IBM i Anywhere, IBM i Everywhere

Strategy, Roadmap & Innovation

Steve Will – IBM i Chief Architect

IBM i and IBM Power Systems Heritage

IBM i Anywhere
IBM i Everywhere

IBM i
2021

POWER9
2017

POWER8
2014

POWER7
2010

POWER6+
2008

Power Systems
2008

POWER6
2007

System i
System p
POWER5
2004

iSeries
pSeries
2000

POWER4
2001

64-Bit RISC
1995

AS/400
OS/400
48-Bit CISC
1988

S/36
1985

S/38
1980

RS/6000
1986

PowerVM
PowerHA

2018






IBM i Business Today

IBM i Anywhere
IBM i Everywhere

- 117 Countries
- 60+ languages
- All sizes
- All industries
- 2020 – Interesting Year

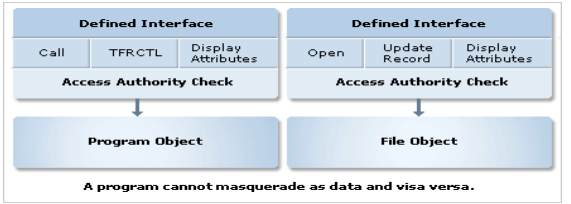
IBM i Architecture: A System Designed for Business

IBM i Anywhere
IBM i Everywhere

Db2 for i & Single Level Store

Automate & optimize storage management

Object Based Architecture

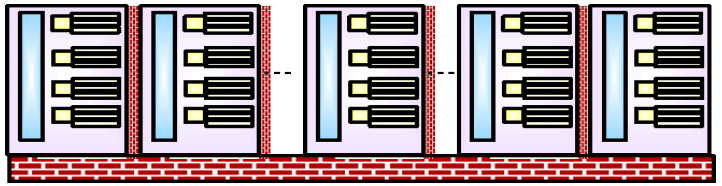


Enables integrity, security, virus-resistance

Integration

Integrates business components, e.g. Db2

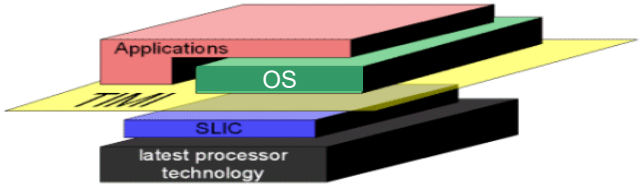
Virtualized Work Management



Provides built-in application virtualization

Technology Independent Machine Interface

Ensures application compatibility across multiple technology generations



Db2 for i – Let the Database do the Work

Some of the key enhancements built into Db2 for i in recent years

- **Row & Column Access Control (RCAC)**
- Field Level Encryption & Masking
- XML & JSON
- Analytics functions
- Query Supervisor built into Query Optimizer
- Authority Collection
- Db2 Mirror

The IBM i Db2 “Datacentric” Strategy

IBM i Strategy

IBM i Anywhere
IBM i Everywhere

Power Solutions

- Enable clients to exploit latest POWER technology
- Enable clients to transform their solutions with new value
  - Analytics, Mobile, Internet of Things, Cognitive, Machine Learning and AI
- Enable Solution Developers to modernize around services & hybrid cloud

Open Platform for Choice

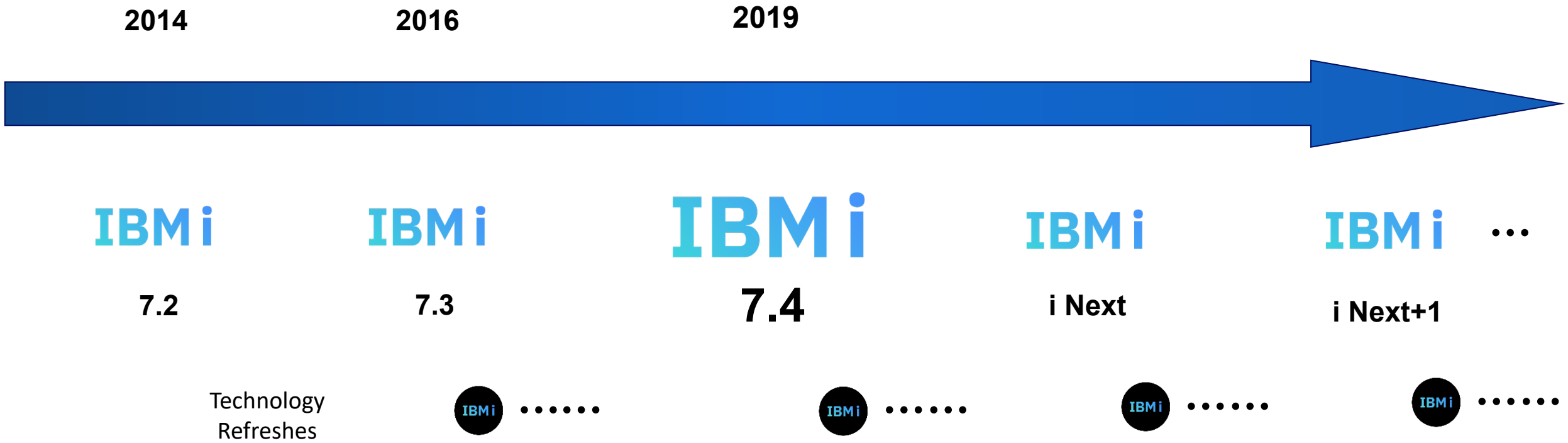
- Grow IBM i solutions options including open source languages & applications
- Provide flexible options for Cloud (inside or outside Data Center)
  - Dynamic Capacity, Power Virtual Server, etc
- Entice new talent with popular open languages and tools

The *Integrated* Promise of IBM i

- Deliver a simple, high value platform for business applications
- Provide exceptional security and resiliency for critical business data
- Enable small staffs to do big things by investing in “ease of use” and automation

IBM i Roadmap

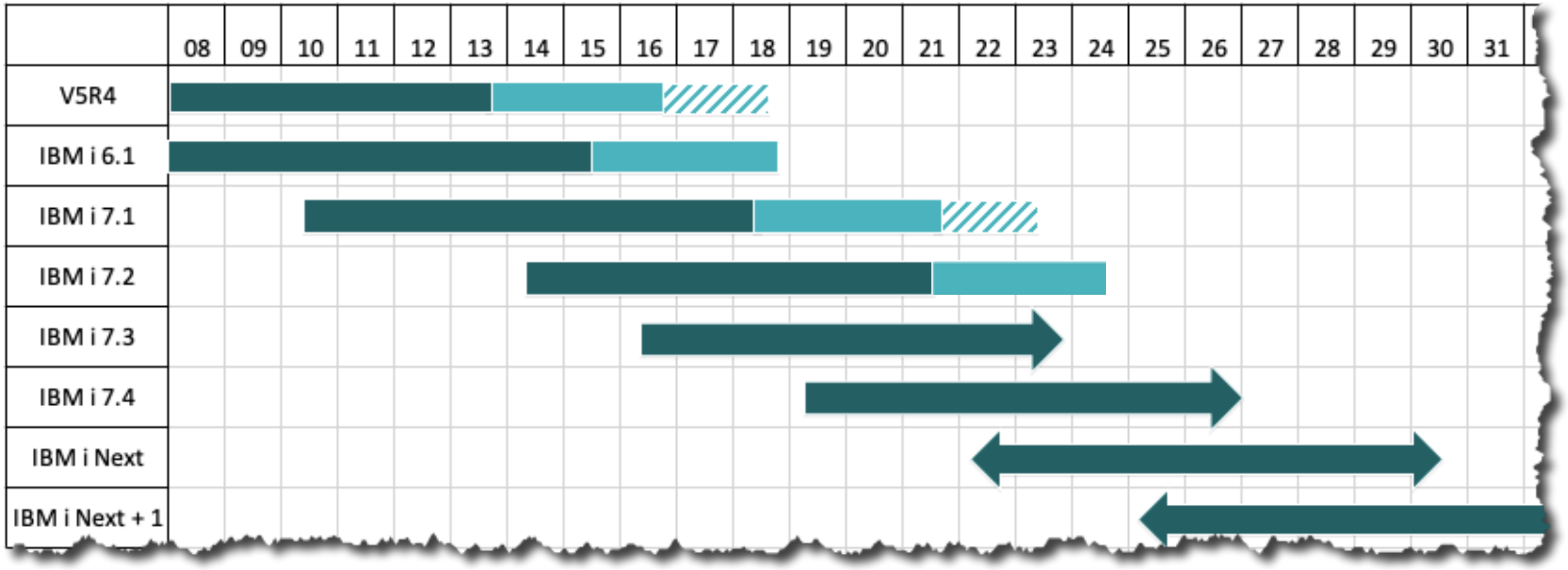
IBM i Anywhere
IBM i Everywhere



** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
** Arrows indicate “ongoing status” and do not imply any specific dates.

IBM i Support Roadmap

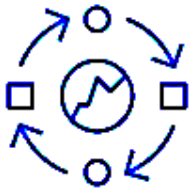
IBM i Anywhere
IBM i Everywhere



** All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice and represent goals and objectives only.
** Arrows indicate “ongoing status” and do not imply any specific dates.
** Service extensions of older Operating System releases are dependent on specific hardware support availability

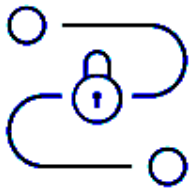
IBM i 7.4 Cornerstones – Delivering on Strategy

The latest IBM i features



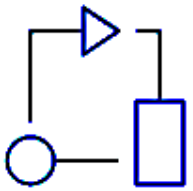
Availability

- IBM Db2 mirror provides continuous availability
- Near zero downtime
- Get work done 24 hours a day, 7 days a week, 365 days a year



Security

- Enhanced security features implement latest industry standard practices
- Protect critical business applications and data
- New auditing capability at the Object level



Open Source

- Industry standard Open Source environments
- Port more applications to IBM i
- Easily integrate with IoT, AI and Watson

IBM i Strategy – Choices & Open

IBM i Anywhere
IBM i Everywhere

Goal: **Code what needs to be coded**
Integrate what needs to be integrated

Traditional Languages & Environments

RPG COBOL C/C++ Apache IBM WebSphere® Liberty

Open Source Language Runtimes

node mono python php

Tools

Rational. software yum yellowdog updater modified BASH THE BOURNE-AGAIN SHELL rsync GCC

Open Frameworks

CherryPy hapi LoopBack

Many client stories with Traditional + Open

*"The ability to run the latest **open source software** alongside unmodified code from the 1980s is surely unheard of on any other platform, and this **offers huge value** to our business in terms of **reducing** both **ongoing risk** and **costs in IT**."*

https://www.ibm.com/case-studies/cras-systems-open-source

*"The fact that the platform supports **open source solutions** means that we can **leverage the very best technology** and benefit from the support and development of the open source community while **avoiding** inhibitive **licensing costs**."*

https://www.ibm.com/case-studies/fibrocit-systems-furniture-design

*"We can develop in C, PHP, Java – there's now a full range of **open source software** on the platform that **meshes seamlessly with the core technologies** that we've been **running for decades**."*

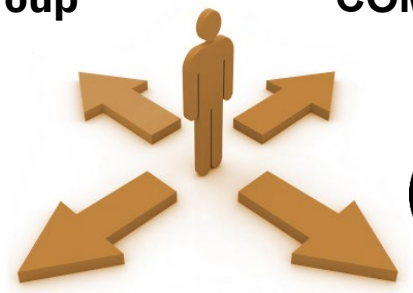
https://cms.ibm.com/case-studies/kube-pak-systems-gardening-wholesale

Client Input is Key to IBM i – Driving Value and Satisfaction

COMMON

Large Users Group (LUG)

COMMON Europe



ISV Advisory Council

IBM i 实验室之旅

ISV Interlocked Development

RFEs

Customer Briefings & Planning Sessions

Face-to-Face and Virtual

Rochester and Montpellier

IBM i NPS = 81

IBM i clients are passionate about the platform, and one reason is their ability to help guide its future.

Access Client Solutions – Strategic Interface

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IBM i Everywhere

WHO?

Users

System Management

Database Engineer

WHAT?

5250
IFS
Spool
Run SQL Scripts
Create Excel Spreadsheets
Schemas
Console

Gone…

IBM i Access for Windows (5733XE1)
End of Life – April 2019

WHERE?

http://ibm.biz/IBMi_ACS

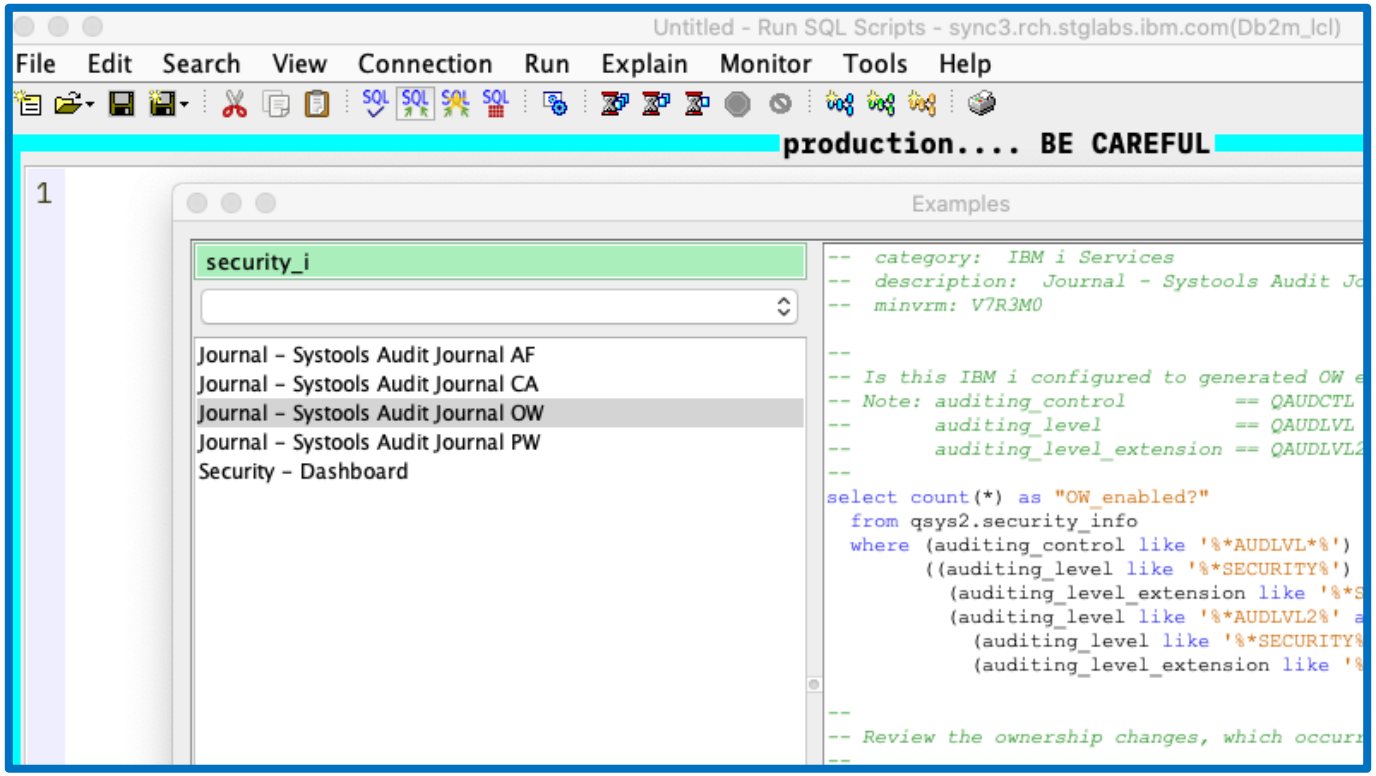
IBM i Access Client Solutions (ACS)

IBM i Anywhere
IBM i Everywhere

ACS 1.1.8.7 – Now Available!

Enhancements to:

- Run SQL Scripts
- Printer Output
- **Insert from Examples**
- And more…



ACS 1.1.8.7 details:

https://www.ibm.com/support/pages/ibm-i-access-acs-updates

IBM i – What Analysts Say

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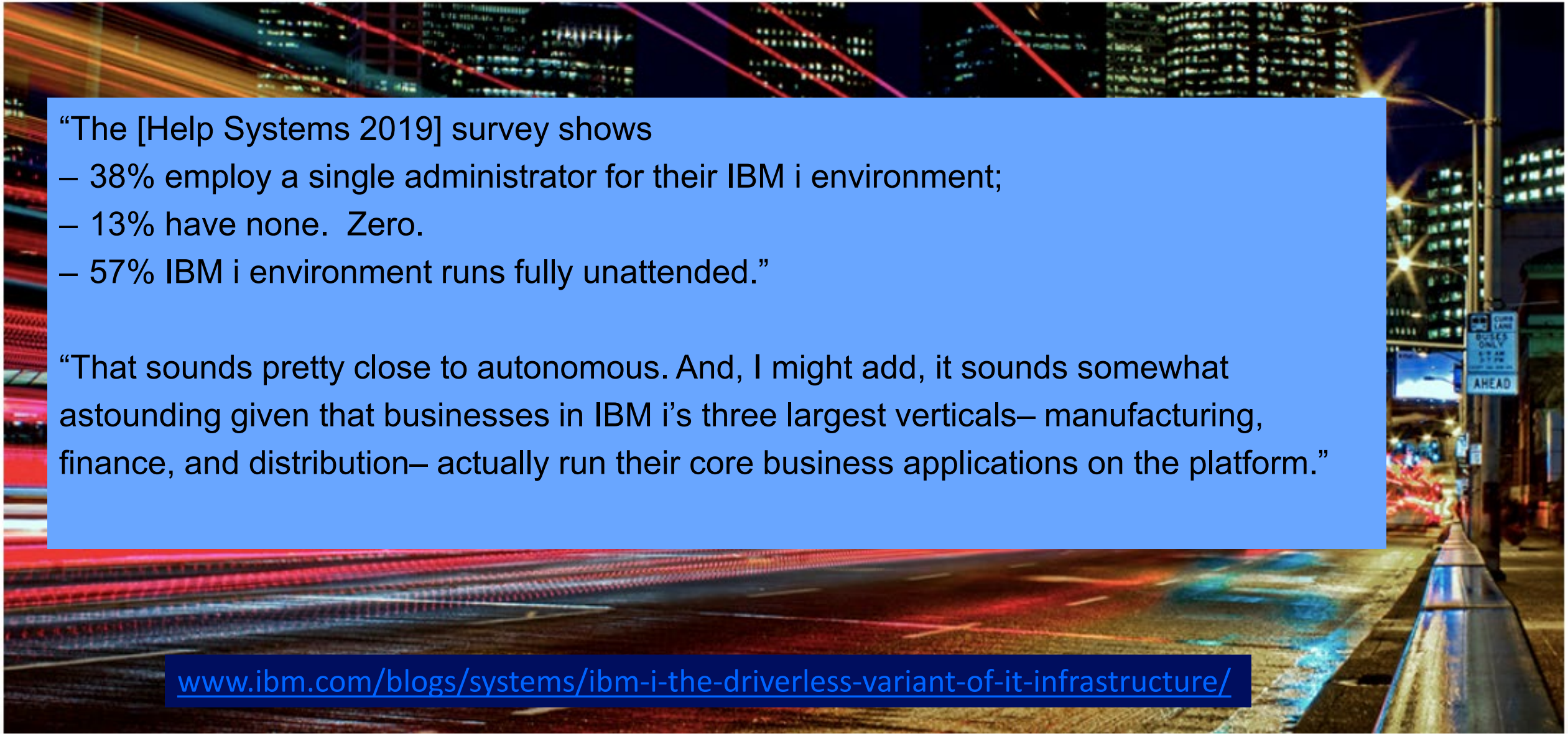
IBM i Everywhere

IBM i – The driverless variant of IT infrastructure

By Peter Rutten | 4 minute read | August 13, 2019



"The [Help Systems 2019] survey shows
– 38% employ a single administrator for their IBM i environment;
– 13% have none. Zero.
– 57% IBM i environment runs fully unattended."

"That sounds pretty close to autonomous. And, I might add, it sounds somewhat astounding given that businesses in IBM i's three largest verticals– manufacturing, finance, and distribution– actually run their core business applications on the platform."

www.ibm.com/blogs/systems/ibm-i-the-driverless-variant-of-it-infrastructure/

IDC Report – “The Value of Staying Current”

https://www.ibm.com/account/reg/us-en/signup?formid=urx-41002

IBM’s Commitment to IBM i

IBM i Anywhere
IBM i Everywhere

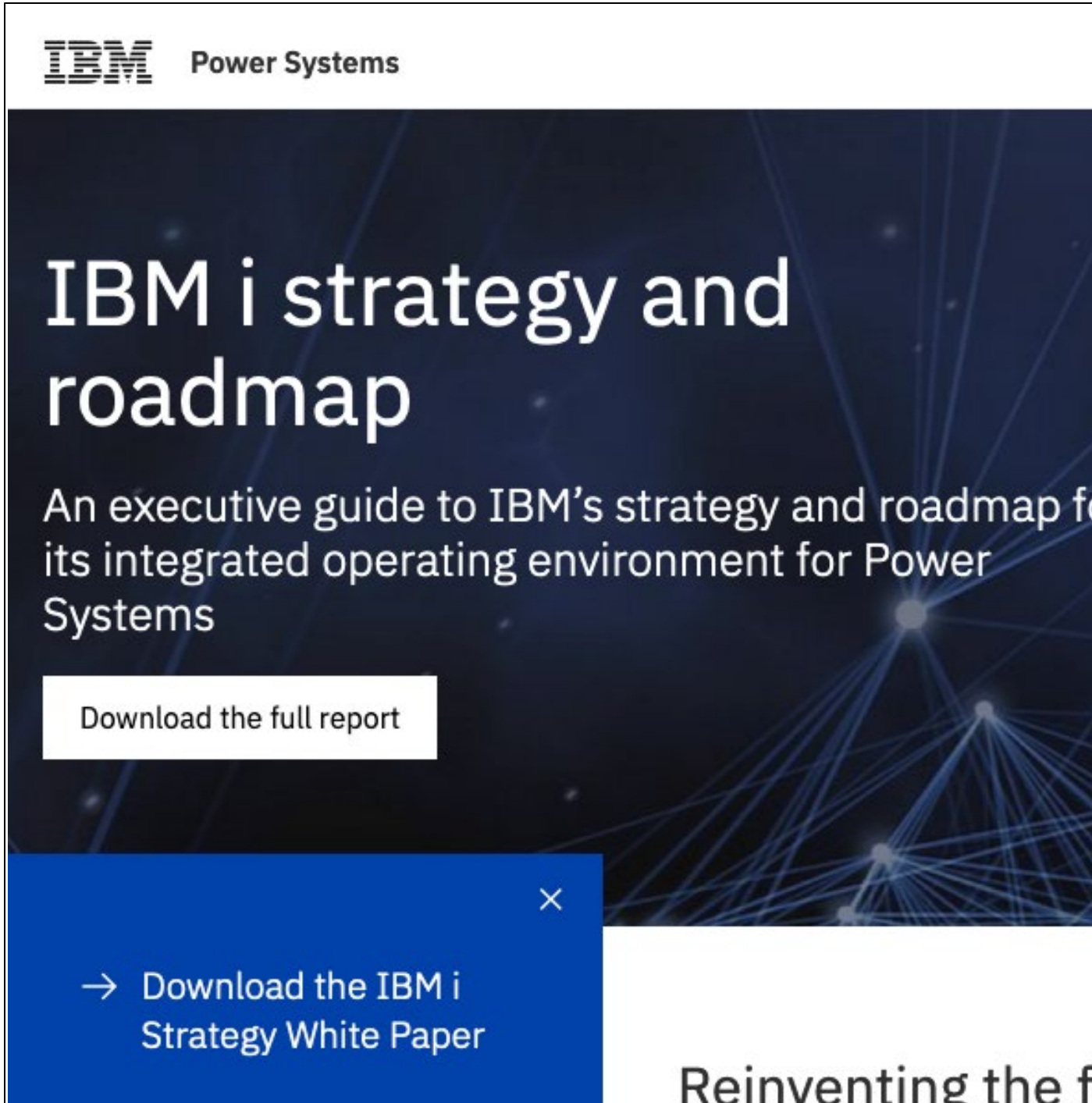
IBM i Strategy Whitepaper

Reviews industry directions

Reflects the strategy of IBM i in specific roadmaps such as

- Strategy
- Partners
- Cloud
- Cognitive Computing
- Application Modernization
- Database

https://www.ibm.com/it-infrastructure/us-en/resources/power/i-strategy-roadmap/

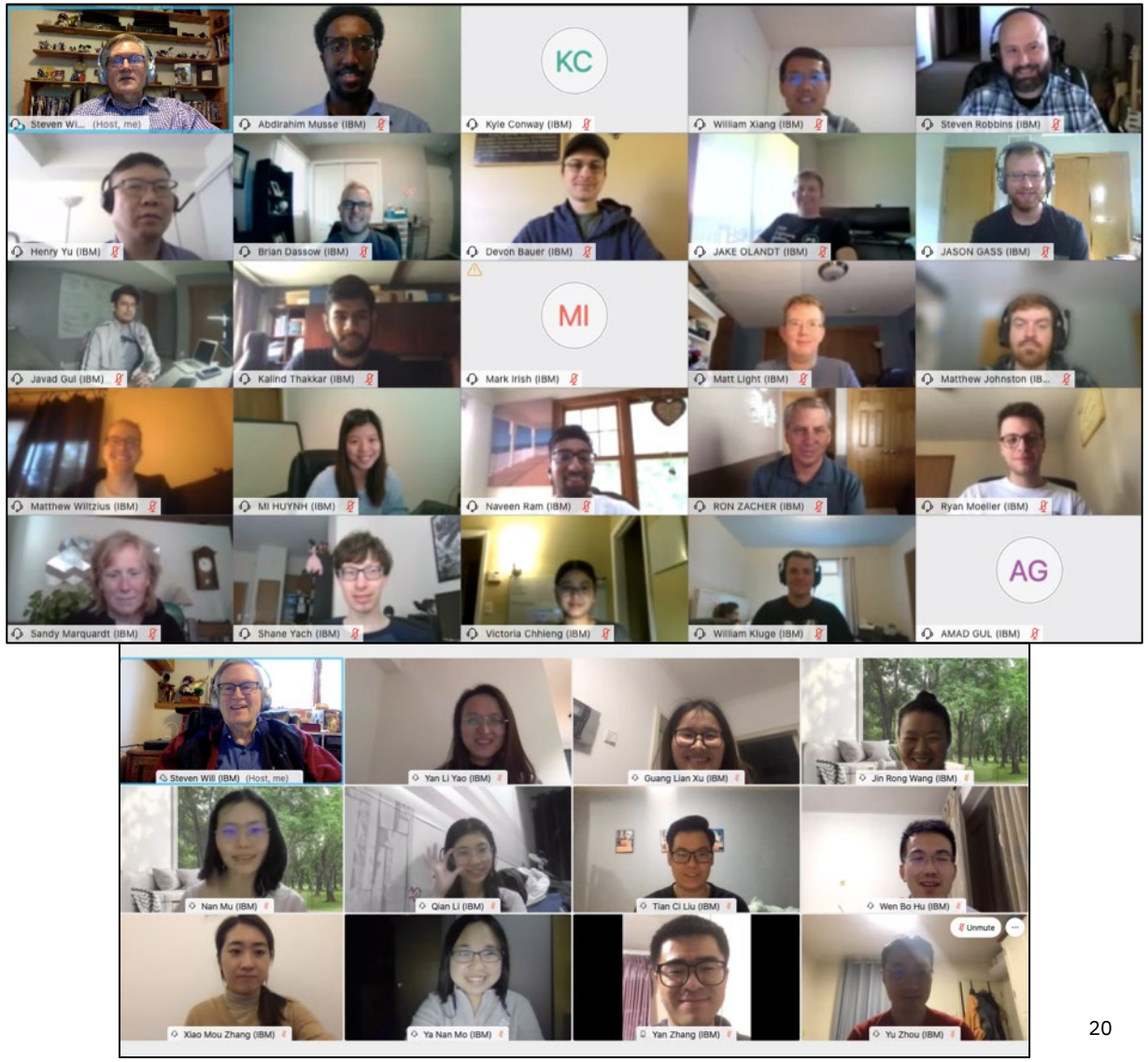


Fresh Faces in IBM i Development

IBM i Anywhere
IBM i Everywhere

2018

2020

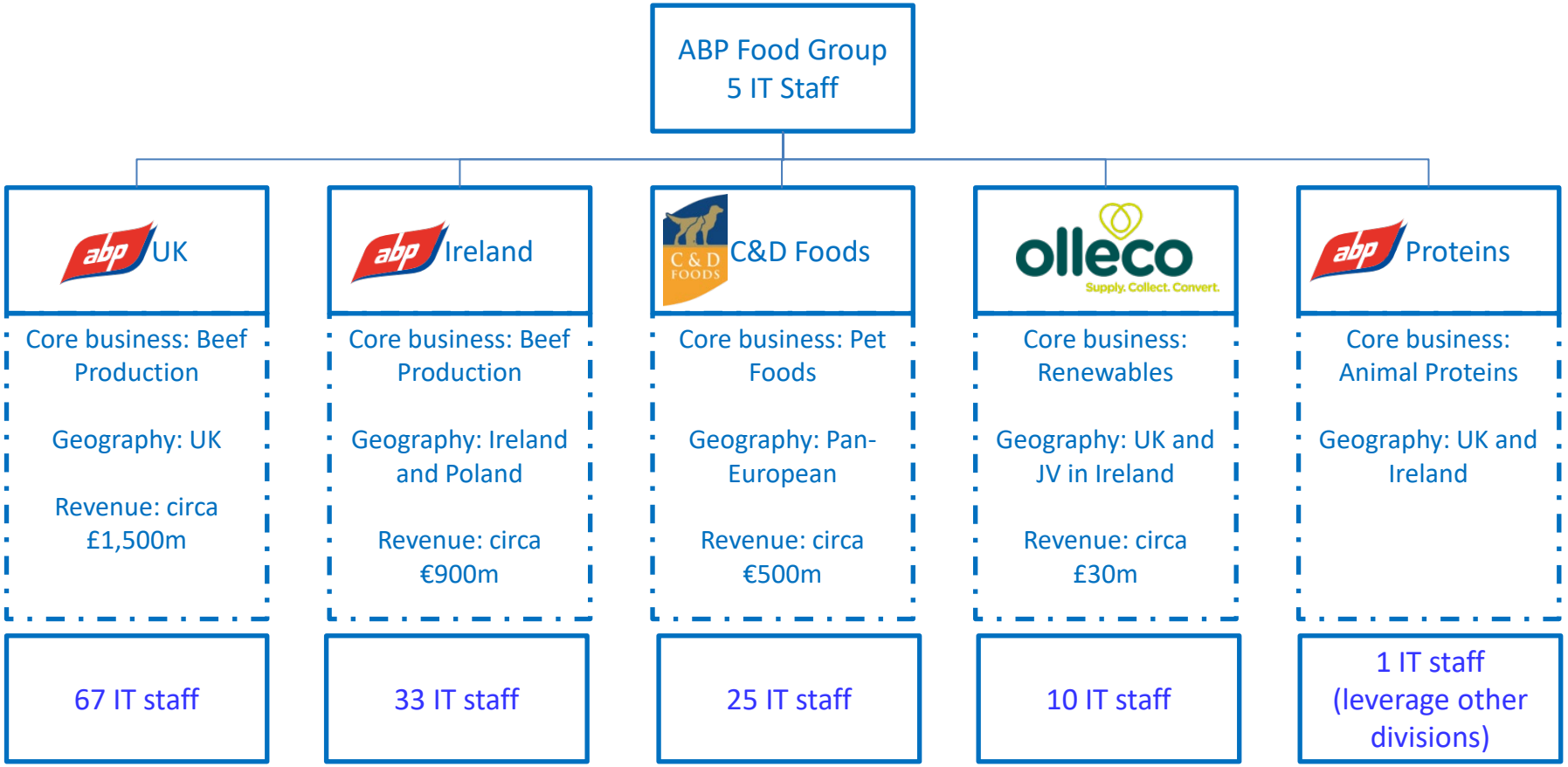


ABP’s innovative approach to GDPR Compliance based on IBM’s integrated operating system

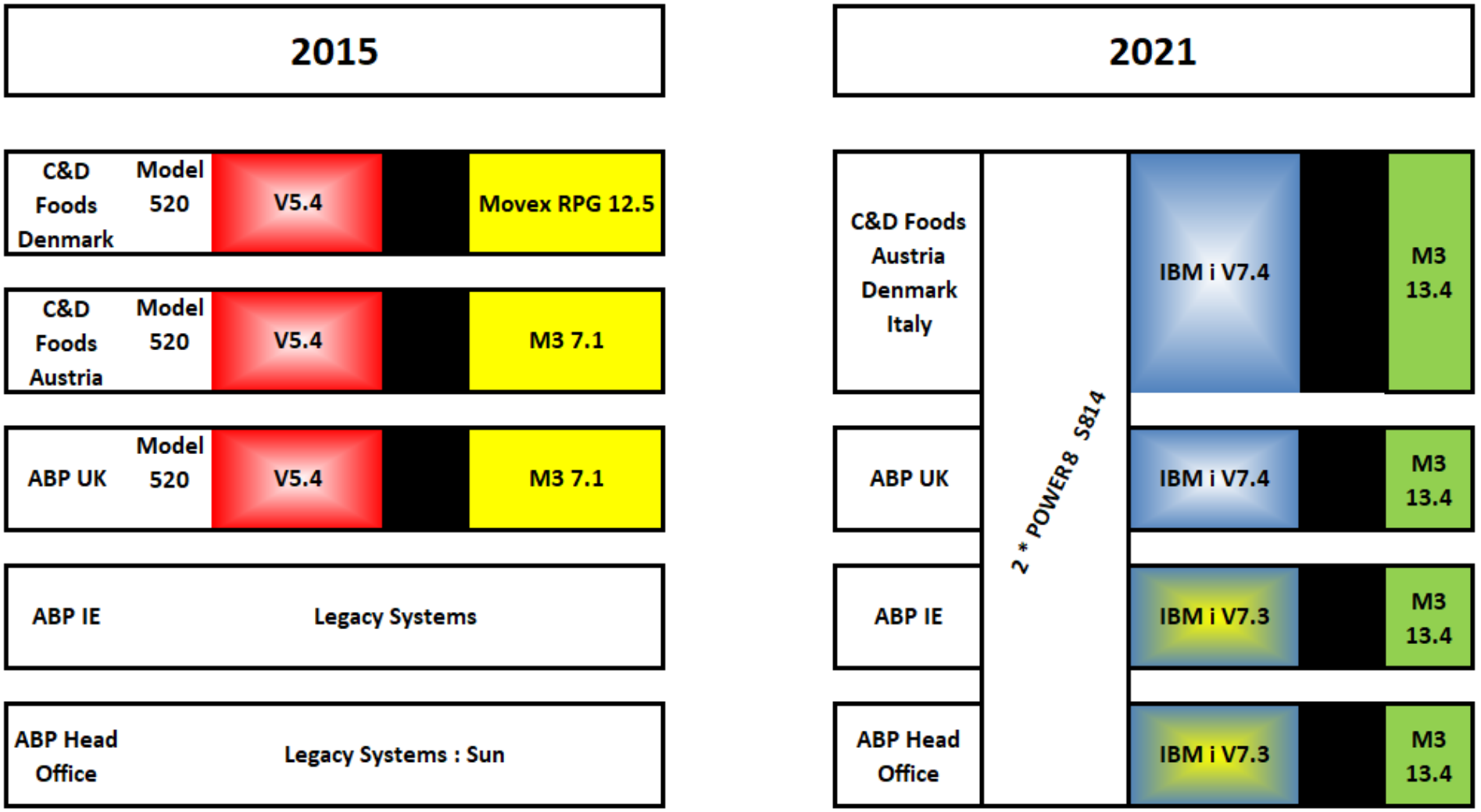
Content

- ABP
- IBM i / M3 – 2015 and now
- IBM tools – work smarter
- Journal caching
- RCAC
- Performance tips (not presented, but for information)

Group Structure



IBM i & M3 – 2015 vs Now



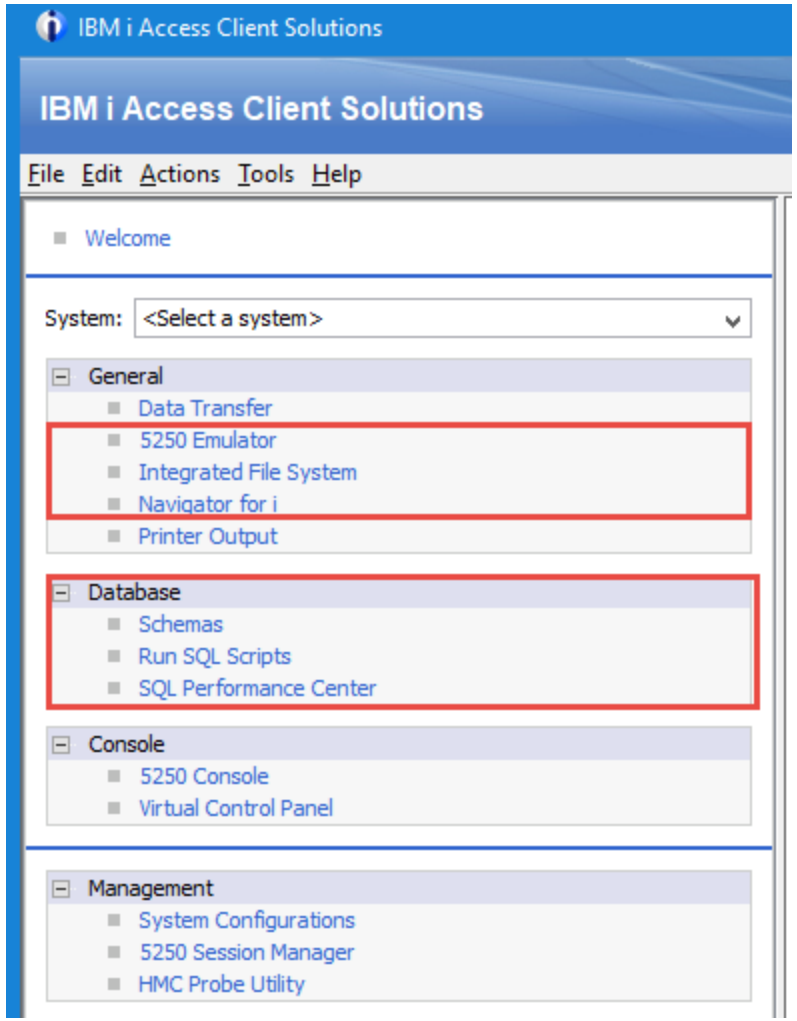
IBM Tools that help me

ACS

- Fast
- Efficient
- Powerful tools

- Work smarter

IBM Tools that help me : ACS

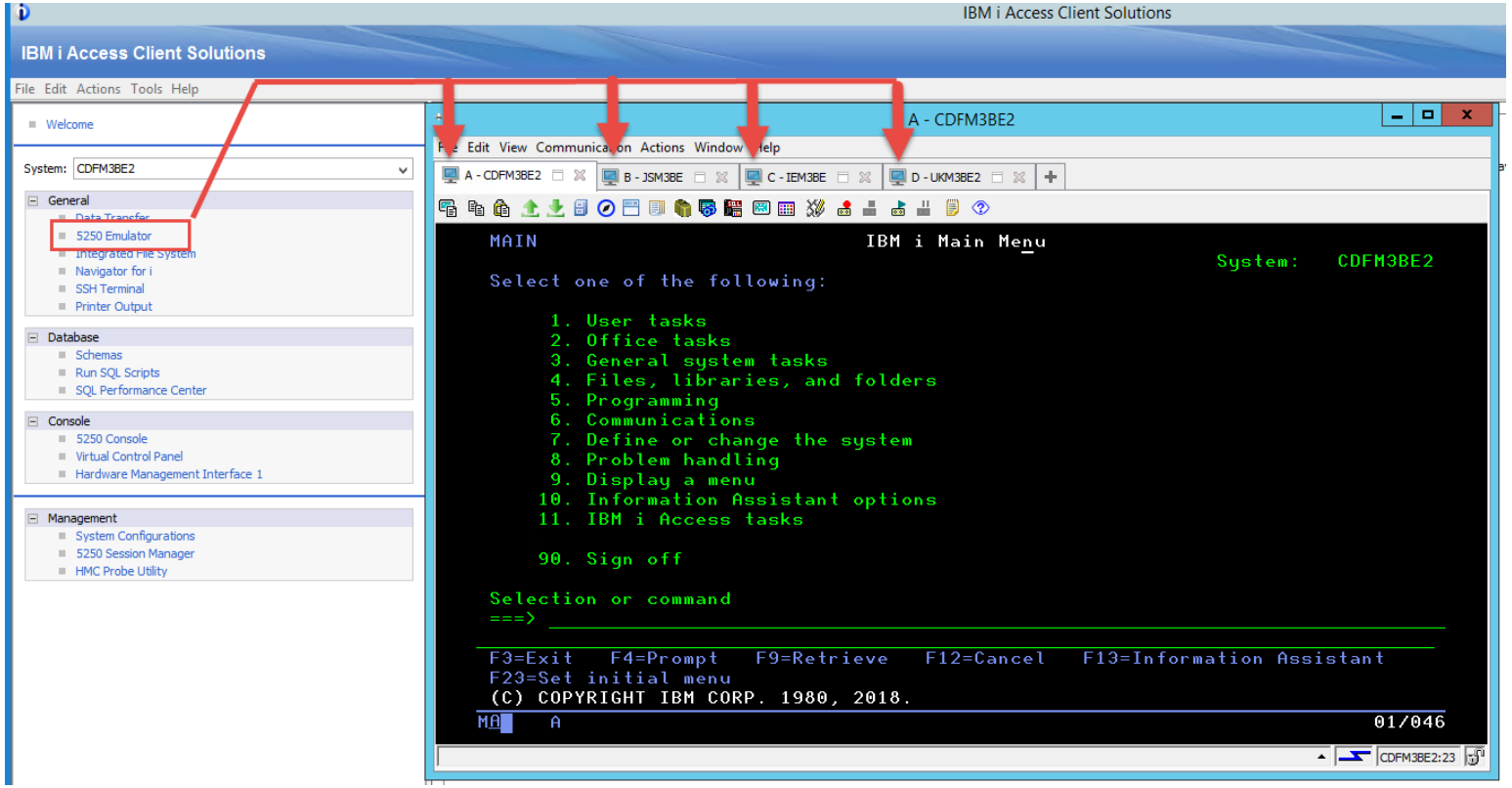


ACS

- Still can't let go of 5250
- IFS – really fast navigation
- Navigator – essential for performance work

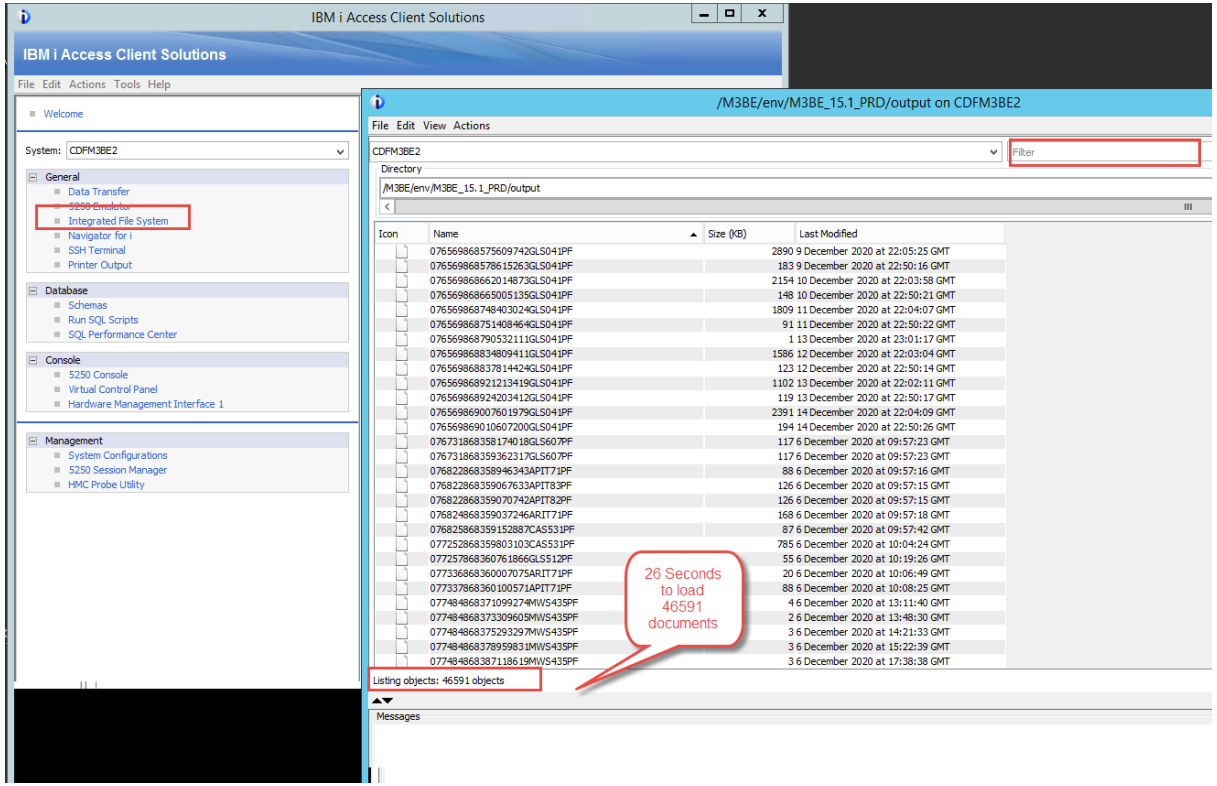
- Database tools
  - Schemas – design/manage
  - SQL Scripts - examples
  - SQL Performance
    Make it go faster.

IBM Tools that help me : ACS



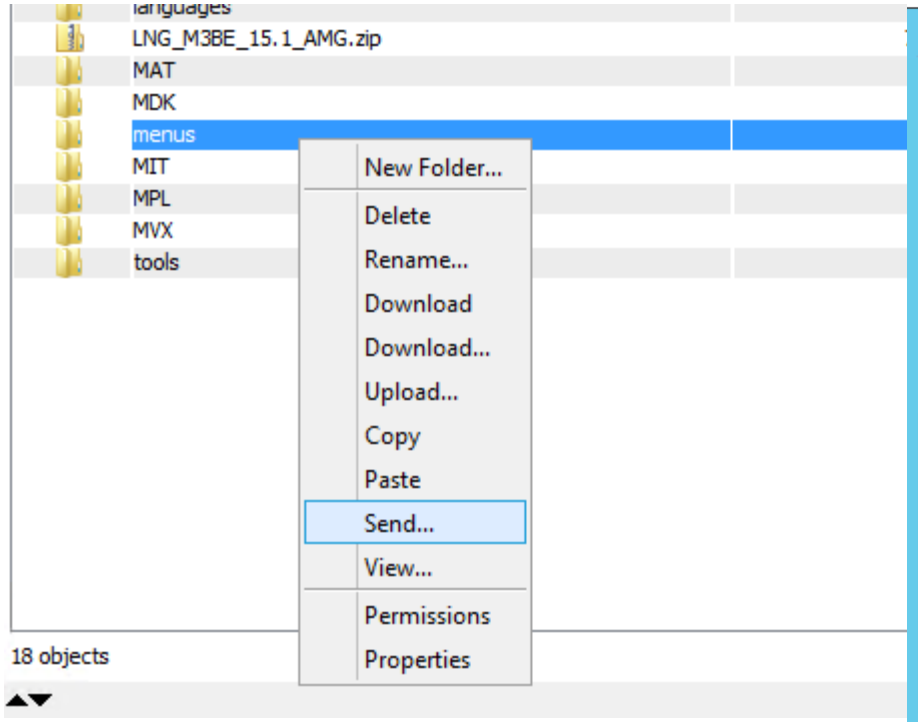
- Tabs for multiple 5250 sessions – single or multiple systems
- Immediate access to data tools using the taskbar

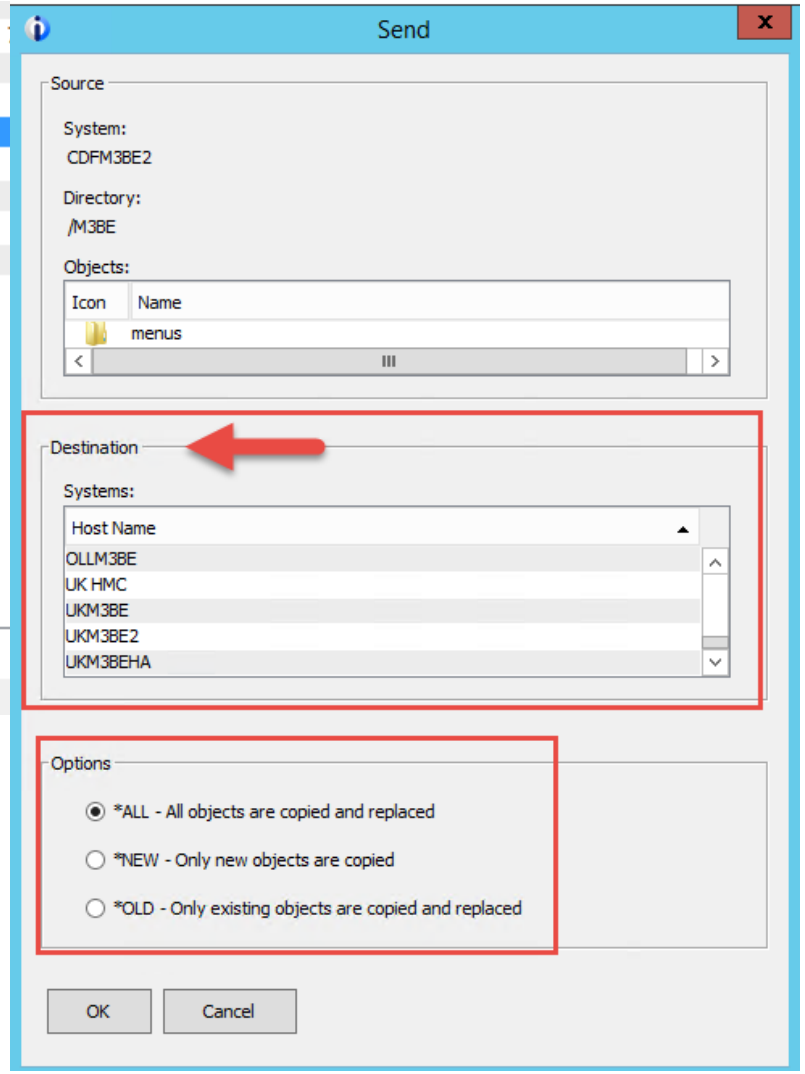
IBM Tools that help me : ACS



- IFS Navigation – very much faster – here it loaded 1791/second
- *If you have (estimate) >800,000 documents in the target folder, you need to change the heap size when you launch ACS.*

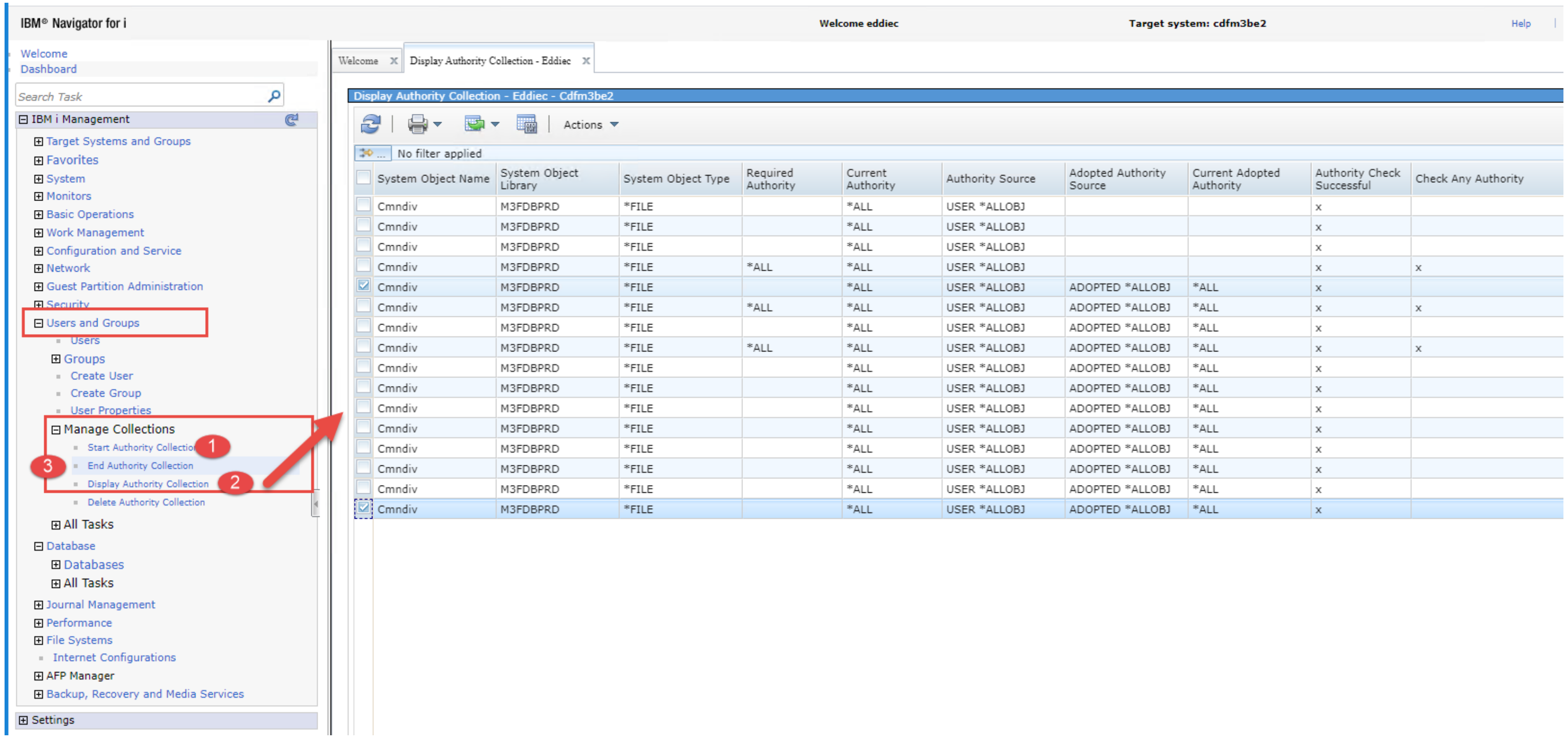
IBM Tools that help me : ACS





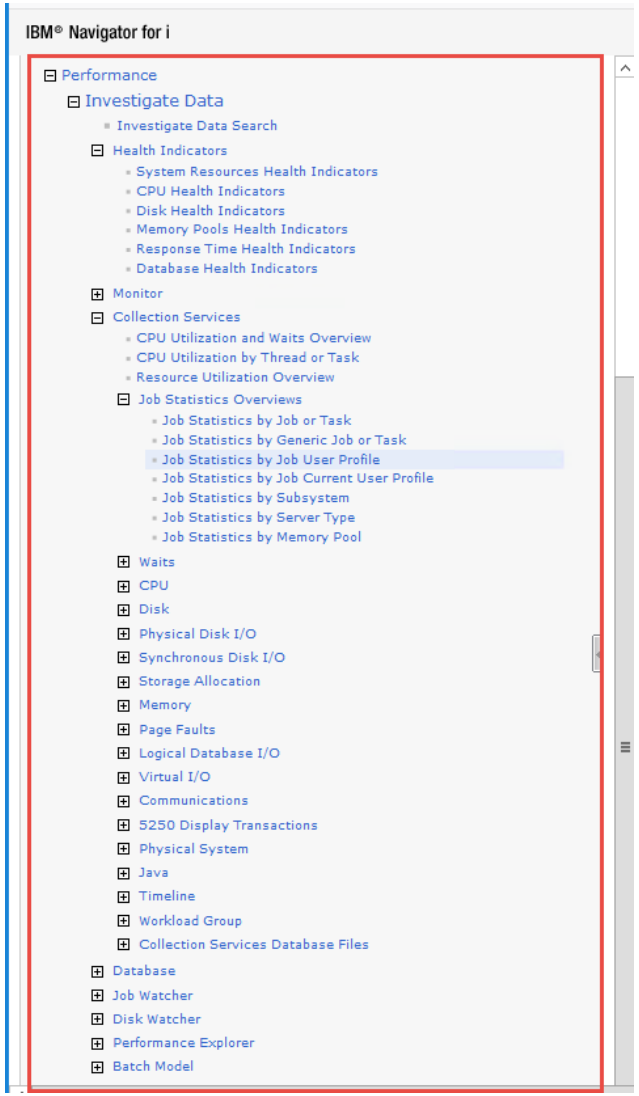
- IFS – Send an object / folder
  to another system
- No *SAVF. No FTP. No Restore
- Click, select and just do it.

IBM Tools that help me : Navigator



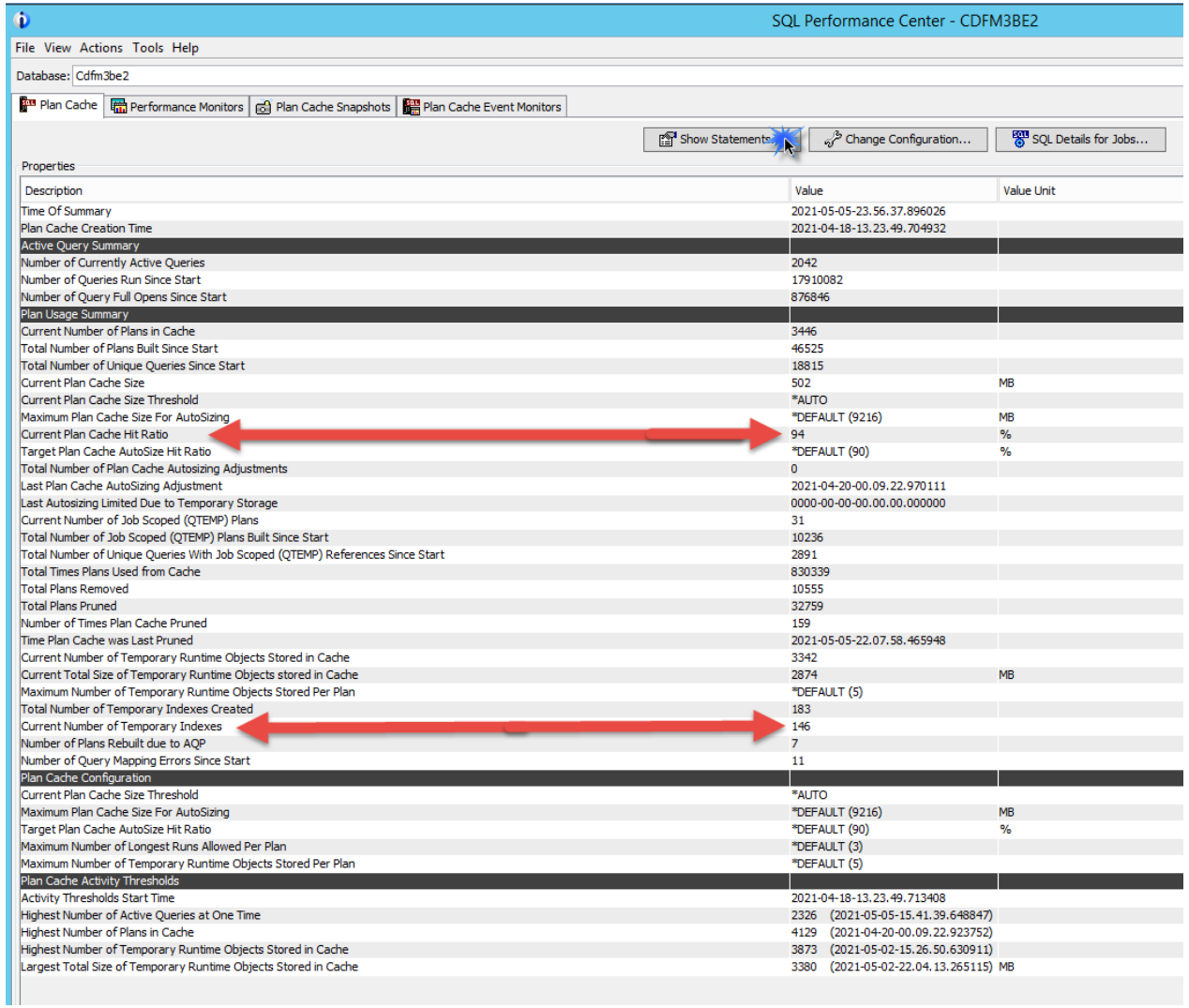
- Navigator -> Authority collection – Introduced in V7R3 and extended in V7R4. Determine where a user obtained rights to access an object
- It also shows what rights the user needed to perform the task (also use SQL)

IBM Tools that help me : Navigator



- Performance investigation
- Vast number of ways to investigate and obtain information.
- Understand what is normal for your system
- Too big a topic to cover now.

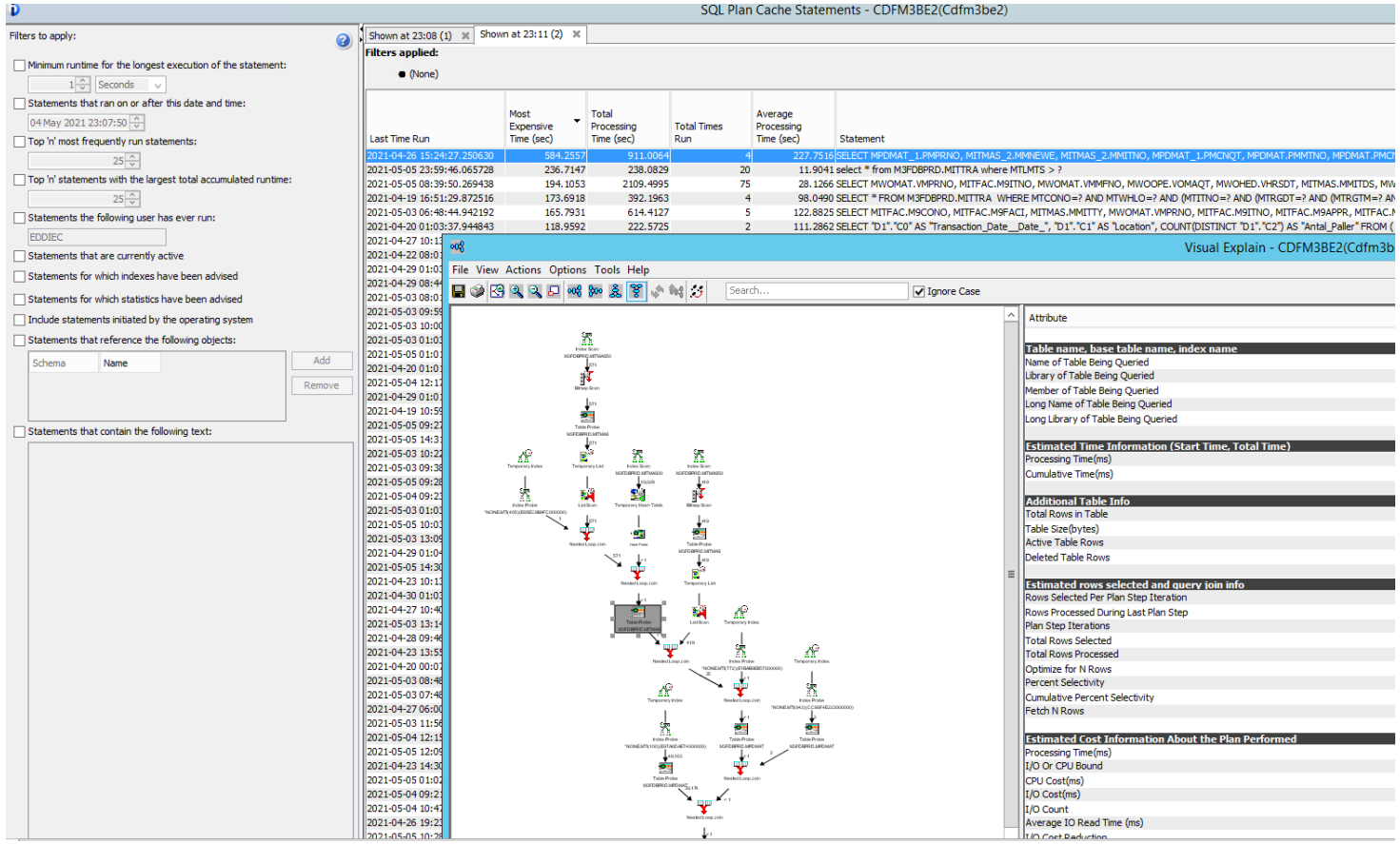
IBM Tools that help me : Database



Description	Value	Value Unit
Time Of Summary	2021-05-05-23.56.37.896026	
Plan Cache Creation Time	2021-04-18-13.23.49.704932	
Active Query Summary		
Number of Currently Active Queries	2042	
Number of Queries Run Since Start	17910082	
Number of Query Full Opens Since Start	876846	
Plan Usage Summary		
Current Number of Plans in Cache	3446	
Total Number of Plans Built Since Start	46525	
Total Number of Unique Queries Since Start	18815	
Current Plan Cache Size	502	MB
Current Plan Cache Size Threshold	*AUTO	
Maximum Plan Cache Size For AutoSizing	*DEFAULT (9216)	MB
Current Plan Cache Hit Ratio	94	%
Target Plan Cache AutoSize Hit Ratio	*DEFAULT (90)	%
Total Number of Plan Cache Autosizing Adjustments	0	
Last Plan Cache AutoSizing Adjustment	2021-04-20-00.09.22.970111	
Last Autosizing Limited Due to Temporary Storage	0000-00-00-00.00.00.000000	
Current Number of Job Scoped (QTEMP) Plans	31	
Total Number of Job Scoped (QTEMP) Plans Built Since Start	10236	
Total Number of Unique Queries With Job Scoped (QTEMP) References Since Start	2891	
Total Times Plans Used from Cache	830339	
Total Plans Removed	10555	
Total Plans Pruned	32759	
Number of Times Plan Cache Pruned	159	
Time Plan Cache was Last Pruned	2021-05-05-22.07.58.465948	
Current Number of Temporary Runtime Objects Stored in Cache	3342	
Current Total Size of Temporary Runtime Objects stored in Cache	2874	MB
Maximum Number of Temporary Runtime Objects Stored Per Plan	*DEFAULT (5)	
Total Number of Temporary Indexes Created	183	
Current Number of Temporary Indexes	146	
Number of Plans Rebuilt due to AQP	7	
Number of Query Mapping Errors Since Start	11	
Plan Cache Configuration		
Current Plan Cache Size Threshold	*AUTO	
Maximum Plan Cache Size For AutoSizing	*DEFAULT (9216)	MB
Target Plan Cache AutoSize Hit Ratio	*DEFAULT (90)	%
Maximum Number of Longest Runs Allowed Per Plan	*DEFAULT (3)	
Maximum Number of Temporary Runtime Objects Stored Per Plan	*DEFAULT (5)	
Plan Cache Activity Thresholds		
Activity Thresholds Start Time	2021-04-18-13.23.49.713408	
Highest Number of Active Queries at One Time	2326 (2021-05-05-15.41.39.648847)	
Highest Number of Plans in Cache	4129 (2021-04-20-00.09.22.923752)	
Highest Number of Temporary Runtime Objects Stored in Cache	3873 (2021-05-02-15.26.50.630911)	
Largest Total Size of Temporary Runtime Objects Stored in Cache	3380 (2021-05-02-22.04.13.265115)	MB

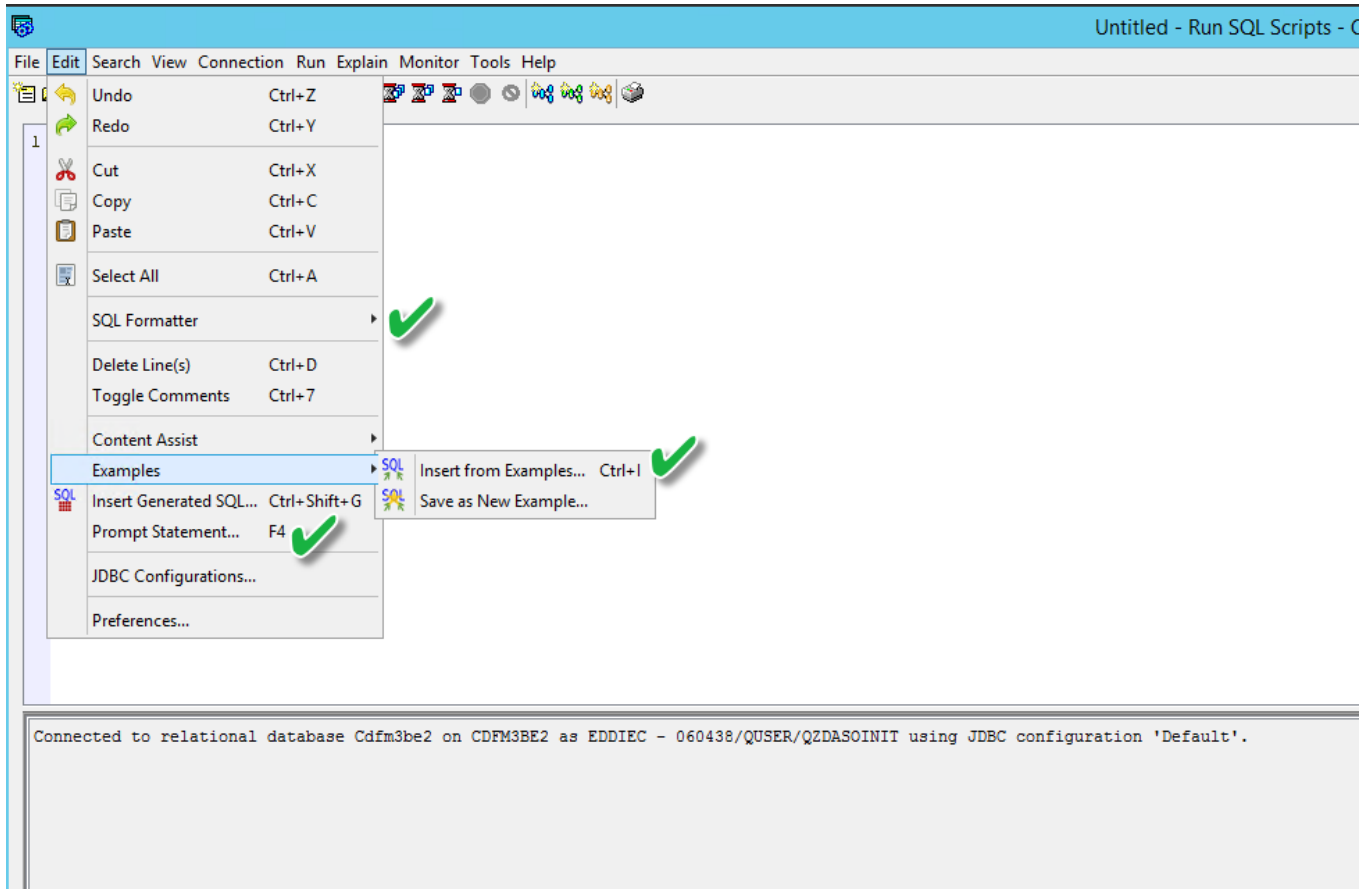
- SQL Performance Center
- Provides overview
- Show statements [button]

IBM Tools that help me : Database



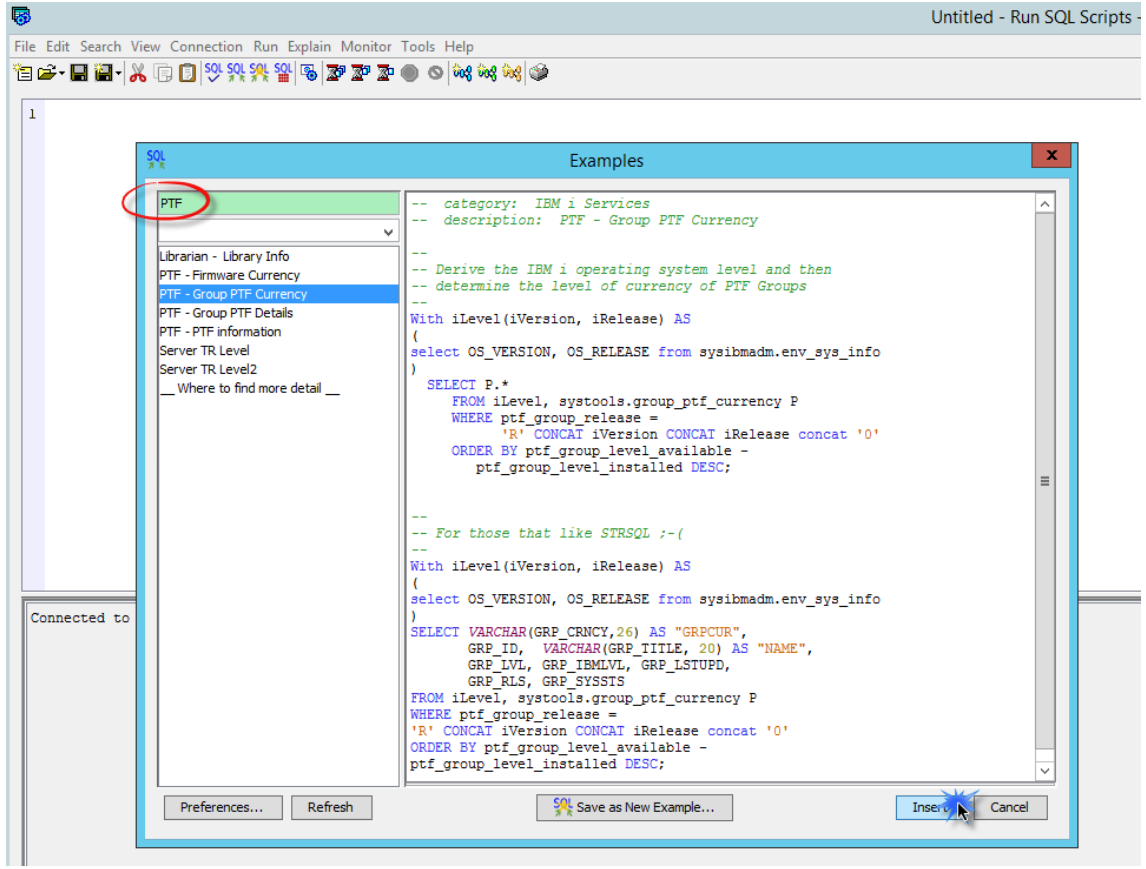
SQL Performance – Statements provide a drill down to “Visual explain”
Makes spotting poorly written queries with incomplete or bad joins.

IBM Tools that help me : SQL Scripts



SQL scripts – already excellent – ongoing enhancements.

IBM Tools that help me : SQL Scripts



From the “Insert from examples, add a search term (PTF)
Click [Insert] and run the example code.

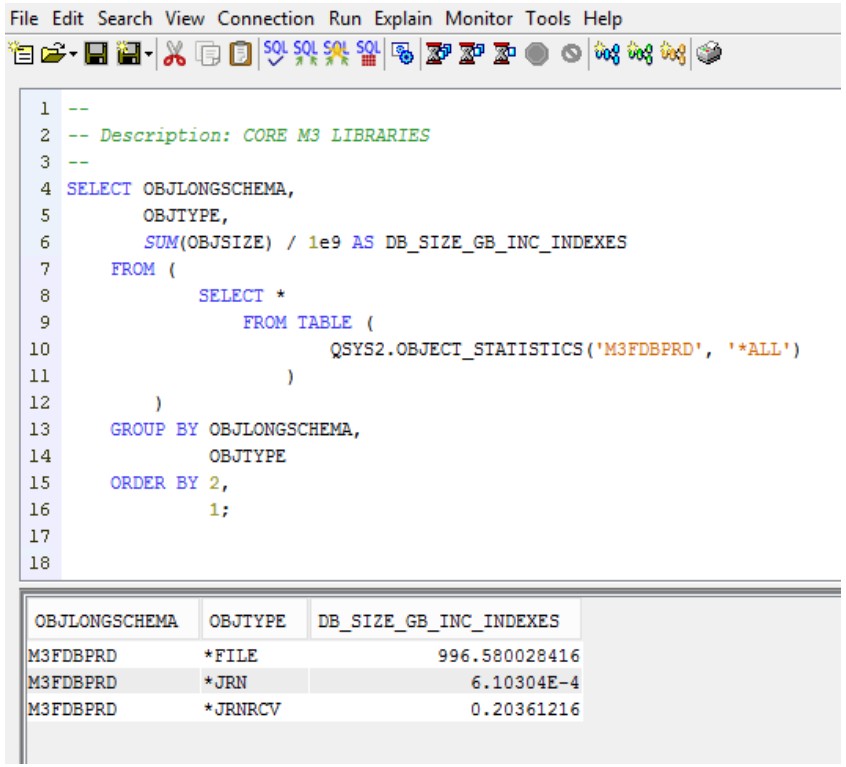
IBM Tools that help me : SQL Scripts

GRPCUR	GRP_ID	NAME	GRP_LVL	GRP_IBMLVL	GRP_LSTUPD	GRP_RLS	GRP_SYSSTS
UPDATE AVAILABLE	SF99740	Current Cumulative P	20303	21091	04/15/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99739	SF99739 740 Group Hi	41	49	05/04/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99738	SF99738 740 Group Se	16	19	04/20/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99662	SF99662 740 IBM HTTP	9	11	04/21/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99663	SF99663 740 Performa	5	7	03/24/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99664	SF99664 740 Backup R	18	20	04/21/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99665	SF99665 740 Java	8	10	03/23/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99704	SF99704 740 DB2 for	10	12	03/15/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99652	SF99652 740 Content	3	4	04/19/2021	R740	RELATED GROUP
UPDATE AVAILABLE	SF99661	SF99661 740 WebSpher	4	5	02/12/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99666	SF99666 740 High Ava	5	6	04/09/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99668	SF99668 740 IBM Db2	8	9	01/29/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99737	SF99737 740 Technolo	3	4	04/15/2021	R740	INSTALLED
UPDATE AVAILABLE	SF99741	SF99741 740 All PTF	7	8	03/19/2021	R740	INSTALLED
-	SF99653	SF99653 740 Db2 Web	9	9	06/22/2020	R740	RELATED GROUP
INSTALLED LEVEL IS CURRENT	SF99667	SF99667 740 740 TCP/	2	2	12/29/2020	R740	INSTALLED
INSTALLED LEVEL IS CURRENT	SF99675	SF99675 740 Hardware	2	2	01/16/2020	R740	INSTALLED

A list of PTF's required and metadata

This system is scheduled for PTF update on 15th May 2021.

IBM Tools that help me : SQL Scripts




```
--
-- Description: CORE M3 LIBRARIES
--
SELECT OBJLONGSCHEMA,
       OBJTYPE,
       SUM(OBJSIZE) / 1e9 AS DB_SIZE_GB_INC_INDEXES
    FROM (
            SELECT *
                FROM TABLE (
                        QSYS2.OBJECT_STATISTICS('M3FDBPRD', '*ALL')
                    )
        )
    GROUP BY OBJLONGSCHEMA,
             OBJTYPE
    ORDER BY 2,
             1;
```

OBJLONGSCHEMA	OBJTYPE	DB_SIZE_GB_INC_INDEXES
M3FDBPRD	*FILE	996.580028416
M3FDBPRD	*JRN	6.10304E-4
M3FDBPRD	*JRNRCV	0.20361216

```
--
-- Description: CORE M3 LIBRARIES
--
SELECT OBJLONGSCHEMA,
       left(OBJLONGNAME,6) Table_and_Indexes,
       OBJTYPE,
       sum(OBJSIZE) / 1e9 AS DB_SIZE_GB
    FROM (
            SELECT *
                FROM TABLE (
                        QSYS2.OBJECT_STATISTICS('M3FDBPRD', '*ALL')
                    )
        )
        GROUP BY OBJLONGSCHEMA,
       left(OBJLONGNAME,6),
       OBJTYPE
    ORDER BY 4 desc
    LIMIT 10;
```

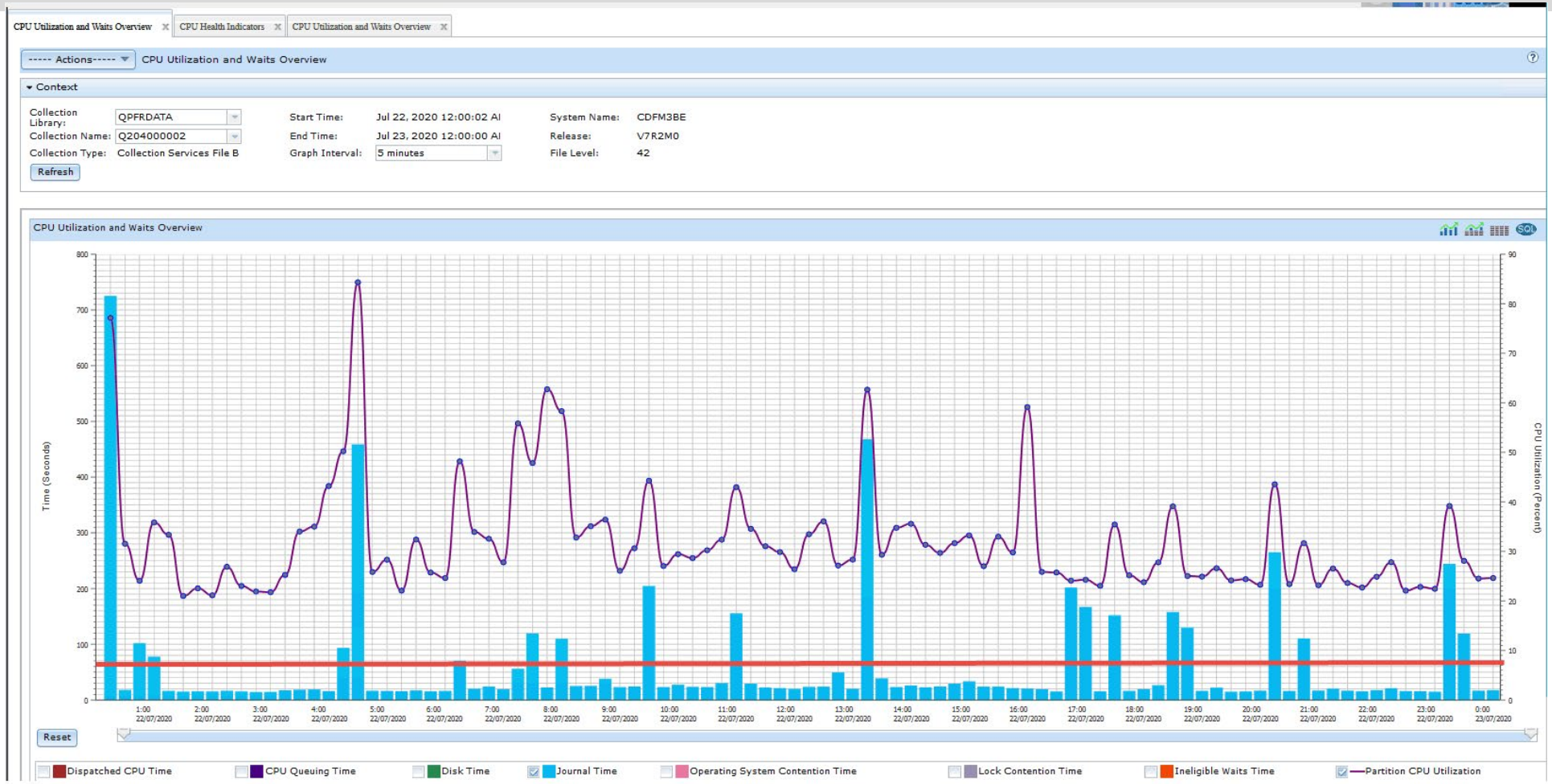
OBJLONGSCHEMA	TABLE_AND_INDEXES	OBJTYPE	DB_SIZE_GB
M3FDBPRD	MITTRA	*FILE	130.09747968
M3FDBPRD	FGLEDG	*FILE	111.810015232
M3FDBPRD	FBAVAL	*FILE	71.490756608
M3FDBPRD	FGLEDX	*FILE	62.984925184
M3FDBPRD	FBAKEY	*FILE	60.301529088
M3FDBPRD	OINACC	*FILE	47.651209216
M3FDBPRD	MCHEAD	*FILE	32.752672768
M3FDBPRD	MFTRNS	*FILE	31.89782528
M3FDBPRD	OSBSTD	*FILE	31.444307968
M3FDBPRD	OSASTD	*FILE	28.775944192

Two examples – modified from “Insert from Examples”

(a) Type and size of objects in M3 production Lib.

(b) Top 10 largest tables in M3 – including the indexes for each table.

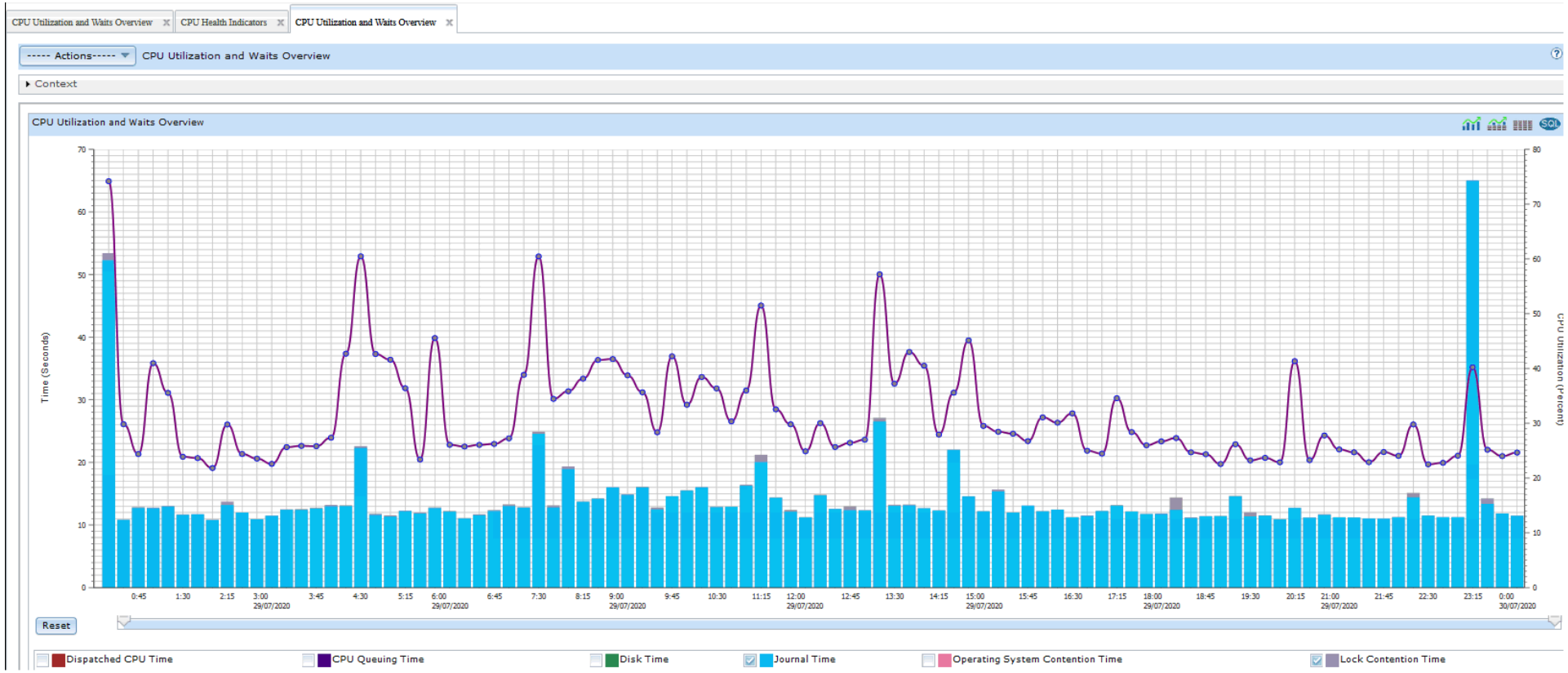
Journal caching - Before



Peak Journal time >700 seconds.

Red line shows the peak on the “After” graph

Journal caching - After



Peak Journal time ~65 seconds.

N.B. Minor risk of data loss if total system failure occurs

Journal caching has a very modest cost (zero maintenance increase)

Row and Column Access Support in IBM DB2 for i (RCAC)

Redbook: *https://www.redbooks.ibm.com/redpieces/abstracts/redp5110.html*

Please do not rush to implement RCAC on M3 without taking advice and perform necessary analysis on you installations.

RCAC

I visited IBM Rochester in September 2019.

IBM requested input from end users to see what parts of the system were actually used.

I found that we were guilty of not using many really useful features

RCAC struck me as the hidden gem

RCAC

What is the problem that I am trying to solve?

Each M3 database is used by competing companies

M3 controls access internally

Risk is external access (e.g. ODBC/JDBC)

Table level access allows users to see data for all divisions

"Data Tourism" is not just a commercial risk

Exposure of personal details is a GDPR compliance issue

RCAC does not replace internal M3 controls

RCAC enables data access control for other mechanisms

RCAC

Why allow access?

Each business is independent and has complex reporting needs

- Financial reporting – accounts produced by 11:00 on Monday
- Planning depends on material availability that day
- Customer orders change on the day – no ETL can keep up
- Different ways of working - different data
- All had a different BI strategy and tool

At this time, we can not get away from external access …
but we can control it

RCAC

Can I find somebody who has done this already?

I asked Infor if they knew of anybody who had implemented RCAC for an M3 installation. Internal enquiries came back with a blank.

I posted a question on the UK M3UA. No responses.

Infor were happy to proceed, but with an obvious reservation. To progress, ABP would need to involve IBM Lab Services. Worked with Kent Milligan – real value added to the process.

RCAC

What were the objectives?

1) Allow restricted row level data access based on the user
2) Mask personal data content from users

M3 considerations

Don’t interfere with internal M3 processes

- Normal operation
- Grid processes (e.g. startup)
- Infrequent processes – e.g. database updates via LCM.

RCAC

Other considerations

Accidental updates of masked data will corrupt the database.
No limited profile can be permitted to perform update operations

MIMIXOWN will be added as user of “QIBM_DB_SECADM”. This affords Mimix the rights to apply the RCAC permissions and masks

Backup processes, data refresh and similar processes must have full access

External (RPGLE) triggers over tables with RCAC will be classified as SECURED with CHGPFTRG (2 of 3 installations)

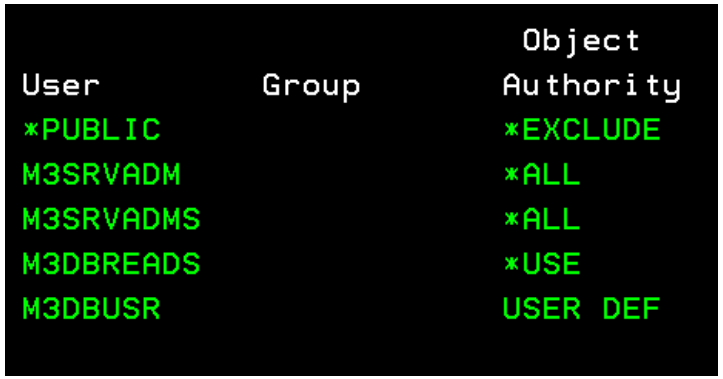
RCAC

Preparation work

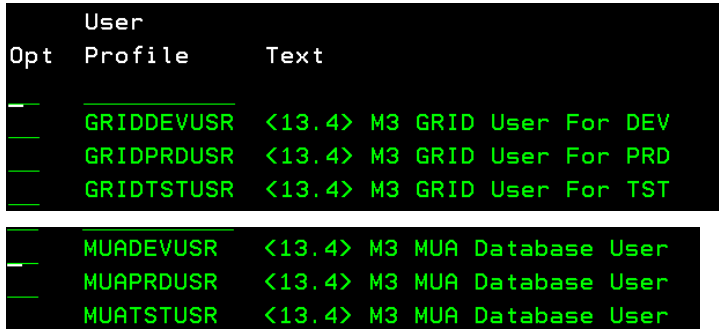
Identification of user profiles using M3

- Check object authority on an M3 object
- Check user profiles

- Use authority collection or an external tool to determine profiles that should not be restricted by the RCAC process.



User	Group	Object Authority
*PUBLIC		*EXCLUDE
M3SRVADM		*ALL
M3SRVADMS		*ALL
M3DBREADS		*USE
M3DBUSR		USER DEF



Opt	User Profile	Text
	GRIDDEVUSR	<13.4> M3 GRID User For DEV
	GRIDPRDUSR	<13.4> M3 GRID User For PRD
	GRIDTSTUSR	<13.4> M3 GRID User For TST
	MUADEVUSR	<13.4> M3 MUA Database User
	MUAPRDUSR	<13.4> M3 MUA Database User
	MUATSTUSR	<13.4> M3 MUA Database User

RCAC

Preparation work

Decide what and how you will structure the permissions to the data. For me, row based access is logically controlled (mostly) at company and division level.

	M3 Database		
	Company	Divisions	
DB Fields	xxCONO	xxDIVI	
ABP UK	700	A.nn	nn=01 to 99
ABP IE	800	I.nn	nn=01 to 99
C&D Foods	600	C.nn	nn=01 to 99

RCAC

Preparation work

I examined the objects that were being accessed externally
Of these, some need to be controlled? Example below

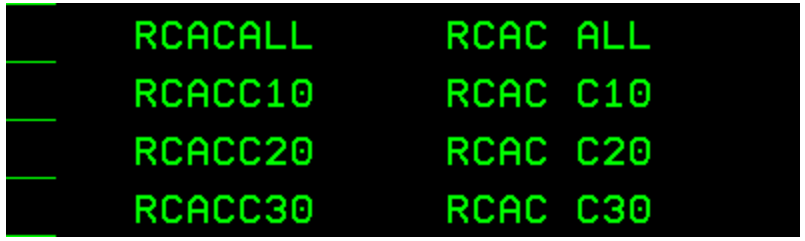
Table	Frequency		Row Control		Column Masking											
CEAEMP	3202		EACONO	EADIVI												
CINACC	290		EZCONO	EZDIVI												
FGLEDG	2468		EGCONO	EGDIVI												
FPLEDG			EPCONO	EPDIVI												
FSLEDG			ESCONO	ESDIVI												
MGHEAD	353		MGCONO	MGFACI												
MITFAC	1618		M9CONO	M9FACI												
CIDMAS	199				IDPHNO	IDPHN2	IDTFNO									
CIDADR	0				SAADR1	SAADR2	SAADR3	SAADR4	SAPONO	SATOWN						
OCUSAD	356				OPCUNM	OPCUA1	OPCUA2	OPCUA3	OPCUA4	OPPHNO		OPTFNO	OPYREF			OPPONO
OCUSMA	393				OKCUNM	OKCUA1	OKCUA2	OKCUA3	OKCUA4	OKPHNO	OKPHN2	OKTFNO	OKYREF	OKYRE2	OKOREF	

RCAC

Implementation

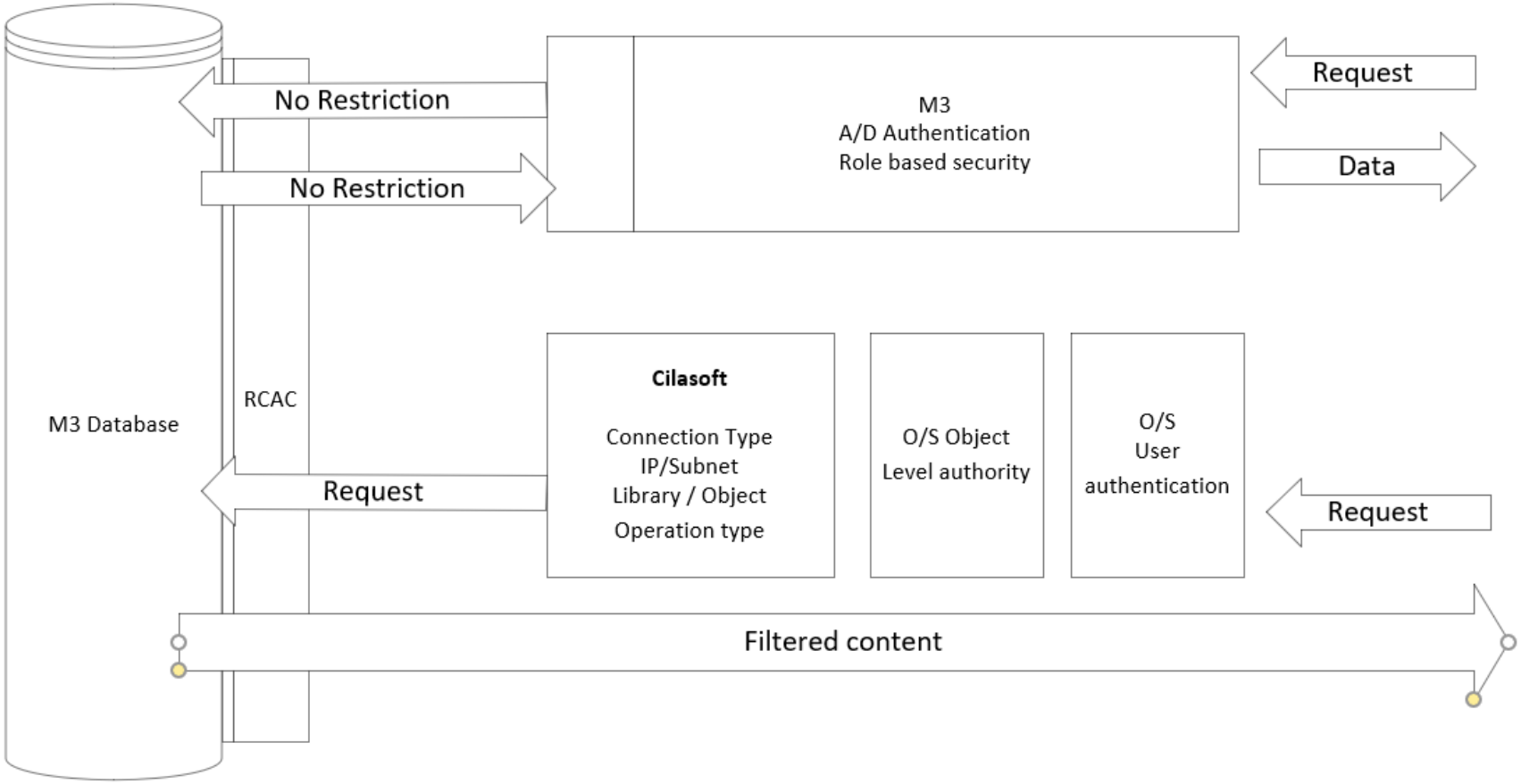
I wanted division C10 to see only data for C10. Similar for C20/C30

After discussion, I created Group Profiles. Currently, and ODBC user is part of the M3DBREADS group. This is replaced with RCACC10 / RCACC20 / RCACC30 or have full access in RCACALL (head office).



RCAC

A simplified representation



RCAC

Implementation

To authorise a user to add RCAC controls:

- *CHGFCNUSG FCNID(QIBM_DB_SECADM) USER(userid) USAGE(*ALLOWED)*

RCAC permission/mask must be created in same library as the table

Permission names require a convention to ensure uniqueness and easy identification

During testing this included the library, table and purpose - e.g.

CREATE OR REPLACE PERMISSION M3FDBPRD.CEAEMP_odbcusers ON…

```
CREATE OR REPLACE PERMISSION M3FDBPRD.CEAEMP_ODBCUSERS ON M3FDBPRD.CEAEMP FOR ROWS WHERE ((VERIFY_GROUP_FOR_USER(SESSION_USER,
           'M3DBREADS', 'M3SRVADM', 'M3SRVADMS', 'M3DBUSR') = 1)
    OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACALL') = 1)
    OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACC10') = 1
        AND EACONO = 600
        AND EADIVI = 'C10')
    OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACC20') = 1
        AND EACONO = 600
        AND EADIVI = 'C20')
    OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACC30') = 1
        AND EACONO = 600
        AND EADIVI = 'C30')) ENFORCED FOR ALL ACCESS ENABLE
```

RCAC

Implementation

A sample mask definition is shown below:

```
CREATE MASK M3FDBPRD.MASK_SAADR1 ON M3FDBPRD.CIDADR FOR COLUMN SAADR1 RETURN
CASE
    WHEN ((VERIFY_GROUP_FOR_USER(SESSION_USER,
                    'M3DBREADS', 'M3SRVADM', 'M3SRVADMS', 'M3DBUSR') = 1)
            OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACALL') = 1)) THEN SAADR1
    ELSE '*****'
END ENABLE;
CREATE MASK M3FDBPRD.MASK_SAADR2 ON M3FDBPRD.CIDADR FOR COLUMN SAADR2 RETURN
CASE
    WHEN ((VERIFY_GROUP_FOR_USER(SESSION_USER,
                    'M3DBREADS', 'M3SRVADM', 'M3SRVADMS', 'M3DBUSR') = 1)
            OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACALL') = 1)) THEN SAADR2
    ELSE '*****'
END ENABLE;
CREATE MASK M3FDBPRD.MASK_SAADR3 ON M3FDBPRD.CIDADR FOR COLUMN SAADR3 RETURN
CASE
    WHEN ((VERIFY_GROUP_FOR_USER(SESSION_USER,
                    'M3DBREADS', 'M3SRVADM', 'M3SRVADMS', 'M3DBUSR') = 1)
            OR (VERIFY_GROUP_FOR_USER(SESSION_USER, 'RCACALL') = 1)) THEN SAADR3
    ELSE '*****'
END ENABLE;
```

RCAC

Implementation – locking considerations

Create Permission & Mask statements don't require exclusive locks unless Row & Access Controls have not been activated

CREATE PERMISSION … ENFORCED FOR ALL ACCESS ENABLE;
CREATE MASK … ENABLE;

Exclusive lock needed here
ALTER TABLE …
ACTIVATE ROW ACCESS CONTROL
ACTIVATE COLUMN ACCESS CONTROL;

Locking considerations		
	Access Control State	
	Inactive	Active
Create Permission	*None	*EXCL
Create Mask	*None	*EXCL
Alter Table		
* ACTIVATE ROW ACCESS CONTROL	*EXCL	*EXCL
* ACTIVATE COLUMN ACCESS CONTROL	*EXCL	*EXCL

RCAC

It works!

A user in the RCACALL Group runs the SQL shown and sees a result set for all divisions.

This is a summary but the detail is the same.

If this user is changed to be part of the RCACC10 / RCACC20 / RCACC30 group, the same SQL gives the results shown.

Exactly as expected

```
===> select egcono,egdivi,count(*) from m3fdbprd/fgledg
     group by egcono,egdivi
```

```
Position to line  . . . . .
....+....1....+....2....+....3
Cmp   Div         COUNT ( * )
600   C10           1,492,913
600   C20           9,119,404
600   C30             230,259
********  End of data  ********
```

```
Position to line  . . . . .
....+....1....+....2....+....3
Cmp   Div         COUNT ( * )
600   C10           1,492,913
********  End of data  ********
```

```
Position to line  . . . . .
....+....1....+....2....+....3
Cmp   Div         COUNT ( * )
600   C20           9,119,404
********  End of data  ********
```

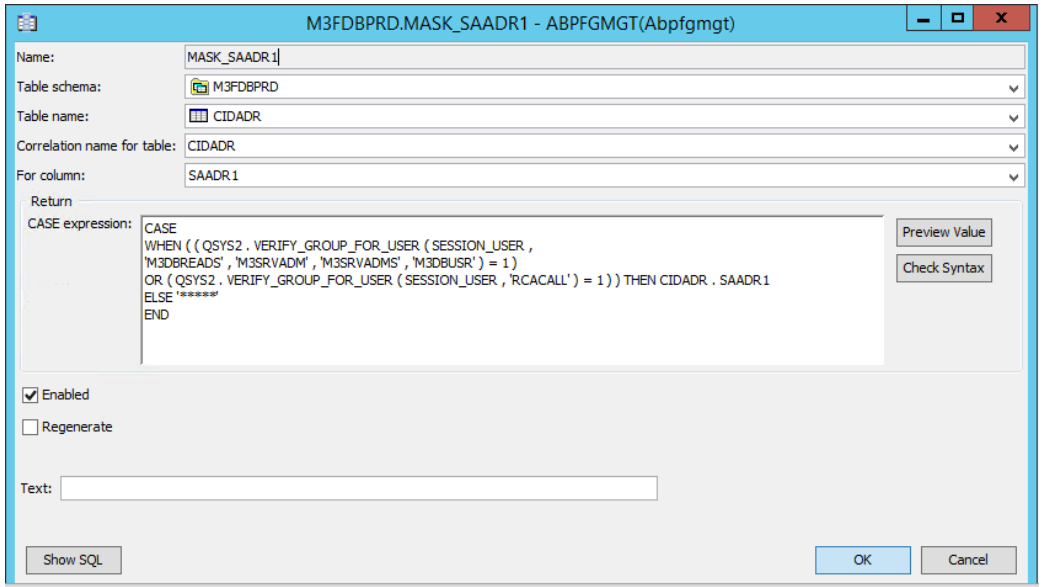
```
Position to line  . . . . .
....+....1....+....2....+....3
Cmp   Div         COUNT ( * )
600   C30             230,259
********  End of data  ********
```

RCAC

Masks

Masks were added for the supplier address table – here is data with fictional suppliers.

The user is not part of the RCACALL all group (or M3 application) so masked data is returned. Downloads to Excel show the mask(s) as expected



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	SACONO	SASUNO	SAADTE	SAADID	SASTDT	SASUNM	SAPRIA	SAADR1	SAADR2	SAADR3	SAADR4	SACSCD	SAPONO	SAADVI
2	600	10101	1	1	20210301	Mr. Hydrogen	0	*****	*****	*****	*****	DK	*****	
3	600	10102	1	1	20210301	Ms. Helium	0	*****	*****	*****	*****	FR	*****	
4	600	10103	1	1	19990101	Dr. Lithium	0	*****	*****	*****	*****	DK	*****	
5	600	10104	1	1	20170524	Mrs. Beryllium	0	*****	*****	*****	*****	DK	*****	
6	600	10105	1	1	20170615	Prof. Boron	0	*****	*****	*****	*****	DK	*****	
7	600	10106	1	1	20170601	Gov. Carbon	0	*****	*****	*****	*****	DK	*****	
8	600	10107	1	1	20170601	Lt. Nitrogen	0	*****	*****	*****	*****	DK	*****	
9	600	10108	1	1	20170601	Col. Oxygen	0	*****	*****	*****	*****	DK	*****	
10	600	10109	1	1	20170629	Maj. Fluorine	0	*****	*****	*****	*****	DK	*****	
11	600	10110	1	1	20170701	Sir Neon	0	*****	*****	*****	*****	DK	*****	
12														
13														

RCAC

RCAC is a powerful tool.

Implementing it needs careful planning.

Initial testing on FGLEDG showed performance was slow BECAUSE the RCAC permission did not use an existing index. By changing the permission to use EGCONO,EGDIVI – part of the primary key, no performance impact was detected.

Discussion with IBM suggested it may add upto 5% CPU. 5% on a small number of tables is a small overhead

RCAC – helping with GDPR

ABP can now :-

Revoke excessive access using M3DBREADS / M3SRVADMS groups

Provide more limited and specific access to defined data rows protecting internal commercial sensitivities

Mask personal data from all but authorised applications

Obtain buy-in from the business to re-evaluate legitimate access requirements. Part of ongoing process.

Thank you.

Eddie Chaffin: Group Enterprise Architect - Power Systems & ERP

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UK M3UA: *https://m3ua.org.uk/who-we-are/meet-the-m3ua-team/*

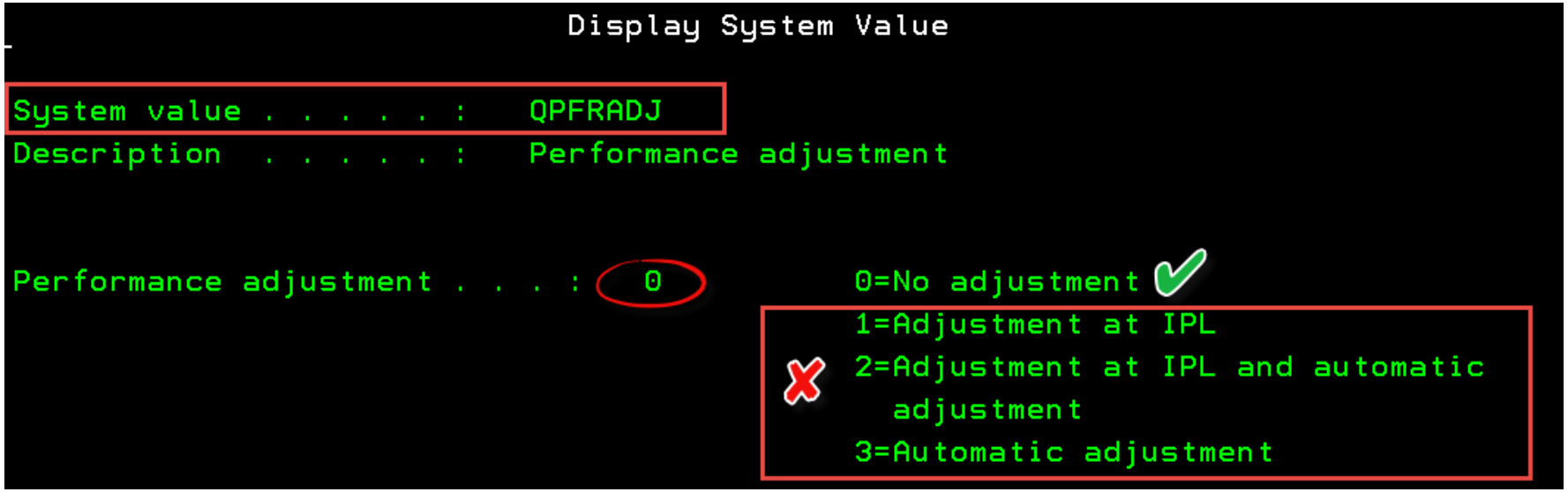
UK i-UG: *https://www.i-ug.co.uk/meet-the-user-group*

Performance tips

Over the years I have spent a lot of time looking at performance and how to get the most from the system and M3.

The following may help you to find some performance gain (for free)

M3 – Performance factors



Automatic memory adjustment does not work well with a Java.
Check it is set correctly. This wasn't always set correctly in the past.

```
> DSPSYSVAL   SYSVAL(QPFRADJ)
```

M3 – Performance factors

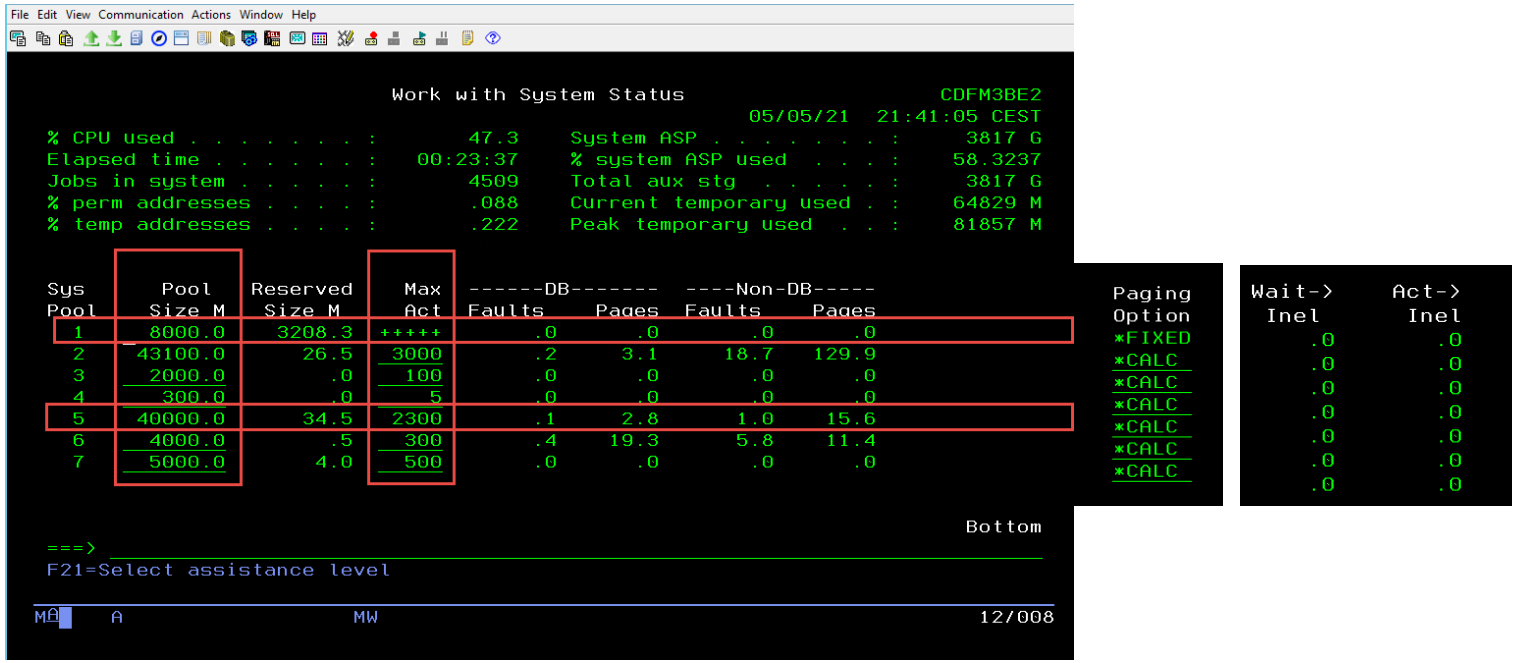
IPL – do not perform unnecessary IPL's on the system.

IBM i creates a number of temporary objects during normal execution of jobs. You can review the index advisor and determine if you would benefit by making some objects permanent.

When you IPL the system, these temporary objects are discarded.

- How many people IPL the system at the weekend, then complain that performance is poor on Monday, when they have a lot of processing to create accounts etc.? Guess why.

M3 – Performance factors



Memory pools:-

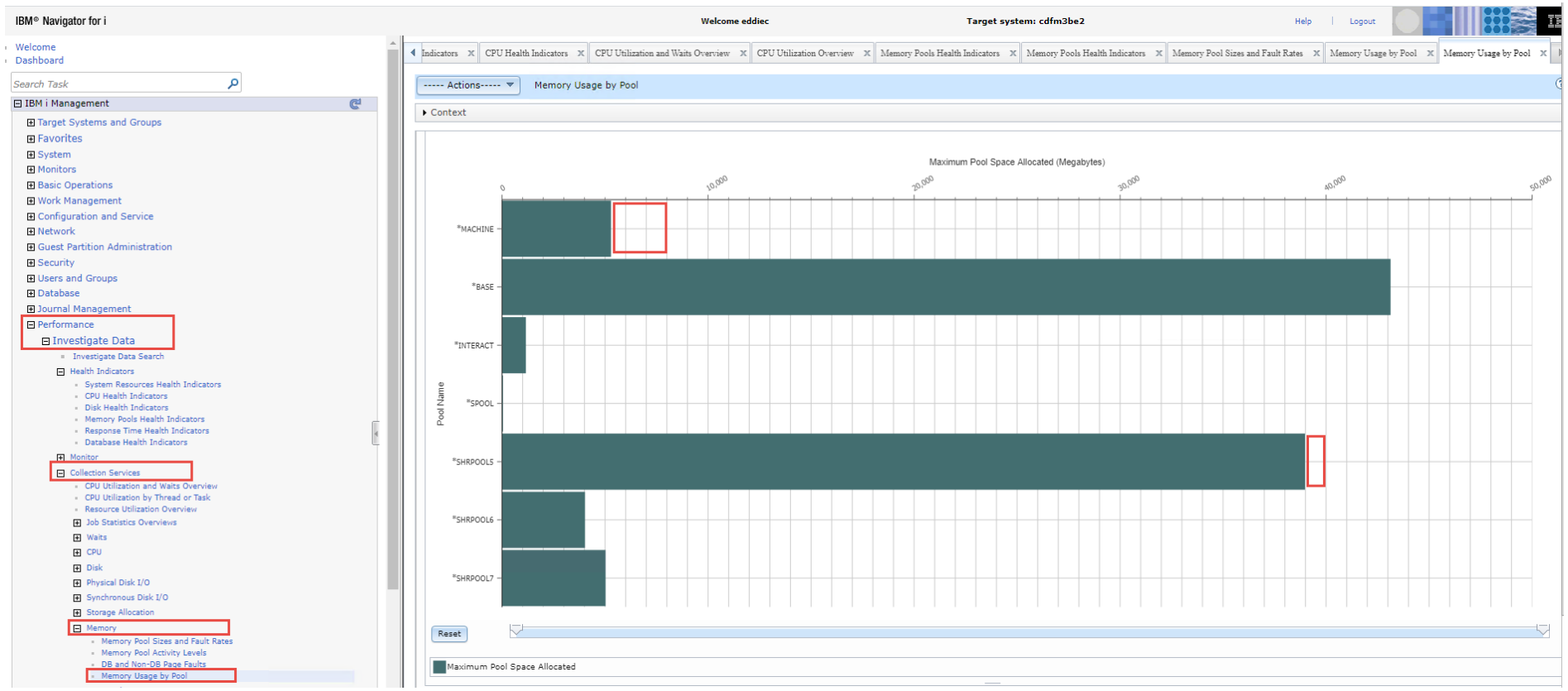
Paging option – set to *CALC for the share pools. The system knows

Isolate the M3 workload from other applications (Mimix / reporting)

Set the pool size for M3 (Pool 5 on this system) to a sensible level. Review it.

Don’t adjust the Pool Size without good reason. Query execution plans become invalid and need to be re-evaluated. This slows things down.

M3 – Performance factors



Use the Navigator to check the maximum memory allocation.

- Understand “Normal” for your system.
- The Red blocks indicate what memory is available but hasn’t been used (Today)

M3 – Performance factors

Review the SQL being executed on the system.

Jobs that take a long time could have a small and easily fixed defect

Consider:
Select * from M3FDBPRD.FGLEDG WHERE
EGDIVI='A99' AND
EGYEA4=2021 AND
EGACDT>='20210115' <<< Incorrect data type – ACDT is numeric.

Select * from M3FDBPRD.FGLEDG WHERE
EGCONO=123 AND <<< Adding the company number with division and year allows
EGDIVI='A99' AND <<< the use of existing indexes speeding up performance
EGYEA4=2021 AND
EGACDT>=20210115