Adams 2023.1

Installation and Operations Guide

HEXAGON

Disclaimer

ADAM:V2023.1:Z:Z:Z:DC-OPS-PDF

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Preface

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About Hexagon

Overview

Hexagon is the leading global provider of virtual product development (VPD) tools, including simulation software and professional services. Hexagon helps companies make money, save time, and reduce costs associated with designing, testing, producing, and supporting manufactured products.

Hexagon works with thousands of companies worldwide, in hundreds of industries, to develop better products faster by using information technology, software, and services to enhance and automate the product design and manufacturing process. Simulating your product performance reduces development costs, time to market, and warranty costs.

About Virtual Product Development and Adams

You've heard it before: manufacturing companies today face intense global competition, demanding customers, fragmented markets, increasing product complexity, compressed product cycles, price and profit pressures, strict regulatory and liability environments, systems integration and supply chain issues, skyrocketing costs of testing and physical prototyping, and on and on…

What you don't often hear, though, is a strategy for enabling your company to improve your new product development process to meet these challenges.

Whether you are delivering airplanes, automobiles, ships, biomedical devices, golf clubs or children's toys to your customers, Hexagon goal is to help you improve your new product development process, allowing you to be significantly better at your concept development, design, testing, and production activities through the application of VPD.

VPD is an environment that uses an integrated combination of both simulation software technology and traditional techniques to design, test, manufacture, and support products. The result is that cost-effective designs that meet all performance, safety, durability, and reliability requirements can be brought to market in less time and for less cost.

Adams, as part of VPD, is focused on enhancing your ability to make better product development decisions, explore innovative design alternatives, and consistently get the product right. It is the world's most widely used mechanical system simulation software. It enables you to produce virtual prototypes, realistically simulating the full-motion behavior of complex mechanical systems on your computers and quickly analyzing multiple design variations until an optimal design is achieved. This reduces the number of costly physical prototypes, improves design quality, and dramatically reduces product development time.

Technical Support

For help with installing or using an Hexagon product, contact Hexagon technical support. Our technical support provides technical assistance on questions related to installation and use of the software. For further details please see the Technical Support Usage Guide, which is accessible via our support web site.

You can reach Hexagon technical support on the web, by telephone, or e-mail.

Web

Go to the Hexagon web site at www.hexagon.com, scroll down and click on **Services & Training.** Here, you can find a wide variety of support resources including Product Updates, Discussions, Technical Articles, and Documentation updates.

In addition, we provide several excellent sources of online information:

- **SimCompanion**: Find solutions to problems in this repository of troubleshooting tips, examples, and frequently asked questions. To access the SimCompanion, go to:
  https://simcompanion.hexagon.com/
- **VPD Community**: The VPD community is where to go when you are looking for peer support, as well as technical expertise. Many of our consultants, developers, and technical support staff monitor the forums. To sign up for the forums, go to Adams Support Home Page.
  Then,
  - To view the Adams discussions, select Adams from the **Forums** menu.
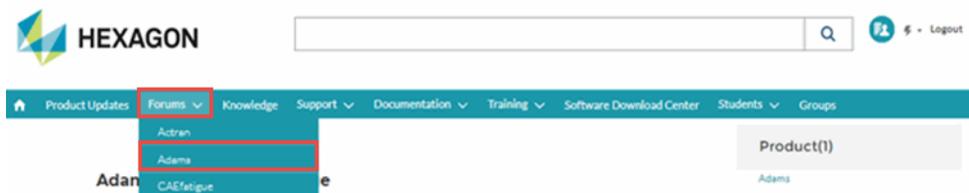
  - To view product alerts and company news and events, select Product Updates.
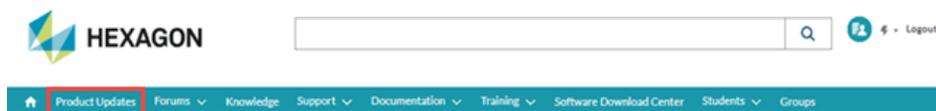
Phone and Email

For a current list of phone numbers and language based email addresses please visit our support web site.

Training

Hexagon training provides comprehensive training in Virtual Product Development. We offer standard and customized training courses in the application of CAE tools to solve from basic to complex problems within any industry. We offer over 100 courses in our state-of-the-art classroom facilities and individual computer graphics laboratories at training centers throughout the world. All of our courses emphasize hands-on computer laboratory work to facilitate skills development. We are uniquely positioned to optimize your investment in design and simulation software tools.

Our industry experienced expert staff is available to customize our course offerings to meet your unique training requirements. For the most effective training, we also offer many of our courses at our customer's facilities.

We specialize in customized training based on our evaluation of your design and simulation processes, which yields courses that are geared to your business. In addition to traditional instructor-led classes, we also offer video courses, interactive multimedia training, web-based training, and a specialized instructor's program.

Course Information and Registration

For detailed course descriptions, schedule information, and registration call the Training Specialist at +1 800 426-1066 or visit www.hexagon.com.

Internet Resources

Hexagon (www.Hexagon.com)

Hexagon corporate site with information on the latest events, products and services for the CAD/CAE/CAM marketplace.

1 Getting Started

- Overview
- Welcome to Adams Products
- What You Need
- Types of Installations
- Product Categories
- Getting Help

Overview

This chapter describes what you need to know and have available to install the Adams 2023.1® suite of software. It contains the sections:

Welcome to Adams Products

Adams products provide you with tools to model, simulate, and optimize your mechanical systems. This guide explains how to install and license the Adams products, and gives you troubleshooting tips if you have any problems during an installation.

What You Need

Before you start installing Adams products, there are a few things that you should be sure to do or have available:

- Check to ensure that your system meets the requirements detailed in the Hardware and Software Specifications, 11. There, you will find Operating System, Compiler, Graphics, Licensing, Memory and Disk Space requirements. Please review these requirements before beginning your installation of Adams.

- Hexagon License Electronic Mail. Authorization codes are e-mailed to you by Hexagon. The Adams applications will not run without proper authorization codes. Following the instructions in the e-mail, you can export these codes to a file and use them as input to the installation process.

- Obtain any Adams software updates at the Hexagon Technical Support Web site at http://simcompanion.hexagon.com.

About Your Adams Licenses

To run the Adams products, you need the authorization codes electronically mailed to you by Hexagon. When you receive this e-mail, copy it's contents to a file as explained in the e-mail message. The actual authorization codes are contained between the lines:

```
# ------ Start of License File ------
```

and

```
# ------  End of License File  ------
```

You should only copy the contents of the e-mail between these two lines to a file. This file can be used as input to the installation process.

If you have an existing MSC license, you may not receive a new set of authorization codes. However, you will need to know the name of the license server and the TCP port number used by the MSC license manager on that license server.

About the Adams Media

You will receive your Adams media in the form of an electronic download. All the files required to install the Adams products will be contained in this media. There is a unique download for each supported Adams platform. To install Adams for multiple supported platforms, you will have to run the installation process multiple times with requisite platform installer.

Types of Installations

The way in which you install and license the Adams products depends on your installation configuration.

Any given installation configuration is composed of the following three components:

- **File server** - Machine that contains the Adams files. It may be shared with other computers on a network.
- **License Server** - Machine that runs the Adams license server. The licensing of Adams products depends on the type of license you purchased.
- **Client** - Machine that runs the Adams products.

You can manage these three components on one machine, three different machines, or any combination of machines. You can also install Adams products on a heterogeneous network where you install Adams products for different platforms all on one network. For information on the various Linux configurations, see Linux Installation Roadmaps, 99.

Product Categories

The product(s) or feature package you are licensed to use for Adams appear on the first page of your password certificate under the section Feature/Password. When you install the products, select the packages that you are licensed for.

Getting Help

If you have questions or problems installing or testing your Adams products, refer to Troubleshooting, 91. If the problems persist, go to the Technical Articles or Known Issues at http://simcompanion.hexagon.com/. If the problems still persist, call Hexagon Technical Support. For a current list of phone numbers and language-based email addresses please visit our web site http://www.hexagon.com, scroll down and click on **Services →Technical Support (SimCompanion),** on the SimCompanion webpage select **Support → Support Contact Information**. Before contacting Technical Support, please have the following information available:

- Hardware type (be as specific as possible)
- Version of the operating system, including build number and service packs, if applicable
- Version of compilers
- Hardcopy of all error messages (you can send it by fax or through e-mail)

If possible, generate a troubleshooting report as explained in Generating Problem Reports, 93.

2 Hardware and Software Configurations

Overview

This chapter provides the hardware and software configurations for Adams.

Note:	For the latest version of the hardware and software specifications, see the Adams Support site at http://simcompanion.hexagon.com

This chapter includes the following sections:

Hardware and Software Specifications

Table 2-1 outlines the hardware and software specifications for Adams.

Table 2-1   Hardware and Software Specifications

Hardware Vendor	Models and Processors	Operating System	Fortran	C/C++
Intel & AMD x86-64 Linux	Intel Pentium 4, Pentium D, Core 2 Duo, Xeon, and compatibles	Red Hat Enterprise Linux 7.9 x64 (Kernel 3.10.0-1160.el7.x86_64) Red Hat Enterprise Linux 8.6 x64 (Kernel 4.18.0-425.13.1.el8_7.x86_64) SuSE 12 SP5 Linux Enterprise Server (Kernel 4.12.14-122.147-default) SuSE 15 SP3 Linux Enterprise Server (Kernel 5.3.18-150300.59.106-default)	Intel oneapi 2022 Version 2021.6.0 Build 20220226_000000	Intel oneapi 2022 Version 2021.6.0 Build 20220226_000000
Intel & AMD x86-64 Windows	Intel Pentium 4, Pentium D, Core 2 Duo, Xeon, and compatibles	Windows 10 Enterprise Version 21H2 (OS Build 19044.2728) Windows 11 Pro 21H2 (OS Build 22000.1335) Windows 10 Pro 22H2 (OS Build 22621.1413) Windows Sever 2019 1809 (OS Build 17763.2114) Windows Server 2022 21H2 (OS Build 20348.1129)	Intel oneAPI 2022 Version 2021.6.0 Build 20220226_000000	Microsoft Visual Studio Professional 2022 Version 17.1.7

Notes:	
	1. Intel IA-32 and x64 processors: Pentium (4, D), Core (i3, i5, i7), Xeon and AMD compatibles.
	2. Adams 2023.1 product developed using the 'Intel Composer Edition' compiler.
	3. Adams Controls is supported on these platforms. However, partner product support varies. Please see the Supported Versions of Integration Products section of the Adams product Release Guide.
	4. Conditions under which compilers are required are listed below in Compiler Requirement Details section.
	5. For the latest information on supported platforms for upcoming releases of MSC products, please visit the following web site: http://www.hexagon.com/platform-support/
	6. Adams officially supports the Professional Edition of Microsoft Visual Studio, but the Community Edition has been found to function in the following scenarios:
	• DLL generation for user-written subroutines in C or in C and Fortran
	• Some Adams Controls scenarios with MATLAB/Simulink, Easy5 and FMI compliant software. For details, please see the Supported Versions of Integration Products section of the Adams product Release Guide.

The required compiler versions for this version of Adams are found in the Hardware and Software Specifications section. The conditions under which compilers are required and any deviations to the generally required versions are listed below:

Table 2-2   Intel & AMD x86-64 Windows

Adams Controls and Adams Mechatronics	FORTRAN Compiler	C/C++ Compiler
User Subroutines	Required	Required
with Easy5		
Function Evaluation	Not required by Adams[*]	Not required by Adams[^]
Co-Sim	Not required by Adams[*]	Not required by Adams[^]
ESL Import	Not required by Adams[**]	Not required by Adams[^]
with MATLAB/Simulink[®]		
Function Evaluation	Not required by Adams	Not required by Adams[#]
Co-Sim	Not required by Adams	Not required by Adams[#]
ESL Import	Not required by Adams	Not required by Adams[##]
with FMI		
Co-Sim	Not required by Adams[$]	Required in case of co-sim V1/V2 FMU export (slave). Not required for V1/V2 Adams master.[$$]
Model Exchange/Import	Not required by Adams[$]	Not required by Adams[$$]

[*]Easy5 requires Intel[®] Fortran

[**]Easy5 requires GNU Compiler Collection or Intel[®] Fortran; Intel[®] recommended

[^]Easy5 requires Visual Studio linker; note that some FORTRAN compiler environments include this

[#]MATLAB/Simulink[®] may require it under some circumstances; check with The MathWorks, Inc. for compiler requirements

[##]MATLAB/Simulink[®] requires it for building the .dll to be exported; check with The MathWorks, Inc. for compiler requirements

[$]FMI with Easy5 requires GNU Compiler Collection or Intel[®] compiler

[$$]FMI with Easy5 requires GNU Compiler Collection or Visual Studio C compiler

Table 2-3   Intel & AMD x86-64 Linux

Adams Controls and Adams Mechatronics	FORTRAN Compiler	C/C++ Compiler
User Subroutines	Required	Required
with Easy5		
Function	Not required by Adams[*]	Not required by Adams
Co-Sim	Not required by Adams[*]	Not required by Adams
ESL Import	Not required by Adams[**]	Not required by Adams
with MATLAB/Simulink®		
Function	Not required by Adams	Not required by Adams[#]
Co-Sim	Not required by Adams	Not required by Adams[#]
ESL Import	Not required by Adams	Not required by Adams[##]
with FMI		
Co-Sim	Required in case of co-sim V1/V2 FMU export (slave). Not required for V1/V2 Adams master[$]	Not required by Adams[$]
Model Exchange/Import	Not required by Adams[$]	Not required by Adams[$]

[*]Easy5 requires Intel® Fortran

[**]Easy5 requires GNU Compiler Collection or Intel® Fortran; Intel® recommended

[#]MATLAB/Simulink® may require it under some circumstances; check with The MathWorks, Inc. for compiler requirements

[##]MATLAB/Simulink® requires it for building the .dll to be exported; check with The MathWorks, Inc. for compiler requirements

[$]FMI with Easy5 requires GNU Compiler Collection or Intel® compiler

System Requirements

Table 2-4 shows the system requirements for Adams.

Table 2-4   System Requirements

Platform	Operating System	Disk Space	Memory and Swap Space
Intel & AMD x86-64 Linux	Red Hat Enterprise Linux 7.9 x64 (Kernel 3.10.0-1160.el7.x86_64) Red Hat Enterprise Linux 8.6 x64 (Kernel 4.18.0-425.13.1.el8_7.x86_64) SuSE 12 SP5 Linux Enterprise Server (Kernel 4.12.14-122.147-default) SuSE 15 SP3 Linux Enterprise Server (Kernel 5.3.18-150300.59.106-default)	19 Gb	1 Gb Minimum 2 Gb Recommended Swap = 2 x RAM
Intel & AMD x86-64 Windows	Windows 10 Enterprise Version 21H2 (OS Build 19044.2728) Windows 11 Pro 21H2 (OS Build 22000.1335) Windows 10 Pro 22H2 (OS Build 22621.1413) Windows Sever 2019 1809 (OS Build 17763.2114) Windows Server 2022 21H2 (OS Build 20348.1129)	13 Gb	1 Gb Minimum 2 Gb Recommended Swap = 2 x RAM

Notes:	■ Ubuntu Linux 20 and 22.04 are also supported, but only for standalone Adams Solver jobs including those that use Adams Controls and/or Adams Car Solver extensions. ■ The CSH shell is required for the installation and use of Adams on Ubuntu. Using another shell, such as bash, will result in unexpected behaviour.

Graphics Requirements

The following are the graphics requirements for Adams.

Table 2-5   Graphics Requirements

Platform	Operating System	System Runtime Libraries	Validated Graphics Hardware
Intel & AMD x86-64 Linux	Red Hat Enterprise Linux 7.9 x64 (Kernel 3.10.0-1160.el7.x86_64) Red Hat Enterprise Linux 8.6 x64 (Kernel 4.18.0-425.13.1.el8_7.x86_64) SuSE 12 SP5 Linux Enterprise Server (Kernel 4.12.14-122.147-default) SuSE 15 SP3 Linux Enterprise Server (Kernel 5.3.18-150300.59.106-default)	X11 and OpenGL 1.2+	NVIDIA Graphics Driver - Quadro M2200 Version 515.76 For RHEL 7.9 use NVIDIA Graphics Driver – Quadro M2200 Version 515.76 For RHEL 8.4 use NVIDIA Graphics Driver – Quadro M2200 Version 515.76 For SUSE12 SP5 use NVIDIA Graphics Driver – Quadro M2200 Version 515.76 For SUSE15 SP2 use NVIDIA Graphics Driver – Quadro M2200 Version 515.76 The Adams products have been developed in full compliance with OpenGL 1.2 and should run properly with graphics cards that adhere to the 1.2 or later specification. ***Must install vendor supplied OpenGL video driver.***
Intel & AMD x86-64 Windows	Windows 10 Enterprise Version 21H2 (OS Build 19044.2728) Windows 11 Pro 21H2 (OS Build 22000.1335) Windows 10 Pro 22H2 (OS Build 22621.1413) Windows Sever 2019 1809 (OS Build 17763.2114) Windows Server 2022 21H2 (OS Build 20348.1129)	OpenGL 1.2+	NVIDIA Graphics Driver - Version 462.3 Quadro M2200 AMD Radeon™ Pro W6600M Graphics Driver - Version 31.0.12026.3004 The Adams products have been developed in full compliance with OpenGL 1.2 and should run properly with graphics cards that adhere to the 1.2 or later specification. Avoid use of the CPU-integrated graphics hardware.

Licensing Requirements

Following are the Adams licensing requirements for obtaining a node locked license file. Note that when obtaining licenses from a server, this version of Adams requires access to MSC License Server (FLEXlm) v11.13 or greater (installed separately).

Table 2-6   Licensing Requirements

Platform	Hostname Retrieval	Host ID Retrieval
Intel & AMD x86-64 Linux	From a shell window, enter the command: `hostname`	From a shell window, enter the command: `/sbin/ifconfig eth0` Return the information in the line labeled "HW addr" and remove the colons ":".
Intel & AMD x86 and x86-64 Windows	From a "Command Prompt" window, enter the command: `hostname`	From a "Command Prompt" window, enter the command: `ipconfig /all` Return the information in the line labeled "Physical Address".

Dropped Platforms

Each release we review the platforms and operating system changes by our partners and in the industry, and address these changes in our release. We make this information available to you for hardware planning. We welcome your input on platform support. Please communicate platform support needs to your MSC Sales Representative.

3   Installing Adams on Linux

Overview

This chapter provides instructions for installing the Adams software. It contains the sections:

After installing the Adams products, you need to set up the licenses to run them. See for more information.

> **Note:** For general steps (roadmaps) for the various Linux configurations, see

Preparing to Install the Adams Product

The primary way to receive the Adams product is by downloading the software from the Software Download Center (SDC). In the case of Linux products, this will be an executable installer for each platform. The download file will have a **.bin** extension.

Select the platform file from the SDC. Download the file to a temporary directory on a file system with enough available space.

Follow the directions in this document for installing Adams from this executable installer.

Note:	Installers always copy to the `/tmp` location, if the `/tmp` partition is too small, it is not possible to run the product on the machine. It is recommended to set the environmental variable 'HMI_TMP_DIR=/file_location' which changes the default location for extracting installer files to the specified directory.
	An example is shown below:
	`HMI_TMP_DIR=/scratch` – Executing this variable will extract the files to scratch folder
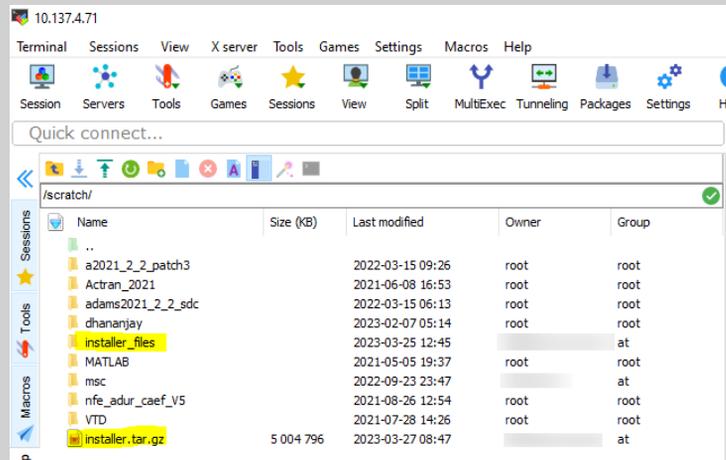
Creating the Installation Directory

This section explains how to create an installation directory in which to install the Adams products. This is the location on your file server where you want the Adams products to reside.

To create the installation directory:

1. Log on to the Linux system where you want to install the Adams products (the file server).

2. Create a directory in which to place the Adams products by entering the following command, where `install_dir` is the directory that you want to create:

   `mkdir install_dir`

   We recommend that you create a directory called `/usr/adamsx` for the Adams products. In the directory name, *x* represents the current version of Adams. If you have a prior version of Adams on your system, you should install the new version in a different location. If, however, you are adding the same version of software to an existing installation, place the new software in the same location.

Installing Adams

This section contains instructions for starting the Adams installation program.

After downloading Adams from the Software Download Center (SDC), you will run the installation program from the directory you unloaded the executable installer into.

Note:	The CSH shell is required for the installation and use of Adams on Ubuntu. Using another shell, such as bash, will result in unexpected behavior.

The installation program has command line options available to help you tailor the installation to your site's needs.

Running the installation program without any options will launch it in graphical mode. Running in graphical mode uses the X-Windows display protocol. You must have the X-Windows DISPLAY variable set to a valid display to run in graphical mode.

Available Options:

--help	Display this information
-i s	Set this mode to run the installer in Silent installation mode. Use *-s* along with silent file name
-i console	Set this mode to if you want to install Adams through console mode by manually entering required input via Linux console without GUI install shield display

The installation responses are often system specific, it is not recommended to use the responses from one platform installer on other supported platforms.

The most common combinations are provided as examples below because Hexagon changes the name of the installation program to include product and release version number. The generic name "installer.bin" is used to represent the name of the installer in these examples.

The installation program will install in graphical mode by default.

1. Move to the installation directory you previously created.
2. Locate the installation program, **adams_*XXXXXX_PLAT*.bin**, in the download directory. The full path to the installation program will be needed to run it.

   where *XXXXXX* is the release version, and *PLAT* is the platform name that corresponds to the platform you wish to install. For example:

   adams_2023_1_linux64_rhe79.bin
3. Start the installation program, the welcome agreement window will appear as shown below.
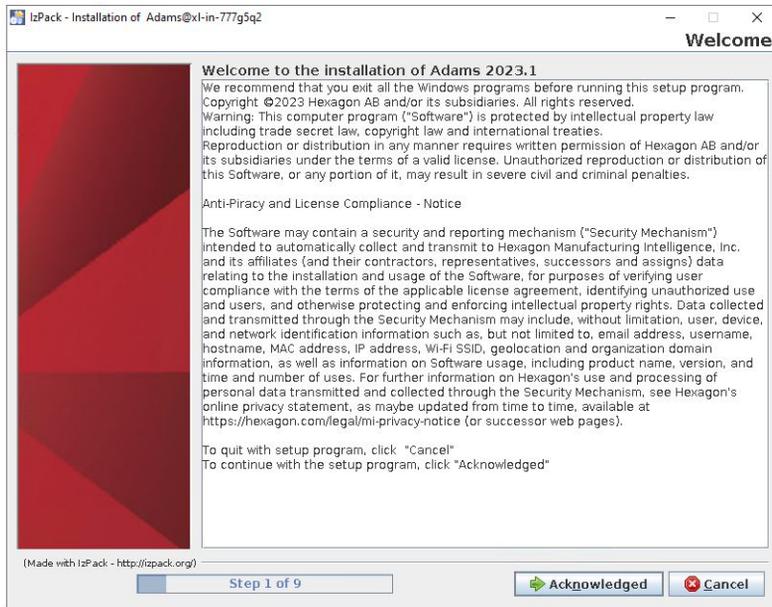
Figure 3-1   Welcome Agreement Window

4. Select **Acknowledged** > button to continue, or **Cancel** button to exit without installing.

5. Select the full path to the directory you want to install Adams in. You can type in the directory path after selecting the **Browse** button, or use the directory tree to locate the installation directory.
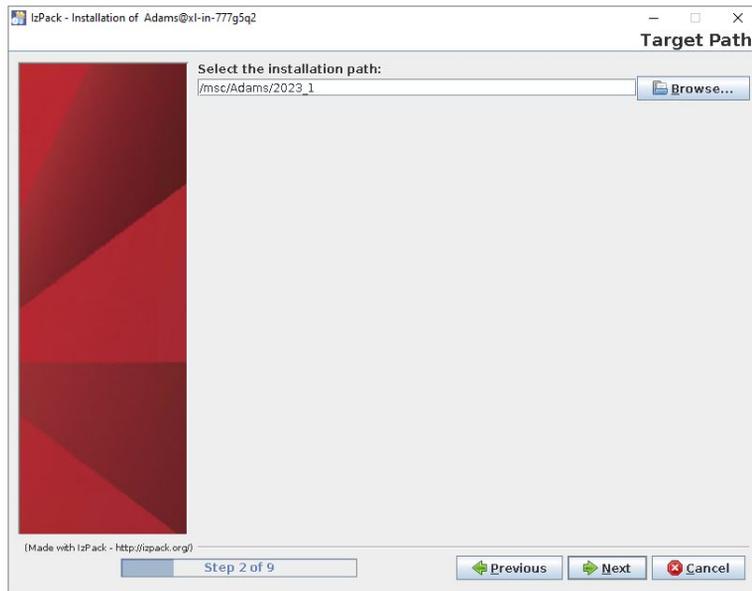
Figure 3-2   Selecting Installation Directory Window

6. Select the packs you want to install.
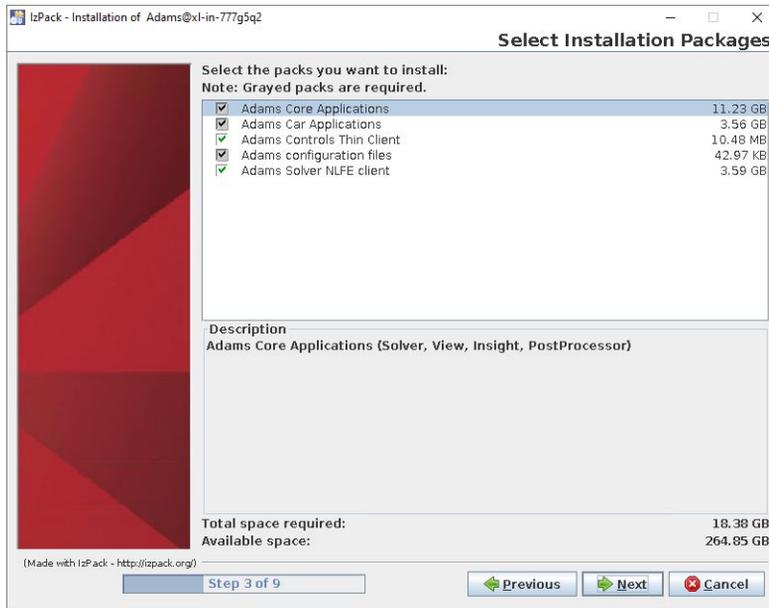
Figure 3-3   Selecting Installation packs

7. Select the **Next >** button to confirm your installation selection (s). A progress dialog box will be displayed. You can select the **Cancel** button at any time to stop the installation.

Figure 3-4   Installation Progress Window

8. You must select your HTML Browser that will be used to access all documentation that you have installed. You can type in the full path after selecting the **Browse** button, or use the directory tree to locate the browser.
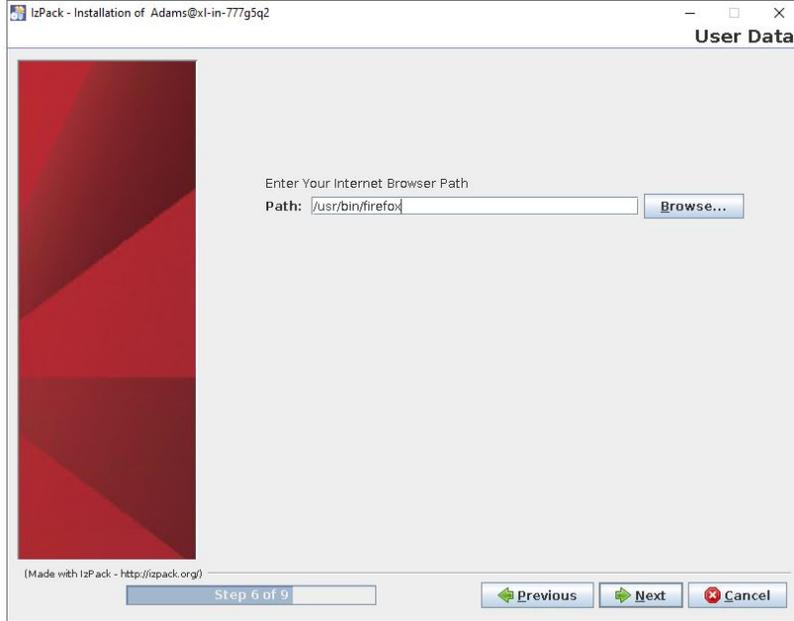
Figure 3-5   HTML Browser Selection Window

9. The Licensing dialog box allows you to choose the method of communications with an Hexagon License Manager. The most common method for communicating with the license manager is a **port@host** connection. This is the TCP port number your license manager is listening to, and the hostname of the system that is running the license manager processes. The standard Hexagon License ManagerTCP port number is **27500**.
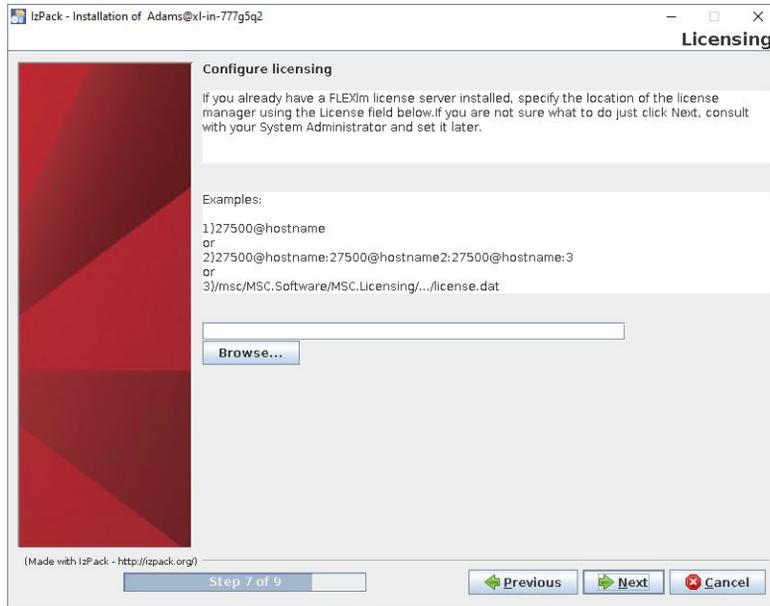
Figure 3-6   License Setup Window

10. Select **Next >** button to continue.
    After the Processing asummary dialog box announces the completion of the installation process and
    provides final instructions for license manager communication changes should you need to change
    that setting in the future. It also provides the Hexagon Technical Support e-mail address. Selecting
    Finish will complete the installation process.
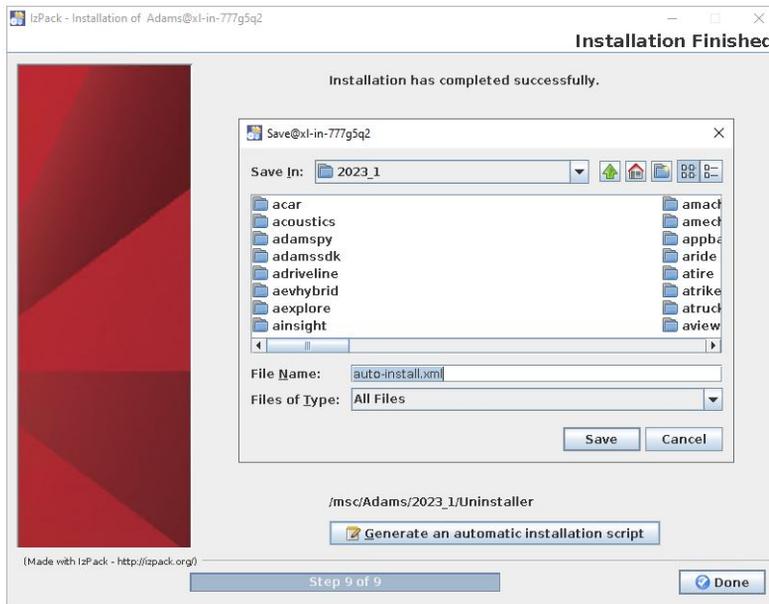
Figure 3-7   Installation Complete Confirmation Window

11. If you chose to install either the **Adams** package or the **Adams Advanced** package, you will need to setup the **Adams Extension for Easy5**. For more information, refer to

Other than the default standard installation, you will encounter various installation scenarios. The following lists the common standard scenarios used in Adams.

Scenario 1:

Linux typically involves running the installer without any user intervention or interaction. If you want to install Adams using the silent installation option, then in command-line use "-s" along with silent file name

> *installer.bin -s* auto_instal.xml

The silent installation process should start and run without any user intervention.

Note:	The file `auto_instal.xml` can be generated after you select **Generate an automatic installation Script** option at the end installation. See Step 10.
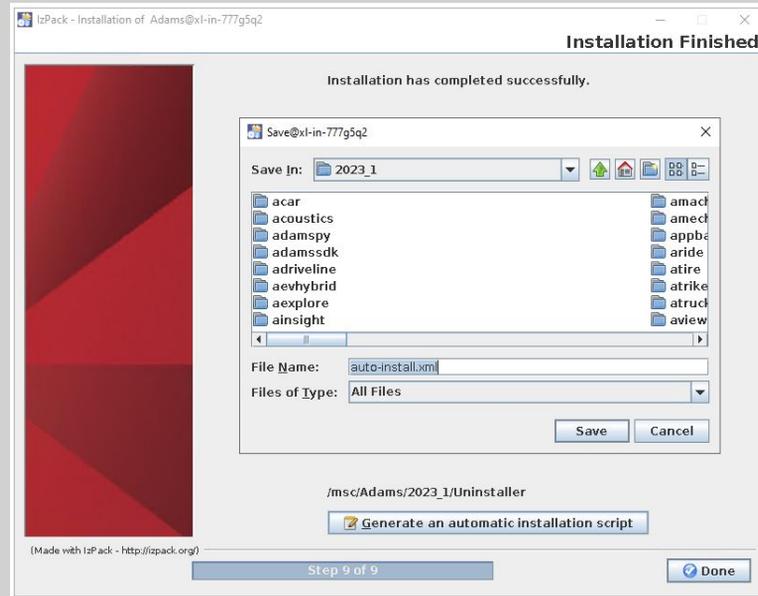
Scenario 2:

You have tried to install, but the installer reports that it does not have enough file system space to create temporary files during the installation. If you are facing space issue in /tmp directory, you can change extraction location for installer files using environment variable.

Set HMI_TMP_DIR to directory of your choice.

Example: *export HMI_TMP_DIR=/root/testing*

Scenario 3:

You are installing on a system that does not have a system console running an X-Windows server. If you want install Adams through console mode by manually entering required input via Linux console without GUI install shield display.

installer.bin -i console

The *-i console* mode will use text prompts to answer the questions required to install. You can use *-i console* mode with all other options.

Installing the Adams Controls Thin Client

The Adams Controls Thin Client is a subset of Adams Controls. This client can be helpful to Easy5 or MATLAB users who want to use TCP/IP communication when performing co-simulations with Adams Controls, but don't want a full Adams installation.

To install the Adams Controls Thin Client:

1. Follow Step 1. on page 23 to Step 5. on page 24.

2. Select only **Controls Client Applications** and **Next**

3. Select **Install** from the Product Selection Summary dialog box.

4. Select **Finish** from the last dialog box to complete the installation

Note:	You must install the Adams Extension for Easy5 to use the Adams Controls Thin Client with Easy5. For more information, see Installing the Adams Extension for Easy5, 33.

Installing the Adams Extension for Easy5

> **Note:** This procedure is only necessary if you installed Adams Controls.

To run Adams and Easy5 together, you must install the Adams extension into Easy5. To import models into Adams that were exported from Easy5 (containing components from licensed Easy5 libraries), you must also configure your computer so that Adams knows how to find your Easy5 license. The following procedures explain how to do this.

To install the Adams extension for Easy5:

1. Make sure that both Easy5 and Adams have been installed.
2. Make sure you have permission (that is, root ('superuser') privilege) to add and modify files in the Easy5 installation directory.
3. Identify the command line command used to start the Adams version you will use with Easy5, for example, `adams2023_1`.

   > **Note:** If you are unable to identify a command line command to run Adams but you can identify the top-level directory of the Adams installation, you can use `-d directory_path` in place of the command line command in the following steps.

4. Perform the following:
   a. Open an xterm window and set your working directory to a directory outside the Easy5 installation directory tree.
   b. Start Easy5. The standard command is **easy5x**.
   c. In the Easy5 main window, from the **File** menu, select **Open Command Shell**.
   d. At the prompt in the command shell, enter:

      $EZHOME/install_adams_controls.ksh *adams_command*

      where *adams_command* is the command line command from Step 3 above.
5. Type **exit** to close the command window.
6. If you started Easy5, from the **File** menu, select **Quit**.

   The Adams extension installation is complete. Be sure to configure your computer as described next.

To configure your computer to run licensed exported Easy5 models within Adams:

1. Start Easy5.
2. From the **File** menu, select **Open Command Shell**.
3. At the prompt in the command shell, type **easy5x --license**.

Easy5 displays the licensing information, beginning with the type of license and the server name (if a server license) or the path to the license file.

4. Write down the contents of the line that starts with **Active license file(s)**, and the value that appears in the line following it (for example, **27500@rainier**).

5. Perform one of the following:

   - If the line is **Active license file(s) [EASY5_LMD_LICENSE_FILE]**, set the environment variable **EASY5_LMD_LICENSE_FILE** to the output value displayed in Step 4 above (for example, **27500@rainier**).

   - If the line is **Active license file(s) [MSC_LICENSE_FILE]**, find the value of the environment variable **MSC_LICENSE_FILE** to see what license file Adams is using.

   - If Easy5 and Adams are using different licenses (or license servers), set **LM_LICENSE_FILE** to the value for the Easy5 license (for example **2500@bosco**).

   - If Easy5 and Adams are using the same license, your computer is configured properly.

Installing on a Heterogeneous Network

If you are installing the Adams products for use on different Linux platforms (Sun, HP, and so on) you are performing a heterogeneous installation. Adams installation directory can support multiple platforms. Binary files specific to each supported platform are located in architecture directories under each product directory. You can use a single installation directory to install all supported Adams platform binaries or multiple file servers to spread out the file serving load to multiple systems.

To install Adams on a heterogeneous network:

- Follow the instructions in Installing Adams, 23, for each platform on which you are installing Adams products.

4 Licensing on Linux

Overview

This chapter provides instructions for licensing the Adams software. You must complete the steps in Installing Adams on Linux, 19 before licensing the Adams software. Refer to Linux Installation Roadmaps, 99 for which procedure in this chapter to follow depending on your system configuration.

The chapter contains the sections:

About the Adams License Server

Adams licensing requires that you operate at least one license server. You can optionally request to use three Adams license servers (see About a Three-Server Configuration below). The Adams license servers can be on any of the supported Adams platforms connected to the network that runs the Adams products. Adams uses the FLEXlm®, license system from Flexera Software.

The following sections give you tips for selecting the license server and explain different configurations:

- Tips for Selecting a License Server, 39
- About a Three-Server Configuration, 39

Tips for Selecting a License Server

You should select the machine to use as your Adams license server using the following guidelines. The machine should:

- Have a local file system that can hold the Adams license server software. If you use a remotely mounted file system for your Adams license server, you risk having your users unable to run the Adams products if the server goes down. You should never run the Adams license server from a diskless node on the network.
- Have enough system resources to robustly serve the number of Adams users requesting a license.
- Be on the same local area network (or sub-net) if the number of Adams license requests is in the range of hundreds per day.
- Be reliable. This means that it has reliable power and its hardware subsystems are in good working order.

You should consolidate your licenses because redundant license servers add complexity. Evaluate what you really want to achieve by using redundant license servers. More robust hardware systems, instead of redundant license servers, can better ensure less down time. You should look at ways to consolidate the number of license servers at the departmental, division, or even at the company-wide level.

About a Three-Server Configuration

For each of the license types, you can have three machines on your network that are designated as license servers. Selecting three license servers lets you back up the main license server in case one of the other machines is down. If your password certificate lists three machines under the `Server Host Name` column, you purchased the three-server configuration. You must install your passwords on **each** of the servers as explained in Licensing Adams When File and License Server Are Same Machine, 40.

You should log in to one of the servers and open three shell windows. Log in to the other two servers in the different shell windows and repeat the procedures in this chapter for each server. You also need to start each of the license servers as explained in Starting the Adams License Server, 42. The order of startup is not critical. The first machine, however, to start the license daemons becomes the master server and serves licenses until it is unavailable.

Licensing Adams When File and License Server Are Same Machine

Follow the instructions below if your license server and file server are the **same** machine. You should log in to the system that appears in the `Server Host Name` column on the password certificate.

To set up licensing:

1. From the Installation directory start the installation program **INSTALL.ADAMS**.

2. Enter **1** to select the option, **Install Adams passwords on this license server**.

3. Enter **y** if the name of the Adams license server that appears in the prompt is the same as the machine designated as the server in your e-mail password certificate. (Depending on the type of license you have, the server name may not be listed in your e-mail certificate; in this case, use the hostid instead.)

4. The default is the machine to which you are logged on. If this is not your license server, enter **n**, log in to your license server, and start the procedure again.

5. Follow the instructions in the e-mail password certificate to locate the information required for licensing your Adams software.

6. At the prompt `Are your passwords in a file e-mailed from MSC Software?`, enter **y**.

7. Enter the name of the text file that contains your passwords.

   The installation program reads this file and constructs a properly formatted license data file (**license.dat**) for you.

8. If the installation program cannot read the file, open the original file and verify that you cut the information required for licensing at the correct locations.

9. Continue with .

Licensing Adams When File and License Server Are Different Systems

Follow the instructions below if your license server and file server are different systems or if you purchased a three-server configuration. You should log into a system that appears in the SERVER HOST NAME column on your password certificate.

If you are installing passwords for a three-server configuration, you should log into one of the servers and open three shell windows, one for each server. Use two of these windows to remotely log into the other license servers and repeat the instructions in this section for each server.

If **you are not familiar** with the FLEXlm license system you should install the license manager from the Installation Program and use the automation described below.

1. Start the Installation Program as described on of this manual
2. Enter the Installation directory
3. Select the **User Selectable** installation type
4. Select **Install** after confirming your package selection, and **Finish** at the last dialog box.
5. Move to the installation directory you specified in Step 2. above
6. Run the `INSTALL.ADAMS` installation script
   a. Enter **1**, to enter passwords supplied by e-mail
   b. Enter **2**, to start the license manager on the system you are logged into
   c. Enter **7**, to exit

You should continue with

For more information, see Hexagon Licensing document.

Starting the Adams License Server

Follow the instructions below for all of the license types, as well as the three-server configuration. For three-server configurations, you must repeat this procedure on **each** license server. You must enter the commands on each license server within one minute.

To restart the Adams license server:

1. Start the installation program **INSTALL.ADAMS**.

2. At the prompt, enter **2** to select the option, **Start the Adams license server on this system**. The Adams license daemons are automatically started.

   Continue with the next section to allow the license daemons to automatically restart when you reboot your system.

Restarting the Adams License Daemons

You must modify the reboot procedure on your license servers to include a restart of the Adams license daemons during a system reboot.

To restart the Adams license daemons:

1. Change to the directory */msc/Adams*, where *msc* is the directory where the Adams products are installed.

2. Locate the file **reboot.txt** based on your platform.

Note:	To add the Adams license server startup commands, follow the instructions provided by your operating system.

The licensing of Adams products is complete. You can now verify that installation was successful by following the procedures in Verifying a Successful License, 45.

Changing the License to Point to a Different License Server

1. Start the installation program with the **client** argument (for example, **install.adams client**) or select option 4.

2. Enter the port number that is used by the license server.

3. Enter the name of the Adams license server that has the licenses you want to use. This can be a different machine than the machine on which you installed the Adams products, which is the file server.

Verifying a Successful License

Follow the procedure below to verify that the Adams installation was successful.

1. Start the installation program on the license server **INSTALL.ADAMS**.

2. At the prompt, enter **5** to select the option, **Generate a problem report**. This automatically generates a report called PROBLEM.RPT that you can use to verify the Adams installation.

3. Using a text editor, open the PROBLEM.RPT file and review the information. Verify that each of the features installed are able to retrieve a license.

5   Installing Adams on Windows

- Overview
- Installing the Adams Controls Thin Client
- Installing the Adams Extension for Easy5
- Installing Adams in Silent Mode (Batch)

Overview

The following sections explain how to install Adams 2023.1 products and online documentation by running the Adams 2023.1 installation program. It also includes information on licensing your Adams 2023.1.

Installing Adams

This section shows you how to install Adams software and documentation.

To install Adams:

1. Open Windows Explorer, browse to your Adams download and double click the Adams 2023.1 self extracting executable file.

   The language selection window will appear as shown below:
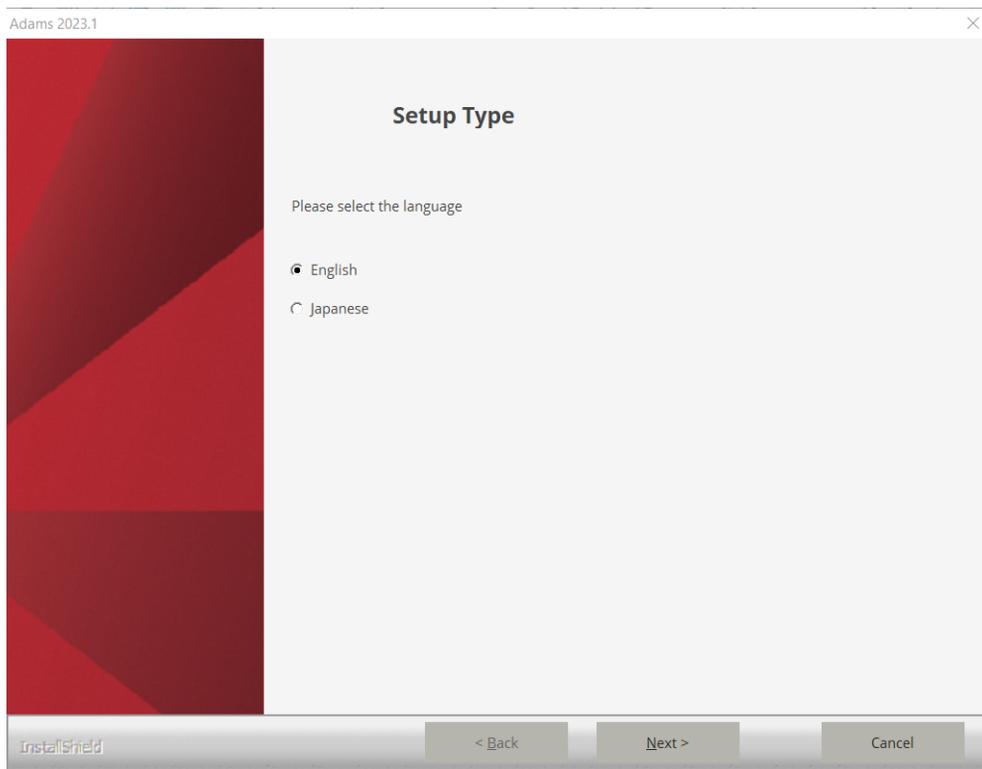
Figure 5-1   Setup Type Window

2. If you select "**English**" the welcome agreement window will appear as shown below.
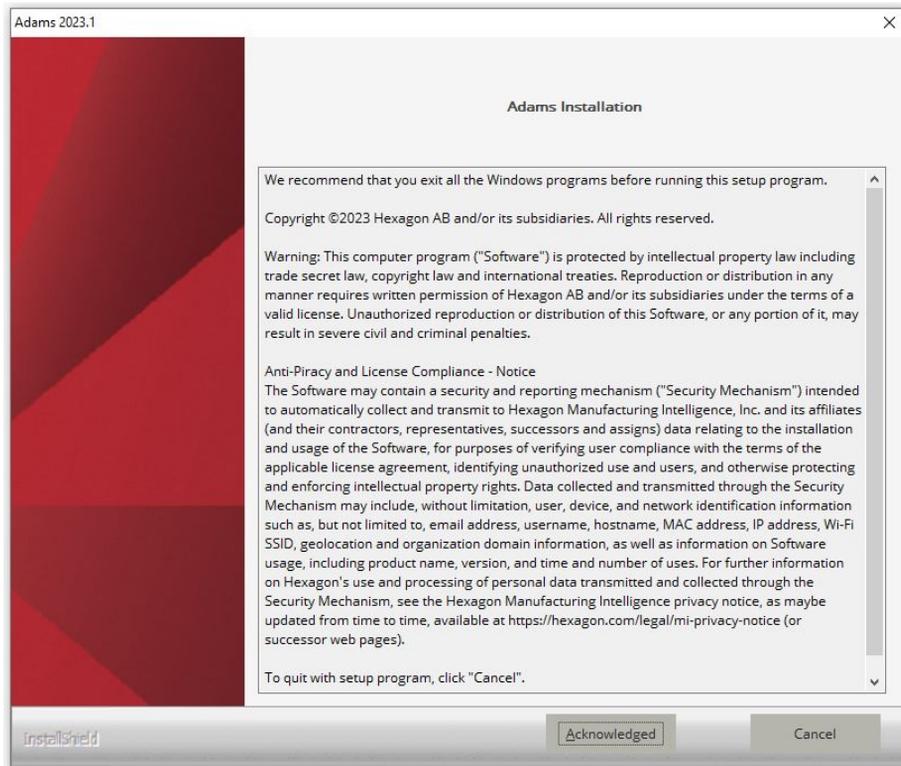
Figure 5-2   License Agreement Window - English

3. If you select "**Japanese**" the welcome agreement window will appear as shown below.

Figure 5-3   License Agreement Window - Japanese

4. Select **Acknowledged** button to continue, or **Cancel** button to exit without installing.

Note:	To re-select the language, click **Cancel** button to exit and restart the installation.

The Customer Information window appears as shown below.
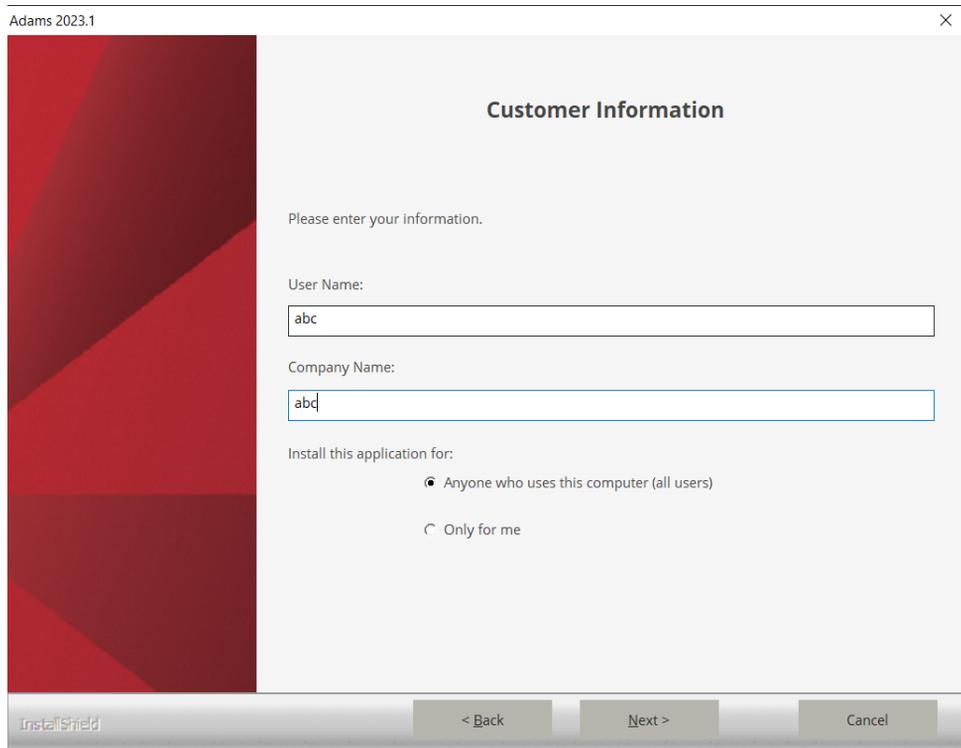
Figure 5-4　　　Customer Information Window

5. In the Customer Information window, enter your user and company name, and then select one of the following:

- **Anyone who uses this computer** (**all users**) - Anyone logged on to this machine can run Adams 2023.1.

- **Only for me** - A user must be logged on using the user name and password that was used at the time of installation.

6. Select **Next**.

The Setup Type window appears as shown below. Browse to the desired installation folder location.

Note:	Installation paths on drives other than the C:\ and including spaces are unsupported. The installation will proceed, but Adams will fail to launch. If Destination Folder is on a drive other than C:\ do not select a path with a space in it.
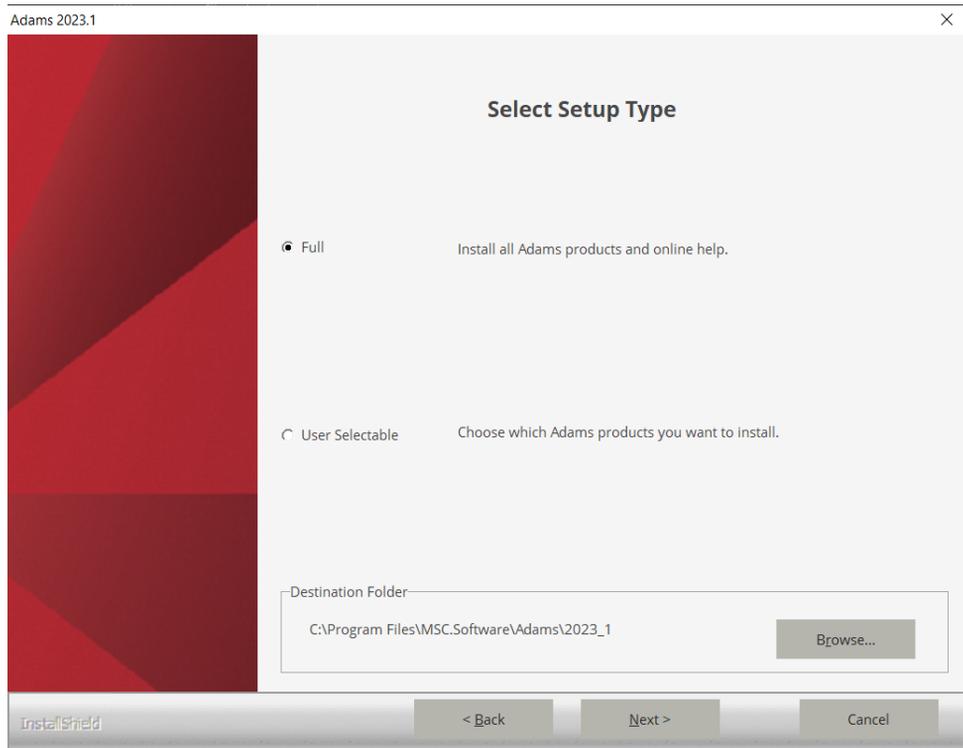
Figure 5-5   Setup Type Window
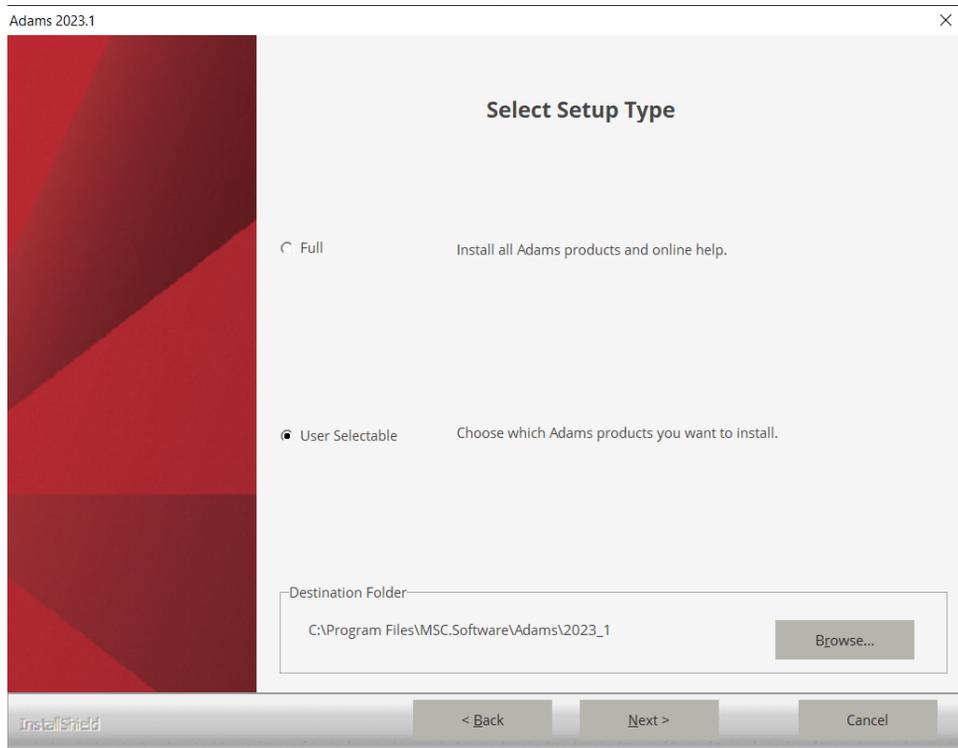
Figure 5-6   User Selectable

7. Select the type of installation you want to perform:

    - **Full** - Installs all Adams 2023.1 products and documentation. Always use this option if you want to use this machine as a file server, allowing other machines to client to it.

    - **User Selectable** - Allows you to select the specific Adams 2023.1 packages and documentation you want to install.

8. If you would prefer Adams 2023.1 to be installed in a folder other than the default destination folder, select **Browse**, and then select the desired folder.

    The default directory for installing Adams 2023.1 products is
    C:\Program Files\MSC.Software\Adams\2023_1.

9. Select **Next**.
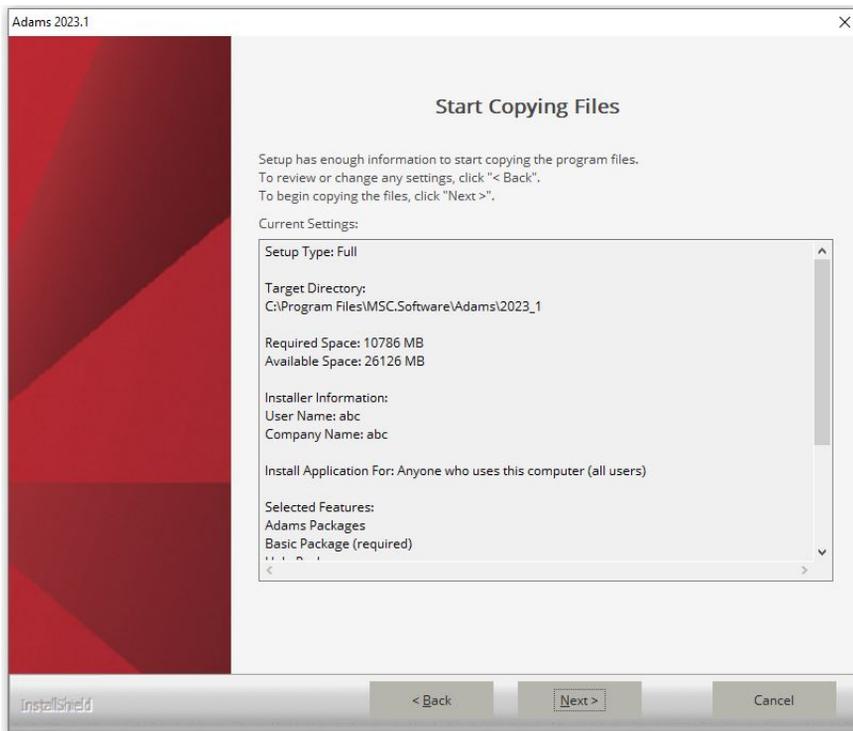
Figure 5-7   Installation Settings Confirmation Window

10. Depending on your selection in Step 7., do one of the following:

- **Full** - Continue to Step 11.
- **User Selectable** - In the Select Components window, select the components you want to install. Then, select **Next.**

> **Note:** You cannot install the Adams Controls Thin Client at the same time as other Adams 2023.1 products. You must install it by itself. See Installing the Adams Controls Thin Client, 59 for more information

11. Confirm the installation settings and then select **Next** to begin the installation.

12. The License Setup window appears as shown below.
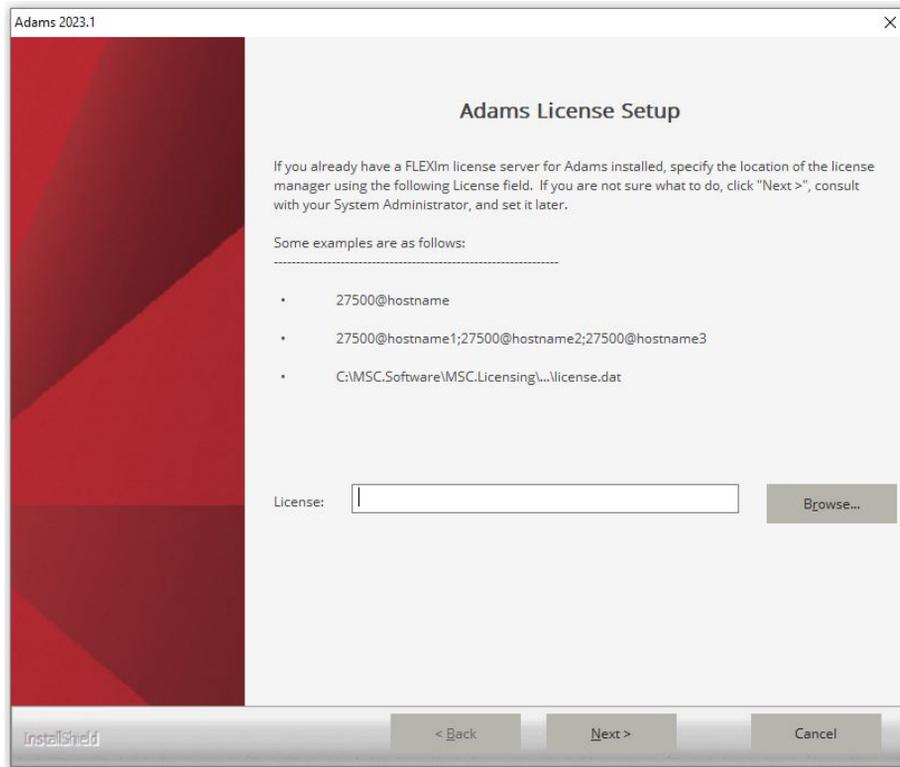
Figure 5-8   License Setup Window

13. Enter the name of the license server or the path to your license file. If you don't enter this information here, you can specify your license using the procedure in Specifying your License, 68.

14. Select **Next**.

15. Specify whether or not you want to install the various desktop icons. If you select **Yes**, then select the products for which the icons to be created.
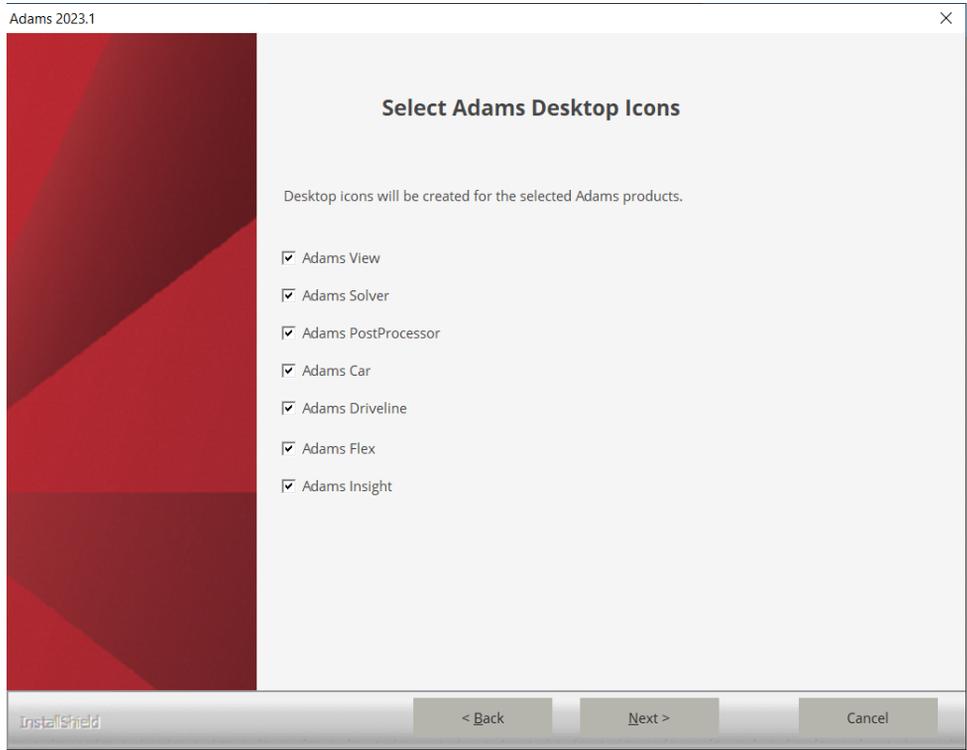
Figure 5-9   Adams 2023.1 Desktop Icons Window

16. Select **Next**.

The Solver File Association window appears as shown below.
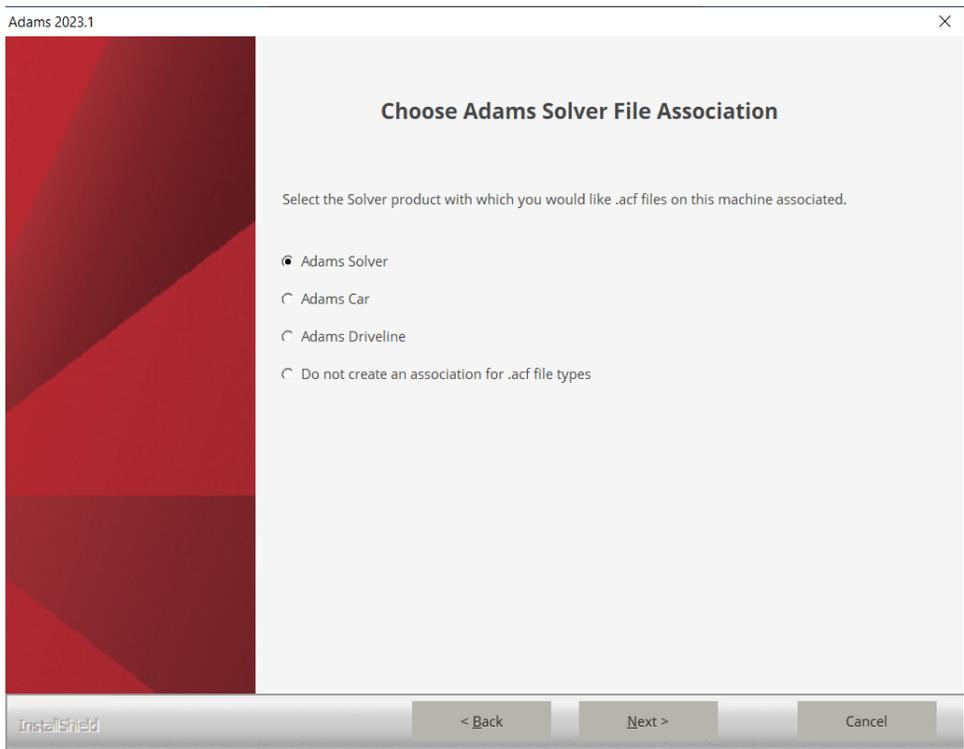
Figure 5-10   Solver File Association Window

17. Select the solver product with which you want .acf files on this machine associated. You can also select not to associate .acf files with an Adams 2023.1 product.

18. Select **Next.**

A dialog box appears indicating that the file permissions are being changed. If you do not have sufficient administration privileges you need to contact the system administrator.

19. Select **Next.**

If you do not have the Visual Studio Redistributable Package installed, the installer begins the installation of the following packages:

- Microsoft VC++ 2017 x64 redist – 14.12.25810
- Microsoft VC++ 2019 x64 redist – 14.24.28127
- Microsoft VC++ 2022 x64 redist – 14.32.31326.0

20. To view the readme file, select **I would like to view the README file.**
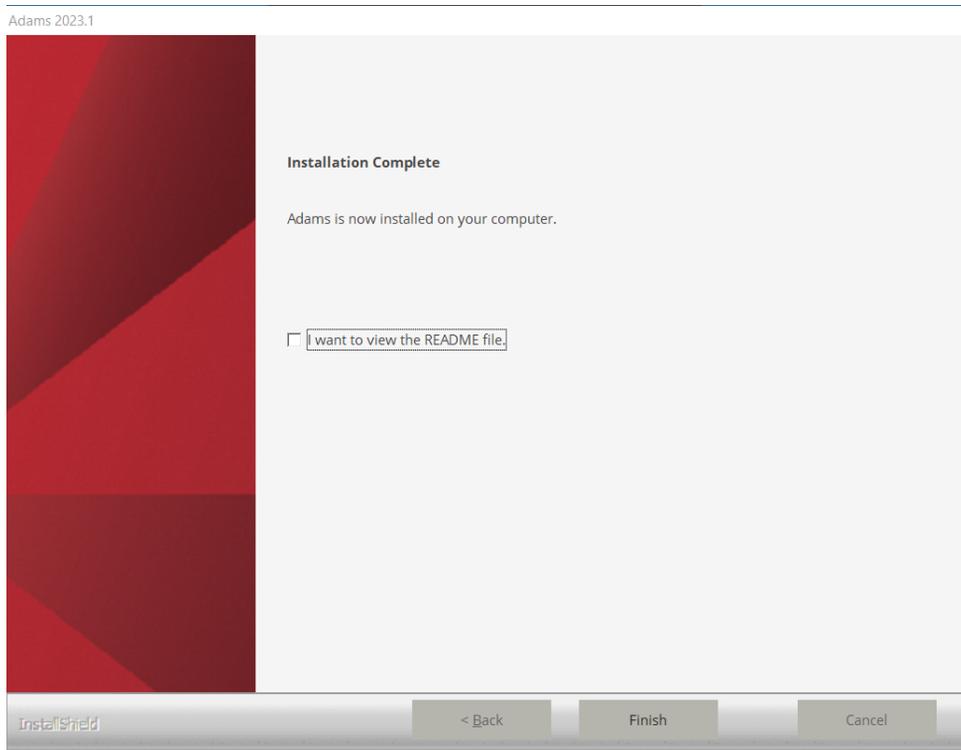
Figure 5-11   Installation Complete Confirmation Window

21. Select **Finish**.

22. If you installed Adams Controls, you need to install the Adams 2023.1 Extension for Easy5. Previously, this was done automatically by the Adams Controls install program. For more information, refer to Installing the Adams Extension for Easy5, 33.

23. If you want to use this installation as a file server (so that other machines can install from it), share the installation directory.

Installing the Adams Controls Thin Client

The Adams Controls Thin Client is a subset of the full Adams installation. This client can be helpful to Easy5 or MATLAB users who want to:

1. Use TCP/IP communication when performing co-simulations with Adams Controls.
2. Generate an External System Library for Control System Import.

To install the Adams Controls Thin Client:

1. Follow steps Step 1 on page 48 through Step 6 on page 52.
2. In the Select Setup Type window, select **User Selectable**.
3. Select **Adams Controls Thin Client**, making sure no other products are selected.
4. Continue with Step 11 on page 54 and complete the remaining steps in the installation procedure.

Note:	You must install the Adams Extension for Easy5 to use the Adams Controls Thin Client.

Installing the Adams Extension for Easy5

> **Note:** This procedure is only necessary if you installed Adams Controls.

To run Adams and Easy5 together, you must install the Adams extension into Easy5. To import models into Adams that were exported from Easy5 (containing components from licensed Easy5 libraries), you must also configure your computer so that Adams knows how to find your Easy5 license. The following procedures explain how to do this.

To install the Adams extension for Easy5:

> **Note:** Check https://help.hexagonmi.com/ to find the versions of Easy5 that are compatible with Adams. Select the current version, for example **Adams 2023.1 - Online Help (HTML)** and go to **Release Guide -> Supported Versions of Integration Products**.

Installation of the Adams Controls Extension is performed automatically during the Easy5 installation process if Adams is previously installed, and you answer "Yes" to the installer prompt asking you to install this component.

To manually install the Adams Controls Extension:

1. Make sure that both Easy5 and Adams have been installed.

2. Make sure you have permission to add and modify files in the Easy5 installation directory. You need administrator privileges if the installation directory is located in "C:\Program Files".

3. Perform the following (As an administrator if Easy5 is installed in "C:\Program Files"):

   a. From the **Start** menu, point to **Programs**, point to **Easy5 <version>** and then left-click on **Easy5** to launch Easy5.

   > **Note:** To run Easy5 as Administrator, right-click on Easy5 and in the menu that pops up, under "More", select "Run as administrator". This will launch Easy5 as Administrator.

   b. From **File** menu in Easy5, Click on "Open Command Shell".

   c. At the prompt within the Easy5 command shell type:

   install_adams_controls.bat *<Adams_topdir>* %EZHOME%

   where: *<Adams_topdir>* is the top-level directory for Adams, also provided by "**adams2023_1-top**"; EZHOME is an environment variable available in Easy5 Command Shell and it points to the top-level directory of Easy5 (for example, C:\Program Files\MSC.Software\Adams\2023_1 C:\Program Files\MSC.Software\Easy5\2021.2, respectively).

4. Type **exit** to close the command window.

5. If you started Easy5, from the **File** menu, select **Quit**.

   The Adams extension installation is complete. Be sure to configure your computer as described next.

To configure your computer to run licensed exported Easy5 models within Adams:

1. Start Easy5.
2. From the **File** menu, select **Open Command Shell**.
3. At the prompt in the command shell, type **easy5x -license**.

   Easy5 displays the licensing information, beginning with the type of license and the server name (if a server license) or the path to the license file.

4. Write down the contents of the line that starts with **Active license file(s)**, and the value that appears in the line following it (for example, **27500@rainier**).

5. Perform one of the following:

   - If the line is **Active license file(s)** [**Easy5_LMD_LICENSE_FILE**], set the environment variable **Easy5_LMD_LICENSE_FILE** to the output value displayed in Step 4 above (for example, **27500@rainier**).

   - If the line is **Active license file(s)** [**MSC_LICENSE_FILE**], find the value of the environment variable **MSC_LICENSE_FILE** to see what license file Adams is using.

     - If Easy5 and Adams are using different licenses (or license servers), set **LM_LICENSE_FILE** to the value for the Easy5 license (for example **2500@bosco**).

     - If Easy5 and Adams are using the same license, your computer is configured properly.

6. For Windows platforms and when using Easy5 2013 or older, modify the Path environment variable to include the path to the lib_em64t_IF91 subdirectory (64 bit Easy5) or lib_nt_IF91 subdirectory (32 bit Easy5) of your Easy5 installation tree.

   - If your Easy5 (2013 or older) model contains components from a licensed library (for example, the Thermal-Hydraulic or Gas Dynamics libraries), you will need to make sure Adams finds your Easy5 license. Failure to perform this step will result in the Easy5 license library not being found.

   - The Easy5 model import feature in Adams (Adams importing an Easy5 library) is not supported with the GNU compiler. If GNU compiler is required, an FMI based interface is recommended (Adams importing an Easy5 FMU).

   To find the appropriate value for the variable:

   a. Start Easy5.

   b. Open an Easy5 command shell: from the Easy5 File menu, select Open Command Shell.

   c. At the command shell prompt, enter: echo %EZHOME%.

   The output is the directory in which Easy5 is installed. You will use the directory information in Step 5 below. The usual value of EZHOME is:

C:\Program Files\MSC.Software\Easy5\<version>

Note:	Check https://help.hexagonmi.com/ to find the versions of Easy5 that are compatible with Adams. Select the current version, for example **Adams 2023.1 - Online Help (HTML)** and go to **Release Guide -> Supported Versions of Integration Products.**

To apply the value of the environment variable:

a. From the **Start** menu, point to **Settings**, and then select **Control Panel**.

b. In the Control Panel dialog box, select the System icon.

c. In the System Properties dialog box, select the Advanced tab.

d. In the Advanced tab container, select Environment Variables.

Adams must know the path to the subdirectory of your Easy5 installation tree to be able to load ez5_lmgr.dll:

lib_nt_IF91 - For the Intel FORTRAN 10.1compiler.

e. Using the path from step 3, in the Environment Variables dialog box, append or create the path to the user variable as follows:

```
Variable Name = PATH
```

For the Intel FORTRAN 10.1compiler, enter the following, where <CURRENT_VALUE> is the current value of PATH:

```
Variable Value = <CURRENT_VALUE>; %EZHOME%\easy5x\lib_nt_IF91
```

and where the value of EZHOME is taken into account.

Installing Adams in Silent Mode (Batch)

By creating a batch setup file, you can automate the process of performing identical installs. You can customize this file with your preferred settings, put it on a server, and let other users perform their own installation using the same settings. This section shows you how to create and run the batch file.

To create the batch setup file:

1. From the **Start** menu, select **Run**.

2. In the Run dialog box, enter the following:

   C:\temp\adams2023_1_windows64.exe -r -f1"*c:\temp\mysetup.iss*"

Important:	No space between "**f1**" and "**c**".

   where:

   - **C:** is the location of your **adams_2023_1_windows64.exe** file
   - **f1** is a lower-case **f** and the number **1**
   - *c:\temp\mysetup.iss* is the location and name of the batch setup file

3. Select **OK**.

4. Follow the installation instructions in the section, Installing Adams, 48.

   The batch installation file (*.iss*) is created.

To perform a batch installation:

1. Check the contents of the batch setup *(.iss)* file to make sure that it contains the correct installation directory location. For example, if it specifies
   D:\Program Files\MSC.Software\Adams\2023_1 as the install directory, and you don't have a **D:** drive, you can change it to **C:\Program Files\MSC.Software\Adams\2023_1.** See Figure 5-12 on page 64.

2. In a command window, enter the following command:

   C:\temp\adams_2023_1_windows64.exe -s -f1"*c:\temp\mysetup.iss*"

Important:	No space between "**f1**" and "**c**".

   where:

   - **C:** is the location of your **adams_2023_1_windows64.exe** file
   - **f1** is a lower-case **f** and the number **1**
   - *c:\temp\mysetup.iss* is the location and name of the batch setup file.

```
[InstallShield Silent]
Version=v7.00
File=Response File
[File Transfer]
OverwrittenReadOnly=NoToAll
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-DlgOrder]
Dlg0={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdWelcome-0
Count=10
Dlg1={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdCustomerInfo-0
Dlg2={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-MSC_SetupType3-0
Dlg3={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdStartCopy-0
Dlg4={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-MSC_License-0
Dlg5={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-0
Dlg6={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-1
Dlg7={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-2
Dlg8={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-3
Dlg9={D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdFinish-0
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdWelcome-0]
Result=1
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdCustomerInfo-0]
szName=buildadm
szCompany=MSC Software Corporation
nvUser=1
Result=1
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-MSC_SetupType3-0]
szDir=C:\Program Files\MSC.Software\Adams\2023_1        ← Installation Directory
Result=301
SetupType=501
SetupName=Full
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-SdStartCopy-0]
Result=1
[Application]
Name=Adams
Version=18.1.0
Company=MSC Software Corporation
Lang=0009
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-MSC_License-0]
szEdit1=27500@yoda        ← License server
Result=1
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-0]
Result=1
Sel-0=1
Sel-1=0
[{D6D7D44A-7056-4EAF-9B63-2691B41583DA}-AskOptions-1]
Result=1
Sel-0=1
Sel-1=1
Sel-2=1
```

Figure 5-12   Sample setup.iss file

6   Licensing on Windows

- Overview
- Licensing Basics
- Specifying your License
- Replacing Codes (Licenses) on an Existing Windows Server
- Customizing End-User License Administration

Overview

Adams products use a license server to manage the access to its products. Therefore, before you can run the products you just installed, you must license them. The next sections explain more about Adams licensing, the initial licensing options, and how you can manage the licensing after you've initially licensed the products.

Licensing Basics

You can license Adams products in the following ways:

- **Set up a license server** that is available to your users through the network, and set up the number of users who can use Adams. The number of users who can run Adams concurrently depends on the number of licenses you purchased. Refer to your password certificate for information on the number of users who can run Adams.

  You can run the license server on one machine or on three. We strongly recommend that you use a one-server configuration, however. If you select a three-server configuration, the machines act as backups to the other machines. You must install passwords on all of the server machines to set up a three-server configuration.

  You can select to load only the licensing tools on the license server and install the Adams products only on the clients.

  You also can set up the licensing so that it is locked to a particular machine or node. If your Adams licensing is node-locked, then users can only run Adams products on that machine. To see if you have purchased node-locked licensing, refer to your password certificate.

- **Set up a client** using an existing license server.

In both cases, the procedure for licensing Adams is the same.

Specifying your License

You typically specify the license for Adams during the installation procedure (see Step 13. on page 55). However, you can modify the license type, location, or name at any time following the installation.

If you already installed Adams on your network and have a license server running, you can enter the hostname and TCP/IP port number of the license server to run Adams from that license server.

For Adams installations, the TPC/IP port number defaults to 27500 and is in the following format, where *hostname* is the name of the host:

> *27500@hostname*

If you do not know the name of the host, enter the command **hostname** at a command prompt. Or, you can refer to the **SERVER** line of your password certificate/license file.

To specify or modify Adams licensing:

1. From the **Start** menu, point to **Programs**, point to **Adams 2023.1**, and then select **Settings & License**.

2. Select **Licensing**.

3. In the **licenseFile** field enter the name of the license server or the path to your license file.

4. Select **OK.**

Replacing Codes (Licenses) on an Existing Windows Server

Follow these steps if you have an existing Adams installation and have received new codes (as a renewal, change, and so on).

To update your passwords:

1. Place the new codes as a license file in the same directory as the existing **license.dat** file. Name it **license_new.dat**. Change the **SERVER** and **DAEMON** lines in the new license file to include the same port number, server name, and paths as the existing file. For example:

   SERVER server1 123465 27500

   DAEMON MSC c:\Program Files\MSC.Software\MSC.Licensing*XX.x*\MSC.exe

   Where *XX.x* is a current version. For example:

   c:\Program Files\MSC.Software\MSC.Licensing*11.13*\MD.exe.

2. Use Windows Explorer to rename the existing **license.dat** file to **license_old.dat**, and the new file to the current license file name (**license.dat**).

3. Run **lmtools.exe**, and then select **Config Services**.

4. Select the appropriate license server in the box below (if you have more than one).

5. Select the **Start/Stop/Reread** tab.

6. Select **ReRead License File**.

This should re-read the **license.dat** file and enable your new licenses. If there is a problem, or if the licenses are still not available, restart the system.

Customizing End-User License Administration

You can use the daemon options file provided with the license manager to customize the installation. This option file allows the end-user to:

- Reserve licenses for specified users or groups of users.
- Restrict the use of the software to certain people.
- Set software time-outs.
- Log activity for use with an optional report writer.

7   Running Adams Products

Starting Adams Products

This sections described how you can start your Adams products on Linux and on Windows.

Starting Adams Products on Linux

The Adams Toolbar is a starting point to using Adams products on Linux. The toolbar is shown below.

Adams Toolbar tool - Right click to set up Toolbar, manage memory models, access online help and Technical Support resources and more

Product tools - Click to run product or right-click to configure products and create user libraries.

Hold the cursor over a tool to see the name of the associated product.

Figure 7-1   Adams Toolbar

You can also use the Adams Toolbar to:

- Customize, keep track of, and organize multiple libraries of standard Adams products
- Create binaries
- Manage custom memory models and product preferences

For more information on these or other Adams Toolbar operations, see the Running and Configuring online help (from the **Help** menu in any product, select **Adams Help**, near the top of the pane on the left, select **Configuring Adams**).

To start a product on Linux:

1. To display the Adams Toolbar, at the command prompt, enter the command **adamsx** where *x* is the version number, for example **adams2023_1.**
2. Click on the tool representing the product you want to start.

Note:	We recommend that you use the Adams Toolbar to start your Adams products, but if you want to automate certain operations, use the text-based Program Menu. For more information, see the Running and Configuring online help.

Important:	**Remote access tools to Linux machine**
	X terminal is a display/input terminal for X Window System client applications. Many X terminal tools are available to display X client applications on remote Windows machines. Running Adams with such tools doesn't guarantee a good graphics experience for remote Linux OS machines. Hexagon recommends the use of NoMachine for the best chance of mitigating these issues.

Starting Adams Products on Windows

You start any Adams product from the Start menu. You can also use the Start menu to:

- Change your license type
- Generate problem reports
- Set Adams preferences

For more information on these or other operations, see the Running and Configuring online help.

To start a product on Windows:

- From the **Start** menu, point to **Programs**, point to **Adams 2023.1**, point to the name of the product you want to start.

Note:	Adams start up command has been changed from "**adams2023_1_x64**" to "**adams2023_1**". The "**MSC.Software**" folder from Start "**All Programs**" has been dropped."

Tip:	Select the corresponding desktop icon for the product, if you installed it on your desktop.

To start a product from DOS shell in Windows:

- **Start → Programs → Adams 2023.1 → Command Prompt.**
- An alternative is to add the **/bin** directory under the Adams installation directory to your user PATH environment variable. You can do this via the Control Panel:

a. Type **environment** in the Control Panel search box.

b. Select the **Edit environment variables for your account** pick.
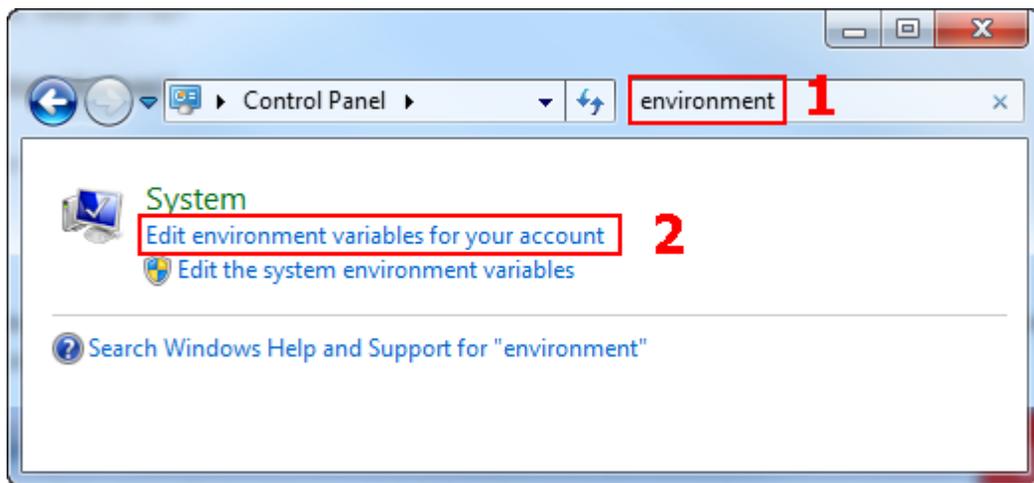
Figure 7-2   Navigation to Edit Environment Variables

- Check to see if you already have a PATH variable defined under "**User variables**". If it exists then edit it, add a semicolon ";" to the end of the existing value, and then add the "bin" directory under the Adams installation directory. Otherwise select **New...**, use PATH for the variable name and add the "bin" directory under the Adams installation directory as the value. The default location of this directory is:

```
C:\Program Files\MSC.Software\Adams\2023_1_XXXXXX\bin
(where XXXXXX denotes the build number)
```

- Once you are done click **OK**.

Note:	Windows appends your User PATH to the System PATH environment variable, so there is no need to copy the existing System PATH variable to your user PATH variable. This behavior is unique to the User PATH variable. For all other environment variables, a User variables definition overrides a System Variables definition.
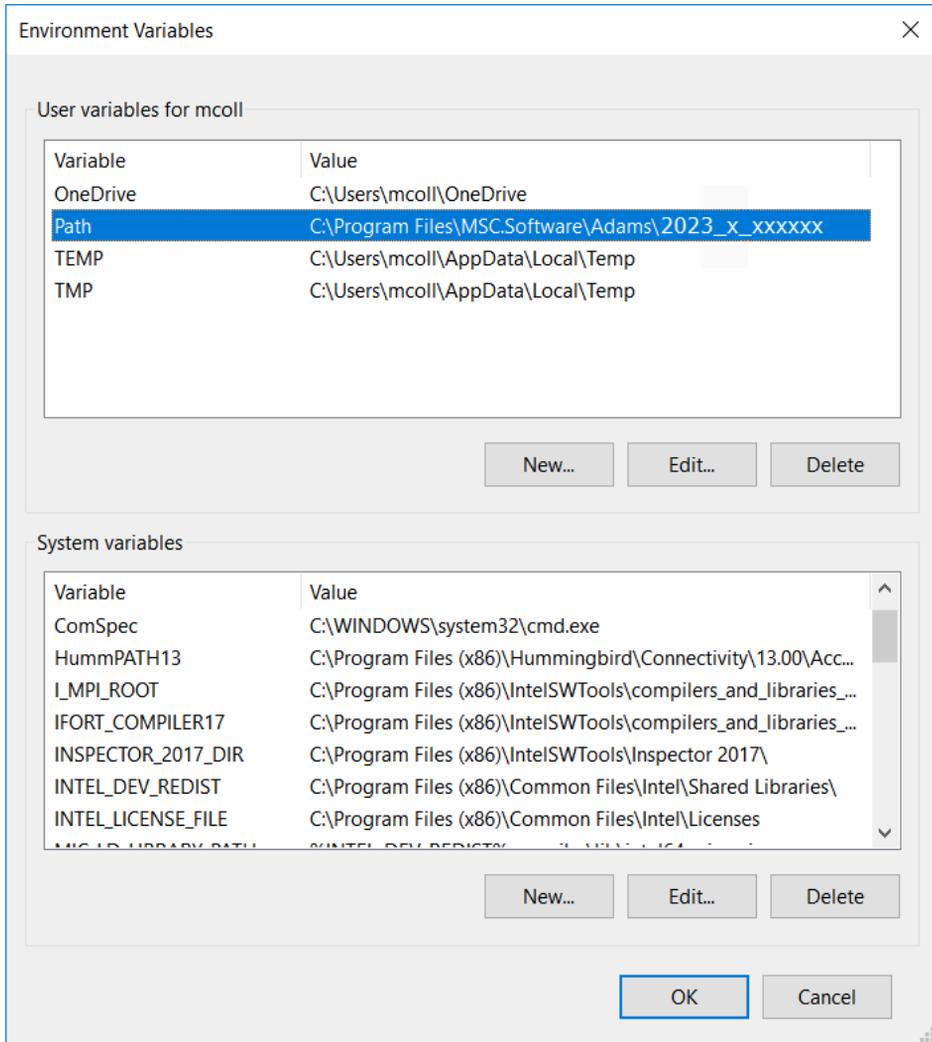
Figure 7-3   Editing Environment Variables

Setting Preferences

This section describes how you can set preferences, such as your working directory, graphics setting, and memory model size.

Setting Preferences on Linux

You use the Adams Registry Editor from the Adams Toolbar to set a variety of preferences. For information on the preferences you can set, see the Running and Configuring online help.

To display the Registry Editor:

- From the Adams **Toolbar**, right-click any product tool, and then select **Change <Product Name> Settings**.

Setting Preferences on Windows

You use the Settings menu to modify:

- Graphics settings
- Licensing
- Memory model size

To display the Settings dialog box:

- From the **Start** menu, point to **Programs**, point to **Adams 2023.1**, and then select **Settings & License.**

Setting Your Working Directory

During a session in a default or custom product, you can select the directory where you want to place your model and output files.

For Adams View, you can set the working directory from the Welcome dialog box.

To set your working directory:

1. From the **File** menu, select **Select Directory**.
2. In the dialog box that appears, select the working directory.

Using Distributed Computing for Nonlinear Adams Flex Bodies

Overview

When constructing a model containing nonlinear flexible bodies using Adams MaxFlex the model can be configure to distribute the computing effort across multiple hosts by specifying Compute Resource hostnames for the nonlinear flex bodies. A prerequisite for a simulation utilizing Compute Resource hosts is that those hosts have been properly configured.

Before an Adams simulation is able to utilize distributed computing some network daemons must be started. On a host on the local network a process called a Directory Service Server needs to be running. In addition, a process called a Starter Daemon needs to be running on each compute host. When needed the Starter Daemon process on a compute host will start one or more NLFE services. The figure below shows a diagram of the relationship between Adams Solver, the network daemons, and the NLFE service.
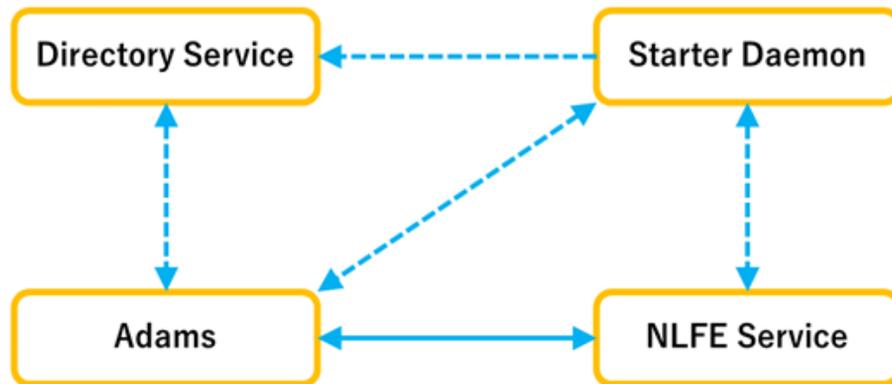
Figure 7-4   Adams Solver, Network Deamons and NLFE service links

The **Directory Service** runs in a thread inside client kernel and is listening. This functions as a broker between the Adams Solver process and the Starter Daemon on an external host. The Starter Daemon registers itself with the Directory Service when it starts. The Directory Service keeps a list of registered hosts along with their credentials. Later when Solver is connecting to an external host it starts by contacting the Directory Service to obtain the host's credentials. The Directory Service runs automatically when required.

The **Starter Daemon** is a process that, when requested, starts up instances of services installed on a remote host. Adams utilizes the Starter Daemon to start the NLFE service when required. A running Starter Daemon is needed on each host that an Adams model utilizes. Only one Starter Daemon should be run on any given host.

Adams- NLFE Client Manager

The Adams NLFE Client Manager is a tool used to start and stop the Starter Daemon on a host.
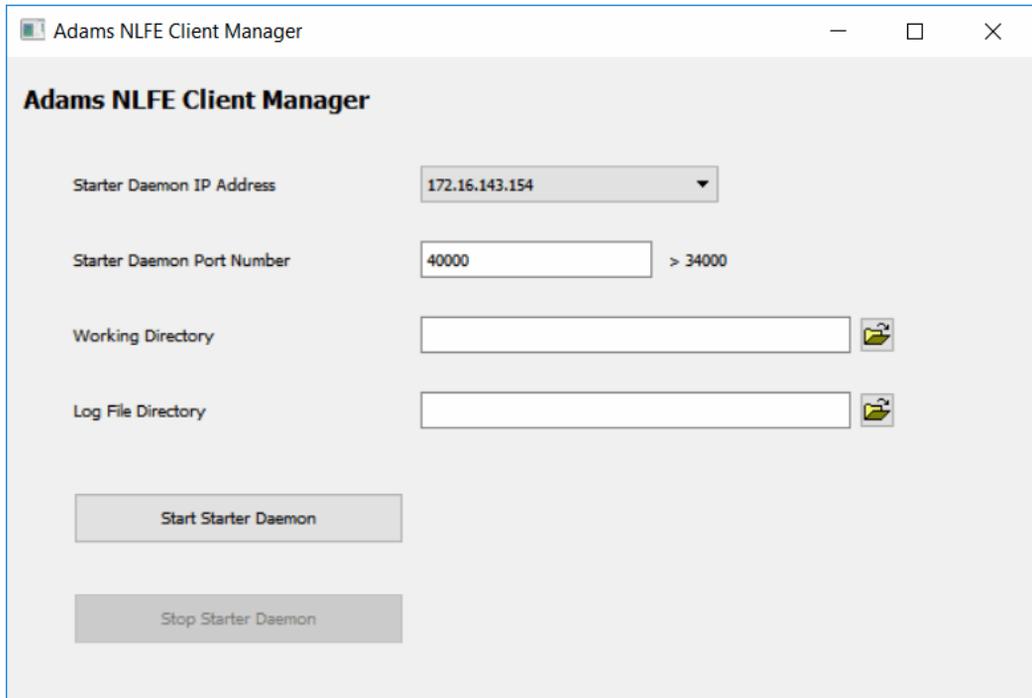
Figure 7-5   Adams NLFE Client Manager Dialog Box

Starting Adams - NLFE Client Manager

On Windows start the Client Manager from the Windows menu:
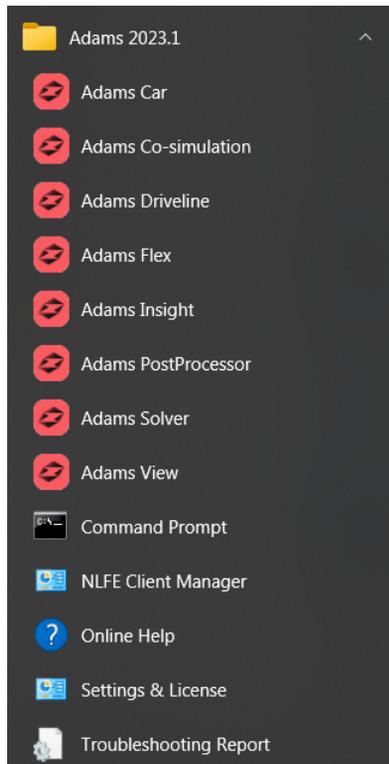
Figure 7-6   Starting Adams - NLFE Client Manager

%: adams<version> -clientmanager

Where, <version> is replaced with the actual string of the version of Adams installation, that is, 2023_1.

Starting a Starter Daemon

Start a Starter Daemon by logging onto the host where the demon is to run and starting the Adams NLFE Client Manager. Then specify a Starter Daemon IP Address, Port Number, enter or browse for a Working Directory, enter or browse for a Log Directory, and then push the "Start Starter Daemon" button. After a few seconds the Start Starter Daemon button will become grayed out and the Stop Starter Daemon button becomes enabled. For best performance, the Working Directory should be on a fast physical drive on the host machine. IP Address is set automatically but you may need to change it if it's not suitable when the machine has multiple addresses. The default of the Working Directory is the current directory and the Log Directory is the Working Directory. The process name for the Starter Daemon is SDServer. After you have started the daemon close the Client Manager.
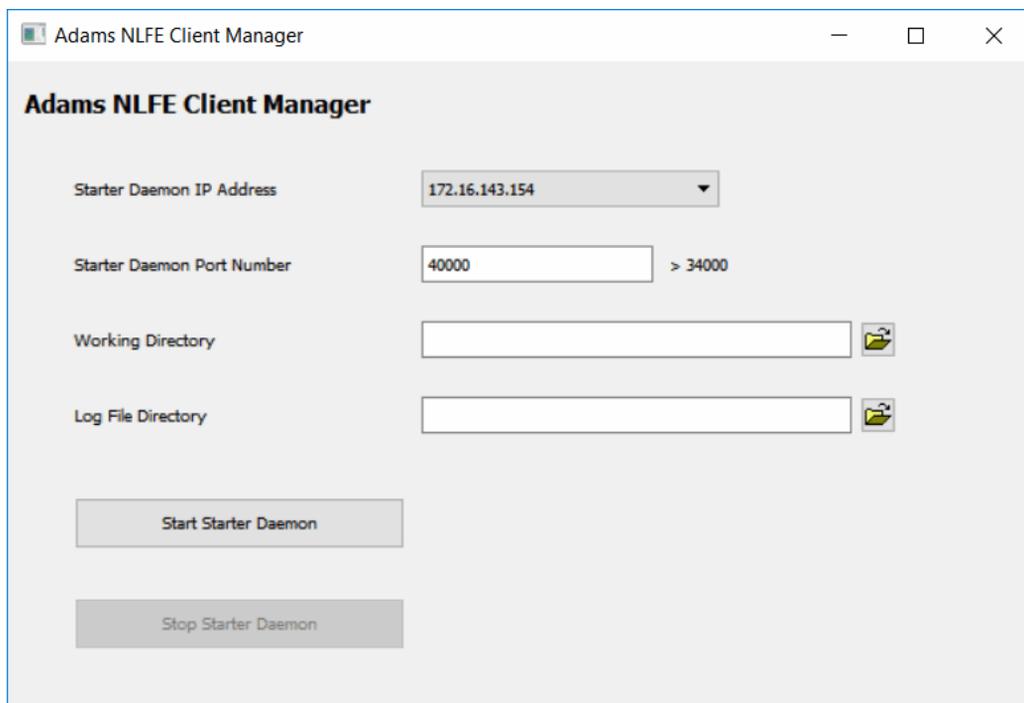
Figure 7-7   NLFE Client Manager: Start and Stop Starter Daemon

IP Address and Port Number of Directory Service and Starter Daemon

IP Address and Port Number have to be defined correctly for the communication between Directory Service and Starter Daemon. The IP Address field is a pulldown menu of valid IP addresses. IP Address is set automatically on both services and Port Numbers of Directory Service and Starter Daemon are set to 45000 and 40000 as default, respectively. If the machine has multiple addresses and the IP Address is not suitable or the Port Number is busy, both can be changed as follows.

- Directory Service (Adams platform)

    Set the environment variables in ACF file, MSC_ADAMS_NLFE_SET_DSADDR and MSC_ADAMS_NLFE_SET_DSPORT respectively. The applied values can be shown as DS_ADDR and DS_PORT in DSC.xml file that is exported in the current directory during the analysis.

- Starter Daemon (NLFE platform)

    Change the values using the NLFE Client Manager. One needs to stop the daemon first, change the values and then start again. When the Port Number is changed (to something other than the default of 40000), it's required to specify the number via the COMPUTE_RESOURCE option in a FLEX_BODY statement, for example:

```
FLEX_BODY/5
, MATRICES = 1, 2, 3, 4
, BDF_FILE = sample.dat
, COMPUTE_RESORCE = linux_box:42000
```

Add a colon (":") between the machine name and the Port Number as shown above.

High Performance Computing Considerations

Intel® SpeedStep for Windows 10

For computers running Windows 10 we have found Intel's SpeedStep to be enabled by default. Furthermore, we have mixed results in Adams Solver performance in our testing of the SpeedStep setting. Some models run slightly faster, but other models run slightly slower when SpeedStep is enabled versus disabled. Thus, we cannot make a recommendation for SpeedStep setting on Windows 10. We suggest keeping the default (Enable) unless you have another reason to disable it. In which case, depending on the model you may only see a slight increase or decrease in Solver performance.

When SpeedStep is enabled, another setting called Minimum Process State is available in Processor Power Management. In our testing we have found that between 5% (default setting for Balanced Power Management) and 100% (default setting for High Performance), there is essentially no difference in Adams speed.

Intel® Hyper-Threading Technology

Intel® processors provide a logical setting for hyper-threading technology (HTT) that can use physical CPU resources more efficiently. Logical processors are the number of physical cores times the number of threads that can run on each core through the use of HTT. Currently, HTT supports two threads per core, so on a 4-core processor, one can have 8 logical processors with HTT activated.

Adams and even the operating system does not provide an option to control the setting of HTT. This can only be done in the BIOS. Most of not all modern systems that employ an Intel logical processor has this setting activated by default.

In our testing it has been found that Adams simulation speeds may improve up to 20% with HTT turned OFF due to the additional logical overhead in HTT. Thus, for Adams performance, it is recommended to have HTT turned OFF in general. One can view the current setting of HTT using the **lscpu** command on Linux, or from the Windows Task Manager.

8

Linux Administration and Configuration

Overview

This chapter describes some basic administration and configuration operations you might want to perform after you install the Adams products, and others that you might need to perform periodically as you obtain new passwords. These operations include the following:

-
-

Setting Up the Client Machine

If you did not install the Adams software as root, you need to make Adams available to all the users by creating a link from a user directory to the installation directory.

To set up a client machine:

1. Mount the Adams installation directory from the central file server to each machine that is going to run Adams.

2. Create a startup command on **each** user's machine in the directory of your choice, using the commands:

   ```
   ln -s /install_dir/mdi adams2023_1
   ```

   This link must be created in a directory that is in the user's path. Check the Path environment variable to see the directories that are already in the user's path.

Updating Passwords

If you receive new passwords from Hexagon, follow the instructions below to update your passwords. If you receive new software along with the passwords, you should follow the complete installation instructions in

Note:	If the license server started with root, you must be root to stop and start it.

The following are two ways to update your passwords:

-
-

Using the Adams Installation Script

To update passwords using the installation script:

1. Log on to the Adams license server.
2. Move to Adams installation directory.
3. Start the installation program **INSTALL.ADAMS**.
4. At the prompt, enter **3** to select the option, **Stop the Adams license server(s)**.
5. At the prompt, enter **1**to select the option, **Install Adams passwords on this license server**.
6. Enter the new passwords by entering the name of the file containing the passwords.
7. At the prompt, enter **2**to select the option, **Start the Adams license server on this machine**.

Updating Outside the Installation Script

To update passwords outside the installation script:

1. Place the new codes as a license file in the same directory as the existing **license.dat** file. Name it **license_new.dat**. Change the **SERVER** and **DAEMON** lines in the new license file to include the same port number, server name, and paths as the existing file. For example:

   SERVER server1 123465 27500

   DAEMON MSC /msc/flexlm/bin/md

2. Rename the existing **license.dat** file to **license_old.dat**, and rename the new file to the current license file name (**license.dat**):

   # mv license.dat license_old.dat

   # mv license_new.dat license.dat

3. Use the **lmreread** command to force the lmgrd daemon to reset using the new license file.

   # *flexlm_install_dir/lmreread -c <path>/license.dat*

where *flexlm_install_dir* is the directory where FLEXlm is installed.

Note:	If you do not have an **lmreread** executable, copy **lmdown** and name it **lmreread**

You should now be able to run Adams products using the new licenses. If this fails, kill and restart the daemons as follows:

flexlm_install_dir/lmdown -c <path>/license.dat

flexlm_install_dir/lmgrd -c <path>/license.dat

9   Troubleshooting

- Overview
- Troubleshooting on Windows
- Troubleshooting on Linux

Overview

This chapter describes how to generate problem reports to send to Adams Technical Support. It also lists some common problems that can occur when installing, updating, and running Adams software, and recommends solutions to those problems.

- Troubleshooting on Windows, 93
- Troubleshooting on Linux, 96

If you do not find your problem in this chapter or if the recommended solution does not solve your problem, then:

- Refer to the Adams Technical Articles at http://simcompanion.hexagon.com
- Contact Adams Technical Support as explained in Getting Help, 7.

Troubleshooting on Windows

Generating Problem Reports

You can generate a report that examines your system configuration and places important debugging information in the file *adams_problem_report.txt*. If you have problems running Adams, you can generate this report and review it or send it to Adams Technical Support by fax or e-mail. As you review the report, refer to the sections in this chapter for explanations of many of the error messages that appear in the report.

Note:	For correct results, you must run the problem report from the license server, not the client machine.

To generate and review a report:

1. From the **Start** menu, point to **Programs**, point to **Adams 2023.1**, and then select **Troubleshooting Report**.

   Adams creates a problem report in your home directory.

2. To review the report, open it into a text editor, such as Notepad.

Obtaining New Passwords

If you need new passwords, you can obtain them by calling your Hexagon Sales Administrator.

When requesting new passwords, provide the following information:

- Request number and Schedule 1 number (**Sched 1 #**) from your password certificate. The request number is at the top of the certificate and the Schedule 1 number is in the **Administrative** Information section.
- System ID and host name of your CPU. Instructions for obtaining this information for your particular CPU are in the hardware and software specifications.

Windows Security Alert

By default, all newer Windows operating systems enable the Windows Firewall to block certain common software interaction patterns frequently used within Adams. So, when running Adams products for the first time with this installation you might get a Windows security alert like the ones shown below (users with administrator privileges will see something like the image on the left; other users will see something like the image on the right).
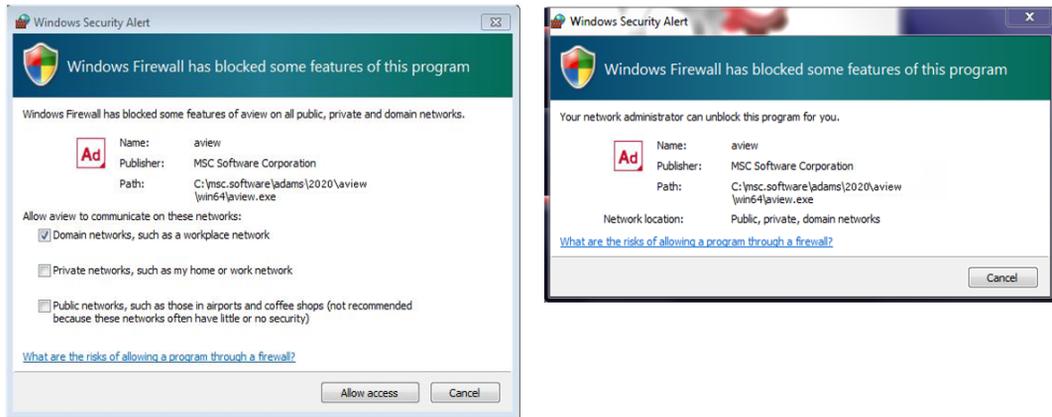
Figure 9-1   Windows Security Alert

The actions, when run for the first time in a given installation of Adams, known to MSC to trigger this alert are:

- Launch of Adams View or Adams View based products like Adams Car and Adams Driveline; Windows security alert will reference "aview"
- Creation of linear (modal) flexible body via Adams ViewFlex; Windows security alert will reference "remotebootstrap.exe"
- Creation of a nonlinear flexible body via import of a BDF; Windows security alert will reference "remotebootstrap.exe"
- Execution of a co-simulation via the Adams Co-simulation Interface (ACSI); Windows security alert will reference "ACSI_Gui.exe"

To fix this permanently, click **Allow access**. This will add the particular Adams component (for example, "aview" or "remotebootstrap.exe") to the Windows Firewall **Allowed Program** list and this dialog will no longer display for the given version of Adams installed on the machine. Note that you need an Administrator access to make this change.

To manage the Windows Firewall on your machine go to **Control Panel → Windows Firewall**.

Non-ASCII Character User Names

Adams supports ASCII characters in the setting of adams working directory. It does not allow non-ASCII characters in the temporary path set for Adams.

In case of non-ASCII character machine profile user name, use below workaround:

- Set the working directory path that contains only ASCII characters user name
- Set the environment variables TEMP/TMP that contains only ASCII characters directory path

Font Cache Directory

Launching Adams PostProcessor and creating pages in it takes a very long time on Windows Adams installations using client-server architecture using SAMBA with ADMIN privilege (or With Restricted User Profile). The issue is related to the font information cache files for applications using `fontconfig` file for their font handling. The fonts directory is scanned for font files. A cache is created which contains properties of each font and the associated filenames. By default, the font cache directory is created when Adams is installed.

Font cache directories created using SAMBA get admin privileges applied. Other users will not have writable permission to this folder which is required to launch Adams 2018 PostProcessor and later versions.

The workarounds are:

- Delete the cache folder from the installation directory, so that Adams will recreate cache folder in the user profile directory.
- Have an admin change the permissions of this folder in installation directory, so that other users could overwrite this file.

Troubleshooting on Linux

Generating Reports and Verifying Software

The installation program provides two options for performing troubleshooting operations.

- **Generate a problem report** - Examines your system configuration and places important debugging information in the file **PROBLEM.RPT**. If you have problems running Adams, you can generate this report and review it or send it to Adams Technical Support by fax or e-mail.

  > **Note:** For accurate results, you must run the problem report from the license server, not the client machine.

- **Check hostid on the system** - Returns the hardware identification number from the system that is used for Adams licensing. This identification number is also included in the problem report.

To generate a problem report:

- From the installation program menu, enter **5** to select the option, **Generate a problem report**.

  If you do not have write permission in the working directory, you will be prompted to enter another directory in which to write the files.

To check hostid on the system:

- From the installation program menu, select **6** to select the option, **Check hostid on this system**.

Obtaining New Passwords

If you need new passwords, you can obtain them by calling your Hexagon Sales Administrator.

Please provide the following information:

- License agreement number and Schedule 1 number (**Sched 1 #**) from your password certificate. The license agreement number is in the License Contract Information section of the password certificate and the Schedule 1 number is in the **Administrative Information** section of the password certificate.
- System ID and host name of your CPU. Instructions for obtaining this information for your particular CPU are in the hardware and software specifications.

About License Server System Resources

The Adams license server runs two processes: `lmgrd` and `MSC`. These processes do not require significant CPU use even for a large number of licenses.

Each time an Adams product talks to the license daemons, a process file descriptor is used. It is very rare that normal Adams license transactions would use up all of the available process file descriptors. The process file descriptor is allocated by a TCP socket. If you have a large number of licenses (200+), you should confirm

that the number of sockets and process file descriptors limitations for your system is adequate to handle all of the licenses. See your operating system's documentation for the maximum number of file descriptors available on the system designated as your Adams license server.

The license server writes a debug log file as it runs. It writes an entry for each license request and return. If the file becomes too large, you can edit the log file periodically.

The Adams license daemons send small amounts of data across the network. Each license transaction requires approximately 1 KB of data. If there are a lot of transactions (in the hundreds), the network bandwidth use can become significant. If this happens, you should consider keeping the license server on the same local area network as the one being used for the Adams products.

Allocating Disk Space for Temporary Files

You can change the location of temporary files created when running Adams. By defining the environment variable TMPDIR, you can point to a file system that has enough disk space to hold your temporary files. You must select a file system that has space and a directory that you have write permissions for. For example, if you are using a Linux C-shell you would add the following line to your **.cshrc** file:

setenv TMPDIR /new_location

10 Linux Installation Roadmaps

Overview

This appendix describes the overall steps or roadmaps that you perform to install Adams products depending on your network configuration. Use these roadmaps to guide your installation. For complete installation and licensing instructions, see Installing Adams on Linux for more information. The roadmaps are:

- File Server, License Server, and Client - Same Machine, 101
- File Server and License Server - Same Machine, Client - Different Machine, 102
- File Server and Client - Same Machine, License Server - Different Machine, 103
- File Server, License Server, and Client - Different Machines, 104
- File Server - Different Machine, License Server and Client - Same Machine, 105
- Different Linux Platforms - Heterogeneous Network, 106

For assistance in determining which roadmap to follow, see Table 10-1. It lists the seven types of configurations and the page that contains the roadmap for performing installation and licensing for that type of configuration. If your configuration is not in the table, review the options in each chapter and choose the ones that best fit your needs.

Table 10-1   Types of Installation and License Configuration

If the file server is:	The license server is:	The client is:	Then follow roadmap on:
Same machine	Same machine	Same machine	page 101
Same machine	Same machine	Different machine	page 102
Same machine	Different machine	Same machine	page 103
Different machine	Different machine	Different machine	page 104
Different machine	Same machine	Same machine	page 105
Differing Linux platform(s) on any of the machines (heterogeneous network)			page 106

File Server, License Server, and Client - Same Machine

This type of installation is typical of a single machine on a network. Only one engineer uses Adams so the installation is placed on that person's machine.

Table 10-2   Roadmap When All Same Machine

Do the following:	For more information, see the section:
1. Log on to the Adams user's workstation.	--
2. Create an installation directory.	Creating the Installation Directory, 22
3. Install Adams.	Installing Adams, 23
4. Install network passwords.	Licensing Adams When File and License Server Are Same Machine, 40
5. Start the license server.	Starting the Adams License Server, 42
6. Modify the system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
7. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

File Server and License Server - Same Machine, Client - Different Machine

This type of installation is typical of larger networks, where there may be one-to-many Adams users. Because there is more than one Adams user, a central server is used as both file server and license server. The Adams users work on personal machines, and access the software across the network using NFS.

Table 10-3   Roadmap When Only Client Different

Do the following:	For more information, see the section:
1. Log on to the central server.	--
2. Create an installation directory.	Creating the Installation Directory, 22
3. Install Adams.	Installing Adams, 23
4. Install network passwords.	Licensing Adams When File and License Server Are Same Machine, 40
5. Start the license server.	Starting the Adams License Server, 42
6. Modify the system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
7. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

File Server and Client - Same Machine, License Server - Different Machine

This type of installation is typical of a large network where central servers have been designated as license servers. Adams users work on personal machines and access the software locally to increase performance

Table 10-4	Roadmap When Only License Server Different
Do the following:	**For more information, see the section:**
1. Log on to the Adams user's workstation.	--
2. Create an installation directory.	Creating the Installation Directory, 22
3. Install Adams.	Installing Adams, 23
4. Exit from the installation program.	--
5. Log on to the license server machine.	--
6. Create a directory for Adams on the license server.	Creating the Installation Directory, 22
7. Install Adams.	Installing Adams, 23
8. Install network passwords, which unloads license software.	Licensing Adams When File and License Server Are Different Systems, 41
9. Start the license server.	Starting the Adams License Server, 42
10. Modify the system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
11. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

File Server, License Server, and Client - Different Machines

This type of installation is typical of a large network where central servers have been designated as file servers and license servers. Adams users work on personal machines, and access the software across the network using NFS.

Table 10-5   Roadmap When All Different Machines

Do the following:	For more information, see the section:
1. Log on to the central NFS server.	--
2. Create an installation directory.	Creating the Installation Directory, 22
3. Install Adams.	Installing Adams, 23
4. Exit from the installation program.	--
5. Log in to the license server machine.	--
6. Create a directory for Adams on the license server.	Creating the Installation Directory, 22
7. Install Adams.	Installing Adams, 23
8. Install network passwords, which unloads license software.	Licensing Adams When File and License Server Are Different Systems, 41
9. Start the license server.	Starting the Adams License Server, 42
10. Modify the system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
11. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

File Server - Different Machine, License Server and Client - Same Machine

This type of installation is typical of a medium-sized network where a departmental NFS server is used. A single Adams user works on a personal machine, and accesses the software across the network through NFS. The Adams user's machine also acts as the license server.

Table 10-6   Roadmap When License Server and Client are the Same Machine

Do the following:	For more information, see the section:
1. Log on to the central NFS server.	--
2. Create an installation directory.	Creating the Installation Directory, 22
3. Install Adams.	Installing Adams, 23
4. Exit from the installation program.	--
5. Log on to license server and client.	--
6. Mount Adams installation directory from file server on license server system through NFS.	--
7. Create a directory for Adams on this machine.	Creating the Installation Directory, 22
8. Install Adams	Installing Adams, 23
9. Install network passwords.	Licensing Adams When File and License Server Are Different Systems, 41
10. Start the license server.	Starting the Adams License Server, 42
11. Modify system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
12. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

Different Linux Platforms - Heterogeneous Network

This situation is similar to the previous, except that multiple platforms may be involved. The license server can be Linux or Windows. However, the file servers must be homogeneous. In other words, the Linux file servers can only serve Linux clients, and Windows file servers can only serve Windows clients. You can use different Linux platforms for clients as long as the files for their platforms have been loaded onto the file server. Note that you may experience degraded performance for a Windows client due to network issues

Table 10-7   Roadmap for Heterogeneous Network

Do the following:	For more information, see the section:
1. Log in to the central NFS server.	--
2. Install Adams.	Installing Adams, 23
3. Exit from the installation program.	--
4. Repeat Steps 1 through 4 for any additional platforms and file servers.	--
5. Log in to the license server machine.	--
6. Create a directory for Adams on this machine.	Creating the Installation Directory, 22
7. Install Adams	Installing Adams, 23
8. Install network passwords.	Licensing Adams When File and License Server Are Different Systems, 41
9. Start the license server.	Starting the Adams License Server, 42
10. Modify the system startup procedures so they include the restarting of the Adams license manager.	Restarting the Adams License Daemons, 43
11. Generate a troubleshooting report to verify that all products and files were properly installed.	Verifying a Successful License, 45

12 dSPACE SCALEXIO® Configuration guide for Adams Real Time

In order to run Adams FMU on dSPACE, you will need to update the SCALEXIO firmware to 2021-A, install dSPACE Hypervisor extension, and configure a Linux based virtual machine for running inside the dSPACE Hypervisor extension. The following steps will guide you through this process.

1. Acquire new flashcard from dSPACE to configure SCALEXIO for 2021-A and update firmware. Contact dSPACE Support for more information.

2. Installation of Hypervisor and Ubuntu 18.04 OS

   https://www.dspace.com/en/pub/home/support/documentation.cfm?helpsetid=SCALEXIOHypervisorExtensionGuide&externalid=Topic_97d999d8-e66f-4bda-be85-b6939d7c9ffe_--_&Language=en-us&Release=RLS2021-A

Note:	You will need a my dSPACE ID to access the link above.

   Contact dSPACE support for assistance with Installation of Hypervisor and the Ubuntu Operating System

3. Setting up network and DNS on Ubuntu 18.04

   DNS Servers - (Ask your IT for latest information on this if not known)

   DNS suffix - (Ask your IT for latest information on this if not known)

   Gateway - (Ask IT for latest information on this if not known)

4. Ubuntu VM configuration

Refer to the following link in the dSPACE 2021-A User Manual for configuration of Ubuntu VM. It is highly recommended to use Ubuntu 18.04 to run Adams.

https://www.dspace.com/en/pub/home/support/documentation.cfm?helpsetid=SCALEXIOHypervisorExtensionGuide&externalid=Topic_0b5482a1-82f0-4aa8-b7c8-4bd067a981c8_--_&Language=en-us&Release=RLS2021-A

Note:	You will need a mydSPACE ID to access the link above.

Note that at a minimum, the RTOS (linux32) needs 2 CPUs to run. Adams requires at least 2 CPUs to run on Ubuntu OS. However, Adams will run faster if more cores are assigned to Ubuntu OS.

5. Setup a shared filesystem between Ubuntu and 32-Bit Linux OS

Refer to the following link in the dSPACE 2021-A User Manual.

https://www.dspace.com/en/pub/home/support/documentation.cfm?helpsetid=SCALEXIOHypervisorExtensionGuide&externalid=Topic_1eab0357-12cb-4dac-b817-243222eb2dfa_--_&Language=en-us&Release=RLS2021-A

Note:	You will need a mydSPACE ID to access the link above.

6. Install Hypervisor Tools on Ubuntu for shared memory Libraries

Refer to the following link in the dSPACE 2021-A User Manual.

https://www.dspace.com/en/pub/home/support/documentation.cfm?helpsetid=SCALEXIOHypervisorExtensionGuide&externalid=Topic_15a0a029-c9b7-4f32-a6b8-d08b28ab381e_--_&Language=en-us&Release=RLS2021-A

Note:	You will need a mydSPACE to access the link above.

7. Shared Memory Configuration Setup for Adams

Adams requires two shared memory partitions with id 1 and id 2 of size 16384 for each. In the VM configuration it would look something like this:

```
"shared_memory" : [
    {
    // unique ID of this shared memory on this platform
    "id"   : 0,
    // Size in Bytes of the shared memory region
    "size" : 134184960,
    },
    {
    "id"   : 1,
    "size" : 16384,
    },
```

```
        {
        "id"   : 2,
        "size" : 16384,
        }
    ],
```

8. Settings on Ubuntu to Improve Real Time Performance
   - Enable RT_PREMEMPT in the KERNEL (Requires building the kernel from source code).
   - Isolate specific CPUs for real-time (Do note that the last CPU in Ubuntu OS is used by the Adams main thread)
   - Isolate interrupts to a specific CPU
   - Disable Ubuntu Desktop UI
   - Disable automatic updates for Ubuntu
   - Additional Hypervisor configuration ("allowIOonServiceCore")

   To accomplish the above steps please refer to the document "Configuration of Virtual Machines for usage with the dSPACE Hypervisor Extension" which can be obtained from dSPACE support.

9. Run a simple example application to check the settings for Realtime performance. Please contact dSPACE support for an example application.

   "Start the application inside the VM first (sh start_shm_server.sh). It also contains a simple script to route the corresponding shared memory irq or ethernet irq to the correct core.

   The test application will print information on the round trip time for the interrupt from the SCALEXIO to the VM and back."

   The output looks something like this:

```
Info2021-08-23 16:52:02VM Call: min: 5.8145 us, avg: 6.3570 us,
max: 8.1595 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:52:01VM Call: min: 5.8312 us, avg: 6.3682 us,
max: 8.2464 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:52:00VM Call: min: 5.8248 us, avg: 6.3919 us,
max: 8.2155 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:59VM Call: min: 5.8362 us, avg: 6.3906 us,
max: 8.2753 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:58VM Call: min: 5.8405 us, avg: 6.3555 us,
max: 8.3262 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:57VM Call: min: 5.8348 us, avg: 6.4207 us,
max: 8.2561 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:56VM Call: min: 5.7578 us, avg: 6.4093 us,
max: 8.4046 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:55VM Call: min: 5.7952 us, avg: 6.4470 us,
max: 26.2536 us (total max: 9.6531 us) (0/0)
Info2021-08-23 16:51:54Application started.
Info2021-08-23 16:51:54VM Shared Memory with ID 0 communication
initialized (0/0)
Info2021-08-23 16:51:54VM Shared Memory with ID 0 opened. (0/0)
Info2021-08-23 16:51:54RTH Test Application (0/0)
Info2021-08-23 16:51:54Application loaded.
```

If the virtual machine is setup correctly, this will run forever without task overruns and jitter > 30 us.

10. Install pre-requisites for installing and running Adams on Ubuntu 18

To install all the prerequisites to run Adams, execute the following command in a terminal:

sudo apt install gcc g++ libsm6 libxrender1 libfontconfig1 tcsh libnss3 libnspr4 libxau6 gfortran p7zip libpng-dev

11. Install Adams on Ubuntu 18

Use the REDHAT 7.9 installer to install Adams on Ubuntu 18.04 OS. To install Adams from Ubuntu Terminal, type the following command from the location containing the Adams installer file:

./adams_2023.1_linux64_rh7.9_a.bin --mode console

12. Install Adams License

The license servers will work only if the DNS suffix is set correctly. Contact Adams Support for setting up the Adams License.

Guidelines for OS settings on Ubuntu 18.04 on dSPACE hypervisor for real-time performance

Interrupts settings

The information provided here is a supplement to the document provided by dSPACE called "Configuration of Virtual Machines for usage with the DSPACE Hypervisor Extension". This section describes steps and lists the scripts (provided by dSPACE) to route interrupts to ensure best real-time performance.

To find out the active interrupts, type the following command in the terminal

```
cat/proc/interrupts
```

The output should look something similar to this which shows the list of interrupts and the cores they are active on

```
    CPU0 CPU1 CPU2 CPU3 CPU4 CPU5
0:   0    0    0    0    0    0    IO-APIC   2-edge       timer
1:   68   139  0    0    0    0    IO-APIC   1-edge       i8042
6:   0    3    0    0    0    0    IO-APIC   6-edge       floppy
8:   1    0    0    0    0    0    IO-APIC   8-edge       rtc0
9:   0    0    0    0    0    0    IO-APIC   9-fasteo     acpi
12: 2319  0    0    0    0    0    IO-APIC   12-edge      i8042
14:  0    0    0    0    0    0    IO-APIC   14-edge      ata_piix
15:  0    0    0    0    0    0    O-APIC    15-edge      ata_piix
24:  0    0    0    0    0    0    PCI-MSI   2113536-edge virtio2-config
25:  0    0    0    0    0    6352 PCI-MSI   2113537-edge virtio2-req.0
26:  0    0    0    0    0    0    PCI-MSI   3162112-edge virtio1-config
27:  65   0    0    0    0    0    PCI-MSI   3162113-edge virtio1-input.0
28:  11   92   0    0    0    0    PCI-MSI   3162114-edge virtio1-output.0
29:  1    0    0    0    0    0    PCI-MSI   65536-edge   ens4f0
30:  202  91   0    0    0    0    PCI-MSI   65537-edge   ens4f0-TxRx-0
31: 1955  0    0    0    0    0    PCI-MSI   65538-edge   ens4f0-TxRx-1
32: 1148  225  0    0    0    0    PCI-MSI   65539-edge   ens4f0-TxRx-2
33:  286  0    0    0    0    0    PCI-MSI   65540-edge   ens4f0-TxRx-3
34:  0    0    0    0    0    0    PCI-MSI   1081344-edge ivshmem-irq
35:  0    0    0    0    0    0    PCI-MSI   1097728-edge ivshmem-irq
```

```
36: 0       0     0     0     0     0     PCI-MSI    32768-edge    virtio0-config
37: 3103    0     0     0     0     0     PCI-MSI    32769-edge    virtio0-control
38: 0       0     0     0     0     0     PCI-MSI    32770-edge    virtio0-cursor
NMI:0       0     0     0     0     0     Non-maskable interrupts
LOC:15270 478   343   329   313   920     Local timer interrupts
SPU:0       0     0     0     0     0     Spurious interrupts
PMI:0       0     0     0     0     0     Performance monitoring interrupts
IWI:0       0     0     0     0     0     IRQ work interrupts
RTR:0       0     0     0     0     0     APIC ICR read retries
RES:3257  209   205   205   204   230     Rescheduling interrupts
CAL:0     901   901   901   901   900     Function call interrupts
TLB:0       0     0     0     0     0     TLB shootdowns
TRM:0       0     0     0     0     0     Thermal event interrupts
THR:0       0     0     0     0     0     Threshold APIC interrupts
DFR:0       0     0     0     0     0     Deferred Error APIC interrupts
MCE:0       0     0     0     0     0     Machine check exceptions
MCP:0       0     0     0     0     0     Machine check polls
HYP:0       0     0     0     0     0     Hypervisor callback interrupts
HRE:0       0     0     0     0     0     Hyper-V reenlightenment interrupts
HVS:0       0     0     0     0     0     Hyper-V stimer0 interrupts
ERR:0
MIS:0
PIN:0       0     0     0     0     0     Posted-interrupt notification event
NPI:0       0     0     0     0     0     Nested posted-interrupt event
PIW:0       0     0     0     0     0     Posted-interrupt wakeup event
```

Follow the steps in "Configuration of Virtual Machines for usage with the DSPACE Hypervisor Extension" to move an interrupt to a specific core. The "Script 1 - startup_interrupt_aff_setting.sh" moves most of the interrupts away from real-time cores (1-5 in this case) to the core 0.

> **Note:** There are some interrupts that cannot be moved. This calls another script to move the ethernet device to a real-time core, in this case it is core 5 where an adams process runs that uses this device. Adams uses this ethernet device during simulation for TCP/IP connection with the real-time application.

After moving the interrupts as necessary, execute the following command to list all the interrupts and make sure there are no unwanted interrupts on the real-time cores

```
cat/proc/interrupts
```

The output received can be compared with the previous output using a difftool, to verify that the activity of interrupts is isolated as required.

```
    CPU0 CPU1 CPU2 CPU3 CPU4 CPU5
0:  0      0    0    0    0    0    IO-APIC    2-edge      timer
1:  68   139    0    0    0    0    IO-APIC    1-edge      i8042
6:  0      3    0    0    0    0    IO-APIC    6-edge      floppy
8:  1      0    0    0    0    0    IO-APIC    8-edge      rtc0
9:  0      0    0    0    0    0    IO-APIC    9-fasteo    acpi
12: 2319   0    0    0    0    0    IO-APIC    12-edge     i8042
14: 0      0    0    0    0    0    IO-APIC    14-edge     ata_piix
15: 0      0    0    0    0    0    O-APIC     15-edge     ata_piix
24: 0      0    0    0    0    0    PCI-MSI    2113536-edge virtio2-config
```

```
25: 0      0    0    0    0   6357 PCI-MSI   2113537-edge virtio2-req.0
26: 0      0    0    0    0    0   PCI-MSI   3162112-edge virtio1-config
27: 65     0    0    0    0    0   PCI-MSI   3162113-edge virtio1-input.0
28: 11     92   0    0    0    0   PCI-MSI   3162114-edge virtio1-output.0
29: 1      0    0    0    0    0   PCI-MSI   65536-edge   ens4f0
30: 205    91   0    0    0    0   PCI-MSI   65537-edge   ens4f0-TxRx-0
31: 1996   0    0    0    0    0   PCI-MSI   65538-edge   ens4f0-TxRx-1
32: 1177   225  0    0    0    0   PCI-MSI   65539-edge   ens4f0-TxRx-2
33: 289    0    0    0    0    0   PCI-MSI   65540-edge   ens4f0-TxRx-3
34: 0      0    0    0    0    0   PCI-MSI   1081344-edge ivshmem-irq
35: 0      0    0    0    0    0   PCI-MSI   1097728-edge ivshmem-irq
36: 0      0    0    0    0    0   PCI-MSI   32768-edge   virtio0-config
37: 3136   0    0    0    0    0   PCI-MSI   32769-edge   virtio0-control
38: 0      0    0    0    0    0   PCI-MSI   32770-edge   virtio0-cursor
NMI:0      0    0    0    0    0   Non-maskable interrupts
LOC:15366  480  347  331  318  920 Local timer interrupts
SPU:0      0    0    0    0    0   Spurious interrupts
PMI:0      0    0    0    0    0   Performance monitoring interrupts
IWI:0      0    0    0    0    0   IRQ work interrupts
RTR:0      0    0    0    0    0   APIC ICR read retries
RES:3261   211  207  207  206  234 Rescheduling interrupts
CAL:0      902  902  902  902  901 Function call interrupts
TLB:0      0    0    0    0    0   TLB shootdowns
TRM:0      0    0    0    0    0   Thermal event interrupts
THR:0      0    0    0    0    0   Threshold APIC interrupts
DFR:0      0    0    0    0    0   Deferred Error APIC interrupts
MCE:0      0    0    0    0    0   Machine check exceptions
MCP:0      0    0    0    0    0   Machine check polls
HYP:0      0    0    0    0    0   Hypervisor callback interrupts
HRE:0      0    0    0    0    0   Hyper-V reenlightenment interrupts
HVS:0      0    0    0    0    0   Hyper-V stimer0 interrupts
ERR:0
MIS:0
PIN:0      0    0    0    0    0   Posted-interrupt notification event
NPI:0      0    0    0    0    0   Nested posted-interrupt event
PIW:0      0    0    0    0    0   Posted-interrupt wakeup event
```

Note:	It is important to execute this script when the VM starts or before starting the real-time simulation as the settings would reset with every restart. This could also be setup to be executed automatically when Ubuntu starts. Please refer to Ubuntu documentation for more information running a script at boot time

Scripts

The scripts provided in this document can be used directly by copying them to blank file with an extension of "sh" and enabling execute permissions.

- Script 1 - startup_interrupt_aff_setting.sh
- Script 2 - route_veth_irq.sh
- Script 3 - route_shm_irq.sh

Script 1 - startup_interrupt_aff_setting.sh

```sh
#!/bin/sh

# Be sure echo application runs on a real-time capable core
# => Be sure isolcpus=1 in this case needs is set for kernel boot
parameter

# move all irqs away from real-time core
IRQ_CPUS=1
for irqlist in $(ls /proc/irq/*/smp_affinity)
do
echo "$IRQ_CPUS"> $irqlist 2> /dev/null
done

# disable mtrr. this is only needed once
echo disable=0 > /proc/mtrr 2>/dev/null
echo disable=1 > /proc/mtrr 2>/dev/null

# move eth1 input irq to real-time core!
./route_veth_irq.sh enp6s1 5 1

# avoid workqueue threads on real-time procesing cores..
# they conflict with the SOFTIRQ thread processing ethernet
frames..
echo 1 > /sys/devices/virtual/workqueue/cpumask
echo 1 > /sys/devices/virtual/workqueue/writeback/cpumask

# udp echo version
LD_BIND_NOW=1 chrt -f 51 ./udp_echo
```

Script 2 - route_veth_irq.sh

The script below is the content of "route_veth_irq.sh" used in the above script to move the interrupts for the ethernet device to a real-time core. This needs 3 inputs the name of the device, core ID and softirq priority.

```sh
#!/bin/sh

# This shell script moves the virtio eth interrupt to a specific
core
# and promotes the irq handler as well as the cores sotftirq
thread to real-time mode

# Ethernet Interface to route IRQ for
ETH_DEVICE=$1
# Core to route the IRQ to
CORE_ID=$2
# Priority of the threads processing ethernet frames on that core
SOFTIRQ_PRIORITY=$3

VIRTIO_DEV=$(basename $(readlink
/sys/class/net/${ETH_DEVICE}/device))
echo Routing RX IRQs of device ${VIRTIO_DEV} to core ${CORE_ID}
IRQ_NUM=$(cat /proc/interrupts | grep ${VIRTIO_DEV}-input | cut
-d: -f 1 | tr -d '[:space:]')
```

```
echo "Device uses IRQ ${IRQ_NUM}"
echo ${CORE_ID} > /proc/irq/${IRQ_NUM}/smp_affinity_list

SOFTIRQD_PID=$(pgrep ksoftirqd/${CORE_ID})
echo "Raising SOFTIRQ kernel thread [PID ${SOFTIRQD_PID}] to
SCHED_FIFO with priority ${SOFTIRQ_PRIORITY}"
chrt -f -p ${SOFTIRQ_PRIORITY} ${SOFTIRQD_PID}

VIRTIOIRQ_PID=$(pgrep irq/${IRQ_NUM}-)
echo "Raising IRQ kernel thread [PID ${VIRTIOIRQ_PID}] to
SCHED_FIFO with priority ${SOFTIRQ_PRIORITY}"
chrt -f -p ${SOFTIRQ_PRIORITY} ${VIRTIOIRQ_PID}
```

Script 3 - route_shm_irq.sh

The script below moves the shared memory interrupts to a specific core. This needs to be moved to a real-time core since adams uses shared memory in the hypervisor during simulation.

```
#!/bin/sh
# This shell script moves the virtio shm interrupt to a specific
core
# shared memory id to route IRQ for
SHM_ID=$1
SHM_ID=$((SHM_ID+1))
SHM_PCI_PATH=/sys/bus/pci/devices/0000:02:0${SHM_ID}.0/msi_irqs

# Core to route the IRQ to
CORE_ID=$2

IRQ_NUM=$(ls /sys/bus/pci/devices/0000:02:0${SHM_ID}.0/msi_irqs)
echo "Shared Memory $1 uses IRQ ${IRQ_NUM}"
echo ${CORE_ID} > /proc/irq/${IRQ_NUM}/smp_affinity_list
```

Removing unused devices from the VM

It is important to remove unused devices from the VM so that interrupts for the device would not impact the real-time performance. This can be done by removing or commenting the line in the device section in the VM configuration file for dSPACE hypervisor.

For example, the devices section from a vmconf file is shown below.

```
// devices to pass exclusively to the VM
   "devices" : [
//    {
//        "type"   : "IGPU",
//        "name"   : "Integrated Graphics Device",
//    },
//    {
//        "type"   : "USB1",
//        "name"   : "USB Host Controller"
//    },
//    {
//        "type"   : "USB2",
//        "name"   : "USB Host Controller #2"
//    },
```

```
//      {
//          "type"   : "PCI Device",
//          "name"   : "My Custom PCI Device",
//          "addr"   : "02:00.0"
//      },
        {
            // We may pass through Ethernet Channels by name
            "type"   : "Ethernet Channel",
            "name"   : "Eth0_1"
        },
    ]
```

As can be seen above, the devices "Integrated Graphics Device", "USB Host Controller", "USB Host Controller #2" and "My Custom PCI Device" are commented out and hence will not start with the VM.

CPU shielding

CPU shielding should be performed before starting the application. It may or may not have an impact if the cores are already isolated. It is best to try this and verify the improvement in performance. It does not hurt to have this on top of isolating cores as mentioned in "Configuration of Virtual Machines for usage with the DSPACE Hypervisor Extension".

The steps are as follows:

1. To add the real-time cores to the shield, execute the following command in the terminal to shield cores 1-5.

   ```
   cset shield --cpu 1-5
   ```

2. Launch the adams process using the shield as below.

   ```
   cset shield --exec /home/mscsoftware/run_adams.sh
   ```

For example, run_adams.sh would look something like this.

```
#!/bin/sh
/home/mscsoftware/adams/adams2023.1/mdi -c python
/home/mscsoftware/adams/adams2023.1/controls/utils/adams_daemon.
py -I 192.168.2.15&
```

Example of usage of the scripts and workflow

Make sure route_veth_irq.sh, startup_interrupt_aff_setting.sh and run_adams.sh are present in the same folder.

All of these steps could be combined to a single script as required.

1. Login as a root user by executing the following and enter the user password when prompted.

   ```
   sudo su
   ```

2. Move all interrupts away from real-time cores and move eth interrupt to real-time core.

   ```
   sh startup_interrupt_aff_setting.sh
   ```

3. Move shared memory interrupts to real-time core.

   ```
   sh route_shm_irq.sh 1 5
   sh route_shm_irq.sh 2 5
   ```

4. Apply shielding to the real-time cores.

```
cset shield --cpu 1-5
```

5. Start adams through the shield.

```
cset shield --exec /home/mscsoftware/run_adams.sh
```

It is recommended to execute the adams program and scripts directly from the console prompt on the web interface for dSPACE SCALEXIO under Hypervisor Control in the "**Console**" tab as shown below.