Université IBM i

7 novembre 2023

IBM Innovation Studio Paris

S20 - DevOps sur IBM i avec IBM Merlin

16:00 / 17:00

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infrasdufutur

#ibmi
#uii2023
#infrastructuredufuturIBM23

IBM

Infrastructures du futur

7 et 8 novembre 2023

Agenda

- Introduction à la modernisation applicative et DevOps sur IBM i
- Qu’est-ce que IBM Merlin ?
- Démonstration

IBM

Infrastructures du futur

7 et 8 novembre 2023

Université IBM i

7 novembre 2023

IBM i 35 YEARS

Let's Create

1. Modernisation?

World leader
in **DevOps for IBM i**
solutions and services

ARCAD SOFTWARE

30+ years of
expertise

Distributed
worldwide by

IBM

Co-author with IBM
of Merlin

Contributing
member of

ECLIPSE FOUNDATION

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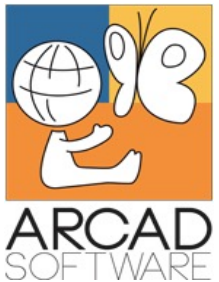
IBM – ARCAD: un long partenariat technologique



- **2003** Intégration avec WDSC (predecessor of Rdi)
- **2007** RPG Free Form converter
- **2012** Rational Innovation award
- **2013** Licences ARCAD dans le Passport Advantage
- **2016** Intégration avec Urbancode
- **2017** ARCAD Observer + RPG converter dans le e-config Channel (5733AO1 – 5733AC1)
- **2022** Merlin

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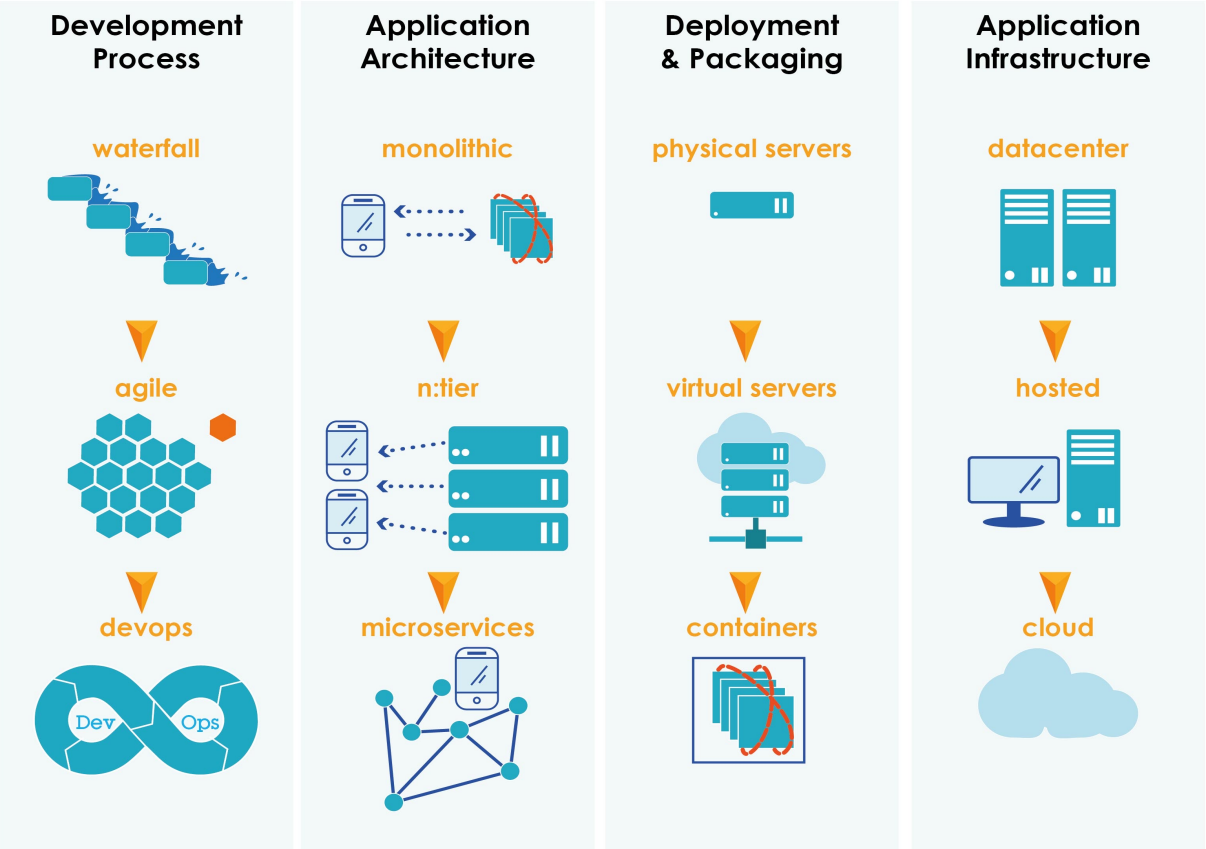
Résumé des mutations technologiques



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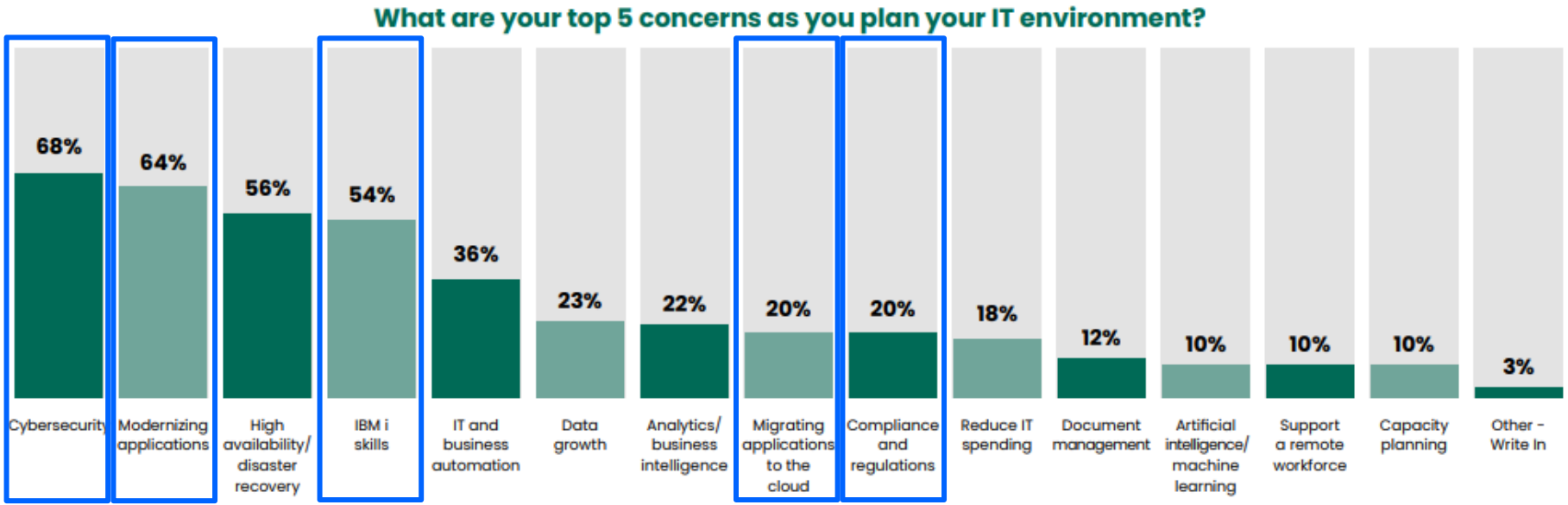
Principales préoccupations des clients IBM i



Source: 2023 IBM i Marketplace Survey Results - Fortra

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Pourquoi DevOps ?

DevOps n’est pas un mouvement bénin

DevOps, une démarche stratégique

- Augmente la productivité des développeurs
- Réduit le temps de mise sur le marché

Taille globale du marché

- De $7bn en 2021…
- … à $58bn d’ici 2030 !

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DevOps sur IBM i: quelle valeur ?

- Permet d'assurer la transition entre les générations de développeurs
- Aligne le monde IBM i avec le monde digital
- Permet de rendre l'IBM i plus « standard » avec des pratiques modernes de développement

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DevOps: une stratégie d’entreprise

- **Conseillée** par les auditeurs externes
  - Risque de perte de connaissance
  - Contraintes rêglementaires (séparation des rôles)
- **Souhaitée** par la direction générale
- Pas toujours bien **acceptée** par les équipes
- Mise en œuvre avec l’aide **d’experts**
  - Healthcheck
  - Assistance régulière

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DevOps: une stratégie d'entreprise

IBM Let's Create

- Convergence des méthodes de travail
- Partage des même outils
- Collaboration naturelle entre les équipes

- **Diversité** des équipes
- **Unicité** des méthodes & outils

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DevOps: l’outillage joue un rôle prépondérant

IBM Let’s Create

- Les outils traditionnels ne sont plus adaptés (quand ils existent…)

- Adopter les outils les plus populaires du monde Open
- Généraliser leur usage au monde IBM i

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DevOps sur IBM i: quels enjeux ?

- **Un monde qui n'a pas changé depuis 3 décennies**
  - Passer aux standards DevOps = Transfert naturel de compétences entre les équipes de développement
  - Changement d'état d'esprit → créer des champions IBM i dans les équipes
  - Besoin d'arguments forts et évidents pour l'adoption
- **La sécurité est la priorité absolue**
  - De nouveaux outils sont nécessaires
- **Les architectures d'application sont spécifiques**
  - Plat de spaghetti → Besoin de "**intelligent builds**"
  - Volume élevé de code → Besoin de **compréhension du code**
  - Applications critiques pour l'entreprise → Besoin de **tests automatisés**

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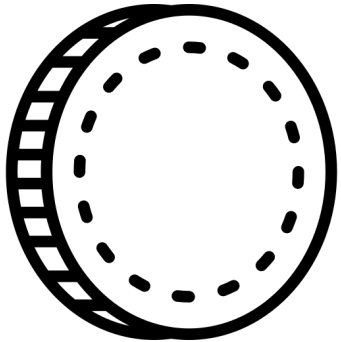
DevOps et modernisation d'applications = 2 faces d'une même pièce !



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Les “standards” du DevOps

Git

- Repository central unique
  - Une seule méthodologie pour toutes les technologies
  - Traçabilité totale
  - Compatibilité avec les standards commerciaux (GitLab, GitHub, Bitbucket)

- Support total du modèle de “branching” sur l’IBM i
  - Décentralisé au niveau développement
  - Centralisé au niveau production

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VS Code

IBM Let's Create

- L'IDE le plus populaire (*)
  - **#1- Simplicité**
  - **#2- Extensibilité**
  - **#3- Gratuit**
  - **#4- Performance**
  - **#5- Evolutivité**

(*) https://insights.stackoverflow.com/survey/2021#section-most-popular-technologies-integrated-development-environment

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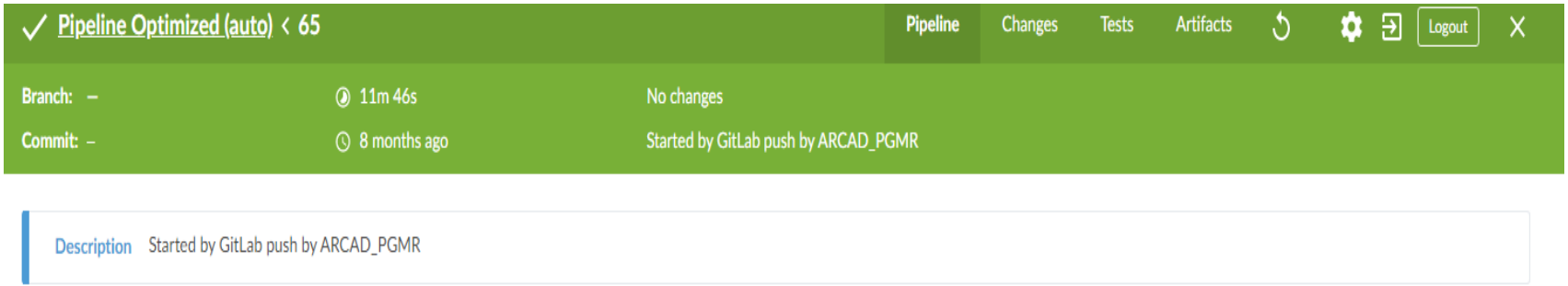
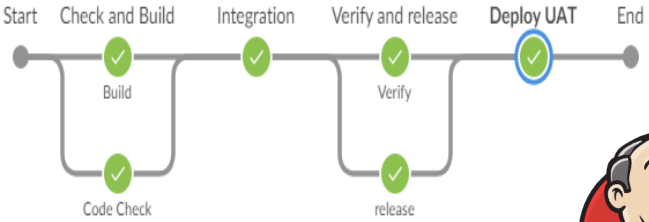
Jenkins

IBM Let's Create

Standard dans l'intégration continue





Jenkins

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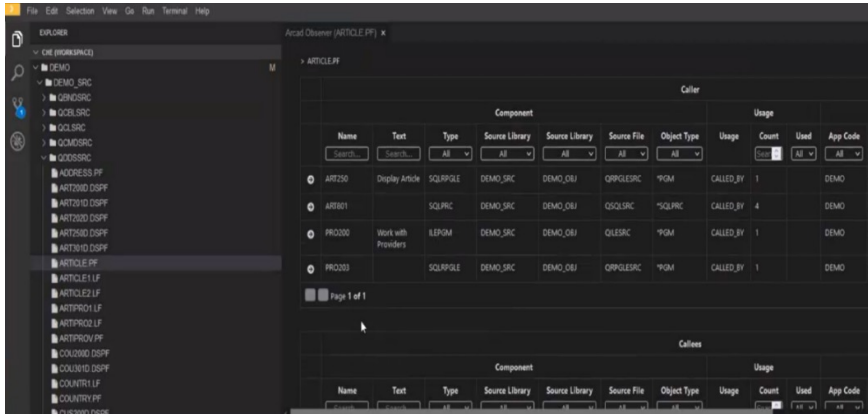
ARCAD Metadata Repository

« L'intelligence des applications IBM i»

- Topologie des composants
- Dépendances inter-composants

- Support de l'environnement ILE
- Support des composants SQL



- Sert à :
  - ⇒ La Compréhension du code (Observer)
  - ⇒ L'Automatisation des compilations (Builder)

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RPG Free Form

IBM Let's Create

Code lisible = code maintenable

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Retour client: pourquoi ils ont adopté ?

- **« Hyper » parallelisme des développements**
- **Meilleure qualité du code délivré**
- **Réduction drastique des incidents de production**

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Merlin

Move to Cloud + Move to DevOps + Move to standards = Move to DevOps on Cloud based on Open-Source standards

Modernization platform
Full web IDE
Containerized CI/CD pipeline

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Merlin As A Service

Coming soon…

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Et l’IA dans tout cela ?

L’intelligence Artificielle

IBM Let’s Create

Va jouer un rôle essentiel dans toutes les phases du développement

- **Productivité des développeurs**
- **Aide à la modernisation**
- **Automatisation des tests**
- **Diagnostics des incidents**

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Philippe Magne
CEO, ARCAD Software

Merci

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Infrastructures du futur

7 et 8 novembre 2023

Université IBM i

7 novembre 2023

IBM i 35 YEARS

Let's Create

2. IBM Merlin

IBM Client Engineering | EMEA

Custom Demos, Architecture Workshops, MVP Prototyping…

Let's create ↷
value together

Generative AI
with Watsonx

IBM zSystems &
IBM i Modernization

Ops Automation
with AIOps

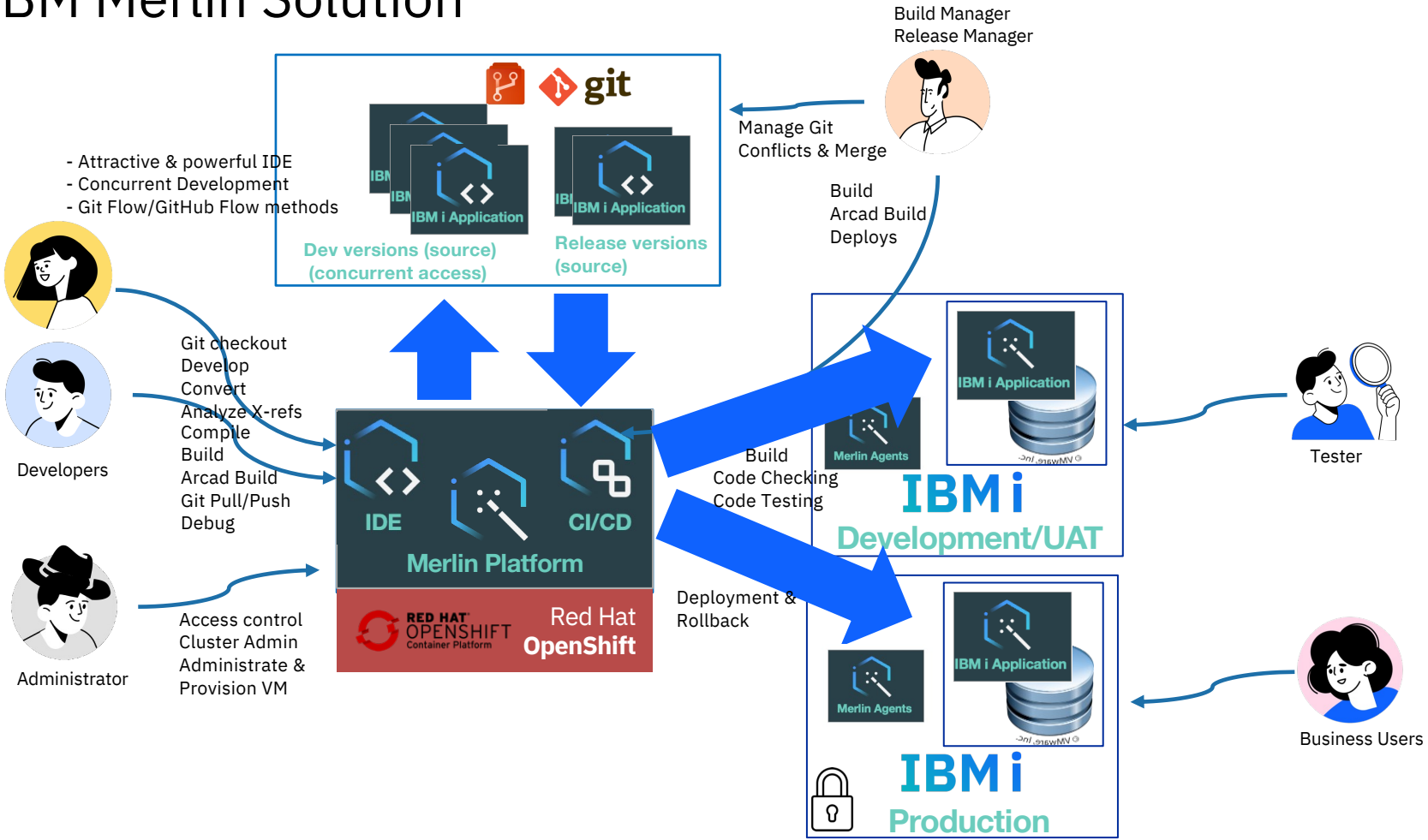
Storage, OpenShift
& Hybrid Cloud

IBM i Next Gen Workshops

- 01_API-zation / REST / Core Business Integration — IBM Technology Zone
- 02_DB2 Data Modernization: from Native to SQL
- 03_OpenShift, Merlin and DevOps — YouTube — IBM Technology Zone
- 04_Open-Source Adoption with Legacy on IBM i — YouTube — IBM Technology
- 05_Power/IBM i move to cloud: IBM Cloud PowerVS — IBM Technology Zone
- 06_IBM i Resilience: PowerHA, DB2 Mirror
- 07_Ansible Automation and AIOps — YouTube — IBM Technology Zone
- 08_Data Governance & MLOps with CP4Data — YouTube — IBM Techno
- 09_ Infuse AI in core business apps — YouTube — YouTube — IBM Technolog
- **NEW**: IBM Watsonx Code Assistant for Z

Contact: benoit.marolleau@fr.ibm.com

IBM Merlin Solution



Why IBM Merlin ?

Modernization Engine for Lifecycle Integration

Enterprise Architect

Application Integration

“ it's challenging to integrate into the rest of my enterprise application landscape "

Applications Executive

Skills

“Suffering from shortage of skills”

VP of IT

Agility & DevOps

“I need my IBM i applications to be as dynamic and agile as the applications elsewhere are in my enterprise”

Application Developer

Modern tools

”I just want to be able to develop applications, using tools that I am familiar with”

What is 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,
RedHat Dev spaces git , Jenkins & more

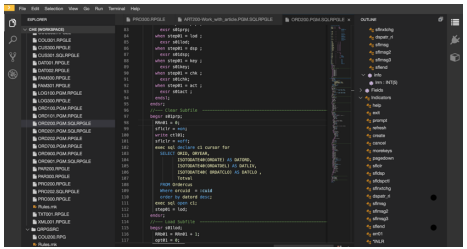
IBM i CI/CD

Provided by IBM in partnership with ARCAD

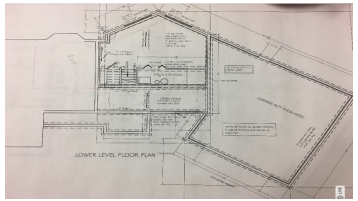
Browser based tooling to setup and manage an automated build, test, and deployment pipeline for native IBM i applications leveraging Jenkins.

The cloudified DevOps environment for IBM i

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



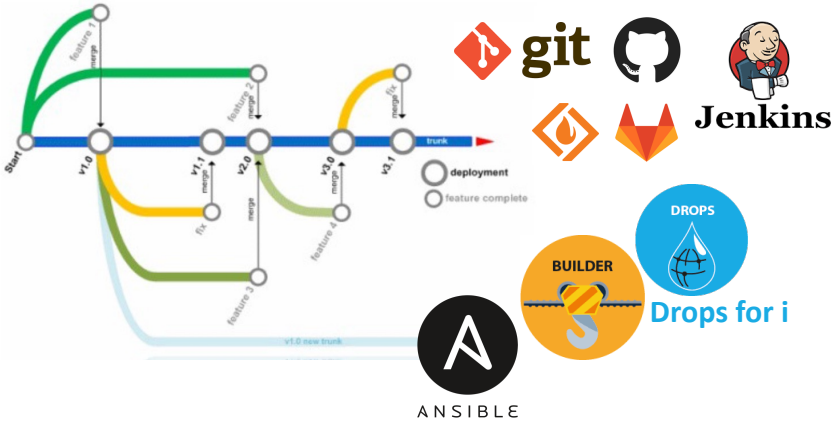
```
ctl-opt bnddir('ACCRCV');
dcl-f custfile usage(*update);
dcl-ds custDs likerec(custRec);
dcl-f report printer;

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



TRANSFORMER RPG

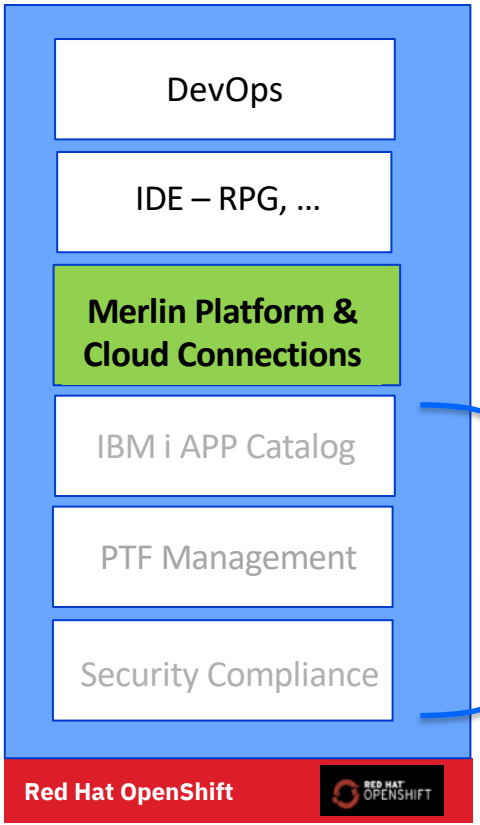
OBSERVER

Centralized Source Control and Branching



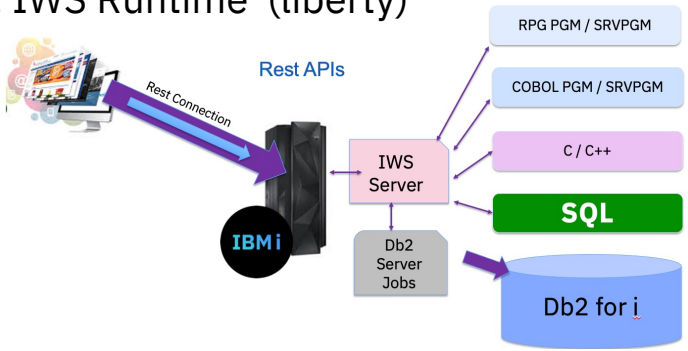
Merlin Engine
Cloud for DevOps

IBM | Let's Create



Merlin Engine (aka Platform) major features:

1. **SSO & credential vault** for secure & easy on-boarding
2. **Infrastructure Provisioning** (PowerVC, IBM Cloud PowerVS) VM lifecycle management (Ansible). Give access to Dev/Test LPARs to your developers
3. **REST API Generation,** IWS Runtime (liberty)



ROADMAP

4. Ansible-based Operation Assistant
for fixes (PTF) & Compliance, Security Management and more…

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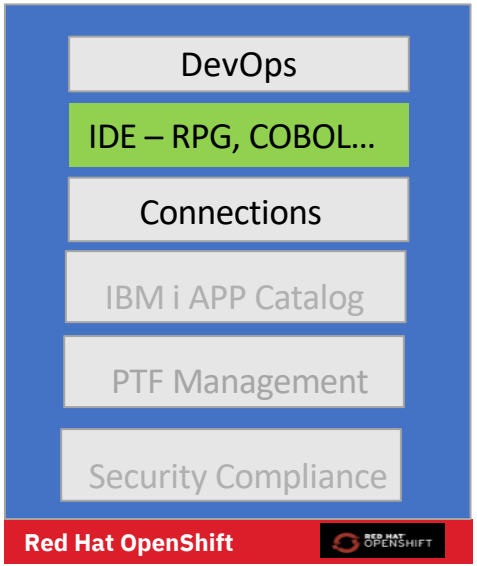
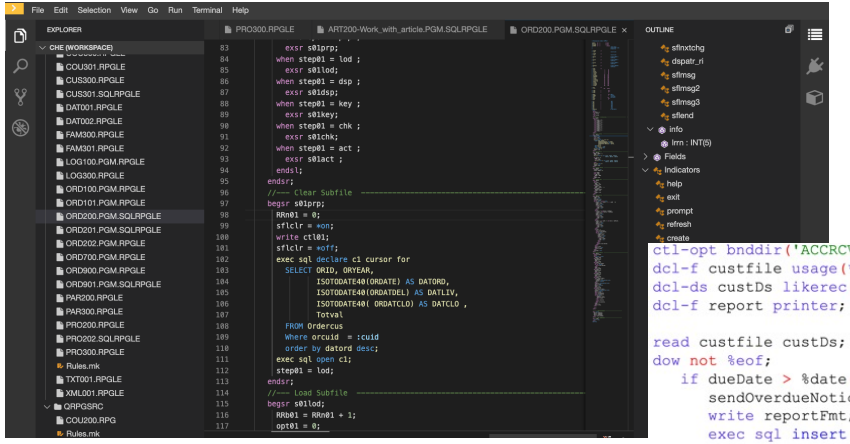
IBM i Developer

Cloudified vscode

Modernization Engine for Lifecycle Integration



Modern Browser based developer environment



- Outline View
- Tokenization
- Content Assist
- Code formatting

- Understand Languages
  - RPG
  - SQL
  - Embedded SQL
  - CL
  - Cobol
  - DDS

TRANSFORMER RPG

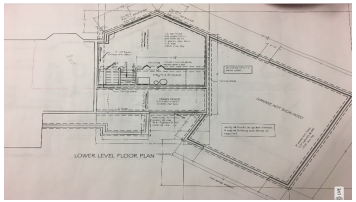
OBSERVER

+ RPG Free Converter

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

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

+ Impact Analysis



On-boarded developers can use & control Transformer, Converter, Builder from their IDE

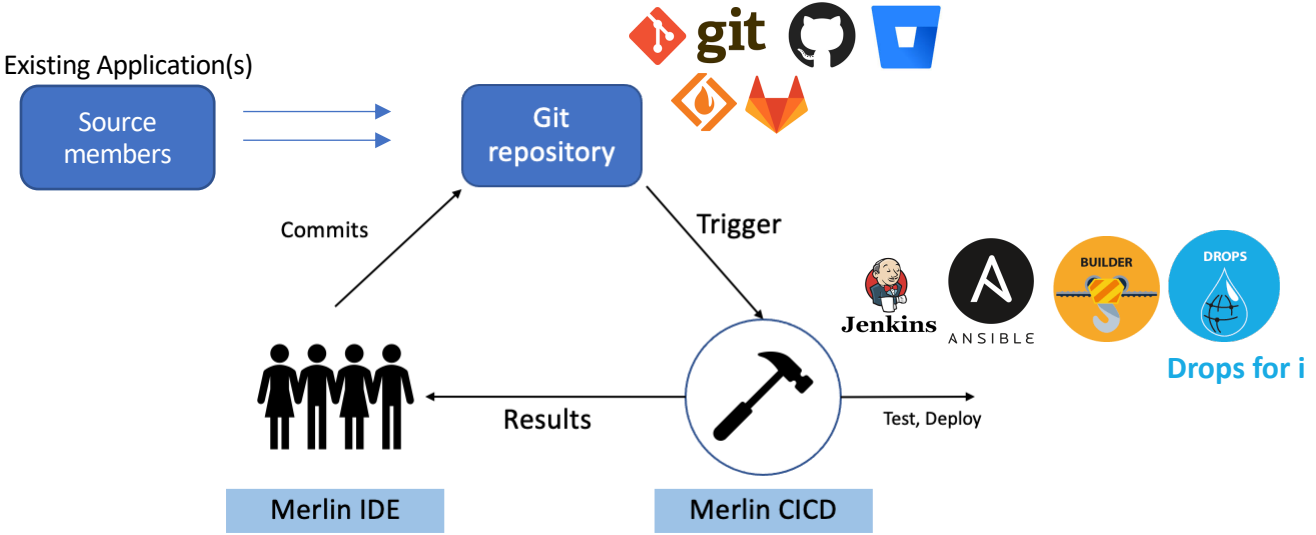
Merlin CI/CD

Modernization Engine for Lifecycle Integration

- DevOps
- IDE – RPG, COBOL…
- Connections
- IBM i APP Catalog
- PTF Management
- Security Compliance

Red Hat OpenShift

→ Migration to Git Source Control Management
→ Automated reliable application build and deployment
→ Centralized Source Control and Branching



Possible Integration:
→ SonarQube (code quality)
→ Jira (change mgt)

Merlin Overview

DevOps
Build Mgt
Release Mgt
Admin

git https (443)
git tcp (9418)

Manage Git Conflict & Merge

git

Login
Connect
Move source to git
Provision VM

Merlin Platform

Keycloak SSO
RBAC
Connections
Automation

ANSIBLE

git https (443)

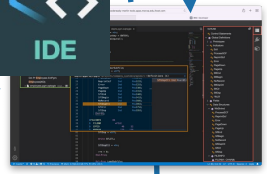
git https (443)

Git Push/Pull

Merlin Control service *ADMIN5 (incl. Arcad Elias)

Git checkout
Develop
Convert
Analyze X-refs
Compile
Build
Arcad Build
Git Pull/Push
Debug

IDE



vscode extensions
ibmidebug
ibmideveloper
arcad-extension

BUILDER

DROPS

ANSIBLE

IBM i

php RPG perl python git

git https (443)
REST https (2012)
Builder https (5252)

Git checkout
Git Pull/Tag
Build
Arcad Build
Deploy

CI/CD

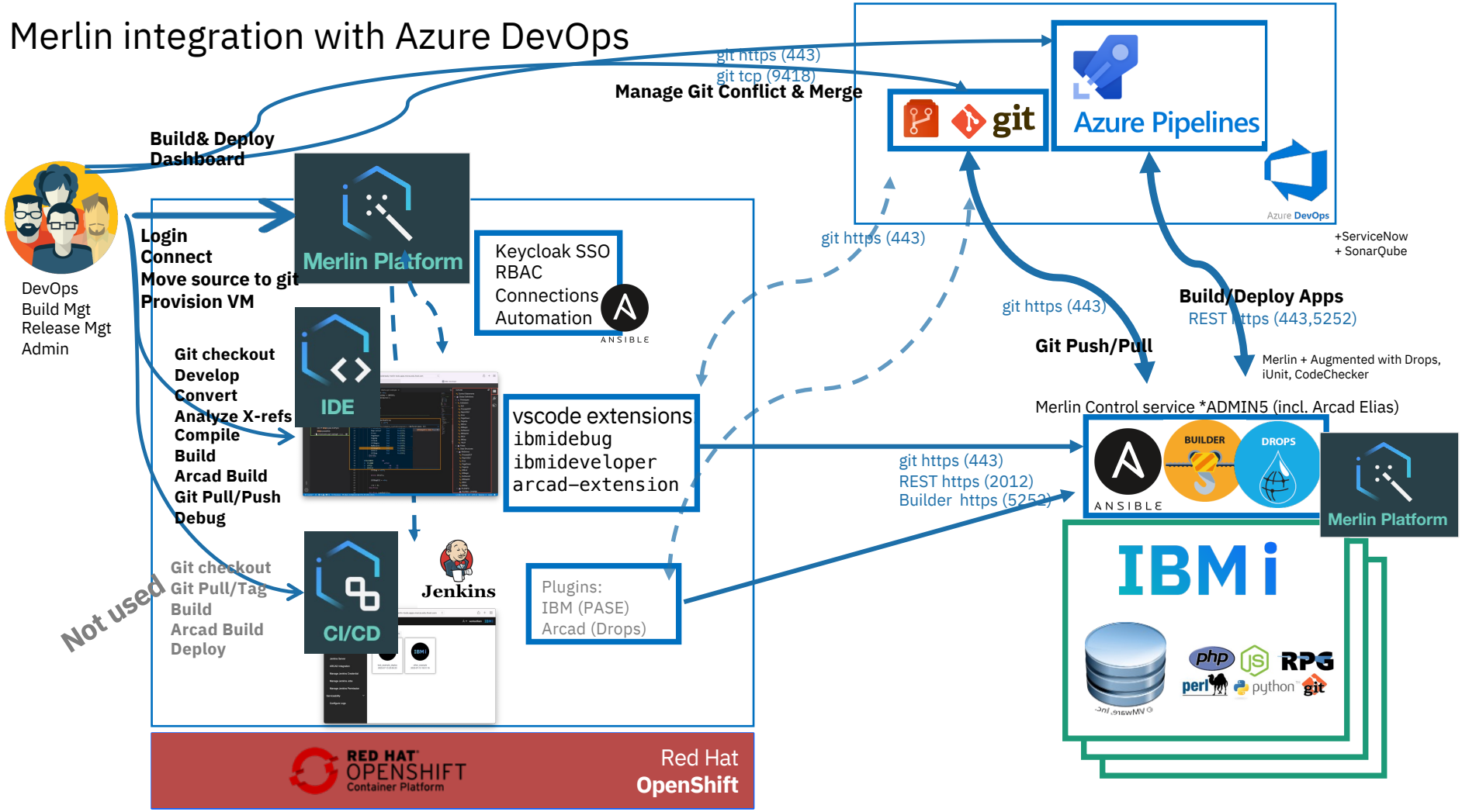
Jenkins

Plugins:
IBM (PASE)
Arcad (Drops)

RED HAT OPENSHIFT Container Platform

Red Hat **OpenShift**

Merlin integration with Azure DevOps



Merlin Product

Program number
5900-AN9

IBM i Modernization Engine for Lifecycle Integration (5900-AN9) introduces the following part numbers:

Part number description	Part number
IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core License + SW Subscription & Support 12 Months	D091ZZX
IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core Annual SW Subscription & Support Renewal	E091YZX
IBM i Modernization Engine for Lifecycle Integration Virtual Processor Core SW Subscription & Support Reinstatement 12 Months	D0921ZX

Perpetual (Buy) or SaaS (Opex):

– License per developer (VPC metric): Perpetual, **Subscriptions** (1 to 5y) or monthly license (< 200$/mo/user)

Deployment Simplification:

– Requires OpenShift Subscriptions (per 2-core) on Power or x86 or Managed OCP (any cloud)

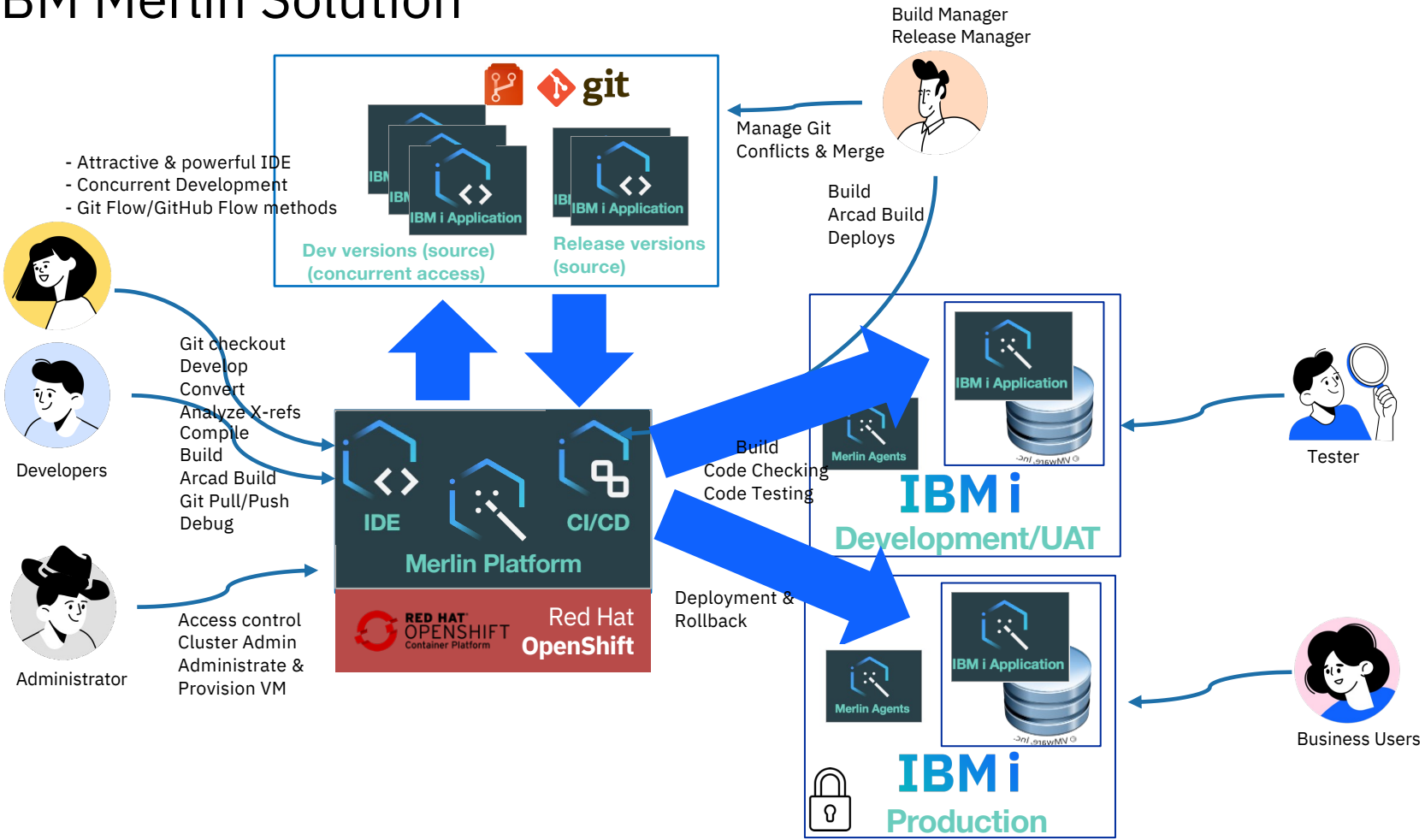
– Free: **OpenShift Local** on your laptop / OpenShift Container Platform trial (60 days)

– Charged but simple: **Single Node OpenShift** (SNO) “all-in-one” in any datacenter

– Merlin on OpenShift On IBM Cloud Power Virtual Server

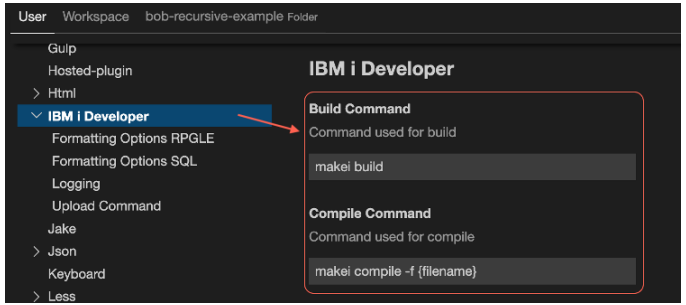
RED HAT OPENSHIFT Container Platform | Red Hat OpenShift | IBM i

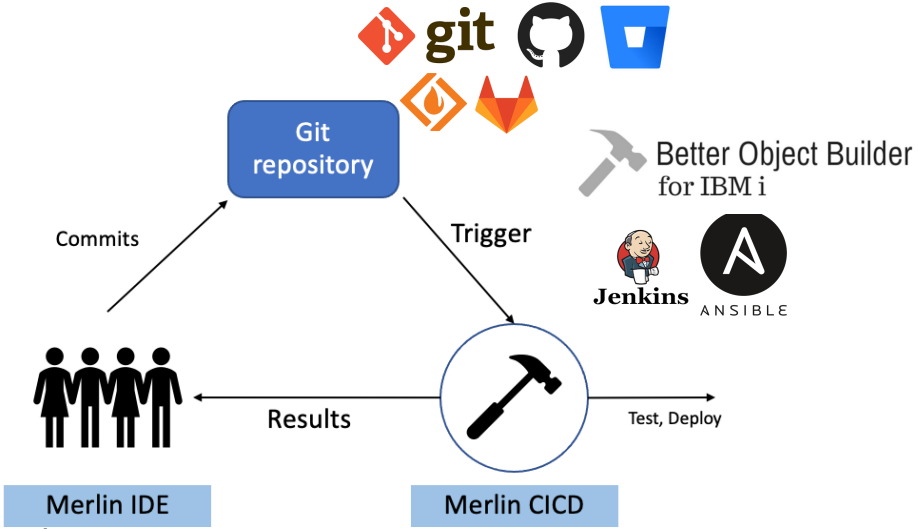
IBM Merlin Solution



DEMO 1 : Basic scenario with Open-Source build

- Source Migration from QSYS to git with Open Source tools
- Compile/Build with BOB (Makei/gmake or any PASE command)
  - « IBM i Developer » supports non-Arcad projects (PASE commands)
    - 'IBM i Projects' standardized in iproj.json
    - Rules targets in Rules.mk files
    - Manual dependencies (X-Rref) management

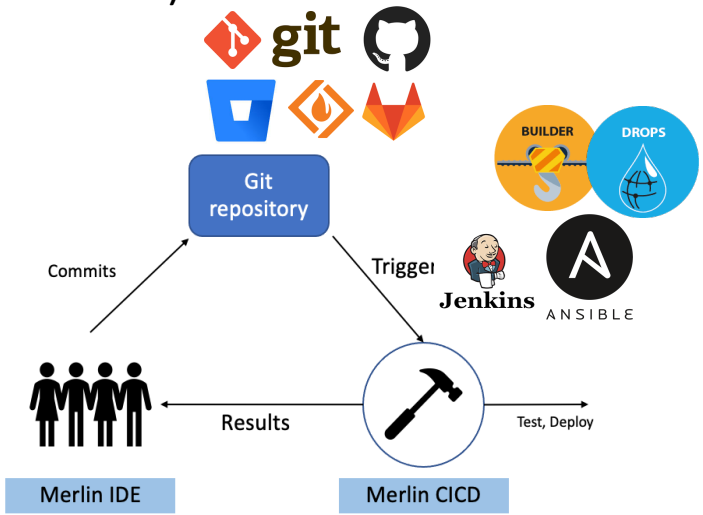




- CI/CD Pipeline with IBM i CI/CD (Jenkins)
  - Git checkout, trigger Build script (CL, bash…) , package (SAVF) & deploy

DEMO 2 Merlin: Advanced scenario (recommended)

- Source Migration from QSYS to git with Arcad Skipper
- Compile/Build with Builder service
  - « IBM i Developer » supports Arcad projects (Elias service)
    - 'IBM i Projects' standardized in iproj.json
  - Automatic X-Rref management (smart Build)
    - Arcad Metatdata database, Observer service
- Tools integrated in Merlin:
  - **ARCAD Observer (for application discovery)**
  - **ARCAD Builder (for build automation on IBM i)**
  - **DROPS for i (for deployment and rollback of IBM i apps)**



- CI/CD Pipeline with IBM i CI/CD (Jenkins)
  - Arcad Builder + Arcad Drops deployment automation

IBM

Infrastructures du futur

7 et 8 novembre 2023

Université IBM i

7 novembre 2023

IBM i 35 YEARS

Let's Create

3. Demonstration

IBM i

Merlin: Démonstration & Tutoriel

Mise en place:
https://ibm.box.com/v/merlin-01-setup-mp4
Scénario Simple:
https://ibm.box.com/v/merlin-02-simpledemo-mp4
Scénario avec fonctions avancées (Arcad):
https://ibm.box.com/v/merlin-03-advanced-demo-mp4
Tutoriel / Travaux pratiques
https://ibm.box.com/v/ibmi-merlin-lab

Get Started with IBM Merlin

IBM Merlin 101 & Hands-on : IBM Technology Zone
https://techzone.ibm.com/collection/application-modernization-with-ibm-merlin

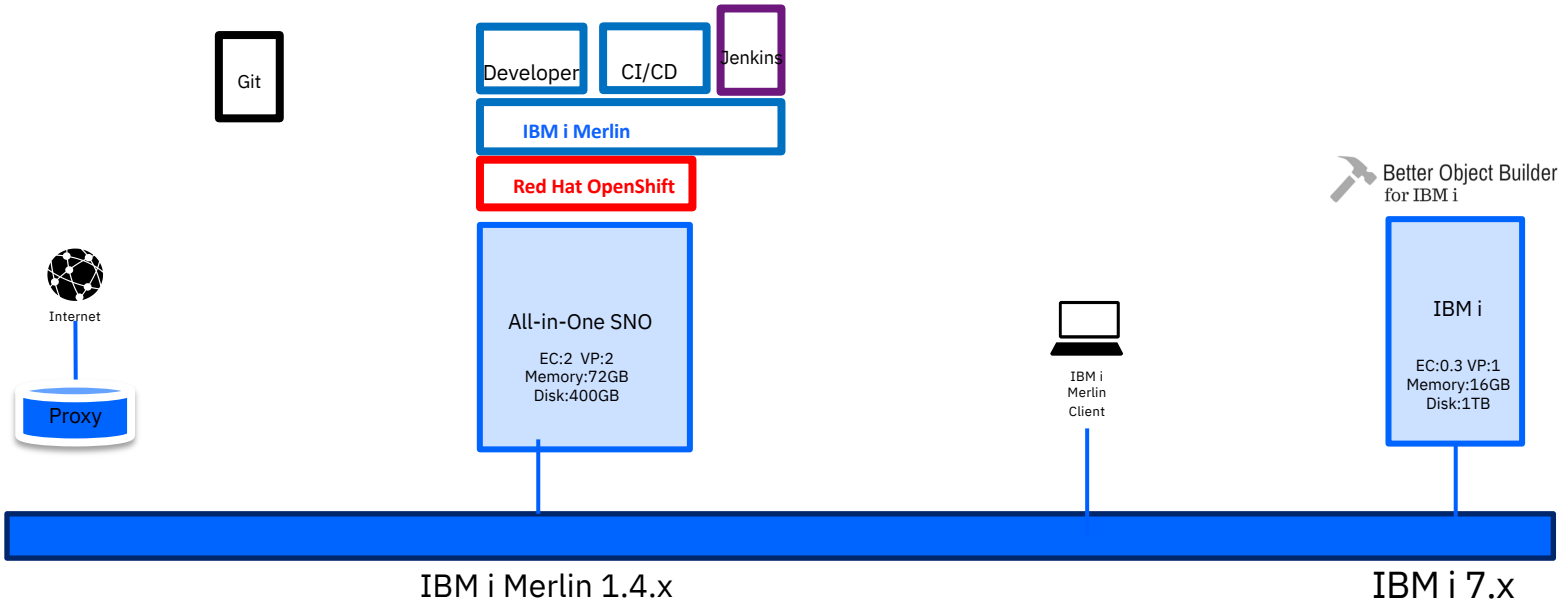
Request IBM Merlin Test Drive aka “Sandbox” for customers
https://ibm.github.io/merlindocs/#/./guides/overview/sandbox

IBM Merlin @ IBM Client Engineering : Custom demos, Point Of eXperience for customers
Contact: benoit.marolleau@fr.ibm.com

IBM Merlin on prems or Cloud (PVS…) Implementation by IBM Expert Labs / Arcad Starter Packs
Contact: ruhlowr@us.ibm.com

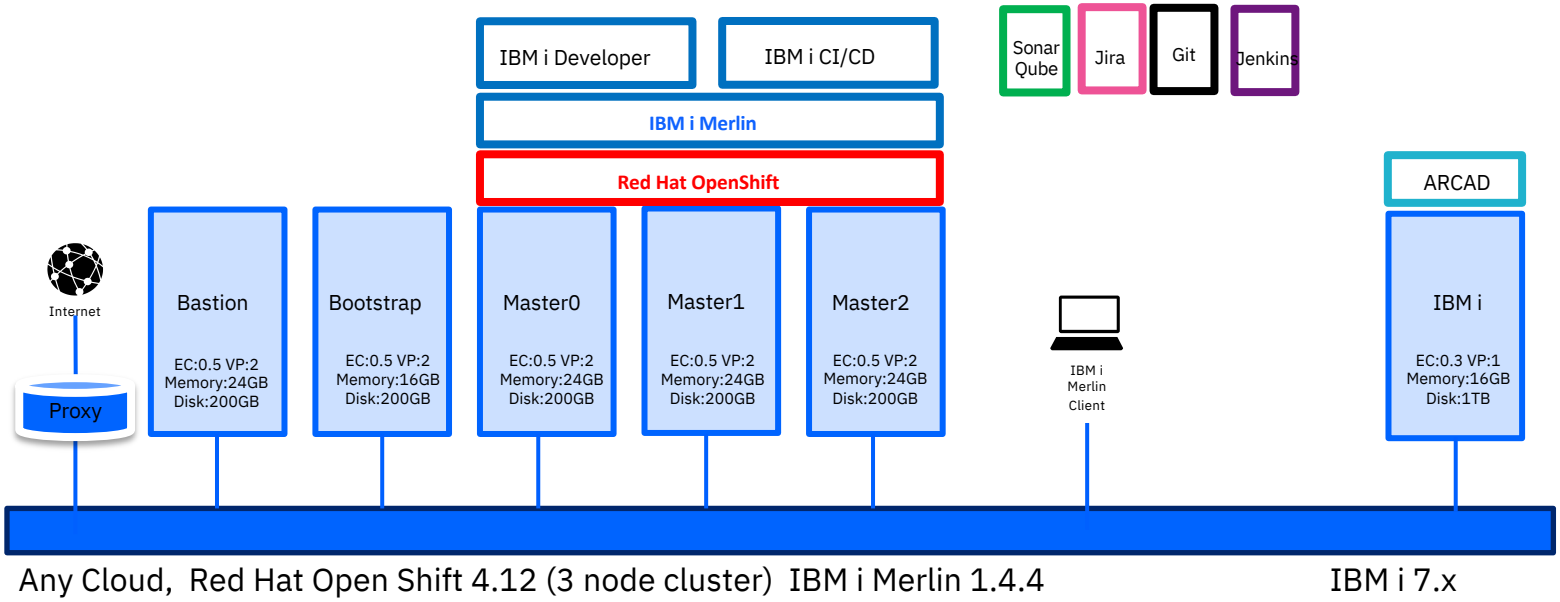
45

IBM Merlin Environment



- Simple install (S Size) , Merlin deployed Simple Single Node Setup or Managed-OCP
- Git repository on public SaaS (GitHub, GitLab, Bitbucket)
- Internal Jenkins on IBM Merlin

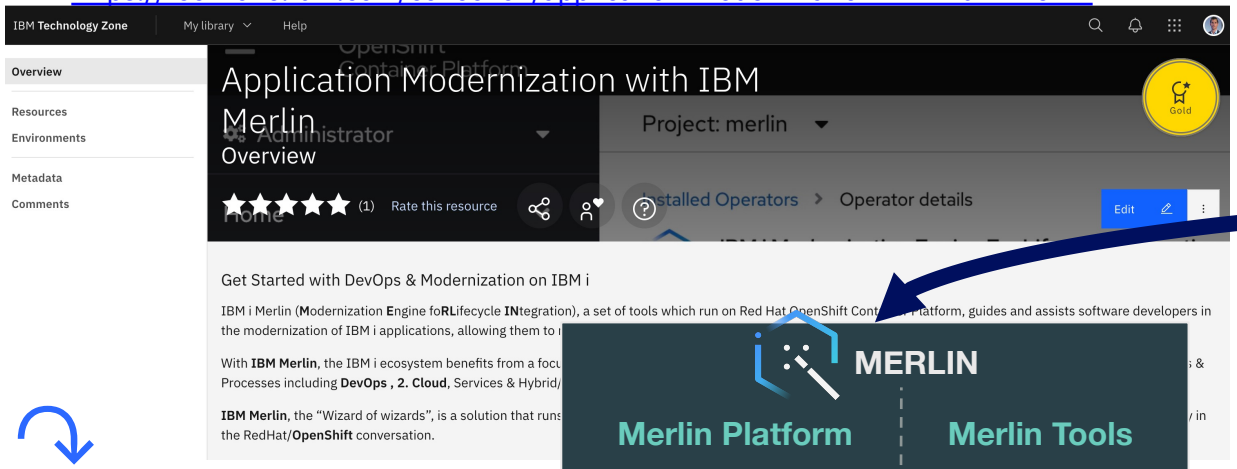
IBM Merlin Environment : Advanced



- Merlin deployed On Premise (XL size) on existing cluster, on Linux on Power (sizing guide)
- Dedicated/Private Git repository on prems or SaaS (GitHub, GitLab, Bitbucket)
- Re-use of existing enterprise Jenkins
- Connection to Jira, Sonarqube etc.

IBM Merlin on IBM Technology Zone (IBMers, BPs)

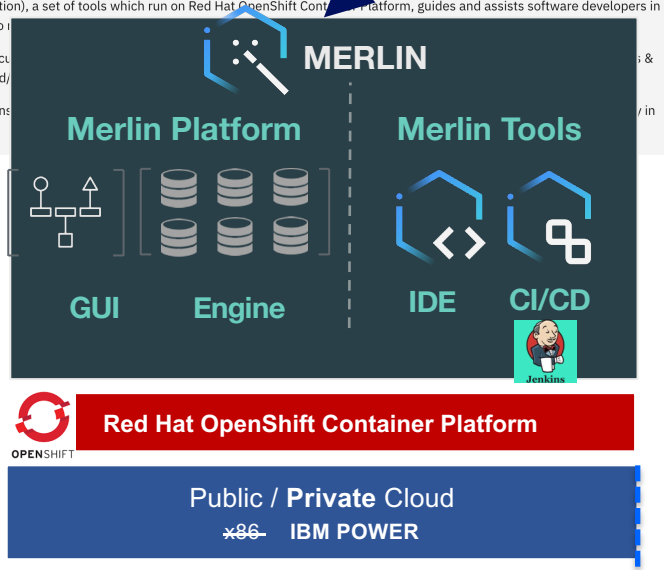
https://techzone.ibm.com/collection/application-modernization-with-ibm-merlin



Internet

→ Introduce the solution
→ Design & size Merlin
→ Use a Live environment

Presentations
Merlin Sizing Guide
Demo Materials & Roadbook
Advanced Tutorial



MERLIN

P9, Power10

IBM Merlin – Application Modernization from IBM powered by Arcad

Automated “single click” conversion from RPGLE to modern Free Form RPG
- Modernize legacy code for ‘new-to-RPG’ developers

Easy onboarding of a new generation of developers
- Future-proof your IBM i application

IBM Labs **proof**
- Developed in collaboration with IBM’s RPG compiler team at Rochester Labs

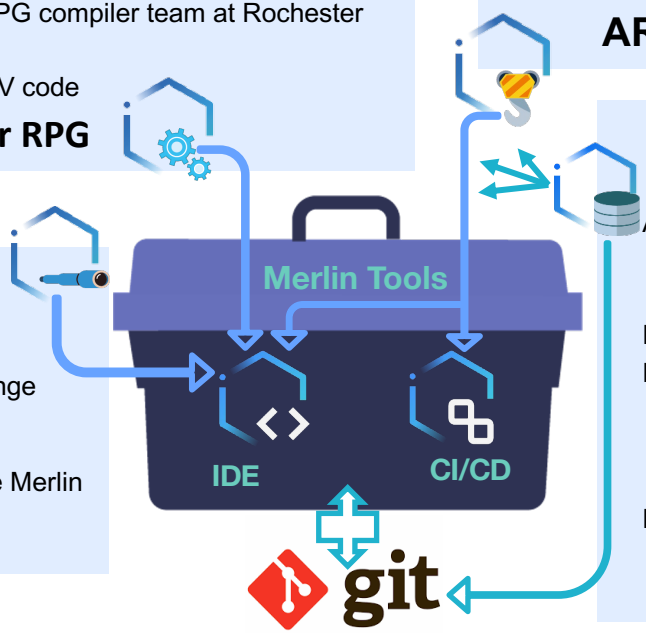
Near **100%** conversion rates of any RPG IV code

Transformer RPG

"Smart" dependency build for IBM I
- Developer Builds for individual tasks
- CI builds for Releases

Built-in integration with Jenkins for automated pipeline
- Accelerates development cycles
- Shortens feedback loop

ARCAD Builder



Metadata Repository

Application metadata shared by all ARCAD modules
- Maintains ‘single version of the truth’
- Powers automation in analysis, build, test, deploy

Holds detailed knowledge about all s/w components

Holds inter-relationships between components
- Simplifies cross-reference analysis
- Simplifies ‘auto-recompile’ of dependencies
- Simplifies integrity checking of modifications

Repository updated dynamically
- In Sync with Git branching automaticaly
- No actions required to maintain repository

Observer

Application Discovery

Impact analysis
- Instantly understand the impact of a change
- Enhances accuracy of project estimates

Powerful application-wide IBM i cross-referencing (“where-used”) from within the Merlin IDE

Improves developer **productivity**

IBM i Developer

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

ARCAD Developed
- Repository Setup
  - Pull code from Legacy lib and populate Git
  - Intelligent build Meta data population
  - Conversion to Fully Free form
  - Management of IBM i pure objects in GIT

- ARCAD Intelligent Build
  - Build all aspects of an application
  - Linkages between parts
  - Branch promotion
  - Dependency Builds without scripting
  - Build Automation (Git integration → CI/CD/Jenkins processes)

- ARCAD Impact Analysis
  - Multilayer (linked to Git Branch level)
  - From fields to Objects Cross references

IBM i CI/CD

IBM Developed

- Deployed by admin or self-service
- Out of box experience with integrated Jenkins
- Framework for defining IBM i endpoints
  - Integrated inventory and credentials
- Simplified GUI and operations for IBM i
  - Run profiles for personal build
  - ARCAD enabler
  - Jenkins initialization
  - Git interactions
  - IBM i command executions
  - Transfer files to IBM i

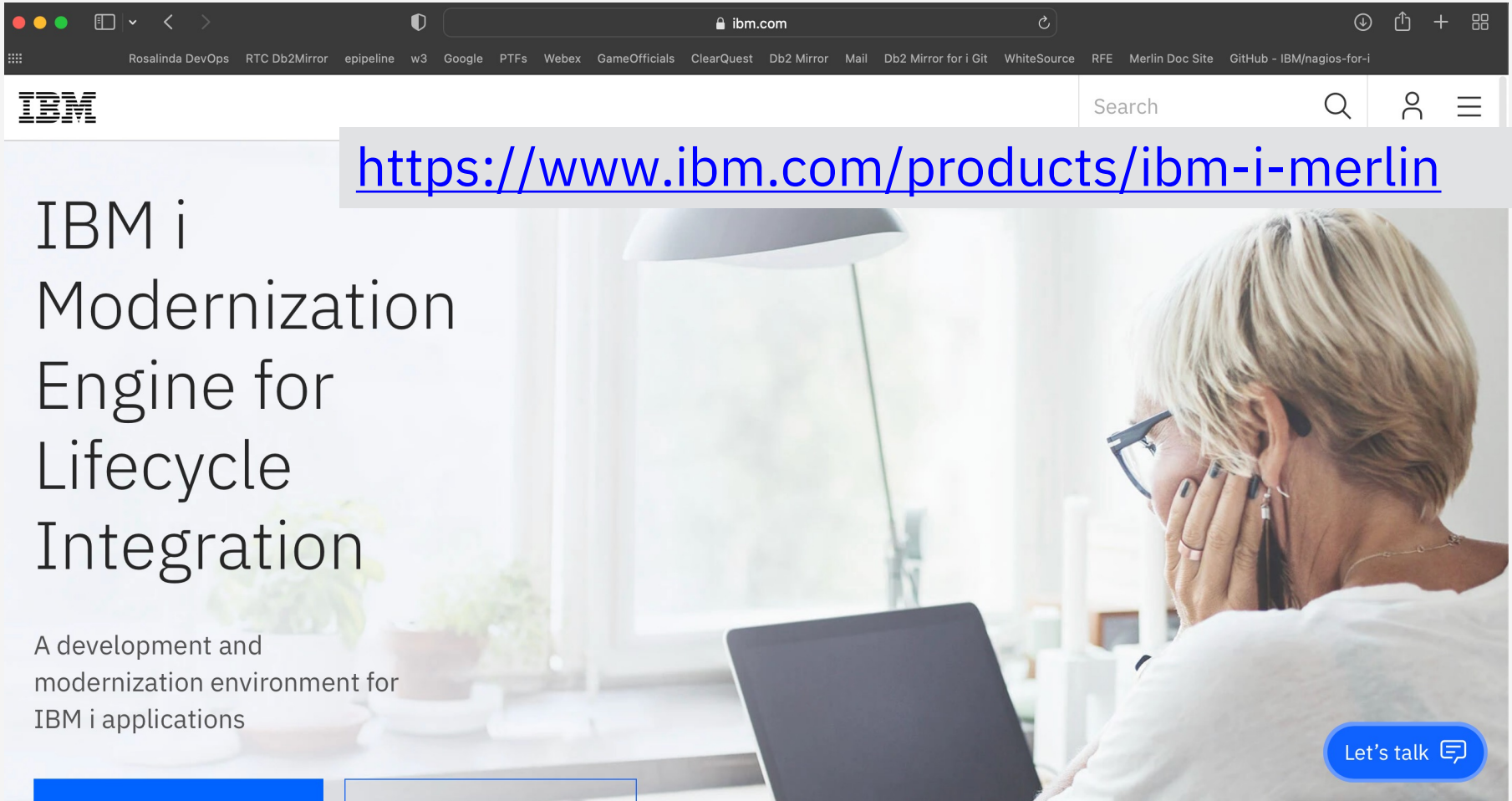
Value – Simple, out-of-box experience, self-service when needed, personal build environment

ARCAD Developed

- ARCAD Builder
  - Build code from Git Repository
  - Build all Application Artifacts
  - Dependency Builds without scripting
  - Build Automation (Git integration → CI/CD/Jenkins processes)
- ARCAD Deploy
  - Deploy Applications to multiple servers
  - Configurations for securities
  - Manage differences between production and development servers

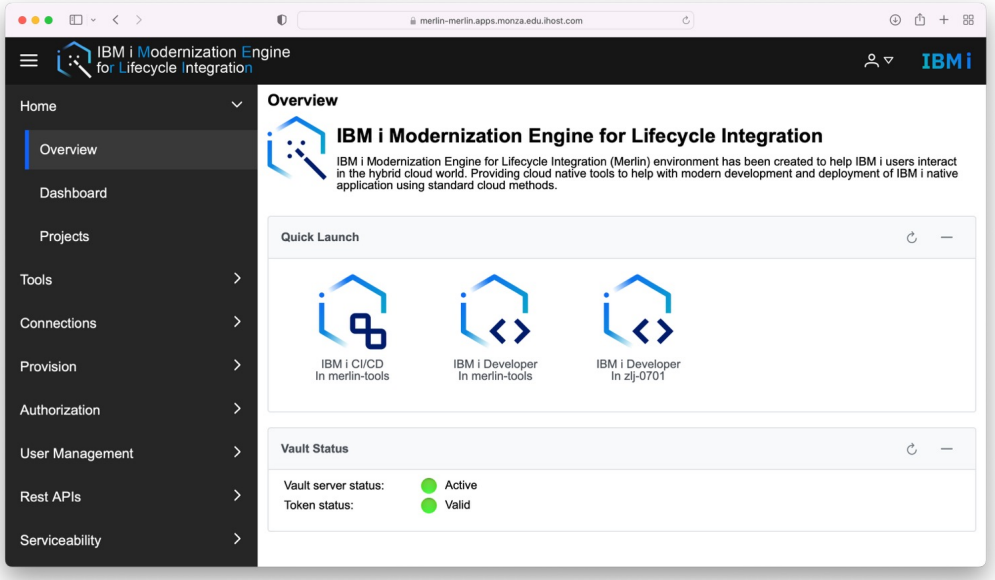
Value – Manage complexity of IBM i application software deployment

Merlin Product Page



Merlin Documentation

- Overview
  - Merlin
  - Platform
  - FAQs
- Source control
  - Moving into git
- OpenShift
  - Requirements (todo)
  - IBM Entitlement
  - Installing Merlin
- Merlin
  - App Installation
  - Configuration
  - Basic Flows
- Merlin IDE
  - Usage
  - ARCAD
- Merlin CICD
  - Usage & Jenkins
  - ARCAD Builder
  - ibmi-bob



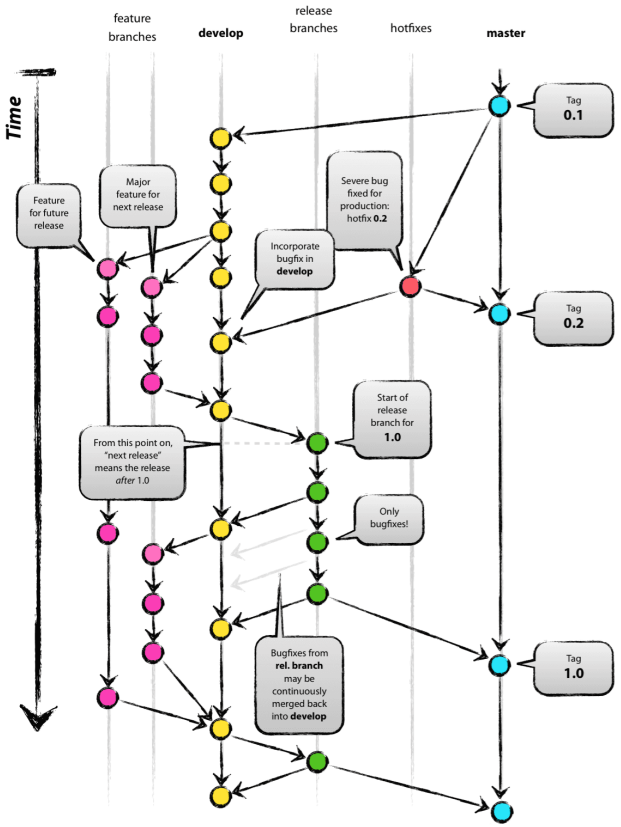
IBM i Modernization Engine for Lifecycle Integration (Merlin) is a set of tools run in OpenShift containers which guide and assist software developers in the modernization of IBM i applications, allowing them to realize the value of a hybrid cloud, multi-platform DevOps implementation.

Getting started videos

https://ibm.github.io/merlin-docs/#/

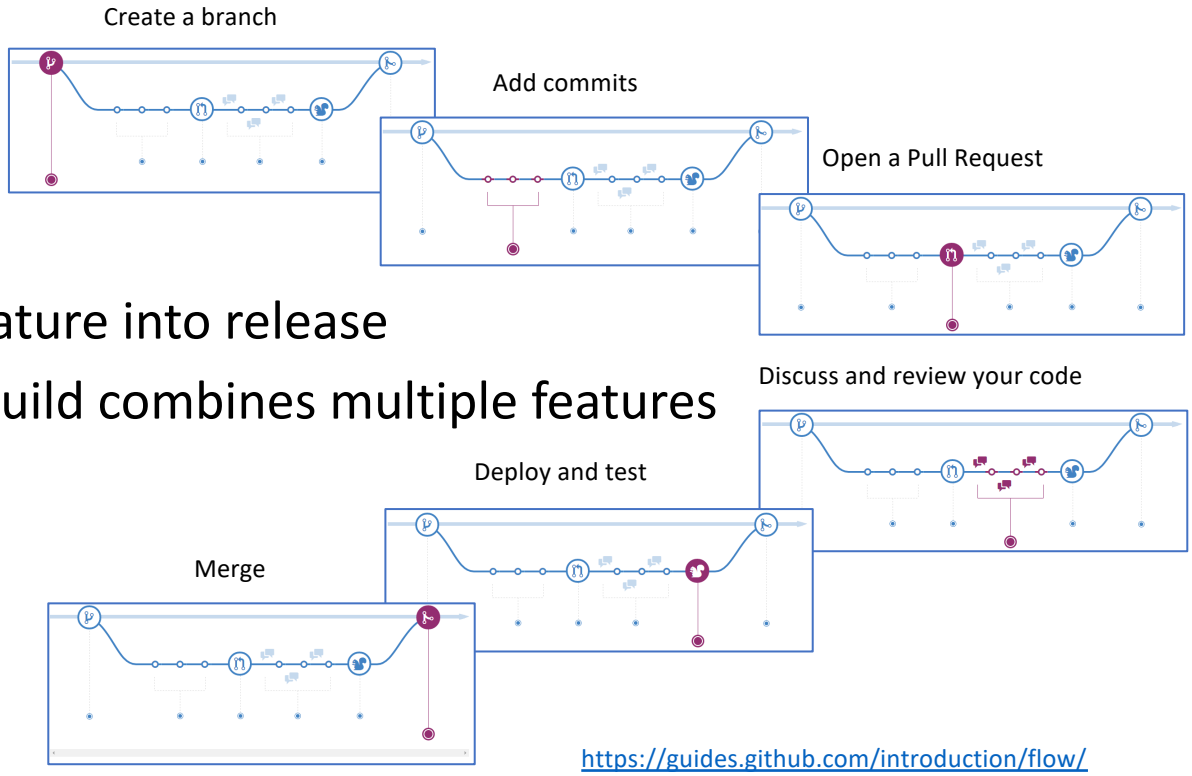
Development Flow reminder

- Inspired by GitFlow
- Adaptable
- Master and Development no direct changes
- Other branches
  - Feature
  - Release
  - HotFix
- Branch = Arcad Version



References
GitFlow original post https://nvie.com/posts/a-successful-git-branching-model/
GitFlow https://www.atlassian.com/git/tutorials/comparing-workflows/gitflow-workflow
IBM I & Git tips https://codefori.github.io/docs/#/pages/tips/git
GitHub Flow alternative https://docs.github.com/en/get-started/quickstart/github-flow
GitFlow in practice https://medium.com/@kevinsjy997/from-git-flow-to-ci-cd-a-practical-guide-to-implement-git-workflow-d2c922f31fdc

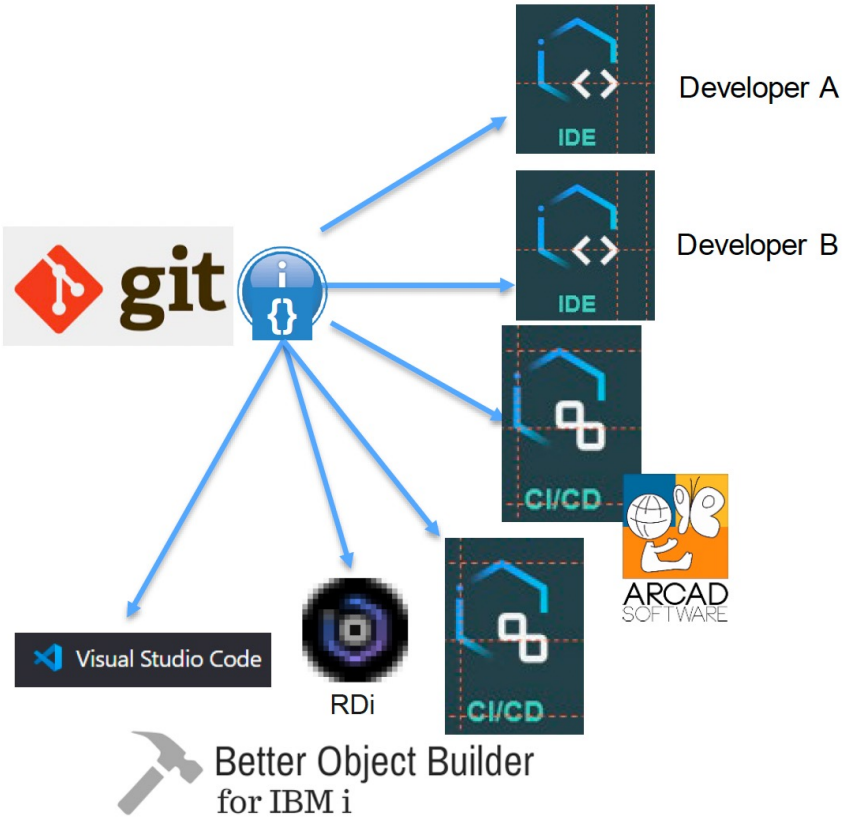
Merge



- Merge feature into release
- Release build combines multiple features

https://guides.github.com/introduction/flow/

iProj – portable, git-storable project



- Single project definition that can be used in many contexts
  - Cloned into different development environments
    - Merlin
    - VS Code
    - Rdi
  - Used to define build in CI/CD pipelines
    - Buildable by ARCAD builder
    - Buildable by open source BOB
  - Has to specify requirements on external environment
    - LIBL
    - Where to resolve includes
    - ASP, OVRxxx etc.
  - But has to be configurable for each environment
    - Uses &name env variables
  - Intelligent defaults to minimize metadata

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Full documentation is here https://ibm.github.io/ibmi-bob/#/prepare-the-project/project-metadata