CEM MiNiFi C++ Agent 1.22.10

MiNiFi C++ Agent Installation

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Install the MiNiFi C++ agent

Learn how to install the MiNiFi C++ agent. You need to install and configure the MiNiFi C++ agent and then start it. You can also do the same on Windows.

Before you begin installing MiNiFi C++ agent

To start using the MiNiFi C++ agent, you need to install it. Learn how to obtain the MiNiFi C++ software bit, install the agent, and configure it. Also learn the system requirements to do so.

System requirements for MiNiFi C++

Carefully review the system requirements for MiNiFi C++ before you begin installing it.

Operating system support (CEM MiNiFi C++ Agent 1.21.10 and above releases)

Operating System	Version
RHEL/CentOS	7.x, 8.x
Debian	10, 11
Ubuntu	18.04, 20.04
Windows	8, 10, Server 2012, Server 2012 R2, Server 2016, Server 2019

Operating system support (CEM MiNiFi C++ Agent 1.21.06 and 1.21.08 releases)

Operating System	Version
RHEL/CentOS	7.x, 8.x
Debian	10
Ubuntu	18.04, 20.04
Windows	8, 10, Server 2012, Server 2012 R2, Server 2016, Server 2019

Operating system support (releases before CEM MiNiFi C++ Agent 1.21.06)

Operating System	Version
RHEL/CentOS	7.x, 8.x
Debian	9
Ubuntu	16.04, 18.04
Windows	8, 10, Server 2012, Server 2012 R2, Server 2016, Server 2019

Before you begin MiNiFi agent installation on Windows

You must go through the prerequisites before you begin installation of MiNiFi agent on Windows.

Requirements

Apache NiFi MiNiFi C++ is built on Window Server 2016, 2019, and Windows 10 operating systems. Since the project is CMake focused, Cloudera recommends building the Microsoft Installer (MSI) or Windows Installer through the ms_build.bat script. In order to build the MSI, please install the WiX Toolset.

The project previously required OpenSSL to be installed. If you follow Cloudera build procedures, you do not need to install that dependency. Further, any MSI distributable requires that systems install the Visual Studio 2010 redistributables.

Building through the build script

The preferred way of building the project is through the win_build_vs.bat script found in the root source folder.

You must supply a single command, the build directory. Typically you create a directory with CMake and build the MSI in that directory referencing your CMake tree. Simply supply the win_build_vs.bat an argument like build as the name of your build directory and it will create this directory building the project within it. Alternatively, you can use the win_build_vs.bat build /K /T /P command to build Kafka, skip tests, and build the CMake at the same time.

If WiX Toolset is installed, cpack creates your MSI in the chosen build directory.

You can also build a 64 bit MSI by adding the /64option. To do so, you require the 64-bit version of the Visual Studio redistributables mentioned in system requirements.

Note: The 64-bit MSI will not run on 32-bit Microsoft Windows platforms. However, the 32-bit MSI will work across distributions.

Install your MiNiFi C++ agent

To install your MiNiFi C++ agent, you need to download the software for the agent and extract it.

Procedure

1. Download the tar.gz or zip files for the MiNiFi C++ agent.

```
wget {cpp.tar.gz}
```

2. To install the MiNiFi C++ agent, extract the file to your desired home directory.

Install the C++ agent on Windows from command line

Learn how to install MiNiFi C++ agent from command line.

Procedure

1. To install the MiNiFi C++ agent from the Command Line with the desired extensions, list all the extensions you would like to install:

```
msiexec /i nifi-minifi-cpp.msi AGREETOLICENSE=Yes ADDLOCAL=CM_C_bin,CM_C
_tzdata,InstallService,InstallVSRedistributableFiles,InstallConf,CM_C_ht
tp_curl,CM_C_sql /quiet
```

2. Optional. In order to exclude some extensions but otherwise install all other extensions:

```
msiexec /i nifi-minifi-cpp.msi AGREETOLICENSE=Yes ADDLOCAL=ALL REMOVE=CM
_C_sql /quiet
```

For all extension identifiers (for example, CM_C_sql), follow the same pattern. Take the extension name (for example, minifi-sql), replace the minifi- prefix with CM_C_ and replace all dashes with underscores. For example, minifi-http-curl becomes CM_C_http_curl.

Note: For the agent to be able to connect to the EFM server, you must have the minifi-http-curl extension installed.

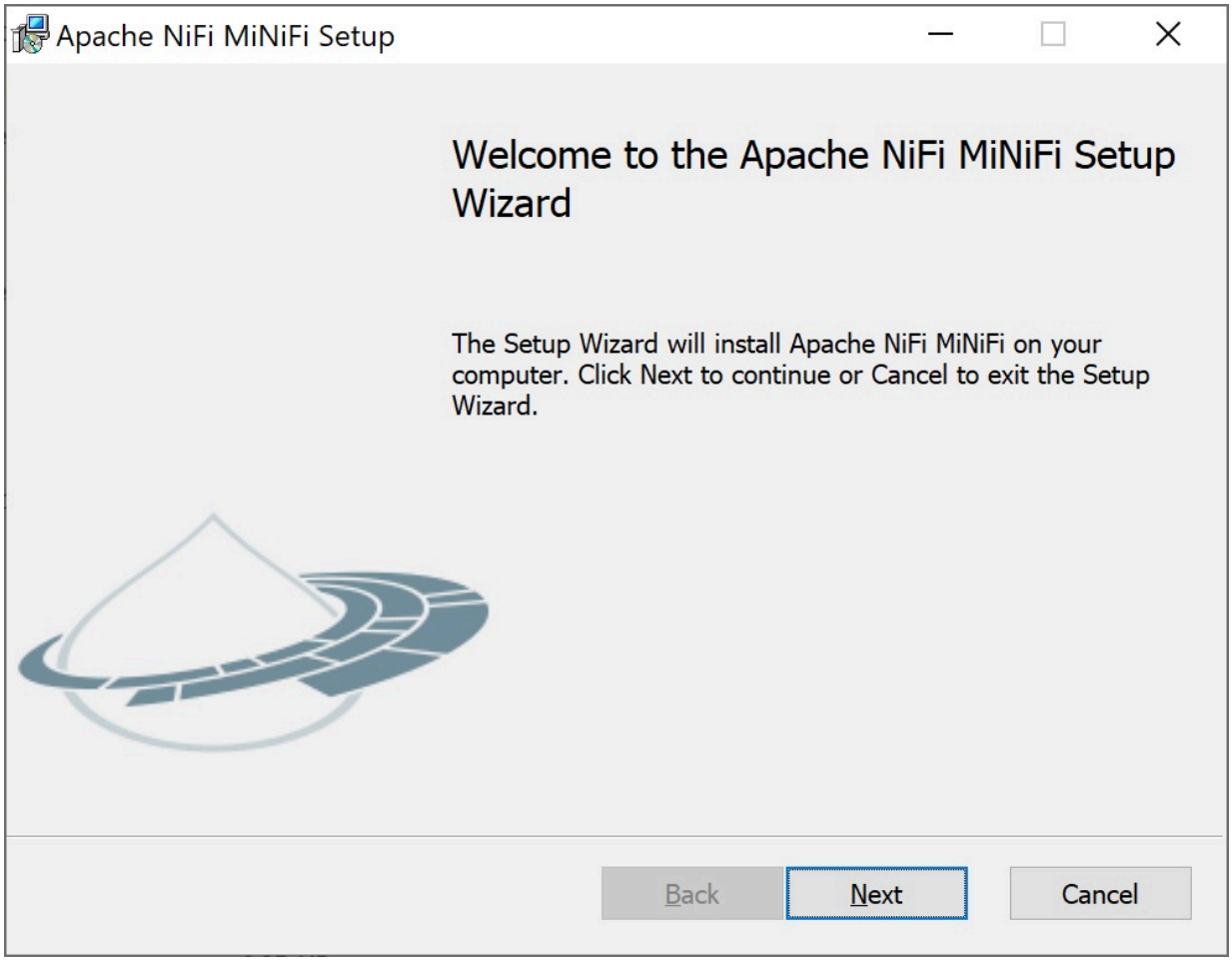
For more information and configuration options for msiexec, see https://docs.microsoft.com/en-us/windows-server/administration/windows-commands/msiexec.

Install the C++ agent on Windows using the MSI

Learn how to install and configure the MiNiFi C++ agent on Windows by using the provided MSI.

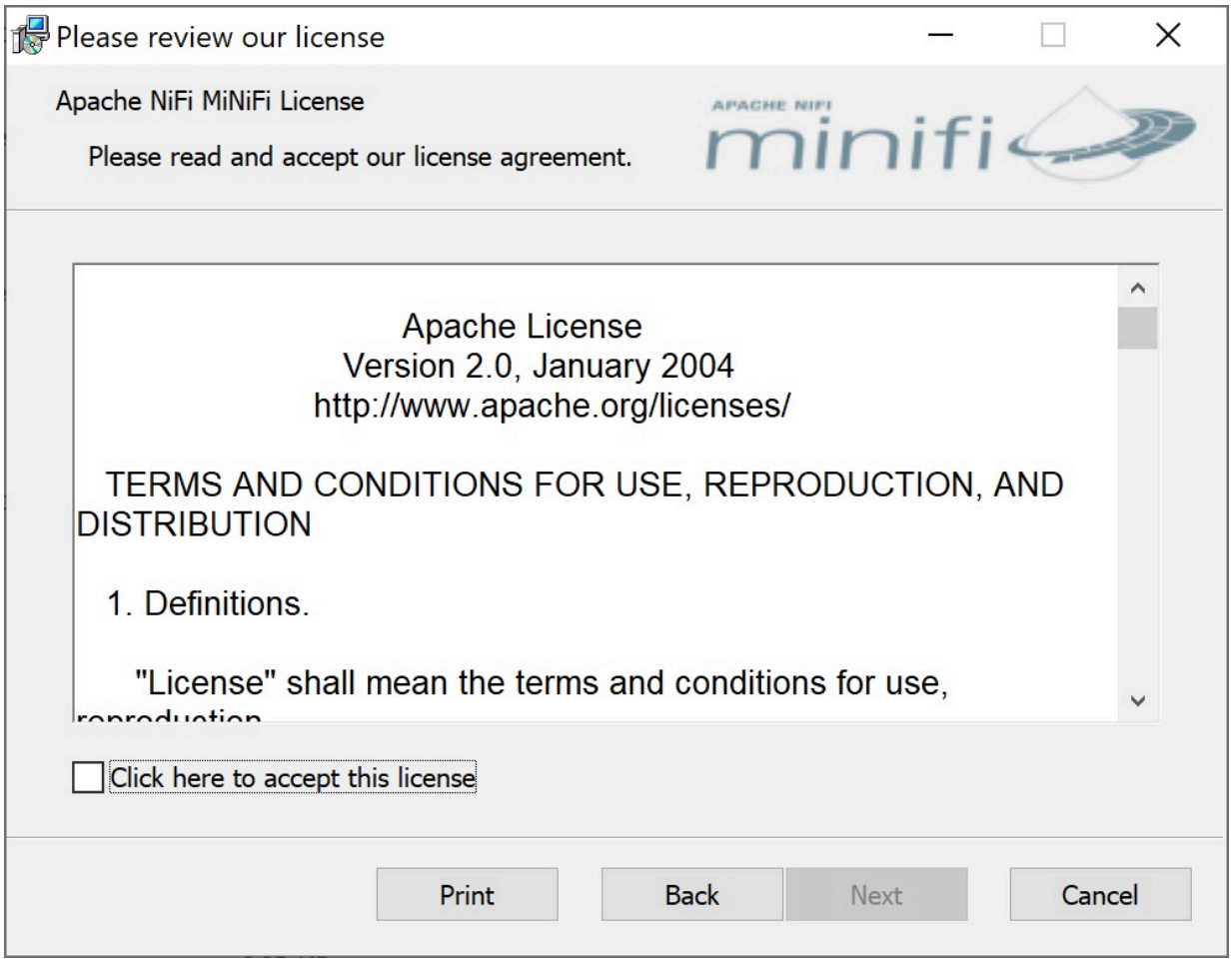
Procedure

1. Open the Apache NiFi MiNiFi Setup wizard, and click Next.



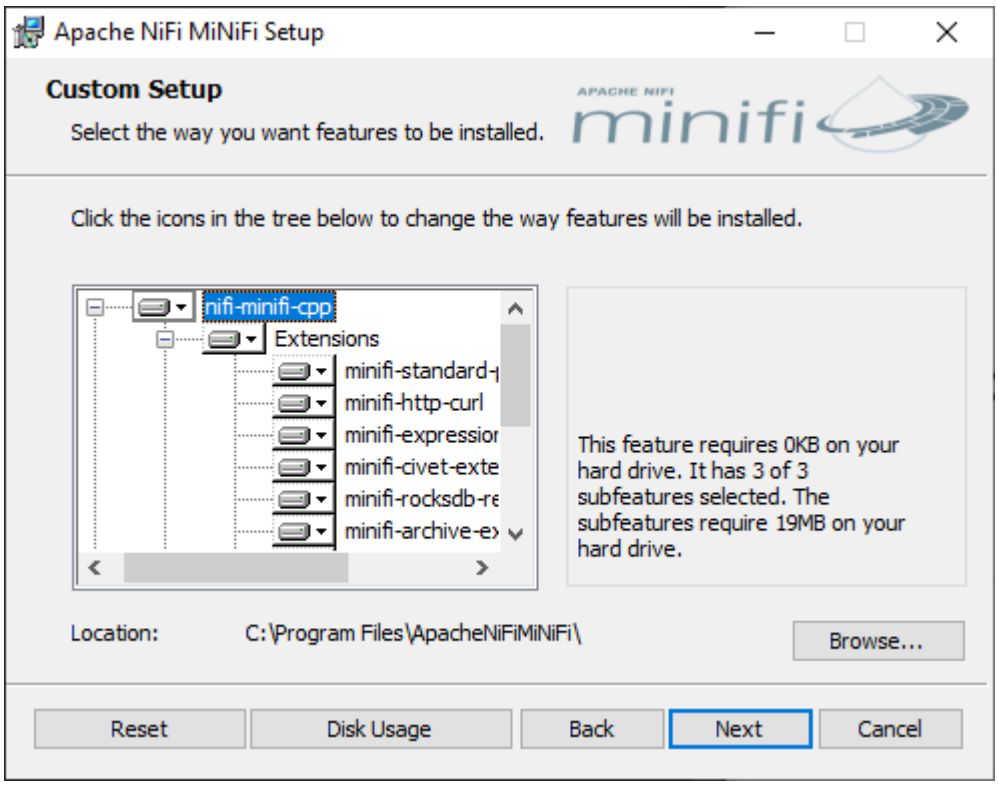
The Apache NiFi MiNiFi License page appears.

2. Check the Click here to accept this license option, and click Next.



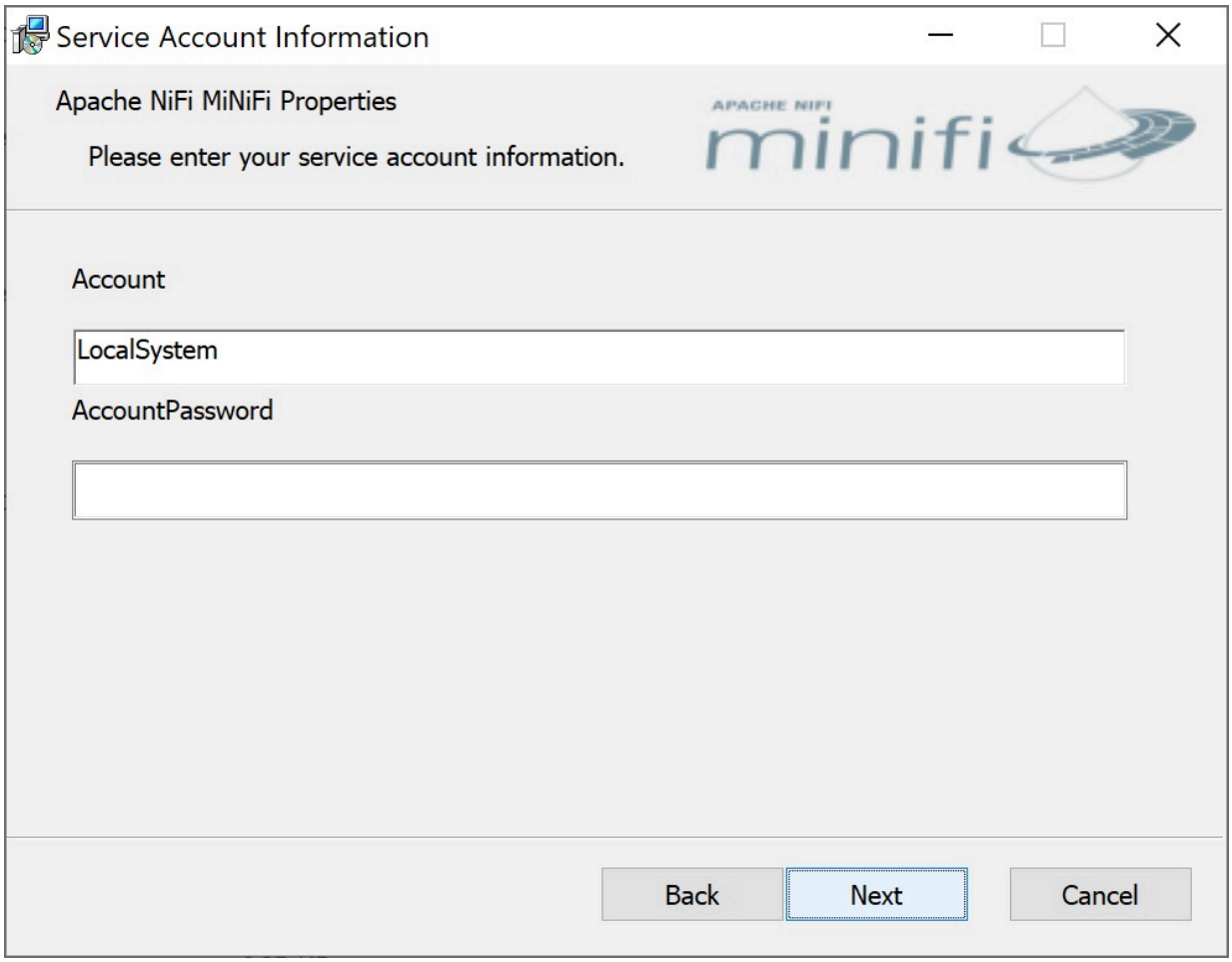
The Custom Setup page appears.

3. Select the extensions you need to install.
   By default, all extensions are enabled.



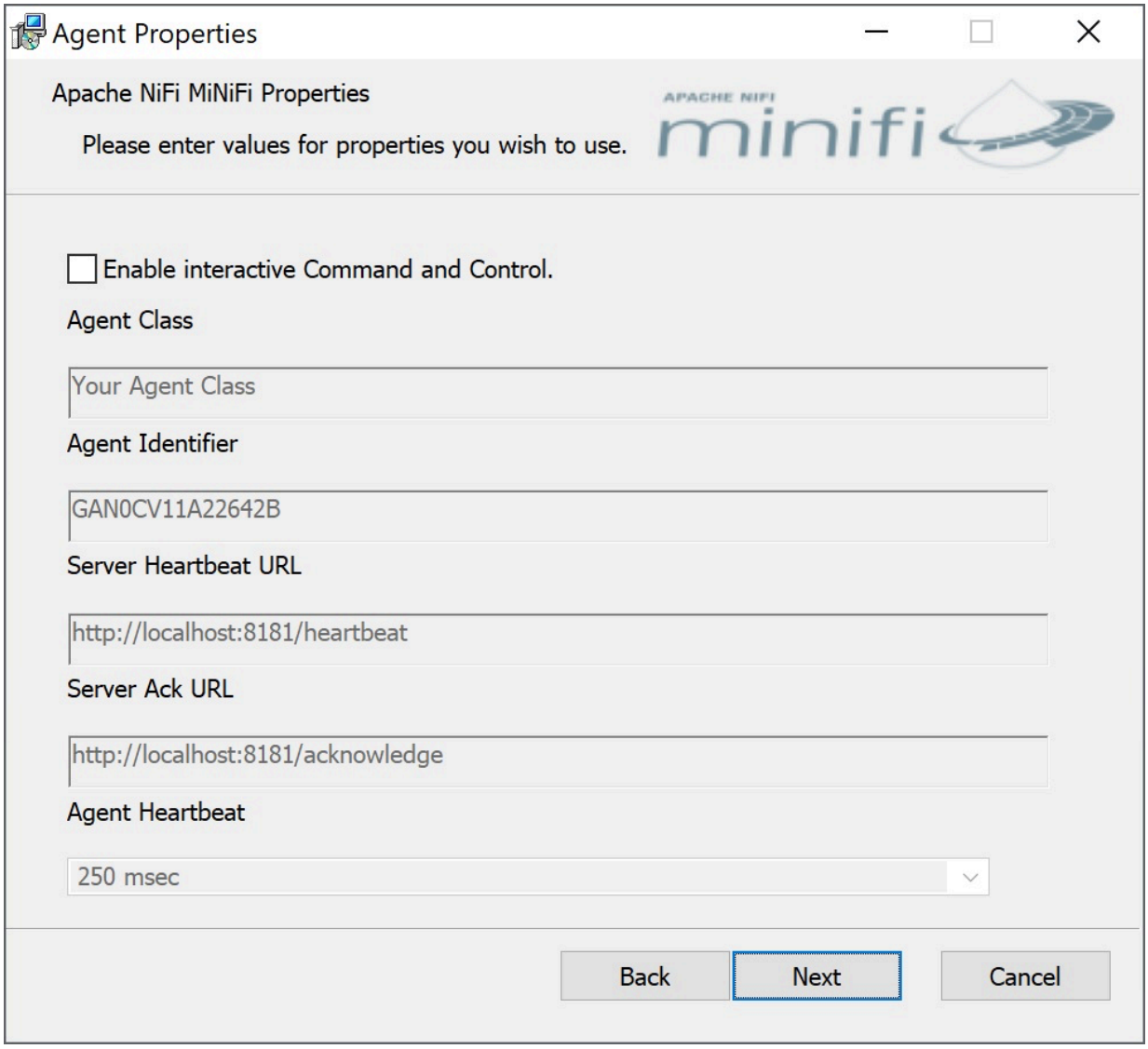
4. Click Next.
   The Service Account Information page appears.

5. Enter a user for the windows service that is installed and a password.



6. Click Next.

   The Agent Properties page appears as shown in the following image:



7. Check the Enable interactive Command and Control option.

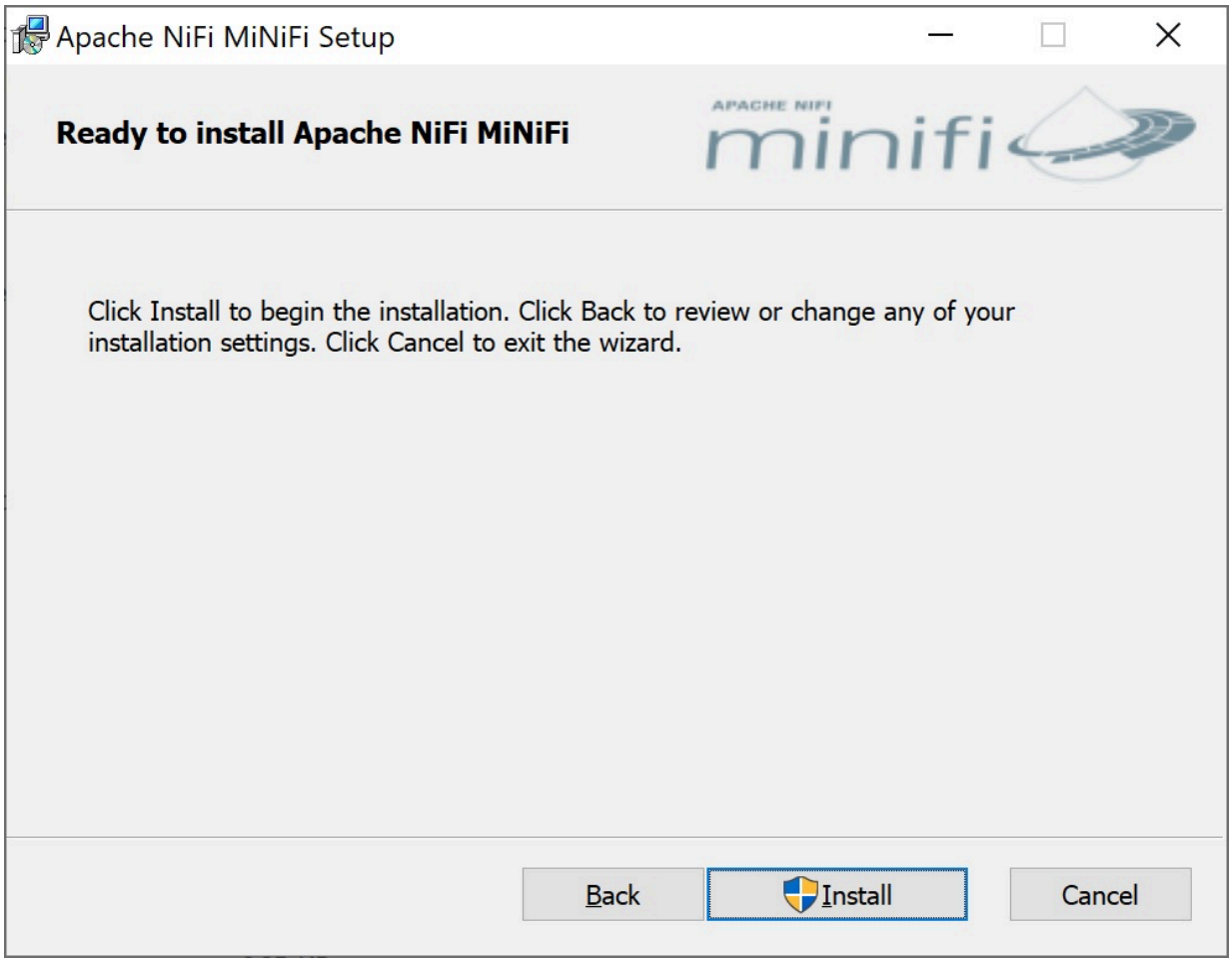
   After you enable this option, you can edit your properties.

8. Edit the following properties:

   - Agent Class
   - Agent Identifier
   - Server Heartbeat URL
   - Server Ack URL
   - Agent Heartbeat

9. Click Next.

10. Click Install.



MiNiFi C++ agent configurations

Learn about different configurations that you can perform for your MiNiFi C++ agent.

Configuring MiNiFi C++ agent

After you install the MiNiFi C++ agent, you need to update the configuration files.

About this task

If you are configuring a MiNiFi C++ agent, the file is conf/minifi.properties. For more information on MiNiFi C++ agent system properties, see *MiNiFi C++ system properties*.

Procedure

1. From the MiNiFi home directory, open the configuration file.
2. Configure the agent class so that you can logically group MiNiFi C++ instances according to their functionality.

```
nifi.c2.agent.class={AGENT_CLASS}
```

Note: Leading and trailing whitespaces are accepted for Agent Class names so consider this when configuring agents.

3. Configure the agent ID. If you do not specify an agent ID, MiNiFi generates a unique ID per agent instance.

```
nifi.c2.agent.identifier={AGENT_ID}
```

4. Set the nifi.c2.enable property to true to inform MiNiFi that run time flow instructions will be received from EFM.

```
nifi.c2.enable=true
```

5. Configure your EFM Server endpoint:

```
nifi.c2.rest.url=http://{EFM_SERVER_IP}:10090/efm/api/c2-protocol/heartb
eat
nifi.c2.rest.url.ack=http://{EFM_SERVER_IP}:10090/efm/api/c2-protocol/ac
knowledge
```

6. Configure your heartbeat interval:

```
nifi.c2.agent.heartbeat.period={HEARTBEAT_INTERVAL}
```

7. Optional. Configure metrics for your MiNiFi C++ agent.

```
nifi.c2.agent.protocol.class=RESTSender
```

For supported processors MiNiFi C++, see *MiNiFi C++ Agent processor support*.

.

Related Information

MiNiFi C++ Agent processor support

Configuring communication with secured EFM

To communicate with secured EFM, you need to configure additional properties.

About this task

If you are configuring a MiNiFi C++ agent, the file is conf/minifi.properties.

Procedure

For the C++ agent, configure the following additional properties in the minifi.properties file to communicate with a secured EFM:

```
# Security Properties #
# enable tls #
nifi.remote.input.secure=true
# if you want to enable client certificate base authorization #
nifi.security.need.ClientAuth=true
# setup the client certificate and private key PEM files #
nifi.security.client.certificate=
nifi.security.client.private.key=
# setup the client private key passphrase file #
nifi.security.client.pass.phrase=./conf/password
# setup the client CA certificate file #
nifi.security.client.ca.certificate=
```

Configuring MiNiFi C++ repositories

Learn how to configure and encrypt MiNiFi C++ repositories.

Persistent repositories, such as the Flow File repository, use a configurable path to store data. The repository locations and their defaults are defined below. By default the MINIFI_HOME environment variable is used. If this variable is

not specified, you extrapolate the path and use the root installation folder. You may specify your own path in place of these defaults in the minifi.properties file.

```
nifi.provenance.repository.directory.default=${MINIFI_HOME}/provenance_repos
itory
nifi.flowfile.repository.directory.default=${MINIFI_HOME}/flowfile_reposi
tory
nifi.database.content.repository.directory.default=${MINIFI_HOME}/content_r
epository
```

You can also use a single database to store multiple repositories with the minifidb:// scheme. This could help with migration and centralize agent state persistence. In the scheme, the final path segment designates the column family in the repository, while the preceding path indicates the directory where the rocksdb database is created. For example, in minifidb:///home/user/minifi/agent_state/flowfile a directory is created at /home/user/minifi/agent_state populated with rocksdb-specific content, and in that repository a logically separate subdatabase is created under the name flow file.

```
nifi.flowfile.repository.directory.default=minifidb://${MINIFI_HOME}/agent_s
tate/flowfile nifi.database.content.repository.directory.default=minifidb://
${MINIFI_HOME}/agent_state/content
nifi.state.manangement.provider.local.path=minifidb://${MINIFI_HOME}/agen
t_state/processor_states
```

Note: You should not simultaneously use the same directory with and without the minifidb:// scheme. Moreover, the default name is restricted and should not be used.

Repository encryption

You can encrypt the repository starting with CEM Agents 1.21.06 release.

You can provide the rocksdb-backed repositories a key to request their encryption (using AES-256-CTR). In the conf /bootstrap.conf file:

```
nifi.flowfile.repository.encryption.key=805D7B95EF44DC27C87FFBC4DFDE376DAE60
4D55DB2C5496DEEF5236362DE62E
nifi.database.content.repository.encryption.key=
# nifi.state.management.provider.local.encryption.key=
```

In the above configuration, the first line causes Flow File repository to use the specified 256 bit key. The second line triggers the generation of a random 256 bits key persisted back into conf/bootstrap.conf, which the Database Content repository then uses for encryption. In this way, you can request encryption while not bothering with what key to use. Finally, as the last line is commented out, it makes the state manager use plaintext storage, and not trigger encryption.

When multiple repositories use the same directory (as with minifidb:// scheme), the repositories should either be all plaintext or all encrypted with the same key.

In-memory repositories

Each of the repositories can be configured to be volatile (state is kept in memory and flushed upon restart). This can increase the performance but also cause data loss in case of restart while data is being processed by the agent.

To configure the repositories in the minifi.properties file:

```
# For Volatile Repositories:

nifi.flowfile.repository.class.name=VolatileFlowFileRepository
nifi.provenance.repository.class.name=VolatileProvenanceRepository
nifi.content.repository.class.name=VolatileContentRepository

# configuration options
```

```
# maximum number of entries to keep in memory
nifi.volatile.repository.options.flowfile.max.count=10000

# maximum number of bytes to keep in memory
nifi.volatile.repository.options.flowfile.max.bytes=1M

# maximum number of entries to keep in memory
nifi.volatile.repository.options.provenance.max.count=10000

# maximum number of bytes to keep in memory
nifi.volatile.repository.options.provenance.max.bytes=1M

# maximum number of entries to keep in memory
nifi.volatile.repository.options.content.max.count=100000
# maximum number of bytes to keep in memory
nifi.volatile.repository.options.content.max.bytes=1M

# limits locking for the content repository
nifi.volatile.repository.options.content.minimal.locking=true

# For NO-OP Repositories:
nifi.provenance.repository.class.name=NoOpRepository
```

Systems that have limited memory must be cognisant of the above options. Limiting the maximum count for the number of entries limits memory consumption but also limits the number of events that can be stored. If you are limiting the amount of volatile content you are configuring, you may have excessive session rollback due to invalid stream errors that occur when a claim cannot be found.

The content repository has a default option for minimal.locking to set to true. This attempts to use lock free structures. This may or may not be optimal as this requires additional searching of the underlying vector. This may be optimal for cases where max.count is not excessively high. In cases where object permanence is low within the repositories, minimal locking results in better performance. If there are many processors so that the content repository fills up quickly, performance may be reduced. In all cases a locking cache is used to avoid the worst case complexity of O(n) for the content repository, however, this caching is more heavily used when minimal.locking is set to false.

Encrypting sensitive data

You can prevent accidental exposure of passwords by encrypting sensitive configuration properties in the minifi.p roperties file. Learn how to encrypt sensitive data.

MiNiFi comes with a tool called encrypt-config (encrypt-config.exe on Windows) which can be found in the bin directory of the installation, next to the main minifi binary. It enables the encryption of sensitive configuration properties in the minifi.properties file along with the encryption of the flow configuration (config.yml by default).

The security of the encryption depends on the security of the bootstrap.conf file, which contains the encryption key.

Note: This feature is available starting with the release of MiNiFi C++ 1.20.09.

The terminologies used in this section are as follows:

- minifi home

  The directory as specified to encrypt-config by the --minifi-home option.
- configuration directory

  The <minifi home>/conf directory.
- properties file

  The <minifi home>/conf/minifi.properties file.

- flow configuration

  The file specified in the properties file with the key nifi.flow.configuration.file, or if not specified it defaults to <minifi home>/conf/config.yml.
- bootstrap file

  The file <minifi home>/conf/bootstrap.conf.
- sensitive property

  All property in the properties file that we wish to encrypt.

Encryption of the configuration properties

If you have a minifi.properties file in your MiNiFi configuration directory /var/tmp/minifi-home/conf containing the following sensitive properties:

```
minifi-properties
...
nifi.security.client.pass.phrase=my_pass_phrase
...
nifi.rest.api.user.name=admin
nifi.rest.api.password=password123
...
```

you can run the encrypt-config tool as shown in the following example:

```
$ ./bin/encrypt-config --minifi-home /var/tmp/minifi-home

Generating a new encryption key...
Wrote the new encryption key to /var/tmp/minifi-home/conf/bootstrap.conf
Encrypted property: nifi.security.client.pass.phrase
Encrypted property: nifi.rest.api.password
Encrypted 2 sensitive properties in /var/tmp/minifi-home/conf/minifi.propert
ies
```

The tool performs the following actions:

1. Generates a new encryption key.
2. Creates a bootstrap.conf file in your configuration directory, and write the encryption key to this file.
3. Encrypts the sensitive properties using this encryption key.
4. Adds a something.protected encryption marker after each encrypted property.

After running the tool, the bootstrap.conf and minifi.properties files look like as shown in the following examples:

```
bootstrap.conf
nifi.bootstrap.sensitive.key=77cd3f88ab997f7ae99b13c70877c5274c3b7b495f601f
290042b14e7db4d542
```

```
minifi.properties
...
nifi.security.client.pass.phrase=STBmfU0uk5hgSYG5O3uJM3HeZjrYJz//||vE/V65Qi
MgSatzScaPYkraVrpWnBExVgVX/CwyXx
nifi.security.client.pass.phrase.protected=xsalsa20poly1305
...
nifi.rest.api.user.name=admin
nifi.rest.api.password=q8XNjJMoVABXz7sks5O6nhaTqqRay4gF||U3762djgMVguHI6GjRl
+iCCDSkIdTFzKDCXi
nifi.rest.api.password.protected=xsalsa20poly1305
...
```

You should protect the bootstrap.conf file to make sure it is only readable by the user who runs MiNiFi.

Additional sensitive properties

By default, encrypt-config encrypts a (short) list of default sensitive properties. If you want more properties to be encrypted, you can add a nifi.sensitive.props.additional.keys setting with a comma-separated list of additional sensitive properties to your minifi.properties file before running the encrypt-config tool. For example,

```
minifi.properties
...
nifi.sensitive.props.additional.keys=nifi.rest.api.user.name,controller.soc
ket.host,controller.socket.port
...
```

The tool encrypts the additional properties. You can also do this after you have already encrypted some properties. In that case, the tool encrypts the additional properties using the existing encryption key and leaves the other, already encrypted, sensitive properties.

Modifying sensitive properties

If you later need to modify the value of a sensitive property which was encrypted earlier, perform the following steps:

1. Replace the encrypted value with the new unencrypted value.
2. Delete the something.protected=... line which was added by the tool.
3. Re-run the encrypt-config tool.

The tool encrypts the modified property using the existing encryption key in bootstrap.conf and leaves the other, already encrypted, sensitive properties.

Encryption of the flow definition

Pass the flag --encrypt-flow-config to encrypt-config so that it also encrypts the flow configuration file, not just the sensitive properties.

Updating the encryption key

If you want to change the encryption key, perform the following steps:

1. If the files are already encrypted, there should be a nifi.bootstrap.sensitive.key=... line in the bootstrap.conf file (that is, have access to the original key), otherwise you have to manually replace all encrypted data (sensitive properties and flow configuration) with their original unencrypted values (or some other new value).
2. If present, rename the nifi.bootstrap.sensitive.key=... property in bootstrap.conf to nifi.bootstrap.sensitive.key.old =... (that is, add .old suffix to the property name).
3. If you have a specific encryption key you would like to use, add it to the bootstrap.conf file (add the line nifi.boo tstrap.sensitive.key=<your encryption key here>). If you provide no encryption key (no nifi.bootstrap.sensitive .key property in bootstrap.conf, or no bootstrap.conf at all), a new key is randomly generated and written to boot strap.conf.
4. Re-run the encrypt-config tool.

Take special care when changing the encryption key and the flow configuration is encrypted, so that you also re-encrypt it before deleting the old key (you get a warning if you do not request its re-encryption).

```
$ cat /var/tmp/minifi-home/conf/bootstrap.conf

nifi.bootstrap.sensitive.key.old=0728061a041edb09445ae4dbd95f11bd255bb0b467
b8efb239e665aea5ace46b
nifi.bootstrap.sensitive.key=46af2c11a3f24c8c875ab4bee65e18a75f825fc3a4e0
3abdc8ce49d405b0b730

$ ./bin/encrypt-config --minifi-home /var/tmp/minifi-home

Old encryption key found in conf/bootstrap.conf
Using the existing encryption key found in conf/bootstrap.conf
```

```
Successfully decrypted property "nifi.security.client.pass.phrase" using old
 key.
Encrypted property: nifi.security.client.pass.phrase
Encrypted 1 sensitive property in conf/minifi.properties
WARNING: you did not request the flow config to be updated, if it is curre
ntly encrypted and the old key is removed, you won't be able to recover the
flow config.
```

If you forgot to specify the --encrypt-flow-config flag, you can re-run encrypt-config with the flag, and it re-encrypts the flow configuration file, as well.

It is always safe to re-run encrypt-config. If it does not find anything new to encrypt, it does not do anything.

When you have successfully re-encrypted all sensitive properties and the flow configuration file(s), you can delete the nifi.bootstrap.sensitive.key.old line from the bootstrap file.

Automatic encryption

Specify the property nifi.flow.configuration.encrypt=true, in the properties file to have the new flow configuration written to the disk encrypted after a flow update (originating from a C2 server). It requires that you have a conf/boo tstrap.conf in your minifi home, containing an encryption key (nifi.bootstrap.sensitive.key). This master key is also used on agent startup to decrypt the flow configuration file.

Integrating with the Windows certificate store

Learn how to enable MiNiFi C++ to get certificates from truststore of the OS.

If you want MiNiFi to communicate with EFM (C2) securely using HTTPS, you need a server certificate that EFM uses to identify itself and a client certificate that MiNiFi uses to identify itself, as well as a private key corresponding to the client certificate.

Manual setup of the client and server certificates on the MiNiFi side:

```
nifi.remote.input.secure=true
nifi.security.need.ClientAuth=true
nifi.security.client.certificate=C:\opt\nifi\data\ssl\client-certificate.pem
nifi.security.client.private.key=C:\opt\nifi\data\ssl\client-certificate.key
#nifi.security.client.pass.phrase=
nifi.security.client.ca.certificate=C:\opt\nifi\data\ssl\server-certificat
e.pem
#nifi.security.use.system.cert.store=
```

If both client and server certificates are in the LocalMachine (= "Local Computer") system certificate store (in MY = "Personal" and ROOT = "Trusted Root Certification Authorities", respectively), then you can simply do:

```
nifi.remote.input.secure=true
nifi.security.need.ClientAuth=true
#nifi.security.client.certificate=
#nifi.security.client.private.key=
#nifi.security.client.pass.phrase=
#nifi.security.client.ca.certificate=
nifi.security.use.system.cert.store=true
```

Ensure that the client certificate is exportable.

If you need to select the client certificate by CN, you can add the following property:

```
nifi.security.windows.client.cert.cn=<myCertificateIssuedToName>
```

If you need to select the client certificate by Extended (= "Enhanced") Key Usage, you can add the following property:

```
nifi.security.windows.client.cert.key.usage=Client Authentication, Server Au
thentication
```

You can also use a different system store location or a different system store for the client and server certificates, if needed:

```
# instead of LocalMachine
nifi.security.windows.cert.store.location=CurrentUser
# instead of MY
nifi.security.windows.client.cert.store=TrustedPeople

# instead of ROOT
nifi.security.windows.server.cert.store=TrustedPublisher
```

Starting MiNiFi agent

After MiNiFi is installed and configured, you can start it. Learn how to start your MiNiFi agent.

Procedure

1. From a terminal window, navigate to the MiNiFi installation directory.
2. To start MiNiFi in the foreground, enter:

   ```
   bin/minifi.sh run
   ```

3. To start MiNiFi in the background, enter:

   ```
   bin/minifi.sh start
   ```

Troubleshooting MiNiFi C++ agent

You might need to perform extra configuration steps for the MiNiFi C++ agent.

If you are using CENTOS7 operating system, you might get the following error when you run the agent:

```
PID 15860 is stale, removing pid file at /grid/0/cloudera_flow_management/cp
p-minifi/bin/.minifi.pid

Starting MiNiFi with PID 10075 and pid file /grid/0/cloudera_flow_manageme
nt/cpp-minifi/bin/.minifi.pid

-bash-4.2$ [2019-07-infol 14:36:04.369] [main] [info] Using MINIFI_HOME=/
grid/0/cloudera_flow_management/cpp-minifi from environment.

[2019-07-infol 14:36:04.369] [org::apache::nifi::minifi::Properties] [info]
 Using configuration file located at /grid/0/cloudera_flow_management/cpp-m
inifi/conf/minifi-log.properties, from ./conf/minifi-log.properties
setting default dir to /grid/0/cloudera_flow_management/cpp-minifi/content_
repository

Could not find platform independent libraries <prefix>

Could not find platform dependent libraries <exec_prefix>

Consider setting $PYTHONHOME to <prefix>[:<exec_prefix>]
```

```
Fatal Python error: Py_Initialize: Unable to get the locale encoding

ImportError: No module named 'encodings'
```

The error occurs when you use an incorrect path for Python. To troubleshoot, update the following property values:

- PYTHONHOME=/usr
- PYTHONPATH=/usr/lib64/python3.4