**OCR Computing F454 Project**

**Employee Tracker**

* **Tom Goodman**

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# Section 1 – Definition, Investigation and Analysis

## Problem Definition –

My end user is the Douglas Jackson executive and managerial call centre, based in Lichfield. They employ a large number of employees, and they provide experienced recruitment consultants to businesses in order to aid them in a wide range of sectors, including, but not limited to: Finance, Banking, Insurance, IT, Telecommunications, Utilities, Online, Retail, Travel, Consumer Goods, Outsourcing and Public Sector/Not for Profit. They also attend a plethora of corporate events, and are often present to judge for some industry bodies and award programs.

The three managers are called Jonny Fishman, Roscoe Marchland and Edna Wescott. Regarding themselves (who are responsible for the filing system), they are neither computer-literate, nor do they currently have much exposure to technology – even in the office environment. Most of their work is still performed with pen and paper, and; moreover, it will be important to ensure that the new system is easy to navigate, well laid-out – providing a quick-to-use, simple interface that is easy to grasp.

The issue that I am investigating is the lethargic and archaic filing system of employee records. Due to the nature of the current system, there is an increasing lack of space to store the records, and records often become intertwined, damaged or lost. This consumes valuable time in the sorting, recreation and finding of records.

The current system relies on manual filing of physical, paper records, which are easily misplaced or damaged. This results in a slow system, and due to the large volume of records required (due to the large volume of employees), it has become time-consuming to find individual employees’ records. Currently, records are kept in filing cabinets, amongst hundreds of others, and in order to ‘update’ the records, that part of the file must be reprinted and rewritten.

Disposing of records also poses an issue, since they contain often confidential or personal information, which cannot just be thrown away as it is. Moreover, a significant amount of company time and resources are dedicated to shredding and disposing of said records. These could be more effectively allocated, were a new, computerised system to be developed.

Before I can begin work on a new system, I will need further details from the end users, regarding the current IT skills of employees, and the nature of the system required. I aim to conduct further investigation into this through the mediums of interviews, questionnaires and meetings, as well as the construction of a process model of the current system.

## Plan of the Investigation -

Firstly, I will create a Process Model of the current system. I will use this in order to fully gauge how the current system operates.

Following this, I will conduct three successive interviews, one with each of the Managers : Jonny Fishman; Roscoe Marchland and Edna Wescott respectively.

I plan to include the following questions:

*∙What is your role within the company itself?*

*∙How does the current filing system work?*

*∙What is your specific role regarding the filing system?*

*∙On average, how much exposure would you say you have to technology on a daily basis?*

*∙What do you like about the current filing system?*

*∙What could be improved about the current filing system?*

Through the interviews, I aim to ascertain specific details about what the problem with the current system is, and the pros and cons to it. It will also help me to understand what a new system should provide.

Following this, I aim to conduct a questionnaire on the employees that currently utilise the filing system, and I will further analysis the results of this in order to gauge the overall consensus on the system.

## Interview 1 – Jonny Fishman -

What is your role within the company itself?

*I am the Chief Executive Officer and Managing Director of the company. I oversee the entire company, and ensure that everything runs smoothly on all levels. This includes liaising with Roscoe and Edna on a daily basis, discussing important company matters and other such business. I also work alongside Edna during the interview process of new candidates for jobs, and I find this useful for creating and maintaining links with all of my staff.*

How does the current filing system work?

*Currently, new employee record templates are printed, and manually filled out by myself, Roscoe, Edna or one of our subordinates. The records are then filed in Chronological order in a series of filing cabinets on the ground floor.*

What is your specific role regarding the filing system?

*Sometimes I fill out new employee records, although my major involvement in the system is when I require an employee record, for example when I am reviewing an employee’s progress, or shortlisting employees for promotion. Other than that, my involvement with the filing system itself is minimal.*

On average, how much exposure would you say you have to technology on a daily basis?

*My only exposure to technology is my personal organiser, and my phone. I conduct a large amount of my work through pen and paper, and have always done so. It seems far simpler than using complicated technology to perform a simple task. I am; however, inclined to becoming more technologically versed in the near future.*

What do you like about the current filing system?

*The current system is easy to grasp and simple to use. Other than that, I don’t particularly entertain the idea of the current system.*

What could be improved about the current filing system?

*Currently, the system is chaotic, time and resource-consuming, and flawed. Records are often misplaced or damaged, and the transcription and recreation of records takes a lot of time and resources, which would be better allocated elsewhere in the company.*

## Interview 1 – Analysis -

Jonny is the CEO and Managing Director of the company, and; moreover, he has a lot of experience of the current system. There are a few flaws, or downfalls, that Jonny highlighted in the interview. They are as follows:

∙Each record must be manually printed when being created or amended. This is resource-consuming, and poses a potentially significant expenditure to the company per Annum, due the sheer number of required records.

∙When creating or amending a record, human transcription is also required, which is slow and somewhat unreliable. It also ties up a lot of employees’ time.

In the development of a new system, it will be imperative that I address both of these issues effectively.

Jonny indicated that he enjoyed the simplicity of the current system, and that his current exposure to technology on a daily basis was low, with him heavily relying on pen and paper. Hence, it will be important, should I develop a computer-based system, to keep it simple, and easy to use and understand.

The new system should also be resource-conservative, and both speed and ease-of-access should be considered by myself in its development.

## Interview 2 – Roscoe Marchland -

What is your role within the company itself?

*I am the Chief of Staff, Vice Chair and Financial Control Officer of the company, and; moreover, I am responsible for a large amount of the company’s duties. I ensure to keep a strong sense of communication between myself and the employees, and; moreover, I have a strong interpersonal connection with the entire staff-base. It is also my responsibility to manage all financial incoming and outgoings.*

How does the current filing system work?

*I am not wholly familiar with the current filing system, but from what I ascertain from the employees that work with it, it consists of a manual, paper-based system.*

What is your specific role regarding the filing system?

*I only ever use the filing system when I require an employee record, though this is seldom.*

On average, how much exposure would you say you have to technology on a daily basis?

*I consider myself quite technologically versed, and I utilise a wide range technology on a daily basis.*

What do you like about the current filing system?

*I can’t really comment on this, as I don’t use it much.*

What could be improved about the current filing system?

*Although I seldom utilise the current system, I may be more so inclined, were it to be computerised.*

## Interview 2 – Analysis –

Roscoe is the Chief of Staff, and this means that he has a strong link with the employee-base. Moreover, as with Jonny, he can provide a reasonably good insight into the system, despite seldom using it.

Since he has little interaction with the current filing system, the only issue with the system that Roscoe identified was that it wasn’t computerised. Following on from this, I feel that there would e quite a lot of potential in developing a computerised system in order to solve the problem, although a refined paper-based system is certainly not out of the question.

Roscoe is likely to be receptive to a computerised system, since he appears to have a large exposure to technology on a daily basis.

## Interview 3 – Edna Wescott -

What is your role within the company itself?

*I am the human resources manager, and I; hence, oversee all of the staff, ensuring that they are allocated suitable jobs, and perform their tasks successfully. I am also the chief interviewer, and, alongside Jonny, I am responsible for the recruitment of new employees.*

How does the current filing system work?

*The current filing system consists of a paper-based, manual filing system, heavily focussed on manual transcription of the records. When we need a new record, or need to change a record, we have to manually transcribe it onto a template.*

What is your specific role regarding the filing system?

*I oversee the team of subordinates that are responsible for the filing system, and occasionally, I need to find and utilise a record.*

On average, how much exposure would you say you have to technology on a daily basis?

*I have an average exposure to technology. I personally own a Smartphone, a Personal Organiser and a Laptop, all of which I rely upon on a daily basis. I would be more than happy to increase my exposure to technology further. My computer skills leave a lot to be desired, but I am more than capable of performing simple tasks.*

What do you like about the current filing system?

*I enjoy the simplicity of the system, but overall, that is about all I do like about it.*

What could be improved about the current filing system?

*The current system is very outdated and time-consuming. I have to dedicate of lot of resources to maintaining it, and even then, it is flawed in this way.*

## Interview 3 – Analysis –

As the Human Resources manager, Edna is responsible for a large proportion of the employees that manage the filing system. Moreover, she has been able to provide a valuable insight into the system.

She highlighted, as Jonny, a few flaws with the current system, but once again, enjoyed the simplicity of the system.

∙The system is outdated and time-consuming, both for herself and her subordinates. This results in lots of company resources being tied up.

∙The system is generally flawed in her eyes.

Following on from this, it will be important to develop a somewhat different system to the existing one, since there appear to be flaws throughout the current system. It will be important to make the new system quick and simple.

## Questionnaire –

Following the three interviews, I conducted a questionnaire, on 50 people that work with the Filing System on a daily basis.

The results of the first question are heavily skewed to the right, indicating that a significant number of employees feel that the current filing system is too time-consuming. Moreover, it is important to ensure that the new system is far more time-efficient.

The results of this question are much more varied than the previous one. On average, the employees rate themselves as around a 6 on a scale of 1-10, regarding their technological skills. This suggests that a computerised system may be a viable replacement for the current paper-based system. There are; however, 19 employees who scored themselves a 5 or less. Following consultation with these employees, I have ascertained that expansive User Documentation and a clear program would help them greatly, if a computerised system was developed. They would require help and guidance.

## 

|  |  |
| --- | --- |
| **Question 1** | Is the current system simple and easy to use? |
| **Question 2** | Is the current system organised? |
| **Question 3** | Is the current system too time-consuming? |
| **Question 4** | Is the current system too resource-consuming? |
| **Question 5** | Is the current system too manually-oriented? |
| **Question 6** | Do you like the current system? |

The results of these six questions are conclusive. They depict a general consensus, that the current filing system is, overall, disorganised, hard to use, too time and resource-consuming and too manually-oriented. Moreover, 90% of employees stated that they disliked the current system. Furthermore, it is important for me to now create a Requirements Specification, as a means of summation of my analysis.

Following the results of both my interviews and my Questionnaire, I feel that it would be important to physically observe the current system. Moreover, I have arranged to observe the team responsible for filing and managing the current system, a week on Tuesday. I will be spending a full day with the team, and I hope that I will be able to obtain some valuable, first-hand experience of the system.

## Process Model – Current System –

Amend Record

Dispose of Record

Do any more records need to be worked with?

File Record

Print Record Template

Reprint Record Template

Shred Record

Fill in new Record

Transcribe and Amend

Dispose of Record

Create Record

What needs to be done?

Start

Find Record

Yes

End

No

Following a day of observation, I have constructed a Process model (above) of the current system.

The Record is first found (if applicable), and then either a record is created, or an existing record is amended or destroyed. In order to create or amend a record, a blank template is printed, and filled in manually by hand. This record is then filed in a filing cabinet, in chronological order. In the case of disposing of a record, the record is found, shredded, and thrown into the bin.

## Data Flow Diagram – Current System

2

Calculations

D1 Filing Cabinet

Fetch Record Template

File Record

Record Fetched

Request Record

Manager

Fetch Record

Employee

1

Printing System

Print Record Template

Lost, Damaged or Destroyed Records

Record Lost, Damaged or Destroyed.

Figures

Results

## Issues with the Current System –

Following my investigation and analysis, I have identified the following as the issues that the current system possesses:

*∙ It is slow and time-consuming to locate/access records.*

*∙ It is completely manual, requiring a lot of transcription by hand – for example, when creating or amending a record.*

*∙ It takes up too much space (it is too space-consuming). Currently, the system occupies 4 Filing cabinets, with more being required each time this capacity is overflowed.*

*∙ Records are easily damaged or lost due to the large amount of records stored, and the physical nature of the filing system.*

*∙ It Requires a lot of maintenance (eg. printing/transcription/shredding)*

*∙ It is somewhat disorganised – Although the files are meant to be stored chronologically, this isn’t always adhered to*

*∙ There is no viable way of ‘backing up’ files – i.e. keeping copies. With the current system, this would require a large amount of photocopying, which is both time, and resource-consuming.*

## Requirements Specification –

The system itself must have a wide range of functionality in order to track employees, as well as calculating total salary and expenditure. The system will provide the following basic functionality:

*∙ Handle a basic login system, with a single login.*

*∙ Create, Amend, Change and Delete Employee Records.*

*∙ Display all employee records simultaneously.*

*∙ Provide a basic record-searching functionality.*

*∙ Allow the user to append notes to an individual record.*

*∙ Track and display the total employee count.*

*∙ Track and display the total salary.*

*∙ Track and display the total expenditure, allowing for expenditure to be added and taken away.*

*∙ Process expenditure, giving daily, weekly, monthly and yearly expenditure.*

*∙ Provide format, presence and type checks, and support double-entry verification.*

*∙ Be simple and easy to grasp.*

*∙ Be quick to use, and time-efficient.*

## Alternative Methods –

### Method One – Improve the current paper-based system –

My first proposed method will be to improve the current system, which is a paper-based filing system. This would consist of more organised filing, and some form of ‘backup’ system, keeping backups of every record, in case of damage or their loss.

Moreover, there are a few advantages and disadvantages to this method:

|  |  |
| --- | --- |
| **Advantages** | **Disadvantages** |
| Very low cost to develop, since there will be no outgoings due to extra wages, nor for the maintenance of the system. | The current system is very manually-oriented, and the general consensus is that this requires far too much time and human resources to use. |
| The current system is already familiar to the end user(s), so they will require little to no training to grasp the system. Moreover, they are likely to operate at a high-efficiency from onset with a familiar system. | Records can be easily lost or damaged. |
|  | This system isn’t particularly secure. |

|  |  |  |
| --- | --- | --- |
| **Factor** | **Score (/10)** | **Justification** |
| Cost Efficiency | 8 | The system is already partially in place, and no extra workers need to be hired. |
| Speed of Production | 7 | As above, a similar system is partially in place, and; hence, the framework is present to improve upon. |
| Professionalism | 2 | A paper-based system is not a particularly professional approach to solving the problems with the current system. |
| **Total Score :** | **17/30** |

### Method Two – Employ a Professional Programmer –

My second proposed method is to employ a professional programmer to develop a program that will act as a solution to the problem.

Moreover, there are a few advantages and disadvantages to this method:

|  |  |
| --- | --- |
| **Advantages** | **Disadvantages** |
| The final system will be very professional and sleek. It is likely that a professional programmer will create an aesthetically pleasing, functional solution. | High cost – The company will incur quite a lot of expenditure through the hiring of a professional programmer. |
|  | It will take a lot of time for the programmer to develop a new system. |

|  |  |  |
| --- | --- | --- |
| **Factor** | **Score (/10)** | **Justification** |
| Cost Efficiency | 3 | It will cost a lot of money to hire a professional programmer. |
| Speed of Production | 3 | Developing a new system from scratch (via the spiral or waterfall models), takes a long time. |
| Professionalism | 9 | A professional programmer will almost certainly produce an elegant solution to the problem. |
| **Total Score :** | **15/30** |

### Method Three – Create a system using Python –

My final proposed method is to create a solution myself, in the Python programming language. This will consist of a basic menu-based system, guiding the user through the program. I would employ the RAD method of software development.

Moreover, there are a few advantages and disadvantages to this method:

|  |  |
| --- | --- |
| **Advantages** | **Disadvantages** |
| Time-efficient, since I would employ Rapid Application Development in order to quickly produce a fully-functional program. | The program is unlikely to be as efficient or as effective as one produced by a professional programmer. |
| The cost of this is far lower than hiring a professional programmer. | Python programs can be somewhat hard to distribute. |
| Previous experience with the company will allow for an effective solution to be created. |  |

|  |  |  |
| --- | --- | --- |
| **Factor** | **Score (/10)** | **Justification** |
| Cost Efficiency | 6 | It would cost significantly less to hire me than it would to hire a professional programmer. (I would still charge the company for my time, since I wouldn’t want to work for free). |
| Speed of Production | 8 | RAD produces a functional and effective program in a relatively short period of time. |
| Professionalism | 7 | This method would still produce a professional program. |
| **Total Score :** | **21/30** |

In conclusion, the overall most effective method to employ will be Method 3, and; moreover, I will create a system in Python in order to provide a solution to the problems that the current system poses.

## Hardware and Software Requirements –

|  |  |
| --- | --- |
| **Software Requirements (minimum)** | **Justification** |
| Windows XP/Vista/7/8 Operating System | Required to support the Python 2.7.x releases. |
| Python 2.7.x (Written in 2.7.5) | Software required to run the program. |
| easygui Python Module | Required at Runtime. The easygui module allows for the creation of a simplistic, menu-based interface. |
| EmpTrackerModule Custom Python Module | Contains all the procedures for the Program. This is a custom module which will be built by myself. |

|  |  |
| --- | --- |
| **Hardware Requirements (minimum)** | **Justification** |
| PC with a sufficient processor 1.0Ghz, 32-bit. | Required to run the program and the Windows 7 (recommended) operating system. |
| Sufficient Hard Disk Space – 20Gb | A 20Gb hard disk is sufficient to store the operating system, any required programs, and a large amount of employee records. |
| Monitor, such as the ACER S220HQLBBD Full HD 21.5" LED Monitor | Required to display the program. This monitor provides a large, high-resolution, crisp display, which would allow for high-quality output. |
| Mouse, such as the Logitech Wireless Performance Mouse mx | Required for input via a menu-based system. A good-performance mouse will allow for quicker, more accurate input. |
| Keyboard, such as the Microsoft Sculpt Comfort Keyboard | Required for user-input of details etc. during runtime. An ergonomic, well-performing keyboard will allow for quicker more accurate input, and make it easier and more comfortable to type for extended periods of time. |

# Section 2 – Design Part 1, Nature of the Solution

## Performance Criteria –

**Requirement One : Handle a basic login system, with a single login –**

* The user must define an Administrator password when the system is first set up. This will be a universal password to access the system.
* There must be some form of recovery system in case the Administrator password is forgotten.
* Only three attempts can be made to access the system before the program shuts down.
* The Administrator password will be encrypted and stored in a text file.

**Requirement Two : Create, Amend, Change and Delete Employee Records –**

* The user must be able to create an employee record by entering credentials. This will be stored in a text file in a useful manner.
* The user must be able to edit employee records (eg. change the salary of an individual employee).
* The user must be able to completely delete an employee record.
* All of the above must be simple to use, and provide a sophisticated verification and validation system.
* There will be one text file to store all employee records (one per line), and each employee will also have an individual text file storing their personal details.

**Requirement Three : Display all employee records simultaneously –**

* The user must be able to view all employee records at once.
* The output must be in a useful format, and be easy to comprehend.
* A text file will be stored, containing all employee records, which can then be accessed in order to print all of the records simultaneously.

**Requirement Four : Provide a basic record-searching functionality –**

* There must be an option to search through all employee records to find an individual record.
* Indexed-Sequential file access may be beneficial, since that allows for all records to be accessed simultaneously, and for records to be accessed directly.
* Each employee will be assigned a unique employee code, which will be used to locate and identify the corresponding record.

**Requirement Five : Allow the user to append notes to an individual record –**

* Each employee record will have a notes section at the end. The user must be able to append notes to this.
* This will be stored on the second line of the employee’s unique text file.

**Requirement Six : Track and Display the total employee count –**

* The system should automatically track the total number of employees that the company employs.
* The end user should be able to view this value at any time.
* The value itself will be a variable, which is altered each time a new employee record is created or deleted.
* The value will be stored in an individual text file.

**Requirement Seven : Track and Display the total salary –**

* This will work in a near-identical way to Requirement Six.
* The value will be altered when an employee salary is changed, or a new employee record is created.
* The value will be stored in an individual text file.

**Requirement Eight : Track and display the total expenditure, allowing for expenditure to be added and taken away –**

* The program should track the total expenditure (per annum), of the company. This will be stored as a variable in a text file.
* The end user will be able to view this data.
* The variable that the value will be assigned to will be altered automatically every time an employee record is created, amended or deleted.
* It will also be possible to for the end user to manually add and take away expenditure from the total.

**Requirement Nine : Process expenditure, giving daily, weekly, monthly and yearly expenditure –**

* The program will be able to calculate daily, weekly, monthly and yearly expenditure at the request of the end user.
* This will utilise the value outlined in Requirement Eight.

**Requirement Ten : Provide format, presence and type checks, and support double-entry verification –**

* The system must provide automatic validation and verification checks throughout.
* Values such as DOB will be checked to ensure that they are in the correct format (eg. DD/MM/YYYY), This will ensure that all values are uniformly formatted.
* Type checks will be utilised to ensure that inputted data is valid, i.e. Salary must be an integer.
* Type checks will also be used to prevent the system from crashing when a nonetype value is entered (i.e. when enter is pressed, but no real value is entered). This is basically a presence check, but it will be performed by checking the type.
* Double-entry verification will be implemented in order to ensure that records are accurately entered.
* Each check will be a predefined procedure in the module.

**Requirement Eleven : Be simple and easy to grasp –**

* The system must be suitable for all of the end users, and some of them are less exposed to technology than others. Moreover, a Menu-based interface will be used in order to help the end users navigate the program.
* There will be somewhat extensive user-documentation to accompany the program itself.
* The system will provide on-screen help.

**Requirement Twelve : Be quick to use, and time-efficient –**

* As with Requirement Eleven, a menu-based interfaced will be utilised. This will ensure that the new system allows for quick navigation
* As Requirement Ten states, there will be extensive Validation and Verification. This will make the system Time-efficient by ensuring that as few as possible mistakes are made, and; moreover, little to no mistakes will need to be amended post-entry.

## Storage Design –

|  |  |  |  |
| --- | --- | --- | --- |
| **Field Name** | **Data type** | **Validation** | **Typical data** |
| Employee Name | String | Ensure that the entered value is a string. | John Doe |
| Unique Employee Code | String | No Validation required, this will be created by the program. | EMP1758374E |
| Department | String | Ensure that the entered value is a string. | Managerial |
| DOB | String | Must be in the format DD/MM/YYYY | 10/10/1990 |
| Gender | String | Must be M/F | M |
| Salary | Integer | Must be a positive integer. | 56932 |
| Employee Count | Integer | Must be a positive integer greater than 0. | 62 |
| Total Salary | Integer | Must be a positive integer. | 567890 |
| Total Expenditure | Integer | Must be a positive integer greater than or equal to the value of Total Salary. | 670810 |
| **Field Name** | **Data type** | **Validation** | **Typical data** |
| Admin Password | String (Will be hashed) | None | 0a4d55a8d778e502 |