have a quick response time | NF1 |
| 5. | Performance | * The system should be always available with minimal maintenance time | NF2 |
| 6. | Performance | * The database should be quick and responsive to changes of details. Example: account log-in details, qualification, and work experience details. | NF3 |
| 7. | Security | * The account details must be encrypted and stored securely in the database | NF1 |
| 8. | Security | * The log-in screen should be secure to malicious attacks | NF1 |
| 9. | Security | * Managers should not be able to change the personal details of accounts. | NF1 |
| 10.1 | Security | * Log-In details should not be able to be seen by managers of the system (encrypted) | NF1 |
| 11. | Security | * Messages between applicants and employers should be secure | NF1 |
| 12. | Cultural, Political and Legal | * Personal details protected in conforming to legislation (GDPA) | NF1 |
| 13. | Cultural, Political and Legal | * The system should only use intellectual property within the law (The Copyright, Designs and Patents Act) | NF1 |

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# 5 STRUCTURAL ANALYSIS

## 5.1 USE CASE DIAGRAM

The use case diagram allows us to view and plan the basic functions of the program of the online recruit system for the client. The use case diagram gives us a visual representation of the systems requirements and the flow of events for each type of user.

Chart, diagram

Description automatically generated

## ANALYSIS OF USE CASE DIAGRAM

This use case diagram firstly outlines the different actors within the iSeek online recruitment system. The use case diagram outlines our different systems and functions which closely follow the requirements of the project we set in stone in our requirements analysis phase. The job applicant and Employer our two types of users interact with the systems differently as our requirements set out. The Job applicant must use the create account function and follow that pathway of the system while the Employer is provided an account through the third actor the System. Above the login/signup system we can see the recruitment system where each actor interacts accordingly.

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# 6 STRUCTURAL ANALYSIS

## 6.1 CLASS DIAGRAM

We used a class diagram in our structural analysis as it allows us to represent the different relationships between objects and subsystems within the overall system and the methods and values, they hold. This allows us to have a visual blueprint and identify the make-up of the system to improve the success of the system.

Diagram, schematic

Description automatically generated

## 6.2 ANALYSIS OF CLASS DIAGRAM

The class diagram above displays the classes that will make up the software solution for iSeek. Each class has attributes and methods also identified as public and private with connections between other classes to show the flow of operations and program.

Applicant User is the class for our applicants on the system which holds all the information required, they can login(), signup() and logout() within the class of Applicant User. They can also interact with our other classes to complete different processes such as Employer Application Form which allows them to fill in the application form with the method held in the class. If you follow the different processes of the class, you will meet the job match class where both user types interact.

The Employer class is our second type of user which are provided an account by the system as laid out in the class diagram and explained in our requirement analysis. The employer has access to multiple functions which give the employer account access to perform different acts within the system which we had also listed as requirements for a successful program.

The class diagram was carefully produced with the requirements in consideration to ensure we meet the requirements we set out before producing the class diagram.

The class diagram will help our future designing and implementation as it allows us to view the structure of the program to track the flow of the program and the interactions with the processes that make the system functional.

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# 7 DATABASE DESIGN

## 7.1 ENITITY RELATIONSHIP DIAGRAM

Diagram, schematic

Description automatically generated

The ERD above was created in RSA allowing us to create the database mapping based on the class diagram from the structural analysis. The diagram shows how the tables will interact on the database and what values will be shared between the tables in the database to have functioning methods.

The Applicant user stores all its information as well as the information it gets from the employee application, qualifications, and experience. The ERD also shows the relationship between the tables for example each applicant user has 1 employee application form and vice versa so this is represented in a one-to-one relationship.

The job match has values from employer account, job positions, applicant user and employee application form to have all the information to complete different methods within the database and some of this is shown in the SQL samples we have given below.

## 7.2 SAMPLE SQL

The first example we have is selecting applicant users with the specified qualifications this shows how we will select applicant uses that meet requirements from the employers for the job position and shows the basics for the systems functionality. The next example shows show the employer and applicant could be notified via email from the database when they get a match on the recruitment system.

1. SELECT \* FROM Applicant Users WHERE qualifications = 'bachelor' AND experience = '2';

SELECT qualifications, experience INTO job\_qualifications, job\_experience FROM job\_positions WHERE id = job\_id;

2. SELECT CONCAT('Applicant name: ', name, ', Email: ', email) FROM applicant\_users WHERE qualifications >= job\_qualifications AND experience >= job\_experience; END;

CREATE PROCEDURE notify\_applicant\_user (IN user\_id INT) BEGIN DECLARE user\_qualifications VARCHAR(255); DECLARE user\_experience INT;

SELECT qualifications, experience INTO user\_qualifications, user\_experience FROM applicant\_users WHERE id = user\_id;

SELECT CONCAT('Job position title: ', title, ', Qualifications required: ', qualifications, ', Experience required: ', experience) FROM job\_positions WHERE qualifications <= user\_qualifications AND experience <= user\_experience; END;

# 8 USER INTERFACE

## 8.1 APPLICANT VIEW

Graphical user interface, application

Description automatically generated

## 8.2 APPLICANT VIEW EXPLANATION

Above is the UI design prototype for the applicant view on a mobile device. The UI designs were created using the application draw.io which allowed us to use a realistic model of a smart device to represent how the app would look on the device it would be design for. The first screen we can see displays what the Login/Signup screen could look like for the applicant with options for signing in if the user already has created an account, a forgot password option which will take them to a page where they can send a reset password request to their email connected to the account and a sign up button which will direct the user to a create account screen where they can enter in details to create a new account for the iSeek application. The next screen is a prototype of the home page for the job applicant type of user where they have access to a myriad of options, this prototype UI design was created closely with the requirements we set earlier. At the top we have a navigation bar where they can change pages to view Profile, Notifications and Settings within the app. Below the navbar we have clear icons with readable labels sticking to the rules set out by WCAG guidelines to ensure the UI designs are of best quality.

## 8.3 EMPLOYER VIEW

Graphical user interface, application

Description automatically generated

## 8.4 EMPLOYER VIEW EXPLANATION

Above the UI design is of the employer perspective to display how the applicant will look from that type of user. The first screen on the UI design is a page on the application where the user will have options for different payment methods which are image buttons and when clicked/pressed on within the application it will bring the user to the second page. The second UI design is the page when the option for MasterCard is chosen the user has the option to enter in the account for payment. This UI design was designed with close inspection of the use-case diagram to ensure the flow of the application is appropriate.

## 8.5 ADMINISTRATOR VIEW

Graphical user interface, application

Description automatically generated

## 8.6 ADMINISTRATOR VIEW EXPLANATION

The UI designs are for the administrator view of the application who have access to a different set of functionalities within the apps due to their higher level of user. The above designs display the sub-page of the payment’s dashboard on the right and when the option button view completed payments is selected the user/admin is directed to the screen on the right. They have access to the database of completed payments for the iSeek application, the admin can search for specific payments or scroll to view more (ordered by “Date Paid”).

# 9 SELF REFLECTION

## 9.1 Justin Taylor

In Week 1 we came up with a plan and introduction to our project. During weeks 2, I had been in and out of hospital with illness so I could only offer little contribution towards Project Planning. After I had left hospital and become a little better, I made efforts to what I could help with the coursework during Week 3 Requirements Analysis, however it was only low contribution due to me still feeling ill. From then forward, I helped contribute towards the Use Case Diagram during the lab/seminar with Brandan. I then completed the UML Class diagram in Structural Analysis and Brandan helped any extra improvements to be made on the diagram to ensure it was all correct. We worked well after my issues with illness at the beginning and completed all the tasks to a good standard and I made great contributions with Brandan from Week 3 to the end. All our tasks were discussed within the labs/seminars, so we knew what parts we were going to contribute to. Overall, I think the coursework was a success and we created a finished product.

## 9.2 Team Lead: Brandan Mincher

The Project had some complications with team members and organisation. I wasn’t able to have an organised schedule outside of the classroom due to unresponsive members or desire to do the work all online. Next the project had major issues with members not completing assigned work without providing reasons and while confirming they would be ok with the work they were given. However, all documentation and each section of the coursework was done to a high quality in my opinion and the work was able to be delegated to the engaging individuals in collaboration. I personally contributed fully to each and every section of the coursework often doing the bulk of the work however also working together with another members of the group who contributed. Overall I think the project was a success and the coursework we had produced in the given time was more than adequate.

## 9.3 Vikas Attili

## 9.4 Rob Pugh

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