



WIL PROJECT

Program Name: CCBT

Project Code: CPL-5559-CCBT-0050

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Technical Report

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EXECUTIVE SUMMARY:

Cloud computing is a method of delivering computing services (including databases, servers, software, and networking) through the internet, permitting the user to bypass direct management of on-premises systems. Cloud computing is a system to remotely store and retrieve data and programming that develops the internet rather than hosting data on your computer's hard drive.

Monitoring Tools: **CloudWatch** (AWS), **Sysdig** (IBM Cloud)

Storage Solutions: **Amazon S3**, **Amazon EBS**, **Amazon EFS**, **vSphere**, **NFS**, **Minio**, **GlusterFS**

Replication solutions: **S3 Cross-Region Replication -CRR**, **S3 Replication Time Control** , **IBM Big Replicate** .

BODY:

CloudWatch supports you to monitor your entire stack (applications, infrastructure, and services) and make use of alarms, logs, and events data to take programmed actions and diminish mean time to resolution. This frees up valuable resources and allows you to focus on building applications and business value. Amazon CloudWatch grants you to store infrastructure metrics from most of the AWS services, such as Amazon Simple Storage Service (Amazon S3), AWS Lambda, and Amazon API Gateway, Amazon ECS, Amazon Elastic Compute Cloud (Amazon EC2), Amazon DynamoDB, with no activity on your part.

IBM Cloud Monitoring with **Sysdig** provides a entirely controlled enterprise monitoring solution for application visibility, troubleshooting and alerting in the IBM Cloud. The IBM Cloud Monitoring with Sysdig service is a fully managed enterprise-grade monitoring service for administrators, Devops teams and developers. You get deep container visibility, comprehensive metrics and service-oriented views.

Container Insights offers automatic dashboards in the CloudWatch console. These dashboards encapsulate the compute performance, alarms by cluster, pod/task, errors, and service. Each dashboard reviews the list of running pods/tasks or containers by CPU and memory for the time window. We can dive deeper into database logs, systems logs, AWS X-Ray traces, and other performance events contextually, based on different parameters and selected infrastructure or container.

IBM Cloud Monitoring with **Sysdig** allows you to monitor health and performance with deep visibility into your Kubernetes infrastructure and containers. IBM Cloud Monitoring with Sysdig helps you resolve issues faster by using granular data derived from system calls and correlating events and activity enriched with cloud and Kubernetes context.

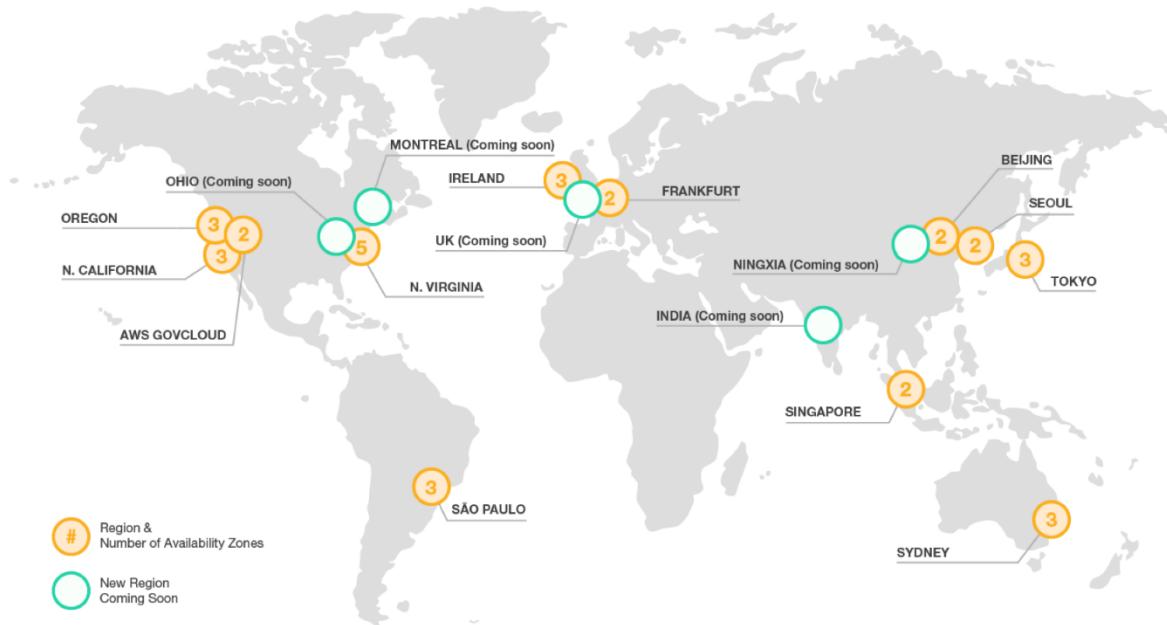
AWS Cost Explorer API enables customers to review pricing available for all different types of services it provides. The Cost Explorer API permits to query your cost and usage data. You can query for collected data such as total monthly costs or weekly costs or total usage on daily basis. You can also query for granular data, such as the number of daily write operations for DynamoDB database tables in your production environment.

Amazon Elastic Load Balance / ELB supports to spread the application traffic to several different targets such as RDS / EC2 instances. The unused targets which are prepared to gather the traffic are monitored by ELB whether they are healthy or not and the traffic is forwarded to the healthy one.

A **vSphere** datastore is a concept that hides storage details, such as LUNs, and delivers a uniform edge for storing persistent data. Datastores support streamlined storage management and data services for storage produced to vSphere. **GlusterFS** : This is a Scale Out Network Attached Storage file system.. The servers have storage bricks and run the glusterfsd Daemon. The GlusterFS clients attach to the servers over a transport layer protocol. GlusterFS has a client/server model

S3 Cross-Region Replication -CRR is utilized to replicate objects across Amazon S3 buckets in several AWS Regions. **S3 Replication Time Control** is utilized to replicate data in the same AWS Region or across different Regions within a predictable time frame. **IBM Big replicate** is the real-time data replication technology which noninvasive and moves big data operations from lab environments to production environments along with from on-premises to cloud environments, with negligible downtime or disruption.

Global Infrastructure



Americas	Europe	Asia Pacific	
Location	Region	Zone	Data center
Dallas	us-south	us-south-1 us-south-2 us-south-3	DAL10 DAL12 DAL13
Sao Paulo	br-sao	br-sao-1 br-sao-2 br-sao-3	SAO01 SAO04 SAO05
Toronto	ca-tor	ca-tor-1 ca-tor-2 ca-tor-3	TOR01 TOR04 TOR05
Washington DC	us-east	us-east-1 us-east-2 us-east-3	WDC04 WDC06 WDC07

Table 1. MZRs in North and South America

XaaS (Everything as a Service) examples:

AWS: Amazon Relational Database Service (RDS) is a fully managed, open-source cloud database service that allows you to easily operate and scale your rdbms instance like Oracle, Postgres, MySQL.

Amazon ElastiCache is a fully managed, in-memory caching service supporting flexible, real-time use cases. ElastiCache can be used for caching, which quickens application and database performance.

IBM Bluemix:

Bluemix is the IBM open cloud platform that provides mobile and web developers access to IBM software for integration security transaction and other key functions as well as software from business partners.

IBM Watson Services

Watson Studio allows you to train, deploy, and manage your AI models, and prepare and analyze information during a single integrated environment

IBM Red Hat OpenShift on IBM Cloud is a fully managed OpenShift service that uses the enterprise scale and security of IBM Cloud to automate updates

Google Cloud:

Google App Engine: App engine service is fully managed by google. A fully managed environment lets you focus on code while App Engine manages infrastructure concerns. App Engine supports most of the development languages and extends a range of developer tools.

Google Big Query

Big Query is a completely managed enterprise data warehouse that supports you control and analyze your data with built-in features similar to machine learning, business intelligence and geospatial analysis

CONCLUSION:

Based on our research on different Public and Private cloud service providers such as AWS we found CloudWatch monitoring tool for AWS as it provides monitoring to all AWS services and is highly automated with least manual intervention needed. Amazon provides on demand services like instances on RDS and storage, memory options on demand which helps reduce cost for any organization. Also, it has self-managed services like on EC2 where organization manages its own storage, memory and supports its own monitoring. Similarly, IBM tool Sysdig is handy monitoring tool for IBM cloud which can monitor all Kubernetes. These monitoring tools can act as programmed based on different alarms and thresholds.

Storage options are vast for both the cloud and provides many options based on organizational needs. With most of the industry moving to serverless architecture , cloud service providers are developing services which are fully managed , Highly available ,price efficient .

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ITIL

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EXECUTIVE SUMMARY

What is ITIL?

ITIL (Information Technology Infrastructure Library) is a framework intended to regulate the selection, planning, maintenance, delivery & overall lifecycle of IT services in a business. These best practices consistently develop as changes are needed in the industry. ITIL focuses to make sure IT services can keep up with business requirements. ITIL is a regulatory framework for how ITIL service management should be done. ITIL service management improves organizations of any size all around the world expand and improve business value take advantage of information technology. ITIL is established on a set of principles centered on value growth and constant improvement, which can take a range of forms.

Traditional IT Support Service

Traditional IT Support provides you access to a group of experts who are ready to solve your IT troubles. This is usually a reactive support model where the client would contact the IT support company when something goes wrong or is not working as required. This type of approach is basically used by small scale industries or mid-size industries where IT infrastructure or application doesn't need continuous support or maintenance.

There are frequently some proactive elements in place that will alert the IT Support company such as an alert where an application has crashed, or a server isn't responding, or a backup has failed. But these are generally picked up at the time the event happens or if abruptly not responded to until the following morning. The fix though is spontaneous in that it is not until it has happened that the IT support company will then struggle to resolve or fix the issue.

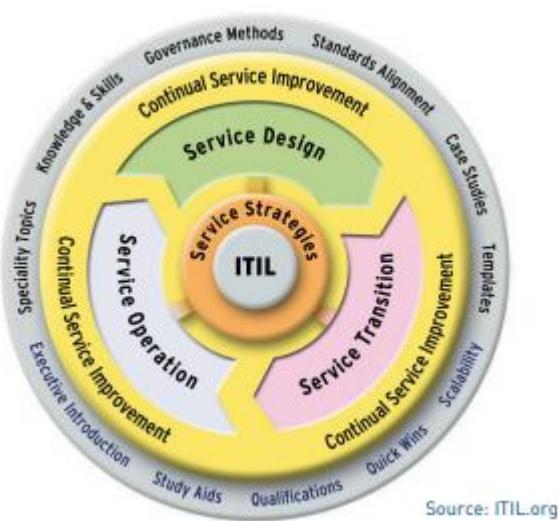
Ex: A good example could be POS system service company. It's a local Billing machine service provider company in food outlets or grocery stores. Initially when service system would go down at stores due to

any technical issue, customer had to call service provider company to fix the issue. Issue could be hardware malfunction or software bug which is a critical issue as it may adversely affect business. In such cases customer had to report an issue via phone calls or email. A normal scenario would be slowness in system which would not impact business completely but would make an impact.

ITIL software support practices

ITIL Best Practices consist of 5 lifecycle phases

- Strategy
- Design
- Transition (which covers implementation and change)
- Operations
- Continual Improvement.



Where ITIL Best Practices are Applicable?

ITIL best practices can be applied to a vast range of fields

1. IT Asset Management

IT asset management is a method that guarantees a company's IT assets like hardware, software, digital data, etc., are recorded, sustained, and updated from time to time.

2. Incident Management

Incident management is a further general process that helps you track and manage unexpected events or service disturbances in your organization. The objective is to restore the service to its normal state as soon as possible.

3. Change Management

Change management is a method that improves to execute or enable organization level changes while reducing the influence of those changes on IT service delivery.

4. Knowledge Management

Knowledge management is a method that helps you create, update, share and access information. Employees of the organization and customers will be able to retrieve help content to get answers quickly.

In traditional IT service practice, it was difficult to diagnose the risks involved in the industry as it was generally an ad-hoc kind of a service, and it would take a longer time for service engineers to diagnose and fix the issue. This puts a lot of impact on the business where business could even face unexpected downtime. But, with ITIL practices which is a framework intended to regulate the selection, planning, maintenance, delivery & overall lifecycle of IT services in a business it drastically improves the uptime of business. ITIL practices make it possible to minimize the upcoming risk by continuously improving the IT services and regulation the overall process of maintenance and delivery.

SLA (Service Level Agreement)

SLA is a documented agreement among a service provider and a customer that recognizes both services involved & the expected level of service.

For ex, when we withdraw cash from ATM it shouldn't take more than 30seconds, that's the SLA between customer and bank. That is an example of a SLA between customer and bank and it is part of service level management.

There are 3 types of SLA's:

Service Level SLA

A service-based SLA covers 1 service for all the customers across.

Customer based SLA

This type of SLA is an agreement with 1 customer, encompassing all the services used by this customer. If the IT service provider delivers numerous services for the business and the customers, and if all the service levels are recorded in one service level agreement for the provided services, this will be a customer-based SLA.

Multi-level SLA

This type of SLA aims on the organization of the customer. All services and their interrelations with subordinate services are applied when describing the multi-level service level agreement structure.

SLA metric for Nextera

Network Availability	Wireless Data, voice services will be available at least 99.99% for Fiber, T-1, EoC. 99 % for wireless network.
Network Latency Guarantees	Its Latency Guarantee is 60 ms or less for average round-trip between its designated core routers/switches and its network equipment located at customer premise.
Packet Delivery Guarantees	99.9% between its designated core routers or switches & the Customer Premise Equipment
Maintenance Window	2:00 AM -4:00 AM
Time to Restore	Status update within 1 hour from receipt of trouble ticket for Fiber, T-1, EoC and 4 hours SLA to restore the services.

Applications which are commonly used in IT landscape that support ITIL

ServiceNow

This is industry's leading ITSM platform, which was built using best practices of ITIL. This injects ITIL best practices into your operations or business. It is a cloud-based platform. It is highly customizable & also can be used for additional purposes.

It recommends many ready to use workflows, solutions, and products for an organization. The organization can build the customized apps and modules as per their business requisite using its scripting and existing tools.

Services of ServiceNow

- ✓ IT Service management
- ✓ HR management
- ✓ IT Asset management
- ✓ Finance operation management

JIRA Service Management

It is a project management tool based on best practices of ITIL which is commonly used for issues and bugs tracking system. It is commonly utilized as an issue-tracking tool for all types of testing.

Use of JIRA

Some of the most significant uses of JIRA are as follows.

- ✓ It is very useful in Workflow and Process management.
- ✓ It is used in Bugs, Issues and Change Request Tracking.
- ✓ JIRA can be used in Customer service, help desk, Support to create tickets and track the resolution and status of the tickets created by the help desk.
- ✓ It is very useful in Project Management, Requirement Management, and task management.

Role of Incident Management

Incident management is a method to discover, analyze, manage, and restore any disorder caused in the service. It guarantees that the performance of the service is up to the mark and any pause in the quality of the service is restored asap.

A special incident record with unique ticket number is raised in ITIL tool, by support/service desk executive for every disruption reported. The corresponding team further analyses and restore the service and updates the Incident ticket accordingly in ITIL tool.

The main objective of incident management is to reduce the negative impact of incidents by restoring regular service operation as rapidly as possible. Incident management can have an immense influence on customer and user satisfaction, and the experience of those shareholders of the service provider.

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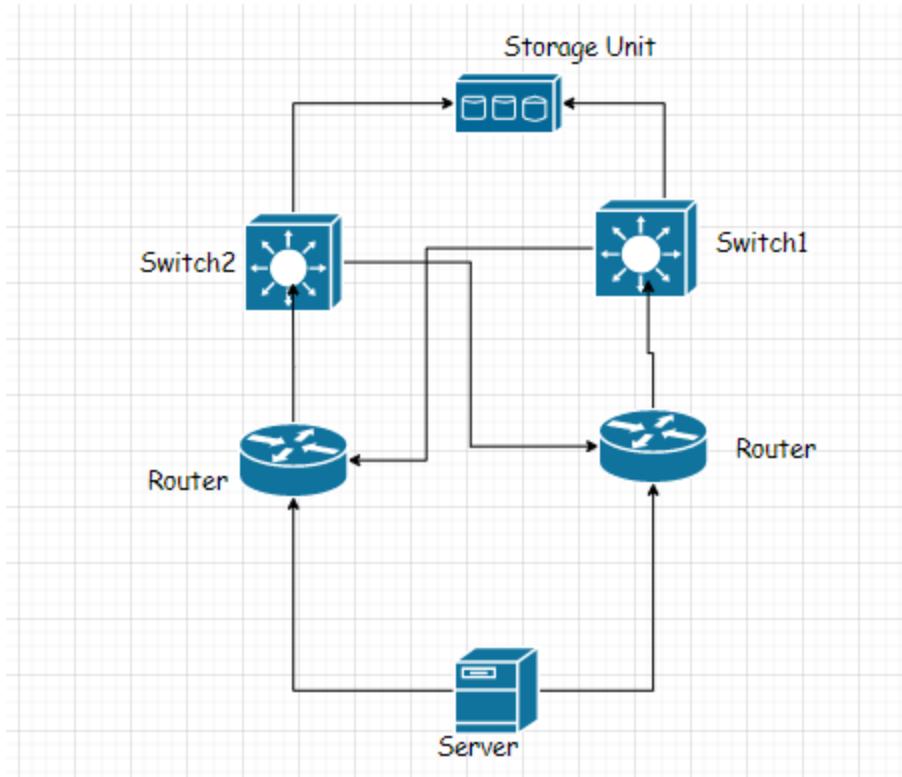
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Technical Report on Networking

Multipathing:

What is Multipathing?	When numerous physical routes are established between a server and the storage device that maintains it, it is known as Multipathing. It is often called as SAN multipathing. Multiple physical routes are created between server and storage. This technique provides alternative paths in case any of the paths fails within the network.
Benefits of Multipathing	Multipathing can provide a range of advantages such as: <ul style="list-style-type: none">➤ Fault tolerance➤ Increased bandwidth➤ Load Balancing
Fault Tolerance	In Storage networking, the route between server & storage device may fail. It may fail because a networking cable may break out or someone may plug out wrong out of socket. This is known as Single Point of failure (SPOF). Hence to overcome SPOF, alternative paths are established, known as Multipathing.
Load Balancing	Due to multiple paths in the network, a server may choose any of the I/O routes available. When a particular route is congested, the server chooses other alternative available paths for routing which acts as Load balancing and load is shared among the alternative paths. Concurrent multipath routing (CMR) helps to distribute load in Multipathing.
Improved Bandwidth	By constantly recommending packets to all alternative routing paths, the paths are more fully utilized and hence provide better bandwidth. All the available routes use their capacity to contribute to the routing.



Link Aggregation:

A bundling method where a bunch of individuals (Ethernet) link together, so they act like a single logical link is known as Link aggregation. Link aggregation is involved with combining multiple ports on two devices.

Why is Link Aggregation used?	Link Aggregation is used to accomplish improved performance by transmitting several packets simultaneously down different links. Link aggregation directs the bits over different links, but it does not chop up the packet to transmit.
How does Link Aggregation work?	Packets to transmit in network are kept intact and sent from one device to the other over one of the available links. IEEE standard for Link Protocol is 802.1AX. Link protocol usually retains whole sessions on a single link. A packet from the next conversation could go over a different link.

Differences between Teaming and Bonding

Teaming	Bonding
Teaming Is a modern way of execution bonding and delivers a separate driver to the network.	Bonding refers to creating a bond of two or more links into one to provide failover and redundancy to the network.
In Teaming network managers can manage the interfaces through flexible strategy and therefore regarded as a modern way of handing the interfaces.	Bonding is a traditional method to bond 2 or more links into 1. Bonding does not support most of the advanced features in networking.
Support for IPv6 (NA/NS) link monitoring	Doesn't Support for IPv6 (NA/NS) link monitoring
Windows operating systems support teaming	Linux OS supports Bonding.

Multi-layer network

Multilayer network is a set of nodes, edges, and layers, where the analysis of the layers depends on the application of the model.

Traditional network description used for decades appears to fail against the array of the objects and the relations. This requires the requirement to go ahead of traditional networks into a richer framework efficient of hosting objects and relations of different scales, called Multilayer Network.

Multilayer networks were established lately to assist study countless types of networks and to combine them into 1 framework. Several of these, such as metarelational networks in sociology and interconnected networks of numerous subsystems in engineering, have been studied for periods, but the advancement of the multilayer-network formalism to evaluate such systems is very new.

Multilayer networks permit one to examine a different set of complicated network architectures and to incorporate various types of data into one mathematical object.

. Two key types of multilayer networks arise from

- labeling edges
- labeling nodes

Multilayer Networks offer improved modeling for complicated networks, like biological networks. These networks are dissimilar in different manners since any biological function rarely depends on just one element or type of interaction between the elements

L2TP and PPTP protocols

L2TP: Layer two Tunneling Protocol is utilized by internet service providers to support VPNs. L2TP must rely on an encryption protocol to pass within the tunnel, to safeguard security and privacy. L2TP packet, header + payload, is sent within a User Datagram Protocol datagram. L2TP does not offer confidentiality or strong authentication by itself. Most L2 data types can be transferred across an IP or Layer Three (L3) network using L2TP. On the internet, the operation creates a tunnel between an L2TP access concentrator (LAC) and an L2TP network server (LNS). This allows for the encapsulation and transmission of a Point-to-Point Protocol (PPP) link layer throughout the internet.

PPTP: Through the construction of a VPN across TCP/IP-based networks, such as the Internet, PPTP allows for the safe flow of data from a remote client to a server in a private company network. It enables remote users to safely access business networks via the Internet, as if they were physically available on the network. Microsoft and its partners suggested PPTP as a standard, which is an extension of the point-to-point protocol already in use on the Internet. These concepts, along with Cisco's Layer 2 Tunneling Protocol proposal, might form the foundation of the next Internet Engineering Task Force (IETF) standard.

PPTP creates data packets that serve as the foundation for the actual tunnel. This packet generating technique is combined with authentication systems to ensure that only legitimate traffic is sent across networks. It also scrambles the data held by the packets via encryption. It uses General Routing Encapsulation (GRE) as its packet generation technology and runs at Data Layer 2. IP port 47 and TCP port 1723 are used for packets, and the encryption standard is Microsoft's own MPPE. PPTP has been dogged by claims that it has been insecure since the beginning of its existence. As a result, L2PT takes its position.

Layer Two Tunneling Protocol (L2TP) is a virtual private network (VPN) version of the Point-to-Point Tunneling Protocol (PPTP) used by internet service providers (ISPs) (VPNs). L2TP must use an encryption protocol to pass data within the tunnel to maintain security and privacy. Most L2 data types can be transferred over an IP or Layer Three (L3) network using L2TP. On the internet, the operation creates a

tunnel between an L2TP access concentrator (LAC) and an L2TP network server (LNS). This allows for the encapsulation and transmission of a Point-to-Point Protocol (PPP) link layer across the internet.

Examples of L2TP

L2TP as a part of ISP's network: Data is tunneled from the customer's premises to the ISP's IP network via L2TP. L2TP tunnels and sessions run across an intermediary network operated by a provider who offers access to ISPs directly. Individual clients connect to a wholesaler managed local LCCE that acts as an L2TP Access Concentrator (LAC). For the customer's ISP (Internet Service Provider), the LAC will dynamically create L2TP tunnels and sessions. Because each client device behaves as if it were connected to the L2 network, this setup allows the provider to control the allocation of client IP addresses and Internet access at its discretion.

L2TP over a public Wi-Fi network: Every access point sends client data to a centralized network via an L2TP connection. This network manages IP address distribution and Internet routing, usually through network address translation. On this network, the usage of L2TP allows a single provider to provide Internet access to a diverse group of clients without having to handle the Internet connection at each Wi-Fi hotspot site.

Examples of PPTP

An ISP that uses a PPTP-enabled network access server to deliver a PPTP service can handle Windows®+ 95, Windows NT versions 3.5 and 3.51, as well as third-party PPP clients like Apple Macintosh® or UNIX. These clients can connect to the ISP server using PPP. The ISP server connects to the PPTP server on the private network as a PPTP client, forming a PPTP tunnel between the ISP server and the PPTP server.

Key Concepts of Networking

What is DMZ?	A DMZ network is a perimeter network that ensures and includes an additional layer of security to an organization's inside local-area network from untrusted activity. A common DMZ may be a subnetwork that sits between the open web and private network. Organizations ordinarily store external-facing administrations and assets, as well as servers for the Space Title Framework (DNS), File Transfer Convention (FTP), mail, intermediary, Voice over Web Convention (VoIP), and web servers, within the DMZ.
Why is so important to have DMZ?	The best thing about a DMZ is to supply an inner arrange with a progressed security layer by confining get to delicate information and servers. A DMZ empowers site guests to get certain administrations whereas giving a buffer between them and the organization's private organize. Additional security benefits of using DMZ are: <ul style="list-style-type: none">✓ Enabling access control✓ Blocking Internet Protocol (IP) spoofing✓ Preventing network reconnaissance
How does it affect the quality of a network security?	DMZ systems have been central to securing worldwide venture systems since the presentation of firewalls. They ensure organizations' delicate information, frameworks, and assets by keeping inner systems isolated from frameworks that may be focused on by assailants. DMZs too empower organizations to control and diminish get to levels to delicate frameworks. DMZs are demonstrating valuable in countering the security dangers postured by unused innovation such as Internet-of-Things (IoT) gadgets and operational innovation (OT) frameworks, which make generation and fabricating more intelligent but make endless risk surface.
Roles of DMZ in Performance	The TCP delay of the “No DMZ No Filter” is the biggest because the arrange activity isn't filtered, this makes it a large activity in interior of DMZ to organize. The highly unfiltered data makes the network to choke and thus causes delay whereas DMZ filters the packets thus sending filtered and less noisy data which gives better performance in the network.

Key Concepts of Networking

Does TCP/IP reserve a role for DMZ?	DMZ Portal viably ends the client's TCP/IP session at the DMZ gateway. The client information contained inside the payload of the TCP/IP parcel is transmitted to the server over the autonomously built-up TCP/IP association between the server and DMZ Portal. Not at all like a organize equipment bridge/router gadget, the DMZ Portal does not "pass through" adjusted bundles by changing the TCP/IP or outline layer headers. Instep, the DMZ Door peruses in a buffer full of information from the client TCP/IP stream (~64KB) and after that sends that information over the TCP/IP attachment set up prior by the server. The result could be a set of completely different TCP/IP parcels with diverse source and goal areas but containing the first payload.
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What is site to site?

A site-to-site [virtual private network](#) (VPN) refers to a connection set up between multiple networks. This could be a corporate network where multiple offices work in conjunction with each other or a branch office network with a central office and multiple branch locations.

Site-to-site VPNs are useful for companies that prioritize private, protected traffic and are particularly helpful for organizations with more than one office spread out over large geographical locations. These businesses often must access resources housed on a primary network, which could include servers that facilitate email or store data. In some instances, a server may be the operational hub of an application essential to the company's business. A site-to-site VPN can, in that case, give all sites full access to the application—as if it were housed within their physical facility.

How site to site works?

It accomplishes this by forming a "tunnel" between two networks. These tunnels move from one location to another with a site-to-site VPN, and only users logged into the network can view the data being transported. At each location, the VPN employs gateways that encrypt all traffic passing through. The gateway, which is exclusively responsible for safeguarding the data and passing it over the tunnel to the other side, must encrypt all traffic (data). When inbound traffic is received, it is decrypted and data

Key Concepts of Networking

packets are delivered to the destination host—for example, an employee receiving confidential client information. Because the data is impermeable and the tunnel is inaccessible, hackers and other cybercriminals are kept out, and any other possible bad actors in the "ocean" are unable to take benefit.

What is point to site?

A VPN gateway connection that is point-to-site (P2S) allows you to establish a secure connection to your virtual network from a single client machine. Starting a P2S connection from the client computer is the first step. Telecommuters who want to connect to Azure VNets from a remote place, such as home or a conference, will find this option beneficial. A VPN device or an on-premises public-facing IP address is not required for P2S connections. P2S and S2S connections can be used using the same VPN gateway if all of the configuration requirements for both connections are met.

How point to site works?

A VPN gateway connection that is point-to-site (P2S) allows you to establish a secure connection to your virtual network from a single client machine. Starting a P2S connection from the client computer is the first step. Telecommuters who want to connect to Azure VNets from a remote place, such as home or a conference, will find this option beneficial. When you simply have a few clients who need to connect to a VNet, P2S VPN can be a good alternative to S2S VPN.

Difference between site to site and point to point?

In point-to-site networking, you must manually connect to the network you want to access. When you log out or restart your workstation, the connection is usually lost, and you must re-join each time. When we work remotely and need access to company assets, we frequently utilise this form of VPN. Although the channel is bidirectional, it is only one-to-many.

When you want to join two networks and maintain communication going all the time, site-to-site is the way to go. Because the connection is made through a network gateway rather than the computer operating system, it's likewise bi-directional but many-to-many and stays up whether your server/workstation is functioning or not.

A virtual private network (VPN) establishes encrypted communications between devices. (IPsec or SSL/TLS encryption technologies are commonly used by VPNs.) Any devices that connect to the VPN create encryption keys, which are used to encrypt and decrypt all data exchanged between them. This

Key Concepts of Networking

procedure may introduce a tiny degree of latency to network connections, slowing network traffic. VPN connections are kept private even when they cross public Internet infrastructure thanks to this encryption.

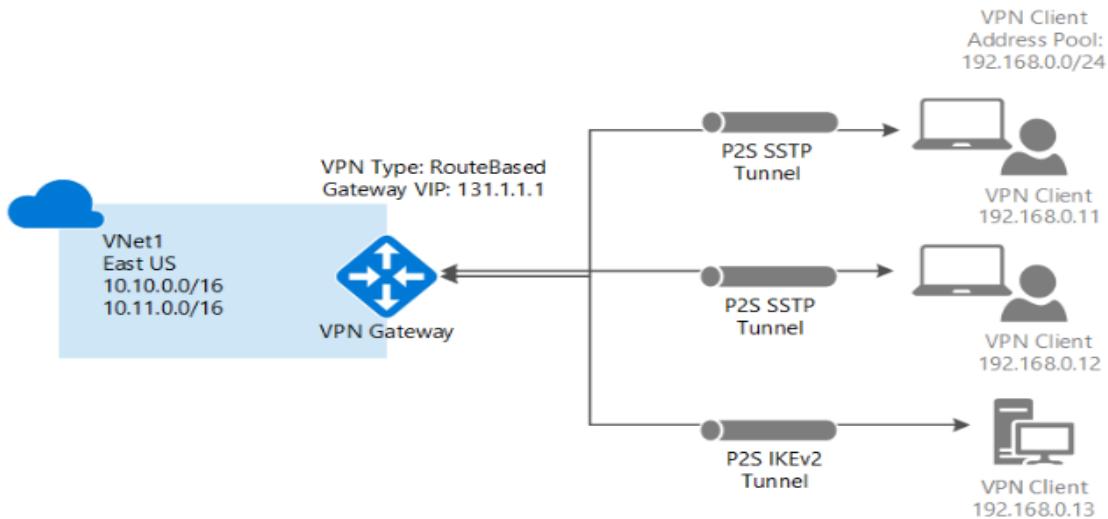
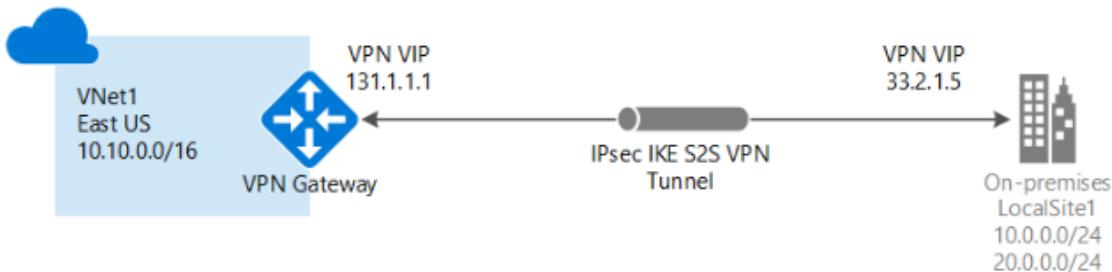


Fig 1:Point to site



Site to site

How remote desktop and remote sessions are used and why they cause network security challenges?

A remote desktop is a program or feature of an operating system that enables a user to connect to a computer in another place, view its desktop, and interact with it as if it were local. Remote desktop software captures a device's screen, as well as mouse and keyboard inputs, and sends them to another device, allowing a user to view or operate it from afar. Remote desktop connectivity is frequently used by tech support workers to debug live repairs on a client's PC. Many of these solutions also allow the controlling machine to transfer documents with the remote server — or just the contents of the clipboard.

Key Concepts of Networking

— and vice versa. In rare circumstances, a remote desktop can also provide audio access, as the sound from the remote computer is transmitted to the controlling device.

Remote Sessions are links to remote deployed assets configured to enable Remote Sessions (as part of the relevant Axed® Gateway or Axeda Connector Agent project or in the Axeda Agent Embedded agent) via the Axeda® Platform. These remote access sessions support "headless" machines, as opposed to desktop-sharing access connections (without monitors). Remote Terminal, Remote Application, Remote Browser, and Remote Desktop are the four types of remote sessions.

Making Remote Desktop Protocol (RDP) accessible via the public internet is one of the most difficult aspects of setting up RDP for remote work. Because RDP is not a secure arrangement in and of itself, additional security measures are required to protect workstations and servers. Organizations face various possible hazards if they do not implement effective security standards, including an increased chance of cyberattacks. Small businesses are the most common targets of these attacks because they often lack the resources needed to defend against and respond to these threats.

Key considerations when we implement a remote desktop session

Make use of strong passwords.

Strong passwords should be regarded an essential step before activating Remote Desktop on any accounts with Remote Desktop access.

Two-factor authentication should be used.

Departments should think about using a two-factor authentication system. RD Gateways can be setup to work with the DUO Campus instance. A simple way for regulating authentication via two-factor certificate-based smartcards is another option not supported by the campus. This method makes use of the Remote Desktop host, as well as YubiKey and RSA as examples.

Keep your software up to date.

One benefit of utilizing Remote Desktop over third-party remote admin solutions is that components are automatically updated with the most recent security changes as part of the usual Microsoft patch cycle. Enable and audit automatic Microsoft Updates to ensure you're running the most recent versions of both client and server software. If you're using Remote Desktop clients on a different platform, double-check that they're still supported and that you have the most recent versions. Older versions may contain security issues and may not support high encryption.

Firewalls can be used to limit access.

To restrict access to remote desktop listening ports, use firewalls (both software and hardware if available) (default is TCP 3389). For limiting RDP access to desktops and servers, an RDP Gateway is strongly recommended (see discussion below). You can also utilize the university VPN software to get a

Key Concepts of Networking

campus IP address and add the campus VPN network address pool to your RDP firewall exception rule to support off-campus connectivity. For additional information on the campus VPN service, go to our page.

You can connect to computers running the following versions of Windows:

Windows 10 Pro

Windows 10 Enterprise

Windows 8 Enterprise

Windows 8 Professional

Windows 7 Professional

Windows 7 Enterprise

Windows 7 Ultimate

Windows 7 Ultimate

Windows Server 2008

Windows Server 2008 R2

Windows Server 2012

Windows Server 2012 R2

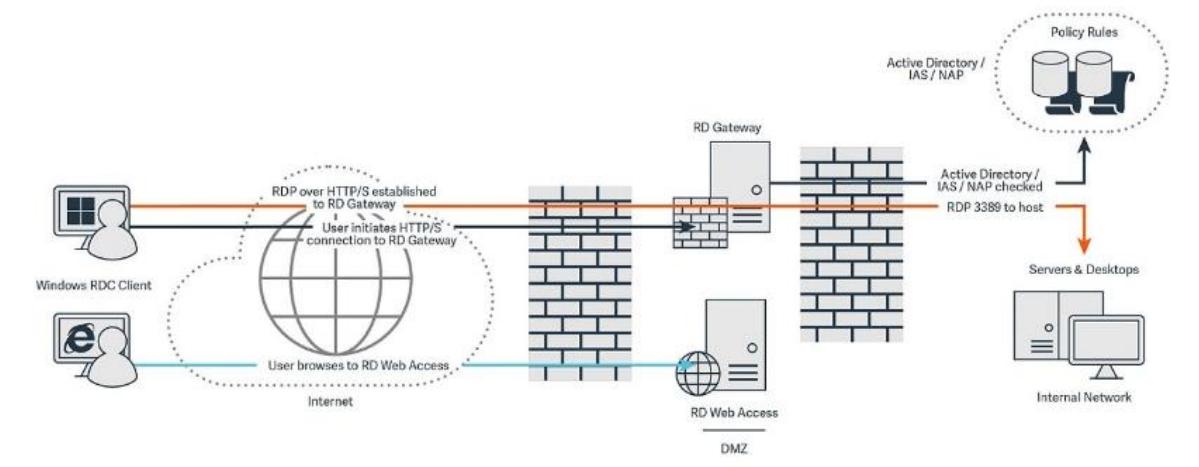
Windows Server 2016

Windows Multipoint Server 2011

Windows Multipoint Server 2012

Windows Small Business Server 2008

Windows Small Business Server 2011



Key Concepts of Networking

References

https://www.researchgate.net/publication/322165207_Evaluation_the_Performance_of_DMZ

<https://www.fortinet.com/resources/cyberglossary/what-is-dmz>

<https://www.kaspersky.com/resource-center/definitions/what-is-a-vpn>

<https://www.imperosoftware.com/blog/remote-assistance-vs-remote-desktop/#:~:text=While%20this%20type%20of%20connection,are%20seeing%20the%20same%20screen>

.

Technical Report

1) A JSON file including the following two elements

- item

- promotion

for “item”, include the following sub-elements:

- itememeName

- itemType

- itemNumber

- item Vendor

for “promotion”, include the following sub-elements:

- itememeNumber

- itemRegularPrice

- itemSalesPrice

- itemPromotionData

- ItemPromotionDuration

```
{  
    "item": [  
        {  
            "itememeName": "Pen",  
            "itemType": "ballpen",  
            "itemNumber": "c0123",  
            "itemVendor": "cello"  
        },  
  
        {  
            "itememeName": "Pen",  
            "itemType": "ballpen",  
            "itemNumber": "c0123",  
            "itemVendor": "cello"  
        },  
  
        {  
            "itememeName": "Pen",  
            "itemType": "ballpen",  
            "itemNumber": "c0123",  
            "itemVendor": "cello"  
        }  
    ],  
  
    "promotion": [  
        {"itememeNumber": "c0123",  
            "itemRegularPrice": "10",  
            "itemSalesPrice": "200",  
            "itemPromotionData": "long",  
            "promotionDuration": "2 months"  
    ]  
}
```

```
        },
        {"itemNumber":"c0123",
         "itemRegularPrice":"10",
         "itemSalesPrice":"200",
         "itemPromotionData":"long",
         "promotionDuration":"2 months"

        },
        {"itemNumber":"c0123",
         "itemRegularPrice":"10",
         "itemSalesPrice":"200",
         "itemPromotionData":"long",
         "promotionDuration":"2 months"

        }
    ]
}
```

2) A Valid XML file and its XSLT file.

XML file named as item.xml is created

```
<?xml-stylesheet type="text/xsl" href="item.xsl"?>

<collection>

<item>
    <itemName>Pen</itemName>
    <itemType>BallPen</itemType>
    <itemNumber>C0123</itemNumber>
    <itemVendor>Cello</itemVendor>
</item>
<item>
    <itemName>Book</itemName>
    <itemType>Fiction</itemType>
    <itemNumber>C0295</itemNumber>
```

```
<itemVendor>Star</itemVendor>
</item>

<item>
<itemName>Phone</itemName>
<itemType>Cell phone</itemType>
<itemNumber>FG345</itemNumber>
<itemVendor>iphone</itemVendor>
</item>

<promotion>
    <ItemNumber>c0123</ItemNumber>
    <ItemRegularPrice>10</ItemRegularPrice>
    <ItemSalesPrice>200</ItemSalesPrice>
    <ItemPromotionData>long</ItemPromotionData>
    <ItemPromotionDuration>2 months</ItemPromotionDuration>
</promotion>

<promotion>
    <ItemNumber>c5911</ItemNumber>
    <ItemRegularPrice>130</ItemRegularPrice>
    <ItemSalesPrice>2900</ItemSalesPrice>
    <ItemPromotionData>long</ItemPromotionData>
    <ItemPromotionDuration>3 months</ItemPromotionDuration>
</promotion>

<promotion>
    <ItemNumber>c5100</ItemNumber>
    <ItemRegularPrice>180</ItemRegularPrice>
    <ItemSalesPrice>900</ItemSalesPrice>
    <ItemPromotionData>short</ItemPromotionData>
    <ItemPromotionDuration>1 months</ItemPromotionDuration>
</promotion>
```

```
</collection>
```

For providing designing to the XML file, we created a file named Items.xsl.

The code for the following is below.

```
<xsl:stylesheet version="1.0"
  xmlns:xsl = "http://www.w3.org/1999/XSL/Transform">
```

```
<xsl:template match = "/collection">
<html>
<body>
<h1> ITEM</h1>
<table border = "1">
<tr bgcolor="yellow">
<th>ItemName</th>
<th>ItemType</th>
<th>ItemNumber</th>
<th>ItemVendor</th>
</tr>
<xsl:for-each select ="item">
<tr>
<td><xsl:value-of select="itemName"/></td>
<td><xsl:value-of select="itemType"/></td>
<td><xsl:value-of select="itemNumber"/></td>
<td><xsl:value-of select="itemVendor"/></td>
</tr>
</xsl:for-each>
</table>
```

```

<h1> PROMOTION</h1>

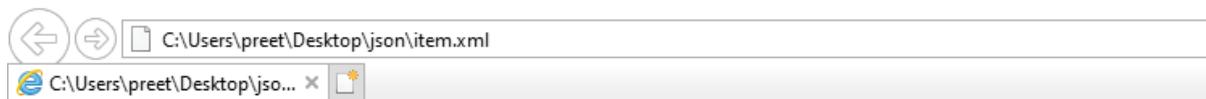
<table border = "1">

<tr bgcolor="pink">
<th>ItemNumber</th>
<th>ItemRegularPrice</th>
<th>ItemSalesPrice</th>
<th>ItemPromotionData</th>
<th>ItemPromotionDuration</th>
</tr>

<xsl:for-each select ="promotion">
<tr>
<td><xsl:value-of select="ItemNumber"/></td>
<td><xsl:value-of select="ItemRegularPrice"/></td>
<td><xsl:value-of select="ItemSalesPrice"/></td>
<td><xsl:value-of select="ItemPromotionData"/></td>
<td><xsl:value-of select="ItemPromotionDuration"/></td>
</tr>
</xsl:for-each>
</table>
</body>
</html>
</xsl:template>
</xsl:stylesheet>

```

Following is the output of the above code:



ItemName	ItemType	ItemNumber	ItemVendor
Pen	BallPen	C0123	Cello
Book	Fiction	C0295	Star
Phone	Cell phone	FG345	iphone

PROMOTION

ItemNumber	ItemRegularPrice	ItemSalesPrice	ItemPromotionData	ItemPromotionDuration
c0123	10	200	long	2 months
c5911	130	2900	long	3 months
c5100	180	900	short	1 months

WIL PROJECT – Weekly Deliverable 7

Program Name: CCBT

Project Code: CPL-5559-CCBT-0050-V2

TEAM MEMBERS

Neeraj	Ghugtyal	C0793557
Naman	Sareen	C0796173
Priyanshu	Sharma	C0785539
Simarpreet	Kaur	C0791523

EXECUTIVE SUMMARY:

This week's deliverable was work on data provided from finance.yahoo.com to modulate Yahoo finance to load financial database about Cisco. This week's task was to download finance CSV file, modulate it as per the deliverable (change the value of volume to 15% of its current value) and use Excel to create Stock Chart for it.

Fig 1 > Raw excel downloaded from finance.yahoo.com

A	B	C	D	E	F	G
Date	Open	High	Low	Close	Adj Close	Volume
23-06-2021	53.27	53.29	52.59	52.76	51.38636	14749800
24-06-2021	52.94	53.05	52.61	52.78	51.40583	13974300
25-06-2021	52.77	53.2	52.65	53.06	51.67855	16682700
28-06-2021	53.16	53.29	52.92	52.96	51.58115	14008700
29-06-2021	52.89	53.19	52.77	52.91	51.53246	10926100
30-06-2021	52.95	53.07	52.62	53	51.62011	15826400
1/7/2021	53.05	53.6	53	53.44	52.04865	15074800
2/7/2021	53.19	53.62	52.84	53.54	52.50961	15066000
6/7/2021	53.22	53.36	52.34	52.98	51.96039	19394500
7/7/2021	53.07	53.3	52.67	53.26	52.235	14411600
8/7/2021	53.16	53.72	52.91	53.26	52.235	15691800
9/7/2021	53.36	53.93	53.29	53.74	52.70576	14673400
12/7/2021	54.04	54.04	53.13	53.23	52.20557	14000600
13-07-2021	53.34	53.58	53.2	53.32	52.29384	9927400
14-07-2021	53.5	54.2	53.34	54.09	53.04902	17113700
15-07-2021	53.84	53.87	53.24	53.65	52.6175	14952400
16-07-2021	53.88	54.41	53.65	53.7	52.66653	14144900
19-07-2021	53.67	53.7	52.73	53.06	52.03885	19925300
20-07-2021	53.28	53.93	53.19	53.58	52.54884	17250200
21-07-2021	53.82	53.9	53.42	53.88	52.84306	14068600
22-07-2021	53.91	54.55	53.78	54.54	53.49036	15729800
22-07-2021	54.99	55.24	54.51	55.22	54.16709	12042500

Fig 2 > Changed the value of volume to 15% of its current value.

	A	B	C	D	E	F	G	H
1	Date	Open	High	Low	Close	Adj Close	Volume	Volume increase 15%
2	23-06-2021	53.27	53.29	52.59	52.76	51.38636	14749800	2212470
3	24-06-2021	52.94	53.05	52.61	52.78	51.40583	13974300	2096145
4	25-06-2021	52.77	53.2	52.65	53.06	51.67855	16682700	2502405
5	28-06-2021	53.16	53.29	52.92	52.96	51.58115	14008700	2101305
6	29-06-2021	52.89	53.19	52.77	52.91	51.53246	10926100	1638915
7	30-06-2021	52.95	53.07	52.62	53	51.62011	15826400	2373960
8	1/7/2021	53.05	53.6	53	53.44	52.04865	15074800	2261220
9	2/7/2021	53.19	53.62	52.84	53.54	52.50961	15066000	2259900
10	6/7/2021	53.22	53.36	52.34	52.98	51.96039	19394500	2909175
11	7/7/2021	53.07	53.3	52.67	53.26	52.235	14411600	2161740
12	8/7/2021	53.16	53.72	52.91	53.26	52.235	15691800	2353770
13	9/7/2021	53.36	53.93	53.29	53.74	52.70576	14673400	2201010
14	12/7/2021	54.04	54.04	53.13	53.23	52.20557	14000600	2100090
15	13-07-2021	53.34	53.58	53.2	53.32	52.29384	9927400	1489110
16	14-07-2021	53.5	54.2	53.34	54.09	53.04902	17113700	2567055
17	15-07-2021	53.84	53.87	53.24	53.65	52.6175	14952400	2242860
18	16-07-2021	53.88	54.41	53.65	53.7	52.66653	14144900	2121735
19	19-07-2021	53.67	53.7	52.73	53.06	52.03885	19925300	2988795
20	20-07-2021	53.28	53.93	53.19	53.58	52.54884	17250200	2587530
21	21-07-2021	53.82	53.9	53.42	53.88	52.84306	14068600	2110290
22	22-07-2021	53.91	54.55	53.78	54.54	53.49036	15729800	2359470
22	22-07-2021	54.90	55.24	54.51	55.22	54.16709	12042500	1056275

Below is the CSV file

Date	Open	High	Low	Close	Adj Close	Volume	Volume increase 15%	
	###	53.27	53.29	52.59	52.76	51.38636	14749800	
	###	52.94	53.05	52.61	52.78	51.40583	13974300	
	###	52.77	53.2	52.65	53.06	51.67855	16682700	
	###	53.16	53.29	52.92	52.96	51.58115	14008700	
	###	52.89	53.19	52.77	52.91	51.53246	10926100	
	###	52.95	53.07	52.62	53	51.62011	15826400	
7/1/2021	53.05	53.6	53	53.44	52.04865	15074800	2261220	
7/2/2021	53.19	53.62	52.84	53.54	52.50961	15066000	2259900	
7/6/2021	53.22	53.36	52.34	52.98	51.96039	19394500	2909175	
7/7/2021	53.07	53.3	52.67	53.26	52.235	14411600	2161740	
7/8/2021	53.16	53.72	52.91	53.26	52.235	15691800	2353770	
7/9/2021	53.36	53.93	53.29	53.74	52.70576	14673400	2201010	
	###	54.04	54.04	53.13	53.23	52.20557	14000600	2100090
	###	53.34	53.58	53.2	53.32	52.29384	9927400	1489110
	###	53.5	54.2	53.34	54.09	53.04902	17113700	2567055
	###	53.84	53.87	53.24	53.65	52.6175	14952400	2242860
	###	53.88	54.41	53.65	53.7	52.66653	14144900	2121735
	###	53.67	53.7	52.73	53.06	52.03885	19925300	2988795
	###	53.28	53.93	53.19	53.58	52.54884	17250200	2587530
	###	53.82	53.9	53.42	53.88	52.84306	14068600	2110290
	###	53.91	54.55	53.78	54.54	53.49036	15729800	2359470
	###	54.89	55.34	54.51	55.23	54.16708	13042500	1956375
	###	55.13	55.65	55.13	55.47	54.40247	10097400	1514610
	###	55.38	55.41	54.79	55.28	54.21612	14738700	2210805
	###	55.46	55.52	54.41	54.77	53.71594	18835700	2825355
	###	55	55.35	54.9	55.07	54.01016	10680200	1602030
	###	55.08	55.49	55.01	55.37	54.30439	13438800	2015820
8/2/2021	55.6	55.94	55.26	55.45	54.38285	12468800	1870320	
8/3/2021	55.54	56.42	55.27	56.25	55.16745	17357400	2603610	
8/4/2021	56.37	56.37	55.47	55.69	54.61823	11662400	1749360	
8/5/2021	55.52	55.98	55.5	55.76	54.68688	10785200	1617780	
8/6/2021	55.47	55.95	55.15	55.59	54.52016	18386100	2757915	
8/9/2021	55.82	56.07	55.4	55.47	54.40247	8707200	1306080	
	###	55.5	55.67	55.25	55.61	54.53977	10441900	1566285
	###	55.89	56.01	55.6	55.86	54.78497	12604500	1890675
	###	55.85	56.45	55.66	56.39	55.30476	11209700	1681455
	###	56.39	56.62	56.26	56.47	55.38322	10841700	1626255
	###	56.3	56.43	55.93	56.28	55.19688	14407400	2161110
	###	55.87	56.02	55.63	56.01	54.93207	11987500	1798125
	###	55.79	56.14	55.03	55.15	54.08862	17111700	2566755
	###	54.76	57.49	54.59	57.27	56.16782	39881600	5982240
	###	57.25	58.34	56.85	58.22	57.09954	21876500	3281475
	###	57.85	58.7	57.74	58.54	57.41338	16225400	2433810
	###	58.49	59.43	58.43	59.32	58.17837	17658300	2648745

###	59.54	60.27	59.17	59.35	58.20779	18069600	2710440
###	59.42	59.63	58.99	59.2	58.06068	13729400	2059410
###	59.27	59.35	58.86	59.02	57.88414	14795200	2219280
###	58.98	59.22	58.8	59.13	57.99202	11798600	1769790
###	59.11	59.18	58.58	59.02	57.88414	19873900	2981085
9/1/2021	59.02	59.14	58.66	59.04	57.90376	11629700	1744455
9/2/2021	59.35	59.72	59.06	59.53	58.38433	12855700	1928355
9/3/2021	59.33	59.66	59.28	59.42	58.27644	9732200	1459830
9/7/2021	59.24	59.37	58.75	58.88	57.74684	15503600	2325540
9/8/2021	58.55	58.93	58.49	58.68	57.55069	13124500	1968675
9/9/2021	58.45	58.94	58.25	58.6	57.47223	14958800	2243820
###	58.75	58.95	57.82	57.89	56.77589	13622100	2043315
###	58.16	58.53	57.73	58.1	56.98185	13553200	2032980
###	58.24	58.47	57.66	57.87	56.75628	12810300	1921545
###	57.78	59.6	57.06	57.56	56.45224	37524600	5628690
###	58.31	58.82	57.13	57.33	56.22667	24029600	3604440
###	57.39	57.45	56.47	56.85	55.75591	40262700	6039405
###	56.38	56.4	55.29	55.89	54.81438	21897000	3284550
###	55.96	56.37	55.23	55.26	54.19651	18700600	2805090
###	55.76	56.13	55.37	55.52	54.45151	17940600	2691090
###	55.7	56.9	55.6	56.69	55.59899	16262500	2439375
###	56.45	56.81	56.22	56.73	55.63821	13156400	1973460
###	56.46	56.67	56.05	56.22	55.13803	13859500	2078925
###	55.78	55.99	55.41	55.52	54.45151	17803200	2670480
###	55.62	55.98	55.34	55.48	54.41227	14051700	2107755
###	55.8	55.9	54.41	54.43	53.38248	18538000	2780700
###	54.6	55.41	54.04	55.14	54.07882	18338000	2750700
###	54.5	54.68	53.95	54.23	53.54563	17084100	2562615
###	54.13	55.03	54.13	54.69	53.99982	14135000	2120250
###	54.35	54.38	52.98	53.94	53.25929	26339200	3950880
###	54.49	55.41	54.35	55.02	54.32566	14725500	2208825
###	55.2	55.3	54.75	55.08	54.3849	9255500	1388325
###	55.25	55.38	54.9	54.93	54.2368	8117600	1217640
###	54.99	55.06	54.07	54.28	53.595	14241900	2136285
###	54.32	54.75	54.08	54.62	53.93071	13737100	2060565
###	55.09	55.85	54.98	55.65	54.94771	14455900	2168385
###	55.89	55.89	54.96	55.25	54.55276	15202200	2280330
###	55.04	55.49	54.57	55.19	54.49352	10989600	1648440
###	55.29	55.78	55.03	55.74	55.03658	13258400	1988760
###	55.8	56.23	55.8	56.2	55.49077	11613600	1742040
###	56.04	56.12	55.53	55.69	54.9872	12619900	1892985
###	55.55	55.86	54.94	55.11	54.41453	15026600	2253990
###	55.11	55.42	54.81	55.14	54.44415	10218900	1532835
###	55.56	56.35	55.4	55.81	55.10569	15250000	2287500
###	56.13	56.72	55.93	56.18	55.47102	16279000	2441850

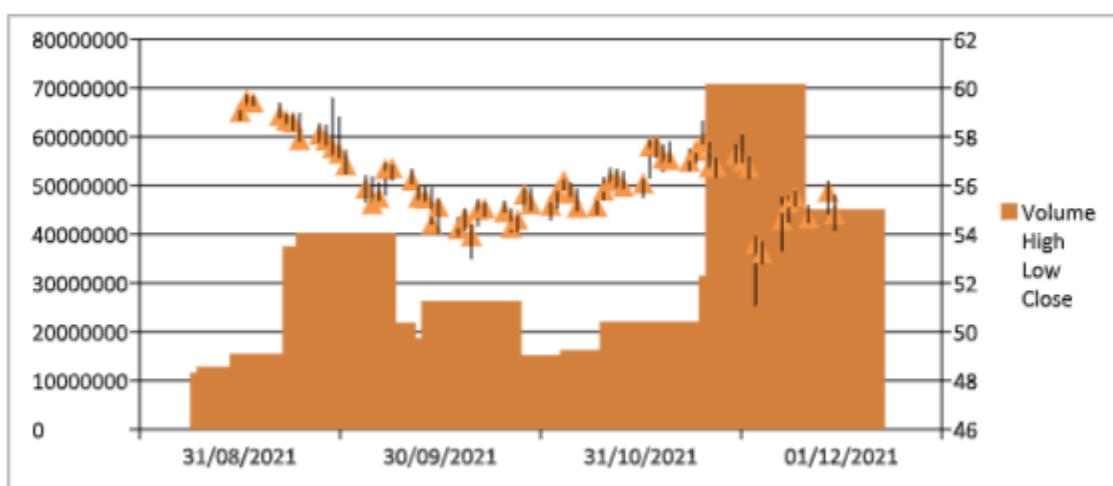
###	56.23	56.69	55.89	56.24	55.53027	11209200	1681380
###	56.32	56.58	55.86	55.97	55.26367	13550400	2032560
###	55.87	56.25	55.5	56.1	55.39203	14341400	2151210
###	56.37	57.87	56.28	57.62	56.89285	22097900	3314685
###	57.58	57.93	57.12	57.65	56.92247	13219400	1982910
###	57.6	57.69	56.56	57.12	56.39916	18070400	2710560
###	57.38	57.8	56.93	57.07	56.34979	15637700	2345655
###	57.1	57.52	56.59	57	56.28067	15045300	2256795
###	57.07	57.63	56.9	57.44	56.71512	14459800	2168970
###	57.9	58.63	57.69	57.77	57.04096	17876300	2681445
###	57.57	57.77	56.69	56.76	56.0437	17440700	2616105
###	56.97	57.15	56.31	56.82	56.10295	16663600	2499540
###	56.93	57.7	56.83	57.27	56.54726	19041800	2856270
###	57.24	58.08	56.93	57	56.28067	21136900	3170535
###	56.61	57.14	56.27	56.76	56.0437	31496300	4724445
###	52.73	53.93	51.08	53.63	52.9532	70834000	10625100
###	53.55	53.69	52.78	53.25	52.578	30030800	4504620
###	53.35	55.53	53.3	54.6	53.91096	39949300	5992395
###	54.61	55.58	54.47	55.3	54.60213	25653100	3847965
###	55.15	55.75	55.15	55.54	54.8391	19328700	2899305
###	54.46	55.19	54.46	54.67	53.98008	16730300	2509545
###	55.14	56.19	54.83	55.76	55.05632	25724500	3858675
###	55.58	55.6	54.15	54.84	54.14793	45141300	6771195
###	55.53	56.38	54.93	55.03	54.33553	24120500	3618075
###	55.15	56.61	55.08	56.15	55.4414	22384700	3357705
###	56.3	56.82	55.67	56.23	55.52039	26235400	3935310
###	56.7	57.17	56.47	56.96	56.24118	23172800	3475920
###	57.1	58.22	57.01	58.08	57.34705	24254800	3638220
###	58.08	58.13	56.63	57.02	56.30042	23631300	3544695
###	57.2	57.83	56.93	57.55	56.82373	16480200	2472030
###	57.91	59.34	57.91	59.25	58.50228	19901500	2985225
###	59.1	59.51	58.54	58.61	57.87035	18496300	2774445
###	58.34	58.53	57.37	57.77	57.04096	19114200	2867130
###	57.92	60.03	57.9	59.93	59.1737	27953900	4193085
###	60.05	60.76	59.87	60.31	59.5489	24599300	3689895
###	60.27	60.8	59.79	60.46	59.69701	62171000	9325650
###	59.67	60.41	59.3	60.36	59.59827	21342100	3201315
###	60.44	61.24	60	61.03	60.25981	20761100	3114165
###	60.97	61.6	60.62	61.53	60.75351	17095500	2564325
###	61.79	62.9	61.79	62.28	61.49404	17771400	2665710
###	62.41	63.47	62.28	63.42	62.61965	14779700	2216955
###	63.42	63.84	63.23	63.53	62.72826	12865000	1929750
###	63.65	64.29	63.55	63.96	63.15284	15069900	2260485
###	64.04	64.14	63.47	63.62	62.81713	9076700	1361505
###	63.55	63.82	63.32	63.37	62.57028	10359100	1553865

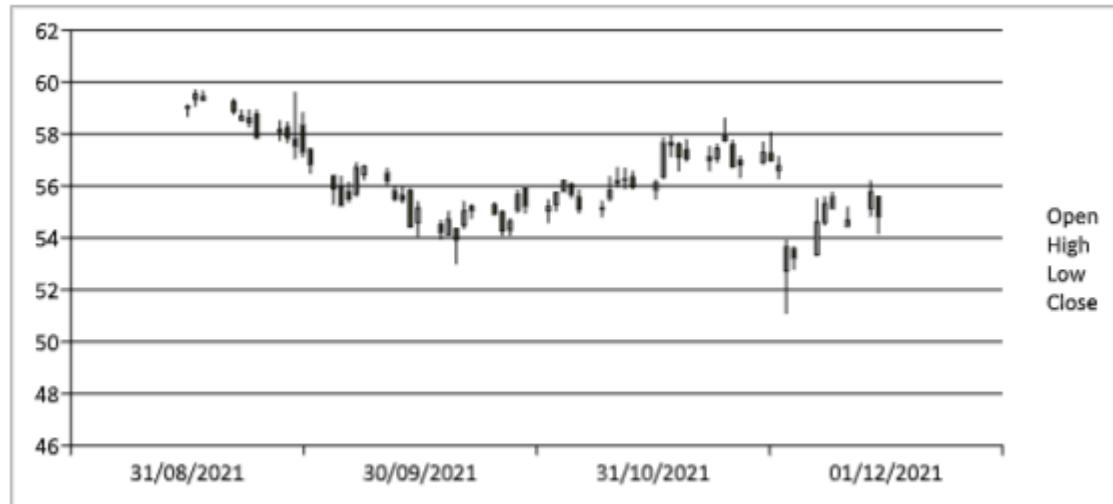
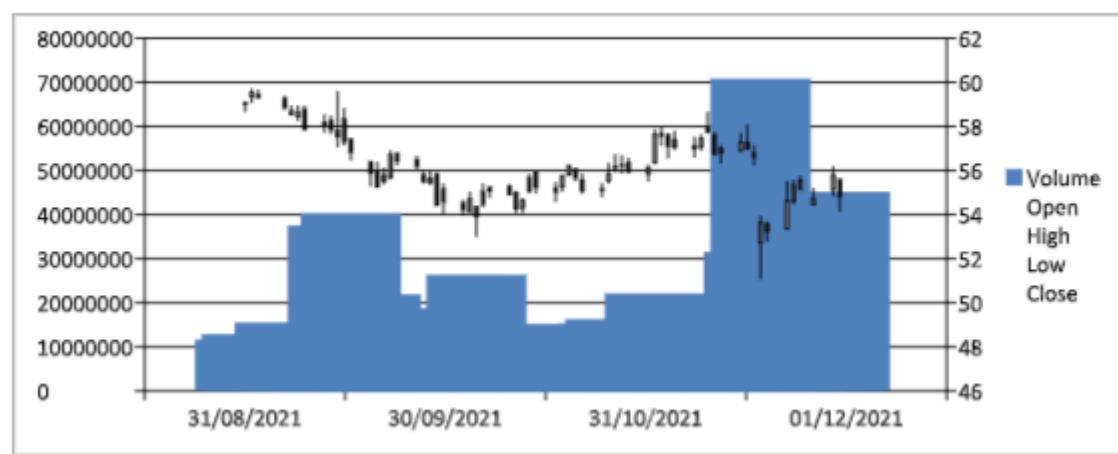
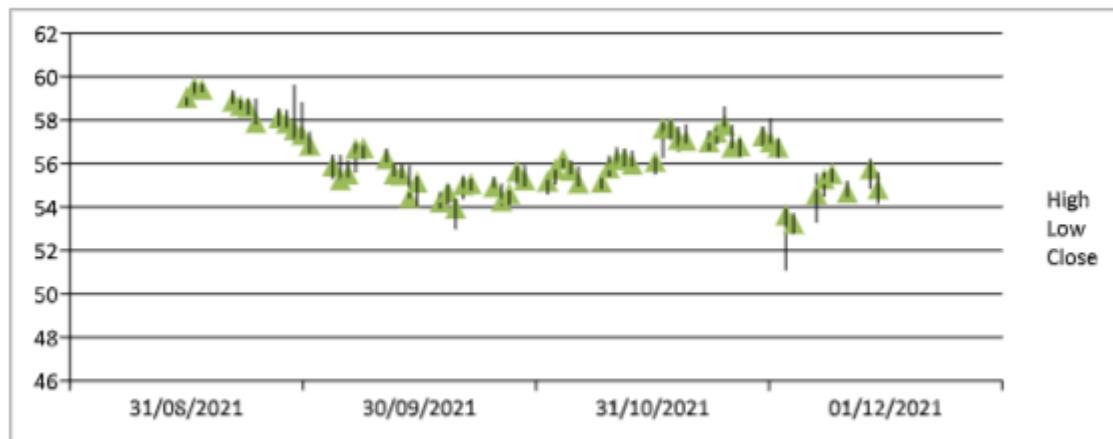
1/3/2022	62.9	63.35	62.5	63.16	62.36294	17184300	2577645
1/4/2022	62.44	62.81	61.11	61.25	60.83341	29682500	4452375
1/5/2022	61.19	61.64	60.25	60.28	59.87001	30317900	4547685
1/6/2022	60	61.13	59.91	60.92	60.50565	19616600	2942490
1/7/2022	60.87	61.5	60.67	61.13	60.71423	20152400	3022860
###	60.87	61.9	60.52	61.82	61.39953	24715300	3707295
###	61.6	62.43	61.44	62.37	61.94579	22804200	3420630
###	62.4	62.82	61.92	62.12	61.69749	13405400	2010810
###	62.08	62.15	61.21	61.5	61.08171	14871600	2230740
###	61.47	61.5	60.94	61.36	60.94266	18831900	2824785
###	59.98	60.22	59.49	59.73	59.32375	26545800	3981870
###	58	59.49	57.78	58.9	58.49939	24333900	3650085
###	58.99	59.34	58.02	58.08	57.68497	17726500	2658975
###	58.07	58.34	56.61	56.68	56.29449	25914000	3887100
###	56.16	57	54.87	56.9	56.513	34180100	5127015
###	56.09	56.69	55.07	56.11	55.72837	25156400	3773460
###	56.11	56.45	54.86	55.33	54.95367	28632700	4294905
###	55.51	56.53	54.4	54.62	54.2485	25967400	3895110
###	54.5	55.66	53.45	55.61	55.23177	30976600	4646490
###	55.43	55.86	54.87	55.67	55.29136	29925300	4488795
2/1/2022	55.45	55.5	54.74	55.37	54.9934	22438500	3365775
2/2/2022	55.23	56.32	55.17	56.17	55.78796	23316700	3497505
2/3/2022	55.87	56.15	55.06	55.2	54.82456	19260500	2889075
2/4/2022	54.89	55.62	54.39	55.15	54.7749	19675900	2951385
2/7/2022	55.33	55.53	54.7	55.17	54.79476	14450200	2167530
2/8/2022	55.06	55.49	54.71	55.34	54.96361	15219900	2282985
2/9/2022	55.82	56.38	55.48	56.29	55.90715	19136700	2870505
###	55.24	56.03	54.74	54.87	54.4968	19730600	2959590
###	54.87	55.09	53.77	53.9	53.5334	20132500	3019875
###	53.41	53.65	52.7	53.18	52.8183	21868400	3280260
###	53.72	54.3	53.64	54.27	53.90088	17678000	2651700
###	54.13	54.44	53.39	54.25	53.88102	20388700	3058305
###	55.5	57.06	55.4	55.77	55.39068	32884700	4932705
###	55.46	57.69	55.38	57.21	56.82089	35626200	5343930
###	56.93	57.14	55.74	56.3	55.91708	25188300	3778245
###	56.61	56.99	54.37	54.44	54.06973	22033700	3305055
###	54.07	54.83	53.21	54.73	54.35775	27739300	4160895
###	54.98	56.22	54.49	56.04	55.65884	18963700	2844555
###	55.41	56	54.75	55.77	55.39068	23868700	3580305
3/1/2022	55.53	55.85	54.26	54.62	54.2485	17799600	2669940
3/2/2022	54.77	56.38	54.71	56.15	55.7681	18660000	2799000
3/3/2022	56.74	57	55.84	56.07	55.68864	16794600	2519190
3/4/2022	55.67	56.9	55.25	56.51	56.12565	16729000	2509350
3/7/2022	56.31	56.44	55.52	55.59	55.21191	21350900	3202635
3/8/2022	55.7	55.86	54.07	54.4	54.03	23642400	3546360

3/9/2022	55.64	56.25	55.25	55.92	55.53966	19150900	2872635
	###	54.4	55.16	53.97	54.71	54.33789	18550900
	###	55.29	56.21	54.6	54.69	54.31802	20330300
	###	54.73	55.4	54	54.3	53.93068	17977500
	###	54.42	55.73	54.42	55.6	55.22184	18829100
	###	55.93	56	54.6	55.81	55.43041	21821800
	###	55.49	56.3	55.35	56.17	55.78796	18830500
	###	56.03	56.42	55.54	55.97	55.58932	51807200
	###	56.06	56.55	55.52	56	55.61912	29174600
	###	56.36	56.72	56.09	56.17	55.78796	29287900
	###	55.9	56.09	54.45	54.48	54.10946	19742100
	###	54.67	54.69	53.68	54.5	54.12932	20551500
	###	54.61	55.18	54.4	54.97	54.59612	18090600
	###	54.8	55.16	54.42	55.14	54.76497	17164600
	###	55.67	56.31	55.04	55.67	55.29136	20036500
	###	55.75	56.94	55.59	56.05	55.66878	16125400
	###	56.04	56.88	55.72	55.76	55.38075	27587700
4/1/2022	56.17	56.19	54.89	55.66	55.28143	17465100	2619765
4/4/2022	55.46	56.12	54.99	55.87	55.49	19629200	2944380
4/5/2022	55.2	55.59	54.67	54.92	54.92	16063600	2409540
4/6/2022	54.69	54.76	53.84	54.37	54.37	19644100	2946615
4/7/2022	54.43	54.85	53.74	54.63	54.63	15739000	2360850
4/8/2022	54.84	54.91	54.01	54.28	54.28	18148200	2722230
	###	53.92	53.95	52.79	52.88	52.88	20992100
	###	51.7	52.95	51.48	51.82	51.82	25254200
	###	51.84	52.36	51.41	52.15	52.15	17004600
	###	52.08	52.38	51.12	51.17	51.17	18024800
	###	50.88	51.56	50.8	51.11	51.11	13990700
	###	51	51.94	50.92	51.83	51.83	15490900
	###	52.22	53.67	52.15	53.02	53.02	19526200
	###	53.34	53.83	52.73	52.78	52.78	17147300
	###	52.92	52.96	51.29	51.36	51.36	17693000
	###	51.45	51.98	50.54	51.94	51.94	18677000
	###	51.88	51.94	50.87	50.9	50.9	19238300
	###	50.91	51.11	49.25	49.31	49.31	33668600
	###	49.53	50.78	49.21	50.63	50.63	20170700
	###	50.51	50.64	48.87	48.98	48.98	20281400
5/2/2022	49.34	49.91	48.93	49.86	49.86	22499200	3374880
5/3/2022	49.77	50.36	49.53	49.92	49.92	15828200	2374230
5/4/2022	50.03	51.66	49.67	51.58	51.58	23942300	3591345
5/5/2022	51.15	51.21	49.16	49.61	49.61	24846500	3726975
5/6/2022	49.15	49.84	48.85	49.33	49.33	21743900	3261585
5/9/2022	49	49.42	48.67	48.96	48.96	22421200	3363180
	###	49.71	50.24	49.15	49.55	49.55	21741100
	###	49.09	49.64	48.58	48.65	48.65	23872100

###	48.63	48.78	47.47	48.29	48.29 25951000	3892650
###	48.71	49.63	48.53	49.56	49.56 18954500	2843175
###	49.66	49.66	48.88	49	49 20254500	3038175
###	49.68	50.72	49.51	50.6	50.6 18780600	2817090
###	50.47	50.47	48.21	48.36	48.36 40672700	6100905
###	43.06	43.93	41.02	41.72	41.72 97674600	14651190
###	41.86	43	41.52	42.94	42.94 46148700	6922305
###	43.34	43.82	42.94	43.35	43.35 27366600	4104990
###	43.4	44.06	42.5	43.77	43.77 30053900	4508085
###	43.75	44.42	43.19	44	44 25504600	3825690
###	44.05	45.53	44.05	44.99	44.99 28294700	4244205
###	45.12	45.64	44.95	45.62	45.62 23882100	3582315
###	45.27	45.61	44.74	45.05	45.05 64821200	9723180
6/1/2022	45.55	45.8	44.77	45.23	45.23 20666000	3099900
6/2/2022	45.18	45.8	44.9	45.79	45.79 20546800	3082020
6/3/2022	45.55	45.74	45.12	45.25	45.25 17945000	2691750
6/6/2022	45.6	46.09	45.13	45.33	45.33 12641900	1896285
6/7/2022	44.82	45.65	44.72	45.57	45.57 14667200	2200080
6/8/2022	45.45	45.63	44.88	44.92	44.92 16263800	2439570
6/9/2022	44.83	45.27	44.24	44.26	44.26 18417700	2762655
###	43.8	43.99	43.29	43.49	43.49 20262400	3039360
###	43.06	43.84	42.89	43.24	43.24 29050800	4357620
###	43.63	43.7	42.57	42.91	42.91 22499100	3374865
###	43.37	44.43	43.1	43.8	43.8 22525100	3378765
###	42.81	43.41	42.81	43.32	43.32 27049000	4057350
###	43.36	44	43.24	43.39	43.39 59510000	8926500
###	43.81	44.28	43.7	44.14	44.14 23277900	3491685
###	43.47	44.12	43.17	43.57	43.57 19936600	2990490

Below are the stock charts prepared from the above excel:





WIL Project Weekly Deliverable 8

Cloud Monitoring Tools



Group Name: CCBT_0050

TEAM MEMBERS

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Simarpreet	Kaur	C0791523

INTRODUCTION

Grafana is one of the best open-source monitoring & data visualization tool that incorporates with complex data from sources like Elasticsearch, InfluxDB. It lets you set up notifications, alerts, filters for your data while also making cooperation with your associates easier through built-in sharing features. Grafana's impressive visualization and alerting, is developed with approach to Enterprise data source plugins and built-in collaboration features.

Kibana is a free and open user interface that lets you visualize your Elasticsearch data and navigate the Elastic Stack. Do anything from tracking query load to understanding the way requests flow through your apps. Kibana is a data visualization and management tool for Elasticsearch that provides real-time histograms, line graphs, pie charts, and maps. Kibana also includes advanced applications such as Canvas, which allows users to create custom dynamic infographics based on their data, and Elastic Maps for visualizing geospatial data. Elasticsearch is a distributed, free, and open search and analytics engine for all types of data, including textual, numerical, geospatial, structured, and unstructured.



Why Grafana?

Understanding all relevant data — and the relationships between them — is important for root-causing incidents as quickly as possible and identifying the real source of unexpected system behavior. Grafana allows teams to seamlessly visualize and move among all their data, all in one place.

Unify your data, not your database

Grafana doesn't require you to ingest data to a backend store or vendor database. Instead, Grafana takes a unique approach to providing a “single-pane-of-glass” by unifying your existing data, wherever it lives. With Grafana, you can take any of your existing data- be it from your Kubernetes cluster, raspberry pi, different cloud services, or even Google Sheets- and visualize it however you want, all from a single dashboard.

Data everyone can see

Grafana was built on the principle that data should be accessible to everyone in your organization, not just the single Ops person. By democratizing data, Grafana helps to facilitate a culture where data can easily be used and accessed by the people that need it, helping to break down data silos and empower teams.

Dashboards that anyone can use

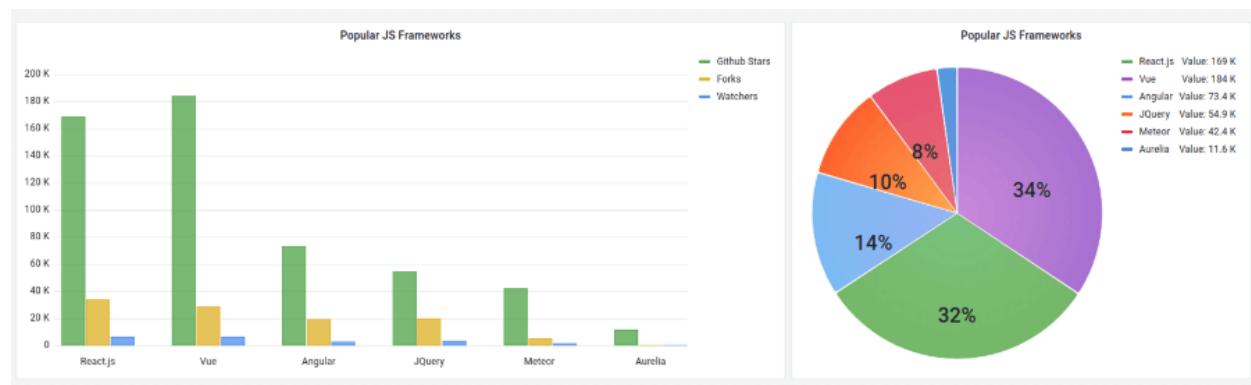
Not only do Grafana dashboards give insightful meaning to data collected from numerous sources, but you can also share the dashboards you create with other team members, allowing you to explore the data together. With Grafana, anyone can create and share dynamic dashboards to foster collaboration and transparency.

Flexibility and versatility

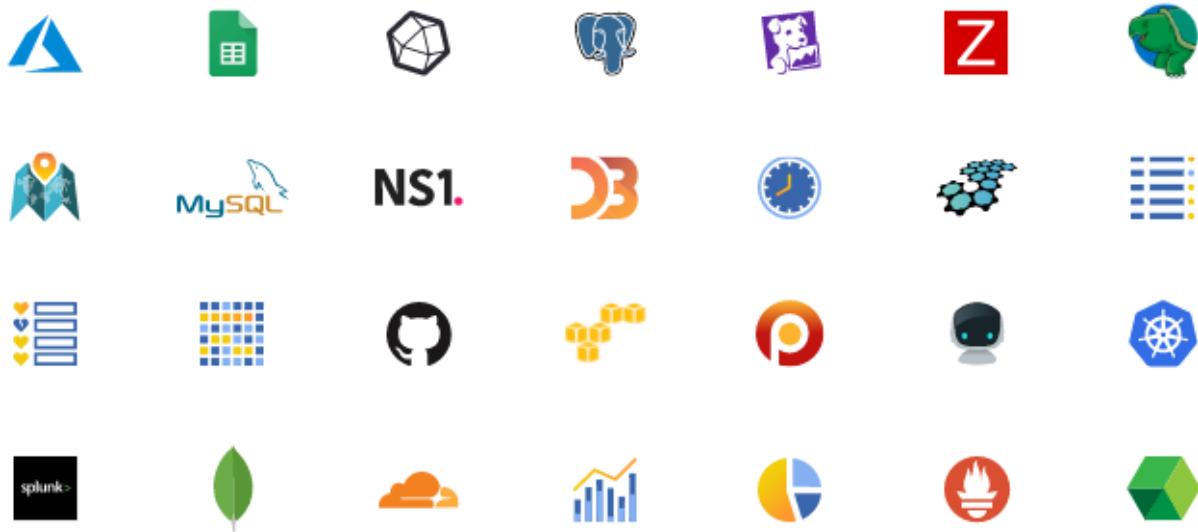
Translate and transform any of your data into flexible and versatile dashboards. Unlike other tools, Grafana allows you to build dashboards specifically for you and your team. With advanced querying and transformation capabilities, you can customize your panels to create visualizations that are actually helpful for you.

Grafana key features

Panels:



Plugins:



How To Install Grafana on Ubuntu 18.04

We used the official APT repository to download Grafana on our Ubuntu 18.04 which is installed on top of our VMware 16 Workstation (Hypervisor type 2) as per our weekly deliverable.

Step 1: Add Grafana APT repository

Then install Grafana APT repository:

```
neeraj@ubuntu:~$ sudo add-apt-repository "deb https://packages.grafana.com/oss/  
deb stable main"  
Get:1 https://packages.grafana.com/oss/deb stable InRelease [12.1 kB]  
Get:2 https://packages.grafana.com/oss/deb stable/main amd64 Packages [31.5 kB]  
Hit:3 http://us.archive.ubuntu.com/ubuntu focal InRelease  
Hit:4 http://security.ubuntu.com/ubuntu focal-security InRelease  
Hit:5 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease  
Hit:6 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease  
Fetched 21.5 kB in 1s (28.6 kB/s)  
R Show Applications lists... Done  
neeraj@ubuntu:~$ █
```

```
neeraj@ubuntu:~$ sudo apt-get install -y gnupg2 curl software-properties-common
Reading package lists... Done
Building dependency tree
Reading state information... Done
curl is already the newest version (7.68.0-1ubuntu2.12).
software-properties-common is already the newest version (0.99.9.8).
gnupg2 is already the newest version (2.2.19-3ubuntu2.2).
0 upgraded, 0 newly installed, 0 to remove and 446 not upgraded.
neeraj@ubuntu:~$ curl https://packages.grafana.com/gpg.key | sudo apt-key add -
  % Total    % Received % Xferd  Average Speed   Time   Time     Current
          Dload  Upload Total   Spent   Left Speed
100  1694  100  1694    0      0  5554      0 --:--:-- --:--:-- 5554
0"
n Show Applications
```

Step 2: After repository is added, update Apt repositories, and install Grafana

```
neeraj@ubuntu:~$ sudo apt-get update
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Hit:2 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease
Hit:3 https://packages.grafana.com/oss/deb stable InRelease
Hit:4 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease
Hit:5 http://security.ubuntu.com/ubuntu focal-security InRelease
R Show Applications lists... Done
neeraj@ubuntu:~$
```

```
neeraj@ubuntu:~$ sudo apt-get -y install grafana
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following NEW packages will be installed:
  grafana
0 upgraded, 1 newly installed, 0 to remove and 446 not upgraded.
Need to get 80.0 MB of archives.
After this operation, 268 MB of additional disk space will be used.
Get:1 https://packages.grafana.com/oss/deb stable/main amd64 grafana amd64 9.0.
2 [80.0 MB]
Fetched 80.0 MB in 20s (4,090 kB/s)
Selecting previously unselected package grafana.
(Reading database ... 145009 files and directories currently installed.)
Preparing to unpack .../grafana_9.0.2_amd64.deb ...
Unpacking grafana (9.0.2) ...
Setting up grafana (9.0.2) ...
Adding system user `grafana' (UID 126) ...
A Terminal w user `grafana' (UID 126) with group `grafana' ...
Not creating home directory `/usr/share/grafana'.
### NOT starting on installation, please execute the following statements to co
nfigure grafana to start automatically using systemd
  sudo /bin/systemctl daemon-reload
  sudo /bin/systemctl enable grafana-server
### You can start grafana-server by executing
  sudo /bin/systemctl start grafana-server
Processing triggers for systemd (245.4-4ubuntu3.4) ...
neeraj@ubuntu:~$
```

Step 3: Enable Grafana Service, Grafana would be up and running

```
neeraj@ubuntu:~$ sudo systemctl enable --now grafana-server
Synchronizing state of grafana-server.service with SysV service script with /lib/systemd/systemd-sysv-install.
Executing: /lib/systemd/systemd-sysv-install enable grafana-server
Created symlink /etc/systemd/system/multi-user.target.wants/grafana-server.service.
neeraj@ubuntu:~$
```

```
neeraj@ubuntu:~$ systemctl status grafana-server.service
● grafana-server.service - Grafana instance
  Loaded: loaded (/lib/systemd/system/grafana-server.service; enabled; vendor>
  Active: active (running) since Wed 2022-07-06 03:13:29 PDT; 1min 24s ago
    Docs: http://docs.grafana.org
   Main PID: 8804 (grafana-server)
     Tasks: 13 (limit: 2281)
    Memory: 99.4M
      CGroup: /system.slice/grafana-server.service
              └─8804 /usr/sbin/grafana-server --config=/etc/grafana/grafana.ini

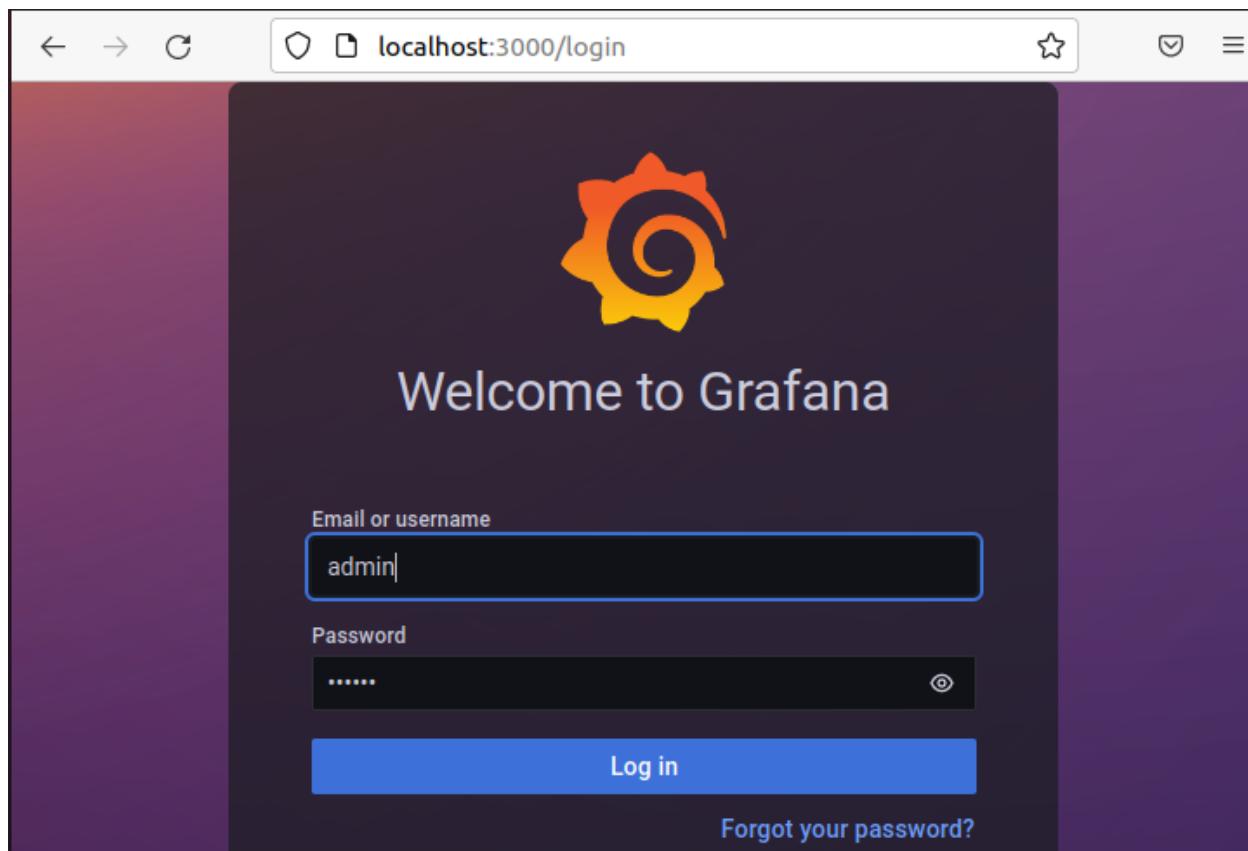
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=plugin.finder t=2022-07-06T03:13:32Z lvl=info msg="Plugin 'Finder' loaded"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=secrets t=2022-07-06T03:13:32Z lvl=info msg="Secrets API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=query_data t=2022-07-06T03:13:32Z lvl=info msg="Query Data API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=live.push_http t=2022-07-06T03:13:32Z lvl=info msg="Live Push HTTP API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=infra.usagestats.collector t=2022-07-06T03:13:32Z lvl=info msg="Usage Statistics Collector API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=server t=2022-07-06T03:13:32Z lvl=info msg="Server API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=http.server t=2022-07-06T03:13:32Z lvl=info msg="HTTP Server API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=ngalert t=2022-07-06T03:13:32Z lvl=info msg="NGALERT API endpoint registered"
Jul 06 03:13:32 ubuntu grafana-server[8804]: logger=ngalert.multiorg.alertmanager t=2022-07-06T03:13:32Z lvl=info msg="NGALERT MultiOrg AlertManager API endpoint registered"
j Show Applications |ubuntu grafana-server[8804]: logger=grafanaStorageLogger t=2022-07-06T03:13:32Z lvl=info msg="Grafana Storage Logger initialized"
lines 1-20/20 (END)
```

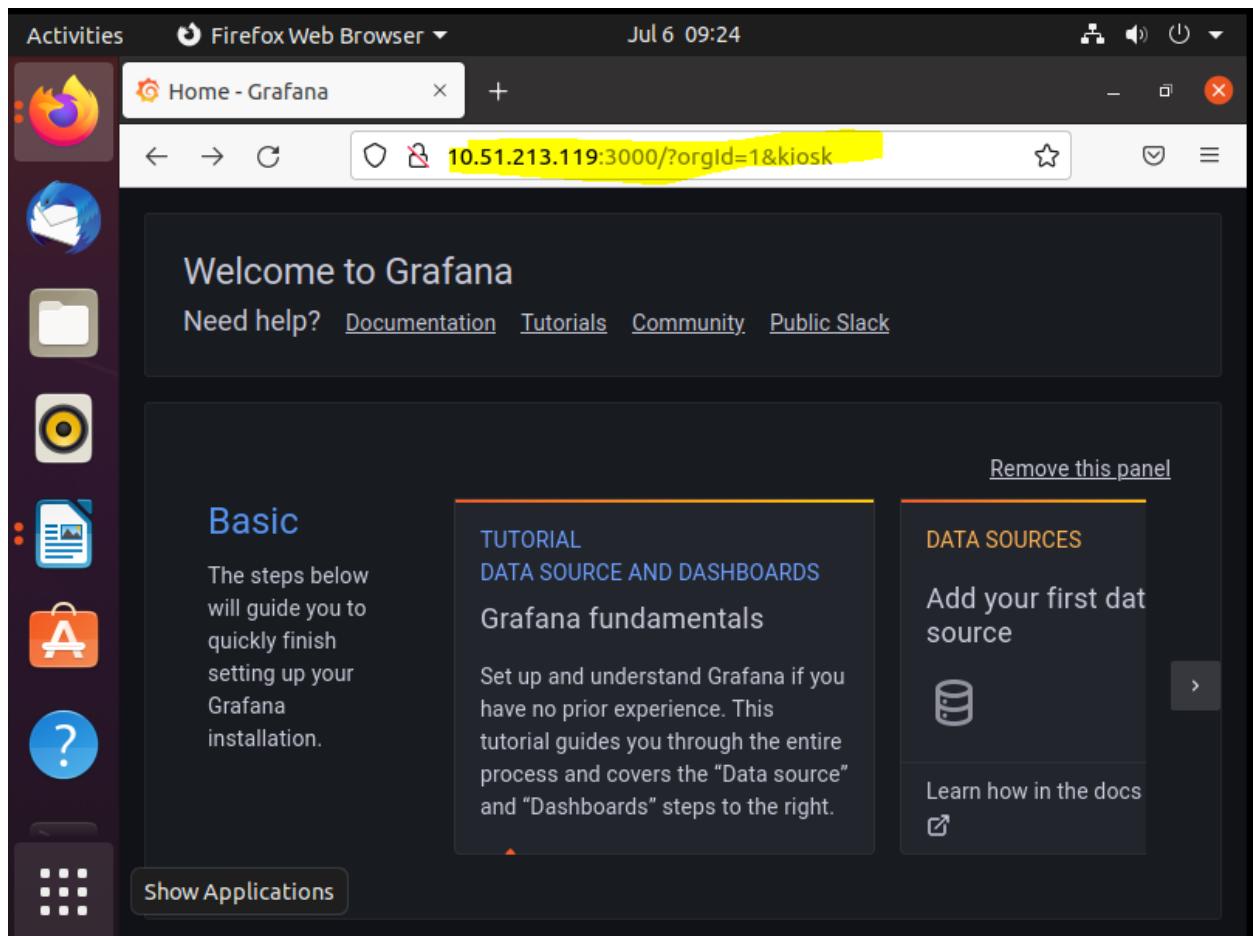
Step 4 : Open port on Firewall

```
neeraj@ubuntu:~$ sudo ufw enable
Firewall is active and enabled on system startup
neeraj@ubuntu:~$
neeraj@ubuntu:~$ sudo ufw allow ssh
Rule added
Rule added (v6)
neeraj@ubuntu:~$
neeraj@ubuntu:~$
neeraj@ubuntu:~$ sudo ufw allow 3000/tcp
Rule added
Rule added (v6)
neeraj@ubuntu:~$ sudo ufw allow from 192.168.50.0/24 to any port 3000
Rule added
neeraj@ubuntu:~$
```

Step 5 : Login to Grafana portal

```
neeraj@ubuntu:~$ ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN group default
    qlen 1000
        link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
        inet 127.0.0.1/8 scope host lo
            valid_lft forever preferred_lft forever
        inet6 ::1/128 scope host
            valid_lft forever preferred_lft forever
2: ens33: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc fq_codel state UP group default
    qlen 1000
        link/ether 00:0c:29:05:1a:27 brd ff:ff:ff:ff:ff:ff
        altnet enp2s1
        inet 10.51.213.119/16 brd 10.51.255.255 scope global dynamic noprefixroute
            ens33
            valid_lft 604190sec preferred_lft 604190sec
            inet6 fe80::a1ac:dd19:2fcd:3389/64 scope link noprefixroute
                Show Applications
                valid_lft forever preferred_lft forever
```





How To Install InfluxDB on Ubuntu 18.04

Installation of InfluxDB on Ubuntu|18.04 is done from Influxdata repository.

Step 1: Update the apt package

Add the repo for InfluxDB, package can be installed using an **apt** package manager.

```
neeraj@ubuntu:~$ sudo echo "deb https://repos.influxdata.com/ubuntu bionic stable" | sudo tee /etc/apt/sources.list.d/influxdb.list
deb https://repos.influxdata.com/ubuntu bionic stable
neeraj@ubuntu:~$ 
neeraj@ubuntu:~$ sudo apt update
Hit:1 http://us.archive.ubuntu.com/ubuntu focal InRelease
Get:2 https://repos.influxdata.com/ubuntu bionic InRelease [4,737 B]
Hit:3 https://packages.grafana.com/oss/deb stable InRelease
Get:4 http://us.archive.ubuntu.com/ubuntu focal-updates InRelease [114 kB]
Get:5 https://repos.influxdata.com/ubuntu bionic/stable i386 Packages [935 B]
Get:6 https://repos.influxdata.com/ubuntu bionic/stable amd64 Packages [1,265 B]
]
Get:7 http://us.archive.ubuntu.com/ubuntu focal-backports InRelease [108 kB]
Get:8 http://us.archive.ubuntu.com/ubuntu focal-updates/main i386 Packages [688 kB]
Get:9 http://security.ubuntu.com/ubuntu focal-security InRelease [114 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu focal-updates/main amd64 Packages [1,947 kB]
Get:11 http://us.archive.ubuntu.com/ubuntu focal-updates/main Translation-en [353 kB]
Get:12 http://us.archive.ubuntu.com/ubuntu focal-updates/universe amd64 Packages [923 kB]
Get:13 http://us.archive.ubuntu.com/ubuntu focal-updates/universe i386 Packages [676 kB]
Get:14 http://us.archive.ubuntu.com/ubuntu focal-updates/universe Translation-en [207 kB]
Fetched 5,137 kB in 4s (1,260 kB/s)
```

Step 2: Update apt index and install InfluxDB on Ubuntu 18.04

```
neeraj@ubuntu:~$ sudo apt install influxdb
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libgs9-common
The following NEW packages will be installed:
  influxdb
The following packages will be upgraded:
  libgs9-common
1 upgraded, 1 newly installed, 0 to remove and 392 not upgraded.
4 not fully installed or removed.
Need to get 54.4 MB/55.1 MB of archives.
After this operation, 153 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 https://repos.influxdata.com/ubuntu bionic/stable amd64 influxdb amd64 1.8.10-1 [54.4 MB]
Fetched 54.4 MB in 5s (11.1 MB/s)
(Reading database ... 151768 files and directories currently installed.)
Preparing to unpack .../libgs9-common_9.50~dfsg-5ubuntu4.5_all.deb ...
Unpacking libgs9-common (9.50~dfsg-5ubuntu4.5) over (9.50~dfsg-5ubuntu4.2) ...
Selecting previously unselected package influxdb.
Preparing to unpack .../influxdb_1.8.10-1_amd64.deb ...
Unpacking influxdb (1.8.10-1) ...
Setting up libgs9-common (9.50~dfsg-5ubuntu4.5) ...
Setting up libgs9:amd64 (9.50~dfsg-5ubuntu4.5) ...
Setting up ghostscript (9.50~dfsg-5ubuntu4.5) ...
Setting up influxdb (1.8.10-1) ...
```

Step 3 : Start and enable the service .

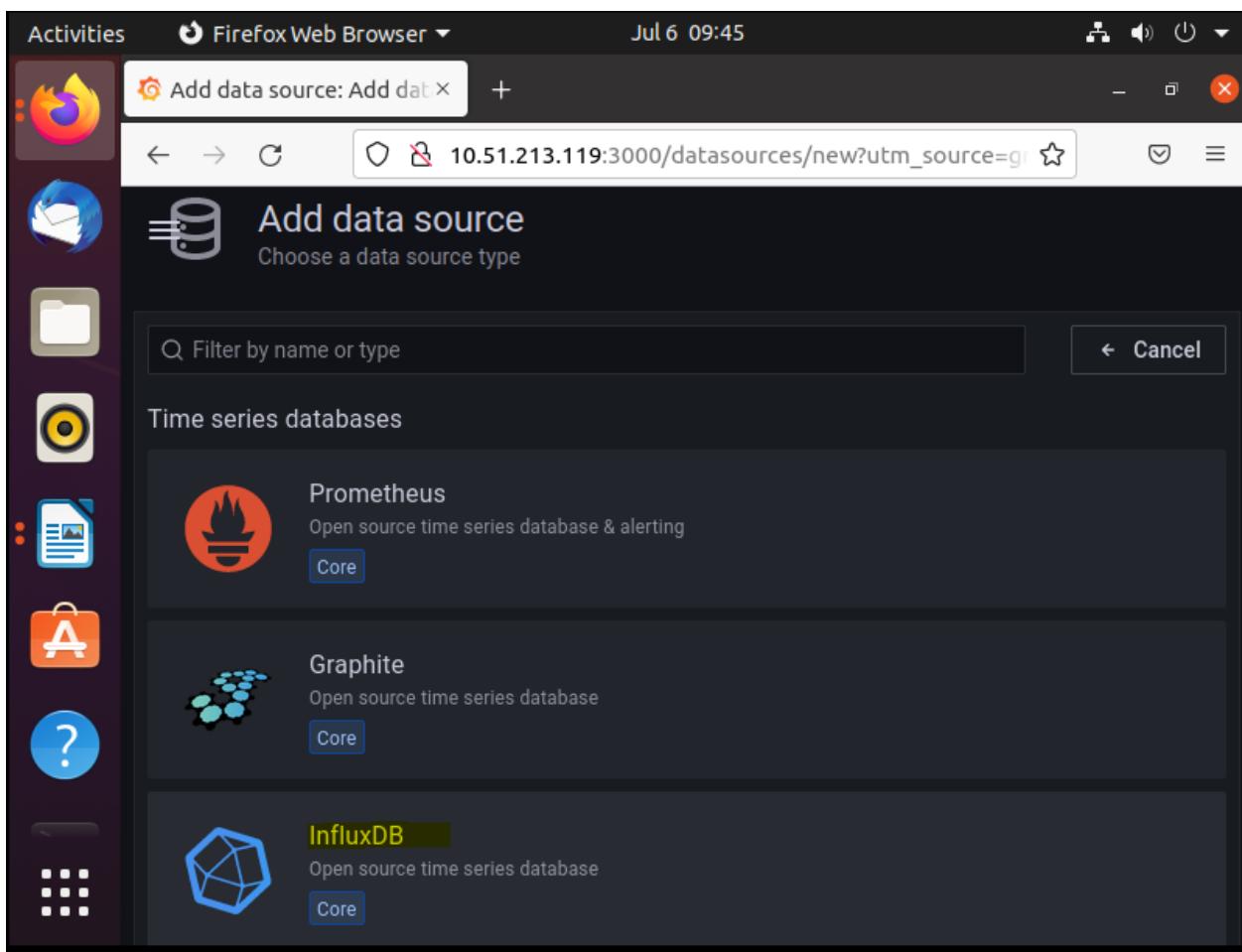
```
neeraj@ubuntu:~$ sudo systemctl status influxdb
● influxdb.service - InfluxDB is an open-source, distributed, time series data>
  Loaded: loaded (/lib/systemd/system/influxdb.service; enabled; vendor pre>
  Active: active (running) since Wed 2022-07-06 06:00:50 PDT; 16min ago
    Docs: https://docs.influxdata.com/influxdb/
 Main PID: 6263 (influxd)
   Tasks: 10 (limit: 2281)
   Memory: 20.9M
     CGroup: /system.slice/influxdb.service
             └─6263 /usr/bin/influxd -config /etc/influxdb/influxdb.conf

Jul  6 06:00:50 ubuntu influxd-systemd-start.sh[6263]: ts=2022-07-06T13:00:50.>
Jul  6 06:00:50 ubuntu influxd-systemd-start.sh[6263]: [httpd] 127.0.0.1 - - [>
Jul  6 06:00:50 ubuntu influxd-systemd-start.sh[6262]: InfluxDB started
Jul  6 06:00:50 ubuntu systemd[1]: Started InfluxDB is an open-source, distribu>
lines 1-20/20 (END)
```

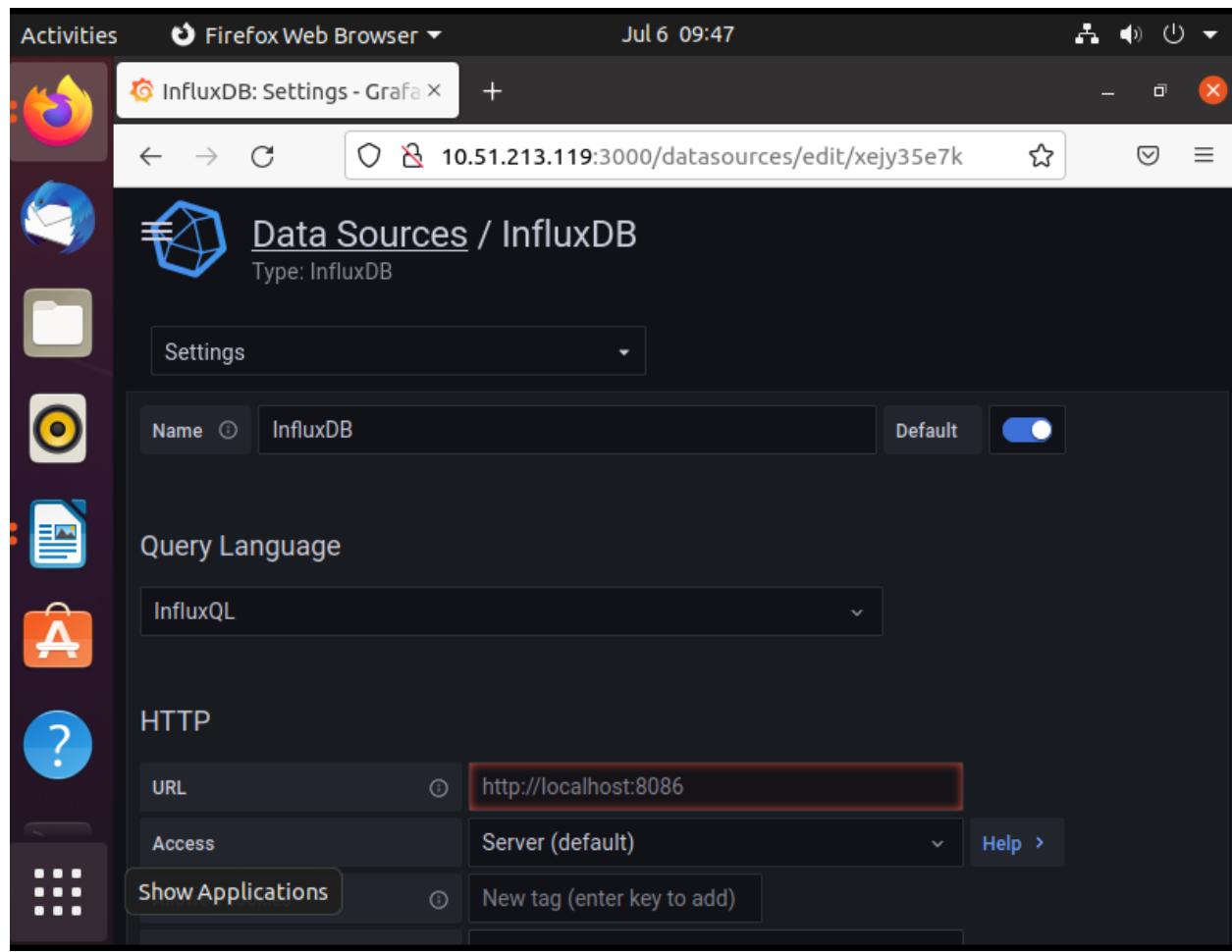
Step4: Create User and add privileges to the user.

```
neeraj@ubuntu:~$ curl -XPOST "http://localhost:8086/query" --data-urlencode "q=CREATE USER admin WITH PASSWORD 'Neeraj' WITH ALL PRIVILEGES"
{"results": [{"statement_id": 0}]}
neeraj@ubuntu:~$ influx -username 'admin' -password 'Neeraj'
Connected to http://localhost:8086 version 1.8.10
InfluxDB shell version: 1.8.10
>
> 
```

Step 5: Influx can be added now as Data source for Grafana.



Add details for the host / user to start importing data from InfluxDB





Technical Report

Week 9

Group Name: - CCBT_0050

Team Members

Neeraj	Ghugtyal	C0793557
Naman	Sareen	C0796173
Priyanshu	Sharma	C0785539
Simarpreet	Kaur	C0791523

What is Big Data?

Big data is defined as data that is more varied, arriving at a faster rate and in larger volumes. The three Vs are another name for this.

Big data, especially from new data sources, is simply a term for larger, more complex data collections. These data sets are so large that they just cannot be handled by conventional data processing software. However, these enormous amounts of data can be leveraged to solve business issues that were previously impossible to solve.

The three Vs in the Big Data

Volume

The volume of data is important. You'll need to process large amounts of low-density, unstructured data when working with big data. This can be unvalued data from sources like Twitter data feeds, clickstreams from websites or mobile apps, or sensor-enabled hardware. This amount of data may reach tens of gigabytes for some corporations. Others might need several hundred petabytes.

Velocity

Velocity refers to how quickly data is received and (perhaps) used. In contrast to being written to disc, the highest velocity of data often streams straight into memory. Some internet-enabled smart goods function in real time or almost real time, necessitating real-time analysis and decision-making.

Variety

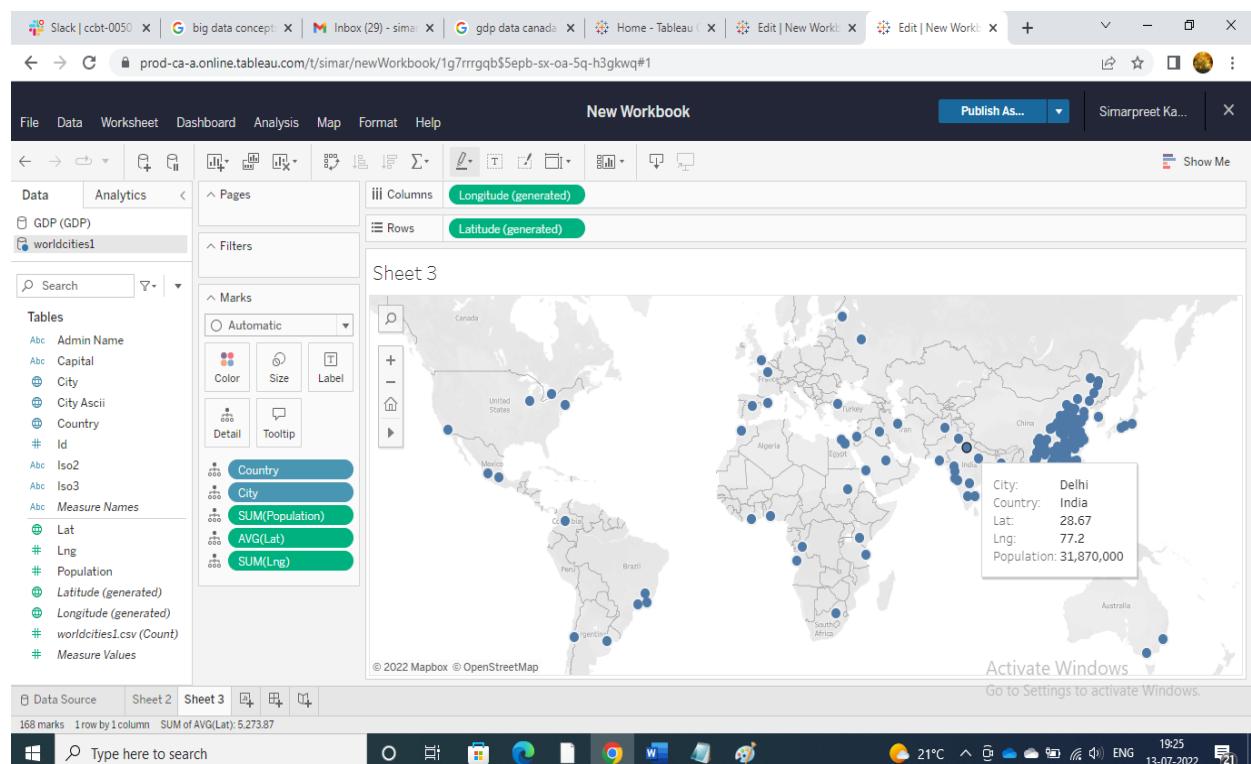
Variety alludes to the wide range of data types that are accessible. In a relational database, traditional data kinds were organized and easily suited. Data now comes in new unstructured data formats thanks to the growth of big data. Text, audio, and video are examples of semi-structured and unstructured data types that require further preprocessing to create meaning and enable metadata.

In Week 9 technical report we created a map using tableau from a csv file named **worldcities1.csv** having columns such as country, cities, population etc.

Steps followed to create a map: -

- 1) First, we go to <http://www.tableau.com> and register for free tableau workspace.
- 2) After that we downloaded the csv file named **worldcities1.csv** from another site. As the site provided in the slack was not showing the file.
- 3) Then on the tableau, we created a workspace by clicking on new.
- 4) A window will appear showing connect to data. There click on files and then select the csv file with the help of which you want to create a visualized data.
- 5) After uploading the file, on the left from the tables section select city, country, population, longitude, and latitude.
- 6) Then a map will be created representing city name, country name along with the population, longitude, and latitude.
- 7) The csv file was having thousand of cities in it. We selected only 200 cities so that everything should be clearly presented.

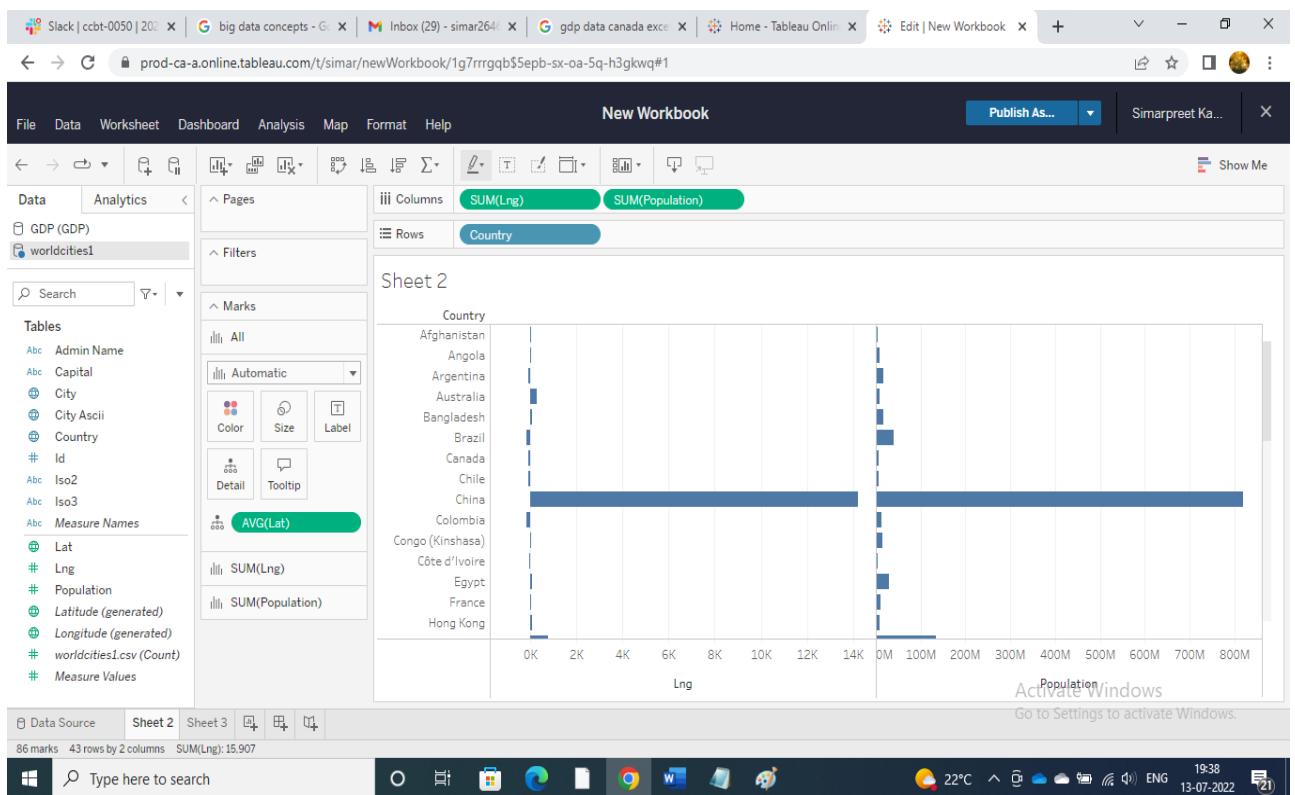
As a result, following map will be generated representing the longitude, latitude and population showing country and city name.





We also tried to create a graph based on the same dataset.

- 1) We selected the csv file named worldcities1.csv.
- 2) Then for creating a graph we put longitude and population in column and country in row.
- 3) Then on the right-hand side top we click on Show Me to select the type of graph we need.
- 4) As a result, we created a following graph showing data based on population and longitude country wise.



Technical Report

Week 11

Group Name: - CCBT_0050

Team Members

Neeraj	Ghugtyal	C0793557
Naman	Sareen	C0796173
Priyanshu	Sharma	C0785539
Simarpreet	Kaur	C0791523

1. From your desktop, click **Apps** at the top of your left sidebar. If you don't see this option, click **More** to find it.
2. Search for and select **Trello** to open a direct message with the app.
3. Click the **plus icon** next to the message field.
4. Search for and select **/trello** from the menu to add the [slash command](#) to the message field.
5. Send the message.
6. Click **Link Account**.
7. Select **Allow**, then click **Link Accounts**.



Trello is requesting permission to access the cloud Slack workspace

What will Trello be able to view?

- Content and info about you ▶
- Content and info about channels & conversations ▶
- Content and info about your workspace ▶

What will Trello be able to do?

- Perform actions as you ▶
- Perform actions in channels & conversations ▶
- Perform actions in your workspace ▶

[Cancel](#)

[Allow](#)

The screenshot shows the Trello workspace settings interface. On the left, there's a sidebar with options like 'Cloud Free', 'Boards', 'Members', 'Settings' (which is selected), 'Workspace views', 'Table', 'Calendar', and 'Your boards'. The main area displays the 'Cloud' workspace details. It shows the workspace name 'Cloud', its visibility status as 'Private', and a link to 'Invite Workspace members'. Below this, under 'Workspace visibility', it says 'Private - This Workspace is private. It's not indexed or visible to those outside the Workspace.' with a 'Change' button. Under 'Slack workspaces linking', it says 'Link your Slack and Trello Workspaces together to collaborate on Trello projects from within Slack. Learn more.' with a 'Add to Slack' button. At the bottom, it shows a link to a specific Slack workspace: 'This Workspace is linked to the [cloud-w7b3579.slack.com](#) Slack workspace. Slack workspace members can [self-join](#) this Trello Workspace.' with a 'Change' button.

cloud

externalsupport

+ Add a bookmark

Channels

externalsupport

general

internalsupport

random

+ Add channels

Direct messages

N Neeraj Singh you

c0785539

c0791523

c0796173

+ Add teammates

Apps

Butler

Trello

+ Add apps

This is the very beginning of the # externalsupport channel
@c0791523 created this channel yesterday. Add description

+ Add people

c0791523 6:15 PM joined #externalsupport along with 2 others.

Trello APP 8:59 PM Hey there, I'm @Trello! 🎉

You can use Trello from any Slack channel I'm in. Just type `/invite @Trello` in your channels to add me (578 kB)

Just wrapping up work on <https://trello.com/c/uRDiqPh/4-ship-new-ios-app>

Card
Ship New iOS app
In 1st Completed Projects on Travidux Company Overview
Apr 14 1 Matt Cowan
Labels: Product
The mobile team has released an Android app and is now working on v2 of the iOS app. [Show more...](#)

Quick Actions

Trello APP 4:26 PM @matf moved Ship New iOS app to the top of Completed Projects.

+ Message Company-overview

You also have a shiny new `/trello` command. Just type `/trello add` in any channel to create a new card. 🎉



Would you like to give the following application access to your account?

Trello Slack App



You are logged in as:

Name

Neeraj Singh Ghugtyal

Username

neerajsinghghugtyal

[Switch Account](#)



Trello Slack App will be able to use your account **until you disable it.**

- Create and update cards, lists, boards and Workspaces
- Read Power-Ups you own
- Update Power-Ups you own

Trello Slack App will **not** be able to:

- See your Trello password

Trello Slack App will have access to the following boards and Workspaces:

Cloud



1 Boards

Additionally, Trello Slack App will have access to any boards and Workspaces you gain access to in the future.

[Trello's Privacy Policy](#)

Deny

Allow

Redirect URL: <https://trello-slack.services.atlassian.com>

Link Accounts?

Associate your Trello account with:



Neeraj Singh
Neeraj Singh

Not you? Please close this tab.

[Link Accounts](#)



Roo! Successfully authenticated with Trello!

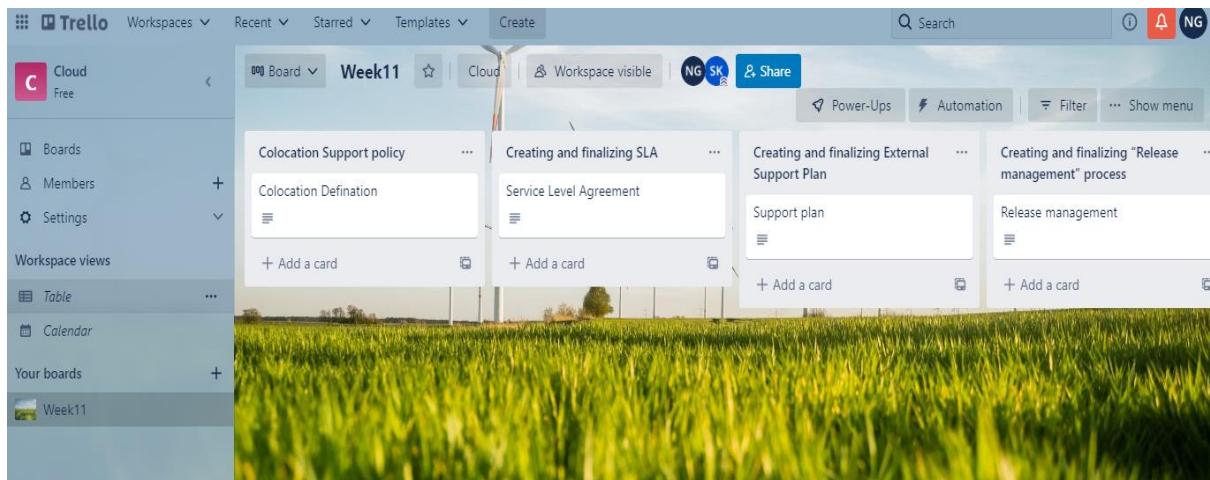
Type **/trello help** in Slack to get started.

Link boards to channels

1. From a channel, click the **plus icon** next to the message field.
2. Search for and select **/trello** from the menu.
3. Following **/trello** in the message field, type **link** and the URL of the board you'd like to add.
4. Send your message, then click **Link to Channel**.

Add new Trello cards

1. From a channel, click the **plus icon** next to the message field.
2. Search for and select **/trello** from the menu.
3. Following **/trello** in the message field, type **add** and the name of the card you'd like to add.
4. Send your message to add the card.



Technical Report

Week 11

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- Perform actions in your workspace ▶

Cancel

Allow

Screenshot of the Trello workspace settings page:

The workspace is named "Cloud" and is currently private.

Settings menu items shown on the left: Cloud (selected), Boards, Members, Settings (selected), Workspace views (Table, Calendar), Your boards (Week11).

Workspace visibility: Private (not indexed or visible outside the workspace). Change button.

Slack workspaces linking: Linked to "cloud-w7b3579.slack.com". Add to Slack button.

Members tab is selected in the workspace navigation bar.

cloud

externalsupport

+ Add a bookmark

Channels

externalsupport

general

internalsupport

random

+ Add channels

Direct messages

N Neeraj Singh you

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Neeraj Singh
Neeraj Singh

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Add new Trello cards

1. From a channel, click the **plus icon** next to the message field.
2. Search for and select **/trello** from the menu.
3. Following **/trello** in the message field, type **add** and the name of the card you'd like to add.
4. Send your message to add the card.

