Internship with

JPMorganChase

(Summer 2006)

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ISE 488
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ISE 488 – Internship at JPMorganChase (Summer 2006)

Introduction

My role during my internship at JPMorgan Chase, most likely resembled that of a “project manager” where I managed several high scope projects along with working hands-on on most of these assigned projects. I was placed under the GTI (Global Technology Infrastructure) GNS (Global Network Services) division where at first I was supporting the wholesale Lines of Business (LoB). Here I learnt how each LoB GTI dealt with multiple LoBs including:

i. Corporate Administrative Systems {CAS}

ii. Investment Bank {IB}

iii. IT Risk Management {ITRM}

iv. Asset and Wealth Management {AWM}

v. Treasury & Securities Services {TSS}

During the 10 weeks of my internship, I was given several projects, which often ranged from assembling and configuring Cisco switches/routers, to assisting in the validation of budgets for projects ranging from $10,000 to $3 Million dollars. There were days where I constantly worked on 4 to 5 different projects a day and got a great sense of pride when I completed these projects on time and sometimes even beating the deadline. My aim was to complete my assigned projects as quickly as possible so that I could be involved with as many projects as possible during my internship. Therefore my learning curve was constantly on the rise.
My managers gave me adequate information to complete my assigned projects. Under their guidance and support, I thrived in this fast-paced environment and they were very satisfied with my output. They showed their confidence in me by agreeing to extend my internship an additional three weeks.

To manage projects I often depended upon the utilization of 4Box (Figure 1) and the Red, Amber and Green {RAG} (Figure 2) reports. These generated reports allowed me to visually see which direction a project was going and if it ran into any problems or issues, I addressed them in a timely manner to prevent any direct impact within JPMC.

![Figure 1: 4Box Report](image)
The experience I received as a project manager exposed me to projects which were extremely complicated, time consuming, and technically advanced. Managing multiple projects, learning about emerging technology and updating myself with current technology was a great hand on learning experience. I worked on four projects which covered Telephony Integration, Datacenter Technology, Networking Design, Disaster Recovery and Network Security, Financial and Resource Management.

Figure 2: Red, Amber and Green Report

*Note: All text within the 4box and the RAGs report was deleted due to proprietary nature of the projects*
1. **ACD – Automatic Call Distributors**

One of the projects that I worked on was to aid in the design and deployment of Automatic Call Distributors (ACD) which also taught me how to effectively manage a project through various stages of its deployment. An ACD is a telephone facility that manages incoming calls and handles them based on the number called and an associated database of handling instructions. Many companies that offer sales and service support use ACDs to validate callers for making outgoing responses or calls, forward calls to the right party, allow callers to record messages, gather usage statistics, balance the use of phone lines, and provide other services. ACDs often provide some form of Automatic Customer/Caller Identification (ACIS) such as that provided by Direct Inward Dialing (DID), Dialed Number Identification Service (DNIS), or Automatic Number Identification (ANI).

ACD software provides the ability for calls to be directed to one of multiple telephone numbers/employees and since this software resides on the switch, it can easily be programmed to perform various functions. The Call Management System (CMS) software, which runs from a server, monitors the operation and collects data directly from the switch. As mentioned above, the features and benefits of using ACD on a switch are:

- Extremely flexible
- Effective for larger call center operations or small intimate teams
- Routes calls to least busy person
- Routes calls to first available person
- Easily transfers calls to a requested person
- Offers clients a choice to hold for team member or leave a voice mail
- Can offer clients a choice for the direction of the call
- Free seating

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1 Automatic Call Distributor - http://searchcrm.techtarget.com/sDefinition/0,,sid11_gci213755,00.html
✓ Manage call flow
✓ Real-time monitoring
✓ Historical data (MIS)
✓ Analyze call flows
✓ Improved service standards
✓ Announcements
✓ Client identification through coding
✓ Call forwarding capabilities for Disaster Recovery

The deployment of the ACD’s was done at 3 Chase MetroTech Center, Brooklyn where the ACD software is connected to a switch which controls a Private Branch Exchange (PBX). PBX is basically a number of phone numbers/lines purchased by the bank. Example of a PBXs used by 3 CMC is the 254 and the 242 exchanges.

My approach to complete this project was as follows:

1. I had to analyze the situation to see how many users would get affected by the upgrade, what equipment would be needed and how the new equipment would get integrated within a data center.

2. I assembled a team of experts who could help me create a project scope for this project.

3. Lastly, I gathered information on the equipment we would be using and helped planning the budget which was based on cost of the equipment first and then on the labor that was needed to deploy the equipment. The equipment we decided to deploy for this was the Callmaster 4 which was purchased from Avaya and Renewtel.

After several weeks of meetings and fine tuning the project scope, I was able to determine if the project could progress from the design stage to the development and finally reaching the implementation stage.
2. **GDNRP - Global Data Network Refresh Project**

The Global Data Network Refresh Project (GDNRP) is an initiative sponsored by JPMorgan Chase’s CEO Jamie Dimon which involved upgrading all existing network appliances in strategic locations. One of these locations is 4 Chase MetroTech Center located in Brooklyn. For this project, I was placed on a team which assessed the current technology present at 4 CMC and helped suggest new technology which could serve as an upgrade to the existing technology. I also worked with several other network engineers, facilities and real estate personnel to ensure that the non-IT infrastructure was sufficient for the newer equipment.

The technology currently being used at 4 CMC is a network closet with token ring connections (Figure 3) and to replace them within 4 CMC, the network engineering team decided to use the Cisco 6500 (Figure 4) family of switches as they could be configured both as switches or as routers providing JPMC with additional scalability, versatility, cost reduction and upgradeability. The Cisco 6500 switch series has a supervisor module which can be upgraded as a backplane from 32 GB/s to 720 GB/s as well has the ability to support L2 and L3 with full wire speed.

*Figure 3: Token Rings*  
*Figure 4: Cisco’s 6500 Series*
Apart from assessing the site for the upgrade, we also assembled the Cisco 6500 switches and then racked them at 4 CMC. When the racking of these switches took place, our non-IT infrastructure did not have adequate power or cooling which was necessary as each Cisco 6500 had two power supplies at 6000 Watts. To overcome the power and cooling problem, we met with the facilities team and came up with a strategy to provide adequate power and cooling to the closet. The solution was to decommission other outdated network appliances before the Cisco 6500 could be added.

The positive aspect to this was that the firm would not have to make any investment to bring additional power or cooling as they would run the network closet within their limits. However, the negative aspect to this was the time it took. The time frame to complete this project was often delayed as we had to make sure that users on particular floors were not being affected by the decommissioning and if they were, we had to devise a strategy to make sure that the users would not lose any network connectivity while the decommissioning was taking place.

Apart from the racking and stacking of the Cisco equipment I also evaluated new network security and maintenance appliances as they also needed to get upgraded. Some of the vendors which were getting evaluated are:

i) Trend Micro
ii) Niksun
iii) Juniper
iv) Network General
v) Barracuda
vi) McAfee
Each vendor had its own strengths and weakness as each provided a unique appliance. After product evaluation and on the request of the network engineering and security team, I arranged for product demonstrations by each company representative to showcase their products. However, due to NDA restrictions the vendor of choice selected can not be mentioned. Once the selected network security appliance was installed could be used to monitor networks, detect and hinder any network intrusions and prevent packet storming, safeguard the company’s assets by stopping any virus, spy ware attacks as well.

For this project, I also researched the existing security appliances within JPMorganChase and found answers to who, why, what and how questions. The generally asked questions were:

i. Who the vendor of choice for network security is?

ii. What makes their appliance suited for the financial industry?

iii. Why JPMorganChase should select a vendor who is unknown within a firm?

iv. How would a vendor’s appliance safeguard the assets belonging to JPMorganChase?

The more involved I got with this project, the more advanced and challenging it became. For example, from this project I learnt about DMZ, secureDMZ, ESF (Enterprise Server Farms), and secureESF zones from a data center perspective, response time taken by generating a system alert and sending it to a network administrator, network design schematics that prevented any disruption towards production servers and machines.

Having to complete this project in different cities and different states, was also a challenge as there was no way of physically verifying what equipment was to be
upgraded or to make sure that network closets had enough cooling and power. To overcome this hurdle we formed a “task-force” consisting of several network engineers and network administrators in different locations after a visit from my team members to assess the network infrastructure currently in place.

This “task-force” provided us with a list of all the outdated equipment along with the type of network environment housing the equipment was operating under. Based on this information GNS decided what equipment to use. A typical datacenter environment within JPMC is divided into core and a distribution data center. Within the distribution data center, a fiber or an OC 3 connection is pulled to provide network connectivity to the entire building. During the project any miscalculation could result in the loss of network connectivity within the building or have a production server go down which is why our schematics were examined several times before we could proceed with the upgrade.
3. **DR - Disaster Recovery**

As JPMorganChase is a financial institution it relies heavily on trading in its business. What would some of the consequences be if a disaster occurred, how much of a monetary loss would JPMC endure, how many clients would be affected by the disaster, what about the employees…these questions led to another project where I had to create a Business Continuity Plan also referred internally as the Business Resiliency Plan.

The objective of the Resiliency Plan is to identify the vital resource and actions required for the recovery of the business in the event of a disruption. Such information includes critical business processes and recovery procedures, technology equipment and inventory, geographical location of the recovery site, names and numbers of the key personnel, vendors and suppliers, and/or civil authorities. By identifying such information, the document helped by:

- Providing a high level of security and safety for JPMorgan Chase & Co. personnel.
- Minimizing the risk of delay in evacuation and/or setting up alternative business locations.
- Minimizing the time and process needed for decision-making.
- Assuring the resiliency of business or support processes, operations and technology components.
- Assuring the timely and orderly restoration of business activities in the event the existing environment is unavailable.
- Prioritizing the recovery of processes to meet recovery time objectives.
- Minimizing the impact to customers and protect the interest of the shareholders.
- Complying with requirements from the applicable regulatory requirements.

The continuity plan is a 55-page word document, which then is distributed to all the strategic buildings and to employees where GNS operates as each LoB within JPMC has its own version of the Business Resiliency Plan. For my team within GNS, these
locations included Brooklyn, Chicago, Tampa, New Jersey, California, Texas and New Hyde Park. This project was perhaps one of the most challenging of all the projects I had been assigned as every part of the document created was completely based on assumption rather than facts.

As stated previously, GNS uses this document to create awareness and protects its employees from a disaster. It shows the evacuation procedures and by making sure all the applications and servers are still available for employees to use by granting them access via a VPN connection from home or from the addressed recovery site, GNS makes sure that business is not interrupted. As soon as this plan was completed, it was sent to our division’s managing director who later approved it so employees could test it in two stages.

1. The first stage of testing was done with a small number of employees so if any problems arose at this first stage, finding a solution and updating the plan would be much easier.

2. The final stage involved testing of the plan in all locations, and gave us a real world scenario of the plans efficiency and one last chance to make sure that the execution of the plan was smooth and error free.
4. **BDAS – Broker Dealer Automated Systems**

JPMorgan is considered as the number one clearing bank for U.S. government securities, and clears over 100,000 trades daily and processes $1.2 trillion dollars a day and more than triple that volume during peak times. To expedite such high transaction volumes consistently, JPMorgan offers a dependable, rapid trade settlement system that moves book-entry deliveries within seconds to the Federal Reserve Bank of New York. BDAS is also another project on which I worked on. For this project, I assisted with the decommissioning of several dedicated connections thus saving JPMorgan and several other clients an estimated sum of $50,000 a month.

BDAS which is also known as Broker Dealer Automation System (BDAS), this system offers customers the level of automation required to expedite trades efficiently and accurately. Not only does BDAS facilitate quick turnaround, it also uses user-friendly commands to expedite the handling of exception items such as unmatched receives, DK’s and partial trades. It also provides end-of-day reports and a wide variety of intra-day queries and the ability to initiate funds transfers and book transfer payments. This system was to be upgraded from a point-to-point network system to a frame relay network due to the mandate given to the financial institutions by the Federal Reserve.

In a point-to-point network (Figure 5), a dedicated connection is used, so an originating message from one node could travel to one or more destination nodes, but not to every node on the network. Having a dedicated connection from carriers like AT&T, Verizon, Sprint or MCI, provides JPMorgan Chase with reliability for trade clearing. The negative impact of this is that the provided connections are extremely expensive and if a
carrier had any network congestion, they (i.e. carrier) could shut down the network connection for some time clearing out any network congestion.

JPMC clears trades for other financial institution such as Merrill-Lynch, Citigroup, DTCC (Depository Trust Company) and Lehman Brothers and having multiple dedicated connections by different carriers would be expensive.

![Figure 5: A typical point-to-point network](image)

A frame relay (Figure 6) on the other hand, is an efficient data transmission technique used to send digital information quickly and cheaply to one or many destinations from one or many end-points. Frame relays are commonly implemented for voice and data as an encapsulation technique, used between local area networks (LANs) over a wide area network (WAN).
Even though a frame relay would also use a dedicated connection and have additional security enhancements, the overall cost of running a frame relay is much cheaper than running a point-to-point network and provides five times the redundancy in an event of an outage.

Dealing with a sensitive information regarding trades, wire transfer of money security and durability becomes a gigantic issue. The mandate by the Federal Reserve is referred to as the “Fed White Paper”. This white paper, addressed the above issues and to be in compliance with the Federal Reserve, JPMorgan Chase moved from a point-to-point network towards a frame relay network.

Additionally, the security within the frame relay network was also enhanced by NAT-ting the IP Addresses, using four different levels of hardware encryption in addition with multiple layers of software encryption for all data traveling through the relay to prevent any information leak to the public or to the various competitors.
Conclusion

The 13 weeks of my internship with JPMorganChase have been very beneficial to me as it provided me with a better understanding of technology and work place issues. As an individual, this experience also expanded the way I look and analyze day to day tasks. I learnt about project risk mitigation and assessment, budgeting, process documentation, allocation of resources and other skills which could also be applied to my personal life.

My internship gave me a better understanding of software development life cycles (SDLC), system requirement analysis, user requirement gathering, network, network security, distributed and grid computing, database administration and technical writing which supplemented what I had learnt at Stony Brook University.

I got a chance to interact with international teams working on JPMC projects and saw first hand how projects are done / managed in today's global economy where a distributed work force is seamlessly integrated to deliver businesses value.

This internship gave me the chance to apply my textbook knowledge and understanding to real life problems in a business environment. I got the opportunity to interact and learn from an outstanding team of managers and professionals who were always eager to guide me as I tackled the work issues.

I learnt to be a better listener, and to analyze problems and assess different available options. Overall, it was an experience which greatly benefited me professionally and personally.
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