Isn't it Time to Stop Baby Sitting Your DB2?

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Session: 17577

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Agenda

- Overview
- Autonomics
  - What is it?
  - IBM's adaptation for DB2 (and IMS)
  - What you need to take full advantage of it
- Management Console
  - What is it?
  - Slides in lieu of demo ☹
- Questions

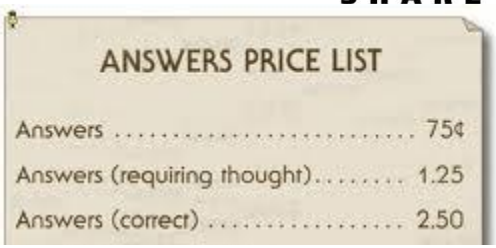
The Modern DBA

- The demands on DBAs and DB2 SysProgs are increasing
  - Companies are expecting more from smaller DBA teams
  - Experienced DBAs and SysProgs continue to retire
  - New DBAs and SysProgs can take some time to become “experienced”
  - Industry wide – modern employees spend less time in a single role

- Yet, the need for expert DBA / SysProg skills is growing
  - Demands for 24x7 high performance operation continue to increase
  - Allowed outage windows are shrinking and are less frequent
  - Demands for non-disruptive object maintenance and to keep CPU cycles out of peak processing periods
  - Increasing system complexity makes planning, maintaining, and troubleshooting more difficult and time consuming

- DBAs / SysProgs must become more efficient, more quickly

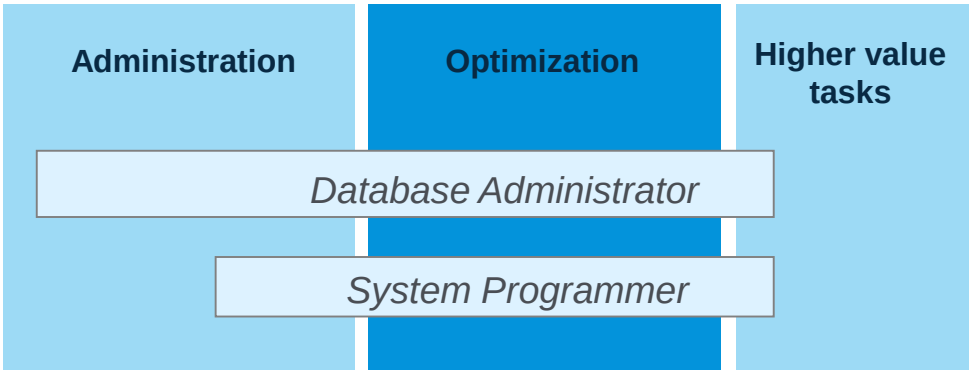
IBM Tools Answer…



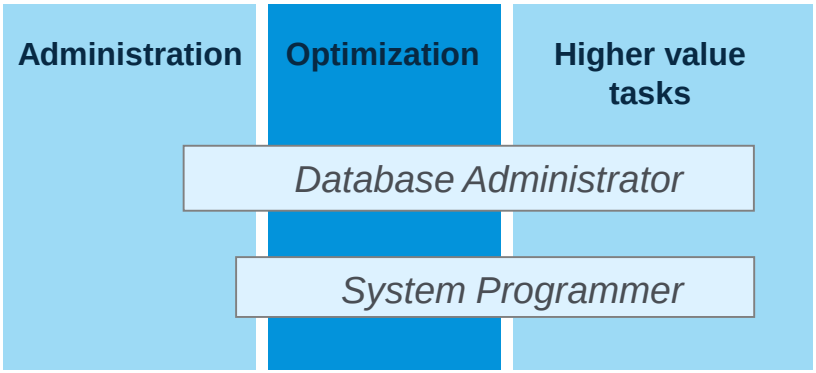
- Autonomics
  - Automate the routine collection of data
  - Automate the analysis of this data
  - Automate the decisions based off this analysis
  - Automate the straight-forward execution of decisions
- Smarter interfaces
  - Consolidate and simplify information from various sources
  - Simplify the presentation of complex information (visuals)
  - Shorten the learning curve (integrated assistance and doc)
  - Unify interfaces to make navigation more familiar
- Integration of our tools
  - IBM tools work better together
  - Share each others data
  - Leverage each others functions

The Value of Autonomics and Smarter Interfaces

Today



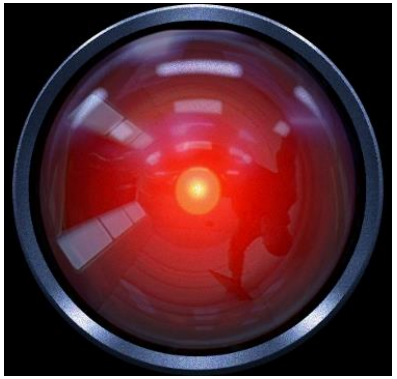
Target: Smarter Tools enable productivity



…the essence of autonomic computing is system self-management, delivering better system behavior and **freeing administrators from low-level task management.**

Source: Wikipedia, Oct 2014, http://en.wikipedia.org/wiki/Autonomic_computing

autonomic



Autonomic computing refers to the self-managing characteristics of distributed computing resources, adapting to unpredictable changes while hiding intrinsic complexity to operators and users. Started by IBM in 2001, this initiative ultimately aims to develop computer systems capable of self-management, to overcome the rapidly growing complexity of computing systems management, and to reduce the barrier that complexity poses to further growth.

Source: Wikipedia, Oct 2014, http://en.wikipedia.org/wiki/Autonomic_computing

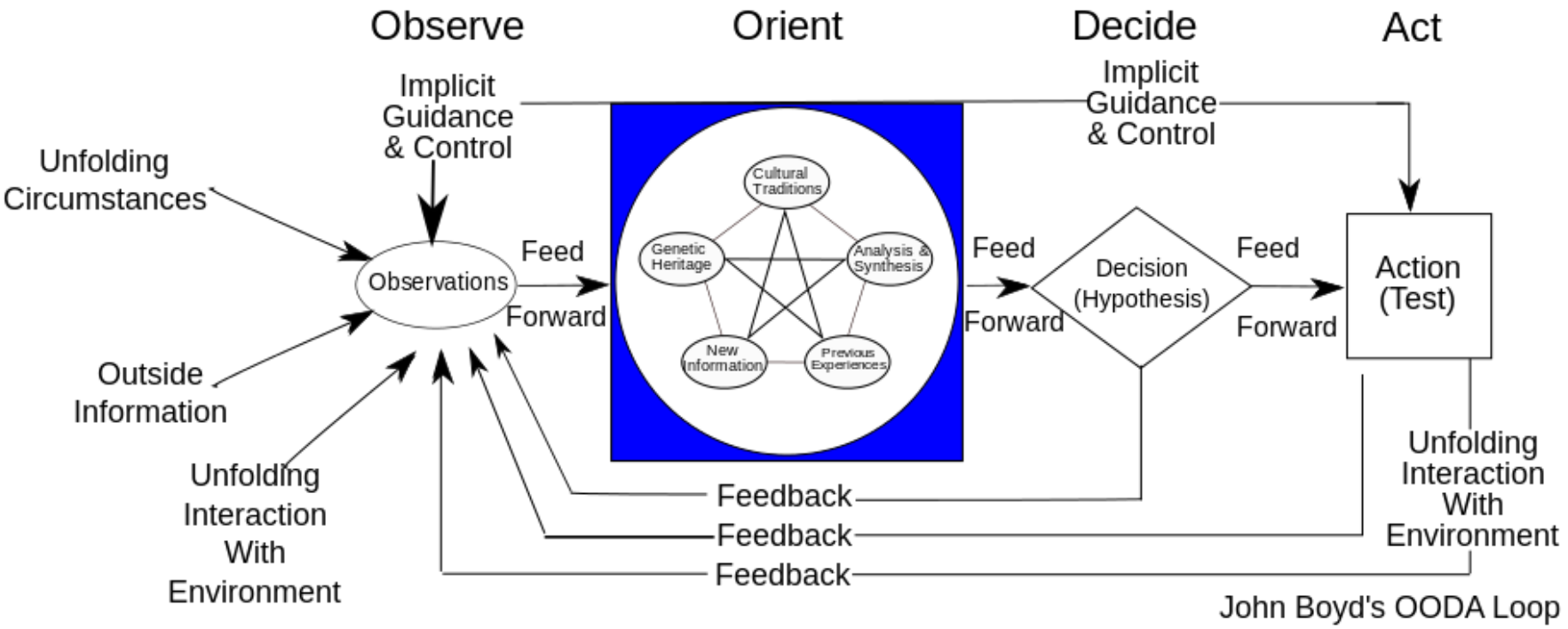
Autonomics inspiration from John Boyd

- Colonel John Boyd (1927-1997)
  - USAF F-86 Sabre fighter pilot during the Korean War
  - Became an instructor at the prestigious USAF Weapons School
  - Together with Thomas Christie created the Energy-Maneuverability theory of aerial combat
  - First created the OODA loop as a teaching aid

- OODA loop
  - Observe
  - Orient
  - Decide
  - Act

Source: Wikipedia, May 2015, http://en.wikipedia.org/wiki/John_Boyd_(military_strategist)

Autonomics and the OODA loop

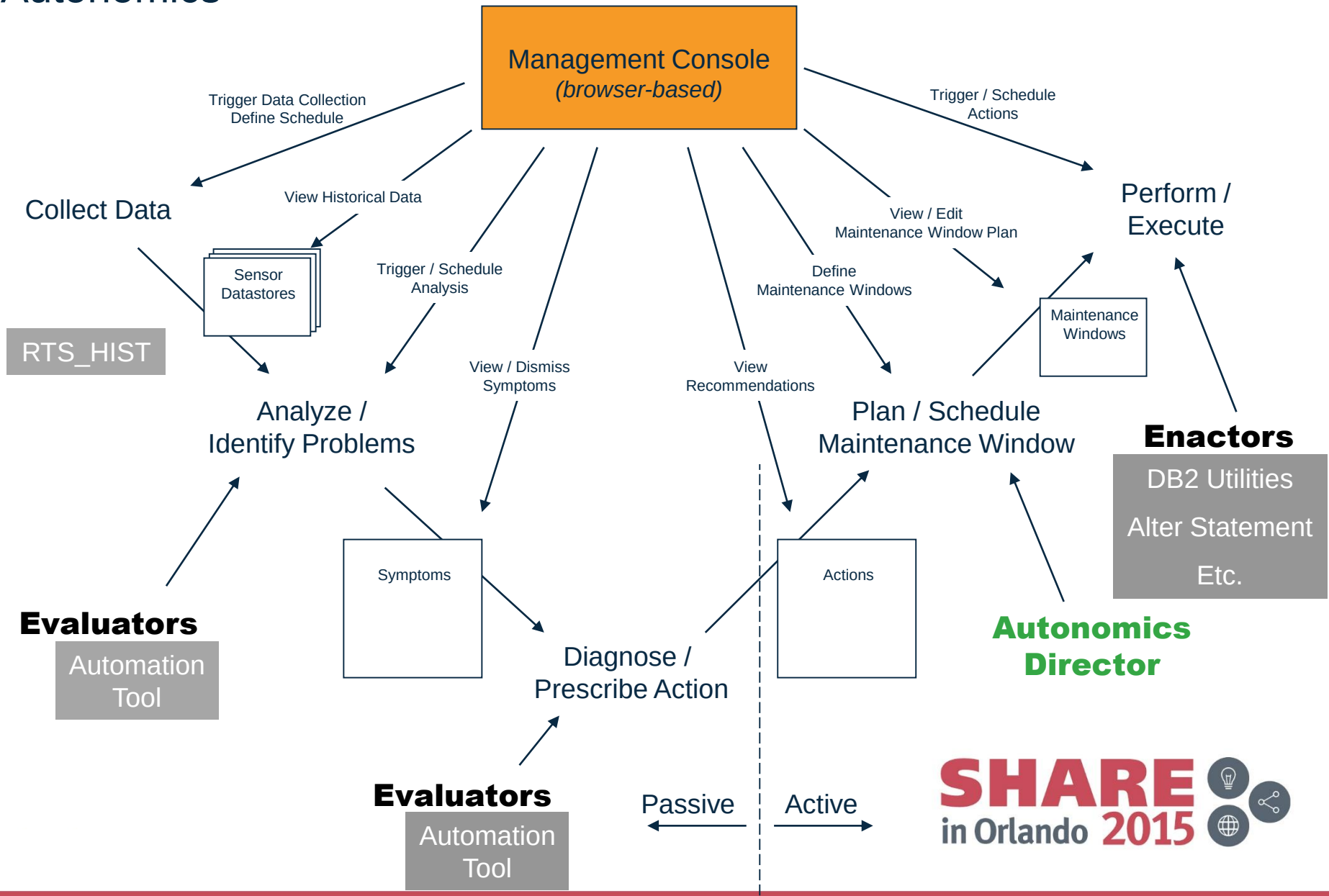


Has found applications in:

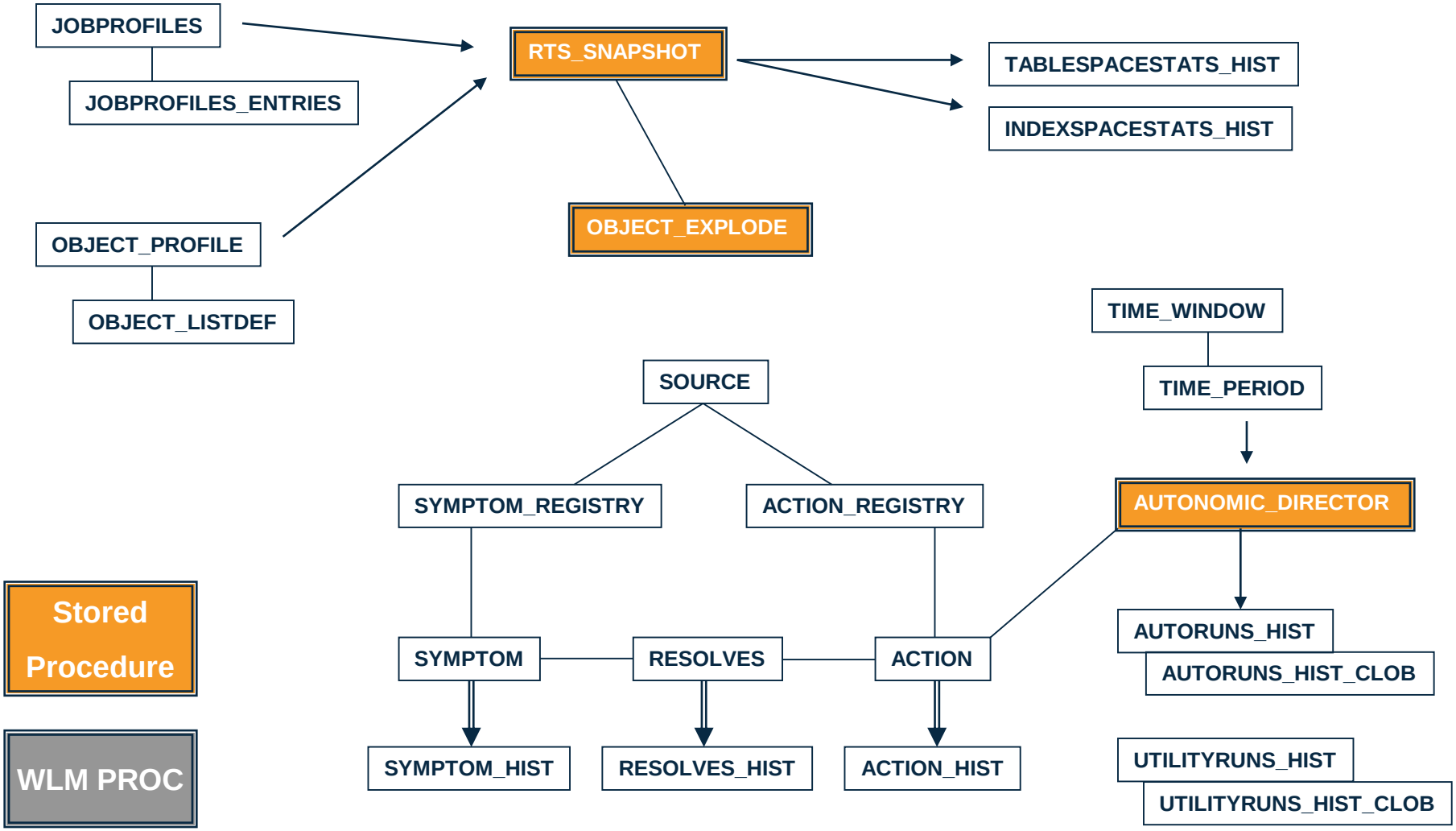
business, politics, sports, litigation theory, game theory, etc…

"OODA.Boyd" by Patrick Edwin Moran - Own work. Licensed under CC BY 3.0 via Wikimedia Commons - http://commons.wikimedia.org/wiki/File:OODA.Boyd.svg#/media/File:OODA.Boyd.svg

Autonomics


Management Console
(browser-based)
Trigger Data Collection
Define Schedule
Trigger / Schedule
Actions
Collect Data
View Historical Data
Perform /
Execute
View / Edit
Maintenance Window Plan
Sensor
Datastores
Trigger / Schedule
Analysis
Define
Maintenance Windows
Maintenance
Windows
RTS_HIST
View / Dismiss
Symptoms
View
Recommendations
Analyze /
Identify Problems
Plan / Schedule
Maintenance Window
Enactors
DB2 Utilities
Alter Statement
Etc.
Symptoms
Actions
Evaluators
Automation
Tool
Autonomics
Director
Diagnose /
Prescribe Action
Evaluators
Automation
Tool
Passive
Active

Autonomics Director for DB2 for z/OS Tables/SP



Object Profile – Tools Base

- Collection of DB2 objects to process
- Much like a LISTDEF
- Support wildcarding
- Many other options to include related spaces
- Can automatically include new objs in application

DB2 Automation Tool – Exception Profile

- Collection of DB2 object attributes, object status, time based attributes, and object statistics with user definable thresholds:
  - RELOCATED ROWS PCT > n
  - DAYS SINCE LAST COPY > n
  - NUMBER OF EXTENTS > n
  - PSUEDO DELETE PCT > n
  - DAYS SINCE LAST RUNSTATS > n
  - STATUS COPY PENDING (True/False)
- Evaluated per object
- Can be ANDed / ORed together
- End result is True or False
- When true, produce a Symptom

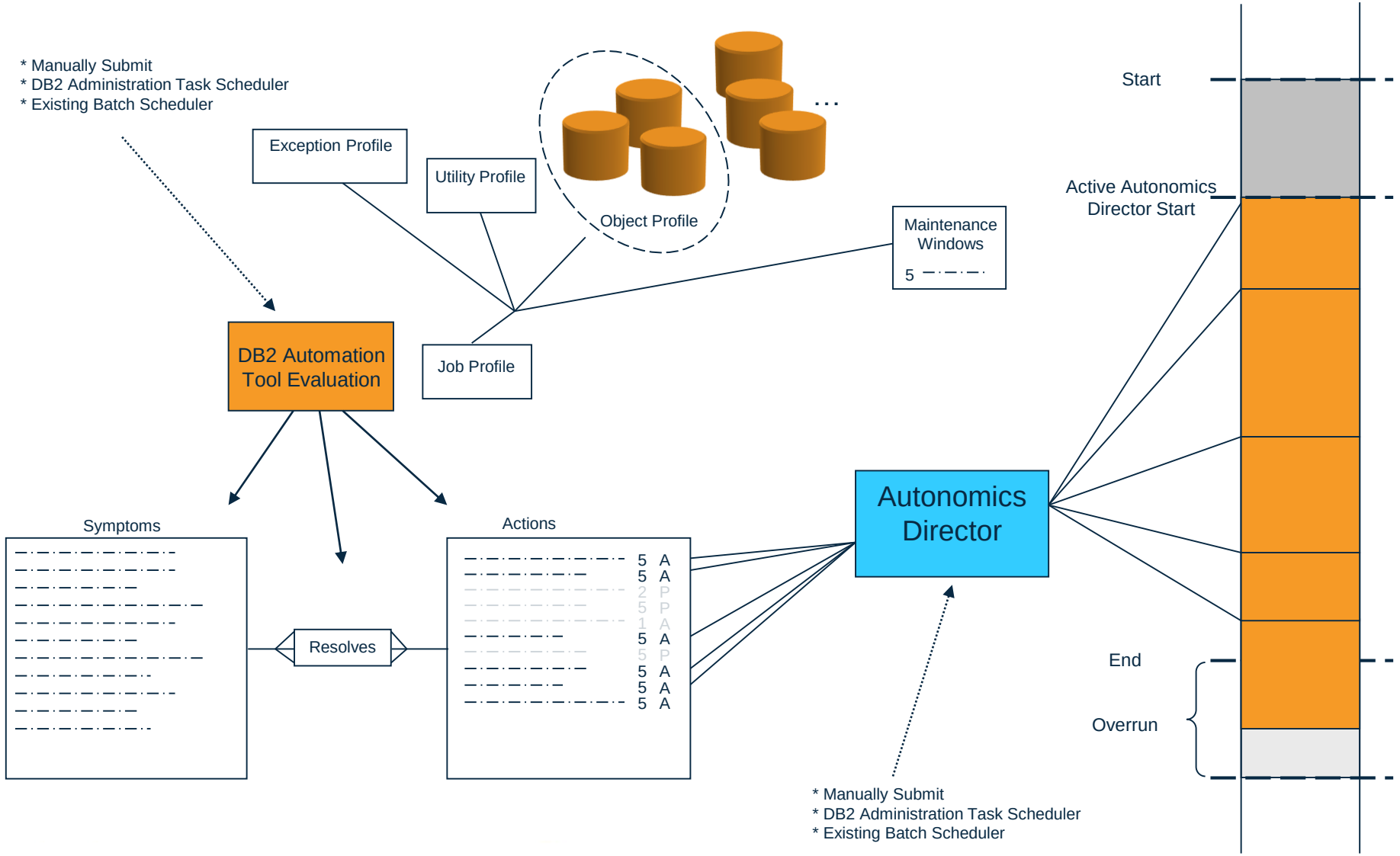
DB2 Automation Tool – Utility Profile

- Collection of DB2 Utilities and/or custom utilities
  - Reorg, Runstats, Copy, Check Data, Modify, Quiesce, Copy to Copy, Recover, Reallocation (alter space), etc
- Specific options for each utility
  - Image Copy
    - FlashCopy, Disk, Tape, Full, Incremental, etc
  - Reorg
    - Inline stats, Discard options, Parallel, Keep Dictionary, Reuse, etc
- Can specify thresholds
  - If NPAGES > n, image copy to tape, disk, or FlashCopy

DB2 Automation Tool – Job Profile

- Collection of Object Profiles
  - What objects to process
  - Supports wildcarding
  - Chose objects based on attributes with advanced options
- Collection of Exception Profiles
  - What conditions or symptoms are you interested in about those objects
- Collection of Job Profiles
  - What Utilities or Actions will resolve those symptoms produced by the exception profile
- Method to specify these with conditional logic

DB2 Utility Autonomics Example



DB2 Utilities Solution Pack 2.1

- DB2 Utility Autonomics Support
  - Capture historical utility execution
  - Automate analysis and surface potential problems and recommended solutions into the Autonomic Framework
  - Autonomically drive REORG, IC, RUNSTATS only when necessary in user configured maintenance windows
- DB2 Sort v2.1 for z/OS*
  - Greater optimization with a tighter integration between DB2 Sort and IBM DB2 Utilities, delivered via a bi-directional, multi-record interface:
    - Up to 87% reduction of Sort CPU usage when used with zIIP engines (up to 49% w/ no zIIP)
    - Up to 60% reduction of utility CPU usage when used with zIIP engines (up to 39% with no zIIP)
    - Up to 46% reduction of utility elapsed time
- DB2 Automation Tool v 4.2 for z/OS*
  - Job profile grouping provides flexibility to combine utility maintenance functions within a single job profile to meet application and business needs
  - Support for email, text message or Write-to-Operator (WTO) notifications when selected events occur, such as start/end of a job build or start/end of a maintenance window

** Also available in point product releases*

"More integration, greater value"

Optimize, control manage & automate

Components:

DB2 Automation Tool

DB2 High Performance Unload for z/OS

DB2 Sort for z/OS

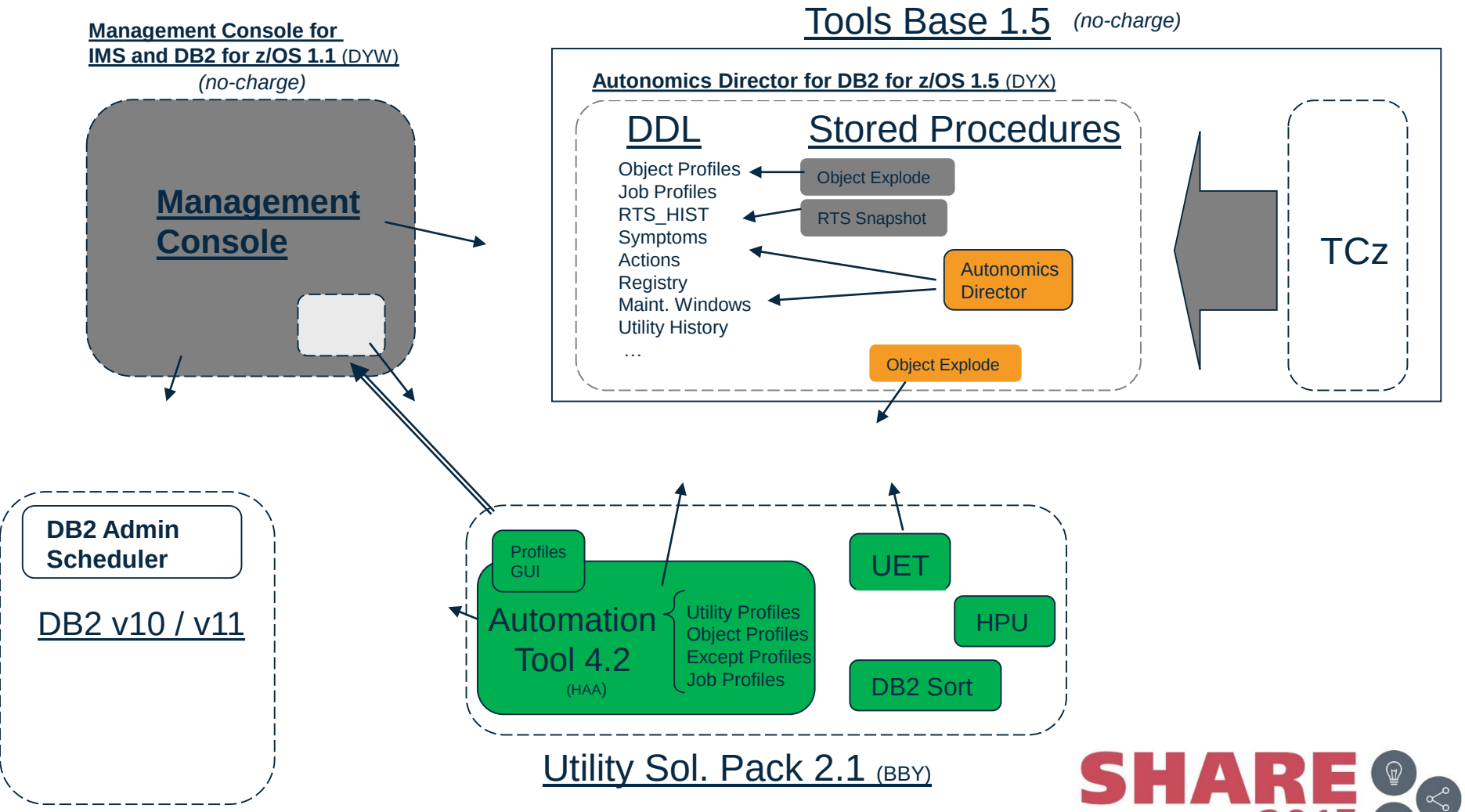
DB2 Utilities Enhancement Tool

+ Autonomics support

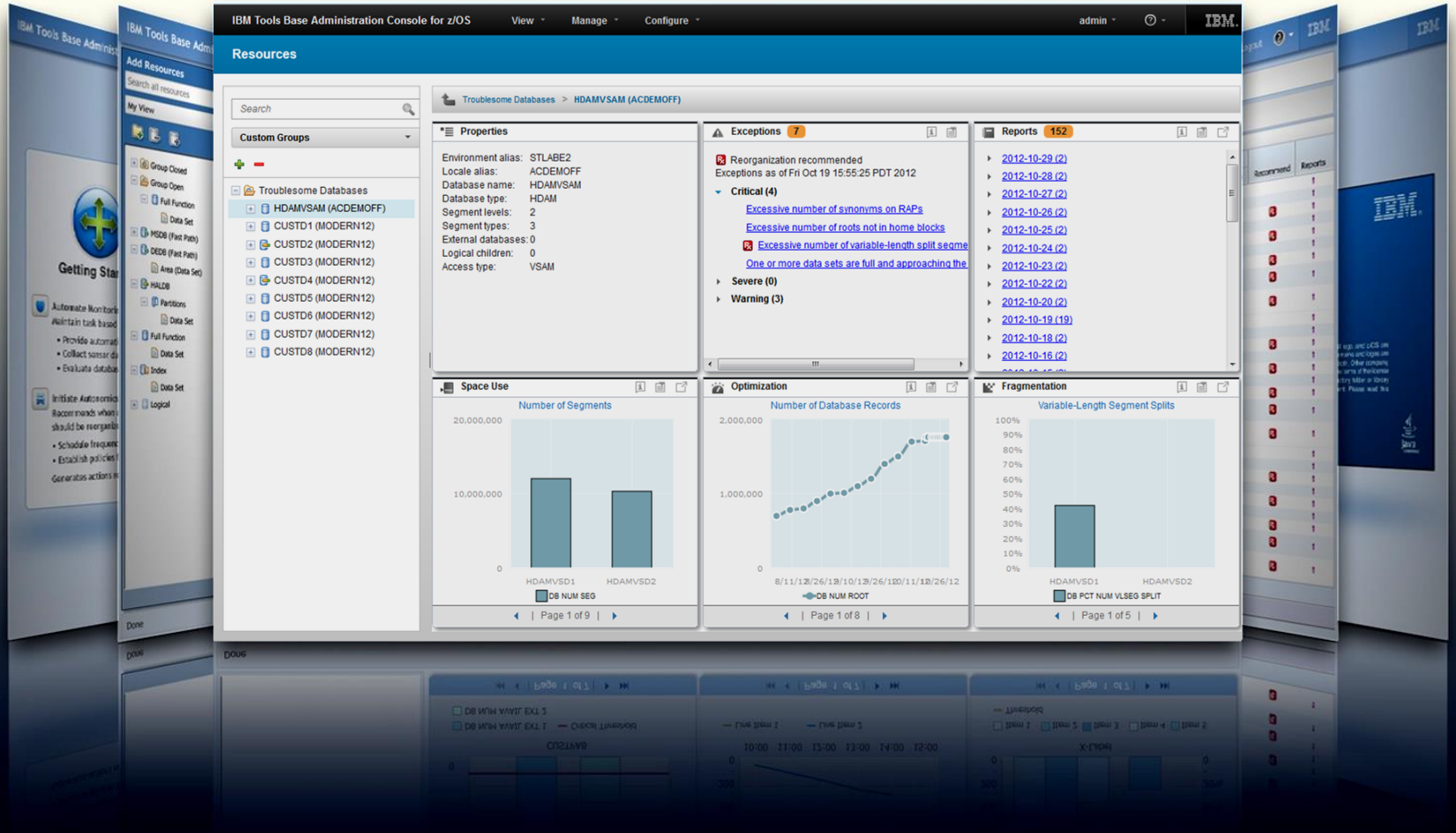
DB2 Utilities Solution

SHARE in Orlando 2015

DB2 Utility Autonomics Products



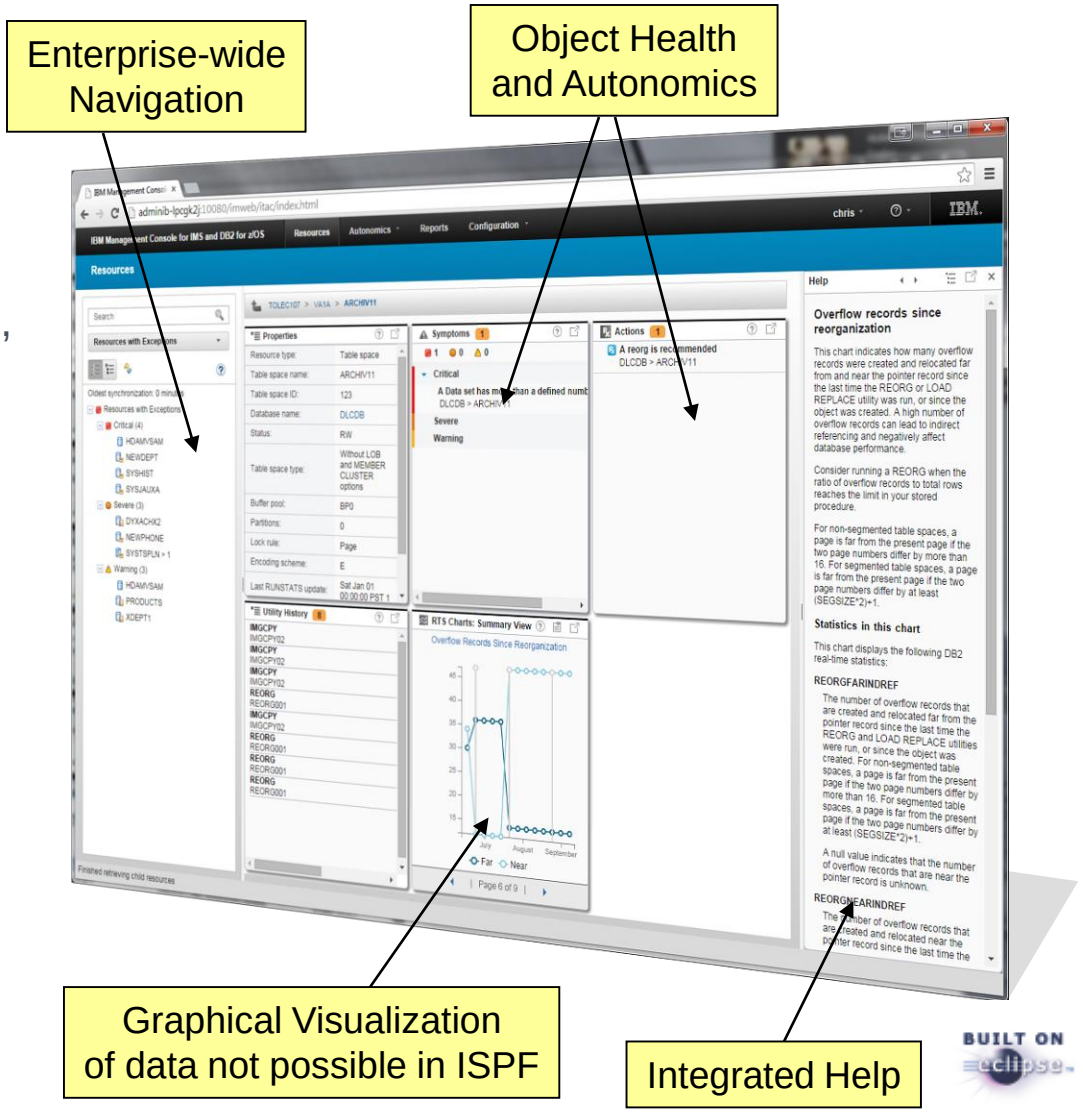
IBM Management Console for IMS and DB2 for z/OS 1.1



IBM Management Console *for IMS and DB2 for z/OS*

- Provides a single, holistic easy-to-use interface to manage IMS and DB2
  - Zero-install web-based interface
  - Consolidate information from IMS, DB2 and tools to from across the entire enterprise
  - Reduced time for problem identification and resolution through tight integration with IMS and DB2 Autonomics
  - Dramatically reduced learning curve for new users of IMS and DB2

- Now available as a separate *no-charge* product *(5655-TAC)*
  - Extensible by growing number of products and solution packs adding additional value

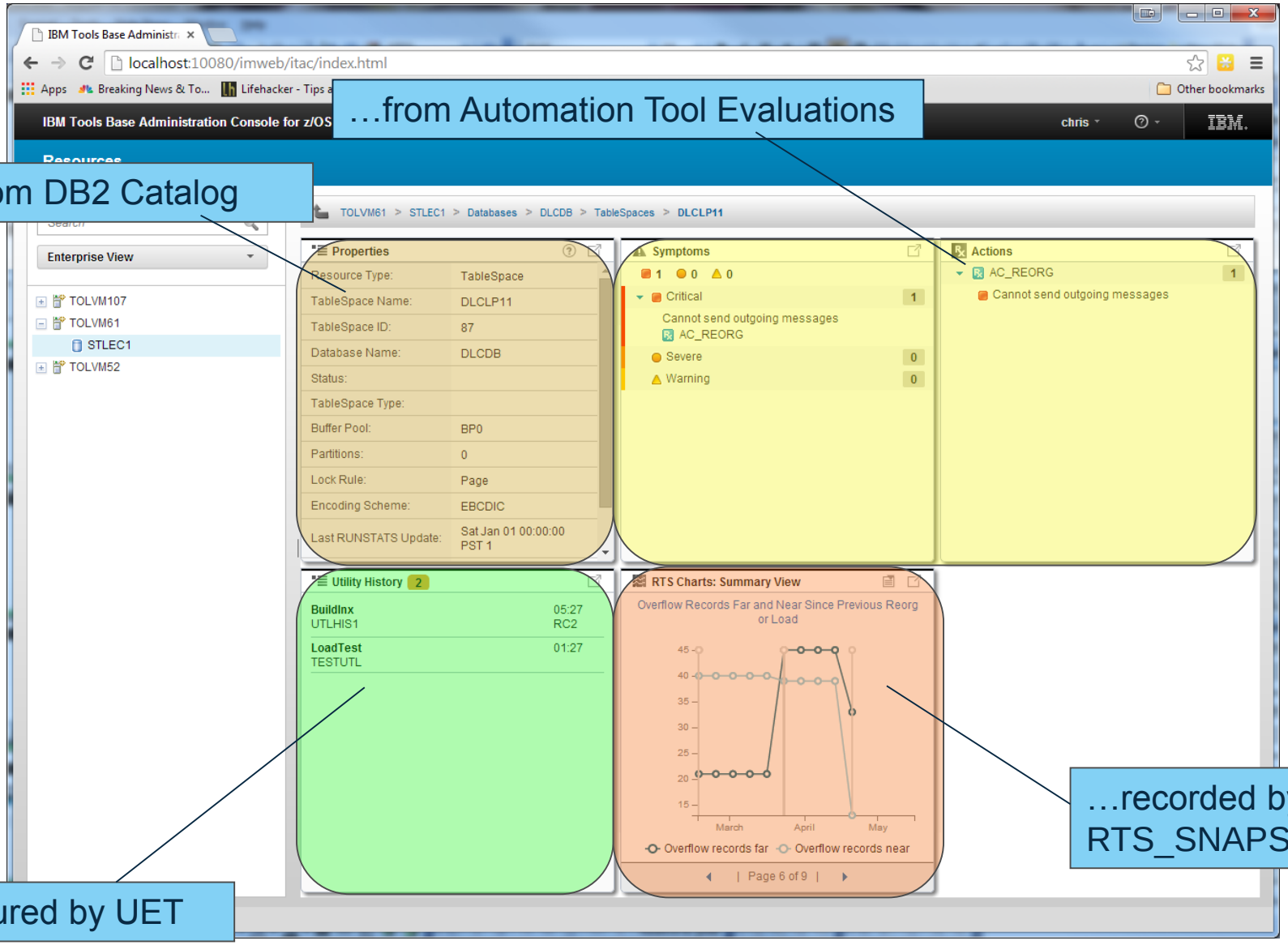


Dashboard based Design

- Currently Existing DB2 Dashboards
  - Data Sharing Group
  - Subsystem
  - Database
  - Tablespace
  - Tablespace Partition
  - Indexspace
  - Indexspace Partition
- Future Dashboards
  - Tables
  - Indexes
  - Packages / Collections
  - etc…

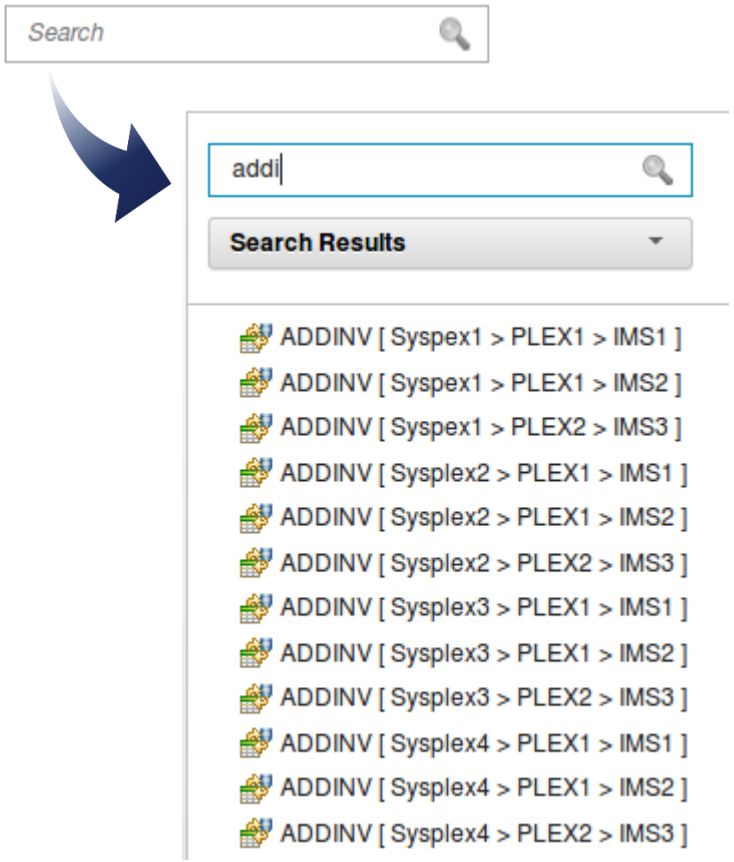
- Currently Existing IMS Dashboards
  - IMS Plex
  - IMS Subsystem
  - IMS Connect
  - Databases (HDAM/HIDAM/DEDB/etc)
  - Partitions / Areas
  - Transactions
  - Programs
  - Routing Codes
- Future Dashboards
  - Message Queues
  - IMS CF Structures
  - etc…

Holistic Dashboards of DB2 Objects

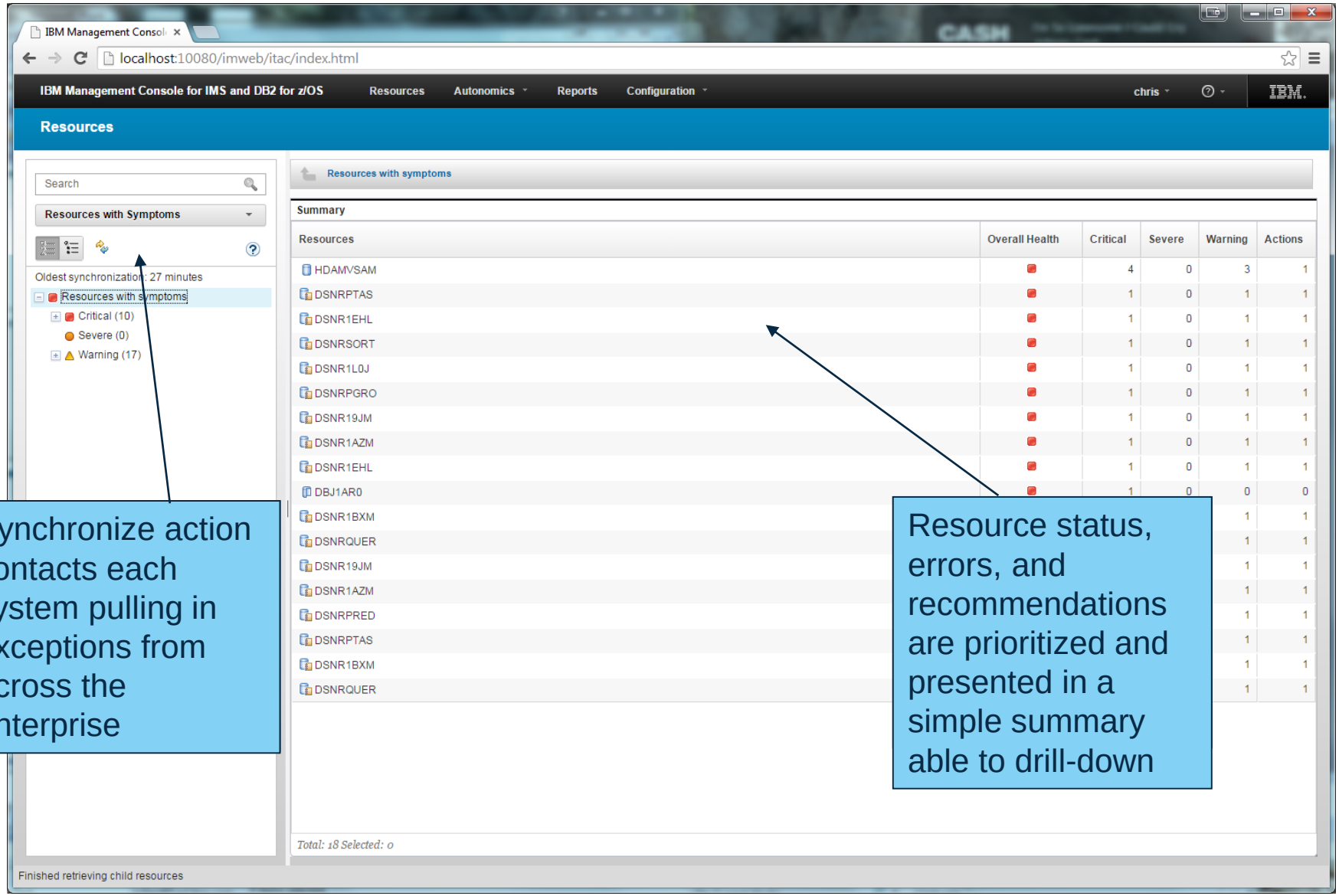


Enterprise-wide Object Search

- Objects are locally indexed at discovery time
- This allows global type-ahead search to jump directly to a desired object, be it:
  - IMS Database
  - DB2 Tablespace
  - DB2 Index
  - IMS Transactions
  - etc.



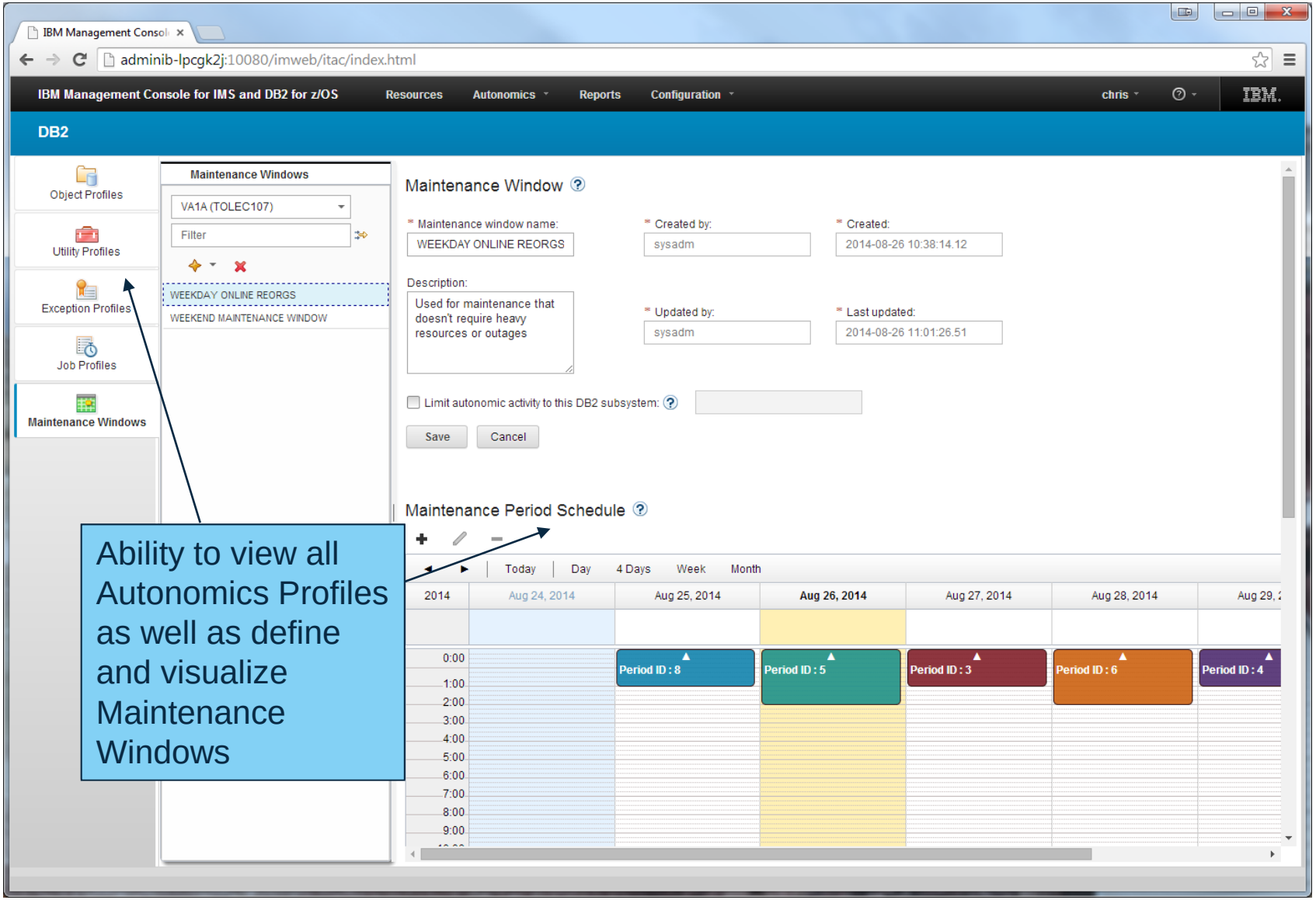
Drill down on Exceptions from an Enterprise-wide View



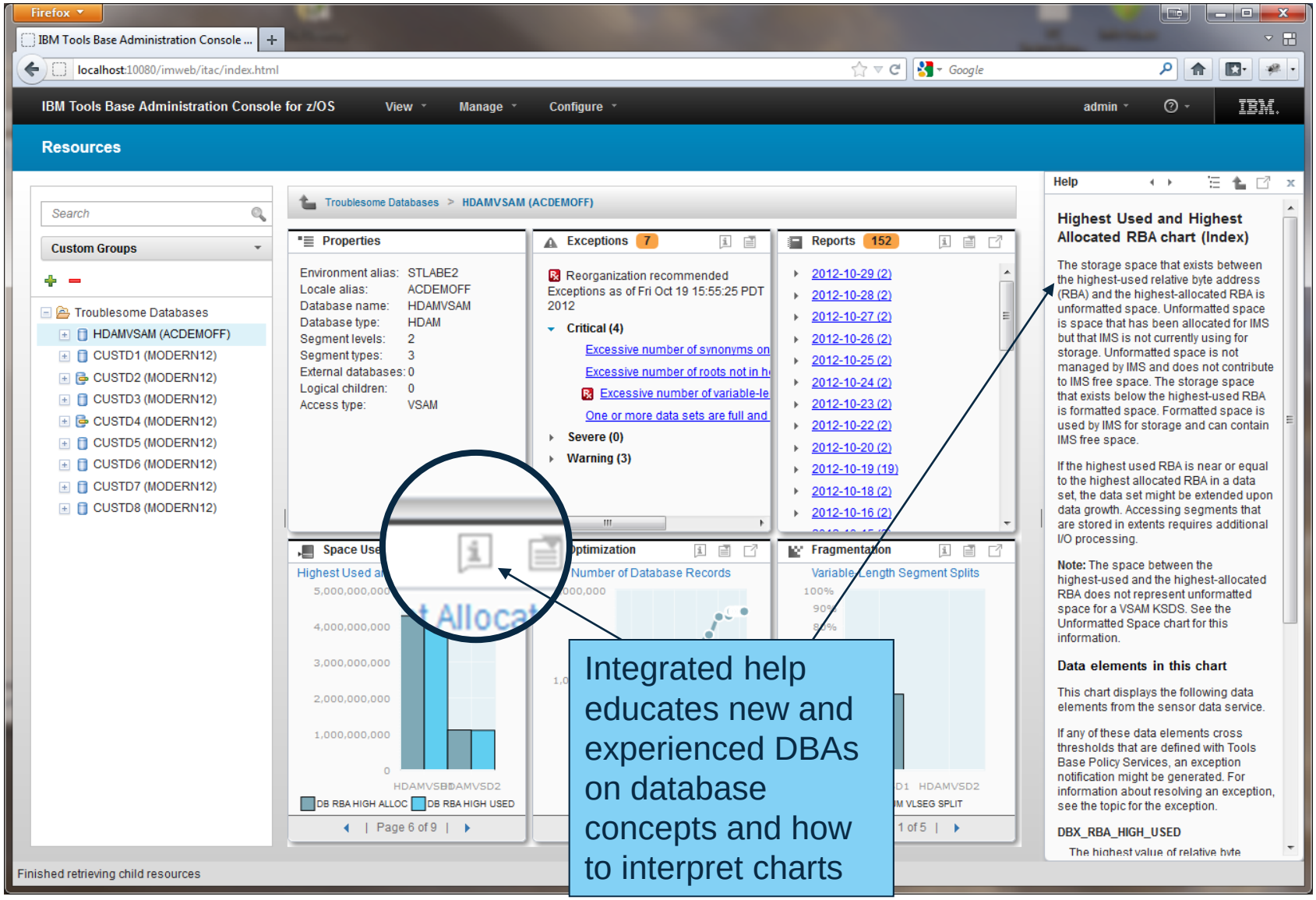
Synchronize action contacts each system pulling in exceptions from across the enterprise

Resource status, errors, and recommendations are prioritized and presented in a simple summary able to drill-down

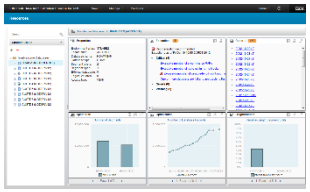
Control of Autonomics for IMS and DB2



Integrated Help / Education



Management Console Deployment



HTTP

(HTTPS)

Mngmt Console Server

TCP/IP

(SSL)

z/OS

DB2

IMS

Mngmt Console

Workstation

Mngmt Console

Mid-Tier Server

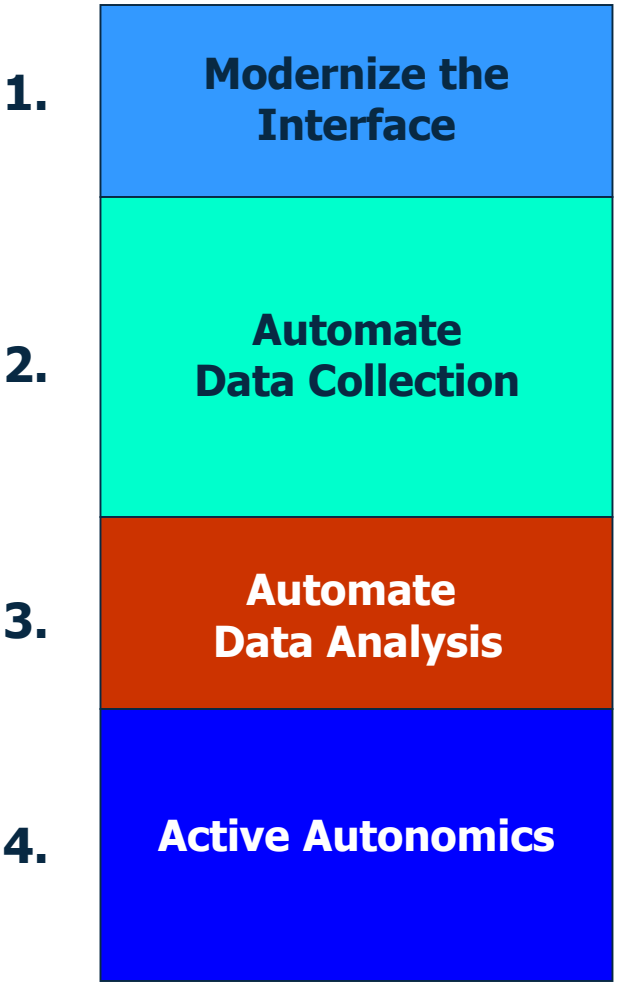
Mngmt Console

z/OS

Mngmt Console

zLinux

Autonomics Deployment w/ Utility Solution Pack

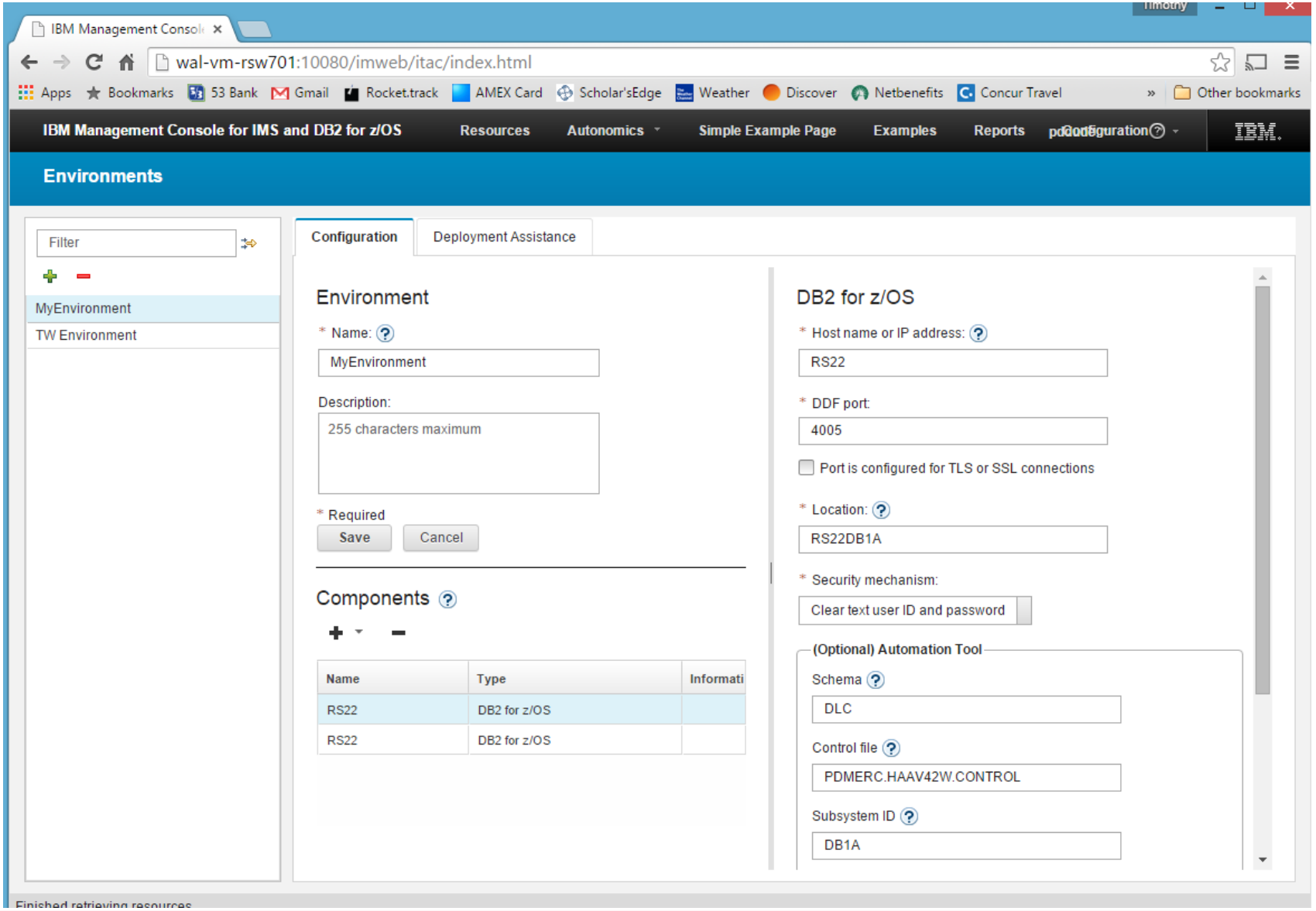


- Point the Management Console at DB2 subsystems, run discovery, and explore DB2 objects
- Run RTS_SNAPSHOT through the DB2 Administrative Task Scheduler[1] to build historical record of object statistics
- Enable ability to automatically capture utility job and record to the Utility History Table
- Drive Automation Tool evaluations and other products evaluations through the DB2 Administrative Task Scheduler[1]
- Define a Maintenance Window, setup active autonomics director to regularly drive REORG, COPY, RUNSTATS on a set of objects

[1] or your existing scheduler

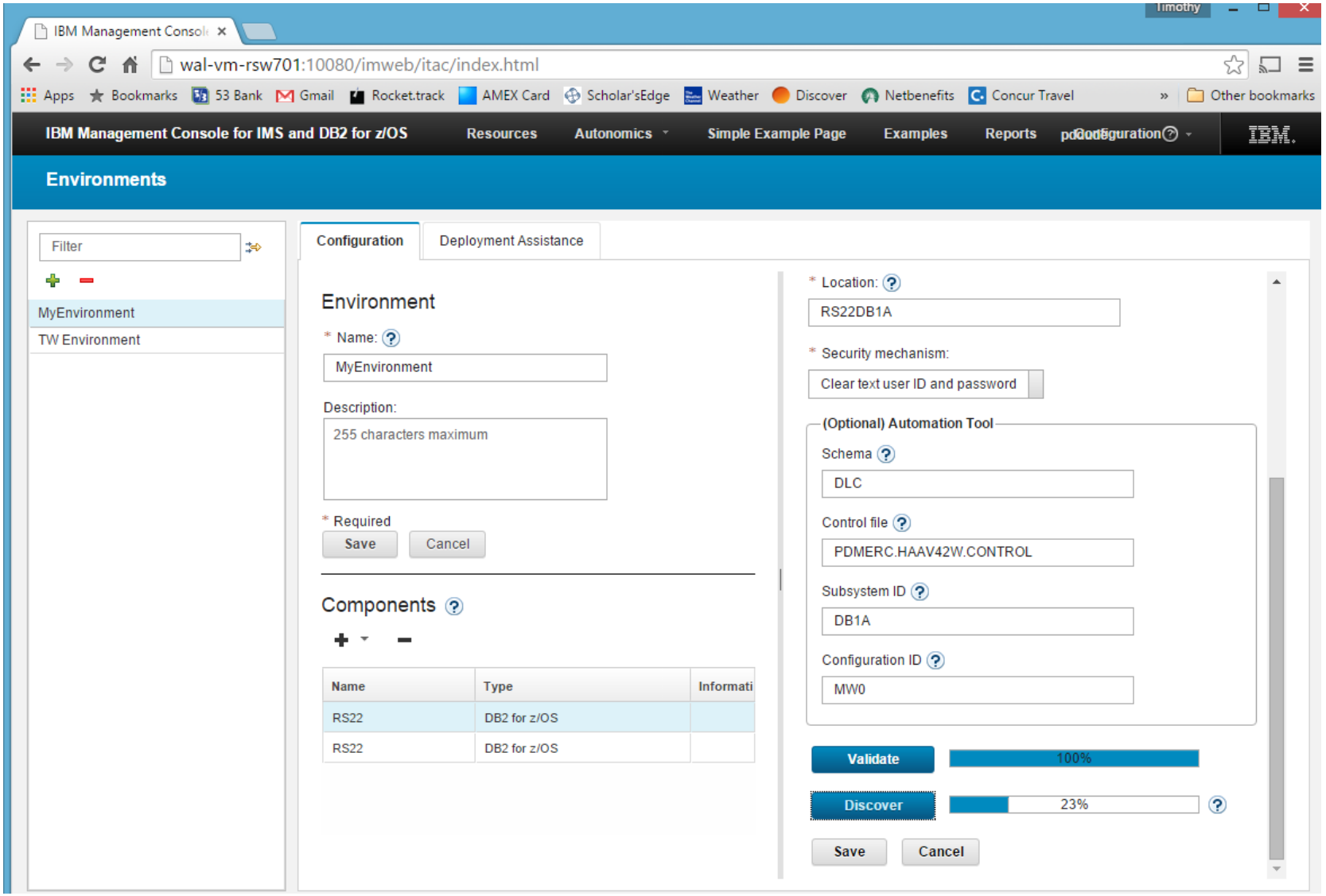
Configuring Enterprise Environments

– *Define all your DB2 environments*

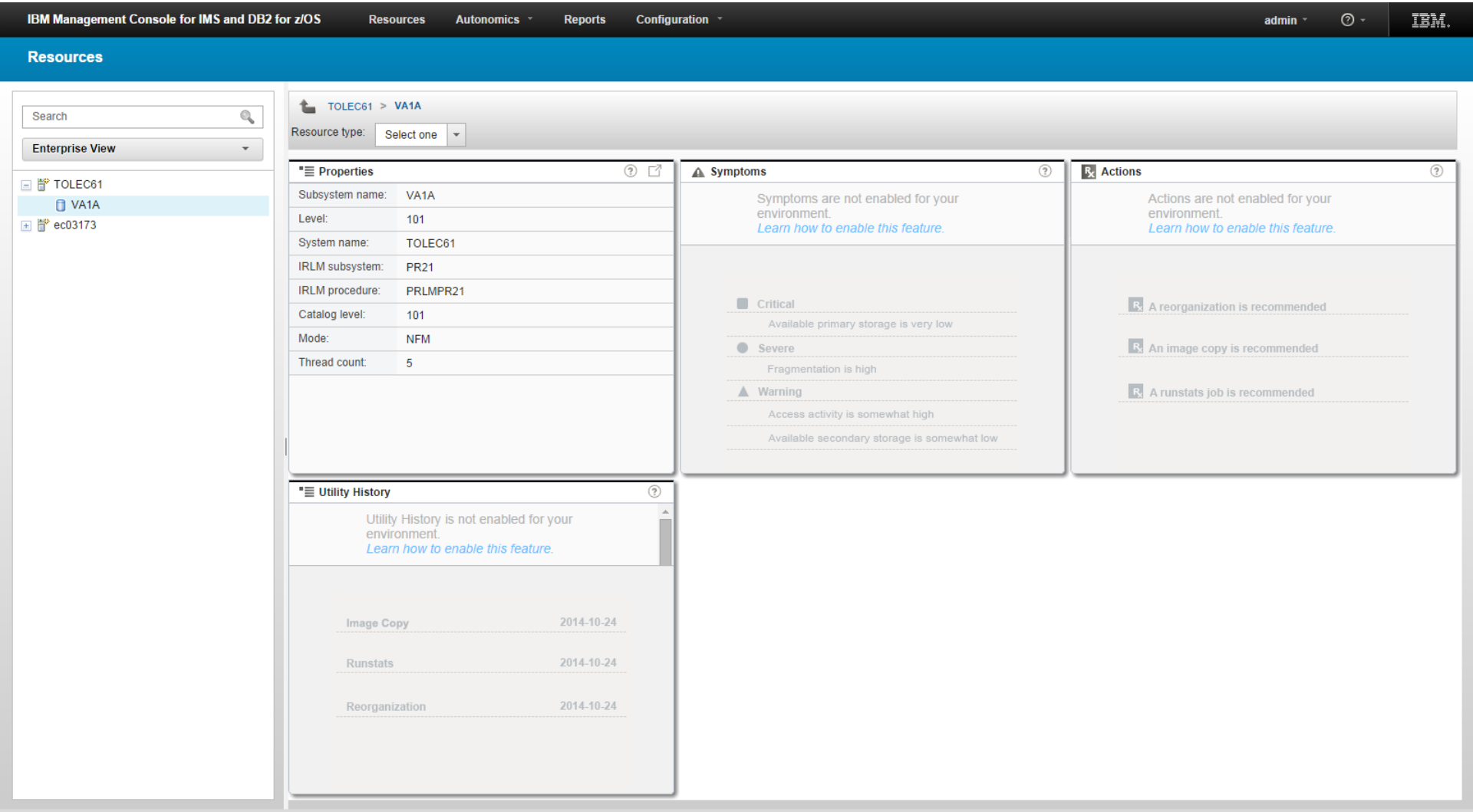


Configuring Enterprise Environments

– *Run Environment Discovery*

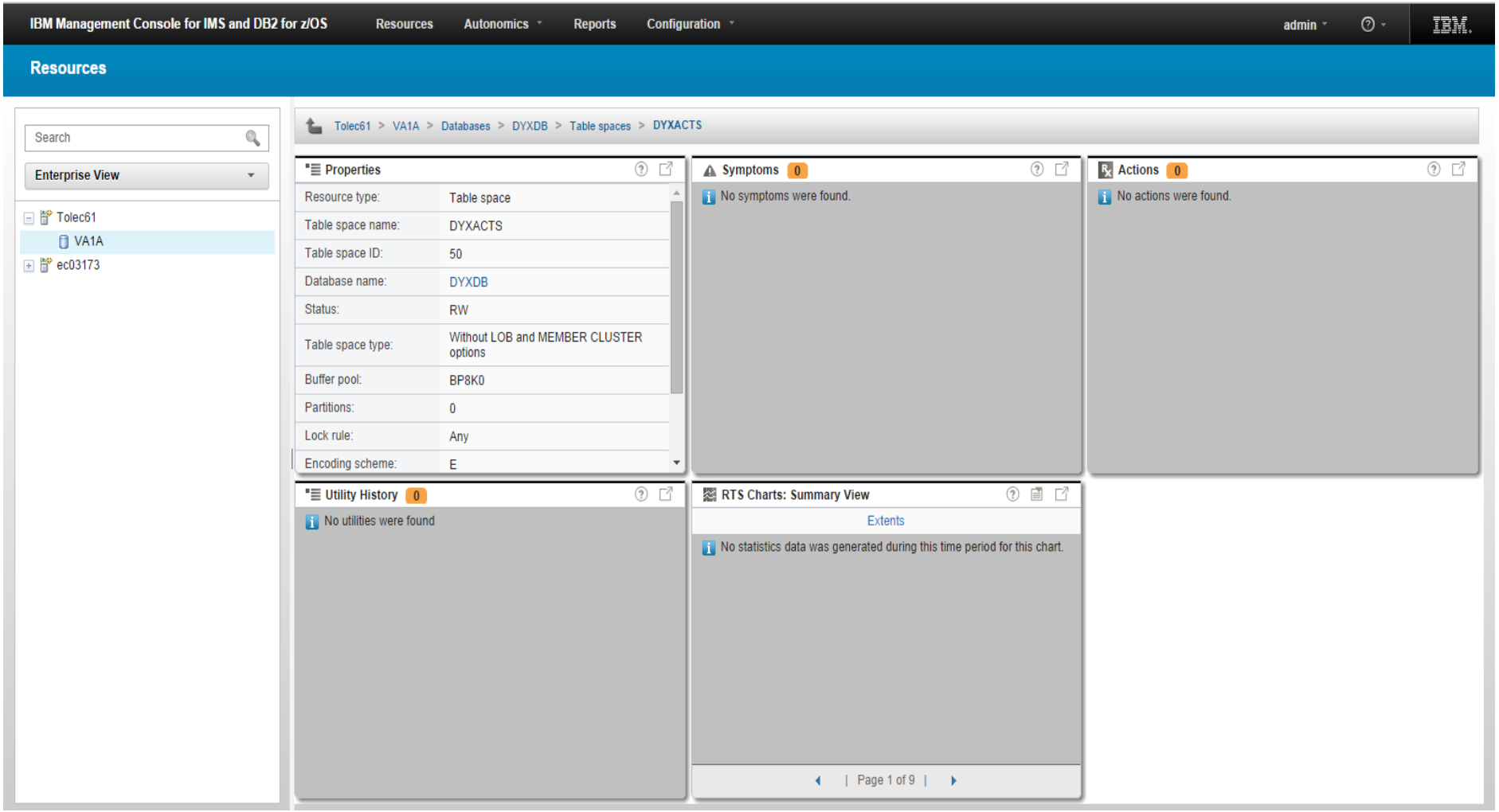


Modernize the Interface



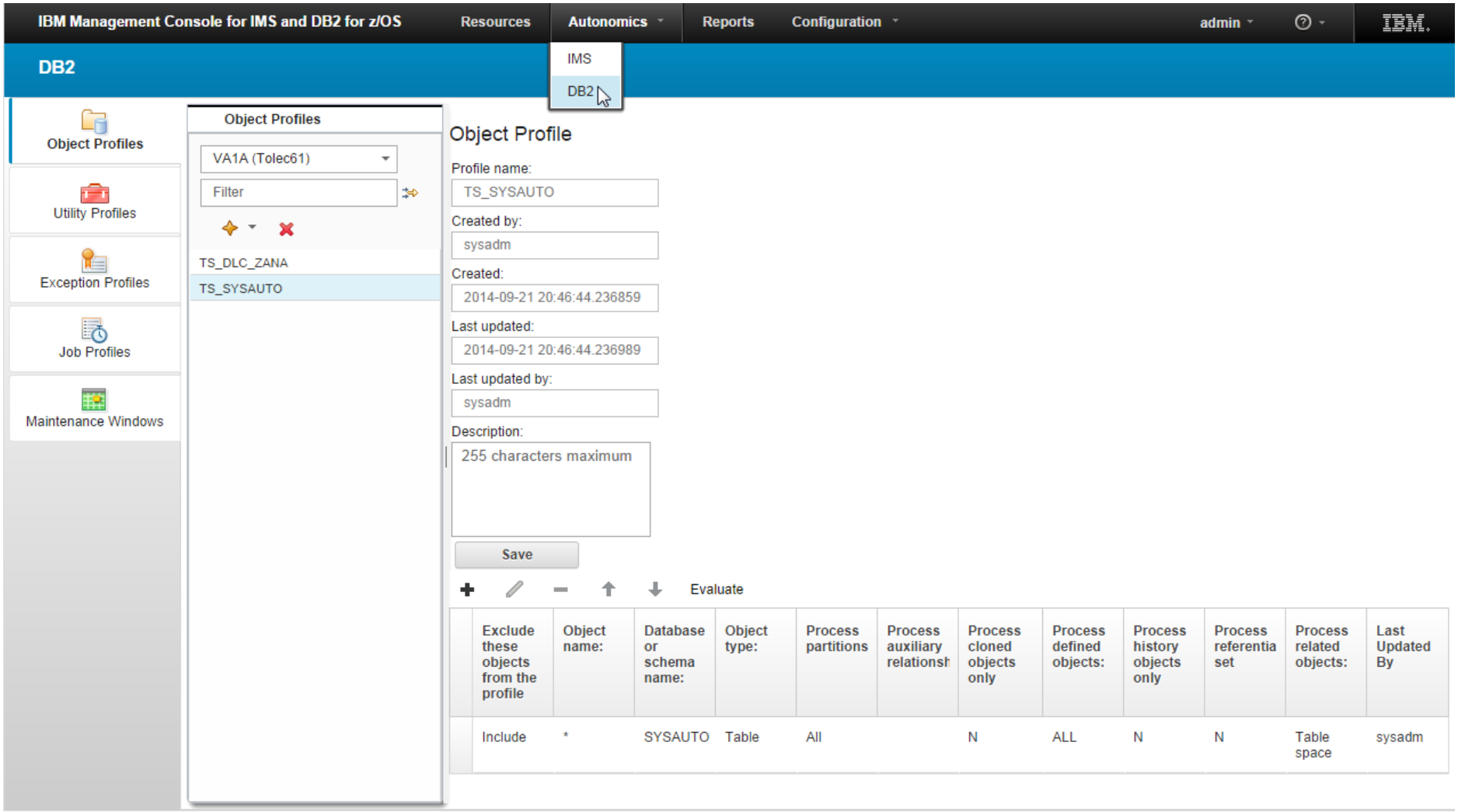
Install and Customize Autonomics Director for DB2

- After customizing AD for DB2 :



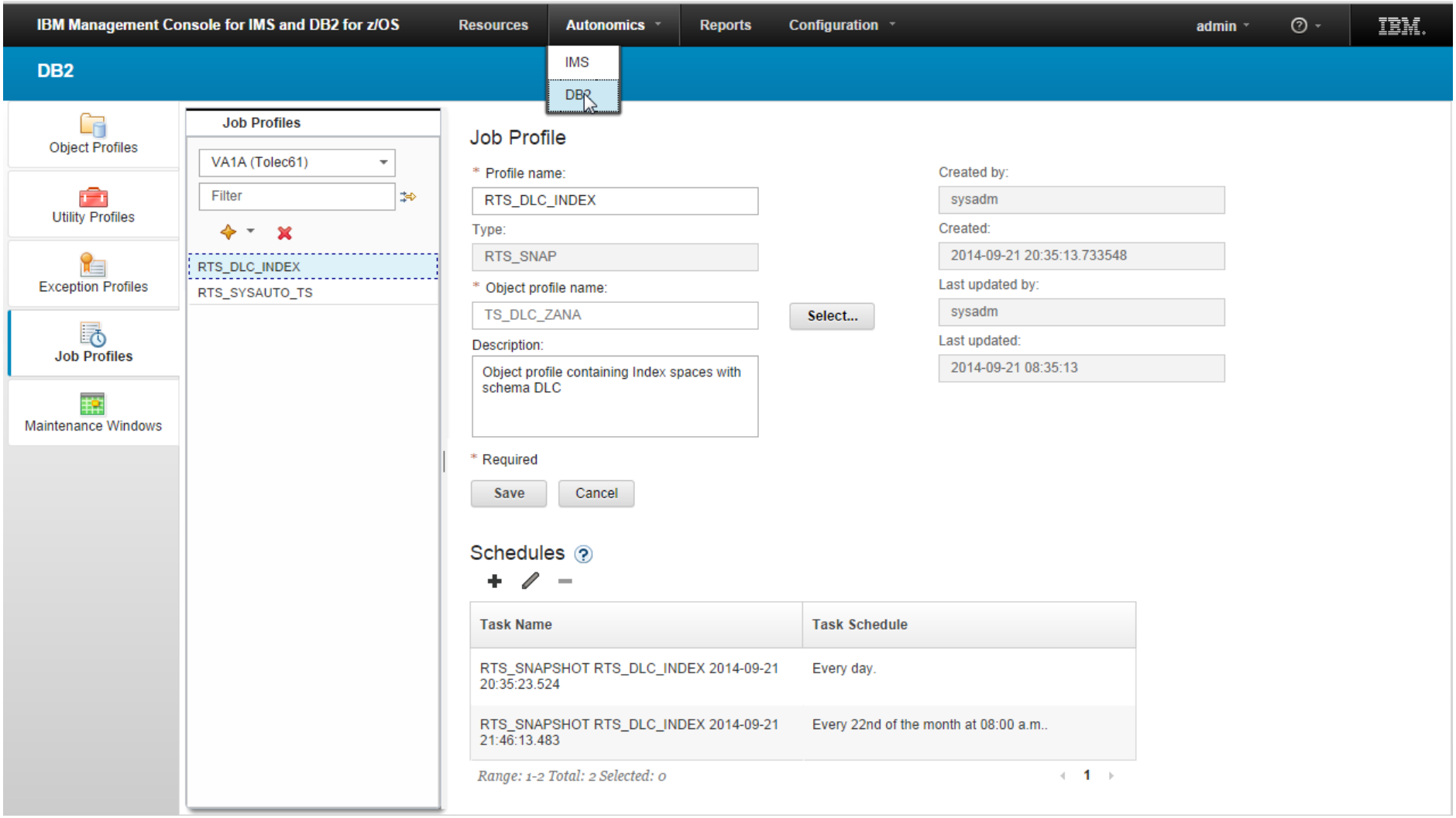
Automate Data Collection (RTS History)

- Define Object Profiles :



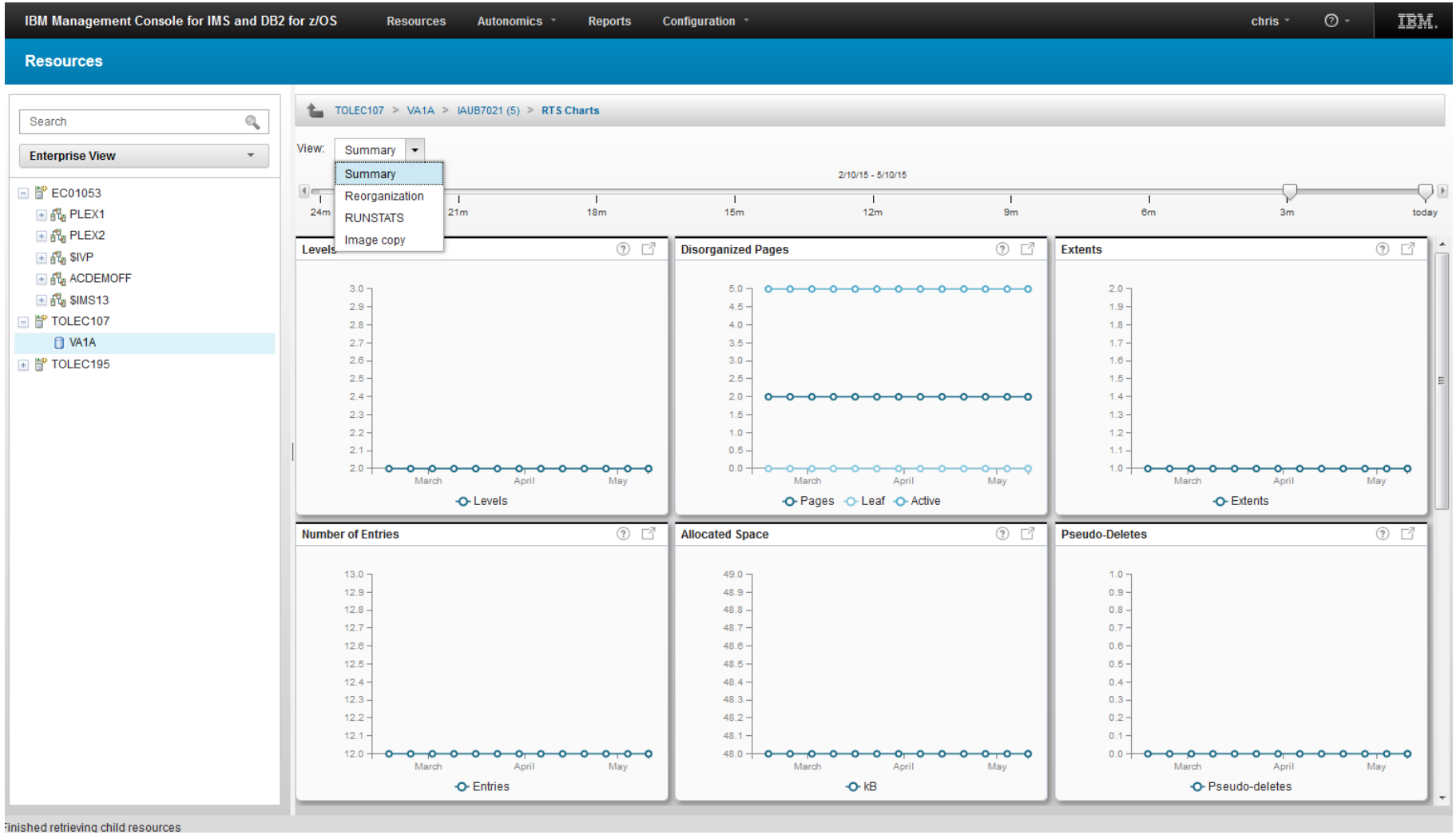
Automate Data Collection (RTS History)

- Define and Schedule an RTS Snap Job Profile :



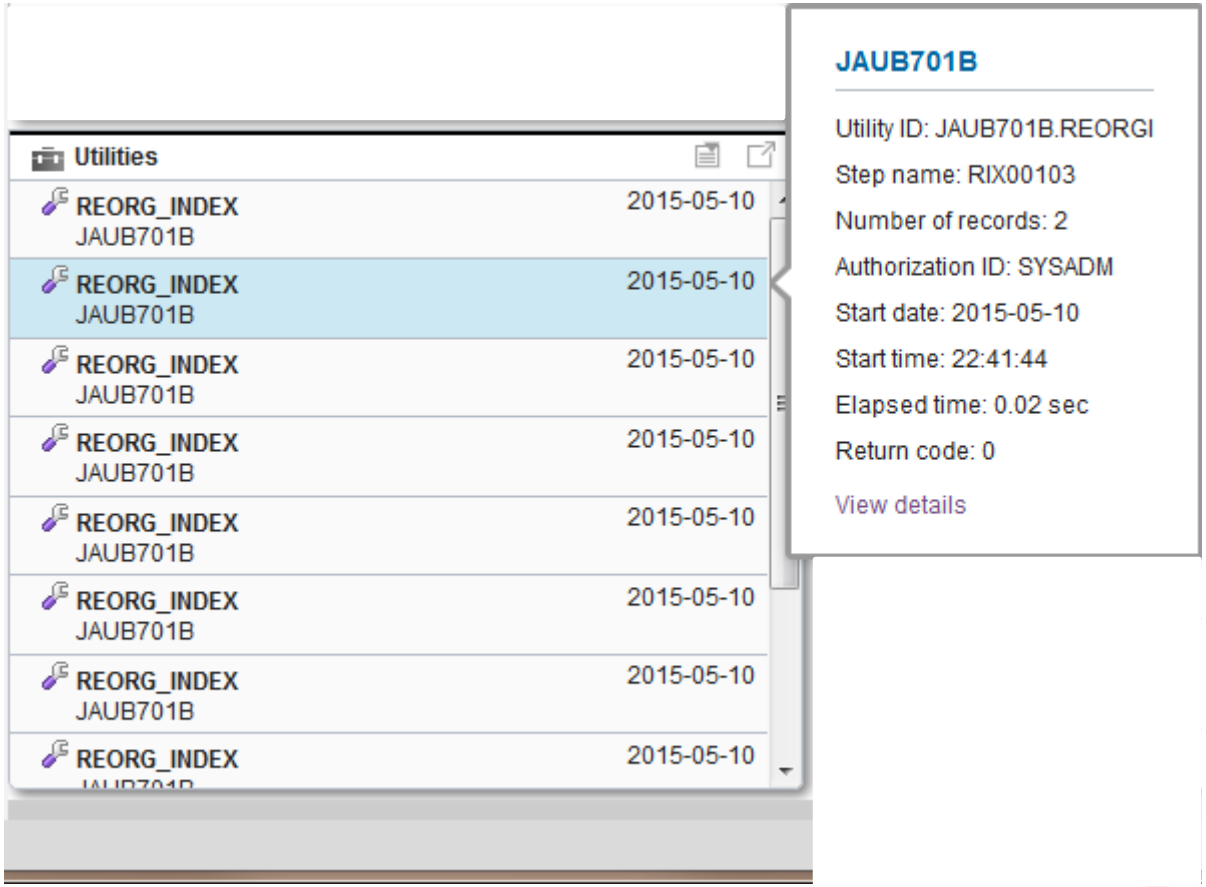
DB2 Object Dashboard with RTS History

- View RTS history data on dashboard :

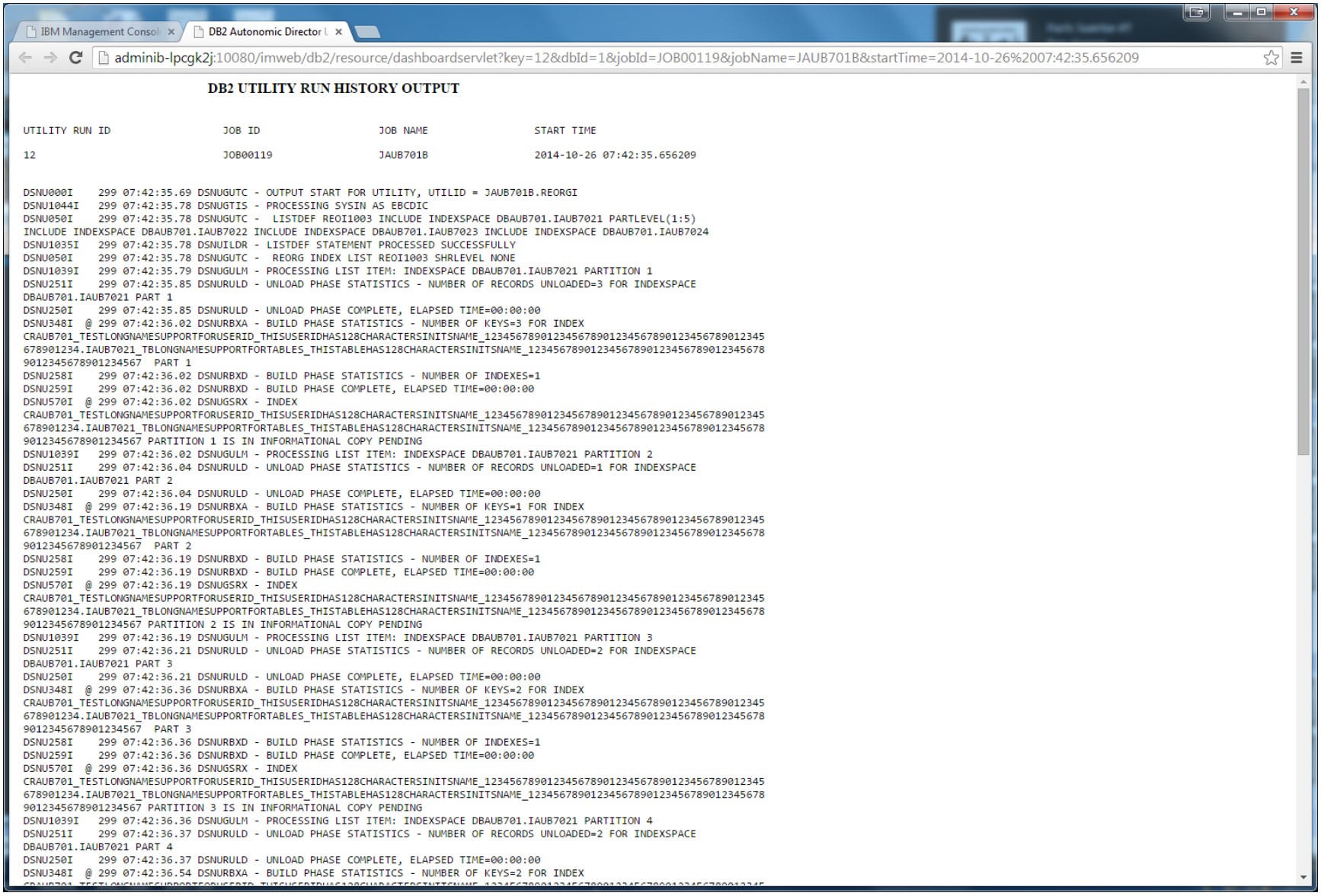


Automate Data Collection (Utility History)

- Install and Customize Utility Enhancement Tool :



View Captured Utility Output



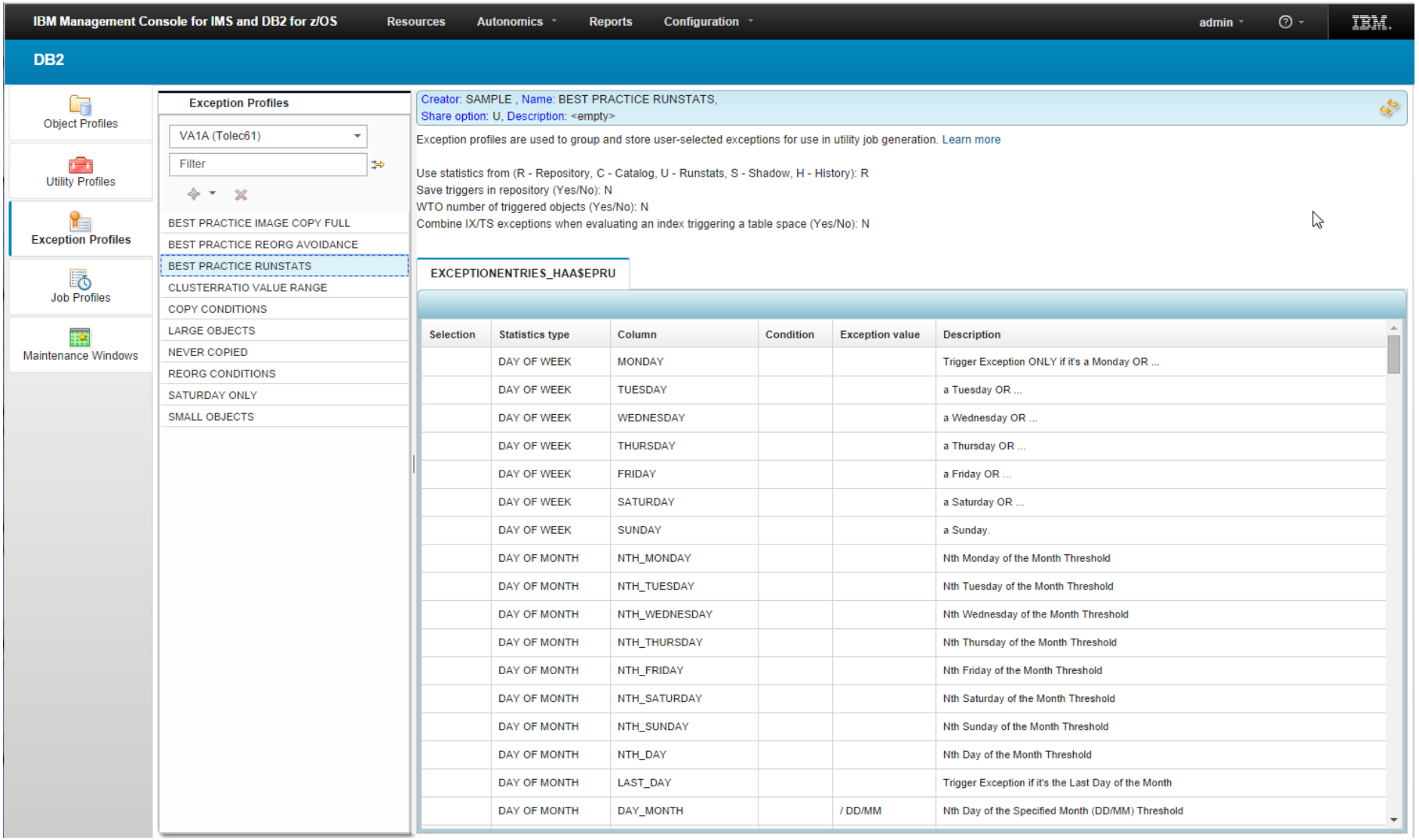
DB2 UTILITY RUN HISTORY OUTPUT

UTILITY RUN ID	JOB ID	JOB NAME	START TIME
12	JOB00119	JAUB701B	2014-10-26 07:42:35.656209

```
DSNU000I    299 07:42:35.69 DSNUGUTC - OUTPUT START FOR UTILITY, UTILID = JAUB701B.REORGI
DSNU1044I   299 07:42:35.78 DSNUGTIS - PROCESSING SYSIN AS EBCDIC
DSNU050I    299 07:42:35.78 DSNUGUTC -  LISTDEF REOI1003 INCLUDE INDEXSPACE DBAUB701.IAUB7021 PARTLEVEL(1:5)
INCLUDE INDEXSPACE DBAUB701.IAUB7022 INCLUDE INDEXSPACE DBAUB701.IAUB7023 INCLUDE INDEXSPACE DBAUB701.IAUB7024
DSNU1035I   299 07:42:35.78 DSNUILDR - LISTDEF STATEMENT PROCESSED SUCCESSFULLY
DSNU050I    299 07:42:35.78 DSNUGUTC -  REORG INDEX LIST REOI1003 SHRLEVEL NONE
DSNU1039I   299 07:42:35.79 DSNUGULM - PROCESSING LIST ITEM: INDEXSPACE DBAUB701.IAUB7021 PARTITION 1
DSNU251I    299 07:42:35.85 DSNURULD - UNLOAD PHASE STATISTICS - NUMBER OF RECORDS UNLOADED=3 FOR INDEXSPACE
DBAUB701.IAUB7021 PART 1
DSNU250I    299 07:42:35.85 DSNURULD - UNLOAD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU348I  @ 299 07:42:36.02 DSNURBXA - BUILD PHASE STATISTICS - NUMBER OF KEYS=3 FOR INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456  PART 1
DSNU258I    299 07:42:36.02 DSNURBXD - BUILD PHASE STATISTICS - NUMBER OF INDEXES=1
DSNU259I    299 07:42:36.02 DSNURBXD - BUILD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU570I  @ 299 07:42:36.02 DSNUGSRX - INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456 PARTITION 1 IS IN INFORMATIONAL COPY PENDING
DSNU1039I   299 07:42:36.02 DSNUGULM - PROCESSING LIST ITEM: INDEXSPACE DBAUB701.IAUB7021 PARTITION 2
DSNU251I    299 07:42:36.04 DSNURULD - UNLOAD PHASE STATISTICS - NUMBER OF RECORDS UNLOADED=1 FOR INDEXSPACE
DBAUB701.IAUB7021 PART 2
DSNU250I    299 07:42:36.04 DSNURULD - UNLOAD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU348I  @ 299 07:42:36.19 DSNURBXA - BUILD PHASE STATISTICS - NUMBER OF KEYS=1 FOR INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456  PART 2
DSNU258I    299 07:42:36.19 DSNURBXD - BUILD PHASE STATISTICS - NUMBER OF INDEXES=1
DSNU259I    299 07:42:36.19 DSNURBXD - BUILD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU570I  @ 299 07:42:36.19 DSNUGSRX - INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456 PARTITION 2 IS IN INFORMATIONAL COPY PENDING
DSNU1039I   299 07:42:36.19 DSNUGULM - PROCESSING LIST ITEM: INDEXSPACE DBAUB701.IAUB7021 PARTITION 3
DSNU251I    299 07:42:36.21 DSNURULD - UNLOAD PHASE STATISTICS - NUMBER OF RECORDS UNLOADED=2 FOR INDEXSPACE
DBAUB701.IAUB7021 PART 3
DSNU250I    299 07:42:36.21 DSNURULD - UNLOAD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU348I  @ 299 07:42:36.36 DSNURBXA - BUILD PHASE STATISTICS - NUMBER OF KEYS=2 FOR INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456  PART 3
DSNU258I    299 07:42:36.36 DSNURBXD - BUILD PHASE STATISTICS - NUMBER OF INDEXES=1
DSNU259I    299 07:42:36.36 DSNURBXD - BUILD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU570I  @ 299 07:42:36.36 DSNUGSRX - INDEX
CRAUB701_TESTLONGNAMESUPPORTFORUSERID_THISUSERIDHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
678901234.IAUB7021_TBLONGNAMESUPPORTFORTABLES_THISTABLEHAS128CHARACTERSINITSNAME_12345678901234567890123456789012345678901234567890123456789012345
901234567890123456 PARTITION 3 IS IN INFORMATIONAL COPY PENDING
DSNU1039I   299 07:42:36.36 DSNUGULM - PROCESSING LIST ITEM: INDEXSPACE DBAUB701.IAUB7021 PARTITION 4
DSNU251I    299 07:42:36.37 DSNURULD - UNLOAD PHASE STATISTICS - NUMBER OF RECORDS UNLOADED=2 FOR INDEXSPACE
DBAUB701.IAUB7021 PART 4
DSNU250I    299 07:42:36.37 DSNURULD - UNLOAD PHASE COMPLETE, ELAPSED TIME=00:00:00
DSNU348I  @ 299 07:42:36.54 DSNURBXA - BUILD PHASE STATISTICS - NUMBER OF KEYS=2 FOR INDEX
```

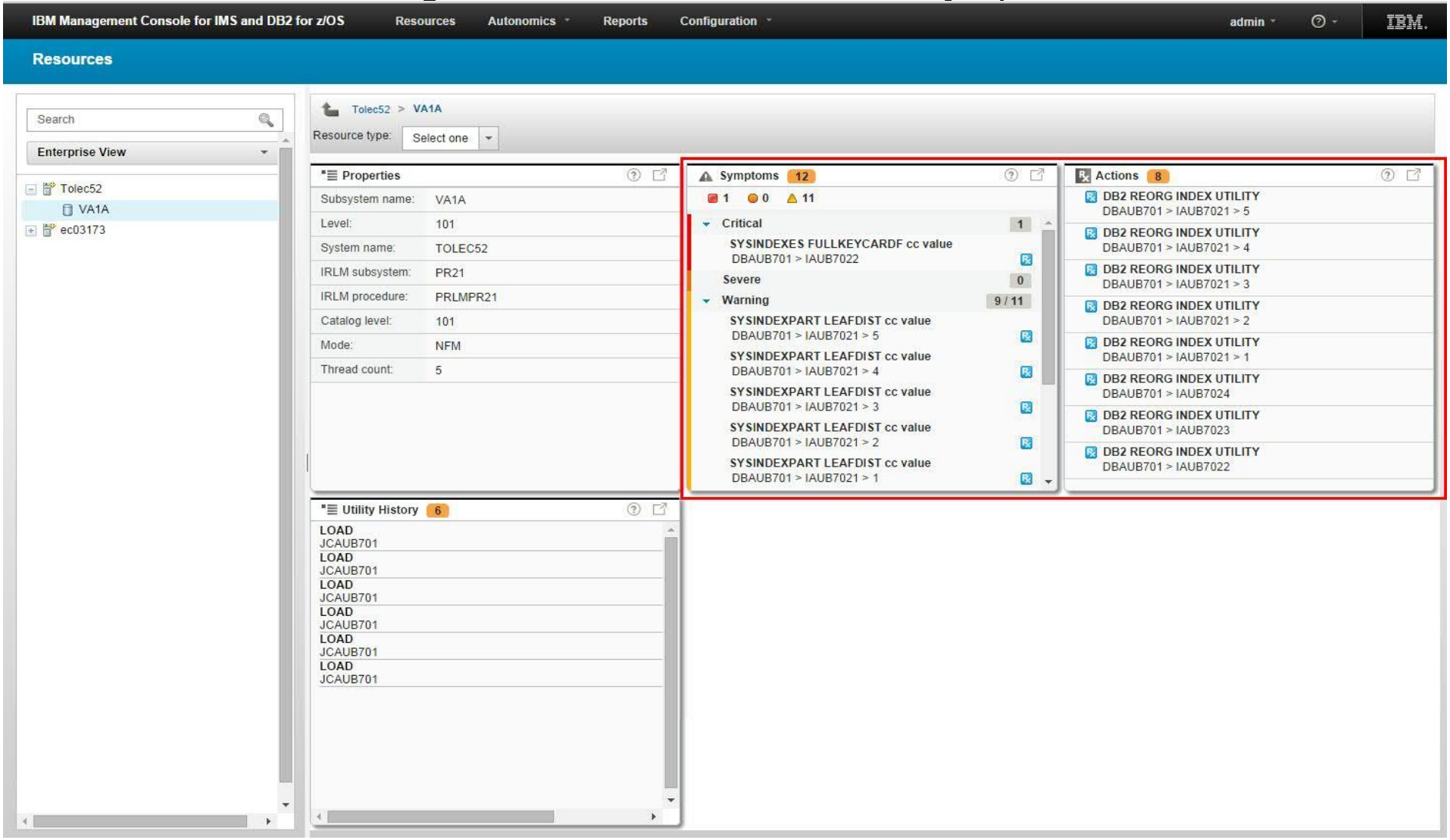
Automation Tool Object / Utility / Exception / Job Profiles

- After customizing DB2 Automation tool view profiles under Autonomics tab :



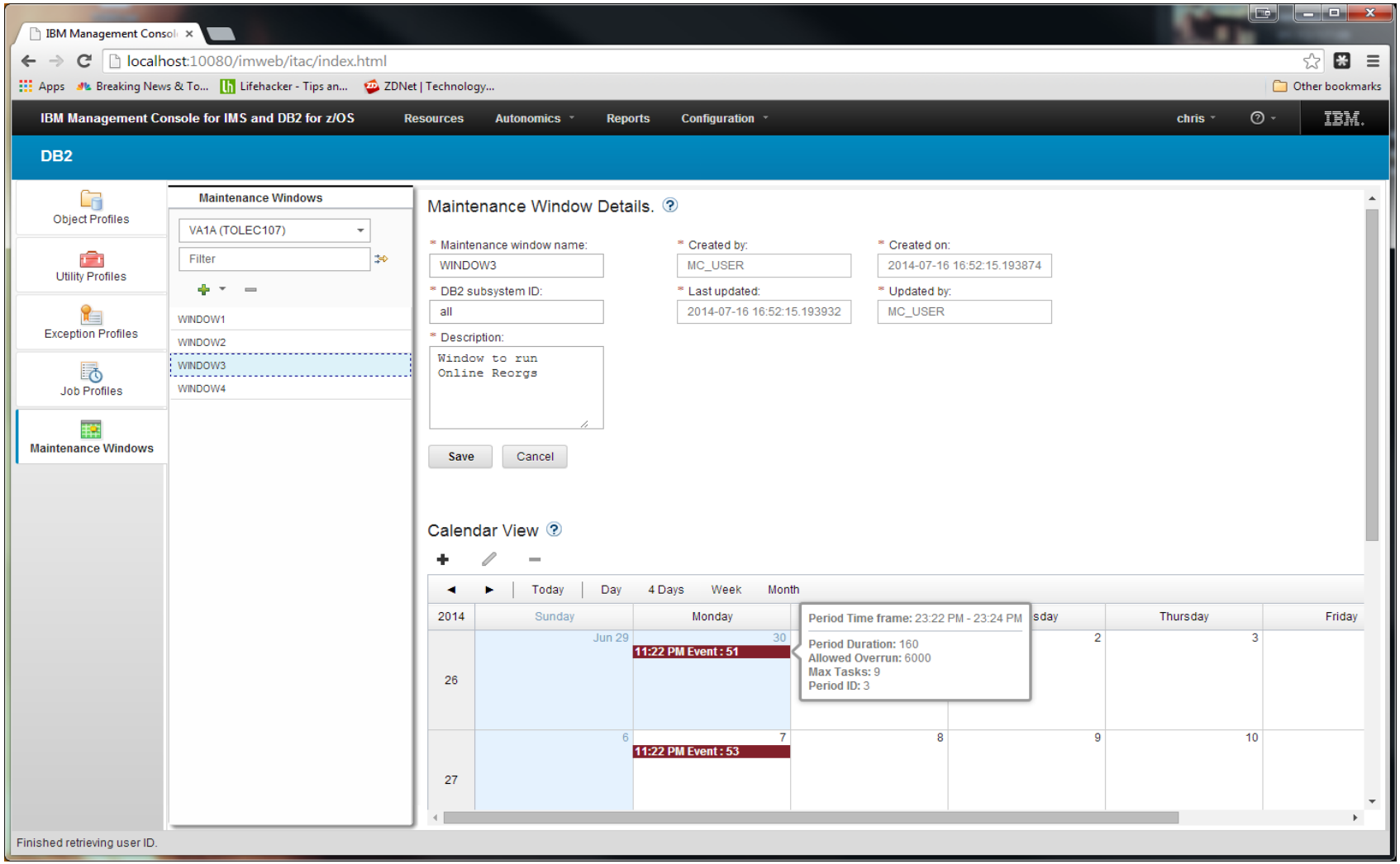
Automate Data Analysis (Passive Autonomics)

- After customizing DB2 Automation tool view symptoms/actions on

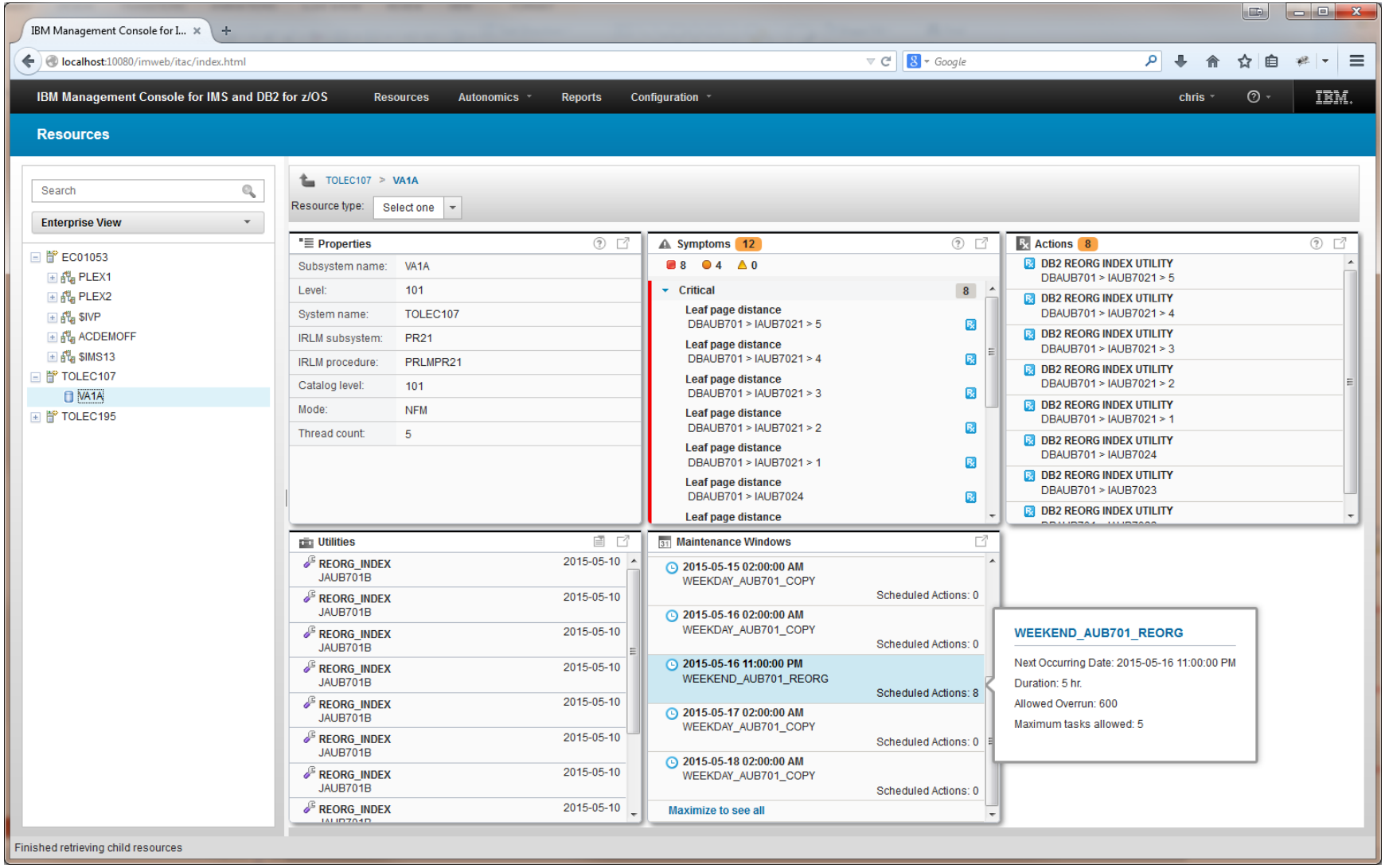


Active Autonomics

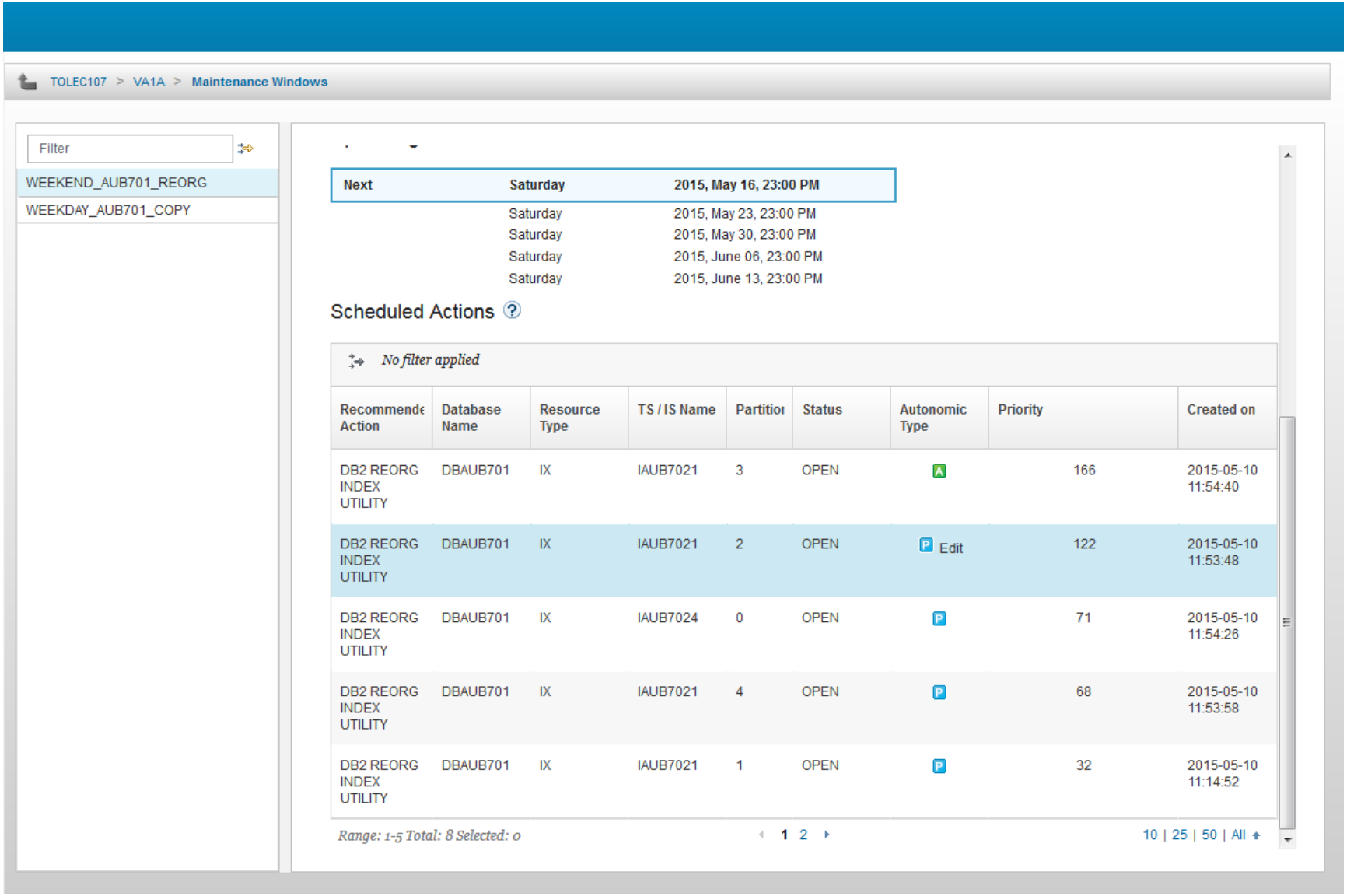
- Define a Maintenance Windows, add to AT Job Profiles
- Run Autonomics Director on Maintenance Windows



View upcoming autonomic maintenance windows with scheduled actions



View/Edit Actions scheduled for upcoming maintenance windows



Q & A

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