

# Git pipelines for IBM i

deep dive

Jesse Gorzinski  
IBM Business Architect  
@OSSJesseG



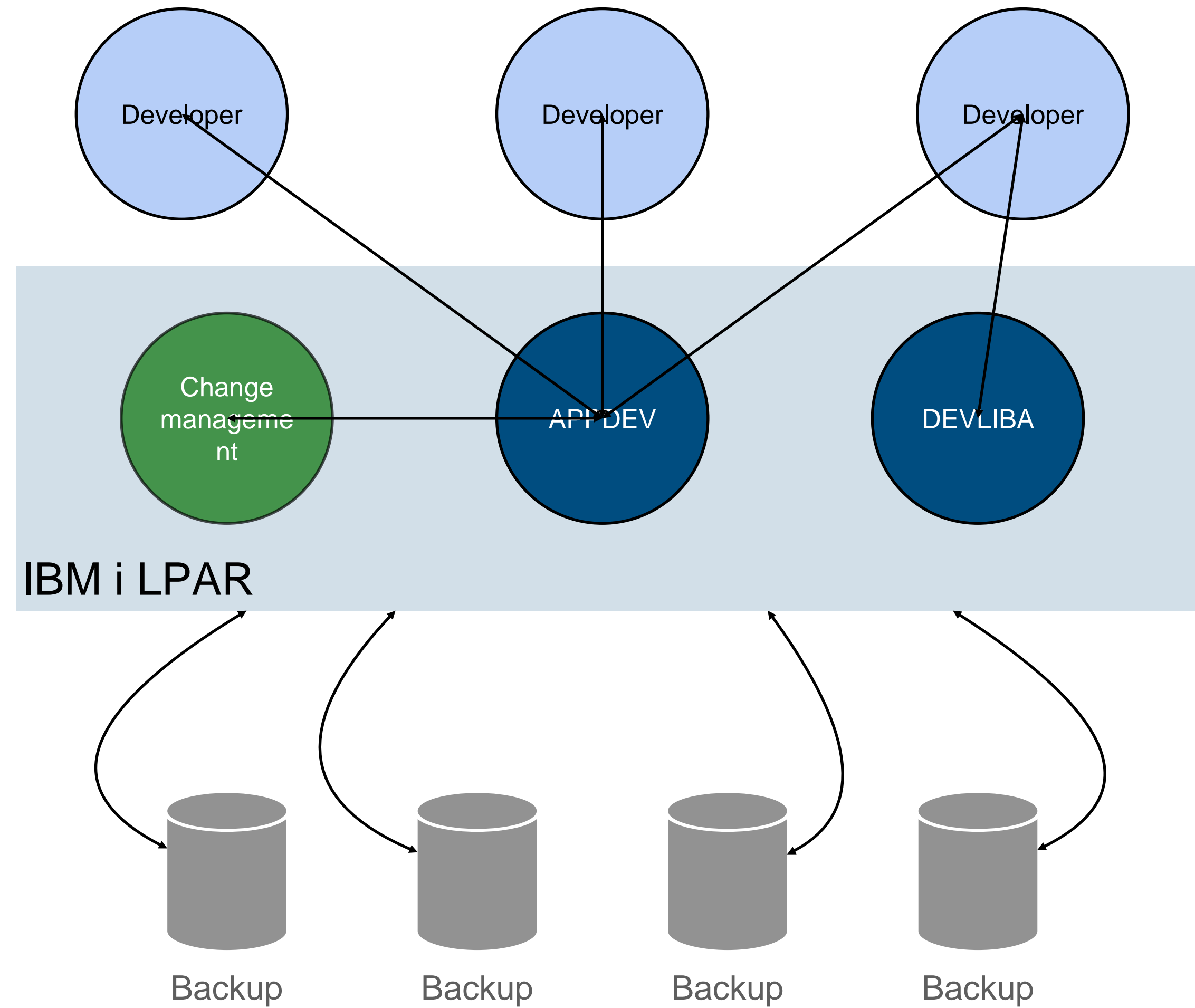
Let's  
Create



# Agenda

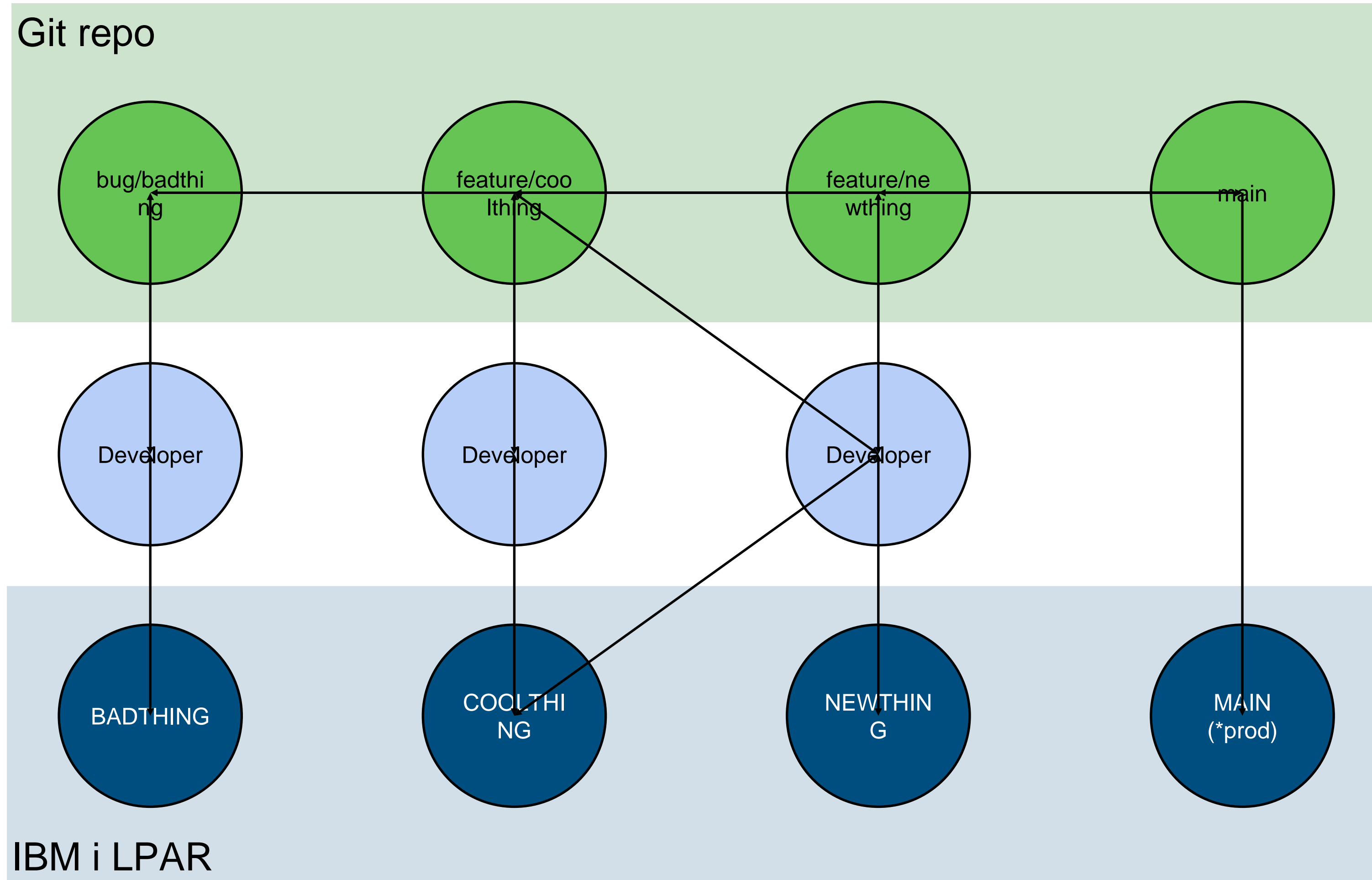
- Why?
- Git overview
- Moving code into git
- Building code from git
- Git hosting services
- Pipelines
- Showcase

# Conventional methods: lack of control



# Concurrent development

GitHub, Azure, GitLab, BitBucket, etc



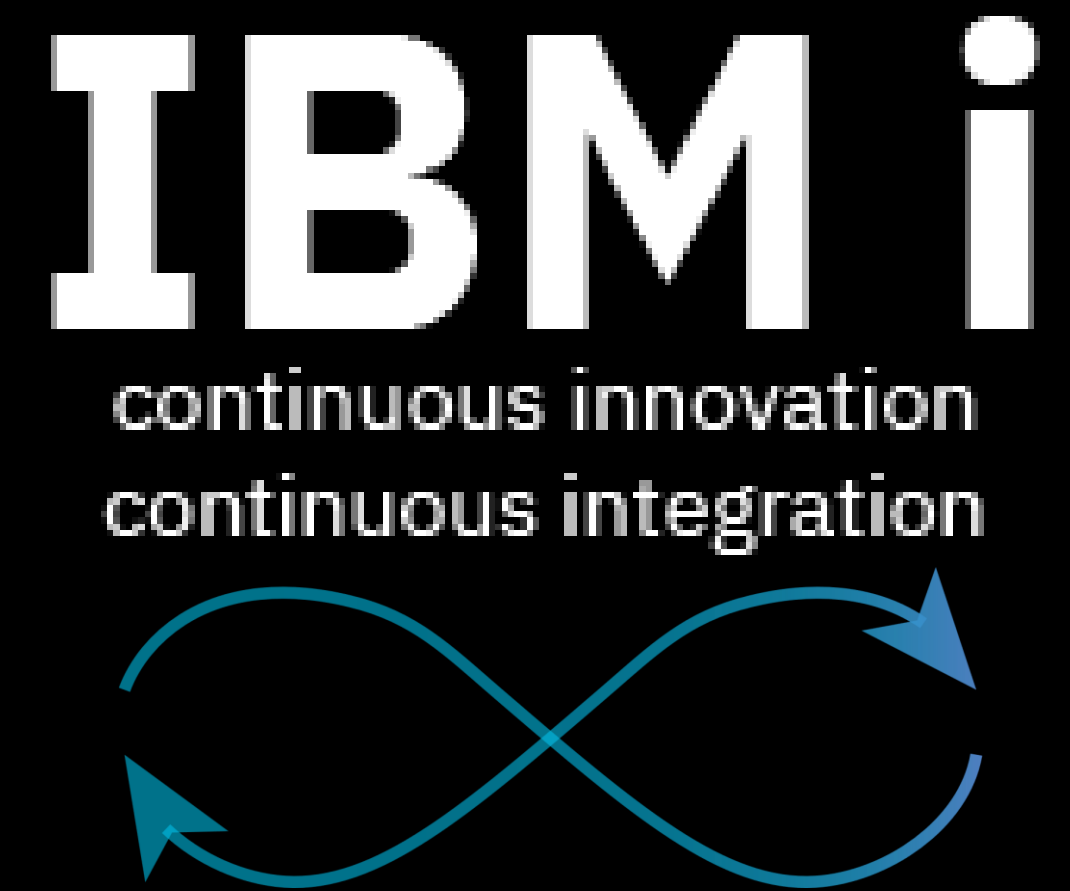
On-prem, cloud, or hybrid



# All change history

BRANCH / TAG	GRAPH	COMMIT MESSAGE	AUTHOR	COMMIT DATE / TIME	SHA
		Fixed broken link	Melese	8/12/22, 1:32 PM	def...
main		additional changes	Alex	8/11/22, 9:27 AM	bf3...
		Updating image URL for login page	Alex	8/11/22, 9:17 AM	bff...
		Spelling & grammar fixes from Tristan	Alex	8/11/22, 8:39 AM	a28...
		Updates directly to prod	Alex	8/10/22, 4:27 PM	d74...
		Merge pull request #52 from Axxzilla/Add-...	Alex Latham	8/10/22, 3:12 PM	bbc...
		Merge pull request #51 from jjsilva4/v8-8-...	Alex Latham	8/10/22, 3:12 PM	a8c...
Add-SSO-docs		Further edits/grammar/spelling fixes	Alex	8/10/22, 1:46 PM	266...
		Updates	Alex	8/9/22, 4:49 PM	d2f...
		Updated video link to remove Ping	Jonathan Silva	8/9/22, 2:53 PM	1b5...
		adding more SSO instructions	Alex	8/9/22, 2:16 PM	f23...
		Update the date	Jonathan Silva	8/8/22, 4:30 PM	53c...
		Tweak a feature	Jonathan Silva	8/5/22, 2:31 PM	a16...
		Simplify SSO definition	Jonathan Silva	8/5/22, 2:28 PM	106...
		Formatting	Jonathan Silva	8/5/22, 2:15 PM	300...
		General fixes	Jonathan Silva	8/5/22, 2:03 PM	377...
		First draft of v8.8 release notes for the Hel...	Jonathan Silva	8/5/22, 12:43 PM	c4b...
		Updating LFS homebrew and teams sectio...	Alex	8/3/22, 3:49 PM	07b...
		more SSO, adding updates for other pages	Alex	8/3/22, 3:21 PM	9e1...
		sso work for the day	Alex	8/2/22, 4:40 PM	c52...
		sso work for the day	Alex	8/2/22, 4:40 PM	c52...
		more SSO, adding updates for other pages	Alex	8/3/22, 3:21 PM	9e1...
		Updating LFS homebrew and teams sectio...	Alex	8/3/22, 3:49 PM	07b...
		First draft of v8.8 release notes for the Hel...	Jonathan Silva	8/5/22, 12:43 PM	c4b...

# Git overview



# Git: A powerful version-control system

- Linus Torvalds – “inventor of Linux” wanted a better source control system – so he wrote one



- Very popular in the open source community and increasingly in enterprises
- Distributed Version Control System



**git**

# Git: fundamentally different

- Technically:
  - NOT a server! NOT a service! Just a simple executable
    - Best practice is to run through SSH
  - Distributed (people work on their own copy)
  - Stores all of its meta data in one special `.git/` directory
  - Very fast !
- Philosophically:
  - Social Coding
  - Unfettered concurrent development





# Two Best Attributes of Git?

## 1. The efficiency of branching and merging



## 2. The integration with the rest of the ecosystem

- Jenkins
- Jira
- Custom git hooks
- Visual Studio Code
- Git-based websites (GitHub, BitBucket, GitLab, etc)
- GitHub Desktop
- Rational Developer for i



# Git from the PASE command line

```

ics — -zsh — 95x24
barry@Liams-MBP ics % git status
On branch feature/wmcpa2
Your branch is up to date with 'origin/feature/wmcpa2'.

Untracked files:
  (use "git add <file>..." to include in what will be committed)
    qrpglesrc/test.rpgle

nothing added to commit but untracked files present (use "git add" to track)
barry@Liams-MBP ics %
  
```

```

ics — less · git log — 95x24
commit 782a5d66eb137b57e35435e17435ad2d7c0b84cf (HEAD -> feature/wmcpa2, origin/feature/wmcpa2)
Author: worksofliam <mrliamallan@live.co.uk>
Date: Thu Apr 11 18:25:56 2024 -0400

    Change the text for a broken ID

    Signed-off-by: worksofliam <mrliamallan@live.co.uk>

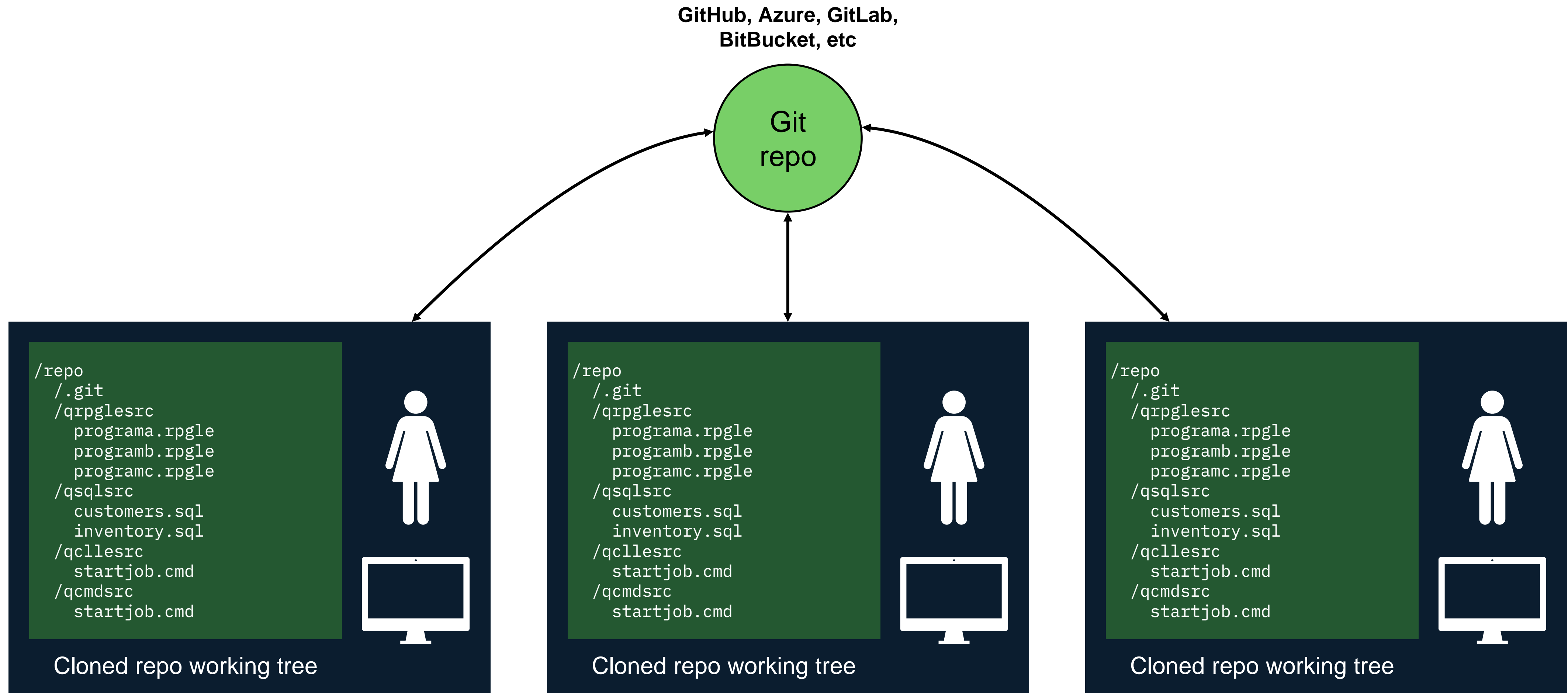
commit eae79241c50d13d4372b49e0a99a4015815e947 (origin/main, origin/feature/coolness, origin/H
EAD, main, feature/coolness)
Merge: e4bc22a 08f739f
Author: barry <3708366+worksofliam@users.noreply.github.com>
Date: Tue Jan 23 15:03:32 2024 -0500

    Merge pull request #35 from IBM/feature/new_dept_employee

    Create employee from department screen

commit 08f739f2591ea04110fb0a3f677b39a807252d0e (origin/feature/new_dept_employee, feature/new_
dept_employee)
Author: worksofliam <mrliamallan@live.co.uk>
Date: Tue Jan 23 15:00:18 2024 -0500
  
```

# Distributed

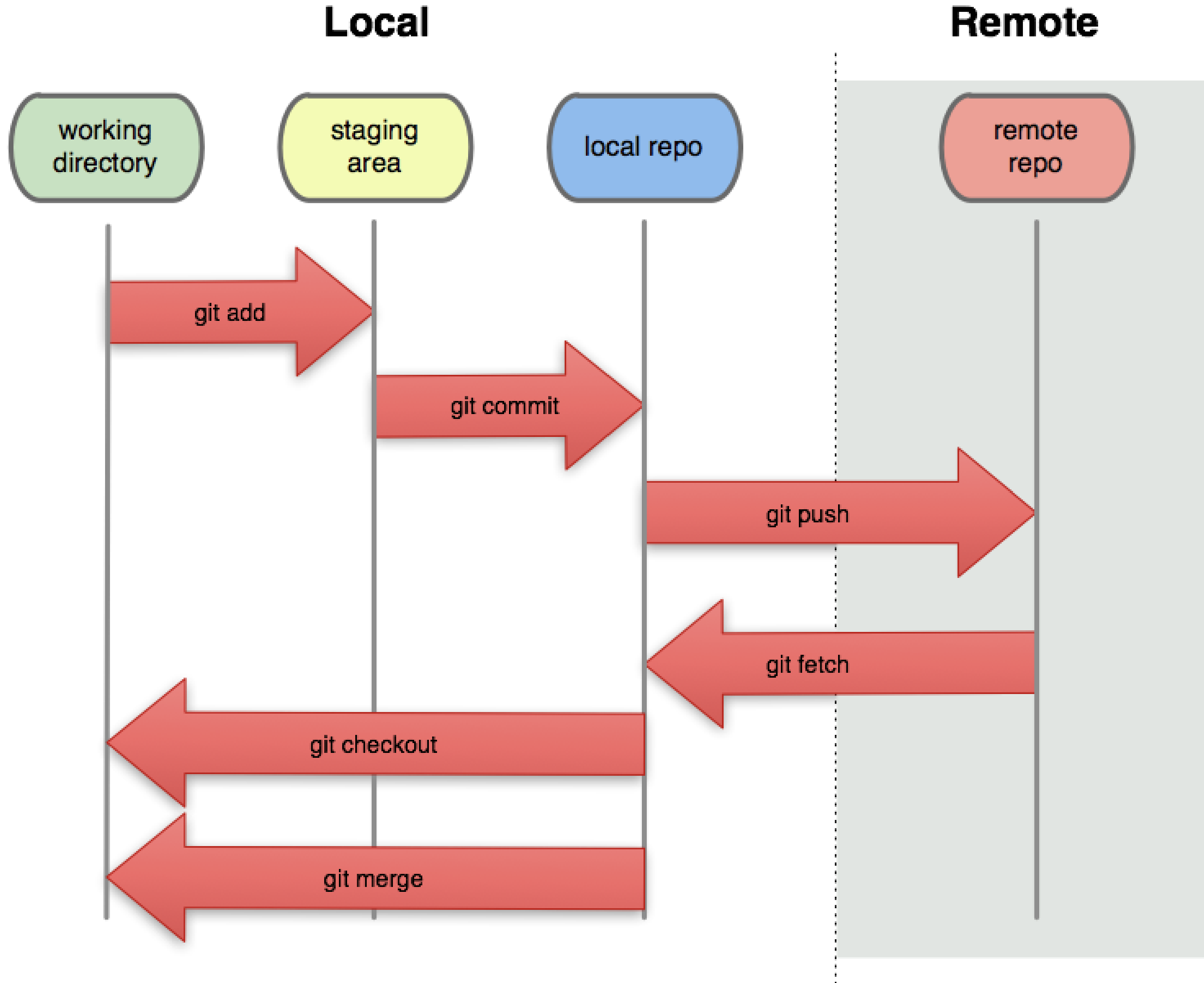


# Small & Fast!



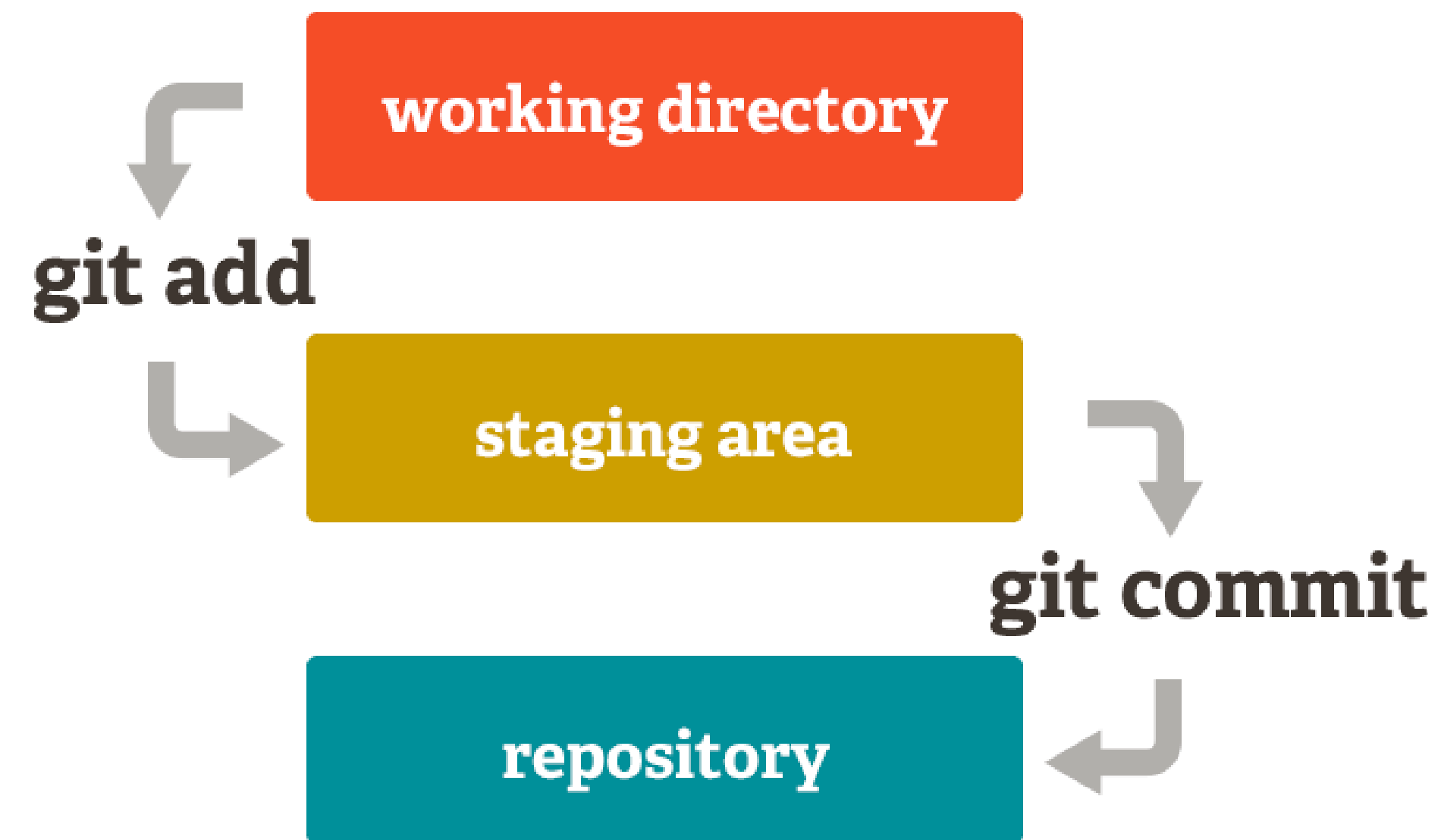


# High-level flow



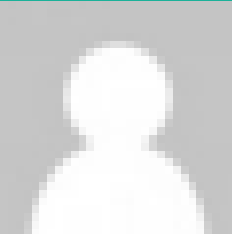
# Staging area?

- Before the commit, files get "staged"
- Why?
  - Commit only one of several changed files
  - Commit only a portion of a changed file!



# Hash codes

- All content is check-summed into a SHA-1 hash code
  - From then on the change is referred to by that hash code
  - Probability of collision is very small ~ # of sand grains on earth
  - => the content is tracked so empty directories are not
- 
- Commits are also referred to by a hash code



From a tablet

Awesome Orion on 5/11/2016, 11:00:15 AM  
committed by Awesome Orion  
<Awesome.Orion@Common.org>

commit:  
**abba2da966aa747cfd0e25744f56d2d89f426998**

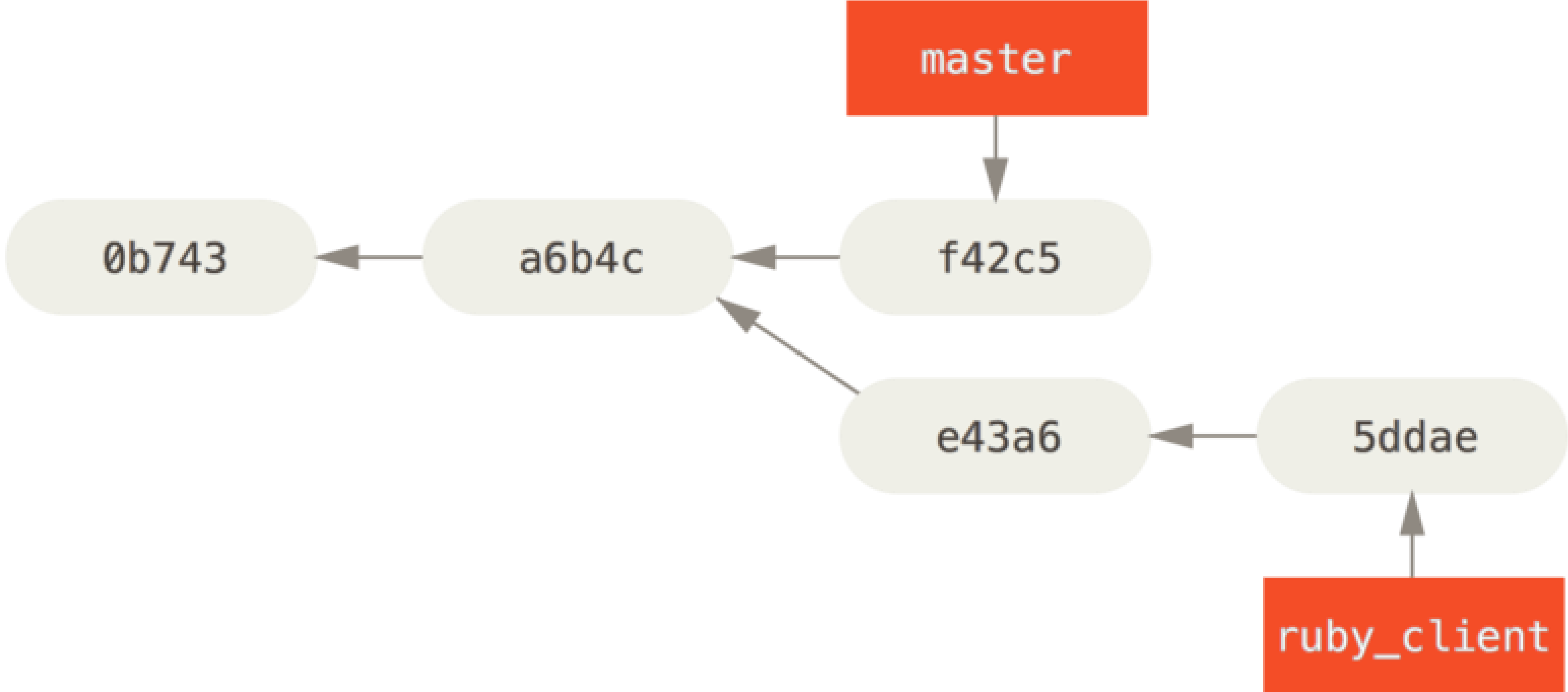
branches: `master` `origin/master`

# Branching and Merging

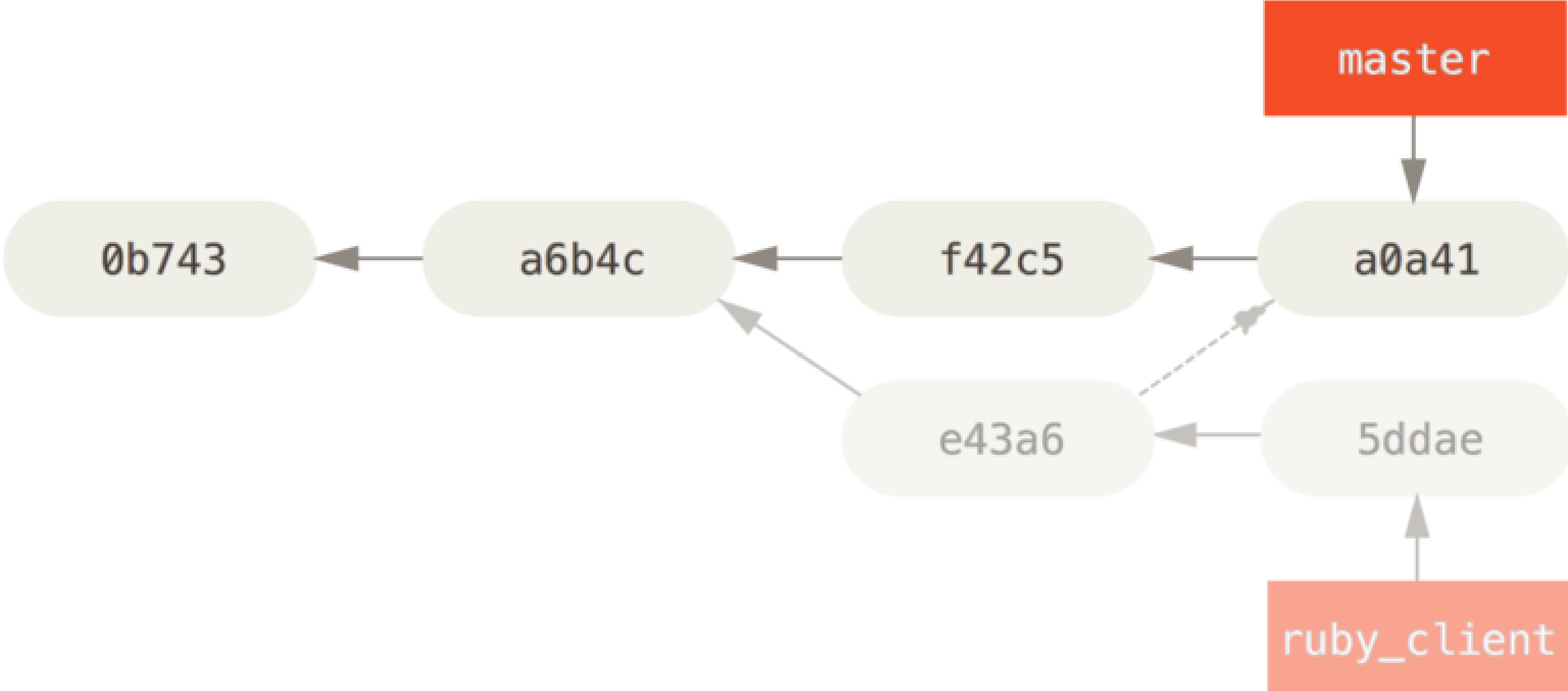


image source= <https://git-scm.com/about>

# Cherry-picking



# Cherry-picking



# Example: Node.js (<https://github.com/nodejs/node>)

nodejs / node

Watch 2,978 Unstar 57,172 Fork 12,652

Code Issues 539 Pull requests 213 Projects 9 Insights

Node.js JavaScript runtime 🌟 🐉 🚀 🌟 <https://nodejs.org>

nodejs javascript node js runtime mit linux macos windows

25,339 commits 136 branches 529 releases 2,392 contributors View license

Branch: master New pull request Create new file Upload files Find file Clone or download

tniessen	test: improve test coverage of native crypto code	Latest commit 7710235 4 days ago
.github	doc: add multiple issue templates for GitHub	5 months ago
benchmark	doc: update benchmark doc	3 days ago
deps	deps: cherry-pick 56f6a76 from upstream V8	2 days ago
doc	doc: fix deprecations metadata	22 hours ago
lib	util: remove eslint comments and rename variables	10 hours ago
src	process: move C++ process events into node_process_events.cc	5 hours ago

# Example: Node.js (<https://github.com/nodejs/node>)

The screenshot shows the GitHub repository page for Node.js. At the top, the repository name 'nodejs / node' is displayed. To the right, there are buttons for 'Watch' (2,978), 'Unstar' (57,172), and 'Fork' (12,652). Below this, there are tabs for 'Code', 'Issues' (539), 'Pull requests' (213), 'Projects' (9), and 'Insights'. The repository description is 'Node.js JavaScript runtime' with a link to 'https://nodejs.org'. Below the description are tags for 'nodejs', 'javascript', 'node', 'js', 'runtime', 'mit', 'linux', 'macos', and 'windows'. A horizontal bar shows statistics: '25,339 commits', '136 branches', '190 releases', and '2,392 contributors'. The '2,392 contributors' box is highlighted with a blue border, and a large blue arrow points to it from the bottom left. To the right of the contributors bar is a 'View license' button. Below the statistics bar are buttons for 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find file', and 'Clone or download'. The file list below shows the latest commit 'tniessen test: improve test coverage of native crypto...' and a list of folders: '.github', 'benchmark', 'deps', 'doc', 'lib', and 'src', each with its most recent commit and time ago.

nodejs / node

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Code Issues 539 Pull requests 213 Projects 9 Insights

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Branch: master New pull request Create new file Upload files Find file Clone or download

tniessen test: improve test coverage of native crypto... Latest commit 7710235 4 days ago

- .github 5 months ago
- benchmark 3 days ago
- deps 2 days ago
- doc 22 hours ago
- lib 10 hours ago
- src 5 hours ago



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tniessen test: improve test coverage of native crypto code Latest commit 7710235 4 days ago

.github	doc: add multiple issue templates	5 months ago
benchmark	doc: update benchmark doc	3 days ago
deps	deps: cherry-pick 56f6a76 from upstream V8	2 days ago
doc	doc: fix deprecations metadata	22 hours ago
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src	process: move C++ process events into node_process_events.cc	5 hours ago

# Example: Node.js (<https://github.com/nodejs/node>)

nodejs / node Watch 2,978 Unstar 57,172 Fork 12,652

Code Issues 539 Pull requests 213 Projects 9 Insights

Overview **Active** Stale All branches

### Active branches

<code>v11.x-staging</code>	Updated 8 months ago by addaleax	✓	1473   1326	<a href="#">Compare</a>
<code>canary-base</code>	Updated 2 days ago by ryzokuken	✗	40   18	<a href="#">Compare</a>
<code>v10.15.1-proposal</code>	Updated 4 days ago by codebytere	✗	3499   2454	#25346 <a href="#">Open</a>
<code>Trott-patch-1</code>	Updated 5 days ago by Trott	✓	73   1	#25371 <a href="#">Closed</a>
<code>v6.x-staging</code>	Updated 16 days ago by addaleax		11727   4077	<a href="#">Compare</a>

# Node.js active branches

---

v6.x  
v8.x  
v10.x




Long-Term Support (LTS) releases

v11.x




Feature Release

v6.x-staging  
v8.x-staging  
v10.x-staging  
v11.x-staging



Staging areas for each release

v6.16.0-proposal  
v8.15.0-proposal  
v10.15.1-proposal



Proposal branches for LTS releases (heavily verified before landing in LTS release)

# Collaboration Example 1: Cross-project dependency

---

- Two development teams (A & B)
  - Team A needs a small change in Team B's code
- What happens?
  - Non-collaborative:
    - Team A files a requirement against Team B
    - Team B establishes priority based on Team B's needs
    - Team A waits for Team B to implement
  - Collaborative:
    - Team A creates a branch in Team B's repository
      - ... Or their own clone of the repository
    - Team A commits a fix to the new branch
    - Team A continues on, using the new branch
    - Team B asked to review the changes and eventually merges

# Collaboration Example 2: Concurrent development

Two developers, working on two separate enhancements



Dev 1

File\_01

File\_02

File\_03

File\_04

File\_05

File\_06

File\_07

File\_08

File\_09



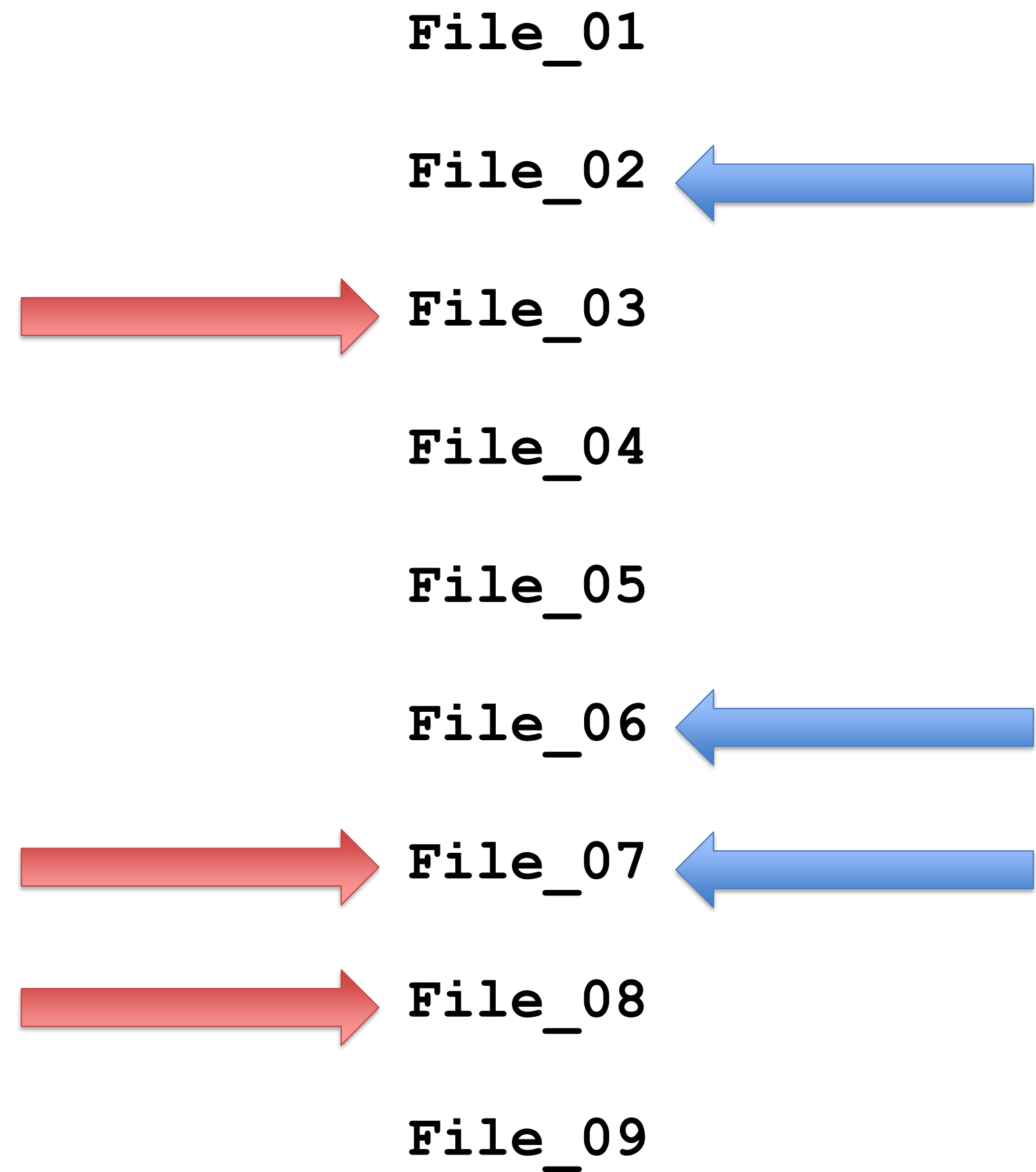
Dev 2

# Collaboration Example 2: Concurrent development

Each needs to change multiple files



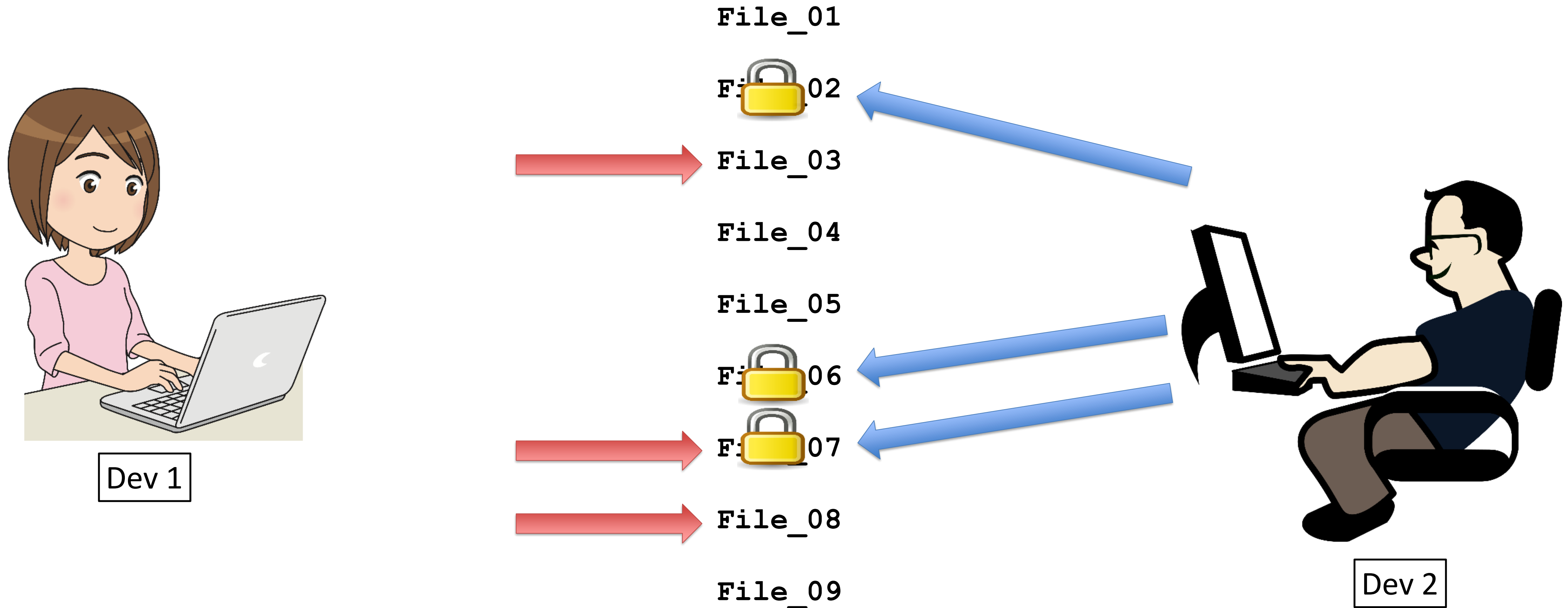
Dev 1



Dev 2

# Collaboration Example 2: Concurrent development

Some traditional change control systems lock files (Dev 2 does just that)



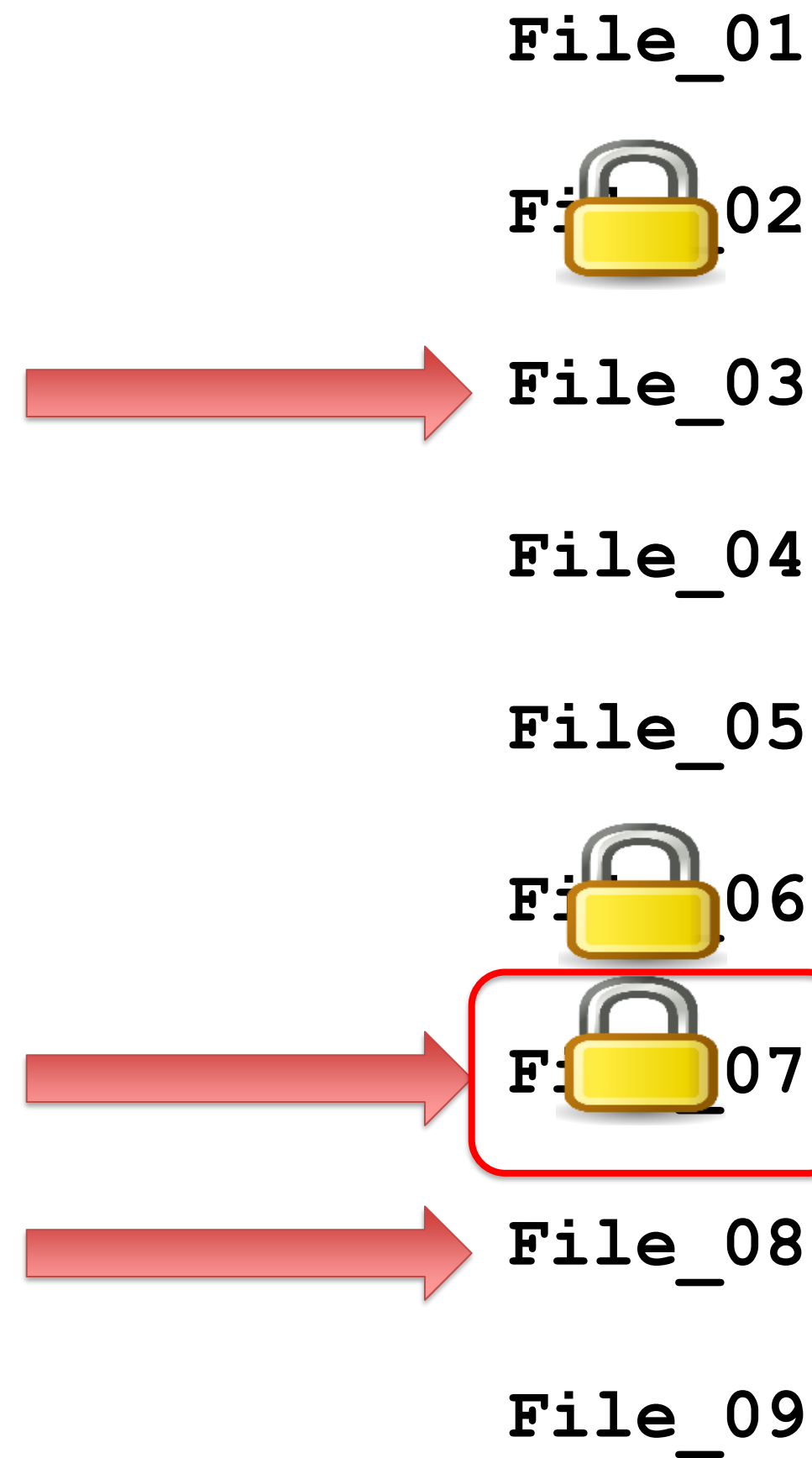


# Collaboration Example 2: Concurrent development

Dev 1 can't lock the file also! Now What?



Dev 1



Dev 2



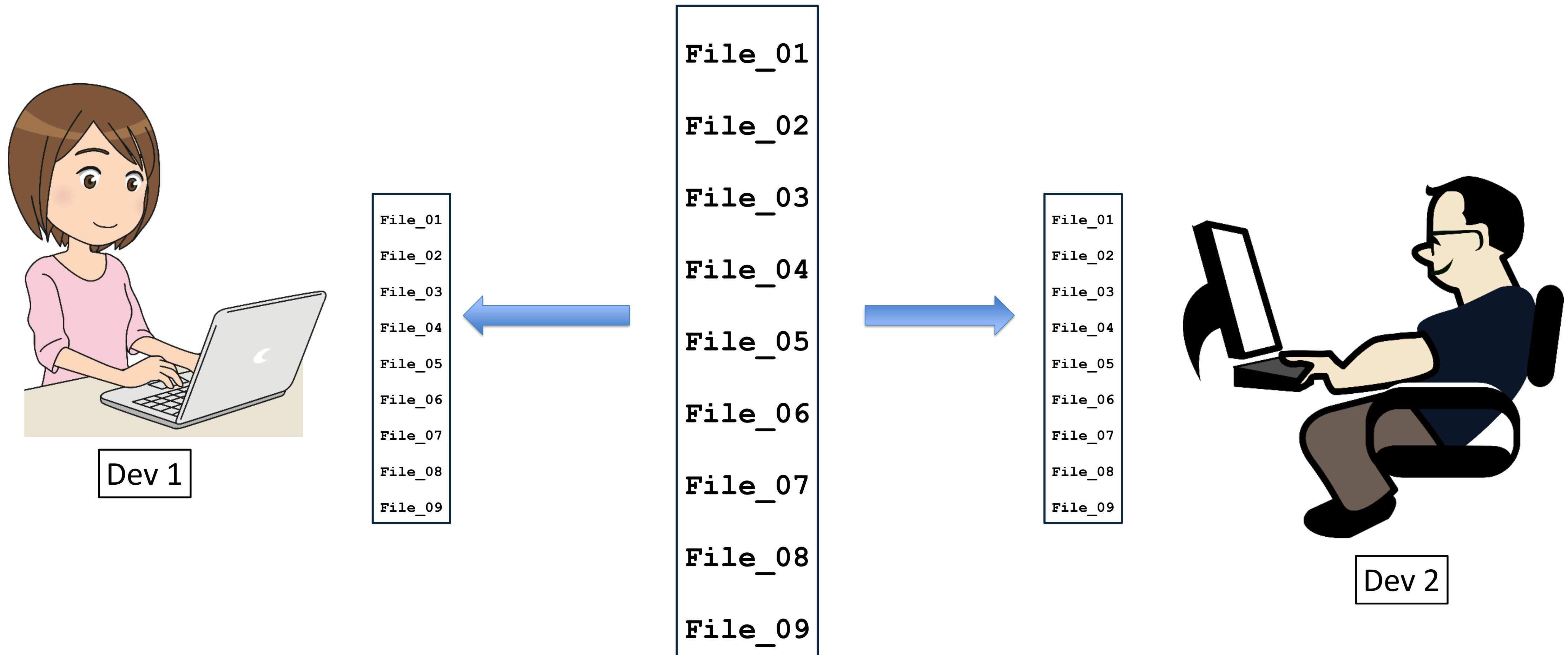
# Locking-based change control: conflict resolution

---

1. Developer waits for teammates to be done with the part
2. Developer takes a copy of the source part, proceeds to make changes, then later manually merges in changes (ERROR PRONE!!)

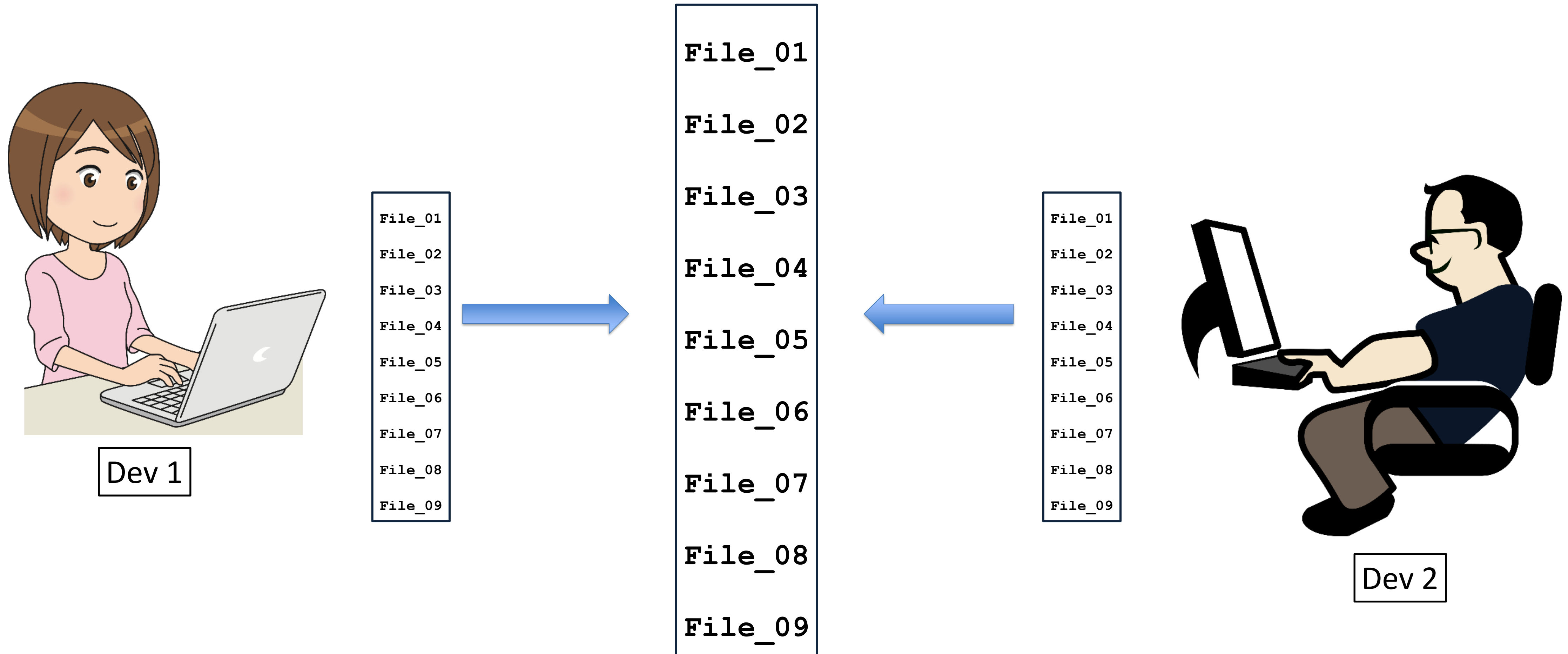
# Collaboration Example 2: Concurrent development

With Git, each Dev clones the repository (and maybe create different branches)



# Collaboration Example 2: Concurrent development

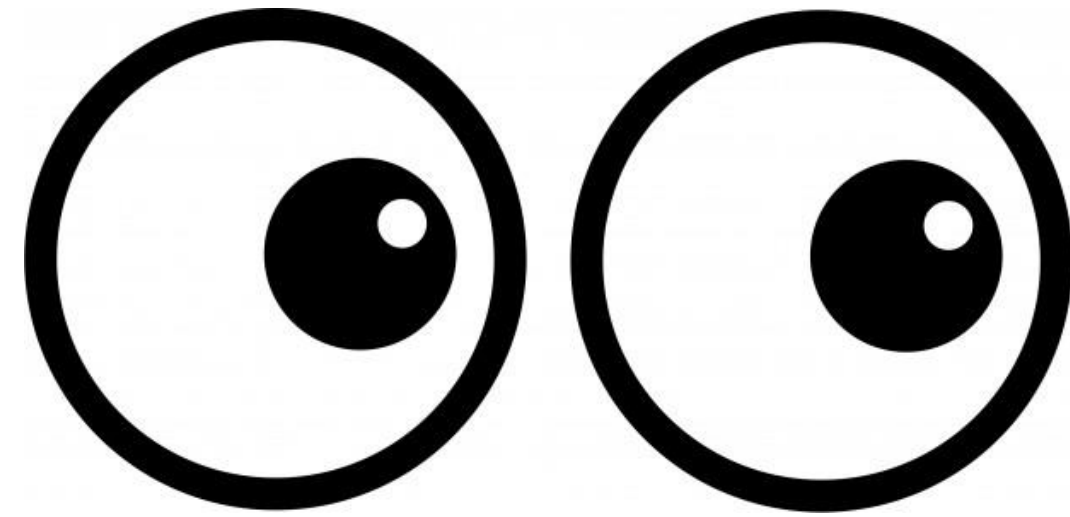
When complete, changes get pushed back into central repository



# Git: conflict resolution

---

- Human eyes are required when multiple devs change the same lines of code (in reality, this is rare)



- Concurrent development is easy because:
  - Everyone works on own copy
  - Branching strategy further avoids conflicts

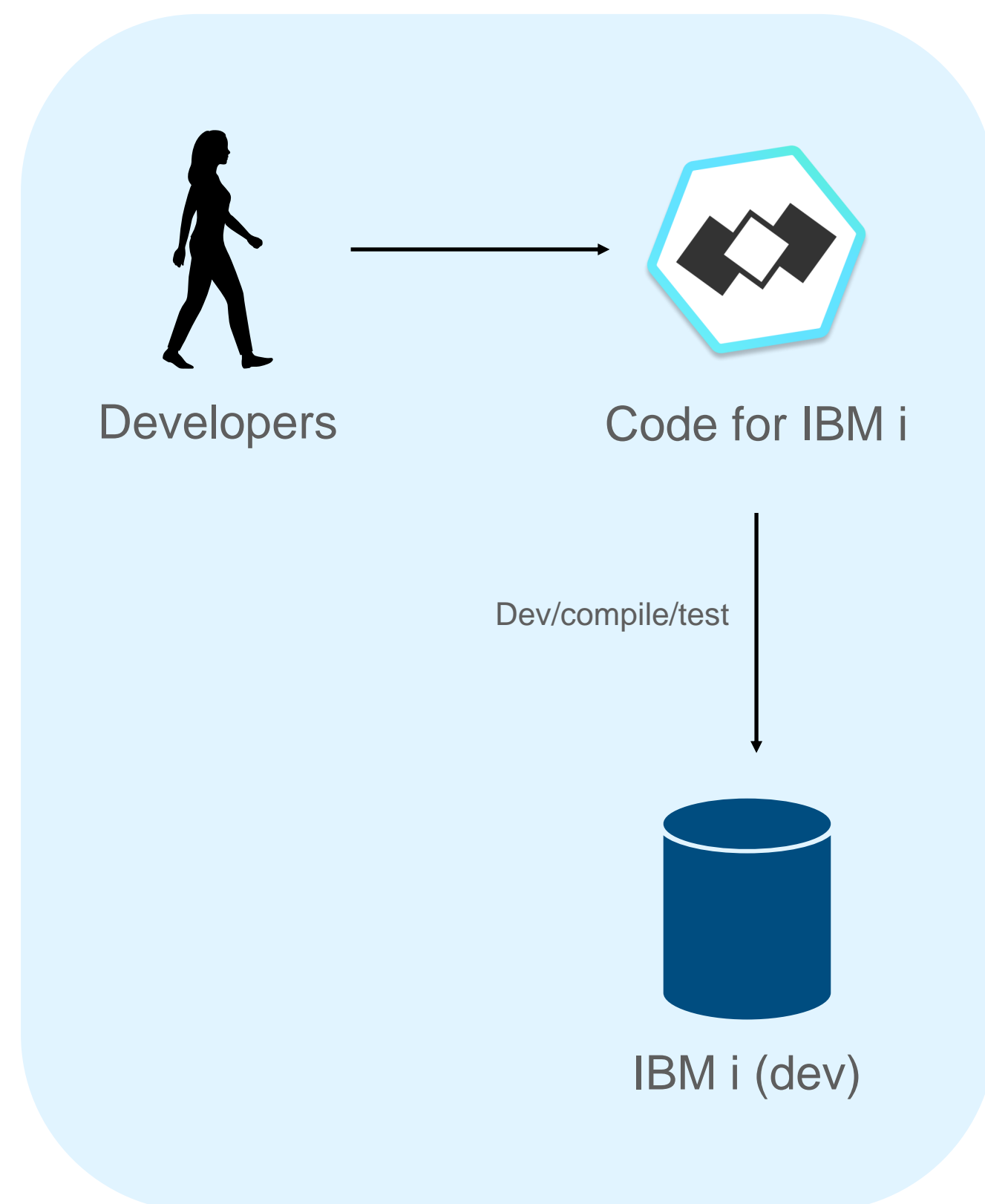


# VSCode

- Has several IBM i modules for language knowledge
- Comes with Git Lens built in
- Accessing source on IBM i
  - "Code for IBM i" extension allows you to access IBM i stream files directly
    - Use with "Git for IBM i" extension
  - Map a drive and open folder directly in VSCode
    - Git Lens works seamlessly
    - Requires FAST connectivity to work well
  - Several VSCode extensions can keep a local folder in sync with a remote (IBM i) directory
    - Git Lens works on local dir (fast and smooth)
  - Several other tools for synchronizing directories (e.g. WinSCP) ← Jesse's preference
    - Git Lens works on local dir (fast and smooth)

# Visual Studio Code

## Development



- First class git support
- IBM i integration via extensions
- Access to hundreds of git tools
- Integrates with vendors or self-managed tools
- RPGLE, COBOL, CL, SQL, and more



SOURCE CONTROL

Message (Ctrl+Enter to commit on 'master')

Changes 0

COMMITS 01 11 • master

uno You, 4 minutes ago

origin test Jesse Gorzinski, 6 hours ago

payrollff.rpgle qrpglesrc M

test You, 6 hours ago

FILE HISTORY payrollff.rpgle

uno You, 4 minutes ago M

origin test Jesse Gorzinski, 6 hours ago M

test You, 6 hours ago M

initial migration Jesse Gorzinski, 7 hours ago A

BRANCHES (1)

master 01 11 origin/master • 4 minutes ago ✓, ▲

REOTES

STASHES

TAGS

SEARCH & COMPARE

payrollff.rpgle clc1.cle payrollff.rpgle (182ee17) ↔ payrollff.rpgle (0f8d7f7)

```
C: > rselab > qrpglesrc > payrollff.rpgle
1 // *****
2 // PROGRAM NAME - Payroll
3 // DESCRIPTION - Time reporting master file maintenance using
4 // externally described workstation processing
5 // *****
6 // INDICATORS USED
7 // 50 - No record found on CHAIN operation
8 // 60 - General error condition
9 // 90 - Protect display on delete request
10 // KC - End of job requested
11 // KD - Return to application selection
12 // KE - Return to employee selection
13 // KF - Return to project selection
14 // KG - Return to reason code selection!
15- // LR - Last record!!!!
16 // *****
17 // SUBROUTINES USED
18 // EDITSL - Edit application selection display (SELECT)
19 // ACDESR - Edit action code for all maintenance requests
20 // *****
21 // This program uses all externally described files. Files
22 // used are - MSTDSP - maintenance display file
23 // - EMPMST - employee master file
24 // - PRJMST - project master file
25 // - RSNMST - reason code master file
26 // *****
27 Dcl-F MSTDSP WORKSTN;
28 Dcl-F EMPMST Usage(*Update:*Delete:*Output) Keyed;
29 Dcl-F PRJMST Usage(*Update:*Delete:*Output) Keyed;
30 Dcl-F RSNMST Usage(*Update:*Delete:*Output) Keyed;
31 //
32 // Compile time array containing error descriptions.
33 Dcl-S ERR Char(50) DIM(10) CTDATA PERRCD(1);
34 Dcl-s i int(10);
35 Dcl-S EMESS Char(50);
36 //
37 // *****
38 // MAINLINE CALCULATIONS
39 // *****
```

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payrollff.rpgle qrpglesrc

test You, 19 hours ago

FILE HISTORY payrollff.rpgle

Uncommitted changes You, seconds ago M

uno You, 13 hours ago M

origin test Jesse Gorzinski, 19 hours ago M

test You, 19 hours ago M

initial migration Jesse Gorzinski, 20 hours ago A

BRANCHES (1)

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```



SOURCE CONTROL

Message (Ctrl+Enter to commit on 'master')

Staged Changes 1

- payrollff.rpgle qrpglesrc M

Changes 0

COMMIT 01 11 • master

Changes to push to origin on GitHub: 1 commit

- uno You, 13 hours ago
- origin test Jesse Gorzinski, 19 hours ago
  - payrollff.rpgle qrpglesrc M
  - test You, 19 hours ago

FILE HISTORY payrollff.rpgle

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19 // ACDESR - Edit action code for all maintenance requests
20 // *****
21 // This program uses all externally described files. Files
22 // used are - MSTDSP - maintenance display file
23 // - EMPMST - employee master file
24 // - PRJMST - project master file
25 // - RSNMST - reason code master file
26 // *****
27 Dcl-F MSTDSP WORKSTN;
28 Dcl-F EMPMST Usage(*Update:*Delete:*Output) Keyed;
29 Dcl-F PRJMST Usage(*Update:*Delete:*Output) Keyed;
30 Dcl-F RSNMST Usage(*Update:*Delete:*Output) Keyed;
31 //
32 // Compile time array containing error descriptions.
33 Dcl-S ERR Char(50) DIM(10) CTDATA PERRCD(1);
34 Dcl-s i int(10);
35 Dcl-S EMESS Char(50);
36 //
37 // *****
38 // MAINLINE CALCULATIONS
39 // *****

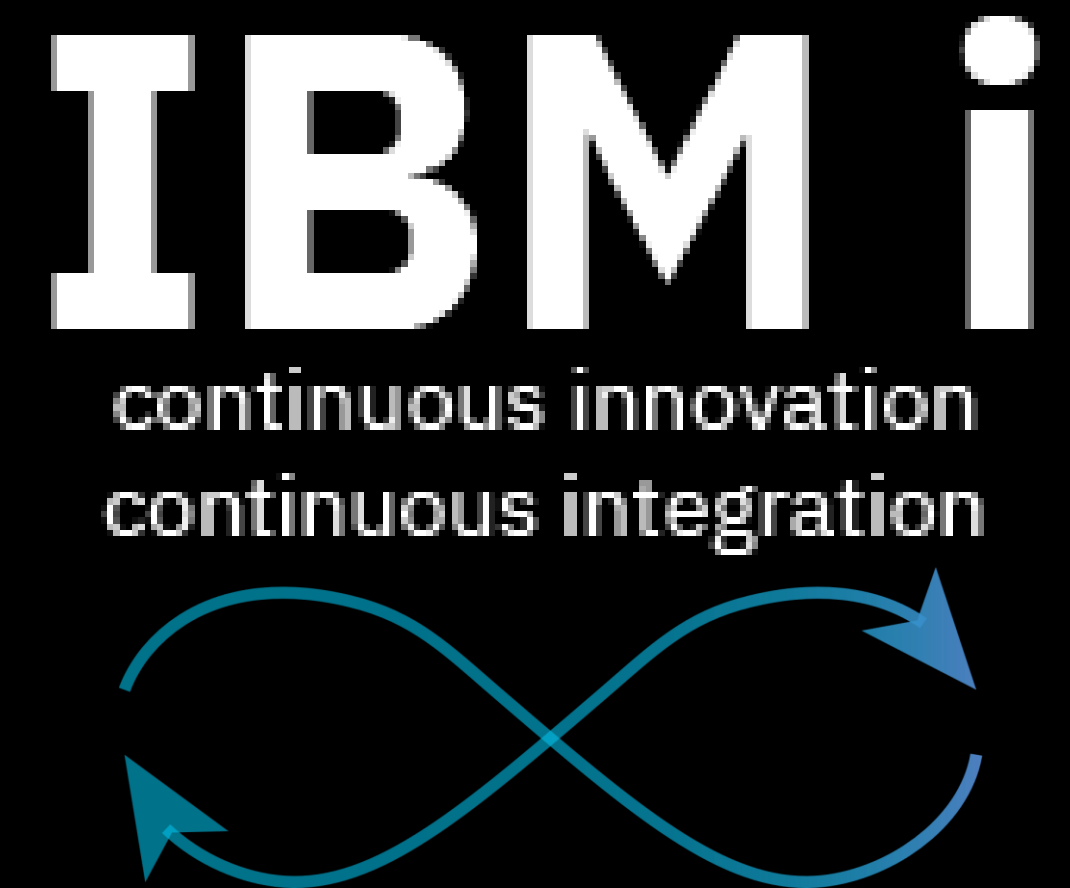
```

```

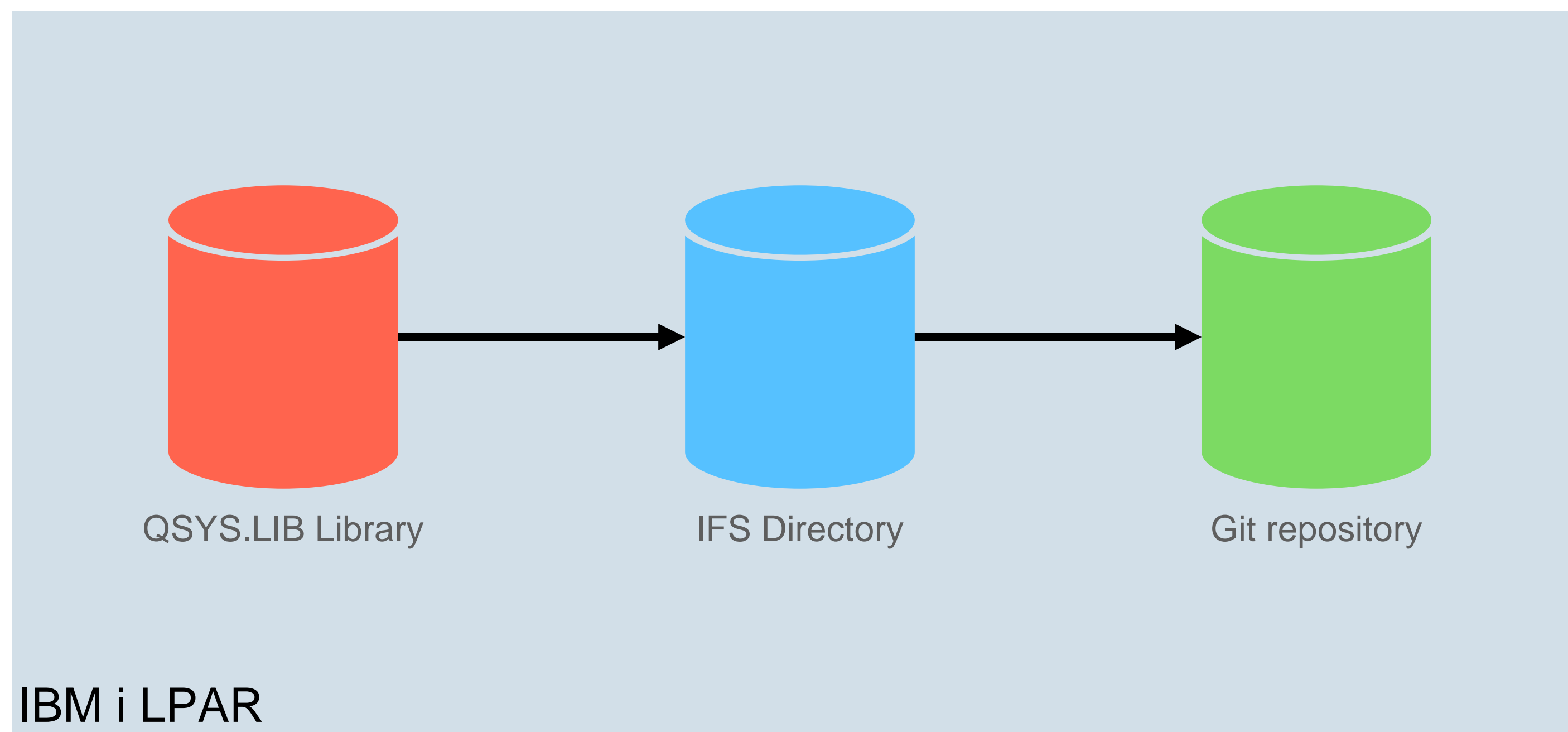
1 // *****
2+ // PROGRAM NAME - PayrollFF You, seconds ago • Uncommi
3 // DESCRIPTION - Time reporting master file maintenance usi
4 // externally described workstation processing
5 // *****
6 // INDICATORS USED
7 // 50 - No record found on CHAIN operation
8 // 60 - General error condition
9 // 90 - Protect display on delete request
10 // KC - End of job requested
11 // KD - Return to application selection
12 // KE - Return to employee selection
13 // KF - Return to project selection
14 // KG - Return to reason code selection!
15 // LR - Last record!
16 // *****
17 // SUBROUTINES USED
18 // EDITSL - Edit application selection display (SELECT)
19 // ACDESR - Edit action code for all maintenance requests
20 // *****
21 // This program uses all externally described files. Files
22 // used are - MSTDSP - maintenance display file
23 // - EMPMST - employee master file
24 // - PRJMST - project master file
25 // - RSNMST - reason code master file
26 // *****
27 Dcl-F MSTDSP WORKSTN;
28 Dcl-F EMPMST Usage(*Update:*Delete:*Output) Keyed;
29 Dcl-F PRJMST Usage(*Update:*Delete:*Output) Keyed;
30 Dcl-F RSNMST Usage(*Update:*Delete:*Output) Keyed;
31 //
32 // Compile time array containing error descriptions.
33 Dcl-S ERR Char(50) DIM(10) CTDATA PERRCD(1);
34 Dcl-s i int(10);
35 Dcl-S EMESS Char(50);
36 //
37 // *****
38 // MAINLINE CALCULATIONS
39 // *****

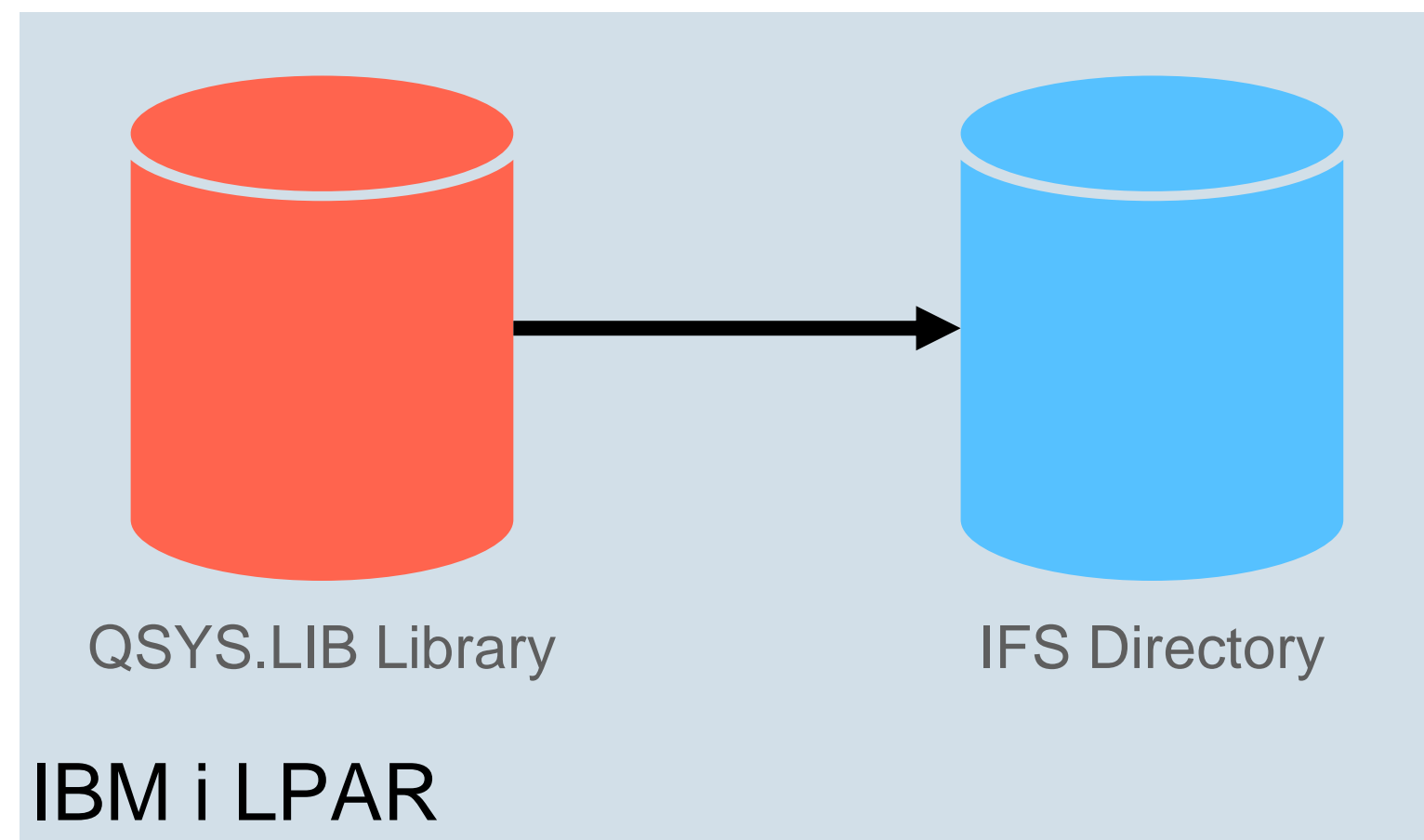
```

# Moving source code into git



# How to move source into git?





## CPYTOSTMF

```
CPYTOSTMF
FROMMBR('/QSYS.lib/DEVLIB.lib/QRPGLESRC.file/PROGRAMA.mbr')
TOSTMF('/home/barry/myproject/qrpglesrc/programa.rpgle')
STMFOPT(*REPLACE) STMFCCSID(1208)
```

## ibmi-bob cvtsrcpf (FOSS)

```
cd myproject/qrpglesrc
makei cvtsrcpf qrpglesrc testproj
```

## Migrate Tool (FOSS) <https://github.com/worksofliam/migrate>

```
MIGSRCPF LIBRARY(TESTPROJ) SOURCEPF(QRPGLESRC)
OUTDIR('/home/BARRY/myproject')
```

## Vendor tools

# Migrate Source with VSCode and "Project Explorer"

CVTSRCPF  
from BOB

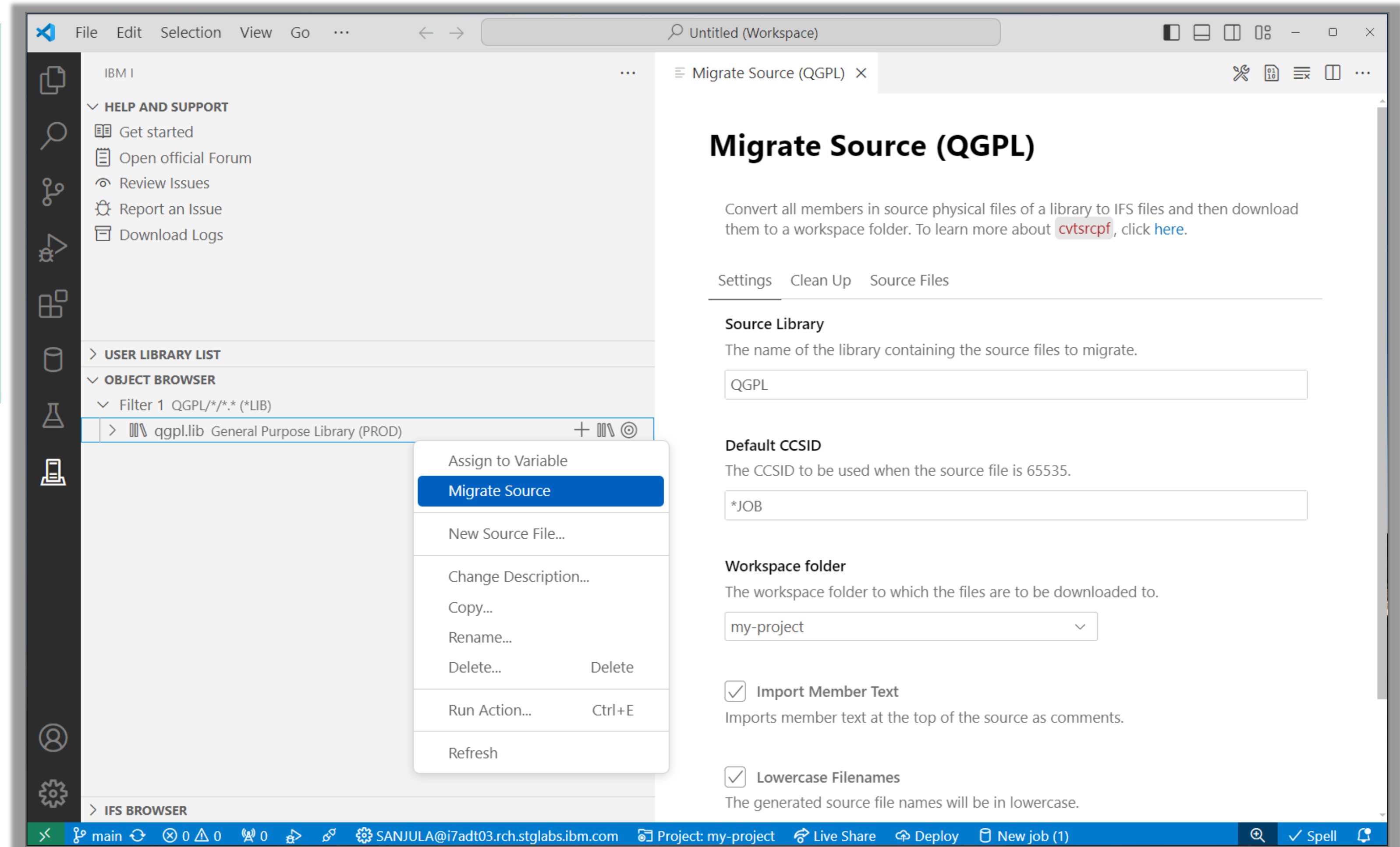


QSYS members in source  
physical files  
↓  
Properly encoded,  
terminated, and named  
source files in an IFS  
directory

↓  
Download to local project

↓  
Rename extensions  
↓  
Convert includes/copy  
directives to Unix style  
paths

Source Orbit





# Similar look

## Just a different file system!

DEVLIB

- QRPGLSRC
  - PROGRAMA.RPGLE
  - PROGRAMB.RPGLE
  - PROGRAMC.RPGLE
- QSQLSRC
  - CUSTOMERS.SQL
  - INVENTORY.SQL
- QCLLESRC
  - STARTJOB.CLLE
- QCMDSRC
  - STARTJOB.CMD

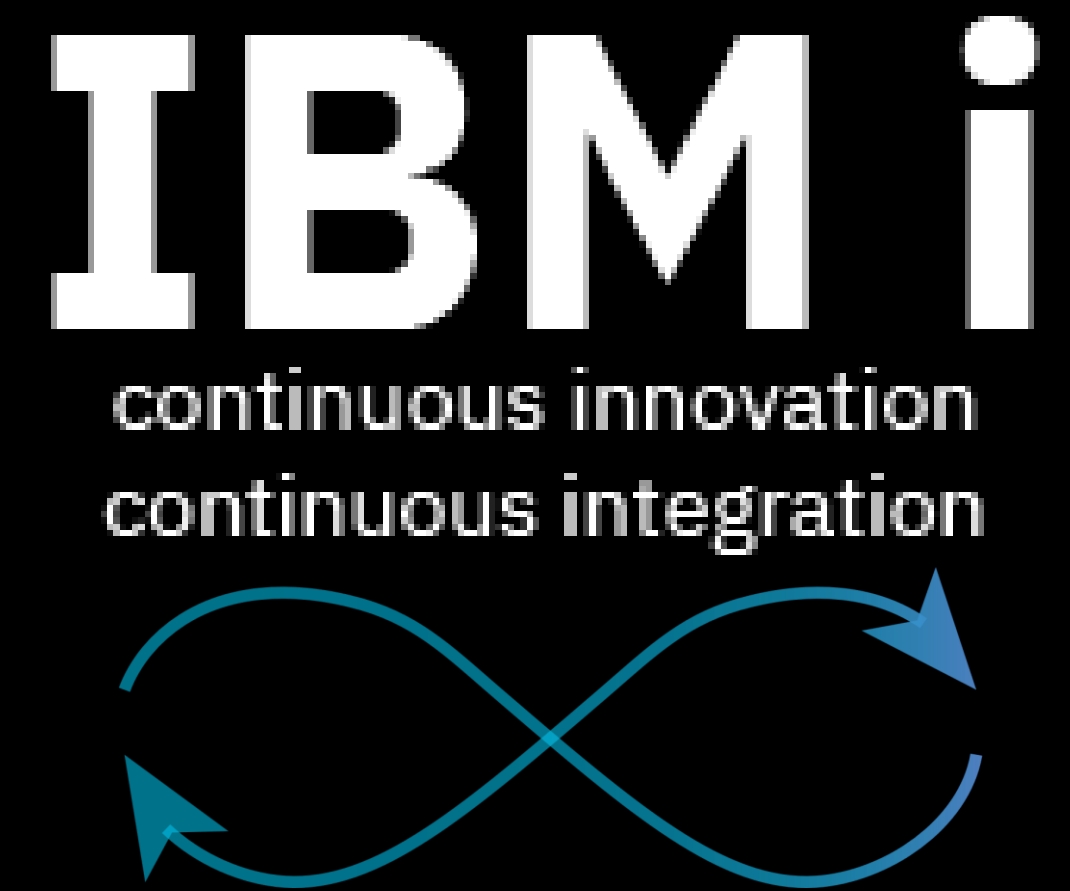
QSYS.LIB Library

```
/repo
  /.git
  /qrpglesrc
    programa.rpgle
    programb.rpgle
    programc.rpgle
  /qsqlsrc
    customers.sql
    inventory.sql
  /qcllesrc
    startjob.cmd
  /qcmdsrc
    startjob.cmd
```

IFS and git repository

```
cd ./repo  
git init --bare
```

Building in git





# Compilers

## Streamfile support

Command	Supports compiling from IFS?
CRTBNDRPG / CRTRPGMOD	SRCSTMF(path)
CRTSQLRPGI	SRCSTMF(path)
CRTSRVPGM	SRCSTMF(path)
CRTBNDCL / CRTCLMOD	SRCSTMF(path)
CRTDSPF	No
CRTPF / CRTLF	No
RUNSQLSTM	SRCSTMF(path)
CRTBNDC / CRTCMOD	SRCSTMF(path)
CRTBNDCBL / CRTCBLMOD	SRCSTMF(path)

The screenshot shows a web browser window displaying the GitHub repository page for 'ibmi-company\_system'. The repository is public and has 19 branches and 0 tags. The 'Code' dropdown menu is open, showing options for cloning the repository. The 'Local' tab is selected, and the 'Clone' option is highlighted. The 'HTTPS' protocol is selected, and the URL 'https://github.com/IBM/ibmi-company\_system' is displayed in a text input field. Below the URL, there is a note 'Clone using the web URL.' and a copy icon. Other options in the menu include 'Open with GitHub Desktop' and 'Download ZIP'. A red arrow points to the 'Code' dropdown button. The repository's file list is visible in the background, showing folders like '.github/workflows', '.vscode', 'qddssrc', 'qrppleref', and 'qrpplersrc', and files like '.gitignore', 'Rules.mk', 'iproj.json', and 'makefile'. The right sidebar shows repository statistics: 10 stars, 5 watching, and 14 forks. There are also sections for 'Releases' and 'Packages'.

Code Issues 1 Pull requests 4 Actions Wiki Security Insights Settings

ibmi-company\_system Public Edit Pins Unwatch 5 Fork 14 Starred 10

main 19 Branches 0 Tags Go to file + <> Code About

worksofliam Merge pull request #35 from IBM/

.github/workflows Updated

.vscode Program

qddssrc Created

qrppleref Add file

qrpplersrc Created

.gitignore Add .e

Rules.mk Support for ibmi-bob 2 years ago

iproj.json Update variable to use CURLIB 9 months ago

makefile Program to create new employee 3 months ago

ime.md Update build commands 2 years ago

Display a menu

Local Codespaces

Clone ?

HTTPS SSH GitHub CLI

https://github.com/IBM/ibmi-company\_system

Clone using the web URL.

Open with GitHub Desktop

Download ZIP

IBM i Example Application

Readme

Activity

Custom properties

10 stars

5 watching

14 forks

Report repository

Releases

No releases published

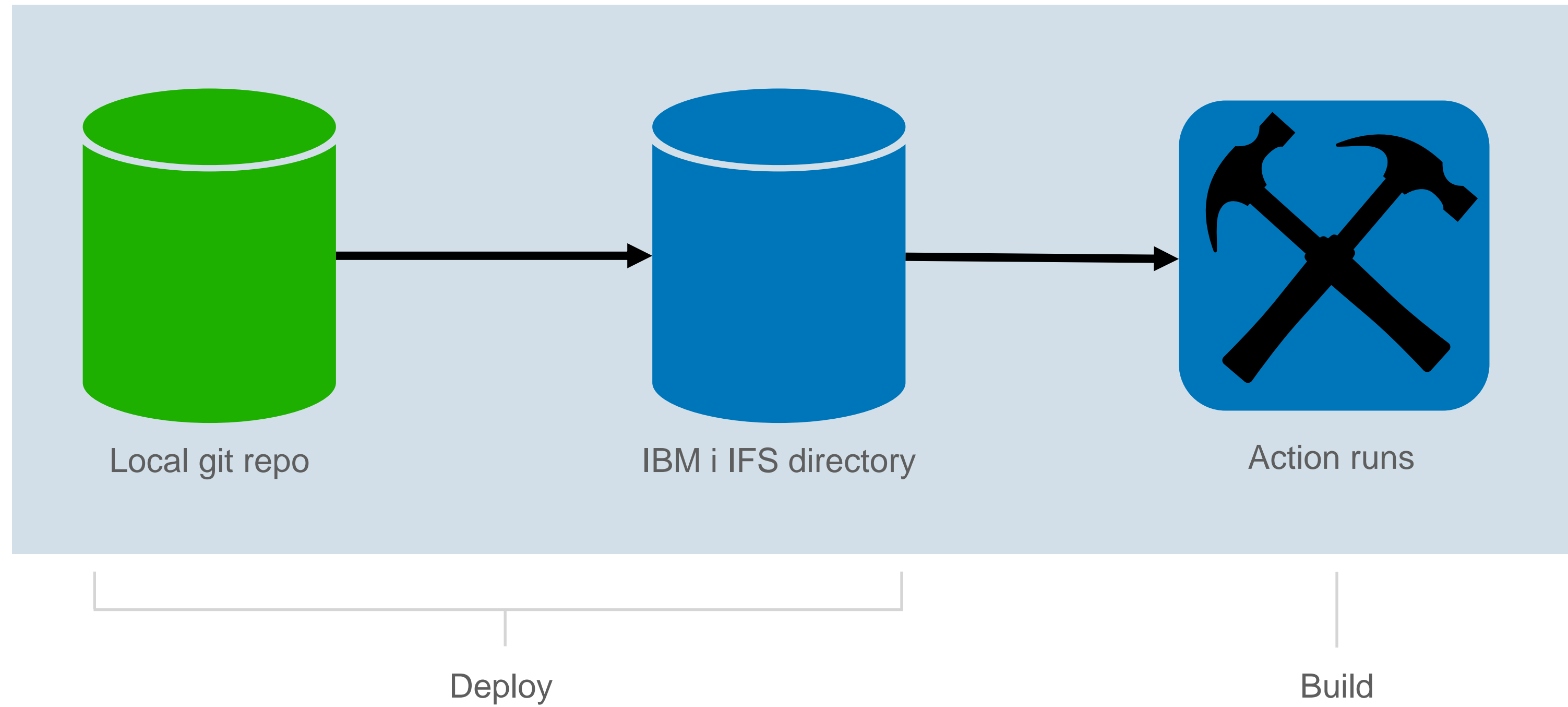
Create a new release

Packages

No packages published

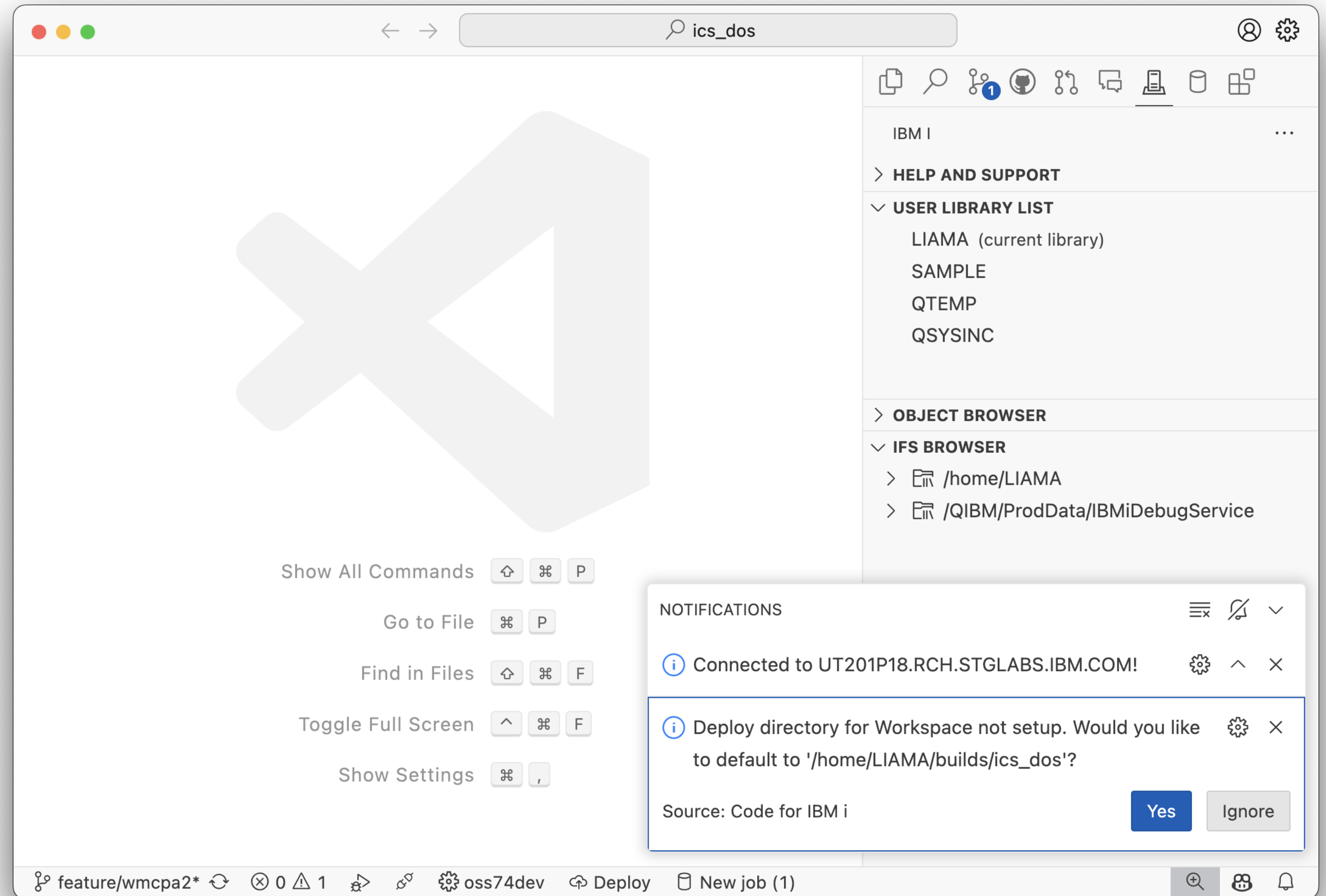
Publish your first package

# Deploy and build



# Deploy location

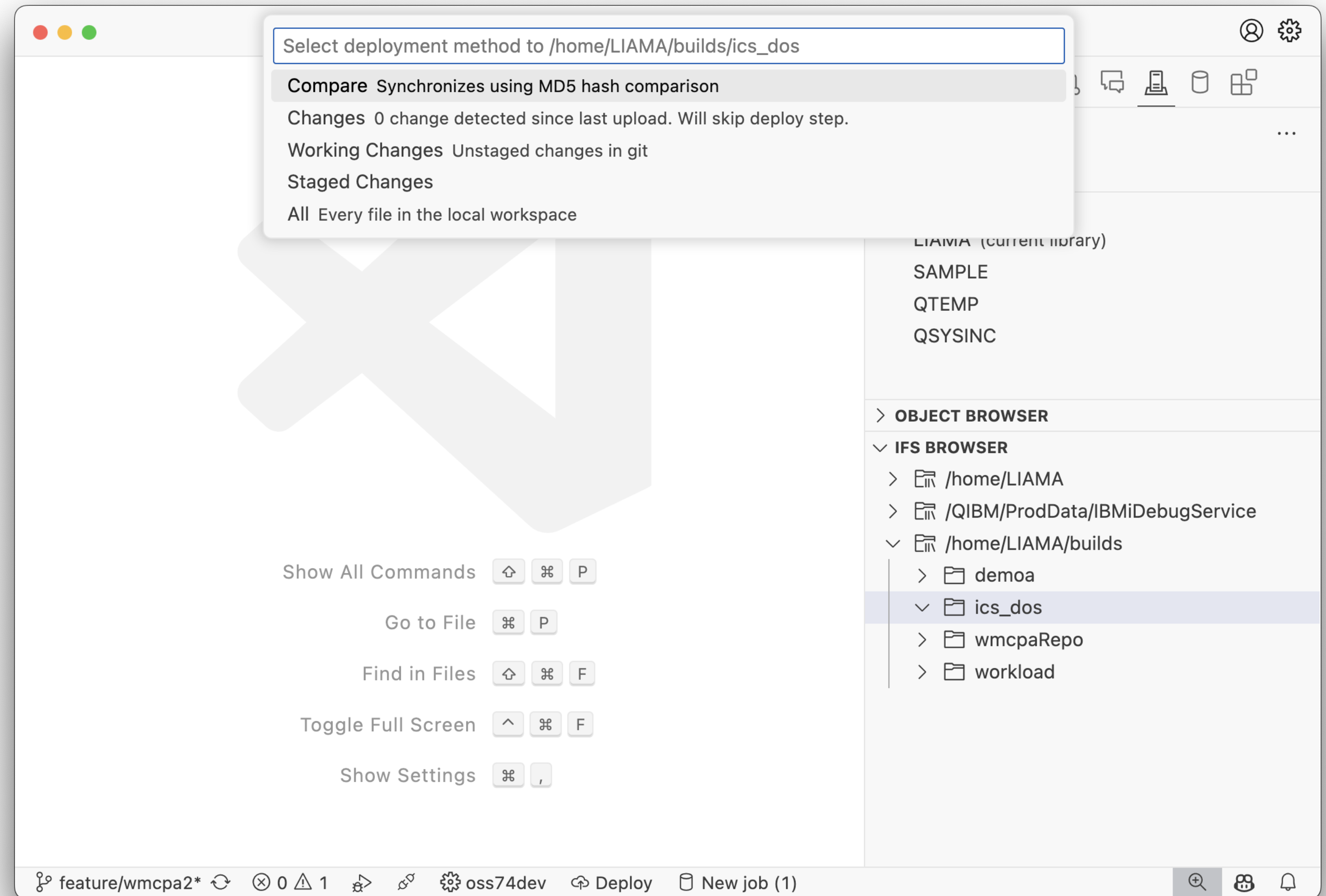
- Typically set only once
- Where sources get uploaded to get compiled
- Each developer gets a unique location
- Each repos get a unique location





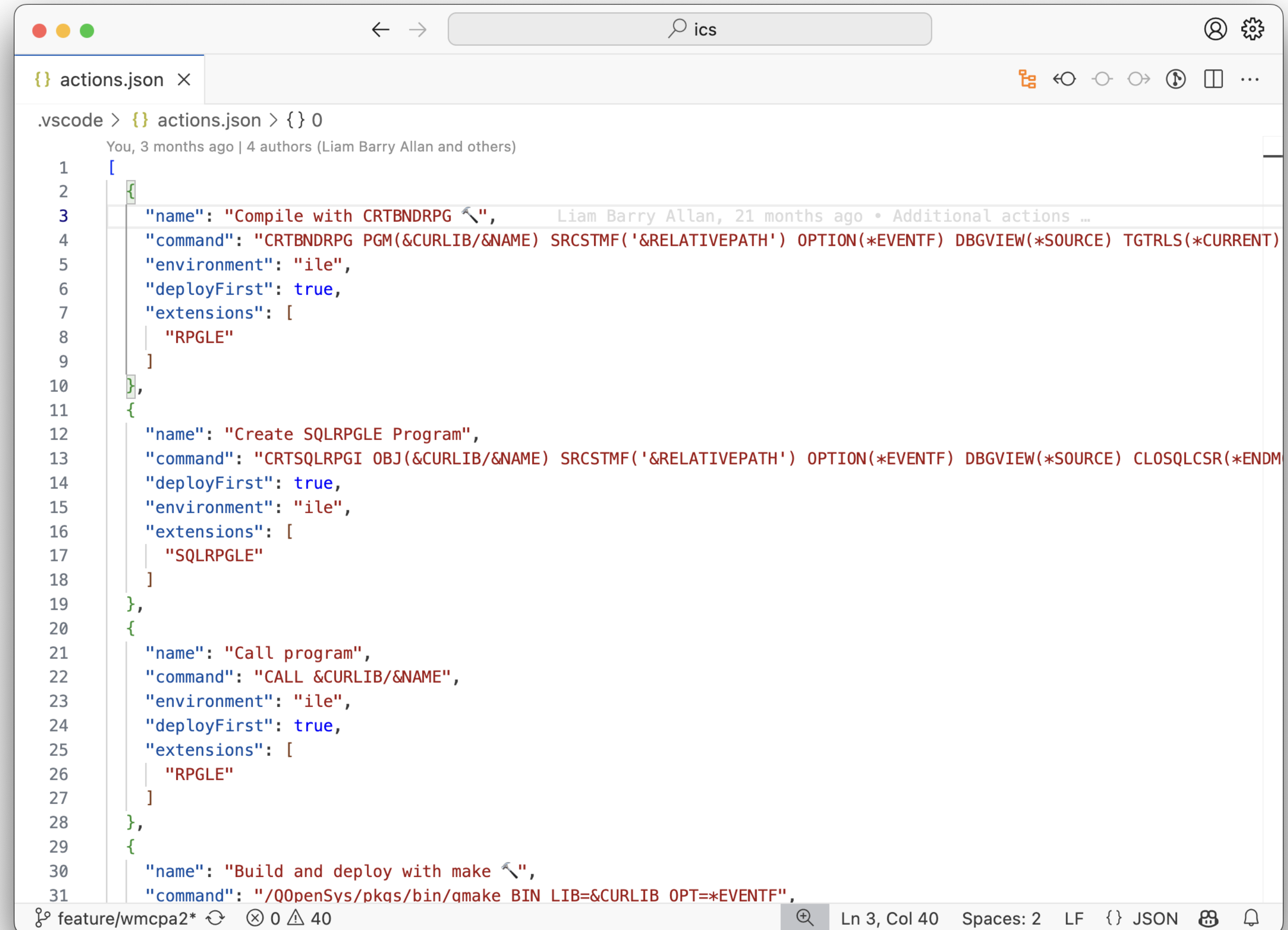
# Deploy

- The process of moving files to the deploy location
- Different options to determine how files get uploaded
- Typically 'Compare' is the safest



# Actions

- JSON file inside of repo
- Lists all compile commands
- Checked into git
- Common commands used by all



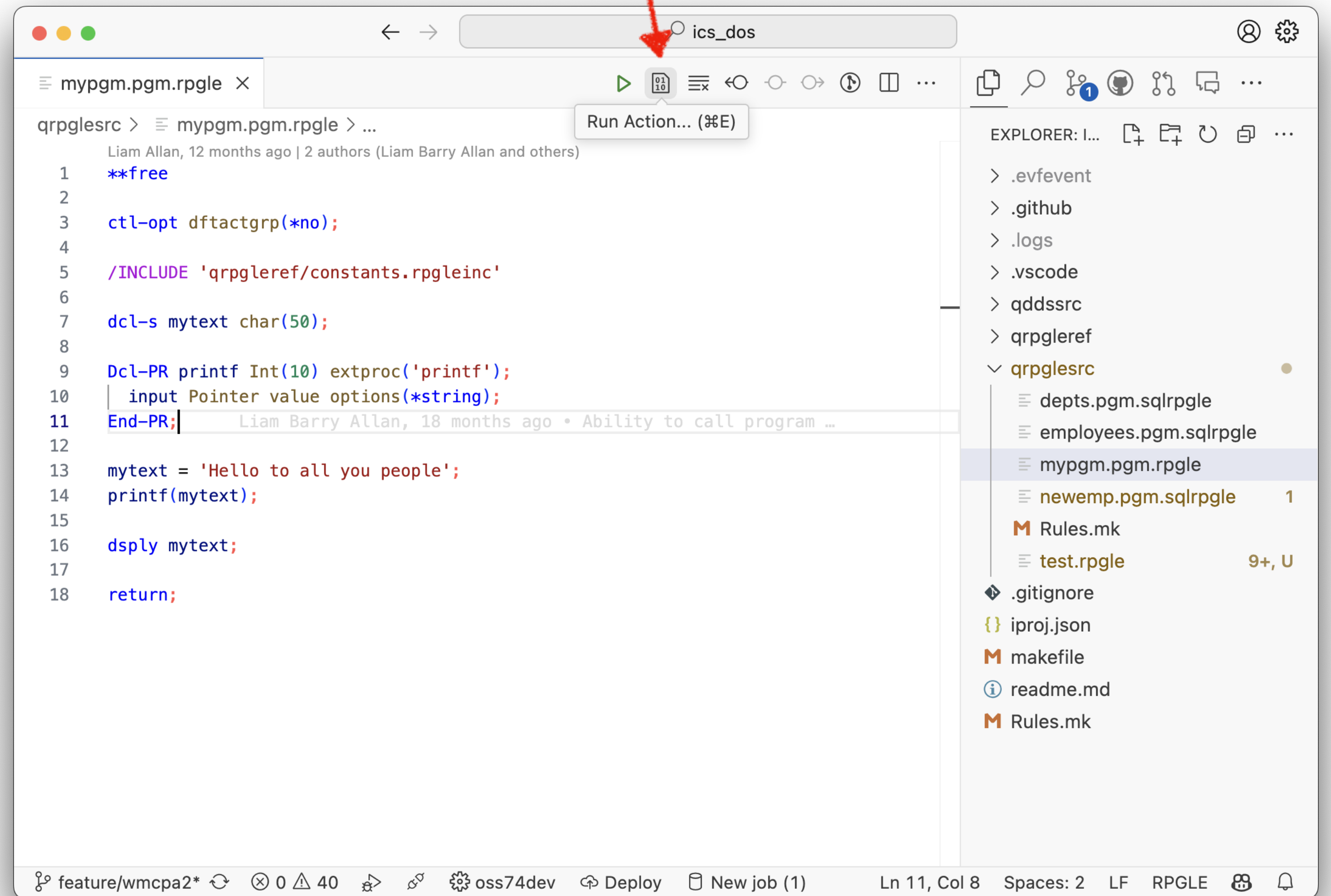
```

1  [
2  [
3    "name": "Compile with CRTBNDRPG",
4    "command": "CRTBNDRPG PGM(&CURLIB/&NAME) SRCSTMF('&RELATIVEPATH') OPTION(*EVENTF) DBGVIEW(*SOURCE) TGTRLS(*CURRENT)",
5    "environment": "ile",
6    "deployFirst": true,
7    "extensions": [
8      "RPGLE"
9    ]
10 ],
11 {
12   "name": "Create SQLRPGLE Program",
13   "command": "CRTSQLRPGI OBJ(&CURLIB/&NAME) SRCSTMF('&RELATIVEPATH') OPTION(*EVENTF) DBGVIEW(*SOURCE) CLOSQLCSR(*ENDM",
14   "deployFirst": true,
15   "environment": "ile",
16   "extensions": [
17     "SQLRPGLE"
18   ]
19 },
20 {
21   "name": "Call program",
22   "command": "CALL &CURLIB/&NAME",
23   "environment": "ile",
24   "deployFirst": true,
25   "extensions": [
26     "RPGLE"
27   ]
28 },
29 {
30   "name": "Build and deploy with make",
31   "command": "/Q0openSys/pkgs/bin/qmake BIN LIB=&CURLIB OPT=*EVENTF",

```

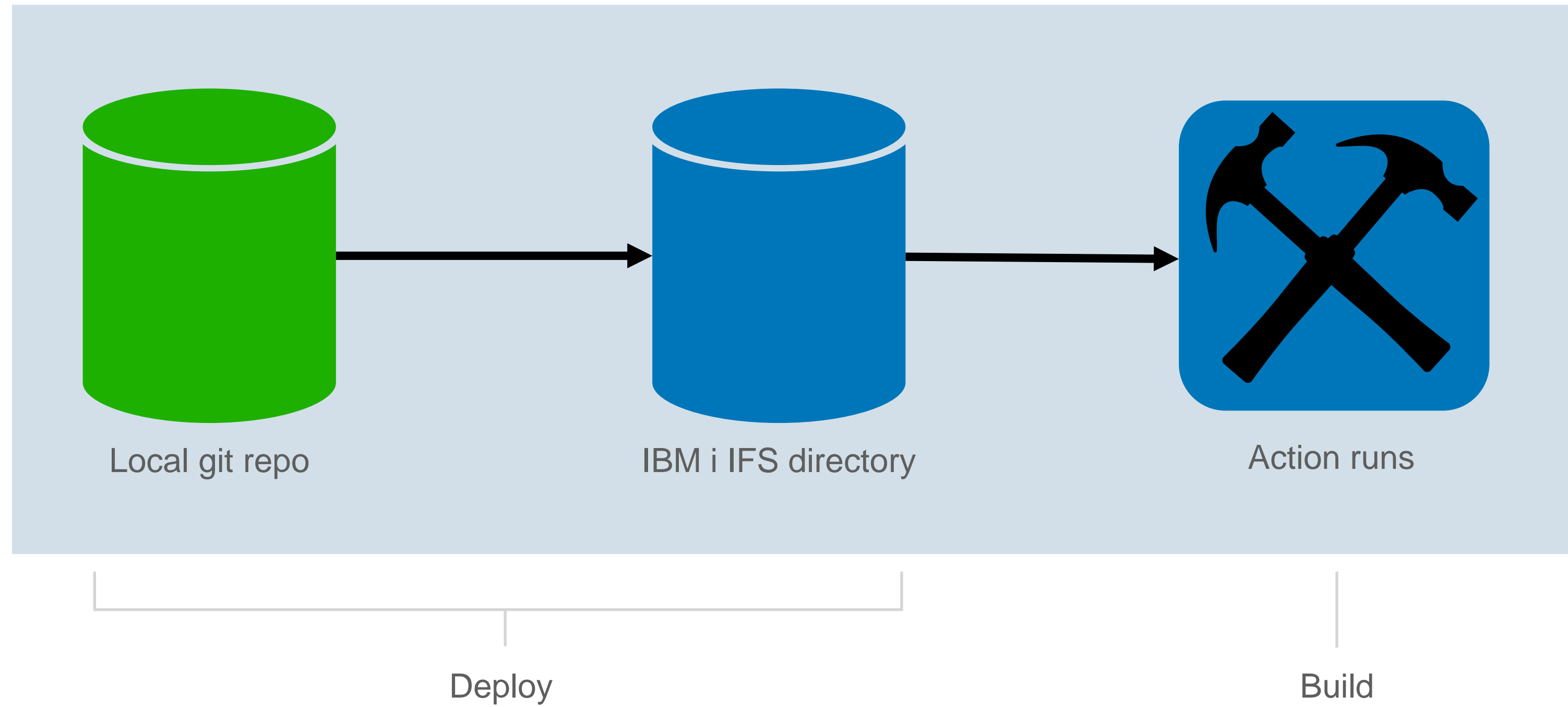
# Run Action

- User can select which Action to run (based on the actions.json)
- Triggers the deploy process
- Runs command(s) on the server
- Also known as the build



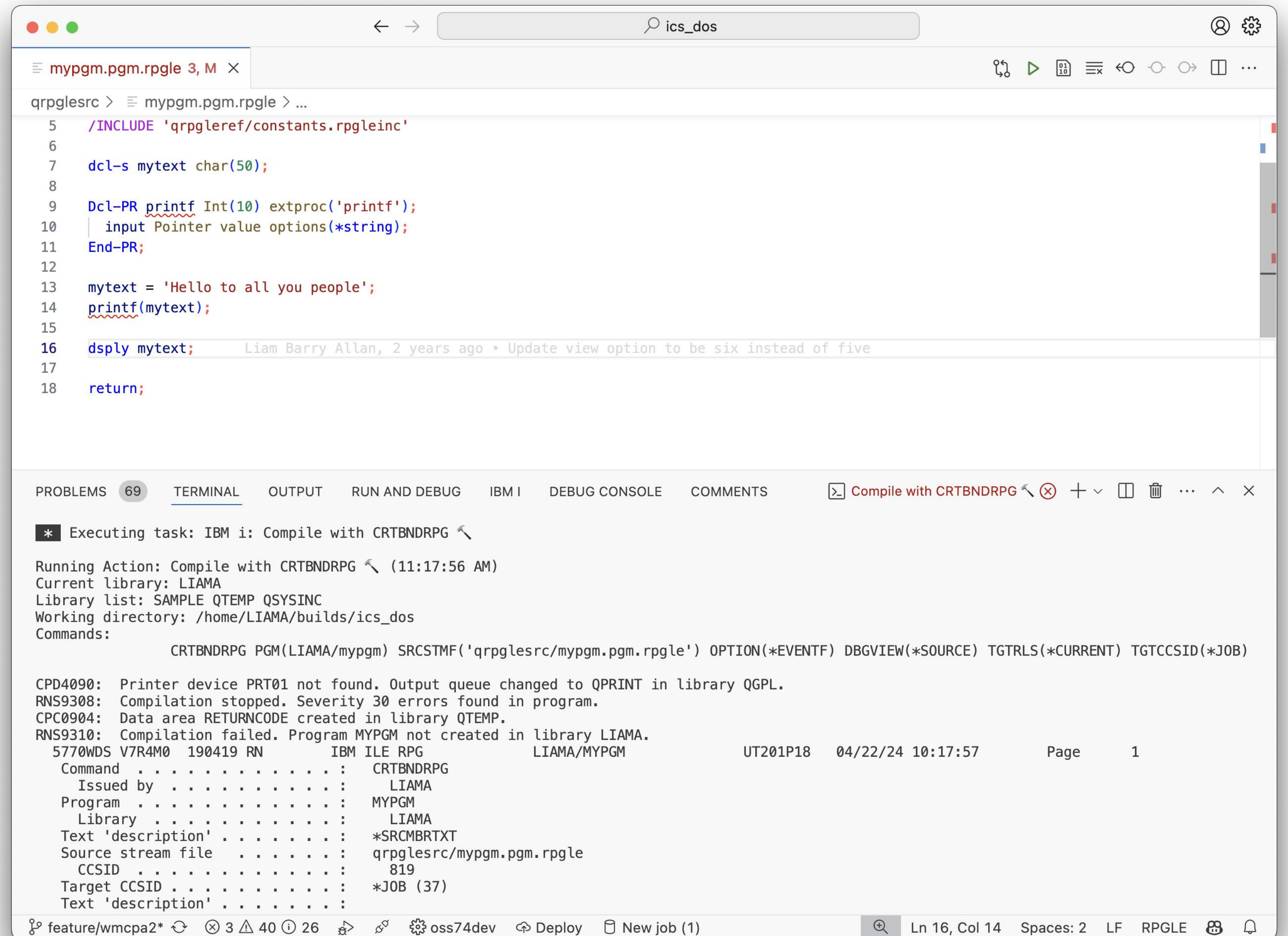


# Deploy and build



# Action result

- List of problems are highlighted
- Spool file result as expected
- Except built from within git



The screenshot shows a code editor window with the following content:

```

myppgm.pgm.rpgle 3, M x
qrpglesrc > myppgm.pgm.rpgle > ...
5  /INCLUDE 'qrpgleref/constants.rpgleinc'
6
7  dcl-s mytext char(50);
8
9  Dcl-PR printf Int(10) extproc('printf');
10 | input Pointer value options(*string);
11 End-PR;
12
13 mytext = 'Hello to all you people';
14 printf(mytext);
15
16 dsply mytext;
17
18 return;

```

Below the code editor, the terminal output shows the compilation process and errors:

```

PROBLEMS 69 TERMINAL OUTPUT RUN AND DEBUG IBM I DEBUG CONSOLE COMMENTS
* Executing task: IBM i: Compile with CRTBNDRPG
Running Action: Compile with CRTBNDRPG (11:17:56 AM)
Current library: LIAMA
Library list: SAMPLE QTEMP QSYSINC
Working directory: /home/LIAMA/builds/ics_dos
Commands:
          CRTBNDRPG PGM(LIAMA/myppgm) SRCSTMF('qrpglesrc/myppgm.pgm.rpgle') OPTION(*EVENTF) DBGVIEW(*SOURCE) TGTRLS(*CURRENT) TGTCSSID(*JOB)

CPD4090: Printer device PRT01 not found. Output queue changed to QPRINT in library QGPL.
RNS9308: Compilation stopped. Severity 30 errors found in program.
CPC0904: Data area RETURNCODE created in library QTEMP.
RNS9310: Compilation failed. Program MYPGM not created in library LIAMA.
5770WDS V7R4M0 190419 RN          IBM ILE RPG          LIAMA/MYPGM          UT201P18  04/22/24 10:17:57          Page 1
Command . . . . . : CRTBNDRPG
Issued by . . . . . : LIAMA
Program . . . . . : MYPGM
Library . . . . . : LIAMA
Text 'description' . . . . . : *SRCMBRTXT
Source stream file . . . . . : qrpglesrc/myppgm.pgm.rpgle
CCSID . . . . . : 819
Target CCSID . . . . . : *JOB (37)
Text 'description' . . . . . :

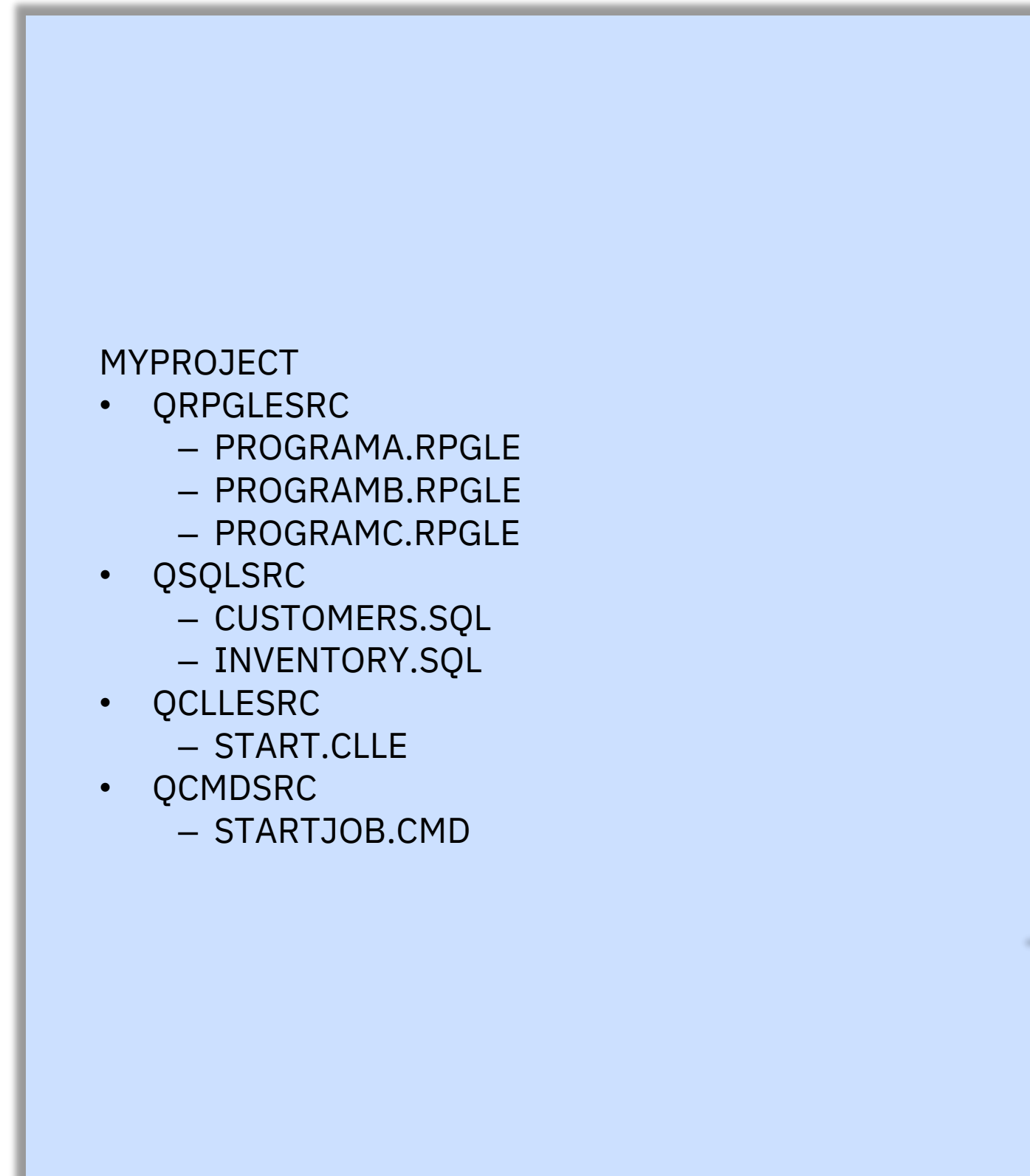
```

# Building on IBM i is hard...

- 1 SRC-PF
  - 10 char names
  - Fixed record length
  - Not accessible to open ecosystem, including Git and Make
  - Source of the same type stored in QxxxSRC to avoid name conflicts (member type does not disambiguate)
  
- 2 Libraries
  - Only 2 level hierarchy to organize, with only short 10 char names
  
- 3 Source control
  - None (sequence number dates)
  - Home grown
  - Proprietary IBM i systems
    - Cost
    - Smaller market = less investment
  
- 4 Build system
  - Individual CRTXXMOD + CRTPGM
  - CL Scripts
  - A couple of vendors have dependency-based build

# How do IBM i Projects and "Bob" overcome this?

# Remember: a different (but similar) file system

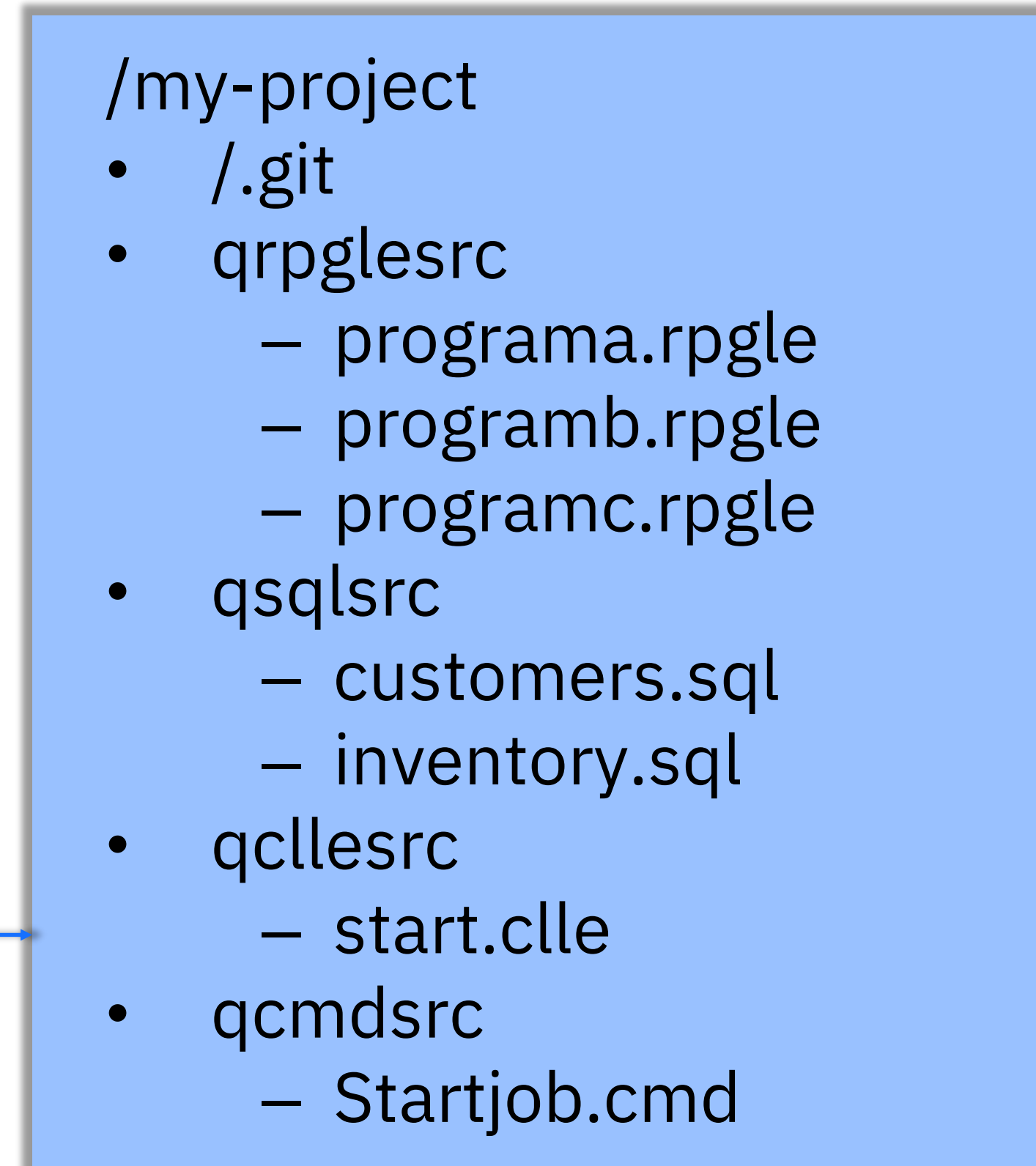


***QSYS.LIB Library***

No more character  
name restrictions

Now usable with Git  
and Make

Flexible directory  
structure



***IFS/Local File System***





# Better Object Builder for IBM i

... for the native OCYC objects



# BOB CLI commands

- `makei` - the main command to interact with Bob
- `crtfrmstmf` - a utility to compile from stream files when the compiler only supports QSYS members

# Makei functionality

- `makei cvtsrcpf` – convert QSYS members to Unicode IFS stream files
- `makei init` – create `iproj.json`
- `makei build` – build the entire project
  - `makei b -t <object>` - build target object
  - `makei b -d <directory>` - make all objects in the specified directory (based on `Rules.mk`)
- `makei compile -f <stream file>` - build target object of specified stream file
- `makei compile -files file1: file2: ...` - build target objects of all specified stream files

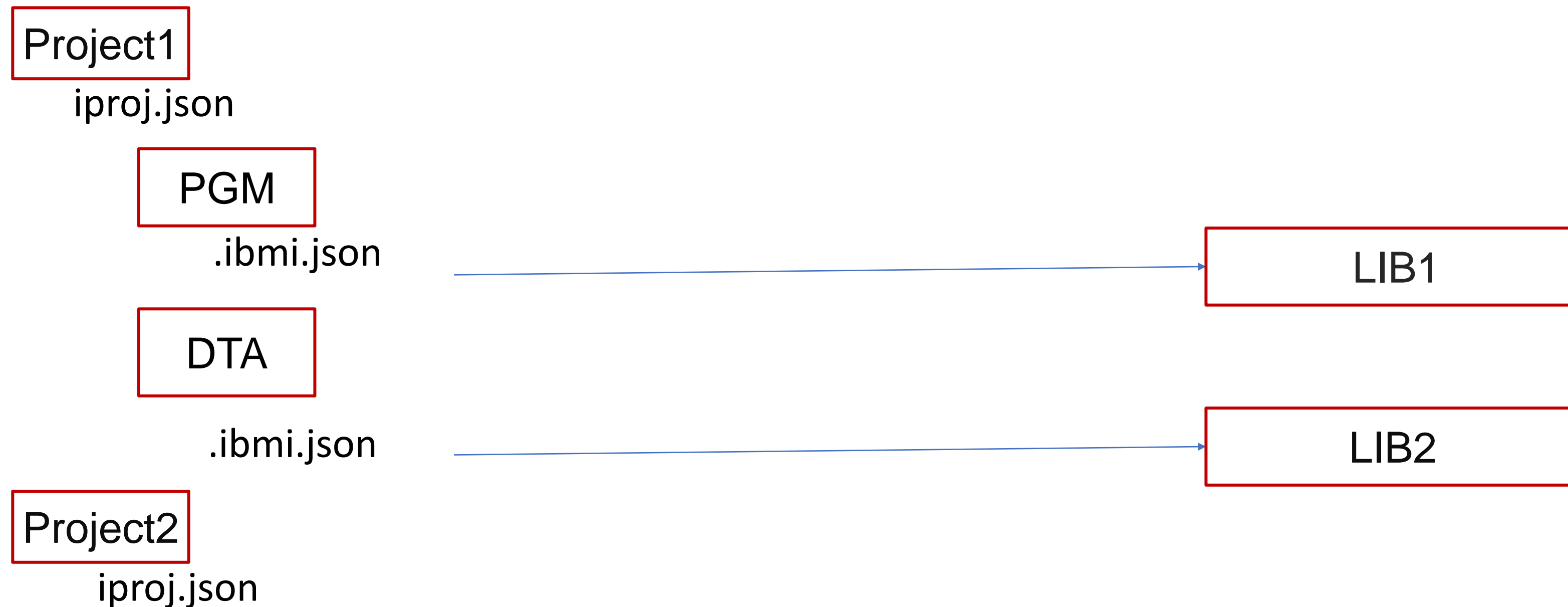
# Typical Bob Project Structure

- iproj.json  
(<https://ibm.github.io/ibmi-bob/#/prepare-the-project/iproj-json>)
- .ibmi.json  
(<https://ibm.github.io/ibmi-bob/#/prepare-the-project/ibmi-json>)
- Rules.mk  
(<https://ibm.github.io/ibmi-bob/#/prepare-the-project/rules.mk>)



# Multi-library project structure

- A directory containing iproj.json is a project
  - Projects cannot be nested
- Target library for creating objects is set by “objlib” attribute
- Can specify multiple target object library
  - Use .ibmi.json to specify target object library for a directory
  - Can also specify the EBCDIC encoding for compiler to use



# Project structure

Payroll-bob <*project directory*>

iproj.json

Rules.mk

```
SUBDIRS := data
```

```
MSTDSP.FILE: MasterDisplay.DSPF PRJMST.FILE RSNMST.FILE
```

```
PAYROLL.PGM: PAYROLL.PGM.RPGLE MSTDSP.FILE PRJMST.FILE
```

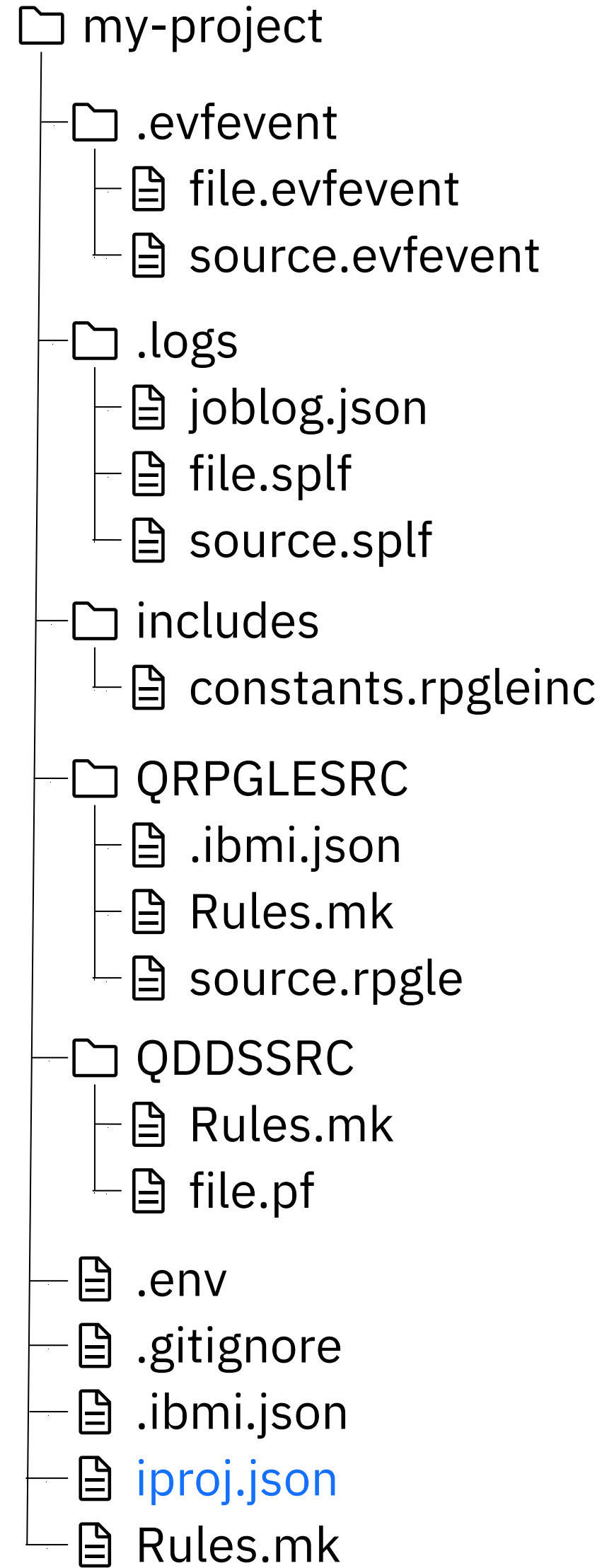
**Data** <*subdirectory*>

Rules.mk

```
RSNMST.FILE: RSNMST.TABLE
```

```
PRJMST.FILE: PRJMST.TABLE
```

# Projects that self-describe how to build themselves!?



Project Information

Configure library list

Configure build/compile environment

```
iproj.json x
iproj.json > ...
1  {
2      "version": "0.0.1",
3      "description": "SAMPLE PROJECT",
4      "repository": "https://github.com/edmundreinhardt/bob-recursive-example.git",
5      "license": "Apache 2.0",
6      "objlib": "&CURLIB",
7      "curlib": "&CURLIB",
8      "includePath": [
9          "includes",
10         "QPROTOSRC"
11     ],
12     "preUsrlib1": [
13         "&lib1"
14     ],
15     "postUsrlib1": [
16         "&lib2"
17     ],
18     "setIBMiEnvCmd": [],
19     "compileCommand": "makei c -f {filename}",
20     "buildCommand": "makei build"
21 }
```

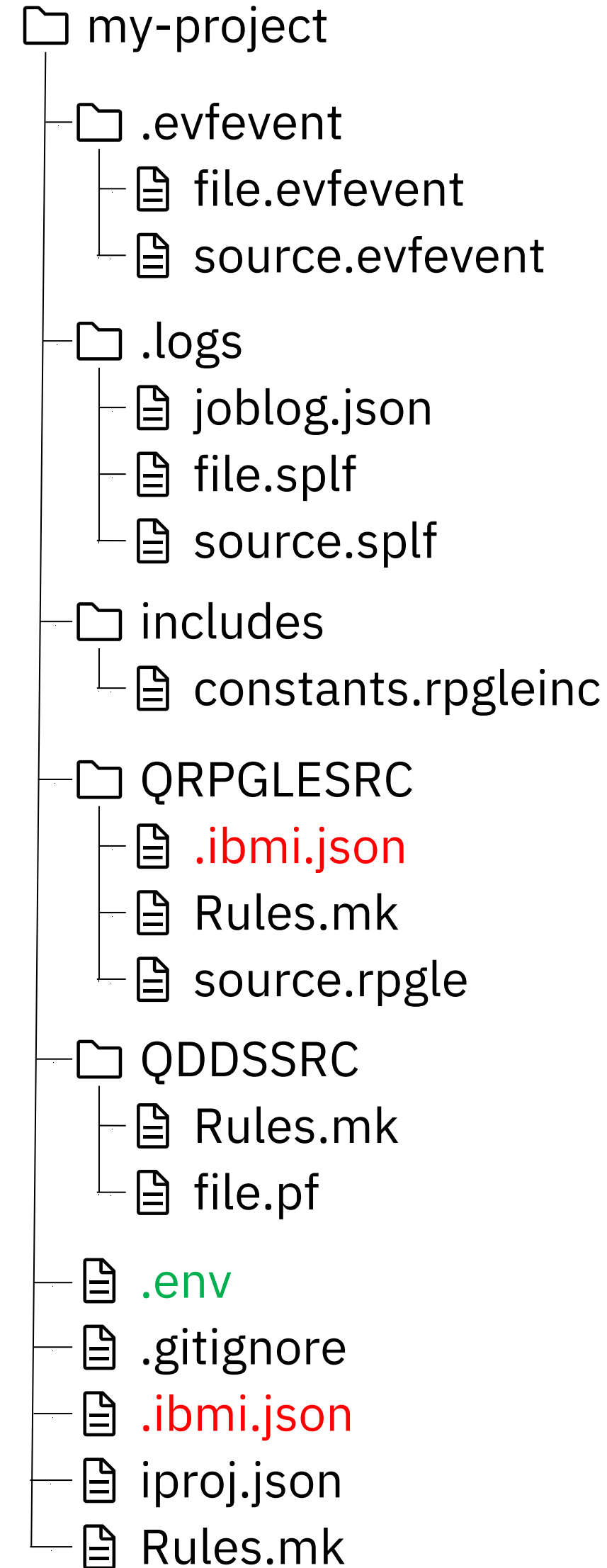
Standardized metadata format with variables (&...)

Set build/compile command

*iproj.json in project root*



# Flexible subdirectories and build customization



```
{ } .ibmi.json x
{ } .ibmi.json > ...
1  {
2    "version": "0.0.1",
3    "build": {
4      "tgtCcsid": "273",
5      "objlib": "&lib3"
6    }
7  }
```

*.ibmi.json in project root or subdirectories*

EBCDIC encoding for compiler

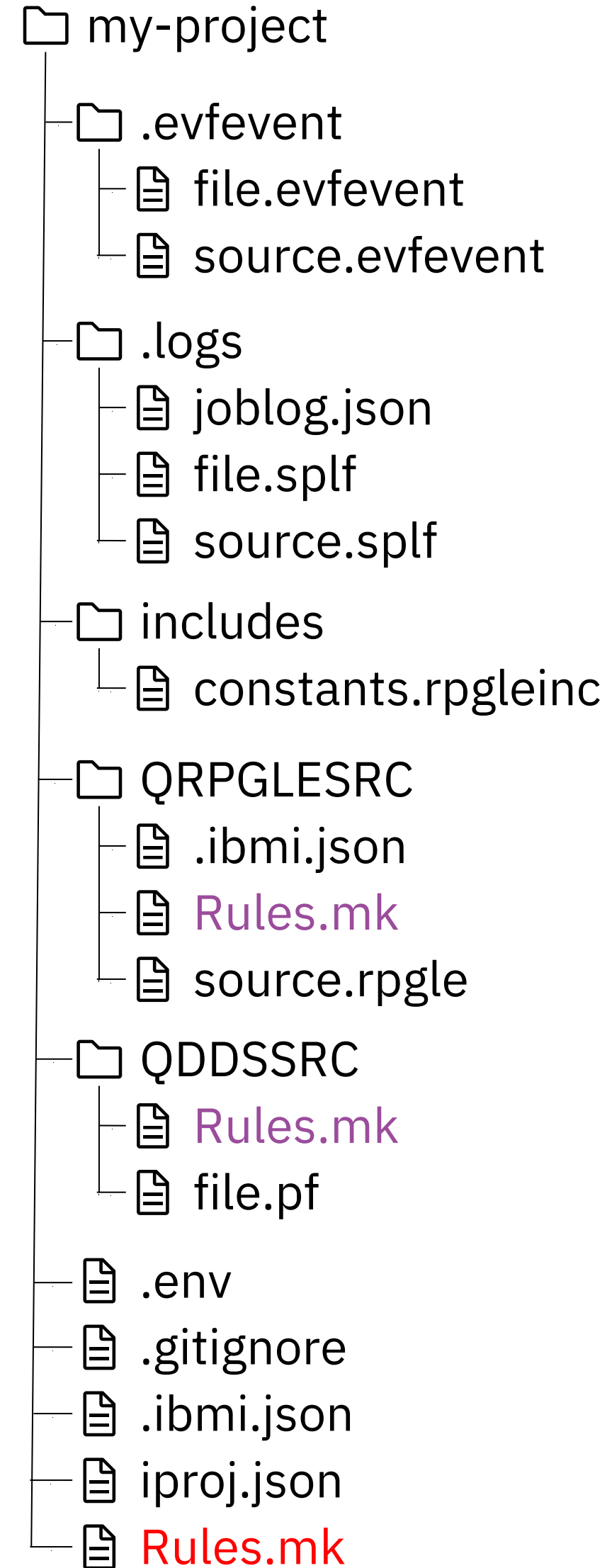
Target object library for directory

```
gear .env x
gear .env
1  LIBL=QGPL QTEMP QDEVELOP QBLDSYS QBLDSYSR
2  CURLIB=SANJULA
3  lib1=MYLIB
4  lib2=ABCLIB
5  lib3=APILIB
```

*.env in project root*

Custom variable values so that each developer can customize build

# Control what objects to build and how to build them



```
M Rules.mk X
M Rules.mk
1 SUBDIRS = qrpglesrc qddssrc
```

*Rules.mk in project root*

Declare subdirectories to be built

```
M Rules.mk X
M Rules.mk
1 FVAT.SRVPGM: fvat.bnd VAT300.MODULE
2 FVAT.SRVPGM: TEXT = Functions VAT
3 FVAT.SRVPGM: private TEXT = Functions VAT
4
5 VAT300.MODULE: vat300.rpgle QPROTOSRC/vat.rpgleinc VATDEF.FILE
6 VAT300.MODULE: private TEXT := bound into FVAT.SRVPGM
7 VAT300.MODULE: private DBGVIEW ::= *SOURCE
8
9 VATDEF.FILE: vatdef.pf SAMREF.FILE
```

*Rules.mk in subdirectories*

Makefile with list of objects to be built and from which source files

# Build and Compile Process

## *Initialization and Migration*

Command	Description
makei init	Create iproj.json
makei cvtsrcpf	Convert QSYS members to Unicode IFS stream files

## *Building*

Command	Description
makei build	Build the entire project
makei b -t <object>	Build target object
makei b -d <directory>	Build all objects in the specified directory (based on Rules.mk)

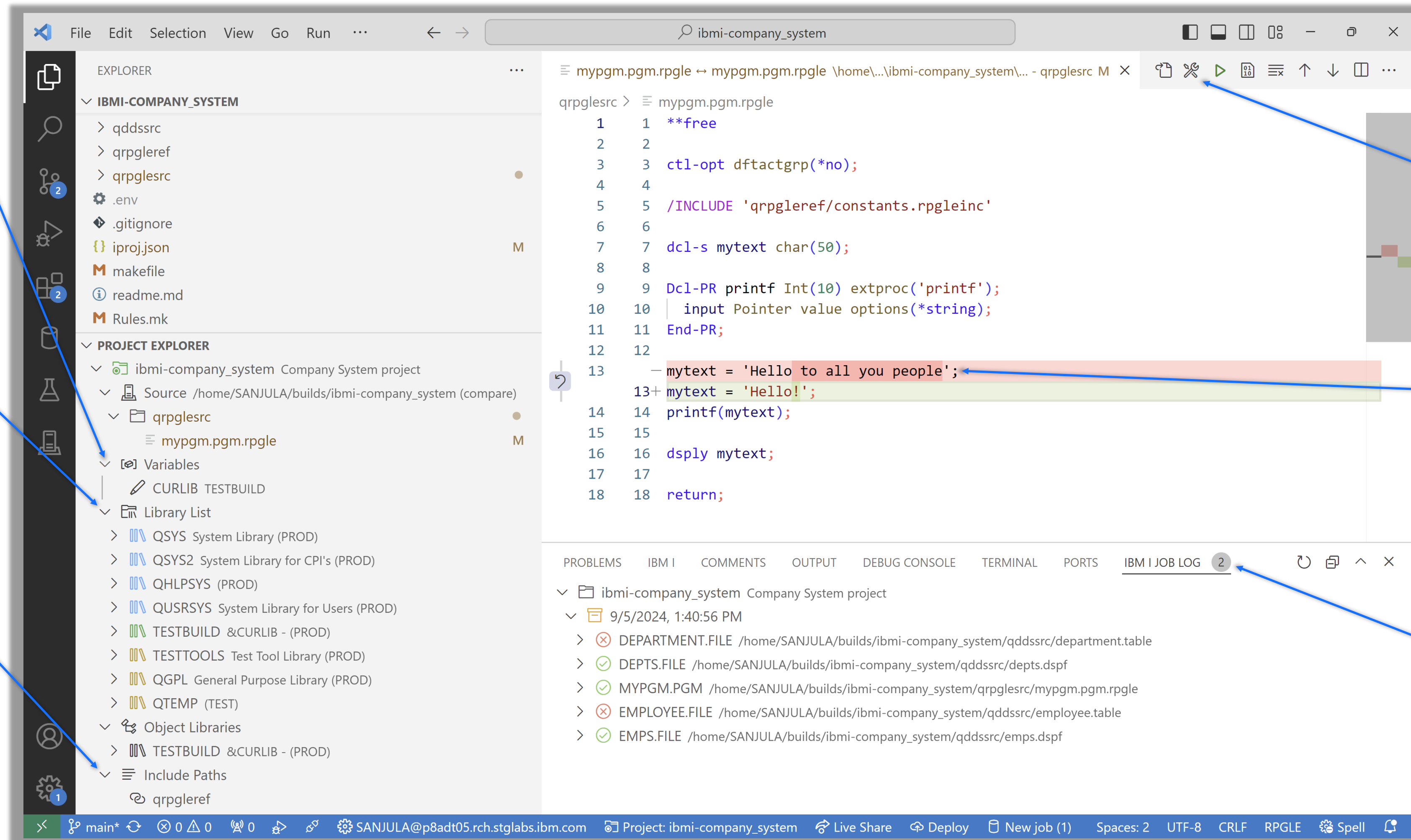
## *Compiling*

Command	Description
makei compile -f <stream file>	Compile target object of specified stream file
makei compile -files file1: file2: ...	Compile target objects of all specified stream files

# **Ins and Outs of IBM i Project Explorer**

# Overview

*The ultimate tool for local development on IBM i!*



Set variables

Manage library list

Modify include paths

Build and Compile

Local source  
vs.  
IFS source

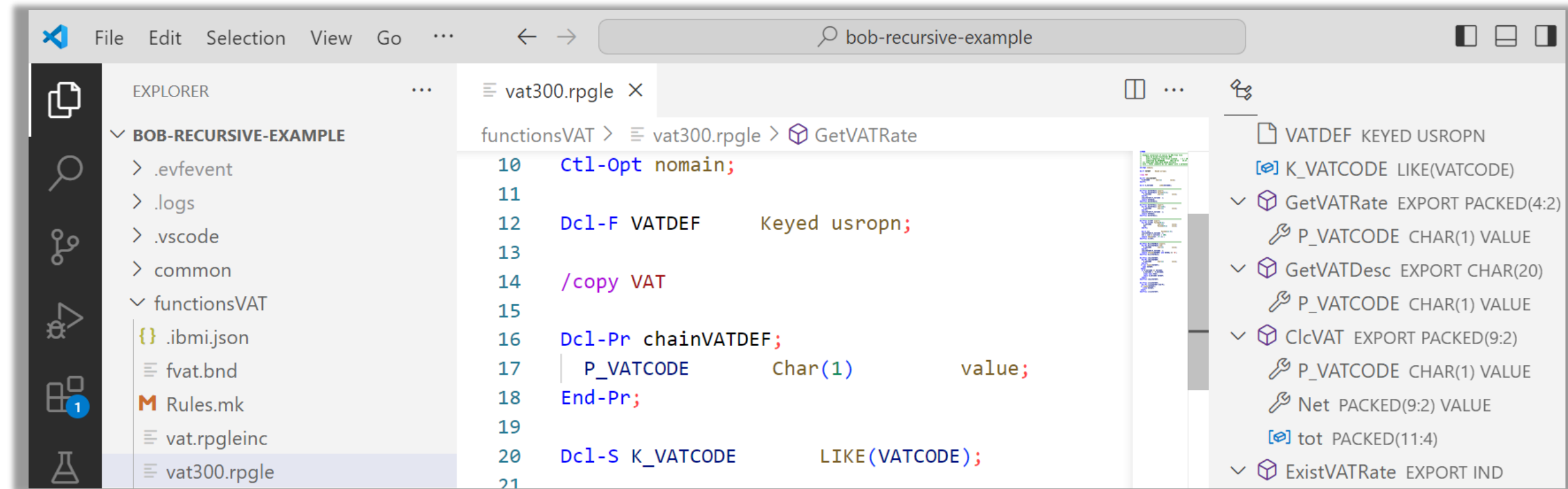
View job logs



# Installation

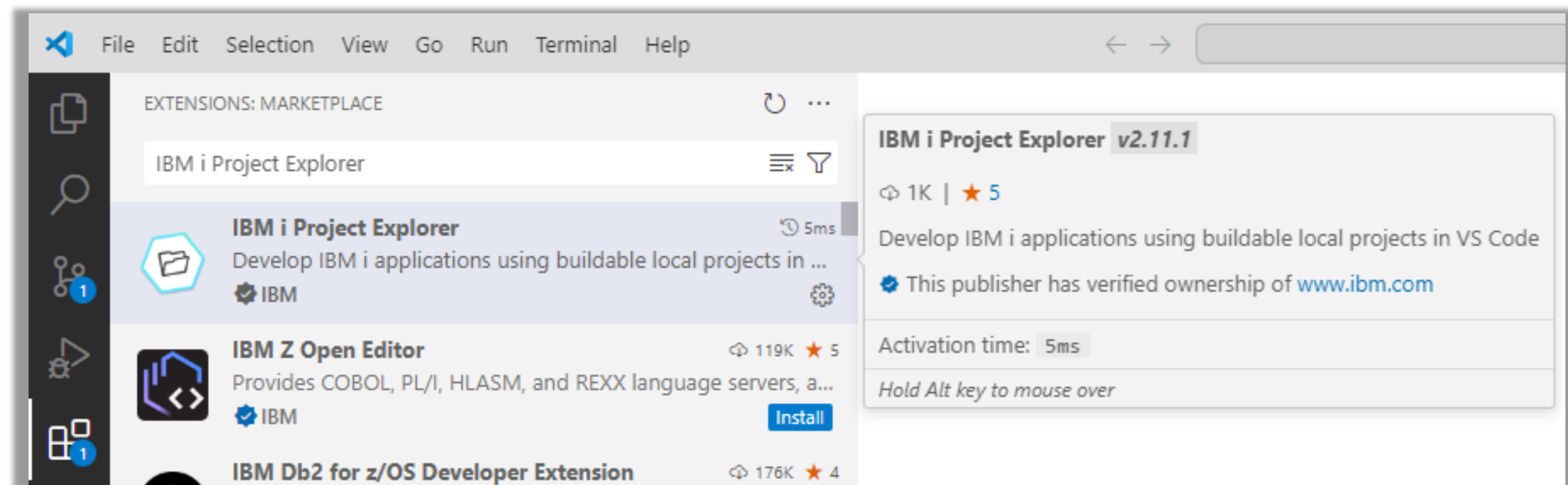
1

*Download  
Visual Studio Code*



2

*Download VS Code extensions  
IBM i Project Explorer and  
Code for IBM i*



3

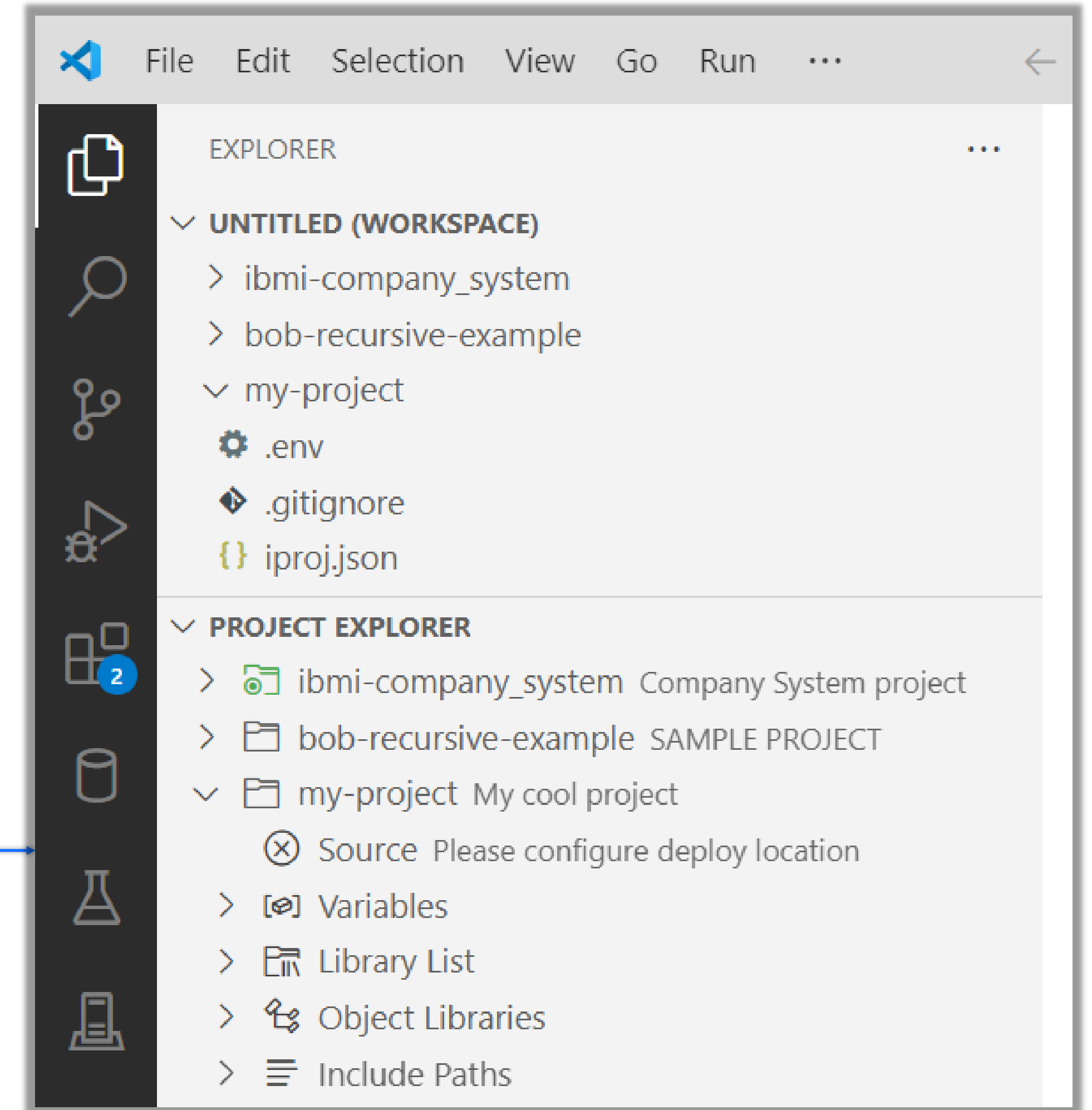
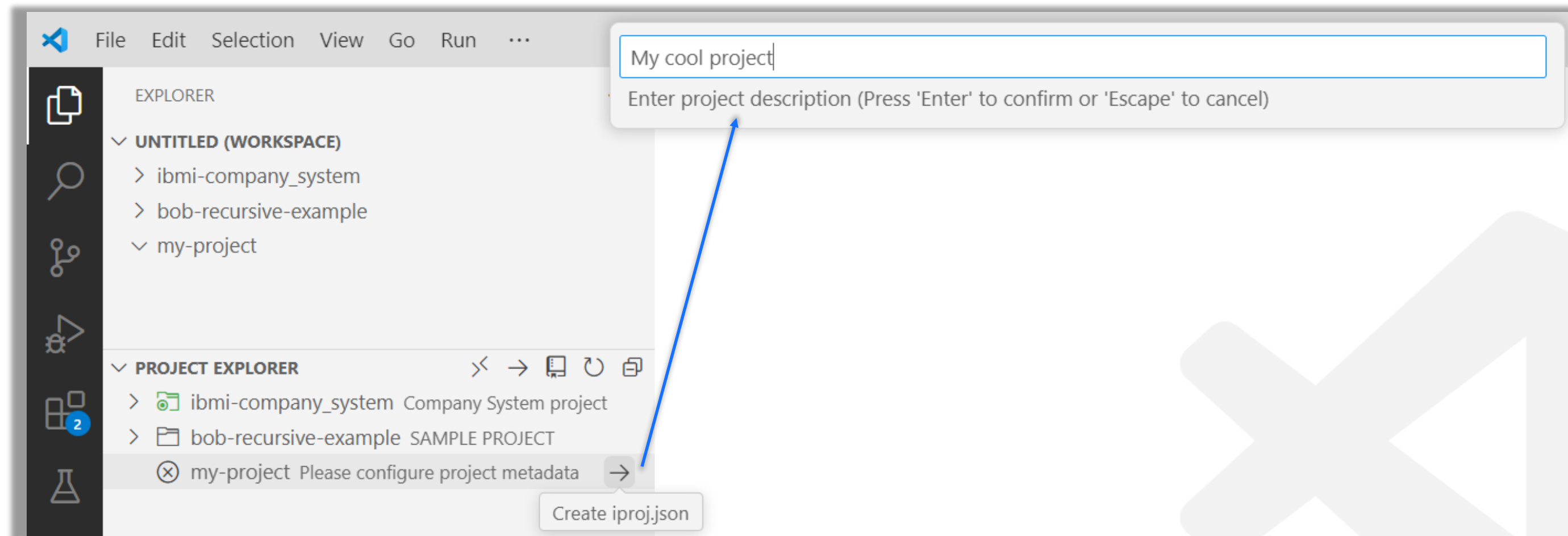
*Run  
yum install bob  
on IBM i*





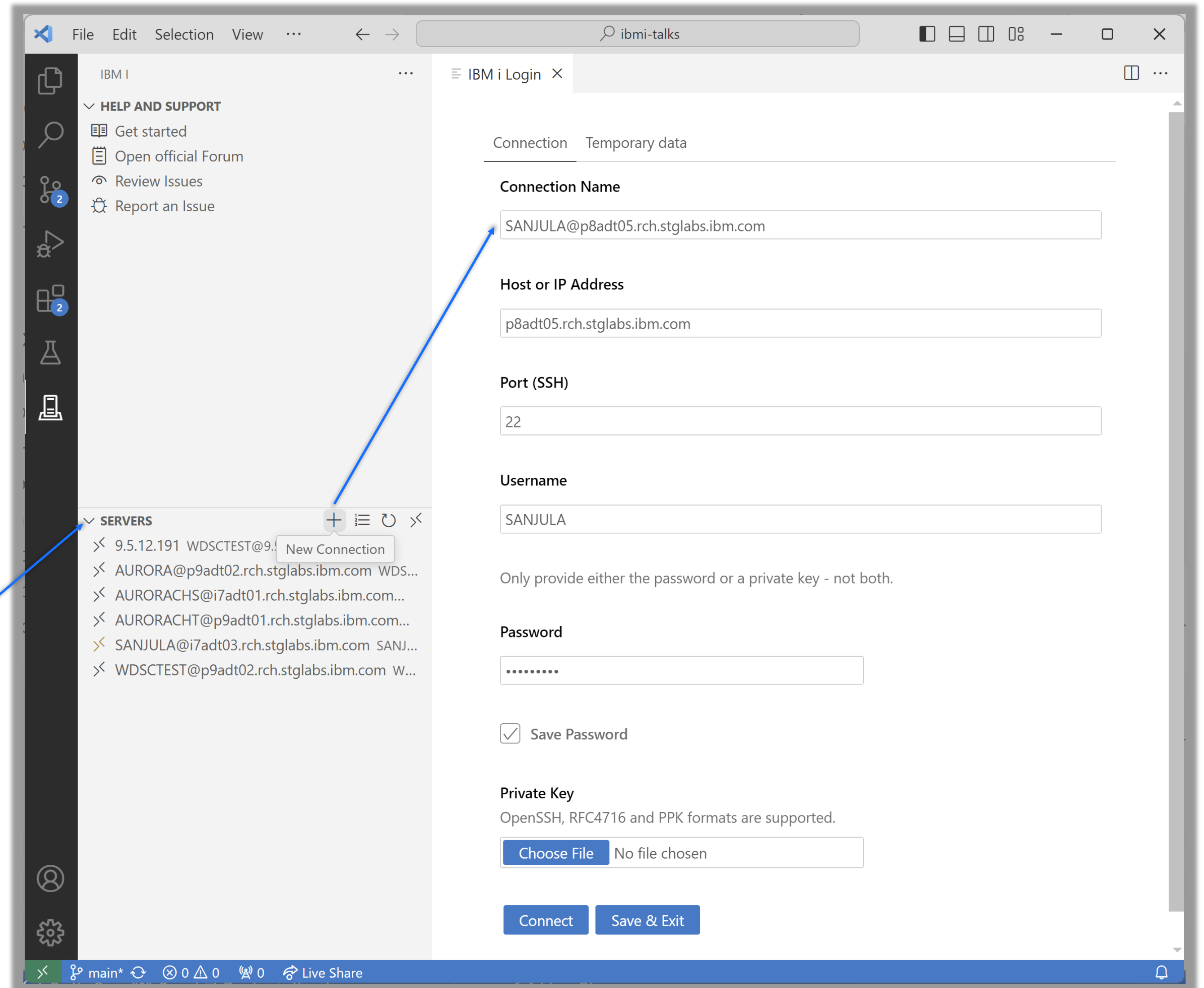
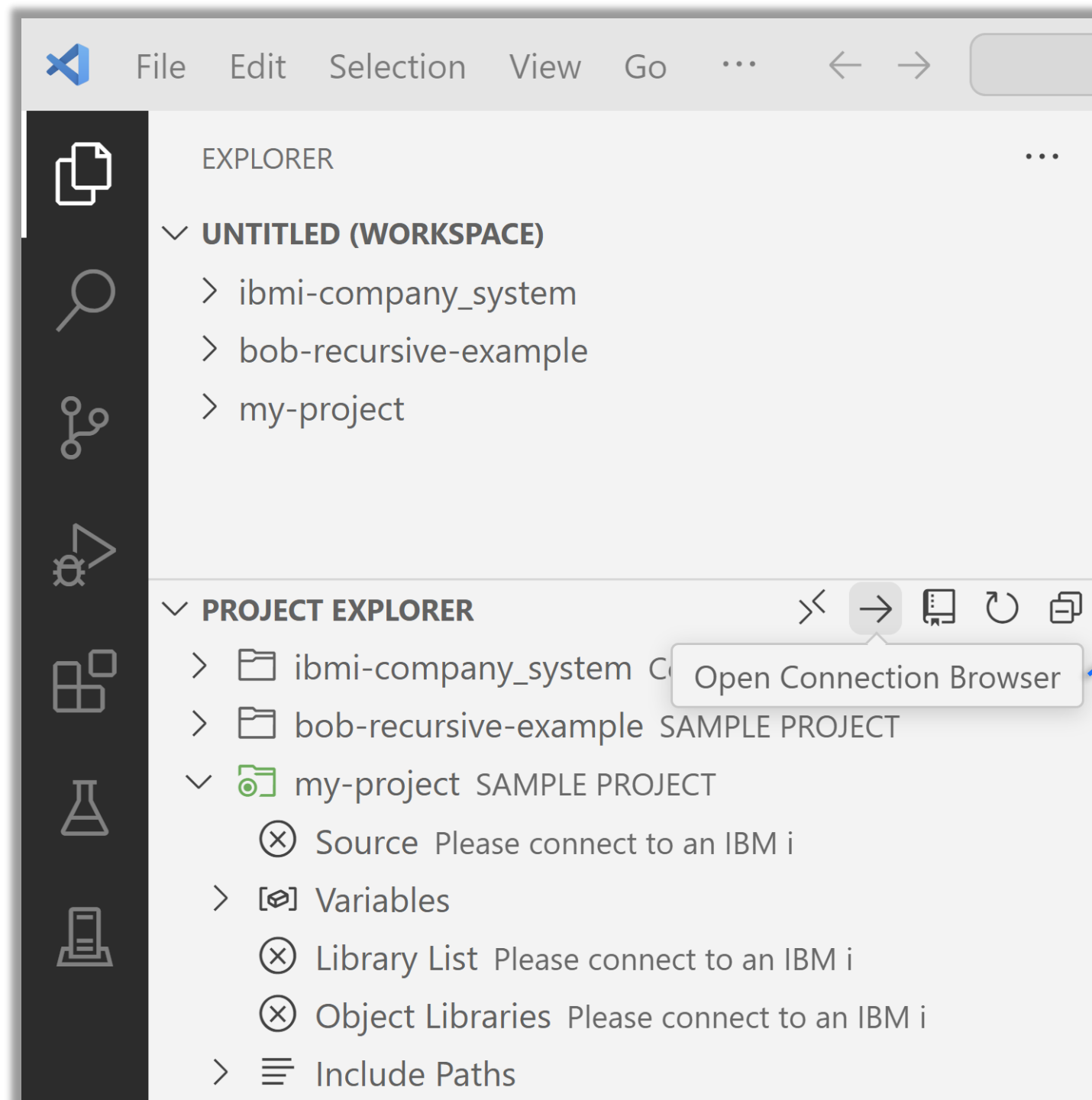
# Create a New Project

- Create and open a folder for your project
- Create an `iproj.json`
- Set the project description



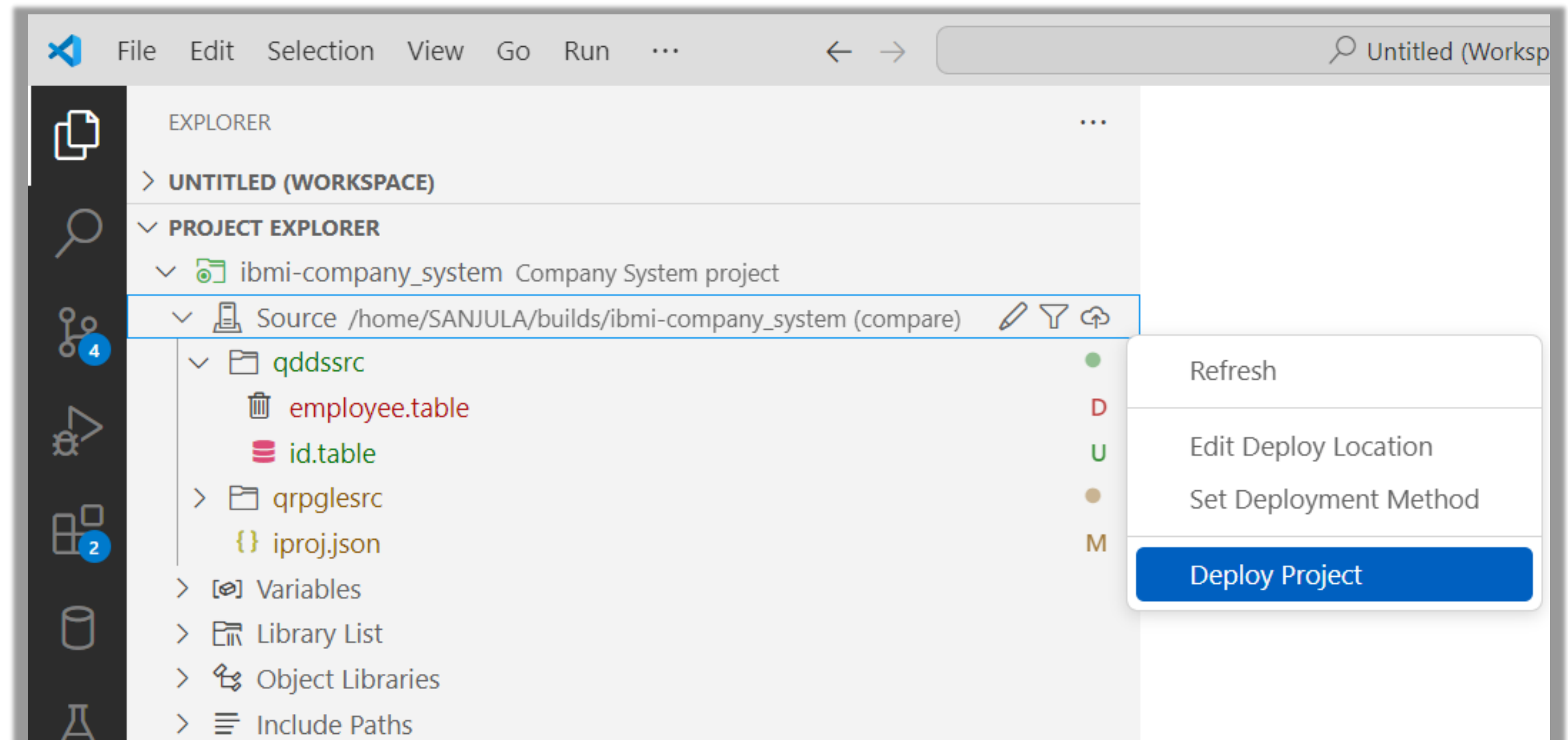
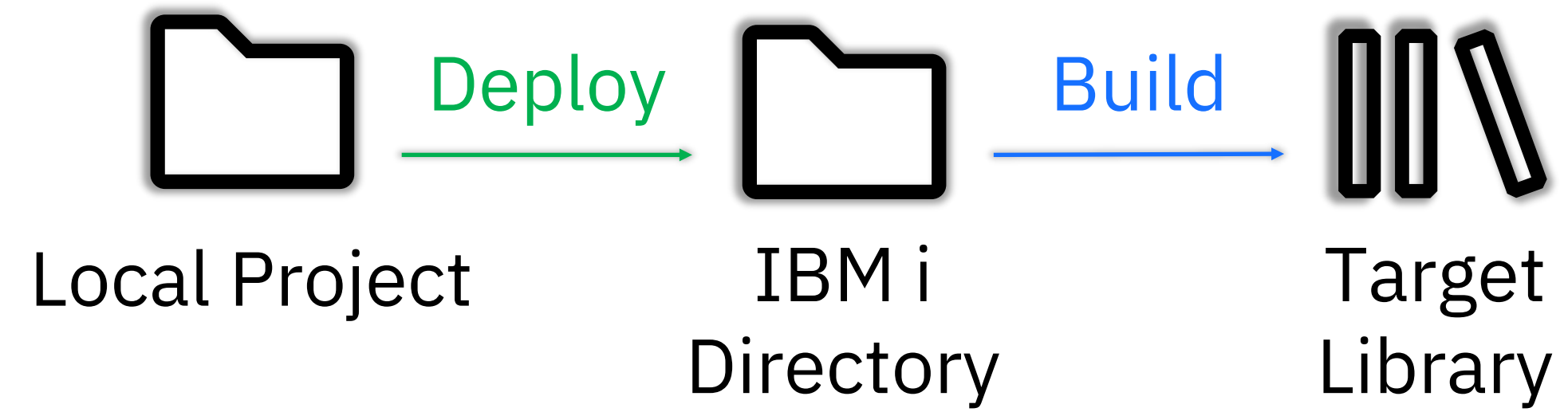
# Connect to an IBM i

- Open the *Connection Browser* from Project Explorer
- Create new IBM i connection from the *Server* view



# Deployment

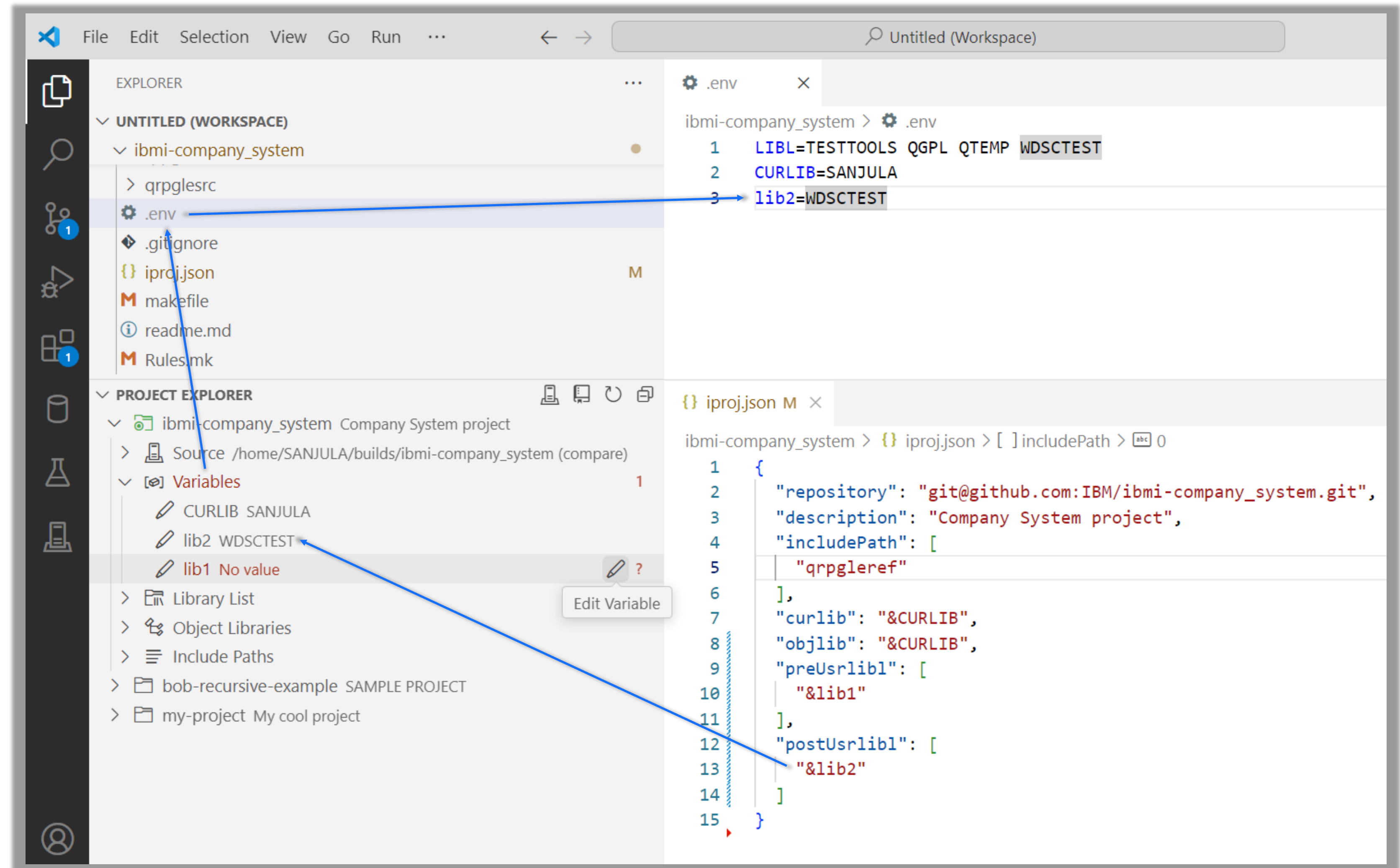
- Set deploy location
  - Where source gets uploaded to
  - Typically set one
  - Each developer gets a unique location
  - Each repository gets a unique location
- Set deployment method
  - Compare (typically the safest)
  - Changes (typically the fastest)
  - Working Changes
  - Staged Changes
  - All
- Deploy project
  - Moves files to deploy location based on deployment method



# Work with Variables

- Reusable project definition that can be used by multiple developers or in automated builds
- View and set variables (for libraries, include paths, or build/compile commands)
- Browse for libraries and assign values to variables
- Configure hardcoded values as variables

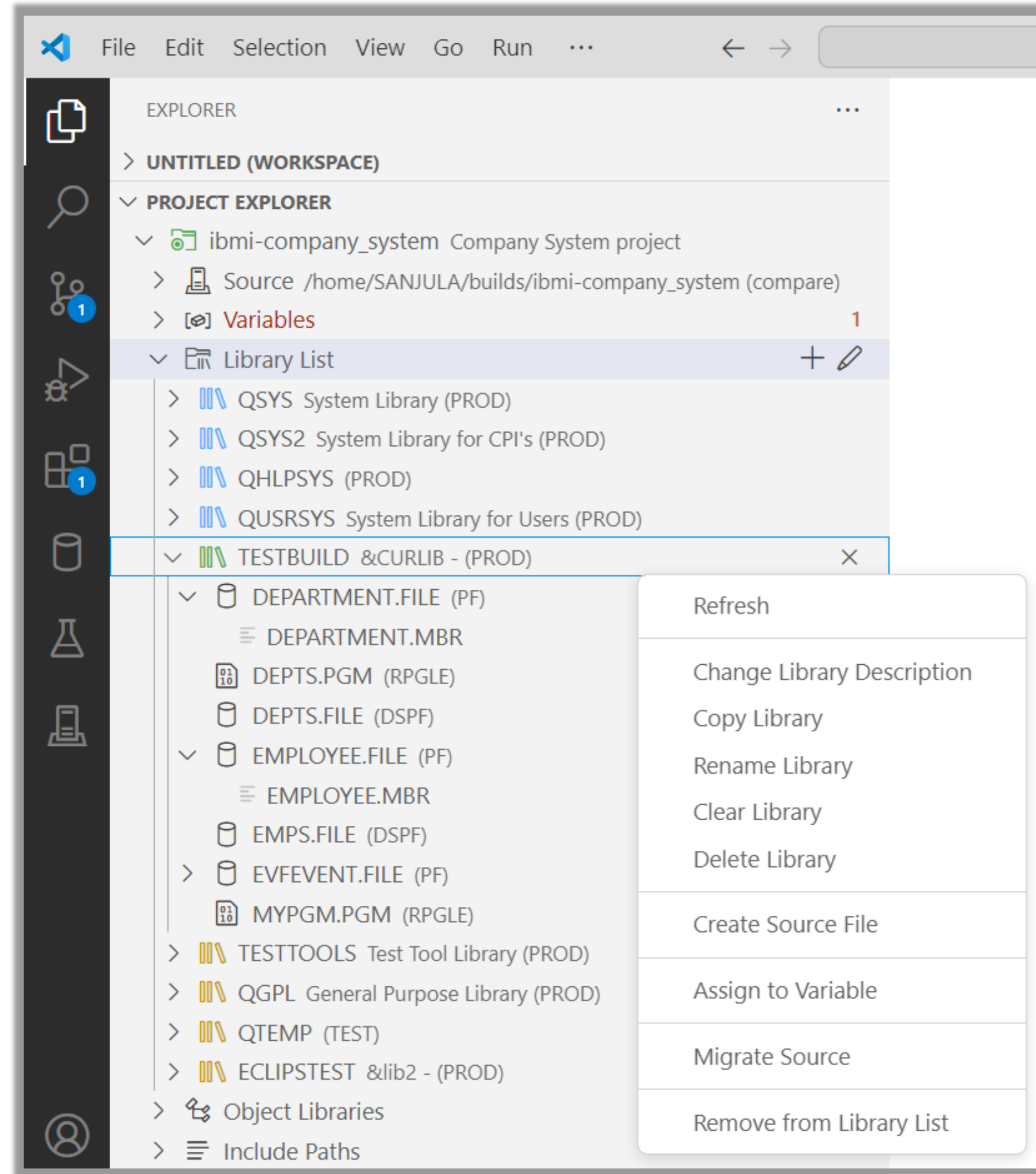
**Do not push .env file to Git!**





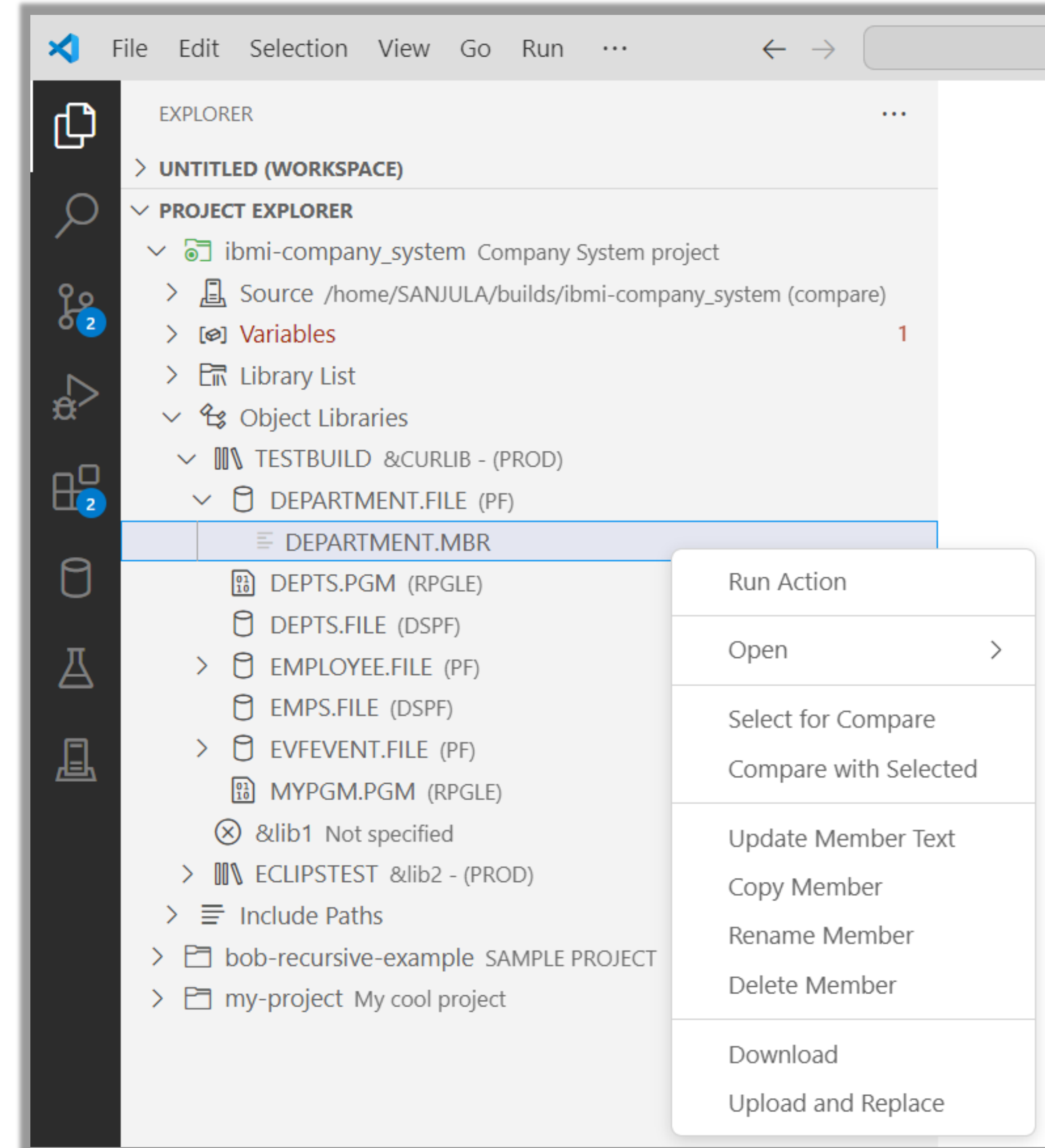
# Manage the Library List

- Project's library list is a composition of your user profile's library list (from JOBD) + set of project specific libraries
- Add to beginning/end of library list (preUsrlibl and postUsrlibl) and set current library (curlib in iproj.json)
- Reorder library list
- Browse objects and members
- Manage libraries, objects, and members



# Browse Object Libraries

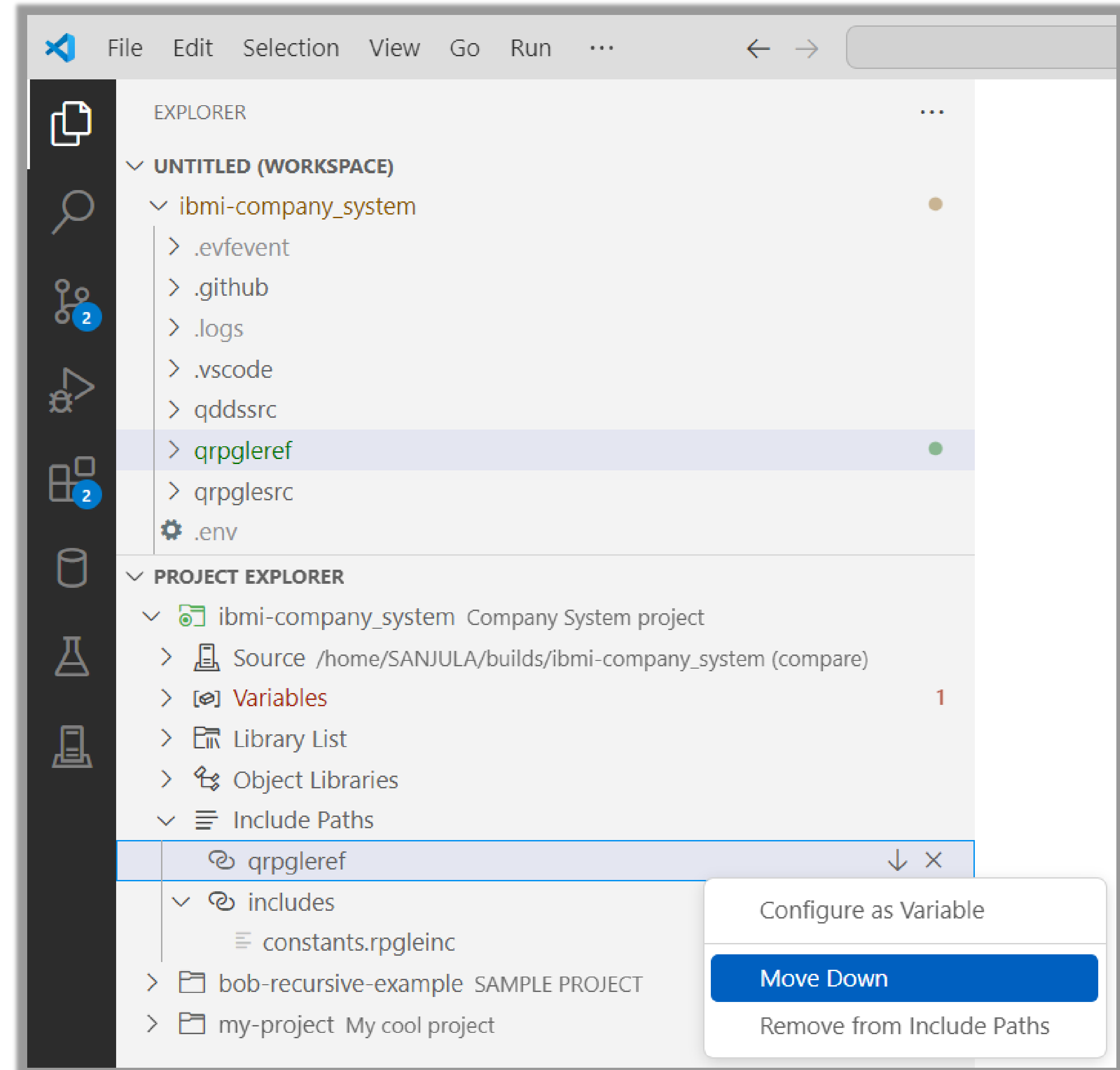
- The place for developers to easily see, debug, and manipulate the results of your build
- Another place to manage libraries in iproj.json (curlib, objlib, preUsrLibl, postUsrLibl)
- Manage libraries, objects, and members





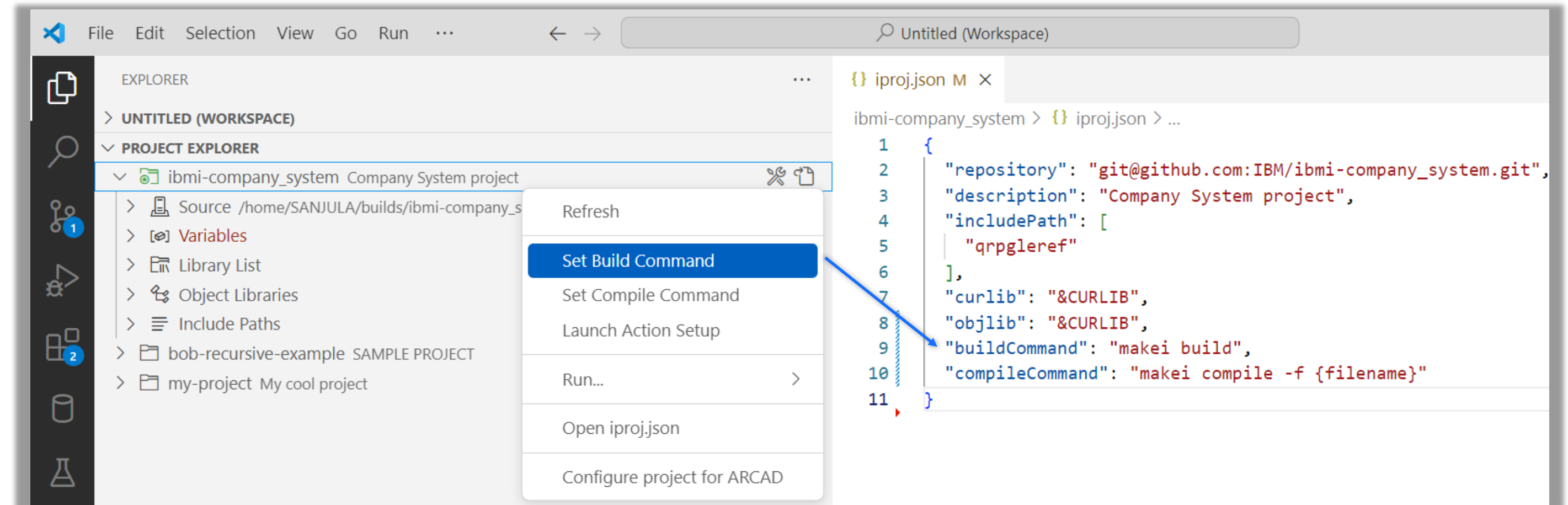
# Manage Include Paths

- Self-contained projects should know where to find includes within the project
- Add, remove, and reorder include paths
- Visualize if includes resolve locally or to remote IFS

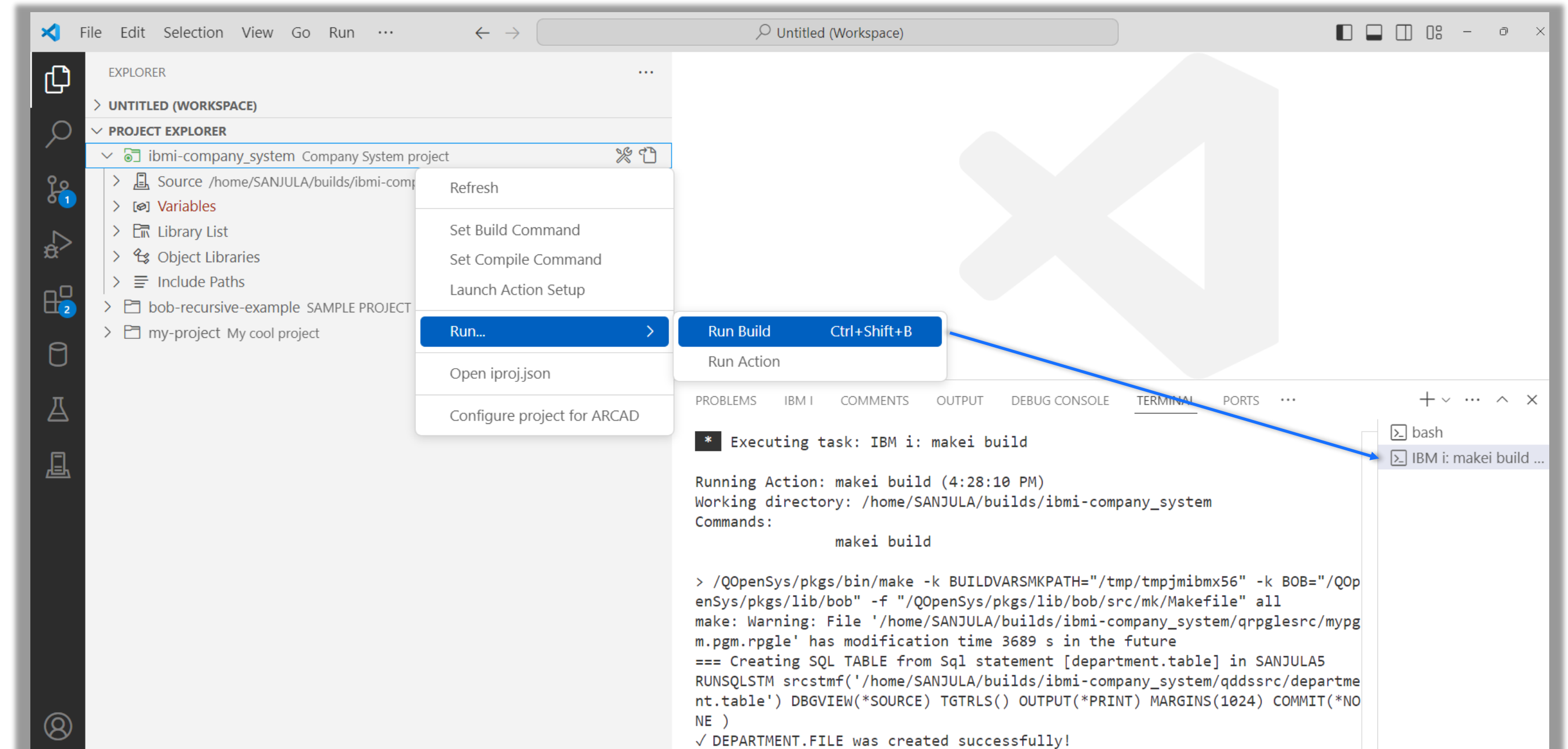


# Build and Compile

- 1 Deploy
- 2 Run build or compile command  
(any build framework)
- 3 Download logs and event files

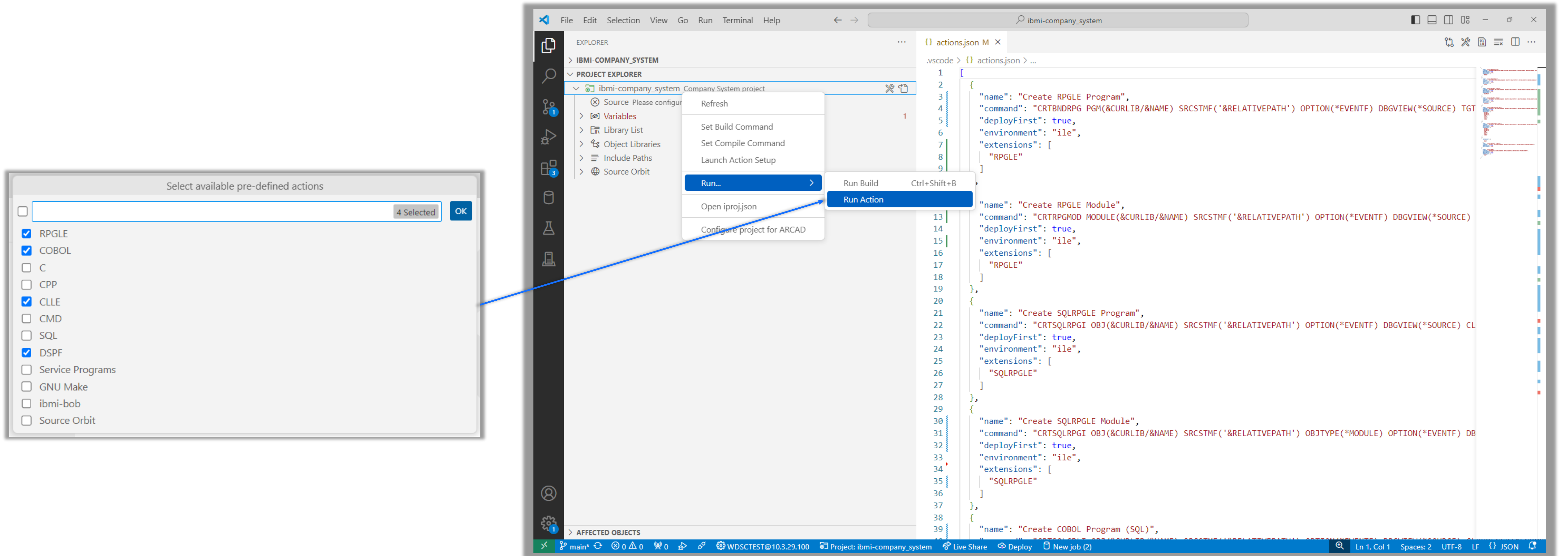


- Building
  - Set build command
  - Run Build (*Ctrl+Shift+b* or *Cmd+Shift+b*)
- Compiling
  - Set compile command
  - Run compile (*Ctrl+Shift+c* or *Cmd+Shift+c*)
    - On active editor
    - On file or directory in File Explorer
    - On file or directory in Source



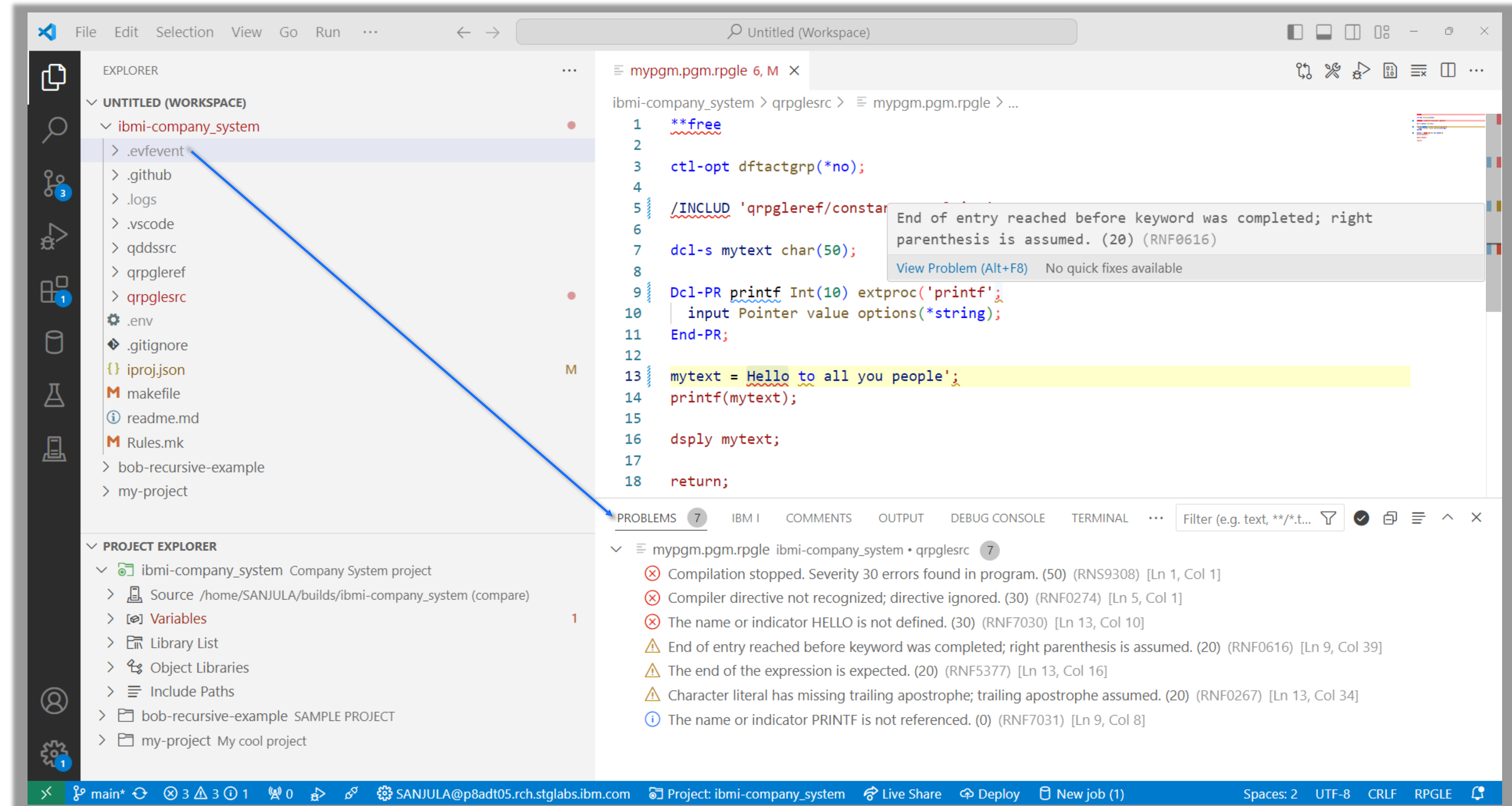
# Run Actions

IBM i Project Explorer also supports running Code for IBM i's custom workspace actions



# View Diagnostics

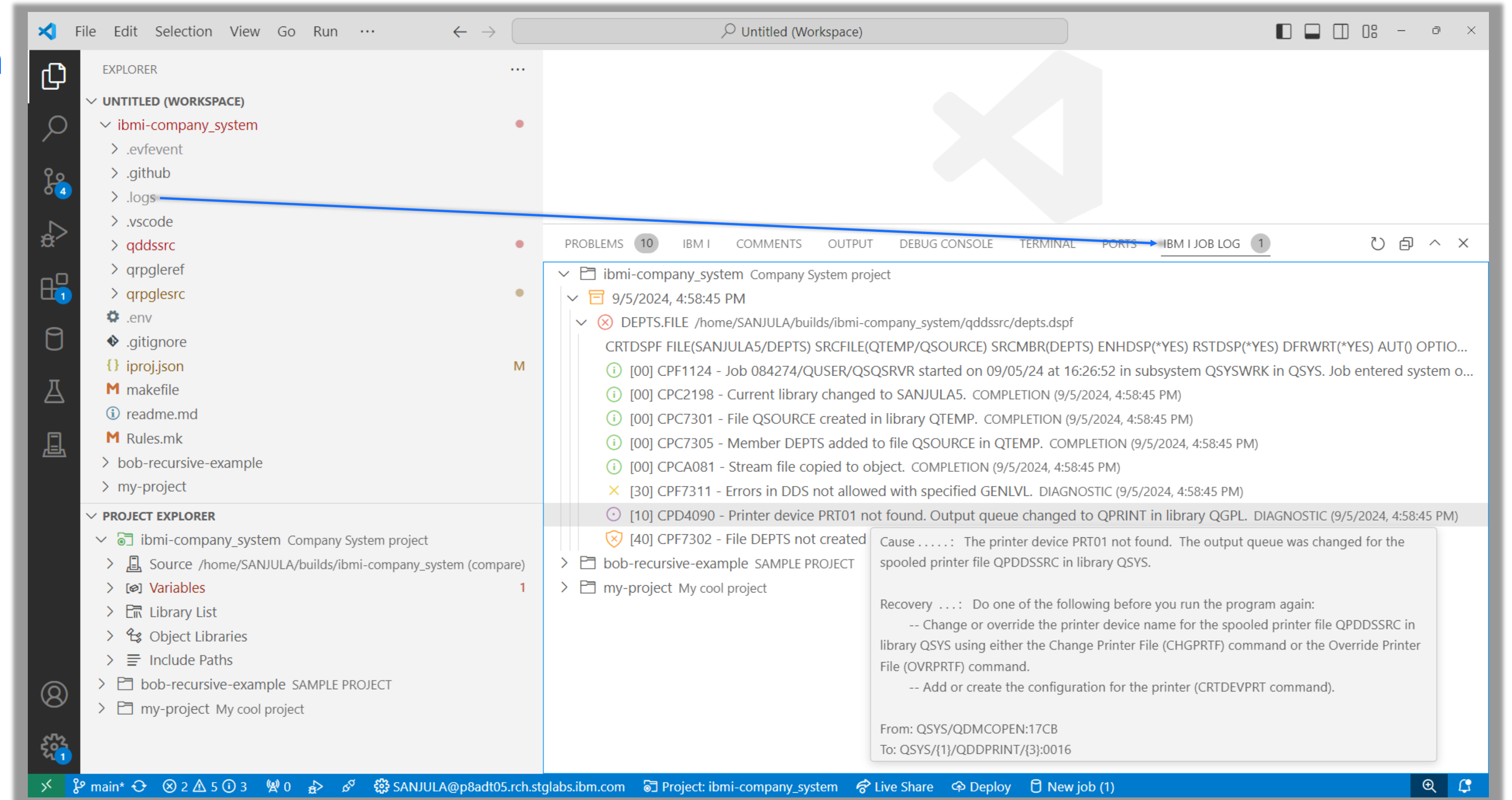
- Visualize build or compile diagnostics in the Problems view
- Evfevent file diagnostics are dumped in a .evfevent directory after a build or compile
- Diagnostics are also rendered inline in the source file



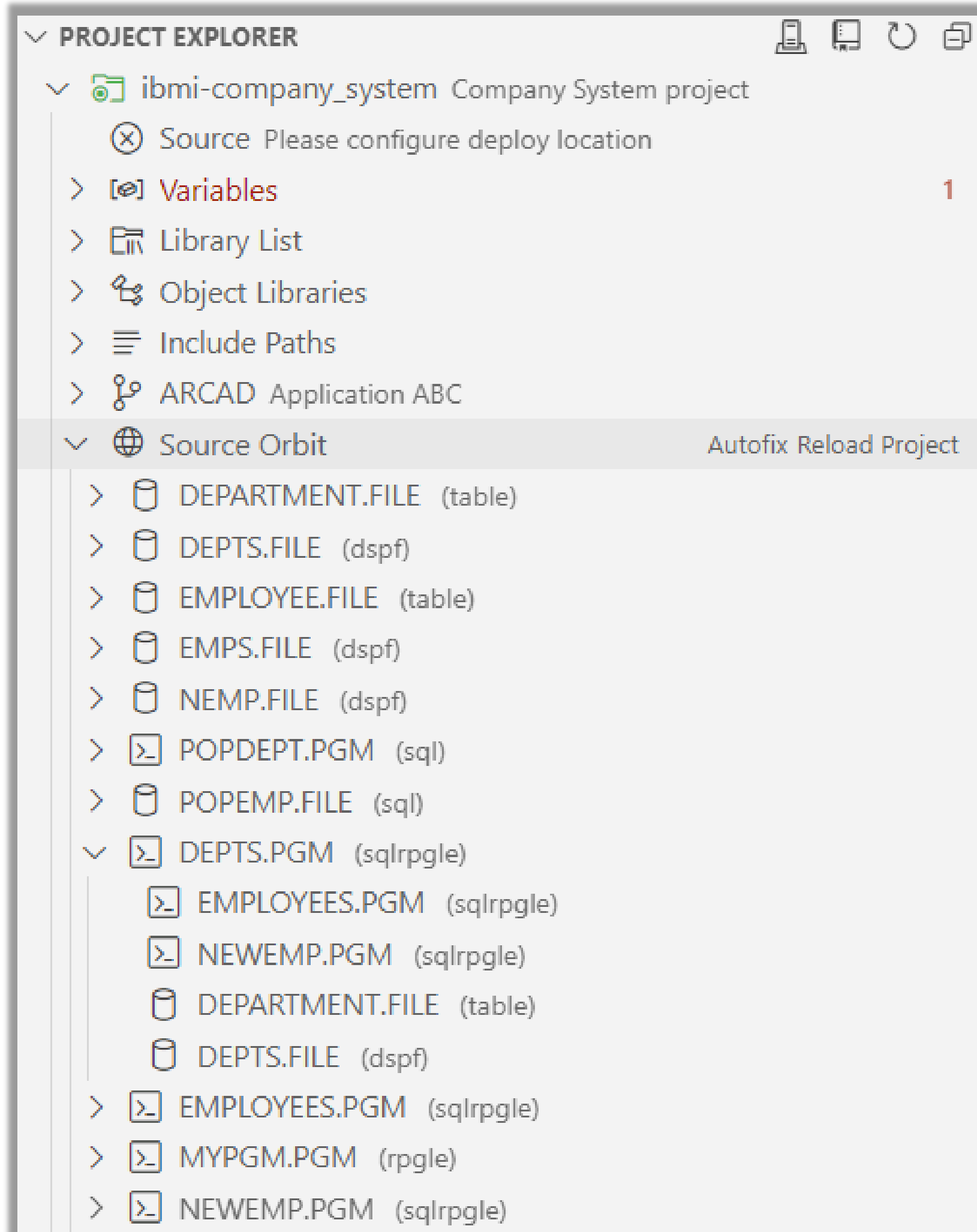
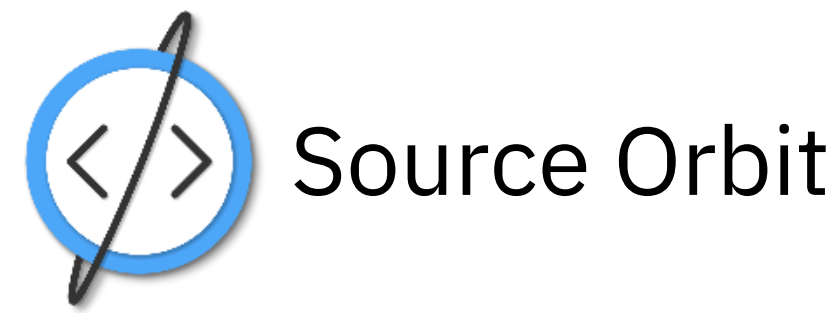


# View Job Logs

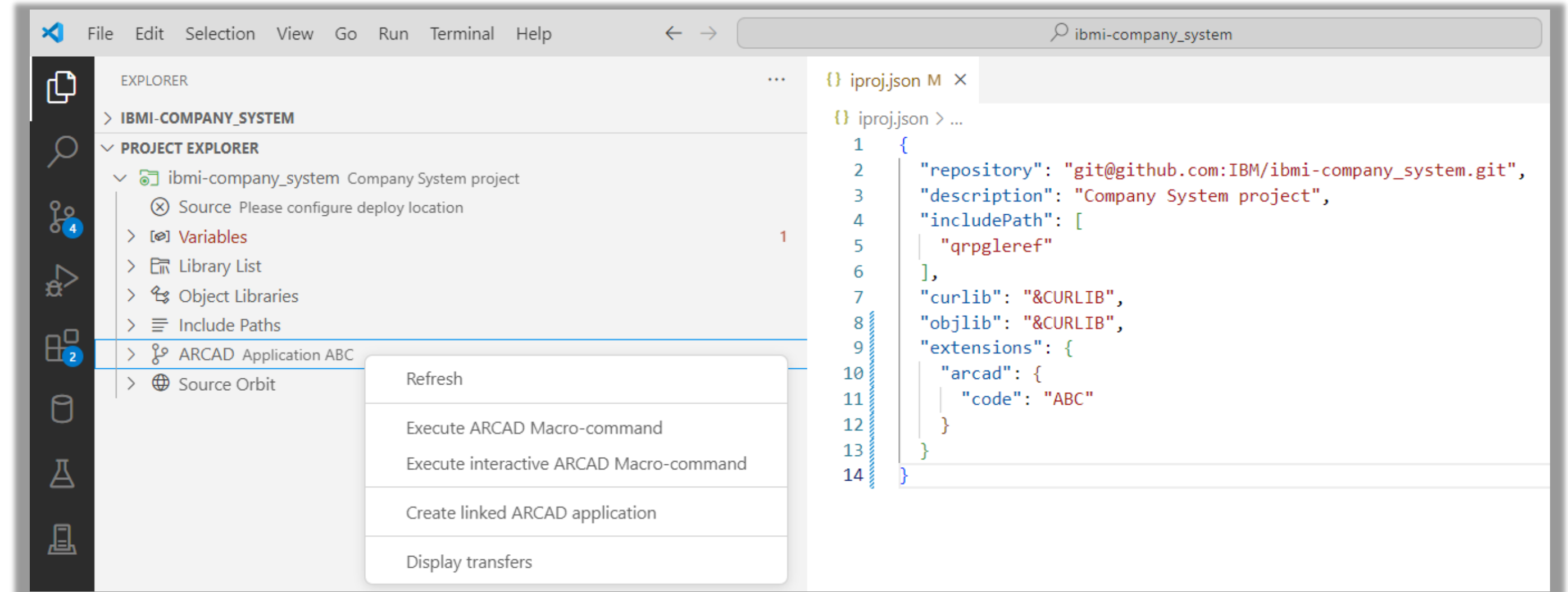
- Visualize and manage anything that could be seen in an IBM i job log including second level help
- Job log and spool files are dumped in .logs directory after a build or compile
- Track up to 10 of the previous logs in memory
- Organized by the ILE objects being built
- Filter by failed objects or severity



# Integration



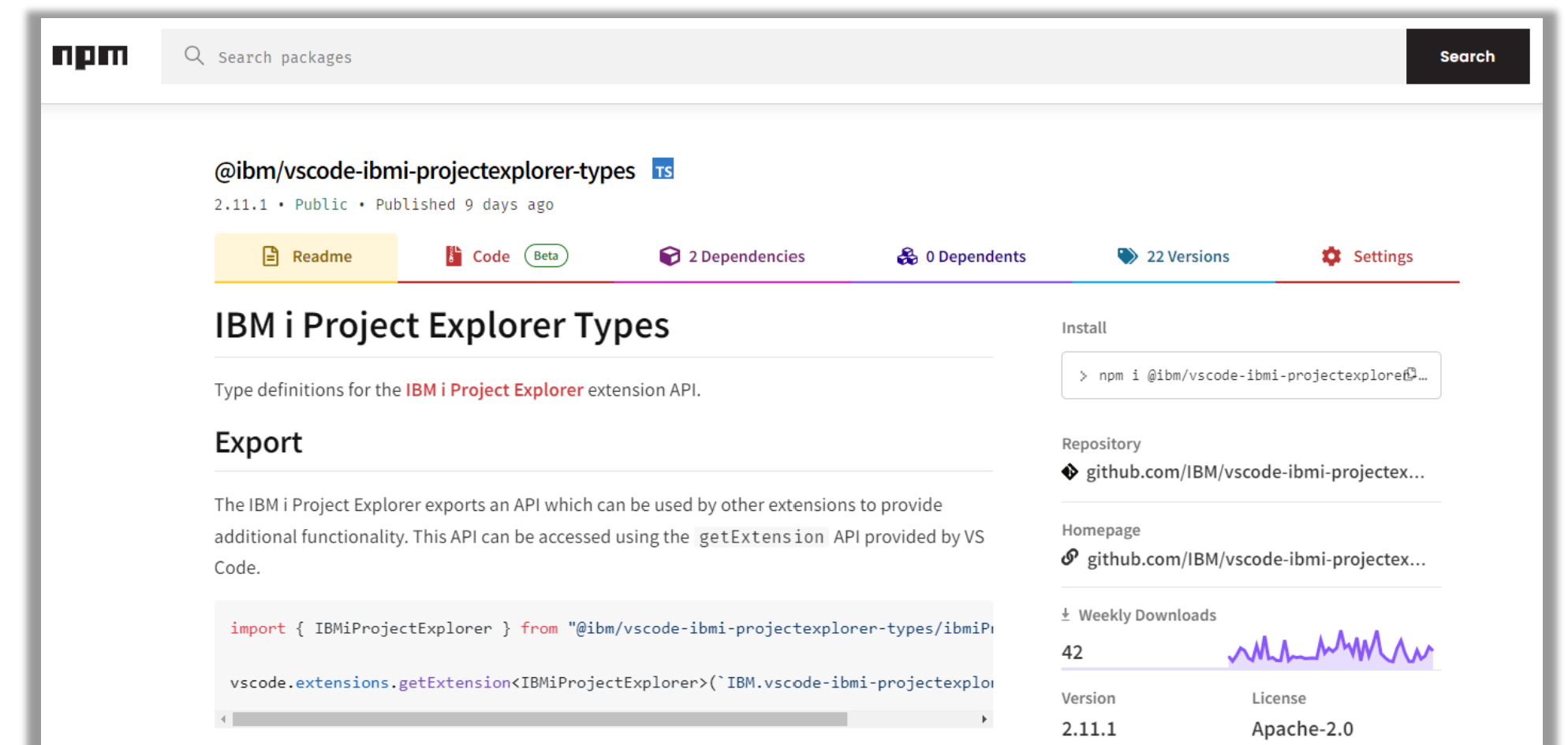
The screenshot shows the Source Orbit interface. On the left, the 'PROJECT EXPLORER' sidebar is expanded to show the 'Source Orbit' section. It lists various database objects: DEPARTMENT.FILE (table), DEPTS.FILE (dspf), EMPLOYEE.FILE (table), EMPS.FILE (dspf), NEMP.FILE (dspf), POPDEPT.PGM (sql), POPEMP.FILE (sql), DEPTS.PGM (sqlrpgle), EMPLOYEES.PGM (sqlrpgle), NEWEMP.PGM (sqlrpgle), DEPARTMENT.FILE (table), DEPTS.FILE (dspf), EMPLOYEES.PGM (sqlrpgle), MYPGM.PGM (rpgle), and NEWEMP.PGM (sqlrpgle). The main area shows a project structure for 'ibmi-company\_system' with sub-items like 'Source', 'Variables', 'Library List', 'Object Libraries', 'Include Paths', 'ARCAD Application ABC', and 'Source Orbit'. A context menu is visible over the 'Source Orbit' item, listing actions like 'Refresh', 'Execute ARCAD Macro-command', and 'Create linked ARCAD application'.



The screenshot shows the VS Code interface. The Explorer sidebar on the left shows the project structure, including 'Source Orbit'. A context menu is open over 'Source Orbit' with options: 'Refresh', 'Execute ARCAD Macro-command', 'Execute interactive ARCAD Macro-command', 'Create linked ARCAD application', and 'Display transfers'. The main editor area shows a file named 'iprojjson' with the following JSON content:

```
1 {
2   "repository": "git@github.com:IBM/ibmi-company_system.git",
3   "description": "Company System project",
4   "includePath": [
5     "qrpgleref"
6   ],
7   "curlib": "&CURLIB",
8   "objlib": "&CURLIB",
9   "extensions": {
10    "arcad": {
11      "code": "ABC"
12    }
13  }
14 }
```

*What can you integrate with IBM i Project Explorer's API?*



The screenshot shows the npm package page for '@ibm/vscode-ibmi-projectexplorer-types'. The package is version 2.11.1, published 9 days ago. It has 2 dependencies, 0 dependents, and 22 versions. The page includes a 'Readme' section with the title 'IBM i Project Explorer Types' and a description: 'Type definitions for the IBM i Project Explorer extension API.' There is an 'Export' section with a code snippet: `import { IBMiProjectExplorer } from "@ibm/vscode-ibmi-projectexplorer-types/ibmiProjectExplorer";` and `vscode.extensions.getExtension<IBMiProjectExplorer>("IBM.vscode-ibmi-projectexplorer")`. The right sidebar shows the 'Install' command: `npm i @ibm/vscode-ibmi-projectexplorer-types`, the repository URL, homepage, weekly downloads (42), and license (Apache-2.0).



# /COPY and /INCLUDE

- Both /COPY and /INCLUDE work for both file systems
  - QSYS
  - IFS
- Can also work across file systems
  - Copy in IFS source from within source member
  - Vice-versa

```
/INCLUDE QRPGLEREF,REF001  
/INCLUDE `qrpgleref/ref001.rpgle`
```

BBSADNUDFR.pgm.rpgle — BBS400

EXPLORER

- BBS400
  - IFS
  - screenshots
  - src
    - #BUILD.pgm.clle
    - #LICENSE.txt
    - #MAKE.pgm.clle
    - BBS400PROD.pgm.clle
    - BBSAACCLVD.dspf
    - BBSAACCLVR.pgm.rpgle
    - BBSADBLD.dspf
    - BBSADGCD.dspf
    - BBSADGCR.pgm.rpgle
    - BBSADMMNUD.dspf
    - BBSADMMNUR.pgm.rpgle
    - BBSADNUDF.dspf
    - BBSADNUDFR.pgm.rpgle
    - BBSAEPGMMD.dspf
    - BBSAEPGMMR.pgm.rpgle
    - BBSBRDL.D.dspf
    - BBSBRDLR.pgm.rpgle
    - BBSDSPIFSC.pgm.clle
    - BBSETPGMSD.dspf
    - BBSETPGMSR.pgm.rpgle
    - BBSHELPERC.pgm.clle
    - BBSHELPPNL.pnlgrp
    - BBSIFSILD.dspf
    - BBSIFSILR.pgm.rpgle
    - BBSINFC.pgm.clle
    - BBSINFD.dspf
    - BBSLGIND.dspf
    - BBSLGINR.pgm.rpgle
    - BBSLSTUSR.D.dspf
    - BBSLSTUSRR.pgm.rpgle
    - BBSMENU.D.dspf
    - BBSMENU.R.pgm.rpgle
    - BBSMSGSD.dspf
    - BBSMSSLD.dspf

PROJECT EXPLORER

JOB LOG

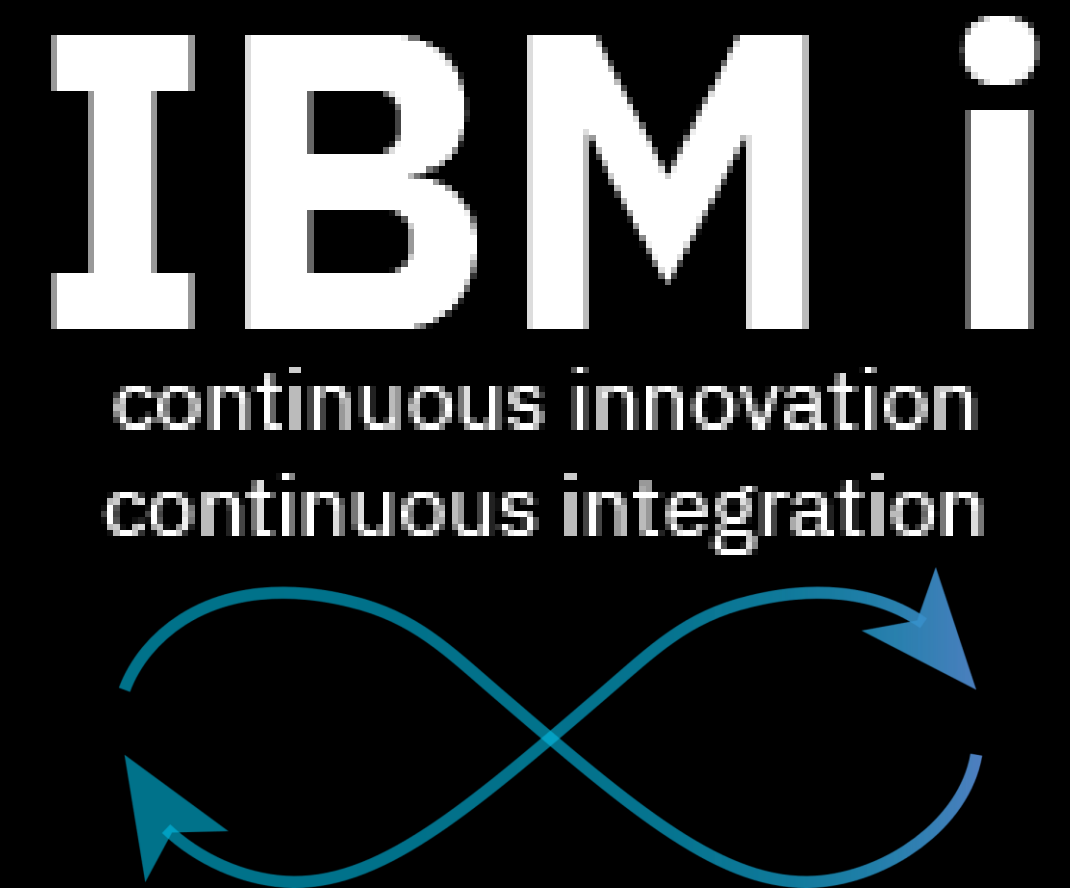
BBSADNUDFR.pgm.rpgle (Working Tree) M X

```
src > BBSADNUDFR.pgm.rpgle > ...
1 H/TITLE Administration - New User default values
2 H COPYRIGHT('(C) 2020 David Asta under MIT License')
3 * SYSTEM : V4R5
4 * PROGRAMMER : David Asta
5 * DATE-WRITTEN: 25/NOV/2020
6 *
7 * This program allows an Administrator user to display/change the
8 * New User default values
9 *****
10 H/COPY DVBBBS400/CURRENTSRC,CBKOPTIMIZ
11 *****
12 * INDICATORS USED:
13 * 80 - *ON turns DSPATR(PR), which protects fields from being change
14 * 81 - CBKPCFGREA CHAIN Not Found
15 *****
16 FBBSADNUDFDCF E WORKSTN
17 FPCONFIG UF E K DISK
18 *****
19 * Data structures
20 D/COPY DVBBBS400/CURRENTSRC,CBKDTAARA
21 * Constants
22 D cKeysDft C CONST('F10=Edit F12=Go back')
23 D cKeysEdit C CONST('F10=Confirm Changes F1
24 cel')
25 D cSavedOK C CONST('Configuration was change
26 cessfully.')
27 D cSavedK0 C CONST('There was an error while
28 ting to PCONFIG.')
29 * Variables
30 D/COPY DVBBBS400/CURRENTSRC,CBKPCFGDCL
31 D wCfgKey S 6A
32 *****
33 C WRITE HEADER
34 C 80 EVAL KEYSLS = cKeysDft
35 C N80 EVAL KEYSLS = cKeysEdit
36 C WRITE FOOTER
37 C EXFMT BODY
38 C CLEAR MSGLIN
39 C EXSR CheckFkeys
40 *****
41 * Subroutine called automatically at startup
42 *****
43 C *INZSR BEGSR
44 C EVAL SCRSR = 'BBSADNUDF'
45 * Protect fields from being modified
46 C EVAL *IN80 = *ON
47 * Get values from PCONFIG and show them on screen
```

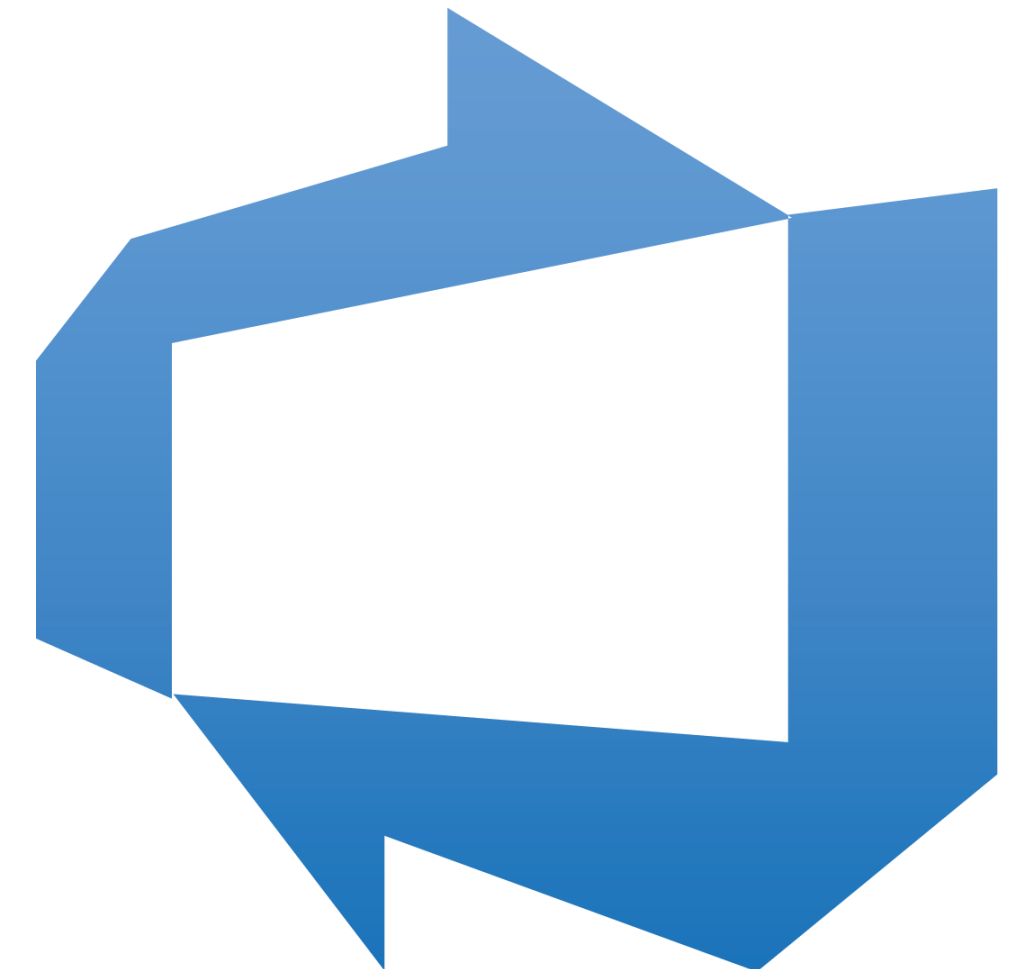
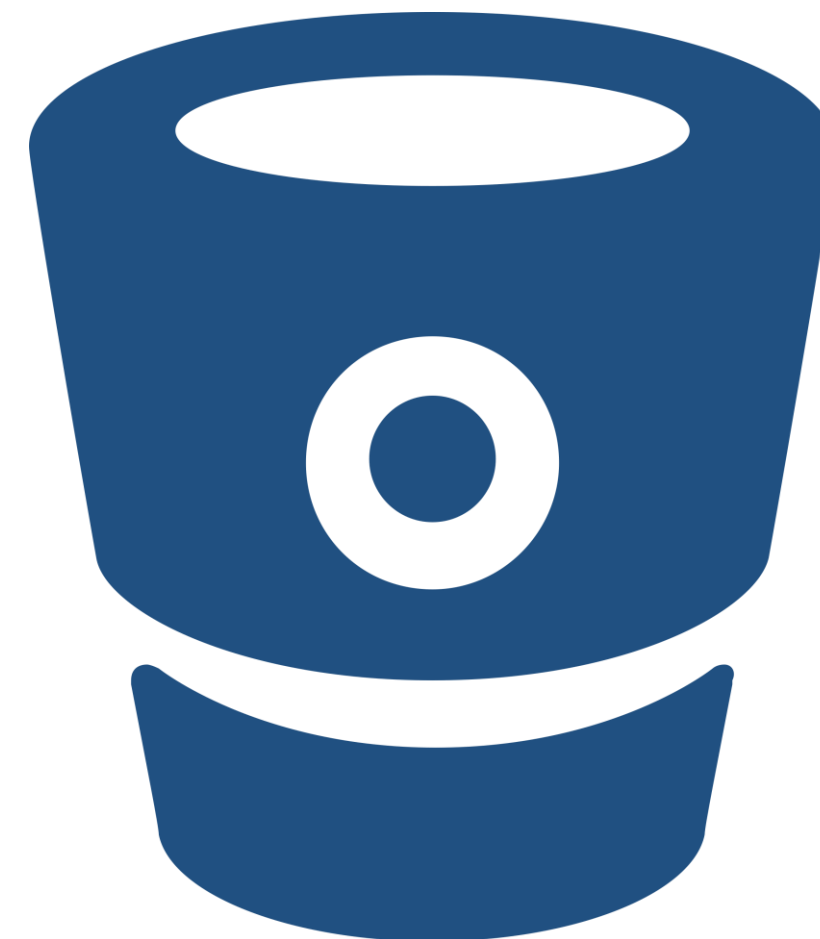
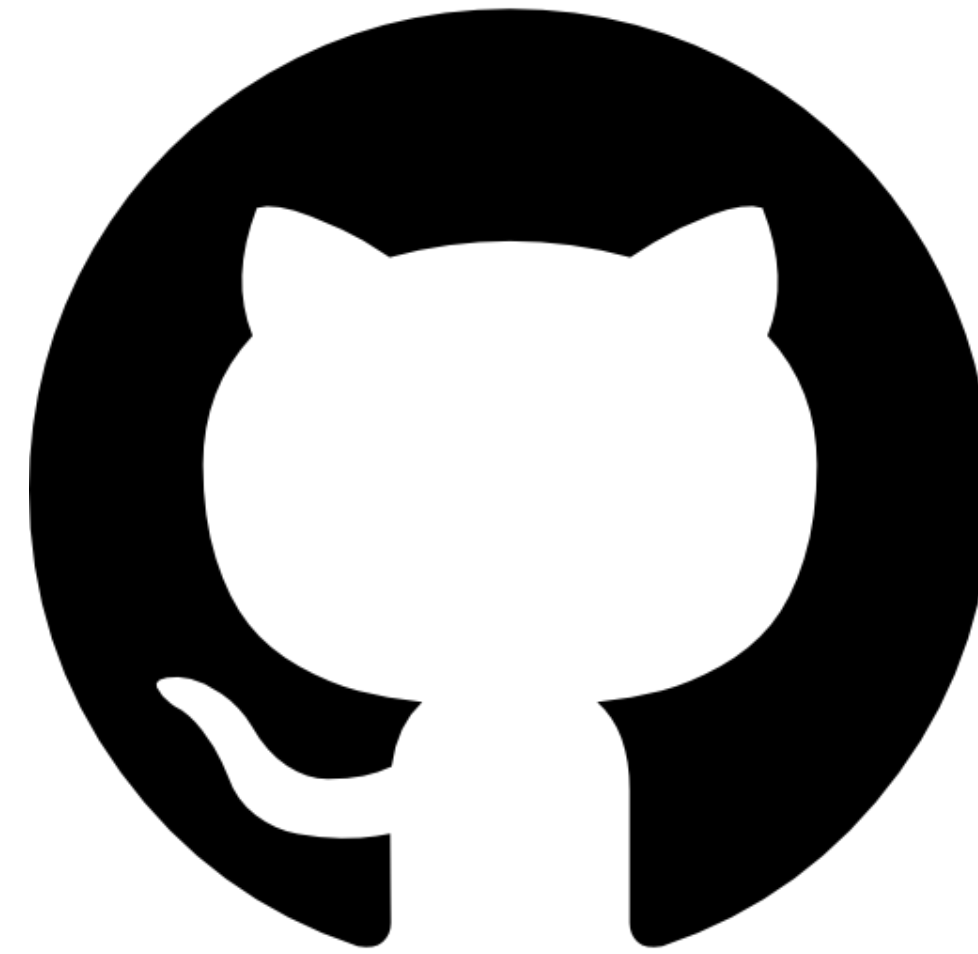
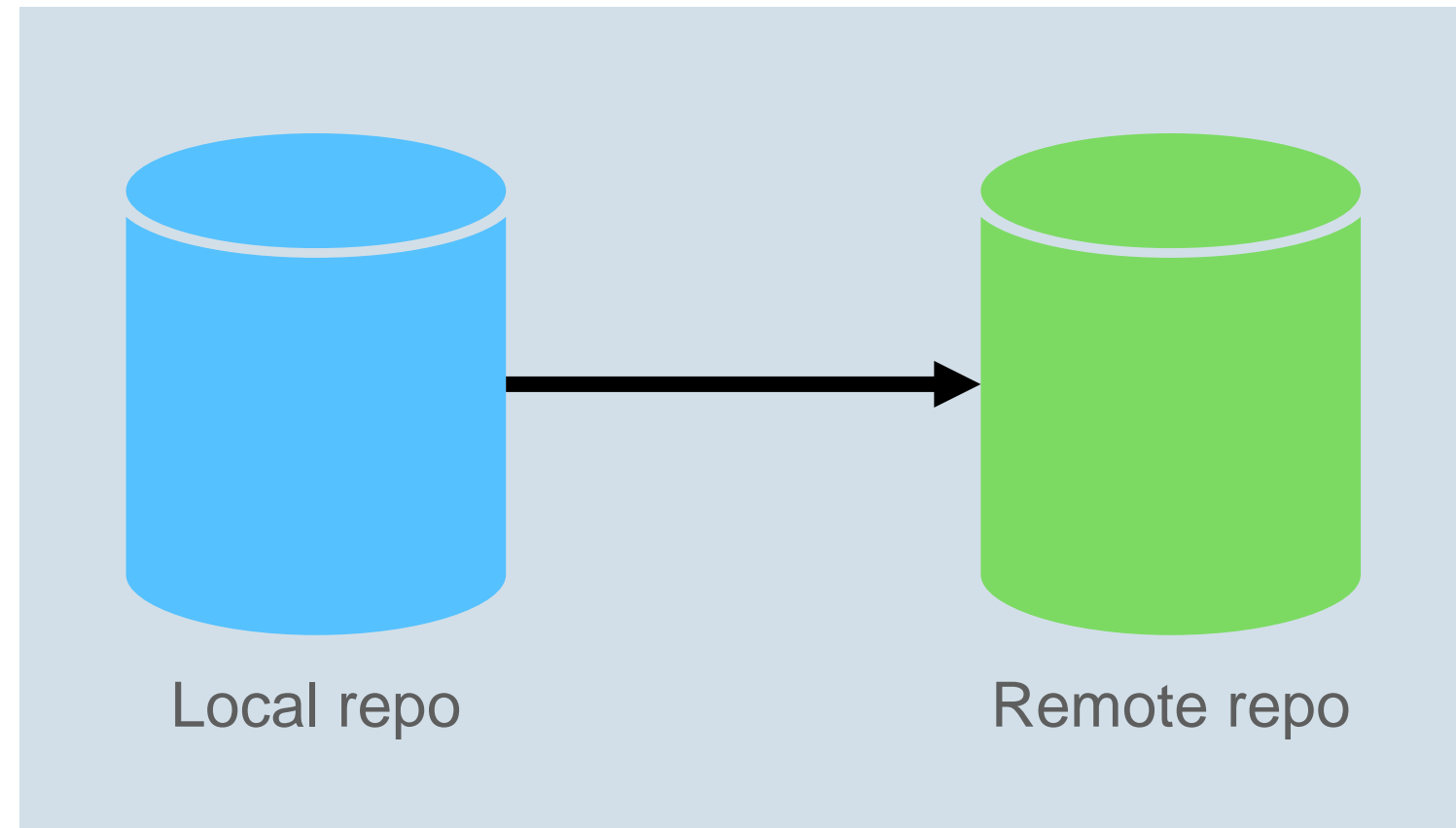
H/TITLE Administration - New User default values  
H COPYRIGHT('(C) 2020 David Asta under MIT License')  
\* SYSTEM : V4R5  
\* PROGRAMMER : David Asta  
\* DATE-WRITTEN: 25/NOV/2020  
\*  
\* This program allows an Administrator user to display/change the  
\* New User default values  
\*\*\*\*\*  
/copy 'src/CBKOPTIMIZ.rpgleinc' You, 1 second ago • Uncommitted  
\*\*\*\*\*  
\* INDICATORS USED:  
\* 80 - \*ON turns DSPATR(PR), which protects fields from being change  
\* 81 - CBKPCFGREA CHAIN Not Found  
\*\*\*\*\*  
FBBSADNUDFDCF E WORKSTN  
FPCONFIG UF E K DISK  
\*\*\*\*\*  
\* Data structures  
/copy 'src/CBKDTAARA.rpgleinc'  
\* Constants  
D cKeysDft C CONST('F10=Edit F12=Go back')  
D cKeysEdit C CONST('F10=Confirm Changes F1  
cel')  
D cSavedOK C CONST('Configuration was change  
cessfully.')  
D cSavedK0 C CONST('There was an error while  
ting to PCONFIG.')  
\* Variables  
/copy 'src/CBKPCFGDCL.rpgleinc'  
D wCfgKey S 6A  
\*\*\*\*\*  
C WRITE HEADER  
C 80 EVAL KEYSLS = cKeysDft  
C N80 EVAL KEYSLS = cKeysEdit  
C WRITE FOOTER  
C EXFMT BODY  
C CLEAR MSGLIN  
C EXSR CheckFkeys  
\*\*\*\*\*  
\* Subroutine called automatically at startup  
\*\*\*\*\*  
C \*INZSR BEGSR  
C EVAL SCRSR = 'BBSADNUDF'  
\* Protect fields from being modified  
C EVAL \*IN80 = \*ON  
\* Get values from PCONFIG and show them on screen

φ You, 1 second ago Ln 10, Col 1 Spaces: 5 UTF-8 LF RPGLE

# Git hosting services



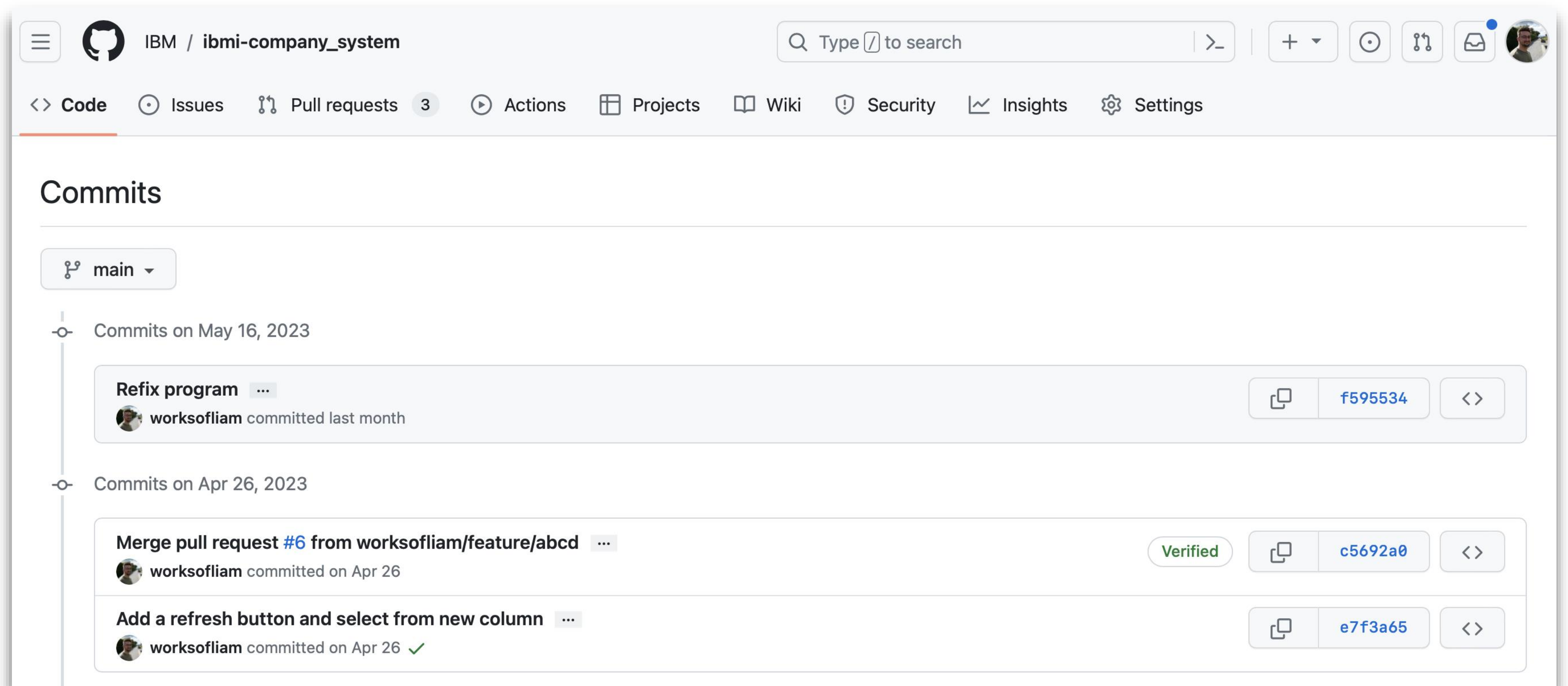
# Where to host?





# Commit History

GitHub  
Azure DevOps  
GitLab  
Bamboo

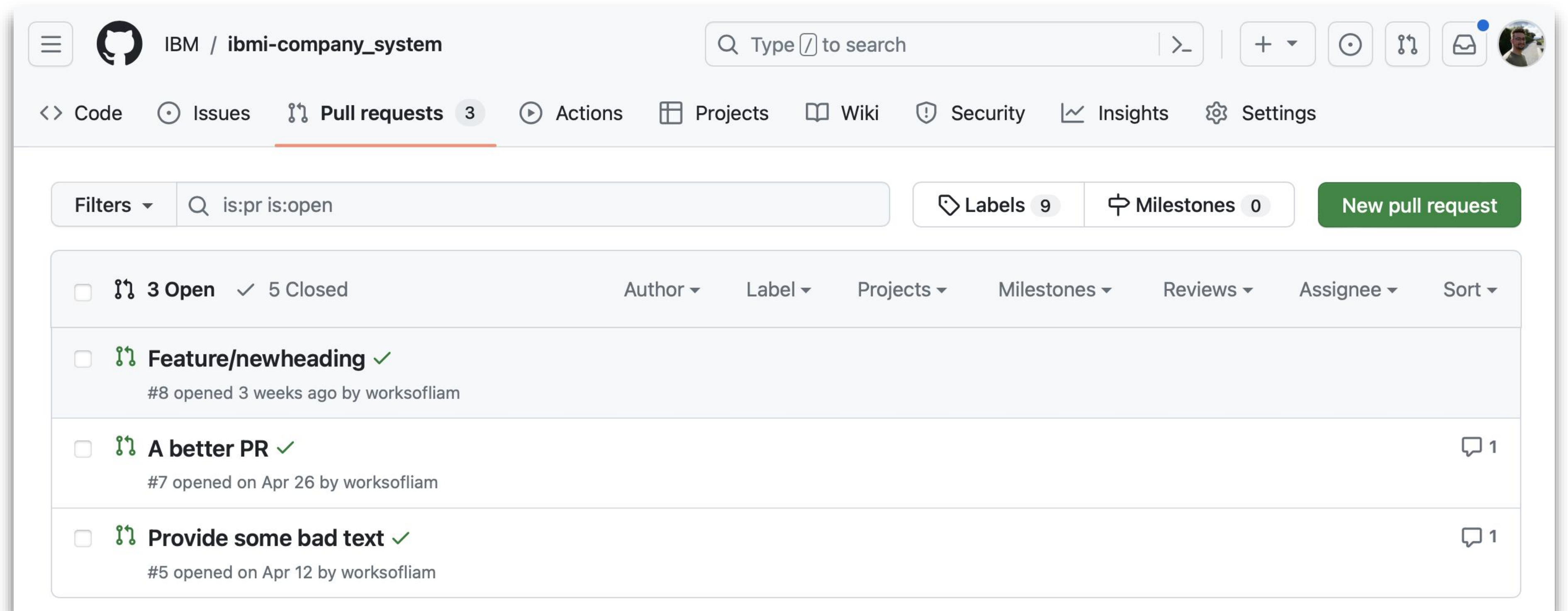


The screenshot shows the GitHub interface for the repository `IBM / ibmi-company_system`. The page title is `ibmi-company_system`. The navigation bar includes `Code` (selected), `Issues`, `Pull requests` (3), `Actions`, `Projects`, `Wiki`, `Security`, `Insights`, and `Settings`. The commit history is displayed for the `main` branch. The commits are grouped by date:

- Commits on May 16, 2023**
  - `Refix program ...` by `worksofliam` committed last month. Commit hash: `f595534`.
- Commits on Apr 26, 2023**
  - `Merge pull request #6 from worksofliam/feature/abcd ...` by `worksofliam` committed on Apr 26. Commit hash: `c5692a0`. Status: `Verified`.
  - `Add a refresh button and select from new column ...` by `worksofliam` committed on Apr 26. Commit hash: `e7f3a65`.

# Pull Requests

GitHub  
Azure DevOps  
GitLab  
Bamboo



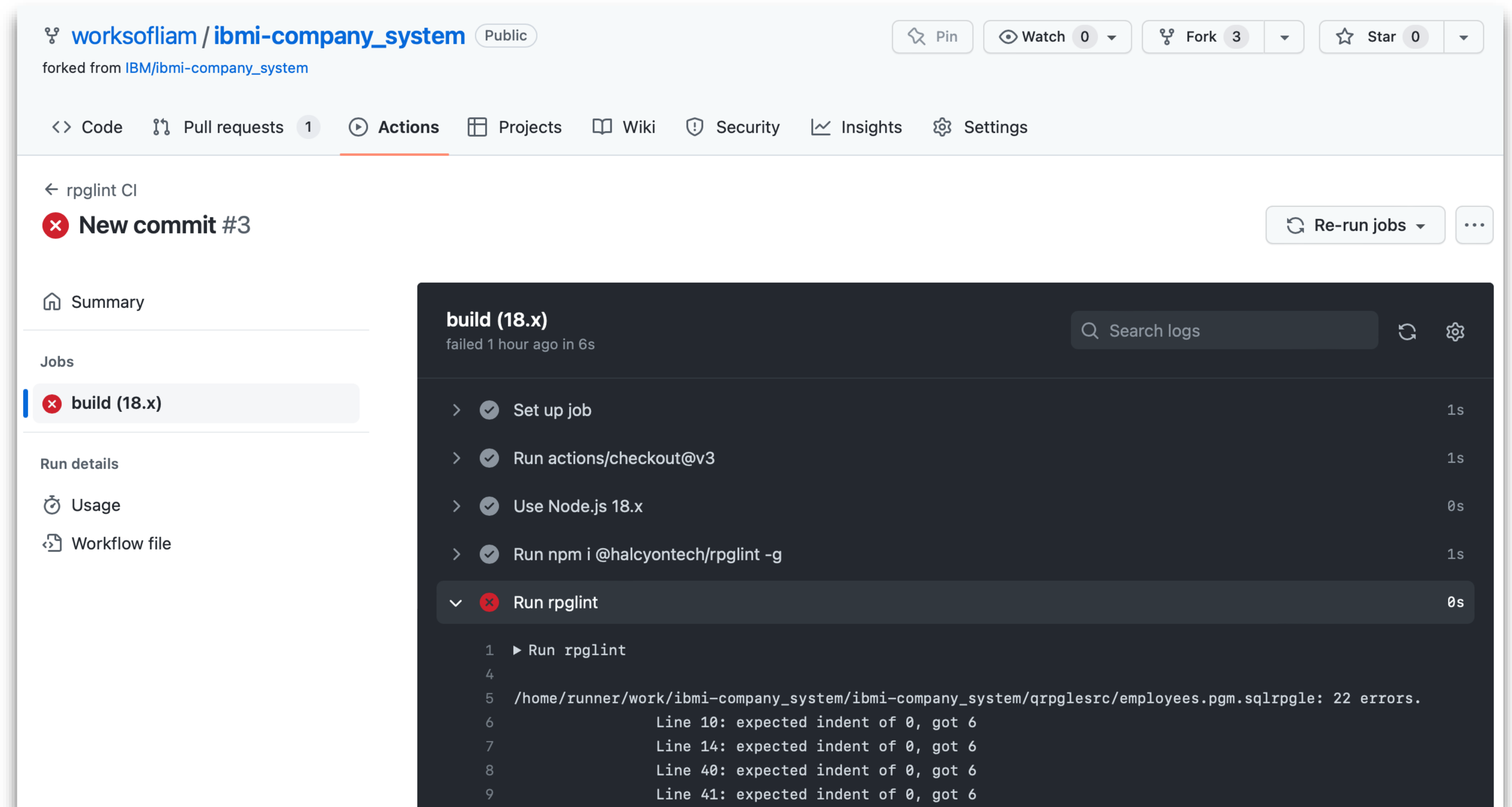
The screenshot shows the GitHub interface for the repository 'IBM / ibmi-company\_system'. The 'Pull requests' tab is active, showing 3 open pull requests. The interface includes a search bar, navigation tabs (Code, Issues, Pull requests, Actions, Projects, Wiki, Security, Insights, Settings), and a list of pull requests with columns for checkboxes, status, title, and comments.

<input type="checkbox"/>	3 Open ✓ 5 Closed	Author ▾	Label ▾	Projects ▾	Milestones ▾	Reviews ▾	Assignee ▾	Sort ▾
<input type="checkbox"/>	<b>Feature/newheading</b> ✓ #8 opened 3 weeks ago by worksofliam							
<input type="checkbox"/>	<b>A better PR</b> ✓ #7 opened on Apr 26 by worksofliam							1
<input type="checkbox"/>	<b>Provide some bad text</b> ✓ #5 opened on Apr 12 by worksofliam							1



# CI/CD

GitHub Actions  
 Azure DevOps Pipelines  
 GitLab CICD  
 Bamboo



worksofliam / **ibmi-company\_system** Public

forked from IBM/ibmi-company\_system

Code Pull requests 1 Actions Projects Wiki Security Insights Settings

← rpglint CI

**✖ New commit #3** Re-run jobs

Summary

Jobs

- ✖ build (18.x)**

Run details

- Usage
- Workflow file

**build (18.x)**  
failed 1 hour ago in 6s

Search logs

- ✔ Set up job 1s
- ✔ Run actions/checkout@v3 1s
- ✔ Use Node.js 18.x 0s
- ✔ Run npm i @halcyontech/rpglint -g 1s
- ✖ Run rpglint 0s**

```

1 ▶ Run rpglint
4
5 /home/runner/work/ibmi-company_system/ibmi-company_system/qrpglesrc/employees.pgm.sqlrpgle: 22 errors.
6           Line 10: expected indent of 0, got 6
7           Line 14: expected indent of 0, got 6
8           Line 40: expected indent of 0, got 6
9           Line 41: expected indent of 0, got 6
          
```

# Insights

halcyon-tech / vscode-ibmi

Code Issues **39** Pull requests **9** Discussions Actions Security **Insights** Settings

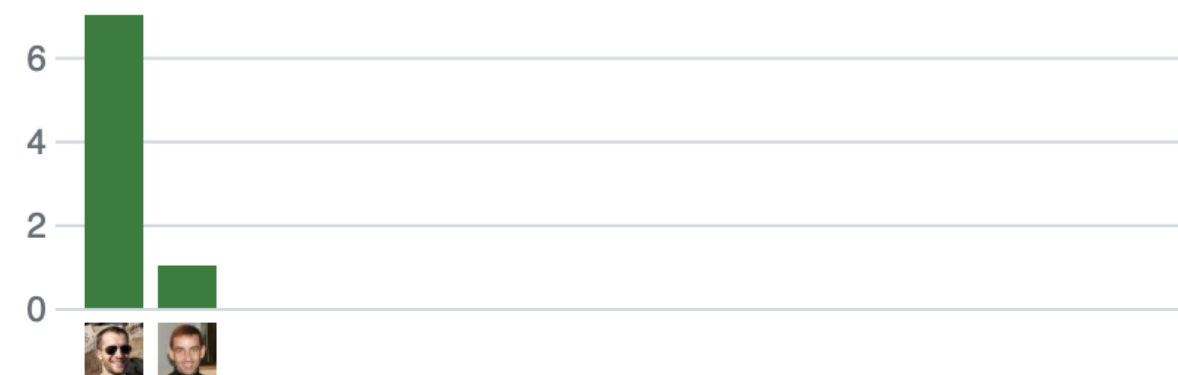
June 6, 2023 – June 13, 2023 Period: 1 week

### Overview

8 Active pull requests 10 Active issues

5 Merged pull requests	3 Open pull requests	6 Closed issues	4 New issues
------------------------	----------------------	-----------------	--------------

Excluding merges, **2 authors** have pushed **7 commits** to master and **8 commits** to all branches. On master, **5 files** have changed and there have been **97 additions** and **56 deletions**.

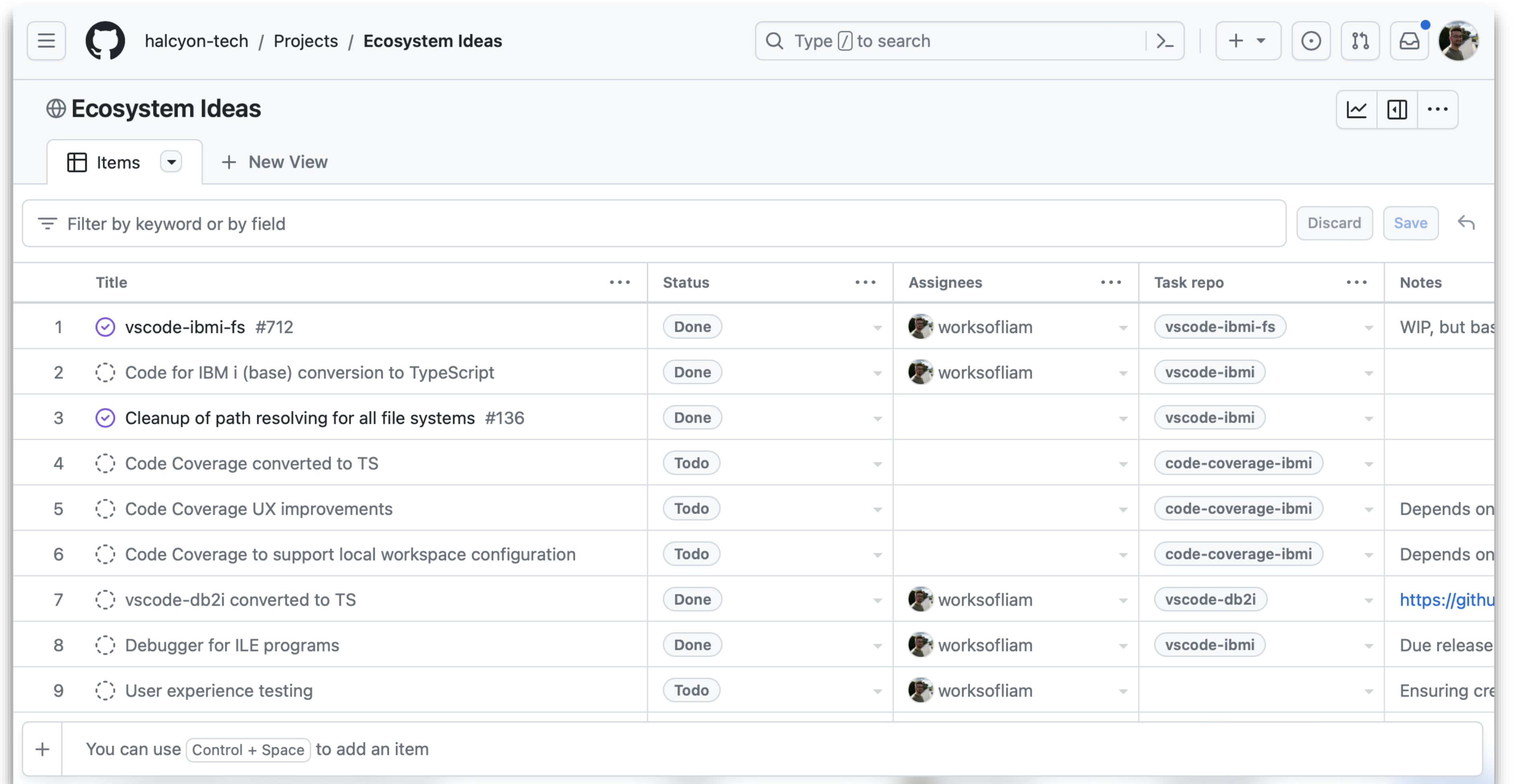


1 Release published by 1 person

1.9.4 Code for IBM i 1.9.4  
published 4 days ago

# Project Management

GitHub  
 Azure DevOps  
 GitLab  
 Bamboo (Jira)



halcyon-tech / Projects / Ecosystem Ideas

Q Type to search

**Ecosystem Ideas**

Items + New View

Filter by keyword or by field Discard Save

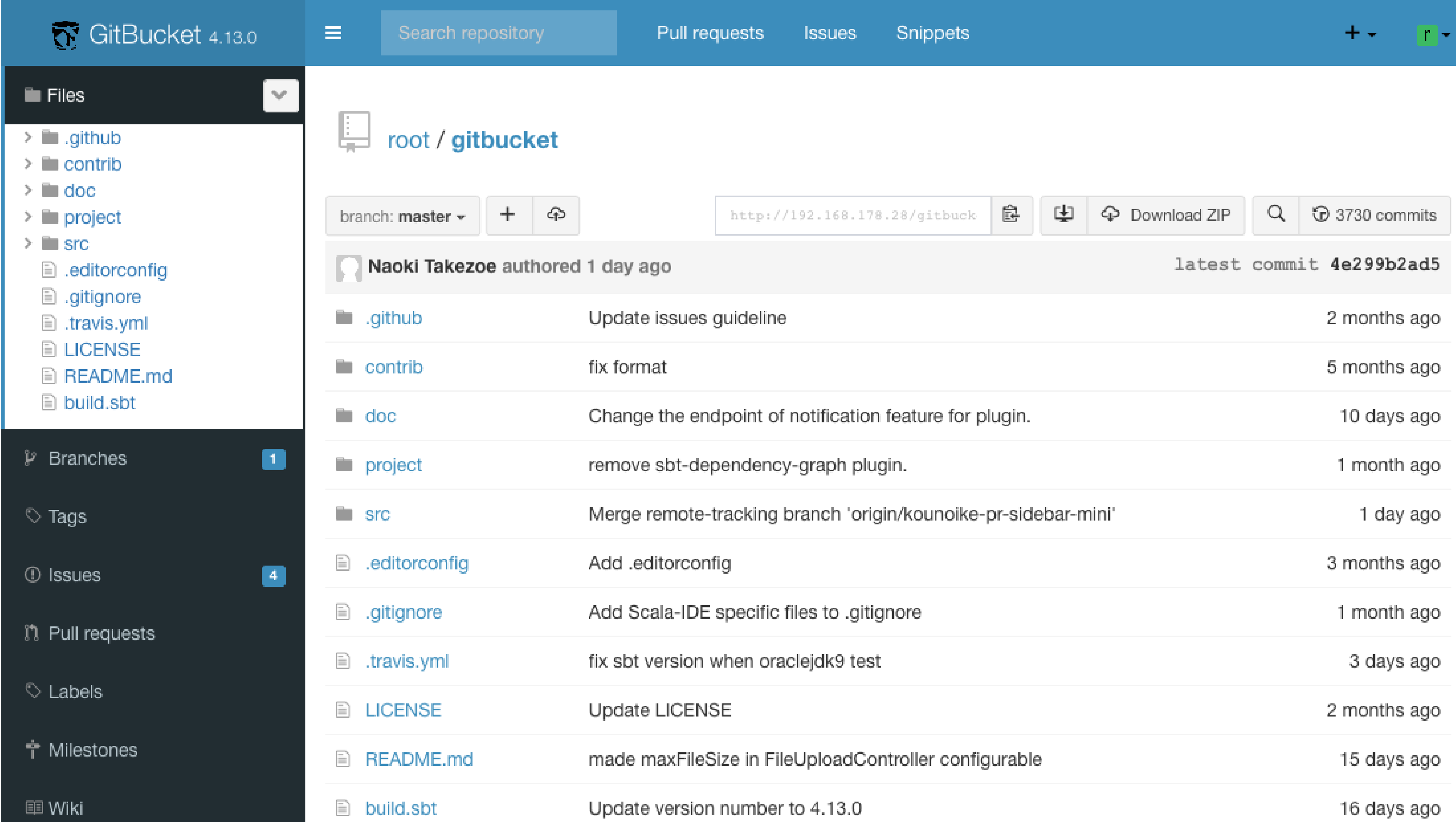
Title	Status	Assignees	Task repo	Notes
1 <input checked="" type="checkbox"/> vscode-ibmi-fs #712	Done	worksofliam	vscode-ibmi-fs	WIP, but bas
2 <input type="checkbox"/> Code for IBM i (base) conversion to TypeScript	Done	worksofliam	vscode-ibmi	
3 <input checked="" type="checkbox"/> Cleanup of path resolving for all file systems #136	Done		vscode-ibmi	
4 <input type="checkbox"/> Code Coverage converted to TS	Todo		code-coverage-ibmi	
5 <input type="checkbox"/> Code Coverage UX improvements	Todo		code-coverage-ibmi	Depends on
6 <input type="checkbox"/> Code Coverage to support local workspace configuration	Todo		code-coverage-ibmi	Depends on
7 <input type="checkbox"/> vscode-db2i converted to TS	Done	worksofliam	vscode-db2i	<a href="https://github.com">https://github.com</a>
8 <input type="checkbox"/> Debugger for ILE programs	Done	worksofliam	vscode-ibmi	Due release
9 <input type="checkbox"/> User experience testing	Todo	worksofliam		Ensuring cre

+ You can use **Control + Space** to add an item

# Git server examples

Option	Key Features	Best For
<b>GitHub</b>	<ul style="list-style-type: none"><li>- Public/private repos</li><li>- GitHub Actions (CI/CD)</li><li>- Large community support</li></ul>	Open-source, collaborative projects
<b>GitLab</b>	<ul style="list-style-type: none"><li>- Self-hosting available</li><li>- Integrated CI/CD</li><li>- DevOps-friendly tools</li></ul>	Enterprises, CI/CD workflows
<b>GitBucket</b>	<ul style="list-style-type: none"><li>- Lightweight, self-hosted Git solution</li><li>- Extensible with plugins</li><li>- Easy to set up</li></ul>	Small teams, self-hosted environments

# Hidden Gem: GitBucket on IBM i

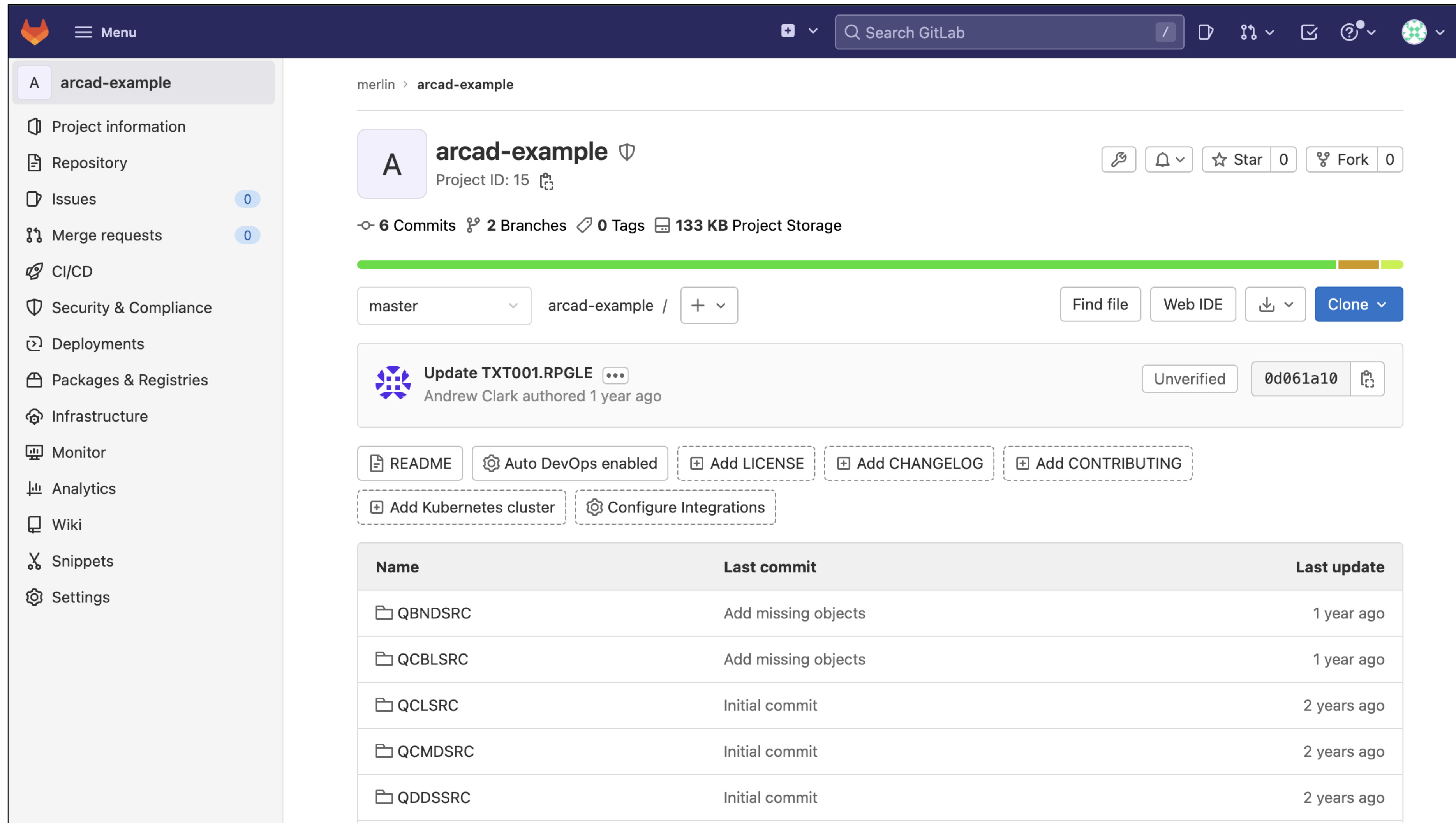


The screenshot displays the GitBucket 4.13.0 web interface. The top navigation bar includes a search repository field, links for Pull requests, Issues, and Snippets, and a user profile icon. The left sidebar shows a file tree with folders like .github, contrib, doc, project, and src, and files like .editorconfig, .gitignore, .travis.yml, LICENSE, README.md, and build.sbt. The main content area shows the repository 'root / gitbucket' with a branch selector set to 'master', a repository URL, and a 'Download ZIP' button. Below this, a commit history table is shown, listing recent commits by Naoki Takezoe.

Commit	Author	Message	Time
4e299b2ad5	Naoki Takezoe	Update version number to 4.13.0	16 days ago
	Naoki Takezoe	made maxFileSize in FileUploadController configurable	15 days ago
	Naoki Takezoe	Update LICENSE	2 months ago
	Naoki Takezoe	fix sbt version when oraclejdk9 test	3 days ago
	Naoki Takezoe	Add Scala-IDE specific files to .gitignore	1 month ago
	Naoki Takezoe	Add .editorconfig	3 months ago
	Naoki Takezoe	Merge remote-tracking branch 'origin/kounoike-pr-sidebar-mini'	1 day ago
	Naoki Takezoe	remove sbt-dependency-graph plugin.	1 month ago
	Naoki Takezoe	Change the endpoint of notification feature for plugin.	10 days ago
	Naoki Takezoe	fix format	5 months ago
	Naoki Takezoe	Update issues guideline	2 months ago



# Gitlab on IBM Power



The screenshot shows the GitLab web interface for a project named 'arcad-example'. The left sidebar contains navigation options: Project information, Repository, Issues (0), Merge requests (0), CI/CD, Security & Compliance, Deployments, Packages & Registries, Infrastructure, Monitor, Analytics, Wiki, Snippets, and Settings. The main content area shows the project details for 'arcad-example' (Project ID: 15) with 6 commits, 2 branches, 0 tags, and 133 KB of project storage. A commit titled 'Update TXT001.RPGLE' by Andrew Clark is highlighted, with a commit hash of 0d061a10. Below the commit, there are buttons for 'README', 'Auto DevOps enabled', 'Add LICENSE', 'Add CHANGELOG', and 'Add CONTRIBUTING'. At the bottom, a table lists the project's files and their commit history.

Name	Last commit	Last update
QBNDSRC	Add missing objects	1 year ago
QCBLSRC	Add missing objects	1 year ago
QCLSRC	Initial commit	2 years ago
QCMDSRC	Initial commit	2 years ago
QDDSSRC	Initial commit	2 years ago

# Deploying with Podman

```
C:\WINDOWS\system32\cmd.exe - podman run gitlab/gitlab-ce
```

```
Microsoft Windows [Version 10.0.22631.4460]  
(c) Microsoft Corporation. All rights reserved.
```

```
C:\Users\911879897>podman machine start  
Starting machine "podman-machine-default"  
API forwarding listening on: npipe:////./pipe/docker_engine
```

```
Docker API clients default to this address. You do not need to set DOCKER_HOST.  
Machine "podman-machine-default" started successfully
```

```
C:\Users\911879897>podman run gitlab/gitlab-ce  
Thank you for using GitLab Docker Image!  
Current version: gitlab-ce=16.5.1-ce.0
```

```
Configure GitLab for your system by editing /etc/gitlab/gitlab.rb file  
And restart this container to reload settings.  
To do it use docker exec:
```

```
docker exec -it gitlab editor /etc/gitlab/gitlab.rb  
docker restart gitlab
```

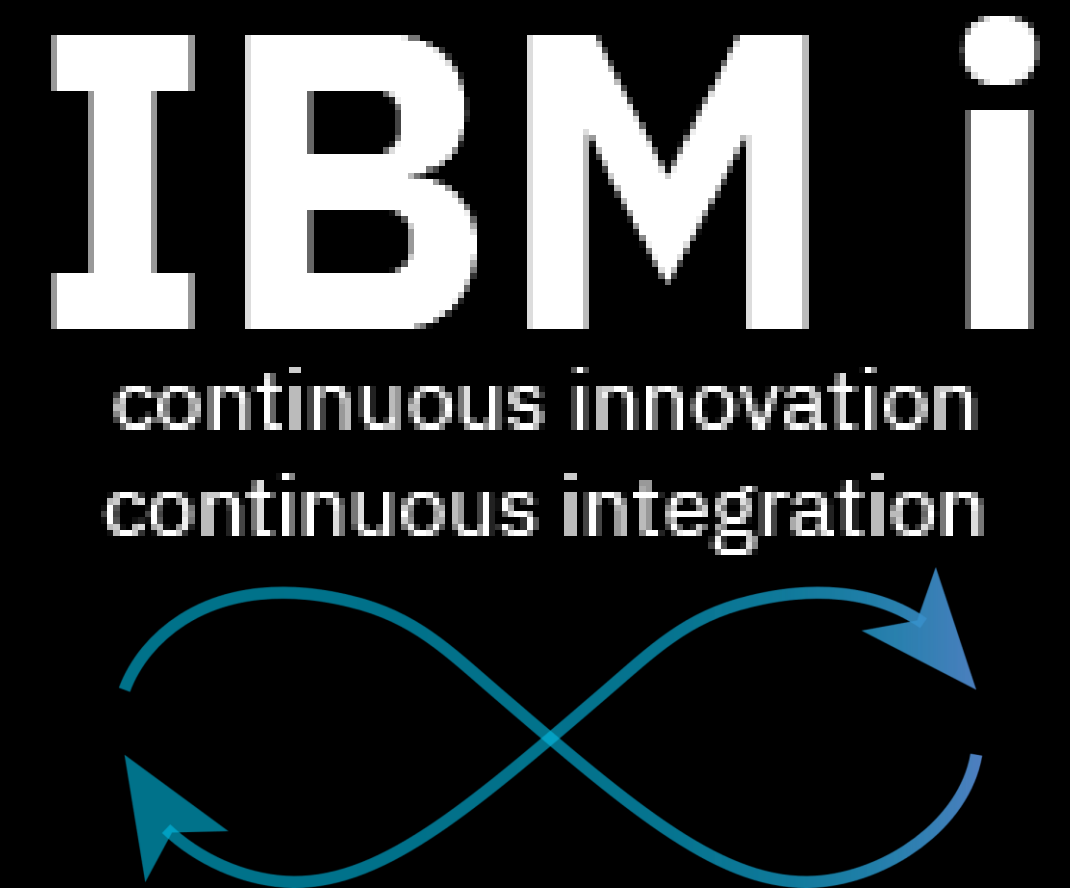
```
For a comprehensive list of configuration options please see the Omnibus GitLab readme  
https://gitlab.com/gitlab-org/omnibus-gitlab/blob/master/README.md
```

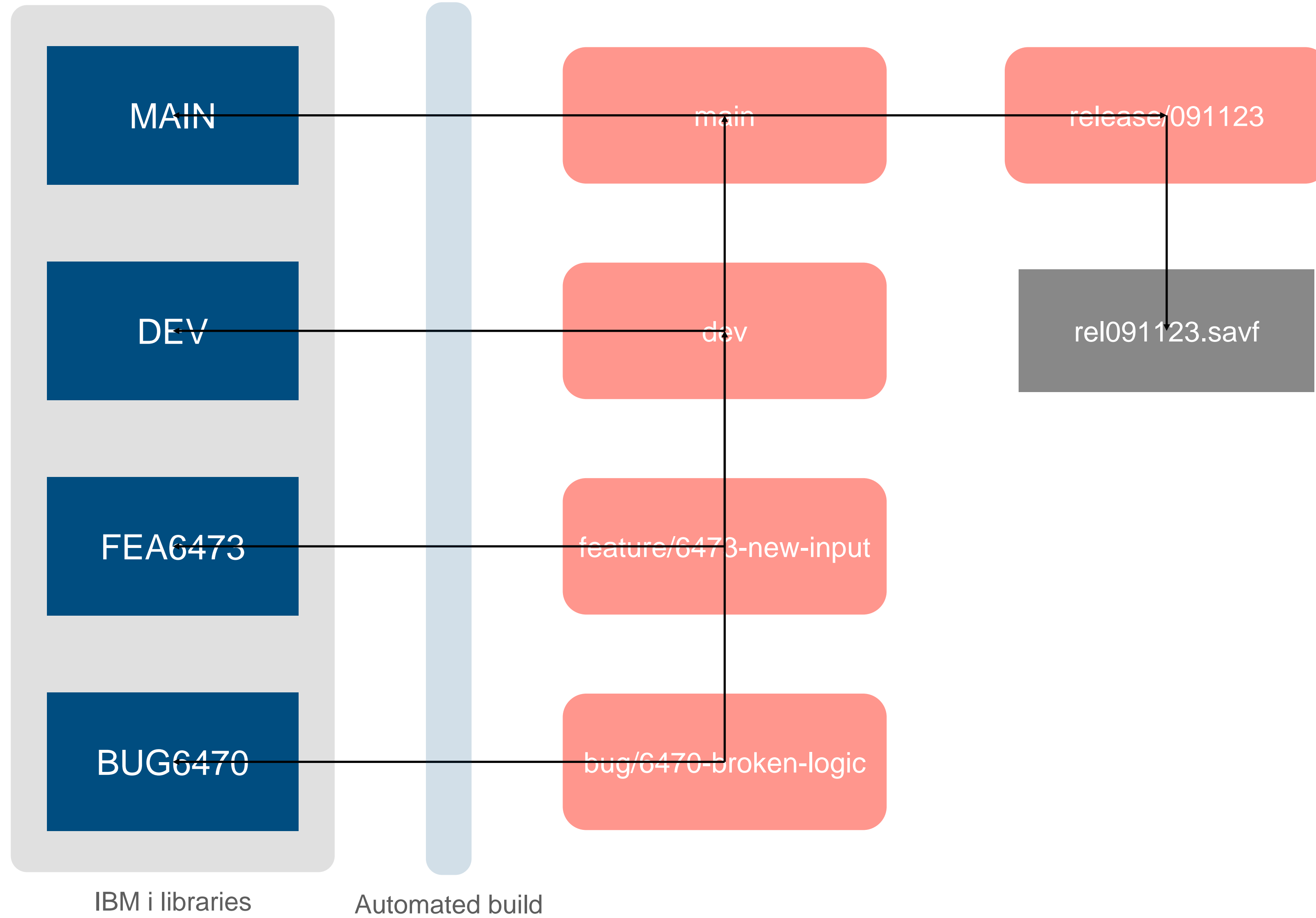
```
If this container fails to start due to permission problems try to fix it by executing:
```

```
docker exec -it gitlab update-permissions  
docker restart gitlab
```

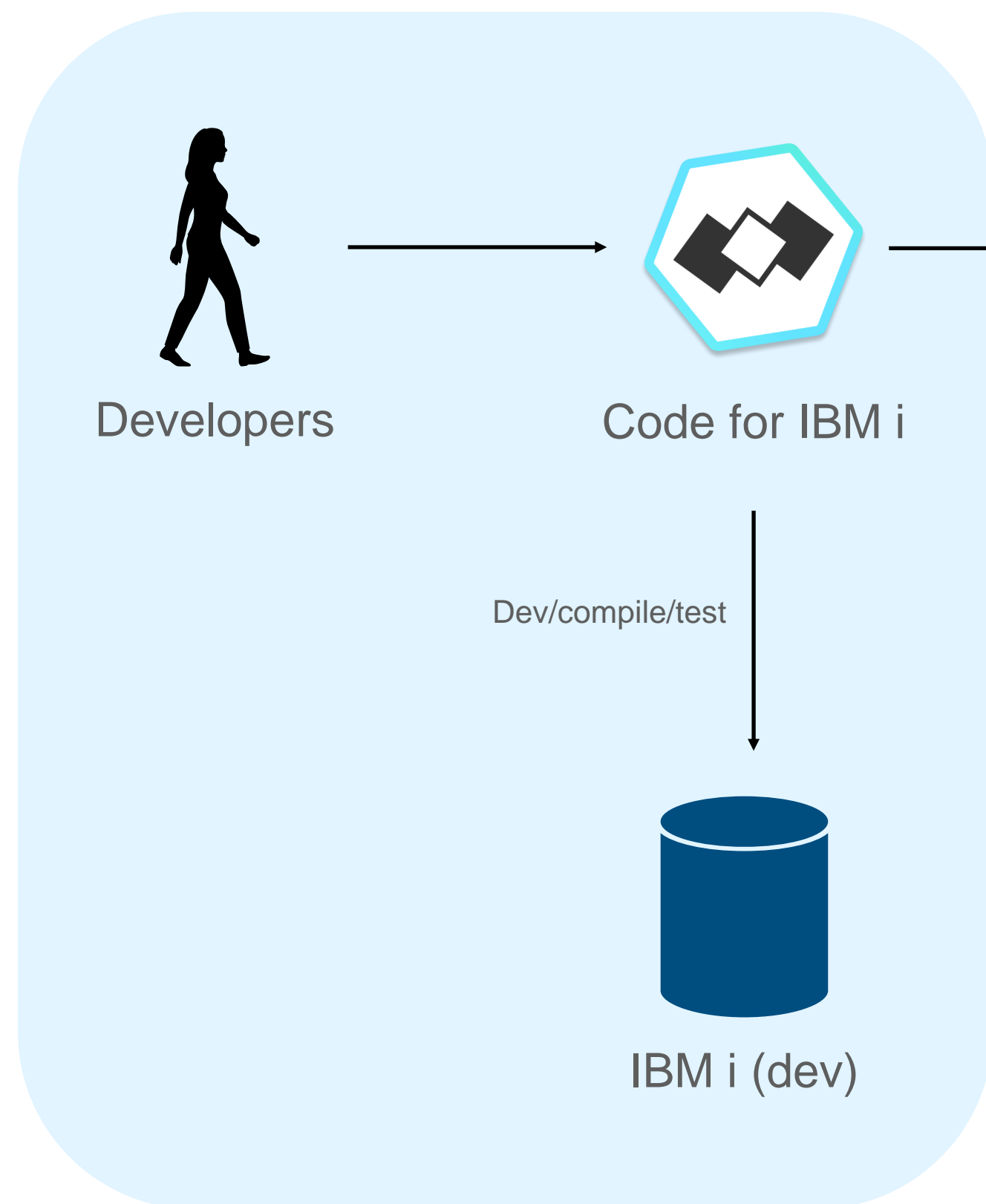
```
Cleaning stale PIDs & sockets
```

# Building pipelines

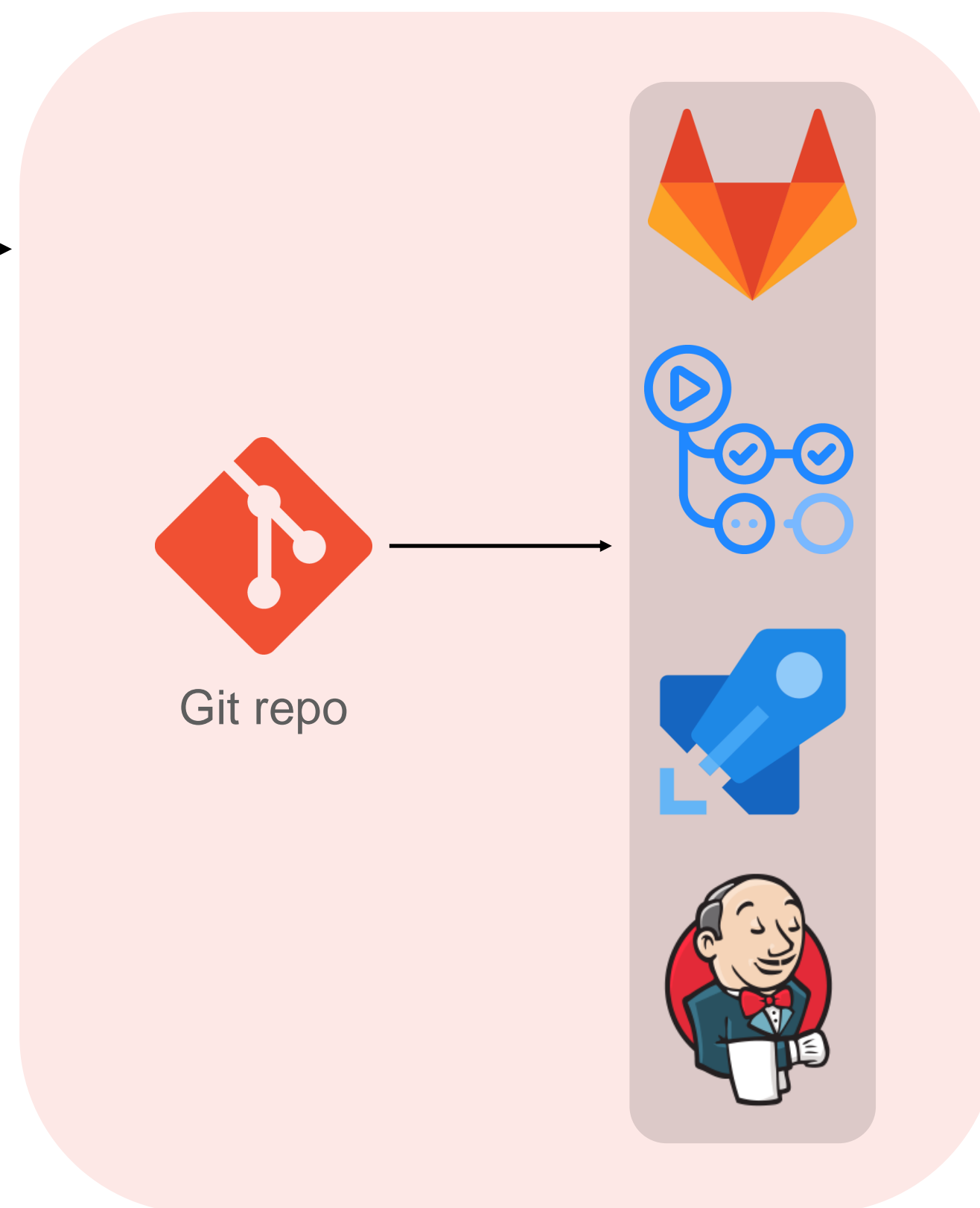




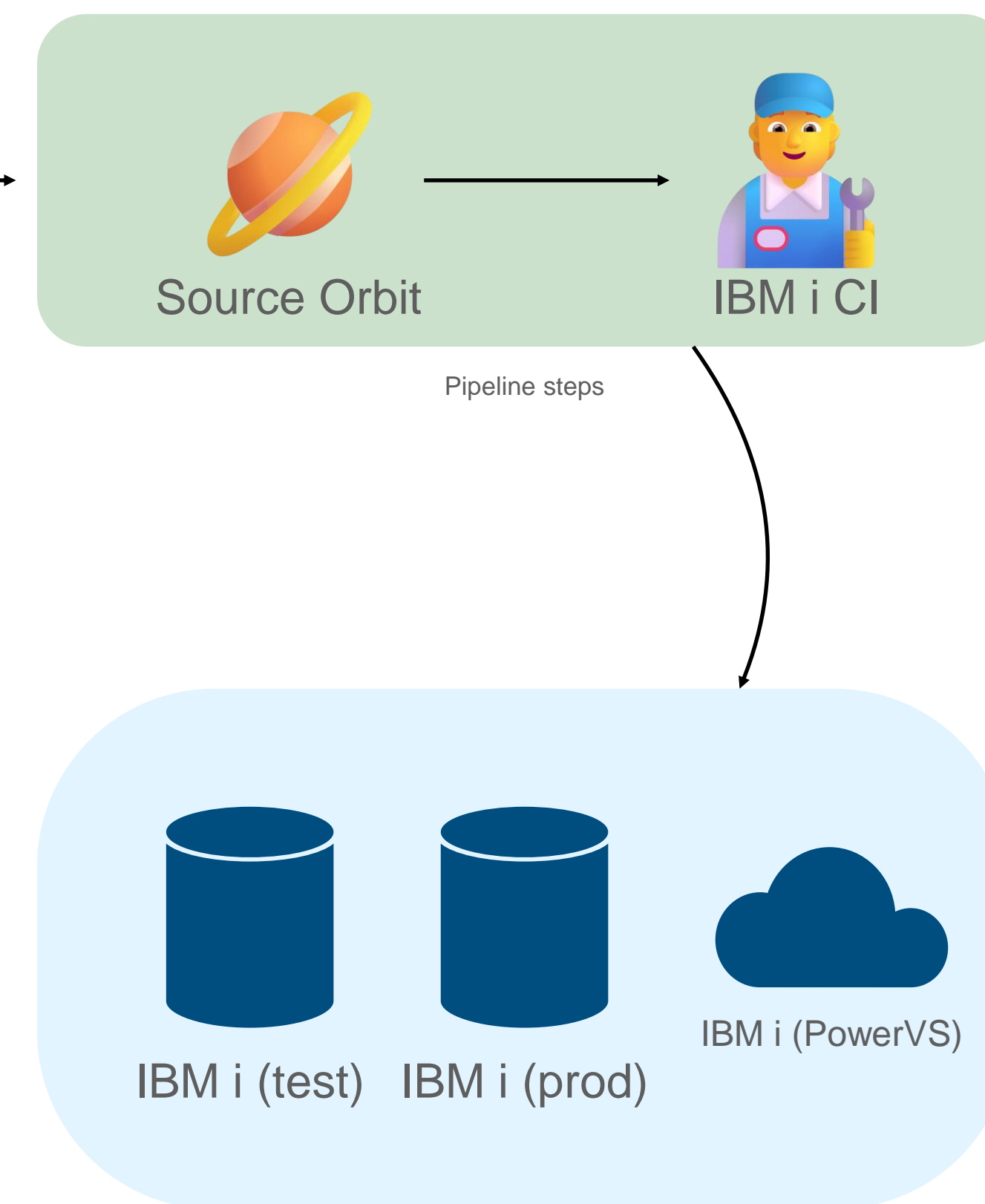
## Development



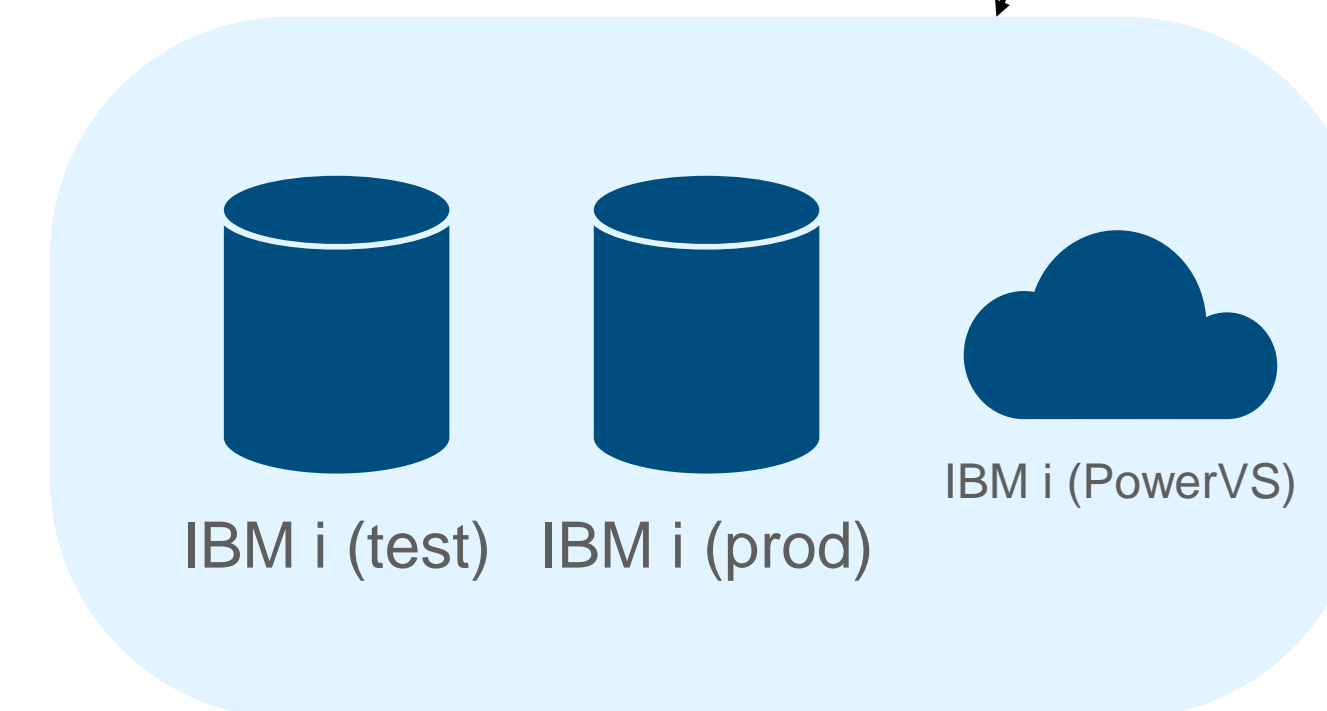
## Source Control



## Automation



## Your systems





# Git hooks

- To install a git hook, just put an executable file in the hooks directory
- The name of the file is the hook
- Example, to install a post-receive hook, do this from the `.git/hooks` directory (depending on how you created the repository, the hooks directory may need to be created)

```
$ touch post-receive  
$ chmod 755 post-receive
```

- Then, populate the file with the commands needed

# git hooks (<https://git-scm.com/docs/githooks>)

- applypatch-msg
- pre-applypatch
- post-applypatch
- pre-commit
- prepare-commit-msg
- commit-msg
- post-commit
- pre-rebase
- post-checkout
- post-merge
- pre-push
- pre-receive
- update
- post-receive
- post-update
- push-to-checkout
- pre-auto-gc
- post-rewrite
- rebase

```
BASE_COMPILE_FLAGS=STGM DL(*INHERIT) OPTION(*NOUNREF) DBGVIEW(*LIST) TGTCCSID($(TGTCCSID))
RCFLAGS=$(BASE_COMPILE_FLAGS) INCDIR('$(INCDIR)' '../..../include/') TGTRLS($(TGTRLS))
SQLRCFLAGS=RP GPP OPT(*LVL2) COMPILEOPT('$(BASE_COMPILE_FLAGS) INCDIR(''$(INCDIR)'' ''../..../include/'') ') TGTRLS($(TGTRLS))
BINDFLAGS=ACTGRP(*CALLER) BNDSRVPGM($(BIN_LIB)/GREETING $(ILEASTIC_LIB)/ILEASTIC) STGM DL(*INHERIT)
```

```
.SUFFIXES: .rpgmod .sqlrpgmod
```

```
# suffix rules
```

```
.rpgmod:
```

```
system -i "CHGATR OBJ('$<') ATR(*CCSID) VALUE($(SOURCE_CCSID))"
```

```
system -iK "CRTRPGMOD $(BIN_LIB)/$@ SRCSTMF('$<') $(RCFLAGS)"
```

```
.sqlrpgmod:
```

```
system -i "CHGATR OBJ('$<') ATR(*CCSID) VALUE($(SOURCE_CCSID))"
```

```
system -iK "CRTSQLRPGI OBJ($(BIN_LIB)/$@) OBJTYPE(*MODULE) SRCSTMF('$<') $(SQLRCFLAGS)"
```

```
OBJECTS = greetingws
```

```
all: compile bind clean
```

```
compile: $(OBJECTS)
```

```
bind:
```

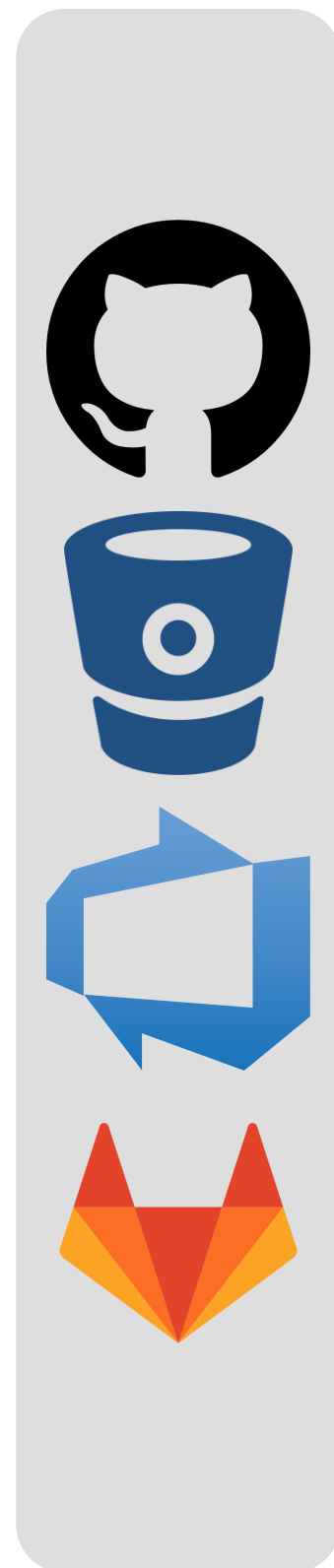
```
system "CRTPGM PGM($(BIN_LIB)/greetingws) $(BINDFLAGS)"
```

```
clean:
```

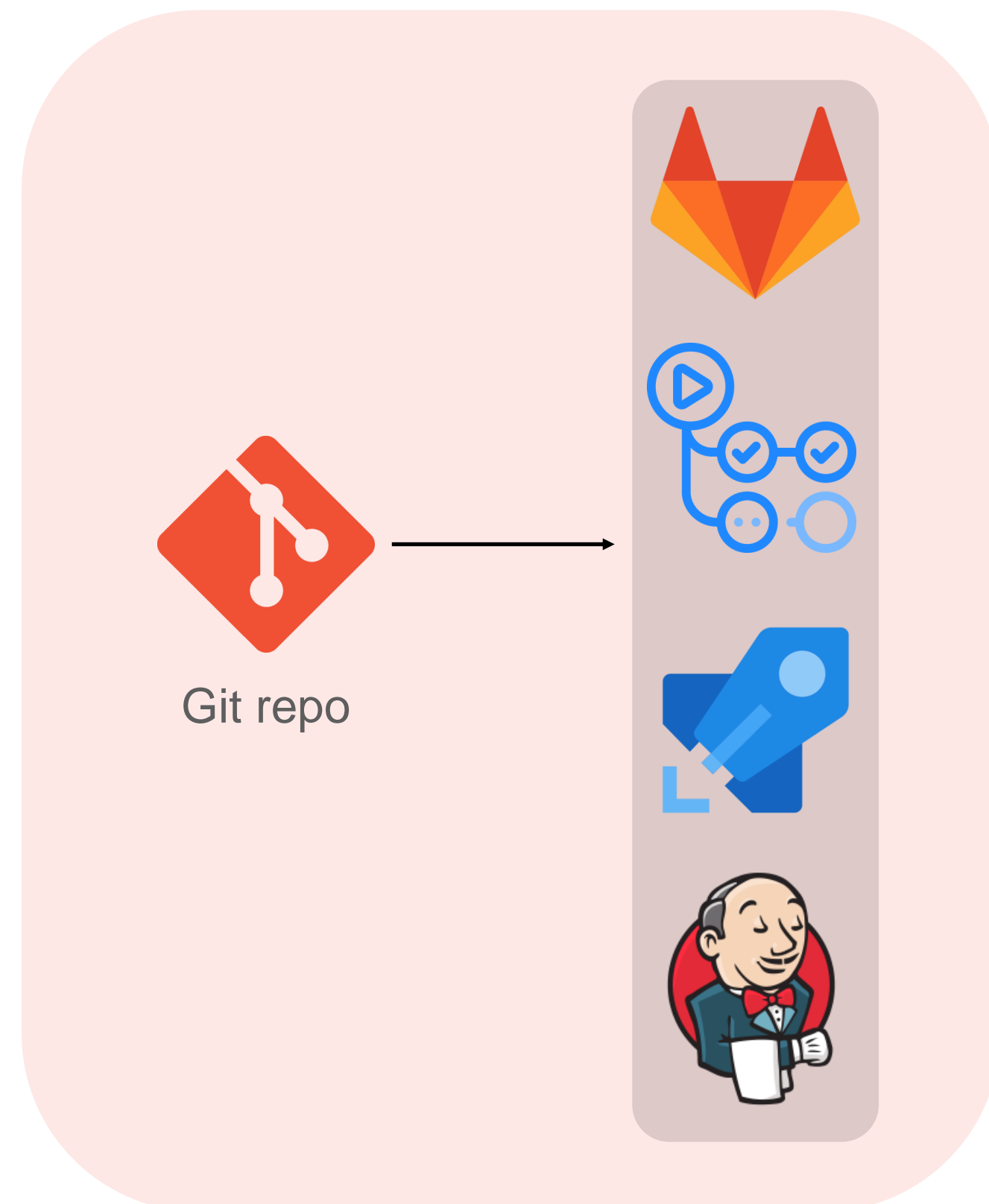
```
-system -i "DLTOBJ $(BIN_LIB)/greetingws OBJTYPE(*MODULE) RMVMSG(*YES)"
```

# Git tooling and automation

Repo hosts



Source Control



- Repository and user management
- Integrated code management and code review tooling
- **Full customisable CI/CD environments**
- Integrates nicely with IBM i via SSH

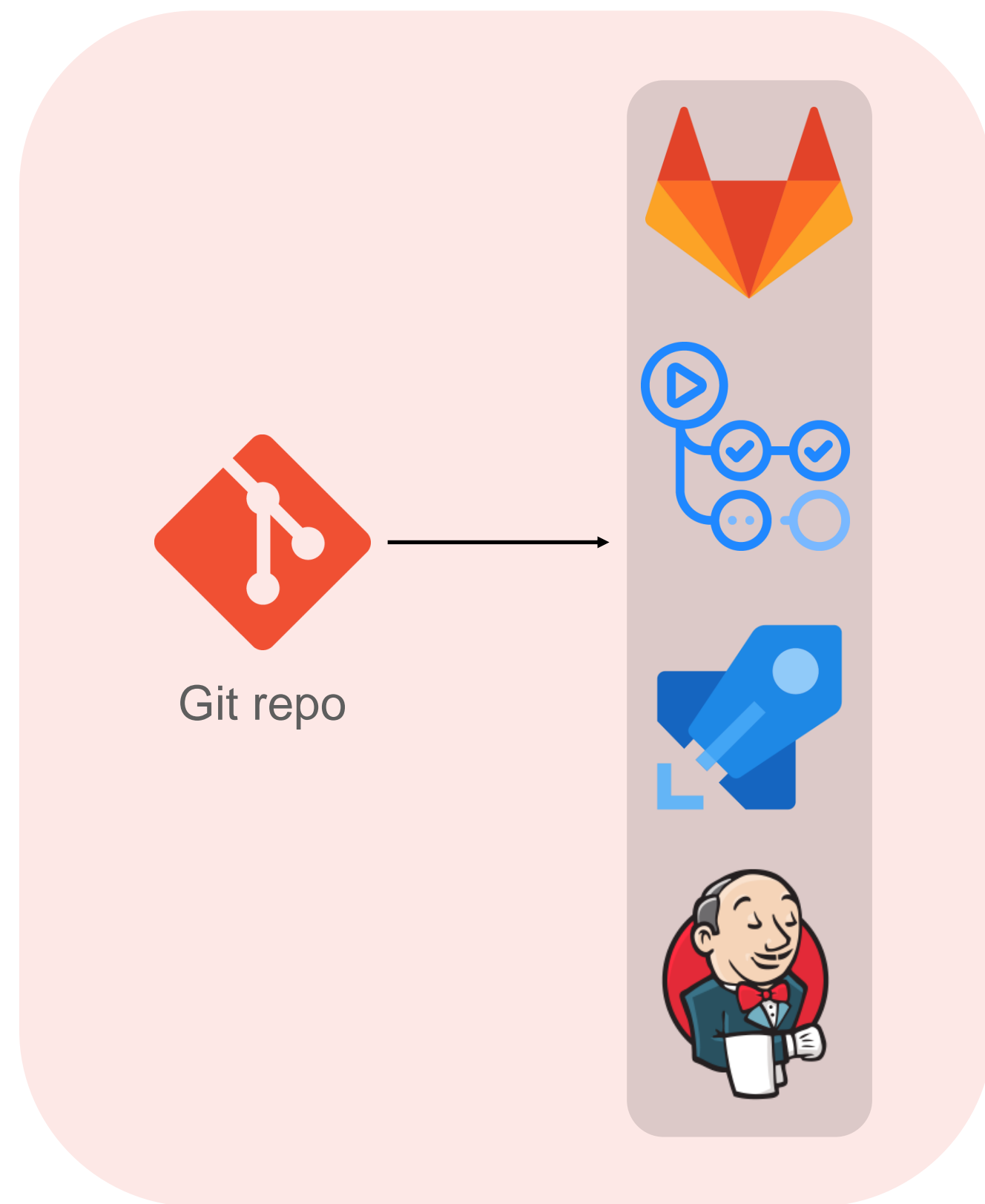
# Leverage Webhooks from git server

The screenshot shows the GitBucket interface for a repository named 'aecspades / arcad-example7'. The top navigation bar includes 'Find a repository', 'Pull requests', 'Issues', and 'Snippets'. The left sidebar contains navigation options: Files, Branches (3), Releases (1), Issues, Pull requests, Labels, Priorities, Milestones, Wiki, and Settings. The main content area is titled 'Webhooks' and contains the following text: 'Webhooks notify external services when certain events occur within this repository. When any of the specified events occur, GitBucket will send a POST request to all of the endpoints (URLs) you provide. Learn more about this feature on the [GitBucket Wiki](#).' Below this text is a green 'Add webhook' button. A single webhook is listed with the URL 'https://10.3.29.100:5252/webhook/v3/AX7GBK (push)' and edit/delete icons.



# Automation steps

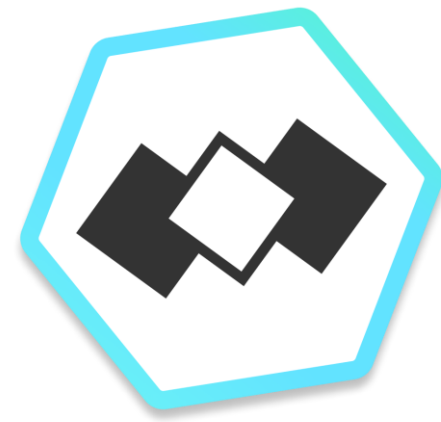
## Source Control & Automation



GitLab	.gitlab-ci.yml
Azure DevOps	azure-pipeline.yml
GitHub	anything.yml
Jenkins	Jenkinsfile

yml can also be yaml

# Tools available



Code for IBM i



Source Orbit



IBM i CI



Better Object Builder  
for IBM i

# **Source Orbit**

**ILE dependency analysis**

# Source Orbit

## What does it do?

- It's a CLI tool
- Build dependency lists for RPGLE, DDS, SQL, CL, etc
- Generate impact analysis information
- Create scripts to automate builds of your application code
- Cleans up your repository
- It's open-source!

```
ics — zsh — 111x30
barry@Liams-MBP ics % so -h

-d <dir>
--cwd <dir>      To see the directory of where source code lives.
                  The default is the current working directory.

-f <relative paths>
--files <relative paths>
                  this option will still scan the entire working
                  directory, but will single out these specific files
                  when generating other files. If no build file is
                  specified, dependencies will be printed.

-bf make|bob|imd|json  Create build files of a specific format
                       Example: -bf make

-bl <name>          Set the BRANCHLIB environment variable based on
                   a user provided branch name, and will write it out.
                   Example: -bl feature/123-cool-idea
                           -bl bug/123-bad-move

Options for project cleanup:

-ar                Run the auto-rename process after scanning all code
                   Ensure it is run inside of source control.
                   Rename program sources to have the '.pgm.' attribute in the name
                   Rename RPGLE copybooks found (based on include statements) to be '.rpgleinc'

-fi                Fix includes for RPGLE sources
                   Ensure it is run inside of source control.
```



# Repository cleanup

The screenshot shows a diff view in Visual Studio Code. The left pane shows the Explorer view with the file structure of the 'BBS400' project. The main editor shows the diff between the local working tree and the repository for the file 'BBSADNUDFR.pgm.rpgle'. The diff highlights several changes to copy statements:

```
10- H/COPY DVBBS400/CURRENTSRC,CBKOPTIMIZ → 10+ /copy 'src/CBKOPTIMIZ.rpgleinc' You, 1 second ago • Uncommitted
20- D/COPY DVBBS400/CURRENTSRC,CBKDTAARA → 20+ /copy 'src/CBKDTAARA.rpgleinc'
30- D/COPY DVBBS400/CURRENTSRC,CBKPCFGDCL → 30+ /copy 'src/CBKPCFGDCL.rpgleinc'
```

The code content is as follows:

```
1 H/TITLE Administration - New User default values
2 H COPYRIGHT('C) 2020 David Asta under MIT License')
3 * SYSTEM : V4R5
4 * PROGRAMMER : David Asta
5 * DATE-WRITTEN: 25/NOV/2020
6 *
7 * This program allows an Administrator user to display/change the
8 * New User default values
9 *****
10 H/COPY DVBBS400/CURRENTSRC,CBKOPTIMIZ → 10+ /copy 'src/CBKOPTIMIZ.rpgleinc' You, 1 second ago • Uncommitted
11 *****
12 * INDICATORS USED:
13 * 80 - *ON turns DSPATR(PR), which protects fields from being change
14 * 81 - CBKPCFGREA CHAIN Not Found
15 *****
16 FBBSADNUDFCF E WORKSTN
17 FPCONFIG UF E K DISK
18 *****
19 * Data structures
20 D/COPY DVBBS400/CURRENTSRC,CBKDTAARA → 20+ /copy 'src/CBKDTAARA.rpgleinc'
21 * Constants
22 D cKeysDft C CONST('F10=Edit F12=Go back')
23 D cKeysEdit C CONST('F10=Confirm Changes F1
24 cel')
25 D cSavedOK C CONST('Configuration was change
26 cessfully.')
27 D cSavedK0 C CONST('There was an error while
28 ting to PCONFIG.')
29 * Variables
30 D/COPY DVBBS400/CURRENTSRC,CBKPCFGDCL → 30+ /copy 'src/CBKPCFGDCL.rpgleinc'
31 D wCfgKey S 6A
32 *****
33 C WRITE HEADER
34 C 80 EVAL KEYSLS = cKeysDft
35 C N80 EVAL KEYSLS = cKeysEdit
36 C WRITE FOOTER
37 C EXFMT BODY
38 C CLEAR MSGLIN
39 C EXSR CheckFkeys
40 *****
41 * Subroutine called automatically at startup
42 *****
43 C *INZSR BEGSR
44 C EVAL SCRSCR = 'BBSADNUDF'
45 * Protect fields from being modified
46 C EVAL *IN80 = *ON
47 * Get values from PCONFIG and show them on screen
```

Show code in a repository where the copy statements have been corrected



# Impact Analysis

worksofliam / ibmi-company\_system-rmake

Code Pull requests 1 Actions Projects Wiki Security Insights Settings

← Impact analysis

Update utils.sqlrpgle #1 Re-run all jobs

Summary

Jobs

- Code scan (18.x)

Run details

- Usage
- Workflow file

Triggered via pull request 2 hours ago

Job	Status	Total duration	Artifacts
worksofliam opened #2 test/utils_impact	Success	22s	-

impact.yaml  
on: pull\_request

Matrix: Code scan

- 1 job completed

Show all jobs

Code scan (18.x) summary

### Impact Analysis

Touched objects:

- UTILS.MODULE : qrpglesrc/utils.sqlrpgle

#### UTILS.MODULE

- UTILS.MODULE ( qrpglesrc/utils.sqlrpgle )
  - UTILS.SRVPGM ( qsrvsrc/utils.bnd )
    - DEPTS.PGM ( qrpglesrc/depts.pgm.sqlrpgle )
    - \$(APP\_BNDDIR).BNDDIR (no source)

Summary

Jobs

- Code scan (18.x)

Run details

- Usage
- Workflow file

### Code scan (18.x) summary

### Impact Analysis

Touched objects:

- BANKING.MODULE : qrpglesrc/banking.sqlrpgle
- DEPTS.PGM : qrpglesrc/depts.pgm.sqlrpgle
- UTILS.MODULE : qrpglesrc/utils.sqlrpgle
- UTILS.SRVPGM : qsrvsrc/utils.bnd

#### BANKING.MODULE

- BANKING.MODULE ( qrpglesrc/banking.sqlrpgle )
  - BANKING.SRVPGM (no source)
    - \$(APP\_BNDDIR).BNDDIR (no source)

#### DEPTS.PGM

- DEPTS.PGM ( qrpglesrc/depts.pgm.sqlrpgle )

Changes to this object have no impact.

#### UTILS.MODULE

- UTILS.MODULE ( qrpglesrc/utils.sqlrpgle )
  - UTILS.SRVPGM ( qsrvsrc/utils.bnd )
    - DEPTS.PGM ( qrpglesrc/depts.pgm.sqlrpgle )
    - \$(APP\_BNDDIR).BNDDIR (no source)

pr.yaml

**name:** Source Orbit Impact Report

**on:**

**pull\_request:**

**types:** [opened]

**jobs:**

**so-impact:**

**runs-on:** ubuntu-latest

**steps:**

- **uses:** actions/checkout@v4

**with:**

**fetch-depth:** 0

- **uses:** actions/setup-node@v3

**with:**

**node-version:** 18

- **run:** npm i -g @ibm/sourceorbit

- **run:** npm i -g @ibm/ibmi-ci

- **name:** Generate impact information

**run:** so -bf imd -l `git diff --name-only origin/main origin/\${GITHUB\_HEAD\_REF}`

- **name:** Adding markdown

**run:** cat impact.md >> \$GITHUB\_STEP\_SUMMARY

# sourceorbit 0.4.25 Latest

IBM i dependency management tool

 Install from the command line:

[Learn more about npm packages](#)

```
$ npm install @ibm/sourceorbit@0.4.25
```

 Install via package.json:

```
"@ibm/sourceorbit": "0.4.25"
```

## Recent Versions


0.4.25 Latest

.↓. 4

## Details

 IBM

 sourceorbit

 Apache License 2.0

 12 dependencies

 [Readme](#)

Last published

**17 minutes ago**

Issues

**1**

Total downloads

**44**

# **ibmi-ci**

**Simple SSH tool**

# CLI usage

```
ici \
```

```
--rcwd "./builds/myproject" \
```

```
--push "." \
```

```
--cmd "/QOpenSys/pkg/bin/gmake BIN_LIB=MYLIB"
```



# Pipeline step

```

jobs:
  so-impact:
    environment: COMMON1
    runs-on: ubuntu-latest
    steps:
      # install SO and ibmi-ci

      - name: Generate makefile
        run: so -bf make -l `git diff --name-only origin/main origin/${GITHUB_HEAD_REF}`

      - name: Deploy to IBM i
        run: |
          ici \
            --cmd "mkdir -p './builds/ics_${GITHUB_HEAD_REF}'" \
            --rcwd './builds/ics_${GITHUB_HEAD_REF}' \
            --push "." \
            --cmd "/QOpenSys/pkg/bin/gmake LIBL='CMPSYS' BIN_LIB=$(so -bl ${GITHUB_HEAD_REF})"
    env:
      IBMI_HOST: ${ secrets.IBMI_HOST }
      IBMI_USER: ${ secrets.IBMI_USER }
      IBMI_PASSWORD: ${ secrets.IBMI_PASSWORD }
      IBMI_SSH_PORT: ${ secrets.IBMI_SSH_PORT }
  
```

# **ibmi-ci** 0.1.1 Latest

IBM i CLI tool

 Install from the command line:

[Learn more about npm packages](#)

```
$ npm install @ibm/ibmi-ci@0.1.1
```

 Install via package.json:

```
"@ibm/ibmi-ci": "0.1.1"
```

## Details

 IBM

 ibmi-ci


 5 dependencies

 Readme

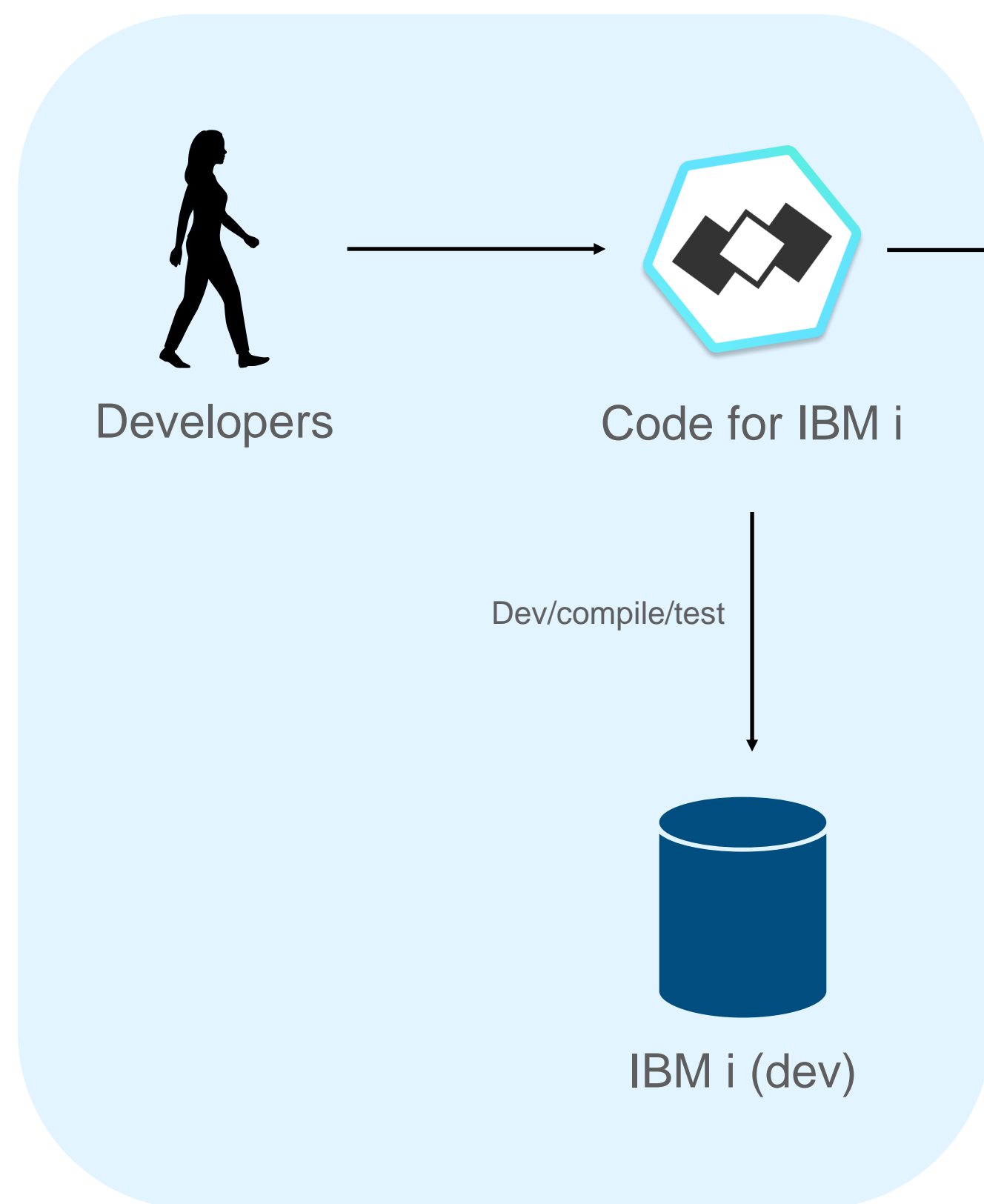
---

Last published

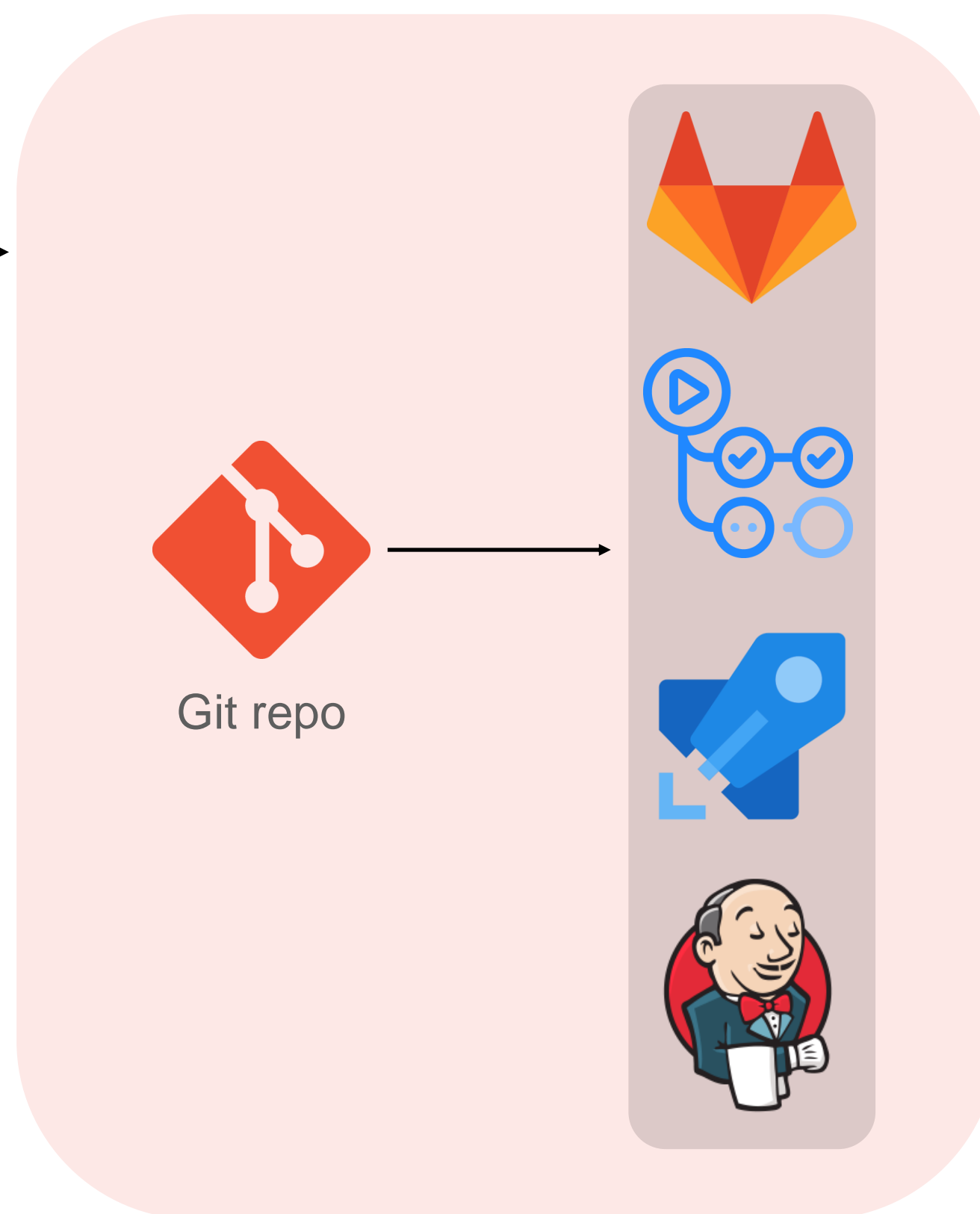
**12 hours ago**

<b>Development</b>	Code for IBM i  RDi	Developer writes and compiles code
<b>Dependency management Impact analysis</b>	Source Orbit	Automated tools to generate build scripts and impact analysis reports automatically
<b>Deployment</b>	IBM i CI	Deploys code to IBM i and runs the build scripts automatically

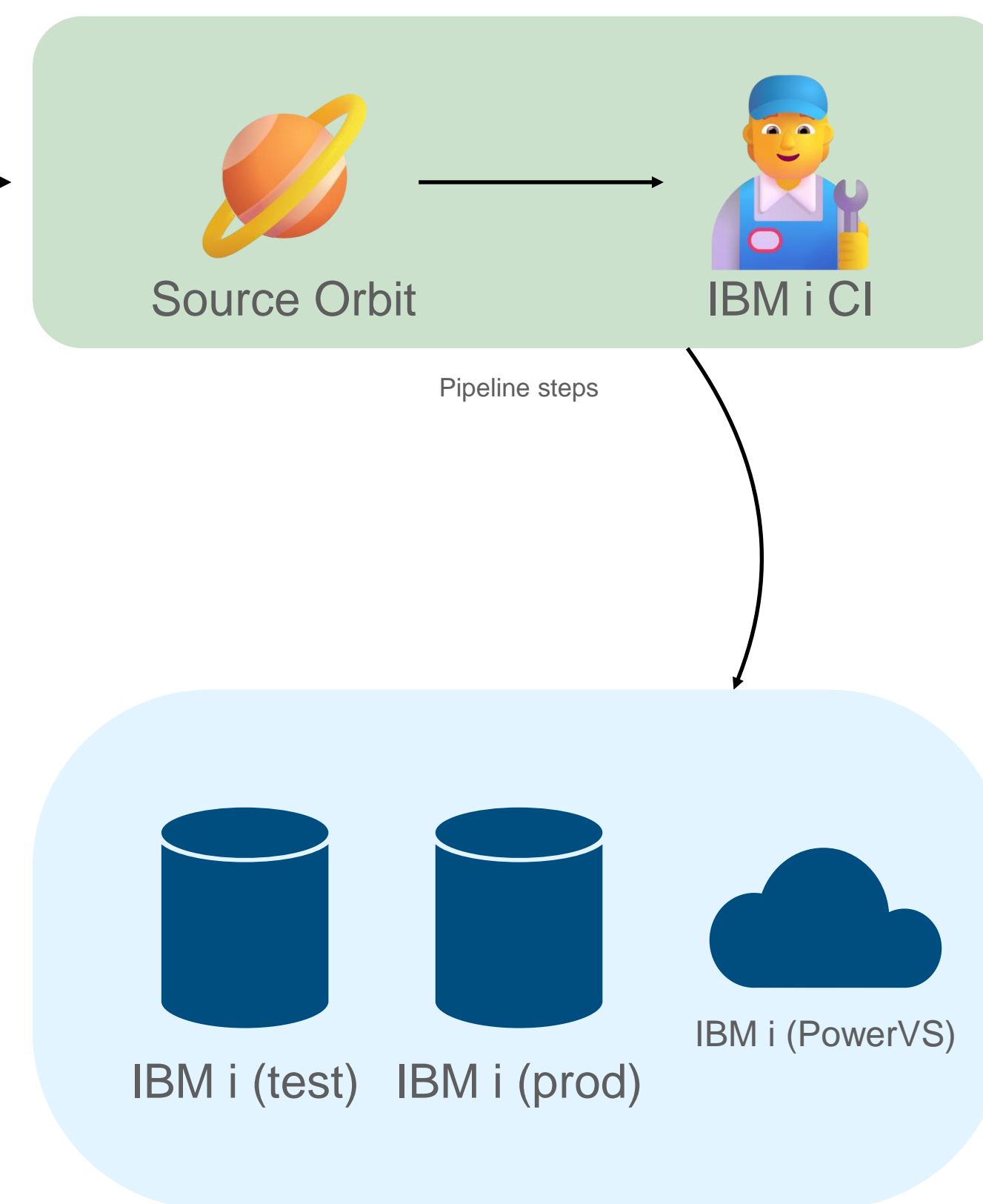
## Development



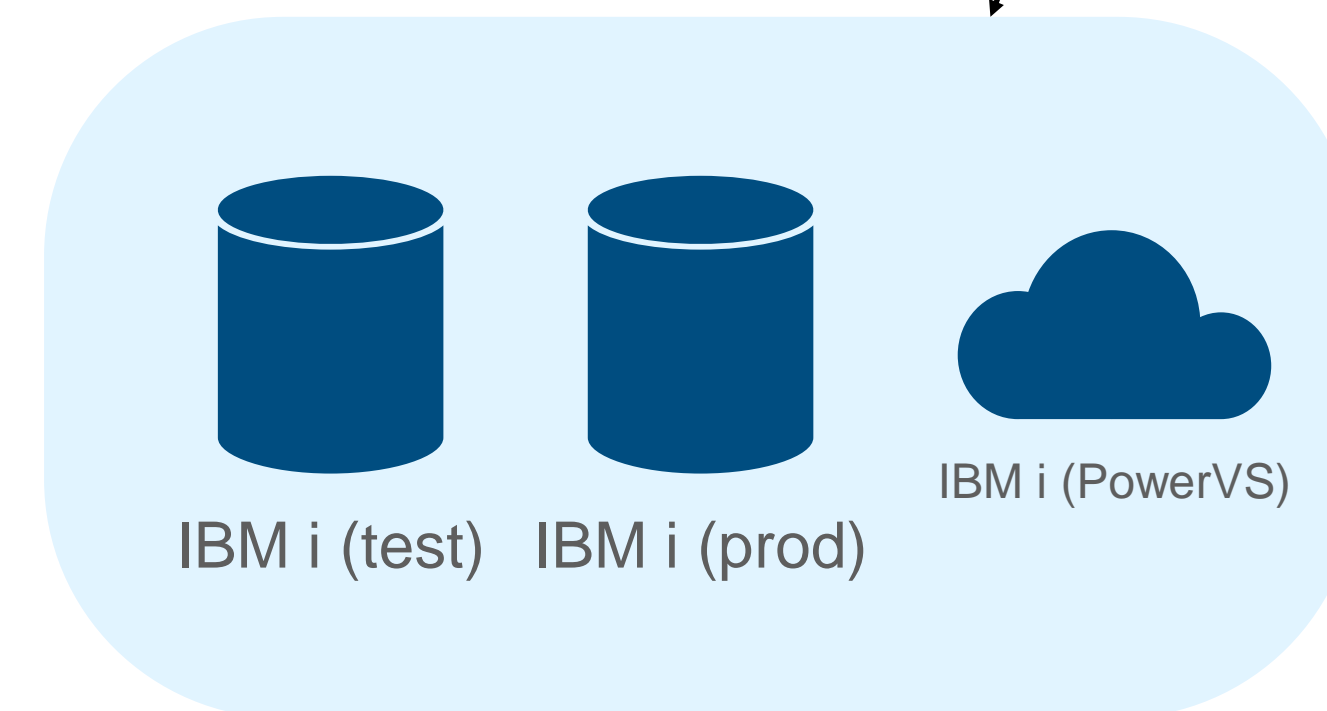
## Source Control & Automation



## Automation



## Your systems



Travis CI



## Environment Variables

Customize your build using environment variables. For secure tips on generating private keys [read our documentation](#)

BASE\_LIB

CMPSYS

Available to all branches

BIN\_LIB

CMPSYS

Only available to the `main` branch

GITHUB\_TOKEN

 .....

Available to all branches

### before\_install:

- echo "//npm.pkg.github.com/:\_authToken=\${GITHUB\_TOKEN}" > .npmrc
- npm config --global set @ibm:registry https://npm.pkg.github.com
- cp .npmrc ~/

### install:

- npm install -g @ibm/sourceorbit@0.4.25

script:

```
# BASE_LIB is always set for the library list  
# We assume BIN_LIB is set based on the branch  
# e.g. main = CMPSYS  
#   dev = CMPSYSDEV  
#   *   = generated by SO
```

```
- export LIBL="$BASE_LIB"  
- export BRANCLIB="$(so -bl ${TRAVIS_BRANCH})"
```

```
# If BIN_LIB is empty, try and use the branch lib
```

```
- |  
  if [[ -z "${BIN_LIB}" ]]; then  
    export BIN_LIB="${BRANCLIB}"  
    export LIBL="${LIBL} ${BIN_LIB}"  
  fi
```

```
# Build specific objects based on branch
```

```
- |  
  if test "$BASE_LIB" = "$BIN_LIB"  
  then  
    $(npm config get prefix)/bin/so -bf make  
  else  
    $(npm config get prefix)/bin/so -bf make -f $(git diff --name-only $TRAVIS_COMMIT_RANGE)  
  fi
```

```
echo gmake library all BIN_LIB="${BIN_LIB}" LIBL="${LIBL}"
```

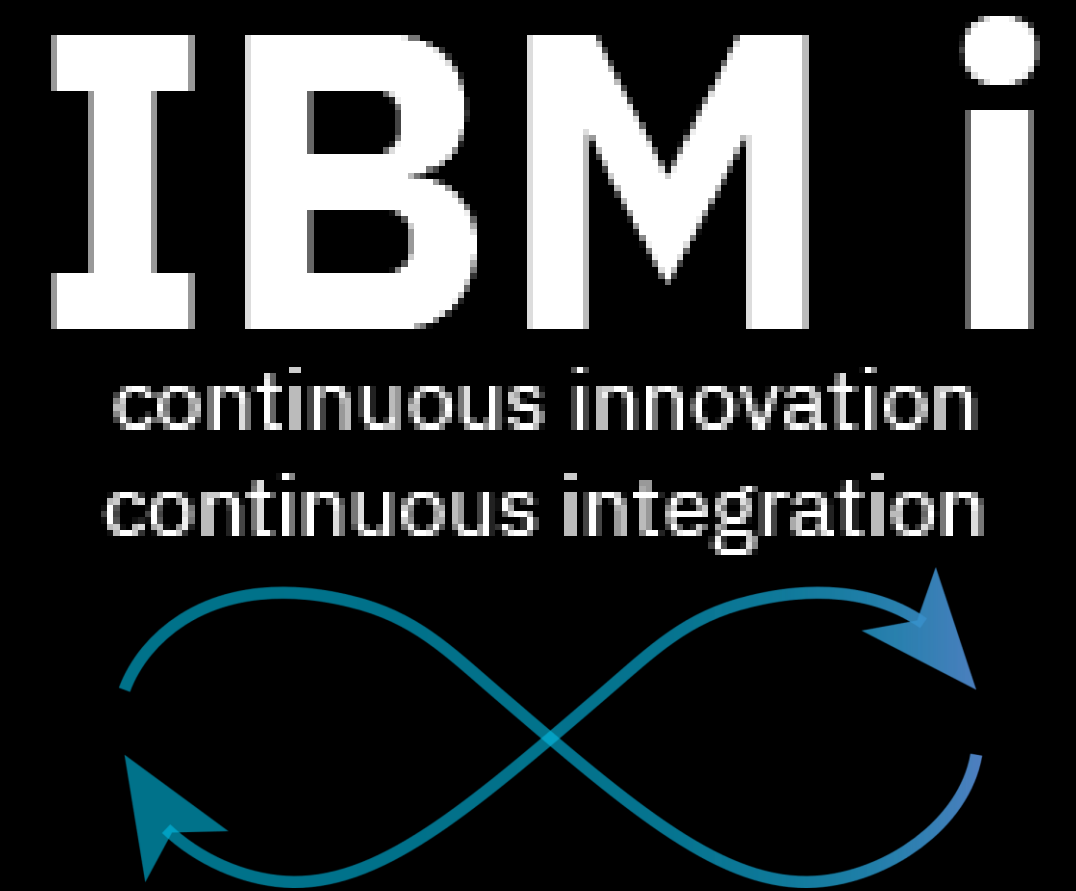
Used to fetch a unique library name based on branch

If building in a branch, then build specific files

Generates a makefile

Gets a list of changes file in this commit

# Showcase



# Impact Analysis



# Open a pull request

The change you just made was written to a new branch named `fix/text_colour`. Create a pull request below to propose these changes. [Learn more about diff comparisons here.](#)

base: main ← compare: fix/text\_colour ✓ **Able to merge.** These branches can be automatically merged.



## Add a title

Update `emps.dspf`

## Add a description

Write Preview

A simple update to function key description text from blue to white.

Create pull request

Remember, contributions to this repository should follow our [GitHub Community Guidelines](#).

Reviewers

No reviews

Assignees

No one—[assign yourself](#)

Labels

None yet

Projects

None yet

Milestone

No milestone

### Development

Use [Closing keywords](#) in the description to automatically close issues

### Helpful resources

[GitHub Community Guidelines](#)

1 commit 1 file changed 1 contributor





Commits on Nov 12, 2023


Update `emps.dspf` Verified `cac56e7`

worksofliam committed now


# Update emps.dspf #20



 Open worksofliam wants to merge 1 commit into `main` from `fix/text_colour` 

 Conversation 0  Commits 1  Checks 0  Files changed 1


 **worksofliam** commented now Member ...





A simple update to function key description text from blue to white.




  Update emps.dspf Verified ✗ cac56e7

Add more commits by pushing to the `fix/text_colour` branch on `IBM/ibmi-company_system`.

 **Some checks were not successful** Hide all checks  
1 queued and 1 action required checks

-  **Source Orbit Impact Report / so-impact (pull\_request)** *Queued — Waiting to run this check...* Details 
-  **DCO** Action required after 1s — DCO Details
-  **This branch has no conflicts with the base branch**  
Merging can be performed automatically.

You can also [open this in GitHub Desktop](#) or view [command line instructions](#).

 **GitHub Actions:** Speed up build times with [larger GitHub-hosted runners](#) ✕

← Back to pull request #20

## ✔ Update emps.dspf #8

Re-run all jobs



### 🏠 Summary

Jobs

✔ so-impact

Run details

🕒 Usage

📄 Workflow file

Triggered via pull request 2 minutes ago	Status	Total duration	Artifacts
worksofliam opened #20 <a href="#">fix/text_colour</a>	<b>Success</b>	<b>18s</b>	—

### so-impact summary ⋮

## Impact Analysis

Touched objects:

- 📁 **EMPS.FILE** : `qddssrc/emps.dspf`

### **EMPS.FILE**

- 📁 **EMPS.FILE** ( `qddssrc/emps.dspf` )
  - 🔨 **EMPLOYEES.PGM** ( `qrpglesrc/employees.pgm.sqlrpgle` )
    - 🔨 **DEPTS.PGM** ( `qrpglesrc/depts.pgm.sqlrpgle` )

name: Source Orbit Impact Report

on:

pull\_request:

types: [opened]

jobs:

so-impact:

runs-on: ubuntu-latest

permissions:

packages: read

issues: write

pull-requests: write

contents: read

steps:

- uses: actions/checkout@v4

with:

fetch-depth: 0

- uses: actions/setup-node@v3

with:

node-version: 20

registry-url: https://npm.pkg.github.com/

- run: npm i -g @ibm/sourceorbit

env:

NODE\_AUTH\_TOKEN: \${secrets.GITHUB\_TOKEN}

- name: Generate impact information

run: so -bf imd -l `git diff --name-only origin/main origin/\${GITHUB\_HEAD\_REF}`

- name: Adding markdown

run: cat impact.md >> \$GITHUB\_STEP\_SUMMARY

- name: Post comment

uses: actions/github-script@v5

with:

script: |

```
github.rest.issues.createComment({
  issue_number: context.issue.number,
  owner: context.repo.owner,
  repo: context.repo.repo,
  body: '👋 A new change report is available based on this PR being created. ...'
})
```



worksofliam commented 4 minutes ago

Member ...

A simple update to function key description text from blue to white.



Update emps.dspf

Verified X cac56e7



github-actions bot commented 4 minutes ago

...

👋 A new change report is available based on this PR being created.

[See summary here.](#)



**Automated builds**



```
jobs:
  so-impact:
    environment: COMMON1
    runs-on: ubuntu-latest
    steps:
      # install SO and ibmi-ci














- name: Generate makefile
  run: so -bf make -l `git diff --name-only origin/main origin/${GITHUB_HEAD_REF}`

- name: Deploy to IBM i
  run: |
    ici \
      --cmd "mkdir -p './builds/ics_${GITHUB_HEAD_REF}'" \
      --rcwd './builds/ics_${GITHUB_HEAD_REF}' \
      --push "." \
      --cmd "/QOpenSys/pkgs/bin/gmake LIBL='CMPSYS' BIN_LIB=$(so -bl ${GITHUB_HEAD_REF})"
env:
  IBMI_HOST: ${ secrets.IBMI_HOST }
  IBMI_USER: ${ secrets.IBMI_USER }
  IBMI_PASSWORD: ${ secrets.IBMI_PASSWORD }
  IBMI_SSH_PORT: ${ secrets.IBMI_SSH_PORT }
```

## Environments / Configure COMMON1

### Environment secrets

Secrets are encrypted environment variables. They are accessible only by GitHub Actions in the context of this environment.

 IBMI_HOST	Updated 20 minutes ago	 
 IBMI_PASSWORD	Updated 10 minutes ago	 
 IBMI_SSH_PORT	Updated 19 minutes ago	 
 IBMI_USER	Updated 11 minutes ago	 
 Add secret		

Multiple environments can be configured in your org/repo



worksofliam

Top Repositories

New

Find a repository...

- codefori/vscode-ibmi
- codefori/vscode-db2i
- codefori/vscode-rpgle
- IBM/sourceorbit
- codefori/rmake
- codefori/docs
- IBM/ibmi-company\_system

Show more

Recent activity

- codefori/vscode-rpgle  
Refactor subroutine under new Code Action
- codefori/vscode-rpgle  
Content assist issues (punctuation characters)
- codefori/vscode-ibmi  
Move CL runner logic to new extension
- barrettotte/vscode-ibmi-languag...  
RPGLE language needs wordPattern to include punctuation

Home

Send feedback Filter 8

remotion-dev/remotion published 2 releases · See more 12 minutes ago

v4.0.95

Fixes a regression which was still not fixed in 4.0.94 (@remotion/zod-types became unexpectedly mandatory)

What's Changed

- Docs: New "terminology" section + mention Serve URL in command line by @Jo...

Read more

Contributors



v4.0.94

What's Changed

Fixes a regression in 4.0.89 where zod and @remotion/zod-types became mandatory.

- @remotion/bundler : Allow missing zod and @zod-types imports when bundling Studio by @JonnyBurger in #...

Read more

Latest changes

- 3 hours ago  
CodeQL 2.16: Python Dependency Installation...
- Yesterday  
Migrating GitHub Classroom Assignment Repository Creatio...
- 5 days ago  
GitHub Issues & Projects – Project status updates & issues...
- 5 days ago  
Copilot – January 18th update  
View changelog →

Explore repositories

- recharts / recharts  
Redefined chart library built with React and D3  
21.8k TypeScript
- HTTPArchive / almanac.httparchive.org  
HTTP Archive's annual "State of the Web" report made by the web community  
584 HTML

Your recovery codes have not been saved in the past year. Make sure you still have them stored somewhere safe by viewing and downloading them again.

### Actions New workflow

#### All workflows

- CodeQL
- Release
- RPM build CI
- Zip dist CI

- Management
- Caches
  - Deployments ↗
  - Attestations ↗
  - Runners

### All workflows Filter workflow runs

Showing runs from all workflows

352 workflow runs		Event ▾	Status ▾	Branch ▾	Actor ▾
✓	<b>Update zip_dist_ci.yaml</b> CodeQL #52: Commit <a href="#">0f2b86e</a> pushed by ThePrez			main	yesterday 1m 37s
✓	<b>Update zip_dist_ci.yaml</b> Zip dist CI #76: Commit <a href="#">0f2b86e</a> pushed by ThePrez			main	yesterday 56s
✓	<b>Update zip_dist_ci.yaml</b> Zip dist CI #75: Pull request <a href="#">#58</a> opened by ThePrez			ThePrez-patch-1	yesterday 22s
✓	<b>Update zip_dist_ci.yaml</b> CodeQL #51: Pull request <a href="#">#58</a> opened by ThePrez			ThePrez-patch-1	yesterday 1m 25s
✓	<b>Rework is_done check when executing prepared statements</b> CodeQL #50: Pull request <a href="#">#57</a> synchronize by ThePrez			fix/isDone	2 days ago 1m 28s
✓	<b>Rework is_done check when executing prepared statements</b> Zip dist CI #74: Pull request <a href="#">#57</a> synchronize by ThePrez			fix/isDone	2 days ago 1m 2s
✓	<b>Rework is_done check when executing prepared statements</b> CodeQL #49: Pull request <a href="#">#57</a> opened by ThePrez			fix/isDone	2 days ago 1m 47s





# Actions

New workflow

## All workflows

CodeQL

Dependabot Updates

Dependency Review

Maven Build

Maven Release

### Management

Caches

Deployments ↗

Attestations ↗

Runners

## All workflows

Showing runs from all workflows

270 workflow runs

✓ PR #40  
CodeQL #96: by SanjulaGanepola

✓ Add SQL, CL, Pool, Connect tests and IN/INOUT/OUT support  
Dependency Review #55: Pull request #40 synchronize by SanjulaGanepola [test/port-more-tests](#)

✗ Add SQL, CL, Pool, Connect tests and IN/INOUT/OUT support  
Maven Build #102: Pull request #40 synchronize by SanjulaGanepola [test/port-more-tests](#)

✓ PR #40  
CodeQL #95: by SanjulaGanepola

✗ Add SQL, CL, Pool, Connect tests and IN/INOUT/OUT support  
Maven Build #101: Pull request #40 synchronize by SanjulaGanepola [test/port-more-tests](#)

✓ Add SQL, CL, Pool, Connect tests and IN/INOUT/OUT support  
Dependency Review #54: Pull request #40 synchronize by SanjulaGanepola [test/port-more-tests](#)



# Dependency Review

✔ No vulnerabilities or license issues or OpenSSF Scorecard issues found.

## Snapshot Warnings

⚠ : No snapshots were found for the head SHA [9a85cf3](#).

Ensure that dependencies are being submitted on PR branches and consider enabling *retry-on-snapshot-warnings*. See [the documentation](#) for more information and troubleshooting advice.

## OpenSSF Scorecard

Package	Version	Score	Details																																																
<a href="#">maven/org.mockito/mockito-core</a>	4.11.0	7.7	<div style="text-align: right;">▼ Details</div> <table border="1"> <thead> <tr> <th>Check</th> <th>Score</th> <th></th> </tr> </thead> <tbody> <tr> <td>Maintained</td> <td>10</td> <td>30 commit(s) and 0 issue activity found in</td> </tr> <tr> <td>Code-Review</td> <td>10</td> <td>all changesets reviewed</td> </tr> <tr> <td>CII-Best-Practices</td> <td>0</td> <td>no effort to earn an OpenSSF best practice</td> </tr> <tr> <td>License</td> <td>10</td> <td>license file detected</td> </tr> <tr> <td>Branch-Protection</td> <td>-1</td> <td>internal error: error during branchesHand</td> </tr> <tr> <td>Signed-Releases</td> <td>-1</td> <td>no releases found</td> </tr> <tr> <td>Security-Policy</td> <td>9</td> <td>security policy file detected</td> </tr> <tr> <td>Dangerous-Workflow</td> <td>10</td> <td>no dangerous workflow patterns detecte</td> </tr> <tr> <td>Token-Permissions</td> <td>10</td> <td>GitHub workflow tokens follow principle</td> </tr> <tr> <td>Vulnerabilities</td> <td>10</td> <td>0 existing vulnerabilities detected</td> </tr> <tr> <td>SAST</td> <td>0</td> <td>SAST tool is not run on all commits -- sco</td> </tr> <tr> <td>Pinned-Dependencies</td> <td>0</td> <td>dependency not pinned by hash detecte</td> </tr> <tr> <td>Fuzzing</td> <td>0</td> <td>project is not fuzzed</td> </tr> <tr> <td>Packaging</td> <td>10</td> <td>packaging workflow detected</td> </tr> <tr> <td>Binary-Artifacts</td> <td>10</td> <td>no binaries found in the repo</td> </tr> </tbody> </table>	Check	Score		Maintained	10	30 commit(s) and 0 issue activity found in	Code-Review	10	all changesets reviewed	CII-Best-Practices	0	no effort to earn an OpenSSF best practice	License	10	license file detected	Branch-Protection	-1	internal error: error during branchesHand	Signed-Releases	-1	no releases found	Security-Policy	9	security policy file detected	Dangerous-Workflow	10	no dangerous workflow patterns detecte	Token-Permissions	10	GitHub workflow tokens follow principle	Vulnerabilities	10	0 existing vulnerabilities detected	SAST	0	SAST tool is not run on all commits -- sco	Pinned-Dependencies	0	dependency not pinned by hash detecte	Fuzzing	0	project is not fuzzed	Packaging	10	packaging workflow detected	Binary-Artifacts	10	no binaries found in the repo
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Thank you!!