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

Tim Willging, Rocket Software
Session: 17577
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

<table>
<thead>
<tr>
<th>Administration</th>
<th>Optimization</th>
<th>Higher value tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Administrator</td>
<td>System Programmer</td>
<td></td>
</tr>
</tbody>
</table>

Target: Smarter Tools enable productivity

<table>
<thead>
<tr>
<th>Administration</th>
<th>Optimization</th>
<th>Higher value tasks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database Administrator</td>
<td>System Programmer</td>
<td></td>
</tr>
</tbody>
</table>

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

**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.

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

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
IMS Sensor

Collect Data

Analyze / Identify Problems

Diagnose / Prescribe Action

Plan / Schedule Maintenance Window

Perform / Execute

Enactors

DB2 Utilities
Alter Statement
Etc.

Automation Tool

Evaluators

Autonomics Director

Sensor Datastores

Management Console (browser-based)

Trigger Data Collection Define Schedule

View Historical Data

Trigger / Schedule Analysis

View / Dismiss Symptoms

Define Maintenance Windows

View / Edit Maintenance Window Plan

View Recommendations

View / Edit Maintenance Window Plan

Perform / Execute

RTS_HIST

Automation Tool

Evaluation

Symptoms

Passive

Active
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 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
DB2 Utility Autonomics Products

Management Console for IMS and DB2 for z/OS 1.1 (DYW) (no-charge)

Tools Base 1.5 (no-charge)

Autonomics Director for DB2 for z/OS 1.5 (DYX)

DDL
- Object Profiles
- Job Profiles
- RTS_HIST
- Symptoms
- Actions
- Registry
- Maint. Windows
- Utility History...

Stored Procedures
- Object Explode
- RTS Snapshot
- Autonomics Director

Object Explode

Automation Tool 4.2 (HAA)

Profiles GUI

Utility Profiles
- Object Profiles
- Except Profiles
- Job Profiles

UET

HPU

DB2 Sort

Utility Sol. Pack 2.1 (BBY)

DB2 Admin Scheduler

DB2 v10 / v11

DB2 v10 / v11
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

Enterprise-wide Navigation
Object Health and Autonomics
Graphical Visualization of data not possible in ISPF
Integrated Help

Built on eclipse
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

...from DB2 Catalog

...from Automation Tool Evaluations

...captured by UET

...recorded by RTS_SNAPSHOT
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

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

Synchronize action contacts each system pulling in exceptions from across the enterprise.
Control of Autonomics for IMS and DB2

Ability to view all Autonomics Profiles as well as define and visualize Maintenance Windows
Integrated Help / Education

Integrated help educates new and experienced DBAs on database concepts and how to interpret charts.
Autonomics Deployment w/ Utility Solution Pack

1. Modernize the Interface
   - Point the Management Console at DB2 subsystems, run discovery, and explore DB2 objects

2. Automate Data Collection
   - 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

3. Automate Data Analysis
   - Drive Automation Tool evaluations and other products evaluations through the DB2 Administrative Task Scheduler\(^1\)

4. Active Autonomics
   - Define a Maintenance Window, setup active autonomies 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:

```
Object Profile
Profile name: TS_SYSAUTO
Created by: sysadm
Created: 2014-09-21 20:46:44.236899
Last updated: 2014-09-21 20:46:44.236899
Last updated by: sysadm
Description: 255 characters maximum
```
Automate Data Collection (RTS History)

- Define and Schedule an RTS Snap Job Profile:

![Job Profile Configuration](image-url)

- Profile name: RTS_DLC_INDEX
- Object profile name: TS_DLC_ZANA
- Description: Object profile containing Index spaces with schema DLC
- Task Name: RTS_SNAPSHOT RTS_DLC_INDEX 2014-09-21 20:35:23.524
  - Task Schedule: Every day.
  - Task Schedule: Every 22nd of the month at 08:00 a.m.
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

<table>
<thead>
<tr>
<th>UTILITY RUN ID</th>
<th>JOB ID</th>
<th>JOB NAME</th>
<th>START TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSNU0001</td>
<td>JOB00119</td>
<td>JAU8018</td>
<td>2014-10-26 07:42:35.656209</td>
</tr>
</tbody>
</table>

Sample entries:

- `DSNU0001` started at 07:42:35.656209
- `JOB00119` with `JAU8018` job name.
After customizing DB2 Automation tool view profiles under Autonomics tab:
Automate Data Analysis (Passive Autonomatics)

- 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

Next: Saturday 2015, May 16, 23:00 PM
- Saturday, 2015, May 23, 23:00 PM
- Saturday, 2015, May 30, 23:00 PM
- Saturday, 2015, June 06, 23:00 PM
- Saturday, 2015, June 13, 23:00 PM

Scheduled Actions

- **Recommend Action**: REORG INDEX
  - **Database Name**: DBAUB701
  - **Resource Type**: IX
  - **TS/IS Name**: IAUB7021
  - **Partition**: 3
  - **Status**: OPEN
  - **Autonomic Type**: 
  - **Priority**: 155
  - **Created on**: 2015-05-10 11:54:40

- **Recommend Action**: REORG INDEX
  - **Database Name**: DBAUB701
  - **Resource Type**: IX
  - **TS/IS Name**: IAUB7021
  - **Partition**: 2
  - **Status**: OPEN
  - **Autonomic Type**: 
  - **Priority**: 122
  - **Created on**: 2015-05-10 11:53:48

- **Recommend Action**: REORG INDEX
  - **Database Name**: DBAUB701
  - **Resource Type**: IX
  - **TS/IS Name**: IAUB7024
  - **Partition**: 0
  - **Status**: OPEN
  - **Autonomic Type**: 
  - **Priority**: 71
  - **Created on**: 2015-05-10 11:54:26

- **Recommend Action**: REORG INDEX
  - **Database Name**: DBAUB701
  - **Resource Type**: IX
  - **TS/IS Name**: IAUB7021
  - **Partition**: 4
  - **Status**: OPEN
  - **Autonomic Type**: 
  - **Priority**: 68
  - **Created on**: 2015-05-10 11:53:58

- **Recommend Action**: REORG INDEX
  - **Database Name**: DBAUB701
  - **Resource Type**: IX
  - **TS/IS Name**: IAUB7021
  - **Partition**: 1
  - **Status**: OPEN
  - **Autonomic Type**: 
  - **Priority**: 32
  - **Created on**: 2015-05-10 11:14:52

Range: 1-5 Total: 8 Selected: 0