Avaya Context Store Snap-in Reference

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Chapter 1: Introduction

Purpose

This document describes the Context Store Snap-in characteristics and capabilities, including feature descriptions, interoperability, and performance specifications. The document also provides instructions on deploying, configuring, and troubleshooting the Context Store services.

For information about Avaya Breeze® platform, Avaya Aura® System Manager, and Avaya Engagement Designer, see the respective product documentation at the Avaya Support website: http://www.avaya.com/support.

This document is intended for anyone who wants to install, configure, and administer Context Store.

Prerequisites

- Users who want to deploy and administer the Context Store services must have a working knowledge of Avaya Breeze® platform and System Manager.
- Users who want to deploy Context Store must have means to access the Avaya PLDS to be able to download the Context Store services.
- Developers who want to use the Context Store services and SDKs must have a working knowledge of the technologies and products referenced in the document.
- Users who want to use Context Store Pluggable Data Connector (PDC) must have access to Avaya Aura® Orchestration Designer.
- Users who want to use Context Store Task Type must have access to Avaya Engagement Designer.

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- To go to the first page, press the `Home` key.
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Chapter 2: Context Store Snap-in services and features

Context Store overview

Context Store provides a flexible and easy integration among different applications, providing a centralized solution to store context information. Many applications can use the abstract context concepts that Context Store provides.

A context entry in Context Store has the following main elements:

- contextId: A text field that contains a unique identification for the context. You can specify the contextId while adding the context entry in Context Store. If you do not specify a contextId while creating a context, the system generates a unique id.
- data: The data field in a context entry is an abstract map with multiple key/value pairs. Keys in the data field must be unique. Multiple identical keys in the same request results in the values being overwritten with the last key. To provide a better structure and organization of context data, Context Store also supports inner maps in context data fields.
- groupId: An optional text field that creates a logical group of related context entries. You can specify the groupId while adding the context entry in Context Store or while updating an existing context entry.
- aliasId: An optional field that contains unique identifications for the aliases associated with a Context object. You can specify aliasId/aliasIds while adding the context entry in Context Store or you can update an existing context entry to have aliasIds.
- routingId (rid): A parameter used in a Geo-redundant deployment to route requests by the load balancer. If you specify a value for the rid parameter, Context Store assigns the value to the routingId. The default value is 0. The rid query parameter for a request, if provided, cannot be left blank.
- topic: An optional text field that can be used to specify the topic of this Context object which can be used later for filtering when querying Context data in the External Data Mart. You can specify the topic while adding the context entry in Context Store or while updating an existing context entry.

Data model mapping

Context Store maps your data model into the Context Store data model. While mapping your data model into the Context Store abstract model of key/value pairs in Context Store, you must consider the following factors:

- Context size: Context Store uses a high performance in-memory data grid. To take advantage of this environment and to achieve high performance, keep the context size minimal. For more information see, Capacity and scalability specification on page 95.
- Pointers rather than actual data: Use Context Store as a centralized solution to share information and not to store data. For example, use Context Store to store the location and name of a user's picture, not to store the actual picture.
- Structure: Use the inner-map structure of Context Store to structure the data properly.

Context lease time

Context Store preserves a context entry for a specific time defined as the *lease time* of the context. Any Context Store client can renew this lease time, or time-to-live, at any moment. The clients can also define the context lease time while creating a context and specify different lease time values for different scenarios.

A Context Store client can also provide the lease query parameter, but leave the value blank. In this case, Context Store uses the default configured lease for the context object.

Be aware when planning to use the External Data Mart Provisioning feature, that provisioned Context objects are stored in the data-grid with infinite lease time.

Note that Context Store supports retrieval of expired Context data, if that data was persisted to the External Data Mart. The retrieved data is written back into the data-grid (with default lease). This optional feature is enabled via the Enable Retrieval From Database attribute of the ContextStoreRest service.

To use the Context Store in-memory data grid efficiently, you must evaluate the contexts' lease time requirements before implementing Context Store. This analysis helps to understand the memory requirements and usage, and to provide a Context Store solution that can store all information as long as required.

For details about the average latency of a request, see Capacity and scalability specification on page 95. To store information for a longer duration, you can use an external database.

Sensitive data

Context Store supports customer-encrypted data. The keys in the key/values pairs must not be encrypted as character restrictions apply on these identifiers. For more information on character restrictions, see ReST API documentation. While creating a context entry, the Context Store

clients can mark context values as sensitive. Context Store does not include the sensitive values in logs, alarms, and reports.

Note:

The ReST API documentation can be accessed by browsing to an instance of the Context Store ReST snap-in by typing `http://clusterIP/services/ContextStoreRest/`. You can access this online documentation over HTTP and HTTPS on Firefox, Microsoft Edge, or Chrome browsers; Internet Explorer is not supported. A copy of the full API documentation is provided in the appendix section of *Avaya Context Store Snap-in Developer Guide*.

Context Store architecture overview

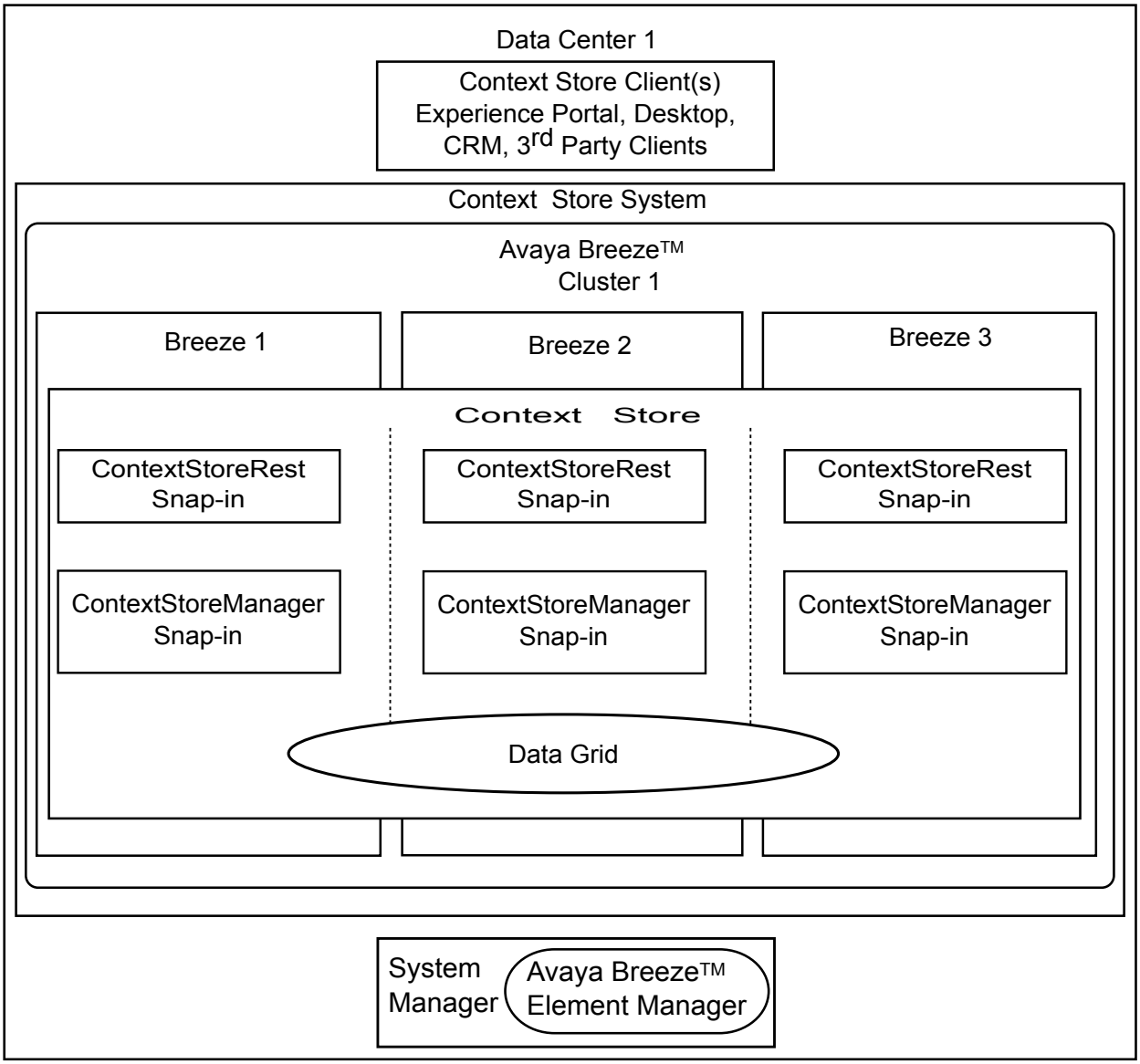
Avaya Context Store Snap-in provides a centralized data cache to the applications in a contact center. Using a distributed cache, Context Store offers a scalable, reliable, and fault-tolerant system to store context information. Context Store also provides services for making changes to the context information. You must deploy Context Store as a service on the applicable release of Avaya Breeze® platform. For more information on a supported line-up, see *Avaya Context Store Snap-in Release Notes*. A high availability (HA) deployment requires an Avaya Breeze® platform cluster containing a minimum of two Avaya Breeze® platform nodes.

Context Store offers the following functionality:

- A standard RESTful Web Service API to third-party components to set and get context information.
- Storage of context information using multiple key-value data.
- Storage of context information using external identifiers, such as the UCID generated by Session Border Controllers.
- Scalable solution with high availability using a distributed cache.
- Management and monitoring services through the integration of Avaya Breeze® platform.
- Security through the integration of Avaya Breeze® platform.

Context Store offers the flexibility to be deployed on Avaya Breeze® platform nodes of varying sizes. You can deploy Context Store on a single node or on a cluster of up to five nodes.

The following diagram shows the high-level architecture for the Context Store configuration of a cluster with three instances of Avaya Breeze® platform. This is a sample illustration. You can have a single-node cluster or cluster of up to five nodes.



Avaya Breeze® platform overview

Avaya Breeze® platform provides a virtualized and secure application platform where workflow developers and Java programmers can develop and dynamically deploy advanced collaboration capabilities. These capabilities extend the power of Avaya Aura®. Customers, Business Partners, and Avaya developers can use Avaya Breeze® platform to deploy snap-ins.

Avaya products, such as Avaya Oceana® Solution, Presence Services, Engagement Designer, and Context Store are powered by Avaya Breeze® platform. It enables the user to do the following:

- Develop the snap-ins, without developing the platform to deploy and invoke snap-ins.
- Perform the following operations:
  - Intercept calls to and from the enterprise.
  - Redirect calls to an alternate destination.
  - Block calls and optionally play an announcement to the caller.
  - Change the caller ID of the calling or called party.
- Place an outbound call for playing announcements and collecting digits.
- Use web services for added functionality.
- Make webpages and web services available for remote browsers and applications.
- Add or replace trust and identity certificates for increased security.
- Create custom connectors that provide access to an external application or service.

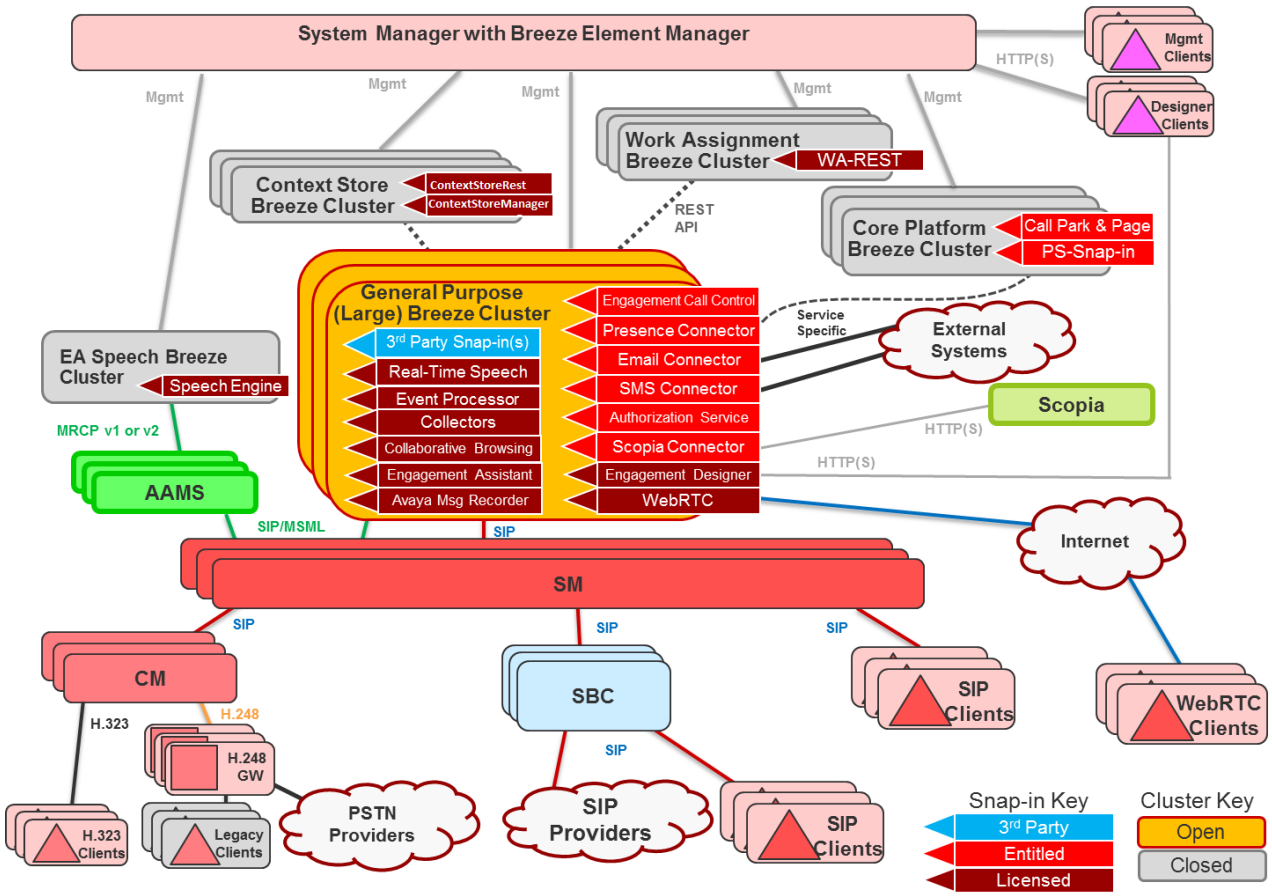
Avaya Breeze® platform provides:

- Unified Communications and Contact Center customers and Business Partners the ability to deliver capabilities using the skill sets of enterprise and cloud application developers.
- A robust Software Development Kit (SDK) with an easy-to-use API. Developers need not understand the details of call processing to develop new capabilities.
- A Collaboration Bus that snap-ins can use to leverage capabilities through a point-to-point model and publish or subscribe to messaging patterns.
- A Common Data Manager framework that snap-ins can use to access common information stored on System Manager.
- Connector snap-ins that provide access to email and conferencing host applications.

  For the list of third-party developed snap-ins, go to https://www.devconnectmarketplace.com/marketplace/ and navigate to **Avaya Snapp Store**.
- Zang call connector to interact with Zang.
- Zang SMS connector for snap-ins to interact with Zang to send and receive messages.
- Tools that log and monitor operations and provide troubleshooting support.

Topology

The following diagram provides a high-level illustration of the components of an Avaya Breeze® platform solution:



Context Store services

Context Store provides the following snap-in services:

- Context Store Manager (ContextStoreManager)
- Context Store Rest (ContextStoreRest)
- Context Store Screen Pop (ContextStoreScreenPop)
- Context Store Notify (ContextStoreNotify)
- Context Store Rules (ContextStoreRules)
- Context Store Event Streams (Streams)
- Context Store SOAP (ContextStoreSoap)
- Context Store Query (ContextStoreQuery)

You must install these services from the Avaya Breeze® platform **Element Manager** page in System Manager to the Context Store cluster. The system installs the services in all the Avaya Breeze® platform servers that are in the Context Store cluster.

Context Store Manager

ContextStoreManager initializes the configuration of Context Store, External Data Mart, the data grid spaces for Context Store, alarming, Event streaming, and Geo redundancy.

When you install the ContextStoreManager snap-in service on Avaya Breeze® platform, the system deploys a ContextStoreManager service in each Avaya Breeze® platform server in the cluster. The service creates the base for Context Store.

Although the ContextStoreManager snap-in service is deployed on every node, only one node is elected to be the Master ContextStoreManager, which handles functions such as alarms. If the node elected to be Master ContextStoreManager fails, another node is immediately elected.

Note:

Using System Manager, you must create a simple network management protocol (SNMP) target profile and assign the profile to your network monitoring system (NMS).

Data grid

Context Store uses an in-memory data grid for storing the context entries for a specific time. Using the ContextStoreManager service of Context Store, you can specify for how long you want the context entries to be present in the data grid. In addition to providing a storage space, the data grid functionality provides the following advantages to Context Store:

- Efficiency by providing an in-memory data cache for a fast and reliable response in any operation on context data
- Scalability by distributing load across all available resources through the built-in scalability features
- High availability by hot backup for zero downtime
- Consistency by maintaining data integrity with 100% transactional data handling

For more information, see Context lease time on page 11.

Context Store REST

Context Store implements a RESTful web services interface, the ContextStoreRest service, to provide the required services to the clients.

The ContextStoreRest service focuses on system resources, including addressing and transferring of resource states. ContextStoreRest identifies the resources using HTTP or HTTPS URLs and returns the output to the clients using JavaScript Object Notation (JSON).

Using the contextId, or optionally an aliasId, through the ContextStoreRest snap-in service, you can create, read, update and delete context entries and values. You can also group related context entries together by assigning a groupId when the context entry is created or updating an existing context entry with a groupId.

The required fields for Context Store object are as follows:

- contextId: A unique identifier for the context. If you do not specify a contextId while creating a context, the system generates a unique id. A contextId can be of maximum 255 characters.
- data: Represented as key/value pairs.

Basic request example

Note:

On multiple node deployments, ContextStoreRest requests must be submitted through the clusterIP, which ensures that the requests are load balanced across all the servers in a cluster. For single node deployments, enter the Avaya Breeze® platform node security IP instead of the cluster IP.

Request name	URL	HTTP request type	Content
Create a new context object	`https://clusterIP/services/ContextStoreRest/cs/contexts/`	POST	{"contextId":"sampleContext", data": {"key1":"value1","key2":"value2","key3":"value3"}}
Retrieve an existing context object	`https://clusterIP/services/ContextStoreRest/cs/contexts/sampleContext`	GET	

For more information about ContextStoreRest, and the complete API documentation, see *Avaya Context Store Snap-in Developer Guide*.

Context Store SOAP

Context Store SOAP is an optional snap-in service that provides the required Context Store services to the clients. All the Context Store operations available through the ContextStoreRest interface are also available through this Simple Object Access Protocol (SOAP)-compliant interface. A Web Service Definition Language (WSDL) file and schema define the ContextStoreSoap interface.

Both the ContextStoreRest and SOAP interfaces are deployed on the same Avaya Breeze® platform cluster. Context Store routes the requests received through the SOAP interface to the ContextStoreRest interface on the local Avaya Breeze® platform node. The ContextStoreSoap snap-in sends the SOAP XML envelopes to the clients as defined by the schema in the snap-in WSDL.

You can download the ContextStoreSoap WSDL from http://clusterIP/services/ContextStoreSoap/wsdl/cs/Cs.wsdl.

Note:

In a geo-redundant deployment, you cannot download the ContextStoreSoap WSDL through the IP address of a customer-provided geo load balancer. You must download the WSDL directly from either of the clusters in the configuration and then update with the IP address of the geo load balancer.

Avaya Aura® Contact Center (AACC) uses Context Store SOAP interface as a web interface to send and receive context data. The SOAP interface is compatible with the Database Integration Wizard (DIW) application of AACC. So the SOAP web service calls can be invoked from the AACC script.

ContextStoreSoap snap-in is installed as an SVAR file. For more information, see the Installing the optional Context Store services topic.

For more information about ContextStoreSoap and the complete API documentation, see *Avaya Context Store Snap-in Developer Guide*.

Context Store Query

Context Store Query (ContextStoreQuery) is an optional snap-in service that you can use to retrieve context data that is unavailable in the Context Store data grid from an external data mart (EDM).

The ContextStoreQuery snap-in provides a REST interface to collect all associated context data from the EDM in the JSON format. Using the ContextStoreQuery REST interface, you can generate audit trails or retrieve instances of context data from the context data stored in the associated EDM database. With this collected data, you can visualize a customer journey represented by an interaction with a touchpoint.

You must configure the **EDM: Database username** and **EDM: Database password** attributes to retrieve information from an EDM. Misconfigured or incorrect details (e.g. incorrect password) will result in errors in the system.

The ContextStoreQuery snap-in is installed as an SVAR file. For more information, see the Installing the optional Context Store services topic.

Note:

To retrieve context audit trails using the ContextStoreQuery snap-in, you must enable the Audit Trail feature using the applicable ContextStoreManager attribute.

Retrieving customer interaction details with ContextStoreQuery snap-in

You can retrieve customer interaction details using a contextId or a groupId. Use contextId to retrieve a single customer journey and use groupId to retrieve multiple customer journeys. You can also retrieve the latest context entry in EDM.

Context Store Screen Pop

ContextStoreScreenPop is an optional service which you can use to either view, add, or update the data stored in Context Store in a format that you prefer. ContextStoreScreenPop uses both predefined and user defined rules to process the available data. The snap-in then returns the processed information to the clients in the specified format. Context Store supports the following formats for returning data: HTML, XML, JSON, URL, REDIRECT, WA, and MAILTO. You can configure these output formats to view the context data in a web browser.

ContextStoreScreenPop provides a rules engine with which you can manipulate the view of context data stored in Context Store. To configure the rules, all you must do is add the rule in System Manager, and the rules engine updates the rule set. The rules engine can change the output format, and filter the results based on the keys in the context. For more information about how to create user-configurable rules or make use of the existing predefined rules, see *Avaya Context Store Snap-in Developer Guide*.

The ContextStoreScreenPop URLs can easily integrate with other applications, such as Avaya One-X Agent. For information for how to configure ContextStoreScreenPop with Avaya one-X® Agent, see *Avaya Context Store Snap-in Developer Guide*.

Context Store Notify

ContextStoreNotify is an optional service in Context Store, using which you can receive notifications for any change in a context entry. The ContextStoreNotify service uses the ContextStoreRest service to send an event trigger to up to five registered subscribers through the REST interface. To use this service, you must:

- Obtain a suitable client that can handle REST messages.
- Create a service on your application server so that the client can handle the REST event messages.
- Subscribe for the ContextStoreNotify service by configuring the ContextStoreNotify attributes in System Manager.

To subscribe for a notification, you must configure the ContextStoreNotify attributes using the System Manager Cluster attributes page and provide the URI of the endpoint that you want to configure for receiving notifications.

You can also provide the following optional filters:

- The tenantId of the contexts for which you want to receive notifications.
- The groupId of the contexts for which you want to receive notifications.

You can configure up to five subscriptions. You can enable or disable a subscription by specifying a value of true or false for the attribute *enabled*. You can disable or enable a subscription dynamically. However, to change any other configuration of a subscription, you must first disable the subscription, make the changes, and then enable the subscription again.

If Context Store cannot send the notification to the client endpoint for any reason, Context Store retries to send the same notification to the same endpoint up to three times in a one– minute

period. After the third try, if Context Store is still unable to send the notification, Context Store disables the subscription for that endpoint. To enable that subscription again, you must first disable the subscription by setting the ContextStoreNotify attribute *enabled* as *false*(a snap-in itself cannot update an attribute value in System Manager). After you verify that the endpoint is available for receiving notifications, you can enable the subscription by setting the value of the *enabled* attribute to *true*.

Context Store Rules

ContextStoreRules is an optional service snap-in with which you can integrate Context Store with CRM systems by triggering an Engagement Designer workflow.

Context Store provides a flag to determine if the data must be sent to the rules engine. The rules engine then determines the workflow that must be triggered by raising the Avaya Breeze® platform event that the workflow is listening for.

You can load the CRM integration ContextStoreRules snap-in using the standard System Manager SVAR loading mechanism. The CRM Integration ContextStoreRules snap-in has:

- User-defined business rules to determine if it must trigger a rule and which Avaya Breeze® platform event it must raise.
- Rules that you can trigger using the following ContextStoreRest API calls, if you add the parameter rules=true to the URL:
  - Create Context (POST)
  - Update Context (PUT)

You can define five rules and trigger five independent workflows based on the rules.

To configure the CRM integration snap-in, you must create a unique Avaya Breeze® platform event and an Engagement Designer workflow. You must also configure the Engagement Designer cluster to allow HTTP requests. For more information about CRM integration, see *Avaya Context Store Snap-in Developer Guide* and *Avaya Engagement Designer Developer's Guide*.

Context Store Event Streams

With the Event Streams feature, Context Store provides more fine-grained and personalized event notifications than the ContextStoreNotify feature. Users, such as an agent or agent supervisor, can register for customized event streams. The users can filter the event streams by identifiers of the context, such as contextId, or specific keys or key/value pairs that the context object contains. The users can register for the event streams using a web interface. Context Store delivers the applicable event notifications to the users through the same interface. A sample JavaScript web interface is provided for the Event Streams feature. For more information about the Event Streams feature and the usage of the web interface, see *Avaya Context Store Snap-in Developer Guide*.

To use the Event Streams feature, you must install the Streams SVAR on the Context Store cluster and enable the feature using the **Event Stream: Enable Event Streaming** field on the

ContextStoreManager page. For more information about installing the SVAR file, see Installing the optional Context Store services on page 62.

The Event Streams feature requires space in the data grid to operate. Hence, while enabling the Event Streams feature, you must reduce the maximum memory allocation in the **ContextStoreSpace DataGrid Settings** field by 6 GB. You must also restart the cluster after reducing the memory allocation.

Feature restrictions

Context Store does not support filtering event notifications by aliasIds. The limitation is because of the inability to filter by complex objects, such as json objects.

The number of users or streams must be limited to five registered streams. You can either have five users with one stream each or fewer users with multiple streams each.

The Event Streams feature is supported only on environments equal to or greater than 64 GB x 3 nodes.

You cannot enable the feature on systems on which traffic is running.

Context Store Java SDK

Context Store provides a Java SDK to facilitate the access to the Context Store services. The Context Store Java SDK provides a client library for users to write software that will interact with a deployed Context Store system.

The Context Store Java SDK is a zip file and is distributed through Avaya DevConnect at http://www.devconnectprogram.com/site/global/products_resources/avaya_breeze/avaya_snap_ins/context_store/overview/index.gsp.

The directory structure of the Context Store Java SDK, ContextStore <version> SDK.zip, is as follows:

```
CS Event Stream Client
 ├ app
   ├ assets
   ├ css
   ├ font
   ├ js
   ├ scripts
 ├ browser components
 - boiler_plate_client.html
 - index.html
 - README.txt
 CS ReST
   ├ CS ReST Clients
      ├ cs-rest-csharp-client (rest clients for testing purposes only)
         ├ packages
         ├ SimpleClient
          - README.txt
          - SimpleClient.sln
 ├ CS SDK
   ├ CS SDK API
      ├ conf (logging configuration file)
      ├ examples (an example integration class using the SDK)
      ├ lib (the dependencies that are required to use the SDK)
       — cs-sdk-api-<version>-SNAPSHOT.jar
```

```
        -cs-sdk-api-<version>-SNAPSHOT-javadoc.jar
        - developer_guide.html
........- LICENSE.txt
   ├ CS SDK Docs (the SDK documentation)
        — developer_guide.html
```

Access to Context Store through the Java SDK requires client authentication. Authentication is established using certificates. The Java SDK requires users to supply the following system properties at runtime: Keystore location, Keystore password, Truststore location, and Truststore password.

For more information about the guidelines for the Context Store SDK use, see *Avaya Context Store Snap-in Developer Guide*.

Context Store JavaScript SDK

Context Store provides a JavaScript SDK to facilitate access to the Context Store services. The JavaScript SDK provides a client library using which users can write software that interacts with a deployed Context Store system through the ContextStoreRest interface.

The SDK provides service interfaces using the created instance of the AvayaDataStoreClient class. With the JavaScript SDK, you can access all Context Store operations that are available through ContextStoreRest.

The Context Store JavaScript SDK is a .js file within a zip file and is distributed through Avaya DevConnect at http://www.devconnectprogram.com/site/global/products_resources/avaya_breeze/avaya_snap_ins/context_store/overview/index.gsp.

The zip file contains:

- AvayaDataStoreClient-<*version*>.min.js: The Context Store JavaScript SDK library
- test_app directory: The directory that contains a sample client for accessing the Context Store JavaScript SDK
- README.txt: Instructions for SDK usage
- License.txt: User license

For more information about JavaScript API operations and guidelines for Context Store JavaScript SDK usage, see *Avaya Context Store Snap-in Developer Guide*.

Context Store features

External Data Mart

External Data Mart overview

External Data Mart (EDM) is an optional feature of the ContextStoreManager snap-in service. Using EDM, you can connect and persist data from Context Store to an external, customer-provided database. To use this feature, you must install any of the databases that Context Store supports , create the required tables, and configure the relevant parameters in the ContextStoreManager section.

Important:

If you make any configuration changes in EDM after installation, you must disable the **EDM: Enable persistence to database** field and enable the field again after reconfiguring the EDM.

Context Store provisioning and persistence of data to EDM

While both Context Store provisioning and the persistence of data to EDM features share the same **ContextStoreManager** EDM attributes, they operate independently of one another. You can enable either Context Store provisioning or persistence of data to EDM or both on a cluster.

- Provisioning Context Store with data from the database: The Context Store space queries the database on start-up for entries in the database and writes them into its data grid with infinite leases.
- Persistence of data to an external database: The EDM Mirror Service listens to the replication channel of the Context Store data grid and adds entries to database for every operation on a flagged context.

Note:

- The EDM Mirror Service captures any context added to Context Store, including the contexts added using the provisioning feature, and persists the operation table of the EDM database.

  Note:

  If the EDM is unreachable by the EDM Mirror Service, the EDM redo logs will save approximately 30 minutes of context data from before the time that the EDM is reconnected. The configuration for the EDM Mirror Service Redo Log attribute is provided for different deployment scenarios in the *Data-grid Configuration Settings – ContextStoreManager Attributes section of the Context Store Release Notes*.

- If you have enabled both the EDM persistence and EDM provisioning features, the system writes the provisioned context data into the CS_OPERATION table each time the cluster is restarted. That means that there will be near-identical entries in the CS_OPERATION table, the only differentiation being the time-stamp of the object.

When you install ContextStoreManager, External Data Mart tries to validate the database tables *CS_OPERATION*, *CS_PROVISION* and *GENERATED_KEYS* in the external database that you have configured. If the tables are not present or if the tables do not match the required database

schema, the installation of the External Data Mart feature fails. If External Data Mart fails to install, Context Store raises an alarm to System Manager.

External Data Mart provisioning

With the EDM provisioning feature, you can replicate contexts to an external database and use the replicated contexts to redeploy a pre-populated CS data grid. To facilitate such provisioning, you must create contexts with the `"persistTo":"CS_PROVISION"` flag set.

Context Store stores the contexts that contain the provisioning flag into the provisioning table of the external data mart. When you reboot Context Store, the contexts that are stored in the CS_PROVISION table are brought back into the data grid from the external data mart.

An operation on a context in the data grid updates the provisioning table in the external data mart with the latest version of the context.

Provisioned context data

When you reboot Context Store, the data grid is empty. If the **EDM: Enable Provisioning from database** field is set to `true` in the ContextStoreManager attributes, Context Store queries the CS_PROVISION table in the EDM database for context entries. Then the system performs a pump-up of the provisioned data to populate the data grid

Context Store supports retrieving 10 contexts from the external data mart per second.

This feature is designed for automatically provisioning vital operational information into the data-grid. It is not intended as a means to pump-up all general context data from external sources.

If a configured external data mart is unavailable or the operation times out, Context Store attempts the operation for a fixed number of times. The multiple attempts are to ensure that potential networking difficulties are addressed. For more information about enabling the EDM provisioning feature in Context Store, see the *Enabling External Data Mart* topic. For more information about EDM provisioning, see *Avaya Context Store Snap-in Developer Guide.*

Database requirements and planning

You must configure the External Data Mart feature while configuring the ContextStoreManager service. Consider the following factors before you configure External Data Mart:

- Database: You must install a database server that Context Store supports.

  Note:

  The Context Store database owner requires a minimum of 100 connections to the external database.

- Network:
  - The database must be in the same LAN as the Avaya Breeze® platform host where you have installed Context Store.
- Database user: You must create a user account for Context Store to connect to the database. The user account must have permissions to read and write database entries for Context Store.

Note:

- If you are using the Microsoft SQL server: The db user configured for the EDM feature must have database ownership or the system administrator privileges for this connection to be successful. Also, from the security profile of the database user, you must set the Context Store database as the default database.

- Database space: You must plan the space requirements for your database. You cannot modify the database and External Data Mart configurations after you install the ContextStoreManager service. The average size of a context is 2 KB in raw JSON data. However, this size might differ significantly depending on your configuration.
- Create database tables: You must create the required database tables before you install External Data Mart. Ensure to create the database tables in the correct database that you intend to use with Context Store.
- Verification: After you create the database tables, perform the following tasks to verify the database and the tables:
  - Test the database connection.
  - Log in to the database and verify if you have created the database tables successfully.
  - Test if the user account that you have created for Context Store has the required permissions.

  For the specific instructions on the verification process, see the documentation of your database.

Creating database tables for External Data Mart

About this task

External Data Mart supports PostgreSQL, Oracle, and Microsoft SQL Server. To use the External Data Mart feature, you must use any of these three databases and create the required database tables. For more information about External Data Mart, see External Data Mart overview on page 23.

Note:

If you are using the Microsoft SQL server: The db user configured for the EDM feature must have database ownership or the system administrator privileges for this connection to be successful. Also, from the security profile of the database user, you must set the Context Store database as the default database.

Procedure

1. Log in to the external database that you are using for External Data Mart using the database user account you have created for Context Store.
2. Create database tables for External Data Mart.

   Note:

   The SQL scripts for database schema creation and update are also available from the DevConnect portal.

Depending on the database that you have, enter the relevant commands provided in the following table:

Database	Commands

PostgreSQL	If the tables *CS_OPERATION*, *CS_PROVISION* and *GENERATED_KEYS* exist, drop the tables:
	`DROP TABLE IF EXISTS CS_OPERATION CASCADE;`
	`DROP TABLE IF EXISTS CS_PROVISION CASCADE;`
	`DROP TABLE IF EXISTS GENERATED_KEYS CASCADE;`
	Create the tables:
	`CREATE TABLE CS_OPERATION (`
	`  PERSIST_CONTEXT_UID INT8 NOT NULL,`
	`  CONTEXT_ID VARCHAR(255) NOT NULL,`
	`  ROUTING_ID VARCHAR(255) NOT NULL,`
	`  TENANT_ID VARCHAR(255),`
	`  DATA_JSON TEXT,`
	`  IDENTIFIER VARCHAR(255),`
	`  META_JSON TEXT,`
	`  GROUP_ID VARCHAR(255),`
	`  OPERATION_TYPE VARCHAR(10),`
	`  UPDATE_DATE TIMESTAMP NOT NULL,`
	`  SCHEMA_JSON TEXT,`
	`  TOUCHPOINT VARCHAR(255),`
	`  TIMESTAMP VARCHAR(255),`
	`  PRIMARY KEY (PERSIST_CONTEXT_UID)`
	`);`
	
	`CREATE TABLE CS_PROVISION (`
	`  SPACE_ID VARCHAR(255) NOT NULL,`
	`  CONTEXT_ID VARCHAR(255) NOT NULL,`
	`  ROUTING_ID VARCHAR(255) NOT NULL,`
	`  TENANT_ID VARCHAR(255),`
	`  DATA_JSON TEXT,`
	`  IDENTIFIER VARCHAR(255),`
	`  META_JSON TEXT,`
	`  GROUP_ID VARCHAR(255),`
	`  OPERATION_TYPE VARCHAR (10),`
	`  UPDATE_DATE TIMESTAMP NOT NULL,`
	`  SCHEMA_JSON TEXT,`
	`  TOUCHPOINT VARCHAR(255),`
	`  TIMESTAMP VARCHAR(255),`
	`  PRIMARY KEY (SPACE_ID)`
	`);`
	
	`CREATE INDEX CS_OPERATION_CONTEXT_ID_IDX ON CS_OPERATION (CONTEXT_ID);`
	
	`CREATE INDEX CS_OPERATION_GROUP_ID_IDX ON CS_OPERATION (GROUP_ID);`
	
	`CREATE INDEX CS_OPERATION_ROUTING_ID_IDX ON CS_OPERATION (ROUTING_ID);`
	
	`CREATE INDEX CS_OPERATION_TOUCHPOINT_IDX ON CS_OPERATION (TOUCHPOINT);`
	
	`CREATE INDEX CS_OPERATION_TIMESTAMP_IDX ON CS_OPERATION (TIMESTAMP);`
	
	`CREATE INDEX CS_OPERATION_GRP_QRY_IDX ON CS_OPERATION (GROUP_ID, TOUCHPOINT);`
	
	`CREATE INDEX CS_PROVISION_CONTEXT_ID_IDX ON CS_PROVISION (CONTEXT_ID);`

Database	Commands
	CREATE INDEX CS_PROVISION_ROUTING_ID_IDX ON CS_PROVISION (ROUTING_ID); CREATE INDEX CS_PROVISION_TOUCHPOINT_IDX ON CS_PROVISION (TOUCHPOINT); CREATE INDEX CS_PROVISION_TIMESTAMP_IDX ON CS_PROVISION (TIMESTAMP); CREATE INDEX CS_PROVISION_GRP_QRY_IDX ON CS_PROVISION (GROUP_ID, TOUCHPOINT); CREATE TABLE GENERATED_KEYS (PK_COLUMN VARCHAR(255),VALUE_COLUMN INT4);

Database	Commands

Oracle	If the tables *CS_OPERATION*, *CS_PROVISION* and *GENERATED_KEYS* exist, drop the tables:
	`DROP TABLE CS_OPERATION CASCADE CONSTRAINTS;`
	`DROP TABLE CS_PROVISION CASCADE CONSTRAINTS;`
	`DROP TABLE GENERATED_KEYS CASCADE CONSTRAINTS;`
	Create the tables:
	`CREATE TABLE CS_OPERATION (`
	`  PERSIST_CONTEXT_UID NUMBER(19,0) NOT NULL,`
	`  CONTEXT_ID VARCHAR2(255 CHAR) NOT NULL,`
	`  ROUTING_ID VARCHAR2(255 CHAR) NOT NULL,`
	`  TENANT_ID VARCHAR2(255 CHAR),`
	`  DATA_JSON CLOB,`
	`  IDENTIFIER VARCHAR2(255),`
	`  META_JSON CLOB,`
	`  GROUP_ID VARCHAR2(255 CHAR),`
	`  OPERATION_TYPE VARCHAR2(10 CHAR),`
	`  UPDATE_DATE TIMESTAMP NOT NULL,`
	`  SCHEMA_JSON CLOB,`
	`  TOUCHPOINT VARCHAR2(255 CHAR),`
	`  TIMESTAMP VARCHAR2(255 CHAR),`
	`  PRIMARY KEY (PERSIST_CONTEXT_UID)`
	`);`
	
	`CREATE TABLE CS_PROVISION (`
	`  SPACE_ID VARCHAR2(255 CHAR) NOT NULL,`
	`  CONTEXT_ID VARCHAR2(255 CHAR) NOT NULL,`
	`  ROUTING_ID VARCHAR2(255 CHAR) NOT NULL,`
	`  TENANT_ID VARCHAR2(255 CHAR),`
	`  DATA_JSON CLOB,`
	`  IDENTIFIER VARCHAR2(255),`
	`  META_JSON CLOB,`
	`  GROUP_ID VARCHAR2(255 CHAR),`
	`  OPERATION_TYPE VARCHAR2(10 CHAR),`
	`  UPDATE_DATE TIMESTAMP NOT NULL,`
	`  SCHEMA_JSON CLOB,`
	`  TOUCHPOINT VARCHAR2(255 CHAR),`
	`  TIMESTAMP VARCHAR2(255 CHAR),`
	`  PRIMARY KEY (SPACE_ID)`
	`);`
	
	`CREATE INDEX CS_OPERATION_CONTEXT_ID_IDX ON CS_OPERATION`
	`(CONTEXT_ID);`
	`CREATE INDEX CS_OPERATION_GROUP_ID_IDX ON CS_OPERATION (GROUP_ID);`
	`CREATE INDEX CS_OPERATION_ROUTING_ID_IDX ON CS_OPERATION`
	`(ROUTING_ID);`
	`CREATE INDEX CS_OPERATION_TOUCHPOINT_IDX ON CS_OPERATION`
	`(TOUCHPOINT);`
	`CREATE INDEX CS_OPERATION_TIMESTAMP_IDX ON CS_OPERATION`
	`(TIMESTAMP);`
	`CREATE INDEX CS_OPERATION_GRP_QRY_IDX ON CS_OPERATION (GROUP_ID,`
	`TOUCHPOINT);`
	`CREATE INDEX CS_PROVISION_CONTEXT_ID_IDX ON CS_PROVISION`
	`(CONTEXT_ID);`
	`CREATE INDEX CS_PROVISION_ROUTING_ID_IDX ON CS_PROVISION`
	`(ROUTING_ID);`
	`CREATE INDEX CS_PROVISION_TOUCHPOINT_IDX ON CS_PROVISION`
	`(TOUCHPOINT);`
	`CREATE INDEX CS_PROVISION_TIMESTAMP_IDX ON CS_PROVISION`
	`(TIMESTAMP);`
	`CREATE INDEX CS_PROVISION_GRP_QRY_IDX ON CS_PROVISION (GROUP_ID,`

Database	Commands
	TOUCHPOINT); CREATE TABLE GENERATED_KEYS (PK_COLUMN VARCHAR2(255 CHAR),VALUE_COLUMN NUMBER(10,0));

Database	Commands

Microsoft SQL Server	If the tables *CS_OPERATION*, *CS_PROVISION* and *GENERATED_KEYS* exist, drop the tables:
	`DROP TABLE CS_OPERATION;`
	`DROP TABLE CS_PROVISION;`
	`DROP TABLE GENERATED_KEYS;`
	Create the tables:
	`CREATE TABLE CS_OPERATION (`
	`  PERSIST_CONTEXT_UID NUMERIC(19,0) NOT NULL,`
	`  CONTEXT_ID VARCHAR(255) NOT NULL,`
	`  ROUTING_ID VARCHAR(255) NOT NULL,`
	`  TENANT_ID VARCHAR(255),`
	`  DATA_JSON TEXT,`
	`  IDENTIFIER VARCHAR(255),`
	`  META_JSON TEXT,`
	`  GROUP_ID VARCHAR(255),`
	`  OPERATION_TYPE VARCHAR(10) NULL,`
	`  UPDATE_DATE DATETIME NOT NULL,`
	`  SCHEMA_JSON TEXT,`
	`  TOUCHPOINT VARCHAR(255),`
	`  TIMESTAMP VARCHAR(255),`
	`  PRIMARY KEY (PERSIST_CONTEXT_UID)`
	`);`
	
	`CREATE TABLE CS_PROVISION (`
	`  SPACE_ID VARCHAR(255) NOT NULL,`
	`  CONTEXT_ID VARCHAR(255) NOT NULL,`
	`  ROUTING_ID VARCHAR(255) NOT NULL,`
	`  TENANT_ID VARCHAR(255),`
	`  DATA_JSON TEXT,`
	`  IDENTIFIER VARCHAR(255),`
	`  META_JSON TEXT,`
	`  GROUP_ID VARCHAR(255),`
	`  OPERATION_TYPE VARCHAR(10) NULL,`
	`  UPDATE_DATE DATETIME NOT NULL,`
	`  SCHEMA_JSON TEXT,`
	`  TOUCHPOINT VARCHAR(255),`
	`  TIMESTAMP VARCHAR(255),`
	`  PRIMARY KEY (SPACE_ID)`
	
	`);`
	
	`CREATE INDEX CS_OPERATION_CONTEXT_ID_IDX ON CS_OPERATION (CONTEXT_ID);`
	`CREATE INDEX CS_OPERATION_GROUP_ID_IDX ON CS_OPERATION (GROUP_ID);`
	`CREATE INDEX CS_OPERATION_ROUTING_ID_IDX ON CS_OPERATION (ROUTING_ID);`
	`CREATE INDEX CS_OPERATION_TOUCHPOINT_IDX ON CS_OPERATION (TOUCHPOINT);`
	`CREATE INDEX CS_OPERATION_TIMESTAMP_IDX ON CS_OPERATION (TIMESTAMP);`
	`CREATE INDEX CS_OPERATION_GRP_QRY_IDX ON CS_OPERATION (GROUP_ID, TOUCHPOINT);`
	`CREATE INDEX CS_PROVISION_CONTEXT_ID_IDX ON CS_PROVISION (CONTEXT_ID);`
	`CREATE INDEX CS_PROVISION_ROUTING_ID_IDX ON CS_PROVISION (ROUTING_ID);`
	`CREATE INDEX CS_PROVISION_TOUCHPOINT_IDX ON CS_PROVISION (TOUCHPOINT);`
	`CREATE INDEX CS_PROVISION_TIMESTAMP_IDX ON CS_PROVISION (TIMESTAMP);`

Database	Commands
	CREATE INDEX CS_PROVISION_GRP_QRY_IDX ON CS_PROVISION (GROUP_ID, TOUCHPOINT); CREATE TABLE GENERATED_KEYS (PK_COLUMN VARCHAR(255),VALUE_COLUMN INT);

Configuring Additional Databases

Additional databases

Context Store provides only the PostgreSQL database by default. However, you can configure Context Store to write to other databases, if the database has a JDBC-compatible driver. You must load the jar file to System Manager and then configure the drivers in the **ContextStoreManager** page.

You need licence to use some JDBC drivers. You must provide a licensed driver and load it into the Context Store cluster.

For more information about configuring the drivers, see ContextStoreManager attribute descriptions on page 74. For more information about enabling External Data Mart, see Enabling External datamart in Context Store on page 66.

Loading JDBC driver to System Manager

Procedure

1. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Configuration** > **JDBC Providers**.
2. Click **New** and enter information in the required fields.
3. Click **Select the jar file** to select the JDBC jar file.

   The driver appears on the list of **Available JDBC drivers**.
4. On the System Manager web console, click **Avaya Breeze** > **Service Management** > **Services**.
5. Select the driver.
6. Click **Install** and select the Context Store cluster.
7. Click **Commit** to install the jar file to the cluster.

JDBC Providers field description

Name	Description
Name	The name of your JDBC driver.

Table continues…

Name	Description
Driver Name	The name of the JDBC driver class. • Oracle: - oracle.jdbc.driver.OracleDriver • Microsoft: - com.microsoft.sqlserver.jdbc.SQLServerDriver
Description	The description of the JDBC driver.

Customer journey visualization

Context Store's audit trail data, when stored in the External Data Mart, can be used to produce a visualization of a Customer's journey. Each journeyElement displayed in the graph represents an individual interaction with the customer. Click on any icon to view the drill-down view of an interaction.

Context Store uses the ContextStoreQuery snap-in to request for customer data stored in an external data mart (EDM). The Context Store Customer Journey application, hosted on the ContextStoreQuery snap-in, uses the ContextStoreQuery API to retrieve the data from the EDM and visualize the data by contextId or groupId.

A multi session journey is when a groupId is used to link disparate contexts into a single journey. You can navigate through a multi session journey using interaction cards displayed at the bottom of the visualization. The interaction cards indicate the start and end of an interaction and the number and type of interactions.

The standalone Context Store Customer Journey application provides the option to choose between two data sources:

- The ContextStoreQuery Snap-in: Data is retrieved from an external database.
- Audit Trail: Audit trail metadata is retrieved from CS data grid.

The ContextStoreQuery snap-in has access to data at each interaction with a touchpoint. You can click the interaction points to view the data. Audit trail does not have access to the underlying data and shows only the touchpoints and timestamps.

Storing audit trail data in Context Store

To visualize the data stored in Context Store, you must associate a touchpoint with each operation on a context object.

For example, Post: `http(s)://`*`clusterIP`*`/services/ContextStoreRest/cs/contexts/?touchpoint=web`

Each interaction has a timestamp associated with it. If you enabled the External Data Mart (EDM) feature and the persistToEDM flag is set to True for a Context Store operation, the data at the time of each update is stored in the EDM database. The ContextStoreQuery snap-in can later retrieve the data stored in this manner.

Viewing customer interactions

The Customer Journey application provides the following options to view and filter customer data:

- Use the mouse wheel to zoom in and out. Zoom is centered at the mouse point.
- Click and drag the mouse pointer towards left or right to see information on a scrolling window.
- Hover the mouse pointer over an interaction to see a tooltip about the interaction.
- Click an interaction to view data. After a data card is opened, you can also filter the data..
- Click a touchpoint label to filter all associated interactions.
- Hover the mouse pointer over a path segment to see interval and data delta, if exists..
- Search interaction data using the input field..
- Timeline navigation cards are displayed below the timeline to aid navigation of interactions. You can:
  - Click these cards to bring the interactions for this session into view.
  - Click a selected card to deselect it and return to the original timeline view.

Note:

- Zooming and panning are not enabled in the drilled-in view.
- The Customer Journey application cannot predict the distribution of interactions. Therefore, some interactions might overlap. The Customer Journey application provides timeline navigation cards and the zoom functionality to address this issue. The application retrieves data as stored in the database; users should use accordingly.

You can select the available date range to view the customer journey. The interactions from the previous 1 to 60 days can be viewed.

Each interaction point in the journey is indicated with a touchpoint icon. You can click a particular icon to view the details of the interaction.

Note:

If the touchpoint is undefined for a specific Context Store operation, you cannot view the interaction details.

The visualization displays icons for the following touchpoints:

- Web
- Email
- Webvoice
- Voice
- Chat
- Social
- Survey
- Chatbot

- CRM
- SMS
- APP

When you use other touchpoints than those listed here, the Context Store Customer Journey application displays the first two letters of the touchpoint string instead of the icons.

Viewing customer journey on a standalone Customer Journey application

About this task

In this release, Google Chrome is the only supported browser for viewing customer journey on the standalone Context Store Customer Journey application.

Procedure

1. Go to `http(S)://clusterIP/services/ContextStoreQuery/`
2. On the top right of the Context Store UI, click the **Configuration** icon.

   The Context Store Customer Journey application displays the Cluster Configuration window.
3. In the **Cluster IP** field, enter the IP address of your Context Store cluster.
4. Select **context Id** or **group Id**.
5. In the **Id** field, enter the appropriate Id for the data you want to view customer journey.
6. In the **Routing Id** field, enter the routingId of the context entry for which you want to view customer journey.
7. In the **Select Data Source** field, select **Audit Trail** or **ContextStoreQuery**.

   From ContextStoreQuery, you can retrieve context data from each interaction point. Audit trail does not have access to the underlying data and shows only the touchpoints and timestamps.

   For details on the usage of the Customer Journey application, see the “Viewing customer interactions” section.
8. Click **Save**.

Context aliasId for additional indexing

You can use the Context alias feature to retrieve the same context object using alternative identifiers. Context aliasIds provide more flexibility in retrieving and updating context objects.

A context object can be indexed using the usual contextId and groupId. The object can also be indexed with context aliasIds such as a customer account number, a billing authorization number, and a mobile phone number. A customer object can be retrieved using any of these aliasIds to retrieve the context object.

Context aliasIds are subject to the same restrictions as all other context identifiers such as permissible characters, length, and must be unique in the data grid.

You can add up to three aliasIds for any one context object. In addition to defining aliasIds when a context object is first created, you can add and delete aliasIds post creation. For more information about adding, updating, or deleting an aliasId, see *Avaya Context Store Snap-in Developer Guide*.

Note:

If you add three aliasIds for a context, you must reduce your context data size to 1.5 KB to achieve the same capacity as that certified through performance tests. The performance tests test with 2KB context objects.

Each aliasId for a context must be unique within the context object, and the Context Store data grid. The same aliasId can exist in each cluster in a Geo solution, but the routingId distinguishes them from one another. Any attempt to duplicate an existing aliasId or retrieve a context using an unknown aliasId results in error messages.

The aliasing capability impacts the performance of Context Store, in particular latency, due to the increased number of lookups and data comparison required to find the correct object in the data grid. For more information, see Capacity and scalability specification on page 95.

Using aliasId as a request parameter

When creating a context, you can specify up to three aliasIds as parameters in the requests. For all other “by aliasId” operations, provide only the aliasId which identifies to the context on which an operation is to be executed.

For more information about the usage of the aliasId feature, see *Avaya Context Store Snap-in Developer Guide*.

Supported databases

Context Store supports the following three databases for External Data Mart:

- PostgreSQL 9.1 and later
- Oracle 11g and later.
- Microsoft SQL Server 2008 and later

Note:

Oracle RAC and Oracle Data Guard are not supported for Context Store EDM deployment.

Audit trail

With the Audit trail feature, you can find out a certain configured number of Context Store operations performed on a context during the lifecycle of the context. If you opt for the ContextStoreQuery snap-in, you can collect all associated context data from an external data mart (EDM) through ContextStoreRest interface. Using this interface, you can generate audit trails or retrieve instances of context data from the historical context data stored in the associated EDM.

Audit trail records all successful interactions with a context and stores the information inside the context object as an extra field. If you enable the Audit trail feature, you can find out which application created or updated the context. You can also track the operation types, such as Create, Read, Update, Delete, and Upsert, that were performed on the context. The audit entry of

a context also provides information such as the time at which the operations were performed and the version of the context.

After you enable the Audit trail feature, the ContextStoreRest API accepts touchpoint, which is any application that can interact with ContextStoreRest APIs, as a parameter for each interaction. The touchpoint parameter is an alphanumeric ID.

If you enabled the Audit trail feature, but did not provide the touchpoint parameter as part of the Rest URL, then the system still records the audit entry with the value `undefined`.

The versionId of a context increases with each interaction, such as Update, Get, Put, and Delete, with a context.

For more information about the touchpoint parameter, see *Avaya Context Store Snap-in Developer Guide*.

If you want to retrieve audit trail data from an EDM, you must configure the EDM database username and EDM database password in the system.

ReST URL paths

You can retrieve the audit entries of a context using the contextId or aliasId of the context. When you provide the correct parameters, the system displays the audit data. For example, the URL to retrieve audit data using contextId is `https://`*`clusterIP`*`/services/ContextStoreRest/cs/contexts/audit/{contextId}/?rid={routingId}`. *Avaya Context Store Snap-in Developer Guide* has more detailed usage examples.

Setting a limit on audit entries

The number of audit entries for the context objects can reduce the number of contexts that you can store in the Context Store data grid. Therefore, you must set a limit on the number of audit entries that can exist for a context.

Setting the audit entry limit to 0 means that the audit feature is disabled. To enable the feature, set the number of audit entries for a context by selecting a value ranging between 1 and 50. If you set the limit to 10, then Context Store records the 10 most recent interactions as entries for the context. When the number of audit entries reaches the maximum limit, the system removes the oldest audit entry each time a new entry is added.

Note:

If you enable the Audit trail feature in a geo-redundant deployment, the CS Audit: Event limit attribute must be set identically in both clusters.

Audit trail and capacity planning

The number of audit entries configured for a context affects the size of the context object and the number of contexts in the data grid. Therefore, you must consider the size of the audit data trail while planning the Context Store capacity.

For more information about Audit trail and capacity planning, see *Avaya Context Store Snap-in Developer Guide*.

Upsert method

With the Upsert method, Context Store either updates an existing context with new data or creates a new context if it does not exist in the data grid. Combining the two operations into a single request reduces the number of API calls.

However, due to the nature of Upsert operations, it is computationally more expensive to complete an Upsert request than to do a single create or update request.

You can perform the Upsert operations using aliasIds. You can also set the lease time of a context with the Upsert method. Context Store applies the lease time that you provide to the context in both Create and Update operations.

Certain fields of the context metadata are immutable by design. You cannot modify the immutable fields of an existing context using the Upsert method. However, if you create a new context with the Upsert method, you can define the properties for the new context .

Note:

There is a performance consideration for Upsert that should be taken into account. A single Upsert operation is more computationally expensive than its corresponding POST or PUT request and can take up to three times longer to complete. Hence, if you are using the Upsert method, the total number of requests per second supported will be reduced as per the number of the Upsert request used per second.

For detailed usage information of Upsert operation, see the *Avaya Context Store Snap-in Developer Guide*.

Pluggable Data Connector

Context Store provides a Pluggable Data Connector (PDC) to integrate Avaya Aura® Experience Portal with the ContextStoreRest service. Experience Portal uses call flows created in Avaya Aura® Orchestration Designer. When you install the Context Store PDC in Orchestration Designer, a Context Store Connector node is available in Orchestration Designer. You can drag the Context Store Connector node into call flows to integrate Context Store into the flow.

You can also configure the Context Store Connector node to perform actions such as creating, getting, updating, or deleting context information using either contextId or aliasId. For more information on using the pluggable data connector, see *Avaya Context Store Snap-in Developer Guide.*

ContextStoreTasks Type for Engagement Designer

ContextStoreTasks Type is the service in Engagement Designer (ED) that interfaces with Context Store. Engagement Designer is an Avaya Breeze® platform snap-in that business analysts and other non-developers can use to create workflow definitions that describe and execute business processes.

The ContextStoreTasks Type enables all the Context Store operations to be run from within a workflow in ED. You can perform Add, Update, Retrieve, and Delete operations for both contexts and values using ContextStoreTasks Type.

Note:

The ContextStoreTasks Type SVAR is compatible only with the same version Context Store and Engagement Designer.

For more information about installing ContextStoreTasks Type and performing CS operations using ContextStoreTasks Type, see *Avaya Context Store Snap-in Developer Guide*.

Authorization

Context Store provides authorized access to context data using the Avaya Breeze® platform Authorization Service (AS) snap-in.

An administrator authorizes different user groups and applications with specific access levels. This user-privilege mapping is stored in the AS snap-in and a bearer token is generated for the user or application.

When the user or application requires access to Context Store, they must supply the authorization token with the Context Store request. If the user or application is accessing Context Store for the first time, the authorization token must be requested from the AS snap-in. When the Web Filter / Token Validator component of Context Store receives a request, it verifies the existence and validity of the authorization token. If the token exists in the ContextStore data grid, Context Store returns the data requested according to the access level that the user or application is granted

Privilege levels

Context Store supports two features or access levels: Privileged and Standard. For each feature, you can have four values:

Value	Definition
Create	Applies to all ContextStoreRest Post requests.
Delete	Applies to all ContextStoreRest Delete requests
Read	Applies to all ContextStoreRest Get requests
Update	Applies to all ContextStoreRest Put requests

Generating bearer tokens

Four Rest methods are available for generating bearer tokens.

Name	Rest method	URL	Headers
Get token	GET	`https://clusterIP/services/ContextStoreRest/cs/contexts/token/`	

Table continues…

Name	Rest method	URL	Headers
Get token by scope	GET	`https://clusterIP/services/ContextStoreRest/cs/contexts/token/scope/`	scope
Get token by user	GET	`https://clusterIP/services/ContextStoreRest/cs/contexts/token/username/`	• user name • password
Get token for user by scope	GET	`https://clusterIP/services/ContextStoreRest/cs/contexts/token/username/scope/`	• scope • user name • password

Scalability overview

Context Store provides scalability by supporting varied deployment types to suit all purposes.

The scalability feature facilitates the deployment of Context Store on Avaya Breeze® platform nodes of varying sizes. You can deploy Context Store on a single node or on a cluster of up to five nodes. Deployments with single node or low resources are for non-mission-critical environments, such as customer trials and lab deployments. The scalability options are as follows:

- Scale Out feature: Provides customers the option to deploy Context Store on a single-node cluster or on a cluster containing from two nodes up to a maximum of five nodes.
- Scale Up feature: Supports incremental memory allocations for Avaya Breeze® platform nodes and provides the option to store data in the grid for longer lease duration.

Addition or removal of nodes overview

Context Store provides the option to add or remove Avaya Breeze® platform nodes in the deployed Context Store setup. This feature is only supported in a multi-node cluster. You can add only one node at a time. When you add or remove nodes, ensure that:

- No traffic runs through the system
- No Geo replication is in operation

Note:

Context Store does not support scaling out dynamically. After adding or removing a node to the cluster, you must shut down all the nodes and start the nodes simultaneously.

The resources of a node must be identical to the other nodes in the cluster. After adding a node and allocating resources to the node, you must manually update the cluster configuration in System Manager before shutting down the nodes. Updating the configuration ensures that the cluster utilizes the new resources.

Note:

When adding or removing nodes, ensure that all external clients that you create or manage are able to handle the changes to capacity or throughput. The maximum requirements for the external clients and connections do not exceed the requirements in the previous Context Store releases. You must provide adequate bandwidth and performance for the external clients.

Scale out

The Context Store Scale out feature allows you to have a single-node deployment or add additional nodes to an existing multi-node deployment. With an increase in the number of nodes and resources associated with the nodes, you can maintain contexts for longer lease duration or use nodes with smaller footprint to use the capacity.

Note:

Context Store does not support scaling out dynamically. After adding a node to the cluster, you must shut down all the nodes and restart the nodes simultaneously.

By using the Scale out feature, you can:

- Deploy Context Store on one node only. In a single node deployment, load balancing is not enabled and therefore a cluster IP address is not required. Context Store uses the security module IP address of the node for traffic.
- Deploy Context Store on a cluster of two to five nodes. Context Store supports high availability in this configuration.
- Scale the clusters in Geo redundant deployments. Context Store clusters that are connected as part of a Geo deployment must contain the same number of nodes. All the nodes in both the clusters must have the same amount of memory. If a node is added to one cluster, a replica node must be added to the second cluster.

For high availability, Context Store supports a maximum of one failed node regardless of how many nodes are assigned to the cluster. To avoid service interruption, the remaining nodes must be able to support the throughput and capacity of the contribution of the failed node.

Scaling out Avaya Breeze® platform cluster

Before you begin

Identify the cluster configuration that you want to achieve. For example, if your current cluster has three nodes of 64 GB each and, you wish to scale out to five nodes of 64 GB each, configure the following fields as per the requirements of a five-node cluster:

- ContextStore ManagerSpace DataGrid Settings
- ContextStoreSpace DataGrid Settings
- Context Store DataGrid type
- EDM: Mirror Service container size
- GEO: Gateway Service container size

- EDM: Mirror Service redo log size
- CS Threshold attributes

Ensure that all your nodes have identical resources, such as CPU, memory, and hard disk. For more information, see Context Store deployment checklist on page 51.

Procedure

1. Deploy a new Avaya Breeze® platform node with the required CPU and memory configuration.
2. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Cluster Administration**.
3. Select the cluster that you want to scale out and select the **Deny New Service** state in the **Cluster State** list.
4. Select the cluster again and click **Edit**.
5. On the Cluster Editor window, go to the **Servers** tab.
6. Add the Avaya Breeze® platform node from the **Unassigned Servers** list.
7. Click **Commit**.

   The system prompts you to ensure that all Avaya Breeze® platform server restarts are complete before placing the cluster into the **Accept New Service** state.
8. Click **OK**.

   The system starts installing the assigned services to the newly added server.
9. Repeat this procedure for all the nodes.
10. Shut down all the nodes.
11. Power on all the nodes simultaneously.
12. On the **Cluster Administration** page, verify that the services are installed for the cluster.
13. Click **Show** on the new cluster to verify if the system has added the servers to the cluster.

    The system displays the Avaya Breeze® platform servers as part of the Context Store cluster.
14. Select the check box of the cluster.
15. From the **Cluster State** drop-down menu, select **Accept New Service**.
16. Click **Continue** in the **Accept New Service** dialog box.

    The system displays the **Accepting** state in the **Servers State** column.

Scale up

The Context Store Scale up feature provides the functionality to increase the memory allocations from 8 GB to 128 GB so that contexts can be stored in the data grid for longer lease durations. Ensure that all nodes in your cluster have identical resources, such as memory, CPU, and hard disks.

By using the Scale up feature, you can:

- Deploy Context Store on Avaya Breeze® platform nodes that have memory ranging from 8 GB to 128 GB.
- Support production environments deployed on a cluster of Avaya Breeze® platform nodes that have memory ranging from 16 GB to 128 GB.

  Note:

  Context Store does not support single-node deployments for production environments as Context Store does not support high availability or Geo redundancy in single-node deployments.
- Support deployments with smaller footprints. You can deploy Context Store on Avaya Breeze® platform nodes that have smaller CPU core allocations for non-mission critical environments.
- Support multiple options for hard disk allocations for the Avaya Breeze® platform nodes in Context Store to facilitate deployments with reduced footprints and requirements. Large hard disks are not required for non-mission-critical environments as maintaining logs for long periods is not required. In addition, the quantity of logs is reduced as the supported throughput is lowered in such a deployment.

For more information about CPU, hard disk and memory allocations see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.

Scaling up Avaya Breeze® platform cluster

Procedure

1. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Cluster Administration**.
2. Select the cluster that you want to scale up and click **Deny New Service** in the **Cluster State** list.
3. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Configuration** > **Attributes** > **Service Clusters** > **ContextStoreManager**.
4. Change the values in the following fields according to the cluster set up that you want to scale up to:
   a. Change the values in the **ContextStore ManagerSpace DataGrid Settings** field.
   b. Change the values in the **ContextStoreSpace DataGrid Settings** field.
   c. Change the values in the **Context Store DataGrid type** field
   d. Change the values in the **EDM: Mirror Service container size** field.
   e. Change the values in the **GEO: Gateway Service container size** field.
   f. Change the values in the **EDM: Mirror Service redo log size** field.
   g. Change the values for the CS Threshold attributes.
5. Shut down all the Avaya Breeze® platform nodes.

6. Using VSphere Client, increase the memory, hard disk and CPU allocations according the deployment that you want to achieve .

   Note:

   The CPU, hard disk and memory settings must be the same for all the nodes in the cluster. In a Geo redundant set up, both the clusters must be identical.

7. Power on all the nodes simultaneously.
8. Select the check box of the cluster.
9. From the **Cluster State** drop-down menu, select **Accept New Service**.
10. Click **Continue** in the **Accept New Service** dialog box.

    The system displays the **Accepting** state in the **Servers State** column.

Chapter 3: Interoperability

Avaya product compatibility

The Context Store snap-in is compatible with the following Avaya products:

Avaya product	Version
Avaya Aura® System Manager	8.0 and 8.0.1 (FP)
Avaya Breeze® platform	3.6.0.1
Avaya Aura® Experience Portal	7.2, 7.2.1 (FP), and 7.2.2 (FP)
Avaya Aura® Orchestration Designer	7.2, 7.2.1 (FP), and 7.2.2 (FP)
Avaya one-X® Agent	2.5, 2.5.2, 2.5.4, and 2.5.5
Intelligent Customer Routing	7.0.1
Avaya Engagement Designer	3.6
Avaya Oceana® Solution	3.6
Avaya Workspaces	3.6

Hardware requirements

This topic provides information about the Context Store hardware requirements. For information about the Avaya Breeze® platform requirements, see the *Interoperability chapter in Avaya Breeze® platform Overview and Specification*.

The requirements specified here are not applicable to all deployments options. For more information about the hardware requirements of the certified deployment scenarios, see *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.

ESXi host server

Context Store supports a range of deployment options from a single node cluster to an Avaya Breeze® platform cluster with a maximum of five nodes. As a failover strategy to ensure maximum availability of the solution, Avaya recommends that at least two Avaya Breeze® platform servers be deployed. The servers must be on different VMware ESXi hosts. To guarantee service availability and to ensure high availability of the solution, it is recommended that three servers be used. If you install any or all three Avaya Breeze® platform servers on the same host, then the failure of the host impacts multiple Avaya Breeze® platform servers. The failure of multiple servers

prevents Context Store from using a backup server during failover and hence impacts the overall availability of the solution.

Note:

The specifications provided here are for a reference implementation. This is the implementation on which Context Store's capacity and performance figures have been certified. Equivalent performance cannot be guaranteed in environments which do not meet the hardware and network requirements stated here.

- Processor: For the specified best performance, the processor should have at least 8 dedicated, non-hyper-threaded cores, equivalent to a 2.9 GHz Xeon processor.

  To ensure that the Context Store solution can support published capacity figures and availability, Avaya recommends that you reserve the processor to achieve maximum traffic rate with low latencies, especially when Context Store is recovering from a failure. Without dedicated cores, Context Store competes with other Virtual Machines on the same VMWare ESXi host for crucial resources at times of maximum throughput or recovery, resulting in poor performance or loss of data.
- Hyper-Threading must not be enabled. Context Store does not support VM features that sub divide the processing power of the core, because it does not expect to have to compete with external processes during max capacity or failover where Context Store requires additional processing overhead to ensure no service interruption.
- vMotion must not be enabled: Context Store has not certified this feature, and hence it is recommended that this feature not be used during the running of Context Store.
- Storage: Must at least be 15000 RPM SATA hard disks.
- For best performance, network must:
  - Support at least Gigabit Ethernet
  - Have a response time of less than 250 milliseconds between hosts.
  - Be able to handle a transfer rate of 48 mb/sec
  - Have all hosts on the same Data Center, on the same subnet and on the same high quality LAN, so no latencies are incurred in the solution. Note that the use of VLAN is not recommended, because capacity testing executed on a VLAN environment resulted in poor performance. Frequent connection issues were also seen within the cluster, between geo-redundant clusters, and to an External Data Mart.
  - Have a dedicated 1 GB channel with a minimum of 300 MB bandwidth being available for Session Replication between the Context Store clusters, if Context Store's Geo Redundancy feature is used.

Guest virtual machines

Note:

The specifications provided here change according to the deployment. For the details about certified deployment scenarios, see *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.

Each guest virtual machine for Context Store must meet the following criteria, which is dependent on the deployment scenario. For details about the Avaya tested hardware requirements based on

the deployment scenarios, see *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.

- Processor: 4 to 8 dedicated cores
  - All Context Store nodes in production environment require 8 dedicated, non-hyper-threaded cores. The CPU resource reservation must be at least 18960 MHz for each node. If Profile 1, 2, or 3 is selected when deploying the Avaya Breeze® platform OVA, the CPU reservation must be increased manually by editing the virtual machine settings after deployment.
- RAM: 8 to 128 GB RAM
- Hard disk: 50 GB to 300 GB

Important:

If you use a SAN, the performance of the SAN must meet the above specifications.

Each guest virtual machine must also be thick provisioned and be on the same subnet.

Software requirements

The Context Store software requirements are based on the Avaya Breeze® platform and System Manager requirements. For information about Avaya Breeze® platformrequirements, see the *Interoperability chapter in Avaya Breeze® platform Overview and Specification.* For information about Avaya Aura® System Manager requirements, see *Deploying Avaya Aura® System Manager in Virtualized Environment*.

Chapter 4: Licensing

License requirements

Use of the Context Store software requires a valid Context Store license file and Avaya Breeze® platform license file.

Context Store uses the snap-in service licensing feature provided by Avaya Breeze® platform. All Context Store SVAR files contain a digital signature which is verified by the Avaya Breeze™ Element Manager.

Platform and snap-in licenses must be installed on the WebLM server of System Manager, which manages the Platform and snap-in licenses.

A single license, containing information for each licensed feature, applies to all Context Store snap-in services.

Note that the following Context Store features have additional associated license costs:

- Context Store GEO Redundancy
- Context Store Java SDK
- ContextStoreScreenPop

Configuring Context Store licenses

Before you begin

- Ensure that you have obtained the Context Store license from Avaya PLDS.
- Ensure that the Avaya Breeze® platform license is installed on System Manager.

  In System Manager, click **Elements** > **Avaya Breeze** > **Server Administration** to see the current status of each Avaya Breeze® platform server platform license.

About this task

This task provides information about configuring Context Store license in System Manager.

Procedure

1. On the System Manager Home page, select **Services** > **Licenses**.
2. Select **Install License**.
3. Browse to the location of the Context Store license.

4. Select the license file and click **Install**.

   The system installs the license file.

   In the left navigation pane, the system displays CONTEXT_STORE under **Licensed Products**.

5. To verify if the license file is installed successfully:

   a. Click **Elements** > **Avaya Breeze** > **Service Management** > **Services**.

   b. In the **License mode** column, verify that the column displays a check mark for the Context Store node.

      The following licensing modes apply to all Avaya Breeze® platform and Context Store licenses

      - Normal: Context Store has a valid license file for normal operation of Context Store.
      - Error: Context Store is operating in 30 day grace period. All the functionalities of Context Store are still available. However, to get Context Store back to the normal mode, you must install a valid license file before the grace period expires.
      - Restricted: Context Store has exceeded its 30 day grace license period and has no access to Avaya Breeze® platform.

      For more information on licensing modes and licensing for Avaya Breeze® platform, see the Avaya Breeze® platform documentation.

      Avaya Breeze® platform licensing audit runs every 9 minutes. Any license changes including install or uninstall actions on the WebLM server takes time to reflect on the user interface. The latest license information thus takes a maximum of 9 minutes to reflect in the Avaya Breeze® platform Element Manager.

Chapter 5: Context Store Deployment

Certified deployment scenarios

Avaya provides 13 tested/certified deployment scenarios for Context Store, in addition to sizings certified for the Avaya Oceana® Solution. The hardware requirements, number of nodes, supported features, settings, and capacity specifications differ as per the deployment scenarios.

The support for additional features, such as, AliasIds, ContextStoreNotify, Audit trail, Geo redundancy, External Data Mart, and Event streams, is dependent on the hardware resources allocated to the cluster.

Note:

The additional memory resources required for the Event Streams feature are not included in these figures. If this optional feature is deployed, the ContextStoreSpace DataGrid size must be reduced by 6GB.

This document provides the minimum hardware requirements required for the External Data Mart, Geo Redundancy, and ContextStoreNotify features.

Key customer configuration information

This topic lists the information that you must have before you install and configure the Context Store snap-in services.

You need the following information to install and configure the Context Store snap-in services. Record the information in this worksheet before beginning the installation.

Requirement	Notes	Your value
The name of the Context Store SVAR files that are available on PLDS.		
The location of the Context Store SVAR files that you have downloaded from PLDS.		

Table continues…

Requirement	Notes	Your value
The instances of Avaya Breeze® platform in System Manager, on which you plan to install Context Store. These Avaya Breeze® platform servers must be dedicated for Context Store.		
The IP address of the cluster	The Cluster IP must be on the same subnet as the Security Module IP of the Avaya Breeze® platform instances. Do not specify the IP address of any of the Avaya Breeze® platform servers that you plan to add to the cluster. **Note:** For single node deployments, you do not require the IP address of the cluster.	
Digital certificates for authentication using mutual TLS	For more information about certificates and authentication, see the *Security* chapter in this document.	
Identify the configuration attributes for the Context Store services	For more information about configuring attributes, see the chapter *Administering Context Store*.	

Context Store deployment checklist

Note:

ContextStore space fails to deploy if you try to contact an EDM with incorrect login details or there are connection issues. If this happens, you must disable the **EDM: Enable provisioning from database** field and enable the field again after providing correct login details.

Task	Notes	✔
• Identify the Avaya Breeze® platform servers to use in the Context Store cluster. • Ensure that the Avaya Breeze® platform servers are synchronized • Ensure that the Avaya Breeze® platform servers have passed the Avaya Breeze® platform tests. • Ensure that the Avaya Breeze® platform license is installed on System Manager. • Ensure that the NMS server is configured with System Manager as the target SNMP Profile.	Verifying the status of Avaya Breeze platform servers on page 55 For more information about creating and managing SNMP target profiles, see *Administering Avaya Aura® System Manager* available at http://support.avaya.com.	
• Register the fully qualified domain names (FQDNs) of System Manager, Avaya Breeze® platform host names, and security IP address with the domain name system (DNS) server. • Ensure that System Manager can resolve the host name of the Avaya Breeze® platform servers.		
Download the Context Store snap-in services.	For more information, see *Avaya Context Store Snap-in Release Notes*.	
Download the Context Store license.	For more information, see *Avaya Context Store Snap-in Release Notes*.	
Load the required SVAR files in System Manager:	For more information, see Loading a snap-in service on page 56.	
If you plan to use an External Data Mart: • Set up an external database on a separate server. The external database must meet the Context Store requirements. • Create the database tables for the External Data Mart feature.	Database requirements and planning on page 24 Creating database tables for External Data Mart on page 25	

Table continues…

Task	Notes	✔
Define a cluster from the Avaya Breeze® platform > **Cluster Administration** page in System Manager, and assign the instances of Avaya Breeze® platform to the cluster.	The system installs the ContextStoreManager service when you create a cluster. The system also installs the selected optional services, which you add to the cluster deployment. For more information, see Setting up a cluster on page 56.	
Configure the **ContextStore ManagerSpace DataGrid Settings**, **ContextStoreSpace DataGrid Settings** and other ContextStoreManager and ContextStoreRest attributes of the services in the System Manager **Service Clusters** tab.	**Important:** If you plan to use External Data Mart or GEO redundancy features, to avoid the need to restart the cluster, configure the applicable data grid type before adding servers to a new cluster as this cannot be changed dynamically once the data grid has been deployed on the servers. **Important:** If you plan to use the external data mart feature, configure If you plan to enable the Geo redundancy feature, see Enabling geo redundancy on page 65. For more information, see ContextStoreManager attribute descriptions on page 74.	
Load the Context Store license in System Manager.	Configuring Context Store licenses on page 48	
Optional: Manually install the ContextStoreScreenPop services.	ContextStoreScreenPop is an optional service. You can manually deploy this service to the cluster after the initial installation of mandatory services. Installing a Context Store service on page 62	
Optional: Configure the ContextStoreScreenPop attributes in System Manager.		

Table continues…

Task	Notes	✔
Optional: Manually install the ContextStoreNotify services.	ContextStoreNotify is an optional service. You can manually deploy this service to the cluster after initial installation of mandatory services. Installing a Context Store service on page 62	
Optional: Configure the ContextStoreNotify attributes in System Manager.		
Optional: Manually install the Streams services.	Event streams is an optional service. You can manually deploy this service to the cluster after the initial installation of mandatory services. Installing a Context Store service on page 62	
Optional: Configure the Streams attributes in System Manager.	ContextStoreManager attribute descriptions on page 74	
Optional: Manually install the ContextStoreRules services.	ContextStoreRules is an optional service. You can manually deploy this service to the cluster after the initial installation of mandatory services. Installing a Context Store service on page 62	
Optional: Configure the ContextStoreRules attributes in System Manager.	ContextStoreRules page field descriptions on page 85	
Optional: Deploy PDC on Orchestration Designer.	PDC Plug-in deployment overview on page 68	
Optional: Manually install the ContextStoreSoap snap-in.	ContextStoreSoap is an optional service. You can manually deploy this service to the cluster after the initial installation of mandatory services. Installing a Context Store service on page 62	
Optional: Configure the ContextStoreSoap attributes in System Manager.		

Table continues…

Task	Notes	✔
Context Store Standalone - Optional: Oceana - Mandatory: Manually install the ContextStoreQuery snap-in.	ContextStoreQuery is an optional service for Context Store standalone, it is a mandatory service for Oceana. You can manually deploy this service to the cluster after the initial installation of mandatory services. Installing a Context Store service on page 62	
On installation of ContextStoreQuery - mandatory: Configure the ContextStoreQuery attributes inSystem Manager.	The correct configuration must be configured for ContextStoreQuery (e.g. correct database username and password). Failure to do so will result in errors in the system.	
Verify the installation.	Verifying a successful deployment on page 63.	
Optional: Verify the installation of optional services.	Verifying a successful deployment on page 63.	

Verifying the status of Avaya Breeze® platform servers

Before you begin

Identify the Avaya Breeze® platform servers on which you plan to install the snap-in services.

About this task

This topic provides the basic procedures for verifying the status of the Avaya Breeze® platform servers. For detailed procedures, see *Deploying Avaya Breeze® platform*.

Procedure

1. Ensure that the Avaya Breeze® platform servers are in the synchronized state:
   a. On the System Manager web console, navigate to **Home** > **Services** > **Replication**.
   b. Locate the Avaya Breeze® platform node in the **Replica Group** list.
   c. In the **Synchronization Status** column, verify that the Avaya Breeze® platform status is **Synchronized**.

   If the status is not **Synchronized**, for more information, see *Maintaining and Troubleshooting Avaya Breeze*.
2. Ensure that the Avaya Breeze® platform servers are passing the tests:
   a. On the System Manager web console, click **Elements** > **Avaya Breeze** > **System Tools** > **Maintenance Tests**.
   b. Select the Avaya Breeze® platform servers and perform all tests.

c. Ensure that all tests are successful.

3. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Server Administration**.

   Ensure that:

   - For the Avaya Breeze® platform servers the **System State** column displays the **Denying** state.
   - The **License Mode** column displays a green check mark.

Loading a snap-in service

Procedure

1. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Service Management** > **Services**.
2. Click **Load**.
3. On the Load Service window, click **Choose File**.
4. Select the snap-in service svar file that you want to load.
5. Click **Load**.

   The system displays the Accept End User License Agreement window.
6. Click **Accept**.

Configuring a cluster and installing mandatory services

Before you begin

- Identify the Avaya Breeze® platform servers on which you plan to install Context Store. These servers must be dedicated to Context Store only.
- Add the Avaya Breeze® platform servers to System Manager. For more information, see *Deploying Avaya Breeze® platform*.
- Verify the status of the Avaya Breeze® platform servers.
- Ensure that System Manager can resolve the host name of the Avaya Breeze® platform servers. Register the fully qualified domain names (FQDNs) of System Manager, Avaya Breeze® platform host names, and security IP address with the domain name system (DNS) server.
- Download the following Context Store SVAR files from PLDS:
  - ContextStoreManager
  - ContextStoreRest

Note:

For more information about downloading the software from PLDS, see *Deploying Avaya Breeze® platform*.

About this task

This topic provides information about setting up an Avaya Breeze® platform cluster for Context Store and installing the ContextStoreManager and ContextStoreRest services. ContextStoreRest is not a mandatory service, but is required if you need to interact with the data grid that ContextStoreManager deploys.

The cluster provides high availability and scaling by distributing the services across multiple Avaya Breeze® platform servers. With this distribution of services, the system achieves throughput and avoids interruption if a failure occurs. The clients access the services through a cluster IP address that supports high availability. For more information about clustering, see *Deploying Avaya Breeze® platform*.

Note:

You can enable load balancer only after adding nodes to your Context Store cluster.

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Service Management** > **Services**.
2. On the Services page, load the mandatory service ContextStoreManager. For more information about loading a service, see *Administering Avaya Breeze® platform*.
3. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Cluster Administration**.
4. On the **Cluster Administration** page, click **New**.
5. Enter the following details for the cluster in the **General** tab of the **Cluster Editor** page:
   - **Cluster Profile**: Select **Context Store** from the drop-down menu.
   - **Cluster Name**: Enter a unique cluster name. The name can be any string such as ContextStore.

     Important:

     Ensure that no spaces are included in string.
   - **Cluster IPv4**: The Cluster IP must be on the same subnet as the Security Module IP of the Avaya Breeze® platform servers. Ensure that you do not specify the IP address of any of the Avaya Breeze® platform servers that you plan to add to the cluster.

     Note:

     For single node deployments, do not enter the IP address of the cluster. Requests must instead be submitted directly to the Security Module IP address of the node.
   - **Description**: Enter a description for the cluster.
6. In the **Cluster Attributes** section, specify the attributes for the cluster that you are creating.

For more information about the cluster attributes, see the topic *Cluster attributes field descriptions.*

7. On the **Cluster Editor** page, select the **Services** tab.

   The system displays the Context Store services that you have loaded and configured through the Services page.

   By default, the system automatically adds the mandatory service, ContextStoreManager, to the **Assigned Services** list. The **Available Services** list displays the optional services that are available for you to add to the Context Store cluster. Ensure that you configure the optional services and then attempt to install the optional services.

8. Click **the plus sign (+)** on any service in the **Available Services** list to add the service to the cluster.
9. Click **Commit**.

   The system prompts you to ensure that all Avaya Breeze® platform server restarts are complete before placing the cluster into the **Accept New Service** state.

10. Configure the attributes of the ContextStoreManager service.

    For more information about configuring attributes, see the chapter *Administering Context Store*.

11. Configure the required and applicable attributes of the Context Store services.
12. On the **Cluster Editor** page, select the **Servers** tab.

    The system displays all Avaya Breeze® platform servers in the **Unassigned Servers** section.

13. Add the three identified Context Store nodes to the Context Store cluster.

    Click the plus sign **(+)** on the node to add the node to the cluster.

    The system adds the Avaya Breeze® platform servers to the **Assigned Servers** section.

14. Click **Commit**.
15. Click **OK**.
16. On the **Cluster Administration** page, verify that the services are installed for the cluster.
17. Click **Show** on the new cluster to verify if the system has added the servers to the cluster.
18. Select the check box of the new cluster.
19. From the **Cluster State** drop-down menu, select **Accept New Service**.
20. Click **Continue** in the **Accept New Service** dialog box.

    The system displays the **Accepting** state in the **Servers State** column.

Next steps

Install optional services.

Enable the installed optional services.

Cluster attributes field descriptions

For more information about setting cluster attributes, see the *Administering Avaya Breeze® platform*.

Basic Attributes

Name	Description	Default value	Change to
Cluster Profile	Type of profile for the cluster.	Not selected	Context Store **Important:** Ensure that you set this value to Context Store.
Cluster Name	Name of the cluster	None	Any name describing the cluster. **Important:** Ensure that no spaces are included in string. This field is mandatory.
Cluster Group	Select the cluster group from the drop-down list.		
Cluster IPv4	IP address for the cluster	None	The designated cluster IP for this Context Store cluster. This field is mandatory for the Load Balancing feature. **Note:** This field is not applicable for a single-node deployment.
Cluster Fully Qualified Domain Name			
Enable Cluster Database	This check box is disabled by default. Not applicable to Context Store.	Not set	You must not select this check box.

Table continues…

Name	Description	Default value	Change to
Enable Database Auto Switchover	This check box is selected by default. Not applicable to Context Store.	Set	Do not update.
Description		None	Any text describing the cluster. This field is optional.

Cluster Attributes

Name	Description	Default value	Change to
Authorization Service Address		None	Do not update
Default SMS Connector Service			
Grid Heap Size for LU		-Xms64m -Xmx256m	Xms64m -Xmx384m
Grid password	Specify a password for grid security.	None	
Use secure grid?	If selected, grid security is enabled.	Not set	
HTTP or HTTPS limit on connections	Number of http/https connections.	3000	Do not update
HTTP or HTTPS traffic rate limit in bytes/sec	Http/https traffic rate in bytes per second.	4000000	Do not update
HTTP Load Balancer backend server max failure response timeout period (seconds)		15	Do not update
Max number of failure responses from HTTP Load Balancer backend server		2	Do not update
Network connection timeout to HTTP Load Balancer backend server (seconds)		10	Do not update
Only allow secure web communications		Enabled	The administrator or user can decide whether to disable this attribute or leave it as enabled.

Table continues…

Name	Description	Default value	Change to
Is Load Balancer enabled?	Select this check box to enable load balancing for the cluster. If you do not select this check box, load balancing will not be available on the cluster. **Note:** You must enable load balancer only after adding nodes to your Context Store cluster.	Not set	Select check box to enable the load balancer. You must enable the check box. **Note:** This field is not applicable for a single-node deployment.
Is session affinity enabled?	Not applicable to Context Store.		Do not update
Trusted addresses for converting to use X-Real-IP for session affinity	Not applicable to Context Store.		Do not update
The maximum number of Avaya Breeze servers allowed in a Cluster	Max number of Avaya Breeze servers allowed in an a cluster. This field is not editable.	5	
Default identity for special make call cases			
Media server shuffle out timer (seconds)			
Limit on the memory (GB) to allocate for base processes			
Percent of memory to allocate base processes			
Percent of memory to allocate for WAS			
Limit on the memory (GB) to allocate for WAS			
Minimum TLS Version for Non-SIP Traffic			

Table continues…

Name	Description	Default value	Change to
Minimum TLS Version for SIP Call Traffic			
List of required snap-ins including minimum version	Lists snap-ins required for a Context Store cluster. This field is not editable.	"ContextStoreManager-1.0.0.0.0",	
Default SIP Domain	Not applicable to Context Store.		Do not update
Use secure signaling for platform initiated SIP calls	Not applicable to Context Store.		
Preferred Minimum Session Refresh Interval (secs)	Not applicable to Context Store.		Do not update
Use early pre-answer media?	Not applicable to Context Store.		Do not enable
Use short replication interval?	Not applicable to Context Store.		Do not enable

Installing the optional Context Store services

Before you begin

Download the optional services that you want to install from PLDS.

Record the information mentioned in the Key customer configuration information on page 50.

About this task

Two approaches to installing optional services are as follows:

- Deploy the optional services manually after creating a cluster.
- Deploy the optional services as part of creating a cluster.

This task provides basic details about manually installing the optional Context Store snap-in services. For detailed procedures about installing snap-in services, see *Deploying Avaya Breeze® platform*.

Note:

The mandatory snap-in service, ContextStoreManager, is installed when you create a cluster.

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze**.
2. In the left navigation pane, click **Service Management** > **Services**.

3. On the **Services** page, select and load the optional Context Store services. For more information about loading a service, see *Administering Avaya Breeze® platform*.
4. On the **Services** page, select and install the Context Store service.

   For more information about installing a service, see *Administering Avaya Breeze® platform*.
5. Configure the attributes of the Context Store services as described in Configuring attributes for a service on page 74.

Verifying a successful deployment

Procedure

Open your web browser and type the following URL:

`https://clusterIP/services/<Service name>/`

Where:

- *clusterIP* is the IP address of the Context Store cluster where the service that you want to verify is running
- <*Service name*> is the service that you want to verify: For example, ContextStoreManager.

Note:

You must enter the service names as they are displayed in the **Name** column on the Service Management page.

Ensure that you have configured certificate authentication on the browser. For more information, see Certificate-based authentication on page 98.

The web browser displays a confirmation message if the service that you are trying to verify is successfully installed in the specified cluster. If you are verifying ContextStoreRest service, On the ContextStoreRest service's verification page, the API's documentation and live test client is available.

Assigning permissions to an authorization client

Before you begin

- Configure LDAP user and synchronize it with System Manager
- Import LDAP server certificate.

For more information about configuring LDAP user, synchronizing the user with System Manager, and importing LDAP server certificate, see *Deploying Avaya Oceana® Solution*.

Procedure

1. On the System Manager web console, click **Home** > **Elements** > **Avaya Breeze** > **Configuration** > **Authorization**.

   The system displays the Authorization Clients tab.
2. Select the CS cluster name and click **Edit Grants**.
3. Click **New**.

   The system displays the Create Grants for Authorization Client: <client name> screen.
4. Select the resource from the **Resource Name** drop-down list.
5. Select the version of the resource cluster from the **Resource Cluster** drop-down list.
6. Select the feature that the resource cluster wants to advertise from the **Feature** drop-down list.
7. Click the **Select** check box corresponding to the value you want to select.
8. Click **Commit**.

Geo redundancy and External Data Mart deployment

The Geo redundancy and External Data Mart features have no dependencies or restrictions on each other; either or both of these optional features can be enabled on a Context Store cluster.

To use the Geo redundancy feature, you must:

1. Manage the Context Store clusters from the same System Manager.
2. Individually enable Geo redundancy for each cluster in the Context Store set up.
3. Allocate identical resources to the clusters in a geo-redundant deployment.

For more information, see Enabling Geo redundancy in Context Store on page 65.

To use the External Data Mart feature, you must:

1. Identify and configure the external database to which context data is saved.
2. Individually enable the External Data Mart for each cluster in the Context Store set up.

- For the External Data Mart connection, **EDM: Enable Persistence to database**
- For the Geo-Redundancy connection, **GEO: Enable session preservation**

For more information, see Enabling External datamart in Context Store on page 66.

To use Context Store without Geo redundancy and External Data Mart, follow the procedure mentioned in Configuring a cluster and installing mandatory services on page 56.

Enabling Geo redundancy in Context Store

Before you begin

- Ensure you have configured two Context Store clusters.
- Create and download the keystore, from the **Security** > **Certificate** > **Authority** page in the System Manager web console. For more information about certificates, see the *Certificate Based Authentication* chapter in the *Avaya Context Store Snap-in Developer Guide*.

About this task

This topic provides information about enabling session preservation and thereby achieve Geo redundancy in Context Store. The same keystore certificate is applied to both clusters.

You must perform this procedure on each Avaya Breeze® platform node in both the Context Store clusters.

Procedure

1. To configure secure data replication between clusters, put the keystore certificate in `/opt/Avaya/dcm/gigaspace/security/` directory of each Avaya Breeze® platform node in both clusters:

   The certificate enforces SSL encryption on the replication channel. For more information about the certificate based authentication and creation of the keystore certificate, see *Avaya Context Store Snap-in Developer Guide*.

   Note:

   The replication does not work without the SSL encryption.

   If an Avaya Breeze® platform node is upgraded or redeployed, the configuration steps for Geo redundancy security must be repeated.

2. Enable the Geo redundancy feature and configure attributes:
   a. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Configuration** > **Attributes**.
   b. Select **Service Clusters** and select the cluster and the service **ContextStoreManager** from the drop-down list of services.
   c. Enter `true` in the **GEO: Enable session preservation** field.
   d. Configure all the other geo redundancy attributes in the **Geo Redundancy Configuration** group.
3. Configure the ContextStoreManager service data grid:

   Note:

   The **ContextStore DataGrid Type** attribute must be set to GEO or PROVISIONED-GEO to use the Geo Redundancy feature. EDM provisioning is an optional Context

Store feature. To learn more about this feature, see *External Data Mart Provisioning* section in this document.

a. Set the applicable values for **DataGrid Settings** and **Gateway Service container size** for the deployment size.

   See the *Certified Deployments* section in *Avaya Context Store Snap-in Release Notes* for applicable values.

b. Click **Commit**.

4. If necessary, restart all the Avaya Breeze® platform servers in the Context Store cluster.

   Note:

   Cluster restart is required only if the DataGrid type has changed. All other geo-redundancy-related configuration is dynamic and can be updated by disabling, updating, and then re-enabling the feature.

5. Enter `true` in the **Cluster Deny Service on two node outage** field if Geo load balancer is configured to automatically detect a compromised cluster.
6. Repeat these steps on the second cluster.

Next steps

After you configure and restart the second Context Store cluster, confirm that replication is active between both the Context Store spaces by creating a context object in one cluster and retrieving the context object from the other cluster.

Note:

If you must restart a cluster, clear the **Cluster Deny Service on two node outage** check box before the restart. To enable the attribute, select the **Cluster Deny Service on two node outage** check box again after the restart. If you enable the Cluster Deny Service on two node outage attribute before the other nodes have started up and joined the cluster, the action triggers throttling on the cluster.

Configure the load balancer for geo redundancy.

Enabling External Data Mart persistence

Before you begin

Ensure that you create the database table(s) before enabling the External Data Mart feature. For more information about creating database tables, see Creating database tables for External Data Mart on page 25

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Configuration** > **Attributes**.
2. Click the **Service Clusters** tab.

Note:

To use only one EDM in the geo-redundant solution, you must disable EDM from the other cluster in the **Service Cluster** tab.

3. From the **Service** drop-down menu, select **ContextStoreManager**
4. Enter `true` in the **EDM: Enable Persistence to database** field.
5. Configure the other EDM attributes. All attributes related to External Data Mart configuration are prefixed with **EDM:**.
6. Configure the ContextStoreManager service data grid:
   a. Set the applicable values for **DataGrid Settings** and **Mirror Service container size** for the deployment size

      See the *Certified Deployments* section in *Avaya Context Store Snap-in Release Notes* for applicable values.

   b. Click **Commit**.

Next steps

Confirm that the external data mart is active by creating a context object in the cluster and verifying that it has been written to the database.

Enabling External Data Mart provisioning

Before you begin

Ensure that you create the database table(s) before enabling the External Data Mart provisioning feature. For more information about creating database tables, see Creating database tables for External Data Mart on page 25

About this task

You cannot enable the EDM provisioning feature at runtime. You must restart the cluster to redeploy the data grid with the updated configuration.

Note:

EDM: Enable Provisioning from database is an optional attribute. Provisioning is a separate, optional EDM feature than EDM Persistence (which is used for Customer Journey).

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Configuration** > **Attributes**.
2. Click the **Service Clusters** tab.
3. From the **Service** drop-down menu, select **ContextStoreManager**
4. Enter `true` in the **EDM: Enable Provisioning from database** field.

5. Configure the other EDM attributes. All attributes related to External Data Mart configuration are prefixed with **EDM:**.
6. Configure the ContextStoreManager service data grid:
   a. Set the applicable values for **DataGrid Settings**, **EDM: Mirror Service redo log size**, and **Mirror Service container size** for the deployment size.

      See the *Certified Deployments* section in *Avaya Context Store Snap-in Release Notes* for applicable values.

   b. Click **Commit**.
7. If necessary, restart all the Avaya Breeze® platform servers in the Context Store cluster.

   Note:

   Cluster restart is required only if the DataGrid type has changed. All other geo-redundancy-related configuration is dynamic and can be updated by disabling, updating, and then re-enabling the feature.

Next steps

Confirm that the provisioning was successful by using ContextStoreRest to retrieve a context object from the data-grid, that existed in the `CS_PROVISION` table in the database.

Deploying Context Store PDC on Orchestration Designer

Before you start deploying PDC on Orchestration Designer, ensure that you have:

- Installed Orchestration Designer 6.0 or later in the system where you want to deploy Context Store PDC. The Orchestration Designer software is available on http://www.avaya.com/devconnect.
- The latest Context Store PDC. The Context Store PDC is available on Avaya DevConnect Program at http://www.devconnectprogram.com/site/global/products_resources/avaya_breeze/avaya_snap_ins/context_store/overview/index.gsp.
- The sample application that uses the Context Store PDC. The sample application is available on Avaya DevConnect Program at http://www.devconnectprogram.com/site/global/products_resources/avaya_breeze/avaya_snap_ins/context_store/overview/index.gsp.

You must also ensure that the machine where you plan to install Context Store PDC can resolve the cluster IP address. If DNS is not set up in the machine, you must add the cluster IP address in the *hosts* file.

For more information about Orchestration Designer, see *Avaya Aura® Orchestration Designer Developer's Guide*.

For more information about installing and using the PDC, see *Avaya Context Store Snap-in Developer Guide* available on http://www.avaya.com/devconnect.

Avaya Context Store Snap-in Developer Guide provides detailed information about the following tasks:

- Configuring Orchestration Designer to use Tomcat.
- Configuring certificates for the Context Store PDC.
- Running the Test project.
- Configuring the Context Store PDC.
- Using the Context Store connector in the workflow.
- Creating the variables and getting the output variables.

Deploying ContextStoreTask Type

Overview of ContextStoreTasks Type deployment

Before you install ContextStoreTasks Type for Engagement Designer, ensure that you have:

- Context Store.
- Engagement Designer.

Note:

The Engagement Designer cluster and the Context Store cluster must be managed by the same System Manager.

Install Engagement Designer into the General Purpose cluster. For more information about installing Engagement Designer, see *Avaya Engagement Designer snap-in Reference.*

Note:

If the Engagement Designer cluster has multiple nodes, you must select the **Is session affinity enabled?** check box for the Engagement Designer cluster while creating the cluster.

Engagement Designer, ContextStoreTasks Type is an SVAR file. When the Engagement Designer cluster has reached the Installed state, upload the ContextStoreTasksType Bundle through the Engagement Designer Administration console.

For more information about accessing the Engagement Designer Administration or Design consoles, see *Getting Started with Avaya Engagement Designer*.

Installing ContextStoreTasks Type SVAR on Engagement Designer

Before you begin

Deploy Engagement Designer.

Procedure

1. Download the ContextStoreTasks Type SVAR file from PLDS.
2. Open the following URL in a web browser.

   `https://Applicable-ED-IP-ADDRESS/services/EngagementDesigner/admin.html`

   For more information on accessing the Engagement Designer Admin console, see *Getting Started with Avaya Engagement Designer*.
3. Click the Bundles tab.
4. Click **Upload Bundle**.
5. Click **Choose File**.
6. Browse and select the ContextStoreTasks Type SVAR file.
7. Click **Upload**.

   The system uploads the file.

   Note:

   Uninstall any older versions of ContextStoreTasks Type before proceeding with the next step.
8. Click the check box corresponding to the ContextStoreTasks Type SVAR file and click **Deploy Bundle**.

   You should now be able to see the Context Store bundle in the Engagement Designer Design console.

Context Store Upgrade overview

To upgrade a Context Store snap-in service in Avaya Breeze® platform you must install a new version of the snap-in service. For detailed procedure and information about upgrading various Context Store snap-in services, see *Avaya Context Store Snap-in Release Notes.*

Context Store uninstallation and deletion

Context Store uninstallation overview

The options are:

- Delete a Context Store cluster: To uninstall the mandatory Context Store services (ContextStoreManager), you must delete the Context Store cluster.
- Uninstall a snap-in service: For optional snap-in services, you can uninstall a service snap-in: When you uninstall a service, the system does not remove the attributes from the Avaya Breeze® platform PostgreSQL database.
- Delete a snap-in service: When you delete a service, the system removes the attributes from the Avaya Breeze® platform PostgreSQL database.

Note:

To completely uninstall Context Store and the data grid, you must delete the services so that the configuration information is removed from the Avaya Breeze® platform server database.

Deleting a Context Store cluster

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Cluster Administration**.
2. Select the Context Store clusters that you want to delete.
3. On the **Cluster State** list, select **Deny New Service**, if the clusters are in **Accepting** state.
4. On the Warning box, click **Continue**.

   The states of the selected clusters change to **Denying**.
5. Click **Delete**.
6. On the Warning box, click **Continue**.

Next steps

Verify that the Context Store cluster was deleted successfully:

1. On the Cluster Administration page of System Manager web console, verify that the clusters that you deleted in the above procedure have been removed from the list.
2. On the Services page of System Manager web console, verify that the status of the Context Store services have been changed from **Installed** to **Loaded**.

Uninstalling an optional snap-in service

About this task

This task provides information about uninstalling an optional service snap-in.

Note:

- When you uninstall a service, the system does not remove the attributes from the Avaya Breeze® platform PostgreSQLdatabase.
- The system preserves the data grid and the entries written to spaces until the lease times expire.

Procedure

1. On the Avaya Aura® System Manager web console, click **Elements** > **Avaya Breeze**.
2. In the left navigation pane, click **Cluster Administration**.
3. On the Cluster Administration page, select the check box for the cluster and then click **Edit**.
4. On the Cluster Editor page, perform the following steps:
   a. Click the **Services** tab.

      The system displays the list of services installed in the cluster.

   b. Click the checkbox for the service that you want to uninstall.
   c. Click **Uninstall**.

Next steps

To verify that the service is uninstalled, click **Elements** > **Avaya Breeze** and perform the following steps:

1. On the Server Administration page, verify that the **Service Install Status** for the service is **Uninstalling**.

   Note:

   After the service is uninstalled, the **State** of the service is **Loaded**.
2. On the Services page, verify that the **State** of the service is **Loaded**.
3. On the Cluster Administration page, perform the following steps:
   a. Click **Show**.
   b. Click the required server and verify that the Service Status page does not display the uninstalled service.

Deleting a snap-in service

Before you begin

Before deleting a service snap-in, you must ensure that the service snap-in is uninstalled.

For more information, see Uninstalling a service snap-in on page 72.

About this task

This task provides information about deleting a service snap-in. When you delete a service, the system removes the attributes from the Avaya Breeze® platform Postgres database.

Note:

Delete all the previous version of Context Store services. Also, note down the existing attributes configurations, so that you can refer to it during the new installation.

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze** > **Service Management** > **Services**.
2. On the Services page, perform the following steps:
   a. Verify that the **State** of the service is **Loaded**.
   b. Select the service that you want to delete and then click **Delete**.
   c. In the dialog box, select the **Please Confirm** check box to confirm the deletion.
   d. Click **Delete**.

Next steps

To verify that the service is deleted, click **Elements** > **Avaya Breeze** and perform the following steps:

1. Click **Service Management** > **Services**.
2. Verify that the Services page does not display the deleted service.

Chapter 6: Administering Context Store

Configuring attributes for a service

About this task

Use this procedure to configure values for a Context Store service. The configuration is a one-time activity that you must perform after installing a service.

Important:

If you plan to use External Data Mart or GEO redundancy features, to avoid the need to restart the cluster, configure the applicable data grid type before adding servers to a new cluster as this cannot be changed dynamically once the data grid has been deployed on the servers.

Procedure

1. On System Manager, click **Elements** > **Avaya Breeze®**.
2. In the navigation pane, click **Configuration** > **Attributes**.
3. Click the **Service Clusters** tab
4. From the **Service** drop-down menu, select the service that contains the service attributes you want to configure.

   The table displays all the attributes that you can configure for the service, including a description of each attribute.
5. For the attribute you want to change:
   a. Click **Override Default**.
   b. Enter the new value or string in the **Effective Value** field.
6. Click **Commit** to save your changes.

ContextStoreManager attribute descriptions

After configuring the following ContextStoreManager attributes which control the data grid you must restart all servers in the cluster:

- ContextStore DataGrid type

- ContextStore ManagerSpace DataGrid Settings
- ContextStoreSpace DataGrid Settings
- Event Stream: Enable Event Streaming

  If you enable the Event Streams feature, ContextStoreSpace DataGrid must be reduced by 6G. Therefore to enable the Event Streams feature on an existing data grid, you must restart the cluster to deploy the smaller ContextStoreSpace DataGrid .

Context Store supports runtime configuration/re-configuration of ContextStoreManager's "GEO:" and "EDM:" attributes. You must disable the applicable enablement attribute for the feature and enable it again after modifying or adding connection details:

- For the External Data Mart connection, **EDM: Enable Persistence to database**
- For the Geo-Redundancy connection, **GEO: Enable session preservation**

Note:

The **ContextStore DataGrid Type** or **ContextStoreSpace DataGrid Settings** attributes cannot be changed dynamically. If this value is not already set to GEO or PROVISIONED-GEO type, you must remove the existing data-grid, and therefore, restart the cluster.

Field	Description
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users
Startup Configuration	
ContextStore DataGrid type	Mandatory attribute The type of Context Store data grid. Four options are available: • `STANDARD`: A single cluster deployment with non-provisioned data grid • `GEO`: A geo-redundant deployment with non-provisioned data grid • `PROVISIONED`: A single cluster deployment with provisioned data grid • `PROVISIONED-GEO`: A geo-redundant deployment with provisioned data grid `STANDARD` is the default deployment.

Table continues…

Field	Description
ContextStore ManagerSpace DataGrid Settings	Mandatory attribute A comma-separated list of three numbers: {memoryCapacityPerContainer},{maximumMemoryCapacity}, {maximumRelocationsPerMachine}. The default values are *1,2,1* The system interprets a numeric value only as gigabytes. You can specify megabytes with an `m` or `mb` after the number. For example, 2MB. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
ContextStoreSpace DataGrid Settings	Mandatory attribute A comma-separated list of three numbers: {memoryCapacityPerContainer},{maximumMemoryCapacity}, {maximumRelocationsPerMachine}. The default values are *8,118,1* The system interprets a numeric value only as gigabytes. You can specify megabytes with an `m` or `mb`after the number. For example, 1MB. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
External Data Mart Configuration	
EDM: Mirror Service redo log size	The amount of context data to store for retry if disconnected from the External Data Mart (EDM). The system discards the oldest data when this size limit is reached. Range: 10000 to 250000 The default value is *60000*. The configuration for this attribute provided for different deployment scenarios in the *Data-grid Configuration Settings – ContextStoreManager Attributes section of the Context Store Release Notes* is designed to store approximately 30 minutes of data.
EDM: Enable Persistence to database	Setting this to `true` enables persistence of context data to the customer-provided External Data Mart. The accepted values are: • true: Enables persistence to the external data mart. • false: Disables persistence to the external data mart The default value is *false*.

Table continues…

Field	Description
EDM: Enable Provisioning from database	Setting this to 'true' will enable provisioning of context data from the customer-provided External Data Mart. The accepted values are: • true: Enables provisioning to the external data mart. • false: Disables provisioning to the external data mart The default value is *false*.
EDM: Database type	The type of EDM database. The accepted values are: • PostgreSQL • Microsoft SQL Server • Oracle Database
EDM: Database host	The host for the EDM database.
EDM: Database port	The port for the EDM database.
EDM: Database username	User name for the External Data Mart database connection. You cannot update this attribute dynamically.
EDM: Database password	Password for the External Data Mart database connection. You cannot update this attribute dynamically.
EDM: Database name	Name of the database used as External Data Mart
EDM: Mirror Service container size	Memory required for the External Data Mart Mirror Service deployment. The default value is *1*. The system interprets a numeric value only as gigabytes. You can specify megabytes with an `m` or `mb` after the number. For example, 2m. For values specific to your deployment type, see the *Certified Deployments section* in *Avaya Context Store Snap-in Release Notes*.
Run-Time Service Configuration	
Cluster Deny Service on two node outage	Determines whether to deny or accept service when two nodes in a cluster are unavailable. If disabled, the last remaining node continues to attempt service requests. The accepted values are: • true: If two nodes in a cluster are unavailable, the third node also denies service. • false: Even if two nodes in a cluster are unavailable, the third node tries to serve incoming requests. The default value is, *false*. **Note:** This attribute is not applicable for one or two-node deployments.

Table continues…

Field	Description
CS Audit: Event limit	Configure the limit of event entries in the audit trail of context objects. • Range: 0 to 50 • Default value: 50 You can update this attribute dynamically. Changes you make do not become effective on a context until the next interaction with that object. **Note:** If you enable the Audit trail feature in a geo-redundant deployment, the CS Audit: Event limit attribute must be set identically in both clusters.
CS Default Lease Time	Default lease time, in seconds, for context data to live in the in-memory data cache Context Store automatically removes a context if the context remains in Context Store for the lease period without any change. This attribute specifies the default lease time that Context Store uses when you do not specify any lease time for a context entry. • Range: 1 to 86400 • Default value: 7200 For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*. **Note:** CS Default Lease Time is not applicable to the contexts in the CS_PROVISION table. The contexts in the CS_PROVISION table has an infinite lease time and remain in the data grid permanently until the contexts are deleted manually.
CS Maximum Lease Time	Maximum lease time, in seconds, for context data. The system logs warnings for leases longer than this value. If the average lease time for the cluster exceeds this value, Context Store raises an error event. If a context is created or updated with a lease time that exceeds this value, Context Store logs only a warning. • Range: 1 to 86400 • Default value: 14400 You can update this attribute dynamically.

Table continues…

Field	Description
CS Threshold: Instance High Requests per Second	High threshold on Context Store instance requests per second. Must be greater than related Minima. If the requests per second for an instance exceeds this value, the Context Store instance rejects the further requests and raises an event. • Range: 1 to 650 • Default value: 65 You can update this attribute dynamically. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
CS Threshold: Instance Low Requests per Second	Low threshold on Context Store instance requests per second. Must be lower than related Maxima. If the requests per second for an instance exceeds this value, the Context Store instance raises an event, without rejecting any further requests. • Range: 1 to 650 • Default value: 55 You can update this attribute dynamically. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
CS Threshold: Max Error Rate	Threshold for maximum tolerated Context Store request error rate in percentage • Range: 1 to 100 • Default value: 20 You can update this attribute dynamically.
CS Threshold: Max Latency	Threshold for maximum tolerated Context Store request latency in milliseconds. When the average latency exceeds the value you have specified in this field, Context Store raises an event. • Range: 1 to 5000 • Default value: 250 You can update this attribute dynamically. **Note:** The average latency of a request in an hour is less than 250 milliseconds with a maximum latency of two seconds.

Table continues…

Field	Description
CS Threshold: Service High Requests per Second	High threshold on Context Store service requests per second. Must be greater than related Minima. If the service requests per second for a Context Store cluster exceeds the value you have specified in this attribute, Context Store rejects the further service requests and also raises an event. • Range: 1 to 1240 • Default value: 105 You can update this attribute dynamically. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
CS Threshold: Service Low Requests per Second	Low threshold on Context Store service requests per second. Must be lower than related Maxima. If the service requests per second for a Context Store cluster exceeds the value you have specified in this attribute, Context Store raises and alarm, without rejecting the further service requests. • Range: 1 to 1240 • Default value: 85 You can update this attribute dynamically. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.
Geo Redundancy Configuration	
GEO: Enable session preservation	Setting this to 'true' enables Geo-Redundancy between configured Context Store clusters. The accepted values are: • true: Enables geo redundancy • false: Disables geo redundancy The default value is *false*.
Geo: Gateway Service container size	Memory required for Geo-Redundancy Gateway Service deployment. The system interprets a numeric value only as gigabytes. You can specify megabytes with an `m` or `mb` after the number. For example, 2m. For values specific to your deployment type, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*. The default value is *1*.
GEO: Keystore file name	Certificate name of the geo redundancy keystore.
GEO: Keystore password	Password of the geo redundancy keystore.
GEO: Target cluster Id	Name of the target cluster on the geo redundant site
Streams Configuration	

Table continues…

Field	Description
Event Stream: Enable Event Streaming	Setting this to 'true' enables clients to subscribe for personalized events from Context Store. The default value is *false*. Enable this parameter for the Event Streams feature to work. **Note:** If you want to enable the Event Streams feature, ensure that there is 6 GB memory on the Avaya Breeze™ cluster.
Supplier	
Supplier Id	The supplier Id that Avaya provides. The default value is *10000000*.
Advanced Configuration	
Enable Centralized Logging	This value indicates that centralized logging is needed by the snap-in. Enables centralized logging after the snap-in is installed.

ContextStoreRest attribute descriptions

Field	Description
Advanced Configuration	
Authorization Service Address	The fully qualified domain name (FQDN) of the node/cluster where Authorization Service is installed Enter the FQDN or IP of the node/cluster where the Authorization Service is installed. **Note:** If the Authorization service is installed on the Context Store cluster, you need not set this attribute.
Enable Breeze Authorization Service	Setting this to 'true' enables authorization against the Breeze Authorization Service. The accepted values are: • true: Enables authorization against the Breeze Authorization Service • false: Disables authorization against the Breeze Authorization Service The default value is *false*.

Table continues…

Field	Description
Require user for Breeze Authorization Service	Setting this to 'true' enforces user access only for Breeze Authorization Service. If you enable this attribute, the system disables the Get Token and Get Token by Scope API methods. The accepted values are: • true • false The default value is *false*.
Enable Centralized Logging	This value indicates that centralized logging is needed by the snap-in. Enables centralized logging after the snap-in is installed.
External Data Mart Configuration	
Enable Retrieval From Database	Setting this to 'true' will enable retrieval of Context data from the External Data Mart when expired in Context Store Space.
Supplier	
Supplier Id	The supplier Id that Avaya provides.
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users

ContextStoreScreenPop attribute descriptions

Field	Description
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users

Table continues…

Field	Description
Rules Configuration	
Base for URL	You must provide this path if you set the override format as URL. You must specify a valid URL to which the system can pass parameters. The default URL is that of a demonstrative CSS file of Context Store. Replace the default URL with the URL of the CSS file. The default URL is: http://127.0.0.1/?
CSS for HTML	You must provide this path if you set the override format as HTML. This path must point to a valid CSS file. The default URL is that of a demonstrative CSS file of Context Store. Replace the default URL with the URL of the CSS file. The default URL is: /services/ContextStoreScreenPop/demo/css/demo.css
Identifier Delimit Character	Use this field to specify the character that delimits the UCID. Context Store extracts the contextId based on the value that you specify for this attribute and the default setting for the UCID delimit position. For example, if the values of: • The default setting for the UCID delimit character = \. • The UCID = 1111111.222222.333333.444444 Then Context Store detects the contextId as 333333.
Identifier Delimit Position	This setting is the occurrence of the UCID delimiter that marks the start of a contextId in a UCID string. The next instance of the delimiter marks the end of the contextIdn. The default setting for the UCID delimit position = 2
Identifier Parsing Position	Use this field to detect a UCID from a string that contains the id. The valid value for this attribute must contain a comma separated list of two positive integers. The first integer is the start location of the id and the second number is the end location of the id. The default value is: 0,10.
JavaScript for HTML	The JavaScript file that must be included when selecting the html format. Provide the http link to where the JavaScript file is hosted.
Rules	

Table continues…

Field	Description
User Rule 01 - 20	You can enter customized rules for ContextStoreScreenPop. The system supports up to 20 user defined rules. This field is empty by default. Select the **Override Default** check box to enter the user defined rule.
Common Configuration	
Supplier ID	Avaya-provided supplier Id.

ContextStoreNotify attribute descriptions

Name	Description
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users
Subscription *number* Where *number* is the serial number of subscription. One subscription is for one client. You can have a maximum of five subscriptions	
Subscription *number* enabled	• true: Enables the subscription • false: Disables the subscription
Subscription *number* endpointURI	This attribute is for configuring the receiver endpoint for ContextStoreNotify. Specify the full URI of the endpoint that will receive notifications for this subscription.
Subscription *number* tenantId	This attribute filters the notifications you receive. Only the contexts created with the specified tenantId will trigger notification for this subscription.
Subscription *number* groupId	This attribute filters the notifications you receive. Only the contexts with the specified groupId will trigger notification for this subscription.
Common Configuration	
Supplier ID	Avaya-provided supplier Id.

ContextStoreRules attribute descriptions

Name	Description
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users
Rule *number* Where *number* is the serial number of the rule.	
Rule 01: Eventing Connector Family	Enter the Family value you entered when creating the event.
Rule 01: Eventing Connector Type	Enter the Type value you entered when creating the event.
Rule 01: Eventing Connector URL	Enter the HTTP location of the Eventing Connector where the ED Workflow is installed.
Rule 01: Eventing Connector Version	Rules Eventing Connector Version for rule 01. This should match the Family value you entered when creating the event.
Rule 01: Eventing Rule Priority	Enter priority for Rule 01. • This should be a number between 1 and 5. • Only one rule can fire and the priority determines which rule will fire when the context matches multiple rules.
Rule 01: Identifier	Enter a name for Rule 01. This should be an alphanumeric string.
Rule 01: Key	Enter the key for Rule 01.
Rule 01: Operator	Enter operator for Rule 01. This must be set to `'=='`
Rule 01: Value	Enter a value for Rule 01.
Common Configuration	
Supplier ID	Avaya-provided supplier Id.

ContextStoreQuery attribute descriptions

Field	Description
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users
External Data Mart Configuration	
EDM: Database username	Password of the customer-provided External Data Mart database
EDM: Database password	Password of the customer-provided External Data Mart database.
Common Configuration	
Supplier Id	The supplier Id that Avaya provides.
Advanced Configuration	
Enable Centralized Logging	This value indicates that centralized logging is needed by the snap-in. Enables centralized logging after the snap-in is installed.

ContextStoreSoap attribute descriptions

Field	Description
DEFAULT_GROUP	
Supplier Id	The supplier Id that Avaya provides.
License Features	
FEAT_CS_EXPIRATION	Context Store expiration feature.
VALUE_CS_AEP_CONNECTOR	Context Store AEP connector.
VALUE_CS_API	Context Store API
VALUE_CS_GEO_REDUNDANT_1	Context Store Geo Redundancy
VALUE_CS_SERVER	Context Store server
VALUE_CS_USERS	Context Store users

Chapter 7: High availability

High availability within a cluster

Note:

- Context Store does not support high availability for single-node deployments. If the single node fails, you cannot recover the data.
- For a cluster with more than one node, Context Store supports data preservation for only one node failure. For more information about multiple node failure and high availability, see *Avaya Context Store Snap-in Developer Guide*.

Context Store uses Avaya Breeze® platform and data grid to achieve high availability. For High availability, the Context Store cluster must consist of two or more Avaya Breeze® platform nodes that are dedicated for Context Store. Context Store creates a data grid across the Avaya Breeze® platform servers in the cluster where you deploy Context Store, so that the servers can operate in an active/active mode.

To achieve high availability, Context Store data grid uses the following techniques:

- Self healing: The Context Store data grid has self healing and disaster recovery capabilities that minimize the chances of a downtime. The data grid also preserves its states so that, in case of a system failure, you can recover the data grid in its latest state.
- Data sharing: All the servers in a Context Store cluster shares the same data grid. Even if one server is unavailable, the other servers in the Context Store cluster can use the data present in the data grid.
- Data partition and redundancy: Context Store partitions the data that is present in the data grid and distributes the data across different machines. This distributed structure enables the system to hold more data than the capacity of a single machine and also helps attain high availability. The system keeps a backup of data from each partition so that if one source becomes unavailable, Context Store can retrieve the same data from the backup location.

The Context Store cluster is accessible through a cluster IP address that is maintained by a highly available load balancer. The load balancer distributes HTTP requests across each of the Avaya Breeze® platform servers in the cluster. If one of the servers in the Context Store cluster is unavailable, Context Store can still work without loss of data and significant impact to its performance. However, unavailability of two servers might result in loss of data and failing HTTP requests. If two servers are unavailable in a cluster, restart the cluster to clear old context data and restore Context Store to a known state. When the cluster is restored to a known state, data replication in the cluster is not accurate for updates that occur during the failover period. The data and EDM on the other cluster, which services the contexts during failover, is accurate.

Note:

You can enable load balancer only after adding nodes to your Context Store cluster.

Server failure

If any of the servers in the cluster are unavailable, Context Store redirects the client requests to the primary partition. If the primary partition is unavailable, Avaya Breeze® platform determines a new primary partition to direct the client requests. Context Store might have an increased response time during this negotiation process, until a new primary partition is assigned.

Server restoration

When an unavailable server becomes available, Avaya Breeze® platform readjusts the partitions to accommodate the new server. If the server that becomes available contains a primary partition, Avaya Breeze® platform determines a new primary partition to serve the client requests. Context Store might have an increased response time during this negotiation process, until a new primary partition is assigned.

Geo redundancy

Context Store Geo redundancy overview

Context Store Geo redundancy is an architecture that you can configure to enhance high availability of Context Store. Using Context Store Geo redundancy , you can have two Context Store clusters in active/active mode. These Context Store clusters can be either in the same data center or in two different data centers. To ensure a successful failover, you must add the two Context Store clusters to the same System Manager.

Context Store supports Geo redundancy with two Data centers only.

To enable Context Store Geo redundancy, you must:

- Configure the *Context Store Geo* attributes: For more information, see Geo redundancy and External Data Mart deployment on page 64.
- Use a load balancer: You must provide and configure a highly available load balancer for the two Context Store clusters. The load balancer must provide:
  - A common address: Both the Context Store clusters must be reachable through a common address. For the third party applications that you integrate with Context Store, use this common address to access the clusters. You must use only the common address, and not the individual cluster IP address, to access the Context Store clusters.
  - Load balancing: The load can be distributed between the clusters as per your requirements, however, the traffic must be routed on the *rid parameter*, the routingId field of a context object. You cannot route requests using round robin, least busy server, or any other mechanism other than routing on the rid parameter.

For routing the requests and distributing the traffic between the clusters, Context Store uses an optional field, *rid parameter*, in each REST request. If you do not specify a value for the rid parameter, the load balancer routes the request to the default Context Store cluster. Due to the replication of the same context entry in the two clusters, Context Store uses a combination of the rid parameter and the contextId to uniquely identify a context entry.

The two geographically redundant Context Store clusters support the same traffic as one non geo redundant Context Store cluster supports.

Avaya Engagement Designer does not support the geo redundancy feature, rid parameter, of Context Store.

For more information about load balancer for a geo-redundant deployment and a reference configuration, see *Avaya Context Store Snap-in Developer Guide*.

Third party load balancer configuration requirement

For a third-party load balancer to route traffic correctly between two or more Context Store clusters, the following mandatory steps must be configured on the load balancer:

- Ensure that the traffic is routed on the rid parameter.

  Each request for a particular context must be routed to the same Context Store cluster. To achieve this, Context Store uses an optional field, *rid parameter*, in each REST request. For example, all requests with rid parameter=1 must be directed to the nondefault cluster and any other requests must be sent to the default cluster. Requests for the same context must go to the same Context Store cluster as the time lag for replication between the two Context Store clusters is not instantaneous. You cannot route requests using round robin, least busy server, or any other mechanism other than routing on the rid parameter. You must ensure that each request for a particular context has the same rid parameter.
- If the load balancer receives responses with any of the following codes: 500, 502, 503, and 504, the load balancer must mark the Context Store cluster as down and redirect all subsequent requests to the other Context Store cluster. The 500 code signifies that only one of the Avaya Breeze® platform nodes in the Context Store cluster is operational and it cannot process requests.
- The load balancer must be able to forward the Context Store https requests. If the load balancer requires authentication, load the certificates in the load balancer. For more information about certificates, see Certificate-based authentication on page 98.

Failover scenarios

The following section displays the failover scenarios in geo redundancy:

- When a Context Store cluster is down, requests that are routed to the cluster will be redirected to the other cluster. This might result in GET requests going to a cluster which does not contain that context. For example, the request will fail in the following sequence of events:

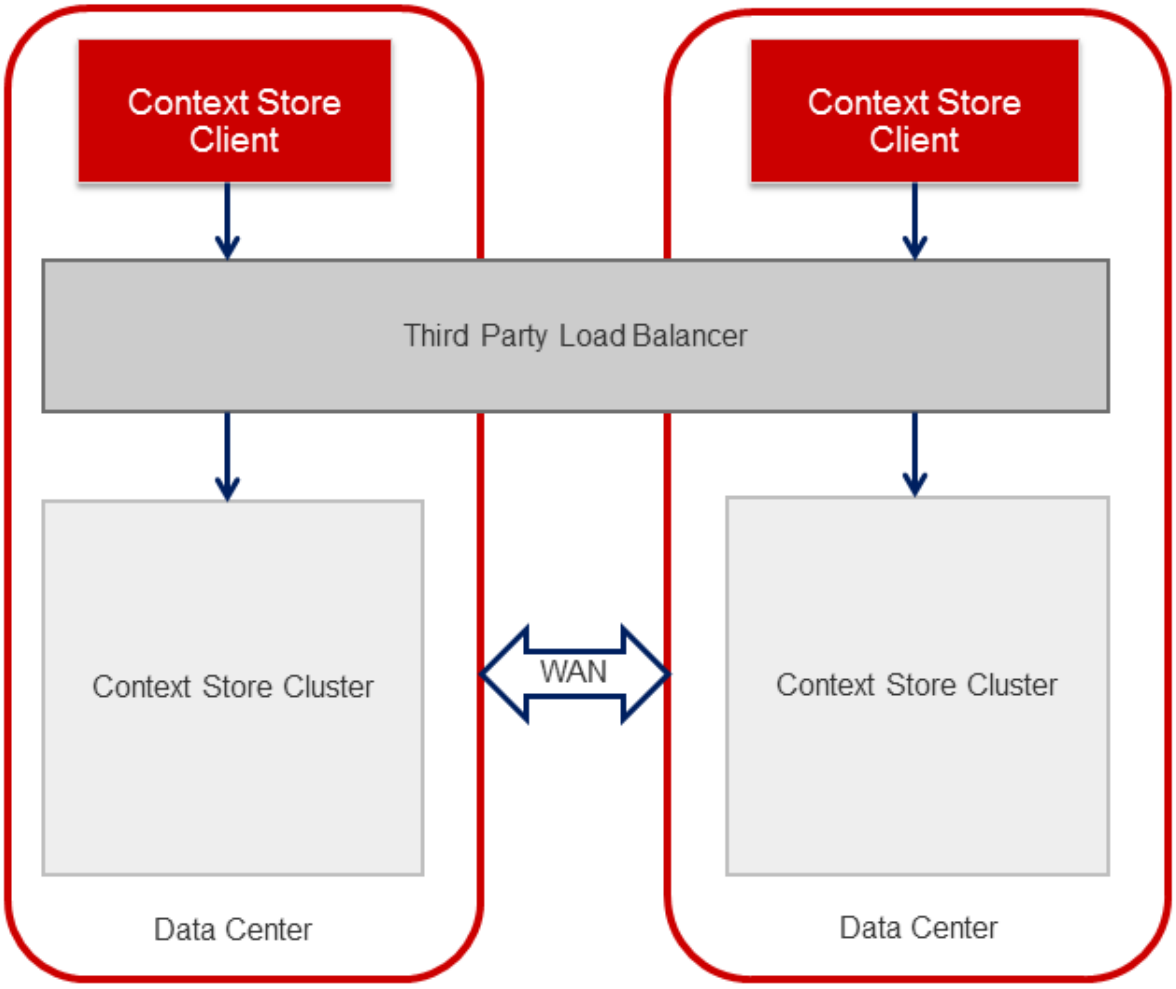
  1. Context A is saved to cluster 1.

2. Cluster 1 goes down before context A has been replicated to cluster 1.
3. The load balancer attempts to route the GET request for context A to cluster 2.

- When a cluster is shut down and restarted, existing data on the active cluster is not replicated to the other cluster. For example, the following data is not replicated:
  1. Shut down cluster 1.
  2. Create new contexts on cluster 2 and update existing contexts on cluster 2.
  3. Restart cluster 1
  4. Only the newly created contexts on cluster 2 are replicated to cluster 1.

Architecture

The following diagram depicts the architecture of a Context Store geo redundant deployment:



Two Context Store clusters are deployed at two different data centers. All requests to Context Store are routed through a third party load balancer that is common between the two Context Store clusters. The load balancer can communicate with both the clusters at any time. The clusters are connected through WAN. The load balancer can reside on either data center.

Service preservation

Context Store geo redundancy provides service preservation through load balancing of requests across the two Context Store clusters, with both the clusters in active state simultaneously. These Context Store clusters can be in two separate LANs, connected by a WAN link. However, because the replication of data between the two Context Store clusters is not instantaneous, you must route all requests for a specific context to the same cluster.

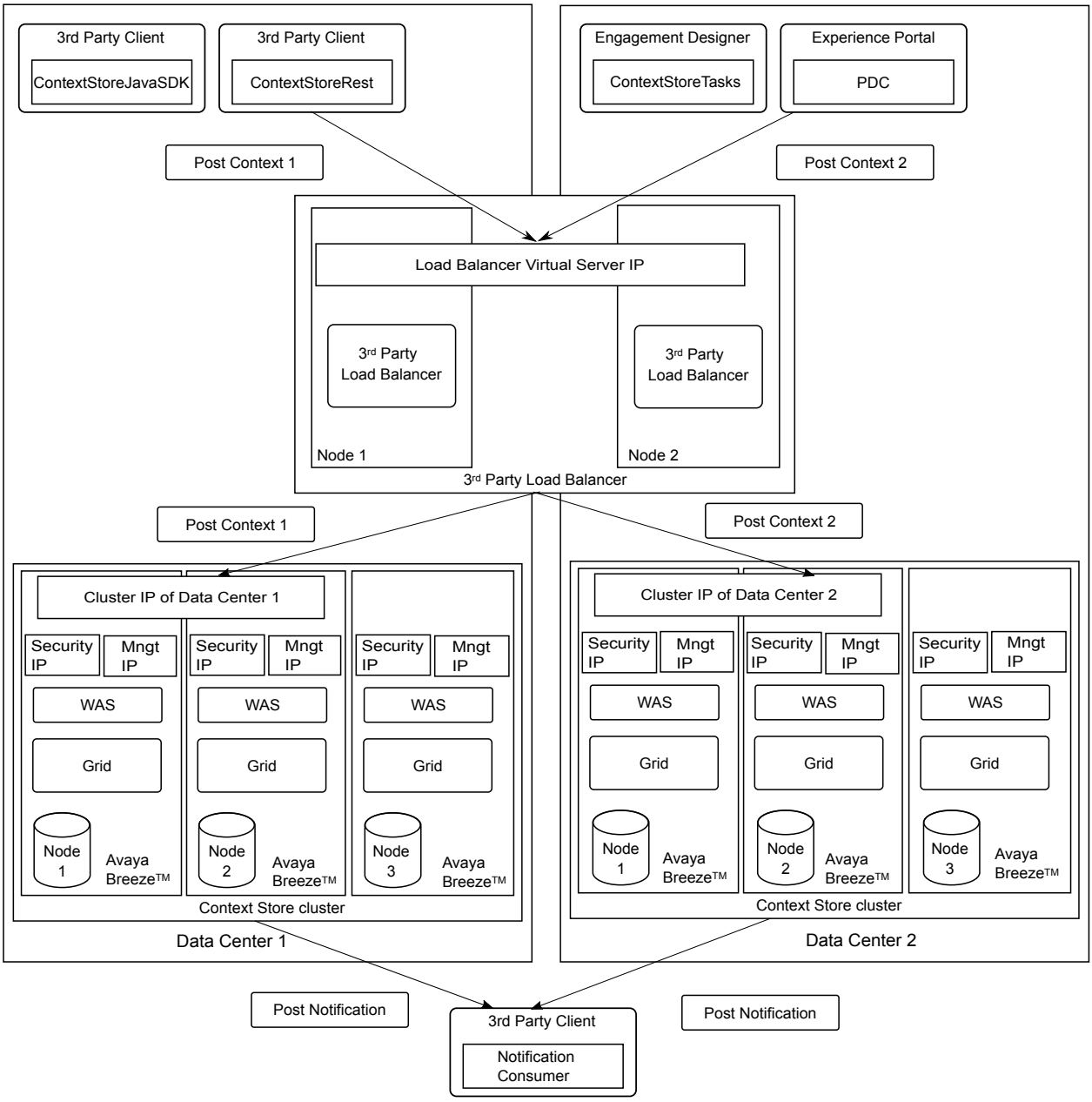
If you enable the option *Cluster Deny Service on 2 node outage* from the ContextStoreManager attributes, the third Avaya Breeze® platform server in a Context Store cluster stops processing requests when the other two servers stop working. The third server then returns 500's as the status code, and the load balancer routes the traffic to the other cluster.

Session preservation

Context Store geo redundancy incorporates bi-directional replication of state and data across the two Context Store clusters to ensure preservation of session, in case of a cluster failure. The bi-directional replication strategy stores backup of all contexts in each Context Store cluster, so that if a cluster or a datacenter is unavailable, you can continue working with the backed up context.

Notifications in geo redundant architecture

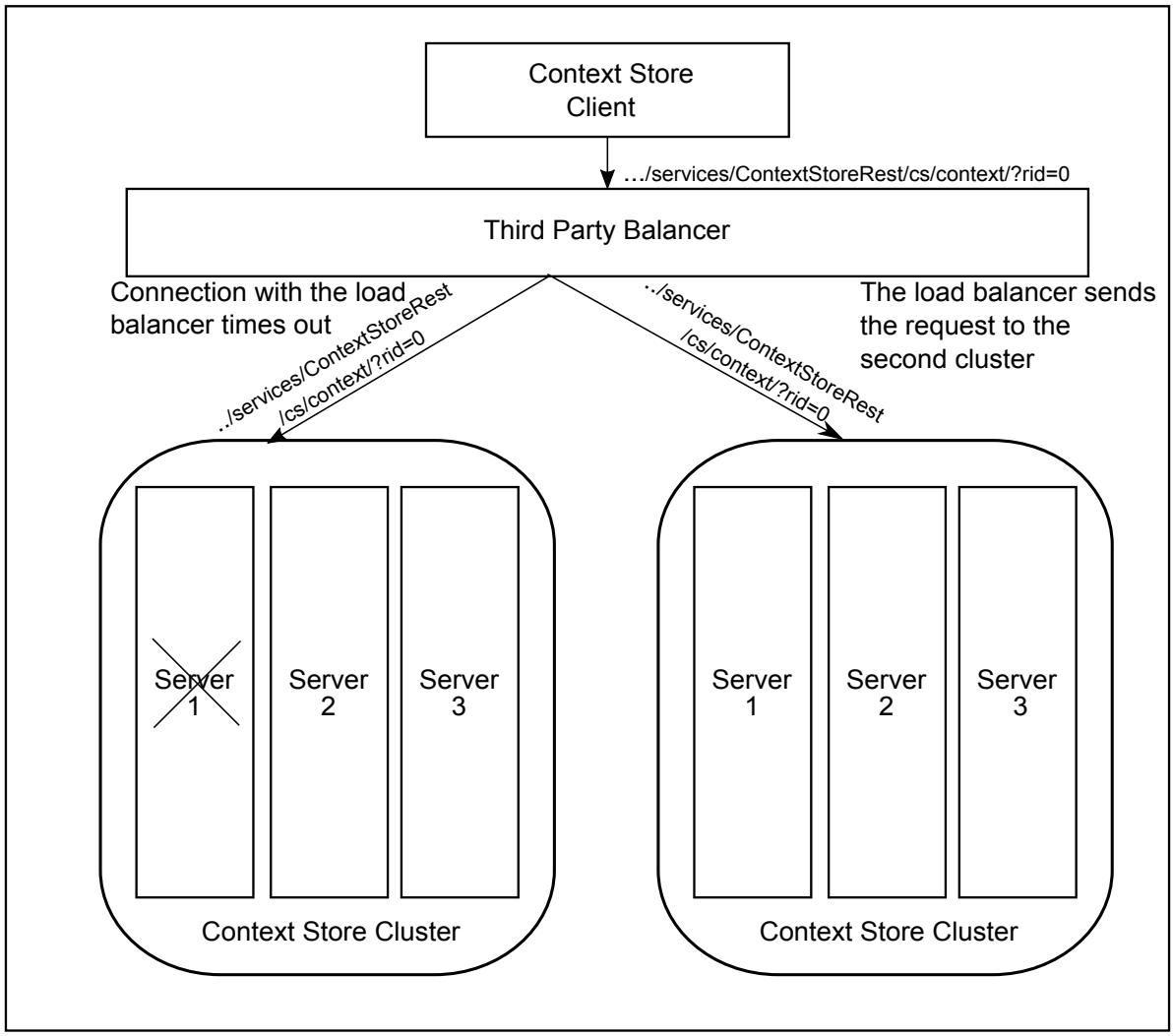
In a geo redundant architecture, Context Store uses the same notification subscription details on each cluster, so that you receive notifications from any of the two clusters. If the Context Store cluster to which you have sent your request is unavailable, Context Store reroutes your request to the other available cluster. The cluster then processes your request and generates the notifications. The following diagram depicts the working of ContextStoreNotify in a Context Store geo redundant architecture.


3rd Party Client
ContextStoreJavaSDK
3rd Party Client
ContextStoreRest
Engagement Designer
ContextStoreTasks
Experience Portal
PDC
Post Context 1
Post Context 2
Load Balancer Virtual Server IP
3rd Party Load Balancer
3rd Party Load Balancer
Node 1
Node 2
3rd Party Load Balancer
Post Context 1
Post Context 2
Cluster IP of Data Center 1
Cluster IP of Data Center 2
Security IP
Mngt IP
WAS
Grid
Node 1
Node 2
Node 3
Avaya Breeze™
Context Store cluster
Data Center 1
Data Center 2
Post Notification
Post Notification
3rd Party Client
Notification Consumer

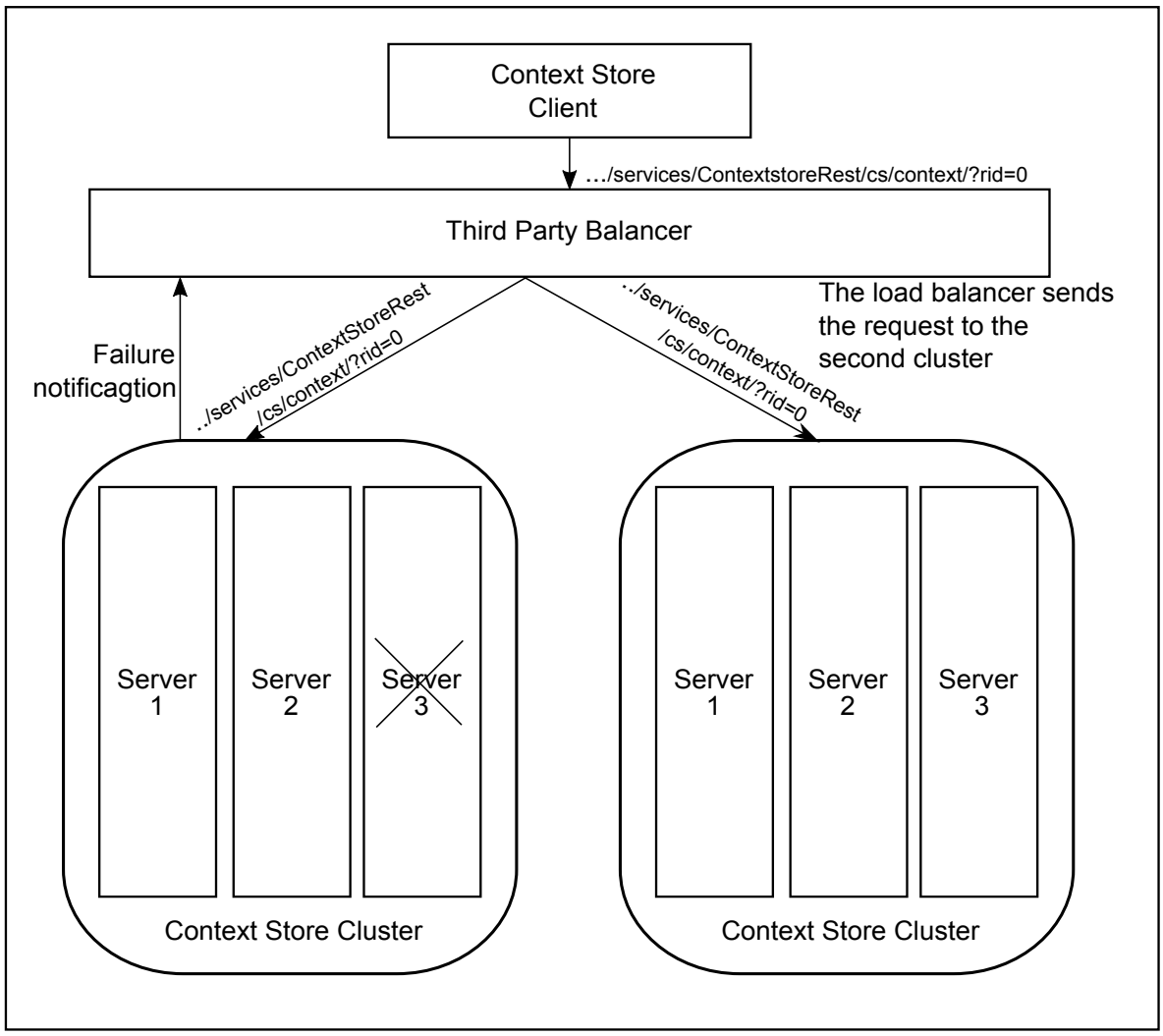
Failover support

In a Context Store geo redundant setup, the load balancer detects that a cluster is unavailable, the load balancer routes the incoming requests to the available cluster. The geo redundant architecture supports the following failover scenarios:

- Both servers are unavailable: If the two Avaya Breeze® platform servers in a Context Store cluster are unavailable, the cluster IP address is also unavailable. The geo redundant load balancer detects the failure and routes all requests to the remaining active cluster.



- Either of the Avaya Breeze® platform servers and the other server of a Context Store cluster is unavailable, the remaining server detects the failure and returns a status code of 500. Upon receiving the failure information from the remaining server, the load balancer routes all requests to the other cluster in the geo redundant system.



- All three servers are unavailable: If all three Avaya Breeze® platform servers in a Context Store cluster are unavailable, the geo redundant load balancer routes all requests to the remaining Context Store cluster in the geo redundant system.

For the reference implementation, the Nginx load balancer running on the Geo cluster will automatically detect if a Context Store cluster is back in service. There are no manual steps required for the Load Balancer to reintroduce a Context Store cluster back into receiving requests.

Chapter 8: Performance

Capacity and scalability specification

This topic provides the capacity specification for the Avaya certified deployment scenarios. Avaya has used these values as a benchmark for capacity verification.

Key considerations:

- The standard storage capacity of a context is 2 KB in raw JSON data. Note that the object might be significantly larger when stored in the data grid depending on the complexity of the object. When you enable optional features, which require memory resources, the size of the Context objects, lease time, or throughput must be decreased to achieve the certified performance. Also, when you use the aliasId feature, the 2 KB standard context must be reduced to 1.5 KB to achieve the certified performance level, in terms of throughput and lease time. Enabling the Audit feature also has an impact on Context Store capacity. You must reduce the context size based on the number of audit entries enabled. For more information, see *Avaya Context Store Snap-in Developer Guide*.
- The average latency of a request in an hour is less than 250 milliseconds with a maximum latency of two seconds regardless of the deployment size. Latency is the time interval between the client request and the Context Store response, in milliseconds.
- Context Store supports a maximum of three aliasIds.
- For production environments which require the Geo redundancy feature, each cluster must contain two or more Avaya Breeze® platform nodes with 16 GB of memory and 8 cores allocated to each node.
- If you want to enable the Event streams feature, you require 6 GB memory on the Avaya Breeze® platform cluster.
- For production deployments that are not certified with five notifications, if you increase the number of notification clients to five, the request per second capacity will be reduced to half.

  Note:

  From Release 3.2 of Context Store, performance is tested with only one notification client.

For the capacity certified for each Avaya certified deployments, see the *Certified Deployments section in Avaya Context Store Snap-in Release Notes*.

Chapter 9: Security

Overview

Context Store uses Avaya Breeze® platform to provide all security configurations for access to its services. Avaya Breeze® platform provides configuration for HTTPS, Mutual TLS (Client Certificate Challenge), Cross Origin Resource Sharing (CORS), Whitelists, and Trust Certificates. In addition, System Manager provides a flexible platform for administering certificates and authorities.

Note:

When enabling the Geo Redundancy feature or using the CS Pluggable Data Connector for Orchestration Designer or a secured client of ContextStoreScreenPop, the CS SDK, or the ContextStoreNotify service, additional security steps (certificates and/or licenses) are required. See individual feature sections for detailed information about required configuration. There are several options available when configuring certificates using System Manager; to help getting started, one particular approach is documented in the *Appendix section of Avaya Context Store Snap-in Developer Guide*.

For more information about security configuration, see *Avaya Breeze® platformOverview and Specification* and *Avaya Aura® System Manager Overview and Specification*.

Secure space

With Context Store Secure space, you can secure the data grid with your own unique password. The unique password prevents unauthorized access of the grid by tools. The secure user for the grid is dcmuser. After security is enabled, the username dcmuser and the password that you set in the **Cluster Attributes** page are applied to the data grid.

You can configure Space security when the cluster is being created or by editing the cluster configuration after the cluster is created.

Warning:

When you enable security after creating the cluster, the system deletes the existing unsecured data grid and all data that the grid contains automatically and the data grid is redeployed in secure mode.

Configuring space security

Procedure

1. On the System Manager web console, go to **Elements** > **Avaya Breeze** > **Cluster Administration**.
2. If you are creating a new secure cluster, click **New** on the **Cluster Administration** page.
3. If you are securing an existing cluster:
   a. Select the check box of the cluster that you want to secure and select the **Deny New Service** option from the **Cluster State** drop-down menu.
   b. On the Warning box, click **Continue**.

      The system changes the state of the cluster to `Denying`.
   c. Click **Edit**.
   d. Go to **Cluster Attributes** > **Cluster Editor** > **General** tab.
   e. Enter the password that you want to use in the **Grid password** text box.
   f. Select the **Use secure grid?** check box.
   g. Click **Commit**.

      The system prompts you to ensure that all Avaya Breeze® platform server restarts are complete before placing the cluster into the **Accept New Service** state.
   h. Click **OK**.
   i. Select the check box of the new/modified cluster.
   j. From the **Cluster State** drop-down menu, select **Accept New Service**.
   k. Click **Continue** in the **Accept New Service** dialog box.

      The system displays the **Accepting** state in the **Servers State** column.

Selecting TLS version for a snap-in service

About this task

Avaya Breeze® platform supports selection of minimum TLS version for SIP and HTTPS service in each cluster. By default, Avaya Breeze® platform uses the value of the **Minimum TLS Version** field set in System Manager configuration. If the value of the **Minimum TLS Version** field is TLSv1.1, Avaya Breeze® platform uses TLSv1.2. If the value of the **Minimum TLS Version** field is SSLv3, Avaya Breeze® platform uses TLSv1.0.

Procedure

1. On the System Manager web console, click **Elements** > **Avaya Breeze®**.
2. In the left navigation pane, click **Cluster Administration**.

3. On the Cluster Administration page, select the check box for the cluster and then click **Edit**.
4. On the Cluster Editor page, perform the following steps:
   a. Click the **Services** tab.

      The system displays the list of services installed in the cluster.

   b. Select the checkbox next to the snap-in service for which you want to select the TLS version.
   c. From the **Select TLS Version for the Selected Snap-in(s)**, select the relevant TLS version.

   The selected TLS version appears in the TLS version column corresponding the service snap-in.
5. Click **Commit**.
6. Reboot the cluster for the changes to take effect.

Certificate-based authentication

For the Context Store certificate-based authentication, you must perform the following procedures in the System Manager web portal:

- Configure the client certificate challenge in Avaya Breeze® platform Element Manager. The configuration is available on the **Avaya Breeze** > **Configuration** > **HTTP Security** page.
- Create a client key store.
- Download the Avaya Breeze® platform trusted certificate from System Manager.
- Authenticate browsers.

Ensure that client applications that access Context Store operations provide the location and credentials of the client certificate and trusted certificate to establish a secure session with the Context Store cluster.

For information about Avaya Breeze® platform certificate-based authentication, see the *Security* chapter in *Avaya Breeze® platform Overview and Specification*. For information about Avaya Aura® System Manager certificate-based authentication, see the *Security Enhancement* section in *Avaya Aura® System Manager Overview and Specification*.

Cross Origin Resource Sharing

Cross Origin Resource Sharing (CORS) enables access to Context Store requests that originate from other domains.

The configuration is available on the **Avaya Breeze** > **Configuration** > **HTTP Security** page.

Note:

When you enable the client certificate challenge , web clients cannot authenticate through Javascript, that is, Ajax calls. As the browser and the Javascript layer are not connected, the required client certificate is not sent.

Port utilization

For Context Store and Avaya Breeze® platform port information, see the applicable Avaya Breeze® platform and Context Store Port Matrix documents at https://support.avaya.com/security.

Chapter 10: Troubleshooting

Troubleshooting overview

This chapter provides information about the alarms and events that Avaya Context Store Snap-in generates. It also lists the Context Store log files. For information on troubleshooting issues related to Avaya Breeze® platform, see the *Maintaining and Troubleshooting Avaya Breeze® platform* guide.

Alarms

Overview

Context Store generates alarms whenever an error occurs.

You can view, search, export, and configure alarms from the System Manager web portal. The alarms information is available in the **Services** > **Events** > **Alarms** page in System Manager.

Prerequisites

Using System Manager, you must create a simple network management protocol (SNMP) target profile and assign the profile to your network managing system (NMS).

For more information about creating and managing SNMP target profiles, see *Administering Avaya Aura® System Manager* available at http://support.avaya.com.

Alarm status

Context Store alarm statuses are consistent with those of the other snap-ins deployed on Avaya Breeze® platform. These alarms can have any of the following two statuses:

Status	Description
Raised	An alarm has been generated. Software recovery actions have failed to correct the problem.
Cleared	The problem has been fixed and the alarm has been cleared. This state must be set manually.

Context Store generates two alarm IDs for the same alarm- one when raising the alarm and the other when clearing the alarm. The alarm ID that Context Store generates for clearing an alarm contains *CLR* as a prefix in the original alarm ID that was in *Raised* state.

Alarm severities

Avaya Context Store Snap-in generates alarms with two severity types, as described in the following table:

Severity	Description
Major	All the Context Store alarms in Raised state are of Major severity.
Normal	Context Store generates a clear alarm with Normal severity.

For more information on alarm statuses and severities, see *Maintaining and Troubleshooting Avaya Aura® Avaya Breeze® platform*.

ContextStoreManager_CS_EVT_1

Event ID `ContextStoreManager_CS_EVT_1`

Default event text `Cluster requests per second is greater than the High configured threshold.`

Event level Major

Trigger component ContextStoreRest: Processing number of requests

Problem description

The REST requests per second is greater than or equal to the configured high threshold for the service or the cluster.

The alarm is cleared automatically when the service request per second is lower than the value in the Context Store attribute **CS Threshold: Service Low Requests per Second**.

Note:

You can configure the high threshold value by updating the ContextStoreManager attribute ***CS Threshold: Service High Requests per Second***. The value is 1240.

Proposed solution

Procedure

Contact the support engineer to ensure that the traffic load is minimized.

ContextStoreManager_CS_EVT_2

Event ID `ContextStoreManager_CS_EVT_2`

Default event text	`Cluster lacks enough ContextStoreRest instances to support the maximum requests/second load.`
Event level	Major
Trigger component	ContextStoreRest: Number of live instances in a cluster

Problem description

Multiple instances of ContextStoreRest failed and Context Store cannot support the service high availability requests for every second.

The system clears the alarm when the number of deployed ContextStoreRest interfaces is equal to or more than 2.

Proposed solution

Procedure

1. Ensure that all the Avaya Breeze® platform nodes in the cluster are running.
2. Ensure that all Avaya Breeze® platform nodes have network connection access.
3. Ensure that all Avaya Breeze® platform nodes have ContextStoreRest snap-in deployed.
4. Ensure that the Avaya Breeze® platform cluster has ContextStoreManager snap-in deployed.

ContextStoreManager_CS_EVT_3

Event ID	`ContextStoreManager_CS_EVT_3`
Default event text	`Cluster lacks enough ContextStoreRest instances to support the maximum requests/second load and be highly available.`
Event level	Major
Trigger component	ContextStoreRest: Number of live instances in a cluster

Problem description

The system cannot support the service high threshold requests per second in the event of another instance failure.

The alarm is cleared when number of REST instances in the cluster is equal to or more than 3.

Proposed solution

Procedure

1. Ensure that all Avaya Breeze® platform nodes in the cluster are running.

2. Ensure that all the Avaya Breeze® platform nodes have network connection access.
3. Ensure that all Avaya Breeze® platform nodes have ContextStoreRest snap-ins deployed.
4. Ensure that the Avaya Breeze® platform cluster have ContextStoreManager snap-in deployed.

ContextStoreManager_CS_EVT_4

Event ID	`ContextStoreManager_CS_EVT_4`
Default event text	`Failed to persist item to external data mart.`
Event level	Major
Trigger component	ContextStoreManager: EDM deployment

Problem description

System cannot persist information from datagrid to External Data Mart. This error occurs if Context Store cannot perform any of the following:

- Connect to the database configured for External Data Mart.
- Validate schema or data of the database configured for External Data Mart.

The alarm is cleared when the connection with database is restored with External Data Mart.

Proposed solution

Procedure

1. Ensure that Context Store is able to connect to the external database.
2. Ensure that the values that you have specified for the External Data Mart attributes in the ContextStoreManager attributes page are correct. If the values are incorrect:
   a. Update the values.
   b. Redeploy ContextStoreManager and ContextStoreRest.
3. Ensure that the database schema is as per the Context Store requirements. If the database schema is incorrect:
   a. Update the database schema.
   b. Redeploy ContextStoreManager and ContextStoreRest.

ContextStoreManager_CS_EVT_5

Event ID	`ContextStoreManager_CS_EVT_5`

Default event text	`ContextStoreNotify Subscription Disabled see log for Details.`
Event level	Major
Trigger component	ContextStoreNotify

Problem description

This alarm is raised when there is a failure to connect to an endpoint and the subscription of that endpoint is disabled automatically.

Proposed solution

Procedure

1. Check logviewer on System Manager to identify details about the subscription that is disabled.
2. Verify the validity of the endpoint and enable the subscription.

Events

Overview

Context Store generates events for warning purpose only.

You can view the events in Log viewer at the following directory: `Home/Services/Events/Logs/Log Viewer`.

CSAUD_5

Event ID	`CSAUD_5`
Default event text	`Instance requests per second is greater than the configured threshold.`
Event level	Warning

Problem description

Context Store creates the `CS_AUDIT_5` event log in System Manager when Context Store operates at the maximum capacity. The system operates at maximum capacity when the request per second is greater than or equal to the value of the ContextStoreManager attribute *CS Threshold: Instance High Requests per Second*.

Proposed solution

Procedure

Contact the support engineer to ensure that the traffic load is minimized.

CSAUD_7

Event ID	`CSAUD_7`
Default event text	`Instance latency is greater than the configured threshold.`
Event level	Warning

Problem description

Context Store creates the `CSAUD_7` event log in System Manager when the average time for the context data to travel between the client and Context Store exceeds the value that you have specified for the ContextStoreManager attribute *CS Threshold: High Latency*.

Proposed solution

Procedure

1. Ensure that all Avaya Breeze® platform nodes in the cluster are running.
2. Ensure that all Avaya Breeze® platform nodes have network access.
3. Ensure that all Avaya Breeze® platform nodes have ContextStoreRest snap-in deployed.
4. Ensure that all Avaya Breeze® platform clusters have ContextStoreManager snap-in deployed.
5. Verify that the context size of the requests is as per the Context Store requirement.

CSAUD_8

Event ID	`CSAUD_8`
Default event text	`Instance error rate is greater than the configured threshold.`
Event level	Warning

Problem description

Context Store creates the `CSAUD_8` event log in System Manager when the rate of the failed requests returned to the client from Context Store exceeds the threshold value that you have specified in the ContextStoreManager attribute *CS Threshold: High Error Rate*.

Proposed solution

Procedure

1. Ensure that all Avaya Breeze® platform nodes in the cluster are running.
2. Ensure that all Avaya Breeze® platform nodes have network access.
3. Ensure that all Avaya Breeze® platform nodes have ContextStoreRest snap-in deployed.
4. Verify that all Avaya Breeze® platform clusters have ContextStoreManager snap-in deployed.
5. Ensure that the traffic load does not exceed the high threshold request per second.

CSAUD_10

Event ID	`CSAUD_10`
Default event text	`Cluster average lease time is greater than the configured threshold.`
Event level	Warning

Problem description

Context Store creates the `CSAUD_10` event log in System Manager when the average lease time for data stored by Context Store exceeds the threshold value.

Proposed solution

Procedure

No corrective action is required.

CSAUD_11

Event ID	`CSAUD_11`
Default event text	`Cluster requests per second is greater than the configured Low threshold.`
Event level	`Information`

Problem description

Context Store creates the `CSAUD_11` event log when cluster requests per seconds is greater than the configured low threshold value.

CSAUD_13

Event ID	`CSAUD_13`
Default event text	`Instance requests per second is greater than the configured Low threshold.`
Event level	Warning

Problem description

Context Store creates the `CSAUD_13` event log in System Manager when the instance requests per second is greater than the configured Low threshold.

Proposed solution

Procedure

1. Ensure that all the Avaya Breeze® platform nodes in the cluster are in the running state.
2. Ensure that all the Avaya Breeze® platform nodes have network access.
3. Ensure that all Avaya Breeze® platform nodes have the ContextStoreRest snap-in deployed.
4. Ensure that all Avaya Breeze® platform clusters have ContextStoreManager snap-in deployed.

Logging

Context Store log files

The following table describes the log name and location of the logs related to Context Store:

Log name	Location	Description
Context Store <service> logs	/var/log/Avaya/services/<*ServiceName*>/<*ServiceName*>.log	Logs related to Context Store services, such as ContextStoreManager, ContextStoreRest, and so on.
External Data Mart logs	/var/log/Avaya/dcm/pu/ContextStoreManager/ContextStoreManager-cs-edm.log	Logs related to the External Data Mart feature.

Table continues…

Log name	Location	Description
ASM logs	/var/log/Avaya/sm/asm.log	Logs related to Avaya Breeze for platform APIs and features used by Snap-ins.
Text logs	/var/log/Avaya/sm/TextLog_date_time.log	Provides information on problems that might be blocking services.
Event logs	/var/log/Avaya/services/event.log	Alarms and events raised by Context Store snap-ins.
Data grid logs	/var/log/Avaya/dcm/	Data grid log file location.

Log level configuration

You can adjust the logging level of all snap-in services individually from **Home** > **Elements** > **Avaya Breeze** > **Configuration** > **Logging**.

Log file configuration

The Context Store service log files are configured, by default, to store up to 10 log files of maximum 10MB each.

This size and number of log files stored, is configurable for each individual Context Store service in the `/opt/Avaya/Common/conf/log4j.properties` file:

- log4j.appender.<*service-name*>.MaxFileSize=10MB
- log4j.appender.<*service-name*>.MaxBackupIndex=10

Chapter 11: Related resources

Documentation

See the following related documents at http://support.avaya.com.

Title	Use this document to understand:	Audience
Installing		
Deploying Avaya Breeze® platform	The procedures on deploying the Avaya Breeze® platform services.	• System administrators • Services and Support personnel • Avaya Professional Services • Implementation engineers
Avaya Breeze® platform Overview and Specification	Avaya Breeze® platform requirements.	Anyone who wants to have a high-level understanding of Avaya Breeze® platform features, functions, capacities, and limitations.
Deploying Avaya Aura® System Manager on VMware® in Virtualized Environment	The procedures for deploying the Avaya Aura® System Manager virtual application in Avaya Aura® Virtualized Environment.	• Implementation Engineers • Field Technicians • Business Partners • Solution Providers • Customers
Maintaining		
Avaya Context Store Snap-in Release Notes	The known issues, patches, and workarounds specific toContext Store.	• Avaya Professional Services • Implementation engineers
Avaya Breeze® platform Port Matrix document	Avaya Breeze® platform port information.	• Implementation Engineers • Field Technicians • Business Partners • Solution Providers • Customers

Table continues…

Title	Use this document to understand:	Audience
Avaya Context Store Port Matrix document	Context Store port information.	• Implementation Engineers • Field Technicians • Business Partners • Solution Providers • Customers
Maintaining and Troubleshooting Avaya Breeze® platform	Avaya Breeze® platform alarm statuses and severities.	Anyone who needs information about maintaining and troubleshooting Avaya Breeze® platform.
Administering		
Avaya Context Store Snap-in Developer Guide	Developer information for all applicable Context Store features and how to write applications using the Context Store REST Interfaces.	• Business process analysts • Developers • Services and Support personnel • Avaya Professional Services
Administering Avaya Breeze® platform	The procedures to administer and configure the Avaya Breeze® platform services.	• System administrators • Services and Support personnel
Administering Avaya Aura® System Manager	The procedures to administer and configure System Manager.	• System administrators • Services and Support personnel
Avaya Aura® Orchestration Designer Developer's Guide	How to write software using Orchestration Designer that interacts with Context Store.	• Business process analysts • Developers
Avaya Aura® System Manager Overview and Specification	Avaya Aura® System Manager certificate-based authentication.	Anyone who wants to have a high-level understanding of System Manager features, functions, capacities, and limitations.
Avaya Engagement Designer Developer's Guide	How to write software using Avaya Engagement Designer that interacts with Context Store. Detailed usage information for the Context Store Task Type for Engagement Designer is documented in the *Avaya Context Store Snap-in Developer Guide*.	• Business process analysts • Developers

Related links

Finding documents on the Avaya Support website on page 111

Finding documents on the Avaya Support website

Procedure

1. Go to https://support.avaya.com.
2. At the top of the screen, type your username and password and click **Login**.
3. Click **Support by Product** > **Documents**.
4. In **Enter your Product Here**, type the product name and then select the product from the list.
5. In **Choose Release**, select an appropriate release number.
6. In the **Content Type** filter, click a document type, or click **Select All** to see a list of all available documents.

   For example, for user guides, click **User Guides** in the **Content Type** filter. The list displays the documents only from the selected category.
7. Click **Enter**.

Related links

Documentation on page 109

Training

The following courses are available on the Avaya Learning website at Avaya Learning. Enter the course code in the **Search** field, and click **Go** to search for the course.

Course code	Course title
2519W	Introducing Avaya Context Store Snap-in (Self-paced, On-demand)

Support

Go to the Avaya Support website at https://support.avaya.com for the most up-to-date documentation, product notices, and knowledge articles. You can also search for release notes, downloads, and resolutions to issues. Use the online service request system to create a service request. Chat with live agents to get answers to questions, or request an agent to connect you to a support team if an issue requires additional expertise.

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