“INDUSTRIAL WORK EXPERIENCE”

BACHELOR OF TECHNOLOGY

in

COMPUTER SCIENCE AND ENGINEERING

RGUKT

Rajiv Gandhi University of Knowledge Technologies

R.K. VALLEY

Submitted by

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Under the Esteemed guidance of

E. Susmitha

RGUKT RK Valley.

DECLARATION

We hereby declare that the report of the B. Tech Major Project Work entitled

"INDUSTRIAL WORK EXPERIENCE" which is being submitted to Rajiv Gandhi University of Knowledge Technologies, RK Valley, in partial fulfilment of the requirements for the award of Degree of Bachelor of Technology in Computer Science and Engineering, is a bonafide report of the work carried out by me. The material contained in this report has not been submitted to any university or institution for award of any degree.

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(A.P. Government Act 18 of 2008)
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CERTIFICATE FOR PROJECT COMPLETION

This is to certify that the project entitled "**INDUSTRIAL WORK EXPERIENCE"** submitted by **Y.DAYANANDA REDDY (R170194),** under our guidance and supervision for the partial fulfilment for the degree Bachelor of Technology in Computer Science and Engineering during the academic year 2022-2023 at RGUKT, RK VALLEY. To the best of my knowledge, the results embodied in this dissertation work have not been submitted to any University or Institute for the award of any degree or diploma.

Project Internal Guide	**Head of the Department**
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Acknowledgement:

I would like to express my deep sense of gratitude & respect to all those people who behind the screen who guided, inspired and helped us crown all our efforts and success . I wish to express our gratitude to **Mrs. E.Susmitha** for her valuable guidance at all stages of study, advice,constructive suggestions and supportive attitude and continious encouragement, without which it would not be possible to complete this project.

I would like to extend our deepest gratitude & reverence to the Director of RGUKT, RK Valley **Prof. K.Sandyarani** and HOD of Computer Science and Engineering **Mr. N.Satyanandaram** for their constant support and the encouragement.

I would like to thank my entire team at **INTEL Corporation** for their support and guidance during my internship . In particular , I would like to thank my manager Asha Balraj for her mentorship and the opportunity to intern at Intel .

Last but not the least I express my gratitude to my parents **Mrs. Y . Jyothi** & **Jagannadha Reddy** for their constant source of encouragement and inspiration for me to keep my morals high .

With Sincere Regards,
Y . Dayananda Reddy.
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ABSTRACT

This report presents a summary of activities I was involved in during an internship at **Intel Technology India Pvt. Ltd.** from August 1th 2022 to May 26 2023 . I was involed in handling the **GAR** and **GER** time Zones Service Requests for both **Netbatch** & **ION** (Interactive Over Netbatch) . During my internship I am the **System Admin** who will manage the access to the servers for users. I will check and allocate the resources(servers) for different projects and BU's (Bussiness Units) . I will create the allocation structure for accessing the resources (servers) .

I enhanced the product with new features.I used both **python** and **bash** scripts inorder to automate the mannual daily tasks which are boring otherwise . The main aim of automating those tasks is to improve the productivity and efficiency . I used to create the resource allocation structures which are formally called as **Qslots** inorder to give the access to the employees who need the resources.Qslots were added in each of the config file based on the site location.Since Intel is a global company users need to work on different machines on different sites globally.So we need to give the remote access to the servers for the employees.

During my internship period I lead the reboot **patching** for GER(Greater Europe Region) sites which involved co-ordinating with users,handing their complaints, working with compute team for system issues.Patching is nothing but the installing or updating the existing firewall rules to enhance the security from the attacks.I also did Netbatch pool upgrade and contributed actively to the team.I also participated in the oncall for supporing the Netbatch and ION. I am also attaching the pictures of some scripts. I used shell scripting , python & Linux Commands like egrep,cat,rm, mv,mkdir etc.

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INDUSTRIAL WORK EXPERIENCE REPORT

Introduction :

During my internship tenure , I mainly worked on two products those are Netbatch and ION . Netbatch is a software tool which is designed to run the jobs on the servers to optimize the usage of the cpu and memory . Netbatch makes use of the available CPU time by running batch jobs on idle or unused machines. This lets the users to run more than one job at a time . Access workstations running the different operating systems. Access higher specification workstaions(ex: with more memory) .

ION stands for Interactive Over Netbatch – is an extension of the Netbatch for managing interactive server resources. ION provides a new intended use model which allows the better dynamic allocation of datacenter resources , improved reservation /isolation of interactive resources and greater ease of use and it also provides the flexibility for resource allocators.

Purpose of my internship :

To gain hands-on experience in cutting technologies.Intel is a technology company known for developing innovative products and technologies. An internship at Intel could provide an opportunity to work with the advanced technologies and gain proctical experience in developing software or hardware products .

To learn abou the company’s operations and culture . An internship at Intel could also serve as an opportunity to learn about the company’s business and also it’s practices,culture and values. This could include attending company meetings , interactig with employees , and participating in training programs.

My Responsibilities :

I worked in EC OS DESIGN PROD. DEVOPS department . My duties/responsibiliites includes :

- Developing the bash/python scripts to automate the daily routine tasks .
- Enhancing the product with new features.
- Handling service and Incident tickets.
- Managing the access to the servers/workstations for customers.
- Allocating the resources for different projects / customers / BU's (Business Units).
- Administrating the servers .
- Monitering and maintaining the machine health by doing patching and upgrades.
- Supporting the Netbatch and Ion to increase the efficiency and productivity.
- Root cause analysis for any problem related to Netbatch and Ion.

Description of my duties:

Writing bash/python scripts:

I used to write the bash scripts to get the data and to automate the daily routine tasks. Due to these scripts one can get the desired data with in short time , which otherwise could take more time . Sometimes not only the bash scripts but also some of the scripting languages like **awk** .

Below is one of the situation where we can use scripting to do the task.

Situation : For each of the data center in each site find the total number of cores of sles11 and sles12 servers and also count the total no. of servers of sles11 and sles12.

Inorder to get the above data we can make use of awk scripting language.Please find the below awk script to get the desired data.

```
{
        if($5=="suel11"){
                s11cores = s11cores+$4
                s11count = s11count+1
        }
        else if($5=="suel12"){
                s12count = s12count+1
                s12cores = s12cores+$4
        }
}
END{
        print "suel11 cores = " s11cores " suel11 Servers Count = " s11count
        print "sue12 cores = " s12cores " suel12 Servers Count = " s12count
        print "Total servers = " NR

}
```

Fig1: Awk script

The above script will give you the desired result . We need to execute the above script by selecting in each site. For example :

Execution:

scynbm76> **query_nodes --field hostname,site,nbpool,cores,osver,mode | egrep -iw ION| egrep s-iw IR | awk -f /tmp/info.awk**

Ouput:

suel11 cores = 124 suel11 Servers Count = 10
sue12 cores = 1580 suel12 Servers Count = 90
Total servers = 100

The above output will give the desired results. It helps in consolidation of the resources in the data center which helps to use the resources optimally and efficiently.

Data center maintainance involves many tasks. If there are any problem in the datacenter or if we want to do the upgrades we require **downtime** . For users we have to intimate earlier regarding the scheduled downtime .Sheduled downtime in nothing but the time when production equipment is limited or shut down to allow for planned maintenance, repairs, upgrades or testing . In the downtime we need to make sure everyone's work should be saved. Aslo we need to store the details of all the workstations. So to do that we can use bash script.

```
#!/bin/bash
while read pool
do
 nbstatus works --tar $pool  --fi "*,InteractiveUsers::30,Resourcegroups::100,OSDistributionName,OSVersion::100"  --fo csv >> workstations.csv
        echo $pool >> workstations.csv
done < "vrpools.txt"
```

Fig:2 Bash Script

The above script will read the each pool name from a file and it will execute the command to get the details of each server.Similarly we can make use of the bash scripts .

Python Scripts:

I also developed one python script which is using in for hupping the pool . It's main purpose is to reflect the changes made in the config files in the pool master. If there were no errors we need to run this script . If there are any errors after modifying the config file we have to remove them . The flow chart for the script is shown below .

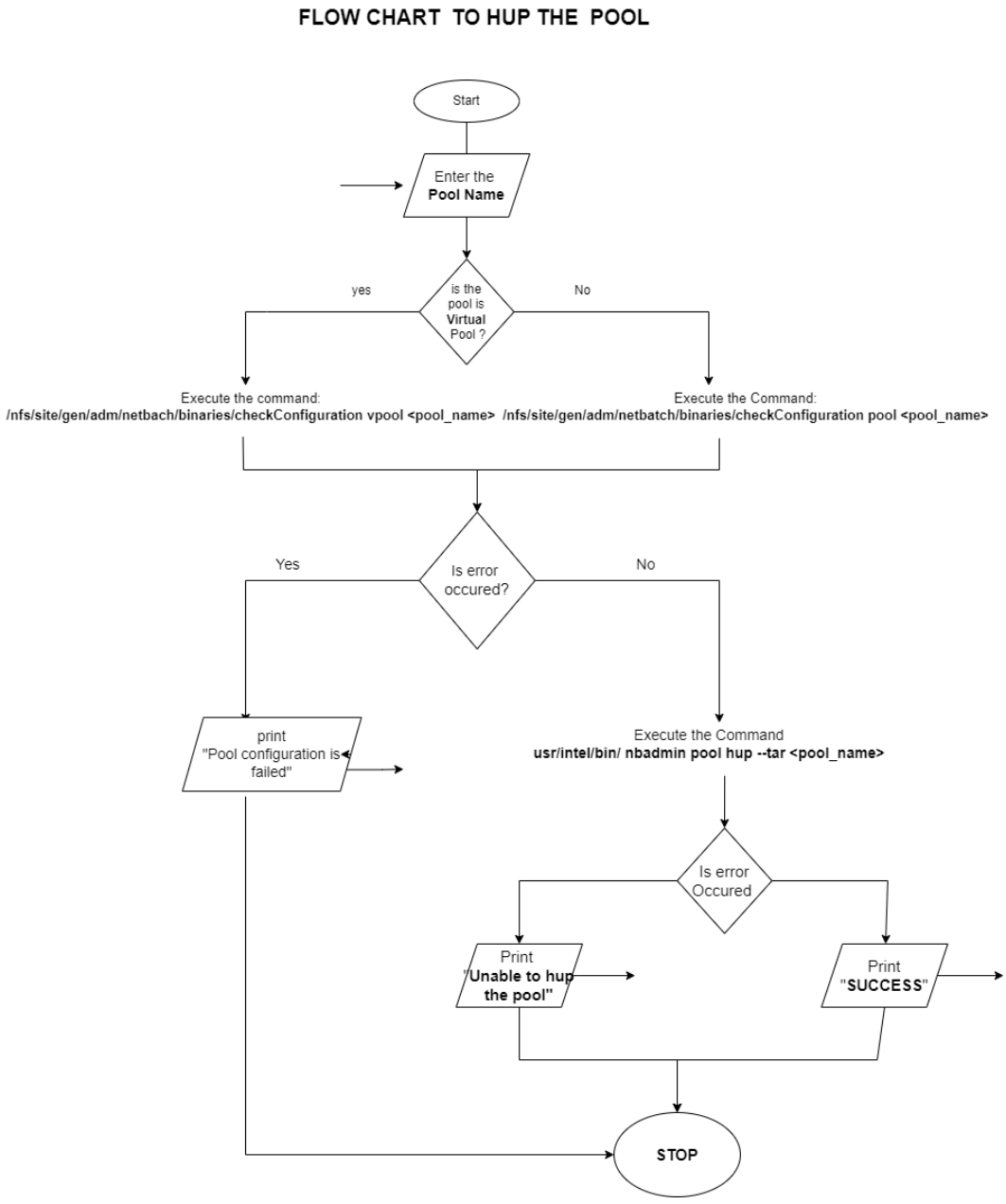


Fig-3 Flow chart for developing python script

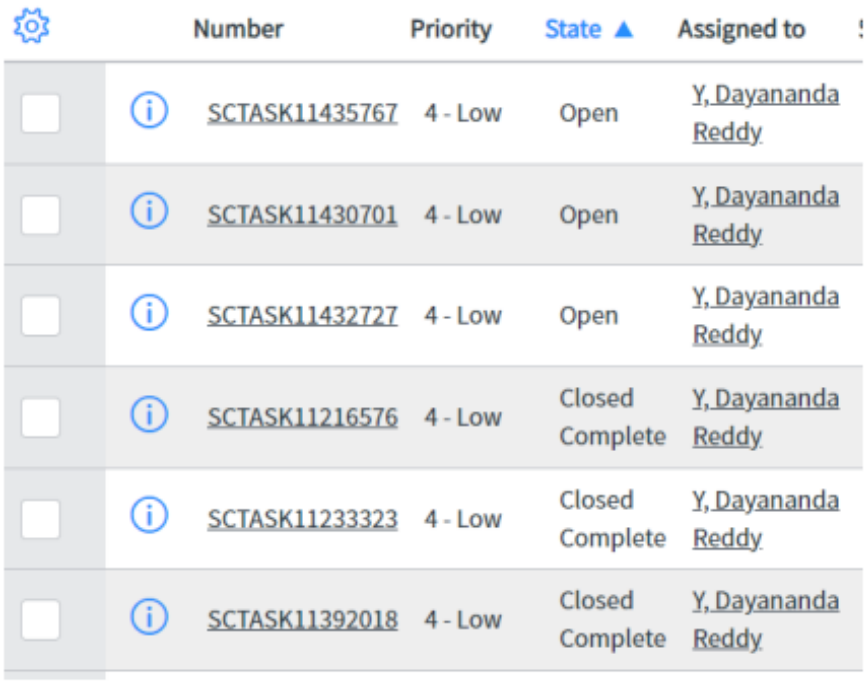
From the flow chart we can see that , based on the type of the pool wheather the pool is physical or virtual we need to execute one command called check config . If we found any errrors we are printing “pool configuration is failed” , Otherwise we are running the python script for hupping the pool .

Handling Service Requests and Incident tickets :

Apart from writing the bash and python scripts, I also engaged in solving the Service and Incident tickets . A **service request** is nothing but the **formal request** for something new to be provided.

Example : - “I need a macbook”.

But in my case users will ask for “I need an India server or Santa Clora Server to work with” . So users will ask if they needs any help from me . There is a set of guidelines to follow inorder to full fill their request. Please find the images of some service requests that are assigned to me .



Number	Priority	State ▲	Assigned to
SCTASK11435767	4 - Low	Open	Y, Dayananda Reddy
SCTASK11430701	4 - Low	Open	Y, Dayananda Reddy
SCTASK11432727	4 - Low	Open	Y, Dayananda Reddy
SCTASK11216576	4 - Low	Closed Complete	Y, Dayananda Reddy
SCTASK11233323	4 - Low	Closed Complete	Y, Dayananda Reddy
SCTASK11392018	4 - Low	Closed Complete	Y, Dayananda Reddy

Fig:4 Service requests assigned to me

Those service requests should be solved with in the SLA . SLA stands for Service Level Agreement . A service-level agreement (SLA) defines the level of service expected by a customer from a supplier, laying out the metrics by which that service is measured, and the remedies or penalties, if any, should the agreed-on service levels not be achieved.

I solved more than 90+ request requests during my internship . I solved more than 60 service requests in the past 3 months of time . Not only solving the requests but with in the SLA I solved more than 90 percent of my tickets. Please find my productivity from the last 3 months.

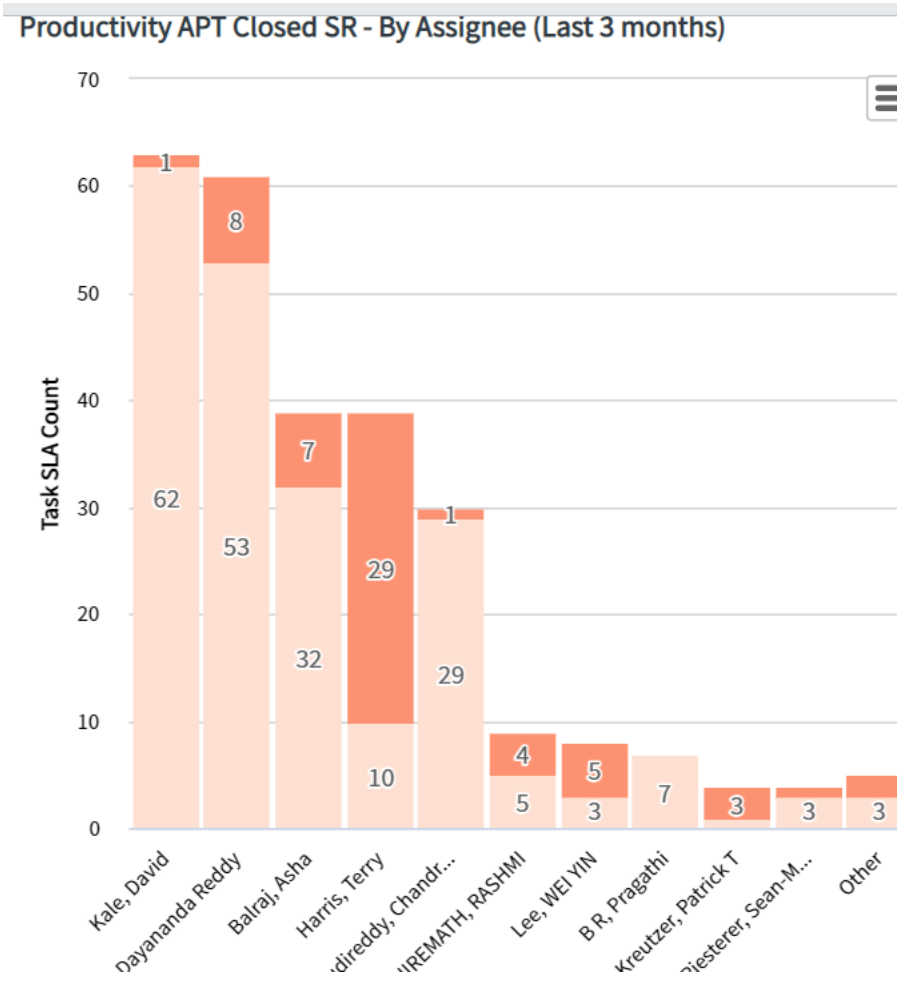


Fig:5
Productivity APT Close SR – By Assignee(Last 3 months)

The Service Request Management Process:

While there are some variations in the way a service request can be captured and fulfilled, it's important to focus on driving standardization to improve overall service quality and efficiency. The following process represents a simple request fulfillment process based on ITIL recommendations. This can be used as a starting point for adapting existing ITIL processes or defining new ones.

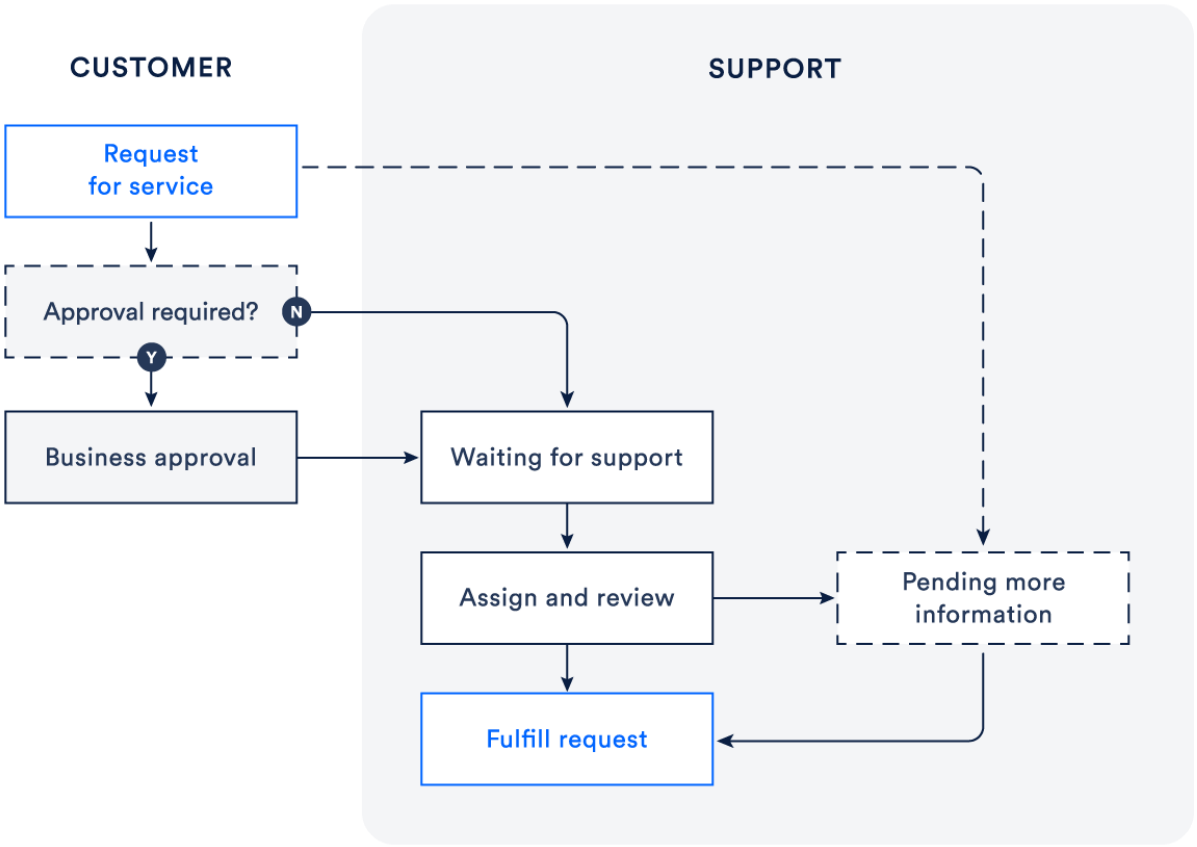


Fig : 6 Service Request Management Process

The service request fulfillment process, in brief:

1. A customer requests help from your service portal or via email.

2. The IT service team assesses the request alongside pre-defined approval and qualification processes. If needed, they send the request for financial or business approval.

3. A service desk agent works to fulfill the service request, or forwards the request to someone who can.

4. After resolving the request, the agent closes the ticket and consults the customer to make sure they are satisfied.

Along with the service requests, I also solved incident requests . To solve the incident tickets we require **strong debugging** l skills ,command over the linux commands and strong understanding about the businesses and work in the organization . An Incident is nothing but the unplanned event that cause disrupts or reduces the quality of a service and requires an emergency response.

Example: “The website is down! Or server is down”

In my case users will contact me if they are unable to take the vnc sessions or tool sessions from their end. It may be due to the shortage of resources or incorrect way of requesting the session. The best example for incident request is server may go down .

Example **: The server is down:** Suppose you run an e-commerce store and all of a sudden you start receiving customer calls, emails, or chats complaining that your website is down. The IT team is informed and they conclude that the server is down. This is an example of a big incident.

Patching:

Patching is the process of distributing and also applying updates to software . These patches are often necessary inorder to correct errors (also referred to as the "vulnerabilities" or "bugs") in the software. The patching enables the security to our servers . The patching reduces the security risk to the servers.

Patching are of two types :

1. Reboot Patching
2. Non-Reboot Patching

1.Reboot Patching : As the name suggests, reboot patching requires the machine/server to be rebooted inorder to apply the patch. So it will cause the machine downtime for the users.

2.Non-Reboot Patching: Unike reboot patching , non-reboot patching doesn't require server to be rebooted . We can patch the server without any reboot . So it won't effect the users .

To check wheather the server is patched or not , we can use patchadmin -b command.

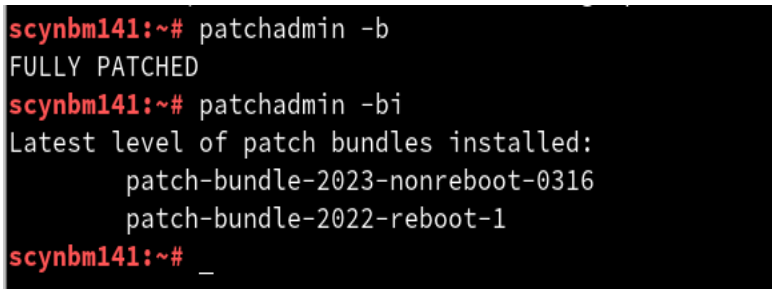


Fig 7 : Patching status of a server

To know the arguments regarding the patching of a server one can use the patchadmin -h command.

```
scynbm141:~# patchadmin -h
Usage: patchadmin [-h] [-p [-a|-l] | -r] [-d] [-v] [-o]
        -pl : Patch Low Impact - exclude high-impact and service impact patches
        -ps : Patch Service Impact - exclude high-impact patches
        -pa : Patch all patches - including high-impact and service patches
        -d : Download only (for patching)
        -n : no-act
        -r : Report - show missing RPMs
        -b / -bm : Report - show missing patch bundles
        -bi : Report - show latest patch bundles installed on the machine
        -ba : Report - show latest patch bundles available in the repository
        -o : Don't refresh the local cache
        -f : Force refresh of the local cache
        -v : verbose
        -k : skip osei nodes value check for patching
```

Fig: 8 Arguments to use for patchadmin command

Instead of patching manually , we can use the automation provided by the developers with in the intel . By using the Autoops flow we can patch any number of machines at a time . Mannual patching would take lot of time and will casue irritation towards the work . Please find the autoops request and it’s progress in the image below.

	Request ID	Requestor	Site	Status	T...	Items...	Progress
⊟	an.netbatch.10010	ydayanan	an	☑ Finished	R..	214	
⊞	an.netbatch.10010:1	ydayanan	an	☑ Finished	{..	214	

Fig:9 Automation for patching the servers

Thus I handled the patching for Greater Europe Region sites . It has many data centers and thousands of servers which needs to be patched. It also involves co-ordinating the users and contacting the CMCC team for any server issues.

Creating allocation structure for providing resources :

If there are any new projects were created in the organization, as a NB & ION team we have to provide the resources . Before providing the resources to them we will verify wheather they have the approved allocation or not . Based on the allocation we will provide the resources (Servers/Workstations) to the users or to the Business Units(BU's).

After checking the neccessity of the resources , I will create the allocation structure . It contians the details and configuration settings for providing the linux environment for each user. It also contains the restrictions like max_core, max_memory and osver like sles12 or sles15 and many more. It contains two permission blocks one is for JobSubmit and another one is for QueueAdmin . The JobSubmit permission block helps us to give the permission only for whom we are giving the access to create a new sessions in the servers. QueueAdmin permission is the privielized permission that will be given to the project lead or manager . QueueAdmins can able to do the operations on the Qslot . The basic template for creating the allocation structure looks like below.

```
Qslot /name
{
    !include perm.deny
    permission
    {
        Operations QueueAdmin
        groups BU_QUEUEADMIN
        deny false
        recursive true
    }
    properties
    {
        demanddriver_id BU_DD
        demanddriver_group BU_GROUP
        DemandDriver_Project BU_PROJ
        # override this below in all non-normal tiers!!!!!
        tier normal
        cgroupmemory true
        prediction true
        interactivesessionssettings hidden
    }
    member_resources none
}
```

```
Qslot /name/subname
{

    permission
    {
        Operations QueueAdmin
        groups BU_QUEUEADMIN
        deny false
        recursive true
    }

    Properties
    {
        tier BU_TIER
        demanddriver_id BU_DD
        demanddriver_group BU_GROUP
        DemandDriver_Project BU_PROJ
        SubDemandDriver_ID BU_SUBDD
        SubDemandDriver_Activity BU_SUBACT
        interactivesessionssettings hidden
    }
    member_resources none
}

Qslot /name/subname/leaf
{
    permission
    {
        operations JobSubmit
        groups BU_JOB
        deny false
        recursive true
    }

    user_max_running
    {
        default 1
    }
    Properties
    {
        interactivesessionssettings vnc
        tier basic
        class_options [OS Name]SLES12:SLES12:default
        cores .05
        max_cores .05
        memory .5
        max_memory 1
    }
    member_resources BU_RESOURCE
}
```

Now users can able to access the new sessions and they can able to work on the servers gloablly . For example below image shows how one can get the vnc after creating the allocation structure.

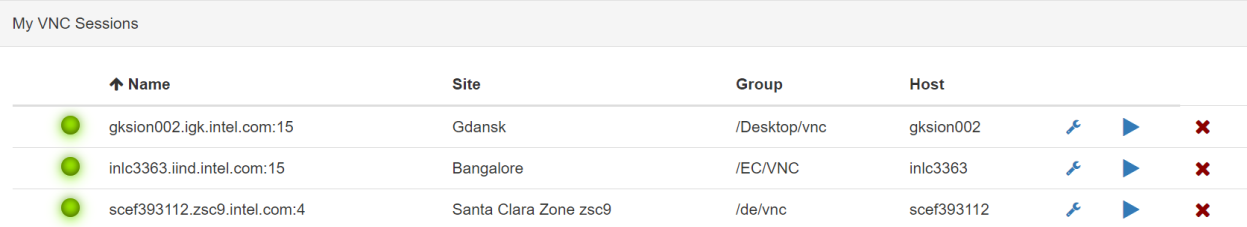


Fig : 10 Vnc Sessions of a user

Once vnc's are created we can login in to the linux environment . For example below is the linux environment

Linux environment for employees to work

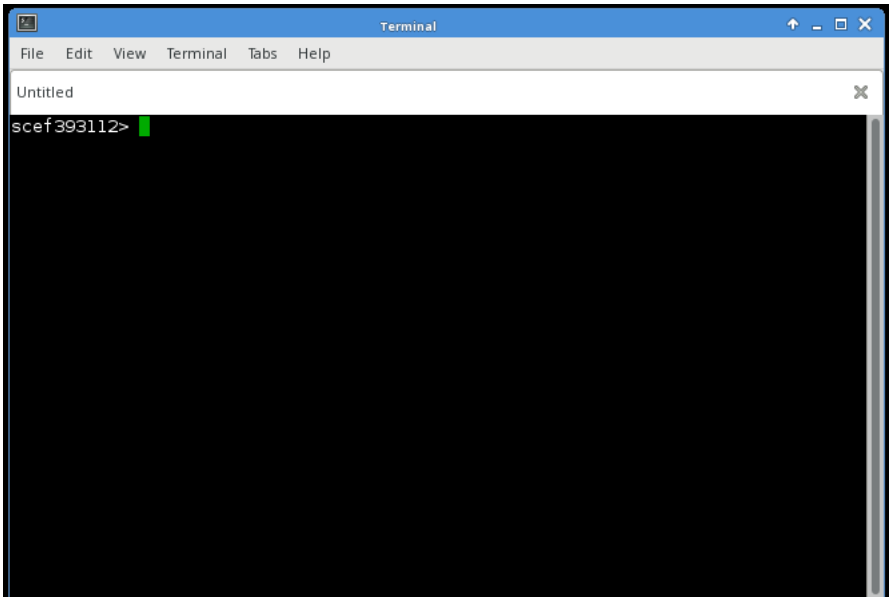


Fig: 11 Linux environment for users to work in the server.

My Achievements/Contributions :

- Single handedly dealed with GAR(Greater Asia Region) and GER(Greater Europe Region) time zone Service Requests for NB & ION.
- I Lead the reboot patching for GER sites which involved coordinating with users, handling their complaints, working with compute team for systems issues etc .
- Helped in NB 8.5.3 upgrade global planning and contribution to the upgrade.
- Developed bash/awk/shell scripts to automate the tasks which otherwise will take lot of efforts and time **.**
- I showed keen interest in learning, to grasp quickly and asked doubts without any hesitation which helps to learn fast .
- I increased the productivity and efficiency of the team by supporting the Netbatch and Ion .

Challenges I faced :

During my internship I faced many challenges . Some of them are listed here . I am unable to write the bash scripts , initially to automate my tasks. I did my tasks manually which have taken lots of time and effort . The repetative task made me to feel tiredness and I sometimes I lost my interest .

All the organizations uses linux environment to work , intel is not so different from others . One should have better command over the linux essential commands like egrep,cat,rm,mkdir,rsync ,du, ssh etc. I faced difficulty while working in the command line interface in the servers . We have to work with only the command line interface(CLI) . There would be no GUI (Graphical User Interface) . I faced some difficulty in remembering the syntax of the commands.

Intel organization is very huge . It has lot of departments and lot of projects that were going on at every time . We need to understand the way of functioning of the organization and our role and responsibilities . I am unable to adapt the conditions soo quickly . Since this is my first time to the industry I also faced some communication problem with my team members .

I hesitate to ask any doubts that I got during my training . Since most of my team members were from other countries , I am unable to understand the accent from the people who are from different countries. I sometimes failed to deliver the results that I have to do .

How I Overcome the Challenges :

- I learned the basic unix commands from my USP(Unix Shell Programming) course and used this knowledge while working in intel.
- I took help from my team manager and asked one of the team member to guide me about the work I have to do in my internship.
- I found the learning resources inside the intel and I utilized most of them to increase my level of understand on the tools and technologies that I am working on .
- Effective time management is critical during an internship. So I used to prioritize my tasks and set goals to keep myselef on track.
- I learned from my mistakes .No one is perfect and mistakes are bound to happen. The important thing that I did is to learn from them and avoided making the same mistakes again and again.
- I made myself to be available to the senior employees inorder to learn from them , because they are more experienced.
- I tried to mingle with others , in my team members and build a rapo with them .

Skills Learned :

Shell Scripting : I learned shell scripting during my internship . Since most of the tasks were repetative and time consuming and I need to develop the scripts to automate the tasks I learned bash shell and k-shell scripting .

Python : Learned by attending the trainings inside the intel from the senior employees who have more experience on developing the products . I used python to develop the autoops flow .

Git : Git is a distributed version control system that tracks changes in any set of computer files, usually used for coordinating work among programmers collaboratively developing source code during software development. Its goals include speed, data integrity . I used gitlab which uses git internally.

Vi : Vi is the tool for editing the files . There are many ways to edit files in Unix. Editing files using the screen-oriented text editor **vi** is one of the best ways. This editor enables you to edit lines in context with other lines in the file.

SSH : Since most of the time I need to connect to the remote servers , I used ssh to connect to the remote server . SSH stands for Secure Shell , it is the standard newtwork protocol that enables to communicate each other .

Example : To connect to the particular site we can do like

ssh <site_name> - login . <site_name>

To connect to the particular server we can do something like

ssh <server_name>

Conclusion :

During my internship at intel I learned a lot . I learned how to develop the python and bash scripts. I learned how to find the root cause for any type of problem while working . Intel not only teached me on how to connect to the remote servers globally, it also teached me how to connect to the people around the world while working remotely. Interning at intel helped me to gain the hands on experience and exposure to cutting edge technologies.The company is known for its strong work culture of innovation and commitment to diversity and also inclusion.It's an honour to work with the greatest minds on the globe.I closely monitered and maintained the hardware while developing the scripts. Working with great minds , and carrying out discussion,knowledge sharing had been stupendous , it helped me to build new dimensions to my perceptions in terms of software solutions in the intel. I came to know that intel is not only part of computers it's the part of everyone's life .

References :

1. For Unix Commands which i used in my internship , please refer *https://www.geeksforgeeks.org/essential-linuxunix-commands/*

2. For Revision Control System (RCS) , refer *https://docstore.mik.ua/orelly/unix3/upt/ch39_05.htm#:~:text=The%20co%20(checkout)%20command%20will,one%20else%20can%20edit%20it*

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