

IBM Predictive Customer Intelligence
Version 1.0.1

*Integration Example for Different
Predictive Scoring Models 1.0*



Note

Before using this information and the product it supports, read the information in "Notices" on page 17.

Product Information

This document applies to IBM Predictive Customer Intelligence Version 1.0.1 and may also apply to subsequent releases.

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Introduction

IBM® Predictive Customer Intelligence gives you the information and insight that you need to provide proactive service to your customers. The information can help you to develop a consistent customer contact strategy and improve your relationship with your customers.

IBM Predictive Customer Intelligence brings together, in a single solution, the ability to do the following tasks:

- Determine the best offer for a customer.
- Retain customers that are likely to churn.
- Segment your customers, for example, by family status and salary.
- Identify the most appropriate channel to deliver an offer, for example, by email, telephone call, or application.

This solution ensures that all interactions with customers are coordinated and optimized. IBM Predictive Customer Intelligence gives you the ability to sift quickly through millions of subscribers and know who to contact, when, and with what action.

The following steps define the process:

1. Understand the customer. Predictive modeling helps you to understand what market segments each customer falls into, what products they are interested in, and what offers they are most likely to respond to.
2. Define possible actions and the rules and models that determine which customers are eligible for which offers.
3. After the best action is identified, deliver the recommendation to the customer.

Audience

This guide is intended to provide users with an understanding of how the IBM Predictive Customer Intelligence solution works. It is designed to help people who are planning to implement IBM Predictive Customer Intelligence know what tasks are involved.

Finding information

To find product documentation on the web, including all translated documentation, access IBM Knowledge Center (<http://www.ibm.com/support/knowledgecenter>).

You can also access PDF versions of the documentation from the IBM Predictive Customer Intelligence web page (www.ibm.com/support/docview.wss?uid=swg27041723).

Accessibility features

Accessibility features help users who have a physical disability, such as restricted mobility or limited vision, to use information technology products. Some of the components included in the IBM Predictive Customer Intelligence have accessibility features.

IBM Predictive Customer Intelligence HTML documentation has accessibility features. PDF documents are supplemental and, as such, include no added accessibility features.

Forward-looking statements

This documentation describes the current functionality of the product. References to items that are not currently available may be included. No implication of any future availability should be inferred. Any such references are not a commitment, promise, or legal obligation to deliver any material, code, or functionality. The development, release, and timing of features or functionality remain at the sole discretion of IBM.

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Chapter 1. Integration Example for Different Predictive Scoring Models

This functional accelerator demonstrates how you can use models from two different modeling tools in a real-time scenario.

It combines the real-time scoring capability of the Zementis ADAPA (Adaptive Decision and Predictive Analytics) engine with the modeling of IBM SPSS®. In this way, you can extend the library of available analytical and predictive models to include any models that can be published in Predictive Model Markup Language (PMML).

The functional accelerator simulates a customer's interactions through a channel, such as a call center. The call center retrieves their profile and evaluates them first for the propensity to churn and then for overall sentiment. The churn score from the first model is used as an input for the second model, the sentiment analysis.

The sample begins at the point where the customer profile is retrieved. The churn model is provided in PMML format and the sentiment model is provided as an IBM SPSS model.

Functional accelerator flow

The Integration Example for Different Predictive Scoring Models functional accelerator is run by using an IBM Infosphere Integration Bus (IIB) message flow.

After the functional accelerator is installed, the simulation is triggered by copying a sample customer profile into a folder that is monitored by IIB. The sample input file that is provided is named `CustomerChurn_NN_100_rows.csv`. It must be copied into a folder that is named `Zementis` on the IIB node computer.

The file contains 100 customers. Each customer is processed individually by the message flow. The output of the message flow is a customer's sentiment score in XML format, one file per customer. The score for the last customer to be processed is in the `Zementis` folder. The scores for the previous customers are found in separate files in the `mqsiarchive` subfolder.

Message flow

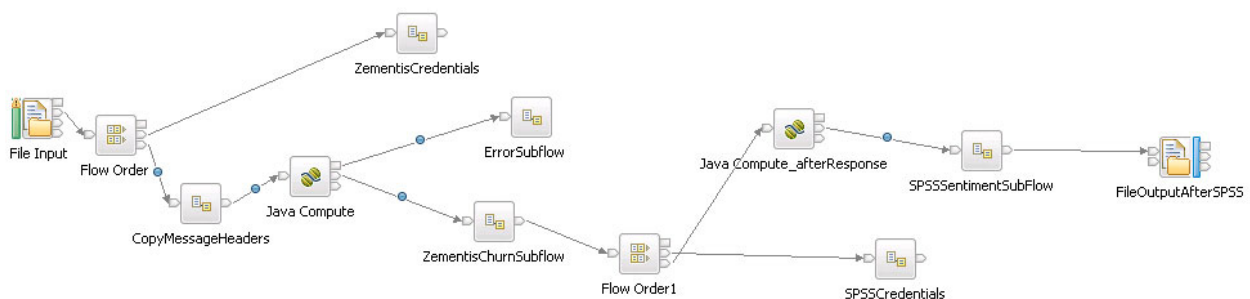


Figure 1. Message flow for the functional accelerator

The Table 1 table provides the descriptions for each node in the flow.

Table 1. Message flow descriptions

Node name	Description
File Input	This node specifies the Zementis folder and file name pattern CustomerChurn*.csv. It also specifies a data format definition (DFDL) that defines the required CSV file format. Deviations from the DFDL causes errors.
Flow Order	This node specifies that the flow must retrieve ADAPA credentials before the rest of the flow can proceed.
ZementisCredentials	This node is a subflow that reads the zcredentials.properties file from the restricted subfolder to obtain the ADAPA credentials and stores the credentials in global environment variables. Note: The credentials are stored in long-lived variables and can be changed only by redeploying the message flow or starting and stopping the IBM Integration Bus server. The subflow can be customized to read the credentials from a database table instead of a file. For more information, see the IBM Integration Bus documentation.
JavaCompute	This node parses the incoming message from the CSV file and prepares the outgoing message that is sent to the ADAPA engine's RPC service to get a score from the CustomerChurn_NN model. The Customer Id is saved in the environment to be used in the IBM SPSS model.
Error Subflow	This node captures any issues with the CSV file format and logs the errors in the failuremessage.xml file in the error subfolder. Note: Any earlier files of the same name are archived in the mqsiarchive folder.
ZementisChurnSubflow	This node executes the call to the ADAPA engine's RPC service as a generic web service call. The SOAP request node specifies the URL of the ADAPA RPC service. Other nodes in the subflow include: <ul style="list-style-type: none"> • Error Subflow captures problems with the Zementis credentials and logs the errors in the failuremessage.xml file in the error subfolder. Note: Any earlier files of the same name are archived in the mqsiarchive folder. • Compute captures any SOAP errors and puts them in a file that is named ADAPA_Error.xml in the error subfolder. • SOAPExtract removes the SOAP envelope from the message before the message is routed back to the main flow.
Flow Order1	This node directs the flow to get the IBM SPSS repository credentials before the SPSS scoring call is prepared.
SPSSCredentials	This node reads the scredentials.properties file in the restricted subfolder to obtain the SPSS repository credentials and store them in global environment variables. Note: The credentials are stored in long-lived variables and can be changed only by redeploying the message flow or starting and stopping the IBM Integration Bus server. The subflow can be customized to read the credentials from a database table instead of a file. For more information, see the IBM Integration Bus documentation.

Table 1. Message flow descriptions (continued)

Node name	Description
JAVA Compute_afterResponse	This node parses the response that is returned from the ADAPA churn model and combines it with the customer ID and the inputs to the Churn model. Then, it creates a new SOAP message for the IBM SPSS Collaboration and Deployment Services scoring engine.
SPSSSentimentSubFlow	<p>This subflow executes the call to the IBM SPSS Collaboration and Deployment Services scoring service as a generic web service call. The SOAP request node specifies the URL of the SPSS scoring service.</p> <p>Other nodes in the subflow include:</p> <ul style="list-style-type: none"> • Error Subflow captures problems with the SPSS repository credentials and logs the errors in the failuremessage.xml file in the error subfolder. Note: Any earlier files of the same name are archived in the mqsiarchive folder. • Process SOAP Error captures any SOAP errors and puts them in a file that is named SPSSScoring_Error.xml in the error subfolder. • Java™ Compute after Sentiment Score captures the response from the IBM SPSS Collaboration and Deployment Services scoring service and routes the message back to the main flow.
FileOutputAfterSPSS	This node captures the customer sentiment score in XML format and inputs it to the SPSSSentiment.xml file.

Adapt the functional accelerator

You can adapt the functional accelerator by modifying the message flow so that it can be used as a web service call.

You can modify the nodes of the flow using the IBM Integration Toolkit client application.

To adapt the functional accelerator into a web service call:

1. Replace the File Input node with an HTTP input node.
 - a. Under Input Message Parsing, specify the message domain JSON : For JavaScript Object Notation messages.
 - b. Under Basic, specify a path suffix for URL, such as /PCI.
2. Replace the final File Output node with an HTTP Reply node so that the sentiment score is returned to a web page in JSON format.
3. Edit the Java Compute after SentimentScore node, that is contained in the SPSSSentimentSubFlow node, to create a JSON message format.
 - Add a procedure such as the following just before the end of the module:

```
private void
    httpReply(MbMessageAssembly inAssembly) throws MbException{
    MbMessage inMessage = inAssembly.getMessage();MbElement body =
    inMessage.getRootElement().getLastChild();
    MbElement record = body.getFirstChild();
    MbElement element = record.getFirstChild();
    MbMessage alternateMessage = new MbMessage();
    MbMessageAssembly alternateAssembly = new MbMessageAssembly(inAssembly,
```

```

        alternateMessage);
    MbElement root = alternateMessage.getRootElement().createElementAsFirstChild("JSON");
    MbElement data = root.createElementAsFirstChild(MbElement.TYPE_NAME, "Data",
        null);
    MbElement response = data.createElementAsLastChild(MbElement.TYPE_NAME,
        "Response", null);
    while (element != null) {
        // Get the field name
        // Get the value
        String fieldName = element.getName();
        Object value = element.getValue();
        response.createElementAsLastChild(MbElement.TYPE_NAME_VALUE, fieldName, value);
        element = element.getNextSibling();
    }
    MbOutputTerminal alternate = getOutputTerminal("alternate");
    alternate.propagate(alternateAssembly);
}

```

4. Deploy the message flow to the IBM Infosphere Integration Bus server. The message flow functions as a web service, available from the URL `http://server:port/PCI`, where *server* is the IBM Infosphere Integration Bus server name or IP address. The *port* is the port number that is used by IBM Infosphere Integration Bus deployed applications. The default is 7080. *PCI* is the URL extension name that is used in the HTTP Input Node in the message flow.
5. A web application is able to post a JSON message to the URL above in the format of name-value pairs. The following sample illustrates the message body using the exact names required, but the values may vary:

```

record={"TotalDollarAmountSpentMerchandiseLast6Months":9744,
"TotalDollarAmountSpentServicesLast6Months":727,
"PurchaseMaxDollarAmount":1949,
"CustomerSinceInMonths":94,
"NumberOfComplaintsLast6Months":1,
"NumberOfSupportTicketsLast4Weeks":14,
"NumberOfMerchandiseReturnsLast1Month":7,
"NumberOfServiceCancellationsLast1Month":3,
"TotalNumberOfPurchasesLast6Months":41,
"TotalNumberOfPurchasesLast2Months":1,
"DaysSinceLastPurchase":15,
"PercentageFriendsAlsoCustomers":0.927278065,
"NumberOfComplainsFromFriendsLast6Months":12,
"PercentageFriendsChurnedLast30Days":0.41847703,
"SameAsFriendsTotalNumberPurchases":2,
"NumberWebsiteVisitsLast7Days":5,
"NumberOfDaysSinceLastWebsiteVisit":1,
"NumberWebsitePagesVisitedDuringLastVisit":5,
"PercentageOpenedNewsletters":0.826028182,
"OverallSentimentForLastPurchasedProduct":0.388175661,
"CustomerGender":"M",
"AvgFriendsAge":34,
"CustomerAge":53}

```

Functional accelerator artifacts

The Integration Example for Different Predictive Scoring Models functional accelerator includes the following artifacts.

IBM Integration Bus flow and data files

```

PCI_ModelIntegration_ZementisChurn_IIB.zip
CustomerChurn_NN_100_rows.csv
scredentials.properties
zcredentials.properties

```

Predictive models

PCI_ModelIntegration_ZementisChurn_ Sentiment_CDS_Archive.pes

The IBM SPSS model: SentimentPrediction.str

The Zementis ADAPA engine model: CustomerChurn_NN.pmm1

Model data file: SentimentScoreInput.csv

Chapter 2. Functional accelerator installation

The Integration Example for Different Predictive Scoring Models functional accelerator is for use with IBM Predictive Customer Intelligence.

The functional accelerator package contains the following parts:

- IBM Integration Bus flow
- IBM SPSS stream and scoring configuration that is contained in an IBM Collaboration and Deployment Services repository export
- IBM SPSS stream file
- Model PMML file
- Sample credential files
- Sample data file

To install the functional accelerator, you must perform the following steps:

1. Download the functional accelerator from IBM AnalyticsZone (www.ibm.com/analyticszone).
2. Import the message flow using IBM Integration Toolkit.
3. Import the sample Churn model.
4. Import the sample Sentiment Score model.

Functional accelerator prerequisites

Before you install the functional accelerator, you must have a fully configured environment.

You must have administration rights and have the ability to copy files between computers.

The Zementis ADAPA engine must be installed on IBM WebSphere® Application Server version 8.5.5.

Download the functional accelerator

You must download the IBM Predictive Customer Intelligence accelerators from IBM AnalyticsZone.

Procedure

1. Go to IBM AnalyticsZone (www.ibm.com/analyticszone).
2. Click **Downloads**, and under **Predictive Customer Intelligence Accelerators**, click **View all PCI downloads**.
3. Click **More details** for the accelerator that you want to download.
4. If you are not signed in, click **Sign In to Download**.
You must enter your IBM ID. If you do not have an IBM ID, you must register to create one.
5. Click **Download**.
6. Go to the directory where you downloaded the functional accelerator.
7. Decompress the file.

Creating folders and a variable on the Integration Bus node computer

You must create folders and set an environment variable on the IBM Predictive Customer Intelligence Integration Bus node for the functional accelerator.

Procedure

1. On the Integration Bus node, create a folder in which to copy the message flow file. This folder will be monitored by IBM Integration Bus. For example, create a folder that is named C:\IBM\PCIData on Microsoft Windows operating systems or /OPT/IBM/PCIData on Linux operating systems.
2. Create an environment variable that is named **MQSI_FILENODES_ROOT_DIRECTORY** that points to the PCIData directory that you created.
3. Go to the PCIData folder, and create a folder that is named Zementis.
4. In the Zementis folder, create two more folders:
 - a. Create one folder that is named restricted.
 - b. Create another folder that is named error.You should have the following folder structure:

```
PCIData
  Zementis
    restricted
    error
```

Installing and configuring the message flow

You must import the functional accelerator message flow file into the IBM Integration Toolkit client application.

Procedure

1. Copy the `PCI_ModelIntegration_ZementisChurn_IIB.zip` from the location where you decompressed the functional accelerator to a location that is on the computer where IBM Integration Toolkit is installed.
2. Click **Start > All Programs > IBM Integration Toolkit > IBM Integration Toolkit 9.0.0.1 > Integration Toolkit 9.0.0.1**.
3. Ensure that you are using the **Integration Development** perspective. Click **Window > Open Perspective > Other**, select **Integration Development**, and click **OK**.
4. Click **File > Import**.
5. Update the `SPSSSentimentSubflow.subflow` subflow with the URL for IBM SPSS Collaboration and Deployment Services.
 - a. In the **Application Development** pane, expand **ZementisChurn > SubFlows**, and double-click `SPSSSentimentSubflow.subflow`.
 - b. Select the **SOAP Request - SPSS CADS** node.
 - c. In the **Properties** pane, click **HTTP Transport**.
 - d. Change the **Web service URL** value to the URL for your IBM SPSS Collaboration and Deployment Services scoring service.

Enter the URL in the following format: `http://hostname:port/scoring/services/Scoring.Httpv2`. Where *hostname* is the name or IP address of the computer where the IBM SPSS Collaboration and Deployment Services server is installed and *port* is the port number of the IBM WebSphere Application Server profile where the IBM SPSS Collaboration and Deployment Services server is installed. The default port number is 9080.

6. Update the **ZementisChurnSubflow.subflow** subflow with the URL for the Zementis ADAPA RPC service.
 - a. In the **Application Development** pane, expand **ZementisChurn > SubFlows**, and double-click **ZementisChurnSubflow.subflow**.
 - b. Select the **SOAP Request** node.
 - c. In the **Properties** pane, click **HTTP Transport**.
 - d. Change the **Web service URL** value to the URL for the Zementis ADAPA RPC service.
 Enter the URL in the following format: `http://hostname:port/adapaws/rpc`. Where *hostname* is the name or IP address of the computer where the Zementis ADAPA engine is installed and *port* is the port number of the IBM WebSphere Application Server profile where the Zementis ADAPA engine is installed. The default port number is 9080.
7. Copy the files that are named `zcredentials.properties` and `scredentials.properties` from the location where you decompressed the functional accelerator to the restricted folder that you created.
8. Edit the credentials in the `zcredentials.properties` file.
 - a. Open the file that is named `zcredentials.properties` in a text editor, and replace `uid:pwd` with the Base 64 encoded string of the Zementis ADAPA engine administrative user name and password, separated by a colon and leaving the word `Basic` and the quotation marks. For example, if your `uid:pwd` is `adapa-admin:adapa`, then the file should contain:

```
Authorization,"Basic YWRhcGEtYWRTaW46YWRhcGE="
```
 - b. Save and close the file.
9. Edit the credentials in the `scredentials.properties` file.
 - a. Open the file that is named `scredentials.properties` in a text editor, and replace `uid,pwd` with the user name and password for a valid IBM SPSS repository user.
 - b. Save and close the file.
10. In IBM Integration Toolkit, create a new integration server for deploying the project.
 - a. In the **Integration Nodes** pane, right-click your integration node, and select **New Integration Server**.
 - b. Enter a name for the server, and click **OK**.
11. In IBM Integration Toolkit, prepare to deploy the project.
 - a. Click **Project > Clean**.
 - b. Select the project, and click **OK**.
12. Deploy the project to the integration server.
 - a. In the **Application Development** pane, right-click the project, and select **Deploy**.
 - b. Select the integration server that you created, and click **Finish**.

Tip: You must redeploy the project any time there is a change to either the `zcredentials.properties` or `scredentials.properties` files.

Installing the sample churn model

You must install the functional accelerator churn model on your Zementis ADAPA engine.

Procedure

1. Open a web browser.
2. Go to the URL for the Zementis ADAPA administrative console. For example, go to `http://hostname:port/adapaconsole`.

Where *hostname* is the name or IP address of the computer where the Zementis ADAPA engine is installed and *port* is the port number of the IBM WebSphere Application Server profile where the Zementis ADAPA engine is installed. The default port number is 9080.

3. Log in using your Zementis ADAPA administrator credentials.
4. Click **Upload PMML Files**.
5. Select **Disable upload of multiple files**.
6. Click **Add File**.
7. Browse to and select the file that is named `CustomerChurn_NN.PMML`.

Importing the sample sentiment score model

You must import the functional accelerator sentiment score model to your IBM SPSS Modeler instance.

Procedure

1. Copy the `PCI_ModelIntegration_ZementisChurn_Sentiment.pes` file from the location where you decompressed the functional accelerator files to a location that is on the computer where IBM SPSS Deployment Manager is installed.
2. Click **Start > All Programs > IBM SPSS Collaboration and Deployment Services > Deployment Manager > Deployment Manager 6.0**.
3. Log in as the SPSS administrator.
4. In IBM SPSS Collaboration and Deployment Service Deployment Manager, right-click **Content Repository**, and click **Import**.
5. Browse to and select the `PCI_ModelIntegration_ZementisChurn_Sentiment.pes` file.
6. Select the following options:
 - **Resolve conflicts globally**
 - **Add new version of target item or rename source item, Use labels from source.**
 - **Continue import even if some objects cannot be imported due to locking conflicts.**
 - **Resolve Invalid Version Conflicts, Import.**
 - **Resource Definitions, Recommended - Import if there are no Duplicate ID conflicts or Duplicate Name conflicts.**
7. Click **OK**.

The model is imported along with a scoring configuration that is named `SentimentPrediction`.

Copying the functional accelerator license files to each computer

After you install the functional accelerator, you must copy the `license` folder to each computer on which you use the IBM Predictive Customer Intelligence functional accelerator.

Important: Do not rename the folders or files.

Procedure

Copy the license folder from the folder where you decompressed the functional accelerator to each computer on which an IBM Predictive Customer Intelligence component is installed. For example, copy the folder and contents so that you have a `C:\IBM\PCI_IndustryAccelerators\1.0\license` folder on Microsoft Windows operating systems or an `/opt/IBM/PCI_IndustryAccelerators/1.0/license` folder on Linux operating systems on each node computer.

The folder contains the license files. The folder should exist on each server and client node computer.

Appendix. Troubleshooting a problem

Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem.

Review the following table to help you or customer support resolve a problem.

Table 2. Troubleshooting actions and descriptions

Actions	Description
A product fix might be available to resolve your problem.	Apply all known fix packs, or service levels, or program temporary fixes (PTF).
Look up error messages by selecting the product from the IBM Support Portal, and then typing the error message code into the Search support box (http://www.ibm.com/support/entry/portal/).	Error messages give important information to help you identify the component that is causing the problem.
Reproduce the problem to ensure that it is not just a simple error.	If samples are available with the product, you might try to reproduce the problem by using the sample data.
Ensure that the installation successfully finished.	The installation location must contain the appropriate file structure and the file permissions. For example, if the product requires write access to log files, ensure that the directory has the correct permission.
Review all relevant documentation, including release notes, technotes, and proven practices documentation.	Search the IBM Knowledge Center to determine whether your problem is known, has a workaround, or if it is already resolved and documented.
Review recent changes in your computing environment.	Sometimes installing new software might cause compatibility issues.

If the items in the table did not guide you to a resolution, you might need to collect diagnostic data. This data is necessary for an IBM technical-support representative to effectively troubleshoot and assist you in resolving the problem. You can also collect diagnostic data and analyze it yourself.

Troubleshooting resources

Troubleshooting resources are sources of information that can help you resolve a problem that you are having with an IBM product.

Support Portal

The IBM Support Portal is a unified, centralized view of all technical support tools and information for all IBM systems, software, and services.

The IBM Support Portal lets you access all the IBM support resources from one place. You can tailor the pages to focus on the information and resources that you need for problem prevention and faster problem resolution. Familiarize yourself

with the IBM Support Portal by viewing the demo videos (https://www.ibm.com/blogs/SPNA/entry/the_ibm_support_portal_videos).

Find the content that you need by selecting your products from the IBM Support Portal (<http://www.ibm.com/support/entry/portal>).

Before contacting IBM Support, you will need to collect diagnostic data (system information, symptoms, log files, traces, and so on) that is required to resolve a problem. Gathering this information will help to familiarize you with the troubleshooting process and save you time.

Service request

Service requests are also known as Problem Management Reports (PMRs). Several methods exist to submit diagnostic information to IBM Software Technical Support.

To open a PMR or to exchange information with technical support, view the IBM Software Support Exchanging information with Technical Support page (<http://www.ibm.com/software/support/exchangeinfo.html>).

Fix Central

Fix Central provides fixes and updates for your system's software, hardware, and operating system.

Use the pull-down menu to navigate to your product fixes on Fix Central (<http://www.ibm.com/systems/support/fixes/en/fixcentral/help/getstarted.html>). You may also want to view Fix Central help.

IBM developerWorks

IBM developerWorks[®] provides verified technical information in specific technology environments.

As a troubleshooting resource, developerWorks provides easy access to the most popular practices, in addition to videos and other information: developerWorks (<http://www.ibm.com/developerworks>).

IBM Redbooks

IBM Redbooks[®] are developed and published by the IBM International Technical Support Organization, the ITSO.

IBM Redbooks (<http://www.redbooks.ibm.com>) provide in-depth guidance about such topics as installation and configuration and solution implementation.

Software support and RSS feeds

IBM Software Support RSS feeds are a quick, easy, and lightweight format for monitoring new content added to websites.

After you download an RSS reader or browser plug-in, you can subscribe to IBM product feeds at IBM Software Support RSS feeds (<https://www.ibm.com/software/support/rss>).

Log files

Log files can help you troubleshoot problems by recording the activities that take place when you work with a product.

Error messages

The first indication of a problem is often an error message. Error messages contain information that can be helpful in determining the cause of a problem.

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