

# How Healthy Is Your ?

**Presented by**

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# What is he talking about?



- ▶ In this session we discuss
  - ▶ How you can check if your system is working well
  - ▶ How you can reduce the risk of unexpected downtime
  - ▶ How you can improve the performance of your server
  - ▶ How you can reduce the cost of running your server
  - ▶ How you can more easily monitor your system
  - ▶ How you can look back in time to find the cause of problems
- ▶ **All without paying any extra for third party tools or services**

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Photographs shown are of engineering prototypes. Changes may be incorporated in production models.

# This is mine

- ▶ I tried ever so hard to get it right
- ▶ *“Opinions are like buttocks - Everyone has them!”*
  - ▶ You are hearing mine, not the i-UGs, not Common’s, not IBM’s
  - ▶ My opinions are not necessarily right - But then again neither are yours

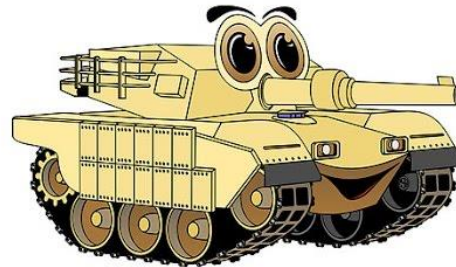


- ▶ *All material presented is done so on an “as is” basis and is mostly correct at the time of presenting them, I hope. This is only intended as a guide to get you going.*

# Is IBM i bulletproof ?



=



Yes - but it still needs a little TLC

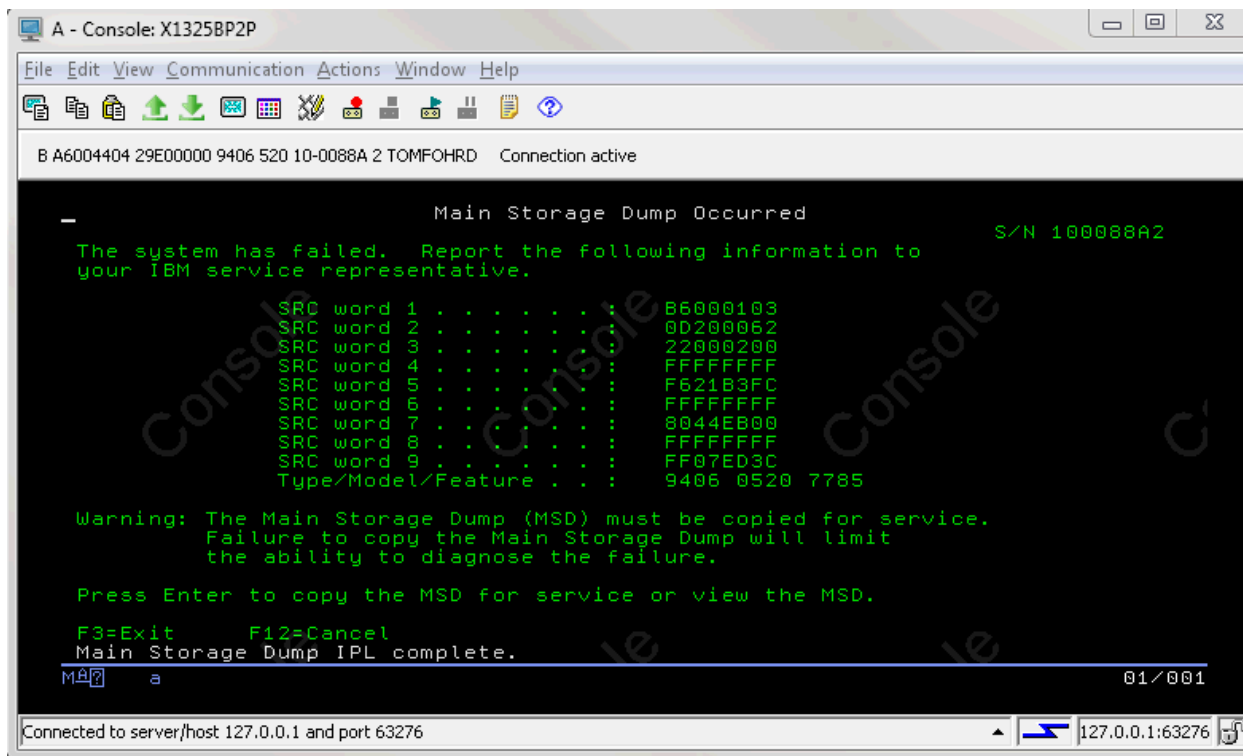
There is a time & place for everything

Example: If you are boarding a plane,  
what is the last thing you want to see?



# There is a time & place for everything

Example: If you are running your Year End,  
what is the last thing you want to see?



A screenshot of an IBM console window titled "A - Console: X1325BP2P". The window displays a "Main Storage Dump Occurred" message. The text is as follows:

```

Main Storage Dump Occurred
S/N 100088A2
The system has failed. Report the following information to
your IBM service representative.

SRC word 1 . . . . . : B6000103
SRC word 2 . . . . . : 0D200062
SRC word 3 . . . . . : 22000200
SRC word 4 . . . . . : FFFFFFFF
SRC word 5 . . . . . : F621B3FC
SRC word 6 . . . . . : FFFFFFFF
SRC word 7 . . . . . : 8044EB00
SRC word 8 . . . . . : FFFFFFFF
SRC word 9 . . . . . : FF07ED3C
Type/Model/Feature . . : 9406 0520 7785

Warning: The Main Storage Dump (MSD) must be copied for service.
Failure to copy the Main Storage Dump will limit
the ability to diagnose the failure.

Press Enter to copy the MSD for service or view the MSD.
F3=Exit      F12=Cancel
Main Storage Dump IPL complete.
MA a
01/001

```

The window also shows a status bar at the bottom indicating "Connected to server/host 127.0.0.1 and port 63276".

# TLC - Tender Loving Care for



## Good News:

It is not difficult

It does not take long

You can do it yourself for free!

**Make a little time for your IBM i**

# What is the number 1 cause of downtime?

## Cabling - Both Network and Power

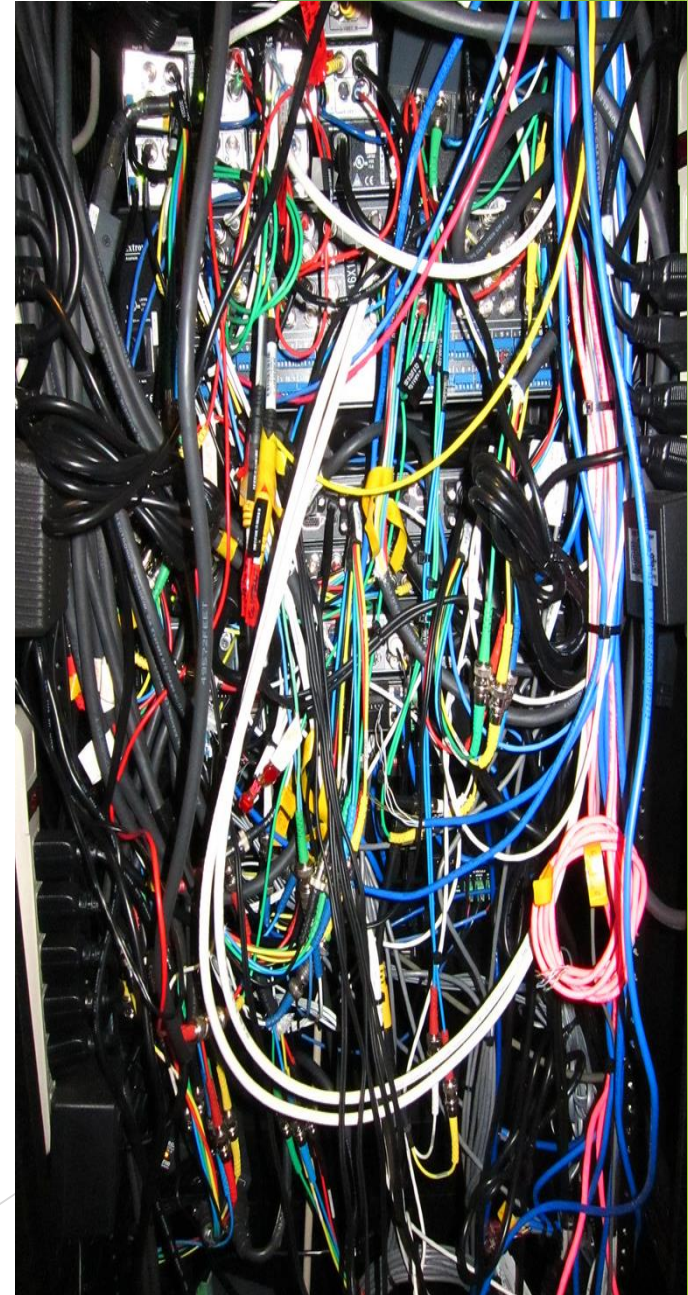
Keep it tidy

Keep it off the floor

You need access to the server

You need to be able to trace the cable

Your messy cabling may work today  
But it is a disaster waiting to happen



# Minimise Electrical Problems

No Electrical Power = No IBM



Your server has dual power supplies

Connect these to alternate power feeds

If in a data centre then use alternate PDUs

If on premise use UPS and utility mains

If you have a UPS make sure you test it

Does the battery last as long as you think?

Typical battery life halves over 2 years

Does the serial cable signal a shut down?

# Minimise Network Problems

No Network = No IBM



Since POWER5 all servers have dual ethernet

Since IBM i 5.4 we have had virtual ethernet

Since IBM i 7.1 we have had aggregated ethernet

Yet so many IBM i Servers still use a single NIC port

Both Virtual and Aggregated Ethernet are Free

Either can protect you from single point of failure in your ethernet cables or switches

# Environment

Physical Environment is important

Operating temperature range 5 - 35°C

Recommended temperature range 18 - 27°C

Protip: Check your thermostats

You might be paying too much for Air conditioning

You can run your servers 22 - 25°C

# Environment

## Other Physical Factors

Humidity - Computers hate humidity

Dust - Dust is the enemy, your server is a hoover!

Protip:

You best way of cleaning is an AirDuster



# Use the Dashboard



If it's GREEN your system is clean

Tip: Use MSGW in you Jobs filter

# Use the Dashboard

## Dashboard

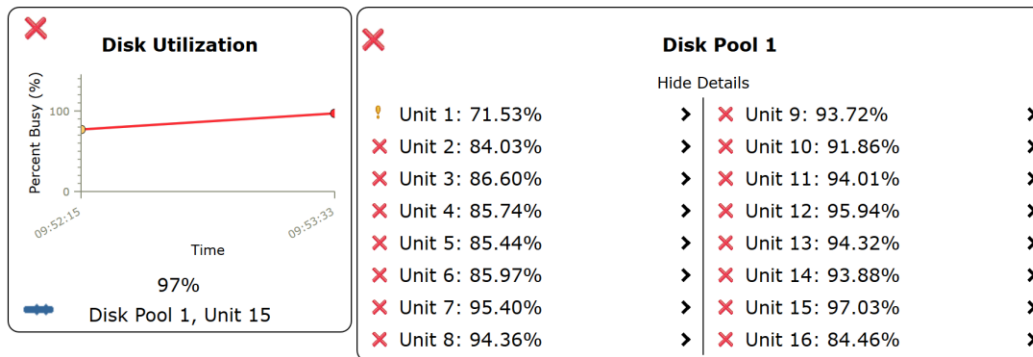


If it is RED then you need to investigate

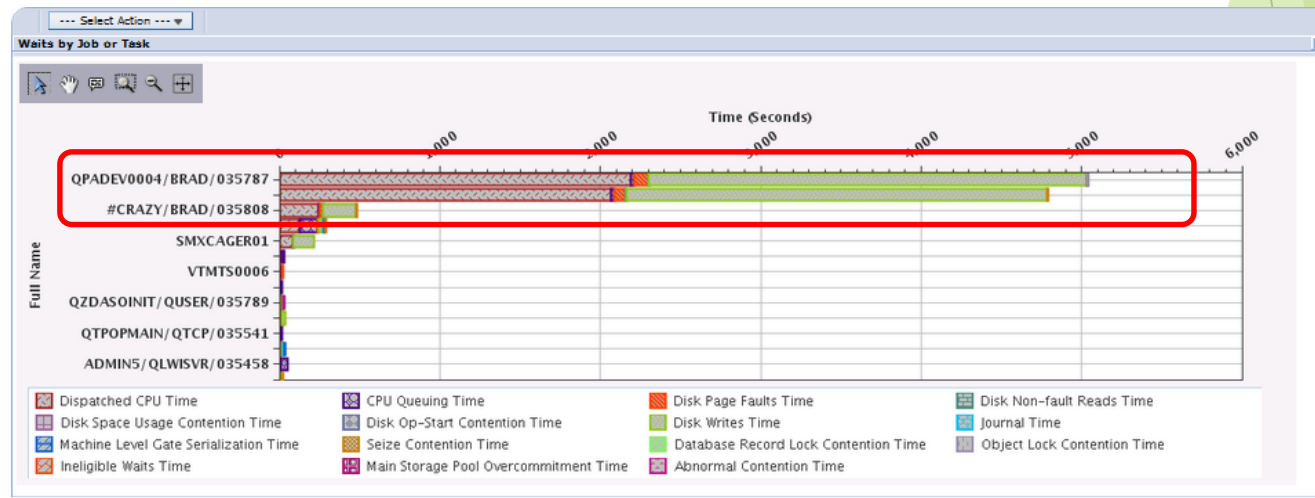
# High Disk Usage Warning

► Click on the Dashboard tile for more detail

## Disk Utilization



► Switch to PDI view in iNav for job detail

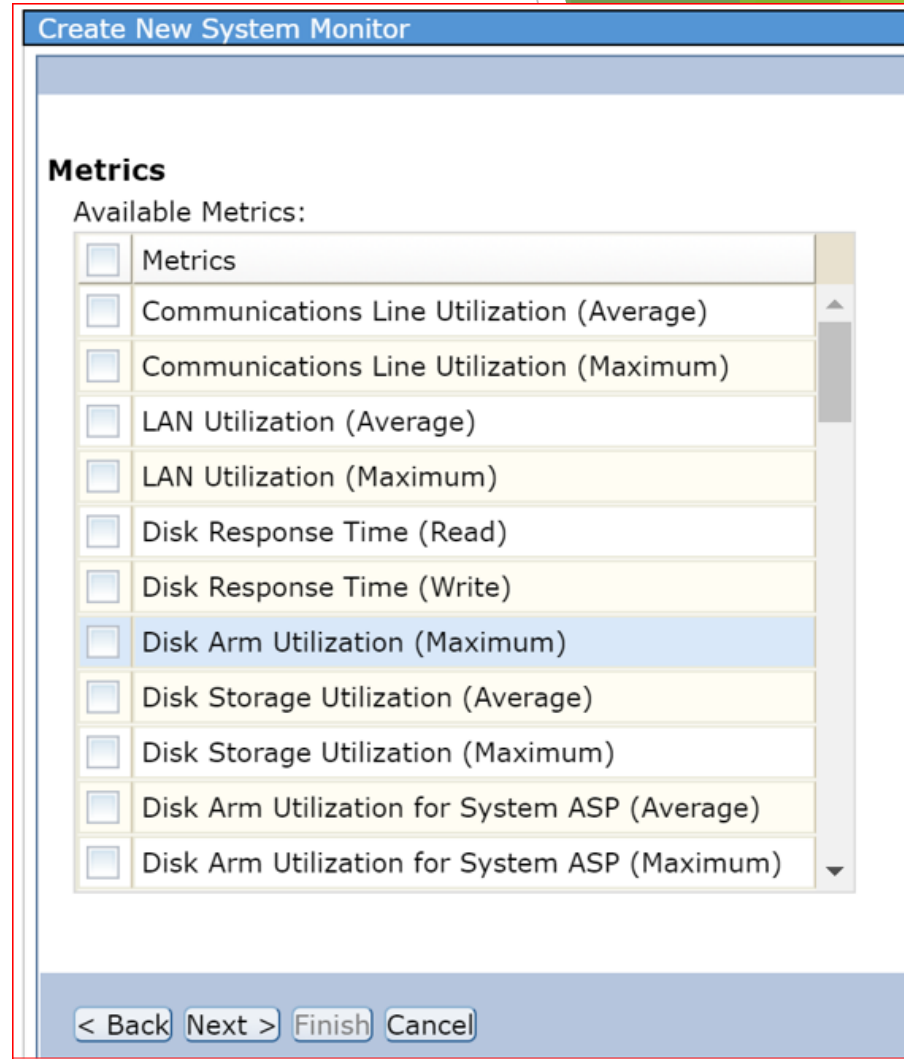


# Use System Monitors

Wide variety of monitors available

Monitors can trigger programs

You can set thresholds for triggers



The screenshot shows a window titled "Create New System Monitor". Inside, under the "Metrics" section, there is a list of "Available Metrics". Each metric has a checkbox to its left. The "Disk Arm Utilization (Maximum)" metric is currently selected, indicated by a blue highlight. At the bottom of the window, there are four buttons: "< Back", "Next >", "Finish", and "Cancel".

| Metrics                             |   |
|-------------------------------------|---|
| <input type="checkbox"/>            | Metrics                                       |
| <input type="checkbox"/>            | Communications Line Utilization (Average)     |
| <input type="checkbox"/>            | Communications Line Utilization (Maximum)     |
| <input type="checkbox"/>            | LAN Utilization (Average)                     |
| <input type="checkbox"/>            | LAN Utilization (Maximum)                     |
| <input type="checkbox"/>            | Disk Response Time (Read)                     |
| <input type="checkbox"/>            | Disk Response Time (Write)                    |
| <input checked="" type="checkbox"/> | Disk Arm Utilization (Maximum)                |
| <input type="checkbox"/>            | Disk Storage Utilization (Average)            |
| <input type="checkbox"/>            | Disk Storage Utilization (Maximum)            |
| <input type="checkbox"/>            | Disk Arm Utilization for System ASP (Average) |
| <input type="checkbox"/>            | Disk Arm Utilization for System ASP (Maximum) |

< Back   Next >   Finish   Cancel

# Setup a Monitor for Disk Busy Usage > 15%

The screenshot illustrates the process of creating a new system monitor in Nagios XI. It shows three overlapping windows:

- Create New System Monitor (General):** The 'Name' field is set to 'DiskBusy15' and the 'Description' is 'Disk Busy GT 15% 2 mins'.
- Configure Metric:** The 'Metric' is 'Disk Arm Utilization (Average)' with a 'Collection Interval' of 60 seconds. The 'Threshold1' is enabled.
- System Monitors - 192.168.100.17:** A table listing the newly created monitor. A context menu is open over the 'DiskBusy15' entry, showing options like 'Start', 'Stop', 'Delete', and 'Properties'.

**Create New System Monitor - General**

Name: DiskBusy15  
Description: Disk Busy GT 15% 2 mins

**Configure Metric**

Metric: Disk Arm Utilization (Average)  
Collection Interval: 60 Seconds  
Threshold1: ☒ Enable Threshold

**System Monitors - 192.168.100.17**

| Monitor    | Status  | Metrics                 | Description          | Creation Date/Time  | Status Changed      | Owner   |
|------------|---------|-------------------------|----------------------|---------------------|---------------------|---------|
| DiskBusy15 | Stopped | Disk Arm Utilization (A | Disk Busy GT 15% 2 r | 2017-11-14 08:55:39 | 2017-11-14 08:55:39 | QSECOFR |

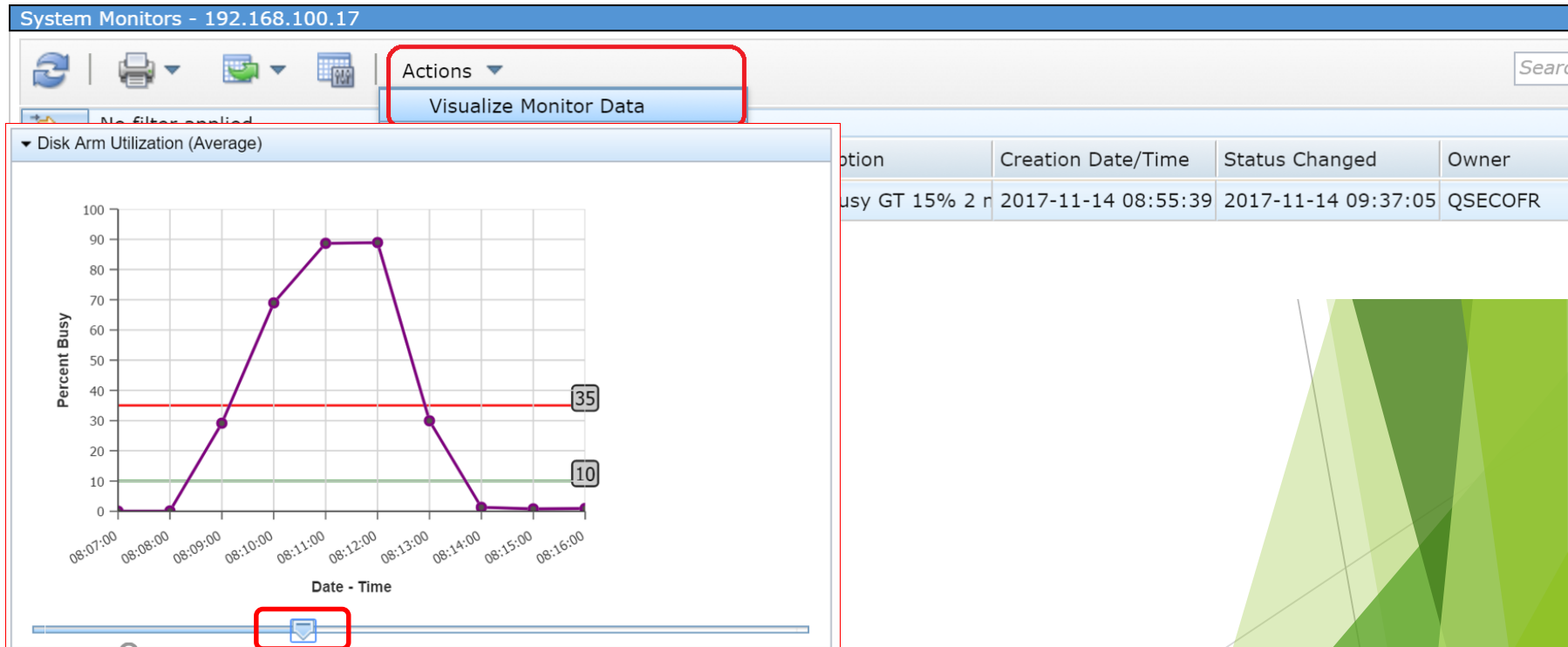
Context Menu Options:

- Visualize Monitor Data
- Investigate Monitor Data
- Event Log
- Start
- Stop
- New Based On
- Delete
- Properties

# Use Visualise Monitor Data

Select System Monitors

Right click DiskBusy35, select Visualise Monitor Data



Scroll Back Through time with slider at the bottom

Protip: You can jump to PDI for problem job details

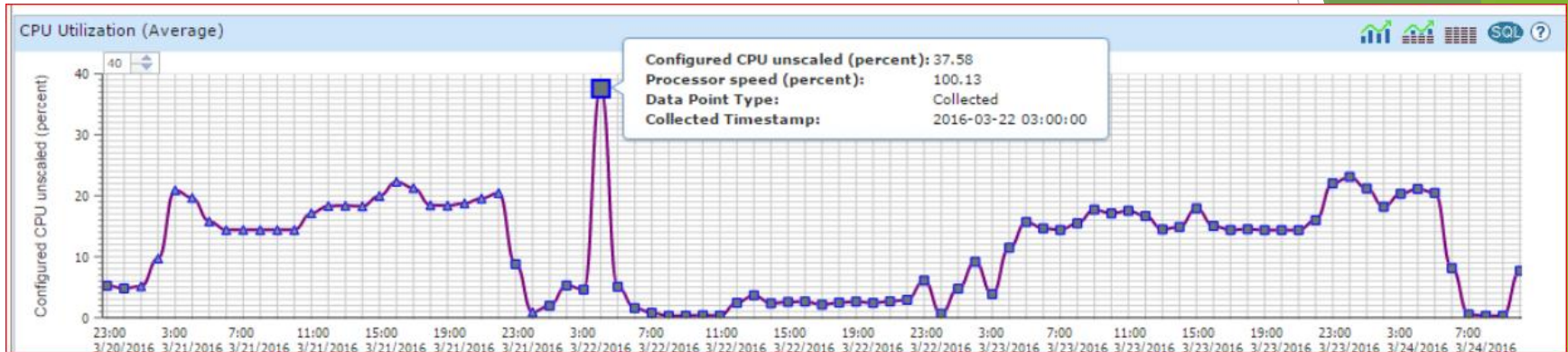
# Establishing a baseline



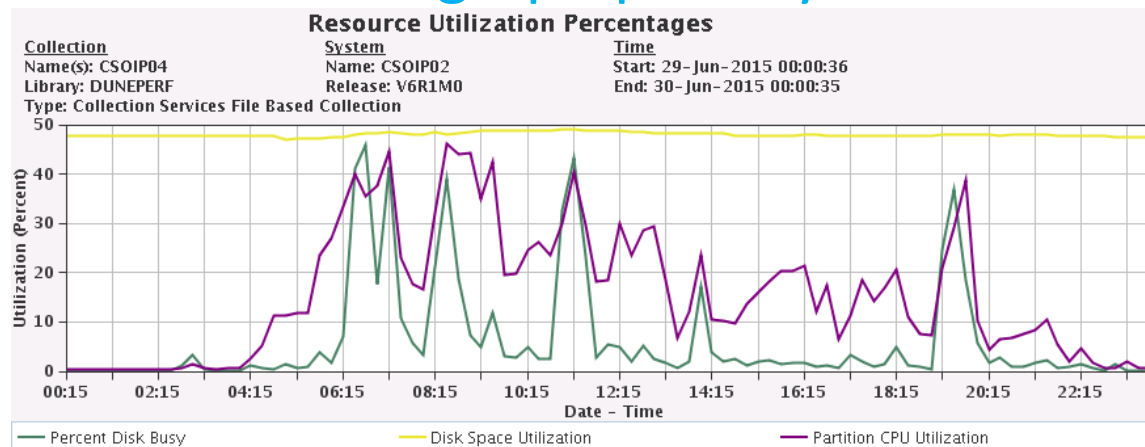
- ▶ Best Practise is to know you system
  - ▶ Record how a system looks when working well
  - ▶ This gives you a base line to compare against
  - ▶ It helps to illuminate false positives
  - ▶ And it nearly always shows you something you were not expecting!
- ▶ **Protip: Check out 5733ARE – now its free!**

# Establishing a baseline

If you have 7.3 then use the Graph History  
This shows rolling history for 30 days

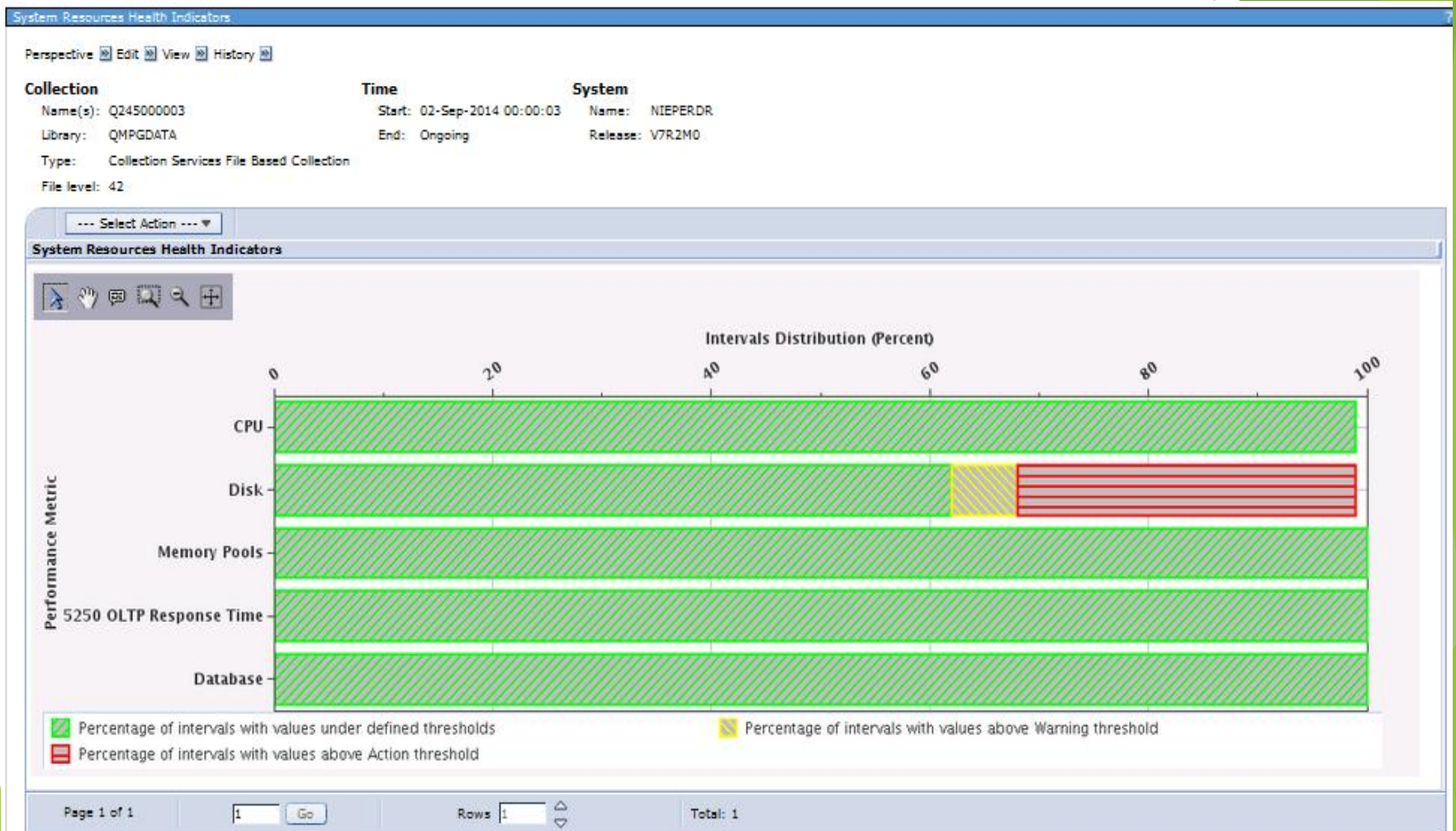


If you are running 7.1 or newer then use PDI  
This shows one graph per day



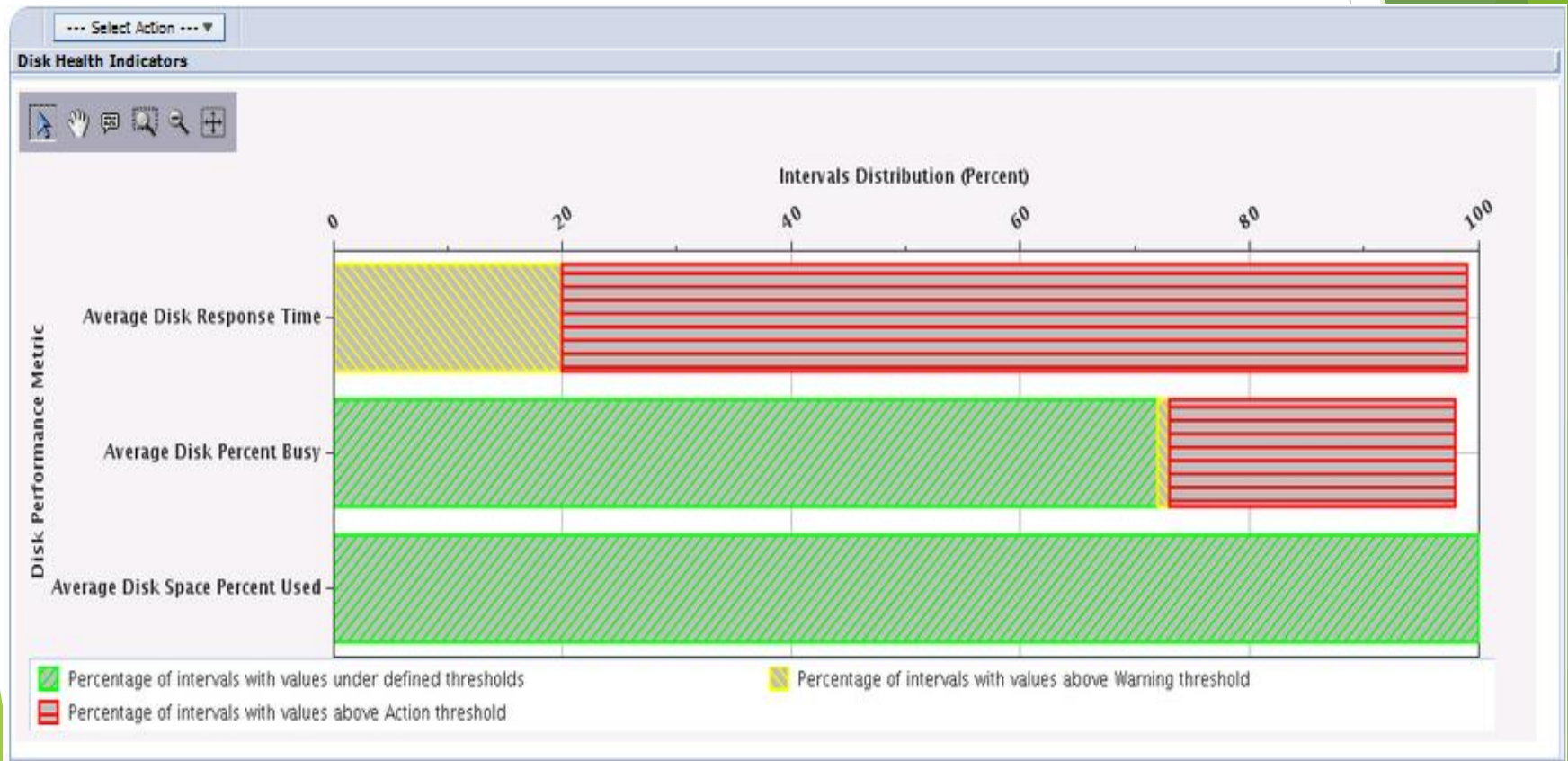
# Health Indicators

Regularly check your health indicator graphs  
They will show you when issues start to appear



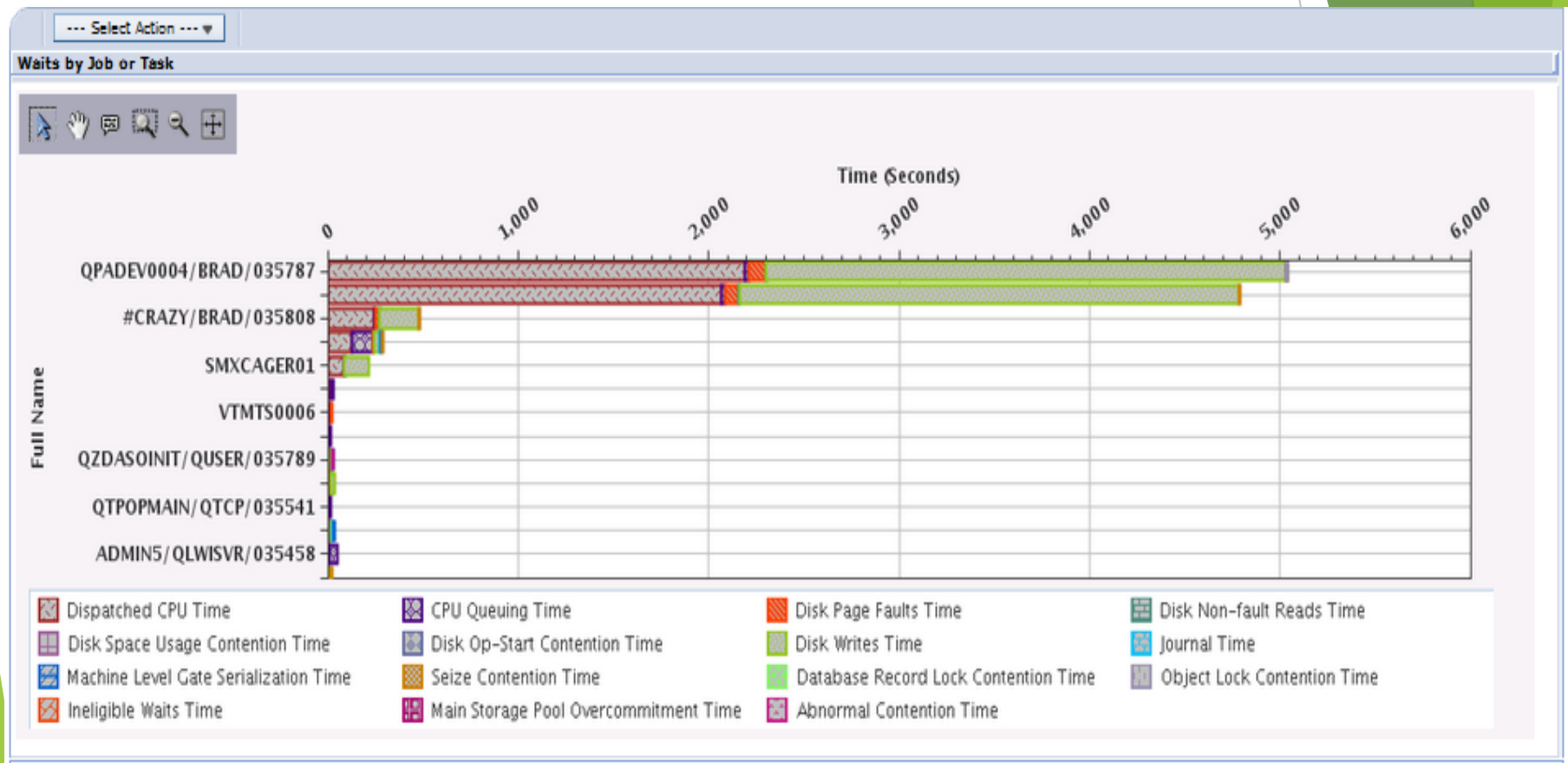
# Health Indicators

- ▶ If the top level Health Indicator shows a problem
- ▶ Then Drill down to next level



# Enhanced Performance Tools

- Keep drilling down until you find the problem job or jobs. Then you can work out a solution



# Cache Batteries



- ▶ On average they make your disk writes 10x faster
- ▶ But like all batteries, they will eventually fail
- ▶ Your system will warn you before this occurs
- ▶ Change your batteries before they fail
- ▶ If you don't, your data is safe but your disk is 10x slower
- ▶ Check your cache batteries with **CALL QSMBTTCC**

```
Display Spooled File
File . . . . . : QPCSMPT      Page/Line  1/18
Control . . . . :              Columns   1 - 78
Find . . . . . :

*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
RESOURCE SERIAL      TYPE      FRAME    CARD    MAINTAINABLE  SAFELY
NAME      NUMBER      MODEL    ID      POSITION  BATTERY PACK  REPLACED
DC01      1C-7014093    2780-001 3C02    C02      YES          NO
DC02      1C-7032002    5708-001 3C02    C03      YES          NO
DC06      0C-5331149    2780-001 3C01    C02      YES          NO
DC07      0C-5311129    5708-001 3C01    C03      YES          NO
RUNNING MACRO: BATTERYINFO      -LIST -WARN
***LIST OF ALL RESOURCES THAT HAVE CACHE
    WITH THE ESTIMATED TIME TO WARNING IN DAYS***

RESOURCE SERIAL      TYPE      FRAME    CARD    EST. TIME  EST. TIME
NAME      NUMBER      MODEL    ID      POSITION  TO WARNING TO ERROR
                                (IN DAYS) (IN DAYS)
DC01      1C-7014093    2780-001 3C02    C02      942       1033
DC02      1C-7032002    5708-001 3C02    C03      942       1033
DC06      0C-5331149    2780-001 3C01    C02      942       1033
DC07      0C-5311129    5708-001 3C01    C03      2         8.0
More...
```

F3=Exit F12=Cancel F19=Left F20=Right F24=More keys

# Cache Batteries

- **ProTip:**  
Before you do your concurrent cache battery swap  
Use CHGSRVA to limit who receives the error message

```
Change Service Attributes (CHGSRVA)

Type choices, press Enter.

Critical messages to user . . . *SYSOPR      Name, *SAME, *SYSOPR.
                                *SECOFR
                                *SECADM
                                *PGMR
+ for more values               *USER
```

# Use Expert Cache

- ▶ This operating system function will use your systems intelligence to work out what data to page in.
- ▶ This is great for systems with plenty of spare CPU
- ▶ This is ideal for read intensive processes
- ▶ It is free and can be turned on or off in real time
- ▶ WRKSYSSTS then F11 (Advanced Assistance Level)

```
% CPU used . . . . . : .3      System ASP . . . . . : 1702 G
Elapsed time . . . . . : 00:00:01 % system ASP used . . . . . : 57.1487
Jobs in system . . . . . : 1298   Total aux stg . . . . . : 1702 G
% perm addresses . . . . . : .007  Current temporary used . . : 10254 M
% temp addresses . . . . . : .248  Peak temporary used . . . : 17109 M
```

| Sys Pool | Pool Size M     | Reserved Size M | Max Act     | Pool      | Subsystem | Library |
|----------|-----------------|-----------------|-------------|-----------|-----------|---------|
| 1        | <u>2807.51</u>  | 1448.30         | +++++       | *MACHINE  |           |         |
| 2        | <u>51874.10</u> | 4.72            | <u>760</u>  | *BASE     |           |         |
| 3        | <u>6143.98</u>  | .00             | <u>1536</u> | *INTERACT |           |         |
| 4        | <u>614.39</u>   | .00             | <u>15</u>   | *SPOOL    |           |         |

| Paging Option |
|---------------|
| <u>*FIXED</u> |
| <u>*CALC</u>  |
| <u>*CALC</u>  |
| <u>*CALC</u>  |

# Check for Damaged Objects

- ▶ Often these lie hidden on your system
- ▶ They tend to appear on infrequently run processes  
Especially Go Save 21, or Application Upgrades
- ▶ You can check for them using the free ARE disk checker
- ▶ Start from QSHELL command line (STRQSH)  
`/Q/IBM/ProdData/OS/OSGi/templates/bin/areVerify.sh -storage diskUnits=*ALL`



```
QSH Command Entry

[21:00] Storage dump complete. 3m 39s
[21:00] Verifying storage...
[21:00] Querying total segment count...483124
[21:00] Query segments...
[21:00] Processing...
[21:02] 18% (90000/483124). Error=0. Time left=8m 14s
[21:08] Task generator finish
[21:08] 100% (483124/483124). Error=0
[21:08] No storage error found.
[21:08] Storage verification complete. 8m 10s
[21:08] Completion date = Tue Aug 23 21:08:19 UTC 2016
[21:08] Total time = 11m 51s
[21:08] Complete.
$

===>

F3=Exit  F6=Print  F9=Retrieve  F12=Disconnect
F13=Clear F17=Top   F18=Bottom  F21=CL command entry
```

- ▶ Protip: This process is disk intensive, do not run at busy times

# Check for Network Issues

- ▶ Often you do not realise you have them
- ▶ They make your system slower / intermittently fail
- ▶ Typical example, your http admin server is slow
- ▶ You can check for them using the free ARE disk checker
- ▶ Start from QSHELL command line (STRQSH)

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

QSH Command Entry

```
Running plugin Network Verifier

Running plugin Network Configuration Checker

Running plugin Product Verifier
Running plugin Network Configuration Checker
Info: The FQDN is not the first entry for the associated IP address

Network verification complete
Running plugin Product Verifier
> Total number of product items checked: 1

Summary report written to //-----
Detailed report written to //Administration Runtime Expert completed with:
$
Plugins run: 4
Items checked: 1
Error: 1
Warning: 0
Info: 1

==> _
```

**Protip: If your Navigator for i runs slowly, run this tool!**

# Keep your clocks in sync

- ▶ Log files become more useful
- ▶ Communication between systems is easier
- ▶ Remove problems with time based authentication
- ▶ It's free and easy to setup

```
Change SNTP Attributes (CHGNTPA)

Type choices, press Enter.

Remote system . . . . . '192.168.100.152'
                        + for more values 'uk.ntp.pool.org'

Client autostart . . . . . *YES_          *SAME, *NO, *YES
Client poll interval . . . . . 60          1-1440 minutes, *SAME
Client minimum adjustment . . . . . 20     0-300000 milliseconds...
Client maximum adjustment . . . . . 20     1-120 minutes, *SAME
Client adjustment threshold . . . . . *MAXADJ 1-7200 seconds, *SAME, *MAXADJ
Client activity log . . . . . *CHANGE      *SAME, *NONE, *CHANGE, *POLL
Server autostart . . . . . *NO            *SAME, *NO, *YES
Server activity log . . . . . *NONE        *SAME, *NONE, *ALL, *ERROR
Synchronization required . . . . . *NO     *SAME, *NO, *YES
```

**Protip: You can use your Windows Domain Controller as remote NTPS**

# Automate Daylight Saving Adjustment

► Let your system change the clock for daylight saving

The screenshot displays the IBM i Navigator for i interface, showing the configuration of Daylight Saving Time. The interface is divided into several panels:

- Left Panel (Navigation):** Shows the 'Time Management' section under 'Configuration and Service'. The 'Time Zones' list includes 'Q000GMT2 - Localhost', which is highlighted with a red box.
- Top Panel (Current time):** Shows the 'Current time' section with fields for 'Identifier' and 'Name', both highlighted with red boxes.
- Right Panel (Edit Time Zone):** Shows the 'Edit Time Zone Q000GMT2 - Localhost' dialog box. The 'General' tab is selected, and the 'Enable Daylight Saving Time' checkbox is checked and highlighted with a red box. Below this, the 'Daylight Saving Time' section is visible, including fields for 'Use system-generated name', 'Use name specified in message' (selected), 'Message ID' (CPX0912), 'Full name' (British Summer Time), and 'Abbreviated name' (BST). The 'Start' and 'End' sections are also visible, with fields for Month, Day, Occurrence of day in month, and Time. The 'Daylight Saving Time shift (0-120)' field is set to 60 minutes and is highlighted with a red box.
- Bottom Panel:** Shows the 'OK' and 'Cancel' buttons, with the 'OK' button highlighted with a red box.

# Check number of jobs in system

- ▶ Having too many jobs can slow your system down
- ▶ Record the normal level in use, track changes
- ▶ As the number increases it can slow your system
- ▶ If the number gets too high it can stop your system
- ▶ Step 1 – Check number of jobs in job tables DSPJOBTL
- ▶ Step 2 – Make sure QTOTJOB is more than normal level
- ▶ Step 3 – Set QADLTOTJ to be at least 10% of QTOTJOB

```
Permanent job structures:
Initial . . . . . : 5000
Additional . . . . : 500
Available . . . . . : 2523
Total . . . . . : 9000
Maximum . . . . . : 163520
```

```
Temporary job structures:
Initial . . . . . : 200
Additional . . . . : 50
Available . . . . . : 41
Storage used . . . : 64.71 M
```

| Table | Size    | Total | Available | In-use | Other |
|-------|---------|-------|-----------|--------|-------|
| 1     | 9245440 | 9000  | 2523      | 6476   | 1     |

# Remove old Spool files

- ▶ This is usually the most effective way of reducing the number of jobs in a system
- ▶ Use WRKOUTQ / CLROUTQ for Bulk removal
- ▶ Download Free DLTOLDSPLF tool for targeted removal

```
DELETE OLD SPOOLED FILES (DLTOLDSPLF)

Type choices, press Enter.

User Profile Name: . . . . . > QSECOFR      Name, *ALL
Output Queue: . . . . . > *ALL             Name, *ALL
Library Name: . . . . .                      Name, *LIBL, *CURLIB...
Last Deletion Date: . . . . . > 300416      Date
```

▶ **ProTip: Free Download from link below**

**<http://www-01.ibm.com/support/docview.wss?uid=nas8N1019285>**

# General Tips for removing Crud

- ▶ Check QGPL for Save Files
- ▶ Check /tmp for temporary objects
- ▶ Check the number of Audit Journal Receivers you have
- ▶ Look for obvious duplicate libraries e.g. SBLIB & SBLIB1
- ▶ Check for old Image Catalogues (WRKIMGCLG)
- ▶ Permanently Apply PTFs (APYPTF \*ALL \*PERM)
- ▶ Check for old Network Storage Space (WRKNWSSTG)

| Name       | Server   | Seq | Link Type | Access  |
|------------|----------|-----|-----------|---------|
| GBLVTEST00 |          |     |           |         |
| GBLVTEST01 | GBLVTEST | 2   | *DYN      | *UPDATE |
| GBLVTEST02 | GBLVTEST | 3   | *DYN      | *UPDATE |
| GBLVTEST03 | GBLVTEST | 4   | *DYN      | *UPDATE |
| GBLVTEST04 | GBLVTEST | 5   | *DYN      | *UPDATE |
| GBLVTEST05 | GBLVTEST | 6   | *DYN      | *UPDATE |

# Tidy up your disks

- ▶ Remove unwanted / obsolete or duplicate objects
- ▶ Use RTVDSKINF / PRTDSKINF for Library Objects

```
Print Disk Information (PRTDSKINF)

Type choices, press Enter.

Type of report . . . . . > *LIB          *LIB, *FLR, *OWN, *OBJ, *SYS
ASP device . . . . .      *SYSBAS       Name, *SYSBAS
Libraries . . . . .      *ALL           Name, generic*, *ALL
Objects . . . . .        *NONE          Name, generic*, *ALL, *NONE
Object types . . . . .   *ALL           *ALL, *ALRTBL, *AUTL...
                               + for more values
Smallest size . . . . .   100000        Size in 1000 bytes
Sort by . . . . .        *SIZE         *SIZE, *OWNER, *LSTCHG...
```

```
Display Spooled File

File . . . . . : QPEZDISK          Page/Line  4/1
Control . . . . : +1              Columns    1 - 78
Find . . . . . :
*...+...1...+...2...+...3...+...4...+...5...+...6...+...7...+...
Disk Space Report
```

| 5770SS1 V7R2M0 140418 |          |           |                    | Library Information |          |
|-----------------------|----------|-----------|--------------------|---------------------|----------|
| Library               | Owner    | % of Disk | Size in 1000 bytes | Last Change         | Last Use |
| CHORUSEADB            | QPGMR    | 23.30     | 396780720.1        | 10/11/17            | 11/11/17 |
| CHORUSETDB            | QPGMR    | 5.86      | 99720958.0         | 21/04/17            | 27/06/17 |
| CHORUSSVF             | QPGMR    | 5.41      | 92082135.0         | 10/11/17            |          |
| CHGDG#KFF             | QPGMR    | 4.15      | 70659203.1         | 10/11/17            | 11/11/17 |
| CHGDG#TEST            | QPGMR    | 3.22      | 54865272.8         | 16/05/17            | 27/06/17 |
| CHGDG#TOLD            | QPGMR    | 2.58      | 43875450.9         | 19/11/16            |          |
| CHXAP                 | QPGMR    | 2.58      | 43847073.8         | 10/11/17            | 11/11/17 |
| #MMXJRN@R             | KINGSLEY | 1.04      | 17680969.7         | 12/11/17            | 11/11/17 |
| BGTEMP                | QPGMR    | .47       | 8014577.7          | 19/11/16            |          |
| CHSKFFDTF             | QPGMR    | .42       | 7094497.3          | 01/11/17            | 11/11/17 |
| MIMIX                 | MIMIXOWN | .39       | 6646358.0          | 12/11/17            | 12/11/17 |

# Tidy up your IFS

RTVDIRINF / PRTDIRINF are useful if you know where to look

► **ProTip Try QRSRV tool if you don't know where to start**

CALL QRSRV PARM("METRICS" '/' "EPFS")

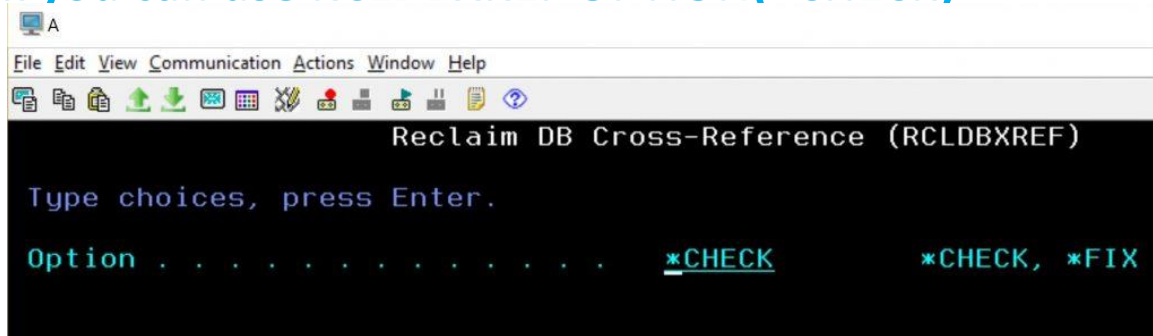
**Analyse the Entire IFS with a single command**

**Output is a spool file but easy to import into DB2 or Excel**

| LINK<br>COUNT                | DFRD<br>LINKS          | DATA<br>SIZE IN<br>K BYTES          | ALLOCATED<br>SIZE IN<br>K BYTES          | DIRECTORY<br>NAME            |        |        |       |        |         |        |       |
|------------------------------|------------------------|-------------------------------------|--|------------------------------|--------|--------|-------|--------|---------|--------|-------|
| 6                            | 0                      | 24                                  | 72                                       | /yajl/working/src_backup/api |        |        |       |        |         |        |       |
| 20                           | 0                      | 159                                 | 320                                      | /yajl/working/src_backup     |        |        |       |        |         |        |       |
| 116                          | 0                      | 34                                  | 984                                      | /yajl/working/test/cases     |        |        |       |        |         |        |       |
| 4                            | 0                      | 90                                  | 112                                      | /yajl/working/test           |        |        |       |        |         |        |       |
| 2                            | 0                      | 4                                   | 16                                       | /yajl/working/verify         |        |        |       |        |         |        |       |
| 17                           | 0                      | 101                                 | 176                                      | /yajl/working                |        |        |       |        |         |        |       |
| 4                            | 0                      | 64                                  | 64                                       | /yajl                        |        |        |       |        |         |        |       |
| 0                            | 0                      | 0                                   | 0  | /v7r3os                      |        |        |       |        |         |        |       |
| 10                           | 0                      | 25797384                            | 25838656                                 | /v7r2ptftr7                  |        |        |       |        |         |        |       |
| 3                            | 0                      | 17456                               | 18784                                    | /v7r2iccptf                  |        |        |       |        |         |        |       |
|                              |                        |                                     |  |                              |        |        |       |        |         |        |       |
| TOTALS FOR /                 |                        |                                     |  |                              |        |        |       |        |         |        |       |
| TOTAL<br>LINK<br>COUNT       | TOTAL<br>DFRD<br>LINKS | TOTAL<br>DATA<br>SIZE IN<br>K BYTES | TOTAL<br>ALLOCATED<br>SIZE IN<br>K BYTES |                              |        |        |       |        |         |        |       |
| 169776                       | 0                      | 68828525                            | 71265220                                 |                              |        |        |       |        |         |        |       |
| *STMF                        | *DIR                   | *SYMLNK                             | *FIFO                                    | *SOCKET                      | *BLKSF | *CHRSF | *DDIR | *DSTMF | *SOMOBJ | *OOPOL | OTHER |
| 148934                       | 16454                  | 4255                                | 0  | 28                           | 0      | 104    | 0     | 0      | 0       | 0      | 0     |
| Total mounted UDFSs:         |                        | 0;                                  | Total Unmounted UDFSs:                   |                              | 0      |        |       |        |         |        |       |
| Objects per Directory - Max: |                        | 1909;                               |  | Average:                     |        | 10     |       |        |         |        |       |
| Max Directory Depth:         |                        | 12;                                 |  | Max Directory Width:         |        | 256    |       |        |         |        |       |

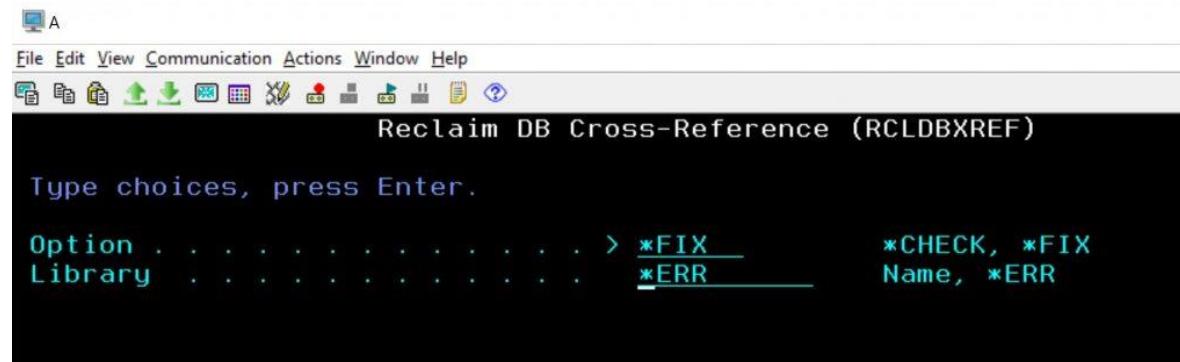
# Check Database Cross Reference

- ▶ IBM i has a cross reference table for long & short table names
- ▶ When this goes wrong, your applications go wrong
- ▶ Using RCLSTG \*DBXREF to detect and fix needs downtime
- ▶ Use the RCLDBXREF command to check whilst in use
- ▶ To check you can use RCLDBXREF OPTION(\*CHECK)



A screenshot of a terminal window titled "Reclaim DB Cross-Reference (RCLDBXREF)". The window has a menu bar with "File", "Edit", "View", "Communication", "Actions", "Window", and "Help". Below the menu bar is a toolbar with various icons. The main text area shows the prompt "Type choices, press Enter." followed by the command "Option . . . . . \*CHECK \*CHECK, \*FIX". The text is displayed in a monospaced font with a black background and white text.

To check you can use RCLDBXREF OPTION(\*CHECK)



A screenshot of a terminal window titled "Reclaim DB Cross-Reference (RCLDBXREF)". The window has a menu bar with "File", "Edit", "View", "Communication", "Actions", "Window", and "Help". Below the menu bar is a toolbar with various icons. The main text area shows the prompt "Type choices, press Enter." followed by the command "Option . . . . . > \*FIX \*CHECK, \*FIX" and "Library . . . . . \*ERR Name, \*ERR". The text is displayed in a monospaced font with a black background and white text.





# What Services are you using?

If you don't use it, disable it

For example:

If you move to sFTP

Why not Disable FTP

| TCP/IP Servers - 192.168.100.17   |                                       |         |  |
|---|---------------------------------------|---------|--|
|     Actions ▾ |                                       |         |  |
| No filter applied   |                                       |         |  |
| <input type="checkbox"/>  | Name                                  | Status  | Description                                    |
| <input type="checkbox"/>  | BootP                                 | Stopped | BootP Server                                   |
| <input type="checkbox"/>  | BootP DHCP Relay Agent                | Stopped | BootP DHCP Relay Agent                         |
| <input type="checkbox"/>  | DDM                                   | Started | DRDA DDM Server TCP/IP                         |
| <input type="checkbox"/>  | DHCP                                  | Stopped | Dynamic Host Configuration Protocol            |
| <input type="checkbox"/>  | DLFM                                  | Stopped | Datalink File Manager                          |
| <input type="checkbox"/>  | EDRSQL                                | Stopped | Extended Dynamic Remote SQL                    |
| <input type="checkbox"/>  | FTP                                   | Started | File Transfer Protocol                         |
| <input type="checkbox"/>  | HTTP Administration                   | Started | HTTP Server                                    |
| <input type="checkbox"/>  | IAS                                   | Stopped | Integrated Web Application Server              |
| <input type="checkbox"/>  | IBM i NetServer                       | Started | IBM i Support for Windows Network Neighborhood |
| <input type="checkbox"/>  | IBM Tivoli Directory Server for IBM i | Started | IBM Tivoli Directory Server for IBM i (LDAP)   |
| <input type="checkbox"/>  | INETD                                 | Stopped | Internet Daemon (INETD) Super Server           |
| <input type="checkbox"/>  | LPD                                   | Started | Line Printer Daemon                            |
| <input type="checkbox"/>  | Management central                    | Started | Management central                             |
| <input type="checkbox"/>  | NFS                                   | Stopped | NFS Server                                     |
| <input type="checkbox"/>  | OMPROUTED                             | Started | OMPROUTED                                      |
| <input type="checkbox"/>  | POP                                   | Stopped | Post Office Protocol                           |
| <input type="checkbox"/>  | QoS                                   | Stopped | QoS Server                                     |
| <input type="checkbox"/>  | RADIUS NAS                            | None    | RADIUS Network Access Server                   |
| <input type="checkbox"/>  | Remote Execution                      | Stopped | RExec  |
| <input type="checkbox"/>  | RouteD                                | Stopped | Route Daemon                                   |
| <input type="checkbox"/>  | RPC                                   | Stopped | Remote procedure call                          |
| <input type="checkbox"/>  | Service and Support Proxy             | Stopped | Service and Support Proxy                      |

# Move from FTP to sFTP

- ▶ Free of charge 5733SC1 Licensed Program
- ▶ Supports End to End Encryption
- ▶ Supports login with PKE (Public Key Encryption)
- ▶ Open Standard supported across platform
- ▶ Can be scripted in CL / RPG just like FTP
- ▶ More secure than FTPS

## Display Installed Licensed Programs

System: KFF810

| Licensed Program | Installed Status | Description                             |
|------------------|------------------|---|
| 5770JV1          | *COMPATIBLE      | Java SE 6 64 bit                        |
| 5770JV1          | *COMPATIBLE      | Java SE 7 32 bit                        |
| 5770JV1          | *COMPATIBLE      | Java SE 7 64 bit                        |
| 5770PT1          | *COMPATIBLE      | IBM Performance Tools for i             |
| 5770PT1          | *COMPATIBLE      | Performance Tools - Manager Feature     |
| 5770PT1          | *COMPATIBLE      | Performance Tools - Job Watcher         |
| 5770QU1          | *COMPATIBLE      | IBM Query for i                         |
| 5733SC1          | *INSTALLED       | IBM Portable Utilities for i            |
| 5733SC1          | *INSTALLED       | OpenSSH, OpenSSL, zlib                  |
| 5770ST1          | *COMPATIBLE      | DB2 Query Mgr and SQL DevKit            |
| 5770TC1          | *COMPATIBLE      | IBM TCP/IP Connectivity Utilities for i |

# Review Users

- ▶ Check for users that have not signed on for a long time
- ▶ Check for users with default passwords
- ▶ Check for users with special authorities
- ▶ Start with the Go SecTools menu

SECTOOLS

Security Tools

Select one of the following:

Work with profiles

1. Analyze default passwords
2. Display active profile list
3. Change active profile list
4. Analyze profile activity
5. Display activation schedule
6. Change activation schedule entry
7. Display expiration schedule
8. Change expiration schedule entry
9. Print profile internals

Selection or command

# Review Users

**Protip: SecTools is a starting point but not a silver bullet solution**

► **For example** - PRTUSRPRF TYPE(\*AUTINFO) SPCAUT(\*ALLOBJ)

| User       | Group    | *ALL | *AUD | SYS | *JOB | *SAV | *SEC | *SER | *SPL | User    |
|------------|----------|------|------|-----|------|------|------|------|------|---------|
| Profile    | Profiles | OBJ  | IT   | CFG | CTL  | SYS  | ADM  | VICE | CTL  | Class   |
| QLPAUTO    | *NONE    | X    |      | X   | X    | X    | X    |      |      | *SYSOPR |
| QLPINSTALL | *NONE    | X    |      | X   | X    | X    | X    |      |      | *SYSOPR |
| QSECOFR    | *NONE    | X    | X    | X   | X    | X    | X    | X    | X    | *SECOFR |
| QSECOFR1   | *NONE    | X    | X    | X   | X    | X    | X    | X    | X    | *SECOFR |
| QSYS       | *NONE    | X    | X    | X   | X    | X    | X    | X    | X    | *SECOFR |
| ROWTON     | *NONE    | X    | X    | X   | X    | X    | X    | X    | X    | *SECOFR |
| ZENDADMIN  | *NONE    | X    | X    | X   | X    | X    | X    | X    | X    | *SECOFR |

| AUTHORIZATION_NAME | STATUS   | NO_PASSWORD_INDICATOR | PREVIOUS_SIGNON            | TEXT_DESCRIPTION                           |
|--------------------|----------|-----------------------|----------------------------|--|
| QLPAUTO            | *ENABLED | NO                    | -                          | IBM-supplied User Profile                  |
| QLPINSTALL         | *ENABLED | NO                    | -                          | IBM-supplied User Profile                  |
| QSECOFR            | *ENABLED | YES                   | 2015-09-20 13:05:04.000000 | Security Officer                           |
| QSECOFR1           | *ENABLED | YES                   | 2015-09-20 14:29:08.000000 | Security Officer                           |
| QSYS               | *ENABLED | NO                    | -                          | Internal System User Profile               |
| ROWTON             | *ENABLED | YES                   | 2015-09-20 13:56:51.000000 | Rowton Support                             |
| SURPRISE           | *ENABLED | YES                   | 2015-09-20 14:29:52.000000 | Has AllObj because Rowton is Group Profile |
| ZENDADMIN          | *ENABLED | NO                    | -                          | Zend Server Administrator                  |

**IBM i Services gives you a better answer.** In this case, user SURPRISE inherits it's \*ALLOBJ super powers from its Group Profile ROWTON. It does not have \*ALLOBJ specified in its own right, so does not show up on the PRTUSRPRF That doesn't stop this user from having full access to every object on the system!

# Apply PTFs Perm

- ▶ If you are happy with your PTFs, apply them Permanently
- ▶ This will save disk space
- ▶ Speed up the next PTF install
- ▶ Improved Roll Back position if you don't like you next PTF install

## Apply Program Temporary Fix (APYPTF)

Type choices, press Enter.

|                                 |          |                       |
|---------------------------------|----------|-----------------------|
| Product . . . . .               | > *ALL   | F4 for list           |
| Release . . . . .               | *ONLY    | *ONLY, VxRyMz, vvrrmm |
| PTF numbers to select . . . . . | *ALL     | Character value, *ALL |
| + for more values               | _____    |                       |
| PTF numbers to omit . . . . .   | _____    | Character value       |
| + for more values               | _____    |                       |
| Extent of change . . . . .      | *perm    | *TEMP, *PERM          |
| Delayed PTFs . . . . .          | *NO      | *NO, *YES, *IMMDLY    |
| IPL apply options:              |          |                       |
| Apply at unattended IPL . . .   | *YES     | *NO, *YES             |
| Prerequisite lic int code . .   | *APYPERM | *APYPERM, *NOAPY      |
| Apply requisite PTFs . . . . .  | *NO      | *NO, *YES             |

▶ But do wait for at least a month after you install new PTFs

# Turn on Auditing

- ▶ If you don't use the System Audit Journal – Start now!
- ▶ If you don't audit you are blind to how your system is used
- ▶ Detect Hacking events
- ▶ Detect badly configured applications
- ▶ If your note using the System Audit Journal start here:  
[https://www.ibm.com/support/knowledgecenter/en/ssw\\_ibm\\_i\\_73/rzarl/rzarlusesecjnl.htm](https://www.ibm.com/support/knowledgecenter/en/ssw_ibm_i_73/rzarl/rzarlusesecjnl.htm)
- ▶ CHGSECAUD / DSPSECAUD are your friends

```
Change Security Auditing (CHGSECAUD)

Type choices, press Enter.

QAUDCTL system value . . . . . *AUDLVL          *SAME, *ALL, *NONE...
      + for more values
Auditing values . . . . . *CREATE             *SAME, *ALL, *DFTSET...
      + for more values   *DELETE
                          *OBJMGT
                          *SAVRST
                          *SECURITY
Initial journal receiver . . . . AUDRCV0001      Name
      Library . . . . . QGPL                      Name, *CURLIB

F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
```

Bottom

# Remember

# your



# needs you too !

# Questions?





# Thank You