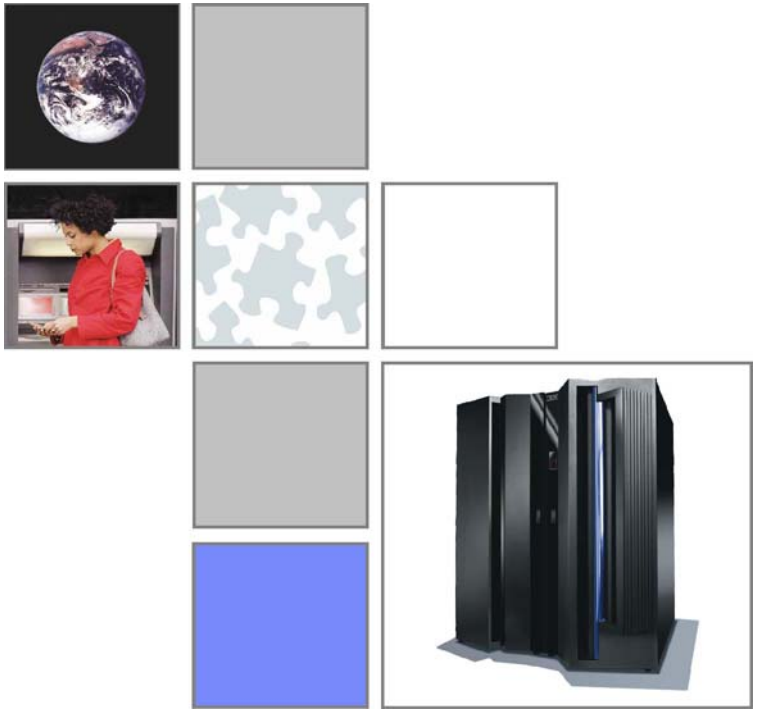
IBM Washington Systems Center

IBM Health Checker for z/OS



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Agenda

- Why Healthchecker
- Some Recent History
- Healthchecker overview and installation
- Health Checker restructure in z/OS 1.7

What is the problem ?

- In depth analysis of outages show:
  - A significant number were avoidable
    - *bad* configurations
      - Single points of failure
  - Non-optimum configurations
    - Stressing key sysplex SW in unique ways
    - Unnecessary performance bottlenecks

What is the problem?

- Parallel Sysplex design allows for elimination of single points of failure, but:
  - Complex configuration requirements
  - Skills are at a premium
  - Speed of recovery operations are critical
- Failures are rare
  - Operations and System Programmers caught off guard
- Sympathy Sickness can occur

What is the problem?

- Best practices are not widely known and implemented|
  - Many sources of best practices materials
  - Multiple product publications, Redbooks, WSC Flashes & White Papers, Wizards, etc.
    - Voluminous, generic
      - Difficult to determine applicability
    - Static, point in time
    - Overwhelming
  - Documentation has limited affect

What is the problem?

- Designers and developers do not know what they do not know
  - Multiple tuning knobs for flexibility
  - Sometimes, default values are best guess
  - Some best practices not known until real customer experiences from multiple production environments
- Need the ability to improve availability characteristics

What is the Objective of the Healthchecker?

- Provide a way to more easily and effectively assist installations to implement best practices
  - Proactive scan and identification of exceptions
- Environment Sniffer
  - Programmatically check various settings on the system
    - In storage checks - not a PARMLIB scan
    - Check against known best practices list
    - Notify when exceptions are found

What is the Objective of the Healthchecker?

- Spread lessons learned from
  - Multiple environments
  - Installations
  - internal experiences

- This all boils down to:
  - ***Outage avoidance***

Proof of Concept

- Developed a prototype that included a set of checks
  - Many checks from Parallel Sysplex Availability Checklist
  - From WSC experience of doing sysplex availability studies
- Run a batch job, get a report
- Added WTO of exceptions based on customer input

Proof of Concept

- Made available via web download
  - Large number of downloads
    - Customer interest shown
- Have learned many things:
  - Need ability to override supplied best practice value
    - But with strict controls
  - Need to expand the scope of components doing checks

Proof of Concept

- Made available via web download
  - Large number of downloads
  - Three updates to prototype
  - Active customer and IBMers defining new requirements
- Available on z/OS web site:
  - http://www.ibm.com/servers/eserver/zseries/zos/downloads/

Existing Health Checker

- Free “as-is” tool that can be downloaded from the Web
  - Upload to OS/390 R10 or z/OS system
  - Run as a batch job
  - View exception messages and reports
  - Make suggested changes manually
- Mostly a **Configuration Checker**
- Not an ***msys* for Operations** replacement
  - No automatic correction of problems
  - No online panel displays

Customers have asked for

- A more formal product
  - With formal support
- Checks from more z/OS components
- Checks from more IBM products
- Checks from ISV products
- Ability to write their own checks

IBM z/OS V1.6 Announcement (204-180)

- IBM Health Checker for z/OS will be a new base function in z/OS 1.7 (FMID HZS7720)
  - Checks delivered separately from the framework, can be added dynamically
  - Checks delivered by elements and components as PTFs
  - User overrides check defaults via HZSPRMxx parmlib updates or MODIFY command
- The Framework and most checks intended to be made available as z/OS web download for z/OS releases V1.4, V1.5, and V1.6
- Initial support for most existing checks with plans for incremental delivery of new checks
- SDSF support for managing checks with CK panel

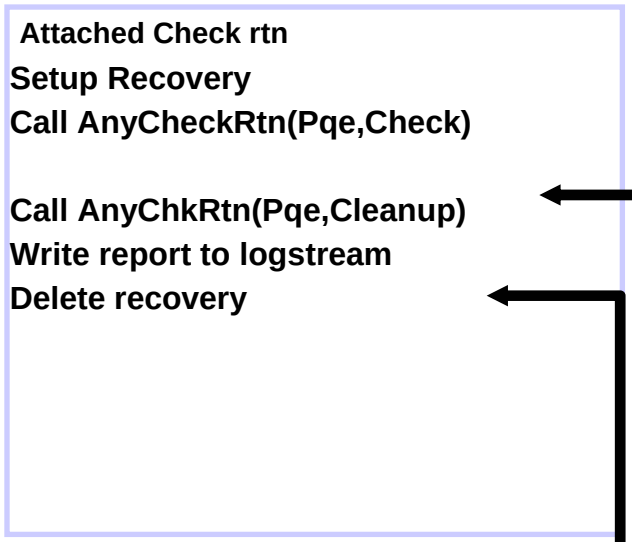
Health Checker Restructure

- Moving from self contained batch job to Started task providing services
  - Allow checks to be added dynamically
    - No previous knowledge of check required by the HC backbone
  - Log results to MVS Logger logstream
  - Provide check management services
  - Long running STC with ability to re-execute checks on interval basis
    - Intervals are unique to each check
    - Interval values from 1 minute to 43 days

New Structure Overview

- Each check has 3 parts
  - The dynamic exit routine that identifies the check to the Healthchecker
  - The check itself
  - A message table to define messages that are issued by the check

Check Runs in Health Checker Subtask



The check is attached by the JOBSTEP TCB for execution

Recovery;
Call AnyChkRtn(Pqe,Cleanup)
Write report to logstream

- **AnyChkRt:**
  - **Function(Null)?**
    - **Return**
  - **Funtion(Init)?**
    - **.....**
  - **Funtion(Delete)?**
    - **.....**
  - **Funtion(Check)?**
    - **EntryCode(AnyChk1)?**
    - **Obtain storage for this iteration of AnyChk1**
    - **Execute**
  - **Funtion(Cleanup)?**
    - **EntryCode(AnyChk1)?**
    - **Release storage for this iteration of AnyChk1**

Checks

- Checks run in the Health Checker address space
- Checks are given a 2K persistent area to save data between check iterations
- 2K Check status area (Current overrides)
- Supervisor, Key 8
- Messages via HZSFMSG service
- Checks are independent of the IBM Health Checker for z/OS component.
  - Check will be shipped by individual component.
    - Expect 3rd party checks to be written
  - SDSF support to modify checks, and view output
    - Expect additional IBM and 3rd party add-ons in the future

Dynamic Exits To Add Checks

- Each dynamic exit routine can either be added via operator command or via an API
- Any dynamic exit routine that is added prior to the start of the Healthchecker, will be invoked when Healthchecker is started
- Healthchecker must be told to run to pick up new checks that are added after Health Checker is started.
- The dynamic exit routine uses the HZSADDCK macro to define one or more checks

Check Structure

- 32 bytes check name and 16 bytes check owner (Company name, and component)
- Entry code (used by the check routine when a single check routine has multiple functions)
- The date the *best practice* values were recommended
- 126 bytes reason that summarizes why the check was written
- The severity of the problem(s) the check is looking for.
- Any default parameter values.
- The default Interval
- The name of the check load module
- The name of the check message table

Check Structure

- Each check is called with a check entry code as defined by HSADDCHK
- Function code:
  - Initialization - Initialization processing (once per life of check)
  - Verify installation parameters
  - Any processing that should be done one for the life of the check
  - Check - Normal check processing
  - Check_cleanup - free any storage obtained during the check.
  - Check_delete - cleanup for any processing done during check initialization

Check Message Table

- Each check has a message table
- Common look and feel
- Structured diagnostic message
- Each message is owned by the check.
- Exception messages contain the WTO text
- Message language based on XML/SGML
- Message source is converted to an assembler file that must be compiled and linked to create the message load module that is included with the check.

Messages

- Checks issue both verbose (‘configuration is good' messages) and exception messages.
- Check output
  - WTOs – exception messages are written as a HSZ (Healthchecker) message number and the component message ID follows HZS msg: **HZS001I IXL002I . . .**
    - Output: All messages are written to the REPORT file (last instance of check)
    - Check history via MVS Logger logstream
    - When an exception message is written, a summary WTO is written to outline the problem

Installation

- Allocate HZSPDATA data set
  - To save checks data between restart
- Set up HZSPRINT utility
  - The Health Checker retains only the check results from the last iteration
    - Kept in a message buffer
    - For historical data define Logger logstream
- Security definitions
  - Users looking at check output require access to resources
    - Multilevel security
- Create HZSPRMxx PARMLIB member
- Copy HZSPROC to PROCLIB

External Interfaces

- Parmlib Support HZSPRMxx
  - Concatenation of members supported
  - Cross Component support
  - User overrides to:
    - Severity, WTO descriptor codes, intervals, active or inactive, categories, parameter values
- Categories
  - Installations can group multiple checks
    - Perform actions against categories
    - One check can be in up to 16 categories
- Operator Interfaces
  - Command interface
    - Display Command
    - Modify Checks
      - Run now, pause, refresh, etc.
  - SDSF CK panel

Operator Commands

- DISPLAY (STATUS/CHECKS/POLICY/DELETED)
- SET/ADD PARMLIB
- LOGGER (ON|OFF)
- ADDNEW
- DELETE target
- ACTTIVATE/DEACTIVATE target
- REFRESH target
- RUN target
- ADDNEW/ADDREPLACE POLICY ….
- UPDATE target update_values
- STOP

SDSF CK Panel

- Display checks, attributes, and status, taking advantage of standard SDSF sort, filter, and arrange support
- Alter check attributes
  - status, interval, severity, category, and WTO descriptor
- Browse check output for the most recent check
- Print check output or sent it to a data set

SDSF: Sample CK Display

```
Display  Filter  View  Print  Options  Help
-------------------------------------------------------------------------------
SDSF HEALTH CHECKER DISPLAY  SYSB                        LINE 10-33 (33)
COMMAND INPUT ===>                                          SCROLL ===> CSR
PREFIX=LOG*  DEST=(ALL)  OWNER=*  SYSNAME=*
NP   NAME                            State              Status             SysN
     CNZ_SYSCONS_ROUTCODE            ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     GRS_CONVERT_RESERVES            ACTIVE(ENABLED)    EXCEPTION-LOW      SYSB
     GRS_EXIT_PERFORMANCE            ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     GRS_MODE                        ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     GRS_SYNCHRES                    ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     RACF_GRS_RNL                    ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     RACF_SENSITIVE_RESOURCES        ACTIVE(ENABLED)    EXCEPTION-HIGH     SYSB
     RSM_AFQ                         ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     RSM_HVSHARE                     ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     RSM_MAXCADS                     ACTIVE(ENABLED)    SUCCESSFUL         SYSB
     RSM_MEMLIMIT                    ACTIVE(ENABLED)    SUCCESSFUL         SYSB
```

SDSF: Sample CK Display

```
RSM_REAL                      20041006 07/15/2005 14:36:06  ONETIME ****
RSM_RSU                       20041006 07/15/2005 14:36:06  ONETIME ****
SDUMP_AUTO_ALLOCATION         20050118 07/15/2005 14:36:06  ONETIME ****
SDUMP_AVAILABLE               20050118 07/15/2005 14:36:06  ONETIME ****
USS_AUTOMOUNT_DELAY           20040808 07/28/2005 14:36:05    24:00 07/2
USS_FILESYS_CONFIG            20040217 07/28/2005 14:36:16    24:00 07/2
USS_MAXSOCKETS_MAXFILEPROC    20040808 07/28/2005 14:36:05    24:00 07/2
VSM_CSA_CHANGE                20040405 07/15/2005 14:36:06  ONETIME ****
VSM_CSA_LIMIT                 20040405 07/15/2005 14:36:06  ONETIME ****
VSM_CSA_THRESHOLD             20040405 07/29/2005 11:17:02     0:05 07/2
VSM_PVT_LIMIT                 20040405 07/15/2005 14:36:06  ONETIME ****
VSM_SQA_LIMIT                 20040405 07/15/2005 14:36:06  ONETIME ****
VSM_SQA_THRESHOLD             20040910 07/29/2005 11:21:14     0:15 07/2
```

SDSF: Sample CK Display, Browse a Check

```
IGVH107I The size of ECSA has not changed since the last IPL.

IGVH107I The size of EPVT has not changed since the last IPL.

IGVH500I
VSM_CSA_CHANGE
Virtual Storage Configuration Report
              Current IPL TOD:              Compare IPL TOD:
              07/15/2005 14:35:00.1468      06/30/2005 15:42:42.6894
              ------------------------      ------------------------
DATE          07/15/2005                    06/30/2005
TIME          14:35:00                      15:42:42
LOADxx        Z6                            Z6
IEANUC0x      1                             1
CSA()         Z6 (3200K,320M)               Z6 (3200K,320M)
SQA()         Z6 (6,256)                    Z6 (6,256)
FIX()         00 00                         00 00
LPA()         Z6 (Z6)                       Z6 (Z6)
MLPA()        Z6 Z6                         Z6 Z6
MLPA()        Z6 Z6                         Z6 Z6

Storage                    Current    Compare
Location    Change         Size       size          Start       End

PVT         0000000000    0000A00000 0000A00000    0000000000   0000A00000
                          (10M)      (10M)
CSA         0000000000    0000343000 0000343000    0000A00000   0000D43000
                          (3340K)    (3340K)
```

Simplifying operations – New z/OS management console* (Planned for 4Q 2005)

Value

- Simplify z/OS management for the new generation of IT professionals
- Automating, eliminating, and streamlining tasks
- Easily upgradeable to OMEGAMON® solutions

Planned Capabilities

- Task-oriented approach with GUI front end
- z/OS Health Checker data plus Tivoli Monitoring Services base capabilities
  - Expert Advice
  - Take Action
- Configuration status metrics for z/OS resources displayed using Tivoli Enterprise Portal
  - Improved ease-of-use of z/OS management
  - Value-add upgrades to comprehensive Tivoli Monitoring Services products

New product planned to be available in 4Q 2005 for no charge to z/OS customers

* All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

IBM Health Checker for z/OS Documentation

- User's Guide (SA22-7994-00)
- Will ship a sample check
  - Including sample message table