

IBM i 7.5 (and 7.4 TR6) & IBM i Merlin

COMMON Luxembourg
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Table of contents

IBM i Strategy and Roadmap		IBM i Offering Updates		IBM i Merlin The IBM i Modernization Wizard		IBM i 7.5 Highlights Hardware & Base Infrastructure	
Db2 for i		Db2 Mirror Updates		IBM i 7.5 Security Enhancements		IBM i 7.5 Core OS Components	
Java Based Web Serving Options on IBM i		IBM i Compilers: ILE CL & RPG		Access Client Solutions 		IBM i Navigator 	
PowerHA SystemMirror for i & BRMS		Miscellaneous					

IBM i Strategy and Roadmap



IBM i



IBM i Strategy Cornerstones

Power Solutions

- Enable clients to **exploit latest Power technology**
- Enable transformation of customer solutions with new value
 - Mobile, Internet of Things, Cognitive, Machine Learning and AI
- Enable Solution Developers to **modernize** around services, hybrid cloud and DevOps

Openness Options Tailored for Business

- Grow IBM i solutions options including modern RPG with **open-source** technologies
- 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
- Leverage IBM systems, storage and software technologies

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



The IBM i Strategy & Roadmap white paper has been updated.

This short link :

<http://bit.ly/IBMiWhitePaper>

takes you to the page where you can click, register and download :

"IBM i - A New Level of Integrated Simplicity"



IBM i Roadmap

Announce: May 3

2016

2019

2022



IBM i

7.3

Technology
Refreshes

IBM i

7.4

Db2 Mirror for i



IBM i

7.5

IBM i Merlin



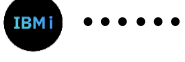
IBM i

iNext



IBM i ...

iNext + 1



- ** 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 System Support – Details about Supported Releases

Servers	IBM i 6.1 ₁	IBM i 7.1 ₁	IBM i 7.2 ₁	IBM i 7.3	IBM i 7.4	IBM i 7.5
Power10 E1080 / Future Scale Out & Mid Range				✓	✓	✓
Power9 S914, S922 (VIOS only), H922 (VIOS only), S924, H924, E980 S922 Entry (single native I/O partition only)		✓ 4	✓	✓	✓	✓
Power8 S814, S822 (VIOS only), S824, E870, E870C, E880, E880C S812 (no IBM i 7.1, native I/O only)		✓	✓	✓	✓	
Power7/7+ 710, 720, 730, 740, 750 (VIOS only), 760 (VIOS only), 770, 780, 795	✓	✓	✓	✓		
Power7 BladeCenter PS700/701/702/703/704 (all VIOS only) Power7/7+ Flex p260/270/460 (all VIOS only)	✓	✓	✓			
Power6+ 520, 550, 560, 570, JS23/43 (VIOS only) Power6 520, 550, 570, 595, JS12/22 (VIOS only)	✓	✓	✓ 3			
Power5/5+ 515, 520, 525, 550, 570, 595	✓	✓				
800, 810, 825, 870, 890	✓					

1 – IBM i 6.1, 7.1, and 7.2: refer to [IBM i Release Lifecycle](#) for extended support information

2 – Virtual client only

3 – no IOP or HSL support

4 – Available on selected S922 and E980 models only

<https://www.ibm.com/support/pages/node/6023368>

IBM i Offering Updates



IBM i



Virtual Serial Number Announcement

As of 1/25/2022, IBM now offers a customer the ability to acquire a Virtual Serial Number (VSN) and assign it to a logical partition. IBM i software can then be ordered on or transferred to the VSN instead of being tied to a physical or hardware IBM Power serial number. Having the IBM i entitlement, keys, and support entitlement on a **VSN provides the flexibility to move a VM to a different Power machine.**

Additional information is published on [IBM i License Topics](#) > “Virtual Serial Number”

- Process document: how to order, assigning a VSN to a partition, Q&A, etc.

Recent webinar - Intro to Virtual Serial Number and new Navigator for i
<https://www.ibm.com/partnerworld/systems/power/isv-resource-center>

For example, on

9009-22G S/N 78-12345 > order FC #EVSN

Partition 1	Partition 2	Partition 3
4850-VSN P10		
Serial = V0-11111	Serial = V0-22222	Serial = V0-33333
Hardware Serial = 78-12345		

IBM i Announcements - May 3, 2022

- IBM i Simplification (Price Adjustment)
- IBM i Subscription
- IBM i 7.5 and IBM i 7.4 TR6
- IBM i Modernization Engine for Lifecycle Integration (Merlin)

IBM i Simplification

- Simplification – easier to order and manage

Products/Options: change from separately charged to "entitled with IBM i"

AFP Font Collection
InfoPrint Server
AFP DBCS Fonts
AFP Fonts
XML Toolkit
Advanced DBCS Support
Rational Application Management Toolset
Advanced Job Scheduler
Performance Tools
Db2 Query Mgr & SQL Dev Kit
IBM i Access Family

IBM i Optional Features:

Media & Storage Extension
Db2 Symmetric Multiprocessing
Db2 Multisystem
PSF 1-55 IPM Support
PSF 1-100 IPM Support
PSF AnySpeed
HA Switchable Resource
HA Journal Performance

Products/Options: remaining separately charged

IBM i operating system
BRMS
PowerHA for i
Cloud Storage Solutions
Rational Development Studio
Db2 Mirror (**comes with Db2 Data Mirroring)
Db2 Web Query
Rational Developer for i

IBM i Optional Features:

Db2 Data Mirroring (**comes with Db2 Mirror)

IBM Power Operating System Purchasing Models

	Ownership	Subscription	As a Service (aaS)
IBM i	Perpetual license	Subscriptions – new in 2022	PowerVS
AIX	Perpetual license	Subscriptions - 2021	PowerVS
Linux	N/A	Subscription & Support (1yr, 3yr)	PowerVS

Subscription-based business model benefits

Client Benefits

- Lower entry cost
- More competitive with commodity OS rivals
- Cloud-like pricing model is consistent with other services
- Increased flexibility

IBM Benefits

- Aligned to market and client expectations
- Transforms IBM and BPs to a competitive subscription-based business model
- Integrated within existing ordering systems

IBM i Operating System Purchasing Models

Offering	Ownership	Subscription Term Pricing		As a Service (aaS)
IBM i	Perpetual license	Subscription Licensing [Software] – New 2Q22	Hardware/Software Subscription Bundle <u>Statement Of Direction</u>	PowerVS
Perpetual <ul style="list-style-type: none"> Traditional way to acquire licenses Non-expiring license to use software Annual renewals for SWMA Higher initial investment for license + SWMA to get started (CAPEX) License stays with the system (serial number) 		Subscription <ul style="list-style-type: none"> Aligned with industry direction Additional way to acquire IBM i software; OPEX model A subscription term pricing model <ul style="list-style-type: none"> Non-cancellable during the term of the contract 1 to 5 year committed terms <ul style="list-style-type: none"> 1 year term carries a premium At term end, customer will purchase new term <ul style="list-style-type: none"> Investigating auto renewals Lower entry price than perpetual Predictable and protected pricing for duration of term New PIDS orderable thru e-Config (AAS) Includes 9x5 support (upgradeable to 24x7) No transfers from perpetual to subscription Modeled after software group structure Helps transition IBM and BPs to a competitive subscription-based business model License stays with the system 	Subscription Bundle <ul style="list-style-type: none"> Leverage the new IBM i operating system subscription offering with the hardware 4-core/P05 model with 1 IBM i processor entitlement 25 IBM i users 3-year term Deliver client value through enhanced support and services from IBM TSS/lab services 	aaS <ul style="list-style-type: none"> VM-as-a-Service Hourly pricing, monthly billing IBM i OS and LPPs <ul style="list-style-type: none"> AIX/Linux OpenShift Consistent architecture to on-prem Access to other cloud services Global footprint and expanding capabilities
Perpetual and Subscription may reside on the same machine				

IBM i Subscription Roadmap - SoD

5/3/2022



IBM i Operating System Subscription

- P05 software tier and IBM i 7.5
- Power9 4-core
- IBM i operating system
 - Processors and users

Extend IBM i Subscription

- Add P10/P20/P30 SW tiers
- Add additional Power Hardware models

Extend IBM i Subscription

- LPPs for i

New hardware/software subscription bundle

- Using IBM i operating system subscription
- 4-core server
- 1 IBM i processor entitlement
- 25 IBM i users
- 3-year term

Statement of Direction

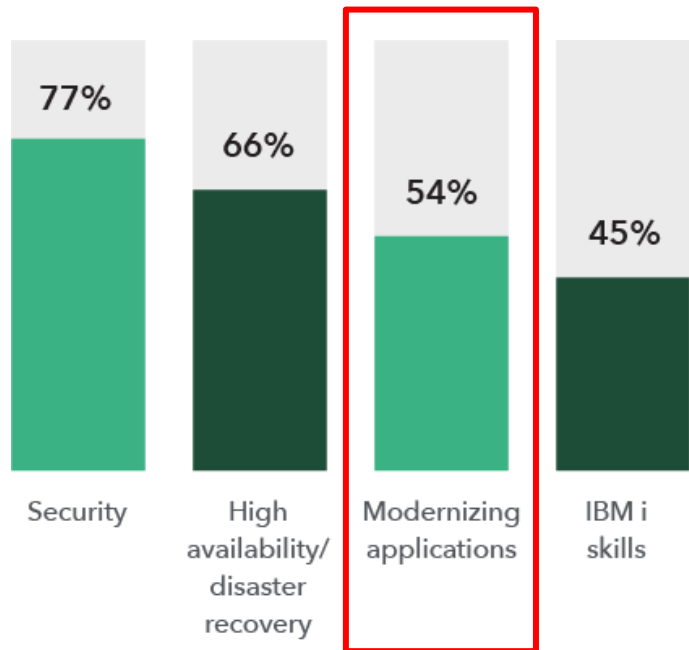
IBM i Merlin

The IBM i Modernization Wizard



IBM i Customers need to modernize their business applications

What are your top concerns as you plan your IT environment?



- Some use “modern” tools and methods
 - Must “cobble together” various pieces
 - Must “force-fit” IBM i native file systems
- Some (many) are stuck/still using inefficient old tech
 - No automated change control, project builds
 - Often in monolithic (not modular) designs
 - Source Editors from the 1980’s

<https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results>

Guiding the market to “IBM i Next Gen Apps”



Quickly Respond to Business Needs
DevOps, CI/CD, Agile



Encapsulate processes & data
Creating assets for the business

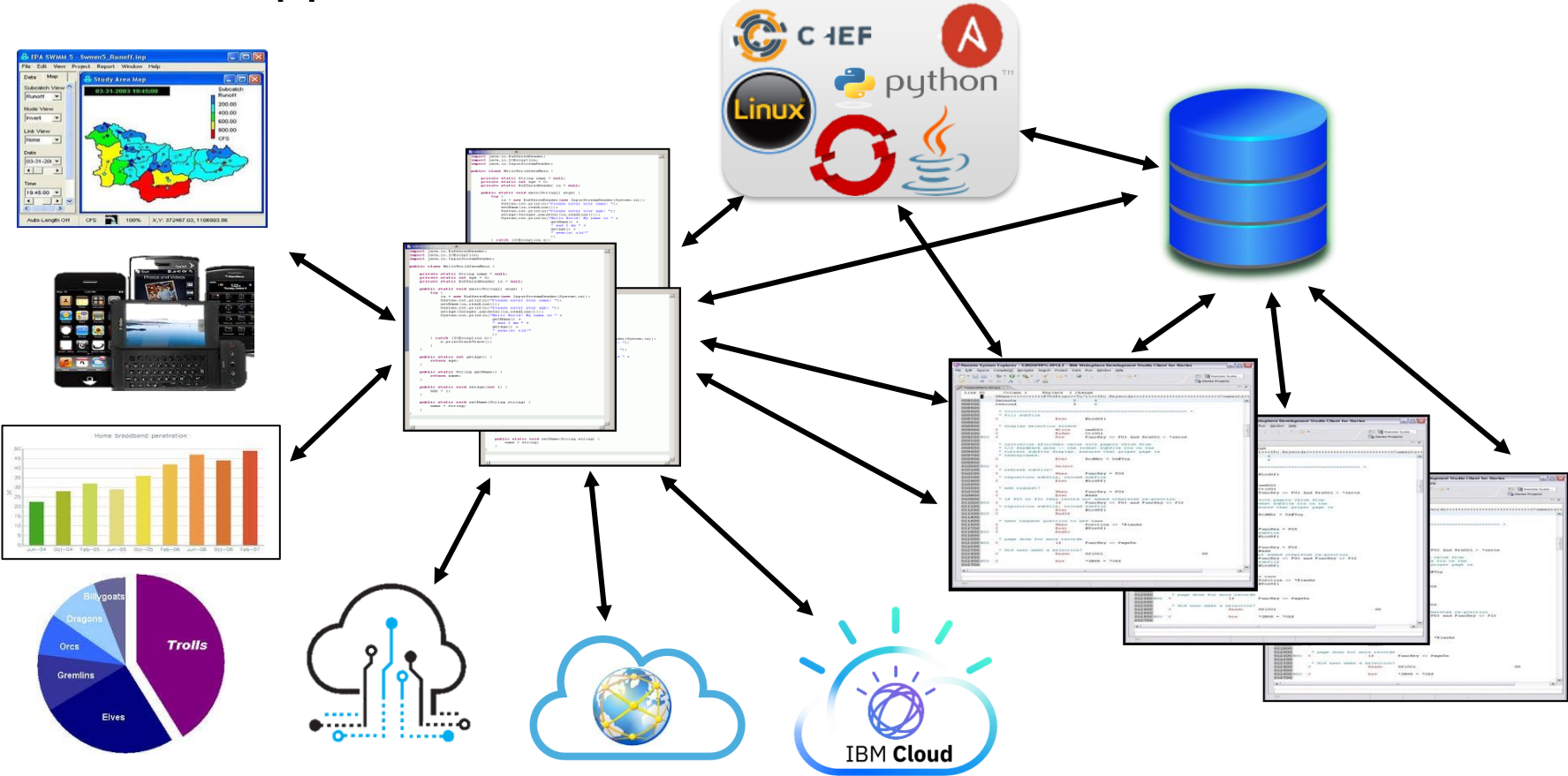


Blend technology
Using the “best fit for purpose”




Easily incorporate new tech
Even if the tech is not “in-house”

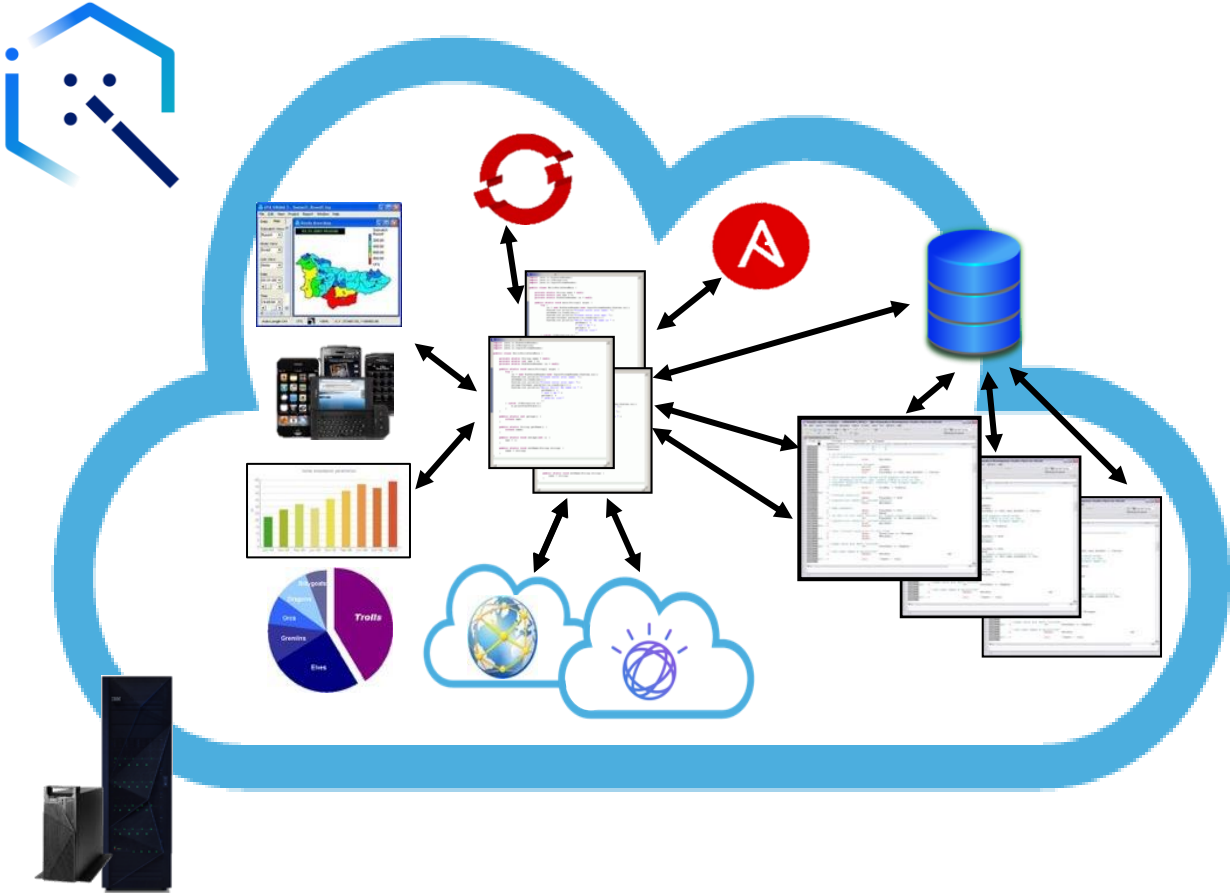
NextGen Application Structure



IBM i Merlin: OpenShift-based tools which guide modernization

Red Hat OpenShift





IBM i Merlin – Brief Description



DevOps

IDE – RPG, ...

IBM i Connections

Debugger for IDE

IBM i App Catalog?

Security/Compliance?

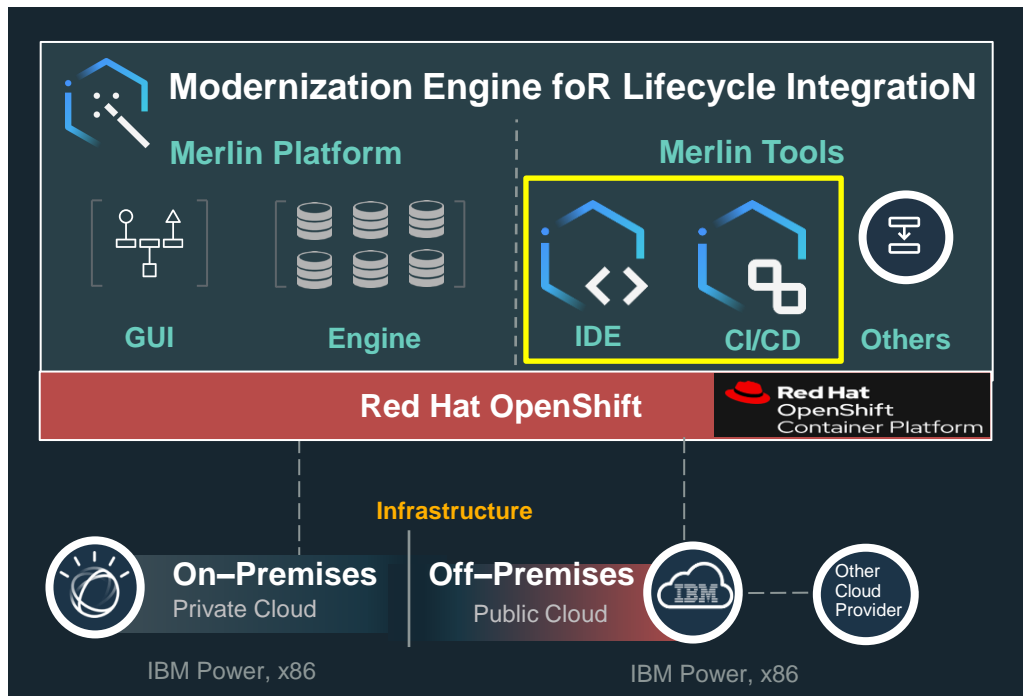
Red Hat OpenShift



- IBM i Merlin is
 - a **set of tools** which
 - **run in OpenShift containers**, which
 - **guide and assist** software developers in the
 - **modernization of IBM i applications** and **development processes**, allowing them to
 - realize the value of a hybrid cloud, multi-platform DevOps implementation.
- The framework guides and simplifies the use of the tools which help implement **DevOps & CI/CD**.
- The technologies used to expose IBM i native functions and data promote Services-based software - Restful interface connections and enterprise message technologies.
- Future updates will contain additional applications based on customer & partner feedback.

Merlin Content Overview

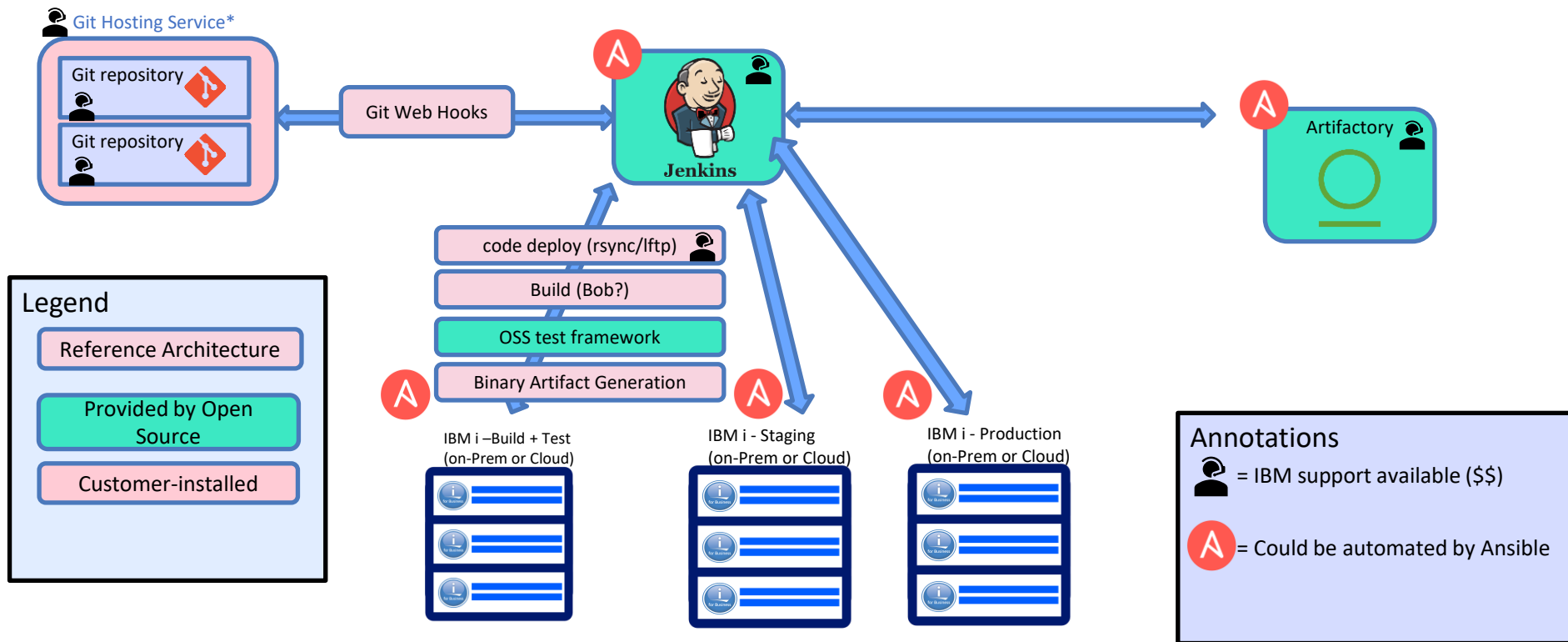
- A modernization platform for IBM i applications, allowing them to realize the value of a hybrid cloud, multi-platform DevOps implementation.
- Expose IBM i native functions as Restful interface and centralized manage IBM i connections.
- Guides and simplifies the use of the tools which help implement DevOps & Services-based software.



Characteristics

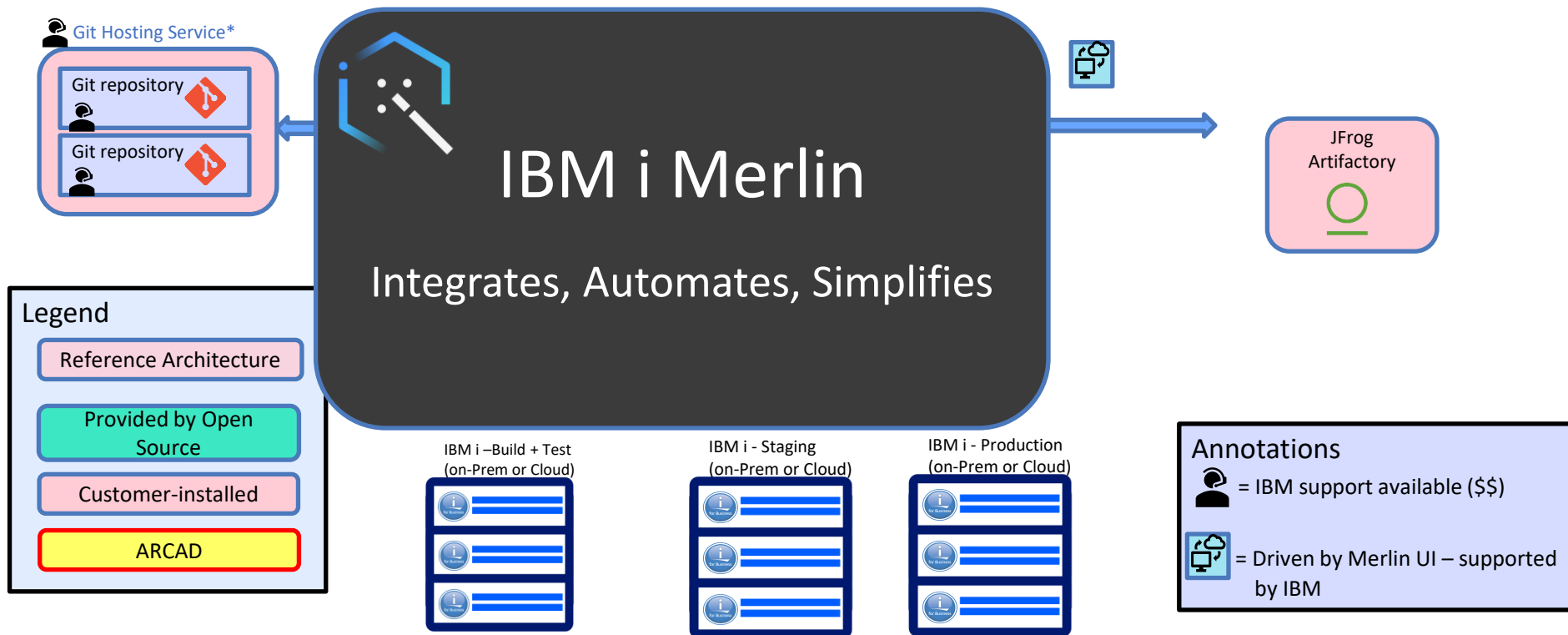
- IBM i focus
- Simplified
- Run anywhere
- IBM Certified
- Centralized management

DevOps CI/CD Typical Architecture View – Before Merlin



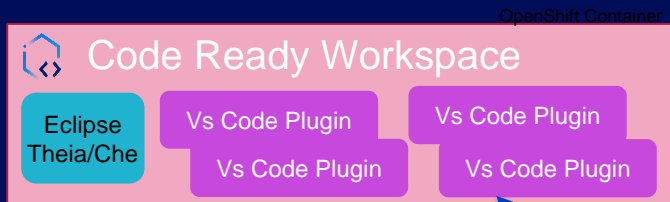
*Customer can choose GitHub, GitLab, or gitbucket

Merlin DevOps CI/CD MVP Architecture View



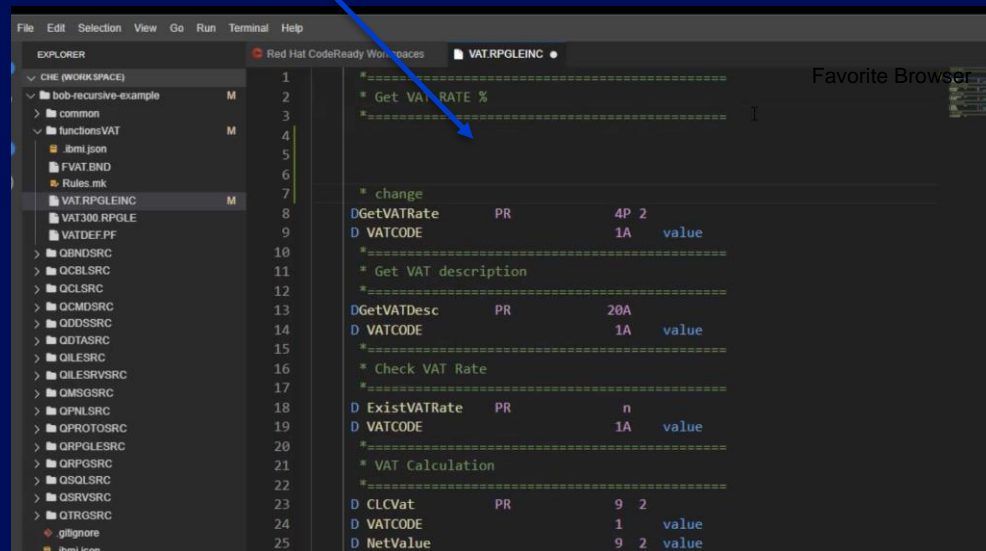
*Customer can choose GitHub, GitLab, or gitbucket

- Built for the Modern Developer
- Natural Git Integration
- Intelligent Build
- Self-contained projects
- Code Understanding
- Integrated Impact Analysis



Integrates with ARCAD tools to

- Convert to Free Form
- Move source code to Git repositories
- Understand and analyze code & data
- Dependency base Build



The screenshot shows the Red Hat CodeReady Workspaces IDE interface. The Explorer panel on the left lists a project structure under 'CHE (WORKSPACE)' including 'bob-recursive-example', 'common', 'functions/VAT', and 'VAT.RPGLEINC'. The main editor displays the source code for 'VAT.RPGLEINC', which includes comments and code for getting VAT rates and descriptions. A blue arrow points from the 'Vs Code Plugin' box in the diagram above to the 'VAT.RPGLEINC' file in the Explorer panel.

```

1  *=====
2  * Get VAT RATE %
3  *=====
4
5
6
7  * change
8  DGetVATRate      PR          4P 2
9  D VATCODE        1A      value
10
11 *=====
12 * Get VAT description
13 *=====
14 DGetVATDesc      PR          20A
15 D VATCODE        1A      value
16
17 * Check VAT Rate
18 *=====
19 D ExistVATRate    PR          n
20 D VATCODE        1A      value
21
22 * VAT Calculation
23 *=====
24 D CLCVat          PR          9 2
25 D VATCODE        1          value
26 D NetValue       9 2      value
  
```

IBM i Development team

- Integration with Code Ready Work Spaces
- VS code plugins for
 - Tokenization of RPG, COBOL, SQL, C, more
 - Color coding
 - Outline view
 - Content assist
 - Rename refactoring
 - Intelligent formatting
 - Managing Include Files
 - Project explorer
 - Manage IBM i environment & source
- Intelligent build
 - Integrated compile feedback
 - Defined Meta data
 - Joblog Explorer
- Git Integration
 - Leverage Git based tooling
 - Pull, Push, Merge, etc

ARCAD Partnership

- Repository Setup
 - Pull code from Legacy lib and populate Git
 - Intelligent build Meta data population
 - Conversion to Fully Free form

Value – deep expertise with converting source control from legacy based to git centric

- ARCAD Intelligent Build
 - Build all aspects of an application
 - Linkages between parts
 - Branch promotion

Value – IBM i applications are unique and highly complex. Simplifies these complexities into an automated set of tooling and processes

- ARCAD Impact Analysis

Value – Visualize application linkages, data usage and code flow

Merlin's Place in the IBM i Market

The IBM i ecosystem will benefit from a focused modernization approach, led and supported by IBM, which helps IBM i clients embrace:

- Modern Tools & Processes – including DevOps
- Cloud, Services & Hybrid/Blended solutions
- Container-based tools

IBM i

IBM i Merlin: “Wizard of wizards” which runs in containers


- Simplifies customers' move from out-of-date, inefficient technology
- Places IBM i directly in the RedHat/OpenShift conversation




The IBM i team included IBM i customer advisory councils in the design of IBM i Merlin and is collaborating with key players in the IBM i modernization business to help client adoption.



Deploy Merlin Platform from OpenShift Web Console

 Red Hat
OpenShift
Container Platform



Home

Overview

Projects

Search

API Explorer

Events

Operators

OperatorHub

Installed Operators

Workloads

Networking

Services

Routes

Ingresses

NetworkPolicies

You are logged in as a temporary administrative user. Update the [cluster OAuth configuration](#) to allow others to log in.

Project: merlin-demo

OperatorHub

Discover Operators from the Kubernetes community and Red Hat partners, curated by Red Hat. You can purchase commercial software through [Red Hat Marketplace](#). You can install Operators on your clusters to provide optional add-ons and shared services to your developers. After installation, the Operator capabilities will appear in the [Developer Catalog](#) providing a self-service experience.

All Items

AI/Machine Learning

Application Runtime

Automation

Cloud Provider

Database

Developer Tools

Integration & Delivery

Logging & Tracing

Monitoring

Networking

OpenShift Optional

Security

Storage


Streaming & Messaging

Other

All Items

Merlin

1 items



IBM i Modernization Engine For Lifecycle Integration
provided by IBM

Deploys Merlin with dynamic and auto-tuning configuration

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Merlin Platform Overview

Merlin Platform Capabilities

Merlin Tool Lifecycle



Install, update, uninstall and upgrade Merlin Tool.

Authentication



Support Single Sign-On across Merlin Platform and Merlin Tools.

Certification Management



Provides certificates to Merlin components and IBM i systems and Merlin pods.

User Management



Manage Users, roles and authority mappings.

Monitoring



Provides monitoring of Merlin projects and a set of Grafana dashboards.

Inventory Management



Provides centralized management of IBM i connections.

Credential Management



Provides centralized management of Credentials.

IBM i VM management



Manage IBM i VM lifecycle, including provision IBM i VM.

IBM i Software Installer



Install dependencies of Merlin tool

Merlin

Modernization Engine for Lifecycle Integration

Merlin Platform



GUI



Engine

Merlin Tools



IDE



CI/CD



Others

Red Hat OpenShift



Red Hat
OpenShift
Container Platform

Infrastructure

On-Premises
Private Cloud



Off-Premises
Public Cloud



Other
Cloud
Provider



Modernization Engine for Lifecycle Integration

Merlin

- IBM Merlin Brings New Approach to Developing on IBM i
 - <https://www.itjungle.com/2022/05/04/ibm-merlin-brings-new-approach-to-developing-on-ibm-i/>
- **IBM i Modernization Engine for Lifecycle Integration (Merlin) Overview**
 - <https://www.ibm.com/support/pages/ibm-i-modernization-engine-lifecycle-integration-merlin-overview>
- IBM i Modernization Engine for Lifecycle Integration (Merlin) Demo
 - https://www.youtube.com/watch?v=Y_TBB9zV9w
- Merlin IBM i Developer Build Demo
 - <https://www.youtube.com/watch?v=a7s3qeebWEI>
- IBM Merlin - Getting Started (YouTube videos)
 - <https://www.youtube.com/playlist?list=PLPELYviDwCnY6L5r5ZnmCneqhakLcB7ko>



Merlin IDE Editing Tour (6m 42s)

<https://youtu.be/SHIOwQErnGI>

IBM | Let's Create



Merlin IBM i Developer Build (5m 4s)

<https://youtu.be/a7s3qeebWEI>

IBM | Let's Create



IBM i 7.5 Highlights

Hardware & Base Infrastructure



IBM i



Hardware and Base Infrastructure Highlights

1. **New Compression Algorithm**
2. Simplified operator panel sequence for unmanaged servers
3. **IBM i 7.5 runs on Power10 and Power9 servers**
4. Support up to 240 processors per LPAR on Power10
5. NVMe device health information in Service Tools
6. Save and Restore enhancements
7. TCP SACK
8. SNMPv3
9. QZRUCCLSP API increases number of parameters

New Compression Option ZLIB

Request for Enhancement: “Add a modern compression algorithm for SAV/RST”

On-chip Nest Accelerator (NX) GZIP on Power10 system

- Used “Under the covers” when in Power10 compatibility mode
- Faster and less CPU-intensive

Informal lab test results

- **Compressibility**
 - **ZLIB option** compresses smaller than all existing options
 - Over **30% less than** the size of the **HIGH** option, **70% less than LOW**
- **Performance**
 - ZLIB is **equivalent or faster than MEDIUM and HIGH**, but slower than LOW
 - ZLIB is **always much faster (even up to 4x faster) when on Power10**
- HOWEVER, results will vary, depending on compressibility of the data and other factors



Compression Use Cases

1. Save commands and APIs for Save Files and Optical
 - Includes Virtual Optical
 - Does not include Tape
 - DTACPR Options: *LOW/*MEDIUM/*HIGH/*ZLIB
 - Restore process automatically determines the compression that was used
2. MI instructions – existing CPRDATA / DCPDATA
3. Geographic Mirroring synchronization

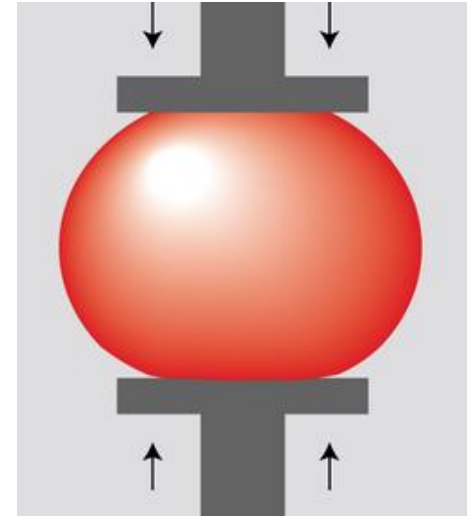
Save Commands & APIs that support ZLIB

Save Commands

SAV	SAVLICPGM
SAVCFG	SAVOBJ
SAVCHGOBJ	SAVSECDTA
SAVDLO	SAVSYS
SAVLIB	SAVSYSINF

Save APIs

- Save Object List (QSRSAVO)
- Save Object (QsrSave)
- Save to Application (QaneSava)



Compression Example Using MI Instruction

Compress

```
char *src = <data to be compressed>;  
char *tgt = <buffer to hold compressed data>;  
_CPRD_Template_T template;  
memset(&template, 0, sizeof(_CPRD_Template_T));  
template.Source_Length = <size of data to compress>;  
template.Result_Length = <length of target buffer>;  
template.Algorithm = 3; /* zlib, defaults to automatically use NX accelerator when on Power10** */  
template.Source = &src;  
template.Result = &tgt;  
_CPRDATA(&template);
```

** Note: Supports only Single Level Store source and target addresses; source data length must be at least 32KB. Otherwise, software zlib is used.

Let's test it! (saving QMGTOOLS LIB 1558 obj. 280MB)

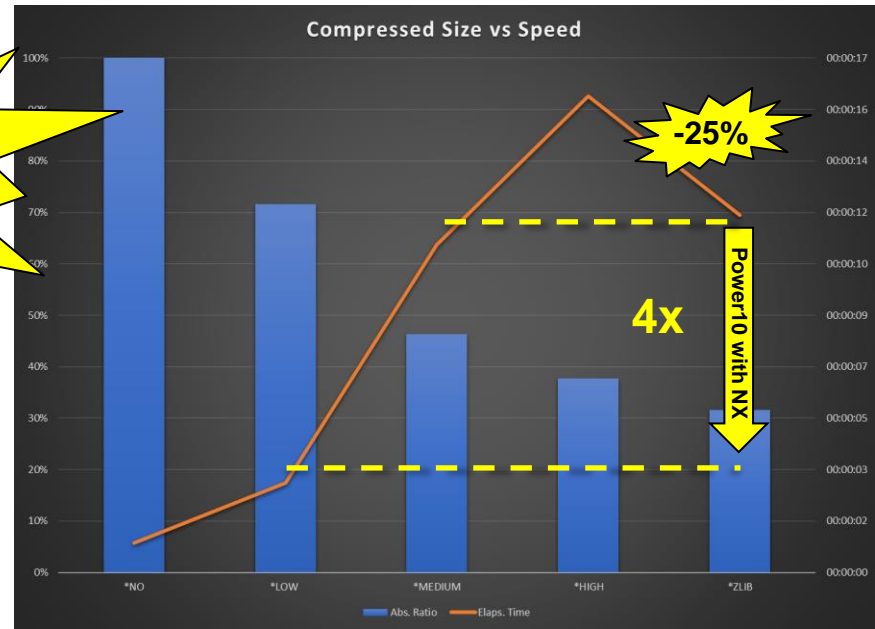
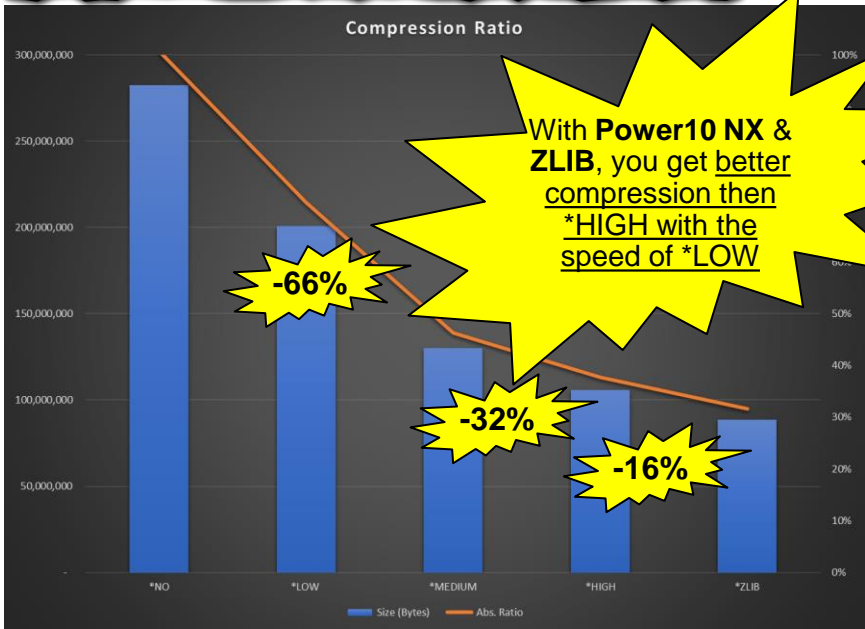
```

Display All Messages
Job . . . : QPADEV0004  User . . . : MICHELF  System: CTCPRF75
Number . . . : 020733

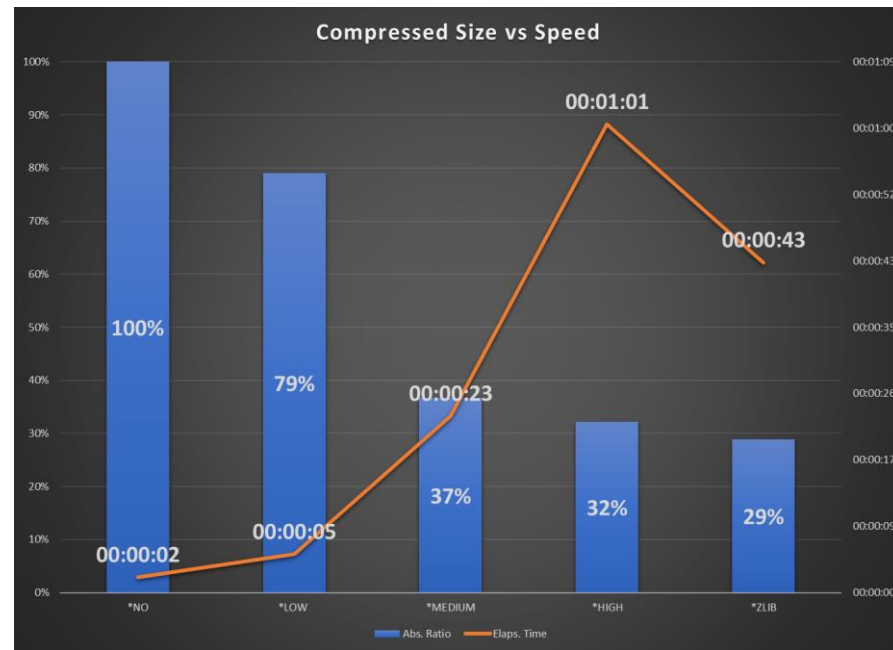
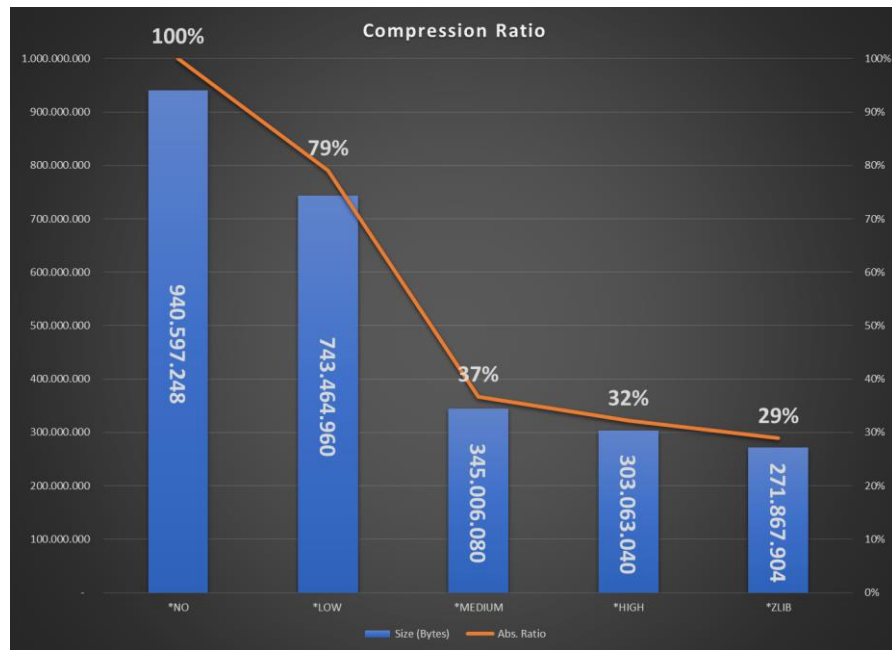
3 > SAVOBJ OBJ(*ALL) LIB(QMGTOOLS) DEV(*SAVF) SAVF(MICHELF/TESTNO) DTACPR(*NO)
1558 objects saved from library QMGTOOLS.
3 > SAVOBJ OBJ(*ALL) LIB(QMGTOOLS) DEV(*SAVF) SAVF(MICHELF/TESTlow) DTACPR(*low)
1558 objects saved from library QMGTOOLS.
3 > SAVOBJ OBJ(*ALL) LIB(QMGTOOLS) DEV(*SAVF) SAVF(MICHELF/TESTmed) DTACPR(*medium)
1558 objects saved from library QMGTOOLS.
3 > SAVOBJ OBJ(*ALL) LIB(QMGTOOLS) DEV(*SAVF) SAVF(MICHELF/TESThigh) DTACPR(*high)
1558 objects saved from library QMGTOOLS.
3 > SAVOBJ OBJ(*ALL) LIB(QMGTOOLS) DEV(*SAVF) SAVF(MICHELF/TESTzlib) DTACPR(*zlib)
1558 objects saved from library QMGTOOLS.

Press Enter to continue.
    
```

	Size (Bytes)	Ratio					
Initial object saved size	280,584,192	100%					
SAVF with compression	Size (Bytes)	Abs. Ratio	Rel. Ratio	Rel. Savings	Start	End	Elaps. Time
*NO	282,615,808	101%	101%	-1%	02:17:16	02:17:17	00:00:01
*LOW	200,826,880	72%	71%	29%	02:17:35	02:17:38	00:00:03
*MEDIUM	130,048,000	46%	65%	35%	02:17:53	02:18:04	00:00:11
*HIGH	105,930,752	38%	81%	19%	02:18:20	02:18:36	00:00:16
*ZLIB	88,629,248	32%	84%	16%	02:18:48	02:19:00	00:00:12



Test (on Power9) with a single large (940 MB) DB PF



Hardware Highlights

IBM i 7.5 fully supports up to **48** processors
(**cores**) per LPAR on Power10

- With SMT8, that is up to **384 threads**
- With Lab Services engagement, can grow up to 240 processors & 1920 threads



Simplified operator panel sequence

Number of operator panel functions to access Console Service Functions has been reduced for unmanaged servers

- IBM i 7.4 & earlier - To advance to next service function, need Functions 65 & 21:
 - Use **Up** to select function 65. Press **Enter**. Use **Up** to select function 21. Press **Enter**.
 - Repeat as needed.
- IBM i 7.5 & later - To advance to next service function, need just Function 65:
 - Use **Up** to select function 65. Press **Enter**.
 - Repeat as needed.
- Power9 and later



NVMe Health Information in Service Tools

- Already available in the **New Navigator**

Actions								
Resource Name ↑↓	Hardware Model ↑↓	Life Remaining (%) ↑↓	Spare Capacity (%) ↑↓	Spare Capacity Threshold (%) ↑↓	Number Media Errors ↑↓	Number Unsafe Shutdowns ↑↓	Composite Temperature (Celsius) ↑↓	Firmware Level ↑↓
Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
DC01	1.6TB NVMe Gen4 U.2 SSD	100%	100%	10%	0	1	39	REV.SN49
DC03	3.2TB NVMe Gen4 U.2 SSD	100%	100%	10%	0	1	37	REV.SN49
DC04	3.2TB NVMe Gen4 U.2 SSD	100%	100%	10%	0	1	39	REV.SN49
DC05	1.6TB NVMe Gen4 U.2 SSD	100%	100%	10%	0	1	37	REV.SN49
<< 1 >> 100								
Total Rows: 4								

- Now also in **Service Tools** green screens

```

Display NVMe Detailed Health Information
Serial Number      Resource Name      Type Model      Physical Location
Y0YHF1YBY0B5      DC05              58FE           U78CD.001.FZHBU50-P2-C6

NVMe serial number . . . . . : S4ECNY0M200292
Model information . . . . . : PCIe3 6.4TB NVMe Flash Adapter III x8
Firmware level . . . . . : HA25HA25

Warning flags . . . . . : 00

Composite temperature . . . . . : 34 C
Warning temperature time . . . . . : 0 minutes
Critical temperature time . . . . . : 0 minutes

Available spare space . . . . . : 100 %
Available spare threshold . . . . . : 10 %
Percentage life remaining . . . . . : 100 %

More...

F3=Exit      F5=Refresh      F12=Cancel
    
```

Save and Restore Highlights

- RSTUSRPRF & RSTAUT update for better system migration
 - Restoring of all user profiles can now be done without going to Restricted state
 - Reduces the prep time & timing window needed to do the overall restore operation
- New default for ASYNCBRING on SAVOBJ command & QsrSave API
 - Causes objects to be brought in asynchronously during Save processing
 - Provides same or better performance for saving IFS data
- Restore progress message now includes size of objects completed
 - Allows better estimation of the time remaining to finish the restore

Networking Highlight – TCP SACK

- Implementation of RFC2018 into IBM i TCP Stack
 - RFC2018: TCP Selective Acknowledgment (SACK) support
 - TCP stack handles lost packets and selectively acknowledges data segments received
 - Therefore, only the missing data segments need to be retransmitted by the sender
 - Helps customers improve overall TCP throughput for applications dependent on a high volume of TCP data being transferred when there is packet loss in the network
 - SACK is enabled by default for the TCP network layer

Networking Highlight – SNMPv3 Security

New SNMPv3 Features provide a higher level of security than previous options

- Configure to allow only SNMPv3 for SNMP agent, local trap manager, SNMP manager APIs
- An SNMPv3 driver is available for network-attached printers
- Define View-based Access Control Model (VACM) rules to restrict information returned
- New SHA-256 and SHA-512 options can be configured as authentication types for users
- New and changed commands include:
 - ADDVACSNMP / CHGVACSNMP / RMVVACSNMP
 - ADDUSRSNMP / CHGUSRSNMP
 - CFGTCPSNMP
 - CRTDEVPRT / CHGDEVPRT
 - CHGSNMPA

Program Model Highlight

- More parameters for Call Service Program Procedure (QZRUCCLSP)
 - This API now supports more procedure parameters
 - Increases programming flexibility needed for REST APIs that are part of IWS
 - Existing limit is 7 → New limit is 248
 - No need to change existing programs or IWS services
 - Pay attention to the new format needed when specifying more than 7 parameters

Hardware and Base Infrastructure Highlights

1. New Compression Algorithm << IBM i 7.4 also (for some)
2. Simplified operator panel sequence for unmanaged servers
3. IBM i 7.5 runs on Power10 and Power9 servers
4. Support up to 240 processors per LPAR on Power10
5. NVMe device health information in Service Tools
6. Save and Restore enhancements
7. TCP SACK
8. SNMPv3
9. QZRUCLSP API increases number of parameters << IBM i 7.4 also

Db2 for i



IBM i



IBM i Technology Updates Wiki

- On May 3rd (announce day), IBM Documentation updates are published
- Enhancements are explained on these landing pages:
- IBM i 7.4 TR6 – Enhancement Landing Page
<https://www.ibm.com/support/pages/ibm-i-74-tr6-enhancements>
- IBM i 7.5 – Enhancement Landing Page
<https://www.ibm.com/support/pages/ibm-i-75-base-enhancements>

Database enhancements with IBM i 7.4 TR6


Who will benefit?

- Database Engineer (DBE)
- SQL Programmers

Database enhancements with IBM i 7.4 TR6

Who will benefit?

- Database Engineer (DBE)



Improved Generation of SQL DDL
New insight Maintained Temporary Indexes
Improved ability to use CL with SQL scripts

- SQL Programmers

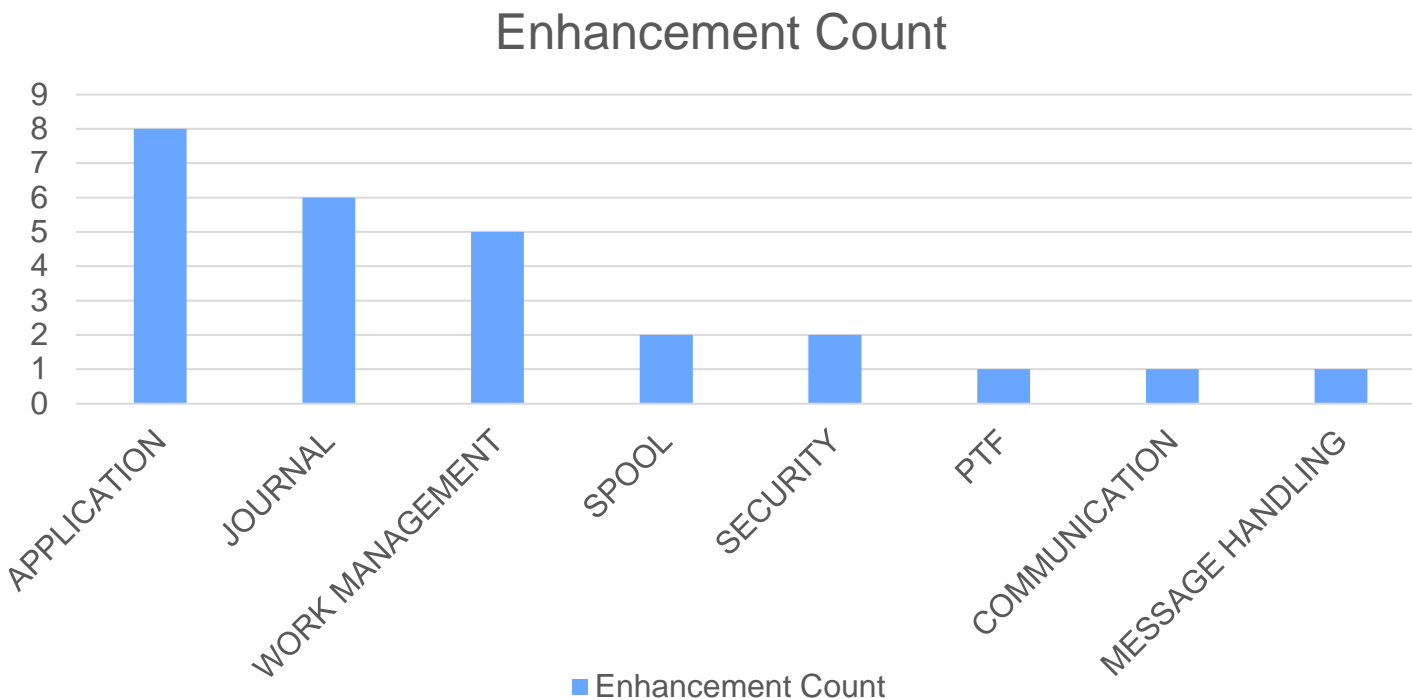


Improved usability in HTTP functions
New capabilities in HTTP functions
A new built-in function!

IBM i Services enhancements with IBM i 7.4 TR6

- Which categories were enhanced?

Enhanced by 15%!



Journal_Receiver_Info

--

-- How far back in time can I search the journal?

--

--

```
select timestamp(attach_timestamp,0) as curavlchn_start_time
  from qsys2.journal_receiver_info
 where journal_library = 'QSYS' and
        journal_name = 'QAUDJRN'
 order by attach_timestamp asc
 limit 1;
```

CURAVLCHN_START_TIME
2022-04-18 04:37:17

PTF Groups for IBM i 7.5

SF99950 *DB2GRP
SF99951 Db2 Mirror
SF99952 *HTTPGRP
SF99953 *PFRGRP
SF99954 *BRSGRP
SF99955 *JVAGRP
SF99956 TR plus
SF99957 TR group
SF99958 Security
SF99959 *HIPERGRP

SF99750 *CUMPKG
SF99751 *ALLGRP

SF99650 Open Source
SF99651 WAS 8.5
SF99660 Hardware
SF99669 Content Manager
SF99671 DB2 Web Query(230)
SF99676 H.A.
SF99677 TCP/IP
SF99679 MQ

Db2 for i – PTF Group Schedule

<https://www.ibm.com/support/pages/db2-ibm-i-2022-ptf-group-schedule>

Db2 for i – IBM i 7.5 Enhancements

- **Ragged Flash**
Quiesce DDL and FlashCopy, pending transactions are not rolled back
- **Increase the maximum size of a Binary Radix Index**
1.7TB → 16TB, based upon the page size
- **Set Server Subsystem Routing for SSL connections**
Relocate users of:
 - Database server secure (QZDASSINIT)
 - File server secure (QPWSERVSS)

Db2 for i – IBM i 7.5 Enhancements

- **SQL**

- **BOOLEAN** – SQL Standard support and more
- **Restrict on Drop** – SQL Tables, Database Physicals, and Database Source Physicals

- **JSON**

- **BOOLEAN values**, for publishing or shredding JSON with SQL

- **Improved Security by default**

- Reduced discovery of *USRPRF names
- Reduced discovery of IBM i library and object names
- Create objects with PUBLIC(*EXCLUDE)

Db2 for i – IBM i 7.5 Enhancements

- IBM i Services (new)
 - TELNET_SERVER_ATTRIBUTES
 - CHECK_PASSWORD
- IBM i Services (enhanced)
 - SECURITY_INFO
 - SERVER_SHARE_INFO
 - NETSTAT_JOB_INFO
 - AUDIT_JOURNAL_CP
 - AUDIT_JOURNAL_M7
 - AUDIT_JOURNAL_M8
- IBM i Services (enhanced)
 - OBJECT_STATISTICS
 - USER_STORAGE
 - SYSTEM_STATUS_INFO,
SYSTEM_STATUS_INFO_BASIC,
SYSTEM_STATUS
 - USER_INFO,
USER_INFO_BASIC
 - DISPLAY_JOURNAL
 - SCHEDULED_JOB_INFO
 - SERVER_SBS_ROUTING

SQE Performance Improvements

With IBM i 7.5, SQE has **improved CPU costing:**

Adaptations in counting heuristics to align with advancements in Power processing technology.

Creation of an automated modeling process
Simply by moving to IBM i 7.5, production workloads will benefit from advancements in SQE optimization.



[ibm-i-75-base-enhancements](#)

In IBM i 7.5, SQE is enhanced when ***OPTIMIZE is used for parallel execution of a query:**

When a percentage is specified for *OPTIMIZE, SQE will apply the percentage prior to optimization. This will provide the optimizer with more accurate information related to the number of tasks a query may run with.

Starting in IBM i 7.5, the query engine will **dynamically adjust the number of tasks** used by queries running with PARALLEL_DEGREE *OPTIMIZE. As these queries run, the query engine will **consider the overall system CPU usage**.

SQE will additionally **recognize when the system CPU is reaching a peak level**, and automatically reduce the amount of parallel processing used by active queries. The **default peak level** where this safety adjustment kicks in **is 80%, but can be adjusted higher or lower via the new QAQQINI parameter PARALLEL_MAX_SYSTEM_CPU**

[qaqqini-query-options](#)

Db2 Mirror Updates



IBM i



Db2 Mirror for IBM i 7.5 Enhancements

Mixed Release Support

- Run one node at 7.4 and the other at 7.5
- Enables rolling upgrades

Active/ Read Only Mode

- Run production on one node, use the read-only node for business analytics
- Read-only node can take over in the event the primary goes down

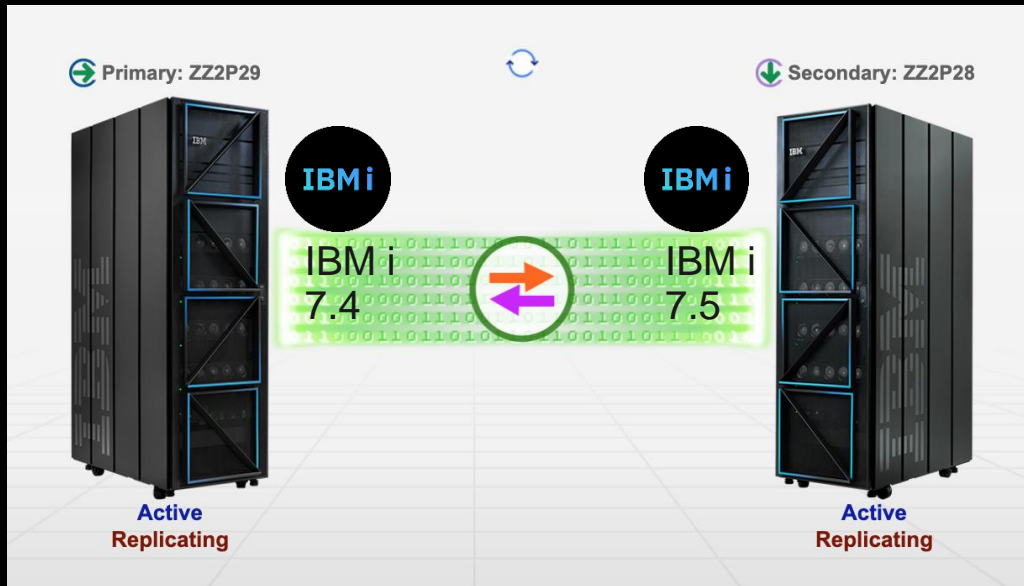
Db2 Mirror Versioning Service (7.4)

- Internally used to track differences in code levels and functions
- Externalized for applications to track differences in code levels and functions

Security best practices updated (7.4)

Identity Column Enhanced Support (7.4)

GUI usability and management enhancements (7.4)

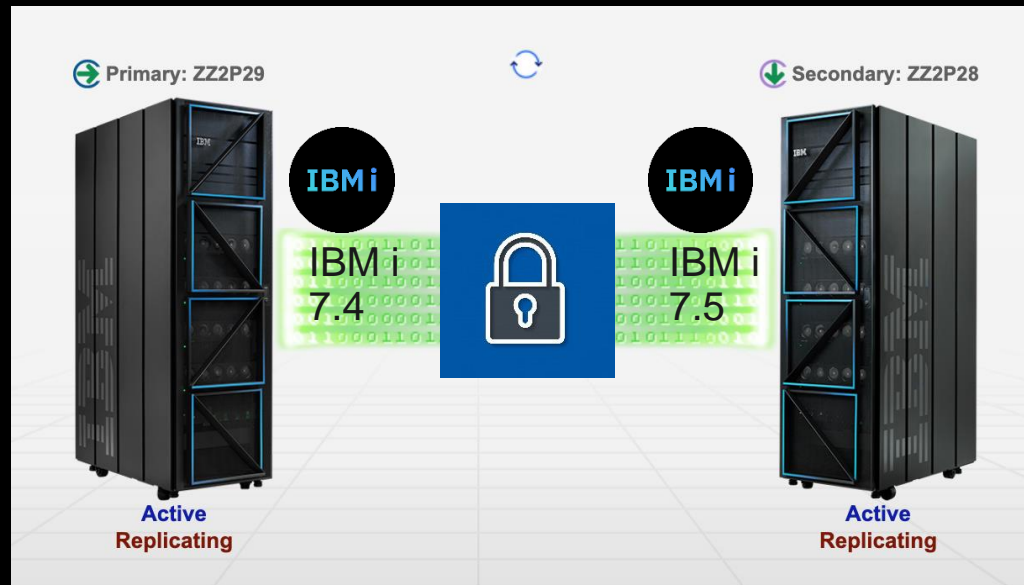


Db2 Mirror for IBM i 7.5 Enhancements

Enhancements from 2H2021:

- A **new adapter** was released that has the capability to **offload the encryption of Db2 Mirror RoCE traffic**.
 - EC77/EC78
- **Supports distances up to 10km**
 - Previous limit of 200m (100m cables with a switch in-between)
 - Can use LR transceivers or switches/routers

<https://www.ibm.com/docs/en/power9/9080-M9S?topic=ad-pcie4-2-port-100gbe-roce-crypto-x16-adapter-fc-ec77-ec78-ccin-2cfa>



IBM i 7.5 Security Enhancements



IBM i

SHA2 Password Encryption Scheme

- Password Based Key Derivation Function 2 (PBKDF2) with **SHA2-512**
- **New Password Level (QPWDLVL) system value (4)**
 - When system changed to password level 4, the DES (password level 0/1) and SHA-1 (password level 2/3) passwords are removed from the user profile.
- **New System Service Tools (SST) password level 3**
 - Used for service tools user ID passwords

Check Password Meets Password Rules API

- Check Password Meets Password Rules (QSYCHKPR) API
 - Checks whether an input value meets the password rules for the password rules for the system
 - This API only checks the password, it does not actually change the user's password
- Related: SQL CHECK_PASSWORD table function



More Password Related Changes

- Password authentication message and return code changes
 - Invalid user or password will result in the same error message with generic text
 - CPF22E2 User &1 does not exist or password not correct for user profile



IBM i NetServer Authorization List Access Control

- Allow an AUTL to be specified at the server level to restrict access to the SMB server to certain users
 - *USE or higher to allow server access
- Allow an AUTL to be specified on each share to restrict certain users' access to that share
 - *CHANGE or higher allows RW access to the share
 - *USE allows read only access to the share
 - Less than *USE will not allow access to the share
- AUTL restrictions are an additional security layer to existing security
 - Existing read only shares remain read only regardless of AUTL authority
 - IFS permissions still apply to objects accessed

Change default *PUBLIC Authority values to *USE

- Changed eligible IBM objects to *PUBLIC *USE (rather than *CHANGE)
- Not a security issue as much as a pain point explaining to auditors
- The [Memo to Users](#) contains the full list of IBM i supplied objects that were changed in 7.5
- Customers under audit can use that list to make similar changes in previous releases



IBM i 7.5 Core OS Components



IBM i

Work management – Job scheduler

Work with Job Schedule Entries

11/05/21 17:16:47 CDT

Status: HLD

Type options, press Enter.

2=Change 3=Hold 4=Remove 5=Display details 6=Release
8=Work with last submission 10=Submit immediately

Opt	Job	Status	-----Schedule-----	Recovery	Next
			Date Time Frequency Action		Submit Date
—	JS750044B	SCD	10/26/21 10:27:53 *YEARLY	*SBMRLS	10/26/23
—	NEW1001	SCD	11/05/21 17:05:22 *WEEKLY	*SBMRLS	11/12/21
—	NEW1002	SCD	*MONTHEND 17:07:12 *MONTHLY	*SBMRLS	11/30/21
—	NEW1003	HLD	*ALL 17:10:07 *WEEKLY	*SBMRLS	11/06/21
—	NEW1004	SCD	11/09/21 12:00:00 *YEARLY	*SBMRLS	11/09/21
—	NEW1005	SCD	01/01/22 17:08:58 *YEARLY	*SBMRLS	01/01/22
—	NEW1006	SCD	USER DEF 02:00:00 *WEEKLY	*SBMRLS	11/06/21

Bottom

Parameters or command

==>

F3=Exit F4=Prompt F5=Refresh F6=Add F9=Retrieve
F11=Display job queue data F12=Cancel F17=Top F18=Bottom

Hold Job Schedule Entry (HLDJOBSCDE)

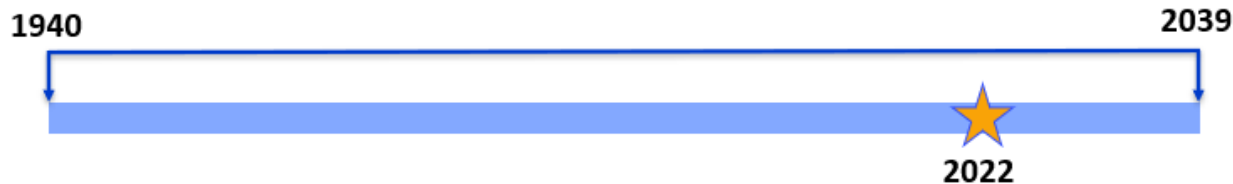
Type choices, press Enter.

Job name *jobscd Name, generic*, *ALL, *JOBSCD
Entry number *all 000001-999999, *ONLY, *ALL

✓ Hold or release the scheduler

✓ New option for *YEARLY

2-digit year date formats – default 100-year range

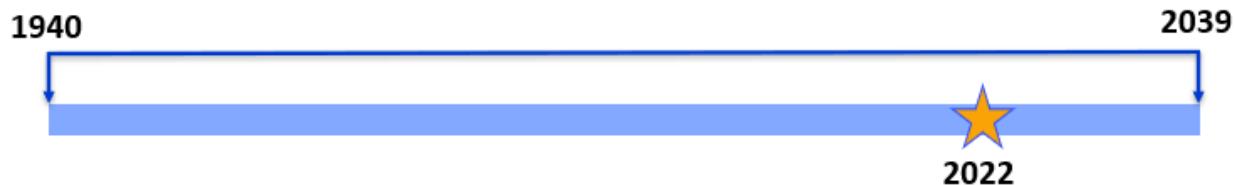


Number of digits in year		Range of Years
2	*YMD, *DMY, *MDY, *JUL	1940 to 2039
3	*CYMD, *CDMY, *CMDY	1900 to 2899
4	*ISO, *USA, *EUR, *JIS, *LONGJUL	0001 to 9999
4	*YYMD, *MDYY, *DMYY	0001 to 9999

Current algorithm:

If YY \geq 40, year = 19YY (1940 – 1999)
If YY < 40, year = 20YY (2000 – 2039)

2-digit year date formats – example



Example: Schedule a job to run in the year 40:

```
> SBMJOB CMD(DLYJOB DLY(999)) SCDDATE('01/01/40')
```

Specified date or time has passed.

Errors occurred on SBMJOB command.

Current algorithm:

If YY \geq 40, year = 19YY (1940 – 1999)

If YY < 40, year = 20YY (2000 – 2039)

Typing the full 4-digit year gives the desired result:

```
> SBMJOB CMD(DLYJOB DLY(999)) SCDDATE('01/01/2040')
```

Job 161101/ANGELA/QDFTJOB submitted to job queue QBATCH in library QGPL.

A new base year – 1970



- **Environment variable** to change the base year
 - **QIBM_QBASEYEAR** can be set to 1940 or 1970
 - **Default base year remains unchanged in 7.5 (1940)**
 - **Primarily intended for testing in 7.5**
- Targeted towards current dates
 - Commands with parameter of TYPE(*DATE)
- Environment variable **will not affect RPG, COBOL, or Database**

Setting up QBASEYEAR environment variable

To set the base year to 1970 for all jobs in the system:

```
ADDENVVAR ENVVAR(QIBM_QBASEYEAR) VALUE(1970) LEVEL(*SYS)
```

(Only jobs started after the environment variable is added will have the environment variable set – use `WRKENVVAR` or `DSPJOB, opt 22` to see if the environment variable is set for a job).

To set the base year to 1970 in your own job:

```
ADDENVVAR ENVVAR(QIBM_QBASEYEAR) VALUE(1970) LEVEL(*JOB) REPLACE(*YES)
```

The base year is set when the job is started and cached in the job, therefore you must call the following command to update the cached base year after adding or changing the job level environment variable:

```
CHGJOB JOB(*) DATFMT(*MDY)
```

(Change the date format to the same date format currently used by your job.)

Java Based Web Serving Options on IBM i



IBM i



Java Web Serving Option by IBM for IBM i

WebSphere Application Server

- 5730-WE3
- Part of IBM i entitlement
- V9.0
- Runs on Java 8
- User responsible for loading update

WebSphere Liberty

- 5730-WE3
- Part of IBM i entitlement
- Runs on Java 8 & 11
- User responsible for loading update

Integrated Application Server – IAS

- 5770-SS1
- Part of IBM i operating system
- Updated via PTF
- Runs on Java 8 & 11
- Latest versions delivered regularly

Integrated Web Services - IWS

- 5770-SS1
- Rest API engine for creating Rest APIs for ILE programs & service programs & SQL statements

WebSphere Application Server

- 5730-WE3
- Part of IBM i entitlement
- V9.0
- Runs on Java 8
- User responsible for loading update

<https://www.ibm.com/cloud/websphere-application-server>

WebSphere Liberty

- 5730-WE3
- Part of IBM i entitlement
- Runs on Java 8 & 11
- User responsible for loading update

<https://www.ibm.com/cloud/websphere-liberty>

1 vs the other

• **Traditional WAS** (sometimes referred to as WebSphere Application Server “classic” or “full profile”) – The original architecture of WebSphere Application Server that started in 1998 with Servlet Express v1.0 and evolved into an industrial-strength Java EE container.

• **Liberty** (sometimes called “WAS Liberty” or “Liberty profile”) – The next generation Java EE container architecture, introduced in WebSphere Application Server v8.5.0 in 2013, designed to be highly composable, to start faster, use less memory, and scale better.

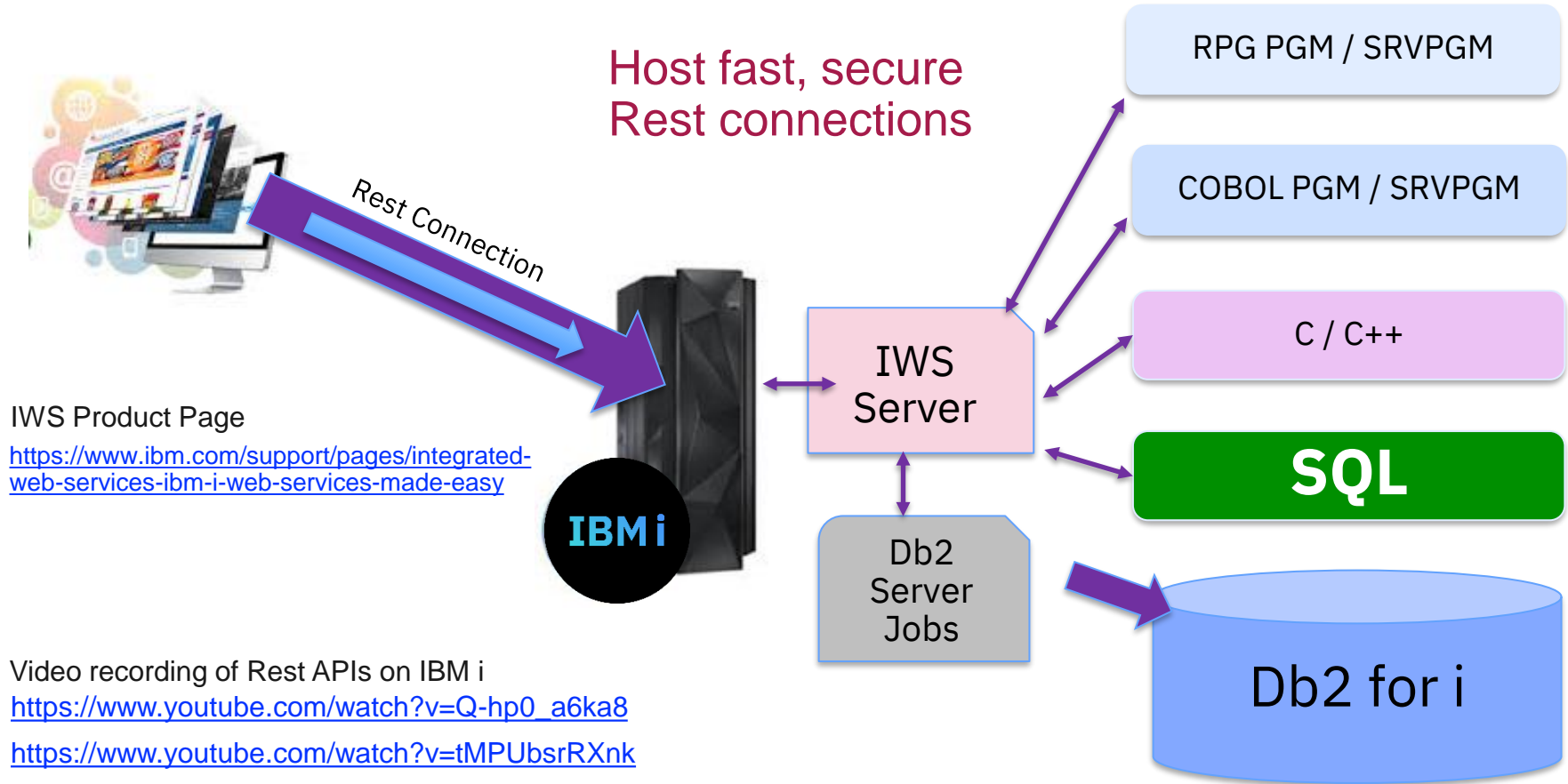
<https://www.ibm.com/cloud/blog/websphere-liberty-different-from-traditional-was-p2>

Integrated Application Server - IAS

- Integrated Application Server – IAS
- 5770-SS1
- Part of IBM i operating system
- Updated via PTF
- Runs on Java 8 & 11
- Based on Liberty
- Simple high speed Java Web Server

<https://www.ibm.com/support/pages/integrated-web-application-server-ibm-i>

Rest API Engine for IBM i

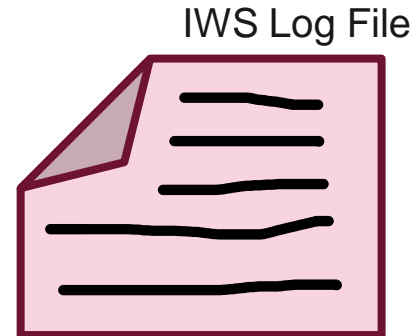


Enhanced Logging - IWS

- IWS / IAS Log files can now be specified as JSON for the format
 - Allows for easy consumption by standard log consumption tools
 - Think – Splunk, Elastic Stack, etc
 - HTTP Access logging now supported
 - HTTP Message logging now supported
- Logs written using ASYNC thread to remove any performance impacts to actual Rest API transaction



Who, What, When, Where



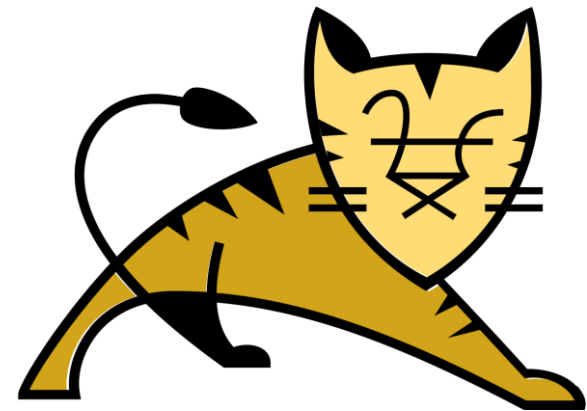
Open Source Java Application Servers

- Requested more frequently
- Portable, lightweight, flexible
- Can run in chroot containers on IBM i

https://ibmi-oss-docs.readthedocs.io/en/latest/java/APP_SERVERS.html

Apache Tomcat

Governed by	Apache Software Foundation (ASF)
IBM Support	Available from TSS
Primary Advantages	<ul style="list-style-type: none">• Long history, popularity with IBM i• Incredibly easy setup• Lots of documentation



Governed by	Red Hat
IBM Support	Available from TSS
Primary Advantages	<ul style="list-style-type: none">• Strategic alignment with Red Hat• Easy upgrade path to JBoss Enterprise Application Server• Pluggable subsystems, quick boot



Governed by	IBM
IBM Support	None, community support only
Primary Advantages	<ul style="list-style-type: none">• Same codebase as WAS Liberty• Easiest migration from IAS or WAS



Eclipse Jetty

Governed by	Eclipse Software Foundation (ESF)
IBM Support	Available from TSS
Primary Advantages	<ul style="list-style-type: none">• Small disk and memory footprint• Embedded in many applications today

jetty://

IBM i Compilers: ILE CL & RPG



IBM i



- ```

Call Program (CALL)

Type choices, press Enter.

Parameters:
Parameter > 'CHICAGO'

Type and length of parameter:
Type > *CHAR *DFT, *DEC, *CHAR, *LGL...
Length > 50 Number
Decimal positions Number

Parameter > 1234

Type and length of parameter:
Type > *DEC *DFT, *DEC, *CHAR, *LGL...
Length > 12 Number
Decimal positions > 2 Number

```

```
Now CALL PGM(LIB1/PAYROLL) PARM(('CHICAGO' (*CHAR 50)) (1234
(*DEC 12 2)) &VAR1)
```

## Plan to support 7.4 via PTF too



# SND-MSG opcode

SND-MSG sends a message to the joblog

You can send an informational message to the current procedure

```
SND-MSG 'hello'; // *INFO is the default
SND-MSG *INFO 'hello';
```

You can send an escape message to your calling procedure

```
SND-MSG *ESCAPE 'hello';
```

You can send a specific message ID from a message file

```
SND-MSG %MSG('ABC1234' : 'MYLIB/MYMSGF');
```

Your message can have replacement text

```
SND-MSG *ESCAPE %MSG('ERR1234' : 'MYLIB/MYMSGF' : err1234ReplText);
```

# SND-MSG opcode

You can send the message explicitly to the current procedure

```
SND-MSG *ESCAPE 'hello' %TARGET(*SELF);
```

You can send the message explicitly to your caller

```
SND-MSG 'Complete' %TARGET(*CALLER);
```

You can send the message to a specific program or procedure on the call stack

```
SND-MSG *ESCAPE
```

- %MSG('ERR1234' : 'MYLIB/MYMSGF' : err1234RepIText)
- %TARGET('myMainProcedure');

You can send the message relative to a specific program or procedure on the call stack

```
SND-MSG *ESCAPE
```

- %MSG('ERR1234' : 'MYLIB/MYMSGF' : err1234RepIText)
- %TARGET('myMainProcedure': 1);

# ON-EXCP opcode

ON-EXCP lets you monitor for specific messages

```
MONITOR;
 do_something ();
ON-EXCP 'ABC1234' : 'DEF2345';
 error_occurred = *ON;
 process_error (psds.errmsgid);
ENDMON;
```

You can code more than one ON-EXCP section:

```
MONITOR;
 do_something ();
ON-EXCP 'ABC1234' : 'DEF2345';
 ...
ON-EXCP 'GHI1234';
 ...
ENDMON;
```

ON-EXCP opcodes must be coded before  
ON-ERROR opcodes

```
MONITOR;
 do_something ();
ON-EXCP 'ABC1234' : 'DEF2345';
 error_occurred = *ON;
 process_error (psds.errmsgid);
ON-ERROR 100 : 102;
 snd-msg *escape 'Unexpected error!';
ENDMON;
```

<https://www.ibm.com/support/pages/rpg-cafe>

# Access Client Solutions

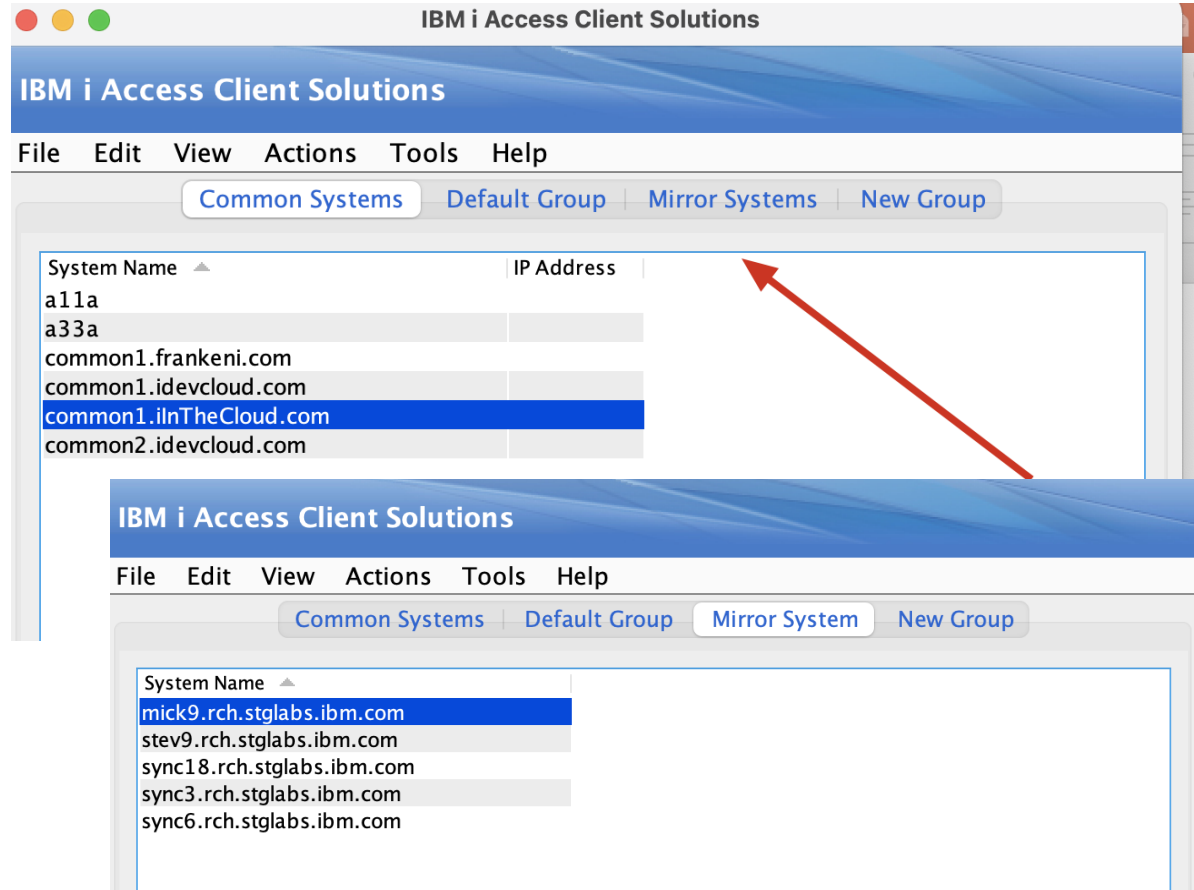


**IBM i**

# ACS 1.1.9 – System Groups

Systems can now be registered into groups!

Also...NO right description area

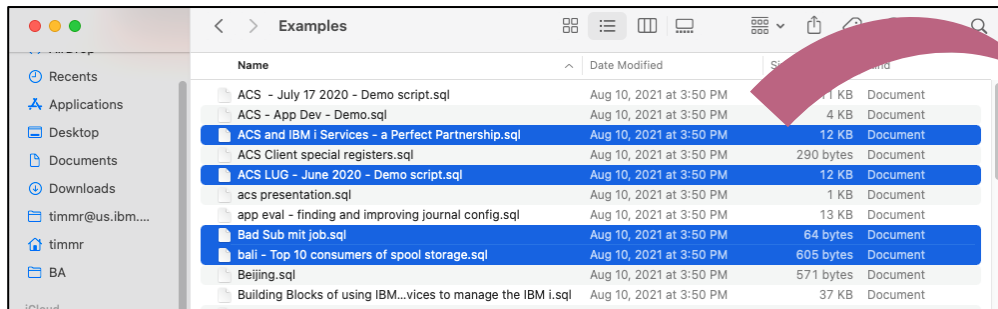


# ACS 1.1.9 – Run SQL Scripts Tabs

- Work with multiple SQL Scripts within a single window/connection

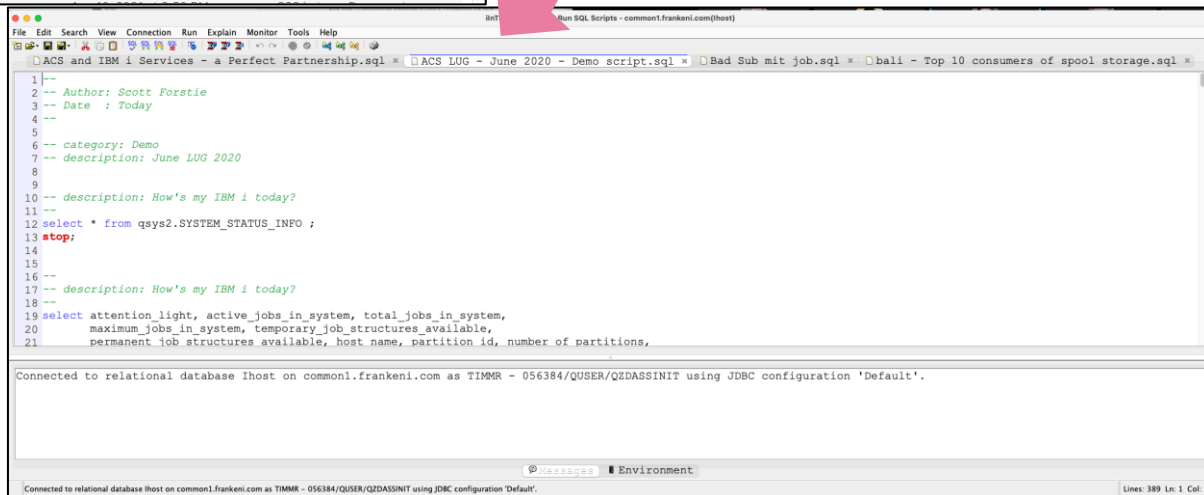


# Access Client Solutions V1.1.9.0 – TABS/Groups



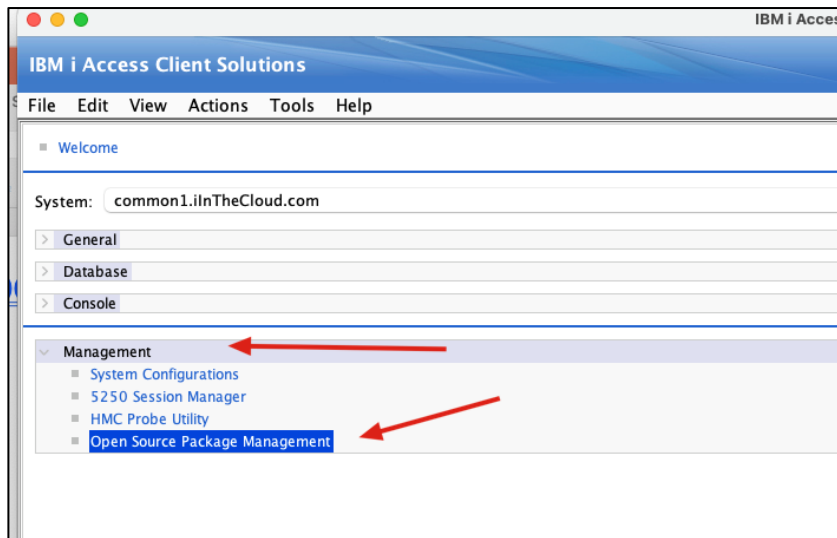
Drag and Drop

- Tabs in Run SQL Scripts!!
  - Open new tab to craft SQL for the window connection
  - Drag and drop .sql files into Run SQL Scripts, a new tab is opened for each file

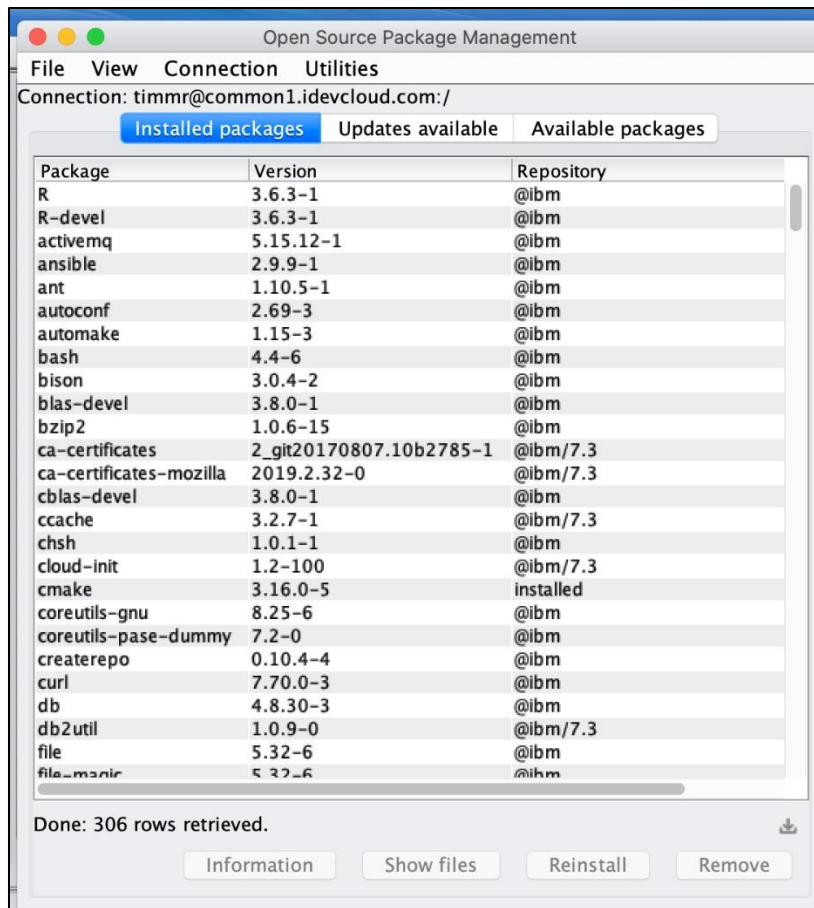


# Open Source Package Management

## RPM & YUM

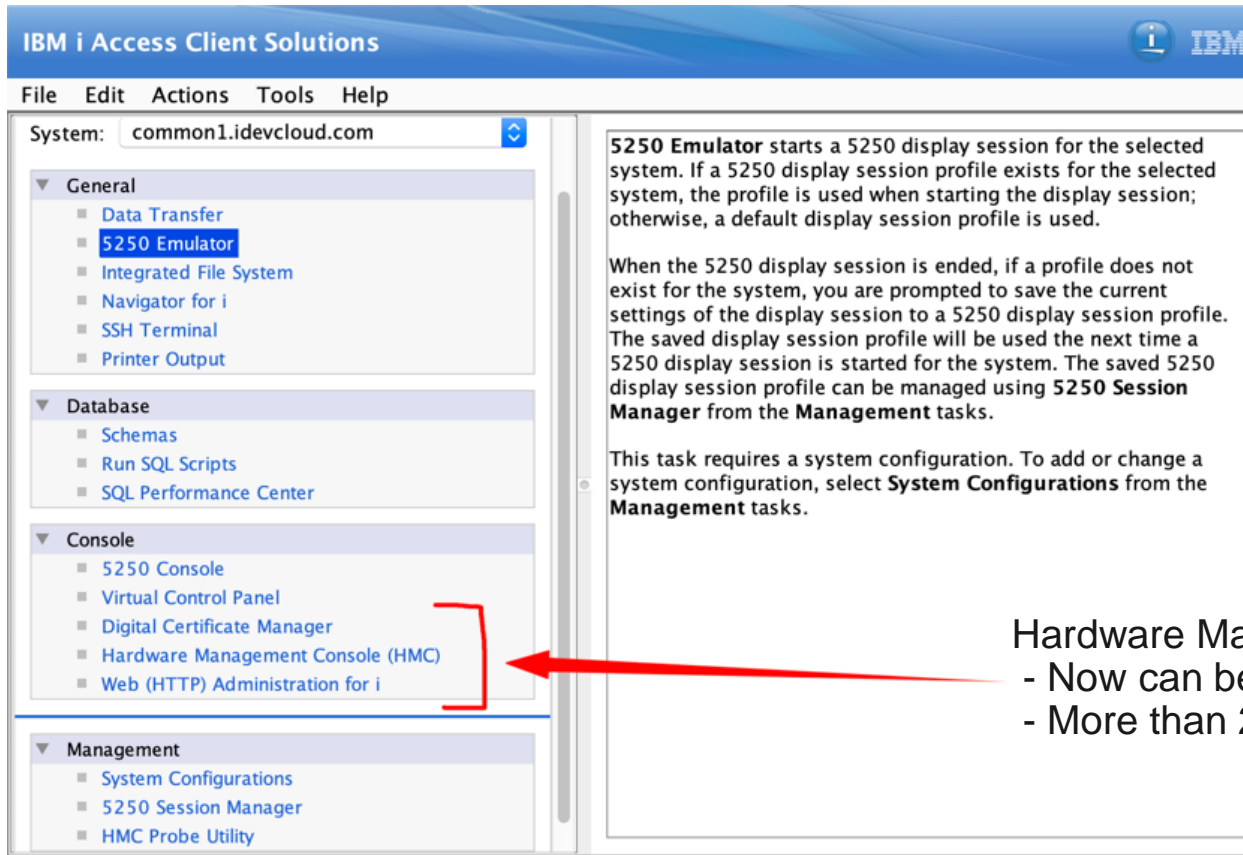


Link NOW under Management!





# ACS 1.1.9 – Hardware Management Interface



Specify all hardware and software management interfaces in a single place

Hardware Management Interfaces  
- Now can be defined  
- More than 2 allowed

# IBM i Navigator

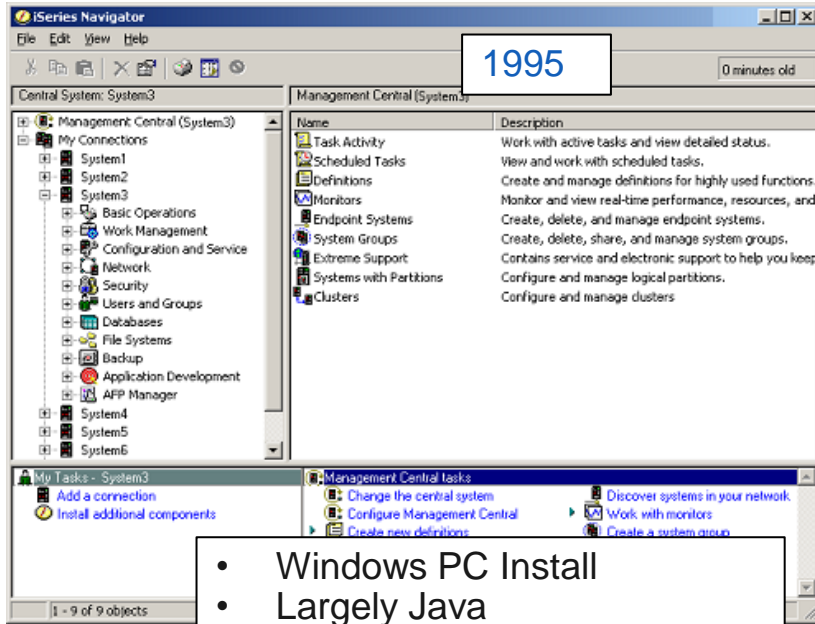


**IBM i**



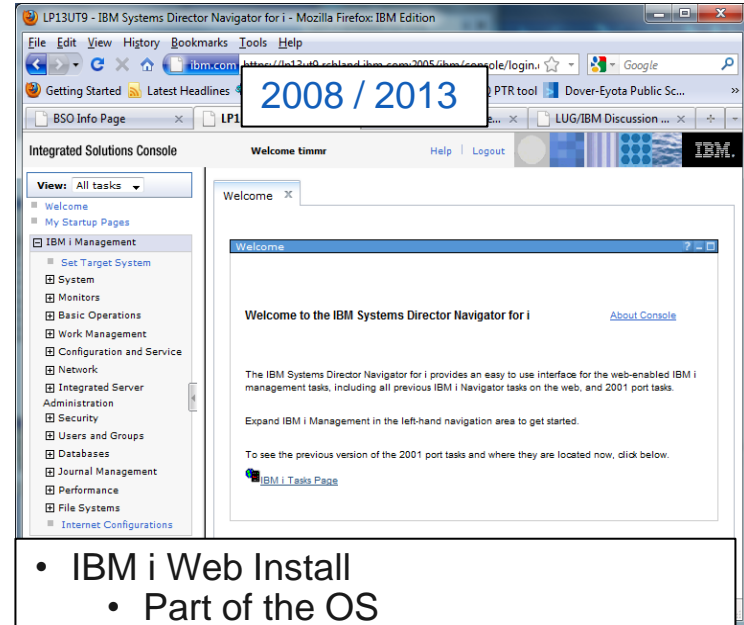
# Navigator - History

## Original Navigator



- Windows PC Install
- Largely Java
- UI built on Java Swing

## Current – Web Based Navigator

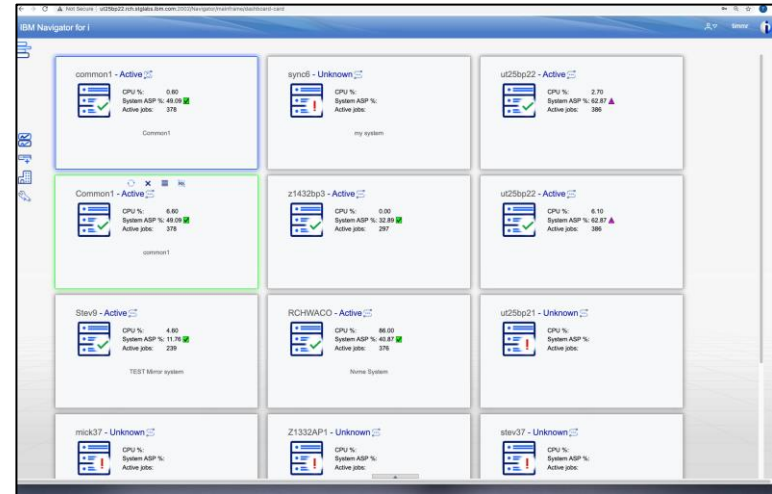


- IBM i Web Install
  - Part of the OS
- PC based solution ported to Web
  - Java Swing replaced with
  - ISC and AUIML (IBM Web Tech)
- Shoe horned in DoJo for 2013

# Design Directions – ‘New Nav’

Tool to provide a secure modern interface for accessing, managing, and monitoring ALL IBM i nodes within a customers infrastructure in new ways

- ‘Client’ for accessing, monitoring and managing one or many IBM i nodes
- Improved monitoring capability for one or many endpoints
- Built on Angular Technology
- Leveraging IBM i Services for data retrieval
- End to End Secure



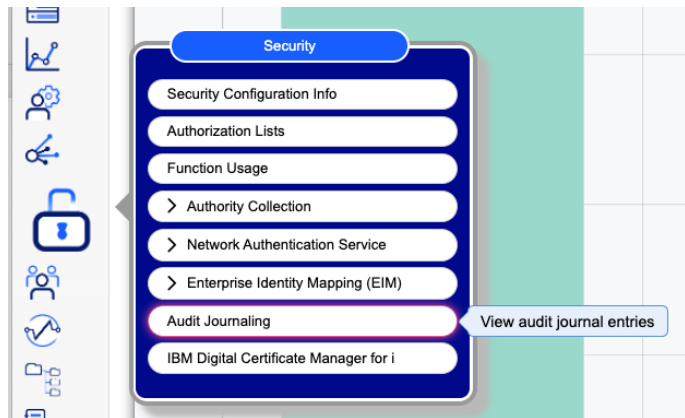
# How do you get it

The IBM Navigator is shipped as part of SS1 option3

- Latest HTTP PTF Group
- Latest Database PTF Group

Documentation - [www.ibm.com/support/pages/node/6483299](http://www.ibm.com/support/pages/node/6483299)

# Audit Journals



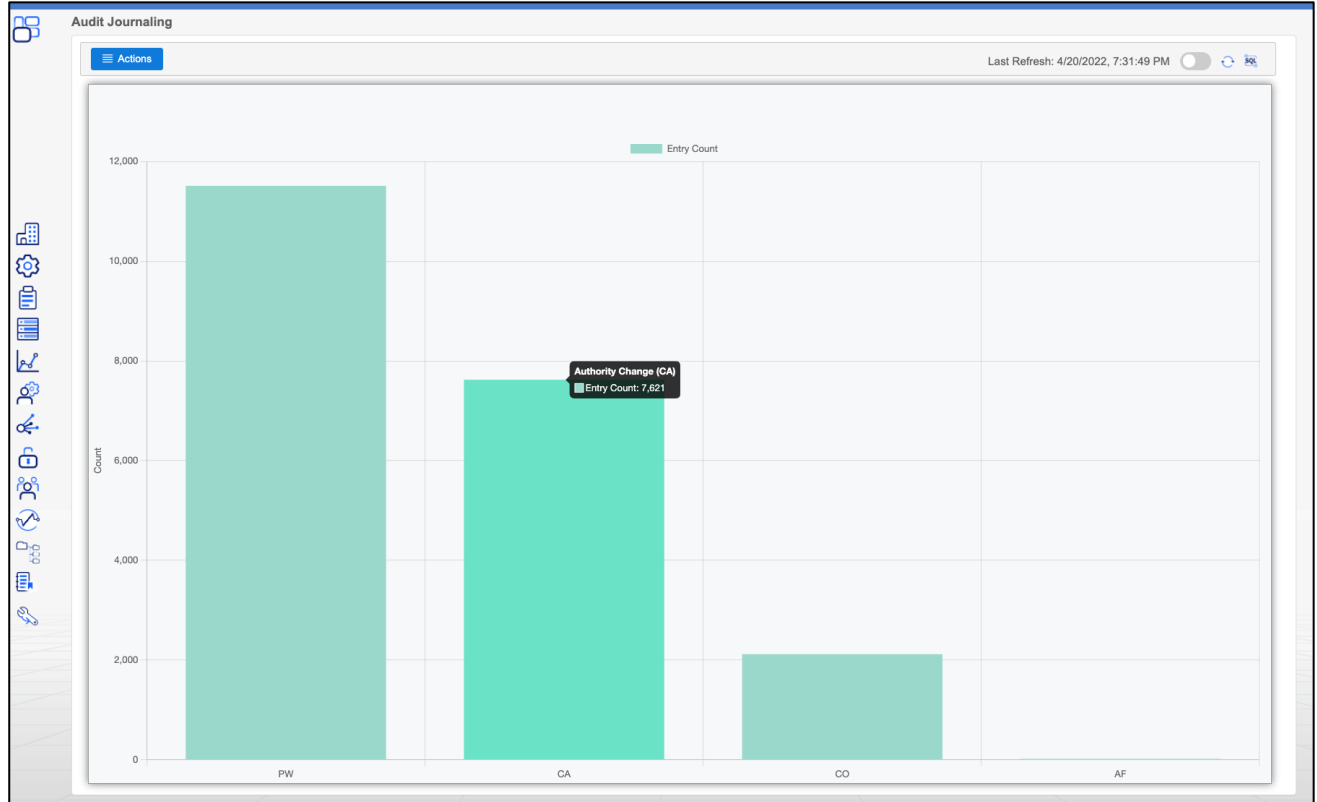
Audit Journals are often over looked

- Visualize your audit journal information
- Daily, Weekly, Charts, Details

A screenshot of the 'Configure view' dialog box. The dialog has a title bar 'Configure view' with a close button. It contains several sections: 'Select view' with radio buttons for 'Chart View' (selected) and 'Detail View'; 'Select audit journal entries' with a search bar and a list of entries: Authority Failure (AF) [checked], Password (PW) [checked], Auditing Changes (AD) [unchecked], Authority Changes (CA) [checked], Command String (CD) [checked], Create Object (CO) [checked], User Profile Changes (CP) [unchecked], and Delete Object (DO) [unchecked]; 'Select chart mode' with radio buttons for 'Daily View' (selected) and 'Weekly View', and date/time pickers for 'From' and 'To'; a 'Note' about audit journal receivers; 'Select graph color' with a color picker showing '#99d8c9'; 'Select auto refresh interval' with a dropdown set to '5 minutes'; and 'Sort chart by' with a dropdown set to 'Entry Count Decreasing'. At the bottom right are 'OK' and 'Cancel' buttons.

# Audit Journals

Visualize the entries  
to gain insight



# Performance Data Investigator

IBM Navigator for i

Search Common1.Franken1.com timmr

Investigate Data

Actions

Context

Collection Library: QPFRDATA Graph Interval: 15 minutes Collection Name: Q102000002 - 4/11/22 11:00:02 PM - \*CSFILE - V7R4M0 - COMMON1

| Package Name        | Perspective Path                                                           | Perspective                             | Description                                                                                                                                                                                |
|---------------------|----------------------------------------------------------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Collection Services | Disk                                                                       | Filter                                  |                                                                                                                                                                                            |
| Collection Services | <input type="checkbox"/> <input type="checkbox"/> Job Statistics Overviews | Disk Read                               | Charts that show average response time, average service time, average wait time, and percent disk busy for the system disk pool over time.                                                 |
| Collection Services | <input type="checkbox"/> Waits                                             | Disk Write                              |                                                                                                                                                                                            |
| Collection Services | <input type="checkbox"/> CPU                                               | Disk Throughput Overview for Disk Pools | This chart shows read MB per second, write MB per second, thousand I/O commands per second, average service time and average wait time for disk pools over time.                           |
| Collection Services | <input checked="" type="checkbox"/> Disk                                   | Disk Overview by IOP Name               | Charts that show average response time and percent disk busy by IOP name ranked by the largest contributors. Use this chart to select contributors for further detailed investigation.     |
| Collection Services | <input type="checkbox"/> Disk > Disk Response Time                         | Disk Overview by Adapter Name           | Charts that show average response time and percent disk busy by adapter name ranked by the largest contributors. Use this chart to select contributors for further detailed investigation. |
| Collection Services | <input type="checkbox"/> Disk > Disk Response Time > Detailed              | Disk Overview by Disk Pool              | Charts that show average response time and percent disk busy by disk pool ranked by the largest contributors. Use this chart to select contributors for further detailed investigation.    |
| Collection Services | Disk                                                                       | Disk Overview by Disk Unit              | Charts that show average response time and percent disk busy by disk unit ranked by the largest contributors. Use this chart to select contributors for further detailed investigation.    |

Launch Chart to new Tab!

Smart Filter

Performance

Investigate Data

Manage Collections

Collection Services Configuration

Graph History - Summary

Graph History - Details

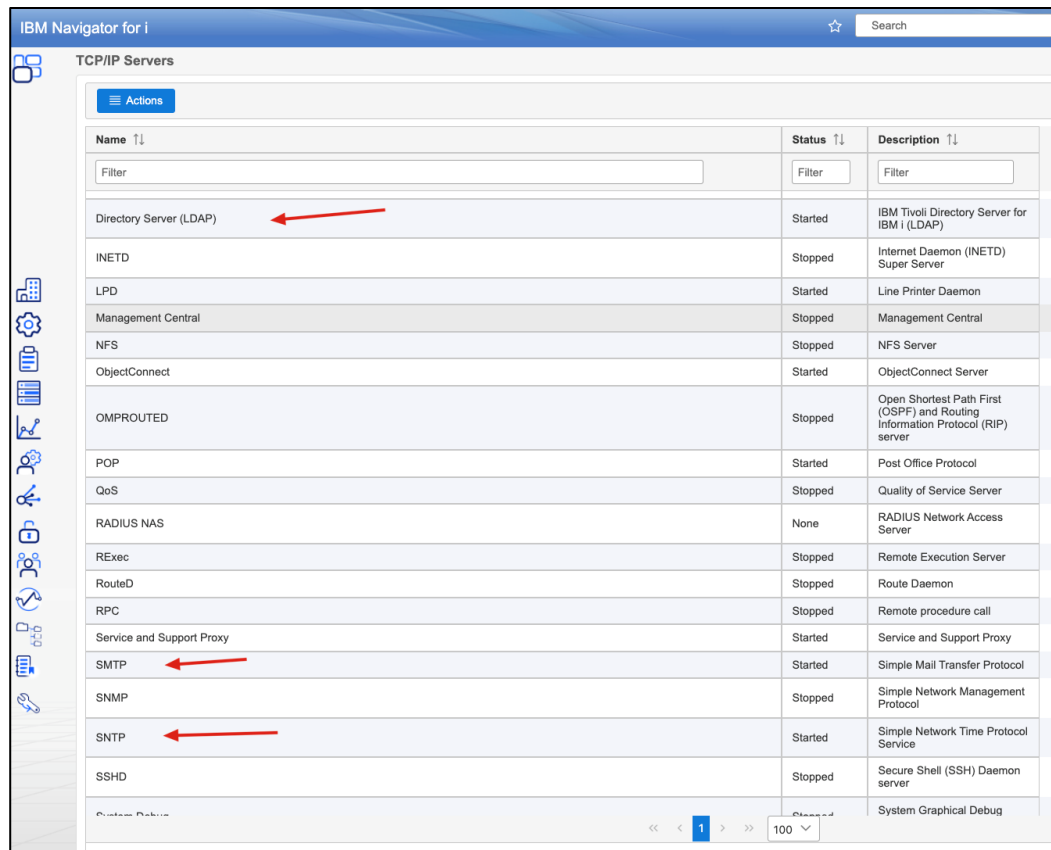
Launch the perspectives table to choose a collection and display charts



# TCP Server Support

## Configuration Support for TCP Servers

- LDAP
- SNTP
- SMTP



IBM Navigator for i

TCP/IP Servers

Actions

| Name ↑↓                   | Status ↑↓ | Description ↑↓                                                                |
|---------------------------|-----------|-------------------------------------------------------------------------------|
| Filter                    | Filter    | Filter                                                                        |
| Directory Server (LDAP)   | Started   | IBM Tivoli Directory Server for IBM i (LDAP)                                  |
| INETD                     | Stopped   | Internet Daemon (INETD) Super Server                                          |
| LPD                       | Started   | Line Printer Daemon                                                           |
| Management Central        | Stopped   | Management Central                                                            |
| NFS                       | Stopped   | NFS Server                                                                    |
| ObjectConnect             | Started   | ObjectConnect Server                                                          |
| OMPROUTED                 | Stopped   | Open Shortest Path First (OSPF) and Routing Information Protocol (RIP) server |
| POP                       | Started   | Post Office Protocol                                                          |
| QoS                       | Stopped   | Quality of Service Server                                                     |
| RADIUS NAS                | None      | RADIUS Network Access Server                                                  |
| RExec                     | Stopped   | Remote Execution Server                                                       |
| RouteD                    | Stopped   | Route Daemon                                                                  |
| RPC                       | Stopped   | Remote procedure call                                                         |
| Service and Support Proxy | Started   | Service and Support Proxy                                                     |
| SMTP                      | Started   | Simple Mail Transfer Protocol                                                 |
| SNMP                      | Stopped   | Simple Network Management Protocol                                            |
| SNTP                      | Started   | Simple Network Time Protocol Service                                          |
| SSHD                      | Stopped   | Secure Shell (SSH) Daemon server                                              |
| System Graphical Debug    | Stopped   | System Graphical Debug                                                        |

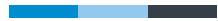
1 100

# PowerHA SystemMirror for i & BRMS



**IBM i**





## BRMS 7.5 Release Update



## 7.5 BRMS Highlights

Backup and restore enhancements – OS equivalency

- The **SAVBRM** command parameter has a new default option, **ASYNCBRING(\*YES)**
  - IFS backup enhancement
- **RSTLIBBRM** has been enhanced with the **STRJRN()** and **SELECT()** parameters.
  - Gives the options to start journaling when objects in the library are restored
- **RSTOBJBRM** has been enhanced with the **STRJRN()** parameter.
  - Starts journaling after objects are restored

Control Group enhancements

- Backup control group support for IFS backups using **SAVACTOPT(\*ALWCHKPWRT)** and **SAVACTOPT(\*ALL)**.
- Backup control group entry support for Save active message queue library.

Reporting and BRMS log enhancements

- Recovery report (**QP1ARCY**) steps have been enhanced to include cloud recovery support for Network Install Using Network File System(NFS) and using VTL iSCSI attached devices.
- **PRTRPTBRM** has been enhanced with an **EXPDATE()** parameter to select which records to include in the report.
- **DSPLOGBRM** has been enhanced to support **OUTPUT(\*OUTFILE)** and **OUTPUT(\*OUTSTMF)**.

## 7.5 BRMS Highlights (continued)

### Media services enhancements

- **WRKMEDBRM** has been enhanced to select multiple From locations and multiple Media class names.
- **WRKMEDBRM** has been enhanced to support **OUTPUT(\*OUTFILE)** and **OUTPUT(\*OUTSTMF)**.

### Policy Enhancements

- **WRKPCYBRM \*SYS** option for BRMS to include all messages that occur during BRMS command processing in the BRMS log.
- **WRKPCYBRM \*RCY** option for check the size of the restore.
- **WRKPCYBRM \*BKU** option for automatic virtual volume attributes.

## 7.5 BRMS Highlights (continued)

### SQL Services

- BRMS is introducing SQL Service interfaces as a new way to view, order, and subset BRMS information.

### Security Enhancements – compliance with the IBM security by design process

- The default for the BRMS shipped database is changing from \*PUBLIC \*USE authority to \*PUBLIC \*EXCLUDE.
- The default authority for BRMS shipped functional usage is changing from default authority \*ALLOWED to \*DENIED. Use the SETUSRBRM command as a starting point to grant system operators and administrators access to BRMS functions and components. Then use the functional usage model to customize access by user.
- The data authority for BRMS shipped flight recording is changing from data authority \*RWX to \*WX.
- APIs have a default assigned functional authority of \*DENIED.

## 7.5 BRMS Highlights (continued)

### APIs and Exit Program Enhancements

- Reclaim Media (Q1ARCLMED) API gives users the ability to programmatically reclaim a single tape volume.
- Change Control Group Attributes (Q1ACHGCGA) API enables users to change programmatically the control group attributes.
- Control Group exit program support for new format BKUI0200.

### Hardware Support

- Added support for **Ultrium 9 (LTO9)** tape drives and media.
- Added support for **VTL iSCSI** attached devices.

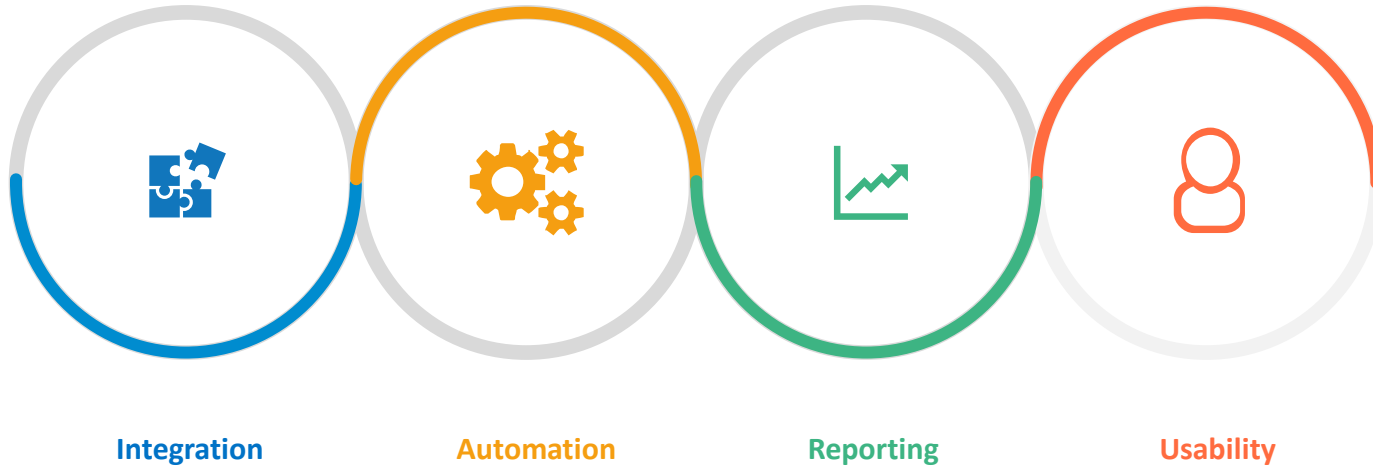


# PowerHA SystemMirror for i Updates





# Themes



# PowerHA Updates

- ▶ Continued delivery of new functionality through PTFs to as many supported releases as possible approximately 3 times per year. Goal is to provide enhancements into the current supported releases.
- ▶ See the PowerHA wiki: <https://ibm.biz/ibmi-powerha>

# PowerHA 2021 Enhancements (Through Q4 2021)

## Integration

- ▶ Simplified IP address switching

## Automation

- ▶ Additional automation for deployment of Geographic Mirroring **reducing commands required by up to 74%** compared to November 2020
- ▶ SVC FlashCopy Automation

## Reporting

- ▶ Switchover **progress monitoring**

## Usability

- ▶ **Interactive wizard-based PowerHA management**
- ▶ Improved control over node selection for switchovers
- ▶ **Simplified commands with f4 prompt options**
- ▶ **SVC Performance Improvements**

# Switchover Progress Monitoring

```
PowerHA Display CRG Activity

CRG name . . . : MYCRG Elapsed time . : 00:00:01
Type : Switchover

Step Elapsed time
Started on 06/24/21 at 20:22:18. 00:00:00
Varying off devices on PROD 00:00:01
 Device MYIASP with job 048248/QSECOFR/QCSTVRYDEV Running

F3=Exit F5=Refresh F12=Cancel F19=Automatic refresh

Bottom
```

# FlashCopy Automation for FlashSystems (SVC) Storage

1. Validate replication state for target side FlashCopy
2. Optionally quiesce production IASP
  - SRCASPACN parameter
3. Take FlashCopy
4. Automatically Vary on Target IASP
  - TGTASPACN parameter

```
Start SVC Session (STRSVCSN)

Type choices, press Enter.

Session > SVCGMIRFC Name
Session type > *FLASHCOPY *METROMIR, *GLOBALMIR...
ASP copy:
 Preferred source SVCGMIRS1 Name
 Preferred target SVCGMIRFC Name
 + for more values
Incremental flash *NO *NO, *YES
Copy rate 0 0-150
Cleaning rate 50 0-150
Source ASP action *NONE *NONE, *FRCWRT, *SUSPEND...
Target ASP action *NONE *NONE, *VARYON

F3=Exit F4=Prompt F5=Refresh F10=Additional parameters F12=Cancel
F13=How to use this display F24=More keys

MA C 14/037
```

# Wizard-Based Management

Command Entry

PROD

Request level: 1

Previous commands and messages:

(No previous commands or messages)

Bottom

Type command, press Enter.

==> \_

F3=Exit F4=Prompt F9=Retrieve F10=Include detailed messages  
F11=Display full F12=Cancel F13=Information Assistant F24=More keys

MA A

MW

18/007

# Upcoming in PowerHA

## 1H 2022 Plans

- ▶ Simplified **single edition** PowerHA offering in 7.5
- ▶ **Geographic Mirroring Compression**
- ▶ PowerHA **Modern Web Interface Preview**

## 2H 2022 Candidates

- ▶ Administrative domain support for new 7.5 object attributes
  - ▶ MAXSIGN for user profiles
  - ▶ SNMPUSR and SNMPCNTX for \*PRTDEV
- ▶ Administrative domain support for CHGUSRAUD updates to user profiles
- ▶ Improved JOBQ support in a PowerHA environment
- ▶ PowerHA **Modern Web Interface – Phase 1**

# Miscellaneous



**IBM i**

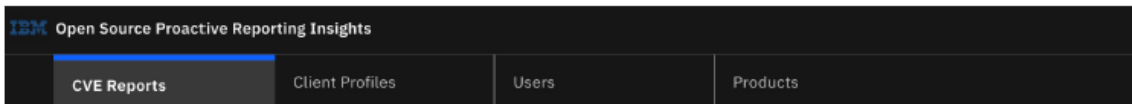




# IBM i Open Source updates through 2021

- **Node.js 16**
- GNU Compiler Collection (**GCC**) 10
- **Python 3.9**
- **tn5250** – The open source "tn5250" emulator is now available for IBM Portable Application Solutions Environment for i (PASE for i). This enables easy 5250 access from any Secure Shell (SSH) terminal.
- **dos2unix** – The dos2unix project provides a set of simple conversion utilities that convert new lines in files between DOS/Windows (CRLF), Unix (LF), and Classic Mac OS (CR). Most notably, the "dos2unix" command converts between Microsoft Windows- style line endings to Unix-style line endings, and "unix2dos" does the opposite.
- **hexdump** - easy and robust tool for SSH users to view the binary contents of a file
- **Cron** - popular UNIX scheduling tool, is now available on IBM i as part of the "cronie" package
- **Ghostscript** - PostScript and PDF interpreter that is primarily used to generate PDFs
- **FreeTDS** libraries - document and implement the Tabular Data Stream (TDS) protocol
- New bash built-ins: **liblist, cl, getjobid**

# Open Source Proactive Reporting Insights



## CVE Reporting and Subscriptions

Clients:

Sharpe Pens x v

Add Report Subscription

Generate Report

Client Packages

☒ Select All Packages

☒ Apache ActiveMQ

☒ Apache Ant

☒ Apache Axis2

☒ Apache Camel

Language(s)

☒ English

Select Language

Start Date

mm/dd/yyyy

## Manage Report Subscriptions

| Report Name      | Interval | Weekday | Day of Month | No of Recipients |
|------------------|----------|---------|--------------|------------------|
| SharpePensAllCVE | Daily    | -       | -            | 2                |

IBM Technology  
Support Services

## Open Source Proactive Reporting Insights

With the popularity of open source technologies continuing to increase in modern software development, it is not uncommon to find open source at the heart of most enterprise IT strategies. However, like any type of software, there are security risks that need to be understood and managed in order to avoid data breaches or unplanned downtime often caused by security vulnerabilities. Organizations often look to their developers and DevSecOps teams to research, track and address Common Vulnerabilities and Exposures (CVEs) which can quickly turn into an overwhelming and time-consuming task that leads to gaps that can allow threats to be missed.



**Data Aggregation:** OSPRI collects CVE and release information from a variety of sources including NIST NVD, open source communities, IBM X-Force exchange and public resources.



**Automated Reporting:** When new information becomes available, users are notified via email based on their subscription preferences.



**Customized Reporting:** The OSPRI portal enables users to customize reports to cover some or all of the open source packages covered under IBM support; its integration with IBM's Watson Language Translator ensure a truly global experience.



**Improved Productivity:** Open Source developers are in high demand and short supply. IBM can help developers improve their efficiency by enabling them to focus on their core mission: writing great code.



**IBM Open Source Proactive Reporting Insights (OSPRI)** is intended to help remove some of the burden from development teams by identifying CVEs & Security Vulnerabilities through the aggregation of critical security data from a wide variety of sources. When a new vulnerability is identified or new release information becomes available, subscribers are notified based on their own unique software stack and preferences. The customized reporting can help clients strengthen their security posture while simultaneously improving developer productivity.

### Receiving Open Source Proactive Reporting Insights information from IBM:

The OSPRI tool is a feature of IBM's Open Source Support offering that is available to clients at no additional cost.

Existing clients may register for the service at: [www.ibm.biz/tss-ospri](https://ibm.biz/tss-ospri)

To learn more about IBM's Open Source Support, visit our website: <https://ibm.biz/OSS-support>

[Register to Open Source Proactive Reporting Insights](#)



Let's create ↪

A New Level of Integrated  
Simplicity

**IBM i**



**IBM i**



# Let's create business value with IBM i

## Flexible options for licensing

- IBM i portfolio simplification
- IBM i subscription

## More Uptime for Apps and Downtime for People

- IBM Db2 Mirror – support for multiple releases and “read-only”
- PowerHA SystemMirror for i – new updates to simplification, reporting and performance
- BRMS - new capabilities via SQL Services and new APIs

## Security that trusts no one

- New system security levels
- Password checking APIs

## Modern paradigms for agile development

- Attract and train new developers
- Retain value from existing software
- Open technology blended with business critical data and software
- More advanced, easy to use tooling for the Database Engineer

## A clear view of your IT Landscape

- Flexible Deployment / Management & Security
- On-prem; Hybrid Cloud; Cloud-native
  - All enabled via Ansible, in addition to traditional native and partner tools
- New Navigator for i

# Community Events



<https://www.common.org/powerup2022/home>



<https://comeur.org/common-europe-congress-2022/>

Plus, many other regional user group meetings now having virtual and face-to-face meetings in 2022

# Certifications for Power Software

**IBM i** Anywhere  
**IBM i** Everywhere

IBM has reinstated certifications

- AIX, PowerHA, PowerVC and IBM i
- Blend of certifications and badges

IBM i will have 2 certifications

- IBM i System Administration
- IBM i Developer

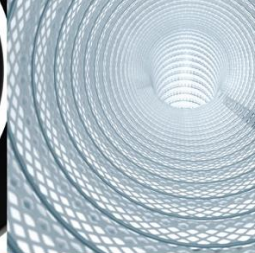
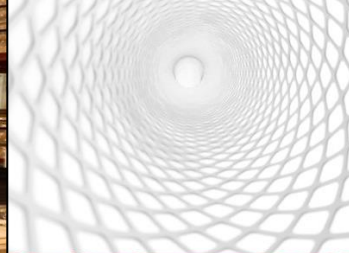
The IBM i certification exam development and education paths process underway.

Technical skills

- Accredited through badges
  - Introductory skills
  - Advanced skills
- Will require tests



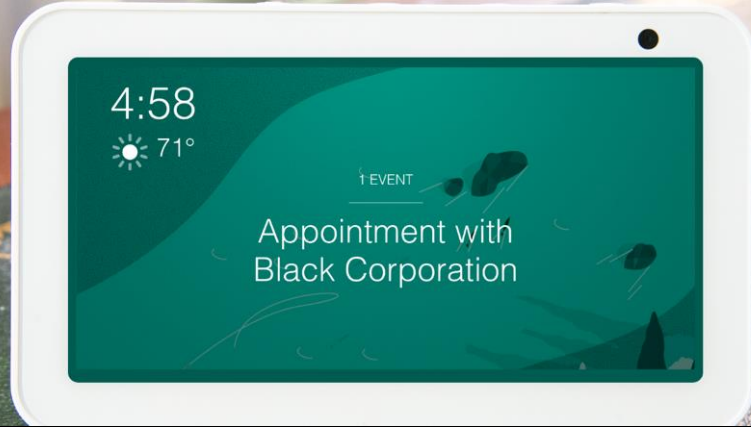




# Client **Innovation**







# Client Innovation





## A Must Attend!

IBM Power has made many announcements this year. We're not done!



You need to attend Common Europe Congress in Alicante, Spain June 13<sup>th</sup>-16<sup>th</sup>.

Not only will you be able to see the latest IBM i announcements 7.5 and Merlin, but you are invited to get an **exclusive look** at what is coming next for IBM Power.

Have a cup of coffee and chat with IBM executives and experts on the latest with IBM i, Power, and future roadmap for the portfolio. You will only be able to get this exclusive access by attending the event in-person.

We're saving your seat in our IBM NDA room!

Register at <https://comeur.org/cec-2022-registration/>



Presented by



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IBM Power has made many announcements this year. We're not done!



You need to attend POWERUP 2022 in New Orleans May 23<sup>rd</sup>-26<sup>th</sup>.

Not only will you be able to see the latest IBM i announcements of IBM i 7.5 and Merlin, but you are invited to get an **exclusive look** at what is coming next for IBM Power.

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Partners who bring 3 clients with them will receive 50% off their registration. For more information and to register: [www.common.org](http://www.common.org)



Presented by



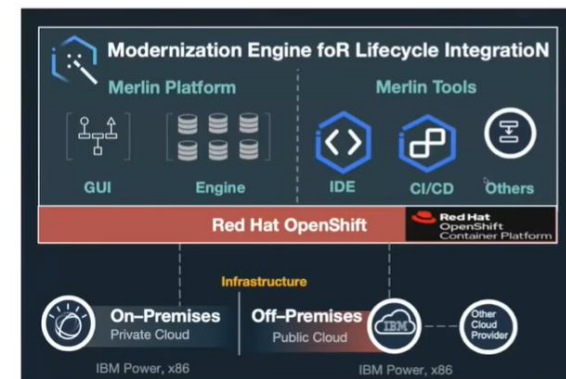
# For More Information:

| Links You Need                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Twitter                                                                                                                                                                                                                                                                                                                                           | #Hashtags                                                                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>IBM i Home Page: <a href="https://www.ibm.com/it-infrastructure/power/os/ibm-i">https://www.ibm.com/it-infrastructure/power/os/ibm-i</a><br/>(find link to Forrester Study and updated IBM i Strategy Whitepaper)</p> <p>IBM Strategy Whitepaper: <a href="https://www.ibm.com/it-infrastructure/us-en/resources/power/i-strategy-roadmap/">https://www.ibm.com/it-infrastructure/us-en/resources/power/i-strategy-roadmap/</a></p> <p>IBM Client Success: <a href="https://www.ibm.com/it-infrastructure/us-en/resources/power/ibm-i-customer-stories/">https://www.ibm.com/it-infrastructure/us-en/resources/power/ibm-i-customer-stories/</a></p> <p>Support Life Cycle: <a href="https://www.ibm.com/support/lifecycle/">https://www.ibm.com/support/lifecycle/</a></p> <p>License Topics: <a href="https://www-01.ibm.com/support/docview.wss?uid=nas8N1022087">https://www-01.ibm.com/support/docview.wss?uid=nas8N1022087</a></p> <p>HelpSystems 2022 Marketplace Survey<br/><a href="https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results">https://www.helpsystems.com/resources/guides/ibm-i-marketplace-survey-results</a></p> | <br><br><a href="#">@IBMSystems</a><br><a href="#">@COMMONug</a><br><a href="#">@IBMChampions</a><br><a href="#">@IBMSystemsISVs</a><br><a href="#">@IBMiMag</a><br><a href="#">@ITJungleNews</a><br><a href="#">@SAPonIBMi</a><br><a href="#">@SiDforIBMi</a> | <p>#PowerSystems<br/>#IBMi<br/>#IBMAIX<br/>#POWER9<br/>#LinuxonPower<br/>#OpenPOWER<br/>#HANAonPower<br/>#ITInfrastructure<br/>#OpenSource<br/>#HybridCloud<br/>#BigData</p> |

# IBM i 7.5 & Merlin resources, articles and demos

# IBM i

- A Look at IBM i 7.5 and Merlin
  - <https://techchannel.com/SMB/5/2022/ibm-i-7-5-and-merlin>
- Announcement Day: IBM Lifts The Veil On IBM i 7.5 And 7.4 TR6
  - <https://www.itjungle.com/2022/05/03/announcement-day-ibm-lifts-the-veil-on-ibm-i-7-5-and-7-4-tr6/>
- IBM Merlin Brings New Approach to Developing on IBM i
  - <https://www.itjungle.com/2022/05/04/ibm-merlin-brings-new-approach-to-developing-on-ibm-i/>
- IBM i Modernization Engine for Lifecycle Integration (Merlin) Overview
  - <https://www.ibm.com/support/pages/ibm-i-modernization-engine-lifecycle-integration-merlin-overview>
- Demonstrating IBM i Next Gen Apps
  - <https://www.linkedin.com/pulse/demonstrating-ibm-i-next-gen-apps-benoit-marolleau/>
- IBM i Modernization Engine for Lifecycle Integration (Merlin) Demo
  - [https://www.youtube.com/watch?v=-Y\\_TBB9zV9w](https://www.youtube.com/watch?v=-Y_TBB9zV9w)
- IBM and COMMON, May 2022 IBM i Updates (webcasts)
  - [https://learn.common.org/products/may-2022-ibm-i-updates#tab-product\\_tab\\_overview](https://learn.common.org/products/may-2022-ibm-i-updates#tab-product_tab_overview)
- Merlin IBM i Developer Build Demo
  - <https://www.youtube.com/watch?v=a7s3qeebWEI>





# Thank You !

