eServices Administrator's Guide

Genesys Engage Digital (eServices) 8.1.4

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eServices Administrator's Guide

This guide presents recommendations for monitoring and adjusting your eServices configuration, plus detailed explanations of procedures to use for selected special purposes.

Most information is classified according to the software component that it applies to; there is also a section containing general information:

- Interaction Server
- E-mail Server
- Universal Contact Server (UCS)
- Chat Server
- Knowledge Manager
- General recommendations

See also a description of limitations on multi-tenancy.

> **Important**
>
> For the latest version of Interation Server Deployment Guide, see here.
>
> For the latest version of Interaction Server Administration Guide, see here.

Interaction Server Administration

This section provides information for administrators regarding Interaction Server

In addition to the information on this page, there is also information on:

- Limitations to observe concerning Interaction Server.
- Improving the performance of the Interaction Server database.
- Converting attached data to and from BLOB format.
- Deploying and using Event Logger, which stores reporting event messages in a database.

Be aware of the following:

- Use CC Pulse to monitor interaction queues (in interaction workflows) for signs of problems with routing strategies. If the number of interactions in a queue increases abnormally, it may be a sign that the strategy that processes interactions from that queue is not loaded in Universal Routing Server.
- Depending on the amount of configuration objects and the volume of the interactions stored in the Interaction Server database, it might take considerable time for Interaction Server to start up and shut down.
- Interaction Server has two possible Application types in the Configuration Layer. `Interaction Server` is the normal type; the `T-Server` type is also available for backward compatibility. Be aware that an Interaction Server 7.6 or later of type `T-Server`, upon startup, will make two attempts to connect to Configuration Server. The first attempt will generate `trace`-level alarms (about a missing application of type: Interaction Server) that you should ignore. The second attempt will succeed.
- If you want to use the Dynamic Workflow Management functionality, be sure to run Interaction Server with a user that has write access to the Configuration Server database for all of the tenants associated with this Interaction Server (that is, the user specified on the Security tab of the Interaction Server Application object).
  In this situation Interaction Server does not support Configuration Server Proxy, which has only read access to the Configuration Server database.

> **Important**
>
> For the latest version of Interation Server Deployment Guide, see here.
>
> For the latest version of Interaction Server Administration Guide, see here.

Interaction Server Limitations

- Interaction Server does not support the following requests:
  - RequestQueryServer
  - RequestQueryLocation
  - RequestDeletePair (when URS sends this request after RequestRouteCall)
- It is not desirable to run Interaction Server in an environment in which servers and clients differ as to the codepages used (by operating systems or databases). In such an environment, characters of non-Latin alphabets may appear as the symbol ? (question mark) in log files and in applications with a user interface, such as Agent Desktop. The functionality of other features of the solution may also be restricted or compromised.
- Making an on-the-fly change to the host or port specification (on the `Server Info` tab) of a backup Interaction Server will cause it to exit.
- When Interaction Server sends a database request right before disconnecting from DB Server, and the request executes after disconnecting, Interaction Server fails to generate events to clients for submitted interactions.
- Starting in release 8.1.3, the scripts supplied with Interaction Server for Oracle databases create the `flexible_properties` field with the type BLOB. To support this feature, you must use DB server 8.1.1 and above with Oracle client 10.2 and above.
- You cannot use commas (,) and semicolons (;) in interaction queue names.

Improving the Performance of the Interaction Server Database

To optimize the performance of Interaction Server, try the following steps:

1. Design or redesign the Business Process for greater efficiency; for example, by minimizing the number of processing steps. This provides for the most performance gain for custom Business Processes.
2. Analyze and optimize the SELECT statements generated by Interaction Server. Analyze the execution plans for the generated SELECT statements and create appropriate indexes. This is especially important if you have added an custom Business Processes: the standard indexes provided with the default schema do not take account of any custom database fields, specific conditions configured, and other items added by custom Business Processes. This step might provide all the performance gain that you need.
3. Perform a general tuneup on the database.
4. Partition the database. The subtopics in this section deal with this.

General Remarks on Partitioning

A partition is a division of a logical database or its constituent elements into independent parts. Database partitioning may be done for reasons of performance, manageability, or availability. This section concentrates on partitioning to improve performance.

By splitting a large table into several smaller tables, queries that need to access only a fraction of the data can run faster because there is less data to scan. Maintenance tasks, such as rebuilding indexes or backing up a table, can also run more quickly. Placing logical parts on physically separate hardware provides a major performance boost since all this hardware can perform operations in parallel.

Interaction Server performs large numbers of queries, updates, inserts, and deletes on its database. While it is relatively easy to achieve optimal performance with updates, inserts, and deletes, queries (SELECTs) are different.

The Interaction Server database consists of a single major table that stores all the interaction data. Every interaction in the system is always assigned to some interaction queue, represented by value of the field queue in the Interaction Server table. Business processes may employ dozens or even hundreds of queues.

Queues can vary greatly in the way they are used: some hold many interactions which are rarely processed at all (for example, an archive queue), others hold a small number of interactions with a high processing rate (for example, a queue for interactions that need some preliminary processing).

If these two types of queue are separated into different partitions, then the slower selection rate of the first type will not interfere with the high-speed selections of the second type. So the queue field is a natural choice to partition the data on. The remainder of this section describes partitioning by queue.

Planning

Decide for which queues it makes sense to separate data into logical partitions. Start by surveying the queues in your Business Processes and separate them out into three types:

1. Queues that contain high numbers of interactions; for example, post processing backlog or archive queues.
2. Queues that should not contain lots of interactions because all interactions in these queues should be processed immediately. A good example is the first queue in a Business Process which is meant for some preliminary processing (such as performing classification, calculating and attaching some user data, or sending an acknowledgment).
3. Queues that feed strategies that wait for resources (agents) to become available; usually there is a single such distribution queue in a Business Process.

Here is the rationale for separating data into at least three partitions that correspond to these three types of queues:

1. Separating Type 1 queues, those with many "inactive" interactions, ensures that these interactions are not even considered when SELECT statements are executed to pull interactions from Type 2 ("active") queues. Even if there are complex conditions for some views in your Business Process, there is much less data to scan because the majority of the interactions in an archive or post processing backlog are not touched by these scans.
2. Separating Type 2 queues is logical because most of the time these queues should be completely empty. Selecting new interactions out of these queues is trivial since there are not many interactions to select from.
3. Type 3 is the most demanding. While the rate of processing can be high, if there are many agents and handling time is relatively low, interactions may still accumulate in these queues when the peak inbound rate is higher than the processing rate. This means that SELECT statements are executed frequently against many records. If there are multiple queues of this type, it may be beneficial to assign them to separate partitions.

Hardware Planning

While purely logical separation of data may be of some benefit, placing the partitions on separate hard drives provides the best performance gain. In planning which drives in your system to dedicate to Interaction Server database partitions, it is advisable set aside one drive for the operating system and one for database log files, and place the Interaction Server database partition on other drives.

The rest of this section presents an example of partitioning using Microsoft SQL.

Creating the Database

To create a database with several file groups that will hold data for different partitions, use an SQL statement similar to the following:

```
CREATE DATABASE [itx_partitioned] ON PRIMARY
(NAME = N'itx802partitioned', FILENAME =
N'D:\MSSQL\DATA\itx802partitioned.ndf',
SIZE = 44828672KB, MAXSIZE = UNLIMITED, FILEGROWTH = 1024KB),
FILEGROUP [P1]
(NAME = N'itx802partitioned1', FILENAME =
N'E:\MSSQL\DATA\itx802partitioned1.ndf',
SIZE = 2048KB , MAXSIZE = UNLIMITED, FILEGROWTH = 1024KB),
FILEGROUP [P2]
(NAME = N'itx802partitioned2', FILENAME =
N'F:\MSSQL\DATA\itx802partitioned2.ndf',
SIZE = 2048KB , MAXSIZE = UNLIMITED, FILEGROWTH = 1024KB),
FILEGROUP [P3]
(NAME = N'itx802partitioned3', FILENAME =
N'G:\MSSQL\DATA\itx802partitioned3.ndf',
SIZE = 2048KB , MAXSIZE = UNLIMITED, FILEGROWTH = 1024KB )
LOG ON
(NAME = N'itx802partitioned_log', FILENAME =
N'H:\MSSQL\DATA\itx802partitioned_log.ldf',
SIZE = 5095872KB , MAXSIZE = 2048GB , FILEGROWTH = 10%)
GO
```

Or you can create the database and file groups using Microsoft SQL Management Studio.

You can create as many file groups as your resources allow.

Carrying Out the Partitioning

Partition Function

The partition function calculates the logical partition number for any specific record based on the record's field value. We only need to consider the value of the 'queue' field since we want to partition data according to queues.

The following is an example of the partition function:

```
CREATE PARTITION FUNCTION [QNamePFN](varchar(64)) AS
RANGE RIGHT FOR VALUES (N'Archive', N'Distribution', N'Inbound')
GO
```

Note that an SQL server partition function is always a range function. The values for the range function must be sorted in ascending order so that you can clearly see which range any particular value falls into.

In the example above, all data that comes earlier in the alphabet than `Archive` is placed in the first partition. All data whose alphabetical order is the same or later than `Archive` but earlier than `Distribution` is placed in the second partition. All data whose alphabetical order is the same or later than `Distribution` but earlier than `Inbound` is placed in the third partition. All other data is placed in the forth partition.

Note that it is the partition scheme that assigns a specific partition to the range; you can actually assign different ranges to the same partition.

Also, this partition function applies to all queues in the Business Process. For example, if there is a queue `Begin` it falls into the second range and will be assigned to the same partition as the `Archive` queue. But if `Begin` is not a Type 1 queue this result may be less than ideal. One way to ensure that every queue is assigned to its intended partition is to list all the queues in the Business Process in alphabetical order in the partitioning function, and then specify the appropriate partition for each queue. If a new queue is added to the Business Process, you can alter the partition function and partition scheme to take account of this new queue.

Partitioning Scheme

The partitioning scheme uses the partitioning function to define which records (with a particular value of the partitioning function) go to which partition.

```
CREATE PARTITION SCHEME [QNamePScheme]
AS PARTITION [QNamePFN] TO ([PRIMARY], [P1], [P2], [P3])
GO
```

Since our partitioning function is based solely on the value of the 'queue' field, our partitioning scheme tells the database which queue goes to which partition.

Partitioning the Table

To partition the table, simply specify the partitioning scheme for the table:

```
create table interactions
(
id varchar(16) not null,
...
) on QNamePScheme(queue)
Go
```

Note that we explicitly specify that the queue field value should be given to the partitioning scheme and subsequently to the partitioning function to decide which partition the record should go to.

Verification

The following SQL statement is an easy way to monitor how many records are stored in each partition for a given partitioned table (the `interactions` table in this example):

```
SELECT
p.partition_number, fg.name, p.rows
FROM
sys.partitions p
INNER JOIN sys.allocation_units au
ON au.container_id = p.hobt_id
INNER JOIN sys.filegroups fg
ON fg.data_space_id = au.data_space_id
WHERE
p.object_id = OBJECT_ID('interactions')
```

This produces results similar to those shown in the following table.

Partition_number	Name	Rows
1	PRIMARY	1
2	P1	1
3	P2	1
4	P3	1

The table shows that each partition contains a single record. If you insert a new record and execute the above statement again, it will show which partition the new record has been placed in, verifying your partition function and scheme.

> **Important**
>
> To compare performance of the partitioned database with an unpartitioned database, you will need to artificially create a certain distribution of interactions between partitions (different queues) and see how fast the same SELECTs are being executed. When interactions change queues, the records are physically relocated into different partitions (according to the partition scheme).

Converting to and From BLOB

Interaction Server ordinarily stores attached data in the `flexible_properties` field as a BLOB (binary large object).

Converting from BLOB

You can convert attached data to a custom field by running Interaction Server in a special utility mode, in which Interaction Server uses the key-value format of this attached data to convert all such fields to custom fields.

To run Interaction Server in utility mode, launch it from a command line with the following option:

```
-convert-fields [command_or_parameters]
```

where the optional `command_or_parameters` is one of the following:

- `reset`—Ensures that the next run in utility mode will start processing from the beginning, rather than picking up where it left off.
- `bulk-size=N`—Determines the number of records that are processed before committing the transaction. The default value is 100, valid values are any integer in the range 1–1000.

Here is an example command line:

```
interaction_server -host genesys_host -port 9876 -app IxnSrv05 -convert-fields reset
```

You can also have Interaction Server convert an existing database field into a BLOB, stored in the `flexible_properties` field. To do so, use the following procedure.

Converting a field to a BLOB

1. Open the corresponding Business Attribute Value in Configuration Manager.
2. In the `translation` section, add an option called `to-delete` and give it the value `yes`.
3. Run Interaction Server in utility mode, as described above. Interaction Server, in utility mode, moves the content of all such fields into the `flexible_properties` field and leaves the custom field with an empty value.

> **Important**
>
> When Interaction Server runs in utility mode all of its other features are disabled: it cannot process interactions or open ports for clients.

Event Logger

Interaction Server includes Event Logger, a mechanism for storing reporting event messages in a database. You can configure it to store all reporting events or a selected subset. You can also create multiple instances of it.

Interaction Server generates, to registered reporting engines, messages that provide a detailed picture of the processing of each interaction. It classifies these messages, in two ways. The attributes of these messages include much information about the interaction itself, such as its type, time received, associated agents, queues and workbins it was placed it, and so on. For a reference listing of these events and their attributes, see the “Reporting Messages” section of the “Other Protocol Events Used by Interaction Server” chapter of the Genesys Events and Models Reference Manual.

All configuration for the logger functionality is done in the Database Access Point (DAP) associated with the logger database.

There are ways to manage the flow of data produced by Event Logger.

You can have Event Logger send events to a message queue.

Deploying Event Loggger

1. Create a database to store the reporting data.
2. Locate the correct setup script for your RDMBS and run it on the database you created in Step 1.

   This script is called `eldb_<database_name>.sql`, where <database_name> is either *db2, mssql,* or *oracle* (for example, `eldb_mssql.sql`). To locate the script, go to the Script subdirectory of the installation directory of your Interaction Server, then open the subdirectory named after your RDBMS; for example, `\InteractionServer_801\Script\Oracle.`
3. Create a Database Access Point (DAP), filling in the usual mandatory settings on the `General` and `DB Info` tabs.
4. On the DAP's `Options` tab, create a section called `logger-settings.` This is the only mandatory section; its existence tells Interaction Server to use this DAP for storing reporting events.
5. In the `logger-settings` section, add at least one option (the section must contain at least one option in order to be valid).
6. Optionally add any of the following section types:
7. `event-filtering`—Contains options filtering out certain classes of event messages
8. `custom-events`—Specifies a custom mapping of the CustomEventId attribute value of `EventCustomReporting` (the option name) to the Event Logger table to store them in (the option values)
9. Custom data `sections`—Five sections that enable you to map the name of any event onto a custom field in the Logger database.
10. On Interaction Server's `Connections` tab, add a connection to the DAP. For multiple instances of the Event Logger, run the creation script multiple times, creating multiple databases. Also create a DAP for each database.

`

Managing Event Logger Data

For the `rpt_interaction`, `rpt_agent`, and `rpt_esp` tables, Genesys supplies a set of scripts that deletes events as soon as processing of the interaction stops, the agent logs out, or the external service responds, respectively. For custom reporting events that are stored in the `rpt_custom` table, the event-driven trigger `trg_del_cust_delay` purges them from the `rpt_custom` table, with a configurable delay (the default is 10 minutes).

If you want to preserve this data, you can disable the triggers `trg_delete_stopped`, `trg_delete_resp`, `trg_del_cust_delay`, and `trg_delete_logout` after you run the setup script. For Oracle, additionally, disable the triggers `trg_mark_cust_logged`, `trg_mark_responded`, `trg_mark_ended_session` and `trg_mark_stopped_ixn`.

You can reenable the triggers any time and resume removing records from the database automatically.

Of course event messages increase rapidly in number as interactions are processed, so you will want to take measures to periodically delete data from the database or move it elsewhere.

Also note that after creating or removing custom fields in a database, some triggers become invalid. If this happens, you must recompile them to be sure they work properly.

Classification of Events in Event Logger

The logger functionality classifies reporting events in two ways:

- By activity type—that is, whether the activity refers to an interaction, an agent, an ESP server, or is of a custom type. The database contains tables for each type: interaction activity is stored in `rpt_interaction`, agent activity is stored in `rpt_agent`, and ESP server activity is stored in `rpt_esp`. Custom activity can be stored in `rpt_interaction`, `rpt_agent`, or `rpt_custom`, depending on the configuration in the `custom-events` section of the Event Logger DAP.
- By endpoint type—that is, whether that interaction is being transmitted to a queue, strategy, agent, or ESP service. You can filter out events according to endpoint type. A few events do not have an endpoint type; you cannot filter these events.

The following table lists the events and their classifications.

Event	Activity	Endpoint
EventPropertiesChanged	Interaction	-
EventPartyAdded	Interaction	Agent, Strategy
EventPartyRemoved	Interaction	Agent, Strategy
EventRevoked	Interaction	Agent
EventInteractionSubmited	Interaction	-
EventProcessingStopped	Interaction	-
EventHeld	Interaction	-
EventResumed	Interaction	-
EventPlacedInQueue	Interaction	Queue
EventPlacedInWorkbin	Interaction	Queue
EventAgentInvited	Interaction	Agent
EventRejected	Interaction	Agent
EventTakenFromQueue	Interaction	Queue
EventTakenFromWorkbin	Interaction	Queue
EventAgentLogin	Agent	Agent State
EventAgentLogout	Agent	Agent State
EventDoNotDisturbOn	Agent	Agent State
EventDoNotDisturbOff	Agent	Agent State
EventMediaAdded	Agent	Agent State
EventMediaRemoved	Agent	Agent State
EventNotReadyForMedia	Agent	Agent State
EventReadyForMedia	Agent	Agent State
EventAgentStateReasonChanged	Agent	Agent State
EventMediaStateReasonChanged	Agent	Agent State

Event	Activity	Endpoint
EventExternalServiceRequested	ESP Server	ESP Server
EventExternalServiceResponded	ESP Server	ESP Server
EventCustomReporting	Interaction, Agent, or Custom	-

Event Logger Options

This section provides short descriptions of the DAP options that configure the Event Logger's behavior. See the eServices 8.1 Reference Manual for full details.

logger-settings Section

`batch-size`—Defines the minimum number of records to store in internal memory before flushing to the database. Valid values are 1–5,000; the default is 500.

`mandatory-logging`—Determines how Interaction Server behaves if the Event Logger database is unavailable. If set to true, Interaction Server stops interaction processing and waits until the database is available. If set to false, Interaction Server does not use this logger and continues processing.

`max-queue-size`—Defines the maximum number of records that are kept in memory while waiting to be written to the database. If the number of records exceeds this maximum, the data are discarded from memory and are not written to the database. Valid values are 10,000–100,000; the default is 20,000.

`storing-timeout`—Defines a time interval, in milliseconds, between operations of writing to the database. Valid values are 500–60,000; the default is 1,000.

> **Important**
>
> `storing-timeout` and `batch-size` define limits that trigger writing to the database: writing takes place as soon as one or the other is reached.

`schema-name`—Specifies the name of the schema used to access the database.

custom-events Section

This section contains options that list custom events by their identifiers and specify which table (interaction, agent or custom) stores them.

event-filtering Section

This section contains eight options, six of which are named for one of the endpoint types that is referred to in the classification of events:

```
log-agent-state
log-agent-activity
log-queue
log-strategy
log-esp-service
event-filter-by-id
```

With the value `false`, events associated with the named endpoint type are filtered out. For example, setting `log-queue` to a value of `false` prevents the events `EventPlacedInQueue`, `EventPlacedInWorkbin`, `EventTakenFromQueue`, and `EventTakenFromWorkbin` from being stored. The remaining two options in this section are:

- `log-userdata`—With the value `false`, data from custom fields is filtered out.
- `event-filter-by-id`—A list of comma-separated event identifiers. Only these events are stored in Event Logger. If this option is not present or contains no event identifiers, event filtering by identifier is not applied.

These event identifiers are listed in the Platform SDK 8.1 API References for Java and .NET. For example, the identifier of EventRejected is 168.

Custom Data Sections

The five sections contain options specifying a list of events that are to be stored in custom fields of the event logger database. All five work identically, the differences being (a) the events from which the user data is taken and (b) the database table that stores them. These differences are shown in the following table.

Section	Source Event	Logger Database Table
`itx-custom-data`	`UserData` and `EventContent` attributes of interaction-related reporting events	`rpt_interaction`
`esp-custom-data`	`UserData` attribute of `EventExternalServiceRequested` and `EventExternalServiceResponded`	`rpt_esp`
`esp-service-data`	`Envelope3rdServer` attribute of `EventExternalServiceRequested` and `EventExternalServiceResponded`	`rpt_esp`
`agent-custom-data`	`EventContent` attribute of `EventCustomReporting`	`rpt_agent`
`custom-customdata`	`EventContent` attribute of	`rpt_custom`

Section	Source Event	Logger Database Table
	EventCustomReporting	

For an explanation of the Envelope3rdServer attribute, see "EventExternalServiceRequested Attributes" and "Structure of Envelope3dServer Attribute" in the "Reporting Messages" section of the "Other Protocol Events Used by Interaction Server" chapter of the Genesys Events and Models Reference Manual.

To use these options, you must first add a field to the appropriate Event Logger database table. Its data type must be the same as that of the mapped user data key. In these sections, the options have the following characteristics:

- The name is a user data key name (case-sensitive).
- The value is three semicolon-separated strings, which specify the following:
  1. The name of the field that you added to the database table. This value is required.
  2. The data type: string, integer, or timestamp. The default is string, with default length 64. If your data type is other than string, or if it is string and you want to specify a non-default length (next item), this value is required.
  3. Optionally, the length. The default for the string type is 64. There are no default values for integer and timestamp.

For example, if you have a data key called CustomerSegment, you can add a custom field to store this data as follows:

1. Add a field called customer_segment to the rpt_interaction table.
2. In the itx-custom-data section, create an option called CustomerSegment.
3. Give it this value: customer_segment;string;64.

Since string and 64 are the default values for type and length respectively, the value of this option could also be simply customer_segment.

Using a Message Queue with Event Logger

You can have Event Logger send events to a message queue, such as IBM MQ-Series, or Microsoft Message Queue (MSMQ). This provides a mechanism for reliable reporting events delivery to Interaction Server's reporting clients. Disconnection of the client does not lead to a loss of reporting events. Instead, events are stored in the message queue and delivered to the client (or otherwise read by the client) after it reconnects.

To use this functionality, you must create a DAP object that is specifically for the streaming of reporting events into MSMQ or MQ-Series. Both Interaction Server and the client connect to this DAP. This DAP must have the following section and options, which partly resemble the sections and options of the Event Logger DAP and are also documented in the eServices 8.1 Reference Manual:

- `logger-settings` section
  - `delivery-protocol`. Possible values are:
    - `event-log`—The default, for using Event Logger database scripts
    - `mq-series`—For the MQ-Series message queue system
    - `msmq`—For the MSMQ message queue system
    - `jms`—For a JMS queue
    - `groovy`—For the Groovy Event Logger
  - `delivery-queue-name`—The name of the queue to send messages to.

Optionally, Event Logger DAP can use the following section and option:

- `event-filtering` section. Contains the single option `event-filter-by-id`, whose value is a list of comma-separated event identifiers. Only these events are sent to the message queue; events not listed are not sent. This option is analogous to the option of the same name used in the Event Logger DAP.

> **Important**
>
> The event identifiers used in `event-filter-by-id` are listed in the Platform SDK 8.1 API References for Java and .NET.

Using the JMS Event Logger with Apache ActiveMQ

> **Important**
> You must have Apache ActiveMQ 5.14.5 or higher.

You can use the JMS Event Logger with Apache ActiveMQ to process reporting events using a JMS queue.

To enable the JMS Event Logger with Apache ActiveMQ, edit the option **delivery-protocol** and set the value to `jms`.

Configuring JMS Event Logger with Apache ActiveMQ

1. Configure Apache ActiveMQ, as described on the Apache website.
2. Create a **jndi.properties** file with the following content:

```
java.naming.factory.initial = org.apache.activemq.jndi.ActiveMQInitialContextFactory
java.naming.provider.url = tcp://activemq_host:61616
connectionFactoryNames = ConnectionFactory
queue.InxEventLogQueue = InxEventLogQueue
queue.inbound = inx.inbound
queue.error = inx.error
queue.processed = inx.processed
queue.notification = inx.notification
```

   > **Important**
   > The value of **queue.InxEventLogQueue** refers to a queue name in your environment.

3. Pack the **jndi.properties** file in **amq-jndi.jar**.
4. Add the following jars to the **-Djava.class.path** option in the **jvm-options** section:
   - activemq-all-5.14.5.jar
   - amq-jndi.jar

   jvm-options are located in Interaction Server application options. They are configured on per-process basis and not on per-capture-point one.
5. Create the JMS Event Logger as a Database Access Point (DAP).

6. Configure JMS Event Logger for connecting to Apache ActiveMQ by adding the following options in the **logger-settings** section:
   - `delivery-protocol=jms`
   - `delivery-queue-name=InxEventLogQueue`
   - `jms-connection-factory-lookup-name=ConnectionFactory`
   - `jms-initial-context-factory=org.apache.activemq.jndi.ActiveMQInitialContextFactory`
   - `jms-provider-url=tcp://activemq_host:61616`
   - `reconnect-timeout=10`

   > **Important**
   > - Change the value of **InxEventLogQueue** to the queue value you set in the **jndi.properties** file.
   > - The value of **jms-provider-url** is the Apache ActiveMQ URL that corresponds to the *<transportConnectorname>* node from the **activemq.xml** file.

7. Optionally, you can repeat the steps in this section to set up multiple JMS Event Loggers. With each additional logger, you must increment the name of additional queues as `queue.InxEventLogQueue2 = InxEventLogQueue2` in the **jndi.properties** file.
8. Add created JMS Event Loggers to Interaction Server connections.

Using TLS with Apache ActiveMQ

1. Prepare the TLS certificates, as described in the Genesys Security Deployment Guide.
2. Copy **cert.jks** and **truststore.jks** into the following folder: ***<Apache ActiveMQ installation directory>*/conf**.
3. Open the file **activemq.xml** in the folder ***<Apache ActiveMQ installation directory>*/conf** and add the following lines:

```
        <transportConnectors>
          ...

<transportConnectorname="ssl"uri="ssl://0.0.0.0:61617?trace=true&needClientAuth=true"/>
          ...
    </transportConnectors>
    <sslContext>
        <sslContextkeyStore="file:${activemq.base}/conf/cert.jks"
        keyStorePassword="YourKeyStorePassword"
        trustStore="file:${activemq.base}/conf/truststore.jks"
        trustStorePassword="YourTrustStorePassword"/>
    </sslContext>
```

> **Important**
> Change the values of **keyStorePassword** and **trustStorePassword** to acceptable passwords.

4. Restart ActiveMQ.
5. Update the following configuration options in the **logger-settings** section:
   - jms-initial-context-factory=org.apache.activemq.jndi.ActiveMQSslInitialContextFactory
   - jms-provider-url=ssl://activemq_host:61617
6. Add the following configuration options in the **jms-additional-context-attributes** section:
   - `connection.ConnectionFactory.keyStore=cert.jks`
   - `connection.ConnectionFactory.keyStorePassword=keyStorePassword`
   - `connection.ConnectionFactory.keyStoreType=jks`
   - `connection.ConnectionFactory.trustStore=truststore.jks`
   - `connection.ConnectionFactory.trustStorePassword=trustStorePassword`
   - `connection.ConnectionFactory.trustStoreType=jks`

> **Important**
> Change the values of **connection.ConnectionFactory.keyStorePassword** and **ConnectionFactory.trustStorePassword** to the values you set in the **activemq.xml** file.

E-mail Server Administration

> **Warning**
> This content has been moved to the *E-Mail Server Administration Guide* as of October 29, 2018 and, as such, the E-mail Server content in this guide will no longer be maintained.

JavaMail Properties

Warning

This content has been moved to the *E-Mail Server Administration Guide* as of October 29, 2018 and, as such, the E-mail Server content in this guide will no longer be maintained.

Delivery Status Notification and Message Disposition Notification

> **Warning**
> This content has been moved to the *E-Mail Server Administration Guide* as of October 29, 2018 and, as such, the E-mail Server content in this guide will no longer be maintained.

Customizing the Format of External Resource E-mails

> **Warning**
>
> This content has been moved to the *E-Mail Server Administration Guide* as of October 29, 2018 and, as such, the E-mail Server content in this guide will no longer be maintained.

UCS Administration

This section provides information for administrators regarding Universal Contact Server (UCS). In addition to the topics on this page, there is also the following:

- Special instructions on enabling a user who is not the schema owner to run UCS with an Oracle database
- Queries that users of the UCS database must have permission to run
- Updating interaction data in a routing strategy
- Limitations to observe in operating UCS
- Information on the UCS Manager user interface
- Enabling full text searching of the UCS database

Access to Configuration Server

Be sure to run UCS with a user that has write access to the Configuration Server database for all the tenants associated with this UCS (that is, the user specified on the `Security` tab of the UCS Application object).

This means that UCS does not support Configuration Server Proxy version 8.0.2 and earlier, which has only read access to the Configuration Server database. UCS does support Configuration Server Proxy version 8.0.3 and later.

Client Connection Timeout

To avoid inconsistency, every client of UCS should have the timeout of its connection to UCS set to a higher value than the timeout of UCS's connection to its Database Access Point (DAP).

This allows UCS to consistently either perform long queries or abort them, in accord with the clients' requirements.

Contact Identification and Creation

When a new interaction enters the system, UCS performs the following tasks:

1. Contact identification—UCS checks whether this interaction is coming from a known contact: more precisely, whether the contact data included in the new interaction matches an existing contact in the UCS database. UCS does this in response to a request from a media server, the `Identify Contact` Routing strategy object, or the Agent Interaction SDK `CreateInteraction` method.

2. Contact creation—If the contact does not exist in the database, UCS creates a new record to represent it.

Character Sets

Oracle

The character set `WE8ISO8859P1` does not have any representation of characters in the range 128–159. Because of this, with an Oracle database, attempting to save characters in this range in a column of type `NCHAR` or `NVARCHAR` results in corrupted data. Genesys recommends that you set the Oracle `NLS_CHARACTERSET` parameter to `WE8MSWIN1252` instead of `WE8ISO8859P1`. `WE8MSWIN1252` is a superset of `WE8ISO8859P1`, so there will be no data loss.

For support of nonlatin charsets, use the following parameter settings in Oracle:

```
NLS_CHARACTERSET AL32UTF8

NLS_NCHAR_CHARACTERSET AL16UTF16
```

DB2

DB2 must use the UTF-8 codeset for the UCS database.

TLS Connection as Windows Service

This also applies to E-mail Server.

When UCS has Transport Layer Security (TLS) configured, either as a server on its ESP port, or as a client in its connection to Message Server, follow these steps to enable it as a Windows Service:

1. Select the Windows service related to UCS.
2. Select the `Log On` tab. The default setting is `Log on as local system account.`
3. Select `Log on as this account` and provide the login/password of a local host user.

Database Performance

OLTP

For best performance, Genesys strongly recommends that you set up the UCS database as OLTP (online transaction processing).

Tuning for Attachments

UCS uses the `Content` field of the `Document` table to store attachments; also, the `Content` field of the `ixnContent` table stores raw e-mails, including attachment data. If you plan to store large attachments (bigger than 5 MB), you should tune the database according to the recommendations of your database vendor.

For example, increasing the block size of database files for these fields can greatly enhance performance in access and storing of large attachments, at the cost of a slight loss of performance with smaller ones. Also, some databases offer the ability to partition data according to specified criteria. Both tables have a `theSize` column that you can use to do such partitioning. This could enable you to store small attachments in a specific file and large ones in another, for example.

Refer to the tuning guides of your database vendor for more information.

User Other than Schema Owner

To enable a user who is not the schema owner to run UCS with an Oracle database:

1. Open the script `ucs_oracle_create_additional_user.sql,` which is located in the `sql_scripts` directory of UCS's starting directory.
2. Locate the following lines:

   ```
   ucs_user := 'UCS_RUNTIME';
   ucs_db_creator := 'UCS_OWNER';
   ```

3. Replace `UCS_RUNTIME` with the name of the non-owner that you want to be able to run the database.
4. Replace `UCS_OWNER` with the name of the Oracle user that created (is the owner of) the schema.
5. Run the script from an Oracle account that has SYSDBA privileges. This creates the user identified in Step 2 and creates synonyms of all objects so that they are accessible to the newly created user.
6. Adjust the DAP that UCS uses (or create a new DAP if you want to retain the existing one), as follows:

   - On the DB Info tab, set the `User Name` equal to the user identified in Step 2, and set the password equal to the user name. This is how the script creates the user and password. If you want a different password you must modify it in Oracle.
   - On the `Options` tab, `settings` section, create the `db-schema-name` option. For its value, enter an upper-case version of the name of the Oracle user that created the UCS database schema (the user identified in Step 3).

- After completing these steps on the main database, repeat them for the archive database.

> **Important**
>
> When using UCS with a limited DB user, UCS is not able to check for the existence of table indexes. The log will display a message warning that indexes do not exist, but you can ignore this warning. Using a limited user does not prevent DB from using indexes.

Required Queries

Users of the UCS DB must have permission to run certain queries on the database, for the following purposes:

- List user's tables—required for launching UCS
- Read NLS (national language support) configuration—required for normal operation of UCS
- List user's indexes—required for normal operation of UCS
- Read the configured maximum number of cursors—required for normal operation of UCS, on Oracle only

The following examples use `CONTACTSERV_USER` and `CONTACTSERVARC_USER` as the names of users of the main and archive databases respectively:

Oracle

To list user’s tables:

```
SELECT T.TABLE_NAME, T.COLUMN_NAME, DECODE (T.NULLABLE, 'N', 'NO', 'YES') AS IS_NULLABLE
FROM ALL_TAB_COLUMNS T WHERE UPPER(T.OWNER)='CONTACTSERV_USER' ORDER BY T.COLUMN_ID</tt>
```

To read NLS configuration:

- In 8.1.0:

  ```
  SELECT * FROM sys.props$ WHERE name LIKE 'NLS%CHARACTERSET%'
  ```

- In 8.1.1 and later:

  ```
  SELECT * from SYS.NLS_DATABASE_PARAMETERS WHERE PARAMETER LIKE 'NLS%CHARACTERSET%
  ```

To list user’s indexes:

```
SELECT I.INDEX_NAME, IND.COLUMN_NAME as COLUMN_NAME, I.UNIQUENESS as IS_UNIQUE FROM
USER_INDEXES I,
USER_IND_COLUMNS IND WHERE I.INDEX_NAME = IND.INDEX_NAME AND I.GENERATED='N' ORDER BY
INDEX_NAME
```

SQLServer

To list user’s tables:

```
exec sp_tables @table_name = null, @table_type = '''TABLE'''
```

To read NLS configuration:

```
SELECT DATABASEPROPERTYEX ('CONTACTSERV_USER', 'Collation')
```

To list user’s indexes:

```
SELECT i.name INDEX_NAME, c.name AS COLUMN_NAME, CASE WHEN (i.status & 2)<>0 THEN 'true' ELSE
'false'
END AS IS_UNIQUE FROM sysindexes i INNER JOIN sysindexkeys k ON i.id=k.id AND i.indid=k.indid
INNER JOIN syscolumns c
ON c.id=i.id AND c.colid=k.colid WHERE INDEXPROPERTY (i.id , i.name , 'IsAutoStatistics' ) =
0 ORDER BY index_name
```

DB2

To list user’s tables:

```
SELECT TABNAME AS TABLE_NAME, COLNAME AS COLUMN_NAME, TYPENAME AS TYPE_NAME,
LENGTH AS TYPE_LENGTH FROM syscat.columns WHERE UPPER(TABSCHEMA)='CONTACTSERV_USER' ORDER BY
COLNO
```

To read NLS configuration:

```
SELECT TYPENAME, CODEPAGE FROM syscat.datatypes WHERE TYPENAME LIKE '%CHAR%' OR TYPENAME LIKE
'%LOB%'
```

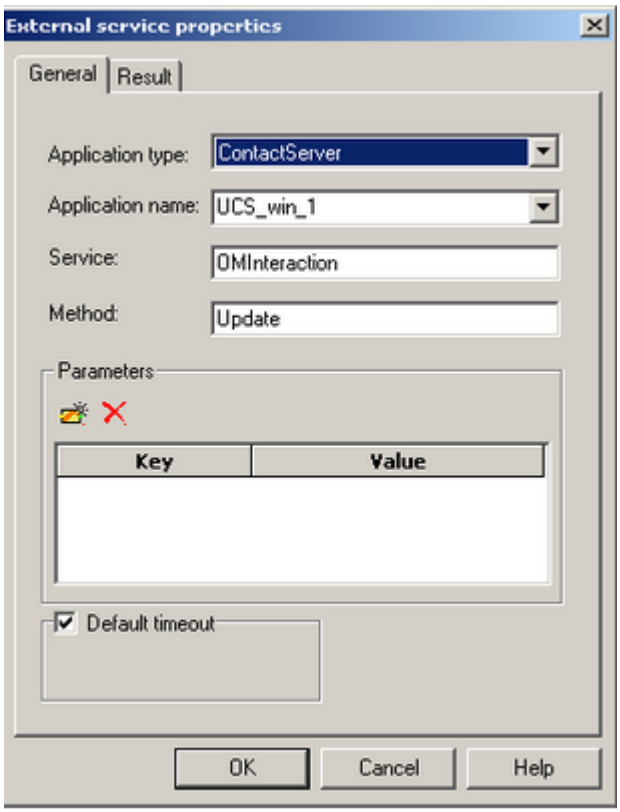
To List user’s indexes:

```
SELECT INDNAME AS INDEX_NAME, COLNAMES AS COLUMN_NAME, UNIQUERULE AS IS_UNIQUE
FROM syscat.indexes WHERE UPPER(TABSCHEMA)='CONTACTSERV_USER' ORDER BY INDNAME
```

Updating Interaction Data in a Routing Strategy

It is possible for a routing strategy to update certain interaction attributes. To ensure that such an update is also made in the UCS database, use the following procedure.

1. Log in to Interaction Routing Designer and open your strategy for editing.
2. In the strategy, create an `External Service` block to call the `OMInteraction` service, using the `Update` method. The figure below shows a sample configuration.



External Service Object

3. Save and reload the strategy.

UCS Limitations

Database

The Oracle SCAN (Single Client Access Name) feature is not supported.

Memory Allocation

By default Java allocates 512 MB of memory for UCS processes. This may not be enough when importing a large archive into Knowledge Manager, in which case an `OutOfMemoryError` exception may occur.

In such a case you can temporarily increase the amount of memory allocated for UCS processes by adjusting the Java option `-Xmx512m` to `-Xmx1000m`, as described in the following sections.

Windows

In the `ContactServerDriver.ini` file:

```
[JavaArgs]
-Xmx1000M
```

Unix

In the `contactServer.sh` file, change `-Xmx512M` to `-Xmx1000M` in the appropriate section, as in the following:

```
# Sun JVM</tt>
$JAVACMD -Xmx1000M -server -XX:+UseConcMarkSweepGC -XX:+UseParNewGC
-XX:+ExplicitGCInvokesConcurrent -Xbootclasspath/p:${JVM_ADDCHARSETS}
-Djava.rmi.dgc.leaseValue=60000 -Djava.library.path="${GMLLIB}"
-Dgenesys.cfglib="${LICENSE}" -Dtkv.multibytes="true"
-Djava.util.logging.config.file=${BASEDIR}/cv/jul.properties
-Dorg.restlet.engine.loggerFacadeClass=org.restlet.ext.slf4j.Slf4jLoggerFacade -classpath
"${COMP_CLASSPATH}" com.genesyslab.icc.contactserver.ContactServerEngine $*
else
# Ibm JVM
$JAVACMD -Xmx1000M -XX:+UseConcMarkSweepGC -XX:+UseParNewGC
-XX:+ExplicitGCInvokesConcurrent -Xbootclasspath/p:${JVM_ADDCHARSETS}
-Djava.rmi.dgc.leaseValue=60000 -Djava.library.path="${GMLLIB}"
-Dgenesys.cfglib="${LICENSE}" -Dtkv.multibytes="true"
-Djava.util.logging.config.file=${BASEDIR}/cv/jul.properties
-Dorg.restlet.engine.loggerFacadeClass=org.restlet.ext.slf4j.Slf4jLoggerFacade
-classpath "${COMP_CLASSPATH}" com.genesyslab.icc.contactserver.ContactServerEngine $*
```

There is a similar issue with Knowledge Manager.

UCS Manager

UCS Manager (Universal Contact Server Manager) connects to UCS and provides a graphic interface that you can use to:

- Configure the options that handle maintenance of the UCS database.
- Correct certain problems that may exist with data integrity.
- Display statistics about the UCS database.

> **Important**
> *Maintenance* here refers to archiving and pruning.

UCS Manager Help describes how to perform all of these tasks.

Inactivity Timeout

If UCS Manager is inactive for a certain length of time, it first issues a warning, then requires you to log in again. The default length of this timeout is 15 minutes; the warning is issued two minutes before the time expires.

To adjust the length of the inactivity timeout,

1. In the Advanced View/Annex (Genesys Administrator) or the Annex tab (Configuration Manager), create a section called `Security` (if it does not already exist).
2. In the `Security` section, create an option called `inactivity-timeout` and give it the desired value. Valid values are any integer from 1 to 1440. Changes take effect upon restart.

Contact Identification

To perform contact identification, UCS takes the contact data included in the new interaction and tries to match it with its existing contact records based on certain attributes.

This page describes the default process of contact identification.

What UCS Checks

The default list of the attributes that UCS checks is `FirstName`, `LastName`, `Title`, `EmailAddress`, and `PhoneNumber`.

> **Important**
>
> This chapter refers to contact attributes by their system names. The system name is the one that is used in the UCS and Configuration Server databases, and the one that appears in the `Name` box of the attribute's `Properties` window in Configuration Manager. In Configuration Manager there is also a display name which usually differs slightly; for example, system name `PhoneNumber`, display name `Phone Number`.

Order of Checking

The attributes that UCS uses in contact identification have a ranking which tells UCS what priority to give them in searching. The default ranking is:

`EmailAddress—0`

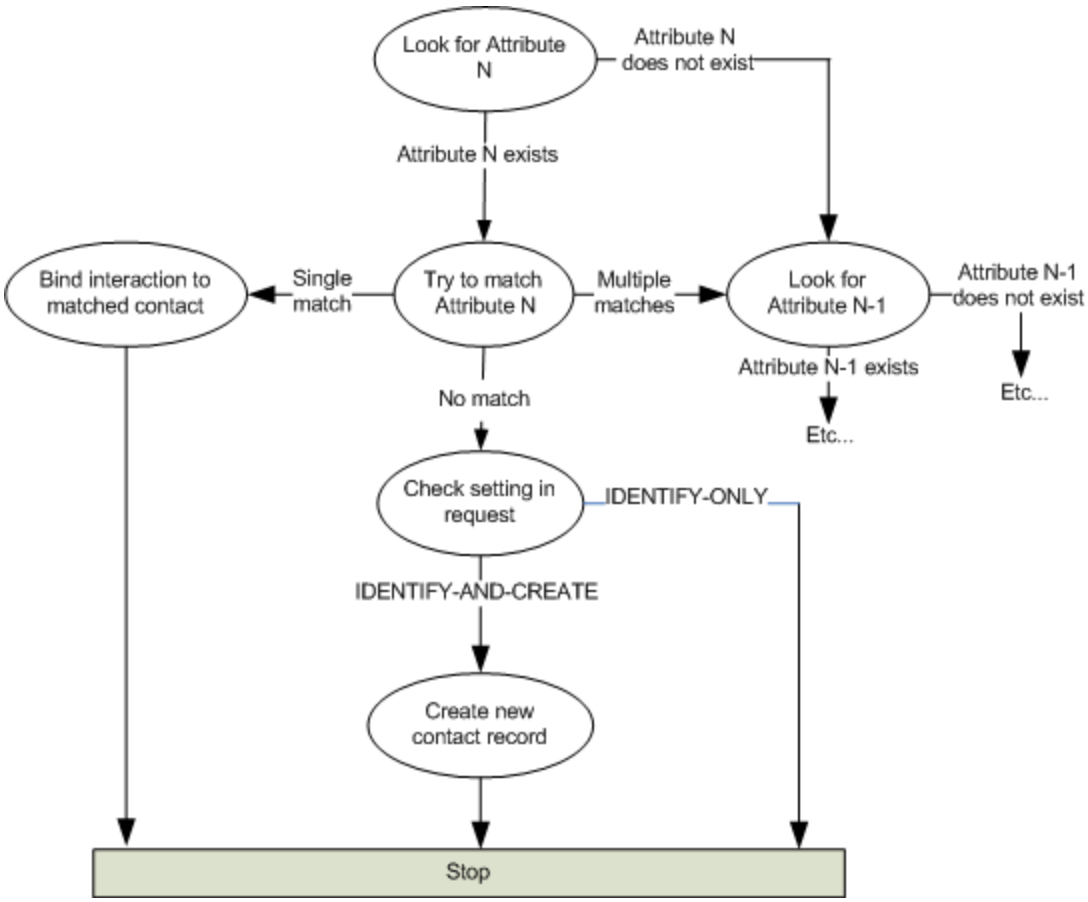
`PhoneNumber—1`

`FirstName—2`

`LastName—2`

`Title—3`

The general procedure that UCS follows in the default case can be diagrammed as in the figure below, where Attribute N is the highest-ranked attribute available in the interaction's contact data, Attribute N-1 is the next highest, and so on.



Default Process for Contact Identification

Example

An example of the default identification process is available.

Customizing

You can alter the default process of contact identification in both aspects:

- Whether an attribute is used in contact identification
- What priority an attribute has in matching

You can do this for all interactions globally or for interactions of a specific media type.

With these differing scopes of customization, the more specific scope takes precedence. UCS operates according to the following order:

1. If a media type has its own configuration for how a contact attribute is used in contact identification, that takes precedence over any other configuration.
2. Configuration of a contact attribute itself is more general and applies only to those media types that lack their own configuration for contact identification.
3. In any areas where items 1 and 2 do not apply, UCS follows the default behavior described on this page.

Contact Identification: Example

This page provides an example of the default process that UCS uses to identify the contact that is the source of a new incoming interaction.

1. A strategy requests identification of a contact, with only the following data provided:
   EmailAddress=johnanddora@doefamily.net
   FirstName=john
   LastName=doe
2. UCS takes EmailAddress, the highest priority attribute, and searches for EmailAddress = johnanddora@doefamily.net.
3. UCS finds two matching contacts, one with FirstName = john and the other with FirstName = dora.
4. UCS moves on to the next highest priority attribute. This would be PhoneNumber if it were specified, but it is not. So UCS takes the next-highest priority attribute, of which there are two, FirstName and LastName, both with a priority of 2.
5. UCS searches on EmailAddress = johnanddora@doefamily.net, and restricts the result to FirstName = john and LastName = doe
6. UCS finds a single contact matching these three criteria. It returns the ID of the Contact found, plus additional information if available.
   ContactId = 56464FGG519EA03
   EmailAddress = johnanddora@doefamily.net
   FirstName = john
   LastName = doe
   PhoneNumber = 555-654-6303

There are the following additional considerations:

- If the client's request conveys no specification of what to do in the event of no match, UCS creates a new contact record.
- When two attributes have the same rank, as do `FirstName` and `LastName` in the default ranking, UCS tries to match both of them.
  If the interaction has values for both attributes, UCS returns only contact records that match both. But if one of equally-ranked attributes has no value, UCS returns any contact records that match the attribute that does have a value (this is equivalent to saying that an attribute with no value matches everything).

If UCS goes through all of the attributes that it has been specified to check and finds no values for any of them, it returns an error message.

If UCS goes through all of the attributes that it has been specified to check and still finds two or more matching contacts, the next step depends on the entity that requested the contact identification:

- If UCS is identifying contacts in response to a request from a media server:
  - With E-mail Server, UCS takes the first contact on the list and associates it with the interaction.
  - With Chat Server, UCS simply passes the interaction on for processing with no associated contact. It reports neither the list of contacts found nor the fact that multiple contacts were found. The agent handling the interaction can select a contact for it using the Agent Desktop.

- If UCS is identifying contacts in response to an IRD `Identify Contact` object, it depends on whether the object's `Return Unique` checkbox is selected:
  - If `Return Unique` is not selected, UCS returns a list of the matching contacts.
  - If `Return Unique` is selected, UCS only reports that multiple contacts were found but does not return the list of matching contacts.

In either case, what happens next depends on the subsequent part of the strategy. The system may continue to process the interaction without any contact, until the interaction reaches the Agent Desktop, when the agent handling the interaction can select a contact for it.

Customizing

You can also customize this default behavior.

Specify Attributes To Check in Contact Identification

1. In Configuration Manager, open the `Properties` window for the desired contact attribute.
2. On the `Annex` tab of the `Properties` window (to set Configuration Manager to show the `Annex` tab, see `Configuration Manager Help`), create a `settings` section if it does not already exist.
3. In the `settings` section, create an option called `is-searchable`. Set its value to `TRUE` to make UCS use this attribute in contact identification. Set its value to `FALSE` to keep UCS from using this attribute in contact identification.

   (The default value depends on the attribute. The five attributes used in UCS's default behavior have the default value `TRUE`. All other attributes have the default value `FALSE`).

> **Important**
>
> This procedure affects the value of the desired attribute's `IsSearchable` attribute in the UCS database. You must use only this procedure to do this. Never edit any attribute or value directly in the database.
> There is also a way to control which attributes are searchable from the agent desktop, described in the "Making an Attached Attribute Sortable" section of the "Interaction Package" chapter of the Genesys Events and Models Reference Manual

Customize Attribute Priority

To customize the priority of the attributes that UCS checks, both of the following conditions must be true:

- The media type is specified in the interaction's user data.
- The interaction's media type is *not* e-mail, chat, or callback. In the typical case, this would be because the interactions are being submitted by a custom media server (built using the Genesys Media Interaction SDK Java or Open Media Interaction SDK Web Services).

To customize attribute priority,

1. In Configuration Manager, open the `Properties` window for the desired attribute and go to its `Annex` tab. Create a `settings` section if it does not already exist.
2. In the `settings` section, create an option called `search-order-level`. Give the option a numerical value to determine its priority in matching. Possible values are any integer in the range 0 (highest priority) to 127 (lowest priority). Two or more attributes can have the same priority.

Customize Contact Identification per Media Type

You can control how contacts are identified for interactions of a specific media type (of course, the interactions must have a valid media type specified in their user data).

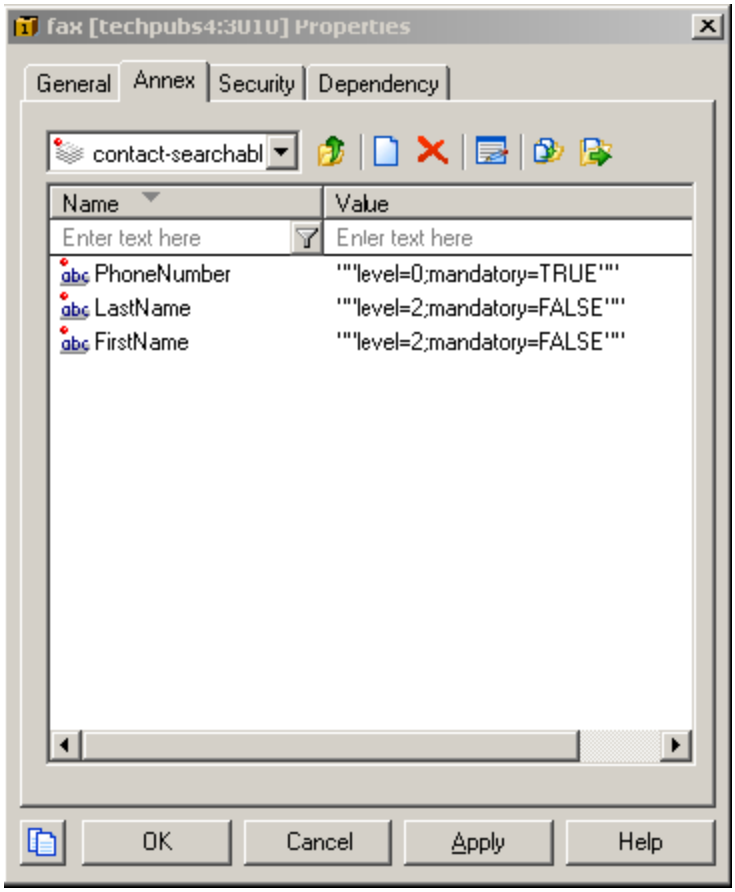
1. In Configuration Manager, open the `Properties` window for the desired media type and go to its `Annex` tab.
2. Create a `contact-searchable-attributes` section.
3. In this section, create an option for each contact attribute that you want UCS to use in contact identification for this media type.

> **Important**
>
> Any such attribute must either be one on the default list or have the is-searchable option with a value of TRUE.

The options that you create must have the following characteristics:

- The name duplicates the attribute's system name (displayed in the `Name` box of the `Properties` window, not the `Display Name` box); for example, `PhoneNumber` rather than `Phone Number`.
- The value has the form `"level=<integer>;mandatory=<Boolean>"`, where
  - `<integer>` is an integer from 0–127 setting the attribute's priority.
  - If `<Boolean>` is `TRUE`, this attribute must be present (that is, it must have a value) for matching to occur.
  - If `<Boolean>` is `FALSE`, this attribute need not be present (that is, it may lack a value) for matching to occur.

The following figure shows an example.



Media Type Configured for Contact Identification

With the configuration in the preceding figure,

- UCS returns an error if no `PhoneNumber` value is present. It does this even if `FirstName` and `LastName` values are available, because `PhoneNumber` is the attribute with highest priority (0) and is defined as mandatory.
- If multiple matching records are found with a given `PhoneNumber` value, UCS uses `FirstName` and `LastName` together to discriminate because they have the same priority (2).
- If there is no `LastName` value, UCS does not use `FirstName` alone, because `LastName` is specified as mandatory in this level. Instead, the list of records matching `PhoneNumber` only is returned. This avoids identification based on `FirstName` only.

Contact Creation

If UCS cannot find a contact in its database that matches the contact associated with a new interaction, it creates one in its database.

Default Behavior

The default behavior is for UCS to simply create a new contact record. This behavior can be overridden for an interaction in a routing strategy using the IRD `Identify Contact` object (see Universal Routing 8.1 Interaction Routing Designer Help). For e-mail interactions only, you can also modify the default behavior by using one of the non-default settings of E-mail Server's `contact-identification` option (see the eServices 8.1 Reference Manual).

Turning contact creation on and off

You can customize the default behavior for each media type.

1. In Configuration Manager, go to `Business Attributes > Media Type > Attribute Values` and double click the media type that you want to adjust.
2. On the `Annex` tab of the resulting `Properties` window (to set Configuration Manager to show the `Annex` tab, see `Configuration Manager Help`), create a `settings` section if it does not already exist.
3. In the `settings` section, create an option called `create-contact` . Set its value to `FALSE` to block contact creation for this media type. (The default value is `TRUE`).

Setting minimum attributes for creation

You can also define a minimum set of contact attributes that must be present (must have values) for a contact to be created.

1. In Configuration Manager, open the `Properties` window for the desired media type and go to its `Annex` tab.
2. Create a `contact-minimum-attributes-set` section.
3. In this section, create an option for each contact attribute that you want to require for contact creation. The option's name must duplicate the attribute's database name (displayed in the `Name` box of the `Properties` window, not the `Display Name` box); for example, `PhoneNumber` rather than `Phone Number.` The option's value must be empty.

Searching the UCS Database

Overview

Starting with release 8.0, UCS supports full-text search of contacts, interactions, and standard responses using the Platform SDK (PSDK) Contact API.

To enable full text search, the stored data must be prepared, an operation known as indexing. Indexing converts, abbreviates, and sorts data to allow fast searching in large data sets.

There are various ways of preparing the data for the index; one way is to divide text data into words. Another way of preparing text data is *stemming,* or storing only the stem of a word rather than all its forms (for example, *run, running, runs,* and *ran* all stored as simply *run*). UCS uses *analyzers* to perform word division and stemming; you can configure which analyzer applies to which database field. In addition,

- Examples of the syntax used for searching are available.
- Many attributes are not directly searchable because of how they are stored; however you can make such attributes searchable.

More About Indexing

It is important to note that the UCS indexing service enables searching for text data, but does not guarantee its retrieval.

When an object is found it must be retrieved using standard PSDK methods. These methods are documented in the API References of the Platform SDK.

When designing an application, data coming from search results should be considered as cached data, like the preview that can be seen in web search engines. This data is optimized for search and cannot be used to update UCS database objects. For example, the StructuredText of an interaction is rendered from HTML to text. All formatting is lost if this data is re-inserted into the interaction.

Documents stored in the index will at least have the following retrievable fields:

- `id`—Unique identifier in the UCS database. This is what enables retrieval of the object from UCS.
- `IndexationDate`—The date this index was created. The format is UTC (yyyy-MM-dd'T'HH:mm:ss.SSS'Z').
- `DocumentType`—Type of the document, selected from the following:
  - EmailIn
  - EmailOut
  - PhoneCall
  - CallBack

- CoBrowse
- Chat
- Interaction (Open Media)
- Contact
- StandardResponse

Example:

```
id = 00001a4EM4TD007K

IndexationDate = 2013-10-02T13:54:54.318Z

Type = chat
```

In the index, even dates and numbers are text. This format enables alphabetic sorting, so that, for example, 21 December 2008 comes before 1 June 2009.

Default configuration enables the indexing of Contacts, Interactions and Standard Responses.

Sizing

Read about sizing for the database and its index.

Sizing for the UCS Database and Index

The index that is produced by the UCS indexing service can be divided into two parts:

- The inverted index part that enables the full text search
- The data part that enables retrieval of the original data

If all of the original data is kept in the index, it can take as much space as the database itself; the default configuration does not compress it. The inverted index part is considerably smaller, but its size depends on the frequency of words. If the inverted index contains many unique values like IDs and timestamps it will be big. If it contains many common words such as those in the body of e-mails, it will be smaller.

The following table presents an example of sizing for a relatively large database.

Database Name	Database Size	Index Size	Duration
Standard responses	15 MB	6.5 MB	3 seconds
Contacts	5 GB	4.68 GB	2.5 hours
Interactions	20 GB	14 GB	2 hours

In this case the total size of the index files is about 19 GB.

During operations the index can grow to twice the size of the usable data.This is because index operations (such as internal reordering, purge of deleted documents, and concatenation) create new temporary files. To make these operations appear instantaneous, the system creates new files while it is still reading the old files. Then when it is finished creating the new files, it removes the old ones. Therefore, to be safe, free space on the disk hosting the indexes should be three times the size of the index.

Configuring Analyzers for UCS Search

Basic options controlling indexing and searching are described in the eServices 8.1 Reference Manual. This page describes one further option that controls the use of analyzers.

> **Warning**
> Any change in configuration of indexing must be followed by a reindexing of the full content of all UCS indexed objects.

The analyzers that are supplied with UCS are

- WhitespaceAnalyzer—Splits the text into tokens separated by white space characters (specifically, SPACE_SEPARATOR, LINE_SEPARATOR, PARAGRAPH_SEPARATOR, HORIZONTAL TABULATION, LINE FEED, VERTICAL TABULATION, FORM FEED, CARRIAGE RETURN, FILE SEPARATOR, GROUP SEPARATOR, RECORD SEPARATOR, or UNIT SEPARATOR).
- StandardAnalyzer—Converts the text to lower case, splits the text into tokens separated by the white space character, and removes high-frequency English words (called *stop words*).
- LowerCaseAnalyzer—Converts the text to lower case and splits the text into tokens separated by the white space character.
- SimpleAnalyzer—Divides text at non-letters and converts to lower case. This works well for languages in which words are separated by spaces, such as most European languages, but is of little use for languages in which words are not separated by spaces, such as many Asian languages.
- KeywordAnalyzer—Treats the entire text as a single token. This is useful for data like zip codes, IDs, and some product names.

In the default case, UCS search uses the StandardAnalyzer for all fields in all tables in the database. To override the default analyzer, use the following option.

<table_name>-field-analyzer<any>

Optional: Yes

Default value: StandardAnalyzer

Valid values: See below

Changes take effect: After restart

Sets the analyzer used for any table or field. In the option name, `<table_name>` is one of the following tables in the UCS database:

- Callback
- Chat

- CoBrowse
- Contact
- ContactAttribute
- EmailIn
- EmailOut
- Interaction
- PhoneCall
- StandardResponse

<any> can be anything, including zero. Use it to differentiate among multiple `field-analyzer` options referring to the same table.

Values for this option have the general form

<field>=<analyzer>, <field>=<analyzer>, ...

where <field> is the name of a field in the table and <analyzer> is the name of a supported and installed analyzer. For example:

- Option name: `interaction-field-analyzer`
- Option value: `Text=GermanAnalyzer,StructuredText=StandardAnalyzer`

With this option name and value, when searching the `Interaction` table, the search operation applies `GermanAnalyzer` to the `Text` field and `StandardAnalyzer` to the StructuredText field.

You can achieve the same result by creating two options:

- Name:`interaction-field-analyzer-01`,value:`Text=GermanAnalyzer`
- Name:`interaction-field-analyzer-02`,value:`StructureText=StandardAnalyzer`

Supported Analyzers

General Analyzers

- WhitespaceAnalyzer
- LowerCaseAnalyzer
- SimpleAnalyzer
- KeywordAnalyzer

Language-specific Analyzers

These are the same as SimpleAnalyzer but also remove *stop words:* words that are so common that there is little to be gained in searching for them or listing their occurrences.

As an example, the stop words used by StandardAnalyzer, the language-specific analyzer for English, are *a an and are as at be but by for if in into is it no not of on or such that the their then there these they this to was will with.*

The language-specific analyzers installed with UCS are:

- BrazilianAnalyzer
- ChineseAnalyzer
- CJKAnalyzer (Chinese/Japanese/Korean; any language that uses Chinese characters/kanji/hanja)
- CzechAnalyzer
- DutchAnalyzer
- FrenchAnalyzer
- GermanAnalyzer
- GreekAnalyzer
- RussianAnalyzer
- StandardAnalyzer (English)
- ThaiAnalyzer
- SpanishAnalyzer
- ItalianAnalyzer

Search Syntax

Searching the UCS database uses the Lucene syntax, described at http://lucene.apache.org/core/3_6_0/queryparsersyntax.html.

Some samples follow.

```
FirstName:kristin*
```

This query searches for all records having a key FirstName whose value is any word starting with "kristin."

```
FirstName:Kim AND LastName:Brown AND EmailAddress:hotmail
```

This query searches on three attributes: FirstName containing "Kim," LastName containing "Brown," and EmailAddress containing "hotmail."

```
Text:complain*
```

This query searches for all records having an attribute `Text` which contains words starting with "complain."

> **Important**
>
> The first character of the search must not be * (asterisk) or ? (question mark).

Making an Attribute Searchable from the Desktop

For both interactions and contacts, many attributes are not directly searchable from the desktop.

This section describes the way to make these attributes searchable from the desktop.

You do this by adding an option called `is-sortable` to the Annex section of the corresponding Business Attribute. Do not confuse this option with the `is-searchable` option. The following table compares the two.

Option	Effect	Used with
is-sortable	Makes attribute searchable from desktop	Interaction attributes, contact attributes
is-searchable	Makes UCS use the attribute in identifying contacts (at runtime)	Contact attributes only

By default, all attributes that are attached to an interaction are stored in the `AllAttributes` attribute of the `Interaction` entity. You can make searchable any attribute that is represented in the Configuration Server database by a `Business Attributes` object of type `Interaction Attributes`. Examples are:

- Category
- Disposition Code
- Interaction Subtype
- Interaction Type
- Language
- Media Type
- Priority
- Reason Code
- Service Type
- StopProcessing Reason

The `Interaction` entity includes attributes `StrAttribute1`–`StrAttribute10` and `IntAttribute1`–`IntAttribute5`, which exist to enable you to make attached attributes searchable. These attributes `StrAttribute1`–`StrAttribute10` and `IntAttribute1`–`IntAttribute5` may be referred to collectively as *replicant attributes,*as explained below.

To be able to perform lookup on any of the attached attributes, use the following procedure.

Making an attached attribute searchable

1. In Configuration Manager, be sure that Properties windows show their Annex tabs. If they do not:
   a. Go to the View menu and select Options.
   b. In the resulting dialog box, select the Show Annex tab in object properties check box.
2. In the tenant for your UCS, go to Business Attributes > Interaction Attributes > Attribute Values.
3. Open the Properties window for the attribute that you want to make searchable (for example, Service Type).
4. On the Annex tab, create a section named settings if it does not already exist.
5. In this settings section, create an option named is-sortable and give it the value true.

> **Important**
> Although the option name refers to being sortable, its real effect is to make attributes searchable.

6. If the attribute is of type string, you are finished. If it is of type integer, you must create an additional option, also in the Settings section, named type with the value integer.

Once you have configured an attached attribute as searchable, UCS takes its value as stored in AllAttributes and copies it as the value of one of the replicant attributes. To find out which replicant attribute copies a given attached attribute, look at the content of the IxnAttributeMetaData table. For example, if you have configured the ServiceType attribute to be searchable, you can find out which replicant attribute copies its value by using the following SQL request:

```
select MappingColumnName from IxnAttributeMetaData where TheName='ServiceType';
```

Please also note the following:

- This replication process only applies to interactions created or updated after' you perform the configuration described in this section. The replication process is not applied to interactions retroactively. The replicant attribute in older records will remain empty.
- By default, the replicant attribute that replicates the Interaction attribute does not have any database index. To increase performance during queries, consider adding index(es) to those replicant attributes that contain copied attributes.
- Replicant attributes are read-only from outside UCS. UCS is responsible for synchronization of their content whenever Interaction.AllAttributes is updated.
- The mapping between a searchable interaction attribute and a replicant attribute is based on the type (string or integer) of the business attribute declared in the Configuration Server database (string by default). UCS chooses from among the replicant attributes of the proper type that are not already associated with an attached attribute. It does this until no more replicant attributes are available.
- Once a replicant attribute has been used for a particular attribute, it is dedicated to that attribute: it cannot be used for another one. The only modification you can make is to configure a searchable attribute to be no longer searchable. The replicant attribute that copied this attribute's values will then retain those values for existing records and for any new records.

Using Full Text Search in a Primary/Backup Environment

This section describes best practices for using the full text search (FTS) functionality of Universal Contact Server in a primary/backup environment.

> **Important**
> The full text search is built on top of the Apache Lucene project.

Shared File System

The same index files can be shared by two primary/backup UCS instances by using a system shared folder with the storage-path configuration option in UCS applications. The mandatory configuration options for the index are as follows:

- **index/enabled** = `true`
- **index.contact/enabled** = `true`
- **index.contact/storage-path** = <same location as backup> (The path does not have to be the same string, but must point to the same location.)
- **index.interaction/enabled** = `true`
- **index.interaction/storage-path** = <same location as backup> (The path does not have to be the same string, but must point to the same location.)
- **index.srl/enabled** = `true`
- **index.srl/storage-path** = <same location as backup> (The path does not have to be the same string, but must point to the same location.)

> **Important**
> The following steps are required in order to have UCS running as a Windows service and able to use a network index:
>
> 1. Set the `storage-path` option of each index in the following form: `\\<host of index>\<end of path>`.
> 2. On the **Log On** tab of the **Properties** service, select **This account**, and provide the login and password to have access to the index location.

Limitations

- If UCS is rebuilding an index when the switchover occurs, it will stop building the index, and the other UCS instance will not continue to rebuild the index. In this case, Genesys recommends a full rebuild of the index.
- If the shared file system becomes unavailable when trying to update the index, the index might omit some data, or become corrupted or locked. To be notified of index update failures, you can set an SCS alarm on message 20105. Here is an example of message 20105 in the UCS log:

  ```
  14:13:25.899 Std 20105 [Notifier-2] Failed to send notification 13 to Persistent.
  ```

  In this case, Genesys recommends a full rebuild of the index.
- If the shared file system becomes unavailable, the search is not available.
- UCS will not be able to start if indexing is enabled and the shared file system where the index resides is not available. In this case, the shared file system must be made available, or UCS can be started by disabling indexation (by setting the enabled option in the index section to FALSE).
- If switchover occurs while the shared file system is not available, the switchover procedure will be reverted and both UCSs returned to their original states. During the switchover attempt, all UCS processing will be stopped. After switchover reversion, the original primary UCS will resume normal processing, except for indexation.
- If the primary UCS shuts down unexpectedly while the shared file system is not available, the successive attempts to switch the backup UCS to primary mode will fail. If such a failure occurs, the first critical recovery piece is either:
  - Make the shared file system available to the backup UCS so it can finish the switching procedure.
  - Disable indexation in the backup UCS application, and then restart the backup UCS. This UCS will start as the primary server without indexation.

Shared File System Recommendation

When implementing High Availability (HA), you may want to first build the index onto a local drive (solid state drive, if possible). Then, move the index to a Storage Area Network/Network Attached Storage (SAN/NAS) with replication/snapshot functionality (a NetApp FAS storage system, for example). Each UCS will access the index as either network storage (NAS) or fiber channel (SAN).

File System Synchronization

In the case of disaster recovery, a High Availability solution must provide FTS service after switchover, but the loss of some of the indexed documents may be acceptable. A possible configuration is to configure the Primary and Backup UCS with the following:

- An independent storage path.
- A nightly synchronization of the file system from primary storage path to backup storage path. In this scenario, a switchover results in uninterrupted UCS service with regard to searchable content. A few hours will be missing from the searchable content, which should be acceptable for disaster recovery.

Limitations

- The limitations regarding availability of the file system apply in the same manner as for a shared file system.
- You will need to schedule the recovery procedure described in the following section

Recovery

Genesys recommends a full rebuild of the indexes, which should occur during off-production (recommended), or during slow contact center activity. Two methods are available to rebuild the indexes:

Full build

1. Shut down all UCSs.
2. Delete the current indexes from the local directory reflected in the storage-path configuration option.
3. Start the UCSs with the option **index-rebuild** = `if-new` for each deleted index.

> **Tip**
>
> - The full build method is the most efficient, time-wise.
> - If searches are expected by the clients during the build period, the response will not be accurate until the full rebuild is complete. This means service is not very useful until a majority of database content is rebuilt.

Full rebuild

1. Shut down all UCSs.
2. Keep the index that was present before the switchover, or restore the most up-to-date backup.
3. Start the UCSs with the option **index-rebuild** = `on-start` for each index that needs reconstructing.

> **Tip**
>
> - The full rebuild method obtains the most accurate search results immediately after UCS startup.
> - Indexing will be significantly slower than a full build.

Chat Server Administration

> **Warning**
> This content has been moved to the *Chat Server Administration Guide* as of October 29, 2018 and, as such, the Chat Server content in this guide will no longer be maintained.

Deploying a High-Availability Chat Solution

> **Warning**
> This content has been moved to the *Chat Server Administration Guide* as of October 29, 2018 and, as such, the Chat Server content in this guide will no longer be maintained.

Matching Contact Attributes

> **Warning**
> This content has been moved to the *Chat Server Administration Guide* as of October 29, 2018 and, as such, the Chat Server content in this guide will no longer be maintained.

Multilingual Processing in Chat Server

> **Warning**
> This content has been moved to the *Chat Server Administration Guide* as of October 29, 2018 and, as such, the Chat Server content in this guide will no longer be maintained.

Knowledge Manager Administration

Basic Limitations

For Knowledge Manager, observe the following limitations:

- Categories: 3,500 categories
- Standard responses: 50 per category
- Attachments: 20 per standard response, 5 MB per attachment
- Field codes: 1,000
- Screening rules: 1,000
- Training objects: 200,000 e-mails, 20 KB per e-mail, 510 B for each e-mail's subject field

Screen Resolution

For Knowledge Manager to operate correctly, you must set a minimum screen resolution of 1280 x 1020.

Memory Allocation

You can adjust the memory size that Java allocates for Knowledge Manager processes by using the parameter `-Xmx1000m` in the following line in the .bat file:

```
start "Knowledge Manager" /b "%GES_HOME%\jre\bin\javaw"
-Xmx1000m -classpath %CLASSPATH% -Djava.security.manager
-Djava.security.policy=.\java.policy Genesys.iknow.manager.TM_start %*
```

`-Xmx1000m` means that 1,000 MB is allocated for Knowledge Manager; changing this number changes the allocation. The following considerations bear on adjusting this parameter.

- In some cases, Knowledge Manager does not work when you attempt to launch it from a machine that has a remote connection to the host of Knowledge Manager. As a workaround, lower the value of `-Xmx1000m` to `-Xmx512m`. In the unlikely event that this does not work, try a further decrease to `-Xmx256m`.
- You may want to adjust this parameter for better performance with large training objects (see See Large Training Objects), or before importing or exporting large files. For DB2 and Oracle, see also the recommendations in Adjusting Database Configuration below.

However, if this parameter is too low, it may impose limits on Knowledge Manager lower than those listed in Basic Limitations above. If so, you can consider increasing this parameter.

There is a similar issue with UCS.

Adjusting Database Configuration

To prevent problems when using Knowledge Manager to import or export very large files, Genesys has the following recommendations about database configuration.

- For DB2, do as follows:
  1. In the DB2 Control Center, select System > Instance > Databases.
  2. Select the database desired.
  3. Right-click the desired database.
  4. In the resulting shortcut menu, select `Configure`.
  5. In the resulting dialog box, select `Logging`.
  6. Increase the number of files and/or file size.
- For Oracle, use Enterprise Manager to increase the number of rollback segments. Refer to Oracle documentation for details.
- For Microsoft SQL, no special configuration is needed.

General Recommendations

This section presents some recommendations for monitoring and adjusting your eServices configuration.

In addition to the items on this page, see also the following topics:

- Database Performance
- Unicode Character Support
- Classification Server
- SMS Server
- Security

Parameters to Check

Check that the following parameters do not significantly exceed their average values:

- Memory usage
- CPU load
- Number of handles for eServices-related processes (with Windows operating system)

Loading on Application Servers

Monitor the loading on application servers (Classification Server, E-mail Server). If application servers are being overloaded, do one or both of the following:

- For all routing strategies that process interactions with no agent involvement, adjust the limit on the number of interactions that Interaction Server can submit to Universal Routing Server (URS). You can set this limit for a strategy using the `max-submitted-interactions` option. See "Interaction Server Options" in Chapter 2 of the eServices 8.1 Reference Manual.
- Add instances of the required application server on other hosts.

Database Performance

This page provides general recommendations on running Microsoft SQL.

Further information on improving the performance of the Interaction Server database is also available.

Microsoft SQL 2000

- In general, patch up to Service Pack 4.
- If Microsoft SQL is running on a machine with over 2 GB of RAM, use Windows' AWE (Address Windowing Extensions) mode. To avoid performance degradation, patch Microsoft SQL according to Microsoft's recommendation "FIX: Not all memory is available when AWE is enabled on a computer that is running a 32-bit version of SQL Server 2000 SP4" (see http://support.microsoft.com/?kbid=899761). This patch brings Microsoft SQL to version 8.00.2040.

Microsoft SQL 2005

There is an issue that occurs with Microsoft SQL 2005: when the database is very large (on the order of one million interactions), there are periodically exceptions in the `Stat` service, and CPU activity rises to 100%.

To avoid this issue, configure the UCS DAP as follows:

1. Create a `settings` section.
2. In this section, create an option called `prepare` and set its value to `false`.

This DAP configuration applies to Microsoft SQL 2005 only; configuring the DAP in this way with Microsoft SQL 2000 degrades performance.

Unicode Character Support

Although UCS supports Unicode character sets, other components of eServices and of the Genesys suite (in particular, Interaction Server and URS) do not. This means that interactions that use a Unicode character set may be corrupted. Specifically, what may be corrupted is any part of the interaction's data that is handled by Interaction Server or URS (or any other component that does not support Unicode). This includes attributes such as Subject, FirstName, and LastName. It does not include the body of the interaction, which is handled by UCS only.
The following scenario provides an example of how this corruption can happen:

1. URS processes an interaction that includes Unicode user data, such as Subject. Because URS does not support Unicode, the Subject and other user data is corrupted.
2. UCS receives `RequestStopProcessing`, either from URS or the agent desktop.
3. UCS saves the interaction's user data (this is done in case the user data has changed during processing), copying certain properties from the user data into the corresponding fields of its `Interaction` table.
   This user data includes the interaction's subject, the value of which is copied into the `Subject` attribute. But the user data was corrupted during processing by URS, so the corrupted data is now stored in the UCS database.
4. If the corrupted subject data is used to compose another e-mail (such as reply or redirect), the subject of the new e-mail is also corrupted.

As a workaround for this scenario, you can modify the applicable strategy so that it deletes the Subject user data before it issues `RequestStopProcessing`.

Classification Server

This section provides information for administrators regarding Classification Server.

Modifying any of the following may have repercussions elsewhere in the system:

- Categories
- Standard responses
- Field codes
- Screening rules

If you modify any of these objects, it would be prudent to check any compiled strategies that use the following:

- Acknowledgment
- Attach Categories
- Autoresponse
- Chat Transcript
- Classify
- Classify Switch
- CreateEmailOut
- CreateSMS
- Forward
- Multi Screen
- Screen

Perform this check by recompiling the strategies in question. If this is not possible, monitor the Classification Server log for errors related to screening rules and UCS logs for errors related to rendering of standard responses.

SMS Server

SMS Server supports the following SMPP v3.4 operations:

- BIND_TRANSCEIVER
  BIND_TRANSCEIVER_RESP

  The purpose of the SMPP bind operation is to register an instance of an ESME (External Short Messaging Entity) with the SMSC (Short Message Service Center) system and request an SMPP session over this network connection for the submission or delivery of messages.
- UNBIND
  UNBIND_RESP

  The purpose of the SMPP unbind operation is to deregister an instance of an ESME from the SMSC and inform the SMSC that the ESME no longer wishes to use this network connection for the submission or delivery of messages.
- SUBMIT_SM
  SUBMIT_SM_RESP

  This operation is used by an ESME to submit a short message to the SMSC for onward transmission to a specified short message entity (SME).
- DELIVER_SM
  DELIVER_SM_RESP

  DELIVER_SM is issued by the SMSC to send a message to an ESME. Using this command, the SMSC may route a short message to the ESME for delivery.
- ENQUIRE_LINK
  ENQUIRE_LINK_RESP

  This message can be sent by either the ESME or SMSC and is used to provide a confidence check on the communication path between an ESME and an SMSC.

The protocol referred to in this section is described in Short Message Peer to Peer Protocol Specification v3.4, 12-Oct-1999 Issue 1.2

Security

Genesys makes the following security recommendations for deploying eServices:

- Put Web API Server in the DMZ.
- Put all other eServices components in the internal network.
- Open ports in the firewall between the DMZ and the internal network to allow Web API Server to connect with other eServices components. The following table lists each component and the port to open.

Port Types in Firewall

Server	Port
Configuration Server	Default port on `Server Info` tab
Message Server	Default port on `Server Info` tab
Solution Control Server	Default port on `Server Info` tab
Interaction Server	Default port on `Server Info` tab
Chat Server	Port specified by the `webapi-port` option in the `settings` section. If not specified, default port on `Server Info` tab.
E-mail Server	Port specified by the `webapi-port` option in the `settings` section
Stat Server	Default port on `Server Info` tab
Co-Browsing Server	HTTPS
UCS	Port specified by the `ucsapi` option in the `ports` section

- Open a port in the firewall to allow Solution Control Server to connect to the Local Control Agent (LCA) located on the host of Web API Server.
- Open ports in the firewall to allow SMS Server to connect to the SMSCs specified in the SMS Server's configuration