ARMIET
ALAMURI RATNAMALA
INSTITUTE OF ENGINEERING AND TECHNOLOGY
(Run by Koti Vidya Charitable Trust)

LABORATORY MANUAL CONTENTS

This manual is intended for the Third year students of Information Technology in the subject of System And Web Security. This manual typically contains practical/Lab Sessions related Software Engineering covering various aspects related the subject to enhanced understanding.

Although, as per the syllabus, study of Vulnerabilities ,OS, Authentication, Web Security is prescribed, we have made the efforts to cover various aspects of System and web securities covering different Techniques to prevent and secured software to develop the project which contains most important criteria of security etc. elaborative understandable concepts and conceptual visualization.

Students are advised to thoroughly go though this manual rather than only topics mentioned in the syllabus as practical aspects are the key to understanding and conceptual visualization of theoretical aspects covered in the books.

Good Luck for your Enjoyable Laboratory Sessions

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Do's and Don'ts in Laboratory:

1. Make entry in the Log Book as soon as you enter the Laboratory.

2. All the students should sit according to their roll numbers starting from their left to right.

3. All the students are supposed to enter the terminal number in the log book.

4. Do not change the terminal on which you are working.

5. All the students are expected to get at least the algorithm of the program/concept to be implemented.

6. Strictly observe the instructions given by the teacher/Lab Instructor.

Instruction for STUDENTS

1. Submission related to whatever lab work has been completed should be done during the next lab session. The immediate arrangements for printouts related to submission on the day of practical assignments.

2. Students should be taught for taking the printouts under the observation of lab teacher.

3. The promptness of submission should be encouraged by way of marking and evaluation patterns that will benefit the sincere students.

PREREQUISITES

Define Software.

Define System.

What Do you mean by security?

What is Vulnerabilities?

What is Virus?

What are the different types of virus?

What Is Network & how to maintain its security.

What is IP Address?

What is SQL injection?

What is strong and Weak Security?

What is CAPTCHA?

What are the different types of attacks?

SUBJECT INDEX

EXPERIMENT NO 1

AIM :- To Design and implement the RSA cryptosystem.

THEORY:- **RSA** is one of the first practicable public-key cryptosystems and is widely used for secure data transmission. In such a cryptosystem, the encryption key is public and differs from the decryption key which is kept secret. In RSA, this asymmetry is based on the practical difficulty of factoring the product of two large prime numbers, the factoring problem. RSA stands for Ron Rivest, Adi Shamir andLeonard Adleman, who first publicly described the algorithm in 1977. Clifford Cocks, an English mathematician, had developed an equivalent system in 1973, but it was not declassified until 1997.

A user of RSA creates and then publishes a public key based on the two large prime numbers, along with an auxiliary value. The prime numbers must be kept secret. Anyone can use the public key to encrypt a message, but with currently published methods, if the public key is large enough, only someone with knowledge of the prime numbers can feasibly decode the message. Breaking RSA encryption is known as the RSA problem; whether it is as hard as the factoring problem remains an open question.

Key generation

RSA involves a *public key* and a *private key.* The public key can be known by everyone and is used for encrypting messages. Messages encrypted with the public key can only be decrypted in a reasonable amount of time using the private key. The keys for the RSA algorithm are generated the following way:

1. Choose two distinct prime numbers p and q.

- For security purposes, the integers p and q should be chosen at random, and should be of similar bit-length. Prime integers can be efficiently found using a primality test.

2. Compute $n = pq$.

- n is used as the modulus for both the public and private keys. Its length, usually expressed in bits, is the key length.

3. Compute $\varphi(n) = \varphi(p)\varphi(q) = (p - 1)(q - 1) = n - (p + q - 1)$, where φ is Euler's totient function.

4. Choose an integer e such that $1 < e < \varphi(n)$ and $\gcd(e, \varphi(n)) = 1$; i.e., e and $\varphi(n)$ are coprime.

- e is released as the public key exponent.
- e having a short bit-length and small Hamming weight results in more efficient encryption – most commonly $2^{16} + 1 = 65{,}537$. However, much smaller values of e (such as 3) have been shown to be less secure in some settings.

5. Determine d as $d \equiv e^{-1} \pmod{\varphi(n)}$; i.e., d is the multiplicative inverse of e (modulo $\varphi(n)$).

- This is more clearly stated as: solve for d given $d \cdot e \equiv 1 \pmod{\varphi(n)}$
- This is often computed using the extended Euclidean algorithm. Using the pseudocode in the *Modular integers* section, inputs a and n correspond to e and $\varphi(n)$, respectively.
- d is kept as the private key exponent.

The *public key* consists of the modulus n and the public (or encryption) exponent e. The *private key* consists of the modulus n and the private (or decryption) exponent *d*, which must be kept secret. *p*, *q*, and φ(*n*) must also be kept secret because they can be used to calculate *d*.

- An alternative, used by PKCS#1, is to choose *d* matching *de* ≡ 1 (mod λ) with λ = lcm(*p* − 1, *q* − 1), where lcm is the least common multiple. Using λ instead of φ(*n*) allows more choices for *d*. λ can also be defined using the Carmichael function, λ(*n*).
- The ANSI X9.31 standard prescribes, IEEE 1363 describes, and PKCS#1 allows, that *p* and *q* match additional requirements: being strong primes, and being different enough that Fermat factorization fails.

Encryption

Alice transmits her public key (n, e) to Bob and keeps the private key d secret. Bob then wishes to send message M to Alice.

He first turns M into an integer m, such that $0 \leq m < n$ by using an agreed-upon reversible protocol known as a padding scheme. He then computes the ciphertext $c$corresponding to

$$c \equiv m^e \pmod{n}$$

This can be done efficiently, even for 500-bit numbers, using Modular exponentiation. Bob then transmits c to Alice.

Note that at least nine values of m will yield a ciphertext c equal to m, but this is very unlikely to occur in practice.

Decryption

Alice can recover m from c by using her private key exponent d via computing

$$m \equiv c^d \pmod{n}$$

Given m, she can recover the original message M by reversing the padding scheme.

ALGORITHM:-

1) Pick two large prime numbers p and q, p != q;
2) Calculate n = p × q;
3) Calculate ø (n) = (p − 1)(q − 1);
4) Pick e, so that gcd(e, ø (n)) = 1, 1 < e < ø (n);
5) Calculate d, so that d · e mod ø (n) = 1, i.e., d is the multiplicative inverse of e in mod ø (n);
6) Get public key as KU = {e, n};
7) Get private key as KR = {d, n}.

Encryption

For plaintext block P < n, its ciphertext C = P^e (mod n).

Decryption

For ciphertext block C, its plaintext is P = C^d (mod n).

CONCLUSION:- Hence we have studied and successfully implemented RSA algorithm.

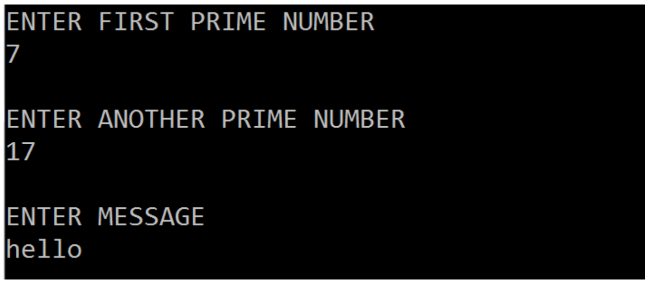
PROGRAM:-

RSA Cryptosystem

```
#include<stdio.h>
#include<conio.h>
#include<stdlib.h>
#include<math.h>
#include<string.h>

long int p,q,n,t,flag,e[100],d[100],temp[100],j,m[100],en[100],i;
char msg[100];
int prime(long int);
void ce();
long int cd(long int);
void encrypt();
void decrypt();
void main()
{
clrscr();
printf("\nENTER FIRST PRIME NUMBER\n");
scanf("%d",&p);
flag=prime(p);
if(flag==0)
{
   printf("\nWRONG INPUT\n");
   getch();
   exit(1);
}
printf("\nENTER ANOTHER PRIME NUMBER\n");
scanf("%d",&q);
flag=prime(q);
if(flag==0||p==q)
{
   printf("\nWRONG INPUT\n");
   getch();
   exit(1);
}
```

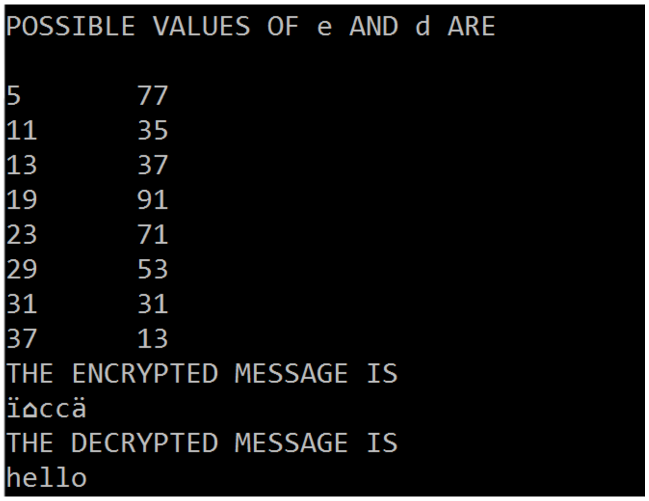
```
printf("\nENTER MESSAGE\n");
fflush(stdin);
scanf("%s",msg);
for(i=0;msg[i]!=NULL;i++)
m[i]=msg[i];
n=p*q;
t=(p-1)*(q-1);
ce();
printf("\nPOSSIBLE VALUES OF e AND d ARE\n");
for(i=0;i<j-1;i++)
printf("\n%ld\t%ld",e[i],d[i]);
encrypt();
decrypt();
getch();
}
int prime(long int pr)
{
int i;
j=sqrt(pr);
for(i=2;i<=j;i++)
{
    if(pr%i==0)
    return 0;
}
return 1;
}
void ce()
{
int k;
k=0;
for(i=2;i<t;i++)
{
    if(t%i==0)
    continue;
    flag=prime(i);
    if(flag==1&&i!=p&&i!=q)
    {
        e[k]=i;
        flag=cd(e[k]);
        if(flag>0)
        {
            d[k]=flag;
            k++;
        }
        if(k==99)
        break;
    }
}
}
long int cd(long int x)
{
long int k=1;
while(1)
{
    k=k+t;
    if(k%x==0)
    return(k/x);
}
}
void encrypt()
{
long int pt,ct,key=e[0],k,len;
i=0;
len=strlen(msg);
while(i!=len)
{
    pt=m[i];
    pt=pt-96;
    k=1;
    for(j=0;j<key;j++)
    {
        k=k*pt;
        k=k%n;
    }
    temp[i]=k;
    ct=k+96;
    en[i]=ct;
    i++;
}
en[i]=-1;
printf("\nTHE ENCRYPTED MESSAGE IS\n");
for(i=0;en[i]!=-1;i++)
printf("%c",en[i]);
}
void decrypt()
{
long int pt,ct,key=d[0],k;
i=0;
while(en[i]!=-1)
{
    ct=temp[i];
    k=1;
    for(j=0;j<key;j++)
    {
        k=k*ct;
        k=k%n;
    }
    pt=k+96;
    m[i]=pt;
    i++;
}
m[i]=-1;
printf("\nTHE DECRYPTED MESSAGE IS\n");
for(i=0;m[i]!=-1;i++)
printf("%c",m[i]);
}
```

//Output Of the above program:-



```
ENTER FIRST PRIME NUMBER
7

ENTER ANOTHER PRIME NUMBER
17

ENTER MESSAGE
hello
```

RSA Inputs



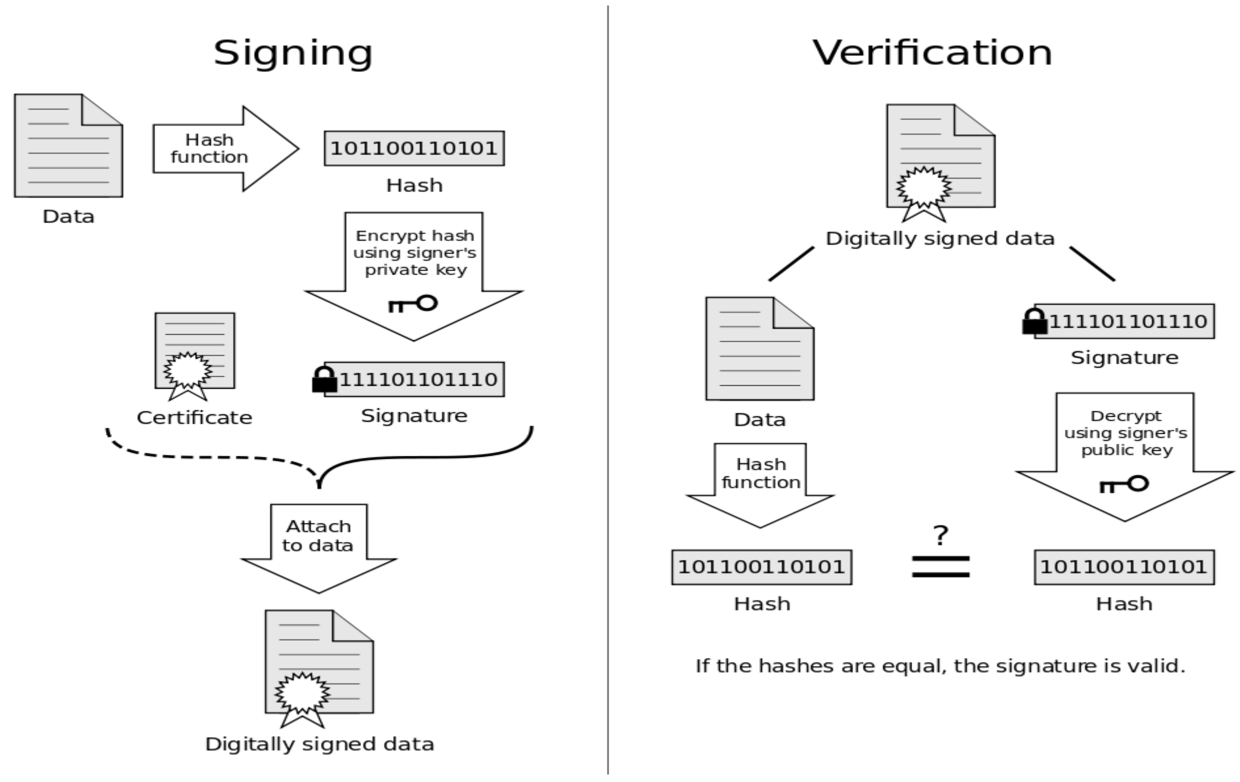
```
POSSIBLE VALUES OF e AND d ARE

5       77
11      35
13      37
19      91
23      71
29      53
31      31
37      13
THE ENCRYPTED MESSAGE IS
ï⌂ccä
THE DECRYPTED MESSAGE IS
hello
```

RSA Result

EXPERIMENT NO 2

AIM :- To Study Digital signature scheme using RSA.

THEORY:- A **digital signature** is a mathematical scheme for demonstrating the authenticity of a digital message or document. A valid digital signature gives a recipient reason to believe that the message was created by a known sender, such that the sender cannot deny having sent the message (authentication and non-repudiation) and that the message was not altered in transit (integrity). Digital signatures are commonly used for software distribution, financial transactions, and in other cases where it is important to detect forgery or tampering.



How it Works??

To create RSA signature keys, generate an RSA key pair containing a modulus *N* that is the product of two large primes, along with integers *e* and *d* such that $e\, d \equiv 1 \pmod{\varphi(N)}$, where φ is the Euler phi-function. The signer's public key consists of *N* and *e*, and the signer's secret key contains *d*.

To sign a message *m*, the signer computes $\sigma \equiv m^d \pmod{N}$. To verify, the receiver checks that $\sigma^e \equiv m \pmod{N}$.

As noted earlier, this basic scheme is not very secure. To prevent attacks, one can first apply a cryptographic hash function to the message *m* and then apply the RSA algorithm described above to the result. This approach can be proven secure in the so-called random oracle model Most early signature schemes were of a similar type: they involve the use of atrapdoor permutation, such as the RSA function, or in the case of the Rabin signature scheme, computing square modulo composite *n.* A trapdoor permutation family is a family ofpermutations, specified by a parameter, that is easy to compute in the forward direction, but is difficult to compute in the reverse direction without already knowing the private key. However, for every parameter there is a "trapdoor" (private key) which when known, easily decrypts the message. Trapdoor permutations can be viewed as public-key encryption systems, where the parameter is the public key and the trapdoor is the secret key, and where encrypting corresponds to computing the forward direction of the permutation, while decrypting corresponds to the reverse direction. Trapdoor permutations can also be viewed as digital signature schemes, where computing the reverse direction with the secret key is thought of as signing, and computing the forward direction is done to verify signatures. Because of this correspondence, digital signatures are often described as based on public-key cryptosystems, where signing is equivalent to decryption and verification is equivalent to encryption, but this is not the only way digital signatures are computed.

Used directly, this type of signature scheme is vulnerable to a key-only existential forgery attack. To create a forgery, the attacker picks a random signature σ and uses the verification procedure to determine the message *m* corresponding to that signature.[15] In practice, however, this type of signature is not used directly, but rather, the message to be signed is first hashed to produce a short digest that is then signed. This forgery attack, then, only produces the hash function output that corresponds to σ, but not a message that leads to that value, which does not lead to an attack. In the random oracle model, this hash-then-sign form of signature is existentially unforgeable, even against a chosen-plaintext attack. There are several reasons to sign such a hash (or message digest) instead of the whole document.

- **For efficiency:** The signature will be much shorter and thus save time since hashing is generally much faster than signing in practice.
- **For compatibility:** Messages are typically bit strings, but some signature schemes operate on other domains (such as, in the case of RSA, numbers modulo a composite number *N*). A hash function can be used to convert an arbitrary input into the proper format.
- **For integrity:** Without the hash function, the text "to be signed" may have to be split (separated) in blocks small enough for the signature scheme to act on them directly. However, the receiver of the signed blocks is not able to recognize if all the blocks are present and in the appropriate order.

Algorithm

With the above considerations, the algorithm below can be used for implementing public key cryptography in Java.

1. Encrypt the message using a symmetric key.
2. Concatenate the symmetric key + Hash of symmetric key + Hash of message.
3. Encrypt the concatenated string using the receivers public key.
4. Sign the data to be transmitted (Encrypted symmetric key + Hash of the key + Hash of message).
5. Validate the Signature.
6. Decrypt the message using Receiver private key to get the symmetric key.
7. Validate the integrity of the key using the Hash of the key.
8. Decrypt the actual message using the symmetric key which has been decrypted and parsed and checked for integrity.
9. Compute MessageDigest of data.
10. Validate if the Message Digest of the decrypted text matches the Message Digest of the Original Message.

CONCLUSION:- Hence we have studied and successfully implemented Digital signature scheme using RSA.

EXPERIMENT NO 3

AIM :- To Simulate the Buffer overflow attack.

THEORY:-

Use of the Stack

The stack is a region in a program's memory space that is only accessible from the top. There are two operations, push and pop, to a stack. A push stores a new data item on top of the stack, a pop removes the top item. Every process has its own memory space (at least in a decent OS), among them a stack region and a heap region. The stack is used heavily to store local variables and the return address of a function.

For example, assume that we have a function

```
void foo(const char* input) {
    char buf[10];


    printf("Hello World\n");


}
```

When this function is called from another function, for example main:

```
int main(int argc, char* argv[])
{
    foo(argv[1]);
```

```
        return 0;
}
```

then the following happens: The calling function pushes the return address, that is the address of the return statement onto the stack. Then the called function pushes zeroes on the stack to store its local variable. Since *foo* has a variable *buf*, this means there will be space for 10 characters allocated. The stack thus will look like depicted in Figure 3.

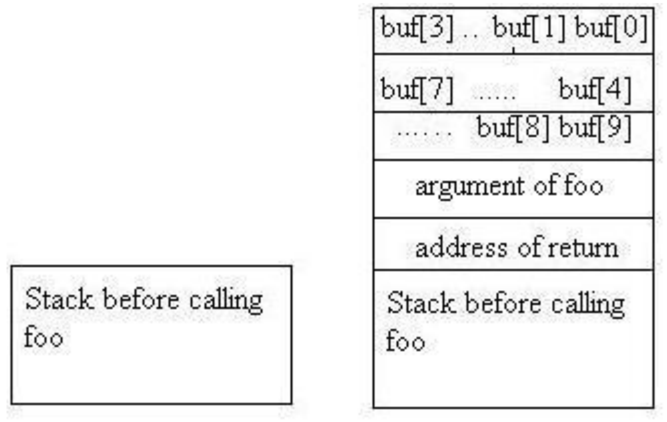


Figure 3: The stack holds the return address, the arguments, and the local variables..

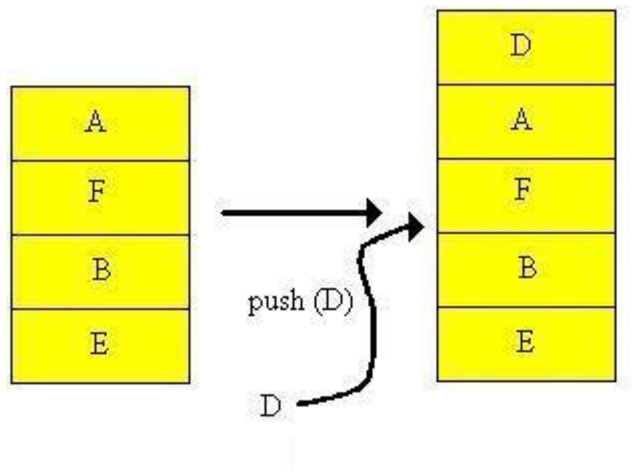


Figure 1: The push operation takes an item and puts it on the top of the stack.

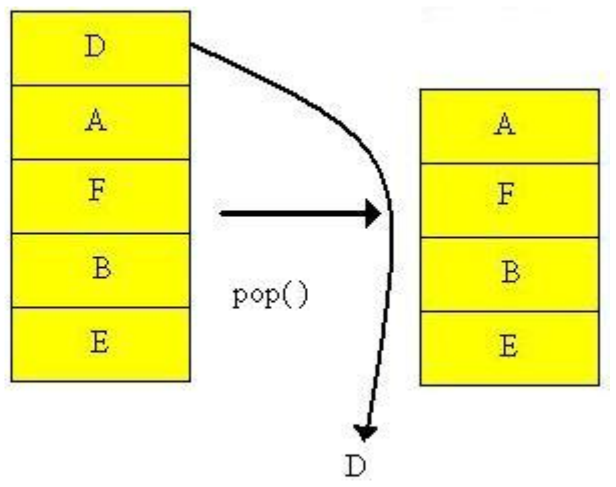


Figure 2: The pop operation removes the top from the stack and makes it available to the application.

This is a simple C-program. Function main uses the command line input. Recall that argc is the number of arguments, including the call to the function itself. Thus, is we put

: stackoverrun Hello

then argc is two and argv[0] is "stackoverrun" and argv[1] is "Hello". The main function calls function foo. foo gets the second word from the commandline as its input.

As we look at foo, foo prints first the stack. This is done with a printf statement. The arguments to printf are taken directly from the stack. The "%p" format means that the argument is printed out as a pointer.

The call to strcpy is the one that is dangerous. strcpy will just copy character for character until it finds a "0" character in the source string. Since the argument we give to the call can be much longer, this **can** mess up the stack. Unfortunately, commercial-grade software is full of these calls without checking for the length of the input.

When the stack is messed up, the return address from foo will be overwritten. With other words, instead of going back to the next instruction after foo in main (that would be the return statement), the next instruction executed after foo finishes will be whatever is in the stack location.

In this program, there is another function, called bar. The program logic bars bar from running ever. However, by giving it the right input to main, we can get bar to run.

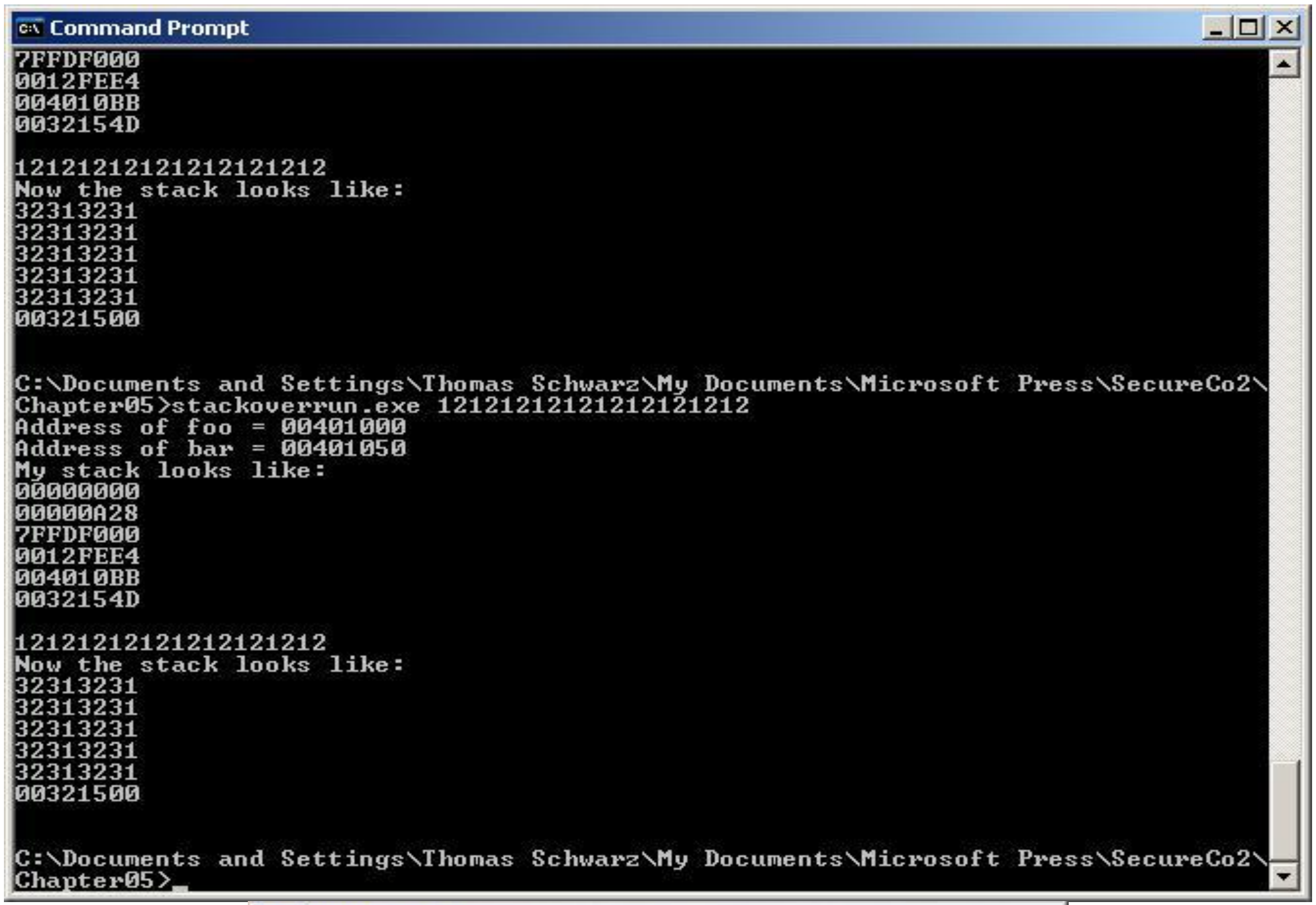
CONCLUSION:- Hence we have studied and successfully implemented To Simulate the Buffer overflow attack.

PROGRAM:-

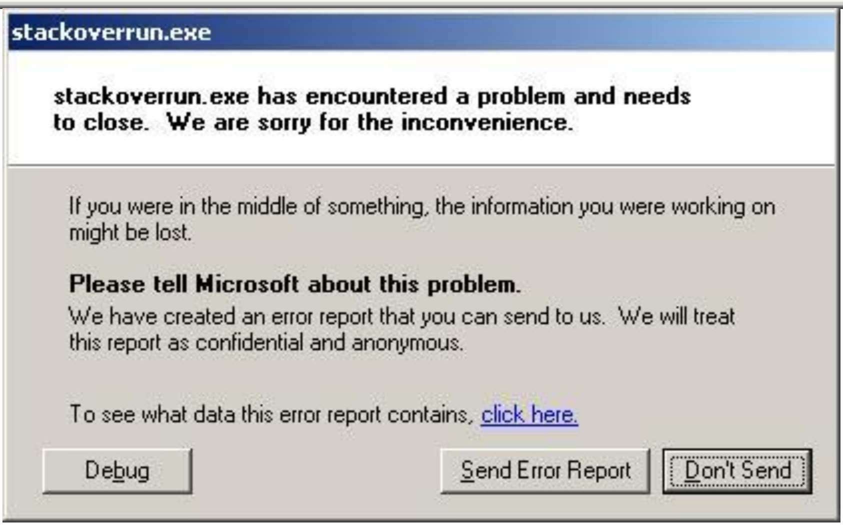
Buffer overflow attack:

```
/*
  StackOverrun.c
  This program shows an example of how a stack-based
  buffer overrun can be used to execute arbitrary code.  Its
  objective is to find an input string that executes the function bar.
*/

#pragma check_stack(off)

#include <string.h>
#include <stdio.h>

void foo(const char* input)
{
    char buf[10];

    printf("My stack looks like:\n%p\n%p\n%p\n%p\n%p\n% p\n\n");

    strcpy(buf, input);
    printf("%s\n", buf);

    printf("Now the stack looks like:\n%p\n%p\n%p\n%p\n%p\n%p\n\n");
}

void bar(void)
{
    printf("Augh! I've been hacked!\n");
}

int main(int argc, char* argv[])
{
    //Blatant cheating to make life easier on myself
    printf("Address of foo = %p\n", foo);
    printf("Address of bar = %p\n", bar);
    if (argc != 2)
 {
        printf("Please supply a string as an argument!\n");
        return -1;
    }
foo(argv[1]);
    return 0;
}
```

Output:-



```
7FFDF000
0012FEE4
004010BB
0032154D

1212121212121212121212
Now the stack looks like:
32313231
32313231
32313231
32313231
32313231
00321500


C:\Documents and Settings\Thomas Schwarz\My Documents\Microsoft Press\SecureCo2\
Chapter05>stackoverrun.exe 1212121212121212121212
Address of foo = 00401000
Address of bar = 00401050
My stack looks like:
00000000
00000A28
7FFDF000
0012FEE4
004010BB
0032154D

1212121212121212121212
Now the stack looks like:
32313231
32313231
32313231
32313231
32313231
00321500


C:\Documents and Settings\Thomas Schwarz\My Documents\Microsoft Press\SecureCo2\
Chapter05>_
```



stackoverrun.exe has encountered a problem and needs to close. We are sorry for the inconvenience.

If you were in the middle of something, the information you were working on might be lost.

Please tell Microsoft about this problem.
We have created an error report that you can send to us. We will treat this report as confidential and anonymous.

To see what data this error report contains, click here.

ONLY FOR ARMIET STUDENTS……….

EXPERIMENT NO 4

AIM :- To Simulate the Salami attack.

THEORY:- A salami technique is an automated form of abuse involving Trojan horses or secret execution of an unauthorized program that causes the unnoticed or immaterial debiting of small amounts of assets from a large number of sources or accounts. The name of this technique comes from the fact that small slices of assets are taken without noticeably reducing the whole. Other methods must be used to remove the acquired assets from the system. For example, in a banking system, the demand deposit accounting system of programs for checking accounts could be changed (using the Trojan horse method) to randomly reduce each of a few hundred accounts by 10 cents or 15 cents by transferring the money to a favored account, where it can be withdrawn through authorized methods. No controls are violated because the money is not removed from the system of accounts. Instead, small fractions of the funds are merely rearranged, which the affected customers rarely notice. Many variations are possible. The assets may be an inventory of products or services as well as money. Few cases have been reported.

Salami Technique in Electronic Banking

The most typical scheme portrayed by a salami attack is that which involves an automated modification to financial systems and their data. For example, the digits representing currency on a bank's computer(s) could be altered so that values to the right of the pennies field (< 0.01) are always rounded down (fair arithmetic routines will calculate in both directions equally). Since all this rounding down produces excess fractions of cents, they must be transferred elsewhere, and, carefully, so that no net loss to the system of accounts becomes apparent. This is done by merely rearranging the funds into a balance owned by the perpetrator. The final rewards could be very attractive, provided the "slices" are taken 1 at frequent intervals throughout an extended period of time and from a large number of accounts.

The essence of this mechanism is its resistance to detection. Account owners rarely calculate their balances to the thousandths or ten-thousandths of a cent, and, consequentially remain oblivious. Even if the discrepancies are noticed, most individuals have better things to do (like preserve their pride) than complain about an erroneous digit in some far off decimal place. The following (alleged) scenarios will demonstrate that "slices" need not always be tiny to evade detection. In fact, they can be rather large, as long as unsuspecting and/or ignorant victims are plentiful.

A modified payroll program increased the federal withholding amounts by a few cents per pay period for hundreds of employees. The excess payments were credited to the perpetrator's withholding account, which, at income-tax time the following year, yielded large refunds from the IRS.Over the course of 3 years, at least 47,000 customers were defrauded by a rental-car agency that overestimated (purposely) the vehicles' gas tank capacity. Customers returning the cars without topping off the gas were charged inflated amounts for the missing gasoline (which wasn't really missing). Theft rates ranged from $2 to $15 per customer.

A Taco Bell drive-up window cash register, modified to internally ring each $2.99 item as 1 cent, allowed the perpetrator to pocket the excess $2.98 each time. Fraudulent computer chips in gasoline pumps cheated customers by overstating the amounts pumped.

CONCLUSION:- Hence we have studied and successfully implemented the Salami attack.

EXPERIMENT NO 5

AIM :- To Design and implement a program for adding passwords to a file. The program should be able to filter out weak passwords (based on dictionary words or variants) and store the strong passwords by creating a hash of user ID and password.

THEORY:- Password strength is a measure of the effectiveness of a password in resisting guessing and brute-force attacks. In its usual form, it estimates how many trials an attacker who does not have direct access to the password would need, on average, to guess it correctly. The strength of a password is a function of length, complexity, and unpredictability.

Using strong passwords lowers overall risk of a security breach, but strong passwords do not replace the need for other effective security controls. The effectiveness of a password of a given strength is strongly determined by the design and implementation of the factors (knowledge, ownership, inherence). The first factor is the main focus in this article.

The rate at which an attacker can submit guessed passwords to the system is a key factor in determining system security. Some systems impose a time-out of several seconds after a small number (e.g. three) of failed password entry attempts. In the absence of other vulnerabilities, such systems can be effectively secured with relatively simple passwords. However the system must store information about the user passwords in some form and if that information is stolen, say by breaching system security, the user passwords can be at risk.

Password Creation

Passwords are created either automatically (using randomizing equipment) or by a human; the latter case is more common. While the strength of randomly chosen passwords against a brute force attack can be calculated with precision, determining the strength of human-generated passwords is challenging.

Typically, humans are asked to choose a password, sometimes guided by suggestions or restricted by a set of rules, when creating a new account for a computer system or Internet Web site. Only rough estimates of strength are possible, since humans tend to follow patterns in such tasks, and those patterns can usually assist an attacker. In addition, lists of commonly chosen passwords are widely available for use by password guessing programs. Such lists include the numerous online dictionaries for various human languages, along with other common passwords. All items in such lists are considered weak, as are passwords that are simple modifications of them. For some decades, investigations of passwords on multi-user computer systems have shown that 40% or more are readily guessed using only computer programs, and more can be found when information about a particular user is taken into account during the attack.

Examples of weak passwords

As with any security measure, passwords vary in effectiveness (i.e., strength); some are weaker than others. For example, the difference in weakness between a dictionary word and a word with obfuscation (i.e., letters in the password are substituted by, say, numbers — a common approach) may cost a password cracking device a few more seconds; this adds little strength. The examples below illustrate various ways weak passwords might be constructed, all of which are based on simple patterns which result in extremely low entropy, allowing them to be tested automatically at high speeds:

- Default passwords (as supplied by the system vendor and meant to be changed at installation time): password, default, admin, guest, etc. Lists of default passwords are widely available on the internet.
- Dictionary words: chameleon, RedSox, sandbags, bunnyhop!, IntenseCrabtree, etc., including words in non-English dictionaries.
- Words with numbers appended: password1, deer2000, john1234, etc., can be easily tested automatically with little lost time.
- Words with simple obfuscation: p@ssw0rd, l33th4x0r, g0ldf1sh, etc., can be tested automatically with little additional effort. For example a domain administrator password compromised in the DigiNotar attack was reportedly Pr0d@dm1n.
- Doubled words: crabcrab, stopstop, treetree, passpass, etc.
- Common sequences from a keyboard row: qwerty, 12345, asdfgh, fred, etc.
- Numeric sequences based on well known numbers such as 911 314159... , or 27182... etc.
- Identifiers: jsmith123, 1/1/1970, 555–1234, one's username, etc.
- Anything personally related to an individual: license plate number, Social Security number, current or past telephone numbers, student ID, current address, previous addresses, birthday, sports team, relative's or pet's names/nicknames/birthdays/initials, etc., can easily be tested automatically after a simple investigation of person's details.

There are many other ways a password can be weak, corresponding to the strengths of various attack schemes; the core principle is that a password should have high entropy (usually taken to be equivalent to randomness) and not be readily derivable by any "clever" pattern, nor should passwords be mixed with information identifying the user.

On-line services often provide a restore password function that a hacker can figure out and by doing so bypass a password. Choosing hard-to-guess restore password questions can further secure the password.

CONCLUSION:- Hence we have studied and successfully implemented a program for adding passwords to a file. The program should be able to filter out weak passwords (based on dictionary words or variants) and store the strong passwords by creating a hash of user ID and password.

.

PROGRAM:-

```
<?php
$pwd = $_POST['pwd'];
if( strlen($pwd) < 8 ) {
        $error .= "Password too short! ";
}
if( strlen($pwd) > 20 ) {
        $error .= "Password too long! ";
}
if( strlen($pwd) < 8 ) {
        $error .= "Password too short! ";
}
if( !preg_match("#[0-9]+#", $pwd) ) {
        $error .= "Password must include at least one number! ";
}
if( !preg_match("#[a-z]+#", $pwd) ) {
        $error .= "Password must include at least one letter! ";
}
if( !preg_match("#[A-Z]+#", $pwd) ) {
        $error .= "Password must include at least one CAPS! ";
}
if( !preg_match("#\W+#", $pwd) ) {
        $error .= "Password must include at least one symbol! ";
}
if($error){
        echo "Password validation failure(your choise is weak): $error";
} else {
        echo "Your password is strong.";
}
```

EXPERIMENT NO 6

AIM :- To Study of a packet sniffer like wireshark, or tcpdump. Use this tool to capture and analyze data in packets.

THEORY:- Wireshark is a free and open-source packet analyzer. It is used for network troubleshooting,analysis,softwareand communications protocol development, and education. Originally named Ethereal, in May 2006 the project was renamed Wireshark due to trademark issues.

Wireshark is cross-platform, using the GTK+ widget toolkit in current releases, and Qt in the development version, to implement its user interface, and using pcap to capture packets; it runs on GNU/Linux, OS X, BSD, Solaris, some other Unix-like operating systems, andMicrosoft Windows. There is also a terminal-based (non-GUI) version called TShark. Wireshark, and the other programs distributed with it such as TShark, are free software, released under the terms of the GNU General Public License.

Functionality

Wireshark is very similar to tcpdump, but has a graphical front-end, plus some integrated sorting and filtering options.

Wireshark allows the user to put network interface controllers that support promiscuous mode into that mode, in order to see all traffic visible on that interface, not just traffic addressed to one of the interface's configured addresses and broadcast/multicast traffic. However, when capturing with a packet analyzer in promiscuous mode on a port on a network switch, not all of the traffic travelling through the switch will necessarily be sent to the port on which the capture is being done, so capturing in promiscuous mode will not necessarily be sufficient to see all traffic on the network. Port mirroring or various network taps extend capture to any point on the network. Simple passive taps are extremely resistant to tampering.

On Linux, BSD, and OS X, with libpcap 1.0.0 or later, Wireshark 1.4 and later can also put wireless network interface controllers into monitor mode.

If a remote machine captures packets and sends the captured packets to a machine running Wireshark using the TZSP protocol or the protocol used by OmniPeek, Wireshark will dissect those packets, thus allowing it to analyze packets captured on a remote machine at the time that they're captured.

History

In the late 1990s, Gerald Combs, a computer science graduate of the University of Missouri–Kansas City, was working for a small Internet service provider. The commercial protocol analysis products at the time were priced around $1500 and did not run on the company's primary platforms (Solaris and Linux), so Gerald began writing Ethereal and released the first version around 1998. The Ethereal trademark is owned by Network Integration Services.

In May 2006, Combs accepted a job with CACE Technologies. Combs still held copyright on most of Ethereal's source code (and the rest was re-distributable under the GNU GPL), so he used the contents of the Ethereal Subversion repository as the basis for the Wireshark repository. However, he did not own the Ethereal trademark, so he changed the name to Wireshark. In 2010 Riverbed Technology purchased CACE and took over as the primary sponsor of Wireshark. Ethereal development has ceased, and an Ethereal security advisory recommended switching to Wireshark.

Wireshark has won several industry awards over the years,[including eWeek, InfoWorld, and PC Magazine. It is also the top-rated packet sniffer in the Insecure.Org network security tools survey and was the SourceForge Project of the Month in August 2010.

Combs continues to maintain the overall code of Wireshark and issue releases of new versions of the software. The product website lists over 600 additional contributing authors.

Features

Wireshark is software that "understands" the structure (encapsulation) of different networking protocols. It can parse and display the fields, along with their meanings as specified by different networking protocols. Wireshark uses pcap to capture packets, so it can only capture packets on the types of networks that pcap supports.

- Data can be captured "from the wire" from a live network connection or read from a file of already-captured packets.
- Live data can be read from a number of types of network, including Ethernet, IEEE 802.11, PPP, and loopback.
- Captured network data can be browsed via a GUI, or via the terminal (command line) version of the utility, TShark.
- Captured files can be programmatically edited or converted via command-line switches to the "editcap" program.
- Data display can be refined using a display filter.
- Plug-ins can be created for dissecting new protocols.
- VoIP calls in the captured traffic can be detected. If encoded in a compatible encoding, the media flow can even be played.
- Raw USB traffic can be captured.

Wireshark's native network trace file format is the libpcap format supported by libpcap and WinPcap, so it can exchange captured network traces with other applications that use the same format, including tcpdump and CA NetMaster. It can also read captures from other network analyzers, such as snoop, Network General's Sniffer, and Microsoft Network Monitor.

Security

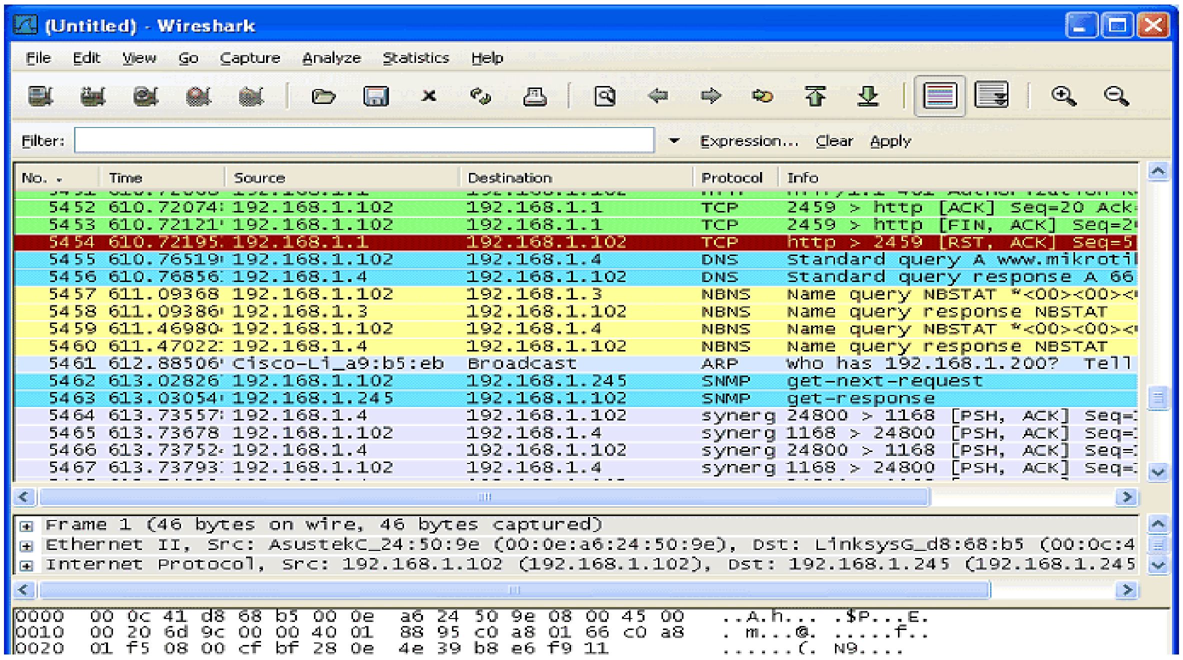
Capturing raw network traffic from an interface requires elevated privileges on some platforms. For this reason, older versions of Ethereal/Wireshark and tethereal/TShark often ran withsuperuser privileges. Taking into account the huge number of protocol dissectors that are called when traffic is captured, this can pose a serious security risk given the possibility of a bug in a dissector. Due to the rather large number of vulnerabilities in the past (of which many have allowed remote code execution) and developers' doubts for better future development, OpenBSDremoved Ethereal from its ports tree prior to OpenBSD 3.6.

Elevated privileges are not needed for all operations. For example, an alternative is to run tcpdump or the dumpcap utility that comes with Wireshark with superuser privileges to capture packets into a file, and later analyze the packets by running Wireshark with restricted privileges. To emulate near realtime analysis, each captured file may be merged by mergecap into growing file processed by Wireshark. On wireless networks, it is possible to use the Aircrack wireless security tools to capture IEEE 802.11 frames and read the resulting dump files with Wireshark.

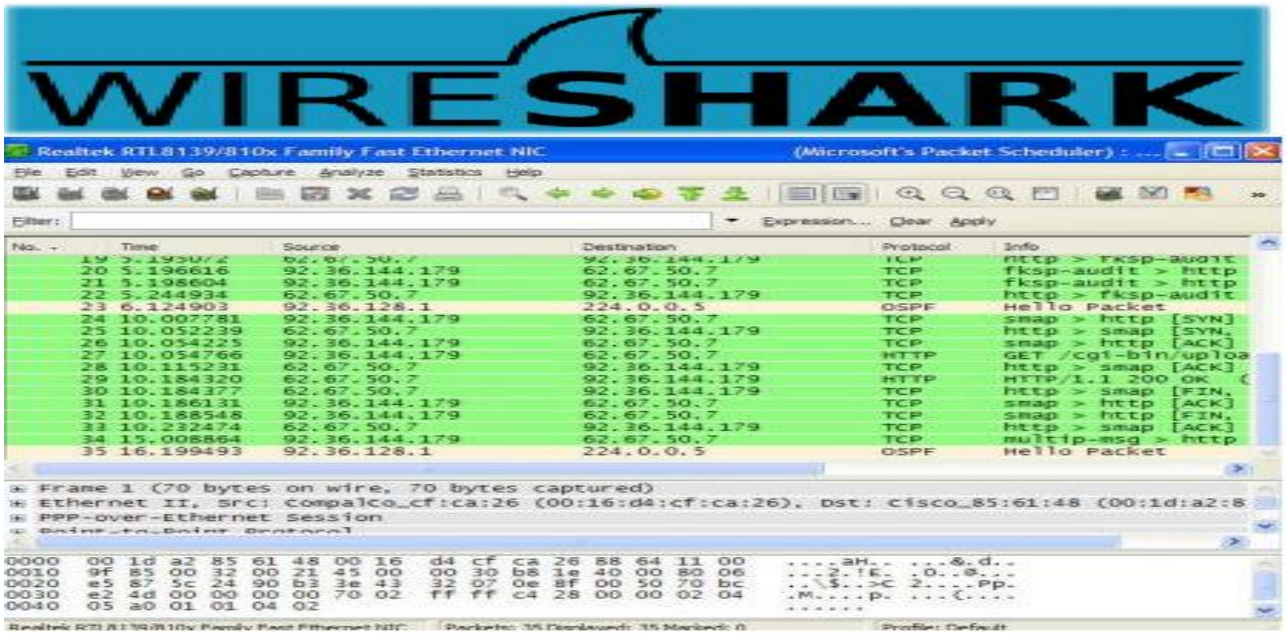
As of Wireshark 0.99.7, Wireshark and TShark run dumpcap to perform traffic capture. On platforms where special privileges are needed to capture traffic, only dumpcap needs to be run with those special privileges: neither Wireshark nor TShark need to or should be run with special privileges.

CONCLUSION:- Hence we have studied and successfully implemented of a packet sniffer like wireshark, or tcpdump. Use this tool to capture and analyze data in packets.

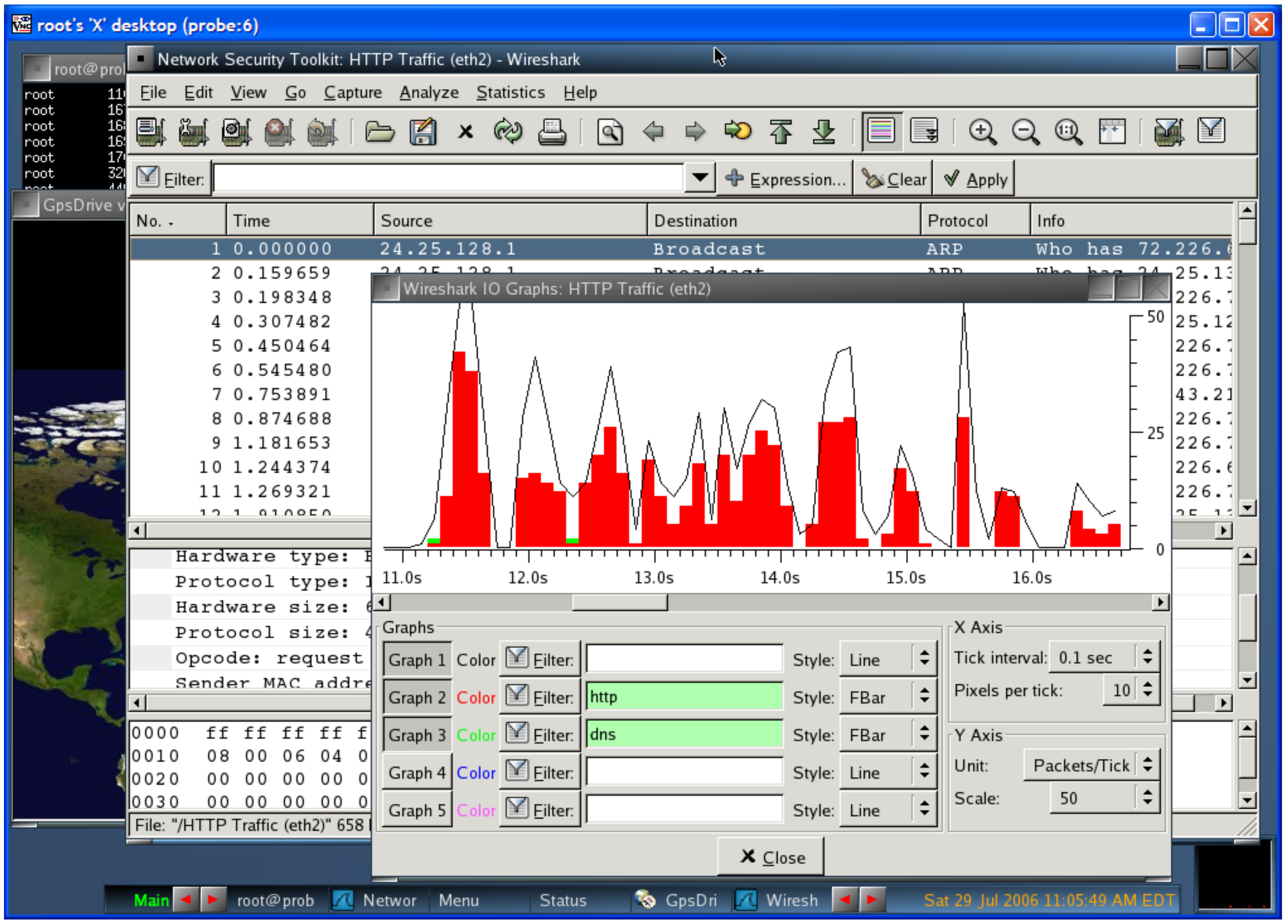
SNAPSHOTS:-


(Untitled) - Wireshark
File Edit View Go Capture Analyze Statistics Help
Filter:
Expression... Clear Apply

```
No. -  Time       Source           Destination      Protocol Info
 5452 610.72074: 192.168.1.102    192.168.1.1      TCP      2459 > http [ACK] Seq=20 Ack
 5453 610.72121' 192.168.1.102    192.168.1.1      TCP      2459 > http [FIN, ACK] Seq=2
 5454 610.72195. 192.168.1.1      192.168.1.102    TCP      http > 2459 [RST, ACK] Seq=5
 5455 610.76519: 192.168.1.102    192.168.1.4      DNS      Standard query A www.mikrotil
 5456 610.76856: 192.168.1.4      192.168.1.102    DNS      Standard query response A 66
 5457 611.09368  192.168.1.102    192.168.1.3      NBNS     Name query NBSTAT *<00><00><
 5458 611.09386' 192.168.1.3      192.168.1.102    NBNS     Name query response NBSTAT
 5459 611.46980. 192.168.1.102    192.168.1.4      NBNS     Name query NBSTAT *<00><00><
 5460 611.47022: 192.168.1.4      192.168.1.102    NBNS     Name query response NBSTAT
 5461 612.88506' Cisco-Li_a9:b5:eb Broadcast       ARP      Who has 192.168.1.200?  Tell
 5462 613.02826' 192.168.1.102    192.168.1.245    SNMP     get-next-request
 5463 613.03054' 192.168.1.245    192.168.1.102    SNMP     get-response
 5464 613.73557: 192.168.1.4      192.168.1.102    synerg   24800 > 1168 [PSH, ACK] Seq=
 5465 613.73678  192.168.1.102    192.168.1.4      synerg   1168 > 24800 [PSH, ACK] Seq=
 5466 613.73752. 192.168.1.4      192.168.1.102    synerg   24800 > 1168 [PSH, ACK] Seq=
 5467 613.73793: 192.168.1.102    192.168.1.4      synerg   1168 > 24800 [PSH, ACK] Seq=

⊞ Frame 1 (46 bytes on wire, 46 bytes captured)
⊞ Ethernet II, Src: AsustekC_24:50:9e (00:0e:a6:24:50:9e), Dst: LinksysG_d8:68:b5 (00:0c:4
⊞ Internet Protocol, Src: 192.168.1.102 (192.168.1.102), Dst: 192.168.1.245 (192.168.1.245

0000  00 0c 41 d8 68 b5 00 0e  a6 24 50 9e 08 00 45 00   ..A.h... .$P...E.
0010  00 20 6d 9c 00 00 40 01  88 95 c0 a8 01 66 c0 a8   . m...@. .....f..
0020  01 f5 08 00 cf bf 28 0e  4e 39 b8 e6 f9 11         ......(. N9....
```


WIRESHARK
Realtek RTL8139/810x Family Fast Ethernet NIC (Microsoft's Packet Scheduler) : ...
File Edit View Go Capture Analyze Statistics Help
Filter:
Expression... Clear Apply

```
No. -  Time        Source          Destination     Protocol Info
   19 5.195072   62.67.50.7      92.36.144.179   TCP      http > fksp-audit
   20 5.196616   92.36.144.179   62.67.50.7      TCP      fksp-audit > http
   21 5.198604   92.36.144.179   62.67.50.7      TCP      fksp-audit > http
   22 5.244934   62.67.50.7      92.36.144.179   TCP      http > fksp-audit
   23 6.124903   92.36.128.1     224.0.0.5       OSPF     Hello Packet
   24 10.007781  92.36.144.179   62.67.50.7      TCP      smap > http [SYN]
   25 10.052239  62.67.50.7      92.36.144.179   TCP      http > smap [SYN,
   26 10.054225  92.36.144.179   62.67.50.7      TCP      smap > http [ACK]
   27 10.054766  92.36.144.179   62.67.50.7      HTTP     GET /cgi-bin/uploa
   28 10.115231  62.67.50.7      92.36.144.179   TCP      http > smap [ACK]
   29 10.184320  62.67.50.7      92.36.144.179   HTTP     HTTP/1.1 200 OK  (
   30 10.184377  62.67.50.7      92.36.144.179   TCP      http > smap [FIN,
   31 10.186131  92.36.144.179   62.67.50.7      TCP      smap > http [ACK]
   32 10.188548  92.36.144.179   62.67.50.7      TCP      smap > http [FIN,
   33 10.232474  62.67.50.7      92.36.144.179   TCP      http > smap [ACK]
   34 15.008864  92.36.144.179   62.67.50.7      TCP      multip-msg > http
   35 16.199493  92.36.128.1     224.0.0.5       OSPF     Hello Packet

⊞ Frame 1 (70 bytes on wire, 70 bytes captured)
⊞ Ethernet II, Src: CompalCo_cf:ca:26 (00:16:d4:cf:ca:26), Dst: Cisco_85:61:48 (00:1d:a2:8
⊞ PPP-over-Ethernet Session
⊞ Point-to-Point Protocol

0000  00 1d a2 85 61 48 00 16  d4 cf ca 26 88 64 11 00   ....aH.. ...&.d..
0010  9f 85 00 32 00 21 45 00  00 30 b8 1e 40 00 80 06   ...2.!E. .0..@...
0020  e5 87 5c 24 90 b3 3e 43  32 07 0e 8f 00 50 70 bc   ..\$..>C 2....Pp.
0030  e2 4d 00 00 00 00 70 02  ff ff c4 28 00 00 02 04   .M....p. ...(....
0040  05 a0 01 01 04 02                                  ......

Realtek RTL8139/810x Family Fast Ethernet NIC   Packets: 35 Displayed: 35 Marked: 0   Profile: Default
```


root's 'X' desktop (probe:6)
Network Security Toolkit: HTTP Traffic (eth2) - Wireshark
File Edit View Go Capture Analyze Statistics Help
Filter: Expression... Clear Apply
Wireshark IO Graphs: HTTP Traffic (eth2)
50
25
0
11.0s
12.0s
13.0s
14.0s
15.0s
16.0s
Close
Main root@prob Networ Menu Status GpsDri Wiresh Sat 29 Jul 2006 11:05:49 AM EDT

```
No. -   Time        Source          Destination     Protocol  Info
      1 0.000000    24.25.128.1     Broadcast       ARP       Who has 72.226.
      2 0.159659
      3 0.198348
      4 0.307482
      5 0.450464
      6 0.545480
      7 0.753891
      8 0.874688
      9 1.181653
     10 1.244374
     11 1.269321

    Hardware type:
    Protocol type:
    Hardware size:
    Protocol size:
    Opcode: request
    Sender MAC addre

0000  ff ff ff ff
0010  08 00 06 04
0020  00 00 00 00
0030  00 00 00 00

File: "/HTTP Traffic (eth2)" 658
```

Graphs	Color	Filter	Style
Graph 1	Color		Line
Graph 2	Color	http	FBar
Graph 3	Color	dns	FBar
Graph 4	Color		Line
Graph 5	Color		Line

X Axis
Tick interval: 0.1 sec
Pixels per tick: 10

Y Axis
Unit: Packets/Tick
Scale: 50

ONLY FOR ARMIET STUDENTS……….

EXPERIMENT NO 7

AIM :- To Study and install nmap. Use it with different options to scan open ports, perform OS fingerprinting, do a ping scan, tcp port scan, udp port scan, etc.

THEORY:- Nmap (Network Mapper) is a security scanner originally written by Gordon Lyon (also known by his pseudonym Fyodor Vaskovich) used to discover hosts and services on a computer network, thus creating a "map" of the network. To accomplish its goal, Nmap sends specially craftedpackets to the target host and then analyzes the responses.

The software provides a number of features for probing computer networks, including host discovery and service and operating systemdetection. These features are extensible by scripts that provide more advanced service detection, vulnerability detection, and other features. Nmap is also capable of adapting to network conditions including latency and congestion during a scan. Nmap is under development and refinement by its user community.

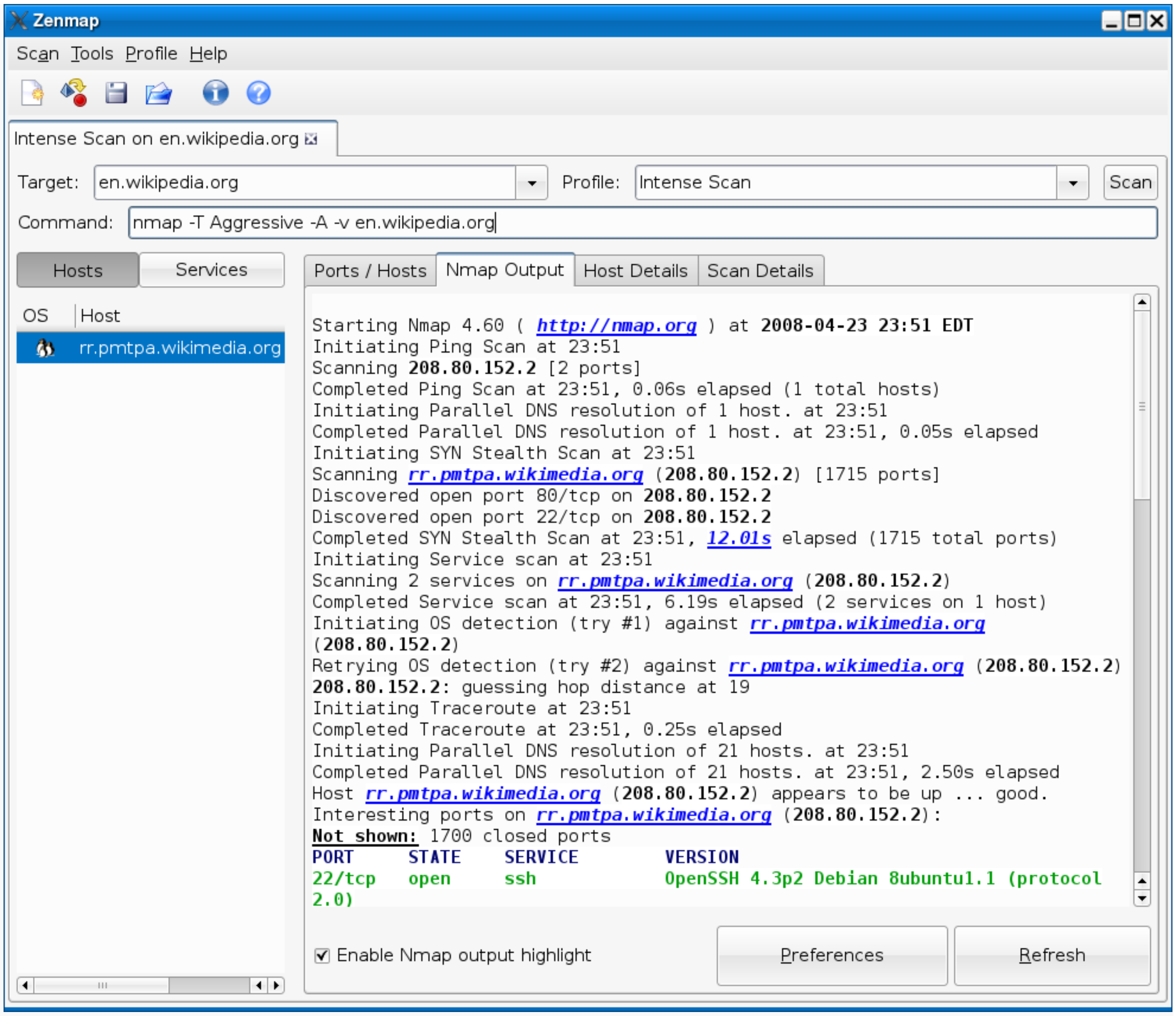
Nmap was originally a Linux-only utility, but it was ported to Microsoft Windows, Solaris, HP-UX, BSD variants (including Mac OS X), AmigaOS, and SGI IRIX. Linux is the most popular platform, followed closely by Windows.

Graphical Interfaces

NmapFE, originally written by Zach Smith, was Nmap's official GUI for Nmap versions 2.2 to 4.22. For Nmap 4.50 (originally in the 4.22SOC development series) NmapFE was replaced with Zenmap, a new official graphical user interface based on UMIT, developed by Adriano Monteiro Marques.

Various web-based interfaces allow controlling Nmap remotely from a web browser. These include LOCALSCAN, nmap-web, and Nmap-CGI.

Microsoft Windows specific GUIs exist, including NMapWin, which has not been updated since June 2003 (v1.4.0), and NMapW by Syhunt.

- 

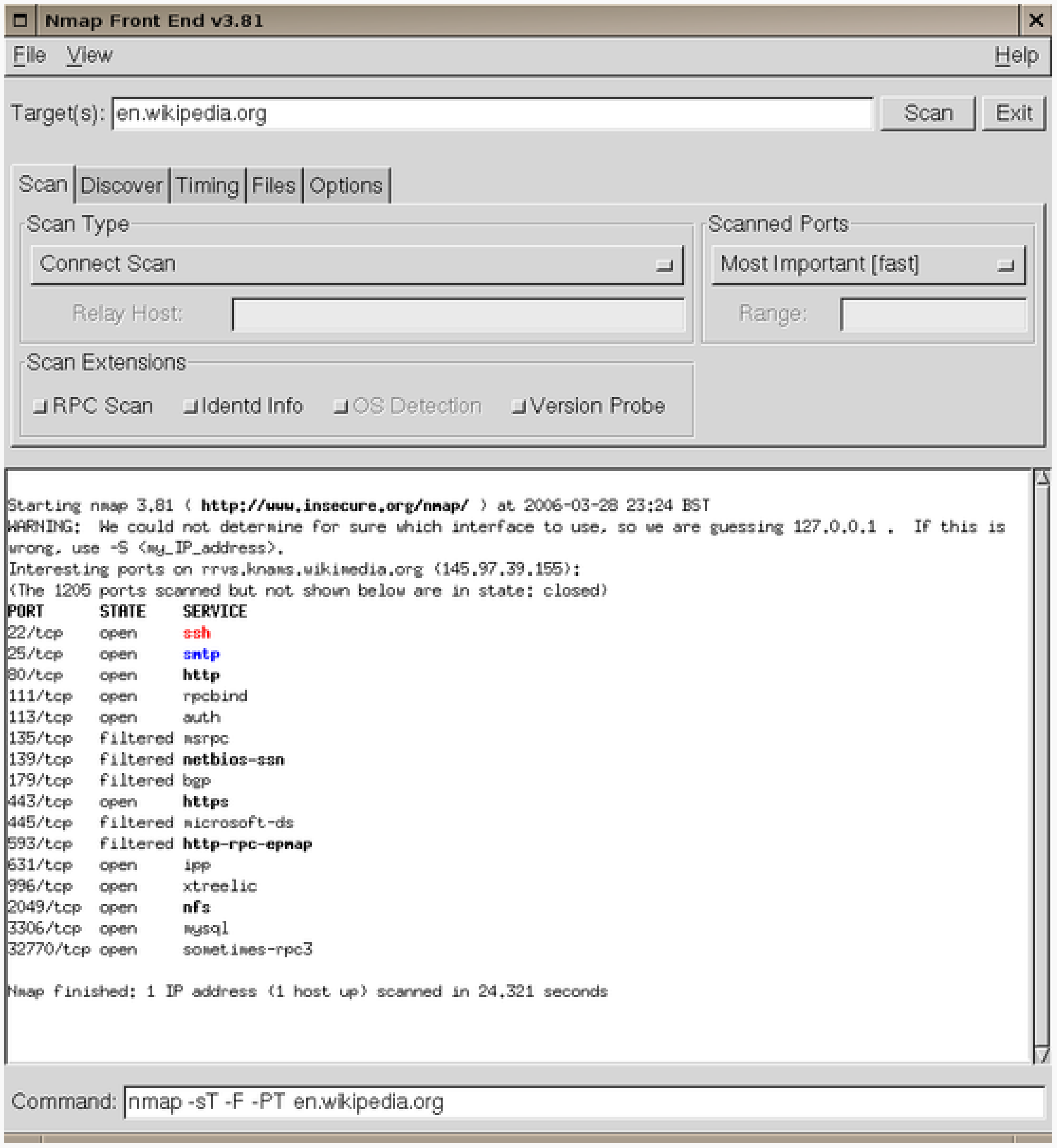
Target: en.wikipedia.org Profile: Intense Scan Scan

Command: nmap -T Aggressive -A -v en.wikipedia.org

```
Starting Nmap 4.60 ( http://nmap.org ) at 2008-04-23 23:51 EDT
Initiating Ping Scan at 23:51
Scanning 208.80.152.2 [2 ports]
Completed Ping Scan at 23:51, 0.06s elapsed (1 total hosts)
Initiating Parallel DNS resolution of 1 host. at 23:51
Completed Parallel DNS resolution of 1 host. at 23:51, 0.05s elapsed
Initiating SYN Stealth Scan at 23:51
Scanning rr.pmtpa.wikimedia.org (208.80.152.2) [1715 ports]
Discovered open port 80/tcp on 208.80.152.2
Discovered open port 22/tcp on 208.80.152.2
Completed SYN Stealth Scan at 23:51, 12.01s elapsed (1715 total ports)
Initiating Service scan at 23:51
Scanning 2 services on rr.pmtpa.wikimedia.org (208.80.152.2)
Completed Service scan at 23:51, 6.19s elapsed (2 services on 1 host)
Initiating OS detection (try #1) against rr.pmtpa.wikimedia.org
(208.80.152.2)
Retrying OS detection (try #2) against rr.pmtpa.wikimedia.org (208.80.152.2)
208.80.152.2: guessing hop distance at 19
Initiating Traceroute at 23:51
Completed Traceroute at 23:51, 0.25s elapsed
Initiating Parallel DNS resolution of 21 hosts. at 23:51
Completed Parallel DNS resolution of 21 hosts. at 23:51, 2.50s elapsed
Host rr.pmtpa.wikimedia.org (208.80.152.2) appears to be up ... good.
Interesting ports on rr.pmtpa.wikimedia.org (208.80.152.2):
Not shown: 1700 closed ports
PORT     STATE    SERVICE      VERSION
22/tcp   open     ssh          OpenSSH 4.3p2 Debian 8ubuntu1.1 (protocol
2.0)
```

Zenmap, showing results for a port scan against Wikipedia

ONLY FOR ARMIET STUDENTS……….

- 

Target(s): en.wikipedia.org

Scan Type: Connect Scan

Relay Host:

Scanned Ports: Most Important [fast]

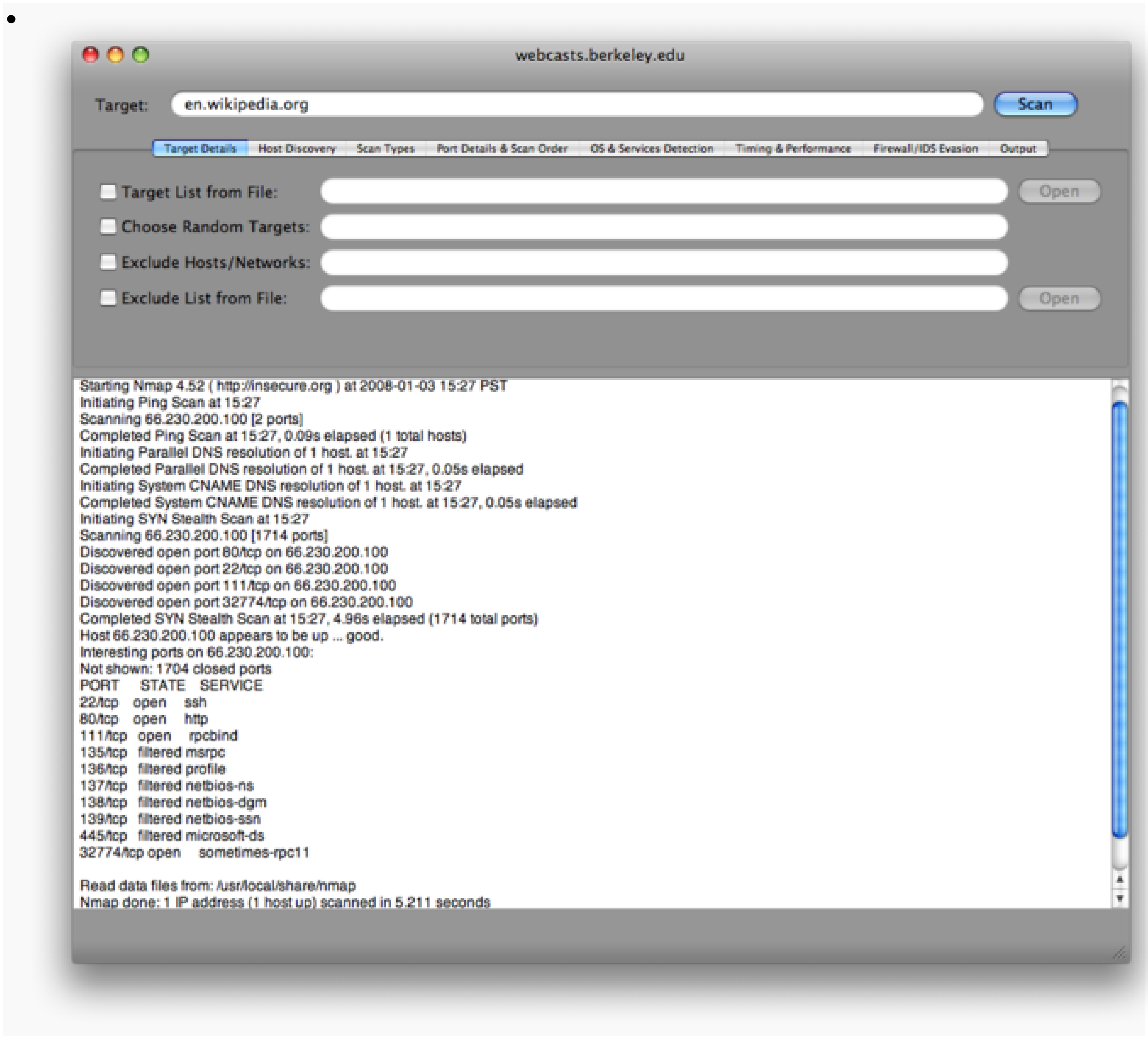
Range:

```
Starting nmap 3.81 ( http://www.insecure.org/nmap/ ) at 2006-03-28 23:24 BST
WARNING:  We could not determine for sure which interface to use, so we are guessing 127.0.0.1 .  If this is
wrong, use -S <my_IP_address>.
Interesting ports on rrvs.knams.wikimedia.org (145.97.39.155):
(The 1205 ports scanned but not shown below are in state: closed)
PORT      STATE    SERVICE
22/tcp    open     ssh
25/tcp    open     smtp
80/tcp    open     http
111/tcp   open     rpcbind
113/tcp   open     auth
135/tcp   filtered msrpc
139/tcp   filtered netbios-ssn
179/tcp   filtered bgp
443/tcp   open     https
445/tcp   filtered microsoft-ds
593/tcp   filtered http-rpc-epmap
631/tcp   open     ipp
996/tcp   open     xtreelic
2049/tcp  open     nfs
3306/tcp  open     mysql
32770/tcp open     sometimes-rpc3

Nmap finished: 1 IP address (1 host up) scanned in 24.321 seconds
```

Command: `nmap -sT -F -PT en.wikipedia.org`

NmapFE, showing results for a port scan against Wikipedia

•



```
Starting Nmap 4.52 ( http://insecure.org ) at 2008-01-03 15:27 PST
Initiating Ping Scan at 15:27
Scanning 66.230.200.100 [2 ports]
Completed Ping Scan at 15:27, 0.09s elapsed (1 total hosts)
Initiating Parallel DNS resolution of 1 host. at 15:27
Completed Parallel DNS resolution of 1 host. at 15:27, 0.05s elapsed
Initiating System CNAME DNS resolution of 1 host. at 15:27
Completed System CNAME DNS resolution of 1 host. at 15:27, 0.05s elapsed
Initiating SYN Stealth Scan at 15:27
Scanning 66.230.200.100 [1714 ports]
Discovered open port 80/tcp on 66.230.200.100
Discovered open port 22/tcp on 66.230.200.100
Discovered open port 111/tcp on 66.230.200.100
Discovered open port 32774/tcp on 66.230.200.100
Completed SYN Stealth Scan at 15:27, 4.96s elapsed (1714 total ports)
Host 66.230.200.100 appears to be up ... good.
Interesting ports on 66.230.200.100:
Not shown: 1704 closed ports
PORT     STATE   SERVICE
22/tcp   open    ssh
80/tcp   open    http
111/tcp  open    rpcbind
135/tcp  filtered msrpc
136/tcp  filtered profile
137/tcp  filtered netbios-ns
138/tcp  filtered netbios-dgm
139/tcp  filtered netbios-ssn
445/tcp  filtered microsoft-ds
32774/tcp open   sometimes-rpc11

Read data files from: /usr/local/share/nmap
Nmap done: 1 IP address (1 host up) scanned in 5.211 seconds
```

XNmap, a Mac OS X GUI

Reporting Results

Nmap provides four possible output formats. All but the interactive output is saved to a file. Nmap output can be manipulated by text processing software, enabling the user to create customized reports.

Interactive

presented and updated real time when a user runs Nmap from the command line. Various options can be entered during the scan to facilitate monitoring.

XML

a format that can be further processed by XML tools. It can be converted into a HTML report using XSLT.

Grepable

output that is tailored to line-oriented processing tools such as grep, sed or awk.

Normal

the output as seen while running Nmap from the command line, but saved to a file.

Script kiddie

meant to be an amusing way to format the interactive output replacing letters with their visually alike number representations. For example, Interesting ports becomes Int3rest1ng p0rtz.

CONCLUSION:- Hence we have studied and successfully Used NMAP.

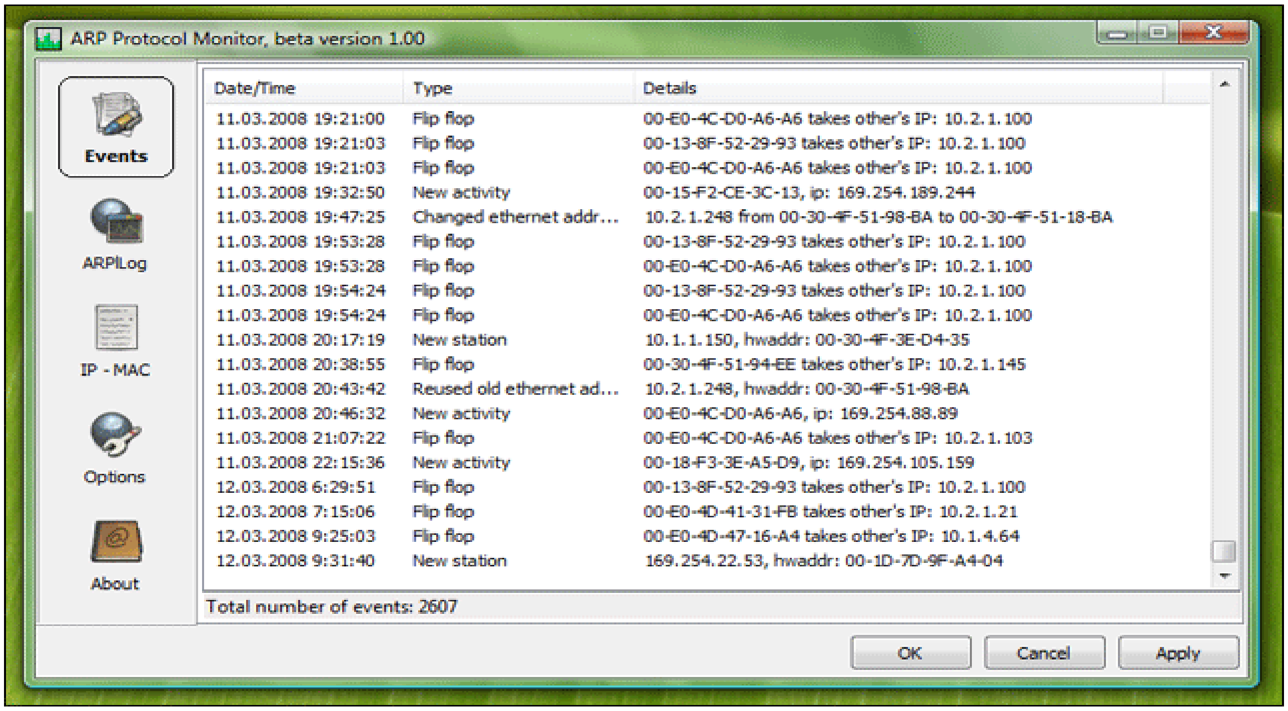
EXPERIMENT NO 8

AIM :- To Detect ARP spoofing using open source tool ARPWATCH.

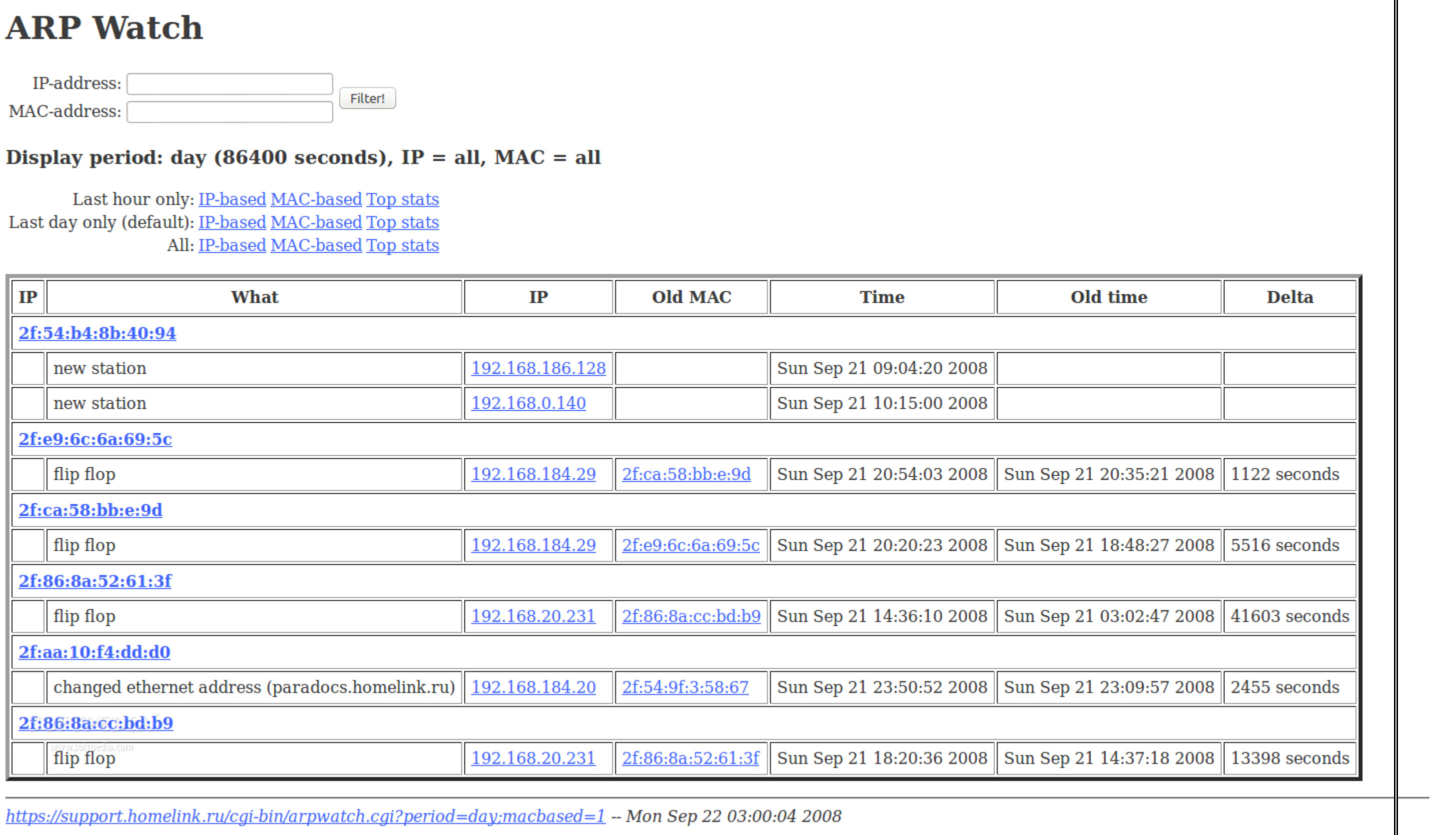
THEORY:- arpwatch is a computer software tool for monitoring Address Resolution Protocol traffic on a computer network. It generates a log of observed pairing of IP addresses with MAC addresses along with a timestamp when the pairing appeared on the network. It also has the option of sending an email to an administrator when a pairing changes or is added.

Network administrators monitor ARP activity to detect ARP spoofing.

arpwatch was developed by Lawrence Berkeley National Laboratory, Network Research Group, as open-source software and is released under the BSD license.



```
Date/Time              Type                        Details
11.03.2008 19:21:00    Flip flop                   00-E0-4C-D0-A6-A6 takes other's IP: 10.2.1.100
11.03.2008 19:21:03    Flip flop                   00-13-8F-52-29-93 takes other's IP: 10.2.1.100
11.03.2008 19:21:03    Flip flop                   00-E0-4C-D0-A6-A6 takes other's IP: 10.2.1.100
11.03.2008 19:32:50    New activity                00-15-F2-CE-3C-13, ip: 169.254.189.244
11.03.2008 19:47:25    Changed ethernet addr...    10.2.1.248 from 00-30-4F-51-98-BA to 00-30-4F-51-18-BA
11.03.2008 19:53:28    Flip flop                   00-13-8F-52-29-93 takes other's IP: 10.2.1.100
11.03.2008 19:53:28    Flip flop                   00-E0-4C-D0-A6-A6 takes other's IP: 10.2.1.100
11.03.2008 19:54:24    Flip flop                   00-13-8F-52-29-93 takes other's IP: 10.2.1.100
11.03.2008 19:54:24    Flip flop                   00-E0-4C-D0-A6-A6 takes other's IP: 10.2.1.100
11.03.2008 20:17:19    New station                 10.1.1.150, hwaddr: 00-30-4F-3E-D4-35
11.03.2008 20:38:55    Flip flop                   00-30-4F-51-94-EE takes other's IP: 10.2.1.145
11.03.2008 20:43:42    Reused old ethernet ad...   10.2.1.248, hwaddr: 00-30-4F-51-98-BA
11.03.2008 20:46:32    New activity                00-E0-4C-D0-A6-A6, ip: 169.254.88.89
11.03.2008 21:07:22    Flip flop                   00-E0-4C-D0-A6-A6 takes other's IP: 10.2.1.103
11.03.2008 22:15:36    New activity                00-18-F3-3E-A5-D9, ip: 169.254.105.159
12.03.2008 6:29:51     Flip flop                   00-13-8F-52-29-93 takes other's IP: 10.2.1.100
12.03.2008 7:15:06     Flip flop                   00-E0-4D-41-31-FB takes other's IP: 10.2.1.21
12.03.2008 9:25:03     Flip flop                   00-E0-4D-47-16-A4 takes other's IP: 10.1.4.64
12.03.2008 9:31:40     New station                 169.254.22.53, hwaddr: 00-1D-7D-9F-A4-04
Total number of events: 2607
```



ARP Watch

IP-address:
MAC-address:
Filter!

Display period: day (86400 seconds), IP = all, MAC = all

Last hour only: IP-based MAC-based Top stats
Last day only (default): IP-based MAC-based Top stats
All: IP-based MAC-based Top stats

IP	What	IP	Old MAC	Time	Old time	Delta
2f:54:b4:8b:40:94						
	new station	192.168.186.128		Sun Sep 21 09:04:20 2008		
	new station	192.168.0.140		Sun Sep 21 10:15:00 2008		
2f:e9:6c:6a:69:5c						
	flip flop	192.168.184.29	2f:ca:58:bb:e:9d	Sun Sep 21 20:54:03 2008	Sun Sep 21 20:35:21 2008	1122 seconds
2f:ca:58:bb:e:9d						
	flip flop	192.168.184.29	2f:e9:6c:6a:69:5c	Sun Sep 21 20:20:23 2008	Sun Sep 21 18:48:27 2008	5516 seconds
2f:86:8a:52:61:3f						
	flip flop	192.168.20.231	2f:86:8a:cc:bd:b9	Sun Sep 21 14:36:10 2008	Sun Sep 21 03:02:47 2008	41603 seconds
2f:aa:10:f4:dd:d0						
	changed ethernet address (paradocs.homelink.ru)	192.168.184.20	2f:54:9f:3:58:67	Sun Sep 21 23:50:52 2008	Sun Sep 21 23:09:57 2008	2455 seconds
2f:86:8a:cc:bd:b9						
	flip flop	192.168.20.231	2f:86:8a:52:61:3f	Sun Sep 21 18:20:36 2008	Sun Sep 21 14:37:18 2008	13398 seconds

https://support.homelink.ru/cgi-bin/arpwatch.cgi?period=day;macbased=1 -- Mon Sep 22 03:00:04 2008

CONCLUSION:- Hence we have studied and successfully Used ARPWATCH.

EXPERIMENT NO 9

AIM :- To Install an IDS (e.g. SNORT) and study the logs..

THEORY:- An intrusion detection system (IDS) is a device or software application that monitors network or system activities for malicious activities or policy violations and produces reports to a management station. IDS come in a variety of “flavors” and approach the goal of detecting suspicious traffic in different ways. There are network based (NIDS) and host based (HIDS) intrusion detection systems. Some systems may attempt to stop an intrusion attempt but this is neither required nor expected of a monitoring system. Intrusion detection and prevention systems (IDPS) are primarily focused on identifying possible incidents, logging information about them, and reporting attempts. In addition, organizations use IDPSes for other purposes, such as identifying problems with security policies, documenting existing threats and deterring individuals from violating security policies. IDPSes have become a necessary addition to the security infrastructure of nearly every organization.

IDPSes typically record information related to observed events, notify security administrators of important observed events and produce reports. Many IDPSes can also respond to a detected threat by attempting to prevent it from succeeding. They use several response techniques, which involve the IDPS stopping the attack itself, changing the security environment (e.g. reconfiguring a firewall) or changing the attack's content.

HIDS & NIDS

Intrusion detection systems are of two main types, network based (NIDS) and host based (HIDS) intrusion detection systems.

Network Intrusion Detection Systems

Network intrusion detection systems NIDS are placed at a strategic point or points within the network to monitor traffic to and from all devices on the network. It performs an analysis for a passing traffic on the entire subnet, works in a promiscuous mode, and matches the traffic that is passed on the subnets to the library of known attacks. Once the attack is identified, or abnormal behavior is sensed, the alert can be sent to the administrator. Example of the NIDS would be installing it on the subnet where firewalls are located in order to see if someone is trying to break into the firewall. Ideally one would scan all inbound and outbound traffic, however doing so might create a bottleneck that would impair the overall speed of the network.

Host Intrusion Detection Systems

Host intrusion detection systems run on individual hosts or devices on the network. A HIDS monitors the inbound and outbound packets from the device only and will alert the user or administrator if suspicious activity is detected. It takes a snapshot of existing system files and matches it to the previous snapshot. If the critical system files were modified or deleted, the alert is sent to the administrator to investigate. An example of HIDS usage can be seen on mission critical machines, which are not expected to change their configurations.

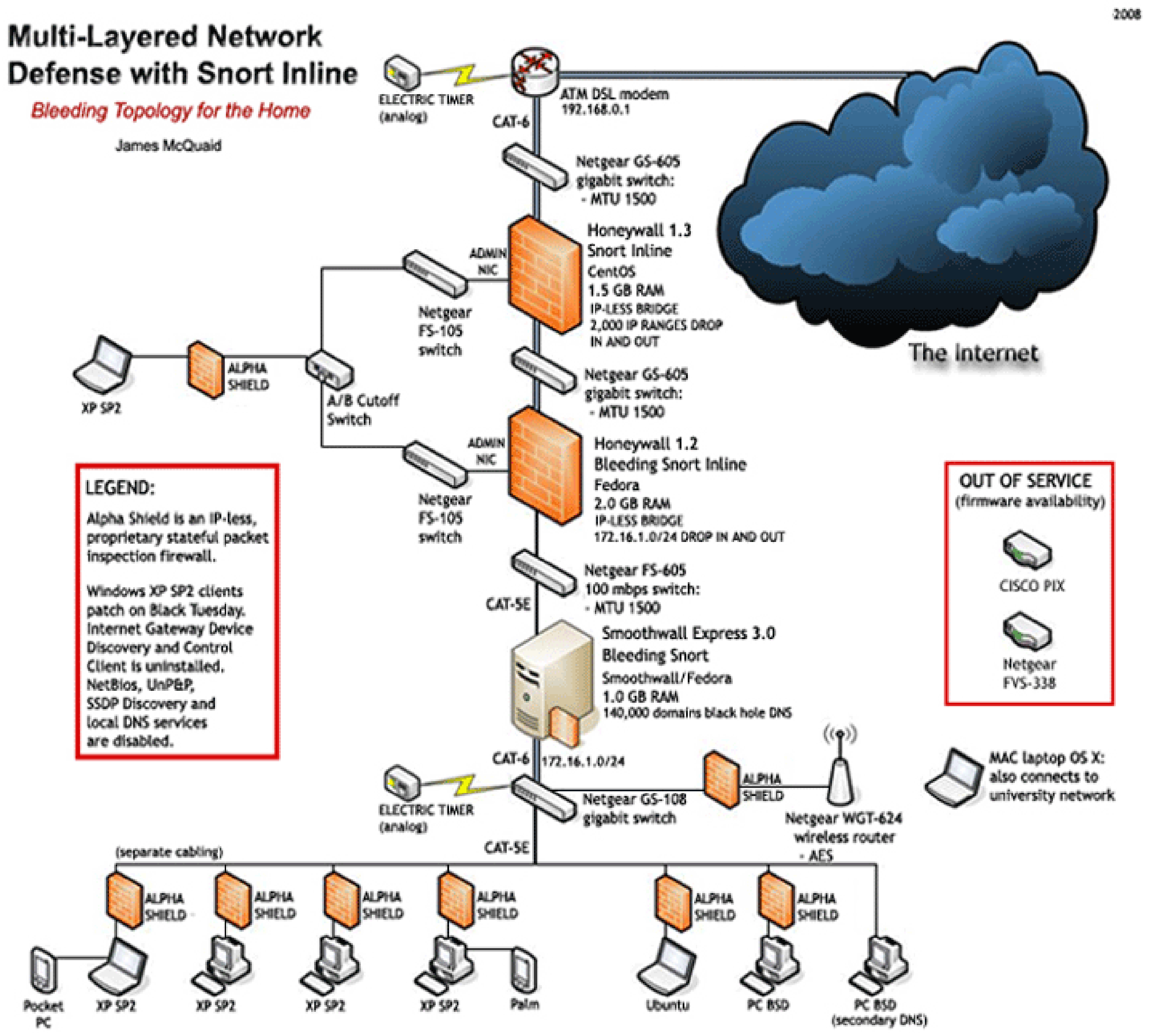
Intrusion detection systems can also be system-specific using custom tools and honeypots.

Passive and active systems

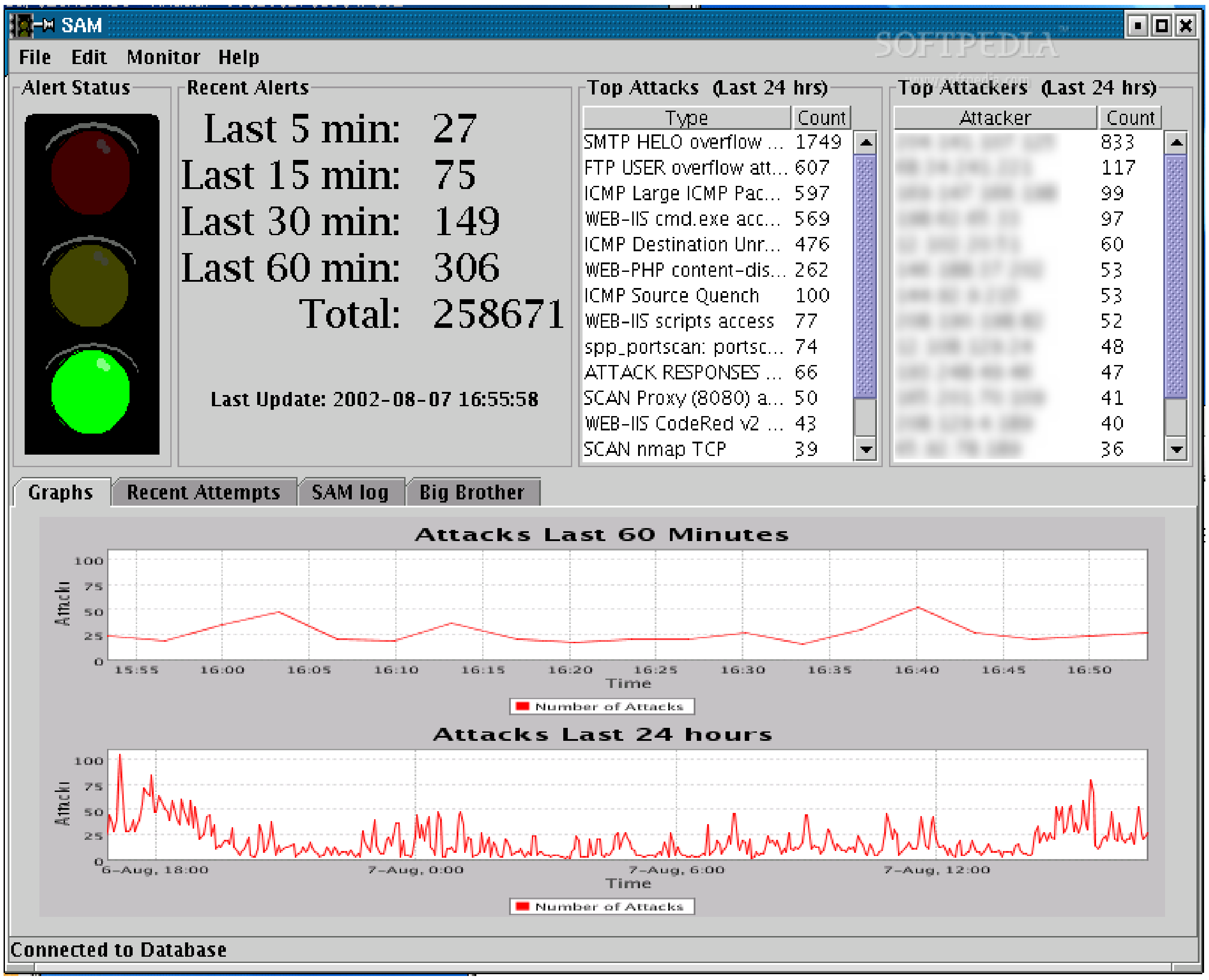
In a passive system, the intrusion detection system (IDS) sensor detects a potential security breach, logs the information and signals an alert on the console or owner.[4] In a reactive system, also known as an intrusion prevention system (IPS), the IPS auto-responds to the suspicious activity by resetting the connection or by reprogramming the firewall to block network traffic from the suspected malicious source. The term IDPS is commonly used where this can happen automatically or at the command of an operator; systems that both "detect (alert)" and "prevent".

Comparision with Firewalls

Though they both relate to network security, an intrusion detection system (IDS) differs from a firewall in that a firewall looks outwardly for intrusions in order to stop them from happening. Firewalls limit access between networks to prevent intrusion and do not signal an attack from inside the network. An IDS evaluates a suspected intrusion once it has taken place and signals an alarm. An IDS also watches for attacks that originate from within a system. This is traditionally achieved by examining network communications, identifying heuristics and patterns (often known as signatures) of common computer attacks, and taking action to alert operators. A system that terminates connections is called an intrusion prevention system, and is another form of an application layer firewall.


2008
Multi-Layered Network Defense with Snort Inline
Bleeding Topology for the Home
James McQuaid
ELECTRIC TIMER (analog)
ATM DSL modem 192.168.0.1
CAT-6
Netgear GS-605 gigabit switch: - MTU 1500
Honeywall 1.3 Snort Inline CentOS 1.5 GB RAM IP-LESS BRIDGE 2,000 IP RANGES DROP IN AND OUT
ADMIN NIC
Netgear FS-105 switch
The Internet
XP SP2
ALPHA SHIELD
A/B Cutoff Switch
Netgear GS-605 gigabit switch: - MTU 1500
Honeywall 1.2 Bleeding Snort Inline Fedora 2.0 GB RAM IP-LESS BRIDGE 172.16.1.0/24 DROP IN AND OUT
LEGEND:
Alpha Shield is an IP-less, proprietary stateful packet inspection firewall.
Windows XP SP2 clients patch on Black Tuesday. Internet Gateway Device Discovery and Control Client is uninstalled. NetBios, UnP&P, SSDP Discovery and local DNS services are disabled.
OUT OF SERVICE (firmware availability)
CISCO PIX
Netgear FVS-338
Netgear FS-605 100 mbps switch: - MTU 1500
CAT-5E
Smoothwall Express 3.0 Bleeding Snort Smoothwall/Fedora 1.0 GB RAM 140,000 domains black hole DNS
172.16.1.0/24
Netgear GS-108 gigabit switch
Netgear WGT-624 wireless router - AES
MAC laptop OS X: also connects to university network
(separate cabling)
Pocket PC
Palm
Ubuntu
PC BSD
PC BSD (secondary DNS)

ONLY FOR ARMIET STUDENTS……….



Recent Alerts

Last 5 min: 27
Last 15 min: 75
Last 30 min: 149
Last 60 min: 306
Total: 258671

Last Update: 2002-08-07 16:55:58

Top Attacks (Last 24 hrs)

Type	Count
SMTP HELO overflow ...	1749
FTP USER overflow att...	607
ICMP Large ICMP Pac...	597
WEB-IIS cmd.exe acc...	569
ICMP Destination Unr...	476
WEB-PHP content-dis...	262
ICMP Source Quench	100
WEB-IIS scripts access	77
spp_portscan: portsc...	74
ATTACK RESPONSES ...	66
SCAN Proxy (8080) a...	50
WEB-IIS CodeRed v2 ...	43
SCAN nmap TCP	39

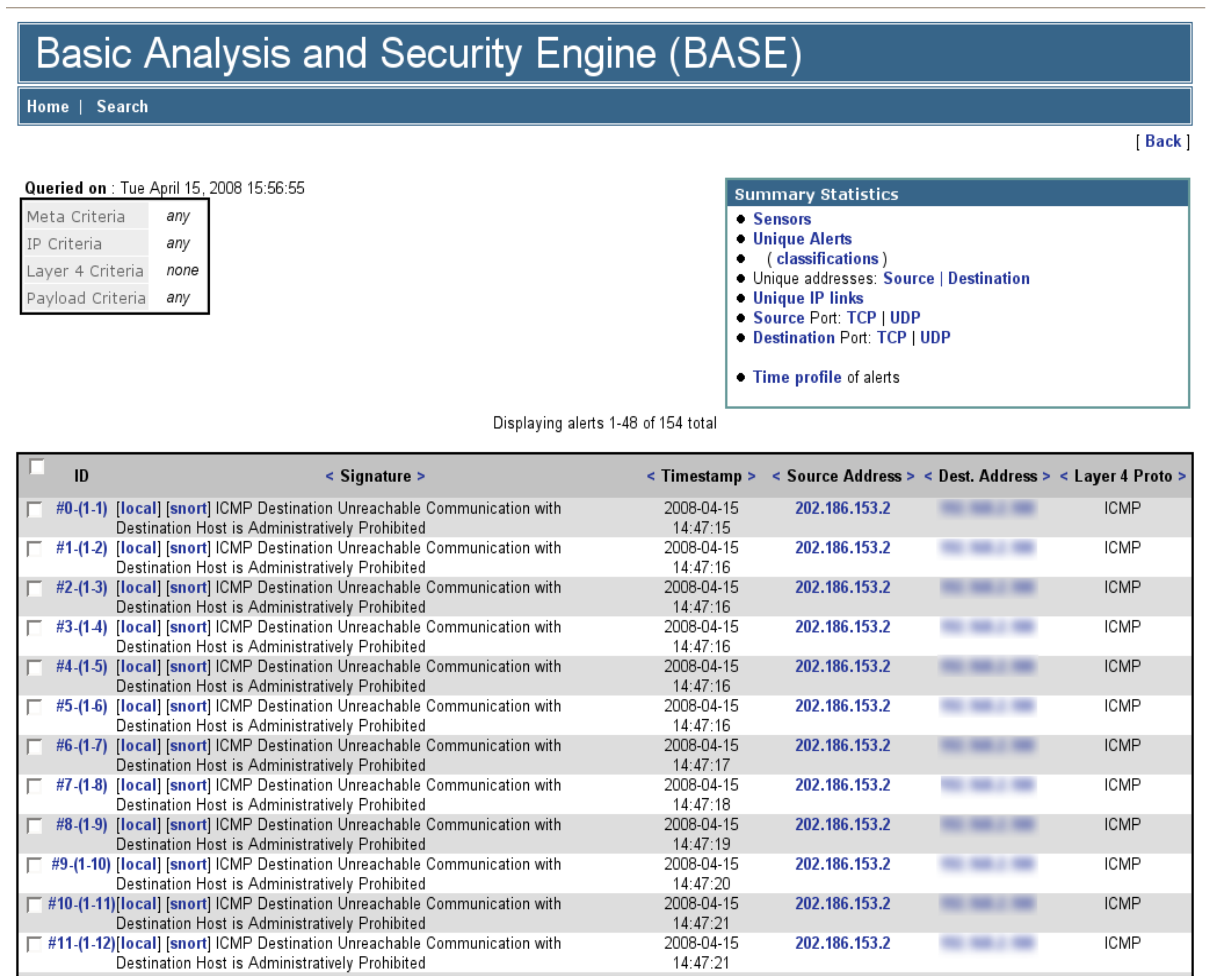
Top Attackers (Last 24 hrs)

Attacker	Count
[redacted]	833
[redacted]	117
[redacted]	99
[redacted]	97
[redacted]	60
[redacted]	53
[redacted]	53
[redacted]	52
[redacted]	48
[redacted]	47
[redacted]	41
[redacted]	40
[redacted]	36

Connected to Database

Fig:-SNORT Alert Manager

ONLY FOR ARMIET STUDENTS……….



Basic Analysis and Security Engine (BASE)

Home | Search

[Back]

Queried on : Tue April 15, 2008 15:56:55

Meta Criteria	any
IP Criteria	any
Layer 4 Criteria	none
Payload Criteria	any

Summary Statistics
- Sensors
- Unique Alerts
- (classifications)
- Unique addresses: Source | Destination
- Unique IP links
- Source Port: TCP | UDP
- Destination Port: TCP | UDP
- Time profile of alerts

Displaying alerts 1-48 of 154 total

ID	< Signature >	< Timestamp >	< Source Address >	< Dest. Address >	< Layer 4 Proto >
#0-(1-1)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:15	202.186.153.2	[redacted]	ICMP
#1-(1-2)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:16	202.186.153.2	[redacted]	ICMP
#2-(1-3)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:16	202.186.153.2	[redacted]	ICMP
#3-(1-4)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:16	202.186.153.2	[redacted]	ICMP
#4-(1-5)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:16	202.186.153.2	[redacted]	ICMP
#5-(1-6)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:16	202.186.153.2	[redacted]	ICMP
#6-(1-7)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:17	202.186.153.2	[redacted]	ICMP
#7-(1-8)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:18	202.186.153.2	[redacted]	ICMP
#8-(1-9)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:19	202.186.153.2	[redacted]	ICMP
#9-(1-10)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:20	202.186.153.2	[redacted]	ICMP
#10-(1-11)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:21	202.186.153.2	[redacted]	ICMP
#11-(1-12)	[local] [snort] ICMP Destination Unreachable Communication with Destination Host is Administratively Prohibited	2008-04-15 14:47:21	202.186.153.2	[redacted]	ICMP

CONCLUSION:- Hence we have studied and successfully Worked on SNORT.

EXPERIMENT NO 10

AIM :- To study Use of iptables in linux to create firewalls.

THEORY:- Setting up a good firewall is an essential step to take in securing any modern operating system. Most Linux distributions ship with a few different firewall tools that we can use to configure our firewalls. In this guide, we'll be covering the iptables firewall.

Iptables is a standard firewall included in most Linux distributions by default (a modern variant called nftables will begin to replace it). It is actually a front end to the kernel-level netfilter hooks that can manipulate the Linux network stack. It works by matching each packet that crosses the networking interface against a set of rules to decide what to do.

In the previous guide, we learned how iptables rules work to block unwanted traffic. In this guide, we'll move on to a practical example to demonstrate how to create a basic rule set for an Ubuntu 14.04 server.

Basic iptables Commands

Now that you have a good understanding of iptables concepts, we should cover the basic commands that will be used to form complex rule sets and to manage the iptables interface in general.

First, you should be aware that iptables commands must be run with root privileges. This means you need to log in as root, use su or sudo -i to gain a root shell, or precede all commands with sudo. We are going to use sudo in this guide since that is the preferred method on an Ubuntu system.

A good starting point is to list the current rules that are configured for iptables. You can do that with the -L flag:

```
sudo iptables -L
Chain INPUT (policy ACCEPT)
target     prot opt source               destination

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
```

As you can see, we have our three default chains (INPUT,OUTPUT, and FORWARD). We also can see each chain's default policy (each chain has ACCEPT as its default policy). We also see some column headers, but we don't see any actual rules. This is because Ubuntu doesn't ship with a default rule set.

We can see the output in a format that reflects the commands necessary to enable each rule and policy by instead using the -S flag:

```
sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
```

To replicate the configuration, we'd just need to type sudo iptables followed by each of the lines in the output. (Depending on the configuration, it may actually slightly more complicated if we are connected remotely so that we don't institute a default drop policy before the rules are in place to catch and allow our current connection.)

If you *do* have rules in place and wish to scrap them and start over, you can flush the current rules by typing:

```
sudo iptables -F
```

Once again, the default policy is important here, because, while all of the rules are deleted from your chains, the default policy will *not* change with this command. That means that if you are connected remotely, you should ensure that the default policy on your INPUT and OUTPUT chains are set to ACCEPT prior to flushing your rules. You can do this by typing:

```
sudo iptables -P INPUT ACCEPT
sudo iptables -P OUTPUT ACCEPT
sudo iptables -F
```

You can then change the default drop policy back to DROP after you've established rules that explicitly allow your connection. We'll go over how to do that in a moment.

Make your First Rule

We're going to start to build our firewall policies. As we said above, we're going to be working with the INPUT chain since that is the funnel that incoming traffic will be sent through. We are going to start with the rule that we've talked about a bit above: the rule that explicitly accepts your current SSH connection.

The full rule we need is this:

```
sudo iptables -A INPUT -m conntrack --ctstate ESTABLISHED,RELATED -j ACCEPT
```

This may look incredibly complicated, but most of it will make sense when we go over the components:

- **-A INPUT**: The -A flag *appends* a rule to the end of a chain. This is the portion of the command that tells iptables that we wish to add a new rule, that we want that rule added to the end of the chain, and that the chain we want to operate on is the INPUT chain.
- **-m conntrack**: iptables has a set of core functionality, but also has a set of extensions or modules that provide extra capabilities.

In this portion of the command, we're stating that we wish to have access to the functionality provided by the conntrack module. This module gives access to commands that can be used to make decisions based on the packet's relationship to previous connections.

* **--ctstate**: This is one of the commands made available by calling the conntrack module. This command allows us to match packets based on how they are related to packets we've seen before.

We pass it the value of ESTABLISHED to allow packets that are part of an existing connection. We pass it the value of RELATED to allow packets that are associated with an established connection. This is the portion of the rule that matches our current SSH session.

* **-j ACCEPT**: This specifies the target of matching packets. Here, we tell iptables that packets that match the preceding criteria should be accepted and allowed through.

We put this rule at the beginning because we want to make sure the connections we are already using are matched, accepted, and pulled out of the chain before reaching any DROP rules.

We can see the changes if we list the rules:

```
sudo iptables -L
Chain INPUT (policy ACCEPT)
```

```
target     prot opt source               destination
ACCEPT     all  --  anywhere             anywhere             ctstate RELATED,ESTABLISHED

Chain FORWARD (policy ACCEPT)
target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
target     prot opt source               destination
```

Now that you know the general syntax, let's continue by adding some more cases where we want to accept the connection.

Accept Other Necessary Connections

We have told iptables to keep open any connections that are already open and to allow new connections related to those connections. However, we need to create some rules to establish when we want to accept new connections that don't meet those criteria.

We want to keep two ports open specifically. We want to keep our SSH port open (we're going to assume in this guide that this is the default 22. If you've changed this in your SSH configuration, modify your value here). We are also going to assume that this computer is running a web server on the default port 80. If this is not the case for you, you don't have to add that rule.

The two lines we're going to use to add these rules are:

```
sudo iptables -A INPUT -p tcp --dport 22 -j ACCEPT
sudo iptables -A INPUT -p tcp --dport 80 -j ACCEPT
```

As you can see, these are very similar to our first rule, but perhaps more simple. The new options are:

- **-p tcp**: This option matches packets if the protocol being used is TCP. This is a connection-based protocol that will be used by most applications because it allows for reliable communication.
- **--dport**: This option is available if the -p tcp flag is given. It gives a further requirement of matching the destination port for the matching packet. The first rule matches for TCP packets destined for port 22, while the second rule matches TCP traffic pointed towards port 80.

There is one more accept rule that we need to ensure that our server can function correctly. Often, services on the computer communicate with each other by sending network packets to each other. They do this by utilizing a pseudo network interface called the loopback device, which directs traffic back to itself rather than to other computers.

So if one service wants to communicate with another service that is listening for connections on port 4555, it can send a packet to port 4555 of the loopback device. We want this type of behavior to be allowed, because it is essential for the correct operation of many programs.

The rule we need to add is this:

```
sudo iptables -I INPUT 1 -i lo -j ACCEPT
```

This looks a bit different than our other commands. Let's go over what it is doing:

- **-I INPUT 1**: The -I flag tells iptables to *insert* a rule. This is different than the -A flag which appends a rule to the end. The -I flag takes a chain and the rule position where you want to insert the new rule.

In this case, we're adding this rule as the very first rule of the INPUT chain. This will bump the rest of the rules down. We want this at the top because it is fundamental and should not be affected by subsequent rules.

* **-i lo**: This component of the rule matches if the interface that the packet is using is the "lo" interface. The "lo" interface is another name for the loopback device. This means that any packet using that interface to communicate (packets generated on our server, for our server) should be accepted.

To see our current rules, we should use the -S flag. This is because the -L flag doesn't include some information, like the interface that a rule is tied to, which is an important part of the rule we just added:

```
sudo iptables -S
-P INPUT ACCEPT
-P FORWARD ACCEPT
-P OUTPUT ACCEPT
-A INPUT -i lo -j ACCEPT
-A INPUT -m conntrack --ctstate RELATED,ESTABLISHED -j ACCEPT
-A INPUT -p tcp -m tcp --dport 22 -j ACCEPT
-A INPUT -p tcp -m tcp --dport 80 -j ACCEPT
```

Implementing a Drop Rule

We now have four separate rules that explicitly accept packets based on certain criteria. However, our firewall currently is not blocking *anything*.

If a packet enters the INPUT chain and doesn't match one of the four rules that we made, it is being passed to our default policy, which is to accept the packet anyways. We need to change this.

There are two different ways that we can do this, with some pretty important differences. The first way we could do this is to modify the default policy of our INPUT chain. We can do this by typing:

```
sudo iptables -P INPUT DROP
```

This will catch any packets that fall through our INPUT chain, and drop them. This is what we call a default drop policy. One of the implications of this type of a design is that it falls back on dropping packets if the rules are flushed.

This may be more secure, but also can have serious consequences if you don't have another way of accessing your server. With DigitalOcean, you can log in through our web console to get access to your server if this happens. The web console acts as a virtual local connection, so iptables rules will not affect it.

You may like your server to automatically drop all connections in the event that the rules are dumped. This would prevent your server from being left wide open. This also means that you can easily append rules to the bottom of the chain easily while still dropping packets as you'd like.

The alternative approach is to keep the default policy for the chain as accept and add a rule that drops every remaining packet to the bottom of the chain itself.

If you changed the default policy for the INPUT chain above, you can set it back to follow along by typing:

```
sudo iptables -P INPUT ACCEPT
```

Now, you can add a rule to the bottom of the chain that will drop any remaining packets:

```
sudo iptables -A INPUT -j DROP
```

The result under normal operating conditions is exactly the same as a default drop policy. This rule works by matching *every* remaining packet that reaches it. This prevents a packet from *ever* dropping all of the way through the chain to reach the default policy.

Basically, this is used to keep the default policy to accept traffic. That way, if there are any problems and the rules are flushed, you will still be able to access the machine over the network. This is a way of implementing a default action without altering the policy that will be applied to an empty chain.

Of course, this also means that any rule that any additional rule that you wish to add to the end of the chain will have to be added before the drop rule. You can do this either by temporarily removing the drop rule:

```
sudo iptables -D INPUT -j DROP
sudo iptables -A INPUT new_rule_here
sudo iptables -A INPUT -j DROP
```

Or, you can insert rules that you need at the end of the chain (but prior to the drop) by specifying the line number. To insert a rule at line number 4, you could type:

```
sudo iptables -I INPUT 4 new_rule_here
```

If you are having trouble knowing which line number each rule is, you can tell iptables to number the rules by typing:

```
sudo iptables -L --line-numbers
Chain INPUT (policy DROP)
num  target     prot opt source               destination
1    ACCEPT     all  --  anywhere             anywhere
2    ACCEPT     all  --  anywhere             anywhere             ctstate RELATED,ESTABLISHED
```

```
3    ACCEPT     tcp  --  anywhere            anywhere            tcp dpt:ssh
4    ACCEPT     tcp  --  anywhere            anywhere            tcp dpt:http

Chain FORWARD (policy ACCEPT)
num  target     prot opt source               destination

Chain OUTPUT (policy ACCEPT)
num  target     prot opt source               destination
```

This can be helpful to make sure you are adding your rule at the appropriate position.

Saving your iptables Configuration

By default, the rules that you add to iptables are ephemeral. This means that when you restart your server, your iptables rules will be gone.

This is actually a feature for some user because it gives them an avenue to get back in if they have accidentally locked themselves out of the server. However, most users will want a way to automatically save the rules you have created and to load them when the server starts.

There are a few ways to do this, but the easiest way is with the iptables-persistent package. You can download this from Ubuntu's default repositories:

```
sudo apt-get update
sudo apt-get install iptables-persistent
```

During the installation, you will be asked if you would like to save your current rules to be automatically loaded. If you are happy with your current configuration (and you have tested your ability to create independent SSH connections, you can select to save your current rules.

It will also ask you if you want to save the IPv6 rules that you have configured. These are configured through a separate utility called ip6tables which controls the flow of IPv6 packets in almost the same way.

Once the installation is complete, you will have a new service called iptables-persistent that is configured to run at boot. This service will load in your rules and apply them when the server is started.

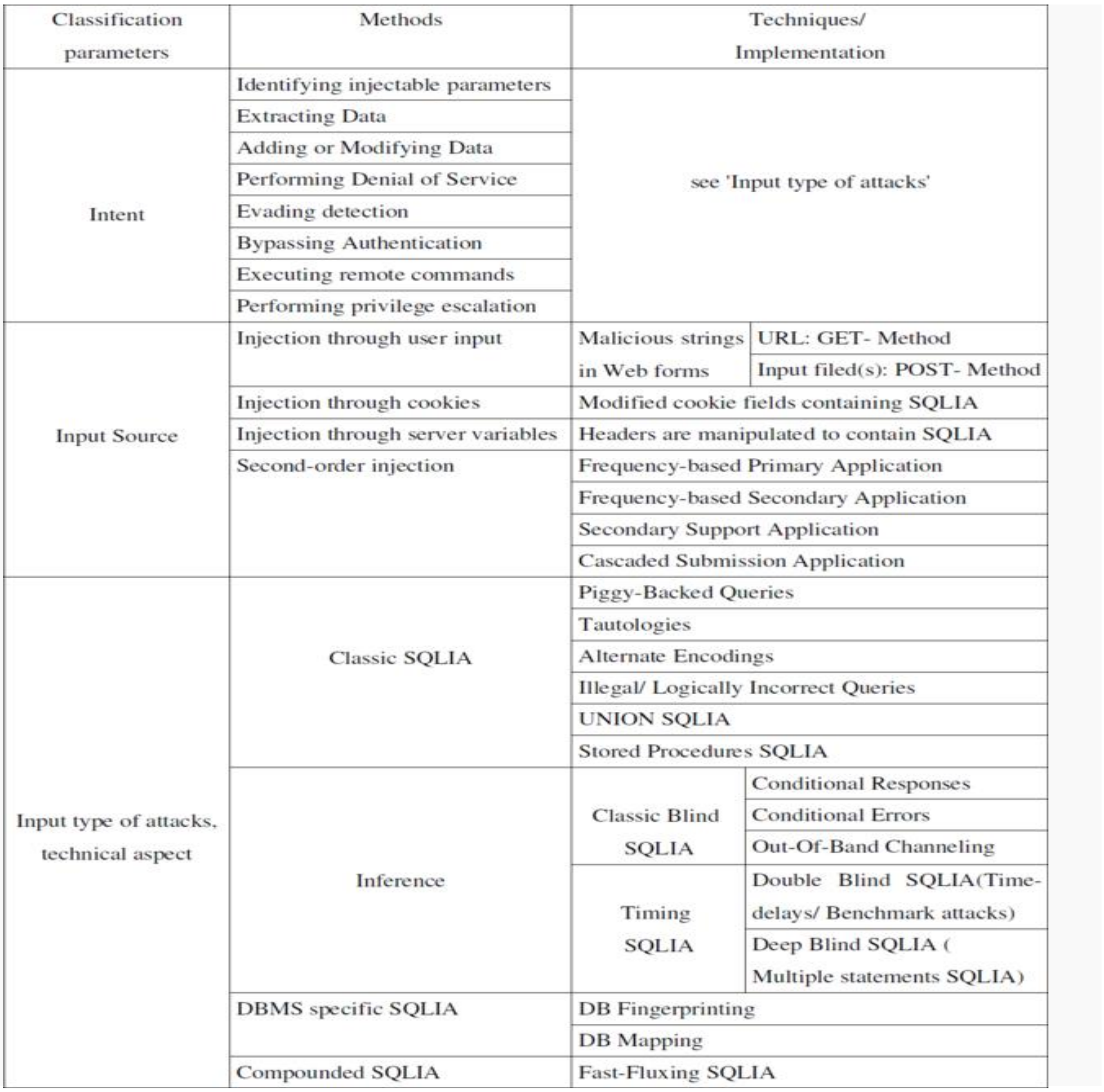
CONCLUSION:- Hence we have studied and successfully Implemented Firewall With the help of Iptables.

EXPERIMENT NO 11

AIM :- To Implement a simple SQL injection attack.

THEORY:- SQL injection is a code injection technique, used to attack data-driven applications, in which malicious SQL statements are inserted into an entry field for execution (e.g. to dump the database contents to the attacker).SQL injection must exploit a security vulnerability in an application's software, for example, when user input is either incorrectly filtered for string literalescape characters embedded in SQL statements or user input is not strongly typed and unexpectedly executed. SQL injection is mostly known as an attack vector for websites but can be used to attack any type of SQL database.

In a 2012 study, security company Imperva observed that the average web application received 4 attack campaigns per month, and retailers received twice as many attacks as other industries.



Classification parameters	Methods	Techniques/ Implementation	
Intent	Identifying injectable parameters	see 'Input type of attacks'	
	Extracting Data		
	Adding or Modifying Data		
	Performing Denial of Service		
	Evading detection		
	Bypassing Authentication		
	Executing remote commands		
	Performing privilege escalation		
Input Source	Injection through user input	Malicious strings in Web forms	URL: GET- Method
			Input filed(s): POST- Method
	Injection through cookies	Modified cookie fields containing SQLIA	
	Injection through server variables	Headers are manipulated to contain SQLIA	
	Second-order injection	Frequency-based Primary Application	
		Frequency-based Secondary Application	
		Secondary Support Application	
		Cascaded Submission Application	
Input type of attacks, technical aspect	Classic SQLIA	Piggy-Backed Queries	
		Tautologies	
		Alternate Encodings	
		Illegal/ Logically Incorrect Queries	
		UNION SQLIA	
		Stored Procedures SQLIA	
	Inference	Classic Blind SQLIA	Conditional Responses
			Conditional Errors
			Out-Of-Band Channeling
		Timing SQLIA	Double Blind SQLIA(Time-delays/ Benchmark attacks)
			Deep Blind SQLIA (Multiple statements SQLIA)
	DBMS specific SQLIA	DB Fingerprinting	
		DB Mapping	
	Compounded SQLIA	Fast-Fluxing SQLIA	

A Classification of SQL injection attacking vector until 2010

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Incorrectly filtered escape characters

This form of SQL injection occurs when user input is not filtered for escape characters and is then passed into a SQL statement. This results in the potential manipulation of the statements performed on the database by the end-user of the application.

The following line of code illustrates this vulnerability:

statement = "SELECT * FROM users WHERE name ='" + userName + "';"

This SQL code is designed to pull up the records of the specified username from its table of users. However, if the "userName" variable is crafted in a specific way by a malicious user, the SQL statement may do more than the code author intended. For example, setting the "userName" variable as:

' or '1'='1

or using comments to even block the rest of the query (there are three types of SQL comments[13]). All three lines have a space at the end:

' or '1'='1' --

' or '1'='1' ({

' or '1'='1' /*

renders one of the following SQL statements by the parent language:

SELECT * FROM users WHERE name = '' OR '1'='1';

SELECT * FROM users WHERE name = '' OR '1'='1' -- ';

If this code were to be used in an authentication procedure then this example could be used to force the selection of a valid username because the evaluation of '1'='1' is always true.

The following value of "userName" in the statement below would cause the deletion of the "users" table as well as the selection of all data from the "userinfo" table (in essence revealing the information of every user), using an API that allows multiple statements:

a';DROP TABLE users; SELECT * FROM userinfo WHERE 't' = 't

This input renders the final SQL statement as follows and specified:

SELECT * FROM users WHERE name = 'a';DROP TABLE users; SELECT * FROM userinfo WHERE 't' = 't';

While most SQL server implementations allow multiple statements to be executed with one call in this way, some SQL APIs such as PHP's mysql_query() function do not allow this for security reasons. This prevents attackers from injecting entirely separate queries, but doesn't stop them from modifying queries.

CONCLUSION:- Hence we have studied and successfully Implement SQL Injection Attack.