

# **ST. ANNE'S**

**COLLEGE OF ENGINEERING AND TECHNOLOGY**

(Approved by AICTE New Delhi, Affiliated to Anna University, Chennai)

(An ISO 9001:2015 Certified Institution)

**ANGUCHETTYPALAYAM, PANRUTI - 607 106.**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**



**IT8761 - SECURITY LABORATORY**

**Regulation 2017**

**Year / Semester: IV / VII**

**Aug 2022 – Dec 2022**

**PREPARED BY**

**Mrs. E.INDHUMA, M.E.,  
Assistant Professor / CSE**

**OBJECTIVES:**

- To learn different cipher techniques
- To implement the algorithms DES, RSA, MD5, SHA-1
- To use network security tools and vulnerability assessment tools

**LIST OF EXPERIMENTS**

1. Perform encryption, decryption using the following substitution techniques  
(i) Ceaser cipher, (ii) Playfair cipher iii) Hill Cipher iv) Vigenere cipher
2. Perform encryption and decryption using following transposition techniques  
i) Rail fence ii) row & Column Transformation
3. Apply DES algorithm for practical applications.
4. Apply AES algorithm for practical applications.
5. Implement RSA Algorithm using HTML and JavaScript
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Calculate the message digest of a text using the SHA-1 algorithm.
8. Implement the SIGNATURE SCHEME – Digital Signature Standard.
9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool
11. Defeating Malware  
i) Building Trojans ii) Rootkit Hunter

**TOTAL: 60**

**PERIODS****OUTCOMES:**

**Upon Completion of the course, the students will be able to:**

- Develop code for classical Encryption Techniques to solve the problems.
- Build cryptosystems by applying symmetric and public key encryption algorithms.
- Construct code for authentication algorithms.
- Develop a signature scheme using Digital signature standard.
- Demonstrate the network security system using open source tools

**REFERENCES:**

1. Build Your Own Security Lab, Michael Gregg, Wiley India

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:****SOFTWARE:**

C / C++ / Java or equivalent compiler GnuPG, Snort, N-Stalker or Equivalent

**HARDWARE:**

Standalone desktops – 30 Nos. (or) Server supporting 30 terminals or more.

## **LIST OF FIRST CYCLE EXPERIMENTS**

1. Perform encryption, decryption using the following substitution techniques  
(i) Ceaser cipher, (ii) playfair cipher iii) Hill Cipher iv) Vigenere cipher
2. Perform encryption and decryption using following transposition techniques.  
i) Rail fence ii) row & Column Transformation
3. Apply DES algorithm for practical applications.
4. Apply AES algorithm for practical applications.

## **LIST OF SECOND CYCLE EXPERIMENTS**

5. Implement RSA Algorithm using HTML and JavaScript
6. Implement the Diffie-Hellman Key Exchange algorithm for a given problem.
7. Calculate the message digest of a text using the SHA-1 algorithm.
8. Implement the SIGNATURE SCHEME – Digital Signature Standard.
9. Demonstrate intrusion detection system (ids) using any tool eg. Snort or any other s/w.
10. Automated Attack and Penetration Tools Exploring N-Stalker, a Vulnerability Assessment Tool
11. Defeating Malware  
i) Building Trojans ii) Rootkit Hunter

## TABLE OF CONTENTS

<b>S.NO</b>	<b>DATE</b>	<b>TITLE OF THE PROGRAM</b>	<b>MARKS</b>	<b>SIGN</b>
1		Perform encryption, decryption using the following substitution techniques.		
a		Caesar Cipher		
b		Playfair Cipher		
c		Hill Cipher		
d		Vigenere Cipher		
2		Perform encryption and decryption using following transposition techniques.		
a		Rail fence		
b		Row & Column Transformation		
3		Data Encryption Standard (DES)		
4		Advanced Encryption Standard (AES)		
5		RSA Algorithm		
6		Diffie-Hellman Key Exchange Algorithm		
7		Secure Hash Algorithm (SHA-1)		
8		Digital Signature Standard (DSA)		
9		Intrusion Detection System (IDS)		
10		Exploring N-Stalker		
11		Defeating Malware		
a		Building Trojans		
b		Rootkit Hunter		

Ex.No. : 1a

## CAESAR CIPHER

Date :

### AIM:

To implement a Caesar cipher substitution technique in Java.

### ALGORITHM:

1. Assign the 26 letters in alphabet to the variable named ALPHABET.
2. Convert the plaintext letters into lowercase.
3. To encrypt a plaintext letter, the first set of plaintext letters and slides it to LEFT by the number of positions of the secret shift.
4. The plaintext letter is then encrypted to the ciphertext letter on the sliding ruler underneath.
5. On receiving the ciphertext, the receiver who also knows the secret shift, positions his sliding ruler underneath the ciphertext alphabet and slides it to RIGHT by the agreed shift number, 3 in this case.
6. Then replaces the ciphertext letter by the plaintext letter on the sliding ruler underneath.

### PROGRAM:

```
import java.util.Scanner;
public class caesercipher
{
    public static final String ALPHABET="abcdefghijklmnopqrstuvwxyz";
    public static String encrypt(String plainText,int shiftKey)
    {
        plainText=plainText.toLowerCase();
        String cipherText="";
        for (int i=0; i<plainText.length();i++)
        {
            int charPosition=ALPHABET.indexOf(plainText.charAt(i));
            int keyVal=(shiftKey+charPosition)%26;
            char replaceVal=ALPHABET.charAt(keyVal);
            cipherText+=replaceVal;
        }
        return cipherText;
    }
    public static String decrypt(String cipherText,int shiftKey)
    {
        cipherText = cipherText.toLowerCase();
        String plainText = "";
        for(int i=0;i<cipherText.length();i++)
        {
            int charPosition= ALPHABET. indexOf(cipherText. charAt(i));
            int keyVal=(charPosition-shiftKey)%26;
            if (keyVal< 0)
            {
                keyVal=ALPHABET.length()+keyVal;
            }
            char replaceVal=ALPHABET.charAt(keyVal);
            plainText+=replaceVal;
        }
    }
}
```

```
        }
        return plainText;
    }
    public static void main(String[] args)
    {
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the Plain text for Encryption: ");
        String message=new String();
        message=sc.next();
        System.out.println("Encrypted message:Cipher Text="+encrypt(message,3));
        System.out.println("Decrypted message:Plain Text="+decrypt (encrypt(
        message,3),3));
        sc.close();
    }
}
```

#### **OUTPUT:**

F:\bin>javac ceasercipher.java

F:\bin>java ceasercipher

Enter the Plain text for Encryption:

covid

Encrypted message:Cipher Text=frylg

Decrypted message:Plain Text=covid

#### **RESULT:**

Thus the Caesar cipher substitution technique was implemented and executed successfully.

**Ex.No. : 1b**

## **PLAYFAIR CIPHER**

**Date :**

### **AIM:**

To implement a Playfair cipher substitution technique in Java.

### **ALGORITHM:**

1. Read the keyword.
2. Then create the key table of 5x5 grid of alphabets.
3. Read the word to encrypt.
4. If the input word should be even and then process it.
5. Then the plaintext message is split into pairs of two letters (digraphs).
6. If both the letters are in the same column, take the letter below each one.
7. If both letters are in the same row, take the letter to the right of each one.
8. If neither of the preceding two rules are true, form a rectangle with the two letters and take the letters on the horizontal opposite corner of the rectangle.

### **PROGRAM:**

```
import java.util.Scanner;
public class Playfair1
{
    public static void main(String[] args)
    {
        Scanner in=new Scanner(System.in);
        System.out.print("Enter keyword: ");
        String key=in.nextLine();
        System.out.print("Enter message to encrypt: ");
        String msg=in.nextLine();
        PFEncryption pfEncryption=new PFEncryption();
        pfEncryption.makeArray(key);
        msg=pfEncryption.manageMessage(msg);
        pfEncryption.doPlayFair(msg, "Encrypt");
        String en=pfEncryption.getEncrypted();
        System.out.println("Encrypting. ..\n\nThe encrypted text is: " + en);
        System.out.println("=====");
        pfEncryption.doPlayFair(en, "Decrypt");
        System.out.print("\nDecrypting... \n\nThe encrypted text is: " +
        pfEncryption.getDecrypted());
    }
}
class PFEncryption
{
    private char [][] alphabets= new char[5][5];
    private char[] uniqueChar= new char[26];
    private String ch="ABCDEFGHIJKLMNOPQRSTUVWXYZ";
    private String encrypted="";
    private String decrypted="";
    void makeArray(String keyword)
```

```

    {
        keyword=keyword.toUpperCase().replace("J", "I");
        boolean present, terminate=false;
        int val=0;
        int uniqueLen;
        for (int i=0; i<keyword.length(); i++)
        {
            present=false;
            uniqueLen=0;
            if (keyword.charAt(i)!=' ')
            {
                for (int k=0; k<uniqueChar.length; k++)
                {
                    if (Character.toString(uniqueChar[k])==null)
                    {
                        break;
                    }
                    uniqueLen++;
                }
                for (int j=0; j<uniqueChar.length; j++)
                {
                    if (keyword.charAt(i)==uniqueChar[j])
                    {
                        present=true;
                    }
                }
                if (!present)
                {
                    uniqueChar[val]=keyword.charAt(i);
                    val++;
                }
            }
            ch=ch.replaceAll(Character.toString(keyword.charAt(i)), "");
        }
        for (int i=0; i<ch.length(); i++)
        {
            uniqueChar[val]=ch.charAt(i);
            val++;
        }
        val=0;
        for (int i=0; i<5; i++)
        {
            for (int j=0; j<5; j++)
            {
                alphabets[i][j]=uniqueChar[val];
                val++;
                System.out.print(alphabets[i][j] + "\t");
            }
            System.out.println();
        }
    }

```



```

}
String manageMessage(String msg)
{
    int val=0;
    int len=msg.length()-2;
    String newTxt="";
    String intermediate="";
    while (len>=0)
    {
        intermediate=msg.substring(val, val+2);
        if (intermediate.charAt(0)==intermediate.charAt(1))
        {
            newTxt=intermediate.charAt(0) + "x" + intermediate.charAt(1);
            msg=msg.replaceFirst(intermediate, newTxt);
            len++;
        }
        len-=2;
        val+=2;
    }
    if (msg.length()%2!=0)
    {
        msg=msg+'x';
    }
    return msg.toUpperCase().replaceAll("J","I").replaceAll(" ", "");
}
void doPlayFair(String msg, String tag)
{
    int val=0;
    while (val<msg.length())
    {
        searchAndEncryptOrDecrypt(msg.substring(val, val+2), tag);
        val+=2;
    }
}
void searchAndEncryptOrDecrypt(String doublyCh, String tag)
{
    char ch1=doublyCh.charAt(0);
    char ch2=doublyCh.charAt(1);
    int row1=0, col1=0, row2=0, col2=0;
    for (int i=0; i<5; i++)
    {
        for (int j=0; j<5; j++)
        {
            if (alphabets[i][j]==ch1)
            {
                row1=i;
                col1=j;
            }
            else if (alphabets[i][j]==ch2)
            {
                row2=i;
            }
        }
    }
}

```

```

                col2=j;
            } } }
    if (tag=="Encrypt")
        encrypt(row1, col1, row2, col2);
    else if(tag=="Decrypt")
        decrypt(row1, col1, row2, col2);
}
void encrypt(int row1, int col1, int row2, int col2)
{
    if (row1==row2)
    {
        col1=col1+1;
        col2=col2+1;
        if (col1>4)
            col1=0;
        if (col2>4)
            col2=0;
        encrypted+=(Character.toString(alphabets[row1][col1])+
        Character.toString(alphabets[row1][col2]));
    }
    else if(col1==col2)
    {
        row1=row1+1;
        row2=row2+1;
        if (row1>4)
            row1=0;
        if (row2>4)
            row2=0;
        encrypted+=(Character.toString(alphabets[row1][col1])+
        Character.toString(alphabets[row2][col1]));
    }
    else
    { encrypted+=(Character.toString(alphabets[row1][col2])+
    Character.toString(alphabets[row2][col1]));
    }
}
void decrypt(int row1, int col1, int row2, int col2)
{
    if (row1==row2)
    {
        col1=col1-1;
        col2=col2-1;
        if (col1<0)
            col1=4;
        if (col2<0)
            col2=4;
        decrypted+=(Character.toString(alphabets[row1][col1])+
        Character.toString(alphabets[row1][col2]));
    }
    else if(col1==col2)
    {

```

```

        row1=row1-1;
        row2=row2-1;
        if (row1<0)
            row1=4;
        if (row2<0)
            row2=4;
        decrypted+=(Character.toString(alphabets[row1][col1])+
        Character.toString(alphabets[row2][col1]));
    }
    else
    {
        decrypted+=(Character.toString(alphabets[row1][col2])+
        Character.toString(alphabets[row2][col1]));
    }
}
String getEncrypted()
{
    return encrypted;
}
String getDecrypted()
{
    return decrypted;
}

```

### OUTPUT:

F:\bin>javac Playfair1.java

F:\bin>java Playfair1

Enter keyword: INFOSEC

Enter message to encrypt: cryptography

I	N	F	O	S
E	C	A	B	D
G	H	K	L	M
P	Q	R	T	U
V	W	X	Y	Z

Encrypting....

The encrypted text is: AQV TYBKPERLW

=====

Decrypting....

The encrypted text is: CRYPTOGRAPHY

### RESULT:

Thus the Playfair cipher substitution technique was implemented and executed successfully.

Ex.No. : 1c

## HILL CIPHER

Date :

### AIM:

To implement a Hill cipher substitution technique in Java.

### ALGORITHM:

1. Obtain a plaintext message to encode in standard English with no spaces.
2. Split the plaintext into group of length three. To fill this, add X at the end.
3. Convert each group of letters with length three into plaintext vectors.
4. Replace each letter by the number corresponding to its position in the alphabet i.e. A=1, B=2, C=3...Z=0.
5. Create the keyword in a 3\*3 matrix.
6. Multiply the two matrices to obtain the cipher text of length three.
7. For decryption, convert each entry in the ciphertext vector into its plaintext vector by multiplying the cipher text vector and inverse of a matrix.
8. Thus plain text is obtained from corresponding plaintext vector by corresponding position in the alphabet.

### PROGRAM:

```
import java.util.Scanner;
import javax.swing.JOptionPane;
public class hillcipher
{
    //the 3x3 key matrix for 3 characters at once
    public static int[][] keymat = new int[][]
    {
        { 1, 2, 1 },
        { 2, 3, 2 },
        { 2, 2, 1 },
    };
    public static int[][] invkeymat = new int[][]
    {
        { -1, 0, 1 },
        { 2, -1, 0 },
        { -2, 2, -1 },
    };
    public static String key = "ABCDEFGHIJKLMNOPQRSTUVWXYZ";

    public static void main(String[] args)
    {
        String text,outtext = "",outtext1="";
        int ch, n;
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter the Plain text for Encryption: ");
        //String text=new String();
        text=sc.next();

        text = text.toUpperCase();
        text = text.replaceAll("\\s", ""); //removing spaces
    }
}
```

```

n = text.length() % 3;
if(n!=0)
{
    for(int i = 1; i<= (3-n);i++)
    {
        text+= 'X';
    }
}
System.out.println("Padded Text:" + text);
char[] ptextchars = text.toCharArray();
for(int i=0;i< text.length(); i+=3)
{
    outtext += encrypt(ptextchars[i],ptextchars[i+1],ptextchars[i+2]);
}

    System.out.println("Encrypted Message: " + outtext);

    char[] ptextchars1 = outtext.toCharArray();
for(int i=0;i< outtext.length(); i+=3)
{
    outtext1 += decrypt(ptextchars1[i],ptextchars1[i+1],ptextchars1[i+2]);
}
System.out.println("Decrypted Message: " + outtext1);
}

private static String encrypt(char a, char b, char c)
{
    String ret = "";
    int x,y, z;
    int posa = (int)a - 65;
    int posb = (int)b - 65;
    int posc = (int)c - 65;
    x = posa * keymat[0][0] + posb * keymat[1][0] + posc * keymat[2][0];
    y = posa * keymat[0][1] + posb * keymat[1][1] + posc * keymat[2][1];
    z = posa * keymat[0][2] + posb * keymat[1][2] + posc * keymat[2][2];
    a = key.charAt(x%26);
    b = key.charAt(y%26);
    c = key.charAt(z%26);
    ret = "" + a + b + c;
    return ret;
}

private static String decrypt(char a, char b, char c)
{
    String ret = "";
    int x,y,z;
    int posa = (int)a - 65;
    int posb = (int)b - 65;
    int posc = (int)c - 65;
    x = posa * invkeymat[0][0]+ posb * invkeymat[1][0] + posc * invkeymat[2][0];
    y = posa * invkeymat[0][1]+ posb * invkeymat[1][1] + posc * invkeymat[2][1];

```

```
        z = posa * invkeymat[0][2]+ posb * invkeymat[1][2] + posc * invkeymat[2][2];
        a = key.charAt((x%26<0)?(26+x%26):(x%26));
        b = key.charAt((y%26<0)?(26+y%26):(y%26));
        c = key.charAt((z%26<0)?(26+z%26):(z%26));
        ret = "" + a + b + c;
        return ret;
    }
}
```

### **OUTPUT:**

```
F:\bin>javac hillcipher.java
```

```
F:\bin>java hillcipher
```

```
Enter the Plain text for Encryption:
```

```
mothertheresa
```

```
Padded Text:MO THERTHERES AXX
```

```
Encrypted Message: AAHXIGPPLJEROLR
```

```
Decrypted Message: MO THERTHERES AXX
```

```
F:\bin>java hillcipher
```

```
Enter the Plain text for Encryption:
```

```
hilcipher
```

```
Padded Text:HILCIPHER
```

```
Encrypted Message: TIIWGHXIG
```

```
Decrypted Message: HILCIPHER
```

### **RESULT:**

Thus the Hill cipher substitution technique was implemented and executed successfully.

Ex.No. : 1d

## VIGENERE CIPHER

Date :

### AIM:

To implement a Java program for encryption and decryption using Vigenere cipher substitution technique.

### ALGORITHM:

1. The Vigenere cipher is a method of encrypting alphabetic text by using a series of different Caesar ciphers based on the letters of a keyword.
2. It is a simple form of *polyalphabetic* substitution.
3. To encrypt, a table of alphabets can be used, termed a Vigenere square, or Vigenere table.
4. It consists of the alphabet written out 26 times in different rows, each alphabet shifted cyclically to the left compared to the previous alphabet, corresponding to the 26 possible Caesar ciphers.
5. At different points in the encryption process, the cipher uses a different alphabet from one of the rows used.
6. The alphabet at each point depends on a repeating keyword.

### PROGRAM:

```
public class vigenerecipher1
{
    public static String encrypt(String text,final String key)
    {
        String res="";
        text=text.toUpperCase();
        for(int i=0,j=0; i < text.length(); i++)
        {
            char c=text.charAt(i);
            if(c<'A' || c>'z')
                continue;
            res+=(char)((c+key.charAt(j)-2*'A')%26+'A');
            j=++j%key.length();
        }
        return res;
    }
    public static String decrypt(String text,final String key)
    {
        String res="";
        text=text.toUpperCase();
        for(int i=0,j=0;i<text.length();i++)
        {
            char c=text.charAt(i);
            if(c<'A' || c>'z')
                continue;
            res+=(char)((c-key.charAt(j)+26)%26+'A');
            j=++j%key.length();
        }
        return res;
    }
}
```

```
}
public static void main(String[] args)
{
    System.out.println("Enter the key: ");
    String key = System.console().readLine();
    System.out.println("Enter the message for encryption: ");
    String message = System.console().readLine();
    String encryptedMsg=encrypt(message,key);
    System.out.println("String :"+message);
    System.out.println("Encrypted message:Cipher Text="+encryptedMsg);
    System.out.println("Decrypted message:Plain Text="
+decrypt(encryptedMsg,key));
}
}
```

### **OUTPUT:**

```
F:\bin>javac vigenerecipher1.java
F:\bin>java vigenerecipher1
Enter the key:
SECURITY
Enter the message for encryption:
CRYPTOGRAPHY
String :CRYPTOGRAPHY
Encrypted message:UVAJKWZPSTJS
Decrypted message:CRYPTOGRAPHY
```

### **RESULT:**

Thus the Vigenere cipher substitution technique was implemented and executed successfully.



Ex.No. : 2a

## RAIL FENCE CIPHER

Date :

### AIM:

To implement a rail fence transposition technique in Java.

### ALGORITHM:

1. In the rail fence cipher, the plaintext is written downwards and diagonally on successive "rails" of an imaginary fence, then moving up when we reach the bottom rail.
2. When we reach the top rail, the message is written downwards again until the whole plaintext is written out.
3. The message is then read off in rows.

### PROGRAM:

```
class railfenceCipherHelper
{
    int depth;
    String encode(String msg, int depth) throws Exception
    {
        int r = depth;
        int l = msg.length();
        int c = l / depth;
        int k = 0;
        char mat[][] = new char[r][c];
        String enc = "";
        for (int i = 0; i < c; i++)
        {
            for (int j = 0; j < r; j++)
            {
                if (k != l)
                { mat[j][i] = msg.charAt(k++); }
                else
                { mat[j][i] = 'X'; }
            }
        }
        for (int i = 0; i < r; i++)
        {
            for (int j = 0; j < c; j++)
            {
                enc += mat[i][j];
            }
        }
        return enc;
    }
    String decode(String encmsg, int depth) throws Exception
    {
        int r = depth;
        int l = encmsg.length();
        int c = l / depth;
        int k = 0;
        char mat[][] = new char[r][c];
```

```

String dec = "";
for (int i = 0; i < r; i++)
    {
    for (int j = 0; j < c; j++)
        {
        mat[i][j] = encmsg.charAt(k++);
        } }
for (int i = 0; i < c; i++)
    {
    for (int j = 0; j < r; j++)
        {
        dec += mat[j][i];
        } }
return dec;
} }
class railfencecipher
{
public static void main(String[] args) throws java.lang.Exception
{
    railfenceCipherHelper rf = new railfenceCipherHelper();
    String msg, enc, dec;
    System.out.println("Enter the Plain text: ");
    msg = System.console().readLine();
    int depth = 2;
    enc = rf.encode(msg, depth);
    dec = rf.decode(enc, depth);
    System.out.println("Plain Text:"+msg);
    System.out.println("Encrypted Message-Cipher Text:"+enc);
    System.out.printf("Decrypted Message- :"+dec);
}
}

```

### **OUTPUT:**

```

F:\bin>javac railfencecipher.java
F:\bin>java railfencecipher
Enter the Plain text:
paulinefreeda
Plain Text:paulinefreeda
Encrypted Message-Cipher Text:puiereaalnfed
Decrypted Message- :paulinefreeda

```

### **RESULT:**

Thus the Rail Fence Transposition Technique was implemented and executed successfully.

**Ex.No. : 2b ROW AND COLUMN TRANSFORMATION TECHNIQUE****Date :****AIM:**

To implement a rail fence transposition technique in Java.

**ALGORITHM:**

1. Consider the plain text hello world, and let us apply the simple columnar transposition technique as shown below

h	e	l	l
o	w	o	r
l	d		

2. The plain text characters are placed horizontally and the cipher text is created with vertical format as: **holewdlo lr.**
3. Now, the receiver has to use the same table to decrypt the cipher text to plain text.

**EXAMPLE:**

```

A U T H O R
1 6 5 2 3 4
-----
W E A R E D
I S C O V E
R E D S A V
E Y O U R S
E L F A B C

```

yields the cipher

W I R E E R O S U A E V A R B D E V S C A C D O F E S E Y L .

**PROGRAM:**

```

import java.util.*;
class TransCipher {
    public static void main(String args[]) {
        Scanner sc = new Scanner(System.in);
        System.out.println("Enter the plain text");
        String pl = sc.nextLine();
        sc.close();
        String s = "";
        int start = 0;
        for (int i = 0; i < pl.length(); i++) {
            if (pl.charAt(i) == ' ') {
                s = s + pl.substring(start, i);
                start = i + 1;
            }
        }
        s = s + pl.substring(start);
        System.out.print(s);
        System.out.println();
        // end of space deletion
    }
}

```

```

int k = s.length();
int l = 0;
int col = 4;
int row = s.length() / col;
char ch[][] = new char[row][col];
for (int i = 0; i < row; i++) {
    for (int j = 0; j < col; j++) {
        if (l < k) {
            ch[i][j] = s.charAt(l);
            l++;
        } else {
            ch[i][j] = '#';
        }
    }
}
char trans[][] = new char[col][row];
for (int i = 0; i < row; i++) {
    for (int j = 0; j < col; j++) {
        trans[j][i] = ch[i][j];
    }
}
for (int i = 0; i < col; i++) {
    for (int j = 0; j < row; j++) {
        System.out.print(trans[i][j]);
    }
}
System.out.println();
}
}

```

### OUTPUT:

F:\bin>javac TransCipher.java

F:\bin>java TransCipher

Enter the plain text

altrozcarshervin

altrozcarshervin

aorrلزvtchiraen

a	l	t	r
o	z	c	a
r	s	h	e
r	v	I	n

### RESULT:

Thus the Row and Column Transposition Technique was implemented and executed successfully.

**Ex.No. : 3**

## **DATA ENCRYPTION STANDARD (DES)**

**Date :**

### **AIM:**

To apply Data Encryption Standard (DES) Algorithm for a practical application like User Message Encryption.

### **ALGORITHM:**

1. Create a DES Key.
2. Create a Cipher instance from Cipher class, specify the following information and separated by a slash (/).
  - Algorithm name
  - Mode (optional)
  - Padding scheme (optional)
3. Convert String into Byte[] array format.
4. Make Cipher in encrypt mode, and encrypt it with Cipher.doFinal() method.
5. Make Cipher in decrypt mode, and decrypt it with Cipher.doFinal() method.

### **PROGRAM:**

```
import javax.swing.*;
import java.security.SecureRandom;
import javax.crypto.Cipher;
import javax.crypto.KeyGenerator;
import javax.crypto.SecretKey;
import javax.crypto.spec.SecretKeySpec;
import java.util.Random;
class DES
{
    byte[] skey=new byte[1000];
    String skeystring;
    static byte[] raw;
    String inputmessage,encrypteddata,decryptedmessage;
    public DES()
    {
        try
        {
            generatesymmetrickey();
            inputmessage=JOptionPane.showInputDialog(null, "Enter message to
            encrypt:");
            byte[] ibyte =inputmessage.getBytes();
            byte[] ebyte=encrypt(raw, ibyte);
            String encrypteddata=new String(ebyte);
            System.out.println("Encrypted message:"+encrypteddata);
            JOptionPane.showMessageDialog(null, "Encrypted
            Data"+ "\n"+encrypteddata);
            byte[] dbyte=decrypt(raw,ebyte);
            String decryptedmessage=new String(dbyte);
            System.out.println("Decrypted message:"+decryptedmessage);
        }
    }
}
```

```

        JOptionPane.showMessageDialog(null, "Decrypted Data
        "+"\\n"+decryptedmessage);
    }
    catch(Exception e)
    {
        System.out.println(e);
    }
}
void generatesymmetrickey()
{
    try
    {
        Random r = new Random();
        int num=r.nextInt(10000);
        String knum=String.valueOf(num);
        byte[] knumb=knump.getBytes();
        skey=getRawKey(knumb);
        skeystring=new String(skey);
        System.out.println("DES
        SymmerticKey="+skeystring);
    }
    catch(Exception e)
    {
        System.out.println(e);
    }
}

private static byte[] getRawKey(byte[] seed) throws Exception
{
    KeyGenerator kgen=KeyGenerator.getInstance("DES");
    SecureRandom sr =SecureRandom.getInstance("SHA1PRNG");
    sr.setSeed(seed);
    kgen.init(56,sr);
    SecretKey skey=kgen.generateKey();
    raw=skey.getEncoded();
    return raw;
}

private static byte[] encrypt(byte[] raw,byte[] clear) throws Exception
{
    SecretKey seckey = new SecretKeySpec(raw, "DES");
    Cipher cipher = Cipher.getInstance("DES");
    cipher.init(Cipher.ENCRYPT_MODE,seckey);
    byte[] encrypted=cipher.doFinal(clear);
    return encrypted;
}

private static byte[] decrypt(byte[] raw,byte[] encrypted) throws Exception
{
    SecretKey seckey = new SecretKeySpec(raw, "DES");

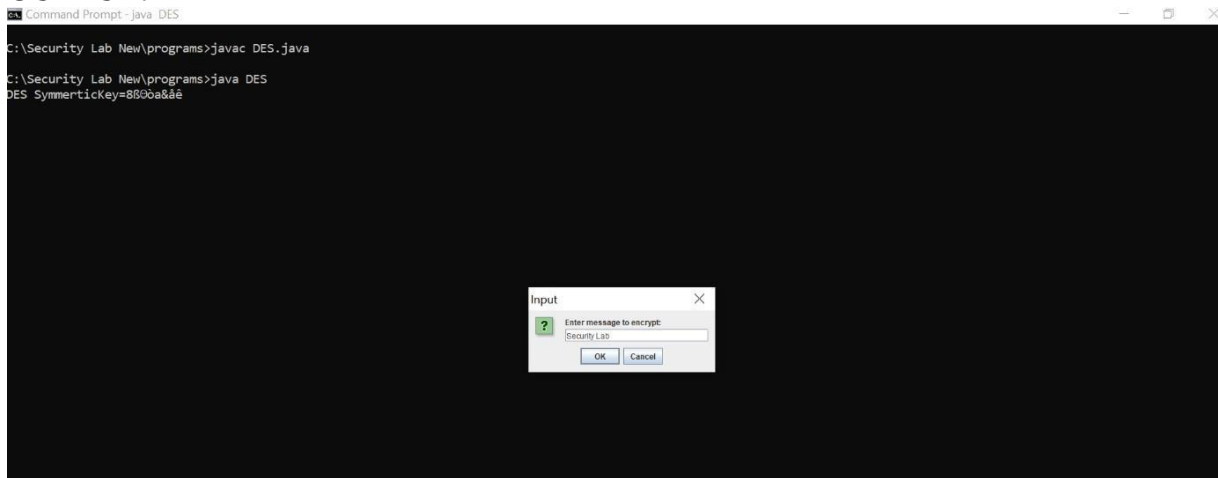
```

```

Cipher cipher = Cipher.getInstance("DES");
cipher.init(Cipher.DECRYPT_MODE,seckey);
byte[] decrypted = cipher.doFinal(encrypted);
return decrypted;
}
public static void main(String args[])
{
    DES des=new DES();
}
}

```

### OUTPUT:



### RESULT:

Thus the java program for applying Data Encryption Standard (DES) Algorithm for a practical application of User Message Encryption is written and executed successfully.

**Ex.No. : 4**

## **AES ALGORITHM**

**Date :**

### **AIM:**

To apply Advanced Encryption Standard (AES) Algorithm for a practical application like URL Encryption.

### **ALGORITHM:**

1. AES is based on a design principle known as a substitution–permutation.
2. AES does not use a Feistel network like DES, it uses variant of Rijndael.
3. It has a fixed block size of 128 bits, and a key size of 128, 192, or 256 bits.
4. AES operates on a  $4 \times 4$  column-major order array of bytes, termed the state

### **PROGRAM:**

```
import java.io.UnsupportedEncodingException;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
import java.util.Arrays;
import java.util.Base64;
import javax.crypto.Cipher;
import javax.crypto.spec.SecretKeySpec;

public class AES
{
    private static SecretKeySpec secretKey;
    private static byte[] key;
    public static void setKey(String myKey) {
        MessageDigest sha = null;
        try {
            key = myKey.getBytes("UTF-8");
            sha = MessageDigest.getInstance("SHA-1");
            key = sha.digest(key);
            key = Arrays.copyOf(key, 16);
            secretKey = new SecretKeySpec(key, "AES");
        } catch (NoSuchAlgorithmException e) {
            e.printStackTrace();
        } catch (UnsupportedEncodingException e) {
            e.printStackTrace();
        }
    }
    public static String encrypt(String strToEncrypt, String secret) {
        try {
            setKey(secret);
            Cipher cipher = Cipher.getInstance("AES/ECB/PKCS5Padding");
            cipher.init(Cipher.ENCRYPT_MODE, secretKey);
            return Base64.getEncoder().encodeToString(cipher.doFinal(strToEncrypt.getBytes("UTF-8")));
        } catch (Exception e) {
            System.out.println("Error while encrypting: " + e.toString());
        }
    }
}
```



```

        return null;
    }

    public static String decrypt(String strToDecrypt, String secret) {
        try {
            setKey(secret);
            Cipher cipher = Cipher.getInstance("AES/ECB/PKCS5PADDING");
            cipher.init(Cipher.DECRYPT_MODE, secretKey);
            return new String(cipher.doFinal(Base64.getDecoder().decode(strToDecrypt)));
        } catch (Exception e) {
            System.out.println("Error while decrypting: " + e.toString());
        }
        return null;
    }

    public static void main(String[] args) {

        System.out.println("Enter the secret key: ");
        String secretKey = System.console().readLine();

        System.out.println("Enter the original URL: ");
        String originalString = System.console().readLine();

        String encryptedString = AES.encrypt(originalString, secretKey);
        String decryptedString = AES.decrypt(encryptedString, secretKey);

        System.out.println("URL Encryption Using AES Algorithm\n -----");
        System.out.println("Original URL : " + originalString);
        System.out.println("Encrypted URL : " + encryptedString);
        System.out.println("Decrypted URL : " + decryptedString);
    }
}

```

### **OUTPUT:**

C:\Security Lab New\programs>java AES

Enter the secret key:

annaUniversity

Enter the original URL:

www.annauniv.edu

URL Encryption Using AES Algorithm

-----

Original URL : www.annauniv.edu

Encrypted URL : vibpFJW6Cvs5Y+L7t4N6YWWe07+JzS1d3CU2h3mEvEg=

Decrypted URL : www.annauniv.edu

### **RESULT:**

Thus the java program for applying Advanced Encryption Standard (AES) Algorithm for a practical application of URL encryption is written and executed successfully.

Ex.No. : 5

## RSA ALGORITHM

Date :

### AIM:

To implement a RSA algorithm using HTML and Javascript.

### ALGORITHM:

1. Choose two prime number p and q.
2. Compute the value of n and t.
3. Find the value of public key e.
4. Compute the value of private key d.
5. Do the encryption and decryption
  - a. Encryption is given as,  
$$c = t^e \text{ mod } n$$
  - b. Decryption is given as,  
$$t = c^d \text{ mod } n$$

### PROGRAM:

*rsa.html*

```
<html>
<head>
  <title>RSA Encryption</title>
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
</head>
<body>
  <center>
    <h1>RSA Algorithm</h1>
    <h2>Implemented Using HTML & Javascript</h2>
    <hr>
    <table>
      <tr>
        <td>Enter First Prime Number:</td>
        <td><input type="number" value="53" id="p"></td>
      </tr>
      <tr>
        <td>Enter Second Prime Number:</td>
        <td><input type="number" value="59" id="q"></p> </td>
      </tr>
      <tr>
        <td>Enter the Message(cipher text):<br>[A=1, B=2,...]</td>
        <td><input type="number" value="89" id="msg"></p> </td>
      </tr>
      <tr>
        <td>Public Key:</td>
        <td><p id="publickey"></p> </td>
      </tr>
      <tr>
        <td>Exponent:</td>
        <td><p id="exponent"></p> </td>
      </tr>
    </table>
  </center>
</body>
</html>
```

```

    <tr>
      <td>Private Key:</td>
      <td><p id="privatekey"></p></td>
    </tr>
    <tr>
      <td>Cipher Text:</td>
      <td><p id="ciphertext"></p> </td>
    </tr>
    <tr>
      <td><button onclick="RSA();">Apply RSA</button></td>
    </tr>
  </table> </center>
</body>
<script type="text/javascript">

```

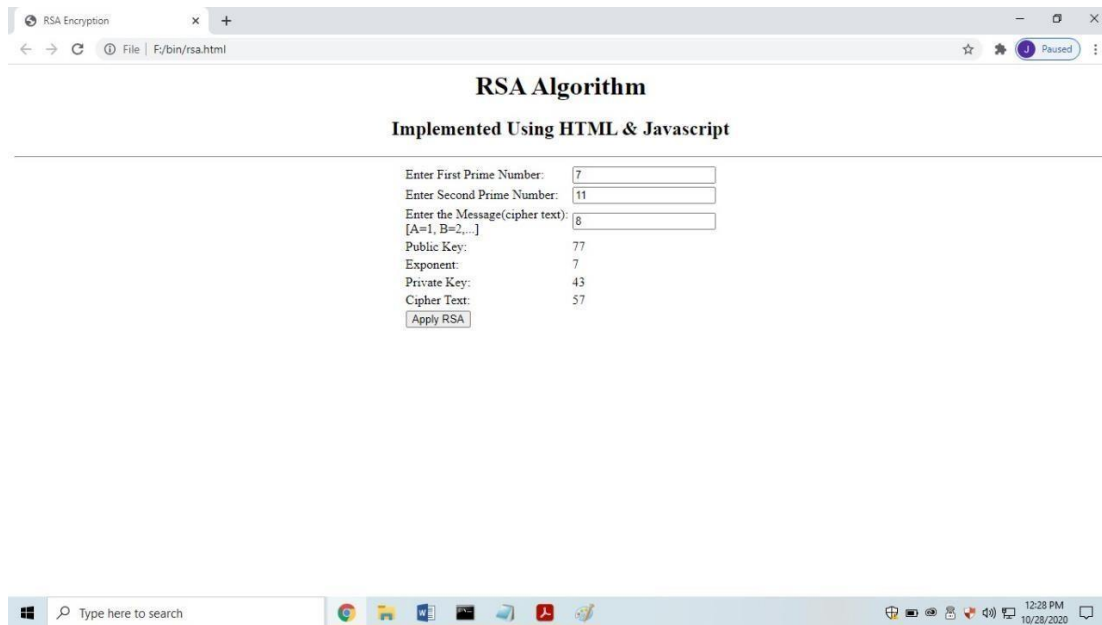
```

function RSA()
{
  var gcd, p, q, no, n, t, e, i, x;
  gcd = function (a, b) { return (!b) ? a : gcd(b, a % b); };
  p = document.getElementById('p').value;
  q = document.getElementById('q').value;
  no = document.getElementById('msg').value;
  n = p * q;
  t = (p - 1) * (q - 1);
  for (e = 2; e < t; e++)
  {
    if (gcd(e, t) == 1)
    {
      break;
    }
  }
  for (i = 0; i < 10; i++)
  {
    x = 1 + i * t
    if (x % e == 0)
    {
      d = x / e;
      break;
    }
  }
  ctt = Math.pow(no, e).toFixed(0);
  ct = ctt % n;
  dtt = Math.pow(ct, d).toFixed(0);
  dt = dtt % n;
  document.getElementById('publickey').innerHTML = n;
  document.getElementById('exponent').innerHTML = e;
  document.getElementById('privatekey').innerHTML = d;
  document.getElementById('ciphertext').innerHTML = ct;
}
</script>

```

</html>

## OUTPUT:



## RESULT:

Thus the RSA algorithm was implemented using HTML and Javascript and executed successfully.

**Ex.No. : 6      DIFFIE-HELLMAN KEY EXCHANGE ALGORITHM****Date :****AIM:**

To implement a Diffie-Hellman Key Exchange algorithm.

**ALGORITHM:**

1. Sender and receiver publicly agree to use a modulus  $p$  and base  $g$  which is a primitive root modulo  $p$ .
2. Sender chooses a secret integer  $x$  then sends Bob  $R1 = g^x \text{ mod } p$
3. Receiver chooses a secret integer  $y$ , then sends Alice  $R2 = g^y \text{ mod } p$
4. Sender computes  $k1 = B^x \text{ mod } p$
5. Receiver computes  $k2 = A^y \text{ mod } p$
6. Sender and Receiver now share a secret key.

**PROGRAM:**

```
import java.io.*;
import java.math.BigInteger;
class dh
{
public static void main(String[]args)throws IOException
{
BufferedReader br=new BufferedReader(new InputStreamReader(System.in));
System.out.println("Enter prime number:");
BigInteger p=new BigInteger(br.readLine());

System.out.print("Enter primitive root of "+p+":");
BigInteger g=new BigInteger(br.readLine());

System.out.println("Enter value for x less than "+p+":");
BigInteger x=new BigInteger(br.readLine());
BigInteger R1=g.modPow(x,p);
System.out.println("R1="+R1);

System.out.print("Enter value for y less than "+p+":");
BigInteger y=new BigInteger(br.readLine());
BigInteger R2=g.modPow(y,p);
System.out.println("R2="+R2);

BigInteger k1=R2.modPow(x,p);
System.out.println("Key calculated at Sender's side:"+k1);
BigInteger k2=R1.modPow(y,p);
System.out.println("Key calculated at Receiver's side:"+k2);
System.out.println("Diffie-Hellman secret key was calculated.");
}
}
```

## **OUTPUT**

```
C:\Security Lab New\programs>javac dh.java
```

```
C:\Security Lab New\programs>java dh
```

```
Enter prime number:
```

```
11
```

```
Enter primitive root of 11:7
```

```
Enter value for x less than 11:
```

```
3
```

```
R1=2
```

```
Enter value for y less than 11:6
```

```
R2=4
```

```
Key calculated at Sender's side:9
```

```
Key calculated at Receiver's side:9
```

```
Diffie-Hellman secret key was calculated.
```

## **RESULT:**

Thus the Diffie-Hellman key exchange algorithm was implemented and executed successfully.

Ex.No. : 7

## SHA-1 ALGORITHM

Date :

### AIM:

To calculate the message digest of a text using the SHA-1 algorithm in Java.

### ALGORITHM:

1. Append Padding bits.
2. Append Length - 64 bits are appended to the end.
3. Prepare Processing Functions.
4. Prepare Processing Constants.
5. Initialize Buffers.
6. Processing Message in 512-bit blocks (L blocks in total message).

### PROGRAM:

```
import java.util.Scanner;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
public class sha1
{
public static void main(String[] args)throws NoSuchAlgorithmException
{
Scanner sc = new Scanner(System.in);
System.out.println("Enter the String:");
String message = new String();
message = sc.next();
System.out.println("Message Digest is=");
System.out.println(sha1(message));
}
static String sha1(String input)throws NoSuchAlgorithmException
{
MessageDigest mDigest = MessageDigest.getInstance("SHA1");
byte[] result = mDigest.digest(input.getBytes());
StringBuffer sb = new StringBuffer();
for(int i = 0;i<result.length;i++)
{
sb.append(Integer.toString((result[i] & 0xff) + 0x100, 16).substring(1));
}
return sb.toString();
}
}
```

### OUTPUT:

```
C:\Security Lab New\programs>java sha1
Enter the String:
CORONA VIRUS DISEASE
Message Digest is=
7690b7ccb987f4b3f32d2b9e7e8a69db2d0ded02
```

### RESULT:

Thus the Secure Hash Algorithm (SHA-1) has been implemented and executed successfully.

**Ex.No. : 8**

## **DIGITAL SIGNATURE SCHEME**

**Date :**

### **AIM:**

To implement the signature scheme - Digital Signature Standard.

### **ALGORITHM:**

1. Declare the class and required variables.
2. Create the object for the class in the main program.
3. Access the member functions using the objects.
4. Implement the SIGNATURE SCHEME - Digital Signature Standard.
5. It uses a hash function.
6. The hash code is provided as input to a signature function along with a random number K generated for the particular signature.
7. The signature function also depends on the sender's private key.
8. The signature consists of two components.
9. The hash code of the incoming message is generated.
10. The hash code and signature are given as input to a verification function.

### **PROGRAM:**

```
import java.util.*;
import java.math.BigInteger;
class dsaAlg {
final static BigInteger one = new BigInteger("1");
final static BigInteger zero = new BigInteger("0");
public static BigInteger getNextPrime(String ans)
{
BigInteger test = new BigInteger(ans);
while (!test.isProbablePrime(99))
e:
{
test = test.add(one);
}
return test;
}
public static BigInteger findQ(BigInteger n)
{
BigInteger start = new BigInteger("2");
while (!n.isProbablePrime(99))
{
while (!(n.mod(start)).equals(zero)))
{
start = start.add(one);
}
n = n.divide(start);
}
return n;
}
```



```

public static BigInteger getGen(BigInteger p, BigInteger q,
Random r)
{
BigInteger h = new BigInteger(p.bitLength(), r);
h = h.mod(p);
return h.modPow((p.subtract(one)).divide(q), p);
}
public static void main (String[] args) throws
java.lang.Exception
{
Random randObj = new Random();
BigInteger p = getNextPrime("10600"); /* approximate
prime */
BigInteger q = findQ(p.subtract(one));
BigInteger g = getGen(p,q,randObj);
System.out.println(" \n simulation of Digital Signature Algorithm \n");
System.out.println(" \n global public key components are:\n");
System.out.println("\np is: " + p);
System.out.println("\nq is: " + q);
System.out.println("\ng is: " + g);
BigInteger x = new BigInteger(q.bitLength(), randObj);
x = x.mod(q);
BigInteger y = g.modPow(x,p);
BigInteger k = new BigInteger(q.bitLength(), randObj);
k = k.mod(q);
BigInteger r = (g.modPow(k,p)).mod(q);
BigInteger hashVal = new BigInteger(p.bitLength(),
randObj);
BigInteger kInv = k.modInverse(q);
BigInteger s = kInv.multiply(hashVal.add(x.multiply(r)));
s = s.mod(q);
System.out.println("\nsecret information are:\n");
System.out.println("x (private) is:" + x);
System.out.println("k (secret) is: " + k);
System.out.println("y (public) is: " + y);
System.out.println("h (rndhash) is: " + hashVal);
System.out.println("\n generating digital signature:\n");
System.out.println("r is : " + r);
System.out.println("s is : " + s);
BigInteger w = s.modInverse(q);
BigInteger u1 = (hashVal.multiply(w)).mod(q);
BigInteger u2 = (r.multiply(w)).mod(q);
BigInteger v = (g.modPow(u1,p)).multiply(y.modPow(u2,p));
v = (v.mod(p)).mod(q);
System.out.println("\nverifying digital signature (checkpoints)\n");
System.out.println("w is : " + w);
System.out.println("u1 is : " + u1);
System.out.println("u2 is : " + u2);
System.out.println("v is : " + v);
if (v.equals(r))

```

```
{
System.out.println("\nsuccess: digital signature is verified!\n " + r);
}
else
{
System.out.println("\n error: incorrect digital signature\n ");
}
}
}
```

### **OUTPUT:**

```
C:\Security Lab New\programs>javac dsaAlg.java
C:\Security Lab New\programs>java dsaAlg
simulation of Digital Signature Algorithm
global public key components are:
p is: 10601
q is: 53
g is: 6089
secret information are:
x (private) is:6
k (secret) is: 3
y (public) is: 1356
h (rndhash) is: 12619
generating digital signature:
r is : 2
s is :41
verifying digital signature (checkpoints):
w is : 22
u1 is : 4
u2 is : 44
v is : 2
success: digital signature is verified!
2
```

### **RESULT:**

Thus the Digital Signature Standard Signature Scheme has been implemented and executed successfully.

**Ex. No. : 9**

**INTRUSION DETECTION SYSTEM (IDS)**

**Date:**

**AIM:**

To demonstrate Intrusion Detection System (IDS) using Snort software tool.

**STEPS ON CONFIGURING AND INTRUSION DETECTION:**

1. Download Snort from the Snort.org website. (<http://www.snort.org/snort-downloads>)
2. Download Rules(<https://www.snort.org/snort-rules>). You must register to get the rules. (You should download these often)
3. Double click on the .exe to install snort. This will install snort in the “C:\Snort” folder. It is important to have WinPcap (<https://www.winpcap.org/install/>) installed
4. Extract the Rules file. You will need WinRAR for the .gz file.
5. Copy all files from the “rules” folder of the extracted folder. Now paste the rules into “C:\Snort\rules” folder.
6. Copy “snort.conf” file from the “etc” folder of the extracted folder. You must paste it into “C:\Snort\etc” folder. Overwrite any existing file. Remember if you modify your snort.conf file and download a new file, you must modify it for Snort to work.
7. Open a command prompt (cmd.exe) and navigate to folder “C:\Snort\bin” folder. ( at the Prompt, type cd\snort\bin)
8. To start (execute) snort in sniffer mode use following command:  
snort -dev -i 3  
-i indicates the interface number. You must pick the correct interface number. In my case, it is 3.  
-dev is used to run snort to capture packets on your network.

To check the interface list, use following command:

snort -W

```

Administrator: C:\Windows\system32\cmd.exe
Total Memory Allocated: 0
=====
Snort exiting
C:\Snort\bin>snort -W

  o''-~
  ''''
eam

-*> Snort! <*-
Version 2.9.6.0-WIN32 GRE (Build 47)
By Martin Roesch & The Snort Team: http://www.snort.org/snort/snort-t
eam
Copyright (C) 2014 Cisco and/or its affiliates. All rights reserved.
Copyright (C) 1998-2013 Sourcefire, Inc., et al.
Using PCRE version: 8.10 2010-06-25
Using ZLIB version: 1.2.3

Index   Physical Address      IP Address             Device Name            Description
-----
1       00:00:00:00:00:00      0000:0000:fe80:0000:0000:78d2:6299 \Device\
NPF_{45DAC1EF-70A2-4C33-B712-AE311620EB7A} VMware Virtual Ethernet Adapter
2       00:00:00:00:00:00      0000:0000:fe80:0000:0000:bca3:2f66 \Device\
NPF_{C355D233-3D77-484F-A344-65626159980E} VMware Virtual Ethernet Adapter
3       00:00:00:00:00:00      0000:0000:fe80:0000:0000:ada3:46c9 \Device\
NPF_{3264BC0F-4BF2-49C5-B5D9-A12EFE40F17C} Microsoft

C:\Snort\bin>

```

### Finding an interface

You can tell which interface to use by looking at the Index number and finding Microsoft. As you can see in the above example, the other interfaces are for VMWare. My interface is 3.

**9.** To run snort in IDS mode, you will need to configure the file “snort.conf” according to your network environment.

**10.** To specify the network address that you want to protect in snort.conf file, look for the following line.

var HOME\_NET 192.168.1.0/24 (You will normally see any here)

**11.** You may also want to set the addresses of DNS\_SERVERS, if you have some on your network.

Example:

example snort

**12.** Change the RULE\_PATH variable to the path of rules folder.

```
var RULE_PATH c:\snort\rules
```

path to rules

**13.** Change the path of all library files with the name and path on your system. and you must change the path of snort\_dynamicpreprocessorvariable.

```
C:\Snort\lib\snort_dynamicpreprocessor
```

You need to do this to all library files in the “C:\Snort\lib” folder. The old path might be: “/usr/local/lib/...”. you will need to replace that path with your system path. Using

```
C:\Snort\lib
```

**14.** Change the path of the “dynamicengine” variable value in the “snort.conf” file..

Example:

```
dynamicengine C:\Snort\lib\snort_dynamicengine\sf_engine.dll
```

15 Add the paths for “include classification.config” and “include reference.config” files.

```
include c:\snort\etc\classification.config
```

```
include c:\snort\etc\reference.config
```

16. Remove the comment (#) on the line to allow ICMP rules, if it is commented with a #.

```
include $RULE_PATH/icmp.rules
```

17. You can also remove the comment of ICMP-info rules comment, if it is commented.

```
include $RULE_PATH/icmp-info.rules
```

18. To add log files to store alerts generated by snort, search for the “output log” test in snort.conf and add the following line:

```
output alert_fast: snort-alerts.ids
```

19. Comment (add a #) the whitelist \$WHITE\_LIST\_PATH/white\_list.rules and the blacklist

Change the nested\_ip inner , \ to nested\_ip inner #, \

20. Comment out (#) following lines:

```
#preprocessor normalize_ip4
```

```
#preprocessor normalize_tcp: ips ecn stream
```

```
#preprocessor normalize_icmp4
```

```
#preprocessor normalize_ip6
```

```
#preprocessor normalize_icmp6
```

21. Save the “snort.conf” file.

22. To start snort in IDS mode, run the following command:

```
snort -c c:\snort\etc\snort.conf -l c:\snort\log -i 3
```

(Note: 3 is used for my interface card)

If a log is created, select the appropriate program to open it. You can use WordPad or NotePad++ to read the file.

To generate Log files in ASCII mode, you can use following command while running snort in IDS mode:

```
snort -A console -i3 -c c:\Snort\etc\snort.conf -l c:\Snort\log -K ascii
```

23. Scan the computer that is running snort from another computer by using PING or NMap (ZenMap).

After scanning or during the scan you can check the snort-alerts.ids file in the log folder to insure it is logging properly. You will see IP address folders appear.

Snort monitoring traffic –

```
Administrator: C:\Windows\system32\cmd.exe - snort -A console -i3 -c c:\Snort\etc\snort.conf -l c...
Rules Engine: SF_SNORT_DETECTION_ENGINE Version 2.1 <Build 1>
Preprocessor Object: SF_SSLPP Version 1.1 <Build 4>
Preprocessor Object: SF_SSH Version 1.1 <Build 3>
Preprocessor Object: SF_SMTP Version 1.1 <Build 9>
Preprocessor Object: SF_SIP Version 1.1 <Build 1>
Preprocessor Object: SF_SDF Version 1.1 <Build 1>
Preprocessor Object: SF_REPUTATION Version 1.1 <Build 1>
Preprocessor Object: SF_POP Version 1.0 <Build 1>
Preprocessor Object: SF_MODBUS Version 1.1 <Build 1>
Preprocessor Object: SF_IMAP Version 1.0 <Build 1>
Preprocessor Object: SF_GTP Version 1.1 <Build 1>
Preprocessor Object: SF_FIPELNET Version 1.2 <Build 13>
Preprocessor Object: SF_DNS Version 1.1 <Build 4>
Preprocessor Object: SF_DNP3 Version 1.1 <Build 1>
Preprocessor Object: SF_DGERPG2 Version 1.0 <Build 3>
Commencing packet processing (pid=2164)
03/29-23:53:16.033913 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56506
03/29-23:53:16.035372 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56507
03/29-23:53:16.036479 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56508
03/29-23:53:16.037093 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56509
03/29-23:53:16.142921 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:302
03/29-23:53:16.194409 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56510
03/29-23:53:16.677078 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:302
03/29-23:53:16.808301 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56513
03/29-23:53:16.944237 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56514
03/29-23:53:16.948012 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56515
03/29-23:53:16.953992 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56516
03/29-23:53:16.967744 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56517
03/29-23:53:16.982649 [**] [120:3:1] (http_inspect) NO CONTENT-LENGTH OR TRANSF
ER-ENCODING IN HTTP RESPONSE [**] [Classification: Unknown Traffic] [Priority: 3
] <TCP> 192.168.1.1:80 -> 192.168.1.20:56518
```

**RESULT:**

Thus the Intrusion Detection System(IDS) has been demonstrated using the Open Source Intrusion Detection Tool Snort.

Ex.No. : 10

## EXPLORING N-STALKER

Date :

### AIM:

To download the N-Stalker Vulnerability Assessment Tool and exploring the features.

### EXPLORING N-STALKER:

- N-Stalker Web Application Security Scanner is a Web security assessment tool.
- It incorporates with a well-known N-Stealth HTTP Security Scanner and 35,000 Web attack signature database.
- This tool also comes in both free and paid version.
- Before scanning the target, go to “License Manager” tab, perform the update.
- Once update, you will note the status as up to date.
- You need to download and install N-Stalker from [www.nstalker.com](http://www.nstalker.com).

1. Start N-Stalker from a Windows computer. The program is installed under Start ⇨ Programs ⇨ N-Stalker ⇨ N-Stalker Free Edition.
2. Enter a host address or a range of addresses to scan.
3. Click Start Scan.
4. After the scan completes, the N-Stalker Report Manager will prompt
5. you to select a format for the resulting report as choose Generate HTML.
6. Review the HTML report for vulnerabilities.



Now goto “Scan Session”, enter the target URL.

In scan policy, you can select from the four options,

- Manual test which will crawl the website and will be waiting for manual attacks.
- full xss assessment
- owasp policy

- Web server infrastructure analysis.

Once, the option has been selected, next step is “Optimize settings” which will crawl the whole website for further analysis.

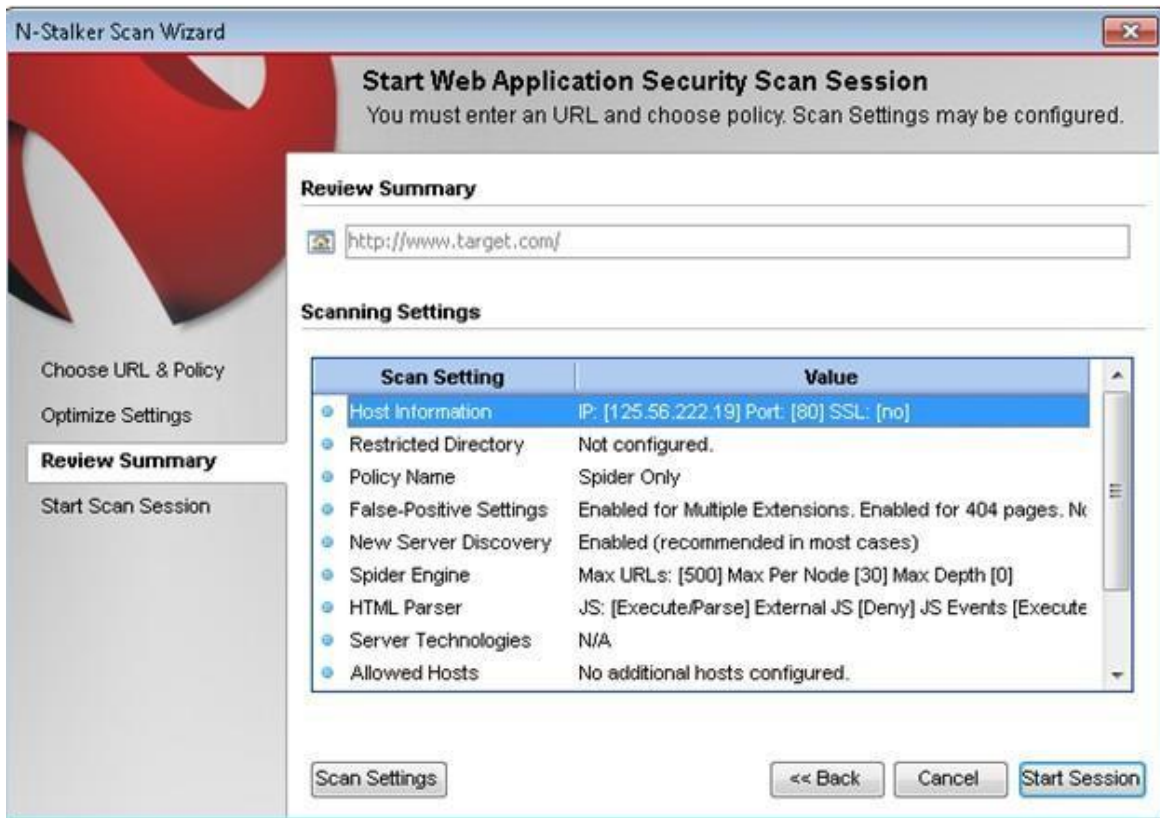
In review option, you can get all the information like host information, technologies used, policy name, etc.

The screenshot shows the 'N-Stalker Scan Wizard' window with the title 'Start Web Application Security Scan Session'. Below the title, it says 'You must enter an URL and choose policy. Scan Settings may be configured.' The window is divided into several sections:

- Enter Web Application URL:** A text input field containing 'www.target.com'. Below it, a note says '(E.g: http://www.example.tl/, https://www.test.tl/VirtualDirectory/, etc)'. To the left of this section is a sidebar with a red and white graphic and the text 'Choose URL & Policy'.
- Choose Scan Policy:** A dropdown menu currently showing '(choose one)'.
- Load Scan Session:** A dropdown menu currently showing '(choose one)'. Below it, a note says '(You may load scan settings from previously saved scan sessions)'. To the left of this section is a sidebar with the text 'Optimize Settings', 'Review Summary', and 'Start Scan Session'.
- Load Spider Data:** A dropdown menu currently showing 'Not available in N-Stalker Free Edition'. Below it, a note says '(You may load spider data from previously saved scan sessions)'. There is also a checkbox labeled 'Use local cache from previously saved session (Avoid new web crawling)' which is currently unchecked.

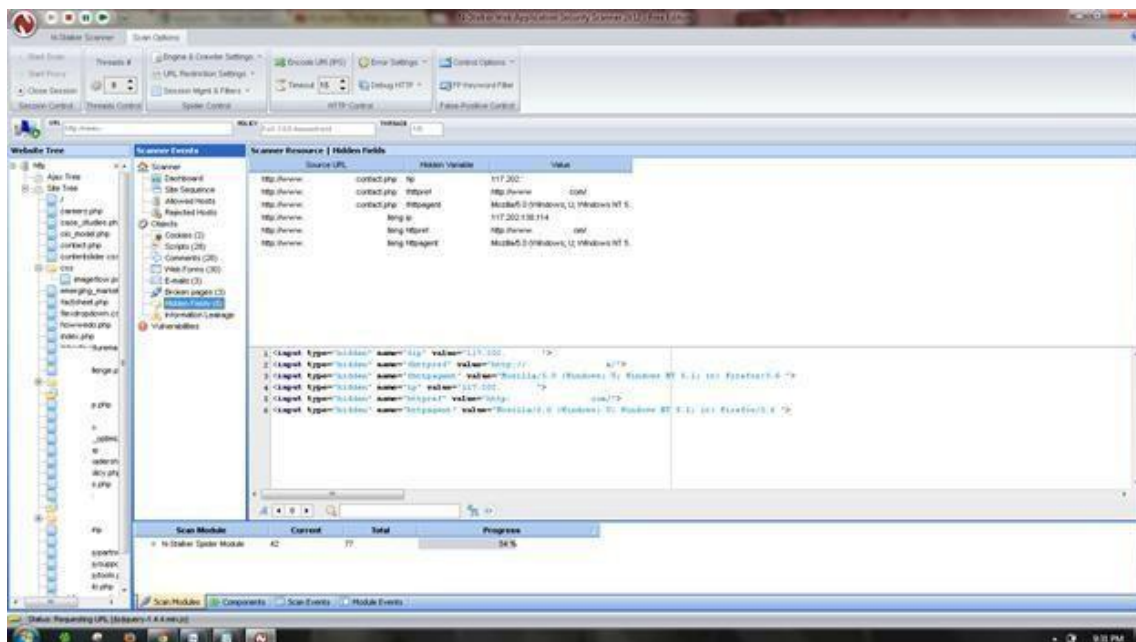
At the bottom of the window, there are three buttons: 'Scan Settings', 'Cancel', and 'Next >>'.



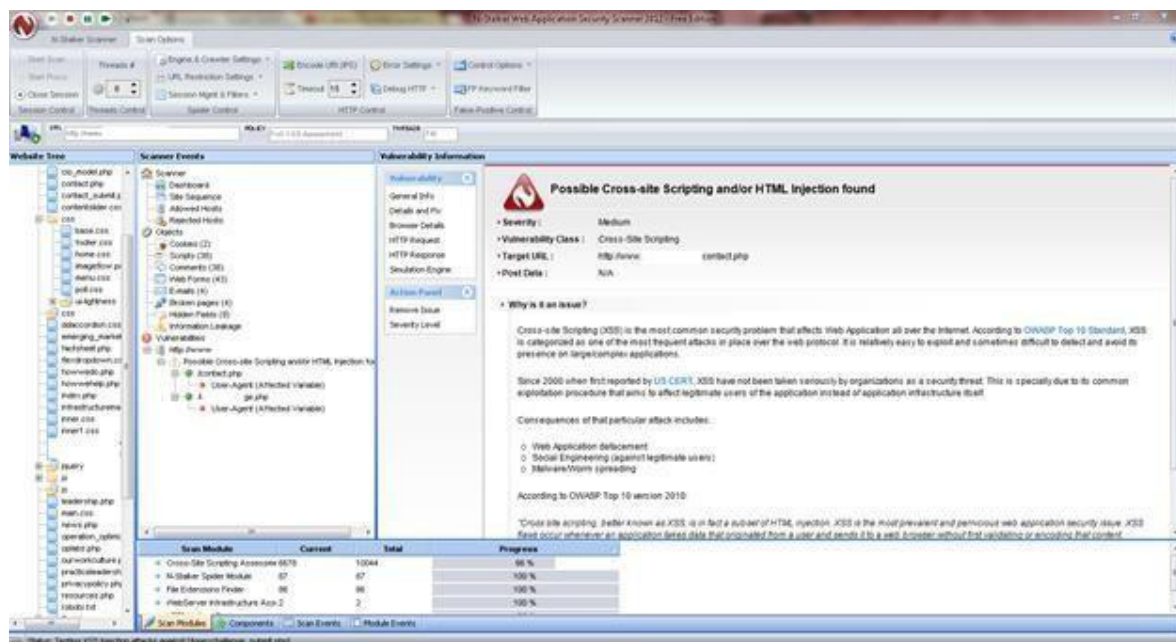


Once done, start the session and start the scan.

The scanner will crawl the whole website and will show the scripts, broken pages, hidden fields, information leakage, web forms related information which helps to analyze further.



Once the scan is completed, the NStalker scanner will show details like severity level, vulnerability class, why is it an issue, the fix for the issue and the URL which is vulnerable to the particular vulnerability?



## RESULT:

Thus the N-Stalker Vulnerability Assessment tool has been downloaded, installed and the features has been explored by using a vulnerable website.

**Ex.No.: 11a**

## **DEFEATING MALWARE - BUILDING TROJANS**

**Date :**

### **AIM:**

To build a Trojan and know the harmness of the Trojan malwares in a computer system.

### **PROCEDURE:**

1. Create a simple Trojan by using Windows Batch File (*.bat*)
2. Type these below code in notepad and save it as **Trojan.bat**
3. Double click on *Trojan.bat* file.
4. When the Trojan code executes, it will open MS-Paint, Notepad, Command Prompt, Explorer, etc., infinitely.
5. Restart the computer to stop the execution of this Trojan.

### **TROJAN:**

- In computing, a Trojan horse, or Trojan, is any malware which misleads users of its true intent.
- Trojans are generally spread by some form of social engineering, for example where a user is duped into executing an email attachment disguised to appear not suspicious, (e.g., a routine form to be filled in), or by clicking on some fake advertisement on social media or anywhere else.
- Although their payload can be anything, many modern forms act as a backdoor, contacting a controller which can then have unauthorized access to the affected computer.
- Trojans may allow an attacker to access users' personal information such as banking information, passwords, or personal identity.
- *Example: Ransomware* attacks are often carried out using a *trojan*.

### **CODE:**

***Trojan.bat***

```
@echo off
```

```
:x
```

```
start mspaint
```

```
start notepad
```

```
start cmd
```

```
start explorer
```

```
start control
```

```
start calc
```

```
goto x
```

### **OUTPUT:**

(MS-Paint, Notepad, Command Prompt, Explorer will open infinitely)

### **RESULT:**

Thus a trojan has been built and the harmness of the trojan viruses has been explored.

**Ex.No. : 11b**

## **DEFEATING MALWARE - ROOTKIT HUNTER**

**Date :**

### **AIM:**

To install a rootkit hunter and find the malwares in a computer.

### **ROOTKIT HUNTER:**

- rkhunter (Rootkit Hunter) is a Unix-based tool that scans for rootkits, backdoors and possible local exploits.
- It does this by comparing SHA-1 hashes of important files with known good ones in online databases, searching for default directories (of rootkits), wrong permissions, hidden files, suspicious strings in kernel modules, and special tests for Linux and FreeBSD.
- rkhunter is notable due to its inclusion in popular operating systems (Fedora, Debian, etc.)
- The tool has been written in Bourne shell, to allow for portability. It can run on almost all UNIX-derived systems.

### **GMER ROOTKIT TOOL:**

- GMER is a software tool written by a Polish researcher Przemysław Gmerek, for detecting and removing rootkits.
- It runs on Microsoft Windows and has support for Windows NT, 2000, XP, Vista, 7, 8 and 10. With version 2.0.18327 full support for Windows x64 is added.

## Step 1

**GMER** <http://www.gmer.net>  
all your rootkits are belong to us [\*]

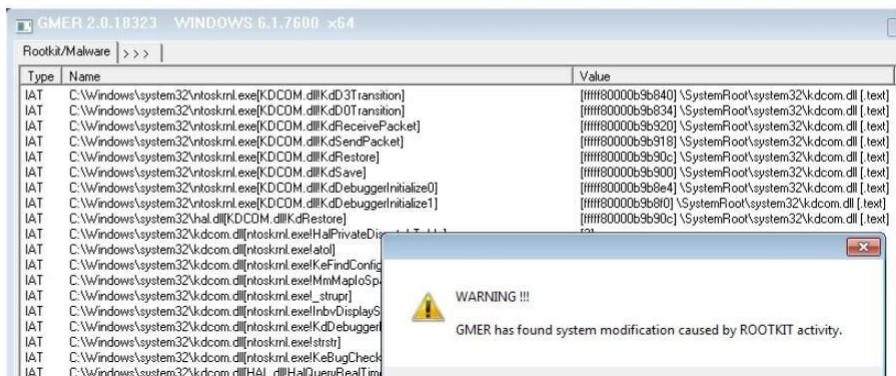
Start  
Files  
News  
Rootkits  
FAQ  
Contact

### Start

GMER is an application that detects and removes rootkits.

It scans for:

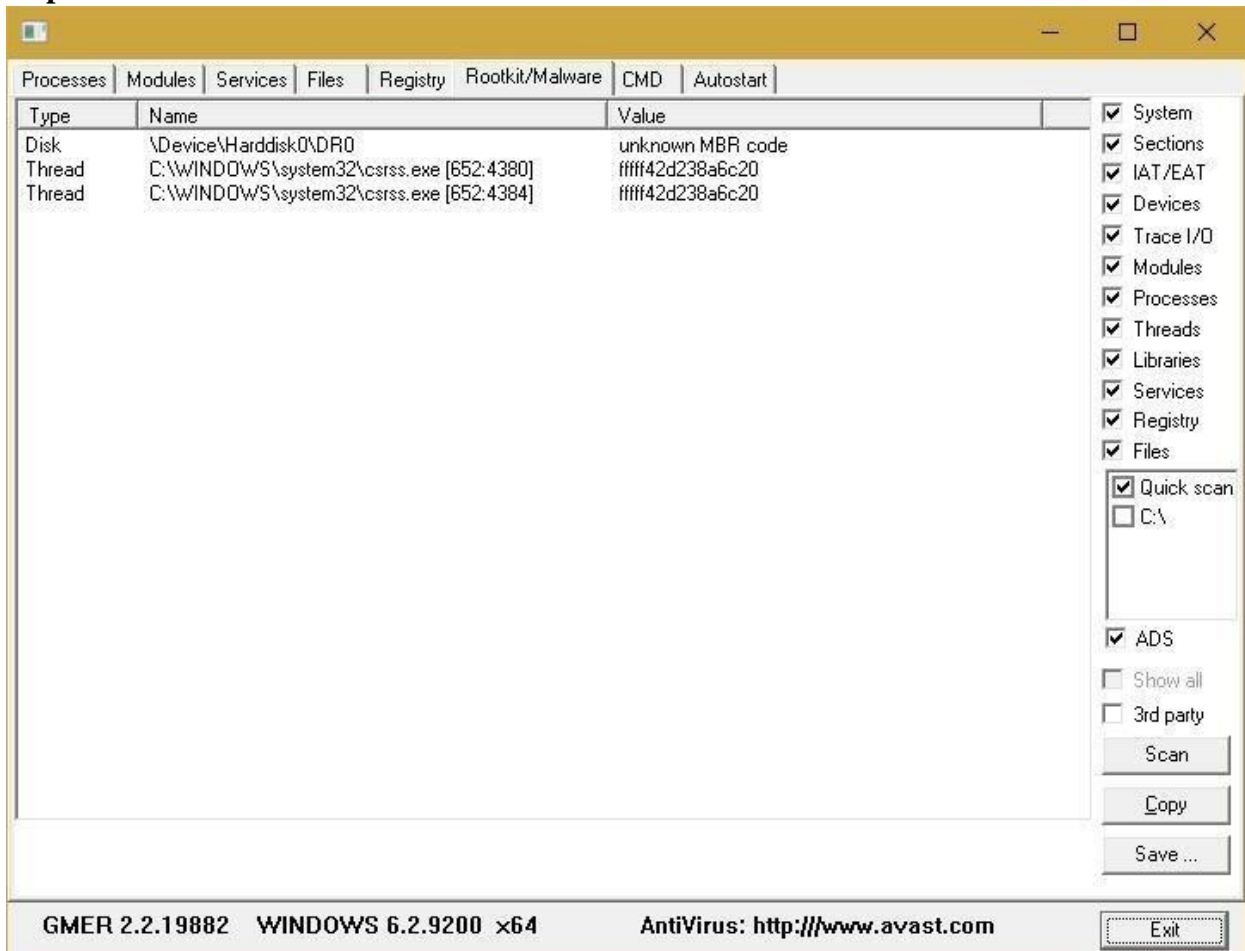
- hidden processes
- hidden threads
- hidden modules
- hidden services
- hidden files
- hidden disk sectors (MBR)
- hidden Alternate Data Streams
- hidden registry keys
- drivers hooking SSDT
- drivers hooking IDT
- drivers hooking IRP calls
- inline hooks



Visit GMER's website (see Resources) and download the GMER executable.

Click the "Download EXE" button to download the program with a random file name, as some rootkits will close "gmer.exe" before you can open it.

## Step 2



Double-click the icon for the program.

Click the "Scan" button in the lower-right corner of the dialog box. Allow the program to scan your entire hard drive.

### Step 3

Rootkit/Malware >>>

Type	Name	Value
Thread	C:\WINDOWS\system32\csrss.exe [732:772]	ffff80fea536c20
Thread	C:\WINDOWS\system32\backgroundTaskHost.exe ...	00007faa9da48e0
Thread	C:\WINDOWS\system32\backgroundTaskHost.exe ...	00007fab16025a0
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[AUTO] CDPUserSvc_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[MANUAL] MessagingService_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[AUTO] OneSyncSvc_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[MANUAL] PimIndexMaintenanceSvc_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[MANUAL] UnistoreSvc_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[MANUAL] UserDataSvc_554df
Service	C:\WINDOWS\system32\svchost.exe [**** hidden ****]	[MANUAL] WpnUserService_554df

**WARNING !!!**  
GEMER has found system modification, which might have been caused by ROOTKIT activity.  
Do you want to fully scan your system ?  
Oui Non

GMER 2.2.19882 WINDOWS 6.2.9200 x64 AntiVirus: <http://www.avast.com> Exit

When the program completes its scan, select any program or file listed in red. Right-click it and select "Delete."

If the red item is a service, it may be protected. Right-click the service and select "Disable." Reboot your computer and run the scan again, this time selecting "Delete" when that service is detected.

When your computer is free of Rootkits, close the program and restart your PC.

### RESULT:

A rootkit hunter software tool *gmer* has been installed and the rootkits have been detected.