How Healthy Is Your ?

Presented by

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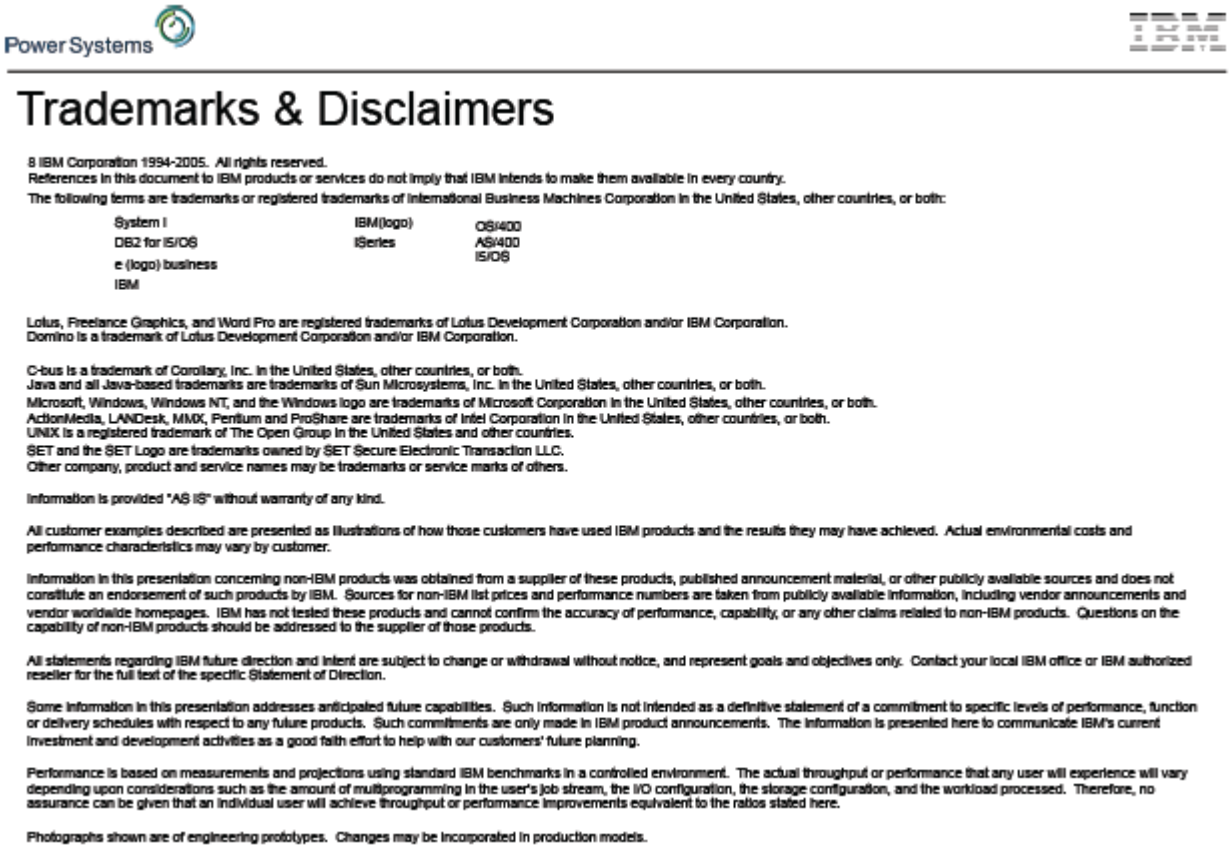
What is he talking about?

- In this session we discuss
  - How you can check if you 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**

But first a Disclaimer

- You may be used to seeing IBM Disclaimers



Power Systems

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

This is mine

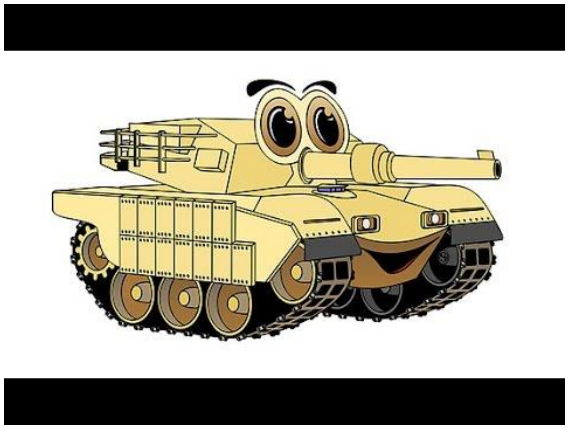
- I tried ever so hard to get it right

- *"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 ?

=



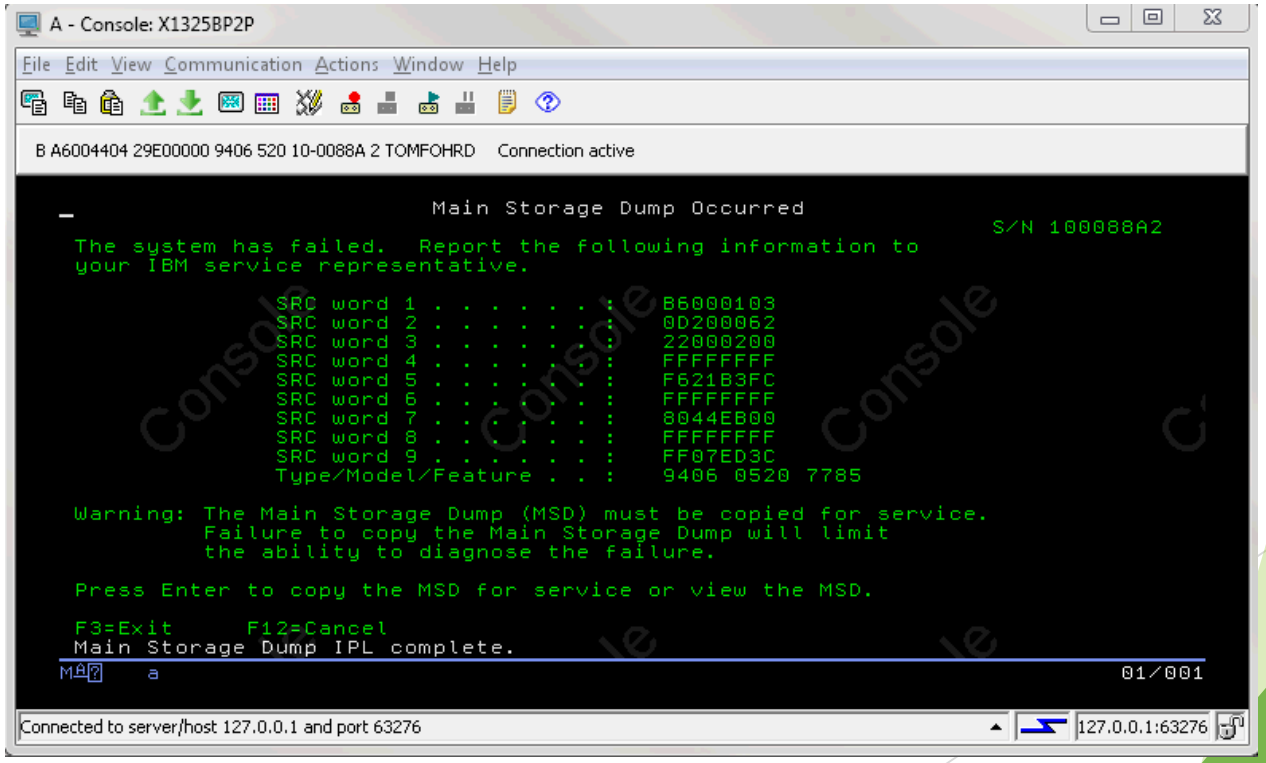
Yes - but it still needs a little TLC

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?



TLC – Tender Loving Care for

Good News:

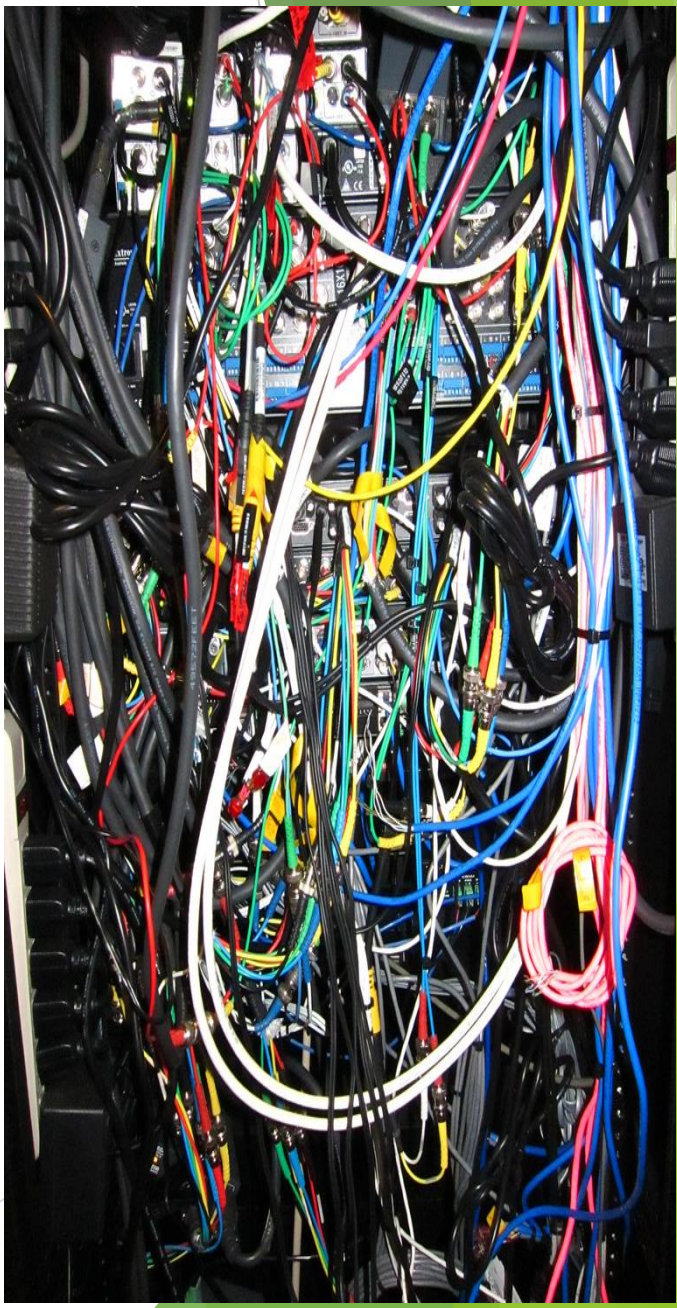
- It is not difficult
- It does not take long
- You can do it yourself for free!

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:

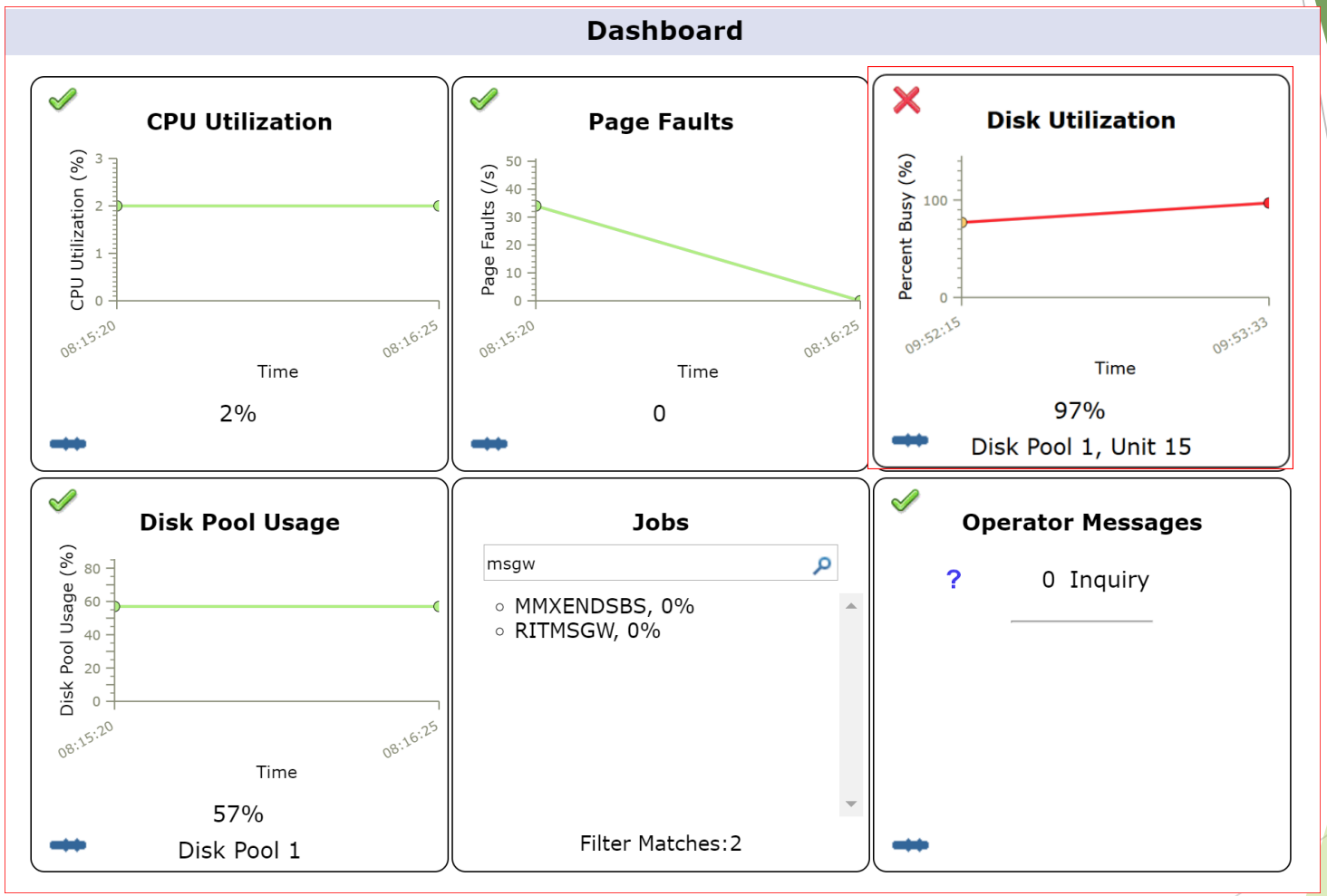
You best way of cleaning is an AirDuster

Use the Dashboard

If it's GREEN your system is clean

Tip: Use MSGW in you Jobs filter

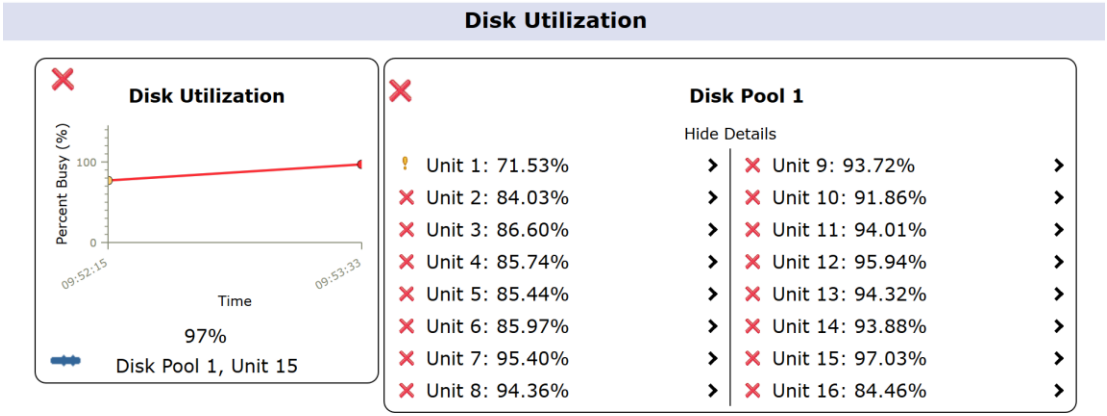
Use the Dashboard



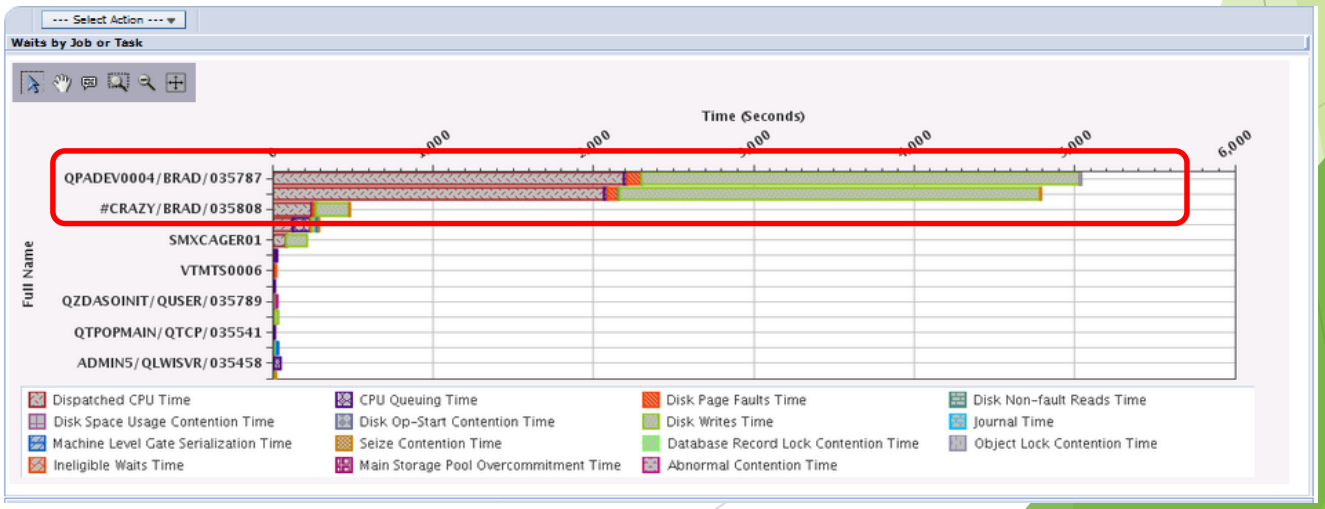
If it is RED then you need to investigate

High Disk Usage Warning

- Click on the Dashboard tile for more detail

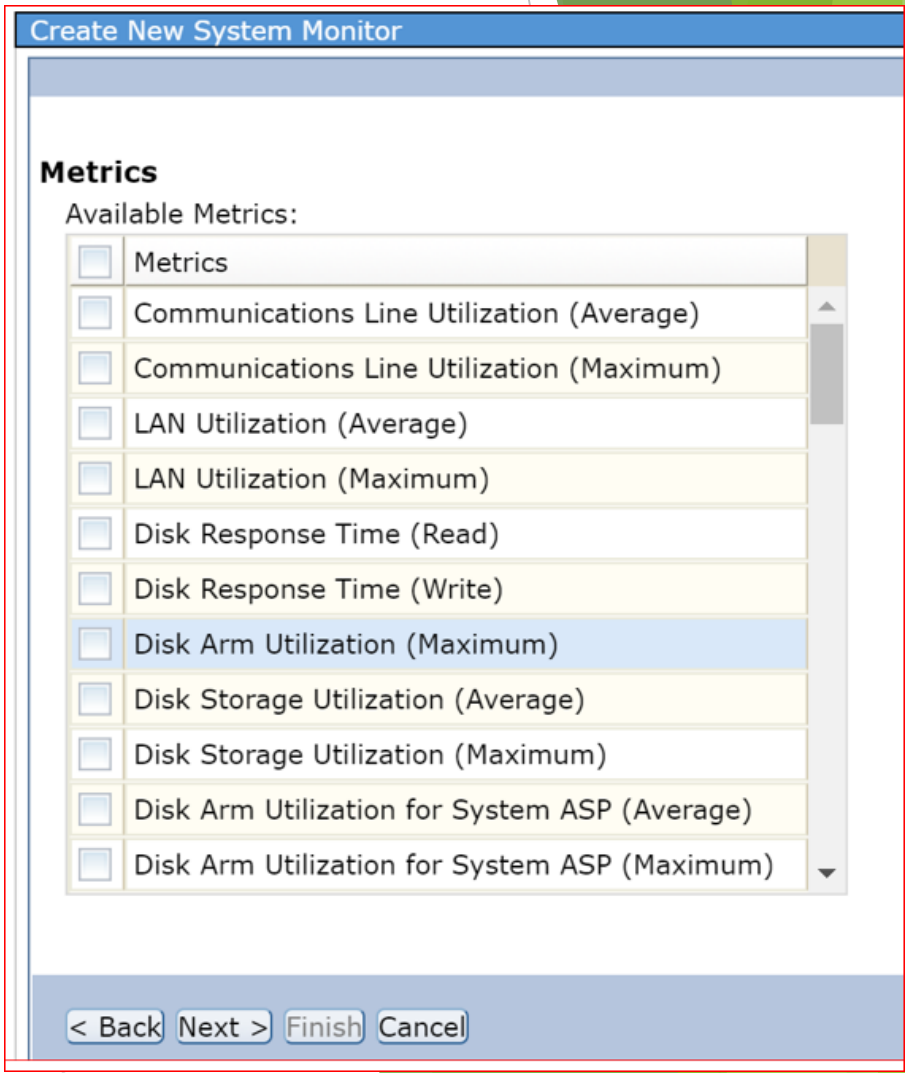


- Switch to PDI view in iNav for job detail

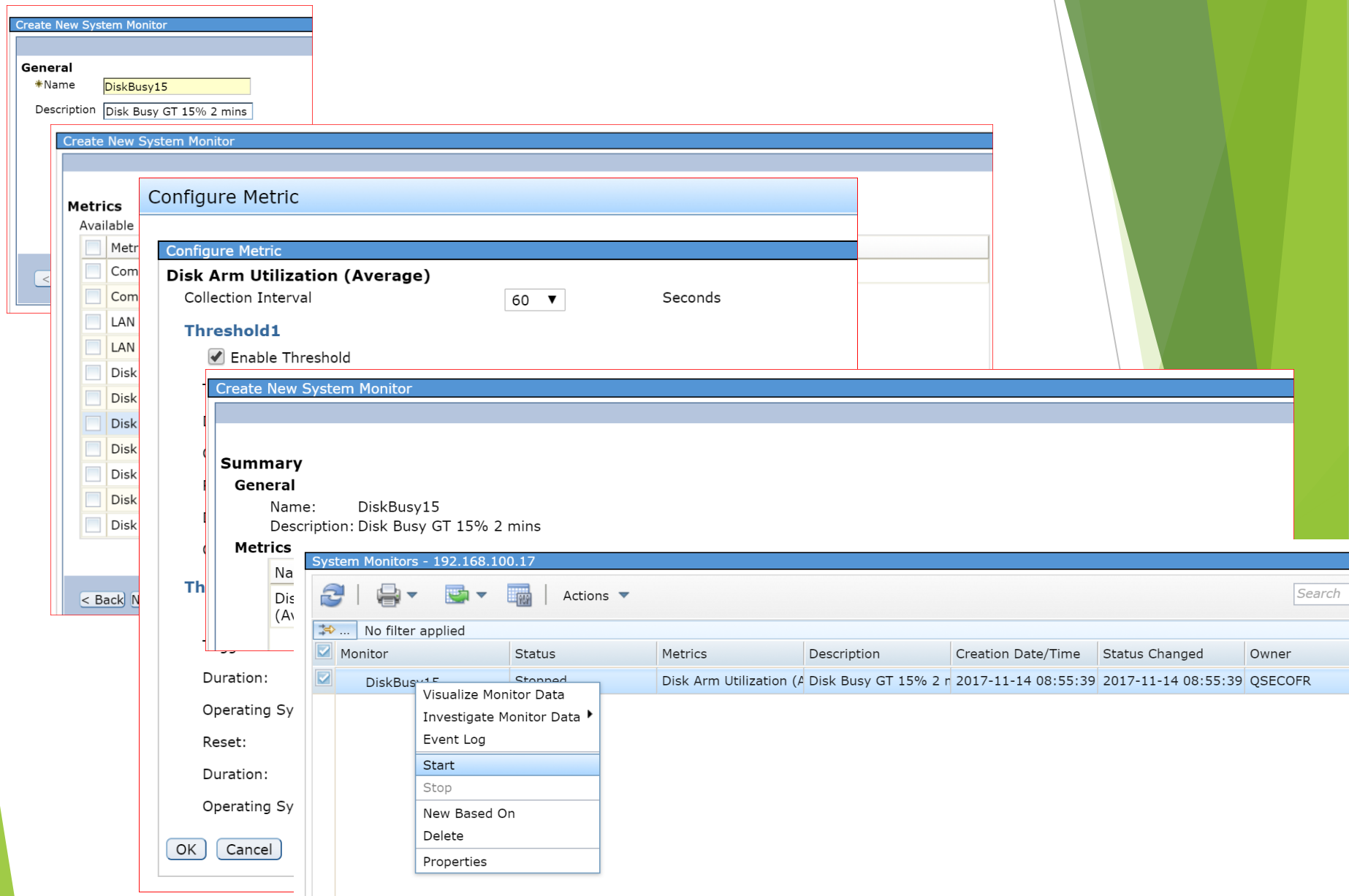


Use System Monitors

- Wide variety of monitors available
- Monitors can trigger programs
- You can set thresholds for triggers



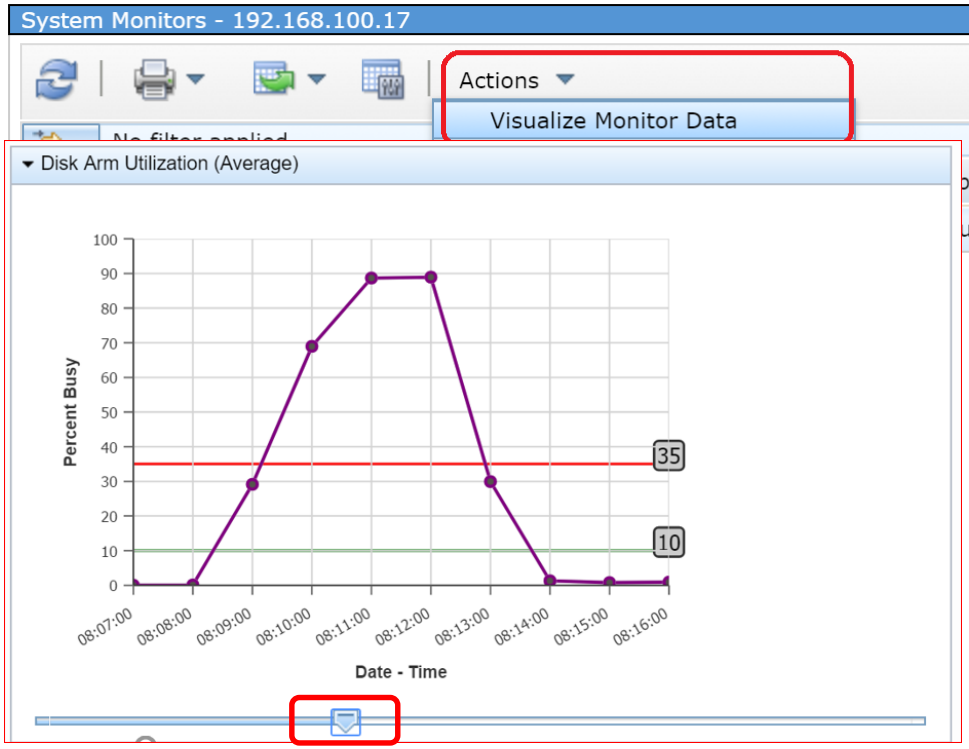
Setup a Monitor for Disk Busy Usage > 15%

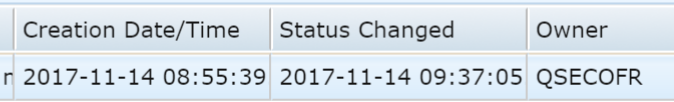


Use Visualise Monitor Data

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

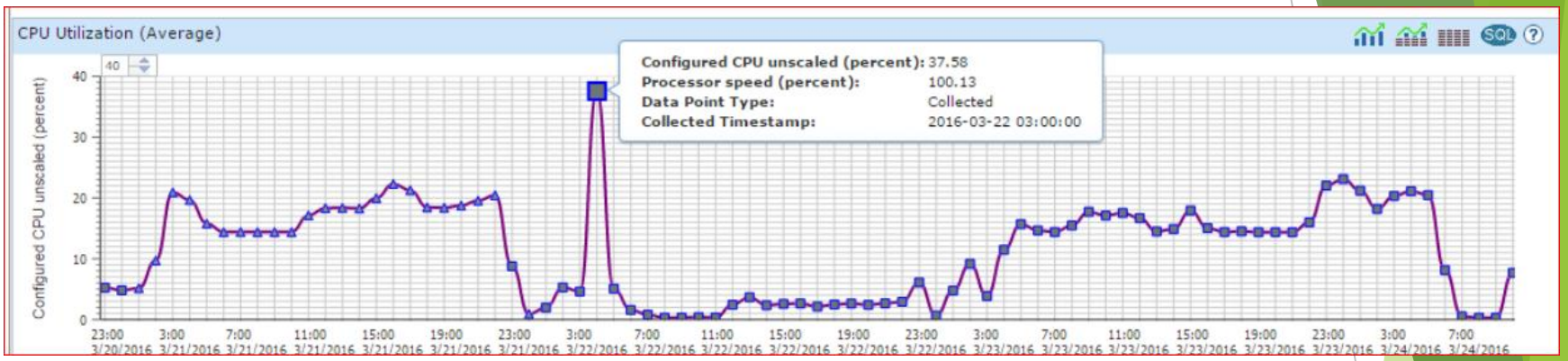
Establishing a baseline

- 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

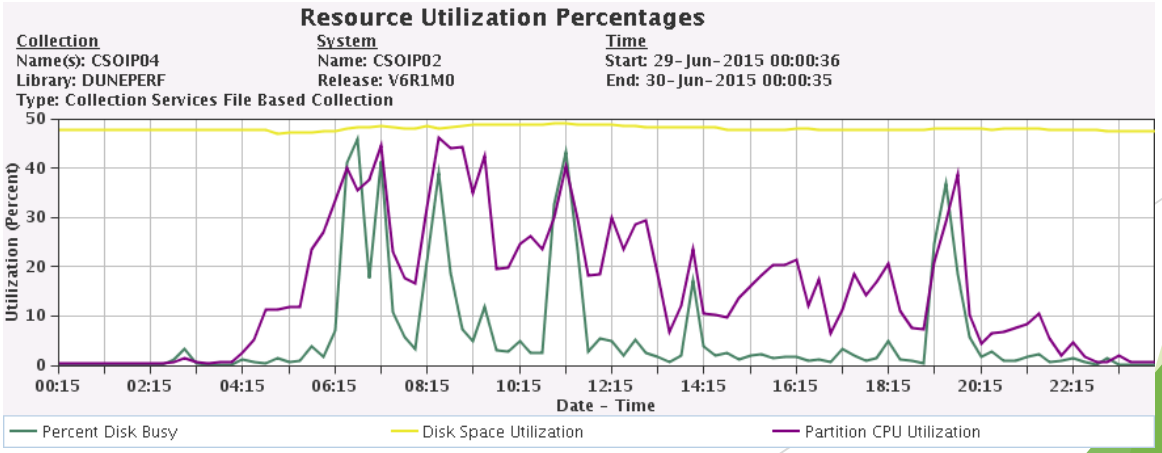
If you have 7.3 then use the Graph History

This shows rolling history for 30 days



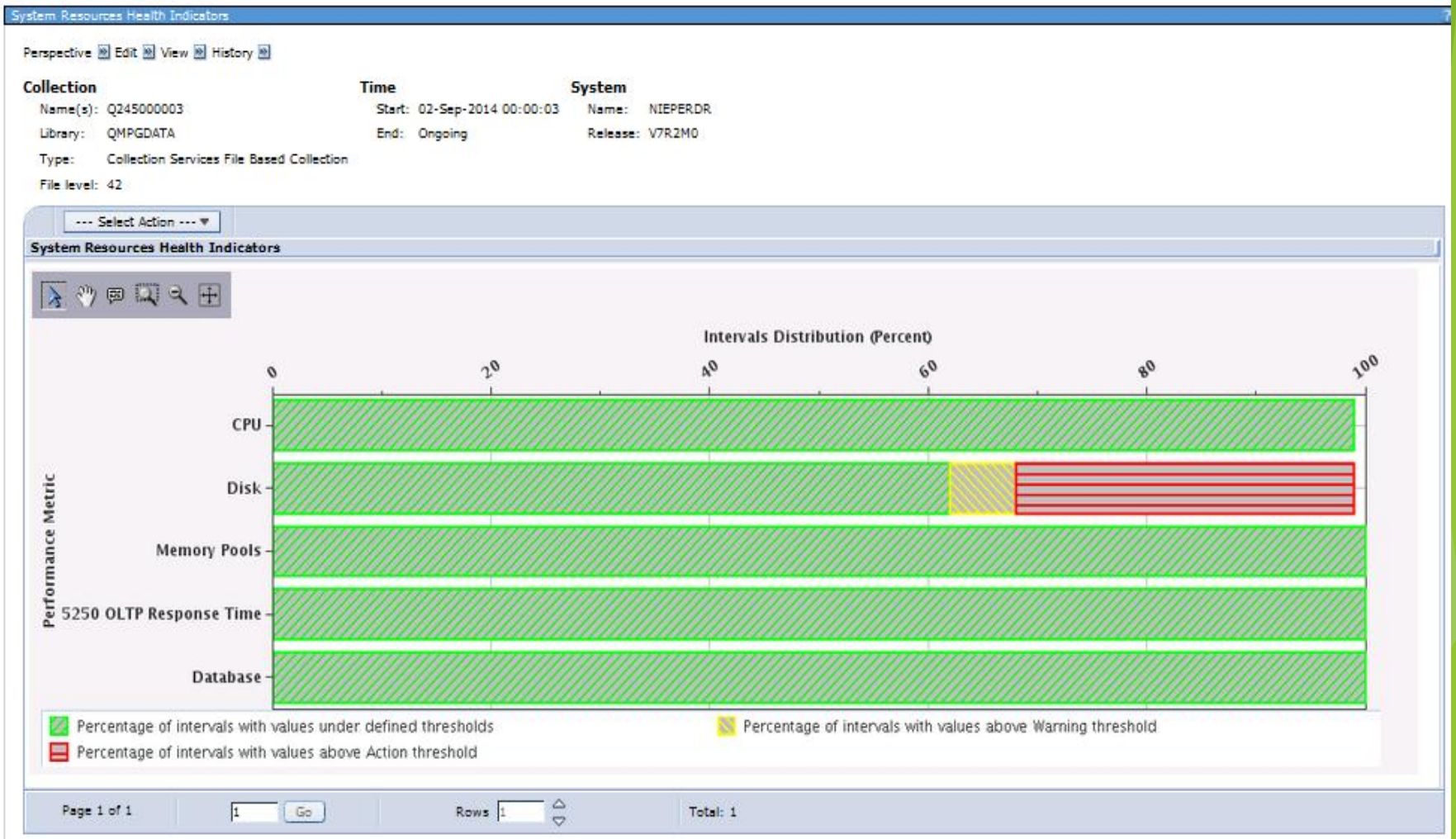
If you are running 7.1 or newer then use PDI

This shows one graph per day



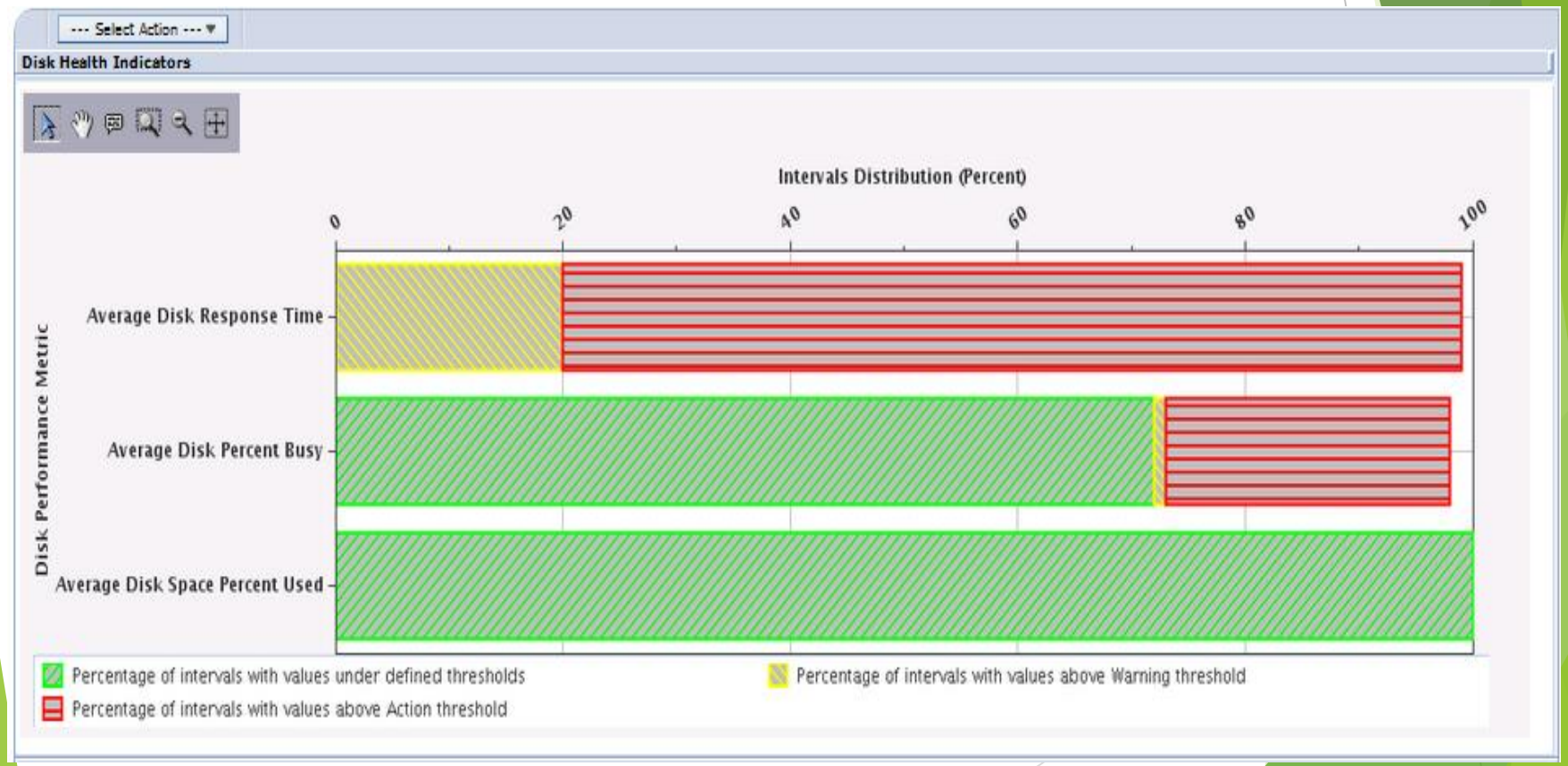
Health Indicators

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



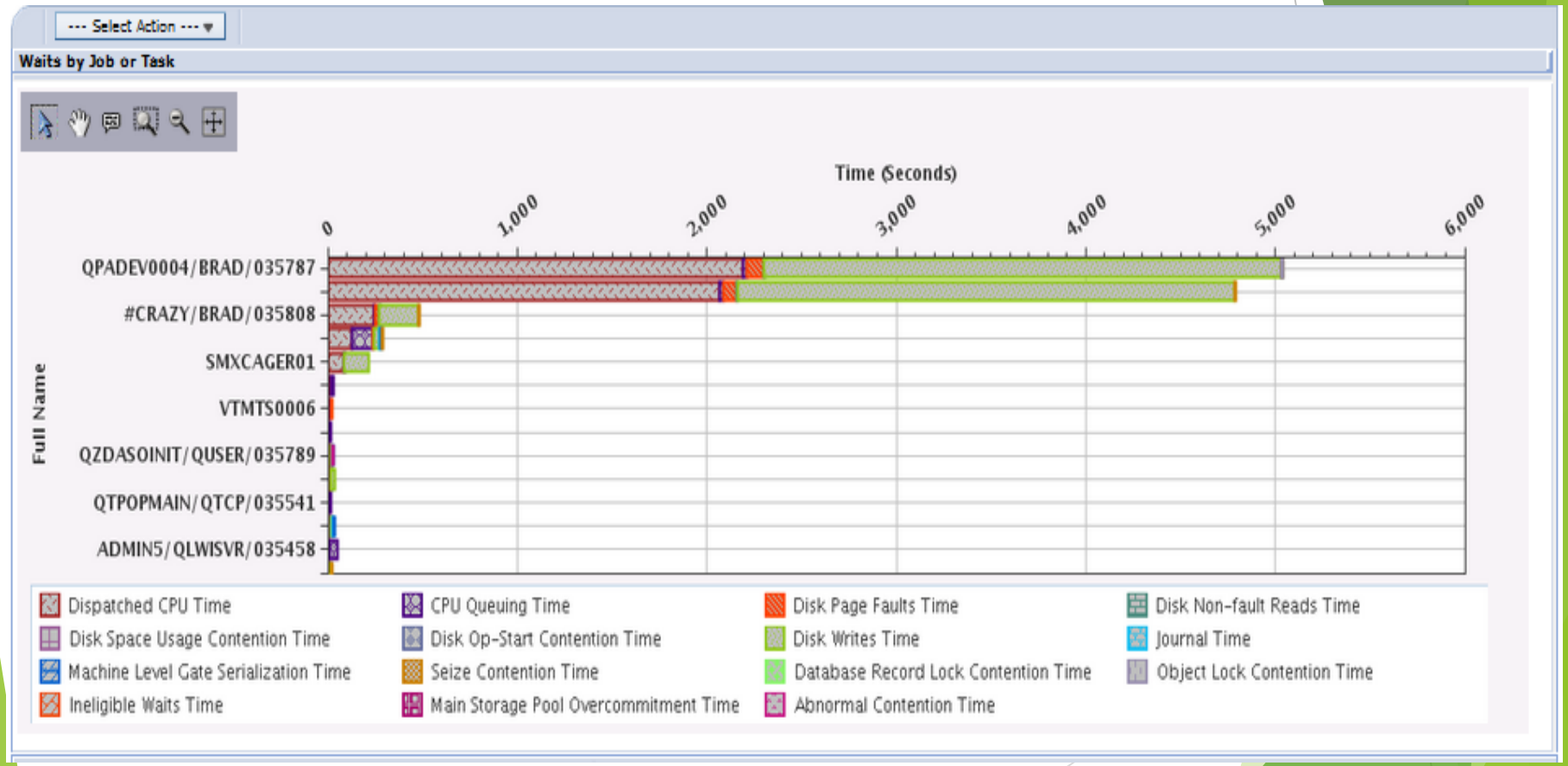
Health Indicators

- If the top level Heath 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



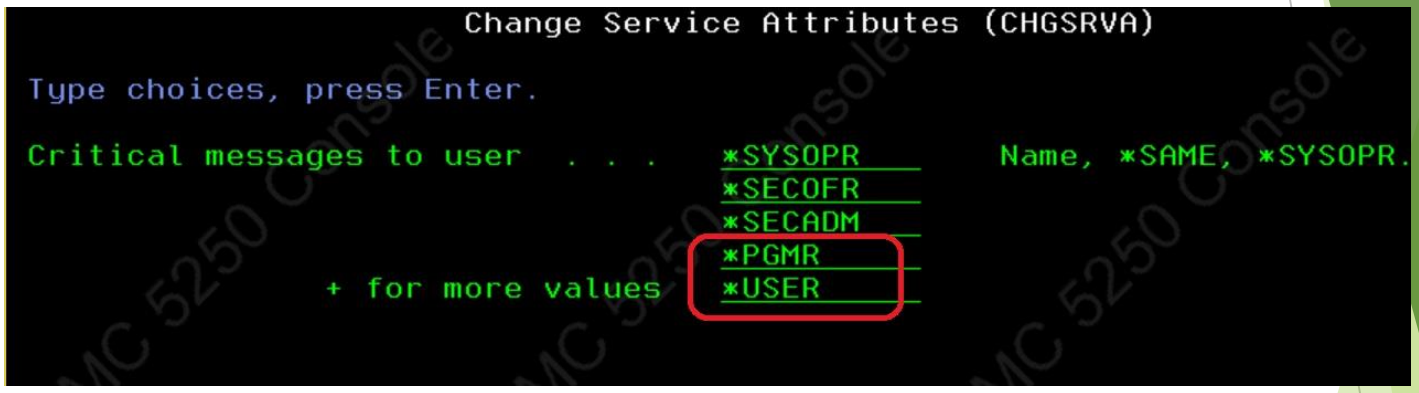
Cache Batteries

- 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, you data is safe but your disk is 10x slower
- Check your cache batteries with CALL QSMBTTCC

```
                              Display Spooled File
File  . . . . . :   QPCSMPRT                          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***

                                                EST. TIME   EST. TIME
RESOURCE  SERIAL          TYPE      FRAME     CARD      TO WARNING  TO ERROR
NAME      NUMBER          MODEL     ID        POSITION  (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          80
                                                                      More...
F3=Exit    F12=Cancel    F19=Left    F20=Right    F24=More keys
```

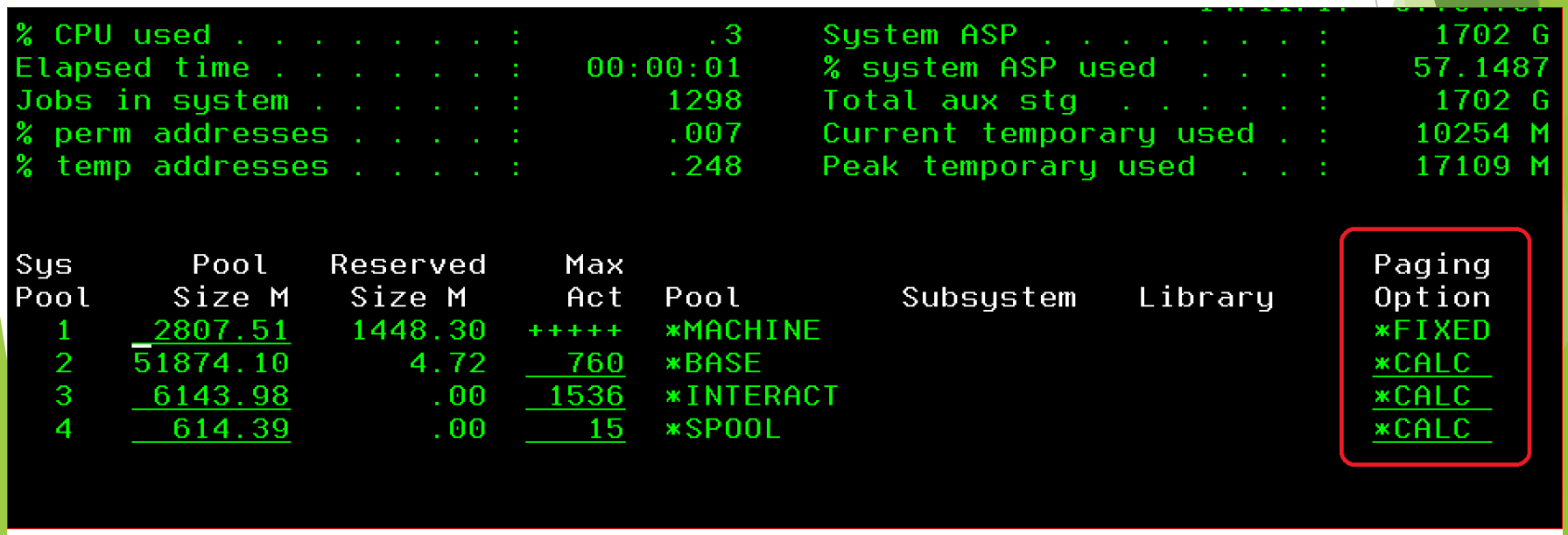
Cache Batteries

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



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)



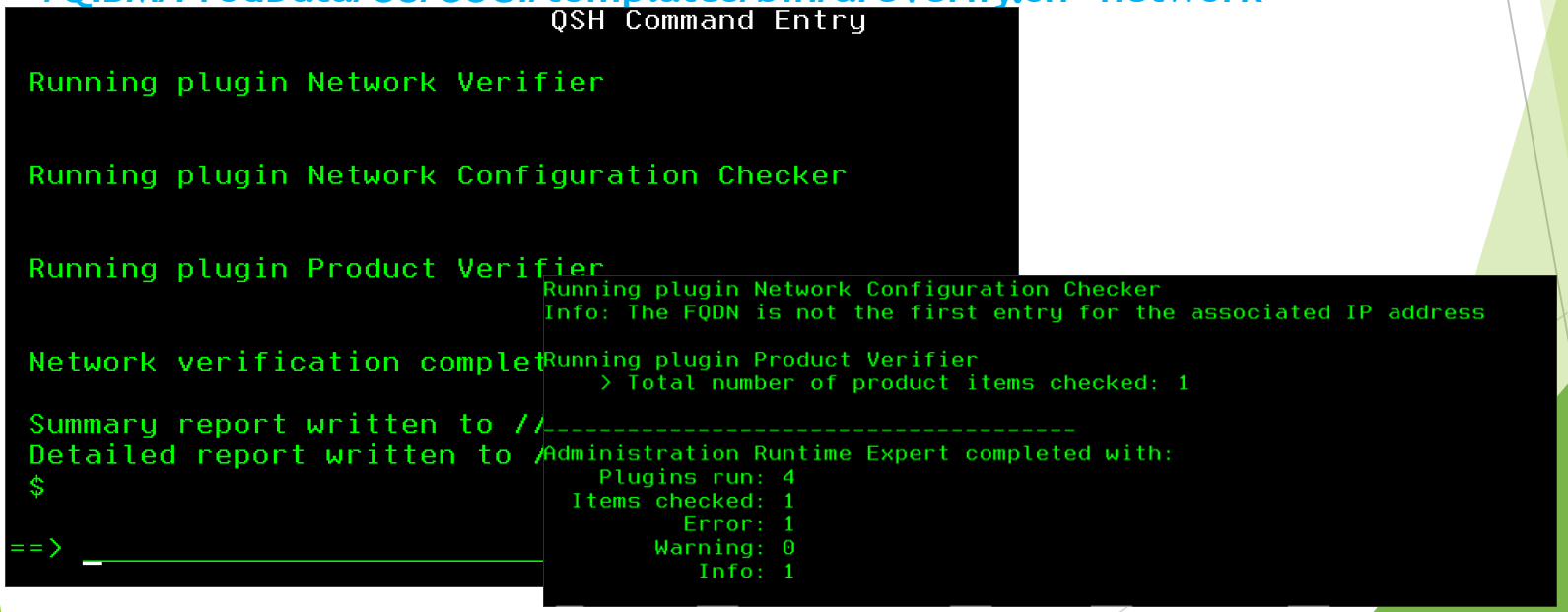
Check for Damaged Objects

- 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)
  /QIBM/ProdData/OS/OSGi/templates/bin/areVerify.sh -storage diskUnits=*ALL

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

Check for Network Issues

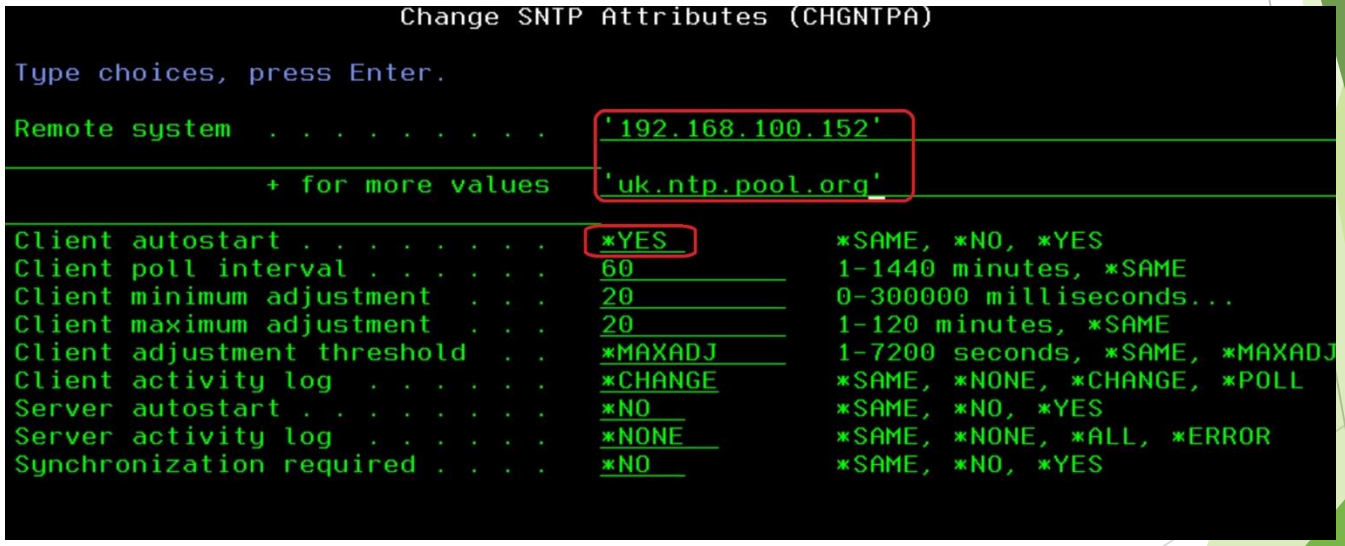
- Often you do not realise you have them
- They make your system slower / intermittently fail
- Typical example, your http admin server is slow
- You can check for them using the free ARE disk checker
- Start from QSHELL command line (STRQSH)
  /QIBM/ProdData/OS/OSGi/templates/bin/areVerify.sh -network



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

Keep your clocks in sync

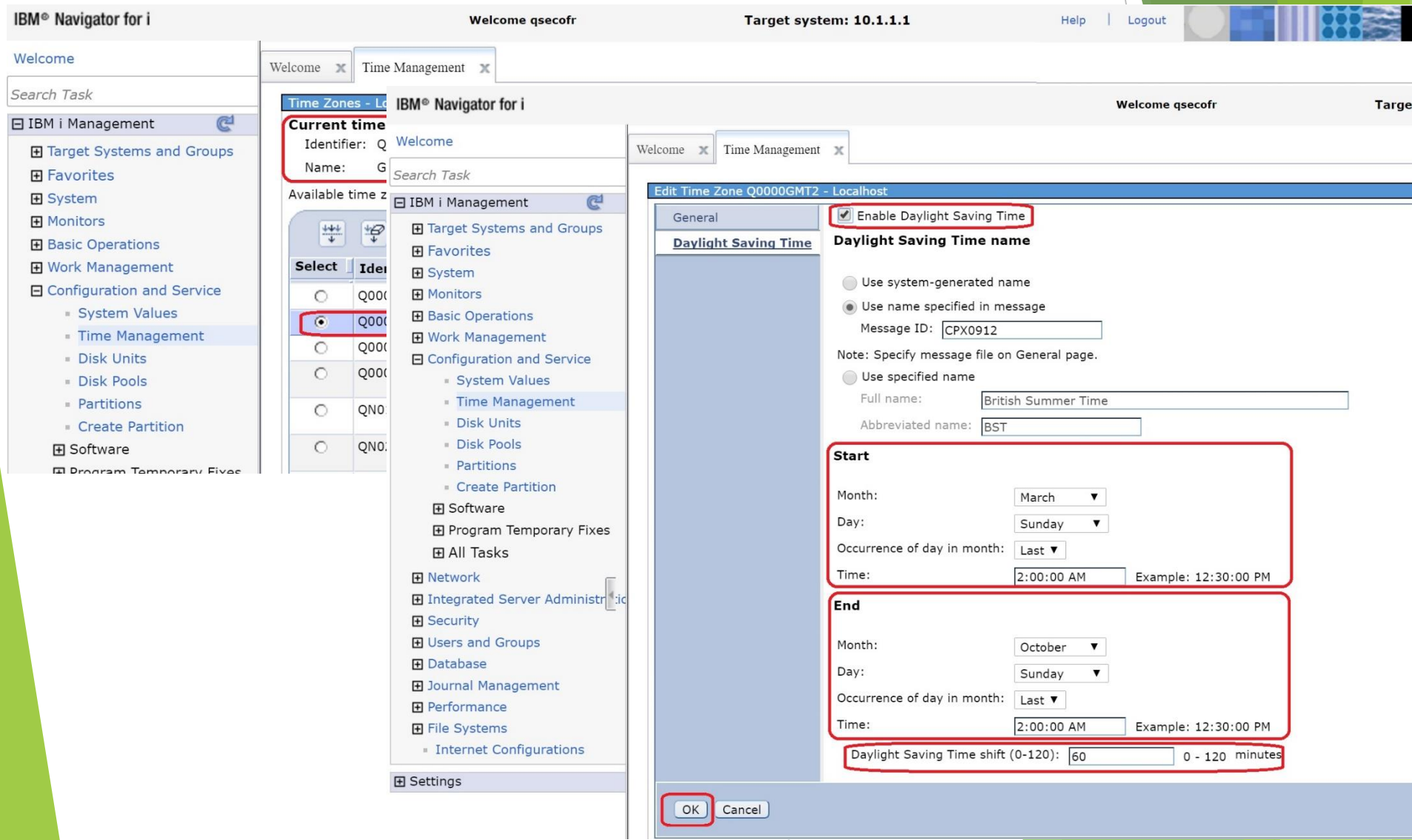
- Log files become more useful
- Communication between systems is easier
- Remove problems with time based authentication
- It's free and easy to setup



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

Automate Daylight Saving Adjustment

- Let you system change the clock for daylight saving



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 DSPJOBTBL
- Step 2 – Make sure QTOTJOB is more than normal level
- Step 3 – Set QADLTOTJ to be at least 10% of QTOTJOB

```
Permanent job structures:                    Temporary job structures:
  Initial  . . . . :   5000                    Initial  . . . . :   200
  Additional . . . :   500                     Additional . . . :   50
  Available  . . . :   2523                    Available  . . . :   41
  Total  . . . . . :   9000                    Storage used . . :   64.71 M
  Maximum  . . . . :   163520


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

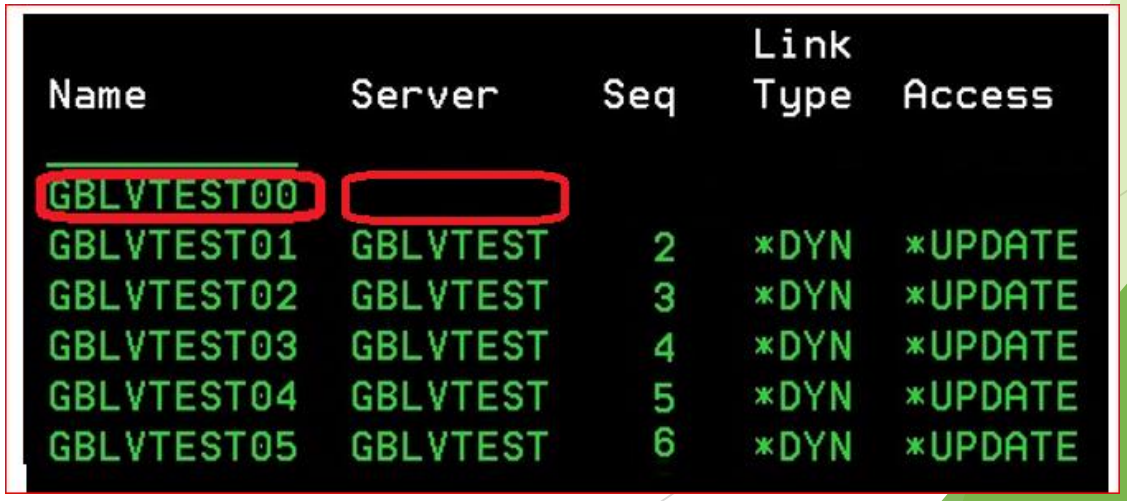
Remove old Spool files

- 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

- 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
                                % of          Size in     Last       Last
 Library       Owner            Disk        1000 bytes   Change     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
                                                                        More.
```

Tidy up your IFS

RTVDIRINF / PRTDIRINF are useful if you know where to look

- **ProTip Try QSRSRV tool if you don't know where to start**

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

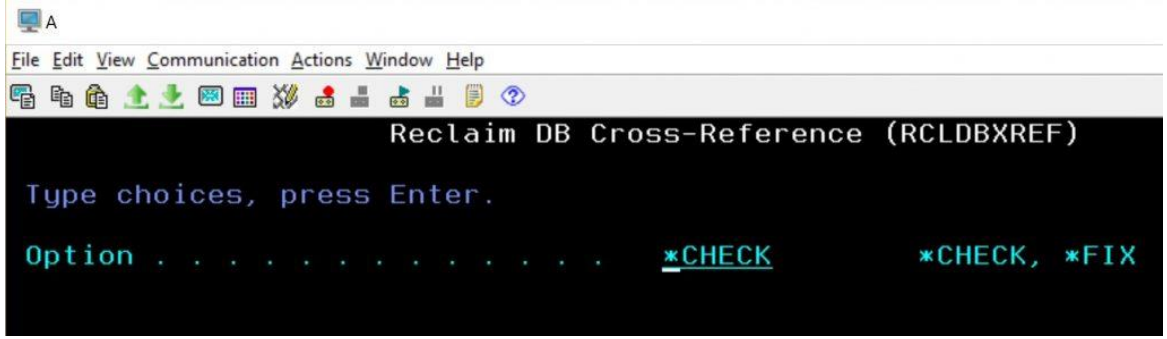
  Analyse the Entire IFS with a single command

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

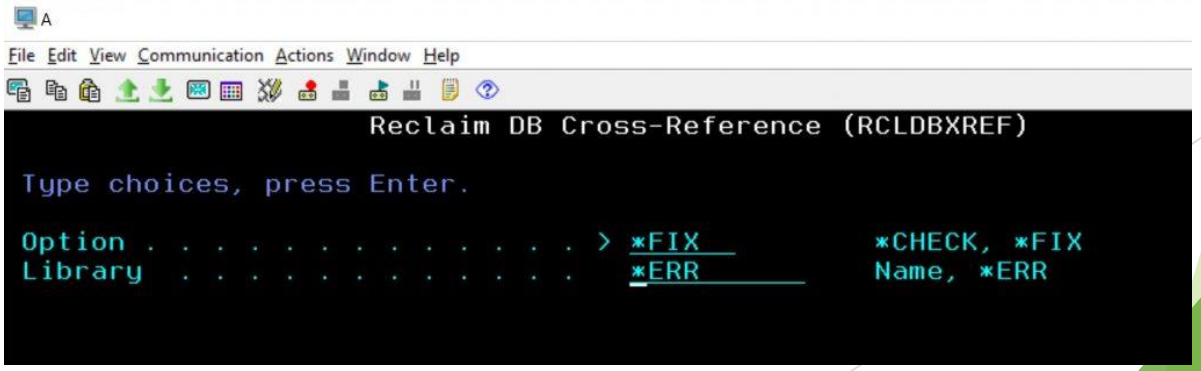
```
                                DATA        ALLOCATED
      LINK     DFRD           SIZE IN          SIZE IN DIRECTORY
     COUNT    LINKS           K BYTES          K BYTES NAME
         6        0                24               72 /yajl/working/src_backup/api
        20        0               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            TOTAL
     TOTAL    TOTAL              DATA        ALLOCATED
      LINK     DFRD           SIZE IN          SIZE IN
     COUNT    LINKS           K BYTES          K BYTES
    169776        0          68828525         71265220

   *STMF     *DIR *SYMLNK   *FIFO *SOCKET  *BLKSF  *CHRSF   *DDIR  *DSTMF *SOMOBJ *OOPOOL   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)



To check you can use RCLDBXREF OPTION(*CHECK)



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

Name	Status	Description
BootP	Stopped	BootP Server
BootP DHCP Relay Agent	Stopped	BootP DHCP Relay Agent
DDM	Started	DRDA DDM Server TCP/IP
DHCP	Stopped	Dynamic Host Configuration Protocol
DLFM	Stopped	Datalink File Manager
EDRSQL	Stopped	Extended Dynamic Remote SQL
FTP	Started	File Transfer Protocol
HTTP Administration	Started	HTTP Server
IAS	Stopped	Integrated Web Application Server
IBM i NetServer	Started	IBM i Support for Windows Network Neighborhood
IBM Tivoli Directory Server for IBM i	Started	IBM Tivoli Directory Server for IBM i (LDAP)
INETD	Stopped	Internet Daemon (INETD) Super Server
LPD	Started	Line Printer Daemon
Management central	Started	Management central
NFS	Stopped	NFS Server
OMPROUTED	Started	OMPROUTED
POP	Stopped	Post Office Protocol
QoS	Stopped	QoS Server
RADIUS NAS	None	RADIUS Network Access Server
Remote Execution	Stopped	RExec
RouteD	Stopped	Route Daemon
RPC	Stopped	Remote procedure call
Service and Support Proxy	Stopped	Service and Support Proxy

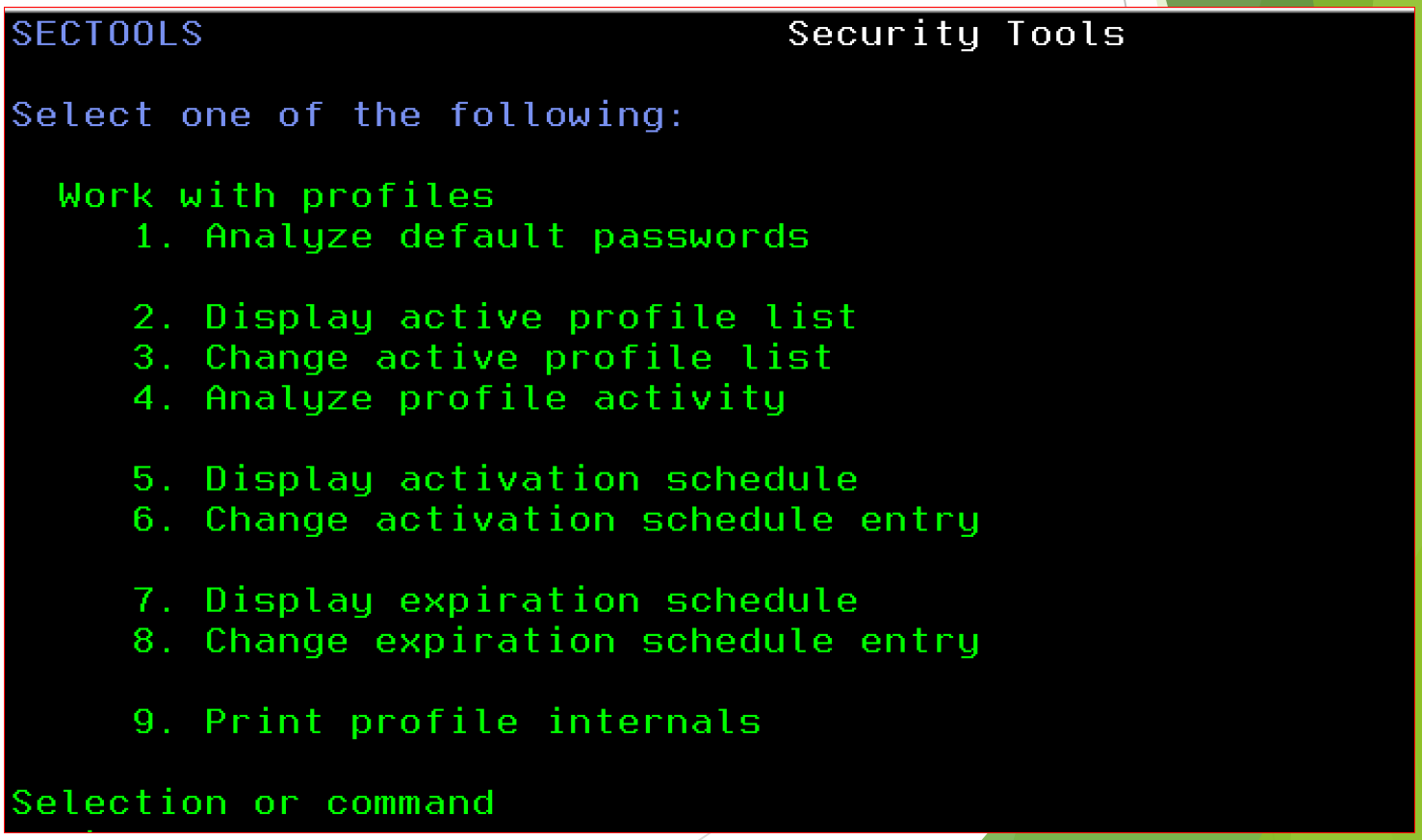
Move from FTP to sFTP

- 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:   KFF81(
Licensed  Installed
Program   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



Review Users

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

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

User Profile	Group Profiles	*ALL OBJ	*AUD IT	SYS CFG	*JOB CTL	*SAV SYS	*SEC ADM	*SER VICE	*SPL CTL	User 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
- CHGSECAUD / DSPSECAUD are your friends

Remember your needs you too !

Questions?

Thank You