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| Stock Watch UK  A2 Computing Project  8/9/2013  Sam Godwin |

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# Introduction

## Definition, Investigation and Analysis

Problem Definition

I have been approached with a problem by James Godwin who is an employee at Hargreaves Lansdown Plc. This organisation is a financial service company at 1 College Square South, Anchor Road, Bristol, BS1 5HL which sells shares, funds and other related products via its website and through the post to UK retail investors. There is over 600 employees in the organisation, which was founded in July 1981.

The company is listed on the London Stock Exchange and is a constituent of the FTSE 100 Index. James, my client, works on pensions within the organisation and, like many others in connection with the company, has committed to a number of investments on the Stock Exchange out of personal interest, and in relation to the organisation which includes a stock brokers. He has been having problems with the current lack of utilities that surround the stock market system, whereby stock data often scattered variously across numerous websites must be kept at a close watch and is usually compared or used to deduce an outcome – which can be hard to juggle when they are not all in one place. This current system is perhaps not easy to make use of, but is also highly inefficient – as it takes time and effort to search for and also come up with your own conclusions from numerous stock websites on the internet. He has therefore asked me to develop a solution that helps him manage the data that he wishes to use in an easy, informative way without needing to go to other sources first, in one easily accessible place. The reason my client has asked me to solve this problem is that he feels he could use the data that he needs more efficiently if it were simply accessible in one place. Information might be fetched from multiple origins and also compared with other data if needed to help confirm whether a specific stock is undervalued or not. The possibility of human errors like misjudgment will also be reduced.

The system would need to be reliable and therefore statistically accurate. Primary external systems will include stock data websites on the internet, such as Bloomberg and The Financial Times, that to my knowledge are always accessible. If they are not, it would be a constraint in sources that I could use. I have contacted my client via text message when I wasn’t able to speak face to face (or while he was at work) to gain more knowledgeable insights into the data that I will need to use. On top of this I shadowed him for a couple of hours so that I could gain a clear idea of what he means and have been in contact with him also through email. Relevant data includes how the amount a stock has increased or decreased over time on all of the stock info sources (websites). He has also given me a brief introduction to the function of the stock market and has shown me around which data is most significant to the problem at hand. I will be conducting an interview with him to find out more.

Investigation and Analysis

Current Systems

I will now illustrate using a flow diagram the current process that I ultimately intend to automate.

*“I have to do all the research for those criteria manually. Going onto each website individually, typing the stock name in, getting the right page up and making a note of the answer. Then perhaps comparing it to other stocks. It takes a long time.”*

* *James Godwin (my client).*

How I will investigate end-user requirements

I will investigate end-user requirements in detail for my F454 Project in a number of ways.

Selection of general user group  
My end user will be anyone that uses FTSE 100 stocks on the London Stock Exchange – most probably adults. As such, I shall correspond with adults within different businesses with regards to user requirements and feedback through development. There are many features that can be included in a stock utility like averages, alerts or a news feed feature, and also things that the utility would be fairly useless without, for example the name of the stock and the price-to-earnings ratio. In order to discover what features are desired by my general user group and to thereby develop a requirements specification I shall conduct an interview with my client and also a series of questions to ask adults 18 and up.

Early Email:

Will the range of stocks be considered?  
Is there a record of a change per day? Month? Year?

(Photo evidence to be inserted for this.)

I also made an enquiry to my client about the look of the application, to which he replied that it didn’t matter to him personally as long as the app did what he wanted it to do. However, actual layout and feel may of course be very important in the ultimate product.

Investigation and analysis

I intend to interview my client aged 24 who works within business and these are the questions that I intend to ask:

Interview questions:

The answers to these questions must be extremely detailed but concise if possible, so I can use them to form SMART data (specific, measurable, attainable, relevant and time-bound).

Background  
What is your job role at HL (Hargreaves Lansdown), what does it consist of? (some background)

How is the stock exchange currently linked to your position at HL?  
>> is the problem related to your job role or does the solution have a use that is personal to you?

How is ICT currently used at HL in terms of the stock exchange & investing? (be detailed)  
>> Use of laptops involved? are smartphones used in the workplace? How are they used? iOS?

You’ve mentioned external stock sites or resources (Bloomberg, etc) does HL have direct involvement with these (if so, what?how?) What is the background to these sites? Are they external resources or are they directly interlinked? What can you say about them?  
>> Have these sites proven to be the most useful? Are there better resources, have you done the research to know this? Would some form of a test with these be helpful?  
>> What are they specifically used for? (what information do you use them for, what do others use them for? what is what?)

Do many other investors use computing and the process you use to manage your investments in a similar way?  
>> Does this vary? How?  
>> Which aspect do investors generally find challenging?

what sorts of specific stocks are typically involved at your current standard of investing? is it vast? do you choose them all yourself? How do you do this? is it limited or can it be in anything? is it relative only to HL or anything else?  
>> What are the limits, if any, on the types of stocks we will be dealing with?

Could computing be useful to show these topics clearly in one place? which main areas would definitely be worth being on show?  
>> Which significant factors do you think the system you want COULDN’T work without?  
>> Are there any specific parts of the current system that investors struggle with? How are investors taught?

Are there any known existing applications like the one you’re going to be the owner of? if so, are they in iOS form?

Current resource system

what is the system that you’ve found isn’t very user friendly at the moment?  
>> How does this work?

Is this whole system available to anyone? or specific people?

what works well and what do you think is good about your current system?

what sort of things are you interested in knowing about when evaluating the stock you’re looking at?

What problems are there with the current system?

What is meant by a stock being ‘undervalued’ or ‘overvalued’? How exactly do you know if a stock is, & what does this mean?

Do a large number of fellow employees have access to Windows or iOS on a day to day basis?  
(Would be easier keeping up with updates, mobility).

What data do you look for when observing stock details, how do you use this? what do you do with that information?

Is there anything on the stock market (except for payment of stocks) that you or I would not have access to, or would be too costly for an effective budget?

Are there any advantages or disadvantages you currently have in comparison with any other people in the process? Do the techniques or tricks vary? in what ways? Is the underlining process in watching your stocks the same? (what exactly is involved if you haven’t already explained) Would you say that it was fair, ‘every man for himself’ or somehow biased?

New resource system

Are there any similar systems to the one you want to create already at HL? How have these products been previously marketed there? (Platforms, cost, difficulty to get a hold of or gain access to)  
>> Does a similar system already exist? If so, what? where? is it exclusive?

>>Do any of your resources have to be on a specific system? E.g. a HL system? What software would be included here? Is there any helpful systems specific to HL for this that you haven’t mentioned? Would we have access?

Would this new system specifically handy to investors be significantly handy to those in the stock market?  
>> For a specific stock, is it easier or more difficult to get an average idea of how it stands than if for some reason you didn’t need to be specific? How many sites roughly are relevant to briefly study until you get a good idea of where whatever you want to know stands? Is it more difficult managing multiple stocks collectively than to manage a low number or one on its own? How is detail about your stock(s) contained? (How would you find exactly what you have possession of at any given time)

Would you like the new resource to be mainly for investors to use by themselves or for the company to use for any reason, as a mass business tool? (This would mean a platform that isn’t necessarily the iPhone)

Do you think that having the new system to use on iOS would be handy? Why?

What actual features would this market make use of in a new app? (try to list all the features that you want to see in your app as any features that you miss probably won’t be included in the 1st version of the product – be as detailed as possible).

Sorry about the lengthiness – You only need to establish fundamentals on such an in-depth level at one step during the whole development of the software.

Is there anything you’d like to expand on or would like to adapt? Do you feel that anything else needs to be established?

Interview results

I have interviewed my client in great detail and I shall compile the sensible responses I received, in the order that they occurred. I shall model my prime user group on this person as he is my client and will therefore return to him (James Godwin) frequently for feedback throughout development.  
The interview was a great success, which has given me the information I need to begin creating the Requirement Specification.

**Information collection evidence – Records from interviews; Original documentation and sample data; Notes from observations and discussions (inc. emails); Evidence of extra research**

I went in to watch my client for a couple of hours, seeing what he does and also how the process is carried out. He makes use of certain sites quite heavily to research the stocks that he wants to buy, before he invests in them. He made it quite clear during this time also that the option to have the info and data that he needs online is useful. The amount of research he does is quite significant, and the stats that he searches for and observes online play a very large role regarding financial decisions. Having online trading accounts to place trades online is also very handy.

Interview (With Answers)

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| **Background** | |
| **Questions** | **Answers to question** |
| What is your job role at HL, what does it consist of? (some background) | I work in the pensions department on the SIPP Income Drawdown team, executing all the daily tasks that are involved with administering the new and current drawdown client accounts. |
| How is the stock MARKET currently linked to your position at HL? >> is the problem related to your job role or does the solution have a use that is personal to you? | The stock market affects everybody who works at HL. Hargreaves Lansdown is what they call an “investment supermarket” – and is effectively a platform for people to go shopping for a wide variety of investments, i.e equities, unit trusts, ETFs, which can then be bought and held in either a SIPP (Self Invested Personal Pension), a Stocks & Shares ISA, or a Fund & Share account (standard trading account). I work in pensions, so primarily deal with the investments that are held inside pensions accounts. The problem is not related to my job in any shape or form, and is purely a solution for personal use. It would be of most benefit to the private “value” investor who is comfortable picking their own shares and is aware of the risks involved. |
| How is ICT currently used at HL in terms of the stock MARKET & investing? (be detailed) >> Use of laptops involved? are smartphones used in the workplace? How are they used? iOS? | There is a dedicated ICT department, who design and build exclusive programs for different departments to use. Different departments use different programs, for example the Stockbrokers use dedicated market software for buying and selling shares. Everyone has a standard desktop Windows computer running the latest software. Laptops are only used when staff have to leave the office on business trips. And I imagine the only use of smartphones is in the mobile and digital department – whose main job is to develop the HL Live app for iPhone and iPad. |
| You’ve mentioned external stock sites or resources (Bloomberg, etc) does HL have direct involvement with these (if so, what?how?) What is the background to these sites? Are they external resources or are they directly interlinked? What can you say about them? | At the bottom of a standard equity share price page on the HL website, it says:  “Prices provided by NetBuilder. Charts provided by Interactive Data. ‘Broker forecast’ and ‘Recent trades’ provided by MoneyAM. News and fundamental data provided by Digital Look.”  These sites are all independent businesses in their own right; external resources used by traders and investors all over the world. I’ve only ever used Bloomberg, Digital Look and Financial Times because it has all the info I need. |
| >> Have these sites proven to be the most useful? Are there better resources, have you done the research to know this? Would some form of a test with these be helpful? As above. What resources people use to research shares is probably down to their personal preference. I haven’t researched any further as those 3 sites have what I need. >> What are they specifically used for? (what information do you use them for, what do others use them for? what is what?) | I personally use them to research stock and company “fundamentals” (price to earnings ratios // price to book ratios), and keep an eye on general economic news that might affect the market. I imagine this is what most people use them for since that’s why they exist! |
| Do many other investors use computing and the process you use to manage your investments in a similar way? | It’s not really a process. I’m just using these sites to heavily research the stocks I want to buy, before parting with my hard earned cash! It’s no different to reading a music website about music. Every investor’s technique is different. It’s the same with any industry, the option to have the info and data you need online is very very useful. I can’t imagine what it must have been like for investors before computers! Having online trading accounts to place trades online is also very handy. |
| >> Does this vary? How? | No |
| >> Which aspect do investors generally find challenging? | Researching stocks is a very time consuming process. And the stock market in general is a very challenging place! It’s much harder to make money than it is to lose it…. |
| What sorts of specific stocks are typically involved at your current standard of investing? is it vast? do you choose them all yourself? How do you do this? is it limited or can it be in anything? is it relative only to HL or anything else? >> What are the limits, if any, on the types of stocks we will be dealing with? | I personally only invest in UK shares, but the options out there are huge. I choose all my stocks myself, but this depends on your attitude to risk, as picking individual stocks is generally considered riskier. Lots of people tend to favour Unit Trusts, which is basically an actively managed “collection of stocks” by a fund manager. The most popular of these by a long mile is Invesco Perpetual High Income, which holds some £13bn of investor’s money. If you want to invest in sausages, you can invest in a company called Cranswick. Or if you want to invest in Next or Marks & Spencers, you can. There’s pretty much anything you can think of. There aren’t really any limits, but I think it might be best to stick to UK shares, as I am the client and this is what I want! |
| Could computing be useful to show these topics clearly in one place? which main areas would definitely be worth being on show? | Yes.  The name of the stock. Then the following stats:  The price-to-earnings ratio is less than or equal to 15 (on Bloomberg) Price/Book ratio is less than or equal to 1.5 (on Bloomberg) Earnings per share (EPS) for the last five years have been positive (on DigitalLook) EPS for the last year is greater than the EPS from five years ago (DigitalLook) The company has paid a dividend over the last 12 months (DigitalLook) The company intends to pay a dividend over the next year (DigitalLook) The long-term debt to working capital ratio is greater than 0% and less than 110% (on FT.com) |
| >>Which significant factors do you think the system you want COULDN’T work without? | All of the above. Presented with the option to either bring up all of the stocks that fit the above descriptors, or, the option to type in a stock name, and then have each of the above criteria listed for that specific stock. |
| >> Are there any specific parts of the current system that investors struggle with? How are investors taught? | Investors are self-taught. I learnt what I know from my job, reading a book called ‘The Intelligent Investor’ by Ben Graham, and from obsessively reading financial websites and columns! |
| Are there any known existing applications like the one you’re going to be the owner of? if so, are they in iOS form? | The only apps I currently use daily, are the HL Live app and the Bloomberg app. Both are on iOS. And don’t do what I want from this application. |

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| **Current resource system** | |
| **Question** | **Answer to question** |
| what is the system that you’ve found isn’t very user friendly at the moment? >> How does this work? | I have to do all the research for those criteria manually. Going onto each website individually, typing the stock name in, getting the right page up and making a note of the answer. Then perhaps comparing it to other stocks. It takes a long time. |
| Is this whole system available to anyone? or specific people? | It’s available to anyone who can think of doing it! Those criteria are adapted from the Ben Graham book. |
| What works well and what do you think is good about your current system? | The fact the criteria is readily available on these websites, and is updated consistently with the rises and falls in share price, is a good thing. |
| What sort of things are you interested in knowing about when evaluating the stock you’re looking at? | See the criteria listed previously. |
| What problems are there with the current system? | It takes quite a while. And the option to bring up all of the stocks which fit those descriptions is not available. |
| What is meant by a stock being ‘undervalued’ or ‘overvalued’? How exactly do you know if a stock is, & what does this mean? | It’s quite complicated, but on a really primitive level this is basically to do with the price to earnings ratio. If it is under the average ratio for the wider market it is basically undervalued. Google it! |
| Do a large number of fellow employees have access to Windows or iOS on a day to day basis? (Would be easier keeping up with updates, mobility). | People have a wide variety of smart phones for personal use and the computers at HL primarily use Windows. |
| What data do you look for when observing stock details, how do you use this? what do you do with that information? | Previously answered above. |
| Is there anything on the stock market (except for payment of stocks) that you or I would not have access to, or would be too costly for an effective budget? | Not that I know of. |
| Are there any advantages or disadvantages you currently have in comparison with any other people in the process? Do the techniques or tricks vary? in what ways? Is the underlining process in watching your stocks the same? (what exactly is involved if you haven’t already explained) Would you say that it was fair, ‘every man for himself’ or somehow biased? | You can’t really have an advantage in the stock market, as nobody can predict what will happen. My only tiny advantage is that I am surrounded by it in my job. It is basically every man for himself. Lots of newspapers and websites offer hot stock tips and hints, but you can take these as you will. Analysts give “broker ratings” on whether they think a stock is a ‘buy’, a ‘hold’, or a ‘sell’. But again, there is no evidence these people are right.  I use Google Finance to watch the live price of my stocks because the prices on most financial websites are delayed by 15 minutes. It produces a graph with the rises and falls and I can work out when to buy and sell. I think most people do this. |

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| **New resource system** | |
| **Question** | **Answer** |
| Are there any similar systems to the one you want to create already at HL? How have these products been previously marketed there? (Platforms, cost, difficulty to get a hold of or gain access to) >> Does a similar system already exist? If so, what? where? is it exclusive? No system exists otherwise I would be using it! >> Do any of your resources have to be on a specific system? E.g. a HL system? What software would be included here? Is there any helpful systems specific to HL for this that you haven’t mentioned? Would we have access? | No this is for private investors only, nothing to do with HL. No access to anything HL related, as it is all private data! |
| Would this new system specifically handy to investors be significantly handy to those in the stock market? >> For a specific stock, is it easier or more difficult to get an average idea of how it stands than if for some reason you didn’t need to be specific? How many sites roughly are relevant to briefly study until you get a good idea of where whatever you want to know stands? Is it more difficult managing multiple stocks collectively than to manage a low number or one on its own? How is detail about your stock(s) contained? (How would you find exactly what you have possession of at any given time) | No because lots of people are not interested in buying and holding undervalued stocks, they want to make a quick buck and treat the market like a casino. Details of the stock you hold are held in your broker account, but this is a separate thing. There are endless stock info sites, and a few fund supermarkets like HL, AllianceTrust, Fidelity or CoFunds where you can hold accounts. |
| Would you like the new resource to be mainly for investors to use by themselves or for the company to use for any reason, as a mass business tool? (This would mean a platform that isn’t necessarily the iPhone) | Absolutely just for private investors, I don’t think companies would have any interest in it as a business tool. |
| Do you think that having the new system to use on iOS would be handy? Why? | Maybe a website would be good, but the preferred options are definitely an iPhone or Windows app. Which of these is not important - as long as the program does what I need it to do. |
| What actual features would this market make use of in a new app? (try to list all the features that you want to see in your app as any features that you miss probably won’t be included in the 1st version of the product – be as detailed as possible). | See above |
| Is there anything you’d like to expand on or would like to adapt? Do you feel that anything else needs to be established? | No way. Those were some pretty intense questions. |

I went for some work experience at Nudge Digital in Bristol and during my day there I got the boss to run me through, in his own words, the stock system and how I could look at this particular problem algorithmically as he had experience of his own in using the FTSE 100 Stock Exchange. I repeated this during another day of work experience at the Bearded Hen in Bath, and from this found correlation in the kinds of things people would look for in the utility that I want to make and the answers my client gave in his interview from me. I also found out the ways in which other adults typically use the Stock Exchange, the majority of which were not dissimilar to my client’s.

Current system data

Analysis of interview results

The sites DigitalLook, Bloomberg and FinancialTimes will play a large role as a source in the application, I found out within my interview. In the main interview with my client, the data of which is compulsory for the application that I want to build was made apparent. This is:

* Whether the price-to-earnings ratio is less than or equal to 15 (on Bloomberg)
* Whether Price/Book ratio is less than or equal to 1.5 (on Bloomberg)
* If the Earnings per share (EPS) for the last five years has been positive (on DigitalLook)
* If EPS for the last year is greater than the EPS from five years ago (DigitalLook)
* Whether the company has paid a dividend over the last 12 months (DigitialLook)
* If the company intends to pay a dividend over the next year (DigitalLook)
* Whether the long-term debt to working capital ratio is greater than 0% and less than 110% (on FT.com)
* All of the above presented with the option to either bring up all of the stocks that fit the above descriptors, or, (or both) the option to type in a stock name, and then have each of the above criteria listed for that specific stock.”

With this data I will be able to create an algorithm that revolves around exactly what my client wants in this application.

*“These sites are all independent businesses in their own right; external resources used by traders and investors all over the world. I’ve only ever used Bloomberg, Digital Look and Financial Times because it has all the info I need.”*

* *James Godwin (my client).*

After some consideration and with the above quote to justify my plans, I will use only the sites my client specified to use in the functioning of my application, as a source for the data displayed; websites FinantialTimes, Bloomberg and DigitalLook.

Based on the results of the main interview, together with considerations of feature compatibility, I have decided upon the following requirements:

Basic Requirements

1. Required access to the specific areas of the sites stated
2. A machine that is capable of running VBA programs
3. The correct stock data that the user wants (if not default start index page) is displayed on screen at any one time
4. The user is able to navigate through the application with the use of navigation buttons and controls
5. The option to refresh the current page is available
6. All of the data is within the scope of the FTSE 100 London Stock Exchange

Variable features

1. The data that my client has specified will be displayed
2. Colours designed by my client will be used
3. The screen size is adjustable
4. The option to see all the stocks for which the specific values (that my client wants in the application) are true is displayed and this page can be accessed
5. Any stock data on display is constantly updated across a specified time period
6. Each time a stock is searched for, the selected data from the necessary resources will be shown in response
7. The application will not continue running when user closes the application window

*What was said-What does all of this SHOW. Justify etc. -To develop ‘Objectives’(SMART)*

The stock market is currently being used a lot namely by employees at HL, which did bud an interest in it for my client, as came up in one of many discussion.

The platform of the new system will be any Windows version above 95, which is quite common.

In theory to the target audience for my application, my system should have quite a strong appeal as it automates a process which could be seen as tedious and keeps it all in one place.

The main problem with the current system is that it is slightly tedious to carry out and there is chance of the user forgetting to check certain stats.

No system like the system I will be making currently exists, as my client has confirmed on a few occasions and is also evident within my interview - “No system exists otherwise I would be using it”.

My client was satisfied by the variable features that I had decided upon. With regards to other research, I shall go with the preference of my client in order to create a requirements specification.

Requirements Specification

User requirements

1) Design requirements

1. The screen size will be adjustable to fit a full screen (x-by-y-pixel resolution)
2. The colour the background will be:
3. Have access to the internet set up
4. The name of the stock will be displayed
5. The data will be displayed in real time, with the option to refresh
6. A form element on-screen to enter the name of a stock with search button
7. Instructions on how to use the program will be accessible via a button somewhere on the screen at all times
8. The data on screen should be live, but the program should also come with an option to refresh in case this fails
9. Links to Bloomberg, DigitalLook and FinancialTimes in case any of the above fails (or the sites change with the unlikely outcome of changing how my program code works)
10. The data will be displayed in real time, with a refresh button

2) Input requirements

1. The user is able to enter a stock name into a search bar, with a search button to cue the action
2. The user is able to select and see either all the stocks for which the chosen data is true, or the stock data for the stock name that they enter in the search box.
3. The user is able to refresh pages if necessary
4. The user is able to navigate through the program via the various button features, etc. and their corresponding actions

3) Processing requirements

1. Using the internet to extract some information: Bloomberg.com, FT.com, DigitalLook.com
2. Access to the specific areas of the sites stated - table data or otherwise for: name of stock will be displayed, value of the price-to-earnings ratio on Bloomberg, the value of the Price/Book ratio data on Bloomberg, the Earnings per share (EPS) for the last five years on DigitalLook, the EPS for the last year on DigitalLook, whether the company has paid a dividend over the last 12 months on DigitalLook, whether the company intends to *pay* a dividend over the next year on DigitalLook, and the long-term debt to working capital ratio on FT.com (whether it is greater than 0% and less than 110%)
3. Each table element in all of the website code I will be using for the stock data that I am looking for must be managed automatically - corresponding to whether the user enters the name of a single stock or wishes to view *all* ofthe stocks that apply to the default fields of data. I plan to do this by November.

4) Output requirements

1. The name of the stock will be displayed
2. Whether the price-to-earnings ratio is less than or equal to 15 (data on Bloomberg)
3. Whether the Price/Book ratio is less than or equal to 1.5 (data on Bloomberg)
4. Whether the Earnings per share (EPS) for the last five years have been positive (data on DigitalLook)
5. This search field will bring up all of the stock entered.
6. Whether or not the EPS for the last year is greater than the EPS from five years ago (DigitalLook data)
7. Whether the company has paid a dividend over the last 12 months (DigitialLook data)
8. Whether the company intends to pay a dividend over the next year (DigitalLook data)
9. Whether the long-term debt to working capital ratio is greater than 0% and less than 110% (data on FT.com)
10. Display of stock data corresponding to the program design structure
11. A form element on-screen to enter the name of a stock, with a search button
12. Instructions on how to use the program will be accessible via a button that is somewhere on the screen at all times

Hardware and Software Requirements

The system will be written in Visual Basic for Applications in Excel, so the hardware and software requirements of the system should therefore be able to run the corresponding DLLs (Download Libraries).

I had initially planned to check if an iOS 7 SDK could be implemented into Xcode 4.2, but this may have come across limitations such as the number of iOS devices that can run the app (for example, iOS 6 or below only). The typical layout and feel of apps between iOS’s 6 and 7 has changed dramatically so therefore I settled with a Windows Application made in Visual Basic out of the options that I had. There should ideally have been ways around compatibility issues should they have arisen, but to avoid complexity me and my client agreed with this platform to build on.

The device should come together with hard disk space to store the utility itself. The additional hardware requirements of the utility will be: A keyboard to enter text input, and quite importantly, internet connection to access data live from the internet.

Be able to access the following:  
The price-to-earnings ratio is less than or equal to 15 (on Bloomberg)  
Price/Book ratio is less than or equal to 1.5 (on Bloomberg)  
Earnings per share (EPS) for the last five years have been positive (on DigitalLook)  
EPS for the last year is greater than the EPS from five years ago (DigitalLook)  
The company has paid a dividend over the last 12 months (DigitialLook)  
The company intends to pay a dividend over the next year (DigitalLook)  
The long-term debt to working capital ratio is greater than 0% and less than 110% (on FT.com)

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| --- | --- |
| Software Requirements | Justification |
| Microsoft Windows 95 or later operating system | An operating system required to run Visual Basic for Applications 7 |
| VBA 7 DLLs | Software required to run the utility |

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| Hardware Requirements | Justification |
| PC with a 486DX/66-Mhz or higher processor | Minimum processing power needed to run Visual Basic for Applications 7 |
| 16 MB of RAM for Windows 95 (32 MB recommended) | Minimum RAM needed to run Visual Basic for Applications 7 |
| 100 MB of hard disk space | Should be more than sufficient to store the program |
| VGA or higher-resolution monitor; Super VGA recommended | Needed to display output from the program |
| Microsoft Mouse or compatible pointing device | Needed for user to select buttons, highlight text or change settings |
| Computer Keyboard | Needed for user to give an input in order to navigate and use the program |

User review of requirements

My client has reviewed and agreed to the above requirements.

Signed:

Next Section

# Section 2 -Design

## Nature of the solution

Design Objectives

The design objectives are similar to the requirements previous specified. As a design consideration I have decided that it would be best to have both the option to search a stock and return results, and to see all stocks that apply to the unique data specific that my client and I decided on. Also, instructions on how to use the application would be in a new form made visible via a command button, so that the initial screen is not cluttered with text.

To demonstrate this to my client and get his feedback on interface specific such as that, I shall design the interface, display it to my client and conduct a series of further interviews on discussions with regards to that.

In addition, I have decided as a processing requirement that in the case that one of the resource sites are no accessible for data, a link that opens the website for the user anyway will be available. This will mean that the application still serves it's purpose to a degree when and if an unexpected run time error occurs.

(Here I will include any other factors that I considered and later decided on having, some of which are spoken about in section A but will need to be checked).

I have discussed and agreed this consideration with my client, whose signature is below the objectives.

1) Aesthetic considerations  
a. The screen size will be large. (Dimensions)  
b. The colour of the background will be:  
c. The main page will have side scrolling tabs that are displaying some stocks for given information, by default.

d. Multi-pages/tabs/side scrolling to show stock information for which specified data = true

2) Input considerations  
a. The user will be able to input a stock name for which information will be displayed  
b. The user can navigate through the application via command buttons using a mouse.  
c. The user will be able to view an instructions screen that opens in a new form by clicking a command button that is on the initial menu screen  
d. The user will be able to select an option to 'Watch' a stock - in that the stock will be followed and the user may be able to receive notifications or updates (perhaps in another page) for stocks for which this option is true.  
e. The user will be able to view a help / instructions screen that opens in a new form by clicking a command button that is on the initial menu screen  
f. The user will be able to go back to the initial level selection screen from the instructions screen with the use of a command button  
g. The user will be able to select a command button to view all 'watched' stocks in a new page  
h. The user will be able to select a command button that brings up a page of information about the application 'about this app'.  
i. All pages opened with a command button also have a command button to go back to the initial page view.

j. tabs/side scrolling to show stock information for which specified data = true  
3) Processing considerations  
a. The application will get external data from web pages using some web queries in Microsoft Excel.  
b. 'Watch this stock' - be able to highlight a stock on main page, highlights on every other appearance in colour

c. from the first time data is extracted on start up, can become data stored in a database? Store last 5 pieces of data / last 2, compare 2 to deduce increase of decrease since last live extraction (and so up or down icon)

d. If the 'get external data from a webpage' step fails, display an error message.

d. extraction every 10 mins?

e. UPDATE button next to stocks to instantly update data on this stoc?

4) Output considerations  
a. Instructions on how to use the application will be displayed in a new form when the help command button is clicked

User review of objectives

My client has reviewed and agreed to the above objectives.

Signed:

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Considerations:  
--**The price-to-earnings ratio is less than or equal to 15 (on bloomberg)  
Price/Book ratio is less than or equal to 1.5 (on bloomberg)  
Earnings per share (EPS) for the last five years have been positive (on digitallook)  
EPS for the last year is greater than the EPS from five years ago (digitallook)  
The company has paid a dividen over the last 12 months (digitiallook)  
The company intends to pay a dividend over the next year (digitallook)  
The long-term debt to working captial ratio is greater than 0% and less than 110% (on FT.com)**  
-'My Watched Stocks' -Open all stocks for which 'watch is selected'  
-Be able to see stock update information for all watched stocks  
An 'about this app' option that brings up a page of information about the application.  
A back button in each page to go back to the previous page / main page  
Having an '^' or 'v' arrow icon next to stock to show it's most recent performance ???? (specific)  
(?)A number notification icon for number of updates on 'watched' link on main page when start up.  
A news feed? (a name of a stock with a (^)up or (v)down arrow, or a random feed of information for select things) -> definitely on watched page, not sure on other pages as the content will change. Same stock may not appear twice etc.  
Have a news feed for the "watched" stocks?

<b>Will browser be specific? generic commands or browser specific?</b>

get external from a web page, (for each watched stock, or for all in general) every 5/10 mins? -> update all stocks corresponding

'watch this stock' icon adds the entry to the watched stocks page as expandable link/tab of (necessary) data on the stock

A small 'update' icon next to a stock to update just the one title

(so the functions are going to be complicated, multiple update functions for different cases)

Search function calls function to get external data from a web page, but for the specific title that was input

Commands for 'get external data from a webpage' how this will work, how things will resolve around this.

^^^^ Very significant pseudo / implementation design info for program to work

(Get Stedman to go through this next to me, get pictures to show works and commands etc, 1 page).

(((Record talk with Stedman as like an interview)))

I made some icons for both an increase or decrease change, up and down arrows, as seen below:

I also made a small refresh icon to make it possible for the user to refresh just an individual stock's data (so call the external data again, to apply to all pages) with ease.

Interface Design 1: Title Screen

Interface Design 1: Title Screen

The initial screen will be using a form called (.....frmMain).

The table below lists the properties of the objects particular to this screen.

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
| frmMain | BackColour |  |

...+Main screen, annotated.

Main Screen interview

So that a discussion can take place that results in agreement between my client and I, I shall conduct interviews to ascertain the particulars of my interface design. These are the questions that I intend to ask:

* What changes (if any) do you feel should be made to the look of the main screen?
* What changes (if any) do you feel should be made to the functionality of the main screen (e.g. with regards to command buttons and instructions)?

After each response, I shall add any further questions that I raised underlined below the response.

After each response, I shall add any further questions that I raised underlined below the response. The interview took place in front of a computer where I could alter the appearance of the interfaces during the interview to get further feedback. The final screen agreed upon is shown below.

What changes (if any) do you feel should be made to the look of the main screen?

* (answer)

(After displaying backgrounds of various shades of \*select colour\* Are you happy with a background of this colour?

* Yes

What changes (if any) do you feel should be made to the functionality of the main screen (e.g. with regards to command buttons and instructions)?

* (answer)

(small, 3/4 question interview)

...

Modified rows of frmMain property table:

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

Interface Design 2: Instructions Screen

The Instructions screen will be made using a form named frmInstructions.

The table below lists the properties of the objects particular to this screen.

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

[table]

\*Instructions Screen Image\* annotated

Instruction screen interview

The final screen agreed upon is shown below.

What changes (if any) do you feel should be made to the look of the instructions screen?

* None? Anything else added by James?

What changes (if any) do you feel should be made to the functionality of the instructions screen?

* There should be an ability to search and continue using the applications functions without having to return to the previous screen

Additional rows of property table for frmInstructions (+Modified rows if any)

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

Interface Design 3: Stock Search screen

The Stock search screen will be made using a form named frmSearch.

The table below lists the properties of the objects particular to this screen.

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
| frmSearch |  |  |

[table]

\*Search Screen Image\* annotated

Search screen interview

The final screen agreed upon is shown below.

What changes (if any) do you feel should be made to the look of the Search screen?

* None? Anything else added by James?

What changes (if any) do you feel should be made to the functionality of the Search screen?

* There should be an ability to search and continue using the applications functions without having to return to the previous screen

Additional rows of property table for frmSearch (+Modified rows if any)

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

Interface Design 4: "My watched stocks" screen

"Watch this stock" icon design and confirmation (& a notification or icon system for non-frequent updates, to get the user's attention?\*)

The Instructions screen will be made using a form named frmWatch.

The table below lists the properties of the objects particular to this screen.

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

[table]

\*Watched Stocks Screen Image\* annotated

Watched Stocks screen interview

The final screen agreed upon is shown below.

What changes (if any) do you feel should be made to the look of the Watched Stocks screen?

* None? Anything else added by James?

What changes (if any) do you feel should be made to the functionality of the Watched Stocks screen?

* There should be an ability to search and continue using the applications functions without having to return to the previous screen

Additional rows of property table for frmWatch (+Modified rows if any)

|  |  |  |
| --- | --- | --- |
| Object | Property | Setting |
|  |  |  |

Error message design:

\*A photograph of brief session on design whiteboard "decided with my client"\*

Other interface screen / page designs

Interview for all other screens

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Error message design

A simple error message, as follows, will be displayed when: ...

\*image\*

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Amendments to design objectives

In light of the client user feedbkack obtained on the interface designs, the initial design objectives have been slightly modified. The altered and new sections are highlighted. My client has again read and agreed to these objectives

\*A copy of the considerations here, with new objectives added in a highlighted colour\*

User review of objectives

My client has reviewed and agreed to the above objectives.

Signed:

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Modular Design of Stock Watch - Structure Diagram

\*Structure Diagram goes here\*

Data Structure Design

1) Program Start up

* Make instructions and search objects visible