syslog-ng Premium Edition 7.0.28

Mutual authentication using TLS
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Legend

⚠️ **WARNING**: A WARNING icon highlights a potential risk of bodily injury or property damage, for which industry-standard safety precautions are advised. This icon is often associated with electrical hazards related to hardware.

⚠️ **CAUTION**: A CAUTION icon indicates potential damage to hardware or loss of data if instructions are not followed.

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Contents

Introduction ......................................................................................................................... 4
Creating self-signed certificates ......................................................................................... 5
Creating a CA ....................................................................................................................... 5
Creating a server certificate ............................................................................................... 7
Creating a client certificate ............................................................................................... 8
Configuring syslog-ng PE .................................................................................................. 11
Configuring the syslog-ng PE server ................................................................................. 11
Configuring syslog-ng PE clients ...................................................................................... 12
Testing what you have done ............................................................................................. 14
Summary ........................................................................................................................... 15
About us ............................................................................................................................. 16
Contacting us .................................................................................................................... 16
Technical support resources ............................................................................................. 16
Introduction

Collecting log messages is an essential part of managing, maintaining, and troubleshooting IT systems. Since your log messages can contain all kinds of sensitive information, you should make sure that they are kept safe. The easiest way to protect the log messages as they are transferred from your clients to your logserver is to authenticate and encrypt the connection between the client and the server.

This tutorial shows you step-by-step how to create the certificates required to authenticate your server and your clients, and how to configure syslog-ng Premium Edition (syslog-ng PE) to send your log messages in an encrypted connection. Installing syslog-ng PE is not covered, but downloading it for your platform and installing it should be easy for details, see "Installing syslog-ng PE" in the Administration Guide.

The tutorial is organized as follows:

- **Creating self-signed certificates** describes how to create the required certificates to encrypt and authenticate the connection between your logserver and your clients. Actually, you can use this part of the tutorial even if you do not use syslog-ng PE, as it is independent from the logging application you use.
- **Configuring syslog-ng PE** describes how to configure syslog-ng PE on your clients and your logserver.
- **Testing what you have done** gives you tips on how to test your configuration to make sure it is really working.

**NOTE**: Some of the command line examples in this tutorial are quite long. You might need to scroll the example to read the whole example.
Creating self-signed certificates

TLS-encryption uses certificates to authenticate the server, and in case of mutual authentication, the client as well. The following sections show you how to create the required certificates.

To use mutual authentication in syslog-ng PE, certificates are required. There are several commercial certificate authorities (CAs) who can help you, but the process costs both money and time (waiting until the submitted certificate is signed). This guide demonstrates how to create your very own Certificate Authority (CA) for creating self-signed certificates. It does not cover all the details, for example, changing expiration dates, only the minimally required steps to be able to use mutual authentication in syslog-ng PE.

There are handy tools, such as CA.pl, which can make certificate creation and signing easier, but they are not available on all platforms, even if it is part of the OpenSSL software suite. On the other hand, the OpenSSL command line tool is available on all Linux distributions and BSD variants, so this tool will be used in the guide.

Creating a CA

This section describes how to create a CA.

**NOTE:** Some of the command line examples in this section are quite long. You might need to scroll the example to read the whole example.

**To create a CA**

1. Create an empty directory and navigate into that directory:
   ```
   mkdir CA
   cd CA
   ```

2. Create a few directories and give starting values to some support files:
   ```
   mkdir certs crl newcerts private
   echo "01" > serial
   cp /dev/null index.txt
   ```
3. Copy openssl.cnf to the current directory. Depending on your distributions, the source directory might be different, so check the list of files in the OpenSSL package before copying:

   ```
cp /etc/ssl/openssl.cnf openssl.cnf
   ```

4. Edit openssl.cnf in the current directory:

   ```
   vi openssl.cnf
   ```

5. Search for the following part and replace ./DemoCA with a single dot:

   ```
   [ CA_default ]
   dir    = ./demoCA          # Where everything is kept
   certs  = $dir/certs        # Where the issued certs are kept
   ```

   Change it to:

   ```
   [ CA_default ]
   dir    = .                  # Where everything is kept
   certs  = $dir/certs        # Where the issued certs are kept
   ```

6. As a last step, generate the certificate for the CA:

   ```
   openssl req -new -x509 -keyout private/cakey.pem -newkey rsa:4096 -out cacert.pem -days 365 -config openssl.cnf
   ```

   **NOTE:** By including and customizing the `-newkey rsa:<key size>` element in your command line, you can set the key size that is compliant with your organization policy.

   The following will be displayed. Answer the questions as in the example:

   ```
   Generating a 1024 bit RSA private key
   ++++
   ......................+++++
   writing new private key to 'private/cakey.pem'
   Enter PEM pass phrase:
   Verifying - Enter PEM pass phrase:
   ----- 
   You are about to be asked to enter information that will be incorporated into your certificate request.
   What you are about to enter is what is called a Distinguished Name or a DN.
   There are quite a few fields but you can leave some blank
   For some fields there will be a default value,
   If you enter '.', the field will be left blank.
   ----- 
   Country Name (2 letter code) [AU]:HU
   State or Province Name (full name) [Some-State]:Budapest
   ```
Creating a server certificate

This section describes how to create a server certificate.

**NOTE:** Some of the command line examples in this section are quite long. You might need to scroll the example to read the whole example.

**To create a server certificate**

1. The next step is to create and sign a certificate for your syslog-ng PE server. The common name should contain the FQDN or IP address of your server, and the email address should be left blank.

   ```
   openssl req -nodes -new -x509 -keyout serverkey.pem -newkey rsa:4096 -out serverreq.pem -days 365 -config openssl.cnf
   ```

   **NOTE:** By including and customizing the `-newkey rsa:<key size>` element in your command line, you can set the key size that is compliant with your organization policy.

2. The following will be displayed. Answer the questions as in the example:

   ```
   Generating a 1024 bit RSA private key
   ..................++++++++++
   .+++++
   writing new private key to 'serverkey.pem'
   ----- 
   You are about to be asked to enter information that will be incorporated into your certificate request.
   What you are about to enter is what is called a Distinguished Name or a DN.
   There are quite a few fields but you can leave some blank
   For some fields there will be a default value,
   If you enter '.', the field will be left blank.
   ----- 
   Country Name (2 letter code) [AU]:HU
   State or Province Name (full name) [Some-State]:Budapest
   Locality Name (eg, city) []:Budapest
   Organization Name (eg, company) [Internet Widgits Pty Ltd]:Mycompany
   Organizational Unit Name (eg, section) []:
   Common Name (e.g. server FQDN or YOUR name) []:172.16.177.147
   ```
Email Address []:
example@linux-modi:~/CA> openssl x509 -x509toreq -in serverreq.pem -signkey serverkey.pem -out tmp.pem

Getting request Private Key

Generating certificate request
example@linux-modi:~/CA> openssl ca -config openssl.cnf -policy policy_anything -out servercert.pem -infiles tmp.pem

Using configuration from openssl.cnf
Enter pass phrase for ./private/cakey.pem:
Check that the request matches the signature
Signature ok

Certificate Details:
  Serial Number: 1 (0x1)
  Validity
  Subject:
    countryName = HU
    stateOrProvinceName = Budapest
    localityName = Budapest
    organizationName = Mycompany
    commonName = 172.16.177.147
  X509v3 extensions:
    X509v3 Basic Constraints:
      CA:FALSE
    Netscape Comment:
      OpenSSL Generated Certificate
  X509v3 Subject Key Identifier:
  X509v3 Authority Key Identifier:

Certificate is to be certified until Jun 25 10:27:39 2015 GMT (365 days)
Sign the certificate? [y/n]:y

1 out of 1 certificate requests certified, commit? [y/n]y
Write out database with 1 new entries
  Database Updated

3. Enter the following:
   rm tmp.pem

Creating a client certificate

This section describes how to create a client certificate.
To create a client certificate

1. The steps for the client(s) are very similar, only the file names and the embedded common name (host identifier: FQDN or IP address) are different. If you have multiple clients, make sure that each has the right host identifier.

   openssl req -nodes -new -x509 -keyout clientkey.pem -newkey rsa:4096 -out clientreq.pem -days 365 -config openssl.cnf

   NOTE: By including and customizing the -newkey rsa:<key size> element in your command line, you can set the key size that is compliant with your organization policy.

2. The following will be displayed. Answer the questions as in the example:

   Generating a 1024 bit RSA private key

   .................................................................
   ..............
   ................+...............++++++
   writing new private key to 'clientkey.pem'
   -----
   You are about to be asked to enter information that will be incorporated into your certificate request.
   What you are about to enter is what is called a Distinguished Name or a DN.
   There are quite a few fields but you can leave some blank
   For some fields there will be a default value,
   If you enter '.', the field will be left blank.
   -----
   Country Name (2 letter code) [AU]:HU
   State or Province Name (full name) [Some-State]:Budapest
   Locality Name (eg, city) []:Budapest
   Organization Name (eg, company) [Internet Wdigts Pty Ltd]:Mycompany
   Organizational Unit Name (eg, section) []:
   Common Name (e.g. server FQDN or YOUR name) []:172.16.177.129
   Email Address []:

   example@linux-modi:~/CA> openssl x509 -x509toreq -in clientreq.pem -signkey clientkey.pem -out tmp.pem
   Getting request Private Key
   Generating certificate request
   example@linux-modi:~/CA> openssl ca -config openssl.cnf -policy policy_anything -out clientcert.pem -infiles tmp.pem
   Using configuration from openssl.cnf
   Enter pass phrase for ./private/cakey.pem:
   Check that the request matches the signature
Signature ok
Certificate Details:
  Serial Number: 2 (0x2)
  Validity
    Not After : Jun 25 10:28:49 2015 GMT
  Subject:
    countryName = HU
    stateOrProvinceName = Budapest
    localityName = Budapest
    organizationName = Mycompany
    commonName = 172.16.177.129
  X509v3 extensions:
    X509v3 Basic Constraints:
      CA:FALSE
    Netscape Comment:
      OpenSSL Generated Certificate
    X509v3 Subject Key Identifier:
    X509v3 Authority Key Identifier:
  Certificate is to be certified until Jun 25 10:28:49 2015 GMT (365 days)
  Sign the certificate? [y/n]: y
  1 out of 1 certificate requests certified, commit? [y/n]: y
  Write out database with 1 new entries
  Data Base Updated

3. Enter the following:
   rm tmp.pem
Configuring syslog-ng PE

Once you are ready with generating CA, server and client certificates, copy them to the respective machines and configure syslog-ng PE to use them. In theory, the CA and other certificates could be placed anywhere in the file system. In practice, server applications, such as syslog-ng PE are often protected by AppArmor, SELinux or other mechanisms, therefore it is recommended to create sub-directories where the syslog-ng.conf resides. This way syslog-ng PE can read them without modifying the related access rules.

Configuring the syslog-ng PE server

In the following example syslog-ng.conf is under /usr/local/etc/syslog-ng, but it could be /opt/syslog-ng/etc/, /etc/syslog-ng/ or any other directory in your system, so adopt the configuration example accordingly.

To configure the syslog-ng PE server

1. As a first step, create two new directories under the syslog-ng PE configuration directory:
   mkdir cert.d ca.d
2. Copy serverkey.pem and servercert.pem to cert.d. Copy cacert.pem to ca.d and issue the following command on the certificate:
   openssl x509 -noout -hash -in cacert.pem
   The result is a hash (for example, 6d2962a8), a series of alphanumeric characters based on the Distinguished Name of the certificate.
3. Issue the following command to create a symbolic link to the certificate that uses the hash returned by the previous command and the .0 suffix.
   ln -s cacert.pem 6d2962a8.0
4. Adopt the following configuration example to your syslog-ng.conf by changing the IP and port parameters and directories to your local environment. In the log statement replace “d_local” with an actual log destination name in your configuration (for
example, the one that refers to /var/log/messages).

```plaintext
source demo_tls_source {
    network(
        ip(0.0.0.0)
        port(6514)
        transport("tls")
        tls(
            key_file("/usr/local/etc/syslog-ng/cert.d/serverkey.pem")
            cert_file("/usr/local/etc/syslog-ng/cert.d/servercert.pem")
            ca_dir("/usr/local/etc/syslog-ng/ca.d")
        )
    );
};

log {
    source(demo_tls_source);
    destination(d_local);
};
```

5. Finally, restart syslog-ng PE for the configuration changes to take effect.

## Configuring syslog-ng PE clients

Configuring the client side is similar to the server, the difference is in the configuration part.
In the following example syslog-ng.conf is under /etc/syslog-ng, but it could be /opt/syslog-ng/etc/, /usr/local/etc/syslog-ng/ or any other directory on your system, so adopt the configuration example accordingly.

### To configure syslog-ng PE clients

1. As a first step, create two new directories under the syslog-ng PE configuration directory:
   ```bash
   mkdir cert.d ca.d
   ```
2. Copy clientkey.pem and clientcert.pem to cert.d. Copy cacert.pem to ca.d and issue the following command on the certificate:
   ```bash
   openssl x509 -noout -hash -in cacert.pem
   ```
   The result is a hash (for example, 6d2962a8), a series of alphanumeric characters based on the Distinguished Name of the certificate.
3. Issue the following command to create a symbolic link to the certificate that uses the hash returned by the previous command and the .0 suffix.
   ```bash
   ln -s cacert.pem 6d2962a8.0
   ```
4. Adopt the following configuration example to your syslog-ng.conf by changing the IP and port parameters and directories to your local environment. In the log statement replace “src” with an actual log source name in your configuration.

```plaintext
destination demo_tls_destination {
    network("172.16.177.147"
    port(6514)
    transport("tls")
    tls(
        ca_dir("/etc/syslog-ng/ca.d")
        key_file("/etc/syslog-ng/cert.d/clientkey.pem")
        cert_file("/etc/syslog-ng/cert.d/clientcert.pem")
    )
}
log { source(src); destination(demo_tls_destination); };
```

5. Finally, restart syslog-ng PE for the configuration changes to take effect.
Testing what you have done

After configuring syslog-ng PE, test if everything works as expected.

To test the configuration

1. On the client side, enter the following command:
   
   ```
   logger "This is a test message"
   ```

2. On the server side, tail the file, where logs from the network are arriving. You should see something similar in case of the above test message:

   ```
   tail -f /var/log/messages | grep test
   ```

   ![Example output]

   Jun 26 19:12:06 172.16.177.129 root: This is a test message

   If you cannot see it, check the log file, where the internal messages of syslog-ng are stored, both on the server and the client side. The most common causes of the problem are the following:

   - There is no trace of connection at all (internal logs show connection attempts), there is a network / firewall problem, or incorrectly configured destination or listening IP.
   - With new certificates an incorrectly configured clock can already cause problems. Check if all of your systems have the same time / time zone.
   - Make sure, that the Common Name is set to the correct FQDN or IP address. If you use FQDN, make sure, that your DNS server works correctly.
   - Do not include an email address in the client and server certificates.
   - For more information about TLS-related error messages, see "Error messages" in the Administration Guide.
Summary

This tutorial has shown you how to encrypt and authenticate the connection between your clients and your logserver.

- If you have run into problems, or need help, leave a comment, or post your problem on the syslog-ng mailing list.
- If you would like to know more about syslog-ng PE, visit the syslog-ng project page.
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