



Avaya Call Management System

ODBC and JDBC

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Preface

Avaya Call Management System (CMS) is an application for businesses and organizations that use Avaya communication servers to process large volumes of telephone calls using the Automatic Call Distribution (ACD) feature. Avaya CMS supports solutions for routing and agent selection, multi-site contact centers, remote agents, reporting, interfaces to other systems, workforce management, desktop applications, system recovery, and quality monitoring. Open Database Connectivity (ODBC) and Java Database Connectivity (JDBC) are optional features that allows you to access data in the CMS database for use in other software applications, such as spreadsheet programs or Java programs. With ODBC and JDBC, you can access the CMS data directly from your application without the need to understand database connectivity or format.

This document covers details about ODBC and JDBC drivers as delivered standard with the CMS product. The use of OpenLink MultiTier ODBC and JDBC drivers is allowed, however this document will not provide details of OpenLink implementation. Customers should work directly with OpenLink for installation and support of any OpenLink products.

This section includes the following topics:

- [Purpose](#) on page 5
- [Intended users](#) on page 6
- [Conventions and terminology](#) on page 6
- [Reasons for reissue](#) on page 6
- [Documentation Web sites](#) on page 7
- [Support](#) on page 7

Purpose

The purpose of this document is to describe how to use ODBC and JDBC with Avaya CMS. This document will help users decide which database items to use in custom reports, spreadsheets, and other user applications that require external data access.

Intended users

This document is written for:

- Avaya support personnel
- Contact center administrators

Users of this document must be familiar with Avaya CMS, have a basic understanding of SQL, and have a basic understanding of database logic and purpose.

Conventions and terminology

If you see any of the following safety labels in this document, take careful note of the information presented.



CAUTION:

Caution statements call attention to situations that can result in harm to software, loss of data, or an interruption in service.



WARNING:

Warning statements call attention to situations that can result in harm to hardware or equipment.



DANGER:

Danger statements call attention to situations that can result in harm to personnel.



SECURITY ALERT:

Security alert statements call attention to situations that can increase the potential for unauthorized use of a telecommunications system.

Reasons for reissue

This document was updated to move the database tables to the *Avaya CMS Database Items and Calculations* document.

Documentation Web sites

All CMS documentation can be found at <http://www.avaya.com/support>. New issues of CMS documentation will be placed on this Web site when available.

Use the following Web sites to view related support documentation:

- Information about Avaya products and service
<http://www.avaya.com>
- Sun hardware documentation
<http://docs.sun.com>
- IBM Informix documentation
<http://www-01.ibm.com/software/data/informix/pubs/library/>

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Escalating a technical support issue

Avaya Global Services Escalation Management provides the means to escalate urgent service issues.

About ODBC and JDBC

This section presents an overview of how Open Database Connectivity (ODBC) and Java Database Connectivity (JDBC) works and how it interacts with the Avaya Call Management System (CMS).

This section contains the following topics:

- [ODBC background and functionality](#) on page 9
- [About the ODBC and JDBC software](#) on page 13
- [ODBC and JDBC features](#) on page 13
- [CMS and ODBC interoperability](#) on page 17
- [CMS database logic structure](#) on page 17

ODBC background and functionality

The ODBC feature is a client/server feature. To access the server the clients must be connected to a network that is fully functional and able to access the server. The *clients* are the computers that are accessing data through ODBC. The *server* is the CMS machine where the CMS database is located.

The ODBC feature is especially useful for call centers with multiple sites. ODBC allows access to data at multiple sites. You can use this data to produce reports. ODBC uses Structured Query Language (SQL) to access data.

ODBC is an Application Programming Interface (API) that allows you to access one or many Database Management Systems (DBMSs). You can use queries to access data in the database for use in reports and other outside applications.

This section contains the following topics:

- [Data access through ODBC](#) on page 10
- [Structured query language](#) on page 11
- [CMS support of ODBC and JDBC](#) on page 11
- [Uses for ODBC data](#) on page 12
- [Requesting data using ODBC](#) on page 12

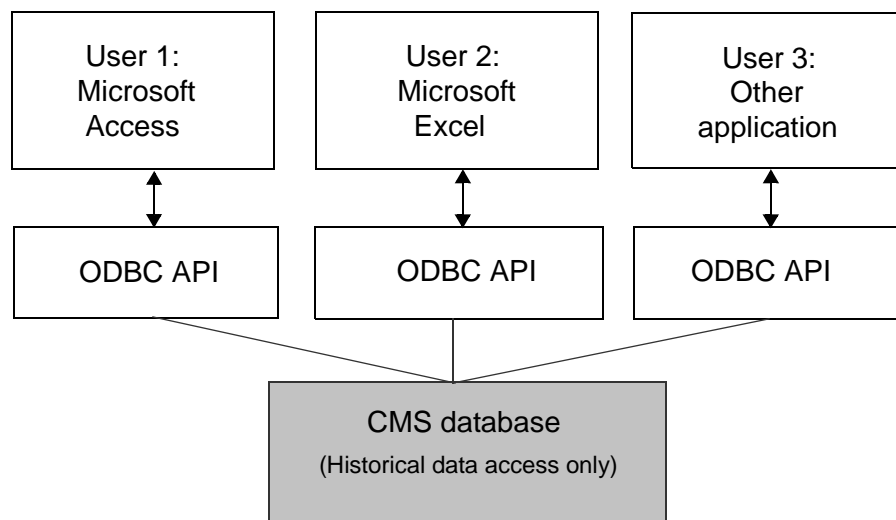
Data access through ODBC

ODBC was developed as a way to access different types of data. A single call center can be working with different applications that must access call center data. For example, a call center can be using Microsoft Access.

ODBC provides a standard method of database access without users having to be concerned with the underlying functionality of network software, naming conventions, and other complexities involved in accessing data through a DBMS. The data must be queried through the embedded SQL query function in the application that you are using. Refer to your specific application documentation for further information on the embedded SQL function for that particular application.

Data access diagram

The following figure illustrates user data access through ODBC.



Important:

Avaya will support only ODBC connectivity. Avaya will not support third-party client applications such as Microsoft Access or Windows.

Structured query language

ODBC uses Structured Query Language (SQL) to query and access data. Because SQL is a language, queries written in SQL can be used to access data with different formats. SQL is the basis for relational database access.

A relational database model is a table that stores data in rows and columns. Relationships between tables are established through data items that match data item values in another table.

SQL queries access the data stored in the relational database tables and extracts it for use in other applications. You compose an SQL query in the Windows application for which you need the data.

You can also use SQL to construct data calculations. You can use data calculations to see a sum of the data. For example, you can view the total number of calls routed to a particular split or skill.

CMS support of ODBC and JDBC

The IBM Informix database management system (DBMS) used by CMS supports IBM Informix ODBC and JDBC compatible clients. CMS is now delivered with this ODBC and JDBC network connectivity enabled. Additionally, CMS will support OpenLink MultiTier ODBC and JDBC drivers. ODBC and JDBC clients allow for direct access to the IBM Informix database that CMS uses and all of the CMS call center data.

ODBC is a specification for a database Application Programming Interface (API). Microsoft ODBC, Version 3.0, is based on the Call Level Interface specifications from X/Open and the International Standards Organization/International Electromechanical Commission (ISO/IEC). ODBC supports SQL statements with a library of C functions. An application calls these functions to implement ODBC functionality. ODBC applications enable you to perform the following operations:

- Connect to and disconnect from data sources.
- Retrieve information about data sources.
- Retrieve information about IBM Informix ODBC Driver.
- Set and retrieve IBM Informix ODBC Driver options.
- Prepare and send SQL statements.
- Retrieve SQL results and process the results dynamically.
- Retrieve information about SQL results and process the information dynamically.

ODBC lets you allocate storage for results before or after the results are available. This feature lets you determine the results and the action to take without the limitations that predefined data structures impose. ODBC does not require a preprocessor to compile an application program.

The Java Database Connectivity (JDBC) API is the industry standard for database-independent connectivity between the Java programming language and a wide range of databases, SQL databases and other tabular data sources, such as spreadsheets or flat files. The JDBC API provides a call-level API for SQL-based database access. JDBC technology allows you to use the Java programming language to exploit "Write Once, Run Anywhere" capabilities for applications that require access to enterprise data. With a JDBC technology-enabled driver, you can connect all corporate data even in a heterogeneous environment.

**Important:**

If you choose to develop an application using ODBC or JDBC, Avaya cannot provide support for that application or for any other third-party software or related mapping.

For more information about the IBM Informix ODBC and JDBC software, see [About the ODBC and JDBC software](#) on page 13.

Note:

Avaya tests ODBC and JDBC only in English. ODBC and JDBC will support double-byte languages, but if you use a language other than English, Avaya cannot provide ODBC or JDBC support.

Additional information about IBM Informix ODBC and JDBC can be found on the Avaya CMS R16 Software Installation disc or the IBM website at:

<http://www-01.ibm.com/software/data/informix/pubs/library/>

Uses for ODBC data

Data extracted and stored by an ODBC application can be used by ODBC-enabled programs, such as workforce management packages, network routers, and blended inbound outbound applications. You can use an ODBC data application to generate reports using data from multiple call center sites and their databases.

Requesting data using ODBC

All queries in ODBC must be composed so that they ensure continued CMS performance. The query is invoked differently in each Windows application.

For more information on how to compose efficient database queries, see [Performance impact](#) on page 14 and the chapter on editing queries in the appropriate Avaya CMS Supervisor report designer user guide.

For more information on how your application interfaces with ODBC, refer to the user documentation for your application.

About the ODBC and JDBC software

IBM Informix ODBC and JDBC have two main components:

- An ODBC and a JDBC client
- Enabled network connectivity in the IBM Informix IDS database server.

After ODBC and JDBC are installed and administered, the ODBC and JDBC software and its components are transparent to the client applications. The CMS ODBC and JDBC features allows multiple, synchronous access from clients, users, and applications. ODBC uses Microsoft data source names (DSN) as the link between the ODBC client and the IBM Informix IDS database. JDBC must be configured in the JDBC client software.

Additional information covering these features in greater detail and also information about other operating systems can be located on the IBM website at:

<http://www-01.ibm.com/software/data/informix/pubs/library/>

Note:

Note: The Windows files on the Avaya CMS R16 Software Installation disc are found under **<DISC_DRIVE>:\CSDK_Windows** and the JDBC files are found under **<DISC_DRIVE>:\IDS_64bit\JDBC**, where **<DISC_DRIVE>** represents the disc drive designation on your PC (for example, **D:** can be a disc or disc drive).

ODBC and JDBC features

The IBM Informix database server provides the ODBC and JDBC communication and connectivity that allows external data access to the CMS database. There are ODBC and JDBC clients available for Windows and other operating systems. This document will only cover the Windows clients. All historical CMS database tables, dictionary tables, and customer-provided tables can be accessed by ODBC or JDBC clients through standard ODBC or JDBC enabled software applications. All standard Structured Query Language (SQL) queries generated by the user applications are supported by the ODBC and JDBC, as limited by permissions. Table-level read-only permissions restrict access to certain database tables.

Additional information covering these features in greater detail and also information about other operating systems can be located on the IBM website at:

<http://www-01.ibm.com/software/data/informix/pubs/library/>

This section contains the following topics:

- [Languages](#) on page 14
- [Supported logins](#) on page 14
- [Performance impact](#) on page 14

- [Table permissions, security and port allocation](#) on page 15
- [Open Database connectivity by Informix ODBC](#) on page 15
- [Informix User definition](#) on page 16

Languages

Avaya tests ODBC and JDBC only in English for use with CMS. IBM Informix ODBC and JDBC will support other double-byte languages, but if you use a language other than English, Avaya does not provide ODBC or JDBC support for that language.

Supported logins

The Sun Enterprise T5120 platforms have a maximum of five licenses. The Sun Enterprise T5220 platforms have a maximum of ten licenses. You must order licenses with the CMS system and authorize them as specified on the CMS order paperwork.

Performance impact

The number, size, and types of queries received by the CMS can impact performance. The recommendations for composing queries in the CMS custom report editor also apply to ODBC queries. Some of the activities that can impact CMS performance are:

Tables : Use the exact table and database item names when querying the database. You can maximize the performance of the system by running queries that access large tables or that perform table joins during a period of low agent activity and low real-time report activity. Accessing large tables, such as the split/skill or agent tables, or joining tables in queries can have a negative impact on CMS performance.

Calculations : Review calculations before sending them to the database. This ensures that the correct operation is performed. Arithmetic operations are performed with the rules of operator precedence, in order from left to right.

Queries: Prioritize resource intensive queries the same way you prioritize reports during high business activity. Running complex or multiple queries on the database impact system performance similar to running multiple reports.

Number of simultaneous database accesses: Minimize the number of database connects and disconnects from an application, and spread your ODBC activities throughout the day.

Synonyms: Download the synonyms to your client application or database and then perform the join at the client.

CMS maintenance: Be aware that during off-peak hours, CMS runs its own activities, such as archiving and making backups. This can use a significant amount of resources and time when working with a large database.

Table permissions, security and port allocation

ODBC users log into the CMS server with password protection. Users have SQL access to Informix tables, as limited by the table permissions.

All historical and dictionary database tables have read-only access permission. The customer-created tables (any table name that begins with "c_") on the host have read and write permissions. No other tables are accessible through ODBC. The ports will be defined on the CMS server in the /opt/Informix/etc/sqlhosts file. See [Enabling ODBC and JDBC on the CMS server](#) on page 20 for more details.

If you want to limit the CMS logins which have ODBC access, that procedure is described in detail in [Providing secure access to the CMS database](#) on page 31.



Important:

If your network uses a firewall, it is common for unused ports to be locked. ODBC uses network ports 50000 and 50001. If these ports are locked, you will not be able to connect to the CMS database with ODBC.

Open Database connectivity by Informix ODBC

CMS R16.2 offers an IBM Informix Open Database Connectivity, ODBC & JDBC, driver and its client software. These drivers support INFORMIX 11.5. Customers moving from an existing CMS R16.x system already have a 5-user license on a T5120 or a 10-user license on a T5220. New R16.2 customers or those upgrading from R15 or earlier must order the needed ODBC/JDBC subscription quantities via material code 265012. A T5120 supports from 0-5 connections whereas a T5220 or T5120 8-Core server supports 0-10 subscriptions. These subscriptions must be configured in the CMS authorization screen (see below). With these components, customers will be able to access historical data and dictionary names for the purpose of exporting data to other ODBC compliant applications. The implementation of ODBC or JDBC access to CMS data allows table-level permissions implying that users will be granted or denied access to entire data tables. If they have access to a specific table, such as an agent table, they will have access to all records within that table. Customers, therefore, should be selective when providing ODBC access to their data. Also see the Informix 'user' definition in the following section.

```
sapsucker.dr.avaya.com - PuTTY
sapsucker# cmsvc

Avaya(TM) Call Management System Services Menu

Select a command from the list below.
1) auth_display Display feature authorizations
2) auth_set Authorize capabilities/capacities
3) run_ids Turn Informix Database on or off
4) run_cms Turn Avaya CMS on or off
5) setup Set up the initial configuration
6) swinfo Display switch information
7) swsetup Change switch information
8) patch_inst Install a single CMS patch from CD
9) patch_rmrv Backout an installed CMS patch
10) load_all Install all CMS patches found on CD
11) back_all Backout all installed CMS patches from machine
Enter choice (1-11) or q to quit: 1

Version purchased: R16.1

Capability/Capacity Authorization
-----
vectoring authorized
forecasting authorized
graphics authorized
external call history authorized
expert agent selection authorized
external application authorized
global dictionary/ACD groups authorized
Avaya CMS Supervisor authorized
Avaya Report Designer authorized
Maximum number of split/skill members 150000
Maximum number of ACDs 8
Simultaneous Avaya CMS Supervisor logins 800
Number of authorized agents (RTU) 50000
Number of authorized ODBC connections 0

sapsucker#
```

Informix User definition

A "User" is defined as an individual, machine, program, application or device within or outside your enterprise that directly connects to the database present in CMS. This includes the CMS application and any third party applications like Avaya Operational Analyst, Admin-Sync, wallboard applications, etc. that connect directly to the database. "User" does not include individuals that can be accessing a machine, program, application or device that is directly connected to the database. For example, an individual that accesses CMS is not a "User," but the direct CMS application connection is a "User." Similarly, a wallboard that is connected to a wallboard application is not a "User," but the wallboard application that directly connects to the database is considered a "User." In the case of direct connections through JDBC and ODBC, a license will be required for each individual directly connecting through JDBC or ODBC. There

will not be an additional license required for the individual's machine or device through which such access is made. It is your responsibility to ensure you acquire the appropriate number of licenses for the anticipated use of the CMS, and to properly determine how many direct connections to the database will be required. You are only licensed and allowed to make direct connections to the database up to the number of licenses you acquired. If additional licenses are required, you are obligated to acquire them before making connection to the database.

CMS and ODBC interoperability

When using ODBC with CMS, you must keep in mind the following:

Dictionary names: Clients can access CMS Dictionary names. You must map the synonym to the report from the client.

Permissions: Applications that access Informix externally, such as database access scripts, might not work if the table permission script tries to access a table to which permission is denied.

Field display: The time and date data you receive from the database might not be formatted. Generally, times can be shown in seconds or in 24-hour clock format. You need to review data for formatting when you import it into your software application. The data returned from your SQL queries will be formatted in the manner described in your database interface specifications. See your software's documentation for further information on formatting data.

Switch features and capabilities: Some switch features and capabilities have an impact on CMS open database items. For more information on these features and capabilities, see the appropriate database items and calculations document for your CMS release.

CMS database logic structure

CMS historical tables store information in one record per row format. This formatting affects the way data can be accessed through ODBC. When accessing data in the historical tables, you might need to sum the information to retrieve complete data.

For example, a record will be created for each split/skill that an agent is logged into in the agent tables. If an agent is logged into four splits/skills, there will be four records for that agent. Similarly, if an agent starts the day with four splits/skills, and is added to a fifth split/skill before the end of the day, the agent's fifth record will be generated only from the point at which the additional split/skill was added. The other four records will reflect the total logon time.

This section contains the following topics:

- [Agent tables](#) on page 18
- [VDN tables](#) on page 18
- [Circular structure tables](#) on page 18

Agent tables

If an agent logs off and logs on more than once in a specified interval, another complete set of records is created for that agent for each logon in the agent tables.

For example, if an agent logs into four split/skills, logs out, and then logs back on during a set interval, there will be two sets of four records for that agent, one set per logon.

VDN tables

The VDN tables store one record per vector on which a VDN terminates. Therefore, if the terminating vector for a specific VDN changes in a set interval, there are two records for that VDN - one per terminating vector. This logic also applies to the Vector, Trunk, Trunk Group, and Split/Skill tables. If information is required from these tables, a sum structured query language (SQL) query can be necessary to access complete data from each table.

Circular structure tables

The Exceptions, Call Record, and Agent Trace tables are circular files. These tables populate continuously, until the table capacity plus ten percent has been reached. At that point, the oldest ten percent of the records are deleted.

For example, if an agent trace table has a capacity of 100 rows, and the total rows populated equals 110, the oldest ten rows will automatically be deleted. Therefore, the data in that table will change continuously as the table is updated.

Converting from Openlink ODBC to IBM ODBC or JDBC

Beginning with CMS R15, IBM Informix ODBC and JDBC are provided as standard. This section describes configuration and migration procedures for existing customers to move from Openlink ODBC to IBM Informix ODBC or JDBC.

This section contains the following topics:

- [System requirements](#) on page 19
- [Testing ODBC applications before an upgrade](#) on page 19
- [Enabling ODBC and JDBC on the CMS server](#) on page 20
- [Obtaining the client software](#) on page 21

System requirements

The following system requirements must be met before you can use the IBM Informix ODBC and JDBC with CMS:

- You must use the appropriate ODBC or JDBC software for the client to ensure connectivity.
- Beginning with R15 CMS the IBM Informix ODBC and JDBC support is enabled by default. CMS loads prior to R15 can have this enabled manually.
- The network communication software must be correctly installed and configured, and the network must be fully functional so that the server can communicate with the clients.

Testing ODBC applications before an upgrade

IBM Informix ODBC and JDBC can be made accessible on CMS R12 through R14 by manually editing files on the server as described in [Enabling ODBC and JDBC on the CMS server](#) on page 20. IBM Informix ODBC and JDBC can run in parallel (or co-resident) with the existing Openlink ODBC. If you have CMS R12 through R14 with Openlink ODBC installed, you do not have to uninstall it. You can continue to use Openlink ODBC while testing the new IBM Informix ODBC or JDBC interface with your applications.

Enabling ODBC and JDBC on the CMS server

CMS R15 is shipped with IBM Informix ODBC and JDBC interfaces available by default. This section applies only to CMS server versions R12, R13, R13.1, R14 and R14.1 where the customer would like to enable access to the IBM Informix ODBC and JDBC interfaces.

In order to enable the IBM Informix ODBC and JDBC access to the CMS server, there are two files that must be edited and then the CMS application and the IDS database must be stopped and started. All of this work must be performed while logged in as root and at a UNIX command prompt. The user performing this work must be familiar with the UNIX editor vi, UNIX cp command to copy and how to stop and start CMS. If you are not familiar with these, consult with an experienced UNIX system administrator or you can request that the Avaya CMS maintenance group perform this work.

Note:

For CMS R15 systems that were installed properly, ODBC and JDBC have already been enabled. Use this procedure to confirm that ODBC and JDBC were installed and make changes only if the hostnames were not set up properly.

1. Obtain the hostname of the CMS server by running the following command:

```
hostname
```

This will respond with the hostname of the system, for example:

```
cardinal
```

2. Save a copy of the `/opt/informix/etc/onconfig.cms` and the `/opt/informix/etc/sqlhosts` files. This will allow you to revert to the original files if necessary. For example, you can use the following commands to make copies of these files:

```
cd /opt/informix/etc
```

```
cp onconfig.cms onconfig.cms.bak
```

```
cp sqlhosts sqlhosts.bak
```

3. On the CMS server, add the following two lines to the `/opt/informix/etc/sqlhosts` file. Note that in both cases, you must substitute the actual hostname of the CMS server. If these lines already exist, do not add them again.

```
cms_net          ontlitcp    <hostname>      50000
```

```
cms_<hostname>  ontlitcp    <hostname>      50001
```

The 50000 and the 50001 values are the network port and if you prefer, you can administer them in the `/etc/services` and then add the name here instead.

4. Modify the **/opt/informix/etc/onconfig.cms** file and add the **cms_net** and **cms_<hostname>** entries to the **DBSERVERALIASES** line separated with commas. Remember to substitute the output found in step 1 from your system for the example **<hostname>** used here.

```
DBSERVERALIASES oacms_ol,cms_net,cms_<hostname># List of alternate
dbservernames
```

5. After you have modified the files, make backup copies of the files using the current date. For example, use the following commands to make backup copies for the date January 25, 2009:

```
cd /opt/informix/etc
cp onconfig.cms onconfig.cms.01252009
cp sqlhosts sqlhosts.01252009
```

6. Stop and start CMS and IDS. See *Avaya CMS Software Installation, Maintenance, and Troubleshooting* or *Avaya CMS Administration* for these commands.

Obtaining the client software

The IBM Informix IDS software disc is shipped with orders for CMS R12 through CMS R15. The IBM Informix IDS software is included in the Call Management System Release 16.2 installation disc for CMS R16 and later. Both discs contains the IBM Informix ODBC and JDBC client software. If you do not have the IBM Informix IDS software, the client software can be obtained from the IBM Web site free of charge at:

<http://www-01.ibm.com/software/data/informix/pubs/library/>

You must be a registered IBM user with a valid login and password. If you do not have a valid login, you can easily register at no cost. The site indicates that the software is a trial version. When the customer upgrades to R15 or R16, the official version of the client software is provided on the CMS software discs.

The location on the IBM Web site to download the newest IBM Informix Connect software, which includes support for ODBC clients on Windows Server 2003, Windows Vista Family (32-bit only), or Windows XP compatible systems, is:

<http://www14.software.ibm.com/webapp/download/search.jsp?pn=Informix+Connect>

The location on the IBM Web site to download the newest multiplatform JDBC 3.50.JC4 Driver is:

<http://www14.software.ibm.com/webapp/download/search.jsp?pn=Informix+JDBC>

Once you open the zip file, the file to extract and install for ODBC is named **IBM Informix Client-SDK.msi**.

Installing ODBC on a Windows client

The IBM Informix ODBC software can be installed on your desktop computer or on your network for each client to access.

This section contains the following topics:

- [Requirements](#) on page 23
- [Installing ODBC on a Windows client](#) on page 24
- [Configuring an ODBC data source](#) on page 24
- [Accessing the ODBC Data Source Administrator window](#) on page 27
- [Removing a data source](#) on page 27
- [Configuring ODBC tracing options](#) on page 27
- [Viewing installed ODBC data source drivers](#) on page 28

Requirements

Before installing the IBM Informix ODBC driver software on your computer, verify that:

- The client network software is installed.
- Your computer is communicating with the CMS server over the network.

Use your desktop TCP/IP products Packet Internet Groper (PING) utility (for example, **ping hostname**) to ensure that Communication between your computer and the CMS server is functional. Do not proceed if basic communications between your computer and the server cannot be established.

- The desktop computer is running Windows 2000 or Windows XP. Windows Vista is not supported for the ODBC and JDBC features.
- You must have the Avaya CMS R16 Software Installation disc that came with CMS or you can download the software from the IBM website.

Installing ODBC on a Windows client

To install IBM Informix ODBC software on a client PC that is running Windows 2000 or Windows XP:

Note:

The Windows XP interface is completely customizable. You can notice some differences based on your system configuration.

1. Insert the software disc, Avaya CMS R16 Software Installation into the disc drive.
2. Open Windows Explorer, and then select the disc drive with the Avaya CMS R16 Software Installation disc.
3. Select the **CSDK_Windows** folder.
4. Double click the application **setup.exe**.
5. The first screen is the Welcome screen, enter Next.
6. Enter the appropriate response for the licensing question, enter Next.
7. Enter the User Name and Organization, enter Next.
8. Keep the default option for Complete Installation, enter Next.
9. Click on Install.
10. Once complete, you will get a final screen and you can select Finish.

Note:

You can accept the default installation configuration. There are other options for installation including an MSI option. However, this document does not cover those options. For further information about these options, review the IBM documentation on the disc. In particular, view the client_install.pdf file under [DISC_DRIVE]:\CSDK_Windows\Doc.

11. Go to [Configuring an ODBC data source](#) on page 24.

Configuring an ODBC data source

You must configure the database to access to a specific server.

Note:

The Windows XP interface is completely customizable. You can notice some differences based on your system configuration.

To configure your ODBC driver software to access CMS data:

1. Select **Start > Control Panel > Administrative Tools > Data Sources (ODBC)**. The system displays the ODBC Data Source Administrator window.
2. Select one of the following tabs:
 - **System DSN (Applies to this machine only):**
Choose the System Data Source option if you want the data source to be available to all. You need administrative privileges to create a system DSN.
 - **User DSN (Applies to this machine only):**
Choose the User Data Source option if you want the data source to be available to the current user. This setting is useful if you must provide access for a specific user. You must not administer data sources on a per-user login ID basis.

Note:

If you do not have administrative privileges to create and save a System DSN, you can use a User DSN to set up the data source.

- **File DSN:**
Choose the System Data Source option if you want the data source to be stored in a file rather than the registry. This file will have a DSN extension. Some applications like Avaya Contact Center Express (CCE) make use of File DSNs.
3. Select **Add**.
 4. The **Create New Data Source** window displays a list of data source drivers.
 5. Select **IBM INFORMIX ODBC DRIVER**.
 6. Do one of the following:
 - If you selected the File DSN tab, select Next, enter the file name, select Next and then select Finish. The system displays the IBM Informix ODBC Driver Setup.
 - If you selected the User DSN or System DSN tab, select Finish and do the following steps:
 - a. Enter a representative name in the **Data Source Name** field for the server or database to which you are connecting to. An example entry for this field is cms_net or cms_hostname where the actual hostname of the cms would replace the word hostname. For example, if the CMS hostname is cardinal, you can enter cms_cardinal for the Data Source Name.
 - b. Enter description of the data source to which you are connecting in the **Description** field. An example entry for this field is CMS ODBC.

- c. Select the **Connection** tab.

Enter the Server Name for the CMS server. The two default options are cms_net or cms_[hostname] where the hostname is the actual hostname of the CMS server. For example if your CMS server has a hostname of cardinal, then you can enter cms_cardinal. If you do not know the hostname, you can use cms_net. However, note that you will not be able to connect to multiple CMS systems at the same time using cms_net since the Server Name field requires a unique value across all DSNs. If you try to create another DSN using cms_net and provide a different Host Name, it will change all DSNs with the same Server Name to use the new Host Name.
 - d. Enter the Host Name or IP address.
 - e. Enter the port of your database host machine in the **Service** field. If you are using cms_net enter port 50000 and if you are using cms_[hostname] enter port 50001.
 - f. Select from the dropdown menu the option "olsoctcp".
 - g. Leave the Options field blank.
 - h. Enter cms for the Database Name.
 - i. Enter the User ID that has permission to login to the CMS server.
 - j. Enter the Password for the User ID that has permission to login to the CMS server.
7. Select the **Environment** tab
 - a. Enter **en_US.UTF8** for the Client Locale.
 - b. Enter **en_US.UTF8** for the Database Locale.
 - c. Keep the defaults for the remaining fields.
 8. Re-select the **Connection** tab.
 9. Select **Apply**.
 10. Select **Apply & Test Connection**.

If everything is configured correct, you will see the message "**Test connection was successful**".
 11. Select **OK**, then **OK** again until all the ODBC Windows close.
- ODBC driver software is installed on your computer.

Note:

Once the driver is configured, the IBM Informix ODBC driver is accessible to ODBC-enabled applications on your computer. Any queries that you send to the CMS database from client Windows applications, such as Microsoft Access, will use the ODBC feature to access data and copy it to your applications. You need to format the data within your application.

Accessing the ODBC Data Source Administrator window

The ODBC Driver Administration utility resides within your desktop environment's control panel. This utility is an optional method for adding and removing ODBC drivers. To access the ODBC Data Source Administrator window on a Windows XP or Windows 2000 system:

1. In the Windows task bar, select **Start > Settings > Control Panel**.

Note:

The Windows XP interface is completely customizable. You can notice some differences based on your system configuration.

2. Select **Administrative Tools**.
3. Double click **Data Sources (ODBC)**.

The system displays the **ODBC Data Source Administrator** window.

Removing a data source

To remove any data source, perform the following:

1. Select the System DSN tab in the **ODBC Data Source Administrator** window.

For information on how to access the **ODBC Data Source Administrator** window, go to [Accessing the ODBC Data Source Administrator window](#) on page 27.

2. Select the appropriate ODBC data source.
3. Select the **Remove** button in the **ODBC Data Source** window and follow the prompts.

Configuring ODBC tracing options

You can specify how the ODBC driver traces ODBC function calls. If tracing is activated, the system generates a file that contains the actual ODBC function calls.

To set the ODBC tracing options:

1. In the **ODBC Data Source Administrator** window, select the **Tracing** tab.

For information on how to access the **ODBC Data Source Administrator** window, go to [Accessing the ODBC Data Source Administrator window](#) on page 27.

2. Choose one of the following options:

- Trace ODBC calls or observe ODBC activity by selecting the **Start Tracing Now** button.
- Stop tracing ODBC function calls automatically by selecting the **Stop Tracing Now** button. This will terminate the ODBC tracing upon completion of the ODBC session.
- Select or change the file to which the IBM Informix driver writes tracing information, by performing one of the following steps:
 - Enter a file name and path in the **Log file Path** field.
 - Use the **Browse...** button to select the appropriate file from the **Select ODBC Log File** window.

Note:

The default log file is **\SQL.LOG**.



CAUTION:

Do not change the default entry in the **Custom Trace DLL** field.

Viewing installed ODBC data source drivers

Use the **Drivers** window to verify installation of the IBM Informix data source driver.

To view a list of installed ODBC drivers:

1. In the **ODBC Data Source Administrator** window, select the **Drivers** tab.

For information on how to access the **ODBC Data Source Administrator** window, go to [Accessing the ODBC Data Source Administrator window](#) on page 27.

2. View detailed information about an installed driver by selecting the driver from the list, and then selecting the **About** tab.

Note:

If the appropriate IBM Informix data source driver is not displayed in the **Drivers** window, return to [Installing ODBC on a Windows client](#) on page 24 and reinstall the driver.

Installing JDBC on a Windows client

This section contains the following topics:

- [Requirements](#) on page 29
- [Installing JDBC on a Windows client](#) on page 29

Requirements

Before installing the IBM Informix JDBC driver software on your computer, verify that:

- The client network software is installed.
- Your computer is communicating with the CMS server over the network.
Use your desktop TCP/IP products Packet Internet Groper (PING) utility (for example, ping hostname) to ensure that Communication between your computer and the CMS server is functional. Do not proceed if basic communications between your computer and the server cannot be established.
- The desktop computer is running Windows 2000 or Windows XP. Windows Vista is not supported for the ODBC and JDBC features.
- You must have the Avaya CMS R16 Software Installation disc that came with CMS or you can download the software from the IBM website.

Installing JDBC on a Windows client

To install IBM Informix JDBC software on a client PC that is running Windows 2000 or Windows XP:

Note:

The Windows XP interface is completely customizable. You can notice some differences based on your system configuration.

1. Insert the disc, Avaya CMS R16 Software Installation into the disc drive.
2. Open Windows Explorer, and then select the disc drive with the Avaya CMS R16 Software Installation disc.
3. Select the **IDS_64bit** folder.

Installing JDBC on a Windows client

4. Select the **JDBC** folder.
5. Double click the executable setup.jar.
6. Click **Next**.
7. Enter the appropriate response to the licensing question, then select **Next**.
8. Select the location to install the JDBC software, then select **Next**.
9. The screen will then show where the IBM Informix JDBC Driver will be installed and the size. Select Next. You will see the progress during the install.
10. Once complete you will be presented with the status. Select Finish.

For programmer and usage related information about this IBM Informix JDBC driver, reference the IBM website at:

http://www-01.ibm.com/software/data/informix/pubs/library/jdbc_2.html

Providing secure access to the CMS database

The CMS database has "open access" permissions as a standard feature. That is, any CMS login connecting to the CMS server using ODBC/JDBC has permissions to view CMS data tables.

Note:

CMS does not allow you to control which tables the CMS login has access to, or which ACD data the CMS login can view.

To limit the users that can access the CMS database using ODBC/JDBC follow the steps listed in this section. The users for whom you set permissions must adhere to the following requirements:

- All CMS login IDs to which you choose to provide CMS database access must be members of the **dbaccess** UNIX group.
- You must execute the **dbaccess** option under the **cmsadm** menu, which makes the proper Informix permission changes to the CMS database.

Your secure access permissions are preserved for you in the **cmsadm** backup and in the CMS Maintenance backup. The permissions are migrated during a CMS upgrade and can be restored in the event of a loss of your CMS server data.

This section includes the following topics:

- [Preparing to set the secure database access](#) on page 31
- [Adding members to the dbaccess UNIX group](#) on page 32
- [Setting the secure access permissions in the CMS database](#) on page 33
- [Removing ODBC access permissions for a specific user ID](#) on page 34
- [Returning the CMS database to public permissions](#) on page 35

Preparing to set the secure database access

1. List all CMS logins for which you wish to provide ODBC/JDBC access. To determine the list of all CMS logins, perform a **List all** under the **User Permissions** menu item in the **CMS** menu.

2. Make a note of which CMS logins need to be placed in the **dbaccess** UNIX group. To determine which logins are already in the **dbaccess** group, enter:

```
cat /etc/group | grep dbaccess
```

- If CMS logins are not in the group, your result looks like this:

```
dbaccess::201:
```

- If CMS logins “**odbcusr1**” and “**odbcusr2**” are in the group, your result looks like this:

```
dbaccess::201:odbcusr1,odbcusr2
```

Adding members to the dbaccess UNIX group

1. Each CMS login which receives ODBC/JDBC access must be a member of the UNIX **dbaccess** group.

Note:

The **root**, **cms**, and **cmssvc** users will have full default permissions to ODBC/JDBC.

2. To put CMS logins into the dbaccess group, enter:

```
usermod -G dbaccess cmslogin
```

where **cmslogin** is the user id of the specific CMS login to be placed in the group. You must execute the **usermod** command once for each CMS login to which you want to provide CMS database access.



CAUTION:

Enter a capital **G** while typing the command. Entering a lower case **g** will change the users default group, which can cause access issues to CMS.

An example:

```
usermod -G dbaccess odbcusr1
```

```
usermod -G dbaccess odbcusr2
```


Setting the secure access permissions in the CMS database

1. Enter:

```
cmsadm
```

The system displays the Avaya Call Management System Administration menu.

Note:

Different options can be displayed in the Avaya Call Management System Administration menu depending on the current version of Avaya CMS on your system.

2. Enter the number associated with the dbaccess option. The system displays the following message:

```
Begin CMS DB Access Permissions changes grant resource to "public";

Your CMS database currently has public access permissions to all resources.
Do you wish to revoke this access and only grant access to specific CMS
users? [y,n,?]
```

3. Press "y", or **Enter**.

The system displays:

```
Please wait while CMS Informix Database permissions are changed.
revoke resource from public;
revoke connect from public;
grant connect to cms;
grant connect to cmssvc;
Revoke resource from public on CMS database.
Please wait while connect permissions are granted for requested users
grant connect to <cmslogin>;
grant connect to <cmslogin>;
...
Changes to CMS DB Access Permissions finished.
```

4. You see one "**grant connect** to <cmslogin>" per CMS login ID which is in the **dbaccess** UNIX group.

Note:

You always see one "**grant connect**" message per CMS login ID, including login IDs which are already in the **dbaccess** group and had connect permissions prior to this.

5. After the changes are complete, you can use the CMS login ID to run ODBC/JDBC clients and access the CMS database.

6. To preserve your changes, run a **cmsadm** backup followed by a Maintenance Backup immediately.

Removing ODBC access permissions for a specific user ID

1. If you wish to remove any CMS login IDs from those designated to have ODBC/JDBC access permission, you must first remove them from the **dbaccess** UNIX group.

Note:

You must execute **usermod** command once for each CMS login you are removing from the group. The **usermod** command will not remove the user from its default group **cms**.

For example, if you wish to remove the CMS login ID **odbcusr1** from the **dbaccess** group:

```
usermod -G "" odbcusr1
```

This command will remove the user from all the **custom groups** along with **dbaccess**.



CAUTION:

Enter a capital **G** while typing the command. Entering a lower case **g** will change the users default group, which can cause access issues to CMS.

2. Enter:

```
cmsadm
```

The system displays the Avaya Call Management System Administration menu.

3. Enter the number associated with the **dbaccess** option. The system reads the UNIX group information and resets the access permissions for only those members still in the **dbaccess** group.

For example, if you have removed **odbcusr1** from the **dbaccess** group but left **odbcusr2** in the group, then:

```
Begin CMS DB Access Permissions changes
Please wait while connect permissions are granted for requested users
grant connect to "Odbcusr2";
Changes to CMS DB Access Permissions finished.
```

4. To preserve your changes, run a **cmsadm** backup followed by a Maintenance Backup immediately.

Returning the CMS database to public permissions

To undo all secure access permissions and put the CMS database back to its original form (public permissions for all CMS login IDs):

1. To get the list of all ODBC users, enter:

```
grep dbaccess /etc/group
```

2. You must first remove all users from the UNIX group **dbaccess**. Run the **usermod** command for each CMS login that is currently in the **dbaccess** group.



CAUTION:

Enter a capital **G** while typing the command. Entering a lower case **g** will change the users default group, which can cause access issues to CMS.

For example, if the users **odbcusr1** and **odbcusr2** are the entire set of CMS login IDs with secure access permissions.

```
usermod -G "" odbcusr1
```

```
usermod -G "" odbcusr2
```

3. Enter:

```
cmsadm
```

The system displays the Avaya Call Management System Administration menu

4. Enter the number associated with the dbaccess option.

```
Begin CMS DB Access Permissions changes

No CMS user ids are in UNIX group dbaccess.
If you proceed, the CMS database is set to public permissions access for all
resources.
Do you really want to do this? [y,n,?]
```

5. Enter: **y**

```
Please wait while CMS Informix Database permissions are set to public.
grant resource to public;
revoke connect from cms;
revoke connect from cmssvc;
Grant resource to public on CMS database.
Changes to CMS DB Access Permissions finished.
```

Run a **cmsadm** backup followed by a Maintenance Backup to preserve your changes.

Troubleshooting

This section presents general troubleshooting procedures and error messages for ODBC and JDBC. For more detailed information, see the documentation that is included on the Avaya CMS R16 Software Installation disc or visit the IBM website for additional documentation at:

<http://www-01.ibm.com/software/data/informix/pubs/library/>.



Important:

If you choose to develop an application for the ODBC or JDBC driver, Avaya cannot provide support for that application or for any other third-party software or related mapping.

This section contains the following topics:

- [Network support](#) on page 37
- [Server log file](#) on page 37
- [Client trace](#) on page 38

Network support

Avaya does not control customer network configuration or ODBC-enabled client applications. Installation and ongoing maintenance support is limited to determining if data is being transferred correctly in the most basic client/server relationship. This is defined as a CMS system running ODBC on the same network hub as the client PC.

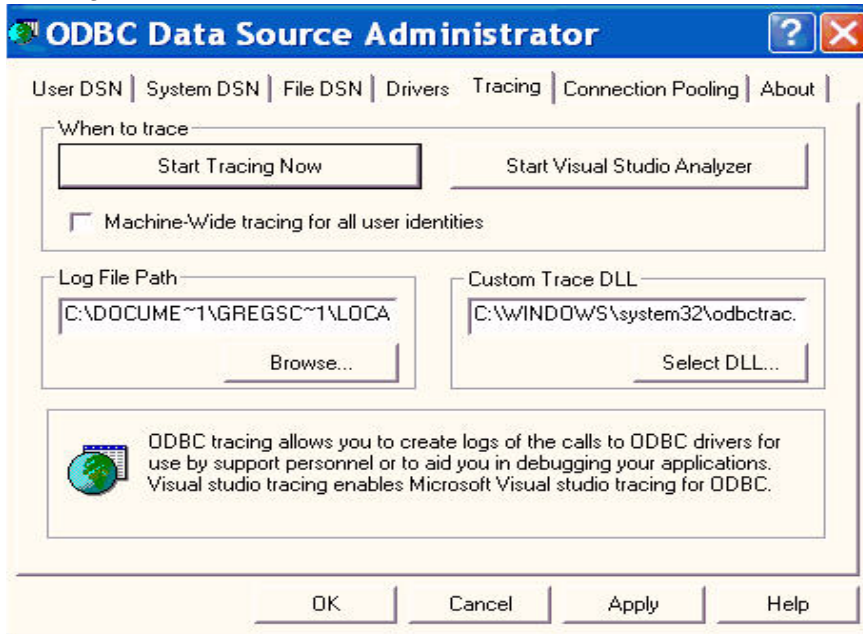
Verify that the trouble occurs on the same network subnet. Then continue with troubleshooting procedures. If the trouble does not occur on the same network subnet, contact the Avaya help line.

Server log file

The default server log for the IBM Informix IDS server on CMS is located at **/opt/Informix/cmsids.log**. Server related errors will be written in this log.

Client trace

The Windows Data Sources (ODBC) configuration utility, located in the Windows Control Panel under Administrative tools, allows you to enable or disable ODBC trace logging under the Tracing tab.



Trace logging provides you with:

- Records of your entire ODBC session, including all ODBC calls made by the ODBC-compliant application you are using
- Native database error messages that might not have been replaced by the ODBC-compliant application you were using.

See [Configuring ODBC tracing options](#) on page 27 for information on configuring this utility.

Glossary

Abandoned call	A call in which a caller hangs up before receiving an answer from an agent. The call can be queued to a split/skill or in a vector/vector directory number (VDN) or ringing at an agent before it is abandoned.
Access permissions	Permissions assigned to a Call Management System (CMS) user so that the user can access different subsystems in CMS or administer specific elements (splits/skills, trunks, vectors, and so on) of the ACD. Access permissions are specified as read or write permission. Read permission means the CMS user can access and view data (for example, run reports or view the Dictionary subsystem). Write permission means the CMS user can add, modify, or delete data and execute processes.
ACD	See Automatic Call Distribution.
ACD call	A call that queued to a split/skill and was answered by an agent in that split/skill, or a call that queued as a direct agent call and was answered by the agent for whom it was queued.
ACW	See After Call Work.
Adjunct/Switch Applications Interface (ASAI)	An open application interface through which processors and switches can jointly provide services that require applications to initiate, receive, and control calls or make use of switch features. (See Open Application Interface.)
After Call Work (ACW)	An agent state generally representing work related to the preceding ACD call.
API	See Application Programming Interface.
Application Programming Interface (API)	A set of related functions that a computer programmer uses to obtain some kind of service from another piece of software. Programmers of Windows based applications use the Windows API to create windows, draw text on the screen, access files, and perform all other services provided by Windows. Despite the use of the word application in this term, applications might not be the only software using an API; lower-level software components such as network drivers also have APIs, but these components are not “applications” and are not used directly by applications.
ASAI	See Adjunct/Switch Applications Interface.
Automatic Call Distribution (ACD)	A switch feature using software that channels high-volume incoming and outgoing call traffic to agent groups (splits or skills). Also an agent state where the extension is engaged on an ACD call.
Backup	The process of protecting data by writing the contents of the disk to an archive (or tape) that can be removed from the computer environment and stored safely.

Calculation

Calculation	The abbreviated name (calculation name) for the formula calculation that generates the data for a field in a report.
Call Management System (CMS)	A software product used by business customers that have Avaya telecommunications switches and receive a large volume of telephone calls that are processed through the Automatic Call Distribution (ACD) feature of the switch. The CMS collects call-traffic data, formats management reports, and provides an administrative interface to the ACD feature in the switch.
Call Management System Query Language (CMSQL)	A tool that allows direct queries of the historical database. This tool is the interactive interface typically used to view the Informix database. For CMS purposes, CMSQL is used instead of Informix SQL.
Call Vectoring	<p>A switch feature that provides a highly flexible method for processing ACD calls.</p> <p>A call vector is a set of instructions that controls the routing of incoming and outgoing calls based on current conditions. Examples of call vector conditions include time of day and the number of calls in queue.</p>
Call Work Code (CWC)	An ACD capability that allows the agent to enter a string of digits during or after the call and send them to CMS for management reporting.
Avaya Supervisor	The Call Management System application for the Microsoft Windows operating environment.
CMS	See Call Management System.
Current interval	Represents the current intrahour interval, which can be 15, 30, or 60 minutes. The current interval is part of the real-time database. CMS starts collecting ACD cumulative data at the beginning of the interval (on the hour, half-hour, or quarter hour) and continues collecting ACD cumulative data until the end of the interval. When the current interval changes, all cumulative data is cleared and CMS begins counting cumulative data again starting from zero. The length of the interval is set in the System Setup: Storage Intervals window and is called the <i>intrahour interval</i> .
CWC	See Call Work Code.
Daily data	Interval data that has been converted to a 1-day summary.
CMS database	A group of files that store ACD data according to a specific time frame: current and previous intrahour real-time data and intrahour, daily, weekly, and monthly historical data.
Database item	A name for a specific type of data stored in one of the CMS databases. A database item can store ACD identifiers (split numbers or names, login IDs, VDNs, and so on) or statistical data on ACD performance (number of ACD calls, wait time for calls in queue, current states of individual agents and so on).
Database Management System (DBMS)	The software that manages access to structured data. For example, the Microsoft SQL Server is a database management system. Database management system can also be used generally to include PC database products such as Microsoft Access, as well as any other software that can provide data access services.

CMS database tables	CMS uses these tables to collect, store, and retrieve ACD data. Standard CMS items (database items) are names of columns in the CMS database tables.
DBMS	See Database Management System.
Dictionary	A CMS subsystem that can be used to assign names to various call center elements such as login IDs, splits/skills, trunk groups, VDNs and vectors. These names are displayed on reports, making them easier to interpret. Dictionary also allows customized calculations to be created for use in reports.
Driver manager	A dynamic link library that loads drivers on behalf of an application.
Dynamic link library	A dynamic link library is another name for a driver or a driver manager. A dynamic link library is specific to the DBMS of the data being accessed. For example, an Informix specific dynamic link library will be used to access data in an Informix database, such as the CMS database.
Entity	A generic term that refers to one of the following: Agent, Split/Skill, Trunk, Trunk Group, VDN, or Vector.
Exception	A type of activity in the ACD which falls outside the limits you have defined. An exceptional condition is defined in the CMS Exceptions subsystem, and usually indicates abnormal or unacceptable performance of the ACD (by agents, splits/skills, VDNs, vectors, trunks, or trunk groups).
Historical database	A database that contains intrahour records for up to 62 days, daily records for up to 5 years, and weekly/monthly records for up to 10 years for each CMS table.
Historical reports	Reports that display past ACD data for various CMS tables.
Informix	A relational database management system used to organize CMS historical data.
Informix SQL	A query language tool that is used to extract data from an Informix database.
Intrahour interval	A 15-, 30-, or 60-minute segment of time starting on the hour. An intrahour interval is the basic unit of CMS report time.
LAN	See <i>Local Area Network</i> .
Local area network (LAN)	A private interactive communication network that allows computers to communicate over short distances, usually less than one mile, at high data transfer rates from 1 Mbps to as high as 100 Mbps.
Monthly data	Daily data that has been converted to a monthly summary.
ODBC	See Open Database Connectivity.
Open Database Connectivity (ODBC)	Open Database Connectivity is a standard application programming interface (API) for accessing data in both relational and non-relational databases.
Previous interval	Represents one intrahour interval and is part of the real-time database. At the end of each intrahour interval, the contents of the current intrahour interval are copied to the previous intrahour interval portion of the real-time database.

Read permission

Read permission	The CMS user with read permission can access and view data (for example, run reports or view the Dictionary subsystem). Read permission is granted from the User Permissions subsystem.
Real-time database	Consists of the current and previous intrahour data on each CMS-measured agent, split/skill, trunk, trunk group, vector, and VDN.
Single-user mode	Only one person can log into CMS. Data continues to be collected if data collection is "on." This mode is required to change some CMS administration.
SQL	See Structured query language.
Structured query language (SQL)	A language used to interrogate and process data in a relational database (such as Informix).
Switch	A private switching system providing voice-only or voice and data communications services (including access to public and private networks) for a group of terminals within a customer's premises.
Trunk	A telephone line that carries calls between two switches, between a Central Office (CO) and a switch, or between a CO and a phone.
Trunk group	A group of trunks that are assigned the same dialing digits - either a phone number or a Direct Inward Dialed (DID) prefix.
VDN	See Vector Directory Number.
Vector	A list of steps that process calls in a user-defined manner. The steps in a vector can send calls to splits/skills, play announcements and music, disconnect calls, give calls a busy signal, or route calls to other destinations. Calls enter vector processing via VDNs, which can have received calls from assigned trunk groups, from other vectors, or from extensions connected to the switch.
Vector directory number (VDN)	An extension number that enables calls to connect to a vector for processing. A VDN is not assigned an equipment location. It is assigned to a vector. A VDN can connect calls to a vector when the calls arrive over an assigned automatic-in trunk group, dial-repeating (DID) trunk group, or ISDN trunk group. The VDN by itself can be dialed to access the vector from any extension connected to the switch.
Weekly data	Daily data that has been converted to a weekly summary.
Write permission	The CMS user can add, modify, or delete data and execute processes. Write permission is granted from the User Permissions subsystem.

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