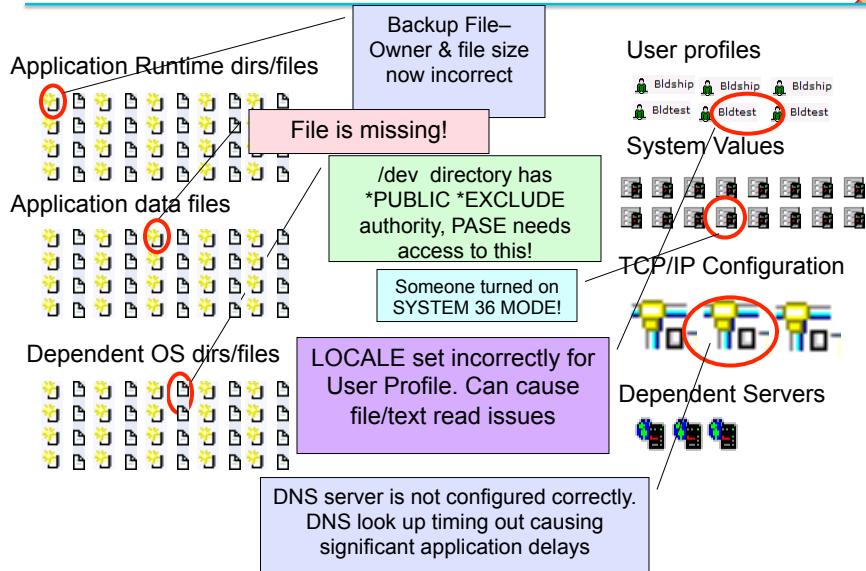


# Understand and Track Your Applications with Application Runtime Expert

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Business Architect for Application Development & Systems Management

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Problem – Application not working/starting – How do you check everything that can affect your application?



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## Application Attributes



- |                                |                          |
|--------------------------------|--------------------------|
| Java Environment               | User Authorities         |
| RPG or C Programs              | File Authorities         |
| File – Size, Existence, Dates  | Data Authorities         |
| Native ILE Object Attributes   | XML File Attributes      |
| Directories – Existence, Dates | Property File Attributes |
| Environment Variables          | Ports                    |
| File Ownership                 | Call SQL Scripts         |

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## System Attributes



- |                           |                           |
|---------------------------|---------------------------|
| Products installed        | TCP/IP configuration      |
| Run Check Prod            | Network setting           |
| Group PTFs Levels         | DNS Working               |
| Individual PTFs Installed | Additional custom plugins |
| User Profiles             | LANTap Varied On          |
| System Values             | System Date = Today       |
| Exit Points               | User Servers Active       |

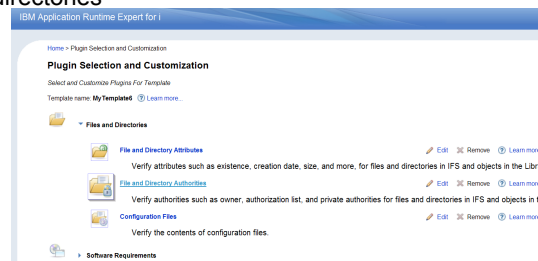
4

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## IBM Application Runtime Expert for i – What is it?



- Automated tool to verify the physical condition and runtime attributes of:
  - Applications
  - Systems
  - Environments
- **Ability to fix detected problems**
  - Fix User Profiles to known values
  - Fix Authorities on files and directories
- Verify multiple systems
  - Select system
  - Timeframe



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## IBM Application Runtime Expert for i – What is it?



- What can be verified?
  - System information
    - Create a system profile
  - An IBM i Product
  - Any application on the IBM i
    - WebSphere Application Server
    - Integrated Web Application Server
    - User created applications
    - RPG application
    - Directory tree in IFS



RPG



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## IBM Application Runtime Expert for i – Why use it?



- Enhanced Serviceability
  - Run on failing system to identify and **fix** problems
  - One tool to check the entire software stack
    - Application, DB, TCP/IP, Security, JVM, QShell, PASE, etc
    - Results are consolidated into a *single* report
  - Runtime Expert checks everything, every time
  - As new problems are found, new checks can be added
    - Update existing template to add new checks
    - Write custom plugins for more sophisticated checking or analysis
- Product Testing
  - Understand product installation
    - Are all authorities and object owners being consistently set?
    - Are all files getting installed in the expected locations with the right attributes?
    - Forces “loose ends” to be taken care of so that Runtime Expert report is clean
  - Build verification



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## IBM Application Runtime Expert for i – Why use it?



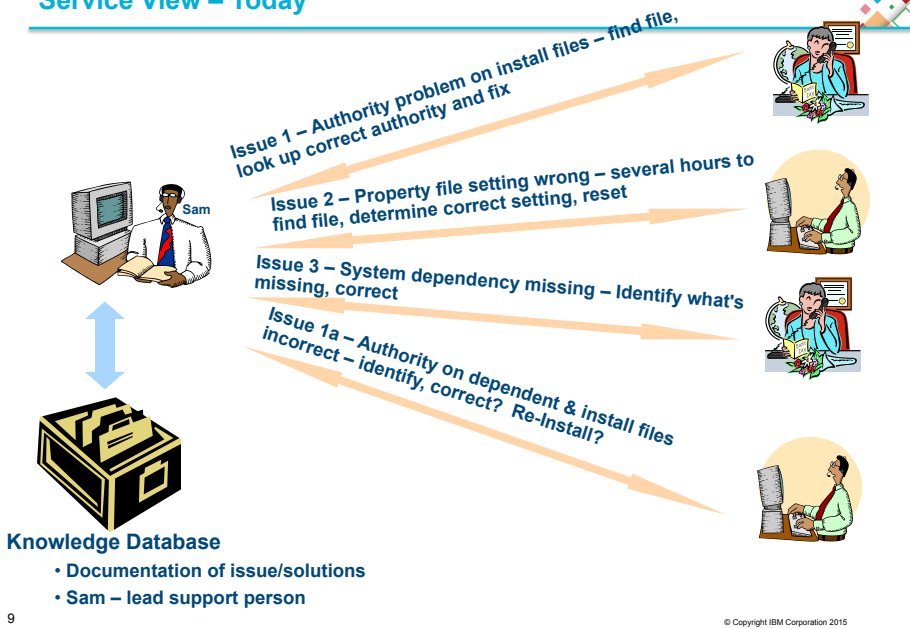
- System Validation
  - Ensure your systems are in expected state
  - Help debug issues with your own systems
- Pre-requisite Checking
  - Most software products have pre-reqs – ARE can check these for you
    - Products, PTF levels, user profiles, system values, network, etc
    - Removes dependency on customer to do it
    - Customers like it because it is simpler – no “list of things to check first”
- It has proven itself for our products
  - IAS and IBM Web Administration for i
    - Using for **over four years** with fantastic results
  - WebQuery
  - Java
  - HTTP
  - Internally for Translation Verification Test (28 partitions)
    - NLS settings, PTF levels, Group PTF levels, User profiles, System date set to ‘today’, verify \*LANTAP was varied on, System value settings



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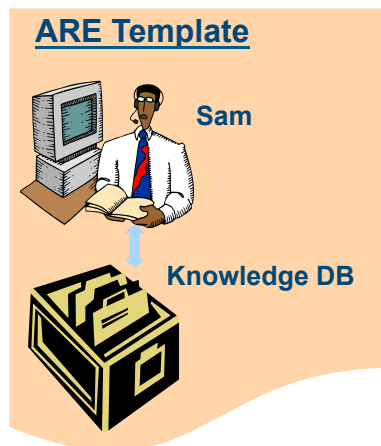
## Service View – Today



## The Solution....

### Package BOTH

Sam + Knowledge DB = automated solution





Known **GOOD**  
Deployment

- Apps
- Servers
- DB



1

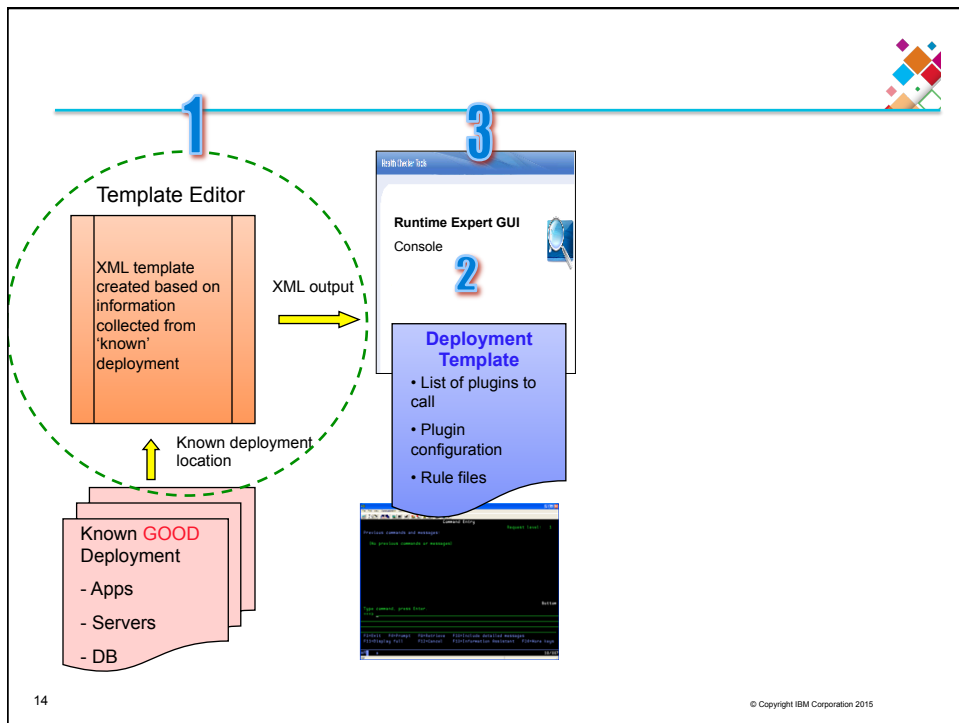
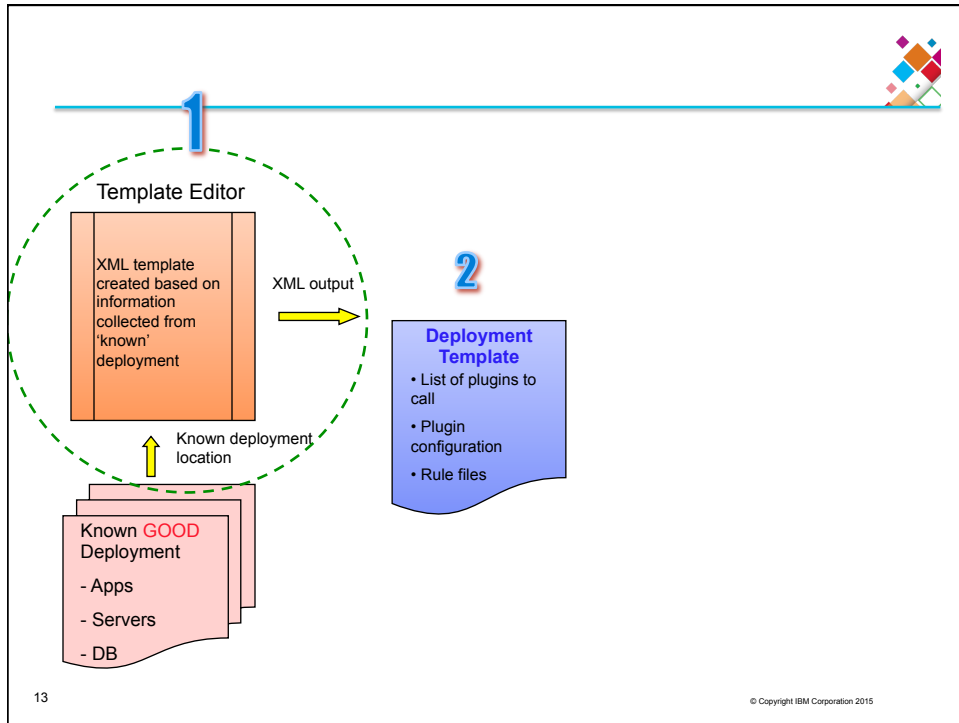
### Template Editor

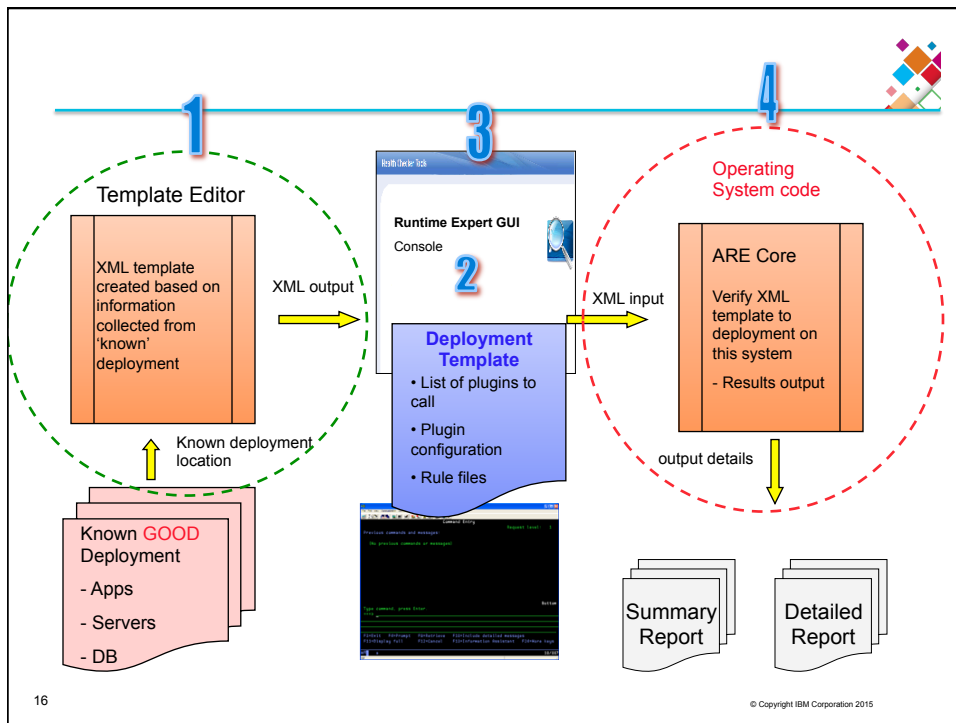
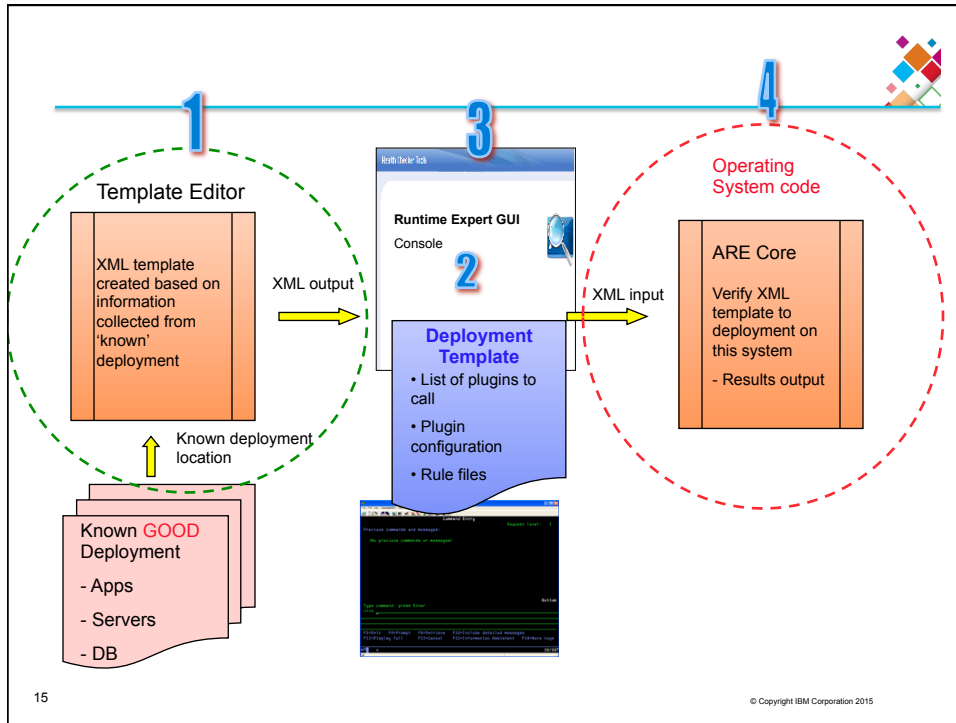
XML template  
created based on  
information  
collected from  
'known'  
deployment

↑ Known deployment  
location

Known **GOOD**  
Deployment

- Apps
- Servers
- DB







IBM Application Runtime Expert for i

## Manage templates

- Create
- Update
- Import

### Deployment Template Editor


The Deployment Template Editor allows users to create, edit, import and export deployment templates. The editor enables users to customize their templates. Templates created, imported, or edited using this editor can be used to verify systems using the 'Launch console' button below. [Learn more](#)

Manage templates:

Name
<input checked="" type="radio"/> AREDemo4
<input type="radio"/> AREProductVerification
<input type="radio"/> AutoFixTemplate
<input type="radio"/> CommonDemo
<input type="radio"/> DCMDemo
<input type="radio"/> skiftest

Create Import Actions

Launch Name MyTemplate2 Create



### Launch the Create template wizard

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Home > Plugin Selection and Customization

## Plugin Selection and Customization





Select and Customize Plugins For Template

Template name: SQL\_and\_Command\_demo [Learn more...](#)

**Work with files. Attributes, Authorities, and Contents.**

**Include files contents for detailed review!**

Files and Directories

- 
**File and Directory Attributes** Edit Remove Learn more...  
 Verify attributes such as existence, creation date, size, and more, for files and directories in IFS and objects in the Library file system.
- 
**File and Directory Authorities** Edit Remove Learn more...  
 Verify authorities such as owner, authorization list, and private authorities for files and directories in IFS and objects in the Library file system.
- 
**Configuration Files** Edit Remove Learn more...  
 Verify the contents of configuration files.
- 
**Resource Collector** Edit Remove Learn more...  
 Specify files, libraries, objects and save files to include into a archive file to allow additional detailed verification.

NEW!

Software Requirements

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Home > Plugin Selection and Customization > File and Directory Attributes

### File and Directory Attributes

Create Collections of Files, Directories, and Libraries

Files, directories, and libraries to collect information [Learn more...](#)

Collection name	Exists	Type	Size	Last modified	CCSID	Creation time	Specific attributes
Collection1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

- Verify specific attributes
  - Files/Directories
  - Libraries
- Verify Native ILE attributes - NEW!!!

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Home > Plugin Selection and Customization > File and Directory Attributes > Select Library Objects


### Select Library Objects

Select Objects in Libraries to Include in the Collection

Library view Collection only view

Specify library

- QSYS.LIB
  - qhttpsv1.lib

**- Native ILE Attributes** 

**- Click advanced select attributes**

Legend

- The entire library is selected
- Only the library is selected
- The library and/or some objects within it are selected
- Library is not selected

Collection name: Collection2

Attributes [Learn more...](#)

- Exists  Size
- Type  Last modified
- Creation time  CCSID

Filters: [Learn more...](#)

Include:

Exclude:

Example: \*USRPRP \*USXA\*

**- Use Filter support to ONLY include the specific files and directories you want based on a set of Filter definitions.**

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**Additional attributes**

- ALL
  - COMMON
  - LIB
  - PGM
  - SRVPGM
  - CMD
  - MODULE
  - JRN
  - JRNRCV
  - FILE
  - MBR

**Additional attributes**

- ALL
- COMMON
  - Program name
  - Program library name
  - Program owner
  - Program attribute
  - Creation date and time
  - Source file name
  - Source file library name
  - Source file member name
  - Source file updated date and time
  - Observable information
  - User profile option
  - Use adopted authority
  - Log commands
  - Allow RTVCLSRC
  - Fix decimal data
  - Text description
  - Type of program
  - Teraspace storage-enabled program
  - Minimum number of parameters
  - Maximum number of parameters
  - Program size

**Additional attributes**

- CMD
  - MODULE
    - Module name
    - Module library name
    - Module attribute
    - Module creation date and time
    - Source file name
    - Source file library name
    - Source member name
    - Source file change date and time
    - Module owner
    - Module CCSID
    - Text description
    - Creation data
    - Sort sequence table name
    - Sort sequence table library name
    - Language identifier
    - Optimization level
    - Maximum optimization level
    - Debug data
    - Module compressed status
    - Minimum number of parameters
    - Maximum number of parameters
    - Module state

**NEW!**

- Hundreds of native attributes!
- Think DSPOBJD

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## ILE Considerations

With ARE you can verify specific ILE attributes.

- Source File & Member
- Source File Library
- Owner

Any attribute you might check manually using DSPOBJD!!

Production IBM i

Pgm A Source - prod
Pgm B Source - prod
Pgm C Source - fred

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > File and Directory Authorities

### File and Directory Authorities

Create Collections of Files, Directories, and Libraries

Files, directories, and libraries to collect information [Learn more...](#)

Collection name	Data authority	Object authority	Owner	Primary group	Authorization list
HCDemoServer	✓	✓	✓	✓	✓

Buttons: Add files/directories, Add libraries, Remove, Update, Edit XML, Test, OK, Cancel

- Add authority profiles for
  - Files/Directories
  - Libraries
- View and work with XML
- Create multiple 'collections' to customize what attributes are verified

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Home > Plugin Selection and Customization > File and Directory Authorities > Select Files and Directories

### Select Files and Directories

Select Files and Directories to Include in the Collection

Integrated File System view Collection only view

**Use file browser to select files and directories**

- Root
- 00dir
- 01dir
- 02dir
- 03dir
- 04dir
- 05dir
- 06dir
- 07dir
- 08dir
- 09dir
- 10dir
- 11dir
- 12dir
- bin
- bin.prv
- builds
- dev
- etc
- home
- IAMASYMLNK1

**Legend**

- The entire directory tree is selected
- Only the directory is selected
- The directory and/or some portions of its sub-tree are selected
- Directory is not selected

Collection name:

Attributes [Learn more...](#)

- Data authority
- Object authority
- Owner
- Primary group
- Authorization list

**Specify which attributes to verify**

Filters: [Learn more...](#)

Include:

Exclude:

Example: \*.USRPRF; \*USXA\* Advanced

Buttons: OK, Cancel

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IBM

## Edit XML Advanced feature: Hand edit the actual XML data

OK Cancel Editview

```
<?xml version="1.0" encoding="UTF-8"?><authoritySet version="1.0">
  <authorities>
    <gui-mapping>
      <fileSelection name="/www/hodemo" selectSubTree="true"/>
      <followSymlink value="false"/>
      <checksum value="ae378cd2fee4fd53f5dd2e9fefc7c5e1"/>
    </gui-mapping>
    <!--# Be careful of modifying any node below, they are generated according to the configuration information above. If mo
  <enableCheck name="dataAuthority"/>
  <enableCheck name="objectAuthority"/>
  <enableCheck name="owner"/>
  <enableCheck name="primaryGroup"/>
  <enableCheck name="authorizationList"/>
  <object authList="NONE" errorLevel="error" name="/www/hodemo" owner="RAOP" primaryGroup="NONE" type="DIR">
    <privateAuthority dataAuth="RWX" errorLevel="error" objAuth="ALL" user="RAOP"/>
    <privateAuthority dataAuth="RX" errorLevel="error" objAuth="NONE" user="QLWISVR"/>
    <privateAuthority dataAuth="RX" errorLevel="error" objAuth="NONE" user="PUBLIC"/>
    <privateAuthority dataAuth="RWX" errorLevel="error" objAuth="NONE" user="QTMHTTP"/>
  </object>
  <object authList="NONE" errorLevel="error" name="/www/hodemo/conf" owner="RAOP" primaryGroup="NONE" type="DIR">
    <privateAuthority dataAuth="RWX" errorLevel="error" objAuth="ALL" user="RAOP"/>
    <privateAuthority dataAuth="RX" errorLevel="error" objAuth="NONE" user="QLWISVR"/>
    <privateAuthority dataAuth="RX" errorLevel="error" objAuth="NONE" user="PUBLIC"/>
    <privateAuthority dataAuth="RWX" errorLevel="error" objAuth="NONE" user="QTMHTTP"/>
  </object>
</authorities>
</authoritySet>
```

**Customize the XML data**

**Add Logic, change values, and responses**

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IBM

Home > Plugin Selection and Customization > Resource Collector > Configure Resource Collector

## Configure Resource Collector

Specify Files, Directories, and Native IBM i objects to Collect

Output zip file name: MyTemplate.zip

Integrated file system [Learn more...](#)

**Zip up specific files or the contents of an entire director**

- Error logs
- Configuration files

**Create a SAVF of IBM i Native object for detailed review**

Collect the following files

Name	Keep path	Severity level
Example /somewhere/dir/somefile.txt	Yes	Error
<input checked="" type="checkbox"/> ww/myServer/logs/err.txt	Yes	Error

Add Remove

Collect all the files in the specified directory

Name	All subtree	Filter	Keep path	Severity level
Example /somewhere/dir	Yes	*.log	Yes	Error
<input checked="" type="checkbox"/>	Yes		Yes	Error

Add Remove

Native IBM i object save support [Learn more...](#)

Specify the IBM i save command to collect native IBM i objects on the target system

Command
Example SAVLIB LIB(MYLIB) DEV(*SAVF) SAVF(QGPL/MYLIB)
Example SAVOBJ OBJ(*ALL) LIB(MYLIB) DEV(*SAVF) SAVF(QGPL/MYLIB)
<input checked="" type="checkbox"/> SAVLIB LIB(MYLIB) DEV(*SAVF) SAVF(QGPL/MYLIB)

Add Remove

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Home > Plugin Selection and Customization > IBM i Products

### IBM i Products

Select the IBM i Products to Verify

Products [Learn more...](#)

Licensed program	Option	Release	Status
5761SS1	5	V6R1M0	*INSTALLED
5761SS1	6	V6R1M0	*INSTALLED
5761SS1	7	V6R1M0	*INSTALLED
5761SS1	8	V6R1M0	*INSTALLED
5761SS1	9	V6R1M0	*INSTALLED
5761SS1	13	V6R1M0	*INSTALLED
5761SS1	14	V6R1M0	*INSTALLED
5761SS1	18	V6R1M0	*INSTALLED
5761SS1	21	V6R1M0	*INSTALLED
5761SS1	22	V6R1M0	*INSTALLED
5761SS1	23	V6R1M0	*INSTALLED
5761SS1	26	V6R1M0	*INSTALLED
5761SS1	27	V6R1M0	*INSTALLED
5761SS1	29	V6R1M0	*INSTALLED

Products to verify [Learn more...](#)

Licensed program	Option	Release	CHKPRDOPT	Severity
5761DG1	*BASE	V6R1M0	<input type="checkbox"/>	Error
5761JV1	11	V6R1M0	<input checked="" type="checkbox"/>	Warning
5761SS1	3	V6R1M0	<input type="checkbox"/>	Error
5761SS1	12	V6R1M0	<input type="checkbox"/>	Error
5761SS1	30	V6R1M0	<input type="checkbox"/>	Error
5761SS1	33	V6R1M0	<input checked="" type="checkbox"/>	Error

**Customize report info!**

- Error
- Warning
- Info

Filter – all supported products or products on this system

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > User IDs > Edit User ID Collection

### Edit User ID Collection

Select User IDs to Verify

All user IDs on the system [Learn more...](#)

- USER03
- USER04
- USER05
- USER06
- USER07
- USER08
- USER09
- USER10
- USER11
- USER12

User IDs to verify [Learn more...](#)

Position to:

**'Position to' auto navigates to specified value!**

Attributes to verify

- CCSID
- Character ID
- Country ID
- Group Authority
- Group Authority Type
- Group Profile
- Job Description
- Language ID
- Limit Capabilities
- Locale
- Message Queue
- Output Queue
- Owner
- Password is \*NONE
- Special Authority
- Special Environment
- Status
- Supplemental Group
- User Class

Specify the user ID attributes to verify

Customize

OK Cancel

All users specified here will verify all attributes listed to the right. Create multiple collections to use different attribute lists.

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Home > Plugin Selection and Customization > Configuration Files

### Configuration Files

Specify Configuration Files to Verify

Configuration files [? Learn more...](#)

Configuration file	Type
 /www/INTAPPSVR/conf/i5OSStartup.properties	Property

**Verify the actual contents of**

- Property files
- XML files
- HTTP config files

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Home > Plugin Selection and Customization > Configuration Files > Customize Configuration File

### Customize Configuration File

Select Configuration Values to Verify

Configuration file: /www/INTAPPSVR/conf/i5OSStartup.properties

Key	Expected value
<input type="checkbox"/> startup.lwiAssignUserID	QLWISVR
<input type="checkbox"/> startup.lwiSubsystem	QHTTSPVR
<input type="checkbox"/> engine.lwiVersion	8.1
<input type="checkbox"/> engine.workingDir	/www/INTAPPSVR/lwi
<input type="checkbox"/> engine.javaVersion	1.6
<input type="checkbox"/> startup.lwiJobQueueName	QZHBHTTP
<input type="checkbox"/> startup.lwiAssignJobName	INTAPPSVR
<input type="checkbox"/> engine.stderr	/www/INTAPPSVR/lwi/logs/lwistderr.txt
<input type="checkbox"/> engine.stdout	/www/INTAPPSVR/lwi/logs/lwistdout.txt
<input type="checkbox"/> engine.lwiProfile	profile.i5intappsvr

**Compare the key value pairs!!**

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > Network Configuration

### Network Configuration

Verify IBM i Network Configuration

**Verify TCP/IP Configuration** [Learn more...](#)

- ✓ Domain information
- ✓ Host table entries
- ✓ Interfaces

**Verify DNS Lookup Performance and Correctness** [Learn more...](#)

- ✓ Retrieve IP address for local host
- ✓ Retrieve IP address for loopback
- ✓ Retrieve the host name for IP address 127.0.0.1

OK Cancel

**Include the Network plugin your template. When Application Runtime Expert runs, the network settings on the target system are verified**

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > System Values and Network Attributes

### System Values and Network Attributes

Select System Values or Network Attributes to Verify

System values and network attributes [Learn more...](#)

QPRCMLTTSK	QCNTRYID	Edit
QPRTDDEV	QCTLSBSD	Edit
QPRTRKEYFMT	QCURSYM	Edit
QPRTTXT	QDATETIME	Edit
QPWDCHGBLK	QDATFMT	Edit
QPWDEXPITV	QDATSEP	Edit
QPWDLMTAJC	QPWDEXPWNRN	Edit
QPWDLMTCHR	QPWDMAXLEN	Edit
QPWDLMTREP	QPWDMINLEN	Edit
QPWDLVL		
QPWDPQSDIF		
QPWDRQDDGT		
QPWDRQDDIF		
QPWDRULES		
QPWOVLDPGM		

Values to verify [Learn more...](#)

Previous Next 9/13

Position to:

Collection name:

OK Cancel

**System Values & Network Attributes**

- Quickly compare ALL system values
- Edit the expected values to match your expectations

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > User IDs > Edit User ID Collection

### Edit User ID Collection

Select User IDs to Verify

All user IDs on the system [Learn more...](#)

User IDs to verify [Learn more...](#)

Attributes to verify

- CCSID
- Character ID
- Country ID
- Group Authority
- Group Authority Type
- Group Profile
- Job Description
- Language ID
- Limit Capabilities
- Locale
- Message Queue
- Output Queue
- Owner
- Password is "NONE"
- Special Authority
- Special Environment
- Status
- Supplemental Group
- User Class

Specify the user ID attributes to verify

Position to:

Collection name:

**'Position to' auto navigates to specified value!**

OK Cancel **Customize the verified attributes**

**All users specified here will verify all attributes listed to the right. Create multiple collections to use different attribute lists.**

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > Scripts and Commands > Customize Script or Command

### Scripts and Commands

Specify the Script or Command to be Run and Verified

Collection name:

Program to run and verify [Learn more...](#)

Script command to run in QShell

system "WRKCFGSTS CFGTYPE (\*LIN) "

Example: system "WRKSYSSTS ASTLVL("ADVANCED)"

CL command to run

Print the result of the command to the verification report: Yes

Result verification [Learn more...](#)

Group	Severity	Source	Expected value	Comparison	Match case
MyGroup1(And)	Error	Standard output	ETHLITCP *DEV ACTIVE	Contains substring	False

Add Remove Update

OK Cancel **Call ANY CL command or QSH Script**

**• Run a command or script on the target system**

**Analyze the spool file or standard out. Verify the results of the command or programs!**

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > SQL Query Verifier > Customize SQL Query Verifier

### Customize SQL Query Verifier

Specify the SQL Query and Verifications Details

Collection name: wangnan\_ticket

Select statement [Learn more...](#)  

```
select * from wangnan.ticket
```

Example: `SELECT * FROM myDB.myTable`

Print the result set of SQL query to the verification report: Yes

Check the number of records returned for the SQL query [Learn more...](#)  
 Expect value: 3  
 Comparison: Equals  
 Severity: Info

Column value verification conditions [Learn more...](#)

Example id	Column name	Check class	Expected value	Comparison	Result type	Match case	Severity	Description
		Numeric	6	Equals	All	False	Error	All ids should equa
	Example name	String	John	Contains substring	Any	True	Error	Names returned st
<input checked="" type="checkbox"/>	comment	String	wangnan	Contains substring	Any	True	Error	demo correct
<input checked="" type="checkbox"/>	comment	String	demo not exist	Contains substring	Any	True	Error	demo not exist

Add Remove

OK Cancel

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**Call a SQL statement**

- Verify the results
- Number of entries
- Specific content!

## Built in DB2 Services – Use SQL to get info from the system!

**PTF Services**

[QSYS2.PTF\\_INFO](#)

[QSYS2.GROUP\\_PTF\\_INFO](#)

**Security Services**

[QSYS2.USER\\_INFO](#)

[QSYS2.FUNCTION\\_INFO](#)

[QSYS2.FUNCTION\\_USAGE](#)

[QSYS2.GROUP...](#)

[QSYS2.SOC...](#)

[QSYS2.SET\\_COE...](#)

**Work Management S...**

[QSYS2.SYSTEM\\_VALU...](#)

[QSYS2.GET\\_JOB\\_INFO...](#)

**TCP/IP Services**

[SYSIBMADM.ENV\\_SYS\\_INFO](#)

[QSYS2.TCPIP\\_INFO](#)

**Storage Services**

[QSYS2.USER\\_STORAGE](#)

[SYS2.SYSDISKSTAT](#)

[SYS2.SYSTMPSTG](#)

[SYS2.SYSLIMITBL](#)

[QSYS2.SYSLIMITS](#)

**Journal Services**

[QSYS2.DISPLAY\\_JOURNAL\(\)](#)

**Application Services**

[QSYS2.QCMDEXC\(\)](#)

**Several new services recently added!**  
 (JVM info, active jobs, server auth entries, and more!)

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```
SELECT * FROM QSYS2.USER_INFO
WHERE SIGN_ON_ATTEMPTS_NOT_VALID > 0
```

```
SELECT
  ASP_NUMBER,UNITNBR,PERCENT_USED
FROM QSYS2.SYSDISKSTAT
```

**Customize SQL Query Verifier**

Specify the SQL Query and Verifications Details

Collection name:

Select statement [Learn more...](#)

Example: `SELECT * FROM myDB.myTable`

Print the result set of SQL query to the verification report:

Check the number of records returned for the SQL query [Learn more...](#)

Column value verification conditions [Learn more...](#)

Column name	Check class	Expected value	Comparison	Result type	Match case	Severity	Description	
Example id	Numeric	6	Equals	All	False	Error	All ids should equal to 6	
Example name	String	John	Contains substring	Any	True	Error	Names returned should contain 'John'	
<input checked="" type="checkbox"/>	PERCENT_USED	Numeric	60	Less than	All	False	Error	Less than 60 percent disk



Console > Result

## Console

System verification status: 2/2 complete [Refresh](#)

System name	Template	Status	Result
localhost	MyTemplate2	Complete	1 error(s), 0 warning(s), 0 info(s)
lp03ut28	MyTemplate2	Complete	No problem found

[Back](#) [Stop all](#)



## Summary Report

System name: localhost

Remote core version: 1.6.20

Template: MyTemplate2

User ID: JGORZINS

Summary details [Learn more...](#)

Plugin name	Attributes verified	Error	Warning	Info	Fix actions
<input checked="" type="checkbox"/> SQL Query Verifier 2		1	0	0	None
<b>Description</b>					
Fail: 75.419 less than 60					

[Back](#)

[Summary report \(plain text\)](#)



- Detailed report lists entire output of SQL command (truncated here)

```
IBM Application Runtime Expert for i
Version 1.6.20
Tue Apr 07 09:20:23 CDT 2015
Using template: file:template.jar (1.0.1)
Number of runtime elements: 25
Running with user: JGORZINS
User JGORZINS has *ALLOBJ authority

Running plugin SQL Query Verifier
> A total of 1 XML rule file will be processed
> Processing XML rule file (xml/sqlVerifier_Collection1.xml) for SQL
  o Executing SQL: SELECT ASP_NUMBER,UNITNBR,PERCENT_USED FROM QSYS2.SYSDISKSTAT
=====
ASP_NUMBER UNITNBR PERCENT_USED
-----
1 1 15.747
1 83 75.419
1 84 75.417
1 85 75.417
1 86 75.419
```

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ration 2014.1



- Detailed report shows which rules were verified and whether they were success or failure

```
3 79 0.012
3 80 0.013
3 81 0.012
-----

o Performing SQL check: Less than 60 percent disk
  - Checking rule: Less than 60 percent disk
    #>V: 15.747 less than 60
ERROR! Fail: 75.419 less than 60
  > Finished processing SQL
  > Total number of SQL items checked: 2
```

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IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > Summary

### Summary

*Deployment Template Build Summary*

Template Summary | File and Directory Authorities | IBM i Products | User IDs

**Generated template file name:** /QIBM/UserData/ARE/workspace/templates/MyFirstTemplate/MyFirstTemplate.jar  
**Version:** 1.0.1  
**Description:** Template created by the IBM Application Runtime Expert for i.

**Features enabled:**

- Capability to fix detected problems

**Review all the values you specified and we collected**  
**Click confirm to build template**

Confirm Cancel

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IBM Application Runtime Expert for i

### Deployment Template Editor

The Deployment Template Editor allows users to create, edit, import and export deployment templates. The editor enables users to customize their templates. Templates created, imported, or edited using this editor can be used to verify systems using the 'Launch console' button below. [Learn more...](#)

Manage templates:

Name
<input checked="" type="radio"/> MyFirstTemplate

Create Import Actions

Launch console

**Message Area**

The following template has been successfully built:  
MyFirstTemplate.

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IBM Application Runtime Expert for i

### Console

The IBM Application Runtime Expert for i is capable of verifying multiple IBM i systems using a deployment template created or importing using the deployment template editor. [Learn more...](#)

Collections:  
 Default  
 Demo  
 Operations

Systems to verify:

System name	User profile	Password	Template
<input checked="" type="checkbox"/> system1	user1		areDemo
<input checked="" type="checkbox"/> system2	user1		areDemo
<input checked="" type="checkbox"/> system3	user1		areDemo
<input checked="" type="checkbox"/> system4	user1		areDemo
<input checked="" type="checkbox"/> system5	user1		areDemo

Add Remove Select all Deselect all Runtime properties

Note: Only selected systems will be verified.

Verify systems View previous results

Launch deployment template editor

- Verify multiple systems using templates built using template editor
  - No need to put template on each system
  - Results of verification pulled into the Console and displayed
- Capability to fix detected problems

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IBM Application Runtime Expert for i

Console > Result

### Console

System verification status: 0/5 complete [Refresh](#)

System name	Template	Status	Result
system1	areDemo	Processing	
system2	areDemo	Processing	
system3	areDemo	Processing	
system4	areDemo	Processing	
system5	areDemo	Processing	

Back Stop all

Follow the progress of each template as it runs on the target systems

Auto refresh every few seconds or click 'Refresh' to check more often

Click 'Stop all' to stop the process from running on the target system

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Console > Result

Console

Verification status updated in real time

System verification status: 0/5 complete [Refresh](#)

System name	Template	Status	Result
system1	areDemo	Plugin 2 of 8 (Authority Verifier) has started	
system2	areDemo	Plugin 5 of 8 (Network Configuration Checker) has started	
system3	areDemo	Plugin 2 of 8 (Authority Verifier) has started	
system4	areDemo	Plugin 2 of 8 (Authority Verifier) has started	
system5	areDemo	Processing	

[Back](#) [Stop all](#)



Console > Result

Console

Table summarizes results for every system verified

System verification status: 5/5 complete [Refresh](#)

System name	Template	Status	Result
system1	areDemo	Complete	7 errors, 0 warnings
system2	areDemo	Complete	No problems found.
system3	areDemo	Complete	8 errors, 0 warnings
system4	areDemo	Complete	4 errors, 0 warnings
system5	areDemo	Complete	No problems found.

- [Summary Report](#)
- [Detailed Report](#)
- [XML Report](#)
- [Runtime Log](#)

[Back](#) [Stop all](#)

Summary and detailed reports are just a click away



Console > Result > Summary Report

### Summary Report

System name: system1  
 Remote core version: 1.0.3  
 Template: areDemo  
 User ID: USER1

Summary details [Learn more...](#)

Plugin name	Attributes verified	Error	Warning	Info	Fix actions
File Attribute Verifier	8068	0	0	0	None
Authority Verifier	8074	3	0	0	<a href="#">Fix actions(3)</a>
<b>Description</b> <ul style="list-style-type: none"> <li>User USER1 has no data authority to object /home/user1</li> <li>User USER1 has no object authority to /home/user1</li> <li>Owner of /home/user1 is not what is expected Expected: USER1 Actual: QSYS</li> </ul>					
Configuration Attribute Verifier	110	0	0	0	None
Network Verifier	0	0	0	0	None
Network Configuration Checker	0	0	0	0	None
Product Verifier	5	0	0	0	None
User Profile Verifier	54	4	0	0	<a href="#">Fix actions(3)</a>
System Value Verifier	5	0	0	0	None

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Console > Result > Summary Report > Fix Problems

### Fix Problems

System name: system1  
 Problems found by: Authority Verifier

Select Description

- Description: User USER1 has no data authority to object /home/user1
- Description: User USER1 has no object authority to /home/user1
- Description: Owner of /home/user1 is not what is expected

Select all Deselect all

Processed problems

Result	Description
This table is empty.	

Fix Back

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Console > Result > Summary Report > Fix Problems

## Fix Problems

System name: system1  
Problems found by: Authority Verifier

Select Description  
*This table is empty.*

Select all Deselect all

Processed problems

Result	Description
Fixed	<input checked="" type="checkbox"/> User USER1 has no data authority to object /home/user1
Fixed	<input checked="" type="checkbox"/> User USER1 has no object authority to /home/user1
Fixed	<input checked="" type="checkbox"/> Owner of /home/user1 is not what is expected Expected: USER1 Actual: QSYS

Fix Back

Monitor results as fix is completed on the remote system

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IBM Application Runtime Expert for i

## Console

The IBM Application Runtime Expert for i is capable of verifying multiple IBM i systems using a deployment template created or imported using the deployment template editor. [Learn more...](#)

Groups:

- Default
- Group1
- Group2


Operations

System name	User ID	Password	Template
<input checked="" type="checkbox"/> myhost.com	test	••••	MyTemplate1
<input checked="" type="checkbox"/> myhost2.com	test	••••	MyTemplate1
<input type="checkbox"/> myhost2.com	*DEFAULT		MyTemplate2
<input type="checkbox"/>			MyTemplate2

Add Remove Select all Deselect all Runtime properties

Note: Only selected systems are verified. Schedule runs only if IBMARE is running.

Verify systems View previous results


Schedule  
No schedule

New Schedule icon added for each group. Click to configure scheduled verification of the group.


**Schedule Setting**

No schedule  
 Daily  
 Weekly  
 Every: Sunday At 0 : 0  
 Monthly

Note: Only selected systems are verified. Schedule runs only if IBMARE is running. [Learn more...](#)

OK Cancel

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IBM Application Runtime Expert for i

### Console

The IBM Application Runtime Expert for i is capable of verifying multiple IBM i systems using a deployment template created or imported using the deployment template editor. [Learn more...](#)

**Icons for the status of last verification**

Groups: Default, Group1, Group2

Systems to verify:

System name	User ID	Password	Template
<input checked="" type="checkbox"/> myhost1	test	••••	AREonliberty
<input checked="" type="checkbox"/> myhost2	test	••••	MyTemplate1
<input type="checkbox"/> myhost3	test		MyTemplate1
<input checked="" type="checkbox"/> myhost4	*default		MyTemplate1

**Icons for scheduler status**

Add Remove Select all Deselect all Runtime properties


Note: Only selected systems are verified. Schedule runs only if IBMARE is running.

Verify systems View previous results

Schedule Every month, 01, 00:00

**A scheduled group**

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IBM Application Runtime Expert for i

### Console

The IBM Application Runtime Expert for i is capable of verifying multiple IBM i systems using a deployment template created or imported using the deployment template editor. [Learn more...](#)

Groups: Default, Group1, Group2

Systems to verify:

System name	User ID	Password	Template
<input checked="" type="checkbox"/> myhost1	test	••••	AREonliberty
<input type="checkbox"/> myhost2	test	••••	MyTemplate1
<input type="checkbox"/> myhost3	test		MyTemplate1
<input type="checkbox"/> myhost4	*default		MyTemplate1

**NEW!! Configure email settings in "Runtime properties"**


Runtime properties

Note: Only selected systems are verified. Schedule runs only if IBMARE is running.

Verify systems View previous results

Schedule Every month, 01, 00:00

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IBM Application Runtime Expert for i

Console > Default

### History of status

History	Run By	Item	Status
2013/09/12/20:55	Manually	1	Good
2013/09/12/01:08	Manually	1	Error
2013/09/11/02:15	Manually	1	Good
2013/09/11/01:26	Manually	2	Error

System	Template	User ID	Status
localhost	MyTemplate6	niejh	Good
9.123.96.209	MyTemplate4	niejh	8 error(s), 0 warning(s), 0 info(s)

List of previous verification results of a group

- Summary Report
- Detailed Report
- XML Report
- View summary report
- Download Archive
- Runtime Log
- Remote runtime log
- Remote stdout
- Remote stderr

Back Select all Deselect all Delete

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## ARE has PTF support today

- Today, you can create a deployment template for specific PTF's and groups

Select the Group and Individual PTFs to Verify

PTF groups to verify

List all PTF groups on the system

PTF group	Minimum level	Recommended level	Severity	Description
INTC710	41	41	Error	INTERNAL CUME GROUP FOR V7R11M0
SF99363	17	17	Error	WEBSPPHERE APP SERVER V7.0
SF99364	9	9	Error	WEBSPPHERE APP SERVER V6.1
SF99368	31	31	Error	IBM HTTP SERVER FOR I
SF99380	12	12	Error	WEBSPPHERE APP SERVER V8.0
SF99381	11	11	Error	WEBSPPHERE APP SERVER V8.5
SF99572	19	19	Error	JAVA
SF99637	9	9	Error	DB2 WEB QUERY FOR IBM I V1.1.2
SF99701	33	33	Error	DB2 FOR IBM I
SF99710	14283	14283	Error	CUMULATIVE PTF PACKAGE C4283710

PTFs to verify

PTF	Expected status	Severity
<input type="checkbox"/> 5770999 - Licensed Internal Code		
<input type="checkbox"/> 5770SS1 - IBM I		
<input type="checkbox"/> 5770SS1 - Extended Base Support		
<input type="checkbox"/> 5770WDS - Workstation Tools - Base		
<input type="checkbox"/> 5770XE1 - IBM I Access for Windows		
<input type="checkbox"/> 5770XH2 - IBM I Access for Web		
<input checked="" type="checkbox"/> Other PTFs		

OK Cancel Edit XML

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## Problem with today's solution?



- With today's solution, the specific PTF and group levels are "static"
- The deployment template calls out specific group levels and PTF's, for instance:
  - SF99572 level 19
  - SI49836
- That means a deployment template is good for "now"
- For the future? Create a new deployment template!
- Needed: A more "dynamic" solution

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## Check for the latest PTF group levels from the IBM cloud!



IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > PTFs

### IBM PSP

Select PTFs to verify on target system against IBM PSP. Internet connection required.

All:

Select PTF groups to verify:

PTF groups [Learn more...](#)

PTF group	Description
INTC710	INTERNAL CUME GROUP FOR V7R1M0
SF99363	WEBSPPHERE APP SERVER V7.0
SF99364	WEBSPPHERE APP SERVER V6.1
SF99368	IBM HTTP SERVER FOR I
SF99381	WEBSPPHERE APP SERVER V8.5
SF99572	JAVA
SF99937	DB2 WEB QUERY FOR IBM I V1.1.2
SF99710	CUMULATIVE PTF PACKAGE C4283710



PTF groups to verify [Learn more...](#)

PTF group	Description
SF99380	WEBSPPHERE APP SERVER V8.0
SF99701	DB2 FOR IBM I
SF99999	== PTF Group added by user ==

Add ▾

Previous

Next

1/1

Disregard groups released in prior:

Collection name:

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## Compare Groups or PTF's against the central system!



IBM Application Runtime Expert for i

Home > Plugin Selection and Customization > PTFs

### Central System

Select PTFs to verify on target system against Central System. This is where local host runs from.

PTF groups

All

Select PTF groups to verify: [Learn more...](#)

PTF groups [Learn more...](#)

PTF group	Description
INTCT10	INTERNAL CUME GROUP FOR V7R1M0
SF99363	WEBSPPHERE APP SERVER V7.0
SF99364	WEBSPPHERE APP SERVER V8.1
SF99368	IBM HTTP SERVER FOR I
SF99381	WEBSPPHERE APP SERVER V8.5
SF99572	JAVA
SF99537	DB2 WEB QUERY FOR IBM I V1.1.2
SF99701	DB2 FOR IBM I
SF99710	CUMULATIVE PTF PACKAGE C4283T10

PTF groups to verify: [Learn more...](#)

PTF group	Description
SF99380	WEBSPPHERE APP SERVER V8.0
SF99669	== PTF Group added by user ==

Disregard groups released in prior:

Products PTFs belong to:

All

Select Products: [Learn more...](#)

Products [Learn more...](#)

Product	Description
570031	IBM I
5701BR1	IBM Backup, Recovery and Media Services for i
INFO454	Information APARs
INFQD5L	Information APARs
ITMELCF	ITM Management Agent
5700NT1	Native Tools (NATT) - IBM Internal Tools
5722A1	IBM Advanced Function Printing Utilities
5722AP1	Advanced DDCS Printer Support
5722BR1	IBM Backup, Recovery and Media Services for i
5722CM1	IBM Communications Utilities for System I
5722CR1	Cryptographic Support
5722DB1	System/385 Utilities
5722DE1	IBM DB2 Extenders Version 9.5 for i
5722DFH	IBM CICS Transaction Server for i

Products to verify: [Learn more...](#)

Product	Description
5722DE1	IBM Business Solutions
1111111	== Product added by user ==

Input Name:

Collection name:

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## So, what's a "Fix Action" for a missing PTF or group?

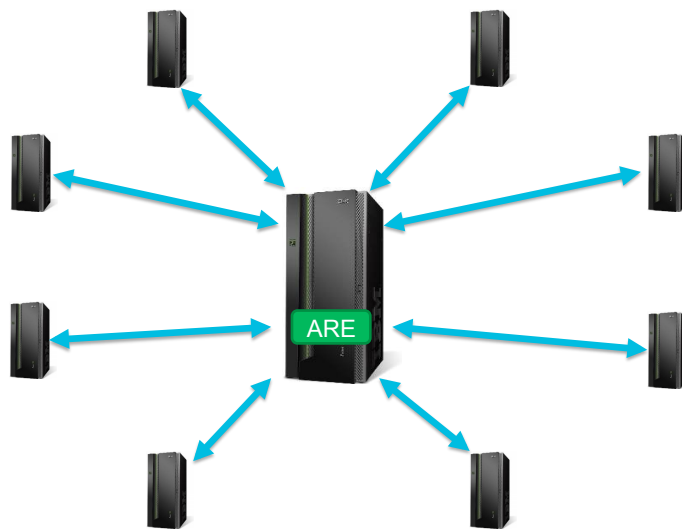


1. Tries to load and apply the fix from a special device name: QIBMAREPTF
2. Tries to send and apply the fix from a central system through use of \*SAVF

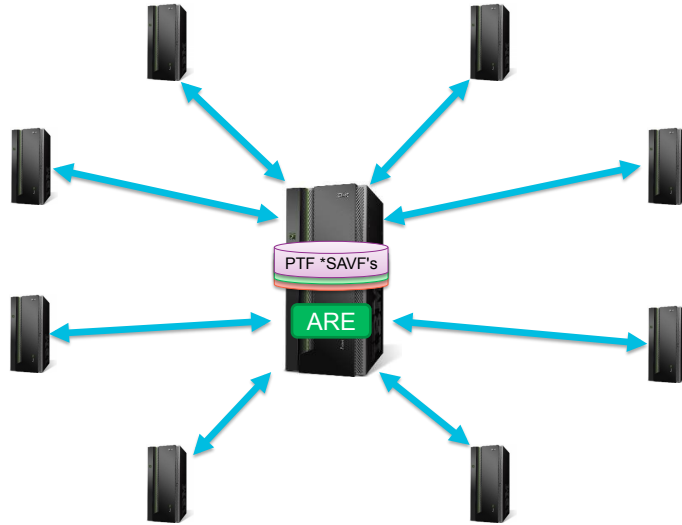
Usage examples



Central system – compare (same release)



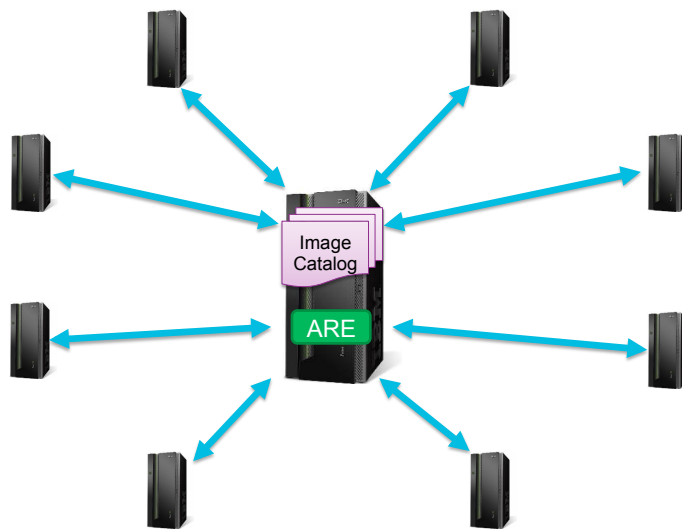
Central system - \*SAVF distribution (same release)



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Central system – Image catalog distribution (same release)

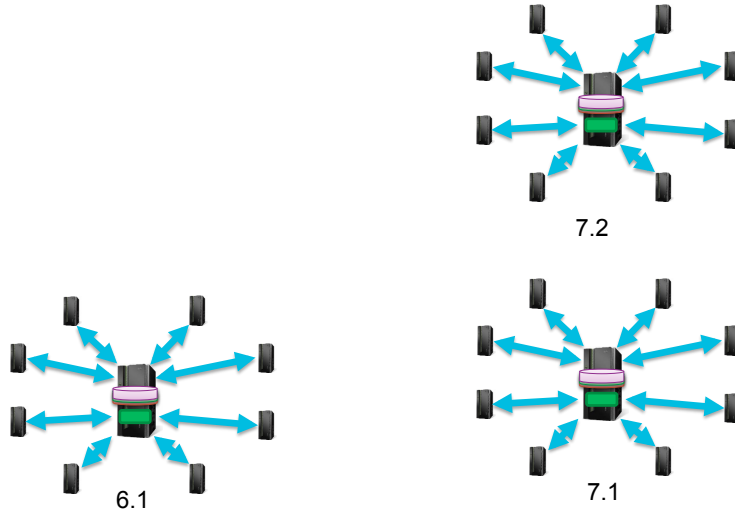


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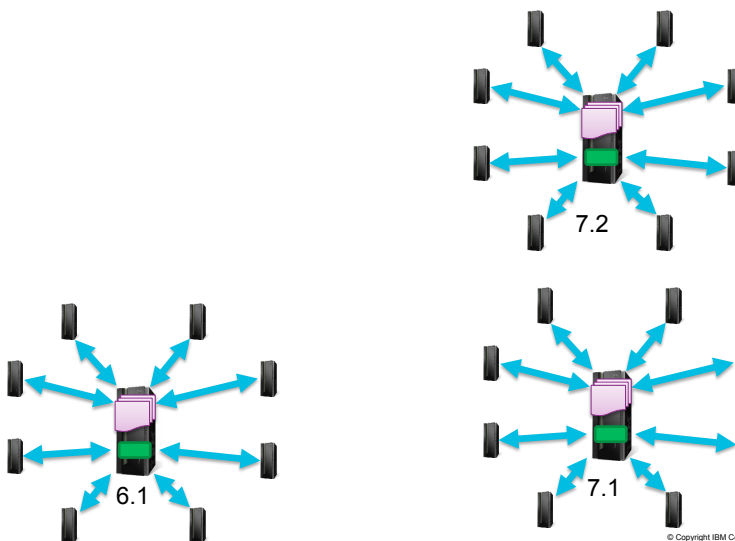
Central system - \*SAVF distribute (multiple releases)



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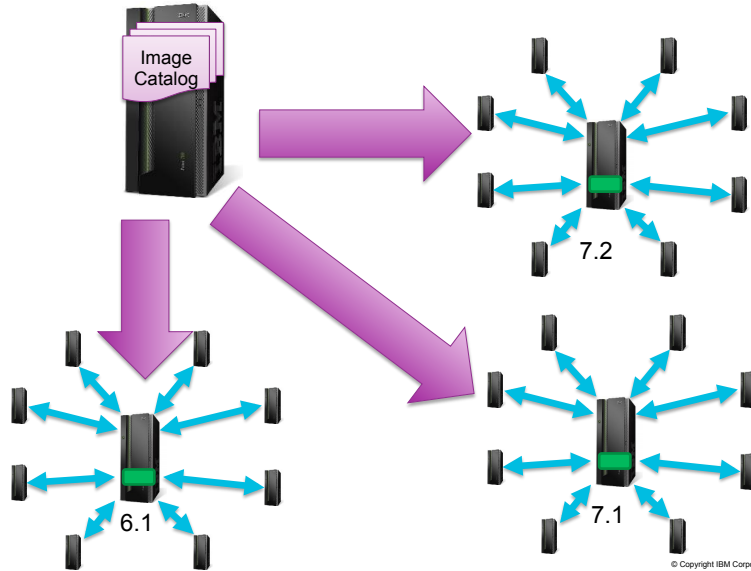
Central system – image catalog dist. (multiple releases)



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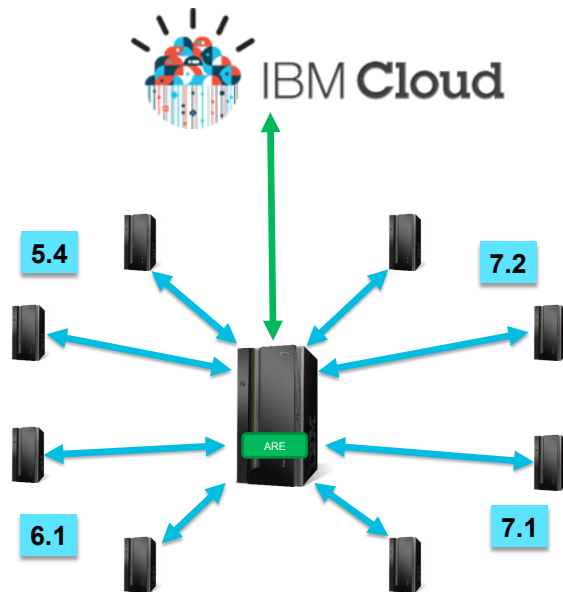
### Central system – image catalog dist. (multiple releases)



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### IBM Cloud – Compare against the latest PTF group levels!



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## Advanced Capabilities




- More advanced features for one-stop solution, including:
  - Ability to exactly and effectively verify file attributes
    - ✓ Checking common object attributes
      - more than 500 object type-specific attributes can be checked and verified
    - ✓ File filter : can exactly choose files by specifying pattern
    - ✓ Symbolic links : can choose whether or not to follow them
    - ✓ Controlling the depth of directories to collect by specifying the max depth
    - ✓ Substitution Variables
      - Part of application/product path is not fixed
      - Application user profile may not be constant
      - Some other aspect of application may vary from system to system

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## Advanced Capabilities



- More advanced features for one-stop solution, including(count.):
  - Customize template XML files
    - ✓ Add logic (if, switch) for
      - OS level
      - Product installed
      - Missing files
      - etc.
    - ✓ Gain access to new plugins not yet supported by the GUI
  - Support users without \*ALLOBJ special authority 
    - Users without \*ALLOBJ authority are able to create template using the GUI tool
    - Users without \*ALLOBJ authority are able to run template using runAREAuth.sh script

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## IBM Web Administration for i GUI – http://hostname:2001/HTTPAdmin



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## Building Custom Plugins



- Problem: ARE can verify many application and system attributes, but not everything
- Applications may have files, data, or settings to verify which are not covered by ARE
  - Attributes of a database table
  - Application specific system settings
  - Performance tuning: memory pools, max active jobs, etc
- Solution: Build custom plugins to verify items not covered by ARE verification

## Building Custom Plugins



- All verification in the ARE is performed by plugins
  - Plugins shipped by IBM perform verification that includes:
    - Authority
    - File attributes
    - PTFs
    - User IDs
    - Configuration
    - IBM i products
    - System values
    - Result set of SQL Query
    - Environment Variables
    - Result of Scripts and Commands
    - Resource collector
    - Network
    - Libraries
  - Plugins are all Java classes
    - Extend the `com.ibm.are.plugin.BasePlugin` class

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## Building Custom Plugins



- Use the same architecture as the pre-packaged plugins
- Simple and safe way to augment existing support
  - **Run your own plugins along with plugins provided by the ARE Core**
  - Very powerful: provides access to all the capabilities of Java, Toolbox, and more
- Flexible development
  - IBM (Development, Support, Consultants, etc)
  - Customers (In house development)
  - Business Partners
- Opens the scope of verification support to include:
  - Performance
  - System audit capabilities
  - Application specific settings
- Nearly unlimited ability to customize verification of applications

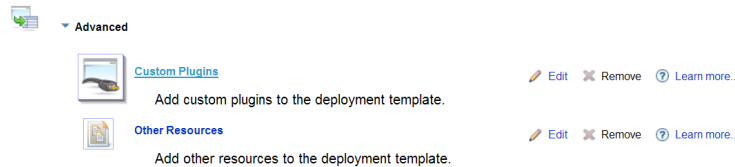
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## Building Custom Plugins



- Simple to create and deploy
  - Basic Java skills
  - Very little knowledge of ARE architecture or implementation needed
- Insert directly into template(s) using Template Editor GUI



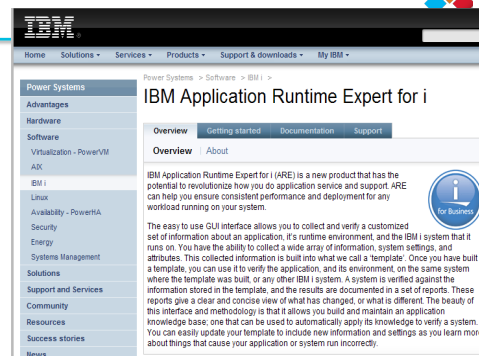
- Step by step guide available on ARE product Web site
- Build your first Custom Plugin in a couple of hours!

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## How do you get it

- GUI is a chargeable LP – 5733ARE
  - Runs on IBM i 7.1, 7.2, & 7.3
  - **Very** reasonably priced!
- Core is part of the base OS
  - Available on IBM i 5.4 and newer
  - Just apply latest HTTP and Java Group PTFs



- Articles
  - Turning Big Problems Into Small Ones  
[http://www.ibmssystemsmag.com/ibmi/application\\_runtime\\_expert/33004p1.aspx](http://www.ibmssystemsmag.com/ibmi/application_runtime_expert/33004p1.aspx)
  - You and i – ARE Solving Problems  
[http://ibmsystemsmag.blogs.com/you\\_and\\_i/2010/07/you-and-i-are-solving-problems.html](http://ibmsystemsmag.blogs.com/you_and_i/2010/07/you-and-i-are-solving-problems.html)
  - Do You Need an Application Runtime Expert?  
<http://ibmsystemsmag.blogs.com/idevelop/2010/07/do-you-need-an-application-runtime-expert.html>
- Product Web site contains install instructions, fix information, and documentation
  - <http://www.ibm.com/systems/power/software/i/are/index.html>

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## Something for free?

- IBM i OS is shipping a handful of ready made templates!!



### Network checking

- Run the network plugin
- Verify DNS servers

### Pre-Checker

- Verify the Java environment
- Verify the condition of PASE

### Host Servers

- Verify the Host Servers are active

### Damage Object Detection

- Scan every disk sector on your system or IASP to search for damaged objects

**New!!**

### Basic IAS Server Verify

- Specify IAS server name
- Basic IAS server infrastructure

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## OS Based Template Details

- New Script
- Run from QSH

```
/QIBM/ProdData/OS/OSGi/templates/bin/areVerify.sh
```

```
Usage: areVerify.sh <parameter>
```

```
Valid parameter:
```

```
-network          : Verify network configuration and status  
-iasserver server_name : Verify the 'server_name' IAS server  
-precheck        : Verify software products that are necessary to use  
                  the IBM Application Runtime Expert for i  
-hostservers     : Verify the host servers are active  
- storage        : Damage Object Detection
```

### Availability

- 5.4 – HTTP group SF99114 level 33 or newer
- 6.1 – HTTP group SF99115 level 27 or newer
- 7.1 – HTTP group SF99368 level 15 or newer

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