Rules

Introduction

With the release of Open-AudIT 3.2.0 we have introduced a new concept called Rules. Rules are created and run against a device when the device is discovered or an audit result is processed. Rules can be used to set a device attribute based on other attributes.

NOTE - At present we cannot delete a rule input or output that contains a /. This is because the framework is parsing the / as part of the URL and returning a 404, even before our code runs. The work-around for this is to delete the Rule itslef, then recreate the inputs and outputs as required. Fortunately inputs and outputs that contain a / are rare (indeed, none exist by default).

How Does it Work?

Each time a device is discovered or an audit result is processed, all rules are retrieved from the database and run against the attributes of the specific device. Rules run against one device at a time - there is no facility to say "Run the rules against all devices" or "Run the rules against these devices". An individual rule will test one or more attributes of the device and if they match the rule, the result will be applied. Several attributes can be tested. Several attributes can be set. Think of this as an If This, Then That system for Open-AudIT.

Initially we have included rules for SNMP Enterprises, MAC Addresses, SNMP OIDs and quite a few custom rules. The actual counts are:

SNMP Enterprise	54006
Mac Address	26432
SNMP OID	10897
Custom	422
Total	**99757**

~~All these rules were previously hard coded into the application codebase. As a result, we have deleted many thousands of lines of code!~~

UPDATE - With the release of 3.2.2, we no longer store ~100,000 rules in the database. This was fine on my test device (a core i7, 16GB memory and Samsung 860 NVMe), but in practice was causing customers servers to choke.

As per the Release Notes for 3.2.2 -

> *So, that was a ride... In* **testing** *our new Rules feature worked a treat. In* **practice**, *not so much. Most servers (ie, not mine) can't cope with loading the rule set, even if we break it down to smaller chunks, when processing multiple devices. What to do? What to do? Well we've taken a small step back. Rules still exist as a feature, and they still work a treat. But instead of inserting 100,000 Rules into the database, we've split them up into four distinct files and implemented them as code only. Hence, no loading all 100,000 Rules, decoding JSON and running them against a device. Now we just load the files and run the statements. Much, much faster and more memory efficient. No load on MySQL, and hence the CPU also drops. No populating a massive recordset and hence the memory drops. The not so good thing - these are no longer editable in the GUI. But it's not the end of the world. You can still make Rules as you see fit and they will be run after the "default" rules (those in code), hence you can override the "default" rules. So we don't lose much, but we gain a LOT of performance. We also added a few new Rules for Mac Models.*

For those curious, the "new" files that replace the Rules are:

File	Description
/open-audit/code_igniter/application/helpers/mac_helper	Matches MAC addresses to manufacturers.
/open-audit/code_igniter/application/helpers/mac_model_helper	Matches Apple manufacturer codes to models (stored in system.manufacturer_code).
/open-audit/code_igniter/application/helpers/snmp_model_helper	Matches the device's SNMP OID to a model and type.
/open-audit/code_igniter/application/helpers/snmp_model_helper	Matches the devices's SNMP OID to the manufacturer.

And of course you are free to add or modify the rules as you see fit. If you have a device with an SNMP OID that doesn't match a model already in the file - now you can add it easily. No more waiting for us to provide a patch and add it to the code base for you.

When you create a Rules entry, you will need to provide a name and a list of inputs and outputs. The inputs and outputs are stored as JSON arrays within the database.

Inputs have a table and attribute, an operator and a value. When executing the condition, it works thus: If $table . $attribute $operator $value then apply the outputs.

A contrived example rule to match a type and set the model is below.

```
INPUTS
table = system
attribute = type
operator = eq
value = computer

OUTPUTS
table = system
attribute = model
value = My Model
value_type = string
```

Operators in Inputs can have the following values.

Name	Result
eq	Equals
ne	Does Not Equal
gt	Greater Than
ge	Greater Than or Equals
lt	Less Than
le	Less Than or Equals
st	Starts With
li	Like
nl	Not Like
in	In the (comma seperated) list
ni	Not in the (comma seperated) list

Value Types in Outputs can have the following values.

Name	Description
string	a String
integer	an Integer
timestamp	A timestamp. If the value is set, that timestamp value will be used. If the value is not set, the current timestamp will be used.

When the rules run in discovery, any matching rules will appear in the discovery log. See below for an example.

```
Hit on snmp_enterprise_id 9 eq 9
Hit on manufacturer is empty
Command: Rule Match - SNMP Enterprise Number for ciscoSystems, ID: 10
Output: {"manufacturer":"Cisco Systems","snmp_enterprise_name":"ciscoSystems"}
```

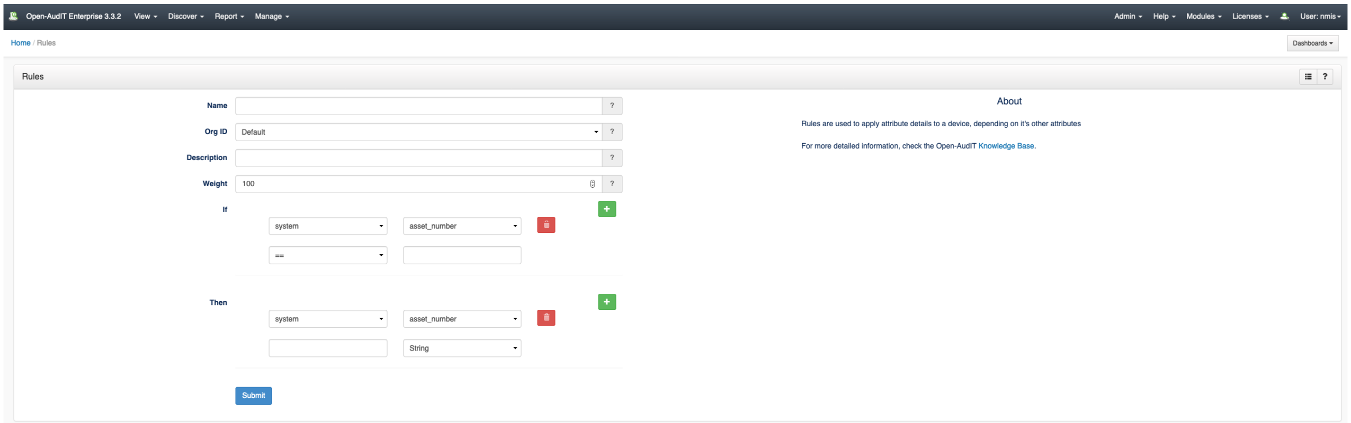
and anohter

```
Hit on snmp_oid 1.3.6.1.4.1.9.1.620 eq 1.3.6.1.4.1.9.1.620
Command: Rule Match - SNMP OID match, ID: 135661
Output: {"model":"Cisco 1841","type":"router"}
```

Create Rules Entries

Rules can be created just like any other item. Menu Manage Rules Create.

You can add and remove inputs and outputs as required.



Name:
Org ID: Default
Description:
Weight: 100

If
system | asset_number
== |

Then
system | asset_number
| String

About

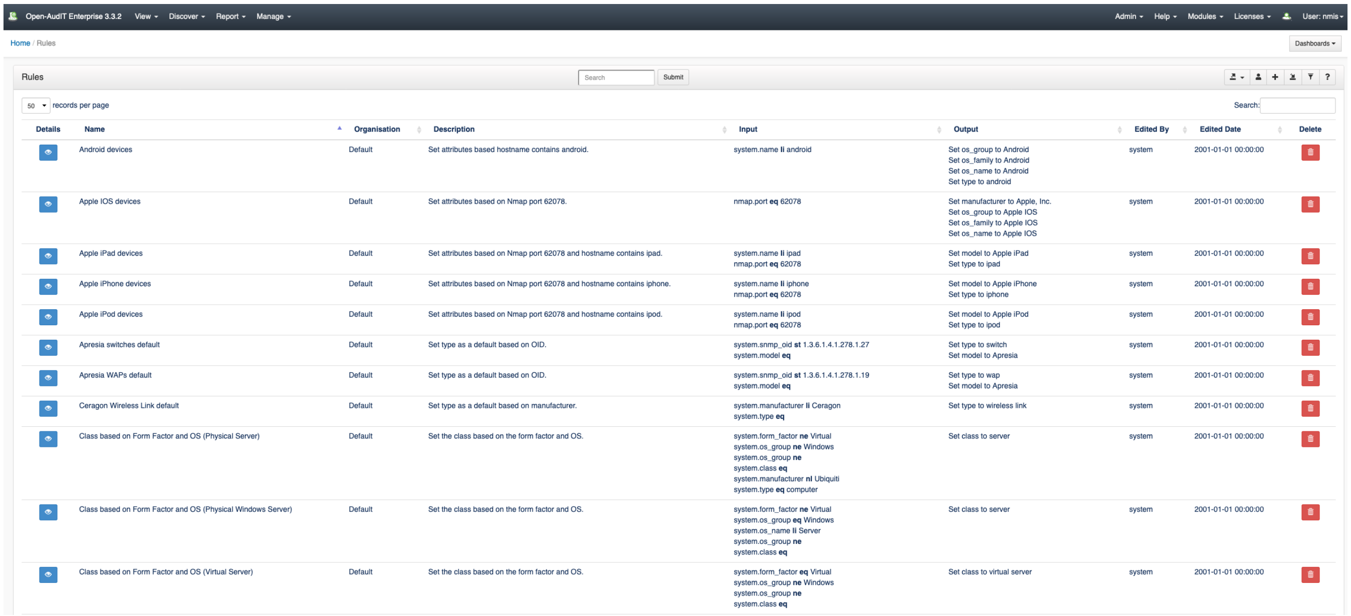
Rules are used to apply attribute details to a device, depending on it's other attributes

For more detailed information, check the Open-AudIT Knowledge Base.

Viewing Rules Details

As usual, go to menu Manage Rules List Rules.

Because there are so many rules (near one hundred thousand), paging through them is unrealistic. We still retrieve the default number of entries as per the configuration item, however there is a search box at the top of the panel. Use this to search through the name, description, inputs and outputs to refine the list and find what you're looking for. There is also a button on the panel header that will show you all the rules you have created or edited. See below.



Details	Name	Organisation	Description	Input	Output	Edited By	Edited Date	Delete
	Android devices	Default	Set attributes based hostname contains android.	system.name **li** android	Set os_group to Android Set os_family to Android Set os_name to Android Set type to android	system	2001-01-01 00:00:00	
	Apple IOS devices	Default	Set attributes based on Nmap port 62078.	nmap.port **eq** 62078	Set manufacturer to Apple, Inc. Set os_group to Apple IOS Set os_family to Apple IOS Set os_name to Apple IOS	system	2001-01-01 00:00:00	
	Apple iPad devices	Default	Set attributes based on Nmap port 62078 and hostname contains ipad.	system.name **li** ipad nmap.port **eq** 62078	Set model to Apple iPad Set type to ipad	system	2001-01-01 00:00:00	
	Apple iPhone devices	Default	Set attributes based on Nmap port 62078 and hostname contains iphone.	system.name **li** iphone nmap.port **eq** 62078	Set model to Apple iPhone Set type to iphone	system	2001-01-01 00:00:00	
	Apple iPod devices	Default	Set attributes based on Nmap port 62078 and hostname contains ipod.	system.name **li** ipod nmap.port **eq** 62078	Set model to Apple iPod Set type to ipod	system	2001-01-01 00:00:00	
	Apresia switches default	Default	Set type as a default based on OID.	system.snmp_oid **st** 1.3.6.1.4.1.278.1.27 system.model **eq**	Set type to switch Set model to Apresia	system	2001-01-01 00:00:00	
	Apresia WAPs default	Default	Set type as a default based on OID.	system.snmp_oid **st** 1.3.6.1.4.1.278.1.19 system.model **eq**	Set type to wap Set model to Apresia	system	2001-01-01 00:00:00	
	Ceragon Wireless Link default	Default	Set type as a default based on manufacturer.	system.manufacturer **li** Ceragon system.type **eq**	Set type to wireless link	system	2001-01-01 00:00:00	
	Class based on Form Factor and OS (Physical Server)	Default	Set the class based on the form factor and OS.	system.form_factor **ne** Virtual system.os_group **ne** Windows system.os_group **ne** system.class **eq** system.manufacturer **nl** Ubiquiti system.type **eq** computer	Set class to server	system	2001-01-01 00:00:00	
	Class based on Form Factor and OS (Physical Windows Server)	Default	Set the class based on the form factor and OS.	system.form_factor **ne** Virtual system.os_group **eq** Windows system.os_name **li** Server system.os_group **ne** system.class **eq**	Set class to server	system	2001-01-01 00:00:00	
	Class based on Form Factor and OS (Virtual Server)	Default	Set the class based on the form factor and OS.	system.form_factor **eq** Virtual system.os_group **ne** Windows system.os_group **ne** system.class **eq**	Set class to virtual server	system	2001-01-01 00:00:00	

Database Schema

```
CREATE TABLE `rules` (
  `id` int(10) unsigned NOT NULL AUTO_INCREMENT,
  `name` varchar(200) NOT NULL DEFAULT '',
  `org_id` int(10) unsigned NOT NULL DEFAULT '1',
  `description` text NOT NULL,
  `weight` int(10) unsigned NOT NULL DEFAULT '100',
  `inputs` text NOT NULL,
  `outputs` text NOT NULL,
  `edited_by` varchar(200) NOT NULL DEFAULT '',
  `edited_date` datetime NOT NULL DEFAULT '2000-01-01 00:00:00',
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=155875 DEFAULT CHARSET=utf8
```

Example Database Entry

```
         id: 65554
       name: Mac Address for Cisco Systems
     org_id: 1
description: Set the manufacturer based on the MAC prefix.
     weight: 90
     inputs: [{"table":"network","attribute":"mac","operator":"st","value":"cc:46:d6"},{"table":"system","
attribute":"manufacturer","operator":"eq","value":""}]
    outputs: [{"table":"system","attribute":"manufacturer","value":"Cisco Systems","value_type":"string"}]
  edited_by: system
edited_date: 2001-01-01 00:00:00
```

API / Web Access?

You can access the /rules collection using the normal Open-AudIT JSON based API. Just like any other collection. Please see the API documentation for further details.

API Routes

Request Method	ID	Action	Resulting Function	URL Example	Notes	Example Response
GET	n		collection	/rules	Returns a list of rules.	
GET	y		read	/rules/{id}	Returns a rules details.	
PATCH	y		update	/rules/{id}	Update an attribute of a rules entry.	
POST	n		create	/rules	Insert a new rules entry.	
DELETE	y		delete	/rules/{id}	Delete a rules entry.	

Web Application Routes

Only available under Open-AudIT Enterprise

Request Method	ID	Action	Resulting Function	URL Example	Notes
GET	n	create	create_form	/rules/create	Displays a standard web form for submission to POST /files.