


Slide 1

WebSphere Education

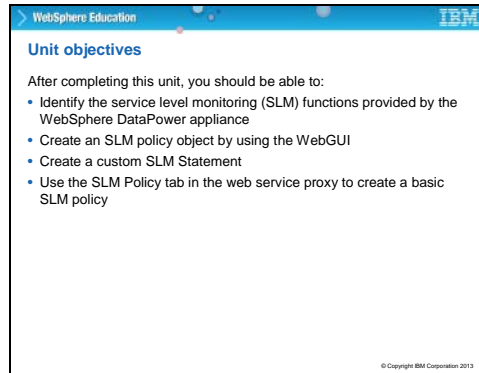
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Service level monitoring



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Slide 2



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Unit objectives

After completing this unit, you should be able to:

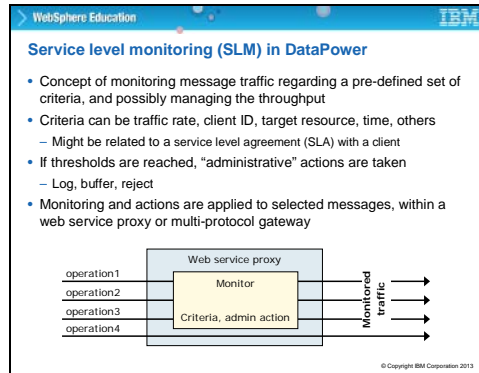
- Identify the service level monitoring (SLM) functions provided by the WebSphere DataPower appliance
- Create an SLM policy object by using the WebGUI
- Create a custom SLM Statement
- Use the SLM Policy tab in the web service proxy to create a basic SLM policy

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In this presentation, students examine how to create a service level monitoring policy. Two types of service level monitoring policies can be created: a simple statement and an advanced statement. The DataPower appliance automatically generates the simple statement. The advanced statement is constructed by creating the respective objects.

Peer URLs are not covered in this presentation, but they are relevant to SLM and might be the subject of questions that students ask. The peer URLs are used to specify a set of DataPower boxes that enforce the same service level monitoring policy. It allows one DataPower box to share traffic information with other DataPower boxes. The service level monitoring policy must also be defined on each of the boxes that are enforcing that policy.

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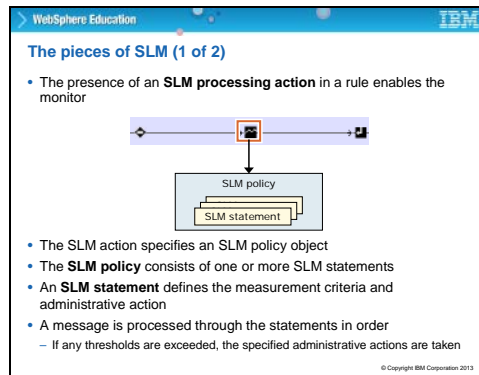
What is service level monitoring (SLM)?

So, what is Service Level Monitoring, or "SLM" as it is usually abbreviated?

It is the process of measuring service quality. By that performance and availability are meant relative to customer expectations. One must ensure the quality stays within agreed-upon parameters that are defined by service level agreements (SLA), by reporting results and taking appropriate actions.

To implement an SLM, incoming traffic is filtered based on predefined criteria and a policy is applied to selected messages. If thresholds are reached during the measured interval, then the configured action runs.

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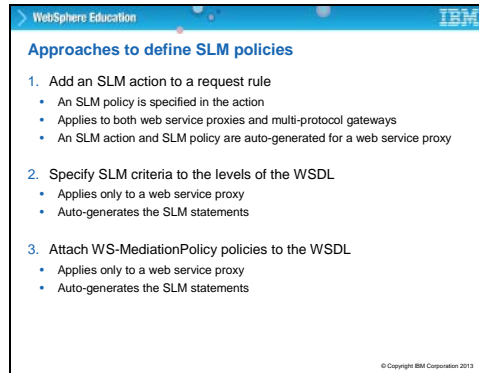


SLM in DataPower: Basic principles

First, some basic principles that apply to SLM. Service-level monitors allow administrative control over users and resource groups, and can penalize services that fail to comply with service policy.

An SLM policy consists of one or more statements that consists of restrictions, along with actions that can be taken when a restriction is violated. This restriction is implemented by an SLM policy.

An SLM Statement counts messages or measures message execution duration. You can have more than one SLM statement, and they are processed sequentially in the order they are configured. An SLM policy consists of one or more statements. Incoming traffic is monitored and controlled in accordance with the SLM policies that are defined.



As you might expect, there are three ways to configure an SLM – top-down, and bottom-up. The first two approaches are supported for many years. The first method – top-down – typically happens during the configuration of a document processing policy.

In this approach, the SLM Rule action is configured as part of the document processing policy by adding the SLM icon to the Rule execution line. In the web service proxy, the SLM Rule action is a separate icon in the policy editor whereas in the multi-protocol gateway, the SLM Rule action is selected from the Advanced icon. The second method – bottom-up – requires you to use the left-side vertical menu, specifically, the Objects/Monitoring option. In this approach, all the basic SLM objects are first configured and then SLM policy is constructed from these basic components.


WS-MediationPolicy is an IBM proposed web service standard for quality of service (QoS) specifications. WS-MediationPolicy statements can be a policy attachment for a WSDL, and be stored in WebSphere Service Registry and Repository. WS-MediationPolicy statements auto-generate SLM-related processing rules. These rules execute before the developer-specified rules within the web service proxy. WS-MediationPolicy is not covered in any detail in this course.

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Approach 1: Add an SLM action to a request rule

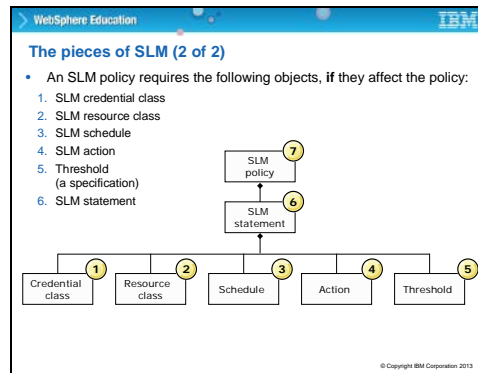
- An **SLM** action identifies an SLM policy for execution
 - Web service proxy: the **SLM** action has its own icon
 - Multi-protocol gateway: the **SLM** action is selected from the **Advanced** icon
- When configuring the SLM action, you must specify an existing SLM policy, or create a new one
- Without an SLM action and SLM policy, no monitoring occurs



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The **SLM** action screen capture is from a web service proxy.
Compare this action with the SLM action object, which is covered later.

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A threshold is not a separate object. It is a specification within an SLM statement. Depending on what criteria are needed for a specific SLM statement, only certain SLM objects are needed. For example, if you are monitoring only the target resource, then the SLM credential and SLM schedule objects are not needed. The numbered steps are used to build an SLM policy. The chart essentially shows the object dependencies. A credential class, resource class, schedule, action, and thresholds are used to define an SLM statement. The SLM policy is composed of one or more statements.

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The SLM credential class

- Defines which clients are subject to an SLM statement
 - Select **Objects > Monitoring > SLM Credential Class** to define individually
- A credential class consists of:
 - **Credential Type:** specifies what to use for a credential
 - **Match Type:** specifies how a successful match is determined
 - **Credential Value:** (optional) is used to specify exact values when match type is **exact**
 - **Request header** (not shown): name of a header when the credential type is request header

Configure SLM Credential Class

Match

SLM Credential Class

Save Cancel

Name

Administrative State ☒ enabled ☐ disabled

Comments

Credential Type

Match Type

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The SLM credential class

The credential class defines a user group subject to SLM statement restrictions. It consists of a Credential Type, which specifies the method that is used to obtain the credential, and a Match Type that specifies how a successful match is determined. There might be a Credential Value that is used to specify exact values for an exact match.

If the credential type is request header then you can specify the header that contains the information.

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The SLM resource class

- Identifies a set of resources subject to an SLM policy statement
 - Select **Objects > Monitoring > SLM Resource Class** to define individually
- A resource class consists of:
 - Resource Type:** specifies a method used to identify the resource
 - Match Type:** specifies how a successful match is determined
 - Resource Value:** values to match

Configure SLM Resource Class

Main

SLM Resource Class

Create Cancel

Name

Administrative State ☒ enabled ☐ disabled

Comments

Resource Type

Match Type

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The SLM resource class

The SLM resource class identifies a set of resources subject to an SLM policy statement. It consists of a Resource Type, a Match Type, and a Resource Value. The Resource Type specifies a method that is used to identify the resource. Match Type specifies how a successful match is determined. Resource Value lists the values to match.

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SLM resource class example

- SLM policy applies to incoming message that contains the following attributes:
 - WSDL operation: **AddressSearch/findByName**
 - Namespace: **http://east.address.training.ibm.com**

SLM Resource Class : nsrc-AddressSearchProxy-wsdl-operator22 [url]

Admin State: ☒ enabled ☐ disabled

Comments:

Resource Type: *

Match Type: *

Resource Value:

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SLM resource class example

Here is an example of an SLM resource class. In this example, the SLM policy applies to an incoming message that contains the attributes WSDL operation, with a value of AddressSearch/findByName, together with a namespace with the value http://east.address.training.ibm.com.

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The SLM schedule

- Specifies a time period during which the associated SLM statement is enforced
 - Select **Objects > Monitoring > SLM Schedule** to define individually
- Schedule elements
 - Week Days
 - Start Time
 - Duration
 - Start Date
 - End Date

SLM Schedule

Name

Administrative State

Comments

Week Days

☐ Sunday
☐ Monday
☐ Tuesday
☐ Wednesday
☐ Thursday
☐ Friday
☐ Saturday

Start Time

Duration

Start Date

End Date

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The SLM Schedule

Here is where the SLM definition is more sophisticated than the Message Monitor definition. It allows for selective monitoring at certain times of the day, and certain days of the week.

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The screenshot displays the 'WebSphere Education' console with the 'The SLM action' section. It includes a list of bullet points explaining SLM actions and their types, a 'Configure SLM Action' form, and a table of pre-defined actions.

The SLM action

- When an SLM statement detects a threshold violation, an SLM action defines the response
- Select **Objects** > **Monitoring** > **SLM Action** to define individually
- Action types
 - Notify**: creates log message when action is fired
 - Shape**: buffers request to meet traffic threshold up to limit; otherwise, it rejects
 - Throttle**: reject outright
- Three SLM actions are pre-defined. New SLM actions can be defined to change log priority of logged message

Configure SLM Action

SLM Action

Apply Cancel

Name: []

Admin State: ☒ enabled ☐ disabled

Comments: []

Type: [log Only] [v]

Log Priority: [debug] [v]

Table of Pre-defined SLM Actions:

Name	Status	Op-State	Logs	Admin State	Comments
notify	saved	up	[v]	enabled	
shape	saved	up	[v]	enabled	
throttle	saved	up	[v]	enabled	

Refresh List

Add

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The SLM action

When an SLM policy statement detects a service level violation, an SLM action defines the response. The actions types can be notify, shape, or throttle. The term "throttle" seems a little incongruous in this context. You might remember the message monitors looked at in the previous section used the term "reject" when messages are to be dropped. In this context, "throttle" means the same as "reject."

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SLM statement (1 of 2)

- An SLM statement can consist of:
 - **Credential Class:** defines a possible client group subject to this SLM statement
 - **Resource Class:** identifies a possible resource group subject to this SLM statement
 - **Schedule:** time frame during which this SLM statement is enforced
 - **Action:** administrative action (sanction) to take if threshold violated (required)
- SLM statements exist only within the SLM policy object

Edit Statement

Identifier	2
User Annotation	Auto-generated
Credential Class	(none) [+]
Resource Class	AddressSearchPolicy_port_operation_findByName [+]
Schedule	(none) [+]
SLM Action	Alert [+]
Threshold Interval Length	0
Threshold Interval Type	Fixed [+]
Threshold Algorithm	Greater Than [+]

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SLM statement (1 of 2)

This slide brings it all together. An SLM statement consists of the Credential Class, the resource class, a schedule, and an action.

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SLM statement (2 of 2)

- Thresholds
 - Usage level that triggers an SLM action
- Threshold fields
 - **Threshold Interval**
 - Length: length of measurement interval
 - **Threshold Interval Type**
 - Fixed: a discrete block of time, for example, 8 a.m. to 9 a.m.
 - Moving: a moving window, for example, the last 60 minutes
 - **Threshold Algorithm**
 - greater than, less than, token bucket, high-low threshold
 - **Threshold Type**: count all, count errors, back-end latency, internal latency, total latency
 - **Threshold Level**: value that triggers the threshold

Threshold Interval Length	0	Seconds
Threshold Interval Type	Fixed	30
Threshold Algorithm	Greater Than	30
Threshold Type	Count all	30
Threshold Level	200	
Reporting Aggregation Interval	0	Minutes
Maximum Records Across Intervals	5000	Records
Auto Generated by GUI	on	off
Maximum Credentialable Resource Combination	5000	Records

OK Cancel

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SLM statement (2 of 2)

Notice how the threshold parameters for SLM are more sophisticated than the message monitors. For example, the “token bucket” parameter is analogous to a “three-strikes-you-are-out” scenario. It allows you to grant some “tokens” to a particular monitor, and you take a token out of the “bucket” each time a threshold is breached. When the bucket is empty, the breach causes the defined action to take place. However, if a time period elapses during which the threshold is **not** exceeded, a token is put back in the bucket. It is like a reward for good behavior.

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SLM policy - Main tab

- An SLM policy consists of one or more SLM statements and an evaluation method
 - Select **Objects > Monitoring > SLM Policy** to define individually
- Evaluation Method: determines how the SLM policy evaluates the remaining SLM statements if a threshold is exceeded in the current SLM statement
 - Execute **all** statements
 - Terminate at first **action**
 - Terminate at first **reject**

SLM Policy: AddressSearchProxy [wz]

Apply Cancel Delete Help

Administrative State: ☒ enabled ☐ disabled

Comments:

Evaluation Method:

Peer Group:

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SLM policy

Since there can be a series of SLM statements within a single policy, it is possible that more than one might be relevant to a particular threshold breach. It is also possible that the actions taken might vary in severity from statement to statement. Within the SLM policy, there is the ability to decide whether all statements are applied. Only those statements up to the first threshold breach. Or only those statements up to the first statement that would cause a message are dropped.

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SLM policy - Statements tab

- Lists the SLM statements that are part of this SLM policy, and the order of evaluation

SLM Policy: AddressSearchProxy.jsp

Apply Cancel Save Cancel

Statement						
Order	Order Association	Credential Class	Resource Class	Schedule	SLM Action	Time Limit
1	Auto Generated		AddressSearchProxy_862293b-ea25-4d27-8039-348a7276e6da	never	deny	60
2	Auto Generated		AddressSearchProxy_912ac184-0909-4d55-96a2-712ac2028a66	always	deny	60
3	Not an web service		ExtAddressSearch_URI		deny	60

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SLM policy – statements tab.

This slide shows the Statements tab, which lists the SLM statements that are part of this SLM policy, and the order of evaluation.

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Getting SLM statements into the Statement list

- Since SLM statements do not exist as separate objects, they cannot be selected from a drop-down list
- SLM statements are added to the list by:
 - Specifying SLM criteria on the SLM Policy tab of a web service proxy (auto-generates SLM statements)
 - Clicking **Add** beneath the list to create a custom SLM statement
- The first two statements are auto-generated. The third statement is custom

Statement ID	Threshold Algorithm	Threshold Type	Threshold Level	High-Low Balance Level	Burst Level	Reporting Aggregation Interval	Statement Results Access Interval	Auto Generated by GSE	Statement Contributions	
1	Lowest	Cost	Cost id	0	0	0	1000	on	1000	34
2	Green	Time	Cost id	5	0	0	5000	on	5000	34
3	Green	Time	Cost id	200	0	0	5000	on	5000	36

Add

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Getting SLM statements:

This graphic is the right side of the WebGUI page from the previous slide. Since SLM statements do not exist as separate objects, they cannot be selected from a drop-down list

SLM statements are added to the list by:

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Approach 2: Specify SLM criteria to the levels of the WSDL (1 of 2)

- Web service proxy has an **SLM Policy** tab to allow simple definitions of SLM monitoring criteria
- Specifying this criteria creates the auto-generated SLM statements
- SLM criteria can be uniquely specified at the different level of the WSDL (proxy, wsdl, service, port port-operation)
- Criteria can be set for successful transactions (Request) and errors (Failure)

Auto Generated SLM Statements

Define the request or failure SLM policy:

```

[Request: none] [Failure: none]
  [wsdl: findAddressSearch.wsdl]
    [Request: none] [Failure: none]
      [wsdl: findAddressSearch.wsdl]
        [Request: none] [Failure: none]
          [service: http://www.addresstraining.com/AddressSearchService]
            [Request: none] [Failure: none]
              [port: http://www.addresstraining.com/AddressSearch]
                [Request: none] [Failure: none]
                  [port-operation: findByName]
                    [Request: interval:60,unit=200,Action=notify [Failure: none] [Graph]]
                    [port-operation: findLocation]
                      [Request: none] [Failure: none]
                      [port-operation: findLocation]
                        [Request: interval:60,unit=150,Action=throttle [Failure: none] [Graph]]

```

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Approach 2, specify SLM criteria to the levels of the WSDL (1 of 2)

For the auto-generated SLM statements, you specify the measurement interval, the threshold value, and the SLM action to take if the threshold is exceeded.

The **Graph** button is covered in a later slide.

The screen capture shows a service-level policy for the findByName operation of 200 transactions per 60 seconds, which if exceeded results in a notify action. It also dictates that five failed transactions within 60 seconds get logged. For the findByLocation operation, a lower limit of 150 transaction per 60-seconds results in the throttle action.

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Approach 2: Specify SLM criteria to the levels of the WSDL (2 of 2)

- **SLM Peers** are a cluster of appliances that support the same service and SLM policy
- **SLM Statements** lists only custom SLM statements
- **Create New Statement** allows creation of a custom SLM statement

SLM Peers

Define the collection of SLM peers that monitor an SLA.

Type
SLA Unicast

URL
http://

Add

SLM Statements

SLM statements define custom SLM policies to monitor transactions that meet specific credential or resource criteria.

SL	Credential Class	Resource Class	Schedule	Threshold Level	Threshold Type	Action
Create New Statement						

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Approach; specify SLM criteria to the levels of the WSDL (2 of 2)

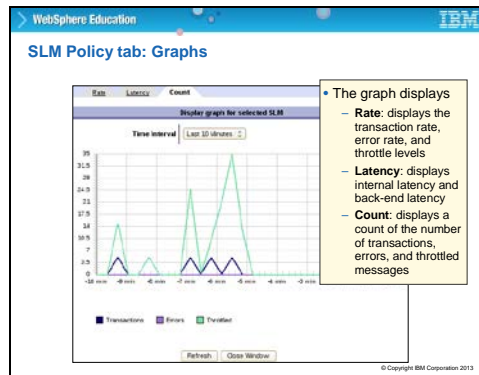
This graphic is the lower part of the SLM Policy tab for a web service proxy.

Configuring SLM peers is an administrative task.

SLM Statement lists only custom SLM statements that exist within the SLM policy that has the same name as the web service proxy. The specifications on this page define the default SLM policy object that is created for the web service proxy.

If you click **Create New Statement**, the page repaints with a section that contains the same fields as exist in an SLM statement configuration page.

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Service level monitor: Graphs

Here is an example of a graph that would appear if you were to click a link as described on the previous slide. You can select the duration that is represented by the graph from the pick-list at the top, and it shows three categories of message.

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SLM action granularity

- A web service proxy or multi-protocol gateway service policy must explicitly define an **SLM action** in order for client requests to participate in service level monitoring
- The default web service proxy request policy contains an SLM action
- A fine-grained policy without an SLM action does not participate in service level monitoring

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SLM action granularity

Default request and response rules are configured at the proxy level. The request includes a match action and a result action, together with an SLM action. You can add to or subtract from these actions if you want. You can add rules at different levels, right down to the fine-grained operation level. Remember that, if there is a rule that is defined for, say, a request at a lower level, any request rule that is defined at a higher level does not run. So for example, in the screen capture on this slide there is a request direction rule that is configured for the operation that is called `findByLocation` that includes a `verify` action but no SLM action. Therefore, any request for this operation does not run an SLM action.

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Unit summary

Having completed this unit, you should be able to:

- Identify the service level monitoring (SLM) functions provided by the WebSphere DataPower appliance
- Create an SLM policy object by using the WebGUI
- Create a custom SLM Statement
- Use the SLM Policy tab in the web service proxy to create a basic SLM policy

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Checkpoint questions

- What are the five constructs that make up the **SLM Statement** object?
 - Credential class, resource class, schedule, threshold, and action
 - Service policy, processing rules, actions, rules, and filter
 - Encryption, polymorphism, inheritance, objects, and class
- Match the functionality to the **Reject** and **Shape** action types:

Description	Definition
1. Reject action	A. Log and drop traffic
2. Shape action	B. Log, queue traffic to meet threshold, otherwise reject
- True or False: SLM monitors are implemented as part of a service policy.

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Checkpoint answers

- A. What are the five constructs that make up the **SLM Statement** object?

✓ A. **Credential class, resource class, schedule, threshold, and action**

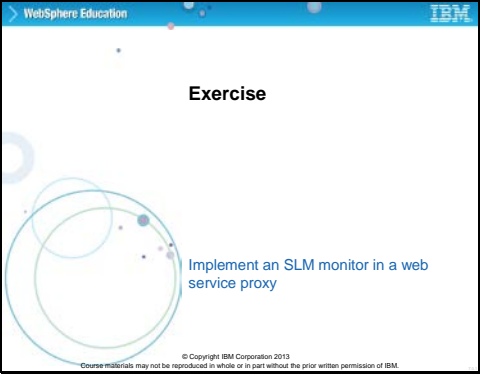
B. Service policy, processing rules, actions, rules, and filter

C. Encryption, polymorphism, inheritance, objects, and class
- Match the functionality to the **Reject** and **Shape** action types:

Description	Definition
1. Reject action	A. Log and drop traffic
2. Shape action	B. Log, queue traffic to meet threshold, otherwise reject
3. **True**. SLM monitors are implemented as part of a service policy.

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Slide 25



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Exercise

Implement an SLM monitor in a web service proxy

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Exercise objectives

After completing this exercise, you should be able to:

- Specify service level monitoring criteria for a web service proxy
- Inspect and edit an SLM policy object
- Explain the need for an operation-level SLM action in a web service proxy
- Create a custom log target for SLM events

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