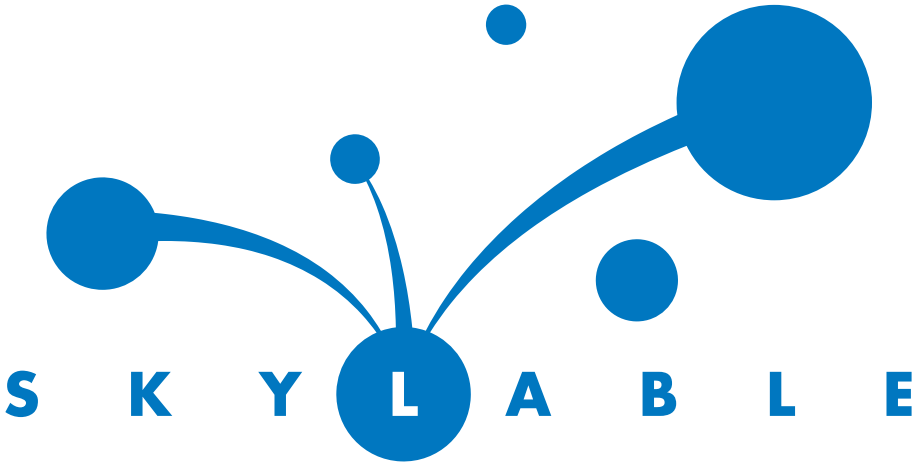

S^X Quick Start Guide

CHAPTER 1

INTRODUCTION

Welcome to Skylable S^X, a complete framework for building distributed data clusters. This Quick Start Guide gives you the basics to install, configure and start using our software. While S^X was designed to be user friendly and easy to set up, we encourage you to read the User Guide (sorry, it may not exist yet :-)) for complete information on all the features.

USEFUL LINKS

- `http://cdn.skylable.com/packages/`
- `http://lists.skylable.com`
- `https://bugzilla.skylable.com`
- `http://wiki.skylable.com`

CHAPTER 2

INSTALLATION

REQUIREMENTS

Skylable S^X is tested on all popular UNIX platforms, including Linux, FreeBSD, and Mac OS X. We try to support as many platforms as possible, if you have troubles installing, compiling or running our software on your platform please open a bug report.

The latest binary packages are available at `http://cdn.skylable.com/packages/`

In order to compile S^X from source, you will need the following packages to be installed together with their development versions:

- OpenSSL/NSS
- libcurl >= 7.34.0 (otherwise the embedded one will be used)

For example, on Debian run:

```
# apt-get install libssl-dev libcurl4-openssl-dev
```

COMPILATION

The software is based on autoconf, so just follow the standard installation procedure. In this guide we will install S^{X} into `/opt/sx`.

```
$ ./configure --prefix=/opt/sx && make
# make install
```

CHAPTER 3

CONFIGURATION

REQUIREMENTS

SX operates on ports 80 and 443, which need to be available on a given IP address. You can build even a single-node SX cluster, however for data safety reasons it is recommended to create at least a two-node cluster and use replica higher than 1.

THE FIRST NODE

Setting up the first node initializes the cluster and makes SX ready to use. The `sxsetup` tool presented below performs an automated configuration of the SX server, which includes creating a local data storage, SSL certificate, and default admin account. You will only need to answer a few basic questions!

In the example we assume the IP address of the first node is 192.168.1.101, the name of the cluster is "mycluster", and SX was installed into `/opt/sx`. Also in some cases (eg. the path to SX storage) we assume default values, however your mileage may vary.

```
# /opt/sx/sbin/sxsetup
```

```
--- SKYLABLE SX CONFIGURATION SCRIPT ---

The script will help you to create or extend a Skylable SX data
cluster.

--- CLUSTER NAME ---

Clients will access your cluster using a sx://clustername/volume/path
URI. It is recommended to use a FQDN for clustername, but not
required. Refer to the documentation for more info.
Enter the cluster name (use the same across all nodes) []: mycluster

--- DATA STORAGE ---

Please provide the location where all incoming data will be stored.
Path to SX storage [default=/opt/sx/var/lib/sxserver]: <confirm default>

Please specify the maximum size of the storage for this node. You can
use M, G and T suffixes, eg. 100T for 100 terabytes.
Maximum size [default=1T]: 500G

--- NODE ADDRESS ---

Enter the IP address of this node [default=192.168.1.101]:
<confirm default>
Checking port 80 on 192.168.1.101 ... OK
Checking port 443 on 192.168.1.101 ... OK

--- CLUSTER CONFIGURATION ---

Is this (192.168.1.101) the first node of a new cluster?
(Y/n)[default=y] <confirm default>

--- SSL CONFIGURATION ---

Generating default SSL certificate and keys in
/opt/sx/etc/ssl/private/sxkey.pem /opt/sx/etc/ssl/certs/sxcert.pem
Generating a 2048 bit RSA private key
..............................+++
.........................................+++
writing new private key to '/opt/sx/etc/ssl/private/sxkey.pem'

--- YOUR CHOICES ---

Cluster: sx://mycluster
Node: 192.168.1.101
Storage: /opt/sx/var/lib/sxserver
Run as user: nobody

Is this correct? (Y/n)[default=Y] <confirm default>
```

```
--- CLUSTER INITIALIZATION ---

Initializing storage (hashfs):
+ /opt/sx/sbin/sxadm node --new --batch-mode --run-as=nobody:nogroup /
    opt/sx/var/lib/sxserver/data
[runas]: Switched to nobody:nogroup (65534:65534)
+ /opt/sx/sbin/sxadm cluster --new --batch-mode --node-dir=/opt/sx/var/
    lib/sxserver/data --ssl-ca-file=/opt/sx/etc/ssl/certs/sxcert.pem
    500G/192.168.1.101 sx://mycluster
Starting SX.fcgi
[runas]: Switched to nobody:nogroup (65534:65534)
Starting sxhttpd
SX node started successfully
[runas]: Switched to nobody:nogroup (65534:65534)
HashFS Version: WiPfs 2.0
Cluster UUID: 01dca714-8cc9-4e26-960e-daf04892b1e2
Cluster authentication: CLUSTER/ALLNODE/ROOT/
    USERwBdjfz3tKcnTF2ouWIkTipreYuYjAAA
Admin key: 0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
Internal cluster protocol: SECURE
Used disk space: 17568768
Actual data size: 463872
List of nodes:
        * ec4d9d63-9fa3-4d45-838d-3e521f124ed3 192.168.1.101
            (192.168.1.101) 536870912000

--- CONFIGURATION SUMMARY ---

SSL private key (/opt/sx/etc/ssl/private/sxkey.pem):
-----BEGIN PRIVATE KEY-----
MIIEvAIBADANBgkqhkiG9w0BAQEFAASCBKYwggSiAgEAAoIBAQCYNdtHyNglHZQ8
vaO1HJWtZ/eerB2H80XyQTZpDFRS87qGUNcrRudDN09EypcueXaW1UN/3L8KKn7t
tGhLe6quG8QuKw//UiJDDGTDEICOndtYfBh07zNR9zgaQRi9loqQB6Iqfe4K/T9F
EONMjVji1OF5JI/3SgxEDwoQ4+1eghDuMGMElzJ4VJCojXhiEtvwo1ZruFX+Xogd
rq4Ys6Pch7n9FowdOc2n+IRxPXKb6CqnHC1t9AKEBmbaoP+0zhM8ZFCl3WFRChvb
JF8T9ZZ5q3nol668NILNN1f4RRe07+pb9ubfWqNABhuI5hQUnG81wKjcIzjWK4HZ
+3bMwg6PAgMBAAECggEAQ+fTGmV6OKTHm4mnXYeRJzm4+SskSaC41elOEvOTMybV
UlMCi6YoSo6EaNZROESsKYKfiI29FRX8ZqQT24kijmaI0WgYzPmhm3QOCBB2qim2
z/UdHB4TMUAv4ValaP+edb9SE872wiRVc8SjA2YT/66loNw09kgszLhA72QgZAbG
xmxVwCNTRFd7dg4Wmy1OQz3YVOnlC3Qs8C8LoGoO0Mci85quhBUw9s7J12skXGbu
ZGDtpJylgwtfc1q7nojaFkWenGCA9D1HB8zCqKPkhMh+HtA26g8VdFaHPVBzw/pz
avv5r9gLnBETwHfM3XuIYv7h3wowE5uAKVhgvL8w0QKBgQDJs2avbYOwgcEEOf7L
nPRqmb5XjJE329KsyIzo4YwOrZDjQXSYrBjifoBIJzUReDDB7ww5lt0Xy3MExeS4
ngL0/oWotjd7jGU+EdABozKwW3bZuyUTSqTeQJwo+aIhjNtiyMrnpFy3vjYrJKGy
W/9cnv1WjqxpqnQgDjE/yJt36wKBgQDBL7p7iCWjIf+LH1/caFgPchJENd4YZZrB
bhGA/tuo6VtJcarc/Etx3DGbKhnJq13LxRRLjyHlPhw/k7oZBdaVK27I+vNfw5Lj
c2KZCYbFnF3kbP5ryuMW0QqGbkZZ/FExzwgFyAOUuCTw9L2VmKtPgbP9ywDTJc0Z
Jq/pdzOe7QKBgFOpxn4dvvIH4DgQlk9+2yMcgoduFw5EcC6bQVeXtrCf7elVzTdG
q0vHjQ5gtPJ6GD9ZGIkKusqT6TGhpC2v3SoiKO7CJmFo6tXELbOALhZY2gOWTNqj
```

```
q59EzYFxin7AHn/rKb7Lvmm4zF844plI77NLf2nX5EwwF9r0CBmc7F/hAoGAUctH
ha4rYVqvu9PY3pU/U6rUmRTFqEa8s1FLD/bYQjgrcnkyAsa/msHELxIwQPbRi8kx
wpwjmdAmXbTKgnW6WQY+rdGy4cUImEzuXiVubpS6HFEZl8IbTDnN3wUpvEfciN5D
Y09AVONyoKK+8mvlfJBKCRa+jqfeotuCd7MEpDECgYAhWcDt6aXSsUOtq+jgVNtC
oi9Cnm4FNW7Z/VVgCCRFIwHxpqqAau63/naSGxkLUlK+U0StReiLC2D4FPrqs9Jh
scUH9hTIp3hxwznZBRFkuvUOm3h6CwQ0t3km7AffLRsGQZ9EMlvNb4T5mR/Izgxy
smcEPJfJgX61fx7c//bU6Q==
-----END PRIVATE KEY-----

SSL certificate (/opt/sx/etc/ssl/certs/sxcert.pem):
-----BEGIN CERTIFICATE-----
MIIDpzCCAo+gAwIBAgIJAODcwxKZHi35MA0GCSqGSIb3DQEBCwUAMDsxCzAJBgNV
BAYTAkdCMQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1
c3RlcjAeFw0xNDAzMjExNDU2NTdaFw0xOTAzMjAxNDU2NTdaMDsxCzAJBgNVBAYT
AkdCMQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1c3Rl
cjCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAJg120fl2CUdlDy9o7Uc
la1n956sHYfzRfJBNmkMVFLzuoZQ1ytG50M3T0TKly55dpbVQ3/cvwoqfu20aEt7
qq4bxC4rD/9SIkMMZMMQgI6d21h8GHTvM1H3OBpBGL2WipAHoip97gr9P0UQ40yN
WOLU4Xkkj/dKDEQPChDj7V6CEO4wYwSXMnhUkKiNeGIS2/CjVmu4Vf5eiB2urhiz
o9yHuf0WjB05zaf4hHE9cpvoKqccLW30AoQGZtqg/7TOEzxkUKXdYVEKG9skXxP1
lnmreeiXrrw0gs03V/hFF7Tv6lv25t9ao0AGG4jmFBScbzXAqNwjONYrgdn7dszC
Do8CAwEAAaOBrTCBqjAdBgNVHQ4EFgQUs7Zs8qeEtPdNQ7l3zs3f2v+MTrswawYD
VR0jBGQwYoAUs7Zs8qeEtPdNQ7l3zs3f2v+MTruhP6Q9MDsxCzAJBgNVBAYTAkdC
MQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1c3RlcoIJ
AODcwxKZHi35MA8GA1UdEwEB/wQFMAMBAf8wCwYDVR0PBAQDAgEGMA0GCSqGSIb3
DQEBCwUAA4IBAQBGwoULuHM5svPvV7c0tdsBmxovrhCYkMg4MwtPJ8eJQckyrCP3
fIU1VMXXeHKegaZ4q3QzIV9DDO1XB9TzifZ8yKm7a2/NlUnvgLQCGu82H/226YLE
abqoipcJsAANo5+2qGYEmYDODmLOnToaCX5bcmbLc1tcG4uf/x88O+PGLgh/h5+9
MUMlffyJWAE5eJN1rk9T5k0Onm5PElQLP/ZQecodHGL9Xxzgj09kLfwbRmUruGu/
ft4Ru0oOrQDIDWxQuiBitawQKX/tyaGkpX+g38gyFwDiPINo2q/IHeckxX5EHgF3
YGgPNaWwBnH3jfsJ/kMXcJS52q/zPOIvUCz0
-----END CERTIFICATE-----

Cluster: sx://mycluster
This node: 192.168.1.101
HashFS Version: WiPfs 2.0
Cluster UUID: 01dca714-8cc9-4e26-960e-daf04892b1e2
Cluster authentication:
CLUSTER/ALLNODE/ROOT/USERwBdjfz3tKcnTF2ouWIkTipreYuYjAAA
Admin key: 0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
Internal cluster protocol: SECURE
Used disk space: 17568768
Actual data size: 463872
List of nodes:
        * ec4d9d63-9fa3-4d45-838d-3e521f124ed3 192.168.1.101
            (192.168.1.101) 536870912000
Storage location: /opt/sx/var/lib/sxserver
Run as user: nobody
Sockets and pidfiles in: /opt/sx/var/run/sxserver
Logs in: /opt/sx/var/log/sxserver/sxfcgi.log
```

```
--- END OF SUMMARY ---

Congratulations, the new node is up and running!
You can control it with '/opt/sx/sbin/sxserver'

You can add a new node to the cluster by running 'sxsetup' on another
server. When prompted, enter the 'admin key', 'SSL private key' and
'SSL certificate' printed above.
```

When the script finishes successfully, the node is already functional. Please notice the admin key listed at the end of the summary: it will be needed for both adding more nodes and accessing the cluster. You can always retrieve the admin key with the following command:

```
# /opt/sx/sbin/sxserver status
--- SX STATUS ---
sx.fcgi is running (PID 14394)
sxhttpd is running (PID 14407)

--- SX INFO ---
Cluster name: mycluster
HashFS Version: WiPfs 2.0
Cluster UUID: 01dca714-8cc9-4e26-960e-daf04892b1e2
Cluster authentication: CLUSTER/ALLNODE/ROOT/
    USERwBdjfz3tKcnTF2ouWIkTipreYuYjAAA
Admin key: 0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
Internal cluster protocol: SECURE
Used disk space: 17568768
Actual data size: 463872
List of nodes:
        * ec4d9d63-9fa3-4d45-838d-3e521f124ed3 192.168.1.101
          (192.168.1.101) 536870912000
Storage location: /opt/sx/var/lib/sxserver/data
SSL private key: /opt/sx/etc/ssl/private/sxkey.pem
SX Logfile: /opt/sx/var/log/sxserver/sxfcgi.log
```

That's it - your SX storage is already up and running! You can now go to the next step and add more nodes or go to the next chapter and learn how to perform basic client operations.

ADDING MORE NODES

Follow these steps to add a new node to the cluster:

- Run 'sxserver status' on one of the nodes of the cluster
- Collect the following information:
  - Cluster name
  - Admin key
  - One of the IP addresses from the list of nodes
  - The content of the SSL private key file (not the path itself!)
- Compile and install SX with `./configure --prefix=/opt/sx && make install`
- Run `/opt/sx/sbin/sxsetup` and provide the collected information. Below we assume the new node is 192.168.1.102 and it's size is 250 GBs.

```
# /opt/sx/sbin/sxsetup
--- SKYLABLE SX CONFIGURATION SCRIPT ---

The script will help you to create or extend a Skylable SX data
cluster.

--- CLUSTER NAME ---

Clients will access your cluster using a sx://clustername/volume/path
URI. It is recommended to use a FQDN for clustername, but not
required. Refer to the documentation for more info.
Enter the cluster name (use the same across all nodes) []: mycluster

--- DATA STORAGE ---

Please provide the location where all incoming data will be stored.
Path to SX storage [default=/opt/sx/var/lib/sxserver]: <confirm default>

Please specify the maximum size of the storage for this node. You can
use M, G and T suffixes, eg. 100T for 100 terabytes.
Maximum size [default=1T]: 250G

--- NODE ADDRESS ---

Enter the IP address of this node [default=192.168.1.102]:
<confirm default>
Checking port 80 on 192.168.1.102 ... OK
```

```
Checking port 443 on 192.168.1.102 ... OK

--- CLUSTER CONFIGURATION ---

Is this (192.168.1.102) the first node of a new cluster?
(Y/n)[default=y] n
Please provide the IP address of a working node in 'mycluster'.
IP address: 192.168.1.101

The admin key is required to join the existing cluster.
If you don't have it, run 'sxserver status' on 192.168.1.101.
Below you can provide the key itself or path to the file
containing the key.
Admin key or path to key-file:
0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA

--- SSL CONFIGURATION ---

Please paste the SSL private key below (and press CTRL+D when
done) or provide a path to it.
SSL private key:
<paste private key from 192.168.1.101 and press CTRL+D>
-----BEGIN PRIVATE KEY-----
MIIEvAIBADANBgkqhkiG9w0BAQEFAASCBKYwggSiAgEAAoIBAQCYNdtHyNglHZQ8
vaO1HJWtZ/eerB2H80XyQTZpDFRS87qGUNcrRudDN09EypcueXaW1UN/3L8KKn7t
tGhLe6quG8QuKw//UiJDDGTDEICOndtYfBh07zNR9zgaQRi9loqQB6Iqfe4K/T9F
EONMjVji1OF5JI/3SgxEDwoQ4+1eghDuMGMElzJ4VJCojXhiEtvwo1ZruFX+Xogd
rq4Ys6Pch7n9FowdOc2n+IRxPXKb6CqnHC1t9AKEBmbaoP+0zhM8ZFCl3WFRChvb
JF8T9ZZ5q3nol668NILNN1f4RRe07+pb9ubfWqNABhuI5hQUnG81wKjcIzjWK4HZ
+3bMwg6PAgMBAAECggEAQ+fTGmV6OKTHm4mnXYeRJzm4+SskSaC41elOEvOTMybV
UlMCi6YoSo6EaNZROESsKYKfiI29FRX8ZqQT24kijmaI0WgYzPmhm3QOCBB2qim2
z/UdHB4TMUAv4ValaP+edb9SE872wiRVc8SjA2YT/66loNw09kgszLhA72QgZAbG
xmxVwCNTRFd7dg4Wmy1OQz3YVOnlC3Qs8C8LoGoO0Mci85quhBUw9s7J12skXGbu
ZGDtpJylgwtfc1q7nojaFkWenGCA9D1HB8zCqKPkhMh+HtA26g8VdFaHPVBzw/pz
avv5r9gLnBETwHfM3XuIYv7h3wowE5uAKVhgvL8w0QKBgQDJs2avbYOwgcEEOf7L
nPRqmb5XjJE329KsyIzo4YwOrZDjQXSYrBjifoBIJzUReDDB7ww5lt0Xy3MExeS4
ngL0/oWotjd7jGU+EdABozKwW3bZuyUTSqTeQJwo+aIhjNtiyMrnpFy3vjYrJKGy
W/9cnv1WjqxpqnQgDjE/yJt36wKBgQDBL7p7iCWjIf+LH1/caFgPchJENd4YZZrB
bhGA/tuo6VtJcarc/Etx3DGbKhnJq13LxRRLjyHlPhw/k7oZBdaVK27I+vNfw5Lj
c2KZCYbFnF3kbP5ryuMW0QqGbkZZ/FExzwgFyAOUuCTw9L2VmKtPgbP9ywDTJc0Z
Jq/pdzOe7QKBgFOpxn4dvvIH4DgQlk9+2yMcgoduFw5EcC6bQVeXtrCf7elVzTdG
q0vHjQ5gtPJ6GD9ZGIkKusqT6TGhpC2v3SoiKO7CJmFo6tXELbOALhZY2gOWTNqj
q59EzYFxin7AHn/rKb7Lvmm4zF844pll77NLf2nX5EwwF9r0CBmc7F/hAoGAUctH
ha4rYVqvu9PY3pU/U6rUmRTFqEa8s1FLD/bYQjgrcnkyAsa/msHELxIwQPbRi8kx
wpwjmdAmXbTKgnW6WQY+rdGy4cUImEzuXiVubpS6HFEZl8IbTDnN3wUpvEfciN5D
Y09AVONyoKK+8mvlfJBKCRa+jqfeotuCd7MEpDECgYAhWcDt6aXSsUOtq+jgVNtC
oi9Cnm4FNW7Z/VVgCCRFIwHxpqqAau63/naSGxkLUlK+U0StReiLC2D4FPrqs9Jh
scUH9hTIp3hxwznZBRFkuvUOm3h6CwQ0t3km7AffLRsGQZ9EMlvNb4T5mR/Izgxy
smcEPJfJgX61fx7c//bU6Q==
-----END PRIVATE KEY-----
```

```
Successfuly obtained SSL certificate from 192.168.1.101

--- YOUR CHOICES ---

Cluster: sx://mycluster
Node: 192.168.1.102
Storage: /opt/sx/var/lib/sxserver
Run as user: nobody

Is this correct? (Y/n)[default=Y] <confirm default>

--- CLUSTER INITIALIZATION ---

Initializing storage (hashfs):
+ /opt/sx/sbin/sxadm node --new --batch-mode --run-as=nobody:nogroup --
    cluster-uuid=01dca714-8cc9-4e26-960e-daf04892b1e2 --key=/opt/sx/var
    /lib/sxserver/cluster.key /opt/sx/var/lib/sxserver/data
[runas]: Switched to nobody:nogroup (65534:65534)
Starting SX.fcgi
[runas]: Switched to nobody:nogroup (65534:65534)
Starting sxhttpd
SX node started successfully
+ /opt/sx/sbin/sxadm cluster --mod 536870912000/192.168.1.101/ec4d9d63
    -9fa3-4d45-838d-3e521f124ed3 250G/192.168.1.102 sx://mycluster
[runas]: Switched to nobody:nogroup (65534:65534)
HashFS Version: WiPfs 2.0
Cluster UUID: 01dca714-8cc9-4e26-960e-daf04892b1e2
Cluster authentication:
CLUSTER/ALLNODE/ROOT/USERwBdjfz3tKcnTF2ouWIkTipreYuYjAAA
Admin key: 0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
Internal cluster protocol: SECURE
Used disk space: 17568768
Actual data size: 463872
List of nodes:
    - ec4d9d63-9fa3-4d45-838d-3e521f124ed3 192.168.1.101
        (192.168.1.101) 536870912000
    * 02e01f5d-80d8-4a01-b1f7-a56eecb8aef5 192.168.1.102
        (192.168.1.102) 268435456000

--- CONFIGURATION SUMMARY ---

SSL private key (/opt/sx/etc/ssl/private/sxkey.pem):
-----BEGIN PRIVATE KEY-----
MIIEvAIBADANBgkqhkiG9w0BAQEFAASCBKYwggSiAgEAAoIBAQCYNdtHyNglHZQ8
vaO1HJWtZ/eerB2H80XyQTZpDFRS87qGUNcrRudDN09EypcueXaW1UN/3L8KKn7t
tGhLe6quG8QuKw//UiJDDGTDEICOndtYfBh07zNR9zgaQRi9loqQB6Iqfe4K/T9F
EONMjVji1OF5JI/3SgxEDwoQ4+1eghDuMGMElzJ4VJCojXhiEtvwo1ZruFX+Xogd
rq4Ys6Pch7n9FowdOc2n+IRxPXKb6CqnHC1t9AKEBmbaoP+0zhM8ZFCl3WFRChvb
```

```
JF8T9ZZ5q3nol668NILNN1f4RRe07+pb9ubfWqNABhuI5hQUnG81wKjcIzjWK4HZ
+3bMwg6PAgMBAAECggEAQ+fTGmV6OKTHm4mnXYeRJzm4+SskSaC41elOEvOTMybV
UlMCi6YoSo6EaNZROESsKYKfiI29FRX8ZqQT24kijmaI0WgYzPmhm3QOCBB2qim2
z/UdHB4TMUAv4ValaP+edb9SE872wiRVc8SjA2YT/66loNw09kgszLhA72QgZAbG
xmxVwCNTRFd7dg4Wmy1OQz3YVOnlC3Qs8C8LoGoO0Mci85quhBUw9s7J12skXGbu
ZGDtpJylgwtfc1q7nojaFkWenGCA9D1HB8zCqKPkhMh+HtA26g8VdFaHPVBzw/pz
avv5r9gLnBETwHfM3XuIYv7h3wowE5uAKVhgvL8w0QKBgQDJs2avbYOwgcEEOf7L
nPRqmb5XjJE329KsyIzo4YwOrZDjQXSYrBjifoBIJzUReDDB7ww5lt0Xy3MExeS4
ngL0/oWotjd7jGU+EdABozKwW3bZuyUTSqTeQJwo+aIhjNtiyMrnpFy3vjYrJKGy
W/9cnv1WjqxpqnQgDjE/yJt36wKBgQDBL7p7iCWjIf+LH1/caFgPchJENd4YZZrB
bhGA/tuo6VtJcarc/Etx3DGbKhnJq13LxRRLjyHlPhw/k7oZBdaVK27I+vNfw5Lj
c2KZCYbFnF3kbP5ryuMW0QqGbkZZ/FExzwgFyAOUuCTw9L2VmKtPgbP9ywDTJc0Z
Jq/pdzOe7QKBgFOpxn4dvvIH4DgQlk9+2yMcgoduFw5EcC6bQVeXtrCf7elVzTdG
q0vHjQ5gtPJ6GD9ZGIkKusqT6TGhpC2v3SoiKO7CJmFo6tXELbOALhZY2gOWTNqj
q59EzYFxin7AHn/rKb7Lvmm4zF844plI77NLf2nX5EwwF9r0CBmc7F/hAoGAUctH
ha4rYVqvu9PY3pU/U6rUmRTFqEa8s1FLD/bYQjgrcnkyAsa/msHELxIwQPbRi8kx
wpwjmdAmXbTKgnW6WQY+rdGy4cUImEzuXiVubpS6HFEZl8IbTDnN3wUpvEfciN5D
Y09AVONyoKK+8mvlfJBKCRa+jqfeotuCd7MEpDECgYAhWcDt6aXSsUOtq+jgVNtC
oi9Cnm4FNW7Z/VVgCCRFIwHxpqqAau63/naSGxkLUlK+U0StReiLC2D4FPrqs9Jh
scUH9hTIp3hxwznZBRFkuvUOm3h6CwQ0t3km7AffLRsGQZ9EMlvNb4T5mR/Izgxy
smcEPJfJgX61fx7c//bU6Q==
-----END PRIVATE KEY-----


SSL certificate (/opt/sx/etc/ssl/certs/sxcert.pem):
-----BEGIN CERTIFICATE-----
MIIDpzCCAo+gAwIBAgIJAODcwxKZHi35MA0GCSqGSIb3DQEBCwUAMDsxCzAJBgNV
BAYTAkdCMQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1
c3RlcjAeFw0xNDAzMjExNDU2NTdaFw0xOTAzMjAxNDU2NTdaMDsxCzAJBgNVBAYT
AkdCMQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1c3Rl
cjCCASIwDQYJKoZIhvcNAQEBBQADggEPADCCAQoCggEBAJg120fl2CUdlDy9o7Uc
la1n956sHYfzRfJBNmkMVFLzuoZQ1ytG50M3T0TKly55dpbVQ3/cvwoqfu20aEt7
qq4bxC4rD/9SIkMMZMMQgI6d21h8GHTvM1H3OBpBGL2WipAHoip97gr9P0UQ40yN
WOLU4Xkkj/dKDEQPChDj7V6CEO4wYwSXMnhUkKiNeGIS2/CjVmu4Vf5eiB2urhiz
o9yHuf0WjB05zaf4hHE9cpvoKqccLW30AoQGZtqg/7TOEzxkUKXdYVEKG9skXxP1
lnmreeiXrrw0gs03V/hFF7Tv6lv25t9ao0AGG4jmFBScbzXAqNwjONYrgdn7dszC
Do8CAwEAAaOBrTCBqjAdBgNVHQ4EFgQUs7Zs8qeEtPdNQ7l3zs3f2v+MTrswawYD
VR0jBGQwYoAUs7Zs8qeEtPdNQ7l3zs3f2v+MTruhP6Q9MDsxCzAJBgNVBAYTAkdC
MQswCQYDVQQIEwJVSzELMAkGA1UEChMCU1gxEjAQBgNVBAMTCW15Y2x1c3RlcoIJ
AODcwxKZHi35MA8GA1UdEwEB/wQFMAMBAf8wCwYDVR0PBAQDAgEGMA0GCSqGSIb3
DQEBCwUAA4IBAQBGwoULuHM5svPvV7c0tdsBmxovrhCYkMg4MwtPJ8eJQckyrCP3
flU1VMXXeHKegaZ4q3QzIV9DDO1XB9TzifZ8yKm7a2/NlUnvgLQCGu82H/226YLE
abqoipcJsAANo5+2qGYEmYDODmLOnToaCX5bcmbLc1tcG4uf/x88O+PGLgh/h5+9
MUMlffyJWAE5eJN1rk9T5k0Onm5PElQLP/ZQecodHGL9Xxzgj09kLfwbRmUruGu/
ft4Ru0oOrQDIDWxQuiBitawQKX/tyaGkpX+g38gyFwDiPINo2q/IHeckxX5EHgF3
YGgPNaWwBnH3jfsJ/kMXcJS52q/zPOIvUCz0
-----END CERTIFICATE-----


Cluster: sx://mycluster
```

```
This node: 192.168.1.102
HashFS Version: WiPfs 2.0
Cluster UUID: 01dca714-8cc9-4e26-960e-daf04892b1e2
Cluster authentication: CLUSTER/ALLNODE/ROOT/
    USERwBdjfz3tKcnTF2ouWIkTipreYuYjAAA
Admin key: 0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
Internal cluster protocol: SECURE
Used disk space: 17568768
Actual data size: 463872
List of nodes:
    - ec4d9d63-9fa3-4d45-838d-3e521f124ed3 192.168.1.101
        (192.168.1.101) 536870912000
    * 02e01f5d-80d8-4a01-b1f7-a56eecb8aef5 192.168.1.102
        (192.168.1.102) 268435456000
Storage location: /opt/sx/var/lib/sxserver
Run as user: nobody
Sockets and pidfiles in: /opt/sx/var/run/sxserver
Logs in: /opt/sx/var/log/sxserver/sxfcgi.log

--- END OF SUMMARY ---
Congratulations, the new node is up and running!
You can control it with '/opt/sx/sbin/sxserver'

You can add a new node to the cluster by running 'sxsetup' on another
server.  When prompted, enter the 'admin key', 'SSL private key' and
'SSL certificate' printed above.
```

The node successfuly joined the cluster - at the end of the summary you can see the current list of nodes in the cluster. Repeat the same steps to add more nodes to the cluster.

CHAPTER 4

CLIENT OPERATIONS

ACCESSING THE CLUSTER

To access the cluster you need to have credentials for an existing account. In this example we will use the default admin account created during cluster setup. The following command sets up the admin access to the SX cluster "mycluster" for the client tools. Because "mycluster" is not a DNS name, we need to point sxinit to one of the nodes of the cluster. It will automatically discover the IP addresses of the other nodes. After the initialization you can access the cluster just as "mycluster", without specifying any IP address.

```
$ ./sxinit -l 192.168.1.101 sx://admin@mycluster
Warning: self-signed certificate:

        Subject: C=GB, ST=UK, O=SX, CN=mycluster
        Issuer: C=GB, ST=UK, O=SX, CN=mycluster
        SHA1 Fingerprint: 84:EF:39:80:1E:28:9C:4A:C8:80:E6:56:57:A4:CD
            :64:2E:23:99:7A

Do you trust this SSL certificate? [y/N] y
Trusting self-signed certificate
Please enter the user key:
0DPiKuNIrrVmD8IUCuw1hQxNqZfIkCY+oKwxi5zHSPn5y0SOi3IMawAA
```

SX allows creating additional users of your choice and assigning them appropriate privileges. In this Quick Start Guide we will only use the default admin account, though.

Please refer to `sxacl useradd --help` on how to add new users to the cluster.

CREATING NEW VOLUMES

Volumes are logical partitions of the S^X storage assigned to particular groups of users. What you need to know about volumes at this point is that their names need to be unique across the entire cluster, and you can create special volumes by enabling data processing filters. For example, the filters allow you to create volumes, which can be transparently encrypted, compressed, or preserve file attributes. The tool to manage volumes is named "sxvol". Here we show how to list available filters and create a client-side encrypted volume "mydata" owned by the admin user.

```
$ /opt/sx/bin/sxvol filter --list
Name            Ver     Type            Full name
----            ---     ----            ---------
null            1.1     generic         Null Filter
zcomp           0.2     compress        Zlib Compression Filter
aes256          1.0     crypt           Encrypt data using AES-256
attribs         1.1     generic         File Attributes
$ /opt/sx/bin/sxvol create --filter=aes256 --owner=admin --replica=2
    sx://admin@mycluster/mydata
aes256: Enter encryption password:
aes256: Re-enter encryption password:
```

WORKING WITH FILES

S^X provides easy to use file tools, which resemble typical UNIX commands. Below we show how to upload a file to the 'mydata' volume, display it, and list files in the volume.

```
$ echo Hello World! > /tmp/hello.txt
$ sxcp /tmp/hello.txt sx://admin@mycluster/mydata/
$ sxcat sx://admin@mycluster/mydata/hello.txt
Hello World!
$ sxls sx://admin@mycluster/mydata/
sx://admin@mycluster/mydata/hello.txt
$ sxrm sx://admin@mycluster/mydata/hello.txt
Deleted 1 file(s)
```

Use `sxcp -r` to recursively upload directories to S^X. You can get more information about the transfers by running the tools in verbose mode (eg. `sxcp -v`). Every tool comes with a help page, which is invoked with `--help`.