Introduction

IBM i

Steve Will- stwill@us.ibm.com
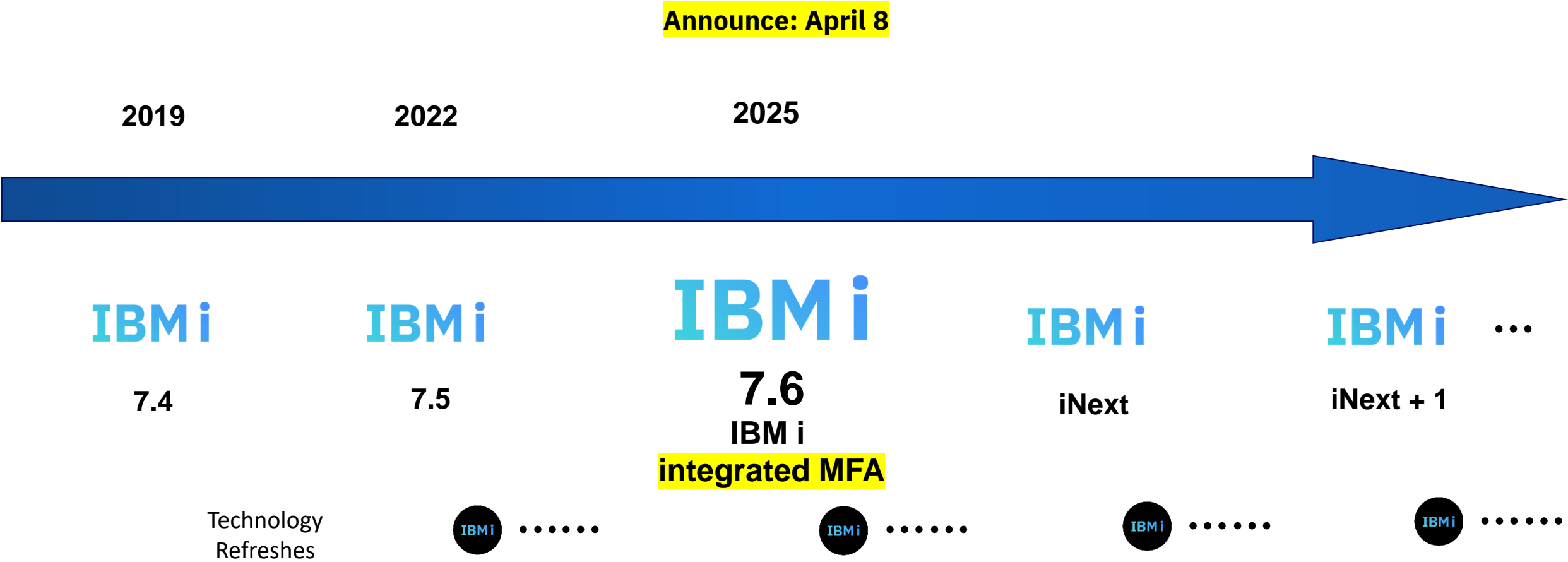DE, CTO, Chief Architect - IBM i

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IBM i Roadmap

2019 **2022** **2025**

IBM i

IBM i

IBM i

IBM i ...

IBM i

7.4 **7.5** **7.6**

IBM i

integrated MFA

iNext **iNext + 1**

Technology
Refreshes   IBMi ......   IBMi ......   IBMi ......   IBMi ......

** 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.

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IBM i Technology Updates

Abstract

IBM i operating system levels and related software products are frequently enhanced via PTFs.

This site contains information, pointers to information, and articles that show how to use IBM i.

Content

Enhancement Landing Pages	
IBM i 7.6	Base Enhancements
IBM i 7.5	TR6-SW - TR5 - TR4 - TR3 - TR2 - TR1 - Base Enhancements
IBM i 7.4	TR11 - TR10 - TR9 - TR8 - TR7 - TR6 - TR5 - TR4 - TR3 - TR2 - TR1 - Base Enhancements
IBM i 7.3	TR13 - TR12 - TR11 - TR10 - TR9 - TR8 - TR7 - TR6 - TR5 - TR4 -TR3 - TR2 -TR1 - Base Enhancements
IBM i 7.2	TR9 - TR8 - TR7 - TR6 - TR5 - TR4 - TR3 - TR2 - TR1 - Base Enhancements
IBM i Memo to Users (MTU) updates	
IBM i - Technical Articles	
Db2 for i SQL Tutor	

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

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IBM i 7.6: Stay Secure. Stay Innovative.

Security

- Integrated multi-factor authentication (MFA) enhances security posture against ransomware

- Simplify adherence to regulatory compliance with advanced authentication and new protection for user profiles

- Further lower costs and improve TCO

Application Development

- Git-based compilation and improved debugging that enables modern development methodologies and techniques

- Improved in-context coding support, SQL syntax validation and integration with GenAI platforms

- Offers developers more secure algorithm choices to protect application credentials and data

System Administration

- Navigator for i has been fully updated to support multi-factor authentication

- License expiration information and warnings are now included on the main multisystem dashboard

- Additional new interfaces have been added to help system administrators make secure connections to IBM i

Key regulations and standards that require MFA

Here are some of the key regulations and standards that require or strongly recommends multi-factor authentication (MFA) for security across different industries

US Regulations
- NIST 800-171 & NIST 800-53 (Government & Contractors)
- CMMC (Cybersecurity Maturity Model Certification) (Defense Contractors)
- GLBA (Gramm-Leach-Bliley Act) (Financial Institutions)
- PCI DSS (Payment Card Industry Data Security Standard) (Payment Processing)
- HIPAA (Health Insurance Portability and Accountability Act) (Healthcare)

European & International Regulations
- GDPR (General Data Protection Regulation) (EU)
- PSD2 (Revised Payment Services Directive) (EU)
- ISO/IEC 27001 (Global Information Security Standard)

Note: While MFA is a crucial security measure, most regulatory standards require a broader security framework, including access controls, data encryption, audit logging, and ongoing risk assessments.

Security

IBM i

Tim Mullenbach - mullenba@us.ibm.com
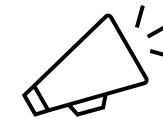IBM i Security Business Architect

IBM i Integrated MFA value proposition

IBM i

- IBM i Integrated MFA solution
  - No gap between password and additional factor authentication processing
  - Embedded in core OS security object (User Profile attributes)
  - Out-of-the-box with no add-ons needed
  - Multiple configurable protection levels configurable at user profile granularity
    - **Core IBM i system administration and management tools work with most restrictive configuration**
      - **Access Client Solutions (ACS)**
      - **Navigator for i**
  - Compatible with dozens of industry TOTP client authenticators
  - Service Tools (SST/DST) user profile support

> **Multi-factor Authentication is one of the most effective Ransomware protections**

- Universal Authentication exit point:
  - Single authentication exit point regardless of server/service (QIBM_QSY_AUTH)
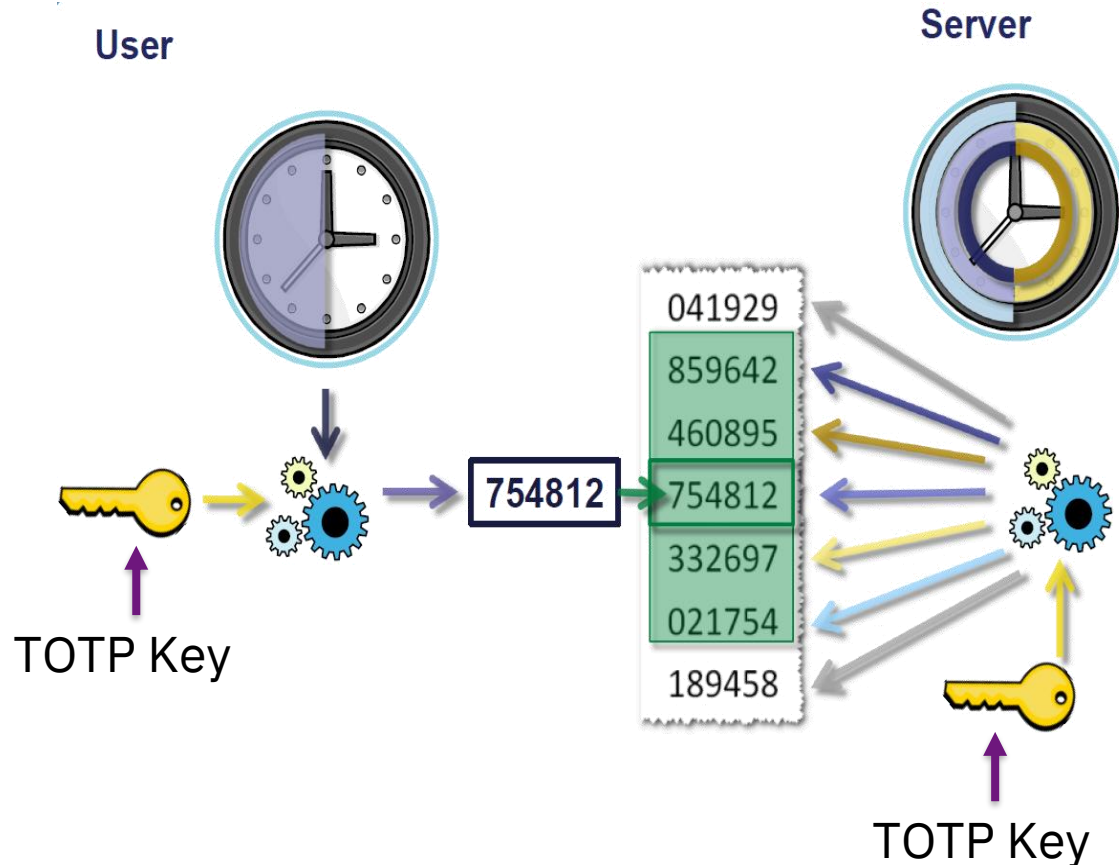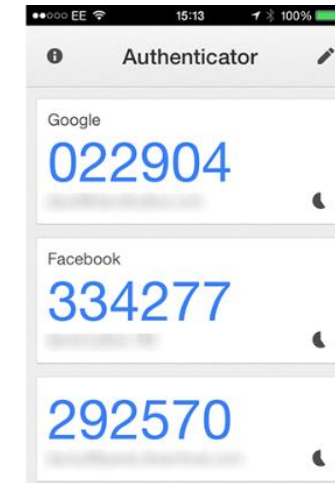 - 3rd party MFA solutions can use to close potential threat modeling holes

See the MFA overview topic in IBM Documentation

Time-based One Time Password (TOTP)

- Built into User Profile (*USRPRF) objects
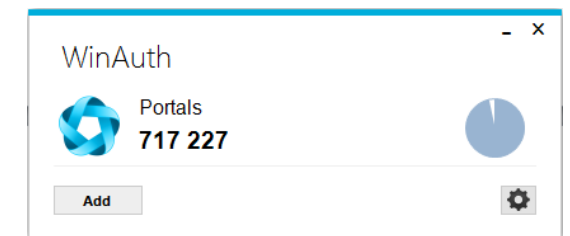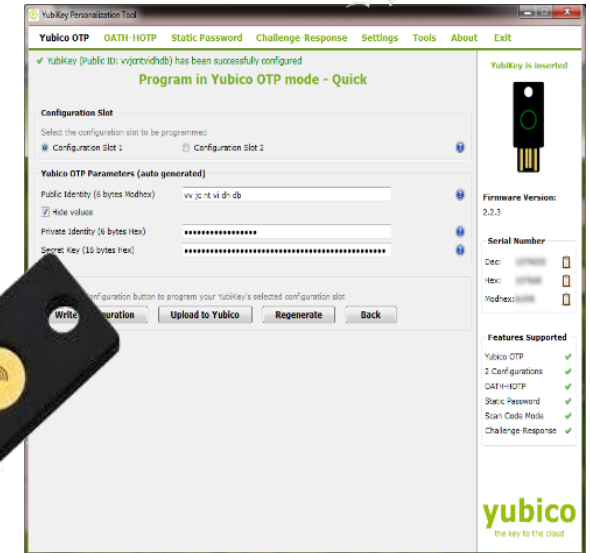- Built into DST/SST User Profiles
  - Independent implementation

RFC 6238 Client Authenticator Examples

Additional Sign-on Factor Enabled

Specifies whether an additional sign-on factor can be used along with a user ID and password.

If this value is enabled, the additional factor field will be shown on the sign on panel.

A user will need to specify the additional factor value if the user profile has *TOTP as an authentication method

Requirements
Security level 40 or 50
Password level 4

If using a customized sign on panel, create a new one based on the new default version

QPWDLVL 0 or 1

QPWDLVL 2, 3, or 4 and Additional Sign-on Factor *DISABLED

Additional Sign-on Factor *ENABLED

TOTP Optional Interval

Problem statement
- Some applications depend on using cached passwords under the covers which will not work with the short life-span of a TOTP token

IBM i 7.6 Solution
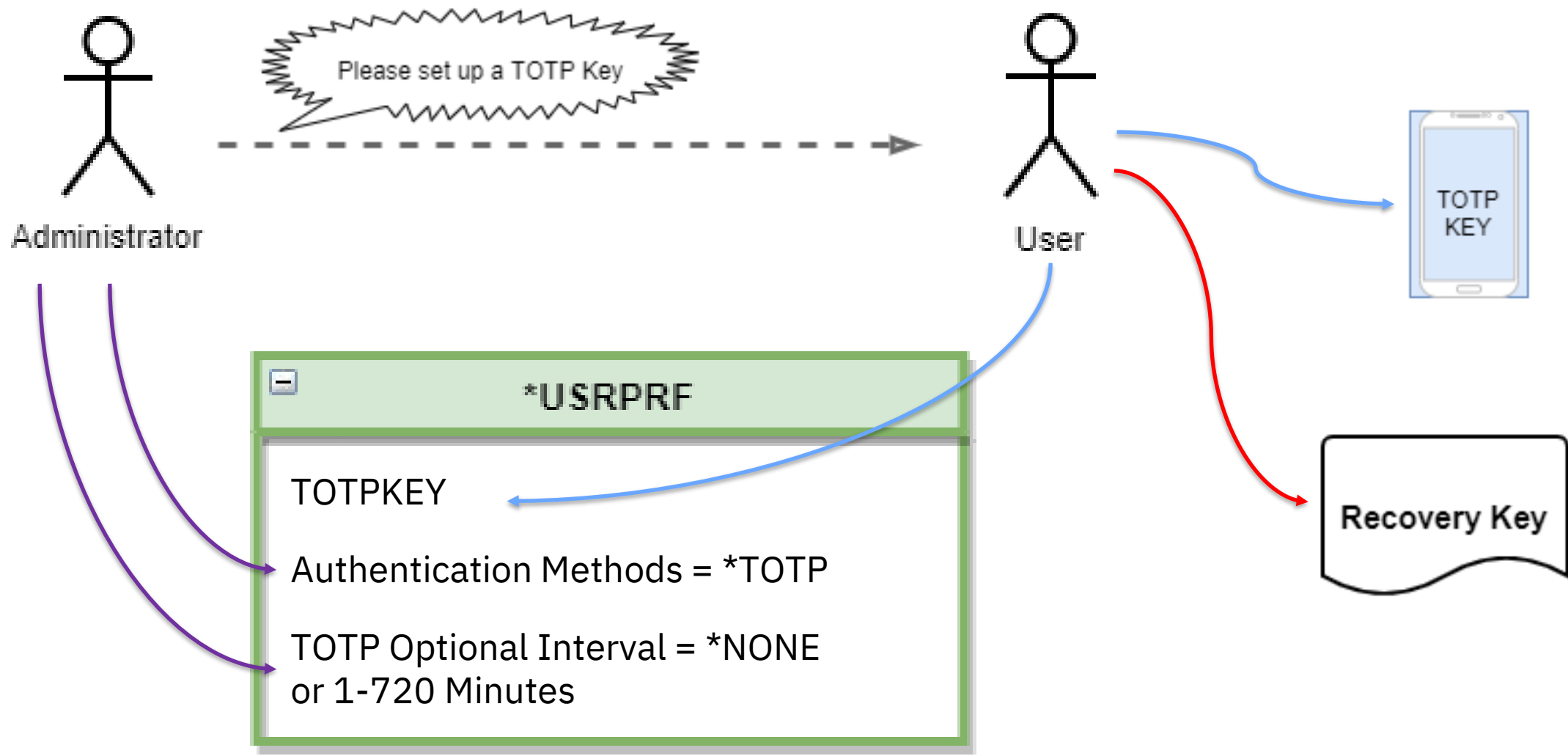- Architected a configurable optional time interval when providing the TOTP token is required

TOTP optional interval == *NONE (0)   *"Absolute Mode"*
- Each password-based authentication requires a valid TOTP token
  - Clients using cached passwords under the covers will fail
  - Some clients could prompt for each unique connection to the system

TOTP optional interval > 0   [1-720 minutes]
- User performs initial password-based authentication with TOTP token
  - Timeout interval starts
  - Subsequent password-based authentication requests only require a password until the interval expires

*TOTP Integrated MFA Configuration Experience

Manage My MFA (TOTP) Key

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Validate MFA Key and Save Recovery Key ✕

IBM i

The new MFA key has been saved to your user profile. Validate that the MFA code allows this user profile to sign on, and then save the recovery key.

1. Saved MFA Key:

Using your client generator application, enter the MFA key below (without blanks) or scan the QR code

GDFUSRYOJSVBZHYNOE7TQX23MKOJM7N7 📋

GDFU SRYO JSVB ZHYN OE7T QX23 MKOJ M7N7

2. Validate MFA Key:

Enter your user profile password and the MFA code from your client generator application to validate that your user profile can sign on with MFA

Password:

MFA Code:

💾 Validate

3. Recovery Key:

Save the recovery key in a safe place, it can be used in place of the user password as a one time recovery if the MFA key and code are not working

E273115536A989E1486672EABF2E3844EA2BCAB611A2D4E99C0F2DCF581A2800 📋 📤

✓ OK

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Host Connection Server (HCS)

<u>Problem Statement</u>
ACS/Navigator can make hundreds of individual Host Server connections in minutes
- Depends on storing a cached password in the client
- Incompatible with a no optional interval user profile

<u>IBM i 7.6 Solution</u>
Host Connection Server invented
- Front-end to the existing Host Servers
- Requires TLS; uses port 9480
- **Persistent TOTP/MFA authenticated connection**
    - All subsequent Host Server connections are created through this connection
- ACS 1.1.9.7, Navigator, DCM and others updated to use HCS
    - **Works with a no optional interval user profile with only the initial prompt for credentials**

See the [Host connection server](#) topic in IBM Documentation

Additional Factor Unaware Interfaces

IBM i

Problem statement
- No ability to change hundreds of application client interfaces like Filezilla

IBM i 7.6 Solution
- **Password with appended additional factor**
- **colon (:) interpreted as a separator in the password field**
- **Allows nearly all existing applications to work with TOTP MFA with no changes!**

Example: myAmazingPa$$w0rd**:**358538

System Admin educates users to append TOTP value to password on interfaces without additional factor prompt

See the [Password with appended additional factor](#) topic in IBM Documentation

QIBM_RUN_UNDER_USER_NO_AUTH Function Usage ID

Problem statement
- The ability to run actions as another user profile based only on having authority to that user profile conflicts with the MFA principles
- The IBM i integrated MFA TOTP implementation permits this password circumvention due to pervasive existing use

IBM i 7.6 Solution
- Optionally block applications from bypassing the need to supply the user profile credentials
- The Run under a user without authentication (QIBM_RUN_UNDER_USER_NO_AUTH) function ID blocks specific user profiles from being the target of a run under operation
- Recommended to be used in conjunction with MFA/TOTP user profile

QIBM_RUN_UNDER_USER_NO_AUTH <u>does not require</u> TOTP/MFA configuration for the user or system

See the [QIBM_RUN_UNDER_USER_NO_AUTH function usage ID](#) topic in IBM Documentation

Enhanced profile token

IBM i

Problem statement
- Profile tokens don't include attributes restricting their use to a specific purpose or from a specific network origination

IBM i 7.6 Solution
- Enhanced profile token security protection is associated with a profile token when restrictions are added during generation
- New and updated APIs with parameters to provide the Remote IP address and Service/Application label to associate with the profile token when generated
- The same values must be provided when setting the profile token
- Helps protect against replay or pre-play attacks

See the [Profile token enhancement](#) topic in IBM Documentation

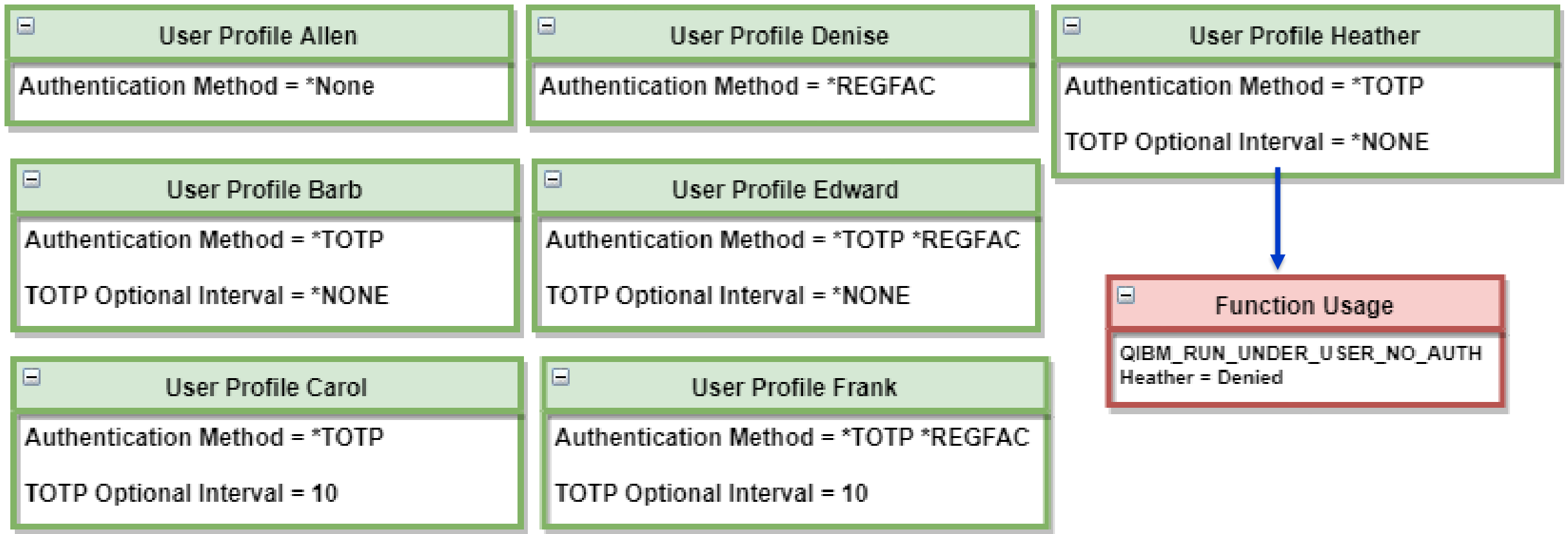# Single authentication exit point QIBM_QSY_AUTH (*REGFAC)

Problem statement
- The IBM i integrated MFA TOTP implementation may not work with existing enterprise level MFA solutions in use by clients

IBM 7.6 Solution
- The new single authentication exit point QIBM_QSY_AUTH provides a way for an exit program to be called during authentication processing for all applications performing an applicable operation.
- The exit program is passed information to use to perform additional verification and can return success or failure indicators.
- A high privilege user could be required to provide a password and TOTP value as well as have the exit program called.
- An administrator provided exit program could generate an out-of-band push notification to a phone that requires a fingerprint to continue. For more information, see the *REGFAC authentication method topic in IBM Documentation.

See the *REGFAC authentication method topic in IBM Documentation.

IBM i Integrated MFA combinations – something for everyone

IBM i

User Profile Allen

Authentication Method = *None

User Profile Denise

Authentication Method = *REGFAC

User Profile Heather

Authentication Method = *TOTP

TOTP Optional Interval = *NONE

User Profile Barb

Authentication Method = *TOTP

TOTP Optional Interval = *NONE

User Profile Edward

Authentication Method = *TOTP *REGFAC

TOTP Optional Interval = *NONE

Function Usage

QIBM_RUN_UNDER_USER_NO_AUTH
Heather = Denied

User Profile Carol

Authentication Method = *TOTP

TOTP Optional Interval = 10

User Profile Frank

Authentication Method = *TOTP *REGFAC

TOTP Optional Interval = 10

System Service Tools (SST/DST) MFA

IBM i

Problem statement
- The limited SST/DST environment doesn't work with traditional third-party MFA solutions due to no exit point support nor do authentication methods such as Kerberos work in the environment
- Privileged SST/DST users should be required to provide multiple authentication factors

7.6 Solution
- System service tools (SST) and dedicated service tools (DST) support an MFA TOTP key implementation not connected to the operating system MFA support
- An SST administrator can enable MFA for SST without enabling it on the operating system
- The look and feel is like the operating system however SST does not allow setting a frequency for providing the TOTP value, it is required every time a password is required

See the Service tools Multi-Factor Authentication (MFA) topic in IBM Documentation

Integrated Multi-factor Authentication (MFA) Element Summary

IBM i

- Time-based one-time password (**TOTP**) implementation extends password authentication to include an additional authentication factor used to verify your identity.

- **QIBM_RUN_UNDER_USER_NO_AUTH function usage ID** prevents a human user profile from being used without supplying the user profile's credentials.

- **New user profiles**: QPGMR_NC, QSECOFR_NC, QSYSOPR_NC and QUSER_NC.
  - IBM-supplied user profiles with names that end in **_NC, for "not changeable"** are used by the operating system and applications.

- Single authentication **exit point QIBM_QSY_AUTH** enables customizable additional authentication processing.

- **"Enhanced profile token"** incorporates purpose and network origination into the generation and subsequent use of the token.

- **System service tools (SST) and dedicated service tools (DST) MFA** TOTP implementation.

System Requirements

IBM i

- Security level 40 or 50
- Password level 4
- Additional Sign-on Factor Enabled *New
  - Protected by SST control *New

```
| CHGSYSVAL  SYSVAL(QSECURITY) VALUE(50)
| CHGSYSVAL  SYSVAL(QPWDLVL) VALUE(4)
| CHGSECA  ADLSGNFAC(*ENABLED)    -- Requires IPL to activate
| CHGSSTSECA  CHGADLSGN(*YES)
```

Multi-Factor Authentication (MFA) Configuration

```
              Display Security Attributes

User ID number . . . . . . . . . . . . . . . :   250
Group ID number  . . . . . . . . . . . . . :   104
Security level . . . . . . . . . . . . . . . :   50
Password level . . . . . . . . . . . . . . . :   4
Additional sign-on factor  . . . . . . . . . :   *ENABLED
Allow change of security related system
  values . . . . . . . . . . . . . . . . . . :   *YES
Allow add of digital certificates  . . . . . :   *YES
Allow service tools user ID with default
  and expired password to change its own
  password . . . . . . . . . . . . . . . . . :   *NO
Allow add and remove of password exit
  programs . . . . . . . . . . . . . . . . . :   *YES
Allow change of additional sign-on factor  :   *YES
Authority collection for objects active  . :   *NO
```

Security Configuration Information

☰ Actions

Name	Current Value	Possible Values	Description
Additional Signon Factor	ENABLED	DISABLED, ENABLED	The current value of the additional sign-on factor security attribute. Can be changed using the Change Security Attributes (CHGSECA) command.
Pending Additional Signon Factor		DISABLED, ENABLED	The additional sign-on factor security attribute that the system will use after the next IPL
Allow Additional Signon Factor Change	YES	YES, NO	Whether the addtional sign-on factor security attribute is allowed to be changed using the Change Security Attributes (CHGSECA) command. The Change SST Security Attributes (CHGSSTSECA) command can be used to change this attribute.

TOTP User Profile Attributes (DSPUSRPRF)

IBM i

```
                   Display User Profile - Basic

User profile . . . . . . . . . . . . . . . :   TIMUSER2

Date password last changed . . . . . . . . :   05/19/23   11:07:28
Password is *NONE  . . . . . . . . . . . . :   *NO
Password expiration interval . . . . . . . :   *SYSVAL
  Date password expires  . . . . . . . . . :    11/21/23
  Days before password expires . . . . . . :    0
Password set expired by command  . . . . . :   *NO
Block password change  . . . . . . . . . . :   *SYSVAL
Local password management  . . . . . . . . :   *YES
TOTP key exists  . . . . . . . . . . . . . :   Yes
Date TOTP key last changed . . . . . . . . :   05/19/23   11:11:25
Authentication methods . . . . . . . . . . :   *TOTP
TOTP optional interval . . . . . . . . . . :   *NONE
  Remaining minutes TOTP optional  . . . . :    0
Maximum sign-on attempts . . . . . . . . . :   *SYSVAL
User class . . . . . . . . . . . . . . . . :   *USER

                                                    More...
```

TOTP Optional Interval

*NONE (0)   *"Absolute Mode"*
- Each password-based authentication requires a valid TOTP token
  - Clients using cached passwords under the covers will fail
  - Some clients could prompt for each unique connection to the system

[1-720 minutes]
- User performs initial password-based authentication with TOTP token
  - Optional interval starts
  - Subsequent password-based authentication requests only require a password until the interval expires

Setting the TOTP Key

IBM i

Validate MFA Key and Save Recovery Key ✕

The new MFA key has been saved to your user profile. Validate that the MFA code allows this user profile to sign on, and then save the recovery key.

1. Saved MFA Key:

Using your client generator application, enter the MFA key below (without blanks) or scan the QR code

GDFUSRYOJSVBZHYNOE7TQX23MKOJM7N7 📋

GDFU SRYO JSVB ZHYN OE7T QX23 MKOJ M7N7

2. Validate MFA Key:

Enter your user profile password and the MFA code from your client generator application to validate that your user profile can sign on with MFA

Password:

MFA Code:

💾 Validate

3. Recovery Key:

Save the recovery key in a safe place, it can be used in place of the user password as a one time recovery if the MFA key and code are not working

E273115536A989E1486672EABF2E3844EA2BCAB611A2D4E99C0F2DCF581A2800

✓ OK

Note that you need to sign-on with the user profile that is setting up their TOTP Key.

`CHGTOTPKEY TOTPKEY(*GEN)`

```
TOTP key  . . . . . . . . :    PGWG KZ6T 7RRY AZLG PPDJ MHFN CRYQ MDAF
Copy/paste version  . . :    PGWGKZ6T7RRYAZLGPPDJMHFNCRYQMDAF


Recovery key  . . . . . . :    47BB3CD184DC10789972AD8B601E98ED
                               2520AD706D6D6697C905BD6EC6DA8BCA

The TOTP key has been saved in your profile.  It must also be entered
into your TOTP generator client application, without the blanks.

Save the recovery key for this TOTP key in a safe place.

Enter=Continue   F9=Check TOTP
(C) COPYRIGHT IBM CORP. 1980, 2024.
```

User Profile Authentication Method configuration

IBM i

Security > MFA Configuration > User

Name	MFA Key Exists	MFA Authentication	Exit Program Authentication	Impersonation
RUSSELL	YES	NO	NO	ALLOWED
RUSSELL2	YES	YES	NO	ALLOWED
SMITHAB	YES	NO	NO	ALLOWED
STYMIE	YES	YES	NO	ALLOWED
TIMMR	YES	NO	NO	ALLOWED
TIMUSER	YES	YES	NO	ALLOWED
TIMUSER1	YES	YES	NO	ALLOWED
TIMUSER2	YES	YES	NO	ALLOWED
TIMUSER3	YES	NO	YES	ALLOWED

Properties
Enable Users for MFA Authentication
Enable Users for Exit Program Authentication

Selected Rows: 1

TIMUSER1 - Properties

User:

Name *: TIMUSER1

Description: Tim Mullenbach Demo

Class: User ∨

☑ Enable user

Password:

Password: Use same password ∨

☐ User must change password at next sign-on

Additional Authentication Options:

☑ MFA Authentication using a TOTP key

MFA key exists: YES
Last changed: 2024-09-16 16:08:01
Optional Interval (minutes):

0

☐ Exit Program Authentication

Commands method

1. Verify user has set up TOTP Key for their profile
   - DSPUSRPRF USRPRF(TIMUSER1) or
   - DSPAUTUSR --- Press F11 twice to see list of all profiles with the TOTP attributes displayed

2. CHGUSRPRF USRPRF(TIMUSER1) AUTHMTH(*TOTP *REGFAC) TOTPOPTITV(*NONE)

Encryption for ASP 1 to Protect User Data at Rest

IBM i

Use Case

– Disk encryption has long been available on IBM i
– Disk Encryption has not included the system Auxiliary Storage Pool (ASP) also known as ASP 1, which is part of SYSBAS
– Data at Rest encryption is required by regulations

IBM i 7.6 Solution

– Disk Encryption now includes the system ASP
– The Sys Admin will use SST disk configuration options to encrypt user data in ASP 1
– Requirement: Base operating system option 45 (Encrypted ASP Enablement) must be installed

More Information

– IBM Documentation [Disk encryption](#)

```
                    Select ASPs to Start Encryption
                                                          System:  BETASYS
Note: This function may take a significant amount of time to
complete.  During this function, the partition performance may be degraded.

If encryption is started on an ASP for the first time,   you should perform a Save System
(SAVSYS) operation after encryption is started on the ASP.

 Type options, press Enter.
  1=Select


                        ----Protected-----   ---Unprotected----
 Option    ASP         Size  %Used           Size %Used  Status
   __        1            0  0.00%         314964 39.89%   Not Encrypted



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

QIBM_IOSYSCFG_VIEW Function ID

Problem statement
- Administrators want users to be able to view input/output system configuration information without also having the ability to change the configuration

IBM 7.6 Solution
- **QIBM_IOSYSCFG_VIEW function ID** provides administrators the ability **to define users with read-only role** for viewing input/output system configuration information without *IOSYSCFG Special Authority
- Read-only operations check for *IOSYSCFG or QIBM_IOSYSCFG_VIEW access
  - Over one hundred display and retrieve interfaces check for read only access

See the IBM-supplied function IDs topic in IBM Documentation

Configure Host Server (CFGHOSTSVR)

Problem statement
- Port scanners identify and flag non-secure network ports
- Security policy requires non-secure ports are closed
- No architected way for administrators to disable the non-secure Host Server Ports. Today they add a TCP port restriction as a hack circumvention
  - The hack prevents non-TLS applications from using the host servers over loopback

IBM 7.6 Solution
- **Configure Host Server (CFGHOSTSVR) command** was created to individually enable, disable, or allow loopback for non-secure connections on the supported host servers
  - Central, Database, Data Queue, File, Network Print, Remote Command, and Signon
- The host servers that only support insecure connections can be individually enabled or disabled
  - Virtual print, transfer, and network drive
- Provides architected and auditable way to comply with port scan audits by disabling non-secure ports
  - Currently administrators add a TCP port restriction as a circumvention

See the CFGHOSTSVR command description in IBM Documentation

Kerberos encryption types

<u>Problem statement</u>
- Administrators need the ability to remove weak or undesired encryption types from keytab entries

<u>IBM 7.6 Solution</u>
- The Kerberos configuration commands include parameters to specify the list of encryption types to add and remove for the specified principal from the keytab entries
    - Kerberos Keytab Entry (**ADDKRBKTE**)
        - ENCTYPE(*DFT)
        - ENCTYPE(*AES128 *AES256)
    - Remove Kerberos Keytab Entry (**RMVKRBKTE**)
        - ENCTYPE(*ALL)
        - ENCTYPE(*CBCDES *DESHMAC *CBCDES3 *ARCFOUR)
    - QSH keytab command new option -e
- The **default encryption types are now AES256 and AES128**

See the <u>ADDKRBKTE</u> and <u>RMVKRBKTE</u> command descriptions or the <u>QSH keytab command</u> in IBM Documentation

Cryptographic Services API algorithm support

- The native IBM i Cryptographic Services APIs used for encryption/decryption/hash operations support additional algorithms

- Key Derivation Function (QC3KDF, Qc3KeyDerivationFunction) API **NEW API
  - Password Based Key Derivation Function 2 (PBKDF-2)
    - NIST recommended password hashing algorithm

- **New Elliptical Curve (ECC) key types** available to use with keystores and multiple existing APIs
  - x25519
  - x448
  - ed25519
  - ed448

- **New symmetric key types** available to use with keystores and multiple existing APIs
  - ChaCha20
  - Poly1305
  - SHA3-224, SHA3-256, SHA3-384 and SHA3-512

IBM i Debugger TLS Support

- IBM i Debugger server
  - Secure TLSv1.3 connections on port "as-debug-s" with default port number 4027
  - Configure TLS using DCM Application Definition QIBM_QTES_DEBUG_SERVER

- IBM i Debugger client
  - Select the "Transport Layer Security (TLS)" checkbox in the Sign-On dialog to connect to as-debug-s using a secure connection
  - The default TLS checkbox mode can be changed by navigating to File > Preferences

See the Securing the IBM i Debugger with TLS section in IBM Documentation
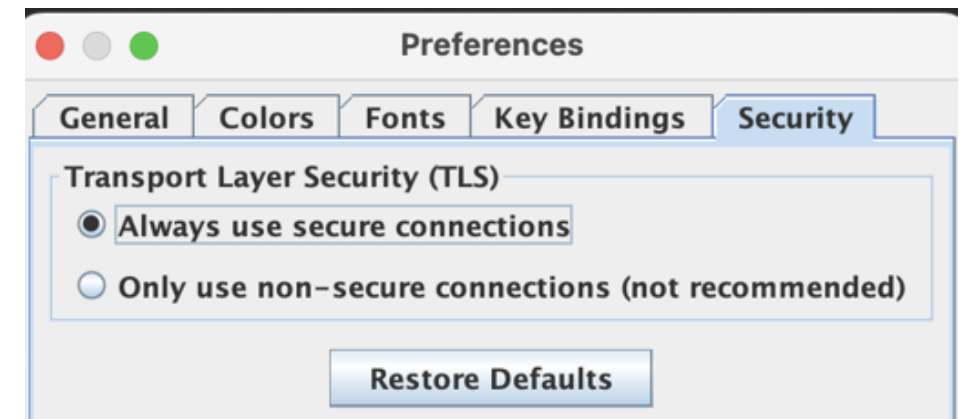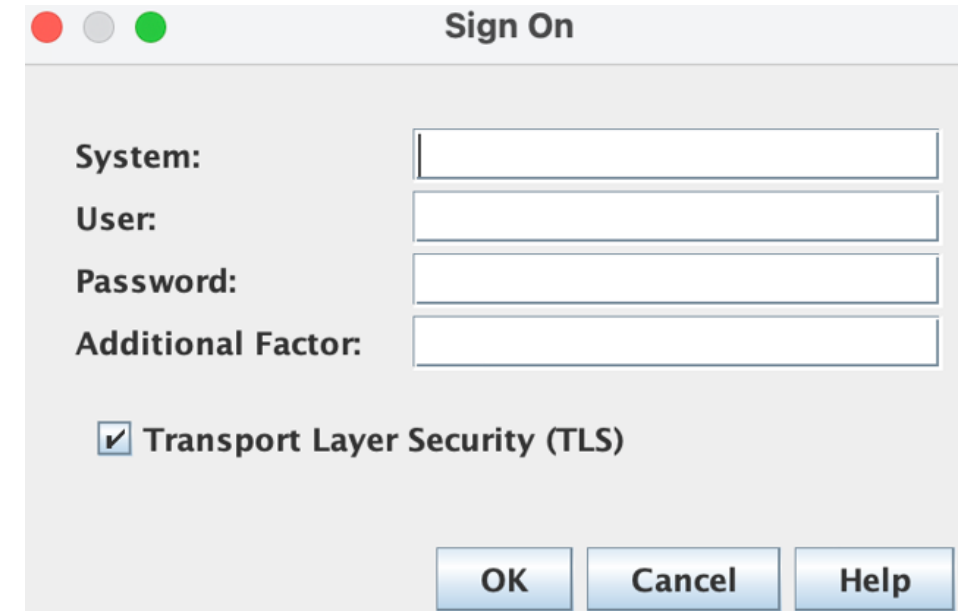
Digital Certificate Manager (DCM) Enhancements

IBM i

- Configure DCM to communicate to host servers with TLS across the internal network
  - This feature is required when using MFA with no time interval
- DCM authentication panel Introduced a show/hide eye-icon to the password's login page and an MFA Additional Factor field
- View certificate hierarchy enhancements
- View a certificate hierarchy from the certificate to the root certificate
- Select View Certificate Hierarchy button from a certificate's action menu
- Displays the details of each parent certificate in the certificate chain.
- Export a server/client certificate to a PKCS12 file with private key has been enhanced to selectively allow only the certificate without including the private key
- New selection buttons and filters on the add and remove certificate assignment actions. Use to perform bulk add and remove certificate assignment actions.

IBM Digital Certificate Manager for i

User Name:
QSECOFR

Password:
Passw0rdForTesting

Additional Factor: ❓
Additional Factor

Log in

Database

Scott Forstie - forstie@us.ibm.com

Db2 for i Business Architect

See Kent Milligan Db2 for IBM i blog :
https://db2ibmi.blogspot.com/2025/04/db2-for-i-76-highlights.html

IBM i

Db2 for i – PTF Groups Schedule for 2025

IBM i

Db2 for i

PTF Group	Enhancements in this DB PTF Group	Level	External Availability	Status
SF99960	IBM i 7.6	1	4/18/2025	Planned
SF99960	IBM i 7.6 – TR1 timed enhancements	2	11/21/2025	Planned

PTF Group	Enhancements in this DB PTF Group	Level	External Availability	Status
SF99950	IBM i 7.5 – TR6 timed enhancements	9	4/18/2025	Planned
SF99950	IBM i 7.5 – Fixpack	10	7/25/2025	Planned
SF99950	IBM i 7.5 – TR7 timed enhancements	11	11/21/2025	Planned

PTF Group	Enhancements in this DB PTF Group	Level	External Availability	Status
SF99704	IBM i 7.4 – Fixpack (no enhancements)	30	4/18/2025	Planned
SF99704	IBM i 7.4 – Fixpack (no enhancements)	31	7/25/2025	Planned
SF99704	IBM i 7.4 – Fixpack (no enhancements)	32	11/21/2025	Planned

https://www.ibm.com/support/pages/db2-ibm-i-2025-ptf-group-schedule

Update & Delete SQL Statements

- SQL is enhanced to provide the SQL programmer with new and powerful capabilities

- The data-change-table-reference has been extended to allow UPDATE and DELETE statements

  o For UPDATE: OLD TABLE, NEW TABLE, and FINAL TABLE are supported

  o For DELETE: OLD TABLE is supported

- The SQLSTATE_INFO table returns information about SQLSTATE values used by Db2 for i and the corresponding SQLCODEs

These enhancements will be delivered with IBM i 7.6

SQL Data Manipulation Programming example

```
--
-- Increase the price of products being delivered via AIR
--


    update kraken77.item_fact


      set


        extendedprice     = extendedprice * 1.1
    where shipmode = 'AIR' ;
```

SQL Data Manipulation Programming example

IBM i

```
--
-- Increase the price of products being delivered via AIR
--
SELECT rrn_val, partkey, extendedprice, newextendedprice
  FROM OLD TABLE (
    update kraken77.item_fact h
      INCLUDE(rrn_val bigint, newextendedprice decimal(15,2))

    set rrn_val            = rrn(h),
        newextendedprice = extendedprice * 1.1,
        extendedprice    = extendedprice * 1.1
    where shipmode = 'AIR') ;
```

SQL Data Manipulation Programming example

```
--
-- Need to update all of Tim's sales
--
select sales_id , sales from final table (
  update toystore.sales
    set sales = sales + 5
      where sales_person = 'ROWE');
```

SALES_ID	SALES
42	6
43	6
44	6

Coming in IBM i 7.6

44

IBM i 7.6 – SQL Query Engine Enhancements

IBM i

Deeper insight into query optimization and execution

- Lock wait information added to Database Monitor and Visual Explain
- More consistent labeling of query information in ACS SQL Performance Center
- New details for queries and related objects in Visual Explain

Future-proof SQE

QRO hash value enlarged to 64 bits, virtually eliminating hash collision when looking up cached plans — even with very large plan caches

Improved Adaptive Processing

Adaptive Query Processing (AQP) has been enhanced to detect when a temporary hash table is too small for the data being processed. AQP can dynamically increase the size of the temporary hash table for subsequent runs of the query to provide improved query performance.

Faster data access for queries with complex predicates

A new data access method allows more efficient use of multi-key indexes for some queries that have complex predicates over the index keys.

Lock wait information added to DBMON & Visual Explain

IBM i

Actual Runtime Information	
Optimization Time (ms)	< 1
Longest Key Range Estimate (ms)	0
Key Range Estimate Timed Out	No
Run Time (ms)	12,484
Statement Open Time (ms)	Not Available
Statement Fetch Time (ms)	12,484
Statement Close Time (ms)	Not Available
Rows Fetched	1
Total Times Query Was Run	13
Total Time For All Runs (ms)	162,296
CPU Time	9
Synchronous Database Reads	40
Asynchronous Database Reads	0
Page Faults	177
SMP Degree Adjusted During Runtime	N/A
Re-Optimization Skipped by Optimizer	No

Actual Runtime Information	
Optimization Time (ms)	11,764
Longest Key Range Estimate (ms)	13
Key Range Estimate Timed Out	No
Average Run Time (ms)	5,417,564
Average Statement Open Time (ms)	Not Available
Average Statement Fetch Time (ms)	5,417,564
Average Statement Close Time (ms)	Not Available
Average Rows Fetched	1
Total Times Query Was Run	1
Total Time For All Runs (ms)	5,417,565
Average CPU Time (ms)	64,239
Average Synchronous Database Reads	2,725,100
Average Asynchronous Database Reads	885,178
Average Page Faults	4,570,638
Average Object Lock Wait Time (ms)	0
Average Object Lock Wait Count	0
Average Record Lock Wait Time (ms)	0
Average Record Lock Wait Count	0
Average Seize Wait Time (ms)	0
Average Seize Wait Count	1
Average Temporary Storage Used (MB)	5
Total Times Temporary Results Were Reused	0
Reason Temporary Result Was Not Reused	No Existing Temporary Result Available
SMP Degree Adjusted During Runtime	N/A
Re-Optimization Skipped by Optimizer	No

IBM i 7.5

IBM i 7.6

Parallel UPDATE & Parallel DELETE

- When adding the NEW TABLE and OLD TABLE support
  for UPDATE and DELETE, a door to **use PARALLEL DML** was opened!
- Walk thru the door if you want **an instant performance improvement for DML**
- IBM recommends using ***OPTIMIZE for the Query Parallelism setting**

```
UPDATE kraken77.item_fact
  SET quantity = quantity + 1
WHERE "MONTH" = 3;
```

```
select count(*)
  from final table(
UPDATE kraken77.item_fact
  SET quantity = quantity + 1
  WHERE "MONTH" = 3
);
```

Traditional

Turbo-Charged

New or Enhanced SQL Services at IBM i 7.6

AUDIT_JOURNAL_AD (Auditing Change) table function

AUDIT_JOURNAL_CP (User Profile Changes) table function

AUDIT_JOURNAL_DS (Service Tools User ID and Attribute Changes) table function

AUDIT_JOURNAL_GR (Generic Record) table function

AUDIT_JOURNAL_NA (Attribute Change) table function

AUDIT_JOURNAL_PW (Password) table function

AUDIT_JOURNAL_SM (Systems Management Change) table function

AUDIT_JOURNAL_VP (Network Password Error) table function
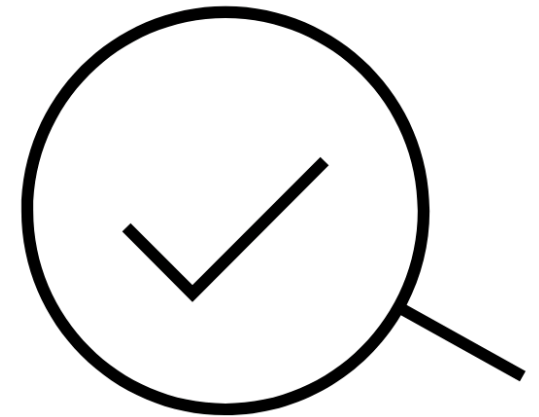
Enhanced Helper Functions – Audit Journal Services

New or Enhanced SQL Services at IBM i 7.6

IBM i

SET_SERVER_SBS_ROUTING procedure

SERVER_SBS_ROUTING view

Server Description	Server Name	Supports secure rerouting	Default subsystem	Supports routing by user	Supports routing by IP address
Central server	QZSCSRVS	Yes	QUSRWRK	Yes	Yes
Database server	QZDASOINIT	No	QUSRWRK	Yes	Yes
Database server secure	QZDASSINIT	Yes	QUSRWRK	Yes	Yes
Data queue server	QZHQSSRV	Yes	QUSRWRK	Yes	Yes
Db2® Mirror server	QDBMSRVR	No	QUSRWRK	Yes	Yes
DDM	QRWTSRVR	Yes	QUSRWRK	Yes	Yes
DRDA	QRWTSRVR	Yes	QUSRWRK	Yes	Yes
File server	QPWFSERVSO	No	QSERVER	Yes	Yes
File server secure	QPWFSERVSS	Yes	QSERVER	Yes	Yes
⊩ Host connection server ⊩	⊩ QZBSCNNSRV ⊩	⊩ Yes ⊩	⊩ QUSRWRK ⊩	⊩ Yes ⊩	⊩ Yes ⊩
IBM® i NetServer	QZLSFILE	No	QSERVER	No	Yes
Network print server	QNPSERVS	Yes	QUSRWRK	Yes	Yes
Remote command server	QZRCSRVS	Yes	QUSRWRK	Yes	Yes
Sign-on server	QZSOSIGN	No	QUSRWRK	No	Yes

Enhanced Server Subsystem Routing

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New or Enhanced SQL Services at IBM i 7.6

IBM i

CHANGE_TOTP_KEY table function

The CHANGE_TOTP_KEY table function generates a new time-based one-time password (TOTP) key, saves a specified TOTP key, or removes the TOTP key for the user invoking the function.

CHECK_TOTP scalar function

The CHECK_TOTP scalar function validates a time-based one-time password (TOTP) value for the user invoking the function.

USER_INFO view

The USER_INFO view contains information about user profiles.

USER_INFO_BASIC view

The USER_INFO_BASIC view contains information about user profiles.

SECURITY_INFO view

The SECURITY_INFO view returns one row containing information about the IBM® i security configuration.

MFA and SQL – Security Services

ACS and Db2 for i VS Code Updates

Run SQL Scripts

When using Run SQL Scripts, **thousands separators will increase readability of large numeric values**

**Coming in
ACS 1.1.9.8**
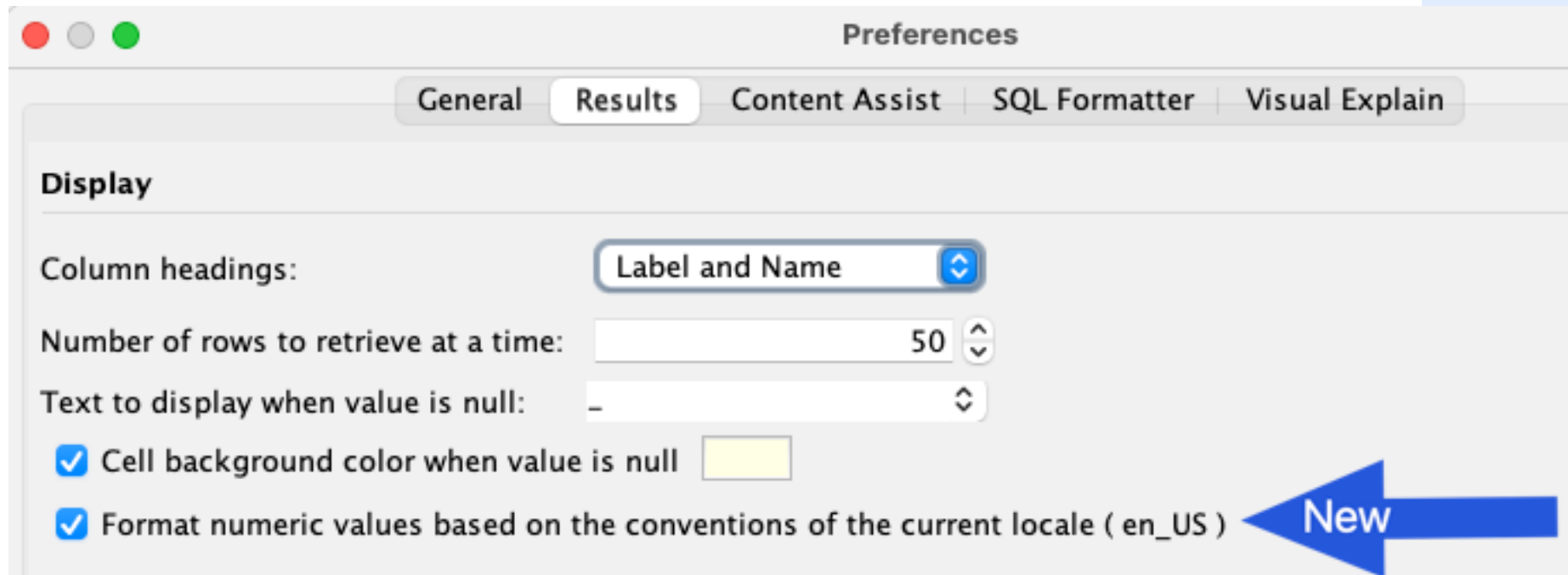
Run SQL Scripts

When using Run SQL Scripts, **thousands separators will increase readability of large numeric values**

```
1
2 select * from qsys2.asp_info;
3
```

Coming in ACS 1.1.9.8

RDB Name	Total Capacity	Total Capacity Available	Protected Capacity Available
RDB_NAME	TOTAL_CAPACITY	TOTAL_CAPACITY_AVAILABLE	PROTECTED_CAPACITY_AVAILABLE
DB2M_LCL	987,910	594,642	594,642
DB2DATA	8,750,057	6,292,440	6,292,440

Name: PROTECTED_CAPACITY_AVAILABLE
Type: BIGINT
Precision: 19
Scale: 0
Nullable: Yes
Label: Protected Capacity Available

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Run SQL Scripts

When using Run SQL Scripts, **thousands separators will increase readability of large numeric values**

Coming in ACS 1.1.9.8

Run SQL Scripts

IBM i

- Provide support for **viewing contents of binary** (BLOB, BINARY, VARBINARY) query result columns

Coming in ACS 1.1.9.8

Run SQL Scripts

IBM i

- Provide support for **"pretty" viewing JSON query result** columns

Coming in ACS 1.1.9.8

SQL Performance Center

IBMi
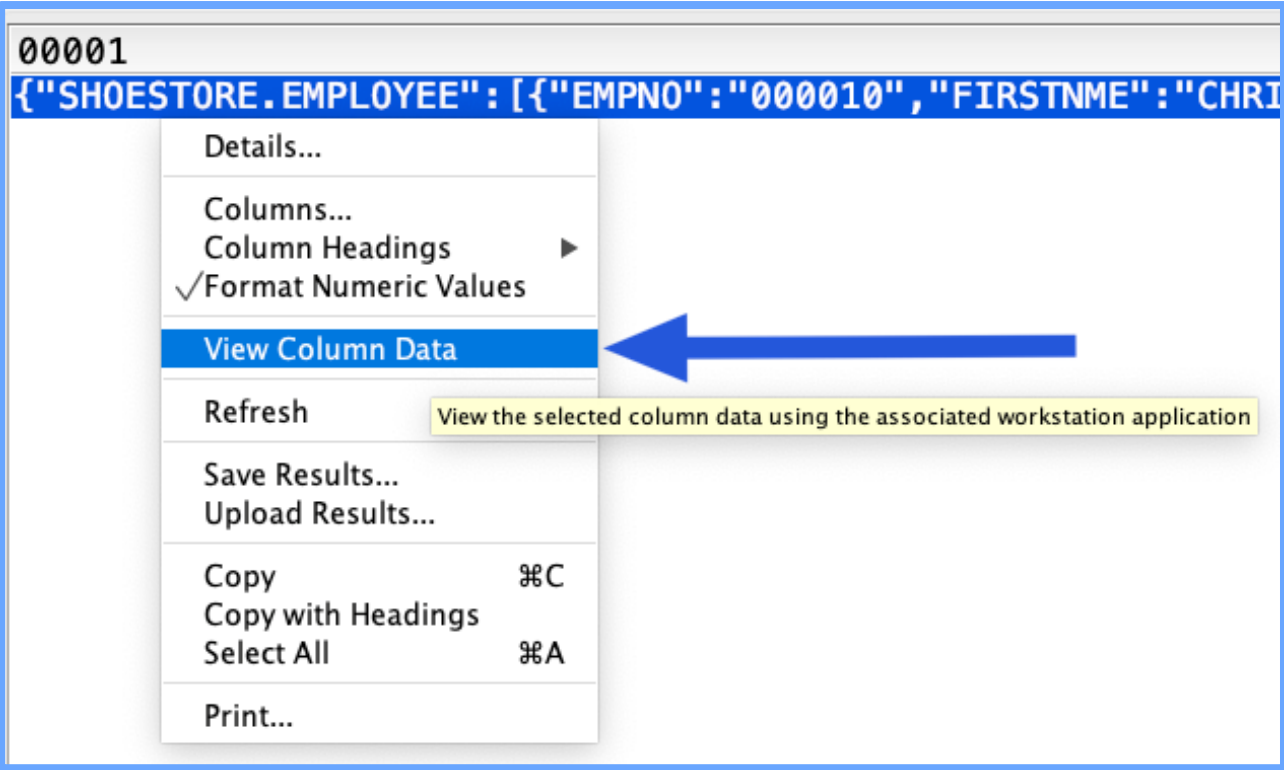
- Index Advisor enhancements

Coming in ACS 1.1.9.8

More Information for Index Considered

Some Visual Explain plan steps may include a list of indexes optimized
* **Includes the reason code explaining why the index was not used**

More Information for Index Considered

- ACS now **displays descriptive text for each reason code**

Coming in ACS 1.1.9.8

More Information for Index Considered

- ACS now **displays descriptive text for each reason code**

**Coming in
ACS 1.1.9.8**

TOYSTORE3.ITEM_FACT - Indexes Considered

Index	Reason	Description
TOYSTORE3.EVITIMESUM	21	The access path cannot be used because not all referenced columns had an Encoded Vector Index.
TOYSTORE3.ITEM_00002	21	The access path cannot be used because not all referenced columns had an Encoded Vector Index.
TOYSTORE3.ITEM_00004	21	The access path cannot be used because not all referenced columns had an Encoded Vector Index.
TOYSTORE3.ITEM_00007	21	The access path cannot be used because not all referenced columns had an Encoded Vector Index.
TOYSTORE3.ITEM_00009	0	The access path was used to implement the query.
TOYSTORE3.ITEM_EVI_1	21	The access path cannot be used because not all referenced columns had an Encoded Vector Index.

Close

Syntax Highlighting

IBM i
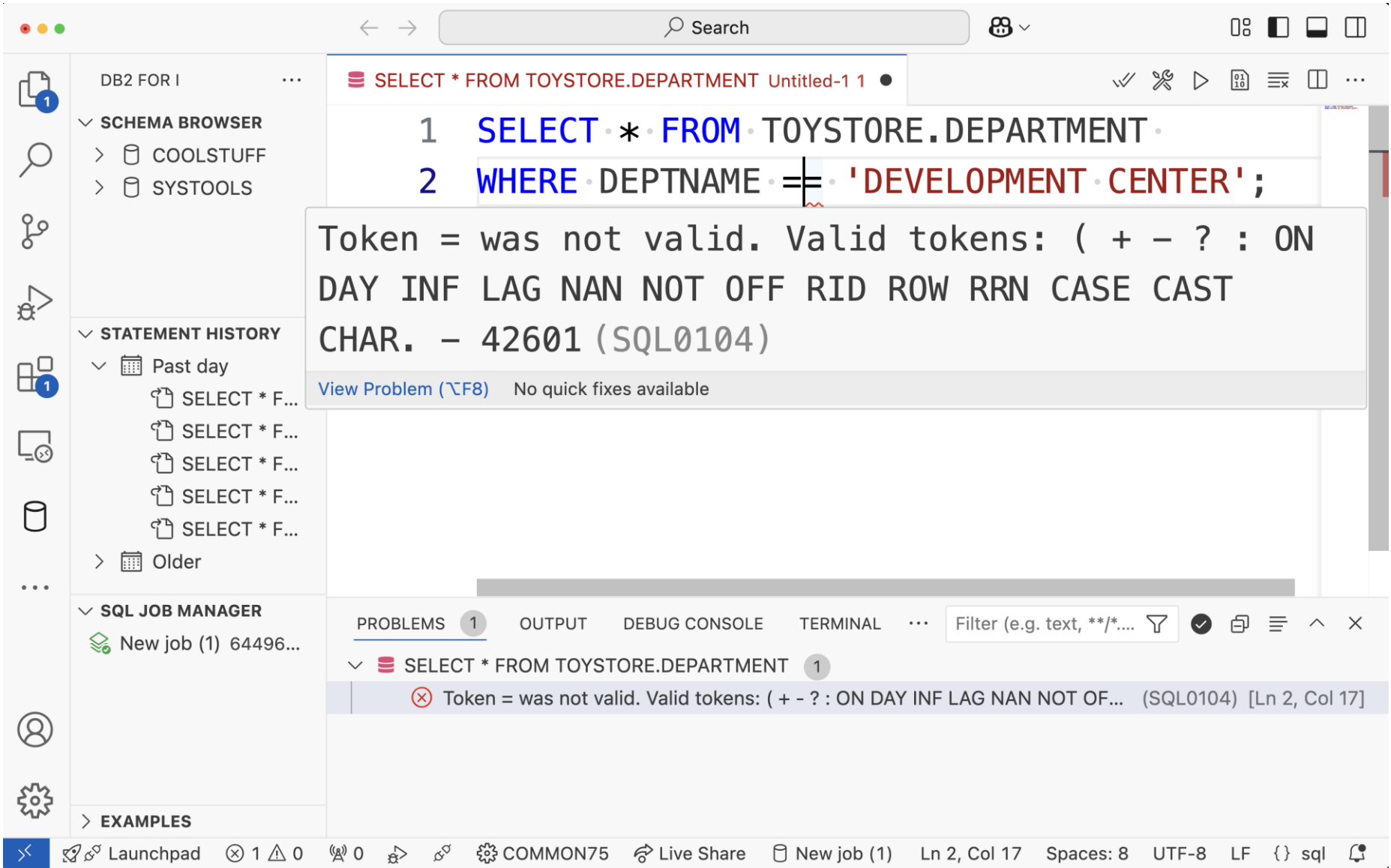
Enhancements also announced in LinkedIn

IBMi

https://www.linkedin.com/in/scottforstie/

Navigator for i

IBM i

Tim Rowe - timmr@us.ibm.com

STSM - IBM i Application Development & System Management

IBM

IBM Navigator for i

One place to see if your servers have been configured for TLS or not

TLS Configuration

≡ Actions

--- Item Actions ---

Restart

--- List Actions ---

Export Selected

Export All

Refresh

Deactivate Unsecure Ports

Configure TLS Wizard ⬅

Restart All

	Status
	Started
	Started
	Started
	Started
	Started
> Remote Command Host Server	Started

TLS Configuration

⓪ Select Servers

Select the Network Servers to be configured for TLS

Host Servers

☐ Central (9470)   ☐ Database (9471)

☐ Data Queue (9472)   ☐ File (9473)

☐ Net Print (9474)   ☐ Remote Command (9475)

☐ Sign On (9476)   ☐ Host Connection server (9480)

‹ Back   Next ›

① Select Keystore

② Enter Keystore Password

③ Select Certificate

④ Summary

Configure all the host servers in one action!

Turn off the unsecure ports

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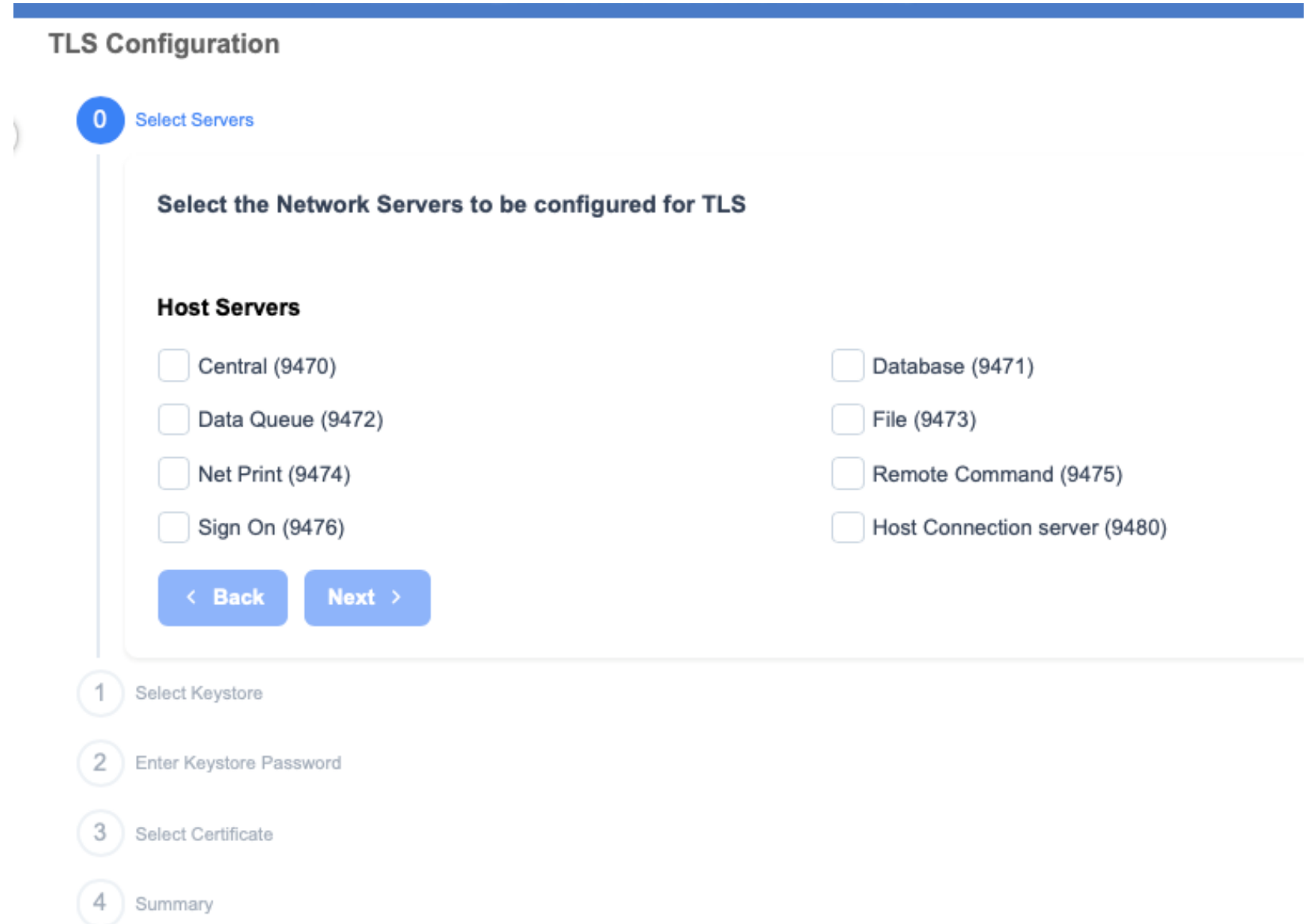
Once you have the host servers configured for TLS and its been tested ☺

Use the Deactivate wizard to turn off the un-secure ports and force only secure port access to all host server activity.

Easier to find Column picker interface. Click on the columns needed, drag and drop to adjust order

Click on the filter icon to enter the filter values

Application Servers

IBM i

Application Servers

Name	Status	Server Type	Hostname Verification	TLS Port	Non-TLS Port	Assigned Certificate
Admin1	Started	IBM ADMIN Server	On	2003	2002	splat.frankeni.com_2025
Admin2	Started	IBM ADMIN Server	Off	Inactive	2004	No certificate assigned
Admin3	Started	IBM ADMIN Server	Off	Inactive	2006	No certificate assigned
Admin4	Started	IBM ADMIN Server	Off	Inactive	2008	No certificate assigned
Admin5	Started	IBM ADMIN Server	Off	Inactive	2011	No certificate assigned
boston	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10662	No certificate assigned
CART	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10651	No certificate assigned
COSTCO	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10497	No certificate assigned
delavan	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10640	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	45000	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10574	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10629	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10530	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10314	No certificate assigned
	Stopped	Integrated Web Services Server - Liberty	Off	Inactive	10684	No certificate assigned
	Started	Integrated Application Server - Liberty	Off	Inactive	Inactive	No certificate assigned
	Started	Integrated Web Services Server - Liberty	Off	Inactive	10772	No certificate assigned

Application Servers

☰ Actions

--- Item Actions ---

Start

Stop

Restart

Turn off Hostname Verification

View Log Files

Properties
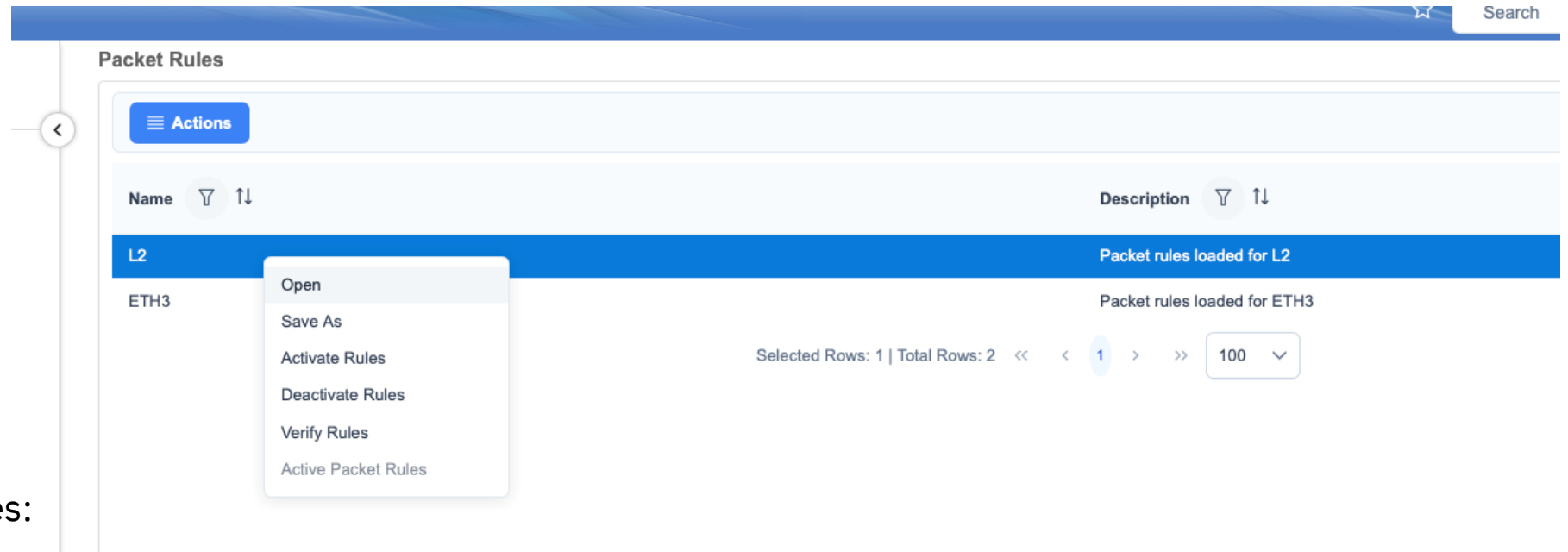
Configure TLS Wizard

Logging & Tracing

--- List Actions ---

Refresh

View and manage Application Servers from Navigator

Packet Rules filtering

Packet Rules filtering changes:
- Verify rules action
- Verify the rule on a specific interface
  - Lets you check that the activate of the rules will succeed
- Default packet rules directory.
- Rules editor closes on save. Currently there are Save and Save As buttons.
- Changed Save icon and functionality to keep the editor open. Kept Save As functionality the same - it will close the editor.
- Insert rule will now add the new rule where the cursor is located
- The File -> Open function will open to the /QIBM/UserData/OS400/TCPIP/OpnavRules/ by default. Allows for searching other directories

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User Profiles

Copy to System

Disable on System

Enable Users for MFA

Copy User

IBM i

Copy User Wizard

General:

common1 → ut25bp22

Users to be copied:

Profile Type	Name	Profile Status	NetServer Disabled	Special Authorities	Group	Supplemental Groups	Description
User	AFHOLMAN	*ENABLED	NO	*JOBCTL *SPLCTL *SAVSYS *IOSYSCFG	*NONE		Andrew Holman/US/IBM@IBMMail
User	AKELLY	*ENABLED	NO		*NONE		Audrey Kelly/US/IBM@IBMMail
User	AMAANA	*ENABLED	NO	*JOBCTL *SPLCTL *SAVSYS *SERVICE *AUDIT *IOSYSCFG	*NONE		Syed Amaan Ali1/India/IBM@IBMM

Copy User Profile.. Password, and TOTP (if applicable)

Disable User Profile

Disable User Wizard

General:

ut23p97	>
	>>
	<
	<<

| ut25bp22 |
| common1 |

Users to be disabled:

Profile Type	Name	Profile Status	NetServer Disabled	Special Authorities	Group	Supplemental Groups	Description	MFA Key Exists	MFA Authentication
User	AFHOLMAN	*ENABLED	NO	*JOBCTL *SPLCTL *SAVSYS *IOSYSCFG	*NONE		Andrew Holman/US/IBM@IBMMail	YES	NO
User	AKELLY	*ENABLED	NO		*NONE		Audrey Kelly/US/IBM@IBMMail	NO	NO
User	AMAANA	*ENABLED	NO	*JOBCTL *SPLCTL *SAVSYS *SERVICE *AUDIT *IOSYSCFG	*NONE		Syed Amaan Ali1/India/IBM@IBMMail	YES	YES

‹‹ ‹ **1** › ››

Disable one or more users across one or many systems

Firmware and License card!!!

IBM i

System Status

☰ Actions

Last refresh: 2025-03-19 20:46:26   2025-03-19 19:46:35 (Browser Time)

- Dashboard
- Home
- Work Management
- Configuration and Service
- System ←
- Monitors
- My Work
- Network
- Security
- Users and Groups
- Performance
- File System
- Content Manager OnDemand for i
- Bookmarks
- Serviceability
- Alerts

System

- System Status
- Disk Status
- System Operator Messages
- History Log
- Temporary Storage
- SQL Services
- > Configuration
- > Hardware
- > Storage

General

CPU
Total usage (elapsed)   0%

Jobs
Total   921
Active   493

Addresses
Permanent   **12.531%**
Temporary   **0.053%**

Usage
Total usage (elapsed)   0%
Interactive performance   0%
Shared processor pool usage (elapsed)   0%
Uncapped CPU capacity pool usage(elapsed)   0%

Processor information
Type of processors   UNCAPPED
Processing power   3

Memory

System memory
Total memory   129,904 MB

Machine   7,806.58 MB
Base   121,123.13 MB
Spool   324.75 MB
Interactive   649.51 MB

Firmware ←

	update available
Currency	
Current fixpack	VL950_105
Recommended update	VL950_175
Update access key expiration	2022-12-11
IPL source	TEMPORARY
IPL required	NO
Temp fixpack	VL950_105
Perm fixpack	VL950_105

License

Machine type and model number	9009-42A
Serial number	780EB30
Software license tier	P20
Processor feature code	EP1E
Partition number	11

5770SS1 FC 5050

IBM i expiration date   2026-02-28

5770SS1 FC 5051

Firmware

IBM i

Firmware		
Currency	update available	
Current fixpack	VL950_105	
Recommended update	VL950_175	
Update access key expiration	2022-12-11	
IPL source	TEMPORARY	
IPL required	NO	
Temp fixpack	VL950_105	
Perm fixpack	VL950_105	

Update Available!!!

MFA

Set your system MFA Awareness flag

Security Configuration Information

Actions

Name	Current Value
Security Level	50
Pending Security Level	
Password Level	4
Pending Password Level	
Additional Signon Factor	ENABLED

MFA

MFA

Validate MFA Key and Save Recovery Key   ✕

The new MFA key has been saved to your user profile. Validate that the MFA code allows this user profile to sign on, and then save the recovery key.

1. Saved MFA Key:

Using your client generator application, enter the MFA key below (without blanks) or scan the QR code

| DH3NGJ7UL7Y7G3D6UHD4DOAAB2QHWM3T | 📋 |

DH3N GJ7U L7Y7 G3D6 UHD4 DOAA B2QH WM3T

2. Validate MFA Key:

Enter your user profile password and the MFA code from your client generator application to validate that your user profile can sign on with MFA

Password:

MFA Code:

💾 Validate

3. Recovery Key:

Save the recovery key in a safe place, it can be used in place of the additional factor for recovery if the MFA key and code are not working

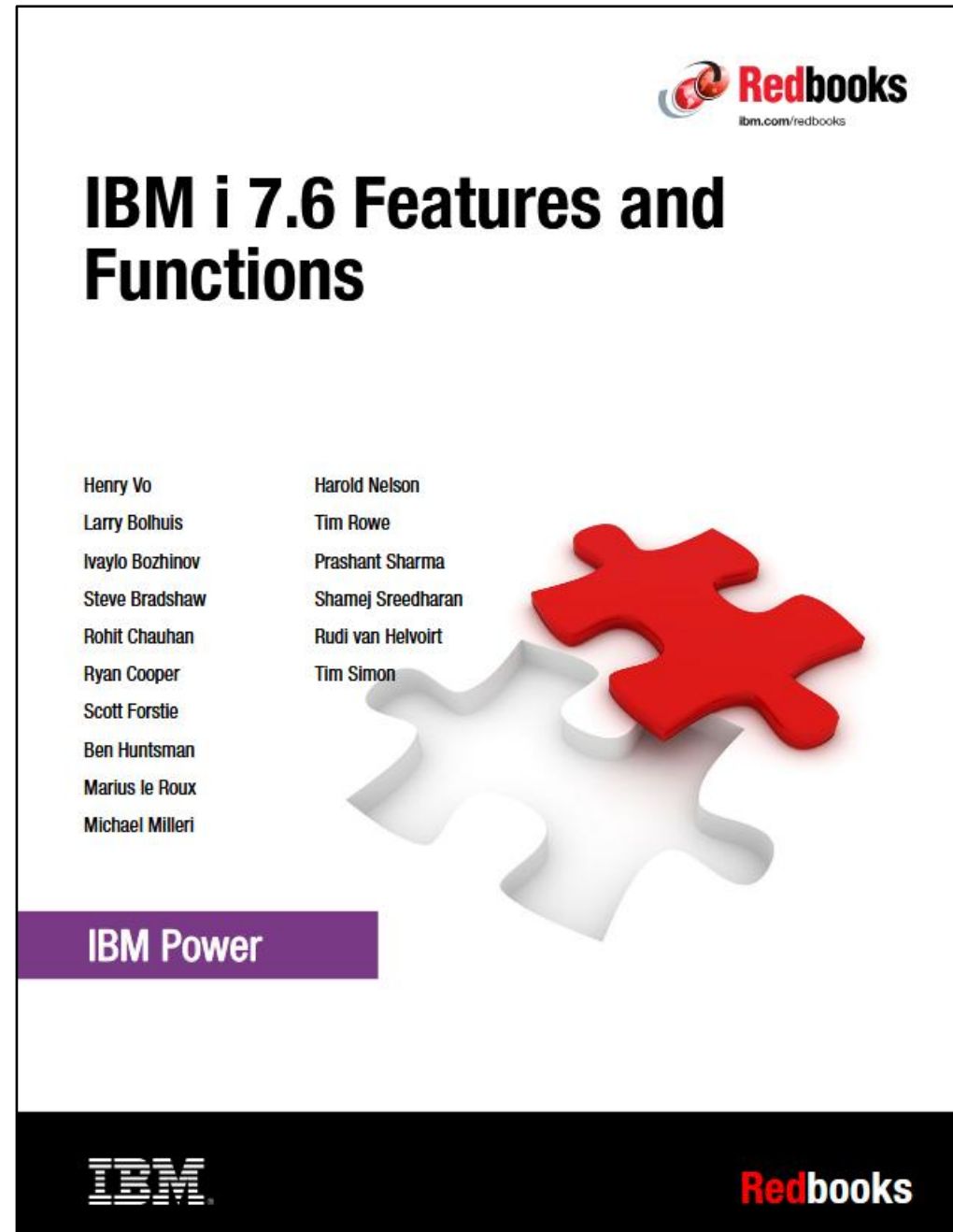| BEC3402F801FE2FB8B9B75E206DE0CD087E19F68F746C4AF24BDF457CE1849EB | 📋 | ➦ |

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MFA

IBM i 7.6

New Redbook

Just published!

Code for i

IBM i

Tim Rowe - timmr@us.ibm.com

STSM - IBM i Application Development & System Management

IBM

Visual Studio Code IBM i Extensions & Code for IBM i

- VS Code is the most popular IDE
  - 2024 Stack Overflow: 73.6%
- VS Code is extensible
  - IBM i extensions have been written
  - Code for IBM i
- VS Code extensions being written by IBM i community
  - Contributors
  - ISVs
  - Merlin uses Code for IBM i

45k + installs

1100+ daily users

Reference customers: FNZ Group, KS3 Solutions, CMA Technology Solutions, Amalgamated Banks of South Africa, Directa SIM, Vermont Information Processing, Polar Beverages, Wright Service Corp, CPB Software

Code for IBM i v2.4.0

Code4i | ⬇ 23,791 | ★★★★☆ (14)

Maintain your RPGLE, CL, COBOL, C/CPP on IBM i right from Visual Stud

Disable Unstall ▼ ⚙

This extension is enabled globally.

Code for IBM i

Db2 for i

Code Coverage

Notebooks

Display File Viewer

ISV integration

MDCMS

Rocket

ARCAD

… future …

Base tools

Separate tools

Code for IBM i

Improvements for supporting DBCS CCSIDs

New translations for Norwegian, German and Polish

Compile DDS (lf, pf, dspf) from local git repositories

Support for batch and SEP debugging

Improved Certificate Management for Debugger!

Navigator and VsCode Debugger

IBMi

Start the debug servers...

Manage the Certificates to ensure secure connections

Navigator to manage the Certificates... Code for i to just connect and use ☺

Db2 for IBM i

Integrated SQL syntax checking

Hover support for quick references

Signature support for procedures and functions

Integration with AI platforms for natural language questions

Updatable result sets

Run All/Selected/From

Db2 for IBM i + AI integration

Updatable result sets

Hover support and signature support
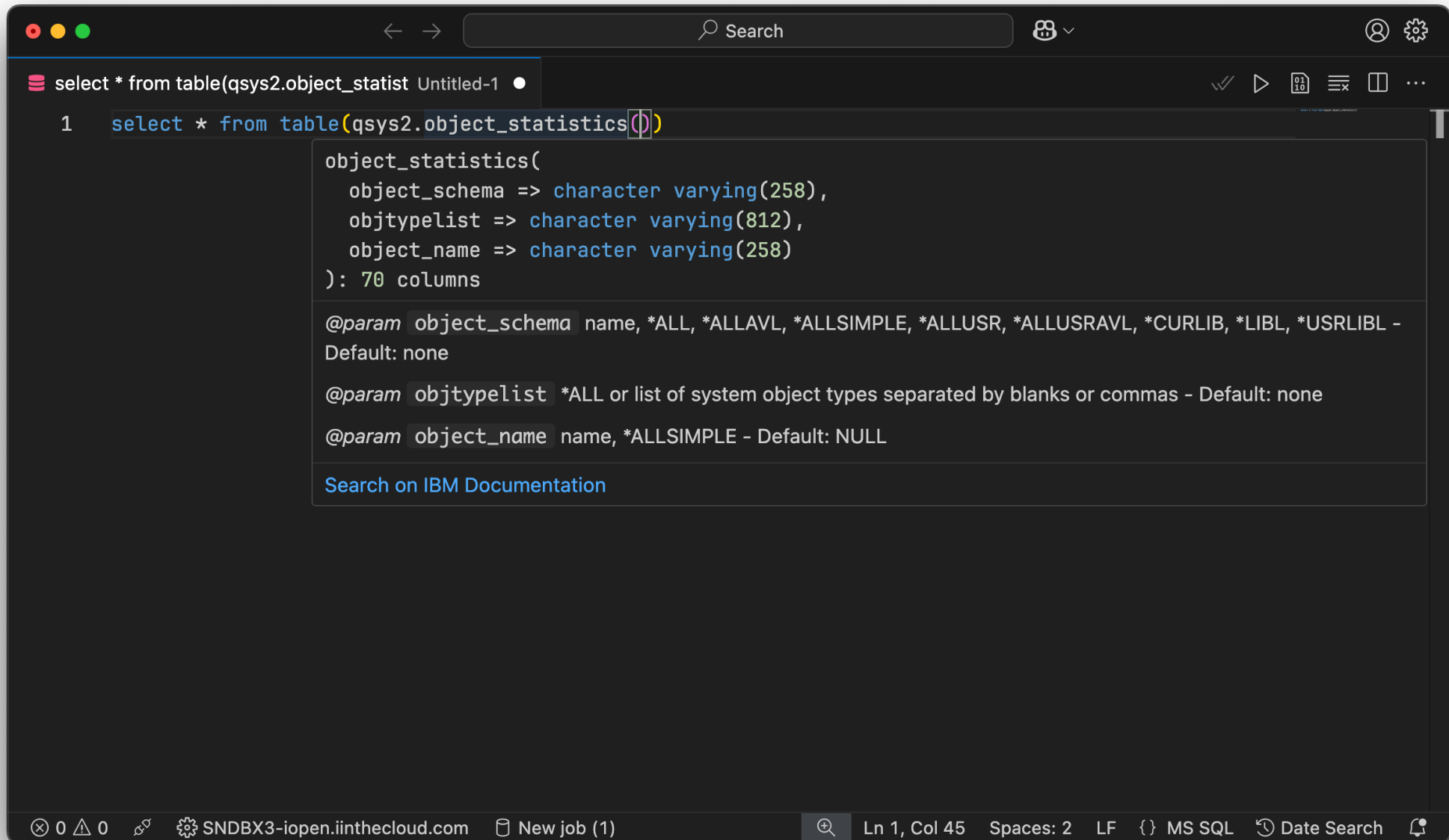
Real time SQL syntax checker

© Copyright IBM Corporation 2025
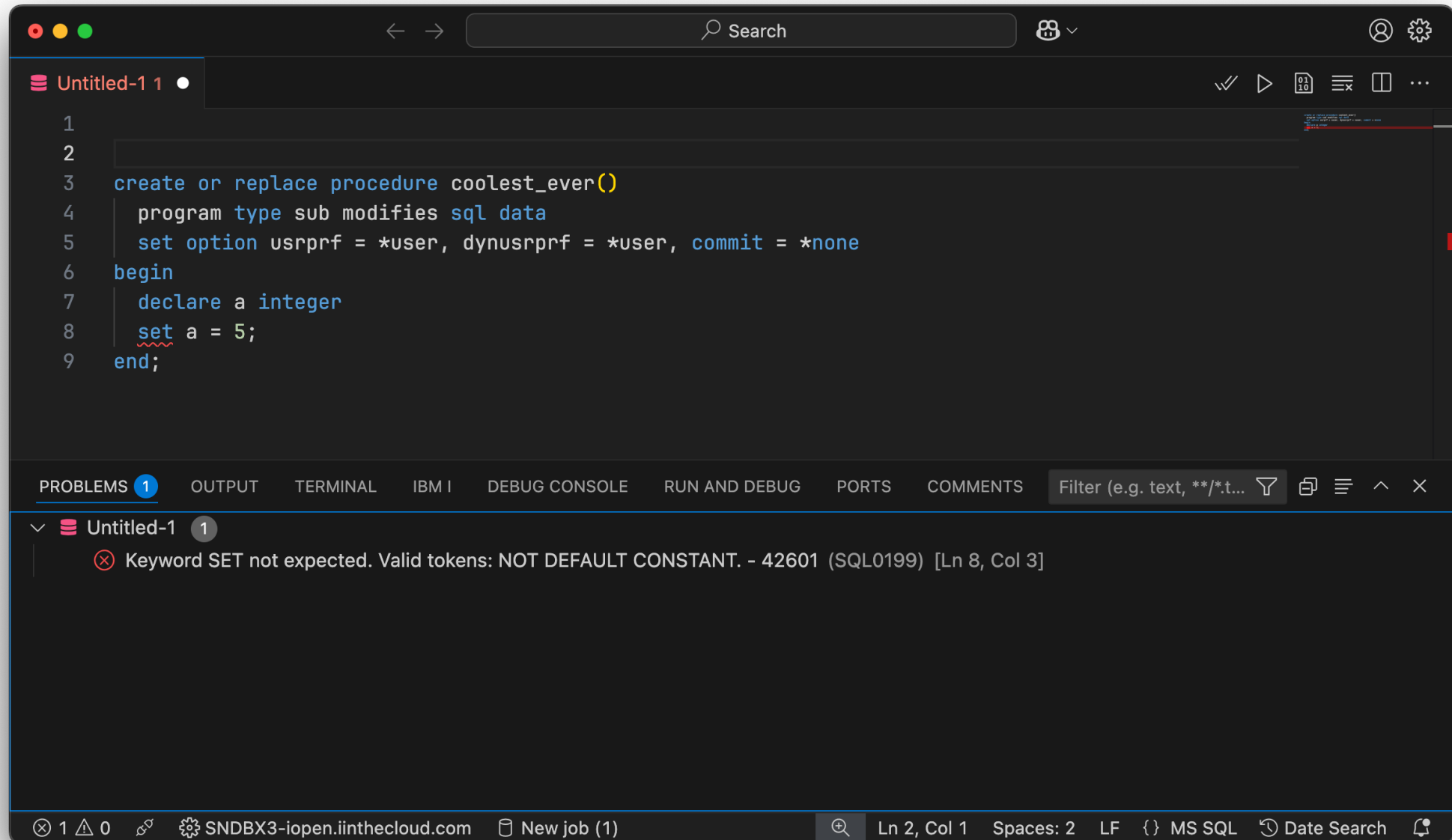
RPG Language support
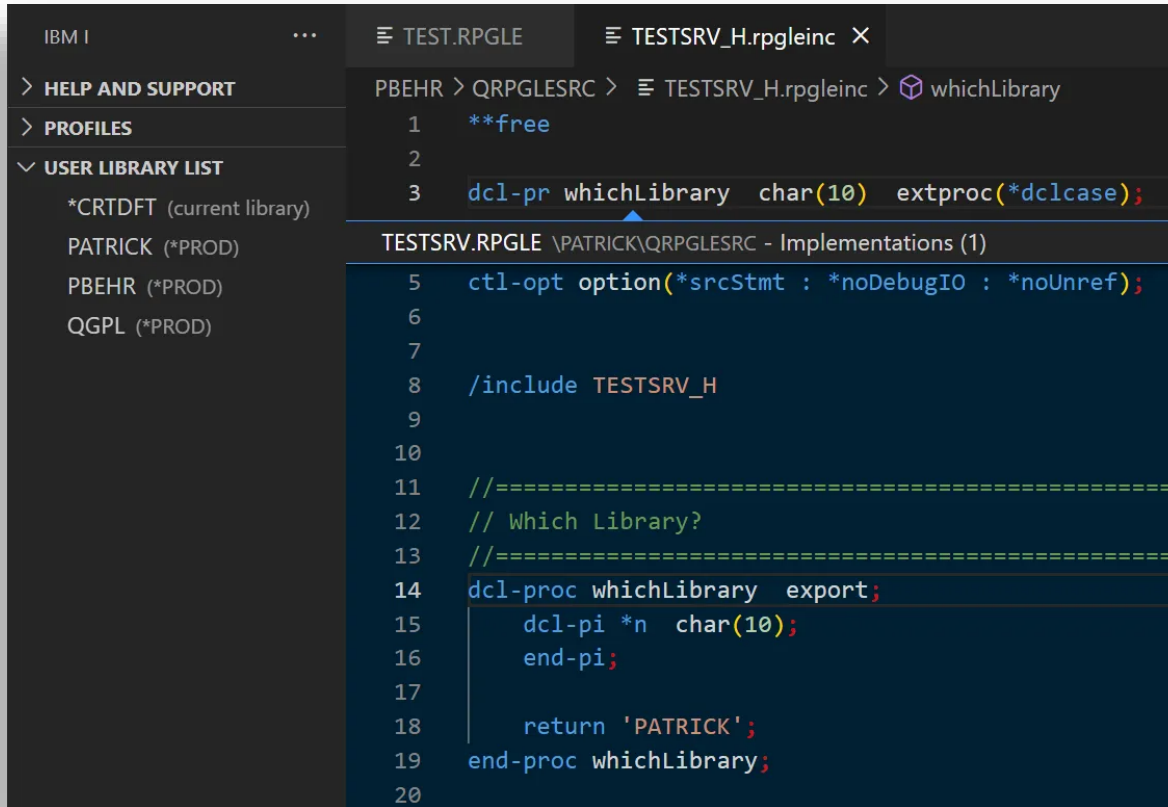
Ability to quickly format free-format RPGLE

Go to implementation for export procedures from references

Support for fixed-format RPGLE references

Peek and go to definition for fixed- and mixed-format RPGLE

Go to Implementation & References

Source Orbit

Complete support for fixed-format, mixed-format and free-format RPGLE

Support for git repositories and the QSYS file system

Visual Studio Code extension release

Source Orbit

Object Browser

Shows all objects that would exist based on source code in the repository.

Object Dependencies

Nodes below the objects indicate that the parent depends on them.

Affected Objects

Source Orbit hooks right into git can show what objects would be affected (and might beed to be rebuilt) based on the working and staged changes.
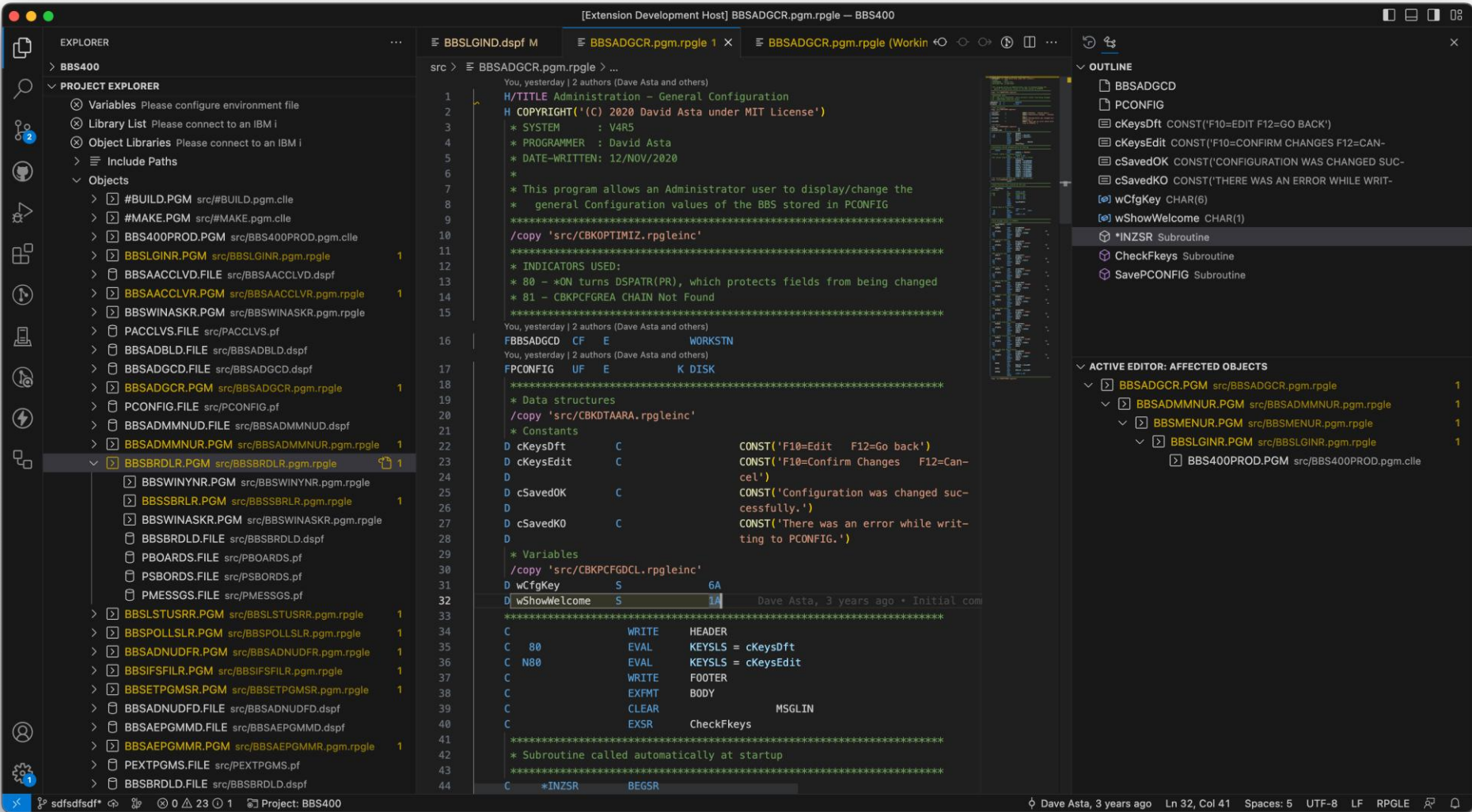
Project Explorer

Integrated right into the IBM i Project Explorer without any additional setup required.

Diagnostic Messages

Source Orbit can make suggestions about source names, missing references, and more.

Affected Objects view

This view shows what objects would be affected based on the active editor. As you switch between sources, the view updates automatically.

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Base OS

IBM i

Angela Newton - amnewton@us.ibm.com
IBM i Core OS Business Architect

IBM

Save and restore Workload Groups

RTVSYSINF LIB(MYLIB)

```
                  Retrieve System Information (RTVSYSINF)

 Type choices, press Enter.

  Library . . . . . . . . . . . .    MYLIB        Name
```

*UPDSYSINF LIB(MYLIB) TYPE(*WLCGRP)*

```
                  Update System Information (UPDSYSINF)

 Type choices, press Enter.

 Library  . . . . . . . . . . . . >  MYLIB        Name
 Type of information  . . . . . . >  *WLCGRP      *ALL, *EDTD, *NETA, *RPYLE...
```

TYPE
*ALL
*EDTD
*NETA
*RPYLE
*SRVATR
*SRVPVD
*SYSVAL
*WLCGRP

Group PTF apply date

IBM i

```
                        Display PTF Group
                                                    System:    MYSYSTEM
  PTF group  . . . . . . . . . :      SF99961
  Level  . . . . . . . . . . :      1
  Status . . . . . . . . . :      Installed
  Target release . . . . . . :      V7R6M0
  Applied date . . . . . . . :      04/08/2025 22:00:00
  Text  . . . . . . :     IBM DB2 MIRROR FOR I


  Type options, press Enter.
   5=Display PTF details      6=Print cover letter    8=Display cover letter
  10=Display PTF apply information


       PTF       Product
 Opt   ID        ID         Release    Status
       SJ03447   5770SS1    V7R6M0     Temporarily applied
       SJ03541   5770SS1    V7R6M0     Temporarily applied
       SJ03634   5770SS1    V7R6M0     Temporarily applied
       SJ04026   5770SS1    V7R6M0     Permanently applied
       SJ04332   5770SS1    V7R6M0     Permanently applied
       SJ04494   5770SS1    V7R6M0     Superseded
                                                              More...
  F3=Exit    F11=Display alternate view    F12=Cancel    F16=Repeat position to
  F17=Position to    F20=Display expanded PTF group    F24=More keys
```

Command:
DSPPTFGRP

API:
QpzListPtfGroupDetails

2-digit year date formats – a new base year

IBM i

1940   2039

1970   2069

After the year 2039, dates with 2-digit years may wrap back to 1940.

QIBM_QBASEYEAR environment variable introduced in 7.5 to shift the base year 30 years.

Number of digits in year / formats	Range of years	Range of years
2 *YMD, *DMY, *MDY, *JUL	1940 to 2039 (base year = 1940)	1970 to 2069 (base year = 1970)
3 *CYMD, *CDMY, *CMDY	1900 to 2899	1900 to 2899
4 *ISO, *USA, *EUR, *JIS, *LONGJUL	0001 to 9999	0001 to 9999
4 *YYMD, *MDYY, *DMYY	0001 to 9999	0001 to 9999
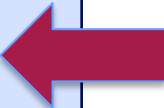
2-digit year date formats, continued

QIBM_QBASEYEAR environment variable:

- Base year can be set to 1940 or 1970

- Default base year remains unchanged in 7.6 (1940)

- Used by commands with parameter of TYPE(*DATE)

- Convert Date (CVTDAT) CL command updated to use environment variable in 7.6

- Does not affect RPG, COBOL, or Database

- Application programs must be updated to use date formats with century or 4-digit year

New RPG keyword for 2-digit year date formats

DATEYY(*ALLOW | *WARN | *NOALLOW)

- The DATEYY keyword can help you find where your code is using dates with 2-digit years.
  *ALLOW
  No messages are issued when a date format with 2-digit years is used. This is the default.
  *WARN
  A severity-10 warning is issued if a date format with 2-digit years is used.
  *NOALLOW
  A severity-30 error is issued if a date format with 2-digit years is used.

- The DATEYY keyword only causes the compiler to issue warning or error messages. It does not cause the compiler to assume different date formats.

- The DATEYY keyword overrides the value set by the DATEYY parameter for the CRTBNDRPG or CRTRPGMOD command.

See https://www.ibm.com/support/pages/rpg-cafe for 7.4 & 7.5 PTF information and details

Qualified job name on WRKJOB (F11)

IBM i

```
                         Work with Job

                                          System:     SYSNAME
 Job:    QPADEV0003         User:    ANGELA        Number:    330467

 Select one of the following:

     1. Display job status attributes
     2. Display job definition attributes
     3. Display job run attributes, if active
     4. Work with spooled files

    10. Display job log, if active, on job queue, or pending
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active


 Selection or command
 ===>

 F3=Exit     F4=Prompt    F9=Retrieve     F11=User/Job   F12=Cancel
```

Easy to copy/paste into other commands

```
                         Work with Job

                                          System:  SYSNAME
 Job:      330467/ANGELA/QPADEV0003

 Select one of the following:

     1. Display job status attributes
     2. Display job definition attributes
     3. Display job run attributes, if active
     4. Work with spooled files

    10. Display job log, if active, on job queue, or pending
    11. Display call stack, if active
    12. Work with locks, if active
    13. Display library list, if active
    14. Display open files, if active
    15. Display file overrides, if active
    16. Display commitment control status, if active

                                                          More...
 Selection or command
 ===>

 F3=Exit       F4=Prompt   F9=Retrieve      F11=Job User      F12=Cancel
```

Base Infrastructure

Nancy Uthke-Schmucki - schmucki@us.ibm.com
IBM i Business Architect, Hardware & Base Infrastructure

IBM i

IBM i 7.6 - Supported Power Servers

Selected IBM Power servers with IBM Power10 technology-based processors

- Enterprise Model
  - 9080-HEX

- Scale Out Models
  - 9105-42A
  - 9786-42H

  - 9105-22A
  - 9105-22B
  - 9786-22H

  - 9105-41B

  - 9028-21B

Minimum FW level: FW1060

S1024 L1024

S1022 L1022

S1014

S1012

E1080

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Ethernet Link Agg - Dynamically add/remove member ports

Use Case

- Ethernet Link Aggregation has long been available on IBM i
  - Binds several full-duplex Ethernet links running at the same speed together into one logical link
  - This logical link has a single Media Access Control (MAC) address
- A communications outage has been required to add or remove member ports from a Link Aggregation
  - IBM Idea IBM-i-1435 - Add/Remove Ethernet Ports to AGG LIND without varying off LIND
    - 20 Votes, created 2017, *Not Under Consideration* since 2021, but on internal list to reconsider
  - IBM Idea IBM-i-4413 – Link Aggregation NIC adapter replacement without service Interruption
    - 88 Votes, created 2025-03-10, *Submitted* status

IBM i 7.6 Solution

- Member ports can now be dynamically added or removed without a communications outage
  - There is no need to Vary Off the Line Description

More Information

- IBM Documentation: Managing an Aggregate Line Description

Collection Services adds Fibre Channel adapter statistics

Use Case

– Isolation of performance issues is complex when using external storage
– Usage of VIOS to share Fibre Channel adapters can add to the complexity

IBM i 7.6 Solution

– Collection Services data now includes Fibre Channel adapter statistics
  - Allows easier analysis of performance bottlenecks
– Statistics are available for both native and virtual configurations to help identify issues
  - Dedicated (i.e., Native) Fibre Channel adapters
    – FC link statistics that may relate to link transmission errors causing degraded performance
  - Virtual adapters that use NPIV to share Fibre Channel adapters in VIOS configurations
    – IBM i adapter driver & I/O performance statistics that may relate to virtualization overhead or overcommitment

More Information

– IBM Documentation for native Fibre Channel: Collection Services data files: QAPMFCN
– IBM Documentation for virtual Fibre Channel: Collection Services data files: QAPMFCV

Use of Platform Keystore for iSCSI CHAP

Use Case

- The **Power Platform KeyStore (PKS)** feature creates an encrypted non-volatile store
  - PKS provides logical partitions with additional capabilities to protect sensitive information
- PowerVM provides the ability to assign an **isolated PKS storage allocation with individually managed access controls to any partition desired**
- Additional IBM i exploitation of PKS: iSCSI CHAP authentication credentials
  - Better protection against unauthorized access to iSCSI-attached VTL devices and data

IBM i 7.6 Solution

- Use HMC partition properties if you want to enable use of PKS
  - Then IBM i default is to use PKS whenever iSCSI target configurations are added or changed
  - Can still choose NOT to use PKS for a given target configuration, if desired
- What about CHAP credentials already in iSCSI target configurations prior to IBM i 7.6?
  - Will be automatically migrated to PKS (only if enabled) after installing IBM i 7.6

More Information

- IBM Support: IBM i Removable Media Support for iSCSI VTL
- IBM Documentation for SQL Services: ADD_ISCSI_TARGET and CHANGE_ISCSI_TARGET
- PowerVM PKS BLOG: PowerVM introduces Platform KeyStore

NVMe enhancements

1. Better Integration of NVMe Password Protection Policy

Use Case
- IBM i 7.5 TR 1 added support for password protection for data on NVMe devices
- Policy management was via a set of IBM i Services and equivalent macros
- Better integration was desired

IBM i 7.6 Solution
- SST and DST interfaces allow a sys admin to use the *Work with Disk Units* function for management

More Information
- IBM Documentation [NVMe password protection](#)

2. Potential NVMe Performance Benefit

Use Case 😊
- NVMe performance is great, but faster is better

IBM i 7.6 Solution
- Low-level I/O architecture changes were made
- SOME workloads running with NVMe drives may get a performance benefit

ObjectConnect attributes for send and receive buffers

Use Case
– ObjectConnect performance over IP varies, depending on the amount of bandwidth available in a network environment

IBM i 7.6 Solution
– Options are added to *Change ObjectConnect Attributes* (CHGOBJCA)
– Can now configure the sizes of the send and receive buffers to change performance characteristics
– Allows better performance tuning

More Information
– IBM Documentation: CHGOBJCA

Open List of Activation APIs return larger values for space used

IBM i

Use Case

– Some application developers want in-depth information about the memory usage of activation groups in which their programs run
– *Open List of Activation* APIs have sometimes overflowed the 4-byte return values for space used
  • The max 4-byte value of 4,294,967,295 was returned if the actual value exceeded 4 bytes

IBM i 7.6 Solution

– *Open List of Activation* APIs now return exact 8-byte values for heap and static space used
– Specific APIs:
  • *Open List of Activation Attributes* (**QWVOLACT**)
  • *Open List of Activation Group Attributes* (**QWVOLAGP**)

More Information

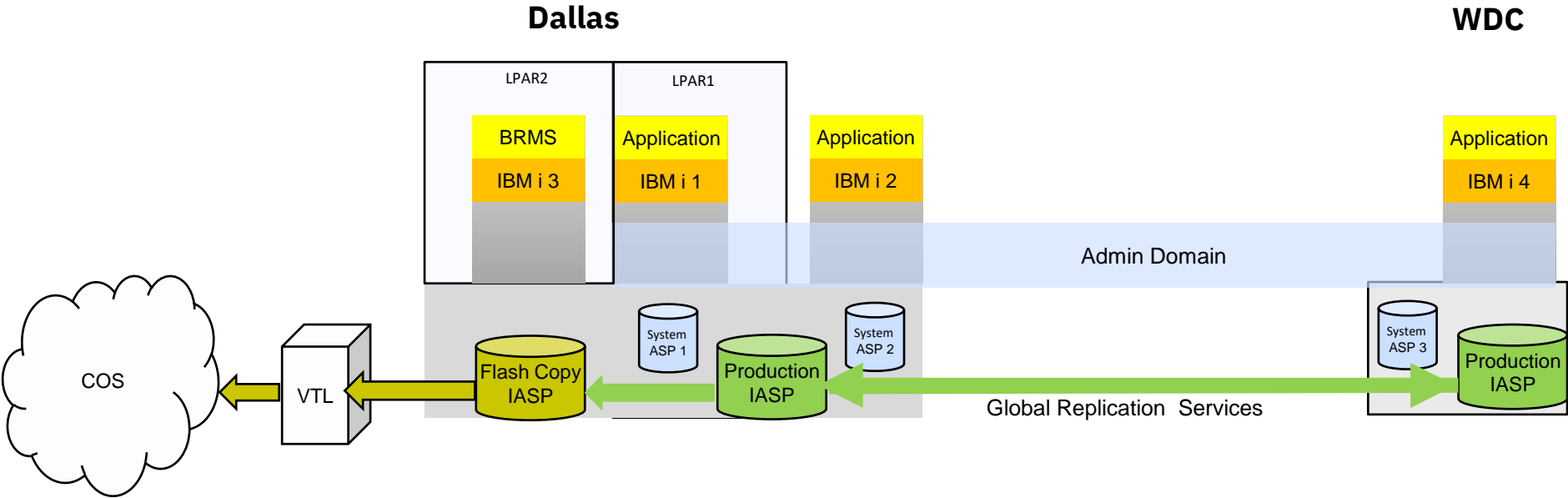– IBM Documentation: QWVOLACT and QSVOLAGP

PowerHA SystemMirror

IBM i

Steve Finnes - finnes@us.ibm.com

Power Systems HA Product Offering Manager

Three "data centers" two remote cloud locations PowerHA IBM i cluster

Category	Capability being delivered.	Customer value
PowerVS HA/DR	PowerHA IBM i Integrate with IBM Power Virtual Server Global Replication Services (GRS)	Automated HA/DR in PowerVS based on storage replication enabling capability comparable to on-premise clustering
PowerVS HA/DR	PowerHA IBM i integrate with IBM Power Virtual Server FlashCopy (SOD)	Providing IASP FlashCopy automation in PowerVS for offline saves to COS
PowerVS HA/DR	PowerHA IBM i integrate with IBM Power Virtual Server LUN Level Switching (SOD)	Enables shared storage HA configurations comparable to on-premise deployments

PowerVS

IBM i

Dan Sundt - dan_sundt@us.ibm.com

IBM i Power as-a-Service Product Manager

Merlin as a Service Now Available

IBM i

- IBM i Modernization Engine for Lifecycle Integration, commonly referred to as "Merlin", is a strategic platform enabling IBM i clients to modernize both applications and development processes via DevOps and is built on Red Hat® OpenShift.

- Clients have asked for a way to take advantage of Merlin without having to partition additional resources or acquire new hardware. Two IBM business partners have recognized this market trend and have developed Merlin as a Service. Merlin as a Service is running on IBM® Power® Virtual Server, IBM's Power in the cloud offering. All end users must do is sign into their Merlin environment and get started modernizing and building next-generation applications on IBM i. Our business partners take care of the setup and management of the environment, so no need to worry about getting additional hardware, learning how to install Red Hat OpenShift, or purchasing additional software.

- The two partners who launched Merlin as a Service are:
  - CSI in EMEA
  - Sanwa Comtec K.K. in Japan

- If you are interested in Merlin as a Service, you can reach out to our partners directly:
  - CSI can be contacted via this link: https://www.csiltd.co.uk/ibm-power/ibm-i-managed-services
  - Sanwa Comtec K.K. can be contacted via sales@sct.co.jp or via this link: https://product.sct.co.jp/product/ibmi/contact
  - Or you can reach out to Tonny Bastiaans, IBM PowerVS Product Manager, +31(0)6 5138 0133, tonny_bastiaans@nl.ibm.com

- More information about Merlin as a Service:
  - Guided tour - https://learn.common.org/products/learn-more-about-merlin-and-how-you-can-easily-use-it-via-our-service-offering-2#tab-product_tab_overview
  - Japanese Guided tour - https://learn.common.org/products/learn-more-about-merlin-and-how-you-can-easily-use-it-via-our-service-offering-japanese
  - Brunch and Learn by CSI - https://video.ibm.com/recorded/134108008

IBM Power Virtual Server HA/DR IBM i Licensing
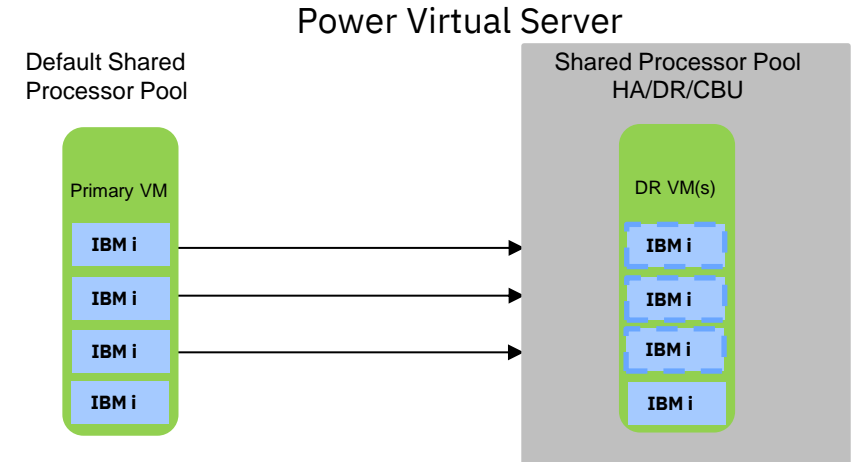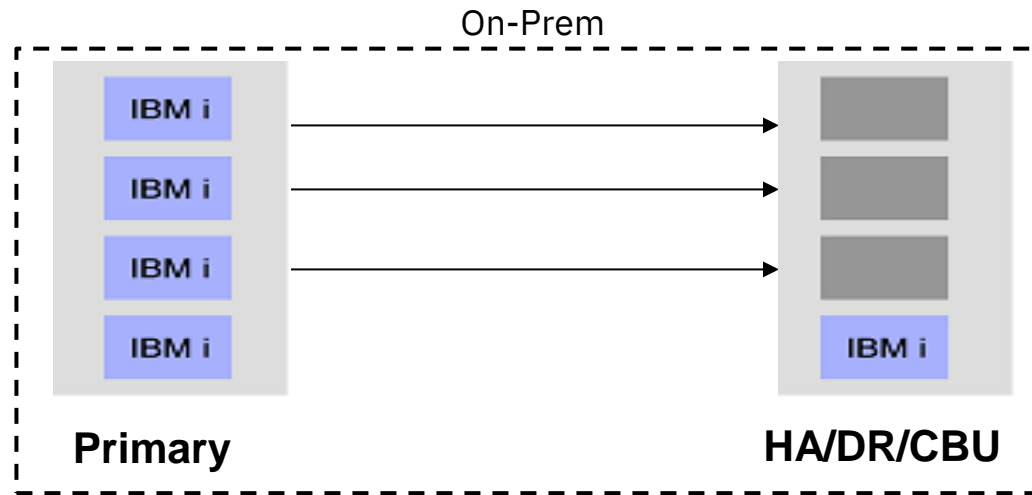
- Desire; provide a way for a customer to assure/reserve hardware resources such as cores and memory like they would with the on-prem CBU (Capacity Backup Unit) offering for HA/DR operations, and help optimize IBM i OS licensing

- <mark>**Use a Power Virtual Server Shared Processor Pool (SPP) to optimize "DR side" OS licenses**</mark>
  - Customer creates a shared processor pool with cores = X
    - …where X = the maximum number of cores that the partition(s) will potentially need
    - This step effectively ensures the customer has access to the cores whenever they're needed for any VM in the pool
  - To achieve the benefit of "optimized DR pricing," customer deploys a VM(s) in the SPP with a small amount of entitled capacity (e.g., 0.25 cores) and whatever memory/storage they need
    - Customer will NOT be charged for the cores since they're already paying for the cores as part of the SPP creation
    - Customer will only pay for 0.25 cores of IBM i OS license charges
    - Customer will be charged for the memory BAU
  - When a HA/DR event occurs, customer can resize the VM(s) up to the appropriate number of cores they need and will pay for the appropriate IBM i OS's BAU – e.g., if they scale up to 4 cores, they'll pay for 4 cores of OS licenses

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IBM i DR Example Details

IBM i

S1022 without SPP					
	Cores/EC	Type	Mem	OS	Total
VM1	4.00	S	64	IBM i	$5,464.31
VM2	2.00	S	48	IBM i	$2,892.17
VM3	1.00	S	32	IBM i	$1,526.09
VM4	1.00	S	32	IBM i	$1,526.09
VM5	2.00	S	48	IBM i	$2,892.17
Total PVS	10.00		224		$14,300.84
				with Discount	$7,865.46

Production without SPP

- 5 VMs, 10 total cores

with SPP and core and memory metering optimization						
	Cores/EC	Type	Mem	OS	Total	% change
Pool	10	C	0	BYOL	$1,591.38	
VM1	0.25	S	64	IBM i	$915.02	
VM2	0.25	S	48	IBM i	$755.02	
VM3	0.25	S	32	IBM i	$595.02	
VM4	0.25	S	32	IBM i	$595.02	
VM5	0.25	S	48	IBM i	$755.02	
Total PVS	1.25		224		$5,206.46	
				with Discount	$2,863.55	-64%

Optimized SPP

- Reserve the 10 cores and memory for the VMs, but run the VMs as low as 0.25 cores each which saves on IBM i licensing

- No extra charge for high memory because of low core/high memory ratio

Events

IBM i

IBM i Guided Tours

Merlin and Modern IBM i Development
9:00 AM - 10:00 AM | Mar 26, 2025 (UTC-5:00)

Register on Teams

VS Code, IBM i and Git
9:00 AM - 10:00 AM | Apr 30, 2025 (UTC-5:00)

Register on Teams

VS Code and Db2 for i
9:00 AM - 10:00 AM | May 28, 2025 (UTC-5:00)

Register on Teams

[IBM i Guided Tours Registration](#)

- Every Wednesday, 9:00 am Central US Time
- Click on webinar above for registration link
- ** Topic subject to change with notification
- Replays available
  - [Common: 2025 Guided Tours](#)
  - [Common: 2024 Guided Tours](#)

Anaheim, California
May 19 – 22
IBM i Education

COMMON Europe

June 02-05
Gothenburg, Sweden

2025 IBM i Marketplace Survey Results Revealed
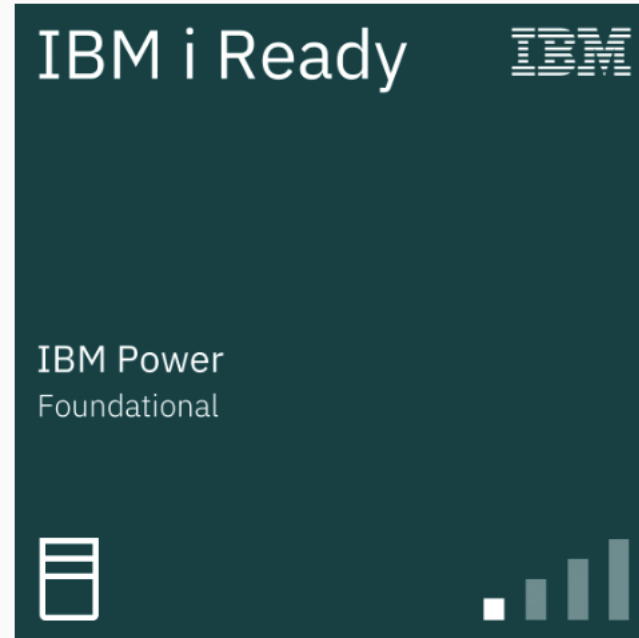
Find out how IBM i shops are using the platform in 2025

https://www.fortra.com/resources/guides/ibm-i-marketplace-survey-results
https://www.fortra.com/resources/videos/2025-ibm-i-marketplace-survey-results-revealed

Ask Your Customers... Are They IBM i Ready?

https://www.ibm.com/university/power/ibmi-ready/

Executive Briefings

- Rochester or Montpellier Briefing Centers
- IBM innovation Centers – rooms are no charge; charges only for extras
- Virtual or on-site briefings; connect with Cindy Chelmowski (cchelm@ibm.com)
- https://www.ibm.com/support/pages/node/7174273

IBM i Resources

IBM i Team

IBM i

For more information

IBM Sites:

IBM i Home Page	https://www.ibm.com/it-infrastructure/power/os/ibm-i
IBM Strategy Whitepaper	https://www.ibm.com/it-infrastructure/us-en/resources/power/i-strategy-roadmap/
IBM Client Success	https://www.ibm.com/it-infrastructure/us-en/resources/power/ibm-i-customer-stories/
Support Life Cycle	https://www.ibm.com/support/lifecycle/
License Topics	https://www-01.ibm.com/support/docview.wss?uid=nas8N1022087
IBM i Release Life Cycle	https://www.ibm.com/support/pages/release-life-cycle
IBM i TR Wikis	IBM i Technology Updates

For more information

IBM and Partner use:

IBM i Seismic Page	https://ibm.seismic.com/Link/Content/DC4VTGP3fR6W88c2H4XJMcXMJRh3
IBM i in Power VS Seismic Page	https://ibm.biz/BdSXBe
IBM i Monthly Call recording and pdfs	https://ibm.box.com/v/IBMiMonthly2024

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For more information

Events:

IBM i Guided Tours registration	https://www.ibm.com/support/pages/ibm-i-guided-tours
IBM i Guided Tours replay	https://learn.common.org/2024guidedtours
IBM TechXchange Conference	https://www.ibm.com/community/ibm-techxchange-conference/
COMMON North America PowerUP 2024	https://www.common.org/powerup-2025/
COMMON Europe Congress (CEC) 2024	https://comeur.org/common-europe-congress-2024-2/

For more information

Marketplace:

Forrester TEI Study	https://www.ibm.com/downloads/cas/1ZLRK39P
Steve Will's blog	https://techchannel.com/SMB/you-and-i-blog
Forta 2024 Marketplace Survey	https://www.fortra.com/resources/guides/ibm-i-marketplace-survey-results
IBM iSee Video Blog	https://learn.common.org/products/ibm-isee-video-blog

IBM i

For more information:

Blogs to follow

- TechChannel You and i (Steve Will)
- TechChannel: i Can (Dawn May)
- TechChannel: iTalk with Tuohy
- TechChannel: OpenYour i with Jesse Gorzinski
- IBM Db2 for i (Kent Milligan)
- IBM i Analytics Blog (Jon Westcott Jr)
- iSee with Scott and Tim

More to follow

@IBMservers
@COMMONug
@IBMChampions
@IBMSystemsISVs
@LinuxIBMMag
@OpenPOWERorg
@ITJungleNews
@SAPonIBMi
@SiDforIBMi
@IBMAIXeSupp
@IBMAIXdoc

Hashtags to Use

#IBMPower
#IBMi
#IBMAIX
#Power10
#LinuxonPower
#HANAonPower
#ITinfrastructure
#OpenSource
#HybridCloud

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What's New   Announcements   Training   Roadmaps   Videos

Introducing the upcoming IBM watsonx Code Assistant for i

Artificial Intelligence

7 May 2025

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IBM watsonx Code Assistant for i

Be one of the first to access

Join the waitlist to accelerate modernization of RPG code with a trusted, transparent, and purpose-built AI coding assistant for IBM i. Sign up today to receive updates, exclusive resources, and a chance to participate in the public preview!

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First name

⚠

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Company

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https://www.ibm.com/account/reg/us-en/signup?formid=urx-53638

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AI ⌄   Hybrid Cloud ⌄   Products ⌄   Consulting   Support ⌄   Think 2025

watsonx   watsonx Code Assistant for i

Home / AI and ML / watsonx /

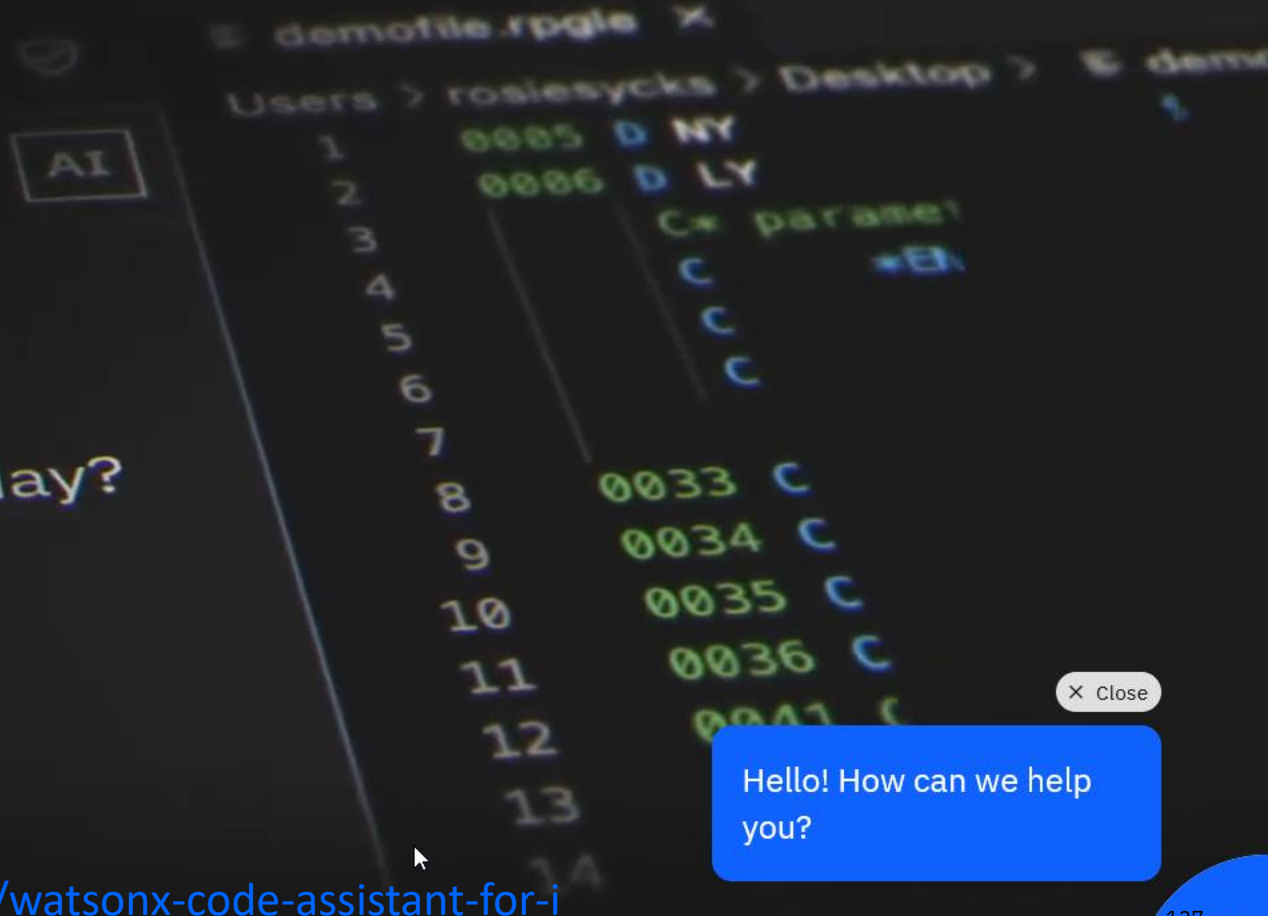# IBM watsonx Code Assistant for i

Modernize IBM i applications faster
with generative AI and automation

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✕ Close

Hello! How can we help
you?

https://www.ibm.com/products/watsonx-code-assistant-for-i

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