Oracle Utilities DERMS Platform Integration

User's Guide

Release 25.4

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Oracle Utilities DERMS Platform Integration User's Guide, Release 25.4

Contents

Preface

Welcome to the Oracle Utilities DERMS Platform Integration User's Guide for release 25.4. This platform is an integration between Oracle Utilities Edge Distributed Energy Resources Management System, Oracle Utilities Digital Asset Cloud Service, and Oracle Utilities Analytics Insights.

This user's guide includes the information required for the integration to work effectively. It describes how to use the features in Oracle Utilities Edge Distributed Energy Resources Management System to work in Oracle Utilities Digital Asset Cloud Service, and Oracle Utilities Analytics Insights. It provides instructions for completing common tasks and provides descriptions of the fields, windows, buttons, and menus used to perform those tasks. The instructions and descriptions in this guide are based on the default product configuration for a user with full authority to use all functionality.

The preface includes the following:

Audience

This document is intended for anyone implementing the integration between Oracle Utilities Edge Distributed Energy Resources Management System, Oracle Utilities Digital Asset Cloud Service, and Oracle Utilities Analytics Insights.

Documentation and Resources

For more information regarding this integration, foundation technology, and the edge applications, refer to the following documents:

Product Documentation

Resource	Location
Oracle Utilities DERMS Platform Integration documentation	https://docs.oracle.com/en/industries/energy-water/integrations-index.html
Oracle Utilities Network Management System documentation	https://docs.oracle.com/en/industries/energy-water/network-management-system/
Oracle Utilities Edge Distributed Energy Resources Management System documentation	https://docs.oracle.com/en/industries/energy-water/digital-asset-cloud-service/
Oracle Utilities Analytics Insights	https://docs.oracle.com/en/industries/energy-water/analytics-insights/index.html

Additional Documentation

Resource	Location
Oracle Integration Cloud Service documentation	Refer to the OIC documentation at: https://docs.oracle.com/en/cloud/paas/integration-cloud/index.html
Oracle Support	Visit My Oracle Support at https://support.oracle.com regularly to stay informed about updates and patches. Refer to the Certification Matrix for Oracle Utilities Products (Doc ID 1454143.1) on My Oracle Support to determine if support for newer versions of the listed products is included. For more information, refer to the Oracle Utilities Integrations page at http://my.oracle.com/site/tugbu/productsindustry/productinfo/utilities/integration/index.htm
Oracle University for training opportunities	http://education.oracle.com/

Updates to Documentation

The complete Oracle Utilities DERMS Platform Integration documentation set is available from Oracle Help Center at https://docs.oracle.com/en/industries/energy-water/index.html.

Visit My Oracle Support for additional and updated information about the product.

Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc.

Access to Oracle Support

Oracle customers have access to electronic support for the hearing impaired. Visit: http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info or http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

Acronyms

The following terms are used in this document:

Term	Expanded Form
DACS	Oracle Utilities Digital Asset Cloud Service
DER	Distributed Energy Resource
Edge DERMS	Oracle Utilities Edge Distributed Energy Resources Management System
DR	Demand Response
DVM	Domain Value Map (Lookup)
OIC	Oracle Integration Cloud

Term	Expanded Form
OUAI	Oracle Utilities Analytics Insights

Statute of Limitations

The screenshots and images provided in this document are sample references based on the previous/current releases of Oracle Utilities Edge Distributed Energy Resources Management System, Oracle Utilities Digital Asset Cloud Service, and Oracle Utilities Analytics Insights. They may change based on changes to UI in the future releases.

Chapter 1

Overview

This chapter provides an overview about Oracle Utilities Edge Distributed Energy Resources Management System, Oracle Utilities Digital Asset Cloud Service, Oracle Utilities Analytics Insights, and Oracle Integration Cloud. It focuses on the functionality and business standpoint of each part and in the integration.

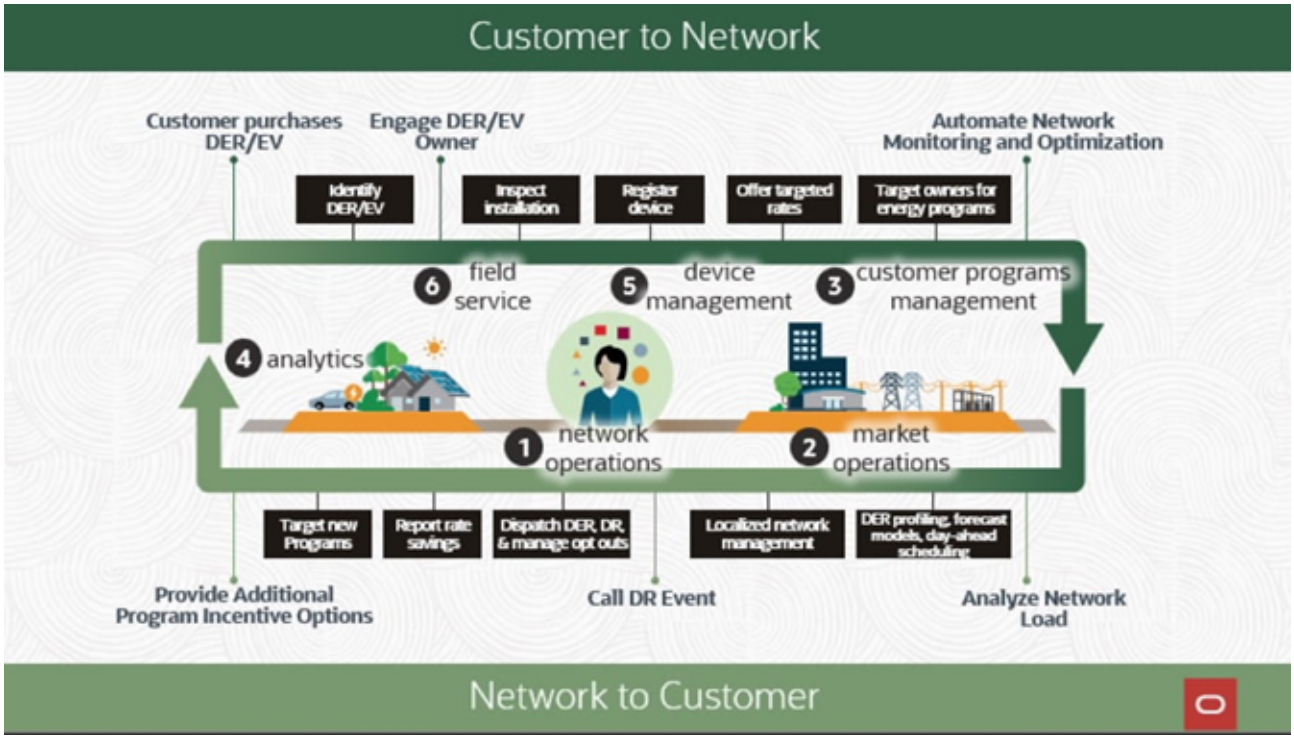
The chapter provides detailed information about the following:

- Background
- Integration Overview

Background

Distributed Energy Resources Management System solutions are architected to model, optimize, dispatch, and manage the Distributed Energy Resources connected to the grid. The key components of a Distributed Energy Resources Management System solution are:

- **Distributed Energy Resources Network Operations**: Real-time grid operations management and optimization of all Distributed Energy Resources and Demand Response devices, including device- and network-level scheduling, control, and optimization.
- **Distributed Energy Resources Device Management**: Distributed Energy Resources device register of connected components, including controllable resources, control/communications modules, physical and electrical asset details, and program constraint attributes.
- **Distributed Energy Resources Customer and Programs Management**: New connections, enrollment, eligibility, opt-in/opt-out, measurement and verification, billing and payment.
- **Distributed Energy Resources Field Service**: Inventory management, service installs, customer service, inspections, proactive maintenance, and/or repairs.
- **Distributed Energy Resources Analytics**: Tools to understand, model, and predict Distributed Energy Resources characteristics and impacts (digital twins, forecasts, state estimation, analysis, and performance)
- **Distributed Energy Resources Market Operations**: Day-ahead forecasts, VPP, bid management, market clearing, and execution. Cybersecure Market Portal for Distributed Energy Resources owners and aggregators to participate in markets to enable ISO/DSO to securely leverage Distributed Energy Resources as both supply-side and grid-side resources.



Oracle Energy and Water's Distributed Energy Resources Management System is an evolving platform that orchestrates how the functional network components and parties from the extended ecosystem (including consumers and their Distributed Energy Resources) can operate, coexist, and interact in the new, decentralized energy markets. While the end-state solution will cater to all the above Distributed Energy Resources components and beyond, the current platform supports Demand Response management and is composed of 3 core applications:

- Oracle Utilities Digital Asset Cloud Service
- Oracle Utilities Edge Distributed Energy Resources Management System
- Oracle Utilities Analytics Insights

Seamless integration within these components and with external applications is crucial for successfully managing the utility demand response programs.

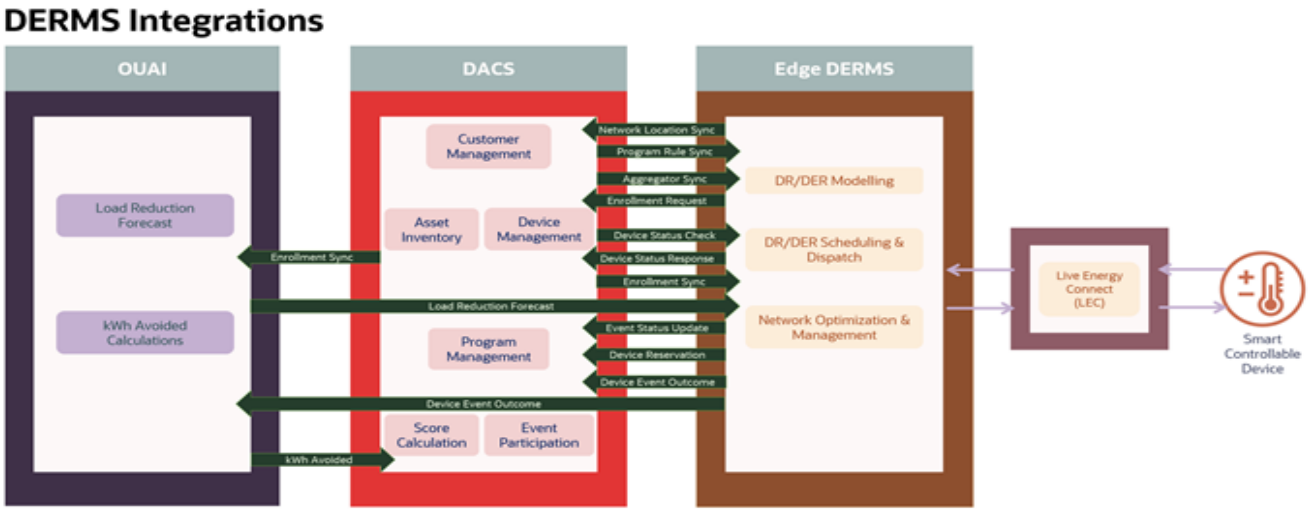
Integration Overview

The integration between Oracle Utilities Edge Distributed Energy Resources Management System, Oracle Utilities Digital Asset Cloud Service, and Oracle Utilities Analytics Insights components facilitates the exchange of information related to controllable devices at a customer's premise.

This integration can be leveraged to support customer enrollment and unenrollment to programs, controllable device replacement, DER registration, load reduction forecasts, control cost evaluation, program event forecast, event participation outcomes, energy (kWh) avoided calculation and customer settlements. It also facilitates the master data synchronization related to network location hierarchy, program rules, and aggregator information.

Oracle Utilities Digital Asset Cloud Service is responsible for managing demand response programs and initiating program enrollments and orchestration of the customer enrollment journey. Oracle Utilities Edge Distributed Energy Resources Management System supports the creation, scheduling, and dispatching of demand response events, whilst Oracle Utilities Analytics Insights computes load reduction forecast values for each customer to facilitate optimal resource utilization during event creation and derives actual energy reduction after an event for each customer who participated to allow financial settlement calculations.

The following diagram shows an overview of the integration:



The complete integration solution is released in 3 different Oracle Integration Cloud packages:

- Oracle Utilities Digital Asset Cloud Service integration to Oracle Utilities Edge Distributed Energy Resources Management System
- Oracle Utilities Analytics Insights integration to Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Edge Distributed Energy Resources Management System
- Oracle Utilities Digital Asset Cloud Service integration to Oracle Field Service

Important! Oracle Utilities Digital Asset Cloud Service integration to Oracle Utilities Edge Distributed Energy Resources Management System is a pre-requisite or should be installed first before the Oracle Utilities Analytics Insights integration to Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Edge Distributed Energy Resources Management System.

The following systems participate in the overall process:

- Oracle Utilities Digital Asset Cloud Service (DACS)
- Oracle Utilities Edge Distributed Energy Resources Management System (Edge DERMS)
- Oracle Utilities Analytics Insight (OUAI)
- Oracle Integration Cloud (OIC)

Oracle Utilities Digital Asset Cloud Service (DACS)

Oracle Utilities Digital Asset Cloud Service provides the core functionality for utilities to create, run, and maintain demand response and distributed energy resource programs as part of a larger Distributed Energy Resource Management System.

Oracle Utilities Digital Asset Cloud Service comprises the following functional areas:

- **Asset and Device Management**: Maintenance of controllable assets, such as "smart" thermostats, electric vehicle chargers, storage batteries, and other types of devices.

- **Program Enrollment/Unenrollment**: Identification of specific customers that are eligible for particular programs, and establishing relationships between the customers, the programs, and if appropriate, device locations where one more controllable device are (or have been) installed.
- **Program Management**: Creation and maintenance of Demand Response Programs to which customers can subscribe and which allow utilities to temporarily alter the settings of specific devices in their homes as a response to periods of high demand.
- **Program Subscriptions**: Maintenance of a customer's program subscriptions, which represent the customer's enrollment in a program and device registration. Program subscriptions link the customer to a program and device location where controllable devices are installed.
- **Demand Response Event Management**: Identification and reservation of a customer's controllable devices in response to usage demand.
- **Oracle Utilities Cloud Service Foundation**: Tools used to orchestrate and automate infrastructure related processes and migrate data from legacy applications into the cloud service.
- **Oracle Utilities Analytics Visualization**: A suite of analytics applications that provides access to real-time data for self-service exploration, discovery, visualization, and analysis. It includes rich pre-built analytical data models, metrics, and key performance indicators that allow you to derive strategic insights from your data.

Oracle Utilities Edge Distributed Energy Resources Management System (Edge DERMS)

Oracle Utilities Edge Distributed Energy Resources Management System is built on Oracle Utilities Network Management System. It adds incremental support to the Oracle Utilities Network Management System platform for the management of behind the meter demand response resources. Oracle Utilities Edge Distributed Energy Resources Management System can initiate control signals to devices inside customer homes, such as smart thermostats. Oracle Utilities Network Management System facilitates the modeling of individual Demand Response devices down to the customer service point and/or aggregated to load transformers to support Oracle Utilities Network Management System driven optimization. In conjunction with Oracle Utilities Network Management System the Oracle Utilities Edge Distributed Energy Resources Management System component can help optimize electrical networks both operationally and commercially.

Oracle Utilities Edge Distributed Energy Resources Management System offers strategy templates to be used for forecasting for various scenarios during event management. It provides event functions that help grid operators manage and review the forecasted impact of an event. This includes the ability to nominate, approve or reject an event; monitor or cancel an ongoing event and audit historical events. Oracle Utilities Edge Distributed Energy Resources Management System supports automatic generation of event stages (blocks of field device activity) for configured objectives. Stages are built based on cost scores and reduction forecasts received from external applications used to help monitor and manage the Demand Response programs.

Oracle Utilities Analytics Insight (OUAI)

Oracle Utilities Analytics Insights delivers pre-built and trained machine learning insights designed to drive utility business outcomes, solving specific and complex use cases with data science. It provides a client-facing web portal user interface with a back-end analytics engine. Insights are surfaced onto Oracle Analytics Cloud to be explored further by utility users.

Oracle Utilities Analytics Insights supports standardized data ingest from other Oracle Utilities applications to significantly speed up delivery. It provides a flexible platform that allows the ability to ingest any type of data and allow data scientists to add it into an algorithm. Export tools featured within the product allows insights to be added to any data lake.

Oracle Integration Cloud (OIC)

Oracle Integration Cloud is a cloud-based integration application designed to integrate cloud and on-premises applications, automate business processes, gain insight into your business processes, develop visual applications, process files, and exchange business documents with a B2B partner.

With the Process Builder, business processes can be rapidly designed, automated, and managed in the cloud. Continuous business flows are quickly created by connecting and integrating applications that live in the cloud and/or on-premises.

Domain Value Map or lookups are available to match application specific codes between the applications.

Integration Insights and Stream Analytics help to simplify and extract business metrics and create custom dashboards.

Chapter 2

Supported Features

Oracle Utilities Edge Distributed Energy Resources Management System integration to Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Analytics Insights helps to manage customer enrollments, their device registration and participation in a program event, energy utilization, and incentive calculation. This pre-built integration represents significant business value for utilities that need to manage their customer energy utilization for a demand response program.

For more information about the functionality, refer to the Oracle Utilities Edge Distributed Energy Resources Management System Integration to Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Analytics Insightsdocumentation available on the Oracle Energy and Water Integrations page on Oracle Help Center.

This chapter focuses on the following:

- Business Terms
- Functional Overview
- Business Processes
- Use Cases

Business Terms

The following terms are used throughout this document:

- **Term**: Explain what this business term is used for or its purpose.
- **DR Event**: Demand response event

Functional Overview

This section describes the functionalities of the business processes in this integration:

- Data Synchronization
- Enrollment/Unenrollment
- Device Replacement
- Event Participation
- Settlement

Data Synchronization

Data synchronization between the different components of Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Digital Asset Cloud Service enables the users to align the data between the components to facilitate the downstream business processes. It is a key step during the configuration and setup of the both Oracle Utilities Edge Distributed Energy Resources Management System platform and Oracle Utilities Digital Asset Cloud Service. This integration facilitates the master data sync for the following areas:

- Network Location Sync: The network model maintained within Oracle Utilities Edge Distributed Energy Resources Management System that allows an electric service point to be hierarchically associated to a transformer, a feeder, and the substation. This information is synchronized with Oracle Utilities Digital Asset Cloud Service to allow for the service point to be associated to the network location on the grid.
- Program Rule Sync: Oracle Utilities Digital Asset Cloud Service is the source of truth for Program and Program Rules (Constraints) and allows the user to create and manage Programs and Program Rules association. This information is synchronized with Oracle Utilities Edge Distributed Energy Resources Management System to facilitate evaluation of these rules and constraints during device reservation for an upcoming event.
- Aggregator Sync: Oracle Utilities Digital Asset Cloud Service is responsible for managing onboarding and maintaining the details of 3rd party Aggregator that facilitate communication with controllable devices. This information is synchronized with Oracle Utilities Edge Distributed Energy Resources Management System to facilitate device communication via these 3rd party Aggregators.

Enrollment/Unenrollment

Enrollment is the process of associating an eligible customer and their controllable devices(s) to a program. The enrollment process is performed in Oracle Utilities Digital Asset Cloud Service, but it can also be initiated from an external application.

- For utility-owned and utility-installed controllable device(s), the enrollment process is initiated from Oracle Utilities Digital Asset Cloud Service and leads to a work requested being created and sent to a field technician for the device installation.
- For customer-owned controllable devices, these are considered Bring your Own (BYO) devices, where the customer has installed the device(s). The enrollment requests typically originate from external entities like energy aggregators or head-end system providers.

The enrollment requests sent to Oracle Utilities Digital Asset Cloud Service can come from either of the following:

- Oracle Utilities Edge Distributed Energy Resources Management System which receives the request via Oracle Utilities Live Energy Connect.
- External systems directly invoking the DACS Program Enrollments REST service.

Oracle Utilities Digital Asset Cloud Service manages the program enrollment and unenrollment. It validates if customers are eligible to participate in specific programs and establishes the relationship between the customers, their controllable device(s), and the associated programs.

When the program enrollment/unenrollment is completed successfully, the customer's program enrollment or subscription is activated or deactivated in Oracle Utilities Digital Asset Cloud Service which triggers enrollment synchronization to both Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Analytics Insights to send the customer's enrollment and controllable device(s) information.

Two enrollment synchronizations go out from Oracle Utilities Digital Asset Cloud Service:

- To update Oracle Utilities Edge Distributed Energy Resources Management System that a customer has enrolled or unenrolled in a program and their controllable device(s) is/are ready to participate or to be excluded from a DR event. The enrollment information is sent to Oracle Utilities Edge Distributed Energy Resources Management System one by one through a REST service call.
- To update Oracle Utilities Analytics Insights for customers that have enrolled or unenrolled in a program, the device information is not set to Oracle Utilities Analytics Insights. This determines if the customer should be included or excluded from load reduction forecast and from calculation of the customer's Kwh saved during event participation. The enrollment information is sent to Oracle Utilities Analytics Insights through a file extract, a collection of enrollments.

  Note: Mandatory pre-requisite for the enrollment synchronization from Oracle Utilities Digital Asset Cloud Service to Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Analytics Insights to be successful is that the customer information should be synchronized from the Customer Information System application or Oracle Utilities Customer Cloud Service to Oracle

Utilities Digital Asset Cloud Service, Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Analytics Insights.

Device Replacement

Controllable device replacements initiated in Oracle Utilities Digital Asset Cloud Service will also synchronize the device information change to Oracle Utilities Edge Distributed Energy Resources Management System. This change goes out of Oracle Utilities Digital Asset Cloud Service as part of the enrollment synchronization.

Event Participation

To maintain network stability during peak periods, utilities plan and manage the release of 'events' that are aimed to control or constrain the load via the controllable devices enrolled into various programs.

When an enrollment synchronization message is successfully processed within Oracle Utilities Edge Distributed Energy Resources Management System, the device becomes eligible for participation in events related to the enrolled program.

Oracle Utilities Edge Distributed Energy Resources Management System evaluates the following inputs to call the most eligible set of controllable devices for an event:

- **Device Score**: Oracle Utilities Digital Asset Cloud Service will periodically calculate and publish a device score value, along with an availability flag for each controllable device associated to an active program. The score calculation algorithm within Oracle Utilities Digital Asset Cloud Service can be configured to consider various factors, such as equipment specifications, monthly/annual capacity, remuneration and penalties, and participation history. The pre-built integration will facilitate the scheduled transfer of device score file generated by Oracle Utilities Digital Asset Cloud Service to Oracle Utilities Edge Distributed Energy Resources Management System.
- **Load Reduction Forecast**: Oracle Utilities Analytics Insights computes an estimated load reduction forecast for each metered service point that is associated to an active program on a daily basis using key inputs, such as energy consumption data, event participation outcomes, and weather forecasts. This pre-built integration will allow Oracle Utilities Analytics Insights to share a flat file with Oracle Utilities Edge Distributed Energy Resources Management System.
- **Event Status Update**: A demand response event within Oracle Utilities Edge Distributed Energy Resources Management System can be spread across different timeslots known as Event Stages. While an overall event in Oracle Utilities Edge Distributed Energy Resources Management System is likely to span across multiple programs, each individual stage will be aligned to a single Oracle Utilities Digital Asset Cloud Service program event.

  To align such events to Oracle Utilities Digital Asset Cloud Service programs, the Oracle Utilities Digital Asset Cloud Service program event corresponds to an Oracle Utilities Edge Distributed Energy Resources Management System event stage. The Oracle Utilities Digital Asset Cloud Service Program Event business

object lifecycle has been enhanced to mirror the Oracle Utilities Edge Distributed Energy Resources Management System event stages and its statuses.

While an event and its associated stages may transition through various statuses in Oracle Utilities Edge Distributed Energy Resources Management System, the ones considered relevant to be updated on Oracle Utilities Digital Asset Cloud Service program event are as follows:

- **SCHEDULED**: Indicates that an event stage has been scheduled in Oracle Utilities Edge Distributed Energy Resources Management System, and an equivalent program event is created in Oracle Utilities Digital Asset Cloud Service.
- **CANCELED**: A scheduled event or stage has been cancelled in Oracle Utilities Edge Distributed Energy Resources Management System, and the Oracle Utilities Digital Asset Cloud Service program event will be transitioned from SCHEDULED to CANCELLED.
- **IN PROGRESS**: Status when a previously scheduled event has reached its configured start time in Oracle Utilities Edge Distributed Energy Resources Management System, and it will result in the Oracle Utilities Digital Asset Cloud Service program event to transition from SCHEDULED to IN PROGRESS.
- **COMPLETED**: Status when an event that was previously 'IN PROGRESS' has reached the configured end time in Oracle Utilities Edge Distributed Energy Resources Management System, and it will transition the event from IN PROGRESS to COMPLETED in Oracle Utilities Digital Asset Cloud Service.

  A stage can only be CANCELED after it has been SCHEDULED. If an event is canceled, all stages will be canceled too. Stages will transition according to their scheduled timing.

- **Device Reservation**: Oracle Utilities Edge Distributed Energy Resources Management System factors in the Device Score and Load Reduction Forecast to identify a list of controllable device when an event is 'Scheduled'. Oracle Utilities Edge Distributed Energy Resources Management System will transfer the list of devices reserved for a program event to Oracle Utilities Digital Asset Cloud Service to allow tracking of the event participation and calculating the score for the impacted controllable devices.
- **Event Outcome**: On completion of a demand response event, Oracle Utilities Edge Distributed Energy Resources Management System will receive the actual outcome for the devices that participated in the event via Oracle Utilities Live Energy Connect. Oracle Utilities Edge Distributed Energy Resources Management System will share the event outcome for each device with Oracle Utilities Digital Asset Cloud Service so that event participation for each device can be updated and it can be factor during computation of device score.

  The same event outcome data is also shared with Oracle Utilities Analytics Insights so that it can be used to compute the actual kWh avoided during the duration of participation.

Settlement

Oracle Utilities Digital Asset Cloud Service is responsible for calculating the financial settlement amount for the customer's participation in a demand response event. When an event is concluded, Oracle Utilities Edge Distributed Energy Resources Management System sends the device participation outcome to both Oracle Utilities Digital Asset Cloud Service and the Oracle Utilities Analytics Insights.

Oracle Utilities Analytics Insights derives the actual energy (kWh) consumption avoided for the event duration using inputs from the event outcome message, the interval consumption data measured for the event duration, and the customer's consumption pattern.

After the event, Oracle Utilities Digital Asset Cloud Service also receives the prices relevant to the event timeline, which could be hourly prices, market prices, or some other price components. Oracle Utilities Digital Asset Cloud Service will use the energy avoided and the price inputs for the event duration to calculate the dollar amount that needs to be credited to the enrolled customer for their participation in the event.

Periodically or on the back of a business event (example: move-out, unenrollment) Oracle Utilities Digital Asset Cloud Service will be aggregating the unbilled settlement credit amounts and sending it over to the CIS application to be processed on the customer's energy bill.

- **kWh Avoided**: Oracle Utilities Analytics Insights calculates the actual reduction in energy consumption per service point. Periodically, Oracle Utilities Analytics Insights sends this data to be consumed for event settlement calculations.

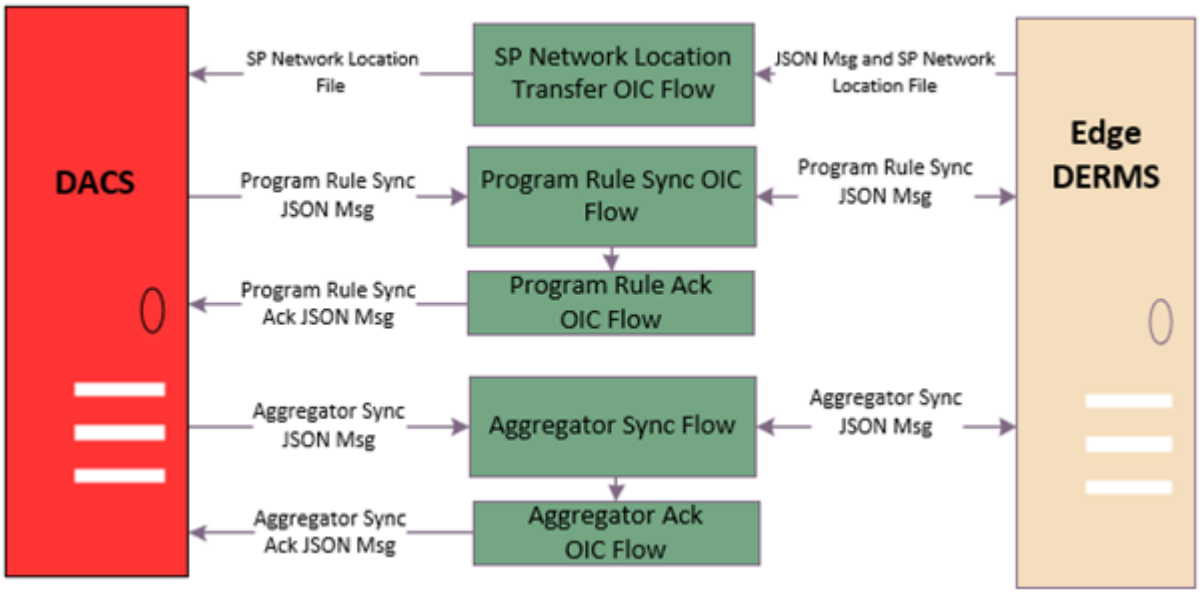
Business Processes

This integration supports the following business processes:

- Data Synchronization
  - SP Network Location
  - Program Rule Synchronization
  - Aggregator Synchronization
- Enrollment
  - Enrollment Request
  - Enrollment Synchronization
  - Enrollment Acknowledgement
- Event Participation
  - Program Event Status Update
  - Device Score
  - Event Device Reservation
  - Event Device Outcome
  - Load Reduction Forecast
- Settlements
  - Kwh Avoided

Data Synchronization

The following diagram shows the business processes related to data synchronization.



SP Network Location

Oracle Utilities Edge Distributed Energy Resources Management System has the capability to capture the network topology details for each service point. Oracle Utilities Edge Distributed Energy Resources Management System creates a file extract containing the nominal network information, namely the Transformer, Feeder and Substation, linked to a service point and this integration sends the file over to Oracle Utilities Digital Asset Cloud Service.

Oracle Utilities Edge Distributed Energy Resources Management System can send the initial load and any following updates, add or updates to existing records, as part of the incremental sync.

On receipt of the file, Oracle Utilities Digital Asset Cloud Service updates the network location entity associated to that service point in order to record the transformer, feeder and substation details.

Program Rule Synchronization

Oracle Utilities Digital Asset Cloud Service allows a utility program manager to maintain a set of event related constraints or rules for each program. These program rules facilitate the determination of a customer's availability to participate in an upcoming event. The utility program manager can also modify some of the rule parameters or associate or disassociate a rule from a program.

This integration allows Oracle Utilities Digital Asset Cloud Serviceto send the program rules associated to a program when it is created or updated by a program manager to Oracle Utilities Edge Distributed Energy Resources Management System. These are recorded and evaluated alongside other parameters to ascertain the customer and device's eligibility to participate in an upcoming event.

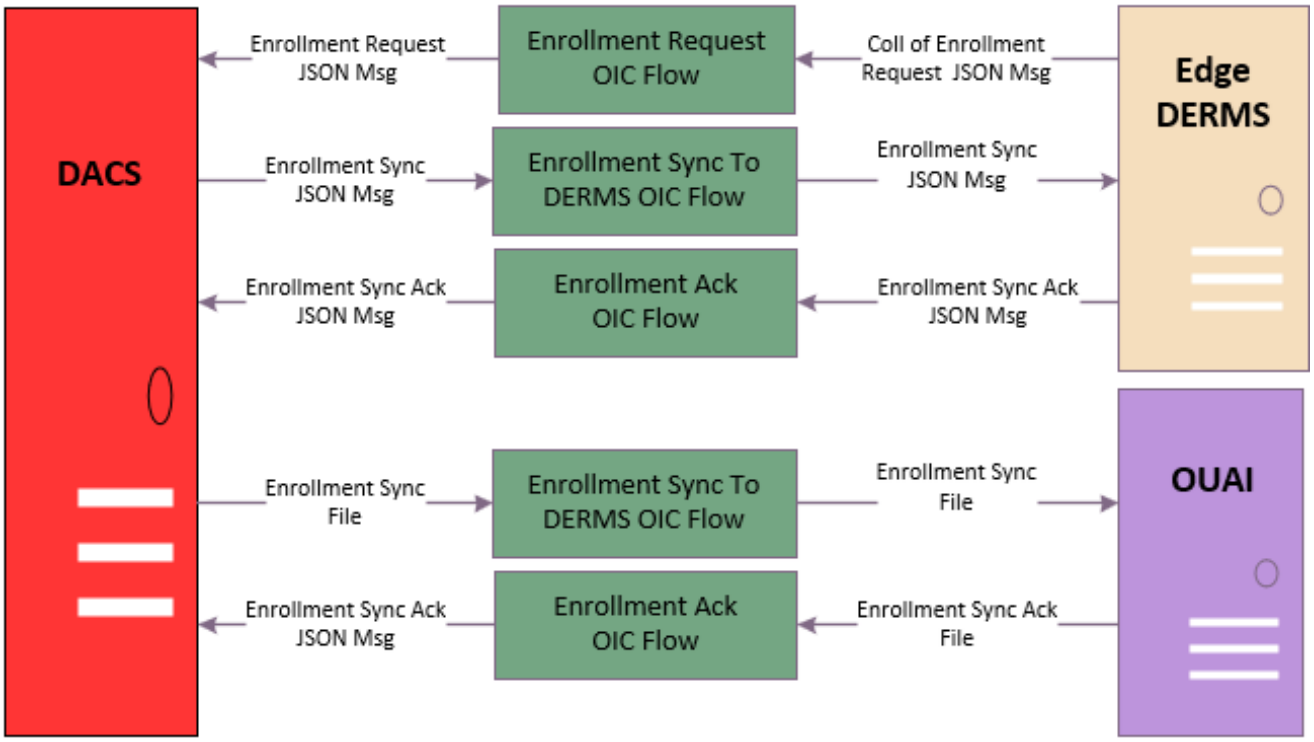
Aggregator Synchronization

Energy aggregators are managed within Oracle Utilities Digital Asset Cloud Service, and it allows the utility to capture details of each aggregator that can enroll and register controllable assets. Aggregator details must also be setup within Oracle Utilities Edge Distributed Energy Resources Management System to facilitate device communication.

This integration allows Oracle Utilities Digital Asset Cloud Service to send the details of newly added aggregators or any modifications done for existing ones to Oracle Utilities Edge Distributed Energy Resources Management System to subsequently update the communication setup for those aggregators.

Enrollment

The following diagram shows the business processes related to enrollments:



Enrollment Request

Enrollment for customer-owned controllable assets can be initiated via Oracle Utilities Edge Distributed Energy Resources Management System. Oracle Utilities Edge Distributed Energy Resources Management System sends the enrollment request details to Oracle Utilities Digital Asset Cloud Service to trigger the Enrollment process. In some scenarios, external systems can directly invoke the Oracle Utilities Digital Asset Cloud Service to initiate such enrollments.

Enrollment Synchronization

After Oracle Utilities Digital Asset Cloud Service successfully completes an enrollment, unenrollment, or device replacement, it sends the enrollment information, program

subscription, and device information, to Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Analytics Insights. Oracle Utilities Digital Asset Cloud Service expects an acknowledgement from Oracle Utilities Edge Distributed Energy Resources Management System and Oracle Utilities Analytics Insights.

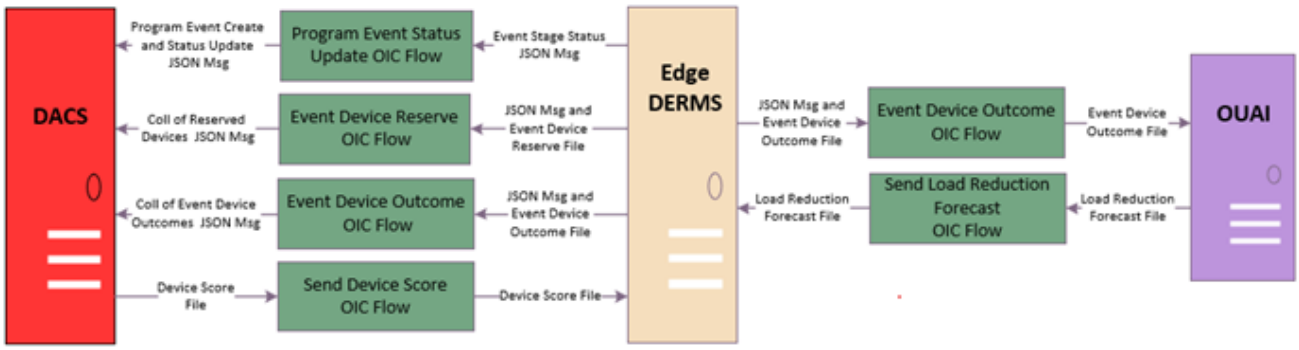
- **DACS-DERMS Enrollment Synchronization Flow**: This integration flow receives the enrollment, unenrollment, or device replacement information outbound message from Oracle Utilities Digital Asset Cloud Service one by one and sends the information to Oracle Utilities Edge Distributed Energy Resources Management System by invoking the DERMS Enroll REST Service. The outbound message contains the program subscription and device(s) information.
- **DACS-OUAI Enrollment Synchronization Flow**: Oracle Utilities Digital Asset Cloud Service creates a flat file containing the list of completed enrollments or unenrollments records. This integration flow picks up the file(s) from the Oracle Utilities Digital Asset Cloud Service Content Server and sends it to the Oracle Utilities Analytics Insights Object Storage for Oracle Utilities Analytics Insights to pick and process. The file only contains the program subscription information; no device information is sent to Oracle Utilities Analytics Insights.

Enrollment Acknowledgement

- **DERMS-DACS Enrollment Acknowledgement:** After Oracle Utilities Edge Distributed Energy Resources Management System receives the enrollment information, it sends a positive or negative acknowledgement back to the Enrollment Synchronization integration flow and it internally calls this flow to send the acknowledgement back to Oracle Utilities Digital Asset Cloud Service by invoking the DACS Update and Transition Sync Request REST Service. The enrollment in Oracle Utilities Digital Asset Cloud Service transitions to 'Synchronized' or 'Error' based on the acknowledgement received.
- **OUAI-DACS Enrollment Acknowledgement Integration Flow**: After Oracle Utilities Analytics Insights processes the enrollment file coming from Oracle Utilities Digital Asset Cloud Service, it creates an acknowledgement file. This integration flow picks up the file from the Oracle Utilities Analytics Insights Content Server, transform the acknowledgement, and send it to Oracle Utilities Digital Asset Cloud Service one by one by invoking the DACS Update and Transition Synchronization Request REST Service. The enrollment in Oracle Utilities Digital Asset Cloud Service transitions to 'Synchronized' or 'Error' based on the acknowledgement received.

Event Participation

The following diagram shows the business processes related to event participation.



Program Event Status Update

When an event stage's status is transitioned to scheduled, in progress, canceled, or completed, Oracle Utilities Edge Distributed Energy Resources Management System sends the status updates to Oracle Utilities Digital Asset Cloud Service. Oracle Utilities Digital Asset Cloud Service creates the program event when it receives a scheduled stage event and transitions to the other statuses as the updates are sent.

Device Score

Oracle Utilities Digital Asset Cloud Service creates a flat file containing the calculated device scores. This integration flow picks up file(s) from the Oracle Utilities Digital Asset Cloud Service Content Server and sends the file to Oracle Utilities Edge Distributed Energy Resources Management System by invoking the DERMS Device Score REST Service.

Event Device Reservation

When controllable devices are selected to participate in an event and the event status is transitioned to 'scheduled', Oracle Utilities Edge Distributed Energy Resources Management System sends Oracle Utilities Digital Asset Cloud Service the devices reserved for specific event in a file.

If the Oracle Utilities Edge Distributed Energy Resources Management System event contains multiple stages, Oracle Utilities Edge Distributed Energy Resources Management System will send out an outbound message with the reserved devices file for each stage in the event. The file will always contain devices reserved for a specific stage or program event. This integration flow receives each file and send the reserved devices to Oracle Utilities Digital Asset Cloud Service by invoking the Program Event Participation - Reserve Device REST Service.

The integration then sends an acknowledgment back to Oracle Utilities Edge Distributed Energy Resources Management System when the process is completed or encountered an error.

Event Device Outcome

After demand response events have completed, Oracle Utilities Edge Distributed Energy Resources Management System receives the actual outcome of all devices' event participation from Oracle Utilities Live Energy Connect (LEC).

Oracle Utilities Edge Distributed Energy Resources Management System aggregates and sends the device outcome per event-stage to both Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Analytics Insights for all controllable devices called to participate in an event or events through a file extract.

The data in the file can come from one event with multiple stages or multiple events with multiple stages. Each device that is called to participate in an event-stage will have one record in the file.

Example: If a service point has 2 devices linked to it and has participated in 2 different stages, then each device will have one outcome record in the file.

Stage 1, Program 1 from 2-4 pm - Device 1

Stage 2, Program 1 from 6-7pm - Device 2

- **DERMS-DACS Event Device Outcome Flow**: This integration flow receives the event device outcome file from Oracle Utilities Edge Distributed Energy Resources Management System and sends a collection of device outcome information to Oracle Utilities Digital Asset Cloud Service by invoking the Program Event Participation - Post Event Outcome REST Service.
- **DERMS-OUAI Enrollment Synchronization Flow**: This integration flow receives the file from Oracle Utilities Edge Distributed Energy Resources Management System and send it to Oracle Utilities Analytics Insights Object Storage for Oracle Utilities Analytics Insights to pick up and process.

Load Reduction Forecast

When Oracle Utilities Analytics Insights computes an estimated load reduction forecast for each metered service point that is associated to an active program, Oracle Utilities Analytics Insights creates a flat file containing the load reduction forecast calculated. This integration flow picks up file(s) from the Oracle Utilities Analytics Insights Content Server and sends the file to Oracle Utilities Analytics Insights Object Storage for Oracle Utilities Analytics Insights to pick and process.

Settlements

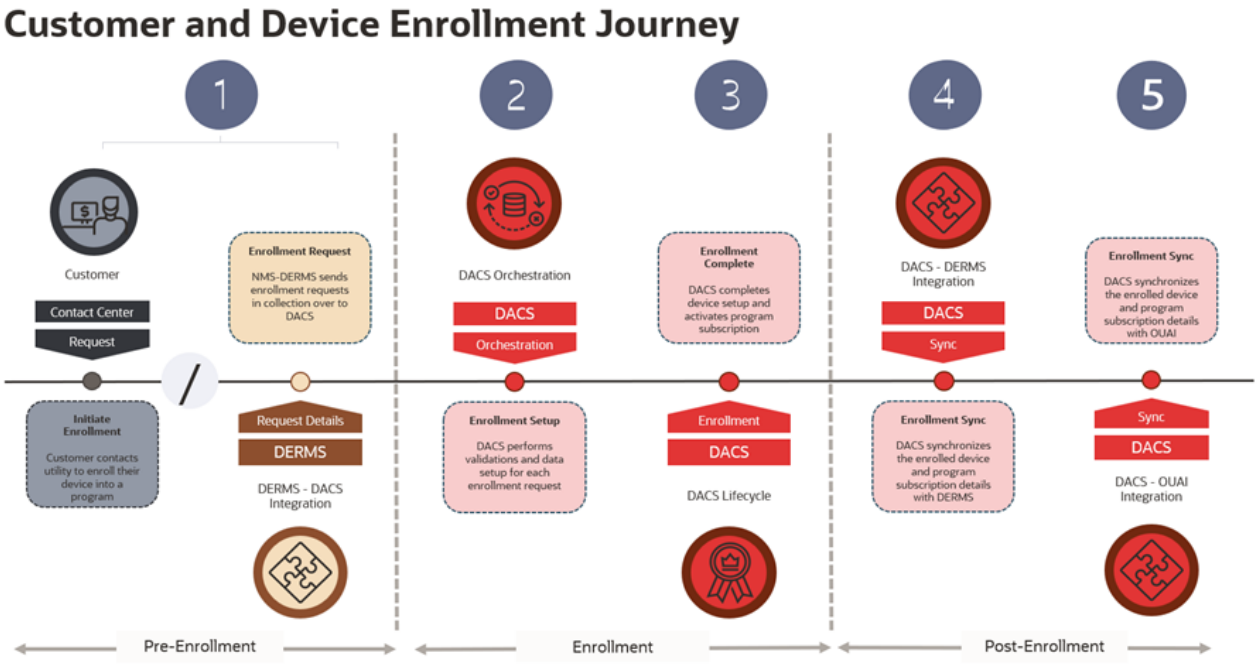
The following diagram shows the business processes related to financial settlements:

Kwh Avoided

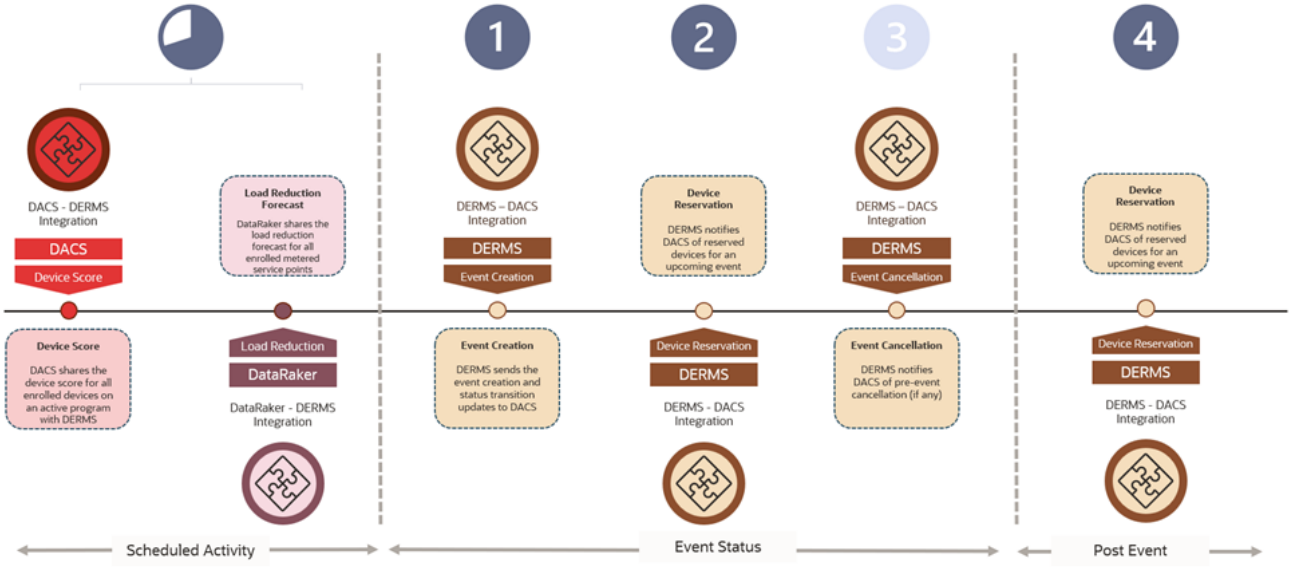
After demand response events have completed, Oracle Utilities Analytics Insights creates a flat file containing the calculated Kwh avoided or saved for each customer that participated in an event. This integration flow picks up the file(s) from Oracle Utilities Analytics Insights Content Server and sends the file to Oracle Utilities Digital Asset Cloud Service Object Storage for Oracle Utilities Analytics Insights to pick and process.

Use Cases

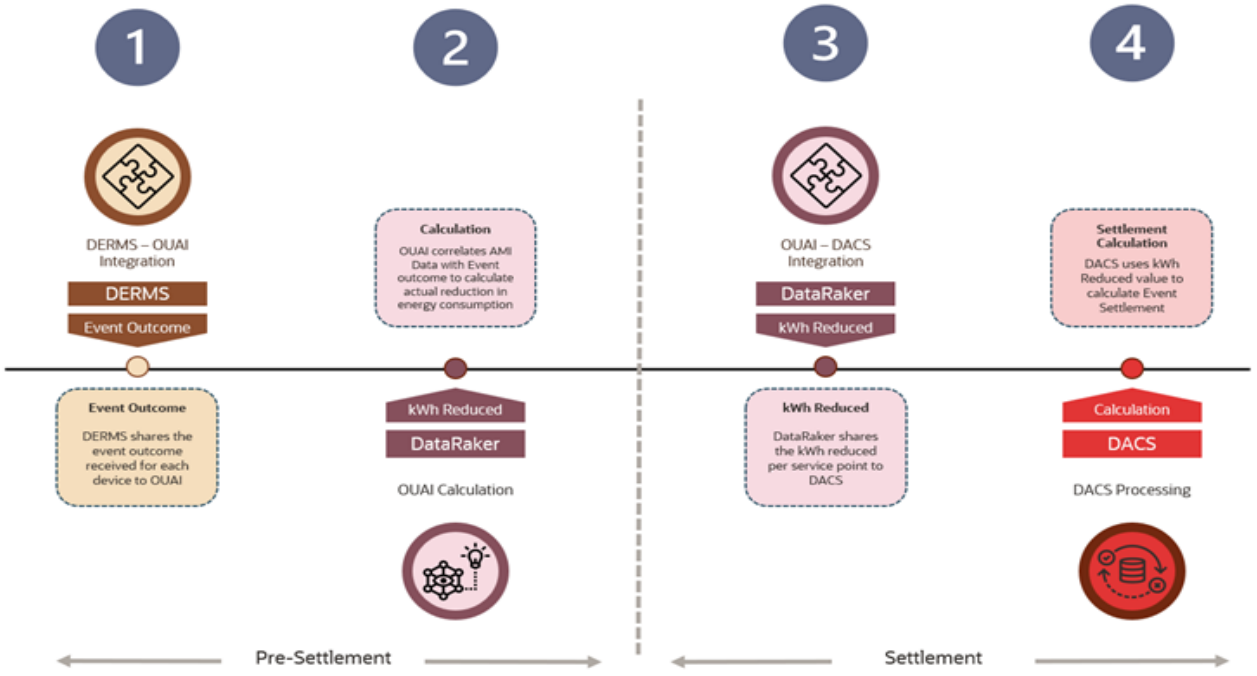
This section describes a scenario that illustrates a mix of use cases for the integration.



Demand Response Event Journey



Settlement Journey



Chapter 3

User Operations

For information about the user operations and instructions to perform those operations, refer to the *Oracle Utilities Analytics Insights Integration to Oracle Utilities Digital Asset Cloud Service and Oracle Utilities Edge Distributed Energy Resources Management System Configuration Guide*. The complete documentation for this release is available on the Oracle Energy and Water Integrations page on Oracle Help Center.

Appendix A

Considerations

The important considerations and known limitations for this integration are:

- In Oracle Utilities Edge Distributed Energy Resources Management System, an event can have multiple stages and each stage can be linked to a program. However, in Oracle Utilities Digital Asset Cloud Service, each 'stage' corresponds to a program event. Therefore, the Oracle Utilities Edge Distributed Energy Resources Management System Stage ID matches with a Oracle Utilities Digital Asset Cloud Service program event.