Oracle® IVR Integrator

Concepts and Procedures

Release 11*i* for Windows NT

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1 Understanding Oracle IVR Integrator

This topic group provides overviews of the application and its components, explanations of key concepts, features, and functions, as well as the application's relationships to other Oracle or third-party applications.

This topic group covers the following topics:

- Overview of Oracle IVR Integrator
- General Flow of an IVR Call
- IVR Integration Options
- Oracle IVR Integrator Service
- Oracle IVR Monitor Service
- Oracle IVR Integration with Cisco ICM
- Oracle Telephony Manager Routing Data Flow
- About the Oracle Campaign Database
- About Standard TCP/IP Messaging
- Understanding Data Packets

1.1 Overview of Oracle IVR Integrator

Oracle IVR Integrator is a server-based solution that integrates Oracle CRM applications with data collected by an interactive voice response (IVR).

An IVR is a computer that uses telephone touch tones for input and prerecorded digitized recordings for output. The recorded output can be either in response to caller input or for repetitive messages such as the initial greeting and the menu of options. IVRs can query a database for information and provide the information as a recorded message, such as a checking account balance or an airline flight schedule. An IVR can accept and record input such as a request for moving money from one account to another.

When a PBX answers a telephone call, the caller is immediately routed to a group of extensions that are connected to the IVR, so that callers are on a phone extension that is connected to the PBX. In this way, callers can choose to transfer their calls to other information topics or to speak with a person.

1.1.1 Characteristics of Oracle IVR Integrator

Oracle IVR Integrator is not an IVR. Oracle IVR Integrator server enables Oracle CRM applications to use IVR-collected data to automatically screen pop customer records. In this way, agents can identify callers without having to request information from them.

The information that Oracle IVR Integrator passes to Oracle Telephony Manager can also be used to intelligently route the IVR call, for example, the delivery of a service request to the assigned agent.

Oracle IVR Integrator is only required when using Dialogic (Intel) CT Connect^{TM} CTI middleware. It is not necessary with Cisco Intelligent Contact Management (ICM) CTI middleware.

1.2 General Flow of an IVR Call

The general flow of an IVR call involves two paths. The first path is the voice path, that is, how a call is moved around the system. The second path is the data path that the IVR information takes as it moves from the IVR to the Oracle Interaction Center applications.

The voice path starts when the caller places the call. When the call arrives at the ACD/PBX, the ACD/PBX passes the call to the IVR unit, usually over T1 connections.

If the caller requests to speak with an agent, the data path begins and two paths (voice and data) simultaneously go through the systems. When the caller requests to speak with an agent, the call is held in a queue until an agent is available. The two paths finally converge at the interaction center agent. When a caller chooses to not speak with an agent, only the voice path is active and is terminated when the caller hangs up the phone.

The data does not move directly from the IVR to the agent application or to Oracle Universal Work Queue (UWQ). The IVR information is received from the IVR and then delivered as raw data to the Oracle Call Center Connectors module, then as media information to Oracle Telephony Manager, and finally to UWQ and the agent application.

In addition to the caller's information input, the IVR application can access external data sources and provide more information to Oracle Interaction Center.

To ensure that the proper call and data are synchronized when the agent receives them, the telephony information merges with the IVR data before they are delivered to Oracle Call Center Connectors. Telephony information is gathered from the CTI link either directly by the IVR application or as part of the delivery process that the Oracle interface performs.

1.3 IVR Integration Options

Three implementation options are available to provide integration between the IVR and the Oracle Interaction Center environment. The specific telephony and CTI architecture must be analyzed to determine the appropriate usage option. The underlying business benefits still apply, regardless of the implementation option that is used. The three implementation options are described in the following sections.

- IVR Integrator Service Standalone
- IVR Integrator and IVR Monitor Services Together
- IVR Integration Support with Cisco ICM

1.3.1 IVR Integrator Service Standalone

The Oracle IVR Integrator service can be implemented in a standalone mode so that the Integrator service receives the raw data packet from the IVR application and passes it to the Oracle Call Center Connectors module. This scenario supports the Dialogic CT Connect CTI middleware.

When you use Oracle IVR Integrator service in standalone mode, you need to consider two conditions:

- The IVR application has access to CTI information and can pass along a unique call identifier as part of the IVR data packet.
- CT Connect is the CTI middleware integrating with Oracle Interaction Center. If Cisco ICM is the CTI middleware, you should not use IVR Integrator because the IVR data is sent as part of the CTI data, rather than sent separately.

1.3.2 IVR Integrator and IVR Monitor Services Together

If the IVR application does not have access to CTI information that can match a call ID with the data packet, Oracle IVR Monitor service can be run with the Integrator service to provide the call ID. In this scenario, the Monitor service receives the raw data packet from the IVR application, adds the call ID to it, and passes it to the Integrator service. The Integrator service passes it to the Call Center Connectors module. This option only supports the Dialogic (Intel) CT Connect CTI middleware with either the Avaya (Lucent) Definity® Enterprise Communications Server (ECS) PBX or the Nortel Meridian 1 ACD.

1.3.3 IVR Integration Support with Cisco ICM

If Cisco ICM software is the CTI middleware in use, the IVR Integrator and IVR Monitor services are not required for IVR integration. Cisco ICM has the ability to collect and send IVR data as part of the CTI data packet. In this option, the telephony and IVR information are not separate.

1.4 Oracle IVR Integrator Service

Oracle IVR Integrator is a Windows NT service that is part of the Oracle Advanced Inbound bundle. Oracle IVR Integrator receives raw data packets containing information that is collected by the IVR application and delivers the information to the Oracle Call Center Connectors application and eventually to the interaction center agent application. Depending on the implementation option, Oracle IVR Integrator may or may not get the IVR information directly from the IVR application. The application always delivers the raw IVR data to the Call Center Connectors module. The Oracle IVR Integrator service does not become involved with the interaction until the caller requests contact with an agent.

In calls when a caller does not request to speak to an interaction center agent, for example, the caller uses the IVR to query an account balance and then hangs up, the Oracle IVR Integrator service does not receive a data packet and has no involvement with the interaction.

1.4.1 Oracle IVR Integrator Service Architecture

Gradient PC-DCE is currently a required third-party component and is used for communication between the Oracle Call Center Connectors module and the Oracle IVR Integrator service. All other communication is provided as part of the module offering.

Before ending at the agent’s workstation, the IVR data packet takes the following steps.

1. The IVR Application creates the data packet for the IVR Integrator service. This communication uses a TCP/IP network socket.

2. The data packet travels from the IVR Integrator service to the Oracle Call Center Connectors module. This communication uses PC-DCE.

3. The raw data is then reformatted into key-value pairs and is passed on to Oracle Telephony Manager (OTM). If OTM is in routing mode, it uses IVR information to make a routing decision.

4. The information is passed on to Oracle Universal Work Queue (UWQ) where it is made available to the business application and a screen pop is sent to the agent's workstation.

1.5 Oracle IVR Monitor Service

Oracle IVR Monitor runs as a Windows NT service as part of Advanced Inbound. It receives raw data packets containing information collected by the IVR application and delivers them to the Oracle IVR Integrator service.

The IVR Monitor service provides the unique call ID to the IVR data packet when the IVR application cannot provide it. The IVR Monitor service uses the CTI link to monitor the PBX extensions that are assigned to the IVR. When the IVR call is transferred, Oracle IVR Monitor retrieves the CTI event and adds the call ID to the data packet by using a matching algorithm.

When the Oracle IVR Monitor service is required, it is installed on the same server as the Oracle IVR Integrator service.

When you use the IVR Monitor, you need to take into account three conditions:

- The IVR application does not have access to CTI information and thus cannot pass along a unique call identifier as part of the IVR data packet.
- The IVR Monitor service is always used in conjunction with the IVR Integrator service. IVR Monitor is never used in a standalone mode.
- CT Connect is the CTI middleware that integrates with Oracle Interaction Center. If Cisco ICM is the CTI middleware, you cannot use IVR Integrator and IVR Monitor because IVR data is part of the CTI data.

Note: At the current release, Oracle IVR Monitor Service works only with Nortel Meridian 1 and Avaya (Lucent) Definity G3.

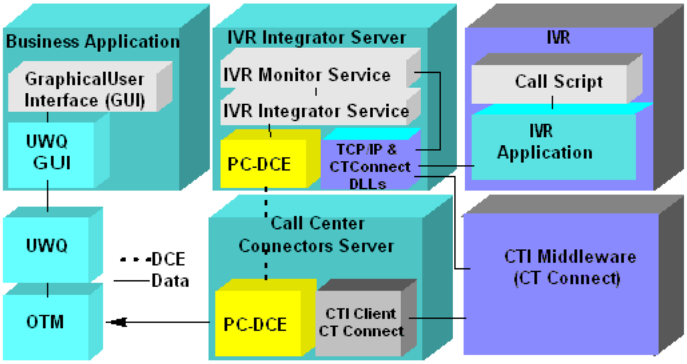
1.5.1 Oracle IVR Monitor Service Architecture

The application components for IVR integration with the IVR Monitor service are identical to the IVR Integrator architecture with two exceptions:

- The IVR Monitor service is present.
- The IVR application sends the raw data packet to the IVR Monitor service rather than the IVR Integrator service. The IVR Monitor service passes the data to the IVR Integrator service.

The connection between the CTI middleware and the IVR Monitor service enables the monitoring of the PBX extensions that are assigned to the IVR. The call information is retrieved from this monitoring. When the IVR Integrator service has the IVR information, the same data path is followed. The communication between the IVR Monitor service and the IVR Integrator service is a TCP/IP network socket, as is the communication between the IVR application and the IVR Monitor service. The two network sockets are unique communication channels.

The following figure illustrates the Oracle IVR Monitor Service architecture.



When the IVR Monitor Service is in use, the IVR application sends the raw data packet to the IVR Monitor service via TCP/IP and CT Connect DLLs rather than to the IVR Integrator Service. From the IVR Monitor Service, the data goes to the Oracle Call Center Connectors server via Entegrity (Gradient) PC-DCE, which passes the data to Oracle Telephony Manager. If Oracle Telephony Manager is in routing mode, the data is passed to Oracle Universal Work Queue and on to the agent's workstation.

1.6 Oracle IVR Integration with Cisco ICM

In addition to Dialogic CT Connect, Cisco ICM is a supported CTI middleware. Cisco ICM provides unique call-routing functionality that Oracle Interaction Center can leverage. Cisco ICM is usually used with multiple interaction centers and can route calls among centers as well as within a center to provide a virtual center. A virtual center looks like a single center to the caller, but is actually two or more centers in separate geographic locations.

Cisco ICM also offers the ability to pass IVR data together with the CTI data in a single data packet. This provides one-step integration between the IVR and Oracle Interaction Center. When using Cisco ICM, the IVR data available to Oracle Interaction Center is a total of 400 bytes in ten 40-byte fields, which is less than the 2KB maximum that is offered with Oracle IVR Integrator.

Because Cisco ICM is always leveraged for IVR integration when it is the CTI middleware, IVR Integrator, IVR Monitor, and PC-DCE are not required. Other than the smaller quantity of IVR data available from Cisco ICM, there is no functional difference compared with IVR Integrator.

> **Note:** If Cisco ICM is the CTI middleware, it does all call routing and can leverage the IVR information as part of the routing decision process. Oracle Telephony Manager runs in passive mode and never routes calls with Cisco ICM.

1.6.1 Architecture of IVR Integration with Cisco ICM

IVR Integration using Oracle IVR Integrator and IVR integration using the Cisco ICM CTI middleware involve three differences:

- IVR Integrator and its associated components (IVR Monitor and PC-DCE) are not used and not present in the diagram.
- The IVR application provides the IVR data to Cisco ICM rather than to a separate service, such as IVR Integrator.
- IVR information is delivered to Oracle Call Center Connectors from Cisco ICM rather than from a separate service.

1.6.2 Oracle IVR Integrator versus Cisco ICM Integration

Cisco ICM is supported CTI middleware. In a single step, Cisco ICM delivers the data collected by the IVR with the CTI data. Both the IVR data and the CTI data are delivered to the Oracle Interaction Center in a single data packet. Because Cisco ICM is CTI middleware, in a Cisco ICM implementation Oracle IVR Integrator and IVR Monitor are not required and are never used. Cisco ICM can deliver 400 bytes of IVR data, which you can place in ten 40-byte fields.

In both Oracle IVR Integrator and Cisco ICM implementations, an application running on the IVR sends the data packet.

1.7 Oracle Telephony Manager Routing Data Flow

When Oracle Telephony Manager (OTM) is in call-routing mode and both Oracle IVR Integrator Server and Oracle IVR Integrator Monitor services are being used together, the data flow build consists of the following eleven steps:

1. An inbound call arrives, and the caller is passed to the IVR.

2. The caller requests to speak with an agent, and the call is transferred to a route point monitored by OTM. The call remains at the route point until OTM determines a route and an agent becomes available.
3. Simultaneously, the IVR sends a data packet to Oracle IVR Integrator.
4. When a call hits a route point, Call Center Connectors sees a CTI event.
5. Call Center Connectors queries Oracle IVR Integrator to determine if an IVR data packet matches the Call ID from the call at the route point.
6. Oracle IVR Integrator sends back the IVR data packet for the call.
7. Call Center Connectors sends CTI and IVR data to OTM., and OTM then issues a route request to the routing server.
8. The route request is returned and OTM transfers the call to the agent.
9. Simultaneously, OTM delivers the data to the UWQ server.
10. The UWQ server delivers the media data to the business application and the agent sees a screen pop with the customer profile information.
11. When the optional IVR Monitor service is in use, the IVR application sends the data packet to IVR Monitor service rather than to IVR Integrator service.

1.8 About Data Mapping

The Oracle IVR data map associates data in the IVR raw data packet with key value pairs that are delivered to Oracle Telephony Manager. The customer determines the data that the IVR system should deliver to the IVR Integrator. The data in turn is passed to Oracle Telephony Manager and mapped to fields in the Customer record. The mapping determines which data in the data packet is presented to the CRM application. The IVR data packet consists of pairs of data labels and data that is delimited by a separator character, for example, a semicolon. Each entry in the data map provides the following information.

- **Label:** Label for the IVR data
- **Position:** Starting character position of the data in the IVR data packet
- **Length:** Length, in number of characters, of the IVR data
- **DB_Field_Name:** Not used in release 11*i,* used in release 3*i* with OTB & OTBFS applications
- **VTT_Field_Name:** Not used in release 11*i*, used in release 3*i* with OTB & OTBFS applications

You can use the IVR data in more than one data map entry, such as account number and Zip code, to locate a customer record. The Oracle

Telesales/Teleservice client application evaluates all data map entries with a selected field name. You can use Boolean operators (AND or OR) between data map entries to define your selection criteria.

1.9 About the TCP/IP Interface

Depending on the configuration, Oracle IVR Integrator and Oracle IVR Monitor both use a TCP/IP socket to receive data packets from the IVR. The IVR must support the ability to provide an ASCII text data packet over a TCP/IP socket connection, which requires C code development by an IVR system integrator.

Oracle IVR Integrator is designed to support multiple IVRs through open TCP/IP messaging with geographically distributed switches and IVRs.

1.10 Understanding Data Packets

The following topics describe the basic concepts of data packets.

- Overview of Data Packets
- Data Packet Header Format
- Data Packet Caller Information Format
- Data Packet Example
- Planning an IVR Integration Data Packet

1.10.1 Overview of Data Packets

Oracle IVR Integrator communicates with the IVR system by receiving information in the form of ASCII text files, called "data packets," via a TCP/IP link. Oracle IVR Integrator is configured to monitor a TCP/IP port from the IVR. The raw data is delivered to either IVR Integrator or IVR Monitor (Cisco ICM uses the CTI data packet).

The IVR system should be configured so that when a call is transferred from the IVR system to a live agent, the system generates a data packet that contains information about the caller. The system then sends the data packet to the Oracle IVR Integrator TCP/IP port.

For implementation with IVR Integrator, the information is received as a text (null characters not allowed) data packet in an agreed-upon format of up to 2000 bytes.

Each data packet typically has header information followed by the caller information collected from the IVR.

1.10.2 Data Packet Messaging

The IVR Integrator application was designed with an architecture that uses standard TCP/IP protocols to receive IVR data packets. With this architecture, multiple IVRs can be serviced even if they are in separate geographical locations. The customer's IVR must have a network TCP/IP connection in addition to its connections to the PBX. Data packets received by the IVR Integrator service are held until the customer is transferred to a live agent. Messages that are not claimed after a certain period of time are discarded.

> **Note:** The current release of Oracle IVR Integrator has limited support for geographically distributed switches and IVRs, that is, Avaya (Lucent) Definity G3 only, without using Cisco ICM as the CTI middleware.

1.10.3 Data Packet Header Format

The following table lists and describes the six fields of the IVR data packet header along with their size in bytes and format.

Data Packet Header Format

Field Name	Size (Bytes)	Format	Description
Unique_ID	10		Typically the call ID that the PBX assigns to each call. It allows the integration to match the data packet with the call that goes to an agent.
IVR_ID	2		Uniquely identifies from which IVR the data packet came. It can be used when there are multiple business units using the same IVR or when there are multiple IVRs.
IVR_Port	4		Logical reference to the port on the IVR that enables a numbering scheme during configuration (for example, 0001, 0002,…,0100 for 100 ports).
PBX_ Extension	4		Actual extension that handles the call during the IVR interaction. Extensions are logically associated with IVR ports
Date	8	yyyymmdd	Date stamp that indicates when the data packet was created and sent.

Data Packet Header Format (Cont.)

Field Name	Size (Bytes)	Format	Description
Time	8	hh:mm:ss	Time stamp that marks when the data packet was created and sent.

1.10.4 Data Packet Caller Information Format

The IVR data packet caller information format is outlined in the following table. The actual fields and information may vary from engagement to engagement depending upon business requirements. The following table lists and describes the format of the data packet caller information.

Data Packet Caller Information Format

Field Name	Size (Bytes)	Description
Name	40	Typically the name associated with the account that is entered by the caller and retrieved by the IVR application from a data source.
Account_Number	20	Uniquely identifies the caller for a more accurate screen pop.
Application_Code	5	Subject of the caller's inquiry.
Bank_Number	4	Reference to the primary bank branch of the account holder.
CIF_Number	11	Legacy system account reference number.
Filler (Future use)	20	Space available for additional information without changing the data packet size.

1.10.5 Data Packet Example

The following table is an example of an IVR data packet file. Note the spacing by byte position.

Data Packet Example

```
“00000220180100045789200004281 4:35:48       MR JAMES D SMITH
9838908383         DDA  009800000803986                “
```

CALLID:	“0000022018”
IVR:	“01”
PORT:	“0004”
EXT:	“5789”
DATE:	“20000428”
TIME:	“14:35:48 “
NAME:	“MR JAMES D SMITH “
ACCOUNT:	“9838908383 “
APPLICATION CODE:	“DDA “
BANK NUMBER:	“0098”
CIF_CODE:	“00000803986”
FILLER:	“ “

1.10.6 Planning an IVR Integration Data Packet

When you plan which information that a new IVR integration data packet will collect and deliver from the IVR, include the following key points:

- Gather current state IVR call flows and data integration.
- Verify that the IVR is TCP/IP compatible, determine which network socket will be used to receive the packets, and define a contact for the IVR application developer.
- Determine which data elements will be collected by the IVR and delivered in the data packet.
- Determine which data elements are required for call routing (if routing is being done by Oracle).
- Determine the data elements that will be used for screen pops.
- Include account number, part number, ANI, DNIS, service request number and customer ID number in the information collected by the IVR and passed to Oracle Interaction Center.

- Determine if a return packet needs to be sent.
- Know that Cisco ICM delivers IVR data with the CTI information, not with IVR Integrator.

1.11 Matching IVR CTI Events to IVR Data Packets

Oracle IVR Monitor monitors the CTI event messages for the IVR ports and attempts to match the IVR data packet received from the IVR system with the CTI event message for the originating call. When there is more than one CTI message associated with an IVR port, Oracle IVR Monitor uses a matching algorithm to select the CTI event message for the originating call.

The parameters for the matching algorithm are configured in the Oracle system database and correspond to events that occur during the progression of a call. The progress of a call is divided into the active time, transfer time, and finish time. The transfer time is further divided into the following thresholds:

- Active Threshold — Number of seconds after the beginning of the call (but before the Transfer Low Threshold) for which an IVR data packet should be considered as a possible match. IVR data packets received before the beginning of the call are not considered a possible match.
- Finish Threshold — Number of seconds after the finish of the call (but before the Maximum Message Delay Time) for which an IVR data packet should be considered as a possible match.
- Transfer Low Threshold — Number of seconds before the transfer of the call for which an IVR data packet should be considered as a possible match.
- Transfer High Threshold — Number of seconds after the transfer of the call for which an IVR data packet should be considered as a possible match.
- Maximum Message Delay Time — Time after the finish of the call for which an IVR data packet should be considered as a possible match. The Max Message Delay Time should be greater than the Finish Threshold. IVR data packets received after the Max Message Delay Time are not considered a possible match.

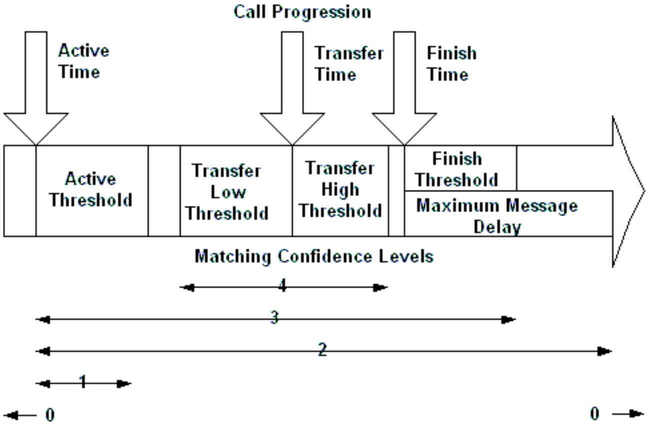
The IVR Monitor service compares the time that the IVR data packet was received to various events during the progression of the call(s) and establishes a level of confidence to the possible match. The call with the highest level of confidence is considered a match.

The following table lists and describes the levels of matching confidence from zero to four.

Levels of Matching Confidence

Level of Matching Confidence	Description
0	Match impossible
1	Low confidence
2	Medium confidence
3	High confidence
4	Match

The following figure illustrates the progression of a call with respective matching levels of confidence.



The highest level of matching confidence, level four, occurs during both the Transfer Low Threshold and Transfer High Threshold. Confidence level three matches occur from the Active Threshold through the Finish Threshold of the call. Confidence level two matches occur from the Active Threshold through the end of the call. Confidence level one matches occur only during the Active Threshold. No match is possible outside of the duration of the call, that is, a confidence level of zero.

The call Active Time begins with the Active Threshold. The Transfer Time occurs at the Transfer High Threshold. The Finish Time starts with the Finish Threshold. The Maximum Message Delay occurs from the Finish Time through the end of the call.

2 Implementing Oracle IVR Integrator

See the Oracle document *Implementing Oracle IVR Integrator.*

3 Administering Oracle IVR Integrator

This topic group provides task-based procedures for required for ongoing system maintenance and includes information on administration tools and utilities.

This topic group covers the following topics:

- Stopping Alerts
- Viewing Log and Alert Properties
- Viewing Log and Alerts

3.1 Stopping Alerts

When it is necessary to stop alert messages, you can do so through the Logs and Alerts node in Oracle Integrated Manager. Use this procedure to stop alert messages for all services.

Prerequisites

A service must have been created and exists for IVR Integrator in Oracle Integrated Manager and the View Alerts option from the Logs and Alerts node must have been enabled.

Steps

1. From the Oracle Integrated Manager navigation tree, double-click **Inbound**.
2. Double-click **IVR Integrator Services**.
3. Click the appropriate service.
4. Right-click **Log and Alerts**.
5. Select **All Tasks**.
6. Select **Stop Viewing Alerts**.

> **Note:** Oracle Integrated Manager will stop displaying alert messages for all services.

7. Click **OK**.

References

- Viewing Log and Alert Properties

- Viewing Log and Alerts

3.2 Viewing Log and Alert Properties

The database and alert properties can be viewed for services from the Logs and Alerts node in Oracle Integrated Manager. Use this procedure view the log and alert properties.

Prerequisites

A service must have been created and exists for IVR Integrator in Oracle Integrated Manager.

Steps

1. From the Oracle Integrated Manager navigation tree, double-click **Inbound**.
2. Double-click **IVR Integrator Services**.
3. Click the appropriate service.
4. Right-click **Log and Alerts**.
5. Select **All Tasks**.
6. Select **View Properties**.
7. Click **Database** tab.
8. Displays the following database properties.
   - TNS Name
   - Database User
   - Password

   Note: All services use the same log and alert database setting. The parameters on the Database tab can only be viewed. They cannot be modified.

9. Click **OK**.
10. Click **Alerting** tab.
11. The number of seconds by which the system will check for alert messages will display. The default is 5 seconds. You can modify this number if required.
12. The Advanced Queuing box contains the following properties.

- Queue Name
- Queue Subscriber
- Password

References

- Stopping Alerts
- Viewing Log and Alerts

3.3 Viewing Logs and Alerts

Alerts provide a real-time view of what is occurring in a service. When alerts are set to view, the log and the message details can be viewed. You can view alerts from the Alerts message window or from the Logs and Alerts node in Oracle Integrated Manager.

The alert records and message specifics will display in the Oracle Integrated Manager screen. Use this procedure view logs and alerts.

Prerequisites

A service must have been created and exists for IVR Integrator in Oracle Integrated Manager and alerts must have been logged for the service.

Steps

1. From the Oracle Integrated Manager navigation tree, double-click **Inbound**.
2. Double-click **IVR Integrator Services**.
3. Click the appropriate service.
4. Double-click **Log and Alerts**.
5. Click an alert to view.

   The message details appear in Oracle Integrated Manager.

   The following information types are listed:

   - Title
   - Source
   - Instance
   - IP
   - Host

- User
- Time Stamp
- Severity
- Action
- Details
- XML Data
- Record

References

- Stopping Alerts
- Viewing Log and Alert Properties

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