



JSS ACADEMY OF TECHNICAL EDUCATION
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
INNOVATIVE METHODS OF TEACHING

2021-22

Sl. No	Faculty Name	Course	Innovative Method
1	K S Rajeshwari	Database Management Systems	Think-Pair-Share Activity
2	Snehalatha N, Rohitaksha K	Big Data Analytics	Demonstration of BDA Tools like MongoDB, Hive, and Pig. Map reducing using Hadoop
3	K S Rajeshwari	UNIX Programming	Think-Pair-Share Activity
4	Rohitaksha K	Database Management Systems	Demonstration of Algebraic Operations in database using Relax Tool
5	Bhavani B H, Pooja H, Manjunath B T, Niranjana K C	Analog and Digital Electronics	Collaborative Project Practice
6	K V Shanthala	Computer Networks and Security	Demonstration of Network Analyzing Tools like WireShark, DIG and working of Whois Database , TraceRoute Function
7	Namitha S J, Impana P, Shruti P	Mobile application Development and Web Design	Conglomeration of the knowledge of CG, Web Technology and Mobile Application Development.
8	Rohitaksha K	Operating System	Demonstration of CPU Scheduling, Memory Management Techniques using OS Sim.
9	Snehalatha N	Automata Theory and Computability	Graphical tool Demonstration
10	Snehalatha N	Internet of Things	Project Based Learning
11	Rashmi B N	Computer Organization	Virtual Lab and use of CPU_OS_Simulator



JSS Academy of Technical Education, Bangalore
Department of Computer Science & Engineering

Assignment I

Think-Pair-Share Activity (Collaborative Learning)

Course: **Database Management Systems [18CS61]**

Activity: **Think-Pair-Share Activity (Collaborative Learning)**

Faculty In-charge: **K S Rajeshwari**

Semester/Sec: **V CSE 'A'**

Date: **1.12.2021**

Date of conduction: **8.12.2021**

CO-PO/PSO Mapping:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
2	2	1	1	1	--	-	-	1	1
PO11	PO12	PSO1	PSO2	PSO3	PSO4				
-	-	1	1	1	-				

Objective of the activity:

- To enhance the knowledge in Database management systems.
- To explore more on Entity-relationship diagram and relation schema and to understand the concepts of ER diagram and relation schema.
- To build team work and communication skills.
- To manage the time.

Activity Description:

1. Made a team of 4 students.
2. Each team has to given the database with requirements to the other group by selecting the chits.
3. The assigned group had written the ER diagram with description and relation schema within the given time.
4. The written ER diagram and relation schema had evaluated by the team which has given.
5. Each team had given 45 minutes for writing the ER diagram and relation schema.

Rubrics for Evaluation:

1. Selecting the database and defining requirements- 5
2. ER diagram with description -3
3. Relation Schema -2

Marks

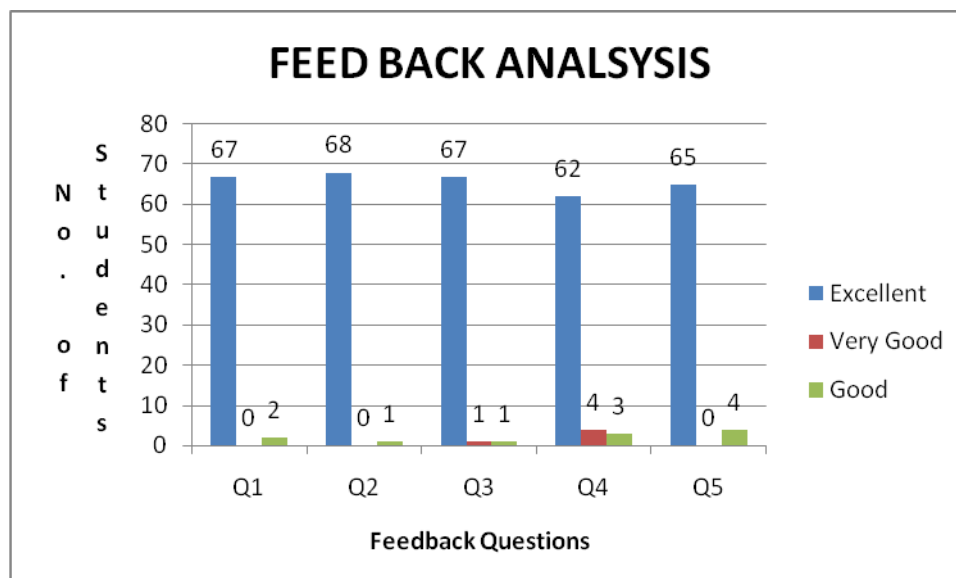
Group No	Members USN	Members Name	Database	Marks
1	1JS19CS034	Aryan Rai	OTT	10
	1JS19CS048	Deeksha S		10
	1JS19CS055	Gagana Chandana M		10
	1JS19CS058	Girish S N		10
2	1JS19CS029	Anupam Ashok	crime records management system	10
	1JS19CS030	Anushka Jha		10
	1JS19CS031	Apoorva V		10
	1JS19CS035	Ashutosh Mishra		10
3	1JS19CS023	Anaghashree Nanda	Banking management system	10
	1JS19CS025	Ananya G		10
	1JS19CS050	Dhananjay A Patel		10
	1JS19CS026	Ankit Kumar Upadhyay		10
4	1JS19CS045	Chandan Kumar	Parking Management System	10
	1JS19CS039	Atul C Anil		10
	1JS19CS060	Hamsa		10
	1JS19CS028	Anshu Upadhyay		10
5	1JS19CS022	Amulya. K	Tax management system	10
	1JS19CS063	Harika.A		10
	1JS19CS021	Mayukha		10
	1JS19CS052	Disha Ramesh		10
6	1JS19CS002	Abdul Nihad	Property Management System	10
	1JS19CS019	Akshay Prakash		10
	1JS19CS036	Ashutosh Wodeyar		10
	1JS19CS054	Gagan Karanth		10
7	1JS19CS005	Abhijna B C	Gym management system	10
	1JS19CS016	Akanksha V G		10
	1JS19CS037	Ashwin		10
	1JS19CS041	Bhargav		10
8	1JS19CS003	Abhay TM	Stationary Management Database	10
	1JS19CS010	Adithya S		10
	1JS19CS049	Deepak Naidu		10
	1JS19CS057	Girish Kumar DV		10
9	1JS20CS400	Chiraag HG	Hotel management system	10
	1JS20CS402	Gourav Dey		10
10	1JS19CS008	Abhishek S P	Online Musical Store Management System	10
	1JS19CS014	Ajay Biradar		10
	1JS19CS018	Akash Rao M B		10
	1JS19CS020	Amit Kadekar		10
11	1JS19CS040	Ayush sharma	Railway management system	10
	1JS18CS068	Kumar R		10
	1JS19CS038	Asif Nawaz		10
	1JS19CS027	Ankit Singh		10

12	1JS19CS046	Chirag Verma	Pharmacy management system	10
	1JS19CS001	Ayushi Singh		10
	1JS19CS056	Ginni Singh		10
	1JS19CS064	Harshavardhan Bhaskar		10
13	1JS19CS017	Akash H	Car showroom management system	10
	1JS19CS043	C Mukund reddy		10
	1JS19CS044	Chaithanya kumar H D		10
	1JS19CS059	H Vamshi		10
14	1JS19CS047	Chiranjeevi R	Project Management System	10
	1JS19CS051	Dhanush Kumar K		10
	1JS19CS061	Hareesh Naik		10
15	1JS20CS401	Divya.S	Lpg Booking Management System	10
	1JS20CS404	Kavya.T.S		10
	1JS20CS405	Meghana.P		10
	1JS19CS192	Sushma S Kalasannavar		10
16	1JS19CS011	Aishwarya BT	Sports management system	10
	1JS18CS029	Ayushi B		10
	1JS18CS134	Sahana TE		10
	1JS19CS013	Aishwarya MB		10
17	1JS19CS012	Aishwarya KS	Farm database management system	10
	1JS19CS033	Arjun BR		10
	1JS19CS042	Bhoomika P		10
	1JS19CS062	Hari Chandana P		10

Outcome of the activity:

1. Students have gained the knowledge about ER diagram and relation schema.
2. Students have understood to write ER diagram and relation Schema for simple real world applications.
3. Students have learnt the time management and to work in team.

Feedback Analysis



Photos







JSS ACADEMY OF TECHNICAL EDUCATION

JSS Campus, Kengeri-Uttarahalli Road, Bengaluru-60. Website: www.jssateb.ac.in



Department of Computer Science and Engineering

Academic year 2021-22(odd semester)

Database Management System (18CS53)

Assignment-01

Submitted by,
Ammineni Mayukha IJS19CS021
Amulya K IJS19CS022
Disha Ramesh IJS19CS052
Harika A IJS19CS063

10

10

10

10

KS

Faculty in-charge,

Mrs. Rajeshwari K S

Assistant Professor, CSE Department

Activity 1

FARM DATABASE

Group 5,

Harika A (17S19CS063)

Amulya K (17S19CS022)

A Mayukha (17S19CS021)

Disha Ramesh (17S19CS052)

Faculty:

ajeshwari ma'am

Assistant Professor

TEB

10
10

checked by
Group 7

Topic: Farm Database

[Given to GROUP 5]

To maintain a database to keep track everything under the organization, which includes farmers, history of produces, the land owned by the farmers under the organization.

In the ER diagram, there are four entities total.

LAND, PRODUCTION, FARMER and PLANT are respective entities.

Entity 1 [LAND]:-

List of attributes under 'LAND' entity are

type of soil, area, location, owner and

position, land-id

land-id is the key attribute

location is a composite attribute which has latitude & longitude.

Entity 2 [PRODUCTION]:-

List of attributes under production are

invest time, type, profit, loss, location,

quality, weight of production, investment
seeds and plantation date.

- Key attribute is the location plant-id

Entity 3 [FARMER]:-

- The list of attributes are FNAME, date, age & residence, farmer-id
- farmer-id is the key attribute

Entity 4 [PLANT]:-

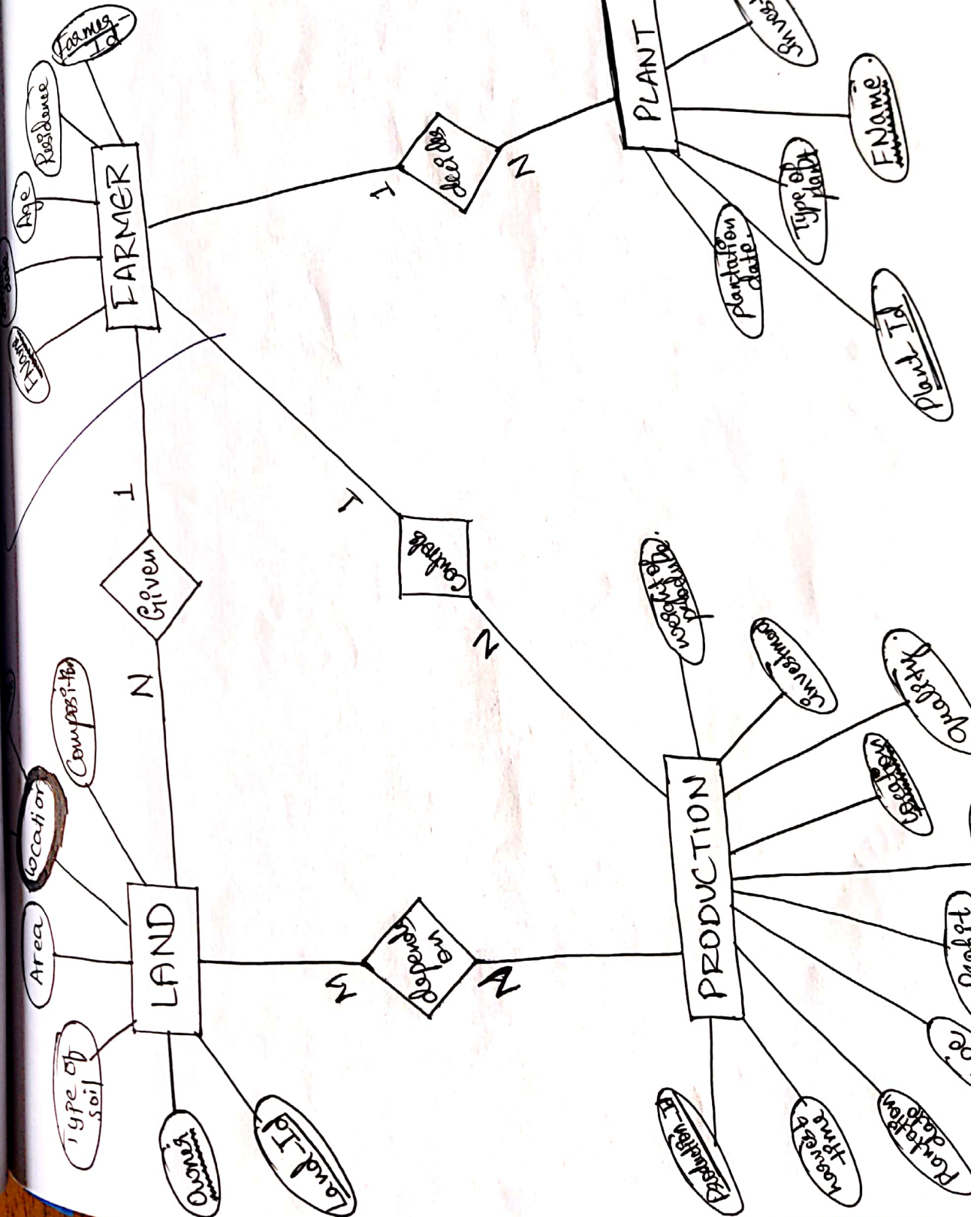
- list of attributes are type of plant, invest, fname, cost, harvest time, plant date, plant-id
- plant-id is the key attribute

Relations:-

- Farmer is provided with land (1:N)
- Farmer controls production (1:N)
- farmer decides plants (1:N)
- Production depends on land (N:M)

Farm Database

2 diagram! -



Date: 11.11.2021

Faculty Name : Mrs Snehathatha N

Class/Section: VII CSE 'C'

Activity Name: Demonstration of Big Data analytics tools: Hadoop, Pig, Hive

Academic Year: 2021-22(ODD semester)

GOAL OF THE ACTIVITY:

- Data analysts can be instrumental in helping organizations improve the way they make business-related decisions by using software and big data analytics framework that is aimed at analyzing big data.
- The application of big data analysis can assist businesses in making better business decisions by analyzing large amounts of data and uncovering hidden patterns.
- Real-time analytics platforms in big data apply logic and math to gain faster insights into data, resulting in a more streamlined and informed decision-making process.

DESCRIPTION OF ACTIVITY:

Team of 4 students were formed. Each team selected one of the analytic tools and were informed to install in their laptops. Each team has to identify their own problem statement and its solution using big data analytic tools.

USE OF APPROPRIATE METHODS:

Installation and demonstration of tools for a given problem statement using Hadoop MongoDB, Cassandra, Hive, Pig, Spark, Flume, Tableau, NoSQL

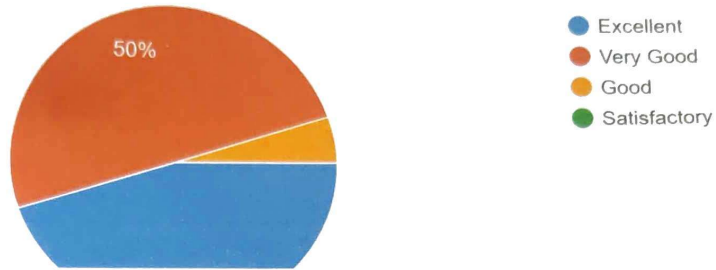
RESULTS/OUTCOME :

Students were able to understand the different tool installation and its working . Also students were able to use the tool for possessing a great ability to store huge data across several servers and applying programming model for processing the different data from different sources and producing the desired results

Feedback:

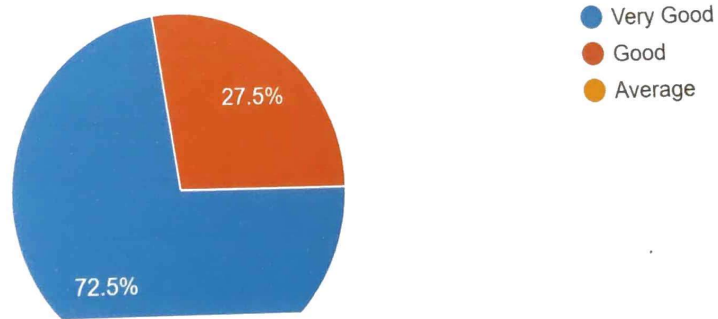
How would you rate the activity useful

40 responses



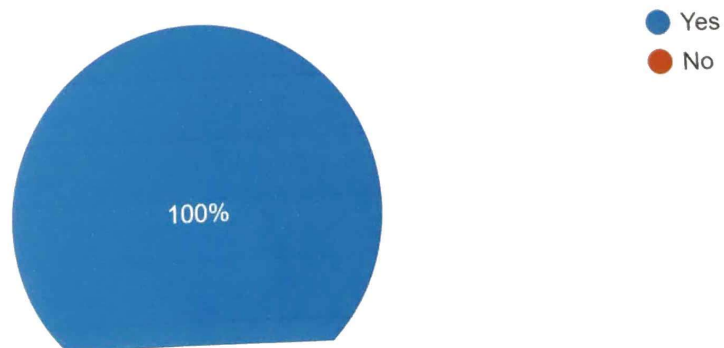
Was the activity helped to enhance the knowledge in Big Data Analytics

40 responses



whether this kind of activity is required and would help in enhancing the learning

40 responses





JSS Academy of Technical Education, Bangalore
Department of Computer Science & Engineering

Assignment I
Think-Pair-Share Activity (Collaborative Learning)

Course: **UNIX Programming [18CS61]**

Activity: **Crossword puzzle**

Faculty In-charge: **K S Rajeshwari**

Semester/Sec: **V CSE 'C'**

Announcement Date: **3.1.2022**

Date of conduction: **7.1.2022**

CO-PO/PSO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C306.1	2	2	2	-	1	-	-	-	1	-	-	-

CO	PSO1	PSO2	PSO3	PSO4
C306.1	2	1	2	1

Crossword puzzles provide students with an opportunity to evaluate their knowledge and require students to pay attention to terminology as they need to frame the questions for Unix commands.

Objective of the activity:

1. To enhance the knowledge in Unix programming.
2. To explore more on Unix commands and to understand the usage of unix commands.
3. To build team work and technical skills.
4. To manage the time.

Activity Description:

1. Made a team of 4 students.
2. Each team has framed the crossword puzzle and given to the other group to fill up by selecting the chits.
3. The assigned group filled the crossword puzzle within the given time.
4. The Cross word puzzle has evaluated by the team which has given.
5. Each team had given 45 minutes for filling the crossword puzzle.

Rubrics for Evaluation:

1. Selection of the commands- 3
2. Framing the crossword puzzle -3
3. Filling the crossword puzzle -5

Cross-Word Puzzle Marks

SL No.	Group No	Names	USN	Alloted group No.	Marks
1	1	SAGAR D	1JS19CS141	9	10
2		SRI VISHNU S	1JS19CS172		10
3		SHANKAR B KHANPUR	1JS20CS413		10
4		Somashekar N	1JS20CS415		10
5	2	Syed salik hussaini	1js18cs172	10	10
6		Srinivas S Rathod	1JS19CS173		10
7		S.Vishwas	1JS19CS140		10
8		S.Sumanth	1JS19CS139		10
9	3	Sanjay T H	1JS19CS150	13	10
10		Sanath suresh kaushik	1JS19CS145		10
11		Rakshith B G	1JS19CS132		10
12		Samartha UM	1JS19CS144		10
13	4	Rajat Kumar Luharuka	1JS19CS130	14	10
14		Rohit Kumar	1JS19CS137		10
15		Saurabh Prakash	1JS19CS152		10
16		Shashank	1JS19CS155		10
17	5	Rakshita P	1JS19CS131	15	10
18		Sanjana RP	1JS19CS147		10
19		Sanjana S	1JS19CS148		10
20		Sireesha G	1JS19CS167		10
21	6	Rakshith B R	1JS19CS133	16	10
22		S Bhavith	1JS19CS138		10
23		Shubham G	1JS19CS162		10
24		Yashas K M	1JS19CS190		10
25	7	Rakshitha S	1JS19CS134	17	10
26		Sahana M	1JS19CS142		10
27		Sinchana T Harish	1JS19CS165		10
28		Sukshma S Kumar	1JS19CS176		10
29	8	R Sahana	1JS19CS128	18	10
30		Shruti KP	1JS19CS160		10
31		Spoorthi Satish	1JS19CS171		10
32		Tina Sharma D	1JS19CS182		10
33	9	RAMA MUTALIKDESAI	1JS19CS135	11	10
34		SHRUSTI M YALIGAR	1JS19CS159		10
35		SINDHU NADIG B N	1JS19CS166		10
36		VEENA ARAHUNASI	1JS19CS187		10
37	10	Sanjay R	1JS19CS149	8	10
38		Shreesha Shastri	1JS19CS158		10

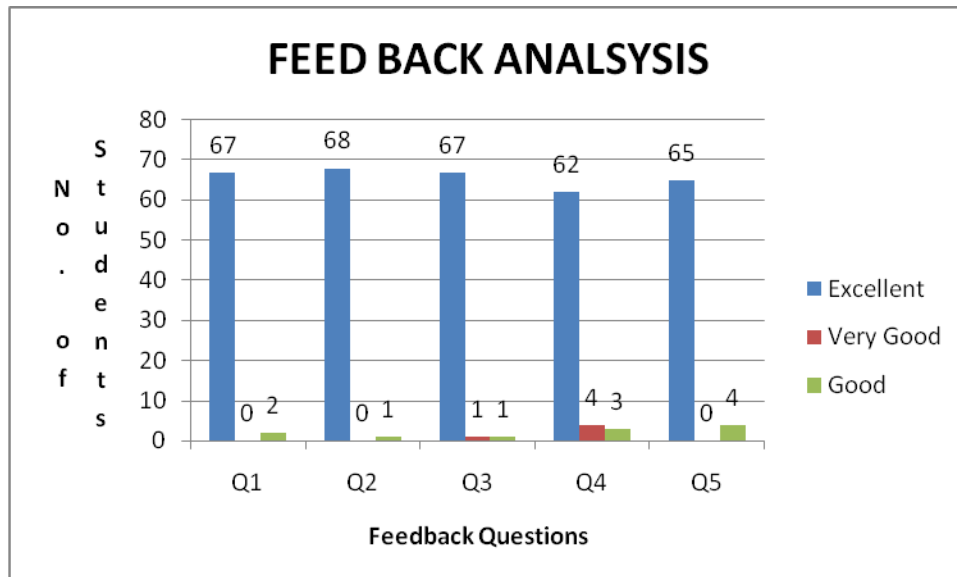
39		Siddhant	1JS19CS163		10
40		Vijay M. Naik	1JS19CS188		10
41	11	Rashika khare	1JS19CS136	7	10
42		Sinchana S L	1JS19CS164		10
43		Varshitha	1JS19CS185		10
44	12	Shilpa	1JS19CS156	6	10
45		Tejashree.R	1JS19CS179		10
46		Tejashree.T	1JS19CS180		10
47		Yajusha Ravi	1JS19CS189		10
48	13	Teliki Sai Jyothsna	1JS19CS181	5	10
49		vibhuti bajaj	1js19cs191		10
50		sweta kumari	1js19cs178		10
51		Sofia Iqbal Khan	1JS20CS414		10
52	14	Sandeep M	1JS19CS146	4	10
53		Shithin S Shetty	1JS19CS157		10
54		Ullas H P	1JS19CS183		10
55		Varun S Athreya	1JS19CS186		10
56	15	SARANSH	1JS19CS151	12	10
57		SHUBH SRIVASTAVA	1JS19CS161		10
58		SNEH SAMARPIT	1JS19CS169		10
59		SUNDEEP KUMAR SINGH	1JS19CS177		10
60	16	Sanjana P	1JS20CS412	3	10
61		Spandana HR	1JS20CS416		10
62		Tejaswini SL	1JS20CS417		10
63		Vandana P	1JS20CS418		10
64	17	Rahul Raj	1JS19CS129	2	10
65		Saurabh Suman	1JS19CS153		10
66		Sudhanshu Raj	1JS19CS174		10
67		Sujal Verma	1JS19CS175		10
68	18	Sakshi Sindhuja	1JS19CS143	1	10
69		Shanmukha Ganesna	1JS19CS154		10
70		S Gautam	1JS19CS168		10
71		Sneha Mondal	1JS19CS170		10

Outcome of the activity:

1. Students have gained the knowledge of UNIX Commands.
2. Students understood the usage of UNIX commands.
3. Students have learnt the time management and to work in team.

Feed Back

- Q1. Knowledge and information gained from the Innovative teaching method.
- Q2. Have you gain the knowledge of framing the questions.
- Q3. Quality of the content delivery.
- Q4. The Method was useful in enhancing the learning capabilities of the subject.
- Q5. Overall rating of the method.





JSS ACADEMY OF TECHNICAL EDUCATION,
BENGALURU

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

UNIX PROGRAMMING (18CS56)

UNIX Crossword Puzzle
(Collaborative Learning Activity)

Submitted by

Sanjana P	1JS20CS412
Spandana H R	1JS20CS416
Tejaswini S L	1JS20CS417
Vandana P	1JS20CS418

Under the guidance of

Mrs. K S Rajeshwari

Assistant Professor,

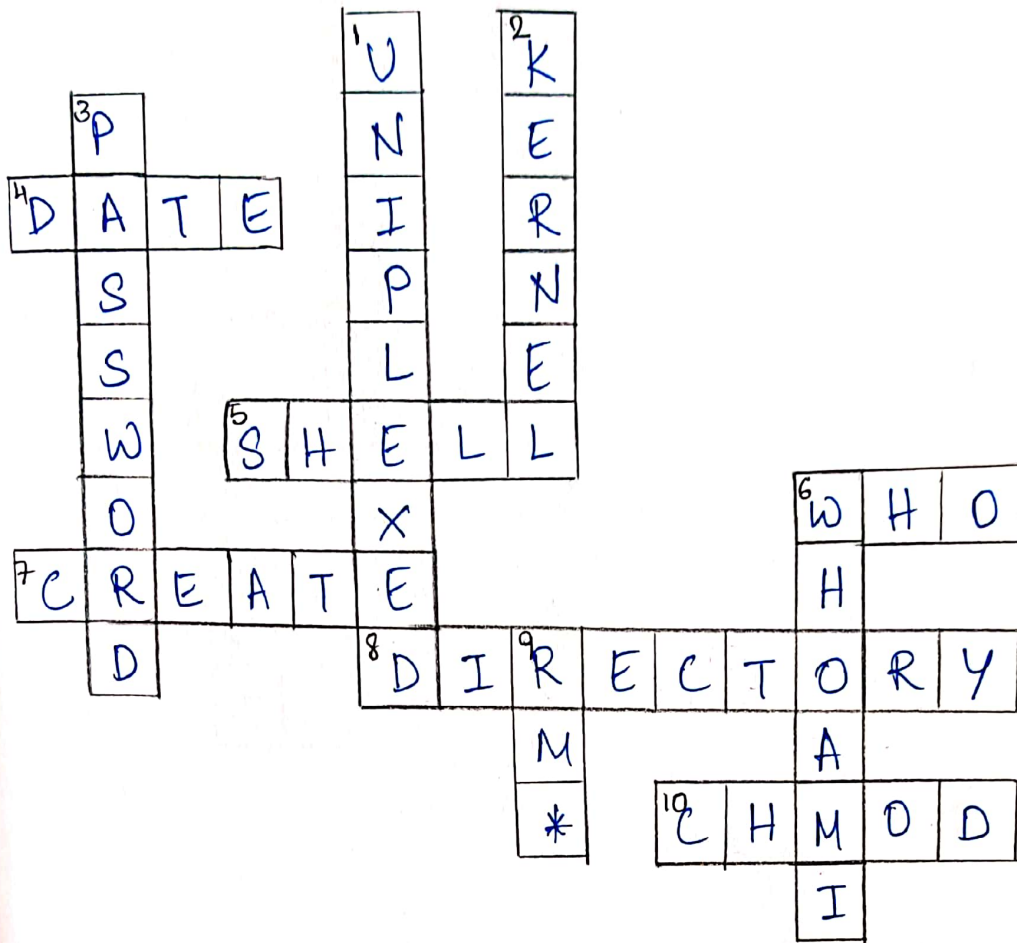
Department of Computer Science,

JSSATE

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28

ALLOTTED PUZZLE



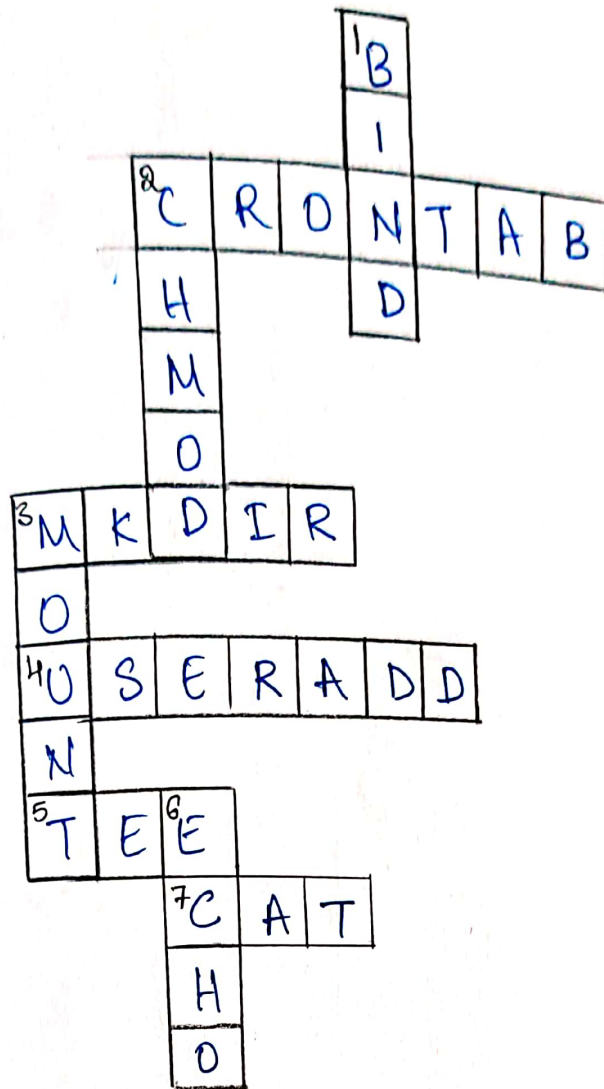
Across

Down.

4. Command to show the current date & time
5. A program that acts as the interface b/w you & UNIX system
6. To view who are all the people using the system
7. The mkdir command is used to _____ directory
8. In parent-child relationship parent is always a _____
10. Command used to change file permissions.

1. The full form of U in Unix is _____
2. _____ Interacts directly with h/w & provides service to the user programs
3. passwd - the command used in changing your _____
6. Command used to print current user's login name along with effective user id.
9. Command used to delete all files in a directory.

SOLVED PUZZLE



Sarath



Horizontal Commands:-

- 2 → Execute scheduled task at specified time
- 3 → To make a directory
- 4 → To add/create user accounts in UNIX
- 5 → Read std input & write o/p of prgm to std o/p & simultaneously copy it into specified file
- 7 → Read file sequentially & write them as std o/p

Vertical Commands:-

- 1 → locate file based on some user specified criteria
- 2 → change access permission of file system objects
- 3 → Used to want file system on device to be like student
- 4 → Command to output string passed as argument.



JSS Academy of Technical Education

Bangalore

Computer Science Engineering
Department

RelaX Tool

Report

SUBMITTED BY:

CSE-B

Introduction:

The relational model and especially the relational algebra is the fundament of each relational database system and thus content of almost every database lecture. Even though there exist a few tools allowing to experiment with relational algebra, a common way to learn it is still by formulating queries on paper, without the option of checking them for syntax or even executing them. To fill this gap ,RelaX, web based tool which is capable of executing arbitrary relational algebra statements on arbitrary datasets. By drawing interactive operator trees corresponding to the queries, it is also possible to compute the final result in a step-by-step manner.

RelaX is a relational algebra calculator used to learn and understand the relational algebra by executing the queries on the machine. Along with the relational algebra calculator it also has the database system to SQL queries which can be used to compare the output of the Queries in SQL and Relational Algebra.

Finally, RelaX is also equipped to execute SQL queries and to automatically translate them to relational algebra.

Features provided by the calculator:

- supports most common operators
 - projection
 - selection
 - rename relations
 - rename columns
 - group by
 - intersect
 - union
 - set difference
 - cross join
 - theta join
 - natural join
 - natural left outer join
 - natural right outer join
 - natural full outer join
 - theta left outer join
 - theta right outer join
 - theta full outer join
 - left semi join
 - right semi join
 - anti join join
 - order by

- runs in any modern browser. no plugins needed
- text based approach. lets you write RelAlg as easy as SQL
- code editor with syntax highlighting and code completion
- pre defined sets of relations
- visualize statement in a operator tree
- plain text alternatives for special symbols like σ or \bowtie
- variables can be used to simplify expressions
- new temporal relations can be declared in the statement
- sql like comments
- arbitrary boolean expressions in conditions
- operations keep original order for better traceability
- translates simple SQL-statements to RelAlg
 - no support for correlated sub-statements
- it also provide some of the databases in-built .On the home-page we can also see what is not supported by the tool as shown in the figure below

RelaX

Calculator

Language

Feedback

Help

Imprint

What it is not:

The tool is not meant to be a full database system. The goal of the implementation was to create a tool to support people to learn RelAlg

	Pen and Paper	relational algebra calculator	MySQL
SQL support	yes :-)	basic SQL	yes
relational algebra	yes	yes	no
use variables for RelAlg	yes	yes	no
large datasets	no	no	yes
query plan	no	yes	no
intermediate results	no	yes	no
iterative working	no	yes	yes

Relational Algebra Calculator:

The screenshot shows the Relational Algebra Calculator interface. At the top, there are navigation links: Calculator, Language, Feedback, Help, and Import. Below this, there are tabs for Relational Algebra, SQL, and Group Editor. The main area contains a query editor with the text "Your query goes here" and a keyboard shortcuts section. The keyboard shortcuts are: execute statement: [Ctrl]+[Enter], execute selection: [Ctrl]+[Shift]+[Enter], and auto complete: [Ctrl]+[Space]. At the bottom, there are buttons for "execute query" and "download history".

SQL Calculator:

The screenshot shows the SQL Calculator interface. At the top, there are navigation links: Calculator, Language, Feedback, Help, and Import. Below this, there are tabs for Relational Algebra, SQL, and Group Editor. The main area contains a query editor with the text "Your query goes here" and a keyboard shortcuts section. The keyboard shortcuts are: execute statement: [Ctrl]+[Enter], execute selection: [Ctrl]+[Shift]+[Enter], and auto complete: [Ctrl]+[Space]. At the bottom, there are buttons for "execute query" and "download history".

Group Editor to add the custom database:

The screenshot shows the Group Editor interface. At the top, there are navigation links: Calculator, Language, Feedback, Help, and Import. Below this, there are tabs for Relational Algebra, SQL, and Group Editor. The main area contains a query editor with the text "Your query goes here" and a keyboard shortcuts section. The keyboard shortcuts are: execute statement: [Ctrl]+[Enter], execute selection: [Ctrl]+[Shift]+[Enter], and auto complete: [Ctrl]+[Space]. At the bottom, there are buttons for "execute query" and "download history".

The screenshot shows the Relax editor with the SQL tab selected. The query is as follows:

```
--- Variant A: directly formulated solution
1  R shop shopOffer R shop shopOffer (shopOffer R . R Item ( @ age > 25
2  (Person R Purchase) ...
3
4
5
--- Variant B: alternative step by step solution using variables
6
7  -- All items that were purchased by persons older than 25
8  R1 = R Item ( @ age > 25 (Person R Purchase)
9  -- All shops that offer these items
10 R2 = shopOffer r R1
11 -- All shops that offer also other items than items contained in R1
12 R3 = shopOffer R2
13 -- final step by step solution
14 R4 = R shop shopOffer . R shop R3
```

Fig. 1: The Relax editor.

RelaX is an online tool available on all and any devices and at anytime. It's a basic tool built to understand the relational Algebra better . The below are some of the plaudits for the tool;

- It is easy to use.
- The goal of the SQL mode of the relational algebra calculator is to provide a translation from SQL to relational algebra to show how they are related.
- Represents the queries be it relational algebra or the SQL, with the flow diagram making it able to understand how the query works(fig.2).
- As there are many database available in-built, they can be used as an example to write queries in relational algebra and SQL and practice.
- Use in group editor feature allows ease of access to the table and its attributes.
- Expressions in the header of relational algebra calculator and SQL clauses in SQL calculator helps to create the queries in fast and efficient manner.
- Hovering over the symbols and clauses gives us the brief information about that particular symbol/clause which helps us to verify and select appropriate symbol for the query.



Fig. 2: Automatically computed operator tree, optionally showing intermediate results.

The tool is not meant to be a full database system. The goal of the implementation was to create a tool to support people to learn Relational Algebra. Hence there are a few drawbacks in the tool.

- Subquery Expressions like EXISTS, IN, ANY/SOME or ALL are not supported because their translation into relational algebra is not trivial and modern database systems use an extended set of operators internally that do not require a one-to-one translation into "classical" relational algebra. Therefore the learning effect for users of this tool would not be that big.
- It is space sensitive. Even though it can be regarded as the positive feature as it avail's the proper legibility with the quires but can be very difficult to handle them.
- It does not support all features a real database system like PostgreSQL or MySQL does because the goal is to provide a translation into relational algebra.
- Using of the tool requires quite a time to understand the syntax for the queries as some are bit complex and difficult to understand even with the manual available on the tool itself.

Conclusion:

RelaX a web based learning tool for relational algebra which allows the execution of arbitrary statements on predefined or custom datasets. Conceptualized for the use in understanding with integrated several functions and means such as a comprehensive editor and operator tree visualization, all of which should help us understand relational algebra better.

Signature,

Pratiksha

Page. 11

Rajani

Pratiksha

JSS ACADEMY OF TECHNICAL EDUCATION
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

COLLABORATIVE LEARNING

Faculty Name : BHAVANI B H

Class/Section: III -B

Activity Name: Analog and Digital Electronics in Real Time Applications

Academic Year: 2021-2022

PO1	PO2	PO3	PO4	PO5	PO9	PO12
√	√	√	√	√	√	√

GOAL OF THE ACTIVITY:

- **To gain practical knowledge on Analog & digital electronics**
- **To understand the working of various electronic devices in real applications**

DESCRIPTION OF ACTIVITY:

- Presentation about various Analog and Digital Electronic Components temperature and humidity sensors, resistors, capacitors, servo motors, stepper motors, 555 Timer IC were given by the faculty. A brief session about working with Aurdino UNO and NANO board to develop the projects was given .
- Students understood the theoretical aspects of Analog and Digital Electronics and were informed to apply the theoretical concepts to build Analog & Digital Circuits using various electronic components to model the real time applications. Students demonstrated the working principle of Electronic Circuits and explained their applications in real world.

USE OF APPROPRIATE METHODS:

Used various Analog and Digital Electronic Components like rain sensors, temperature and humidity sensors, resistors, capacitors, servo motors, stepper motors, 555 Timer IC, LED, Buzzer, Transistor, Photodiode, Opto-coupler, Light Dependent resistor (LDR), Aurdino UNO and NANO board to develop the projects.

RESULTS/ OUTCOME :

- **Students understood the concepts of Analog and Digital Electronic devices and its application in real time and gained practical knowledge of several ADE components.**
- **An exhibition was arranged where students showcased their mini projects like smart home, smart garbage system, smart traffic lights etc**

Collaborative Practice Project Exhibition

The project exhibition “Collaborative Project Practice” on Analog & Digital Electronics and Computer Organization was held on 14th March 2022 from 10:00-12:30 PM in Analog & Digital Electronics Lab and Network Lab.

Project exhibition started at 10 AM in Analog & Digital Electronics Lab and Networks Laboratory. All 3rd Semester students participated in the project exhibition and demonstrated their projects to Principal, H o D of CSE, H o D of E & I, Mechanical Department Professor Dr. Anand Annigeri, all the department staff and faculty from other departments. Objective of the project was to design simple models to address some of the societal problems.

Models addressed solutions to real time problems as electronic devices play a vital role in addressing them. Project exhibition was also witnessed by 1st year students where they could get ideas to carry out these kind of projects related to Electronic Circuits. Principal, E& I H o D, Dr. Anand Annigeri and all other staff members appreciated the efforts made by student groups in carrying out these projects. They also gave inputs to enhance the projects and to come out with product so that it can be used in our Institution. Students were motivated with the appreciation received from everyone and they assured to enhance their projects so that it becomes helpful to the society. Event was coordinated by Mrs. Bhavani B H, Mrs Pooja H, Mr Manjunath B Talwar and Mr. Niranjan C Kundur with continuous support from HOD, CSE.

JSS MAHAVIDYAPEETHA
JSS ACADEMY OF TECHNICAL EDUCATION
BENGALURU

Department of Computer Science & Engineering

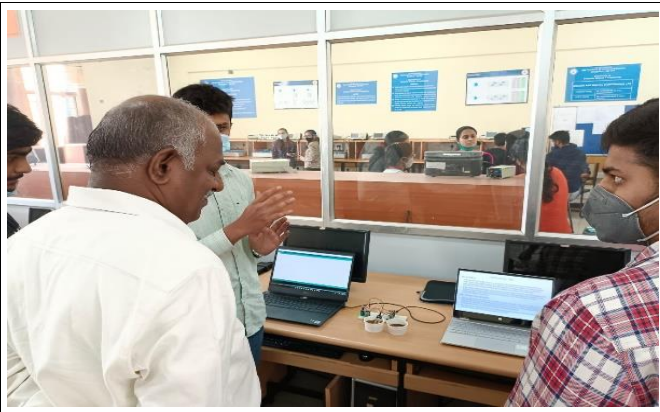
COLLABORATIVE PRACTICE PROJECTS - 2022
Analog & Digital Electronics
and
Computer Organization

Students from II Year will demonstrate the Models

Coordinators
1. Mrs. Bhavani B H
2. Mrs. Pooja H
3. Mr. Manjunath B Talwar
4. Mr. Niranjan C Kundur

Date 14-Mar-2022
Venue : ADE Lab,CSE
Time : 10:00 AM Onwards

ALL ARE WELCOME HOD, CSE





JSS Academy of Technical Education, Bangalore
Department of Computer Science & Engineering
Collaborative Learning Activity- Assignment 2
Academic Year 2021-22

Subject Name/Code: Computer Networks (18CS52)

Class/Section: V Sem A Section

Name of Faculty: Shanthala KV

Maximum Marks:10

Course Outcomes:

CO#	Course Outcome	Bloom's Level
1	Examine application layer protocols for providing different network services.	L4
2	Analyze transport layer services to infer TCP and UDP protocols.	L4
3.	Examine the different routing protocols in network layer.	L4
4	Examine cryptographic algorithms to provide security for various applications	L4

Demonstration of Wireshark tool to analyse traffic in the network ,Working of DNS lookup and TraceRoute function by the faculty in the class on a Linux system.

Activity Description:

- 1.Students are divided into groups. Each group has to implement the given program/task and justify the output
- 2.Prepare a report of 5-6 pages with appropriate screenshots and analysis of the output.

Goal of the activity:

1. Reinforcement of topics learnt in the theory class.
2. Use of tools to demonstrate and analyse the working of various transport protocols, network protocols and assessment of the vulnerability of a network in terms of network security.

Rubrics:

1. DOCUMENTATION/REPORT- 4 Marks
2. DEMONSTRATION & EXECUTION – 6 Marks

PO MAPPING:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
√	√	√	√	√				√	√		

Outcome of the Activity:

Students gained practical knowledge and insight into the working of various network protocols. They were familiarised with the following Tools:

1. DNS LookUp Tool -DIG
2. Packet Sniffer tool – WireShark
3. Whois Database.
4. TraceRoute Function in Linux/Windows
5. Cybersecurity tools - Metasploit Framework, Aircrack-ng, OSSEC

Signature of the Faculty

HoD, CSE

Problems assigned to student Groups

Name	USN	TOPIC
CHIRAG VERMA	1JS19CS046	a) Use the Command-Line DNS Lookup Tool- dig tool for Unix /Linux/Windows hosts to explore the hierarchy of DNS servers. A DNS server higher in the DNS hierarchy delegates a DNS query to a DNS server lower in the hierarchy, by sending back to the DNS client the name of that lower-level DNS server. First read the man page for dig, and then answer the following questions. a. Starting with a root DNS server (from one of the root servers [a-m].rootservers.net), initiate a sequence of queries for the IP address for the college Web server by using dig. Show the list of the names of DNS servers in the delegation chain in answering your query. b. Repeat part a) for several popular Web sites, such as google.com, yahoo.com, or amazon.com.c) List down important dig commands and their application. Prepare a report explaining your answers with appropriate screenshot
GINNI SINGH	1JS19CS056	
DEEPAK NAIDU	1JS19CS049	
AAYUSHI SINGH	1JS19CS001	
AMULYA K	1JS19CS022	Develop a program in C/C++/Java/Python to implement SHA-1 algorithm for message Authentication. Prepare a report explaining the importance of digital signature and digital certificate in network security along with code and output for the above authentication method.
DISHA RAMESH	1JS19CS052	
HARIKA A	1JS19CS063	
HAMSASHREE SRINIVAS	1JS19CS060	
ABHAY TM	1JS19CS003	Develop a web server that handles one HTTP request at a time. Your web server will accept and parse an HTTP request message, get the requested file from the server's file system (you must create this file as well), create an HTTP response message consisting of the requested file preceded by appropriate message header lines, and send the response directly to the client. If the requested file is not present in the server, your server will send an HTTP "404 Not Found" message back to the client
ADITHYA S	1JS19CS010	
ASHUTOSH WODEYAR	1JS19CS036	
GIRISH KUMAR DV	1JS19CS057	
AISHWARYA KS	1JS19CS012	Use NS2 Simulator to simulate a network consisting of 7 nodes, numbered from 1 to 7, forming a ring topology. The links have a 512Kbps bandwidth with 5ms delay. Set the routing protocol to DV (Distance vector). Send UDP packets from node 1 to node 4 with the rate of 100 packets/sec (using default packet size). Start transmission at 0.01. Bring down the link between node 2 and node 3 at 0.4. Finish the transmission at 1.000. Then run nam to view the results. Answer the following: a. What path does the packets follow initially? and why? b. What path does the packets take after the link fails? and why?
ARJUN BR	1JS19CS033	
BHOOMIKA P	1JS19CS042	
HARI CHANDANA P	1JS19CS062	
AKSHAY PRAKASH	1JS19CS019	a) visit a web site that is password-protected and examine the sequence of HTTP message exchanged for such a site. The URL http://gaia.cs.umass.edu/wireshark-labs/protected_pages/HTTP-wireshark-file5.html is password protected. The username is "wireshark-students" (without the quotes), and the password is "network" (again, without the quotes). Answer the following questions: a) What is the server's response (status code and phrase) in response . b) Use an online Tool for Website Malware Scanning and perform website checking and scans for the vulnerabilities to the initial HTTP GET message from your browser? B) When your browser's sends the HTTP GET message for the second time, what new field is included in the HTTP GET message?Prepare a report explaining your answers with appropriate screenshots
ABDULLA NIHAD	1JS19CS002	
ANUPAM ASHOK	1JS19CS029	
BHARGAV	1JS19CS041	
CHANDAN KUMAR R	1JS19CS045	a) Develop a program in Java, to implement File Transfer Protocol using TCP. b) Consider a short, 10-meter link, over which a sender can transmit at a rate of 150 bits/sec in both directions. Suppose that packets containing data are 100,000 bits long, and packets containing only control (e.g., ACK or handshaking) are 200 bits long. Assume that N parallel connections each get 1/N of the link bandwidth. Now consider the HTTP protocol, and suppose that each downloaded object is 100 Kbits long, and that the initial downloaded object contains 10 referenced objects from the same sender. Would parallel downloads via parallel instances of non-persistent HTTP make sense in this case? Now consider persistent
ATUL C ANIL	1JS19CS039	
ASHWIN R	1JS19CS037	
BADAMIKAR		

ABHIJNA B C	1JS19CS005	<p>HTTP. Do you expect significant gains over the non-persistent case? Justify and explain your answer.</p> <p>c) Now suppose that the link is shared by Bob with four other users. Bob uses parallel instances of non-persistent HTTP, and the other four users use non-persistent HTTP without parallel downloads. i. Do Bob's parallel connections help him get Web pages more quickly? Why or why not? ii. If all five users open five parallel instances of non-persistent HTTP, then would Bob's parallel connections still be beneficial? Why or why not?</p>
Mayukha A	1JS19CS021	<p>Use an online vulnerability assessment tool and prepare a report on various vulnerabilities in your system and network to which you are connected to.</p>
Ayushi B	1JS18CS029	
Aishwarya BT	1JS19CS011	
Sahana TE	1JS18CS134	
Abhijeet Kumar	1JS19CS004	<p>a. What is a whois database? b. Use various whois databases on the Internet to obtain the names of two DNS servers. Indicate which whois databases you used. c. Use nslookup on your local host to send DNS queries to three DNS servers: your local DNS server and the two DNS servers you found in part (b). Try querying for Type A, NS, and MX reports. Summarize your findings. d. Use nslookup to find a Web server that has multiple IP addresses. Does the Web server of your college have multiple IP addresses? e. Use the ARIN whois database to determine the IP address range used by your university. f. Describe how an attacker can use whois databases and the nslookup tool to perform reconnaissance on an institution before launching an attack. g. Discuss why whois databases should be publicly available. Prepare a report explaining your answers with appropriate screenshots</p>
Anand Rai	1JS19CS024	
Adarsh Narayan	1JS19CS009	
Ayush Sharma	1JS19CS040	
Aryan Rai	1JS19CS034	<p>Perform a Comparative analysis of distance vector and Link state protocols for routing using ns2 Simulator. Observe the Packet drop rate (PDR), Bandwidth / Link Utilization, End to End Delay, throughput behaviours of these two protocols</p>
Deeksha S	1JS19CS048	
Gagana Chandana M	1JS19CS055	
Girish S N	1JS19CS058	
Anaghashree Nanda	1JS19CS023	<p>Write a simple TCP program for a server that accepts lines of input from a client and prints the lines onto the server's standard output. Compile and execute your program. On any other machine that contains a Web browser, set the proxy server in the browser to the host that is running your server program; also configure the port number appropriately. Your browser should now send its GET request messages to your server, and your server should display the messages on its standard output. Use this platform to determine whether your browser generates conditional GET messages for objects that are locally cached</p>
Ananya Gopalakrishna	1JS19CS025	
Ankit Kumar Upadhyay	1JS19CS026	
Dhananjay Patel	1JS19CS050	
Ajay Singh Raju	1JS19CS015	<p>Develop a program to implement the following cipher methods to convert given plain text to cipher text: Rail Fencing Simple Columnar Transposition Vernam Cipher. Prepare a report explaining the importance of Firewalls in network security along with code and output for the above cipher methods</p>
Chiranjeevi R	1JS19CS047	
Dhanush Kumar K	1JS19CS051	
Hareesh Naik	1JS19CS061	
Divya.S	1JS20CS401	<p>Use an online vulnerability assessment tool and prepare a report on various vulnerabilities in your system and network to which you are connected to.</p>
Kavya.T.S	1JS20CS404	
Meghana.P	1JS20CS405	

Sushma S Kalasannavar	1JS19CS192	
Aishwarya MB	1JS19CS013	Develop a program to implement the following cipher methods to convert given plain text to cipher text: Playfair Cipher, Caesar Cipher and Vigenere Cipher. Prepare a report explaining the importance of cryptography in network security along with code and output for the above cipher methods.
Anshu Upadhyay	1JS19CS028	
Abhishek Chakrasali	1JS19CS006	
Kumar R	1JS18CS068	
Anushka Jha	1JS19CS030	<p>a) Perform a Traceroute between source and destination on the same continent at three different hours of the day. i. Find the average and standard deviation of the round-trip delays at each of the three hours. ii. Find the number of routers in the path at each of the three hours. Did the paths change during any of the hours? iii. Try to identify the number of ISP networks that the Traceroute packets pass through from source to destination. Routers with similar names and/or similar IP addresses should be considered as part of the same ISP. In your experiments, do the largest delays occur at the peering interfaces between adjacent ISPs? iv. Repeat the above for a source and destination on different continents. Compare the intra-continent and inter-continent results.</p> <p>b) Visit the site www.traceroute.org and perform traceroutes from two different cities in India to the same destination host in the United States. How many links are the same in the two traceroutes? Is the transatlantic link the same?</p> <p>c) Pick a city in India, and perform traceroutes to two hosts, each in a different city in China. How many links are common in the two traceroutes? Do the two traceroutes diverge before reaching China?</p> <p>d) Use an online Tool for Website Malware Scanning and perform website checking and scans for the vulnerabilities.</p> <p>Prepare a report explaining your answers with appropriate screenshots</p>
Ashutosh Mishra	1JS19CS035	
Apoorva V	1JS19CS031	
Ankit Singh	1JS19CS027	
Akash Rao M B	1JS19CS018	Develop a program to implement the following cipher methods to convert given plain text to cipher text: Hill Cipher, Polygram Substitution Cipher. Prepare a report explaining the importance of digital signature in network security along with code and output for the above cipher methods.
Abhishek S P	1JS19CS008	
Ajay Biradar	1JS19CS014	
Amit Kadekar	1JS19CS020	
H Vamshi	1JS19CS059	<p>Install Wireshark packet sniffer tool, Run and Start packet capture in Wireshark application and then open your web browser and type in an URL of website of your choice and answer the following and prepare a report with screenshots corresponding to each case:</p> <p>a) Is your browser running HTTP version 1.0 or 1.1? What version of HTTP is the server running?</p> <p>b) What languages (if any) does your browser indicate that it can accept to the server?</p> <p>c) What is the IP address of your computer? Of the gaia.cs.umass.edu server?</p> <p>d) What is the status code returned from the server to your browser?</p> <p>e) When was the HTML file that you are retrieving last modified at the server?</p> <p>f) How many bytes of content are being returned to your browser?</p> <p>g) By inspecting the raw data in the packet content window, do you see any http headers within the data that are not displayed in the packet-listing window? If so, name one.</p> <p>h) List the different protocols that appear in the protocol column in the unfiltered packet-listing window in Wireshark GUI</p> <p>i) How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received for the webpage you visited in your web browser?</p> <p>j) What is the Internet (IP) address of the URL you visited and what is the Internet address of your computer?</p> <p>k) Print the two HTTP messages displayed in Wireshark GUI after you had visited the URL through your web browser. (select Print from the Wireshark File command menu, and select "Selected Packet Only" and "Print as displayed" and then click OK).</p>
Chaithanya kumar H D	1JS19CS044	
C Mukund Reddy	1JS19CS043	
Akash H	1JS19CS017	

Gagan Karanth N	1JS19CS054	Use online cybersecurity tools - Metasploit Framework, Aircrack-ng, OSSEC to identify vulnerabilities on your system as well as the network to which you are connected to. Make a report on your findings with appropriate screenshots
Chirag HG	1JS20CS400	
Gourav Dey	1JS20CS402	
Akanksha VG	1JS19CS016	
Harshavardhan	1JS19CS064	

Demonstration and Use of various tools to analyse Network protocols and Network security.

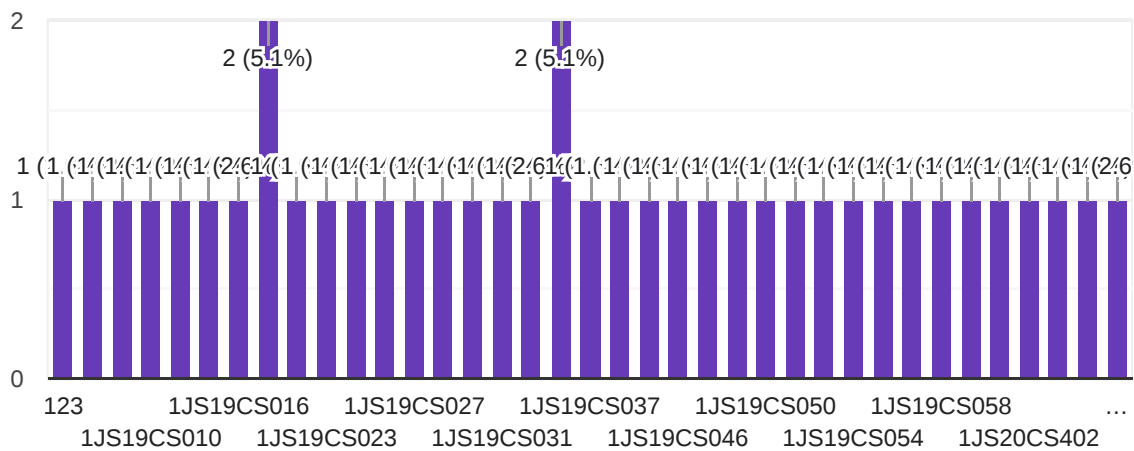
39 responses

[Publish analytics](#)

USN



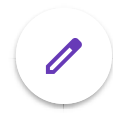
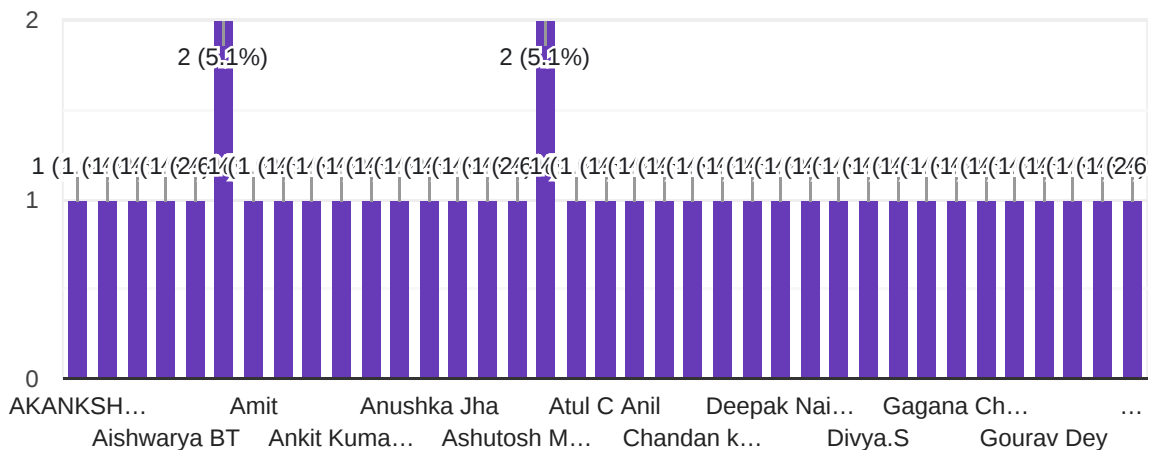
39 responses

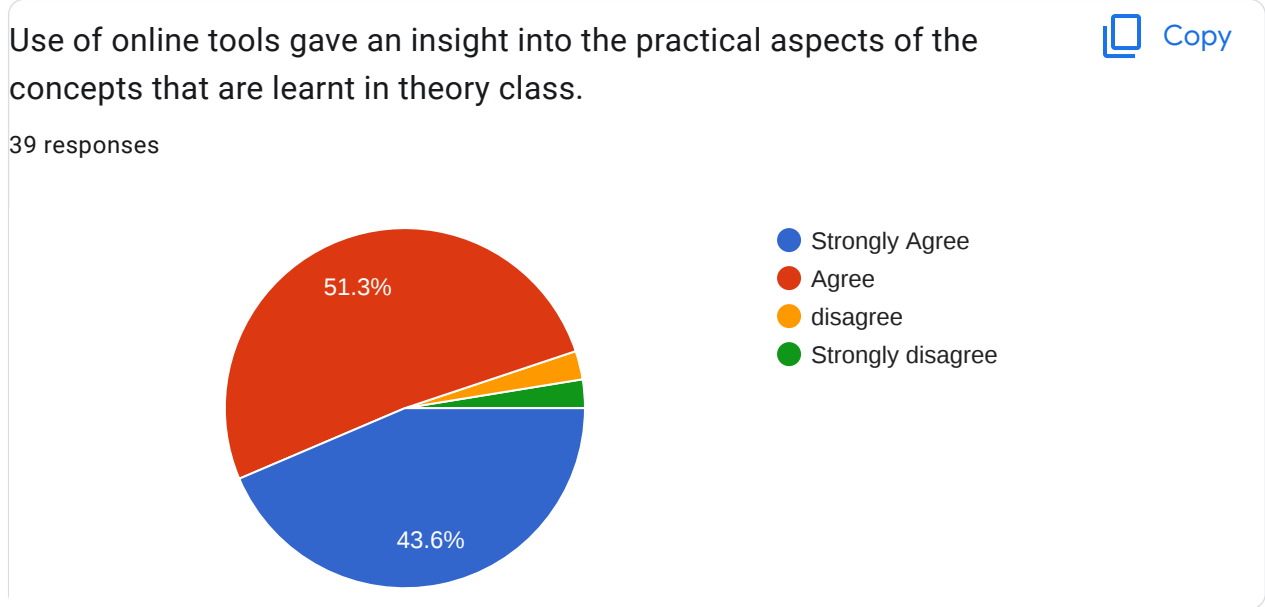
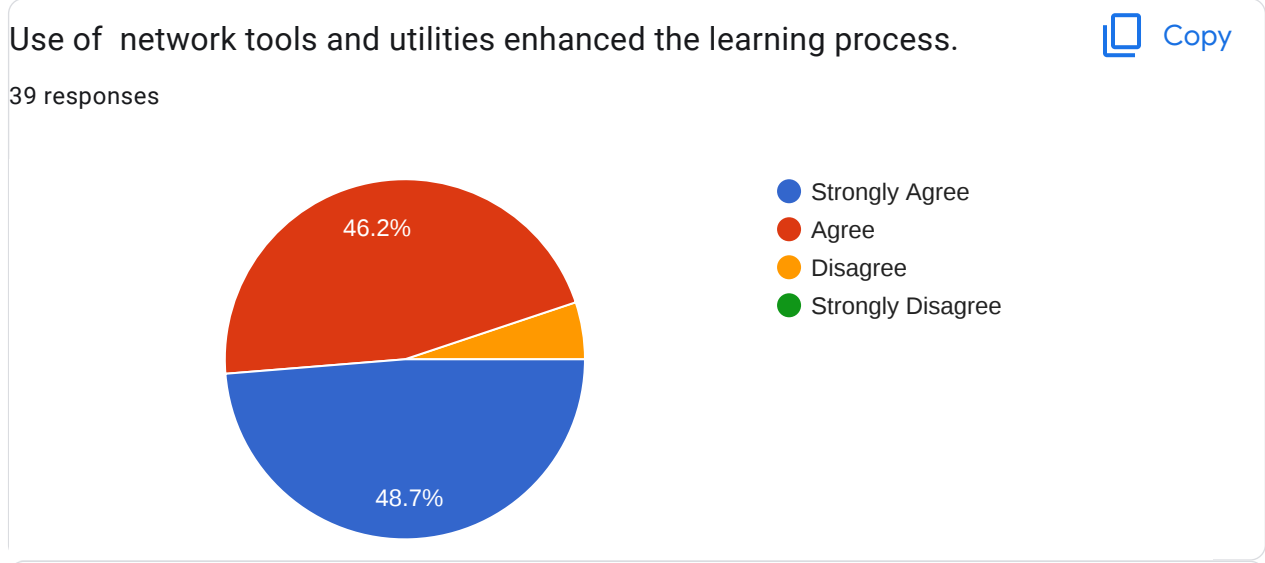
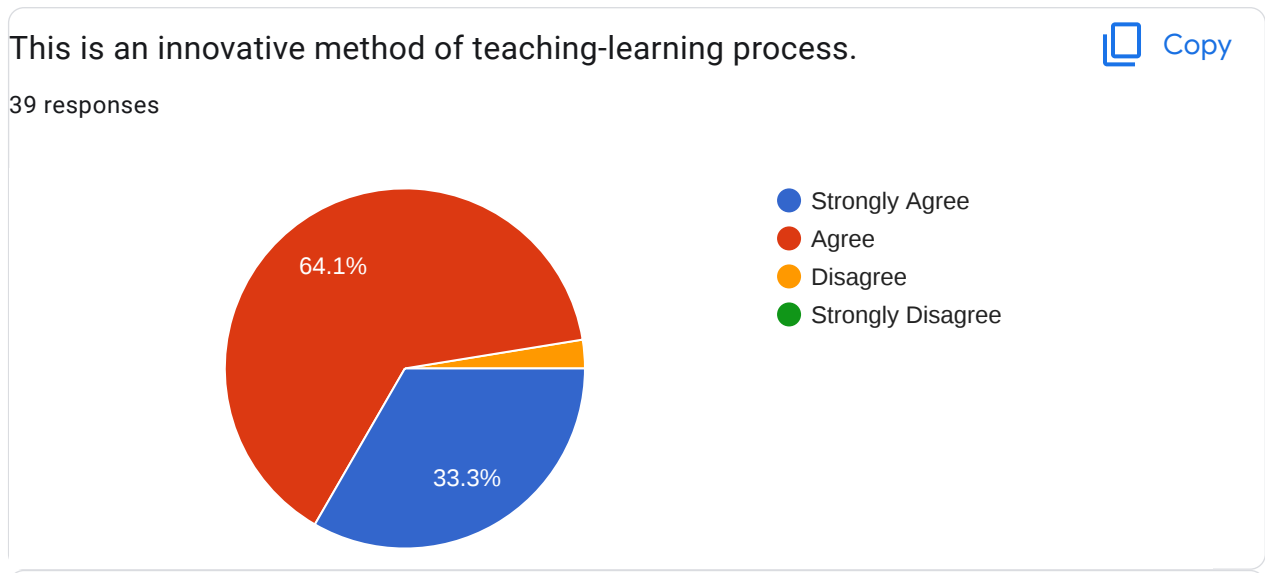


NAME



39 responses

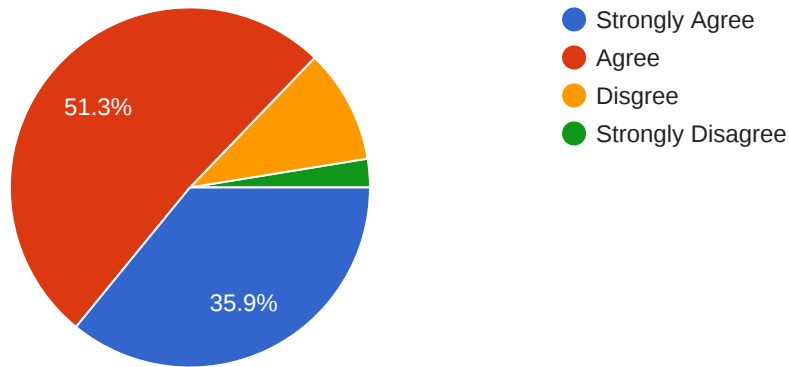




Group Activity following the demonstration of the tool in class, helped to build team work and made learning enjoyable



39 responses



Any Suggestions (to make teaching the course computer networks even more interesting)

4 responses

XYZ

Frequency of the home assignment given for practice knowledge would be more

It's being taught pretty well already :)

Its going good already, none needed

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JSS MAHAVIDYAPEETHA

JSS ACADEMY OF TECHNICAL EDUCATION

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MECHANICAL ENGG

**DEPARTMENT OF COMPUTER SCIENCE AND
ENGINEERING**

Course Name: Computer Networks And Security

Course code: 18CS52

Section: CSE A

Group Activity

Under the guidance of

Shanthala K V

Associate Professor

Department of Computer Science and Engineering

JSS Academy of Technical Education,

Bangalore-60

Submitted by,

Abhishek S P (1JS19CS008)

Ajay (1JS19CS014)

Akash Rao M B (1JS19CS018)

Amit (1JS19CS020)

Seen

10
10
10
10

HILL CIPHER:

Hill cipher is a polygraphic substitution cipher based on linear algebra. Each letter is represented by a number modulo 26. Often the simple scheme A = 0, B = 1, ..., Z = 25 is used, but this is not an essential feature of the cipher. To encrypt a message, each block of n letters (considered as an n-component vector) is multiplied by an invertible $n \times n$ matrix, against modulus 26. To decrypt the message, each block is multiplied by the inverse of the matrix used for encryption. The matrix used for encryption is the cipher key, and it should be chosen randomly from the set of invertible $n \times n$ matrices (modulo 26).

Examples:

Input : Plaintext: ACT

Key: GYBNQKURP

Output : Ciphertext: POH

Encryption

We have to encrypt the message 'ACT' (n=3). The key is 'GYBNQKURP' which can be written as the nxn matrix:

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix}$$

The message 'ACT' is written as vector:

$$\begin{bmatrix} 0 \\ 2 \\ 19 \end{bmatrix}$$

The enciphered vector is given as:

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix} \begin{bmatrix} 0 \\ 2 \\ 19 \end{bmatrix} = \begin{bmatrix} 67 \\ 222 \\ 319 \end{bmatrix} \equiv \begin{bmatrix} 15 \\ 14 \\ 7 \end{bmatrix} \pmod{26}$$

which corresponds to ciphertext of 'POH'.

HILL CIPHER CODE:

```
// Java code to implement Hill Cipher
```

```
class HillCipher
```

```
{
```

```
// Following function generates the
```

```
// key matrix for the key string
```

```
static void getKeyMatrix(String key, int keyMatrix[][])
```

```
{
```

```
    int k = 0;
```

```
    for (int i = 0; i < 3; i++)
```

```
    {
```

```
        for (int j = 0; j < 3; j++)
```

```
        {
```

```
            keyMatrix[i][j] = (key.charAt(k)) % 65;
```

```
            k++;
```

```
        }
```

```
    }
```

```
}
```

```
// Following function encrypts the message
```

```
static void encrypt(int cipherMatrix[][],
```

```
                    int keyMatrix[][],
```

```
                    int messageVector[][])
```

```
{
```

```
    int x, i, j;
```

```
    for (i = 0; i < 3; i++)
```

```
    {
```

```
        for (j = 0; j < 1; j++)
```

```
        {
```

```
            cipherMatrix[i][j] = 0;
```

```
            for (x = 0; x < 3; x++)
```

```
            {
```

```
                cipherMatrix[i][j] +=
```

```
                    keyMatrix[i][x] * messageVector[x][j];
```

```
            }
```

```
            cipherMatrix[i][j] = cipherMatrix[i][j] % 26;
```

```
        }
```

```
    }
```

```
}
```

```
// Function to implement Hill Cipher
```

```
static void HillCipher(String message, String key)
```

```
{
```

```
    // Get key matrix from the key string
```

```

int [][]keyMatrix = new int[3][3];
getKeyMatrix(key, keyMatrix);

int [][]messageVector = new int[3][1];

// Generate vector for the message
for (int i = 0; i < 3; i++)
    messageVector[i][0] = (message.charAt(i)) % 65;

int [][]cipherMatrix = new int[3][1];

// Following function generates
// the encrypted vector
encrypt(cipherMatrix, keyMatrix, messageVector);

String CipherText="";

// Generate the encrypted text from
// the encrypted vector
for (int i = 0; i < 3; i++)
    CipherText += (char)(cipherMatrix[i][0] + 65);

// Finally print the ciphertext
System.out.print(" Ciphertext:" + CipherText);
}

// Driver code
public static void main(String[] args)
{

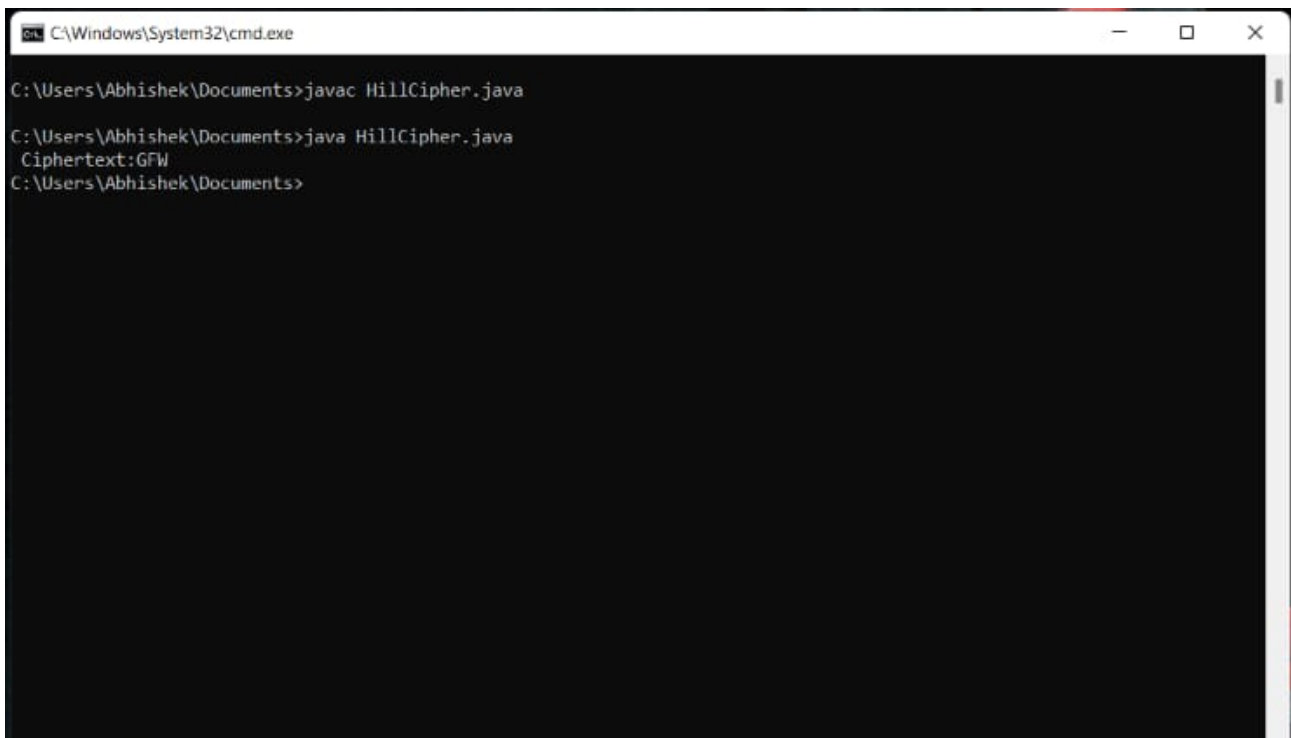
```

```
// Get the message to be encrypted
String message = "HEY";

// Get the key
String key = "GYBNQKURP";

HillCipher(message, key);
}
}
```

OUTPUT:



```
C:\Windows\System32\cmd.exe
C:\Users\Abhishek\Documents>javac HillCipher.java
C:\Users\Abhishek\Documents>java HillCipher.java
Ciphertext:GFW
C:\Users\Abhishek\Documents>
```

SUBSTITUTION CIPHER:

Substitution Cipher Hiding some data is known as encryption. When plain text is encrypted it becomes unreadable and is known as ciphertext. In a Substitution cipher, any character of plain text from the given fixed set of characters is substituted by some other character from the same set depending on a key. For example with a shift of 1, A would be replaced by B, B would become C, and so on. Mathematical representation The encryption can be represented using modular arithmetic by first transforming the letters into numbers, according to the scheme, A = 0, B = 1, ..., Z = 25. Encryption of a letter by a shift n can be described mathematically as.

$$E_n(x) = (x + n) \bmod 26$$

SUBSTITUTION CIPHER CODE:

```
import string
# A list containing all characters
all_letters= string.ascii_letters

"""
create a dictionary to store the substitution
for the given alphabet in the plain text
based on the key
"""
```

```
dict1 = {}
key = 4

for i in range(len(all_letters)):
    dict1[all_letters[i]] = all_letters[(i+key)%len(all_letters)]

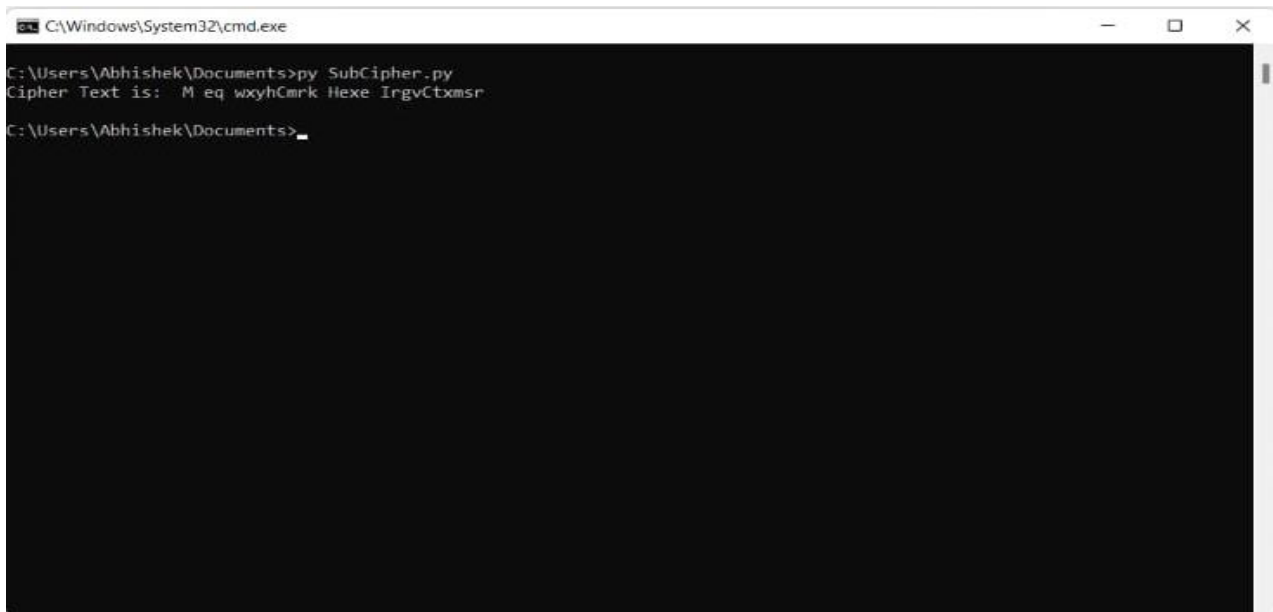
plain_txt= "I am studying Data Encryption"
cipher_txt=[]

# loop to generate ciphertext

for char in plain_txt:
    if char in all_letters:
        temp = dict1[char]
        cipher_txt.append(temp)
    else:
        temp =char
        cipher_txt.append(temp)

cipher_txt= "".join(cipher_txt)
print("Cipher Text is: ",cipher_txt)
```

OUTPUT:



```
C:\Windows\System32\cmd.exe
C:\Users\Abhishek\Documents>py SubCipher.py
Cipher Text is: M eq wxyhCmrk Hexe IngvCtXmsr
C:\Users\Abhishek\Documents>_
```

DIGITAL SIGNATURE:

A digital signature is a mathematical technique used to validate the authenticity and integrity of a message, software or digital document. It's the digital equivalent of a handwritten signature or stamped seal, but it offers far more inherent security. A digital signature is intended to solve the problem of tampering and impersonation in digital communications.

Digital signatures can provide evidence of origin, identity and status of electronic documents, transactions or digital messages. Signers can also use them to acknowledge informed consent.

In many countries, including the United States, digital signatures are considered legally binding in the same way as traditional handwritten document signatures.

How do digital signatures work?

Digital signatures are based on public key cryptography, also known as asymmetric cryptography. Using a public key algorithm, such as RSA (Rivest-Shamir-Adleman), two keys are generated, creating a mathematically linked pair of keys, one private and one public.

Digital signatures work through public key cryptography's two mutually authenticating cryptographic keys. The individual who creates the digital signature uses a private key to encrypt signature-related data, while the only way to decrypt that data is with the signer's public key.

If the recipient can't open the document with the signer's public key, that's a sign there's a problem with the document or the signature. This is how digital signatures are authenticated.

Digital signature technology requires all parties trust that the individual creating the signature has kept the private key secret. If someone else has access to the private signing key, that party could create fraudulent digital signatures in the name of the private key holder.

What are the benefits of digital signatures?

Security is the main benefit of digital signatures. Security capabilities embedded in digital signatures ensure a document is not altered and signatures are legitimate. Security features and methods used in digital signatures include the following:

- **Personal identification numbers (PINs), passwords and codes.** Used to authenticate and verify a signer's identity and approve

their signature. Email, username and password are the most common methods used.

- **Asymmetric cryptography.** Employs a public key algorithm that includes private and public key encryption and authentication.
- **Checksum.** A long string of letters and numbers that represents the sum of the correct digits in a piece of digital data, against which comparisons can be made to detect errors or changes. A checksum acts as a data fingerprint.
- **Cyclic redundancy check (CRC).** An error-detecting code and verification feature used in digital networks and storage devices to detect changes to raw data.
- **Certificate authority (CA) validation.** CAs issue digital signatures and act as trusted third parties by accepting, authenticating, issuing and maintaining digital certificates. The use of CAs helps avoid the creation of fake digital certificates.
- **Trust service provider (TSP) validation.** A TSP is a person or legal entity that performs validation of a digital signature on a company's behalf and offers signature validation reports.

Other benefits to using digital signatures include the following:

- **Timestamping.** By providing the data and time of a digital signature, timestamping is useful when timing is critical, such as for stock trades, lottery ticket issuance and legal proceedings.
- **Globally accepted and legally compliant.** The public key infrastructure (PKI) standard ensures vendor-generated keys are made

and stored securely. Because of the international standard, a growing number of countries are accepting digital signatures as legally binding.

- **Time savings.** Digital signatures simplify the time-consuming processes of physical document signing, storage and exchange, enabling businesses to quickly access and sign documents.
- **Cost savings.** Organizations can go paperless and save money previously spent on the physical resources and on the time, personnel and office space used to manage and transport them.
- **Positive environmental impact.** Reducing paper use also cuts down on the physical waste generated by paper and the negative environmental impact of transporting paper documents.
- **Traceability.** Digital signatures create an audit trail that makes internal record-keeping easier for business. With everything recorded and stored digitally, there are fewer opportunities for a manual signee or record-keeper to make a mistake or misplace something.

How do you create a digital signature?

To create a digital signature, signing software, such as an email program, is used to provide a one-way hash of the electronic data to be signed.

A hash is a fixed-length string of letters and numbers generated by an algorithm. The digital signature creator's private key is then used to encrypt the hash. The encrypted hash -- along with other information, such as the hashing algorithm -- is the digital signature.

The reason for encrypting the hash instead of the entire message or document is a hash function can convert an arbitrary input into a fixed-length value, which is usually much shorter. This saves time as hashing is much faster than signing.

The value of a hash is unique to the hashed data. Any change in the data, even a change in a single character, will result in a different value. This attribute enables others to use the signer's public key to decrypt the hash to validate the integrity of the data.

If the decrypted hash matches a second computed hash of the same data, it proves that the data hasn't changed since it was signed. If the two hashes don't match, the data has either been tampered with in some way and is compromised or the signature was created with a private key that doesn't correspond to the public key presented by the signer -- an issue with authentication.

A person creates a digital signature using a private key to encrypt the signature. At the same time, hash data is created and encrypted. The recipient uses the signer's public key to decrypt the signature.

A digital signature can be used with any kind of message, whether it is encrypted or not, simply so the receiver can be sure of the sender's identity and the message arrived intact. Digital signatures make it difficult for the signer to deny having signed something as the digital signature is unique to both the document and the signer and it binds them together. This property is called *nonrepudiation*.

Digital signatures are not to be confused with digital certificates. A digital certificate is an electronic document that contains the digital signature of the issuing CA. It binds together a public key with an identity and can be used to verify that a public key belongs to a particular person or entity.

Most modern email programs support the use of digital signatures and digital certificates, making it easy to sign any outgoing emails and validate digitally signed incoming messages. Digital signatures are also used extensively to provide proof of authenticity, data integrity and nonrepudiation of communications and transactions conducted over the internet.

Classes and types of digital signatures

There are three different classes of digital signature certificates (DSCs):

- **Class 1.** Cannot be used for legal business documents as they are validated based only on an email ID and username. Class 1 signatures provide a basic level of security and are used in environments with a low risk of data compromise.
- **Class 2.** Often used for electronic filing (e-filing) of tax documents, including income tax returns and goods and services tax (GST) returns. Class 2 digital signatures authenticate a signer's identity against a pre-verified database. Class 2 digital signatures are used in environments where the risks and consequences of data compromise are moderate.
- **Class 3.** The highest level of digital signatures, Class 3 signatures require a person or organization to present in front of a certifying authority to prove their identity before signing. Class 3 digital signatures are used for e-auctions, e-tendering, e-ticketing, court filings and in other environments where threats to data or the consequences of a security failure are high.

-

Uses for digital signatures

Industries use digital signature technology to streamline processes and improve document integrity. Industries that use digital signatures include the following:

- **Government.** The U.S. Government Publishing Office (GPO) publishes electronic versions of budgets, public and private laws, and congressional bills with digital signatures. Digital signatures are used by governments worldwide for a variety of reasons, including processing tax returns, verifying business-to-government (B2G) transactions, ratifying laws and managing contracts. Most government entities must adhere to strict laws, regulations and standards when using digital signatures. Many governments and corporations also use smart cards to ID their citizens and employees. These are physical cards endowed with a digital signature that can be used to give the cardholder access to an institution's systems or physical buildings.
- **Healthcare.** Digital signatures are used in the healthcare industry to improve the efficiency of treatment and administrative processes, to strengthen data security, for e-prescribing and hospital admissions. The use of digital signatures in healthcare must comply with the Health Insurance Portability and Accountability Act (HIPAA) of 1996.
- **Manufacturing.** Manufacturing companies use digital signatures to speed up processes, including product design, quality assurance (QA), manufacturing enhancements, marketing and sales. The use of digital signatures in manufacturing is governed by the International Organization for Standardization (ISO) and the National Institute of Standards and Technology (NIST) Digital Manufacturing Certificate (DMC).

- **Financial services.** The U.S. financial sector uses digital signatures for contracts, paperless banking, loan processing, insurance documentation, mortgages and more. This heavily regulated sector uses digital signatures with careful attention to the regulations and guidance put forth by the Electronic Signatures in Global and National Commerce Act (E-Sign Act), state Uniform Electronic Transactions Act (UETA) regulations, the Consumer Financial Protection Bureau (CFPB) and the Federal Financial Institutions Examination Council (FFIEC).
- **Cryptocurrencies.** Digital signatures are also used in bitcoin and other cryptocurrencies to authenticate the blockchain. They are also used to manage transaction data associated with cryptocurrency and as a way for users to show ownership of currency or their participation in a transaction.

Importance of Digital Signature

Out of all cryptographic primitives, primitives, the digital signature using public key cryptography is considered as very important and useful tool to achieve information security.

Apart from ability to provide non-repudiation of message, message, the digital signature also provides message authentication and data integrity. Let us briefly see how this is achieved by the digital signature –

- Message authentication – When the verifier validates the digital signature using public key of a sender, he is assured that signature has been created only by sender who possess the corresponding secret private key and no one else.

- Data Integrity – In case an attacker has access to the data and modifies it, the digital signature verification at receiver end fails. The hash of modified data and the output provided by the verification algorithm will not match. Hence, receiver can safely deny the message assuming that data integrity has been breached.
- Non-repudiation – Since it is assumed that only the signer has the knowledge of the signature key, he can only create unique signature on a given data. Thus the receiver can present data and the digital signature to a third party as evidence if any dispute arises in the future.

By adding public-key encryption to digital signature scheme, we can create a cryptosystem that can provide the four essential elements of security namely – Privacy, Authentication, Integrity, and Non-repudiation.

JSS ACADEMY OF TECHNICAL EDUCATION, BENGALURU



DEPARTMENT OF COMPUTER SCIENCE

SUBJECT: COMPUTER NETWORKING (18CS52)

Activity name

DIG COMMAND IMPLEMENTATION

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Introduction

The **dig** command in Linux is used to gather DNS information. It stands for Domain Information Groper, and it collects data about Domain Name Servers. The **dig** command is helpful for troubleshooting DNS problems, but is also used to display DNS information.

It is the most commonly used tool among system administrators for troubleshooting DNS problems because of its flexibility and ease of use. It allows you to query information about various DNS records, including host addresses, mail exchanges, and name servers.

A DNS server higher in the DNS hierarchy delegates a DNS query to a DNS server lower in the hierarchy, by sending back to the DNS client the name of that lower-level DNS server.

Installation in Linux

Most modern Linux systems include the **dig** command.

Verify that it's installed by checking the software version. To do so, open a command line and enter the following:

```
dig -v
```

The system should respond with a numeric code after running this command.

The **dig** command enables searching for a domain name. To perform a DNS lookup, we opened the terminal and typed several websites with dig, which we're going to explain below one by one.

1. **Google.com**
2. **Jssateb.ac.in**
3. **Yahoo.com**
4. **Amazon.com**

google.com

```
nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

; <<>> DiG 9.16.1-Ubuntu <<>> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A

;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$ █
```

this image shows the result of a DNS lookup done for google.com

jssateb.ac.in

```
nick@nick-VB:~$ dig @a.root-servers.net www.jssateb.ac.in +norec

; <<>> DiG 9.16.1-Ubuntu <<>> @a.root-servers.net www.jssateb.ac.in +norec
; (2 servers found)
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 57492
;; flags: qr; QUERY: 1, ANSWER: 0, AUTHORITY: 6, ADDITIONAL: 13

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 1472
;; QUESTION SECTION:
;www.jssateb.ac.in.        IN      A

;; AUTHORITY SECTION:
in.                172800  IN      NS      ns1.registry.in.
in.                172800  IN      NS      ns2.registry.in.
in.                172800  IN      NS      ns3.registry.in.
in.                172800  IN      NS      ns4.registry.in.
in.                172800  IN      NS      ns5.registry.in.
in.                172800  IN      NS      ns6.registry.in.

;; ADDITIONAL SECTION:
ns1.registry.in.   172800  IN      A      37.209.192.12
ns2.registry.in.   172800  IN      A      37.209.194.12
ns3.registry.in.   172800  IN      A      37.209.196.12
ns4.registry.in.   172800  IN      A      37.209.198.12
ns5.registry.in.   172800  IN      A      156.154.100.20
ns6.registry.in.   172800  IN      A      156.154.101.20
ns1.registry.in.   172800  IN      AAAA   2001:dcd:1::12
ns2.registry.in.   172800  IN      AAAA   2001:dcd:2::12
ns3.registry.in.   172800  IN      AAAA   2001:dcd:3::12
ns4.registry.in.   172800  IN      AAAA   2001:dcd:4::12
ns5.registry.in.   172800  IN      AAAA   2001:502:2eda::20
ns6.registry.in.   172800  IN      AAAA   2001:502:ad09::20

;; Query time: 179 msec
;; SERVER: 198.41.0.4#53(198.41.0.4)
;; WHEN: Sun Jan 16 14:04:43 IST 2022
;; MSG SIZE rcvd: 427

nick@nick-VB:~$ █
```

Yahoo.com

```
nick@nick-VB:~$ dig Yahoo.com

;<<>> DiG 9.16.1-Ubuntu <<>> Yahoo.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 43802
;; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;Yahoo.com.                IN      A

;; ANSWER SECTION:
Yahoo.com.                726    IN      A      74.6.231.21
Yahoo.com.                726    IN      A      74.6.143.26
Yahoo.com.                726    IN      A      98.137.11.164
Yahoo.com.                726    IN      A      74.6.143.25
Yahoo.com.                726    IN      A      74.6.231.20
Yahoo.com.                726    IN      A      98.137.11.163

;; Query time: 28 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:05:54 IST 2022
;; MSG SIZE rcvd: 134

nick@nick-VB:~$
```

Amazon.com

```
nick@nick-VB:~$ dig amazon.com

;<<>> DiG 9.16.1-Ubuntu <<>> amazon.com
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 9295
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;amazon.com.               IN      A

;; ANSWER SECTION:
amazon.com.               18     IN      A      54.239.28.85
amazon.com.               18     IN      A      176.32.103.205
amazon.com.               18     IN      A      205.251.242.103

;; Query time: 32 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:06:45 IST 2022
;; MSG SIZE rcvd: 87

nick@nick-VB:~$
```

We're going to explain each section below -

The most important section is the **ANSWER** section:

- The first column lists the name of the server that was queried
- The second column is the **Time to Live**, a set timeframe after which the record is refreshed
- The third column shows the class of query – in this case, “IN” stands for Internet
- The fourth column displays the type of query – in this case, “A” stands for an A (address) record
- The final column displays the IP address associated with the domain name

```
nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A

;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$
```

The **first line** displays the version of the **dig** command.

```
nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A

;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$
```

The **HEADER** section shows the information it received from the server. Flags refer to the answer format.

```
nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:;, udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A

;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$
```

The **OPT PSEUDOSECTION** displays advanced data:

- EDNS – Extension system for DNS, if used
- Flags – blank because no flags were specified
- UDP – UDP packet size

```
nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
;; EDNS: version: 0, flags:;, udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A

;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$
```

The **QUESTION** section displays the query data that was sent:

- First column is the domain name queried
- Second column is the type (IN = Internet) of query
- Third column specifies the record (A = Address), unless otherwise specified

```

nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A
;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$

```

The **STATISTICS** section shows metadata about the query:

- Query time – The amount of time it took for a response
- SERVER – The IP address and port of the responding DNS server. You may notice a loopback address in this line – this refers to a local setting that translates DNS addresses
- WHEN – Timestamp when the command was run
- MSG SIZE rcvd – The size of the reply from the DNS server

```

nick@nick-VB:~$ dig -v
DiG 9.16.1-Ubuntu
nick@nick-VB:~$ dig Google.com

;<<> DiG 9.16.1-Ubuntu <<> Google.com
;; global options: +cmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 27133
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:;, udp: 65494
;; QUESTION SECTION:
;Google.com.                IN      A
;; ANSWER SECTION:
Google.com.                203     IN      A      142.250.195.110

;; Query time: 40 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Sun Jan 16 14:02:59 IST 2022
;; MSG SIZE rcvd: 55

nick@nick-VB:~$

```

Some Linux dig commands to query DNS

1. Query domain "A" record

```
# dig yahoo.com

; <<>> DiG 9.16.1-Ubuntu <<>> yahoo.com
; global options: +cmd
; Got answer:
; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 20076
; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
yahoo.com.                IN      A

;; ANSWER SECTION:
yahoo.com.                387    IN      A      98.137.11.163
yahoo.com.                387    IN      A      74.6.143.26
yahoo.com.                387    IN      A      74.6.143.25
yahoo.com.                387    IN      A      74.6.231.20
yahoo.com.                387    IN      A      74.6.231.21
yahoo.com.                387    IN      A      98.137.11.164

;; Query time: 4 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 10 12:58:13 IST 2021
;; MSG SIZE rcvd: 134
```

The above command causes dig to look up the "A" record for the domain name **yahoo.com**. Dig command reads the **/etc/resolv.conf** file and querying the **DNS** servers listed there. The response from the **DNS** server is what dig displays. Let us understand the output of the commands:

- Lines beginning with ";" are comments not part of the information.
- The first line tells us the version of the dig (**9.16.1**) command.
- Next, dig shows the header of the response it received from the **DNS** server.
- Next comes the question section, which simply tells us the query, which in this case is a query for the "A" record of **yahoo.com**. The "IN" means this is an Internet lookup (in the Internet class).
- The answer section tells us that **yahoo.com** has the IP address **98.137.11.163**.

- Lastly, there are some stats about the query. You can turn off these stats using the “+nostats” option.

2. Query domain “A” record with +short

By default, **dig** is quite verbose. One way to cut down the output is to use the **+short** option. which will drastically cut the output as shown below.

```
# dig yahoo.com +short
```

```
98.137.11.164
74.6.231.21
74.6.231.20
74.6.143.25
74.6.143.26
98.137.11.163
```

3. Querying MX record for domain

Querying different types of DNS resource records only.

```
# dig yahoo.com MX
```

```
; <<>> DiG 9.16.1-Ubuntu <<>> yahoo.com MX
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 60630
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags:; udp: 65494
;; QUESTION SECTION:
;yahoo.com.                IN      MX

;; ANSWER SECTION:
yahoo.com.                 51      IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.                 51      IN      MX      1 mta5.am0.yahoodns.net.
yahoo.com.                 51      IN      MX      1 mta7.am0.yahoodns.net.

;; Query time: 4 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 10 13:03:32 IST 2021
;; MSG SIZE rcvd: 117
```


4. Querying SOA Record for Domain

```
# dig yahoo.com SOA

; <<>> DiG 9.16.1-Ubuntu <<>> yahoo.com SOA
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 25140
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags; udp: 65494
;; QUESTION SECTION:
yahoo.com.                IN      SOA

;; ANSWER SECTION:
yahoo.com.                1800   IN      SOA      ns1.yahoo.com. hostmaster.yahoo-inc.com.
2021121001 3600 300 1814400 600

;; Query time: 128 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 10 13:04:08 IST 2021
;; MSG SIZE rcvd: 99
```

5. Querying TTL Record for Domain

```
# dig yahoo.com TTL

; <<>> DiG 9.16.1-Ubuntu <<>> yahoo.com TTL
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 64017
;; flags: qr rd ra; QUERY: 1, ANSWER: 6, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags; udp: 65494
;; QUESTION SECTION:
yahoo.com.                IN      A

;; ANSWER SECTION:
yahoo.com.                1606   IN      A        74.6.143.25
yahoo.com.                1606   IN      A        74.6.231.21
yahoo.com.                1606   IN      A        74.6.143.26
yahoo.com.                1606   IN      A        98.137.11.164
yahoo.com.                1606   IN      A        98.137.11.163
yahoo.com.                1606   IN      A        74.6.231.20

;; Query time: 4 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 10 13:04:58 IST 2021
;; MSG SIZE rcvd: 134

;; Got answer:
;; ->HEADER<- opcode: QUERY, status: SERVFAIL, id: 27889
;; flags: qr rd ra; QUERY: 1, ANSWER: 0, AUTHORITY: 0, ADDITIONAL: 1

;; OPT PSEUDOSECTION:
; EDNS: version: 0, flags; udp: 65494
;; QUESTION SECTION:
;TTL.                    IN      A

;; Query time: 0 msec
;; SERVER: 127.0.0.53#53(127.0.0.53)
;; WHEN: Fri Dec 10 13:04:58 IST 2021
;; MSG SIZE rcvd: 32
```

6. Querying Only Answer Section

```
# dig yahoo.com +nocomments +noquestion +noauthority +noadditional +nostats

; <<>> DiG 9.16.1-Ubuntu <<>> yahoo.com +nocomments +noquestion +noauthority +noadditional +nostats
;; global options: +cmd
yahoo.com.      1556      IN        A         74.6.231.20
yahoo.com.      1556      IN        A         98.137.11.163
yahoo.com.      1556      IN        A         98.137.11.164
yahoo.com.      1556      IN        A         74.6.143.26
yahoo.com.      1556      IN        A         74.6.231.21
yahoo.com.      1556      IN        A         74.6.143.25
```

7. Querying ALL DNS Records Types

```
# dig yahoo.com ANY +noall +answer

; <<>> DiG 9.8.2rc1-RedHat-9.8.2-0.10.rc1.el6 <<>> yahoo.com ANY +noall +answer
;; global options: +cmd
yahoo.com.      3509      IN        A         72.30.38.140
yahoo.com.      3509      IN        A         98.138.253.109
yahoo.com.      3509      IN        A         98.139.183.24
yahoo.com.      1709      IN        MX        1 mta5.am0.yahoodns.net.
yahoo.com.      1709      IN        MX        1 mta6.am0.yahoodns.net.
yahoo.com.      1709      IN        MX        1 mta7.am0.yahoodns.net.
yahoo.com.      43109     IN        NS        ns2.yahoo.com.
yahoo.com.      43109     IN        NS        ns8.yahoo.com.
yahoo.com.      43109     IN        NS        ns3.yahoo.com.
yahoo.com.      43109     IN        NS        ns1.yahoo.com.
yahoo.com.      43109     IN        NS        ns4.yahoo.com.
yahoo.com.      43109     IN        NS        ns5.yahoo.com.
yahoo.com.      43109     IN        NS        ns6.yahoo.com.
```

8. DNS Reverse Look-up

Querying **DNS Reverse Look-up**. Only display answer section with using **+short**.

```
# dig -x 72.30.38.140 +short

ir1.fp.vip.sp2.yahoo.com.
```

9. Querying Multiple DNS Records

Query multiple website's DNS specific query viz. **MX**, **NS**, etc. records.

```
# dig yahoo.com mx +noall +answer redhat.com ns +noall +answer

; <<>> DiG 9.8.2rc1-RedHat-9.8.2-0.10.rc1.el6 <<>> yahoo.com mx +noall +answer redhat.co
;; global options: +cmd
yahoo.com.          1740    IN      MX      1 mta6.am0.yahoodns.net.
yahoo.com.          1740    IN      MX      1 mta7.am0.yahoodns.net.
yahoo.com.          1740    IN      MX      1 mta5.am0.yahoodns.net.
redhat.com.         132     IN      NS      ns1.redhat.com.
redhat.com.         132     IN      NS      ns4.redhat.com.
redhat.com.         132     IN      NS      ns3.redhat.com.
redhat.com.         132     IN      NS      ns2.redhat.com.
```

10. Create .digrc file

Create **.digrc** file under **\$HOME/.digrc** to store default dig options.

```
# dig yahoo.com
yahoo.com.          3427    IN      A       72.30.38.140
yahoo.com.          3427    IN      A       98.138.253.109
yahoo.com.          3427    IN      A       98.139.183.24
```



DEPARTMENT OF COMPUTER SCIENCE
Computer Networks and Security (18CS52)

Collaborative Learning Assignment
CNS Assignment 2

Submitted by

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Problem:

1. Perform a Traceroute between source and destination on the same continent at three different hours of the day.
 - i. Find the average and standard deviation of the round-trip delays at each of the three hours.
 - ii. Find the number of routers in the path at each of the three hours. Did the paths change during any of the hours?
 - iii. Try to identify the number of ISP networks that the Traceroute packets pass through from source to destination. Routers with similar names and/or similar IP addresses should be considered as part of the same ISP. In your experiments, do the largest delays occur at the peering interfaces between adjacent ISPs?
 - iv. Repeat the above for a source and destination on different continents. Compare the intra-continent and inter-continent results.
2. Visit the site www.traceroute.org and perform traceroutes from two different cities in India to the same destination host in the United States. How many links are the same in the two traceroutes? Is the transatlantic link the same?
3. Pick a city in India, and perform traceroutes to two hosts, each in a different city in China. How many links are common in the two traceroutes? Do the two traceroutes diverge before reaching China?
4. Use an online Tool for Website Malware Scanning and perform website checking and scans for the vulnerabilities.

Prepare a report explaining your answers with appropriate screenshots

WHAT IS TRACEROUTE?

Traceroute is a network diagnostic tool used to track in real-time the pathway taken by a packet on an IP network from source to destination, reporting the IP addresses of all the routers it pinged in between.

Traceroute also records the time taken for each hop the packet makes during its route to the destination.

Traceroute most commonly uses Internet Control Message Protocol (ICMP) echo packets with variable time to live (TTL) values. The response time of each hop is calculated. To guarantee accuracy, each hop is queried multiple times (usually three times) to better measure the response of that particular hop. Traceroute uses ICMP messages and TTL fields in the IP address header to function. Traceroute tools are typically included as a utility by operating systems such as Windows and Unix. Traceroute utilities based on TCP are also available.

WHAT IS IT USED FOR?

An Internet Protocol (IP) tracer is helpful for figuring out the routing hops data has to go through, as well as response delays as it travels across nodes, which are what send the data toward its destination. Traceroute also enables you to locate where the data was unable to be sent along, known as points of failure. You can also perform a visual traceroute to get a visual representation of each hop.

TO RUN A TRACEROUTE CODE:

To run traceroute on a Mac or Linux system, do the following:

- Step 1: Open up an instance of Terminal.
- Step 2: Type in the phrase “traceroute [hostname]” and press enter.

On a Windows system, you can:

- Step 1: Go to the Start menu.
- Step 2: Select Run.
- Step 3: Type in “cmd” and then hit “OK.” This initiates a command prompt.
- Step 4: Type in “tracert [hostname]” and press enter.

READING A TRACEROUTE REPORT:

Hops and Round-Trip Times (RTT)

The traceroute report lists data pertaining to every router the packets pass through as they head to their destination. The hops get numbered on the left side of the report window. Each line in the report has the domain name—if that was included—as well as the IP address belonging to the router.

There are also three measurements of time, displayed in milliseconds. These tell you the length of time to send the ICMP packets from your computer to that router and back

Typical Hop Sequence

A “hop” refers to the move data makes as it goes from one router to the next. The first hop within the report provides information about the first router, which would be on your local-area network (LAN). The hops that come after provide data about routers controlled by your internet service provider (ISP).

When the ICMP packets get beyond the ISP’s domain, they go to the general internet, and you will likely see that the hop times increase, typically due to geographical distance.

Asterisk

Sometimes, a traceroute has a hard time accessing a device or is unreachable. In these situations, it may show a message saying, “Request timed out,” along with an asterisk. This indicates that the router it reached was configured to deprioritize or automatically reject ICMP packets, which is done because ICMP is not categorized as essential traffic by many routers.

Reasons for several timeouts in a row:

1. The packets arrived at a router with a firewall that prevents traceroute online requests.
2. The packets arrived at the subsequent router, but they were not able to return to the computer that sent them.
3. The router has a connection problem.

1. Perform a Traceroute between source and destination on the same continent at three different hours of the day.

The average RTT to each hop along the path to a destination is specified by each of these rows, then by the averaging the three times on each line displayed (traceroute) sends three packets by default and gives you the RTT for each), will give the average RTT for each hop.

Intercontinental Tracing between the source IP (Bengaluru) and the google.co.nz(new Zealand) TEST-1

```
apoorvav -- -zsh -- 80x24
Last login: Sun Jan 23 07:06:06 on ttys000
[apoorvav@Apoorvas-MacBook-Air ~ % traceroute google.co.jp
traceroute to google.co.jp (142.250.77.131), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 3.761 ms 4.954 ms 3.125 ms
 2 117.213.160.1 (117.213.160.1) 5.081 ms 4.413 ms 4.400 ms
 3 218.248.160.193 (218.248.160.193) 5.756 ms 11.046 ms 4.582 ms
 4 218.248.160.202 (218.248.160.202) 4.641 ms 5.425 ms 4.652 ms
 5 218.248.255.20 (218.248.255.20) 24.311 ms 32.945 ms 24.842 ms
 6 * * *
 7 72.14.197.4 (72.14.197.4) 32.886 ms 31.381 ms 30.631 ms
 8 108.170.248.195 (108.170.248.195) 36.275 ms
   108.170.248.211 (108.170.248.211) 31.929 ms
   108.170.248.163 (108.170.248.163) 37.821 ms
 9 108.170.232.243 (108.170.232.243) 28.899 ms
   142.250.212.7 (142.250.212.7) 58.059 ms
   66.249.94.39 (66.249.94.39) 80.872 ms
10 74.125.242.129 (74.125.242.129) 33.873 ms
   74.125.242.145 (74.125.242.145) 30.950 ms 34.851 ms
11 142.251.55.205 (142.251.55.205) 30.872 ms 32.108 ms
   142.251.55.207 (142.251.55.207) 49.401 ms
12 maa05s16-in-f3.1e100.net (142.250.77.131) 41.850 ms 36.083 ms 33.636 ms
[apoorvav@Apoorvas-MacBook-Air ~ % ]
```

Average RTT for test 1 = 31.195ms

Intracontinental Tracing between the source IP(bengaluru) and the google.co.jp(Japan) TEST-1

```
apoorvav -- -zsh -- 80x24
142.251.55.89 (142.251.55.89) 34.079 ms
108.170.253.97 (108.170.253.97) 52.108 ms
12 maa03s41-in-f3.1e100.net (142.250.195.163) 33.294 ms
   142.251.55.91 (142.251.55.91) 29.493 ms
   maa03s41-in-f3.1e100.net (142.250.195.163) 43.257 ms
[apoorvav@Apoorvas-MacBook-Air ~ % traceroute google.co.nz
traceroute to google.co.nz (142.250.77.131), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 4.689 ms 3.043 ms 3.204 ms
 2 61.1.158.1 (61.1.158.1) 10.822 ms 7.865 ms 7.679 ms
 3 218.248.160.193 (218.248.160.193) 7.625 ms 7.521 ms 8.534 ms
 4 218.248.160.210 (218.248.160.210) 8.027 ms 8.537 ms 8.280 ms
 5 * 218.248.255.20 (218.248.255.20) 36.880 ms 38.354 ms
 6 * * *
 7 72.14.197.4 (72.14.197.4) 38.511 ms 38.836 ms 38.755 ms
 8 108.170.248.203 (108.170.248.203) 38.811 ms
   108.170.248.170 (108.170.248.170) 47.862 ms
   108.170.248.195 (108.170.248.195) 44.902 ms
 9 66.249.94.39 (66.249.94.39) 52.791 ms
   209.85.251.15 (209.85.251.15) 86.327 ms 78.632 ms
10 74.125.242.129 (74.125.242.129) 71.667 ms
   74.125.242.145 (74.125.242.145) 73.159 ms 46.674 ms
11 142.251.55.207 (142.251.55.207) 74.253 ms 54.718 ms 67.195 ms
12 maa05s16-in-f3.1e100.net (142.250.77.131) 34.121 ms 35.081 ms 32.454 ms
[apoorvav@Apoorvas-MacBook-Air ~ % ]
```

Average RTT for test 1 = 38.172ms

Intercontinental Tracing between the source IP(bengaluru) and the google.co.nz(new zealand) TEST-2

```
apoorvav — -zsh — 80x24
traceroute to google.co.nz (142.250.196.35), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 7.023 ms 12.427 ms 3.332 ms
 2 117.213.160.1 (117.213.160.1) 7.273 ms 68.977 ms 7.460 ms
 3 218.248.160.193 (218.248.160.193) 4.855 ms 3.668 ms 4.324 ms
 4 218.248.160.206 (218.248.160.206) 61.031 ms 57.832 ms 4.680 ms
 5 218.248.255.22 (218.248.255.22) 76.001 ms 65.493 ms 80.922 ms
 6 218.248.255.23 (218.248.255.23) 82.551 ms 71.874 ms 82.558 ms
 7 74.125.48.138 (74.125.48.138) 77.462 ms
   142.250.161.230 (142.250.161.230) 81.213 ms 109.670 ms
 8 * * *
 9 142.250.214.110 (142.250.214.110) 107.373 ms
   108.170.248.177 (108.170.248.177) 98.829 ms
   142.251.69.42 (142.251.69.42) 31.945 ms
10 108.170.248.178 (108.170.248.178) 89.413 ms
   108.170.248.163 (108.170.248.163) 79.230 ms *
11 108.170.237.69 (108.170.237.69) 114.786 ms
   142.250.212.5 (142.250.212.5) 80.486 ms
   172.253.68.120 (172.253.68.120) 30.866 ms
12 * 108.170.253.97 (108.170.253.97) 108.654 ms 80.328 ms
13 142.251.55.31 (142.251.55.31) 46.926 ms 40.462 ms
   108.170.253.97 (108.170.253.97) 118.154 ms
14 142.251.55.31 (142.251.55.31) 33.530 ms
   maa03s45-in-f3.1e100.net (142.250.196.35) 40.414 ms
   142.251.55.31 (142.251.55.31) 27.058 ms
```

Average RTT for test 1 = 40.007ms

Intracontinental Tracing between the source IP(bengaluru) and the google.co.jp(Japan) TEST-2

```
apoorvav — -zsh — 80x24
Last login: Sat Jan 22 20:53:16 on ttys000
[apoorvav@Apoorvas-MacBook-Air ~ % traceroute google.co.jp
traceroute to google.co.jp (142.250.77.131), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 4.293 ms 14.137 ms 4.944 ms
 2 117.213.160.1 (117.213.160.1) 11.676 ms 66.658 ms 7.463 ms
 3 218.248.160.193 (218.248.160.193) 6.840 ms 7.853 ms 70.464 ms
 4 218.248.160.202 (218.248.160.202) 10.147 ms 10.831 ms 77.060 ms
 5 218.248.255.20 (218.248.255.20) 75.518 ms 81.183 ms 82.082 ms
 6 218.248.255.21 (218.248.255.21) 94.475 ms * *
 7 72.14.197.4 (72.14.197.4) 30.411 ms 81.494 ms 92.066 ms
 8 * 108.170.248.162 (108.170.248.162) 100.203 ms 91.580 ms
 9 172.253.74.113 (172.253.74.113) 74.524 ms
   142.250.212.3 (142.250.212.3) 76.725 ms
   172.253.68.120 (172.253.68.120) 81.640 ms
10 74.125.242.145 (74.125.242.145) 106.072 ms 80.383 ms
   172.253.72.136 (172.253.72.136) 83.291 ms
11 142.251.55.207 (142.251.55.207) 72.149 ms 54.488 ms 105.131 ms
12 maa05s16-in-f3.1e100.net (142.250.77.131) 36.172 ms 104.481 ms
   142.251.55.207 (142.251.55.207) 63.945 ms
[apoorvav@Apoorvas-MacBook-Air ~ % clear
```

Average RTT for test 1 = 43.195ms

Intercontinental Tracing between the source IP(bengaluru) and the google.co.jp(Japan) TEST-3

```
apoorvav — -zsh — 80x24
Last login: Sun Jan 23 07:06:06 on ttys000
[apoorvav@Apoorvas-MacBook-Air ~ % traceroute google.co.jp
traceroute to google.co.jp (142.250.77.131), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 3.761 ms 4.954 ms 3.125 ms
 2 117.213.160.1 (117.213.160.1) 5.081 ms 4.413 ms 4.400 ms
 3 218.248.160.193 (218.248.160.193) 5.756 ms 11.046 ms 4.582 ms
 4 218.248.160.202 (218.248.160.202) 4.641 ms 5.425 ms 4.652 ms
 5 218.248.255.20 (218.248.255.20) 24.311 ms 32.945 ms 24.842 ms
 6 * * *
 7 72.14.197.4 (72.14.197.4) 32.886 ms 31.381 ms 30.631 ms
 8 108.170.248.195 (108.170.248.195) 36.275 ms
   108.170.248.211 (108.170.248.211) 31.929 ms
   108.170.248.163 (108.170.248.163) 37.821 ms
 9 108.170.232.243 (108.170.232.243) 28.899 ms
   142.250.212.7 (142.250.212.7) 58.059 ms
   66.249.94.39 (66.249.94.39) 80.872 ms
10 74.125.242.129 (74.125.242.129) 33.873 ms
   74.125.242.145 (74.125.242.145) 30.950 ms 34.851 ms
11 142.251.55.205 (142.251.55.205) 30.872 ms 32.108 ms
   142.251.55.207 (142.251.55.207) 49.401 ms
12 maa05s16-in-f3.1e100.net (142.250.77.131) 41.850 ms 36.083 ms 33.636 ms
apoorvav@Apoorvas-MacBook-Air ~ %
```

Average RTT for test 1 = 32.144ms

Intercontinental Tracing between the source IP(Bengaluru) and the google.co.nz(new zealand) TEST-3

```
apoorvav — -zsh — 80x24
[apoorvav@Apoorvas-MacBook-Air ~ % traceroute google.co.nz
traceroute to google.co.nz (142.250.76.67), 64 hops max, 52 byte packets
 1 192.168.1.1 (192.168.1.1) 4.585 ms 3.622 ms 3.019 ms
 2 117.213.160.1 (117.213.160.1) 4.357 ms 51.234 ms 4.396 ms
 3 218.248.160.193 (218.248.160.193) 4.733 ms 4.436 ms 4.704 ms
 4 218.248.160.198 (218.248.160.198) 4.328 ms 84.140 ms 67.481 ms
 5 218.248.255.20 (218.248.255.20) 103.041 ms 79.450 ms 78.108 ms
 6 218.248.255.21 (218.248.255.21) 79.234 ms 80.609 ms 82.994 ms
 7 72.14.197.4 (72.14.197.4) 82.098 ms 129.756 ms 40.217 ms
 8 108.170.248.162 (108.170.248.162) 75.887 ms 89.226 ms
   108.170.248.210 (108.170.248.210) 74.368 ms
 9 108.170.237.69 (108.170.237.69) 105.310 ms
   172.253.68.120 (172.253.68.120) 106.728 ms
   216.239.50.22 (216.239.50.22) 86.153 ms
10 142.250.238.207 (142.250.238.207) 64.242 ms
   74.125.242.145 (74.125.242.145) 73.773 ms 85.823 ms
11 142.250.228.187 (142.250.228.187) 79.151 ms
   142.250.228.245 (142.250.228.245) 77.656 ms 83.014 ms
12 142.250.228.245 (142.250.228.245) 79.780 ms
   maa05s14-in-f3.1e100.net (142.250.76.67) 121.367 ms
   142.250.228.187 (142.250.228.187) 40.931 ms
apoorvav@Apoorvas-MacBook-Air ~ %
```

Average RTT for test 1 = 46.102ms

RESULTS

- The average of the three round trips for **intracontinental route**= 37.827ms
 - The average of the three round trips for **intercontinental route**= 39.101ms
 - The **deviation** can be found out to be 5.918ms
 - The **total number of routers** between the **intracontinental route** trace is 16 routers, 16 routers and 18 routers, for 3 different times of the day. The paths did change as we can see there are different numbers of routers.
 - The **total number of routers** between the **intercontinental route** trace is 16 routers, 22 routers and 19 routers, for 3 different times of the day
 - The **ISP routers for intracontinental** that we identified were 108.170.248.xxx, 74.125.242.xxx, 142.251.55.xxx.
2. Visit the site www.traceroute.org and perform traceroutes from two different cities in India to the same destination host in the United States. How many links are the same in the two traceroutes? Is the transatlantic link the same?

For this question we took a destination of bengaluru IP and one of Mysore to the host located at Atlanta-USA

Query Results:

Router: Atlanta, GA - US

Command: traceroute 2406:7400:73:3095:456:fc26:a32:f46e

Disclaimer: Traceroute is a useful tool for determining the route a packet takes, but it should not be used as an accurate measure of network performance. For more information please view the [Traceroute Disclaimer](#).

Tracing the route to 2406:7400:73:3095:456:fc26:a32:f46e

```
1  ae-14.r22.atlnga05.us.bb.gin.ntt.net (2001:418:0:2000::14e) 2 msec
   ae-4.r23.atlnga05.us.bb.gin.ntt.net (2001:418:0:2000::10e) 1 msec
   ae-14.r22.atlnga05.us.bb.gin.ntt.net (2001:418:0:2000::14e) 1 msec
2  ae-0.a02.atlnga05.us.bb.gin.ntt.net (2001:418:0:2000::2f6) 1 msec 1 msec
   ae-1.a02.atlnga05.us.bb.gin.ntt.net (2001:418:0:2000::2fe) 2 msec
3  ix-ae-23-0.tcore2.a56-atlanta.ipv6.as6453.net (2001:5a0:1b00:100::21) 1 msec 1 msec 1 ms
4  if-ae-21-2.tcore1.aeq-ashburn.ipv6.as6453.net (2001:5a0:600:400::30) 14 msec 14 msec 14
5  if-ae-1-2.tcore3.aeq-ashburn.ipv6.as6453.net (2001:5a0:3c01:110::80) 14 msec 14 msec 14
6  if-ae-36-2.tcore2.lvw-losangeles.ipv6.as6453.net (2001:5a0:600:500::25) 58 msec 58 msec
7  if-ae-2-16.tcore1.svw-singapore.ipv6.as6453.net (2001:5a0:100:100::49) 238 msec 240 msec
8  if-ae-13-2.tcore1.cxr-chennai.ipv6.as6453.net (2405:2000:ff10::10) 262 msec 262 msec 263
9  2405:2000:ff10::a 265 msec 266 msec 266 msec
10 2403::31e 274 msec 272 msec 272 msec
11 *
   2403:0:554::1e 267 msec 265 msec
12 * * *
13 2406:7400:72:a4ed::1 278 msec 279 msec 279 msec
14 2406:7400:73:3095:456:fc26:a32:f46e 349 msec 301 msec 275 msec
```

Query Results:**Router:** Atlanta, GA - US**Command:** traceroute ip 118.151.209.194

Disclaimer: Traceroute is a useful tool for determining the route a packet takes, but it should not be used as an accurate measure of network performance. For more information please view the [Traceroute Disclaimer](#).

Tracing the route to 118.151.209.194

```

1  ae-14.r22.atlnga05.us.bb.gin.ntt.net (129.250.5.202) 1 msec 1 msec
   ae-4.r23.atlnga05.us.bb.gin.ntt.net (129.250.5.213) 1 msec
2  ae-1.a00.atlnga05.us.bb.gin.ntt.net (129.250.5.92) 2 msec 1 msec 1 msec
3  63-218-69-57.static.pccwglobal.net (63.218.69.57) 1 msec 1 msec 1 msec
4  Hu0-0-0-16.br05.sin02.pccwbtn.net (63.223.34.54) 218 msec
   Hu0-0-0-0.br05.sin02.pccwbtn.net (63.218.164.66) 236 msec 232 msec
5  63-218-107-194.static.pccwglobal.net (63.218.107.194) 229 msec *
   Hu0-0-0-0.br05.sin02.pccwbtn.net (63.218.164.66) 232 msec
6  182.79.198.242 271 msec
   bharti.bell.br05.sin02.pccwbtn.net (63.218.165.10) 239 msec
   182.79.177.228 270 msec
7  125.19.104.214 307 msec
   182.79.189.9 273 msec 270 msec
8  125.19.104.214 276 msec 281 msec
   yash-static-194.209.151.118.yashtel.co.in (118.151.209.194) 264 msec

```

There are a few common routers between the routes for these two IP's.

3. Pick a city in India, and perform traceroutes to two hosts, each in a different city in China. How many links are common in the two traceroutes? Do the two traceroutes diverge before reaching China?

These are the two trace routes for Hong Kong and Beijing.

traceroute to www.google.co.in (69.171.242.11), 30 hops max, 40 byte packets(Download traceroute)		
Hop	Node	Response Time(ms)
1	100.65.0.1 (100.65.0.1)	8.701
2	Internal (Internal)	74.248
3	11.76.96.142 (11.76.96.142)	4.413
4	*	-
5	11.94.4.32 (11.94.4.32)	4.653
6	11.94.9.35 (11.94.9.35)	5.296
7	*	-
8	Internal (Internal)	5.928
9	11.94.9.36 (11.94.9.36)	2.223
10	*	-
11	11.94.4.19 (11.94.4.19)	1.609

Query Results:

Router: Hong Kong - HK

Command: traceroute 2406:7400:73:3095:456:fc26:a32:f46e

Disclaimer: Traceroute is a useful tool for determining the route a packet takes, but it should not be used as an accurate measure of network performance. For more information please view the [Traceroute Disclaimer](#).

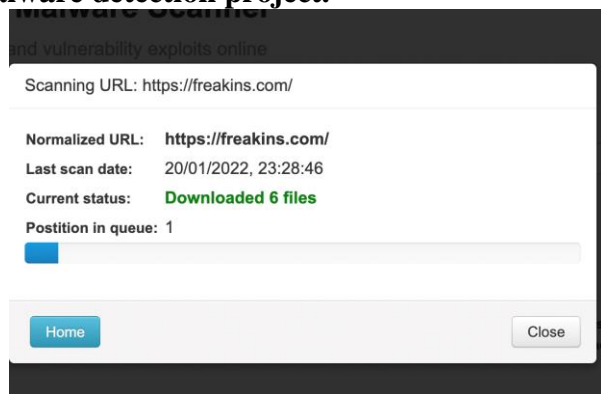
Tracing the route to 2406:7400:73:3095:456:fc26:a32:f46e

```
 1 ae-7.r27.tkokhk01.hk.bb.gin.ntt.net (2001:218:0:2000::152) 2 msec
    ae-8.r26.tkokhk01.hk.bb.gin.ntt.net (2001:218:0:2000::146) 15 msec 1 msec
 2 ae-2.r02.tkokhk01.hk.bb.gin.ntt.net (2001:218:0:2000::139) 1 msec 2 msec 2 msec
 3 ix-ae-20-0.tcore2.hk2-hongkong.ipv6.as6453.net (2405:2000:400:300::8) 2 msec 2 msec 3 msec
 4 if-ae-32-2.tcore2.svw-singapore.ipv6.as6453.net (2405:2000:ffa0:200::40) 35 msec 41 msec
 5 if-ae-2-2.tcore1.svw-singapore.ipv6.as6453.net (2405:2000:ffa0:100::1) 37 msec 34 msec 5
 6 if-ae-13-2.tcore1.cxr-chennai.ipv6.as6453.net (2405:2000:ff10::10) 68 msec 67 msec 68 ms
 7 2405:2000:ff10::a 68 msec ? ?
 8 ? ?
    2403::31e 72 msec
 9 * * *
10 * * *
11 2406:7400:72:a4ed::1 73 msec 71 msec 72 msec
12 2406:7400:73:3095:456:fc26:a32:f46e 77 msec ? ?
```

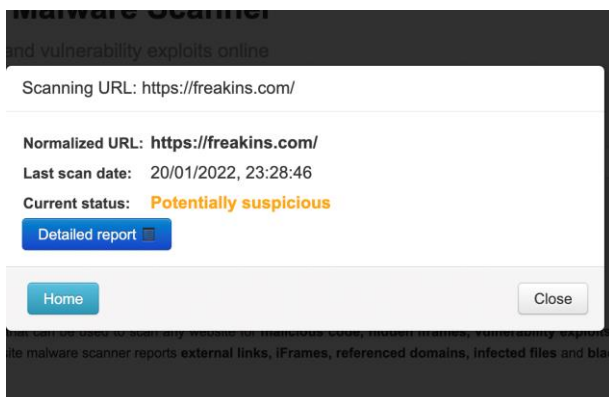
4. Use an online Tool for Website Malware Scanning and perform website checking and scans for the vulnerabilities.

The website which was being tested out was **freakins.com**, which is an online brand store which sells clothing and accessories. As this site is pretty new and has been creating a lot of buzz, especially after the Instagram Targeted advertisements, this was chosen to run a malware scanner. This online report was generated using **Perisks.com**. And as a result, the report that was obtained has mostly cleared this website except a malicious file in the website. This site has been deemed safe to use by Pcrisks.

Malware detection project.



Preliminary Analysis of the website.



Additional and Detailed summary of the test.

[Sitescan report](#) [Scanned files analysis](#) [Additional information](#) [Blacklisting check](#)

Scanned files analysis

Malicious files: 0

Suspicious files: 0

Potentially Suspicious files: 1

Clean files: 9

[Sitescan report](#) [Scanned files analysis](#) [Additional information](#) [Blacklisting check](#)

Iframes and external links

List of external links: 135

List of iframes: 3

List of referenced domains/hosts: 0

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Provider	Status
StopBadware	Clean more info
Phishtank	Clean more info
URLhaus	Clean more info
MalwareDomainList	Clean more info
Quttera Labs	Clean more info
Yandex Safebrowsing	Clean more info
ZeusTracker	Clean more info
Google	Clean more info



Brochure:



JSS Mahavidyapeetha

JSS Academy of Technical Education

(Affiliated to VTU, Approved by AICTE, Accredited by NBA)
Bengaluru - 60

Department of Computer Science & Engineering

WEGoMAD

Project Contest
on

“Web Technology & its Applications, Mobile Application
Development and Computer Graphics & Visualizations”

Project Topics

Web Technology and its Applications	Mobile Application Development	Computer Graphics and Visualizations
e-Commerce Website	Google Scholar Website Scraping	Tower of Hanoi
Resume Building Website	Women Safety Application	Postfix to Infix

Timeline: 9:00 AM , 8th July 2022 to 9:00 AM , 9th July 2022

All are Welcome

Dr. Naveen N.C
HOD,CSE

Dr. Bhimasen Saragoan
Principal

Staff Coordinators

Mrs. Namitha SJ

Mrs. Shruthi P

Mrs. Impana K.P

Event Registration Form and Link:

Link : <https://forms.gle/aSThUbviciVWmddYA>



Event registration

Event Name : WEGoMAD - Project Contest
Event Timing: 08- July -2022 To 09-July-2022
Event Address: Dept. of CSE, JSSATE Bengaluru

 shruthiprabhuswamy@jssateb.ac.in (not shared)
[Switch account](#)

 Saving disabled

* Required

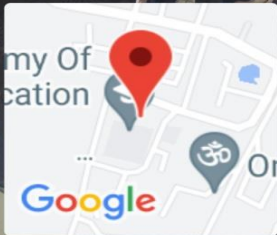
WEGoMAD - 24 hrs Online Project Contest.

Students can select any one of the projects listed in the poster from any of the subjects CG, Web or MAD. They have to solve and send the working solution to the concerned faculties by Saturday morning (09th July 2022).

CG Projects - Impana K P (impanaraj@jssateb.ac.in)

Web Projects - Namitha S J (namithasj@jssateb.ac.in)

MAD Projects - Shruthi P (shruthiprabhuswamy@jssateb.ac.in)



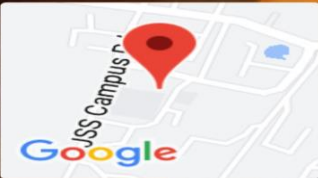
Bengaluru, Karnataka, India

Jss Academy Of Technical Education, JSS Campus Rd, Srinivaspura, Bengaluru, Karnataka 560060, India

Lat 12.902701°

Long 77.504688°

12/07/22 02:57 PM



Bengaluru, Karnataka, India

Jss Academy Of Technical Education, JSS Campus Rd, Srinivaspura, Bengaluru, Karnataka 560060, India

Lat 12.902588°

Long 77.50482°

12/07/22 01:01 PM



Project Selected *

Your answer _____

Team Name *

Your answer _____

Email (Any one of the team members email id) *

Your answer _____

Team Members Name and USN *

Your answer _____

Submit Clear form

Evaluation Rubrics

Knowledge (10M)	Presentation (10M)	Societal (10M)	Efficiency (10M)
----------------------------	-------------------------------	---------------------------	-----------------------------

Date: Jan 3rd week 2022.

Faculty Name : Mrs Snehalatha N

Class/Section: V CSE 'B'

Activity Name: Demonstration of JFLAP- Graphical Visualization tool

Academic Year: 2021-22(ODD semester)

GOAL OF THE ACTIVITY:

Automata theory and formal languages courses are math courses in essence, and traditionally are taught without computers. Well known advantages of the use of computers in education are: interactive manipulation, concepts visualization and feedback to the students. Using the graphical interactive tool students can benefit to understand the course with following advantages.

- Most of the mathematical concepts can be graphically visualized. Interactivity can help in the consolidation of the concepts and an easier grasp of the formal notation.
- Most of the theorem proofs are algorithmic and can be interactively constructed
- Automatic correction of exercises provides immediate feedback to the students, giving counter-examples and pointing out the errors, thus allowing for a quicker understanding of the concepts.

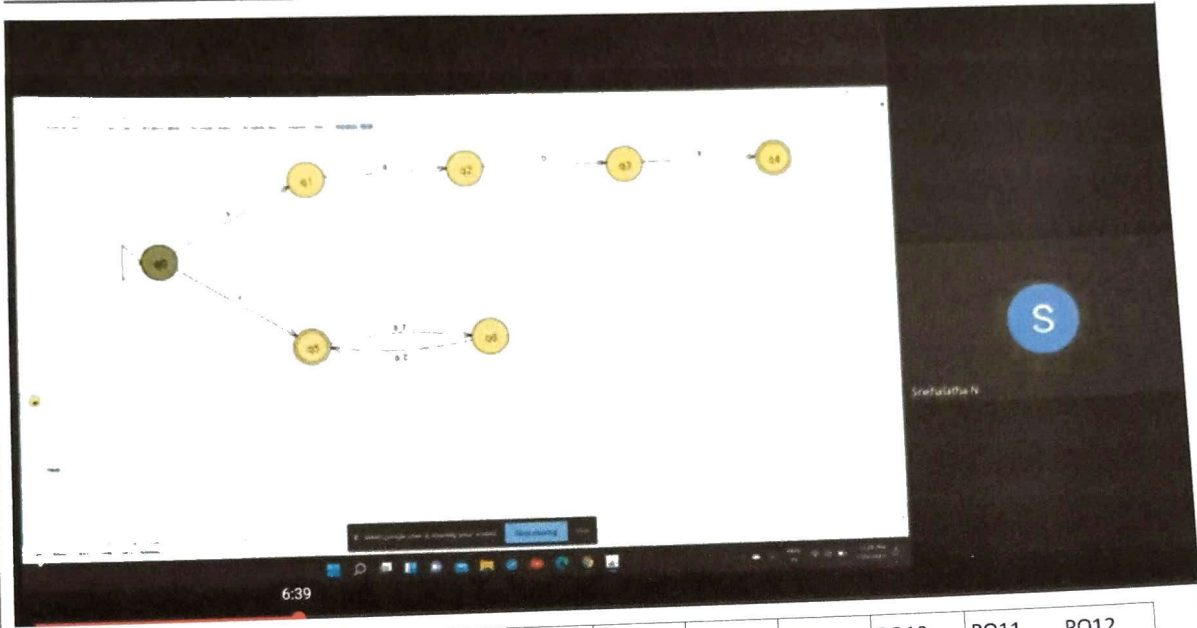
DESCRIPTION OF ACTIVITY:

Team of 5 students were formed and were informed to install the JFLAP software. Each team were asked to choose one of the topic and demonstrate the tool with examples . Students were informed to submit the report with the following contents

- Topic with Team Members with USN
- Introduction to JFLAP
- Description about the topic chosen
- Snapshots of the experiment
- Conclusion

USE OF APPROPRIATE METHODS:

RESULTS/OUTCOME :



PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
✓	✓	✓		✓				✓	✓		

All the teams demonstrated the JFLAP tool with the hands-on working the topic chosen with suitable example .and were able to visualize and understand the concepts of automata theory and construction of different machines


Signature of the Faculty

HOD, CSE

Date: 10.1.2021

Faculty Name: N. Snehalatha

Class/Section: VIII CSE 'A'

Activity Name: Project based Learning: Mini Project on IoT Applications

Academic Year: 2021-22

GOAL OF THE ACTIVITY:

- To enhance the knowledge on Internet of things
- To explore the features and implementation of different IoT solutions.
- To experience various real time problems that can be solved using IoT solutions.
- To explore real world problems that can be solved using IoT solutions.

About the Activity:

Team of 2 to 3 students were formed . Each team were asked to carry out the project based on IoT solutions Students implemented various projects using sensors and Raspberry Pi. Students demonstrated the project and reports were submitted.

USE OF APPROPRIATE METHODS:

- Raspberry Pi
- Different types of Sensors

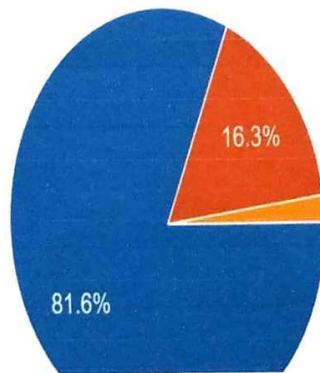
RESULTS/OUTCOME :

Students were able to implement various IoT applications.

Feedback:

How clearly objectives of the project defined

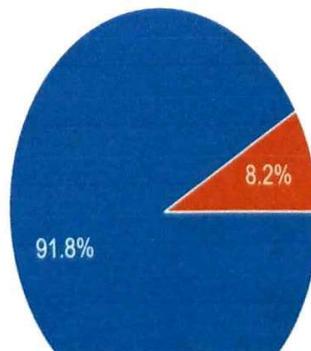
49 responses



- Excellent
- Very Good
- Good
- Satisfactory

Outcome of the project was

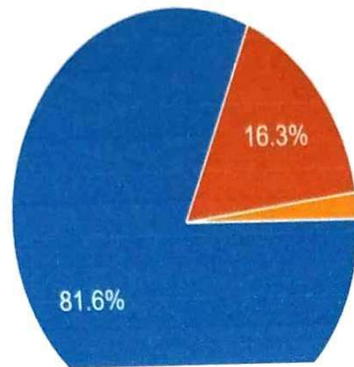
49 responses



- Very good
- Good
- Satisfactory

How did the project helped to enhance the concepts of IoT

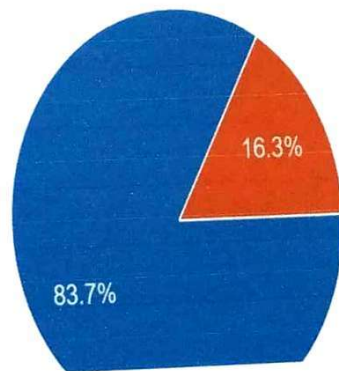
49 responses



- Excellent
- Very Good
- Good
- Satisfactory

Knowledge gained in understanding the application of IoT

49 responses



- Excellent
- Very Good
- Good
- Satisfactory

Sueh

Signature of the Faculty



JSS ACADEMY OF TECHNICAL EDUCATION

11

Department of Computer Science & Engineering

Academic Year 2021-22(ODD)

Faculty Name: Rashmi B N
10/3/22

Date:

Semester/Section: III B

Subject: Computer Organization /18CS34

Activity Name: Virtual Lab practice and Program executions using CPU_OS_Simulator

Goal of the activity: *The goal of the activity is to provide an opportunity to*

- *Make students to gain more knowledge and better understanding of the computer concepts, Addressing modes and pipelining.*
- *Actively participate in the lab session and the group work submitted.*

Description of the activity:

Students were asked to prepare a group of 4 members and each group should do an implementation of the concepts using CPU-OS Simulator. Each group should present their program and reports were maintained by each group, discussions were held on the presentation.

Use of appropriate methods:

Rubrics have been designed for evaluation. The following are the rubrics followed for evaluation.

1) Submission 2) Presentation 3) Documentation 4) Discussion

Significance of results, effective presentation and reflective critique:

Based on the rubrics evaluation is done and marks have been allocated to award the assignment marks . The activity helps the students to gain more knowledge on the concepts like Organization of Basic computer, Fetch decode ,execute cycles, big Endian and little Endian storage, Stack operation, addressing modes , and pipelining concepts



DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
 JSS ACADEMY OF TECHNICAL EDUCATION
Feedback on Innovative Method

Course: Computer Organization /18CS3	Sem /Sec: III B
Topic: Lab practice and Program executions using CPU_OS Simulator	Date: 10/3/22
Resource person/ Staff: Rashmi B N	Academic Year 2021-22(ODD)

1. Knowledge and information gained from the activity. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	4. Comments and suggestion
2. Whether the activity conducted enhanced your learning skills <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	
3. Overall quality of the activity. <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4	

1. Satisfactory 2. Good 3. Very Good 4. Excellent

JSS Mahavidyapeetha



JSS Academy of Technical Education, Bangalore-60
 Dept. of Computer Science & Engineering
Feedback Analysis on Innovative Method

Subject: **Computer Organization /18CS34**
 Semester: III B
 Faculty Name: Rashmi BN
 Topic: Lab practice and Program executions using CPU_OS _Simulator

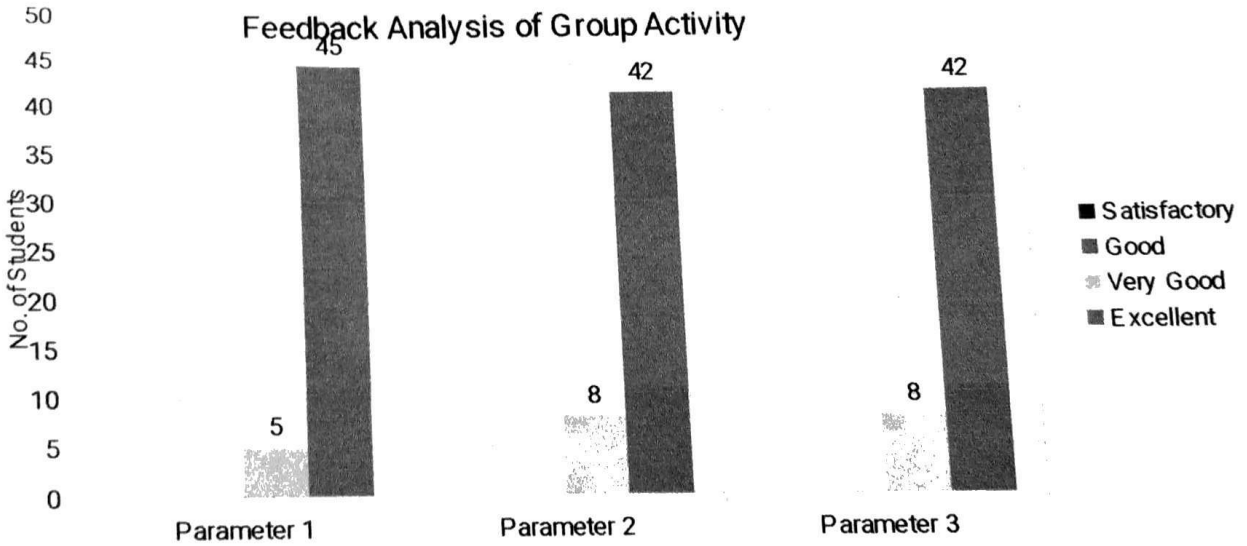
Mapping for PO and PSO

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
-----	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------

✓	✓	✓						✓				✓	✓		
---	---	---	--	--	--	--	--	---	--	--	--	---	---	--	--

Sl No.	Questions
Parameter 1	Knowledge and information gained from the topic
Parameter 2	Whether the activity conducted enhanced your learning skills
Parameter 3	Overall quality of the activity

	Satisfactory	Good	Very Good	Excellent
Parameter 1	0	0	5	45
Parameter 2	0	0	8	42
Parameter 3	0	0	8	42



Signature of Faculty

