

IBM TRIRIGA Application Platform
Version 3.2

*Connector
User Guide*



Note

Before using this information and the product it supports, read the information in "Notices" on page 55.

This edition applies to version 3, release 2, modification 0 of IBM® TRIRIGA® Application Platform and to all subsequent releases and modifications until otherwise indicated in new editions.

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About This Guide

This user guide describes the procedures for implementing IBM TRIRIGA connector products.

Conventions

This document uses the following conventions to ensure that it is as easy to read and understand as possible:



Note - A Note provides important information that you should know in addition to the standard details. Often, notes are used to make you aware of the results of actions.



Tip - A Tip adds insightful information that may help you use the system better.



Attention - An attention notice indicates the possibility of damage to a program, device, system, or data.

Intended Audience

This document is intended for people who are implementing one of IBM TRIRIGA connector products.

Prerequisites

This guide assumes that the reader has a basic understanding of the IBM TRIRIGA Application Platform and the fundamental concepts required to operate the Web-based IBM TRIRIGA system.

Support

IBM Software Support provides assistance with product defects, answering FAQs, and performing rediscovery. View the IBM Software Support site at www.ibm.com/support.

1. IBM TRIRIGA Connector for Energy Star Benchmarking

Executives require a mechanism to evaluate the energy performance of their building portfolio. They require the ability to compare the energy performance rating of buildings to other buildings within their portfolio as well as to the average of similar buildings. From these ratings, executives set targets for improving the ratings of their buildings and evaluate the potential savings if they meet their targets. By comparing the current ratings to the targets, managers prioritize buildings that maximize return on investment by comparing potential savings to costs of efficiency opportunities.

The EPA ENERGY STAR rating provides the de facto industry standard for energy performance ratings in the United States. The 1 - 100 scale makes it easy for executives and managers to understand the performance of their buildings. The rating system considers attributes of each building by space type, as well as the energy usage and monthly weather data for each building region.

Implementing the IBM TRIRIGA Connector for Energy Star Benchmarking involves the following steps:

1. [Setup](#)
2. [Baseline Locations](#)
3. [Request Ratings](#)
4. [Review Results](#)



Note - EPA ENERGY STAR Automated Benchmarking System (ABS) Supported Version - The EPA has an aggressive timeline concerning the two environments that they provide. Their test environment is updated with a beta version of their upcoming release. Their live environment is then updated some time after that.

Setup

A few activities must be undertaken as the first steps of implementing the IBM TRIRIGA Connector for Energy Star Benchmarking. These activities focus on tailoring classifications; updating building, structure, and retail location records; and establishing system-wide defaults.

Setup activities should be performed in the following areas before starting to use the IBM TRIRIGA Connector for Energy Star Benchmarking. There is no recommended sequence of activities. All activities listed are important.

- [Energy Rating Settings](#)
- [Energy Rating Type Classification](#)
- [Energy Space Type Classification](#)
- [Location \(Building, Retail Location, Structure\)](#)
- [Location Primary Use Classification](#)
- [Meter](#)

- [EnergyStar ClassLoader](#)
- [Notifications](#)
- [Debugging](#)

Energy Rating Settings

Set the default Energy Rating Settings for the system in the Integration Settings tab of Application Settings, which is located in Tools > System Setup > General > Application Settings. See the *IBM TRIRIGA 10 Application Administration User Guide* for details.



Note - These are global settings. The Energy Rating Settings on the Integration Settings tab apply to the entire IBM TRIRIGA system.

The system attempts to integrate with the EPA ENERGY STAR Automated Benchmarking System on the periodic schedule set in *Retry Every (hours)*. If the system does not receive an actual rating from the EPA ENERGY STAR Automated Benchmarking System, the system tries again until it reaches the number specified in the *# of Retries* field or the EPA ENERGY STAR Automated Benchmarking System returns an error.

Energy Rating Type Classification

Classifications are records presented in a hierarchical fashion. If the type of field is classification, a record in the Classifications hierarchy can be chosen as the value of the field. For an in-depth discussion of Classifications and the Classifications hierarchy, see the *IBM TRIRIGA 10 Application Administration User Guide*.

The Energy Rating Type identifies the rating system used. For the IBM TRIRIGA Connector for Energy Star Benchmarking, use the *Energy Star* Energy Rating Type. Energy Space Types are associated to an Energy Rating Type.

In the Integration Credentials section, *Test URL*, *Test Username*, and *Test Password* display the connection to the EPA ENERGY STAR Automated Benchmarking System test environment. *Live URL*, *Live Username*, and *Live Password* display the connection to the EPA ENERGY STAR Automated Benchmarking System live environment.

Energy Space Type Classification

Classifications are records presented in a hierarchical fashion. If the type of field is classification, a record in the Classifications hierarchy can be chosen as the value of the field. For an in-depth discussion of Classifications and the Classifications hierarchy, see the *IBM TRIRIGA 10 Application Administration User Guide*.

An Energy Rating Type has attributes for specific use of spaces. Each Energy Space Type contains the energy rating data attributes for that type of space and default values as appropriate. For the IBM TRIRIGA Connector for Energy Star Benchmarking, the data attributes must correspond to ones used in the EPA ENERGY STAR system. Energy Space Types are associated to an Energy Rating Type.

To see the Energy Space Type records, go to Tools > Administration > Classifications. Scroll down the Hierarchy left-side bar and expand the Energy Rating Type section. Expand the Energy Star section, select the Energy Space Type record you want, and click **Open**.

Once the Energy Space Type record is opened, you can add data attributes by clicking **Add** or **Find Using Template** on the Data Attributes section.



Attention - If you change a data attribute name or add a data attribute, you must make a corresponding change to the interface configuration that defines the mapping between the IBM TRIRIGA Connector for Energy Star Benchmarking and the EPA ENERGY STAR Automated Benchmarking System. The file is named energyStarAttrMapping.xml and is in the Energy Star ClassLoader. For more information, see "Energy Star ClassLoader".

To Add Data Attributes to an Energy Space Type

Step 1 Click **Add** on the Data Attributes section bar.

The system opens the Data Attribute Item for Energy Star form.

Step 2 In the General section:

- The system generates the *ID* and *Status* when the record is created.
- Specify a value for the *Name* and the *Description* fields.
- If this data attribute is required in order to receive a rating, select the *Required* check box.
- Select the *Field Type* from the drop-down box.
- Specify a default value in the *Data Value* field.

Other fields may be present depending on the Field Type selected.

Step 3 Click **Create**.

The system adds the new data attribute to the Energy Space Type Data Attributes section.

Location

ENERGY STAR ratings can be done for Buildings, Structures, and Retail Locations.

The Locations hierarchy is located in the Locations portal section on the Portfolio page. The *IBM TRIRIGA 10 Portfolio Management User Guide* and the *IBM TRIRIGA 10 Real Estate Environmental Sustainability Portfolio Management User Guide* contain detailed instructions about how to use the Locations hierarchy that are not replicated in this user guide.

Several fields in a Building/Structure/Retail Location are used by the IBM TRIRIGA Connector for Energy Star Benchmarking.

In a Location record, in the Details section on the General tab, the *Primary Use* field contains a value from the Location Primary Use classification, as described in "[Location Primary Use Classification](#)".

The fields in the Energy Rating Setup and Energy Rating Result sections specifically relate to the IBM TRIRIGA Connector for Energy Star Benchmarking.

The Geography for the address of the location must include a State Geography record that contains a valid two-letter abbreviation for the state as the ID field of that record. The two letter state is required by ABS so that it can correctly categorize the location in its ranking algorithms and is submitted to them from this field in the associated record. Without this correct linkage, any new buildings submitted to ABS will be rejected.

In the Environmental tab, data from most sections are used for ENERGY STAR ratings. Previous ENERGY STAR ratings for a Building, Structure, or Retail Location are displayed in the Energy Ratings tab.

Location Primary Use Classification

Classifications are records presented in a hierarchical fashion. If the type of field is classification, a record in the Classifications hierarchy can be chosen as the value of the field. For an in-depth discussion of Classifications and the Classifications hierarchy, see the *IBM TRIRIGA 10 Application Administration User Guide*.

To view the records available in as Location Primary Use, go to Tools > Administration > Classification. Scroll down the Hierarchy section until you find the Location Primary Use section, and expand it. Select the record you want and click **Open**.

The Location Primary Use includes one or more Energy Rating Type and Energy Space Type values. For each energy rating record created, the system captures the associated energy space types using the Location Primary Use of the Building, Structure, or Retail Location.

In the Energy Space section, *Subtype* further defines the *Energy Space* within the *Energy Rating Type*. For the IBM TRIRIGA Connector for Energy Star Benchmarking, the Energy Rating Type must be Energy Star.

Meter

Define the meters used to record energy rating data in the Building Equipment business object.

To find the Building Equipment page navigate to Portfolio > Assets > Building Equipment. The *IBM TRIRIGA 10 Portfolio Management User Guide* and the *IBM TRIRIGA 10 Real Estate Environmental Sustainability Portfolio Management User Guide* contain detailed instructions about how to use the Assets page that are not replicated in this user guide.

See [Appendix B](#) for allowed values in ENERGY STAR attributes and meters.

The *Spec Class* is `Utility Meter`, which is in the Operations Specification Class, under Instrumentation and Controls.

EnergyStar ClassLoader

The EnergyStar ClassLoader object can be found at Tools > System Setup > ClassLoader > EnergyStar. Set the ClassLoader Type field in your ClassLoader instance to Parent First.

To Access the EnergyStar ClassLoader

Step 1 Select Tools > System Setup > System > Class Loader.

Step 2 Open the EnergyStar record.

The system opens the EnergyStar ClassLoader form.

Make sure that the Resource Files section contains only the following libraries and dependencies:

- `energyStar.properties`

This file is used to define several runtime parameters used for the ENERGY STAR integration. Inside this file you will find parameters for which URL to use, where to find the XSD schemas to validate against, what resource file is used to define the translation and ordering of the DataAttributes for SpaceTypes, as well as the UOM translation between IBM TRIRIGA and ABS. This file is heavily commented with what each parameter is used for and what options you have for modifications. This file cannot be renamed. It is referenced in the code to find all other runtime attributes for this integration.
- `energyStarClient.keystore`

This file was provided by ENERGY STAR and is required in order to make an SSL connection to ABS.
- `energyStarAttrMapping.xml`

This file defines the DataAttribute mapping between IBM TRIRIGA objects and the ABS XML schema elements used to be sent to ABS. The name of this file can change but must be reflected in the `energyStar.properties` file. The ordering of the attributes define the order that the SpaceTypes are created in the XML sent to ABS. The XSD from ABS requires that these elements be in a precisely defined order otherwise the submission will fail.
- `energyStar.jar`

This is the JAR file where the classes for the ENERGY STAR connector reside. The Java stubs for connecting to the ABS website, defined by the WSDL provided by ENERGY STAR, also are included in this package and were created by using JDK 1.5 with the Java2WSDL class from Apache Axis 1.3. The `axis.jar` file is not included in this package because it exists in the server library classpath.

You must include the dependent libraries as resource files to this ClassLoader object. The libraries required can be retrieved from the ABS Client_tool package at http://estar8.energystar.gov/ESES/ABS20/ClientTools/ClientTool_Test.zip. You may need a valid ABS account to log in.

Notifications

The IBM TRIRIGA Connector for Energy Star Benchmarking can send out notifications internally and to external email accounts with the use of an Integration Notification object. You can use this object to set up templates for notification types that can contain groups, persons, or both, that should be notified if an error, alert, or warning of the specified type occurs.

To Set Up Templates for Notification Types

Step 1 Navigate to Sustainability > Set Up > Templates > Integration.

Step 2 You should see three Integration Types.

- *Energy Rating*: This is for general messages and system failures.
- *Energy Rating Alert*: This is for any alert responses that come back from ABS for buildings, meters, or space types.
- *Energy Rating Error*: This is for any error responses that come back from ABS for buildings, meters, or space types.



Note - If you do not see these three, you must add them for the notifications to work.

Step 3 Depending on the message type, the ENERGY STAR integration will create an instance of an Integration Notification using one of these types. Most occasions will use Energy Rating.

IBM TRIRIGA contains workflows that fire when an Integration Notification is created. These workflows dynamically attach an Integration Notification to the IBM TRIRIGA notification engine, which sends out emails and internal notifications.

Debugging

The `energyStar.log` helps diagnose problems while testing or even if in a production environment. The `energyStar.log` is located in the `<IBM TRIRIGA_INSTALL_DIR>\log` folder. You can enable debugging for Energy Star in the Administrator Console under Platform Logging > Energy Star. The error messages can be verbose as they will print out the request and responses to and from ABS.

Baseline Locations

Baseline data provides a set of initial energy rating values for a Building/Structure/Retail Location. You can tell the system to baseline an individual Building/Structure/Retail Location from the Energy Rating Setup section or to baseline a collection of Buildings/Structures/Retail Locations from Sustainability > Set Up > General > Baseline and Target Setup.

Baseline a Building/Structure/Retail Location

Follow the steps below to establish baseline energy rating values for a single Building/Structure/Retail Location.

To Establish Baseline Energy Rating Values for a Single Building

- Step 1** Navigate to the form for the Building/Structure/Retail Location.
- Step 2** Scroll to the Energy Rating Setup section.
- Step 3** Make sure that Energy Rating Type is set to *Energy Star*.
- Step 4** Set *Baseline Date* to the date the baseline data represents.
- Step 5** Set *Baseline Rating* to the ENERGY STAR rating on the Baseline Date.
- Step 6** Click **Set Baseline** on the Energy Rating Setup section bar.

The system sets the baseline value from the most recent Energy Rating from the Baseline Date given. If the baseline date is not provided, the system sets the baseline date and value from earliest Energy Rating record.

Baseline Buildings/Structures/Retail Locations

Follow the steps below to establish baseline energy rating values for several Buildings/Structures/Retail Locations.

To Establish Baseline Energy Rating Values for Several Buildings/Structures/Retail Locations

- Step 1** Navigate to Sustainability > Set Up > General > Baseline and Target Setup.
- Step 2** Click **Add**.

The system opens the Baseline and Target Setup form.
- Step 3** In the General section:
 - The system supplies an *ID* and *Status* when the record is created.
 - The *Date Created* is the current date.
 - Enter a unique *Name* for the Baseline or Target.
 - Select the *Process Type* (*Baseline* or *Target*) from the drop-down list.
- Step 4** If Process Type is *Baseline*, enter the *Baseline Date*.

The system sets the baseline value from the most recent Energy Rating from the Baseline Date given. If the Baseline Date is not provided, the system sets the baseline date and value from earliest Energy Rating record.

To Establish Baseline Energy Rating Values for Several Buildings/Structures/Retail Locations

Step 5 If Process Type is *Target*, enter the *Target Date* and *Target Rating*.

Step 6 In the Locations section:

- Click **Find**.
- Select the Buildings, Structures, and Retail Locations to which the Baseline or Target applies.

Step 7 Click **Create Draft**.

Step 8 Click **Apply**.

The system sets the Baseline or Target value in the selected Locations.

Request Ratings

You can schedule or manually request ratings from EPA ENERGY STAR.

- [Schedule Ratings](#)
- [Manual Rating](#)

Schedule Ratings

A rating schedule creates an Energy Rating record automatically for each Building/Structure/Retail Location listed in the rating schedule.

To Establish a Rating Schedule

Step 1 Navigate to Sustainability > Set Up > General > Energy Rating Schedule.

Step 2 Click **Add**.

The system opens the Rating Schedule form.

To Establish a Rating Schedule


Step 3 In the General section:

- The system supplies an *ID* and *Status* when the record is created.
- The *Recorded Date* is the current date.
- Enter a unique *Name*.
- *Energy Rating Type* must be *Energy Star*.
- Select the *Frequency* (*Monthly*, *Quarterly*, *Semi-Annual*, or *Annual*) from the drop-down list.
- Enter the appropriate value in *Number of months of energy logs to use*. The default value is 12, which is the minimum value.



Tip - The data sent to EPA ENERGY STAR must include consecutive data for each day this time period with no gaps or overlaps in time.



Step 4 The other fields in the General section depend on the value for Frequency. In this example, Frequency is *Annual*.

- *Month* is the month the record becomes active.
- *Day of Month* is the day the record is processed.
- Set *Submit After* to be the number of days after the record becomes active that the system is to submit the record to EPA ENERGY STAR. Click the Calendar icon  to set the value.



Tip - While *Submit After* can be 0, set it to a value that allows time to adjust any data attributes that have changed.

The system sends a notification when the record for a building/structure/retail location is ready. This gives you time to adjust the data attributes on the building/ structure/retail location if any changes occurred.

- *Start Date* is the first date in the frequency range. The value must be greater than or equal to the current date. Click the Calendar icon  to set the value.
- *End Date* is the last date in the frequency range. The value must be greater than or equal to *Start Date*. Click the Calendar icon  to set the value.
- Initially the system sets *Next Scheduled Date* to be the same as *Start Date*. After a rating event completes, the system updates the date to the next date appropriate for the value of *Frequency*.

Step 5 In the Locations section:

- Click **Find**. The system displays Buildings, Structures, Retail Locations, or all options with *Energy Rating Type* equal to the *Energy Rating Type* in the *Rating Schedule General* section (*Energy Star*).
- Select the Buildings, Structures, Retail Locations, or all options to be submitted to EPA ENERGY STAR.

To Establish a Rating Schedule

Step 6 Click **Create Draft**.

Step 7 Click **Issue**.

The Rating Transaction Status section shows each status step as the rating schedule is submitted to and processed by EPA ENERGY STAR. The Rating Transaction Status section displays *Rating Schedule*, *Transaction ID*, *Retry Count*, *Polling Date Time*, and *Status*.

The system sends notifications when it submits a rating schedule to EPA ENERGY STAR and when it receives success or failed results.

Before submitting any requests to ABS, you must Add or Update the Attributes in the Energy Rating with a valid Meter. This is true for both Automatic and Manual submissions and is a one-time setup step. Once the Meter has been associated to the Attributes for the Space Type used for the Building, each subsequent request to ABS will pull the Meters used on the previous submission. If a Meter is not associated, the space type will not be sent to ABS and the submission will result in error.

Manual Rating

Follow the steps below to manually request an Energy Rating record for a Building, Structure, or Retail Location.

To Manually Request an Energy Rating Record

Step 1 Navigate to the General tab of the Building, Structure, or Retail Location record.

Step 2 Scroll to the Energy Rating Result section. Click **Update** on the Energy Rating Result section bar.

The system opens an Energy Rating form.

Step 3 Enter the number of months and the **End Date**.

Step 4 Click **Create**. The system associates all energy meters associated with the location.

If you have created Energy Spaces the location, the system copies them to the new request.

If you created a previous request, the Attribute records from this last rating request are located, and the attribute values are pulled into the current record.

Step 5 You can change the Attributes, Find or Remove associations to energy meters, and Finds or Remove associations to Energy Spaces if needed

Step 6 Click **Submit**.

To Manually Request an Energy Rating Record

- Step 7** The system calculates the start date for records, then associates energy logs within the start and end date range to the request for the meters that are associated.
- Step 8** The ABS Integration process runs.
- Step 9** The result from the integration is used to update the rating record.

Before submitting any requests to ABS, you must Add or Update the Attributes in the Energy Rating with a valid Meter. This is true for both Automatic and Manual submissions and is a one-time setup step. Once the Meter has been associated to the Attributes for the Space Type used for the Building, each subsequent request to ABS will pull the Meters used on the previous submission. If a Meter is not associated, the space type will not be sent to ABS and the submission will result in error.

Review Results

The IBM TRIRIGA Connector for Energy Star Benchmarking offers several ways to check the results from an EPA ENERGY STAR rating and to evaluate the rating for your portfolio.

Environmental Manager

The Energy Rating business object in the Environmental Manager displays Energy Rating records. For those that have been rated, the system shows a color coded status in the Location Status column.

The Location Status color coding is based on the following criteria:

- **Green:** If the rating is greater than or equal to the Target * $(1 - (\text{Days until Target Date}) / (\text{Days between Target Date and Baseline Date}))$
- **Yellow:** If the rating is less than the Target * $(1 - (\text{Days until Target Date}) / (\text{Days between Target Date and Baseline Date}))$ and greater than or equal to the Baseline
- **Red:** If the rating is less than the Baseline

Building/Structure/Retail Location Form

The Energy Rating Result section on the General tab of a Building/Structure/Retail Location form shows the result of the most current rating by EPA ENERGY STAR.

The *Projected Yearly Savings* uses current annual energy costs as follows:

- If the Target is greater than the Rating, the Projected Yearly Savings = $((\text{Target} - \text{Rating}) / \text{Max Rating} * \text{Effect Factor} * \text{Annual Energy Costs})$
- If the Target is less than or equal to the Rating, the Projected Yearly Savings = \$0

Environmental Manager Portal Metrics

The Home - Environmental Manager Portal includes IBM TRIRIGA ENERGY STAR metrics in the Performance Metrics portal section.

Metric Categories

The IBM TRIRIGA Connector for Energy Star Benchmarking metrics are in the following metric categories:

- *Environmental*: Measures cost, intensity, and recovery for Energy, Emissions, Water, and Waste.
- *Financial*: Measures the cost of operations, total occupancy costs, revenue weeks, and profitability of workplace operations and resources.



Note - The external corporate financial system used is hierarchical and aggregates costs at the building/structure level, and the cost code structure and roll-up align with common industry definitions of: Capital, Cost of Operations (IFMA definition), Operating Costs (IFMA definition), Capital or Expense.

- *Portfolio*: Measures the utilization, condition, and return on workplace assets.

The following section provides a detailed explanation of each metric delivered with the IBM TRIRIGA Connector for Energy Star Benchmarking. For a discussion of other performance metrics, see the *IBM TRIRIGA 10 Workplace Performance Management User Guide* or the *IBM TRIRIGA Real Estate Environmental Sustainability Workplace Performance Management User Guide*.

IBM TRIRIGA Connector for Energy Star Benchmarking Metric ID

The following chart provides a Metric ID to identify each IBM TRIRIGA Connector for Energy Star Benchmarking metric.

IBM TRIRIGA ENERGY STAR Metric ID	Metric Category	IBM TRIRIGA ENERGY STAR Metric
1201-01-EN	Environmental	Ranking by Quartile
1202-01-FI	Financial	Projected Yearly Savings
1203-01-PO	Portfolio	Energy Rating Certification
1204-01-PO	Portfolio	Energy Rating Comparison to Average
1205-01-PO	Portfolio	Energy Rating Improvement

IBM TRIRIGA Connector for Energy Star Benchmarking Metric Details

This section describes each IBM TRIRIGA Connector for Energy Star Benchmarking metric. See [Appendix B](#) for allowed values in ENERGY STAR attributes and meters.

Energy Rating Certification

Item	Description
Name	Energy Rating Certification

Item	Description
Metric ID	1203-01-PO
Metric Category	Portfolio
Metric Objective	Determine which Buildings/Structures/Retail Locations are eligible for ENERGY STAR recognition
Analysis Objective for Exception Conditions	Identify Buildings/Structures/Retail Locations with ENERGY STAR rating equal to or greater than 50
Description	ENERGY STAR ratings
Source (of metric recommendation or industry benchmark reference)	Customer Focus Group, EPA
Measurement	ENERGY STAR rating
Dependent Data that is calculated	
Roles	ES Manager/Planner
Display/Graph Types	Value-based: Horizontal Stacked Bar Chart (default view)
Thresholds (default)	None
Fact Details	<p>Module: triMetricFact</p> <p>Business Object: triLocationFact</p> <p>Metric Query: triLocationFact - Metric - Energy Rating Certification</p>
Drill Paths (graph or table axis)	Value-based: Geography, Capture Period, Certification
Filters (Interactive)	Value-based: Geography, Location, Building Class
Filters (Static)	Active Buildings, Active Structures, Active Retail Locations, Active Energy Rating records
Sub-tabs	<p>Related Reports - triLocationFact - Related Report - Building Summary - Energy Rating Certification</p> <p>Data - standard for all metrics</p>

Time

Item	Description
Data Point Refresh Rate	
License Dependency	IBM TRIRIGA Connector for Energy Star Benchmarking
Functional Dependency	Energy Rating

Energy Rating Comparison to Average

Item	Description
Name	Energy Rating Comparison to Average
Metric ID	1204-01-PO
Metric Category	Portfolio
Metric Objective	Determine energy efficiency of the portfolio compared with EPA averages
Analysis Objective for Exception Conditions	Determine what Buildings/Structures/Retail Locations have good or poor energy used compared with EPA ENERGY STAR average (always 50)
Description	Energy Rating Comparison to Average
Source (of metric recommendation or industry benchmark reference)	Customer Focus Group, EPA
Measurement	(Rating - Average/Max Rating)
Dependent Data that is calculated	
Roles	ES Manager/Planner
Display/Graph Types	Value-based: Horizontal Stacked Bar Chart (default view)
Thresholds (default)	None

Item	Description
Fact Details	Module: triMetricFact Business Object: triLocationFact Metric Query: triLocationFact - Metric - Energy Rating Comparison to Average
Drill Paths (graph or table axis)	Value-based: Geography, Location, Capture Period
Filters (Interactive)	Value-based: Geography, Location, Building Class
Filters (Static)	Active Buildings, Active Structures, Active Retail Locations, Active Energy Rating records
Sub-tabs	Data - standard for all metrics
Time	
Data Point Refresh Rate	
License Dependency	IBM TRIRIGA Connector for Energy Star Benchmarking
Functional Dependency	Energy Rating

Energy Rating Improvement

Item	Description
Name	Energy Rating Improvement
Metric ID	1205-01-PO
Metric Category	Portfolio
Metric Objective	Determine energy rating improvement of the portfolio
Analysis Objective for Exception Conditions	Determine what Buildings/Structures/Retail Locations have improved EPA ENERGY STAR ratings
Description	Energy Rating Improvement over time
Source (of metric recommendation or industry benchmark reference)	Customer Focus Group, EPA

Item	Description
Measurement	<p>Compare the current rating to the baseline and derive the improvement percentage from baseline:</p> <ul style="list-style-type: none"> ▪ If Baseline greater than zero, $((\text{Rating} - \text{Baseline}) / \text{Max Rating})$ ▪ If Baseline zero, N/A
Dependent Data that is calculated	
Roles	ES Manager/Planner
Display/Graph Types	Value-based: Horizontal Stacked Bar Chart (default view)
Thresholds (default)	None
Fact Details	<p>Module: triMetricFact</p> <p>Business Object: triLocationFact</p> <p>Metric Query: triLocationFact - Metric - Energy Rating Improvement</p>
Drill Paths (graph or table axis)	Value-based: Geography, Location, Capture Period
Filters (Interactive)	Value-based: Geography, Location, Building Class
Filters (Static)	Active Buildings, Active Structures, Active Retail Locations, Active Energy Rating records
Sub-tabs	Data - standard for all metrics
Time	
Data Point Refresh Rate	
License Dependency	IBM TRIRIGA Connector for Energy Star Benchmarking
Functional Dependency	Energy Rating

Projected Yearly Savings

Item	Description
Name	Projected Yearly Savings
Metric ID	1202-01-FI

Item	Description
Metric Category	Financial
Metric Objective	Determine energy cost efficiency based on comparing projected yearly savings from Energy Rating records
Analysis Objective for Exception Conditions	Summarize potential savings by geography, location, building type
Description	Projected yearly savings
Source (of metric recommendation or industry benchmark reference)	Customer Focus Group
Measurement	<p>Evaluate the current rating to the Target.</p> <ul style="list-style-type: none"> ▪ If Target > Rating: $((\text{Target} - \text{Rating}) / \text{Max Rating} * \text{Effect Factor} * \text{Annual Energy Costs})$ ▪ If Target less than or equal to Rating: 0
Dependent Data that is calculated	
Roles	ES Manager/Planner
Display/Graph Types	Value-based: Horizontal Stacked Bar Chart (default view)
Thresholds (default)	None
Fact Details	<p>Module: triMetricFact</p> <p>Business Object: triLocationFact</p> <p>Metric Query: triLocationFact - Metric - Projected Yearly Savings (USD)</p>
Drill Paths (graph or table axis)	Value-based: Geography, Location, Capture Period
Filters (Interactive)	Value-based: Geography, Location, Building Class
Filters (Static)	Active Buildings, Active Structures, Active Retail Locations, Active Energy Rating records
Sub-tabs	Data - standard for all metrics
Time	Years

Item	Description
Data Point Refresh Rate	Yearly
License Dependency	IBM TRIRIGA Connector for Energy Star Benchmarking
Functional Dependency	Energy Rating

Ranking by Quartile

Item	Description
Name	Ranking by Quartile
Metric ID	1201-01-EN
Metric Category	Environmental
Metric Objective	Determine energy efficiency based on comparing ENERGY STAR ratings
Analysis Objective for Exception Conditions	Determine what facilities have good or poor ENERGY STAR ratings
Description	ENERGY STAR ratings per quartile
Source (of metric recommendation or industry benchmark reference)	Customer Focus Group, EPA
Measurement	Rank each Building/Structure/Retail Location rating per quartile (0 - <25, 25 - <50, 50 - <75, 75 - 100)
Dependent Data that is calculated	
Roles	ES Manager/Planner
Display/Graph Types	Value-based: Horizontal Stacked Bar Chart (default view)
Thresholds (default)	None
Fact Details	<p>Module: triMetricFact</p> <p>Business Object: triLocationFact</p> <p>Metric Query: triLocationFact - Metric - Ranking by Quartile</p>

Item	Description
Drill Paths (graph or table axis)	Value-based: Geography, Capture Period, Quartile, Location
Filters (Interactive)	Value-based: Geography, Location, Building Class
Filters (Static)	Active Buildings, Active Structures, Active Retail Locations, Active Energy Rating records
Sub-tabs	Related Reports - triLocationFact - Related Report - Building Summary - Energy Rating Quartile Data - standard for all metrics
Time	
Data Point Refresh Rate	
License Dependency	IBM TRIRIGA Connector for Energy Star Benchmarking
Functional Dependency	Energy Rating

ENERGY STAR Tips

ENERGY STAR Tips

In order to get an Energy Star rating, you must submit a minimum of 12 months of energy use information to the EPA. It is also necessary to submit 12 months of attribute data or set the Effective Date of the attributes back 12 months.

Energy logs cannot have a zero Rate. While it would not be normal for someone to enter a zero Rate, if you wanted to document usage you might enter records with a quantity but a zero Rate. Doing so causes the Energy Star Connector to not submit the records. Consider changing the validation rule on the quantity to not equal to zero.

You should become familiar with the requirements and documentation set forth from the EPA's ENERGY STAR ABS provided online at: <https://www.energystar.gov/istar/has/>

The ID field on a State Geography record needs to be the two character state abbreviation. The ENERGY STAR Connector uses this ID field and if it is not valid the EPA's ABS system rejects the building.

2. IBM TRIRIGA Connector for ESRI Geographic Information System

A geographic information system (GIS), also known as a geospatial information system, is a system for capturing, storing, analyzing, and managing data and associated attributes that are spatially referenced to Earth.

In the strictest sense, it is an information system capable of integrating, storing, editing, analyzing, sharing, and displaying geographically referenced information. In a more general sense, GIS is a tool that allows users to create interactive queries (user created searches), analyze the spatial information, edit data, integrate maps, and present the results of all these operations.

Geographic information system technology can be used for resource management, asset management, environmental impact assessment, urban planning, sales, marketing, logistics, and many other activities. For example, GIS might allow facility managers to easily assess impacts on facility assets in the event of a natural disaster or GIS can be used by a company to find a site for a new business to take advantage of a previously underserved market. Data for the GIS feature comes from both IBM TRIRIGA and Esri. The breakdown is as follows:

Source	Data
IBM TRIRIGA	<ul style="list-style-type: none">▪ Provides the initial set of building data and geographical layers used to query the Esri ArcGIS server. These layers are in the GIS Config form.▪ The IBM TRIRIGA Connector for ESRI GIS is a ClassLoader object that also contains an xml configuration file for the form menus, base maps, and other services available. (See "Custom ClassLoader" in Appendix A for more information about ClassLoaders.)▪ Provides shape files for World Countries and US States.
Esri	<ul style="list-style-type: none">▪ Houses all of the geographical and geospatial data (Data Services), which the IBM TRIRIGA system obtains through Web Service and REST API calls.▪ The actual map view. ArcGIS Server, whether it is the services offered online or the services hosted on your proprietary ArcGIS Server, renders the maps and handles any of your geo-processing.▪ All Geo-Processing for drive time or distance radii are handled by the ArcGIS Server as well as any Geo-Coding for latitude and longitude coordinate gathering of addressable objects.▪ The Esri Flex Viewer Version 1.3 is used to render the BaseMaps from the server and provide basic interaction with the map data. The standard configuration file used for the Flex Viewer is available in the IBM TRIRIGA ArcGIS ClassLoader instance. The file is in the ResourceFile section named <code>config.xml</code>.



Note - The interaction between Esri and IBM TRIRIGA can be considered truly a mashup. Data within IBM TRIRIGA is not stored within the ArcGIS server and likewise the ArcGIS data is not stored in IBM TRIRIGA. Data from the two systems come together at run time to display GIS spatial analysis pertaining to building information originating from IBM TRIRIGA.

Esri offers a number of data services, in particular the Spatial Query data service. These services are used by GIS to determine which geographies the user is looking at within the current map view.

IBM TRIRIGA displays the ArcGIS connector in two functional areas of the application. The component can be added to portal sections or within a custom tab of a business object. The same full-featured functionality is available any time a map is displayed.

ArcGIS FlexViewer

The form component used throughout the IBM TRIRIGA application to display geographically enabled objects is based on the Sample FlexViewer distributed openly from Esri. This component uses the ArcGIS API for Flex and has been customized to allow a seamless interaction with the IBM TRIRIGA application.

The interaction between IBM TRIRIGA and the ArcGIS server makes sure that your maps are published with support for the REST API provided by ArcGIS Server.

You can use the `config.xml` file to configure ArcGIS FlexViewer. To locate this configuration file, navigate to Tools > System Setup > System > Class Loader in IBM TRIRIGA and select the ArcGIS ClassLoader object.

Your ArcGIS Connector ClassLoader instance should have the following Resource Files:

Resource File	Description
<code>ArcGis.zip</code>	Contains all the html, js, css, and flex files used to render the maps.
<code>arcgis_agsws_stubs.jar</code>	Contains the Java classes that were generated from the WSDL file provided by Esri to do GeoCoding.
<code>config.xml</code>	This file was provided by Esri with the Flex Sample Viewer used to render the maps. It allows you to configure what menu items are displayed on the map, what REST Url Base maps to point to, and what widgets will be displayed.
<code>TririgaPs-ArcGIS.jar</code>	Contains the Java classes used to process the information from IBM TRIRIGA that is displayed on the map.



Note - The API calls used for the IBM TRIRIGA GIS application only work with ArcGIS Server version 9.2 or higher.

There are two views, one for Location and one for Geography. They are similar. The only difference is the name of the query in the `anchormame` parameter string. The URL string contains a parameter that defines the default query string to use when rendering the query results and which default view to use (Location or Geography). The parameters can be set up as a simple URL parameter string:
`/html/en/default/rest/ArcGIS`

You can pass optional parameters in the URL to affect the behavior of your map. The values are as follows:

Parameter Value	Description
<code>/html/en/default/rest /ArcGIS</code>	This is the base URL that points to a Servlet Proxy loading components from the ArcGIS ClassLoader. (See " Servlet Proxy " in Appendix A for more information about Servlet Proxies.) By default if no parameters are passed, it will load the map with the default <code>anchormame</code> of <code>triApplicationSettings - GIS Anchor - All Environmental Queries</code> and with a view of Locations.

anchormame The `anchormame` parameter is the name of the query that holds all available metric/standard queries. These queries are added as related reports to the anchor query. The anchor query never produces results; it is merely a container for the GIS queries. The ArcGIS FlexViewer contains a widget that houses the queries that you can choose to run. The results can be returned as either Location points or Geographic regions.

For example, for a custom `anchormame` query named `MyCustomAnchor`, the URL would look like this: `/html/en/default/rest /ArcGIS?anchormame=MyCustomAnchor`

queryname The `queryname` parameter allows you to pass a simple query that will show basic objects on the map that are geo-coded. The results in the query must have the labels of "Latitude" and "Longitude" in order to show up on the map. The values are omitted from the bubble up as well as from the table section. They are used only to display the bubble marker. Since you are not specifying an `anchormame`, the system uses the default to add to the list. Unlike the queries in the `anchormame` list, this query does not need a related report for Location and for Geography. It assumes Location based on the Latitude and Longitude in the query results.

For example, to show all buildings in the country with a query named `MyBuildings`, the URL would look like the following:

`/html/en/default/rest/ArcGIS?queryname=MyBuildings`

view The `view` parameter is the default view of the query. If the user has saved their Settings on the map, that overrides this view type. Otherwise, this default view type is used.

Valid values are: `LOC` (for location view) and `GEO` (for geography view)

To run the previous custom anchor and default the results to geography, the

Parameter Value	Description
-----------------	-------------

	URL would look like this: /html/en/default/rest /ArcGIS?anchortname=MyCustomAnchor&view=GEO
--	--

GIS FlexViewer Application

The GIS Flex Sample Viewer v1.3 application is a Flex client inside a standard Web browser. It supports two views: Locations and Geographies. The map initially loads with a default query and view type, as listed in the Externally Linked portal section. This section is a portal section of type External Link that contains a URL string pointing to the GIS FlexViewer Application with a hard-coded parameter string. This parameter string contains the name of the query to run and whether it should load in Location view or Geography view. Once the GIS FlexViewer Application loads, the query fires and the user views the results of this query on the map.

The results are either pin points of Locations (if Location view) or a shaded geographical display (if Geography view). The shading reflects the metric query Threshold color for the particular geography (for example, California red, Nevada yellow, Texas green). Geographies that are not part of the metric results display as normal. The extents of the map default to what the Portal map extents were when launching the Web application. If a user pans the map in the Portal to a geographical area that does not contain any data, the Web application does not show any results. A user would need to pan/zoom to an area (for example, the United States) and run the query again. If the query being run is a standard query (not a metric query), then the color is blue.

The map behaves like other GIS maps, with panning and zooming features via a mouse wheel. It supports a set of widgets used for finding locations by address, panning/zooming, and map types (for example, street, aerial, tiled, dynamic, custom).

Below the map is a grid that contains textual data relevant to the query. The grid displays the data of the related report that is defined for that particular view. Because of limited real estate on the screen, if the view port of the GIS map is too small, you will not see the data grid unless you open the GIS map in expanded view. There are two related reports for this purpose, one for Geography view and one for Location view. Each query in the drop-down query list has this set of two related reports, and these related reports are the same in each of the queries. This way the grid data has a one-to-one relationship with the map. The data columns in the grid match the data in the expanded bubble marker.

The purpose of the related reports is to provide each location/geography with an associated bubble marker, where a user can define the fields that show up in the bubble marker. There is one query for Locations and one for Geographies. Each location has the same set of field labels as the other locations, and each of the geographies has the same set of field labels as the other geographies.

If the query is a standard IBM TRIRIGA query, this grid contains the query results. The standard IBM TRIRIGA query will have an associated Geography and Location related report. Depending on the view, the query with the corresponding object type (Location or Geography) runs, rendering a list of those objects in the grid. When a user switches the view, the corresponding related data also renders in the grid.

There is a set of menus at the top of the map with which the user can interact. The application consists of several widgets and controls defined in the `config.xml` file. Two widgets that are open by default are the IBM TRIRIGA widget, which displays the default-related reports, and the Settings widget, which allows the user to save their default zoom and latitude/longitude.

The controls available are as follows:

Control	Description
Map View	<p>Map View includes:</p> <ul style="list-style-type: none"> ▪ <i>Show Locations</i>: Shows pin-pointed locations on the map. ▪ <i>Show Geographies</i>: Shows color-coded geographies based on the Threshold value of the metric.
Available Queries	<p>This drop-down list contains all queries available to the user. The queries in this list are configurable via a standard IBM TRIRIGA query. This query is considered the anchor query. Within it, there is a list of related reports associated to this main query. These related reports are the ones displayed in the application query list. When a user switches queries in the drop-down, an onChange event fires and causes that query to run.</p>

The GIS FlexViewer Application allows for the same functionality in all areas that it is displayed. The actions include:

Action	Description
Ability to run various queries	<p>The available queries within the Web application are defined through an IBM TRIRIGA page. IBM TRIRIGA pages have a Queries tab, where you can specify the queries you want to show in the Web application.</p>
Ability to see related report data for metric queries	<p>When defining metric queries in the Report Manager, you can include two sub-reports that are of type Query. One sub-report must have a Location object as its associated business object, and the other must have a Geography as its associated business object. At run time, the metric will run and load the results of these reports in a grid below the map. Depending on the user view, the corresponding sub-report data displays in the grid.</p>
Ability to move a location to a new point on the map and update the geocode	<p>After a user runs a query, they see bubble text that corresponds to each location on the map. A user can click the bubble marker and expand it. From here, they can move the location to a new area on the map. After moving the location, the system updates the geocode settings for that location (The X/Y coordinates of the location only, no other fields are updated on the Location record).</p> <p>In addition, security is enabled to restrict who can perform this operation (see below on Security).</p>

Action	Description
Security	<p>Updating location geocodes is security-driven using the security groups defined in the IBM TRIRIGA application and based on who can update geocodes on IBM TRIRIGA forms for the various Location records. At run time, the system checks whether the user has access to update geocodes in the form. This drives whether they can perform GIS Map functions. If they do not have access, they will not see the controls in the map or they will have limited control based on what permissions they have.</p> <p>For each of the Location/Geography business objects, users either have access or no access to:</p> <ul style="list-style-type: none"> ▪ View the record. ▪ Update geocodes (on location/transaction business objects only). ▪ The Move Location and/or More Information buttons on the bubble markers.

GIS Portal Section

The GIS portal section points to an internal Web page that contains a GIS map. The map has a default query associated to it and renders the results in GIS-fashion onto the map. The default query can be a metric query or a standard query.

The URL section names are as follows:

- triURL - GIS - Environmental Manager/Planner (US Govt)
- triURL - GIS - Environmental Manager/Planner

When a user logs in to the application, the URL is called to load the Web page containing the map. Based on the query name that is a part of the URL parameter, the list of related reports is returned, and the first related report in that list is executed, returning the results to the map. Whether the query is a metric query or a standard query, it must have two related reports: One based on the Location module and one based on the Geography module.

The map determines which view type the user is currently in and runs the appropriate related report. These related reports are used to define what a user sees in the bubble markers for the Locations/Geographies. These queries also populate the data grid in the Flex application. There is a one-to-one correlation between the Locations/Geographies on the map and the grid data. The grid data contains the same fields that the bubble marker contains, as these are both coming from the same related report.

The map has widgets available to the user to Pan/Zoom, Find Locations, and view different map types.

Two views are supported:

- Location view
- Geography view

View	Description
Location View	This view shows the locations returned from the query pinpointed on the map. Each of the locations has a bubble marker (hover text) that displays information related to the location. If the query is a metric query, the bubble marker also displays the metric results and each location point icons are color-coded to match the threshold of its metric value. If the query is a standard query, the color is blue.
Geography View	This view shows color-coded geographical shapes based on the geographies returned by the metric query. The colors represent the Thresholds of those geographies. For example: If California's status is green and Nevada's status is red, you will see a map of the states with those states shaded green and red. The Geographies display a bubble marker when a user hovers over the shaded area. Not all geographies are supported in this shading; only the following geographies provided by Esri are supported: World Countries, U.S. States, U.S. Counties, and U.S. Cities.

The query associated to the map neither has a direct impact on nor reacts to any other metric on the portal. This is a stand-alone application inside a portal section. It has its own Save Map Settings button. This feature saves the current map extent, as well as the view. The next time a user signs in, the saved settings override the default view in the URL parameter of the portal section URL. If the user has not Saved Map Settings, the system displays the default view as defined in the URL parameter string.

Creating a Custom GIS Portal Section

The following steps describe how to create a custom GIS portal section. Use the as-delivered portal sections for reference:

- `triURL - GIS Environmental Manager/Planner`
- `triURL - GIS Environmental Manager/Planner (US Govt)`

To Create a Custom GIS Portal Section

Step 1 Create an Anchor Query. For a sample Anchor Query see `triApplicationSettings - GIS Anchor - All Environmental Queries`.

An Anchor Query contains a list of related reports. These related reports are the ones you see in the GIS query list. The query above is for users logged in as Environmental Planner.

To Create a Custom GIS Portal Section

Step 2 For each query you create for the GIS query list, you need to do the following steps:

- Make sure the query returns a list of Location objects (for example, building, land, property). For metric queries the drill path must be Location.
- Make sure that the query has two related reports: one for Location data and one for Geography data. These related reports are used to populate the bubble markers and grid.

For an example, look at the query `Location - GIS - Sub Anchor for triBuilding - Env` related report within the `triApplicationSettings - GIS Anchor - All Environmental Queries`.

Step 3 Create a new portal section of type External. Enter a URL as shown in the example below:

```
/html/en/default/rest/ArcGIS?anchorname=triApplicationSettings%20-%20GIS%20Anchor%20-%20All%20Environmental%20Queries&view=LOC
```

where:

- `anchorname` is the name of the anchor query; make sure to put the `%20` in place of spaces in the query name.
- `view` defines if you want to see locations (`LOC`) or geographies (`GEO`) in the portal map by default.

GIS Tab

Location, Geography, and RE Transaction Plan records have a GIS tab. This tab contains a map that pinpoints the Location, and the map extent is the localized area. A default query renders the map. The query is specified in the URL as a parameter string (same as in the portal section) that determines which query to run - metric or standard. The URL of the GIS tab is defined in the Form Builder.

If the record is a Location record, the query runs on the Location.

For a RE Transaction, which can consist of many locations that are part of that transaction, the query first retrieves all RE Projects from the Transaction Plan and then gets the Proposed Sites for those RE Projects. These Proposed Sites are what appear in the map. At this time, only RE Project Leases and RE Project Acquisitions have Proposed Sites, so these are the only RE Projects that are included.

If the record is a Geography record, the query finds all of the locations that are within that geography and displays them on the map.

GIS/Esri Integration Points

For GIS functionality, IBM TRIRIGA uses a mapping service provided by Esri ArcGIS Server. IBM TRIRIGA communicates to the server using Java and Flex through HTML pages containing the FlexViewer

application and through IBM TRIRIGA workflow Custom tasks to facilitate the Geo-coding of buildings via their addresses.

Flex makes the service calls to ArcGIS Server and to IBM TRIRIGA using its native HTTP Service protocol. Actions provided on IBM TRIRIGA records (for example, Geocode Address) use a Custom task that makes calls to the services. Three fields on each of the Location forms and business objects support the Custom task:

Field	Description
triGisLatitudeNU	Holds the latitude of the geocode point.
triGisLongitudeNU	Holds the longitude of the geocode point.
triCountryCodeTX	Holds the Country Code for the country the address is in. This is used as a key for finding the boundaries of countries when viewing a map for Geography. For example, United States (US) and Canada (CA) need this, but some European services do not. Populate the country code to ensure a map for Geography has the correct boundaries of countries.

Two fields on Geography records are used for matching against Esri Spatial Query key fields (and Dbf/Shp file key fields) and to map the Country Code field to a location that uses the geography. The fields are `triGisLinkNameTX` and `triCountryCodeTX`.

Each time the Spatial Query and Dbf/Shp files are used, the system matches the Geography names from those fields to the Geography name in IBM TRIRIGA. Because there is the possibility that the Geography name in the Spatial Query or Dbf/Shp files could be different (upper/lower case, for example), the `triGisLinkNameTX` field contains the value to match against the key fields in the Spatial Query and Dbf/Shp files. The Country Code field maps this value into a Location record when the user selects the Geography. There is a Country Code field on the Locations that a user can manually enter, but the `triCountryCodeTX` field is designed so that a user does not have to do that. It is mapped in, assuming the field has been populated on the Geography record.

The `triGisLinkNameTX` field is populated by the module level workflow that fires when a Geography record is saved. If this field is blank, the workflow populates it with the value in the `triNameTX` field. If this value is already populated, the system ignores it.

In order to support configurability for customers to use their own servers, IBM TRIRIGA delivers a set of three forms. Use these forms to enter your customer-specific GIS configuration data. The forms are located in the Setup menu in the Application Setup Manager. The forms are: [GIS Config](#), [GIS Layer Config](#), and [GIS Service](#).

Form	Description
GIS Config	<p>GIS Config defines the following:</p> <ul style="list-style-type: none"> The ArcGIS Server geo-processing service source name, which is the SOAP service name to handle geoprocessing. The Primary GIS Service object to use to display the shape file overlays.

Form	Description
GIS Layer Config	<p>GIS Layer Config defines the following:</p> <ul style="list-style-type: none"> ▪ Geography that pertains to the GIS Service. This should represent an item in the top-level service of the GIS Config page. The default is country. ▪ Which GIS Service to call for this particular geography. The GIS Service object contains the shape layer data that can be overlaid on the viewer. ▪ Layer Type and Scale are no longer used.
GIS Service	<p>GIS Service defines shape files for geographical shading in GIS and includes:</p> <ul style="list-style-type: none"> ▪ Service Name, which is used as an identifier. ▪ Service Type. The values are: <ul style="list-style-type: none"> • Polygon: Tells the system that this relates to a polygon shape for the GIS map. • Point: Tells the system that this relates to a geocode point on the GIS map. ▪ Service Key. The field name from the service that the system uses to get the name of the geography. Each service contains a set of key/value fields for each geography, so we need to define which field in that set we need to look at to get the actual name of the geography we are looking for. ▪ Module Name, which is the IBM TRIRIGA module of the Geography that corresponds to the service. ▪ BO Name, which is the IBM TRIRIGA Business Object of the Geography that corresponds to the service. ▪ Details section, which defines the actual shape file to be used for shading the geographies for this service: <ul style="list-style-type: none"> • Dbf File. This is one of two files needed for the shape file set. It contains a list of all geographies that fall within the service name. • Shp File. This is one of two files needed for the shape file set. It contains binary information for defining the points that outline a specific geography. • Key Field. The key value in the Dbf file that holds the name of the Geography. At run time, the system matches the Geography name from IBM TRIRIGA to the Geography name of the key value within the shape file. Each Geography name in the shape file has its own key to match against. This is the field name in the Dbf/Shp file the Flex application uses to look up the correct shape.

Adding/Customizing GIS Configuration

You may choose to add new base maps or shape files for geographies. The following sections describe how to [add new BaseMap](#) and [add Dbf/Shp file services](#):

Adding a BaseMap

The following steps assume that you want to add a different BaseMap from your ArcGIS Server to be rendered in the GIS map.

To Add a BaseMap

- Step 1** Make sure that the Map you select is published and accessible via the REST API.
- Step 2** After establishing this map, sign in to IBM TRIRIGA.
- Select Tools > System Setup on the menu bar
 - Click **Class Loader** under System in the System Setup page
 - Open the ArcGIS Connector record
 - Within this ArcGIS instance ClassLoader object, there is a Resource File in the query section called, "config.xml". Open this record and download this file to your machine.
- Step 3** Once you have downloaded this file, you can open it up using any text editor. This file is an XML file that can be configured to add/remove elements from the FlexViewer application.
- Near the top of the file, you will see a node section with the following XPath: `configuration/map/basemaps`. By default, this node contains two nodes named `mapservice`.
- Step 4** Add a new `mapservice` node to the XML file with structure similar to the other two, except change the name to what you want displayed in the map and the value to point to your BaseMap URL.
- Save the file, upload it to the Resource File for config.xml and click Save.
 - By saving this modified file, the ClassLoader revision number will increase by one, telling the system to reload the new Resource Files.
 - When you go to your form and refresh, you will have a new menu item that when selected will render the new BaseMap.



Note - This viewer and the configuration file were provided by Esri with some modifications. It is known as the ArcGIS Sample Flex Viewer v1.3.

Adding a Dbf/Shp File Service

The following steps assume that you want to add geographical shading to Japanese Regions.

To Add a Dbf/Shp File Service

Step 1 Make sure that you provide a geo-processor to allow for the key lookup of these files.

Step 2 When the Dbf/Shp files exist, create a GIS Service record.

- Service Name: Name of the Spatial Query data service for Japanese Regions.
- Service Type: Leave blank.
- Service Key: This is the Key-Field name within the Esri Spatial Query service that returns the actual name of the region.
- Module Name: The module that contains the geographies. In IBM TRIRIGA standard product, this is Geography.
- BO Name: The business object name for Japanese Regions.
- Dbf File: Upload the Dbf file for Japanese Regions here.
- Shp File: Upload the Shp file for Japanese Regions here.
- Key Field: The field in the Dbf/Shp files that holds the name of the Region. The Dbf/Shp files also may have a few key/value pairs of data for each Region. Specify which field the system should look at when matching Geography names between IBM TRIRIGA geographies, Dbf/Shp file geographies, and Spatial Query geographies.



Note - The Service Name must match the corresponding Dbf/Shp file Region name and the IBM TRIRIGA region name. These all need to match up, including upper/lower case.



Note - The Spatial Query service can return a series of fields for each Region (for example, Name, Population, Median Household Income). This Service Key field needs to be the Key Field name that represents the name of the Region.

Step 3 Open the GIS Config record for Esri.

Step 4 The General and Details sections should already be correct. Click Add in the Layer Configs section to add a new Layer Configuration record.

Step 5 In the GIS Layer Config window:

- Geography: The geography to Japanese Regions.
- Service: The name of the GIS Service record you created.

Step 6 At run time, when the user is within that scale range and runs a query in Geography mode, they should see the Regions highlighted according to the query results.

GIS Supported Mapping Queries

IBM TRIRIGA GIS solution supports a set of pre-defined queries in the standard Real Estate Environmental Sustainability and U.S. Federal Government products. These queries are configurable.

Two anchor queries define the queries for each Role type. Within these queries, there is a set of related reports. These related reports are the ones populated in the drop-down menu of the GIS FlexViewer Application.

Creating a New GIS Metric Query

Metric queries in GIS behave differently from those in IBM TRIRIGA Workplace Performance Management, due to the map being the main driver. The metrics are filtered/grouped by the geographical data that is displayed in the current map view when running a metric query. IBM TRIRIGA Workplace Performance Management metrics have a Show By/Group By drop-down box, as well as a series of Filter drop-down menus. With GIS, there is no concept of filters.

Another key difference is the concept of Related Reports, Tabular Reports, and Sub-Reports. In IBM TRIRIGA Workplace Performance Management, each metric query can have a Related Report to show data in the grid below the chart. These Related Reports are of type Metric. With GIS, the Metric Report has no sub-reports that are of type Metric. Instead, each metric query has two sub-reports that are used to show the data in the grid and bubble markers: One for the Location module and one for the Geography module. When a user is in Location view on the map, the Location module sub-report runs. When a user is in Geography view on the map, the Geography module sub-report runs. These are both of type Query.

Follow these steps to add a new metric query to the GIS application:

To Add a New Metric Query to the GIS Application

- Step 1** Make a copy of the intended metric query.
- Step 2** Delete all sub-reports.
- Step 3** Add the two Query reports for Location and Geography:
 - Location - GIS - Bubble Marker Fields
 - Geography - GIS - Bubble Marker Fields

To Add a New Metric Query to the GIS Application

Step 4 Remove all filters on the Filter tab except the `triGeographyTX` filter, which should match against `$$RUNTIME$$`.

Step 5 Add this new metric query as a sub-report to the anchor query:

- If this metric is for the Environmental Planner role (non-US Gov), the anchor query is: `triApplicationSettings - GIS Anchor - All Environmental Queries`
- If this metric is for the U.S. Federal Government Environmental Planner role, the anchor query is: `triApplicationSettings - GIS Anchor - All Environmental Queries (US Gov)`

Step 6 When a user launches the GIS application from the portal map, they will see this metric query in the GIS query list drop-down.

Creating a New GIS Standard Query

Each standard query has its own anchor query of type Query. This anchor needs to contain a Location and Geography query of type Query as sub-reports. The anchor is attached as a sub-report to the main anchor query. The main anchor query is the one that is used in the Portal section for the specific role, and will resemble this hierarchy:

```
Role-level query
  Metric query sub-report
  ...
  Standard query anchor
    Location query
    Geography query
```

Creating a New GIS Location Query

GIS leverages the IBM TRIRIGA query engine to display locations on a map. In order to do this, you need to create a query that returns a list of Locations. You can use any filters (associations and static). As long as the objects returned from the query are Location objects, they work with GIS.

The one caveat is that the query needs to have an association to Geography records. This is because GIS is driven by the map, and all we have as a driver is the geographies in view. Standard queries for GIS typically contain a set of three associated queries:

1. Query to get Location records, with an association query to get all the cities that these are in (query number 2).
2. A query to get all of the Cities, with an association query to get all geographies that these Cities are in (for example, Counties, States, Countries). This has an association query to number 3.

3. A query to get all Geographies, with an association filter specifying the Primary Geography association to the current record. This in effect is saying to get itself, as all geographies have an association string of Primary Geography that points to itself.

Using the two geography queries described above, one to grab Cities, and one to grab Geographies, resolves how the applications are set up with associations. Locations are only associated to the Cities they are in. Location records do not see what other geographies the City is in, they see their immediate location. However, when on a map, the geographical drivers are typically geographies like US States, Countries, Counties.

City records have associations to all of their parent geographies (for example, County, Metropolitan Area, State, Country), which is why GIS needs the third association query.

To see an example, look at the query `Location - GIS - Buildings, Structures, and Retail Locations - Env`. It is set up the correct way to see Locations from a Standard query in GIS.

Creating a New GIS Geography Query

Geography queries are handled in somewhat the same way as the Location queries, except the associations are in reverse. The goal is to get a list of Geographies that have locations in them, essentially reversing the association order from that in the Location standard query described immediately above:

1. Query to get all geographies that are associated to Cites (query number 2). This query should have an association filter specifying the Primary Geography association to the current record. This is in effect saying to get itself, as all geographies have an association string of Primary Geography that points to itself.
2. A query to get all Cities that fall within the above geographies. This has an association query to number 3.
3. Query to get Location records. This causes the first two queries to be limited in that only the Cities that have locations in them return in query number 2.

GIS Tips

GIS Tips

Performance of the map when zooming in and out is at Internet speed. Any time a user moves the map, a call is made to respond and redraw the map. IBM TRIRIGA lets the FlexViewer handle these actions, so there is a chance latency due to network traffic, since the commands are communicating over HTTP. This is only if you are using the Base Maps provided from an online service like Esri. If you have your own Esri server in your house, the latency will be determined by your intranet.

GIS Tips

GIS may show different locations than the corresponding IBM TRIRIGA Workplace Performance Management metric. This is because of a key distinction between IBM TRIRIGA Workplace Performance Management metrics and GIS metrics. Although GIS uses the same metric calculation on the same Fact Table record, GIS does not support filtering of metric results.

IBM TRIRIGA Workplace Performance Management has a Group By drop-down box to define dimension and a set of filter drop-down boxes for further filtering of the results based on other criteria. GIS considers only the Group By drop-down (the dimension). In order to compare the results, the IBM TRIRIGA Workplace Performance Management metric would need to have its Group By set to either Locations or Geographies and all filters cleared out.

GIS considers only Locations and Geographies (defined at run time by which view a user is in, Location View or Geography View). At run time, the system determines in which view the user wants to render the query and toggles the Group By parameter within the API call to the Metric Query Engine.

GIS supports four push pin colors: Green, Yellow, Red, and Blue. IBM TRIRIGA uses the first three to represent the Threshold value of the Metric Query result. The blue push pin is a default color used for standard query results. At this time the system does not support adding colors.

The labels within the bubble markers and the grid are defined by the IBM TRIRIGA queries used for the display. There are three fields that can be added to your query results but will not show in the data grid or in the bubble marker. The three field labels are "Latitude" and "Longitude", which are used to paint the marker on the map, and "Image", which is used to display the Image graphic of your location in the bubble marker.

The label area within the bubble markers is a set width. Because of this, any labels that are more than about 17 characters will overlap into the right column (the actual data representing that field). If you add new fields, avoid overlap by checking the length of the label in the query definition.

If you cannot see locations in the GIS map, it may be caused by the following problems:

- You have more than one geography with the same `triGisLinkNameTX` field value. The GIS system uses the first geography it finds, and this one may not be the geography that is associated to the location record. This can happen, for example, if United States appears under two different hierarchy structures within the Geography tree, one under the World Regions node and the other under the North America node.
- Your locations are not geocoded. In order for GIS to display locations on the map, the records must be geocoded so that GIS knows where to put them on the map.
- Your location records have a Geography Lookup set to something other than a City (for example, `...\United States\California`, as opposed to `...\United States\California\Pleasanton`). Just as in IBM TRIRIGA Workplace Performance Management, the location records need to have a City in this field.

Use these standards for IBM TRIRIGA data to work properly with Esri:

- All queries must resolve to a list of Locations or Geographies.
- The system is designed to have an initial query and two related reports within it: one for Locations and one for Geographies. When you run a query (metric or standard), that query has two related reports associated to it - one based on the Location module and one based on the Geography module. At runtime, GIS determines which view the user is in and runs the appropriate related report.
 - In the case of a metric query, the initial query is used to obtain the results and the related reports are used for the bubble marker/grid data. Each metric query has the same set of two bubble marker queries and returns a list of objects that are within the current map view.
 - In the case of a standard query, the initial query is bypassed. Only the related reports run. These related reports define what appears in the bubble marker and grid. They return a list of locations that are within the current map view.
 - A standard query can also bypass these requirements and display any geo-coded results returned on the map. The caveat is that the query must return two columns with the Latitude and Longitude in the results.

Duplicate records in the grid are caused by a data issue with your hierarchy structures. Like IBM TRIRIGA Workplace Performance Management, GIS uses a flattened hierarchy table. If there is any issue with that table, you can rebuild the flattened hierarchy structure.

To rebuild the flattened hierarchy structure:

- Click the Administration Menu item. Select Data Modeler.
- On the upper right side of the section bar, click Utilities, and then click Hierarchy Structures.
- The system displays the Hierarchy Structure Manager, showing all hierarchies that are defined in the flattened hierarchy table.
- For each of the following hierarchies, click the hyperlinked Name, then click Generate Data:
 - All Geographies
 - Building Spaces
 - Buildings and Land

If you see a blank white screen instead of a map, check the following conditions:

- The GIS configuration pages are set up properly.
- The ArcGIS server is up.
- The ArcGIS ClassLoader is not set to debug mode.
- You have the proper licenses to use the GIS Map.

If you see a “No GIS License” message, make sure your `IBM_TRIRIGALICENSE.properties` file is up to date.

3. Appendix A: Connector Technology

IBM TRIRIGA connectors allow extended functionality to be coded and distributed through an Object Migration package. It uses the IBM TRIRIGA ClassLoader business object and Resource File that correspond to their IBM TRIRIGA Application Platform feature components as well as Custom workflow components like CustomTask, CustomParameters, and CustomTransitions. The use of the Servlet Proxy, an extension of ClassLoaders, also gives a handle to the Java IBM TRIRIGA Connector for Business Applications (BC) API (no SOAP, just java) that allows for easy integration into external systems with custom form components via Java Servlet style programming.

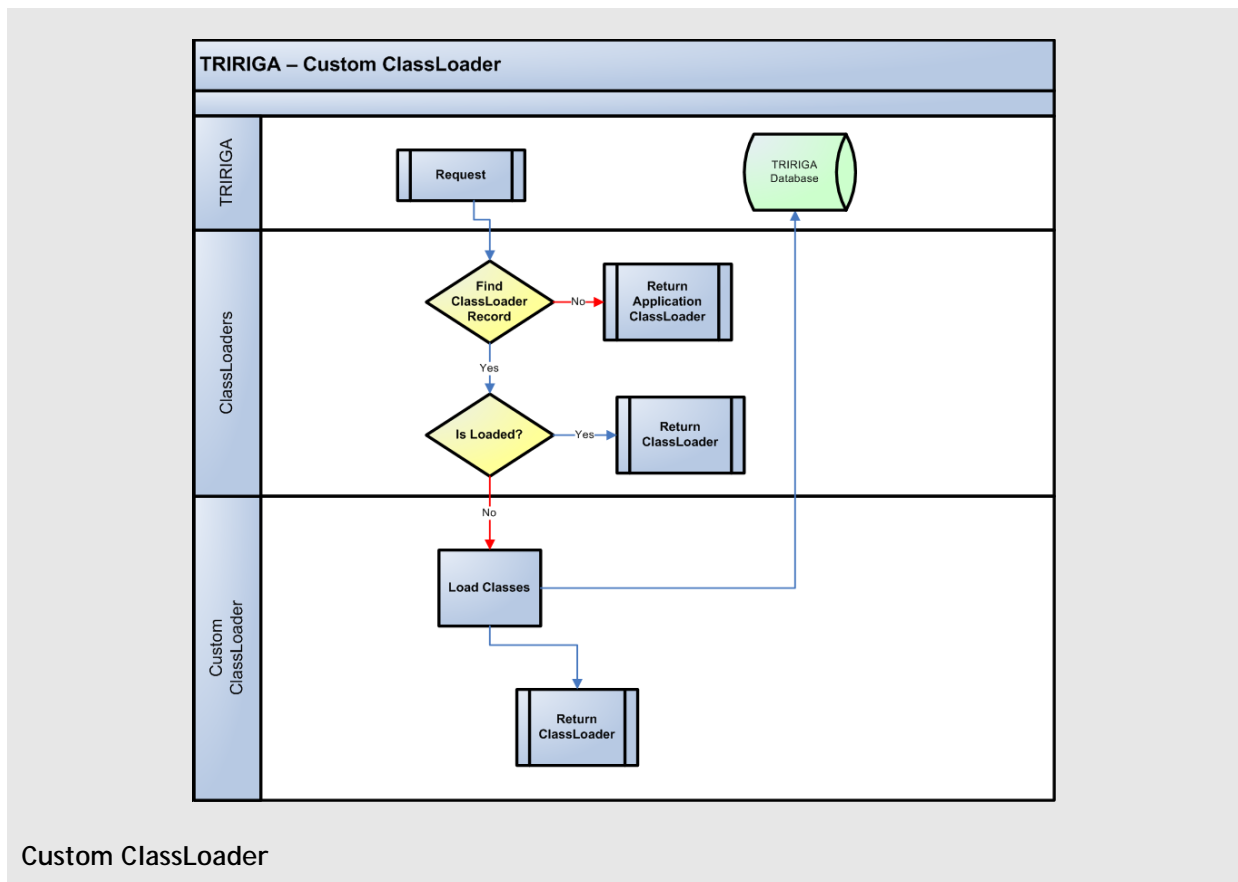
The audience for this appendix should include those familiar with the IBM TRIRIGA Application Building tools, IBM TRIRIGA Connector for Business Applications, and the Java Programming Language. A connector can only be implemented using the Java Programming Language.



Note - See your IBM TRIRIGA Sales representative for more information about IBM TRIRIGA Connector licensing.

Custom ClassLoader

The IBM TRIRIGA Custom ClassLoader has two components that work in tandem to allow you to deploy Java classes into the application server domain. Below is a diagram of how that works:



How This Works

When you create a ClassLoader instance, you can add custom java classes to the classpath of the application server in one of three ways: Parent First, Parent Last, and Isolated. These classes can be accessed via a Custom task in workflow for programmatic interaction or can be extended to work as a Java Servlet, extending the form capabilities for portal sections and custom tabs in objects.

To access your classes from a Custom task, loaded through the ClassLoader. Make sure that the following elements are in place:

To Access Your Classes from a Custom Task

Step 1 Your class packages can start with only one of these three structures. Everything else will be blocked.

- `com.tririga.ps`
- `com.tririga.appdev`
- `com.tririga.custom`

Step 2 In the ClassName field in the IBM TRIRIGA workflow Custom task, you must specify the ClassLoader name separated by a colon.

For example if you have a ClassLoader instance named "MyClassLoader" and your entry class is "com.tririga.custom.myclassloader.Hello" your ClassName field will look like this:

```
MyClassLoader:com.tririga.custom.myclassloader.Hello
```

This allows workflow to search for your class within the context of the ClassLoader specified.

Step 3 The last thing you need to do is implement one of the various `com.tririga.workflow.pub.CustomTask` objects available from the distributed `TririgaCustomTask.jar` in the `{IBM TRIRIGA_INSTALL_FOLDER}/tools/BusinessConnect`.

For development, you need to include the `TririgaBusinessConnect.jar` and the `TririgaCustomTask.jar` into your IDE classpath. These two libraries should not be included into the ClassLoader business object as they will be ignored.

How to Load Your Files into the ClassLoader

Follow these steps to load your files into the ClassLoader:

To Load Your Files into the ClassLoader

Step 1 Navigate to Tools > System Setup > System > Class Loader.

Step 2 Select EnergyStar.

To Load Your Files into the ClassLoader

The system opens the EnergyStar ClassLoader form.

The ClassLoader object requires that you provide a unique name and the ClassLoader type. Inside this object is the Resource Files query section. Add your classes and form assets, such as HTML, Flash, JS, Images, properties files, in this section.

The *Resource File* field is of type Binary and is required. This allows you to upload the file that will be used for this ClassLoader. The *Name* field is required and you can make it identifiable as belonging to this ClassLoader. A Resource File object can be used in more than one ClassLoader.



Tip - A good rule of thumb is to prefix library names with an abbreviation of the ClassLoader and the real name of the library.

If you are uploading a *.jar file, only the *.class files will be loaded into the Classpath. For convenience, if you have many assets (for example, html, js, images) you can put them into a *.zip file and upload them as a single file. You also can upload a file individually, such as a configuration file, so that you can more easily modify just a single file.

Development

If you have access to the <IBM TRIRIGA_INSTALL_DIR>/userfiles/<ClassLoaderName> folder, you can select the check box named *Development Mode* on the ClassLoader object.

When this check box is checked, the ClassLoader ignores the revision number and always pulls from the <IBM TRIRIGA_INSTALL_DIR>/userfiles/<ClassLoaderName> directory. This gives you the freedom to change any files like HTML, JS, flash, or images and see your changes with a simple refresh of the page and not have to actually upload them to ClassLoader object.

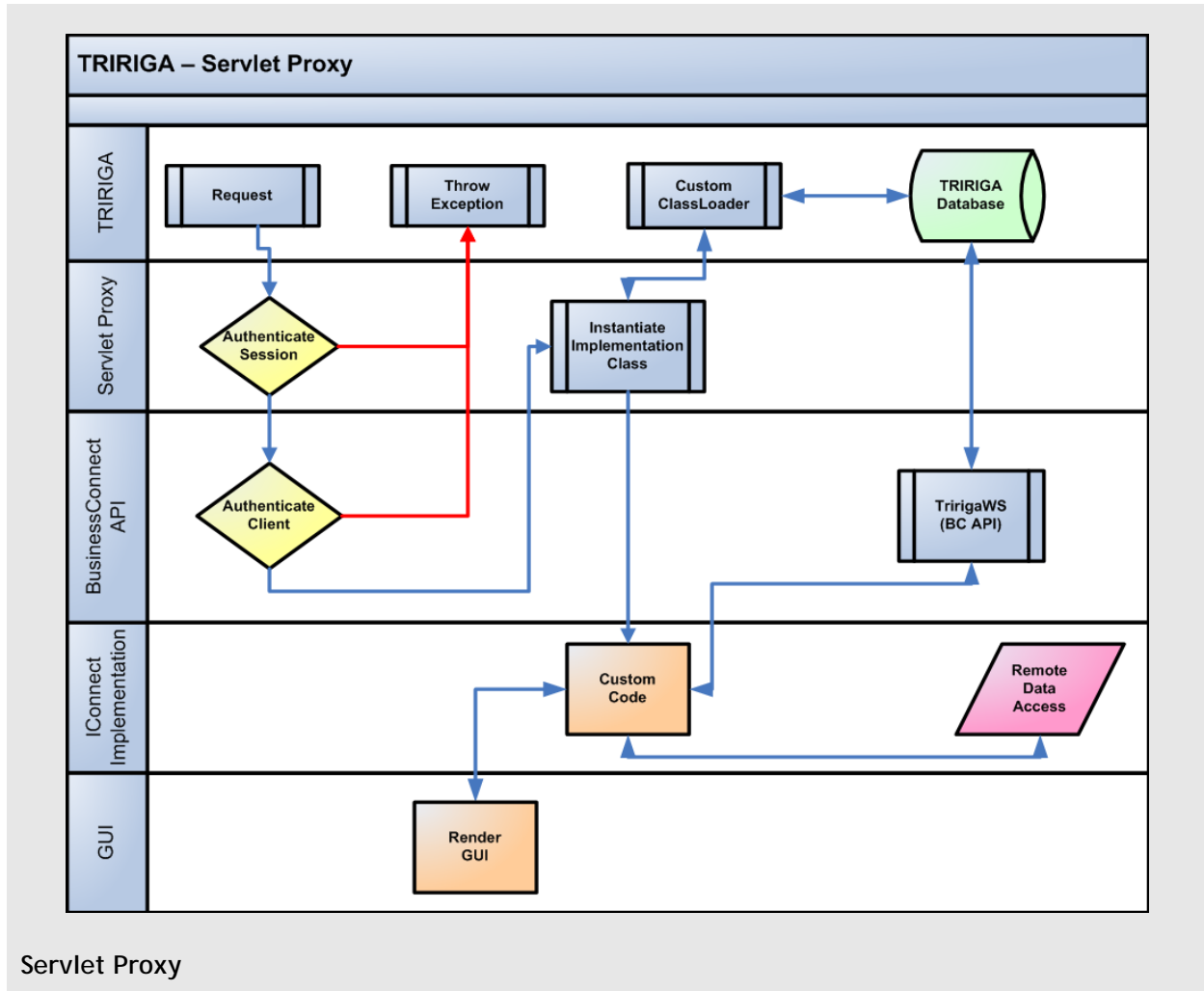


Attention - If you clear the Development Mode check box, the system pulls the latest files from the ClassLoader and potentially overwrites all your work.

Servlet Proxy

The Servlet Proxy is an extension of the ClassLoader functionality that allows you to develop Servlet style classes that can render, redirect, and communicate with form assets within your ClassLoader object. The assets must be uploaded to the ClassLoader object as Resource Files.

The following diagram shows how the Servlet Proxy works on the server:



Implementing the Hook

As with the ClassLoader objects used exclusively through the Custom task in workflow, you need to implement a Java Interface class contained in the `TririgaCustomTask.jar`.

To get your Servlet Proxy to render correctly and pass through your code, you will need to follow these steps:

To Get Your Servlet Proxy to Render Correctly and Pass Through Your Code

Step 1 Create a Java class in the package `com.tririga.custom` and implement the `com.tririga.pub.adapter.IConnect` Java Interface.

- Note that the package `com.tririga.custom` is the only package that will allow you to create an implementation class, so make sure that it is unique.
- The `IConnect` class has one method that needs to be implemented called `execute`.
- If you have a class named "MyFirstConnector", your code should look like this:

```
public class MyFirstConnector implements IConnect {  
  
    public void execute(TririgaWS tws, HttpServletRequest request,  
  
        HttpServletResponse response) throws ServletException, IOException {  
  
        //your code goes here.  
  
    }  
  
}
```

To Get Your Servlet Proxy to Render Correctly and Pass Through Your Code

Step 2 Looking at this method you can see that you have a handle to a TririgaWS Interface class, which is the Java Interface for the IBM TRIRIGA Connector for Business Applications API, and you have your basic request and response that you would normally have in a Java Servlet.

Add the following code to your execute method where it says “your code goes here.”

```
PrintWriter out = response.getWriter();

try{

    response.setContentType("text/html");

    out.println("<html><head></head><body marginwidth='0' marginheight='0'
style='margin:0;padding:0;border:0;'>");

    out.print("Hello World");

    out.println("</body></html>");

    out.flush();

} finally {

    if(out!=null)out.close();

}
```

This will print out an html page with the words “Hello World”.

Step 3 Compile this class and add it to a JAR file named “MyFirstConnector.jar”.

- Now navigate to System > ClassLoader and click Add.
- The ClassLoader name and the Java class implementing `IConnect` must be named the same. You can have only one `IConnect` implementation class per ClassLoader object. Since this class is “MyFirstConnector”, that is what you must name your ClassLoader instance.

Step 4 Add a new Resource File instance and upload your “MyFirstConnector.jar” file. Click Save.

When you modify, add, or remove a Resource File from the ClassLoader object, it will fire a workflow that increments the revision number. A change to this revision number tells the IBM TRIRIGA Application Platform to reload this ClassLoader instance.

Step 5 Your Servlet Proxy is now configured and ready to be accessed.

Accessing a Connector

If you have configured your Servlet Proxy correctly, it will be available at the following URL:
`http://<yourserver>/html/en/default/rest/MyFirstConnector.`

You need to have a valid login to access this URL. The easiest way is to add this URL to an external link section for a portal section or within a custom tab external link within any form.

All access to your Servlet Proxy will now happen from the above base URL. Navigating to the base URL in this example, your screen will print out the words "Hello World."

Should you need to access any files within your ClassLoader Resource File section, you can do so by appending the word `resource` to the base URL and then the path to the resource you want to load. For example, if you have an image as a Resource File called "helloWorld.jpg" you can load this image dynamically with this URL:
`http://<yourserver>/html/en/default/rest/MyFirstConnector/resource/helloWorld.jpg`

The server checks to see if this resource has been loaded yet and if it has not it pulls the file from the Binary field on the Resource File object and places it into the `<IBM TRIRIGA_INSTALL_DIR>/userfiles/<ClassLoaderName>` folder. When a request is made, it checks the cache and matches it to the revision number in the ClassLoader. If they are different, it reloads all the files that are not part of a *.jar file into this directory and refers to this location for each subsequent request.

The benefit to this is that it allows your files to be available on any application servers that may be running and will automatically refresh any changes made, so that they can be seen without having to bounce the server.

Debugging

There are a couple of ways to debug the ClassLoader, the ServletProxy, and/or your custom Connector. The following section briefly explains some common ways to achieve this.

Set Platform Logging

In the Administrator Console under the Platform Logging managed object, turn on debugging for the Class Loader and the Servlet Proxy objects to help you debug any problems you may be having. These logs are verbose but will give you a better understanding of what the server is doing with all of the libraries and assets. The *IBM TRIRIGA Application Platform 3 Administrator Console User Guide* describes how to access and use the Administrator Console.

Modify CustomLogCategories.xml

You can modify the `CustomLogCategories.xml` file.

If you have access to the <IBM TRIRIGA_INSTALL_DIR>/config folder, you will see an XML file called CustomLogCategories.xml. By adding a custom category to this file and restarting the server, your category will be added to the Platform Logging section in the Administrator Console.

This is probably the preferred method, since you will need to set this up only once. If the server is ever restarted, all you need to do is select a check box to turn DEBUG back on.

4. Appendix B: Allowed Values

The following table shows the allowed / required values for the ENERGY STAR attributes and meters.

Check with <https://www.energystar.gov/istar/has/> for the latest requirements and parameters available.

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
Meters / Energy Logs	meterEnergyType	District Chilled Water		
		District Hot Water		
		Coal (anthracite)		
		Coal (bituminous)		
		Coke		
		Diesel		
		District Steam		
		Electricity		
		Kerosene		
		Liquid Propane		
		Natural Gas		
		Other		
		Propane		
		Steam		
		Wood		
		Fuel Oil (No. 1)		
		Fuel Oil (No. 2)		
		Fuel Oil (No. 4)		
		Fuel Oil (No. 5 and No. 6)		
	meterGenerationMethod			

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
		Grid Purchase *		Integration will default this value.
		On-Site Solar		
		On-Site Wind		
		Electric-Driven Chiller		
		Absorption Chiller using Natural Gas		
		Engine-Driven Chiller using Natural Gas		
		Other		
	meterEnergyUnit			Integration will set up a properties file to map the full IBM TRIRIGA UOM with the abbreviated ABS value, so that it can be easily modified if needed.
		MBtu		
		MLbs		
		MWh		
		Mcf		
		ccf		
		cf		
		daily tons		
		gal		
		kBtu		
		kLbs		
		kWh		
		kcf		

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
		lbs		
		therms		
		ton hours		
		tons		
		cu m		
		I		
	meterActiveIndicator	Y		
		N		
	meterAddToTotal	Y		
		N		
	meterReadingSetAction	New *	Integration will default this value.	
		ReplaceAll		
		ReplaceRange		
Computer Data Center	Gross Floor Area	0-9 numbers	Number	
	Operating Hours/Week	0-168	Number	
Hospital (Acute Care or Children's)	Gross Floor Area	0-9 numbers	Number	
	Maximum Number of Floors	0-99	Number	
	Number of Licensed Beds	0-9999	Number	
	Tertiary Care	Yes/No	List	Integration will translate Yes to Y and No to N.
	Laboratory	Yes/No	List	Integration will translate Yes to Y and No to N.
	Laundry Facility	Yes/No	List	Integration will translate Yes to Y and No to N.

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
	Number of Buildings	0-999	Number	
	Ownership Status	For Profit, Governmental, Non Profit	list	
Hotel	Food Preparation Facility	Yes/No	List	Integration will translate Yes to Y and No to N.
	Gross Floor Area	0-9 numbers	Number	
	Number of Rooms	0-9999	Number	
	Workers on Main Shift	0-9999999	Number	
	Number of Refrigeration/Freezer Units	0-9 numbers	Number	
	% Heated	0-100	Number	
	% Air conditioned	0-100	Number	
	Average Occupancy	0-100	Number	
	Laundry Facility			xsd Type not looks valid.
	Guest Hours	<15 hours/day, 15 - 19 hours/day, 20+ hours/day	list	
	Guest Meals	0-9 numbers	Number	
	Spa Floor Area	0-9 numbers	Number	
	Gym Floor Area	0-9 numbers	Number	
	Laundry Quantity	0-9 numbers	Number	Integration will hardcode "lbs/year" as UOM
K-12 School	% Air-Conditioned	0-100	Number	
	% Heated	0-100	Number	
	Cooking Facility	Yes/No	List	Integration will translate Yes to Y and No to N.
	Gross Floor Area	0-9 numbers	Number	

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
	Months in use	08-12	Number	
	Number of PCs	0-9 numbers	Number	
	School district	String	String	
	Number of Refrigeration/Freezer Units	0-9 numbers	Number	
	High School	Yes/No	List	Integration will translate Yes to Y and No to N.
	Open Weekends	Yes/No	List	Integration will translate Yes to Y and No to N.
Medical Office	% Air-Conditioned	0-100	Number	
	% Heated	0-100	Number	
	Gross Floor Area	0-9 numbers	Number	
	Number of Workers	0-9999	Number	
	Operating Hours/Week	0-9 numbers	Number	
Bank/Financial Institution	Gross Floor Area	0-9 numbers	Number	
	Number of PCs	0-9 numbers	Number	
	Workers on Main Shift	0-9999999	Number	
	Operating Hours/Week	0-168	Number	
	Percent Air conditioned	0-100	Number	
	Percent Heated	0-100	Number	
Courthouse	Gross Floor Area	0-9 numbers	Number	
	Number of PCs	0-9 numbers	Number	
	Workers on Main Shift	0-9999999	Number	
	Operating Hours/Week	0-168	Number	
	Percent Air conditioned	0-100	Number	
	Percent Heated	0-100	Number	
Office	Gross Floor Area	0-9 numbers	Number	
	Number of PCs	0-9 numbers	Number	

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
Parking	Workers on Main Shift	0-9999999	Number	
	Operating Hours/Week	0-168	Number	
	Percent Air conditioned	0-100	Number	
	Percent Heated	0-100	Number	
	Parking ft2 that is enclosed (with roof)	0-9 numbers	Number	
	Parking ft2 that is unenclosed (with roof)	0-9 numbers	Number	
	Parking ft2 that is open	0-9 numbers	Number	
Other	Weekly Hours of Access	0-168	Number	
	Gross Floor Area	0-9 numbers	Number	
	Operating Hours/Week	0-168	Number	
Residence Hall/Dormitory	OtherType	String	String	Integration will pick up from Subtype field
	% Air-Conditioned	0-100	Number	
	% Heated	0-100	Number	
	Gross Floor Area	0-9 numbers	Number	
	Number of Rooms	0-9999	Number	
	Dorm Computer Lab	Yes/No	list	Integration will translate Yes to Y and No to N.
	Dorm Dining Hall	Yes/No	list	Integration will translate Yes to Y and No to N.
Retail	Gross Floor Area	0-9 numbers	Number	
	Operating Hours/Week	0-168	Number	
	Open and Closed Refrigeration/Freezer Cases	0-9 numbers	Number	
	Walk-in Refrigeration/Freezer Units	0-9 numbers	Number	
	Workers on Main Shift	0-999	Number	
	Number of PCs	0-9 numbers	Number	

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
	Number of Cash Registers	0-9999999	Number	
	Percent Air conditioned	0-100	Number	
	Percent Heated	0-100	Number	
	Exterior Entrance	Yes/No	list	Integration will translate Yes to Y and No to N.
Supermarket/Grocery	Percent Heated	0-100	Number	
	Percent Air-Conditioned	0-100	Number	
	Cooking Facilities	Yes/No	list	Integration will translate Yes to Y and No to N.
	Gross Floor Area	0-9 numbers	Number	
	Workers on Main Shift	0-999	Number	
	Operating Hours/Week	0-168	Number	
	Walk-in Refrigeration/Freezer Units	0-9 numbers	Number	
Swimming Pool	Months in Use	1-12	Number	
	Indoor/Outdoor	Indoor, Outdoor	list	
	Pool Size	Short course (25 yards x 20 yards), Recreational (20 yards x 15 yards), Olympic (50 meters x 25 meters)	list	
Warehouse (Refrigerated)	Gross Floor Area	0-9 numbers	Number	
	Number of Workers	0-9999	Number	
	Operating Hours/Week	0-168	Number	
Warehouse (Unrefrigerated)	% Air-Conditioned	0-100	Number	
	% Heated	0-100	Number	
	Gross Floor Area	0-9 numbers	Number	
	Number of Workers	0-9999	Number	
	Operating Hours/Week	0-168	Number	
	Walk-in Refrigeration/Freezer Units	0-9 numbers	Number	

Object Type	Field Element	Allowed Values (Verbatim)	Integration Field Types and Defaults	Integration Translations
	Distribution Center	Yes/No	Number	Integration will translate Yes to Y and No to N.
Multifamily Housing	Gross Floor Area	0-9 numbers	Number	
	Number of Units	0-99	Number	
	Bedrooms per Unit	0-9 numbers	Number	
	Number of Floors	0-9 numbers	Number	
	Percentage of square footage for living units	0-100	Number	
	Number of laundry hookups in individual units	0-9 numbers	Number	
	Number of common laundry hookups	0-9 numbers	Number	
	Number of dishwashers in individual units	0-9 numbers	Number	
	% Heated	0-100	Number	
	% Air Conditioned	0-100	Number	
	Regulation Type	Affordable, Market Rate, Both Affordable and Market Rate	list	
House of Worship	Gross Floor Area	0-9 numbers	Number	
	Seating Capacity	0-9999999	Number	
	Weekdays in Operation	0,1,2,3,4,5	list	
	Operating Hours	0-168	Number	
	PCs	0-9 numbers	Number	
	Commercial Food Prep	Yes/No	list	Integration will translate Yes to Y and No to N.
	Commercial Refrigerator/Freezers	0-9 numbers	Number	

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