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IPConfigure

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1. Introduction

I decided to do an internship as a Steelfin Assembler at IPConfigure because I had connections there before I started working there and thought it was a good idea to use as my internship class because it had to deal with both the hardware and software side of computers. A Steelfin Assembler assembles surveillance servers from scratch every day and then will image them with Ubuntu and edit settings so it can be customized to what it needs to be for that order from the company that needs these servers built. I work with five other assemblers that are also in college at ODU. The primary learning objectives for this internship provided by my supervisor were to learn how to assemble surveillance servers from scratch, troubleshoot various issues with different computer components, and work in all aspects of the hardware production cycle, imaging, and configuration.

The first objective of this internship, learning to assemble surveillance servers from scratch was the very first thing I learned to do and was the thing that I did the most throughout the whole internship. This process was simpler then I thought it would be and consisted of assembling the motherboard as the first step and then putting that motherboard into the server chassis and wiring everything and screwing everything in. Then we would have to make sure everything works before we can get that server ready for racking and imaging. The second objective was to troubleshoot issues with the computer components. This objective wasn't as easy as the first because I'd have to figure out what was wrong and it wasn't always clear as to what was the issue. The third objective was to work in all aspects of the hardware production cycle, imaging, and configuration. This objective is pretty much just putting everything together in the end because it involves pretty much everything we do.

2. IPConfigure intro and Beginning of internship

IPConfigure is a security solutions company that sells cameras and servers using orchid software to make the user experience better and easier. The headquarters of IPConfigure is located in Norfolk, VA and was founded in 2003 by CEO Chris Uiterwyk who is a U.S. Navy

veteran. The goal of CEO Chris Uiterwyk was to modernize and simplify how video surveillance is delivered. IPConfigure has a sales team, marketing team, and support team that are able to communicate with customers and help them in any way they can. Some notable customers of IPConfigure include McDonalds, Family Dollar, Dollar Tree, Wawa, and Sephora. There are many other customers too including some school districts. These companies will order servers and sometimes cameras too from IPConfigure so they can better their surveillance systems. All orders from different companies have something different about them because their orders are based on the needs of that company's surveillance needs.

My introduction to IPConfigure was hearing about it from two of my friends that already worked there. I was able to apply because they had openings and my friends put in a good word for me, so I was able to obtain an interview. After a little bit of time passes by after I do my interview, I get an email that says to send potential work hours, so they know my availability because they want people who work a good amount of hours a week because at the time they only had four guys working there and only one of them worked every day during the week. A little while after that, I get another email saying that I got the job and was set to start on a certain date. My first day I met with HR and my supervisor and they showed me around the building and showed what I'd be doing and how I'd be spending my time there most days.

When I was getting trained for the first time, I thought assembling servers looked a little complicated and was a little worried I might not know what I'm doing, but I got the hang of it pretty quickly and it was a lot simpler than I thought. I was trained by multiple people depending on who was there when I was and when I had any questions, they would have no problem answering them and were very helpful to me. One of the hardest parts at the start was learning the different types of servers from each other and being able to figure out exactly where I put everything in the server. Some of the things that took a little to learn and remember were knowing where each type of screw went in the server and where each cable had to be connected to. Some of the servers were more simple than others, but when I started we were

working on the servers that were more difficult than some, so it took time to get used to it, but because I started with the more difficult servers, it made it easier for me to do the other servers even though I hadn't worked with them yet. The more difficult servers were Wawa's servers and then Dollar Tree servers are the simplest ones, but I started with Wawas.

3. Management structure

At IPConfigure, the assembly team is a part of the support department. Our supervisor is a part of the support department and everyone we would go to for any questions about our work are also a part of the support department. We have a main supervisor that we can go to and also one person above him and one person below him that we can go to. We only go to the supervisor above him if there is a big issue such as a major broken computer component or if the main one and the one below the main one are occupied at the moment. There are also two other guys that are a part of the support department that we can go to for questions if everyone is occupied because they used to be assemblers before they moved to full time positions in the support department.

Our main supervisor, Mark, is in charge of us and what we do each day. Mark is one of the top guys in the support department because he has been there so long compared to everyone. The guy below him, Stephen, is also in charge of us, he is like Mark's number one guy. He used to be an assembler and is a part of the support department, but is more on the hardware side compared to the rest of the department because that is what his job focuses on. The guy above Mark is Ben, he is the supervisor of the whole support department. The other two guys in the management chain above Mark and Ben are the CEO and CTO. As an assembler, I don't get too many interactions with either of them. In my opinion, the supervisors and anyone I've ever gone to for questions have definitely been helpful and try to help us be most efficient with our work by changing processes or moving things around, so we can do our job the best we can. Managers of other departments, such as the accounting department have a say in what we do each day because they have to communicate with Mark and Ben to see what is able to be

assembled by the assemblers based on what has been kitted by them. Stuff being kitted depends on what has been ordered by other companies and if the parts for all those orders have been delivered to us yet. Once the accounting department kits everything together, we are able to start building the servers in that order. Sometimes we will have a few orders at a time, but we only build one order at a time, and sometimes we may only have one depending on how slow orders and deliveries are coming in. If there isn't anything for the assemblers to build, we may be sent home early unless there are other tasks to do around our warehouse, which there sometimes is, but if we have multiple hours left, we may not be there the entire time.

4. Work duties

An assembler's main work duties consist of building servers, racking and imaging servers, and boxing and palletting servers. Without the amount of assemblers the company has now (six), the company would most likely fall behind in getting servers to the other companies in time. Building the servers is the task that takes the longest most of the time. All of these tasks are a major part of the process of the way IPConfigure operates in getting the orders built, prepared, and sent out.

The assembly part is the longest part of this process for the assemblers because most of the time we are building 25 servers per order. We usually do two main types of servers for two different companies, Dollar Tree and Wawa, but every once in a while, there will be an unusual order that we have to build. Dollar Tree orders go by quicker because their chassis is smaller and they are quicker to build and image. For me, the longest part of building servers is unboxing all the computer components and assembling the motherboards because I usually do five at a time. I've gotten a lot quicker at building servers because I have now done it for a few months, so building the server itself after assembling all the motherboards and unboxing everything will take only about 10 minutes if it is a Dollar Tree server that I am building.

For the first part of assembling a server, I gather all of the necessary computer components and bring them to the table I'm working at, so I can unbox them and prepare to build the

motherboards. Most of the time I build five motherboards at a time, so I will get five of everything, except we usually use two sticks of RAM, so for that I would grab 10. Each server needs a motherboard, CPU and CPU fan, sticks of RAM, SSD card, hard drive, SATA cable, IO shield, NIC card, and screws for the SSD card. The hard drive, IO shield, and NIC card are used once the motherboards are completed and we can use the server chassis. Once we finish assembling the motherboards, we open the chassis and take everything out of it that is in the way of us putting the motherboard in, so we can put the motherboard in and start assembling that server. I start by putting the IO shield in and screwing the motherboard into the chassis, so it stays put and I make sure nothing is blocked on the motherboard from the IO shield such as a USB or HDMI port. The things that we plug into the motherboard include the motherboard power, CPU power, jumpers, NIC card, USB power, audio, and USB 3.0. Once I plug everything into the motherboard, I use a ziptie to make sure everything is out of the way of the CPU fan and the fan attached to the power supply. The power supply is already in the server chassis when we open it up, so we don't have to worry about putting that in or anything. After the motherboard is done in the chassis, I screw in the hard drive, and plug the SATA cable from the motherboard into the hard drive and use the hard drive power from the power supply. The power supply give us the motherboard power, hard drive power, and CPU power cables. The other cables come from either the buttons or a different circuit board already in the server chassis. Once I plug in the hard drive and make sure everything is plugged in and out of the way of the fan, I use a power cable to turn on the server to make sure the server turns on, the fans work and nothing is stuck in them or making any noises, and make sure the CPU and RAM lights are not on to confirm that they are working properly. Once I confirm that, I screw the chassis back together and get it ready to be racked.

Once all the servers in an order are built or there are none left for me to build, I will start to rack them on two or three racks depending on the size of the servers. Dollar Tree servers are taller, so they will be placed on three racks while Wawa servers are placed on two racks. For Dollar

Tree servers, before we are able to rack them, we have to switch their power from 115 to 230 because that's what our racks use and if we forget to do that, the power supply will pop and be very loud and the supervisors would not be happy because a server is ruined and would require new parts. Luckily, I have not been there while that has happened and it has not happened since before I started my internship here. When we place them on the racks we have numbers on the HDMI and USB cables, so we know which server is which when placing the serial number stickers on the server. We plug in the HDMI and USB cables, as well as the ethernet cables and power cables into the server. We use a KVM switch on each rack to go through each server one by one on the same monitor once we start imaging. Each rack has its own KVM and monitor to work on, so multiple racks can be getting imaged at the same time. We have 8 racks, so we can usually have two orders on the racks up at a time. Usually there are two up there once it's a couple hours into the day. We usually have one order on the racks in the morning when we come in and then get another one up there in about two hours. The first order comes off the racks around lunch time after they’re finished with quality checks. Then we eventually get another order on the racks, but that one is usually the one that stays up there until the next day because there wouldn’t be enough time to quality check those as well. The second order that was on the racks from that morning would usually be done getting quality checked about an hour or two before the day is over. The truck driver usually gets to IPConfigure at 4:30 in the afternoon or later, so we usually have that order boxed, palletted, and ready to go along with the other one that we had already palletted.

Once each server in a rack is all plugged in, I can start the imaging process for that rack. To start imaging, I move all of the servers into M-flash mode, so we can update the BIOS for that server. Depending on what motherboard and CPU are being used for this server, doing this could take awhile. We update our BIOS version to 1.9 using flash drives that we plug into the USB ports on the front of the server when in M-flash mode. We can’t do this for each server at the same time because we have limited flash drives and we can’t do it without the flash drives.

Once the update is finished, we unplug the flash drive and move it to a server that does not have it and do the same thing. Once all of the servers have been updated and then powered off and back on, we can update the BIOS settings. The settings we change are increasing the fan speed to max speed, disabling secure boot, power on when restoring AC power loss, and enabling network stack. Once I change the settings and hit the x, you can hear the fans speed up right away. After about 30 seconds, you can select the operating system to install which we usually do ubuntu 22.04 auto. Once we choose the operating system, we let it image, and make sure when it is done, it is correct and we don't have to change anything. Once we do this, the support department will ansible them from their own computer, so they can get serials, and we can sticker them. After stickering the servers, the support department will give each server a quality check to make sure it is good to be sent out to the company that ordered them.

The stickers that each server gets, is an IPConfigure serial number sticker, an assembled in USA sticker, and a channel sticker if needed. To make sure each server gets the correct serial sticker, we have to open up a terminal on the server, so we can check the number. After each server is quality checked, we can move to boxing each server. The boxes also need to have the serial sticker on each box and we make sure that the server being placed in that box matches the serial on the box. Other than the server being placed in the box, we place a power cable, antennas, the quality check sheet, a checklist for how to set up their server, and an instructions paper for how to use their server. The quality check sheets need to be signed by people to verify that certain things are placed in the box and to verify that certain things were done to the server's software.

Our pallets have to be done very well because we don't want to have any issues in transportation. To start this we have to place each server on the pallet once the boxes have been taped up. We have to make sure no servers are wobbling off and that they are steady before we wrap it tightly in saran wrap. We use box corners where we put the straps so there is no damage to the boxes that the servers are in because the straps have to be tight as well. We

use various tools in order to make sure the straps are tight and able to be sent out. We also have to stick the packing slip onto one of the boxes and put any necessary papers for the truck driver on the pallet as well. The pallet process isn't a long process unless doing everything entirely by yourself. When it is a two man job, it is very efficient and done fairly quickly. Once we complete the pallet, we move it to where it is known that it is ready to go out and it is ready for a truck driver to pick up when they get there.

5. Cybersecurity Skills/knowledge

Before working this internship, I didn't know every computer component very well. Now that I've been working this internship, I know a lot more about these computer components and I know what I can do in some situations if something is not working, so I can try to troubleshoot the issue. I also had never built a computer before working this internship, now I've built hundreds of servers. I used to not know everything people would say when they were building their own computers and what parts they were getting, but now my understanding is a lot better and I can actually be involved in a conversation about that. Configuring your settings to what you want it to be is very important because this can help you with cybersecurity or just customizing it to your liking. We have to configure the settings of the servers to the liking of whatever company that server is for. Some of these settings can affect cybersecurity in a positive way or negative way depending on what settings they are and what we change.

6. ODU curriculum

A class I'm taking at the same time as I'm working the internship that I've connected some of the things from work to the classroom is IT 201 which is Intro to Information Systems. This class has talked about certain hardware parts and what they do, and I've been able to recognize them and be a part of the class conversation because I've worked with those parts and sometimes had to troubleshoot issues with those parts. There have been other classes that have talked about business processes and business practices and systems that I have been able to connect

to IPConfigure because of what I have seen there. CYSE 200T is one of those classes where I learned something and then saw it at work and connected it to that class.

From the ODU curriculum, I would say I was able to connect some knowledge to my internship from a couple different classes, but I wouldn't say that there were skills that I gained from any classes that I was able to use in my internship. Another thing that IT 201 has taught me is different information systems that companies use and I've been able to see if they're used or not by IPConfigure. I don't know exactly how IPConfigure uses it everywhere for the company, but I've seen how their supply chain management works because we're in the warehouse and we can only build servers that are fully kitted by the accounting department which holds all the pieces pretty close to us, so we can see what we have and what we don't have. I'm able to see orders come in and orders go out and orders coming in will bring in the parts that we need to build the servers, but they never have too much or too little shipped at once and they can only order a certain amount based on how many orders they have coming in at once.

7. Internship objectives

The internship objectives I listed that were from my supervisor were to learn how to assemble surveillance servers from scratch, troubleshoot various issues with different computer components, and work in all aspects of the hardware production cycle, imaging, and configuration. For the first primary learning objective, learning how to assemble surveillance servers from scratch, I would say that that objective was 100 percent fulfilled. I built different types of servers for different companies with different chassis and different components. Building servers is what I spent most of my time doing during this internship which is why I would say that this first objective was fulfilled.

The second primary learning objective, troubleshooting various issues with different computer components, was also 100 percent fulfilled because I got to learn how to figure out what is wrong with a server for the most part. Most of the time, I was able to troubleshoot the server itself, but sometimes I would need to get a higher up to help me out or figure out the issue

themself. The third primary learning objective was to work in all aspects of the hardware production cycle, imaging, and configuration. This learning objective was also fulfilled because I got to learn how to work in all these areas and continue to work in those areas. I would rack servers and image them after I built them so I was involved in the hardware production cycle as well as imaging, and I was also involved in configuration because I configured settings on each server, so that they would work how they were supposed to before getting shipped out.

8. Most motivating and exciting aspects of this internship

The best part of working at IPConfigure is that we are working in a good environment and I get to work with three of my friends and two other guys that are cool too. Some of the guys higher up than us are still pretty young too, so they are able to relate to us as well. Working in a good environment definitely keeps me motivated to continue working at IPConfigure and want to go to work everyday. I also like to see how much I've gotten quicker at building servers because we have to write down how many servers we built that day and how long it took to build them. I used to take a lot longer building servers because I would build one motherboard at a time and then the server for the first week I started, but now I'm a lot faster and all of us together will usually build two pallets a day which is 50 servers.

Another thing that would motivate me to work harder or faster would be to make sure that we are keeping up with schedule. If they want us to get two pallets out a day, then we will work our hardest to try to get that done, but it isn't always possible depending on the speed of the quality checks and when those are finished. Once we all had worked there for a good amount of time, we would consistently get two pallets out a day. Getting two pallets out a day hasn't really ever been something we've had to stress over except for in the beginning when the truck driver would show up right as we were palletting it at the end of the day, so we would have to speed up. That was before we moved into the new warehouse though which has definitely improved our efficiency and since we've moved into the new warehouse, we haven't had that happen

since. They had been planning to move into the warehouse for a long time, since before I was there, but we moved into it at the end of January.

9. Most discouraging aspects of this internship

The most discouraging part of this internship is that after a while, the job gets very repetitive and you can get bored at some point. My longest two days would be Tuesdays and Fridays. I was lucky that I didn't have back-to-back long days because on Wednesdays I didn't work and I didn't work over the weekend either. Mondays and Thursdays, I would work an hour less than the other two days, so the days wouldn't feel as long and I would start earlier, so I'd be done earlier. I had to make my schedule around my classes, which is why my schedule turned out like it did. I was lucky to not get very bored during the internship because I got to get close with my coworkers and we are able to have good conversations throughout the work day and working with all of them is fun.

When I first told my dad that I was considering applying for this internship, he told me that it wouldn't take long for me to get bored. He told me that it is a good job to have, but I'd probably get bored pretty quickly. Luckily, I get to work with who I am working with, so I am not getting bored easily and continue to want to work there. Another discouraging aspect is when I see a pallet coming up of servers that I do not want to build. I prefer building Dollar Tree servers over any other server, but when I see a McDonalds pallet, it doesn't feel good and can be discouraging to want to continue working for the rest of the day because those servers take forever and will most likely be there again the next day when I come in, so it will feel like you're getting a nonstop session of building those.

10. Most challenging aspect of this internship

I don't think I'd consider this a very challenging internship, one of the most challenging parts of it was definitely learning everything in the beginning, but after a little while, I was able to get the hang of everything and was able to adapt easily. I'm also a fairly quick learner, so some people may not be able to say the same thing. The most challenging servers to build were ones that we

didn’t build often such as servers that we built for McDonalds. These servers would be tight inside, so it’d take awhile to line everything up to plug in and you couldn’t take off more than two sides of the chassis.

The most challenging part of this internship was troubleshooting. Troubleshooting took time because I wouldn’t always be able to figure out exactly what the problem with the server was and I sometimes would have to get my supervisor to figure it out. The most common issues I would have would be with the CPU or RAM at the beginning when I was testing the server and the light on the motherboard would come on. To troubleshoot this issue, I would reseat either the CPU or RAM and if the light went off when I tested it again, it was all good. The most challenging issues to troubleshoot would happen when we had already racked the servers and began the imaging process. There was one rack that bricked four motherboards because the rack had an issue with power, so for that we had to replace each server’s motherboards. There are other occasions where we will have to remove the server from the rack and unscrew and open it and reseat components to see if that works and sometimes it does, sometimes it doesn’t, so we would potentially have to replace a computer component. Some racks are slower than others so we can’t power on all the servers on the rack at the same time because they won’t display on the monitor, so when this happens, I have to power them back off and then on again, but one at a time.

Another time we had an issue that was not anyone at IPConfigure’s fault was when we got a shipment of hard drives for Luxottica servers and all the hard drive bags had holes in them and looked like something was wrong with them. When we tried to plug sata cables or hard drive power cables into these hard drives, they would just snap and could no longer be used. After we broke two, we knew something was up, so we told our supervisors and showed them and some that were still in the bags were also bent and messed up, so we had to get a new order of those hard drives and put the Luxottica order to the side while we waited for about a week until we got the new shipment that had no problems. The Luxottica order was already behind because some

of the other parts had taken a long time to arrive to IPConfigure, so the company was a little stressed out about the whole situation and they had made these orders a priority, so it didn't feel good when a shipment of hard drives was messed up and they had to wait on another. These Luxottica servers also take very long to image compared to any other server we build, so this was another thing that added to the stress for our supervisors. And to add even more stress, only two out of our 8 racks could rack the Luxottica servers because not all of our racks have VGA.

11. Recommendations for future interns that hold this internship

The best recommendation I can give to future interns is to not go too fast and to take your time when first starting because it helps you learn better and you will make fewer mistakes. Another important recommendation I would make is to make sure you ask questions to your supervisors, so they know that you care and so that they believe they can trust you to take on more important tasks and maybe end up training you for a full-time position. I would also say do your best and not make any mistakes, but if you do make a mistake, make sure to tell your supervisor as soon as you can, so they can trust you and not be as mad at you when you make a mistake. There have been times where people have made mistakes and not told anyone, so the supervisor went on the cameras and saw what happened, and they got written up for it. We had one stretch where we had screws keep breaking in the hard drives and we wouldn't be able to use those hard drives anymore. It wasn't really our fault, but it happened too often, that we had to change the screws we used and that ended up solving the issue, but before that we would have to be extremely careful because we were worried we could get fired if that happened again because of how expensive the hard drives were. What I did to make sure it wouldn't happen was tell our supervisors when a screw was feeling tight in the hard drive and could potentially break if we kept going and bring it to them, so if that screw breaks, it's on the supervisor and not us.

If I had any recommendations about preparing for the internship, I would say do your best to familiarize yourself with different computer components, so you know what you're working with and what they do. If you are someone who has built a computer before, you will have an advantage because some of the guys who apply will not have any experience building computers, but even if you've never built a computer, you will be fine because building servers is not a very complicated or hard thing to do. The supervisor to our supervisor, Ben, always says that if you can build legos, then you can build servers. I would also tell someone who gets this internship to not worry about having never built a computer because they will teach you and it really is not a hard thing to do. I was a little worried before I started because I felt like I may not know what I'm doing, but I learned quickly and realized it wasn't as challenging as I thought it would be.

12. Conclusion

After completing this internship, I realized that it was a great opportunity and experience and I chose to continue working at IPConfigure for the summer as an assembler. I was glad that I took the opportunity to work at IPConfigure because I have enjoyed working here so far and will continue to do so. The internship ended up being a lot easier and enjoyable than I thought it would be. I'm glad that I have now had hands-on experience working with computers and increased my knowledge with hardware because I've worked so much with that.

I think this internship experience will benefit me for the rest of my time in college at ODU because now that I've had hands-on experience, I will be able to apply it in classes. Having this experience will be beneficial to me at ODU because I've taken a few classes and will take more classes where the knowledge and skills that I've learned from my internship will be helpful to me. I think it will help me build good relationships with professors because professors like when students participate in class and participate in conversations and because of this internship, I will be able to participate more and more in class conversations because of what I've learned in some topics. There are some people that work at IPConfigure that attend ODU and this could

benefit me because maybe I'll be struggling in a class and they'd be able to help me out or we could collaborate on a class project or something.

The benefits that this internship will provide me in the future for my career path will include potentially having an opportunity to work there full-time and give me even more experience to put on my resume to help me get a job that would pay more and be a better cybersecurity job. My goal is to have a cybersecurity job that pays well and has a good working environment and is in a location that I'd be willing to live near. Working with servers now will show future potential employers that I've worked with computers before and my supervisors at IPConfigure would likely consider being a reference for me because I've worked hard for them and showed that I care about my job and want to do my best. Working at IPConfigure can also have me gain connections with people that I didn't know before. Making connections is one of the best things you can do anywhere because you never know when someone can help you out to get a job or for anything. The reason I have this internship at IPConfigure is because I had connections that were already working there and they were able to put in a good word for me, so I could get the job.