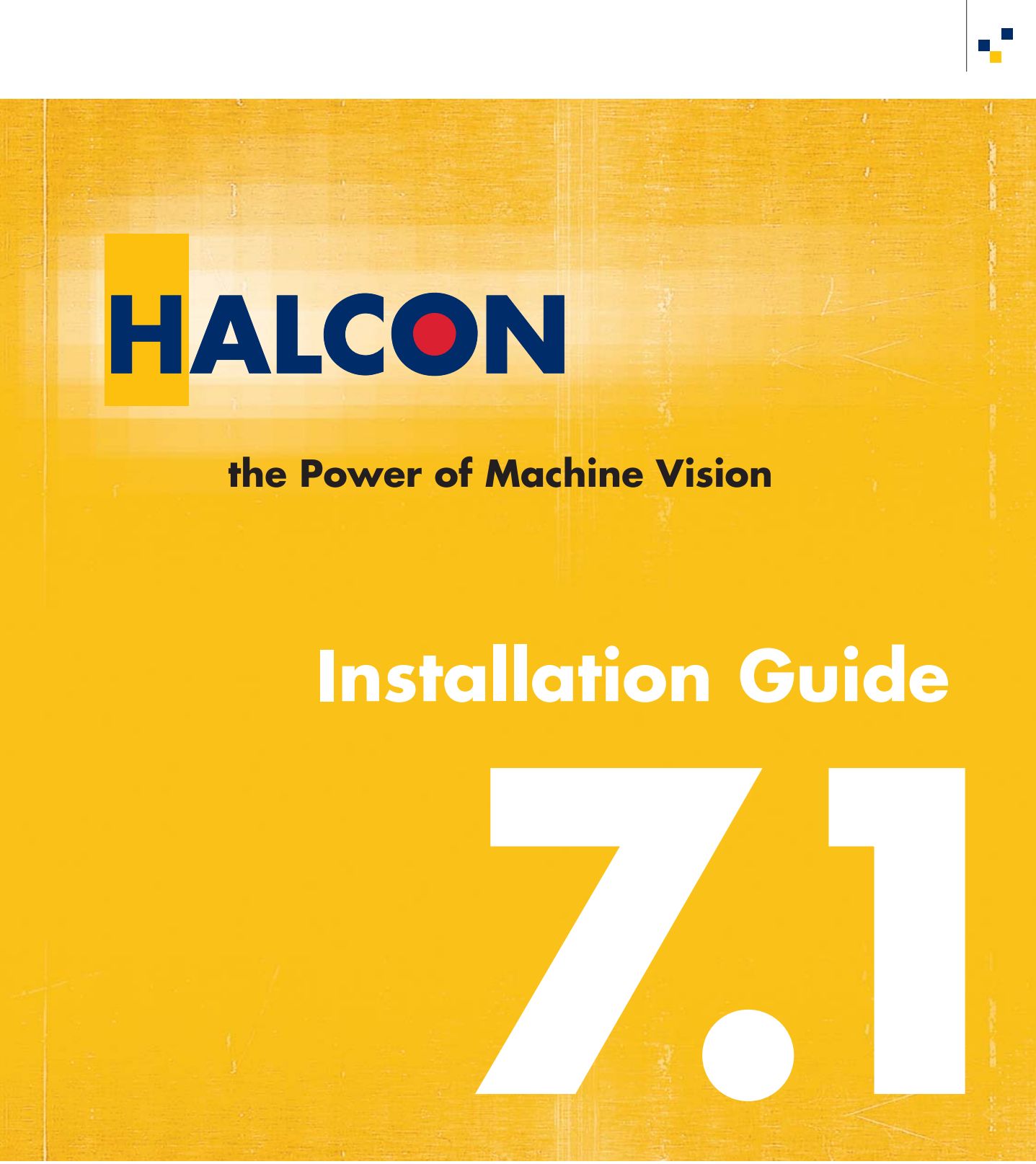


MVTec Software GmbH

Building Vision for Business

All about installing and licensing HALCON, Version 7.1.4

Edition 1	December 2003	(HALCON 7.0)
Edition 1a	July 2004	(HALCON 7.0.1)
Edition 1b	April 2005	(HALCON 7.0.2)
Edition 2	July 2005	(HALCON 7.1)
Edition 2a	April 2006	(HALCON 7.1.1)
Edition 2b	December 2006	(HALCON 7.1.2)
Edition 2c	August 2007	(HALCON 7.1.3)

More information about HALCON can be found at:

`http://www.halcon.com/`

About This Manual

The manual provides the necessary information to install HALCON and setup the licensing mechanism successfully. It is divided into the following chapters:

- **Introduction**
  A short overview of the different HALCON versions, available licensing schemes, and the system requirements.
- **Installing HALCON**
  How to install HALCON, either for the first time or in form of an update or upgrade.
- **All About HALCON Licenses**
  Detailed information about the different types of licenses and how to obtain and install them.
- **Troubleshooting**
  Possible problems and how to solve them.
- **Appendix**
  Details like the installed file structure, the relevant environment variables, and information for users of ActivVisionTools.

For **further information** about HALCON, please consult the Quick Guide, which gives an overview of the available documentation. ☜

Notation

Except for Linux/UNIX-specific sections, file paths and environment variables are printed in the Windows convention, e.g.,

```
%HALCONROOT%\examples\extension_package\halconuser
```

to denote the subdirectory `halconuser` containing an example package within the HALCON base directory referenced by the environment variable `HALCONROOT` (see section A.2 on page 52 for more information on environment variables). The same expression in Linux/UNIX convention would look like

```
$HALCONROOT/examples/extension_package/halconuser
```

Contents

Chapter 1

Introduction

To use HALCON on a computer, you must

1. install HALCON on this computer and
2. obtain a license (except for the demo version).

Before looking into the details of these two steps in chapter 2 on page 5 and chapter 3 on page 19, this chapter gives an overview of the different HALCON versions and licensing methods. Finally, it describes the system requirements for running HALCON.

1.1 HALCON Configurations

You can use HALCON in three configurations:

1. **Development version**
   The development version (sometimes also denoted as full version) includes the full spectrum of HALCON, i.e., language interfaces to C, C++, and COM, interfaces to about 50 image acquisition devices, the Extension Package Interface, which allows you to integrate your own HALCON operators, and, of course, the interactive development tools HDevelop and HMatchIt. You need this version whenever you want to develop applications based on HALCON.
2. **Runtime version**
   If you have finished developing an application based on HALCON, you only need a runtime version of HALCON for each computer where the application is to be run. Since the runtime version is not determined for developing applications it does not include the development tools HDevelop and HMatchIt. Furthermore, you can obtain runtime versions that include only parts of the functionality (so-called *modules*); please contact your local distributor for more information.
3. **Demo version**
   The demo version is basically a special version of HDevelop with the full image processing functionality but some limitations, e.g., without interfaces to image acquisition devices or programming languages. Using the demo version, you can test all HALCON operators within the HDevelop environment for an unlimited amount of time.

1.2 Releases and HALCON Versions

The term *version* has a second meaning: It denotes the major HALCON releases, e.g., HALCON 7.0 or HALCON 7.1, to differentiate them from so-called *maintenance releases* like HALCON 7.0.2. The main differences between these two types of releases are:

- **Functionality**
  A new HALCON *version* always represents a major step in the functionality. This means that it contains a significant number of new operators, but possibly also new auxiliary tools, be it in HDevelop or stand-alone tools like HMatchIt. Furthermore, the functionality of individual operators may be extended or operators have been sped up. Of course, all currently known bugs in the preceding release will have been fixed.

  In contrast, the main intention of a *maintenance release* is to fix all currently known bugs. Nevertheless, such a release typically also brings some speed-ups and minor functional extensions of existing operators.

- **Compatibility**
  A new HALCON *version* is not downward compatible, with the following implications: First, you must upgrade your HALCON license (see section 3.5 on page 32). Second, if you want to run applications created with an older release under the new version, you must regenerate the applications, as the new HALCON library is not binary compatible to the old one. The term 'applications' includes also frame grabber interfaces and extension packages you created yourself based on an older release. Note that a new version may also be source-code incompatible in some parts, e.g., the signature of an operator or a class method may have been changed. These changes are indicated in the release notes of the HALCON version. In such a case, you must adapt the source code of your application before regenerating it. Finally, an ActivVisionTools release based on an older HALCON release cannot be directly used with a new HALCON version. For some combinations of ActivVisionTools and HALCON releases this problem is solved during the HALCON installation; please refer to section A.3 on page 55 for more information.

  In contrast, a *maintenance release* is in most cases fully downward compatible to its corresponding version. This compatibility includes the license. Please note, however, that some maintenance releases may not be fully binary or source-code compatible because of technical reasons. In such cases, the release notes will contain corresponding warnings and describe how to proceed.

1.3 Licensing

To run HALCON on a computer, you need a license. The only exception to this rule is the HALCON demo version, i.e., the demo version of the development tool HDevelop, which can be run without a license. The license itself is stored in a file named `license.dat` and resides in the subdirectory `license` of the folder where you installed HALCON.

Licenses are always issued for a certain HALCON version (i.e., major release, see section 1.2), e.g., for HALCON 7.1. However, a license is not exclusively bound to this version: It is *upward compatible within the version number*, i.e., licenses for HALCON 7.1 are also valid for HALCON 7.1.1. Note that in contrast to previous versions, from HALCON 7.0 on, licenses are not downward compatible, i.e., **a license for HALCON 7.1 is not valid for HALCON 7.0**.

If you want to use different HALCON versions at the same time, from version 7.1 on the name of the license file is not restricted to "`license.dat`" anymore. Now, it has to begin with "license" and end with ".dat", but in between other information can be included. Thus, different licenses for different versions (e.g., `license71.dat` for version 7.1) can be stored in the same directory.

The three possible licensing types mainly correspond to the different HALCON versions described in section 1.1 on page 1. Detailed information about HALCON licenses can be found in chapter 3 on page 19.

- **Evaluation license**
  To evaluate the full power of HALCON, you can obtain an evaluation license from your local distributor free of charge. This type of license is not bound to any computer hardware, i.e., you can use HALCON on any computer you installed it on; however, it is only valid for a limited time, typically for a month. Note that you may not use this license to develop commercial applications.

- **Development license**
  To develop HALCON applications, whether in HDevelop or via a programming language, you need a development license. In contrast to the evaluation license, this license is permanent. Furthermore, this license is bound to a certain hardware component (network card or dongle, see section 3.1 on page 19).

  If you want to use HALCON on multiple computers simultaneously, you need a license for each of them. You can either obtain multiple *node-locked licenses*, or, if the computers are connected via a network, you can also use a *floating license*. The main point of using floating licenses is that you do not need to specify on which computers you want to run HALCON, but only on how many of them simultaneously. Floating licenses are described in detail in section 3.3.3 on page 26.

- **Runtime license**
  If you finished developing your application based on HALCON and now want to install and run it on a customer's computer, you only need a runtime license. Like development licenses, runtime licenses are permanent and bound to a certain hardware component (network card or dongle); note, however, that there are no floating runtime licenses.

  As already noted, you can obtain runtime licenses that cover only parts of the functionality (so-called *modules*. Please contact your local distributor for more information.

1.4 System Requirements

Table 1.1 shows the requirements for running HALCON on the currently supported operating systems. It should run on newer versions of an operating system; however, we cannot guarantee this.

Operating System	Processor	Compiler / Environment
Windows NT/2000/XP/2003/Vista	Intel Pentium or compatible	Microsoft Visual Studio* Microsoft Visual Studio .NET Borland Delphi
Windows XP/2003/Vista x64 Edition	Intel EM64T or AMD64	Microsoft Visual Studio 2005 Windows Platform SDK April 2005 or newer
Linux 2.2/2.4	Intel Pentium or compatible	`gcc 3.3`
Linux 2.4	Intel EM64T or AMD64	`gcc 3.3`
Solaris 7 or higher	SPARC	`CC`
* Make sure to install the latest service pack in order to avoid problems with Visual Studio 6.		

Table 1.1: Platforms supported by HALCON .

Note that under Linux `libc6` is required, which is available on most current Linux distributions like RedHat or SuSE. Please check your distribution's documentation.

Chapter 2

Installing HALCON

In this chapter, we show how to

- install HALCON for the first time (section 2.2),
- install additional parts (section 2.3 on page 10),
- update HALCON to a newer maintenance release (section 2.5 on page 12), and
- upgrade HALCON to a newer version (section 2.6 on page 12).

Furthermore, this chapter explains how to

- uninstall HALCON (section 2.7 on page 12),
- manage multiple versions in parallel (section 2.8 on page 15),
- switch between HALCON for 32 bit and 64 bit Windows or vice versa (section 2.9 on page 16),
- install updates of frame grabber interfaces (section 2.10 on page 16), and
- install extension packages (section 2.11 on page 17).

2.1 How to Obtain HALCON

You can obtain HALCON in form of a CD from your local distributor, or by downloading it from `http://www.halcon.com/download`. The CD includes all HALCON configurations (see section 1.1) while the download provides separate files for the different configurations. Note that maintenance releases are typically not available on CD.

2.2 Installing HALCON for the First Time

In the following sections, we explain how to install HALCON for the first time

- from CD on Windows systems: section 2.2.1
- from CD on Linux/UNIX systems: section 2.2.2 on page 8
- via WWW: section 2.2.3 on page 10

Please note, that **you need administrator privileges** to install HALCON under Windows.

2.2.1 Installing HALCON from CD under Windows

To install HALCON on Windows systems, simply insert the CD. This should automatically start the setup program. If the **setup program doesn't start automatically**, execute the program `Setup.exe` located in the directory `install-windows` of the CD.

Step 1: Internal checks, license agreement

First, the setup program checks whether your system meets the requirements for running HALCON (see section 1.4 on page 4). Besides, it checks whether you already installed HALCON on this computer. If not, a license agreement is displayed; its text is stored in the file `eula.txt`, which will be installed in the folder you select for the installation.

If you are using ActivVisionTools, the setup program checks whether the installed version is compatible to the current HALCON version. Please refer to section A.3 on page 55 for more information.

Step 2: Select installation destination

After these checks you can choose a folder where HALCON is to be installed, e.g., `C:\Program Files\MVTec\HALCON`.

Step 3: Select installation type

Then, you are asked to select between the following installation types which correspond to the HALCON configurations described in section 1.1 on page 1. Note that you can install additional parts of HALCON at a later time by starting the setup program again and selecting the parts you need (see section 2.3 on page 10).

Full

This installs the complete development version of HALCON, i.e., the full set of libraries and executables including interfaces to image acquisition devices and programming languages. Furthermore, it installs the full documentation including the Quick Guide, the **Application Guide**, the Reference Manuals for the three programming language interfaces C, C++, and COM, and the full set of example programs (see section A.1 on page 50 for an overview), including all necessary images and image sequences.

Compact
This installs a minimal development version of HALCON, i.e., besides the full set of libraries and executables including interfaces to image acquisition devices and programming languages the installation encompasses only the User's Manuals and the Reference Manual in HDevelop syntax. Note that neither examples nor images are installed.

Custom
Like the `Full` and the `Compact` installation, this type installs the development version of HALCON. As its name suggests, it lets you select which parts of the documentation, examples, and images you want to be installed. Note that some HALCON experience is required to handle this type of installation.

Demo
This installs the demo version of HALCON, i.e., the demo version of HDevelop without interfaces to image acquisition devices or programming languages. The installed documentation encompasses the User's Manuals, the Quick Guide, and the Reference Manual in HDevelop syntax. Furthermore, the HDevelop example programs and the images and image sequences used by these examples are installed. Please note, however, that some of the large images sequences are not installed; this means that example programs based on such an image sequence cannot be run. You can install these sequences in a separate step as described in section 2.3 on page 10.

Runtime
This installs the runtime version of HALCON, i.e., only the set of libraries including interfaces to image acquisition devices and programming languages that are necessary to run a HALCON application. Naturally, this type of installation encompasses neither documentation, examples nor images.

Step 4: Selections concerning licensing

After this selection, the setup program asks whether to install the driver programs that are necessary if you want to use a dongle-bound license. Section 3.3.2 on page 25 provides detailed information about these dongle drivers, including how to install them manually if you do not let the setup program install them.

The next dialog asks whether the computer is to act as the so-called *floating license server*. In this case, the setup program installs the so-called *license manager daemon*, a system service that manages your floating licenses. Note that when using floating licenses, you need to install the license manager daemon only on one computer: the license server. Please refer to section 3.3.3 on page 26 for more information about floating licenses, e.g., how to install the license manager daemon manually.

Step 5: The actual installation

After some further questions the actual installation starts, which includes copying files from the CD to the destination folder (see section A.1 on page 50 for an overview of HALCON's fileset), entering information in the Windows registry, and setting environment variables (see also section A.2 on page 52). Depending on the installation type and content, it may be necessary to reboot the computer after the installation is finished.

Apart from that, no further action on your part is required. You can immediately use HALCON, e.g., experiment with the demo version of HDevelop if you have not obtained a license yet. A good starting

point is the Windows start menu, via which you can read the manuals or the release notes, or start HDevelop and HMatchIt. In case that you have already obtained a license from your local distributor, you can now proceed with the installation of the license file `license.dat` which has to be placed in the directory `%HALCONROOT%\license`.

Note that in order to use Parallel HALCON, you must initialize it once on each computer on which it is to be used. This is described in the Programmer's Guide, section 1.3.1 on page 4.

2.2.2 Installing HALCON from CD under Linux/UNIX

To install HALCON on Linux or UNIX systems, mount the CD, e.g., on the directory `/cdrom`. On some systems, you need `root` rights to do so. Note that on some systems, most notably Linux, the default mount entry, in `/etc/fstab`, does not allow users to execute programs on a CD. In such cases, you have to mount the CD explicitly with a command similar to the following (consult your operating system documentation for details):

```
mount -t iso9660 /dev/cdrom /cdrom
```

To start the installation, execute the shell script

```
install-unix
```

which is located in the top-level directory of the CD.

Step 1: Internal checks, license agreement

First, the setup program checks whether your system meets the requirements for running HALCON (see section 1.4 on page 4). Then, a license agreement is displayed; its text is stored in the file `eula.txt`, which will be installed in the directory you select for the installation.

Step 2: Select installation destination

The script will ask you in which directory you want to install HALCON; the environment variable `HALCONROOT` must be set to this directory later; see below. If the directory does not exist yet, the script offers to create it. On the other hand, if HALCON was already installed in the selected directory, the script asks whether to remove the old installation completely or replace existing files with the new ones.

Step 3: Select installation type

Then, you are asked to select between different installation types, which correspond to those described in section 2.2.1 on page 6. Note that you can install additional parts of HALCON at any time by mounting the CD again and copying the corresponding directories and files to the directory where you installed HALCON (see section 2.3 on page 10). You can also execute the shell script `install-unix` once again to install additional parts of HALCON.

Step 4: The actual installation

Now, the actual installation starts, i.e., the requested parts are copied from the CD to the destination directory.

```
#!/bin/sh
# Sample shell script for HALCON environment settings
# (sh syntax)

export ARCHITECTURE=i586-linux2.2
export HALCONROOT=/opt/halcon
export HALCONIMAGES=${HALCONROOT}/images
export PATH=${PATH}:${HALCONROOT}/bin/${ARCHITECTURE}:\
${HALCONROOT}/FLEXlm/${ARCHITECTURE}

if [ $LD_LIBRARY_PATH ] ; then
  export LD_LIBRARY_PATH=${LD_LIBRARY_PATH}:${HALCONROOT}/lib/${ARCHITECTURE}
else
  export LD_LIBRARY_PATH=${HALCONROOT}/lib/${ARCHITECTURE}
fi
```

Figure 2.1: Example for a shell script with environment variables in `sh` syntax, generated when installing HALCON into the directory `/opt/halcon` on a Linux system.

Step 5: Set environment variables

After the installation, the following environment variables must be set or modified in order for HALCON to work (see section A.2 on page 52 for more information about these and other environment variables):

- `HALCONROOT`: directory you installed HALCON in
- `HALCONIMAGES`: path(es) in which HALCON searches for images, usually `$HALCONROOT/images`
- `ARCHITECTURE`: select value corresponding to the used platform from table A.1 on page 53 (necessary for running of some of the example programs)
- `PATH`: this system variable should include `$HALCONROOT/bin/$ARCHITECTURE` and `$HALCONROOT/FLEXlm/$ARCHITECTURE`
- `LD_LIBRARY_PATH`: this system variable should include `$HALCONROOT/lib/$ARCHITECTURE`

We recommend to set the environment variables in a login script or a shell resource script, e.g., `.cshrc` or `.profile`. **The installation script automatically creates two example shell scripts `.cshrc_halcon` and `.profile_halcon` in `$HALCONROOT`** which contain the necessary settings in `csh` and `sh` syntax, see figure 2.1. The suitable shell script can be used to be included in your login script. Note that different shells offer different commands to set environment variables, e.g., `setenv <variable> <value>` or `export <variable>=<value>`. Please consult your shell's documentation for further information. If a value consists of multiple items, those items must be separated by *colons*.

Step 6: Further configuration

If you are using floating licenses, you must install and start the license manager daemon as described in section 4.3.3 on page 43.

If you want to use a dongle-bound license (Linux only), see section 4.3.2.3 on page 41 for information how to install the USB dongle driver.

In order to use Parallel HALCON, you must initialize it once on each computer it is to be used on. This is described in the Programmer's Guide, section 1.3.1 on page 4.

Apart from that, no further action on your part is required. You can immediately use HALCON, e.g., experiment with the demo version of HDevelop if you have not obtained a license yet. In case that you have already obtained a license from your local distributor, you can now proceed with the installation of the license file `license.dat` which has to be placed in the directory `$HALCONROOT/license`.

2.2.3 Installing HALCON via WWW

All HALCON releases can be downloaded from `http://www.halcon.com/download`. Note that you must first register yourself before downloading software. Note that the registration process differentiates between the demo and the full version. How to download and install HALCON via WWW is described in detail on the web pages themselves.

2.3 Installing Additional Parts of HALCON

Windows systems

On Windows systems, you can install additional parts of HALCON at any time by starting the setup program another time, e.g., by inserting the CD. The setup program then lists the already installed parts and lets you choose additional parts.

If you downloaded the full version of HALCON via WWW as described in section 2.2.3, you get a similar behavior by starting the downloaded executable again.

Linux/UNIX systems

On Linux/UNIX systems, you can install additional parts of HALCON at any time by mounting the CD again and copying the corresponding directories and files to the directory where you installed HALCON. To copy directories, open a shell, change into the root directory on the CD, and type

```
tar -cf - <directory_to_be_copied> | ( cd $HALCONROOT; tar -xf - )
```

2.4 Manually Installing a Runtime Version of HALCON on Windows

Usually, when a machine vision application is finished it has to be set up at a production site. This involves installing HALCON runtime versions on a number of computers. Depending on that number, single installations from CD can become a nuisance. Quite often, a software distribution tool or script-based solution is used to install required programs on the client computers. This section shows the relevant steps of installing a HALCON runtime version manually. With this knowledge, the task of software distribution can be automated.

1. Set the environment variable `%HALCONROOT%`, e.g., to `C:\HALCON`. See also section A.2 on page 52.

2. Copy the required runtime DLLs to, e.g., `C:\HALCON\bin\i586-nt4`. The following DLLs are required: `halcon.dll`, the relevant HALCON language interface used by the application, e.g., `halconcpp.dll`, and, if used, the appropriate image acquisition device interface, e.g., `HFG1394IIDC.dll`. If the application uses Parallel HALCON, the relevant DLLs with the prefix `par` must be copied instead.

   The HALCON DLLs must never be found in the `%PATH%` twice or even multiple times. Additionally, it is highly recommended not to copy the HALCON DLLs into the Windows system directories (`C:\%WINDIR%`, `C:\%WINDIR%\system`, and `C:\%WINDIR%\system32`).

3. Add the directory with the HALCON DLLs to the `%PATH%` environment variable, e.g., `C:\HALCON\bin\i586-nt4`. This step is not required if the application resides in the same directory as the DLLs.

4. Register `halconx.dll` (or `parhalconx.dll` if the application uses the HALCON/COM interface. To do this, execute `regsvr32 halconx.dll` in the directory where the file resides.

5. Register `hdevenginex.dll` (or `parhdevenginex.dll`) if the application uses HDevEngine. To do this, execute `regsvr32 hdevenginex.dll` in the directory where the file resides.

6. Copy the HALCON help files to `%HALCONROOT%\help`.

7. Copy the license file `license.dat` (or similar, see section 1.3 on page 2) to `%HALCONROOT%\license`.

8. If you are using dongle-based licensing, the corresponding dongle driver needs to be installed as well.

9. Depending on the application, one or more of the following directories need to be copied to `%HALCONROOT%` as well: `calib`, `filter`, `lut`, `ocr`.

2.5 Updating HALCON

With HALCON, the term “update” means to install a newer maintenance release over a release based on the same HALCON version, e.g., HALCON 7.1.2 over 7.1.1 or 7.1. As described in section 1.2 on page 2, you can update HALCON without needing a new license.

Typically, maintenance releases are not available as a CD, i.e., you must install them via WWW as described in section 2.2.3 on page 10. When updating an existing HALCON installation under Windows the setup program will ask you whether you want to replace the already installed components with the updated ones.

2.6 Upgrading HALCON

With HALCON, the term “upgrade” means to install a newer version over an older one, e.g., HALCON 7.1 over 7.0 or 7.0.2. As described in section 1.2 on page 2, new versions are not compatible to older ones. Therefore, we recommend to **uninstall the older HALCON release before installing the new one**. On Windows systems, this is especially important in order to clean up the registry.

The easiest way to uninstall the older version on Windows is to start the installation of the new version, because the setup program offers to perform the uninstallation for you if it detects an older version. More information regarding uninstalling HALCON can be found in section 2.7. If you want to keep the older version, please refer to section 2.8 on page 15.

The installation process itself is the same as the first-time installation described in section 2.2 on page 6. Please note that after installing the new version you must upgrade the license as described in section 3.5 on page 32.

2.7 Uninstalling HALCON

2.7.1 Uninstalling HALCON under Windows

The preferred method to uninstall HALCON is to use the automatic uninstallation program as described in the following section. In case you want to keep track of what is happening to your system, you may want to follow the instructions given in section 2.7.1.2.

2.7.1.1 Uninstalling Automatically

There are multiple ways to uninstall HALCON; please note that not all are available for older versions of HALCON:

1. Select `Start` ▷ `Programs` ▷ `MVTec HALCON` ▷ `Uninstall HALCON` in the Windows start menu.
2. Choose `Add/Remove Programs` in the system control panel.

3. When installing HALCON, the setup program checks whether there is an old version of HALCON and allows you to uninstall it. Note that during updating an existing HALCON installation under Windows the setup program will ask you whether you want to replace the already installed components with the updated ones.

Typically, this is all you have to do. If you encounter any problems, please refer to section 4.2 on page 34.

Note that **the uninstallation removes exactly those files that were installed**. This has two implications: If you added files after the installation manually, e.g., new frame grabber interfaces, extension packages, images, or manuals, these files and the corresponding directories will "survive" the uninstallation. On the other hand, if you only modified a file, e.g., an example, without changing its name the uninstallation will remove it nevertheless. Therefore you might want to copy such files to another directory before starting the uninstallation.

The uninstallation warns if it encounters DLLs or executables that might be or are actually used by another application. The warnings regarding `halconx.dll` and `HFGDirectShow.dll` can safely be ignored, i.e., the files can be removed. In contrast, warnings regarding `mvtecd.exe` and `lmgrd.exe` are serious; they indicate that the license manager daemon was installed manually but not uninstalled. In this case, we recommend to abort the uninstallation process, uninstall the license manager daemon manually as described in section 4.3.3 on page 43, and then restart the uninstallation of HALCON.

The uninstallation process will not remove any *user-specific settings*. This means that registry entries concerning, e.g., the layout of HDevelop or its file history, will be left in the category `HKEY_CURRENT_USER` ▷ `Software` ▷ `MVTec` ▷ `HALCON`. You may remove these entries manually without risk. Furthermore, it does not remove the dongle drivers as they might be needed by another application; section 3.3.2 on page 25 describes how to remove them manually.

2.7.1.2 Uninstalling Manually

The commands given in the following description should be entered in a Windows command prompt, which can be obtained by entering `cmd.exe` in the dialog `Start` ▷ `Run`. You need administrator privileges to perform the uninstallation.

1. Unregister the HALCON/COM interface and the COM version of HDevEngine. If you have been using Parallel HALCON, prefix the `.dll` files with `par` in the following commands (thus, `halconx.dll` becomes `parhalconx.dll`, for example).

   ```
   regsvr32 /u "%HALCONROOT%\bin\i586-nt4\halconx.dll"
   regsvr32 /u "%HALCONROOT%\bin\i586-nt4\hdevenginex.dll"
   ```

   If you are using Windows x64, the corresponding commands are slightly different:

64 bit version:

```
C:\WINDOWS\system32\regsvr32 /u "%HALCONROOT%\bin\x64-xp\halconx.dll"
C:\WINDOWS\system32\regsvr32 /u "%HALCONROOT%\bin\x64-xp\hdevenginex.dll"
```

32 bit version:

```
C:\WINDOWS\SysWOW64\system32\regsvr32 /u
  "%HALCONROOT%\bin\i586-nt4\halconx.dll"
C:\WINDOWS\SysWOW64\system32\regsvr32 /u
  "%HALCONROOT%\bin\i586-nt4\hdevenginex.dll"
```

2. For extensive cleaning of the Windows registry you can optionally run the program `misc\i586-nt4\clean_reg_halconx.exe` from the HALCON installation CD.

3. Delete the installation directory. You can also use Windows Explorer to do this. Please note that **the license file and any local additions to this directory will be lost**. A backup of these files is highly recommended.

```
rmdir /S "%HALCONROOT%"
```

4. Delete all HALCON registry keys. Replace `x.x` at the end of the following command with the version number you are uninstalling. Alternatively, start `regedit.exe` to use the Windows registry editor to delete the keys.

```
reg delete HKLM\SOFTWARE\MVTec\HALCON\x.x
```

You can query all installed versions of HALCON using this command:

```
reg query HKLM\SOFTWARE\MVTec\HALCON
```

5. Delete all environment variables set by HALCON. The indented lines must be appended to the preceding lines separated by a space character. See section A.2 on page 52 on how to edit environment variables using the Windows GUI. Please also use the GUI to manually remove the HALCON binary directory from the environment variable `PATH`.

```
reg delete "HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Environment"
           /V HALCONROOT
reg delete "HKLM\SYSTEM\CurrentControlSet\Control\Session Manager\Environment"
           /V HALCONIMAGES
```

6. Delete the uninstall information created when HALCON was installed. Replace `<ID>` with the actual HALCON GUID, which depends on the installed version:
HALCON 6.1 → `BBEC9F40-4A36-11D6-A14C-00E0296C2846`
HALCON 7.0 → `47F424B4-1077-11D8-A0D3-00E01883F42C`
HALCON 7.1 → `0B2DE0B7-FD31-11D9-A19F-00E01883F42C`

```
rmdir /S "%ProgramFiles%\InstallShield Installation Information\{<ID>}"
reg delete HKLM\SOFTWARE\Microsoft\Windows\CurrentVersion\Uninstall\{<ID>}
```

2.7.2 Uninstalling HALCON under Linux/UNIX

HALCON provides no uninstallation script for Linux/UNIX systems, therefore you must perform the uninstallation manually. In case that you are using a floating license you have to uninstall the floating license daemon as well (see section 3.3.3 on page 26).

Please note: The following procedure will **delete your local additions to the HALCON base directory**. To check for any local additions and changes beforehand, mount the HALCON CD, e.g., on `/cdrom` and run

```
diff -q -r /cdrom $HALCONROOT | grep $HALCONROOT
```

The actual uninstallation consists of simply removing the content of the HALCON base directory `$HALCONROOT` and all its subdirectories, e.g., by executing

```
rm -rf $HALCONROOT
```

Furthermore, remove the subdirectory `.hdevelop` of the directory referenced by the environment variable `HOME` (see section A.2 on page 52); HDevelop creates this directory to save options, window positions, and the file history.

Finally, delete references to HALCON from the environment variables (see section 2.2.2 on page 8).

To remove the dongle driver, refer to section 4.3.2.3 on page 41.

2.8 Managing Multiple HALCON Versions

Linux/UNIX systems

On Linux/UNIX systems, you can switch between different HALCON versions by setting the environment variable `HALCONROOT` accordingly. Note that in order for this method to work, paths based on `HALCONROOT` in other environment variables like `PATH` and `LD_LIBRARY_PATH` must use the variable and not its content. See figure 2.1 on page 9 for an example.

Windows systems

Under Windows, you must adapt those environment variables that are set during the installation, i.e., `HALCONROOT`, `PATH`, and `HALCONIMAGES`, and those you set yourself (e.g., `HALCONEXTENSIONS`). Please refer to section A.2 on page 52 for more information about setting environment variables.

If you are using the HALCON/COM interface or HDevEngine, you must also re-register the corresponding DLLs `halconx.dll` or `hdevenginex.dll`, for example as follows: Open a Windows Command Prompt and change into the subdirectory `bin\i586-nt4` of the root directory of your "old" HALCON installation. Unregister `halconx.dll` or `hdevenginex.dll` by typing

```
regsvr32 /u halconx.dll
regsvr32 /u hdevenginex.dll
```

Then change into the corresponding subdirectory of your other HALCON installation and register its halconx.dll or hdevenginex.dll by typing

```
regsvr32 halconx.dll
regsvr32 hdevenginex.dll
```

With the same method, re-register hdevenginex.dll, i.e., the DLL of the COM version of HDevEngine.

If you are using Parallel HALCON/COM, you must re-register parhalconx.dll and parhdevenginex.dll instead.

As an alternative to the Command Prompt, you can unregister and register halconx.dll or hdevenginex.dll via the dialog Start ▷ Run together with the Windows Explorer: In the latter, "open" the directory bin\i586-nt4 of the root directory of your old HALCON installation. Now, type regsvr32 /u in the dialog Run and then drag and drop halconx.dll or hdevenginex.dll from the Explorer into the dialog, where it automatically appears with the full path. To execute the command, click OK. Then, open the directory bin\i586-nt4 of the root directory of the other HALCON installation in the Explorer, type regsvr32 in the dialog Run, drag and drop halconx.dll or hdevenginex.dll from the Explorer into the dialog, and again click OK.

Please note that if you are using ActivVisionTools, you may have to register another ActivVisionTools OCX (see section A.3 on page 55).

2.9 Switching between 32 and 64 bit HALCON on Windows

Starting with the release of HALCON 7.1, HALCON can be used on a Windows 32 bit or a Windows 64 bit platform. Note that only the first installation sets the environment variable PATH (see section A.2 on page 52). If you want to switch e.g., from Windows 32 bit to Windows 64 bit, you must install the additional HALCON x64 components and adapt PATH to include %HALCONROOT%\bin\x64-xp instead of %HALCONROOT%\bin\i586-nt4.

2.10 Installing HALCON Frame Grabber Interfaces

With every HALCON installation (except the demo version), you automatically obtain the latest release of the currently available frame grabber interfaces (see also section A.1 on page 50). In between HALCON releases, however, frame grabber interfaces might be updated by MVTec or a frame grabber manufacturer. Such updates are indicated on MVTec's WWW server, to which you can connect by selecting HDevelop's menu entry Help ▷ HALCON News (WWW). You can then download the interface together with its documentation and HDevelop example programs, and install it as described on the corresponding web pages.

2.11 Installing HALCON Extension Packages

The HALCON Extension Package Interface enables you to integrate newly developed image processing algorithms into HALCON in the form of so-called *extension packages*. The same mechanism is used by MVTec to extend the current HALCON release with additional functionality. Which extensions packages are currently available can be checked by selecting HDevelop's menu entry `Help` ▷ `HALCON News (WWW)`, which connects to MVTec's WWW server.

This section describes how to integrate a (downloaded) package named `newextpkg` in order to use it within your HALCON system.

First, move the package to the directory `%HALCONROOT%` and unpack it there. Then, add the *complete* path of the package, e.g.,

```
%HALCONROOT%\packages\newextpkg
```

to the environment variable `HALCONEXTENSIONS`. Note, that the delimiter between paths in an environment variable is a semicolon on Windows systems and a colon on Linux/UNIX systems.

Never change the name of an extension package or the corresponding names of the libraries or DLLs contained in it. These names are encoded *within* the libraries/DLLs. If you change the names this information will no longer match. Thus, the loader of the operating system will fail to open the dynamic libraries.

If the package contains images used, e.g., within example programs we recommend to include the (complete) path to the corresponding directory `images` within the package in the environment variable `HALCONIMAGES` (see section A.2 on page 52) to access those images without specifying a complete path.

2.11.1 Using an Extension Package Within HDevelop

In order to use a new package within HDevelop under Windows or Solaris, you just need to restart the program. HDevelop automatically integrates all extension packages specified in `HALCONEXTENSIONS`, i.e., the operators contained in a package can be accessed and used like any other HALCON operator.

Under Linux/UNIX, you must include the package library subdirectory (e.g., `lib/i586-linux2.2-gcc33`) in the environment variable `LD_LIBRARY_PATH` before starting HDevelop the first time.

2.11.2 Using an Extension Package in a Stand-Alone Application

If you want to generate a stand-alone application that uses an extension package, you have to link the package libraries (DLLs under Windows, shared libraries under Linux/UNIX) to the application code, in addition to the HALCON library.

2.11.2.1 Using an Extension Package Under Windows

In order to create new application programs (written in C or C++) you have to link `packagec.lib` or `packagecpp.lib` to your objects. Furthermore, you will need `halconc.lib` or `halconcpp.lib` (as for any HALCON application).

To be able to link the package DLL to your application program, the *complete* DLL file path of the new package, e.g.,

```
%HALCONROOT%\packages\newextpkg\bin\i586-nt4
```

must be added to the environment variable `PATH`.

Do not copy a package DLL into the Windows system directories, as it would be loaded twice in this case!

2.11.2.2 Using an Extension Package Under Linux/UNIX

In order to create new application programs (written in C or C++) you have to link `libnewextpkg.so` and `libnewextpkgc.so` or `libnewextpkgccpp.so` to your objects (besides `libhalcon.so` and `libhalconc.so` or `libhalconcpp.so` as for any HALCON application).

Furthermore, you have to add the path to the package library subdirectory `lib/$ARCHITECTURE` to the environment variable `LD_LIBRARY_PATH`, otherwise the loader will fail to access the libraries. Table A.1 on page 53 lists the content of `ARCHITECTURE` for the different operating systems.

Chapter 3

All About HALCON Licenses

Section 1.3 on page 2 already contained an overview of the possible licensing schemes. In this chapter, you will find detailed information about how to obtain and install

- evaluation licenses (section 3.2 on page 22),
- development licenses (section 3.3 on page 23), and
- runtime licenses (section 3.4 on page 30),

Finally, section 3.5 on page 32 shows how to upgrade a license.

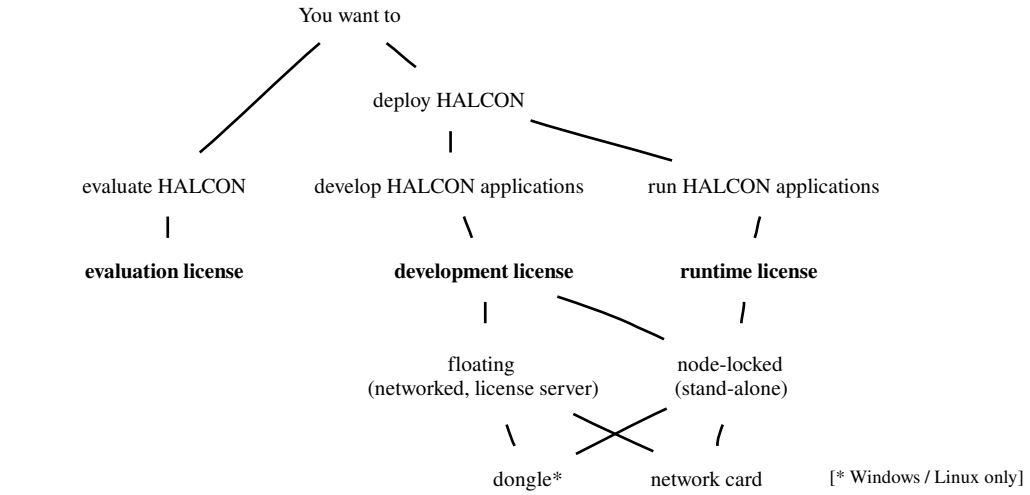
3.1 What is a License?

HALCON's licensing mechanisms are based on the license manager software *FLEXlm* from Macrovision. The licenses themselves are stored in so-called *license files*; example files are depicted in the following sections. The content of these files specifies

- what is licensed (e.g., HALCON 7.1 development version, runtime version, etc.)
- whether the license is temporary (evaluation license) or permanent
- the hardware to which the license is bound (see below)
- additional information for floating licenses.

License files are named `license.dat` (or `license71.dat` or similar, see section 1.3 on page 2) and reside in the subdirectory `license` of the folder where you installed HALCON. **Note that HALCON will not run if you modify the license keys within the license file manually!**

Available Licenses



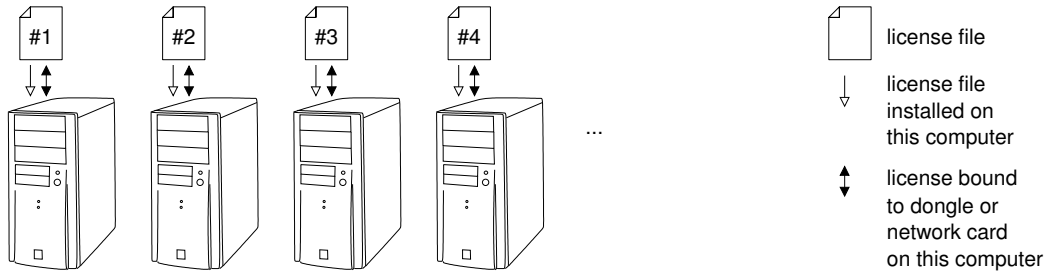


Figure 3.1: Individual node-locked licenses.

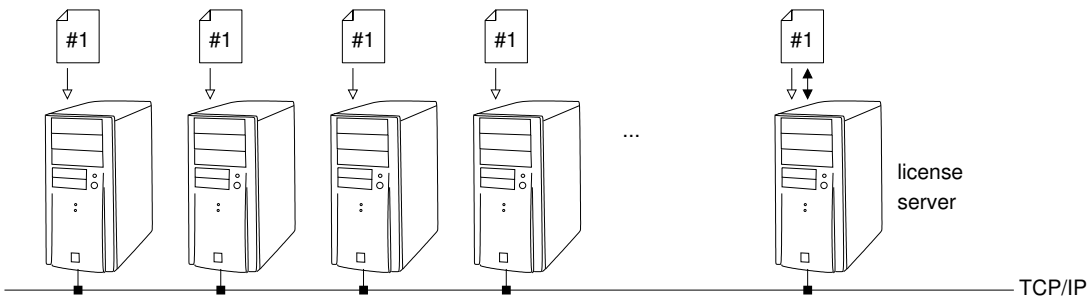


Figure 3.2: Floating license: License server is contacted to approve starting HALCON instances.

Node-locked versus floating development licenses

You can choose between two types of development licenses. They differ in the number of computers that can run HALCON applications simultaneously and in their method of license validation.

Firstly, there are *node-locked licenses*. Such a license allows to run exactly one installation of HALCON at a time. The license validation is done on the local computer. To have additional people use HALCON on different computers at the same time, additional node-locked licenses have to be purchased (see figure 3.1 on page 20). However, node-locked licenses can travel between computers by moving the hardware they are bound to (see below).

Then, there are *floating licenses* which require participating computers to be networked. When ordering a floating license, you have to specify the number of concurrently running HALCON instances (see page 26) and decide on a computer in your network to act as a designated *license server*. There is no need to specify the participating computers. When the ordered license file arrives it is copied to the license server and each HALCON installation. The license validation is performed on the license server, which monitors concurrently running instances of HALCON in the network (see figure 3.2 on page 20).

In contrast to development licenses, runtime licenses are always node-locked.

Network Card versus Dongle Binding

As noted in section 1.3 on page 2, development and runtime licenses are bound to a certain hardware component. This is either the *network card* (see section 3.3.1 on page 24) or, on Windows and Linux systems, a *dongle* (see section 3.3.2 on page 25).

Dongle-bound node-locked licenses allow to use HALCON on different computers by moving the dongle. Of course, network cards can also be switched between computers, but in practice they can be regarded as fixed. Thus, if you want to develop applications with HALCON on more than one stand-alone computer at different times, the easiest solution is to obtain a dongle-bound node-locked license on Windows and Linux systems.

If you are developing applications based on HALCON in a team on different computers in a network, you can use a floating license. This license is bound to the network card or dongle which is attached to the license server. The license server may be changed by moving the dongle and altering the server entry in the license file. Floating licenses also are an option if a single person wants to use HALCON on different computers within a network at different times. For more details about floating licenses see section 3.3.3 on page 26.

Identifying the Hardware

The license manager software FLEXlm identifies a network card by a so-called *host ID* and a dongle by a so-called dongle ID. A valid host ID is the unique, immutable, machine-readable identification of an actual piece of ethernet hardware as devised by the hardware vendor. You can execute the following commands from a Windows Command Prompt or a UNIX shell to get the host ID and the dongle ID, respectively. See section 4.3.1 on page 38 for a detailed description on solving problems extracting the host ID. The utility `lmhostid` is located in `$HALCONROOT/FLEXlm/$ARCHITECTURE`.

```
lmhostid -ether
lmhostid -flexid
```

HDevelop, both in the full and in the demo version, automatically checks whether any network cards or dongles are present and displays their IDs in the menu item `Help` ▷ `About`. For an example see figure 3.3, which was generated on a computer equipped with a network card and a dongle.

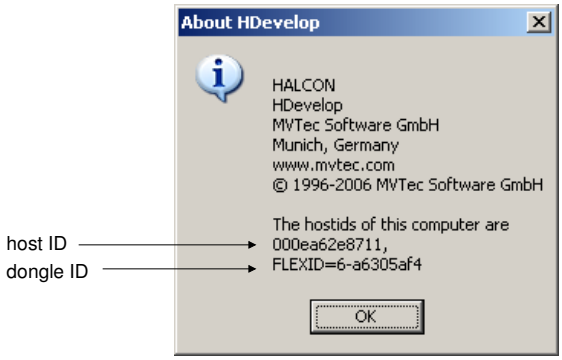


Figure 3.3: Identifying information in the HDevelop window `About`.

3.2 Evaluation Licenses

As already noted in section 1.3 on page 2, with an evaluation license you can evaluate the full functionality of HALCON free of charge on any computer. The only restrictions are that evaluation licenses are valid only for a limited time (typically a month), and no commercial applications may be developed.

Step 1: Obtain the license

You can obtain an evaluation license from your local distributor. The distributor will send you a *license file* that looks similar to the one depicted in figure 3.4: The lines starting with # are comments; the date 09/2005 indicates that the evaluation license is valid until the end of September 2005.

```
##############################################
# Evaluation License for 09/2005  (ID: DEMO) #
##############################################
FEATURE MVTec_HALCON mvtecd 7.1 01-oct-2005 uncounted VENDOR_STRING=511 \
        HOSTID=DEMO SIGN="133D C45D 66E3 BF26 3AFD 1860 FB2E 7C50 A0EE F2EE \
        A324 E9EF FF57 9DD0 4EA7 094A 1D3D 19C2 1678 F817 327E 1DC2 004C \
        8825 2D5E C7A8 A397 5F91 7A5E 98E2"
FEATURE MVTec_HDevelop mvtecd 7.1 01-oct-2005 uncounted VENDOR_STRING=511 \
        HOSTID=DEMO SIGN="0AF4 67D3 3674 9B07 9E53 1894 681E E3A0 5275 A60A \
        78B2 2304 A6AC BB4A 87C1 090F B47E 70D2 3231 C571 BA53 FB84 D9A0 \
        4AE6 3A7A 20C5 9F24 A737 8A3D A27C"
```

Figure 3.4: Example evaluation license for September 2005.

The lines starting with `FEATURE` contain the actual license data; they are called *license keys*. Evaluation licenses contain two license keys: `MVTec_HALCON` includes those HALCON parts that are necessary for running HALCON, while `MVTec_HDevelop` includes additional parts for developing, e.g., HDevelop.

As you can see, the license keys contain the licensed version number of HALCON (figure 3.4: `7.1`). As noted in section 1.3 on page 2, the license is upward compatible within the version number, i.e., licenses for HALCON 7.1 are also valid for all maintenance releases of HALCON 7.1, e.g., HALCON 7.1.1.

The entry following the HALCON version specifies when the evaluation license key expires (figure 3.4: `01-oct-2005`).

Step 2: Install the license

"Installing" the license simply means placing the license file into the subdirectory `license` of the folder where you installed HALCON. If necessary, rename the file to `license.dat` (or `license71.dat` or similar, see section 1.3 on page 2).

Note that you can evaluate HALCON on any computer where you installed HALCON just by copying the evaluation license file into the corresponding subdirectory `license`. You can also evaluate HALCON under different operating systems.

3.3 Development Licenses

Like the evaluation license, a development license allows you to use the full functionality of HALCON including the development tools like HDevelop (see also section 1.3 on page 2). But in contrast to the evaluation license, a development license is permanent, i.e., there is no temporal restriction. However, it must be bound to a certain hardware component (see also section 3.1 on page 19). The following sections describe how to proceed to obtain and install a

- node-locked license bound to a network card (section 3.3.1)
- node-locked license bound to a dongle (section 3.3.2 on page 25)
- floating license bound to a network card or dongle (section 3.3.3 on page 26)

3.3.1 Node-locked License Bound to a Network Card

Step 1: Extract the host ID

Start HDevelop (full or demo version) and select the menu item `Help` ▷ `About`. This dialog displays the host ID of the network card, e.g., the string `"000ea62e7fa4"` in figure 3.3 on page 22.

If HDevelop fails to detect a host ID although your computer does have a network card, please try to extract the host ID manually as described in section 4.3.1 on page 38. This section also describes what to do if IDs like `"ffffffff"` or `"0"`, or multiple IDs are displayed.

Step 2: Obtain the license

Send the host ID of the network card to your local distributor. The distributor then sends you a *license file* that looks similar to the one depicted in figure 3.5.

```
##########################################
# MVTec Software GmbH (ID:  00e02958e3b6) #
# Development License                    #
##########################################
FEATURE MVTec_HALCON mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
  HOSTID= 00e02958e3b6 TS_OK SIGN="1672 CF90 D9E1 BDCE 3B6F 1008 1062 \
  0FC1 0214 C5EB FG1B 9B3C 49C4 1CD3 DA0F 0F5D B870 36C4 D91A 2B21 \
  169F 26BC 5915 383E 71C7 153B 5440 5H4A 5458 5E1D"
FEATURE MVTec_HDevelop mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
  HOSTID= 00e02958e3b6 TS_OK SIGN="19C8 0F4A 8D52 4CF4 A0CB D4A9 D443 \
  8B22 4DC8 6734 3190 A4D9 047A 7261 B123 06A1 D0A2 3012 6D8F 9E49 \
  1438 ECD9 3AF8 9978 7924 4E92 4D94 C248 0262 3FA1"
```

Figure 3.5: Example node-locked development license, bound to network card.

Like the evaluation license depicted in figure 3.4 on page 22, it contains two *license keys* (lines starting with `FEATURE`), one for the runtime parts of HALCON (`MVTec_HALCON`) and one for the development parts (`MVTec_HDevelop`). The differences to the evaluation license show up as follows:

- The expiration date is set to `01-jan-0000`, which means that the license is permanent (alternatively, the entry may contain the string `permanent`).
- Both license keys are bound to the `HOSTID` you extracted in the first step (in the example: `00e02958e3b6`).

If the `FEATURE` line contains the additional keyword `TS_OK`, then this license allows also the checkout from a terminal server (Windows only).

Step 3: Install the license

Place the license file into the subdirectory `license` of the folder where you installed HALCON. If necessary, rename the file to `license.dat` (or `license71.dat` or similar, see section 1.3 on page 2).

3.3.2 Node-locked License Bound to a Dongle

Note that for Windows systems we assume that you let the setup program install the driver programs necessary for using dongles as described in section 2.2.1 on page 6. If you did not install the drivers, please refer to section 4.3.2 on page 40. On architectures based on x64, no dongles are available for native 64bit HALCON. However, see table 4.1 on page 43 for configurations that work on these architectures. On Linux systems, the dongle driver has to be installed manually, which is described in section 4.3.2.3 on page 41.

Step 1: Obtain dongle and license

Please note that **you cannot use any dongle but only those supplied by MVTec via your local distributor**. Currently, HALCON supports dongles connected to the parallel port and USB dongles.

The distributor will send you the dongle together with a corresponding *license file*, which looks similar to the one depicted in figure 3.6. The only difference to the network card license depicted in figure 3.5 on page 24 is that the entry `HOSTID` now contains the ID of the dongle (in the example: `FLEXID=6-a6305af4`). This ID is also printed on the back of the dongle. Dongles for the parallel port have IDs starting with `'FLEXID=6-'` or `'FLEXID=7-'`, while USB dongles have IDs starting with `'FLEXID=9-'`.

If the `FEATURE` line contains the additional keyword `TS_OK`, then this license allows also the checkout from a terminal server.

```
##############################################
# MVTec Software GmbH (ID: FLEXID=6-a6305af4) #
# Development License                         #
##############################################
FEATURE MVTec_HALCON mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
  HOSTID=FLEXID=6-a6305af4 TS_OK SIGN="016D 9000 4BE3 30D0 F631 13D5 \
  D694 ED77 D4D8 2A35 AA31 6672 1651 EC07 C392 031E 197A CF39 005A \
  4811 6DE3 3BA5 0549 CA11 FE97 68C3 15F9 62E4 DA06 3E96"
FEATURE MVTec_HDevelop mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
  HOSTID=FLEXID=6-a6305af4 TS_OK SIGN="07F0 5BED 3C77 2773 63B0 79B6 \
  B1B7 4D56 C16E 749E D959 37DB DD11 EBA9 906B 0C6E 0E99 C20E 91E7 \
  9037 A47A 37A8 B010 84BE D518 480B 5318 EE81 DCE4 5A6D"
```

Figure 3.6: Example development license, bound to dongle.

Step 2: Install the license

Place the license file into the subdirectory `license` of the folder where you installed HALCON. If necessary, rename the file to `license.dat` (or `license71.dat` or similar, see section 1.3 on page 2).

If you want to use HALCON on more than one computer by switching the dongle between them, repeat this step for every computer.

3.3.3 Floating License Bound to a Network Card or Dongle

Section 3.1 on page 19 already briefly described the basic concept of floating licenses; now, we take a closer look:

- With a floating license, you can use HALCON on multiple computers in a network without having to identify each of these computers.
- When ordering a floating license via your local distributor you have to specify *how many* HALCON instances are allowed to run simultaneously.

  Do determine this number, add the number of users per computer:
  - single user runs *many* HALCON applications on the *same* computer: 1 instance,
  - single user runs HALCON applications on two computers: 2 instances,
  - two users run HALCON applications on the *same* computer: 2 instances,
  - two users on computer A, three users on computer B: 5 instances, and so forth...
- Only one computer must be identified: the *license server*. On this computer, the *license manager daemon* is installed, a program that keeps track of the HALCON applications currently being run (see section 4.3.3 on page 43 for details).
  As already described for non-floating licenses, the computer which acts as the license server can be identified via network card or dongle.

- Note that **only development licenses are available as floating licenses**.

Floating licenses are well-suited especially in the following scenarios:

- A single person wants to develop HALCON applications on different computers within a network, and does not want to use a dongle-bound license.
- A group of persons wants to develop HALCON applications simultaneously in a computer network.

Step 1: Choose the computer acting as the license server

In principle, any computer can be chosen as the license server; it need not be a “server” in the sense that it must provide special functionality or have a special kind of operating system, e.g., Windows 2000 Server, installed. The only requirement is that the computer must be accessible whenever HALCON is to be used in the network.

You can even use different architectures for the license server and for the HALCON applications, respectively, e.g., a Linux workstation for the license server and Windows for developing HALCON applications. The license server can also be used for developing HALCON applications; but even if not, HALCON must be installed on it.

Step 2: Extract the host ID of the license server

Like all development licenses, floating licenses must be bound to a hardware component. Here, it is the computer acting as the license server that must be identified, be it via a network card or a dongle. Please refer to section 3.3.1 on page 24 (network card). If you choose a dongle-bound license, no further action is required as you get the dongle together with the license (see section 3.3.2 on page 25).

Step 3: Obtain the license

Send the desired number of licenses (i.e., the maximum number of HALCON applications that should run simultaneously per user on different computers), the hostname of the computer which acts as the license server, and – except in case of a dongle-bound license – the extracted host ID of the license server to your local distributor.

The distributor then sends you a license file, which looks similar to the one depicted in figure 3.7. If you requested a dongle-bound license, you will also receive the dongle.

Step 4: Adapt the license

In contrast to the license types described in the previous sections, you may need to adapt parts of the floating license file. Therefore, we take a closer look at the example floating license depicted in figure 3.7. It is bound to the same network card as the example node-locked license depicted in figure 3.5 on page 24.

```
################################################
# MVTec Software GmbH (ID: 00e02958e3b6)       #
# Development License                          #
################################################
SERVER myservername 00e02958e3b6 27000
DAEMON mvtecd C:\Progra~1\MVTec\HALCON\FLEXlm\i586-nt4\mvtecd
FEATURE MVTec_HALCON mvtecd 7.1 01-jan-0000 7 VENDOR_STRING=511 \
  DUP_GROUP=UH SIGN="1649 6254 749D 6F3A 986E 93F9 754F EAFE 0B78 \
  B20A 9319 AFEF A7FC 9CAC B75C 049D 2ED5 F54F 3778 A8E5 6C61 4F01 \
  9C2A 84AB 1B2D 4D36 66A1 215C 6935 64E9"
FEATURE MVTec_HDevelop mvtecd 7.1 01-jan-0000 7 VENDOR_STRING=511 \
  DUP_GROUP=UH SIGN="16BD B3AD B31A 7CB4 0195 73D9 0463 0416 43B9 \
  9E42 7CCC DB72 CEB9 A6B6 2283 0D24 0A80 97FC 3775 6022 008A 01CB \
  65F1 21C9 9698 7A8C 2277 7DD3 EEA4 9140"
```

Figure 3.7: Floating license with 7 licenses, bound to network card.

The license consists of the following parts:

- **Description of the license server**
  The line starting with `SERVER` describes the computer acting as the *license server* by stating its hostname (in the example: `myservername`), its host ID (`00e02958e3b6`), and the number of the TCP/IP port (27000), over which the HALCON applications connect to the license manager daemon running on the license server.

  Please note that the **hostname must be specified correctly.** The reason is that the HALCON applications need the name to connect to the license server (even if they are started on the license server itself).

  This means that if you did not send the name of the computer acting as the license server to your distributor when requesting the license, you must adapt this entry. The same holds if you decide to switch the dongle to another computer.

You may also need to adapt the port number, e.g., if the default port number 27000 is already used by another software in your computer network. Note, that on many systems all ports < 1024 are privileged and can only be used by privileged accounts!

- **Path to the license manager daemon**
  The line starting with `DAEMON` contains the path of the daemon `mvtecd` (see also section 4.3.3 on page 43). This program resides in the subdirectory `FLEXlm\%ARCHITECTURE%` of the folder where you installed HALCON on the license server (see section A.2 on page 52 for possible values of the environment variable `ARCHITECTURE`). In most cases, you must adapt this path. Unfortunately, you cannot use environment variables in the license file.

  Note that paths including blanks may not be handled properly under Windows: Thus, if you have installed HALCON to a directory like `C:\Program Files\MVTec\HALCON` you will have to use the short path `C:\Progra~1\MVTec\HALCON` instead. You can query short path names as follows: Open a Windows Command Prompt, change into the directory that contains the directory or file whose short name is searched for (here: `C:`), and then type

  ```
  dir /x
  ```

  Note that the daemon `mvtecd` opens a second port. By default, this port is selected by the operating system, and thus its number can change. Especially when using a firewall, you might need to specify the port number explicitly. For this, append the string `port=`*number* to the line starting with `DAEMON`, for example as follows:

  ```
  DAEMON mvtecd C:\Progra~1\MVTec\HALCON\FLEXlm\i586-nt4\mvtecd port=28000
  ```

- **The license keys**
  Like the node-locked network card license depicted in figure 3.5 on page 24, the floating license contains two *license keys* (lines starting with `FEATURE`), one for the runtime parts of HALCON (`MVTec_HALCON`) and one for the development parts (`MVTec_HDevelop`). In contrast to the node-locked version, the floating license keys do not contain the entry `HOSTID` , of course, because with a floating license HALCON applications can be started on any computer in the network. Instead, the keys specify how many applications can run simultaneously in the entry after the expiration date (in the example: `7`). **This part of the license file must not be modified**.

Step 5: Install the license

As in the previous sections, installing the license file means to rename the file to `license.dat`, if necessary, and then to place it into the subdirectory `license` of the folder where you installed HALCON. Unlike the possibility described in section 1.3 on page 2, where you can choose a similar name as well (e.g., `license71.dat`), for floating licenses only `license.dat` is valid (but you can apply changes manually via `installs.exe`, see section 4.3.3.1 on page 44). Note that you must place a copy of the license file on all computers you installed HALCON on, i.e., on the license server and on all those computers you want to use HALCON on.

Step 6: (Re-)start the license manager daemon

Finally, you must start the license manager daemon, or restart it if it is already running. Please refer to section 4.3.3 on page 43 for further information.

Note that whenever you get a new floating license you must copy it to all computers and then restart the license manager daemon. The same is true if you modify parts of the license file while the license manager daemon is running. If you use different HALCON versions at the same time, you have to start the different license manager daemons on different servers.

3.4 Runtime Licenses

In contrast to a development license, a runtime license only allows to run HALCON applications. Like a development license, a runtime license is permanent, but must be *node-locked* (see also section 3.1 on page 19).

Step 1: Extract the required modules

To extract the modules that are used by an application proceed as follows:

1. If the application is running in HDevelop, select the menu item `File` ▷ `Modules` which will open a dialog. Figure 3.8 shows the result for the HDevelop example program `examples\hdevelop\Applications\FA\ic.dev`, which uses color transformation, blob analysis, and morphology to extract ICs, resistors, and capacitors on a board. As you can see, you only need the module 'Foundation' to run this program.

   If you click `Save`, the required modules are saved in a file with the extension `_modules.txt` in the currently used directory.

2. If the application is written in a programming language (C, C++, COM), insert the operator `get_modules` (see the corresponding entry in the HALCON Reference Manuals for more information) at the end of the program. Note that **the operator `get_modules` will only return the correct modules if all HALCON operators used in the application are executed at least once**.

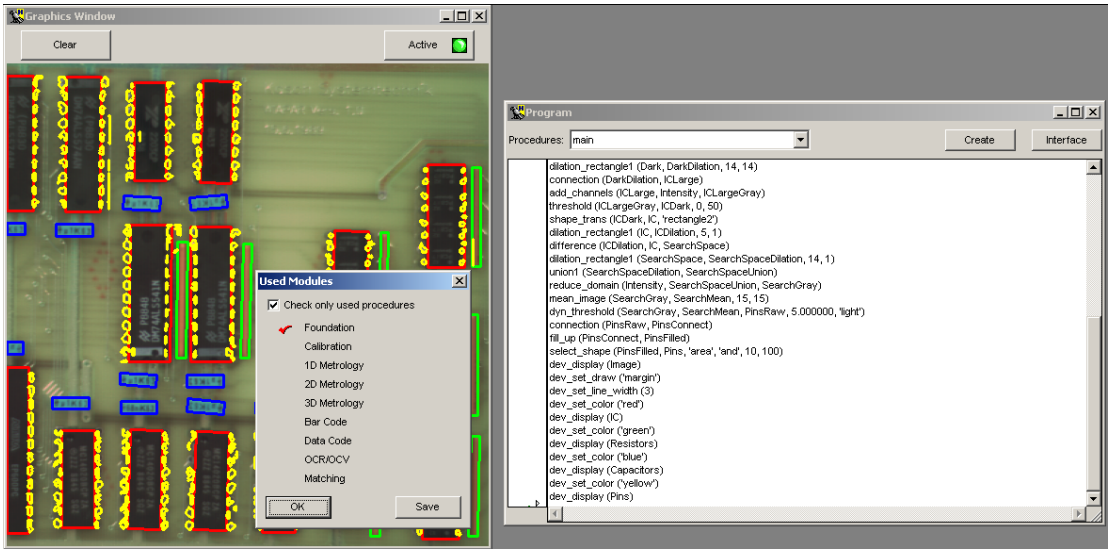


Figure 3.8: Used modules in the example program `examples\hdevelop\Applications\FA\ic.dev`.

Step 2: Extract the host ID

Please refer to section 3.3.1 on page 24 (network card) for information about how to extract the host ID. If you choose a dongle-bound license, no further action is required as you get the dongle together with the license (see section 3.3.2 on page 25).

Step 3: Obtain the license

Send the determined module names and – except in case of a dongle-bound license – the extracted host ID to your local distributor.

The distributor then sends you a license file, which looks similar to the one depicted in figure 3.9. If you requested a dongle-bound license, you will also receive the dongle.

```
##########################################
# MVTec Software GmbH (ID: 00e02958e3b6) #
# Runtime Module: Foundation             #
##########################################
FEATURE MVTec_HALCON mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=1 \
  HOSTID=00e02958e3b6 TS_OK SIGN="06B1 EEED EB14 D4A6 5557 C450 4217 \
  885A 6B02 AD22 6F1C 74DF C152 97E7 26A0 1F43 C4E2 BD29 FF44 7790 \
  2D5F 5AD1 B33C 3EF0 8DF5 DBCF 75CF D7AB 428F ACC5"
```

Figure 3.9: Runtime license for the module 'Foundation', bound to network card.

If you compare the depicted license with the corresponding development license in figure 3.5 on page 24, you will note two differences: First, the runtime license contains only one *license key* for the runtime parts of HALCON (`FEATURE MVTec_HALCON`). Secondly, the entry `VENDOR_STRING` contains a different number (`1` instead of `511`). In this entry the licensed modules are stored; in the example, only 'Foundation' is licensed.

Step 4: Install the license

Place the license file into the subdirectory `license` of the folder where you installed HALCON. If necessary, rename the file to `license.dat` (or `license71.dat` or similar, see section 1.3 on page 2). In case of a dongle-bound please make sure that the dongle driver is installed (see section 4.3.2 on page 40).

3.5 How to Upgrade a License

Node-locked Licenses

If you upgrade a HALCON node-locked license to a newer version, e.g., from HALCON 7.0.x to HALCON 7.1, your distributor provides you with a new license file which contains new license keys. This new license file should replace the old one in `%HALCONROOT%\license\license.dat` . Note that the comments at the beginning of the license file reflect the history of the license, see figure 3.10 for an example upgrade from HALCON 7.0 to HALCON 7.1.

```
#####################################################################
# MVTec Software GmbH                                               #
# License history:                                                  #
# 14-nov-2003: new license,  HALCON 7.0, ID: 00e02958e3b6      #
# 08-jul-2005: free upgrade, HALCON 7.1, ID: 00e02958e3b6      #
#####################################################################
FEATURE MVTec_HALCON mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
        HOSTID= 00e02958e3b6 SIGN="1649 6254 749D 6F3A 986E 93F9 754F EAFE 0B78 \
        B20A 9319 AFEF A7FC 9CAC B75C 049D 2ED5 F54F 3778 A8E5 6C61 4F01 \
        9C2A 84AB 1B2D 4D36 66A1 215C 6935 64E9"
FEATURE MVTec_HDevelop mvtecd 7.1 01-jan-0000 uncounted VENDOR_STRING=511 \
        HOSTID= 00e02958e3b6 SIGN="16BD B3AD B31A 7CB4 0195 73D9 0463 0416 43B9 \
        9E42 7CCC DB72 CEB9 A6B6 2283 0D24 0A80 97FC 3775 6022 008A 01CB \
        65F1 21C9 9698 7A8C 2277 7DD3 EEA4 9140"
```

Figure 3.10: Upgrading a node-locked license from HALCON 7.0 to HALCON 7.1.

Floating Licenses

From HALCON 7.1 on no specific upgrade license for a floating license is available anymore. Previously, in case of upgrading a floating license your distributor provided you with a so-called *upgrade license file*, which contained upgrade license keys (lines start with `UPGRADE`). The contents of this file were appended to the end of the old license file. Now, if you want to use an older version of a floating license simultaneous to the new one, you have to start the corresponding license manager daemons on separate servers.

Chapter 4

Troubleshooting

This chapter offers help for problems encountered during installing or uninstalling HALCON on Windows systems (section 4.1 and section 4.2, respectively), with the licensing mechanism (section 4.3 on page 38), or when starting HDevelop or your own HALCON applications (section 4.4 on page 47). Section 4.5 on page 48 discusses miscellaneous problems.

4.1 Problems During Installation (Windows)

- **Installer aborts with error -6001**

  This error is caused by certain versions of the InstallShield-based installer. In many cases, a workaround is to rename the directory

  ```
  %ProgramFiles%\Common Files\InstallShield\Professional\Runtime\<Version>
  ```

  `<Version>` is typically `701`. If this does correct the problem, you can try to rename the entire directory `%ProgramFiles%\Common Files\InstallShield`, perform the installation, and rename the directory back to the original name. Other possible remedies can be found in the section "Professional 7.x and Later Users" at the following web address:

  ```
  http://support.installshield.com/kb/view.asp?articleid=Q111519
  ```

- **Registration of `halconx.dll` or `hdevenginex.dll` failed**

  On some systems you might get a warning message that the HALCON/COM interface library `halconx.dll` or `hdevenginex.dll` failed to self-register. A possible cause for this may be that the Microsoft library `atl.dll` was not registered properly. This library resides in the directory `%SystemRoot%\system32`, e.g., `C:\WINNT\system32`. To register the library, open a Windows Command Prompt, change into the directory `misc\i586-nt4` on the CD, and execute the supplied program `reg_halconx` twice as follows:

```
reg_halconx atl.dll
reg_halconx
```

The first call of `reg_halconx` registers `atl.dll`, the second one registers `halconx.dll`.

As an alternative to the Command Prompt, you can use the dialog `Start` ▷ `Run`; here, you can select the program via the button `Browse` or drag and drop `reg_halconx` from the Windows Explorer, followed by the library name if necessary. Note that by default the Windows Explorer does not show DLL files, unless you explicitly tell it to do so.

4.2 Problems During Uninstallation (Windows)

- **Patch for uninstalling HALCON 7.1.2**
  Unfortunately, the uninstallation of HALCON 7.1.2 under Windows contains a bug that prevents the uninstallation of all installed files: As soon as you try to start the actual uninstallation, the setup program will show the wrong version number "7.0.2" and exit without any further action.

  To enable the correct uninstallation of HALCON 7.1.2, please download the following zip file containing the three correct installer files:

  ```
  http://www.mvtec.com/download/release/zip/halcon-7.1.2-uninstall-patch.zip
  ```

  Unzip the file and replace the three erroneous files in the directory

  ```
  %ProgramFiles%\InstallShield Installation Information\
  {0B2DE0B7-FD31-11D9-A19F-00E01883F42C}
  ```

  with the new ones from the zip file.

  Note that all other versions of HALCON besides HALCON 7.1.2 are not affected. In particular, the bug will be fixed automatically as soon as you update from HALCON 7.1.2 to HALCON 7.1.3.

- **Unregistration of `halconx.dll`**
  If you had to register the HALCON/COM interface library `halconx.dll` manually as described in section 4.1 on page 33, you must unregister it manually before you can uninstall HALCON. To do so, insert a HALCON CD, then open a Windows Command Prompt, change into the directory `misc\i586-nt4` on the CD, and execute the supplied program `reg_halconx` as follows:

  ```
  reg_halconx /u
  ```

  As an alternative to the Command Prompt, open the dialog `Start` ▷ `Run`, select the program `reg_halconx` via the button `Browse`, append the option `/u`, and then click `OK`.

- **"Internal Error"**
  If the uninstall process terminates with a message like

  > **"Internal Error, unable to load or call external DLL. Please contact your distributor for more information."**

  the most likely reason is that a new HALCON version was installed over an existing one without completely removing the old files first.

  Other possible reasons might be that the whole HALCON directory was moved to another position on the hard disk, or the environment variable `HALCONROOT` was changed manually. You have to follow the following steps to recover from the error:

  1. Check whether the environment variable `HALCONROOT` matches the location of your HALCON installation. You can check this via the system control panel `System` (look for `Environment`) or in a Windows Command Prompt via `echo %HALCONROOT%`. If the variable contains nothing or the files are in some other location, you have to set `HALCONROOT` manually via the `System` control panel.

  2. Check whether the following files / directories are present:

     - In the directory `%HALCONROOT%\FLEXlm\i586-nt4`: `HalconUninst.dll`
       Note that by default the Windows Explorer does not show DLL files, unless you explicitly tell it to do so.
       `HalconUninst.dll` is a HALCON specific DLL for the uninstallation process. If this file has been removed, you can get a copy of the file from the directory `FLEXlmi586-nt4` on the HALCON CD.

     - **Only for HALCON 7.1**
       In the directory `C:\Program Files\InstallShield Installation Information`: the directory `{0B2DE0B7-FD31-11D9-A19F-00E01883F42C}` with a set of files. This directory has been created during the installation. If it has been removed, an automatic uninstallation is not possible.

     - **Only for HALCON 7.0**
       In the directory `C:\Program Files\InstallShield Installation Information`: the directory `{47F424B4-1077-11D8-A0D3-00E01883F42C}` with a set of files. This directory has been created during the installation. If it has been removed, an automatic uninstallation is not possible.

     - **Only for HALCON 6.1**
       In the directory `C:\Program Files\InstallShield Installation Information`: the directory `{BBEC9F40-4A36-11D6-A14C-00E0296C2846}` with a set of files. This directory has been created during the installation. If it has been removed, an automatic uninstallation is not possible.

     - **Only for HALCON releases $<$ 6.1**
       In your `%HALCONROOT%` directory: `Uninst.isu`
       This file has been created during the installation. If it has been removed, an automatic uninstallation is not possible.

3. Check whether the registry entry for the uninstaller is set properly: Start `regedit.exe` in a Windows Command Prompt or in the dialog `Start ▷ Run`.

   - **Only for HALCON 7.1**
     Go to

     ```
     HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
       CurrentVersion -> Uninstall ->
      {0B2DE0B7-FD31-11D9-A19F-00E01883F42C}
     ```

     There, you should find a key named `UninstallString`. The value of this string should be something like this:

     ```
     RunDll32 C:\PROGRA~1\COMMON~1\INSTAL~1\engine\6\INTEL3~1\Ctor.dll,
     LaunchSetup "C:\Program Files\InstallShield Installation
     Information\{0B2DE0B7-FD31-11D9-A19F-00E01883F42C}\
     setup.exe" -l0x9 UninstallHALCON
     ```

   - **Only for HALCON 7.0**
     Go to

     ```
     HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
       CurrentVersion -> Uninstall ->
       {47F424B4-1077-11D8-A0D3-00E01883F42C}
     ```

     There, you should find a key named `UninstallString`. The value of this string should be something like this:

     ```
     RunDll32 C:\PROGRA~1\COMMON~1\INSTAL~1\engine\6\INTEL3~1\Ctor.dll,
     LaunchSetup "C:\Program Files\InstallShield Installation
     Information\{47F424B4-1077-11D8-A0D3-00E01883F42C}\
     setup.exe" -l0x9 UninstallHALCON
     ```

   - **Only for HALCON 6.1**
     Go to

     ```
     HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
       CurrentVersion -> Uninstall ->
       {BBEC9F40-4A36-11D6-A14C-00E0296C2846}
     ```

     There, you should find a key named `UninstallString`. The value of this string should be something like this:

     ```
     RunDll32 C:\PROGRA~1\COMMON~1\INSTAL~1\engine\6\INTEL3~1\Ctor.dll,
     LaunchSetup "C:\Program Files\InstallShield Installation
     Information\{BBEC9F40-4A36-11D6-A14C-00E0296C2846}\
     setup.exe" -l0x9 UninstallHALCON
     ```

- **Only for HALCON releases < 6.1**
  Go to

  ```
  HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
    CurrentVersion -> Uninstall -> HALCON <Version-Number>
  ```

  with `<Version-Number>` being the version number of the HALCON version that you want to uninstall. There, you should find a key named `UninstallString`. The value of this string should be something like this (the option `-c...` is only included if you have chosen an installation with floating licenses):

  ```
  C:\WINNT\IsUninst.exe
  -f"C:\Program Files\MVTec\HALCON\Uninst.isu"
  -c"C:\Program Files\MVTec\HALCON\FLEXlm\i586-nt4\
  HalconUninst.dll"
  ```

  Make sure that the path `C:\Program Files\MVTec\HALCON` (or equivalent) in the above example points to the folder where you installed HALCON. Note that **file names that contain blanks must be quoted** as in the above example. If you encounter unquoted path names containing blanks, please insert the quotation marks yourself.

4. Close the registry editor and try to run the uninstaller again.

- **Uninstallation failed**
  If the automatic uninstallation fails for another reason, proceed as follows:
  - For floating licenses only: Uninstall the license manager daemon as described in section 4.3.3.1 on page 44.
  - Start `regedit` and delete the key

    ```
    HKEY_LOCAL_MACHINE -> SOFTWARE -> MVTec -> HALCON -> x.x
    ```

  - **Only for HALCON 7.1**
    Also delete the key

    ```
    HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
      CurrentVersion -> Uninstall ->
     {0B2DE0B7-FD31-11D9-A19F-00E01883F42C}
    ```

  - **Only for HALCON 7.0**
    Also delete the key

    ```
    HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
      CurrentVersion -> Uninstall ->
      {47F424B4-1077-11D8-A0D3-00E01883F42C}
    ```

- **Only for HALCON 6.1**
  Also delete the key

```
HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
  CurrentVersion -> Uninstall ->
  {BBEC9F40-4A36-11D6-A14C-00E0296C2846}
```

- **Only for HALCON releases $<$ 6.1**
  Also delete the key

```
HKEY_LOCAL_MACHINE -> SOFTWARE -> Microsoft -> Windows ->
  CurrentVersion -> Uninstall -> HALCON
```

- Using, e.g., the Windows Explorer, delete the directory

```
%ProfileRoot%\All Users\Start Menu\Programs\MVTec HALCON
```

  with `%ProfileRoot%` depending on the used Windows version: `C:\WINNT\Profiles` (Windows NT) or set to `C:\Documents and Settings` (other Windows versions).

- Delete the environment variables `HALCONROOT` and `HALCONIMAGES` in `Start` ▷ `Settings` ▷ `Control Panel` ▷ `System` (Windows Vista: ... ▷ `System` ▷ `Advanced System Settings`).

- Finally, delete the contents of the HALCON directory and all its subdirectories.

4.3 Problems Concerning Licenses

If you encounter problems with your HALCON license even though your license file exists and is located in the correct directory, a first step is always to check if the information identifying your network card or dongle matches the entries in the license file (see the corresponding sections in chapter 3 on page 19). If the two do not match, please send the new identifying information to your distributor. See section 4.3.1 if you encounter problems with extracting the identifying information.

Section 4.3.2 on page 40 contains information all around dongle drivers, e.g., how to check whether they are installed correctly.

If you have problems with a floating license, the first step is to check whether the entries in the license file that can be customized contain the correct information, especially the port number for the license manager daemon (see section 3.3.3 on page 26). If the license file is correct, please refer to section 4.3.3 on page 43, which explains how to check whether the floating license manager daemon was installed successfully and how to install it manually.

The FLEXlm End User's Guide can be obtained from `http://www.macrovision.com`.

4.3.1 Extracting Host IDs

- **The dialog `Help` ▷ `About HDevelop` does not show any host IDs**
  If HDevelop fails to detect any host IDs although your computer does have a network board,

a Pentium III, or a dongle, please try to extract the host IDs manually using the program `lmhostid` shipped together with the license manager FLEXlm. Under Windows, open a Windows Command Prompt[1]. Under Linux/UNIX, open a shell, change into the directory `$HALCONROOT/FLEXlm` and then into the subdirectory corresponding to your operating system (e.g., `i586-linux2.2-gcc33` or `sparc-sun-solaris7`).

- To identify a computer by its **network card**, type `lmhostid -ether` (or just `lmhostid`). The output might look like this on a Windows system:

```
> lmhostid -ether
lmhostid - Copyright (C) 1989-2003 Macrovision Corporation
The FLEXlm host ID of this machine is "00e02958e36a"
```

  If `lmhostid` returns `"ffffffff"` or `"0"` please see below.

- To check the **dongle ID**, type `lmhostid -flexid`. The output now might look like this:

```
> lmhostid -flexid
lmhostid - Copyright (C) 1989-2003 Macrovision Corporation
The FLEXlm host ID of this machine is "FLEXID=6-a6305af4"
```

  The host ID must be identical to the one printed on the back of the dongle. If this is not the case, please see below.

- **`lmhostid -ether` returns `"ffffffff"` or `"0"`**

  If `lmhostid` returns `"ffffffff"` or `"0"`, this usually indicates that you do not have a network card. If you do have one, on Windows versions higher than Windows NT check whether the client for Microsoft networks is installed in the dialog `Start` ▷ `Settings` ▷ `Network Connections` ▷ `Local Area Connections` ▷ `Properties`. If the client for Microsoft networks does not appear in the list install it by clicking `Install` and then selecting it from the list of clients.

  On **Windows NT** systems check whether the NetBEUI and TCP/IP protocols are installed in the dialog `Start` ▷ `Settings` ▷ `Control Panel` ▷ `Network` ▷ `Protocol`. If the protocols do not appear in the dialog, please install these two protocols by adding them in the dialog.

  Then, call `lmhostid` again or open HDevelop's dialog `Help` ▷ `About` (see section 3.1 on page 19) to check whether a correct host ID is found now.

- **Multiple IDs for only one network card**

  On Windows 2000 and higher systems, sometimes more than one ID is returned even if there is only a single network card. In this case, use the ID that remains when both the NetBEUI and IPX/SPX protocols are disabled. Alternatively, use the ID that does not change when you reboot your computer.

- **Licensing via network card does not work when network is not connected**

  On Windows 2000 and higher systems, you must disable Media Sense (DHCP) when no network is connected to the network card. Usually, it is sufficient to disable the DHCP protocol in this case. Further details can be found under `http://support.microsoft.com/support/kb/articles/Q239/9/24.asp`.

[1] Do not start the program from the Windows Explorer. You *must* use a Command Prompt.

- `lmhostid -flexid` **does not return the dongle ID**

  If `lmhostid` does not return the ID that is printed on the back of the dongle, check whether the dongle driver is installed and configured correctly as described in section 4.3.2.

  If the driver is installed but `lmhostid` still does not return the correct ID, please check the corresponding port (parallel or USB) of your computer, before requesting a new dongle.

- `lmhostid -ether` **does not return all installed network card IDs under Linux**

  `lmhostid` returns only the ID of the network card that is configured as `eth0` on your Linux computer. To use another network card you must configure your computer that the desired network card is configured as `eth0`.

4.3.2 Dongle Drivers

4.3.2.1 Dongles for the Parallel Port (Windows only, except Windows x64 editions)

As described in section 2.2.1 on page 6, you can let HALCON install the driver programs necessary for using dongles. You can check the success of this installation in the following system dialog, which should contain an entry called `sentinel`.

- **Windows NT** : `Start` ▷ `Settings` ▷ `Control Panel` ▷ `Devices`.
- **Windows 2000 and higher**: `Start` ▷ `Programs` ▷ `Accessories` ▷ `System Tools` ▷ `System Information` ▷ `Software Environment`, then select `Drivers` (or `System Drivers`).

You can install, configure, and uninstall the dongle driver manually using an auxiliary program that is part of each HALCON installation. Open a Windows Command Prompt or the dialog `Start` ▷ `Run` and start the program

```
%HALCONROOT%\FLEXlm\i586-nt4\flexid6-7\SentinelProtectionInstaller-7.3.2.exe
```

and follow the instructions. Afterwards, reboot your computer. Then, the driver should appear in the dialog described above. **Please note that you need administrator privileges to install the driver!** If you try to install the driver without administrator privileges, the setup program might falsely state that the installation was successful.

You might need to configure the driver if your computer has more than one parallel port.

Note that the HALCON uninstallation process does not uninstall the dongle driver as it might also be used by another application. However, the uninstallation removes the auxiliary program. Therefore, if you want to uninstall the driver, do so before uninstalling HALCON; of course, the program can still be found on the HALCON CD in the directory `FLEXlm\i586-nt4\flexid6-7\win_nt`.

4.3.2.2 Dongles for the USB Port (Windows)

As described in section 2.2.1 on page 6, you can let HALCON install the driver programs necessary for using dongles. You can check the success of this installation in the system dialog given in section 4.3.2.1, which should contain two entries called `hardlock` and `haspnt`.

Depending on your operating system, you can install, configure, and uninstall the dongle drivers manually using an auxiliary program that is part of each HALCON installation. Open a Windows Command Prompt or the dialog `Start` ▷ `Run` and execute the program `%HALCONROOT%\FLEXlm\i586-nt4\flexid9\hinstall.exe` in one of the following ways:

```
hinstall                  opens a dialog explaining how to use hinstall
hinstall -info            shows the status of the drivers
hinstall -i               installs the drivers
hinstall -remove          removes the drivers
```

Please note that you need administrator privileges to install the drivers!

Note that the HALCON uninstallation process does not uninstall the driver as they might also be used by another application. However, the uninstallation removes the auxiliary program. Therefore, if you want to uninstall the drivers, do so before uninstalling HALCON; of course, the program can still be found on the HALCON CD in the directory `FLEXlm\i586-nt4\flexid9`.

4.3.2.3 Dongles for the USB Port (Linux)

The USB dongle daemon has been tested on the following Linux distributions: RedHat (8.x or 9.x) and SuSE (8.x or 9.x). Other distributions may work, but were not tested explicitly. The output of the following examples is specific to SuSE Linux.

On SuSE 9.0 systems, unplugging and reconnecting USB devices can cause the hotplug daemon to hang.

In order to install the USB dongle daemon on Linux, issue the following commands as `root`:

```
# cd $HALCONROOT/FLEXlm/$ARCHITECTURE/flexid9
# ./dinst bin
```

The installation script will install the dongle daemon and the corresponding start-up scripts.

```
---------------------------------------
Copy AKSUSB daemon to /usr/sbin ...
Copy AKSUSB daemon startup script to /etc/init.d
Setting up to autostart AKSUSB daemon
create symbolic link ‘S90aksusbd’ to ‘/etc/init.d/aksusbd’
Trying to start AKSUSB daemon ...
Starting AKSUSB daemon                                          done
Done
---------------------------------------
```

To test, if the dongle daemon is running, enter the following command as `root` (where `/etc/init.d` is to be replaced by the directory reported when installing the dongle daemon):

```
# /etc/init.d/aksusbd status
Checking for AKSUSB daemon: OK
```

If the **dongle daemon does not start up as expected**, make sure that the `usbfs` file system is set up correctly. Look for the following line in `/etc/fstab`:

```
usbfs                 /proc/bus/usb        usbfs      noauto                 0 0
```

This entry may be missing in recent Linux distributions (e.g., SuSE 10.1). As a workaround, add that line to `/etc/fstab` and issue the following command as `root`:

```
mount /proc/bus/usb
```

Afterwards, reinstall and test the dongle daemon as described above.

When the dongle daemon is running and the dongle is plugged into an USB port, it should be detected by the system automatically. To actually verify this, the output from the following command should contain a block similar to the one displayed below:

```
# cat /proc/bus/usb/devices
...
T:  Bus=01 Lev=01 Prnt=01 Port=01 Cnt=01 Dev#=  3 Spd=1.5 MxCh= 0
D:  Ver= 1.00 Cls=ff(vend.) Sub=00 Prot=00 MxPS= 8 #Cfgs=  1
P:  Vendor=0529 ProdID=0001 Rev= 1.00
S:  Manufacturer=AKS
S:  Product=HASP4 USB 1.31
C:* #Ifs= 1 Cfg#= 1 Atr=80 MxPwr= 54mA
I:  If#= 0 Alt= 0 #EPs= 0 Cls=ff(vend.) Sub=00 Prot=00 Driver=(none)
...
```

Look for lines containing the words `AKS` and `HASP4` in the output. In order for the above command to work, make sure your kernel is configured to support the USB device filesystem. This should be the default setting for the major distributions. If the option is not included in your kernel configuration, a custom kernel has to be compiled with the corresponding option set. See your operating system manual for information about compiling a new kernel. In a menu-based kernel configuration, the corresponding option appears similar as in the following example:

```
Support for USB
...
  --- Miscellaneous USB options
  ...
    [x]   Preliminary USB device filesystem
```

Alternatively, you can edit the file `.config` in the kernel source directory to contain the line

```
CONFIG_USB_DEVICEFS=y
```

To uninstall the dongle daemon, the start-up scripts and the daemon executable have to be removed (as `root`):

```
rm /usr/sbin/aksusbd
rm /etc/init.d/rc5.d/S90aksusbd
rm /etc/init.d/aksusbd
```

Again, the directory `/etc/init.d` depends on your Linux distribution. You can find the actual location of the start-up scripts with the command:

```
find /etc -name "aksusbd"
```

4.3.2.4 Dongles for the USB Port on x64 Systems

On x64-based systems, USB dongles can only be used in certain configurations. Consult table 4.1 to find out whether your configuration supports USB dongles.

Operating system	HALCON version	USB dongle?
Windows x32	i586-nt4	yes
Windows x64	i586-nt4	yes
Windows x64	x64-xp	no
Linux x32	i586-linux2.2-gcc33	yes
Linux x64	i586-linux2.2-gcc33	yes
Linux x64	x64-linux2.4-gcc33	no

Table 4.1: USB dongle support on x64 systems.

4.3.3 The License Manager Daemon

The license manager daemon (which is used in case of floating licenses) consists of two programs:

1. `lmgrd`: This is the main license manager daemon, which is provided by the licensing software FLEXlm. It handles the connections from the HALCON applications and passes them on to the second daemon.
2. `mvtecd`: This is the so-called *vendor daemon*, which is charged with keeping track of the HALCON applications currently being run.

The following sections explain how to install, (re-)start, and uninstall the license manager daemon on Windows (section 4.3.3.1) and Linux/UNIX (section 4.3.3.2 on page 46) platforms. Note that if you use different HALCON versions simultaneously you have to start the corresponding license manager daemons on separate servers.

4.3.3.1 Windows

How to Check Whether the License Manager Daemon is Running

To check whether the daemon was installed and started successfully, open the Windows dialog showing the state of the installed services:

- Windows NT: Open the dialog `Start` ▷ `Settings` ▷ `Control Panel` ▷ `Services`.
- Windows 2000 and Windows XP: Open the dialog `Start` ▷ `Settings` ▷ `Control Panel` ▷ `Administrative Tools` ▷ `Services`.

If the daemon was installed successfully by the setup program, the dialog contains the entry `HALCON Licenses`.

How to Install the License Manager Daemon

If you did not install the license manager daemon via the setup as described in section 2.2.1 on page 6, or if its installation failed, you can install it manually at a later time as described below. Note that **you need administrator privileges** for this procedure.

Open a Windows Command Prompt, change into the directory `%HALCONROOT%\FLEXlm\i586-nt4`, and type (*one* long command line):

```
installs -n "HALCON Licenses"
  -c "%HALCONROOT%\license\license.dat"
  -l "%HALCONROOT%\license\license.log"
  -e "%HALCONROOT%\FLEXlm\i586-nt4\lmgrd.exe"
```

The environment variable `HALCONROOT` points to the folder where you installed HALCON (see also section A.2 on page 52). The quotes are necessary to handle paths that contain blanks. As mentioned in section 3.3.3 on page 26, here you can change the name of the license file manually (replace `license.dat`, e.g., by `license71.dat` or similar).

To check whether the installation succeeded, (re-)open the Windows dialog showing the state of the installed services (see above), which now should contain the entry `HALCON Licenses` (or, to be more exact, an entry with the name you specified with the option `-n` or `FLEXlm license manager` if you leave out this option).

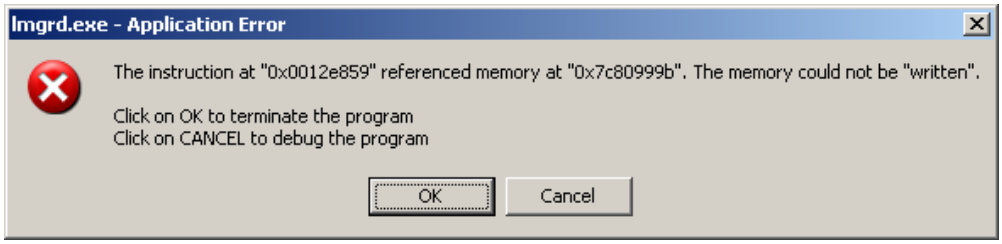
Note that if you installed the license manager daemon manually, you must also uninstall it manually before you uninstall HALCON. Otherwise it remains installed.

How to Start the License Manager Daemon

After the installation, the daemon is not started automatically. You can start it by rebooting the computer. If you have administrator privileges, you can start it directly in the dialog which shows the state of the installed services (see above) by selecting it and then clicking the start button or icon; if this fails, please check whether the entries in the license file are correct.

If the License Manager Daemon Fails to Start

Recent versions of the license manager daemon fail to start if no floating license is available. The following error dialog will be displayed while booting:



After login, the following message may be displayed in a notification window:

```
LMGRD encountered a problem and needed to close.
```

If you do have a floating license, make sure it is correctly installed on the license server as described in section 3.3.3 on page 26. Otherwise, it is recommended to uninstall the license manager daemon as described below.

How to Restart the License Manager Daemon

Whenever you replace a floating license or modify it you must *restart* the license manager daemon. Another reason for restarting the license manager daemon is when you update to a HALCON release that uses a newer version of the FLEXlm license manager software. One possible method is to reboot the computer acting as the license server. If you have administrator privileges, you can also restart the daemon manually: Open the dialog showing the state of the installed services (see above), select the entry `HALCON Licenses` and then stop and start it again.

How to Uninstall the License Manager Daemon

Please note that for the following procedure **you need administrator privileges**.

Before you can uninstall the license manager daemon, you must first stop it: Open the Windows dialog showing the state of the installed services (see above), select the entry `HALCON Licenses` and then click the stop button or icon. Note that under Windows 2000 and Windows XP an error message may appear, which can safely be ignored.

Now, open a Windows Command Prompt, change into the directory `%HALCONROOT%\FLEXlm\i586-nt4`, and type:

```
installs -r -n "HALCON Licenses"
```

To check whether the uninstallation succeeded, re-open the services dialog, which should not contain an entry `HALCON Licenses` anymore.

4.3.3.2 Linux/UNIX

How to Install the License Manager Daemon

On Linux/UNIX systems, the license manager daemons `lmgrd` and `mvtecd` are automatically "installed" in the subdirectory `FLEXlm/$ARCHITECTURE` of the directory you installed HALCON in (see table A.1 on page 53 for the possible values of `ARCHITECTURE`).

How to Start the License Manager Daemon

The license manager daemon `lmgrd` must be started from the appropriate startup file (called, e.g., `/etc/init.d/boot.local`, `/sbin/init.d/boot.local`, `/etc/rc.boot`, `/etc/rc.local`, or `/etc/localrc`, please consult your system's documentation). Add the following (long) line to this file, replacing the environment variables with their content (see section A.2 on page 52):

```
$HALCONROOT/FLEXlm/$ARCHITECTURE/lmgrd -c $HALCONROOT/license/license.dat
    > $HALCONROOT/license/license.log 2>&1 &
```

If you copied `lmgrd` to another location, you must of course adapt the path to it accordingly. Please note, that you **should not start `lmgrd` with root privileges**!

`lmgrd` automatically starts the vendor daemon `mvtecd`.

How to Restart the License Manager Daemon

Whenever you replace a floating license or modify it you must restart the license manager daemon. Another reason for restarting the license manager daemon is when you update to a HALCON release that uses a newer version of the FLEXlm license manager software.

One possible method is to reboot the computer acting as the license server. If you have administrator privileges, you can also restart the daemon manually by stopping the process `lmgrd` and then restarting it with the line used in the startup file (see above).

How to Uninstall the License Manager Daemon

To uninstall the license manager daemon you must remove the corresponding entry in the startup file (see above) and stop the currently running `lmgrd` and `mvtecd` processes. This can be achieved by rebooting the computer that acts as the license server or by use of the `kill` command (please see your system's documentation or ask your system administrator for advice).

4.4 Troubleshooting in HDevelop or HALCON Applications

This section explains some typical error messages when starting HDevelop or your own HALCON applications and their reasons.

- **Error using license file**

  This error message might have several reasons:

  - The file `%HALCONROOT%\license\license.dat` is missing and/or not readable.
  - Your license is not valid on this machine.
  - In case of floating licenses: There are too many applications using HALCON active, i.e., the maximum number of simultaneous HALCON applications (which is specified in the floating license) has been exceeded.

- **Lost connection to license server**

  Verify that the license server is running. You may also check whether your machine is properly connected with the server. For this you may need to contact your system administrator.

- **No license for this operator**

  The operator which you try to execute belongs to a HALCON module that is not licensed (see section 3.4 on page 30. Obtain a new license including this module.

- **hdevelop: Command not found** (Linux/UNIX)

  Check your system environment variable `PATH`. It must include the path `$HALCONROOT/bin/$ARCHITECTURE` (see table A.1 on page 53 for the values of `ARCHITECTURE`).

- **lib* : can't open file** (Linux/UNIX)

  Check the system variable `LD_LIBRARY_PATH` (see section A.2 on page 52).

- **No help files for package <package-name> in directory <directory>**

  Possible reasons for this error message are:

  - No files `%HALCONROOT%\help\*` (if the package name is "system") or no help files in one of the user packages.
  - If the package name is "system": Wrong `HALCONROOT`.
  - Check the file permissions. Probably HDevelop cannot access important files.

- **Help file for package <package-name> is corrupt**

  Possible reasons for this error message are:

  - If the package name is "system": Inconsistent version of `%HALCONROOT%\help\*` or wrong `HALCONROOT`.
  - If the package name is that of a user package: Inconsistent version of the help files of this package.

- **Can't open display** (Linux/UNIX)

  If you see an error message like this you may have a wrong system variable `DISPLAY` and/or your program is not allowed to open a window by the specified X-server.

4.5 Miscellaneous Problems

- **No refresh of window content on a Linux/UNIX system**

  On some Linux/UNIX systems the default behavior regarding occluded windows may be set in an inconvenient way for HALCON. The result is that if a window is temporarily occluded by another window, its content is not saved and restored anymore, i.e., windows remain "black" after uncovering. An example for this are all SuSE Linux distributions $\geq$ 7.0. The corresponding property is called "backing-store"; you can check the current setting of this property by typing (the following example corresponds to a SuSE 8.2 Linux system):

  ```
  xdpyinfo | grep backing-store
  ```

  which should result in the output like

  ```
  options:    backing-store YES, save-unders YES
  ```

  if the window content is saved and restored. You can change this behavior by modifying the file `Xservers` residing in the directory `/usr/lib/X11/xdm` (or `/opt/kde3/share/config/kdm` in case of newer Linux versions), see your system's documentation. Note, that you probably need root privileges to modify this file. Append the option `+bs` (i.e., "plus backing-store") to the line that starts the local X server:

  ```
  :0 local /usr/X11R6/bin/X :0 vt07 +bs
  ```

  Now, stop and start the X server again (by using the appropriate commands or by rebooting your computer); the command `xdpyinfo` now should yield the output shown above.

Appendix A

More on the Installation

This appendix contains information about

- the installed file structure (section A.1),
- the relevant environment variables (section A.2 on page 52), and
- special information for users of ActivVisionTools (section A.3 on page 55).

A.1 The Installed File Structure

Let's take a look at the installed file structure in the directory `%HALCONROOT%`. In the following, the most important directories and files are described briefly. Please note that, depending on your installation, not all directories may be present.

- `FLEXlm`**:** This directory contains programs used for licensing in subdirectories corresponding to the different platforms (see chapter 3 on page 19 and section 4.3.3 on page 43).
- `bin`**:** This directory contains HALCON programs, for example HDevelop (Windows: `hdevelop.exe`; Linux/UNIX: `hdevelop`), again in subdirectories corresponding to the different platforms. For Windows, this directory also contains the DLLs of the HALCON libraries and the DLLs for the supported frame grabber interfaces.
- `calib`**:** This directory contains description files for the calibration plates, which you can use to calibrate your camera.
- `doc\html`**:** Here, you find the HTML documentation of the HALCON frame grabber interfaces (subdirectory `manuals`), the HTML version of the reference manuals (subdirectory `reference`), and a set of tutorials (subdirectory `tutorials`).
- `doc\pdf`**:** Here, you find the PDF version of the user's manuals (subdirectory `manuals`), the **Application Guide** (subdirectory `application_guide`), and of the reference manuals (subdirectory `reference`).
- `examples`**:** The subdirectories of this directory contain example programs for the different parts of the HALCON system:
  - `application_guide`**:** Examples referenced in the **Application Guide**.
  - `c`**:** Examples for using HALCON within the programming language C (see also the Programmer's Guide, chapter 14 on page 107).
  - `c#`**:** Examples for using HALCON within the programming language C# (see also the Programmer's Guide, chapter 10 on page 83).
  - `cpp`**:** Examples for using HALCON within the programming language C++ (see also the Programmer's Guide, chapter 6 on page 57).
  - `cpp.net`**:** Examples for using HALCON within managed C++ (see also the Programmer's Guide, chapter 10 on page 83).
  - `delphi`**:** Examples for using HALCON within Borland Delphi.
  - `fg_integration`**:** Example programs for frame grabber interfaces (see also the Frame Grabber Integration Programmer's Manual).
  - `extension_package`**:** The example user package `halconuser` (see also the Extension Package Programmer's Manual).
  - `hdevelop`**:** Examples for using HALCON in HDevelop:
    - `Applications`**:** Examples that show how to realize machine vision applications.

  - ▷ `Classification ...XLD`: Examples for the HALCON operators, in subdirectories following the operator hierarchy as in the Reference Manuals or in HDevelop's menu `Operators`.
  - ▷ `Manuals\HDevelop`: Examples referenced in the HDevelop User's Manual.
- ▷ `hdevengine`: Examples for using HDevEngine.
- ▷ `mfc`: Examples for using HALCON together with MFC (see also the the sections in the Programmer's Guide mentioned above).
- ▷ `motif`: Examples for using HALCON together with Motif (see also the Programmer's Guide, chapter 6 on page 57).
- ▷ `qt`: Examples for using HALCON together with Qt (see also the Programmer's Guide, chapter 6 on page 57).
- ▷ `quick_guide`: Examples referenced in the Quick Guide.
- ▷ `vb`: Examples for using HALCON within Visual Basic, together with the example programs described in the Programmer's Guide, chapter 10 on page 83.
- ▷ `vb.net`: Examples for using HALCON within Visual Basic .NET (see also the Programmer's Guide, chapter 10 on page 83).

Please note that the examples should not be used directly for two reasons: First, on most platforms only the user who installed HALCON is allowed to save a (modified) example program. More importantly, on some operating systems not all users have the permission to create new files in the example subdirectories; this causes errors in example programs that contain operators that write data to files. To experiment with examples we therefore recommend to create a private copy in your own working directory.

- `filter`: This directory contains predefined filter masks.
- `help`: This directory contains information for the online help of HDevelop as well as the file `examples.xml` that contains the index data for the `Open example program...` dialog in HDevelop.
- `images`: This directory contains example images and, in subdirectories, image sequences. These images are used by the example programs described above.
- `include`: This directory contains the header files that are necessary to use HALCON within the programming languages C or C++.
- `lib`: This directory contains the HALCON libraries and under Linux/UNIX also the libraries for the supported frame grabber interfaces (Windows: file extension `.lib`; Linux/UNIX: file extension `.so`), again in subdirectories corresponding to the different platforms.
- `license`: The license file `license.dat` must be placed in this directory (see section 3.1 on page 19).
- `lut`: This directory contains predefined look-up tables.
- `ocr`: This directory contains pretrained fonts.

A.2 HALCON's Environment Variables

Most of the configuration necessary to work with HALCON amounts to setting environment variables, e.g., to tell HALCON the directories where to find images or extension packages etc. These environment variables are described below, after some information regarding the different platforms.

Setting Environment Variables Under Windows

The installation program `Setup.exe` automatically sets the necessary environment variables, e.g., `HALCONROOT`, `HALCONIMAGES`, and `PATH` (see below). To take a look at these settings, open the dialog `Start` ▷ `Settings` ▷ `Control Panel` ▷ System (Windows Vista: ... ▷ `System` ▷ `Advanced System Settings`) and select `Environment`. You can add or modify a variable by entering the name of a variable and the desired value. If a value consists of multiple items, e.g., the variable `PATH`, which may contain multiple directories, those items must be separated by *semicolons*. Please note that in order to modify variables set during the HALCON installation you need administrator privileges!

Setting Environment Variables Under Linux/UNIX

As described in section 2.2.2 on page 8, you must set the necessary environment variables in a login script or a shell resource script.

HALCON-Specific Environment Variables

- `HALCONROOT`
  This is the most important environment variable. It designates the directory where HALCON is installed. A typical path is, for example, `C:\Program Files\MVTec\HALCON` (Windows) or `/opt/halcon` (Linux/UNIX). Based on this variable, the system switches to subdirectories, which are important for running HALCON. Some of them are listed below; the HALCON file structure is described in section A.1 on page 50.
  - `%HALCONROOT%\help`
    The operator data base is located in this directory. It is accessible by all HALCON programs to obtain information about HALCON operators.
  - `%HALCONROOT%\doc\html\reference\hdevelop`
    HDevelop uses this directory for online help, which can be displayed by a suitable HTML browser.
  - `%HALCONROOT%\license`
    This directory contains the license file necessary for using HALCON (see chapter 3 on page 19).
  - `%HALCONROOT%\images`
    If the variable `HALCONIMAGES` (see below) is not set the system looks for image files in this directory.
- `HALCONIMAGES`
  The system uses this environment variable to search for image files specified by a relative path. As a rule it contains several directory names and possibly including the CD ROM drive, separated by semicolons (Windows) or colons (Linux/UNIX).

ARCHITECTURE	Operating System (Platform)	Compiler
i586-nt4	Windows NT/2000/XP/2003/Vista on Intel Pentium (or compatible)	Visual Studio or Visual Studio .NET
x64-xp	Windows XP/2003/Vista x64 Edition on Intel EM64T or AMD64	Visual Studio .NET
i586-linux2.2-gcc33	Linux 2.2/2.4 on Intel Pentium (or compatible)	gcc 3.3
x64-linux2.4-gcc33	Linux 2.4 on Intel EM64T or AMD64	gcc 3.3
sparc-sun-solaris7	Solaris 7 or higher on SPARC workstations	CC

Table A.1: Values of ARCHITECTURE for the currently supported platforms.

- ARCHITECTURE
  This variable designates the used platform by an abbreviation (e.g., i586-nt4 or i586-linux2.2-gcc33; its syntax is: *processor-hardware_vendor-operating_system*). ARCHITECTURE appears in several directory paths: Executable HALCON programs, e.g. hdevelop, and DLLs, e.g. halcon.dll (Windows only), reside in %HALCONROOT%\bin\%ARCHITECTURE% . On Windows systems, this path is therefore automatically included in the environment variable PATH; on a Linux/UNIX system, you must include it in your login script.

  The libraries that you need for linking programs, e.g., halcon.lib (Windows) or halcon.so (Linux/UNIX) reside in the directory %HALCONROOT%\lib\%ARCHITECTURE% .

  Table A.1 gives an overview of the currently supported platforms and the corresponding values of ARCHITECTURE.

- HALCONEXTENSIONS
  This is a list of directories in which user-defined extension operators (so-called extension packages) are kept. Each package consists of a number of operators linked into a shared library, plus the additional operator documentation in help files and HTML files. See section 2.11 on page 17 for information on how to install an extension package, and the Extension Package Programmer's Manual for details on creating your own extension packages.

- HALCONSPY
  If this environment variable is defined (regardless of the value) *before you start* a HALCON program, the HALCON debugging tool HALCON Spy is activated. This corresponds to call the HALCON operator set_spy with the parameters "mode","on" *within* a HALCON program. The main difference between the two modes for activating HALCON Spy is that by defining HALCONSPY it is possible to monitor an already linked HALCON program during runtime without modifications. For further information on how to use HALCON Spy and how to parameterize it via this environment variable please refer to the Programmer's Guide, section 2.1 on page 11.

General Environment Variables

- PATH
  Windows : During the installation, the directories %HALCONROOT%\bin\i586-nt4 and %HALCONROOT%\FLEXlm\i586-nt4 (for Windows x64: x64-xp instead of i586-nt4) are automatically added to the system variable PATH.

Linux/UNIX : If you want to start HDevelop from an arbitrary directory, you must include the HALCON program path `$HALCONROOT/bin/$ARCHITECTURE` in the system variable `PATH`.

- `LD_LIBRARY_PATH` (Linux/UNIX only)
  Please include the HALCON library path `$HALCONROOT/lib/$ARCHITECTURE` in the system variable `LD_LIBRARY_PATH`. This is necessary both for running HDevelop and for creating stand-alone applications.
- `DISPLAY` (Linux/UNIX only)
  The system uses this environment variable to open windows. It is used in the same way as for other X applications.
- `HOME` (Linux/UNIX only)
  This system variable points to your home directory.

A.3 Information for Users of ActivVisionTools

ActivVisionTools are based on HALCON, to be more exact on HALCON/COM. What makes matters more complicated is that the used HALCON functionality is not compiled into ActivVisionTools; instead, ActivVisionTools use HALCON in the same way as any other HALCON application, i.e., they expect HALCON to be installed (if not already installed, the ActivVisionTools setup installs it), locate the corresponding DLL `halconx.dll` via the registry and use it.

As only one instance of `halconx.dll` can be registered, this means that ActivVisionTools and HALCON applications use the same HALCON installation. This must be kept in mind when you want to use both HALCON and ActivVisionTools on the same computer. Of course, as long as you want to use the HALCON release that your ActivVisionTools release is based on, there is no problem. However, when you update or upgrade HALCON or ActivVisionTools, the issue of compatibility gets more complicated.

Therefore, the HALCON setup program checks whether there is an ActivVisionTools installation on the computer before installing HALCON on it and informs you about its compatibility. Some HALCON releases even offer to replace the ActivVisionTools OCX with a compatible one (see below).

Compatibility	AVT 1.0 - 1.3	AVT 2.0	AVT 2.1	AVT 2.2	AVT 3.0	AVT 3.1	AVT 3.1.1
HALCON 6.0	based on	×					
HALCON 6.0.1	×	based on					
HALCON 6.0.2	(×)	(×)					
HALCON 6.0.3	(×)	×*)					
HALCON 6.0.4	(×)	×*)					
HALCON 6.1		×*)	based on	(×)			
HALCON 6.1.1		×*)	×	based on			
HALCON 6.1.2		×*)	×	×			
HALCON 7.0				×*)			
HALCON 7.0.1				×*)	based on		
HALCON 7.0.2				×*)	×		
HALCON 7.1					×**)	based on	
HALCON 7.1.1					×**)	×	based on
HALCON 7.1.2					×**)	×	×
HALCON 7.1.3					×**)	×	×

(*) via replacement OCX

(**) contact your distributor for detailed information

Table A.2: Compatibility between the different HALCON and ActivVisionTools releases.

Table A.2 shows which ActivVisionTools releases are compatible to which HALCON releases. In prin-

ciple, the same rules as described in section 1.2 on page 2 for the HALCON releases themselves apply, with some differences:

- **Same HALCON version**
  If an ActivVisionTools release is based on a certain (maintenance release of a) HALCON version, it should also be compatible to all other maintenance releases based on the same HALCON version. For example, ActivVisionTools 2.1, which is based on HALCON 6.1, is compatible to HALCON 6.1.1 and 6.1.2.

  Sometimes, however, new HALCON maintenance releases are not fully downward compatible because of technical reasons. For example, HALCON 6.0.2 introduced a change that limited the compatibility of ActivVisionTools 1.0 - 2.0.

  To fix such incompatibilities, HALCON releases may provide a replacement OCX for some ActivVisionTools versions. For example, HALCON 6.0.3 and 6.0.4 provided a replacement OCX for ActivVisionTools 2.0. If the HALCON setup program detects such an ActivVisionTools version, it offers to replace the OCX automatically. Typically, you will choose this option. If not, you can replace it manually as described below.

- **Higher HALCON version**
  An ActivVisionTools release is by default not compatible to HALCON versions that are higher than its base. For example, ActivVisionTools 1.3, which is based on HALCON 6.0, is not compatible to HALCON 6.1.

  When you install such a higher HALCON version, the setup program warns that by continuing you will disable your ActivVisionTools installation. If you still want to use your ActivVisionTools installation, you must also keep your old HALCON installation and switch back to it as described in section 2.8 on page 15. Note that if you only want to evaluate the new HALCON version, you can minimize the switching effort by installing only the demo version: In this case there is no need to re-register the HALCON/COM interface library `halconx.dll`.

  Again, some HALCON releases provide a replacement OCX. For example, all HALCON 6.1.x releases provided a replacement OCX for ActivVisionTools 2.0, which was based on HALCON 6.0.1; HALCON 7.0 provides a replacement OCX for ActivVisionTools 2.2.

- **Lower HALCON version**
  An ActivVisionTools release is not compatible to HALCON versions that are lower than its base. For example, ActivVisionTools 2.1, which is based on HALCON 6.1, is not compatible to HALCON 6.0.x.

  When you install such a lower HALCON version, the setup program warns that by continuing you will disable your ActivVisionTools installation. If you still want to use your ActivVisionTools installation, you must also keep your its HALCON installation and switch back to it as described in section 2.8 on page 15.

How to Replace the ActivVisionTools OCX Manually

Open a Windows Command Prompt and change into the subdirectory `bin\i586-nt4` of the root directory of your ActivVisionTools installation. Unregister `ActivVTools.ocx` by typing

```
regsvr32 /u ActivVTools.ocx
```

Then delete the OCX (or rename it) and replace it by the new one, which can be found on the CD in the directory `misc\i586-nt4\avt22`, or in the ActivVisionTools download area (`http://www.activ-vision-tools.com/download`). Register the new OCX by typing

```
regsvr32 ActivVTools.ocx
```

As an alternative to the Command Prompt, you can unregister and register the OCX via the dialog `Start` ▷ `Run` together with the Windows Explorer: In the latter, "open" the directory `bin\i586-nt4` of the root directory of your ActivVisionTools installation. Now, type `regsvr32 /u` the dialog `Run` and then drag and drop `ActivVTools.ocx` from the Explorer into the dialog, where it automatically appears with the full path. To execute the command, click `OK`. Then, replace the OCX with the new open, type `regsvr32` in the dialog `Run`, drag and drop `ActivVTools.ocx` from the Explorer into the dialog, and again click `OK`.

If you decide to switch back to an older HALCON version as described in section 2.8 on page 15, you must also unregister the new OCX and register the old one; if you deleted it you can recover it from the corresponding directory on the ActivVisionTools CD.

Index