i-Chi and the art of system management

Presented by Rudi van Helvoirt

IBM Champion, Member of the CEAC
Technical Director, van Helvoirt Beheer
rvanhelvoirt@vanhelvoirt.nl

Assisted by Steve.Bradshaw@RowtonIT.com

IBM Champion, Member of the CEAC
Technical Director of i-UG.co.uk (CommonUK)
Friendly Techie at RowtonIT.com

What is i-Chi?

- Thinking differently about IBM i System Management
- Embracing new ways of doing old tasks
- Automating processes and monitoring
- Using the latest features in ACS, Nav4i, ARE, AJS & SQL Services
- Integrating IBM i SysAdmin with other platforms
- Reducing your reliance on the 5250 command line

  But not your reliance on commands and programs

What is he talking about?

Part 1: Audit Journal

Part 2: Improved User Management

Part 3: Add Run SQL Script to your Toolbox

Part 4: Establishing a Baseline S

Part 5: Add SQL Performance Center to your Toolbox

Part 6: How Much Downtime do I need for my backups?

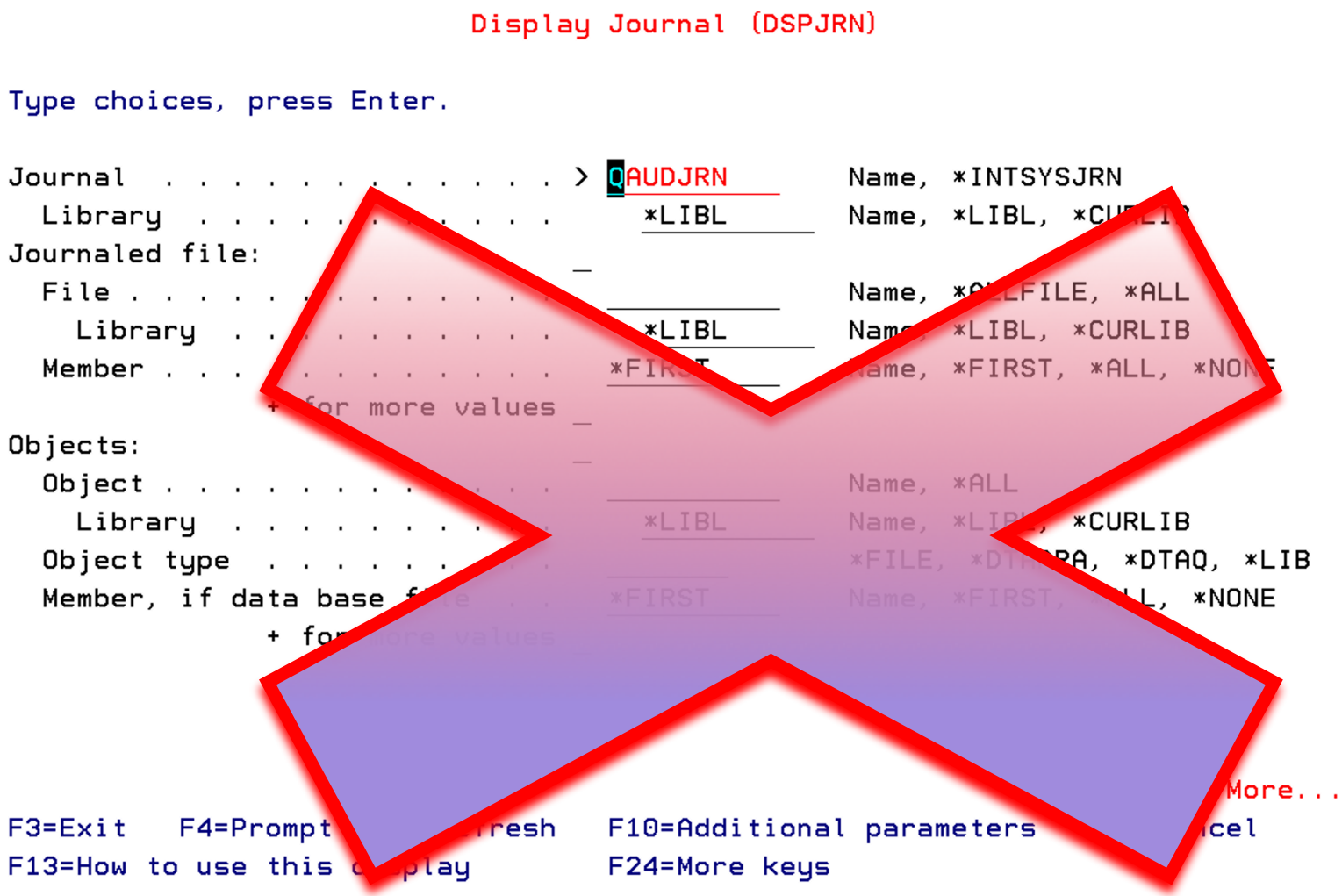
Part 1

Audit Journal

Why bother improving handling Audit journal data?

- Make better decisions
- Implement automation to improve consistency
- Delegate subsets of Audit journal data to development
- Facilitate the transition from Security level 30 to 40
- Improve security of your systems
- Allow most of the above to happen automated

DSPJRN is not your friend

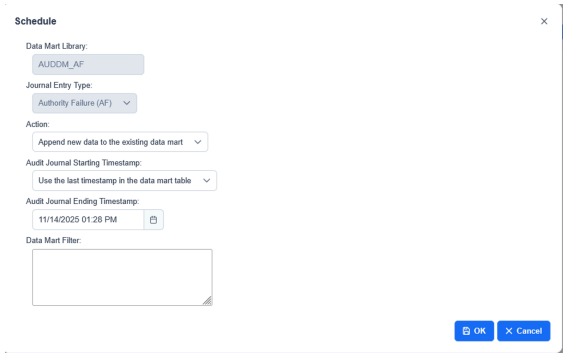


Navigator for i (Nav4i) is your new best friend

Actions including a schedule option

Filter any column

SQL button
To extract the SQL statement behind the data shown



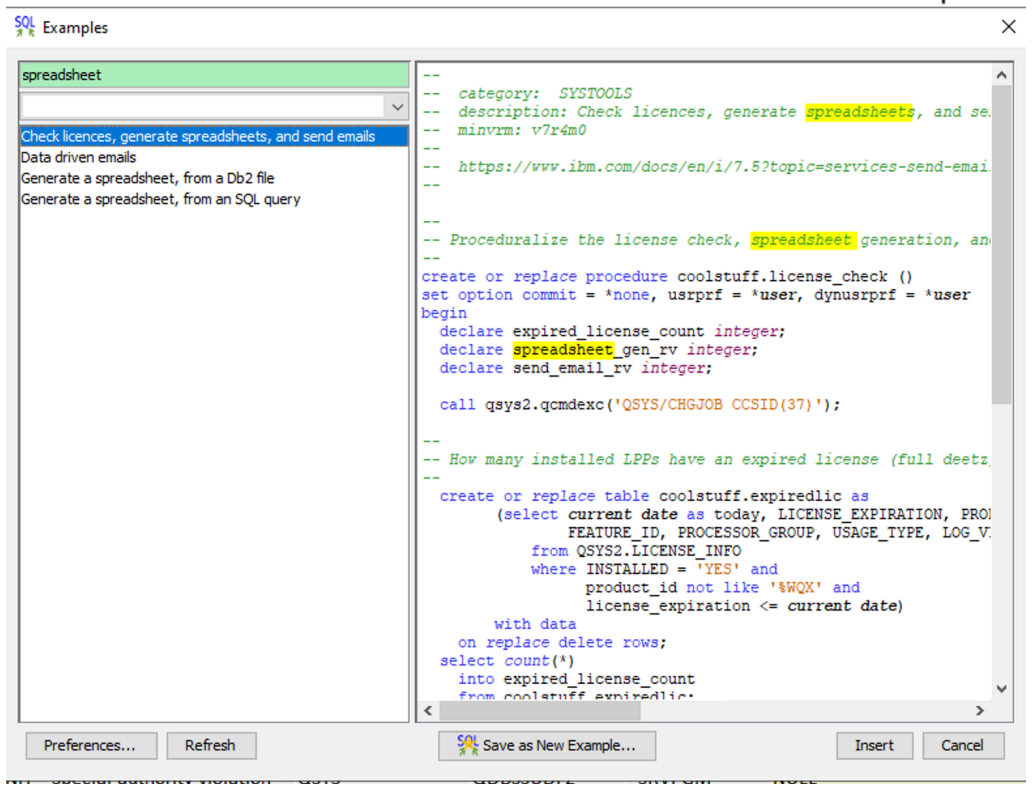
Manage Audit Journal Data Mart

Actions

Data Mart Library	Data Mart	Data Mart System Table Name	Data Mart Filter	Journal Entry Type	Status
Filter	Filter	Filter	Filter	Filter	Filter
AUDDM_AF	AUDIT_JOURNAL_AF	AJ_AF		Authority Failure (AF)	COMPLETED

Automate the reviewing process

```
-- Create a SQL statement according to your needs
-- Limit the number of records just in case
SELECT ENTRY_TIMESTAMP, USER_NAME, QUALIFIED_JOB_NAME, VIOLATION_TYPE_DETAIL, OBJECT_LIBRARY, OBJECT_NAME, OBJECT_TYPE, PATH_NAME
   FROM AUDDM_AF.AUDIT_JOURNAL_AF WHERE ENTRY_TIMESTAMP > CURRENT TIMESTAMP - 1 DAY LIMIT 100
```



Combine this SQL statement with the Insert from Examples "Check licences, generate spreadsheets, and send emails" example found and schedule this SQL script to run every day.

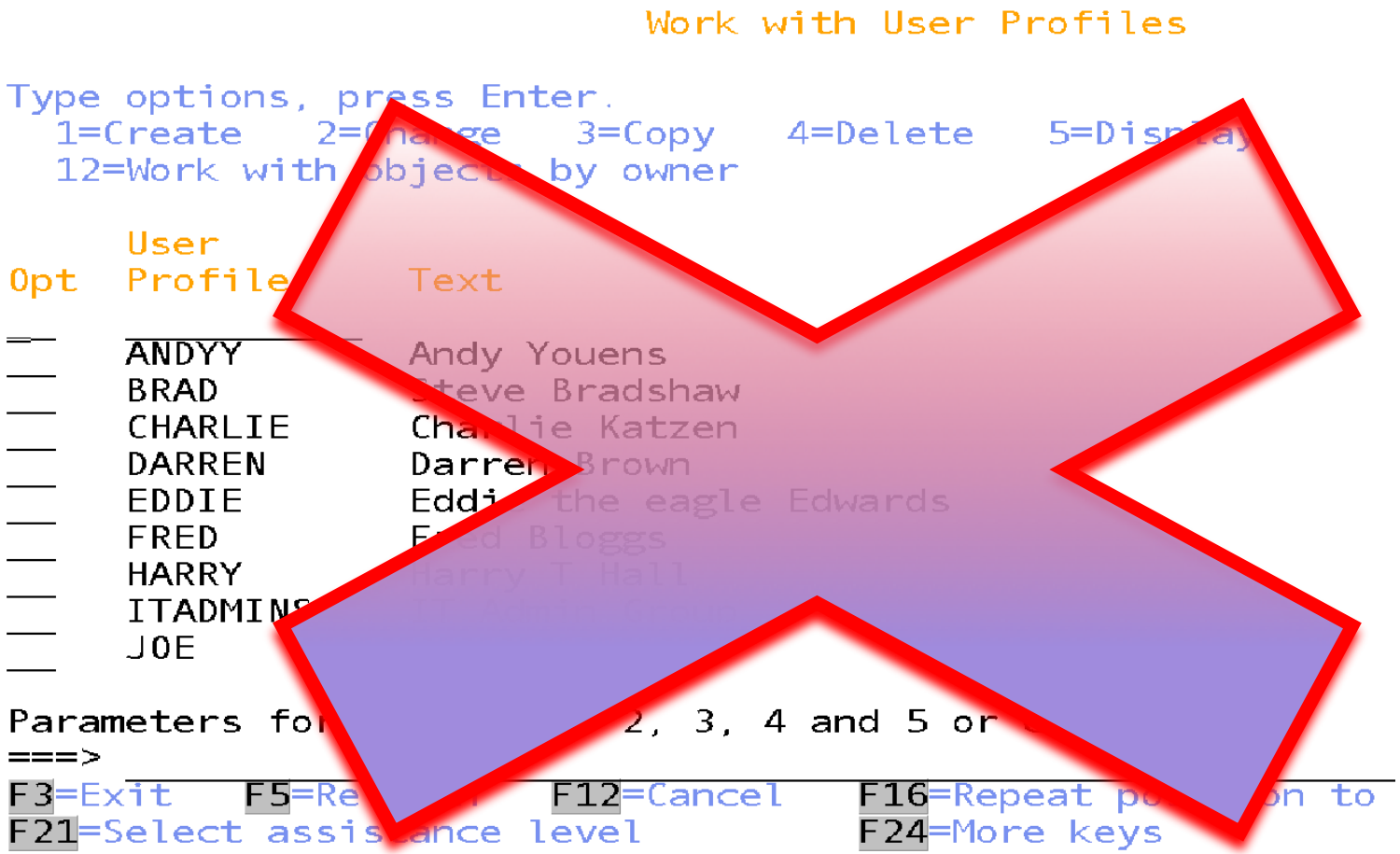
Part 2

Improved User Management

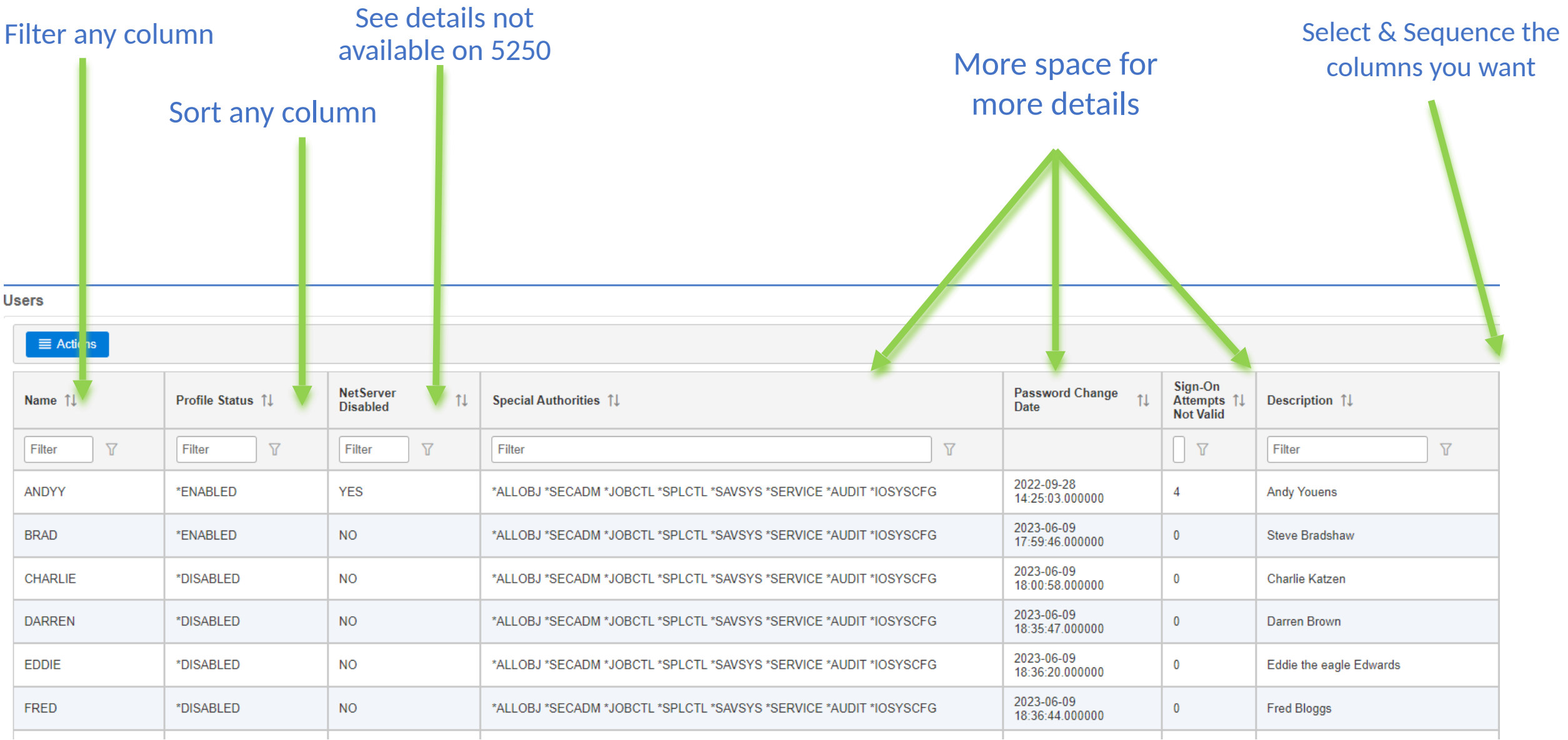
Why bother improving user management?

- Make better decisions
- Implement automation to improve consistency
- Delegate subsets of user management to other departments
- Improve compliance with regulations and certifications
- Improve security of your systems
- Allow most of the above to happen whilst you sleep

WRKACTJOB is not your friend



Navigator for i (Nav4i) is your new best friend



Check for potentially inactive/obsolete users

```
Select Authorization_Name, Text_Description, Previous_Signon, Creation_Timestamp, Status, Pass
    From Qsys2.User_Info
    Where Previous_Signon < (Current Date - 60 Days)
          And Authorization_Name Not Like 'Q%'
    Order By Previous_Signon Desc;
```

Authorization Name	Text Description	Previous Signon	Creation Timestamp	Status
TEZ	<NULL>	2023-01-30 19:04:41.000000	2023-01-30 15:53:30.000000	*ENABLED
ANDYY	Andy Youens	2022-10-03 18:29:54.000000	2022-09-28 14:25:03.000000	*ENABLED

You can embed SQL like this in a program, add your business logic, automating alerting to IT and HR Departments and disabling users.

Part 3

Add Run SQL Script to your Toolbox

Why use Run SQL Scripts?

- Flexibility
- Facilitate reuse
- Consistency
- Embrace IBM i services (SQL)

Once you get started writing SQL there is no way back😄

Some Examples

```
-- Save Library QUSRBRM after resolving all issues
CL:CRTSAVF FILE(QGPL/BR1) TEXT('QUSRBRM prior to upgrade from 5770BR1 to 5770BR2');
CL:SAVLIB LIB(QUSRBRM) DEV(*SAVF) SAVF(QGPL/BR1);
-- Remove the BRMS SQL services to prevent file dependency issues
CL:CALL QBRM/Q1AOLD PARM('INSTALL ' 'RMVSQLSERV' 'N' '00');
stop;
-- Check for locks to enable Delete of product 5770-BR1
-- end the jobs having locks
SELECT  LOCK_STATE, LOCK_STATUS, LOCK_SCOPE, JOB_NAME
   FROM QSYS2.OBJECT_LOCK_INFO
   WHERE OBJECT_SCHEMA = 'QSYS' AND OBJECT_NAME = 'QBRM' AND OBJECT_TYPE = '*LIB';
stop;
-- Delete product 5770-BR1
CL:DLTLICPGM LICPGM(5770BR1) OPTION(*ALL);
stop;
-- Install product 5770-BR2
-- Include automatic accepting license agreement for 5770-BR2 7.5
CL:CALL PGM(QSYS/QLPACAGR) PARM('5770BR2' 'V7R5M0' '0000' 0);
CL:RSTLICPGM LICPGM(5770BR2) DEV(OPTVRT01);
stop;
-- Before continuing check if the job BRMSPRDINZ has completed
SELECT X.MESSAGE_TIMESTAMP, X.MESSAGE_ID, X.MESSAGE_TEXT, FROM_JOb
   FROM TABLE (
         QSYS2.HISTORY_LOG_INFO(CURRENT TIMESTAMP - 1 HOUR)
      ) X
```

```
-- category: System Management
-- description: Configure TLS for HTTP BRMS for i
CL:CHGWEBBRM HTTP(*AUTO 2088) HTTPS(*ON 2089);

CL:ENDTCPSVR SERVER(*HTTP) HTTPSVR(QBRMWEBSVR);
CL:DLYJOB 15;
CL:STRTCPSVR SERVER(*HTTP) HTTPSVR(QBRMWEBSVR);
CL:DLYJOB 15;
-- Check if port 2088 & 2089 are active
SELECT JOB_NAME,
      LOCAL_PORT,
      LOCAL_ADDRESS,
      REMOTE_PORT,
      REMOTE_ADDRESS
   FROM QSYS2.NETSTAT_JOB_INFO
   WHERE LOCAL_PORT IN (2088, 2089);
stop;
-- happy with testing?
-- Disable non-TLS port
CL:CHGWEBBRM HTTP(*OFF) HTTPS(*ON 2089) AUTOSTART(*YES);
stop;
CL:ENDTCPSVR SERVER(*HTTP) HTTPSVR(QBRMWEBSVR);
CL:DLYJOB 15;
CL:STRTCPSVR SERVER(*HTTP) HTTPSVR(QBRMWEBSVR);
```

Please do not forget when Prompting CL commands to Press F1

Part 4

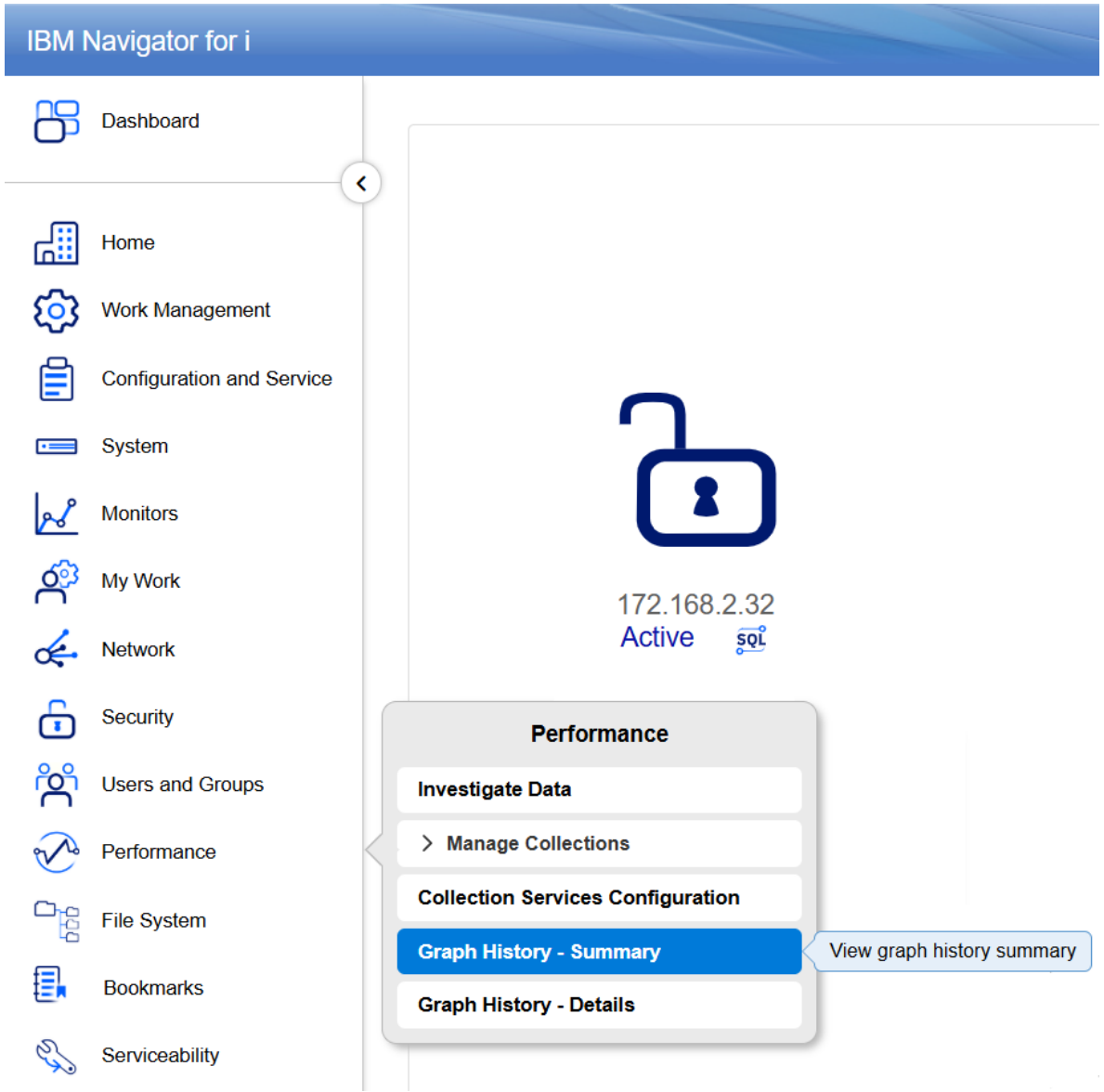
Establishing a Baseline

What does normal look like?

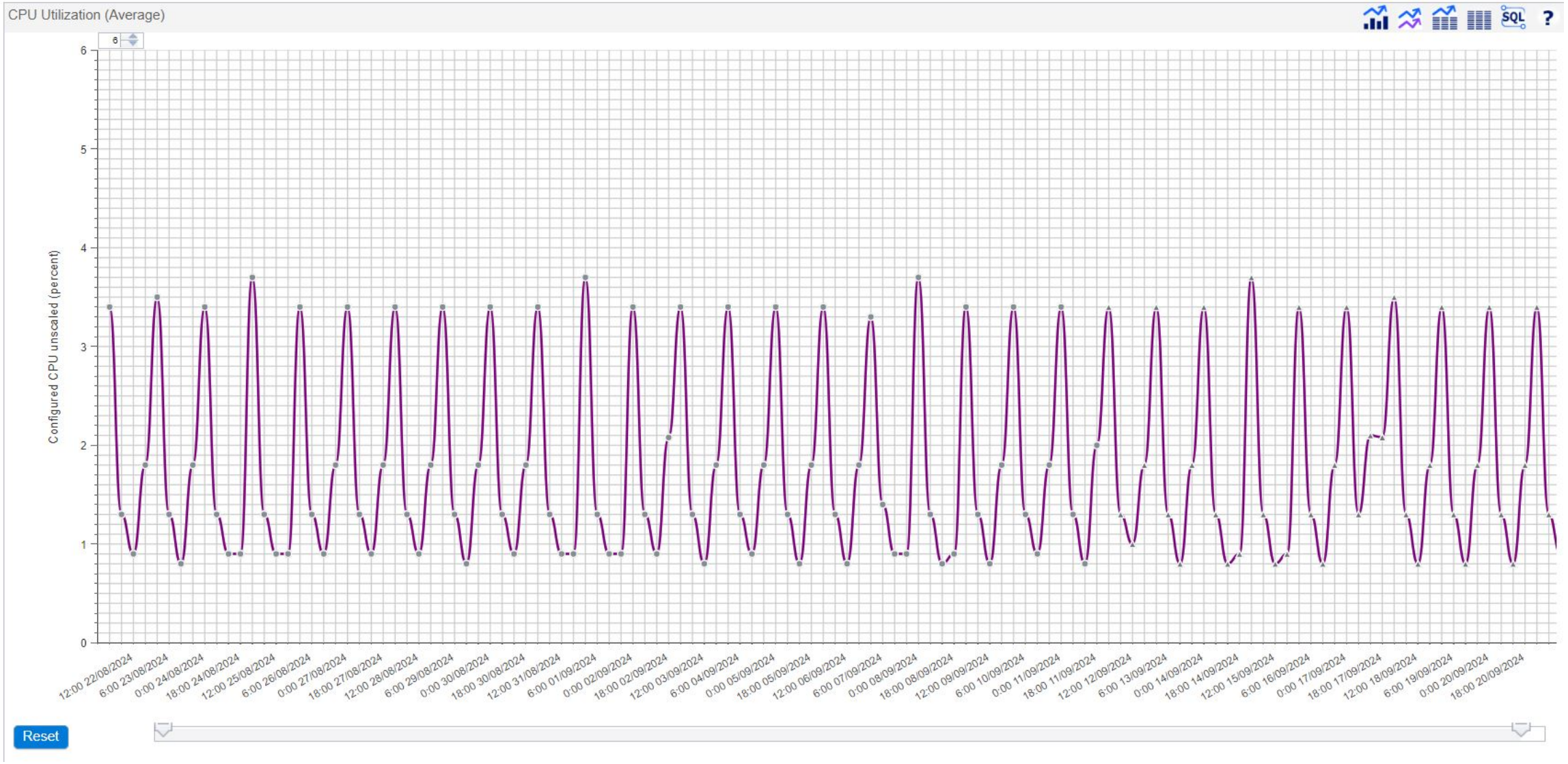
- How busy are our processors?
- How busy is our storage?
- How much network traffic we generate?
- What does our memory usage look like?

When you know what normal looks like,
you can QUICKLY understand WHAT SORT of problem you have

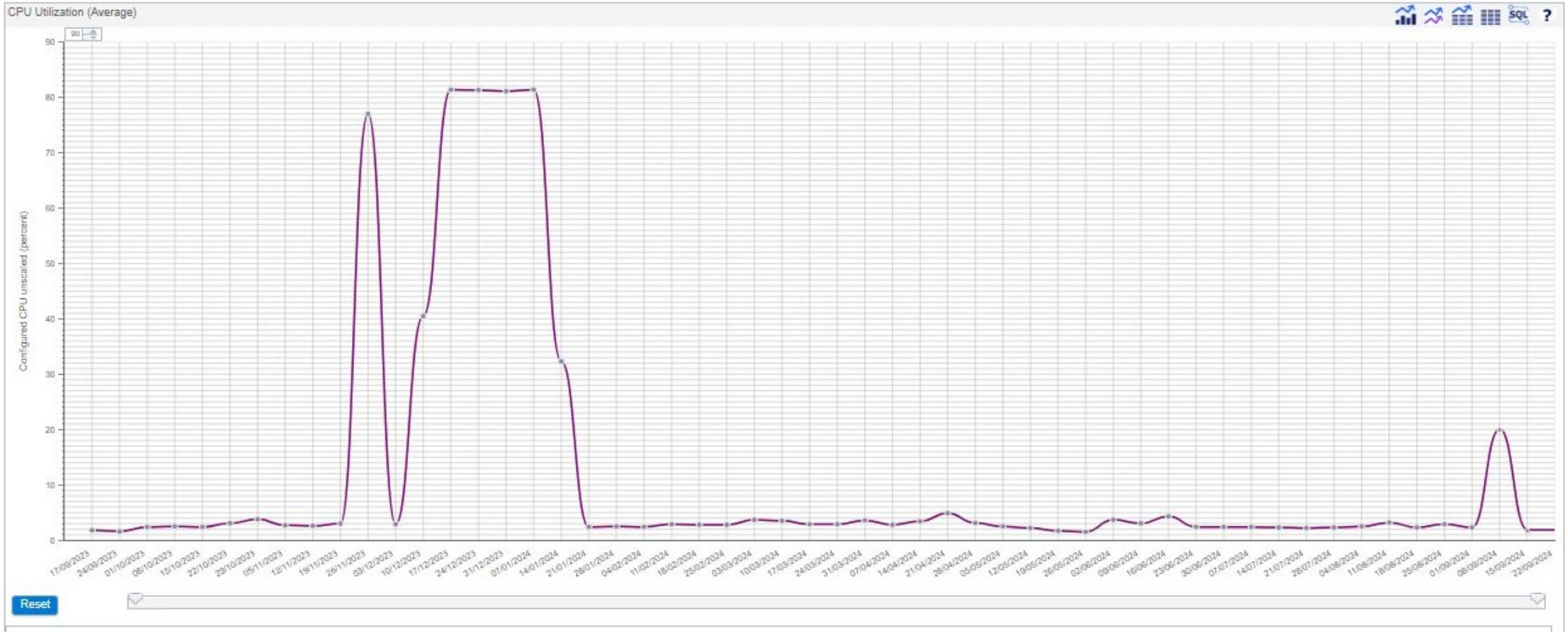
Graph History – Part of Navigator for i



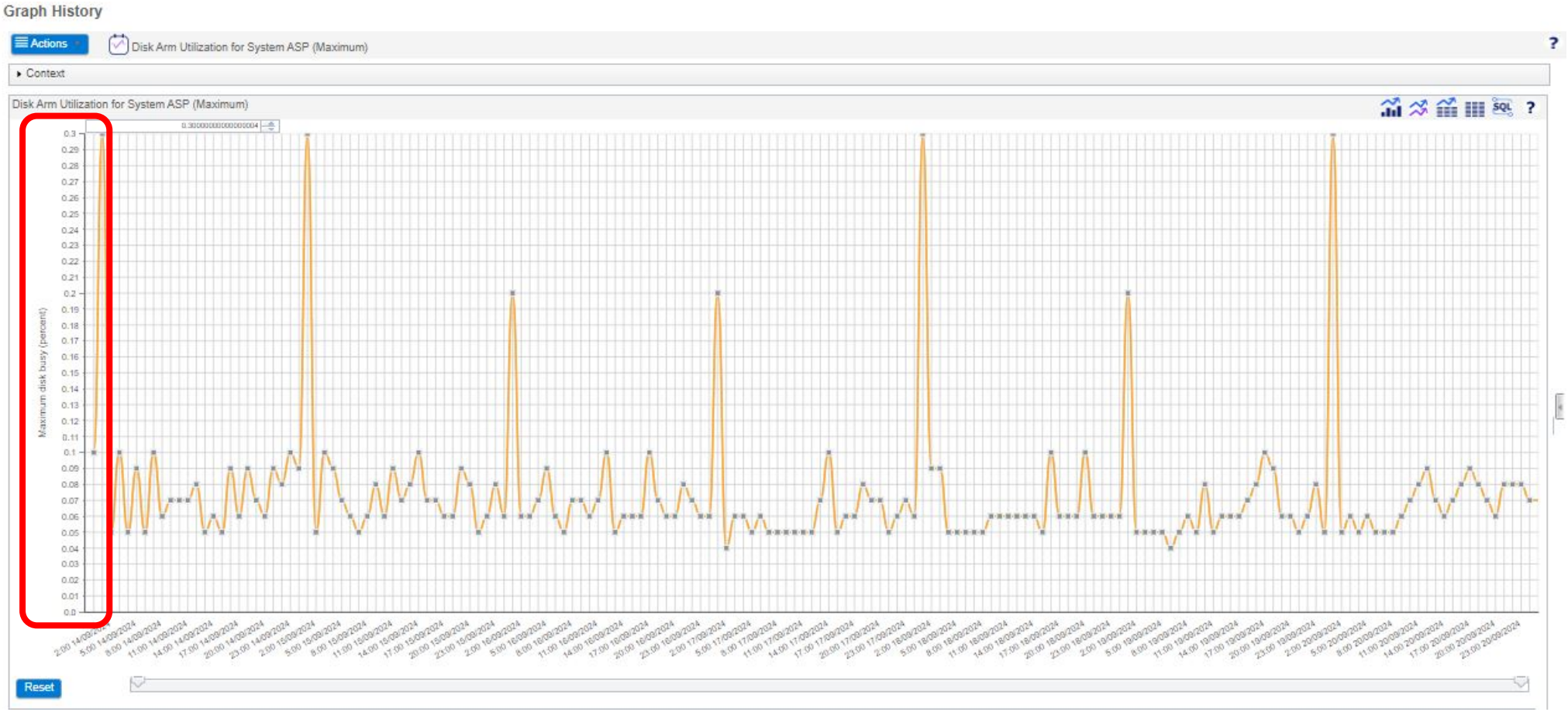
Graph History – Processor Usage with a regular pattern



Graph History – Processor Usage – what is that spike?

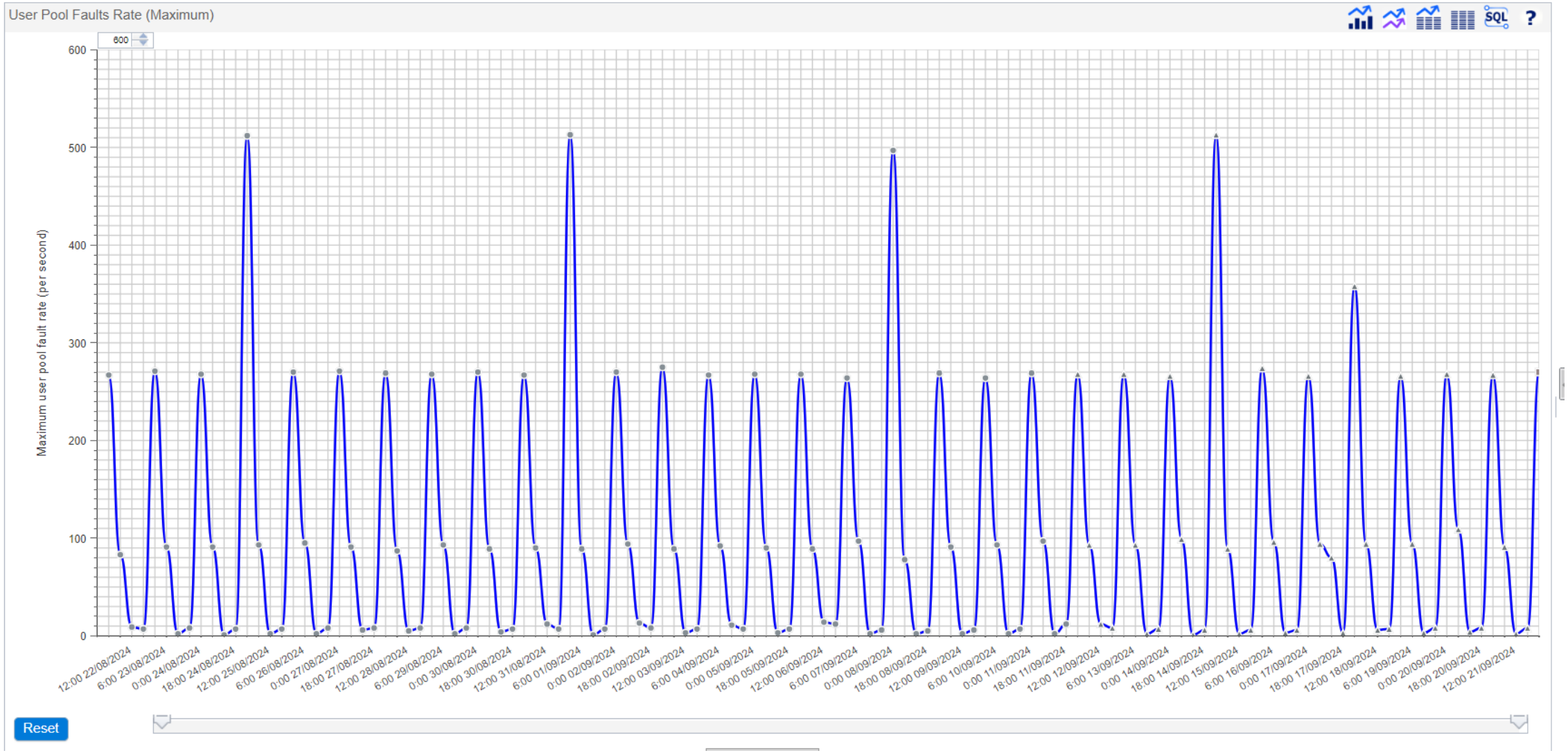


Graph History – Storage Usage



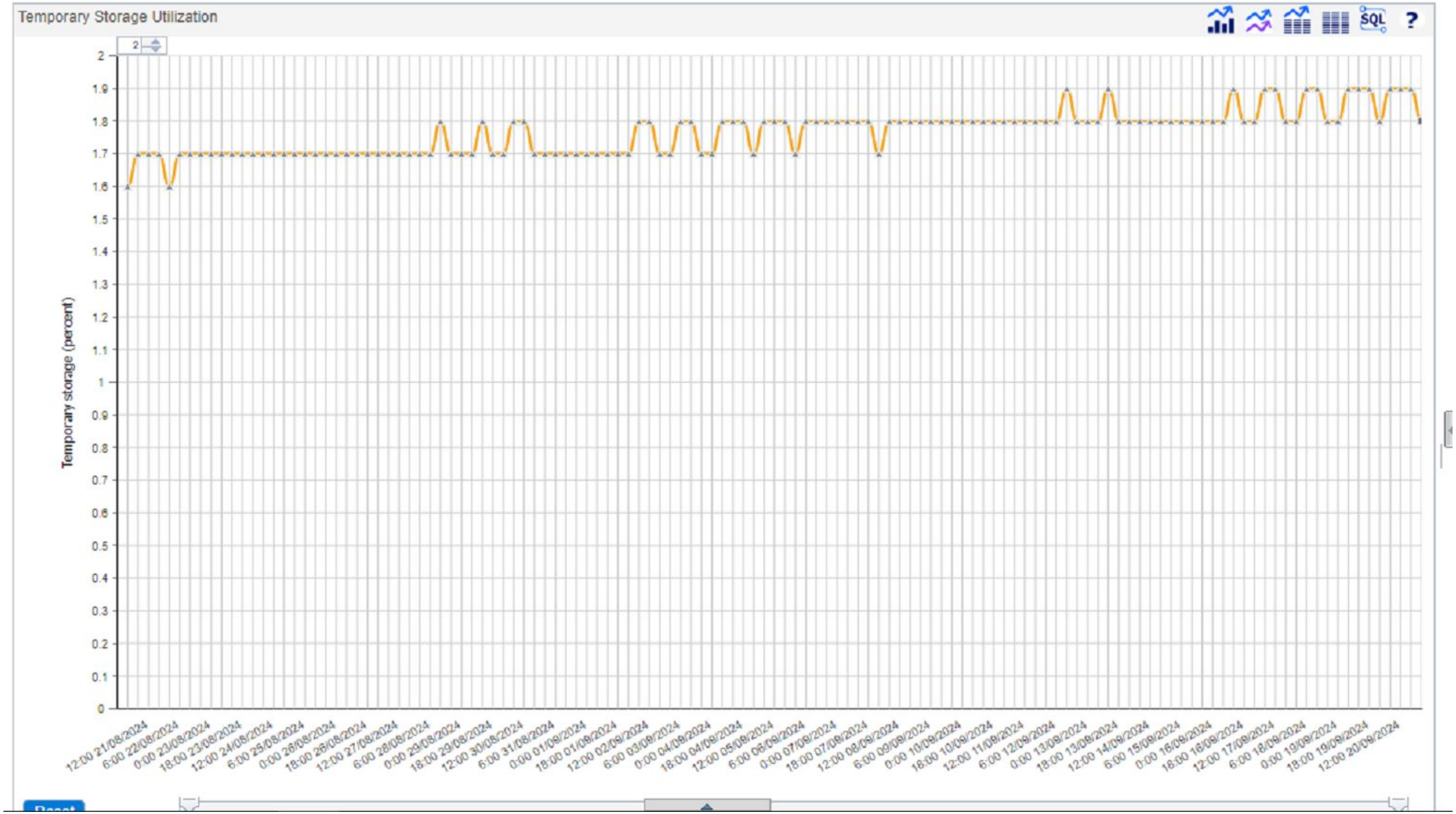
Be aware of your axis range, in this case from 0 to 0.3% so these peaks are Not a problem

Graph History – Memory Usage

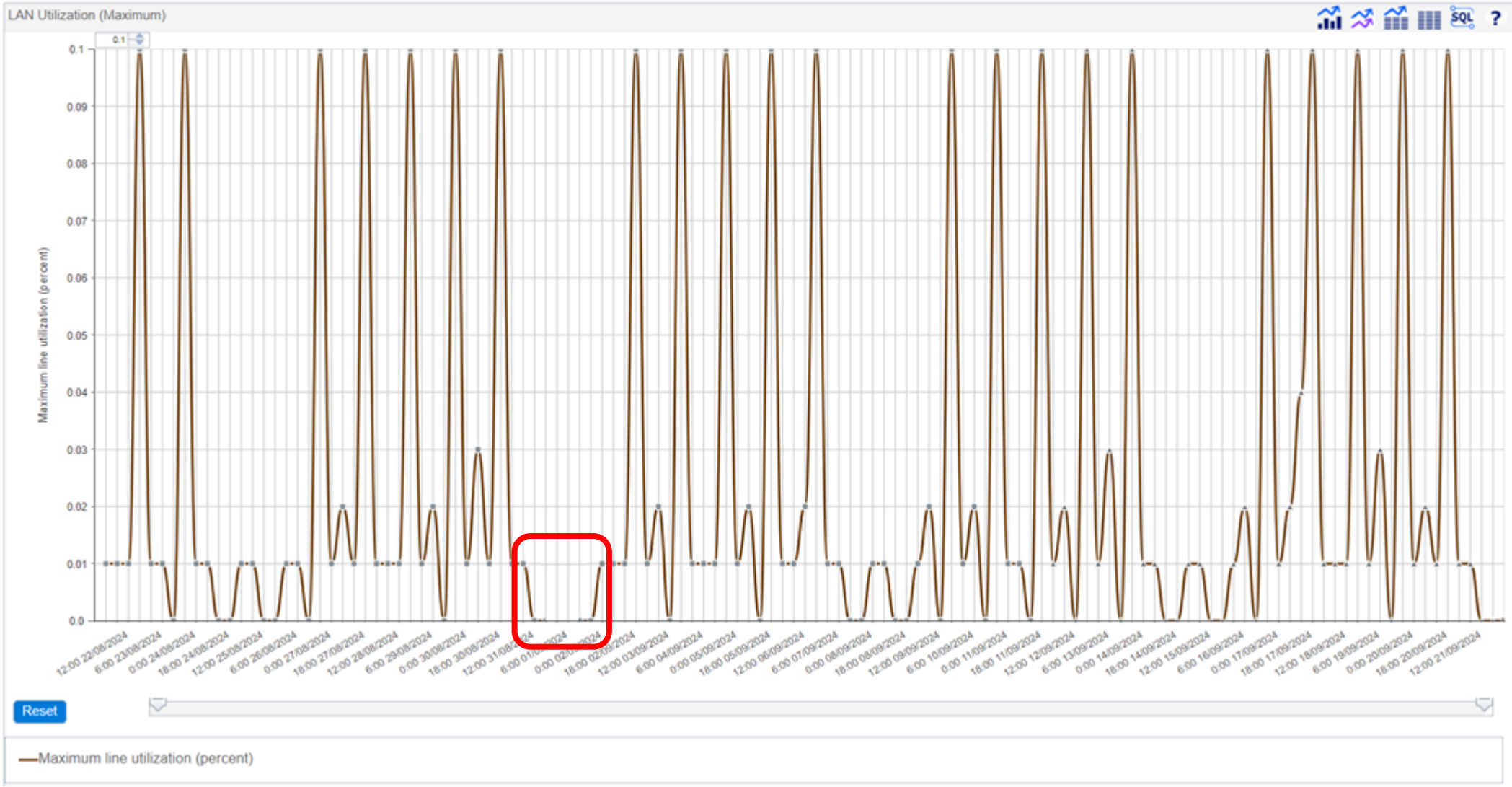


It’s OK to have peaks, as long as they are legitimate, in this case weekly processes

Graph History – Temporary Storage Usage

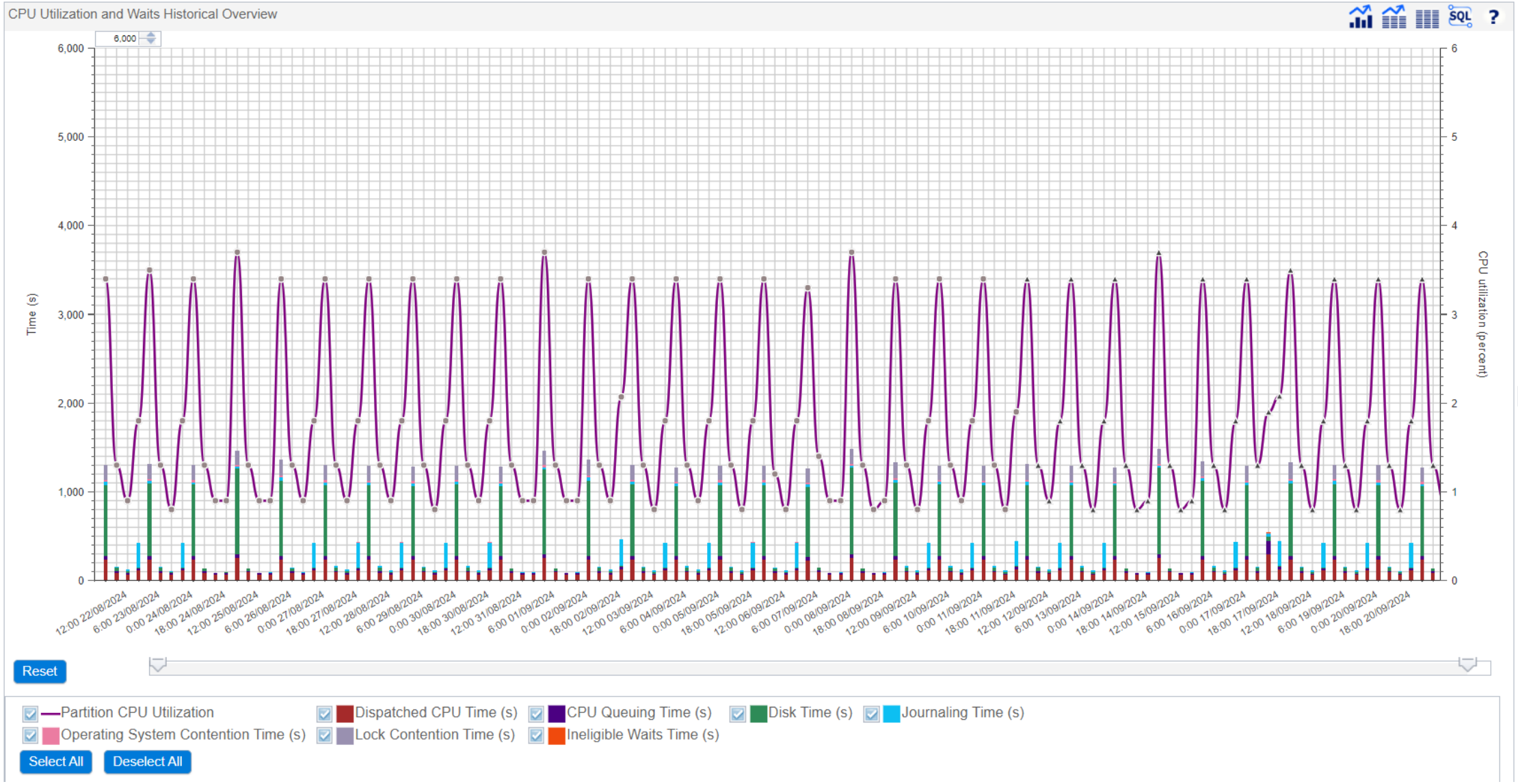


Graph History – Communications Traffic Usage



Watchout for network outages, these can be problems outside of IBM i that effect IBM i

Graph History – Wants a more holistic view?



You can customise these views to include the metrics you want & then export them!

Graph History – Know your system

If you know what normal looks like, then you can:

- Know whether the problem is your IBM i or not
- Know what type of problem you might have
- Know where to focus to fix the problem

Part 5

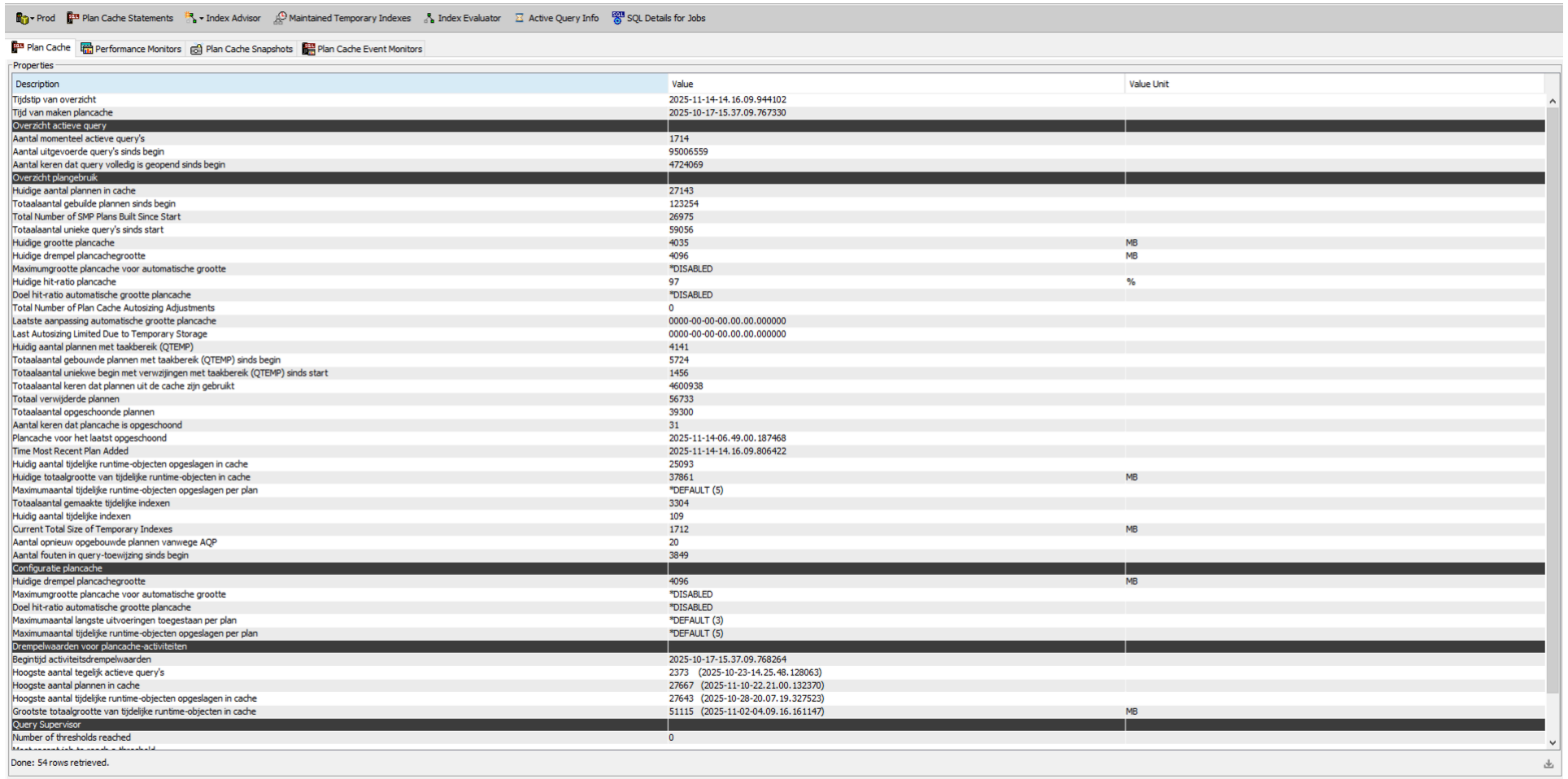
Add SQL Performance Center to your Toolbox

What is the SQL Performance Center all about?

- Plan Cache (Statements, Performance & Event Monitors, Snapshots)
- Index Advisor
- Maintained Temporary Indexes
- Index Evaluator
- Active Query Info
- SQL Details for Jobs

Start Exploring, start getting acquainted
The objective is to learn the value

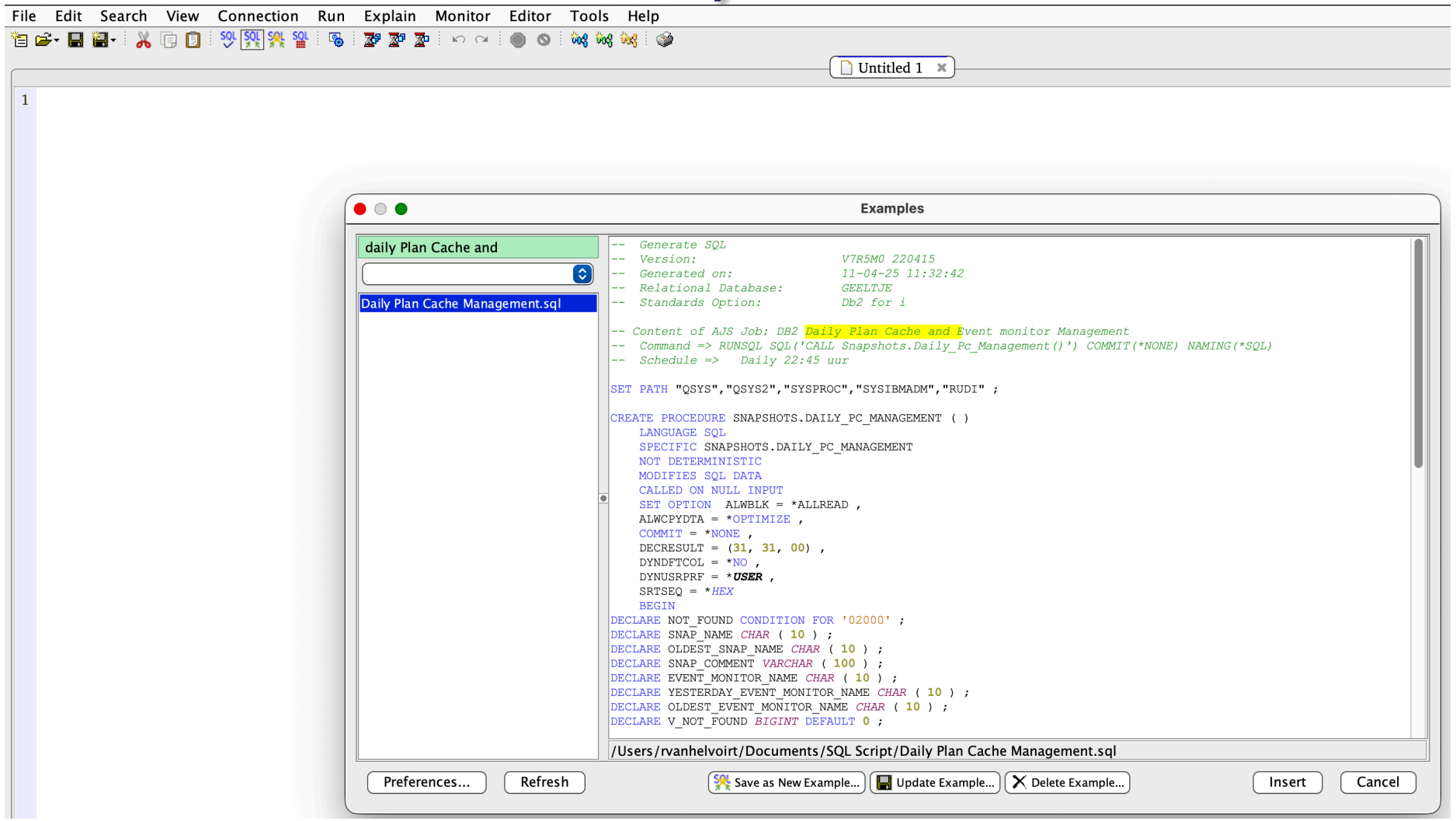
SQL Performance Center



Description	Value	Value Unit
Tijdstip van overzicht	2025-11-14-14.16.09.944102	
Tijd van maken plancache	2025-10-17-15.37.09.767330	
Overzicht actieve query		
Aantal momenteel actieve query's	1714	
Aantal uitgevoerde query's sinds begin	95006559	
Aantal keren dat query volledig is geopend sinds begin	4724069	
Overzicht plangebruik		
Huidige aantal plannen in cache	27143	
Totaalaantal gebuilde plannen sinds begin	123254	
Total Number of SMP Plans Built Since Start	26975	
Totaalaantal unieke query's sinds start	59056	
Huidige grootte plancache	4035	MB
Huidige drempel plancachegrootte	4096	MB
Maximumgrootte plancache voor automatische grootte	*DISABLED	
Huidige hit-ratio plancache	97	%
Doel hit-ratio automatische grootte plancache	*DISABLED	
Total Number of Plan Cache Autosizing Adjustments	0	
Laatste aanpassing automatische grootte plancache	0000-00-00-00.00.00.000000	
Last Autosizing Limited Due to Temporary Storage	0000-00-00-00.00.00.000000	
Huidig aantal plannen met taakbereik (QTEMP)	4141	
Totaalaantal gebouwde plannen met taakbereik (QTEMP) sinds begin	5724	
Totaalaantal uniekwe begin met verwzijingen met taakbereik (QTEMP) sinds start	1456	
Totaalaantal keren dat plannen uit de cache zijn gebruikt	4600938	
Totaal verwijderde plannen	56733	
Totaalaantal opgeschoonde plannen	39300	
Aantal keren dat plancache is opgeschoond	31	
Plancache voor het laatst opgeschoond	2025-11-14-06.49.00.187468	
Time Most Recent Plan Added	2025-11-14-14.16.09.806422	
Huidig aantal tijdelijke runtime-objecten opgeslagen in cache	25093	
Huidige totaalgrootte van tijdelijke runtime-objecten in cache	37861	MB
Maximumaantal tijdelijke runtime-objecten opgeslagen per plan	*DEFAULT (5)	
Totaalaantal gemaakte tijdelijke indexen	3304	
Huidig aantal tijdelijke indexen	109	
Current Total Size of Temporary Indexes	1712	MB
Aantal opnieuw opgebouwde plannen vanwege AQP	20	
Aantal fouten in query-toewijzing sinds begin	3849	
Configuratie plancache		
Huidige drempel plancachegrootte	4096	MB
Maximumgrootte plancache voor automatische grootte	*DISABLED	
Doel hit-ratio automatische grootte plancache	*DISABLED	
Maximumaantal langste uitvoeringen toegestaan per plan	*DEFAULT (3)	
Maximumaantal tijdelijke runtime-objecten opgeslagen per plan	*DEFAULT (5)	
Drempelwaarden voor plancache-activiteiten		
Begintijd activiteitsdrempelwaarden	2025-10-17-15.37.09.768264	
Hoogste aantal tegelijk actieve query's	2373 (2025-10-23-14.25.48.128063)	
Hoogste aantal plannen in cache	27667 (2025-11-10-22.21.00.132370)	
Hoogste aantal tijdelijke runtime-objecten opgeslagen in cache	27643 (2025-10-28-20.07.19.327523)	
Grootste totaalgrootte van tijdelijke runtime-objecten in cache	51115 (2025-11-02-04.09.16.161147)	MB
Query Supervisor		
Number of thresholds reached	0	

You do not want to see a date behind the Last Autosizing Limited Due to Temporary Storage row!

SQL Performance Center History



TIP: Wait for the next version of IBM i Acces Clients Solution GA next month

Part 6

How Much Downtime do I need for my backups?

How Much Downtime do I need for my backups?

- None, you do not need down time for backups
- As long has you have invested in one of the following:
    - Db2 Mirror
    - PowerHA
    - External Storage with FlashCopy
    - Software HA Replication Tool
    - A blatant disregard for your data

How long will is Save 21 – Entire System Save

- This Backup is bootable and contains a complete snapshot of your system
- It forms a key part of many companies Disaster Recovery Strategy
- The problem however is that no one can use the system whilst you run it!
- Questions That I'm often asked:
  - How long will my Save 21 Take?
  - When was my Save 21 last run?

How long was my last Save 21? – Entire System Save

- You can find the answer to both how long and when was it last run with SQL

```
create or replace function systools.go_save_info ()
  returns table (
    step_time timestamp(0), step_name varchar(16), device varchar(10)
  )
  begin
    declare pos int default 1;
    declare step int default 1;
    declare step_count int;
    declare dtaara_guts varchar(2000) ccsid 37;
    set dtaara_guts = (select data_area_value
           from qsys2.data_area_info
           where data_area_library = 'QUSRSYS'
                and data_area_name = 'QSRSAV21');
    set step_count = length(rtrim(dtaara_guts)) / 50 + 1;
    while (step <= step_count) do
      pipe (
        timestamp_format(substr(dtaara_guts, pos, 14), 'YYYYMMDDHH24MISS'),
        case
          when rtrim(substr(dtaara_guts, pos + 15, 10)) = '********'
            then 'GO SAVE Complete'
          else rtrim(substr(dtaara_guts, pos + 15, 10))
        end,
        substr(dtaara_guts, pos + 26, 10)
      );
      set pos = pos + 50;
      set step = step + 1;
    end while;
    return;
  end
```

```
select *
  from table (
     systools.go_save_info()
   )
  order by step_time desc;
```

STEP_TIME	STEP_NAME	DEVICE
2024-01-03 21:22:41	SAVSYS	TAP01
2024-01-03 21:26:27	SAVLIB	TAP01
2024-01-03 21:38:06	SAVDLO	TAP01
2024-01-03 21:38:12	SAV	TAP01
2024-01-03 21:40:29	SAVIASPS	TAP01
2024-01-03 21:40:29	STRSBS	
2024-01-03 21:40:29	GO SAVE Complete	
2024-03-13 16:18:45	SAVSYS	TAP02
2024-03-13 16:22:12	SAVLIB	TAP02
2024-03-13 16:40:47	SAVDLO	TAP02
2024-03-13 16:40:59	SAV	TAP02
2024-03-13 16:44:06	SAVIASPS	TAP02
2024-03-13 16:44:07	STRSBS	
2024-03-13 16:44:07	GO SAVE Complete	

Questions ?