

Girne American University
Faculty of Engineering
Department of Computer Engineering



Oman Holdings International Company

Summer Training (EE400) Report.

Detailed report of summer training done from 19th of June 2010 to 28th of July 2010.

Ameer Abdulhussain
070301046
1/11/2010

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1. Introduction:

While searching for a company in which to perform my summer training in, I had high standards as well as high hopes. I set my gaze to the horizon and applied to as many companies as I possibly could. From as far as one of the leading game developers in the world, Blizzard in the United States of America, to the multinational public corporation that has been dominating the internet for the past 12 years, Google Inc.

I remember now how some people questioned my choices, and asked me as to why I would send applications to such big companies for something that's not even a real position in the company, but rather just a summer internship in which I would be dismissed after only a month and a half. And I would explain to them just how I saw this summer practice as more of an opportunity, than a burden. I saw it as a path that would lead me to prosperity, a tool that will give me the knowledge I needed to further myself, not only in my studies, but in my career as well. And that will also give me an edge over my fellow competitors when the time comes when we all enter the race for a job.

Unfortunately, while I was unable to get a summer internship position in one of those highly renowned companies that I was hoping for, I did manage to get a position in OHI [1] (the Oman Holdings International Co.) back in my home country, the Sultanate of Oman. And I truly felt that being a part of OHI for the summer was an honor and I was sure to make full use of the time that I was to spend there. OHI is a holdings company, which basically means that it's a company that's consisted of many other smaller companies, and because of that, it gave me more opportunities to expand my knowledge and gave me the ability to gain more from many different fields.

During the course of this report, I'll be explaining my position in each of the companies that I spent time in and I'll be explaining in vivid details what I learnt during my time there and how I was able to successfully complete the tasks that were given to me.

In each of the coming chapters, I'll try my best to evenly distribute each of the chapters into three parts. One for each of the companies I worked in, because during my time in OHI, I had the privilege of allocating my time amongst three different companies. I spent 15 days in IITC (International Information Technology Company), 5 days in the IITC Internet and Web Division and I spent my last 10 days in OHI in the SSL (Software Systems) company. And in the following chapter, I'll be explaining in vivid detail each of these companies, what they do and how they function.

During my 10 days in IITC, I was working closely with the support team, Mr. Saleem and Mr. Jijil, and under supervision of Mr. Gajinder Shakma. I spent most of the day there troubleshooting and reporting to any issues that the rest of the employees faced with their computer, whether it was software, hardware or network issue. So I'll be explaining in the coming chapters in detail the issues we were faced with and how we came to solve them using the tools and knowledge that we had available to us.

After my stay in IITC, I was moved to the IITC Internet Division for 5 days, under supervision of Mr. Ravi Chandran, and it was there that I learned all about web design and the implementation of websites. Even though my stay in this division was the shortest, relatively speaking, it must have been the most enjoyable. I learned a lot about how websites come together, and the tools used to create an impressive, innovative design that will appeal to the costumers. So when the time comes for me to talk about my time in the IITC Internet Division, I'll be explaining mostly what I learned from my instructor, Mr. Mohammed, and how I'll be able to implement what I was taught in my everyday life.

Lastly, after my short stay in the IITC Internet Division, I was given the honor to have spent my last days in OHI with the Software Systems Company, and it was here that I spent 10 days working closely with team leader Ms. Rajeena Joseph and under supervision of Mr. Osama M Henein. During my time in SSL, I felt that I gained the most amount of knowledge than any of the other companies, because it was here that I was introduced to the System Development Life Cycle, and where I also gained an understand of the relational database management system and the object relational database management system and also, which I found to be very interesting, is that I was able to use the information and knowledge I gained during some of my courses in GAU in real time, and I was able to implement my own knowledge and skills in the tasks that

were given to me. But I'll explain in further details on those topics when the appropriate chapter has come.

2. Oman Holdings International Company:

The Oman Holdings International Company was established over 30 years ago as a modest business, and is now considered as one of the premier business houses in the Sultanate of Oman with business interests ranging from contracting, telecommunications, hospitality, real estate, communications and IT solutions to marine, petroleum and energy services in the core industrial sector.

The main incentive on which OHI is based upon is the power of partnership, and it's under that single belief that it was able to become what it is today, and it's because of that partnership, OHI has been able to provide enduring results and sustain its footing between the corporate houses in the Sultan of Oman.

Amongst the many subsidiary and associate companies that work in the various fields of tourism, telecommunications, energy and manufacturing, are:

- **Eihab Travels LLC.**
- **Budget Rent-A-Car.**
- **OHI Telecommunications Co.**
- **OHI Petroleum & Energy Services LLC.**
- **Oman United Exchange Co. LLC.**
- **Oman Steel Co. LLC.**

And last, but definitely not least, I'd like to talk a little about the three companies that I spent my time in during this summer:

1. International Information Technology Company:

IITC has been a leader in the Sultanate of Oman in delivering IT systems, while earning a reputation for being the most responsive IT company in Oman for over 26 years. Activities include equipment installation, maintenance, consulting, training, skilled manpower services and representation of overseas companies in Oman.

IITC's main strength lies in implementing 'mission critical' computer systems. To deliver such high end IT solutions and services. IITC has partnerships with some of the top IT

vendors in the world such as HP, Cisco, Oracle, Microsoft, Wipro, and Systimax. The company also ensures the optimized allocation of their resources (40+ employees and 3 engineers that are specialized with computer hardware, computer networking and electrical circuiting) so that they are able to provide high quality local implementation and support services.

2. IITC Internet Division:

Even though the Internet Division of IITC represents one of its smaller divisions, with roughly 20 employees and 2 computer engineers specializing in website design and implementation, its importance cannot be underestimated. The Internet Division of IITC represents ingenuity and it is here where companies from the public sectors and the private sectors come to request websites to be designed for their companies. By using applications such as Adobe Flash and Adobe Photoshop, they are able to create visually stunning websites that will appeal to the companies, and also to the costumers of those companies.

3. Software Systems LLC:

Software Systems (SSL) is one of Oman's leading providers of integrated business, process, and technology services, with a crew of over 50 trained employees and 4 engineers specializing in computer software development. A leading independent software services provider, the firm offers such services as application development, enterprise systems implementation, systems integration, client relationship management, business intelligence, enterprise project management, and technology consulting services.

Strategic alliances with technology vendors and system integrators enable SSL to deliver industry-best end-to-end solutions to its customers. SSL has partnered with many of the best of breed technology providers in all the solution areas. While the alliance partner provides the software application, SSL offers professional services including business process consulting, systems integration, custom application development, and other consulting and implementation expertise.

3. Problem Definition:

3.1 International Information Technology Company:

During the 15 days I spent in IITC, there were many tasks that I was asked to perform, some of these tasks I was able to do without much guidance, while others required me to ask for assistance in order to get the job done. Most of these tasks were ranging from networking, IP configuration and troubleshooting to server installation and assembly. I was also introduced to many new technical terms during my time in IITC and loads of new information that I'm sure will be to my advantage in the years to come.

At the beginning of my internship at IITC, I was asked to re-acquaint myself with some of the basic knowledge that was necessary in performing the required tasks. Accordingly, I was obliged to research information regarding detailed installation guides to the various versions of Windows operating systems. This newly attained knowledge of detailed configuration, proved to be useful due to the fact that, the Ministry of Manpower requested a large shipment of desktop computers. In addition, these computers were needed to be pre-configured to the specific needs of the Ministry. The requirements included the activation of additional language packages and software, and further customization of system details.

Additionally, while working closely with Mr. Saleem, who was the lead networking engineer, I became exposed to an immense new range of networking terms. Some of these terms consisted of, Domain Name System(DNS), which is a naming system that translates locations and addresses on a network into understandable phrases; Dynamic Host Configuration Protocol(DHCP), which is a computer networking protocol used by hosts in order to retrieve IP address assignments and other configuration information; Active Directory, that provides a variety of network services while insuring information security and single sign-on for user access to network based resources; and Domain Controller, which responds to security authentication requests within the windows server domain.

While undertaking my networking duties, I was asked, alongside my esteemed colleague Mr. Saleem, to handle certain tasks such as restoring internet connectivity, as well as installing missing software. Moreover, I made runs with the support team, to other companies under OHI to address similar issues. One of the major issues we came across at that point was where specific domains in the networks were unable to retrieve data or e-mails from other domains. This caused serious inconveniences with the companies that were unable to communicate with their partner companies as a result of the malfunctions. Whether this malfunction was caused by the networking team or by the service provider (Omantel) was unsure at the time, it was only a few days later with intensive investigation, that we were able to figure out what was the cause of the fault.

During the last few days in the IITC division, I was introduced to the server racks, where I gained knowledge regarding its assembly, configuration and installation. Here, I was assigned to three different jobs. One involved addressing a problem where a server suddenly stopped functioning. The second job entailed me to work on implementing a new server into the system which included the assembly and installation of Windows 2008 Enterprise and configuring it to suit the company's needs. The final task that was given to me in the division was the retrieval of the back-up data from the servers, which required me to go into the server room and recover data while ensuring atomicity.

3.2 IITC Internet Division:

Moving to the Internet Division of IITC proved to be very educational and exciting at the same time. It was here that I learnt the basics of webpage designs and management, and on my first day there, I met with the senior local web designer, Mr. Mohammed, and it was thru him I was introduced to the process of creating a website, from the basic design & layout to the tools that were used to create the website.

In the IITC Internet Division, they would use Adobe Photoshop to create and edit the images for their websites, and they'd use Adobe Flash to produce animation, video and interactivity for their webpages. Needless to say, my first task in this division was to become more knowledgeable with the tools that they were using, which were Photoshop, Flash.

As for the actual website construction, the Internet Division would use Microsoft FrontPage, which is an HTML editor and web site administration tools from Microsoft. An excellent choice in my opinion due to the many useful features Microsoft FrontPage has to offer.

During the next few days, my need to become more familiar with the tools that were being used grew due to the fact that the senior lead web designer has started to use more and more advanced features of these software. And because of that, I was asked to attain the software and practice the skills I learned whenever I returned to my house.

While there weren't many projects occurring at the time that I was there, however, I did manage to become involved with a particular project that involved the Ministry of Tourism. It seemed that the Ministry requested a change in the design of their website and they had come to the IITC Internet Division in hopes that they would return with impressive results. So while I was there, I was asked to provide opinions and sample designs that may be used in the end product. In the following chapter, I'll explain the tools and methods I used to attain my sample designs, unfortunately I'll be unable to show the actual designs I had made due to the divisions requests.

Later on, after practice and research, the senior lead web designer became aware of my progress and asked me to perform a few tasks for him. This included the following:

- Importing images from Photoshop to Flash in order to create flash images for the website.
- To implement the designs that we created onto Microsoft FrontPage by using the slice tool that is provided in Photoshop.

Just before my time at the Internet Division was to come to an end, Mr. Mohammed introduced me to the editorial side of the website management, where I learnt all about modules and their roles in the website. I was taught how to create and insert these modules into the webpage. Afterwards, I was tested on my knowledge when Mr. Mohammed asked me to perform a few simple jobs on the website, which included creating links and inserting text, images and flash images onto the webpage.

3.3 Software Systems LLC:

For my last 10 days in OHI, I had the honor of spending it with the Software Systems team, and it was here that I believe I gained the most amount of knowledge. Without delay, I was briefed on the critical life-cycle on which the company functions upon, which began with the procedure and process for accepting a new project: The company would begin planning the initial meeting with the costumers after accepting the project, and after all the necessary information is gathered, the developers would begin developing the software. After the software is completed, the company would arrange another meeting with the costumers to show progress and make certain that all the features are as per required. It is at this point the costumers would provide any additional modification requests before the cycle can proceed to its next phase.

After all the necessary modifications are made, the team will begin to write the manuals and instructions for the users of the software. As soon as that's done, the team will hand the software over to the QA team (Quality Assurance team), who will begin intensively testing the software for any bugs/mistakes/errors, and if they so happen to find any, they'll write a report to the developers and send the software back for bug-fixing.

Later on, after becoming familiar with the project life-cycle in the company, I was given a manual and told to study up on Oracle SQL. And every day after that I was given that manual, I would progress further and further into it, learning new SQL functions & capabilities. Some of the new functions and capabilities that I learnt are:

- **Conversions:** Where we're able to convert values from one data type to another, and even though the Oracle servers are capable of automatically converting the data to the expected data type, there are certain functions that allow the user to perform this task manually. Explicit data type conversions are done by using the conversion functions. Generally, the form of the function names follows the convention *data type TO data type*. The first data type is the input data type and the last data type is the output.
- **Date Formats:** By using the different date formats, we're able to display dates in the database in any possible format the costumer requires.

- **NVL functions:** NVL functions allow us to convert a null field into an actual value. For example, if a certain result would return null values, instead of displaying NULL, we'll be able to display the number '0' or anything else we want.

After rigorous studying, I was given many exercise questions to test my knowledge and capabilities. In the following chapter I'll provide the example questions that were given to me, and the solutions I provided for those questions.

Aside from the exercise questions that were given to me to test my newly attained knowledge of more advanced commands of Oracle SQL, I was asked to prepare a report and to present to my supervisor at the very end of my internship period. This report was to include all the new commands I learned while giving definitions and examples to demonstrate the practical uses of these commands. By the time I was done preparing the report, it consisted of 50 pages and over 6500 words. Along with many screenshots of the solutions to those exercise questions.

4. The Work Done:

4.1 International Information Technology Company:

While I was entering the IITC office for the first time, my first task before anything else was to introduce myself to the staff members that were on duty that day. I met with my supervisor and the members of the support team, which I was told that I would be a part of during my stay in IITC. Mr.Gajinder Sharma, my supervisor, was kind enough to explain how the support team functioned and their main duties in IITC. It seemed that Mr.Saleem, one of the members of the support team, was also the lead network engineer, and he was in control of the main networking aspects of all the companies that are under OHI and that are in the near vicinity of IITC. And it was Mr.Saleem that introduced me into the networking terms that I know now, among the many things that he showed me was the mailing groups, and the ability to allocate space for the other employees mailboxes, etc.. I'll get into more details later in this chapter.

After the initial briefing was over with, I was given my schedule and sent on my way to become a member of the support team for the next fifteen days.

My first task in IITC was to reacquaint myself with some of the basic knowledge that I needed to know in order to properly install various Windows operating systems onto computers. There were many guides and manuals in which I kept myself busy with for the majority of the first day or so. And even though most of the information was very standard and basic, I did gain some new information, such as the ability to create new drives on the hard disk and to be able to allocate space as needed between them.

Soon after I was done with the manuals, I was informed that there was an incoming shipment of over a hundred and ten desktop computers that were headed to the support team. These desktop computers were requested by the Ministry of Manpower to be preconfigured to the correct time zone, along with a few additional language packages to be installed. While the task itself was easy to do, the only problem we had was the fact that they requested over a hundred and ten desktop computers to be configured this way, and we only had a few days to complete the task.

Initially, we'd unbox three of the desktop computers, and connect them to the three monitors we had available in the support room, but after a few hours, we figured that by using this method, we would not be able to meet our deadline. So I came up with the plan to use the room next to the support room that had a few extra monitors available. But still, even with the five monitors attached, and considering it took approximately 45-60 minutes to completely install Windows XP and configure the computers settings according to the said requirements of the Ministry of Manpower, we were still going to miss our deadline. So finally, the next day I figured out a way to maximize and amount of desktops we'd have ready per hour. I offered a solution that would increase the output of the ready-configured desktop computers per hour from a mere 5 to 15. And that was to set three desktops to each monitor, and by connecting all the desktops to power outlets, and systematically installing and switching the monitor cable between the desktop computers, we were able to achieve this, and we were able to meet the deadline.

During the next few days, Mr. Saleem began introducing me to the world of networking. Along with some of the new terms and definitions, I had the chance of experiencing network administration in real-time. I saw the procedures and steps Mr. Saleem took when he got an e-mail from a fellow employee requesting an increase in the storage size of his e-mail inbox. Also, he showed me how to assign distribution groups and security groups in order to easily the employees accounts on the server.

Aside from the mailing features that I just mentioned, there was a networking aspect that I was exposed to that I found to be very interesting. This was the ability to access other computers on the network from Mr. Saleem's laptop to resolve issues without having the need to personally go to the person's computer. He was able to navigate through other computers as if it was his own, and he managed to do this by using DHCP (Dynamic Host Configuration Protocol). On many instances, I watched as Mr. Saleem opened up the desktops of other computers that were connected to the network; address the problems that the users of those computers were facing by adjusting the appropriate settings. While I was unable to perform any of the tasks that I witness, due to privacy and security issues, it was still extremely interesting to observe.

Next on the agenda was the actual main duty of the support team, and that was to troubleshoot and fix any and all problems the employees would face during their day to day usages of their computers. I'd like to note that because IITC is under OHI, and there are many other company's under OHI, the support team was not only limited to supporting IITC with its technical expertise, but also the companies that were within the close vicinity. Some of these companies included: Eihab Travels, Budget Rent A Car, Software Systems, OHI Electronics and the OHI Telecommunications company.

So while I was with the support team, we would receive calls from employees from the other companies on a regular basis, and while we tried most of the time to resolve the issue to the best of our abilities over the phone, sometimes it would not be possible and we'd have to take a trip down to the department/company in order to address the problem personally. Most of these issues involved internet connectivity problems that were easily fixed by adjusting the Internet Protocol (IP). Other times we had to install missing software onto the computers. While most of the calls were regarding basic issues that were easily solvable, there was a certain common complaint that we started to receive from multiple companies and departments. This issue lasted for days and caused a reasonable amount of inconvenience to the employees affected. The issue was that certain domains on the network were unable to communicate with their partner companies and domains, and at the time that the issue had risen, we were uncertain were the problem was coming from, whether it was from the service provider (Omantel) or if it was an internal malfunction with the network settings.

Once again, because I was very inexperienced with the structure of the network, I was unable to provide much assistance, but I did do my best to keep track on the progress of the investigation that was being commenced in order to find the root of the problem. Mr. Saleem was the man in charge of finding out what happened, and after a few phone calls to Omantel, describing the situation at hand; they assured him that there was no fault from their end, and that if there was a malfunction, it had to have been generated internally. It was only after further investigation into the matter, that Mr. Saleem was able to pinpoint the problem and fix it. It seemed that when the company decided to upgrade the operating system that was being used in the server, it somehow caused the server to change the address ID for the affected domains, and because of that, those domains were unable to accurately send or receive data.

One of the other tasks that I helped the support team with that during this one instance where we got a call from Mr. Eihab's residence (Mr. Eihab being the owner of the Eihab Travels company) and we were requested to pay a visit to his house of residence to solve an issue with his wireless network. While the support team doesn't usually cater to the personal needs of employees, there is a certain group of high profile individuals that they do cater to, Mr. Eihab being one of them.

I was asked to attend this house call with Mr. Saleem to get some extra experience, and after arriving at Mr. Eihab's house, we quickly got to work. We checked the connection from the server provider, which, as we found out, wasn't the problem. What we discovered was that if we were to connect a laptop to the modem via a LAN cable, the internet would work fine, but if we connected it via wireless, the laptop would not detect an internet connection. So after inspecting the settings, we discovered that the IP settings were incorrectly set, and after adjusting it to its proper settings, the wireless worked just fine.

The final portion of my internship days at IITC involved me working very closely with the server racks. These server racks consisted mainly of different models of the HP ProLiant Server products, they also contained many storage units that would hold the company's e-mails and important back-up data. And my first task that involved these server racks required me to assist with the retrieval of the aforementioned back up data. It seems that at the start of every week, Mr. Saleem would be required to go into the server room, and exchange the storage units that were currently installed into the servers with brand new ones, and on two different occasions, I was there to witness the procedure and steps that were involved in making this exchange.

Firstly, it is required of the person that wishes to retrieve the back-up data to sign into a log book as soon as he/she enters the server room. In the log book, the person is required to write down the time, his/her name, job title and his/her reason for being in the server room. This way, if there was a sudden malfunction with any of the server components, they would check the log book and will be able to determine the last person that came in contact with the servers.

Subsequently, the person will have to safely disengage the back-up storage units from the servers by using a laptop that's provided in the server room. After disengaging the storage unit, he then carefully places it in a container that houses all the other back-up data. And he does this only after writing down the unique code on each of the storage units, the new ones and the ones that

just got replaced. Also, another important piece of information that I learned during my trips down to the server room was the proper method of maintaining a server room, and the importance of keeping the server as cool as possible.

One of the essential points to keep in mind is that the servers can get extremely hot and it may overheat, and the cooling system on the server blades will usually not be enough to keep them at a cool and appropriate temperature, especially when you have a couple of server blades on top of each other in the server rack. So a powerful air conditioner is required to be running at all times to keep the servers from overheating. General recommendations state that you should not go below 10°C (50°F) or above 28°C (82°F). Also, a good point to keep in mind is how to deal with a fire, if it were to break out in the server room. Obviously, using a sprinkler system would not be the best options, so non-water based fire suppressants would be ideal for this situation.

One of the final tasks that were appointed to me while I was at IITC involved addressing an issue with a malfunctioned HP Proliant DL380. The obvious problem was that the server blade was unresponsive to any external power and it up to me to figure out the reason.

Right at the start, I had a feeling that the issue was with the motherboard of the server. I believed that it had somehow malfunctioned, possibly due to overheating. So my next step was to test out my assumptions, and I did that by taking another HP Proliant DL380 that was in perfect working condition and I began to dismantle it. I took the two servers apart to extract the motherboards from them, and then I carried out a delicate switch where I put the motherboard from the malfunctioning DL380 and put it into the working one, and vice versa. And after doing that, I connected the DL380 to a power outlet and found that the motherboard that came from the functioning DL380 was working just fine, as opposed to the other one that would not work even after moving it. As a result of that, I was able to prove my initial assumption and confirmed that the problem was indeed with the motherboard.

The final task that was assigned to me during my stay at IITC required me to install an operating system on a brand new HP Proliant DL380 that had been shipped to the company. Specifically speaking, the operating system that I had to install was Microsoft Windows 2008 Enterprise and I was asked to configure it as per the company's requirements.

Windows Server 2008 is built from the same code base as Windows Vista; therefore, it shares much of the same architecture and functionality. Since the code base is common, it automatically comes with most of the technical, security, management and administrative features new to Windows Vista such as the rewritten networking stack (native IPv6, native wireless, speed and security improvements); improved image-based installation, deployment and recovery; improved diagnostics, monitoring, event logging and reporting tools. Due to the new improved-image based installation, the task itself was not as difficult to complete as it otherwise would have been, but I still had to ask for assistance when it came down to configuring the new operating system as some of the configuration settings were very detailed and had to be accurately inputted.

This concludes the tasks I performed while I was part of the hard working support team of IITC, and I would like to offer my thanks and gratitude one last time to everyone that helped me along the way, and to everyone that offered me any piece of new knowledge and that pushed me to broaden my horizon in any way possible. And even though my time here with the support team was over, it was surely not the end of my internship period. Beginning the following Saturday, I was moved to a different division of IITC, the Internet Division.

4.2 IITC Internet Division:

It was the 10th of July that I was sent to Internet Division of IITC to continue my internship, and it was on that day that I met with the man in charge, Mr. Ravi Chandran. After sitting with Mr. Ravi for a few minutes, I got a better idea of what exactly it was the Internet Division does and how they operate. It seems that it's in this division that they take care of all aspects of websites, from design and implementation to management and maintenance. Each member of the Internet Division is given a specific role to play, and they're required to be extremely precise while working due to the fact that all the members of the team depend highly on each other to accurately complete their own tasks.

All except for a Mr. Mohammed, who is the senior lead designer and was also my supervisor during the next five days. Mr. Mohammed was in charge of supervising the team, making sure that everyone was doing their parts as good as they possibly could, he'd also offer his assistance to his fellow colleagues whenever they'd ask him. Apart from supervising the rest of the team, he was also in charge of the actual design of the webpages and the implementation of links, animation and text.

It was truly an educational experience as Mr. Mohammed started to explain to me how the team gets started on a job. The division would accept requests from other companies or institutions, and these requests would usually require the team to redesign a website, fix certain bugs or create a website from scratch. The later one being the most common one, and its because of that fact, that Mr. Mohammed began to instruct me on how to create a website. From the tools used to create/edit images to the methods used to implement those images onto webpages.

Starting with the most commonly used graphics editing program available, Adobe Photoshop, I began learning the art behind image editing.

But before I could begin editing images and creating designs that could be potentially implemented in webpages, I first had to do a little research on the programs that I would be using, starting with Adobe Photoshop.

Photoshop has ties with other Adobe software for media editing, animation, and authoring. The .PSD (Photoshop Document), Photoshop's native format, stores an image with support for most imaging options available in Photoshop. These include layers with masks, color spaces, ICC profiles, transparency, text, alpha channels and spot colors, clipping paths, and duotone settings. This is in contrast to many other file formats (e.g. .EPS or .GIF) that restrict content to provide streamlined, predictable functionality.

Photoshop's popularity means that the .PSD format is widely used, and it is supported to some extent by most competing software. The .PSD file format can be exported to and from Adobe Illustrator, Adobe Premiere Pro, and After Effects, to make professional standard DVDs and provide non-linear editing and special effects services, such as backgrounds, textures, and so on, for television, film, and the Web. Photoshop is a pixel-based image editor, unlike programs such as Macromedia FreeHand (now defunct), Adobe Illustrator, Inkscape or CorelDraw, which are vector-based image editors.

After I learned what Adobe Photoshop was, it was time to start learning about the tools available in Photoshop to create, edit and manipulate images in any way I could imagine, and so I would like to explain some of the basic tools that are used in Photoshop, and what they do, please note that the letters in the parenthesis are the keyboard shortcuts :

- **Rectangular Marquee Tool (M):** Use this tool to make selections on your image, in a rectangular shape. This changes the area of your image that is affected by other tools or actions to be within the defined shape.
- **Lasso Tool (L):** Use this to draw selections in whatever shape you would like.
- **Magic Wand Tool (W):** Use this to select a color range. It will select the block of color, or transparency, based on wherever you click. In the Options Bar at the top, you can change the Tolerance to make your selections more/less precise.
- **Crop Tool (C):** The Crop Tool works similarly to the Rectangular Marquee tool. The difference is when you press the [Enter/Return] key, it crops your image to the size of the box. Any information that was on the outside of the box is now gone.
- **Slice Tool (K):** This is used mostly for building websites, or splitting up one image into smaller ones when saving out.

- **Healing Brush Tool (J):** This is a really useful tool. Mildly advanced. You can use this tool to repair scratches and specs and stuff like that on images. It works like the Brush tool (see below). You choose your cursor size, then holding the [Alt] key, you select a nice/clean area of your image. Let go of the [Alt] key and paint over the bad area. It basically copies the info from the first area to the second, in the form of the Brush tool. Only, at the end, it averages the information, so it blends.
- **Blur Tool (R):** Is used to blur the areas of the picture that you click and drag, while having this tool selected. The more you click and drag, the blurrier it gets.
- **Dodge Tool (O):** Is used to lighten whatever area you use it on.

I won't go into further details about the other tools that are available in Photoshop; it'll take far too long. But I have become familiar with a vast majority of the tools. After I got used to the tools, I was asked to create a few sample images using Photoshop and present them to Mr. Mohammed the next day as a sort of homework.

Once Mr. Mohammed was certain that I was able to use Photoshop, he showed me how he uses a tool in the program to cut up a single image into multiple smaller images to be used for the webpages. By using a tool called the Slice Tool (explained above), we're able to not only cut up the image into smaller pieces, but also save each piece in a separate file for easier uploading when we want to upload those images for the webpage.

After giving me a brief demonstration, I was introduced to a new program that is also extremely useful when designing a webpage, Adobe Flash, and as with the previous program that I learned, I needed to do a little research on it before I could start using it.

Adobe Flash (formerly Macromedia Flash) is a multimedia platform used to add animation, video, and interactivity to Web pages. Flash is frequently used for advertisements and games. More recently, it has been positioned as a tool for "Rich Internet Applications" ("RIAs").

Flash manipulates vector and raster graphics to provide animation of text, drawings, and still images. It supports bidirectional streaming of audio and video, and it can capture user input via mouse, keyboard, microphone, and camera. Flash contains an Object-oriented language called ActionScript.

After that, my supervisor demonstrated to me how it was possible to transfer images from Photoshop into Flash, to be created into an animated image that can be later used for websites. He also showed me a few webpages that were built completely using Flash files, and while they may not have as much depth and information, the interactivity of the Flash images were truly impressive.

Due to the lack of time, I didn't get much hands-on experience with Adobe Flash, but I didn't install the program onto my laptop and I'd experiment with the tools available whenever I'd find myself with some free time.

Next on the list was HTML. During my time in the Internet Division, I was introduced briefly to HTML coding, and how it's used to hold together practically everything we see on webpages. HTML (HyperText Markup Language) is a page layout language and since the time that HTML was first introduced around 1990, it has evolved through the years from a simple way to display and link documents on multiple types of computers to its current capabilities to support complex page layouts, embed streaming media, and support add-in languages such as JavaScript.

HTML uses a system of 'tags', which are bits of codes that define every type of element (from links to images) on a webpage. Tags are available to place images, creates tables, define the font used and many more. All these tags are marked by a set of opening (<) and closing (>) characters. For example, an <href> HTML tag used for buttons and links looks like this:

```
< a href = " page2.htm" > Page2 </a >
```

In this example, the user would only see an underlined *Page 2* link on the webpage. Clicking on the link would take the user to another page, specifically, one called page2.htm. Also, the link's text does not have to mirror the name of the page you are linking to.

What I also found to be extremely interesting is that web browsers, such as Internet Explorer and Mozilla Firefox, make it possible to take a peek at the HTML source code that's behind any webpage. This is great because it allows us to learn from what's already available on the net so that we can follow their example and create something similar on our webpage.

Towards the end of the week, Mr. Mohammed informed me that a request had come in from the Ministry of Tourism in Oman, and this request required the Internet Division team to redesign the Ministry's web page, to offer a few different formats to choose from while having the website available in both English and Arabic.

So I was asked to work on a few designs for the new website that would be potentially used in the final product, and because I was using the company's computer to create these designs, I, unfortunately, do not have them with me and I will not be able to add them in this report.

I used Photoshop tools to create the designs, and the team was very happy with my results, and because the project is still on-going, I am unaware if they decided to use my designs or not. Later on, I was asked, while under supervision, to create and edit modules on the website. As per requested, I added text, images and flash with the pre-determined information they had given to me.

On the last day of my internship period in the Internet Division, I was introduced to FTP (File Transfer Protocol). It seems that FTP is a standard network protocol used to copy a file from one host to another over a TCP/IP-based network, such as the Internet. FTP is built on a client-server architecture and utilizes separate control and data connections between the client and server. FTP users may authenticate themselves using a clear-text sign-in protocol but can connect anonymously if the server is configured to allow it. While I wasn't given any opportunities to receive any hands on experience with FTP, it was still extremely interesting to learn about.

In conclusion for this part of the report, I would like to thank Mr. Mohammed, for walking me through all the new tools and programs that I learned that week, Photoshop, Flash and an introduction to HTML coding. Mr. Ravi Chandran for giving me the opportunity to spend some of my internship time in his division, and the rest of the Internet Division team for helping me out whenever I got stuck with something. And while I didn't have a lot of tasks assigned to me during my time there, I certainly did learn a lot.

4.3 Software Systems LLC:

As I finally reach the last two weeks of my internship period with OHI, I became increasingly exciting, knowing that I'll be spending it with the company that specializes in software development and is considered to be one of the leading independent software services providers in the country.

As soon as I entered the SSL offices, I was told that Mr. Osama M Hanein requested to see me before I began any sort of work. Mr. Hanein was the manager at SSL and he wished to sit me through a quick interview before I started to get any work done. The questions he asked me were very general and focused mainly on my interests and the direction in which I'd like to take once I graduate from university, career-wise. I informed him that I was very much interested in software development and I would love it if I managed to get a position in such a company once I get my computer engineering degree. Before we were done, Mr. Hanein introduced me to Ms. Rajeena Joseph, and informed me that she'll be my supervisor during my time with SSL.

Ms. Joseph went on to explain to me the life-cycle of any and all projects that comes through SSL, this I showed in detail in chapter 3.3, therefore I will not go through it again. What I will go into detail on is the knowledge I gained while I was at SSL, once again, because I was there for only 10 days, it certainly was not enough time for me to become involved with a lot of the projects that were going on during the time that I was there. However I will try to explain, to the best of my capabilities, how far along I've advanced with SQL.

Allow me to clarify that my main task while I was at SSL, was to study and to do research on SQL, specifically Oracle9i SQL. Considering the software development team at SSL managed the data in their relational databases via Oracle SQL, I was required to become familiar with the commands, tools and capabilities of SQL so that I'll be able to use it in real time.

Furthermore, I was asked to prepare a report that consisted of all the commands I learnt and present it to my supervisor on the last day of my internship, so after a few days of research, I began to prepare the report. The report consisted of every command I learned, and examples with screenshots of the results to further clarify the uses of those commands in real time.

But before anything else, I'd like to explain what SQL is:

SQL (officially pronounced /,ɛskju:'ɛl/ like "S-Q-L" but often pronounced /'si:kwəl/ like "sequel"), often referred to as Structured Query Language, is a database computer language designed for managing data in relational database management systems (RDBMS), and originally based upon relational algebra. Its scope includes data insert, query, update and delete, schema creation and modification, and data access control. SQL was one of the first languages for Edgar F. Codd's relational model in his influential 1970 paper, "A Relational Model of Data for Large Shared Data Banks" and became the most widely used language for relational databases.^[A]

Next, I was required to become familiar with Oracle itself, and I found out that Oracle offers a comprehensive high-performance infrastructure for e-business. It also includes everything needed to develop, deploy, and manage Internet applications.

Benefits include:

- Scalability from departments to enterprise e-business sites
- Robust, reliable, available, secure architecture
- One development model, easy deployment options
- Leverage an organization's current skillset throughout the Oracle platform (including SQL, PL/SQL, Java, and XML)
- One management interface for all applications
- Industry standard technologies, no proprietary lock-in.

Next, I was introduced to the actual Oracle Server, where I learned that server supports both the relational and object relation models, and it extends the data modeling capabilities to support an object relational database model that brings object-oriented programming, complex data types, complex business objects, and full compatibility with the relational world.

Oracle9i can scale tens of thousands of concurrent users, support up to 512 petabytes of data (a petabyte is 1,000 terabytes), and can handle any type of data, including text, spatial, image, sound, video, and time series as well as traditional structured data.

The following is the ‘System Development Life Cycle’; this is a systematic approach to database development that’s capable of transforming business information requirements into an operational database.

- **Strategy and Analysis:** Study and analyze the business requirements. Interview users and managers to identify the information requirements. Incorporate the enterprise and application mission statements as well as any future system specifications. Build models of the system. Transfer the business narrative into a graphical representation of business information needs and rules. Confirm and refine the model with the analysts and experts.
- **Design:** Design the database based on the model developed in the strategy and analysis phase.
- **Build and Document:** Build the prototype system. Write and execute the commands to create the tables and supporting objects for the database. Develop user documentation, Help text, and operations manuals to support the use and operation of the system.
- **Transition:** Refine the prototype. Move an application into production with user acceptance testing, conversion of existing data, and parallel operations. Make any modifications required.
- **Production:** Roll out the system to the users. Operate the production system. Monitor its performance, and enhance and refine the system if needed.

Now that I’ve explained what Oracle is, I’d like to go into further details about Relational Databases and also Entity-Relationship Models before I get into the Oracle SQL commands that I’ve learned during my time at SSL.

A relational database uses relations or two-dimensional tables to store information. For example, you might want to store information about all the employees in your company. In a relational database, you create several tables to store different pieces of information about your employees, such as an employee table, a department table, and a salary table.

An entity relationship (ER) model is an illustration of various entities in a business and the relationships between them. An ER model is derived from business specifications or narratives and built during the analysis phase of the system development life cycle. ER models separate the information required by a business from the activities performed within a business. Although

businesses can change their activities, the type of information tends to remain constant. Therefore, the data structures also tend to be constant.

Also, ER Models are consisted of three different components:

- **Entity:** A thing of significance about which information needs to be known. Examples are departments, employees, and orders.
- **Attribute:** Something that describes or qualifies an entity. For example, for the employee entity, the attributes would be the employee number, name, job title, hire date, department number, and so on. Each of the attributes is either required or optional. This state is called *optionality*.
- **Relationship:** A named association between entities showing optionality and degree. Examples are employees and departments, and orders and items.

Now that I've finished explaining the basic concept of Oracle9i SQL, I'll try to explain a bit of the commands that I've learned. I'll try to list most, if not all, of the commands that I worked with. Afterwards, I'll provide a brief explanation of some of the more interesting commands along with a few examples to further clarify their uses.

The following are all of the commands that I've become familiar with:

- TO_CHAR
- NVL
- NVL2
- NULLIF
- COALSECE
- CASE
- DECODE
- TO_DATE
- LOWER
- UPPER
- INITCAP
- CONCAT

- SUBSTR
- LPAD
- RPAD
- INSTR
- LENGTH
- DEFINE

In addition to those commands, I've also become aware of GROUPING and HAVING clauses, as well as Joins (equijoins, non-equijoins, outer joins and Cartesian products). Also, I was introduced to analytical functions and groups within groups.

I've chosen the following commands to explain in further details, along with examples and solutions to the example questions to further clarify its uses: NVL2, CASE, INSTR, COALSECE and TO_CHAR.

- **NVL2:** Is a command used check whether or not an expression contains a NULL value, if it does, then it'll return a predetermined expression, and if it doesn't contain a NULL value, it'll return a different expression.

For example, if we wanted to show all the employees in a company, and indicate with a 'Yes' or a 'No' whether or not they receive a commission, we'd use this code [2].

The previous code will display the last name of the employee, his/her salary and an extra field that would show a 'No' if the commission field is null, otherwise it'll show a 'Yes'.

- **CASE:** The CASE expression allows us to use IF-THEN-ELSE logic without having to invoke procedure. When the CASE expression is implemented, SQL looks for the first WHEN ... THEN pair for which expression is equal to comparison_expr and returns return_expr. If none of the WHEN ... THEN meet their conditions, then an ELSE clause exists and will be used.

Let's say that we would like to increase everyone's salary by a certain amount, and the increase is salary is dependent on their current job position, according to the following:

ACCOUNT → +\$1000,

ASST → +\$800

VP → +\$600,

PROG → +\$400

REP → +\$200

We'll use this code [3].

The previous code will show display the employees ID number, last name, salary and in a new column, their increase in salary.

- **INSTR:** Allows us to return the numeric position of the named string. And is considered one of the character manipulation functions.

The INSTR is a fairly simple function to use. For example, if we wanted to find and display the numeric location of the letter 'A' in the employees last names, we'd use this code [4].

```
SELECT      EMPLOYEE_ID,      LAST_NAME,      INSTR(LAST_NAME,      'a')
FROM EMPLOYEES
```

- **COALESCE:** The Coalesce function can take many arguments, and what it does is it checks the 1st expression to see if it contains a NULL, and if it doesn't, then the function will display that expression and exit, otherwise it'll move onto the next expression. Now, if the 2nd expression doesn't contain a NULL, the function will print that and exit, but if it does contain a null, the function will move on to the next expression, and so on.

In this code [5], we use to the coalesce function to see if the employee receives a commission or no. For those employees that do receive commission, the commission percentage is shown; otherwise it'll show their salary.

- **TO_CHAR:** Converts a number or date value to a 'variable-character' character string with a format model.

In this code [6], I show how it's possible to change the default format of DD-MM-YY into one that is user specified.

Towards the end of my internship period here at SSL, I went ahead and finalized my report and presented it to my supervisor, Ms. Joseph, and needless to say that she was very happy with the information that I gathered and added to my own. After that, I was asked to solve a few questions that were a bit more advanced than what I was used to, roughly 30 questions were given to me and I solved them all in a timely manner and presented back to my supervisor right before my last day was over, the following appendices show some of the questions solved along with a screenshot of the corresponding SQL answer code [7]-[20].

To narrow it down, though I didn't have any actual jobs to perform, I did manage to attain a lot of knowledge and I achieved much. Amongst my achievements that I've accomplished while I was here at SSL were:

- Becoming familiar with DBMS.
- Gained intensive knowledge on Oracle9i SQL.
- Introduced to the Software Development Life Cycle
- Prepared and presented a detailed report on numerous commands and functions of Oracle9i SQL.
- Solved an extensive amount of SQL-related questions as proof of my knowledge.

And in the end, I would like to thank the SSL department for giving me this great opportunity, Ms. Rajeena Joseph for giving me the tools needed to further broaden my knowledge and Mr. Hanein for allowing me to spend the last 10 days of the internship in Software Systems LLC.

5. Conclusion:

At the end of this report, I would simply like to share a brief summary of, what I believed to be, the most interesting pieces of information that I attained while being part of OHI for 30 days.

The first 15 days I spent with the IITC support team was extremely interesting, it was there that I learned all about networking basics (from DNS, DHCP, Active Directory and Domain Controllers to Distribution Groups, Security Groups and Mail Functioning) and was given an opportunity to closely study servers and server racks. And due to that, I was able to learn about the servers' assembly, composition and the OS that runs it all. Also, another bit of information that I found to be very useful is the proper method of maintaining a server room, and maintaining it in such a way in order to prevent overheating and electrical fires.

Once again, I would simply like to offer my gratitude towards all the members that helped me along the way. Mr. Saleem, for being there for me every step of the way, Mr. Jijil, for assisting whenever he felt like I could use the extra help and Mr. Gajinder Shakma, for allowing me to spend those 15 days with him and his support team.

For the next 5 days of my internship period, I spent it at the exceptionally creative side of IITC, the Internet Division. And it was here that I learned everything I needed to know about the creation of WebPages, from the basic design and layout using programs, such as Adobe Photoshop and Adobe Flash, to the implementation of the WebPages using software such as Microsoft FrontPage and the usage of HTML to further glue the components of the Webpage together.

At this point, I would like to offer my thanks to Mr. Ravi Chandran, that gave me the opportunity to spend some time in his division, and gave me the chance to learn about web design and management. I'd also like to offer my thanks to Mr. Mohammed that walked me through all the steps and taught me all the tools that I now know.

Finally, for the last 10 days of my internship period, I had the great honor of spending it with the software development team over at SSL, where I learned all about the software development life

cycle, and where I gained intensive knowledge of Oracle9i SQL by doing plenty of research and solving multiple example questions that helped to further clarify the uses of the functions and commands that I learned.

In the end, I would like to offer my deepest gratitude towards Mr. Hanein, head of SSL, for giving me the chance to sit in SSL for the last ten days of my of internship. And Ms. Rajeena Joseph, for showing me the ropes when it came to SQL and helped me along whenever I needed light to be shed on the situation I was facing problems with.

There is one other person I'd like to offer my great appreciation towards. Mr. Behram Devecha, CO of OHI, without his consideration and approval, none of this would have been possible.

6. References:

[A] <http://en.wikipedia.org/wiki/SQL>

7. Appendix

[1]



[2]

```
1 SELECT LAST_NAME, SALARY,  
2 NUL2(COMMISSION_PCT, 'YES','NO') "Commission ?"  
3* FROM EMPLOYEES  
SQL> /
```

LAST_NAME	SALARY	Com
Zlotkey	10500	YES
Tucker	10000	YES
Bernstein	9500	YES
Hall	9000	YES
Olsen	8000	YES

[3]

```
SQL> SELECT EMPLOYEE_ID, LAST_NAME, SALARY, JOB_ID,  
2 CASE JOB_ID WHEN 'AS_ACCOUNT' THEN SALARY+1000  
3           WHEN 'AD_ASST' THEN SALARY+800  
4           WHEN 'AD_UP' THEN SALARY+600  
5           WHEN 'IT_PROG' THEN SALARY+400  
6           WHEN 'PR_REP' THEN SALARY+200  
7           ELSE SALARY END "New Salary"  
8 FROM EMPLOYEES  
9 WHERE JOB_ID IN ('AS_ACCOUNT', 'AD_ASST', 'IT_PROG', 'PR_REP', 'AD_UP');
```

EMPLOYEE_ID	LAST_NAME	SALARY	JOB_ID	New Salary
200	Whalen	4400	AD_ASST	5200
204	Baer	10000	PR_REP	10200
101	Kochhar	17000	AD_UP	17600
102	De Haan	17000	AD_UP	17600
103	Hunold	9000	IT_PROG	9400
104	Ernst	6000	IT_PROG	6400
105	Austin	4800	IT_PROG	5200
106	Pataballa	4800	IT_PROG	5200
107	Lorentz	4200	IT_PROG	4600

9 rows selected.

[4]

```
1 SELECT LAST_NAME, INSTR (LAST_NAME, 'a') AS "Position of A", JOB_ID  
2  
3 FROM EMPLOYEES
```

```
SQL> /  
LAST_NAME          Position of A  
-----          -  
Taylor              2  
  
Fleur              4
```

[5]

```
SQL> SELECT last_name,  
2 COALESCE(commission_pct, salary, 10) comm  
3 FROM employees  
4 ORDER BY commission_pct;
```

[6]

```
1 SELECT EMPLOYEE_ID, HIRE_DATE, TO_CHAR(HIRE_DATE, 'DD/MM') "New Format"  
2* FROM EMPLOYEES  
SQL> /
```

EMPLOYEE_ID	HIRE_DATE	New F
149	29-JAN-00	29/01
150	30-JAN-97	30/01
151	24-MAR-97	24/03

[7] Display the employee numbers, last names, and salaries of all employees who earn more than the average salary and who work in a department with any employee with a *u* in their name.

```
1 SELECT EMPLOYEE_ID, LAST_NAME, SALARY  
2 FROM EMPLOYEES  
3 WHERE SALARY > (SELECT AVG(SALARY)  
4 FROM EMPLOYEES  
5 WHERE DEPARTMENT_ID = ANY(SELECT DEPARTMENT_ID  
6 FROM EMPLOYEES  
7* WHERE LAST_NAME LIKE '%u%'))  
SQL> /
```

EMPLOYEE_ID	LAST_NAME	SALARY
149	Zlotkey	10500
150	Tucker	10000
151	Bernstein	9500
152	Hall	9000
153	Olsen	8000
154	Cambault	7500
155	Tuvault	7000

[8] Display the last name and salary of every employee who reports to King.

```
1 SELECT LAST_NAME, SALARY
2 FROM EMPLOYEES
3 WHERE MANAGER_ID = ANY ( SELECT EMPLOYEE_ID
4                           FROM EMPLOYEES
5*                          WHERE LAST_NAME = 'King')
SQL> /
```

LAST_NAME	SALARY
Zlotkey	10500
Hartstein	13000
Kochhar	17000
De Haan	17000
Raphaely	11000

[9] Display the department number, last name, and job ID for every employee in the Executive department.

```
SQL> SELECT DEPARTMENT_ID, LAST_NAME, JOB_ID
2 FROM EMPLOYEES
3 WHERE DEPARTMENT_ID = (SELECT DEPARTMENT_ID
4                         FROM DEPARTMENTS
5                         WHERE DEPARTMENT_NAME = 'Executive')
6 ;
```

DEPARTMENT_ID	LAST_NAME	JOB_ID
90	King	AD_PRES
90	Kochhar	AD_UP
90	De Haan	AD_UP

[10] Create an anniversary overview based on the hire date of the employees. Sort the anniversaries in ascending order.

```
1 SELECT LAST_NAME, TO_CHAR(HIRE_DATE, 'DD Month') AS "Birthday"
2 FROM EMPLOYEES
3* ORDER BY TO_CHAR(HIRE_DATE, 'Month'), TO_CHAR(HIRE_DATE, 'DD')
SQL> /
```

LAST_NAME	Birthday
Patel	06 April
Fripp	10 April
Olson	10 April
Banda	21 April
Kumar	21 April

[11] Show the department number and the lowest salary of the department with the highest average salary.

```
1 SELECT DEPARTMENT_ID, MIN(SALARY)
2 FROM EMPLOYEES
3 GROUP BY DEPARTMENT_ID
4 HAVING AVG(SALARY) = ( SELECT MAX(AVG(SALARY))
5     FROM EMPLOYEES
6*      GROUP BY DEPARTMENT_ID)
SQL> /
```

DEPARTMENT_ID	MIN(SALARY)
90	17000

[12] Show all employees who have managers with a salary higher than \$15,000. Show the following data: employee name, manager name, manager salary, and salary grade of the manager.

```
1 SELECT E.LAST_NAME, M.LAST_NAME, M.SALARY
2 FROM EMPLOYEES E, EMPLOYEES M
3 WHERE M.EMPLOYEE_ID = E.MANAGER_ID
4* AND M.SALARY > 15000
SQL> /
```

LAST_NAME	LAST_NAME	SALARY
Zlotkey	King	24000
Hartstein	King	24000
De Haan	King	24000
Weiss	King	24000
Raphaely	King	24000
Kochhar	King	24000

[13] Show the department number and name, and the number of employees working in each department that:

a. Has fewer than three employees:

```
1 SELECT D.DEPARTMENT_ID, D.DEPARTMENT_NAME, COUNT(E.EMPLOYEE_ID)
2 FROM EMPLOYEES E, DEPARTMENTS D
3 WHERE D.DEPARTMENT_ID = E.DEPARTMENT_ID
4 GROUP BY D.DEPARTMENT_ID, D.DEPARTMENT_NAME
5* HAVING COUNT(*) < 3
SQL> /
```

DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(E.EMPLOYEE_ID)
10	Administration	1
20	Marketing	2
40	Human Resources	1
70	Public Relations	1
110	Accounting	2

b. Has the highest number of employees:

```
1 SELECT D.DEPARTMENT_ID, D.DEPARTMENT_NAME, COUNT(E.EMPLOYEE_ID)
2 FROM EMPLOYEES E, DEPARTMENTS D
3 WHERE E.DEPARTMENT_ID = D.DEPARTMENT_ID
4 GROUP BY D.DEPARTMENT_ID, D.DEPARTMENT_NAME
5 HAVING COUNT(*) = (SELECT MAX(COUNT(*))
6 FROM EMPLOYEES
7* GROUP BY DEPARTMENT_ID)
SQL> /
```

DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(E.EMPLOYEE_ID)
50	Shipping	45

c. Has the lowest number of employees:

```
1 SELECT D.DEPARTMENT_ID, D.DEPARTMENT_NAME, COUNT(E.EMPLOYEE_ID)
2 FROM EMPLOYEES E, DEPARTMENTS D
3 WHERE E.DEPARTMENT_ID = D.DEPARTMENT_ID
4 GROUP BY D.DEPARTMENT_ID, D.DEPARTMENT_NAME
5 HAVING COUNT(*) = (SELECT MIN(COUNT(*))
6                     FROM EMPLOYEES
7*                    GROUP BY DEPARTMENT_ID)
SQL> /
```

DEPARTMENT_ID	DEPARTMENT_NAME	COUNT(E.EMPLOYEE_ID)
10	Administration	1
40	Human Resources	1
70	Public Relations	1

[14] Show the employee number, last name, salary, department number, and the average salary in their department for all employees.

```
1 SELECT E.EMPLOYEE_ID, E.LAST_NAME, E.DEPARTMENT_ID, AVG(S.SALARY)
2 FROM EMPLOYEES E, EMPLOYEES S
3 WHERE E.DEPARTMENT_ID = S.DEPARTMENT_ID
4* GROUP BY E.DEPARTMENT_ID, E.EMPLOYEE_ID, E.LAST_NAME
SQL> /
```

EMPLOYEE_ID	LAST_NAME	DEPARTMENT_ID	AVG(S.SALARY)
200	Whalen	10	4400
201	Hartstein	20	9500
202	Fay	20	9500
114	Raphaely	30	4150
115	Khoo	30	4150

[15] Show all employees who were hired on the day of the week on which the highest number of employees were hired.

```

1 SELECT LAST_NAME, TO_CHAR (HIRE_DATE, 'Day') day
2 FROM EMPLOYEES
3 WHERE TO_CHAR(HIRE_DATE, 'Day') = (SELECT TO_CHAR(HIRE_DATE, 'Day')
4                                     FROM EMPLOYEES
5                                     GROUP BY TO_CHAR(HIRE_DATE, 'Day')
6                                     HAVING COUNT(*) = (SELECT MAX(COUNT(*))
7                                                         FROM EMPLOYEES
8                                                         GROUP BY TO_CHAR(HIRE_DATE, 'Day'))
SQL>
SQL> /

```

LAST_NAME	DAY
Hall	Wednesday
Cambrault	Wednesday
Lee	Wednesday
Bates	Wednesday
Hutton	Wednesday
Dellinger	Wednesday
Dilly	Wednesday

[16] Write a compound query to produce a list of employees showing raise percentages, employee IDs, and old salary and new salary increase. Employees in departments 10, 50, and 110 are given a 5% raise, employees in department 60 are given a 10% raise, employees in departments 20 and 80 are given a 15% raise, and employees in department 90 are not given a raise.

```

1 SELECT CASE WHEN DEPARTMENT_ID IN (10,50,110) THEN '05% raise'
2           WHEN DEPARTMENT_ID IN (60) THEN '10% raise'
3           WHEN DEPARTMENT_ID IN (20,80) THEN '15% raise'
4           ELSE 'No raise' END AS "Raise",
5 EMPLOYEE_ID,
6 SALARY,
7 CASE WHEN DEPARTMENT_ID IN (10,50,110) THEN ((SALARY*1.05)-SALARY)
8       WHEN DEPARTMENT_ID IN (60) THEN ((SALARY*1.10)-SALARY)
9       WHEN DEPARTMENT_ID IN (20,80) THEN ((SALARY*1.15)-SALARY)
10      ELSE SALARY END AS "New Salary"
11 FROM EMPLOYEES
12 WHERE DEPARTMENT_ID IN (10,20,50,80,110,90)
13* ORDER BY "Raise"
SQL> /

```

Raise	EMPLOYEE_ID	SALARY	New Salary
05% raise	180	3200	160
05% raise	181	3100	155
05% raise	182	2500	125
05% raise	183	2800	140
05% raise	187	3000	150
05% raise	189	3600	180
05% raise	191	2500	125
05% raise	193	3900	195

[17] Display the last name, department number, and job ID of all employees whose department location ID is 1700.

```
1 SELECT LAST_NAME, DEPARTMENT_ID, JOB_ID
2 FROM EMPLOYEES
3 WHERE DEPARTMENT_ID = ANY (SELECT DEPARTMENT_ID
4 FROM DEPARTMENTS
5* WHERE LOCATION_ID = 1700)
SQL> /
```

LAST_NAME	DEPARTMENT_ID	JOB_ID
Whalen	10	AD_ASST
Raphaely	30	PU_MAN
Tobias	30	PU_CLERK
Colmenares	30	PU_CLERK
Himuro	30	PU_CLERK

[18] Write a query to display the last name and hire date of any employee in the same department as Zlotkey. Exclude Zlotkey.

```
1 SELECT LAST_NAME, HIRE_DATE
2 FROM EMPLOYEES
3 WHERE DEPARTMENT_ID = (SELECT DEPARTMENT_ID
4 FROM EMPLOYEES
5 WHERE LAST_NAME = 'Zlotkey')
6* AND LAST_NAME ^= 'Zlotkey'
SQL> /
```

LAST_NAME	HIRE_DATE
Tucker	30-JAN-97
Bernstein	24-MAR-97
Hall	20-AUG-97
Olsen	30-MAR-98
Cambrault	09-DEC-98
Tuvault	23-NOV-99

[19] Show the department number, name, number of employees, and average salary of all departments, together with the names, salaries, and jobs of the employees working in each department.

```

1 SELECT d.department_id, d.department_name,
2 count(e1.employee_id) employees,
3 NVL(TO_CHAR(AVG(e1.salary), '99999.99'),
4 'No average' ) avg_sal,
5 e2.last_name, e2.salary, e2.job_id
6 FROM departments d, employees e1, employees e2
7 WHERE d.department_id = e1.department_id(+)
8 AND d.department_id = e2.department_id(+)
9 GROUP BY d.department_id, d.department_name,
10 e2.last_name, e2.salary, e2.job_id
11* ORDER BY d.department_id, employees
SQL> /

```

DEPARTMENT_ID	DEPARTMENT_NAME	EMPLOYEES	AUG_SAL
10	Administration	1	4400.00
20	Marketing	2	9500.00
20	Marketing	2	9500.00

LAST_NAME	SALARY	JOB_ID
Whalen	4400	AD_ASST
Fay	6000	MK_REP
Hartstein	13000	MK_MAN