COMP4 Project

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Includes full analysis, design, specific implementation, testing and evaluation

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# Analysis

## Identification of problem

The end user is my father, Peter, who currently owns a construction company called Top Builders. He conducts all sorts of construction work, including extensions, furniture fixing, painting & decorating, and more. He tends to work alone, but sometimes he will hire workers to help him with larger-scale projects. He needs a system to aid him in managing quotes, invoices, employees and his stock of materials in order to ensure a smooth running of the business and decrease the amount of time spent on bureaucracy and administration.

## Observation of the current system

Being Peter’s son and living in the same house as him allows me to observe the working of his system almost every day. For example, very recently a customer called him on a Friday enquiring about a job offer; I witnessed the whole conversation and found out a lot about the types of information which my dad requires to start a project. He arranged an appointment to see the client on the next day (Saturday). I asked to accompany him in order to better understand his work pattern. We left at 10:00am and made our way to the client’s house. Upon arrival, the client showed us to the kitchen where a whole refurbishment was needed. My dad spoke with him about exactly what needs to be done, which furniture needs to be replaced, the details of any plumbing/electrical work and the estimated time of completion. He used pen and paper to note these things down while I observed. At about 3:30pm we left the client, and said that we would e-mail him with the quote for the required work. We returned home at about 4:00pm and immediately began working on a quote in Excel. My dad often makes me operate the computer while he simply dictates the jobs, their details and prices as I input them into the spreadsheet; this is due to my better IT and English skills. This makes me very knowledgeable in the exact workings of an integral part of the current system.

## Document analysis

The following are screenshots of various invoices which were produced by Peter over the last couple of months. The invoices are made entirely in Excel and are not standardised – most invoices differ in layout, look, table headings, etc. The reason for this is the lack of any rigorous system which takes care of standardising invoices to ensure a consistent look for every job/client. The new system should have a way of exporting invoices into Excel format which looks similar to the invoices made already, and follow a pre-determined layout.

## N:\Computing\2b46de8094305c42b70a5e0d7ae3820d.png

## N:\Computing\sshot-2.png

## 

## N:\Computing\83ccadcf4a8ef9350b96a39650cf077c.png

## Interview of company ceo

In order to find out more details about the prospective end user, I carried out a live interview with Peter. This interview aimed to provide the basis for analysis of the current system limitations, setting targets for the new system, planning a feasible solution and ensuring that the finished product meets the requirements of the end user.

**Norbert**: To start us off, what do you currently do for a living?  
**Peter**: I own a building company called Top Builders. I do all kinds of construction work including extensions, kitchen and bathroom fitting, tiling, painting and decorating, etc.  
  
**Norbert**: Do you work on your own?  
**Peter**: Mostly, yes. I am self-employed under the Top Builders name and the company is entirely self-run. However, for some bigger jobs, I may hire a couple of workers that help me. I pay them a working wage but act as the project manager, while still of course also working with them on-site.

**Norbert**: How do you co-ordinate your workers, keep track of how many hours they have worked, etc.?  
**Peter**: Heh, well, I guess I just keep it in my head, or write it down. I hand them the money after a week of work and just tell them the days when they should come in and where we’re going.

**Norbert**: That sounds a bit cumbersome?  
**Peter**: It is, but I don’t hire that much workers for it to be too much of an issue at the moment. However, if I carry on getting large-scale projects like I have been recently, it could get very disorganised.

**Norbert**: What about the details of all the jobs you need to complete?  
**Peter**: I record those inside a large “job book”, which records the details of every client, the jobs they need us to do, things like that. I use this information to later produce a quote for the client.

**Norbert**: Do you ever advertise, or is your business quite small?  
**Peter**: I give out business cards to any potential clients which may require my services. I am advertised on Yell and have a van with my business logo and contact details on it. I also had a simple website which listed all my services, but found it not useful enough in bringing in new clients for the price I was paying.  
  
**Norbert**: How do you find your work, and then how do you proceed to complete it?  
**Peter**: I receive work, very often through recommendation, from a potential client and immediately arrange a meeting to inspect the premises and discuss the details. Using this information I then produce a price estimate (quote) listing all of the specific jobs that need to be done for the client, and the total cost. I then present this quote back to the client, discuss any amendments, and begin work immediately. Once complete, I hand the client an invoice, which is basically just the same as a quote, but with slight amendments to reflect the exact work that was completed.

**Norbert**: Could you tell me more about what you include in your quotes?  
**Peter**: My quotes tend to differ a lot due to the fact that I make them manually in Microsoft Excel. Usually I will have a table of 5-10 jobs for the project, with different materials listed for every job. I will then have a price for every job, and sometimes break this price up to indicate labour and material costs. I will also have a total at the bottom. I like to include my company logo and the name and address of the client, although sometimes forget to do this.

**Norbert**: And how long do these quotes take to produce?  
**Peter**: Well, I am nearly 50 years old and although I don’t consider myself completely backwards in terms of technology, messing around in Excel can sometimes take me up to 3 hours to complete one quote. Most of the time I just ask you [my son] to do it, as you’re much quicker. But as you know that involves a lot of disagreements, because you never seem to listen and do it exactly how I want!

**Norbert**: (Laughs) that’s because you never seem to know what you want! What would you like the new system to do for you?  
**Peter**: Well, everything would be nice (chuckles). I mainly want something easier than Excel produce my quotes for me quickly and efficiently. I want to be able to quickly launch an application, fill in some jobs details and figures and have it printed off and the client e-mailed within minutes. Of course the format still needs to be Excel, just not made using Excel, if that makes sense, as I find most clients are able to open such a format, and it can be made to look nice.

**Norbert**: Is that all?  
**Peter**: Well, I’m open to suggestions. Anything to make my life easier.

**Norbert**: Well, what about the future? Where do you see your business going?  
**Peter**: Right now, everything is going pretty well and I would love to turn this into a more of a structured enterprise rather than a small family business. I will definitely be pursuing some higher forms of advertising in the future so that I can get a much larger volume of clients. Of course, this will mean hiring a proper team of employees, especially with me getting so old. A website will eventually become a must.

**Norbert**: What would this website contain?  
**Peter**: A description of all the services I provide, a gallery, my contact details. It would also be nice if clients could request a quote online which I could somehow see and complete.

**Norbert**: That could definitely be something I could include in the application, allowing you to complete quote requests submitted online. Would that be useful?  
**Peter**: Absolutely! It would be incredibly convenient to direct potential clients onto the website and allow them to describe their problem without me having to take the time out to see them or call them.

**Norbert**: Okay! We haven’t discussed materials. How do you currently get all of the materials you need to complete a project?  
**Peter**: After producing the final quote I take a trip to any builders’ warehouse such as Selco and pick out all the things I will need. This sometimes takes more than one trip and is quite tedious to do, but there’s not much I can do about it. If the business was large enough, I would probably store a stock of materials somewhere and pick them out from there.

**Norbert**: Surely you would need something to manage that stock electronically?  
**Peter**: I would indeed.

**Norbert**: That’s something worth looking into for the new system. Finally, do you have any final thoughts on how you would like your new system to function?  
**Peter**: I just want something that works well, is fast and doesn’t look overly complicated. Initially I just wanted a simple quote maker, but now that I think about it, the expansion of my system may come quite soon and I will most likely require other tools to help me. For example, that stock of materials manager you mentioned sounds like it could be very useful.

**Norbert**: I will definitely aim to produce something that satisfies your long-term requirements. Thank you very much for this, it was very helpful in determining exactly what you need.  
**Peter**: No problem.

Interview was conducted in Polish and later translated and adjusted for easier understanding.  
Following this interview, the (main) end user will simply be referred to as **Peter**.

## End user questionnaire

Although the interview has provided me with a lot of information, this questionnaire was also given to Peter to complete. It deals with more quantitative information which will hopefully further enhance my knowledge of Peter’s work pattern, eventually leading me to creating a more effective piece of software for him.

1. How many hours per week do you spend on completing tasks related to the running of your business (creating invoices, speaking with customers, etc)?

*7-9 hours*

*3-6 hours*

*< 3 hours*

*> 12 hours*

*10-12 hours*

1. How many of these hours are spent on tasks which require you to use a computer?

*10-12 hours*

*7-9 hours*

*3-6 hours*

*< 3 hours*

*> 12 hours*

1. Asd
2. Asdas
3. Asd
4. Asd
5. Asd
6. Asd
7. Asd
8. Asd

## Description of the current system

After primary observation of Peter’s current system, the interview and completion of the questionnaire, Peter’s current typical work pattern is as follows:

1. Find a client, either through recommendation, advertising or otherwise
2. Consult with the client, assess the construction work to be completed
3. Produce a quote (price estimate) of the work and present this to the client
   1. The quote should include a breakdown of all the jobs to be done for the whole construction project, the details of each job, the materials required and the prices for each individual job
   2. This is currently done manually, using an Excel spreadsheet
4. Further consultation with the client based around the produced quote
5. Employees are hired for the project, and given concrete tasks/targets
6. Work then begins
7. After the construction project is complete, the client is handed an invoice which represents the actual work done, materials purchased, and overall cost
8. Employees are paid

## Limitations of the current system

Based on the conducted interview and outline of the system, the following limitations can be concluded:

* Creation of invoices is cumbersome and requires tinkering with Excel spreadsheets
* Invoices/quotes are not standardised, i.e. the layout and look of each quote differs
* Employees are managed on paper (sometimes not even formally recorded)
* No way of potential clients to request quotes prior to initial consultation
* No way of organising tasks between employees, leading to disorganisation
* Material must be found and purchased manually

## Identification of prospective users

## Identification of user needs

Peter needs a system which solves the above limitations. The list of user needs and acceptable limitations may be summarised as follows.

* Manages any amount of current projects
* Automates the creation of quotes/invoices, with the capability of exporting to Excel
* Allows customers to request a quote using an interlinked online form. These “quote requests” will be placed in a queue and completed in the order received. The client will be e-mailed with the completed quote
* Provides an employee management system, with capability of assigning concrete tasks and different pay rates
* Provides an employee login system which lists assigned tasks, pay rate and easy contact with project manager through e-mail
* Manages the stock of materials
* Allows new materials to be found through various online stores, through a search system which filters for best prices
* Allows customisation through an adequate list of settings/preferences to suit user needs

## Data sources and destinations

|  |  |  |
| --- | --- | --- |
| Data | Source | Destination |
| Client details | Client (e-mail, phone, word of mouth) | Company job book |
| Job descriptions | Discussion between Peter and client | Company job book |
| Job costs | Peter | Client, company job book |
| Job materials | Discussion between Peter and client | Client, company job book |
| Employee full name | Employee | Peter |
| Employee address | Employee | Peter |
| Employee contact number | Employee | Peter |
| Company business email | Peter | Client |
|  |  |  |
|  |  |  |
|  |  |  |

## Data volumes

My dad usually has about 2 projects going on at the same time. However, as mentioned in the interview, the business may soon expand with more employees being employed, allowing more projects to be completed at the same time. Let us assume that Top Builders deals with 3 clients at any given time. An average project has about 10 individual jobs, although some bigger projects can have up to 20. For these 3 projects, Peter may hire about 6 employees which will all need an account in the system. There may be about 30-40 different types of materials used across all projects, and this number will probably expand as more projects are taken up. These materials will therefore all have to be stored and kept track of in the system, with an ability to add new ones on-the-fly. There will also be a small amount of personal settings/perferences which will need to be stored for every user. In regards to quote requests, my dad receives about 1 call per week from a new customer. Therefore we can assume to receive about 1 online quote request per week.

## Analysis data dictionary

|  |  |  |
| --- | --- | --- |
| Field name | Data type | Details |
| Client full name | String |  |
| Client address | String |  |
| Client contact number | Integer |  |
| Client e-mail address | String |  |
| Job descriptions | String |  |
| Job costs | Real |  |
| Job materials | String |  |
|  |  |  |
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|  |  |  |
| --- | --- | --- |
| Field name | Data type | Details |
| Table name: Projects | | |
| ID | Integer | Primary key |
| Client name | String |  |
| House number | String | Stored as a string due to house numbers like 12A |
| Address | String | Street name + town |
| City | String |  |
| Postcode | String |  |
|  |  |  |
| Table name: Jobs |  |  |
| ID | Integer | Primary key |
| Project ID | Integer | The project assoiated with this job |
| Job description | String |  |
| Materials required | Array | Comma-seperated list of primary keys in the table responsible for storing stock of materials |
|  |  |  |
| Table name: Quote requests |  |  |
| ID | Integer | Primary key |
| Client name | String |  |
| House number | String | Stored as a string due to house numbers like 12A |
| Address | String | Street name + town |
| City | String |  |
| Postcode | String |  |
| Contact number | String | Stored as a string to allow +, () etc. |
| E-mail address | String |  |
| Project description | String |  |
|  |  |  |
| Table name: User |  |  |
| ID | Integer | Primary key |
| Username | String |  |
| Password | String |  |
| E-mail address | String |  |
| Full name | String |  |
| User type | String | ‘normal’, ‘manager’ or ‘superuser’. Specifies the amount of privileges a user has. A superuser may add managers, which can in turn manage employees. A superuser could be the CEO of the company, while managers can be people of lower positions in the company, but higher than regular employees. This is done with the future expansion of the company in mind. |