Placement Report

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Executive Summary

This report details the responsibilities and activities I undertook as a Software Engineering intern at Tomo Motor Parts Ltd commencing 28th September 2015; focusing on my professional development and achievements during the course of the placement. The success of the placement is measured by the S.M.A.R.T objectives (*see section 9.1 & 5*) as well as the Testimonials (*see section 7*) provided by my colleagues and managers.

The most prominent aspect of this placement is the design and development of a system semi automatically manage the sale of car parts on eBay using eBay's Java API, this project covered a wide range of technical skills: implementation of a MySQL database, database design, JDBC, concurrency, connection pooling, thread pooling, SOAP API's, XML, design patterns, dynamic HTML using Java and Javascript as well as much more.

I also cover the role I took in the requirements gathering and specification formalisation for the inception of a new warehouse management system, as well as the role I took in testing and feedback.

Figure 1. Tomo Motor Parts Ltd logo

Figure 2. Brunel University Logo

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1 The Company

Tomo Motor Parts Ltd was formed in 2005 by Darren and Dean Perkins with the aim to provide genuine manufacturer car parts at wholesale prices. Tomo buy their stock direct from the manufacturers (in most cases), and have a very close relationship with PSA(Citroen/Peugeot).Because of the quantity of stock they purchase from manufacturers they get quite a substantial discount, which they can then pass on to their customers. The majority of their customers are trade customers: body repair shops, garages and other parts dealers including Euro Car Parts. Although they also sell to consumers through their on-premises counter and eBay shops.

Over the past 16 years they have built up their customer base and business to the point that they made a turnover in the region of £7.5M last year, and a profit in the region of £1M [9] This is soon to increase further after signing a deal they negotiated with PSA to become a dealer hub [8], after which Tomo will distribute all parts direct from PSA within the M25 and out to Oxford and Basingstoke. This will conservatively increase turnover by £4M and bolster expected profits to around the £1.5M mark.

Tomo are classified as a small company and employ just over 30 individuals (to date), including: office staff, warehouse staff and drivers. Accounting and IT are handled by consultants who work on-premises on a more or less full time basis.

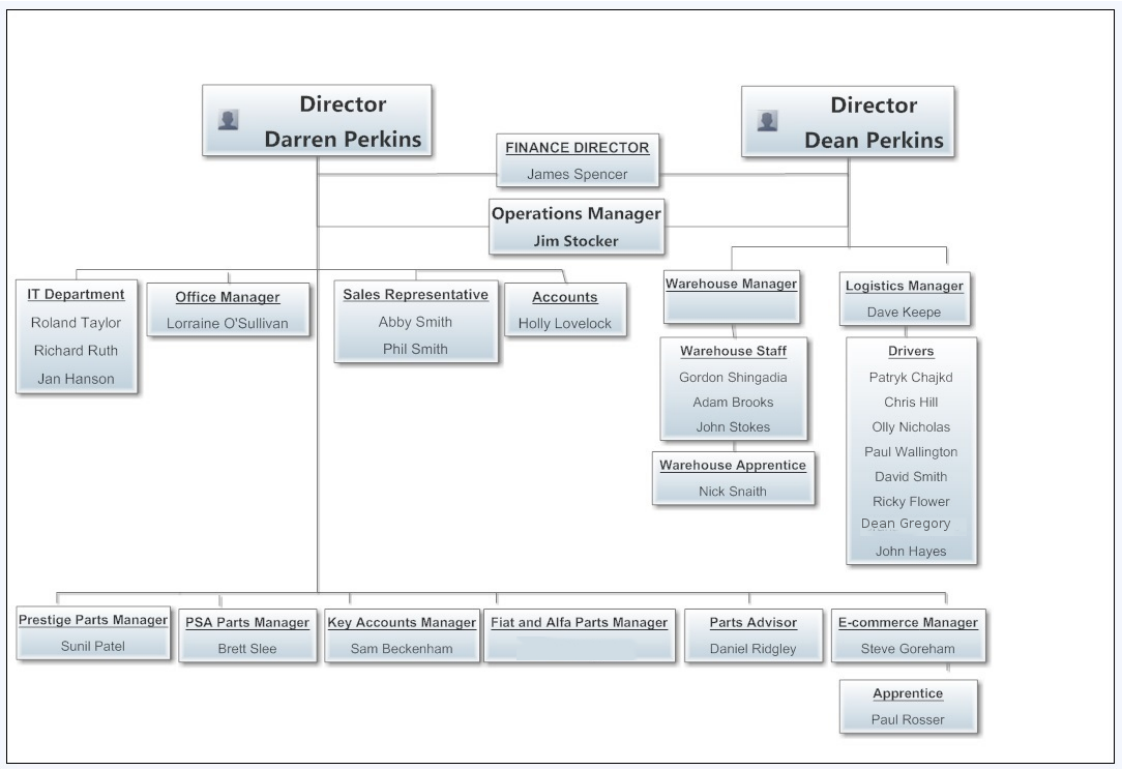

Figure 3. Company Organisational Chart

Tomo have recently acquired a new building and are looking to move their offices there later in 2016, this will help to alleviate the growing lack of space within the warehouse and the office. Accommodating for an increase in business due to the PSA hub deal as well as the accompanying office staff necessary to cope with the increase in business.

2 The Placement

I have taken on a role of software engineer [10] within the IT department. The IT department at Tomo Motor Parts Ltd consists of 3 employees, this is 10% of the overall workforce. The IT department provides infrastructure and support for the company including:

- Email Services
- File Servers
- Web Services
- VPN services
- Network Infrastructure
- Setup of new users
- IT infrastructure purchasing

Tomo is fairly unique with respect to its software usage, in so far as; most companies in this business use proprietary third party software to manage their business needs, Tomo has built its own ERP from the ground up over the last 15 years and this gives them the flexibility to modify their software to fit with their requirements as and when they change. This software (called WINSTOCK) was developed and is maintained by a single programmer, who is at the time of writing this report 65 years of age. Winstock has become a relatively large system and, with the recent expansion of the business, Tomo feels that having an extra programmer on board would help lighten the load.

The original remit of the placement was to aid in the expansion and maintenance of Winstock. Winstock is written in C++ and is heavily integrated into the Microsoft Windows infrastructure. The preliminary discussions revolved around moving new functionality away from this to a more modern language and more generic way of doing things, to make it easier for any programmer hired in the future to take over from the current engineer (should he wish to retire at some point etc), we discussed using Java and the JNI to interface with the current code but it soon became obvious that this would not fulfil the requirements and a full rewrite of the software was necessary.

Obviously this was too much to ask a single programmer to do in the time frame that Tomo wanted (6 - 8 months), So the project was contracted out to an external software company Cevo Studios, to complete. I was heavily involved in initial discussions and requirements gathering; advising Tomo Parts on technologies and feasibility.

In January 2015, Tomo Motor Parts started selling parts on eBay and it soon grew to the point where two full time employees where needed to manage and fulfil all the orders, and within a couple of months (at its current growth rate) this would no longer be enough; which is the point at which I joined the company. So I tndook on the development of a system to automate, as much as possible, the management of the various facets of the eBay process.

Being part of the IT team I was also involved in support as well as development, helping users with general IT related issues, installing and setting up new hardware, improving and streamlining existing systems as well as the sourcing and purchase of required hardware. I undertook such tasks as:

- Updating the ageing PPTP VPN service to an OpenVPN implementation on a Linux environment.
- Setting up Windows Server 2012 environment for a Java, MySQL development/production stack.
- Advising the Infrastructure technician with regards to the setup of the new server cabinet.
- Upgrading hardware for users (and building PC's) as the need arose.

3 The Projects

During my time at Tomo Motor Parts Ltd I have been involved in two Major projects. The largest of these projects: the architecting and development of the eBay management system (TomoBay) is where I spent the majority of my time and energy. From the initial requirements gathering and design of the basic system, through to implementation and testing and then extension and maintenance.

I was also responsible for the gathering of requirements for a new warehouse management system that Tomo commissioned, as well as aiding in testing and being a general point of contact.

3.1 Warehouse Management System

This project was conceived during negotiations with PSA (Citroen/Peugeot), to create a system that could handle the following tasks electronically:

- Picking
- Packing
- Deliveries (to Tomo)
- Stock checks
- Internal Stock audits
- Stock management
- Location management

This system would, ideally, be able to handle these common tasks performed in the warehouse using an Android handheld device with attached barcode scanner.

The first stage of this project involved sitting down with various stakeholders, primarily the Managing Director and Warehouse Manager to find out, in general terms, what they required from this system, how the system would be used and to what degree manual intervention was wanted/required.

I then sat down, taking what had been said before, and to the best of my ability translating this into a skeletal wireframe structure showing the process flow from one screen to the next with the aim of encapsulating all the requirements withing this.

The next stage was taking these preliminary wireframes back to the stakeholders; including, now, the users of the system. This was important as they were able to point out various improvements and flaws that the Management level stakeholders had missed. After a great deal of discussion and some modification to the preliminary wireframes, everyone was agreed upon what the system should look like, what information should be presented and the security measures that should protect the system from unauthorised and accidental use.

After the requirements where gathered and finalised (as much as they ever can be), I started the process of formalising these specifications so that they could be passed on to Cevo Studios to implement. Taking the advice of Wilson Fletcher [11] I decided to use a web based application called POP (Prototype On Paper) to create an interactive prototype to convey these specifications. This allowed me a compact prototypical representation of the specifications that was self documenting in so far as by using the interactive prototype the program flow is obvious. It also allowed me to add comments to the slides that make up the prototype, and so, to provide any clarification necessary (should there be behaviour that the prototype can not deal with using POP). The comments also allowed me to make (pseudo) user stories, that go along with the prototype.

Another useful feature of the POP web app is that it allows you to share the prototype with others by providing them with a link. This link allows the person that you have shared it with to view and use the prototype that you have shared, as well as (in some cases) write notes in reply. In our case i decided to have communication go through email rather than the POP comments (this could lead to a very cluttered specification).

This specification turned out to be succinct and effective as there was very little clarification needed by Cevo and they could get started almost immediately. From this point onwards I took on the role of first point of communication whenever Cevo needed clarification on a point about the functionality, in addition to this I provided support in the form of testing and feedback as well as providing advice/sounding board, for Cevo when they were having some issues with the barcode scanner functionality (and interfacing it with the android framework).

The specification was not provided to Cevo all at once, but was drawn up module by module, and then passed to Cevo as soon as a particular module was finalised. This allowed the development of the warehouse management system to start sooner and as a result be finished sooner. It also allowed us to go through a testing cycle on the module while the next one was being developed, passing feedback to Cevo regarding anything that needed changing/fixing. This methodology worked well and we quickly gained a very useful piece of software.

In hindsight, however, there are certain areas where having a couple more face to face meetings would have been useful. Particularly when integrating the parts of the warehouse management system that require data from Winstock (the in-house ERP). This is because it runs a custom protocol for communications over a socket, and while the specification for this protocol was sent to Cevo, it would have made for quicker development having them on premises while they were dealing with this; rather than an exchange of copious amounts of emails over a period of weeks.

3.2 Product Photography

Early on in my placement the managing director learned that I have an enthusiasm for photography and asked me if i'd like to upgrade their current product photography setup, as well as train the current member of staff responsible for the product photography in the use of the manual camera settings.

Their initial setup was a lightbox, desk lamps and an ageing Nikon D2H (4 Megapixel) camera, and because the member of staff responsible for the product photographs was not familiar with the use of the manual functions of the camera; he was limited to using the auto features of the camera, which were producing far less than optimum results.

I was given a budget of £500 to improve the setup with, the first thing to do was sort out the equip the new setup consisted of:

- Panasonic G5 Camera body
- Sigma 30mm lens
- extension tubes
- 1250W 5500K softboxes with stands
- Tripod
- A1 Paper

The next step was start training the member of staff in their use. I organised a series of eight training sessions, covering the different aspects of the camera, lights, and how to use them to get better product shots. The difference in the quality of the product photography was noticeable and as a result looked much more professional. Unfortunately, due to a series of unfortunate events, Tomo became short staffed and as a result the product shots have fallen by the wayside.

3.3 eBay Management System (TomoBay)

In January 2015 Tomo Motor Parts started selling car parts using eBay as a sales medium. Over the course of the year (up until September, when I joined) eBay business had quickly picked up to the point where the one person assigned to it could not keep up with the volume of orders, at this point another person was added to the eBay team. By the time i joined Tomo Motor Parts, however, demands of manually dealing with every order: picking/packing, invoicing, labelling, shipping, etc had become too much for the two people on the team to handle.

It was decided that I would work on a project to attempt to automate and streamline the paperwork side of eBay as much as possible. The primary goal of this was the management and centralisation of orders from multiple accounts and invoice generation and printing for these orders.

My first port of call was to look at the eBay developer documentation and find out what the eBay API was actually capable of. As it turns out the eBay API allows the user to perform almost any task that can be performed using the website as well as doing tasks and finding information that are not possible using the website.

The downside to the eBay API (as it currently stands) is that, while the documentation covers every class in the API, it is sparse at best; with many methods having cursory descriptions that tell you little more than the method name did. This, coupled with the lack of community documentation, made life mildly frustrating to start with; as getting API calls to work was a process of educated trial and error, which in many cases was not consistant between different API calls. However afterwards I had a more detailed idea of what was feasible.

The next thing to do was to try and identify some kind of specification for the project. This was easier said than done as neither the potential users of the eBay system, Manageing Director nor the IT Manager had a concrete idea of what they wanted from the project. The two things that were consistant were that firstly: orders had to be grabbed directly from eBay and the system I was to build would invoice these orders followed by printing the invoiced orders and their associated packing lists; and secondly: the system would be web based (i.e. no desktop application).

So given this minimal set of requirements, I set to work trying to produce a system that would do as they asked, but was easy to extend without becoming a tangled mess of code. The first thing I decided on was to use the Jetty embedded webserver as the display engine for frontend. This had multiple benefits: no external webserver necessary in order for it to work, complete control of all settings from within the server program and lastly the whole program could be wrapped up into one neat binary and some associated files (configs/logs/keystore) making deployement and server management easy.

The second major decision with regards to the design of the system was to use a modified Model-View-Presenter style architecture (I shall explain the 'modified' qualifier shortly). The Model would hold all the functionality to directly interact with the data sources (eBay API/database/Winstock/etc) as well as external systems such as the Javamail/Gmail interactions; and taking a leaf out of the Service Oriented Architecture way of doing things, i decided to include in the model a package for services.

In the context of this project, I defined services to be one of two possible things:

1. Background tasks that would need to happen periodically in order to maintain the system, such as syncing orders from eBay, checking the database for errors and so on.

2. Functionality the user choses to invoke that would be substantial enough to cause delays to the system.

The reason for classifing the above as services as opposed to having it fall under some other area was that the background tasks reffered to in (1) are (in general) fairly lengthy processes in terms of execution time as are the items of user invoked functionality referenced in (2). If these were carried out in the main program thread could lead to user percievable slow downs, which should be avoided where possible.

I decided to use Java's built in 'executor' framework to create two distinct types of threadpools in order to cope with the two distinct types of services: the first was a threadpool for 'scheduled services', those services which come under the remit of the first definition; and a threadpool for 'triggered services', those services that fall under the second definition.

4 Links to Academic activity

In this section I would like to take a moment to provide some information about my 1st & 2nd year courses and how the information that I was taught in them relates to activities I performed on my placement

Group Projects	This module acclimated me to working with people of different skill sets and skill levels and aided me in communication between Tomo Motor Parts Ltd and external developers used for a variety of tasks.
Logic and Computation	Provided me with a background in the lower level aspects of how computers and programming languages work as well as formal logic. All this stood me in great stead allowing me to write much better programs and giving me more tools to solve problems with in general.
Data and Information	Gave me a background in the theory behind relational databases as well as statistical analysis. This came in particularly useful when designing the database backend and processing the data that is retrieved from eBay before storing it in the database.
Information Systems and Organisation	The content of this course was particularly useful while gathering the requirements and writing the specifications for the warehouse management system. The content regarding use cases in particular, and whilst 'use cases' where not used as part of the specification (in any formal sense), the information that they would have contained was kept in mind when putting the specification together.
Introductory Programming	Unfortunately this course was of limited use to me as I had covered all the material in this course before starting at Brunel University, and was already comfortable with the concepts and techniques contained in this course.
Software Development and Management	This course provided me with knowledge about a range of tools that are exceedingly useful in a software development context: Doxygen for code documentation, Git for version control and backup. It also made me familiar with the concept of using code metrics as a code analysis tool and as a guidline to analyse the design of a system.
Usability Engineering	The content of this module eased my design of the frontend to my system and encouraged me to be more aware of many HCI concepts as relates to the user interface. It was also directly responsible for my choice of tool used to produce the requirements specification for Cevo Studios (POP - Prototype-On-Paper).
Networks and Operating-Systems	This module gave me a background in a variety of techniologies that came in usefl on my placement: XML, Cryptography and to a lesser extent, networking protocol. XML was used as a transfer format between Winstock (in-house ERP) and external software, and as such knowledge of this was invalulable.
Algorithms	This module gave me a headstart and good basckground information when it came to creating a custom sorting algorithm for the eBay management system. Thanks to this module I was able to draw inspiration from classical sorting algorithms and customise them for my particular purposes.

Table 1. !st & 2nd Year courses and their relevance to this placement

5 Evaluation

5.1 Objective 1 - Design Patterns

5.2 Objective 2 - Concurrency

5.3 Objective 3 - MySQL

5.4 Objective 4 - Doxygen

5.5 Objective 5 - Git

5.6 Objective 6 - User Support

5.7 Stretch Objective

5.8 Conclusion

6 Case Study

6.1 What motivated you towards applying to the company?

One of the big draws of Tomo Motor Parts Ltd, for me, was that it is a small company. There is a difference in the athmosphere in small companies vs large companies, it is more intimate, the chain of command is shorter and you get the feeling that what you are doing is affecting the company as a whole, in a real monetary way. I am not disparaging against large companies, they have their plus points too, but I felt that working for a small company my placement would be more focused on one projeect as opposed ti moving from department to department doing little bits here and there. I like a project that I can get my teeth into.

Along with this, the company had an IT team of 2, one of whom was a developer. Now this has both positive and negative points, but for me it indicated that this would be a challenge and a chance for me to stand on my own two feet in a commercial setting. As well as being personally responsible for all my achievements.

6.2 What did your role entail?

The role I took on essentially boiled down to full lifecycle Software Engineering, from gathering the requirements for software to be developed, then taking those requirements and designing software around it. Then Developing that software into a viable, working product; testing it and deploying it. Then making imporvements, introducing new features, working out bugs (unwanted features) and integrating into the existing deployment. It really did cover pretty much every stage of the lifecycle of a commercial software project.

In addition to the responsibilities mentioned above, my role occaisionally entailed liaising with developers from an external software house helping them with their testing, providing them with requirements specifications, and being a point of contact for them in case of isssues.

6.3 Do you feel your work experience was valulable?

I feel my work experience was incredibly valulable, it allowed me to gain experience of a large scale software development project, engage in full lifecycle development. It also benefitted me by allowing me to explore technologies and techniques that there are not covered at university such as: sockets, concurrency and dependancy injection. The last area I feel my work experience has been valulable is in allowing me to regularly communicate with the stakeholders involved in the projects, forcing me to get used to explaining technical concepts and problems who, by their nature, are not technically minded.

6.4 How has your work benefitted the company?

My work has benefitted the company in a number of ways. The most obvious of these is the amount of man hours saved due to the introduction of my eBay management system. This is made obvious by the fact that when I joined there were two members of staff permanently employed and busy with dealing with eBay orders. Since then the amount of business going through the eBay channel has increased quite substantially with another two accounts being managed and yet the amount of staff has remained constant; that is to say, the number of staff dedicated to eBay went down to one, but in the last couple of months an apprentice has been hired in order to help with the picking/packing side of things. In terms of concrete savings to the company, the system saves them about 35%-40% in time, which at the time of writing equates to between 18.2 and 20.8 man weeks per year or a concrete saving (assuming minimum wage) of between £5792.15 and £6619.60.

Other concrete savings to the company were made by myself with technology related purchases, including: finding a good deal on android handheld units, as well as other hardware purchases. This lead to a total savings of around £5400 and lastly I also installed two high efficiency printers which are currently saving the company over £2000 per year.

Then there are the less tangible benefits: time saved helping external developers test code, writing formal requirements specifications and liaising with them with respect to prospective solutions, as well as general user support.

6.5 What did you learn that was not covered on the course?

Thanks to the open nature of the TomoBay project (eBay management system) I was able to learn about a good number of technologies and techniques not covered on the Brunel course, including:

- Concurrency and multi-threaded programming
- Communication using Sockets
- Database connection pooling
- Thread pooling
- Inversion of control & Dependancy injection
- Java Generics
- Java JVM tweaking and optimisation
- Windows system administration

6.6 What general advice would you give to students who are yet to apply for a placement?

Applying for a placement (at least in my case) can be a tedious, long winded and often disheartening affair. Employers often don't reply for weeks, and when they do often its to say "were sorry to inform you .....", it is important to keep applying. Do a little bit every day, even if its just one application, over time you will get responses and some of them will be positive. Dont give up, you WILL find a placement.

Having an up to date CV is important, but I would say spinning your CV to the job/sector you are applying for is as important if not more so. I found the most useful way to do this was to tailor my CV to my ideal job, and my strengths. This has the benefit of getting favourable replies from companies that are more likely to be a good fit with what you want to do.

My last piece of advice is reply as soon as you get a response, the more communication you can coax out of an employer the less likely you are to stick in their minds and as a result; the more likely you are to progress further with your application.

7 Testimonials

> "*Jan's work ethic has been exemplary and he has shown great flexibility in adapting his system to changes in business needs promptly and effectively. Jan is knowledgeable in his field and always willing to give support and advice when it is needed. He has been a dependable employee and an asset to the IT team.*"
>
> — Darren Perkins, Managing Director

> "*Jan works well in a team, as he has shown time and again when coordinating efforts with our external consultants; but is also more than capable of working unsupervised, and left to his own devices will push on with work that needs doing.*"
>
> —- Richard Ruth, IT Infrastructure Manager

> "*blah blah blah blah*"
>
> —- Roland Taylor, Winstock Software Engineer

> "*Jan is very approachable, friendly and very happy to help out with any IT issues I had, he would deal with them quickly with no fuss at all. If the system got disconnected from the servers and I couldn't invoice anything temporarily, he was quick to fix the problem and it was business as usual after that. His hard work and knowledge has made my job on Ebay so much quicker and easier.*"
>
> —- Steve Goreham, eCommerce Manager

For more professional please feel free to check my LinkedIn Profile and GitHub pages:

https://uk.linkedin.com/in/jpchanson

https://github.com/jpchanson

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9 Appendices

9.1 S.M.A.R.T Objectives

Objective 1	**Skills**: *Design Patterns*
Description:	I aim to develop a good understanding of Design Patterns and utilise them extensively (where appropriate) throughout my code.
Barriers:	Due to the urgent need for a working system (so that Tomo does not lose custom or gain negative feedback on eBay), there is only a limited amount of time to weigh up the pro's and cons of various approaches. As a result, during the initial push towards a working core of code I will need to balance learning and implementing patterns I have previously not used against expediency.
Opportunities:	Due to the nature of the project, I have a blank slate to work with, which affords me the freedom to tackle the whole project from start to finish, as I think is best. I am not limited by having to conform to a prior code base.
Achievements:	• Many modules within my code conform to the inversion of control principal, primarily due to a map of factory method objects to enum constants, allowing objects for a particular module to be created and distributed from a central location. This central location can only accept values defined as constants of a particular Enum, avoiding the need for sanitising input to the class. Overall this approach leads to high cohesion within the module but loose coupling within the module w.r.t behaviour, as well as loose coupling between the module itself and users of it. • The creation of a general purpose SQL framework. • The creation of a framework to replace complex conditionals using double dispatch. • Implementation of an Email framework using Java mail and the builder pattern.

Table 2. Objective 1: Design Patterns

Objective 2	**Skills**: *Concurrency*
Description:	I aim to develop a working knowledge of Concurrency, its pitfalls and strategies for coping with them. I aim to produce typesafe code throughout any projects I work on.
Barriers:	My choice of frontend system (Jetty embedded web-server) means that I have to deal with the realities of concurrency from the get-go as opposed to building up to it. This is very much a sink or swim scenario.
Opportunities:	Jetty, Services
Achievements:	• No member variables in shared objects • No non-final static variables or objects within objects that could have more than one instance in existance at any instance during the program lifecycle. • Typesafe singletons. • Thread pooling • Use of Java's Executor system for the creation and management of threads

Table 3. Objective 2: Concurrency

Objective 3	**Skills**: *MySQL*
Description:	I aim to develop my knowledge of SQL and transactions, utilising transactions in all database queries and attempting to keep any databases I develop in third normal form.
Barriers:	I will be setting up the MySQL implementation of Windows Server 2012, an environment that I have previously only had limited experience with, In fact Microsoft Windows in general is something that I do not have much experience with; as for the last 10 years I have used Linux almost exclusively.
Opportunities:	This is a chance to familiarise myself with Windows Server from both an OS standpoint as well as a Server standpoint (maintainance, installation, security, etc)
Achievements:	• The design, creation and management of an Oracle MySQL database of live information taken from the eBay API. • All database tables in third normal form.

Table 4. Objective 3: MySQL

Objective 4	**Skills**: *Doxygen*
Description:	I aim to use the Doxygen tool(including some advanced features and annotations) to document ALL code that I produce during my placement, with AT LEAST documentation for all public methods and variables as well as class and package level documentation, for all classes and packages.
Barriers:	This is not a small project and the amount of documentation needed will be rather substantial, as a result, I will need to keep up with the documentation needs as I go; or else run the risk of having to play catch-up after a given period of time.
Opportunities:	I see this as an opportunity to get into/reinforce good habits when it comes to code documentation. I have always been quite rigorous with the documentation of code, but I have never had the chance to do this on a substantial commercial project.
Achievements:	• Built-in manual created from external Markdown documents. • Extensive package level documentation for code that is framework-like, including code snippets and usage examples. • In-Page cross-linking of classes to other relevant classes to convey code intent. • UML style inheritance and collaboration diagrams using dynamic SVG's as well as caller and call graphs.

Table 5. Objective 4: Doxygen

Objective 5	**Skills**: *GIT*
Description:	My employers have given me permission to open-source the code that I write for them so I will use the Github platform throughout my Placement to record and document my code as well as for project management. As a result, at the end of my placement I will have a fully documented open-source project.
Barriers:	If i create a git repository in the development directory, by default it will upload everything to the repository, including possiblly sensitive information like passwords for accounts and such. For the sake of security it is necessary to make sure that all sensistive information is included in the relevant .gitignore file. Git also has quite a steep learning curve and many of the functions can take experience to use properly.
Opportunities:	This is a chance to launch a self contained open-source project from scratch that could concievably benefit a wider audience than just Tomo Motor Parts Ltd. It is also an opportunity to provide maintainance and design documentation in a central off-site place using GitHubs gh-pages functionality and wiki. This would allow anyone who succeeds me to find it easily and, hopefully, pick up where I leave off without too much hassle.
Achievements:	• Use of the GitHub gh-pages branch to post code documentation(generated by doxygen) online • Use of the GitHub issue tracker to keep track of bugs/new features/improvements/etc. • Regular commits.

Table 6. Objective 5: GIT

Objective 6	**Skills**: *User Support*
Description:	During the length of my placement I will provide training and support to the end users of my system as well as providing technical support to the existing IT infrastructure, I have agreed with the IT Manager that he will provide an informal written assessment of my performance in this regard at the end of my placement.
Barriers:	The infrastructure of the company is based around Microsoft products, and all the workstations are loaded with Windows 7. Being a Linux user, this is an OS that i am not so familiar with, and as such, in order to be helpful in a user support role I will need to learn how to administer the windows platform as well as how to deal with common windows problems.
Opportunities:	The positive side of using a system that I am unfamiliar with is that it provides me the opportunity to learn more about it, which can only be a good thing, and given that the majority of business users around the world use windows on their desktops, this is a skill that will stand me in good stead in the future.
Achievements:	• Script to remotely query users on a particular server and kick them off if necessary (Only a certain number of RDP session licences available, and would often get locked out of server if someone forgets to log out). • Installation of printers that come with somewhat temperamental drivers • Installation and setup of computerised cash register, as well as authoring a script that unlocks and opens the cash drawer. • Frequently changeing users internet gateway as one or the other goes down. Until I came up with the idea of using the RIP listener to automatically select the route to the internet that is most appropriate.

Table 7. Objective 6: User Support

Stretch Objective	
Description:	Tomo is employing an external software house to develop and build a Warehouse Management System for Android, Through discussion and meetings with the IT Manager, General Manager and Warehouse staff I will be responsible for creating the specification for this system. This specification will take the form of a documented interactive prototype. I will also be responsible for communicating this specification to the software house responsible for building it as well as clarifying any questions they have regarding the specification.
Barriers:	Cevo Studios (The external software house) are not familiar with the auto parts trade and as a result I need to make sure that certain jargon terms that are par-for-the-course at Tomo are accurately and correctly conveyed to Cevo so as to minimise (hopefully eliminate) confusion.
Opportunities:	This is a chance to improve my communication accross different groups of stakeholders. It is also an opportunity to practice requirements gathering and formalisation processes.
Achievements:	• Creation of an expansive interactive prototype, indicating the application flow and intent. • Succesful communication of the requirements to Cevo Studios.

Table 8. Objective 6: User Support

9.2 Skills analysis

Skills Analysis

Student Name:	Jan Hanson	**Date last updated:**	18/03/2016
Manager Name:	Richard Ruth	**Date approved by manager:**	18/03/2016
Tutor Name:	Tracy Hall	**Date approved by tutor:**	21/03/2016

Please rate current level of skills currently agreed as relevant to the job using the scale below:

1. Unacceptable.
2. Performance not fully up to requirements. Some improvement necessary.
3. Performance fully meets normal requirements of a placement student.
4. Performance significantly above requirements.
5. Outstanding.

Skill	Rating (1-5)	Action for improvement
Ability to take initiative	4	If a problem is spotted talk to the appropriate member of staff, even if they may not be initially receptive to the idea.
Time Management	3	Work on improving the self assessment of deadline timescales
Prioritising work	4	Take time occaisionally to assess whether the work currently being done is providing the most benefit at this time
Teamwork	3	Work on closer communication with team members
Interviewing technique	4	Interviewing stance could be a little on the passive side, take a slightly more aggressive/assertive role in the interview
Negotiation skills	4	Work on not backing down so easily
General communication skills	4	Learn to communicate technical concepts to non technical people.
Ability to benefit from constructive criticism	3	Act more decisively regarding the constructive criticism offered to rectify the problem at hand.
Ability to understand instructions	5	No action needs to be taken
Research skills	5	No action needs to be taken
Computer literacy	5	No action needs to be taken
Ability to extract core problem	5	No action needs to be taken
Problem solving skills	5	No action needs to be taken
Ability to deal with changing requirements	4	It could be beneficial to treat changes in requirements as a new challenge as opposed to an inconvenience that needs to be dealt with.

Figure 4. Skills Analysis

9.3 Log Book

Table 9. September Log

Table 10. October Log

Table 11. November Log

Table 12. December Log

9.4 Placement Visit Reports

Placement Visit 1 Report

Placement Tutor: Tracy Hall

Date of Visit : 13/11/2015

Student Interview

Student Workplace Experience

- [x] The Student feels that they fit in well in the work environment and has experienced no significant difficulties.
- [ ] Despite initial difficulties, the student feels they have adapted well to the work environment.
- [ ] The student feels that there are unresolved issues in their work environment.

Work Undertaken

- [x] The student feels that the work is entirely appropriate for the requirements of the work placement scheme.
- [ ] Some issues have been identifiedby the student, but have been or can be resolved.
- [ ] The student feels that the work is not appropriate for the requirements of the work placement scheme.

Objectives Agreed with the manager

- [x] The student believes that they are making good progress against the objectives.
- [ ] The student feels they have made reasonable progress but has encountered some problems.
- [ ] The student feels that they are making little progress against the objectives.

Learning Outcomes

- [x] The student understands the learning outcomes and is confident of achieving them.
- [ ] The student understands the learning outcomes and has identified problems/potential problems in achieving them.
- [ ] The student appears not to understand the learning outcomes.

Support for the student

[x]	[ ]	The student feels that they have good support from the employer
[x]	[ ]	The student feels that they have good support from the university.
Yes	No	

Outlook

- [x] The student is satisfied with the plans for the remainder of the placement.
- [ ] The student has some reservations about the plan for the placement, but through discussion and objectiv setting, the student feels that these can and will be resolved.
- [ ] The student has some concerns or uncertainties around the plan for the rest of the placement.

Manager Interview

Name of Manager Interviewed: Darren Perkins

Workload

- [x] The manager feels that a varied and stimulating workload is provided.
- [ ] The manager feels that the workload could be more varied and stimulating.

Objectives and Learning outcomes

- [x] The manager has discussed and agreed the objectives and learning outcomes with the student.
- [ ] The manager has not discussed and agreed the objectives and learning outcomes with the student.

Progress

- [x] The manager feels that the student has made good progress against the agreed objectives and learning objectives.
- [ ] The manager feels that the student has made reasonable progress against the agreed objectibes and learning outcomes.
- [ ] The manager feeks that the student has made little progress against the agreed objectives and learning objectives.

Figure 5. Placement Visit 1: Report(page 1)

Support from Brunel University

☒ The manager is aware of the support provided by the University.
☐ The manager is not aware of the support provided by the university.

Collaboration

☒ Collaborative opportunities were not discussed
☐ No interest was shown.
☐ Some interest was shown, but this needs to be followed up at a subsequent visit.
☐ Interest was shown and is being followed up regarding:

Tutors Comments

"*The student is performing some very challenging development work which he seems to be able to cope with. I did discuss the level of challenge with the manager with a view to monitoring that the student continues to cope with this*."

Tutors assessment of the visit outcome

☐ There were some minor issues, but these have been or are in the process of being resolved.
☒ The placement is fit for purpose. No further action necessary.
☐ There are serious issues which will be brought to the attention of the placement and careers centre and/or the department/division.

Students statement of Acknowledgement

"*I agree with what has been reported*"

Figure 6. Placement Visit 1: Report (page 2)

Placement Visit 2 Report

Placement Tutor: Tracy Hall

Date of Visit : 20/04/2016

Student Interview

Student Workplace Experience

- [x] The Student feels that they fit in well in the work environment and has experienced no significant difficulties.
- [ ] Despite initial difficulties, the student feels they have adapted well to the work environment.
- [ ] The student feels that there are unresolved issues in their work environment.

Work Undertaken

- [x] The student feels that the work is entirely appropriate for the requirements of the work placement scheme.
- [ ] Some issues have been identifiedby the student, but have been or can be resolved.
- [ ] The student feels that the work is not appropriate for the requirements of the work placement scheme.

Objectives Agreed with the manager

- [x] The student believes that they are making good progress against the objectives.
- [ ] The student feels they have made reasonable progress but has encountered some problems.
- [ ] The student feels that they are making little progress against the objectives.

Learning Outcomes

- [x] The student understands the learning outcomes and is confident of achieving them.
- [ ] The student understands the learning outcomes and has identified problems/potential problems in achieving them.
- [ ] The student appears not to understand the learning outcomes.

Support for the student

Yes	No	
[x]	[ ]	The student feels that they have good support from the employer
[x]	[ ]	The student feels that they have good support from the university.

Outlook

- [x] The student is satisfied with the plans for the remainder of the placement.
- [ ] The student has some reservations about the plan for the placement, but through discussion and objectiv setting, the student feels that these can and will be resolved.
- [ ] The student has some concerns or uncertainties around the plan for the rest of the placement.

Manager Interview

Name of Manager Interviewed: Darren Perkins

Workload

- [x] The manager feels that a varied and stimulating workload is provided.
- [ ] The manager feels that the workload could be more varied and stimulating.

Objectives and Learning outcomes

- [x] The manager has discussed and agreed the objectives and learning outcomes with the student.
- [ ] The manager has not discussed and agreed the objectives and learning outcomes with the student.

Progress

- [x] The manager feels that the student has made good progress against the agreed objectives and learning objectives.
- [ ] The manager feels that the student has made reasonable progress against the agreed objectibes and learning outcomes.
- [ ] The manager feeks that the student has made little progress against the agreed objectives and learning objectives.

Figure 7. Placement Visit 2: Report (page 1)

Support from Brunel University

- [x] The manager is aware of the support provided by the University.
- [ ] The manager is not aware of the support provided by the university.

Collaboration

- [x] Collaborative opportunities were not discussed
- [ ] No interest was shown.
- [ ] Some interest was shown, but this needs to be followed up at a subsequent visit.
- [ ] Interest was shown and is being followed up regarding:

Tutors Comments

"*The student seems to have done an excellent job in a very challenging environment*"

Tutors assessment of the visit outcome

- [ ] There were some minor issues, but these have been or are in the process of being resolved.
- [x] The placement is fit for purpose. No further action necessary.
- [ ] There are serious issues which will be brought to the attention of the placement and careers centre and/or the department/division.

Students statement of Acknowledgement

"*I agree with the content of this report*"

Figure 8. Placement Visti 2: Report (Page 2)

9.5 Reference Letters

Figure 9. Testimonial/Recommendation Letter from the General Manager

Figure 10. Testimonial/Recommendation Letter from the IT Manager

Figure 11. Testimonial/Recommendation Letter from the Lead Programmer

Figure 12. Testimonial/Recommendation Letter from the TomoBay User