

Announcing IBM i 7.4 and Db2 Mirror for i


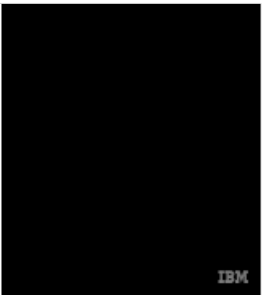
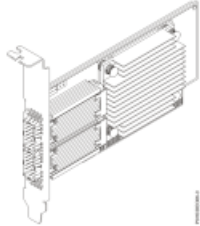



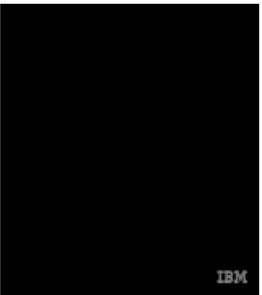

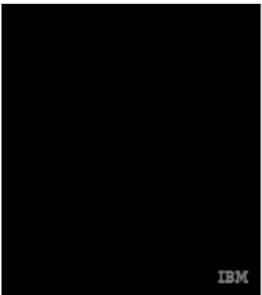





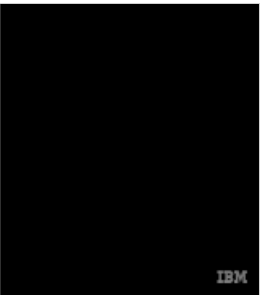

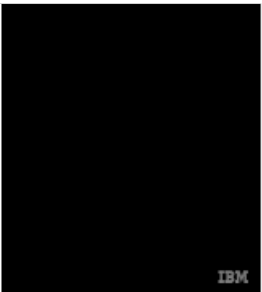

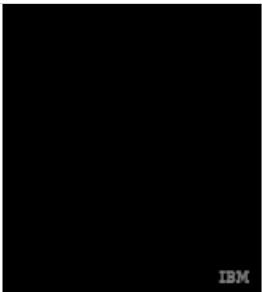


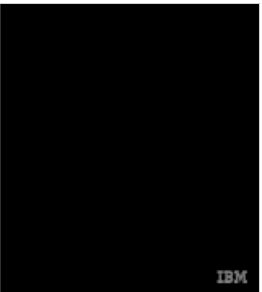


COMMON Luxembourg
20 February 2020

Fabian Michel
Client Technical Architect
IBM Belgium



Today's menu

<p>IBM i Latest & Greatest 7.4 and so much more!</p> 		<p>IBM i – Hardware, I/O, and Core OS</p> 		<p>Security Enhancements</p> 		<p>Work Management Update</p>	
<p>Db2 for i</p> 		<p>Continuous Availability - Db2 Mirror for i <small>5770-DBM</small></p> 		<p>IBM i Access Client Solutions (ACS)</p> 		<p>Integrated Web Server (IWS)</p> 	
<p>Open Source</p> 		<p>Solution Development</p> 		<p>IBM i and Cloud</p> 		<p>Miscellaneous Updates</p>	

IBM i Latest & Greatest

7.4 and so much more!



IBM i – A Platform for Innovators, by Innovators

IBM i: A platform for innovators, by innovators

IBM i never stops innovating with new features so that you never have to stop innovating your organization.



1Q 2019

FY 2018

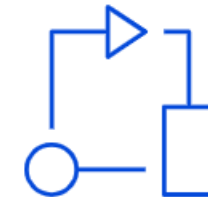
4Q 2017



Availability



Security



Open Source

IBM i Release Roadmap



** 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 7.4 and IBM i 7.3 TR6 - Dates

- IBM i 7.4 and IBM Db2 Mirror for i
 - Announcement **April 23, 2019**
 - **GA June 21, 2019**
 - ** RDi enhancements see the [Fix list for Rational Developer for i website.](#)
- IBM i 7.3 TR6
 - Announcement April 23, 2019
 - **GA May 10, 2019**
- More information available:
 - Announcement letters
 - developerWorks Enhancement Landing pages...
<http://www.ibm.com/developerworks/ibmi/techupdates/i73-TR6>
and
<http://www.ibm.com/developerworks/ibmi/techupdates/i74>
 - Knowledge Center

IBM i System Support

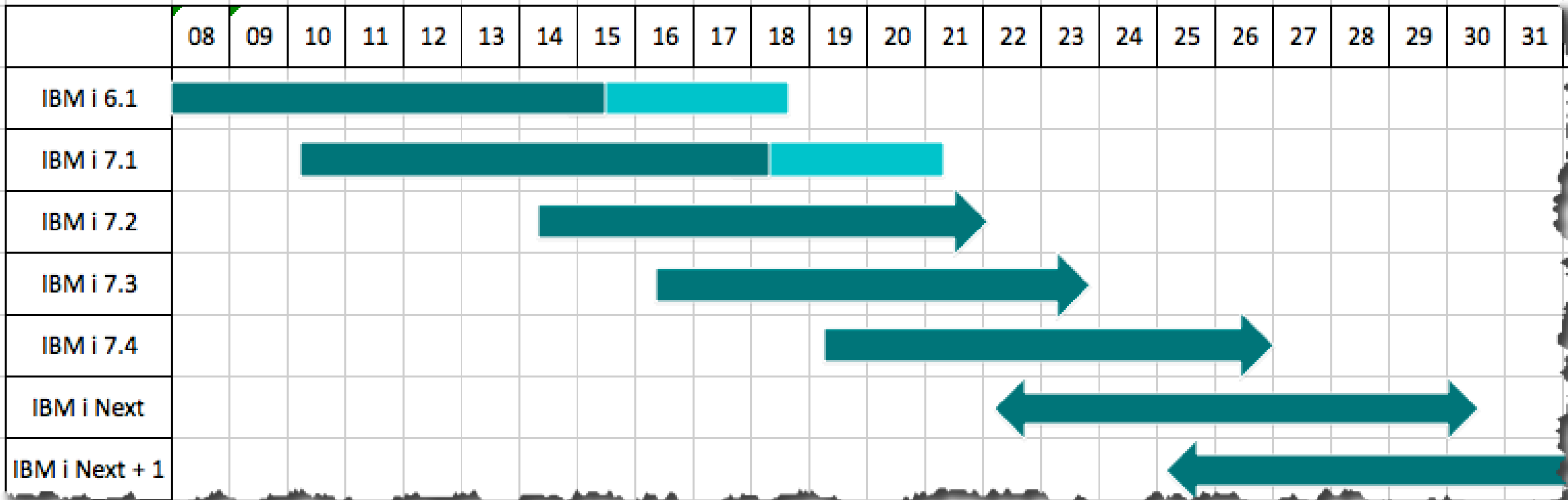
Servers	IBM i 7.2	IBM i 7.3	IBM i 7.4
POWER9 S914, S922 (VIOS only), H922 (VIOS only), S924, H924, E980	✓	✓	✓
POWER8 S812, S814, S822 (VIOS only), S824, E870, E870C, E880, E880C	✓	✓	✓
POWER7/7+ 710, 720, 730, 740, 750, 760, 770, 780, 795	✓	✓	
⚡ POWER7 BladeCenter PS700/701/702/703/704 (all VIOS only) 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)	✓ ¹		

1 – no IOP or HSL support

Current as of 2019-04-23

<https://www-01.ibm.com/support/docview.wss?uid=ssm1platformibmi>

IBM i Support Roadmap



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IBM i Strategic Directions

- **Power Solutions**

- Enable clients to exploit latest hardware technology ([POWER9 and peripherals](#))
- Enable clients to transform their customer experience using [mobile, Internet of Things, Cognitive, Machine Learning and AI](#)
- [Enable ISV Solutions](#) to implement the latest technologies
- Provide flexible solutions options for [cloud and MSPs](#)

- **Open Platform**

- Grow IBM i solutions options including [open source languages and applications](#)
- Extend IBM i solutions portfolio with Linux and AIX application choices

- **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](#)

IBM i 7.4 Portfolio – *“Strong Foundation for Continuous Innovation”*

Availability

- PowerHA supports Hyperswap clustering configurations, and user profile administration is automated
- IBM Db2 Mirror for i reduces RTO to zero by providing continuous availability

Security

- Implementing latest in industry standards, allowing clients to secure critical business information
- Authority collection has added support for object based control

Support of POWER9 Hardware

- Add support for applicable hardware and I/O available in the 2Q timeframe

Cloud

- Supporting cloud initiatives from IBM Cognitive Systems – IBM i in IBM Cloud, MSPs, Private & Hybrid Cloud

Solution Enablement

- Providing new RPG and COBOL Operations, making processing of data more efficient
- Many improvements in Db2 functions, including HASH built-in and Services for DTAARAs
- New Open Source environments allowing the porting of new application solutions to IBM i

Connectivity

- Enhancements to multiple products connecting to and from IBM i applications and database

Social

- Supporting the latest in social connections, Domino 10 is available for IBM i

Lots More



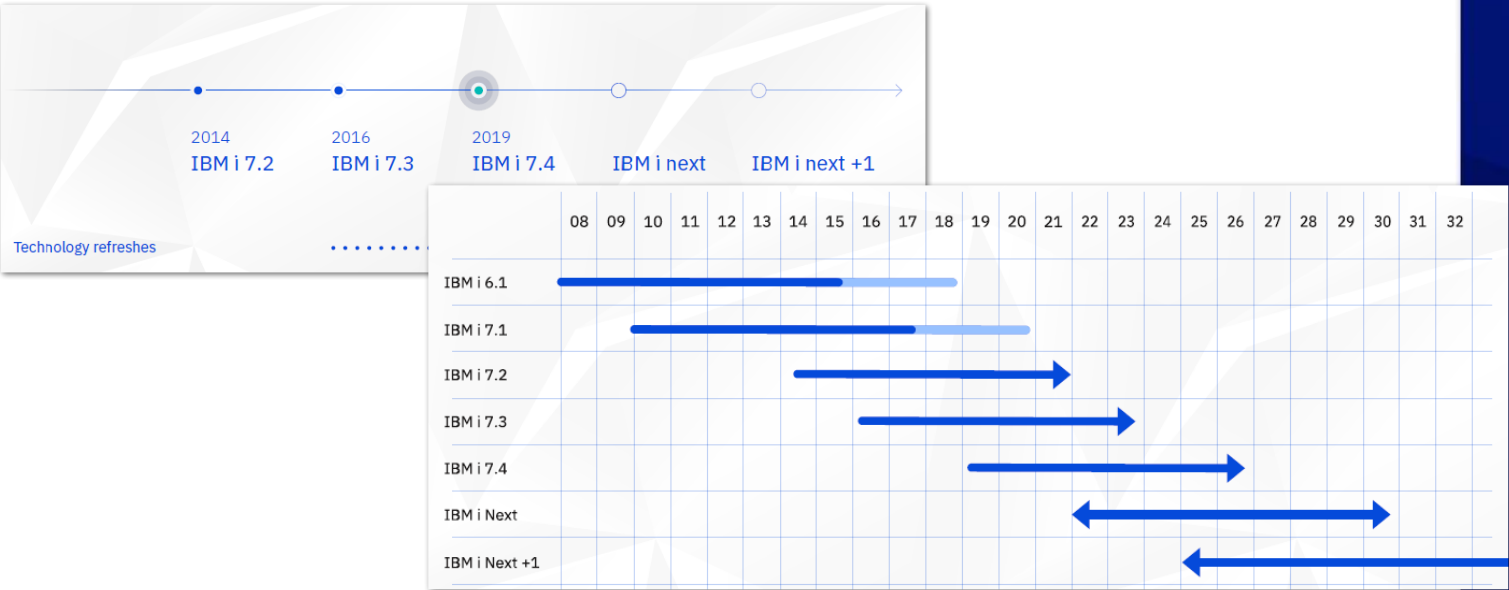
IBM i strategy and roadmap - May 2019 edition

IBM i strategy and roadmap

An executive guide to IBM's strategy and roadmap for its integrated operating environment for Power Systems

Download the full report

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



An IBM White Paper

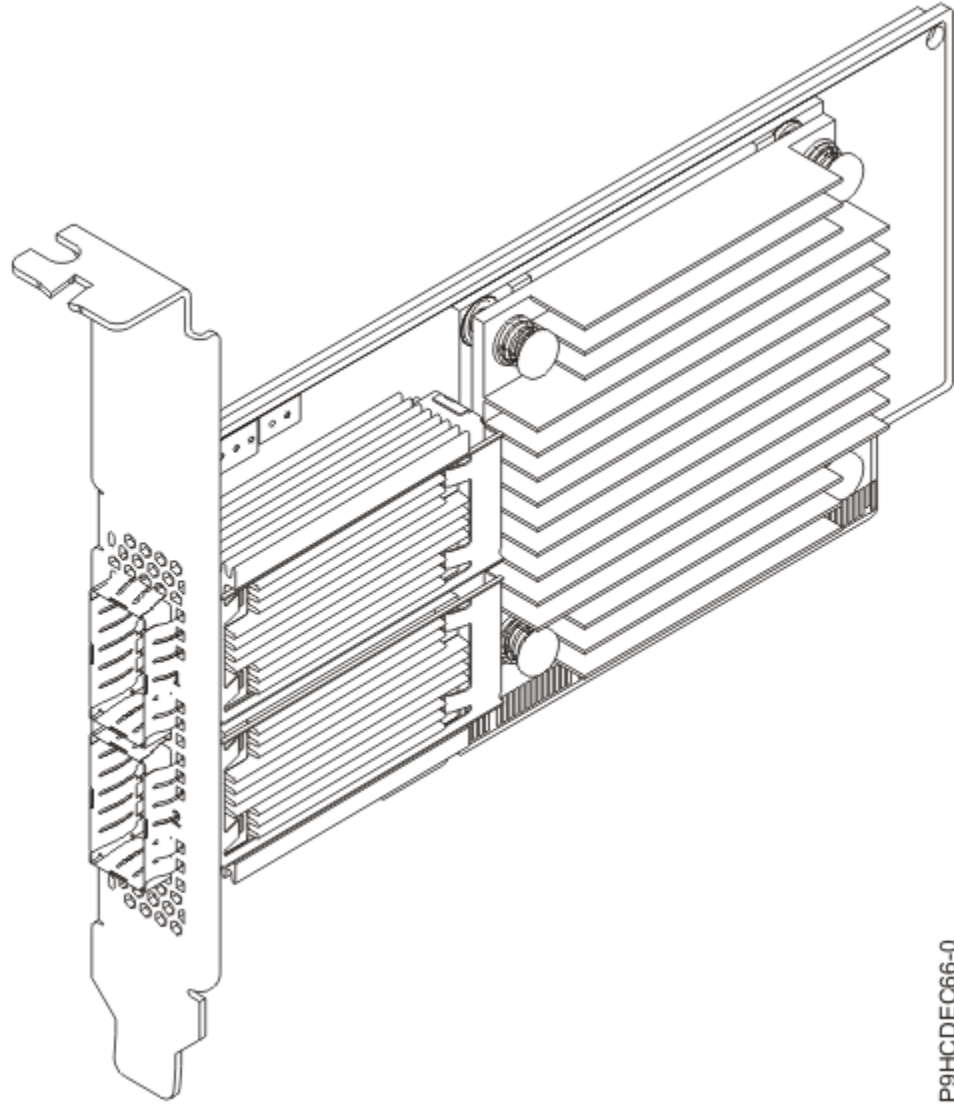
IBM i

A platform for innovators, by innovators

An executive guide to the strategy and roadmap for the IBM i integrated operating environment for Power Systems.

Fully updated for IBM i 7.4 and Db2 Mirror for i

IBM i – Hardware, I/O, and Core OS



P9HCDEC66-0

IBM i Cores/Partition – SMT – Threads

Processor	Limit	IBM i 7.1	IBM i 7.2	IBM i 7.3	IBM i 7.4
POWER7	Max Cores/Partiition (LBS Offering Only)	64 (SMT4)	96 (SMT4)	96 (SMT4)	NA
	MAX Threads	256 (LBS only)	384 (LBS Only)	384 (LBS Only)	NA
POWER8	Max cores/Partition (LBS Offering Only)	64 (SMT4) 32 (SMT8)	96 (SMT8)	192 (SMT4) 96 (SMT8)	192 (SMT4) 96 (SMT8)
POWER8	Max Threads	256	768 (LBS Only)	768 (LBS Only)	768 (LBS Only)
POWER9	Max Cores/Partition (LBS Offering Only)	NA	96 (SMT8)	192 (SMT4) 96 (SMT8)	192 (SMT8)
POWER9	Max Threads	NA	768 (LBS Only)	768 (LBS Only)	1536 (LBS Only)

Limits – Disk Arms and Max LUN size

	IBM i 7.1	IBM i 7.2	IBM i 7.3	IBM i 7.4
Disk arms in all basic auxiliary storage pools (ASPs 1 – 32), per partition	2047	2047	2047	3999
Disk arms in all independent auxiliary storage pools (iASPs 33 – 255) in all nodes in a cluster	2047	2047	2047	5999
Maximum combined number of disk arms and redundant connections to disk units (i.e., maximum number of disk paths)	2800	35,600	35,600	35,600
512/520 byte block size LUNs (Note 1): <ul style="list-style-type: none"> • 5xx block SAS disks (internal or vSCSI attached) • DS8000 LUNs • IBM Storwize LUNs • SVC LUNs 	1.2 TB or 2 TB (Note 2)	2 TB	2 TB	2 TB
4160 byte block size LUNs (Note 1): <ul style="list-style-type: none"> • 4K block SAS disks (internal or vSCSI attached) 	2 TB	4 TB	4 TB	16 TB
4096 byte block size LUNs (Note 1): <ul style="list-style-type: none"> • 4K block SAS disks (vSCSI attached) • FlashSystems LUNs 	N/A	2 TB	2 TB	16 TB

Note 1 – Actual limit is one block short of the max shown in the table.

Note 2 – For IBM i 7.1 the load source max is up to 1.2 TB. Other LUNs can be up to 2 TB.

Hardware and I/O – IBM i 7.4 and IBM i 7.3 TR 6

- Support for POWER9 Systems in 1H2019
 - IBM i, 7.4, 7.3, and 7.2
 - FW930 support
 - More legacy I/O support
 - Making the internal DASD backplane optional for Scale Out models

- New I/O

- PCIe gen4 dual port 100 Gb Ethernet adapter

7.3 TR6

- Adds Native NIC (both Dedicated and SR-IOV)
- Adds Native RoCE (both Dedicated and SR-IOV) for use in IBM i 7.4's Db2 Mirror configurations
- Dedicated & SR-IOV RoCE support is added for PCIe gen3 Ethernet adapters in IBM i 7.4
 - Sharing this adapter allows more configuration flexibility for use in IBM i 7.4's Db2 Mirror configurations
 - 2-port 100 Gb, 2-port 25/10 Gb, 2-port 10 Gb

7.3 TR6

- New PCIe3 6-Slot Fan-out Module for the PCIe3 expansion drawer

7.3 TR6

- New Single-wide Optical Cable cards for attaching the PCIe3 drawer with the new Fan-out module
 - For Scale Out models, allows I/O drawer to be attached without blocking an additional adjacent PCIe gen4 x16 card slot.

7.3 TR6

- New 387 GB, 775 GB, and 1.55TB Enterprise SAS 4k SFF-3 and SFF-2 SSDs.

7.3 TR6

- New 931 GB, 1.86 TB, and 3.72 TB Mainstream SAS 4K SFF-2 and SFF-3 SSDs.

- Also new 7.45 TB capacity, but support is only with IBM i 7.4, where max LUN limit is increased



Statement of Direction - NVMe

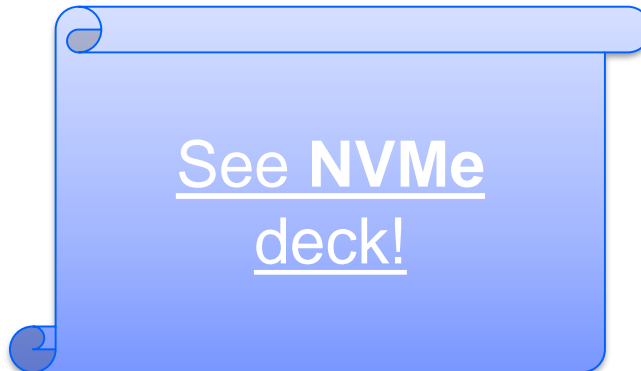
POWER9 processor based Systems have the ability to attach NVMe storage

Currently no supported VIOS or Direct configuration of NVMe by IBM i

IBM i 7.4 Announce has SOD for NVMe:

IBM plans to add IBM i native support for direct attached PCIe Non-Volatile Memory Express (NVMe) devices that are internal to the system unit.

Some customers may notice NVM on some configuration screens please point to this Statement of Direction



Base Operating System – IBM i 7.4 Enhancements

Clustering Functions made available through PowerHA

- New clustering policies automate adding and deleting of resources in a cluster admin domain
- Restores in a cluster admin domain will now honor restored values, instead of reverting back
- New Container Cluster Resource Group allows management of a group of CRGs as a single entity
- New capability of specifying a source node for a Cluster whose values take precedence when starting the Cluster Admin Domain

Save/Restore

- User can now choose to not start the controlling subsystem when a save or restore operation completes



– Allows system to stay in restricted state

Networking

- Securely send, receive, and forward SNMPv3 Trap and Inform messages

Serviceability

- LIC Log min/default/max size limits have been increased so important debug information does not wrap

Reminder - Retranslate Programs in IBM i 7.4

Can get [minor improvements](#) to generated sequences of machine instructions

- Typical for a new release
- Provide better optimizations for isolated sequences of instructions
- Especially for newer generations of hardware

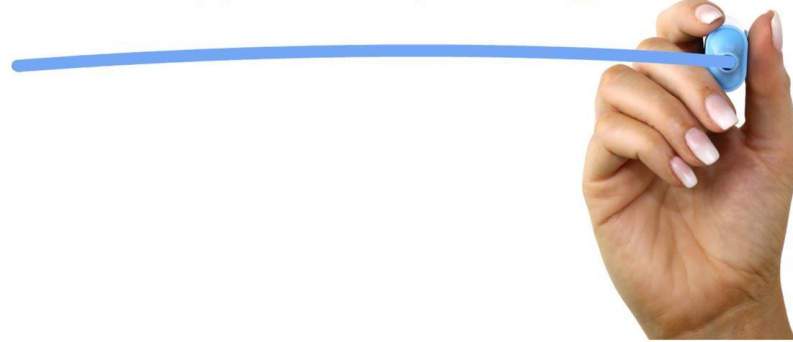
Identify programs that are performance sensitive

- Simply [retranslate them](#), even if you do not have the source code
- Run them on the new IBM i 7.4 release [for a possible performance benefit](#)

[QBNCVTPGM tool](#) makes it easier to retranslate a set of programs

- See the [Simplified program conversion](#) article on developerWorks for details

PERFORMANCE



Security Enhancements



Authority Collection

- A utility that captures pertinent data associated with an authority check
 - Covers all native IBM i file systems
 - Capture unique instances of the authority check
- The collection will include one key piece of information...
 - **“What authority does the OS require for this authority check?”**
- A security administrator or application provider can determine minimum authority required to the objects to allow the application to run successfully.
- Allows **“locking down” authority with no impact to existing workflow.**



Authority Collection Usage Overview




- Turn on the authority collection
- Collect authority info
- Examine the results via SQL or Navigator



Authority Collection – Interrogate the collected data

Welcome X Users X Display Authority Collection - Tlk X

Leverage Navigator to do **basic** data investigation

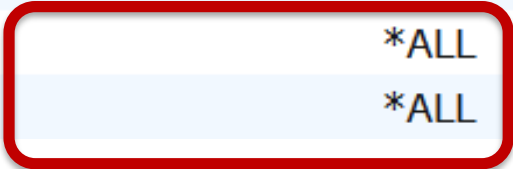
Display Authority Collection - Ut28p09.rch.stglabs.ibm.com							
Filter							
	Authorizaiton Name	Check Timestamp	System Object Name	System Object Library	System Object Type	Required Authority	Current Authority
	Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF	*ALL	*ALL
	Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF		*ALL
	Tlk	2015-08-17 11:42:03	Syslimtbl	QSYS2	*FILE		*ALL

Authority Collection – Interrogate the collected data

Welcome x Users x Display Authority Collection - Tlk x

Leverage Navigator to do **basic** data investigation

Display Authority Collection - Ut28p09.rch.stglabs.ibm.com							
Filter							
	Authorizaiton Name	Check Timestamp	System Object Name	System Object Library	System Object Type	Required Authority	Current Authority
	Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF	*ALL	*ALL
	Tlk	2015-08-17 11:41:48	Qmsf	QSYS	*USRPRF		*ALL
	Tlk	2015-08-17 11:42:03	Syslimtbl	QSYS2	*FILE		*ALL



Use SQL to get more details

```
16
17 SELECT SYSTEM_OBJECT_NAME, DETAILED_REQUIRED_AUTHORITY, DETAILED_CURRENT_AUTHORITY FROM QSYS2.AUTHORITY_COLLECTION A
18 WHERE AUTHORIZATION_NAME = 'SCOTT' AND SYSTEM_OBJECT_SCHEMA = 'TOYSTORE'
19 GROUP BY SYSTEM_OBJECT_NAME, DETAILED_REQUIRED_AUTHORITY, DETAILED_CURRENT_AUTHORITY
20 ORDER BY 1,2,3;
21
```

Authority Collection by Object

- As of IBM i 7.4 authority collection support allows the collection of authority information for specific objects when accessed by any user
- The authority collection value for an object set with the new Change Authority Collection (CHGAUTCOL) command.
- Object types:
 - QSYS file system
 - "root" (/)
 - QOpenSys
 - user-defined file system
 - document library objects

Authority Collection Updated Interfaces

Updated authority collection interfaces:

- Start Authority Collection ([STRAUTCOL](#))
- End Authority Collection ([ENDAUTCOL](#))
- Delete Authority Collection ([DLTAUTCOL](#))

Updated interfaces to display authority collection for objects active indicator:

- Display Security Attributes ([DSPSECA](#)) command
- Retrieve Security Attributes ([QSYRTVSA](#)) API

Interfaces that show object attributes now include the authority collection value, for example

- Display Object Description ([DSPOBJD](#))
- Display Attributes ([DSPATR](#))

Service tools user ID password composition rules

- Composition rules similar to operating system password rules
- Configured using DST, SST, or the new SST Security Attribute commands.
 - Change SST Security Attributes ([CHGSSTSECA](#))
 - Display SST Security Attributes ([DSPSSTSECA](#))
- The SST Security Attribute commands also can configure:
 - Service tools password level
 - Allow/restrict security-related system values from being changed

Service tools user ID management commands

Create Service Tools User ID (CRTSSTUSR)

Change Service Tools User ID (CHGSSTUSR)

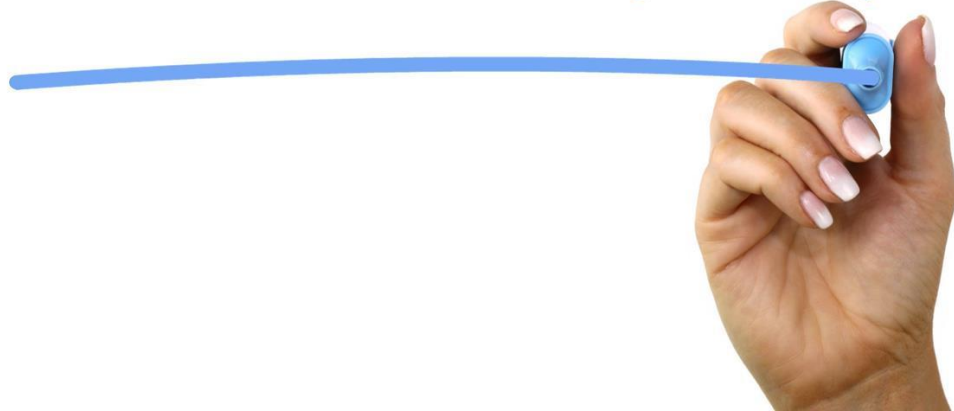
Delete Service Tools User ID (DLTSSTUSR)

- Create and Change commands can assign/set 27 SST privileges

Transport Layer Security (TLS) version 1.3

- Newest and most secure version of the TLS/SSL protocols replacing TLSv1.2
 - All key negotiation protected by elliptical curve algorithms
 - Majority of handshake messages are encrypted
 - Fixed or removed features susceptible to existing named vulnerabilities

SECURITY



Transport Layer Security (TLS) version 1.3

- Many applications automatically will use TLS 1.3 because they use the System TLS defaults.
 - QSSLPCL(*OPSYS) or customer adds *TLSV1.3
 - Older protocols *TLSV1.1 and *TLSV1.0 no longer part of default
 - Cipher suite default changes to match with TLSv1.3/1.2 protocols
- Retrieve TLS Attributes (QsoRtvTLSA) API
 - Programmatic way to retrieve System TLS system wide attributes

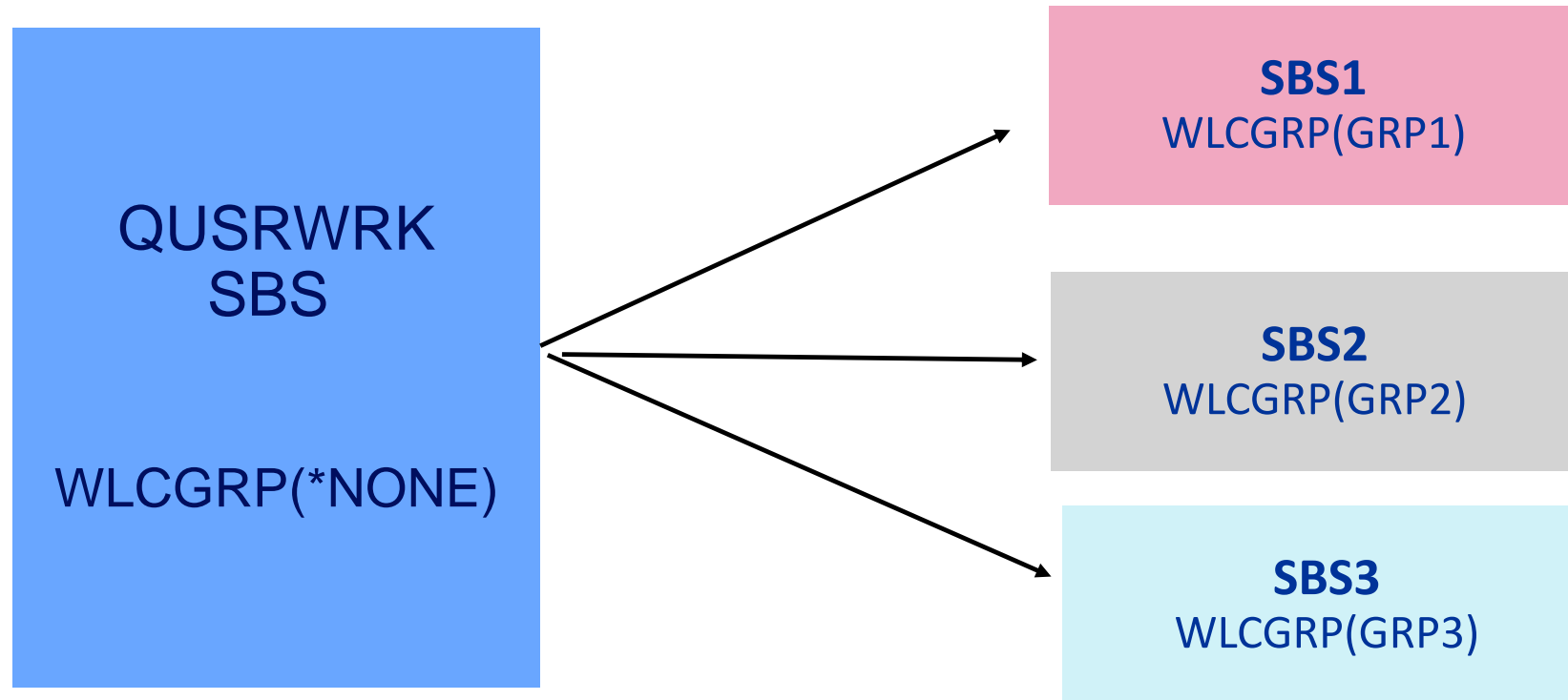
Digital Certificate Manager (DCM) automation

- Application Definition certificate assignment capabilities
 - Remove a certificate assignment from an application ([QycdRemoveCertUsage](#))
 - Add a certificate assignment to an application ([QycdUpdateCertUsage](#))
 - Retrieve information about the certificate currently assigned to an application ([QycdRetrieveCertUsageInfo](#))
- Certificate Authority (CA) Trust List capabilities
 - Add a CA certificate to the CA certificate trust list ([QycdAddCACertTrust](#))
 - Remove a CA certificate from the CA certificate trust list ([QycdRemoveCACertTrust](#))
 - Check if CA certificate is in the CA certificate trust list ([QycdCheckCACertTrust](#))
- Request a certificate renewal and import certificate into system store ([QycdRenewCertificate](#))
 - First call creates and returns a CSR (Certificate Signing Request) based on an existing certificate
 - Second call imports an issued certificate into the system certificate store

Work Management Update

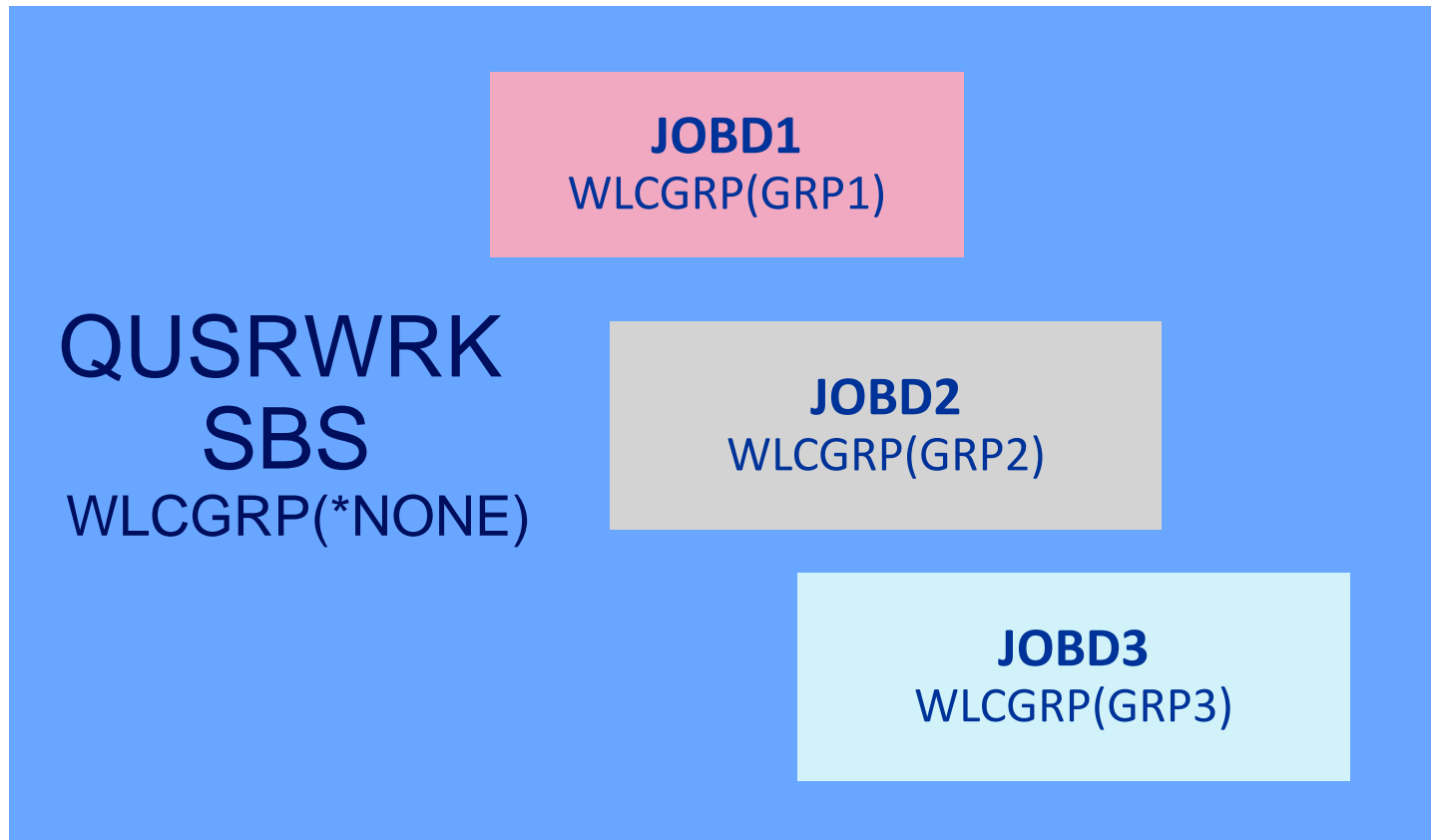
Workload groups **before 7.4**

- Prior to 7.4, configure by Subsystem only ([CRTSBSD](#), [CHGSBSD](#))
- Every job in the subsystem runs in same group
- Must [split workloads into separate subsystems](#) for each workload group



Workload groups on JOBD in 7.4

- Configure by Job description – [CRTJOB](#), [CHGJOB](#)
- Workloads can now run in different groups within same subsystem



Easy to set up, just create a group and then CHGJOB to use the workload group.

No need to restart the subsystem!

QHST enhancements

- Improved availability with new QHST system job
 - Performs message logging to the history log
 - Function previously done in SCPF job
 - New job can be restarted without an IPL
- Better search capability on DSPLOG command
 - Can search history log for all messages sent by user name
 - Can also search by job name or number, as well as generic support for the name
 - **No need to fill in entire 3-part job name**



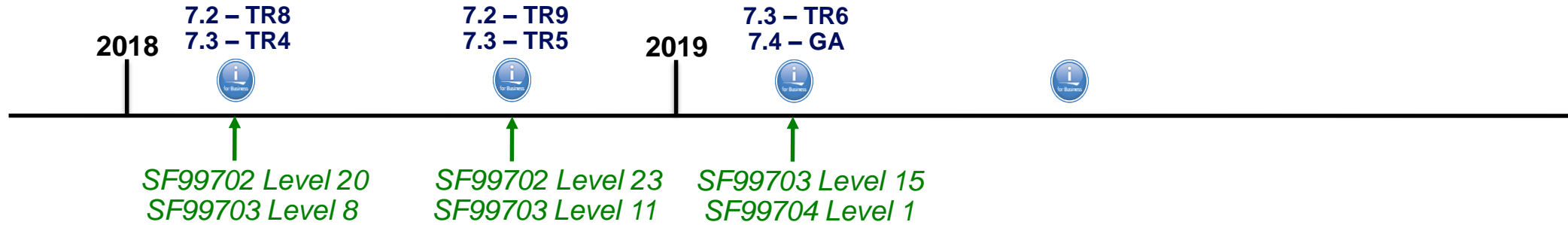
Work Management APIs

- New Exit points for tracking and managing submitted jobs
 - QIBM_QWT_SBMJOB calls a user exit program during SBMJOB, before the job is placed on the job queue.
 - QIBM_QWT_CHGJOB calls a user exit program when the CHGJOB command or API is called to change a job on a job queue.
- New API for Retrieve Active Prestart Job Status, QWTRAPJS
 - Similar to DSPACTPJ command
 - Returns statistics about number of requests handled, waiting, peak, etc.
- Improved SMT reporting
 - Retrieve Processor Multitasking Information API, QWCRTVPR
 - Now returns Current & Maximum number of secondary hardware threads
 - Previously only returned Configured value
 - The new fields are also reported by Collection Services in QAPMCONF file

Db2 for i



Enhancements delivered via Db2 PTF Groups



Enhancements timed with TR5 & TR9

- RPG Embedded SQL Enhancements
- New and Enhanced SQL built-in functions
- New and Enhanced IBM i Services
- Additional Database features in ACS
- SQL Language Improvements
- OmniFind Text Search enhancement
- And more...

Enhancements timed with IBM i 7.4 GA & TR6

- IBM Db2 Mirror for i
- Authority Collection for objects
- RPG Embedded SQL Enhancements
- New and Enhanced IBM i Services
- Additional Database features in ACS
- SQL Language Improvements
- And more...

www.ibm.com/developerworks/ibmi/techupdates/db2/groupptf

Db2 for i – What's in IBM i 7.4?

- Everything in IBM i 7.3 TR1 → TR6
- [Db2 Mirror](#)
- New HASH built-in functions
- SQL Precompiler enhancements for RPG and COBOL
- Reorganize Physical File Member enhance
- Authority Collection by Object

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- [Quality Improvements related to Db2 Mirror](#)
 - SQE
 - Enforcing job temporary storage limits
 - Improved paging within the SQL Plan Cache
 - Improved paging for plans with Random I/O
 - Improved estimates (costing) of plans with temporary objects
 - Improved management of stale plans
 - Improved optimization on busy partitions

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System Limits – Alerting the System Operator

- IBM i sends messages to QSYSOPR to alert the operator high consumption of a subset of the most critical limits
- Full details here: ibm.biz/Db2foriAlerts
- New: 15003 – Maximum Size of a Table



Limit ID	Limit description	Maximum	Alerting Level	Alerting cadence
15000	Maximum number of all rows in a partition	4,294,967,288	Above 90%	Once per day
15003	Maximum size of the data in a table partition	1,869,169,767,219	Above 90%	Once per day
15400	Maximum *MAX4GB Index Size	4,294,967,296	Above 90%	Once per day
15401	Maximum *MAX1TB Index Size	1,869,166,411,776	Above 90%	Once per day
15403	Maximum Encoded Vector Index Size	2,199,023,255,552	Above 90%	Once per day
15104	Maximum number of variable-length segments	65,533	Above 90%	Once per day

System Limits – Alerting the System Operator

- Full details here: ibm.biz/Db2foriAlerts
- New: 15003 – Maximum Size of a Table



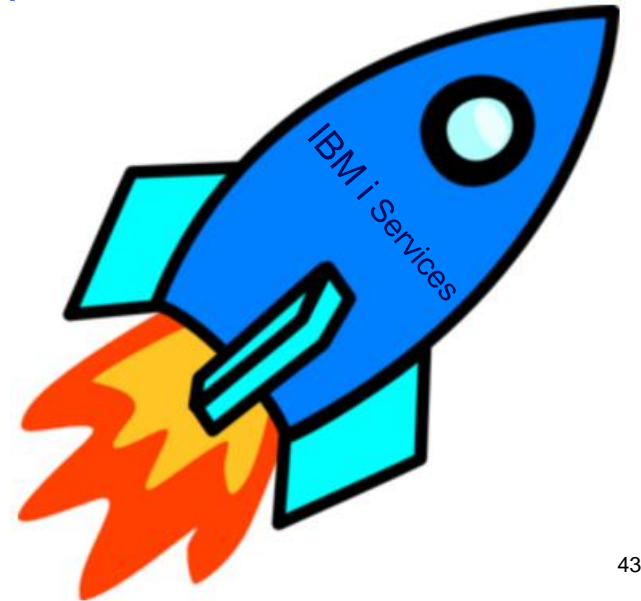
- Due to popular request, the message being sent to QSYSOPR now has a unique message identifier
- SQL7062 – Severity 80

```
Message ID . . . . . : SQL7062      Severity . . . . . : 80
Message type . . . . . : Information
Date sent . . . . . : 12/03/18      Time sent . . . . . : 12:41:45

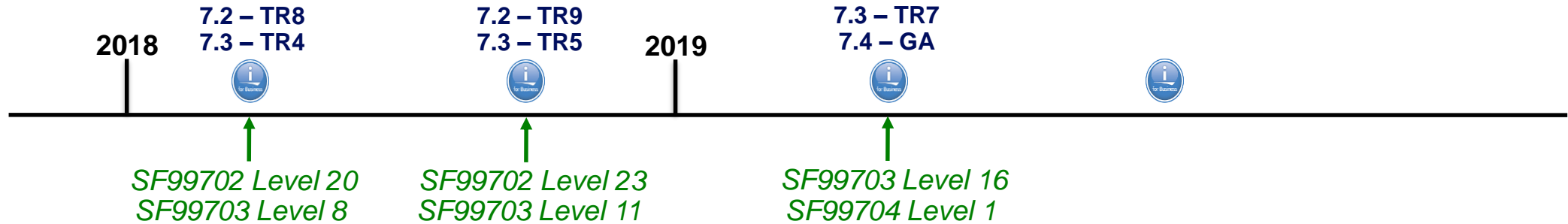
Message . . . . . : PRODLIB/ORDERS *FILE HAS CONSUMED MORE THAN 90% OF THE
LIMIT: 15000-MAXIMUM NUMBER OF ALL ROWS (3908420232 OF 4294967288=91.00%).
REFER TO ibm.biz/DB2foriAlerts FOR MORE DETAIL.
```

IBM i Services – A Brief History

- What: [Use SQL, SQL DDL and SQE](#) to provide alternatives to IBM i APIs and CL Commands
- Dawn of the 1st IBM i Service (2013) – [QSYS2.PTF_INFO](#)
 - Alternative to the DISPLAY PTF (DSPPTF) command
 - Proof of concept that SQL Views paired with SQL UDTFs provide significant value, for low cost
- [IBM i Services](#) take root (2015)
 - Enhancements delivered with every Technology Refresh
 - Examples shift from IBM presentations into [ACS's Insert from Examples](#)
- IBM i Services begin to be used as a [modernization technology](#) (2017)
- IBM i Services consist of [13 topical categories](#) (2019)
 - Significant ISV adoption
 - RFEs too numerous to count



IBM i Services – Timeline



Services in 4Q/2017:

- Syslog detail returned from DISPLAY_JOURNAL & HISTORY_LOG_INFO
- ASP_INFO
- ASP_VARY_INFO
- JOB_QUEUE_INFO
- STACK_INFO
- And more...

Services in 3Q/2018:

- JOB_DESCRIPTION_INFO
- ACTIVE_JOB_INFO enhancements
- NETSTAT_INFO & NETSTAT_JOB_INFO enhancements
- And more...

Services in 2Q/2019:

- DATA_AREA_INFO
- ASP_JOB_INFO
- MESSAGE_FILE_DATA
- SYSTOOLS.FIRMWARE_CURRENCY
- SYSTOOLS.SPLIT
- SYSTOOLS.SPOOLED_FILE_DATA
- IBM i 7.4 only services
- And many enhanced services

<http://ibm.biz/Db2foriServices>

MESSAGE_FILE_DATA

- Returns one row for each message in a message file
- SQL Alternative to the Display Message Description (DSPMSGD) CL command and the Retrieve Message (QMHRTVM) API

```
select * from qsys2.MESSAGE_FILE_DATA
  where message_file_library = 'QSYS' and
         message_file       = 'QSQLMSG' and
         message_id like 'SQ20%';
```

MESSAGE_ID	MESSAGE_TEXT	Message Second Level Text	MESSAGE _DATA_C OUNT	Message Data
SQ20038	Clauses not valid in same definition.	Cause : &1 and &2 cannot be spe...	2	&1 *CHAR *VARY 2
SQ20054	File &1 in &2 has DataLinks in link ...	Cause : The accessed file &1 ha...	3	&1 *CHAR *VARY 2
SQ20055	Result column not compatible with co...	Cause : The data type of a resu...	1	&1 *CHAR *VARY 2
SQ20058	Subselect for materialized query tab...	Cause : &1 in &2 cannot be crea...	3	&1 *CHAR *VARY 2
SQ20073	Attribute not valid for function &1 ...	Cause : Function &1 in &2 canno...	2	&1 *CHAR *VARY 2

DATA_AREA_INFO - Details of the last GO SAVE operations

The image shows two side-by-side SQL Developer windows. The left window, titled 'Untitled* - Run SQL Scripts - common1.idevcloud.com(lhost)', contains a query and its results. The query is:

```
--
-- Details for the last 5 GO SAVE operations are found
-- within the QUSRSYS/QSRSAV21 *DTAARA
--
-- https://www-01.ibm.com/support/docview.wss?uid=nas8N1010666
select data_area_value
  from qsys2.data_area_info
 where data_area_library = 'QUSRSYS'
    and data_area_name   = 'QSRSAV21';
```

The results table has the following data:

DATA_AREA_VALUE
20190329225312 SAVSYS TAPMLB03 20190329225629 SAVLIB TAPMLB03

Done: 1 rows retrieved.

The right window, titled '/Users/scottforstie/GO SAVE info.sql* - Run SQL Scripts - common1.idevcloud.com(lhost)', contains a PL/SQL function definition and its execution results. The function is:

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

stop;

select * from table(systools.go_save_info());
```

The results table has the following data:

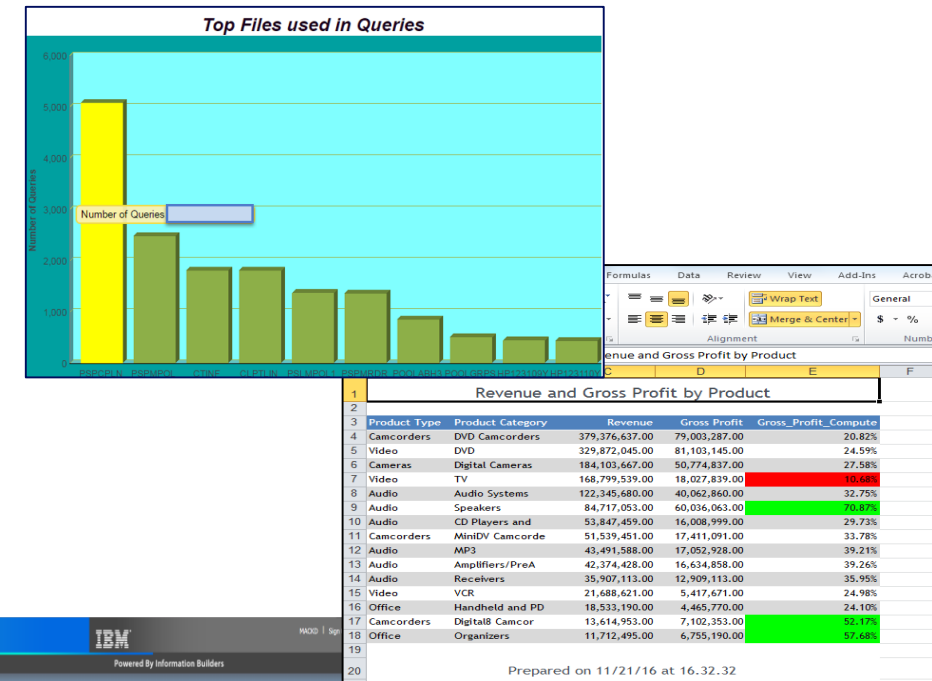
STEP_TIME	STEP_NAME
2018-09-22 19:17:27	SAVSYS
2018-09-22 19:17:29	STRSBS
2018-09-22 19:17:29	GO SAVE Complete
2018-09-22 19:24:49	ENDSBS
2018-09-22 19:25:24	SAVSYS
2018-09-22 19:25:24	STRSBS
2018-09-22 19:25:24	GO SAVE Complete
2018-09-22 21:02:19	ENDSBS
2018-09-22 21:02:54	SAVSYS
2018-09-22 21:05:39	SAVLIB
2018-09-22 21:35:10	SAVDLO
2018-09-22 21:35:11	SAV
2018-09-22 21:58:15	SAVIASPS
2018-09-22 21:58:15	STRSBS
2018-09-22 21:58:15	GO SAVE Complete
2019-03-29 22:46:38	ENDSBS
2019-03-29 22:46:45	SAVSYS
2019-03-29 22:47:27	STRSBS
2019-03-29 22:47:35	GO SAVE Complete

Done: 40 rows retrieved.

IBM Db2 Web Query for i

IBM Db2 Web Query for i – Version 2.2.1

- IBM i Business Intelligence and Data Warehousing family of products
 - IBM i Licensed Program Product (5733-WQX)
 - You probably already own a limited use license*
- Empower End Users with self service managed reporting
- Data driven analysis with interactive dashboards
- Get Started Quickly with Db2 Web Query EZ-Install
 - 100+ business and I/T reports and supporting tutorials
 - Query/400 Discovery Tool
 - Systems Administrator sample monitoring reports
- Email QU2@us.ibm.com for details



Learn more at: ibm.biz/db2webqueryi



Db2 Web Query – System and Security Management

Db2 Web Query for i

IBM

scottf | Sign Out | Resources | Administ

Powered By Information Builders

Reporting

Repository

Common

IBM Db2 Web Query Information

IBM i Administration Samples

Utilities

Get Status of Sys Admin Reports

PTF Group Currency Report

Spool File Usage

Subsystem summary report

System CPU Dashboard

System environment info report

System(s) status dashboard

Systems CPU Utilization over 1 hour

Systems CPU Utilization over 2 hours

Systems CPU Utilization over 24 hours

Systems CPU Utilization over 8 hours

Top 10 jobs by CPU chart

Top 10 jobs by disk I/O chart

Top 10 jobs by temp storage chart

Top 10 spool file consumers chart

Top 10 spool files by output queues chart

Retail Samples

Century Electronics

Favorites

Mobile Favorites

Reporting Servers

Change Management

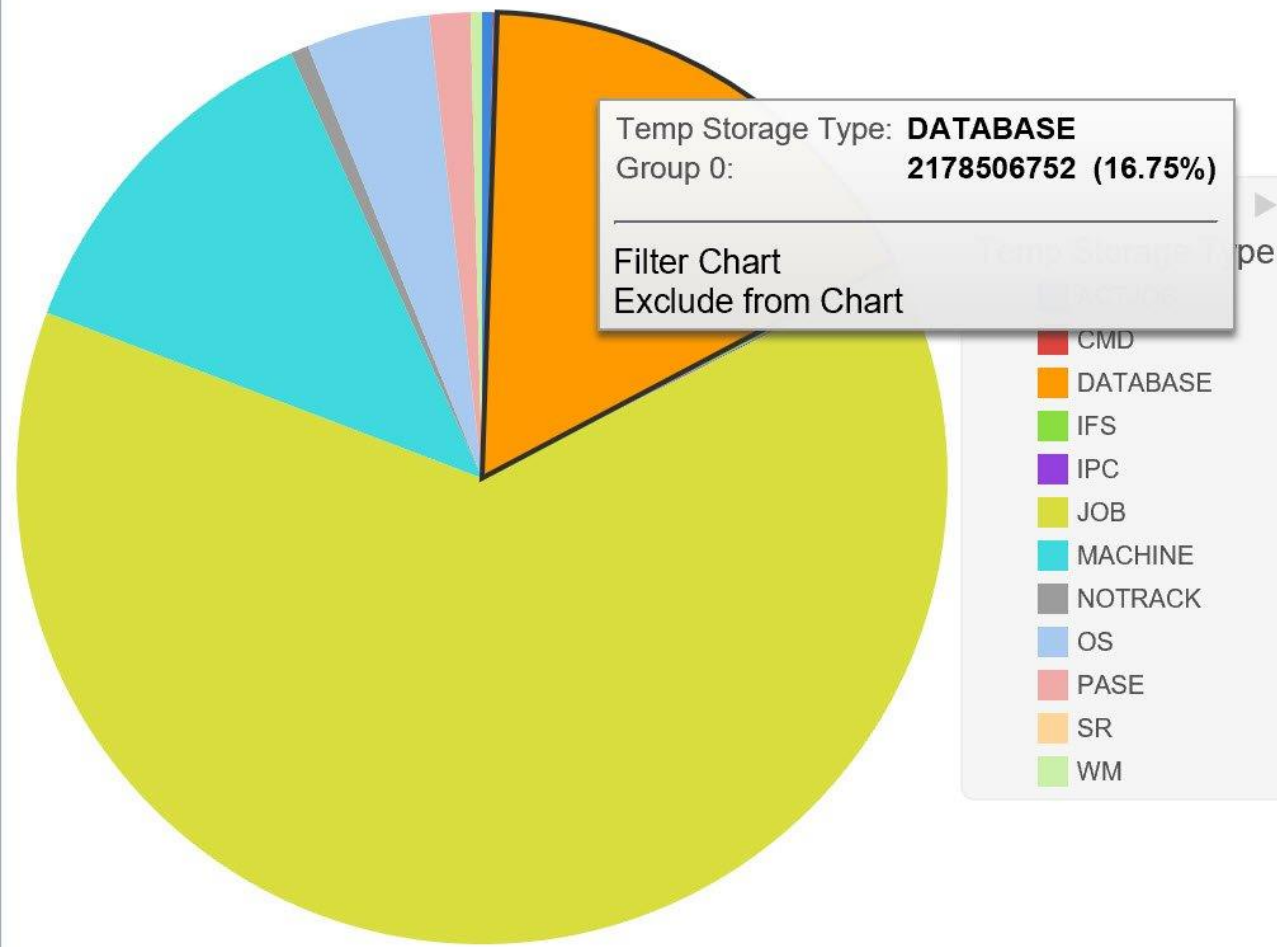
PTF Group - Currency Report

Status	PTF Group ID	PTF Group Name	Installed Level	Level Available	Date of last IBM Update
UPDATE AVAILABLE	SF99433	Db2 Web Query for i V2.2.1	4	5	2018/12/23
	SF99727	Technology Refresh	4	5	2018/09/13
	SF99730	Current Cumulative PTF Media Documentation	16299	18242	2018/09/14
	SF99859	IBM MQ for IBM i - v7.1.0/v8.0.0/v9.0.0/v9.1.0	3	15	2018/12/20
RELATED GROUP INSTALLED LEVEL IS CURRENT	SF99333	DB2 Web Query for i V2.2.0	5	5	2018/05/13
	SF99225	IBM Open Source Solutions for i	6	6	2017/11/06
	SF99252	Content Manager OnDemand for i - 5770-RD1 7.3	10	10	2018/10/15
	SF99581	WebSphere App Server V8.5	6	6	2018/08/17
	SF99703	DB2 for IBM i	12	12	2018/09/25
	SF99722	IBM HTTP Server for i	17	17	2018/12/27
	SF99723	Performance Tools	4	4	2017/10/25
	SF99724	Backup Recovery Solutions	25	25	2019/01/02
	SF99725	Java	11	11	2018/12/18
	SF99728	Group Security	38	38	2019/01/08
	SF99729	Group Hiper	75	75	2019/01/08
	SF99731	All PTF Groups except Cumulative PTF Package	11	11	2018/08/28
	SF99867	730 TCP/IP PTF	1	1	2018/06/21
	SF99875	Hardware and Related PTFs	15	15	2018/06/01
SF99876	High Availability for IBM i	7	7	2018/09/14	

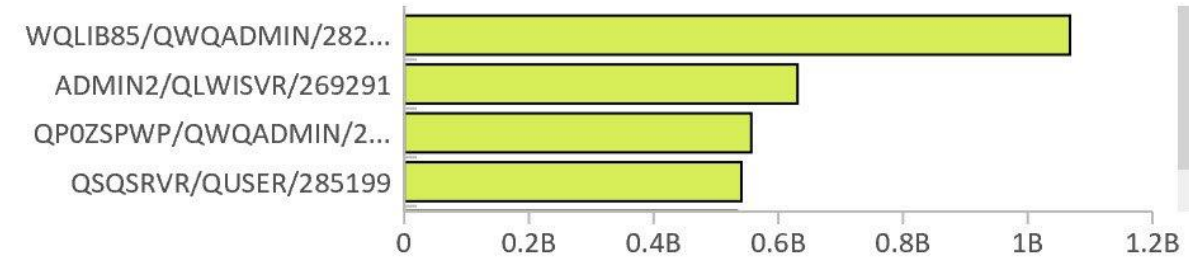
13 January, 2019 at 10.08.56

Temporary Storage - Current Usage

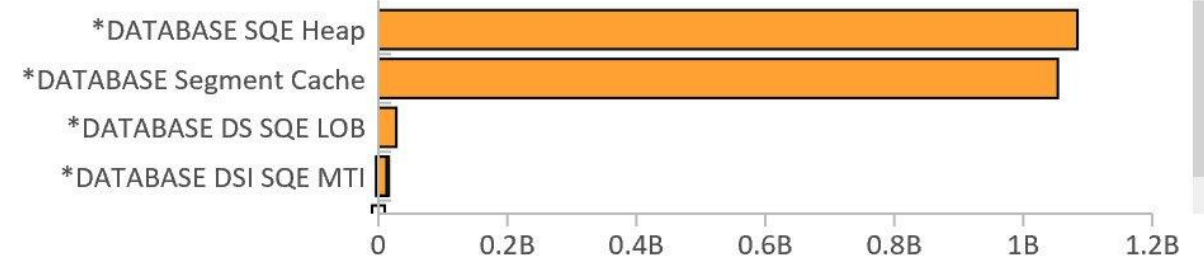
By Temp Storage Type



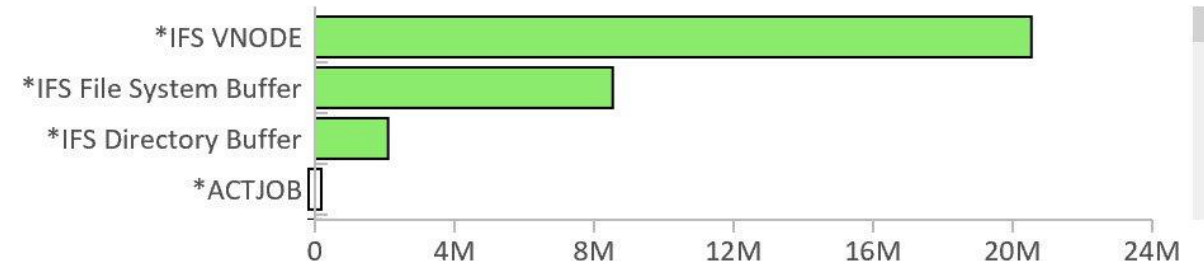
By Job



By Database Object Type



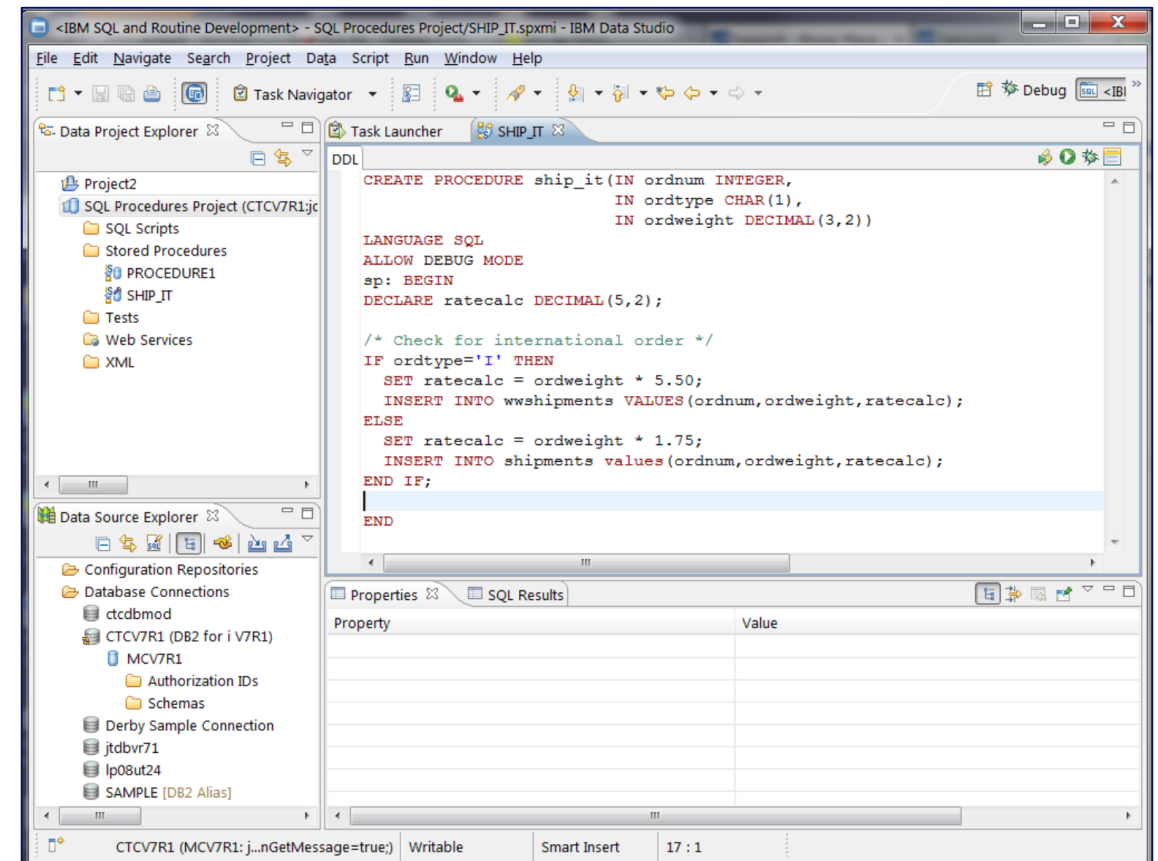
By IFS Object Type



Data Studio and Db2 for i

Data Studio and Db2 for i

- Enhancement: Support for table partition in Db2 for i database in Data Studio
<http://www-01.ibm.com/support/docview.wss?uid=ibm10742699>
- Data Studio Latest Version:
 - Software version: 4.1.3
 - Operating system(s): Linux, Windows
- Debugging with Data Studio and Db2 for i
ibm.biz/DataStudioandDb2fori
- Download it here:
ibm.com/developerworks/downloads/im/data

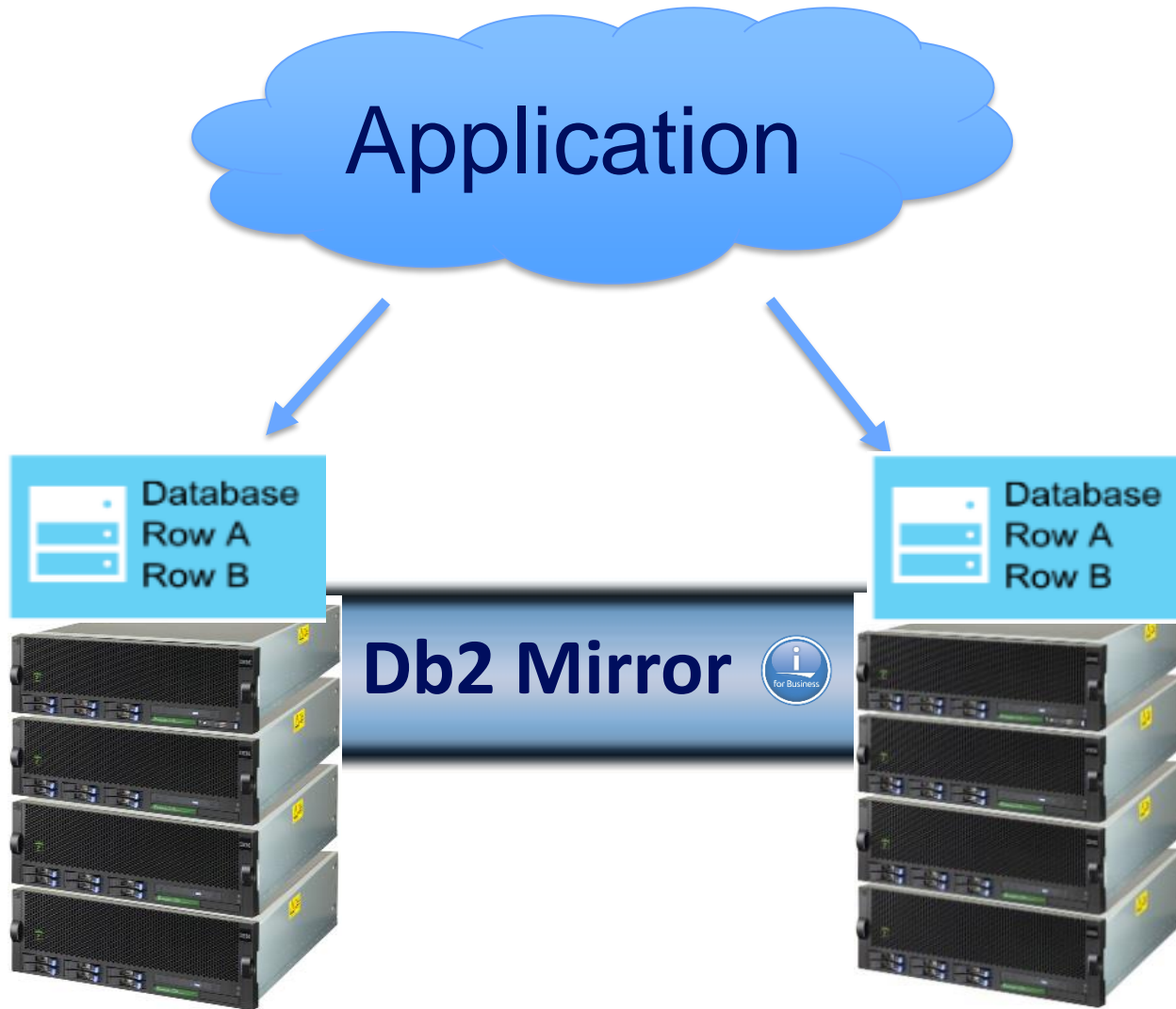


Continuous Availability - Db2 Mirror for i

5770-DBM



IBM Db2 Mirror for i



IBM Db2 Mirror for i: Enables Continuous Availability

- High speed synchronous replication of Db2 for i (Data Center Solution)
- Access Db2 objects from either LPAR

Application Availability Enablement

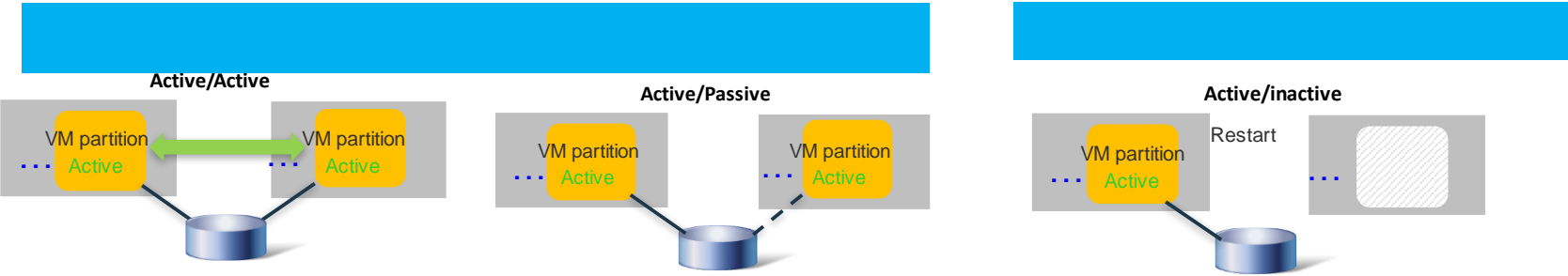
- Two Nodes read and write to the same DB Files
- Enables quickly moving all work to one node, for planned maintenance or node failure

Enables Business Continuity for Disruptive System Upgrades

- Nodes can be at different OS levels
- Nodes can be on different Power Hardware Generations
- Rolling upgrades for no downtime
- Roll a node back a release with minimal impact if Active/Active applications are deployed

- Requires POWER8 or later and IBM i 7.4
- New IBM i LPP: 5770-DBM

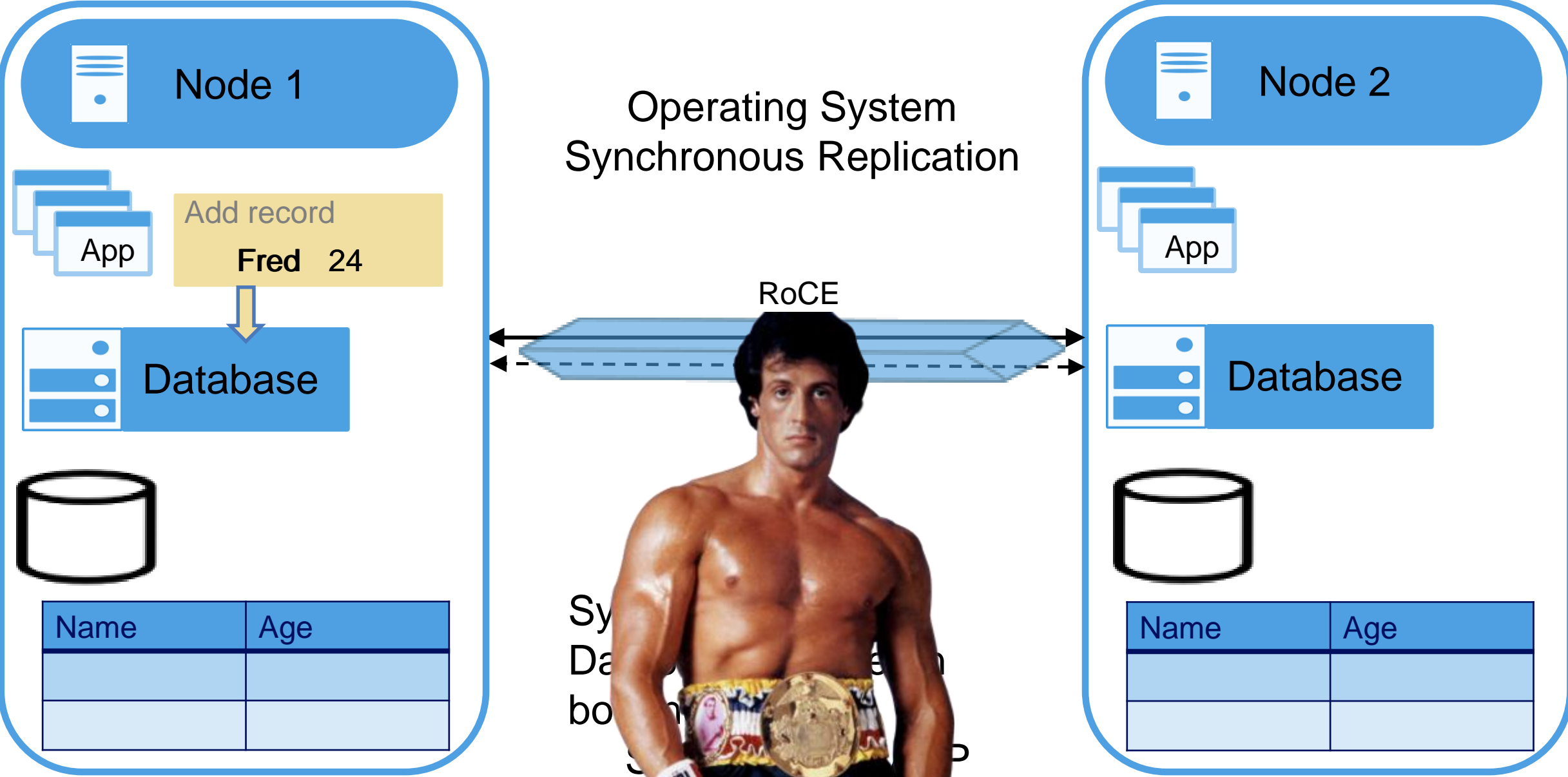
High Availability topology classification & positioning



Technology	Active/Active Clustering	Active/Passive Clustering	Active/Inactive
Definition	Application level clustering; applications in the cluster have simultaneous access to the production data therefore no app restart upon an app node outage. Certain types enable read-only access from secondary nodes	OS level clustering; one OS in the cluster has access to the production data, multiple active OS instances on all nodes in the cluster. Application is restarted on a secondary node upon outage of a production node.	VM level clustering, One VM in a cluster pair has access to the data, one logical OS, one or two physical copies. OS and applications must be restarted on a secondary node upon a primary node outage event. LPM enables the VM to be moved non-disruptively for a planned outage event.
Outage Types	SW,HW,HA, planned, unplanned RTO 0, limited distance	SW,HW,HA,DR, planned, unplanned, RTO>0, multi-site	HW,HA,DR, planned, unplanned, RTO>0, multi-site
OS integration	Inside the OS	Inside the OS	OS agnostic
RPO	Sync mode only	Sync/Async	Sync/Async
RTO	0	Fast (minutes)	Fast Enough (VM Reboot)
Licensing*	N+N licensing	N+1 licensing	N+0 licensing
Industry Examples	Oracle RAC, Db2 Mirror , pureScale	PowerHA, Redhat HA, Linux HA	VMware, VMR HA, LPM,

- N = number of licensed processor cores on each system in the cluster
- Illustrations represent two-node shared-storage configurations for conceptual simplicity. There are many other topologies and data resiliency combinations

Db2 Mirror – Active Active



Db2 Mirror – Database Supported Objects

Database replication eligible:

- Native:

- -- Database physicals & logical files

SQL:

- Aliases

- Functions

- Indexes

- Permissions

- Procedures

- Schemas

- Sequences

- *SQLPKG (not extended dynamic SQL

Packages)

- Tables

- Triggers

- Types

- Global

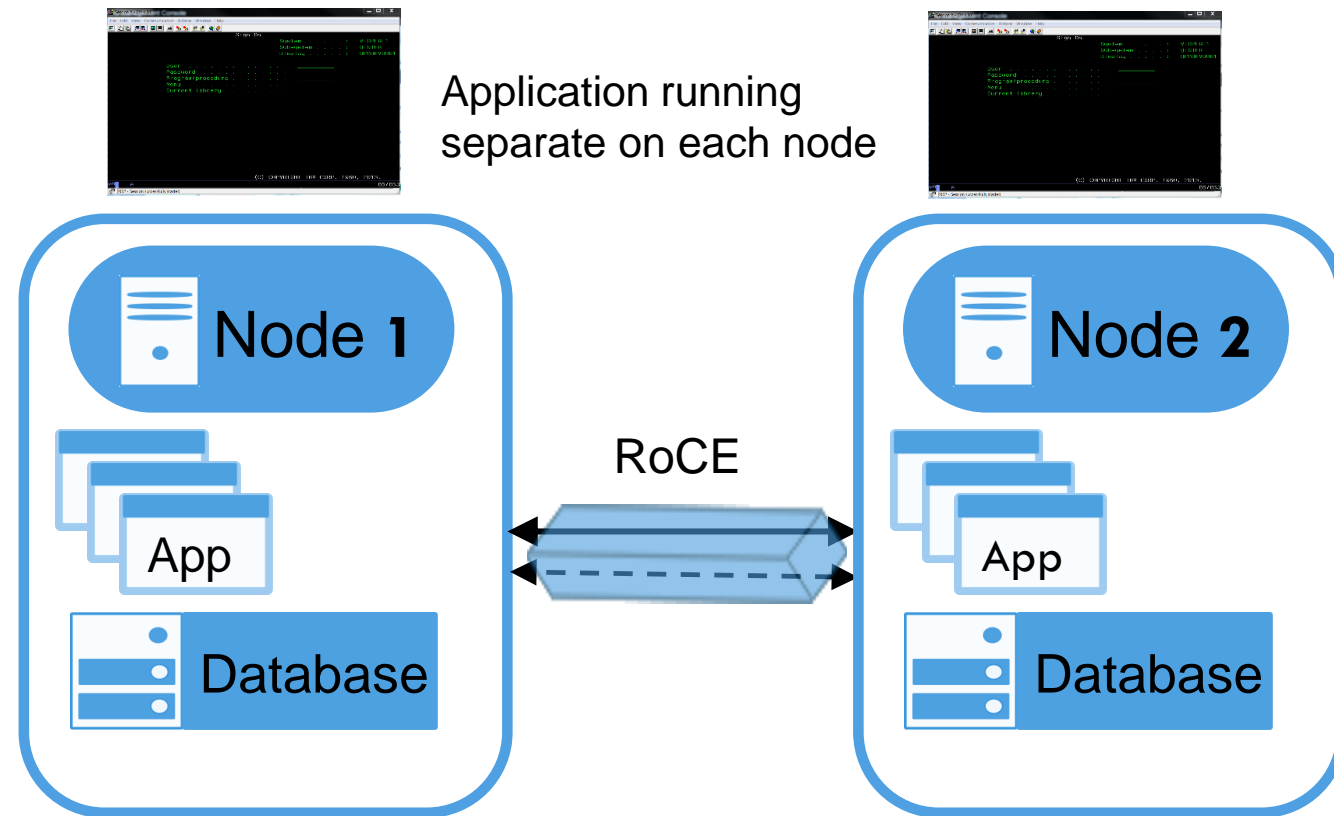
Variables

- Views

- XSR Objects

DDS / Record Level Access

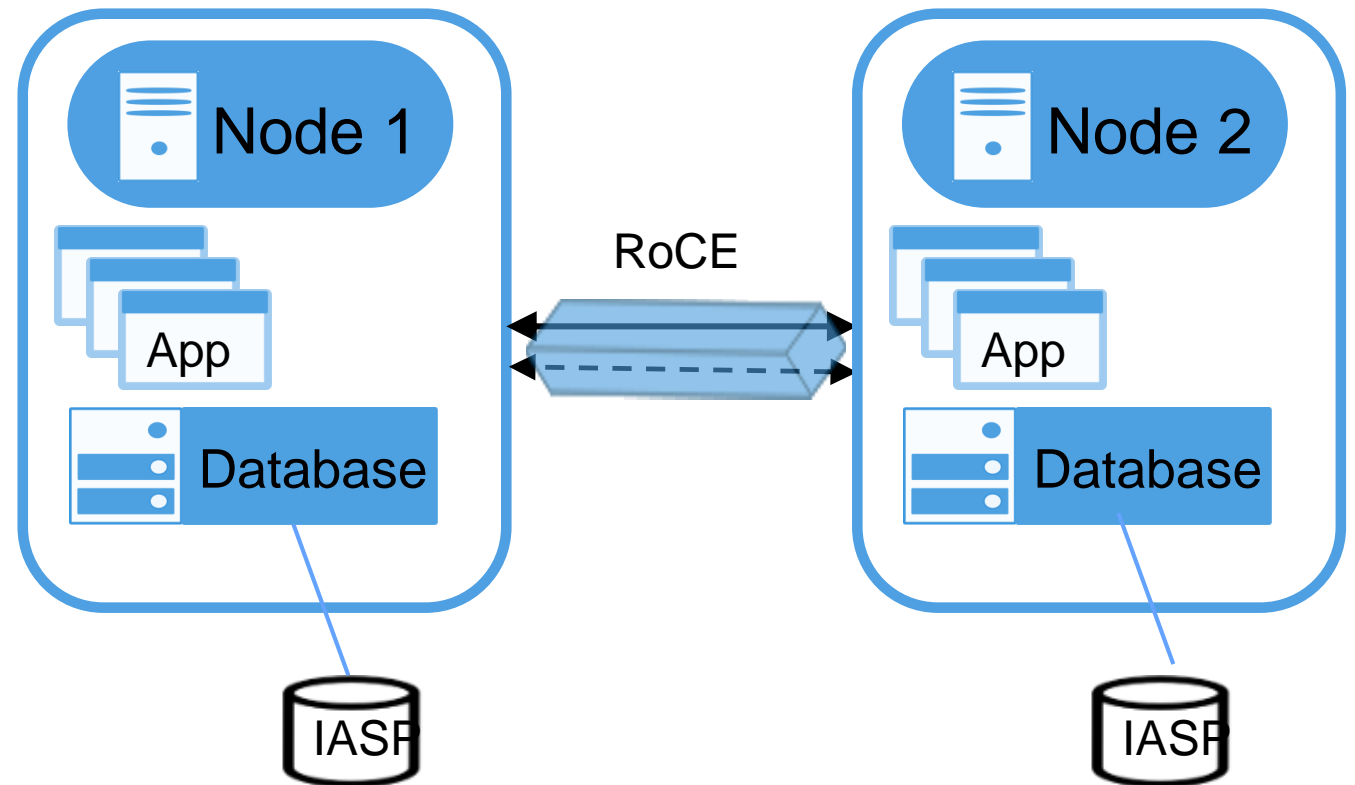
SQL / Set Based Access



Db2 Mirror – Other Supported Objects

- Other Objects
 - User profiles
 - Authority
 - Ownership
 - Security
 - PGM/SRVPGM
 - Data Areas
 - Data Queues (DDL Only)
 - SYSVALs
 - ENVARs
 - LIB
 - JOB
 - Journals
 - Files (also has DDL Only option)
- Special Handling
 - OUTQ / Spool
 - Job Queue

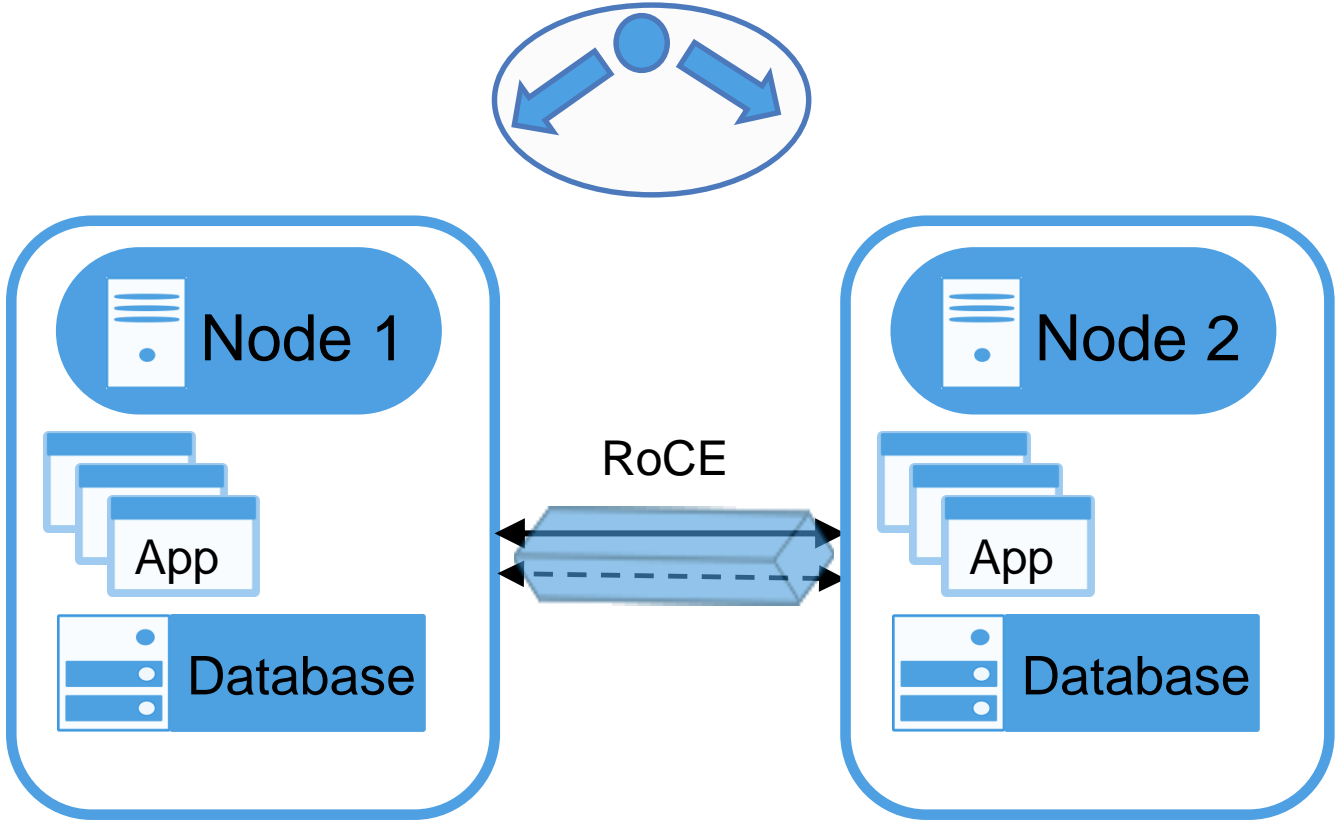
Objects can be in either SYSBASE or IASPs



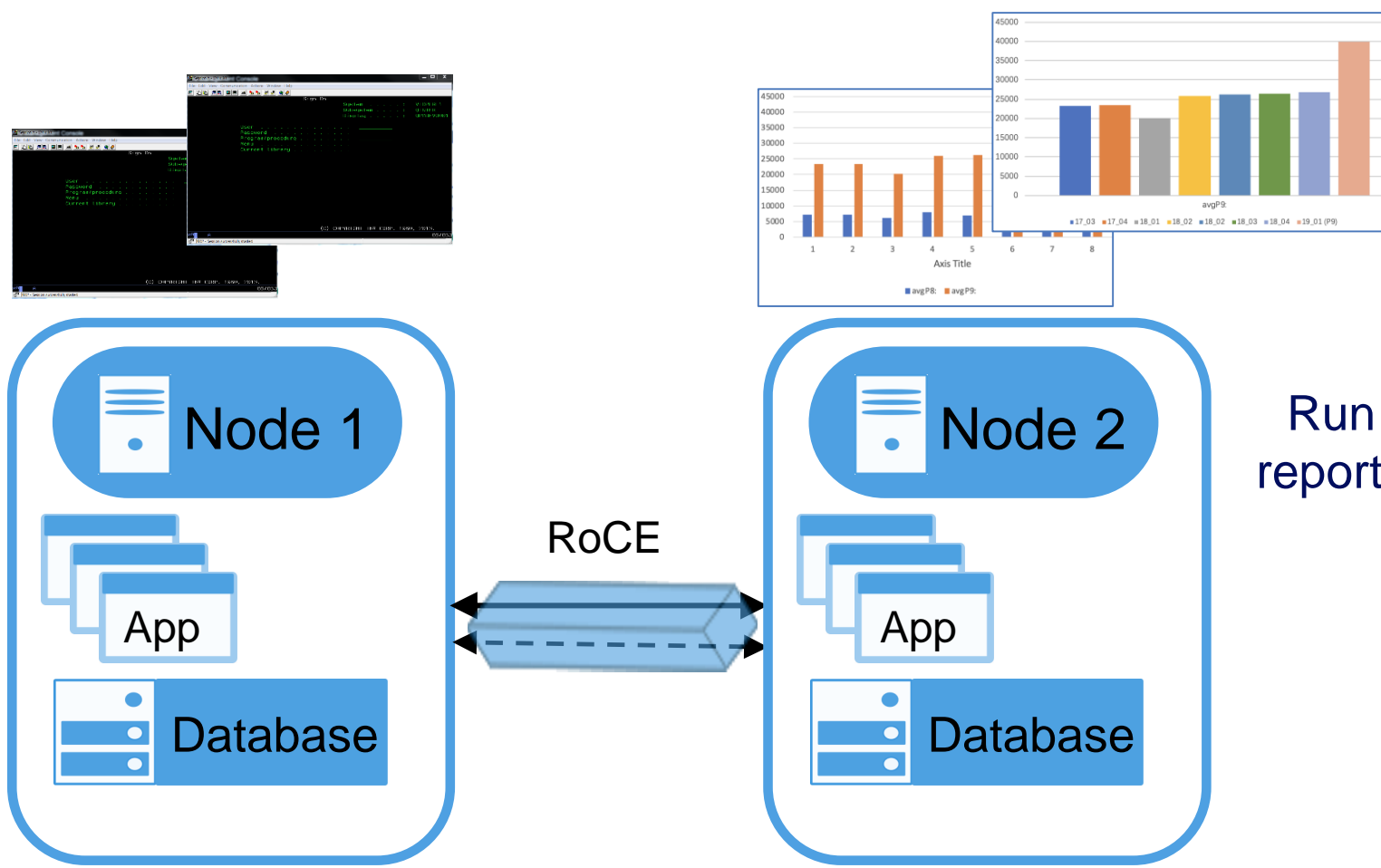
Db2 Mirror – Active Active, Web Clients



Application layer connects with either **JDBC** or **Load Balancer**

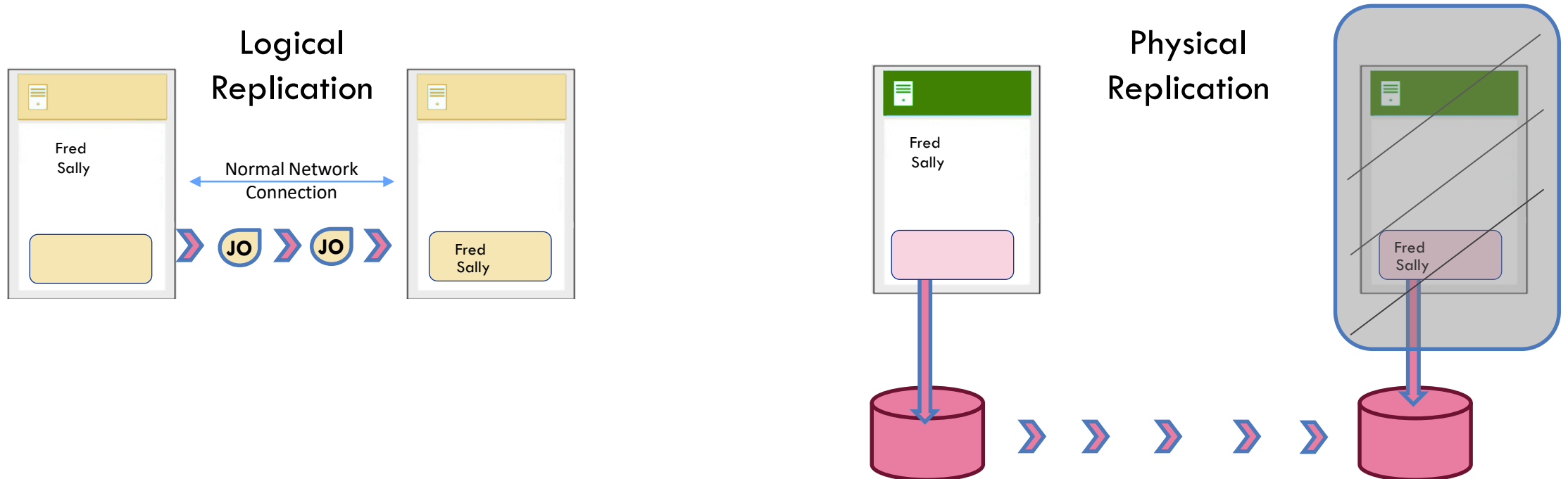


Db2 Mirror – Active Passive

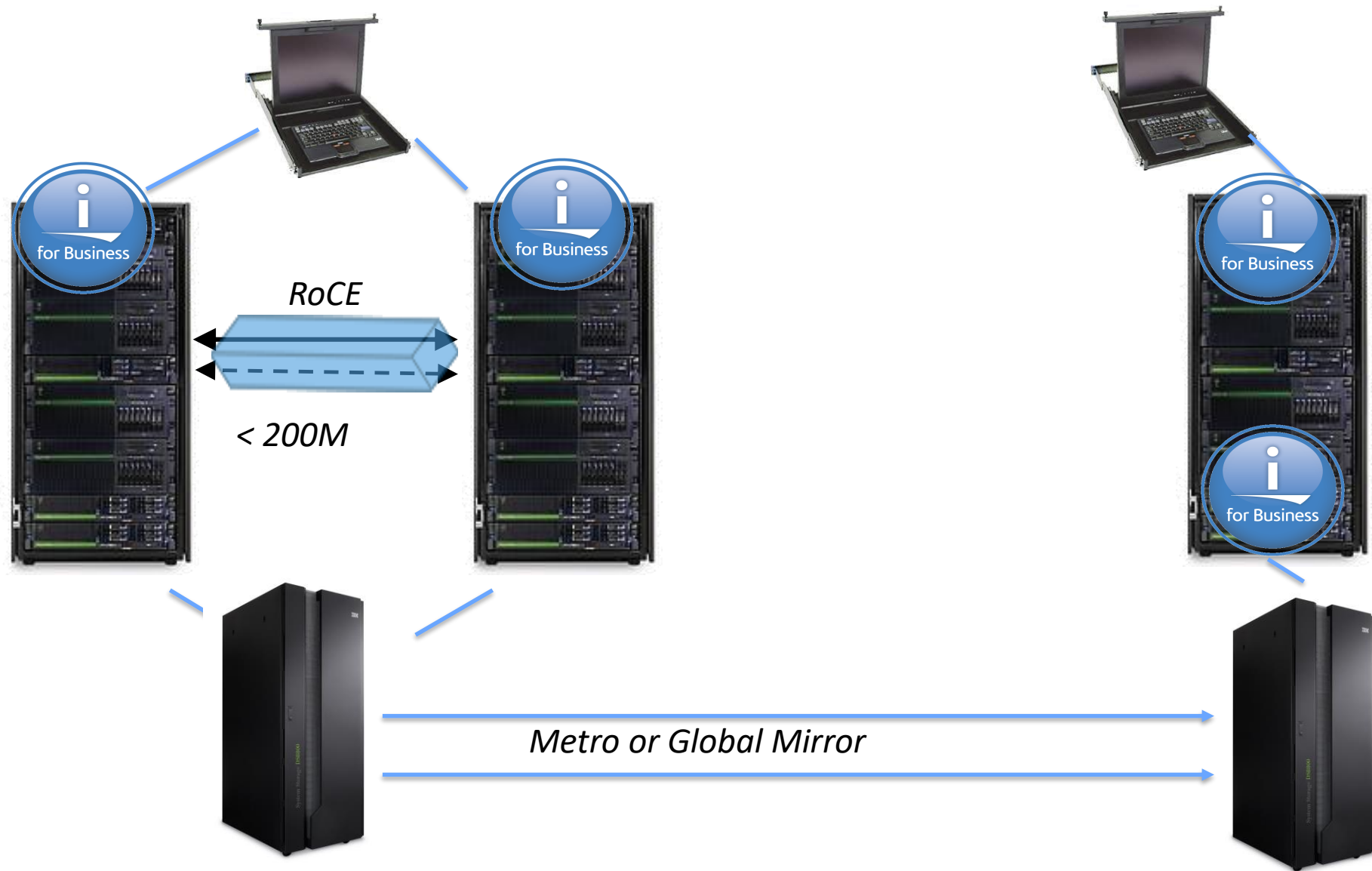


Db2 Mirror – What makes it different

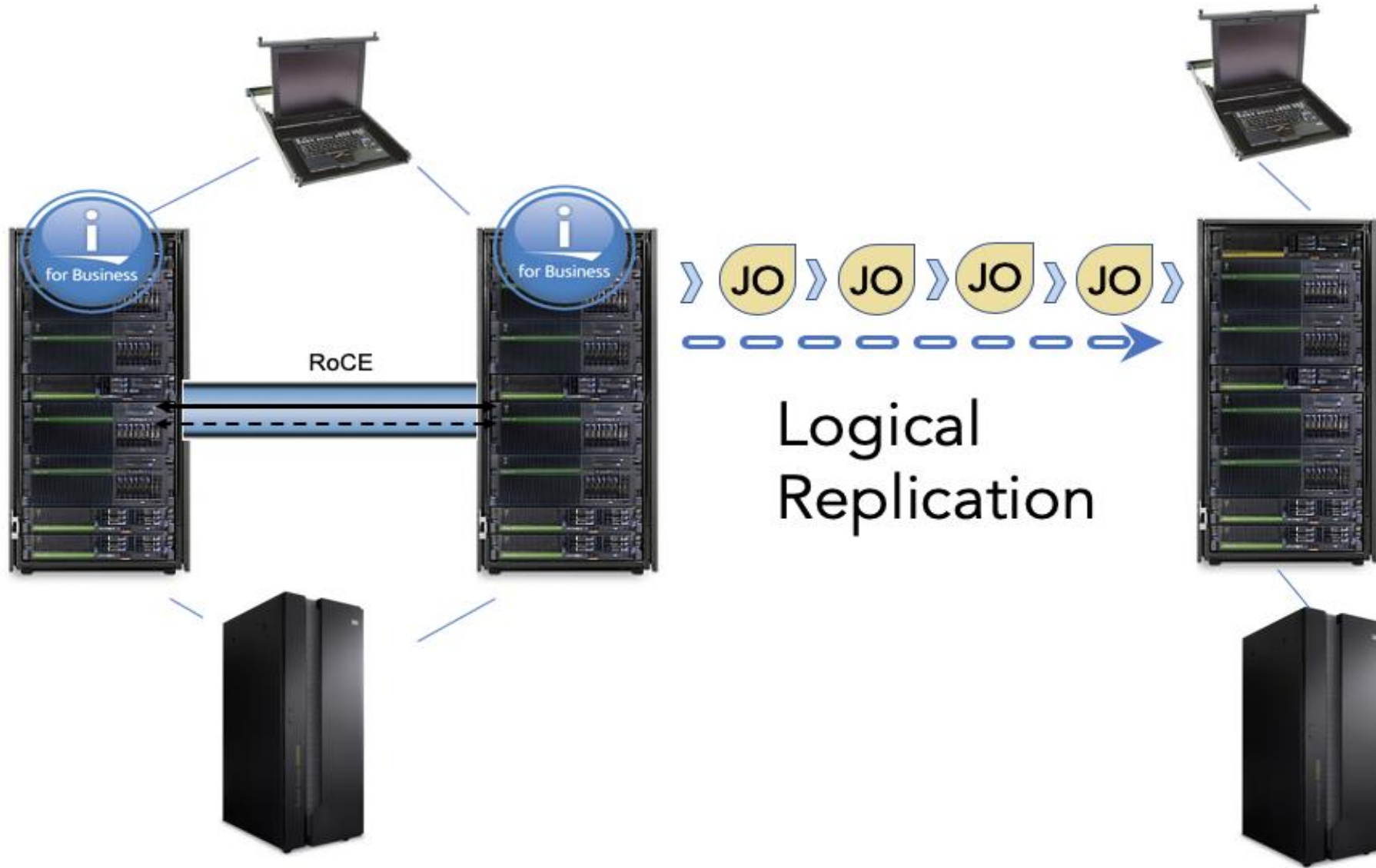
- New integrated IBM i synchronization technology
- Does not leverage any existing availability technology to provide continuous availability
 - But does work with existing technology



DR Solutions Built on Top of Db2 Mirror for IBM i



DR Solutions Built on Top of Db2 Mirror for IBM i



Communication Hardware

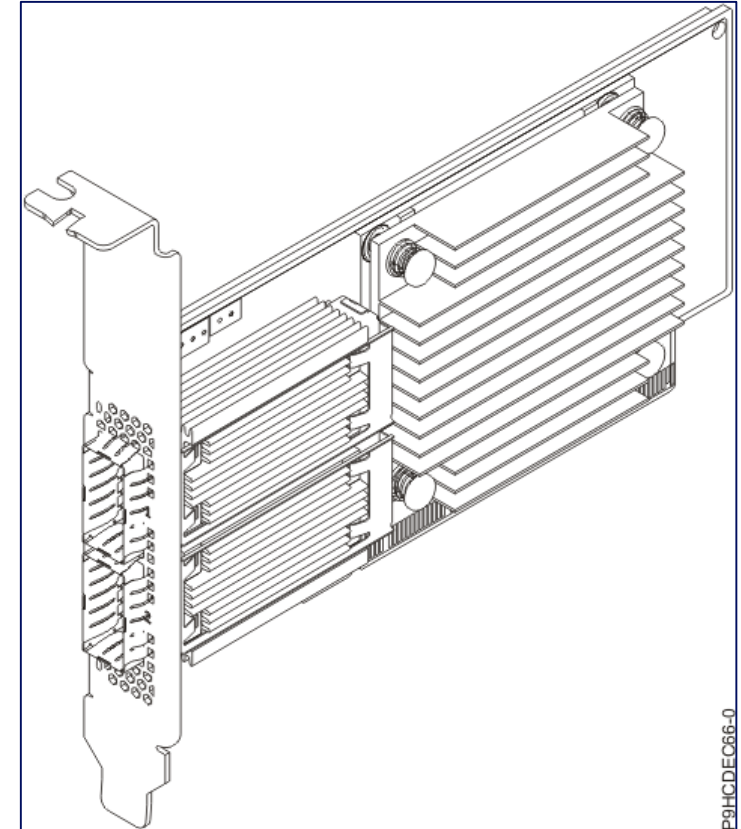
4 Adapter Options

- PCIe3 2-port **10 Gb** NIC & ROCE SR/Cu adapter (FC EC2R and EC2S; CCIN 58FA)
- PCIe3 2-port **25/10 Gb** NIC & ROCE SFP28 adapter (FC EC2T and FC EC2U; CCIN 58FB)
- PCIe3 2-port **100 GbE** NIC & ROCE QSFP28 Adapter (FC EC3L and EC3M; CCIN 2CEC)
- **PCIe4** 2-port 100 GbE ROCE x16 adapter (FC EC66 and EC67; CCIN 2CF3)

Max Cable length = **100 M**

Optional RoCE switch


Power9 enables **SR-IOV**



GUI running on IBM i




Db2 Mirror – Where to get more information

 IBM Knowledge Center

Home > IBM i 7.4 > Availability >

Db2 Mirror

 Table of Contents Change version or product ▾

Start of Db2 Mirror documentation.

- **PDF file for Db2 Mirror**
Use this to view and print a PDF of this information.
- **Intro and architecture**
chapter 1 placeholder
- **Db2 Mirror concepts**
This section describes the basic concepts you need to understand when working with Db2 Mirror.
- **Application considerations**
chapter 3 placeholder
- **Planning and setup**
There are many decisions that need to be made as you prepare and step through the Db2 Mirror setup process. Db2 Mirror configuration should be understood before starting in order to make the right decisions for your business.

Availability

PowerHA 7.4 Solutions

Internal Storage	DS8000	SVC/Storewize	IBM Copy Services Manager (DS8000)
Sync. Geographic Mirroring	LUN Level Switching	LUN Level Switching	Metro Mirror and Global Mirror
Async. Geographic Mirroring	Metro Mirror and Global Mirror	Metro Mirror and Global Mirror	HyperSwap with Global Mirror
	FlashCopy	FlashCopy	
	HyperSwap	HyperSwap	



IBM Copy Services Manager (CSM) for DS8000 Replication

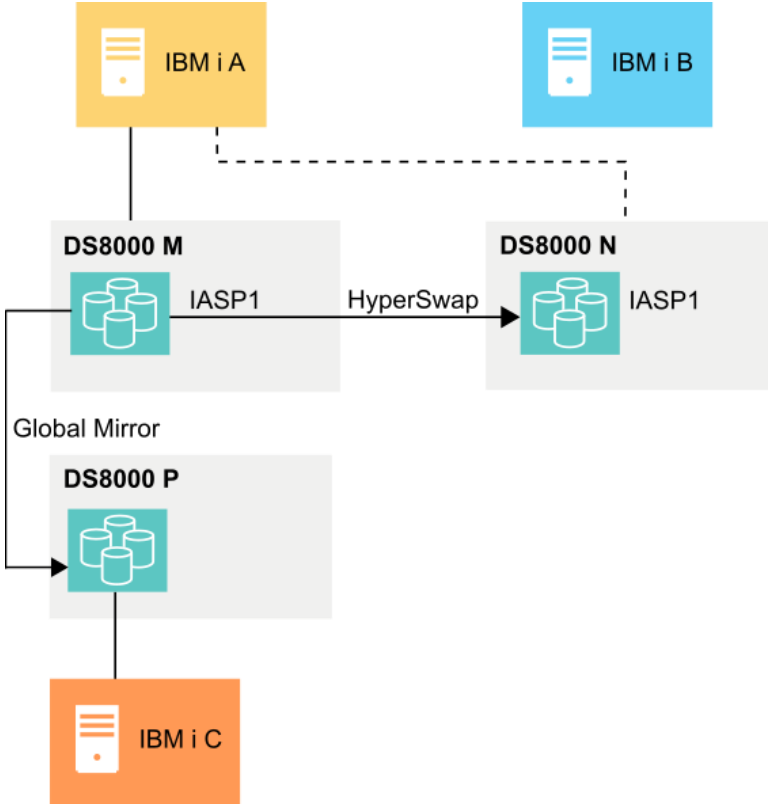


- Strategic direction for new copy services functions for DS8000.
- Integrated PowerHA support for managing the following types of sessions:
 - Metro Mirror Failover/Failback
 - Global Mirror Either Direction
 - Metro Mirror – Global Mirror w/ Site 3 Global Mirror

- Can be combined with other PowerHA technologies such as LUN Level Switching and FlashCopy
- Like SVC, has new CSM session commands
 - STRCSMSSN, CHGCSMSSN, DSPCSMSSN, RTVCSMSSN, ENDCSMSSN
- Enhanced display panel
 - No more overloaded columns, easily see both source and target node information
 - Takes advantage of 132 column displays if available

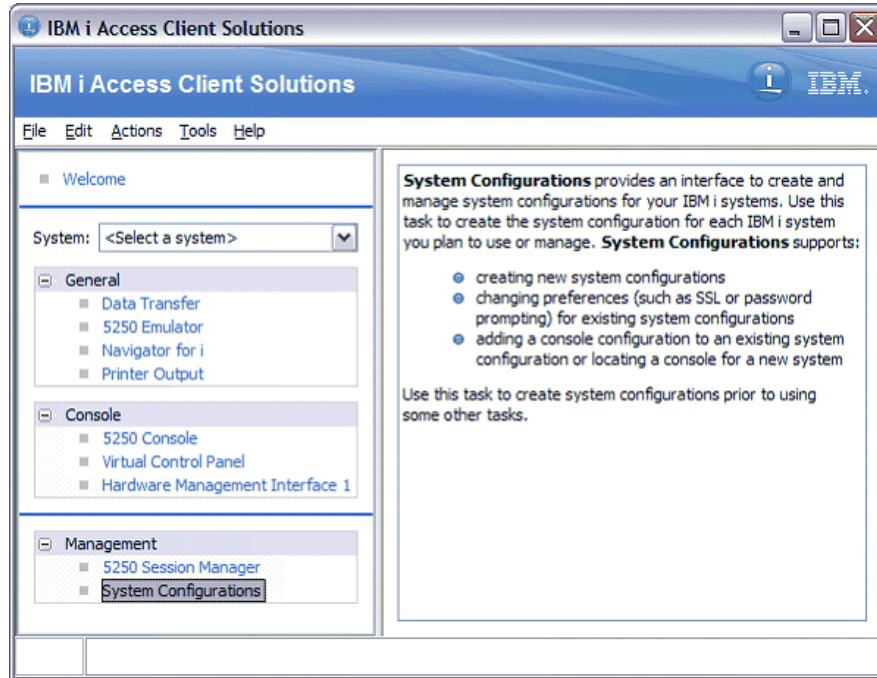
DS8000 HyperSwap + Global Mirror

Outage Type Scorecard					
Storage Outage	Server/Hardware Outage	OS/Software Outage	Data Center Outage	Regional Outage	Offline Backups
Minimal Impact	Vary off/on IASP	Vary off/on IASP	Vary off/on IASP	Vary off/on IASP	FlashCopy



- Uses new Copy Services Manager Support
Managing the solution is designed to be as similar to other solutions as possible:
- Global Mirror is managed through the CSM session commands
 - CHGCSMSSN (suspend/resume/detach/reattach)
 - DSPCSMSSN
 - Switchovers are managed through the CRG (CHGCRGPRI, CHGCRG)
 - HyperSwap is managed through the HyperSwap status commands
 - CHGHYSSTS, DSPHYSSTS, WRKHYSSTS

IBM i Access Client Solutions (ACS)



Access Client Solutions – Strategic Interface

WHO?



End Users
System Managers
Database Engineers

WHAT?



5250
IFS
Spool
Run SQL Scripts
Create Excel Spreadsheets
Schemas
Console

WHERE?



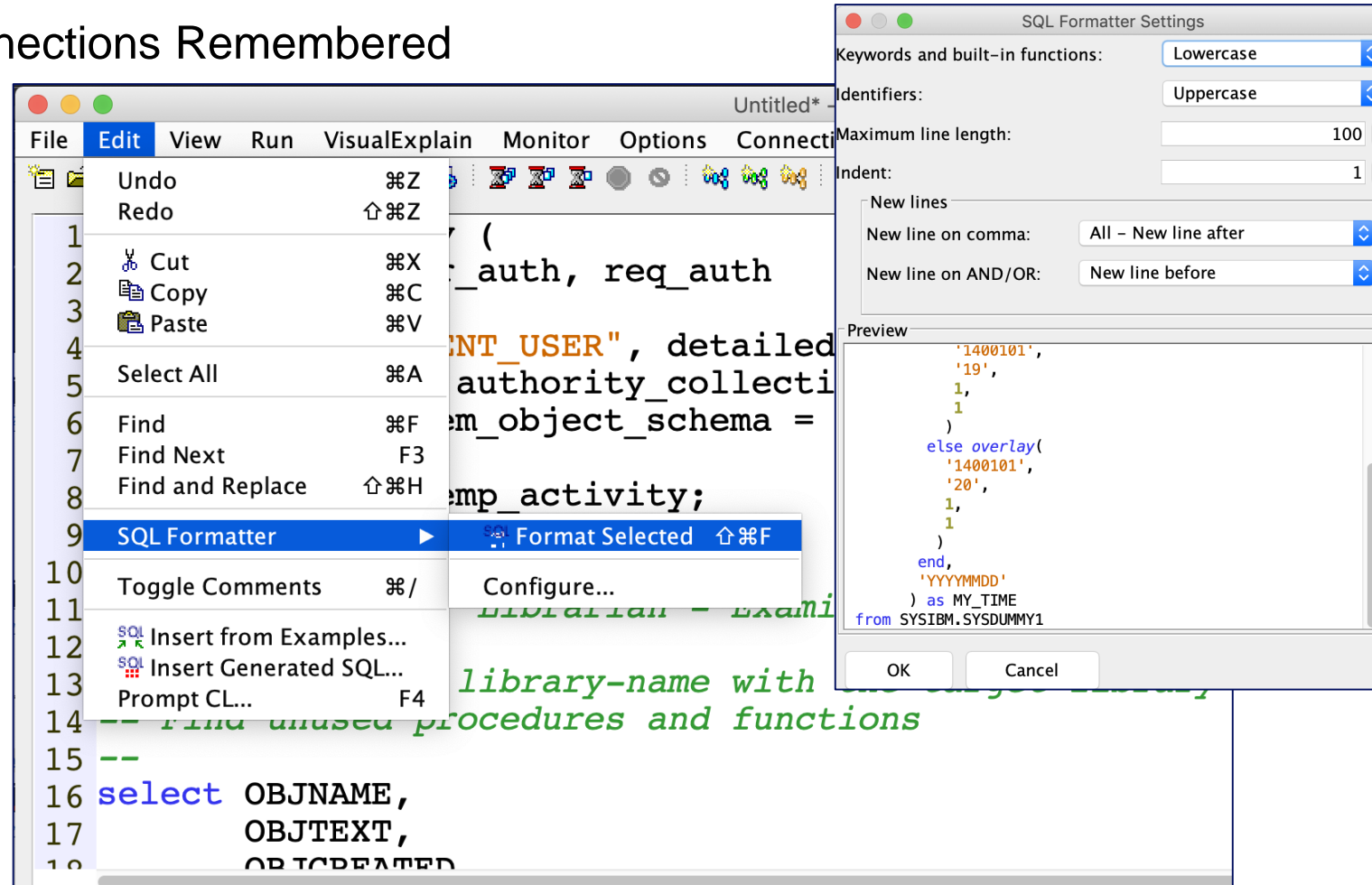
http://ibm.biz/IBMi_ACS

GONE

IBM i Access for Windows
(5733XE1)
End of Life – April 30, 2019

Access Client Solutions – What's New

- New Formatter!
 - It works
- Validates Syntax!
- IASP and DB Connections Remembered

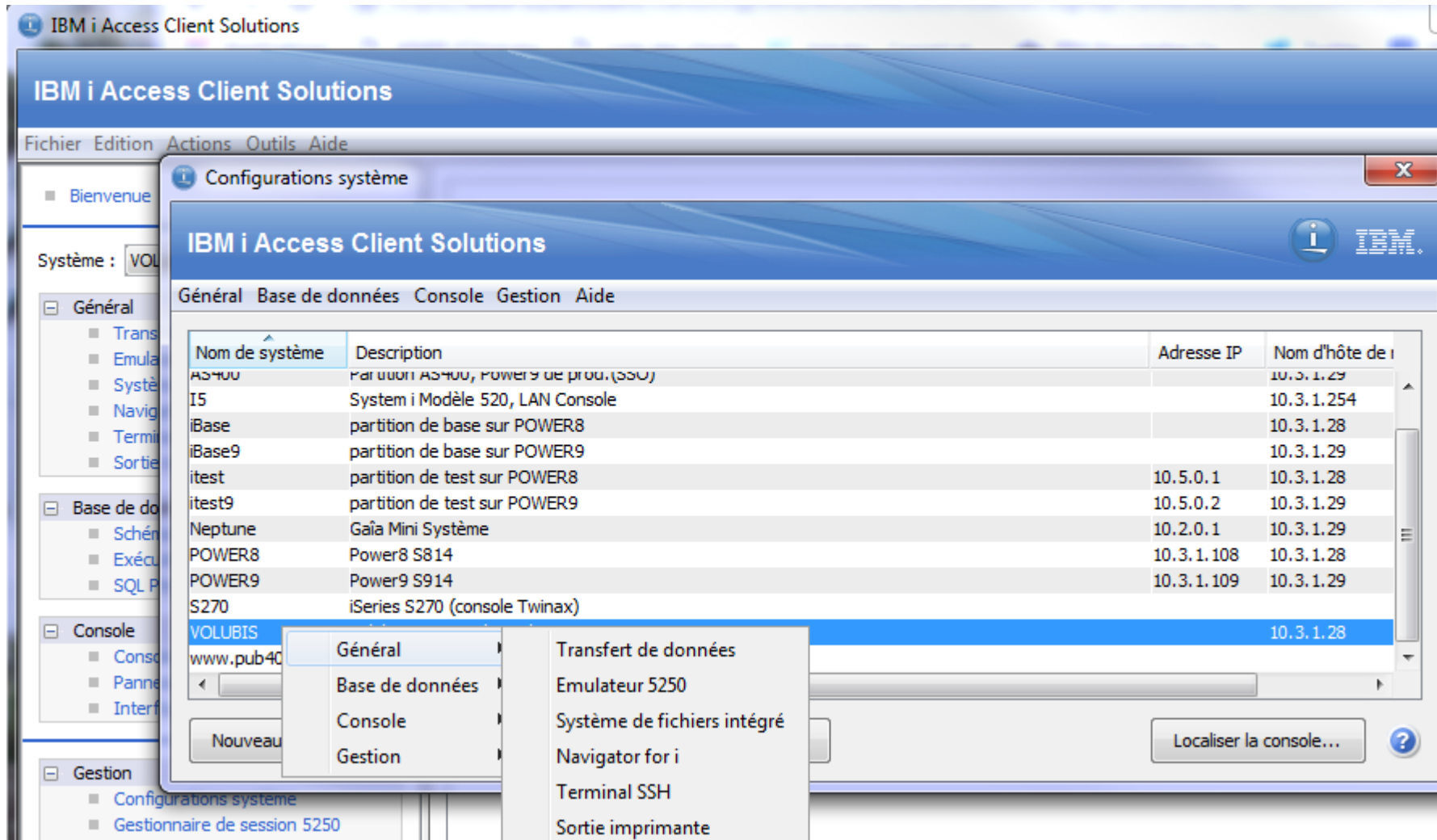


Format (CTRL+SHIFT+F) also checks syntax

```
23 |SELECT JSON_OBJECT('films' VALUE JSON_ARRAYAGG(  
24 |    JSON_OBJECT('titre' VALUE RTRIM(titre),  
25 |    'annee' VALU annee, 'duree' VALUE duree)))  
26 |FROM video.films;  
--
```

- ✗ Formatting error encountered...
- ✗ Line 25: "VALUE" expected instead of this input
- ✗ Erreur : 1 instructions n'ont pas pu être formatées !

Directly launch the right option from the systems list



IBM i Services – ACS Run SQL Scripts!!

- All in ACS! No more posters required.

Security Services

QSYS2.AUTHORITY_COLLECTION – VIEW
QSYS2.AUTHORITY_COLLECTION_DLO – VIEW
QSYS2.AUTHORITY_COLLECTION_FSOBJ – VIEW
QSYS2.AUTHORITY_COLLECTION_LIBRARIES – VIEW
QSYS2.AUTHORITY_COLLECTION_OBJECT – VIEW
QSYS2.AUTHORIZATION_LIST_INFO – VIEW
QSYS2.AUTHORIZATION_LIST_USER_INFO – VIEW
QSYS2.DRDA_AUTHENTICATION_ENTRY_INFO – VIEW
QSYS2.FUNCTION_INFO – VIEW
QSYS2.FUNCTION_USAGE – VIEW
QSYS2.GROUP_PROFILE_ENTRIES – VIEW
QSYS2.OBJECT_PRIVILEGES – VIEW
QSYS2.SQL_CHECK_AUTHORITY – UDF
QSYS2.USER_INFO – VIEW
SYSPROC.SET_COLUMN_ATTRIBUTE – PROCEDURE

Storage Services

QSYS2.ASP_INFO – VIEW
QSYS2.ASP_JOB_INFO – VIEW
QSYS2.ASP_VARY_INFO – VIEW
QSYS2.MEDIA_LIBRARY_INFO – VIEW
QSYS2.SYSDISKSTAT – VIEW
QSYS2.SYSTMPSTG – VIEW
QSYS2.USER_STORAGE – VIEW

Journal Services

QSYS2.DISPLAY_JOURNAL – UDTF
QSYS2.JOURNAL_INFO – VIEW

Java Services

QSYS2.JVM_INFO – VIEW
QSYS2.SET_JVM – PROCEDURE

Librarian Services

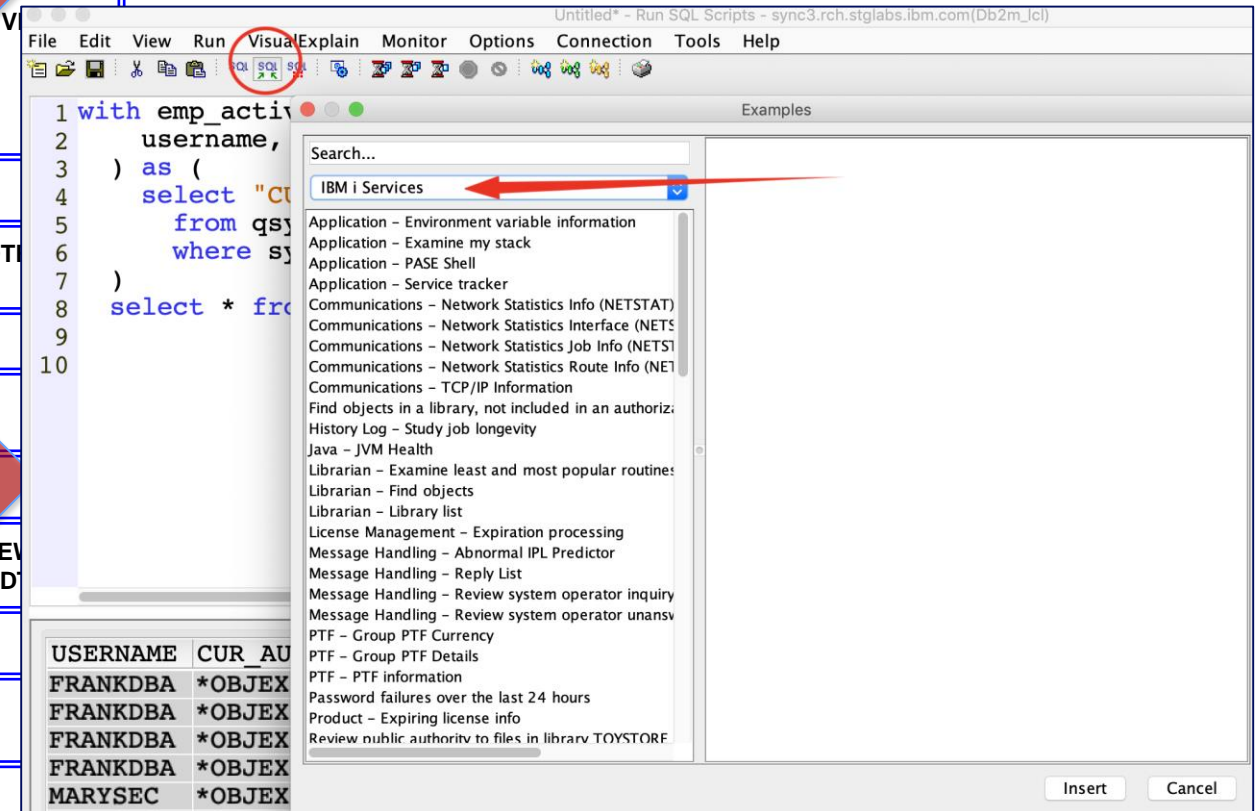
QSYS2.LIBRARY_LIST_INFO – VIEW
QSYS2.OBJECT_STATISTICS – UDTF

System Health Services

QSYS2.SYSLIMITS – VIEW
QSYS2.SYSLIMTBL – TABLE

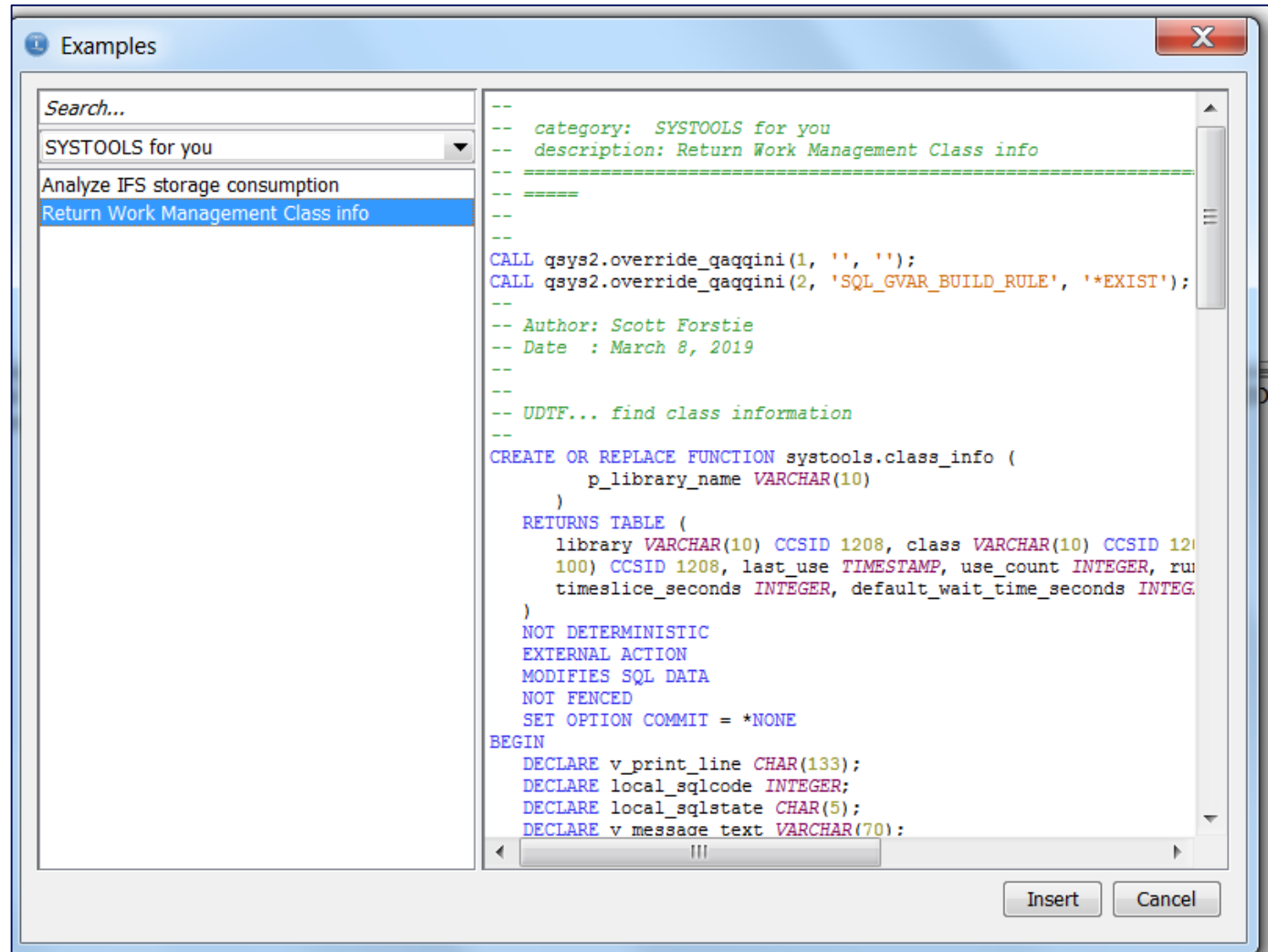
Spool Services

QSYS2.OUTPUT_QUEUE_ENTRIES – VIEW
QSYS2.OUTPUT_QUEUE_ENTRIES_BASIC – VIEW
QSYS2.OUTPUT_QUEUE_ENTRIES – UDTF
QSYS2.OUTPUT_QUEUE_INFO – VIEW
SYSTOOLS.SPOOLED_FILE_DATA – UDTF



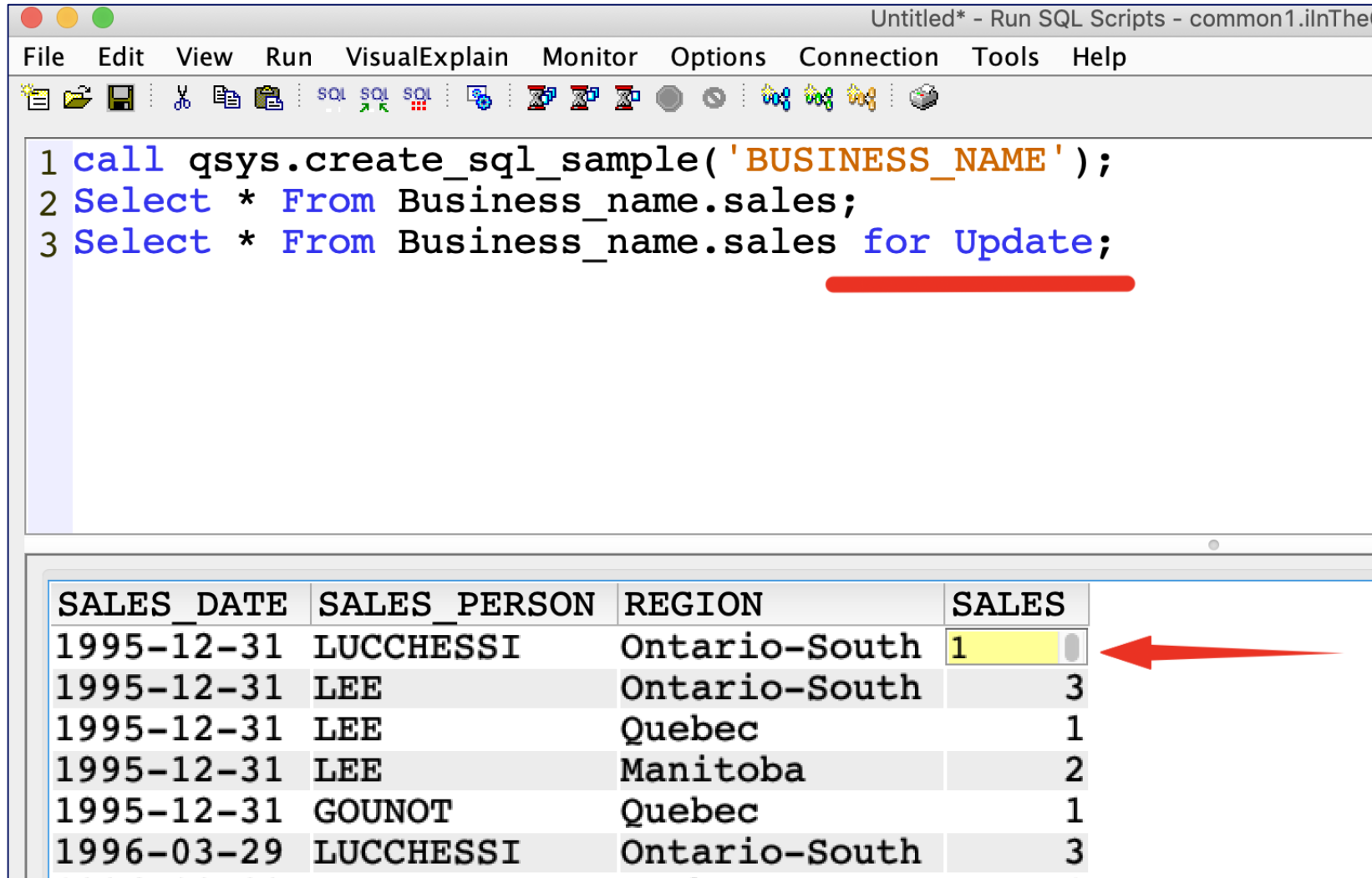
ACS – Run SQL Scripts – Insert from Examples

- New Category
- Useful as is or as a template for your own project



ACS – Edit Table

- Edit Table Contents from ACS



Untitled* - Run SQL Scripts - common1.ilnTher

File Edit View Run VisualExplain Monitor Options Connection Tools Help

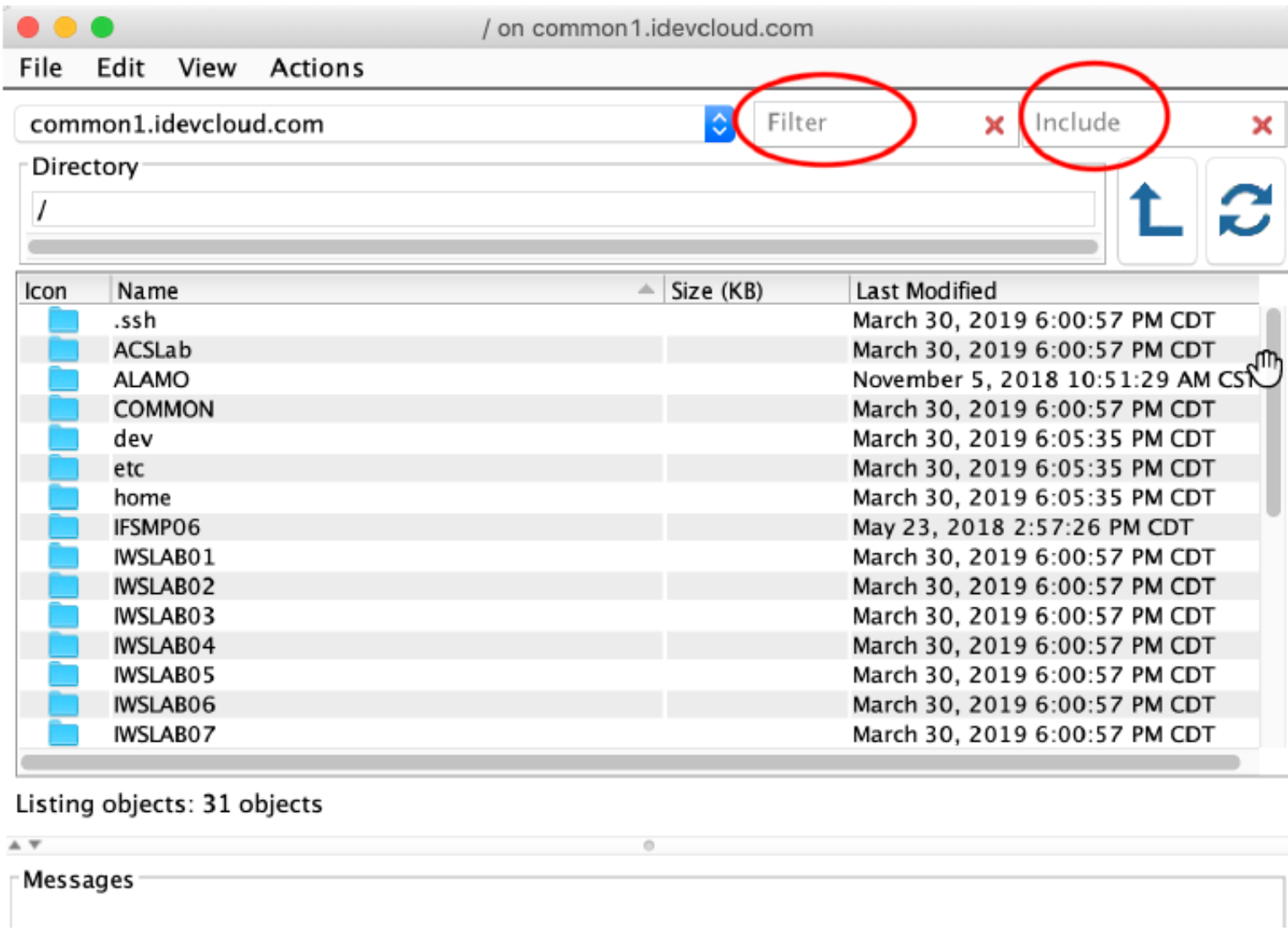
```
1 call qsys.create_sql_sample('BUSINESS_NAME');
2 Select * From Business_name.sales;
3 Select * From Business_name.sales for Update;
```

SALES_DATE	SALES_PERSON	REGION	SALES
1995-12-31	LUCCHESSI	Ontario-South	1
1995-12-31	LEE	Ontario-South	3
1995-12-31	LEE	Quebec	1
1995-12-31	LEE	Manitoba	2
1995-12-31	GOUNOT	Quebec	1
1996-03-29	LUCCHESSI	Ontario-South	3

ACS - IFS

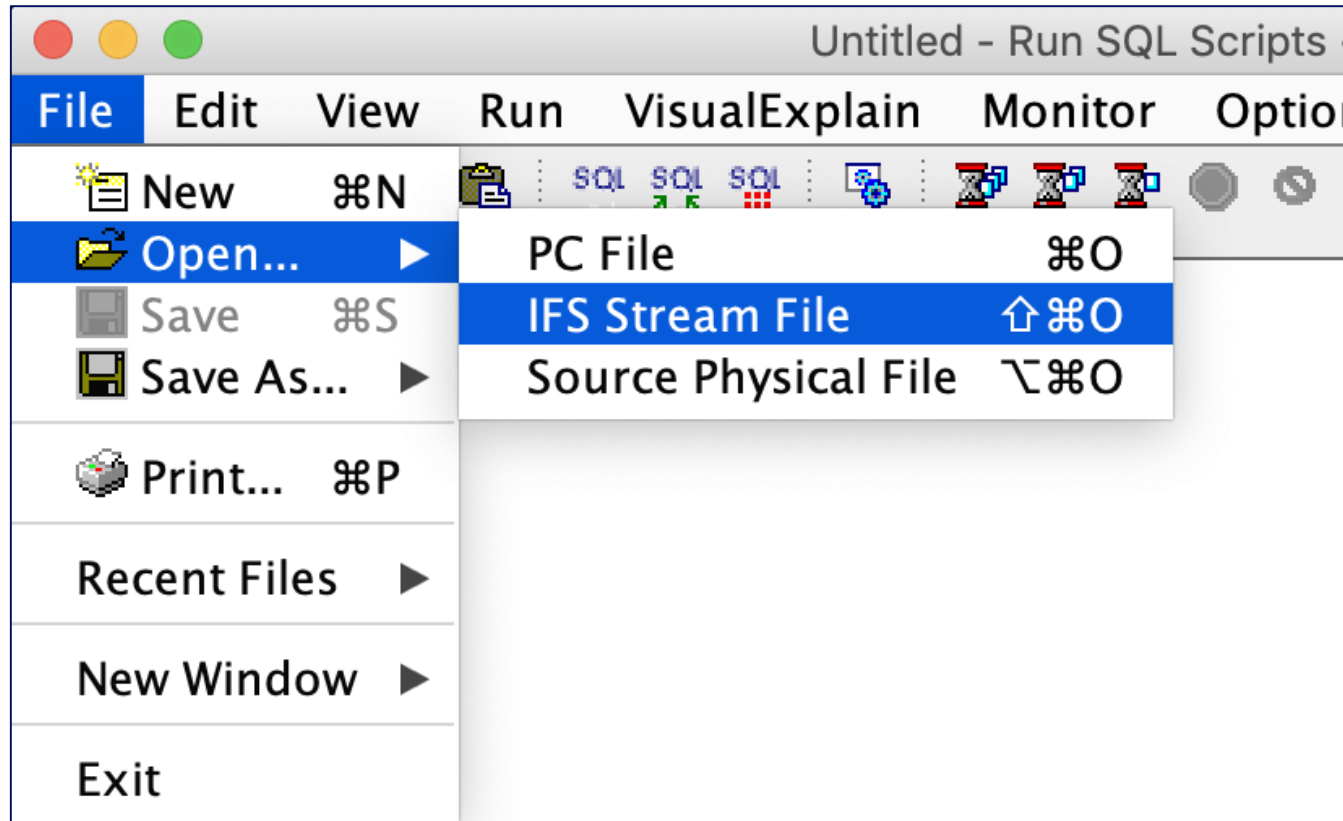
Include - Only bring into the IFS interface the files & directories that match the include value

Filter – Contextual filter of displayed content



ACS Version 1.1.8.2

- Open/Save from Run SQL Scripts to IFS stream files and Source Physical files



ACS – Run SQL Scripts – IFS

1. Developed in ACS
2. Saved to the IFS
3. Deployed via RUNSQLSTM

SUCCESS FORMULA



```
QINTER IN QSTS. JOB ENTERED SYSTEM ON 05/05/15 AT 10.34.14.  
> RUNSQLSTM SRCSTMF('/usr/coolstuff/display class capture.sql')  
          COMMIT(*NONE) NAMING(*SQL)  
Printer device PRT01 not found. Output queue changed to QPRINT in  
  QGPL.  
File QSQLSRC created in library QTEMP.  
File QSQLSRC in library QTEMP changed.  
Member CLASS_INFO added to file QSQLSRC in QTEMP.  
File QSOLT00000 created in library QTEMP.  
Member CLASS_INFO added to file QSOLT00000 in QTEMP.
```

Send emails using SQL



[@Forstie IBMi](#)

DB2 for i Business Architect
SQL Development Team Leader
[IBM i developerWorks](#) content
manager

```
-- category: DB2 for i Services
-- description: Send emails using SQL
--
cl: STRTCPSVR SERVER(*SMTP);
cl: ADDUSRSMTP USRPRF(SCOTTFF);
CL: ALCOBJ OBJ((QSYS2/SYSLIMTBL *FILE *EXCL)) CONFLICT(*RQSRLS) ;
CL: DLCOBJ OBJ((QSYS2/SYSLIMTBL *FILE *EXCL));

create or replace trigger scottf.system_limits_large_file
after insert on qsys2.syslimtbl
referencing new as n for each row mode db2row
set option usrprf = *owner, dynusrprf = *owner
begin atomic
declare v_cmdstmt varchar(2000);
declare v_error integer;
declare v_host varchar(10) ccsid 37;
declare exit handler for sqlexception set v_error = 1;
/* ----- */
/* If a table has exceeded 80% of this limit, send an email alert */
/* ----- */
/* 15000 == MAXIMUM NUMBER OF ALL ROWS IN A PARTITION */
/* (max size = 4,294,967,288) */
/* ----- */
if (n.limit_id = 15000 and
    n.current_value > ((select supported_value from qsys2.sql_sizing where sizing_id = 15000) * 0.8)) then
select host_name into v_host from qsys2.system_status_info;
/* -- Send SMTP E-mail Message (SNSMTPPEMM) -- */
set v_cmdstmt =
'SNSMTPPEMM RCP(('forstie@us.ibm.com' *pri)) SUBJECT('' concat v_host concat
' - System Limits Alert: ' concat n.system_schema_name concat '/' concat n.system_object_name concat
' size') NOTE('User: ' concat USER_NAME concat
' caused Table: ' concat n.system_schema_name concat '/' concat
n.system_object_name concat ' (' concat
n.system_table_member concat
') to exceed 80% of the maximum size of a table. ROW COUNT = ' concat
current_value concat ' ');
call qsys2.qcmdexc(v_cmdstmt);
end if;
end;
```



SYNC3 – System Limits Alert: PRODLIB/ORDERS size

scottf to: Scott Forstie

User: TIMMR caused Table: PRODLIB/ORDERS (ORDERS) to exceed 80% of the maximum size of a table. ROW COUNT = 4000001000

#ShareThatSQL #Db2fori #SQLcandoit

```
--
-- definition: Find objects created > 6 months ago that have
--              not been used or changed in the last 6 months
select * from
  table(qsys2.object_statistics('SYSIBM', '*ALL'))
where (last_used_timestamp < current timestamp - 6 months) and
      (change_timestamp    < current timestamp - 6 months) and
      (objcreated          < current timestamp - 6 months);
```

```
-- description: CPU by subsystem
--
-- CPU_TIME - The total processing unit time used by the job, in milliseconds.
select subsystem_library_name concat '/' concat subsystem as subsystem,
       sum(cpu_time) as total_sbs_cpu_time
from table (
  qsys2.active_job_info(detailed_info => 'ALL')
) j
where job_type <> 'SYS'
group by subsystem_library_name concat '/' concat subsystem
order by 2 desc ;
stop;
-- https://www.ibm.com/support/knowledgecenter/ssw_ibm_i_74/rzajq/rzajqudfactivejobinfo.htm
-- Find the top 4 consumers of CPU, by SBS
with top_consumers (sbs, job_name, authorization_name, cpu_time, rank) as (
  select subsystem_library_name concat '/' concat subsystem, job_name,
         authorization_name, cpu_time, rank() over (
           partition by subsystem_library_name concat '/' concat subsystem
           order by cpu_time desc
         )
  from table (
    qsys2.active_job_info()
  ) x
  where job_type <> 'SYS'
)
select sbs, job_name, authorization_name as user_name, cpu_time
from top_consumers
where rank in (1, 2, 3, 4)
order by sbs, cpu_time desc;
stop;
```

SBS	JOB_NAME	USER_NAME	CPU_TIME
\$DFZIMMER/DFZIMMERSS	132654/DFZIMMER/RCDFZIMMER	DFZIMMER	1438
\$DFZIMMER/DFZIMMERSS	132653/QSYS/DFZIMMERSS	QSYS	7
QHTTSPVR/QHTTSPVR	132533/QLWISVR/ADMIN2	QLWISVR	201767
QHTTSPVR/QHTTSPVR	132536/QLWISVR/ADMIN5	QLWISVR	21653
QHTTSPVR/QHTTSPVR	132534/QWEBADMIN/ADMIN4	QWEBADMIN	14908
QHTTSPVR/QHTTSPVR	132532/QLWISVR/ADMIN2	QLWISVR	13303

```
--
-- ===== Scott's SQL =====
--
-- description: Review the connections that are extracting the most data
--
SELECT j.AUTHORIZATION_NAME, j.JOB_NAME,
       varchar_format(BYTES_SENT_REMOTELY, '999G999G999G999G999G999G999G999')
AS TOTAL_BYTES_EXTRACTED, j.LOCAL_PORT_NAME, j.*, i.*
FROM QSYS2.NETSTAT_INFO i
  INNER JOIN QSYS2.NETSTAT_JOB_INFO j ON
i.local_port = j.local_port and
i.remote_port = j.remote_port
ORDER BY BYTES_SENT_REMOTELY DESC LIMIT 10;
```

AUTHORIZATION_NAME	JOB_NAME	TOTAL_BYTES_EXTRACTED	LOCAL_PORT_NAME	CONNECTION_TYPE	REMOTE_ADDRESS	REMOTE_PORT
SCOTT	018421/QUSER/QZDASOINIT	20,253,175	as-database	IPV4	9.80.35.26	63844
		4,787,690		IPV4		

USER	CPU_TIME
DFZIMMER	1438
QSYS	7
QLWISVR	201767
QLWISVR	21653
QWEBADMIN	14908
QLWISVR	13303
SYS	123
SYS	10
USER	9
USER	7
USER	6
USER	6
USER	6
SYS	10
PGMR	9
COTTF	361
SYS	54
USER	234
USER	27
SECOFR	15
SYS	13
PGMR	13
SYS	6
SYS	174023
NTP	26153
TCP	19850
TCP	13599
COTTF	11824
COTTF	1926
COTTF	783
COTTF	460

GitHub Gist

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All gists Back to GitHub

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Scott Forstie

forstie

DB2 for i Business Architect

IBM

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All gists 6

Forked 1

Sort: Recently created ▼



forstie / printf to the Joblog using SQL.sql

Created 2 days ago

printf to the Joblog using SQL

1 file

0 forks

0 comments

2 stars

```
1
2  --
3  -- description: printf to the Joblog, using SQL
4  --
5  cl:addlible qsysinc;
6  cl:crtsrcpf qtemp/qcsrc;
7  cl:adppfm file(qtemp/qcsrc) mbr(LPRINTF);
8  insert into qtemp.qcsrc values
9  (1,010101,'{''),
10 (2,010101,'extern int Qp0zLprintf (char *format, ...);'),
```



forstie / Restoring libraries that begin with the letter E.sql

Created 2 days ago

Restoring libraries that begin with the letter E

1 file

0 forks

0 comments

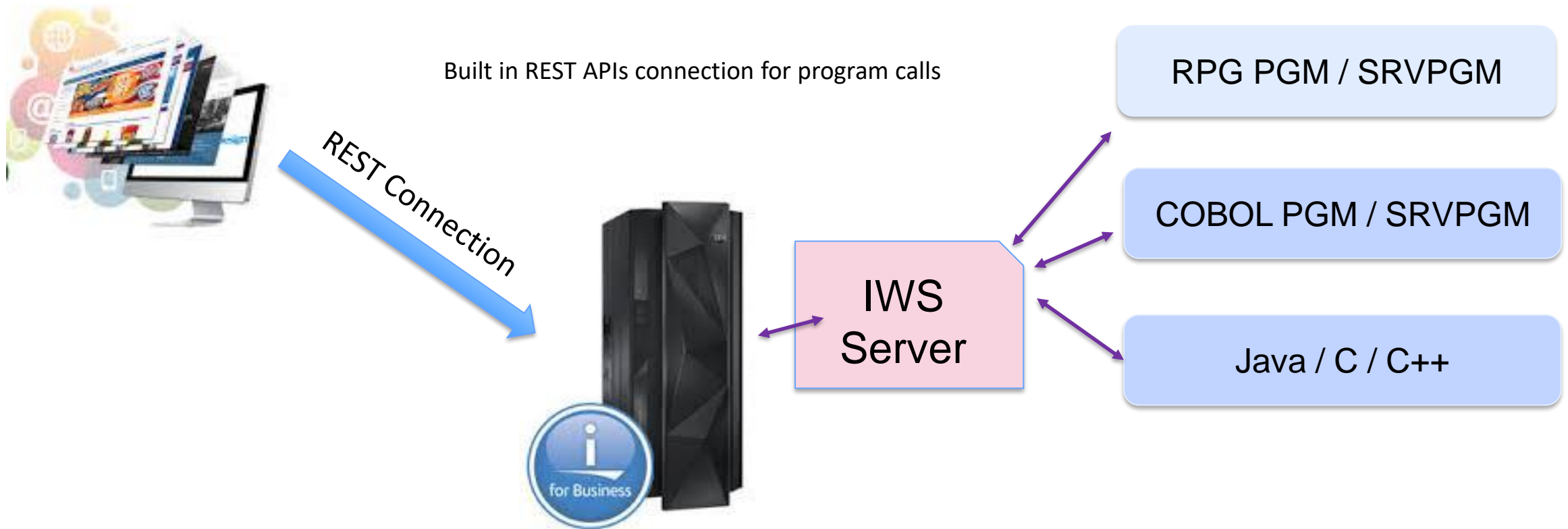
0 stars

```
1
2  -- =====
3  -- author: Scott Forstie
4  -- date  : May 29, 2019
5  -- email : forstie@us.ibm.com
```

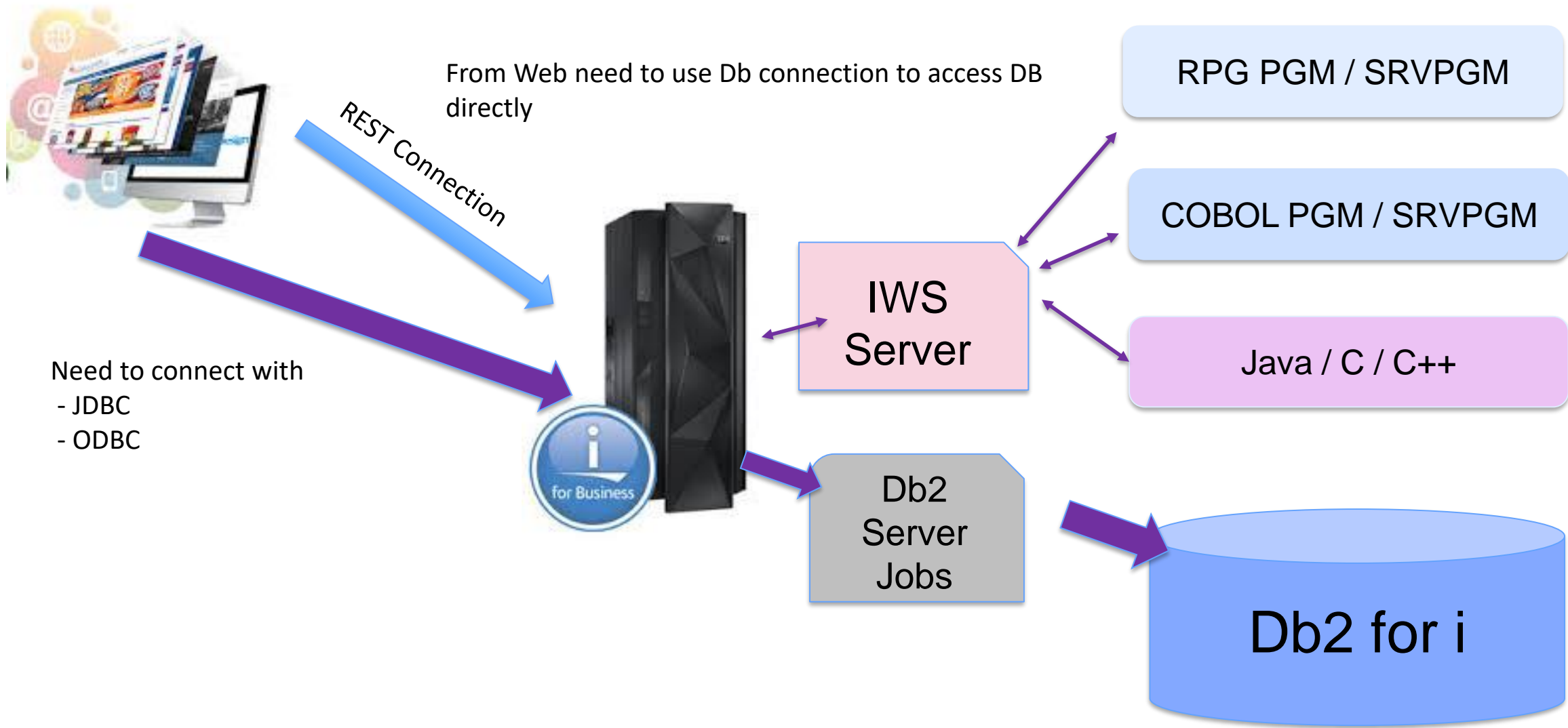
Integrated Web Server (IWS)



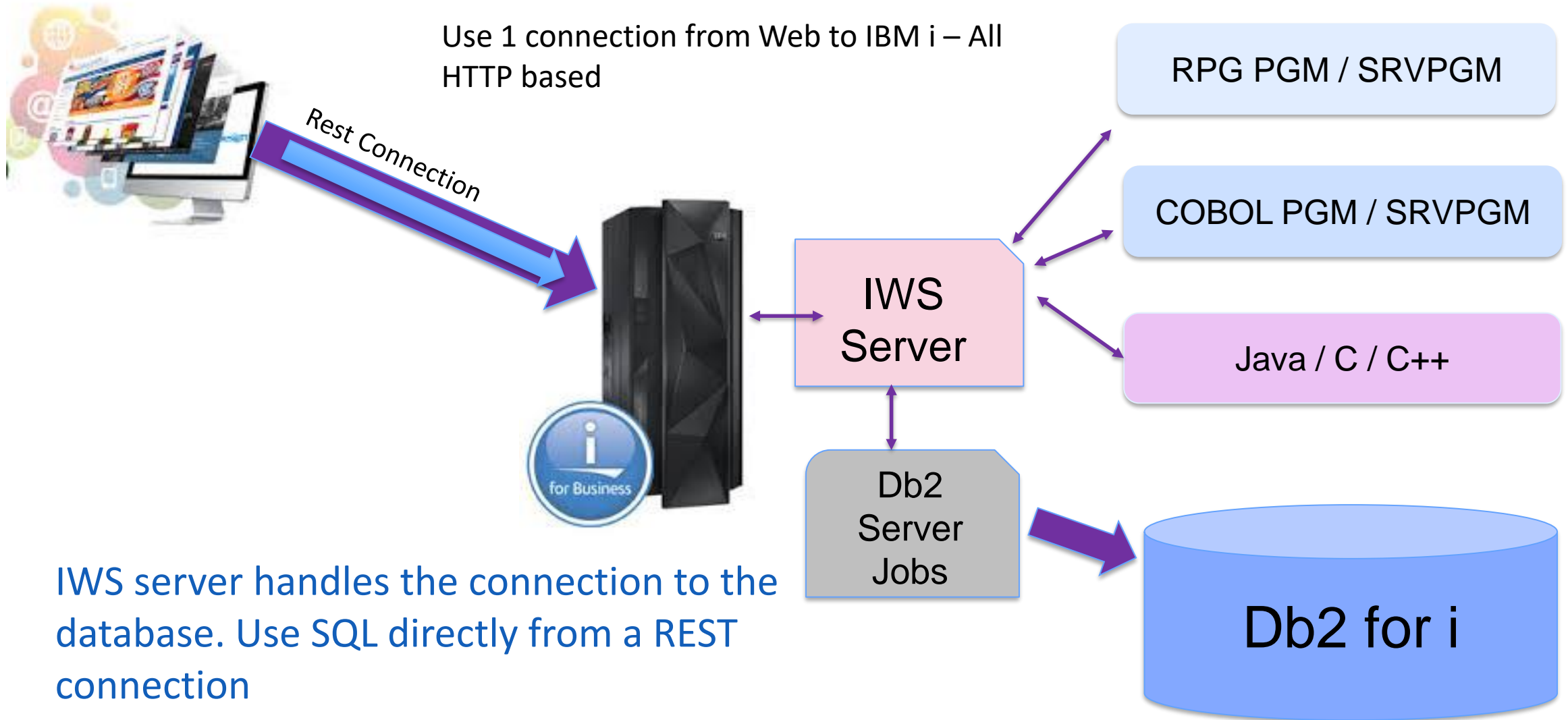
REST APIs - Today



Connect to the Database - Today



REST APIs – New SQL Access Using REST



IWS Wizard Updated

IBM Web Administration for i

Setup

Manage

Advanced

Related Links

All Servers

HTTP Servers

Application Servers

Installations

Running

Server: SQLBaby - V2.6 (web services)

Common Tasks and Wizards

- Create Web Services Server
- Create HTTP Server
- Create Application Server

Web Services Wizards

- Deploy New Service
- Configure SSL
- Disable SSL

Server Properties

- Properties
- Server Tracing
- View HTTP Servers

Services

- Manage Deployed Services

SQLBaby > Manage Deployed Services > Deploy New Service

Deploy New Service

Specify Web service type - Step 1 of 8

Welcome to the Deploy New Service wizard. This wizard helps y that are accessible over the Internet and exchange XML messag exchanged is defined by the resource itself.

Specify Web service type: REST

Specify Web service implementation: *SQL

90

Specify SQL

Deploy New Service

Specify SQL Statements - Step 4 of 8

Specify SQL statements that will be externalized as a Web service: ?

	Procedure name	SQL statement/Parameter name	Data type
<input checked="" type="checkbox"/>	SpoolUsers	Select User_Name, Sum(Size) As Total_Spool_Space From Table (Qsys2.Object_Statistics('QSYS', '*LIB')) As A, Table (Qsys2.Object_Statistics(A.Objname, 'OUTQ')) As B, Table (Qsys2.Output_Queue_Entries(A.Objname, B.Objname, '*NO')) As C Where User_Name Not Like 'Q%' Group By User_Name Order By Total_Spool_Space Desc Fetch First 10 Rows Only;	

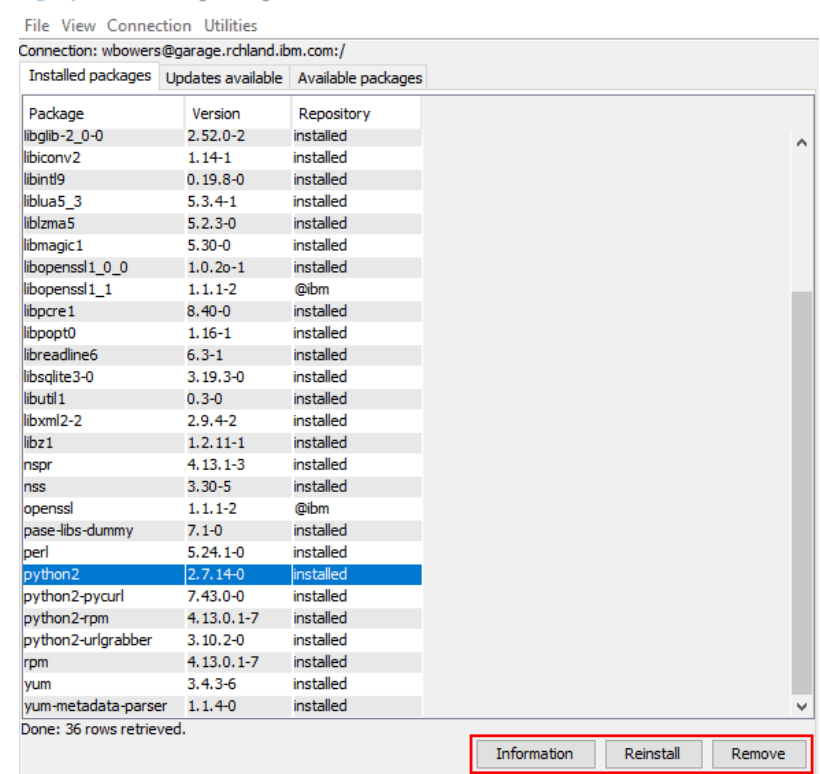
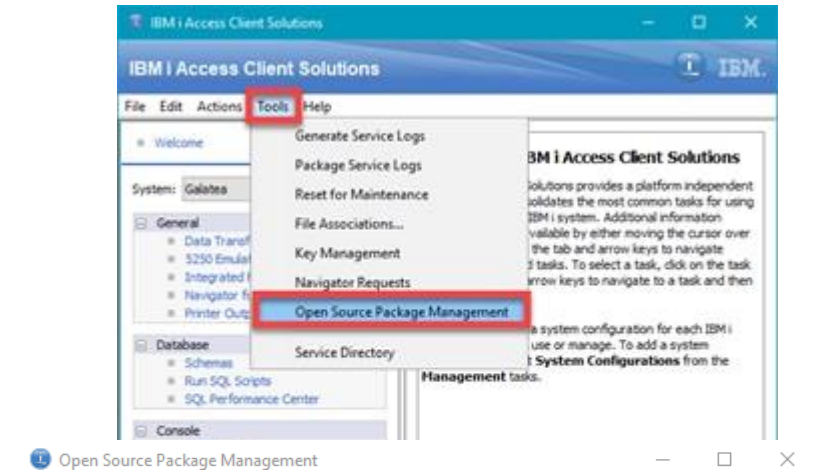
Add Remove Remove All Continue

Open Source



Open Source RPMs

- 5733-OPS is sunsetted, and no longer needed!
- Now delivered with RPMs (just like RedHat packages) and the 'yum' package manager
 - MUCH more technology available
 - Faster security fixes
 - Industry-standard
 - IBM and third-party distribution
- Manage with command-line tools or ACS
- Install or update an entire open source ecosystem in a matter of minutes!!
- To get started:
- <http://ibm.biz/ibmi-rpms>



Node.js version 10

- Long-term-support (LTS) release
 - Performance improvements
 - New version of node package manager (NPM)
 - JavaScript language enhancements
- Buildable from community source
 - Anyone can use a tool like nvm to manage their own versions, including feature releases
- Expecting version 12 soon!






















R: a new programming language on IBM i!

- Great for:
 - Data analysis
 - Statistical computing
 - Data mining
 - Big Data

- Ranked #7 by IEEE

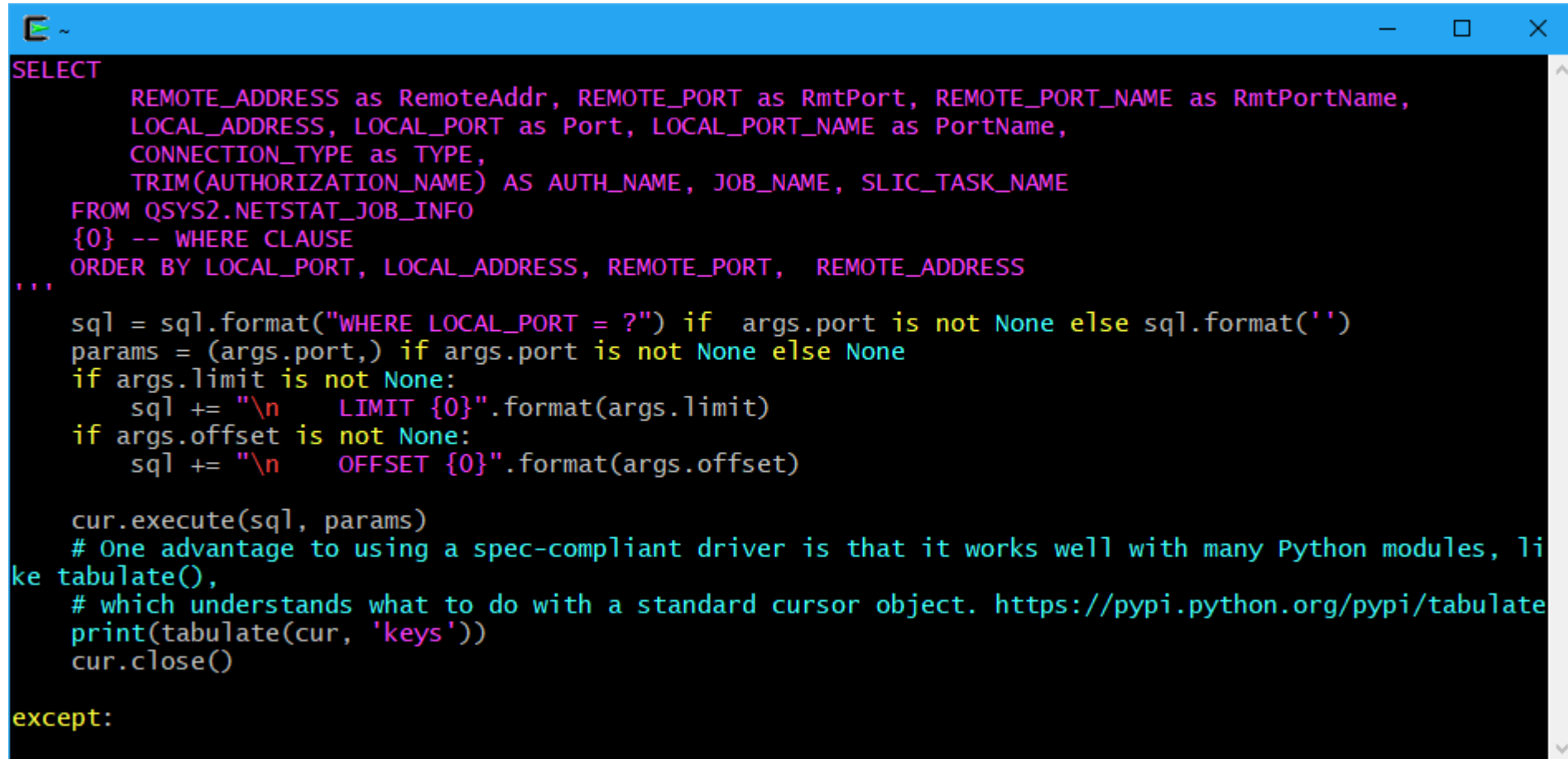
<https://spectrum.ieee.org/at-work/innovation/the-2018-top-programming-languages>



Language Rank	Types	Spectrum Ranking
1. Python	  	100.0
2. C++	  	99.7
3. Java	  	97.5
4. C	  	96.7
5. C#	  	89.4
6. PHP		84.9
7. R		82.9
8. JavaScript	 	82.6

vim

- Popular terminal-based editor



```
SELECT
    REMOTE_ADDRESS as RemoteAddr, REMOTE_PORT as RmtPort, REMOTE_PORT_NAME as RmtPortName,
    LOCAL_ADDRESS, LOCAL_PORT as Port, LOCAL_PORT_NAME as PortName,
    CONNECTION_TYPE as TYPE,
    TRIM(AUTHORIZATION_NAME) AS AUTH_NAME, JOB_NAME, SLIC_TASK_NAME
FROM QSYS2.NETSTAT_JOB_INFO
{0} -- WHERE CLAUSE
ORDER BY LOCAL_PORT, LOCAL_ADDRESS, REMOTE_PORT, REMOTE_ADDRESS
...

sql = sql.format("WHERE LOCAL_PORT = ?") if args.port is not None else sql.format('')
params = (args.port,) if args.port is not None else None
if args.limit is not None:
    sql += "\n    LIMIT {0}".format(args.limit)
if args.offset is not None:
    sql += "\n    OFFSET {0}".format(args.offset)

cur.execute(sql, params)
# One advantage to using a spec-compliant driver is that it works well with many Python modules, li
ke tabulate(),
# which understands what to do with a standard cursor object. https://pypi.python.org/pypi/tabulate
print(tabulate(cur, 'keys'))
cur.close()

except:
```

Midnight Commander

- Two-pane file manager
- Abilities include:
 - FTP access
 - Compare files
 - Compare directories
 - Edit files
 - Move, copy, delete, etc
 - Subshell
 - Scroll wheel
 - Mouse
 - Directory side-by-side and tree views
 - See and modify file info
 - Tons more!!

```
mc [timmr@Common1.Frankeni.com]:~
Left  File  Command  Options  Right
~      Name      Size  Modify time
..      UP--DIR Sep  4 11:11
.cache  8192 Aug 14 20:44
.config 8192 Aug 14 20:44
.local  8192 Aug 14 20:44
.node-gyp 8192 Sep 10 18:20
.npm    12288 Sep 10 18:22
/myrepo 8192 May 16 12:22
/ssl_certs 12288 Jul 20 16:39
.bash_history 9250 Sep 13 14:13
.bash_profile 218 Jun 21 11:21
.node_repl_history 33 Aug 27 13:00
.sh_history 788 Jul 6 14:26
.vi_history 18 Aug 15 09:03
*a.out 14957 Jun 21 11:19
bootstrap.sql 1054 Apr 18 19:51
hello.cpp 107 Jun 21 11:18
upd2.data 223872 Jul 16 19:45
updcommon.data 31338K Jul 16 18:36

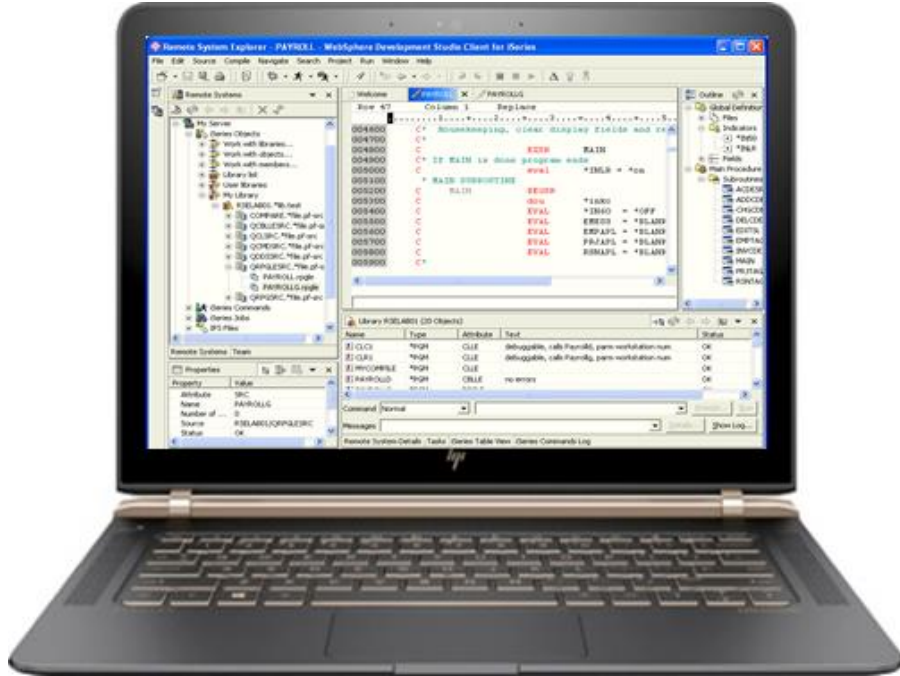
UP--DIR 79G/327G (24%)
Hint: Use C-x t to copy tagged file names to the command line.
bash-4.4$
1Help 2Menu 3View 4Edit 5Copy 6RenMov 7Mkdir 8Delete 9PullDn 10Quit
```

ActiveMQ

- Open source message broker (Java-based)
- Supported protocols:
 - OpenWire
 - STOMP
 - MQTT
 - AMQP
 - REST
 - WebSockets



Solution Development



RPG

Innovation continues to give RPG developers client-requested options

- Varying-dimension arrays – RFE 90712
 - DIM(*VAR:n)
 - DIM(*AUTO:n)
 - %ELEM
- SAMEPOS – position subfields - RFE 121317

COBOL

- SORT table elements according to specified table keys
- New LEADING and TRAILING keywords for COPY & REPLACE
- Conditional compilation provides a way to include or omit selected lines of code based on the value of literals specified by the DEFINE directive
- New ALLOCATE and FREE statements to obtain/free dynamic storage
- INITIALIZE enhancement
- EXIT enhancement
- Inline comments

IBM Developer Kit for Java (5770-JV1)

The JV1 options for IBM Technology for Java(IT4J) 7.0 and 7.1 (option 14 and 15) are no longer supported on IBM i 7.4. The default JVM on IBM i 7.4 is IBM Technology for Java 8.0 64bit (option 17).

ILE compiler updates in 7.4: CL

- Supports building CLLE program and CL command from IFS source file
 - Supports both absolute and relative IFS path name
 - SRCSTMF parameter is added for
 - Create command (CRMCMMD)
 - Create CL Module (CRTCLMOD)
 - Create Bound CL Program (CRTBNDCL)
 - INCDIR parameter is added for
 - Include CL source (INCLUDE)
 - Also available in 7.3 via PTF SI67337, SI67358
- New built-in function %PARMS for CLLE program

Examples:

1. Create CLLE program from IFS source file

```
CRTBNDCL PGM(TEST/HELLO)
        SRCSTMF('/tmp/examples/hello.clle')

PGM PARM(&NAME)

        DCL &NAME *CHAR 10
        SNDPGMMSG MSG('HELLO, ' *CAT &NAME)

ENDPGM
```

2. Create CL command from IFS source file

```
CRTCMD CMD(TEST/HELLO) PGM(TEST/HELLO)
        SRCSTMF('hello.cmd')

CMD1: CMD PROMPT('HELLO')
        PARM KWD(NAME) TYPE(*CHAR) LEN(10) MIN(1) +
        PROMPT('Your Name')
```

3. New %PARMS built-in

```
PGM PARM(&mbrr1)

        DCL VAR(&mbrr1) TYPE(*CHAR) LEN(10)
        DCL VAR(&num) TYPE(*INT) LEN(2) VALUE(0)

        CHGVAR VAR(&num) VALUE(%PARMS())
        SNDPGMMSG MSG('%PARMS: ' *CAT %CHAR(&num))

ENDPGM
```


System Debugger updates in 7.4

- Change Program Data (QBNCHGPD) API is enhanced to update the debug source location
 - Supports both library physical file and IFS stream file
 - Compile a program from an IFS stream source file or library physical file with DBGVIEW(*SOURCE)
 - Move the source file to another location
 - Use API QBNCHGPD to update the old source location to the new one with new format CHGP0200
 - Debug the target program. System debugger will show the source file correctly from the new location

- Examples:

```
/* Start setting up chg info */
chgobjinf->Number_Change_Records = 1;
rec1->Rec_Len = sizeof(Qbn_CHGPD_Chg_Rec_0200_t)+strlen(topath)
               +strlen(frompath);

rec1->Key = 1;
rec1->From_CCSID = fccsid;
rec1->From_Len = strlen(frompath);
rec1->From_Offset = sizeof(Qbn_CHGPD_Chg_Rec_0200_t);
rec1->To_CCSID = tccsid;
rec1->To_Len = strlen(topath);
rec1->To_Offset = sizeof(Qbn_CHGPD_Chg_Rec_0200_t)+strlen(frompath);
char *fp = (char *) rec1 + sizeof(Qbn_CHGPD_Chg_Rec_0200_t);
char *tp = fp + strlen(frompath);
strcpy(fp, frompath);
strcpy(tp, topath);

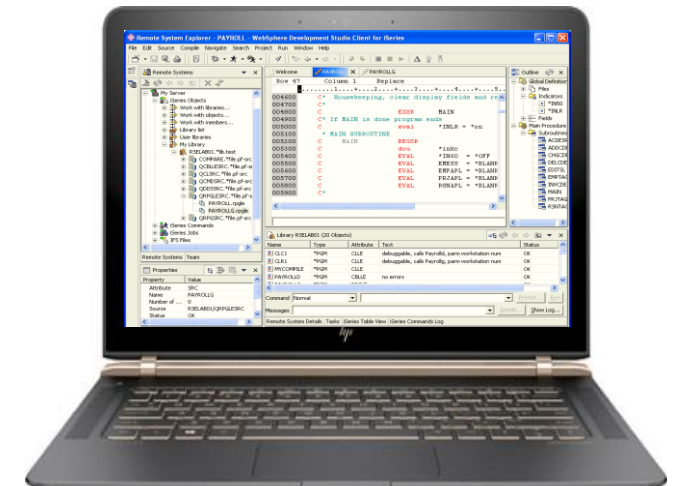
/* Make the call. */
Qus_EC_t ec[100];
memset(ec, 0, sizeof(ec));

printf("Making the call...\n");
QBNCHGPD(tgtobj, type, format, chgobjinf, ec, bndMod, NULL);
if (ec[0].Bytes_Available)
{
    printf("ERROR: QBNCHGPD failed\n");
    ec[0].Reserved = 0;
    printf("error = %-7s\n", ec[0].Exception_Id);
    return 8;
}
```

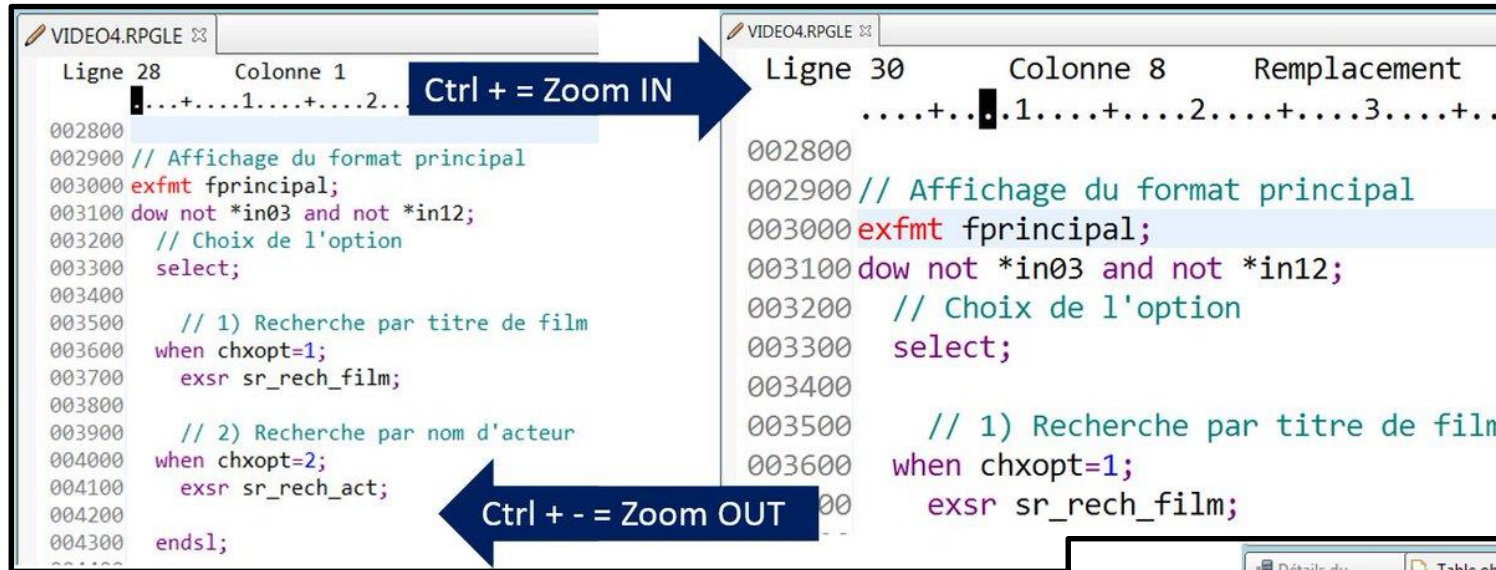
CHGSRCLC.C

Rational Developer for i

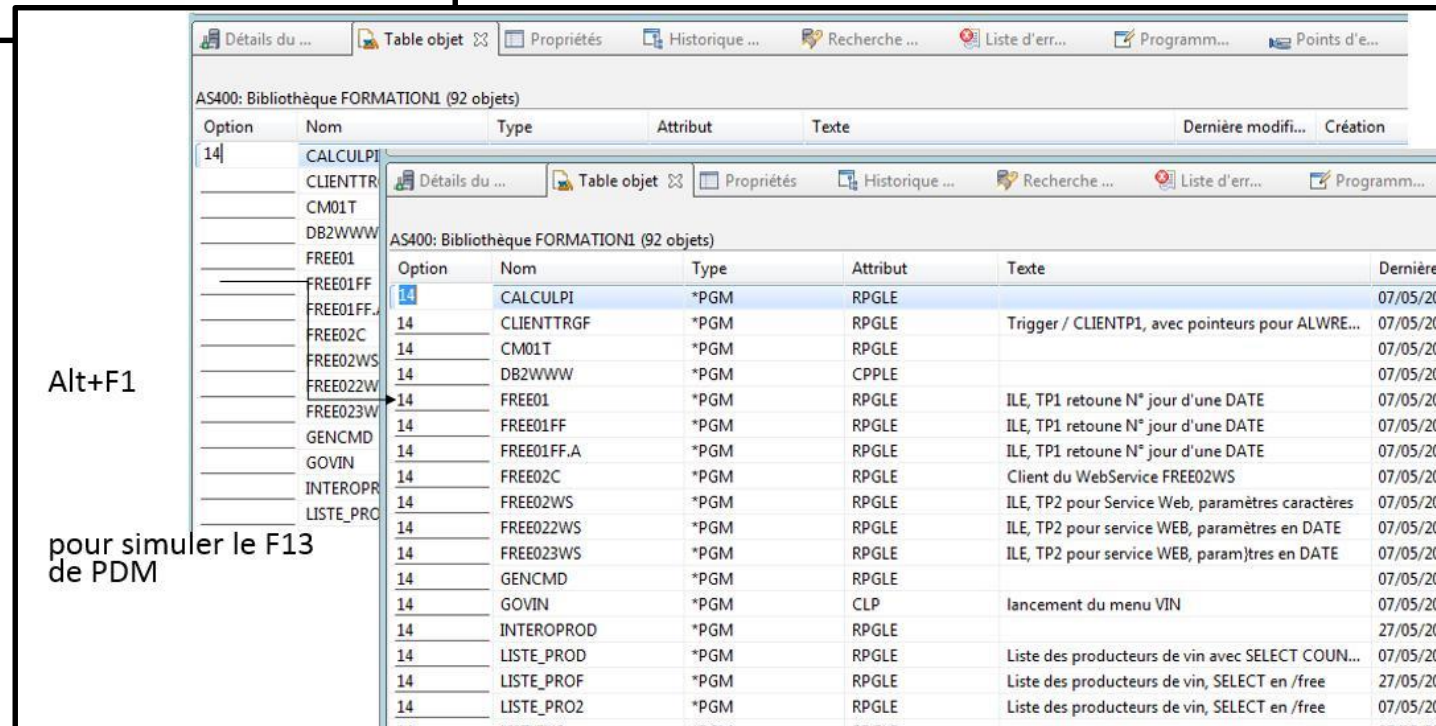
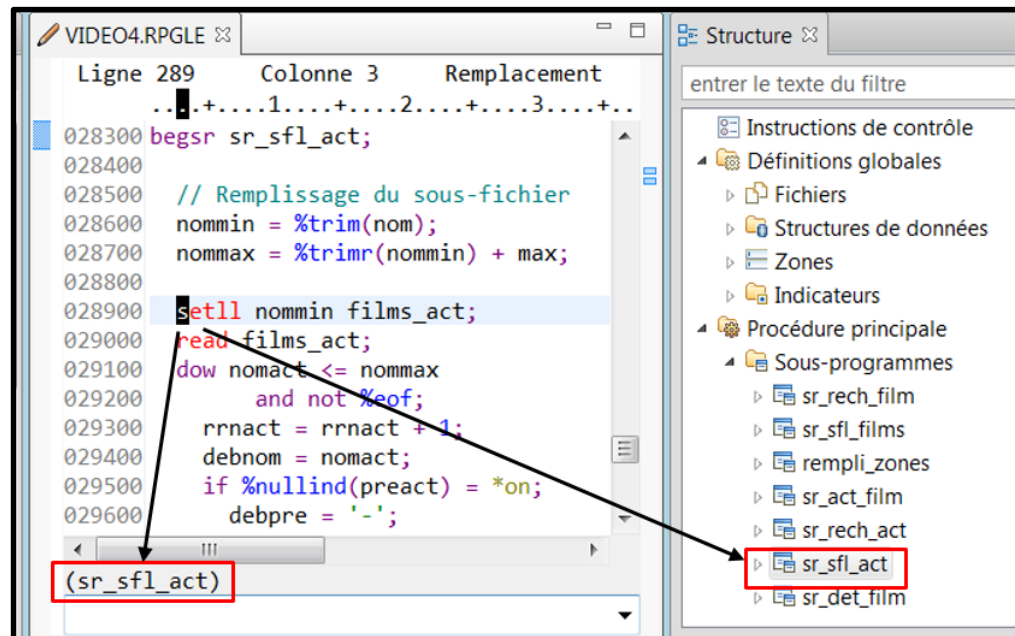
- Strategic Development Environment for IBM i
- Improvements in many areas
- Answered many RFEs from clients including
 - Code coverage improved web faced view
 - Code coverage source view displays in “browse”
 - PDM Perspective, added in 2019, further refinements
 - Supports added enhancements to RPG and COBOL
 - Improved SQL formatting
 - New smart keys to improve programmer productivity



RDi – improve programmer productivity

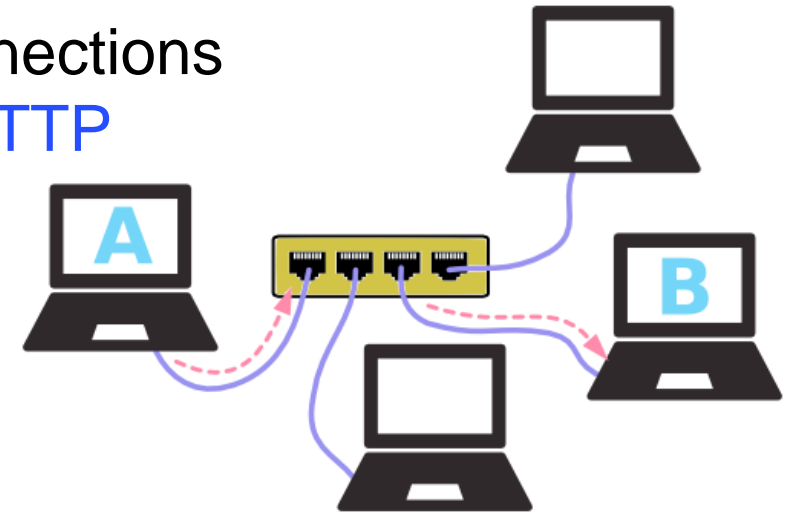


- Zoom IN / OUT Ctrl+=
- Display the procedure, sub-routine name where you are in
- Alt+F1 to simulate repeated PDM F13



IBM i Application Connectivity Improvements

- JTOpen JDBC
 - Previously - when connection lost, a new connection had to be re-established with the backup server
 - IBM i 7.4 – Connection is NOT lost in the application, the ‘backup’ server just takes over
- Application and Data Connections
 - Previously – use REST APIs for program connections and Db connections (ODBC or JDBC) for data connections
 - IBM i 7.4 – Both applications and Db2 can use 1 HTTP based connection from Web to IBM i
- SMB3
 - Support for larger read and write sizes providing encryption and performance improvements




IBM i and Cloud



It's getting Cloud i...

Skytap Announces Upcoming General Availability of First Self-Service, Public Cloud Capabilities for IBM i



IBM Cloud Blog Why IBM Products Solutions Garage Pricing Blogs Docs Support IBM Cloud Announcements




Compute Infrastructure


IBM POWER9 on IBM Cloud: More Choice and Flexibility, On-Premise and Off

February 12, 2019 | Written by: Jose Paez, Michael Daubman, and Alise Spence

Categorized: [Compute Infrastructure](#) | [Think 2019](#)

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HYB221: Introducing IBM Power Systems for Google Cloud


Carl Burnett, Distinguished Engineer, IBM
Andy Waddell, Technical Program Manager, Google Cloud
Kyle Johnson, Senior Engineer, IBM

Google Cloud



 **Andy Waddell**

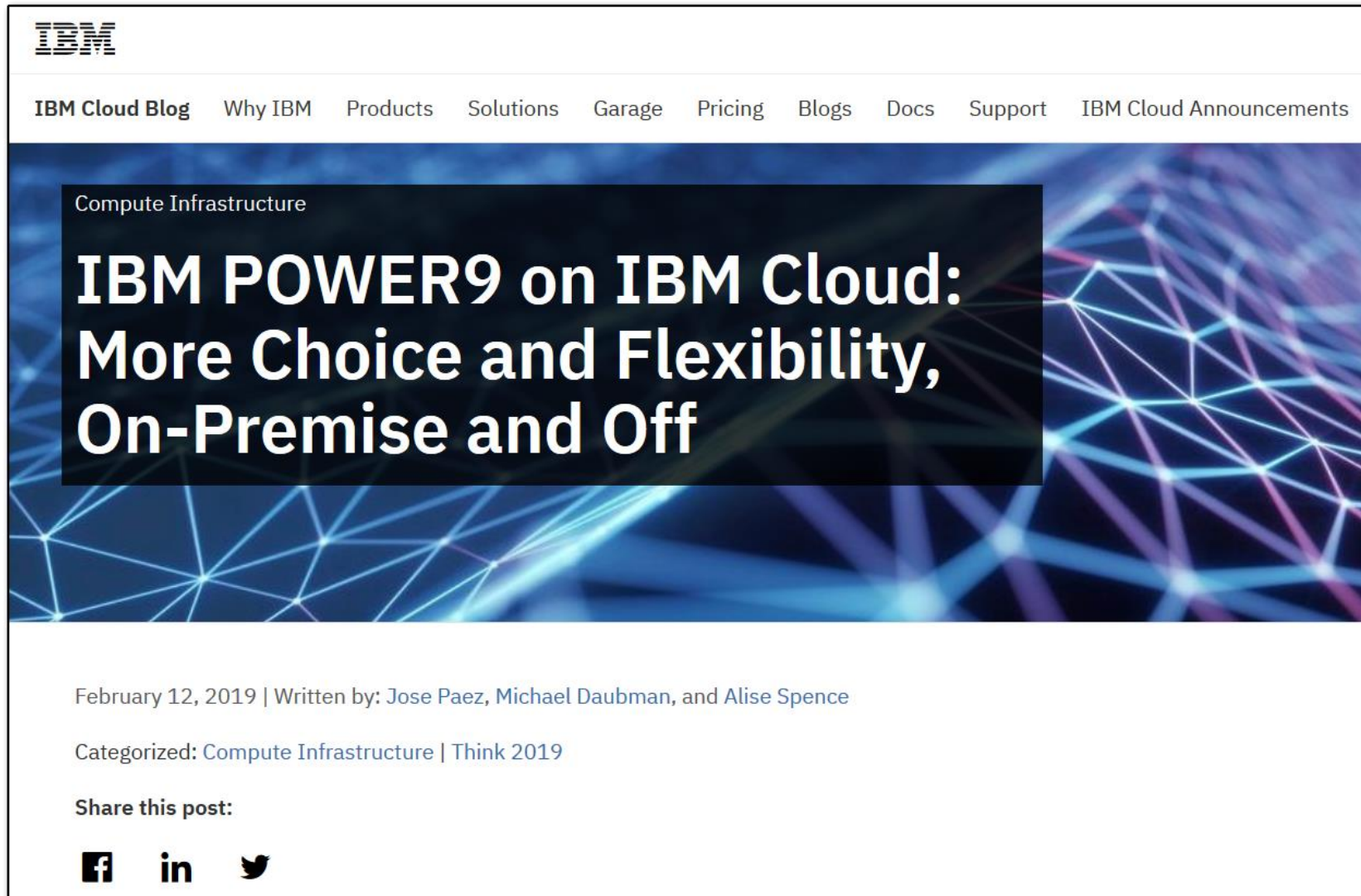
Introducing IBM Power Systems for Google Cloud (Cloud Next '19)

1 230 vues  27  0  PARTAGER  ENREGISTRER ...

IBM i in the IBM Cloud

- Announced at [THINK, February 2019](#)
 - Available later in the year
- Power Systems located in the IBM Cloud
 - “public cloud” model
 - Order the capacity required
 - Pay for use
 - Details still to come
- Support and work with MSPs, Skytap, ISVs offering SaaS, Partners offering DRaaS

IBM POWER9 on IBM Cloud



[Click image to access the link](#)

IBM Power Systems Virtual Server on IBM Cloud at a glance

- Up to 160 cores
- Up to 7 TB RAM
- Choose of AIX or IBM i OS
- Fiber Attached IBM Storewize V7000 Storage



Steve Will @Steve_Will_I... 27m

Steve Sibley announces availability of #IBMi in IBM Cloud in North America today. Check the entry in the catalog

[cloud.ibm.com/catalog/servi](https://cloud.ibm.com/catalog/services)
c... #ibmpower #CEC2019

P

Power Systems Virtual Server

IBM

Power Systems Virtual Server projects deliver flexible compute capacity for Power Systems workloads. Integrated with the IBM Cloud platform for on-demand provisioning, this offering provides a secure and scalable server virtualization environment built upon the advanced RAS features and leading performance of the Power Systems™ platform.

[Afficher la documentation](#) [Dispositions](#)

AUTEUR

IBM

DATE DE PUBLICATION

15/06/2019

TYPE

Service

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S-Class and E-Class systems running PowerVM
 - **AIX and IBM i**
Choose from a catalog of support AIX and IBM i images, or bring your own.
- **Flexible Compute**
Configure your workloads with cores, types of resources, with dynamic resizing available.

Images

Les images peuvent être des captures d'écran, des diapositives ou des vidéos. Cliquez sur une image pour afficher ses détails.



TARIFICATION
0,097395 € EUR/Virtual Processor Core-Hour
0,769723 € EUR/Virtual Processor Core-Hour
0,104869 € EUR/Virtual Processor Core-Hour
0,828915 € EUR/Virtual Processor Core-Hour
0,011476 € EUR/Gigabyte-Hour
0,017214 € EUR/Gigabyte-Hour
0,000207 € EUR/Gigabyte-Hour
0,000103 € EUR/Gigabyte-Hour
0,026878 € EUR/Application Instance-Hour
0,075274 € EUR/Application Instance-Hour
1,034275 € EUR/Application Instance-Hour
2,275344 € EUR/Application Instance-Hour
0,413665 € EUR/Application Instance-Hour
0,910153 € EUR/Application Instance-Hour
0,06795 € EUR/Gigabyte Transmitted

Remember?

THE FOUR HUNDRED

Power Systems & IBM i Insight

GOOGLE CLOSE TO LAUNCHING IBM I CLOUD SERVICE, WILL SAYS

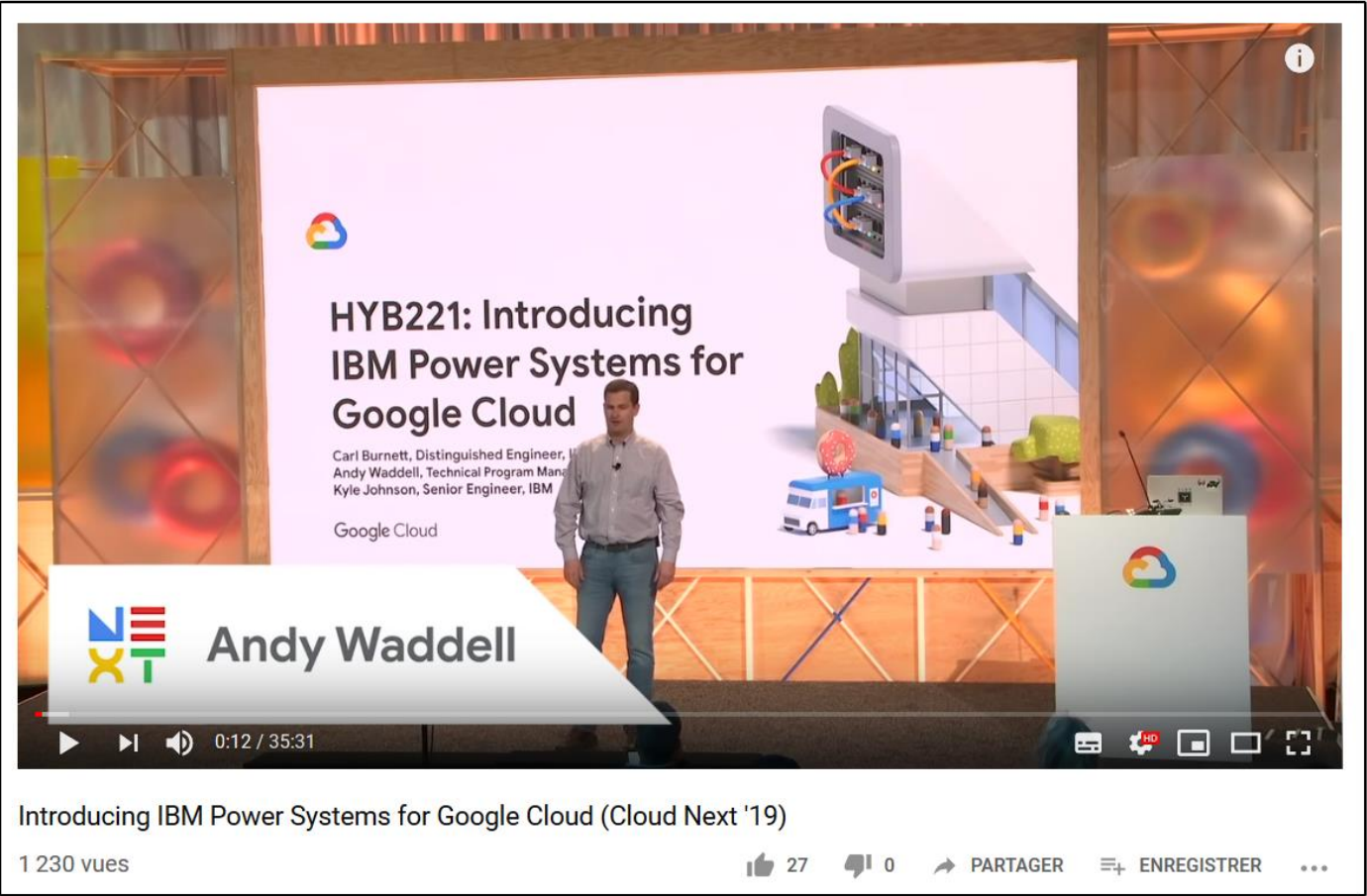
June 4, 2018 Alex Woodie

One of the laments of Power chip types everywhere is the lack of a public cloud service for Power applications. While Linux and Windows folks can run their X86 workloads on multiple public clouds, the opportunities for hosting IBM i, AIX, or Power Linux workloads are limited to so-called private clouds. But according to IBM i chief architect Steve Will, that could soon be changing.


While neither [IBM](#) nor [Google](#) have made any official announcements about Google running IBM i in its public cloud, Will talked openly about the relationship between the two tech giants at [COMMON's](#) PowerUp conference in San Antonio, Texas, two weeks ago. During the *Future of IBM i* panel on Sunday, May 20, Will stated that Google “was on the doorstep” of offering an IBM i service, and that we should be keeping an eye on the news for that announcement.

[Click image to access the link](#)

Introducing IBM Power Systems for Google Cloud



Click image to access the link



IBM Power Systems Infrastructure

PowerVM
AIX, IBM i, Linux
Traditional Power Workloads


What's Inside?

Hardware

- POWER9-based servers
- IBM V7000 Gen 3 Storage with flash core technology
- 16 Gbit fiber channel
- 25 and 100 Gbit networking

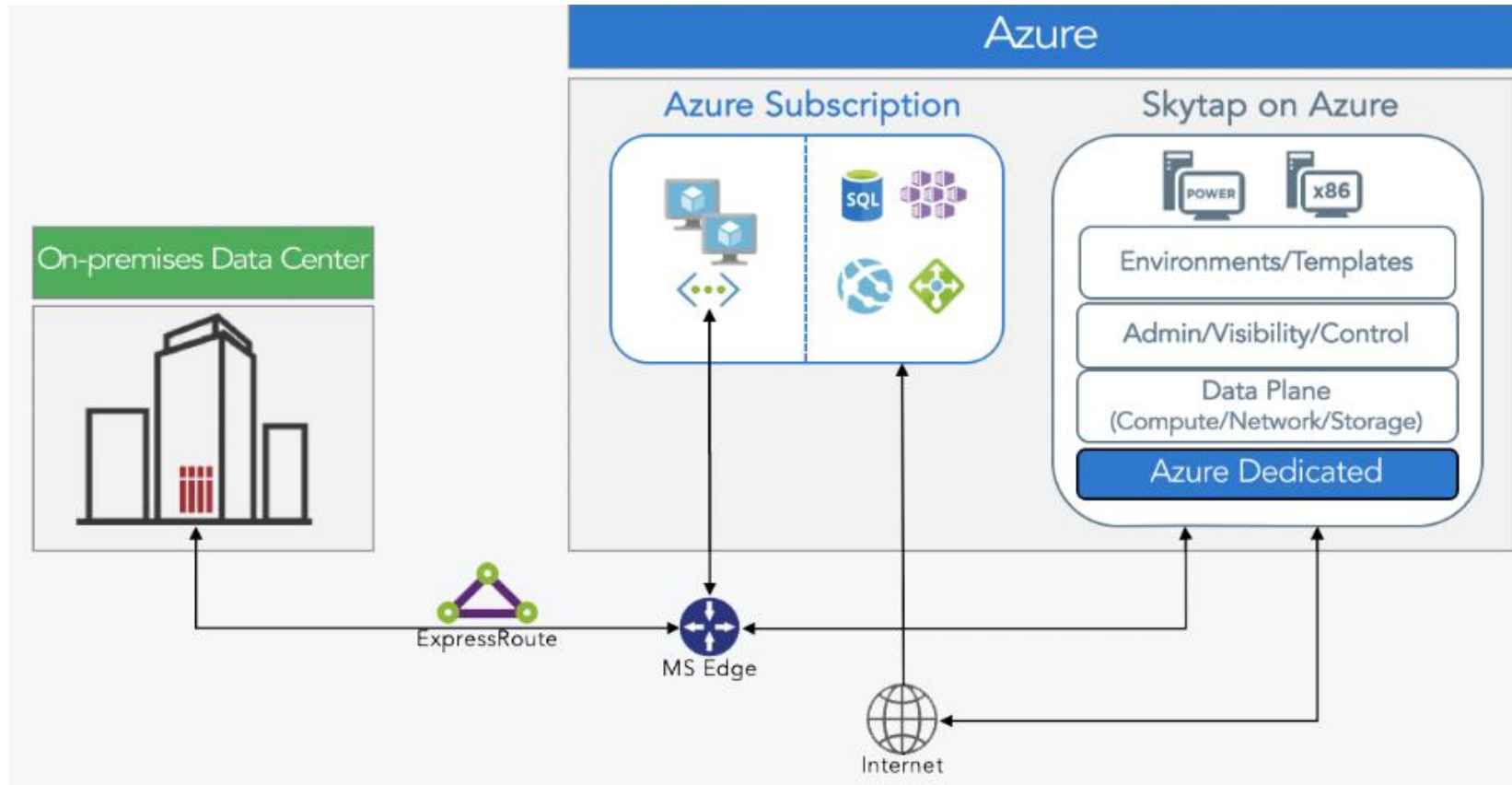
Systems Software

- PowerVM with dual VIOS instances
- PowerVC

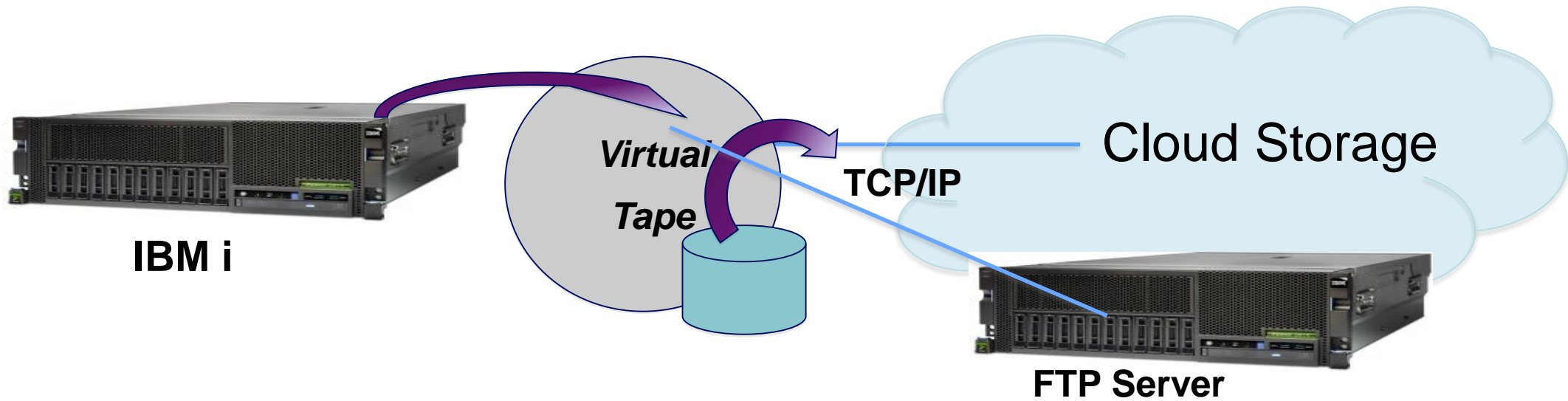


IBM Power in Azure

- Skytap on Azure is a cloud service purpose-built to natively run traditional systems including AIX, IBM i, and Linux on IBM POWER together with x86 workloads.
- <https://www.skytap.com/azure/>



IBM Cloud Storage Solutions for i ([5733ICC](http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/icc/topics/iccuoverview.htm))




Save your IBM i data into a Cloud or FTP Server

- Two modes
 1. BRMS to Cloud for backup operations
 2. GUI dashboard for storing files in the Cloud (think of BOX-like usage cases)







http://www.ibm.com/support/knowledgecenter/ssw_ibm_i_73/icc/topics/iccuoverview.htm

Miscellaneous Updates

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IBM I: The Most Amazing IBM Product You've Never Heard Of

By: Rob Enderle | February 13, 2019



NEW PRODUCT ANALYSIS: The IBM I platform (the second "I" stands for Integrated) is converged packaged software platform that evolved out of that legendary AS400, and it is even more amazing.



SAN FRANCISCO--Occasionally, I run into a product that just has me sitting back wondering if I stepped into some kind of alternative universe. One of the first products that gave me this impression was the old AS400 from IBM. It was kind of like if you took an Abrams Tank and created a server with similar survivability The stories of these things were legendary.

One system was on the top floor of a four-story building that was demolished, literally flattened, by a tornado and after falling those four stories, being buried by rubble and rained on, they only needed to dry it out to bring it back on line. Another system ran for a whopping 19

<https://www.eweek.com/innovation/ibm-i-the-most-amazing-ibm-product-you-ve-never-heard-of>

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Marketing Themes

- 2019 Theme – Innovation
- 7.4 – Strong Foundation for Continuous Innovation
- Feature new technologies – integration
- Highlight Customer Stories
 - Q: How many new stories are on the site this year?
 - Please send in more candidates
- Collateral available shortly following announcement



Wijnen Van Maele
Tracking wine production with blockchain
on IBM i

[Read the customer story →](#)

New IBM i web site

IBM i: A platform for innovators, by innovators

IBM i never stops innovating with new features so that you never have to stop innovating your organization.

Overview

Technologies

IBM i 7.4 is here

The latest update to IBM i has arrived. With IBM i 7.4, you'll get continuous availability (thanks to IBM Db2 Mirror for i), the latest security features, and easy integration with IoT, AI and Watson. To find out more, read the blog post from Steve Will, Chief Architect for IBM i.

Read the blog

IBM i release roadmap

The roadmap shows a timeline of IBM i releases. The current version, IBM i 7.4, is highlighted with a green circle. The timeline includes: 2014 IBM i 7.2, 2016 IBM i 7.3, 2019 IBM i 7.4, IBM i next, and IBM i next.


Year	Version
2014	IBM i 7.2
2016	IBM i 7.3
2019	IBM i 7.4
	IBM i next
	IBM i next

Click image to access the link


IBM i Customer Stories

IBM i Customer Stories


For over thirty years, IBM i has supported thousands of customers worldwide and continues to be the backbone of their infrastructure into the future. Read why customers are continuing to choose IBM i as their platform of choice.




See innovation at work in the IBM i community



Cimberio S.p.A.
IBM i helps streamline production for Cimberio
[Read the customer story →](#)



FormaServe Systems
Streamlining the tax return process with IBM i
[Read the customer story →](#)



Carhartt
Expanding ecommerce internationally with IBM i
[Read the customer story →](#)

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Your Travel Guide to IT Transformation

IBM Power Systems

YOUR TRAVEL GUIDE TO IT TRANSFORMATION

48 Hours in POWER



Travel the world – from Belgium to Brazil and beyond – to see how IT pros are using IBM Power Systems™ to drive big ideas and learn how you can bring IT innovation to your headquarters.

Your POWER excursion begins in Las Vegas at Allegiant Air.

Let's go!

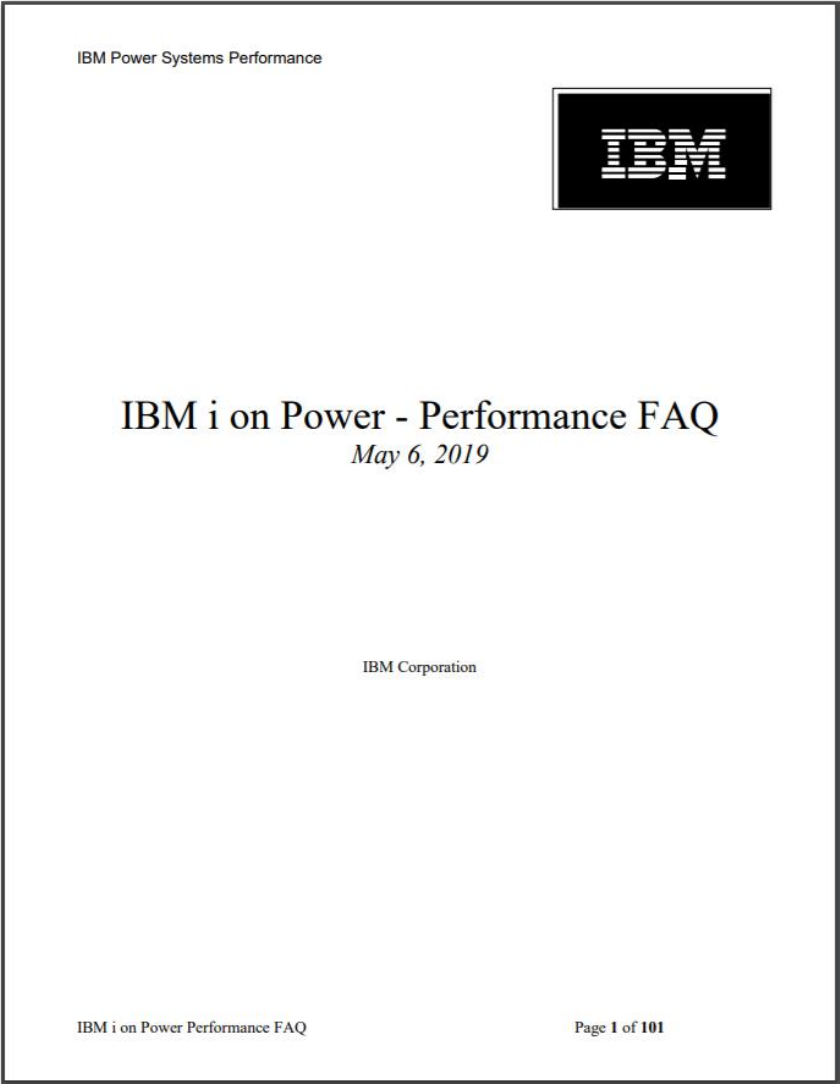
[Click image to access the link](#)

IBM Db2 Mirror for i data sheet

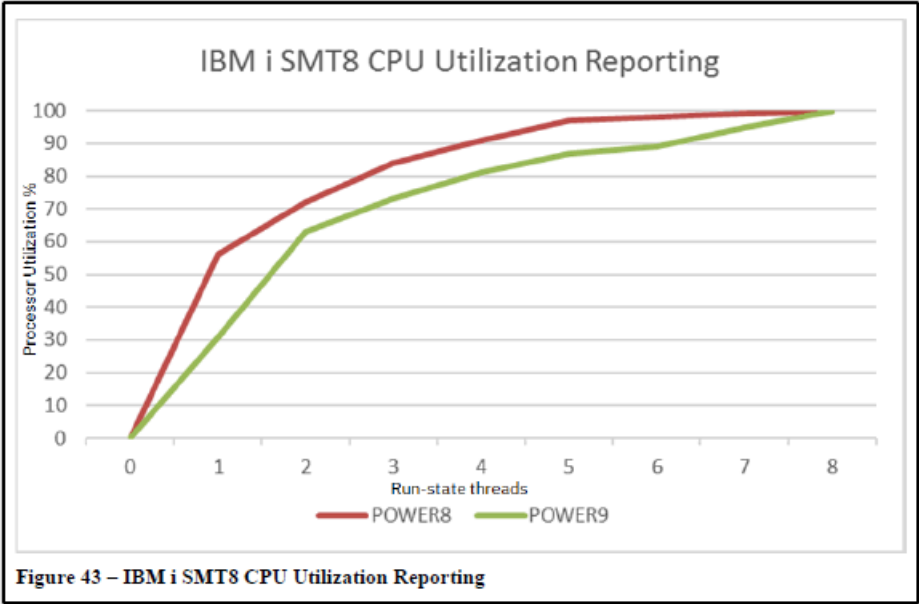


Click image to access the link

IBM i Performance FAQ



Click image to access the link

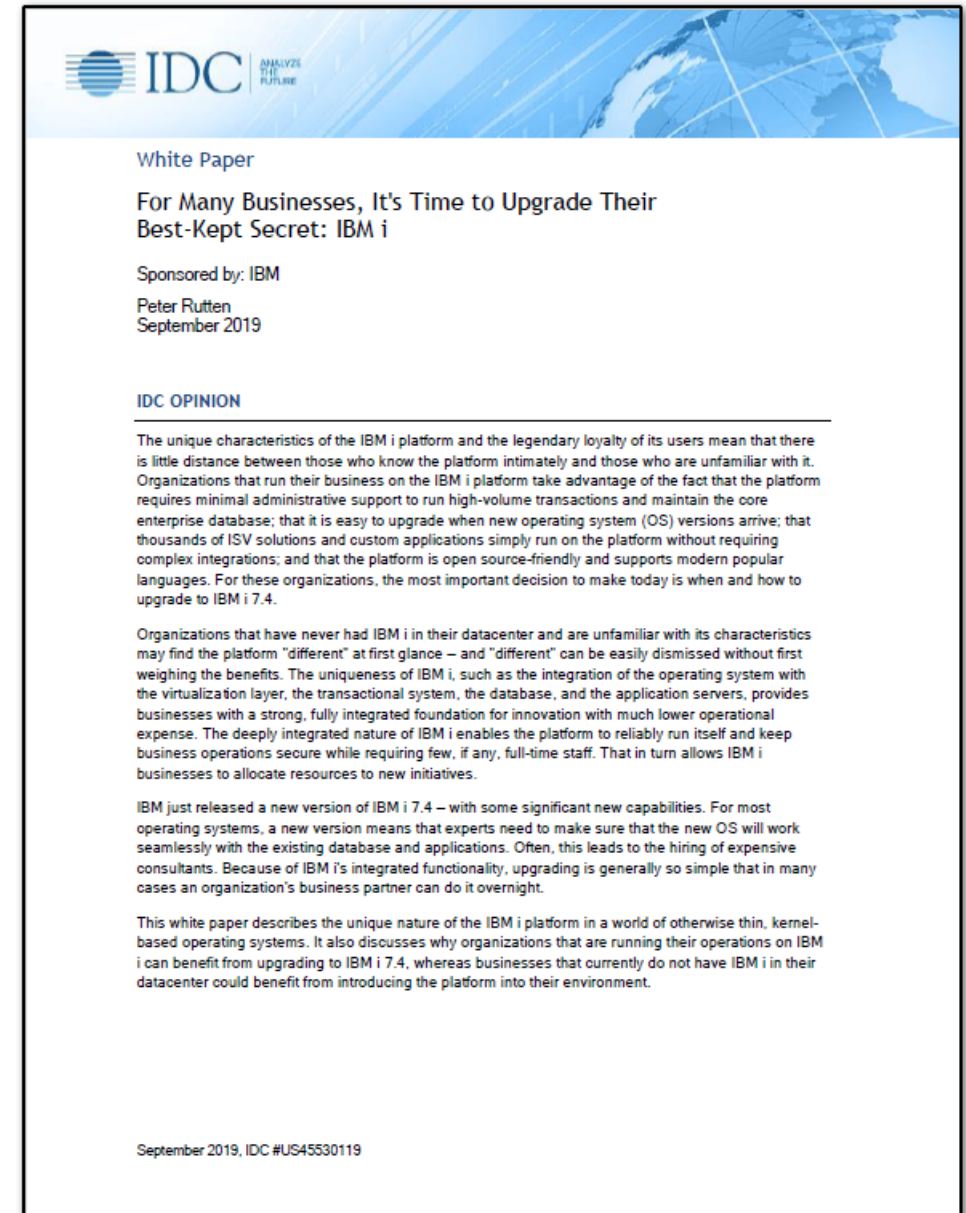


IBM i IDC paper, Sept. 2019

Businesses that run on IBM i gain a distinct competitive edge:

- Thanks to IBM i's unique capabilities as **an integrated transactions, database**, and business solutions platform
- The system's **low operational expenses**, thanks to the limited resources that are needed for day-to-day management
- The **performance** and capabilities of the underlying Power Systems hardware, including the same POWER9 processors that are used in Summit and Sierra, the two most powerful supercomputers in the world
- The platform's **developer-friendly affinity for modern languages and open source solutions**

IBM i can be thought of as autonomous driving for the datacenter: the platform manages most of the intricacies of maintaining a complex system that reliably processes massive amounts of critical data with very little supervision. IDC believes that the combination of POWER9 and IBM i 7.4 provides a strong enterprise platform for organizations of all sizes that prefer a platform that takes care of business rather than the business having to take care of the system.



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<https://www.2019.universite-i.fr/>

**Power
Week**

Université IBM i

22-23 mai 2019


#IBMi
#uui2019
#IBMPowerWeek
#IBMCCParis

- 2 jours dans les locaux du Client Center de Paris
- **725 participants dont 635 clients et partenaires**
- 2 sessions plénières
- 56 sessions techniques

ibm.biz/uui2019



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Some Links You Need	 Twitter	#Hashtags
<p>IBM i Home Page: www.ibm.com/systems/i</p> <p>IBM 30th Anniversary http://ibmi30.mybluemix.net/</p> <p>IBM Systems Magazine IBM i Edition: http://ibmsystemsmag.com/ibmi/</p> <p>Support Life Cycle: https://www-01.ibm.com/software/support/ibmi/lifecycle/</p> <p>License Topics: https://www-01.ibm.com/support/docview.wss?uid=nas8N1022087</p>	<p>@IBMSystems @COMMONug @IBMChampions @IBMSystemsISVs @IBMiMag @ITJungleNews @SAPonIBMi @SiDforIBMi</p>	<p>#IBMi30 #PowerSystems #IBMi #IBMAIX #POWER8 #LinuxonPower #OpenPOWER #HANAonPower #ITInfrastructure #OpenSource #HybridCloud #BigData</p>

For More Information:

Blogs	
<p><u>IBM Blogs:</u></p> <ul style="list-style-type: none">• IBM Systems Magazine You and i (Steve Will)• IBM Systems Magazine i-Can (Dawn May)• IBM Systems Magazine: Open your i (Jesse Gorzinski)• IBM DB2 for i (Mike Cain)• IBM DB2 Web Query for i (Doug Mack) <p><u>IBM Champion's Blogs:</u></p> <ul style="list-style-type: none">• IBM Systems Magazine: iDevelop (Jon Paris and Susan Gantner)• IBM Systems Magazine: iTalk with Tuohy	<p>http://ibmsystemsmag.com/blogs/you-and-i/</p> <p>http://ibmsystemsmag.com/blogs/i-can/</p> <p>http://ibmsystemsmag.com/blogs/open-your-i/</p> <p>http://db2fori.blogspot.co.uk/</p> <p>http://db2webqueryi.blogspot.co.uk/</p> <p>http://ibmsystemsmag.com/blogs/idevelop/</p> <p>http://ibmsystemsmag.com/ibmi/trends/italk-with-tuohy/</p>

A collaborative environment for the sharing of technical information related to IBM i.

If you can not find answers to your questions, check out the IBM i technical forums.

Visit the [developerWorks IBM i Technical Topic](#) for more resources.

developerWorks for iPhone

How-to-Find-Anything-About-IBM-i blog

Click image to access the link

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