FINAL YEAR B. TECH SEMESTER INTERNSHIP REPORT

A report submitted in partial fulfillment of the requirements for the award of Degree of

BACHELOR OF TECHNOLOGY in

ELECTRONIC AND COMMUNICATION ENGINEERING

SUBMITTED BY BT18ECE013 Mudit Gupta

INTERNSHIP PERIOD: 8th July 2021 – 7th January 2022

Under the Supervision of Sanjeev Kumar Sharma

भारतीय सचूना प्रौद्योगिकी संस्थान, नागपुर

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY

NAGPUR

(An Institution of National Importance by Act of Parliament)

Survey No. 140,141/1,

Behind Br. Sheshrao Wankhade Shetkari Sahkari Soot Girni, Waranga, Dongargaon(Butibori), Nagpur (Rural), Maharashtra- 441108.

ERICSSON

Public
INTERNSHIP COMPLETION CERTIFCATE

Date	Reference
2022-01-20	EGIL/HR-476 Uen
Your Date	Your Reference

Attending to this matter
NO/EGI/H Rajat Bajaj/AS

Mr. Mudit Gupta

TO WHOM SO EVER IT MAY CONCERN

This is to certify that Mr. Mudit Gupta has successfully completed internship at Ericsson, starting from 08-Jul-2021 to 07-Jan-2022. During this period, Mudit has worked on the project- "**Automation CI/CD Pipeline".**

He has been a sincere and hard working person and has shown very good learning & understanding abilities.

We wish him all the best for future endeavours.

Yours faithfully,
ERICSSON INDIA GLOBAL SERVICES PRIVATE LIMITED

RAJAT BAJAJ Digitally signed by RAJAT BAJAJ Date: 2022.01.20 22:37:58 +05'30'

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INTERNSHIP PERFORMANCE ASSESSMENT BY EMPLOYER

To,
The Reporting Manager / Program Coordinator (Internships)

We appreciate your contribution to the professional growth and development of students of IIIT Nagpur.
This internship is a mandatory part of B.Tech curriculum at IIIT Nagpur. This Assessment form is a part of INTERNSHIP EVALUATION of the student. Based on your assessment, the student will earn the credits for this internship.

Please handover this document duly filled and signed by the Supervisor/Reporting Manager to the student for submitting to the Institute.

Please note this form may be shared with the student; comments that will aid the student in career and related skill development are particularly encouraged.

STUDENT'S INFORMATION:

Student's Name: Mudit Gupta

Student's Enrollment Number: BT18ECE013

Internship Start Date: 8th July 2021

Internship End Date: 7th January 2022

Work hours per week:

- **Internship Profile Name**: Development of SWDP (CI/CD)

- **Duties allotted to the student: Worked as a developer, responsible for coding, testing, troubleshooting, bug fixing.**

INTERNSHIP EVALUATION SHEET

Please rate the internship performance of the student in the following areas on a scale of 1 to 5.

1=Poor	2=Acceptable	3=Good	4=Very good	5=Excellent

Sr No	Area	Rating (Out of 5)	Comments
1	Domain knowledge	4	Mudit very well understood the technologies and requirements used in SWDP (Software Delivery Pipeline or CI/CD)
2	Ability to apply domain knowledge to tasks given	4	Delivered quality work on time.
3	Completion of Assignment/Project	5	On/before time delivery of tasks.
4	Ability to meet deadlines	5	Demonstrates capability to deliver assigned tasks on time.
5	Ability to develop creative solutions to problems	4	Put efforts in thinking the solution and comes up with valuable ideas.
6	Ability to take initiative	5	Shows willingness to take responsibilities and self-initiatives
7	Ability to work with others	5	A very good team player, helping other team members in completing the activities.
8	Presentation Skills	4	A very clear thought while discussing any requirement, design etc.
9	Communications Skills	4	Able to communicate effectively during discussions and detailing out the solutions/design etc.
10	Punctuality	5	Very sincere, always on time, understands the priorities.
	TOTAL SCORE (Out of 50)	45	

NARRATIVE ASSESSMENT (*Please state in narrative form your final assessment of the student's performance. Is the student better prepared for the industry? What are the specific strengths and weaknesses?*)

Mudit is technically strong as per his experience level and as an intern. He understands the technology well, works hard to understand the requirements, Frameworks etc which helped in valuable contribution from his side in the activities assigned to him. He is fast learner, shows perseverance, thrives for new learnings. As an intern, he gave additional strength to team in completing the activities on/before time with quality.

RECOMMENDATIONS (*Do you have any recommendations to the program faculty on how to improve the program or the internship experience?*)

_____

_____

_____

_____

_____

DETAILS OF THE ORGANIZATION WHERE INTERNSHIP IS PURSUED

Name of the Organization/Institute where internship is pursued: Ericsson Global India Ltd.

Office Address: Tower A, ASF Insignia, Gwal Pahari, Gurgaon Faridabad Road, Gurgaon

Date of Evaluation: 22-12-2021

Name of Supervisor/Reporting Manager:
Sanjeev Kumar Sharma

Signature of Supervisor/Reporting Manager:
_____

Contact No: +919289096230 **E-mail ID**: sanjeev.kumar.sharma@ericsson.com

Company Seal:

Declaration

I Mudit Gupta, declare that the internship report submitted to the Indian Institute of Information Technology, Nagpur in partial fulfillment of the requirement for the award of the degree of B. Tech in the Electronics and Communication Department is a work contained in this project that has been done by me under the guidance of my supervisor(s).

In respect of materials (data, theoretical analysis, figures, and text) from other sources, I have acknowledged their contribution by citing them in the text of the report and supplying their details in the references.

I further declare that the work reported in this project has not been submitted and will not be submitted, either in part or in full, for the award of any other degree in this institute or any other institute or university. and I have conformed to the Internship guidelines given by the Institute.

(Signature Of Student)
Mudit Gupta
BT18ECE013

(Signature of Institute Mentor)
Dr. Rashmi Pandhare
Assistant Professor IIIT Nagpur

Acknowledgement

I would like to extend my heartfelt obligation towards all the personages who have helped me in this endeavor. Without their active guidance, help, and cooperation, I would not have made headway in this six-month internship.

Internship Opportunity with Ericsson Global India Ltd. Gurgaon was a great learning opportunity for me. I would like to show my gratitude to **Mr Sanjeev Kumar Sharma**, R&D manager, Ericsson Global Services for constantly guiding me and to all the team members who have created a nurturing working environment, evolving my professional persona and introducing me to corporate culture.

I thank the **IIIT Nagpur Senate** who has made a six-month internship compulsory part of the curriculum. Sincere thanks to **Dr Omprakash Kakde**, Director IIIT Nagpur, and **Dr Ashwin Kothari**, Dean IIIT Nagpur, for this opportunity.

I express my gratitude to **Dr Tapan Kumar Jain**, HoD, ECE, **Dr Rashmi Pandhare**, Asst. Professor, ECE and Training and **Placement cell, IIIT Nagpur** for helping me throughout the journey in every best way possible.

Also, I would like to thank all my friends and all other people who have directly or indirectly helped me in this internship, making it possible.

Mudit Gupta
9th January 2022

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Telefonaktiebolaget LM Ericsson (lit. "Telephone Stock Company of LM Ericsson"), commonly known as Ericsson, is a Swedish multinational networking and telecommunications company headquartered in Stockholm. The company sells infrastructure, software, and services in information and communications technology for telecommunications service providers and enterprises, including, among others, 3G, 4G, and 5G equipment, and Internet Protocol (IP) and optical transport systems.

The company employs around 100,000 people and operates in more than 180 countries. Ericsson has over 57,000 granted patents. Ericsson has been a major contributor to the development of the telecommunications industry and is one of the leaders in 5G.

Ericsson Global India Ltd.

Ericsson has more employees in India than in any other country. With regional headquarters in Gurgaon, Haryana, the Indian region has 19,971 employees working in engineering and research and development in areas such as revenue management, internet protocol, networking and big data.

The R&D (Research and Development) centre at Gurgaon, the unit provides core networks, Operations Support Systems such as network management and analytics, and Business Support Systems such as billing and mediation. Within the Digital Services unit, there is an m-Commerce offering, which focuses on service providers and facilitates their working with financial institutions and intermediaries.

Ericsson Mediation Department

Mediation is a key telecom node as defined in standards, which is in between the data generators, like network or IT nodes and the data consumers which are the downstream operations and business support systems. The mediation system is responsible to filter out the non-relevant data, aggregating the partial data records and transforming the data as per the format required by the data consumers.

The importance of mediation is ever increasing and it simply will not be possible to manage today's complex networks without a fit-for-purpose mediation function. New technologies, new formats, new protocols and new, fast-changing business models require a fully convergent mediation platform that can bridge all network elements with your Operations and Business Support Systems (OSS/BSS).

Ericsson as a company has been leading the mediation business since the need was identified in the 1990s. All this knowledge and understanding gained over the years has been gathered into our Ericsson Mediation product.

Today it is the market-leading mediation solution covering all your requirements in telecom and IT mediation. With modern interfaces, it even supports the big data you need to analyze and understand the market and consumer behaviour, so you can identify trends and act.

Business Model For Mediation

It collects, transforms and distributes data from your network and IT systems, making it available for a range of purposes such as charging and billing, service assurance, fraud detection and compiling statistics. It also provides post-processing systems with one stable, flexible and uniform interface for online and offline charging data collection – even when the network uses a range of technologies and equipment from multiple vendors.

Key features

- Pre-integrated. Ericsson Mediation has been designed, tested and verified for fast deployment with Ericsson equipment, yet also supports equipment from other vendors.
- Agile Mediation to Handle Service Complexity: Ericsson Mediation provides several capabilities that redefines the way the system is used. Due to the support of a state of the art web-based interface, it is possible to access key functionalities remotely from any device. Ericsson Mediation, therefore, is clearly on track to provide the best user experience to the user thus becoming the platform of choice.
- One Mediation for All Business Needs: As a single solution for all mediation needs, Ericsson Mediation's vast capabilities enable OSS/BSS transformation and leverage all available data to power more informed business decisions.
- LTE capabilities. Ericsson Mediation provides out-of-the-box applications for fast solution deployment in key areas such as charging and billing in a VoLTE. VoWiFi environment. It can be deployed as a VNF node in the Cloud NFV environment.
- Enabler of IT Systems Interworking: OSS/BSS transformation aims to increase flexibility and speed, but during any system evolution, different components will evolve at a different pace. Legacy systems need to coexist and interoperate with modern business support systems in different phases of transformation. Ericsson Mediation plays a key role in smoothening this evolution, with inherent capabilities to act as an IT interoperability and message orchestrator.
- Flexible Deployment: Ericsson Mediation deployment options contribute to this flexibility in two important ways:
    - Providing vendor independence for needed hardware
    - By supporting various deployment modes i.e. native, virtualization and cloud.

Internship Profile

Role: Software Developer for Automation

Duration: 6 months

Team Name: SWDP Team

Team Members: Mentioning the team with whom I have closely worked with

- Project Manager - Vipul Jain
- Project Owner - Naiza Mazhar
- Scrum Master - Himanshu Khunteta
- ESR Lead - Peeyush Jain
- Software Developer - Mili Supreet, Kshitiz Gupta, Riya Jindal, Neha Saini

Description

I was offered a six-month internship after Technical rounds and interviews. The position was for a software development intern. It was a good opportunity for me. The process was very standard for selection and onboarding. Over the complete duration of the internship, I was attached to a single team in Ericsson Mediation Department.

My role at Ericsson was on the automation of the Ericsson Mediation (EM) Software. This involves knowledge of DevOps as well as the Software Development cycle. The software should be able to install and upgrade EM on customer service. I was focused primarily on development, maintenance, and testing software.

WorkFlow

- The working model for the whole duration of the Internship was Online.
- Working Hours every day were from 8 am to 5 pm.

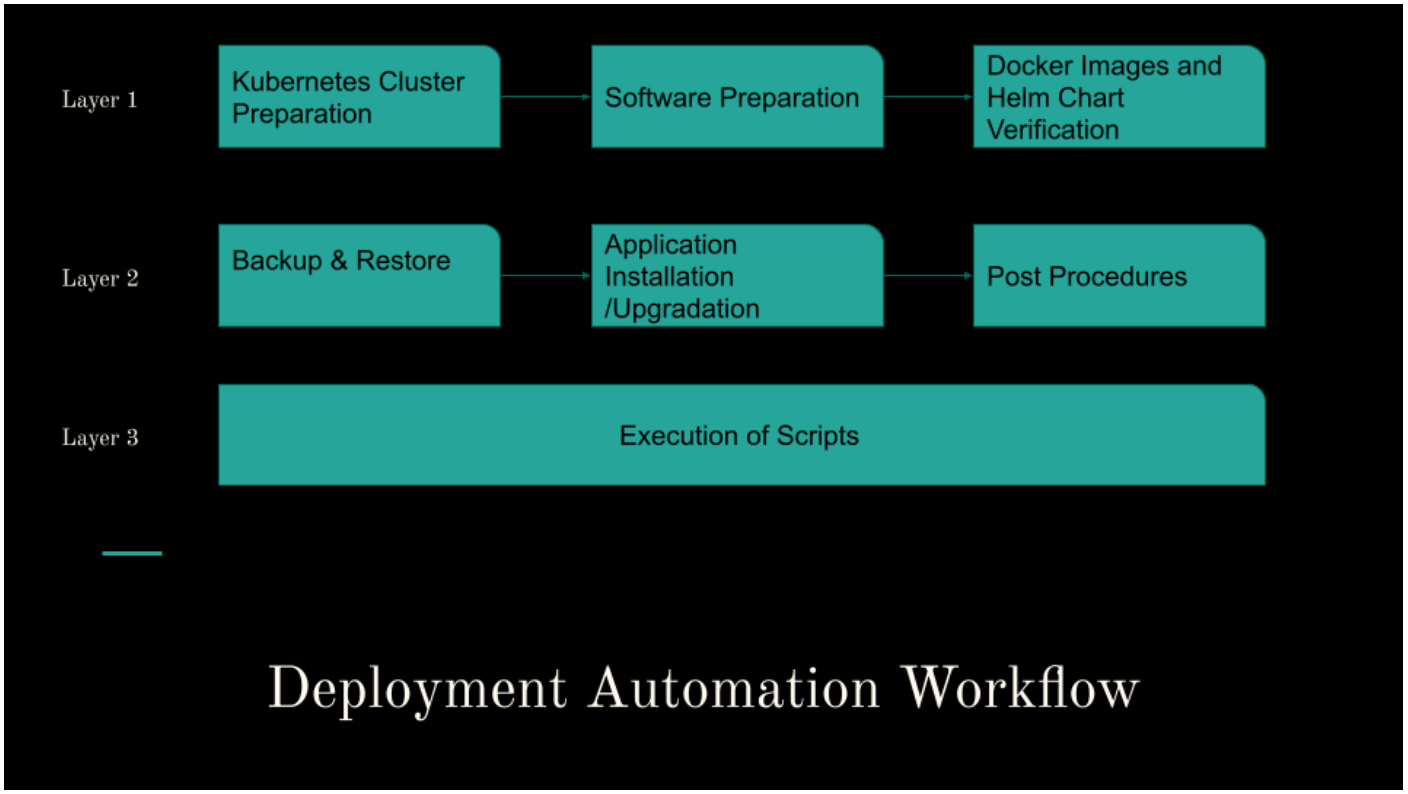
- The complete project was divided into sprints. Each sprint was of 10 working days
- In each sprint, the scrum master will assign a ticket (task) to each of the team members which has to be closed (completed) by the end of the current sprint. However, there could be a spillover of the tickets as the task required more work or interdependency from other teams.
- Every day a standup call was scheduled to discuss the updates and gain information on the progress within the teams. This involved query submission, resource planning and overview.

- After a ticket is assigned to you we need to do the following
    - Understand the problem statement
    - Develop a solution case
    - Present the solution to the team
    - Code
    - Analysis
    - Checkin
    - Final Review
    - Ticket under verification
- There was a weekly demo session that consisted of merging the code from all the developers and after integration, performing a run to verify for successful merging.
- Quarterly the product needs to be presented by the team to the Mediation Department to show its work and features.
- Then before releasing the software, final testing is done by a testing team to perform simulation cases and find out the bugs which need to be fixed. This feedback is then addressed by the development team.
- After the final go-ahead by that development and testing team, the software is released in the market.

Technical Description of the Project

The project in which I was engaged was responsible for the Automation of one of the most important products of Ericsson, that is, Mediation. Normally, Ericsson Mediation (EM) which needs to be set up in a consumer's server requires a lot of work, involving critical steps and hours of debugging time if any manual error arises.

Therefore, Automation of the whole process is being developed. EM has a lot of services that run on various pods and inside that there are containers. CDD software ensures that all the services are up and running and therefore it follows a pipeline flow which is given below.



- Layer 1 - In this layer, the server is prepared for the installation or up-gradation of EM.
    - Kubernetes Cluster Preparation - In this step a storage space is set up for the first time in the installation or it is checked whether all old version services are running that needs to be updated.
    - Software Preparation - In this step docker images along with helm charts are fetched.
    - Docker Images and Helm Chart Verification - A sanity check is performed on all the resources which are fetched from the internal Ericsson server.

- Layer 2 - In this layer, the installation/ Upgradation of all services in the consumer environment happens.
    - Backup & Restore - Before performing any upgrade on the existing installed EM services, a backup is being performed using the BRO (Backup, Restore Orchestrator). In any case, the upgrade fails therefore we will be able to perform a rollback.
    - Application Installation / Upgradation - This is the most important step in the whole project, where all the services which are running are terminated and again installed with the latest features. This is performed using Helm and Kubectl commands.
    - Post Procedures - When all the services are updated or installed, then certain pods need to be integrated with one another for the proper functioning of the whole product. This step involves the same.

- Layer 3 - In this Layer, when all the previous steps are successfully completed then Test Cases are executed for checking the product in the customer environment.
    - Once all the test cases run successfully. Then License Verification is performed.
    - GUI based services are activated after successful validation.
    - Consumers can now use the EM product.

Work Done during the internship, Weekly Analysis

Over the span of 6 months, I have worked on various modules and technologies and below is a tabular description of the accomplishments week wise.

The table contains all the major work I have in very brief bullet points format.

Month-1	
Week	Activity Performed
1	● Onboarding, Team Introduction ● Vartalaap Sessions (Orientation) ● Resources Access ● Working Routine
2	● Project Introduction ● Setting up coding environment on VDA ● Cloning the project ● Understanding the Project
3	● Documentation Understanding ● Tasks Assignment Started ● Version Controlled Systems learning
4	● Learning Microservices, Kubernetes, Helm and Docker ● Python, Jenkins and Spinnaker Technologies pioneering

Month-2	
Week	Activity Performed
1	• Implementation of Logging throughout the project using Logger Module for Python
2	• Software Ingestion Setup
3	• Extraction Automation of zip files • Checksum of extracted files by performing MD5/Sha256
4	• Script development for XML ticket search and matching checksum

Month-3	
Week	Activity Performed
1	• Learning Robot Framework • Maven Project setup for reference
2	• Python Library development for Ericsson Smart Robot. • Parallel Test Case executions
3	• Automation of Kubernetes Cluster setup • Cleaning up of a namespace • Storage class Deletion • Removal of the secrets created for old services
4	

Month-4	
Week	Activity Performed
1 2 3 4	● Pre Upgrade Checks ● Performing secure connection to Kubernetes cluster using Kube config ● Pods status whether they are in Running/Pending state ● Backup and Restore agent tag is enabled in all the services or not ● YAML files with all the values are present to the corresponding services that need to be updated or installed.

Month-5	
Week	Activity Performed
1	● Python Script development for installation and updating of the EM services
2	● Backup Automation using BRO (Orchestrator) ● Executing scripts inside pods via secure SSH connection
3 4	● Debugging and Testing of the Scripts Developed on Jenkins and Spinnaker. ● End to end software execution. ● Customer like Setup simulation ● Code Quality Enhancement

Month-6	
Week	Activity Performed
1	● Reporting ● Create Summary data in a Table format
2	● Sanity Check and ● License Verification from consumer
3	● Analysis Of Rollback Services ● Presentation by the team for the Product to be delivered at Q4, 2021 ● Testing Report from other teams ● Feedback Analysis for the software ● Corrections in the code
4	● Documentation of the whole Project. ● Farewell

Modules Used

- Requests -
    - Requests is an HTTP library for the Python programming language. The goal of the project is to make HTTP requests simpler and more human-friendly. The current version is 2.26.0. Requests are released under the Apache License 2.0.
    - Requests are one of the most popular Python libraries that are not included with Python. Requests allow you to send HTTP/1.1 requests extremely easily. There's no need to manually add query strings to your URLs or to form-encode your POST data. Keep-alive and HTTP connection pooling are 100% automatic, thanks to urllib3.

- Pyyaml -
    - YAML is a data serialization format designed for human readability and interaction with scripting languages. PyYAML is a YAML parser and emitter for Python.
    - PyYAML features a complete YAML 1.1 parser, Unicode support, pickle support, capable extension API, and sensible error messages. PyYAML supports standard YAML tags and provides Python-specific tags that allow representing an arbitrary Python object.
    - PyYAML is applicable for a broad range of tasks from complex configuration files to object serialization and persistence

- Python RegEx -
    - A RegEx, or Regular Expression, is a sequence of characters that forms a search pattern.
    - RegEx can be used to check if a string contains the specified search pattern.
    - Python has a built-in package called re, which can be used to work with Regular Expressions.

- Logger -
    - Python has a built-in module logging which allows writing status messages to a file or any other output streams. The file can contain the information on which part of the

code is executed and what problems have been arisen.

- Robot framework -
    - Robot Framework is a generic open-source automation framework. It can be used for test automation and robotic process automation (RPA).
    - Robot Framework is open and extensible. Robot Framework can be integrated with virtually any other tool to create powerful and flexible automation solutions. Robot Framework is free to use without licensing costs.
    - Robot Framework has an easy syntax, utilizing human-readable keywords. Its capabilities can be extended by libraries implemented with Python, Java or any other programming language. Robot Framework has a rich ecosystem around it, consisting of libraries and tools that are developed as separate projects.

- Sys - The sys module in Python provides various functions and variables that are used to manipulate different parts of the Python runtime environment. It allows operating on the interpreter as it provides access to the variables and functions that interact strongly with the interpreter

- OS - The OS module in Python provides functions for interacting with the operating system. OS comes under Python's standard utility modules. This module provides a portable way of using operating system dependent functionality. The *os* and *os.path* modules include many functions to interact with the file system.

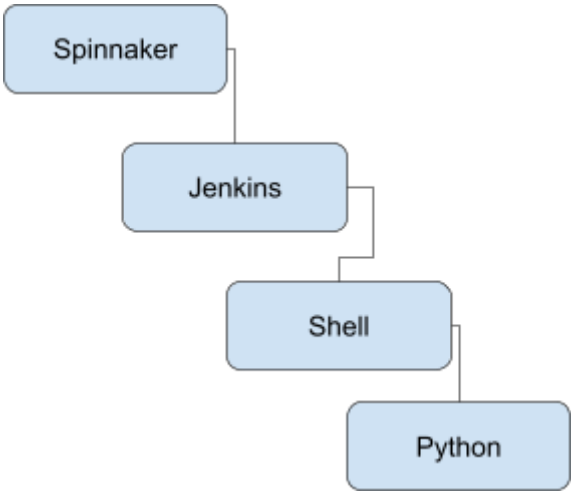
- Time - Python time module allows to work with time in Python. It allows functionality like getting the current time, pausing the Program from executing, etc.

- XML etree - The xml.etree.ElementTree module implements a simple and efficient API for parsing and creating XML data.XML in an inherently hierarchical data format and the most natural way to represent it is with a tree.

- Subprocess - The subprocess module allows you to spawn new processes, connect to their input/output/error pipes, and obtain their return codes. This module intends to replace several older modules and functions

Theoretical Background of the Concepts

All the technologies are interlinked among each other in the broader perspective and then everything is packaged together which then is deployed as a product.



The above flow chart describes the control on level wise technologies. The overall pipeline execution begins from Spinnaker and then it calls Jenkins which has an individual Shell inside that commands are executed, along with Python Scripts.

The model is a very good one but, different kinds of problems arise when we are using multiple shells and servers. One issue that I was able to rectify was secure access among different servers using SSH. In an automated it is a little tricky to enter password on runtime.

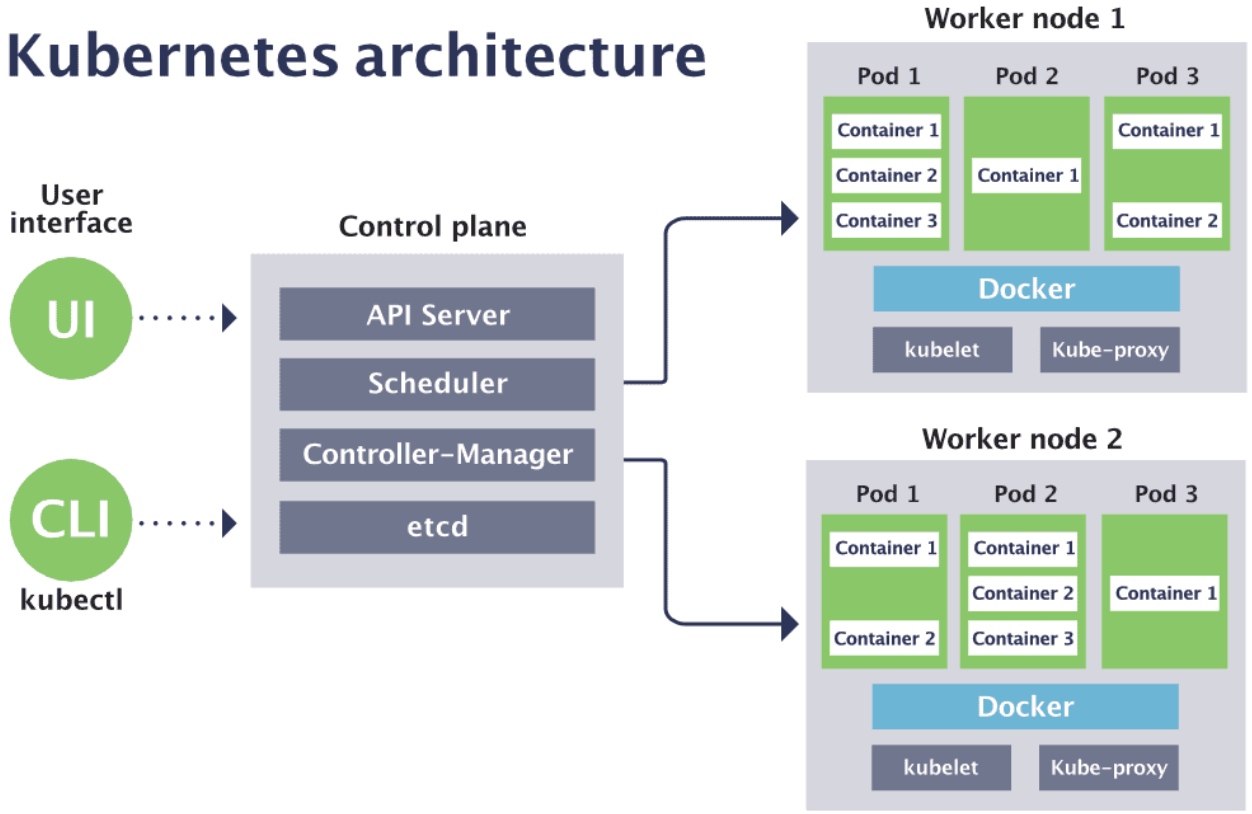
```
Big-Retina-MacBook-Pro% ssh osxdaily@192.168.1.5
Password:
Last login: Thu Apr 27 15:00:55 2017 from 192.168.1.5
Big-Retina-MacBook-Pro:~ osxdaily$ exit
logout
Connection to 192.168.1.5 closed.
Big-Retina-MacBook-Pro%
```

The above referential image shows that passwords need to entered on runtime for this we use ssh askpass method to echo the value at runtime and we can use encryption techniques to keep the password safe before sending.

```
#!/bin/bash

u="testuser"
p="testpassword"

ask="/tmp/ask"

echo "echo $p" > $ask
chmod +x $ask

SSH_ASKPASS=$ask
DISPLAY=localhost:0.0
setsid ssh -o StrictHostKeyChecking=no -o UserKnownHostsFile=/dev/null
```

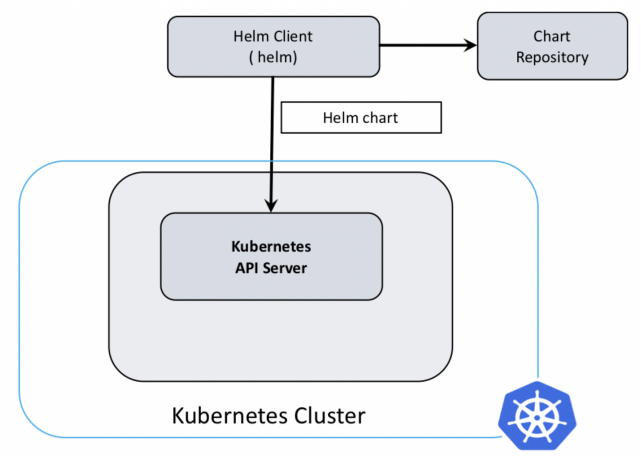
Using the Above method we can eliminate the issue, by calling this script as a command.

Throughout the project I learnt how kubernetes work, this diagram shows the architecture of kubernetes.



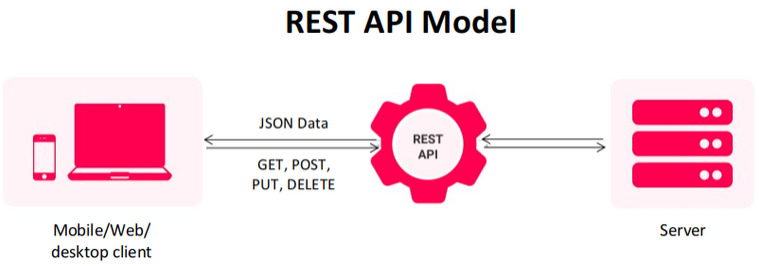
- Kubectl is a cli for kubectl to control the pods and its container services. It can be used to scale the amount of replicas according to the demand of a particular pod.
- User side won't be knowing on which pod the service is running and due to various replicas the data is continuously copied to among themselves, to remove the possibility of any data loss.

- For Installation of a service as a pod, helm chart is developed and it is configured by YAML files. Therefore the command for installation can be shown as
    - Helm install –kubeconfig kube.config -f values.yaml deployment_template.zip



- The chart repository is fetched on the internal ericsson server and downloaded on the working node, then It is installed on the kubernetes cluster.
- Using python then was checked whether the service was properly deployed and now it is in running state. Until then the whole thing is in pause state with a timeout condition.
- On an occasion if a service is not up due to any dependencies or resource crunch then via timeout condition the pipeline can be failed, giving immediate feedback to the user with issues faced.
- Monitoring of the software while development is one of the most important tasks are there might be several centarios where it can crash and this leads to losing control over the flow.

- Receiving files from the customer for configuration is done by REST API, all the YAML files are posted on the server via REST API which was also automated as by only giving the file location, a shell script could send all the files to the desired location.



Productivity Tools Used

- Python -

Python is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation. Its language constructs as well as its object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects.
Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented and functional programming. It is often described as a "batteries included" language due to its comprehensive standard library

- Shell -

A shell script is a computer program designed to be run by the Unix shell, a command-line interpreter. The various dialects of shell scripts are considered to be scripting languages.
Typical operations performed by shell scripts include file manipulation, program execution, and printing text. A script that sets up the environment, runs the program, and does any necessary cleanup or logging, is called a wrapper.

- Citrix Workspace -

Citrix Receiver is the client component of XenDesktop or XenApp. Devices with Receiver installed can access full desktops via XenDesktop or individual applications via XenApp from a centralized host, such as a server or cloud infrastructure. The product's intended users are employees.

- Jenkins -

Jenkins is an open-source automation server. It helps automate the parts of software development related to building, testing, and deploying, facilitating continuous integration and continuous delivery. It is a server-based system that runs in servlet containers such as Apache Tomcat. It supports version control tools, including AccuRev, CVS, Subversion, Git, Mercurial, Perforce, ClearCase and RTC, and can execute Apache Ant, Apache Maven and SBT based projects as well as arbitrary shell scripts and Windows batch commands.

- Spinnaker -

Spinnaker is a free and open-source continuous delivery software platform originally developed by Netflix and extended by Google. It is designed to work with Kubernetes, Google Cloud Platform, AWS, Microsoft Azure and Oracle Cloud. Spinnaker was developed by Netflix as a successor to the internally developed Asgard. It was released under the Apache License 2.0 on November 16 2015 and has been adopted by tech companies.

- Kubernetes -

Kubernetes, commonly stylized as K8s, is an open-source container orchestration system for automating software deployment, scaling, and management. Originally, Google designed Kubernetes, but now, the Cloud Native Computing Foundation maintains the project. Kubernetes works with Docker, Containers, and CRI-O. Originally, it interfaced exclusively with the Docker runtime through a "Dockershim"; however, since 2016, Kubernetes has deprecated the shim in favour of directly interfacing with the container through Containers or replacing Docker with a runtime that is compliant with the Container Runtime Interface.

- Helm - 

Helm helps you manage Kubernetes applications — Helm Charts help you define, install, and upgrade even the most complex Kubernetes application. It is used to build Helm charts, which are packages of Kubernetes resources that are used to deploy apps to a cluster. Those charts are kept in a repository served by the chart museum.

- Java - 

Java is a high-level, class-based, object-oriented programming language that is designed to have as few implementation dependencies as possible. It is a general-purpose programming language intended to let programmers write once, run anywhere (WORA), meaning that compiled Java code can run on all platforms that support Java without the need for recompilation.

- Jira - 

Jira is a software application used for issue tracking and project management. The tool, developed by the Australian software company Atlassian, has become widely used by agile development teams to track bugs, stories, epics, and other tasks.
Create, collaborate, and organize all your work in one place. Confluence is a team workspace where knowledge and collaboration meet. Dynamic pages give your team a place to create, capture, and collaborate on any project or idea

- Version Controlled Tools -

Version control, also known as source control, is the practice of tracking and managing changes to software code. Version control systems are software tools that help software teams manage changes to source code over time.

As development environments have accelerated, version control systems help software teams work faster and smarter. They are especially useful for DevOps teams since they help them to reduce development time and increase successful deployments.

Version control software keeps track of every modification to the code in a special kind of database. If a mistake is made, developers can turn back the clock and compare earlier versions of the code to help fix the mistake while minimizing disruption to all team members.

- Microsoft Suite -

Microsoft Office, or simply Office, is a family of client software, server software, and services developed by Microsoft. The office contains Microsoft Word, Microsoft Excel, and Microsoft PowerPoint, etc. along with Microsoft Teams which is the official meeting and chatting app.

Learning Aspects

1. As a Software Developer, I have about how software is released as a product. Industry-specific internships are designed to provide individuals with hands-on experience working in their preferred industry. Here I have gained the IT sector knowledge which will give a kickstart to my professional career.

2. New technologies are being used and skill enhancement of the technologies that I already have learnt in my college. The connection between different platforms such as python, shell and Jenkins.

3. Time Management, managing time is a crucial aspect for success. Sometimes I was given short deadlines for the assigned work, but by delegating time in planning and organizing tasks I learned how to manage time and submit the required work in a timely.

4. Coordination is required among team members to execute a task successfully. I learnt that it is incredibly important to continuously interact with your team members and be an active part of the team building activities. This makes it easier for us to bond and coordinate while working together on a project for better results.

5. Automation Process, DevOps Cycle and agile methodologies, I have learnt these technologies in my college from a theoretical aspect, but from this internship, I was actually able to practically perform it and see its implementation.

6. Version Controlled tools and code quality aspects for continuous integration of software. I learnt how VCT is used in an IT company, to integrate work between developers. The technologies were Gerrit (Github), JIRA by Atlassian, Confluence, etc.

Challenges Faced

- There were a lot of challenges that I faced during the internship because the complete internship was online and it was amidst a pandemic.

- Learning new technologies - When my internship started, within a week there was a lot of new technologies that was expected of me to be proficient at in a very short time span. To overcome this problem, I took help from my college faculty, friends and also have attended many online sessions to quickly gain knowledge, then as the task was assigned to me. I would assess the case and learn the new topic along with work.

- The complexity of Work - This internship is my first industrial exposure, a lot of work given to me was very different to the exams and projects I have done till now. To overcome it I tried to put in extra efforts to develop efficient algorithms and design, also taking up the doubts in online forums for better solutions.

- Deadlines - Every Company has time-limited work and completing tasks before a deadline is always very challenging. There were some times when a minor spillover of tasks happened. To overcome this issue, working on parallel modules was a good option so that whenever I am stuck in one module, I could make up my time by completing other modules before the end dates.

- Internship with other plans - My internship was going on with my final year project, placement exams, practice tests and interviews preparation for getting landing myself into a good position after my graduation. Managing all that with conflicts in time slots was a little tricky but it also helped me to get multitasking experience, which would surely help me in future.

Result / Outcome

- There was a lot of exposure to myself via this internship in the IT industry and technology skill set development. All the theoretical knowledge of Operating systems, shell scripting, python coding and algorithms were applied to a practical application.

- Product wise - The EM product can now be installed on a kubernetes cluster in an automated way. All the manual monitoring and debugging time will now be saved, also benefiting the company to present its software as more robust with advanced features.

- I was able to improve and acquire new skills not only in the technical field but also in the professional field as well.I gained a solid understanding of different tech stacks, programming languages, and engineering practices, below are some key learnings primarily in the field of Software Development.

- Agile software development -- also referred to simply as Agile -- is a type of development methodology that anticipates the need for flexibility and applies a level of pragmatism to the delivery of the finished product.

- Resource estimation is the technique of assessing the type and number of resources required for an upcoming project. Resources are the driving force behind the success of the project.

- Ideas, timelines, and estimates that are related directly to technical knowledge are hard to explain to non-technical audiences. Through frequent explanation and communication required between managers, Project owner, and other team members helped me improve this skill.

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