Natural

Installation

Version 9.3.3

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ADABAS & NATURAL

This document applies to Natural Version 9.3.3 and all subsequent releases.

Specifications contained herein are subject to change and these changes will be reported in subsequent release notes or new editions.

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Table of Contents

Preface

This documentation describes the installation of Natural on the Linux and Cloud platform. This also includes the installation of related products such as Natural Development Server and Natural Security.

The Natural installation consists of two major steps:

- In the first step, Natural makes use of the Installer (for further information see ***Installing Natural***), which you download from ***https://empower.softwareag.com/***.
- In a second step, when the installation is finalized, some configuration is required which is done using the SYSPCI utility. This configuration step is mandatory. If this step is not executed, the products may start, but do not function properly. See ***Completing the Installation*** for further information.

This documentation provides product-specific instructions for installing Natural. It is intended for use with see the *Software AG Installer* documentation, which explains how to prepare your machine to use the Installer, and how to use the Installer and Uninstaller to install and uninstall your products. You can find it at ***https://documentation.softwareag.com/***.

This documentation is organized under the following headings:

What Can be Installed With Natural?	General information on Natural and the components that can be installed with Natural, on Natural Security, and on the required license files.
System Requirements	Supported operating system platforms and prerequisites.
Important Information	Important information that you should be aware of before you start the installation.
Installing Natural	How to install Natural (including Natural Development Server, the Natural Web I/O Interface server and the ApplinX interface) and Natural Security with the Installer.
Completing the Installation	How to proceed after the installation.
Activating the Natural Buffer Pool on Linux	Describes the procedure which is used to activate the buffer pool during system startup.
Activating Natural Development Server on Linux	Describes the procedure which is used to activate Natural Development Server during system startup.
Activating the Natural Web I/O Interface Daemon on Linux	Describes the procedure which is used to activate the Natural Web I/O Interface during system startup.
Building a Natural Docker Image	Describes how to use scripts provided by Natural to build a Docker image and run Docker container for Natural or Natural Development Server (NDV) with or without Natural Security (NSC).
Uninstalling Natural	How to uninstall Natural.

For important last-minute information, see the readme file that is provided with Natural. You can find it in the Natural product documentation at ***https://documentation.softwareag.com/***.

1 About this Documentation

Document Conventions

Convention	Description
Bold	Identifies elements on a screen.
`Monospace font`	Identifies service names and locations in the format *`folder.subfolder.service`*, APIs, Java classes, methods, properties.
`Italic`	Identifies: Variables for which you must supply values specific to your own situation or environment. New terms the first time they occur in the text. References to other documentation sources.
`Monospace font`	Identifies: Text you must type in. Messages displayed by the system. Program code.
{ }	Indicates a set of choices from which you must choose one. Type only the information inside the curly braces. Do not type the { } symbols.
|	Separates two mutually exclusive choices in a syntax line. Type one of these choices. Do not type the | symbol.
[ ]	Indicates one or more options. Type only the information inside the square brackets. Do not type the [ ] symbols.
...	Indicates that you can type multiple options of the same type. Type only the information. Do not type the ellipsis (...).

Online Information and Support

Product Documentation

You can find the product documentation on our documentation website at **https://documentation.softwareag.com**.

Product Training

You can find helpful product training material on our Learning Portal at **https://learn.softwareag.com**.

Tech Community

You can collaborate with Software GmbH experts on our Tech Community website at **https://techcommunity.softwareag.com**. From here you can, for example:

- Browse through our vast knowledge base.
- Ask questions and find answers in our discussion forums.
- Get the latest Software GmbH news and announcements.
- Explore our communities.
- Go to our public GitHub and Docker repositories at **https://github.com/softwareag** and **https://hub.docker.com/publishers/softwareag** and discover additional Software GmbH resources.

Product Support

Support for Software GmbH products is provided to licensed customers via our Empower Portal at **https://empower.softwareag.com**. Many services on this portal require that you have an account. If you do not yet have one, you can request it at **https://empower.softwareag.com/register**. Once you have an account, you can, for example:

- Download products, updates and fixes.
- Search the Knowledge Center for technical information and tips.
- Subscribe to early warnings and critical alerts.
- Open and update support incidents.
- Add product feature requests.

Data Protection

Software AG products provide functionality with respect to processing of personal data according to the EU General Data Protection Regulation (GDPR). Where applicable, appropriate steps are documented in the respective administration documentation.

2 What Can be Installed With Natural

Natural

This is the local Natural development environment.

Natural Development Server

Natural Development Server (NDV) enables remote development using Natural Single Point of Development (SPoD). Natural Development Server needs the Natural development environment as a prerequisite.

For further information (including any limitations that may apply for your installation), see the separate Natural Single Point of Development documentation and the separate Natural Development Server documentation.

Natural Web I/O Interface

The Natural Web I/O Interface is used to execute Natural applications in a web browser and consists of a server and a client. The server part of the Natural Web I/O Interface needs the Natural development environment as a prerequisite. On Linux, the server is implemented as a daemon.

The Natural Web I/O Interface server supports two types of clients: the Natural Web I/O Interface client for displaying character-based applications in the web browser, and Natural for Ajax for displaying rich internet applications in the web browser. For more information, see the *Natural Web I/O Interface* documentation.

ApplinX Interface

The ApplinX interface is used to replace the Natural character-based user interface by the ApplinX GUI facilities. It needs the Natural development environment as a prerequisite. See the separate ApplinX documentation for further information.

Natural Security

Natural Security enables you to protect your Natural environment against unauthorized access and improper use. For further information, see the *Natural Security* documentation and especially the chapter *Natural Security On Different Platforms*.

License Files

During the installation of Natural, the Installer prompts you to enter the path to one or more valid license files. However, if these licenses are not required (see below), these fields can be left empty. If a license file is not specified at installation time, it can be manually installed later (see below). The license file is an XML file which is delivered by e-mail.

Separate license files are required for the following products:

- Natural

  Note: Starting with version 9.3.3, Natural can be installed without a license. During installation, you will still be prompted for the path to a license file, but you can leave the field empty. Without a license file, Natural runs in Community Edition mode (see below).

- Natural Security

  Note: Starting with version 9.3.3, Natural Security can be installed and "activated" via `SYSPCI` without a license. However, to run Natural Security, both a valid Natural license file and a valid Natural Security license file are required.

To install or replace a license file manually, you can copy it to the *common/conf subdirectory* of your corresponding Natural development installation directory, overwriting any existing license file. Note that the name of the license file must be `<product-code><version>.xml`, where `<product-code>` is the three-letter product abbreviation in lower case (for example "nat" for Natural, "nsc" for Natural Security, or "one" for NaturalONE), and `<version>` is the first two digits of the version number. For example, for Natural Security 9.3.3, the name of the license file must be *nsc93.xml*.

Notes:

1. The Installer does not check all information in the license file. All license checks are done, however, when the product itself is started.
2. Starting with Natural 9.3.3, a license for the Natural Development (NDV) Server is no longer required, neither during installation, nor at run-time.

Natural Community Edition

Starting with Natural 9.3.3, the Natural Community Edition is no longer a separate product, but a mode of operation that is employed when Natural is started without a license. For simplicity and convenience, however, the term “Natural Community Edition” is sometimes still used, as if it still were a separate product.

In Community Edition mode, Natural runs without an expiration date but with the following limitations:

- User libraries are limited to 200 objects. System libraries do not have this restriction but are read-only.
- No more than two Natural sessions can simultaneously be running on the same buffer pool, even if the buffer pool was started with **Maximum Users** set to a larger value (see also *Buffer Pool Assignments* in the *Configuration Utility* documentation). However, if a valid Natural license is subsequently installed, the full user capacity provided by the buffer pool will immediately be available to newly started Natural sessions, without the buffer pool needing to be restarted.
- Batch mode is not available.
- Natural Security cannot be used.
- The maximum number of database calls between consecutive screen I/O requests (`MADIO`) is 32767. If `MADIO` is set to 0, it is treated as 32767 rather than “unlimited”.
- The maximum number of program calls between consecutive screen I/O requests (`MAXCL`) is 50. If `MAXCL` is set to 0, it is treated as 50 rather than “unlimited”.
- The `USIZE` parameter value is forced to its default setting of 20 MB internally, regardless of the passed value.

3 System Requirements

Supported Platforms, Requirements, Product Availability, and End of Maintenance

You can view all available product versions and check the dates when their maintenance ends by using the System Requirements App at:

https://documentation.softwareag.com/systemrequirements/#/

Here, you can enter the product name or code in the search field and see the latest information on system requirements and product availability.

Compilers Used to Build Natural

Natural was built and tested with the compilers listed below. When relinking Natural during the installation or using the `make` command, we strongly recommend that you use the same compiler version.

In the event that a compiler other than one of those listed below is used, it is not guaranteed that Natural will function properly. This applies even in the case that the compiler used is declared compatible to the listed compiler by its manufacturer and/or vendor.

Release Platform	Supported Compiler	Build Platform and Compiler
Red Hat Enterprise Linux 8 (x86-64)	gcc 8.5.0	Red Hat Enterprise Linux 8: gcc 8.5.0
Red Hat Enterprise Linux 9 (x86-64)	gcc 11.3.1-4	Red Hat Enterprise Linux 8: gcc 8.5.0
SUSE Linux Enterprise Server 15 SP3 or above (x86-64)	gcc 8.5.0	Red Hat Enterprise Linux 8: gcc 8.5.0
Red Hat Enterprise Linux 8 (z/Linux)	gcc 8.5.0	Red Hat Enterprise Linux 8 (z/Linux): gcc 8.5.0

Memory Space Requirements

The memory space required by Natural largely depends on the number of users.

The memory space per user is determined by the settings in the parameter file, especially by the values of profile parameters such as `USIZE` and `SSIZE`. By default, Natural is invoked with the parameter file `NATPARM`. However, you can also invoke Natural with an alternative parameter file (by specifying, for example, `PARM=myparm`).

In addition to the user-specific memory, memory is required for the buffer pool, which is shared among all users.

Disk Space Requirements

Approximately 2 GB of hard-disk space is required for Natural (including all Natural and Installer packages). This value depends on the installation hardware. On some platforms, it is higher.

Another 250 MB of hard-disk space is required for Natural Security.

Software Requirements for Using Related Natural Products

The following is required if you want to use related Natural products:

- Entire Access to access SQL databases.
- EntireX when using Natural RPC.
- Entire Net-Work to access remote Adabas database systems.
- Tamino when using Natural for Tamino.
- HTTP server, like Apache or IIS when using the Natural Web Interface.

Natural includes interfaces to:

- Adabas
- ApplinX

It is recommended that you use the latest versions of the above listed products. You can view all available product versions and check the dates when their maintenance ends by visiting ***https://empower.softwareag.com/***. Go to **Products > Product Version Availability**.

Software Requirements for Natural Security

Natural Security requires:

- Natural (same version and update package or fix as that of Natural Security).
- Adabas.
- Entire Net-Work. Only required if the `FSEC` system file is located in a remote database. See also *Using Natural Security on Multiple Platforms* in the *Natural Security* documentation.

4 Important Information

Administrator Status

During the installation, the **Sudo** panel may appear. When you enter the sudo password in this panel, the installer will execute the scripts which require sudoers privileges. If sudoers privileges are not available, you may run the script manually after installation as explained later in this documentation.

For you to use sudo in the installer, the user that you are using to install must be in the sudoers configuration. If you are creating or installing from an installation script, the installer cannot execute the script because it does not store the sudo password for security reasons. You must therefore execute the script manually after the installation.

User ID for Installation

When installing Natural, the user ID under which you run the Installer must not be longer than eight characters. If you use a longer user ID, an error message is shown. You can then exit the installer and use a different user ID or - in case you also want to install other products - return to the product selection tree and deselect Natural.

Installation Directory

During the installation, you are asked to specify an installation directory in which you want to install your products. In general, any directory can be used. The user that you are using to install must have full read and write permissions to this directory.

We recommend that you use a sub-directory of the */opt/softwareag* directory as the location for Natural and its add-on products, for example */opt/softwareag/suiteyyyy*, whereby *yyyy* stands for the current year. This allows future side-by-side installations.

Important: It is recommended that you do not install into a directory which is a subdirectory of a previous installation. Such a previous installation may have been created either with the Installer or by an installation tool that was used in the past.

Extended Natural functionality needs a shared library for operation, from where external executables are loaded dynamically at runtime. The external executables are delivered with Natural in the *<install-dir>/Natural/lib* directory. They will be copied to the */opt/softwareag/Natural/v<version>/lib* directory if the user executing the Installer has sufficient permissions. This directory will not be removed by an uninstallation. The Natural executables calling the external executables are configured with the runpath */opt/softwareag/Natural/v<version>/lib* during link time. In that way, the external executables may be found. Furthermore, the *natenv* environment script delivered in

the <install-dir>/Natural/INSTALL directory places the directory /opt/softwareag/Natural/lib at the very beginning of the environment variable LD_LIBRARY_PATH to point to the location of the external executables. If the external executables cannot be copied to the runpath location, they may be found via the environment variable LD_LIBRARY_PATH.

The runpath /opt/softwareag/common/lib is supported for the shared library load of the adalnk shared library in Adabas 6.3 (or lower) environments. For Adabas Client 6.5 and Adabas 6.4 or higher (installed with the Installer), the runpath /opt/softwareag/AdabasClient/lib is supported for the shared library load of the adalnk shared library in Adabas environments.

For accessing Adabas 6.4 or higher from Natural, the adalnk shared library may be found in <install-dir>/AdabasClient/lib, using the $LD_LIBRARY_PATH setting. Alternatively, the adalnk shared library may be found in one of the following ways:

- by installing the Adabas Client and Natural in the installation directory /opt/softwareag, or
- by copying the library <install-dir>/AdabasClient/lib to the library /opt/softwareag/AdabasClient/lib, or
- by creating a link from the library /opt/softwareag/AdabasClient/lib to <install-dir>/AdabasClient/lib.

File Permissions

The user who starts the installation owns all files that are installed.

The user file-creation mode mask (umask command) determines the file permissions for newly created files. Make sure that the umask command you are using for the installation will not prevent users from accessing and executing the installed files. On Linux systems, for example, the command umask 022 allows full access rights for the file owner and read-only access rights for group members and others.

The Natural installation sets read and write permissions (chmod ug+w) for the files *NATCONF.CFG*, *NATCONV.INI*, *NATURAL.INI* and *SAGtermcap* located in the <install-dir>/Natural/etc directory and for the <install-dir>/Natural/tmp directory.

The Natural installation sets execute permissions (chmod ug+x) for the scripts located in the <install-dir>/Natural/INSTALL directory and for the script *natstart.bsh* located in the <install-dir>/Natural/bin directory.

Installation Considerations

If you install multiple products from a suite using one installation directory, these products are compatible. But most products cannot be installed in a directory which already contains an older version of the same product (called "over-install"). New versions of a product must therefore be installed in another directory (called "side-by-side installation").

For a new Natural version, it is in general recommended to use the side-by-side installation as described in ***Side-by-Side Installations***.

In addition to the side-by-side installation, Natural offers procedures which allow replacing an installed Natural version and reusing the same installation directory. For a new major or minor version, the old version must be de-installed before the new version can be installed. A new Service Pack can be installed over the old version. The procedures are described in ***Replacing an Installed Natural Version***. Options are available which preserve most configuration settings.

Notes:

1. The first digit of the version indicates the major version, the second the minor version and the third the Service Pack (see *Glossary* > *Version*).
2. Replacing an installed Natural is only possible if the previous version has been installed with the Software AG Installer. Otherwise you must use the side-by-side installation.
3. If you are replacing an installed Natural and there are other products from previous suites installed in the same directory, it is up to you to ensure that the products are compatible.
4. If you are replacing an installed Natural version, there is no fallback if you need to reuse the previous version for any reason.

Side-by-Side Installations

If you are using a new directory for the installation rather than an existing installation directory, the installation is named "side-by-side installation". Side-by-side installation is the default procedure for the products, and it is also the recommend procedure for installing a new Natural version.

A side-by-side installation enables you to install several different versions of Natural on the same machine. This may be necessary for testing a new Natural version before it is taken over into a production environment. The following should be considered:

- If the previous version was installed with the Installer in a sub-directory of the */opt/softwareag* directory, use another sub-directory as the location for Natural and its add-on products, for example */opt/softwareag/<new suite name>*.

- In the Installer page concerning the Natural configuration data, you may select “Copy configuration data from another installation directory” if you want to transfer configuration settings from a previous version. This is described in the section *Installing Natural*.
- If necessary, adjust the settings for the FUSER because the default system files (22,10 and 22,20) are adapted to the new installation directory.

Since Empower only offers the latest version of Natural and other products, it is recommended that you create and keep an image of installed Natural versions for possible later use. Installing from an image rather than downloading it from Empower will usually be faster, too. For further information, see the *Software AG Installer* documentation.

Replacing an Installed Natural Version

New Major or Minor Version

With the following steps you can replace an installed Natural version with a new major or minor version and reuse the same installation directory:

1. Deinstall Natural (but do not delete the installation folder manually).
2. Install the new Natural version using the same installation directory as before.
3. In the Installer page concerning the Natural configuration data, select “Reuse configuration data from the current installation directory” which will preserve most configuration settings from the previous version as described in the section ***Installing Natural***.

New Service Pack

If you install a new Natural Service Pack and specify the same installation directory and select the same items as before, the Installer does not prompt again for license files, configuration data, and port numbers. The existing license files, configuration data, and port numbers will be used.

During the update, the installation does not stop any running Natural services (buffer pool, Natural Development Server, Natural Web I/O Interface server), nor does the installation ask to stop running Natural sessions. The executables will be replaced while in use. The new version of a replaced executable will become active after a restart of the executable. Administrators and users can restart any executables manually according to their own needs.

The Natural installation delivers two standard Natural nuclei in the *<install-dir>/Natural/bin* directory. One nucleus is linked with a classic Adabas control block (ACB), but *without* Natural Security. This nucleus is called "natural". The other nucleus is also linked with a classic Adabas control block (ACB) and *with* Natural Security. This nucleus is called "natsec". These two nuclei will be replaced during an update installation. If you want to keep "natural" or "natsec", you must create a backup copy before you start the update installation. If you have linked "natural" or "natsec"

with additional drivers, you need to re-link the nuclei manually after the update installation as described in the section ***Re-Linking a Natural Nucleus***.

The contents of the buffer pool will be deleted during the installation.

Scripts located in the *<install-dir>/Natural/INSTALL* or *<install-dir>/Natural/bin* directory will not be replaced. Thus, user changes in scripts will be kept. If a script changes with a Natural update, you can find the updated scripts in the *<install-dir>/Natural/INSTALL/tpl* directory. The name of an updated script consists of the original name followed by *.tpl*. For example, *natenv* is then named *natenv.tpl*. Administrators and users can adapt any scripts manually according to their own needs.

The files *NATCONF.CFG, NATCONV.INI, NATURAL.INI* and *SAGtermcap* in the *<install-dir>/Natural/etc* directory will not be updated.

For ApplinX and the Natural Web I/O Interface, the directory which has the same name as the machine/host will not be updated. Modules from these directories which have changed with a Natural update can be found in the *node-name* directories of the *<install-dir>/Natural/apx* and *<install-dir>/Natural/nwo* directories.

Natural Web I/O Interface

The activities listed below are necessary before installing the Natural Web I/O Interface daemon.

The Natural Web I/O Interface daemon *<install-dir>/Natural/nwo/bin/nwosrvd*

- needs a TCL shared library which is delivered in the directory *<install-dir>/Natural/lib*,
- is linked with the runpath */opt/softwareag/Natural/v<version>/lib*,
- will be installed with permissions 6755 (s-bit).

Since the s-bit is used, `$LD_LIBRARY_PATH` will not be searched. Therefore, ensure that the Natural Web I/O Interface daemon will find the TCL shared library by

- allowing the Natural installation to copy the directory *<install-dir>/Natural/lib* to */opt/softwareag/Natural/v<version>/lib* by giving the installation user sufficient permissions or install with sudoers permissions,
- making the TCL shared library available from a system directory.

FNAT Usage

By default, a new FNAT is created in the installation directory during the installation of Natural (<*install-dir*>/*Natural/fnat*). This FNAT must always exist, and the global configuration file must have an entry which defines this FNAT. The FNAT path below the <*install-dir*> must not contain a symbolic link.

The Natural add-ons (such as Predict or Natural Business Services) can only be installed into this FNAT.

Note: If you want to check or edit the settings in the global configuration file, use the Configuration Utility.

The Installer maintains an internal list of installed products, which must coincide with the add-ons that are currently installed in the FNAT. This is important for updates and uninstallations to work correctly.

For this reason:

- Do not install products into the FNAT without the use of the Installer.
- Do not replace the default FNAT (<*install-dir*>/*Natural/fnat*) with another FNAT.
- Make sure to complete the installation of an add-on by using the SYSPCI utility.

If an error occurs due to the above-mentioned scenarios, the only way to solve the problem is a new installation. In some situations, one of the following workarounds may help:

- Workaround 1: Complete the previous installation by using the SYSPCI utility.
- Workaround 2: Uninstall the product and then start the installation once more.

FUSER Usage

By default, a new FUSER is created in the installation directory during the installation. If you want to use an existing FUSER of Natural Version 6.3, you have to adjust the system file settings in the global configuration file after the installation. See also *Overview of Configuration File Parameters* in the *Configuration Utility* documentation.

Natural Development Server

You can install both the Natural development environment and Natural Development Server at the same time, or you can install Natural Development Server after having installed the Natural development environment.

To become operable, Natural Development Server requires a post-installation configuration and initialization step. This includes:

- setting or loading the Natural Development Server file `FDIC`,
- adjusting the Natural parameter files,
- adjusting the global configuration file,
- starting the Natural Development Server (first-time installation).

See also ***Setting Up Your Products Using the SYSPCI Utility*** in the section *Completing the Installation*. This step is not necessary after an update installation.

Natural Security

You can install both Natural and Natural Security at the same time, or you can install Natural Security after having installed Natural.

To become operable, Natural Security requires a post-installation configuration and initialization step. This includes:

- setting or loading the Natural Security log file,
- setting or loading the Natural Security file `FSEC`,
- adjusting the Natural parameter files,
- adjusting the global configuration file.

See also ***Setting Up Your Products Using the SYSPCI Utility*** in the section *Completing the Installation*. This step is not necessary after an update installation.

Important: Once you have installed and configured Natural Security, Natural on the assigned system file (`FNAT`) can only be accessed under the control of Natural Security. Natural Security cannot be removed once it has been installed. It can only be removed if you uninstall the whole Natural environment in which Natural Security has been installed.

5 Installing Natural

You can install Natural in one of the following two ways:

1. ***Using the GUI to Install Natural*** for an easy user-based installation.
2. Via a command line interface that is available for automated installation. It is described in ***Using Software Distribution Tools to Install Natural***.

Using the GUI to Install Natural

This installation documentation provides just a brief description on how to install Natural directly on the target machine using the Installer GUI. For detailed information on the Installer, see the *Software AG Installer* documentation.

Important: Make sure all ports you specify on panels or in response to prompts are not already being used by other products on your machine. The installer cannot detect whether ports are in use when products are shut down, and the shutting down of products is a requirement for running the installer. For a list of default ports used by the products, see "List of Used TCP/IP Ports" at **https://empower.softwareag.com/** (go to **Products > Download Components > TCP/IP Ports**).

To install Natural

One or more license files are provided for Natural; the installer prompts for them during a first-time installation. Starting with Natural 9.3.3, however, these files are not required for the installation, so you can leave the corresponding license path fields empty. If you want to install a license at the time of product installation (for example, to avoid manually installing it later), copy it to any temporary location on the machine on which you want to install Natural. The installer will ask for the location of your license files and, if specified, will then copy them to the *common/conf* directory of your installation directory.

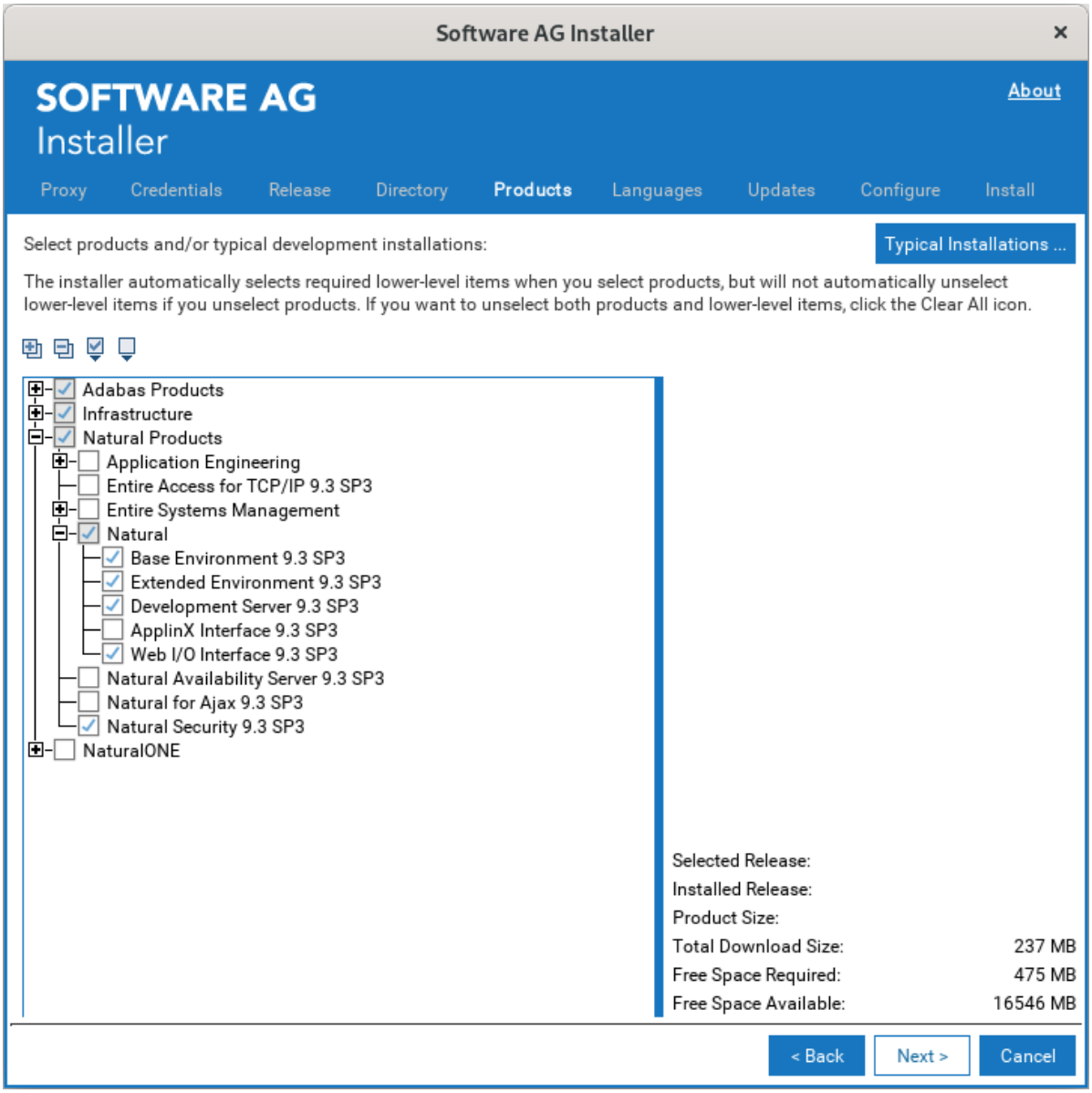
1 Start the Installer GUI as described in the *Software AG Installer* documentation.

2 When the first page of the Installer GUI (the so-called Welcome panel) is shown, choose the **Next** button repeatedly (and specify all required information on the shown panels as described in the *Software AG Installer* documentation) until the panel containing the product selection tree appears. This tree lists the products you have licensed and which can be installed on the operating system of the machine on which you are installing.

3 To install Natural with all of its product components, expand the **Natural Products** node and select **Natural**.

Or:

Expand **Natural Products > Natural** and select the product components that you want to install.



Note: Products or product versions which are already installed in the selected installation directory are shown as disabled.

The following product components are available:

- **Base Environment**
  Installs the base environment for Natural.
- **Extended Environment**
  Installs the extended (that is, non-runtime) environment for Natural. You will be prompted to optionally provide the license file later during the installation (first-time installation only).

> **Note:** Starting with Natural 9.3.3, the **Runtime Environment** is no longer available for installation. Therefore, **Extended Environment** must be selected.

- **Development Server**
  Installs Natural Development Server (NDV) which enables remote development using Natural Single Point of Development (SPoD).
- **ApplinX Interface**
  Installs the Natural runtime environment for ApplinX. ApplinX enables you to modernize your Natural applications so that they run in a browser. To set the s-bit for the ApplinX executables, sudoers privileges are required.
- **Web I/O Interface**
  Installs the server part of the Natural Web I/O Interface. This enables you to use a browser as the I/O device for Natural applications. To set the s-bit for the Natural Web I/O Interface executables, sudoers privileges are required.

4 If you want to install Natural Security, select **Natural Products > Natural Security** in the product selection tree. Natural Security can only be installed together with Natural or after the Natural installation is complete.

> **Note:** If user authentication via an LDAP server is to be used, it is required that the SSX security libraries (**Infrastructure > Libraries > Security Libraries**) are installed as part of the Natural Security installation procedure. By default, if you select Natural Security in the installation tree, the SSX security libraries are automatically selected also. Refer to *Authentication Options* in the section *Administrator Services* of the *Natural Security* documentation for further details.

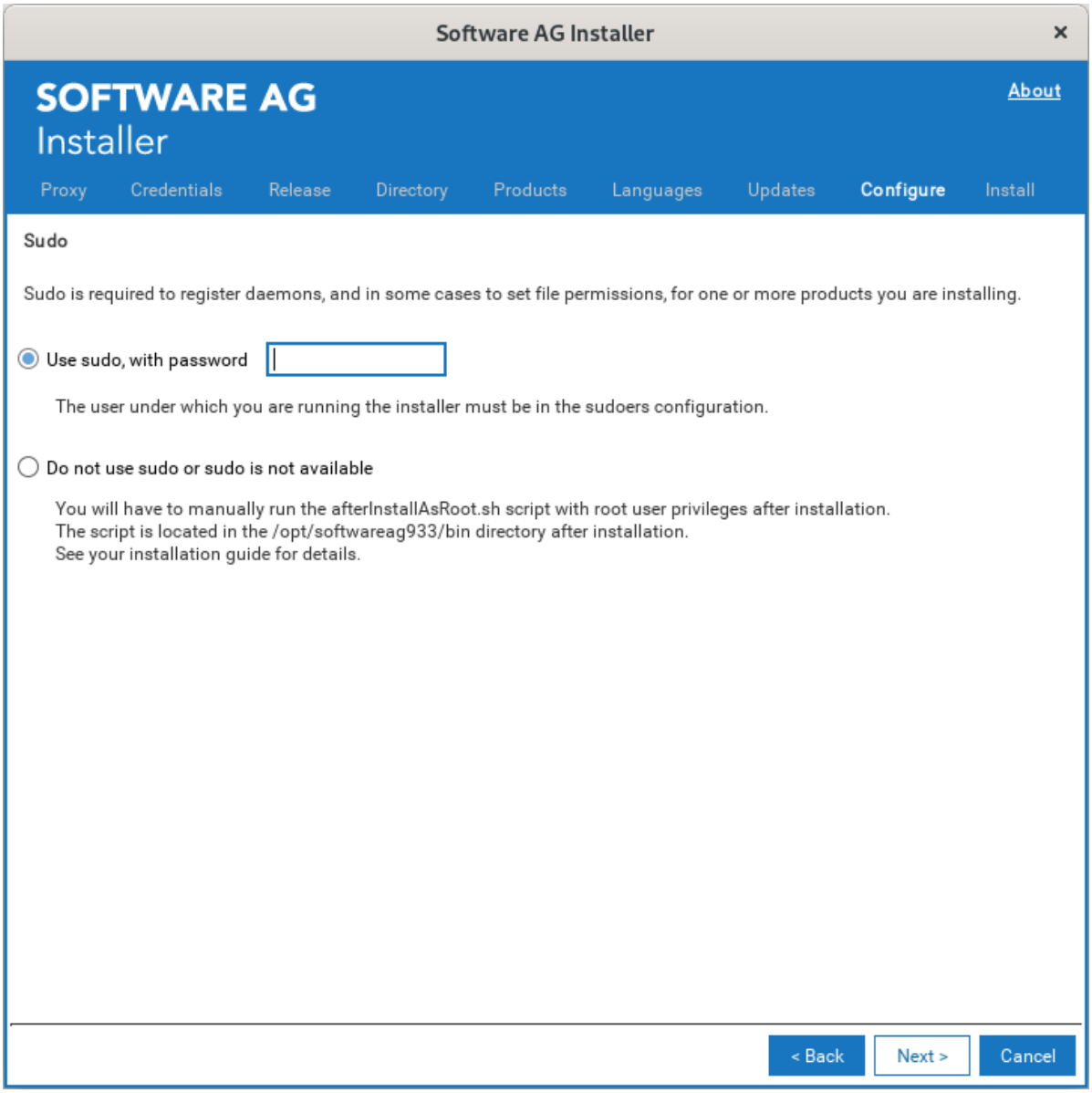
5 Choose the **Next** button.

6 Read the license agreement, select the check box to agree to the terms of the license agreement, and choose the **Next** button.

7 Specify whether to use sudo or not.

You must either have the installer execute the `<install-dir>`*/bin/afterInstallAsRoot.sh* script, or you must run the script manually after installation as explained later in ***Registering Daemons and Setting File Permissions***. If you want to have the installer to execute the script, the user under which you are running the installer must be in the sudoers configuration.

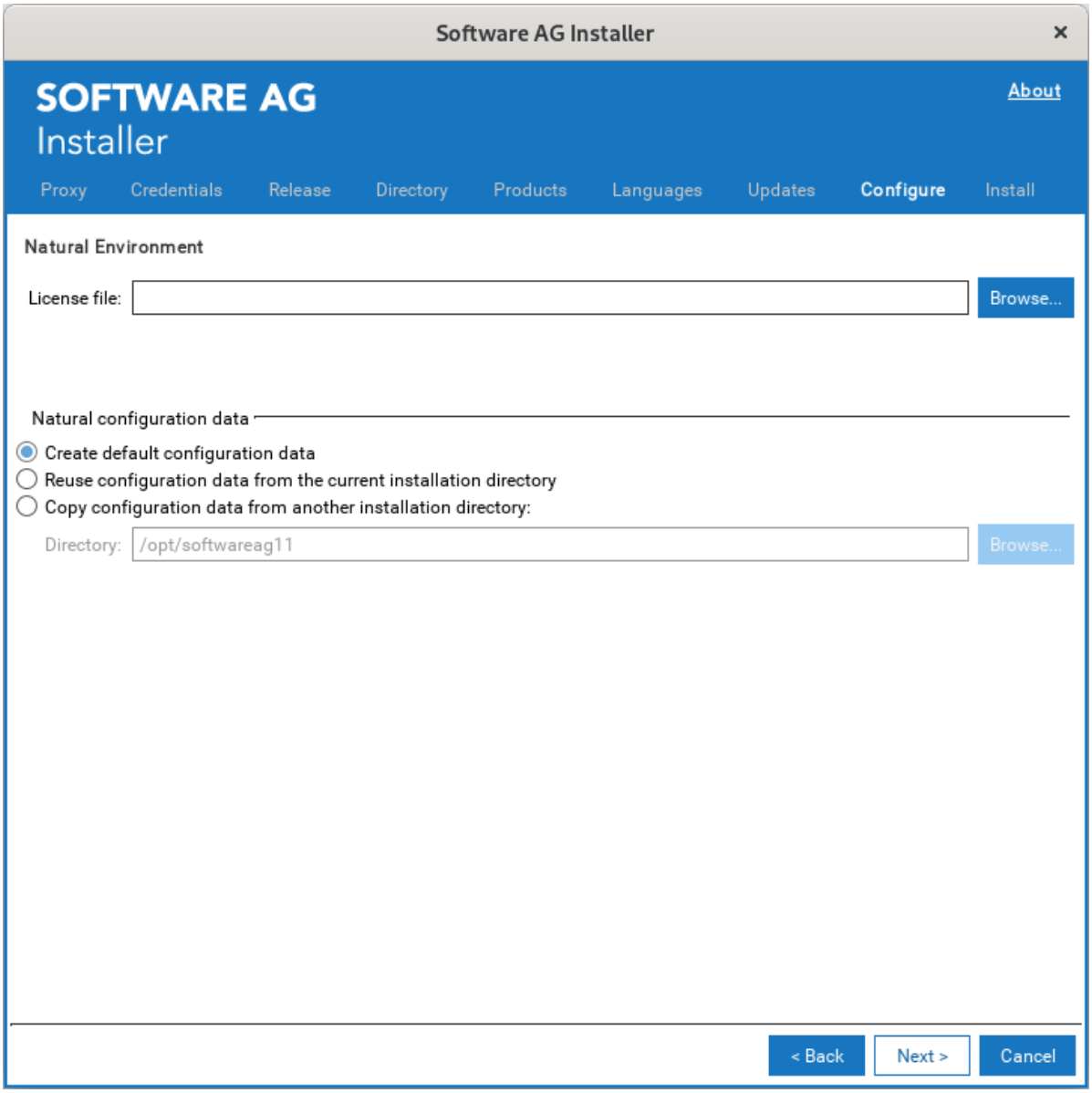
For security reasons, the installer does not store the sudo password in installation scripts. If you are creating or installing from an installation script, therefore, the option to use sudo is not available. You must execute the *afterInstallAsRoot.sh* script manually after the installation.



8 Choose the **Next** button.

9 First-time installation only.

You can optionally enter the full path to the Natural license file (or use the **Browse** button to select it from a dialog box). Starting with Natural version 9.3.3, it is possible to install without a license by leaving this field empty.



It is only possible to reuse or copy configuration data from a Natural installation which has been installed with the Installer.

Create default configuration data

Default. All required configuration files are created. These files contain default values.

Reuse configuration data from the current installation directory

This option is helpful, if you want to reuse the configuration files from a previous uninstallation in the same directory.

Copy configuration data from another installation directory

This option is helpful if you have side-by-side installations. In this case, you can copy the configuration files from an existing Natural installation directory into the current directory. The existing Natural installation remains unchanged. Enter the full path to the existing

root directory (or use the **Browse** button to select the root directory from a dialog box). At least the *NATURAL.INI* file is expected in this case.

The following configuration files are reused or copied:

<install-dir>/Natural/etc/NATURAL.INI [1]
<install-dir>/Natural/etc/NATCONV.INI
<install-dir>/Natural/etc/NATCONF.CFG [2]
<install-dir>/Natural/etc/SAGtermcap
<install-dir>/Natural/prof/ [3]
<install-dir>/Natural/<host-name> [4]
<install-dir>/Natural/nwo/<host-name> [5]
All Natural text members INST-*<productcode>* within the library SYSPCI

Notes:

[1] For the default buffer pool `NATBP`, new semaphore and shared memory keys are generated, and the buffer pool parameter `READONLY` is set to `NO`.

[2] The paths of the default system files (22,10 and 22,20) are adapted to the current installation directory.

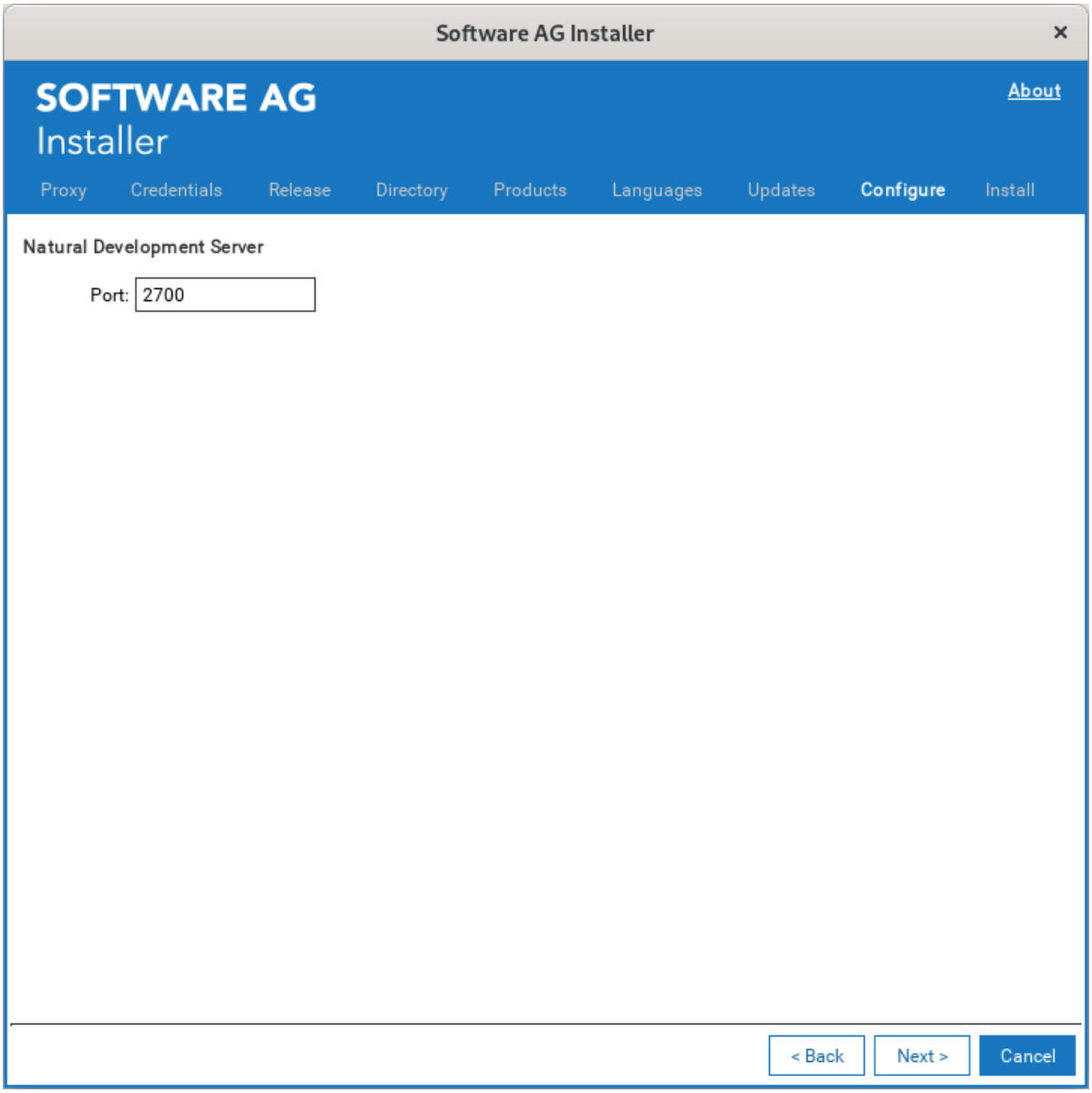
[3] All files except *NDVSERVER.PRU*.

[4] If available and independent from the selection of the ApplinX Interface: All files except log files.

[5] If available and independent from the selection of the Web I/O Interface: All files except log files.

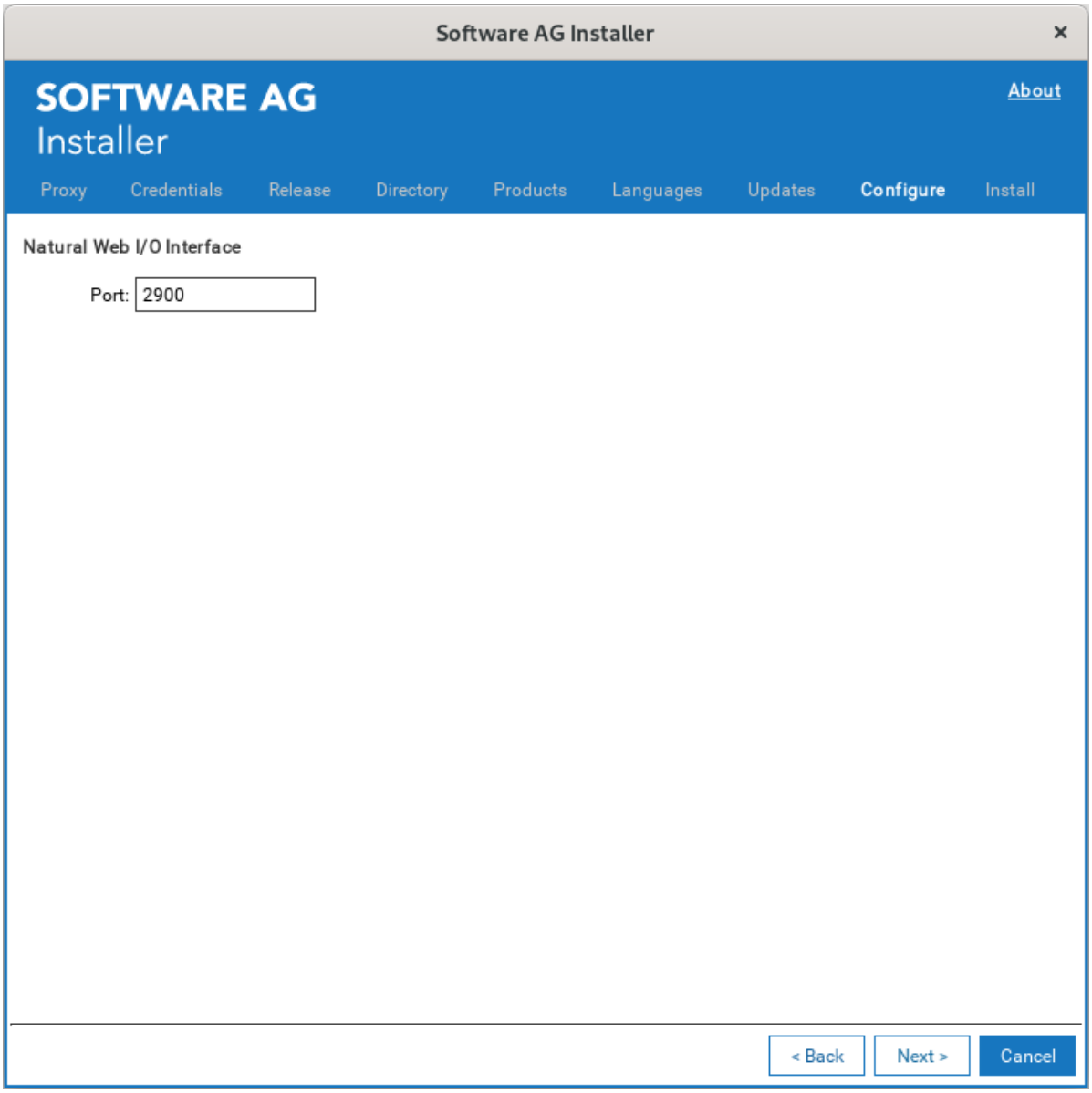
10 Choose the **Next** button.

11 First-time installation only: When **Development Server** was selected in the product selection tree, you can enter a different value for the Natural Development Server port. Values between 1023 and 65536 are valid. The default value is 2700. If this port is already used, the number of the next free port will be shown.



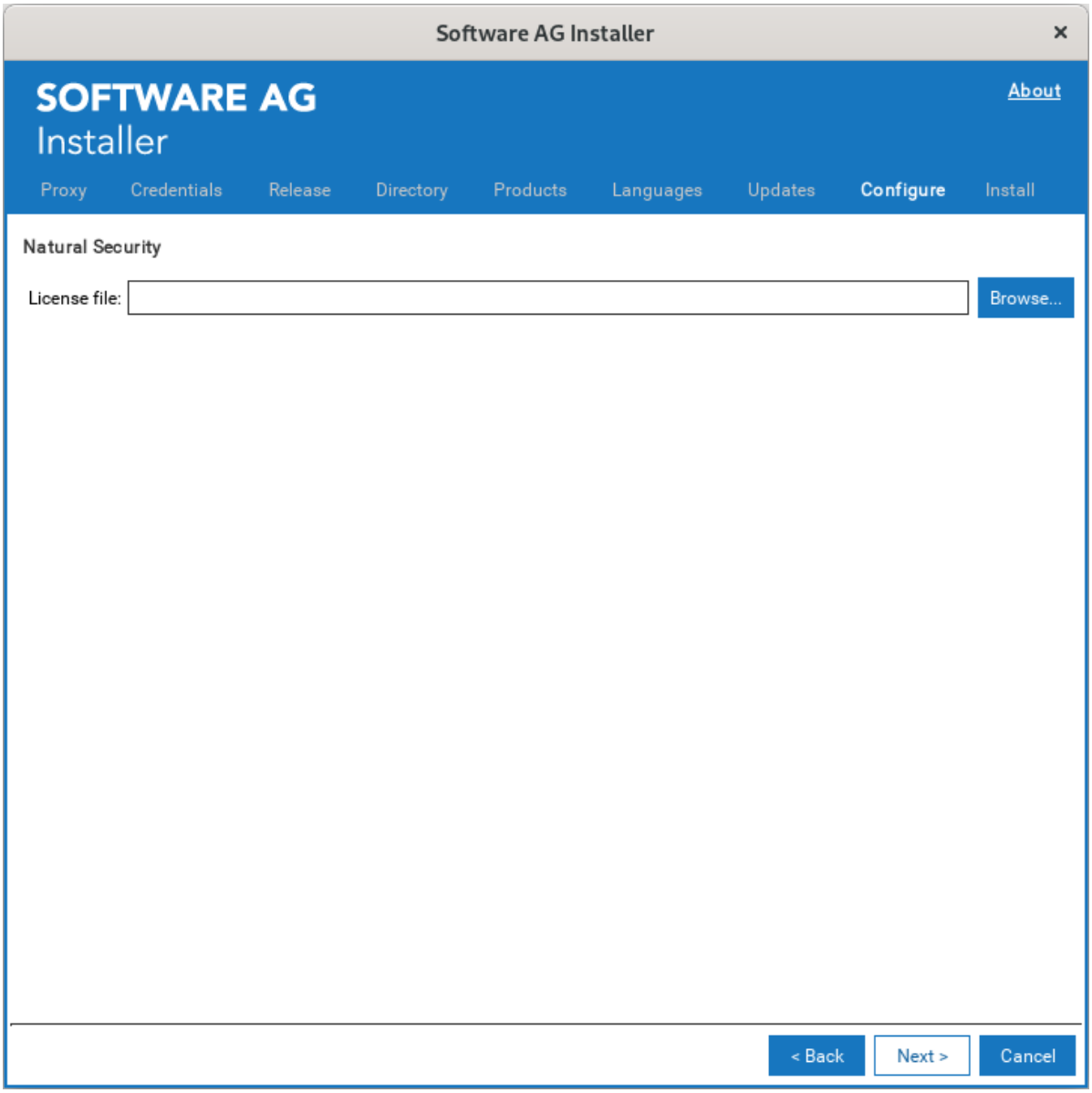
12 Choose the **Next** button.

13 First-time installation only: When **Web I/O Interface** was selected in the product selection tree, you can enter a different value for the port. This port is used by the Natural Web I/O Interface daemon. Values between 1023 and 65536 are valid. The default value is 2900. If this port is already used, the number of the next free port will be shown.



14 Choose the **Next** button.

15 First-time installation only: When Natural Security was selected in the product selection tree, enter the full path to the Natural Security license file (or use the **Browse** button to select it from a dialog box).



16 Choose the **Next** button.

17 On the last panel, review the list of products and items you have selected for installation. If the list is correct, choose the **Next** button to start the installation process.

When the Installer has completed the first-time installation, additional configuration steps are required. See *Completing the Installation* for further details.

Using Software Distribution Tools to Install Natural

You can use the Installer to create an installation package which can then be distributed automatically to any number of computers in your environment. You can use third-party distribution tools for this purpose.

To distribute Natural, the following items are required:

- Installer.
- Installer image containing the products to be installed.
- Script file which defines the location of the image file, the products to be installed, and the locations of all required license files.
- License files for the products to be installed.

The description below just provides a brief overview on how to create the required files. For more detailed information, see the *Software AG Installer* documentation.

To create the image and script

1 Start the Installer GUI as described in the *Software AG Installer* documentation.

2 On the Welcome panel, choose the **Advanced Options** button.

3 Go to the **Images** tab and proceed as follows:

1. Select the **Use installation image** check box.
2. Select the **Create image** option button.
3. Specify a location and name for the image. The installer will automatically add the extension *.zip*.
4. Specify the platform for which you want to create the image. You can create an image for any platform from any platform.
5. Choose the **OK** button to return to the Welcome panel.

4 Choose the **Next** button repeatedly in order to:

1. Select the products to be installed.
2. Agree to the terms of the license agreement.
3. Start the installation to create the image.

Note: When creating an image, the panels on which you usually specify the license files and ports do not appear.

5 Start the Installer GUI once more, and choose the **Advanced Options** button again.

6 Go to the **Images** tab again and proceed as follows:

1. Select the **Use installation image** check box.
2. Select the **Install from image** option button.
3. Specify the name of the image that you have previously created.

7 Go to the **Scripts** tab and proceed as follows:

1. Select the **Use installation script** check box.
2. Select the **Create script** option button.
3. Select the **Do not install products on local machine** option button, unless you also want to install on the local machine in the same step.
4. Specify a location and name for the script.
5. Choose the **OK** button to return to the Welcome panel.

8 Choose the **Next** button repeatedly in order to:

1. Specify the installation directory.
2. Select the products to be installed.
3. Agree to the terms of the license agreement.
4. First-time installation only: Specify the paths to all required license files and, if required, specify the ports for the selected products.
5. Start the installation to create the script.

Note: It is recommended that you create separate scripts for first-time installations and update installations.

To adapt the script

1 Edit the script that you have previously created and adjust the references to the image and license files. For example:

```
guiNscLicense=__VERSION1__,C%3A%5CUsers%5Cxyz%5CDocuments%5CLics%5Cnsc84.WinDesk.2017.xml
guiNatLicense=__VERSION1__,C%3A%5CUsers%5Cxyt%5CDocuments%5CLics%5Crun84WinDesk.2017.xml
imageFile=C\:\\Users\\xyz\\Documents\\NaturalSec84.zip
```

For an automated installation, the references to the image and license files need to be adjusted to the actual installation location. You can specify either the full path or a relative path such as *file-name*, .*file-name* or .*folder-name**file-name*. You can also specify the full path to a file server such as *file-server**folder-name**file-name*. The following examples show the different ways in which a path can be specified:

```
guiNscLicense=__VERSION1__,nsc84.WinDesk.2017.xml
guiNscLicense=__VERSION1__,.\\Lics\\nsc84.WinDesk.2017.xml
guiNscLicense=__VERSION1__,\\\\Server1\\Lics\\nsc84.WinDesk.2017.xml
```

You also can use environment variables as part of the path specification. For example:

```
imageFile=$IMAGEDIR$\\NaturalSec84.zip
```

2 If necessary, adjust the parameter values in the script (for example, port numbers).

Note: You can delete the port specification lines for Natural Development Server (`guiNdvPort=..`) and the Natural Web I/O Interface (`guiWebioPort=..`) from the script if you want to make sure that the installation does not stop if the specified port number is in use. In this case, the next free port number will be used.

To start the installation

1 Start the installation from the command line. Start the installer jar file as follows:

```
java -jar SoftwareAGInstaller.jar -readScript script-file-name ↩
-scriptErrorInteract no
```

Note: An appropriate Java version must be installed on the machine.

2 For security reasons, the installer does not store the sudo password in installation scripts. Execute the *afterInstallAsRoot.sh* script manually after the installation (see also ***Registering Daemons and Setting File Permissions***).

6 Completing the Installation

Registering Daemons and Setting File Permissions

If you installed Natural on a Linux system and did not use sudo, the installer was not able to register daemons and set file permissions for the affected products. Also the runpath directory */opt/softwareag/Natural/v<version>/lib* may not have been created if the user that you are using to install does not have full read and write permissions to the runpath directory. Note that the runpath directory may have been created by a previous Natural installation. Perform these tasks now by executing the script *afterInstallAsRoot.sh* as the root user. You can find this script in the *bin* directory of your main installation directory. It contains actions for all installed Software GmbH products.

Important: If you did not use sudo during the installation, you must run the script *afterInstallAsRoot.sh* or some products might not work correctly.

- If you do not want to register daemons for Natural, set file permissions or create the runpath directory, proceed as follows:

  Remove the commands to start the setup scripts in the *afterInstallAsRoot.sh* script before you execute it. The script to register daemons is called *daemon.sh*. The script to set up the run path library is called *install_lib_to_runpath*. All these scripts are located in the *<install-dir>/Natural/INSTALL* directory.

- For the daemons, uninstall scripts are available. Therefore, if you do not want to register the daemons, you can also proceed as follows:

  Install all daemons (either automatically with the installation when sudo is used, or manually by executing the *afterInstallAsRoot.sh* script when sudo is not used) and then uninstall the Natural daemons using the following commands:

  - `<install-dir>/common/bin/daemon.sh -r -f <install-dir>/Natural/INSTALL/sys/natbpsrv_sys`
  - `<install-dir>/common/bin/daemon.sh -r -f <install-dir>/Natural/INSTALL/sys/natdvsrv_sys`
  - `<install-dir>/common/bin/daemon.sh -r -f <install-dir>/Natural/INSTALL/sys/nwosrvd_sys`

Refer to the documentation *Installing Software GmbH products*, section *Register Daemons to Automatically Start and Shut Down Products on Linux Systems* for further details on the *daemon.sh* script.

Setting the Environment Variables with sagenv.new

Before you start your product, it is recommended that you run (source) the *sagenv.new* script in the *<install-dir>/bin* directory. This sets the environment variables needed to run your product and other products.

Important: The *sagenv.new* file is replaced with every new installation. If you have set up your own environment settings file (for example, with the name *sagenv*), replace only the modified product-specific part in your existing *sagenv* file.

Running the *sagenv.new* script is also recommended before configuring the installed products with the SYSPCI utility.

Important: It is recommended that you start a new shell before switching to a different installation directory and running the *sagenv.new* script (for example, when switching from the directory for a test environment to the directory for a production environment).

Setting Up Your Products Using the SYSPCI Utility

After you have installed your product, you need to set up a number of files, parameters and individual settings depending on your environment. These are described below. To set them up, you use the SYSPCI utility. For detailed information on this utility, see *SYSPCI Utility - Product Configuration and Initialization* in Natural's *Tools and Utilities* documentation.

The Natural Command Processor requires an `NCP` file.

Natural Security requires an Adabas `FSEC` system file.

Natural Security provides the function **Logging of Maintenance Functions**. If logging is activated, a Natural Security log file (`NSL`) is required in Adabas and needs to be set up with the SYSPCI utility. With this version, you can continue to use your existing Natural Security log file. If you want to set up a Natural Security log file, it is recommended that you do this before setting up an `FSEC` file for Natural Security. In this order, both files can be set up by starting the SYSPCI utility only once.

Natural Development Server requires an Adabas `FDIC` system file. After the installation of Natural Development Server, the `FDIC` parameter is not set automatically. If you start Natural without setting the `FDIC` parameter and then use the Natural editor, the Natural error `NAT7399` will occur because the `FDIC` file is not available for locking.

If you want to use an `FDIC` file and you use Natural Security, configure the `FDIC` file first. When an `FDIC` file is configured, additional `FDIC` information will be written to the `FSEC` file when it is

initialized. It is thus recommended that you set up the files for Natural Development Server and Natural Security in the following order:

1. FDIC
2. NSL
3. FSEC

The database IDs and file numbers of the new or existing files (FSEC, FDIC or NCP) that you specify using the SYSPCI utility are entered into the default parameter files for Natural Security (NSCPARM), Natural Development Server (NDVPARM) and Natural (NATPARM).

Note: If Natural Security is already active and you use the SYSPCI utility to create a new FSEC file, database ID and file number are not entered into the current NSCPARM file.

The FSEC definition will also be written to the NDVPARM parameter file.

When you initialize (activate) Natural Security using the SYSPCI utility or when you start Natural Development Server, the default FNAT system file from the installation must be used (that is, *<install-dir>/Natural/fnat*). Otherwise, a subsequent update installation will not be possible.

Note: If you want to use the same FDIC file in both Natural Development Server and Predict, it is recommended that you install Natural Development Server without initializing an FDIC file. Then install Predict and do the initialization there. Afterwards, run the SYSPCI utility, process the Predict FDIC file and deactivate the **Initialize product** option. You can then also use the newly created FDIC file in Natural Development Server. When you set up a Predict FDIC file after setting up a Natural Development Server FDIC file, an inconsistency problem will occur because Predict always delivers the very latest FDIC file.

The required Adabas files can either be local or remote.

- **Remote Access**
  If the file is located in a remote database, Entire Net-Work must be active and the database must be accessible.

  Note: For Natural Security, see also *Using Natural Security on Multiple Platforms* in the *Natural Security* documentation.

- **Existing Local File**
  Before you start the SYSPCI utility, make sure that the Adabas database containing the required files is active. With this version, you can continue to use your existing files. No migration of data from the previous version to the current version is necessary.

- **New File**
  Before you start the SYSPCI utility, make sure that the Adabas database which will contain the required files is active. The SYSPCI utility will load and initialize these files. This should be also done if another file is required for your product.

Before you create new files with the SYSPCI utility, make sure that the ASSO and DATA sizes of your Adabas database are appropriate for these files. It is therefore recommended that you check the Adabas *.fdu* files in the *<install-dir>*/*<product>*/*INSTALL*/*<product-code>* directory for the used sizes. If required, change your database setup so that the files can be created.

For Natural Security, for example, the ASSO and DATA sizes are not appropriate if you are using the default database. The *.fdu* files for Natural Security can be found in the *<install-dir>*/*Natural*/*INSTALL*/*nsc* directory.

In addition, make sure that the Adabas nucleus parameters listed in the following table are set for the database you want to use at database startup. They are not appropriate if you are using the default nucleus parameters.

`LWP`	Must be at least 1,000,000.
`OPTIONS`	The option `TRUNCATION` must be set in the `OPTIONS` parameter.

Notes:

1. After Natural Security has been initialized (activated) with the SYSPCI utility, you need to use a Natural Security nucleus to start Natural. The Natural Security nucleus delivered with the Natural Security installation is called "natsec" and is located in the *<install-dir>*/*Natural*/*bin* directory. Start Natural Security with `natsec parm=NSCPARM`. Alternatively, you can back up the nucleus called "natural" and rename "natsec" to "natural".
2. When you have installed Natural Security, you need to start Natural Development Server with a Natural Security nucleus (for example, `natdvsrv -s=natsec`).

Invoking the SYSPCI Utility

In order to invoke the SYSPCI utility, you must first invoke Natural. You can then invoke the SYSPCI utility using the **Direct Command** window.

To invoke the SYSPCI utility

1 Enter the following command at the Linux system prompt to invoke Natural:

```
natural
```

2 Select the **Direct** menu and press ENTER to invoke the **Direct Command** window.

3 Enter the following command in the **Direct Command** window:

```
SYSPCI
```

For more information, see *SYSPCI Utility - Product Configuration and Initialization* in Natural's *Tools and Utilities* documentation.

Invoking the SYSPCI Utility Using a Shell Script

It is possible to execute certain functions of the SYSPCI utility with a Linux shell script. Two shell scripts are available in `<install-dir>`*/Natural/INSTALL* directory. They are called *syspci_reuse.sh* and *syspci_create.sh*. These scripts can be used to automatically call SYSPCI for each installed product to intialize the product.

The scripts can be used for the following tasks:

- **syspci_reuse.sh**
  This script executes the SYSPCI utility to initialize installed Natural products with already existing Adabas files.

  Note: The necessary conversion of Adabas files to the new version has to be done before starting this script.

- **syspci_create.sh**
  This script executes the SYSPCI utility to initialize installed Natural products and create the required Adabas files.

For more information, see *SYSPCI Utility - Product Configuration and Initialization* in Natural's *Tools and Utilities* documentation.

Re-Linking a Natural Nucleus

When the installation of Natural finishes, the installation directory `<install-dir>`*/Natural/bin* contains the binary file *natural*. Only if you had previously selected 'Natural Security' in the installer menu, does `<install-dir>`*/Natural/bin* additionally contain the binary file *natsec*.

Both delivered nuclei *natural* and *natsec* are linked by default with the flags `ada2=yes`, `osx=yes`, `sax2=yes`, `xslt=yes`, `ins=yes`, and are ready for use.

To re-link Natural with different flags, use the command `make natural {flags}` as described below:

Note: If Natural Security is installed and you link a modified Natural nucleus, the Natural Security interface is automatically linked. The name of the nucleus containing Natural Security is then *natural* (not *natsec*).

To link a modified Natural nucleus

1 Set the environment variables for your Adabas (see also the information in the table below).

2 Run the *natenv* script in the *<install-dir>/Natural/INSTALL* directory to set the environment variables for Natural.

3 Run the makefile located in the *<install-dir>/Natural/bin/build* directory with the following command:

```
make natural {flags}
```

This generates a program with the name *natural* which is placed in the current directory (*<install-dir>/Natural/bin/build*).

The following flags are available:

Flag	Description
`ada=yes` or `ada2=yes`	Link with the Adabas client interface.
`osx=yes`	Link with SQL interface (OSX). When executing the makefile, the SQL interface libraries must be accessible in the *<install-dir>/Natural/bin/build* directory. In addition, the following environment variables must be set: `OSXDIR`: OSX base directory. `OSXVERS`: OSX version.
`sax2=yes`	Link with XML SAX parser. Required for the `PARSE XML` statement, for Tamino access, and for the application programming interface `USR6001N` (call external XSLT processor) in the library `SYSEXT`.
`xslt=yes`	Link with XSLT processor. Required for `USR6001N`.
`ins=yes`	Link with Tamino interface. The XML SAX parser is implicitely used. Therefore, do not specify `sax2=yes` in addition to `ins=yes`.
`apx=yes`	Link with ApplinX interface.
`shlib=yes`	Link Natural shared library (*libnatural.so* or *libnatural.sl*, depending on the Linux platform). Required for the Natural Native Interface. Non-Natural applications can load this shared library dynamically and access Natural code through the exported interface functions. Do not use `apx=yes` in combination with `shlib=yes` because interactive I/O is suppressed for shared libraries.

Flag	Description
coso=<*your-libcosort-path*>	Link with IRI CoSort libraries (*libcosort.a* and *libsortcl.a*). Where <*your-libcosort-path*> represents the path containing the *libcosort.a* and *libsortcl.a* libraries (i.e. */opt/cosort/cosort95/lib*).
sync=<*your-libsyncsort-path*>	Link with DMExpress Syncsort library (*libsyncsort.so*). Where <*your-libsyncsort-path*> represents the path containing the *libsyncsort.so* library (i.e. */opt/dmexpress/lib*).

4 Use the following command to copy the generated *natural* program from <*install-dir*>*/Natural/bin/build* to <*install-dir*>*/Natural/bin*:

```
make install
```

The original *natural* program in <*install-dir*>*/Natural/bin* is then renamed to *natural.old*.

5 If you have specified `shlib=yes`, use the following command to copy the generated *libnatural.so* or *libnatural.sl* program from <*install-dir*>*/Natural/bin/build* to <*install-dir*>*/Natural/bin*:

```
make install shlib=yes
```

The original *libnatural.so* or *libnatural.sl* program in <*install-dir*>*/Natural/bin* is then renamed to *libnatural.so.old* or *libnatural.sl.old*.

See the source of the makefile for more information.

Setting Up the Additional Natural Components

After Natural has been installed for the first time, additional configuration steps are required in the following cases:

- **Natural Development Server**
  If you want to get information about the startup parameters for the Natural Development Server, enter the following command in the *Natural/bin* directory:

  ```
  natdvsrv -help
  ```

  The possible startup parameters are then shown with explanations.

- **Natural Web I/O Interface**
  If you have installed the Natural Web I/O Interface, see the *Natural Web I/O Interface* documentation for information on how to configure the server part (that is, the daemon), and how to install and configure the Natural Web I/O Interface client. If you want to use Natural for Ajax as the client, see the Natural for Ajax documentation. This documentation is available separately.

- **ApplinX Interface**
  If you have installed the ApplinX interface, see the ApplinX documentation for information on how to replace the Natural character-based user interface by the ApplinX GUI facilities. This documentation is available separately.

Setting Up Natural Security

The initial installation of Natural Security results in the creation of the following security profiles and relationships:

- A library security profile with library ID `SYSSEC`. The library is people-protected (**People-protected** set to "Y" and **Terminal-protected** set to "N").
- A user security profile with user ID "DBA", user type "ADMINISTRATOR", and password set to "DBA".
- User "DBA" is linked to library `SYSSEC` (ordinary link, no special link).

If there is a previously installed version of Natural Security, these two security profiles will not be modified by a subsequent installation, nor will any objects or relationships already defined be affected.

If you have installed Natural Security for the very first time (that is, if the version you have installed is your first version of Natural Security on this `FSEC` system file), proceed as described in the *Natural Security* documentation under the heading *First Steps After the Installation*. Do this immediately after a successful installation of Natural Security.

Configuring Natural

After setting up Natural and the add-ons, Natural can easily be configured using the Configuration Utility. See the *Configuration Utility* documentation for further details, especially the *Overview of Configuration File Parameters*.

7 Activating the Natural Buffer Pool on Linux

About Activating the Natural Buffer Pool on Linux

Since the Natural buffer pool requires resources that should be created every time your system is booted, a procedure to activate the buffer pool should be called during system startup.

The Natural installation process provides a buffer pool start/stop service procedure. The name of the procedure will be generated depending on the installation directory.

Furthermore, the Natural installation process determines the platform automatically and prepares the system to execute the start/stop service procedure during start/stop of the system. Depending on the platform, the system directory for initialization and, if needed, the runlevel startup directories will be selected. The start/stop service procedure will be copied to the system directory for initialization and links will be created in the runlevel startup directories or it will create the unit files for systemd.

The Natural installation process installs the buffer pool start/stop service when sudoers permissions are available.

You can also use the script *daemon.sh* in the `<install-dir>`*/common/bin* directory (see also the documentation *Installing Software GmbH products*, section *Register Daemons to Automatically Start and Shut Down Products on Linux Systems*). The used rc scripts are in `<install-dir>`*/Natural/INSTALL/sys*.

The Natural buffer pool needs some operating system resources for its operation. Therefore, kernel parameters need to be checked and, if necessary, increased as described below.

To verify the operation of the buffer pool, invoke the `NATBPMON` utility which is used to monitor the buffer pool's activity.

Changing the Kernel Parameters

The information below applies to Linux.

The Natural buffer pool needs the following operating system resources for its operation:

- A set of semaphores to enable synchronization between the users.
- Shared memory to store the buffer pools objects.

The amount of available shared memory and the semaphores are configured in the kernel. For information on how to change your current kernel, contact your system administrator or consult your respective operating system documentation.

Note: Since semaphores are also needed to synchronize the access to Natural system files, additional operating system resources should also be considered here.

The following abbreviations are used:

NBP	Number of buffer pools running on one computer.
SMU	Sum of all "maximum users" assignments for all buffer pools.
MAXMEM	Largest buffer pool size value for all buffer pools.
NSF	Number of system files used.

If you have only one buffer pool on your computer, the following values are used:

NBP	1
SMU	"Maximum users" assignment from the buffer pool assignments in the local configuration file.
MAXMEM	Buffer pool size from the buffer pool assignments in the local configuration file.

As not all resources defined by the default parameter settings are used during normal system operation, the default values are sufficient to operate one buffer pool supporting up to 20 users using about 1 MB of memory.

Note: You can find the default values specific to your environment in your kernel configuration file. Do not decrement any kernel parameters that are above their default values, as other software may need the larger value.

Change the following kernel parameters to the required values as follows:

Name	Required Value
SEMAEM *	Must be at least SMU.
SEMMNI	Increment by (NBP + NSF).
SEMMNS	Increment by (SMU + 5 * NBP) + NSF.
SEMMNU *	Increment by SMU.
SEMMSL	Must be at least SMU + 4.
SEMUME *	Must be at least 5.
SEMVMX *	Must be at least SMU.
SHMMAX	Must be at least MAXMEM.
SHMMNI	Increment by NBP.
SHMSEG	Must be at least 4.

* Cannot be modified on Linux.

Review the changes made to the file *sag1natbpsrv* in your *init.d* directory in case the startup message is not displayed during rebooting.

Note: If the system should fail to boot after modification (that is, the new kernel cannot be booted), check if there is an error in the startup procedure. Detailed information about trouble-shooting the operating system can be found in your respective operating system manuals. If you cannot solve the problem, contact support.

8 Activating Natural Development Server on Linux

About Activating the Natural Development Server on Linux

When Natural Development Server is used, a procedure to activate the server may be called during system startup.

The Natural installation process provides a Natural Development Server start/stop service procedure. The name of the procedure will be generated depending on the installation directory.

Furthermore, the Natural installation process determines the platform automatically and prepares the system to execute the start/stop service procedure during start/stop of the system. Depending on the platform, the system directory for initialization and, if needed, the runlevel startup directories will be selected. The start/stop service procedure will be copied to the system directory for initialization and links will be created in the runlevel startup directories or it will create the unit files for systemd.

The Natural installation process installs the Natural Development Server start/stop service when sudoers permissions are available.

You can also use the script *daemon.sh* in the `<install-dir>`*/common/bin* directory (see also the documentation *Installing Software GmbH products*, section *Register Daemons to Automatically Start and Shut Down Products on Linux Systems*). The used rc scripts are in `<install-dir>`*/Natural/INSTALL/sys*.

To verify the operation of Natural Development Server, invoke a Natural for Windows and connect to the system on which the server runs. Use the port specified at start of Natural Development Server.

9 Activating the Natural Web I/O Interface Daemon on Linux

About Activating the Natural Web I/O Interface Daemon on Linux

When a Natural Web I/O Interface daemon is used, a procedure to activate the daemon may be called during system startup.

The Natural installation process provides a Natural Web I/O Interface daemon start/stop service procedure. The name of the procedure will be generated depending on the installation directory.

Furthermore, the Natural installation process determines the platform automatically and prepares the system to execute the start/stop service procedure during start/stop of the system. Depending on the platform, the system directory for initialization and, if needed, the runlevel startup directories will be selected. The start/stop service procedure will be copied to the system directory for initialization and links will be created in the runlevel startup directories or it will create the unit files for systemd.

The Natural installation process installs the Natural Web I/O Interface daemon start/stop service when sudoers permissions are available.

You can also use the script *daemon.sh* in the `<install-dir>`*/common/bin* directory (see also the documentation *Installing Software GmbH products*, section *Register Daemons to Automatically Start and Shut Down Products on Linux Systems*). The used rc scripts are in `<install-dir>`*/Natural/INSTALL/sys*.

To verify the operation of the Natural Web I/O Interface daemon, invoke a Natural Web I/O Interface client on Windows and connect to the system on which the server runs. Use the port that was specified when starting the Natural Web I/O Interface daemon.

10 Building a Natural Docker Image

This document describes how to build a Natural Docker image and run the Natural container using scripts provided with Natural. It covers the following topics:

About Building a Natural Docker Image

The starting point to prepare a docker container is the installation of the products in question. The installation should be done without `sudo`, but using the `afterinstallasroot` procedure.

After the installation of the appropriate Natural components has been accomplished, the preparation of Natural in a docker container can be started.

This is done in two steps:

- Preparation of a *.tar* file which contains all required components
- Building the docker image based on the *.tar* file

The advantage of this approach is that the *.tar* file does neither contain any configuration specifics nor license files. In the second step, the configuration is done via scripts. Therefore, building the docker image is always reproducible.

There are two ways to provide license and configuration file to the docker image:

- Include the license and configuration files into the docker image
- Mount the license and configuration files directory to your docker image

Prerequisites for Building a Natural Docker Image

- Docker installation 1.13.1 or compatible,
- Depending on the use case, a product installation containing the packages:
  - Natural > Base Environment,
  - Natural > Development Environment,
  - Natural > Development Server,
  - Natural > ApplinX Interface,
  - Natural Security,
  - EntireX > Broker.
  - Natural for Ajax

Building and Running the Natural Docker Image

In your <*install_dir*>/*Natural/docker/* directory you will find six use cases for Natural:

- Natural / ApplinX – in directory *NaturalApplinX*

  Note: For the above mentioned use cases an ApplinX server is required. For more information see the *ApplinX* documentation.

- Natural / ApplinX with Natural Security (NSC) – in directory *NaturalApplinXNSC*

  Note: For the above mentioned use cases an ApplinX server is required. For more information see the *ApplinX* documentation.

- Natural / Natural Development Server - in directory *NaturalDevelopmentServer*
- Natural / Natural Development Server with Natural Security (NSC) - in directory *NaturalDevelopmentServerNSC*
- Natural / RPC with EntireX Attachmanager – in directory *NaturalRPCService*
- Natural for Ajax – in directory *NaturalAjax*

The scripts provided with Natural, support the following two methods of building a Docker image and running the Docker container:

- Mounting the License and Configuration Files into Container
- Configuring with Modified Docker File

Mounting the License and Configuration Files into Container

In the following, you find an example for NaturalDevelopmentServerNSC. This example can be used for the other uses cases as well, but with additional license files.

To mount the license and configuration files into container, using default file names

1 Set your working directory to <*install_dir*>/*Natural/docker/NaturalDevelopmentServerNSC*.

2 Create the *.tar* file containing all the necessary files with the following command:

```
./ CreateNaturalDevelopmentNSC-tar.sh
```

3 Provide your configuration and license directories:

1. License files in directory *<install_dir>/License*
   - *Nat91.xml*
   - *Ndv91.xml*
   - *Nsc91.xml*
2. The Configuration files in directory *<install_dir>/Configuration*
   - NATURAL.INI
   - NATCONV.INI
   - NATCONF.CFG
   - SAGtermcap
3. The parameter files in directory *<install_dir>/Configuration*
   - NATPARM.SAG
   - NDVPARM.SAG
   - NSCPARM.SAG

4 In case you do not provide specific configuration and parameter files, the default files from the installation will be taken. Build the Natural image, for example:

```
docker build . -t natural-development-nsc:9.1.2
```

In this case the license and configuration files are mounted during startup. You will need to map your Natural Development Server port during startup, for example:

```
docker run -it -p 2799:2700 --name natndvnsc912 -e NSC_DBID=11 -e NSC_FNR=6 ↩
-v <installdir>/License/:/licenses natural-development-nsc:9.1.2
```

Advantages

Configuration changes can be persistent; if the configuration changes, you only need to rerun the container.

Disadvantage

The configuration files are mounted to the container. For troubleshooting, support will require an image, configuration files and the command you entered.

Configuring with Modified Docker File

In the following, you find an example for NaturalDevelopmentServerNSC. This example can be used for the other uses cases as well, but with additional license files.

To copy the license and configuration files into the Docker image

1 Set your working directory to *<install_dir>/Natural/docker/NaturalDevelopmentServerNSC*.

2 Create the *.tar* file containing all the necessary files with the following command:

```
./ CreateNaturalDevelopmentNSC-tar.sh
```

3 Provide your configuration files into the current working directory, like::

1. License files in the working directory
   - *Nat91.xml*
   - *Ndv91.xml*
   - *Nsc91.xml*
2. The Configuration files in the working directory
   - NATURAL.INI
   - NATCONV.INI
   - NATCONF.CFG
   - SAGtermcap
3. The parameter files in the working directory
   - NATPARM.SAG
   - NDVPARM.SAG
   - NSCPARM.SAG

4 Update the Docker file, for example:

```
# Possibility to add a valid license file already to the image instead of
# providing it during start up
# e.g.:
ADD nat91.xml /opt/softwareag/common/conf/
ADD ndv91.xml /opt/softwareag/common/conf/
ADD nsc91.xml /opt/softwareag/common/conf/

# Possibility to add different config file already to the image instead of
# providing it during start up
# e.g.:
ADD NATURAL.INI $NAT_HOME/etc
```

```
ADD NATCONV.INI $NAT_HOME/etc
ADD NATCONF.CFG $NAT_HOME/etc
ADD SAGtermcap  $NAT_HOME/etc
ADD NATPARM.SAG $NAT_HOME/prof
ADD NDVPARM.SAG $NAT_HOME/prof
ADD NSCPARM.SAG $NAT_HOME/prof
```

5 Build the Natural Docker image, for example:

```
docker build . -t natural-development-nsc:9.1.2
```

With this method, the Docker build copies the configuration into the image. You will need to map your Natural Development Server port during startup, for example:

```
docker run -it -p 2799:2700 --name natndvnsc912 -e NSC_DBID=11 -e NSC_FNR=6 ↩
natural-development-nsc:9.1.2
```

Advantages

The complete configuration is in the image. For troubleshooting, support will require only the image and the command you entered.

Disadvantage

If the configuration changes, you will need to build a new image and rerun the container.

11 Uninstalling Natural

You uninstall Natural using the Software AG Uninstaller. For detailed information on how to use the uninstaller, see the *Using the Software AG Installer* guide.

You uninstall Natural using the Uninstaller. For detailed information on how to use the uninstaller, see the *Software AG Installer* documentation.

In short: to uninstall Natural, proceed as follows:

1. Open a command window and go to the *bin* directory of your main installation directory.
2. This step is only required if the password of the root user will not or could not be entered during step 3.

   Execute the script *beforeUninstallAsRoot.sh* as the root user.
3. Run the command `uninstall`. This starts the Uninstaller.
4. This step is only required if the script *beforeUninstallAsRoot.sh* was executed in step 2.

   Execute the script *afterInstallAsRoot.sh* as the root user.

Note: Natural Security cannot be uninstalled without removing the whole Natural environment in which Natural Security has been installed.

The following files are not removed:

- If it has been created, the runpath directory */opt/softwareag/Natural/v<version>/lib*.
- All files created by the user, for example, Natural modules in `FUSER` or parameter files.
- Scripts in the *Natural/INSTALL* directory which may be needed to stop services or daemons.
- Machine-name directories for ApplinX and the Natural Web I/O Interface which contain files to access these services.