CLOUD COMPUTING AND IoT PRACTICAL

SEMESTER – VI (21O – Scheme) **INSTRUCTION MANUAL**

LEARNING RESOURCE CENTRE
THIAGARAJAR POLYTECHNIC COLLEGE
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CONCEPTS AND REALIZATION

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PREFACE

Learning gives creativity, Creativity leads to thinking, Thinking provides knowledge and Knowledge makes you great – Dr. APJ. Abdul Kalam.

Knowledge acquired through creative thinking can elevate the learning process of the young learners. In order to make the students think and learn, the Student Centered Learning (Problem Based Learning) is an innovative teaching methodology adopted in many nations across the world.

My study visits to Singapore, Canada and UK provided me an opportunity to study this new method of teaching-learning process of Student Centered Learning (**SCL**) practiced in the Polytechnics and Universities of Singapore, Canada and UK. Adoring the great success of PBL in those nations, the new methodology of Student Centered Learning was improved with the necessary modifications and introduced in our Polytechnic education in practical courses during 2011.

The successful implementation of the Student Centered Learning as a pilot project in all the practical courses in this institution has resulted in the consistent and uniform performance of the students in the class rooms, examinations and in placement interviews.

Considering the benefits of PBL, this **Record of Work book** is brought out as a new venture in lieu of the conventional method of writing the Record Note, which is a mere replication of observation note book.

The **Record of Work Book** consists of experiments and procedures, PBL worksheets and application and inference of the concepts. This innovative **Record of Work Book** will kindle the creativity of our students and enhance their academic performances to the International Standards.

The unstinted support and encouragement of our Honourable Chairman Sri.C.Valliappa and respected Vice Chairmen Sri.Chocko Valliappa and Sri.Thyagu Valliappa have resulted in the successful implementation of PBL and this Record of Work Book in our institution. I place my sincere gratitude to our Management for all their continuous guidance in this venture.

I honestly appreciate the Heads of Departments and all the teachers who understood the concept quickly and rendered their fullest co-operation for the immediate implementation of PBL in our institution.

I firmly believe that this Record of Work Book which adopts Creative Learning Methodology (**CLM**) based on Bloom's Taxonomy will promote higher order thinking skills of our students to learn, analyze and apply the concepts.

Dr.V.KARTHIKEYAN

PRINCIPAL & CHIEF CO-ORDINATOR

CLOUD COMPUTING AND IoT PRACTICAL

Instruction Manual

Name	
Course	
Semester	
Roll No	
Register No	

CLOUD COMPUTING AND IoT PRACTICAL

Instructions

1. Read the questions, and procedure of the assigned exercises in the instruction manual before coming to the laboratory.
2. Students should carefully listen to the instructions of the faculty during the practical classes.
3. Record the observations properly and get the initials when you are doing the exercises.
4. Keep the system clean and operate the computer in proper methods.
5. Arrange the chairs properly in their respective places while leaving the laboratory.
6. Any problem in the computers during the lab session, must be reported to the staff in charge / Lab Assistant immediately.

THIAGARAJAR POLYTECHNIC COLLEGE, SALEM – 636005

| Govt. Aided | Autonomous | NBA Accredited from 2018-19 to 2023-24: Civil, Mech, EEE, Prodn & Textile Tech. |

Programme : Computer Engineering
Semester : VI
Course Code : 21O - 7311
Course Name : **Cloud Computing and IoT Practical**
Course Type : Applied Technology

TEACHING AND SCHEME OF EXAMINATION

No of weeks per semester: 16 weeks

Name of the Course	Instructions		Examinations			
			Max. Marks			Duration
	Hours / Week	Hours / Semester	Continuous Assessment	Semester- End Examination	Total	
Cloud Computing and IoT Practical	**4**	**64**	**25**	**100***	**100**	**3 Hours.**

*** Semester - End Examination will be conducted for 100 marks and converted to 75 marks**

COURSE OUTCOMES:

21O – 7311 Cloud Computing and IoT Practical	
On successful completion of this course, students should be able to	
C605.1	Use the various SaaS application, install server in AWS, VM using VMWare and perform a case study on cloud providers.
C605.3	Design application using Arduino & Raspberry Pi

CO – PO & PSOs MAPPING MATRIX

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
C605.1	3	3	3	3	-	2	3	3	2
C605.2	3	3	3	3	-	2	3	3	2
C605 Total	6	9	9	9	-	4	9	3	4
Correlation Level	3	2	2	2	-	2	3	3	2

LIST OF EXPERIMENTS

PART - A		28 Hrs.
1.	To implement program on SaaS to Create an word document of your class time table and store locally and on cloud with doc and pdf format	
2.	To implement program on SaaS to Create a spread sheet to generate a mark sheet for student progress report.	
3.	To implement web services by create your BlogSpot and Collaborating via Wikis	
4.	To implement an server instance using AWS	
5.	Install Virtual box / VMware Workstation with different flavours of linuxor windows OS on top of windows7 or 8.	
6.	Case Study on any one Open source and commercial Cloud-Microsoft Azure , Eucalyptus , Amazon EC2, Open Stack	
PART – B		**33 Hrs.**
8.	To implement LED Blink and LED Pattern With Arduino	
9.	To implement LED Pattern with Push Button Control With Arduino	
10.	To display “Hello World “ in LCD 16X2 Display With Arduino	
11.	To implement the Servo Motor Control with Arduino	
12.	To implement and monitor the LM35 Temperature Sensor and Ultrasonic Distance Measurement With Arduino	
13.	To implement the IR Sensor Analog Input With Arduino	
14.	Using Think Speak Cloud Reading Temperature Sensor Monitoring with Node MCU /Raspberry Pi	
	Model Examination	**3 Hrs.**

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	Model Examination	**3 Hrs.**

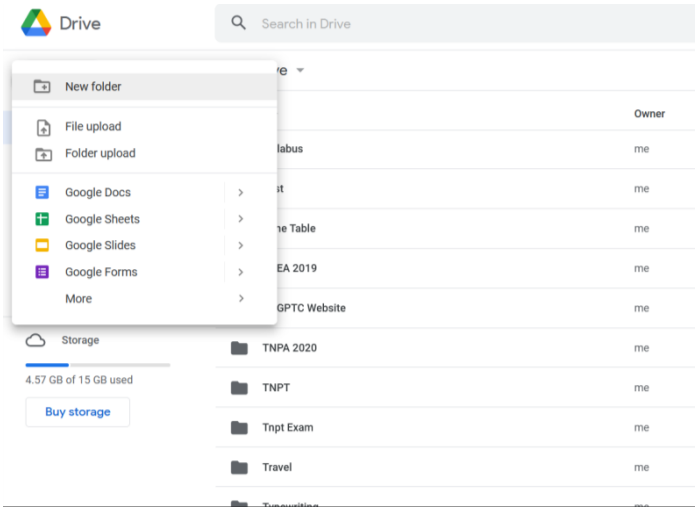
Ex. No. 1	TO CREATE WORD DOCUMENT, STORE IT LOCALLY AND IN CLOUD USING SaaS
Date:	

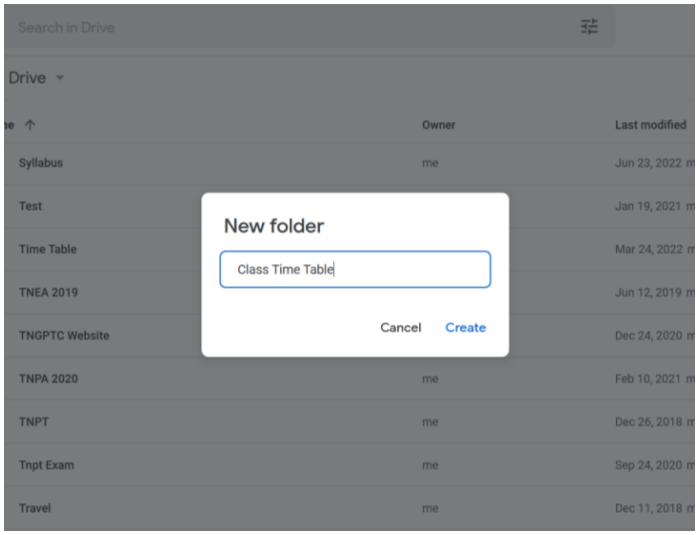
AIM

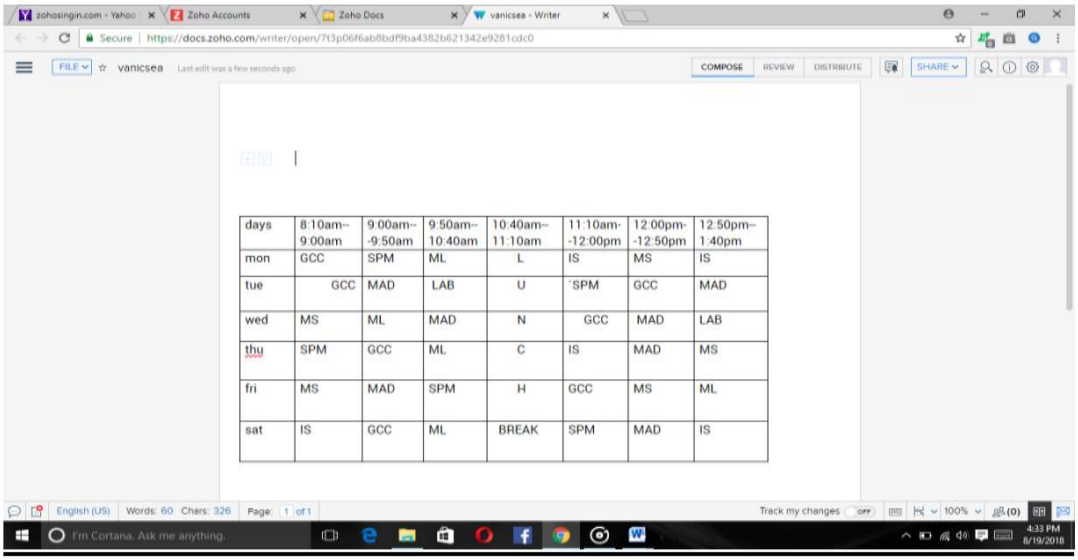
To implement program on SaaS and to create an word document of your class time table and store locally and on the cloud with doc, and pdf format.

PROCEDURE

1. Create a word document of class time table using word processing software on computer.
2. Save the document in doc and pdf format.
3. Login to Google Drive using email-id and password.
4. Create a folder in Google Drive and upload the created doc and pdf files in it.
5. Right click on the uploaded files and select Share option.
6. Select file access type.
7. When it is selected as “Restricted” access add the Gmail ID of the receiver and select the role of the receiver. Send the files.
8. Assign the Roles based on requirement
    a. Viewer: People can view, but can’t change or share the file with others.
    b. Commenter: People can make comments and suggestions, but can’t change or share the file with others.
    c. Editor: People can make changes, accept or reject suggestions, and share the file with others.
9. When it is selected as “Anyone with the link” select the role of the person who will access the file with the link. Send the file.
10. Access will be updated in the Google Drive.
11. Files can be accessed by the person with whom it is shared or it can be accessed using the link.







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fri	MS	MAD	SPM	H	GCC	MS	ML
sat	IS	GCC	ML	BREAK	SPM	MAD	IS

RESULT:

Thus SaaS implementation by creating Time Table in word document locally and uploading it in cloud is completed and verified.

TO CREATE WORD DOCUMENT, STORE IT LOCALLY AND IN CLOUD USING SaaS PART- B SCL WORKSHEET			
Worksheet No : 1			
1.	In cloud computing "Cloud" is a metaphor for_____		
Ans.			
2.	Which one is not a characteristic of Cloud Computing?		
Ans.	a)on demand self service	b) rapid elasticity	c)one time purchase
3.	Is Google DOCS a FOSS? Yes/No?		
Ans.			
4.	List out the types of cloud.		
Ans.			
5.	What is meant by software as a service and list out the vendors?		
Ans.			
6.	List any one advantages of cloud computing?		
Ans.			
7.	List any one disadvantages of cloud computing?		
Ans.			
8.	List any 5 vendors of cloud service.		
Ans.			
9.	What is meant by resource pooling?		
Ans.			
10.	Which one is replaced by cloud computing?		
Ans.	a)Corporate data centers	b)Expensive software upgrades	c) Both a and b
11.	What is the number one concern of cloud computing?		
Ans.	a)Too expensive	b)Security concerns	c)Accessibility
12.	Which one of these is not a leader in cloud computing?		
Ans.	a)Google	b)Amazon	c)Blackboard

13.	Google Docs is a type of cloud computing		
Ans.	a)True	b)False	
14.	An internet connection is necessary for cloud computing interaction		
Ans.	a)True	b)False	
15.	What is the number one concern of cloud computing?		
Ans.	a)Too expensive	b)Security concerns	c)Accessibility

TO CREATE WORD DOCUMENT, STORE IT LOCALLY AND IN CLOUD USING SaaS PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	What have you inferred from this experiment?
Ans:	
APPLICATIONS	
2.	Write in short as how Google Docs work?
Ans:	

ASSESSMENT			
Name of the Student		Name of the facilitator	V.Saranya
Register Number		Comments :	
Year/ Semester		Marks (5+3+2)	/10
Signature of the student		Signature of the facilitator with date	

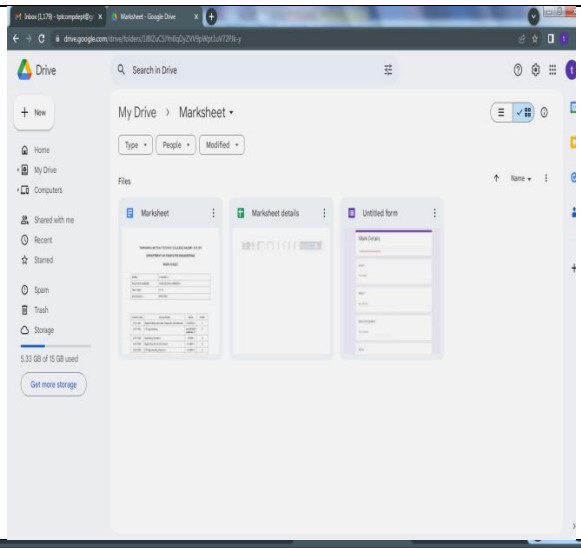
Ex. No. 2 Date:	SAAS IMPLEMENTATION - TO CREATE MARKSHEET USING GOOGLE DOCS, GOOGLE FORMS AND GOOGLE SPREADSHEET USING AUTOCRAT

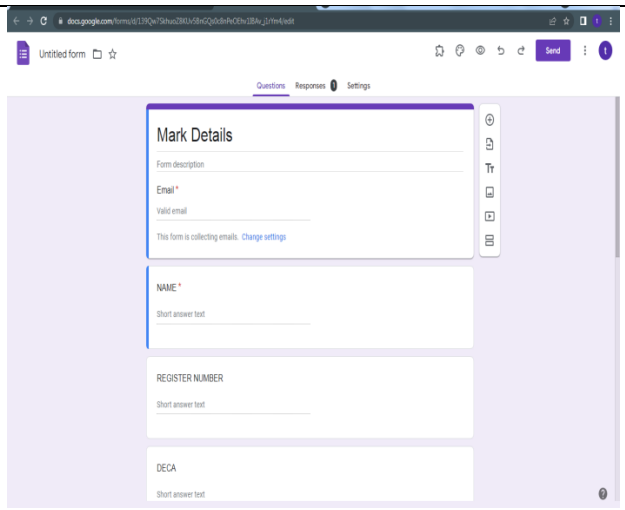
AIM

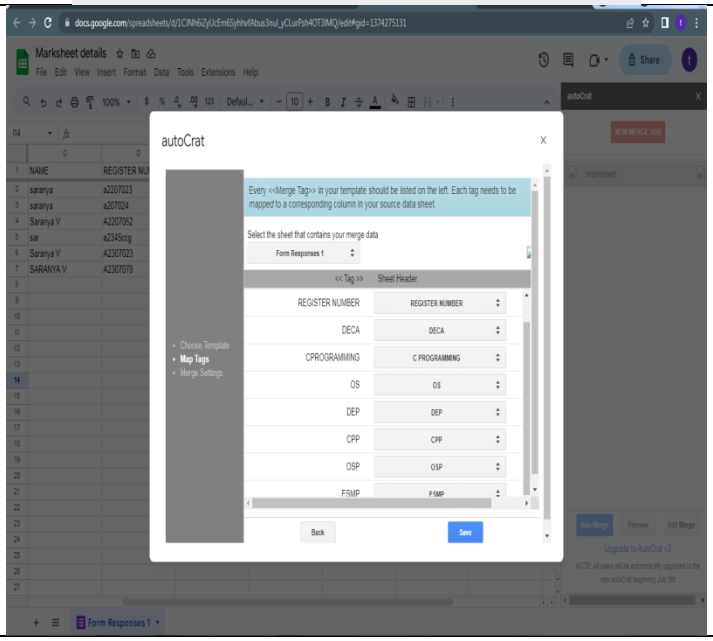
To implement program on SaaS to create a spread sheet to generate a mark sheet for student progress report.

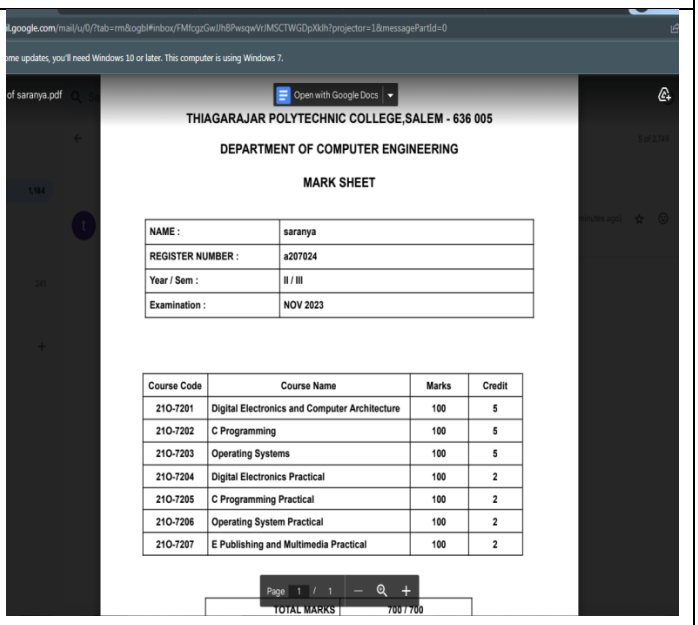
PROCEDURE

1. Login your mail account and open the Google Drive
2. Create a new folder "Mark Sheet" in **Google Drive**.
3. Create a blank Google Form and name it as "Marks Entry". Change the settings of the Google Form to collect email Address. **Go to Settings -->Responses set Collect email addresses to true**.
4. Design the Google Form to Collect Student Name, Register Number, Year/Sem, Examination, all the Subject Marks of the required semester. Make all the fields as Required.
5. Go back to the "Mark Sheet" folder and Right Click to create a blank document in Google Docs.
6. Design Mark Sheet Template in the docs and name it as "Marksheet".
7. The place where the details to be fetched from Google form place the respective field names provided in the google form within "<< >>".
8. Next go to the google form and select the preview button to make entries or share the link to students to enter their marks
9. Click on the Responses tab and select the spread sheet where the responses from google form are collected.
10. Go to Extensions Menu--- > Add-Ons--- > Get Add-Ons ---> Install "Autocrat" Extension.
11. Allow Autocrat Permission to install the extension.
12. Then go to Extensions Menu ---> Autocrat ---> Open---> and add a New Job in Autocrat Extension.
13. Give a Job Name in Autocrat Menu and click next.
14. Choose a Template to Create Mark Sheet. Select From Drive.
15. Select the created word template and click next.
16. Map Source data to template for Mark Sheet Creation and click next.
17. Give Proper File Name Format and select file type as PDF and click next.
18. Choose destination folder to store pdf file in Google Drive and and complete the oteher instructions as required.
19. Set Share Doc and send email as yes, Select Share doc as PDF, and enter <<Email Address>> tag in the response mail. After completing run the job
20. The generated mark sheet will be sent in your email.









RESULT:

Thus SaaS implementation to create mark sheet using Google Docs, Google forms and Google Spreadsheet using Autocrat is implemented and executed.

SAAS IMPLEMENTATION - TO CREATE MARKSHEET USING GOOGLE DOCS, GOOGLE FORMS AND GOOGLE SPREADSHEET USING AUTOCRAT PART- B SCL WORKSHEET				
Worksheet No : 2				
1.	**What do you mean by elasticity?**			
Ans.				
2.	**What is private cloud?**			
Ans.				
3.	**What is scalability?**			
Ans.				
4.	**List the types scalability available.**			
Ans.				
5.	**In cloud how you can secure your data?**			
Ans.				
6.	**What is Cloud Foundry?**			
Ans.				
7.	**Which of the following isn't an advantage of cloud?**			
Ans.	**A) No worries about running out of storage**	**B) Easier to maintain a cloud network**	**C) Computing resources cannot be used immediately**	**D) Paying only for what you use**
8.	**What are the security aspects provided with cloud?**			
Ans.				
9.	**Mention the types of service provided by Microsoft Azure (SaaS/PaaS/IaaS)**			
Ans.				
10.	**What feature does not belong to a private cloud?**			
Ans.	**a) Metered billing**	**b) Self-service portal**	**c) Dial-home support**	**c) Rapid elasticity**
11.	**What do you mean by autonomic computing?**			
Ans.				
12.	**Which one of this is not a major cloud computing usage?**			
Ans.	**a)Software as a Service**	**b)Hardware as a Service**	**c)Infrastructure as a Service**	

13.	"Cloud" in cloud computing represents _____			
Ans.	a)wireless	b)Hard drives	c)Internet	d)People
14.	What do you mean by "Horizontal scaling"?			
Ans.				
15.	Define the terms swap in, swap out in scalability.			
Ans.				

SAAS IMPLEMENTATION - TO CREATE MARKSHEET USING GOOGLE DOCS, GOOGLE FORMS AND GOOGLE SPREADSHEET USING AUTOCRAT PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	What have you inferred from this implementation?
Ans:	
APPLICATIONS	
2.	Can you explain what a spreadsheet is? How does it differ from other types of data storage methods like databases and text files?
Ans:	

ASSESSMENT			
Name of the Student		Name of the Facilitator	V.Saranya
Register Number		Comments :	
Year/ Semester		Marks (5+3+2)	/10
Signature of the student		Signature of the facilitator with date	

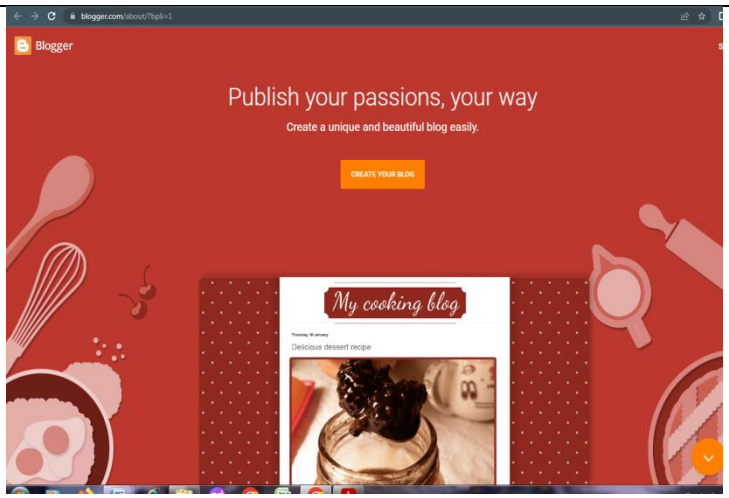
Ex. No. 3	IMPLEMENTING WEB SERVICES BY CREATING YOUR BLOGSPOT AND COLLABORATING VIA WIKIS
Date:	

AIM

To implement web services by creating your BlogSpot and Collaborating via Wikis..

PROCEDURE

1. Login to Gmail and open Blogger app from app list.
2. Create a new Blog from My Blog Menu.
3. Give a Name for Blog and provide an unique URL name.
4. Use Theme to customize the design of blog.
5. After Customizing the Theme create a Post.
6. Give Post Title and content for the post using the Editor.
7. Save the post and Preview the post.
8. Publish the Blog after checking the preview.
9. View the Blog in browser using blog URL address.
10. Open Google Workspace Market Place. Search ZOHO Wiki and install.
11. Open Zoho Wiki from App drawer in Google login.
12. Provide Basic Profile Details and Create Zoho Wiki Account.
13. Open Homepage and make changes in it. Save and close the Wiki Page.
14. Open Permissions tab from the setting menu. Add users with specific permission for content collaboration.
15. Select Custom Permissions from Actions. Add users with permissions and send invitation mail.
16. Ask the user to open the invitation mail and collaborate with wiki. Login with Google account.
17. Make changes in the shared wiki and Save it.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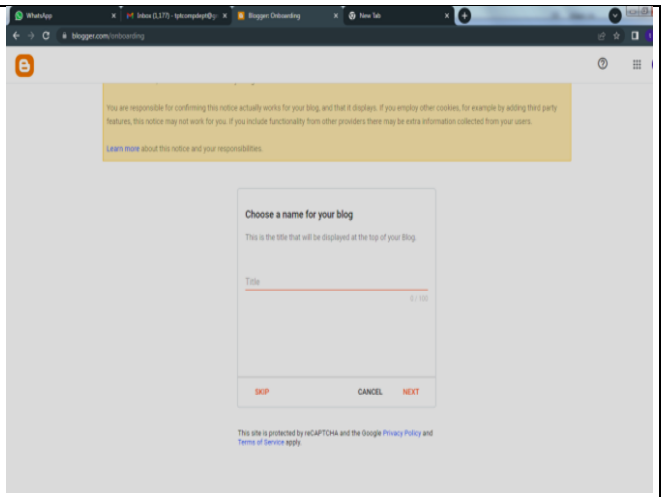
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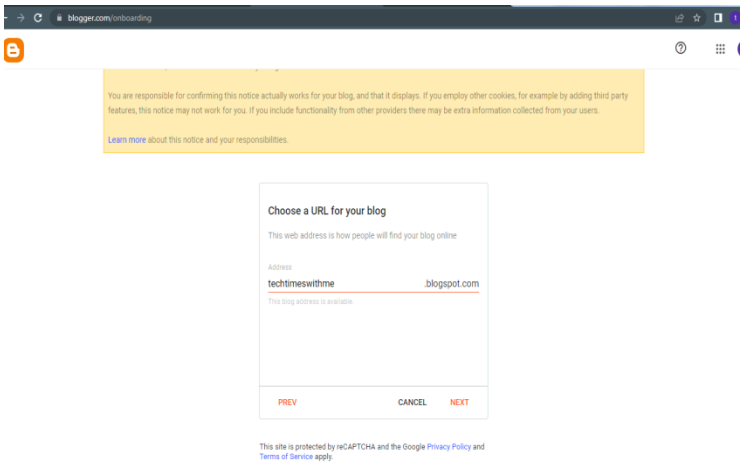
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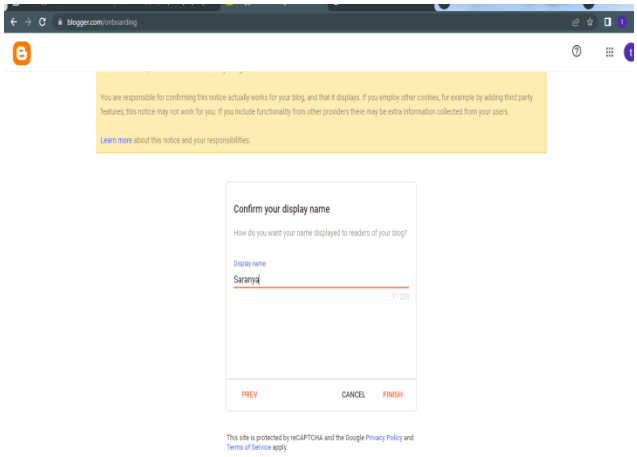
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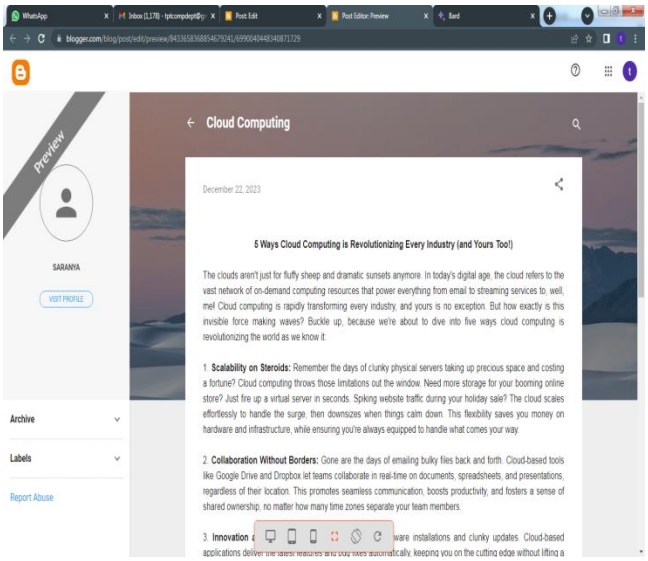
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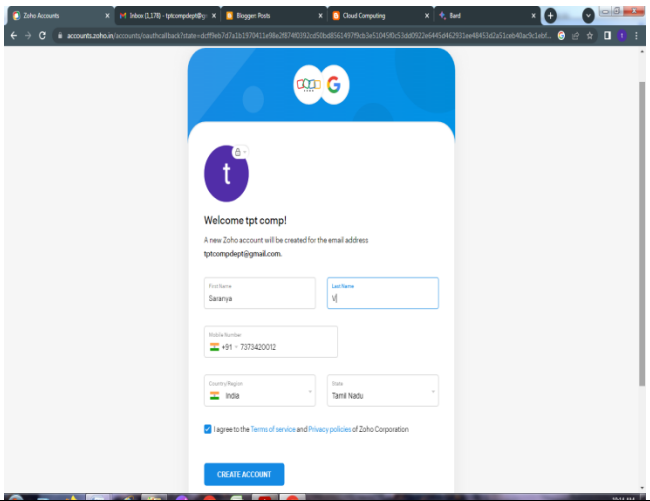
Cloud Computing
December 22, 2023
5 Ways Cloud Computing is Revolutionizing Every Industry (and Yours Too!)
The clouds aren't just for fluffy sheep and dramatic sunsets anymore. In today's digital age, the cloud refers to the vast network of on-demand computing resources that power everything from email to streaming services to, well, me! Cloud computing is rapidly transforming every industry, and yours is no exception. But how exactly is this invisible force making waves? Buckle up, because we're about to dive into five ways cloud computing is revolutionizing the world as we know it:
1. Scalability on Steroids: Remember the days of clunky physical servers taking up precious space and costing a fortune? Cloud computing throws those limitations out the window. Need more storage for your booming online store? Just fire up a virtual server in seconds. Spiking website traffic during your holiday sale? The cloud scales effortlessly to handle the surge, then downsizes when things calm down. This flexibility saves you money on hardware and infrastructure, while ensuring you're always equipped to handle what comes your way.
2. Collaboration Without Borders: Gone are the days of emailing bulky files back and forth. Cloud-based tools like Google Drive and Dropbox let teams collaborate in real-time on documents, spreadsheets, and presentations, regardless of their location. This promotes seamless communication, boosts productivity, and fosters a sense of shared ownership, no matter how many time zones separate your team members.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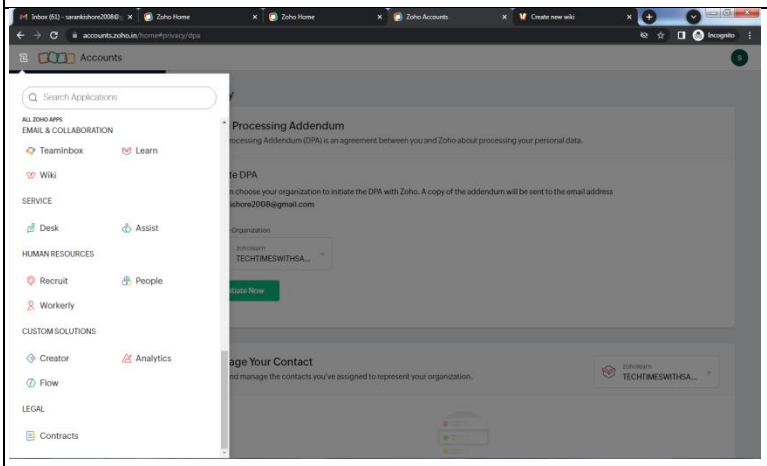
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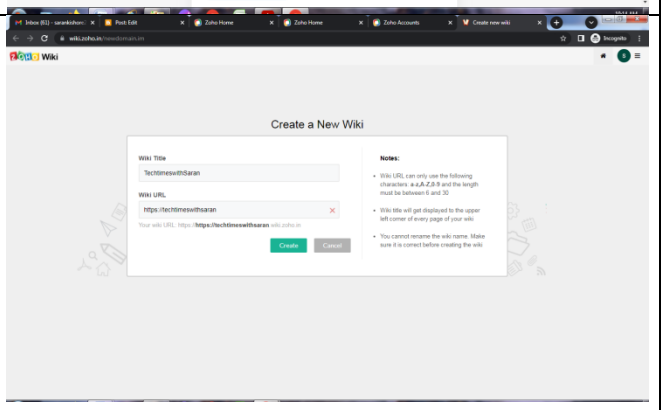
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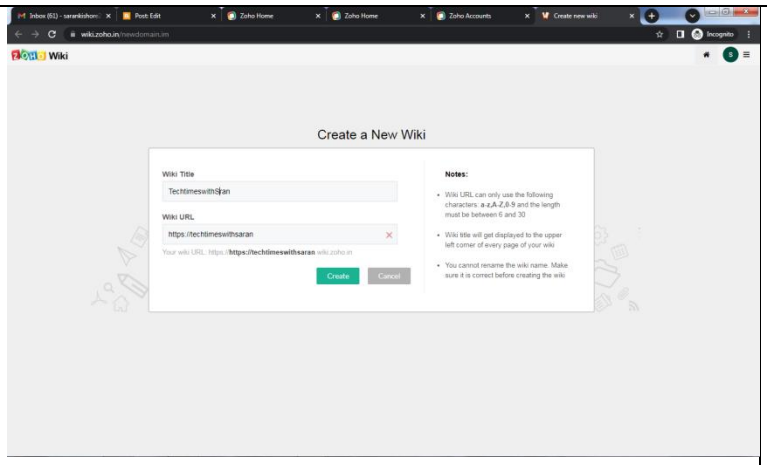
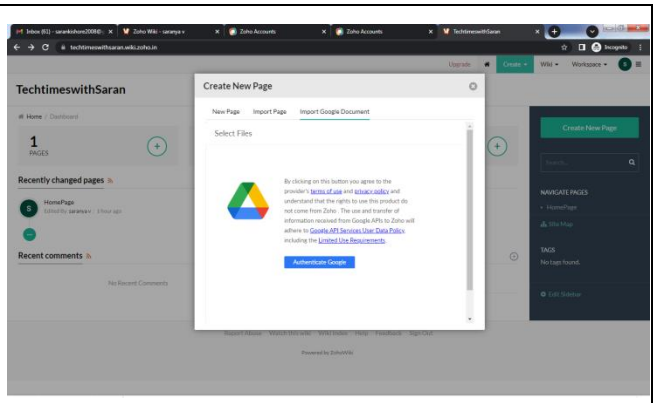
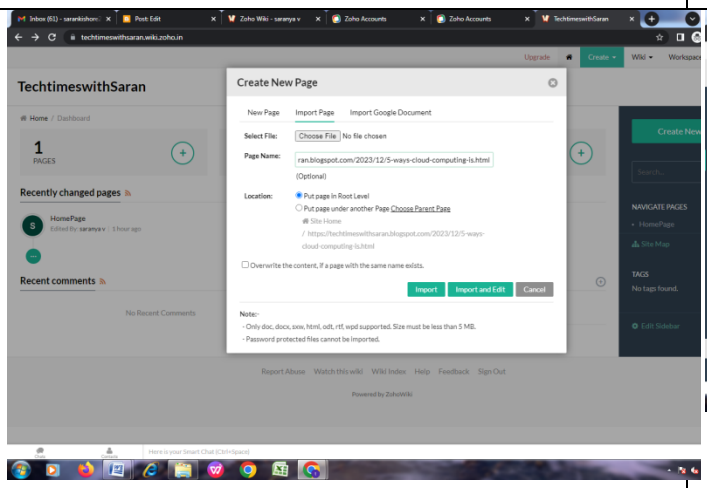
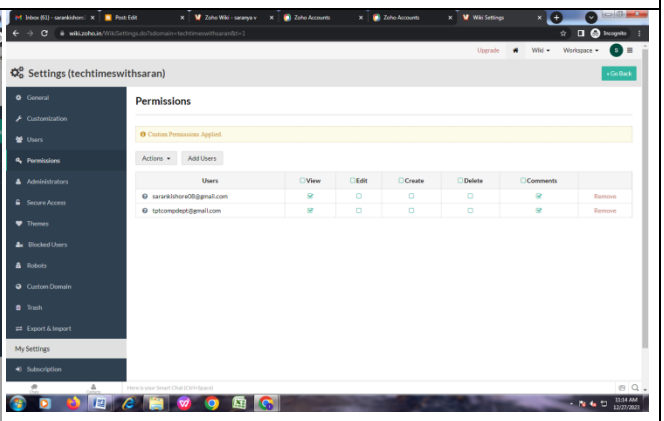
Cancel
Notes:









RESULT:

Thus SaaS implementation to implement web services by creating your BlogSpot and collaborating via wikis is implemented and executed.

IMPLEMENTING WEB SERVICES BY CREATING YOUR BLOGSPOT AND COLLABORATING VIA WIKIS PART- B SCL WORKSHEET				
Worksheet No :3				
1.	**Which language is best for blogging?**			
Ans.				
2.	**How many blogs can I create in Blogspot?**			
Ans.				
3.	**What is the purpose of creating a blog?**			
Ans.				
4.	**What are the limitations of Blogspot?**			
Ans.				
5.	**Does Blogspot expire?**			
Ans.				
6.	**Is Blogspot private?**			
Ans.				
7.	**Does Blogspot delete blogs?**			
Ans.	a) True	b)False		
8.	**How to block Blogspot?**			
Ans.				
9.	**What is function of blogs?**			
Ans.				
10.	**Is BlogSpot static or dynamic?**			
Ans.				
11.	**What is a collaboration wiki?**			
Ans.				
12.	**_____is the feature of cloud computing that allows the service to change in size or**			
Ans.	**a)scalability**	**b)Virtualisation**	**c)security**	**d)cost savings**
13.	**_____describes a distribution model in which applications are hosted by a service**			
Ans.	**a)SaaS**	**b)IaaS**		

14.	_____ describes a cloud service that can only be accessed by a limited amount of people.		
Ans.	a)Private Cloud	b)Data Center	c)Virtualisation
15.	Which of these a company should consider before implementing cloud computing?		
Ans.	a)Employee satisfaction	b)Potential cost reduction	c)Information senstivity	d)All the above

IMPLEMENTING WEB SERVICES BY CREATING YOUR BLOGSPOT AND COLLABORATING VIA WIKIS PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	What have you inferred from this implementation?
Ans:	
APPLICATIONS	
2.	What are the importance of blogging and knowing wikis?
Ans:	

ASSESSMENT			
Name of the Student		Name of the Facilitator	V.Saranya
Register Number		Comments :	
Year/ Semester		Marks (5+3+2)	/10
Signature of the student		Signature of the facilitator with date	

Ex. No. 4	CREATE ONLINE VIRTUAL MACHINE USING AWS
Date:	

AIM

To Create Virtual Machine online using Amazon web service.

PROCEDURE

1. Enter the EC2 Dashboard
2. Create and Configure Your Virtual Machine
3. Click Launch Instance to Amazon EC2 console
4. Click Select to Microsoft Windows Server 2012 R2 Base
5. Click Review and Launch at the bottom of the page
6. Create a Key Pair and Launch Your Instance
7. Connect to Your Instance
8. Select the Windows Server instance you just created and click Connect
9. When prompted log in to the instance, use the User Name and Password you generated in to connect to your virtual machine.
10. Terminate Your Windows VM
11. Back on the EC2 Console, select the box next to the instance you created. Then click the Actions button, navigate to Instante State, and click Terminate.
12. Confirm termination - select Yes, Terminate.

Services | Resource Groups | N. Virginia | Support

AWS services

Find a service by name (for example, EC2, S3, Elastic Beanstalk).

All services

Compute
EC2
EC2 Container Service
Lightsail
Elastic Beanstalk
Lambda
Batch

Storage
S3
EFS
Glacier
Storage Gateway

Database
RDS
DynamoDB
ElastiCache
Redshift

Networking & Content Delivery
VPC
CloudFront
Direct Connect
Route 53

Migration
Application Discovery Service
DMS
Server Migration
Snowball

Developer Tools
CodeCommit
CodeBuild
CodeDeploy
CodePipeline
X-Ray

Management Tools
CloudWatch
CloudFormation
CloudTrail
Config
OpsWorks
Service Catalog
Trusted Advisor
Managed Services

Security, Identity & Compliance
IAM
Inspector
Certificate Manager
Directory Service
WAF & Shield
Compliance Reports

Analytics
Athena
EMR
CloudSearch
Elasticsearch Service
Kinesis
Data Pipeline
QuickSight

Artificial Intelligence
Lex
Polly
Rekognition
Machine Learning

Internet of Things
AWS IoT

Game Development
Amazon GameLift

Mobile Services
Mobile Hub
Cognito
Device Farm
Mobile Analytics
Pinpoint

Application Services
Step Functions
SWF
API Gateway
Elastic Transcoder

Messaging
Simple Queue Service
Simple Notification Service
SES

Business Productivity
WorkDocs
WorkMail
Amazon Chime

Desktop & App Streaming
WorkSpaces
AppStream 2.0

Featured next steps

Manage your costs
Get real-time billing alerts based on your cost and usage budgets. Start now

Get best practices
Use AWS Trusted Advisor for security, performance, cost and availability best practices. Start now

What's new?

Announcing AWS Batch
Now generally available, AWS Batch enables developers, scientists, and engineers to process large-scale batch jobs with ease. Learn more

Announcing Amazon Lightsail
See how this new service allows you to launch and manage your VPS with AWS for a low, predictable price. Learn more

See all

AWS Marketplace
Discover, procure, and deploy popular software products that run on AWS.

Have feedback?
Submit feedback to tell us about your experience with the AWS Management Console.

AWS | Services | Edit | N. Virginia | Support

EC2 Dashboard
Events
Tags
Reports
Limits

INSTANCES
Instances
Spot Requests
Reserved Instances
Scheduled Instances
Commands
Dedicated Hosts

IMAGES
AMIs
Bundle Tasks

ELASTIC BLOCK STORE
Volumes
Snapshots

NETWORK & SECURITY
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces

LOAD BALANCING
Load Balancers

AUTO SCALING
Launch Configurations
Auto Scaling Groups

Resources

You are using the following Amazon EC2 resources in the US East (N. Virginia) region:

- 0 Running Instances
- 0 Dedicated Hosts
- 0 Volumes
- 0 Key Pairs
- 0 Placement Groups
- 0 Elastic IPs
- 0 Snapshots
- 0 Load Balancers
- 3 Security Groups

Need fast, reliable, scalable, fully-managed message queuing? Try Amazon Simple Queue Service.

Create Instance

To start using Amazon EC2 you will want to launch a virtual server, known as an Amazon EC2 instance.

Launch Instance

Note: Your instances will launch in the US East (N. Virginia) region

Service Health

Service Status:

US East (N. Virginia):
This service is operating normally

Availability Zone Status:

us-east-1b:
Availability zone is operating normally

us-east-1c:
Availability zone is operating normally

us-east-1d:
Availability zone is operating normally

us-east-1e:
Availability zone is operating normally

Service Health Dashboard

Scheduled Events

US East (N. Virginia):

No events

Account Attributes

Supported Platforms
VPC

Default VPC
vpc-4e3f712a

Resource ID length management

Additional Information

Getting Started Guide
Documentation
All EC2 Resources
Forums
Pricing
Contact Us

AWS Marketplace

Find **free software trial** products in the AWS Marketplace from the EC2 Launch Wizard. Or try these popular AMIs:

Tableau Server (10 users)
Provided by Tableau
Rating ★★★★★
Pay by the hour for Tableau software and AWS usage
View all Business Intelligence

SAP HANA One 244GiB
Provided by SAP America, Inc
Rating ★★★★★
Pay by the hour for SAP HANA One 244GiB software and AWS usage
View all Business Intelligence

Feedback | English

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AWS | Services | Edit | N. Virginia | Support

1. Choose AMI | 2. Choose Instance Type | 3. Configure Instance | 4. Add Storage | 5. Tag Instance | 6. Configure Security Group | 7. Review

Step 2: Choose an Instance Type

Amazon EC2 provides a wide selection of instance types optimized to fit different use cases. Instances are virtual servers that can run applications. They have varying combinations of CPU, memory, storage, and networking capacity, and give you the flexibility to choose the appropriate mix of resources for your applications. Learn more about instance types and how they can meet your computing needs.

Filter by: All instance types | Current generation | Show/Hide Columns

Currently selected: t2.micro (Variable ECUs, 1 vCPUs, 2.5 GHz, Intel Xeon Family, 1 GiB memory, EBS only)

Family	Type	vCPUs	Memory (GiB)	Instance Storage (GB)	EBS-Optimized Available	Network Performance
General purpose	t2.nano	1	0.5	EBS only	-	Low to Moderate
General purpose	t2.micro Free tier eligible	1	1	EBS only	-	Low to Moderate
General purpose	t2.small	1	2	EBS only	-	Low to Moderate
General purpose	t2.medium	2	4	EBS only	-	Low to Moderate
General purpose	t2.large	2	8	EBS only	-	Low to Moderate
General purpose	m4.large	2	8	EBS only	Yes	Moderate
General purpose	m4.xlarge	4	16	EBS only	Yes	High
General purpose	m4.2xlarge	8	32	EBS only	Yes	High
General purpose	m4.4xlarge	16	64	EBS only	Yes	High
General purpose	m4.10xlarge	40	160	EBS only	Yes	10 Gigabit
General purpose	m3.medium	1	3.75	1 x 4 (SSD)	-	Moderate
General purpose	m3.large	2	7.5	1 x 32 (SSD)	-	Moderate

Cancel | Previous | Review and Launch | Next: Configure Instance Details

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AWS | Services | Edit | N. Virginia | Support

EC2 Dashboard
Events
Tags
Reports
Limits

INSTANCES
Instances
Spot Requests
Reserved Instances
Scheduled Instances
Commands
Dedicated Hosts

IMAGES
AMIs
Bundle Tasks

ELASTIC BLOCK STORE
Volumes
Snapshots

NETWORK & SECURITY
Security Groups
Elastic IPs
Placement Groups
Key Pairs
Network Interfaces

LOAD BALANCING
Load Balancers

AUTO SCALING
Launch Configurations
Auto Scaling Groups

Launch Instance | Connect | Actions

Filter by tags and attributes or search by keyword | 1 to 1 of 1

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS	Public IP
	i-609f88e0	t2.micro	us-east-1b	running	Initializing	None	ec2-54-88-54-198.comp...	54.88.54.198

Instance: i-609f88e0 **Public DNS:** ec2-54-88-54-198.compute-1.amazonaws.com

Description | Status Checks | Monitoring | Tags

Instance ID	i-609f88e0	Public DNS	ec2-54-88-54-198.compute-1.amazonaws.com
Instance state	running	Public IP	54.88.54.198
Instance type	t2.micro	Elastic IP	-
Private DNS	ip-172-31-52-176.ec2.internal	Availability zone	us-east-1b
Private IPs	172.31.52.176	Security groups	launch-wizard-1. view rules
Secondary private IPs		Scheduled events	No scheduled events
VPC ID	vpc-4e3f712a	AMI ID	Windows Server-2012-R2 RTM-English-64Bit-

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Connect To Your Instance

You can connect to your Windows instance using a remote desktop client of your choice, and by downloading and running the RDP shortcut file below:

Download Remote Desktop File

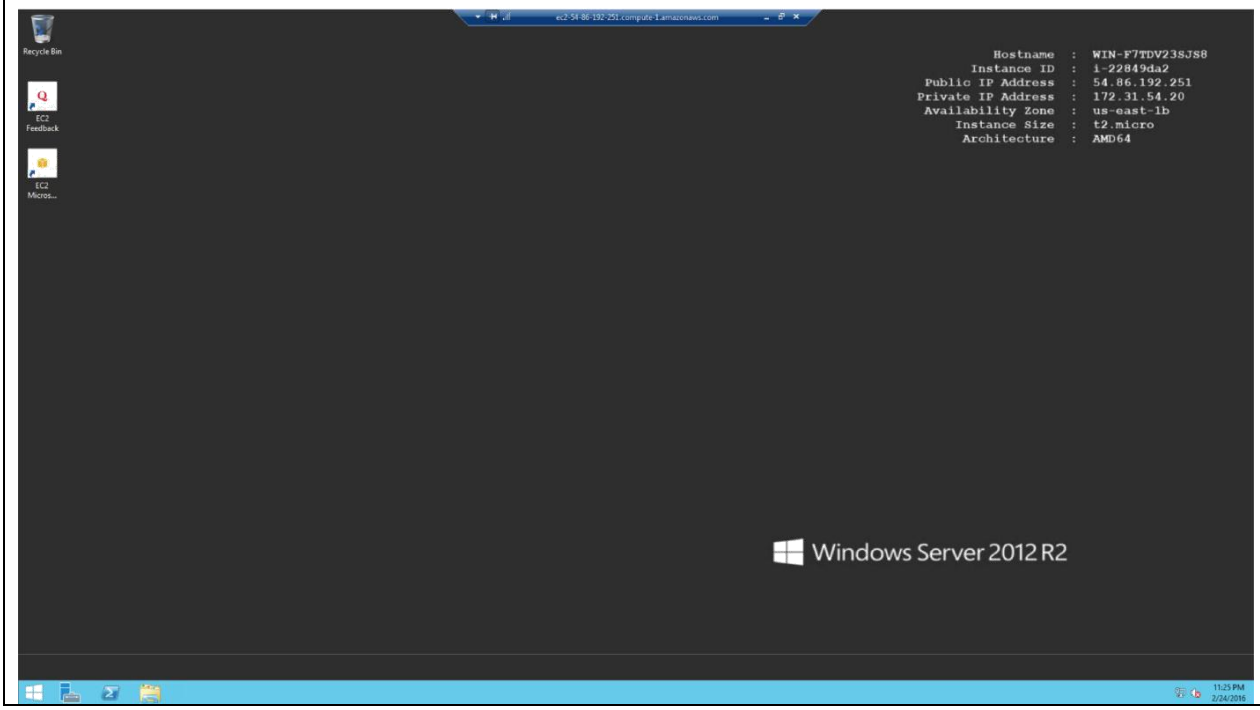
When prompted, connect to your instance using the following details:

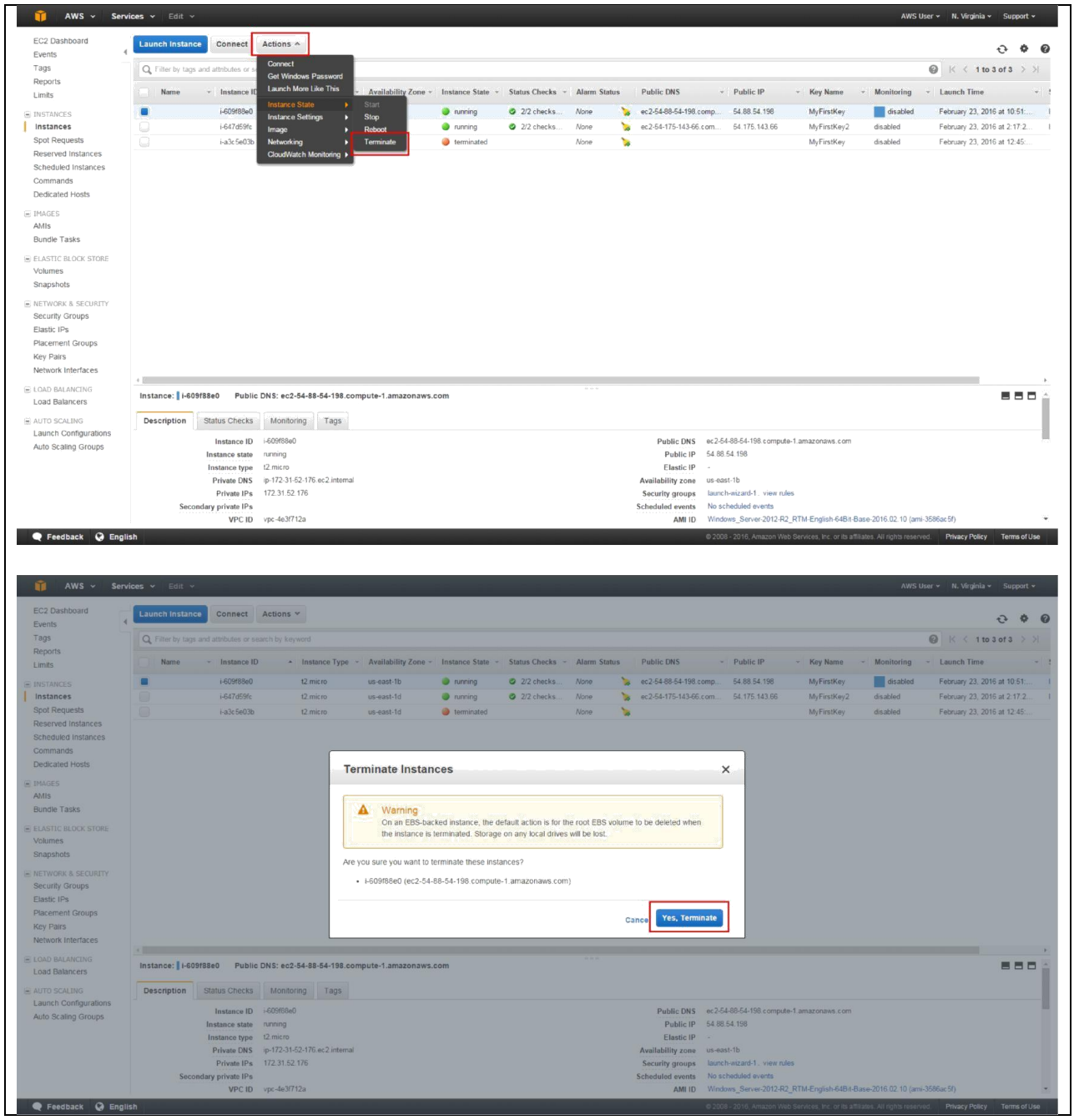
Public DNS	ec2-54-88-54-198.compute-1.amazonaws.com
User name	Administrator
Password	JC!gkswh)%

If you've joined your instance to a directory, you can use your directory credentials to connect to your instance.

If you need any assistance connecting to your instance, please see our connection documentation.

Close





RESULT:

Thus the given virtual machine using Amazon Web Service is created successfully.

CREATE ONLINE VIRTUAL MACHINE USING AWS PART- B SCL WORKSHEET			
Worksheet No : 4			
1.	What is AWS EC2?		
Ans.			
2.	What is the function of PaaS?		
Ans.			
3.	Is PaaS private or public?		
Ans.			
4.	Write any 3 benefits of PaaS?		
Ans.			
5.	What is the Fullform of PaaS?		
Ans.			
6.	List any 3 PaaS providers?		
Ans.			
7.	What is the difference between IaaS and PaaS in Cloud?		
Ans.			
8.	Which of the following is Cloud Platform by Amazon?		
Ans.	a) Azure	b) AWS	c) Cloudera
9.	Mention some open source cloud computing platform databases?		
Ans.			
10.	What are the security laws which are implemented to secure data in a cloud?		
Ans.			
11.	Mention the name of some large cloud providers and databases?		
Ans.			
12.	Explain the difference between cloud and traditional datacenters?		
Ans.			

13.	**What is the use of API's in cloud services?**
Ans.	
14.	**As a infrastructure as a service what are the resources that are provided by it?**
Ans.	
15.	**In cloud architecture what are the entities?**
Ans.	

CREATE ONLINE VIRTUAL MACHINE USING AWS PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**Explain hybrid and community cloud?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

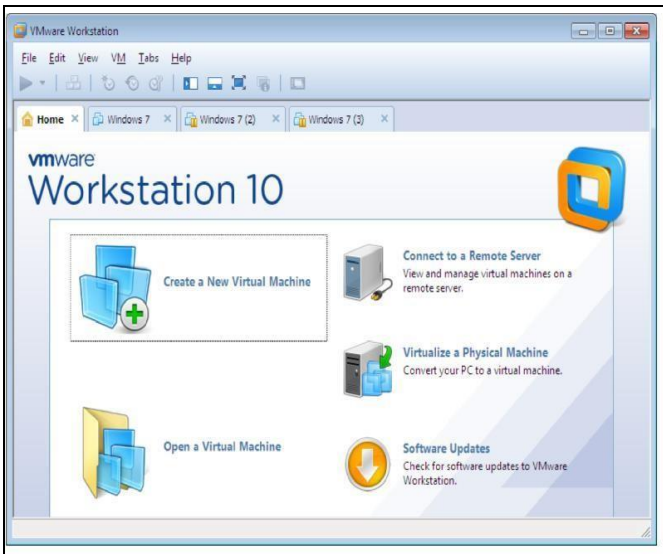
Ex. No. 5	INSTALL VIRTUAL BOX/VMware WORKSTATION
Date:	

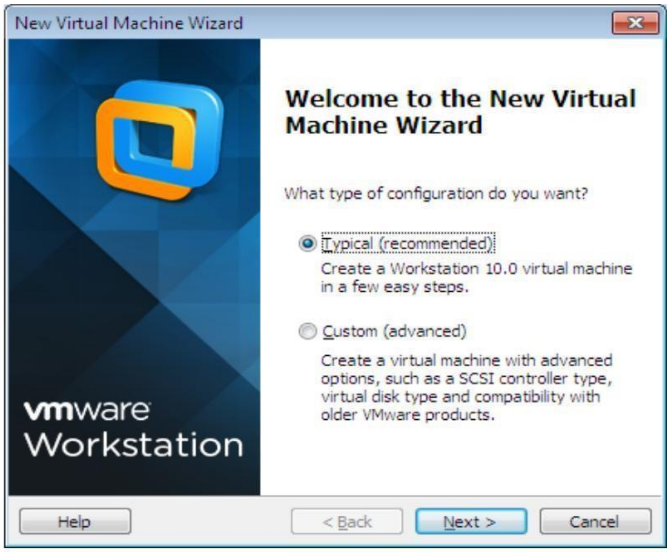
AIM

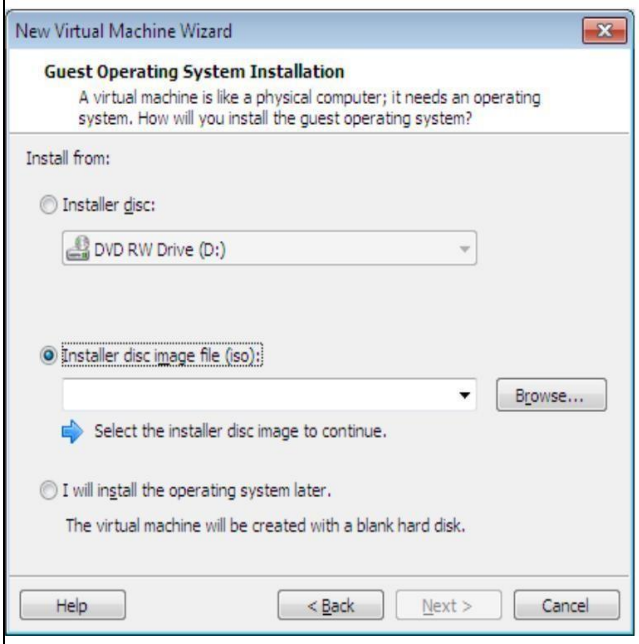
To Install Virtualbox /VMware Workstation with different flavors of linux or windows OS on top of windows 7 or 8.

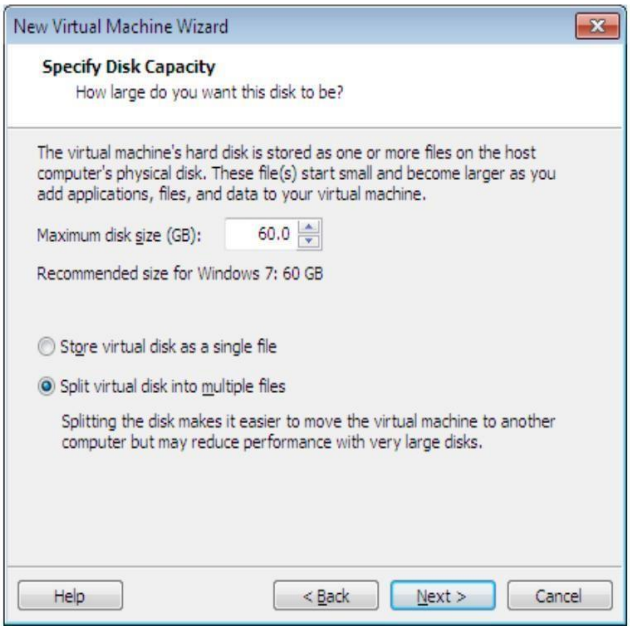
PROCEDURE

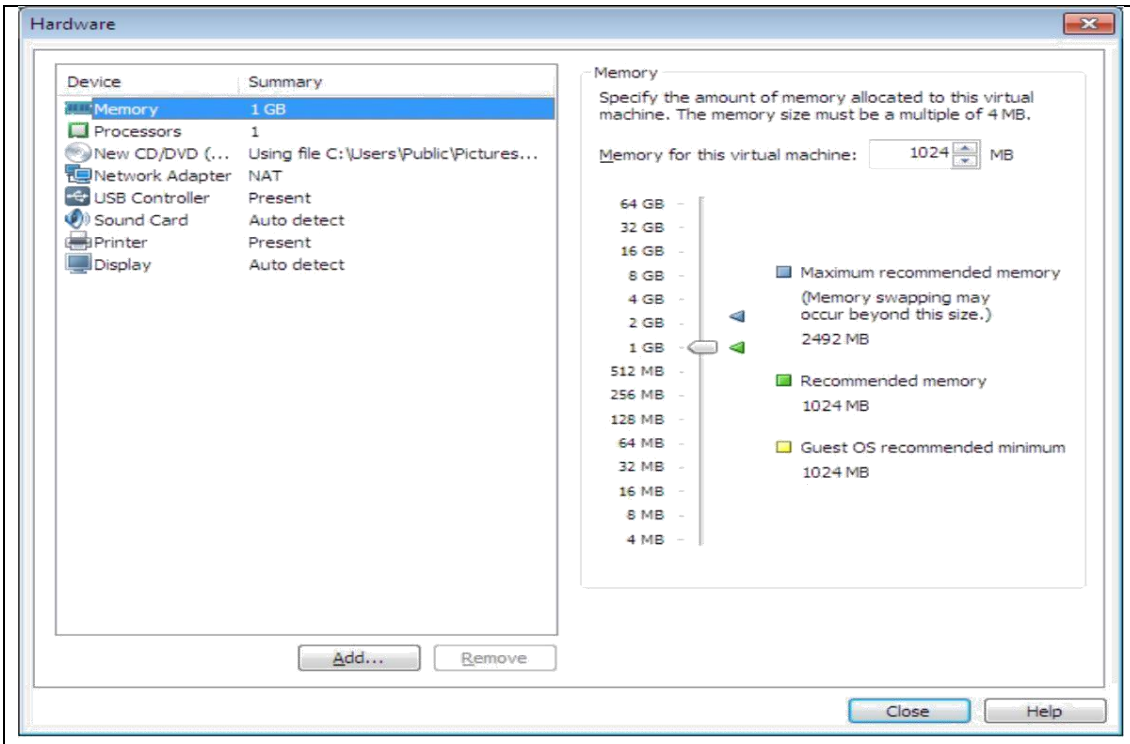
1. Create a new virtual machine. Open VMware Workstation click "Create a New Virtual Machine".
2. Select type of configuration. A New Virtual Machine Wizard dialog box will be opened. There are two options: typical and custom. Keep the default and click "Next" button.
3. Choose "Install disc image file". This type matches the iso file you download. Click "Browse" to locate your linux/windows iso file. Then, click "Next".
4. Select the version of Windows to install. The version depends on the iso file you download. You can set your product key and personalize Windows later. Click "Next" button to continue.
5. Wait for the dialog to pop up. If you do not enter the Windows product key, click "Yes" to continue.
6. Name the virtual machine. Change the name and location if you want. Click "Browse" to modify the path. Then, click "Next".
7. Specify Disk Capacity. Click the arrow button to change the maximum size of virtual machine's hard disk. Also choose, store as one or more files on host computer. Click "Next" button to continue.
8. Confirm the setting. This step lists the settings the virtual machine will create. Click "Customize Hardware" button to change any of the details.
9. Change Memory. If you want to change the memory of the virtual machine, select the arrow button or drag the slider tab. Click "Close" to go back to the last dialog box.
10. Create the new virtual machine. After confirming that the settings are all accurate, click the "Finish" button to start the process.

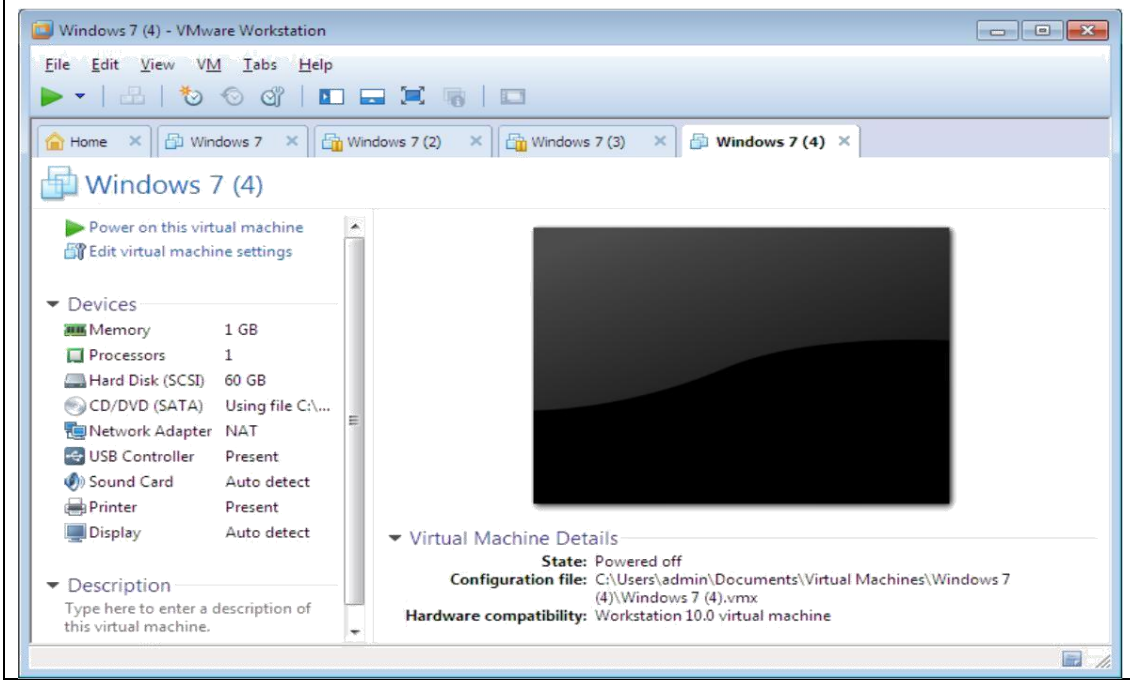

VMware Workstation
File Edit View VM Tabs Help
Home
Windows 7
Windows 7 (2)
Windows 7 (3)
vmware
Workstation 10
Create a New Virtual Machine
Connect to a Remote Server
View and manage virtual machines on a remote server.
Virtualize a Physical Machine
Convert your PC to a virtual machine.
Open a Virtual Machine
Software Updates
Check for software updates to VMware Workstation.


New Virtual Machine Wizard
Welcome to the New Virtual Machine Wizard
What type of configuration do you want?
Typical (recommended)
Create a Workstation 10.0 virtual machine in a few easy steps.
Custom (advanced)
Create a virtual machine with advanced options, such as a SCSI controller type, virtual disk type and compatibility with older VMware products.
vmware
Workstation
Help
< Back
Next >
Cancel


New Virtual Machine Wizard
Guest Operating System Installation
A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?
Install from:
Installer disc:
DVD RW Drive (D:)
Installer disc image file (iso):
Browse...
Select the installer disc image to continue.
I will install the operating system later.
The virtual machine will be created with a blank hard disk.
Help
< Back
Next >
Cancel


New Virtual Machine Wizard
Specify Disk Capacity
How large do you want this disk to be?
The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine.
Maximum disk size (GB):
60.0
Recommended size for Windows 7: 60 GB
Store virtual disk as a single file
Split virtual disk into multiple files
Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
Help
< Back
Next >
Cancel





Result:

Thus the linux OS is installed in the VMWare successfully.

INSTALL VIRTUAL BOX/VMware WORKSTATION PART- B SCL WORKSHEET	
Worksheet No : 5	
1.	List out any 5 open source text tools applications in cloud
Ans.	
2.	_____is a service providing model in which a service provider makes computer resources and infrastructure management available to the customer whenever needed.
Ans.	
3.	What is meant by tenant?
Ans.	
4.	Define multi- tenancy
Ans.	
5.	Define anything as a service.
Ans.	
6.	What is multi core CPU?
Ans.	
7.	In cloud computing resources are not scalable. State True/False
Ans.	
8.	List out some IaaS providers
Ans.	
9.	List out the windows azure services?
Ans.	
10.	Who is the first CEO of Google?
Ans.	
11.	Mention the type of virtualisation in VMWare.
Ans.	
12.	List an application where data virtualisation is used.
Ans.	

13.	List the types of hardware virtualization		
Ans.			
14.	Name any two service providers who provide Platform as a service.		
Ans.			
15.	Which one of the following is essential for creating cloud-computing centres?		
Ans.	a)Virualisation	b)Cannibalisation	c)Insubordiation

INSTALL VIRTUAL BOX/VMware WORKSTATION PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	What have you inferred from this experiment?
Ans:	
APPLICATIONS	
2.	How do you see the relationship between virtualization & Cloud computing?
Ans:	

ASSESSMENT			
Name of the Student		Name of the facilitator	V.Saranya
Register Number		Comments :	
Year/ Semester		Marks (5+3+2)	/10
Signature of the student		Signature of the facilitator with date	

Ex. No. 6	CASE STUDY ON ANY ONE OPEN SOURCE AND COMMERCIAL CLOUD
Date:	

AIM

To do a Case Study on any one Open source and commercial Cloud-Microsoft Azure , Eucalyptus , Open Stack Amazon EC2 (Study Exercise)

PROCEDURE

a) Eucalyptus - Open Source Cloud

1. Eucalyptus is an open source software platform for implementing Infrastructure as a Service (IaaS) in a private or hybrid cloud.
2. Eucalyptus is an acronym for Elastic Utility Computing Architecture for Linking Your Programs To Useful Systems.
3. Eucalyptus was founded out of a research project in the Computer Science Department at the University of California, Santa Barbara.
4. Eucalyptus Systems announced a formal agreement with Amazon Web Services (AWS) in March 2012.
5. This allows us to combine Amazon EC2 public cloud and Eucalyptus private cloud to create a hybrid cloud.
6. Eucalyptus has the following components: cluster controller, storage controller, cloud controller, Walrus storage controller and Node Controller.

Features of eucalyptus

1. Support Linux and Windows Virtual Machines
2. API compatible with Amazon EC2 platform
3. Works with multiple hypervisors including VMware, Xen and KVM.
4. Has provision for group, user management and security groups.

b) OpenStack - Open Source Cloud

1. OpenStack (shorten O~S) is a free, open standard cloud computing platform. It is mostly deployed as infrastructure-as-a-service (IaaS) in both public and private clouds where virtual servers and other resources are made available to users.
2. The software platform consists of interrelated components that control diverse, multi-vendor

hardware pools of processing, storage, and networking resources throughout a data center.

3. Users manage it either through a web-based dashboard, through command-line tools, or through RESTful web services.

4. OpenStack began in 2010 as a joint project of Rackspace Hosting and NASA. As of 2012, it was managed by the OpenStack Foundation, a non-profit corporate entity established in September 2012 to promote OpenStack software and its community.

5. Major components of OpenStack include: Compute (Nova), Object Storage (Swift), Block Storage (Cinder), Networking (Neutron), Dashboard (Horizon), Identity Service (Keystone), Image Service (Glance), Telemetry (Ceilometer), Orchestration (Heat), Shared File System (Manila), Elastic Map-reduce (Sahara).

Features of OpenStack

1. **Modular architecture:** OpenStack is designed with a modular architecture that enables users to deploy only the components they need. This makes it easier to customize which makes it easier to customize as per business needs.

2. **Multi-tenancy support:** OpenStack provides multi-tenancy support, which enables multiple users to access the same cloud infrastructure while maintaining security and isolation between them.

3. **Open-source software:** OpenStack is an open-source software platform that is free to use and modify.

4. **Distributed architecture:** OpenStack is designed with a distributed architecture that enables users to scale their cloud infrastructure horizontally across multiple physical servers.

5. **API-driven:** OpenStack is API-driven, which means that all components can be accessed and controlled through a set of APIs. This makes it easier to automate and integrate with other tools and services.
6. **Comprehensive dashboard:** OpenStack provides a comprehensive dashboard that enables users to manage their cloud infrastructure and resources through a user-friendly web interface.

7. **Resource pooling:** OpenStack enables users to pool computing, storage, and networking resources, which can be dynamically allocated and de-allocated based on demand.

c) Microsoft Azure – Commercial Cloud

1. Azure is Microsoft's cloud platform that provides a wide variety of commercial services.
2. Microsoft unveiled Windows Azure in early October 2008 but it went to live after February 2010.
3. In 2014 Microsoft changed its name from Windows Azure to Microsoft Azure.

Microsoft Azure offers the following services.

1. **Compute Services**: It includes the Microsoft Azure Cloud Services, Azure Virtual Machines, Azure Website, and Azure Mobile Services, which processes the data on the cloud with the help of powerful processors.
2. **Data services:** This service is used to store data over the cloud that can be scaled according to the

requirements. It includes Microsoft Azure Storage (Blob, Queue Table, and Azure File services), Azure SQL Database, and the Redis Cache.

3. **Application services:** It includes services, which help us to build and operate our application, like the Azure Active Directory, Service Bus for connecting distributed systems, the Azure Scheduler, and the Azure Media Services.
4. **Network services:** It helps you to connect with the cloud and on-premises infrastructure, which includes Virtual Networks, Azure Content Delivery Network, and the Azure Traffic Manager.
5. **Web + Mobile:** Creating Web + Mobile applications is very easy as it includes several services for building and deploying applications.
6. **Internet of Things:** Includes IoT Hub and IoT Edge services that can be combined with a variety of machine learning, analytics, and communications services.
7. **Security + Identity:** Includes Security Center, Azure Active Directory, Key Vault and Multi-Factor Authentication Services.

Result:

Thus Case study of Eucalyptus, OpenStack – Open Source Cloud and Microsoft Azure – Commercial cloud are done.

CASE STUDY ON ANY ONE OPEN SOURCE AND COMMERCIAL CLOUD PART- B SCL WORKSHEET	
Worksheet No : 6	
1.	**What is OpenStack?**
Ans.	
2.	**Mention what are the components that make the architecture of OpenStack?**
Ans.	
3.	**List any 5 OpenStack Services**
Ans.	
4.	**What does “role” and “tenant” indicates in OpenStack?**
Ans.	
5.	**Define anything as a service.**
Ans.	
6.	**What is meant by hypervisor?**
Ans.	
7.	**What type of hypervisor does OpenStack supports?**
Ans.	
8.	**What are the two types of storage does OpenStack Compute provides?**
Ans.	
9.	**Mention what are the networking options used in OpenStack?**
Ans.	
10.	**Is Microsoft Azure opensource or a commercial cloud?**
Ans.	
11.	**What does “ EUCALYPTUS” stands for?**
Ans.	
12.	**Explain what is the use of “EUCALYPTUS” in cloud computing?**
Ans.	

13.	Is MongoDB a open source cloud computing platform database? Yes/No
Ans.	
14.	What is the initial name of Microsoft Azure?
Ans.	
15.	Can Microsoft Azure be used to develop mobile applications? Yes/No
Ans.	

CASE STUDY ON ANY ONE OPEN SOURCE AND COMMERCIAL CLOUD PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	What have you inferred from this experiment?
Ans:	
APPLICATIONS	
2.	Analyse a real time application which uses public cloud in its implementation.
Ans:	

ASSESSMENT			
Name of the Student		Name of the facilitator	V.Saranya
Register Number		Comments :	
Year/ Semester		Marks (5+3+2)	/10
Signature of the student		Signature of the facilitator with date	

Ex. No. 7	IMPLEMENT LED BLINK AND LED PATTERN WITH ARDUINO
Date:	

AIM

To implement LED Blink and LED Pattern With Arduino

LIST OF COMPONENTS REQUIRED:

1. ARDUINO UNO
2. BREADBOARD
3. 5MM LED: RED- 2 NUMBERS
4. RESISTOR 1K OHM
5. JUMPER WIRES-4

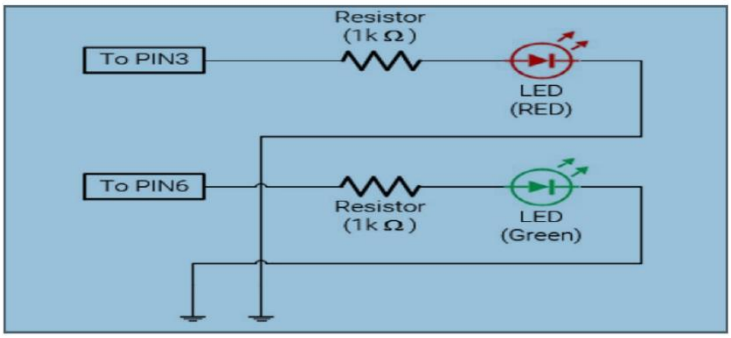
APPLICATION REQUIRED:

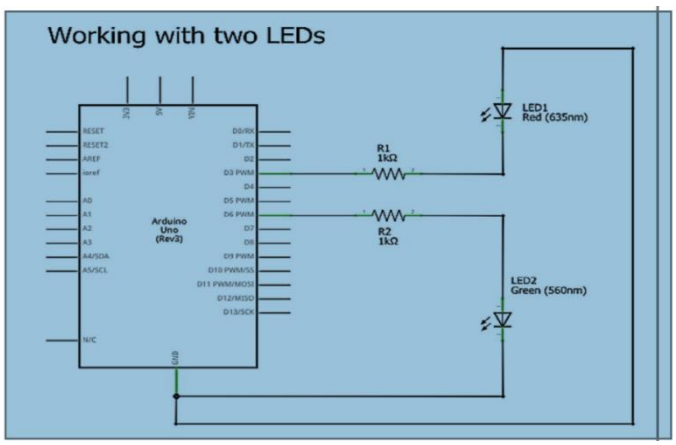
- **ARDUINO IDE**

PROCEDURE:

1. Connect LED in the bread board. (For Ex: In LED big needle is positive and small needle is negative)
2. Connect jumper wire from RED LED to 3rd pin in arduino UNO kit and GREEN LED to 6th pin in arduino kit.
3. Connect one end of resistor to red LED negative and other end to ground of arduino .
4. Connect one end of resistor to GREEN LED negative and other end to ground of arduino .
5. Connect UNO board to computer.
6. In computer open arduino software and type the code in the arduino software.
7. Click on tools->arduino board and tools->port->com port.

CIRCUIT DIAGRAM:





ARDUINO CODE:

```
const int LED_red = 3;
const int LED_green = 6;
void setup() {
pinMode (LED_red, OUTPUT);
pinMode (LED_green, OUTPUT);
}
void loop() {
digitalWrite (LED_red, HIGH);
digitalWrite (LED_green, LOW);
delay (1000);
digitalWrite (LED_red, LOW);
digitalWrite (LED_green, HIGH);
delay (1000);
}
```

RESULT:

Thus the LED blink and LED pattern with Arduino is implemented successfully.

IMPLEMENT LED BLINK AND LED PATTERN WITH ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 7	
1.	What are the components required for blinking LED using Arduino?
Ans.	
2.	Which side of LED is positive?
Ans.	
3.	What resistor to use with LED?
Ans.	
4.	What is the full name of LED ?
Ans.	
5.	What is the unit of LED?
Ans.	
6.	What is the function of LED in Arduino?
Ans.	
7.	Which command is used to blink the LED?
Ans.	
8.	What language does Arduino use?
Ans.	
9.	Which wire is positive LED?
Ans.	
10.	Which LED indicates that Arduino is receiving power?
Ans.	
11.	What frequency does the LED blink at Arduino?
Ans.	
12.	Is Arduino LED input or output?
Ans.	

13.	**What pin is built in LED on Arduino?**
Ans.	
14.	**What is the maximum brightness of LED in Arduino?**
Ans.	
15.	**What is GND in Arduino?**
Ans.	

IMPLEMENT LED BLINK AND LED PATTERN WITH ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What are the applications of LED blinking?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 8	IMPLEMENT LED PATTERN WITH PUSH BUTTON CONTROL USING ARDUINO
Date:	

AIM

To implement LED Pattern with Push Button Control with Arduino

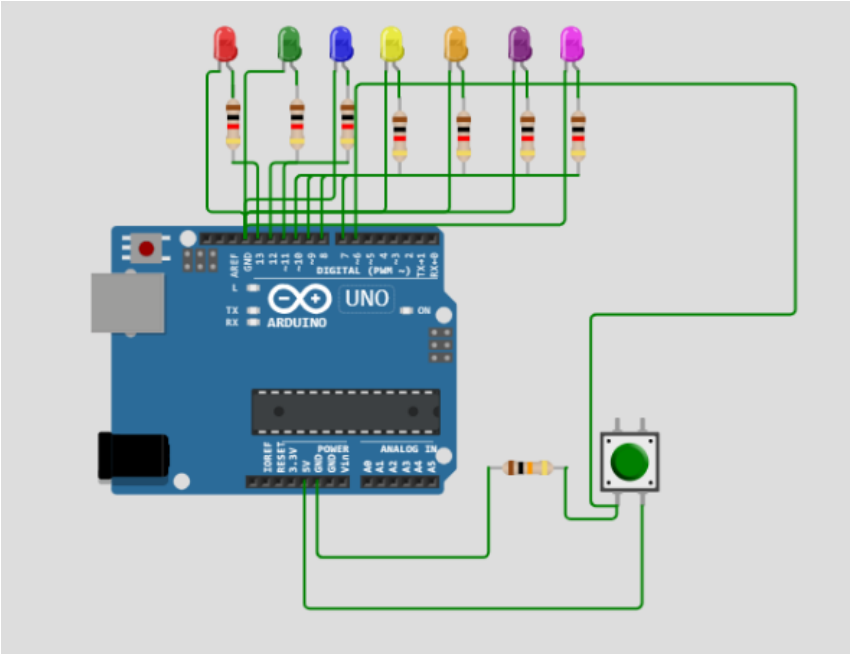
LIST OF COMPONENTS REQUIRED:

- Arduino UNO R3 – 1 No
- USB Cable A/B – 1 No
- Push Button – 1 No
- Resistors (10k, 470ohm) – (1,7)
- 5mm LED – 7 Nos
- BreadBoard – 1No
- Connecting Wires – As required

APPLICATION REQUIRED:

- **ARDUINO IDE**

CIRCUIT DIAGRAM:



PROCEDURE / CONNECTION:

STEP # 1 (Push Button Connections)

- Pin1 to 5V of Arduino.
- Resistor 10k B/w Pin2 of Push Button & Ground of Arduino
- Pin2 is also connected to D6 of Arduino

STEP # 2 (LED Connections)

- Connect All -VE of LED To Ground of Arduino

STEP # 3 (Resistors Connections)

- All Resistor's to +VE of LED and then D7,D8,D9,D10,D11,D12,D13 of Arduino

STEP # 4 (Upload code)

ARDUINO CODE:

```
int L1 = 13;
int L2 = 12;
int L3 = 11;
int L4 = 10;
int L5 = 9;
int L6 = 8;

int L7 = 7; //7 LED pin
int buttonPin = 6; //the number of the pushbutton pin
int de=500; // delay time
int p=0; // variable for pattem
int buttonState = 0; // variable for reading the pushbutton status
void setup() {
pinMode(L1, OUTPUT);
pinMode(L2, OUTPUT);
pinMode(L3, OUTPUT);
pinMode(L4, OUTPUT);
pinMode(L5, OUTPUT);
pinMode(L6, OUTPUT);
pinMode(L7, OUTPUT);
pinMode(buttonPin, INPUT);
}
void loop()
{
buttonState = digitalRead(buttonPin);
if (buttonState == HIGH)
{
```

```
p++;
delay(2000);
}
if(p==1)
{
digitalWrite(L1,1);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //1
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //2
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,0);


digitalWrite(L6,0);
digitalWrite(L7,0); //3
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,1);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //5
delay(de);
digitalWrite(L1,0);
```

```
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //6
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,1); //7
delay(de);
}
if(p==2)
{
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,1); //7
delay(de);


digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //6
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //5
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,1);
```

```
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //3
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //2
delay(de);
digitalWrite(L1,1);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //1

delay(de);
}
if(p==3)
{
digitalWrite(L1,1);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //1
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //2
delay(de);
```

```
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //3
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,1);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //5
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);

digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //6
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,1); //7
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //6
```

```
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //5
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,1);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //3
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);

digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //2
delay(de);
}
if(p==4)
{
digitalWrite(L1,1);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,1); //1,7
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);
digitalWrite(L3,0);
```

```
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //2,6
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //3,5
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,1);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
}
if(p==5)
{
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);

digitalWrite(L4,1);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //4
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,1);
digitalWrite(L4,0);
digitalWrite(L5,1);
digitalWrite(L6,0);
digitalWrite(L7,0); //3,5
delay(de);
digitalWrite(L1,0);
digitalWrite(L2,1);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,1);
digitalWrite(L7,0); //2,6
```

```
delay(de);
digitalWrite(L1,1);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,1); //1,7
delay(de);
}
if(p==6)
{
digitalWrite(L1,1);
delay(de);
digitalWrite(L2,1);
delay(de);
digitalWrite(L3,1);
delay(de);
digitalWrite(L4,1);
delay(de);
digitalWrite(L5,1);
delay(de);
digitalWrite(L6,1);
delay(de);
digitalWrite(L7,1); //1,7
delay(de);
digitalWrite(L7,0); //1,7

delay(de);
digitalWrite(L6,0);
delay(de);
digitalWrite(L5,0);
delay(de);
digitalWrite(L4,0);
delay(de);
digitalWrite(L3,0);
delay(de);
digitalWrite(L2,0);
delay(de);
digitalWrite(L1,0);
delay(de);
}
if(p==7)
{
digitalWrite(L1,0);
digitalWrite(L2,0);
digitalWrite(L3,0);
digitalWrite(L4,0);
```

```
digitalWrite(L5,0);
digitalWrite(L6,0);
digitalWrite(L7,0); //1,7
p=0;
}
}
```

RESULT:

Thus the LED blink and Push button Control with Arduino is implemented successfully.

IMPLEMENT LED PATTERN WITH PUSH BUTTON CONTROL USING ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 8	
1.	**What is the use of push button?**
Ans.	
2.	**Does push button need resistor?**
Ans.	
3.	**Is push button a sensor?**
Ans.	
4.	**How to connect a push button?**
Ans.	
5.	**What is button state in Arduino?**
Ans.	
6.	**What type of input is a push button?**
Ans.	
7.	**What is an example of a push button?**
Ans.	
8.	**What is push button in IOT?**
Ans.	
9.	**How is a push button connected to an LED?**
Ans.	
10.	**What is the structure of a push button?**
Ans.	
11.	**What are the two types of push buttons?**
Ans.	
12.	**What is the difference between a push button and a switch?**
Ans.	

13.	**How do I stop my LED from blinking in Arduino?**
Ans.	
14.	**How to connect LED with button Arduino?**
Ans.	
15.	**What is the function of push button in Arduino?**
Ans.	

IMPLEMENT LED PATTERN WITH PUSH BUTTON CONTROL USING ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What is the working principle of push-button switch?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 9	IMPLEMENT LCD DISPLAY WITH ARDUINO
Date:	

AIM

To display “Hello World “ in LCD 16X2 Display With Arduino

LIST OF COMPONENTS REQUIRED:

1. ARDUINO UNO R3 – 1 No
2. USB Cable A/B – 1 No
3. LCD Display 16X 2 – 1 No
4. I2C Module – 1 No
5. Jumper Cables (M to F) - – 4 Nos

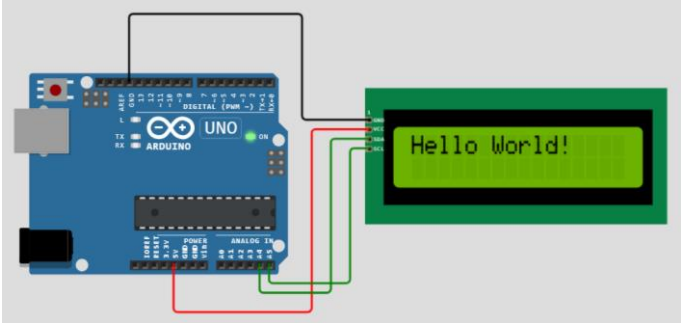
APPLICATION REQUIRED:

- **ARDUINO IDE**

PROCEDURE:

1. Connect LCD display to I2C module and solder it using the pins.
2. Connect I2c module VCC to 5v in arduino.
3. Connect I2C module ground pin to Arduino Ground.
4. Connect SDA and SCL to A4 and A5 in arduino.
5. Fix arduino in the computer.
6. Before running the code Click on the "Libraries" tab -> Search for the "LiquidCrystal_I2C" library and install it
7. After typing the code right click and click auto format. And run the code.

CIRCUIT DIAGRAM:



ARDUINO CODE:

```
#include <LiquidCrystal_I2C.h>
const int address = 0x27; // Replace with your I2C module address if different
const int lcdColumns = 16;
const int lcdRows = 2;
LiquidCrystal_I2C lcd(address, lcdColumns, lcdRows);
void setup() {
lcd.init(); // Initialize the LCD
lcd.backlight(); // Turn on the backlight (optional)
lcd.print("Hello World!"); // Print the message
}
void loop() {
// No code needed in the loop for this example
}
```

RESULT:

Thus the LCD Display with Arduino is implemented successfully.

IMPLEMENT LCD DISPLAY WITH ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 9	
1.	What is the purpose of using LCD?
Ans.	
2.	What type of LCD is used in Arduino?
Ans.	
3.	How to stop LCD in Arduino?
Ans.	
4.	How to clear LCD in Arduino?
Ans.	
5.	How do you test an LCD screen?
Ans.	
6.	What is LCD shield for Arduino?
Ans.	
7.	What is I2C in an LCD?
Ans.	
8.	Does Arduino LCD need PWM?
Ans.	
9.	How do you identify dead pixels?
Ans.	
10.	What is SDA and SCL in LCD?
Ans.	
11.	How to display text in LCD using Arduino?
Ans.	
12.	What does LCD begin mean in Arduino?
Ans.	

13.	**What is the enable pin of the LCD?**
Ans.	
14.	**What is LCD sensor?**
Ans.	
15.	**How to print new line in Arduino LCD?**
Ans.	

IMPLEMENT LCD DISPLAY WITH ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**How does LCD display work in Arduino?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 10	IMPLEMENT SERVO MOTOR CONTROL WITH ARDUINO
Date:	

AIM

To implement the Servo Motor Control with Arduino

LIST OF COMPONENTS REQUIRED:

1. ARDUINO UNO R3 – 1 No
2. USB Cable A/B – 1 No
3. Servo Motor – 1 No
4. Bread Board – 1 No
5. Connecting Wires - – As required

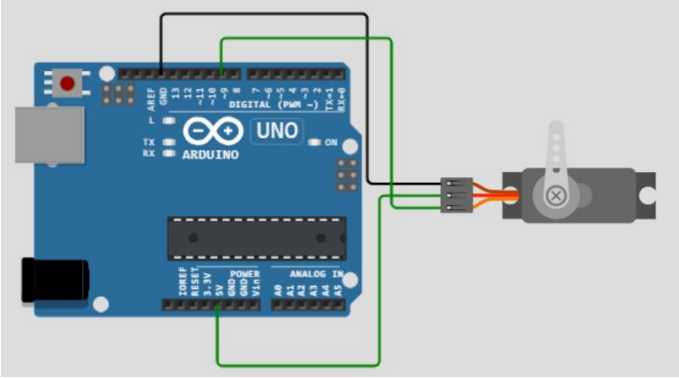
APPLICATION REQUIRED:

- **ARDUINO IDE**

PROCEDURE:

1. Connect Red wire to 5V of Arduino.
2. Connect Brown wire to Ground.
3. Connect Oragnge wire to pin number 9 in Arduino.
4. Install the Servo.h file in library.
5. Add the code.
6. Run the code to operate the motor between 0 to 180

CIRCUIT DIAGRAM:



ARDUINO CODE:

```
#include <Servo.h>  // Include the Servo library
Servo s1;           // Create a Servo object named s1
void setup() {
s1.attach(9);      // Attach the servo to pin 9
}
void loop() {
s1.write(0);       // Move the servo to 0 degrees
delay(1000);       // Wait for 1 second
s1.write(180);     // Move the servo to 180 degrees
delay(1000);       // Wait for 1 second
s1.write(0);       // Move the servo back to 0 degrees
}
```

RESULT:

Thus the Servo motor control with Arduino is implemented successfully.

IMPLEMENT SERVO MOTOR CONTROL WITH ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 10	
1.	How many servo motors can Arduino control?
Ans.	
2.	Why servo motor is used in Arduino?
Ans.	
3.	What is the use of servo motor?
Ans.	
4.	What is the voltage of Arduino servo?
Ans.	
5.	How to connect two servo motors to Arduino?
Ans.	
6.	Why is it called a servo motor?
Ans.	
7.	What are the 3 pins in servo motor?
Ans.	
8.	What are the two basic types of servo motors?
Ans.	
9.	What is the voltage unit of Arduino?
Ans.	
10.	Which motors are easy to control with Arduino?
Ans.	
11.	Do servo motors have sensors?
Ans.	
12.	How to control motor direction with Arduino?
Ans.	

13.	**Why does a servo motor have 3 wires?**
Ans.	
14.	**What sensor is used in servo motor?**
Ans.	
15.	**What are the three basic components of a servo system?**
Ans.	

IMPLEMENT SERVO MOTOR CONTROL WITH ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What is the working principle of servo motor in Arduino?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 11	IMPLEMENT AND MONITOR TEMPERATURE & DISTANCE MEASUREMENT WITH ARDUINO
Date:	

AIM

To implement and monitor the LM35 Temperature Sensor and Ultrasonic Distance Measurement with Arduino

LIST OF COMPONENTS REQUIRED:

1. ARDUINO UNO R3 – 1 No
2. USB Cable A/B – 1 No
3. LCD Display – 1 No
4. I2C Module – 1 No
5. Jumper cables(M to F) - – 4 No
6. Ultrasonic Sensor – 1 No
7. LM35 Temperature sensor - No

APPLICATION REQUIRED:

- **ARDUINO IDE**

PROCEDURE:

1. Connect LCD display to arduino kit by following steps:

   (i) Connect I2c module VCC to 5v in arduino.

   (ii) Connect I2C module ground pin to Arduino Ground.

   (iii) Connect SDA and SCL to A4 and A5 in arduino.

2. Connect Ultrasonic sensor to arduino by following steps:

   (i) Connect TRIG to pin 2 of arduino.

   (ii) Connect ECHO to pin 3 of arduino.

3. Connect LM35 temperature sensor with arduino kit by following steps:

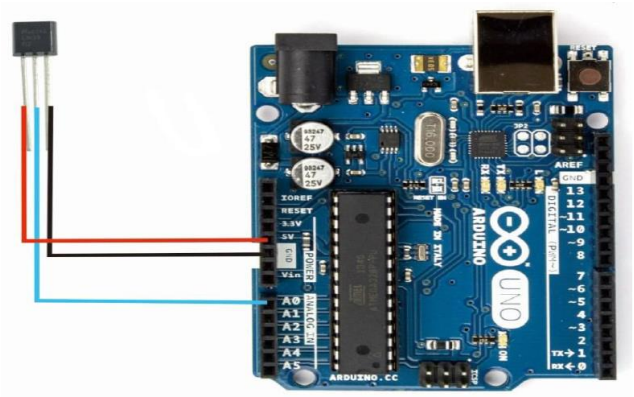
   (i) Connect positive(+) pin(1) to 5v of arduino.

   (ii) Connect pin 2 of LM35 to A0 of Arduino.

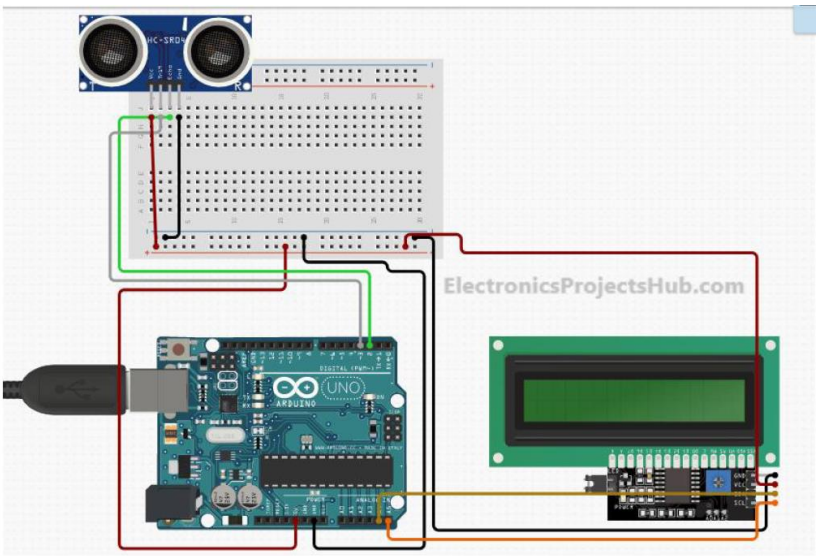
   (iii) Connect pin 3 to ground of arduino.

4. Upload the header files <wire.h> and <liquid crystaldisplay.h>

CIRCUIT DIAGRAM FOR LM35 TO ARDUINO



CIRCUIT DIAGRAM FOR ULTRASONIC SENSOR WITH ARDUINO



ARDUINO CODE:

```
#include<wire.h>
#incllude<LiquidCrystal_I2C.h>
Liquid Crystal_I2C lcd(0*3F,16,2);
Const int trigPin=2;
Const int echoPin=3;
long duration ;
int dist;
Void setup()
{
Serial.begin(9600);
pinMode(trigPin,OUTPUT);
pinMode(echoPin,INPUT);
Serial.println("Ultrasonic working Principle");
```

```
lcd.begin();
lcd.backlight();
lcd.clear();
lcd.setcursor(4,0);
lcd.print(WELCOME”);
lcd.setcursor(0,1);
lcd.print(“LET US SEE OUTPUT”);
delay(1000);
}
Void loop()
{
digitalWrite(trigPin,LOW);
delayMicroseconds(2);
digitalWrite(trigPin,HIGH);
delayMicroseconds(2);
digitalWrite(trigPin,LOW);
duration=pulseIn(echoPin,HIGH);
dist=(duration/2)*0.0340;
Serial.print(“Distance: “);
Serial.print(dist);
Serial.print(“ cm “);
lcd.clear();
lcd.setcursor(0,0);
lcd.print(“OUTPUT”);
lcd.setcursor(0,1);
lcd.print(“Distance: “);
lcd.print(dist);
lcd.print(“ cm”);
delay(500);
// DISPLAY TEMPERATURE//
lcd.clear();
int reading = analogRead(sensorPin);
float voltage = reading * (5.0 / 1024.0);
float temperatureC = voltage * 100;
Serial.print("Temperature: ");
lcd.setCursor(0,0);
lcd.print("Temperature:");
lcd.setCursor(0,1);
lcd.print(temperatureC);
lcd.setCursor(6,1);
lcd.print("C");
float temperatureF = (temperatureC * 9.0 / 5.0) + 32.0;
lcd.setCursor(8,1);
lcd.print(temperatureF);
lcd.setCursor(14,1);
lcd.print("F");
delay(1000);
}
```

RESULT:

Thus the monitoring temperature and distance measurement with Arduino is implemented successfully.

IMPLEMENT AND MONITOR TEMPERATURE & DISTANCE MEASUREMENT WITH ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 11	
1.	**What are the sensors used for monitoring temperature?**
Ans.	
2.	**How do sensors detect temperature?**
Ans.	
3.	**What are the temperature monitoring points?**
Ans.	
4.	**What are the methods of temperature monitoring?**
Ans.	
5.	**What is the use of temperature sensor?**
Ans.	
6.	**What type of sensor is temperature sensor?**
Ans.	
7.	**What is the full form of RTD?**
Ans.	
8.	**Are temperature sensors analog or digital?**
Ans.	
9.	**Where is temperature sensor in laptop?**
Ans.	
10.	**Is temperature sensor an input?**
Ans.	
11.	**Which temperature sensor used in digital thermometer?**
Ans.	
12.	**What are the 2 types of temperature sensor?**
Ans.	

13.	**How many pins are there in temperature sensor?**
Ans.	
14.	**What is the function of temperature sensor?**
Ans.	
15.	**What is the purpose of sensor?**
Ans.	

IMPLEMENT AND MONITOR TEMPERATURE & DISTANCE MEASUREMENT WITH ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What are the benefits of temperature monitoring system?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 12	IR SENSOR ANALOG INPUT USING ARDUINO
Date:	

AIM

To implement the IR Sensor Analog Input with Arduino.

LIST OF COMPONENTS REQUIRED:

1. ARDUINO UNO R3 – 1 No
2. USB Cable A/B – 1 No
3. Jumper cables(M to F) - – 4 No
4. IR Sensor – 1 No
5. LED – 1 No

APPLICATION REQUIRED:

- **ARDUINO IDE**

PROCEDURE:

1. Connect IR sensor with the following steps:

(i) Connect out pin to 7 th pin of arduino

(ii) Connect VCC to 5v of arduino.

(iii) Connect GRND to GRND of arduino.

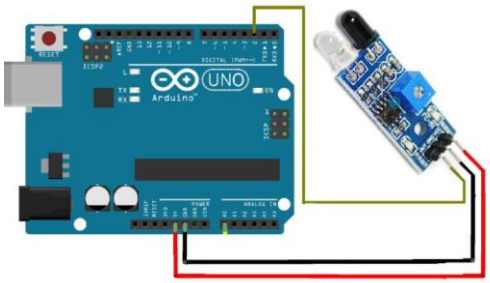
2. Connect LED to detect the sensor:

(i) Connect 9 th pin to LED positive and negative to grnd.

3. Upload the code and sensor will work with led light detection.

4. 4. We can use buzzor for detection the sound.

CIRCUIT DIAGRAM FOR LM35 TO ARDUINO



ARDUINO CODE:

```
int sensorvalue;

void setup() {
  pinMode(4,OUTPUT);
 Serial.begin(9600);
}
void loop() {
  sensorvalue=digitalRead(11);
  Serial.println(sensorvalue);
    if(sensorvalue==0){
    digitalWrite(4,HIGH);
  }
  else{
    digitalWrite(4,LOW);
  }
delay(1000);
}
```

RESULT:

Thus the object detection using IR Sensor with Arduino is implemented successfully.

IR SENSOR ANALOG INPUT USING ARDUINO PART- B SCL WORKSHEET	
Worksheet No : 12	
1.	How does an IR sensor work with Arduino?
Ans.	
2.	What is the purpose of IR sensor?
Ans.	
3.	Are IR sensors affected by temperature?
Ans.	
4.	Is IR sensor digital or analog?
Ans.	
5.	What is VCC in IR sensor?
Ans.	
6.	What are the 3 pins of an IR sensor?
Ans.	
7.	What is the range of IR sensor in Arduino?
Ans.	
8.	What is the difference between LED and IR sensor?
Ans.	
9.	What is the maximum range of IR sensor?
Ans.	
10.	What is the voltage of the IR sensor?
Ans.	
11.	What is the technical name of IR sensor?
Ans.	
12.	Is IR sensor used in GPS?
Ans.	

13.	**What is IR sensor output?**
Ans.	
14.	**What devices are controlled with IR?**
Ans.	
15.	**Where is IR receiver used?**
Ans.	

IR SENSOR ANALOG INPUT USING ARDUINO PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What is the Arduino code to identify black and white colors, using IR sensor?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	

Ex. No. 13	TEMPERATURE MONITORING USING THING SPEAK
Date:	

AIM

To use node MCU for reading temperature and monitor the temperature using Thing Speak.

LIST OF COMPONENTS REQUIRED:

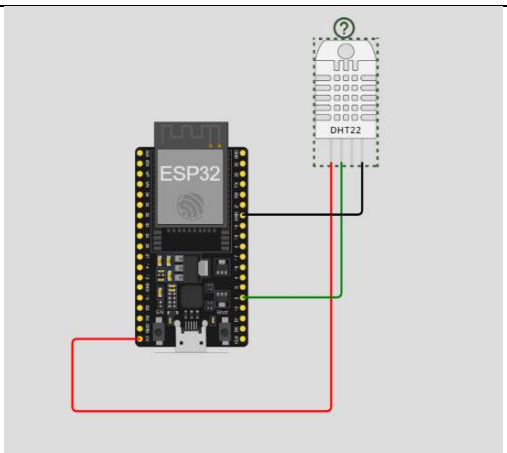
1. ARDUINO R3 – 1 No
2. USB Cable A/B – 1 No
3. Jumper cables(M to F) - – 4 No
4. NODE MCU– 1 No
5. WiFi Adapter – 1 No

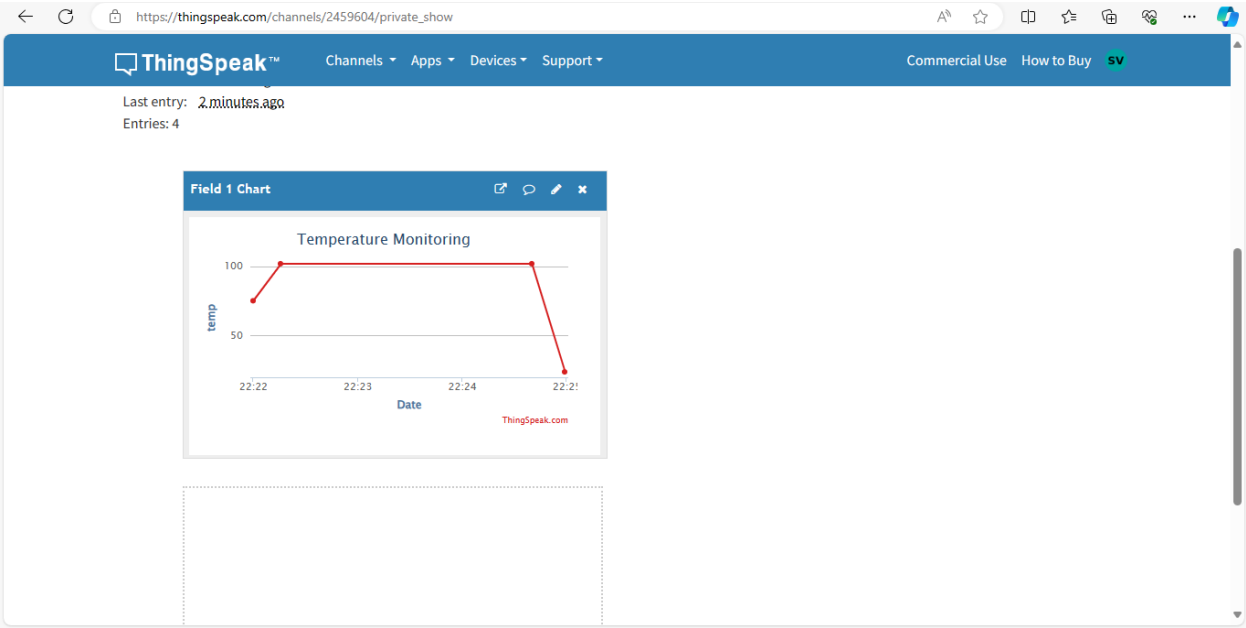
APPLICATION REQUIRED:

- **ARDUINO IDE**

PROCEDURE:

1. To create the think speak account
   - Sign up to THINK SPEAK account, by clicking on create new account.
   - Enter the details e-mail id, name and click on continue.
   - You will be receiving the confirmation mail link and click on the link and then continue to sign in the thinkspeak account.
2. Click on create channel and enter the field details. Then channel will be created.
3. Click on API keys and there will be 2 keys write API and Read API keys, write API keys will store the sensor values and write in think speak and when the think speak key value is given to arduino board then it is called write API keys.
4. Download DHT library and update into the arduino IDE
5. Upload below code in the arduino uno.
6. Run the code and automatically the temperature will be increased upto the current temperature in the think speak cloud interface.





ARDUINO CODE:

```
// Replace with your ThingSpeak channel ID and Write API key
const int myChannelNumber = 2459604;
const char* myWriteAPIKey = "MT43LEU5EVNZK0FQ";

// Replace with your Wi-Fi credentials
const char* ssid = "Wokwi-GUEST"; // For convenience with Wokwi
const char* password = "";

// DHT sensor pin (choose a pin that's not connected to other components)
const int DHTPIN = 2;

#include "WiFi.h"
#include "DHT.h"
```

```
#include "ThingSpeak.h"

WiFiClient client;
DHT dht(DHTPIN, DHT22); // Change to DHT22 if using the DHT22 sensor

void setup() {
  Serial.begin(115200);
  dht.begin();

  WiFi.begin(ssid, password);
  while (WiFi.status() != WL_CONNECTED) {
    Serial.println("Connecting to WiFi..");
    delay(500);
  }
  Serial.println("Connected to the WiFi network");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());

  ThingSpeak.begin(client);
}

void loop() {
  // Read temperature data
  float temp = dht.readTemperature(true); // Use Celsius reading

  // Check if any reads failed and exit early (to avoid NaN values)
  if (isnan(temp)) {
    Serial.println("Failed to read from DHT sensor!");
    return;
  }

  Serial.print("Temperature: ");
  Serial.print(temp);
  Serial.println(" °C");

  // Update ThingSpeak channel
  ThingSpeak.setField(1, temp);
  int x = ThingSpeak.writeFields(myChannelNumber, myWriteAPIKey);

  if(x == 0) {
    Serial.println("Field 1 of channel [myChannelNumber] updated successfully.");
  } else {
    Serial.print("Field 1 update failed, code: ");
    Serial.println(x);
  }
```

```
  delay(10000); // Update ThingSpeak every 10 seconds
}
```

RESULT:

Thus the temperature monitoring with NODE MCU and ThingSpeak is implemented successfully.

TEMPERATURE MONITORING USING THING SPEAK PART- B SCL WORKSHEET	
Worksheet No : 13	
1.	Which sensor do we use to check the Humidity& temperature in node MCU?
Ans.	
2.	Can a device have multiple sensors?
Ans.	
3.	Which API key is used when we want to send the data on ThingSpeak server?
Ans.	
4.	How many digital pins are there in NodeMCU?
Ans.	
5.	What type of data is accepted by ThingSpeak?
Ans.	
6.	Does ThingSpeak store data?
Ans.	
7.	Which protocol is used by ThingSpeak?
Ans.	
8.	What is metadata in ThingSpeak?
Ans.	
9.	How to delete data from ThingSpeak?
Ans.	
10.	Which 2 protocols are supported in ThingSpeak?
Ans.	
11.	How to send sensor data from Raspberry Pi to ThingSpeak?
Ans.	
12.	What is temperature sensor?
Ans.	

13.	**What are two applications of temperature sensor?**
Ans.	
14.	**How to connect temperature sensor to NodeMCU?**
Ans.	
15.	**How many channels can ThingSpeak support?**
Ans.	

TEMPERATURE MONITORING USING THING SPEAK PART – C INFERENCE AND APPLICATIONS	
INFERENCE	
1.	**What have you inferred from this experiment?**
Ans:	
APPLICATIONS	
2.	**What is ThingSpeak and how it works?**
Ans:	

ASSESSMENT			
Name of the Student		**Name of the facilitator**	**V.Saranya**
Register Number		**Comments :**	
Year/ Semester		**Marks (5+3+2)**	**/10**
Signature of the student		**Signature of the facilitator with date**	