IBM Intelligent Water
Version 1 Release 5

IBM Intelligent Operations for Water Product Documentation

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Note
Before using this information and the product it supports, read the information in "Notices" on page 233.

This edition applies to IBM Intelligent Operations for Water version 1, release 5, modification 0. This edition applies to all subsequent releases and modifications until otherwise indicated in new editions.

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Chapter 1. Solution overview

Smarter water management means enabling water utilities to better manage their water and assets by using insights from the water network, the environment, and from stakeholders. In particular, the success of a water enterprise is dependent on having a fully functioning and productive asset base, reducing operational and maintenance costs, minimizing outages, and ensuring a high quality of service.

IBM® Intelligent Operations for Water is a product in the IBM Intelligent Water Family from the IBM Smarter Cities® Software Solutions portfolio, which is a collection of industry solutions software designed for effective supervision and coordination of operations.

IBM Intelligent Operations for Water provides an intelligent dashboard for a water management organization. It displays information on water infrastructure and events. Underlying the solution is a set of carefully constructed variability points, including programming and data models, that can be programmed and configured to meet the needs of different types of water management scenarios and organizations.

IBM Intelligent Operations for Water is built on concepts of visualization, information services, and data integration. The application integrates the Water Information Hub asset with IBM Intelligent Operations Center and leverages multiple components from IBM Intelligent Operations Center. With IBM Intelligent Operations for Water, input data is ingested from external SCADA systems via WebSphere® Message Broker and is stored in an operational (and historical) database. IBM Intelligent Operations for Water provides executives and managers with real-time and historical views into the status of a set of domains. The domain views enable you to anticipate events and optimize operations.

IBM Intelligent Operations for Water can extend its semantic model to cater to different data models ingested from varying customers. IBM Intelligent Operations for Water interacts with underlying operation and information systems through gateways, maintaining separation of roles and responsibilities for the domains of an organization.

Based on the water organization's requirements, key performance indicators and custom reports can be generated from the real-time data and historical data. IBM Intelligent Operations for Water uses water industry frameworks and data from Enterprise Asset Management (EAM) systems, water consumption databases, and Geographical Information Systems (GIS), to provide the following benefits:

- Single view to monitor asset and infrastructure data.
- Visualization of current and historical asset system data.
- Integration of data from disparate water systems.
- Filtering display results.
- Targeted monitoring of the health of the water network. An interactive heat map enables you to monitor the overall health of the water network and drill down on water key performance indicators.
- Provides stakeholder collaboration, notification, and operational management capabilities.

IBM Intelligent Operations for Water can help provide a common view of operations that transcends individual systems, devices and departments, aggregating and integrating data from various sources. Once data is reconciled and collated, water operational and executive personnel can visualize information in an intuitive fashion to quickly identify anomalies, trends, and patterns. Personnel can view information about a map that shows critical events and monitors key resources.

IBM Intelligent Operations for Water runs on top of the IBM Intelligent Operations Center, which is a software solution designed for effective supervision and coordination of operations. IBM Intelligent Operations Center provides the base platform for IBM Intelligent Operations for Water.

IBM Intelligent Operations for Water can be deployed in two ways, either on premise or as a cloud-based offering. IBM Intelligent Operations for Water can also be integrated with other products in the IBM Smarter Cities Software Solutions portfolio.

Intended audience

This information center is intended for people who are using, installing, administering, and maintaining IBM Intelligent Operations for Water. It also contains implementation documentation for customizing the solution and integrating the external water management systems that IBM Intelligent Operations for Water requires.

This information center assumes that users have prior knowledge of, or proficiency with, the prerequisite software. Training for these base products is outside the scope of this information center. If you require training for these products, ask your systems integrator or IBM representative where you can obtain information about base component training opportunities.

You can find links to the component product documentation in the "Additional information" on page 231 page of the References section.

Features

IBM Intelligent Operations for Water provides water management information and analytics that help monitor and manage water infrastructure, optimize reliability and performance, reduce operating expenses, and improve service provision to city, corporate and domestic water users.

IBM Intelligent Operations for Water provides you with real time, map-based information, and spatial-temporal analytics that you can use to analyze the performance of your water management systems, assets, and networks. The available information and analytics help you to manage water maintenance initiatives and to identify potential problems before they occur.

IBM Intelligent Operations for Water is prepackaged with implementation content and sample data that can be used to familiarize you with end-to-end data flows. The simulated environment provides education and shortens the adoption and implementation cycle.

The following table describes the features of IBM Intelligent Operations for Water in more detail.

Table 1. The features of IBM Intelligent Operations for Water.

Feature	Capabilities
Dashboard	• Use a role-based dashboard to provide quick views of the critical operating alerts and Key Performance Indicators (KPIs). • Manage day-to-day operations and improve longer term planning. • Current and historical data views. • Centralized, comprehensive, and configurable platform. • Provides on-demand geographical visibility, analysis, and reporting, for current, future, and historic water data.

Table 1. The features of IBM Intelligent Operations for Water. (continued)

Feature	Capabilities
Performance and optimization	• Take advantage of sensor-based data which is collected in a data warehouse and optionally displayed on a dashboard. • Monitor performance and optimization of SCADA systems to track real time data on water management and to identify cost savings opportunities. • Use advanced statistical analysis along with best practices to enable the identification of areas of improvement and potential for optimization of water management. • Gain insight and ability to analyze historical patterns of water conditions in critical link areas.
Asset management	• Display information about equipment, water assets, network and infrastructure. • Interrogate water related assets to obtain status.
Workflow management	• My Activities portlet - view role-based activities and standard operating procedures as a gateway to handling incidents and work orders.
Collaboration	• Immediate access to a contact list on all pages enabling team collaboration and city wide communication. • Visibility of notifications - view changes in KPI that are available in interface. Related and unrelated events display in an area available for view on a map.
Security	• Integrates with historians not directly with SCADA systems. • Uses a role-based single sign on.
Data integration and storage	• Integrates data from disparate water and data capture systems by using integration protocols recognized by the industry. • Water information model core and basic platform for visualization and analysis of water and event data. • Model manager integrates multiple SCADA, meter, and sensor systems in network. • Model manager provides a metadata view of the water infrastructure and defined KPIs.
Extendable highly customizable model	• Programming model is extendable to support future unknown facets of the water management world. • Scalability and reusability of Intelligent Cities products.

Table 1. The features of IBM Intelligent Operations for Water. (continued)

Feature	Capabilities
Visualization	• View system maps and filters on the map. • Turn on and off layers for display on a map. • Visualize and filter assets by district metered areas. • View ingested GIS data representing asset types that are defined in the model manager. • View pipe network, meter turnouts, sewer network, pumping station location, individual meter location. • View key performance indicators to monitor events such as: waste water removal, dry weather overflows, wet weather maximization, efficiency of collection systems. Track key measurements like Flow, Water Quality, Energy Consumption, Pump Efficiency, Pressure.
Installation utility	• A prerequisite check is incorporated in the installation script. When you run the command to install the IBM Intelligent Operations for Water, prerequisite checking is performed automatically to ensure that the required IBM Intelligent Operations Center Fix Pack 1 is installed. • The installation script also detects if a previous version of the IBM Intelligent Operations for Water is installed in your environment. • The installation program logs all steps executed by the installer and, when finished, returns a successful log message. • A post-installation validation check is automatically carried out to ensure that the installation was successful.
Globalization	In addition to English, the IBM Intelligent Operations for Water product and online help is available in the following languages: Brazilian Portuguese, French, German, Korean, Simplified Chinese and Traditional Chinese, Spanish, Japanese, and Italian. The information center is available in the following languages: Brazilian Portuguese, French, German, Korean, Simplified Chinese and Spanish.

Users and benefits

IBM Intelligent Operations for Water is designed for water operations and management personnel to help optimize and more efficiently manage water systems, assets, and networks across a geographically dispersed infrastructure.

The following table describes the users and associated benefits of using IBM Intelligent Operations for Water.

Table 2. Benefits of IBM Intelligent Operations for Water

If you are an ...	This software can help you ....
Operator	• Identify and act on conflicts and issues shown on maps, dashboards, and alerts. • Manage events by adding new events, editing existing events, canceling events, and escalating events to incidents. • Monitor assets and key performance indicators (KPIs). • Communicate quickly and easily on matters of importance. • Monitor status, create and edit events and incidents to be shown in lists. • Notify appropriate manager or executives and issue alerts. • Communicate quickly and easily in emergencies and other situations requiring a response.
Executive	• Gain an executive level summary of events and incidents through maps, dashboards, and alerts. • Determine measures of organizational success with KPIs. • Identify and track issues using reports. • Direct priorities and implementation of policy using data provided.

Related concepts:

"User roles and responsibilities" on page 37
IBM Intelligent Operations for Water implements security by limiting access to features and data based on user roles.

Components

IBM Intelligent Operations for Water is built on concepts of visualization, information services, and data integration. The application integrates the Water Information Hub asset with IBM Intelligent Operations Center and leverages multiple components from IBM Intelligent Operations Center. Multiple functional components are specific to IBM Intelligent Operations for Water.

The following table describes the functional components that are specific to IBM Intelligent Operations for Water.

Table 3. IBM Intelligent Operations for Water functional components and their capabilities

Functional component	Capability
Model manager	Extends the core IBM Intelligent Operations for Water semantic model to allow meaningful queries and granular filtering validation.
Reporting (Cognos)	Generates customized reports that are generated from stored data.
Event engine (event and KPI preprocessor)	Integrates the key performance indicators (KPIs) that relate to a specific environment. **Note:** These KPIs can be atomic or roll-up. An atomic KPI must be capable of being calculated (typically) from information that a sensor or meter provides.

Table 3. IBM Intelligent Operations for Water functional components and their capabilities (continued)

Functional component	Capability
Standard operating procedures	Provides access to water-related standard operating procedures.
Historical reporting data store	Creates reporting and operational data stores that are based on the sensors and their measurement types and measurement values.
Messaging infrastructure	Implements IBM Intelligent Operations for Water streams, such as data from devices, sensors, and meters, as well as the measurement type and measurement values that these sensors provide.

Figure 1 shows the IBM Intelligent Operations for Water functional components and their relationships.

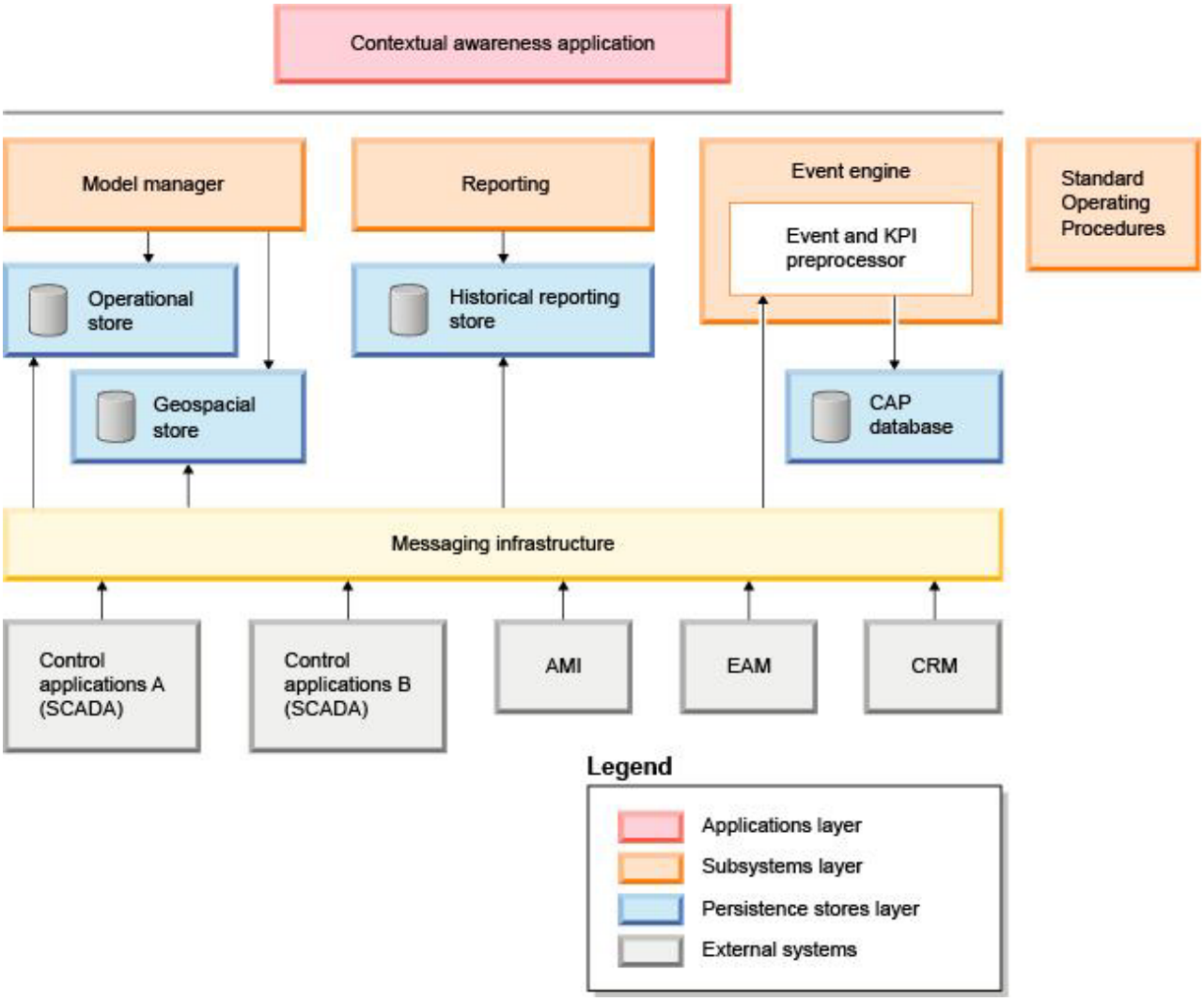

Figure 1. IBM Intelligent Operations for Water functional components and their relationships

Samples

IBM Intelligent Operations for Water provides samples that show the features that are available in IBM Intelligent Operations for Water, and how to use them.

IBM Intelligent Operations for Water 1.5 system comes with an optional sample set of data illustrating its use for waste water operations. The provided data allows for validation of the installed IBM Intelligent Operations for Water 1.5 by exercising all the customizable points within the programming model. The following samples are provided.

- An extension to the initial semantic model that provides asset types for waste water. For example, River Gauges, Rain Gauges, Waste Water Plants, Combined Sewer Overflow (CSO) Diversion Structures, Trunk Line Monitors, and Lift Stations.
- A set of connected resources (connected sewers) to display on the Map in the form of Resource Description Framework (RDF) files.
- A set of sample assets is provided based on the above asset types.
- Linkages are provided to measurement and measurement values for the above assets.
- Waste water table structures are provided for managing alerting and events.
- Sample Key Performance Indicators (KPIs) are provided based on Storm Water Overflow Management, Fixed Asset Repair and Management and Waste Water Treatment and Recycling.
- Sample standard operating procedures are provided that are automatically triggered on certain waste water related events. For example, a CSO Diversion Structure high water level.
- Sample Tivoli® Netcool/Impact policies are provided that handle incoming reading values, and trigger alerts, events, sample KPIs and standard operating procedures. The Tivoli Netcool/Impact policies are available on the event server.

The waste water sample files are available in the: `/opt/IBM/iss/iow/samples` directory on their respective servers. For example, the model manager files are available on the management node, and the monitor samples are available on the application server. If you load the sample data during the installation process, the files are deployed and available for your education and learning.

Samples provided by IBM Intelligent Operations Center are also available to IBM Intelligent Operations for Water. IBM Intelligent Operations for Water also provides sample users for security configuration. All samples are available to further understand the capabilities of IBM Intelligent Operations for Water and to ensure that the installed system operates correctly.

Related concepts:

"Customizing asset types and instance" on page 136
Assets types such as sensors and meters are central to the infrastructure of water management systems. Using the IBM Intelligent Operations for Water semantic model, you can distinguish between asset types. Changes to the infrastructure, for example adding asset types, requires that you update the model instance. Use the tasks in this section to customize the IBM Intelligent Operations for Water semantic model to your implementation.

"Defining asset types" on page 136
Use the information in this section to define asset types.

Related information:

Sample KPIs in Intelligent Operations Center

Asset samples

Sample waste water asset types, sample assets based on those types, and sample measurement and measurement values for assets are provided when you install the waste water sample content along with IBM Intelligent Operations for Water Version 1.5. The data provides a model instance of data in a geographic region. The data consists of 57 items of the various asset types that are listed. A sample pipeline asset instances RDF file that describes the pipe network is also provided.

Table 4. Sample asset data

Sample	Description
Asset types	Transmitter Level, Indicator Flow, Pump Centrifugal, Flow Meter, CSO Diversion Structure, Pipe, Junction

Table 4. Sample asset data (continued)

Sample	Description
Asset measurements	CSO Level, Rain Gauge, Waste water plant influent flow rate, CSO overflow volume year to date
Measurement status	No reading, Critical, Caution, Acceptable
Logical zones	Zone 1, Zone 2

Alert and event samples

Sample waste water table structures for managing alerting and events are provided when you install IBM Intelligent Operations for Water Version 1.5. The sample data includes alert and event samples for, for example, Combined Sewer Overflow (CSO). An event is posted when a CSO reaches 70 percent of its overflow height and when a CSO reaches 100 percent of its overflow height.

KPI samples

Sample waste water KPIs are provided when you install IBM Intelligent Operations for Water version 1.5.

Table 5. Summary of Sample KPIs

Sample	KPI Description
Storm Water Overflow Management	• Dry weather sewer overflows • Dry weather sewer overflows prevented • Wet weather collection system maximization
Waste Water Treatment and Recycling	• Total volume of waste water treated • Volume of waste water treatment plant effluent recycled • Wet weather waste water plant maximization
Fixed Asset Repair and Management	• Cumulative number of pump starts and stops • Cumulative pump runtime • Number of feet of sewer inspected

Storm Water Overflow Management

Storm Water Overflow Management groups three KPIs:

1. Dry weather sewer overflows
   - *Overflow volume the past seven days* counts the number of dry weather sewer overflows that have occurred during the past seven days.
   - *Overflow volume this month* counts the number of dry weather sewer overflows that have occurred during the current month.
   - *Overflows the past seven days* totals the discharge volume for all dry weather sewer overflows that have occurred during the past seven days.
   - *Overflows this month* totals the discharge volume for all dry weather sewer overflows that have occurred during the current month.
2. Dry weather sewer overflows prevented
   - *Overflows prevented the past seven days* counts the number of dry weather sewer overflows that have been prevented during the past seven days.
   - *Overflows prevented this month* counts the number of dry weather sewer overflows that have been prevented during the current month.
3. Wet weather collection system maximization

- *Actual compared to typical overflow volume* calculates the percentage the corrected combined sewer overflow volume amount (by rainfall) is over or under the typical combined sewer overflow volume amount.
- *Actual compared to typical overflow volume as a percentage* calculates the difference between the corrected combined sewer overflow volume amount (by rainfall) and the typical combined sewer overflow volume amount.

Waste Water Treatment and Recycling

Waste Water Treatment and Recycling groups three KPIs:

1. Total volume of waste water treated
2. Volume of waste water treatment plant effluent recycled
3. Wet weather waste water plant maximization
   - *Discharge volume the past seven days* counts the volume of waste discharged during the past seven days.
   - *Discharge volume this month*counts the volume of waste discharged during the past month.
   - *Waste water treatment plant discharge less than specified volume the past seven days* calculates the discharge flow rate during the past seven days.
   - *Waste water treatment plant discharge less than specified volume the past month* calculates the discharge flow rate during the past month.

The Wet weather waste water plant maximization KPI counts the number of times the Waste Water Treatment Plant does not reach a specified discharge flow rate during wet weather and an overflow condition at the Combined Sewer Overflow (CSO). IBM Intelligent Operations for Water processes the KPI in the following way.

- IBM Intelligent Operations for Water collects rain gauge, waste water treatment plant, and sewer overflow data readings from sensors and meters.
- When IBM Intelligent Operations for Water receives a rain gauge reading, a policy that is defined in Tivoli Netcool/Impact determines if it is wet weather now, and sets the wet weather indicator.
- When IBM Intelligent Operations for Water receives a waste water plant reading, the policy that is defined in Tivoli Netcool/Impact calculates the plant flow rate and stores the rate temporarily.
- When IBM Intelligent Operations for Water receives a reading from the defined CSO diversion structure, the policy defined in Tivoli Netcool/Impact calculates the overflow volume of the CSO, composes a CAP event and sends the event to IBM WebSphere Business Monitor .
- IBM WebSphere Business Monitor calculates the KPI and sends the notification to WebSphere Portal for display in the portal.

Fixed Asset Repair and Management

Fixed Asset Repair and Management groups three KPIs:

1. Cumulative number of pump starts and stops
2. Cumulative pump runtime
3. Number of feet of sewer inspected

Standard operating procedure samples

Sample standard operating procedures, workflows, and resources are provided when you install IBM Intelligent Operations for Water Version 1.5.

Table 6. Standard operating procedure samples

Standard operating procedure	Description
PLUSIDWSOP	Process to prevent dry weather sewer overflow. A procedure that is invoked to prevent a Combined Sewer Overflow (CSO) from occurring. It is automatically invoked if a 70 percent CSO weir height event is triggered.
PLUSIDWSOC	Dry weather sewer overflow confirm. A procedure that is invoked after an overflow occurs in a combined sewer. The procedure allows the manager to confirm that the overflow has occurred.

Chapter 2. Installing and configuring

IBM Intelligent Operations for Water is a solution that runs on top of the IBM Intelligent Operations Center. IBM Intelligent Operations for Water provides a deployment wizard that installs the package into the existing IBM Intelligent Operations Center and underlying environment. After deploying the IBM Intelligent Operations for Water package, some additional configuration is required.

Preparing for installation

Before deploying IBM Intelligent Operations for Water, understand the IBM Intelligent Operations for Water system configuration and ensure that the prerequisites are met for the environment.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

"Installing the solution" on page 22
Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

System configuration

IBM Intelligent Operations for Water deployment wizard installs the product on top of the IBM Intelligent Operations Center production environment. IBM Intelligent Operations Center is a prerequisite for IBM Intelligent Operations for Water.

IBM Intelligent Operations for Water is installed on IBM Intelligent Operations Center 1.5. For information about IBM Intelligent Operations Center 1.5 system services, see the related information.

Related tasks:

"Installing the solution" on page 22
Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

Related information:

IBM Intelligent Operations Center system services

Hardware requirements

There are no additional hardware requirements for deploying IBM Intelligent Operations for Water, as the product is installed on top of the existing servers in the IBM Intelligent Operations Center cluster.

IBM Intelligent Operations Center hardware requirements

The hardware requirements of the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water is installed on top of are defined in the IBM Intelligent Operations Center Information Center. These are the minimum hardware requirements. The IBM Intelligent Operations Center cluster might require additional resources, depending on any additional IBM Smarter Cities Software Solutions that are deployed in this environment.

Related tasks:

"Installing the solution" on page 22
Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

"Preparing the installation management server" on page 15
You must prepare the server that runs the installation of IBM Intelligent Operations for Water before you start the deployment wizard. The installation management server is only required during the deployment process.

Related information:

IBM Intelligent Operations Center hardware requirements

IBM Intelligent Operations for Water system requirements

IBM Intelligent Operations Center system requirements

Software requirements

The servers and clients involved in the deployment of IBM Intelligent Operations for Water must meet the minimum software requirements. This includes the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water is installed onto and the installation management server that the IBM Intelligent Operations for Water installer runs from.

Server software requirements

The software requirements of the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water is installed on top of are defined in the IBM Intelligent Operations Center Information Center.

Client software requirements

The IBM Intelligent Operations for Water solutions interface supports a number of browsers. Some browsers can be used with limitations.

IBM Intelligent Operations for Water has been tested, and is supported, on the following browsers:

- Microsoft Internet Explorer 8.x (32-bit only)
- Microsoft Internet Explorer 9.x (32-bit only)
- Mozilla Firefox 10 ESR

Internet Explorer Compatibility View

IBM Intelligent Operations for Water does not support Internet Explorer 8 or Internet Explorer 9 Compatibility View.

Internet Explorer 8.x performance

Users might experience slow performance using Internet Explorer 8.x.

To avoid this problem, use Internet Explorer 9.x or Firefox 10 ESR.

Users might also experience problems when working with the Water Conservation Portal using Internet Explorer 8.x. Internet Explorer 9.x is required for users of Water Conservation Portal. To avoid any issues, use Internet Explorer 9.x.

Minimum screen resolution

IBM Intelligent Operations for Water is designed to run at a minimum 1280 x 800 screen resolution.

Related tasks:

"Installing the solution" on page 22
Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

"Preparing the installation management server" on page 15
You must prepare the server that runs the installation of IBM Intelligent Operations for Water before you start the deployment wizard. The installation management server is only required during the deployment process.

Related information:

IBM Intelligent Operations Center software requirements

IBM Intelligent Operations Center browser requirements

IBM Intelligent Operations for Water system requirements

IBM Intelligent Operations Center system requirements

Media packaging

You can order IBM Intelligent Operations for Water as a package of DVDs or obtain it through Passport Advantage®.

The IBM Intelligent Operations for Water V1.5 product is listed under the IBM Intelligent Water Family. The offering includes the following items:

- IBM Intelligent Operations for Water V1.5 Multilingual DVD
- IBM Intelligent Operations Center V1.5 Multilingual DVD

Related tasks:

"Installing the solution" on page 22
Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

"Preparing the installation media" on page 16
Before you run the IBM Intelligent Operations for Water deployment wizard, you must first obtain and prepare the installation media.

Related information:

IBM Intelligent Operations for Water Passport Advantage download page

IBM Passport Advantage

Installing the IBM Intelligent Operations Center

Before installing IBM Intelligent Operations for Water, you must first install the IBM Intelligent Operations Center.

About this task

The IBM Intelligent Operations Center is required by IBM Intelligent Operations for Water. It is not possible to install IBM Intelligent Operations for Water without first deploying and configuring the IBM Intelligent Operations Center. The IBM Intelligent Operations Center must be running during the installation of IBM Intelligent Operations for Water.

Procedure

Install, configure, and verify the IBM Intelligent Operations Center using the steps outlined in the IBM Intelligent Operations Center Information Center. See the related information.

What to do next

Install the required interim fix and prepare the IBM Intelligent Operations Center servers before you start the IBM Intelligent Operations for Water installer.

Related tasks:

"Preparing the IBM Intelligent Operations Center servers"
Before you start the deployment of IBM Intelligent Operations for Water, you must first prepare the existing IBM Intelligent Operations Center environment.

Related information:

Installing and configuring

Preparing the IBM Intelligent Operations Center servers

Before you start the deployment of IBM Intelligent Operations for Water, you must first prepare the existing IBM Intelligent Operations Center environment.

About this task

The IBM Intelligent Operations Center must be running during the installation of IBM Intelligent Operations for Water. Some of the IBM Intelligent Operations Center services are automatically restarted by the installer. To avoid a disruption in service, it is recommended that users of the IBM Intelligent Operations Center be logged off the system during the IBM Intelligent Operations for Water installation period.

Procedure

1. Make sure that all of the IBM Intelligent Operations Center servers are started. Use the Platform Control Tool in IBM Intelligent Operations Center to control the services.
2. Query the status of all of the IBM Intelligent Operations Center servers to ensure that they are started before the installation begins. If any of the IBM Intelligent Operations Center components are not started, the installation of IBM Intelligent Operations for Water does not complete successfully. Use the System Verification Checks in IBM Intelligent Operations Center to determine the operational status of IBM Intelligent Operations Center services.
3. Verify that you can access the IBM Intelligent Operations Center portal by logging on as the administrator using the following URL:

   `http://application_server_hostname/wpsv70/wps/myportal`

   In the IBM Intelligent Operations Center portal you can see the **Intelligent Operations Center** link on the top navigation bar.

What to do next

After the IBM Intelligent Operations Center environment is configured and all servers are up and running, you are ready to start preparing the IBM Intelligent Operations for Water.

Related tasks:

"Installing the IBM Intelligent Operations Center" on page 13
Before installing IBM Intelligent Operations for Water, you must first install the IBM Intelligent Operations Center.

"Preparing the installation management server"
You must prepare the server that runs the installation of IBM Intelligent Operations for Water before you start the deployment wizard. The installation management server is only required during the deployment process.

Related information:

Controlling the services in IBM Intelligent Operations Center

Starting the components in IBM Intelligent Operations Center

Stopping the components in IBM Intelligent Operations Center

Performing system verification checks

Preparing the installation management server

You must prepare the server that runs the installation of IBM Intelligent Operations for Water before you start the deployment wizard. The installation management server is only required during the deployment process.

Before you begin

Review the hardware and software requirements of the installation management server.

Procedure

1. Install and configure a new server running the Linux operating system, according to the minimum software and hardware requirements.
2. Temporarily disable any firewall security that is currently running on the server.
3. Restart the system.
4. Configure the network settings of the server so that it can communicate with all of the existing IBM Intelligent Operations Center server nodes.
5. Test the connectivity of the server to and from all other servers in the environment:
   a. From the new server, ping each of the IBM Intelligent Operations Center server nodes, by using their host names to ensure that they are reachable.
   b. From each of the existing IBM Intelligent Operations Center server nodes, ping the impending IBM Intelligent Operations for Water by using the host name to ensure that it is reachable.
   c. Contact your local network administrator to resolve any connectivity issues.

What to do next

Prepare the installation media before you start the deployment of IBM Intelligent Operations for Water.

Related concepts:

"Hardware requirements" on page 11
There are no additional hardware requirements for deploying IBM Intelligent Operations for Water, as the product is installed on top of the existing servers in the IBM Intelligent Operations Center cluster.

"Software requirements" on page 12
The servers and clients involved in the deployment of IBM Intelligent Operations for Water must meet the minimum software requirements. This includes the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water is installed onto and the installation management server that the IBM Intelligent Operations for Water installer runs from.

Related tasks:

"Preparing the IBM Intelligent Operations Center servers" on page 14
Before you start the deployment of IBM Intelligent Operations for Water, you must first prepare the existing IBM Intelligent Operations Center environment.

"Preparing the installation media"
Before you run the IBM Intelligent Operations for Water deployment wizard, you must first obtain and prepare the installation media.

Preparing the installation media

Before you run the IBM Intelligent Operations for Water deployment wizard, you must first obtain and prepare the installation media.

Before you begin

There are two forms of installation media for deploying IBM Intelligent Operations for Water:

- Product installation DVD
- Licensed customers can download the installation package from the IBM® Passport Advantage® website

See the link at the end of this page for more information about the Passport Advantage software package numbers and download links.

Related concepts:

"Media packaging" on page 13
You can order IBM Intelligent Operations for Water as a package of DVDs or obtain it through Passport Advantage.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

"Preparing the installation management server" on page 15
You must prepare the server that runs the installation of IBM Intelligent Operations for Water before you start the deployment wizard. The installation management server is only required during the deployment process.

Related information:

 IBM Intelligent Operations for Water Passport Advantage download page

Preparing the installation DVD

The IBM Intelligent Operations for Water installation DVD contains all the files required to start the deployment. You must first mount the DVD on to the installation management server.

About this task

This task is not required if you are using the IBM Intelligent Operations for Water downloaded installation media to run the installation.

To mount a CD-ROM on Linux operating systems, you must issue the `mount` command. Depending on your system configuration, you might need root user authority for this procedure.

Procedure

Insert the DVD into the drive and enter the following command:

```
mount -t iso9660 -o ro /dev/cdrom /cdrom
```

Note: `/cdrom` represents the mount point of the DVD folder. This folder must exist prior to using the mount command.

Results

Your DVD file system is mounted. View the contents of the installation DVD by placing the disc into the drive and enter the `cd /cdrom` command where `/cdrom` is the mount point directory.

What to do next

The installation management server is now ready to run the IBM Intelligent Operations for Water deployment wizard and deploy the solution.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

Preparing the downloaded installation package

The IBM Intelligent Operations for Water installation package contains all the files required to start the deployment. You must first copy and extract the required installation files and directory structure onto the installation management server before you begin the deployment.

About this task

This task is not required if you are using the IBM Intelligent Operations for Water product DVD media to run the installation.

Procedure

1. Log on to the IBM Intelligent Operations for Water installation management server as the root user.
2. Create a new directory to contain the temporary installation files and directory structure, for example `/images`.
3. Copy the IBM Intelligent Operations for Water installation package into the new directory that you created in the previous step.
4. From the operating system command line, go to the directory where you just copied the installation package.
5. Extract the installer by using the following command:

   ```
   tar -xvf CIA2SML.tar
   ```

Results

The installation management server is now ready to run the IBM Intelligent Operations for Water deployment wizard and deploy the solution. The installation starts from the directory into which you have just extracted the installation package.

What to do next

The IBM Intelligent Operations for Water installation management server is now ready to run the IBM Intelligent Operations for Water deployment wizard and deploy the solution.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

Installing and configuring semantic model services

IBM Intelligent Operations for Water provides a semantic model services application and sample model. This service needs to be installed and configured prior to use.

Configuring the Jazz team server

The IBM Intelligent Operations for Water semantic model services is installed on a Jazz team server. The Jazz team server needs to be configured before the IBM Intelligent Operations for Water semantic model services are installed.

About this task

The IBM Intelligent Operations for Water architecture needs to be installed before configuring the Jazz team server.

Procedure

1. In a web browser go to `http://`*`management_host`*`:82/jts/setup` where *management_host* is the fully qualified host name of the management server.
2. Log on with the user ID `iicsystemuser` and password `passw0rd`.
3. Click **Next**.
4. On the Configure Public URI page, provide a **Public URI Root** value in the form `https://`*`management_host`*`:9448/jts` and select `I understand that once the Public URI is set, it cannot be modified.`. Click **Next**.
5. Click **Test Connection**. A message should be displayed that the configuration test was successful.
6. Click **Next** to save the settings and continue.
7. Configure the database on the Configure Database page.
   a. Select `DB2` for **Database Vendor**.
   b. Select `JDBC` for **Connection Type**.
   c. Enter the DB2 database password defined as the `DEFAULT.PWD.DB2` property in the topology properties file for **JDBC Password**. Ignore the displayed password message.
   d. For **JDBC Location** enter `//`*`db_host`*`:50005/JTS:user=db2inst5;password={password};` where *db_host* is the host name of the data server. The {password} string must be entered as shown. Do not substitute with a password value.
   e. Click **Test Connection**. If an error occurs, check and correct any entries. If the entries are correct, make sure the database services are started on the data server using the Platform Control Tool.
   f. After a message is displayed that no Jazz tables are present in the database, click **Create Tables**. Processing will take several minutes to complete.
   g. Click **Next**.

8. On the Enable E-mail Notification page set the value to **Disabled** and click **Next.**
9. The Register Applications page should display "No new applications detected." Click **Next**.
10. Select **LDAP** for the **User Registry Type** in Step 1 on the Setup User Registry page.
11. In Step 2 configure LDAP for the Jazz Team Server registry.
    a. Enter `ldap://mgmt_host:389` for **LDAP Registry Location** where *mgmt_host* is the fully qualified host name of the management server.
    b. Enter `OU=USERS,OU=SWG,O=IBM,C=US` for **Base User DN**.
    c. Enter `userId=uid,name=cn,emailAddress=mail` for **User Property Names Mapping**.
    d. Enter `OU=GROUPS,OU=SWG,O=IBM,C=US` for **Base Group DN**.
    e. For **Jazz to LDAP Group Mapping** make sure the value is set to `JazzAdmins=JazzAdmins, JazzUsers=JazzUsers, JazzDWAdmins=JazzDWAdmins, JazzProjectAdmins=JazzProjectAdmins, JazzGuests=JazzGuests`.
    f. Enter `cn` for **Group Name Property**.
    g. Enter `cn` for **Group Member Property**.
12. Click **Test Connection**. If a warning message is displayed, click **show details**. If the warning is about the `mail` property you can ignore the message.
13. For **Client Access License Type** select `IBM Integrated Information Core - IIC Model Server`.
14. Click **Next**.
15. For **Configure Data Warehouse** select the `I do not wish to configure the data warehouse at this time` checkbox.
16. Click **Finish** on the Summary page.

Results

The Jazz team server is operational.

Installing semantic model services

The semantic model services and a sample application are provided with IBM Intelligent Operations for Water.

About this task

Configuration of the Jazz Team Server on the management server is required before using the semantic model services.

Procedure

1. In a web browser go to `http://management_host:82/jts/admin` where *management_host* is the fully-qualified host name of the management server.
2. On the Server Administration page, click **Server** > **Configuration** > **Register Applications**.
3. Click **Add** on the Registered Applications page.
4. Add the Model Server application on the Add Application page.
    a. Enter `Model Server` for **Application Name**.
    b. Enter `http://management_host:82/modelserver/scr`, where *management_host* is the fully qualified host name of the management server, for **Discovery URL**.
    c. Enter a value of your choice for **Consumer Secret** This value will be used to provide access to the application. The value should be treated with the same security as a password.
    d. Enter `iicsystemuser` for **Functional ID**

    The **Application Type** will change to `Model Server`.
5. If there are no errors, click **Finish**.

Verifying semantic model services configuration

A semantic model services sample application is provided with IBM Intelligent Operations for Water and can be used to verify the correct installation and configuration of the semantic model services.

Procedure

1. Prepare the sample model files.
   a. On the installation server find the `iic15_2_stagebuildtoserver.xx.jar` file in the *install_media* directory.
   b. Expand the `iic15_2_stagebuildtoserver.xx.jar` file into a directory of your choice. In the rest of these steps this directory is referred to as *model_home*.
2. Install the sample model.
   a. In a web browser on the server where *model_home* is located, go to `http://mgmt_host:82/iic/console` where *mgmt_host* is the fully-qualified host name of the management server.
   b. Log on as the `iicsystemuser` user with `passw0rd` as the password.
   c. Click **Model Manager** > **Ontologies** > **Browse**.
   d. Navigate to the *install_media*`/ioc/image/IIC/install/modelServices/post_install/` directory.
   e. Open the `rsm.owl` file.
   f. Click **Load**. The file will be loaded.
   g. Click **Model Manager** > **Ontologies** > **Browse**.
   h. Navigate to the *install_media*`/ioc/image/IIC/install/modelServices/post_install/` directory.
   i. Open the `modelServer.owl` file.
   j. Click **Load**. The file will be loaded.
   k. Click **Model Manager** > **Ontologies** > **Browse**.
   l. Navigate to the *install_media*`/ioc/image/IIC/install/ktpRuntimeServices/post_install/` directory.
   m. Open the `kpi.owl` file.
   n. Click **Load**. The file will be loaded.
   o. Click **Model Manager** > **Load** > **Browse**
   p. Navigate to the *install_media*`/ioc/image/IIC/samples/rdf/rsm/` directory.
   q. Open the `IBMOilDownstreamSampleRDF.xml` file.
   r. Click **Load**. The file will be loaded.
   s. Click **Model Manager** > **Load** > **Browse**
   t. Navigate to the *install_media*`/ioc/image/IIC/samples/rdf/rsm/` directory.
   u. Open the `IBMOilUpstreamSampleRDF.xml` file.
   v. Click **Load**. The file will be loaded.
   w. Click **Model Manager** > **Load** > **Browse**
   x. Navigate to the *install_media*`/ioc/image/IIC/samples/rdf/rsm/` directory.
   y. Open the `IBMOilDownstreamSampleReferenceRDF.xml` file.
   z. Click **Load**. The file will be loaded.
   aa. Click **Model Manager** > **Load** > **Browse**
   ab. Navigate to the *install_media*`/ioc/image/IIC/samples/rdf/rsm/` directory.
   ac. Open the `IBMOilUpstreamSampleReferenceRDF.xml` file.
   ad. Click **Load**. The file will be loaded.
3. Verify that the sample model is correctly installed.
   a. Click **Model Manager** > **Query** > **Query**. A predefined query will run. An XML structure will be displayed with the query results. The top level tag should be `spargl` and have secondary tags `head` and `results`.

b. Click **Model Explorer** and make sure you can browse the model.

4. Use the model to verify the installation of model manager.
   a. In a web browser on the management server, go to `http://mgmt_host:82/iic/ibmoil` where *mgmt_host* is the fully-qualified host name of the management server.
   b. Click **IBM Oil Company** > **Variables**. Web service URLs are displayed.

Results

The semantic model services and IBMOil sample model are installed.

Improving semantic model services performance

Configure the semantic model services provided by IBM Intelligent Operations for Water to improve performance when running queries against models.

Procedure

1. In a web browser go to `http://management_host:82/iic/console` where *management_host* is the fully-qualified host name of the management server.
2. Add the property values in Table 7 to the **OPCWEBSERVICE** category.

Table 7. OPCWEBSERVICE properties

Property	Value
`cache.browse.timetolive.second`	3600
`cache.timetolive.second`	2592000
`cache.wait.second.after.create.action`	1

3. Update or add the following properties and values in Table 8 in the RSM category.

Table 8. RSM properties

Property	Value
`mvmViewPath.0`	http://iec.ch/TC57/CIMgeneric# ISA95_Enterprise##http://iec.ch/TC57/CIMgeneric# RSM_OrganizationalEntity.ManagesAspectOf_PhysicalEntity##iec.ch/TC57/CIMgeneric# ISA95_Site##http://iec.ch/TC57/CIMgeneric# RSM_PhysicalEntity.contains_PhysicalEntity##http:// iec.ch/TC57/CIMgeneric# ISA95_Area##http://iec.ch/TC57/CIMgeneric# RSM_PhysicalEntity.contains_PhysicalEntity##http:// iec.ch/TC57/CIMgeneric# ISA95_ProductionUnit##http:// iec.ch/TC57/CIMgeneric# RSM_PhysicalEntity.ManagedBy_OrganizationalEntity##http://iec.ch/TC57/CIMgeneric# RSM_OrganizationalEntity##http://iec.ch/TC57/CIMgeneric# RSM_OrganizationalEntity.has_measurement##http://iec.ch/TC57/CIM-generic#RSM_Measurement##http:// iec.ch/TC57/CIMgeneric# RSM_Measurement.HasA_MeasurementValue##http://iec.ch/TC57/CIM-generic#RSM_MeasurementValue
`mvmViewPath.1`	http://iec.ch/TC57/CIMgeneric# ISA95_Enterprise##http://iec.ch/TC57/CIMgeneric# RSM_OrganizationalEntity.ManagesAspectOf_PhysicalEntity##iec.ch/TC57/CIMgeneric# ISA95_Area##http://iec.ch/TC57/CIMgeneric# RSM_PhysicalEntity.contains_PhysicalEntity##http:// iec.ch/TC57/CIMgeneric# ISA95_ProductionUnit##http://iec.ch/TC57/CIMgeneric# ISA95_WorkCenter.Contains_Equipment##http:// iec.ch/TC57/CIMgeneric# RSM_WorkEquipment##http:// iec.ch/TC57/CIMgeneric# RSM_PhysicalEntity.has_measurement##http:// iec.ch/TC57/CIM-generic#RSM_Measurement##http:// iec.ch/TC57/CIMgeneric# RSM_Measurement.HasA_MeasurementValue##http:// iec.ch/TC57/CIM-generic#RSM_MeasurementValue
`mvmDownLevelPreRequest`	3

Table 8. RSM properties (continued)

Property	Value
mvmCacheProperty.0	cim:RSM_IdentifiedObject.name
mvmMaxQueryURI	500
mvmMaxSparqlEntry	4000

4. Click **Publish**. The new and modified properties will be saved.
5. Restart the semantic model services using the Platform Control Tool.
6. In a web browser go to `http://`*`management_host`*`:82/iic/console` where *management_host* is the fully-qualified host name of the management server.
7. Make any solution or application-specific changes as needed. If changes are required, the changes will be identified in the product or solution documentation.

Installing the solution

Installing IBM Intelligent Operations for Water involves several steps. A deployment wizard is provided to deploy and install IBM Intelligent Operations for Water.

Before you begin

The installation of IBM Intelligent Operations for Water requires an installation management server to run the deployment wizard on. The installation management server must be able to connect to and from the IBM Intelligent Operations Center servers. The IBM Intelligent Operations Center environment provides the middleware required by IBM Intelligent Operations for Water.

The IBM Intelligent Operations for Water installation management server can be a physical hardware server or a virtual machine running on a VMware Server. It can also be a server in the cloud, if the IBM Intelligent Operations Center environment is also deployed in the cloud. Make sure that the installation management server meets the minimum hardware and software requirements.

About this task

The deployment wizard performs several deployment steps:

- Component selection
- Specification of the IBM Intelligent Operations Center installation location
- Review of deployment progress, status messages and results

When the deployment of IBM Intelligent Operations for Water is complete, the installation management server is no longer required. The installation profile can be optionally saved for later reference, and is useful for future upgrades that are required.

Related concepts:

"Preparing for installation" on page 11
Before deploying IBM Intelligent Operations for Water, understand the IBM Intelligent Operations for Water system configuration and ensure that the prerequisites are met for the environment.

"System configuration" on page 11
IBM Intelligent Operations for Water deployment wizard installs the product on top of the IBM Intelligent Operations Center production environment. IBM Intelligent Operations Center is a prerequisite for IBM Intelligent Operations for Water.

"Hardware requirements" on page 11
There are no additional hardware requirements for deploying IBM Intelligent Operations for Water, as the product is installed on top of the existing servers in the IBM Intelligent Operations Center cluster.

"Software requirements" on page 12
The servers and clients involved in the deployment of IBM Intelligent Operations for Water must meet the minimum software requirements. This includes the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water is installed onto and the installation management server that the IBM Intelligent Operations for Water installer runs from.

"Media packaging" on page 13
You can order IBM Intelligent Operations for Water as a package of DVDs or obtain it through Passport Advantage.

Deploying the solution

IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

Before you begin

Prepare the installation media before you start the deployment wizard. You must also perform the prerequisite tasks that are outlined in this information center. The following list describes specific prerequisite tasks that are required.

- Ensure that the IBM Intelligent Operations Center is completely installed, that all IBM Intelligent Operations Center servers are operational.
- Ensure that all the IBM Intelligent Operations Center System Verification checks run successfully. See the related checklist link.
- Configure the Jazz team server. See the related task.
- Install and verify the Semantic model services and configuration. See the related task.
- Globally unlock the files for the Tivoli Netcool/Impact server. Follow these steps:
  1. Log on to the following URL as admin. The password is netcool.
     `http://eventserver:9080/nci/login_main.jsp`
  2. Click **Global**, and then click **Unlock**.
  3. Log off.

     Note: Logging off is very important. Otherwise, items do not stay unlocked.

About this task

Run the deployment wizard on the IBM Intelligent Operations for Water on which you prepared the installation media.

The deployment wizard requires the following information from the existing IBM Intelligent Operations Center environment:

- The location of the IBM Intelligent Operations Center 1.5 installer. For example: `/opt/IBM/IOC/BA/ioc`.
- The Java home directory. For example: `/opt/ibm/java-i386-60`

- The password used by the IBM Intelligent Operations Center installer when installing IBM Intelligent Operations Center.

Procedure

1. Download IBM Intelligent Operations for Water in Passport Advantage or use the product DVD media to run the deployment.
2. Extract the `CIA2SML.tar` file to the Installation server, and run **`./launchpad.sh`** under the **Offering_Setup** folder. The welcome panel of the IBM Intelligent Operations for Water deployment wizard is displayed with information about the installation process.
3. If you have not installed Installation Manager 1.5.3, select **Install IBM Installation Manager**. If Installation Manager 1.5.3 is installed, select **Install IBM Intelligent Operations for Water**.
4. Click **Install IBM Installer Manager** to install Installation Manager 1.5.3.

   Note: If Installation Manager 1.5.3 is already installed, click **Install IBM Intelligent Operations for Water**.
5. Optional: Add the repository to Installation Manager before you begin the deployment by completing the following steps:
   a. Start **Installation Manager**
   b. Select **File** > **Preferences...** > **Repositories**.
   c. Enter the service repository location and click **Apply**.
6. Click **Install IBM Intelligent Operations for Water** to start the deployment.
7. On the **Install Packages** panel, select the package to install and click **Next** to continue.
8. Accept the license agreement and click **Next**, then **Next** again to continue.
9. On the **Install Packages** panel, select the features to install:
   a. Click **Utility Base** to install the core features of IBM Intelligent Operations for Water.
   b. Optional: Click **Waste Water Content** to install the sample data for the IBM Intelligent Operations for Water waste water deployment.
   c. To continue to the next deployment panel, click **Next**.
10. On the **Configuration for IBM Intelligent Operations for Water 1.5.0.0** panel, enter:
    a. Location of the IBM Intelligent Operations Center 1.5 installer.
    b. Location of the Java home directory, which is version 6.0 or later.
    c. Password used by the IBM Intelligent Operations Center installer during the installation of IBM Intelligent Operations Center 1.5.
    d. Confirm the password again and then click **Next** to continue.
11. The **Summary Panel** displays a summary of all selected tasks and an estimation of the time it takes to complete the deployment. Click **Install** to start the installation.

    Note: The deployment process can take several minutes. Allow the process to continue, even if you do not observe movement of the progress bar.

Results

IBM Intelligent Operations for Water is installed.

Note: If the IBM Intelligent Operations for Water installation fails using the IBM Installation Manager, and you manually resolve the problem and wish to continue the installation, you can use the command-line installation method. See the related task.

What to do next

Verify the installation to ensure the solution is correctly deployed and working with the IBM Intelligent Operations Center.

Related concepts:

"Preparing for installation" on page 11
Before deploying IBM Intelligent Operations for Water, understand the IBM Intelligent Operations for Water system configuration and ensure that the prerequisites are met for the environment.

Related tasks:

"Preparing the installation media" on page 16
Before you run the IBM Intelligent Operations for Water deployment wizard, you must first obtain and prepare the installation media.

"Verifying the deployment" on page 26
Verify the installation of IBM Intelligent Operations for Water to ensure the solution is correctly deployed and working with the IBM Intelligent Operations Center.

"Post-installation configuration" on page 27
After successfully completing the installation of IBM Intelligent Operations for Water, additional steps are required to configure the solution.

"Deploying from the command line"
The IBM Intelligent Operations for Water solution package can be deployed when the IBM Intelligent Operations Center base architecture is deployed.

Related information:

Installation checklists

Configuring the Jazz team server
The IBM Intelligent Operations for Water semantic model services is installed on a Jazz team server. The Jazz team server needs to be configured before the IBM Intelligent Operations for Water semantic model services are installed.

Installing and configuring semantic model services
IBM Intelligent Operations for Water provides a semantic model services application and sample model. This service needs to be installed and configured prior to use.

Deploying from the command line

The IBM Intelligent Operations for Water solution package can be deployed when the IBM Intelligent Operations Center base architecture is deployed.

Procedure

1. Extract the `SOLUTION.zip` file into the `IOC_Installer/spec` directory.

   When extracted, the files should be in the `/opt/IBM/IOC/BA/ioc` directory if you used the `/opt/IBM/IOC/BA/ioc` directory for the IBM Intelligent Operations Center installation. If the directory does not exist, review your IBM Intelligent Operations Center installation logs to determine the location of the `IOC_Installer/spec` directory.

   Note: The `SOLUTION.zip` and `water_wih_solution.zip` files are located in the command-line subdirectory within the `/install/image` directory.

2. Extract the `water_wih_solution.zip` file into the `/waterbuild` directory on theInstallation server.

   Note: The `water_wih_solution.zip` file is located in the command-line subdirectory within the`/install/image` directory.

3. Import the IBM Intelligent Operations for Water solution. Run this command:

   ```
   /opt/IBM/IOC/BA/ioc/bin/ba.sh importSolution -f /waterbuild/water_wih_solution.zip -p password
   ```

4. Install the IBM Intelligent Operations for Water solution. Run this command:

`/opt/IBM/IOC/BA/ioc/bin/ba.sh installSolution -s water_wih -p password`

Where *password* is the administrator password specified when the IBM Intelligent Operations for Water deployment wizard was run.

5. If an error is displayed, check the `install.log` file for details. Correct any errors. Rerun the command.

What to do next

Log on to the portal to verify that IBM Intelligent Operations for Water was successfully deployed.

Related concepts:

"Known problems and solutions" on page 223
Some common problems with IBM Intelligent Operations for Water are documented, along with their solutions or workarounds. If you have a problem with IBM Intelligent Operations for Water, review the problem-solution topics to determine if a solution is available to the problem that you are experiencing. The problem-solution topics are categorized according to the type of issue.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

Verifying the deployment

Verify the installation of IBM Intelligent Operations for Water to ensure the solution is correctly deployed and working with the IBM Intelligent Operations Center.

About this task

Verify that you can access the IBM Intelligent Operations for Water portal by logging on as the administrator. Use the following procedure to start a new browser session and access the IBM Intelligent Operations Center. You can also access the solution from other IBM Smarter Cities Software Solutions installed in your environment. From the main navigation bar at the top of the portal, select **Intelligent Water**.

Procedure

1. Enter the URL into the address field of the browser.

   Note: The fully qualified domain name is required in the URL, for example, `http://application_server_hostname/wpsv70/wps/myportal`. If you use the IP address instead of the registered fully qualified domain, some portlets do not display correctly.
2. On the login page, enter your user ID and password.
3. Click **Sign In**.

Results

Only the pages, features, and data that you have permission to access are displayed. Contact your administrator if you require more access.

What to do next

The system is now ready for post-installation configuration.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

"Post-installation configuration"
After successfully completing the installation of IBM Intelligent Operations for Water, additional steps are required to configure the solution.

Post-installation configuration

After successfully completing the installation of IBM Intelligent Operations for Water, additional steps are required to configure the solution.

Related tasks:

"Deploying the solution" on page 23
IBM Intelligent Operations for Water provides a deployment wizard to install IBM Intelligent Operations for Water into an existing environment that is running the IBM Intelligent Operations Center.

"Verifying the deployment" on page 26
Verify the installation of IBM Intelligent Operations for Water to ensure the solution is correctly deployed and working with the IBM Intelligent Operations Center.

Starting WebSphere Message Broker processes

Using administrative tools, you can start the WebSphere Message Broker processes.

About this task

When IBM Intelligent Operations for Water has successfully installed, the WebSphere MQ Manager and WebSphere Message Broker processes are running. However, when you reboot the servers, it is recommended that you check to ensure the processes are still running. If not, you must start the processes.

Restriction: You must logged on as the appropriate user to complete the tasks. Message Queue tasks are performed by user mqm. Message Broker tasks are performed by user mqmconn.

Procedure

1. Log on to the IBM Intelligent Operations Center event server.
2. Run the following command to check the status of the WebSphere MQ Manager.
   ```
   /opt/mqm/bin/dspmq
   ```
3. Run the following command to start the WebSphere MQ Manager: *WIH.MB.QM*.
   ```
   /opt/mqm/bin/strmqm WIH.MB.QM
   ```
4. Run the following command to check the status of the WebSphere Message Broker: *WIH_BROKER*
   ```
   source /opt/IBM/mqsi/8.0.0.0/bin/mqsiprofile
   /opt/IBM/mqsi/8.0.0.0/bin/mqsilist
   ```
5. Run the following command to start the WebSphere Message Broker: *WIH_BROKER*.
   ```
   /opt/IBM/mqsi/8.0.0.0/bin/mqsistart WIH_BROKER
   ```

Related tasks:

"Checking the Netcool/OMNIbus probes"
Using administrative tools, you can check that the Netcool/OMNIbus probes for IBM Intelligent Operations for Water and IBM Intelligent Operations Center are operational.

Checking the Queue Manager and Message Broker status

You can use a VNC client to check that the necessary queue managers, their listeners, and message brokers are operational.

Procedure

1. Using a VNC client to log on to the Event server, run the following command to open MQ Explorer:

   ```
   [root@event-ioc ~}# xhost +
   [root@event-ioc ~]# su - mqm
   [mqm@event-ioc ~]$ strmqcfg
   [mqm@event-ioc ~]$
   ```

2. On the **MQ Explorer - Navigator** tab, expand **Queue Managers** and ensure that the following queue managers and their listeners are running:
   - IOC.MB.QM
   - WIH.MB.QM

   To check the status of the listener for each queue manager, expand the queue manager and select **Advanced** > **Listeners**.
3. Ensure that the IOC_BROKER and WIH_BROKER are running. Run the following command: If the brokers are not running, run the following command:

   ```
   [root@event-ioc bin]# su - mgmconn
   [mqmconn@event-ioc ~]$ cd /opt/IBM/mqsi/8.0.0.0/bin
   [mqmconn@event-ioc bin]$ source mqsiprofile
   ```

   If the brokers are not running, start them by running the following command:

   ```
   [mqmconn@event-ioc bin]$ ./mqsilist
   [mqmconn@event-ioc bin]$ ./mqsistart WIH_BROKER
   [mqmconn@event-ioc bin]$ ./mqsistart IOC_BROKER
   ```

Checking the Netcool/OMNIbus probes

Using administrative tools, you can check that the Netcool/OMNIbus probes for IBM Intelligent Operations for Water and IBM Intelligent Operations Center are operational.

Procedure

1. Log in to the Event server as root. Optionally, log in to the Event server as an administrator and use the **sudo** command to run the required commands if you are unable to log in as root.
2. Verify the status of the Netcool/OMNIbus probes. Run this command:

   ```
   ps auxww |grep water_wih
   ps auxww |grep ioc_xml
   ```

   If no processes are running, you must start the probes manually.
   a. Start the **ioc_xml** probe. Run this command:

      ```
      /opt/IBM/netcool/omnibus/probes/nco_p_xml -name ioc_xml -propsfile
      /opt/IBM/netcool/omnibus/probes/linux2x86/ioc_xml.props &
      ```

      You can also use the IOCControl management tools to start the ioc_xml probe. See the related task.
   b. Start the **water_wih** probe. Run this command:

      ```
      /opt/IBM/iss/iow/omnibus/startXmlProbe.sh
      ```
3. Repeat the commands in step 2 to verify the status of the Netcool/OMNIbus probes.

4. Go to the following URL to check that the appropriate WebSphere MQ Manager and WebSphere Message Broker processes are running:
   `https://solutionsid.rtp.raleigh.ibm.com/cities15/topic/com.ibm.water.doc/install_start_wmb.html`

Related tasks:

"Starting WebSphere Message Broker processes" on page 27
Using administrative tools, you can start the WebSphere Message Broker processes.

Starting and stopping the Tivoli Netcool/OMNIbus probe

Enabling the events record

Using administrative tools, you can enable record event management in order to manage event activity in IBM Intelligent Operations for Water. Use the information in this task to enable event monitoring on the application server.

Procedure

1. Log on to WebSphere Application Server at the following URL:
   `https://appserver:9043/ibm/console`
2. Select **Applications** > **Monitor Services** > **Recorded Events Management** > **Enable/Disable Events Record**.
3. Select the local host and click **Enable Events Record** to enable event monitoring.

Configuring the timezone of the monitoring model

Using administrative tools, you can synchronize the timezone settings in the monitor model with the host operating system timezone settings

Procedure

1. Extract all content from `water_wih_monitor_models.zip` located at: `topology\water_wih_solution_samples\MONITOR_Sample_Data\content\models` in the water solution installer.
2. Import the business monitoring projects into Rational® Application Developer using the installed IBM WebSphere Business Monitor development toolkit.
3. Set the correct timezone for each KPI model to match your host timezone settings.
4. Generate a monitor J2EE project and export the monitor model EAR file.
5. Update the monitor model application in IBM WebSphere Business Monitor server.

Deleting sample users

IBM Intelligent Operations for Water includes sample users. For security reasons, delete the sample users after IBM Intelligent Operations for Water is installed.

About this task

The WebSphere Portal administrator manages user accounts in the **Administration** portal. Use the following procedure to delete the sample users that are included with IBM Intelligent Operations for Water.

Procedure

1. Log on to the portal as administrator (wpsadmin) using the following URL:
   `http://app_server_ur/wpsv70/wps/myportal`
2. Click **Administration**.
3. Click **Access > Users and Groups**.
4. Click the delete icon for the following users:
   - gkooper (Gwen Kooper)

- jharckness (Jac Harckness)
- eharper (Eoin Harper)

Important: Do not delete the following required users. If you delete them, IBM Intelligent Operations for Water and the IBM Intelligent Operations Center will not operate properly.

- admin
- iicsystemuser
- maxadmin
- maxintadm
- maxreg
- notesadmin
- resAdmin1
- resDeployer1
- resMonitor1
- rtsAdmin
- rtsConfig
- rtsUser
- taiuser
- SRMSELFSERVICEUSR
- wasadmin
- waswebadmin
- wpsadmin
- wpsbind
- All user IDs beginning with "PM"

Related concepts:

Chapter 3, “Securing the solution,” on page 37
Securing IBM Intelligent Operations for Water is an important consideration. To ensure that the system is secure, you must manage who can access the system and assign the correct level of access within the solution.

“Sample users” on page 43
During the deployment of IBM Intelligent Operations for Water, sample users are created with corresponding responsibilities and access permissions.

Getting started with the solution

Use the information in this section to get started with the IBM Intelligent Operations for Water solution. By working with the sample demonstration and data provided with the solution, you can quickly get familiar with the capabilities and tasks performed when using the solution.

Checking the sample system is operational

Complete the steps in this section to verify that the sample system is operational and all scripts are available to start working with data in the content pack.

Before completing the steps in this section, check that all IBM Intelligent Operations Center servers are operational. To work with the sample system, the application server, database server, event server and management server must be operational.

To download the scripts, please go to the URL in the related information.

Note: For demonstration purposes, all systems use password: *passw0rd* unless otherwise indicated.

Related information:

IBM Intelligent Operations for Water APAR PO00035

IBM Intelligent Operations for Water APAR PO00170

Extracting the demonstration scripts

The IBM Intelligent Operations for Water sample requires demonstration scripts that are used to set up your environment so that you can perform some common tasks. Use the information in this topic to access the demonstration scripts.

Procedure

To locate and extract the demonstration scripts, download the APARs and follow the installation steps.

Related information:

IBM Intelligent Operations for Water APAR PO00035

IBM Intelligent Operations for Water APAR PO00170

Starting the Simulator

IBM Intelligent Operations for Water provides a simulation tool that monitors incoming folders, parses CSV files, and sends data readings. You can use the Simulator to check operational data flows sourced from external systems. To begin working with the demonstration scripts, you must start the Simulator.

About this task

The Simulator is installed on the application server in the directory: `/opt/IBM/iss/iow/apps/simulator`.

Procedure

To start the simulator, type

```
cd /opt/IBM/iss/iow/apps/simulator/
./run_simulator.sh
```

Loading the KPI thresholds

To start familiarizing with KPIs and how they are used in the sample solution, you must load and set up sample KPI thresholds. The IBM Intelligent Operations for Water demonstration system contains sample KPI thresholds for the Combined Sewer Overflow diverter.

About this task

You need to perform this procedure only once per system.

Procedure

1. On the application server, open a command line as db2inst1 user if it is not already opened. For example, `su - db2inst1`
2. Type `cd /opt/IBM/iss/iow/apps/simulator/demoscripts`
3. Type the **`db2 connect to wihdb user db2inst1`** command.
4. Type the *passw0rd* password.
5. Type the **`db2 -tf set_csolevel_thresholds.sql`** command.

Checking mapped key measurements

When working with the Combined Sewer Overflow diverter sample, you must check that the mapped key measurements are set up properly before performing water tasks.

About this task

Set up the mapped key measurement for the Combined Sewer Overflow diverter. The diverter (CSO003) should map to `http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2` for the purposes of the demonstration.

You need to perform this procedure only once per system.

Procedure

1. From the data server, log on as root and type the following commands:
   ```
   xhost +
   su - db2inst1
   db2cc &
   ```
2. Expand **All Databases**, expand **WIH_DB**, select **Tables**, search for the table named KEY_MEASUREMENT_CONFIG, and find the record corresponding to CSO003.

   Note: KEY_MEASUREMENT_CONFIG and KEY_MEASUREMENT_RDFID (see Step 3) are under the WIH schema.
3. When you locate the record, change the second column, KEY_MEASUREMENT_RDFID to `http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2`.

Checking that servers are operational

Use the information in this topic to verify that all servers are operational.

Procedure

1. From the management server, log in as root: **`su - ibmadmin`**
2. Switch to the `scripts` directory: `cd /opt/IBM/ISP/mgmt/scripts` and enter the `./iopmgmt.sh status all passw0rd` command.
3. Select one of the following steps depending on whether no servers are running, only some servers are running, or all servers are running:
   a. If no servers are running, enter `./iopmgmt.sh start all passw0rd`
   b. If only some servers are running, enter `./iopmgmt.sh stop all passw0rd`, then enter `./iopmgmt.sh start all passw0rd`
   c. If all servers are running, continue to the next topic.

Checking Message Queue Manager Broker is running

Check that the Message Queue Manager Broker is running on the event server.

Procedure

1. From the event server, log in as root: **`su - mqm`**
2. Switch to the `bin` directory: `cd /opt/mqm/bin` and enter the `./dspmq` command to show queues.
3. If the WIH.MB.QM is not running, start the broker by entering `./strmqm WIH.MB.QM`.
4. Enter the `./dspmq` command again to verify the broker has started.

Checking Message Queue SI Broker is started

Check that the Message Queue SI broker is started.

Procedure

1. From the event server, log on as root. You should be logged on as mqm on the event server.
   To log on as mqm, type `su - mqm` from a command line.
2. Switch to the `bin` directory `cd /opt/IBM/mqsi/8.0.0.0/bin`
3. Check the source profile. Type `source ./mqsiprofile`

4. Check the list of running processes. Type `./mqsilist`
5. If both IOC_BROKER and WIH_BROKER are not running, start both processes by typing `./mqsistart WIH_BROKER` or `./mqsistart IOC_BROKER`
6. Verify the processes are running by typing `./mqsilist`

Checking Netcool probes are running

Check that the Netcool probes are running.

Procedure

1. To check IBM Intelligent Operations Center, from the event server log in as root. Enter `ps auxww | grep ioc_xml`
2. If only the **grep** command is returned, start the XML probe with the command: `/opt/IBM/netcool/omnibus/probes/nco_p_xml -name ioc_xml -propsfile /opt/IBM/netcool/omnibus/probes/linux2x86/ioc_xml.props &`
3. To check WIH, enter `ps auxww | grep water_wih`
4. If only the **grep** command is returned, start the XML probe with the command: `/opt/IBM/iss/iow/omnibus/startXmlProbe.sh`

Running a demonstration using the sample

Use the information in this section to familiarize with the solution interface and demonstration data to perform typical tasks when using IBM Intelligent Operations for Water.

IBM Intelligent Operations for Water has many different water management use cases. IBM Intelligent Operations for Water takes advantage of semantic models so that different contextual relationships between assets that are related to waste water, water source and distribution, ports and harbors, and water management can be accommodated.

IBM Intelligent Operations for Water KPIs are used to track events such as Dry Weather Sewer Overflows. Using the sample data provided you can simulate how to trigger events. The Dry Weather Sewer Overflow example is one of many examples available in the content pack. Each content pack for IBM Intelligent Operations for Water contains specific sets of KPIs, asset models, reports, standard operating procedure, event triggers, and other artifacts.

In the demonstration, you work with KPI samples and simulate a task where water operators prevent a Dry Weather Sewer Overflow. Executive users confirm the overflow event. When working with the KPI samples, you begin with all pertinent KPIs having a green status. If a Dry Weather Sewer Overflow KPI is NOT green, you might need to reset the database. To view a KPI, double-click the item in the KPI map to display the KPI hierarchy in the Details portlet.

In the demonstration, you also work with the key elements in IBM Intelligent Operations for Water interface including the Map and Details portlets on the Operations view.

- The Map portlet provides contextual information about water assets and is used to track events. Many objects are displayed on the map including Combined Sewer Overflow diversion structures (CSO), rain gauges, and the pipe network. Using the Filter options, you can select the content to display. You can select events, and various types of assets in the system. The asset types are configurable and are not limited to the samples displayed in the interface. You can also select from a pre-configured list of logical zones. The zones can be pressure management zones, district metering areas (DMAs), zip codes, or other regions.
- The Details portlet expands on IBM Intelligent Operations Center and contains the Events tab and Asset tab. The Asset tab tracks the assets that are displayed in the map and the key measurements that are associated with the assets. The Details portlet shows measurement names, values, and trends. The Details portlet indicates whether a measurement is not read in a while (keyed to a configurable timeout period) and can indicate whether a particular measurement reaches warning or critical levels.

Preparing to run the scripts

Use the information in this topic to set up your system to run the demonstration scripts.

Procedure

1. If you are not already running the simulator, log on to the application server as root and type

   ```
   cd /opt/IBM/iss/iow/apps/simulator/
   ./run_simulator.sh
   ```

   Keep the window open because useful status information about the records is displayed.

   Note: You can check if the simulator is already running by typing `ps -ef | grep simulator`
2. Go to the `demoscripts` directory.
   a. Log on as root and type `xhost +` to ensure you can use the X-windows programs.
   b. Type `su - db2inst1`.
   c. Change to the `demoscripts` directory: `cd /opt/IBM/iss/iow/apps/simulator/demoscripts`.
3. Continue to the steps in the related task.

Related information:

Familiarizing with the solution interface
Use the information in this topic to familiarize with the solution interface.

Familiarizing with the solution interface

Use the information in this topic to familiarize with the solution interface.

Procedure

1. Open a web browser. Enter the URL `http://<applicationserverhost>/wpsv70/wps/portal`, and select the Water solution.
2. Explore the Executive tab.
3. Explore the Operator tab.
4. View the common portlets.

   The Notifications portlet displays important water KPI-related events.

   The My Activities portlet displays standard operating procedure that are started when certain events begin, such as a warning level breach for a key measurement.

   The Contacts portlet is used for communication and collaboration within the system.
5. Continue with the steps in the related task.

Related information:

Triggering a changing event
Using the demonstration data and the tools available, you can simulate changes to measurement readings. You can view the impact of those events in the solution interface when triggering a Dry Weather Sewer Overflow warning.

Triggering a changing event

Using the demonstration data and the tools available, you can simulate changes to measurement readings. You can view the impact of those events in the solution interface when triggering a Dry Weather Sewer Overflow warning.

Procedure

1. Use the built in Simulator to provide values to the rain gauges.
2. From the application server, navigate to the demoscripts directory: `cd /opt/IBM/iss/iow/apps/simulator/demoscripts`

3. Simulate that the weather has been dry for 24 hours by sending a zero reading value to neighborhood rain gauges for both today and yesterday. Log on as `db2inst1`, and run the following two scripts in sequence to display records in the run_simulator.sh window.

   ```
   ./make_it_dry_yesterday.sh
   ./make_it_dry_today.sh
   ```

4. The zero values are displayed for the rain gauges on the **Assets** tab in the Details portlet and also in the pop-up on the map.
5. Start with a normal reading on Combined Sewer Overflow diverter (CSO003). Run the `./cso_acceptable.sh` script. The CSO003 status is Green on the Assets list and Map.
6. Trigger a water level rise in Combined Sewer Overflow diverter (CSO003). Run the `./cso_warning.sh` script. The CSO003 status changes to Yellow on the Assets list and Map. In addition, on the map, an event pop-up warning is displayed to state that the Combined Sewer Overflow has reached 75% of the water level. The warning is displayed in both the events list and on the Map.
7. A standard operating procedure is created in the My Activities portal in response to the rising water level. The standard operating procedure is configured using the Administration panel of IBM Intelligent Operations for Water. To complete each step in the standard operating procedure, open the procedure by clicking the left arrow. Click **Start** > **Finish** for each step until the activity is no longer displayed. It may take some time to register each step.
8. When the standard operating procedure has completed, the KPI system registers the event as a Prevented Dry Weather Sewer Overflow. View the event in the Notifications portlet. The counters for Prevented Dry Weather Sewer Overflows are increased.
9. Switch to the Executive page. Check the KPI status is green as the Prevented Dry Sewer Overflow has been avoided.
10. To simulate a series of events when an overflow can not be avoided, run the `./cso_critical.sh` script. Switch to the Operator page to view the status turn from Yellow to Red.
11. If the standard operating procedure does not start immediately, run the `./cso_acceptable.sh` script to confirm the overflow has occurred. An activity is displayed to confirm that the overflow has occurred.
12. Confirm the Dry Weather Sewer Overflow by opening the task in the My Activities portlet.
13. Click **Start** > **Finish** on the Dry Weather Sewer Overflow to confirm the task. The event is also displayed on the **Events** tab and Map. A red border surrounds the Combined Sewer Overflow and an event icon is displayed to show the event.

    See the related task for information about the Executive view of the Dry Weather Sewer Overflow event.

Related information:

Viewing the response to events in the solution interface
By opening the Executive page in the solution interface, you can view the response to the simulated event.

Viewing the response to events in the solution interface

By opening the Executive page in the solution interface, you can view the response to the simulated event.

Procedure

1. Click the Executive tab.
2. The Dry Weather Sewer Overflow KPI status is displayed in Red to indicate that a Dry Weather Sewer Overflow has occurred.

Resetting the sample demonstration

When the demonstration has concluded, you must reset the demonstration for subsequent use.

Procedure

1. Clear the KPI notifications. In the Notifications portlet, click the top checkbox to select all notifications. Right-click a notification, and select **Close Alert**.
2. Clear all Events. In the Details portlet, select the Events tab. Select each event in the list, right click, and select **Cancel Event**. Click **OK** on the pop-up window, and wait for the window to display. Repeat the step until all events are cleared.
3. Reset the database for the Dry Weather Sewer Overflow KPI. You must perform this task as the Dry Weather Sewer Overflow maintains a Red status if a Dry Weather Sewer Overflow happened within the last week. Complete the following steps to reset the KPI system and so ignore that the Dry Weather Sewer Overflow occurred. To do this:
   a. In your web browser, open the URL `http://<application_server>:9060/ibm/console`. Accept the certificate and log on as *waswebadmin/passw0rd*.
   b. Navigate to **Applications** > **Application Types** > **Monitor Models**.
   c. Click the **Version** column. For example, click *2012-04-22T17:01:40* of column **Storm_Water_SSO_CSO_Management**.
   d. Click **Manage Schema**.
   e. Click **Run Delete Schema Script.**
   f. Click **Run Create Schema Script**.
   g. Click **Monitor Models** in the breadcrumbs area to return to the initial page for that Monitor service.
   h. Select **Storm_Water_SSO_CSO_Management**, click **Stop**, and wait for confirmation that the service has stopped. A red **Stopped** icon appears to the right of the service. Then click **Start** to restart the service. The Dry Weather Sewer Overflow KPI should return to green in the Executive view.

Chapter 3. Securing the solution

Securing IBM Intelligent Operations for Water is an important consideration. To ensure that the system is secure, you must manage who can access the system and assign the correct level of access within the solution.

Securing the base architecture

Because IBM Intelligent Operations for Water is a solution that runs on top of the IBM Intelligent Operations Center, set the high-level security settings through the IBM Intelligent Operations Center. For details on the various options available, see the security section of the IBM Intelligent Operations Center Information Center.

Securing the data import

The importing of data into IBM Intelligent Operations for Water is performed on the IBM Intelligent Operations Center event and management server. Ensure that the method used to connect and transfer data on to this server is secure. For more information, see the related links at the end of this topic.

Securing the portal

The following topics explain how to secure the solution and manage user access to the IBM Intelligent Operations for Water portal.

Related concepts:

Chapter 4, “Integrating the solution,” on page 45
Products and services can be integrated with IBM Intelligent Operations for Water.

Related information:

Securing the IBM Intelligent Operations Center

Cyber hygiene

Securing the model

User roles and responsibilities

IBM Intelligent Operations for Water implements security by limiting access to features and data based on user roles.

The security model and user access roles of IBM Intelligent Operations for Water are consistent with the IBM Intelligent Operations Center and other IBM Smarter Cities Software Solutions.

To use a specific feature of IBM Intelligent Operations for Water, a user must be a member of a user role group that provides the required access level to use that feature. A user is made a member of a user role group by the administrator.

Table 1 shows the authorized pages, portlets, and responsibilities of the user roles of IBM Intelligent Operations for Water.

Table 9. The roles of IBM Intelligent Operations for Water.

User role (role group)	Authorized pages	Authorized responsibilities
Water Operator	Operator: Operations view City: Water Conservation view	View the **Map**. View **Details**. View **Notifications**. View **City View: Water Conservation**. **Note:** The Water Operator can view the **City: Water Conservation** page only and is unable to view the **Citizen: Water Conservation** page in the portal. The Water Operator can only view the **Citizen: Water Conservation** page if the Water Operator also has the Water Consumer role and has an account in the system. View **My Activities**. Send and receive Sametime® messages.
Water Executive	Executive: Status view City: Water Conservation view	View **Status**. View the **Key Performance Indicator Drill Down**. View **Notifications**. View **My Activities**. View **City View**. **Note:** The Water Executive can view the **City: Water Conservation** page only and is unable to view the **Citizen: Water Conservation** page in the portal. The Water Operator can only view the **Citizen: Water Conservation** page if the Water Executive also has the Water Consumer role and has an account in the system. Send and receive Sametime messages.
Water Consumer	Citizen: Water Conservation view	View the **Citizen: Water Conservation** page.

Table 9. The roles of IBM Intelligent Operations for Water. (continued)

User role (role group)	Authorized pages	Authorized responsibilities
Water Administrator	All preceding pages and Administrator pages.	All preceding responsibilities. Additionally, a user of this role can: Configure the page layout. Configure portlets, including • **Map** • **Details** • **Status** • **Key Performance Indicator Drill Down** • **Notification** • **My Activities** • **Contacts** • **City: Water Conservation** • **Citizen: Water Conservation**

Related concepts:

"Users and benefits" on page 4
IBM Intelligent Operations for Water is designed for water operations and management personnel to help optimize and more efficiently manage water systems, assets, and networks across a geographically dispersed infrastructure.

Related tasks:

"Adding users and groups"
To use a specific feature of IBM Intelligent Operations for Water, a user must be a member of a user role group that provides the required access level to use that feature. Use the **Administration** portal to add users and groups to IBM Intelligent Operations for Water.

"Viewing or modifying group membership" on page 41
Use the **Administration** portal to manage users of IBM Intelligent Operations for Water and their access permissions. Membership of a role group gives users access to the parts of the solution appropriate to that role. You can change the access level of a user by removing them from one role group and adding them to another group. You can also remove a user from IBM Intelligent Operations for Water.

Adding users and groups

To use a specific feature of IBM Intelligent Operations for Water, a user must be a member of a user role group that provides the required access level to use that feature. Use the **Administration** portal to add users and groups to IBM Intelligent Operations for Water.

Before you begin

Choose from one of the following IBM Intelligent Operations for Water roles that provides the access level that your users or groups require:

- Water Operator
- Water Executive
- Water Administrator
- Water Consumer

IBM Intelligent Operations for Water users must also be members of the following IBM Intelligent Operations Center user category groups:

- ioc_base_rescue
- ioc_base_safety
- ioc_base_meteorological
- ioc_base_chemical
- ioc_base_radiological
- ioc_base_infrastructure
- ioc_base_fire
- ioc_base_explosive
- ioc_base_health
- ioc_base_other
- ioc_base_environmental
- ioc_base_security
- ioc_base_transportation
- ioc_base_nuclear
- ioc_base_biological
- ioc_base_geophysical

See the related links at the end of this topic for more information about the roles of IBM Intelligent Operations for Water and about IBM Intelligent Operations Center groups.

About this task

You can add new users and groups to IBM Intelligent Operations for Water. You can also add users and groups from an existing Lightweight Directory Access Protocol (LDAP) directory source that is configured to work with the underlying IBM Intelligent Operations Center. For more information about how to import LDAP directory users into the solution, see the IBM Intelligent Operations Center Information Center.

Procedure

1. Log on to the solution portal as a portal administrator, for example, *wpsadmin* or another user who is a member of the *wpsadmins* portal group.
2. On the main navigation bar at the top of the page, click **Administration**.
3. On the sidebar menu, expand the **Access** submenu, and click **Users and Groups**.
4. Click **All Portal User Groups**. The list of role groups for IBM Intelligent Operations for Water, the IBM Intelligent Operations Center, and any other IBM Smarter Cities Software Solutions installed in this environment are displayed.
5. Scroll through the list to find the user group role that you would like to assign to your users.
6. Select the required IBM Intelligent Operations for Water role group by clicking it. The IDs of the existing group members are listed.
7. Add the user to the group using one of the following steps:
   - To add a new user, click **New User** and complete the required **Profile Management** fields.
   - To add an existing user or group of users, click **Add Member** and select one or more users or groups from the list.
8. Click **OK**.

Results

The recently added users or groups appear in the membership list of the user role group. The users are authorized to access the solution portal according to the permissions assigned to the role group selected.

What to do next

If the users also require access to the IBM Intelligent Operations Center and other IBM Smarter Cities Software Solutions installed in this environment, add them to the relevant user roles for those solutions. For more information, see the security topics in the information center for the IBM Intelligent Operations Center or the other IBM Smarter Cities Software Solutions you have deployed.

Related concepts:

"User roles and responsibilities" on page 37
IBM Intelligent Operations for Water implements security by limiting access to features and data based on user roles.

Related tasks:

"Viewing or modifying group membership"
Use the **Administration** portal to manage users of IBM Intelligent Operations for Water and their access permissions. Membership of a role group gives users access to the parts of the solution appropriate to that role. You can change the access level of a user by removing them from one role group and adding them to another group. You can also remove a user from IBM Intelligent Operations for Water.

Related information:

Importing users and groups into the IBM Intelligent Operations Center

User category groups and data permissions

Viewing or modifying group membership

Use the **Administration** portal to manage users of IBM Intelligent Operations for Water and their access permissions. Membership of a role group gives users access to the parts of the solution appropriate to that role. You can change the access level of a user by removing them from one role group and adding them to another group. You can also remove a user from IBM Intelligent Operations for Water.

About this task

Use the following procedure to add or remove existing users from IBM Intelligent Operations for Water user role groups. Users removed from an IBM Intelligent Operations for Water user role group can still continue to access the IBM Intelligent Operations Center and any other IBM Smarter Cities Software Solutions. For more information about how to completely delete a user and revoke their access to the entire portal and all solutions running in this environment, see the related links.

Procedure

1. Log on to the solution portal as a portal administrator, for example, *wpsadmin* or another user who is a member of the *wpsadmins* portal group.
2. On the main navigation bar at the top of the page, click **Administration**.
3. On the sidebar menu, expand the **Access** submenu, and click **Users and Groups**.
4. Click **All Portal User Groups**. The list of role groups for IBM Intelligent Operations for Water, the IBM Intelligent Operations Center, and any other IBM Smarter Cities Software Solutions installed in this environment are displayed.
5. Click one of the following IBM Intelligent Operations for Water user role groups that you would like to view or modify. You can scroll to the next page to find the required user role group that you are interested in.
   - Water Administrator

- Water Operator
- Water Executive
-  Water Consumer

6. A table containing all the users and groups that have been assigned to the user role are displayed. You can perform several actions by clicking the icons at the end of each row for the user you are interested in.
   - To remove a user or group, click the **Delete** icon on the row for that user.
   - To view all other roles that the selected user or group has been assigned, click the **View membership** icon on the row for that user.
   - To add an existing portal user or group to this role, click **Add Member** and select the user or groups to be added.
   - To create a new portal user and add them to the role, click **New User** and complete the required fields.
   - To create a new portal group and add the group to this role, click **New Group** and complete the required fields.
7. To finish and return to IBM Intelligent Operations for Water, on the main navigation bar at the top of the portal, click **More...** and then select **Intelligent Water**.

Related concepts:

"User roles and responsibilities" on page 37
IBM Intelligent Operations for Water implements security by limiting access to features and data based on user roles.

Related tasks:

"Adding users and groups" on page 39
To use a specific feature of IBM Intelligent Operations for Water, a user must be a member of a user role group that provides the required access level to use that feature. Use the **Administration** portal to add users and groups to IBM Intelligent Operations for Water.

Removing users or groups

If a user or group no longer requires access to the solution, you can remove them from IBM Intelligent Operations for Water. You can also remove a user or group from the entire solution including the IBM Intelligent Operations Center and any other IBM Smarter Cities Software Solutions deployed in the environment.

Procedure

1. To remove a user or group from only the IBM Intelligent Operations for Water solution, see Viewing or modifying groups.

   Note: Removing a user from the IBM Intelligent Operations for Water user role groups does not affect any access the user may have to the IBM Intelligent Operations Center and any other IBM Smarter Cities Software Solutions installed in this environment.
2. To completely remove a user or group from the entire system, see the security section of the IBM Intelligent Operations Center Information Center.

Related tasks:

"Viewing or modifying group membership" on page 41
Use the **Administration** portal to manage users of IBM Intelligent Operations for Water and their access permissions. Membership of a role group gives users access to the parts of the solution appropriate to that role. You can change the access level of a user by removing them from one role group and adding them to another group. You can also remove a user from IBM Intelligent Operations for Water.

Related information:

Deleting a user or group in the IBM Intelligent Operations Center

Sample users

During the deployment of IBM Intelligent Operations for Water, sample users are created with corresponding responsibilities and access permissions.

IBM Intelligent Operations for Water includes the following sample users.

Name	User ID	User role
Gwen Kooper	gkooper	Water Operator  Water Consumer
Jac Harckness	jharckness	Water Executive
Eoin Harper	eharper	Water Administrator

By default, the sample users only have access to the IBM Intelligent Operations for Water solution.

If the sample users require access to the IBM Intelligent Operations Center and other IBM Smarter Cities Software Solutions installed in this environment, they must be added to the relevant user roles for those solutions.

Related tasks:

"Deleting sample users" on page 29
IBM Intelligent Operations for Water includes sample users. For security reasons, delete the sample users after IBM Intelligent Operations for Water is installed.

Related information:

User roles and access in the IBM Intelligent Operations Center

Viewing or modifying user profiles

View or edit the profile of a user to set or reset any of the user profile attributes including password, name, email, and language. You cannot change the user ID.

About this task

The portal administrator can view or edit user profiles by using the **Administration** portal. Select the user from the authenticated portal users list to open the user profile and change profile details.

Note: Each user can also change their own profile by clicking **Edit My Profile** on the top navigation bar of the portal.

Procedure

1. Log on to the solution portal as a portal administrator, for example, *wpsadmin* or another user who is a member of the *wpsadmins* portal group.

2. On the main navigation bar at the top of the page, click **Administration**.
3. On the sidebar menu, expand the **Access** submenu, and click **Users and Groups**.
4. Click **All Authenticated Portal Users**. A table containing all existing users is displayed.
5. Find the user that you are interested in. Click the edit icon on the row for that user, to display their **Profile Management** page. The attribute fields for the user profile are displayed.
6. Optional: To change the password for the user, enter a new password in the **New Password:** and **Confirm Password:** fields.
7. You can add, edit, or delete information in any of the remaining fields.
8. To submit the changes you have made, click **OK**.

Results

The user profile is updated with the changes you submitted.

Setting the password policy

Tivoli Access Manager installed with the IBM Intelligent Operations Center provides a default for how long a password can be used before it must be changed. Set a different password policy if the default value is not acceptable

Procedure

1. On the IBM Intelligent Operations Center management server, access the Tivoli Access Manager WebSEAL Web Portal Manager at the following URL:
   `http://management_server_hostname:9061/ibm/console`
2. Log on with the IBM Intelligent Operations Center administrator ID and password created when the IBM Intelligent Operations Center was installed.
3. Click **Tivoli Access Manager** > **Web Portal Manager** > **Users** > **Show Global User Policy**.
4. Enter the Tivoli Access Manager administrator ID and password created when the IBM Intelligent Operations Center was installed.
5. Click **Show Global User Policy**.
6. Specify the maximum password age desired for the system.

Chapter 4. Integrating the solution

Products and services can be integrated with IBM Intelligent Operations for Water.

IBM Intelligent Operations for Water provides a public web service interface when you are writing or testing applications. You can use any HTTP client in any programming language to query metadata about your water infrastructure. You can access the URLs and any HTTP client in any programming language to interact with the API.

For information about other solution integration points, refer to the links at the end of the page.

Related concepts:

Chapter 3, "Securing the solution," on page 37
Securing IBM Intelligent Operations for Water is an important consideration. To ensure that the system is secure, you must manage who can access the system and assign the correct level of access within the solution.

"Customizing data integration" on page 135
The IBM Intelligent Operations for Water solution provides extension options that you can use to customize the data that is made visible to users. Working with the model manager, you can define what infrastructure, assets, measurements, and values are presented in the interface, and determine how to integrate that data with components in the solution. Use the information in this topic to familiarize with model customization and extensions.

"Customizing data import and operational storage" on page 150
With IBM Intelligent Operations for Water, you can build a customized data consolidation plan to gather and reconcile data from many sources. Use the information in this section to customize data population.

"Customizing data processing" on page 153
You can customize data processing in IBM Intelligent Operations for Water to suit the requirements of your operational and executive staff. By specifying and implementing user specific Key Performance Indicators (KPIs), you can establish service level agreements and key measurements to meet the performance needs of your organization and key stakeholders.

Related information:

Overview of Integration in Intelligent Operations Center

Reference information in Intelligent Operations Center

IBM developerWorks article: Developing KPIs (Part 1)

IBM developerWorks article: Developing KPIs (Part 2)

Software Development Kit (SDK) Overview

IBM Intelligent Operations for Water provides a software development kit (SDK) for developers.

Model

Many software development companies provide an application framework that enables developers to create custom applications by using a set of reusable components. The IBM Intelligent Operations for Water SDK follows the same model. You can use the SDK to create your own customized applications that are additional to the core applications provided on the platform. Use the applications to perform tasks that you are interested in. For example, you can create applications to handle flood management or measure water quality.

Features

The IBM Intelligent Operations for Water SDK has the following features:

- A set of underlying interfaces and a programming model to enable application development.
- One simple way to build applications on the IBM Intelligent Operations for Water 1.5.0.2.
- Detailed documents that are targeted at developers of IBM Intelligent Operations for Water who are working in research, lab services, GBS, and with client partners.
- A simplified route for productizing IBM Intelligent Operations for Water assets that add value to the business.

SDK Architecture

The following diagram of the IBM Intelligent Operations for Water SDK architecture shows the functional components and their relationships.

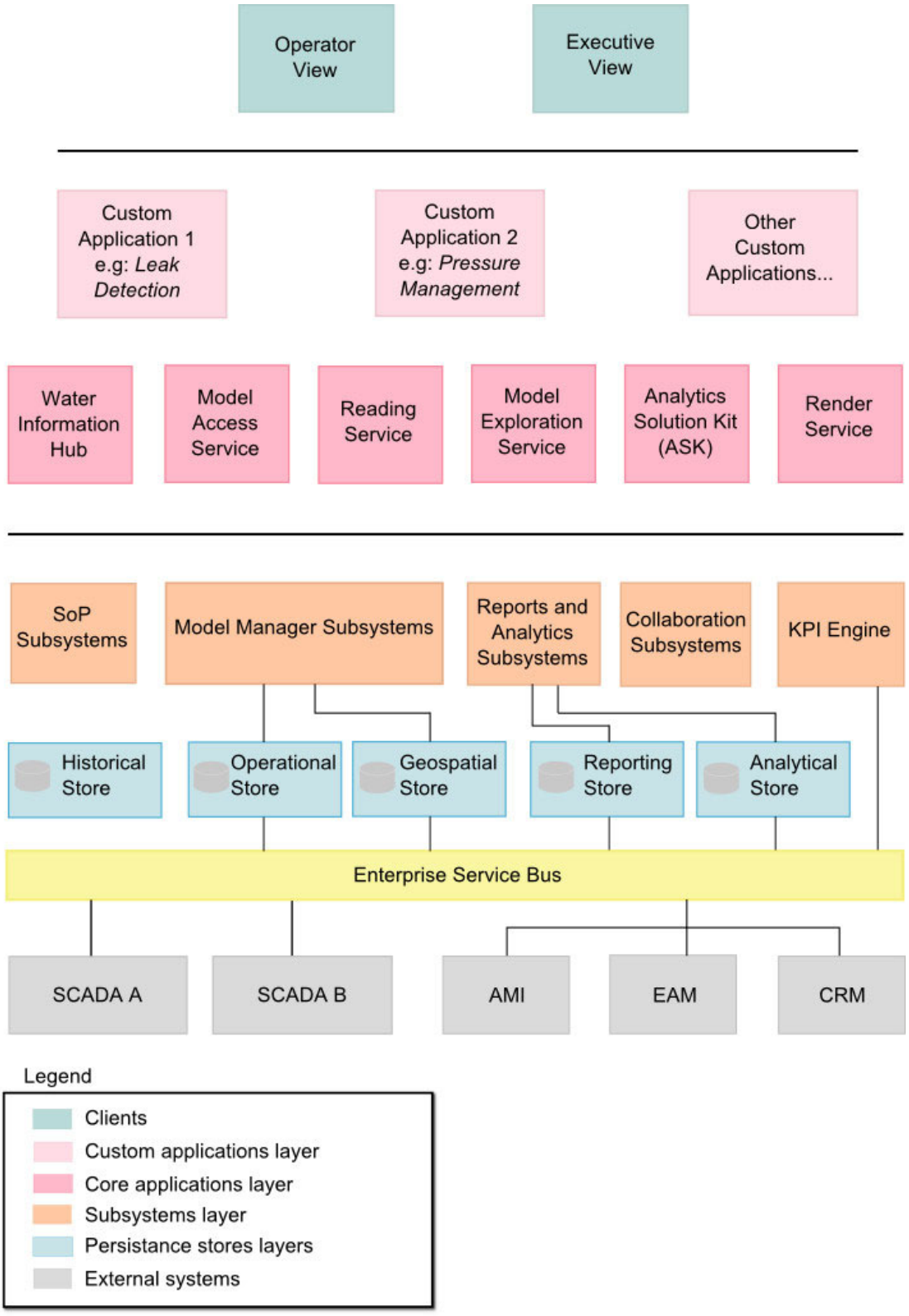

Figure 2. IBM Intelligent Operations for Water SDK Architecture

Application Tiers

The following table describes the tiers in the IBM Intelligent Operations for Water SDK.

Tier	Name	Description
1	External System	The External System tier contains SCADA System A and SCADA System B. SCADA systems are centralized to monitor and control entire sites. The tier can also contain Application Messaging Interface (AMI) systems, Enterprise Asset Management (EAM) systems, and Customer Relationship Management (CRM) systems.
2	IBM Intelligent Operations for Water Persistence Stores	The IBM Intelligent Operations for Water Persistence Stores tier contains an Analytical Store, Reporting Store, Operating Store, and Geospatial Store. External systems interact with persistence stores by way of the event server broker. The SDK provides extensions to the WebSphere Business Modeler. The SDK provides database extensions and content packs in the tier.
3	IOC Subsystems	The IBM Intelligent Operations Center Subsystems tier contains a Key Performance Indicator (KPI) engine, a Collaboration Subsystem, a Reports and Analytics Subsystem, a Model Manager Subsystem, and a Subsystem Relationship Model (SRM) Subsystem. The SDK provides Custom KPIs and Custom Analytics/Reports in the tier.
4	Applications - Core and Custom	The Applications tier provides an SDK API to build core and custom applications. APIs include the Model Access Service, Reading Service, Render Service, Model Exploration Service, ASK Service, and the Water Information Hub.
5	Clients	The Clients tier has an Executive View and a Client View. The Clients tier enables uses to integrate their applications into the client tier.

Web Service Interface

IBM Intelligent Operations for Water provides an Application Programming Interface (API) based on Representational State Transfer (REST) principles. You can use the API to build and test your own applications.

Overview

To successfully use the IBM Intelligent Operations for Water REST API, you must understand how to construct a URL and interpret the response.

All resources and operations that are exposed by the REST API are accessible through a hierarchy of endpoints for each IBM Intelligent Operations for Water service that is published on the server. Your request can be any of the following HTTP methods. All requests require you to authenticate.

- Retrieve resources with the GET method. GET is like a select statement and retrieves information, returning JSON or XML format. The method's parameters are typically appended to the request URI.
- Create or update resources with the POST or PUT method. When POST is called, you pass in JSON or XML that contains your method's parameters.
- Delete resources with the DELETE method. The method's parameters are typically appended to the request URI.

Base URI

IBM Intelligent Operations for Water API URIs use the following base URI format:

```
<protocol>://<hostname>:<port_number>/ibm/water/api/<name>-service/<resource>
```

- *protocol* is either http or https
- *hostname* is the hostname of the application server
- *port_number* is the port number of WebSEAL. For example, 80 for http and 443 for https.
- *name* is the component name
- *resource* is the name of the resource

An example of the IBM Intelligent Operations for Water API URI:

```
http://app.ioc.ibm.com/ibm/water/api/reading-service/realtime
```

Status codes

Table 1 lists the possible response status codes.

Table 10. Possible response status codes

HTTP Status Code	Description
200 (OK)	Returned by a successful GET, PUT, or POST request.
204 (No Content)	Returned by a successful DELETE request.
400 (Bad Request)	Returned when supplied data is invalid or missing (that is, any input validation errors).
403 (Forbidden)	Returned with the user is not authorized to call the requested API.
404 (Not Found)	Returned by a GET, PUT, or DELETE request where the resource does not exist.
409 (Conflict)	Returned by a PUT request where the last modified time supplied by the user does not match the current value.
500 (Internal Server Error)	Something went wrong that cannot be represented by one of the other status codes. Use this code as a last resort if something goes wrong.

Response formats

The IBM Intelligent Operations for Water can respond to requests in various formats. Table 2 lists the response formats.

Table 11. Response formats

Response Format	Request Header
JSON	Accept: application/json
XML	Accept: application/xml

Using the REST API

The IBM Intelligent Operations for Water REST API is a hierarchy of resources.

The resource hierarchy contains a number of services, including the Model Access Service, Reading Service, Render Service, Model Exploration Service, and ASK Service. The following is a file based representation of the resource hierarchy:

```
/ibm/water/api
  /ibm/water/api/model-service/<resource>
  /ibm/water/api/reading-service/<resource>
  /ibm/water/api/render-service/<resource>
  /ibm/water/api/topicmaps-service/<resource>
/askws /<resource>
```

Model Access Service resources

Model Access Service resources are used to access semantic models. You can use the services to make SPARQL queries, to update the model, and to retrieve detailed information about specific RDF objects. The Model Access Service can also query resources, such as asset types, measurement values, assets, measurement, and contained-assets and connects-assets relationships.

query:

The `query` resource runs SPARQL queries on the model. In the Water REST API, `query` is one of the Model Access Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/model-service/query?sparql=<sparql>
```

Request Body

Not applicable.

Response

SPARQL query results in XML or JSON format. Please reference the standards at the URL: http://www.w3.org/TR/rdf-sparql-XMLres/.

Resource Parameter

The resource has the following parameter.

Parameter	Description
sparql	The SPARQL query string.

Examples

The following examples demonstrate how to use the `query` resource to call services and return either an XML or JSON response. Assume that the examples are using the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/query?sparql=<sparql>

In the examples, the service accepts the SPARQL query string using the parameter named *sparql*. The following sample SPARQL query string is passed to the service:

```
select * where {
 ?a ?b ?c
 } limit 10
```

The query string is encoded in the following URL:

```
http://app-ioc.cn.ibm.com/ibm/water/api/model-service/query?
sparql= select%20*%20where%20%7B%0A%20%3Fa%20%3Fb%20%3Fc%0A%7D%20limit%2010
```

Example 1: Call the service and get a XML response

The example calls the service and gets an XML response. It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/query? sparql= select%20*%20where %20%7B%0A%20%3Fa%20%3Fb%20%3Fc%0A%7D%20limit%2010
- Accept: application/xml.

In the example, you get the following XML response:

```
<sparql xmlns="http://www.w3.org/2007/SPARQL/results#">
 <head>
  <variable name="a"></variable>
  <variable name="b"></variable>
  <variable name="c"></variable>
 </head>
 <results>
  <result>
   <binding name="a">
    <uri>http://cityName#Pipe1248</uri>
   </binding>
   <binding name="b">
    <uri>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</uri>
   </binding>
   <binding name="c">
    <uri>http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject</uri>
   </binding>
  </result>
  <result>
   <binding name="a">
    <uri>http://cityName#Pipe1248</uri>
   </binding>
   <binding name="b">
    <uri>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</uri>
   </binding>
   <binding name="c">
    <uri>http://cityName#Pipe</uri>
   </binding>
  </result>
  ...
 </results>
</sparql>
```

Example 2: Call the service and get a JSON response

The example calls the service and gets a JSON response. It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/query? sparql= select%20*%20where %20%7B%0A%20%3Fa%20%3Fb%20%3Fc%0A%7D%20limit%2010
- Accept: application/json.

In this example, you get the following JSON response:

```
{
 "head": {
  "variable": [{
   "name": "a"
  },
  {
   "name": "b"
  },
  {
   "name": "c"
  }]
 },
 "results": {
  "result": [{
   "binding": [{
    "uri": "http://cityName#Pipe1248",
    "name": "a"
   },
   {
    "uri": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
    "name": "b"
   },
   {
    "uri": "http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject",
    "name": "c"
   }]
  },
  {
   "binding": [{
    "uri": "http://cityName#Pipe1248",
    "name": "a"
   },
   {
    "uri": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
    "name": "b"
   },
   {
    "uri": "http://cityName#Pipe",
    "name": "c"
   }]
  },
  ......
  ]
 }
}
```

update:

The `update` resource runs SPARQL updates on the model. In the Water REST API, `update` is one of the Model Access Service resources.

Resource URI

`/ibm/water/api/model-service/update`

Resource Properties

Not applicable.

Response

No response.

Resource Parameters

The resource has the following parameter:

Parameter	Description
sparql	The SPARQL query string.

Example 1: Update using SPARQL

The following example demonstrates how to use the `update` resource. Assume the service is using the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/update.

The request body is the SPARQL query string.

```
PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
insert {
 <http://example.org#foo> rdf:type cim:RSM_WorkEquipment
 } where{
 }
```

Example 2: Use POST to call the resource

The example demonstrates how to use POST to call the `update` resource. It uses the method, URL, and Accept request-header:

- Method: POST
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/update
- Response: `status 204 no content indicate the SPARQL update success.`

properties:

The `properties` resource retrieves the properties of a model object. In the Water REST API, `properties` is one of the Model Access Service resources.

Method

GET.

Resource URI

`/ibm/water/api/model-service/properties?id=<id>`

Request Body

Not applicable.

Response

The response is a list of properties in XML or JSON format.

Resource Parameters

Retrieves properties of a model object.

Parameter	Description
sparql	The SPARQL query string.
id	The ID of the model object.

Examples

The following examples demonstrate how to use the `properties` resource. Assume the service is using the following URL: `http://app-ioc.cn.ibm.com/ibm/water/api/model-service/properties`.

Example 1: Retrieve properties in XML format

The example uses `properties` to retrieve the properties of object, http://cityName#Pipe558, in XML format. It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/properties?id=http%3A%2F%2FcityName%23Pipe588
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<modelObject xmlns="http://www.ibm.com/iss/iow/services/modelaccess">
 <id>http://cityName#Pipe588</id>
 <property>
    <id>http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject.name</id>
    <name>RSM_IdentifiedObject.name</name>
    <value>Pipe588</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity.TypeOfPhysicalEntity</id>
  <name>RSM_PhysicalEntity.TypeOfPhysicalEntity</name>
  <value>WorkEquipment</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity.has_Location</id>
  <name>RSM_PhysicalEntity.has_Location</name>
  <value>http://cityName#Pipe588-Location</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_UnnamedObject.mrid</id>
  <name>RSM_UnnamedObject.mrid</name>
  <value>Pipe588</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.Contains_Equipment</id>
  <name>RSM_WorkEquipment.Contains_Equipment</name>
  <value>http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.Contains_Equipment</id>
  <name>RSM_WorkEquipment.Contains_Equipment</name>
  <value>http://cityName#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation</value>
```

```
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.TypeOfEquipment</id>
  <name>RSM_WorkEquipment.TypeOfEquipment</name>
  <value>Pipe</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connected_workEquipment</id>
  <name>RSM_WorkEquipment.connected_workEquipment</name>
  <value>http://cityName#Junction265</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_WorkEquipment</id>
  <name>RSM_WorkEquipment.connects_WorkEquipment</name>
  <value>http://cityName#Junction265</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_WorkEquipment</id>
  <name>RSM_WorkEquipment.connects_WorkEquipment</name>
  <value>http://cityName#Junction268</value>
 </property>
<property>
  <id>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_workEquipment</id>
  <name>RSM_WorkEquipment.connects_workEquipment</name>
  <value>http://cityName#Junction264</value>
 </property>
 <property>
  <id>http://iec.ch/TC57/CIM-generic#hasDirectType</id>
  <name>hasDirectType</name>
  <value>http://cityName#Pipe</value>
 </property>
<property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://cityName#Pipe</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#ISA95_WorkLocation</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#ISO15926_FunctionalLocation</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#MIMOSA_Agent</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#MIMOSA_Segment</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#RSM_FunctionalLocation</value>
 </property>
 <property>
  <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
  <name>type</name>
  <value>http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject</value>
 </property>
 <property>
```

```
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://iec.ch/TC57/CIM-generic#RSM_MaintainableItem</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://iec.ch/TC57/CIM-generic#RSM_ResourceMember</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://iec.ch/TC57/CIM-generic#RSM_UnnamedObject</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://www.epanet.org#EPANET_Entity</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://www.epanet.org#EPANET_Link</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://www.epanet.org#EPANET_Pipe</value>
</property>
<property>
 <id>http://www.w3.org/1999/02/22-rdf-syntax-ns#type</id>
 <name>type</name>
 <value>http://www.ibm.com/water/wih#WIH_Pipeline_Asset</value>
</property>
</modelObject>
```

Example 2: Retrieve properties in JSON format

This example uses `properties` to retrieve of the object, http://cityName#Pipe558, in JSON format. Assume the service is using the following URL: `http://app-ioc.cn.ibm.com/ibm/water/api/model-service/properties`.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/properties?id=http%3A%2F%2FcityName%23Pipe588
- Accept: application/json

In this example, you get the following JSON response:

```
"id": "http://cityName#Pipe588",
 "property": [{
  "id": "http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject.name",
  "name": "RSM_IdentifiedObject.name",
```

```
 "value": "Pipe588"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity.TypeOfPhysicalEntity",
 "name": "RSM_PhysicalEntity.TypeOfPhysicalEntity",
 "value": "WorkEquipment"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity.has_Location",
 "name": "RSM_PhysicalEntity.has_Location",
 "value": "http://cityName#Pipe588-Location"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_UnnamedObject.mrid",
 "name": "RSM_UnnamedObject.mrid",
 "value": "Pipe588"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.Contains_Equipment",
 "name": "RSM_WorkEquipment.Contains_Equipment",
 "value": "http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.Contains_Equipment",
 "name": "RSM_WorkEquipment.Contains_Equipment",
 "value": "http://cityName#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.TypeOfEquipment",
 "name": "RSM_WorkEquipment.TypeOfEquipment",
 "value": "Pipe"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connected_workEquipment",
 "name": "RSM_WorkEquipment.connected_workEquipment",
 "value": "http://cityName#Junction265"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_WorkEquipment",
 "name": "RSM_WorkEquipment.connects_WorkEquipment",
 "value": "http://cityName#Junction265"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_WorkEquipment",
 "name": "RSM_WorkEquipment.connects_WorkEquipment",
 "value": "http://cityName#Junction268"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment.connects_workEquipment",
 "name": "RSM_WorkEquipment.connects_workEquipment",
 "value": "http://cityName#Junction264"
},
{
 "id": "http://iec.ch/TC57/CIM-generic#hasDirectType",
 "name": "hasDirectType",
 "value": "http://cityName#Pipe"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://cityName#Pipe"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#ISA95_WorkLocation"
},
```

```
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#ISO15926_FunctionalLocation"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#MIMOSA_Agent"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#MIMOSA_Segment"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_FunctionalLocation"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_IdentifiedObject"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_MaintainableItem"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_PhysicalEntity"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_ResourceMember"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_UnnamedObject"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://www.epanet.org#EPANET_Entity"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://www.epanet.org#EPANET_Link"
},
{
 "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
 "name": "type",
 "value": "http://www.epanet.org#EPANET_Pipe"
},
{
```

```
  "id": "http://www.w3.org/1999/02/22-rdf-syntax-ns#type",
  "name": "type",
  "value": "http://www.ibm.com/water/wih#WIH_Pipeline_Asset"
 }]
```

asset-types:

The `asset-types` resource retrieves a list of asset types. The resource is a subclass of `RSM_WorkEquipment`. In the Water REST API, `asset-types` is one of the Model Access Service resources.

Method

GET.

Resource URI

`/ibm/water/api/model-service/asset-types?prefix=<prefix>&id=<id>`

Request Body

Not applicable.

Response

A list of asset types in XML or JSON format.

Resource Parameters

The `asset-types` resource uses the optional parameters in the following table.

Optional Parameter	Description
prefix	The prefix of the asset type; for example, the city name prefix, http://cityName#.
id	The ID of the asset type; for example the pipe prefix, http://cityName#Pipe.

Examples

This section provides examples of how you can use `asset-types`.

Sample Model

In the examples, you can assume that the model is imported to the model server. In addition, the model defines several sensor meter assets and pipeline assets in the prefix, http://cityName#. The example model is as follows:

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:owl="http://www.w3.org/2002/07/owl#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
 xml:base="http://cityName">

 <!-- Sensor Meter Types -->
 <rdf:Description rdf:about="http://cityName#RainGauge">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
  <rdfs:label xml:lang="en">Rain Gauge</rdfs:label>
  <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
  <rdfs:comment>Rain Gauge</rdfs:comment>
 </rdf:Description>

 <rdf:Description rdf:about="http://cityName#CSODiversionStructure">
  <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
```

```
 <rdfs:label xml:lang="en">CSO Diversion Structure</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
 <rdfs:comment>CSO Diversion Structure</rdfs:comment>
</rdf:Description>

<rdf:Description rdf:about="http://cityName#LiftStation">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">Lift Station</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
 <rdfs:comment>Lift Station</rdfs:comment>
</rdf:Description>

<rdf:Description rdf:about="http://cityName#RiverGauge">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">River Gauge</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
 <rdfs:comment>River Gauge</rdfs:comment>
</rdf:Description>

<rdf:Description rdf:about="http://cityName#WastewaterPlant">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">Wastewater Plant</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
 <rdfs:comment>Wastewater Plant</rdfs:comment>
</rdf:Description>

<rdf:Description rdf:about="http://cityName#TrunkLineMonitor">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">Trunk Line Monitor</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset" />
 <rdfs:comment>Trunk Line Monitor</rdfs:comment>
</rdf:Description>

<!-- Pipeline Types -->
<rdf:Description rdf:about="http://cityName#Pipe">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">Pipe</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.epanet.org#EPANET_Pipe" />
 <rdfs:comment>Pipe</rdfs:comment>
</rdf:Description>

<rdf:Description rdf:about="http://cityName#Junction">
 <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class" />
 <rdfs:label xml:lang="en">Junction</rdfs:label>
 <rdfs:subClassOf rdf:resource="http://www.epanet.org#EPANET_Junction" />
 <rdfs:comment>Junction</rdfs:comment>
</rdf:Description>

</rdf:RDF>
```

Example 1: Retrieve all asset types

The example retrieves a list of all asset types in JSON format. In this example, assume that the service uses the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types. The example uses the Method, URL, and Accept request header:

- Method: GET
- Example URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types
- Accept: application/JSON

In this example, you get the following JSON response

```
"AssetType": [{
  "id": "http://www.epanet.org#EPANET_Link",
  "name": "EPANET_Link",
  "description": "Super class EPANET Links",
```

```
 "parentId": "http://www.epanet.org#EPANET_Entity"
},
{
 "id": "http://www.epanet.org#EPANET_Node",
 "name": "EPANET_Node",
 "description": "Super class EPANET Nodes",
 "parentId": "http://www.epanet.org#EPANET_Entity"
},
{
 "id": "http://cityName#LiftStation",
 "name": "Lift Station",
 "description": "Lift Station",
 "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
},
{
 "id": "http://cityName#WastewaterPlant",
 "name": "Wastewater Plant",
 "description": "Wastewater Plant",
 "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
},
......
]
}
```

Example 2: Retrieve asset types by prefix

The example retrieves a list of asset types with prefix, http://cityName#, in JSON format. In the example, assume that the service uses the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types?prefix=<prefix>

The example uses the following method, URL, and Accept request-header:

- Method: GET
- Example URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types?prefix=http%3A%2F%2FcityName%23
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "AssetType": [{
  "id": "http://cityName#LiftStation",
  "name": "Lift Station",
  "description": "Lift Station",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 },
 {
  "id": "http://cityName#WastewaterPlant",
  "name": "Wastewater Plant",
  "description": "Wastewater Plant",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 },
 {
  "id": "http://cityName#CSODiversionStructure",
  "name": "CSO Diversion Structure",
  "description": "CSO Diversion Structure",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 },
 {
  "id": "http://cityName#Pipe",
  "name": "Pipe",
  "description": "Pipe",
  "parentId": "http://www.epanet.org#EPANET_Pipe"
 },
 {
```

```
  "id": "http://cityName#Junction",
  "name": "Junction",
  "description": "Junction",
  "parentId": "http://www.epanet.org#EPANET_Junction"
 },
 {
  "id": "http://cityName#TrunkLineMonitor",
  "name": "Trunk Line Monitor",
  "description": "Trunk Line Monitor",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 },
 {
  "id": "http://cityName#RiverGauge",
  "name": "River Gauge",
  "description": "River Gauge",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 },
 {
  "id": "http://cityName#RainGauge",
  "name": "Rain Gauge",
  "description": "Rain Gauge",
  "parentId": "http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"
 }]
}
```

Example 3: Retrieve asset type by id

The example retrieves a list of asset types of ID, http://cityName#WastewaterPlant, in XML format. In this example, assume that the service uses the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types?id=<id>

It uses the method, URL, and Accept header-request as follows:

- Method: GET
- Example URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/asset-types?id=http%3A%2F%2FcityName%23WastewaterPlant
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AssetTypeList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <AssetType>
  <id>http://cityName#WastewaterPlant</id>
  <name>Wastewater Plant</name>
  <description>Wastewater Plant</description>
  <parentId>http://www.ibm.com/water/wih#WIH_SensorMeter_Asset</parentId>
 </AssetType>
</AssetTypeList>
```

assets:

The `assets` resource retrieves a list of asset instances. The resource is an instance of the `RSM_WorkEquipment` subclass in the Reference Semantic Model (RSM). In the Water REST API, `assets` is one of the Model Access Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/model-service/assets?prefix=<prefix>&assetTypeId=<assetTypeId>&id=<id>
```

Request Body

Not applicable.

Response

A list of assets in XML or JSON format.

Resource Parameters

A query resource is represented by the following optional properties.

Optional Property	Description
prefix	The prefix of the asset; for example, http://cityName#.
id	The ID of the asset; for example, http://cityName#Pipe1336.
assetTypeId	The ID of the asset type; for example, http://cityName#Pipe

Examples

This section provides examples of how you can use the `asset` resource to retrieve a list of asset instances.

Sample Model

In the examples, you can assume that the model is imported to the model server. The model defines one instance of an asset type for a waste water plant.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
 xmlns:dm="http://iec.ch/2002/schema/CIM_difference_model#"
 xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:tns="http://cityName#"
 xml:base="http://cityName">

<tns:WastewaterPlant rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP">
<cim:RSM_IdentifiedObject.name>WWTP</cim:RSM_IdentifiedObject.name>
<cim:RSM_UnnamedObject.description>WWTP</cim:RSM_UnnamedObject.description>
</tns:WastewaterPlant>

<cim:RSM_GeoSpacial rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-Location">
<cim:RSM_IdentifiedObject.name>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_IdentifiedObject.name>
<cim:RSM_UnnamedObject.description>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_UnnamedObject.description>
<cim:RSM_GeoSpacial.InternalLocation>POINT(-86.268865 41.71947)
</cim:RSM_GeoSpacial.InternalLocation>
<cim:RSM_Location.providesLocationOf_PhysicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP" />
</cim:RSM_GeoSpacial>
</rdf:RDF>
```

Example 1: Retrieve all assets

This example retrieves a list of all assets in JSON format. Assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets.

Use the following method, URL, and default content type to get the response:

- Method: GET

- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets
- The default content-type is `application/json`.

In this example, the following JSON response occurs:

```
{
 "Asset": [{
  "id": "http://cityName#Junction878",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction878",
  "location": "POINT(-86.23678227774798 41.6726297008337)"
 },
 {
  "id": "http://cityName#Junction360",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction360",
  "location": "POINT(-86.25162264523162 41.6600355330907)"
 },
 {
  "id": "http://cityName#Pipe1336",
  "assetTypeId": "http://cityName#Pipe",
  "name": "Pipe1336",
  "location": "LINESTRING(-86.24302310908904 41.6870486413301,-86.24299651237408 41.6857306029503)"
 },
 ......
 ]
}
```

Example 2: Retrieve assets by prefix

This example retrieves a list of assets with the prefix, http://cityName#, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets?prefix=http%3A%2F%2FcityName%23
- The default content-type is `application/json`.

In this example, the following JSON response occurs:

```
{
 "Asset": [{
  "id": "http://cityName#Junction878",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction878",
  "location": "POINT(-86.23678227774798 41.6726297008337)"
 },
 {
  "id": "http://cityName#Junction360",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction360",
  "location": "POINT(-86.25162264523162 41.6600355330907)"
 },
 {
  "id": "http://cityName#Pipe1336",
  "assetTypeId": "http://cityName#Pipe",
  "name": "Pipe1336",
  "location": "LINESTRING(-86.24302310908904 41.6870486413301,-86.24299651237408 41.6857306029503)"
 },
 ......
 ]
}
```

Example 3: Retrieve assets by asset type

This example retrieves assets with the type, http://cityName#WastewaterPlant, in XML format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets?assetTypeId=http%3A%2F%2FcityName%23WastewaterPlant
- The default content-type is `application/xml`.

In this example, the following XML response occurs:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AssetList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <Asset>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</id>
  <assetTypeId>http://cityName#WastewaterPlant</assetTypeId>
  <name>WWTP</name>
  <description>WWTP</description>
  <location>POINT(-86.268865 41.71947)</location>
 </Asset>
</AssetList>
```

Example 4: Retrieve an asset by ID

This example retrieves an asset with the following ID, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets.

The example uses the following method, URL, and Accept header-request:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/assets?id=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP
- Accept: application/json.

In this example, you get the following JSON response:

```
{
 "Asset": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "assetTypeId": "http://cityName#WastewaterPlant",
  "name": "WWTP",
  "description": "WWTP",
  "location": "POINT(-86.268865 41.71947)"
 }]
}
```

measurements:

The `measurements` resource retrieves a list of measurements. The resource is an instance of `RSM_Measurement`. In the Water REST API, `measurements` is one of the Model Access Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/model-service/measurements?prefix=<prefix>&assetId=<assetId>& id=<id>
```

Request Body

Not applicable.

Response

A list of measurements in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Property	Description
prefix	The prefix of the asset; for example, the city prefix, http://cityName#.
id	The ID of the measurement; for example, the measurement ID, http://cityName#pipe1_measurement1.
assetId	The ID of an asset; for example, the asset ID, http://cityName#pipe1.

Examples

This section provides examples of how you can use the `measurement` resource.

Sample Model

In the examples, you can assume that the model is imported to the model server. The model defines several measurements for the asset, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:dm="http://iec.ch/2002/schema/CIM_difference_model#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#" xmlns:sb=http://cityName#
xml:base="http://cityName">
   <sb:WastewaterPlant rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP">
      <cim:RSM_IdentifiedObject.name>WWTP</cim:RSM_IdentifiedObject.name>
   <cim:RSM_UnnamedObject.description>WWTP</cim:RSM_UnnamedObject.description>
   </sb:WastewaterPlant>
   <cim:RSM_GeoSpacial rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-Location">
      <cim:RSM_IdentifiedObject.name>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_UnnamedObject.description>
      <cim:RSM_GeoSpacial.InternalLocation>41.71947,-86.268865</cim:RSM_GeoSpacial.InternalLocation>
      <cim:RSM_Location.providesLocationOf_PhysicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   </cim:RSM_GeoSpacial>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge">
      <cim:RSM_IdentifiedObject.name>WWTP-Rain-Gauge-WWTP-RainGuage</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Rain Level Indicator</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>Inches</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Is_Primary_Measurement_Of
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
```

```
   <cim:RSM_Measurement.Type>RainGauge</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge-MV.WWTP-Rain-Gauge">
      <cim:RSM_IdentifiedObject.name>WWTP-RainGuage</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>65##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS">
      <cim:RSM_IdentifiedObject.name>WWTP-RAS-RASFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Return Activated Sludge</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>GPM</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   <cim:RSM_Measurement.Type>RASFlowMeter</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS-MV.WWTP-RAS">
      <cim:RSM_IdentifiedObject.name>RASFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>17##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow">
      <cim:RSM_IdentifiedObject.name>WWTP-TotalFlow-TotalFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Total Flow</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>GPM</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   <cim:RSM_Measurement.Type>TotalFlowMeter</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow">
      <cim:RSM_IdentifiedObject.name>TotalFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>58##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather">
      <cim:RSM_IdentifiedObject.name>WWTP-WetWeather-WeatherIndicator</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>WWTP WetWeather Indicator</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Type>WetWeatherIndicator</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather-MV.WWTP-WetWeather">
      <cim:RSM_IdentifiedObject.name>WeatherIndicator</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>999994##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate">
      <cim:RSM_IdentifiedObject.name>WWTP-InfluentFlowRate</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>WWTP Influent Flow Rate</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Type>WastewaterPlantWWTPInfluentFlowRate</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate-MV.WWTP-InfluentFlowRate">
      <cim:RSM_IdentifiedObject.name>InfluentFlowRate</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>999999##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
```

```
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate"/>
   </cim:RSM_MeasurementValue>
   </rdf:RDF>
```

Example 1: Retrieve all measurements

The example retrieves all measurements in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements.

It uses the following method, URL, and default Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements
- Accept: application/json.

In this example, you get the JSON response:

```
{
 "Measurement": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.P-LiftStation-WE.P-LiftStation-M.P-Pump3-CRT",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.P-LiftStation-WE.P-LiftStation",
  "name": "P-Pump3-CRT-P-Pump3CRT",
  "description": "P Pump3 CRT",
  "type": "PumpCRT",
  "isPrimary": false
 },
 {
  "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO021-WE.CSO021-M.CSO021-Overflow_MTD",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO021-WE.CSO021",
  "name": "CSO021-Overflow_MTD-CSO021-OverflowVolMTD",
  "description": "CSO021",
  "unit": "MGallons",
  "type": "CSOOverflowVolMTD",
  "isPrimary": false
 },
 {
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "name": "WWTP-TotalFlow-TotalFlowMeter",
  "description": "Total Flow",
  "unit": "GPM",
  "type": "TotalFlowMeter",
  "isPrimary": false
 },
 ......
 ]
}
```

Example 2: Retrieve measurements by prefix

In this example, you want to retrieve measurements with the prefix, http://cityName#, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements.

Use the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements?prefix=http%3A%2F%2FcityName%23
- The Accept request-header is `application/json`.

In this example, you get the following JSON response:

```
{
 "Measurement": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.P-LiftStation-WE.P-LiftStation-M.P-Pump3-CRT",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.P-LiftStation-WE.P-LiftStation",
  "name": "P-Pump3-CRT-P-Pump3CRT",
  "description": "P Pump3 CRT",
  "type": "PumpCRT",
  "isPrimary": false
 },
 {
  "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO021-WE.CSO021-M.CSO021-Overflow_MTD",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO021-WE.CSO021",
  "name": "CSO021-Overflow_MTD-CSO021-OverflowVolMTD",
  "description": "CSO021",
  "unit": "MGallons",
  "type": "CSOOverflowVolMTD",
  "isPrimary": false
 },
 {
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "name": "WWTP-TotalFlow-TotalFlowMeter",
  "description": "Total Flow",
  "unit": "GPM",
  "type": "TotalFlowMeter",
  "isPrimary": false
 },
 ......
 ]
}
```

Example 3: Retrieve measurements by asset ID

In this example, you want to retrieve all measurements of asset, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP, in XML format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements?assetId=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP
- The default content-type is `application/xml`.

In this example, the following XML response occurs:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<MeasurementList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <Measurement>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow</id>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
  <name>WWTP-TotalFlow-TotalFlowMeter</name>
  <description>Total Flow</description>
  <unit>GPM</unit>
  <type>TotalFlowMeter</type>
  <isPrimary>false</isPrimary>
 </Measurement>
 <Measurement>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather</id>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
  <name>WWTP-WetWeather-WeatherIndicator</name>
  <description>WWTP WetWeather Indicator</description>
  <type>WetWeatherIndicator</type>
  <isPrimary>false</isPrimary>
 </Measurement>
```

```
 <Measurement>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge</id>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
  <name>WWTP-Rain-Gauge-WWTP-RainGuage</name>
  <description>Rain Level Indicator</description>
  <unit>Inches</unit>
  <type>RainGauge</type>
  <isPrimary>true</isPrimary>
 </Measurement>
 <Measurement>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS</id>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
  <name>WWTP-RAS-RASFlowMeter</name>
  <description>Return Activated Sludge</description>
  <unit>GPM</unit>
  <type>RASFlowMeter</type>
  <isPrimary>false</isPrimary>
 </Measurement>
 <Measurement>
  <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate</id>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
  <name>WWTP-InfluentFlowRate</name>
  <description>WWTP Influent Flow Rate</description>
  <type>WastewaterPlantWWTPInfluentFlowRate</type>
  <isPrimary>false</isPrimary>
 </Measurement>
</MeasurementList>
```

Example 4: Retrieve measurements by ID

In this example, you want to retrieve a measurement of ID, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurements?assetId=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP
- The default content-type is `application/json`.

In this example, the following JSON response occurs:

```
{
 "Measurement": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "name": "WWTP-TotalFlow-TotalFlowMeter",
  "description": "Total Flow",
  "unit": "GPM",
  "type": "TotalFlowMeter",
  "isPrimary": false
 }]
}
```

measurement-values:

The `measurement-values` resource retrieves a list of measurement values. The resource is an instance of `RSM_MeasurementValue`. In the Water REST API, `measurement-values` is one of the Model Access Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/model-service/measurements-values?prefix=<prefix>&assetId=<assetId>& id=<id>
```

Request Body

Not applicable.

Response

A list of measurement values in XML or JSON format.

Resource Parameters

The resource has the following optional parameters:

Optional Parameter	Description
prefix	The prefix of the asset; for example, the city name prefix, http://cityName#.
id	The ID of the measurement value; for example, the asset ID, http://cityName#pipe1_m1_v1.
assetId	The ID of an asset; for example, http://cityName#pipe1
measurementId	The ID of a measurement; for example, the measurement ID, http://cityName#pip1-m1.

Examples

The following examples demonstrate how you can use the `measurement-values` resource.

Sample Model

In the examples, you can assume that the model is imported to the model server. The model defines several measurements for the asset, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:dm="http://iec.ch/2002/schema/CIM_difference_model#"
 xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:sb=http://cityName# xml:base="http://cityName">
   <sb:WastewaterPlant rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP">
      <cim:RSM_IdentifiedObject.name>WWTP</cim:RSM_IdentifiedObject.name>
   <cim:RSM_UnnamedObject.description>WWTP</cim:RSM_UnnamedObject.description>
   </sb:WastewaterPlant>
   <cim:RSM_GeoSpacial rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-Location">
      <cim:RSM_IdentifiedObject.name>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>CityName:AREA.CityName:UNIT.WWTP:WE.WWTPLocation
</cim:RSM_UnnamedObject.description>
      <cim:RSM_GeoSpacial.InternalLocation>41.71947,-86.268865</cim:RSM_GeoSpacial.InternalLocation>
      <cim:RSM_Location.providesLocationOf_PhysicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   </cim:RSM_GeoSpacial>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge">
```

```
      <cim:RSM_IdentifiedObject.name>WWTP-Rain-Gauge-WWTP-RainGuage</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Rain Level Indicator</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>Inches</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Is_Primary_Measurement_Of
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   <cim:RSM_Measurement.Type>RainGauge</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge-MV.WWTP-Rain-Gauge">
      <cim:RSM_IdentifiedObject.name>WWTP-RainGuage</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>65##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS">
      <cim:RSM_IdentifiedObject.name>WWTP-RAS-RASFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Return Activated Sludge</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>GPM</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   <cim:RSM_Measurement.Type>RASFlowMeter</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS-MV.WWTP-RAS">
      <cim:RSM_IdentifiedObject.name>RASFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>17##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow">
      <cim:RSM_IdentifiedObject.name>WWTP-TotalFlow-TotalFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>Total Flow</cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.UOM>GPM</cim:RSM_Measurement.UOM>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
   <cim:RSM_Measurement.Type>TotalFlowMeter</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow">
      <cim:RSM_IdentifiedObject.name>TotalFlowMeter</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>58##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather">
      <cim:RSM_IdentifiedObject.name>WWTP-WetWeather-WeatherIndicator
        </cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.description>WWTP WetWeather Indicator
        </cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Type>WetWeatherIndicator</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather-MV.WWTP-WetWeather">
      <cim:RSM_IdentifiedObject.name>WeatherIndicator</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>999994##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather"/>
   </cim:RSM_MeasurementValue>

   <cim:RSM_Measurement rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate">
      <cim:RSM_IdentifiedObject.name>WWTP-InfluentFlowRate</cim:RSM_IdentifiedObject.name>
```

```
      <cim:RSM_UnnamedObject.description>WWTP Influent Flow Rate
        </cim:RSM_UnnamedObject.description>
      <cim:RSM_Measurement.associatedTo_physicalEntity
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP"/>
      <cim:RSM_Measurement.Type>WastewaterPlantWWTPInfluentFlowRate</cim:RSM_Measurement.Type>
   </cim:RSM_Measurement>
   <cim:RSM_MeasurementValue
rdf:ID="CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate-MV.WWTP-InfluentFlowRate">
      <cim:RSM_IdentifiedObject.name>InfluentFlowRate</cim:RSM_IdentifiedObject.name>
      <cim:RSM_UnnamedObject.alias>999999##TBLFLOAT_RT##Val</cim:RSM_UnnamedObject.alias>
      <cim:RSM_MeasurementValue.IsA_Measurement
rdf:resource="#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-InfluentFlowRate"/>
   </cim:RSM_MeasurementValue>
   </rdf:RDF>
```

Example 1: Retrieve all measurement values

In this example, you want to retrieve all measurement values in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values
- Accept: application/json

In the example, you get the following JSON response:

```
{
 "MeasurementValue": [{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation-M.B-Pump4-CRT-
MV.B-Pump4-CRT",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation-M.B-
Pump4-CRT",
 "name": "B-Pump4CRT",
 "alias": "48##TBLFLOAT_RT##Val"
},
{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037-M.CSO037-MV.CSO037",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037-M.CSO037",
 "name": "CSO037LevelIndicator",
 "alias": "21805-2##TBLFLOAT_RT##Val"
},
{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022-M.CSO022-Overflow-MV.CSO022
   -Overflow",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022-M.CSO022-Overflow",
 "name": "CSO022-OverflowVol",
 "alias": "19107-O##TBLFLOAT_RT##Val"
}
......
]
}
```

Example 2: Retrieve measurement values by prefix

In this example, you want to retrieve measurement values with the prefix, http://cityName#, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values.

Use the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values?prefix=http%3A%2F%2FcityName%23
- Accept: application/json

In this example, the following JSON response occurs:

```
{
"MeasurementValue": [{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation-M.B-Pump4-CRT-
MV.B-Pump4-CRT",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.B-LiftStation-WE.B-LiftStation-M.B-
Pump4-CRT",
 "name": "B-Pump4CRT",
 "alias": "48##TBLFLOAT_RT##Val"
},
{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037-M.CSO037-MV.CSO037",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.CSO037-WE.CSO037-M.CSO037",
 "name": "CSO037LevelIndicator",
 "alias": "21805-2##TBLFLOAT_RT##Val"
},
{
 "id": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022-M.CSO022-Overflow-
MV.CSO022-Overflow",
 "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022",
 "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.CSO022-WE.CSO022-M.CSO022-Overflow",
 "name": "CSO022-OverflowVol",
 "alias": "19107-O##TBLFLOAT_RT##Val"
}
......
]
}
```

Example 3: Retrieve measurements by asset ID

In this example, you want to retrieve all measurement values of asset ID, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP, in XML format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values.

Use the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values?assetId=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
 <MeasurementValueList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <MeasurementValue>
 <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow</id>
 <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
 <measurementId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow</measurementId>
 <name>TotalFlowMeter</name>
 <alias>58##TBLFLOAT_RT##Val</alias>
 </MeasurementValue>
 <MeasurementValue>
 <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather-MV.WWTP-WetWeather</id>
```

```
 <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
 <measurementId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-WetWeather</measurementId>
 <name>WeatherIndicator</name>
 <alias>999994##TBLFLOAT_RT##Val</alias>
 </MeasurementValue>
 <MeasurementValue>
 <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge-MV.WWTP-Rain-Gauge</id>
 <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
 <measurementId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-Rain-Gauge</measurementId>
 <name>WWTP-RainGuage</name>
 <alias>65##TBLFLOAT_RT##Val</alias>
 </MeasurementValue>
 <MeasurementValue>
 <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS-MV.WWTP-RAS</id>
 <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
 <measurementId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-RAS</measurementId>
 <name>RASFlowMeter</name>
 <alias>17##TBLFLOAT_RT##Val</alias>
 </MeasurementValue>
 <MeasurementValue>
 <id>http://cityName#CityName-AREA.CityName-UNIT.WWTP-
WE.WWTP-M.WWTP-InfluentFlowRate-MV.WWTP-InfluentFlowRate</id>
 <assetId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP</assetId>
<measurementId>http://cityName#CityName-AREA.CityName-UNIT.WWTP-
WE.WWTP-M.WWTP-InfluentFlowRate</measurementId>
<name>InfluentFlowRate</name>
<alias>999999##TBLFLOAT_RT##Val</alias>
</MeasurementValue>
</MeasurementValueList>
```

Example 4: Retrieve measurements values by measurement ID

The example retrieves measurement values of measurement ID, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values?measurementId=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "MeasurementValue": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow",
  "name": "TotalFlowMeter",
  "alias": "58##TBLFLOAT_RT##Val"
 }]
}
```

Example 5: Retrieve measurement values by ID

In this example, you want to retrieve a measurement of ID, http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow, in JSON format. You can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values.

Use the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/measurement-values?id=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "MeasurementValue": [{
  "id": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow-MV.WWTP-TotalFlow",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP",
  "measurementId": "http://cityName#CityName-AREA.CityName-UNIT.WWTP-WE.WWTP-M.WWTP-TotalFlow",
  "name": "TotalFlowMeter",
  "alias": "58##TBLFLOAT_RT##Val"
 }]
}
```

connected-assets:

The `connected-assets` resource retrieves a list of connected assets. The resource is described in the model using `RSM_WorkEquipment.connected_WorkEquipment`. In the Water REST API, `connected-assets` is one of the Model Access Service resources.

The relationship between connected-assets and connects-assets

The resources `connected-assets` and `connects-assets` are inverse to one other. For example, suppose your infrastructure has pipeline assets called A and B. If A connects to B, in this case the `connected-assets` of A is B. Inversely, the `connects-assets` of B is A. The resources represent the following relationship in the Reference Semantic Model (RSM): `RSM_WorkEquipment.connected_WorkEquipment` and `RSM_WorkEquipment.connects_WorkEquipment`.

Method

GET.

Resource URI

`ibm/water/api/model-service/connected-assets?id=<id>`

Request Body

Not applicable.

Response

A list of assets in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
id	The ID of the asset; for example, the pipe ID, http://cityName#pipe1.

Example: Retrieve connected assets

This section provides an example of how you can use the `connected-assets` resource. The example retrieves a list of assets that are connected by the ID, http://cityName#Junction700, in JSON format.

Sample Model

In the example, you can assume that the model is imported to the model server. The model defines that the asset `Pipe1000` is connected to the assets `Junction699` and `Junction700`. The following sample model also indicates that `Junction700` is connected by `Pipe1000`.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:tns="http://cityName#" xml:base="http://cityName">
<tns:Pipe rdf:ID="Pipe1000">
<cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction700" />
<cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction699" />
</tns:Pipe>
</rdf:RDF>
```

In the example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connected-assets.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connected-assets?id=http%3A%2F%2FcityName%23Junction700
- Accept: application/json

In the example, you get the following JSON response:

```
{
"Asset": [{
"id": "http://cityName#Pipe1000",
"assetTypeId": "http://cityName#Pipe",
"name": "Pipe1000",
"location":
"LINESTRING(-86.24601906033934 41.6883641803688,-86.24596386291452 41.6870366835013)"
 }
 ]
}
```

connects-assets:

The `connects-assets` resource retrieves a list of assets that connect to a specific asset. The resource is described in the model using `RSM_WorkEquipment.connects_WorkEquipment`. In the Water REST API, `connects-assets` is one of the Model Access Service resources.

The relationship between connects-assets and connected-assets

The resources `connects-assets` and `connected-assets` are inverse to one other. For example, suppose your infrastructure has pipeline assets called A and B. If A connects to B, in this case the `connected-assets` of A is B. Inversely, the `connects-assets` of B is A. The resources represent the following relationship in the Reference Semantic Model (RSM): `RSM_WorkEquipment.connected_WorkEquipment` and `RSM_WorkEquipment.connects_WorkEquipment`.

Resource URI

`/ibm/water/api/model-service/connects-assets?id=<id>`

Request Body

Not applicable.

Response

The response is a list of assets in XML or JSON format.

Resource Parameters

The resource has the following property.

Parameter	Description
id	The ID of the asset; for example, http://cityName#pipe1.

Example: Retrieve connects assets

This section provides an example of how you can use the `connects-assets` resource. The example retrieves a list of assets that connect to the specific asset, http://cityName#Pipe1000, in JSON format.

Sample Model

In the example, you can assume that the model is imported to the model server. The model defines that `Pipe1000` is connected to `Junction699` and `Junction700`.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:cim="http://iec.ch/TC57/CIM-generic#"
 xmlns:tns="http://cityName#" xml:base="http://cityName">
 <tns:Pipe rdf:ID="Pipe1000">
  <cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction700" />
  <cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction699" />
 </tns:Pipe>
</rdf:RDF>
```

In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connects-assets.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connects-assets?id=http%3A%2F%2FcityName%23Pipe1000
- The default content-type is `application/json`.

In this example, the following JSON response occurs:

```
{
 "Asset": [{
  "id": "http://cityName#Junction699",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction699",
  "location": "POINT(-86.24596386291452 41.6870366835013)"
 },
 {
  "id": "http://cityName#Junction700",
  "assetTypeId": "http://cityName#Junction",
```

```
  "name": "Junction700",
  "location": "POINT(-86.24601906033934 41.6883641803688)"
 }]
}
```

physical-connected-assets:

The `physical-connected-assets` resource retrieves a list of assets that are physically connected to specified asset. The resource, as described in the model, uses RSM connection nodes and connection points.

Resource URI

`/ibm/water/api/model-service/physical-connected-assets?id=<id>`

Request Body

Not applicable.

Response

The response is a list of assets in XML or JSON format.

Resource Parameter

The resource has the following property.

Parameter	Description
id	The ID of the asset; for example, http://cityName#pipe1.

Example: Retrieve physical connects assets

The following example demonstrates how to use the `physical-connected-assets` resource. The example model retrieves a list of assets that are connected by the pipe ID, http://cityName#Pipe849, in JSON format.

Sample Model

In the example, you can assume that the model is imported to the model server. The model defines that `Pipe849` is physically connected to `Junction408` and `Junction419`. The physical connections have no direction, so the model also indicates that `Junction408` and `Junction419` are physically connected to `Pipe849`. The sample model is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
<!-- a Line from Pipe849 to Junction408 - START -->
<cim:RSM_ConnectionPoint rdf:ID="Pipe849_CPoint1">
<cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Pipe849"/>
<cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe849_Junction408_CNode"/>
</cim:RSM_ConnectionPoint>
<cim:ISO15926_ConnectionNode rdf:ID="Pipe849_Junction408_CNode">
</cim:ISO15926_ConnectionNode>
<cim:RSM_ConnectionPoint rdf:ID="Junction408_CPoint3">
<cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Junction408"/>
<cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe849_Junction408_CNode"/>
</cim:RSM_ConnectionPoint>
<!-- a Line from Pipe849 to Junction408 - END -->
<!-- a Line from Pipe849 to Junction419 - START -->
<cim:RSM_ConnectionPoint rdf:ID="Pipe849_CPoint2">
<cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Pipe849"/>
```

```
<cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe849_Junction419_CNode"/>
</cim:RSM_ConnectionPoint>
<cim:ISO15926_ConnectionNode rdf:ID="Pipe849_Junction419_CNode">
</cim:ISO15926_ConnectionNode>
<cim:RSM_ConnectionPoint rdf:ID="Junction419_CPoint1">
<cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Junction419"/>
<cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe849_Junction419_CNode"/>
</cim:RSM_ConnectionPoint>
<!-- a Line from Pipe849 to Junction419 - END -->
</rdf:RDF>
```

In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/physical-connected-assets.

Use the following method, URL, and default content-type to get the response:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/physical-connected-assets?id=http%3A%2F%2FcityName%23Pipe849
- Default content-type: application/json.

In this example, the following JSON response occurs:

```
{
 "Asset": [{
  "id": "http://cityName#Junction419",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction419",
  "location": "POINT(-86.23816331614161 41.6582141986323)"
 },
 {
  "id": "http://cityName#Junction408",
  "assetTypeId": "http://cityName#Junction",
  "name": "Junction408",
  "location": "POINT(-86.23932975803322 41.6581465539612)"
 }]
}
```

contained-assets:

The `contained-assets` resource retrieves a list of assets where the specified asset is contained by the model.The resource, as described in the model, uses RSM_WorkEquipment.ContainedBy_Equipment.

Method

GET.

Resource URI

`/ibm/water/api/model-service/contained-assets?id=<id>`

Request Body

Not applicable.

Response

The response is a list of assets in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
id	The ID of the asset; for example, the pipe ID, http://cityName#pipe1.

Example: Retrieve contained assets

The following example demonstrates how to use the `contained-assets` resource. The example model retrieves a list of assets where the following specified asset, http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation, is contained by the model in JSON format.

Sample Model

In the example, you can assume that the model is imported to the model server. The model contains relationship between pipes and sensors.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:tns="http://cityName#" xml:base="http://cityName">
 <tns:Pipe rdf:ID="Pipe588">
  <cim:RSM_WorkEquipment.Contains_Equipment
   rdf:resource="#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation" />
 </tns:Pipe>
 <tns:RainGauge
  rdf:ID="CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation">
  <cim:RSM_WorkEquipment.ContainedBy_Equipment
   rdf:resource="#Pipe588" />
 </tns:RainGauge>
</rdf:RDF>
```

In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contained-assets. It uses the following method, URL and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contained-assets?id=http%3A%2F%2FcityName%23CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation
- Accept: application/json.

In this example, you get the following JSON response:

```
{
 "Asset": [{
  "id": "http://cityName#Pipe588",
  "assetTypeId": "http://cityName#Pipe",
  "name": "Pipe588",
  "location": "LINESTRING(-86.25036834194756 41.676400581511,-86.25034702004082 41.6750618109485)"
 }]
}
```

contains-assets:

The `contains-assets` resource retrieves a list of assets that a specific asset contains. The resource is a subclass of `RSM_WorkEquipment.Contains_Equipment`. In the Water REST API, `contains-assets` is one of the Model Access Service resources.

Method

GET.

Resource URI

`/ibm/water/api/model-service/contains-assets?id=<id>`

Request Body

Not applicable.

Response

The response is a list of contain relationships in XML or JSON format.

Resource Parameters

The resource has the following property:

Parameter	Description
id	The ID of the asset; for example, the pipe ID, http://cityName#pipe1.

Example: Retrieve contained assets

The following example demonstrates how to use the `contains-assets` resource. The example retrieves a list of assets with the specified ID, http://cityName#Pipe588, in XML format.

Sample Model

In the example, you can assume that the model is imported to the model server. The model contains the relationship between pipes and sensors. The sample model is as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:tns="http://cityName#" xml:base="http://cityName">
 <tns:Pipe rdf:ID="Pipe588">
  <cim:RSM_WorkEquipment.Contains_Equipment
   rdf:resource="#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation" />
 </tns:Pipe>
 <tns:RainGauge
  rdf:ID="CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation">
  <cim:RSM_WorkEquipment.ContainedBy_Equipment
   rdf:resource="#Pipe588" />
 </tns:RainGauge>
</rdf:RDF>
```

In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains-assets.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains-assets?id=http%3A%2F%2FcityName%23Pipe588
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<AssetList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <Asset>
  <id>http://cityName#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation</id>
  <assetTypeId>http://cityName#LiftStation</assetTypeId>
  <name>M-LiftStation</name>
  <description>M-LiftStation</description>
  <location>POINT(-86.25033 41.68629)</location>
 </Asset>
 <Asset>
  <id>http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation</id>
  <assetTypeId>http://cityName#RainGauge</assetTypeId>
  <name>I-LiftStation</name>
  <description>I-LiftStation</description>
  <location>POINT(-86.215158 41.63698)</location>
 </Asset>
</AssetList>
```

connections:

The `connections` resource retrieves a list of objects that describe assets connection relationships. In the Water REST API, `connections` is one of the Model Access Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/model-service/connections?prefix=<prefix>
```

Request Body

Not applicable.

Response

The response is a list of connection relationships in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
prefix	The prefix of the asset; for example, the city name prefix, http://cityName#.

Examples

The following examples demonstrate how to use the `connections` resource.

Sample Model

In the example, you can assume that the model is imported to the model server. The model contains relationship between pipes and junctions.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:cim="http://iec.ch/TC57/CIM-generic#" xmlns:tns="http://cityName#" xml:base="http://cityName">
```

```
    <tns:Pipe rdf:ID="Pipe588">
        <cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction265"/>
        <cim:RSM_WorkEquipment.connects_WorkEquipment rdf:resource="#Junction268"/>
    </tns:Pipe>
<rdf:RDFf>
```

Example 1: Retrieve all connection relationships

The example retrieves a list of connection relationships defined in model in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connections.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connections
- Accept: application/json.

In this example, you get the following JSON response:

```
{
 "Connection": [
......
 {
  "sourceId": "http://cityName#Pipe588",
  "targetId": "http://cityName#Junction268"
 },
......
 {
  "sourceId": "http://cityName#Pipe588",
  "targetId": "http://cityName#Junction265"
 },
......
 ]
}
```

Example 2: Retrieve connection relationships by prefix

The example retrieves a list of connection relationships of prefix, http://cityName#, in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connections.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/connections?prefix=http%3A%2F%2FcityName%23
- Accept: application/xml.

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ConnectionList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 ......
 <Connection>
  <sourceId>http://cityName#Pipe588</sourceId>
  <targetId>http://cityName#Junction268</targetId>
 </Connection>
 ......
 <Connection>
  <sourceId>http://cityName#Pipe588</sourceId>
```

```
  <targetId>http://cityName#Junction265</targetId>
 </Connection>
 ......
</ConnectionList>
```

contains:

The `contains` resource retrieves a list of objects that describe contain relationships for assets. In the Water REST API, `contains` is one of the Model Access Service resources.

Method

GET.

Resource URI

`/ibm/water/api/model-service/contains?prefix=<prefix>`

Request Body

Not applicable.

Response

The response is a list of contain relationships in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
prefix	The prefix of the asset; for example, the city prefix, http://cityName#pipe1.

Examples

The following example demonstrates how to use the `contains-assets` resource.

Sample Model

In the example, you can assume that the model is imported to the model server. The model defines the contains relationships between pipes and junctions.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#"
xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
 xmlns:tns="http://cityName#" xml:base="http://cityName">
 <tns:Pipe rdf:ID="Pipe588">
  <cim:RSM_WorkEquipment.Contains_Equipment
   rdf:resource="#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation" />
 </tns:Pipe>
 <tns:RainGauge
  rdf:ID="CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation">
  <cim:RSM_WorkEquipment.ContainedBy_Equipment
   rdf:resource="#Pipe588" />
 </tns:RainGauge>
</rdf:RDF>
```

Example 1: Retrieve all contain relationships

The example model retrieves a list of all contain relationships that are defined in model in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains-assets.

It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "Contain": [{
  "container": "http://cityName#Pipe588",
  "containee": "http://cityName#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation"
 },
 {
  "container": "http://cityName#Pipe588",
  "containee": "http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation"
 }]
}
```

Example 2: Retrieve contain relationships by prefix

The example model retrieves a list of contain relationships with the prefix, http://cityName#, in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains.

It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/model-service/contains?prefix=http%3A%2F%2FcityName%23
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ContainList xmlns="http://www.ibm.com/iss/iow/services/contextualmodel">
 <Contain>
  <container>http://cityName#Pipe588</container>
  <containee>http://cityName#CityName-AREA.CityName-UNIT.M-LiftStation-WE.M-LiftStation</containee>
 </Contain>
 <Contain>
  <container>http://cityName#Pipe588</container>
  <containee>http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation</containee>
 </Contain>
</ContainList>
```

Reading Service resources

Reading Service resources are used to access reading values. Using the resources, you can query historical values and get real-time reading values from specified filters.

realtime:

The `realtime` resource retrieves a list of real-time reading values. In the Water REST API, `realtime` is one of the Reading Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/reading-service/realtime?prefix=<prefix>&alias=<alias>
&measurementValueId=<measurementValueId>&measurementId=<measurementId>
&assetId=<assetId>&assetTypeId=<assetTypeId>&since=<since>
```

Request Body

Not applicable.

Response

The response is a list of reading objects in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
prefix	The prefix of the measurement value; for example, http://cityName#.
alias	The alias of the measurement value.
measurementValueId	The ID of the measurement value.
measurementId	The ID of the measurement.
assetId	The ID of the asset.
assetTypeId	The ID of asset type.
since	The property that is used to get a changed reading value in a specified timestamp. For example, the number of milliseconds since January 1, 1970, 00:00:00 GMT.

Examples

The following examples demonstrate how to use the `realtime` resource.

Example 1: Retrieve all real-time reading value of a specified prefix

The example model retrieves a list of real-time readings with the prefix, http://cityName#, in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime.

It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime?prefix=http%3A%2F%2FcityName%23
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "timestamp": 1359037036432,
 "Reading": [{
```

```
  "assetTypeId": "http://cityName#CSODiversionStructure",
  "assetTypeName": "CSO Diversion Structure",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO026-WE.CSO026",
  "assetName": "CSO026",
  "measurementId": "http://cityName#CityName-AREA.CityName-
UNIT.CSO026-WE.CSO026-M.CSO026-Overflow_YTD",
  "measurementName": "CSO026-Overflow_YTD-CSO026-OverflowVolYTD",
  "measurementType": "CSOOverflowVolYTD",
  "measurementUOM": "MGallons",
  "measurementValueId": "http://cityName#CityName-
AREA.CityName-UNIT.CSO026-WE.CSO026-M.CSO026-Overflow_YTD-MV.CSO026-Overflow_YTD",
  "measurementValueName": "CSO026-OverflowVolYTD",
  "alias": "29639-O##SB_YTD_V##Val",
  "value": "1.0",
  "timestamp": 1359037036432,
  "threshold": "0",
  "trending": "0",
  "recordtime": 1359037036432
 },
 {
  "assetTypeId": "http://cityName#CSODiversionStructure",
  "assetTypeName": "CSO Diversion Structure",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO004-WE.CSO004",
  "assetName": "CSO004",
  "measurementId":
"http://cityName#CityName-AREA.CityName-UNIT.CSO004-WE.CSO004-M.CSO004-Overflow",
  "measurementName": "CSO004-Overflow-CSO004-OverflowVol",
  "measurementType": "CSOOverflowVol",
  "measurementUOM": "MGallons",
  "measurementValueId":
"http://cityName#CityName-AREA.CityName-
UNIT.CSO004-WE.CSO004-M.CSO004-Overflow-MV.CSO004-Overflow",
  "measurementValueName": "CSO004-OverflowVol",
  "alias": "33957-O##TBLFLOAT_RT##Val",
  "value": "1.0",
  "timestamp": 1359037036432,
  "threshold": "0",
  "trending": "0",
  "recordtime": 1359037036432
 },
......
]
}
```

Example 2: Retrieve the real-time reading value of a specified asset

The example model retrieves a list of readings of the asset, http://cityName#CityName-AREA.CityName-UNIT.CSO003, in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime.

It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime ?assetId=http%3A%2F %2FcityName%23CityName-AREA.CityName-UNIT.CSO003-WE.CSO003
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ReadingList xmlns="http://www.ibm.com/iss/iow/services/readings">
 <Reading>
  <assetTypeId>http://cityName#CSODiversionStructure</assetTypeId>
  <assetTypeName>CSO Diversion Structure</assetTypeName>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003</assetId>
```

```
  <assetName>CSO003</assetName>
  <measurementId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003-Overflow-Rate</measurementId>
  <measurementName>CSO003-Overflow-Rate-CSO003-OverflowRate</measurementName>
  <measurementType>CSOOverflowRate</measurementType>
  <measurementUOM>GPM</measurementUOM>
  <measurementValueId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003-Overflow-Rate-MV.CSO003-Overflow-Rate
</measurementValueId>
  <measurementValueName>CSO003-OverflowRate</measurementValueName>
  <alias>19892-R##TBLFLOAT_RT##Val</alias>
  <value>1.0</value>
  <timestamp>1359037036432</timestamp>
  <threshold>0</threshold>
  <trending>0</trending>
  <recordtime>1359037036432</recordtime>
 </Reading>
 ......
 <timestamp>1359037036432</timestamp>
</ReadingList>
```

Example 3: Retrieve changed real-time reading values

The example model retrieves a list of changed reading values after the timestamp 1356290811000 in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime.

It uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/realtime ?since=1356290811000
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<ReadingList xmlns="http://www.ibm.com/iss/iow/services/readings">
 <Reading>
  <assetTypeId>http://cityName#CSODiversionStructure</assetTypeId>
  <assetTypeName>CSO Diversion Structure</assetTypeName>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003</assetId>
  <assetName>CSO003</assetName>
  <measurementId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003-Overflow-Rate</measurementId>
  <measurementName>CSO003-Overflow-Rate-CSO003-OverflowRate</measurementName>
  <measurementType>CSOOverflowRate</measurementType>
  <measurementUOM>GPM</measurementUOM>
  <measurementValueId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003-Overflow-Rate-MV.CSO003-Overflow-Rate</measurementValueId>
  <measurementValueName>CSO003-OverflowRate</measurementValueName>
  <alias>19892-R##TBLFLOAT_RT##Val</alias>
  <value>1.0</value>
  <timestamp>1359037036432</timestamp>
  <threshold>0</threshold>
  <trending>0</trending>
  <recordtime>1359037036432</recordtime>
 </Reading>
 ......
 <timestamp>1359037036432</timestamp>
</ReadingList>
```

historical:

The `historical` resource retrieves a list of historical reading values. In the Water REST API, `historical` is one of the Reading Service resources.

Method

GET.

Resource URI

```
/ibm/water/api/reading-service/historical?prefix=<prefix>&alias=<alias>
&measurementValueId=<measurementValueId>&measurementId=<measurementId>
&assetId=<assetId>&assetTypeId=<assetTypeId>&from=<from>&to=<to>
```

Request Body

Not applicable.

Response

The response is a list of reading objects in XML or JSON format.

Resource Parameters

The resource has the following optional properties.

Optional Property	Description
prefix	The prefix of the measurement value; for example, http://cityName#.
alias	The alias of the measurement value.
measurementValueId	The ID of the measurement value.
measurementId	The ID of the measurement.
assetId	The ID of the asset.
assetTypeId	The ID of asset type.
from	The timestamp that is used to specify the start time in a reading value. For example, the number of milliseconds since January 1, 1970, 00:00:00 GMT.
to	The timestamp that is used to specify the end time in a reading value. For example, the number of milliseconds since February 1, 1970, 00:00:00 GMT.

Examples

The following examples demonstrate how to use the `historical` resource.

Example 1: Retrieve all historical reading values of specified measurement value

The example model retrieves a list of historical reading values with the measurement value alias, 11210##TBLFLOAT_RT##Val, in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/historical.

The example uses the following method, URL, and Accept request-header:

- Method: GET

- URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/historical?alias=11210%23%23TBLFLOAT_RT%23%23Val
- Accept: application/xml

In this example, you get the following XML response:

```
<ReadingList xmlns="http://www.ibm.com/iss/iow/services/readings">
 <Reading>
  <assetTypeId>http://cityName#CSODiversionStructure</assetTypeId>
  <assetTypeName>CSO Diversion Structure</assetTypeName>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003</assetId>
  <assetName>CSO003</assetName>
  <measurementId>http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2</measurementId>
  <measurementName>CSO003_C.3b.2-CSO003CLevelIndicator</measurementName>
  <measurementType>CSOLevelIndicator</measurementType>
  <measurementUOM>Feet</measurementUOM>
  <measurementValueId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2-MV.CSO003_C.3b.2</measurementValueId>
  <measurementValueName>CSO003CLevelIndicator</measurementValueName>
  <alias>11210##TBLFLOAT_RT##Val</alias>
  <value>3.0</value>
  <timestamp>1355465514199</timestamp>
  <recordtime>1355418714340</recordtime>
 </Reading>
 <Reading>
  <assetTypeId>http://cityName#CSODiversionStructure</assetTypeId>
  <assetTypeName>CSO Diversion Structure</assetTypeName>
  <assetId>http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003</assetId>
  <assetName>CSO003</assetName>
  <measurementId>http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2</measurementId>
  <measurementName>CSO003_C.3b.2-CSO003CLevelIndicator</measurementName>
  <measurementType>CSOLevelIndicator</measurementType>
  <measurementUOM>Feet</measurementUOM>
  <measurementValueId>
http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2-MV.CSO003_C.3b.2</measurementValueId>
  <measurementValueName>CSO003CLevelIndicator</measurementValueName>
  <alias>11210##TBLFLOAT_RT##Val</alias>
  <value>3.0</value>
  <timestamp>1355465514521</timestamp>
  <recordtime>1355418714512</recordtime>
 </Reading>
                  ......
 <timestamp>1358911855750</timestamp>
</ReadingList>
```

Example 2: Retrieve the historical reading value in a specified time interval

The example model retrieves a list of historical reading values with the measurement value alias, 11210##TBLFLOAT_RT##Val, between the timestamps 1355418714340 and 1355418714512 in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/historical.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/reading-service/historical?alias=11210%23%23TBLFLOAT_RT%23%23Val&from=1355465514199&to=1355465514521
- Accept: application/json

In this example, you get the following JSON response:

```
{
 "timestamp": 1355465514521,
 "Reading": [{
  "assetTypeId": "http://cityName#CSODiversionStructure",
  "assetTypeName": "CSO Diversion Structure",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003",
  "assetName": "CSO003",
  "measurementId": "http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2",
  "measurementName": "CSO003_C.3b.2-CSO003CLevelIndicator",
  "measurementType": "CSOLevelIndicator",
  "measurementUOM": "Feet",
  "measurementValueId":
"http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2-MV.CSO003_C.3b.2",
  "measurementValueName": "CSO003CLevelIndicator",
  "alias": "11210##TBLFLOAT_RT##Val",
  "value": "3.0",
  "timestamp": 1355465514199,
  "recordtime": 1355418714340
 },
 {
  "assetTypeId": "http://cityName#CSODiversionStructure",
  "assetTypeName": "CSO Diversion Structure",
  "assetId": "http://cityName#CityName-AREA.CityName-UNIT.CSO003-WE.CSO003",
  "assetName": "CSO003",
  "measurementId": "http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2",
  "measurementName": "CSO003_C.3b.2-CSO003CLevelIndicator",
  "measurementType": "CSOLevelIndicator",
  "measurementUOM": "Feet",
  "measurementValueId":
"http://cityName#CityName-AREA.CityName-
UNIT.CSO003-WE.CSO003-M.CSO003_C.3b.2-MV.CSO003_C.3b.2",
  "measurementValueName": "CSO003CLevelIndicator",
  "alias": "11210##TBLFLOAT_RT##Val",
  "value": "3.0",
  "timestamp": 1355465514521,
  "recordtime": 1355418714512
 }]
}
```

Render Service resources

The Render Service resources is used to manage map layers and to create, update, and retrieve features in those layers. For example, after you create a pipeline layer, you can add lines or points as features to the layer.

layers:

The `layers` resource is used to retrieve, create, update, and delete layers. In the Water REST API, `layers` is one of the Render Service resources.

Using GET to retrieve layers:

The HTTP GET request method is used to retrieve information from a server. In the Water API, you can use GET with the Render Service resource, `layers`, to retrieve map layers in a comprehensive list or by name.

Method

GET.

Resource URI

`/ibm/water/api/render-service/layers?layerName=<layerName>`

Request Body

Not applicable.

Response

The response is a list of layer objects in XML or JSON format.

Resource Parameters

The resource has the following optional property.

Optional Property	Description
layerName	The name of the layer; for example, pipelinelayer.

Examples

The following examples demonstrate how to retrieve map layers by using the GET method with the `layers` resource.

Example 1: Retrieve layers by name

The example model retrieves an existing layer by its name in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers?layerName=test
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<layers xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
 <layer>
  <name>test</name>
  <description>test</description>
  <zIndex>3</zIndex>
  <style>{fillColor:&quot;blue&quot;,strokeColor:&quot;blue&quot;,pointRadius:1}
  </style>
 </layer>
</layers>
```

Example 2: Retrieve all layers

The example model retrieve a list of layers defined in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers

- Accept: application/json

In this example, you get the following JSON response:

```
{
 "layer": [{
  "name": "Pipeline Layer",
  "description": "pipeline layer",
  "style": "{fillColor:\"blue\",strokeColor:\"blue\",pointRadius:1}",
  "zIndex": 2
 },
 {
  "name": "test",
  "description": "test",
  "style": "{fillColor:\"blue\",strokeColor:\"blue\",pointRadius:1}",
  "zIndex": 3
 }]
}
```

Using POST to create layers:

The HTTP POST request method is used to request that a web server accepts the data enclosed in the request message's body for storage. In the Water API, you can use POST with the Render Service resource, `layers`, to create new map layers.

Method

POST.

Resource URI

`/ibm/water/api/render-service/layers`

Request Body

The request includes the map layer object to be created in XML or JSON format. It describes the name, description, style, and z-index of the layer.

Response

Not applicable.

Resource Parameters

Not applicable.

Examples: Create a new layer

The following examples demonstrate how to create map layers by using the POST method with the `layers` resource.

Example 1: JSON

The example model creates a new layer by constructing a request body in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers.

The example uses the following method, URL, and Content Type request-header:

- Method: POST

- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers
- Content Type: application/json

In this example, the following is the JSON request body:

```
{
 "name": "test",
 "description": "test",
 "style": "{fillColor:\"blue\",strokeColor:\"blue\",pointRadius:1}",
 "zIndex": 3
}
```

Example 2: XML

The example model creates a new layer by constructing a request body in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers.

The example uses the following method, URL, and Content Type request-header:

- Method: POST
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers
- Content Type: application/xml

In this example, the following is the XML request body:

```
<layer xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
 <name>test</name>
 <description>test</description>
 <style>{fillColor:"blue",strokeColor:"blue",pointRadius:1}</style>
 <zIndex>3</zIndex>
</layer>
```

Using PUT to update layers:

The HTTP PUT method is used to request that an enclosed entity is stored under the supplied URI. In the Water API, you can use PUT with the Render Service resource, `layers`, to update an existing map layer.

Method

PUT.

Resource URI

```
/ibm/water/api/render-service/layers?layerName=<layerName>
```

Request Body

The request includes the map layer object to be updated in XML or JSON format. It describes the name, description, style, and z-index of the layer.

Response

Not applicable.

Resource Parameters

The resource has the following parameter:

Parameter	Description
layerName	The name of the layer; for example, pipelinelayer.

Examples: Update the style of a layer

The following examples demonstrate how to update map layers by using the PUT method with the `layers` resource.

Note: A layer style is the default style for features in the layer. The style field is a string in JSON format that you must encod correctly, as in the following examples. The update style operation will replace the old style.

Example 1: XML

The example model updates the style property of an existing layer by constructing a request body in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers.

The example uses the following method, URL, and Content-Type request-header:

- Method: PUT
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers?layerName=test
- Content Type: application/xml

In this example, you get the following XML response:

```
<layer xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
 <style>{fillColor:"red",strokeColor:"red",pointRadius:1}</style>
</layer>
```

Example 2: JSON

The example model updates the style property of an existing layer by constructing a request body in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers. The example uses the following method, URL, and Content-Type request-header:

- Method: PUT
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers?layerName=test
- Content Type: application/json

In this example, you get the following JSON response:

```
{
 "style": "{fillColor:\"red\",strokeColor:\"red\",pointRadius:1}"
}
```

Using DELETE to remove layers:

The HTTP DELETE method is used to request the web server to delete a resource that is identified by the Request URI. In the Water API, you can use DELETE with the Render Service resource, `layers`, to delete layers.

Method

DELETE.

Resource URI

```
/ibm/water/api/render-service/layers?layerName=<layerName>
```

Request Body

Not applicable.

Response

Not applicable.

Resource Parameter

The resource has the following parameter:

Parameter	Description
layerName	The name of the layer for deletion; for example, pipelinelayer.

Example: Delete a layer

The following example demonstrates how to delete a map layer by using the DELETE method with the `layers` resource. The example deletes the layer by using the following method and URL:

- Method: DELETE
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/layers?layerName=test

features:

In the Water REST API, `features` is one of the Render Service resources. The `features` resource provides the ability to retrieve, create, update and delete features.

Using GET to retrieve features:

The HTTP GET request method is used to retrieve information from a server. In the Water API, you can use GET with the Render Service resource, `features`, to retrieve a list of features.

Method

GET.

Resource URI

```
/ibm/water/api/render-service/features?layerName=<layerName>
&featureName=<featureName>&area=<area>&level=<level>
&timestamp=<timestamp>&since=<since>&defer=<defer>
```

Request Body

Not applicable.

Response

The response is a list of features in XML or JSON format.

Resource Parameters

The resource has the following optional properties:

Optional Property	Description
layerName	The name of the layer; for example, pipelinelayer.
featureName	The name of a feature; for example, http://cityName#Pipe606.
area	A polygon in WKT format, used to filter the features; for example, "POLYGON((-86.24495744705251 41.67503278023767,-86.22779130935777 41.67503278023767,-86.22779130935777 41.684648463423216,-86.24495744705251 41.684648463423216,-86.24495744705251 41.67503278023767))"
level	An integer value that indicate map zoom level, which is used to filter the features.
timestamp	The timestamp that is used to retrieve historical features. For example, the number of milliseconds since January 1, 1970, 00:00:00 GMT. If not specified, the property will return the current timestamp of the server (db).
since	The property used to get a changed feature value in a specified timestamp. If specified, only changed features between "since" and "timestamp" will be returned; for example, the number of milliseconds since January 1, 1970, 00:00:00 GMT. If not specified, all features will be returned.
defer	The milliseconds used to adjust the timestamp when the timestamp property is not specified. The property can be treated as a timestamp that is relative to the current server (db) timestamp; for example, if defer=-60000, and the timestamp is not specified, the property returns features from one minute before.

Examples

The following examples demonstrate how to retrieve a list of features by using the GET method with the `features` resource.

Example 1: Retrieve a feature by feature name

The example model retrieves a feature defined in a specific layer in renderService in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point&featureName=point1
- Accept: application/xml

In this example, you get the following XML response:

```
<features>
<feature>
  <name>point1</name>
<timeStamp>1357614423099</timeStamp>
 <geometry>POINT (-86.2353141 41.6792579)</geometry>
 <startLevel>0</startLevel>
 <endLevel>0</endLevel>
 <style>{graphicTitle:"I am a tooltip of point1"}</style>
 <deleted>false</deleted>
</feature>
</features>
```

Example 2: Retrieve all features

The example model retrieves all features defined in a specific layer in renderService in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point
- Accept: application/json

In this example, you get the following JSON response:

```
"feature": [
    {
      "name": "point3",
      "timeStamp": 1358151585635,
      "geometry": "POINT (-86.2300283 41.6792199)",
      "startLevel": 12,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point3\"}",
      "deleted": false
    },
    {
      "name": "point4",
      "timeStamp": 1358151585635,
      "geometry": "POINT (-86.2368666 41.6792301)",
      "startLevel": 14,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point4\"}",
      "deleted": false
    },
    {
      "name": "point2",
      "timeStamp": 1358151585634,
      "geometry": "POINT (-86.2330464 41.6792373)",
      "startLevel": 10,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point2\"}",
      "deleted": false
    },
    {
      "name": "point1",
      "timeStamp": 1358151585121,
      "geometry": "POINT (-86.2353141 41.6792579)",
      "startLevel": 0,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point1\"}",
```

```
      "deleted": false
    }
  ]
}
```

Example 3: Retrieve features in specific areas and levels

The example model retrieves features in a specific area and in a specific level, which are defined in a specific layer in renderService, in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point &area=POLYGON((-86.24495744705251%2041.67503278023767,-86.22779130935777 %2041.67503278023767,-86.22779130935777%2041.684648463423216,-86.24495744705251 %2041.684648463423216,-86.24495744705251%2041.67503278023767))&level=10
- Accept: application/json

In this example, you get the following JSON response:

```
{
  "feature": [
    {
      "name": "point2",
      "timeStamp": 1358151585634,
      "geometry": "POINT (-86.2330464 41.6792373)",
      "startLevel": 10,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point2\"}",
      "deleted": false
    },
    {
      "name": "point1",
      "timeStamp": 1358151585121,
      "geometry": "POINT (-86.2353141 41.6792579)",
      "startLevel": 0,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point1\"}",
      "deleted": false
    }
  ]
}
```

Example 4: Retrieve features by timestamp

The example model retrieves features defined in renderService in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=pipelinelayer& timeStamp=1358151585141
- Accept: application/json

In this example, you get the following JSON response:

```
{
  "feature": [
    {
```

```
      "name": "point1",
      "timeStamp": 1358151585121,
      "geometry": "POINT (-86.2353141 41.6792579)",
      "startLevel": 0,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point1\"}",
      "deleted": false
    },
    {
      "name": "point4",
      "timeStamp": 1357783017706,
      "geometry": "POINT (-86.2368666 41.6792301)",
      "startLevel": 14,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point4\"}",
      "deleted": true
    },
    {
      "name": "point3",
      "timeStamp": 1357783017706,
      "geometry": "POINT (-86.2300283 41.6792199)",
      "startLevel": 12,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point3\"}",
      "deleted": true
    },
    {
      "name": "point2",
      "timeStamp": 1357783017705,
      "geometry": "POINT (-86.2330464 41.6792373)",
      "startLevel": 10,
      "endLevel": 0,
      "style": "{graphicTitle:\"I am a tooltip of point2\"}",
      "deleted": true
    }
  ]
}
```

Example 5: Retrieve changed features since specify time

The example model retrieves all features defined in a specific layer in renderService in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_polygon&since=1357614423099
- Accept: application/xml

In this example, you get the following XML response:

```
<features xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
  <feature>
    <name>polygon1</name>
    <timeStamp>1357614424156</timeStamp>
    <geometry>
      POLYGON ((-86.2369386 41.6805700, -86.2368743 41.6778456, -86.2316601
      41.6778776, -86.2316171 41.6806340, -86.2369386 41.6805700))
    </geometry>
    <startLevel>0</startLevel>
```

```
    <endLevel>0</endLevel>
    <deleted>false</deleted>
  </feature>
</features>
```

Example 6: Retrieve changed features since some time before current time

The example model retrieves features defined in renderService in JSON format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_polygon&defer=-3600
- Accept: application/xml

In this example, you get the following XML response:

```
<features xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
  <feature>
    <name>polygon1</name>
    <timeStamp>1357614424156</timeStamp>
    <geometry>
      POLYGON ((-86.2369386 41.6805700, -86.2368743 41.6778456, -86.2316601
      41.6778776, -86.2316171 41.6806340, -86.2369386 41.6805700))
    </geometry>
    <startLevel>0</startLevel>
    <endLevel>0</endLevel>
    <deleted>false</deleted>
  </feature>
</features>
```

Using POST or PUT to create and update features:

The HTTP POST request method is used to request that a web server accepts the data enclosed in the request message's body for storage, whereas HTTP PUT method is used to request that an enclosed entity is stored under the supplied URI. In the Water API, you can use POST or PUT with the Render Service resource, `features`, to create and update a list of features.

Methods

POST or PUT.

Resource URI

```
/ibm/water/api/render-service/features?layerName=<layerName>
```

Request Body

Not applicable.

Response

The response is a list of features in XML or JSON format.

Resource Parameters

The resource has the following property:

Parameter	Description
layerName	The name of the layer; for example, pipelinelayer.

Examples: Create and update features

The following example demonstrates how to create and update features by using the POST and PUT methods with the `features` resource.

Example 1: Create features

This example demonstrates how you can create features using the POST or PUT methods. In the example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The following default values apply when you create features:

- The name and geometry of a new feature cannot be null.
- The default value of a timestamp is the current time of data base server.
- The startLevel and endLevel default values are 0.
- The style default value is null.

The example uses the following method, URL, and Accept request-header:

- Method: POST
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_polygon
- Accept: application/xml

In the example, you get the following XML response:

```
<features xmlns="http://www.ibm.com/iss/iow/services/renderservice/">
  <feature>
    <name>polygon1</name>
    <timeStamp>1357614425156</timeStamp>
    <geometry>
      POLYGON ((-86.2369386 41.6805700, -86.2368743 41.6778456, -86.2316601
      41.6778776, -86.2316171 41.6806340, -86.2369386 41.6805700))
    </geometry>
    <startLevel>0</startLevel>
<endLevel>0</endLevel>
<style>{fillColor:"blue",strokeColor:"blue",pointRadius:3}</style>
  </feature>
</features>
```

Example 2: Update features

The example demonstrates how you can update a `features` style in a specific layer. In the example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

The example uses the following method, URL, and Accept request-header:

- Method: POST
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point

- Accept: application/json

In the example, you get the following JSON response:

```
{
  "feature": [
    {
      "name": "point1",
      "style": "{fillColor:"blue",strokeColor:"blue",pointRadius:3}"
    },
    {
      "name": "point4",
      "style": "{fillColor:"blue",strokeColor:"blue",pointRadius:3}"
    },
    {
      "name": "point3",
      "style": "{fillColor:"blue",strokeColor:"blue",pointRadius:3}"
    },
    {
      "name": "point2",
      "style": "{fillColor:"blue",strokeColor:"blue",pointRadius:3}"
    }
  ]
}
```

Using DELETE to clear features:

The HTTP DELETE method is used to clear some or all features in a specific layer. In the Water API, you use DELETE with the Render Service resource, `features`, to delete features. The method does not literally delete features; rather, it marks features as deleted at a specified timestamp. If necessary, you can use GET to retrieve a deleted feature by specifying an historical timestamp.

Method

DELETE.

Resource URI

```
/ibm/water/api/render-service/features?layerName=<layerName>
&featureNames=<featureNames>&clear=<isClear>&timestamp=<timestamp>
```

Request Body

Not applicable.

Response

Not applicable.

Resource Parameters

The resource has the following parameters:

Parameters	Description
layerName	The name of the layer for deletion; for example, pipelinelayer.
featureName	The name of the feature for deletion. The property is optional.

Parameters	Description
clear	The clear property is either true or false. The property is only used if featureNames is not specified. If clear=true, all features in specified layer are deleted.
timestamp	The specific time that the features are deleted. If not specified, the current timestamp of the server (db) is used.

Examples

The following example demonstrates how to delete a map layer by using the DELETE method with the `layers` resource. In the example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features.

Example: Delete features

The following example demonstrates how to delete features in a specific layer at current time. The example uses the following method and URL:

- Method: DELETE
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point &featuresName=point1&featuresName=point2

Example: Clear features in specific layer

The following example demonstrates how to delete all features in a specify layer at current time. The example uses the following method and URL:

- Method: DELETE
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point &clear=true

Example: Clear features at a specific time in a specific layer

The following example demonstrates how to delete all features in a specific layer at a specific time. The example uses the following method and URL:

- Method: DELETE
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/render-service/features?layerName=mylayer_point& featureName=point3&featureName=point4&timestamp=1357614425156

renderEngine:

You use the command line application, renderEngine, to call the render service REST API. To describe how to call the Rest Service, you use rule files. The rules files create, delete, update, get, list map layers, and features. Additionally, renderEngine can import data from an exiting KML file to render the service.

Command-Line syntax:

You run renderEngine in the application node.

To run renderEngine, you use the following command-line syntax:

- To run by rules files, use the syntax: `./renderEngine.sh –rule <rulefile.xml> <rulefile.xml>...`
- To import the KML file to a layer, use the syntax:`./renderEngine.sh –kml <layerName> <kmlfile.kml> <kmlfile.kml>...`

Rule files:

You use rule files with renderEngine to call the render service REST API. You must correctly format the rules files to ensure successful calls. Examples are provided to demonstrate how to create, delete, update, get, list map layers, and features.

Rule file formats:

Use the following information to understand how to apply the correct format to rule files, which describe how to call the REST service when using renderEngine. Each rule has a node and associated features.

Rules

`Rules` is the root node of a rule file. It features one or more `rule` nodes.

Rule

`Rule` contains a layer and the operations you can perform on the layer. The layers and operations of `rule` are as follows:

Layer	Operations
name	An attribute that contains the name of the rule.
description	A node that describes the rule.
variable	A node that defines the variable for other nodes to use.
query	A node that contains a SPARQL string that is queried by the model service. The results are used in the template node.
layer	A node that describes the layer that is affected by the rule.
template	A node that is a template of the feature that is filled by the query result of the node query.
feature	A node that defines features.

Variable

`Variable` defines a variable name. The attribute for `variable` is as follows:

Attribute	Feature
name	An attribute that contains the name of the variable.

Query

`Query` defines a query string. The attribute for `query` is as follows:

Attribute	Feature
type	An attribute that contains a SPARQL string.

Layer

`Layer` defines a layer. The nodes and attributes for `layer` are as follows:

Node/Attribute	Feature
action	An attribute that contains the action which is performed on the layer. The value can be GET, UPDATE, CREATE, DELETE, or CLEAR.
name	A node that is name of the layer.
description	A node that describes layer.
z-Index	A node that contains the number which defines the order of the layer.
style	A node that is a string in JSON format which defines the default style of features in the layer.

Template

`Template` that used to generate a features set. The attribute for `template` is as follows:

Attribute	Feature
name	An attribute that contains the name of the variable.

Feature

`Feature` defines a feature. The nodes and attributes for `feature` is as follows:

Node/Attribute	Feature
action	An attribute that contains the action which is performed on the layer. The value can be GET, UPDATE, CREATE, DELETE, or CLEAR.
name	A node that contains the name of feature.
timestamp	A node that contains the timestamp of the feature.
geometry	A node that contains a well known text (WKT) to describe point, line, or polygon.
startlevel	A node that contains the start level of the feature.
endlevel	A node that contains the end level of the feature.
style	A node that contains a string in JSON format which defines the style of the feature.

Rule file examples:

The examples demonstrate how to manipulate map layers and features by using rule files with the `renderEngine` resource.

Example 1: Create layers

The following example creates map layers with renderEngine.

Command

```
./renderEngine.sh –rule createLayers.xml
```

Rule file

```
createLayers.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="mylayer_point">
    <description>create a point layer</description>
    <layer action="CREATE">
        <name>mylayer_point</name>
        <type>generic</type>
        <description>mylayer_point</description>
        <zIndex>3</zIndex>
<style>{graphic:true,pointRadius:10,externalGraphic:
"http://openlayers.org/dev/img/marker-gold.png",
graphicXOffset:-10,graphicYOffset:-20,labelAlign:"lt"}</style>
    </layer>
  </rule>
  <rule name="createPolygon">
    <description>create a polygon layer</description>
    <layer action="CREATE">
        <name>mylayer_polygon</name>
        <type>generic</type>
        <description>mylayer_polygon</description>
        <zIndex>1</zIndex>
<style>{fill:true,fillColor:"gray",fillOpacity:0.4,stroke:false,graphic:true}</style>
    </layer>
  </rule>
</rules>
```

Example 2: Update layers

The following example updates map layers with renderEngine.

Command

```
./renderEngine.sh –rule updateLayers.xml
```

Rule file

```
updateLayers.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="mylayer_point">
    <description>update a layer's style</description>
    <layer action="UPDATE">
        <name>mylayer_point</name>
<style>{graphic:true,pointRadius:3,externalGraphic:
"http://openlayers.org/dev/img/marker-gold.png",
graphicXOffset:-10,graphicYOffset:-20,labelAlign:"lt"}</style>
    </layer>
  </rule>
  <rule name="createPolygon">
    <description>update a layer's zIndex</description>
    <layer action="UPDATE">
        <name>mylayer_polygon</name>
```

```
        <zIndex>4</zIndex>
    </layer>
  </rule>
</rules>
```

Example 3: Delete layers

The following example deletes map layers with renderEngine.

Command

```
./renderEngine.sh –rule deleteLayers.xml
```

Rule file

```
deleteLayers.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="mylayer_point">
    <description>delete a layer</description>
    <layer action="DELETE">
        <name>mylayer_point</name>
    </layer>
  </rule>
  <rule name="createPolygon">
    <description>create a polygon layer</description>
    <layer action="DELETE">
        <name>mylayer_polygon</name>
    </layer>
  </rule>
</rules>
```

Example 4: Create features

The following example creates features with renderEngine.

Command

```
./renderEngine.sh –rule createFeatures.xml
```

Rule file

```
createFeatures.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="add_points">
    <description>demo1</description>
    <variable name="layerName">mylayer_point</variable>
    <layer action="GET">
      <name>${layerName}</name>
    </layer>
    <feature action="CREATE">
      <name>point1</name>
      <type>generic</type>
       <geometry>POINT(-86.23531405314246 41.67925782340392)</geometry>
       <startLevel>0</startLevel>
```

```
      <endLevel>0</endLevel>
    </feature>
  </rule>
</rules>
```

Example 5: Update features

The following example updates features with renderEngine.

Command

```
./renderEngine.sh –rule updateFeatures.xml
```

Rule file

```
updateFeatures.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="add_points">
    <description>demo1</description>
    <variable name="layerName">mylayer_point</variable>
    <layer action="GET">
      <name>${layerName}</name>
    </layer>
    <feature action="UPDATE">
      <name>point1</name>
      <style>{strokeColor:"red",pointRadius:3}</style>
    </feature>
  </rule>
</rules>
```

Example 6: Delete features

The following example deletes features with renderEngine.

Command

```
./renderEngine.sh –rule deleteFeatures.xml
```

Rule file

```
deleteFeatures.xml
```

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/renderengine/rule">
  <rule name="add_points">
    <description>demo1</description>
    <variable name="layerName">mylayer_point</variable>
    <layer action="GET">
      <name>${layerName}</name>
    </layer>
    <feature action="DELETE">
      <name>point1</name>
    </feature>
  </rule>
</rules>
```

style:

You can perform advanced feature styling with properties and rules on vector layers on a GIS map. You use a simple JSON string to create an Openlayers style object. OpenLayers is an opensource javascript library that is used to load, display and render maps from multiple sources on web pages. For more information, you should visit the OpenLayers website: http://docs.openlayers.org/library/feature_styling.html.

Style objects

OpenLayers Style objects are descriptions of the way that features should be rendered. When a feature is added to a layer, the layer combines the style property with the feature to create a 'symbolizer', which is a set of style properties that will be used when rendering the layer.

Style properties

You can use the following properties for styling:

Property	Description
fill	{Boolean} Set to false if no fill is desired.
fillColor	{String} Hex fill color. Default is "#ee9900".
fillOpacity	{Number} Fill opacity (0-1). Default is 0.4.
stroke	{Boolean} Set to false if no stroke is desired.
strokeColor	{String} Hex stroke color. Default is "#ee9900".
strokeOpacity	{Number} Stroke opacity (0-1). Default is 1.
strokeWidth	{Number} Pixel stroke width. Default is 1.
strokeLinecap	{String} Stroke cap type. Default is "round". [butt | round | square]
strokeDashstyle	{String} Stroke dash style. Default is "solid". [dot | dash | dashdot | longdash | longdashdot | solid]
graphic	{Boolean} Set to false if no graphic is desired.
pointRadius	{Number} Pixel point radius. Default is 6.
pointerEvents	{String} Default is "visiblePainted".
cursor	{String} Default is "".
externalGraphic	{String} URL to an external graphic that will be used for rendering points.
graphicWidth	{Number} Pixel width for sizing an external graphic.
graphicHeight	{Number} Pixel height for sizing an external graphic.
graphicOpacity	{Number} Opacity (0-1) for an external graphic.
graphicXOffset	{Number} Pixel offset along the positive x axis for displacing an external graphic.
graphicYOffset	{Number} Pixel offset along the positive y axis for displacing an external graphic.
rotation	{Number} For point symbolizers, this is the rotation of a graphic in the clockwise direction about its center point, or any point off center as specified by graphicXOffset and graphicYOffset.
graphicZIndex	{Number} The integer z-index value to use in rendering.

Property	Description
graphicName	{String} Named graphic to use when rendering points. Supported values include “circle” (default), “square”, “star”, “x”, “cross”, “triangle”.
Title	{String} Tooltip when hovering over a feature.
backgroundGraphic	{String} URL to a graphic to be used as the background under an externalGraphic.
backgroundGraphicZIndex	{Number} The integer z-index value to use in rendering the background graphic.
backgroundXOffset	{Number} The x offset (in pixels) for the background graphic.
backgroundYOffset	{Number} The y offset (in pixels) for the background graphic.
backgroundHeight	{Number} The height of the background graphic. If not provided, the graphicHeight will be used.
backgroundWidth	{Number} The width of the background width. If not provided, the graphicWidth will be used.
label	{String} The text for an optional label. For browsers that use the canvas renderer, this requires either fillText or mozDrawText to be available.
labelAlign	{String} Label alignment. This specifies the insertion point relative to the text. It is a string composed of two characters. The first character is for the horizontal alignment, the second for the vertical alignment. Valid values for horizontal alignment: “l”=left, “c”=center, “r”=right. Valid values for vertical alignment: “t”=top, “m”=middle, “b”=bottom. Example values: “lt”, “cm”, “rb”. Default is “cm”.
labelXOffset	{Number} Pixel offset along the positive x axis for displacing the label. Not supported by the canvas renderer.
labelYOffset	{Number} Pixel offset along the positive y axis for displacing the label. Not supported by the canvas renderer.
labelSelect	{Boolean} If set to true, labels will be selectable by using SelectFeature or similar controls. Default is false.
labelOutlineColor	{String} The color of the label outline. Default is ‘white’. Only supported by the canvas and SVG renderers.
labelOutlineWidth	{Number} The width of the label outline. Default is 3, set to 0 or null to disable. Only supported by the canvas & SVG renderers.
fontColor	{String} The font color for the label, to be provided like CSS.
fontOpacity	{Number} Opacity (0-1) for the label.
fontFamily	{String} The font family for the label, to be provided like in CSS.
fontSize	{String} The font size for the label, to be provided like in CSS.
fontStyle	{String} The font style for the label, to be provided like in CSS.

Property	Description
fontWeight	{String} The font weight for the label, to be provided like in CSS.
display	{String} Symbolizers will have no effect if display is set to “none”. All other values have no effect.

Model Exploration Service resources

Model Exploration Service resources are used to retrieve, create, update, delete, and query topic maps. You can also use the resources to run impact analysis on the topic maps index.

topicmaps:

The `topicmaps` resource is used to retrieve, create, update, and delete topic maps. In the Water REST API, `topicmaps` is a Model Exploration Service resource.

Using GET to retrieve topic maps and descriptions:

The HTTP GET request method is used to retrieve information from the server. In the Water API, you can use GET with the Model Exploration Service resource, `topicmaps`, to retrieve lists of topic maps and descriptions.

Method

GET.

Resource URI

`/ibm/water/api/topicmaps-service/topicmaps`

Request Body

Not applicable.

Response

The response is a topic map in XTM 2.0 format. You can find more information about topic map responses at the website, isotopicmaps.com, at the following URL: http://www.isotopicmaps.org/sam/sam-xtm/

Resource Parameters

Not applicable.

Examples

The following examples demonstrate how to retrieve map layers and descriptions by using the GET method with the `topicmaps` resource.

Example 1: Retrieve a list topic maps

The example model retrieves a list of topic maps in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<TopicMapDescriptionList xmlns="http://www.ibm.com/iss/iow/services/topicmaps">
 <TopicMapDescription>
  <name>default</name>
  <description>this is the default topicmaps</description>
 </TopicMapDescription>
 <TopicMapDescription>
  <name>test</name>
  <description>A topic map for test</description>
 </TopicMapDescription>
</TopicMapDescriptionList>
```

Example 2: Retrieve all topic map content

The example retrieves content from topic maps named "default" in XML format. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/default
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/" />
```

Using POST and PUT to create and update topic maps:

The HTTP POST request method is used to request that a web server accepts the data enclosed in the body of a request message for storage. In the Water API, you can use POST with the Model Exploration Service resource, `topicmaps`, to create a new empty topic map with a default name and description, and use PUT to update the newly created topic maps.

Method

POST and PUT.

Resource URI

```
/ibm/water/api/topicmaps-service/topicmaps
```

Request Body

The request is a topic map description object in JSON or XML format.

Response

Not applicable.

Resource Parameters

Not applicable.

Examples: Create and update topic maps

The following example demonstrates how to create and update topic maps and descriptions by using the POST and PUT methods with the `topicmaps` resource.

Example 1: Create a topic map

The following example demonstrates how to create a new empty topic map by using the POST method with the `topicmaps` resource. You create the topic maps by taking the following two steps:

1. POST a topic map description object to the URL.
2. PUT topic map content to URL.

Step 1: POST a topic map description object to the URL

To create a topic map, the first step is to post a topic map description object to the example URL, http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

This example uses the following method, URL, and Content-Type request-header:

- Method: POST
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps
- Content-Type: application/xml

In this example, you use the following request entity:

```
<TopicMapDescription xmlns="http://www.ibm.com/iss/iow/services/topicmaps">
 <name>test</name>
 <description>A topic map for test</description>
</TopicMapDescription>
```

Step 2: PUT topic map content to the URL

The second step is to PUT topic map content to the example URL, http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/test, where *test* is the name of the newly created topic maps.

This example uses the following method, URL, and Content-Type request-header:

- Method: PUT
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/test
- Content-Type: application/xml

In this example, you use the following request entity:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/" />
```

Example 2: Update a topic map description

The following example demonstrates how to update the description of a topic map named *test* with the `topicmaps` resource. To update the description, you need the PUT method and topic map description objects in XML or JSON format. The example uses the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

Use the following method, URL, and Content-Type request-header:

- Method: PUT
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps
- Content-Type: application/json

In this example, you use the following request entity:

```
{
 "name": "test",
 "description": "This is new description"
}
```

Example 3: Update topic map content

The following example demonstrates how to update the topic map content with the `topicmaps` resource. To update topic map content, you PUT the topic map document to the URL, http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/<name>.

Use the following method, URL, and Content-Type request-header:

- Method: PUT
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/default
- Content-Type: application/xml

In this example, you use the following request entity:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/" />
```

Using DELETE to delete a topic map:

The HTTP DELETE method is used to request the web server to delete a resource that is identified by the Request URI. In the Water API, you can use DELETE with the Model Exploration Service resource, `topicmaps/<name>`, to delete a topic map.

Method

DELETE.

Request URI

`/ibm/water/api/topicmaps-service/<name>`

Request Body

Not applicable.

Response

Not applicable.

Resource Parameters

Not applicable.

Example: Delete a topic map

The following example demonstrates how to delete a map layer by using the DELETE method with the `topicmaps/<name>` resource. In the example, the service uses the following URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method and URL:

- Method: DELETE
- URL: hhttp://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/test

topicmaps/<name>/topics:

The `topicmaps/<name>/topics` resource is used to retrieve topics in specified topic maps. In the Water REST API, `topicmaps/<name>/topics` is a Model Exploration Service resource.

Using GET to retrieve topics and related associations:

In the Water API, you can use the HTTP GET request topics with the Model Exploration Service resource, `topicmaps/<name>/topics`, to get topic maps and related associations.

Method

GET.

Resource URI

```
/ibm/water/api/topicmaps-service/topicmaps/<name>/
topics?topicId=<topicId>&scope=<scope >&associationType=<associationType
```

Request Body

Not applicable.

Responses

The response is a topic map in XTM 2.0 format. You can find more information about topic maps at the website, isotopicmaps.com, at the following URL: http://www.isotopicmaps.org/sam/sam-xtm/.

Resource Parameters

The resource has the following properties.

Property	Description
topicId	The ID of the start topic.
scope	A list of scope topic IDs used to restrict the navigation. The property is optional.
associationType	A list of association type topic IDs used to restrict the navigation. The property is optional.
depth	A number to restrict navigation depth. The default value is 0 if not specified; therefore, the property only returns the topic specified in `topicId` parameter. The property is optional.

Example: Retrieve topics and associated topics

The following examples demonstrate how to retrieve topics and associated topics by using the GET method with the `topicmaps/<name>/topics` resource. The example model retrieves the connected junctions of the pipe, http://cityName#Pipe1161, with the following parameters:

- “RSM” and “cityName” in scope
- Association type restricted to “rsm-contains” and “rsm-connects”

- Depth restricted to 1

In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/default/topics?topicId=http%3A%2F%2FcityName%23Pipe1161&scope=cityName&scope=RSM&associationType=rsm-contains&associationType=rsm-connects&depth=1
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/">
 <topic id="http://cityName#Junction701">
  <itemIdentity href="http://cityName#Junction701" />
  <instanceOf><topicRef href="http://cityName#Junction" /></instanceOf>
  <name>
   <scope><topicRef href="#cityName" /></scope>
   <value>Junction701</value>
  </name>
  <occurrence>
   <type><topicRef href="#GIS" /></type>
   <resourceData datatype="http://www.w3.org/2001/XMLSchema#string">POINT(-86.24710578612327
    41.6883944550089)</resourceData>
  </occurrence>
 </topic>
 <topic id="http://cityName#Pipe1161">
  <itemIdentity href="http://cityName#Pipe1161" />
  <instanceOf><topicRef href="http://cityName#Pipe" /></instanceOf>
  <name>
   <scope><topicRef href="#cityName" /></scope>
   <value>Pipe1161</value>
  </name>
  <occurrence>
   <type>
    <topicRef href="#GIS" />
   </type>
   <resourceData datatype="http://www.w3.org/2001/XMLSchema#string">LINESTRING(-86.24705431019666
    41.6897564042222,-86.24710578612327 41.6883944550089)</resourceData>
  </occurrence>
 </topic>
 <topic id="http://cityName#Junction">
  <itemIdentity href="http://cityName#Junction" />
  <instanceOf><topicRef href="#iso13250-topic-type" /></instanceOf>
  <name>
   <scope> <topicRef href="#cityName" /></scope>
   <value>Junction</value>
  </name>
 </topic>
 <topic id="http://cityName#Junction643">
  <itemIdentity href="http://cityName#Junction643" />
  <instanceOf><topicRef href="http://cityName#Junction" /></instanceOf>
  <name>
   <scope><topicRef href="#cityName" /></scope>
   <value>Junction643</value>
  </name>
  <occurrence>
   <type>
    <topicRef href="#GIS" />
   </type>
   <resourceData datatype="http://www.w3.org/2001/XMLSchema#string">POINT(-86.24705431019666
    41.6897564042222)</resourceData>
```

```
 </occurrence>
</topic>
<topic id="rsm-connects-source">
 <instanceOf><topicRef href="#iso13250-association-role-type" /></instanceOf>
</topic>
<topic id="rsm-connects-target">
 <instanceOf><topicRef href="#iso13250-association-role-type" /></instanceOf>
</topic>
<topic id="rsm-connects">
 <instanceOf><topicRef href="#iso13250-association-type" /></instanceOf>
</topic>
<topic id="cityName">
 <instanceOf><topicRef href="#iso13250-scope" /></instanceOf>
 <name><value>cityName</value></name>
</topic>
<topic id="http://cityName#Pipe">
 <itemIdentity href="http://cityName#Pipe" />
 <instanceOf><topicRef href="#iso13250-topic-type" /></instanceOf>
 <name>
  <scope><topicRef href="#cityName" /></scope>
  <value>Pipe</value>
 </name>
</topic>
<association
 reifier="cityName-rsm-connects-http://cityName#Pipe1161-http://cityName#Junction701">
 <type><topicRef href="#rsm-connects" /></type>
 <scope><topicRef href="#cityName" /></scope>
 <role>
  <type><topicRef href="#rsm-connects-source" /></type>
  <topicRef href="http://cityName#Pipe1161" />
 </role>
 <role>
  <type><topicRef href="#rsm-connects-target" /></type>
  <topicRef href="http://cityName#Junction701" />
 </role>
</association>
<association
 reifier="cityName-rsm-connects-http://cityName#Pipe1161-http://cityName#Junction643">
 <type><topicRef href="#rsm-connects" /></type>
 <scope><topicRef href="#cityName" /></scope>
 <role>
  <type><topicRef href="#rsm-connects-source" /></type>
  <topicRef href="http://cityName#Pipe1161" />
 </role>
 <role>
  <type><topicRef href="#rsm-connects-target" /></type>
  <topicRef href="http://cityName#Junction643" />
 </role>
</association>
</topicMap>
```

topicmaps/<name>/search:

The `topicmaps/<name>/search` resource is used to search topic maps. In the Water REST API, `topicmaps/<name>/search` is a Model Exploration Service resource.

Using GET to search topics by name:

In the Water API, you can use the HTTP GET request method with the Model Exploration Service resource, `topicmaps/<name>/search`, to get topic and related associations.

Method

GET.

Resource URI

`/ibm/water/api/topicmaps-service/topicmaps/<name>/search?keyword=<keyword>&scope=<scope>`

Request Body

Not applicable.

Response

The response is a topic map in XTM 2.0 format, which you can find more information on isotopicmaps.com at the following URL: http://www.isotopicmaps.org/sam/sam-xtm/

Resource Parameters

The resource has the following properties.

Property	Description
keyword	The search key word.
scope	A list of scope topic ids used to restrict the navigation. The property is optional.

Example: Search topics in scope

The example model searches the topics with names that contain the keyword, pipe, in scope, RSM. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method, URL, and Accept request-header:

- Method: GET
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/default/search?keyword=pipe&scope=RSM
- Accept: application/xml

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/">
 <topic id="CIM-EPANET_Pipe">
  <itemIdentity href="http://www.epanet.org#EPANET_Pipe" />
  <instanceOf><topicRef href="#iso13250-topic-type" /></instanceOf>
  <name>
   <scope><topicRef href="#RSM" /></scope>
   <value>EPANET_Pipe</value>
  </name>
 </topic>
 <topic id="CIM-WIH_Pipeline_Asset">
  <itemIdentity href="http://www.ibm.com/water/wih#WIH_Pipeline_Asset" />
  <instanceOf><topicRef href="#iso13250-topic-type" /></instanceOf>
  <name>
   <scope> <topicRef href="#RSM" /></scope>
   <value>WIH_Pipeline_Asset</value>
  </name>
 </topic>
</topicMap>
```

topicmaps/<name>/impact:

The `topicmaps/<name>/impact` resource is used to run impact analysis on the topic map index. In the Water REST API, `topicmaps/<name>/impact` is a Model Exploration Service resource.

Using GET to run impact analysis on topic maps:

In the Water API, you can use the HTTP GET request method with the Model Exploration Service resource, `topicmaps/<name>/impact`, to run impact analysis on topics maps.

Method

GET.

Request URI

```
/ibm/water/api/topicmaps-service/topicmaps/<name>/impact?topicId=<topicId>&scope=<scope>&associationType=
<associationType>&depth=<depth>
```

Request Body

Not applicable.

Response

The response is a topic map in XTM 2.0 format. You can find more information about topic maps at the website, isotopicmaps.com, at the following URL: http://www.isotopicmaps.org/sam/sam-xtm/.

Resource Parameters

The resource has the following properties.

Property	Description
topicId	The ID of the start topic.
scope	The list of scope topic IDs used to restrict the navigation. The property is optional.
associationType	A list of association type topic IDs used to restrict the navigation. The property is optional.
depth	A number to restrict navigation depth. The default value is 0 if not specified; therefore, the property returns only the topic that is specified in `topicId` parameter. The property is optional.

Example: Run impact analysis on topic maps

The example model gets all the measurements, CIM-RSM_Measurement, of the asset, http://cityName%23CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation. In this example, you can assume that the service uses the following base URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps.

The example uses the following method, Accept request-header and URL:

- Method: GET
- Accept: application/xml
- URL: http://app-ioc.cn.ibm.com/ibm/water/api/topicmaps-service/topicmaps/default/impact?topicId=http%3A%2F%2FcityName%23CityName-

AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation&topicId=CIM-RSM_Measurement&depth=3

In this example, you get the following XML response:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<topicMap xmlns="http://www.topicmaps.org/xtm/">
 <topic id="CIM-RSM_Measurement">
  <itemIdentity href="http://iec.ch/TC57/CIM-generic#RSM_Measurement" />
  <instanceOf>
   <topicRef href="#iso13250-topic-type" />
  </instanceOf>
  <name>
   <scope><topicRef href="#RSM" /></scope>
   <value>RSM_Measurement</value>
  </name>
 </topic>
 <topic id="http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation">
  <itemIdentity uref="http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation" />
  <instanceOf><topicRef href="http://cityName#RainGauge" /></instanceOf>
  <name>
   <scope><topicRef href="#cityName" /></scope>
   <value>I-LiftStation</value>
  </name>
 </topic>
 <topic id="http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation-M.I-RainGauge">
  <itemIdentity href="http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation-M.I-RainGauge" />
  <instanceOf><topicRef href="http://iec.ch/TC57/CIM-generic#RSM_Measurement" /></instanceOf>
  <name>
   <scope><topicRef href="#cityName" /></scope>
   <value>I-RainGauge</value>
  </name>
 </topic>
 ......
 <association>
  <type><topicRef href="http://psi.topicmaps.org/iso13250/model/type-instance" /></type>
  <scope><topicRef href="#cityName" /></scope>
  <role>
   <type><topicRef href="http://psi.topicmaps.org/iso13250/model/type" /></type>
   <topicRef href="#CIM-RSM_Measurement" />
  </role>
  <role>
   <type><topicRef href="http://psi.topicmaps.org/iso13250/model/instance" /></type>
   <topicRef href="#http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation-M.I-RainGauge" />
  </role>
 </association>
 <association reifier=
"cityName-rsm-has-measurement-http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation-
http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation-M.I-RainGauge">
  <type><topicRef href="#rsm-has-measurement" /></type>
  <scope><topicRef href="#cityName" /></scope>
  <role>
   <type><topicRef href="#rsm-has-measurement-asset" /></type>
   <topicRef href="http://cityName#CityName-AREA.CityName-UNIT.I-LiftStation-WE.I-LiftStation" />
  </role>
  <role>
   <type><topicRef href="#rsm-has-measurement-measurement" /></type>
   <topicRef href="http://cityName#CityName-AREA.CityName-
UNIT.I-LiftStation-WE.I-LiftStation-M.I-RainGauge" />
  </role>
 </association>
 ......
</topicMap>
```

Running the Index Engine:

Index Engine is a command line tool that is used to generate topic maps by using a template. In the template, you can either write the topics and associations directly, or query the model server to generate the topics and associations.

To run the Index Engine on the application node, you take the following steps:

1. Go to the directory, `/opt/IBM/iss/iow/apps`.
2. Run the command by using the following rule files: `/index.sh <topic_map_name> <topic_map_description> topicmaps\rules_core.xml <custom_rule_file> <custom_rule_file>...`

Example XML response

The following XML response demonstrates how to find example custom rule files in the directory, `/opt/IBM/iss/iow/apps/topicmaps`:

```
<?xml version="1.0" encoding="UTF-8"?>
<rules xmlns="http://www.ibm.com/iss/iow/common/topicmap/rule">
 <rule>
  <name>Custom Scope</name>
  <description>Create custom scope topics</description>
  <variable name="namespace">http://cityName#</variable>
  <variable name="scopeName">cityName</variable>
  <template>
   <topicMap xmlns="http://www.topicmaps.org/xtm/">
    <topic id="${scopeName}">
     <instanceOf><topicRef href="#iso13250-scope"/></instanceOf>
     <name><value>${scopeName}</value></name>
    </topic>
   </topicMap>
  </template>
 </rule>

 <rule>
  <name>Index Custom Classes</name>
  <description>Index Custom Classes</description>
  <variable name="namespace">http://cityName#</variable>
  <variable name="scopeName">cityName</variable>
  <query datasource="" type="SPARQL">
  <![CDATA[
   PREFIX owl:<http://www.w3.org/2002/07/owl#>
   PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
   PREFIX rdf:<http://www.w3.org/1999/02/22-rdf-syntax-ns#>
   PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
   SELECT ?classID ?classLabel
   WHERE {
     ?classID a owl:Class .
     ?classID rdfs:label ?classLabel .
     FILTER regex(str(?classID), '^${namespace}', 'i')
   }
  ]]&gt;
  </query>
  <template>
   <topicMap xmlns="http://www.topicmaps.org/xtm/">
    <topic id="${classID}">
     <itemIdentity href="${classID}"/>
     <instanceOf><topicRef href="#iso13250-topic-type"/></instanceOf>
     <name>
      <scope><topicRef href="#${scopeName}"/></scope>
      <value>${classLabel}</value>
     </name>
     <occurrence>
      <type><topicRef href="#ModelAccessService"/></type>
      <resourceData datatype="http://www.w3.org/2001/XMLSchema#string">${classID}</resourceData>
```

```
    </occurrence>
   </topic>
  </topicMap>
 </template>
</rule>
......
```

ASK Service resources

The Analytics Solution Kit (ASK) is designed to simplify the deployment and management of analytic models. It is a middleware server that enriches enterprise applications with descriptive, predictive, and prescriptive capabilities. ASK analytical and optimization solutions are built with advanced IBM software.

Understanding ASK:

The Analytics Solution Kit (ASK) is a J2EE-based framework that enables seamless management of complex mathematical programs that are built with IBM products. Using ASK, you can manage the deployment and execution of analytical and optimization models.

Using IBM products with ASK

Within the ASK framework, you can build complex mathematical modeling with rigorous industry-leading software standards. To do so, you use IBM products such as ILOG CPLEX Optimization Studio and SPSS PASW Modeler.

Building and deploying analytical models with IBM products requires high skill, high value resources. As such, these resources are scarce. When the analytic models are built, it takes considerable time and resources to integrate the models into an enterprise environment.

Typically, the analytic model expert is not skilled in integration. Likewise, the enterprise IT developer seldom has the expertise in the interface API to the analytical tools. The result is a skill deficiency. This issue becomes a barrier-of-entry for enterprise applications that seek to use predictive and prescriptive capabilities within an enterprise application.

Furthermore, for each class of problem there are standard algorithms and models that can be used across domains.

Therefore, rather than building one-off models for each industry and customer, analytic experts can build a set of reusable analytical models within the ASK framework. These models can be used in any industry domain.

Example of an analytical model

Suppose you want to optimally route a set of crews to distant locations to fix problems with assets. In this scenario, you can build mathematical programming models to power distribution from the water domain to the rail domain. Generic and configurable analytical models can be coupled with a common industry-based data model for analytics. They provide a solution that is ready for immediate use. This solution is a key value proposition to repeatable solution deployment.

Running ASK on WebSphere Application Server

ASK runs on top of WebSphere Application Server. You can register a data schema for a model, deploy the model, and associate it with a particular technology. ASK is designed to allow for the support of any analytic engine. The installation and configuration of the analytic engines is contained within the ASK installation. Therefore, you do not have to perform these tasks.

ASK V4 is named Lurch and supports analytical models from Cognos, ILOG, SPSS, and custom analytics engines.

Choosing a metadata repository

ASK contains a metadata repository that can be a file system or relational database. The choice is left to the ASK user. For less complex installs, you might elect to use a file-based repository. For more complex, enterprise-wide installs you can use a database. ASK currently supports DB2. The metadata repository contains information about the models, analytic engines, and data schemas that are registered in the system.

Working with the administrative console

ASK provides an administrative console for data modelers and analytic modelers to register, deploy, and run their models by using a graphical user interface. ASK also provides RESTful web services. By using web services, an enterprise application can start the execution of a model and have the model results returned and displayed in the enterprise application.

Using ASK web services:

Analytics Solution Kit (ASK) web services are available in the following four methods: GET, POST, PUT, and DELETE.

Web service methods

The ASK web services methods are described as follows:

- GET: This method retrieves information, returning JSON. The form of the GET method is similar to a SELECT statement. The parameters of the method are typically appended to the request URI.
- POST: This method creates, updates, or deletes data. When you call POST, you pass in JSON, which contains the parameters of the method.
- PUT: This method creates or updates data. As with POST, you pass in JSON with the parameters of the method.
- DELETE: This method deletes data. The parameters of the method are typically appended to the request.

Resource URI

The endpoint that is used for the web service is the end of the resource URI. The form of the URI begins with the URL of the ASK instance and includes the general address of REST web services in ASK. You use both together to form the URI to request resources. In this way, the URI uses the following syntax: `http://<host_name>:<port_number>/<context>/rest/<endpoint>`.

Example URI

Suppose you want to retrieve a list of all the schemas that are installed on the server and your domain is analytics41.watson.ibm.com. In this scenario, you create the following resource URI: http://analytics41.watson.ibm.com:9080/askws/rest/dataService/schemas.

The root of the URL hierarchy represents the catalog of folders and services that are published by using the ASK Server. Each folder in turn represents a catalog of services that are published within that folder.

Web service hierarchy

The ASK REST system of endpoints is a hierarchy of resources. The following is a description of the services within the hierarchy.

Service Hierarchy	Description
catalog	The root of the URL hierarchy. The syntax for catalog is as follows: `http://<host>/<instance>/<services>`.
Data Service	The Data Service installs, uninstalls, activates, deactivates, and updates the schemas and models in the database. The visual editor is used to install solutions. Solutions can be uninstalled. The syntax for the service is as follows: `/<get>/<servicename>`.
Validation Service	The Validation Service validates the input data, input parameter, and models. The syntax for the service is as follows: `/<validate>/<servicename>`.
Execution Service	The Execution Service provides the methods to run the models and sequence solutions. The syntax for the service is as follows: `/<execute>/<servicename>`.
Configuration Service	The Configuration Service defines the methods to manage the system properties. The syntax for the service is as follows: `/<config>/<servicename>`.
Logging Service	The Logging Service provides the methods to retrieve the logs and set the logging level. The syntax for the service is as follows: `/<log>/<servicename>`.

Tutorials

IBM Intelligent Operations for Water Interim Feature 2 provides a sample application that you can use to familiarize yourself with the SDK and the REST API services. Using the sample application, you can learn the process of building integrated applications with IBM Intelligent Operations for Water.

The sample application provides a simulated environment that you can use to perform application development in IBM Intelligent Operations for Water. When you select to install IBM Intelligent Operations for Water Interim Feature 2, a sample application environment is loaded in the following directory: `/opt/IBM/iss/iow/samples`.

The application is a Rational Application Developer workspace that you import into a Rational Application Developer development environment.

Note: You must have an Rational Software Architect for WebSphere Software and Rational Application Developer application development environment to import the workspace and start using the sample application.

Using the sample application to create your own web application

The sample application source code and web services are provided to facilitate the deployment of customized web applications in IBM Intelligent Operations for Water. The sample includes the following assets to facilitate deployment:

- Project toolkit for Rational Software Architect (RSA) and Rational Application Development (RAD).
- Sample custom semantic model to import into the model server. This includes sample OWL and RDF files for pipeline and meter types and instances.
- Sample scripts to configure a pipe network for use by the Render Service.
- Sample scripts to create a topic map index on the asset model.
- Sample application source code.

In the tutorial in this section, the sample application is used extensively to share knowledge on the IBM Intelligent Operations for Water application development process.

Scenario

Before building an application on the IBM Intelligent Operations for Water platform, you must have a clear view of what the application is to provide. Define the challenges to overcome and the skills available in your team to build the application. The scenario determines what application environment you must set up and configure, and also determines how you build your application.

For the purpose of this tutorial, the following scenario is used.

Situation

Sunshine Water Group manage a water network for a regional council. The water network contains a number of sensors that monitor measurements. Sunshine Water Group have been experiencing challenges with water pressure measurements in their pipe infrastructure. Each pipeline asset in the water network has the following managed components: pipes, junctions, reservoirs, valves and tanks. Each managed component has an associated measurement. For example, both junctions and valves have pressure readings, measured in psi (force per square inch). Sunshine Water Group use valves to set pressure readings.

Complication

There has been significant expansion in the Sunshine Water Group water network. Economic growth has brought new residential and commercial development in the managed region. The water infrastructure has expanded accordingly and Sunshine Water Group are challenged to maintain constant water pressure in their evolving infrastructure.

Proposal

Sunshine Water Group need an application in IBM Intelligent Operations for Water to optimize pressure management in the pipe infrastructure.

Outcome

Sunshine Water Group hope that by optimizing pressure management they will satisfy customer demands, improve infrastructure efficiencies, and ensure that service level agreements and the requirements of regional water consumption and conservation policies are met.

Using the information above, the application developer addresses the problem in the context of services offered by the IBM Intelligent Operations for Water SDK and REST API. For example:

- Use the Model Access Service to get the infrastructure element types from the Water Information Hub. For example, get a list of pressure critical points and valves and add a pressure critical point as input.
- Use the Model Exploration Service to run an impact analysis and retrieve a list of valves that impact this pressure critical point. By getting the infrastructure elements from the Water Information Hub, and running an impact analysis, a water asset graph is returned.
- Use the Reading Service to get the current pressure value of pressure critical points and the current setting value of valves. The Reading Service enables post processing of the water asset graph.
- Use the ASK Service to use embedded analytics offered by the IBM Intelligent Operations for Water to optimize pressure management. By calling the pressure optimization analytics, you gain insight from the data available to help make better decisions. The ASK Service is used to post process the water asset graph.
- Use the Render Service to render the optimization results to a map for display in the interface and test the application.

Once the scenario is defined, continue by setting up and configuring the environment for application development.

Configuring the application setup

Before you can begin to build the application, you must create your application environment by using the assets provided by the sample application. Use the tutorials to configure the application setup.

Configuration Tasks

To set up the application, you must complete the following configuration tasks:

- Import the sample projects
- Extend the water semantic model
- Create index for the Model Exploration Service
- Generate custom map layers
- Verify the configuration
- Create sample reading data to verify event flow

The tasks are described in the tutorials.

Importing the sample projects:

Import the prerequisites and sample projects.

Installing prerequisites

As a prerequisite, you need to install the following systems:

1. Install IBM Intelligent Operations Center 1.5.
2. Install IBM Intelligent Operations for Water 1.5.
3. Install IBM Intelligent Operations for Water Interim Feature 2.
4. Deploy the Rational Application Developer (RAD) Development Environment. For information on installing and using RAD, see the Rational Application Developer information center. RAD is included with the IBM Intelligent Operations Center on separate DVDs or images.

Downloading and importing the projects

You download and import the sample project files as follows:

1. Go to the sample project at the application node in the following directory: `/opt/IBM/iss/iow/samples`.
2. Download and import the following projects in to your Rational Application Developer workspace: water_sdk_sample_model and water_sdk_sample_app.
3. After you import the projects, you will find them in your development environment.

Extending the water semantic model:

Configure the asset model by using the model provided with the sample application. You can extend the water semantic model to define the custom pipeline, sensor, and meter asset types.

Custom asset types

In the example, the RSM is extended to define the new custom asset types, including Pipe, Junction, Reservoir, Valve, and Tank.

Source code files

You can find the following model source code files in the Rational Application Developer workspace:

- sunshine_meter_instances.rdf
- sunshine_meter_type.owl
- sunshine_pipeline_instances.rdf
- sunshine_pipeline_instances.owl

Importing custom asset types:

Use the instructions to import and verify the registration of the custom asset types.

Importing the custom model

Follow the steps to import the custom model to the model server:

1. Open the Model Manager console at the URL, http://<mgmt_node>:82/iic/console.
2. Go to **Model Manager > Ontologies**.
3. Click **Browse** and locate the asset type OWL file, `sunshine_pipeline_type.owl`.
4. Click **Load** to upload the asset type OWL file. When you have successfully registered the asset type, you will see the OWL file uploaded in the list.
5. Repeat above steps to import `sunshine_meter_type.owl`.

Verifying registration

To verify that the custom model successfully registered, take the following steps:

1. Go to **Model Manager > Query**.
2. Run the following SPARQL query:

```
PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
PREFIX wih:<http://www.ibm.com/water/wih#>
SELECT ?object_ID ?object_Name ?object_Comment
WHERE {
  ?object_ID rdfs:subClassOf wih:WIH_Pipeline_Asset; rdfs:label ?object_Name.
   OPTIONAL { ?object_ID rdfs:comment ?object_Comment. }
}
```

3. Verify that `object_Name`, `object_ID` and `object_Comment` are correct in the result list.

Importing custom asset instances:

Use the instructions to import and verify custom asset instances.

Importing the custom model instance

Follow the steps to import the custom model instance to the model server:

1. Open the Model Manager console at the URL, http://<mgmt_node>:82/iic/console.
2. Go to **Model Manager > Load**.
3. Click **Browse** and locate the asset type OWL file, `sunshine_pipeline_instance.owl`.
4. Click **Load** to upload the instance RDF file. When you successfully register the asset metadata, the graph is displayed in the console.
5. Repeat above steps to import `sunshine_meter_instance.owl`.

Verifying registration

To verify that the custom model successfully registered, take the following steps:

1. Go to **Model Manager > Query**.
2. Run the following SPARQL query:

```
PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
PREFIX wih:<http://www.ibm.com/water/wih#>
SELECT *
WHERE {
```

```
?asset_ID a wih:WIH_Pipeline_Asset; a ?asset_Type_ID.
?asset_ID cim:RSM_IdentifiedObject.name ?asset_Name.
OPTIONAL { ?asset_ID cim:RSM_UnnamedObject.description ?asset_Description. }
}
```

3. View the result to check if asset is in the result list.

Verifying using the Model Access Service:

Use the instructions to verify the Model Access Service.

Verifying custom asset types

To verify that you imported the custom asset types successfully, open the URL, http://<application-node>/ibm/water/api/model-service/asset-types.

The asset types are defined as follows:

```
<AssetTypeList>
 <AssetType>
  <id>http://www.epanet.org#EPANET_Link</id>
  <name>EPANET_Link</name>
  <description>Super class EPANET Links</description>
  <parentID>http://www.epanet.org#EPANET_Entity</parentID>
 </Asset Type>
 <AssetType>
  <id>http://www.epanet.org#EPANET_Node</id>
  <name>EPANET_Node</name>
  <description>Super class EPANET Nodes</description>
  <parentID>http://www.epanet.org#EPANET_Entity</parentID>
 </AssetType>
 <AssetType>
  <id>http://water.sdk.sample#EPANET_Entity</id>
  <name>EPANET_Entity</name>
  <description>Super class EPANET entities</description>
  <parentID>http://www.ibm.com/water/wih#WIH_SensorMeter_Asset</parentID>
 </AssetType>
```

Verifying custom asset instances

To verify custom asset instances imported successfully, open the URL, http://<application-node>ibm/water/api/model-service/assets.

The asset instances are defined as follows:

```
<AssetList>
 <Asset>
  <id>http://ibm.com/iss/iic/sample/IBMOilDownstreamSampleRDF#IBM_OIL_DS.WE.NAT-201-HE-105</id>
  <assetTypeID>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment</assetTypeId>
  <name>NAT-201-HE-105</name>
  <description>ShellTube_2 HeatExchanger</description>
 </Asset>
 <Asset>
  <id>http://ibm.com/iss/iic/sample/IBMOilDownstreamSampleRDF#IBM_OIL_DS.WE.NAT-201-TD-105</id>
  <assetTypeID>http://iec.ch/TC57/CIM-generic#RSM_WorkEquipment</assetTypeId>
  <name>NAT-201-TD-105</name>
  <description>Drum Tank</description>
  <parentID>http://www.epanet.org#EPANET_Entity</parentID>
 </Asset>
```

Synchronizing the model to the database:

Use the instructions to synchronize the model to the database.

After you import the models into the model sever, take the following steps to synchronize the semantic model to the database:

1. Log in to the application node.
2. Run the syncModelToDB.sh command as follows:

```
[root@app-ioc ~]# cd /opt/IBM/iss/iow/apps
[root@app-ioc apps]# ./syncModelToDB.sh <DB Node host name> <DB Port>
  <DB username > <DB password > http://SunshineWaterGroup#
```

Creating the index for the Model Exploration Service:

Use the instructions to create the index for the Model Exploration Service.

Copying files to the application node

Copy the following files from your Rational Application Developer workspace to the application node:

- water_sdk_sample_model\topicmap\rules_core.xml
- water_sdk_sample_model\topicmap\rules_custom.xml

Running the command

Log in to the application node, and run the following command to create the index for the Model Exploration Service:

```
/opt/IBM/iss/iow/apps/index.sh custom custom rules_core.xml rules_custom.xml
```

Generating custom map layers:

Use the procedures to generate custom map layers.

Copying files to the application node

Copy the following files from your Rational Application Developer workspace into the application node:
`water_sdk_sample_model\render\rule_import_renderservice_data.xml`

Running the command

Log in to the Application node, and run the following command to generate the custom map layers:

```
/opt/IBM/iss/iow/apps/renderEngine.sh -rule rule_import_renderservice_data.xml
```

Verifying the configuration:

Use the instructions to verify the Logical Map configuration settings.

Map Portlet settings

The Logical Map configuration settings are as follows:

Configuration Items	Description
Enable Logic Map	The setting that you use to display the map.
Logical Map Name	The setting for the name that you specify when generating a topic map index.
Model Prefix	The setting that controls the prefix of model that you want to display.

Configuring the map portlet

You must configure the map portlet as follows:

1. Configure the map portlet to set the model prefix, enable the logic map, and set the logical map name as follows.
   a. Open the following URL, http://<application-node>/wpsv70/wps/myportal.
   b. Navigate to **Water > Operator:Operations**.
   c. Click the Down Arrow button on the top right-hand side of the page.
   d. Select **Configure** from the resulting menu.
   e. In the configuration page, enter the Logical Map configuration items as follows:
      1) Enable Logic Map: true
      2) Logical Map Name: custom
      3) Model Prefix: http://water.sdk.sample.
   f. Click **Save**.
   g. Verify that the Sunshine Water model and custom layers are shown in the map.
   h. Click **Logical Map** to change to the logical map view. Verify that the Model Exploration Service index is created successfully.
2. Click the **Select Content** menu.
3. Select **Search for another asset on which to focus**.
   a. Enter a keyword and click **Search**.
   b. Select a result item to display the related asset on the logical map.
   c. Double-click an item on the logical map to display all related items.

Creating sample reading data to verify event flow:

Use the instructions to create sample CSV reading data to verify the event flow.

Sample reading data

The following is sample CSV reading data:

```
PRV19_Setting_Value,100,2013-01-11T07:00:00.00+08:00
PRV24_Setting_Value,40,2013-01-11T07:00:00.00+08:00
PRV18_Setting_Value,40,2013-01-11T07:00:00.00+08:00
Pressure_Value_J604_MV,21.50,2013-01-11T01:00:00.00+08:00
Pressure_Value_J599_MV,28.98,2013-01-11T12:00:00.00+08:00
Pressure_Value_J599_MV,28.67,2013-01-11T13:00:00.00+08:00
Pressure_Value_J553_MV,41.24,2013-01-11T01:00:00.00+08:00
Pressure_Value_J553_MV,45.33,2013-01-11T02:00:00.00+08:00
Pressure_Value_J553_MV,37.22,2013-01-11T03:00:00.00+08:00
```

Importing the reading data

To import the sample CSV reading data in to the IBM Intelligent Operations for Water, take the following steps:

1. Log in to the application node.
2. Copy the CSV file to the directory, `/opt/IBM/iss/iow/apps/simulator/incoming`

Verifying the reading data

To verify the reading data has been processed, go to `/opt/IBM/iss/iow/apps/simulator/processed`.

The suffix must be a file with the latest time.

Running the sample application

Use the instructions to run the sample application.

1. Create a new Ajax Test Server, or open an existing Ajax Test Server, in your Rational Application Developer workspace.
2. Click **Configure Proxy URLs**. Change the configuration to the XML script below. Replace the `<hostname-of-application-node>` to the host name of your application node:

```
<?xml version="1.0" encoding="UTF-8"?>
<proxy:proxy-rules
 xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
 xmlns:proxy="http://www.ibm.com/xmlns/prod/sw/ajax/proxy-config/1.1">
<proxy:mapping contextpath="http/*" />
<proxy:mapping contextpath="https/*" />
<proxy:mapping url="http://www.ibm.com" contextpath="us/en" />
<proxy:mapping url="http://<hostname-of-application-node>:10039" contextpath="ibm/*" />
<proxy:mapping url="http://<hostname-of-application-node>:10039" contextpath="iocbase/*" />
<proxy:policy url="*" acf="none" basic-auth-support="true">
<proxy:actions>
<proxy:method>GET</proxy:method>
<proxy:method>POST</proxy:method>
<proxy:method>PUT</proxy:method>
<proxy:method>DELETE</proxy:method>
<proxy:method>HEAD</proxy:method>
</proxy:actions>
<proxy:headers></proxy:headers>
<proxy:mime-types></proxy:mime-types>
<proxy:cookies></proxy:cookies>
<proxy:users></proxy:users>
</proxy:policy>
<proxy:ipfilter></proxy:ipfilter>
<proxy:meta-data>
<proxy:name>unsigned_ssl_certificate_support</proxy:name>
<proxy:value>true</proxy:value>
</proxy:meta-data>
<proxy:meta-data>
 <proxy:name>forward-http-errors</proxy:name>
<proxy:value>true</proxy:value>
</proxy:meta-data>
</proxy:proxy-rules>
```

3. Right-click **Ajax Test Server**, select **Add and Remove**, and add the application, `water_sdk_sample_app`, to the application node.
4. Right-click **Ajax Test Server**, and start the Ajax Test Server.
5. Open the URL, http://localhost:8080/water_sdk_sample_app/. Verify that the application runs. Assume that the application has a simple widget to enable you to input and view results.
6. In the widget, you can implement the following logic in JavaScript:
   a. Call the Model Access Service to list Pressure Critical Point (PCP) and Pressure Reducing Valve (PRV) files.
   b. Select PCP as the target and call the Topic Maps service to run impact analysis. The result of the impact analysis is a list of PRV files.
   c. Using the resulting PRV list and the PCP as input, call the custom service to start the pressure optimization.
   d. Call the custom service to get the optimization results.

Security

The IBM Intelligent Operations for Water REST API is secured by WebSEAL authentication.

You require a specific security role to access the IBM Intelligent Operations for Water REST API as described in the table.

Table 12. Security roles and HTTP Methods

	GET	**POST**	**PUT**	**DELETE**
Water Executive	Yes	No	No	No
Water Operator	Yes	No	No	No
Water Administrator	Yes	Yes	Yes	Yes

Chapter 5. Customizing the solution

You can customize some aspects of the user interface and system settings of IBM Intelligent Operations for Water to suit your operational requirements and users. By working with the sample content, you can become familiar with system capabilities when customizing the solution.

Customizing data integration

The IBM Intelligent Operations for Water solution provides extension options that you can use to customize the data that is made visible to users. Working with the model manager, you can define what infrastructure, assets, measurements, and values are presented in the interface, and determine how to integrate that data with components in the solution. Use the information in this topic to familiarize with model customization and extensions.

Related concepts:

Chapter 4, "Integrating the solution," on page 45
Products and services can be integrated with IBM Intelligent Operations for Water.

Customizing the model

By extending the IBM Intelligent Operations for Water semantic model, you can build a customized model to meet your requirements. Use the information in this section to customize the semantic model.

IBM Intelligent Operations for Water uses the IBM Integrated Information Core as a core component of IBM Intelligent Operations Center 1.5. IBM Integrated Information Core provides a framework to create water-based applications that are centered on a semantic model of the real world, and that support integration of real-time operational data and related enterprise applications.

The key component of the IBM Integrated Information Core architecture supporting this goal is the semantic model that, based on industry standards (centered largely on ISA-95 and ISA-88), supports the definition of an enterprise model down to assets and associated measurements

Central to IBM Intelligent Operations for Water is a semantic model called the Reference Semantic Model (RSM). The RSM is a semantic model because it provides a real world abstraction of the enterprise and assets in a graphical model. Through it, applications can access information from disparate systems with various access methods. IBM Intelligent Operations for Water extends the RSM with water-specific content.

The information model in IBM Integrated Information Core contains named entities based on industry standards (today, primarily including ISA-95, ISA-88, and ISO15926) and relationships either defined by those standards or implied by combining the standards into one, homogenous model.

The Reference Semantic Model is queried through services or (based on the deployment) through a SPARQL interface.

Another key component of the IBM Integrated Information Core architecture is the model aware adapters layer that supports integration of various types of endpoints (OPC, databases, and web services accessible applications), and maps of the information flowing between those endpoints and elements of the model.

There are really two views of the IBM Integrated Information Core semantic model:

- Reference model
- Instantiated model

Reference model (ontology)

This view defines the classes that exist in the model and the relations between them, but does not correspond to any particular enterprise or asset.

Instantiated model

This view includes instances of the classes that have a direct mapping to real-world entities. They are populated with a set of properties (for example, location, temperature) and with relationships to other instantiated entities in the model.

Related concepts:

"Customizing the connected resource network" on page 146
A connected resource network is a network of connected pipes, sewers, or other nodes. Examples of a connected resource network are a pipe network and a sewer network. By extending the IBM Intelligent Operations for Water semantic model, you can customize the connected resource network to meet your requirements.

Customizing asset types and instance

Assets types such as sensors and meters are central to the infrastructure of water management systems. Using the IBM Intelligent Operations for Water semantic model, you can distinguish between asset types. Changes to the infrastructure, for example adding asset types, requires that you update the model instance. Use the tasks in this section to customize the IBM Intelligent Operations for Water semantic model to your implementation.

Related concepts:

"Samples" on page 6
IBM Intelligent Operations for Water provides samples that show the features that are available in IBM Intelligent Operations for Water, and how to use them.

Defining asset types:

Use the information in this section to define asset types.

Operators use the Map portlet and Details portlet to work with asset types. A number of asset types are packaged in the IBM Intelligent Operations for Water content pack. For example, Trunk Line Monitor, Wastewater Plant, River Gauge, Lift Station, Rain Gauge, CSO Diversion Structure. To view the packaged asset types on the IBM Intelligent Operations for Water interface, open the Map portlet, and navigate to the **Select Content: Asset Types** option. Asset types are displayed in the **Asset Type** column on the **Assets** tab of the Details portlet. You can define your own asset types, as the topics in this section describe.

Related concepts:

"Samples" on page 6
IBM Intelligent Operations for Water provides samples that show the features that are available in IBM Intelligent Operations for Water, and how to use them.

Modifying the packaged asset types:

You can update the asset types that are packaged with IBM Intelligent Operations for Water.

Before you begin

To perform any model management tasks in IBM Intelligent Operations for Water you must be logged on as administrator and have access to the IBM Integrated Information Core administrative console on the application server.

About this task

To modify the existing asset type ontology, you must export the packaged asset type ontology.

Procedure

1. Open your web browser.
2. Enter the web address supplied by your system administrator that points to the application server that is running the IBM Integrated Information Core administrative console software. For example: `http://management node:82/iic/console`. The administrative console login window is displayed.
3. Select the **Model Manager** tab. The **Model Manager** tab displays consolidated model management data and provides options to change, query, and manage the semantic model.
4. Click **Ontologies** from the options on the left side of the tab. The asset type ontology is initially named `asset_type.owl`. The output of the file is an RDF file with the xml extension. You can use a plain text editor or an RDF editor to edit the file.
5. Right-click the asset type ontology from the list, and click **Export**. The asset type ontology is initially named `asset_type.owl`. The output of the file is an RDF file with the .xml extension. You can edit the file with a plain text editor or an RDF editor.
6. Select the destination folder for the ontology.

What to do next

The packaged ontology is now available for subsequent customization.

Defining a new asset type:

When you define a new asset type, you modify the owl ontology and then add the new asset type.

Before you begin

Before extending the model, consider the classes that already exist and consider extending the most appropriate subtype. *WIH* itself has two specific extension points: *WIH_SensorMeter_Asset*, which can be used for any kind of water sensor or meter, and *WIH_PipelineAsset*, which can be used for pipes or other connectable asset. Both of these extension points are subclassed from `RSM_WorkEquipment`.

Additionally, IBM Intelligent Operations for Water loads several classes that map to EPANET types. These include the following class hierarchy, starting with *WIH_PipelineAsset* and extending through the EPANET classes:

- + *WIH_PipelineAsset*
  - + *EPANET_Entity*
    - + *EPANET_Link*
      - + *EPANET_Pipe*
      - + *EPANET_Pump*
      - + *EPANET_Valve*
    - + *EPANET_Node*
      - + *EPANET_Junction*
      - + *EPANET_Reservoir*
      - + *EPANET_Tank*

Procedure

1. Open the exported owl ontology file in any text editor.
2. Modify the owl ontology to add the new asset type. For example, to add a water usage meter type to the *WIH_SensorMeter_Asset* class:

a. Open the ontology file in any text editor.
b. Go to the section below of the ontology file.
c. Add a phrase similar to the following example to the file.

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:owl="http://www.w3.org/2002/07/owl#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
xml:base="http://SunshineWaterGroup" >
  <rdf:Description rdf:about="http://SunshineWaterGroup#WaterUsageMeter">
    <rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
    <rdfs:label xml:lang="en">Water Usage Meter</rdfs:label>
    <rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_SensorMeter_Asset"/>
<rdfs:comment>Water Usage Meter</rdfs:comment>
  </rdf:Description>
</rdf:RDF>
```

Note: The namespace `http://SunshineWaterGroup` must be unique and applied to all models for a customer. The namespace is used in subsequent configuration.

3. Save your changes to the file.

What to do next

The updated ontology is now ready to import into the model manager.

Adding the new asset type:

When you add a new asset type, you import the updated asset type ontology into the model manager.

Procedure

1. Log on to the IBM Integrated Information Core administrative console software. For example: `http://`*`management node:82`*`/iic/console`. The administrative console login window is displayed.
2. Select the **Model Manager** tab.
3. Click **Load** from the options on the left side of the tab. Select the owl file to load into the model manager.
4. Perform a SPARQL query of the model to verify asset type updates have been registered in the model manager.
   a. Select the **Model Manager** tab and click **Query**.
   b. Enter the following SPARQL input in the upper part of the tab.

```
PREFIX cim:http://iec.ch/TC57/CIM-generic#
PREFIX rdfs:http://www.w3.org/2000/01/rdf-schema#
PREFIX wih:http://www.ibm.com/water/wih#
SELECT ?object_ID ?object_Name ?object_Comment
WHERE {
  ?object_ID rdfs:subClassOf wih:WIH_SensorMeter_Asset; rdfs:label ?object_Name.
   OPTIONAL { ?object_ID rdfs:comment ?object_Comment. }
 }
```

5. Perform the check. The query results are displayed in the lower part of the tab.

Related tasks:

"Configuring the IBM Intelligent Operations for Water database with the new asset type"
When you configure the IBM Intelligent Operations for Water database with a new asset type, you update the table to add the new namespace URL in the model.

Configuring the IBM Intelligent Operations for Water database with the new asset type:

When you configure the IBM Intelligent Operations for Water database with a new asset type, you update the table to add the new namespace URL in the model.

Procedure

1. Log on to the Data server.
2. Open the database table: WIH_GLOBAL_CONFIG. See the related task.
3. Update the value of the RDF_PREFIX configuration key with the value that was used when adding the new asset type. For example, `http://SunshineWaterGroup`. See the related task.

   Note: The value in the RDF_PREFIX field must match the namespace URL in the model.

   ```
   <rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
    xmlns:owl="http://www.w3.org/2002/07/owl#"
    xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
    xml:base="http://SunshineWaterGroup" >
   ```
4. Open the IBM Intelligent Operations Center application at `http://`*host*`/wpsv70/wps/portal`, select the **Water** tab, and click **Select Content** to ensure that the additional types you defined appear in the **Asset Type** list. If the additional types do not appear in the **Asset Type** list, review the related task and confirm that the correct definition is included.

Results

The database table recognizes the new asset type.

Related tasks:

"Adding the new asset type" on page 138
When you add a new asset type, you import the updated asset type ontology into the model manager.

"Opening the database table"
If an IBM Intelligent Operations for Water procedure instructs you to open the database table and you are uncertain about how to perform that step, follow the steps in this topic.

Opening the database table:

If an IBM Intelligent Operations for Water procedure instructs you to open the database table and you are uncertain about how to perform that step, follow the steps in this topic.

Procedure

1. Log on to the database server as root, type `xhost +`, and press **Enter**.
2. Change to user db2inst1, type `su - db2inst1`, and press **Enter**.
3. Type `db2cc` to open the DB2® Connect Client.
4. In **All Databases**, select the **WIHDB** database.

Related tasks:

"Configuring the IBM Intelligent Operations for Water database with the new asset type" on page 138
When you configure the IBM Intelligent Operations for Water database with a new asset type, you update the table to add the new namespace URL in the model.

Creating an asset model instance:

IBM Intelligent Operations for Water requires metadata to provide context and value to information displayed in portals. When customizing the model, you must also add metadata specific to sensors and meters including information such as asset type, asset name, asset description, measurement types and so on. Use the information in this topic to create an asset model instance with model metadata.

Modifying the packaged asset model:

When you modify the existing asset model, you must export the packaged asset model.

Before you begin

To perform any model management tasks in IBM Intelligent Operations for Water you must be logged on as administrator and have access to the IBM Integrated Information Core administrative console on the application server.

Procedure

1. Open your web browser.
2. Enter the web address supplied by your system administrator that points to the application server that is running the IBM Integrated Information Core administrative console software. For example: `http://management node:82/iic/console`. The administrative console login window is displayed.
3. Select the **Model Manager** tab. The **Model Manager** tab displays consolidated model management data and provides options to change, query, and manage the semantic model.
4. Click **Graphs** from the options on the left side of the tab.
5. Right-click the graph from the list, and click **Export**.
6. Select the destination folder for the model instance

What to do next

The model instance is now available for subsequent customization.

Defining a new asset instance:

When you define a new asset instance, the model instance metadata is captured in the RDF file.

Procedure

1. Open the exported model instance RDF file.
2. To modify the model namespace.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<?xml version="1.0" encoding="UTF-8"?>
<rdf:RDF xmlns:cim="http://iec.ch/TC57/CIM-generic#" xmlns:dm="http://iec.ch/2002/schema
/CIM_difference_model#" xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:tns="http://SunshineWaterGroup#" xml:base="http://SunshineWaterGroup">
```

   Note: The namespace must be unique and applied to all models for a customer.
3. To define an asset in the model instance.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<tns:WaterUsageMeter rdf:ID="WaterUsageMeter_1">
  <cim:RSM_IdentifiedObject.name>Water Usage Meter 1</cim:RSM_IdentifiedObject.name>
  <cim:RSM_UnnamedObject.description>Water Usage Meter 1</cim:RSM_UnnamedObject.description>
</tns:WaterUsageMeter>
```

4. To define an asset location in the model instance.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<cim:RSM_GeoSpacial rdf:ID="WaterUsageMeter_1_Location">
  <cim:RSM_IdentifiedObject.name>WaterUsageMeter_1_Location</cim:RSM_IdentifiedObject.name>
  <cim:RSM_UnnamedObject.description>WaterUsageMeter_1_Location</cim:RSM_UnnamedObject.description>
  <cim:RSM_Location.TypeOfLocation>ISO6709</cim:RSM_Location.TypeOfLocation>
  <cim:RSM_GeoSpacial.InternalLocation>41.69974,-86.31132</cim:RSM_GeoSpacial.InternalLocation>
  <cim:RSM_Location.providesLocationOf_PhysicalEntity rdf:resource="#WaterUsageMeter_1"/>
</cim:RSM_GeoSpacial>
```

5. To define a measurement provided by an asset.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<cim:RSM_Measurement rdf:ID="WaterUsageMeter_1_WaterUsage">
  <cim:RSM_IdentifiedObject.name>Water Usage</cim:RSM_IdentifiedObject.name>
  <cim:RSM_UnnamedObject.description>Water Usage</cim:RSM_UnnamedObject.description>
  <cim:RSM_Measurement.UOM>tons</cim:RSM_Measurement.UOM>
  <cim:RSM_Measurement.associatedTo_physicalEntity rdf:resource="#WaterUsageMeter_1"/>
  <cim:RSM_Measurement.Type>WaterUsage</cim:RSM_Measurement.Type>
</cim:RSM_Measurement>
```

6. To define a measurement value provided by an asset.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<cim:RSM_MeasurementValue rdf:ID="WaterUsageMeter_1_WaterUsage_Value">
<cim:RSM_IdentifiedObject.name>WaterUsageMeter_1_WaterUsage_Value</cim:RSM_IdentifiedObject.name>
  <cim:RSM_UnnamedObject.alias>water_usage_1</cim:RSM_UnnamedObject.alias>
  <cim:RSM_MeasurementValue.IsA_Measurement rdf:resource="#WaterUsageMeter_1_WaterUsage"/>
</cim:RSM_MeasurementValue>
</rdf:RDF>
```

   Note: The alias of the measurement value must be unique as the IBM Intelligent Operations for Water event flow uses the alias to identify and read data related to the measurement.
7. Save your model instance metadata updates by saving the file.

Importing asset data into the model instance:

When you update the model instance with new asset data, you must import the updated model instance into the model manager.

Procedure

1. Log on to the IBM Integrated Information Core administrative console software. For example: `http://`*`management node:82`*`/iic/console`. The administrative console login window is displayed.
2. Select the **Model Manager** tab.
3. Click **Load** from the options on the left side of the tab. Select the RDF file to load into the model manager.
4. Perform a SPARQL query of the model to verify the data has loaded in the model manager.
   a. Select the **Model Manager** tab and click **Query**.
   b. Enter the following SPARQL input in the upper part of the tab.

```
PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
PREFIX wih:<http://www.ibm.com/water/wih#>
SELECT *
WHERE {
?asset_ID a wih:WIH_SensorMeter_Asset; a ?asset_Type_ID.
?asset_ID cim:RSM_IdentifiedObject.name ?asset_Name.
OPTIONAL { ?asset_ID cim:RSM_UnnamedObject.description ?asset_Description. }
}
```

5. Perform the check. The query results are displayed in the lower part of the tab.

Updating the database with model changes:

When you update the database with model changes, you synchronize model instance changes to the database.

About this task

To update the database with model instance changes, a script is available.

Procedure

1. Log on to the application server and go the following folder:/opt/IBM/iss/iow/apps
2. Run the following command to update the database with model changes.
   ./syncModelToDB.sh *MGMT_NODE_HOSTNAME* 82 *DB_NODE_HOSTNAME* 50000 db2inst1 *DB_PASSWORD PREFIX*
   where
   - *MGMT_NODE_HOSTNAME* is the fully qualified host name of the management node.
   - *DB_NODE_HOSTNAME* is the fully qualified host name of the database node.
   - *DB_PASSWORD* is the password of the DB2 user db2inst1.
   - *PREFIX* is the namespace URL of the model. For example, http://SunshineWaterGroup.

   Note: When you update the model, you must run the command in Step 2 to synchronize model changes to the database.

Results

The database is updated with model instance changes.

Configuring the interface to display model changes:

To view the underlying model changes in IBM Intelligent Operations for Water interface, you need to perform the configuration steps in this section.

About this task

Both the Map portlet and the Details portlet are used to represent the underlying model in the IBM Intelligent Operations for Water interface. When you add new logical zones, change geographic areas, create new assets types, add new measurements, or set new thresholds for indicators, you must configure the interface for those model changes. Use the steps in this task to configure the interface for model changes.

Defining an icon to represent the asset type:

When you create a new asset type you must assign an icon to that asset type so that the asset can be viewed in the portlets, and be distinguished from other assets in the IBM Intelligent Operations for Water interface.

About this task

To define an icon to represent an asset type:

Procedure

1. Go to the database server.
2. Open the IOW database: WIHDB. DB2 instance: db2inst1.
3. Use the script to insert the image configured for the new asset into the CONFIG_ASSET_IMAGE table.

```
INSERT INTO WIH.CONFIG_ASSET_IMAGE (ASSETTYPE,SMALLICONURL,LARGEICONURL,HIGHLIGHTICONURL,GREYICONURL)
VALUES (
    'http://SunshineWaterGroup#WaterUsageMeter',
    '/water_wih_common_widgets_web/images/Small/FlowMeter.General_16.png',
```

```
    '/water_wih_common_widgets_web/images/Large/FlowMeter.General_38.png',
    '/water_wih_common_widgets_web/images/Hilite/FlowMeter.General_38_HILITE.png',
    '/water_wih_common_widgets_web/images/Grey/FlowMeter.General_38_GREY.png'
);
```

Note: If you need to create new icons, use the size and style of the existing icons. The packaged icons are available in the `water_wih_common_widgets_web/images` folder.

Configuring asset key measurements:

Asset may contain a number of measurements. In the IBM Intelligent Operations for Water interface, one is selected as the key measurement. Use the information in this topic to configure asset measurements.

About this task

To configure asset measurements.

Procedure

1. Go to the database server.
2. Open the IOW database: WIHDB.
3. Open the KEY_MEASUREMENT_CONFIG database table.
4. Create a mapping in a table row between the work equipment and the key measurement.
   a. WORKEQUIPMENT_RDFID = `<namespaceURL>#<ID of asset>`
   b. KEY_MEASUREMENT_RDFID = `<namespaceURL>#<ID of measurement>`

   For example: WORKEQUIPMENT_RDFID = `http://cityName#LiftStation1` and KEY_MEASUREMENT_RDFID = `http://cityName# LiftStation1-M.Pump1-CRT`.

Setting thresholds for asset measurements:

Measuring the performance of assets in the infrastructure is important to determine operational efficiency. By setting the thresholds for asset measurements, you can monitor the status of assets and define acceptable and unacceptable boundaries for measurement values. The Details portlet uses these measurements to indicate when status values are acceptable (green), warrant caution (yellow), or are critical (red) and require immediate attention. Use the information in this topic to set thresholds for asset measurements.

Procedure

1. Locate the asset and measurement value for which you want to set thresholds, described in the related task. Read the value from the **Alias** field of the **Measurement Details** dialog.
2. Go to the database server.
3. Open the Water Information Hub database: WIHDB.
4. Open the MEASUREMENT_VALUE database table.
5. In the MEASUREMENT_VALUE_ALIAS column, search for the alias identified in step 1. Note the value in the MEASVAL_ID column for the measurement.
6. Open the THRESHOLD_CONFIG table. In the MEASVAL_ID column, search for the measurement value identified in step 5.
7. Edit the threshold values in the row to update range start and end.

   Valid threshold values are as follows:

   - 0 (Acceptable)
   - 1 (Caution)
   - 2 (Critical)

Related information:

Displaying measurement values for assets
Use the information in this topic to display measurement values for water assets and equipment on the Operator: Operations view.

Specifying settings when reading no measurement data:

Use the information in this topic to specify timeout settings when there are no measurement data readings. By setting the timeout value, you can configure when the status notifications are displayed on the Details portlet in the event that no measurement reading is received from a sensor or asset.

Procedure

1. Go to the database server.
2. Open the Water Information Hub database: WIHDB.
3. Open the NO_DEVICE_READING_CONFIG database table.
4. In the MEASVAL_ID column, search for the measurement value you want to update.
5. Edit the timeout value for the selected measurement value. Enter the measurement in milliseconds.

   Note: When the timeout value is specified, if no new data is read after the specified time interval, the measurement status in the **Assets** tab of the Details portlet displays **NO READING** (grey background).

Setting up logical zones for assets:

Logical zone settings are displayed on the Map portlet. Use the information in this topic to configure logical zones to filter assets by geographical location.

Procedure

1. Go to the database server.
2. Open the Water Information Hub database: WIHDB.
3. Open the ZONES database table.
4. Add a new entry to the zone table using the following sample SQL.

```
INSERT INTO WIH.ZONES(PREFIX, NAME, DESCRIPTION, LOCATION)
VALUES (
'http://sampleCity',
'Test Zone 1',
'Test Zone 1',
db2gse.ST_Polygon ('polygon ((-86.25021 41.72178, -86.24953 41.60175, -86.17674 41.59815,
-86.16301 41.73511, -86.25021 41.72178))', 1003)
);
```

Configuring the Map portlet default location:

Use the information in this topic to configure the longitude and latitude settings for the Map portlet.

Before you begin

You must be logged on as administrator to configure the default location.

About this task

To configure the default location.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. Select **Edit** > **Configure** on the Map portlet.
4. Change the values in the **Center latitude** and **Center longitude** fields as required.

Verifying data flow using the Simulator:

IBM Intelligent Operations for Water provides a simulation tool that monitors incoming folders, parses CSV files, and sends data readings. You can use the Simulator to check operational data flows sourced from external systems.

Before you begin

The Simulator is installed on the application server in the directory: `/opt/IBM/iss/iow/apps/simulator`. Before you start the Simulator, please check you have configuration settings as follows in the `simulator.properties` file.

```
[root@icpvm19671 simulator]
# cat simulator.properties
#This file is use to define properties for CSV simulator

#WAS Server host name where JMS Connection Factory is configured.
hostname=icpvm19671.cn.ibm.com

#WAS Server port where JMS Connection Factory is configured.
port=10035

#Queue connection factory JNDI name
target.queue.connection.factory=jms/wih.mb.con.factory

#Queue JNDI Name
target.queue=jms/water.wih.reading.in.q

#The directory where the incoming message file is put.
#Once new files are copied into this folder, the file will processed.
incoming.message.dir=/opt/IBM/iss/iow/apps/simulator/incoming

#After new files are processed, the processed files will be copied into this directory.
processed.message.dir=/opt/IBM/iss/iow/apps/simulator/incoming/processed

# In millisecond. This configuration is used to define the scan interval.
By default, incoming.message.dir will be scanned every 5 seconds.
scan.interval=5000

# In millisecond. This configuration is used to define the message sending interval.
The message found will be sent every configured milliseconds.
send.interval=10000
```

Procedure

1. Start the Simulator by running the following command:

   ```
   nohup ./run_simulator.sh > simulator.log &
   ```

   Note: Check the Simulator is not already running. To check the startup status, view the Simulator log by entering the command: **`tail –f simulator.log`**. If the Simulator is running, you will need to stop and restart if you have made any changes to the configuration.
2. Create and send the sample reading data.
   a. Locate a measurement reading in the IBM Intelligent Operations for Water interface as described in the link below. Remember the alias of the selected measurement.
   b. Create a new CSV file to simulate a new measurement reading. For example:

```
water_usage_4,1.0,2012-05-23T14:30:01.0+08:00
```

c. Send the reading to IBM Intelligent Operations for Water. Copy the CSV to the Simulator by running the following command.

```
cp Reading1.csv  /opt/IBM/iss/iow/apps/simulator/incoming/
```

3. Verify the value, status trending, and send time in the IBM Intelligent Operations for Water interface has changed.

Related tasks:

"Verifying the message flow" on page 153
You can verify that the measurement reading event flows are forwarded to the *WATER.USAGE.INI* queue.

Related information:

Displaying measurement values for assets
Use the information in this topic to display measurement values for water assets and equipment on the Operator: Operations view.

Customizing the connected resource network

A connected resource network is a network of connected pipes, sewers, or other nodes. Examples of a connected resource network are a pipe network and a sewer network. By extending the IBM Intelligent Operations for Water semantic model, you can customize the connected resource network to meet your requirements.

See the related link for information about the semantic network.

Related concepts:

"Customizing the model" on page 135
By extending the IBM Intelligent Operations for Water semantic model, you can build a customized model to meet your requirements. Use the information in this section to customize the semantic model.

Defining the customized connected resource network asset type

When you define a customized connected resource network asset type, you import the asset type into the model manager.

Before you begin

To perform any model management tasks in IBM Intelligent Operations for Water you must be logged on as administrator and have access to the IBM Integrated Information Core administrative console on the application server.

Procedure

1. Define the new customized connected resource network asset type.
   a. Open the exported owl ontology file in any text editor
   b. Modify the owl ontology to add the new asset type. To add a customized connected resource network asset type to the *WIH_Pipeline_Asset* class:
      1) Open the ontology file in any text editor.
      2) Go to the section below of the ontology file.
      3) Add a phrase similar to the following example to the file.

```
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:owl="http://www.w3.org/2002/07/owl#" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#"
xml:base="http://SunshineWaterGroup" >
<rdf:Description rdf:about="http://SunshineWaterGroup#Pipe">
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/>
<rdfs:label xml:lang="en">Pipe</rdfs:label>
<rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_Pipeline_Asset"/>
<rdfs:comment>Pipe</rdfs:comment>
</rdf:Description>
```

```
<rdf:Description rdf:about="http://SunshineWaterGroup#Junction">
<rdf:type rdf:resource="http://www.w3.org/2002/07/owl#Class"/
<rdfs:label xml:lang="en">Junction</rdfs:label>
<rdfs:subClassOf rdf:resource="http://www.ibm.com/water/wih#WIH_Pipeline_Asset"/
<rdfs:comment>Junction</rdfs:comment>
</rdf:Description>
</rdf:RDF>
```

Note: The namespace `http://SunshineWaterGroup` must be unique and applied to all models for a customer. The namespace is used in subsequent configuration.

c. Save your changes to the file.

2. Import the updated asset type ontology into the model manager.
   a. Log on to the IBM Integrated Information Core administrative console software. For example: `http://`*`management node:82`*`/iic/console`. The administrative console login window is displayed.
   b. Select the **Model Manager** tab.
   c. Click **Load** from the options on the left side of the tab. Select the owl file to load into the model manager.
   d. Perform a SPARQL query of the model to verify asset type updates have been registered in the model manager.
      1) Select the **Model Manager** tab and click **Query**.
      2) Enter the following SPARQL input in the upper part of the tab.

```
PREFIX cim:http://iec.ch/TC57/CIM-generic#
PREFIX rdfs:http://www.w3.org/2000/01/rdf-schema#
PREFIX wih:http://www.ibm.com/water/wih#
SELECT ?object_ID ?object_Name ?object_Comment
WHERE {
  ?object_ID rdfs:subClassOf wih:WIH_SensorMeter_Asset; rdfs:label ?object_Name.
   OPTIONAL { ?object_ID rdfs:comment ?object_Comment. }
 }
```

   e. Perform the check. The query results are displayed in the lower part of the tab.

Creating the connected resource network model instance

The connected resource network asset instances define the resources, the junctions of the connected resource network, and their relationship. Use the information in this topic to create a connected resource network model instance.

About this task

The model instance metadata is captured in the RDF file. Use the *RSM_ConnectionPoint* and *ISO15926_ConnectionNode* classes to define the assets and to describe the connections between assets.

Procedure

1. Open the exported model instance RDF file.
2. Define the asset instances in the connected resource network.
   a. Navigate to the section below of the file.
   b. Add content similar to the following example.

```
<?<?xml version="1.0" encoding="UTF-8"?"?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
xmlns:cim="http://iec.ch/TC57/CIM-generic#" xmlns:dm="http://iec.ch/2002
/schema/CIM_difference_model#"
xmlns:tns="http://sampleCity#" xml:base="http://SunshineWaterGroup">
<!-a Tank segment - START ->
<tns:Junction rdf:ID="Junction1">
  <cim:RSM_IdentifiedObject.name>Junction1</cim:RSM_IdentifiedObject.name>
  <cim:RSM_UnnamedObject.mrid>Junction1</cim:RSM_UnnamedObject.mrid>
  <cim:RSM_PhysicalEntity.TypeOfPhysicalEntity>WorkEquipment
```

```
</cim:RSM_PhysicalEntity.TypeOfPhysicalEnt>
  <cim:RSM_WorkEquipment.TypeOfEquipment>Tank</cim:RSM_WorkEquipment.TypeOfEquipment>
</tns:Junction>
<cim:RSM_GeoSpacial rdf:ID="Junction1-Location>
 <cim:RSM_IdentifiedObject.name>Junction1-Location</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.description>Junction1-Location/<cim:RSM_UnnamedObject.description>
 <cim:RSM_Location.TypeOfLocation>ISO6709</cim:RSM_Location.TypeOfLocation>
 <cim:RSM_GeoSpacial.InternalLocation>41.70158782221015,-86.2688320725981
</cim:RSM_GeoSpacial.InternalLocation>
 <cim:RSM_Location.providesLocationOf_PhysicalEntity rdf:resource="#Junction1"/>
</cim:RSM_GeoSpacial>
<tns:Pipe rdf:ID="Pipe1">
 <cim:RSM_IdentifiedObject.name>Pipe1</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.mrid>Pipe1</cim:RSM_UnnamedObject.mrid>
 <cim:RSM_PhysicalEntity.TypeOfPhysicalEntity>WorkEquipment
</cim:RSM_PhysicalEntity.TypeOfPhysicalEntity>
 <cim:RSM_WorkEquipment.TypeOfEquipmen>Pipeline</cim:RSM_WorkEquipment.TypeOfEquipment>
</tns:Pipe>
<cim:RSM_GeoSpacial rdf:ID="Pipe1-Location">
 <cim:RSM_IdentifiedObject.name>Pipe1-Location</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.description>Pipe1-Location</cim:RSM_UnnamedObject.description>
 <cim:RSM_Location.TypeOfLocation>ISO6709</cim:RSM_Location.TypeOfLocation>
 <cim:RSM_GeoSpacial.InternalLocation>41.671220788544815,-86.23071260541845
</cim:RSM_GeoSpacial.InternalLocation>
 <cim:RSM_Location.providesLocationOf_PhysicalEntity rdf:resource="#Pipe1"/>
</cim:RSM_GeoSpacial>
```

3. Define the connection points of the asset instances.
   a. Navigate to the section below of the file.
   b. Add content similar to the following example.

```
<cim:RSM_ConnectionPoint rdf:ID="Pipe1_CPoint1">
 <cim:RSM_IdentifiedObject.name>Pipe1_CPoint1</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.mrid>Pipe1_CPoint1</cim:RSM_UnnamedObject.mrid>
 <cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Pipe1"/>
 <cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe1_Junction1_CNode"/>
</cim:RSM_ConnectionPoint>
<cim:RSM_ConnectionPoint rdf:ID="Junction1_CPoint1">
 <cim:RSM_IdentifiedObject.name>Junction1_CPoint1</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.mrid>Junction1_CPoint1</cim:RSM_UnnamedObject.mrid>
 <cim:RSM_ConnectionPoint.belongsTo_PhysicalEntity rdf:resource="#Junction1"/>
 <cim:ISO15926_ConnectionPoint.To_ConnectionNode rdf:resource="#Pipe1_Junction1_CNode"/>
</cim:RSM_ConnectionPoint>
```

4. Define the connection node that connect two connection points.
   a. Navigate to the section below of the file.
   b. Add a phrase similar to the following example.

```
<cim:ISO15926_ConnectionNode rdf:ID="Pipe1_Junction1_CNode">
 <cim:RSM_IdentifiedObject.name>Pipe1_Junction1_CNode</cim:RSM_IdentifiedObject.name>
 <cim:RSM_UnnamedObject.mrid>Pipe1_Junction1_CNode</cim:RSM_UnnamedObject.mrid>
Pipe1_Junction1_CNode>
</cim:ISO15926_ConnectionNode>
```

5. Save your model instance metadata updates by saving the file.
6. Import the customized resource network instances into model server.
   a. Log on to the IBM Integrated Information Core administrative console software. For example: `http://`*`management node:82`*`/iic/console`. The administrative console login window is displayed.
   b. Select the **Model Manager** tab.
   c. Click **Load** from the options on the left side of the tab. Select the owl file to load into the model manager.
   d. Perform a SPARQL query of the model to verify asset type updates have been registered in the model manager.
      1) Select the **Model Manager** tab and click **Query**.

2) Enter the following SPARQL input in the upper part of the tab.

```
PREFIX cim:<http://iec.ch/TC57/CIM-generic#>
PREFIX rdfs:<http://www.w3.org/2000/01/rdf-schema#>
PREFIX wih:<http://www.ibm.com/water/wih>
SELECT *
WHERE {
?asset_ID a wih:WIH_Pipeline_Asset; a ?asset_Type_ID.
?asset_ID cim:RSM_IdentifiedObject.name ?asset_Name.
OPTIONAL { ?asset_ID cim:RSM_UnnamedObject.description ?asset_Description. }
```

e. Perform the check. The query results are displayed in the lower part of the tab.

Using the command line to generate connected resource network asset instances:

You can use the command line to create a new RDF file. Use the information in this topic to generate connected resource network asset instances.

Procedure

1. Log on to the WebSphere Application Server administrative console at `http://APPLICATION_SERVER_HOST:9060/admin` using the WebSphere Application Server Administrative ID admin and password. *APPLICATION_SERVER_HOST* is the host name for the application server.
2. Select the `/opt/IBM/iss/iow/apps` folder, and submit the following command:

   `opt/IBM/WebSphere/AppServer/java/bin/java -jar ModelUtil.jar pipe_asset_csv_file pipe_link_csv_file rdf_filebase_namespacebase_namespace_name`,

   where

   - *pipe_asset_csv_file* is a file that defines the connected resource network assets in CSV format. The first column is the unique ID of the asset, the second column is the custom-defined type ID, and the third column is the asset location.

     For example,

     ```
     sunshine_pipeline_assets.csv:
     Name,Type,Location
     Junction_26103,Junction,"25.769364482651095,-80.23951063848175"
     Junction_26103xexe1,Junction,"25.77021366468323,-80.24000354629214"
     Pipe_610e1,Pipe,"25.769789073667162,-80.23975709238695"
     ```

   - *pipe_link_csv_file* is a file that defines the connection between assets. The first column is the unique ID of the asset, and the second column is the unique ID of the junction.

     ```
     sunshine_pipeline_connections.csv:
     Pipe_610e1,Junction_26103
     Pipe_610e1,Junction_26103xexe1
     ```

   - *rdf_file* is the file name of the generated RDF file.
   - *base_namespace* is the namespace URL of the generated RDF file.
   - *base_namespace_name* is the prefix of the generated RDF file.

   The following example shows the output of a generated .rdf file.

   ```
   root@app-ioc apps# /opt/IBM/WebSphere/AppServer/java/bin/java -jar ModellUtil.jar
   /root/sunshine_pipeline_assets.csv /root/sunshine_pipeline_connections.csv
   /root/sunshine_pipeline_instances.rdf http://SunshineWaterGroup tns
   RDF file /root/sunshine_pipeline_instances.rdf is generated successfully.
   ```

3. Modify the generated .rdf file as needed, or import the generated file directly into the model server.

   Follow these steps to import the .rdf file into the model server:

   a. Open the model manager console at http://<*mngt_node*>:82/iic/console.

   b. Select **Model Manager** > **Load**, and upload the .rdf file.

   Follow these steps to upload the modified .rdf file into the model server:

   a. Open the model manager console at http://<*mngt_node*>:82/iic/console.

   b. Select **Model Manager** > **Graphs**, and delete the original .rdf graph.

c. Select **Model Manager** > **Load**, and upload the updated .rdf file.

Note: You cannot use the command line to modify an existing .rdf file.

Generating a KML file from the connected resource network asset instance

You use a Keyhole Markup Language (KML) file to view the pipe network on the Map portlet. Use the information in this topic to generate a KML file from the connected resource network asset instance.

Procedure

1. Log on to the WebSphere Application Server administrative console at `http://APPLICATION_SERVER_HOST:9060/admin` using the WebSphere Application Server Administrative ID admin and password. *APPLICATION_SERVER_HOST* is the host name for the application server.
2. Submit the following command:

   ```
   /opt/IBM/iss/iow/lib/water_wih_common_utils.jar:/opt/IBM/iss/iow/lib/
   water_wih_common_resources_utils.jar:/opt/IBM/iss/common/lib/iss_common.jar:/opt/IBM/iss/
   common/lib:/opt/IBM/iss/common/lib/CDI_ModelServer_EJBClient.jar
   com.ibm.iss.water.wih.util.KMLGenerator mgmt_node_hostname82targetFolder nameSpacePrefix
   ```

   For example,

   ```
   /opt/IBM/WebSphere/AppServer/java/bin/java -cp /opt/IBM/iss/iow/lib/
   water_wih_common_utils.jar:/opt/IBM/iss/iow/lib/water_wih_common_resources_utils.jar:/opt/
   IBM/iss/common/lib/iss_common.jar:/opt/IBM/iss/common/lib:/opt/IBM/iss/common/lib/
   CDI_ModelServer_EJBClient.jar com.ibm.iss.water.wih.util.KMLGenerator mgmt-ioc.cn.ibm.com 82
   /tmp http://SunshineWaterGroup
   ```

   A generated KML file named `pipenetwork.kml` appears in the `/tmp` folder.

Configuring the interface to display the generated KML file

After you generate the KML file, you must add it into an existing application. Use the information in this topic to add the KML file.

Procedure

1. Log on to the WebSphere Application Server administrative console at `http://APPLICATION_SERVER_HOST:9060/admin` using the WebSphere Application Server Administrative ID admin and password. *APPLICATION_SERVER_HOST* is the host name for the application server.
2. Copy the generated KML file into the following folder:

   /opt/IBM/WebSphere/wp_profile1/installedApps/cell1/water_wih_portal_ear.ear/water_wih_asset_service_web.war/
3. Log on to the IBM Intelligent Operations for Water user interface as operator.
4. Select the Operator: Operations view.
5. Check that the connected resource network appears in the **Map** portlet.

Customizing data import and operational storage

With IBM Intelligent Operations for Water, you can build a customized data consolidation plan to gather and reconcile data from many sources. Use the information in this section to customize data population.

IBM Intelligent Operations for Water uses the middleware components provided by IBM Intelligent Operations Center 1.5 to manage and process data streams sourced from external systems. IBM Intelligent Operations for Water works with data that is extracted from sources such as sensor systems, meter systems, or enterprise asset management systems. The extracted data is transformed using WebSphere Message Broker and then loaded into operational data stores for use by IBM Intelligent Operations for Water.

The middleware components accept common separated value (CSV) data feeds. Using the CSV data feed, IBM Intelligent Operations for Water generates an RDF model that is imported into the model manager. The model instance is extendable, and describes the water network, assets, connection points and geographic locations. Working with WebSphere Message Broker, you can create a schedule to connect to SCADA systems historians.

Related concepts:

Chapter 4, "Integrating the solution," on page 45
Products and services can be integrated with IBM Intelligent Operations for Water.

Importing data from external systems

WebSphere Message Broker connects applications together, regardless of the message formats or protocols that they support. For IBM Intelligent Operations for Water, data that is exported from external systems is available as CSV files. Data that is imported to IBM Intelligent Operations for Water through WebSphere Message Broker is validated, enriched, transformed, and then routed to the appropriate data stores.

IBM Intelligent Operations for Water uses a common data ingest mechanism. Sensor or meter data that is exported from data management systems as CSV files is ingested into IBM Intelligent Operations for Water internal data stores. When the CSV file is exported from the data management system, the data is placed on a WebSphere Message queue: *Water.Usage.IN*. WebSphere Message Broker applications monitor the queue. When a message that contains water usage reading data is placed on the queue, the data in the queue is updated in the IBM Intelligent Operations for Water analytic data stores. When the WebSphere Message Broker data consolidation is completed, data is forwarded to the *WIH.READING.IN* queue for operational processing by IBM Intelligent Operations for Water.

Checking extended model data is in the operational database

Use the information in this task to check extended model data is in the operational database.

Before you begin

Ensure that you have completed any customization steps to extend the model. The operational database must be configured with the required asset types. Review the steps described in "Customizing asset types and instance" on page 136 to ensure that the operational database is updated with model instance changes.

About this task

Procedure

1. Log in to the database server as *root* and enter `xhost +`.
2. Change to user *db2inst1* and enter `su - db2inst1`.
3. Enter `db2cc` to open the DB2 Control Center.
4. Select the **All Databases** option to view the availableIBM Intelligent Operations for Water orIBM Intelligent Operations Center databases. Select **WIHDB** to view the IBM Intelligent Operations for Water database.

Working with imported data

Use the information in this topic to work with imported data.

WebSphere Message Broker integrates the applications that supply and use data in the operational store. WebSphere Message Broker routes data to a number of locations.

- Data is routed to the operational store for use by the model manager.
- Data is routed to the geo-spatial store where sensor data resides.

- Data is routed to the reporting and analytical store where custom report and advanced analytic data resides.
- Data is routed to the IBM Intelligent Operations Center event and KPI subsystems for impact analysis and event correlation.

Preparing for the analytical database

To prepare the analytical database, you must create and catalog the database.

Before you begin

Ensure that database connections have been established before you run the scripts provided by IBM Intelligent Operations for Water.

Procedure

1. Create the database on the database server.
2. Insert the sample data.
3. Catalog the WIHANLDB database to the event server.
   a. Create the ODBC source on the Event server.
   b. Edit the `/var/mqm/odbc.ini` file to add the following stanza

```
;# DB2 stanza
[WIHANLDB]
;#DRIVER=libdb2Wrapper.so
DRIVER=/opt/IBM/DB2/lib64/libdb2.so
Description=WIHANLDB DB2 ODBC Database
Database=WIHANLDB
```

Defining the message flow

To define the message flow, you must be familiar with WebSphere Message Broker and know how to create the queue and import the required data to create the message flow.

Procedure

1. Create Queue WATER.USAGE.IN in WIH.MB.QM queue manager in WebSphere MQ Explorer.
2. Install the WebSphere Message Broker Toolkit 8.0.
3. Import the required code to WebSphere Message Broker Toolkit 8.0 to create the message flow

```
WATER.USAGE.IN ---> Compute ---> WIH.READING.IN
```

Related information:

WebSphere Message Broker information center

Deploying the message flow

To deploy the message flow, you must be familiar with WebSphere Message Broker commands required to associate a specific user ID and password with one or more resources that are accessed by the broker.

Procedure

1. Set up security credentials for WIHANLDB using the WebSphere Message Broker command.

```
mqsisetdbparms WIH_BROKER -n WIHANLDB -u db2inst1 -p passw0rd
```

2. Deploy the message flow directly using the WebSphere Message Broker Toolkit.
   a. Select the required flow.
   b. Open the **Deploy** window.
   c. Click **Finish** to deploy.
3. Optionally, you can deploy the generated bar file directly using the following command.

```
${MB_HOME}/bin/mqsideploy WIH_BROKER –e default –a <barfile_path>
```

4. Restart WebSphere Message Broker.

Related information:

WebSphere Message Broker information center

Working with the message queues

Create the Java Message Service (JMS) queue on the Portal server by updating resource settings using the WebSphere Application Server administrative console.

Procedure

1. Log on to the WebSphere Application Server administrative console at the following URL:
   `https://appserver:9043/ibm/console`
2. Select **Resources** > **JMS** > **Queues**.
3. Modify the **Scope** to read `Cluster=Portal` and click **New**.
4. Click **WebSphere MQ messaging provider** when selecting the JMS resource provider.
5. Create a JMS queue for the WATER.USAGE.INI message queue with the following entries.
   a. **Name:** `water.usage.in.q`
   b. **JNDI name:** `jms/water.usage.in.q`
   c. **Queue name:** `WATER.USAGE.IN`
   d. **Queue manager:** `WIH.MB.QM`
6. Go to **Servers** > **Clusters** > **WebSphere application server clusters**. Restart the Portal server.

Verifying the message flow

You can verify that the measurement reading event flows are forwarded to the *WATER.USAGE.INI* queue.

Procedure

1. Perform the verification steps in the linked topic.
2. Set the target queue in the `simulator.properties` file.
   `target queue = jms/water.usage.in.q`
3. Log on to the WebSphere Application Server administrative console at the following URL:
   `https://appserver:9060/ibm/console`
4. Go to **Servers** > **Clusters** > **WebSphere application server clusters**.
5. Restart the Portal cluster.

Related tasks:

"Verifying data flow using the Simulator" on page 145
IBM Intelligent Operations for Water provides a simulation tool that monitors incoming folders, parses CSV files, and sends data readings. You can use the Simulator to check operational data flows sourced from external systems.

Customizing data processing

You can customize data processing in IBM Intelligent Operations for Water to suit the requirements of your operational and executive staff. By specifying and implementing user specific Key Performance Indicators (KPIs), you can establish service level agreements and key measurements to meet the performance needs of your organization and key stakeholders.

Customizing data processing involves working with IBM Intelligent Operations Center to build and deploy customized KPIs that are used in IBM Intelligent Operations for Water. You should be familiar with the following tasks.

Defining the KPI CAP Event

Before defining or modifying a KPI you must understand the Common Alerting Protocol (CAP)

alert on which the KPI is based. For example, if you are defining a KPI that tracks the status of water pressure sensors, you must know the CAP elements to track (water sensor name, reading time, reading status, reading value).

Creating a KPI Model
With your understanding of the Common Alerting Protocol (CAP) alert and purpose of the KPI, you can begin to model the KPI using available tooling.

Creating a KPI Policy
The KPI policy sets the framework for when KPI processing is triggered, when data consolidation happens, when KPI CAP events are built and sent to the IBM Intelligent Operations Center.

This section provides guidelines on how to create and deploy a customized KPI using the samples provided in the IBM Intelligent Operations for Water content pack.

Related concepts:

Chapter 4, “Integrating the solution,” on page 45
Products and services can be integrated with IBM Intelligent Operations for Water.

Defining a KPI CAP event

Events are received by IBM Intelligent Operations for Water in the Common Alerting Protocol (CAP) format. The events are displayed on both the Map and Details portlets.

About this task

The WebSphere Message Broker, which is provided with IBM Intelligent Operations Center, accepts CAP event messages and uses the data in KPI calculations. KPI definitions determine how events are displayed. For example, if a KPI threshold is exceeded, the event might be flagged with a higher urgency or severity. The following is a sample KPI CAP event definition.

```
<?xml version="1.0" encoding="UTF-8"?>
<cap:alert xmlns:cap="urn:oasis:names:tc:emergency:cap:1.2"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="urn:oasis:names
:tc:emergency:cap:1.2 CAP-v1.2-os.xsd ">
 <cap:identifier>c329ac4e-c9e0-47d7-85b6-369d242ad2b1</cap:identifier>
 <cap:sender>My_KPI_Policy</cap:sender>
 <cap:sent>2012-03-07T12:30:00-05:00</cap:sent>
 <cap:status>Actual</cap:status>
 <cap:msgType>Alert</cap:msgType>
 <cap:scope>Public</cap:scope>
 <cap:code>KPI</cap:code>
 <cap:info>
  <cap:category>Infra</cap:category>
  <cap:event>water_pressure_kpi</cap:event>
  <cap:urgency>Unknown</cap:urgency>
  <cap:severity>Unknown</cap:severity>
  <cap:certainty>Unknown</cap:certainty>
  <cap:eventCode>
   <cap:valueName>OwningOrg</cap:valueName>
   <cap:value>Water</cap:value>
  </cap:eventCode>
  <cap:parameter>
   <cap:valueName>Alias</cap:valueName>
   <cap:value>water_pressure_1</cap:value>
  </cap:parameter>
  <cap:parameter>
   <cap:valueName>Reading Time</cap:valueName>
   <cap:value>2012-06-27T119:00:00.000+08:00</cap:value>
  </cap:parameter>
  <cap:parameter>
   <cap:valueName>Reading Value</cap:valueName>
   <cap:value>1</cap:value>
  </cap:parameter>
```

```
  <cap:parameter>
   <cap:valueName>Reading Status</cap:valueName>
   <cap:value>1</cap:value>
  </cap:parameter>

 </cap:info>
</cap:alert>
```

Related information:

Integrating with the Common Alerting Protocol

CAP structure

Event types

Using CAP for KPI events

Creating a KPI model

KPIs are modeled using Rational Application Developer or WebSphere Integration Developer with the IBM WebSphere Business Monitor Developers toolkit. For more information on using these tools, see the information centers for these products.

Procedure

See the IBM Intelligent Operations Center information center for detail about creating a KPI model.

Related information:

Creating and Integrating KPIs

Modeling KPIs

WebSphere Business Monitor information center

IBM developerWorks article: Developing KPIs (Part 1)

IBM developerWorks article: Developing KPIs (Part 2)

Deploying the KPI model to Intelligent Operations Center

After defining key performance indicators (KPIs) and their monitor models, the monitor models need to be deployed to the IBM WebSphere Business Monitor running on the IBM Intelligent Operations Center analytic server.

About this task

To deploy a monitor model that will be used by the IBM WebSphere Business Monitor, Java™ Enterprise Edition (JEE) projects must be generated from the defined models. When the JEE projects are generated, the model application can be exported as an EAR file. The EAR file can then be deployed into the IBM WebSphere Business Monitor running on the IBM Intelligent Operations Center analytic server.

Procedure

1. Log on to the WebSphere Application Server administrative console.
2. Select **Applications** > **Application Type** > **WebSphere Enterprise Applications** > **Install New Application**.
3. Map the KPI model to the appropriate server. For example, deploy the KPI model EAR file `Water_PressureApplication.ear` to target cluster `WBM_DE.AppTarget`. When the installation is complete, you receive a notification that the application installed successfully.
4. Go to **Applications** > **Monitor Models** to verify the model has been deployed.

Attention: When deploying the KPI model, a message may be displayed by the WebSphere Application Server administrative console stating that 'No application modules were mapped to Web servers. The plug-in configuration file (`plugin-cfg.xml`) for each Web server is generated based on the application modules which are mapped to it, therefore no Web server will route requests to this application. To change this option, select the Map modules to servers step.' You can ignore this message.

5. To verify that the Water_PressureApplication is started, go to **Applications** > **Application Types** > **WebSphere Enterprise Applications** and check that the application status is green.

Related information:

Deploying monitor models

Configuring a KPI

Using the IBM Intelligent Operations Center tools, you can customize the Key Performance Indicator (KPI) models to suit your business processes.

About this task

Use the Key Performance Indicators portlet to customize KPIs in the IBM Intelligent Operations Center. The Key Performance Indicators portlet is provided for the administrator as one of the **Solution Customization Tools** options. Using the portlet, you can view KPI properties; create, copy, or modify KPIs; and view or change the hierarchical displays for KPI models.

Procedure

1. Log on to IBM Intelligent Operations Center as administrator.
2. Navigate to **Administration** > **Solution Customization Tools** > **Key Performance Indicators**.
3. Use the tree to select the KPI and modify settings as required.
   a. Click **Add Owning Organization** to associate an organization to the KPI.
   b. Set the KPI levels as required
4. Click **Save**.
5. Return to the Executive: Status view.
6. Verify that the KPI is displayed in the Key Performance Indicator Drill Down portlet.

What to do next

Sample KPIs and monitor models are provided with IBM Intelligent Operations Center. The KPIs are designed to provide guidance for implementing different types of KPIs using the IBM WebSphere Business Monitor.

The IBM Intelligent Operations Center resource bundles can be used to provide alternate display values from those values provided by the IBM WebSphere Business Monitor models. For more information on sample KPIs and customizing display values, read the linked IBM Intelligent Operations Center topics.

Related information:

Customizing KPIs in Intelligent Operations Center

KPI Display values in Intelligent Operations Center

Sample KPIs in Intelligent Operations Center

Checking the KPI

Using the IBM Intelligent Operations Center tools, you can check the Key Performance Indicator (KPI) models to suit your business processes.

Procedure

1. In the WebSphere Portal Administration interface, click **Intelligent Operations** > **Demonstration Tools** > **Sample Event Publisher**.
2. Click the **Event Form** tab.
3. Click the **Event CAP** tab.
4. From the **Category** list, select an event category.
5. For the **Event Message** field, choose one of the following options:
   - To insert the XML for the corresponding pre-written CAP message automatically into the **Event Message** field, from the **Sample Event** list, select an event. If you want, edit the XML to suit your requirements.
   - In the **Event Message** field, manually enter the XML for the CAP message from scratch.
6. In the **Event Instance Count** field, either enter the number of messages required, or use the arrows to select the number of messages required. You can submit a single CAP message or an automated sequence of messages.
7. Optional: Select the **Randomize Events** check box. If you select **Randomize Events**, a sequence of CAP messages is published with random IDs applied. The messages are published at incremental time intervals, and in random locations within a range.
8. Click **Submit Event**.

Results

The Sample Publisher populates the IBM Intelligent Operations Center with events and can trigger KPIs.

Related information:

Creating and publishing test events

Working with the Sample Publisher

Creating a KPI policy

Using Tivoli Netcool/Impact, you can create a customized KPI policy.

Related tasks:

"Creating an event policy" on page 167

An event policy determines when to trigger standard operating procedure processing. A policy also encompasses event data consolidation, CAP event construction, and sending a CAP event to the IBM Intelligent Operations Center.

Setting up the project

When you create a KPI policy, the first step is to create a new project in Tivoli Netcool/Impact.

Procedure

1. Log on to Tivoli Netcool/Impact as administrator.
2. On the **Projects** tab, click the plus sign (+) at the top right.
3. In the **Project Name** field, type a project name. For example, type **My Project**.
4. From the **List By Section:** list, select **Data Sources**.
   a. From the **Global Repositories** list, select **IOC_CAP_IN**, click **Add**, and click **OK**.
5. From the **List By Section:** list, select **Services**.
   a. From the **Global Repositories** list, select **WIH_Event_Reader**, click **Add**, and click **OK**.
6. To verify that the project settings are created correctly, select the project from the **Projects:** list. For example, select **My Project**.
   a. Verify that **IOC_CAP_IN** appears in the **List by Section:** > **Data Sources** list.
   b. Verify that **WIH_Event_Reader** appears in the **List by Section:** > **Services** list.

Creating the policy framework

You create a customized KPI policy within the newly created Tivoli Netcool/Impact project.

Procedure

1. Log on to Tivoli Netcool/Impact as administrator.
2. On the **Properties** tab, select the new impact project and expand the **Policies** menu.
3. From the **Template** drop-down list, select **Custom** and click the plus sign (+) to create a new policy.
4. In the **Policy Name** field of the **Custom** tab, type a name for the newly created policy and click **Save**. The Tivoli Netcool/Impact policy editor displays content similar to the following example. In the example, the name of the policy is **My_KPI_Policy**.

```
Log(3, "Entry: My_KPI_Policy");
Log(3, "Exit: My_KPI_Policy");
```

Adding a KPI CAP alert to the policy

If a sensor exceeds a threshold, an event Common Alerting Protocol (CAP) alert is sent to IBM Intelligent Operations Center to trigger a KPI calculation in IBM WebSphere Business Monitor.

Procedure

1. Log on to Tivoli Netcool/Impact as administrator.
2. Create a CAP event. Select the **My_KPI_Policy** tab.
3. Retrieve data required from external data sources by using the *EventContainer* global variable.

   IBM Intelligent Operations for Water provides basic variable definitions in the *EventContainer* global variable. To access the *EventContainer* global variable, add content similar to the following example:

```
Log(3, "Entry:My_KPI_Policy"):
If(EventContainer.MEASUREMENT_TYPE 1= "WaterPressure"){
Log(3, EventContainer.MEASUREMENT_VALUE_ALIAS+ "is not WaterPressure");
```

   You can also retrieve data from any external source. See the following example script.

```
DataType = "SysProp";
Filter ="Realm = 'System' AND Subject = '*' AND Name = 'EventContainerDeleteEvent'";
CountOnly = False;
SystemProps = GetByFilter(DataType, Filter, CountOnly);
```

   Table 1 lists the event container variables.

Table 13. Event Container Variables

Variable	Type	Columns
MEASVAL_ID	Integer	Internal ID of measurement value
PREFIX	String	Model prefix of the customer, e.g. http://cityName
ASSET_RFID	String	Asset ID in model, e.g. http://cityName#assetId
ASSET_TYPE	String	Asset Type label in model
ASSET_NAME	String	Asset Name in model
ASSET_LOCATION	String	Asset Location in WKT, e.g. POINT (-86.2103940 41.6611900)
MEASUREMENT_RFID	String	Measurement ID in model
MEASUREMENT_NAME	String	Measurement name in model
MEASUREMENT_TYPE	String	Measurement type in model
MEASUREMENT_UOM	String	Measurement unit in model
MEASUREMENT_VALUE_RFID	String	Measurement value ID in model

Table 13. Event Container Variables (continued)

Variable	Type	Columns
MEASUREMENT_VALUE_NAME	String	Measurement value name in model
MEASUREMENT_VALUE_ALIAS	String	Measurement value alias in model
READING_VALUE	String	Current reading value
READING_THRESHOLD	Integer	Threshold status of reading, 0:Acceptable, 1:Caution, 2:Critical
READING_TRENDING	Integer	Trending of the reading, -1:Down, 0:Flat, 1: Up
READING_TIME	String	Current reading time in format of xsd:dataTime, e.g. 2012-06-24T04:02:13.000+08:00
READING_TIME_UTC_MILLIS	Long	Reading time in milliseconds
READING_TIME_SQL_TIMESTAMP	java.sql.Timestamp	Reading time in java.sql.Timestamp

Sending the CAP alert to IBM Intelligent Operations Center triggers a KPI calculation in IBM WebSphere Business Monitor.

The following is an example KPI CAP alert.

```
Log(3, "Entry:My_KPI_Policy"):
If(EventContainer.MEASUREMENT_TYPE 1= "WaterPressure"){
Log(3, EventContainer.MEASUREMENT_VALUE_ALIAS+ "is not WaterPressure");
Log(3, "Exit: My_KPI_Policy");
}

WIH_KPI_UTILS.GenerateUUID(CAPIdentifier);
CAP_Alert = "<?xml version=\"1.0\"encoding=\"UTF-8\"?>n"
<cap:alert xmlns:cap=\um:oasis:names:tc:emergency:cap:1.2\" xmlns:xsi=\http
<cap:identifier>" + CAPIdentifier + "</cap:identifier>\n"
<cap:sender>My_KPI_Policy</cap:sender>\n"
<cap:sent>2012-03-07T12:30:00-05:00</cap:sent>\n"
<cap:status>Actual</cap:status>\n"
<cap:msgType>Alert</cap:msgType>\n"
<cap:scope>Public</cap:scope>\n"
<cap:code>KPI</cap:code>\n"
<cap:info>\n"
<cap:category>Infra</cap:category>\n"
<cap:urgency>Future</cap:urgency\n">
<cap:severity>Minor</cap:severity>\n"
<cap:certainty>Likely</cap:certainty>\n"
<cap:event>water_pressure_event</cap:event>\n"
<cap:headline>water pressure event</cap:headline>\n"
</cap:info>\n"
</cap:alert>;

Log(3, CAP_Alert);
Log(3, "Sending CAP Alert to IOC");
JMSDateSource = "IOC_CAP_IN";
MsgProps = NewObject( );
SendJMSMessage(JMSDataSource,MsgProps,Cap_Alert);

Log(3, "Exit:My_KPI_Policy");
```

Binding the KPI policy to the event

After you create the new Tivoli/Impact project, the customized KPI policy, and the KPI CAP alert in the policy, you bind the KPI policy to the Water Information Hub reader service.

Procedure

1. Log on to Tivoli Netcool/Impact as administrator.
2. On the **Projects** tab, expand the **Services** menu and select **WIH_Event_Reader**.
3. On the **Event Mapping** tab, select **New Mapping:New**.
4. In the **Create a New Event Filter:** area, click the down arrow beside **Policy to Run:** and locate the new policy

   For example, the name of the new policy that you previously created is **My_KPI_Policy**.
5. Select **Active** and **Chain**.
6. On the **Server Status** tab, click **Stop** and then click **Start** to restart **WIH_Event_Reader**.

Checking the KPI policy

After you create a customized KPI policy, you can check the policy to ensure that messages are successfully sent.

Procedure

1. Log on to Tivoli Netcool/Impact as administrator.
2. On the **Service Status** tab, select **Policy Logger**.
3. In the **PolicyLogger Service:** area, use the **Highest Log Level** drop-down list to change the logging level as needed. Level 3 is recommended.
4. Use the simulator to send several readings to trigger the KPI policy.
5. Go to event host, and check the log file: `/opt/IBM/netcool/impact/log/NCI_policylogger.log`.
6. If the IBM Intelligent Operations Center XML probe on `event-ioc.cn.ibm.com` is not already running, submit the following command:

   ```
   export OMNIHOME="/opt/IBM/netcool/omnibus"
   nohup /usr/bin/nohup $OMNIHOME/probes/nco_p_xml -name ioc_xml -propsfile
   $OMNIHOME/probes/linux2x86/ioc_xml.props > /dev/null 2>&1 &
   ```
7. Log on to `app-ioc.cn.ibm.com` and locate the `/opt/IBM/iss/water/wih/apps/simulator` folder.
8. Create the following reading CSV file: `water_pressure_1,100,2012-06-26T14:35:11.000+08:00`.
9. Submit the following command to send the message to the IBM Intelligent Operations Center: `cp reading.csv incoming/`.
10. Log on to the IBM Intelligent Operations for Water interface as *wpsadmin*.

    If you are unfamiliar with logging on to the IBM Intelligent Operations for Water user interface, see the related task.
11. Select the Key Performance Indicator Drill Down.
12. Check the KPI activities in the portlet.

Customizing business reporting

IBM Intelligent Operations for Water supports the generation of many types of business relevant custom reports.

Using the reporting capabilities that are provided by IBM Intelligent Operations Center, you can create new reports or customize the predefined reports installed with the solution to suit the requirements of your water network. The IBM Intelligent Operations Center provides a reporting subsystem that uses IBM Cognos® Business Intelligence to create and manage reports. The reporting subsystem is installed on the analytic server.

To customize business reporting in IBM Intelligent Operations for Water, you should be familiar with IBM Cognos Business Intelligence and be able to complete the following steps.

- Import the water usage metadata.
- Define the data model.

- Define the report.
- Import the report package on the IBM Intelligent Operations for Water Cognos server
- Integrate the report page with the IBM Intelligent Operations for Water portal.

Related information:

IBM Cognos Business Intelligence information center

Importing water metadata

Before creating reports in IBM Intelligent Operations for Water, you must import metadata. Using the IBM® Cognos® Framework Manager metadata modeling tool, you can import metadata from a variety of data sources. Framework Manager is part of IBM Cognos Business Intelligence, the reporting subsystem used by IBM Intelligent Operations Center.

Before you begin

Before you can import metadata, you must create a project in IBM® Cognos® Framework Manager. IBM® Cognos® Framework Manager provides a Metadata Wizard used to import metadata from data sources. The prerequisite DB2 Client software must be installed and the database must be cataloged.

About this task

Procedure

1. Click the namespace, folder, or segment that you want to import into, and from the **Actions** menu, click **Run Metadata Wizard**.
2. Click the data source that you want to import. For sample water usage data, select the Water Information Hub Analytic data store: **WIHANLDS**.
3. Proceed through the steps presented by the Metadata Wizard to select the objects you want to import. A list of created objects is displayed in the Project Viewer.

Defining the metadata model

Using the IBM® Cognos® Framework Manager metadata modeling tool, you can define the metadata for your project. IBM Intelligent Operations for Water provides a sample water analytic usage metamodel. A metamodel defines the language and processes from which to form a model.

About this task

The IBM Intelligent Operations for Water data model is organized as layers. The following views are available in the sample water analytic usage metamodel :

Database View
: This view contains database tables and can not be changed by report authors.

Business View
: This view contains dictionaries, filters, and data and can not be changed by report authors.

Dimension View
: This view contains dimensions for reports and analysis to customize time, account, measurement, and location dimensions and can not be changed by report authors.

Presentation View
: This view contains namespaces that are made available to report authors to create customized reports.

Creating the custom report

Using Report Studio in IBM Cognos Connection, you can create new reports and modify existing reports.

About this task

Using the objects that are available in the Presentation View of the metadata model, you can create customized reports.

Procedure

1. Open IBM Cognos Connection.
2. From the Launch menu, select **Report Studio**.
3. Select the Water Information Hub package to access the presentation view of the metamodel.
4. Click **Create New**.
5. Select the type of report type to build.
6. Click **OK**.

Working with the sample reports

Use the information in this topic to import a new report or import a report that is packaged with IBM Intelligent Operations for Water.

Before you begin

Using IBM® Cognos® Administration available from the launch menu in IBM Cognos Connection, you can import the sample business report. You must have the required permissions to access IBM Cognos Administration.

About this task

To import the report, you must prepare the business report database setup, catalog the database, and create a datasource for the report on the Cognos Administration console.

Procedure

1. Set up the business report database.
   a. Run the `create_WIH_ANALYSIS_DB.ddl` script to create WIHANLDB database on the database node as db2inst1 instance user.
   b. Run the `create_WIHANALYSIS_DB_tables.ddl` script to create the tables in the database WIHANLDB.
2. Register the WIHANLDB database on the analytic server node
   a. Run the `db2 catalog database wihanldb as wihanldb at node db2node` script on the Cognos node.
3. Create the WIHANLDS datasource for the report on the Cognos Administration web console with the following details:

   ```
   Type: IBM DB2
   DB2 database name: WIHANLDB
   Name: WIHANLDS
   UserID/Password: db2inst1/password
   ```

   Note: The DB2 administrator provides the password.
4. Import the report to the Cognos Administration console.
   a. Copy the `water_usage_report.zip` file to `cognos_home/deployment/`.
   b. Go to **Configuration** > **Content Administration**.
   c. Click **New Import**, and select the `water_usage_report` deployment archive.
   d. Accept the default settings, and click **Next** to complete the remaining configuration.
   e. Click **Finish** to import the report.

Configuring a portlet to display reports

Use the information in this topic to configure a portlet to display reports.

About this task

Using WebSphere Portal, you can use standard portlet configuration options to create a reports portlet in IBM Intelligent Operations for Water that can reference a URL.

Procedure

1. Log on to the solution portal as an administrator.
2. Navigate to **Administration** > **Portlet Management** > **Web Modules**
3. Navigate to **Administration** > **Portlet Management** > **Portlets**.
4. On the **Manage Portlets** screen, search for **Reports** and click **Copy** to create a duplicate of that portlet.
5. Copy the link from the Cognos web console and paste the link into the newly created report portlet in the portal application.

Customizing business processes

IBM Intelligent Operations for Water supports the generation of many types of business processes including standard operating procedures in response to systems alerts and event.

Using the business process capabilities that are provided by IBM Intelligent Operations Center, you can create new business processes or customize the predefined standard operating procedures to suit the requirements of your operations. The IBM Intelligent Operations Center provides capabilities to manage alerts, including those requiring immediate or standard responses.

Customizing standard operating procedure

A standard operating procedure defines a sequence of activities that are triggered in response to an event in which parameters meet certain predefined conditions, where each activity corresponds to either a manual or an automated task. You can customize standard operating procedure and activities to manage events that come into the IBM Intelligent Operations Center.

Use the standard operating procedure portlet to access the standard operating procedure, standard operating procedure selection matrix, and Workflow Designer applications in Tivoli Service Request Manager®. To launch the standard operating procedure portlet, in the WebSphere Portal Administration interface, click **Administration** > **Solution Customization Tools** > **Standard Operating Procedures**. To customize standard operating procedure, click the down arrow in the upper right corner of the portlet to see your portlet menu customization options.

Creating standard operating procedures

Create a standard operating procedure, and assign it to an owner group. Users are assigned to an owner group through their membership of a person group.

Procedure

1. To open the Standard Operating Procedures portlet, in the WebSphere Portal Administration interface, click **Intelligent Operations** > **Customization Tools** > **Standard Operating Procedures**.
2. To open the standard operating procedure application, click **Standard Operating Procedures**.
3. In the Standard Operating Procedure window, on the **List** tab, click the **New SOP** icon. A blank standard operating procedure is displayed on the **Standard Operating Procedure** tab.
4. For **SOP Name**, enter a name, and in the field next to **SOP Name**, enter a description. For the names of standard operating procedures, use a consistent format that is similar to the names of the sample standard operating procedures; for example, `Prepare for severe weather evacuation (Prepare)`. Also, if the last character of the name is a closing parenthesis, append the left-to-right mark (LRM)

character to prevent potential problems related to the rendering of bidirectional text. For example, enter the name used in the previous example as `Prepare for severe weather evacuation (Prepare)‎`. The LRM character is not displayed in the user interface after you save the standard operating procedure. Also, if you add a common prefix to the names of all your standard operating procedures, it is easier to filter your standard operating procedures in a search. For example, for customer projects, use the common prefix `CX`.

5. To enter a longer description, click the icon next to the description field and enter a description in the window that is displayed.
6. Under Details, from the **Template Type** list, select **Activity**.
7. Under Details, assign an owner group to the standard operating procedure:
   a. Click the icon next to the **Owner Group** field.
   b. In the Select Value window, select **PLUSIWTO**.
8. Optional: For **Duration**, enter a time limit that the standard operating procedure must be completed in. The format for the time limit is *hh*`:`*mm*, where *hh* is the number of hours and *mm* is the number of minutes. The due date is calculated based on the duration.
9. Add tasks to the standard operating procedure, as required:
   a. Near the lower right of the Tivoli Service Request Manager user interface, click **New Row**. Under SOP Steps, a new task row is appended to the task sequence list.
   b. For **Sequence**, and for **Task**, enter the same number. Number tasks with the following pattern: `10`, `20`, `30`, and so on. If you use this pattern, you have more flexibility to add and remove tasks later.
   c. For **Instruction**, enter a task description. To select from descriptions that you have entered previously, click the icon next to the description field.
   d. Optional: Assign a workflow:
      1) For **Workflow Name**, click the **Select Value** icon.
      2) In the **Select Value** window, click a value in the list to select it. To narrow down the list, in the filter field that is displayed at the top of the list, enter the first few letters of the name of a workflow that you want to use.
      3) Expand the task row and, under Details, enter more details as required. If you want, you can specify an owner group, and flow control settings. If you do not specify an owner group and flow control settings for the task, the task inherits the settings from the parent standard operating procedure.
10. To save the standard operating procedure, near the top of the Tivoli Service Request Manager user interface, click the **Save SOP** icon.
11. For the standard operating procedure to be applied to the events specified in the standard operating procedure selection matrix, ensure that you change the status from `DRAFT` to `ACTIVE`:
    a. Click the **Change Status** icon.
    b. In the Change Status window, from the **New Status** list, select **Active**.
    c. Optional: Enter values for **As Of Date** and **Memo**.
    d. Click **OK**.
12. To review the available standard operating procedures, do the following steps:
    a. Click the **List** tab.
    b. Under SOP Job Plans, choose one of the following options:
       - In the filter field, press Enter to view all the available standard operating procedures.
       - In the filter field, enter the first few letters of the name of a standard operating procedure.
    c. To view the details for a standard operating procedure, click the name of the standard operating procedure in the list. The details are displayed on the **Standard Operating Procedure** tab.

What to do next

If you want to be able to specify the order in which some or all of the activities in a standard operating procedure are executed, under Details, select the **Flow Controlled?** check box. For more information about how to order the activities that are assigned to users or groups based on standard operating procedures, see the Maximo® Asset Management information center and search for *flow control*.

In the standard operating procedure selection matrix, define the event parameters that determine for which events the standard operating procedure is selected.

Reviewing entries in the standard operating procedure selection matrix

In the standard operating procedure selection matrix, review the selection criteria for each standard operating procedure. The selection criteria are based on event parameters.

Procedure

1. To open the Standard Operating Procedures portlet, in the WebSphere Portal Administration interface, click **Intelligent Operations** > **Customization Tools** > **Standard Operating Procedures**.
2. To open the Standard Operating Procedure Selection Matrix application, click **Standard Operating Procedures Selection Matrix**.
3. In the Standard Operating Procedure Selection Matrix window, to display the filter row, click the **Filter** icon.
4. Determine which filter field to use:
   - Category
   - Severity
   - Urgency
   - Certainty
   - SOP Name
5. Choose one of the following options:
   - In the filter field, press Enter to view all the existing entries that relate to your chosen parameter or standard operating procedure name.
   - In the filter field, enter the first few letters of a value to filter on.
   - If you are filtering on a parameter value, enter values through the Select Value window:
     a. Next to the filter field, click the **Select Value** icon.
     b. In the Select Value window, click a value in the list to select it.
   - To select the name of a standard operating procedure to filter on through the Standard Operating Procedure window:
     a. Next to the **SOP NAME** filter field, click the **Detail Menu** icon, and then click **Go To Standard Operating Procedure**.
     b. In the Standard Operating Procedure window, click the **List** tab.
     c. Under SOP Job Plans, in the filter field, enter the first few letters of the name of a standard operating procedure.
     d. To view the details for a standard operating procedure, click the name of the standard operating procedure in the list. The details are displayed on the **Standard Operating Procedure** tab.
     e. To return the name of the standard operating procedure that is displayed on the **Standard Operating Procedure** tab, in the upper right corner, click **Return With Value**. The name is displayed in the **SOP Name** filter field in the selection matrix.
6. To further refine the list of displayed selection criteria entries, repeat Step 5 using one of the other filter fields listed in Step 4.

Defining parameters in the standard operating procedure selection matrix

In the standard operating procedure selection matrix, define the event parameters that determine whether a standard operating procedure is selected for a particular event.

About this task

You cannot save a standard operating procedure selection matrix that contains two rows of identical selection criteria. If appropriate, a validation message is displayed that informs you that you must define a unique set of selection criteria for a standard operating procedure.

Procedure

1. To open the Standard Operating Procedures portlet, in the WebSphere Portal Administration interface, click **Intelligent Operations** > **Customization Tools** > **Standard Operating Procedures**.
2. To open the Standard Operating Procedure Selection Matrix application, click **Standard Operating Procedures Selection Matrix**.
3. In the Standard Operating Procedure Selection Matrix window, to display the filter row, click the **Filter** icon.
4. In the **SOP Selection Matrix** window, in the lower right corner, click **New Row**. A new row is appended to the selection matrix.
5. Enter values for each of the following parameters:
   - Category
   - Severity
   - Urgency
   - Certainty

   Use one of the following options to enter values for each of the parameters:
   - To enter values through the Select Value window:
     a. Next to the parameter field, click the **Select Value** icon.
     b. In the Select Value window, click a value in the list to select it.
   - To enter the name of the parameter manually:
     a. Enter the first few letters of the value of the parameter in the field.
     b. Press the TAB key to move the cursor to the next field, and the value of the parameter is automatically completed.
6. To enter the name of the standard operating procedure in the **SOP Name** field, choose one of the following options:
   - To enter the name of the standard operating procedure through the Standard Operating Procedure window:
     a. Next to the **SOP NAME** field, click the **Detail Menu** icon, and then click **Go To Standard Operating Procedure**.
     b. In the Standard Operating Procedure window, click the **List** tab.
     c. Under SOP Job Plans, in the filter field, enter the first few letters of the name of a standard operating procedure.
     d. To view the details for a standard operating procedure, click the name of the standard operating procedure in the list. The details are displayed on the **Standard Operating Procedure** tab.
     e. To return the name of the standard operating procedure that is displayed on the **Standard Operating Procedure** tab, in the upper right corner, click **Return With Value**. The name is displayed in the **SOP Name** field of the new row in the selection matrix.
   - Enter the name of the standard operating procedure manually.
7. Click the **Save matrix** icon.

Creating an event policy

An event policy determines when to trigger standard operating procedure processing. A policy also encompasses event data consolidation, CAP event construction, and sending a CAP event to the IBM Intelligent Operations Center.

About this task

When you create an event policy, you first create a new Tivoli Netcool/Impact project. Then you create the customized event policy, construct an event CAP alert in the customized event policy, and bind the customized event to the hub event reader. Finally, you debug the customized event policy.

Related concepts:

"Creating a KPI policy" on page 157
Using Tivoli Netcool/Impact, you can create a customized KPI policy.

Creating a project:

When you create an event policy, the first step is to create a new project in Tivoli Netcool/Impact.

Before you begin

Obtain the URL for your Tivoli Netcool/Impact server.

Procedure

1. Go to Tivoli Netcool/Impact and log on as *admin*. For example, `http://event_host:9080/nci`.
   The default password is *netcool*.
2. On the **Projects** tab, click the plus sign (+) at the top right.
3. In the **Project Name** field, type a project name. For example, type **My Project**.
4. From the **List By Section:** list, select **Data Sources**.
   a. From the **Global Repositories** list, select **IOC_CAP_IN**, click **Add**, and click **OK**.
5. From the **List By Section:** list, select **Services**.
   a. From the **Global Repositories** list, select **WIH_Event_Reader**, click **Add**, and click **OK**.
6. To verify that the project settings are created correctly, select the project from the **Projects:** list. For example, select **My Project**.
   a. Verify that **IOC_CAP_IN** appears in the **List by Section:** > **Data Sources** list.
   b. Verify that **WIH_Event_Reader** appears in the **List by Section:** > **Services** list.

Related tasks:

"Creating a customized event policy"
You create a customized event policy within the newly created Tivoli Netcool/Impact project.

Creating a customized event policy:

You create a customized event policy within the newly created Tivoli Netcool/Impact project.

Before you begin

Obtain the URL for your Tivoli Netcool/Impact server.

Procedure

1. If you are not already logged on, go to Tivoli Netcool/Impact and log on as *admin*. For example, `http://event_host:9080/nci`.
   The default password is *netcool*.

2. On the **Properties** tab, select the new impact project and expand the **Policies** menu.
3. From the **Template** drop-down list, select **Custom** and click the plus sign (+) to create a new policy.
4. In the **Policy Name** field of the **Custom** tab, type a name for the newly created policy and click **Save**.

Related tasks:

"Creating a project" on page 167
When you create an event policy, the first step is to create a new project in Tivoli Netcool/Impact.

"Constructing an event CAP alert"
If a sensor exceeds a threshold, an event Common Alerting Protocol (CAP) alert is sent to IBM Intelligent Operations Center to trigger standard operating procedure processing. The related activities are then displayed in the My Activities portlet of the IBM Intelligent Operations for Water interface so that the operator can address them. You construct an event CAP alert within the newly created Tivoli Netcool/Impact event policy.

Constructing an event CAP alert:

If a sensor exceeds a threshold, an event Common Alerting Protocol (CAP) alert is sent to IBM Intelligent Operations Center to trigger standard operating procedure processing. The related activities are then displayed in the My Activities portlet of the IBM Intelligent Operations for Water interface so that the operator can address them. You construct an event CAP alert within the newly created Tivoli Netcool/Impact event policy.

Before you begin

Obtain the URL for your Tivoli Netcool/Impact server.

Procedure

1. If you are not already logged on, go to Tivoli Netcool/Impact and log on as *admin*. For example, `http://event_host:9080/nci`.

   The default password is *netcool*.
2. In the Tivoli Netcool/Impact policy editor, define the CAP event.
   a. Ensure that the value of the *code* parameter is *event*.
   b. Specify a value for the following parameters:
      - *Category* (possible values include *env*, *fire*, *geo*, *health*, *infra*, *met*, *other*, *rescue*, *safety*, *security*, *transport*)
      - *Urgency* (possible values include *expected*, *future*, *immediate*, *past*, *unknown*)
      - *Severity* (possible values include *extreme*, *minor*, *moderate*, *severe*, *unknown*)
      - *Certainty* (possible values include *likely*, *observed*, *possible*, *unknown*, *unlikely*)

      Note: The Tivoli Service Request Manager determines which standard operating procedures to apply by checking the received CAP event data and comparing these parameters to the standard operating procedure selection matrix records.

   See the following example CAP event.

```
<?xml version="1.0" encoding="UTF-8"?>
<cap:alert xmlns:cap="urn:oasis:names:tc:emergency:cap:1.2"
xmlns:xsi="http://www.w3.org/2001/XMLSchemainstance"
xsi:schemaLocation="urn:oasis:names:tc:emergency:cap:1.2
CAP-v1.2-os.xsd ">
 <cap:identifier>c329ac4e-c9e0-47d7-85b6-369d242ad2b1</cap:identifier>
 <cap:sender>My_Event_Policy</cap:sender>
 <cap:sent>2012-03-07T12:30:00-05:00</cap:sent>
 <cap:status>Actual</cap:status>
 <cap:msgType>Alert</cap:msgType>
 <cap:scope>Public</cap:scope>
 <cap:code>Event</cap:code>
```

```
 <cap:info>
  <cap:category>Infra</cap:category>
  <cap:urgency>Future</cap:urgency>
  <cap:severity>Minor</cap:severity>
  <cap:certainty>Likely</cap:certainty>
  <cap:event>water_pressuer_event</cap:event>
  <cap:headline>water pressure event</cap:headline>
 </cap:info>
</cap:alert>
```

3. Construct the event CAP alert in the customized event policy and send the CAP alert to the **Intelligent Operations Center**.

   Sending the CAP alert to the **Intelligent Operations Center** triggers the appropriate standard operating procedure in Tivoli Service Request Manager.

   See the following example CAP event.

```
Log(3, "Entry: My_Event_Policy");
If(EventContainer.MEASUREMENT_TYPE != "WaterPressure"){
Log(3, EventContainer.MEASUREMENT_VALUE_ALIAS + " is not WaterPressure");
Log(3, "Exit: My_Event_Policy");
Exit();
}
WIH_KPI_UTILS.GenerateUUID(CAPIdentifier);
CAP_Alert = "<?xml version=\"1.0\" encoding=\"UTF-8\"?>\n"
+ "<cap:alert xmlns:cap=\"urn:oasis:names:tc:emergency:cap:1.2\"
xmlns:xsi=\"http://www.w3.org/2001/XMLSchema-instance\"
xsi:schemaLocation=\"urn:oasis:names:tc:emergency:cap:1.2 CAP-v1.2-os.xsd \">\n"
+ "<cap:identifier>" + CAPIdentifier + "</cap:identifier>\n"
+ "<cap:sender>My_KPI_Policy</cap:sender>\n"
+ "<cap:sent>2012-03-07T12:30:00-05:00</cap:sent>\n"
+ "<cap:status>Actual</cap:status>\n"
+ "<cap:msgType>Alert</cap:msgType>\n"
+ "<cap:scope>Public</cap:scope>\n"
+ "<cap:code>Event</cap:code>\n"
+ "<cap:info>\n"
+ "<cap:category>Infra</cap:category>\n"
+ "<cap:urgency>Future</cap:urgency>\n"
+ "<cap:severity>Minor</cap:severity>\n"
+ "<cap:certainty>Likely</cap:certainty>\n"
+ "<cap:event>water_pressure_event</cap:event>\n"
+ "<cap:headline>water pressure event</cap:headline>\n"
+ "</cap:info>\n"
+ "</cap:alert>";

Log(3, CAP_Alert);
Log(3, "Sending CAP Alert to IOC");
JMSDataSource = "IOC_CAP_IN";
MsgProps = NewObject();
SendJMSMessage(JMSDataSource, MsgProps, CAP_Alert);

Log(3, "Exit: My_Event_Policy");
```

   IBM Intelligent Operations for Water provides basic variable definitions in the *EventContainer* global variable. To access the *EventContainer* global variable, add content similar to the following example:

```
Log(3, "Entry:My_Event_Policy"):
If(EventContainer.MEASUREMENT_TYPE 1= "WaterPressure"){
Log(3, EventContainer.MEASUREMENT_VALUE_ALIAS+ "is not WaterPressure");
```

   You can also retrieve data from any external source. See the following example script.

```
DataType = "SysProp";
Filter ="Realm = 'System' AND Subject = '*' AND Name = 'EventContainerDeleteEvent'";
CountOnly = False;
SystemProps = GetByFilter(DataType, Filter, CountOnly);
```

Related tasks:

"Creating a customized event policy" on page 167
You create a customized event policy within the newly created Tivoli Netcool/Impact project.

Binding the customized event policy to the hub reader service:

After you create the new Tivoli Netcool/Impact project, the customized event policy, and the event CAP alert in the policy, you bind the event policy to the hub reader service.

Before you begin

Obtain the URL for your Tivoli Netcool/Impact server.

Procedure

1. If you are not already logged on, go to to Tivoli Netcool/Impact and log on as *admin*. For example, `http://event_host:9080/nci`.

   The default password is *netcool*.
2. On the **Projects** tab, expand the **Services** menu and select **WIH_Event_Reader**.
3. On the **Event Mapping** tab, select **New Mapping:New**.
4. In the **Create a New Event Filter:** area, click the down arrow beside **Policy to Run:** and locate the new policy

   For example, the name of the new policy that you previously created is **My_Event_Policy**.
5. Select **Active** and **Chain**.
6. On the **Server Status** tab, click **Stop** and then click **Start** to restart **WIH_Event_Reader**.

Verifying the customized standard operating procedure and the customized event policy

After you create a customized event policy, you check the policy to verify both the customized standard operating procedure and the customized event policy.

Before you begin

Obtain the URL for your Tivoli Netcool/Impact server.

Procedure

1. If you are not already logged on, navigate to Tivoli Netcool/Impact and log on as *admin*. For example, `http://event_host:9080/nci`..

   The default password is *netcool*.
2. On the **Service Status** tab, select **Policy Logger**.
3. In the **PolicyLogger Service:** area, use the **Highest Log Level** drop-down list to change the logging level as needed. Level 3 is recommended.
4. If the IBM Intelligent Operations Center XML probe on `event-ioc.cn.ibm.com` is not already running, submit the following command:

   ```
   export OMNIHOME="/opt/IBM/netcool/omnibus"
   nohup /usr/bin/nohup $OMNIHOME/probes/nco_p_xml -name ioc_xml -propsfile
   $OMNIHOME/probes/linux2x86/ioc_xml.props > /dev/null 2>&1 &
   ```
5. Log on to `app-ioc.cn.ibm.com` and locate the `/opt/IBM/iss/water/wih/apps/simulator` folder.
6. Create the following reading CSV file: `water_pressure_1,100,2012-06-26T14:35:11.000+08:00`.
7. Submit the following command to send the message to the IBM Intelligent Operations Center: `cp reading.csv incoming/`.
8. Log on to the IBM Intelligent Operations for Water interface as *wpsadmin*.

If you are unfamiliar with logging on to the IBM Intelligent Operations for Water user interface, see the related task.

9. Select Operator: Operations.
10. Check the activities in the My Activities portlet and select the new activity.
11. Click **Start** and then click **Finish**. When you click **Finish**, the activity is processed and removed from the My Activities portlet. The related KPI is updated.

Related tasks:

"Logging on" on page 179
Log on to access the IBM Intelligent Operations for Water user interface.

Customizing the user interface

You can customize some elements of the IBM Intelligent Operations for Water user interface to suit your operation.

Related information:

Customizing the user interface in Intelligent Operations Center

IBM WebSphere Portal product documentation

List of portlets

IBM Intelligent Operations for Water is a portlet-based solution using portal technology.

The following portlets are provided with IBM Intelligent Operations for Water out of the box.

Table 14. List of portlets

Name	Description	Page
Map	• Displays the geographical region with event and resource markers. • Provides a filter form to select the categories of the events to be shown.	Operations
Details	• Linked to the Map portlet. • Provides an interactive and detailed list of events, incidents and assets that you are authorized to view.	Operations
Status	• Provided by IBM Intelligent Operations Center displaying an executive-level summary of the status of KPIs across the organizations that you have permission to view. • Used to view up-to-date changes in the KPI status so that you can plan and take action if necessary.	Executive
Key Performance Indicator Drill Down	• Provided by IBM Intelligent Operations Center and offering drill down capabilities on a specific KPI category. • Used to inspect the underlying KPIs until you reach details of the KPI that caused the status change.	Executive

Table 14. List of portlets (continued)

Name	Description	Page
Notifications	• Portlet provided by IBM Intelligent Operations Center displaying a dynamic, interactive list of alerts that result from changing KPIs and correlated events. • Highlights changes in KPI or event status and shows key details for each of the alerts.	Operations and Executive
My Activities	• Portlet provided by IBM Intelligent Operations Center displaying a list of activities that are owned by the team member logged in. • Lists each activity ID and the related incident information.	Operations and Executive
Sametime	• Portlet provided by IBM Intelligent Operations Center and provides a customizable contact list organized by group. • Used to communicate and collaborate with team members.	Operations and Executive

Related concepts:

"Guidelines for customizing portlets"
You can reposition and customize the portlets on the Operator: Operations or Executive: Status views.

Guidelines for customizing portlets

You can reposition and customize the portlets on the Operator: Operations or Executive: Status views.

Repositioning the portlets

Use the following procedure to move a portlet from its default location to a new location on the same portal page. You can move a portlet up, down, left, or right, depending on its current location. You must have administrative role permissions to reposition the portlets on the page.

1. Log on to the solution portal as an administrator.
2. Open the portal page that you would like to customize.
3. Go to the portlet that you would like to move and click the portlet display menu.
4. Select one of the following options:
   - **Move Up**
   - **Move Down**
   - **Move Left**
   - **Move Right**

   Note: Only the options applicable to the current position of the portlet are available.

Resizing the portlets

All users of IBM Intelligent Operations for Water can resize a portlet, which is useful for viewing the map or graph portlets in more detail.

To resize a portlet, click the upper right corner of the portlet, and select options from the menu that is displayed, as follows:

- To expand the portlet to fill the page, click **Maximize**.
- To hide the portlet contents, other than its title bar, click **Minimize**.
- To restore a minimized or maximized portlet to its default view, click **Restore**.

Note: Resizing a portlet clears the current filter query and results from the map and list.

Customizing the map

You can configure the base geographical information system (GIS) map used by IBM Intelligent Operations for Water. You can also configure the default starting point for the map for each component of the solution. See the related links at the end of this topic for more information about the GIS server requirements for IBM Intelligent Operations for Water and also how to configure the map service.

Customizing the reports

The graph and table summaries generated in the reports portlets of IBM Intelligent Operations for Water are determined by the type of query submitted from the map. You cannot customize the reports in IBM Intelligent Operations for Water. Customized reports are outside the scope of the solution. For more information, contact your IBM Intelligent Water Family representative and arrange a Lab Services engagement.

Related concepts:

"List of portlets" on page 171
IBM Intelligent Operations for Water is a portlet-based solution using portal technology.

Related information:

Customizing the user interface in Intelligent Operations Center

 IBM WebSphere Portal product documentation

Chapter 6. Managing the solution

The topics in this section describe how to perform administrative tasks for IBM Intelligent Operations for Water.

Verifying the version

You can verify the version of IBM Intelligent Operations for Water that you have deployed by using the Intelligent Operations Center - About portlet in the **Administration** portal. You can also verify the version of the IBM Intelligent Operations Center and other integrated IBM Smarter Cities Software Solutions that you have deployed in this environment.

For more information about the Intelligent Operations Center - About portlet, see the IBM Intelligent Operations Center Information Center.

Related information:

Verifying the version of the IBM Intelligent Operations Center and integrated solutions

Controlling the services

IBM Intelligent Operations for Water runs on top of the IBM Intelligent Operations Center production environment. The IBM Intelligent Operations Center server cluster provides the middleware and base architecture for the solution. The services for IBM Intelligent Operations for Water are run and managed from the servers of the IBM Intelligent Operations Center.

For information about how to stop and start the IBM Intelligent Operations Center servers that IBM Intelligent Operations for Water runs on, see the Related information link in the IBM Intelligent Operations Center Information Center.

Related information:

Controlling the IBM Intelligent Operation Center servers

Chapter 7. Maintaining the solution

Perform the tasks described in this section to keep your solution running smoothly.

Tuning performance

You can enhance the performance of the product after you have completed the installation.

IBM Intelligent Operations for Water runs on top of the IBM Intelligent Operations Center. For details on tuning performance in IBM Intelligent Operations for Water, see the section of the IBM Intelligent Operations Center Information Center.

Related information:

Tuning performance in the IBM Intelligent Operations Center

Backing up data

To prevent the loss of valuable data in IBM Intelligent Operations for Water, back up certain files, directories, and databases.

Ensure that the IBM Intelligent Operations for Water database used to store production data and information generated by the solution, is backed up on a regular basis.

Database name	Location	Format
WIHDB	IBM Intelligent Operations Center database server	DB2

IBM Intelligent Operations for Water is integrated with IBM Intelligent Operations Center. When backing up data, ensure that you also backup the IBM Intelligent Operations Center database: IOCDB.

Some data, for example event data that is used by IBM Intelligent Operations for Water, is stored in the IBM Intelligent Operations Center database. There are other files, directories, and databases provided by the IBM Intelligent Operations Center architecture and base platform that must also be backed up regularly. For more information about backing up the IBM Intelligent Operations Center, see the related information.

Related information:

Backing up data in the IBM Intelligent Operations Center

Maintenance tips

Additional tips for maintaining the solution are documented in the form of individual technotes in the IBM Support Portal.

The following link launches a customized query of the live Support knowledge base for IBM Intelligent Operations for Water:

IBM Intelligent Operations for Water technotes and APARs (problem reports)

Chapter 8. Using the solution interface

IBM Intelligent Operations for Water is a product of the IBM Intelligent Water Family that enables water companies to monitor water assets. With IBM Intelligent Operations for Water you can monitor operating alerts and key performance indicators to get a summary and detailed view of water assets. IBM Intelligent Operations for Water aggregates data from water monitoring systems and other asset management systems into a centralized, configurable dashboard that provides valuable information to support water management. IBM Intelligent Operations for Water is a web-based solution that uses portal technology. You can access the solution with any of the supported web browsers.

For details of which browsers are supported, see the detailed system requirements.

Related information:

IBM Intelligent Operations Center browser requirements

Logging on

Log on to access the IBM Intelligent Operations for Water user interface.

Before you begin

Contact your administrator to obtain a user ID and password. Your administrator is responsible for making sure that you have the required system security access level appropriate to your role in your organization. Your administrator also provides you with the web address (URL) for accessing the solution.

About this task

On the main navigation bar at the top of the portal, select **Water** to access the solution from the IBM Intelligent Operations Center or other IBM Smarter Cities Software Solutions installed in this environment. Use the following procedure to start a new browser session and access IBM Intelligent Operations for Water.

Procedure

1. Enter the web address URL into the address field of your web browser. The fully qualified domain name is required in the URL. For example, `http://servername.domainname/wpsv70/wps/myportal`.
2. On the server home page, enter your user ID and password.
3. Click **Sign In**.
4. Select **Water** from the navigation bar at the top of the portal.

Results

The IBM Intelligent Operations for Water home page is displayed in the web browser. Only the pages, features, and data that you have permission to access are displayed. Contact your administrator if you need additional access.

Related tasks:

“Verifying the customized standard operating procedure and the customized event policy” on page 170
After you create a customized event policy, you check the policy to verify both the customized standard operating procedure and the customized event policy.

“Logging off”
Log off to exit the IBM Intelligent Operations for Water user interface and end the server session.

“Viewing or editing your user profile”
Click **Edit My Profile** to access your user profile for the portal server. From your user profile you can modify some of your personal user settings, including password, name, email, and language preferences.

Logging off

Log off to exit the IBM Intelligent Operations for Water user interface and end the server session.

Procedure

To log off from the solution, click **Log Out**. By default, the **Log Out** link is in the upper right corner of the IBM Intelligent Operations for Water interface.

Related tasks:

“Logging on” on page 179
Log on to access the IBM Intelligent Operations for Water user interface.

Viewing or editing your user profile

Click **Edit My Profile** to access your user profile for the portal server. From your user profile you can modify some of your personal user settings, including password, name, email, and language preferences.

Procedure

See the IBM Intelligent Operations Center help and documentation for more information about viewing or editing your user profile.

Related information:

Viewing or editing your user profile in the IBM Intelligent Operations Center

Using pages

The IBM Intelligent Operations for Water user interface is a role-based dashboard for consolidating data. Below the navigation bar are two pages. Each page consists of portlets that you can interact with to access the information you need. Each page provides a consolidated view of water operations that enable specific roles to monitor, manage, and respond to key areas that impact water organizational performance.

Operator: Operations view

Use the Operator: Operations view to maintain awareness of the status of water assets, measurement readings, water events, and their location. The Operator: Operations view is intended for operators, managers, or others monitoring and responding to current water infrastructure events.

The Operator: Operations view is an interactive web page. The view contains the following portlets, which you can think of as independent sections of the page that cooperate with one another to provide comprehensive information and interaction at the operations level.

Table 15. Operator: Operations view portlets

Portlet	Description
"Map" on page 186	A **Geospatial Map** of the geographical region that contains event and resource markers, water asset and status, logical zones and layers. A filter form to select the categories of events to be shown on the map and in the **Events and Incidents** tab on the Details portlet. A filter form to select the asset types to be shown on the map and in the **Assets** tab on the Details portlet. A filter form to select the logical zones to be shown on the map. A filter form to select the layers to be shown on the map. The layers allow you to filter assets to display on the map, for example by virtual group or pipe network. A **Logical Map** of the logical structure that contains a graphical view of the model. The model shows topics, topic associations, and linkages in the model.
"Details" on page 193	The Details portlet is an interactive list portlet. All the events that you are authorized to see are visible on the events list and on any map portlet linked to the Details portlet. Events and incidents and asset details are displayed. Resources in the vicinity of an event can be displayed in a resource list and on a map. Key asset measurements, including current and historical values can be displayed.
"Notifications" on page 198	The Notifications portlet provides a dynamic, interactive list of alerts that result from changing KPIs and correlated events. The role of this portlet is to draw attention to changes in KPI or event status. The list contains key details for each of the alerts.
"My Activities" on page 199	The My Activities portlet displays a list of activities that are owned by the person who is currently logged on to IBM Intelligent Operations for Water. In the My Activities portlet, the activities are grouped by their parent Standard Operating Procedures. Each Standard Operating Procedure corresponds to an individual event.
"Contacts" on page 201	The Sametime portlet provides a contacts list organized by group. It can be customized based on the people you need to communicate with. You can chat with people and modify your online status, contacts, or groups.

For help using each portlet, click the upper right corner of the portlet, and select **Help** from the menu displayed.

To resize a portlet, click the upper right corner of the portlet, and select options from the menu that is displayed, as follows:

- To expand the portlet to fill the page, click **Maximize**.
- To hide the portlet contents, other than its title bar, click **Minimize**.

- To restore a minimized or maximized portlet to its default view, click **Restore**.

Administrator

Customizing a portlet

As an administrator you can change portlet settings by clicking the upper right corner of the portlet, and selecting an option from the portlet menu.

There are two possible modes of customization, each changing the portlet settings for all users:

- **Edit Shared Settings** changes the portlet only for the instance of the portlet you are in when you change the settings.
- **Configure** changes the portlet's global settings for all instances of the portlet wherever those instances occur.

The modes of customization that are available to you depend on the permissions associated with your user ID. Global settings are superseded by shared settings.

The portlets that are supplied with the IBM Intelligent Operations Center have some settings that are specific to a portlet type, for example, set the default zoom level for a map. In addition, you can set generic portlet parameters that are common across the portlets supplied, for example, the portlet title.

Administrator

Customizing a page

As an administrator you can access the WebSphere Portal options for managing pages. Click the right side of the page name tab and select an option from the page menu.

Executive: Status view

Use the Executive: Status view to obtain a consolidated view of key performance indicators (KPIs) and key events. The Executive view enables users with cross-organization responsibility to monitor, manage, and respond to status changes in key areas of organizational performance.

The Executive: Status view is an interactive web page. The view contains the following portlets, which you can think of as independent sections of the page that cooperate with one another to provide comprehensive information and interaction at the executive level.

Table 16. Executive: Status view portlets

Portlet	Description
"Status" on page 196	The Status portlet provides an executive-level summary of the status of KPIs across the organizations that you have permission to view. Use this portlet to view up-to-date changes in the KPI status so that you can plan and act if necessary.
"Key Performance Indicator Drill Down" on page 198	To focus on a specific KPI category, click the category in the Status portlet. This category is then displayed in the Key Performance Indicator Drill Down portlet. You can use the list to inspect the underlying KPIs until you reach details of the KPI that caused the status change.
"Notifications" on page 198	The Notifications portlet provides a dynamic, interactive list of alerts that result from changing KPIs and correlated events. The role of this portlet is to draw attention to changes in KPI or event status. The list contains key details for each of the alerts.

Table 16. Executive: Status view portlets (continued)

Portlet	Description
"My Activities" on page 199	The My Activities portlet displays a list of activities that are owned by the person who is currently logged on to IBM Intelligent Operations for Water. In the My Activities portlet, the activities are grouped by their parent Standard Operating Procedures. Each Standard Operating Procedure corresponds to an individual event.
"Contacts" on page 201	The Sametime portlet provides a contacts list organized by group. It can be customized based on the people you need to communicate with. You can chat with people and modify your online status, contacts, or groups.

For help using each portlet, click the upper right corner of the portlet, and select **Help** from the menu displayed.

To resize a portlet, click the upper right corner of the portlet, and select options from the menu that is displayed, as follows:

- To expand the portlet to fill the page, click **Maximize**.
- To hide the portlet contents, other than its title bar, click **Minimize**.
- To restore a minimized or maximized portlet to its default view, click **Restore**.

Administrator

Customizing a portlet

As an administrator you can change portlet settings by clicking the upper right corner of the portlet, and selecting an option from the portlet menu.

There are two possible modes of customization, each changing the portlet settings for all users:

- **Edit Shared Settings** changes the portlet only for the instance of the portlet you are in when you change the settings.
- **Configure** changes the portlet's global settings for all instances of the portlet wherever those instances occur.

The modes of customization that are available to you depend on the permissions associated with your user ID. Global settings are superseded by shared settings.

The portlets that are supplied with the IBM Intelligent Operations Center have some settings that are specific to a portlet type, for example, set the default zoom level for a map. In addition, you can set generic portlet parameters that are common across the portlets supplied, for example, the portlet title.

Administrator

Customizing a page

As an administrator you can access the WebSphere Portal options for managing pages. Click the right side of the page name tab and select an option from the page menu.

City: Water Conservation

Use the City: Water Conservation view to obtain a consolidated view of resource consumption and use in a city. The City: Water Conservation view enables users with cross-organization responsibility to monitor, manage, and respond to status changes in key areas of organizational performance.

The City: Water Conservation view is an interactive web page. The view contains the following independent sections that cooperate with one another to provide comprehensive information on resource consumption in a city.

Table 17. City: Water Conservation view

Section	Description
Map	A map of the geographical region that contains resource markers (households, parks, assets, zones). Shows your monitored community area. A filter to select the view. You can toggle between the **Map** or **List** view. The resources are shown on the map, for example household. Click the resource to determine the associated metrics for that resource. The metrics are displayed in a popup and consumptions trends are displayed in the**Trend** section of the view.
List	A table that contains a list of resource markers (households, parks, assets, zones) in the geographic map and their associated properties (name, number of meters, location, contact).
Trend	Compares and charts historic with current usage data for a monitored resource in a monitored community, displayed in either a chart or table view.

For help using each portlet, click the upper right corner of the portlet, and select **Help** from the menu displayed.

To resize a portlet, click the upper right corner of the portlet, and select options from the menu that is displayed, as follows:

- To expand the portlet to fill the page, click **Maximize**.
- To hide the portlet contents, other than its title bar, click **Minimize**.
- To restore a minimized or maximized portlet to its default view, click **Restore**.

Administrator

Customizing a portlet

As an administrator you can change portlet settings by clicking the upper right corner of the portlet, and selecting an option from the portlet menu.

There are two possible modes of customization, each changing the portlet settings for all users:

- **Edit Shared Settings** changes the portlet only for the instance of the portlet you are in when you change the settings.
- **Configure** changes the portlet's global settings for all instances of the portlet wherever those instances occur.

The modes of customization that are available to you depend on the permissions associated with your user ID. Global settings are superseded by shared settings.

The portlets that are supplied with the IBM Intelligent Operations Center have some settings that are specific to a portlet type, for example, set the default zoom level for a map. In addition, you can set generic portlet parameters that are common across the portlets supplied, for example, the portlet title.

Administrator

Customizing a page

As an administrator you can access the WebSphere Portal options for managing pages. Click the right side of the page name tab and select an option from the page menu.

Citizen: Water Conservation

Use the Citizen: Water Conservation view to obtain a consolidated view of resource consumption and use. The Citizen: Water Conservation view enables users to analyze individual consumption and monitor water leakages. The view provides a water report. By using the report, you can plan for changes to behavior, usage patterns, or changes to individual water equipment to actively engage in water conservation.

The Citizen: Water Conservation view is an interactive web page. The view contains the following independent sections of the page that cooperate with one another to provide comprehensive information on resource consumption for a citizen.

Table 18. Water Conservation Portal: Citizen view

Portlet	Description
Profile area	Shows the profile name for the report. The profile name might be a park, a marina or a household. You can select from the list. Below the profile name is the one or multiple meters in the account. If you have multiple meters, you can select from the list to see the consumption of each meter.
Progress area	Shows your progress, such as your **Usage Trend**, **Monthly Year to Date Variance** in dollars and in gallons. Shows your water conservation progress in relation to other participants . The **Rank** shows your position in relation to other participants in your community. The **Green Points** shows the number of points earned. Green points are awarded for reductions in water consumption and determined by weekly readings from your water meter.
Daily usage area	Shows your water usage each day for the past several months in two usage units: gallons and dollars. Using the slider bar, you can move along a 12 month calendar to see the total water consumption each day. When you move the slider bar, the data and usage unit also change in the two views in the Details area: **Hourly Usage** and **Weekly Usage**. Hover over each bar to see the actual amount for Weekly Usage
Details area	Compares hourly and weekly usage in a chart. The following views are available for display: • Hourly Usage • Weekly Usage • Compare • This weeks game
Team Chat / Pilot Chat	Used to foster communications and collaboration between teams and communities.

For help using each portlet, click the upper right corner of the portlet, and select **Help** from the menu displayed.

To resize a portlet, click the upper right corner of the portlet, and select options from the menu that is displayed, as follows:

- To expand the portlet to fill the page, click **Maximize**.
- To hide the portlet contents, other than its title bar, click **Minimize**.
- To restore a minimized or maximized portlet to its default view, click **Restore**.

Administrator

Customizing a portlet

As an administrator you can change portlet settings by clicking the upper right corner of the portlet, and selecting an option from the portlet menu.

There are two possible modes of customization, each changing the portlet settings for all users:

- **Edit Shared Settings** changes the portlet only for the instance of the portlet you are in when you change the settings.
- **Configure** changes the portlet's global settings for all instances of the portlet wherever those instances occur.

The modes of customization that are available to you depend on the permissions associated with your user ID. Global settings are superseded by shared settings.

The portlets that are supplied with the IBM Intelligent Operations Center have some settings that are specific to a portlet type, for example, set the default zoom level for a map. In addition, you can set generic portlet parameters that are common across the portlets supplied, for example, the portlet title.

Administrator

Customizing a page

As an administrator you can access the WebSphere Portal options for managing pages. Click the right side of the page name tab and select an option from the page menu.

Using portlets

A portlet provides access to information that you can view and interact with on a portal page. With IBM Intelligent Operations for Water, you can use portlets to monitor water infrastructure, assets, measurements, and key performance indicators to get a summary and detailed view of water agency performance.

Map

Use the Map portlet to see events and assets on a map.

The Map portlet interacts with the Details portlet. The Map portlet provides you with a visual representation of events and assets on a map. Use the Map portlet together with the Details portlet to identify location patterns, conflicts, issues, and synergies.

The Map portlet can also be used to update the content of the Details portlet. You can select in the Map portlet the categories of events, asset types, and zones you want to view. Your selection affects what is displayed in both the Map portlet and the corresponding Details portlet on the portal page.

Map interface

The Map portlet has two views: **Geospatial Map** and **Logical Map**.

The **Geospatial Map** has the interactive interface elements as shown in the following table:

Table 19. Map portlet - Geospatial Map interfaces

Interface element	Description
Map	A map of the geographical region provides event and associated resource locations.
Select Content: Event Categories	A filter form to select the categories of the events to be shown on the map and in the **Events and Incidents** tab on the Details portlet.
Select Content: Asset Type	A filter form to select the asset types to be shown on the map and in the **Assets** tab on the Details portlet.
Select Content: Logical Zone	A filter form to select the zone to be shown on the map and in the **Assets** tab on the Details portlet.
Select Content: Other Layers	A filter form to select the layers to be shown on the map. Using the layers, you can filter assets to display on the map, for example by virtual group or pipe network.

The **Logical Map** has two interactive interface elements as shown in the following table:

Table 20. Map portlet - Logical Map interfaces

Interface element	Description
Map	A logical map of the model provides topics in the model and associations.
Select Content	A filter form to customize the display in the logical map. Use the options to set the number of items that are displayed, the depth of impact analysis, the type of associations, and the nature of relationships.

Initially, the page opens with the **Geospatial Map** view that shows all the events and asset types that are relevant to you.

Note: To enable the **Logical Map** view, you must select the **Edit Shared Settings** option on the Map portlet, scroll to **Enable the Logical Map** field, and enter `True`.

The **Geospatial Map** map uses latitude and longitude values specified in the event record or asset type to show the location. A point marker or shape outlines the area. You can display more detail on an event headline or asset type by clicking the marker on the map. If there is more than one event or asset clustered at the same location, the number is indicated and when you click the marker. The headline of each event or asset is also displayed.

There is a limit to the number of markers that can be shown on the **Geospatial Map**. If the number of markers in the area in view exceeds the threshold, the markers are not shown. You receive a message with the number of markers available and the number of the threshold. You are given two options to display all available markers:

- Zoom in or pan to an area of the map with the number of markers below the threshold.
- Click **Load all items in view**.

If you choose the second option, you might notice that markers are displayed on the **Geospatial Map** at a slower rate.

When you select **View Nearby Resources** for an event in the Details portlet, resources are shown on the map based on the radius and capabilities you selected.

The map keeps you up-to-date by adding new events, subject to any filters you set to limit the categories shown.

Note: If an event or asset type has no coordinates it is displayed only in the Details portlet list; it is not displayed in the Map portlet.

Geospatial Map markers

The map represents the location of events or assets with one of the following types of marker:

Table 21. Map markers

Marker Type	Description
Icon	Pinpoints on the map the location of an event or asset by using a unique icon for each.
Polygon	Outlines on the map the area associated with a particular event or asset.
Cluster	Indicates more than one event or asset at the same location with a number that represents the number of events or assets at that location
Radius	Outlines on the map the area you select for **View Nearby Resources**.

The icon that represents an event type is defined in the category field of the event details on the **Events and Incidents** tab in the Details portlet. When an event is escalated to an incident, the icon displayed on the map retains its category-specific symbol. A red margin around the icon displays that it is an incident. Clicking an event marker on the map highlights the associated event or events in the Details portlet.

The icon that represents an asset is shown on the **Assets** tab in the Details portlet.

Table 22. Geospatial Map: Water asset icons

Icon	Represents
 **Waste water plant**	Waste water plant
 **Level indicator**	Level indicator
 **River gauge**	River gauge
 **Rain gauge**	Rain gauge
 **Position indicator**	Position indicator
 **Asset**	Asset
 **Lift station**	Lift station
 **Recorder level**	Recorder level
 **Trunk line monitor**	Trunk line monitor

Table 22. Geospatial Map: Water asset icons (continued)

Icon	Represents
 **Combined Sewer Overflow diversion structure**	Combined Sewer Overflow diversion structure
 **Well head**	Well head

Selecting event categories for the Geospatial Map

Use the Event Categories filter to select by category which events are displayed on the map.

To view the filter form, click **Select Content**. The categories of events displayed on the map and in the Details portlet can be changed based upon the filter form selection that you make. You can focus on the categories of event you want to analyze by using the filter to hide the event categories you do not need. The map responds to any change on the filter form. When a selection is changed, the map is updated and only the locations of events within the selected categories are plotted on the map. Change the categories of event displayed by selecting or clearing check boxes on the filter form. To close the filter form, click **Select Content**. If you leave the portal page and return, the filter is reset to the default which is all categories selected.

You can focus on individual events you want to analyze by ticking check boxes in the Details portlet. These events are highlighted on the map.

Selecting asset types for the Geospatial Map

Use the Asset Type filter to select by category the assets to display on the map.

To view the filter form, click **Select Content**. The types of assets displayed on the map and in the Details portlet can be changed based upon the filter form selection that you make. You can focus on the categories of assets you want to analyze by using the filter to hide the assets you do not need. The map responds to any change on the filter form. When a selection is changed, the map is updated and only the locations of assets within the selected categories are plotted on the map. Change the types of asset displayed by selecting or clearing check boxes on the filter form. To close the filter form, click **Select Content**. If you leave the portal page and return, the filter is reset to the default which is all categories selected.

You can focus on individual assets you want to analyze by ticking check boxes in the Details portlet. These assets are highlighted on the map.

Selecting logical zones for the Geospatial Map

Use the Logical Zones filter to select by category which zones are displayed on the map.

To view the filter form, click **Select Content**. The categories of zones displayed on the map can be changed based upon the filter form selection that you make. You can focus on the zones you want to analyze by using the filter to hide the zones you do not need. The map responds to any change on the filter form. When a selection is changed, the map is updated and only the zones selected are plotted on the map. Change the zones displayed by selecting or clearing check boxes on the filter form. To close the filter form, click **Select Content**. If you leave the portal page and return, the filter is reset to the default which is all categories selected.

Selecting layers for the Geospatial Map

Use the Other Layers filter to select by category which layers are displayed on the map.

To view the filter form, click **Select Content**. The categories of layers displayed on the map can be changed based upon the filter form selection that you make. You can focus on the layers you want to analyze by using the filter to hide the layers you do not need. The map responds to any change on the filter form. When a selection is changed, the map is updated and only the layers selected are plotted on the map. Change the layers displayed by selecting or clearing check boxes on the filter form. To close the filter form, click **Select Content**. If you leave the portal page and return, the filter is reset to the default which is all categories selected.

Selecting resource capabilities for the Geospatial Map

When you select **View Nearby Resources** on the Details portlet, the Event Categories filter is replaced by the Resources filter. Use the Resources filter to select which resources are displayed on the map.

To view the filter form, click **Select Content**. The capabilities of resources displayed on the map and in the Details portlet can be changed based upon the filter form selection that you make. You can focus on the capability you want to analyze by using the filter to hide the capabilities you do not need. The map responds to any change on the filter form.

When a selection is changed, the map is updated and only the locations of the resources with the selected capabilities are plotted on the map. Change the capability of resources displayed by selecting or clearing a check box on the filter form. To close the filter form, click **Select Content**. If you leave the portal page and return, the filter is reset to default which is all capabilities selected. The capabilities selected by default depend on the category of the event and how that category is mapped to capabilities.

Adding an event

You can create an event, adding it to the Map portlet map and the Details portlet list at the same time. The map and the list provide two ways of looking at the same content.

About this task

Use the **Add Event** dialog to specify event properties.

Procedure

1. Right-click a location on the map and click **Create a new event** to start the **Add Event** dialog. Some of the event properties are completed automatically.
2. Specify the remaining event properties. Properties marked with an asterisk are required for the successful creation of a new event, those properties not marked with an asterisk are optional.
3. Click **OK** to save the event or **Cancel** to stop adding the event.

Results

An icon that represents the category of the new event is displayed in the requested location on the map and its details in the Details portlet list.

Note: In the Map portlet, you cannot create an event at a location where an icon or polygon is already displayed. To create an event for a location already occupied by an event on the map, hide the event category by using the filter and right-click the location. Alternatively, you can use the Details portlet to add an event at that location.

Using the Geospatial Map controls

You can move the cursor around the map by using your mouse or keyboard.

The map controls are on the upper left side of the map

The map controls are on the upper left side of the map. They consist of:
- Pan arrows (up, down, left, right)
- Zoom in
- World view (zooms out to the maximum extent)
- Zoom out

Pan controls for moving around the map

To move around the map you can:
- Click and drag the map by using the mouse
- Press the up pan arrow, or the up arrow key on the keyboard, to pan north
- Press the down pan arrow, or the down arrow key on the keyboard, to pan south
- Press the right pan arrow, or the right arrow key on the keyboard, to pan east
- Press the left pan arrow, or the left arrow key on the keyboard, to pan west

Zoom controls for magnifying or reducing the scale of the map

To zoom in and out of the map you can:
- Click the **+** map icon to zoom in, or the **-** map icon to zoom out of the center of the map
- Double-click the mouse to center the map and zoom in to the selected location
- Click the **World view** icon to maximize the zoom out to show the world view
- Press the **+** key on the keyboard to zoom in
- Press the **-** key on the keyboard to zoom out
- Press Shift while you use the mouse to draw a rectangle around the area to zoom in on

Resetting the Geospatial Map

The Map portlet can be reset to the default view configured for the system.

Procedure

1. On the Map portlet, click **Reset the Map**.
2. Select one of the following options.
   - **Reset the Map** to zoom and center the map to the default setting.
   - **Reset the Map and Clear Filters** to zoom and center the map to the default setting and reset the values set in **Select Content** to the default values.

Navigating the Logical Map

Use the Logical Map on the Map portlet to browse topics and associations in the model.

Before you begin

Before you can view the **Logical Map** view, you must select the **Edit Shared Settings** option on the Map portlet, scroll to **Enable the Logical Map** field, and enter `True`.

Procedure

1. On the Map portlet, toggle the **Logical Map** view.
2. To browse the model, select one of the following options.
   - Click a topic in the **Logical Map** view.

- Expand the topic to view associations.
- Right click the topic to select from a list of browse options. For example, you can select to **Expand**, **Focus**, **Hide**, **View Details** or **Perform Impact Analysis**. Select the **Focus** option to centralize your view of the graph on the selection.

Customizing the Logical Map

The Map portlet can be customized to limit the number of items that are displayed in the Logical Map.

Procedure

1. On the Map portlet, select the **Logical Map** view.
2. Click the **Select Content** option and customize your settings using the following options.
   - Enter a number in **Limit item count to:** to set the maximum number of items to display in the map.
   - Enter a number in **Limit impact analysis depth to:** to set how deep within the layers in the map you want to allow impact analysis to be performed.
   - Select from the available options to customize the display of relationships in the model.

     Type instance shows relationships of type instance, for example, where Pipe 1 is an instance of Pipe.

     Connects shows the connection relationship between assets.

     Has measurement shows the relationship between assets and measurements.

     Contains shows the contain relationship between two assets.

     Supertype Subtype shows the class inherent relationship between two asset types.
   - Select from the available options to restrict the scope of relationships displayed in the map. The settings are based on the topic map index rule and can be limited to **City Name** or **Reference Semantic Model**.
   - Select to focus your analysis on a specific asset.
   - Select to search for an alternate asset by entering the asset name or selecting an item from the available list.
   - Select the **Reset Map** option on the upper right of the portlet to reset the graph to the initial state and clear any navigation that is displayed.
   - Select the **Reset the Map** > **Change Layout** option on the upper right of the portlet to change the layout of the graph. Select from the **Forced Directed Layout**, **Circular Layout**, **Tree Layout**, or **Hierarchical Layout**, **Long Link Layout**,**Short Link Layout** options.

Customizing the Map portlet - Geospatial Map

Administrator

An administrator can change Map portlet settings by clicking the upper right corner of the portlet, and selecting options from the menu that is displayed.

- To change settings for all users and all instances of the Map portlet, click **Configure**.
- To change settings for all users and the instance of the Map portlet on the current portal page, click **Edit Shared Settings**.

Any settings that you change by using the **Edit Shared Settings** option override settings that are changed by using the **Configure** option.

The settings that you can change for the map are as follows:

- Reset the default center point and zoom level for the map.
- Select a new base map.

- Add to the map geographic annotation and visualization layers in Keyhole Markup Language (KML), to represent additional data.
- Set a threshold for the markers that can be displayed without a warning message.
- Set the default selection on the map filters to be displayed when you click **Select Content**.

Select to enable the **Logical Map** view and associated settings. To enable the display, select **Edit Shared Settings**. Go to the **Enable the Logical Map** field and enter the value `True`. Optionally, you can specify a map name in the **Logical Map Name** field, and set a prefix for the model the **Model Prefix** field.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Details

Use the Details portlet to view, monitor, and manage events and assets in the IBM Intelligent Operations for Water.

The Details portlet is an interactive list portlet. All the events and assets that you are authorized to see are visible on the tabs and on any map portlet linked to the Details portlet. Assets in the vicinity of an event can be displayed in a resource list and on a map.

Events and assets

The Details portlet has two interactive interface elements as shown in the following table:

Table 23. Details portlet display

Interface element	Description
Events and Incidents	The list contains key details for each event. You can display a more detailed description of an event by hovering over the row in the list.
Assets	The list contains key details for each asset types. You can display a more detailed description of the asset by hovering over the row in the list.

Initially, when you open IBM Intelligent Operations for Water, the Details portlet shows all the events and assets that are relevant to you.

In the Map portlet, you select the categories of events and the asset types to be shown. The categories of events shown on the **Events and Incidents** tab and the assets shown on the **Assets** tab correspond to events and assets displayed on the Map portlet.

The lists are refreshed on a regular basis with updates, subject to any filters you set to limit the categories shown.

A counter in the left corner of the action bar at the end of the list indicates the number of items displayed and the total number of items. In the center of the action bar, you can select the number of items to be displayed at one time. If there are more rows than can be displayed at one time, you can page forward or backward by clicking the buttons in the right corner of the action bar.

Event properties

The following table outlines the properties that describe an event.

Table 24. Event properties

Property	Content
Who	
Sender	Source or user ID
Contact name	Person to contact for additional information
Contact e-mail	Email address of contact person
Contact telephone	Telephone number
What	
Event type*	Event classification below category level
Event status*	Event handling instructions
Event scope*	Intended audience for the message
Restriction	Additional information required when *Event scope* is 'Restricted'
Headline*	Short description of the event
Category*	High-level event classification
Severity*	Intensity of the impact of the event
Certainty*	Confidence in the event prediction
Urgency*	Timeframe for action in response to the event
Message type	Nature of the message
Description	Additional description of the event
Web address	Web address for additional information about the event
When	
Sent date and time	Date and time the message was submitted or sent
Effective date and time	Date and time the message is effective
Onset date and time	Date and time the event is expected to begin
Expiration date and time	Date and time the event is expected to end
Where	
Area description	Description of the affected area
Latitude / Longitude	Coordinates of the event location

Note: Properties marked with an asterisk in the table are required for the successful creation of a new event. Properties not marked with an asterisk are optional when creating an event.

Managing events and incidents

In the Details portlet, you can perform various actions on the events in the list on the **Events and Incidents** tab. In the Map portlet, you can add an event that is shown on both the map and the events list of the Details portlet.

Procedure

On the **Events and Incidents** tab, right-click a row in the events list and select an option from the menu:

- To update the information about an event, click **Update Event**. You can enter your changes in a window with fields that contain information about the event. When an event record is updated the message type property changes to *Update*.
- To change an event status to incident, click **Escalate to Incident** to display a window and enter your contact details. When an event record is escalated there is a change to the properties and to the icon on the map.
- To remove an event from the list and the map, click **Cancel Event** to display a window and enter your contact details.
- To view the standard operating procedure and workflow activities associated with an event, click **View Activity Summary and History**. If there are no standard operating procedures associated with an event, this option is not available. If there is an associated standard operating procedure, it is displayed in Maximo Asset Management, in the **SOP Activities** tab. Use the My Activities portlet to manage the workflow activities associated with a standard operating procedure.
- To view a list of the resources in the vicinity of an event, click **View Nearby Resources** and select the radius of the area you want to focus on. A list of resources is displayed on the **Resources** tab.
- To view the information about an event, click **Properties** to display a window that contains information about the event.

Managing assets

In the Details portlet, you can perform various actions on the assets in the list on the **Assets** tab.

Procedure

On the **Assets** tab, right-click a row in the assets list and select an option from the menu:

- To view current and historical measurement details associated with an asset, click **View Details**. Table 3 displays the measurement details shown for selected assets.

  Note: The measurement detail that is provided on the **Assets** tab is for the default measurement associated with that particular asset. If you right-click and select to view details, a list of other measurements associated with the asset are displayed if available. Selecting any one of the options displays associated properties.

Table 25. Measurement Details

Property	Description
Current Value	
ID	Source of measurement
Name	Name of asset
Type	Asset type
Alias	Asset alias
Description	Asset description
Value	KPI value
Unit	Measurement unit
Threshold	Critical, Warning, Normal, No Reading
Trend	Up, Down, Unchanged
Sent Time	Date and timestamp
Historical Values	
Graphs	Two reports are displayed. Click **Recent Historical Values** to set the time range and level of granularity for recent historical report display. Click **Aggregate Historical Values** to view aggregate historical values.

- To view the properties of an asset, click **Properties**. Table 4 describes asset properties.

Table 26. Asset properties

Property	Description
What	
ID	Source or user ID
Name	Asset name
Type	Asset type
Description	Asset description
Where	
Latitude / Longitude	Coordinates of the asset location

Whichever option you choose, the measurement details or properties of the asset are displayed.

Customizing the Details portlet

Administrator

As an administrator, you can customize the portlet by clicking the menu on the upper right corner of the portlet and configuring the portlet settings.

Setting parameters for the Details portlet you can:
- Specify column layout, headings, sort order, and priority.
- Specify the additional conditions to filter the events or resources displayed.
- Specify a group name to enables communication with other map and Details portlets.
- Acknowledge or ignore event creation.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Status

Use the Status portlet to see the status of key performance indicators (KPIs) for a single organization or across organizations.

The Status portlet provides an executive-level summary of the status of KPIs across the organizations that you have permission to view. Use this portlet to view up-to-date changes in the KPI status so that you can plan and take action if necessary.

KPI color code

Each column contains KPI information about an organization that is named at the top of the column. The KPI categories that are associated with each organization are represented by colored cells. The background color for a KPI category reflects its status. If there are more than six KPIs to be displayed in a column, the size of each individual cell is reduced to accommodate the extra KPIs.

The background color code that is supplied with the solution's sample KPIs is as follows:
- Green indicates that the status is acceptable, based on the parameters for that KPI.
- Yellow indicates that caution or monitoring is required.
- Red indicates that action is recommended.
- Gray indicates that there is insufficient data available to calculate the KPI status.

The color code is defined in the legend at the top of the portlet.

An undetermined status indicates that there is no KPI value available in the time period that is defined for that KPI. This situation occurs when the solution does not receive any messages for the KPI in the specified time period. For example, the water level for a water source is calculated daily. If no water level message for that water source is received on a particular day, then there is no data to determine the KPI value.

To see the KPI name and a definition of the status that is represented by the color of a KPI, hover over the cell with your cursor.

KPI updates

When an underlying KPI changes, the change is reflected in the Status portlet. For example, one of the sample KPIs that determine the status of the Water Quality KPI changes status from acceptable to caution. The change is reflected in the portlet by a change in the background color of the Water Quality cell from green to yellow. In addition, the Notifications portlet indicates that a KPI changed.

When the solution receives a message that is related to the calculation of a KPI, there is an instant color change. This feature is an advantage when the KPI category is one that is likely to receive changes in real time, for example, airport delays. It is not relevant to those categories that contain historical KPIs, for example, flood control. For those categories of KPI, regular daily measurements are taken and there is unlikely in the interim to be a sudden change that affects status.

For each KPI, you can see all of the underlying KPIs and details in the Key Performance Indicator Drill Down portlet that is linked to the Status portlet.

To focus only on a specific KPI in the Key Performance Indicator Drill Down portlet, click the KPI cell in the table in the Status portlet. You can also click the owning organization title, for example, for example "Water", to see all related KPIs.

Customizing the Status portlet

If you have administrator access, you can customize this portlet. Click the button in the upper right corner of the portlet to see your portlet menu customization options. Shared settings affect the content of this portlet for all users, but only for this occurrence of the portlet.

By setting parameters for the Status portlet you can:

- Customize KPI colors.
- Enable an additional KPI filter.
- Show or hide the KPI legend.
- Define how the KPIs are sorted.
- Specify a group name to enable communication with a Key Performance Indicator Drill Down portlet.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Customizing KPIs

A set of sample KPIs is provided with the solution. These KPIs are designed to provide guidance for planning and implementing different types of KPIs to suit your organization. Examples are provided in the areas of water, transportation, and public safety.

Key Performance Indicator Drill Down

Use the Key Performance Indicator Drill Down portlet to see more information about a KPI category, the status of its underlying KPIs.

The Key Performance Indicator Drill Down portlet shows all of the underlying KPIs associated with an organization or KPI category that is shown on the Status portlet. The KPIs are displayed in the form of a nested list that can be expanded or collapsed. The status of each underlying KPI is represented by color, in the same way that color is used for the KPI categories that are displayed in the Status portlet. The values of the underlying KPIs control the color of the parent KPI. To display the status of the KPI, hover over the KPI with your cursor.

To focus on a specific KPI category in the Key Performance Indicator Drill Down portlet, click the category in the Status portlet. This category is then displayed on its own in the Key Performance Indicator Drill Down portlet. You can use the list to inspect the underlying KPIs until you reach details of the KPI that caused the status change.

Administrator

Customizing the Key Performance Indicator Drill Down portlet

If you have administrator access, you can customize this portlet. Click the button in the upper right corner of the portlet to see your portlet menu customization options. Shared settings affect the content of this portlet for all users, but only for this occurrence of the portlet.

By setting parameters for the Key Performance Indicator Drill Down portlet you can:

- Specify column layout, headings, sort order, and priority.
- Customize KPI colors.
- Enable an additional KPI filter.
- Show or hide the toolbar at the top of the list.
- Specify a group name to enable communication with a Key Performance Indicator Drill Down portlet.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Notifications

Use the Notifications portlet to view your alert messages and their details.

The Notifications portlet is an interactive window that contains a list of all the current alerts relevant to you. You see those only alerts sent to the user groups you are a member of. Alerts are notifications that received when:

- Multiple events are happening in the same vicinity and at a similar time, thus might be in conflict or require coordination
- A predefined key performance indicator (KPI) value change occurs, where that change is defined as an alert trigger by your administrator

You can also use the portlet to display further details of an alert.

Notifications list

The Notifications portlet provides a dynamic, interactive list of alerts that result from changing KPIs and correlated events. The role of this portlet is to draw attention to changes in KPI or event status. The list contains key details for each of the alerts.

To show a more detailed description of an alert, hover over the row with the cursor. To see all the information that is associated with that alert in a window, right-click the row and select **Properties**.

Initially, when you open the portal page, the portlet displays all of your current alerts. Remove any alert from the portlet by right-clicking the row and selecting **Close alert**. It is possible to close multiple alerts in this way by selecting multiple rows. Close an alert only after you have handled it appropriately because the alert is removed for all recipients when you close it.

Click the button in the upper right corner of the window to cancel it and take you back to the list.

A counter in the left corner of the action bar at the end of the list indicates the number of items displayed and the total number of items. In the center of the action bar, you can select the number of items to be displayed at one time. If there are more rows than can be displayed at one time, you can page forward or backward by clicking the buttons in the right corner of the action bar.

Alert Properties

The window for alert details displays the following properties:

Table 27. Alert properties

Property	Content
Headline	Short description of the alert
Category	High-level classification of event or KPI
Sender	Source of the alert
Sent to Groups	Groups to whom the alert was sent
Sent	Date and time the alert was sent
Description	Additional description of the alert
Refers to Alerts	Event identifier, if the alert is caused by correlated events
Refers to KPIs	Name of the KPI, if the alert is caused by a changing KPI value

Administrator

Customizing the Notifications portlet

If you have administrator access, you can customize this portlet. Click the button in the upper right corner of the portlet to see your portlet menu customization options. Shared settings affect the content of this portlet for all users, but only for this occurrence of the portlet.

By setting parameters for the Notifications portlet you can:

- Specify column layout, headings, sort order, and priority.
- Show or hide the toolbar at the top of the list.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

My Activities

The My Activities portlet displays a dynamic list of activities that are owned by the group of which the user, who is logged on to the interface, is a member.

Each time an event triggers a standard operating procedure according to the selection criteria defined in the standard operating procedure selection matrix, the associated activities are assigned to owners.

A user who is logged on can view the activities that are assigned to them in the My Activities portlet. In the My Activities portlet, the activities are grouped by their parent standard operating procedures. Each standard operating procedure corresponds to an individual event.

For each standard operating procedure, the My Activities portlet displays only open activities, and not closed or completed activities. Open activities include those activities that are already started, and those activities that are eligible to be started. For example, if one or more of the activities that are specified in a standard operating procedure are ordered in a sequence, only the current activity in the sequence is displayed. If a particular activity relies on the completion of a predecessor activity, it is not displayed until the predecessor activity is complete or skipped.

The following activity due icons are displayed near the top of the My Activities portlet:

Past Due
Activities whose completion is past due.

Today Activities that are due to be completed today.

Future Activities whose completion is due in the future.

When an activity is started, the due date is calculated by adding the start time to the duration of the activity. The activity due dates are used to calculate the number that is displayed in each of the activity due icons.

In the My Activities portlet, standard operating procedures that have past due activities are displayed first, and the remaining standard operating procedures are displayed in alphabetical order.

Next to each standard operating procedure in the list that has past due activities, a red icon indicates the number of activities that are past due. The standard operating procedures with past due activities are sorted according to the number of past due activities they contain. The standard operating procedure that has the most past due activities is displayed at the top of the list.

Managing activities in the My Activities portlet

Manage your activities in the My Activities portlet:

- To view details about a standard operating procedure, expand the name of the standard operating procedure.
  - The name of the event that triggered the standard operating procedure is displayed. Hover over the event name to view hover help information that includes the event start date and time, and the category, severity, certainty, and urgency of the event.
  - If the Details portlet is displayed on the page, to view the event properties, click the event name. The event Properties window is displayed.
  - Steps that are in progress or eligible to be started are displayed. Also, the status and due date of each step is displayed.
- To view further details about a step, including comments and references that users added to the step, expand the name of the step.
- To start, finish, or skip a step, expand the name of the step, and then choose one of the following options:
  - To start a step, from the list, select **Start**. If the step is defined as an automated task in the standard operating procedure, the workflow that is assigned to the task is started automatically, and the step is finished automatically. The user who starts a step becomes the owner of that step, and the name of the user is displayed in the **Owner** field.
  - To skip a step, from the list, select **Skip**.
  - To finish a step, from the list, select **Finish**.
- To add a comment to a step, use the following substeps:

1. Expand the name of the step.
2. From the list, select **Add Comment**.
3. In the Add Comment window, enter a comment in the **Comment** field. **Commentator name** and **Activity name** are read-only fields and contain automatically entered values.
4. Click **OK**.
5. Expand the name of the step again. The new comment is displayed at the end of the list of existing comments and references for the step.

- To add a reference to a step, use the following substeps:
  1. Expand the name of the step.
  2. From the list, select **Add Reference**.
  3. In the Add Reference window, enter values for **Reference name** and **Reference URI**. **Activity name** is a read-only field that contains an automatically entered value.
  4. Click **OK**.
  5. Expand the name of the step again. The new reference is displayed as a link at the end of the list of existing comments and references for the step.
- To view the details for a standard operating procedure, click the **i** icon next to the name of the standard operating procedure. In the Standard Operating Procedure Details window, all the activity steps that are included in the standard operating procedure are displayed, including those steps that are in progress, eligible to be started, completed, and closed. The status and due date of each step is also displayed. To view further details about a step, expand the step name.

Administrator

Customizing the My Activities portlet

If you have administrator access, you can customize this portlet. Click the button in the upper right corner of the portlet to see your portlet menu customization options. Shared settings affect the content of this portlet for all users, but only for this occurrence of the portlet.

For the My Activities portlet, you can specify a group name to enable communication with other portlets; for example, Details portlets.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Related information:

Standard Operating Procedures

Enabling the events record

Using administrative tools, you can enable record event management in order to manage event activity in IBM Intelligent Operations for Water. Use the information in this task to enable event monitoring on the application server.

Procedure

1. Log on to WebSphere Application Server at the following URL:
   `https://appserver:9043/ibm/console`
2. Select **Applications** > **Monitor Services** > **Recorded Events Management** > **Enable/Disable Events Record**.
3. Select the local host and click **Enable Events Record** to enable event monitoring.

Contacts

Use the Contacts portlet to send instant messages within the solution.

The Contacts portlet can display a list of your contacts that are organized by category. You can organize contacts in categories that are based on the people you need to communicate with. For example, you can have a category for general work contacts and another category for project work contacts. With the Contacts portlet, you can communicate with people and modify your online status, contacts, or groups.

Click the menus at the top of the portlet:

- **File** to add contacts, modify groups or log out
- **Tools** to set up a chat, meeting, or announcement; or to change your privacy settings
- **Help** to get more detailed information about how to use the portlet

Click your status to modify your status and message. The default status indicates that you are available. You can change your status to indicate that you are away from your computer, in a meeting, or that you do not want to be disturbed.

Note: For this portlet to work as expected, you must log on to the solution portal by using the fully qualified domain name of the IBM Intelligent Operations Center application server. If you log on to the portal by using an IP address or a host name alias instead of the registered fully qualified domain name, this portlet does not display correctly.

Administrator

If you have administrator access, you can customize this portlet. Click the button in the upper right corner of the portlet to see your portlet menu customization options. Shared settings affect the content of this portlet for all users, but only for this occurrence of the portlet.

The settings that you can change for the Contacts portlet are:

- Help file
- Portlet height
- Portlet height when maximized
- Portlet title
- Resource bundle

Customize Asset

Use the Customize Asset portlet to set thresholds for sensor readings.

Measuring the performance of multiple asset instances in the infrastructure is important to determine operational efficiency. By setting the thresholds for multiple asset instances, you can monitor the status of assets and define acceptable and unacceptable boundaries for measurement values. The Customize Asset portlet uses these measurements to indicate when status values are acceptable, warrant caution, or are critical and require immediate attention.

Threshold events help you determine when the measurements obtained from a sensor or other source move outside the normal range. Basic threshold events are comparisons that compare two or more measures and report a trend. More sophisticated threshold events can compare measures against a threshold that is created by historical information. An example of threshold events are high and low water levels. The IBM Intelligent Operations Center can manage such events in the form of key performance indicators (KPIs).

Using the Customize Asset portlet, role-specific users can perform the following actions:

- View threshold list by measurement type.
- Create thresholds for a measurement type.
- Update thresholds across multiple asset instances.
- Delete thresholds for a measurement type.

The Customize Asset portlet has three interactive interface elements as shown in the following table:

Table 28. Customize Asset portlet interfaces

Interface element	Description
Default configuration	List of configuration items - measurement status
Configure by Measurement Type	List of measurement types to configure
Measurement Status	Table to set and display thresholds for measurement types

Viewing or modifying threshold values

To view or modify the threshold values for a measurement type, use the following procedure.

Procedure

- To start the Customize Asset portlet, in the WebSphere Portal Administration interface, click **Intelligent Operations** > **Customization Tools** > **Asset Measurements for Water**.
- In Customize Asset page, in the **Configure a Measurement Type** field, enter an asset measurement type, or select an option from the drop-down menu, and expand the **Measurement Status** section. The threshold table is displayed.
- In the table, you can perform the following actions in relation to thresholds:
  - You can view thresholds for a list of measurements. For every asset instance, the threshold table can display the threshold values and its corresponding measurements status, which can be **Acceptable**, **Caution**, or **Critical**. You can view threshold values across multiple asset instances. If you change the **Measurement Type** in the **Configure A Measurement Type** field, the table resets with the threshold values for the selected measurement type.
  - To add a threshold status and data range to the table, click **Add Threshold**. Select a measurement status, and add valid threshold values for the start and end of the data range.
  - To update threshold values for the selected measurement type, click the **Range Starts** and **Range Ends** cells for the threshold and enter valid threshold values. The columns accept numerical values only. Ensure that there is no difference between the Range End value and Range Start value of the subsequent row. If there is a gap between the data values, a warning message displays. In such cases, you must modify the range to remove the difference between the end range and start range on the subsequent row.
  - To remove the threshold setting for a measurement, select the threshold row and click **Remove** in its Actions column or **Remove Selected Thresholds** at the bottom of the table.
  - To revert the table to the last saved version, click **Reset** at the bottom of the table.
  - To save the table for the selected measurement type, click **Save** at the bottom of the table.

City: Water Conservation

Use the City: Water Conservation portal to obtain a consolidated view of resource consumption and use in a city. The City: Water Conservation portal enables users with cross-organization responsibility to monitor, manage, and respond to status changes in key areas of organizational performance.

The City: Water Conservation portal is an interactive web page and provides you with a visual representation of water consumers on a map or list and information about their consumption behavior. Use the City: Water Conservation portal together with the Citizen: Water Conservation portal to identify locations, patterns of consumption, conflicts, issues, and synergies.

You can select in the City: Water Conservation portal the household you want to view from the Map. Your selection affects what is displayed in the other sections of the portal.

Interface element

The City: Water Conservation portal has interactive interface elements as shown in the following table:

Table 29. City: Water Conservation interfaces

Interface element	Description
Map	A map of the geographical region that contains resource markers (households, parks, assets, zones). Shows your monitored community area. A filter to select the view. You can toggle between the **Map** or **List** view. The resources are shown on the map, for example household. Click the resource to view the metrics for that resource. A popup is displayed when the resource is selected. The popup contains the key metrics for the monitored resource that includes number of meters, home owner, location, last weekly usage and trend as a percentage, last daily usage trend as a percentage (use today), average usage, peak time, and number of leaks reported.
List	A table that contains a list of resource markers (households, parks, assets, zones) in the geographic map and their associated properties (name, number of meters, location, contact).
Trend	Compares and charts historic with current usage data for a monitored resource in a monitored community. You can toggle between the **Chart View** and **Table View**.

Initially, the page opens with the City: Water Conservation portal that shows all the households that are relevant to you. The map uses latitude and longitude values to show the location. A point marker or shape outlines the household. You can display more detail on a household by clicking the marker on the map. If there is more than one household clustered at the same location, the number is indicated when you click the marker. The headline of each household is also displayed.

You can use the **List view** to see the household information in table format.

Note: If a household has no coordinates, it is displayed only in the portlet list; it is not displayed in the Map.

Map markers

The map represents the location of households with the following type of marker.

Table 30. Map markers

Marker Type	Color	Description
Icon	Red or Green	Pinpoints on the map the location of a household by using a circular icon for each. A red icon indicates that there is an incident associated with the household, for example a water leak. A green margin icon indicates that there are no incidents associated with the household.

Selecting the households on the map

To review water consumption in a household, use the following procedure.

Procedure

1. Select the City: Water Conservation.
2. In the City: Water Conservation, select the household in the map.
3. In the City: Water Conservation, view the key metrics in the popup to review consumption measures.
4. In the City: Water Conservation, view the Trend area to review the two-year trend charts.

Detecting leaks

To detect water leaks in a household, use the following procedure.

Procedure

1. Select the City: Water Conservation.
2. In the City: Water Conservation, select the household in the map.
3. In the City: Water Conservation, view the key metrics in the popup to review the number of detected leaks.

Viewing household consumption data

To view household consumption data, use the following procedure.

Procedure

1. Select the City: Water Conservation.
2. In the City: Water Conservation, select the household in the map.
3. In the City: Water Conservation, view the key metrics in the popup to review household consumption data.
4. In the City: Water Conservation, view the Trend area to review the two-year trend charts.

Viewing consumption trends

To view household consumption trends, use the following procedure.

Procedure

1. Select the City: Water Conservation.
2. In the City: Water Conservation, select the household in the map.
3. In the City: Water Conservation, view the Trend area to review consumption measures.

Using the map controls

You can move the cursor around the map by using your mouse or keyboard.

The map controls are on the upper left side of the map

The map controls are on the upper left side of the map. They consist of:

- Pan arrows (up, down, left, right)
- Zoom in
- World view (zooms out to the maximum extent)
- Zoom out

Pan controls for moving around the map

To move around the map you can:

- Click and drag the map by using the mouse
- Press the up pan arrow, or the up arrow key on the keyboard, to pan north
- Press the down pan arrow, or the down arrow key on the keyboard, to pan south
- Press the right pan arrow, or the right arrow key on the keyboard, to pan east
- Press the left pan arrow, or the left arrow key on the keyboard, to pan west

Zoom controls for magnifying or reducing the scale of the map

To zoom in and out of the map you can:

- Click the **+** map icon to zoom in, or the **-** map icon to zoom out of the center of the map
- Double-click the mouse to center the map and zoom in to the selected location
- Click the **World view** icon to maximize the zoom out to show the world view
- Press the **+** key on the keyboard to zoom in
- Press the **-** key on the keyboard to zoom out
- Press Shift while you use the mouse to draw a rectangle around the area to zoom in on

Customizing the City: Water Conservation

Administrator

An administrator can change City: Water Conservation settings by clicking the upper right corner of the portlet, and selecting options from the menu that is displayed.

- To change settings for all users and the instance of the City: Water Conservation portlet on the current portal page, click **Edit Shared Settings**.

The settings that you can change for the portlet are as follows:

- Default help
- Portlet height
- Portlet maximum height
- Portlet title
- Report URL

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Citizen: Water Conservation

Use the Citizen: Water Conservation portal to obtain a consolidated view of resource consumption and use. The Citizen: Water Conservation portal enables users to analyze individual consumption and monitor water leakages. The view provides a water report. By using the report, you can plan for changes to behavior, usage patterns, or changes to individual water equipment to actively engage in water conservation.

The Citizen: Water Conservation portal is an interactive web page. The view contains the following independent sections of the page that cooperate with one another to provide comprehensive information about resource consumption for a citizen.

Interface elements

The Citizen: Water Conservation portlet has interactive interface elements as shown in the following table.

Table 31. Citizen: Water Conservation portal display

Interface element	Description
Profile area	Shows the profile name for the report. The profile name might be a park, a marina, or a household. You can select from the list. Below the profile name is the one or multiple meters in the account. If you have multiple meters, you can select from the list to see the consumption of each meter.

Table 31. Citizen: Water Conservation portal display (continued)

Interface element	Description
Progress area	Shows your progress, such as your **Usage Trend**, **Monthly Year to Date Variance** in dollars and in gallons. Shows your water conservation progress in relation to other participants. The **Rank** shows your position in relation to other participants in your community. The **Green Points** shows the number of points earned. Green points are awarded for reductions in water consumption and determined by weekly readings from your water meter.
Daily usage area	Shows your daily water usage for the past several months in 2 usage units: gallons and dollars. Using the slider bar, you can move along a 12 month calendar to see the total water consumption each day. When you move the slider bar, the data and usage unit also change in the two views in the Details area: **Hourly Usage** and **Weekly Usage**. Hover over each bar to see the actual amount for weekly usage
Details area	Compares hourly and weekly usage in a chart. The following views are available for display: • Hourly Usage - toggle to display in a graph or table the hourly water usage in a specific day. • Weekly Usage - toggle to display in a graph or table the water usage for a four week period. • Compare Usage - toggle to display in a graph or table a comparison of water usage for each day over weekly intervals. • This weeks game - toggle to display in a graph or table a comparison of your water usage with usage by others in your community.
Team Chat / Pilot Chat	Communications facility to chat with other users and pilot participants in your community.

Initially, when you open Citizen: Water Conservation, the portal shows your household data. If your household comprises a number of accounts, you can select to display the data for each account.

The lists are refreshed regularly with updates, subject to any filters you set to limit the categories that are shown.

Comparing usage

In the Citizen: Water Conservation portal, you can monitor and compare resource usage.

Procedure

- Log on to the Citizen: Water Conservation portal.
- View the water report to review the **Usage trend** and **Monthly Variance** figures.
- Drag the slider to view the water usage by day.
- Toggle to select to view data in gallons or dollars.
- Select the **Hourly Usage** tab to view hourly usage.
- Select the **Weekly Usage** tab to view weekly usage.

Customizing the Citizen: Water Conservation

Administrator

As an administrator, you can customize the portlet by clicking the menu on the upper right corner of the portlet and configuring the portlet settings.

Click the **Edit Shared Settings** option to set the following parameters.

- Default help JSP

- Portlet height, titles
- Report URL
- Resource bundle
- Show URL field on page

When you set parameters for the Citizen: Water Conservation portal you can
- Specify the Cognos Report URL.
- Specify column layout, headings, sort order, and priority.
- Specify the additional conditions to filter the events or resources displayed.
- Specify a group name to enables communication with other map and Details portlets.
- Acknowledge or ignore event creation.

You can set generic portlet parameters that are common across portlets: help file location, portlet height, portlet title, and resource bundle.

Operator tasks

Use the information in this topic to perform operator tasks using IBM Intelligent Operations for Water.

The Operator: Operations view provides a visual representation of water data enabling you to perform the following actions:
- View current water levels, devices, and events, on a geographical information system (GIS) map and accompanying table.
- Navigate around the GIS map, zooming in and out of water infrastructure networks to view pipe infrastructure, asset types and locations within the network.
- View graphical reports summarizing recent water events.
- Monitor specific pipe networks and areas of interest.
- Customize the water data you would like to monitor on the GIS maps.

Use the Operator: Operations view to monitor and analyze current water data available in the IBM Intelligent Operations for Water solution.

If you have administrator access, you also can perform some configuration and customization actions from this view.

Displaying the Map portlet

Use the information in this topic to monitor the status and performance of water infrastructure and assets. The map contains geo-spatial and system data collected from subsystems and external data sources. The map provides a single view of infrastructure, assets, devices, and events sourced from SCADA, meter, or sensor systems that are configured in the water network.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges. The subsystems, for example GIS and SCADA subsystems, and all external data feeds must be operational.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the filter options on the Map portlet to refine your view by:

a. Event category
b. Asset type
c. Logical zone

5. Use the pan or zoom options to navigate and refine your view of the map.

Showing the pipe network on the map

Use the information in this topic to display the pipe network on the Map portlet.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges, and validated as a water operator.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.
5. Use the filtering options on the map to view the asset types.
6. Select the pipe network to display all assets graphically on the map.

Viewing water assets and equipment

Use the information in this topic to display water assets and equipment on the Operator: Operations view.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges, and validated as a water operator.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.
5. Use the filtering options on the map to view the asset types.
6. Select the asset or equipment item in the map.
7. View the status of the asset on the Details portlet.

Displaying measurement values for assets

Use the information in this topic to display measurement values for water assets and equipment on the Operator: Operations view.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges, and validated as a water operator.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.
5. Use the filtering options on the map to view the asset types.
6. Select the asset or equipment item. Hover over the asset to view critical information about the asset (for example, the location of the device or the last reading/historical reading from the device).
7. View the status of the asset on the Details portlet.
8. Right-click the asset to display the **Measurement Details** dialog.

   Note: If the default measurement displayed for the asset in the Details portlet is not what you require, right-click on the asset to select an associated measurement from the list.
9. Use the scroll bar to navigate to the **Value** and **Unit** fields to view the measurement details.

View historical data records for an asset measurement

Use the information in this topic to display past measurement values for water assets and equipment on the Operator: Operations view. By reading historical measurement values and readings from water network sensors or meters, you can monitor the performance water infrastructure more effectively.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges, and validated as a water operator.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.
5. Use the filtering options on the map to view the asset types.
6. Select the asset or equipment item in the map.
7. View the status of the asset on the Details portlet.
8. Right-click the asset to display the **Measurement Details** dialog.

   Note: If the default measurement displayed for the asset in the Details portlet is not what you require, right-click on the asset on the Details portlet to select an associated measurement from the list.
9. Use the scroll bar to navigate to the **Historical Values** section.
10. Click the **Date Time (All)** field on the x-axis to toggle views of historical values.

Selecting an asset type

Use the information in this topic to display the assets of a specific asset type on the Map portlet.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.

5. Use the filtering options on the map to view the asset types.
6. Navigate to the **Select Content: Asset Types** option, and select an asset type from the available list.
7. View the refined asset type display in the map.
8. View the status of the asset on the Details portlet.
9. Right click the asset to display the **Properties** dialog.

Displaying assets in a domain or zone

Use the information in this topic to display assets in a domain or zone on the Map portlet. By selecting a zone, you can get a clearer view of the assets and equipment that are displayed on a map.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the Map portlet.
4. Use the pan or zoom options to refine your view of the map.
5. Use the filtering options on the map to view the asset types.
6. Navigate to the **Select Content: Logical Zone** option, and select a logical zone from the available list.
7. View the asset or equipment in the logical zone.
8. View the status of the asset on the Details portlet.

Adding water events

Use the information in this topic to add water events on the Operator: Operations view.

Before you begin

Use the Zoom and Pan map controls to find the exact location on the map where the new water event has occurred. Otherwise, you need to know the latitude and longitude coordinates of the event location before you begin.

Procedure

1. Open the **Add Event** window by using one of the following options:
   - Go to the Map portlet, right-click the map, then click **Add Event**.
   - Go to the Details portlet, click **Add Event**.
2. In the **Add Event** window, enter a **Name** to identify the event.
3. Enter the details of the event, by completing the required **Who**, **What**, **Where**, and **When** fields.
4. Click **OK**.

Water event properties

Water events include properties for identifying the individual event, its type, and its location.

To display a more detailed description of a water event, hover over the location of the event in the Map portlet, or the row in the Details portlet.

The following table outlines the properties of a water event.

Table 32. Water event properties

Label	Description
ID	Unique identifier that is used to identify the event in the water system and subsystems. The syntax and format of the ID are specific to the organization requirements.
Name	Meaningful name to identify the event.

Table 32. Water event properties (continued)

Label	Description
Type	Detailed classification of the event, specific to the general classification.
Description	Additional details and information to describe the event.
Latitude / Longitude	Geographical coordinates of the event location.

Viewing key alerts and notification messages

Use the information in this topic to understand how to view key alerts on the Operator: Operations view. Managing alerts requires that you regularly evaluate and monitor received alerts to identify recurring performance problems.

About this task

The **Notifications** portlet provides a dynamic, interactive list of alerts that result from changing KPIs and correlated events. For example if multiple events are happening in the same vicinity and at a similar time, there might be a conflict that requires coordination. In a similar way, a predefined key performance indicator (KPI) value that changes might trigger an alert where such a change is defined for notification by your administrator.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. View the **Notifications** portlet to view your current alerts.
4. View the properties associated with the alert. Right click the alert and select **Properties**. Hover over the selected alert in the **Notifications** portlet to view more detail on the alert.

Notifying stakeholders of water network events

Use the information in this topic to understand how to notify stakeholders of water network events.

About this task

Use the **Sametime** portlet to collaborate with key stakeholders to manage water network events.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. Go to the **Sametime** portlet to view your current contacts.
4. Use the capabilities to notify the relevant parties of water network events by sending a broadcast or instant message.

Building a list of key contacts

Use the information in this topic to build a list of contact to collaborate with when managing water network events.

About this task

Use the **Sametime** portlet to build a list of key contacts to collaborate with when managing water network events.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. Go to the **Sametime** portlet to view your current contacts.
4. Use the **People** menu to add contacts to your available list.

Displaying the logical map

Use the information in this topic to monitor the IBM Intelligent Operations for Water semantic model in a map. The model is a real world abstraction of the water infrastructure, assets, and measurements represented in a graph. Working with the graph, you can explore the model and analyze integration points and impacts.

Before you begin

Before you can perform this task, you must be authenticated with the appropriate role and privileges. You must load the model with the required OWL and RDF files. You must also select to enable the **Logical Map** view and associated settings. To enable the display, select **Edit Shared Settings** in the upper right of the portlet. Go to the **Enable the Logical Map** field and enter the value `True`. Optionally, you can specify a map name in the **Logical Map Name** field, and set a prefix for the model in the **Model Prefix** field.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. Select the **Logical Map** link.
4. Use the filter options on the Map portlet to refine your view of the map.
   - Enter a number in **Limit item count to:** to set the maximum number of items to display in the map.
   - Enter a number in **Limit impact analysis depth to:** to set how deep within the layers in the map you want to allow impact analysis to be performed.
   - Select from the available options to customize the display of relationships in the model.

     Type instance shows relationships of type instance, for example, where Pipe 1 is an instance of Pipe.

     Connects shows the connection relationship between assets.

     Has measurement shows the relationship between assets and measurements.

     Contains shows the contain relationship between two assets.

     Supertype Subtype shows the class inherent relationship between two asset types.
   - Select from the available options to limit the scope of relationships displayed in the map. The settings are based on the topic map index rule and can be limited to **City Name** or **Reference Semantic Model**.
   - Select to focus your analysis on a specific asset.
   - Select to search for an alternate asset by entering the asset name or selecting an item from the available list.
   - Select the **Reset the Map** > **Change Layout** option on the upper right of the portlet to change the layout of the graph. Select from the **Force Directed Layout**, **Circular Layout**, **Tree Layout**, or **Hierarchical Layout**, **Long Link Layout**,**Short Link Layout** options.

Performing impact analysis

Use the information in this topic to perform impact analysis on model artifacts.

About this task

Use the **Logical Map** to perform impact analysis, for example, on a measurement in the model.

Procedure

1. Log on to IBM Intelligent Operations for Water as operator.
2. Select the Operator: Operations view.
3. Select the **Logical Map** option to view the logical map.

   Note: To enable the **Logical Map** view, you must select the **Edit Shared Settings** option on the Map portlet, scroll to **Enable the Logical Map** field, and enter `True`.
4. Navigate the **Logical Map** to find the asset that you want to analyze. Right click and select the **Perform Impact Analysis** option.

Executive tasks

Use the information in this topic to perform executive tasks with IBM Intelligent Operations for Water.

Use the Executive: Status view to obtain a consolidated view of key performance indicators (KPIs) and key events. The Executive: Status view provides a visual representation of water infrastructure and organizational efficiency.

If you have administrator access, you can perform configuration and customization actions.

Displaying Key Performance Indicators

Use the information in this topic to monitor the overall health of the water network. Using the heat map displayed on the Status portlet on the Executive: Status view, you can monitor system health for performance categories that are configured in your system.

Procedure

1. Log on to IBM Intelligent Operations for Water as executive.
2. Select the Executive: Status view.
3. View the Status portlet to display key performance indicator categories. The background color options and legends indicate the performance status.
4. Hover over the key performance indicator to display more information. Click the key performance indicator to display more information in the Key Performance Indicator Drill Down portlet.

Related information:

Key Performance Indicators

Viewing Key Performance Indicator details

Use the information in this topic to get a detailed view of the health of the water network. By drilling down on performance indicators in the heat map displayed on the Status portlet on the Executive: Status view, you can get a detailed view of system health. You can expand nested Key Performance Indicators that monitor system health for additional diagnosis.

Procedure

1. Log on to IBM Intelligent Operations for Water as Executive.
2. Select the Executive: Status view.
3. View the Status portlet to display Key Performance Indicator categories. The background color options and legends indicate the performance status.

4. Double-click the key performance indicator to drill down for more information. The detail is displayed in the Key Performance Indicator Drill Down portlet.

What to do next

Switch to the Operator: Operations view to locate the key performance indicator abnormality geo-spatially and display it on the map. Alerts are also posted on the Notifications portlet.

Note: All key performance indicators that are beyond the normal range are displayed on the Map Details portlet and reported to the Executive: Status dashboard.

Related information:

Key Performance Indicators

Monitoring changes to Key Performance Indicators

The Notifications portlet provides a dynamic interactive list of alerts that result from changing KPIs and correlated events.

Procedure

1. Log on to IBM Intelligent Operations for Water as executive.
2. Select the Executive: Status view.
3. View the Notifications portlet to view your current alerts.
4. View the properties associated with the alert by right clicking the alert and selecting **Properties**. Hover over the selected alert in the Notifications portlet to view more detail on the alert.

Related information:

Key Performance Indicators

Working with Standard Operating Procedures

The My Activities portlet provides a dynamic table of open activities that are owned by the person who logged on to IBM Intelligent Operations for Water. Standard Operating Procedures are provided to respond to changing KPIs and correlated events.

Procedure

1. Log on to IBM Intelligent Operations for Water as executive.
2. Navigate to the My Activities portlet to view the procedural response to your current alerts. Counters are displayed for past, present, and future activities.
3. Expand the procedure to view the steps. Click **Start** to begin the procedure. Click the information icon for more information about the procedure.

Related information:

Standard Operating Procedures

Chapter 9. Troubleshooting and support for IBM Intelligent Operations for Water

To isolate and resolve problems with your IBM products, you can use the troubleshooting and support information. This information contains instructions for using the problem-determination resources that are provided with your IBM products, including IBM Intelligent Operations for Water from the IBM Intelligent Water Family of solutions.

Techniques for troubleshooting problems

Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem. Certain common techniques can help with the task of troubleshooting.

The first step in the troubleshooting process is to describe the problem completely. Problem descriptions help you and the IBM technical-support representative know where to start to find the cause of the problem. This step includes asking yourself basic questions:

- What are the symptoms of the problem?
- Where does the problem occur?
- When does the problem occur?
- Under which conditions does the problem occur?
- Can the problem be reproduced?

The answers to these questions typically lead to a good description of the problem, which can then lead you to a problem resolution.

What are the symptoms of the problem?

When starting to describe a problem, the most obvious question is "What is the problem?" This question might seem straightforward; however, you can break it down into several more-focused questions that create a more descriptive picture of the problem. These questions can include:

- Who, or what, is reporting the problem?
- What are the error codes and messages?
- How does the system fail? For example, is it a loop, hang, crash, performance degradation, or incorrect result?

Where does the problem occur?

Determining where the problem originates is not always easy, but it is one of the most important steps in resolving a problem. Many layers of technology can exist between the reporting and failing components. Networks, disks, and drivers are only a few of the components to consider when you are investigating problems.

The following questions help you to focus on where the problem occurs to isolate the problem layer:

- Is the problem specific to one platform or operating system, or is it common across multiple platforms or operating systems?
- Is the current environment and configuration supported?
- Do all users have the problem?
- (For multi-site installations.) Do all sites have the problem?

If one layer reports the problem, the problem does not necessarily originate in that layer. Part of identifying where a problem originates is understanding the environment in which it exists. Take some time to completely describe the problem environment, including the operating system and version, all corresponding software and versions, and hardware information. Confirm that you are running within an environment that is a supported configuration; many problems can be traced back to incompatible levels of software that are not intended to run together or have not been fully tested together.

When does the problem occur?

Develop a detailed timeline of events leading up to a failure, especially for those cases that are one-time occurrences. You can most easily develop a timeline by working backward: Start at the time an error was reported (as precisely as possible, even down to the millisecond), and work backward through the available logs and information. Typically, you need to look only as far as the first suspicious event that you find in a diagnostic log.

To develop a detailed timeline of events, answer these questions:

- Does the problem happen only at a certain time of day or night?
- How often does the problem happen?
- What sequence of events leads up to the time that the problem is reported?
- Does the problem happen after an environment change, such as upgrading or installing software or hardware?

Responding to these types of questions can give you a frame of reference in which to investigate the problem.

Under which conditions does the problem occur?

Knowing which systems and applications are running at the time that a problem occurs is an important part of troubleshooting. These questions about your environment can help you to identify the root cause of the problem:

- Does the problem always occur when the same task is being performed?
- Does a certain sequence of events need to happen for the problem to occur?
- Do any other applications fail at the same time?

Answering these types of questions can help you explain the environment in which the problem occurs and correlate any dependencies. Remember that just because multiple problems might have occurred around the same time, the problems are not necessarily related.

Can the problem be reproduced?

From a troubleshooting standpoint, the ideal problem is one that can be reproduced. Typically, when a problem can be reproduced you have a larger set of tools or procedures at your disposal to help you investigate. Consequently, problems that you can reproduce are often easier to debug and solve.

However, problems that you can reproduce can have a disadvantage: If the problem is of significant business impact, you do not want it to recur. If possible, re-create the problem in a test or development environment, which typically offers you more flexibility and control during your investigation.

- Can the problem be re-created on a test system?
- Are multiple users or applications encountering the same type of problem?
- Can the problem be re-created by running a single command, a set of commands, or a particular application?

Related tasks:

"Searching knowledge bases"
You can often find solutions to problems by searching IBM knowledge bases. You can optimize your results by using available resources, support tools, and search methods.

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You can often find solutions to problems by searching IBM knowledge bases. You can optimize your results by using available resources, support tools, and search methods.

About this task

You can find useful information by searching the information center for IBM Intelligent Operations for Water. However, sometimes you need to look beyond the information center to answer your questions or resolve problems.

Procedure

To search knowledge bases for information that you need, use one or more of the following approaches:

- Find the content that you need by using the IBM Support Portal.

  The IBM Support Portal is a unified, centralized view of all technical support tools and information for all IBM systems, software, and services. The IBM Support Portal lets you access the IBM electronic support portfolio from one place. You can tailor the pages to focus on the information and resources that you need for problem prevention and faster problem resolution. Familiarize yourself with the IBM Support Portal by viewing the demo videos (https://www.ibm.com/blogs/SPNA/entry/the_ibm_support_portal_videos) about this tool. These videos introduce you to the IBM Support Portal, explore troubleshooting and other resources, and demonstrate how you can tailor the page by moving, adding, and deleting portlets.
- Search for content about IBM Intelligent Operations for Water by using one of the following additional technical resources:
  - IBM Intelligent Water Support Portal page
  - IBM Intelligent Water system requirements
- Search for content by using the IBM masthead search. You can use the IBM masthead search by typing your search string into the Search field at the top of any ibm.com® page.
- Search for content by using any external search engine, such as Google, Yahoo, or Bing. If you use an external search engine, your results are more likely to include information that is outside the ibm.com domain. However, sometimes you can find useful problem-solving information about IBM products in newsgroups, forums, and blogs that are not on ibm.com.

  Tip: Include "IBM" and the name of the product in your search if you are looking for information about an IBM product.

Related concepts:

"Techniques for troubleshooting problems" on page 217
Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem. Certain common techniques can help with the task of troubleshooting.

Getting fixes from Fix Central

You can use Fix Central to find the fixes that are recommended by IBM Support for a variety of products, including IBM Intelligent Operations for Water. With Fix Central, you can search, select, order, and download fixes for your system with a choice of delivery options. A product fix for IBM Intelligent Operations for Water might be available to resolve your problem.

Procedure

To find and install fixes:

1. Obtain the tools that are required to get the fix. If it is not installed, obtain your product update installer. You can download the installer from Fix Central. This site provides download, installation, and configuration instructions for the update installer.
2. Select IBM Intelligent Operations for Water as the product, and select one or more check boxes that are relevant to the problem that you want to resolve.
3. Identify and select the fix that is required.
4. Download the fix.
   a. Open the download document and follow the link in the “Download Package” section.
   b. When downloading the file, ensure that the name of the maintenance file is not changed. This change might be intentional, or it might be an inadvertent change that is caused by certain web browsers or download utilities.
5. To apply the fix, follow the instructions in the "Installation Instructions" section of the download document.
6. Optional: Subscribe to receive weekly email notifications about fixes and other IBM Support updates.

Related tasks:

“Subscribing to Support updates” on page 222
To stay informed of important information about the IBM products that you use, you can subscribe to updates.

Contacting IBM Support

IBM Support provides assistance with product defects, answers to FAQs, and helps users resolve problems with the product.

Before you begin

After trying to find your answer or solution by using other self-help options such as technotes, you can contact IBM Support. Before contacting IBM Support, your company or organization must have an active IBM software subscription and support contract, and you must be authorized to submit problems to IBM. For information about the types of available support, see the Support portfolio topic in the *Software Support Handbook*.

Procedure

To contact IBM Support about a problem:

1. Define the problem, gather background information, and determine the severity of the problem. For more information, see the Getting IBM support topic in the *Software Support Handbook*.
2. Gather diagnostic information.
3. Submit the problem to IBM Support in one of the following ways:
   - Online through the IBM Support Portal: You can open, update, and view all of your service requests from the Service Request portlet on the Service Request page.
   - By phone: For the phone number to call in your region, see the Directory of worldwide contacts web page.

Results

If the problem that you submit is for a software defect or for missing or inaccurate documentation, IBM Support creates an Authorized Program Analysis Report (APAR). The APAR describes the problem in detail. Whenever possible, IBM Support provides a workaround that you can implement until the APAR

is resolved and a fix is delivered. IBM publishes resolved APARs on the IBM Support website daily, so that other users who experience the same problem can benefit from the same resolution.

Related concepts:

"Known problems and solutions" on page 223
Some common problems with IBM Intelligent Operations for Water are documented, along with their solutions or workarounds. If you have a problem with IBM Intelligent Operations for Water, review the problem-solution topics to determine if a solution is available to the problem that you are experiencing. The problem-solution topics are categorized according to the type of issue.

Related tasks:

"Exchanging information with IBM"
To diagnose or identify a problem, you might need to provide IBM Support with data and information from your system. In other cases, IBM Support might provide you with tools or utilities to use for problem determination.

Exchanging information with IBM

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Related tasks:

"Contacting IBM Support" on page 220
IBM Support provides assistance with product defects, answers to FAQs, and helps users resolve problems with the product.

Sending information to IBM Support

To reduce the time that is required to resolve your problem, you can send trace and diagnostic information to IBM Support.

Procedure

To submit diagnostic information to IBM Support:

1. Open a problem management record (PMR).
2. Collect the diagnostic data that you need. Diagnostic data helps reduce the time that it takes to resolve your PMR. You can collect the diagnostic data manually or automatically:
   - Collect the data manually.
   - Collect the data automatically.
3. Compress the files by using the `.zip` or `.tar` file format.
4. Transfer the files to IBM. You can use one of the following methods to transfer the files to IBM:
   - The Service Request tool
   - Standard data upload methods: FTP, HTTP
   - Secure data upload methods: FTPS, SFTP, HTTPS
   - Email

   All of these data exchange methods are explained on the IBM Support website.

Receiving information from IBM Support

Occasionally an IBM technical-support representative might ask you to download diagnostic tools or other files. You can use FTP to download these files.

Before you begin

Ensure that your IBM technical-support representative provided you with the preferred server to use for downloading the files and the exact directory and file names to access.

Procedure

To download files from IBM Support:

1. Use FTP to connect to the site that your IBM technical-support representative provided and log on as `anonymous`. Use your email address as the password.
2. Change to the appropriate directory:
   a. Change to the `/fromibm` directory.
      ```
      cd fromibm
      ```
   b. Change to the directory that your IBM technical-support representative provided.
      ```
      cd nameofdirectory
      ```
3. Enable binary mode for your session.
   ```
   binary
   ```
4. Use the **get** command to download the file that your IBM technical-support representative specified.
   ```
   get filename.extension
   ```
5. End your FTP session.
   ```
   quit
   ```

Subscribing to Support updates

To stay informed of important information about the IBM products that you use, you can subscribe to updates.

About this task

By subscribing to receive updates about IBM Intelligent Operations for Water, you can receive important technical information and updates for specific IBM Support tools and resources. You can subscribe to updates by using one of two approaches:

RSS feeds and social media subscriptions

The following RSS feed is available for IBM Intelligent Operations for Water: IBM Intelligent Water RSS feed

For general information about RSS, including steps for getting started and a list of RSS-enabled IBM web pages, visit the IBM Software Support RSS feeds site.

My Notifications

With My Notifications, you can subscribe to Support updates for any IBM product. (My Notifications replaces My Support, which is a similar tool that you might have used in the past.) With My Notifications, you can specify that you want to receive daily or weekly email announcements. You can specify what type of information you want to receive (such as publications, hints and tips, product flashes (also known as alerts), downloads, and drivers). My Notifications enables you to customize and categorize the products about which you want to be informed and the delivery methods that best suit your needs.

Procedure

To subscribe to Support updates:

1. To subscribe to the IBM Intelligent Operations for Water RSS feed, use the following substeps:
   a. Open the link: IBM Intelligent Water RSS feed.

b. In the **Subscribe with Live Bookmark** window, select a folder in which to save the RSS feed bookmark and click **Subscribe**.

For more information on subscribing to RSS feeds, see the IBM Software Support RSS feeds link in the Related information section at the end of the topic.

2. Subscribe to My Notifications by going to the IBM Support Portal and click **My Notifications** in the **Notifications** portlet.
3. Sign in using your IBM ID and password, and click **Submit**.
4. Identify what and how you want to receive updates.
   a. Click the **Subscribe** tab.
   b. Select IBM Intelligent Water RSS feed and click **Continue**.
   c. Select your preferences for how to receive updates, whether by email, online in a designated folder, or as an RSS or Atom feed.
   d. Select the types of documentation updates that you want to receive, for example, new information about product downloads and discussion group comments.
   e. Click **Submit**.

Results

Until you modify your RSS feeds and My Notifications preferences, you receive notifications of updates that you have requested. You can modify your preferences when needed (for example, if you stop using one product and begin using another product).

Related tasks:

"Getting fixes from Fix Central" on page 219
You can use Fix Central to find the fixes that are recommended by IBM Support for a variety of products, including IBM Intelligent Operations for Water. With Fix Central, you can search, select, order, and download fixes for your system with a choice of delivery options. A product fix for IBM Intelligent Operations for Water might be available to resolve your problem.

Related information

IBM Software Support RSS feeds

Subscribe to My Notifications support content updates

My Notifications for IBM technical support

My Notifications for IBM technical support overview

Known problems and solutions

Some common problems with IBM Intelligent Operations for Water are documented, along with their solutions or workarounds. If you have a problem with IBM Intelligent Operations for Water, review the problem-solution topics to determine if a solution is available to the problem that you are experiencing. The problem-solution topics are categorized according to the type of issue.

Cannot reinstall custom KPI model on the application server

If you cannot reinstall a custom key performance indicator (KPI) model on the application server, uninstall the monitor models and data and then reinstall the models. For information about uninstalling a single version of a monitor model, see the related task.

No message is displayed when using the command line to install IBM Intelligent Operations for Water 1.5 on top of an existing IBM Intelligent Operations for Water deployment

Because IBM Intelligent Operations for Water is already installed, the status of all components in the topology files is ready. Therefore, no messages from the new installation are displayed. This behavior differs from the graphical user interface (GUI) installation, which allows separate checking to determine if the solution is already installed.

After an IBM Installation Manager installation failed, the reinstallation attempt also fails

If, after an IBM Installation Manager installation of IBM Intelligent Operations for Water fails and you manually fix a problem and want to continue the installation, run the command-line installer. See the related task for more information.

If the IBM Installation Manager installation failed because you manually canceled the IBM Installation Manager, use the command line to continue the installation.

After a command-line installation failed, the reinstallation attempt also fails

Check the log file for a message similar to the following:

```
Command failed: The following error occurred while executing this line:
/opt/IBM/IOC/BA/ioc/spec/SOLUTION/portal_content/build.xml:16:
Command failed with code 1

If you want more detailed operation messages, please check
/opt/IBM/IOC/BA/ioc/log/installSolution_water_wih...log
```

Review the problem details and attempt to manually fix the problem. Then use the command line to continue the installation.

If problems persist, you can take one of the following actions:

- Recover the system to the IBM Intelligent Operations Center status and then reinstall IBM Intelligent Operations for Water.
- Contact IBM Support for help. See the related task.

The launchpad shows an authentication rejected error

This issue is environmental and not launchpad-specific. No method is currently available to suppress the error message, but the functionality or display of the launchpad is not affected. This issue is being addressed.

After clicking Sign in at `http://app-ioc.cn.ibm.com`, the following message appears: `Access Manager WebSEAL could not complete your request due to an unexpected error.`

Ensure that the amount of free disk space on the servers is sufficient.

Nothing happens when I select Add Event from the map in the IBM Intelligent Operations for Water portal

This issue is being addressed. Until it is resolved, go to **Citywide** > **Operator** to create the event.

After setting up the new IBM Intelligent Operations for Water 1.5 and trying to log on through Tivoli Access Manager WebSEAL, the following message appears: `Third-party server not responding.`

The portal server and the Tivoli Service Request Manager server did not start properly. The Tivoli Service Request Manager port conflict issue is resolved.

When I send a .csv file to the simulator in the `app-ioc` host, two messages with the same title and time are displayed in My Activities portlet

Another simulator process is running on either a PuTTY or VNC client. Stop that process.

An activity does not appear in My Activities portlet, as specified in the standard operating procedure policy, even though the Tivoli Service Request Manager service displays as ON in the `IOCControl.sh` script for services status

Log on to `https://event_server: :9044/ibm/console/` and restart the MXServer, or start the MXServer if it is not running. Select **Servers** > **Application servers** > **MXServer**. To verify that the Tivoli Service Request Manager cluster is running, select **Servers** > **Clusters** > **TSRMCluster**. If the cluster is running, you see a green icon.

Related tasks:

"Contacting IBM Support" on page 220
IBM Support provides assistance with product defects, answers to FAQs, and helps users resolve problems with the product.

"Deploying from the command line" on page 25
The IBM Intelligent Operations for Water solution package can be deployed when the IBM Intelligent Operations Center base architecture is deployed.

Related information:

Uninstalling a single version of a monitor model

Problem starting the simulator when the property file is updated with a new JMS Queue

When you create a new JMS Queue in the Portal Server, you must update the **`target.queue`** parameter in the `simulator.properties` file with a new JMS Queue. An error may be displayed in the `simulator.log` file when you attempt to start the simulator. You must restart the Portal Server before you start the simulator.

Procedure

1. Log on to WebSphere Application Server at the following URL:
   `https://appserver:9043/ibm/console`
2. Select **Servers** > **Clusters** > **WebSphere Application Server clusters**.
3. Select the **PortalCluster**.
4. Click **Stop** and wait until the red icon is displayed.
5. Click **Start** and wait until the green icon is displayed.
6. Log off WebSphere Application Server and run the command to start the simulator.
   `#nohup ./run_simulator.sh > simulator.log &`

Cannot select IBM Intelligent Operations for Water assets from the Categories menu

If you cannot select IBM Intelligent Operations for Water assets from the Categories menu, check the status of the DB2 server.

Procedure

1. Log on to the management server as ibmadmin.
2. Type the following command:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh status db24po topology_password
   ```

   If the portal is running, you see a message similar to the following:

   ```
   Executing query command....completed.
   IBM DB2 Enterprise server for WebSphere Portal Extend [ on ]
   Command completed successfully.
   ```

3. If the DB2 server is not running, type ./iopmgmt.sh start db24pe *topology_password*

   Note: To check the status of all DB2 instances, type ./iopmgmt.sh status all *topology_password*.

Authentication mechanism not available

If you receive the HPDIA0119W Authentication mechanism is not available error message after you log on to the WebSphere Portal, check the status of the Tivoli Directory Server and the Tivoli Directory Server Proxy for the application server.

Procedure

1. Log on to the management server as ibmadmin and type the following commands:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh  status tds topology_password
   ```

   If the server is running, a message similar to the following example is displayed:

   ```
   Executing query command.....completed.
    IBM Tivoli Directory Server [ on ]
   Command completed successfully.
   ```

2. If the server is not running, type./iopmgmt.sh start tds *topology_password*
3. If the server is not running after you complete Steps 1 and 2, log on to the management server as ibmadmin and type the following commands:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh  status tdspxyapp topology_password
   ```

   If the server is running, a message similar to the following example is displayed:

   ```
   Executing query command.....completed.
   IBM Tivoli Directory Server [ on ]
   Command completed successfully.
   ```

4. If the server is not running, type ./iopmgmt.sh start tdspxyapp*topology_password*

Third-party server not responding

If you receive the Third-party server not responding error message after you log on to theWebSphere Portal portal, check the status of the WebSphere Portal.

Procedure

1. Log on to the management server as ibmadmin and type the following command:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh  status wpe topology_password
   ```

   If the portal is running, a message similar to the following is displayed:

   ```
   Executing query command.....completed.
   IBM WebSphere Portal Extend [ on ]
   Command completed successfully.
   ```

2. If the portal is not running, type `./iopmgmt.sh start wpe topology_password`.

Cannot access portal

If you cannot access the portal at http://*portal_URL*/wpsv70/wps/myportal, check the status of the Tivoli Access Manager WebSEAL.

Procedure

1. Log on to the application server as `root` and type **`pd_start status`**. The status of the Tivoli Access Manager WebSEAL is displayed. If the Tivoli Access Manager WebSEAL is not running, type **`pd_start start`** to start the Tivoli Access Manager WebSEAL server.
2. You can also check the Tivoli Access Manager WebSEAL status by logging on to the management server as `ibmadmin` and typing the following command:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh status tamweb topology_password
   ```

   If the server is running, you see a message similar to the following:

   ```
   Executing query command.....completed.
    IBM Tivoli Access Manager WebSEAL [ on ]
   Command completed successfully.
   ```

   If the status is `[ off ]`, type `./iopmgmt.sh start tamweb topology_password`.

Authentication failed

If you receive an `error 403: authenticationFailed` message after you log on to the portal, check the status of the Tivoli authorization server and the Tivoli Access Manager policy server.

Procedure

1. Log on to the management server as `root` and type **`pd_start status`**. You see results similar to the following. Ensure that the status of each component is `yes`.

   ```
   Tivoli Access Manager servers
   Server Enabled Running
   ------------------------------------------
   pdmgrd yes yes
   pdacld yes yes
   pdmgrproxyd no no
   ```

   Note: `pdmgrd` refers to the Tivoli authorization server, and `pdacld` refers to the Tivoli Access Manager policy server.

   If the Tivoli authorization server and the Tivoli Access Manager policy server are not running, type **`pd_start start`**.
2. You can also check the status of the Tivoli authorization server and the Tivoli Access Manager policy server by typing the following commands on the management server:

   ```
   ./iopmgmt.sh status tamas topology_password
   ```

   If the Tivoli authorization server is running, you see a message similar to the following:

   ```
   Executing query command...completed.
   IBM Tivoli Access Manager Authorization Server [ on ]
   Command completed successfully.
   ```

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh status tamps topology_password
   ```

   If the Tivoli Access Manager policy server is running, you see a message similar to the following:

   ```
   Executing query command...completed.
   IBM Tivoli Access Manager Policy Server [ on ]
   Command completed successfully.
   ```

   If the Tivoli authorization server is not running, type `./iopmgmt.sh start tamas topology_password`.

If the Tivoli Access Manager policy server is not running, type `./iopmgmt.sh start tamps topology_password`.

Cannot access IBM Cognos Business Intelligence reports, and receive error message

If you cannot access IBM Cognos Business Intelligence reports and you receive `An error occurred while retrieving content` error message, check the status of IBM Cognos Business Intelligence.

Procedure

1. Log on to the management server as `ibmadmin` and type the following command:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh status cognos topology_password
   ```

   If IBM Cognos Business Intelligence is running, you see a message similar to the following:

   ```
   Executing query command...completed.
   IBM COGNOS Business Intelligence [ on ]
   Command completed successfully.
   ```

2. If IBM Cognos Business Intelligence is not running, type `./iopmgmt.sh start cognos topology_password`.

KPIs are not triggered

If Key Performance Indicators (KPIs) are not triggered, check the status of the WebSphere Message Broker.

Procedure

1. Log on to the management server as `ibmadmin` and type the following command:

   ```
   su – ibmadmin
   cd /opt/IBM/ISP/mgmt/scripts
   ./iopmgmt.sh status wmb topology_password
   ```

   If WebSphere Message Broker is running, you see a message similar to the following:

   ```
   Executing query command....completed.
   IBM WebSphere Message Broker [ on ]
   Command completed successfully.
   ```

2. If WebSphere Message Broker is not running, type `./iopmgmt.sh start wmb topology_password`.

Measurements in the user interface are not changing

If you know the queue manager and broker are started, are running the simulator, and are trying to simulate measurements, but you do not see the measurements changing in the user interface, check the status of the IBM Intelligent Operations Center XML probe and the IBM Intelligent Operations for Water XML probe.

Procedure

1. Log on to the event server as `root` and check the status of the water_wih Tivoli Netcool/OMNIbus probe and the ioc_xml Tivoli Netcool/OMNIbus probe. Type the following commands:

   ```
   ps auxww |grep water_wih
   ps auxww |grep ioc_xml
   ```

   Note: If you cannot log on to the event server as `root`, log on as an administrator and use the **sudo** command to issue the required commands.

2. If no processes are running, you must manually start the probes.
   a. To start the ioc_xml probe, type the following command:

      ```
      /opt/IBM/netcool/omnibus/probes/nco_p_xml -name ioc_xml -propsfile
      /opt/IBM/netcool/omnibus/probes/linux2x86/ioc_xml.props &
      ```

b. To start the water_wih probe, type the following command:
   `/opt/IBM/iss/iow/omnibus/startXmlProbe.sh`

Measurements are changing but KPIs and standard operating procedures are not triggered

If measurements in the user interface are changing but Key Performance Indicators (KPIs) and standard operating procedures do not seem to be triggering, check your Tivoli Service Request Manager password.

Procedure

1. Log on to the Tivoli Netcool/Impact administrative console at `http://event_host:9080/nci/main` where *event_host* is the host name of the event server. Log on as the `admin` user with the `netcool` password.
2. Click **IOC Project**.
3. In the Policies section, double-click the policy **IOC_Sample_Password_Encoder**. The policy is opened in the Policy Editor window.
4. In the **Enter Password Here** field, enter the password for **Maxadmin**.
5. To save the policy, click **Save**.
6. Click the **Trigger Policy** icon.
7. Click **Execute**.
8. In the Service Status section, scroll to **PolicyLogger**, click **View log for PolicyLogger** (icon with the down arrow).
9. In the policy logger window, locate the statement that is similar to the following statement:
   `11 May 2012 14:19:12,260: [IOC_Sample_Password_Encoder][pool-1-thread-46]Parser log: {aes}FF877B74ADF4DF1C2002F94ACB38FAFF`
10. Copy the encrypted **Maxadmin** password from the statement, for example:
    `{aes}FF877B74ADF4DF1C2002F94ACB38FAFF`
11. In the Tivoli Netcool/Impact administrative console, in the Policies section, double-click the policy **UTILS_LIBRARY_IOC_TSRM**. The policy is opened in the Policy Editor window.
12. Replace the value of *MAXAdminPassword* with the encrypted value that you copied in Step 10:
    `MAXAdminPassword = "{aes}FF877B74ADF4DF1C2002F94ACB38FAFF";`
13. Click **Save**.
14. Return to the policy **IOC_Sample_Password_Encoder** that you accessed in Step 3 and remove your unencoded password.

    You can leave the field blank or you can type a text string.

    Important: Ensure that the string does not contain any spaces. Check for spaces at the beginning and end of the string.

Log files

To troubleshoot a problem in IBM Intelligent Operations for Water, you might need to analyze log files on several systems on the IBM Intelligent Operations Center servers.

See the related link for a list of the log files that are available for each of the IBM Intelligent Operations Center servers.

Related information:

IBM Intelligent Operations Center server log files

Chapter 10. Reference

These topics contain additional reference information to help you.

PDF library

This topic provides links to the information center content in PDF format.

The information center content is available in the following PDF for convenient printing:

- IBM Intelligent Water Family: IBM Intelligent Operations for Water information center

Additional information

The following additional resources are available online.

WebSphere Portal

- WebSphere Portal product support page: http://www.ibm.com/support/entry/portal/Overview/Software/WebSphere/WebSphere_Portal
- WebSphere Portal information library: http://www.ibm.com/software/genservers/portal/library/
- WebSphere Portal wiki: http://www.lotus.com/ldd/portalwiki.nsf

WebSphere Application Server

- WebSphere Application Server product support page: http://www.ibm.com/software/webservers/appserv/was/support/
- WebSphere Application Server information library: http://www.ibm.com/software/webservers/appserv/was/library/index.html
- WebSphere Application Server 7.0.x Information Center: http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp

Redbooks®

- Smarter Cities Series Redguide: http://www.redbooks.ibm.com/abstracts/redp4736.html
- Redbooks Domain: http://publib-b.boulder.ibm.com/Redbooks.nsf

Tivoli software

- Tivoli training and certification: http://www.ibm.com/software/tivoli/education/

Cognos software

- IBM Cognos Business Intelligence: http://www-01.ibm.com/software/analytics/cognos/business-intelligence/
- IBM Cognos Business Intelligence Information Center: http://publib.boulder.ibm.com/infocenter/c8bi/v8r4m0/index.jsp

Web resources

- JAWS Screen Reading Software: http://www.freedomscientific.com/products/fs/jaws-product-page.asp

Information centers

- IBM Smarter Cities Software Solutions Information Center: http://publib.boulder.ibm.com/infocenter/cities/v1r0m0/index.jsp

- WebSphere Application Server 7.0.x Information Center: http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp
- IBM WebSphere Business Monitor Information Center: http://publib.boulder.ibm.com/infocenter/dmndhelp/v7r0mx/index.jsp?topic=/com.ibm.btools.help.monitor.doc/home/home.html
- Rational Application Developer Information Center: http://publib.boulder.ibm.com/infocenter/radhelp/v7r5/index.jsp?topic=/com.ibm.rad.legal.doc/helpindex_rad.html

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Product Documentation
Version 1 Release 5

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