

Université **IBM i**

19 et 20 novembre 2024

IBM Innovation Studio Paris

S30 – Développement moderne, Merlin et Code Assistant sur IBM i

20 novembre 10:15 - 11:15

Benoit Marolleau

Solution Architect - Client Engineering

benoit.marolleau@fr.ibm.com



uui2024

#ibmi

#uui2024

The classic IBM logo, consisting of the letters 'IBM' in a bold, sans-serif font with horizontal stripes.The logo for 'Common France', featuring the word 'common' in a stylized, rounded font with a white outline, and the word 'FRANCE' in a smaller, plain font below it.




Agenda

S30 - Développement moderne, Merlin, Code Assistant sur IBM i

- 1 | Introduction : mission modernisation
- 2 | Git, vscode et Merlin V2
- 3 | Code Assistant pour le développeur RPG

IBM Client Engineering | EMEA

Custom Demos, Architecture Workshops, MVP Prototyping...

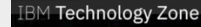
Let's create 
value together

Data & AI Squad
IBM Z & Modernization Squad
Sustainability Squad
Hybrid Cloud & AIOps Squad



Example of IBM i modernisation workshops:

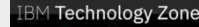
01 API-zation / REST / Core Business Integration



02 DB2 Data Modernization: from Native to SQL

03 OpenShift, Merlin and DevOps



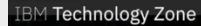


04 Open-Source Adoption with Legacy on IBM i





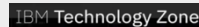
05 Power/IBM i move to cloud: IBM Cloud PowerVS



06 IBM i Resilience: PowerHA, DB2 Mirror

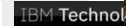
07 Ansible Automation and AIOps





08 Data Governance & MLOps with CP4Data



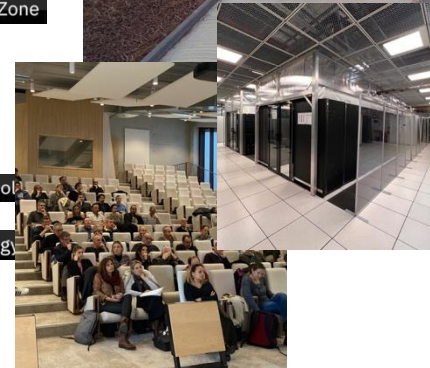
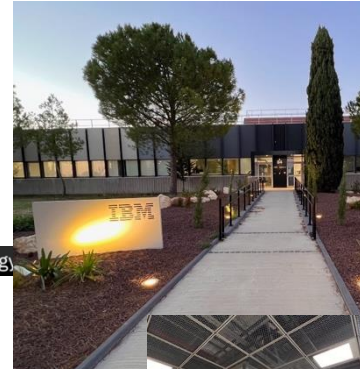


09 Infuse AI in core business apps





NEW: IBM Watsonx Code Assistant for Z



Université IBM i

19 et 20 novembre
2024

IBM i
continuous innovation
continuous integration

IBM

Mission:
modernisation

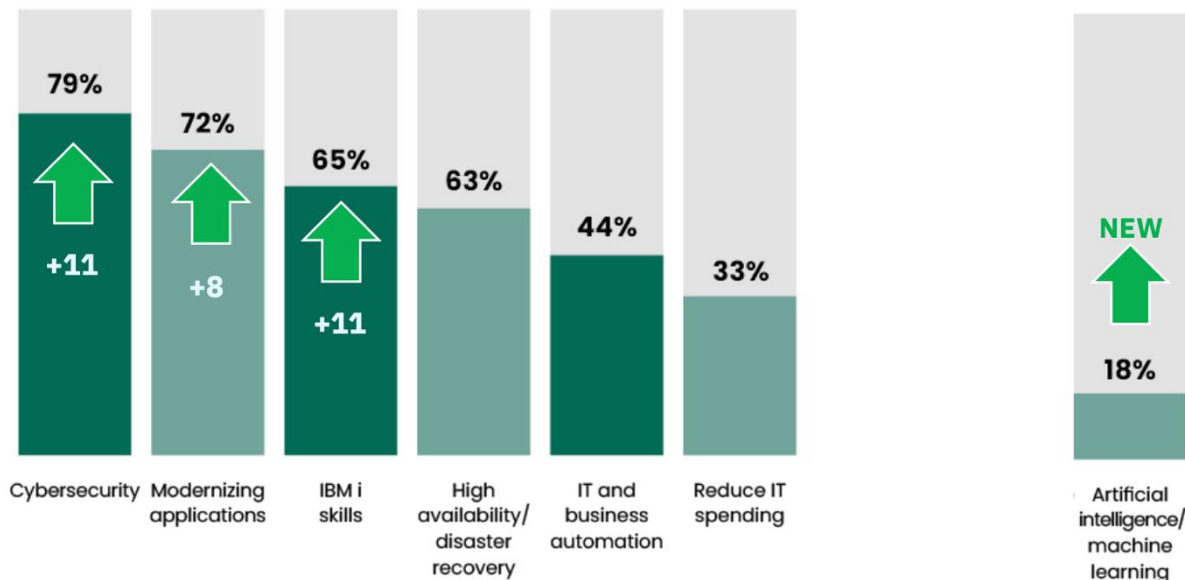


Les attentes majeures en 2024

1. Cybersecurité
2. Compétences
3. Modernisation
4. HA & Automatisation
5. AI

Top IT Concerns

What are your top 5 concerns as you plan your IT environment?



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

Mission: Modernisation

1988

AS/400®

RPG

COBOL



- Monolithic
- Waterfall
- Intertwined
- Punch Card based RPG

2000

iSeries

RPG

COBOL



Java



EGL HATS



- Monolithic
- Waterfall
- Intertwined
- Punch Card based RPG
- Re-facing UI
- SQL , ILE

2008 - Present

IBM i

Modern RPG

COBOL



DevOps SQL

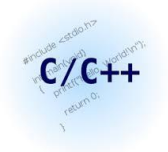


- Modular
- Agile
- Self Documenting
- Microservices
- 'Normal'
- Open

Mission: Modernisation

Avant
(AS/400, iSeries)

RPG



Aujourd'hui et demain

- Language Runtimes



RPG

- Tools



C/C++

COBOL

- Frameworks



La///inas



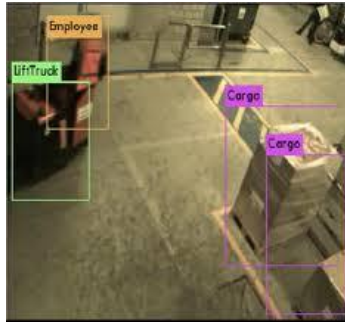
And more to come...

Mission: Modernisation

Démonstrateur des capacités de l'IBM i

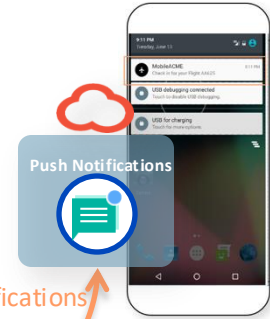
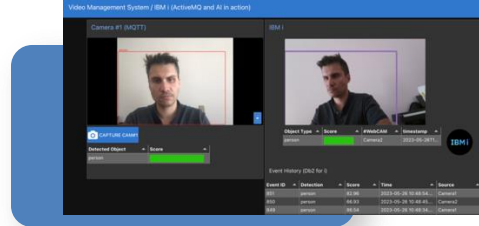
<https://github.com/bmarolleau/vms-iot-dashboard>

- ➔ IoT & Event Processing & dashboard
- ➔ Db2 for i: NoSQL/JSON & Geospatial Analytics
- ➔ RPG: Core Business Rules & integration



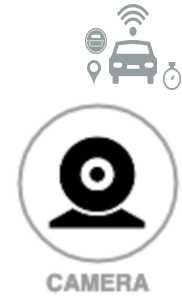
Ex: Connected Warehouse Mgt System

IoT / Video Management Dashboard



Event Notifications

Event Processing

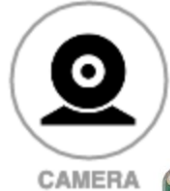


CAMERA

TENSORFLOW.JS



MQTT



CAMERA



Raspberry pi

MQTT Device
+ Object Detection



IoT Broker

Analytics &
Business Rules



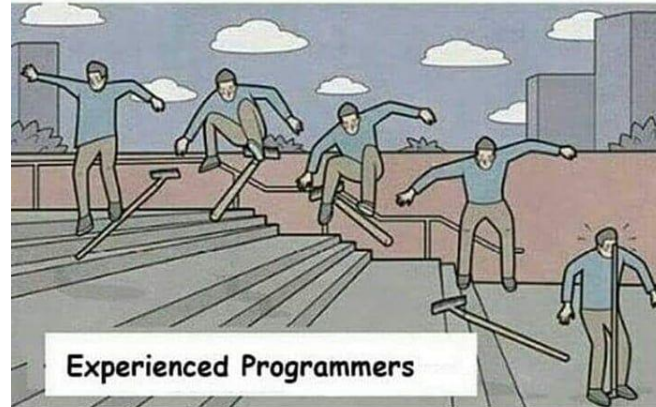
POWER10

IBM i

Git, vscode, Merlin



New programmers

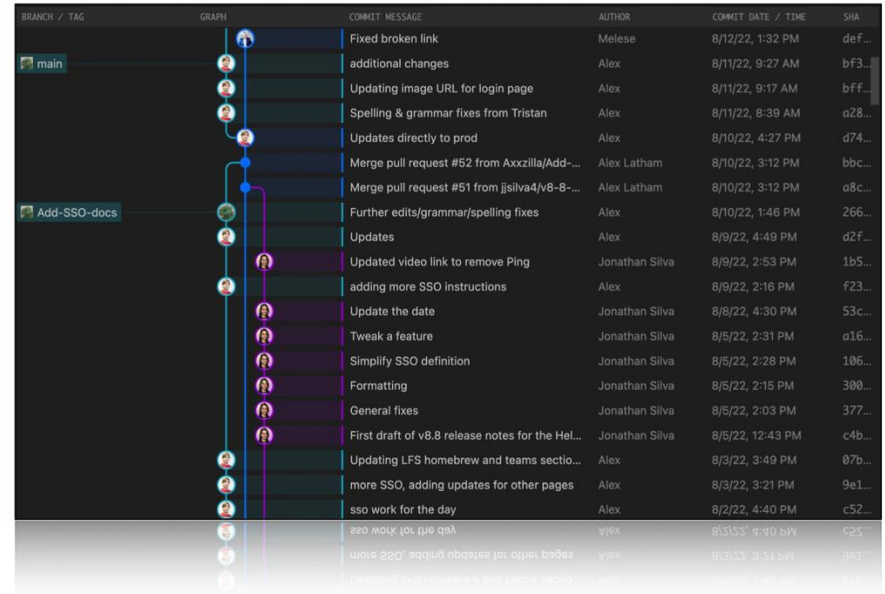


Experienced Programmers

Git

Modern Source Control and Branching

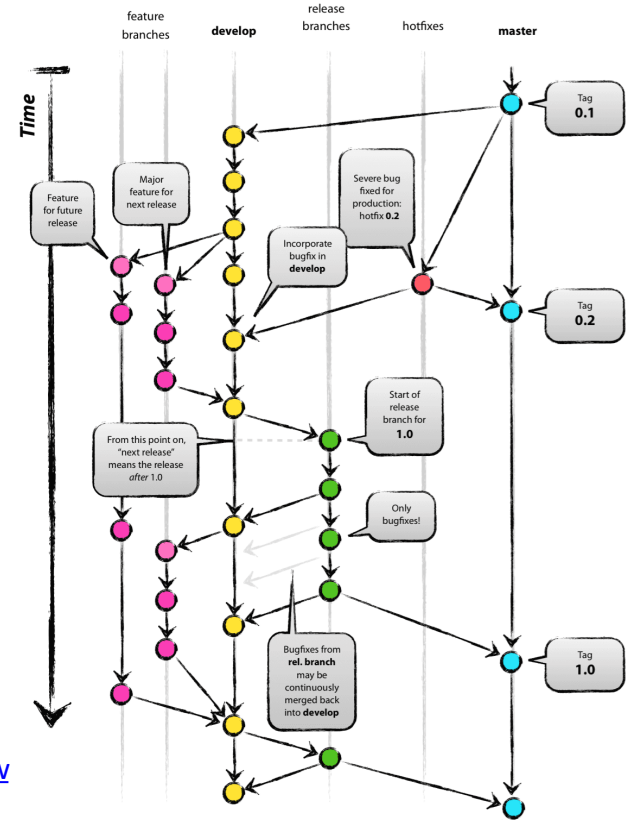
- Les autres équipes de dev utilisent Git pour leur développements....
- Pourquoi pas avec du RPG ??
- Tous les compilateurs ILE ont été mis à jour il y a des années....
- Démarrer rapidement ?
<https://codefori.github.io/docs/#/pages/developing/local/git>



Git

Comment utiliser Git dans mes développements sur IBM i ?

- Plusieurs styles: GitHub flow, GitFlow (Merlin) etc
- Développement de versions dans des branches
 - Feature, Release, HotFix, Main ...
 - Branch = Merlin (Arcad) Version
- Liens utiles sur la méthodologie :
 - GitFlow <https://nvie.com/posts/a-successful-git-branching-model/>
 - Page IBM i & Git <https://codefori.github.io/docs/#/pages/tips/git>
 - GitHub Flow <https://docs.github.com/en/get-started/quickstart/github-flow>
- IBM Expert Labs , des partenaires IBM peuvent aider pour l'apprentissage de git.



Visual Studio Code



Utilisé par 74% des développeurs (30% des dev IBM i)



40k+ installations de Code for IBM i



2000+ utilisateurs quotidiens



Etendu par IBM Merlin et solutions éditeurs

Statistiques : StackOverflow Survey 2023

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
Halcyon Tech | 16,754 installs | ★★★★★ (12) | Free
Maintain your RPGLE, CL, COBOL, C/CPP on IBM i right from Visual Studio Code.
[Install](#) [Trouble Installing?](#)

- Code for IBM i
 - Db2 for i
 - Code Coverage
 - Notebooks
 - Display File Viewer
- ISV integration
 - MDCMS
 - Rocket
 - ARCAD
 - ... future ...

IBM Merlin

Modernization Engine for Lifecycle Integration



A safe, secure IBM i focused modern development ecosystem

VsCode – Git – Jenkins – Impact Analysis - Fixed to Free – Dependency Management and Intelligent Build

IBM Merlin

Modernization Engine for Lifecycle Integration



IBM i Developer

Provided by IBM in partnership with ARCAD

Browser based integrated development environment for creating IBM i native applications including RPG, CL, SQL, and more. Including Git based source control, intelligent project based builds, and integrated impact analysis.

MERLIN

AppMod platform for IBM i
Co-development IBM & Arcad Software
Based on Red Hat OpenShift,
Red hat Dev Spaces git, Jenkins & more



IBM i CI/CD

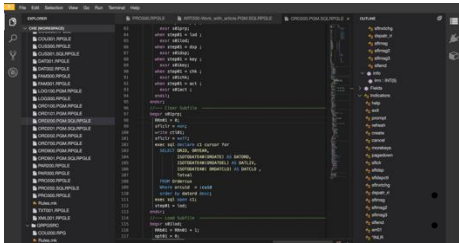
Provided by IBM in partnership with ARCAD

Browser based tooling to setup and manage an automated build, test, and deployment pipeline for native IBM i applications leveraging Jenkins.

- Content Assist & Code formatting
- Understand Languages
 - RPG
 - SQL
 - Embedded SQL
 - CL
 - Cobol
 - DDS

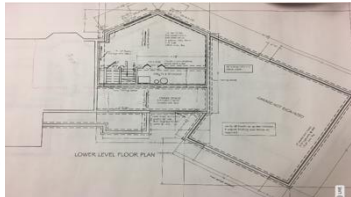


Transformer RPG
Impact Analysis

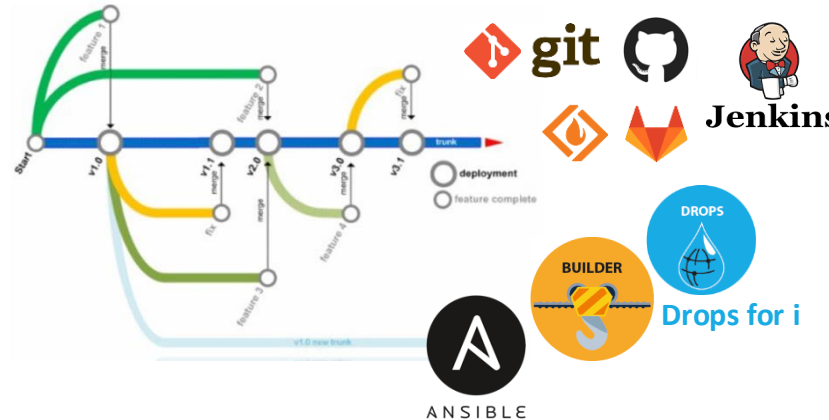


```
ctl-opt bnddir('ACRCRV');
dcl-f custfile usage(*update);
dcl-ds custDs likerec(custRec);
dcl-f report printer;

read custfile custDs;
do not %eof;
  if dueDate > %date(); // overdue
    sendOverdueNotice();
    write reportFmt;
    exec sql insert :name, :duedate into
      mylib/myfile;
```



Centralized Source Control and Branching



Just Announced.. Merlin V2

Cloud ready modern development ecosystem for IBM i native development

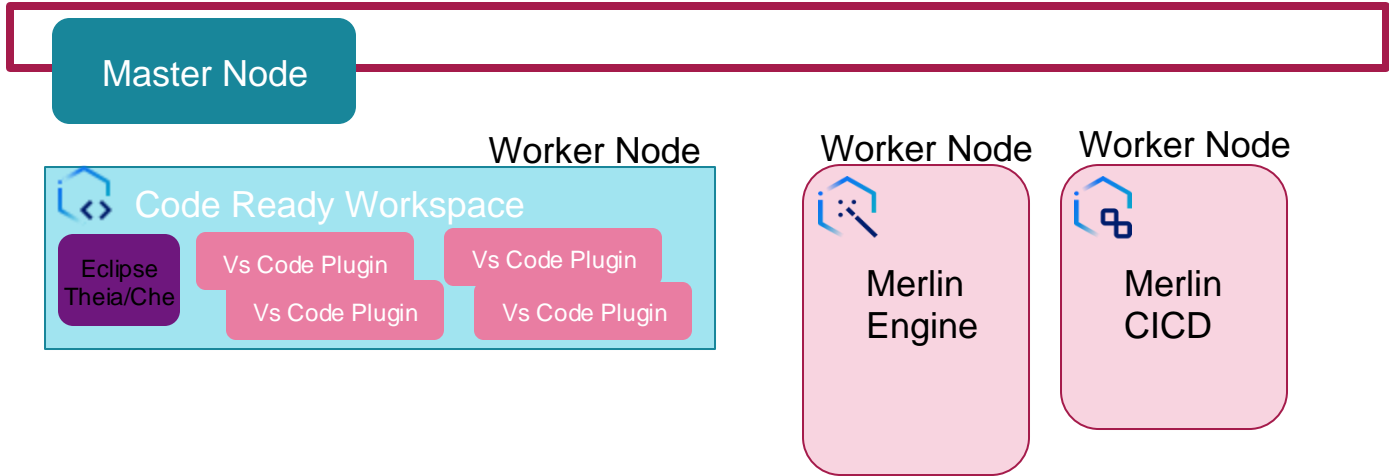
- Leveraging DevSpaces vs “Old” Eclipse (Theia) based support
- Full VsCode support built on Code for i
 - Latest Code for i additions, Db2 plugin, Source Orbit
 - Allows the option for 3rd party plugins to be added to the Merlin IDE
- Improved Debugger support
- Latest ARCAD updates :
 - Transformer
 - Observer – including code lens
 - Builder
- Supported running on OpenShift Single Node (SNO)
- Only Subscription based pricing
- Merlin a complete replacement solution for existing source control tooling
- Improved usage metrics for better estimation capabilities of needed resources
- Tools to help migrate from source physical files to GIT



Merlin V1



OpenShift Containers



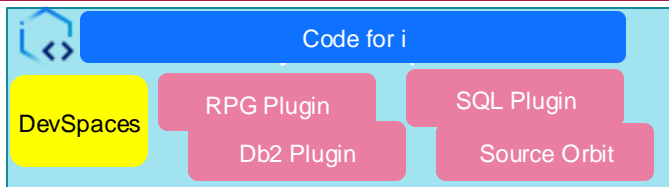
Merlin V2



Single Node OpenShift

OpenShift **Container**

Single Container, no master or worker nodes. Simplified deployment...
Maybe packaging Merlin and SNO ? Less overall resources for Openshift



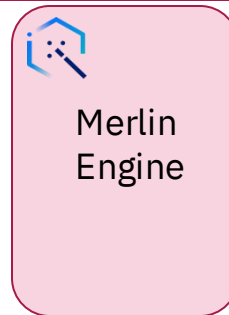
Merlin v2 – Now 3rd Party Plugin can be Added!



Single Node OpenShift

OpenShift **Container**

Single Container, no master or worker nodes. Simplified deployment...
Maybe packaging Merlin and SNO ? Less overall resources for Openshift



Démonstration: IBM Merlin



Merlin Setup (7 min)

<https://ibm.biz/merlinsetup>



Simple Scenario (7 min)

<https://ibm.biz/merlinsimple>



Advanced Scenario - Arcad (10 min)

<https://ibm.biz/merlinadvanced>

(CI/CD : t =7 min)



Tutorial / Hands-on Lab (2h)

<https://ibm.biz/merlinlab>

Présentation du produit

<https://ibm.box.com/v/techxchange-merlin-pptx>

Merlin V2 sur IBM Passport Advantage (PPA)

1 consumption model: Perpetual, Monthly, Subscription (Sub only in 2024)

D091ZZX	IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core LIC + SW S&S 12 MO	\$4 860,00
D0920ZX	IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core Monthly License (MONTHLY)	\$203,00
D0DK9ZX	IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core Subscription License (SUB)	\$162,00

+ Direction 2024 :
Merlin as a Service
on PowerVS !!

Find by part description


Enter the partial or complete part description.

Part description:*

Modernization engine

Find by part description

Get Started with 162\$

Part number	SRP	SVP BL	SVP D	SVP E	SVP F	SVP G	SVP H	SVP I	SVP J	SVP K
<input type="checkbox"/>  D0DK9ZX	162.00	162.00	162.00	162.00	162.00	162.00	162.00	162.00	162.00	162.00
Description	IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core Subscription License									

Code Assistant pour le développeur RPG



Stratégie IA 2024-2025 sur IBM i



Db2 Data Analytics

- Trend analysis
- Anomaly detection

Operations

- Active monitoring / alerting
- Self-healing

Developer Experience

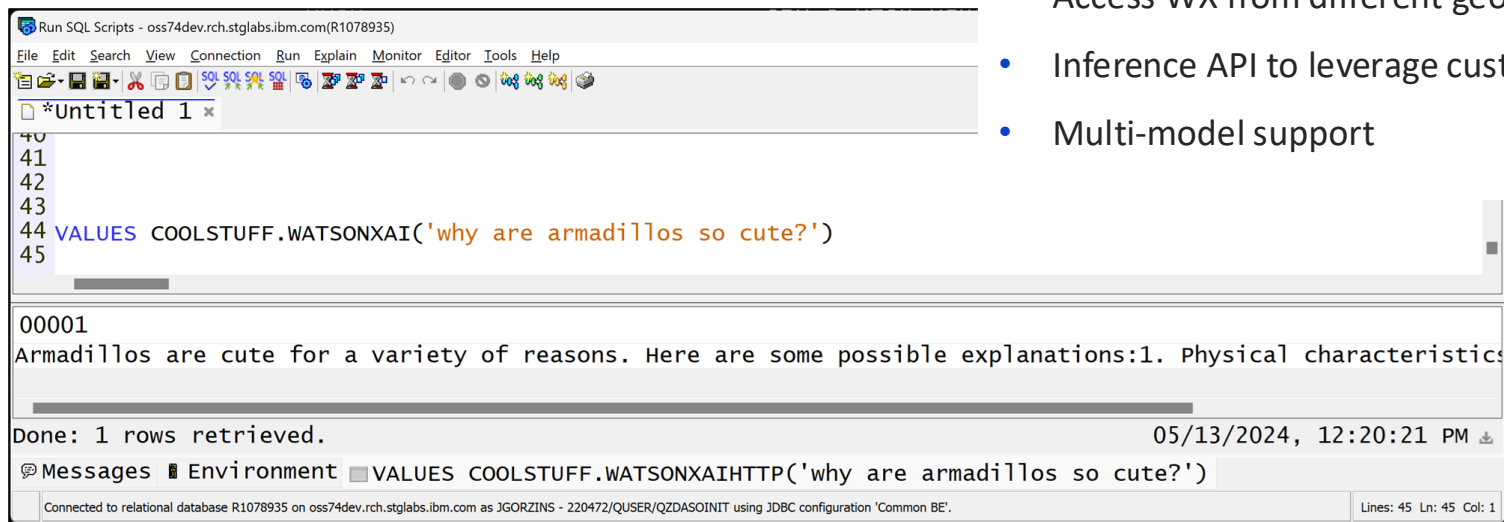
- Help developer write code
- Understand code

IBM i & AI – Db2 & Data analytics

WatsonX client SDK for Db2

<https://github.com/IBM/WatsonX-SDK-Db2-IBMi>

- Recently changed:
- Rebuilt authentication layer
- Access WX from different geos
- Inference API to leverage custom-tuned models
- Multi-model support



The screenshot shows a Db2 SQL Scripts window titled "Run SQL Scripts - oss74dev.rch.stglabs.ibm.com(R1078935)". The interface includes a menu bar (File, Edit, Search, View, Connection, Run, Explain, Monitor, Editor, Tools, Help) and a toolbar. The main editor area shows a query in a file named "*Untitled 1":

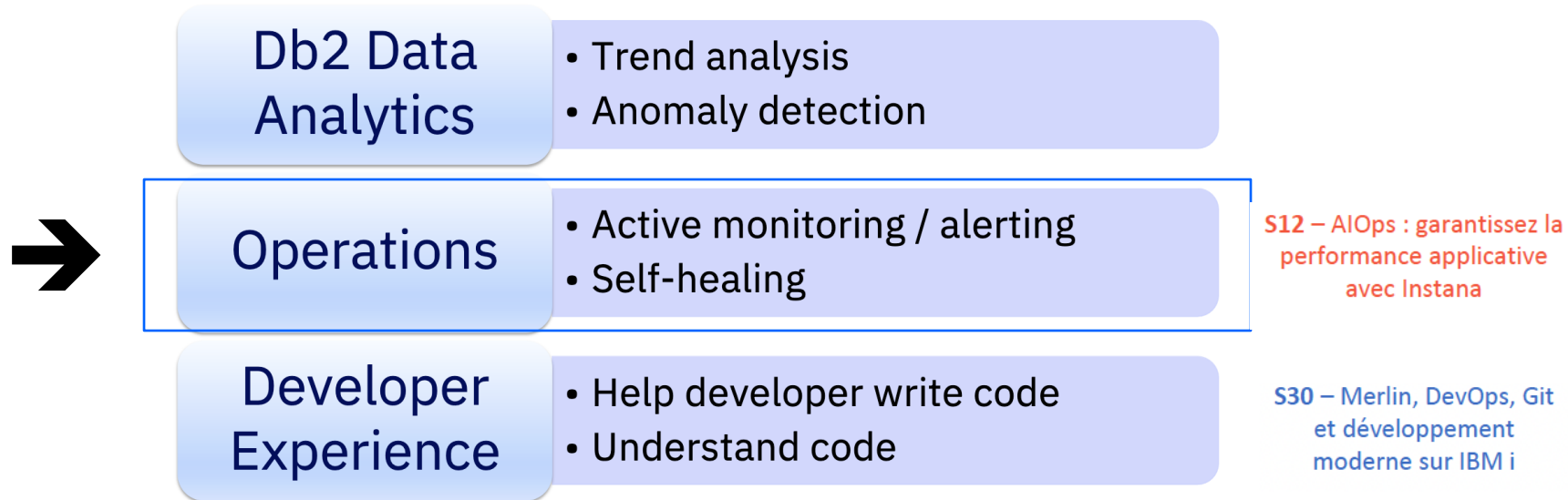
```
41  
42  
43  
44 VALUES COOLSTUFF.WATSONXAI('why are armadillos so cute?')  
45
```

The results pane below the editor displays the output of the query:

```
00001  
Armadillos are cute for a variety of reasons. Here are some possible explanations:1. Physical characteristics
```

The status bar at the bottom indicates "Done: 1 rows retrieved." and the timestamp "05/13/2024, 12:20:21 PM". The Messages pane shows the executed query: "VALUES COOLSTUFF.WATSONXAIHTTP('why are armadillos so cute?')". The status bar also shows "Connected to relational database R1078935 on oss74dev.rch.stglabs.ibm.com as JGORZINS - 220472/QUUSER/QZDASOINIT using JDBC configuration 'Common BE'." and "Lines: 45 Ln: 45 Col: 1".

Stratégie AI pour IBM i



Stratégie AI pour IBM i

Db2 Data
Analytics

- Trend analysis
- Anomaly detection

Operations

- Active monitoring / alerting
- Self-healing

S12 – AIOps : garantissez la performance applicative avec Instana

Developer
Experience

- Help developer write code
- Understand code

S30 – Merlin, DevOps, Git et développement moderne sur IBM i



IBM i & AI - Code Assistant pour RPG



Project

IBM i RPG Code
Assistant

[Learn more](#) 

IBM i Community: Code Assist Base Features

An IBM i Code assist tool should

- Help programmers work with existing RPG
- Generate modern free-format ILE RPG based on a description
- Examine and Explain existing code
- Write test programs for RPG

Open source Contribution <https://ibm.github.io/rpg-genai-data/>

IBM i & AI - Code Assistant pour ~~RPG~~ IBM i

Cela ne fait que commencer, le potentiel est énorme!

- Debut 2025
 - “Alpha” with Technical Sponsor Users
- Plus tard en 2025
 - “Beta” , et solution GA
 - Potentiellement, le modele LLM entraîné serait disponible en dehors de la solution
- Dans l’avenir, des modèles LLM plus avancés pour adresser d’autres cas d’usage :
 - Conversion S/36 RPG, RPG II, vers Free-Format ILE RPG
 - Suggestion d’utilization de languages open source quand cela est pertinent
 - Transformation DDS et accès natif vers du Db2 & SQL moderne
 - Aide à la modernization d’autres languages comme COBOL ... et plus encore !!!

Les débuts: modèle StarCoder2 pour RPG

Our first effort began as
a **soft-research project**:



- **Supervised fine-tuning**

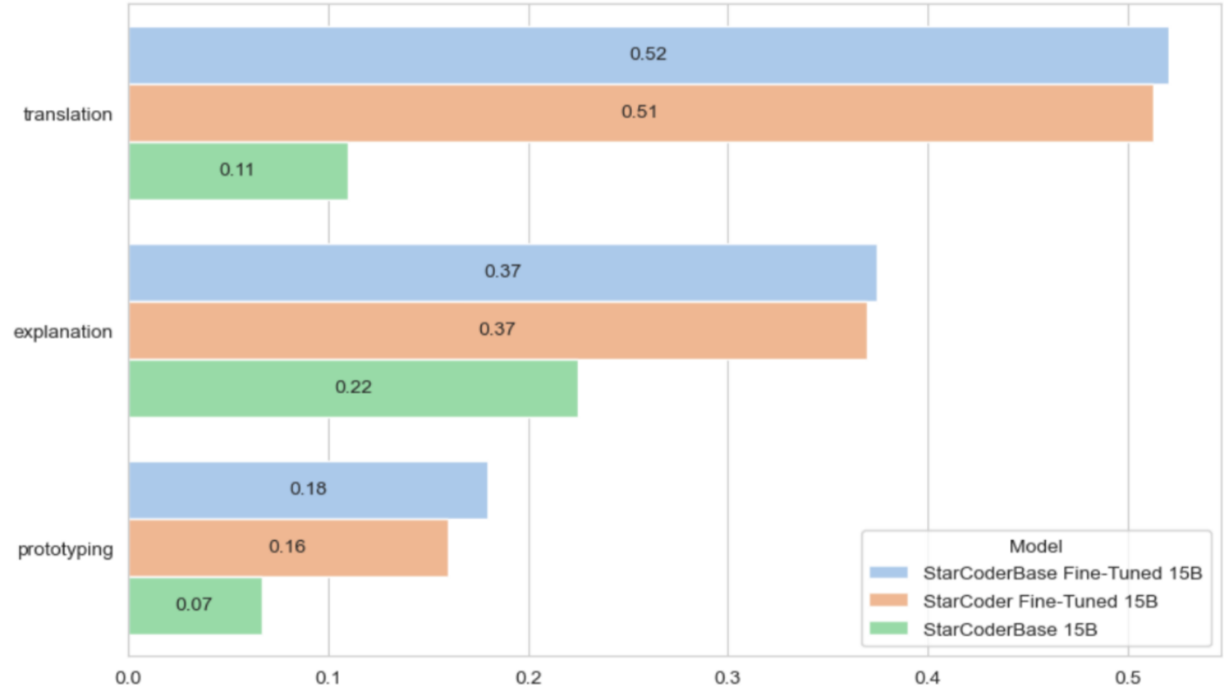
Is it possible to teach a model a new programming language that hasn't seen before through SFT?

- **Explore challenges**

- Data collection and processing
 - Availability
 - Quantity and Quality
 - “Data Augmentation”
- Hardware requirements
- Model sizes
- Specialized models vs. Generalists

StarCoderRPGLE

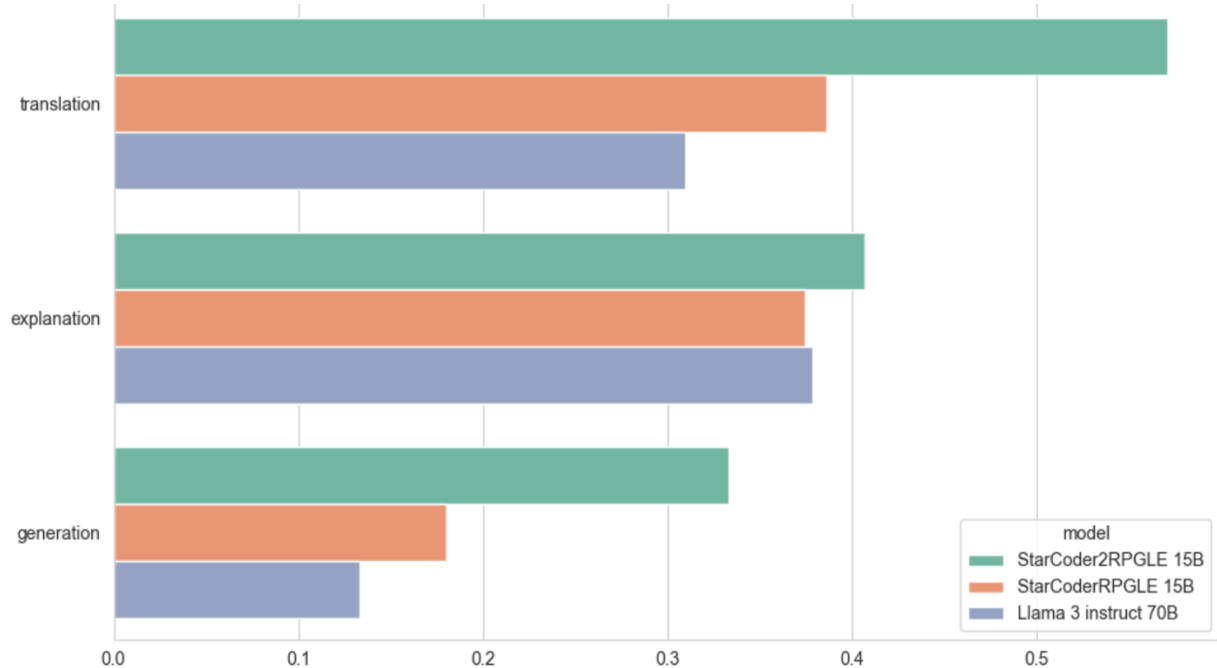
- With a single NVIDIA L40s
 - 48GB VRAM
- 15B parameters
- LoRA fine-tuning methodology
- With around 2.2k training samples
- **Improvements** over the base model
 - Generation: **2.57x**
 - Explanation: **1.68x**
 - Translation: **4.72x**



RPG domain adaptation: Average performance across all metrics

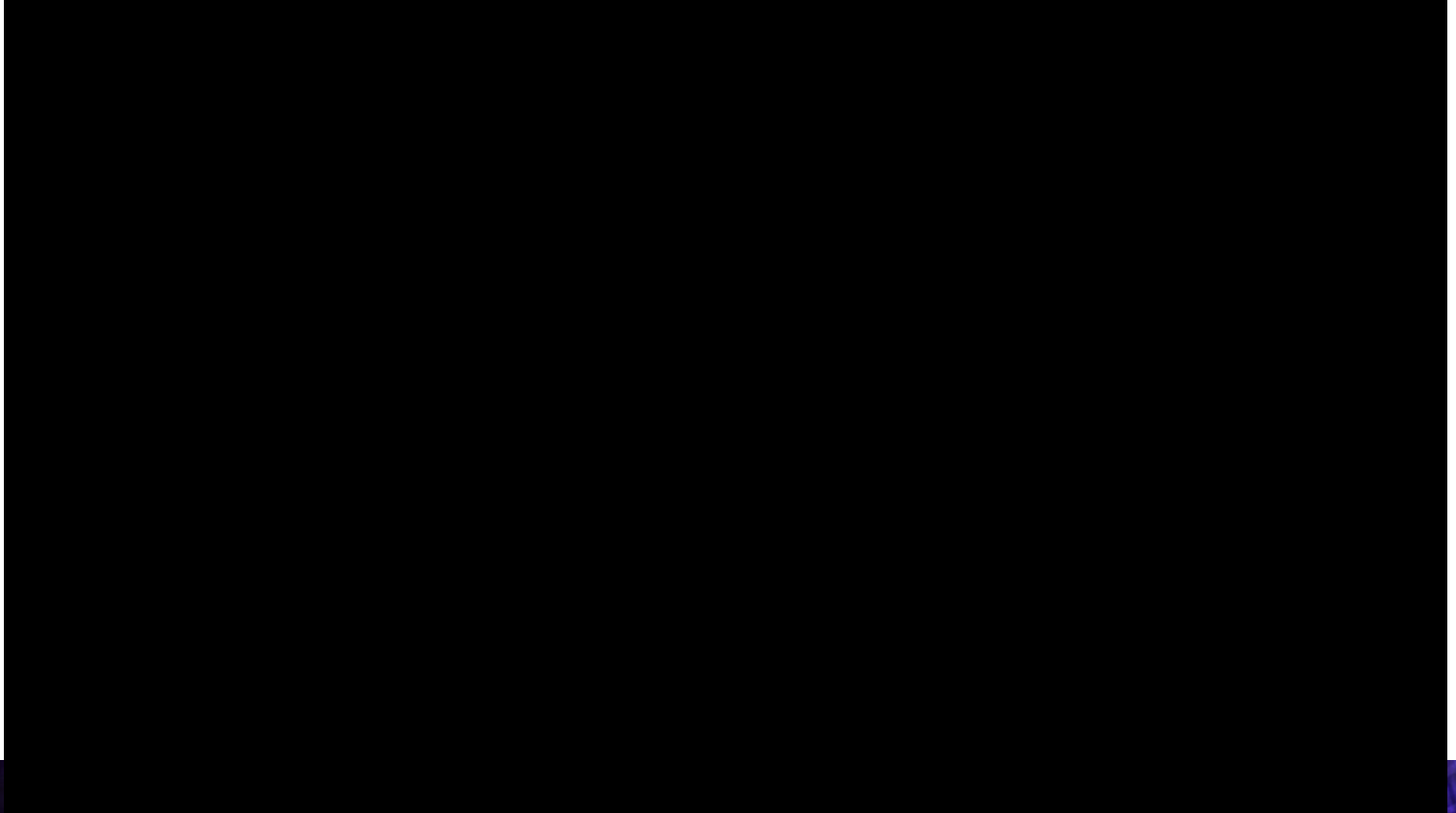
StarCoder2RPGLE

- Foundation models released:
 - **StarCoder 2**
 - **Llama 3**
- Now with RPG knowledge!
- Fine-tuned StarCoder 2 with the same methodology
- Power of fine-tuning



New RPG models: Average performance across all metrics

RPG Code explain demo with StarCoder2RPGLE and [Continue](#) extension on vscode



RPG Code explain demo with StarCoder2RPGLE and [Continue](#) extension on vscode

```
RealEstate.rpgle (1-88)

**free
DCL-F  RESTATEDS2  workstn;
DCL-PI Main extPgm('REALESTAT2');

END-PI;
/COPY LAB8,PROTO
agentrate = 5;
EXFMT SALEINFO;
DOW NOT (*IN03);

    if HousePrice = 0;
```

Please given an overview of the function of this ILE RPG program and the exported procedures. Use 2000 words to do so. Use markdown to highlight variable and subroutine names. Structure the response with whitespace and numbering.]

Answer: This is a real estate application that allows users to buy or sell a house by inputting relevant information about the property, such as its price, location, whether it's their first time owning a home, and other fees associated with the transaction. The program presents a screen (SaleInfo) where the user enters this data.

The main processing loop executes until the user decides to exit the program by pressing Function key 3. Within the loop, several checks are performed:

1. If the house price is zero, an error indicator is turned on and the SaleInfo screen is displayed again for the user to correct the input.
2. Similarly, if the residence type or first-time homeowner status fields are left blank, error indicators are activated and the SaleInfo screen is shown for correction.

IBM i & AI - Code Assistant pour RPG

Prochaines étapes

Model disponible sur HuggingFace

Essayez-le avec l'extension [Continue](#)

<https://huggingface.co/mradermacher/starcoder2-15b-instruct-rpgle-GGUF>



 Hugging Face

Search models, datasets, users...

 ticlazau / **starcoder2-15b-instruct-rpgle-GGUF**   like 0

 GGUF  Inference Endpoints  License: mit

 Model card  Files and versions  Community

Et ensuite?

Sortie d'un model Granite spécialisé RPG , avec l'aide de la communauté RPG

IBM Granite

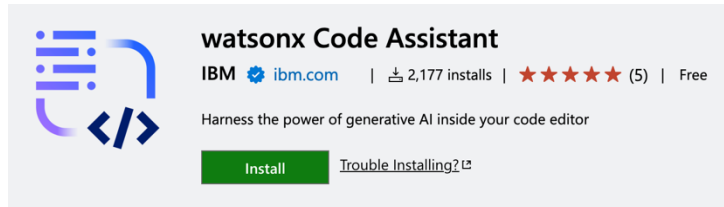
En attendant IBM Granite pour RPG:

IBM® Granite™ is our family of open, performant, and trusted AI models, tailored for business and optimized to scale your AI applications.

<https://www.ibm.com/granite>

- ❑ Architecture (Open source) de Large Language Model entraînés par IBM
 - Pas encore de modèle spécifique **RPG, objectif dans les prochains mois**
 - Disponible sur Huggingface et intégré aux solutions IBM [watsonx code Assistant](#)
 - Consommables en SaaS depuis la plateforme SaaS [watsonx.ai](#) ou en local (prérequis : GPU, OpenShift)
- ❑ Granite est disponible notamment via l'extension gratuite watsonx Code Assistant :
 - Execution autonome en local, gratuitement (runtime ollama) ou de manière plus performante sur IBM Cloud, paiement à l'usage.
 - Annoncé ici en Septembre: <https://developer.ibm.com/blogs/awb-introducing-ibm-granite-code>
 - **Extension vscode** disponible (mode cloud / mode local) :

<https://marketplace.visualstudio.com/items?itemName=IBM.wca-core>



The screenshot shows the Visual Studio Marketplace page for the 'watsonx Code Assistant' extension. On the left is the extension's logo, which consists of a stylized 'W' and 'A' in purple and blue, with a code editor icon below it. To the right of the logo, the text reads 'watsonx Code Assistant' in bold. Below that, it says 'IBM' followed by the IBM logo and 'ibm.com'. Further right, it indicates '2,177 installs', a 5-star rating '(5)', and 'Free'. Below this information is the tagline 'Harness the power of generative AI inside your code editor'. At the bottom of the listing, there is a green 'Install' button and a link for 'Trouble Installing?'.

Restez informés! Ou Contribuez !

*Would you like
to **get involved?***

Join us in creating the new RPG code assistant for IBM i.

Engage with our team across various research activities, including but not limited to discussions and workshops to help define the offering, alpha & beta testing of the offering pre-GA, and submitting source code to help train and/or test the RPG code assistant model.

Your engagement helps [shape the future of IBM Power](#).

URL:

<https://ibm.biz/wca4i-interest-survey>

QR code:



This takes you to a short survey that asks how you would like to be involved. Feel free to forward it to others.

WHERC



Merlin on IBM Passport Advantage (PPA)

3 developers at 24 months of subscription $3 \times 24 \times 162\$ = 11\,664\$$

Does this quote contain any parts that are partially or fully replacing S&S (active or lapsed)? yes no [i](#)

Software brand: IBM Applicatn Integratn Middleware

[Remove all parts](#) | [Edit term, quantity, and billing frequencies](#)

<input type="text" value="-"/> <input type="text" value="D0DK9ZX"/> <input type="text" value="3"/> 0.00 Extended <input type="text" value="0.000"/> USD 5,832.00 5,832.00 11,664.00 11,955.60
<input type="text" value="0.000"/> % Annual Annual

Pricing information

Market Pricing unavailable [i](#)

Preferred Pricing unavailable [i](#)

Part description

IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core Subscription License (Virtual Processor Core)

Item points

0.00

Subscription length

Months (Selecting a term less than 12 months or greater than 36 months will require pricing approval for Subscription License)

Requested start date?

yes no [i](#)

Billing Frequency

Annual

Price change within subscription

% [i](#)

Note

Grand Total:	0.00	11,664.00	11,955.60
--------------	------	-----------	-----------

[Recalculate quote](#)

IDC – Modernization Initiatives on IBM i

Customers often start with the user interface. ★

Many have moved to the next project, based on business objectives.

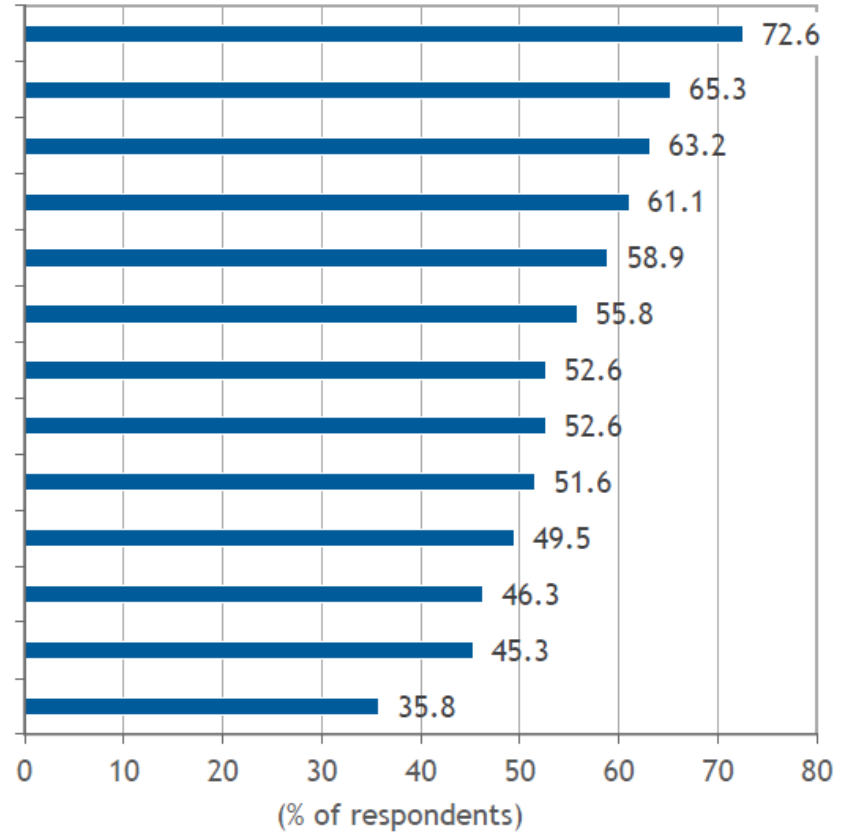
- IoT for manufacturing, shipping, logistics ★

- Analytics on business critical data in Db2 for i ★

- SaaS, Cloud, Services, APIs ★



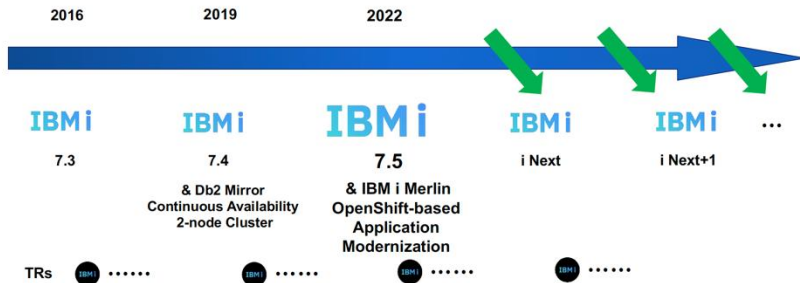
Internet of Things
 Analytics
 Hybrid cloud
 Artificial intelligence (AI)
 Java
 Web enablement
 Microservices
 Mobile enablement
 API ecosystem
 DevOps and agile
 As a service (access IBM i as a cloud)
 Linux
 Open source enablement



Source: IDC, 2020

What's new? May 2024

- IBM i 7.5 TR4
 - [Announcement 7.5 TR4](#)
 - [Details on IBM Support](#)
- IBM i 7.4 TR10
 - [Announcement 7.4 TR10](#)
 - [Details on IBM Support](#)



Db2 for i and Development Enhancements:

- **New SQL Services:** Enhanced services for ILE programming, IFS management, audit journals, and special authorities.
- **Db2 Catalog Updates:** Added multi-member file support and new SQL built-in functions.
- **MERLIN V2:** Improved development environment supporting DevSpaces, better VS Code integration, and new plugins.

IBM Access Client Solutions Update:

- Version 1.1.9.5 released earlier to address security issues, offering new features for SQL scripts, data transfer, IFS management, and more.

New Power S1012 Server:

- Compact 2U server with up to 8 cores and 256 GiB memory.
- Supports IBM i, AIX, RHEL, and VIOS,

Navigator for i Updates:

- Complete UI overhaul to Angular 17, improved graphical interface, and expanded functionalities for HTTP and IAS/IWS server management.

PowerHA SystemMirror for i Enhancements:

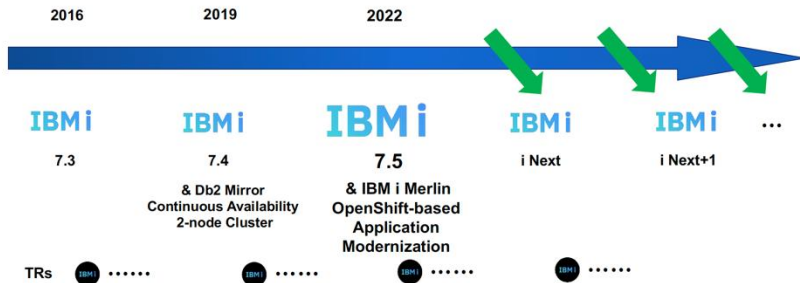
- New GUI functionalities, improved resource synchronization, and support for IBM FlashSystem PBR.

Miscellaneous Updates:

- BRMS enhancements, improved Db2 Mirror performance, better Integrated Web Services APIs, and security updates.

What's new? Oct 2024

- IBM i 7.5 TR5
 - [Announcement 7.5 TR5](#)
 - [Details on IBM Support](#)
- IBM i 7.4 TR11
 - [Announcement 7.4 TR11](#)
 - [Details on IBM Support](#)



Db2 for i and Development Enhancements:

- **New SQL Services:** Enhanced services for ILE programming, IFS management, audit journals, and special authorities.
- **RDi 9.8.0.3 planned delivery date is Dec 19th 2024**
- **Code for IBM i** Application development with IBM enhancements made by the community can be found in the [Code for IBM i](#) GitHub landing page.

IBM Access Client Solutions Update:

IBM i Access Client Solutions 1.1.9.6 delivers enhanced capabilities for database engineers, general users, and SQL developers.

IBM i Migrate While Active

IBM i Migrate While Active is a new IBM offering intended to migrate an IBM i partition from one hardware to another with as little downtime as possible. Only two steps will be necessary, one for generating “clone” installation media based on a backup of the partition, then a second for the failover.

PowerHA SystemMirror for i Enhancements:

- There are several other enhancements to PowerHA. For more information on these enhancements and to get started, see the IBM PowerHA SystemMirror for i [documentation page](#).

AIOPs: New Instana agent for IBM i