

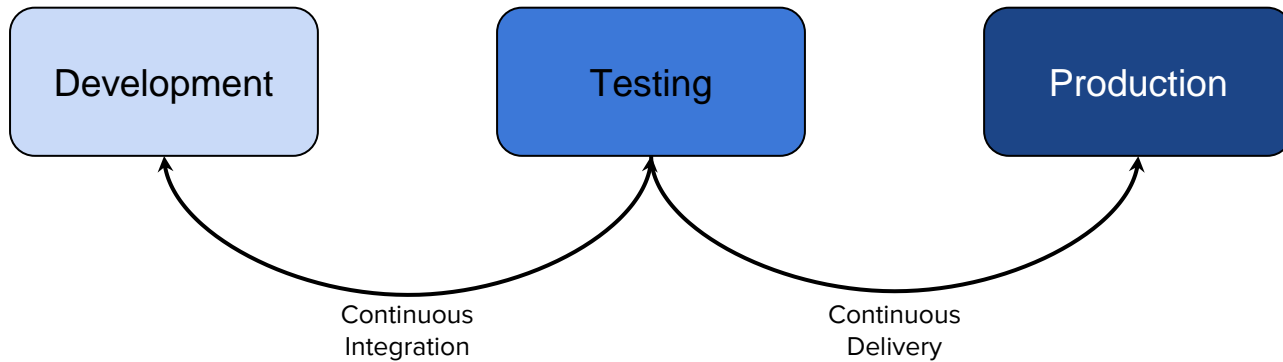
CI/CD Workflow for RPG

Liam Allan

Agenda

- Why maintain your code with git
- IDEs and their support for RPG/ILE development with git
- Introduction to gitCM.
- Introduction to GitHub
- Introduction to CI/CD
- Using GitHub
 - Managing branches
 - Code reviews
 - Automated deployment

CI/CD visualised



Why manage your source code with git?

True source version control

Ability rollback source code

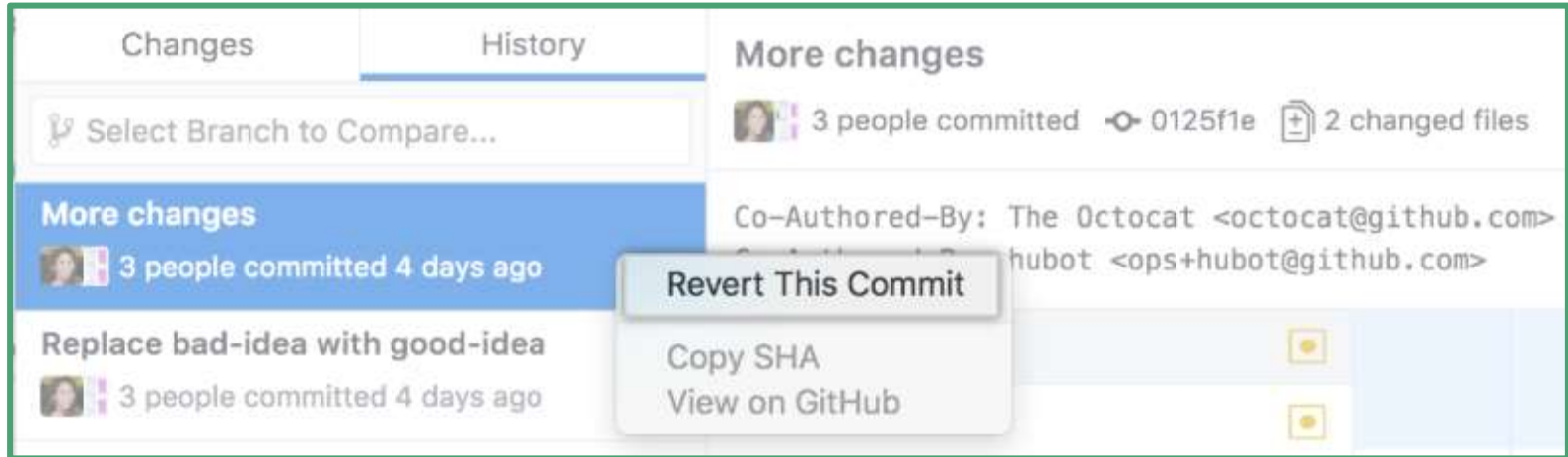
Distributed environment

1. True source version control

The screenshot displays a Git web interface for a repository named 'wrkifspdm'. The current commit is by 'worksoftliam' from 4 days ago. The interface shows two files with changes:

- File 1: src\ifspdx.dspf**
 - Line 29: `COLOR(MFI)`
 - Line 30: `2 'Type options, press Enter.'`
 - Line 31: `COLOR(BLUI)`
 - Line 32: `6 1'2=Edit 5=Display'` (Change: -)
 - Line 33: `6 3'2=Edit -` (Change: +)
 - Line 34: `5=Display -` (Change: +)
 - Line 35: `14=Compile -` (Change: +)
 - Line 36: `15=Create module...` (Change: +)
 - Line 37: `COLOR(BLUI)`
 - Line 38: `3 2'Directory '` (Change: +)
 - Line 39: `A @DIR 184 0 3 25 2*` (Change: A)
- File 2: src\wrkifspdx.rpgle**
 - Line 121: `Iter;`
 - Line 122: `Endif;`
 - Line 123: `123`
 - Line 124: `index = %Scan(';',StreamFiles(rnn),Name);` (Change: +)
 - Line 125: `if (index > 0);` (Change: +)
 - Line 126: `name = %Subst(StreamFiles(rnn),Name:index-1);` (Change: +)
 - Line 127: `Extension = %Subst(StreamFiles(rnn),Name:index+1);` (Change: +)
 - Line 128: `also;` (Change: +)

2. Ability to rollback source code

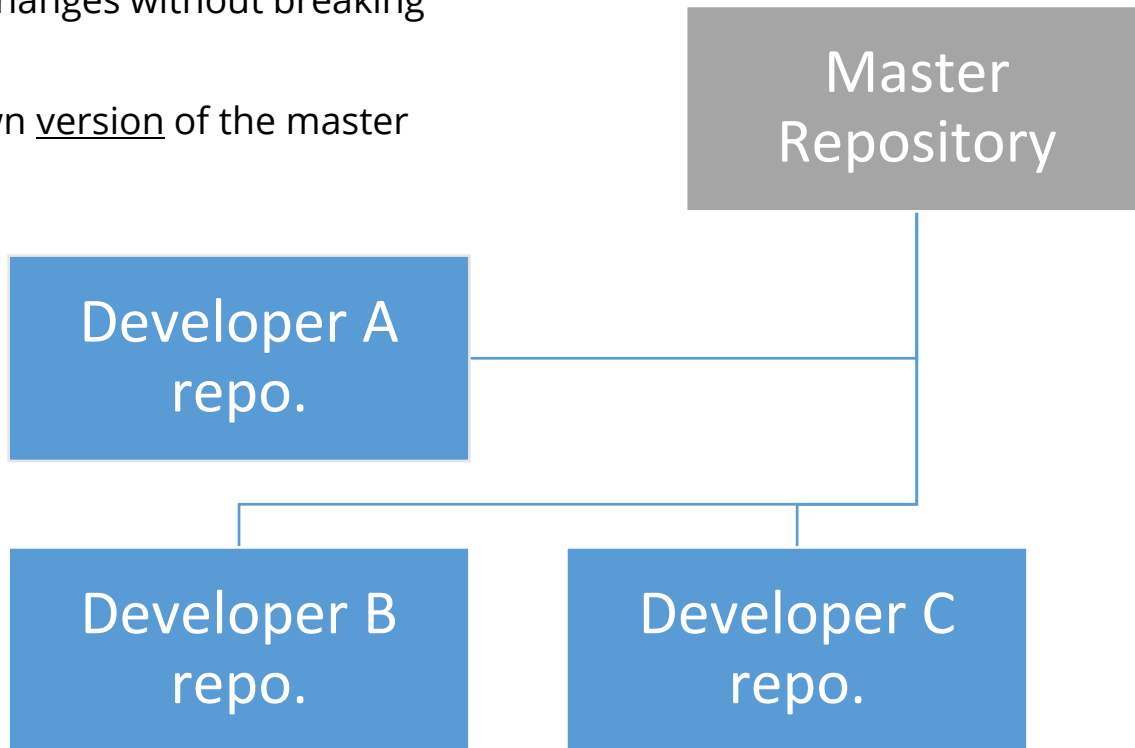


The screenshot displays the GitHub commit history interface. At the top, there are tabs for "Changes" and "History", with "History" being the active tab. Below the tabs is a search bar labeled "Select Branch to Compare...". To the right, there is a summary for the current commit: "More changes", "3 people committed", a commit hash "0125f1e", and "2 changed files". Below this, the commit message is visible: "Co-Authored-By: The Octocat <octocat@github.com>" and "hubot <ops+hubot@github.com>". A context menu is open over one of the commit entries, showing options: "Revert This Commit", "Copy SHA", and "View on GitHub". The commit entry itself shows the title "Replace bad-idea with good-idea" and "3 people committed 4 days ago".

3. Distributed environment

Allows developers to make changes without breaking the rest of the application

Each developer gets their own version of the master repo

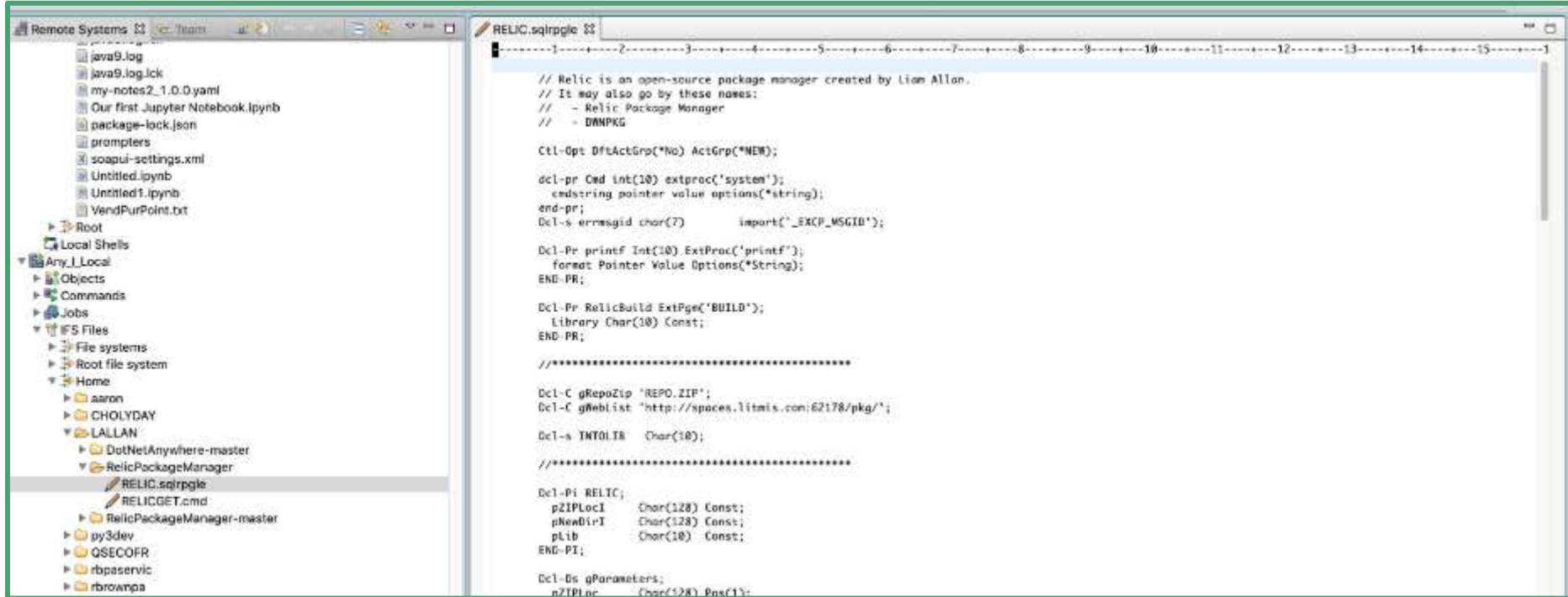


IDEs and their support

IDEs and their support

- Rational Developer for i
- ILEditor
- Visual Studio Code

Rational Developer for i



ILEditor

The screenshot displays the ILEditor application window. The main area shows a COBOL program listing with the following structure:

```
1 FFNAME IF E DISK
2 FLNAME IF E DISK
3 FCUSTOMERO F 78 DISK A
4 I*
5 I 'ABCDEFGHIJKLMNPOQRS- C UP
6 I 'TUVWXYZ'
7 I 'abcdefghijklmnoqrs- C LO
8 I 'tuvxyz'
9 I*
10 I DS
11 I
12 I I 64 B 1 66 CUSTNM
13 I 3 20FLDLN
14 C* * HELLO
15 C N77 Z-ADD1 CUSTNO 90 77 * UPDATE TIME LCV
16 C*
17 C CUSTNO DOWLE9999 * FOR EACH DAY-O-WK
18 C*
19 C MOVE *BLANKS CNAME
20 C*
21 C Z-ADD1 BGNNBR 60 * WORLD
22 C Z-ADD4724 ENDNBR 60 * START LCV TIMEDAY
23 C Z-ADD8 RTVNUM 60 * START LCV TIMEDAY
24 C CALL 'RTRAND' * GET RANDOM NUM
25 C PARM BGNNBR
26 C PARM ENDNBR
27 C PARM RTVNUM
28 C*
29 C RTVNUM CHAINLNAME 79
30 C UP:LO XLATELASTNM:2 LASTNM
31 C NOVELLASTNM CNAME
32 C*
33 C Z-ADD1369 ENDNBR * START LCV TIMEDAY
34 C RTVNUM
```

On the right side, there are two panels. The top panel, titled 'FILE1400 (Listing)', shows a list of files with columns for Name, Language, and Type. The bottom panel, titled 'ITS Etwave', shows a tree view of the file system structure.

The task bar at the bottom indicates the system time is 7:09 on 12/08/2019.

ILEditor 2

The screenshot displays the ILEditor 2 application interface. On the left is a sidebar with a tree view showing the project structure, including folders like 'Resources', 'System', 'mscorlib', and 'mscorlib.resources'. The main area is titled 'mscorlib.dll' and contains assembly code with line numbers 1 through 27. A tooltip is visible over line 17, showing the instruction 'ldobj float, System.Collections.Generic.Dictionary`2, System.Collections.Generic.Dictionary`2'. Below the code editor is a 'References' section with a search bar and a list of references, including 'mscorlib.dll' and 'System.Collections.Generic.dll'. The bottom right corner shows a 'References' pane with a list of references and their versions.

```
1 .method public static void Main()
2 {
3     Console.WriteLine("IL Editor 2");
4     Console.WriteLine("Copyright (c) Microsoft Corporation. All rights reserved.");
5     Console.WriteLine("http://msdn.microsoft.com/en-us/library/ms172196.aspx");
6     Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
7     Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
8     Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
9     Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
10    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
11    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
12    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
13    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
14    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
15    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
16    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
17    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
18    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
19    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
20    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
21    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
22    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
23    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
24    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
25    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
26    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
27    Console.WriteLine("http://www.microsoft.com/presspass/presskit/2007/07.mspx#MSDN_IL_Editor_2");
}
```

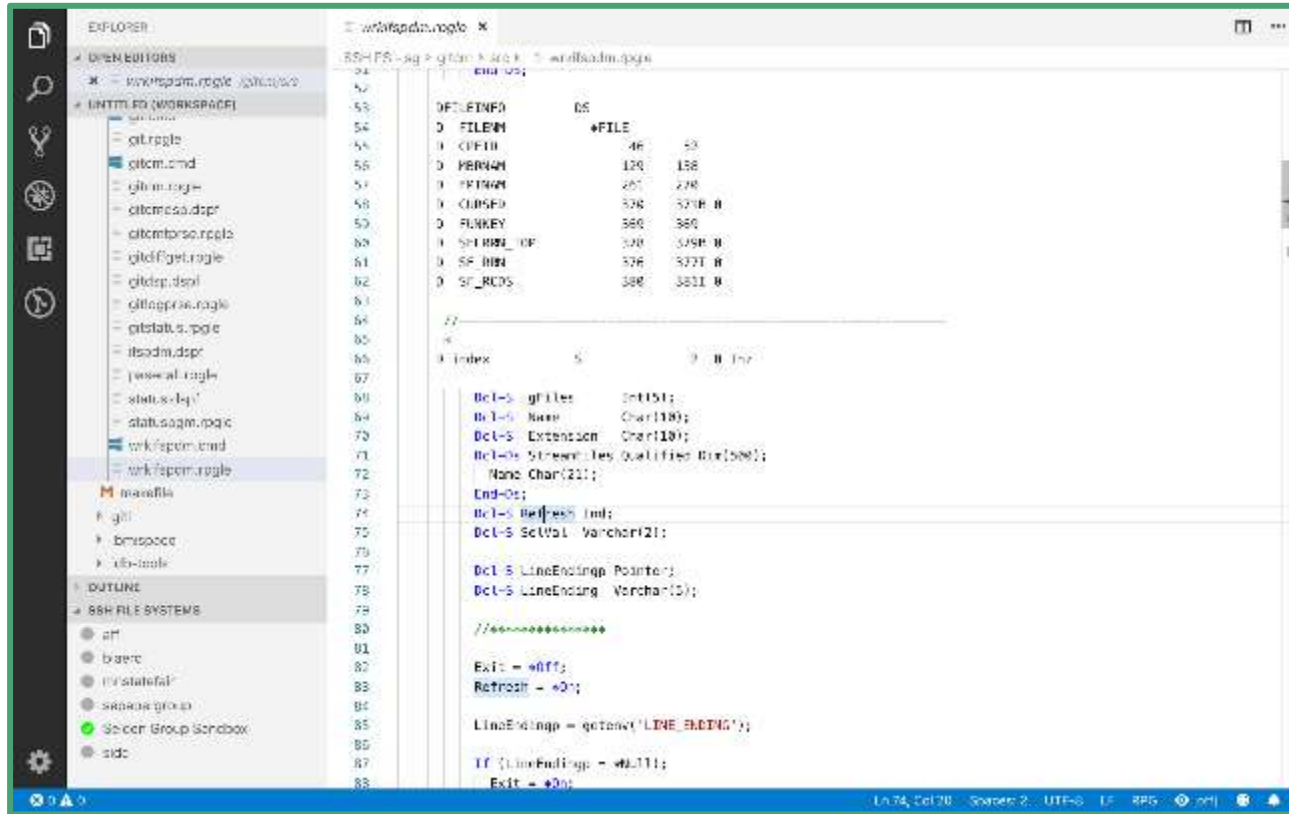
References:

- mscorlib.dll (System.Collections.Generic)
- System.Collections.Generic.dll (System.Collections.Generic)

References:

- mscorlib.dll (System.Collections.Generic) 1.0.0.0
- System.Collections.Generic.dll (System.Collections.Generic) 1.0.0.0

Visual Studio Code



IDE comparison

Rational Developer for i

- IFS Browser
- Compiles from the IFS
- Error listing

ILEditor

- IFS Browser
- Compiles from the IFS
- Error listing
- **Free**

Visual Studio Code

- IFS Browser (using SSH FS)
- Built in terminal for SSH
- Spool file output from compile when using system
- **Free**

ILEditor 2

- IFS Browser
- Compiles from the IFS
- Error listing
- Has built in git client for remote

Introduction to gitCM

<https://github.com/worksofbarry/gitcm>

What is gitCM

- A 5250 git client
 - Browse history, see diffs, make commits, etc
- WRKIFSPDM
 - Imagine work member PDM, but for the IFS
 - Yes, that means you can use SEU.

gitCM

```
Git Change Management

Select one of the following:

1. WRKIFSPDM
2. Git

_
F12=Back

MA  A  MW  20/007
```

gitCM git client

```

                                     Display Commits
                                     14:52:45  8/03/19
5=View 7=Reset branch to here

Sel  Commit      User           Date           Text
_   02fab0d    Liam Allan <mrliamallan@l  Tue Jul 30 18:20:49 2019  Working copy temp for non-ifs
_   9ff30e5    Liam Allan <mrliamallan@l  Tue Jul 30 16:36:12 2019  Start on compile from wrkifspdm
_   8abdb44    Liam Allan <mrliamallan@l  Tue Jul 30 12:31:59 2019  Better support for different line endings
_   a248318    Liam Allan <mrliamallan@l  Sun Jul 28 12:37:18 2019  Fix status add all and pull
_   c6a7829    Liam Allan <mrliamallan@l  Fri Jul 26 17:30:14 2019  Re-add F4 to add all in status program
_   3e3e898    Liam Allan <mrliamallan@l  Fri Jul 26 15:23:53 2019  Move columns on wrkifspdm
_   8b70eff    Liam Allan <mrliamallan@l  Fri Jul 26 15:20:56 2019  Add gitcm command
_   0b7f0ce    Liam Allan <mrliamallan@l  Fri Jul 26 14:55:05 2019  Make wrkifspdm two character input
_   0efb3d6    Liam Allan <mrliamallan@l  Thu Jul 25 20:31:04 2019  Correct directory field on wrkifspdm
_   ca2f4eb    Liam Allan <mrliamallan@l  Thu Jul 25 19:34:56 2019  Change diff screen to be ds3
_   748941b    Liam Allan <mrliamallan@l  Thu Jul 25 19:13:18 2019  Use correct constant for diffview
_   30ba4c9    Liam Allan <mrliamallan@l  Thu Jul 25 18:55:23 2019  Recreate diff screen with better program
_   9a18c26    Liam Allan <mrliamallan@l  Thu Jul 25 18:45:17 2019  Rewrite commitinf program
_   1162481    Liam Allan <mrliamallan@l  Thu Jul 25 17:57:27 2019  Rewrite status page with brand new program
_   2d64d02    Liam Allan <mrliamallan@l  Thu Jul 25 17:30:49 2019  Rewrite git main page with brand new program
_   34cc90b    Liam Allan <mrliamallan@l  Thu Jul 25 16:21:02 2019  Remake wrkifspdm with a brand new program

F3=Exit F6=Status
M8  A      MW      07/003
```

gitCM git client (commit view)

```
Changes at commit

5=View difference

Commit 9ff30e5 Start on compile from wrkifspdm
Tue Jul 30 16:36:12 2019 -0400

Sel Path
- src/ifspdm.dspf
- src/wrkifspdm.rpgle
```

MA A MW 10/003

gitCM git client (diff)

```
Changes at commit
Commit 8ff30e5 src/ifspdm.dspf

Line
e -29,7 +29,10 @@
_
A          COLOR (WHT)
A          5 2'Type options, press Enter.'
A          COLOR (BLU)
A          6 3'2=Edit    5=Display'
A          6 3'2=Edit  -
A          5=Display  -
A          14=Compile -
A          15=Create module...'
A          COLOR (BLU)
A          3 2'Directory . . . . .'
A          @XDIR      10A 0 3 25

MA  A          MWJ 06/003
```

gitCM git client (status)

```
                                Status

5=Diff A=Add R=Reset U=Undo

Sel  Path
-    src/gitdiffget.rpgle (re-changed)
-    src/status.dspf
-    src/wrkifspdm.rpgle (re-changed)

F4=Add all F5=Refresh F6=Commit F9=Push F10=Fetch/Pull F12=Back

ME  A                               MW                                07/002
```

WRKIFSPDM

```
Work IFS PDM (WRKIFSPDM)
Type choices, press Enter.
Source directory . . . . . _____ Character value
Bottom
F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
F24=More keys
MA  A  MW  05/037
```

WRKIFSPDM

```
Work IFS PDM
Directory . . . . QRPGRSRC
Type options, press Enter.
 2=Edit  5=Display 14=Compile 15=Create module...

Opt  Name
___  bcust.rpg
___  bflight.rpg
___  frs000.rpg
___  frs001.rpg
___  frs001t.rpg
___  frs001u.rpg
___  frs001u2.rpg
___  frs001x.rpg
___  frs002.rpg
___  frs003.rpg

F12=Back

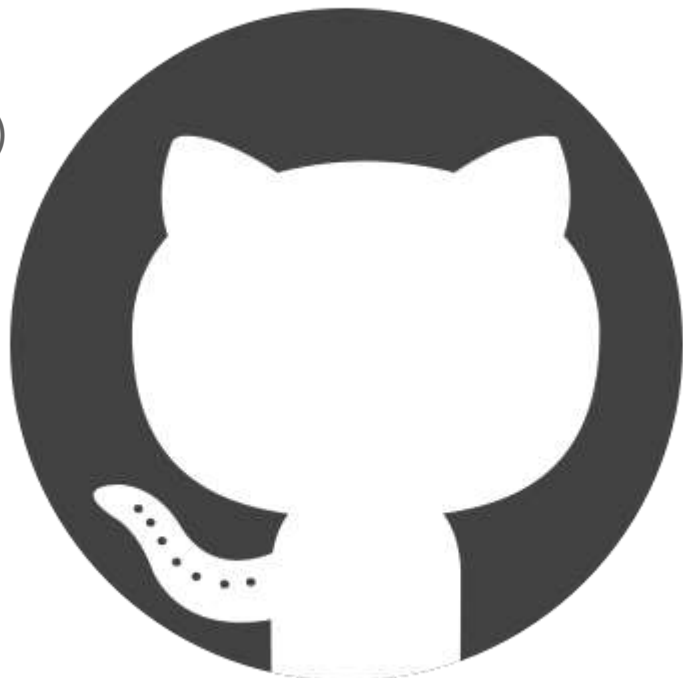
MA  A  MW  09/004
```

Intro to GitHub

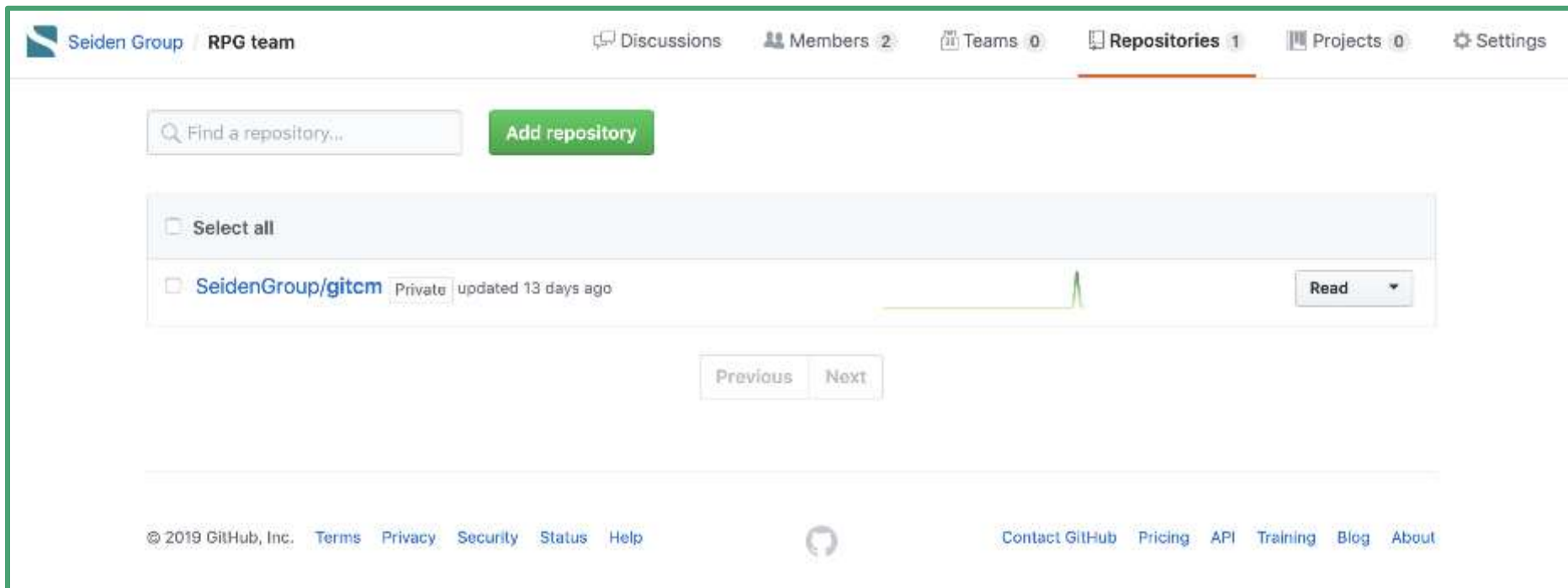


Intro to GitHub

- Public & private cloud git repositories
- GitHub Enterprise (on-prem, \$\$\$)
- Interactive management of teams and git repos
- Interactive code reviews (via branch pull-requests)
- Integrates well into application deployment



Interactive management of teams



The screenshot displays the GitHub interface for the 'Seiden Group' team. At the top, navigation links include 'Discussions', 'Members 2', 'Teams 0', 'Repositories 1', 'Projects 0', and 'Settings'. Below the navigation bar, there is a search input field labeled 'Find a repository...' and a green 'Add repository' button. A list of repositories is shown, with the first entry being 'SeidenGroup/gitcm', which is private and was updated 13 days ago. A 'Read' dropdown menu is visible next to this repository. Below the list, there are 'Previous' and 'Next' navigation buttons. The footer contains copyright information for GitHub, Inc. (© 2019), along with links for 'Terms', 'Privacy', 'Security', 'Status', 'Help', 'Contact GitHub', 'Pricing', 'API', 'Training', 'Blog', and 'About'.

Seiden Group / RPG team

Discussions Members 2 Teams 0 **Repositories 1** Projects 0 Settings

Find a repository... Add repository

Select all

SeidenGroup/gitcm Private updated 13 days ago Read

Previous Next

© 2019 GitHub, Inc. Terms Privacy Security Status Help Contact GitHub Pricing API Training Blog About

Interactive code reviews

The screenshot shows a GitHub pull request page for the repository `IBM / xmlservice`. The pull request title is `extend pwd length to 128 for xmlcgi #39`. It is marked as `Merged` and was merged by `kadler` 19 days ago. The pull request details show 2 commits, 1 check, and 3 files changed. A comment from `jimoibm` on 5 Jul asks for help with issue #38. The pull request is associated with commit `676c528`. The right sidebar shows the reviewer `kadler` and no assignees or labels.


IBM / `xmlservice` Unwatch 18 Star 12 Fork 5

[Code](#) [Issues 9](#) [Pull requests 2](#) [Projects 0](#) [Wiki](#) [Security](#) [Insights](#)


extend pwd length to 128 for xmlcgi #39


Merged kadler merged 2 commits into `IBM:master` from `jimoibm:pwd_limit` 19 days ago


[Conversation 4](#) [Commits 2](#) [Checks 1](#) [Files changed 3](#) +7 -7

 `jimoibm` commented on 5 Jul Contributor + 🗨️ ...

@kadler this is for issue #38 which is also an APAR tracking internal for a PTF request. Please help take a look. Thanks!

 extend pwd length to 128 for xmlcgi ... 676c528

 `jimoibm` force-pushed the `jimoibm:pwd_limit` branch from `e6d52b0` to `676c528` on 5 Jul

Reviewers
 `kadler` ✓

Assignees
No one assigned

Labels
None yet

Interactive code reviews

kadler commented 26 days ago Member

We should fix this reference as well

```
xmlservice/src/pluginconf.rpgle.in  
Line 257 in 30c7791
```

```
257  D  nPWD                                10A  value
```

Technically, that function does not use the variable, but it does get passed so if someone modified this function they would not be able to get the full password. Why this function needs the user's password, I have no clue...

jimoibm changed custom conf for pwd 915fed8

jimoibm force-pushed the `jimoibm:pwd_limit` branch from `e8dcf60` to `915fed8` 20 days ago

jimoibm commented 20 days ago Author Contributor

@kadler Thanks for the comments!
I have changed the conf files.

kadler approved these changes 19 days ago View changes

kadler left a comment Member

LGTM

kadler merged commit `6f2ef26` into `IGN:master` 19 days ago View details
2 checks passed

GitHub Releases (git tags)










The screenshot shows the GitHub interface for the repository 'sitemule / noxDB'. At the top, there are navigation links for 'Code', 'Issues 1', 'Pull requests 0', 'Projects 0', 'Wiki', 'Security', 'Insights', and 'Settings'. On the right, there are buttons for 'Unwatch 13', 'Unstar 18', and 'Fork 8'. Below the navigation, there are tabs for 'Releases' (selected) and 'Tags', and a 'Draft a new release' button.

The main content area displays the release 'noxDB 1.1'. It includes a 'Latest release' badge, a commit hash 'a1a5de3', and a 'Verified' badge. The release was created by 'worksofliam' on '7 Dec 2018' with '12 commits' to master since this release. The update message is 'Update barryci.json'. There are three assets listed:

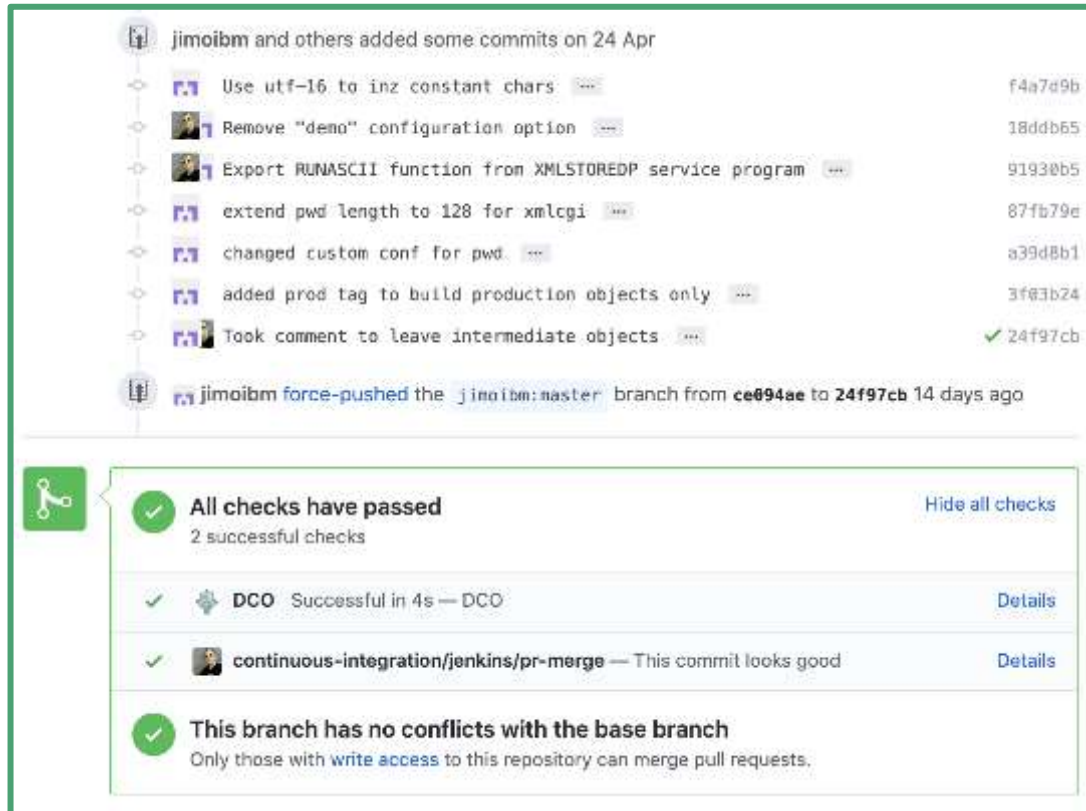
- release.savf (3.03 MB)
- Source code (zip)
- Source code (tar.gz)

An 'Edit' button is visible in the top right corner of the release details.

GitHub CI/CD integration

2 Open	7 Closed	Author	Labels	Projects	Milestones	Reviews	Assignee	Sort
 #42	Added prod tag to build production objects only ✓							4
<small>#42 opened 18 days ago by jimoibm</small>								
 #40	convert Yips wiki pages to sphinx docs ✓							5
<small>#40 opened on 8 Jul by jimoibm • Changes requested</small>								
 #39	extend pwd length to 128 for xmlcgi ✓							4
<small>#39 by jimoibm was merged 19 days ago • Approved</small>								
 #36	Use utf-16 to inz constant chars to be source ccsid independent on build ✓							8
<small>#36 by jimoibm was merged 19 days ago</small>								
 #34	[ImgBot] Optimize images ✗							
<small>#34 by imgbot bot was merged on 23 Apr</small>								
 #33	Use binding source for xmlstoredp.srvpgm ✗							17
<small>#33 by Justin-E-Taylor was closed on 24 Apr • Changes requested</small>								
 #31	Whitespace cleanup ✓							
<small>#31 by kadler was merged on 4 Mar</small>								
 #30	Support 64-bit mode for iLibCall ✓							20
<small>#30 by jimoibm was closed on 24 Apr</small>								
 #28	Binding source for XMLSTOREDP ✓							2
<small>#28 by Justin-E-Taylor was merged on 12 Feb • Approved</small>								

GitHub CD/CD integration



The screenshot displays a GitHub commit history for the `jimoibm` branch. The most recent commit is `24f97cb`, titled "Took comment to leave intermediate objects", which is marked as successful. Below the commit list, the "Checks" section shows that all checks have passed, including DCO and a Jenkins PR merge check.

jimoibm and others added some commits on 24 Apr

- Use utf-16 to inz constant chars `f4a7e9b`
- Remove "demo" configuration option `18ddb65`
- Export RUNASCII function from XMLSTOREDP service program `91930b5`
- extend pwd length to 128 for xmlcgi `87fb79e`
- changed custom conf for pwd. `a39d8b1`
- added prod tag to build production objects only `3f63b24`
- Took comment to leave intermediate objects `24f97cb` ✓

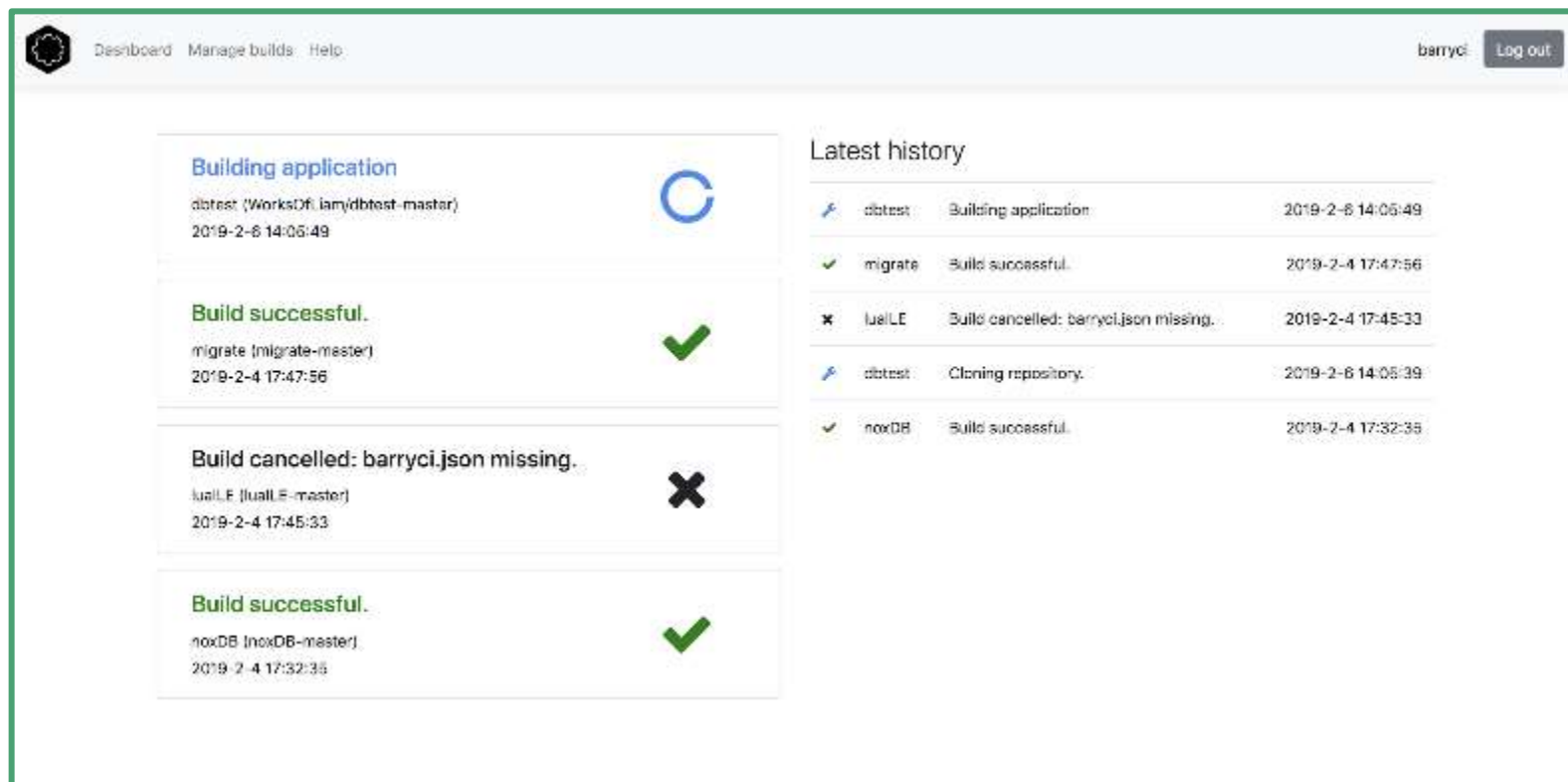
jimoibm force-pushed the `jimoibm:master` branch from `ce694ae` to `24f97cb` 14 days ago

Checks

- ✓ **All checks have passed** [Hide all checks](#)
2 successful checks
- ✓ **DCO** Successful in 4s — DCO [Details](#)
- ✓ **continuous-integration/jenkins/pr-merge** — This commit looks good [Details](#)
- ✓ **This branch has no conflicts with the base branch**
Only those with [write access](#) to this repository can merge pull requests.

Intro to CI

What is CI?



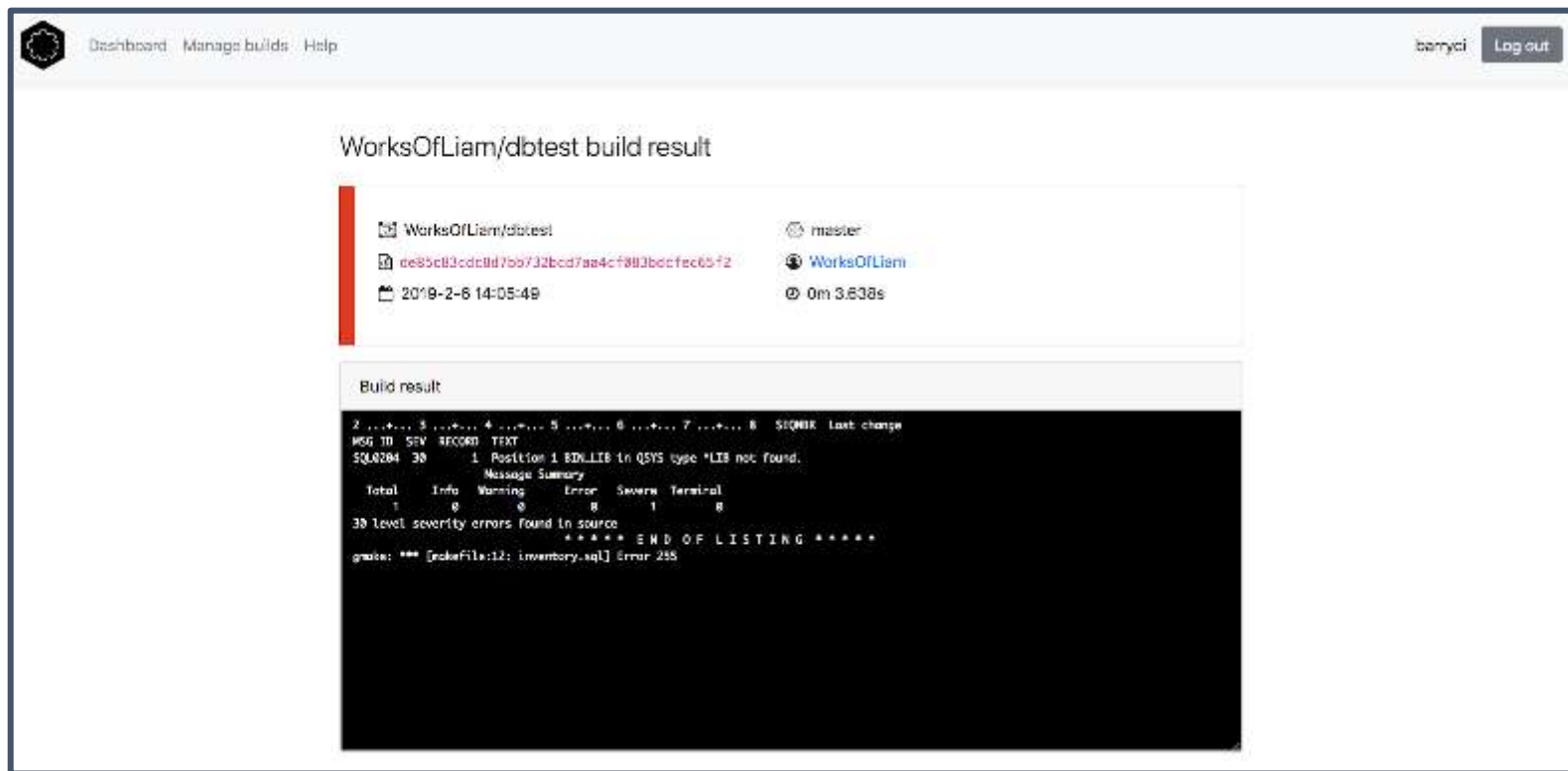
The screenshot displays a CI/CD dashboard with a navigation bar at the top containing a logo, "Dashboard", "Manage builds", and "Help". On the right side of the navigation bar, the user "barryci" is logged in, with a "Log out" button.

The main content area is divided into two sections:

- Build Status Summary:** A vertical list of four build entries, each with a title, repository name, and a status icon:
 - Building application:** dbtest (WorksOf/i-am/dbtest-master) 2019-2-6 14:06:49. Status: In progress (blue circle with 'C').
 - Build successful:** migrate (migrate-master) 2019-2-4 17:47:56. Status: Success (green checkmark).
 - Build cancelled: barryci.json missing:** luaLE (luaLE-master) 2019-2-4 17:45:33. Status: Failure (black 'X').
 - Build successful:** noxDB (noxDB-master) 2019-2-4 17:32:36. Status: Success (green checkmark).
- Latest history:** A table listing the most recent builds:

Icon	Repository	Build Status	Timestamp
	dbtest	Building application	2019-2-6 14:06:49
	migrate	Build successful.	2019-2-4 17:47:56
	luaLE	Build cancelled: barryci.json missing.	2019-2-4 17:45:33
	dbtest	Cloning repository.	2019-2-6 14:06:39
	noxDB	Build successful.	2019-2-4 17:32:36

Real time integration



The screenshot shows a web interface for a CI/CD system. At the top left is a logo and navigation links: "Dashboard", "Manage builds", and "Help". At the top right, the user "barnyci" is logged in, with a "Log out" button.

WorksOfLiam/dbtest build result

Build details:

- Project: WorksOfLiam/dbtest
- Branch: master
- Build ID: de85c83cdc8d7bb732bcd7aa4cf803bcdfec65f2
- Repository: WorksOfLiam
- Timestamp: 2019-2-6 14:05:49
- Duration: 0m 3.638s

Build result

```
2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8 SQNRK Last change
MSG ID  SEV  RECORD  TEXT
SQ0284  30      1  Position 1 EDLLIB in QSYS type *LIB not found.
Message Summary
Total  Info  Warning  Error  Severe  Terminal
1      0      0      0      1      0
30 level severity errors found in source
***** END OF LISTING *****
gnome: *** [packfiles:12: inventory.sql] Error 245
```

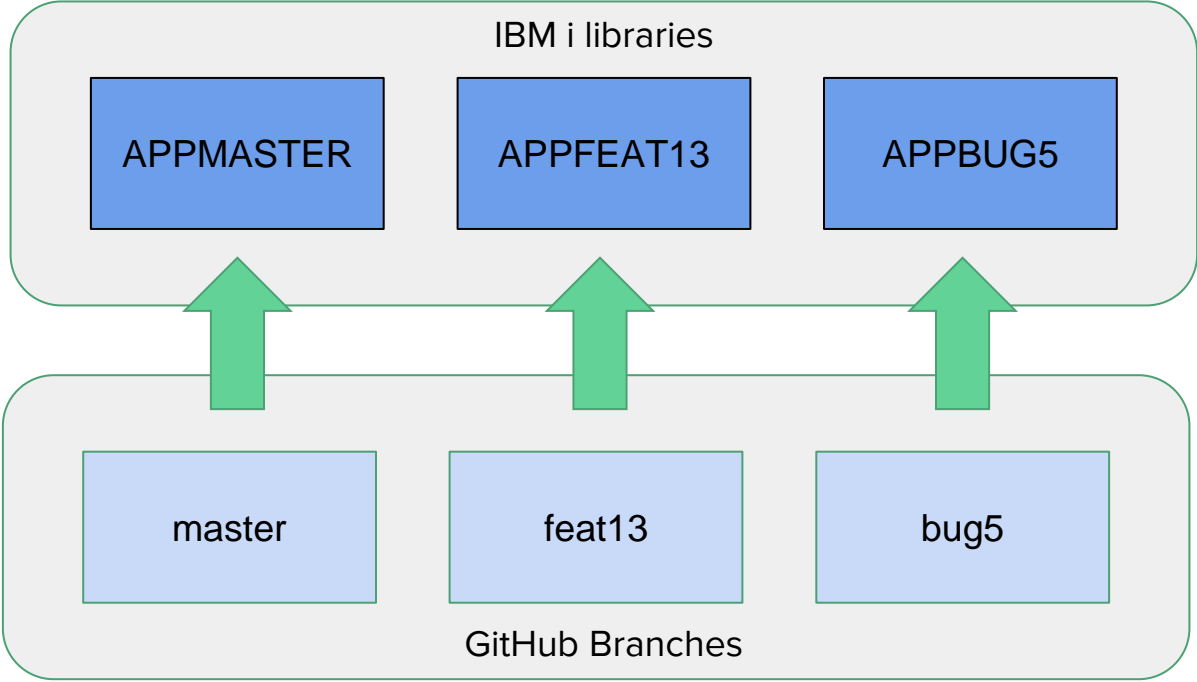
Hooks right into GitHub

The screenshot shows the GitHub interface for the repository 'sitemule / ILEusion'. At the top right, there are buttons for 'Unwatch' (6), 'Star' (4), and 'Fork' (1). Below these are navigation tabs for 'Code', 'Issues' (9), 'Pull requests' (0), 'Insights', and 'Settings'. The current branch is 'master'. The commit history is grouped by date:

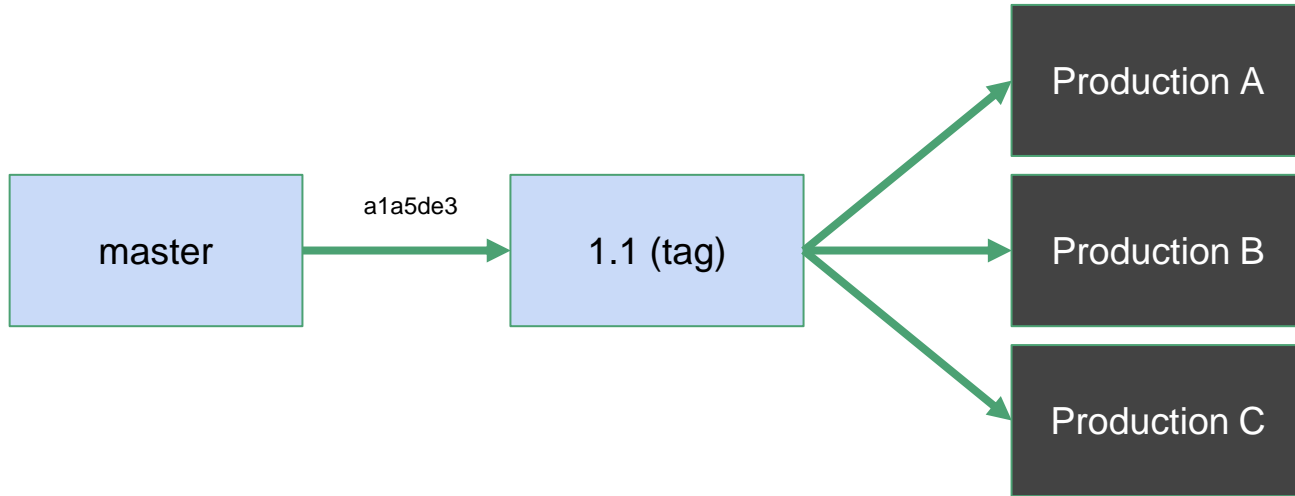
- Commits on Nov 27, 2018:**
 - Commit: QSH endpoint. WorksOfLiam committed 4 hours ago ✓. Hash: 1566dda.
- Commits on Nov 26, 2018:**
 - Commit: Change any to transaction. WorksOfLiam committed a day ago ✓. Hash: 9d7e6d8.
- Commits on Nov 21, 2018:**
 - Commit: Initial support for packed. WorksOfLiam committed 6 days ago ✓. Hash: 22ab43c.
 - Commit: Fix /call args being blank. WorksOfLiam committed 6 days ago ✓. Hash: 64e6447.
- Commits on Nov 20, 2018:**
 - Commit: Command Language execution. WorksOfLiam committed 7 days ago ✓. Hash: 83e79ba.
 - Commit: Support for multiple actions at once. WorksOfLiam committed 7 days ago ✓. Hash: cdF01dd.
 - Commit: Rewrite result handler. WorksOfLiam committed 7 days ago ✗. Hash: 86bdcc8.

A notification box is overlaid on the commit 'Change any to transaction', stating: 'All checks have passed' and '1 successful check'. Below this, it shows a checkmark, the GitHub logo, 'default — Build successful.', and a 'Details' link.

Multiple branch & PR



GitHub release support (tags)



Workflow Overview Example

Flight400

What is Flight400

- Originally created by Tony Carines
- Source can be found in 'Enhancing the IBM Power Systems Platform with IBM Watson Services' redbook
- Page 133 (chapter 7.2)

```
Flights Reservation System - Create Order      15:07:49  8/15/19      SEIDEN
Type choices, press F10 to Make Reservation
FLIGHT INFORMATION                          TICKET ORDER INFORMATION
Airline:      Flight: 0000000
Date of Flight...: 00 00 2019
From City.:
Depart Time.....:
To City...:
Arrival Time.....:
Order Number.....: PENDING
Customer...:
Class of Service - First.....:
                  Business.....:
                  Economy.....: X
Number of Tickets.....: 01
Price $.....:
Tax $.....:
Total Due w/ Tax $.....:
F2=Refresh  F4=FROM Cities  F5=TO Cities  F6=Flights  F7=Customers
MA  A  MW  09/023
```

Already partially migrated

The screenshot shows the GitHub interface for the repository 'worksoffiam / flight400'. At the top, there are statistics for Watch (0), Star (1), and Fork (0). Below this is a navigation bar with links for Code, Issues (0), Pull requests (0), Projects (0), Wiki, Security, Insights, and Settings. The main heading is 'Example migration of Flight400' with an 'Edit' button. Below the heading, there are statistics for 12 commits, 1 branch, 0 releases, and 1 contributor. A secondary navigation bar includes 'Branch: master', 'New pull request', 'Create new file', 'Upload files', 'Find File', and 'Clone or download'. The file list shows several source files (qqlpsrc, qcndsrc, qddsrd, qddsrf, qmrusrc, qrpqsrc) and utility files (.gitignore, barryci.json, makefile) with their respective commit messages and timestamps.

worksoffiam / flight400

Watch 0 Star 1 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Security Insights Settings

Example migration of Flight400 Edit

Manage topics

12 commits 1 branch 0 releases 1 contributor

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

worksoffiam	Change text	Latest commit #0139ae 19 hours ago
qqlpsrc	Initial commit with sources	2 months ago
qcndsrc	Initial commit with sources	2 months ago
qddsrd	Initial commit with sources	2 months ago
qddsrf	Initial commit with sources	2 months ago
qmrusrc	Change text	19 hours ago
qrpqsrc	Added some comments	14 days ago
.gitignore	Add missing sources	19 hours ago
barryci.json	Create barryci.json	19 hours ago
makefile	Change build library	20 hours ago

Flight400 usage

- ADDLIBLE FLGHT400
- ADDLIBLE FLGHT400M
- GO FRSMAN

Flight400

```
FRSMAIN      15:04:52      Flight Reservation System      8/15/19      SEIDEN

Select one of the following:

    1. Create a New Reservation
    2. Update an existing Reservation
    3. Inquire on an existing Reservation
    4. Delete an existing Reservation
    5. Fax Reservation Information

    10. Flight Reservation System Maintenance

    20. Reservation System Reports

    90. Signoff
Selection or command

===> _
```

MW A MW 22/007

Flight400

```
Flights LOGON display                                     System: SEIDEN
Type choices, press F10 to continue

Agent Name . . . . . Alan Name
Password . . . . . mercury Name

F2=Refresh F3=Exit F4=Agent Prompt F10=LOGON
MA A MW 08/047
```

Flight400

```
Flights Reservation System - Create Order      15:07:49  8/15/19      SEIDEN
Type choices, press F10 to Make Reservation

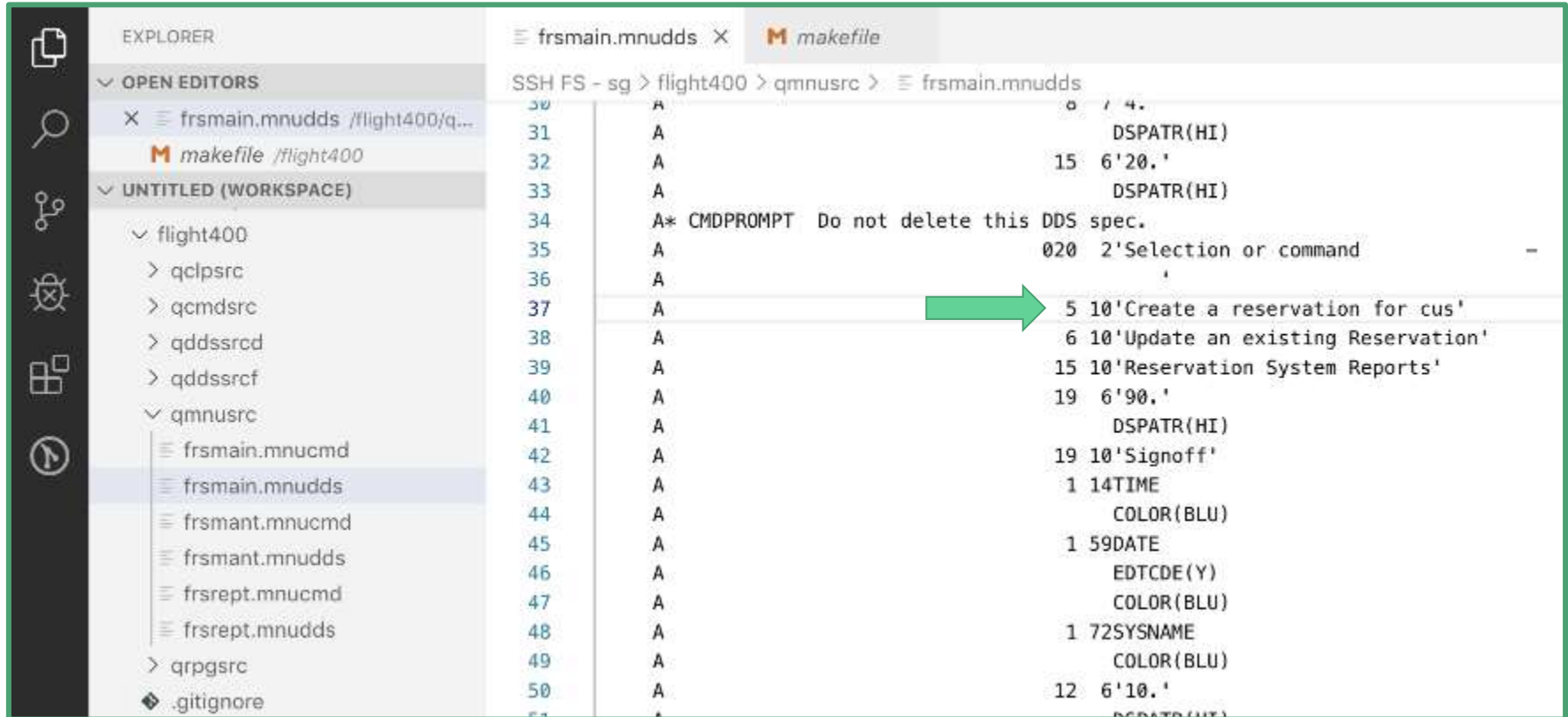
  FLIGHT INFORMATION                                TICKET ORDER INFORMATION
  -----
  Airline:      Flight: 00000000
  Date of Flight.: 00 00 2019
  From City.: _____
  Depart Time.....:
  To City....:
  Arrival Time.....:

  Order Number.....:      PENDING
  Customer.....: _____
  Class of Service - First.....:
  Business.....:
  Economy.....:      X
  Number of Tickets.....:      01
  Price $.....:
  Tax $.....:
  Total Due w/ Tax $.....:

F2=Refresh  F4=FROM Cities  F5=TO Cities  F6=Flights  F7=Customers

MA  A                                MW                                09/023
```

Flight400 - making a simple change



The screenshot shows the Visual Studio Code interface. On the left is the Explorer sidebar with the file tree for a project named 'flight400'. The 'qmnusrc' directory is expanded, showing files like 'frsmain.mnucmd', 'frsmain.mnudds', 'frsmant.mnucmd', 'frsmant.mnudds', 'frsrept.mnucmd', and 'frsrept.mnudds'. The 'frsmain.mnudds' file is selected. The main editor window shows the 'makefile' for 'frsmain.mnudds'. The file path is 'SSH FS - sg > flight400 > qmnusrc > frsmain.mnudds'. The code in the editor is as follows:

```
30 A 0 / 4.  
31 A DSPATR(HI)  
32 A 15 6'20.'  
33 A DSPATR(HI)  
34 A* CMDPROMPT Do not delete this DDS spec.  
35 A 020 2'Selection or command -  
36 A  
37 A 5 10'Create a reservation for cus'  
38 A 6 10'Update an existing Reservation'  
39 A 15 10'Reservation System Reports'  
40 A 19 6'90.'  
41 A DSPATR(HI)  
42 A 19 10'Signoff'  
43 A 1 14TIME  
44 A COLOR(BLU)  
45 A 1 59DATE  
46 A EDTCDE(Y)  
47 A COLOR(BLU)  
48 A 1 72SYSNAME  
49 A COLOR(BLU)  
50 A 12 6'10.'  
51 A DSPATR(HI)
```

A green arrow points to line 37, which contains the text: `5 10'Create a reservation for cus'`.

Using gitCM with Flight400 code

```

                                     Status

5=Diff A=Add R=Reset U=Undo

Sel  Path
-      qmnusrc/frsmain.mnudds (re-changed)

F4=Add all F5=Refresh F6=Commit F9=Push F10=Fetch/Pull F12=Back

MF  A      MW      07/002
```

Seeing our change in gitCM

```

                                Changes at commit
Commit HEAD qmnusrc/frsmain.mnudds

Line
@ -34,7 +34,7 @@
-
A* CMDPROMPT Do not delete this DDS spec.
A          020 2'Selection or command
A          '
A          5 10'Create a New Reservation'
A          5 10'Create a reservation for cus'
A          6 10'Update an existing Reservatio
A          15 10'Reservation System Reports'
A          19 6'90.'
```

MA A MW 06/003

Flight400 - building my change

```
Liams-MacBook-Pro:taxthing barry$ ssh sg
bash-4.4$ cd flight400
bash-4.4$ gmake frsmain.mnucmd BIN_LIB=BARRY ← gmake frsmain.mnucmd BIN_LIB=BARRY
system -qi "CRTSRCPF FILE(BARRY/QMNUDDS) RCDLEN(112)"
system "CPYFRMSTMF FROMSTMF('qmnusrc/frsmain.mnudds') TOMBR('/QSYS.lib/BARRY.lib/QMNUDDS.file/frsmain.mbr') MBROPT(*REPLACE)"
CPC7305: Member FRSMAN added to file QMNUDDS in BARRY.
CPCA081: Stream file copied to object.
system -s "CRTDSPF FILE(BARRY/frsmain) SRCFILE(BARRY/QMNUDDS)"
CPD4090: Printer device PRT01 not found. Output queue changed to QPRINT in library QGPL.
CPC7301: File FRSMAN created in library BARRY.
system -qi "CRTSRCPF FILE(BARRY/QMNUCMD) RCDLEN(112)"
system "CPYFRMSTMF FROMSTMF('qmnusrc/frsmain.mnucmd') TOMBR('/QSYS.lib/BARRY.lib/QMNUCMD.file/frsmain.mbr') MBROPT(*REPLACE)"
CPC7305: Member FRSMAN added to file QMNUCMD in BARRY.
CPCA081: Stream file copied to object.
system -s "CRTMNU MENU(BARRY/frsmain) TYPE(*DSPF) DSPF(BARRY/frsmain)"
CPF9801: Object FRSMAN in library *LIBL not found.
CPD6AC4: Problem exists with use of object FRSMAN type *MSGF in *LIBL.
CPC9801: Object FRSMAN type *MENU created in library BARRY.
rm frsmain.mnudds
bash-4.4$
```

Can also do this in your IDE! (Rational Developer for i or ILEditor)

Testing the change - the library list

```
Display Library List                                     System:  SEIDEN

Type options, press Enter.
 5=Display objects in library

Opt  Library      Type      ASP
     Device      Text
-----
  -   QSYS          SYS       System Library
  -   QSYS2         SYS       System Library for CPI's
  -   QHLP5SYS      SYS
  -   QUSR5SYS      SYS       System Library for Users
  -   BARRY         CUR
  -   FLGHT400M     USR
  -   FLGHT400      USR

Bottom

F3=Exit  F12=Cancel  F17=Top  F18=Bottom
(C) COPYRIGHT IBM CORP. 1980, 2018.
```

```
MA  A                               MW                               10/003
```

Flight400 - Check for changes

```
FRSMAIN 15:20:47 Flight Reservation System 8/1
Select one of the following:

1. Create a New Reservation
2. Update an existing Reservation
3. Inquire on an existing Reservation
4. Delete an existing Reservation
5. Fax Reservation Information

10. Flight Reservation System Maintenance

20. Reservation System Reports

90. Signoff
Selection or command

===> _

MR A MW
```

```
FRSMAIN 15:21:57 Flight Reservation System 8/1
Select one of the following:

1. Create a reservation for cus
2. Update an existing Reservation
3. Inquire on an existing Reservation
4. Delete an existing Reservation
5. Fax Reservation Information

10. Flight Reservation System Maintenance

20. Reservation System Reports

90. Signoff
Selection or command

===> _

MR A MW
```

(without BARRY)

(with BARRY)

Committing our change with gitCM

```

                                     Status
5=Diff A=Add R=Reset U=Undo
Sel Path
_ qmnusrc/frsmain.mnudds
                                     Make commit
Change to text in display file
Enter=Commit F12=Back
F4=Add all F5=Refresh F6=Commit F9=Push

```

```
git add qmnusrc/frsmain.mnudds
git commit -m "Change to text in display file"
git push
```


gitCM commit log

```
5=View 7=Reset branch to here                                Display Commits
```

<u>Set</u>	<u>Commit</u>	<u>User</u>	<u>Date</u>	<u>Text</u>
—	16d441a	Liam Allan <mrliamallan@l	Thu Aug 15 15:28:49 2019	Change to text in display file
—	8a2a7be	Liam Allan <mrliamallan@l	Thu Aug 15 14:58:47 2019	Change build library
—	597824f	Liam Allan <mrliamallan@l	Fri Aug 2 12:50:34 2019	Added some comments
—	2082cc4	Liam Allan <mrliamallan@l	Thu Jun 13 14:08:55 2019	Build commands
—	1f49c45	Liam Allan <mrliamallan@l	Thu Jun 13 13:57:56 2019	Add CL sources to makefile
—	63b6e51	Liam Allan <mrliamallan@l	Thu Jun 13 13:47:18 2019	Building the display files
—	2ddae36	Liam Allan <mrliamallan@l	Thu Jun 13 13:36:32 2019	Support for building menus
—	bf9d210	Liam Allan <mrliamallan@l	Thu Jun 13 13:07:16 2019	Makefile to build all rpg
—	cb4cdbc	Liam Allan <mrliamallan@l	Thu Jun 13 12:47:30 2019	Initial commit with sources

F3=Exit F6=Status

M0 A MW 07/003



Seeing our changes on GitHub

The screenshot shows the GitHub interface for the repository `worksofliam / flight400`. At the top right, there are buttons for `Watch` (0), `Star` (1), and `Fork` (0). Below this is a navigation bar with `Code`, `Issues` (0), `Pull requests` (0), `Projects` (0), `Wiki`, `Security`, `Insights`, and `Settings`. A dropdown menu shows the current branch is `master`.

The commit history is grouped by date:

- Commits on Aug 15, 2019**
 - Change to text in display file**
worksofliam committed 9 minutes ago
Commit hash: `16d441a`
 - Change build library**
worksofliam committed 39 minutes ago
Commit hash: `8a2a7be`
- Commits on Aug 2, 2019**
 - Added some comments**
worksofliam committed 13 days ago
Commit hash: `597824f`

Seeing the commit difference on GitHub

worksofliam / flight400

Watch 0 Star 1 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Security Insights Settings

Change to text in display file [Browse files](#)

master

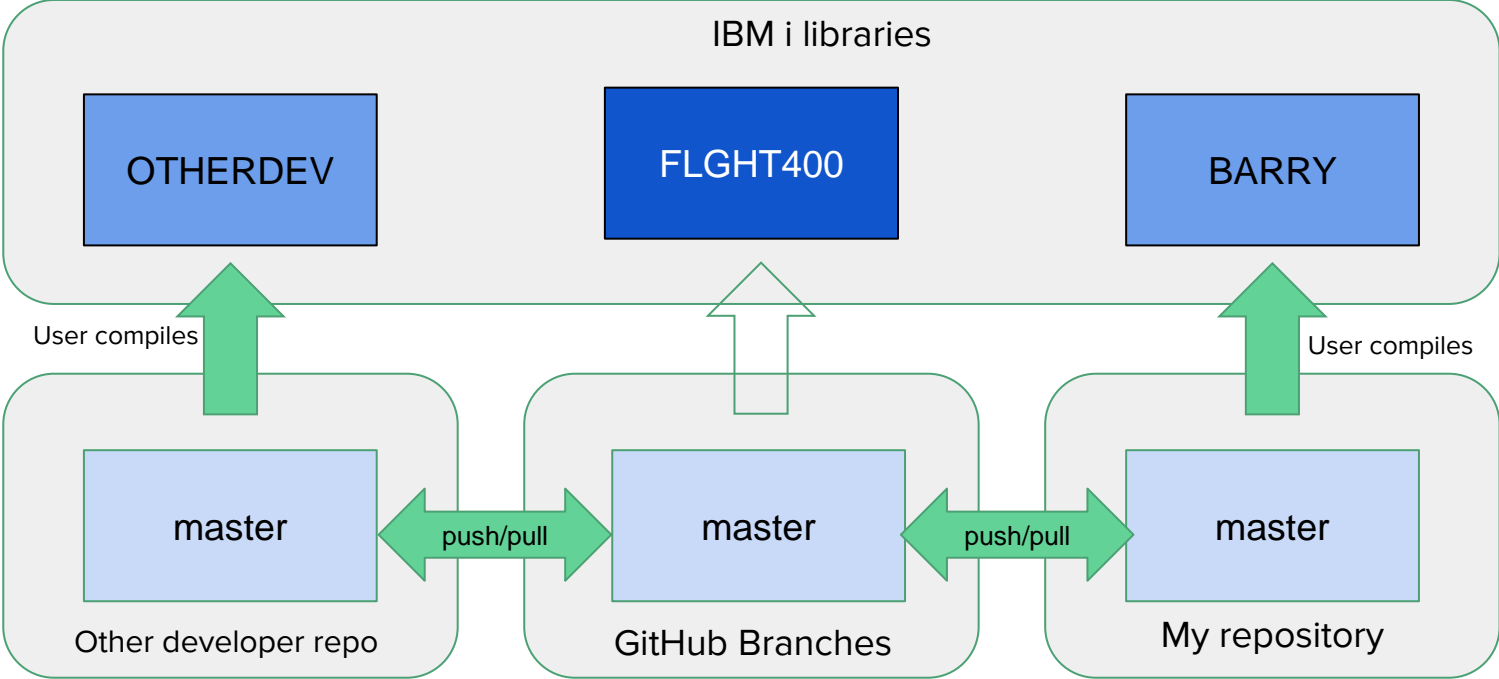
worksofliam committed 10 minutes ago 1 parent 8a2a7be commit 16d441a1b5ebafcf763fee68cef0e06f809a25f

Showing 1 changed file with 1 addition and 1 deletion. [Unified](#) [Split](#)

2 qmusrvc/frsmain.mnuds

old	new	changes	diff
34	34	A*	CMDPROMPT Do not delete this DDS spec.
35	35	A	020 2'Selection or command
36	36	A	,
37	-	A	5 10'Create a New Reservation'
37	+	A	5 10'Create a reservation for cus'
38	38	A	6 10'Update an existing Reservation'
39	39	A	15 10'Reservation System Reports'
40	40	A	19 6'90.'

Development workflow so far

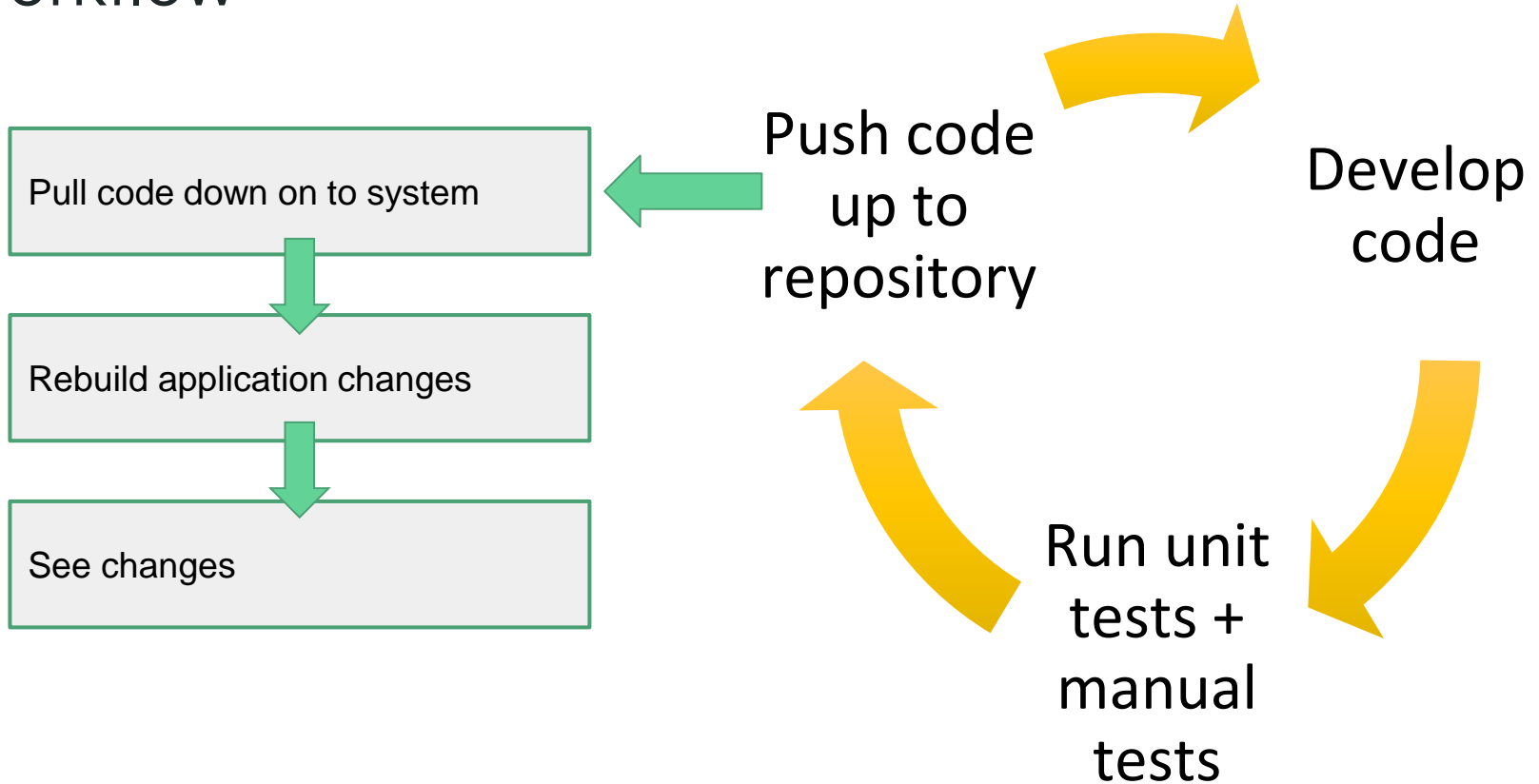


Automating
deployment

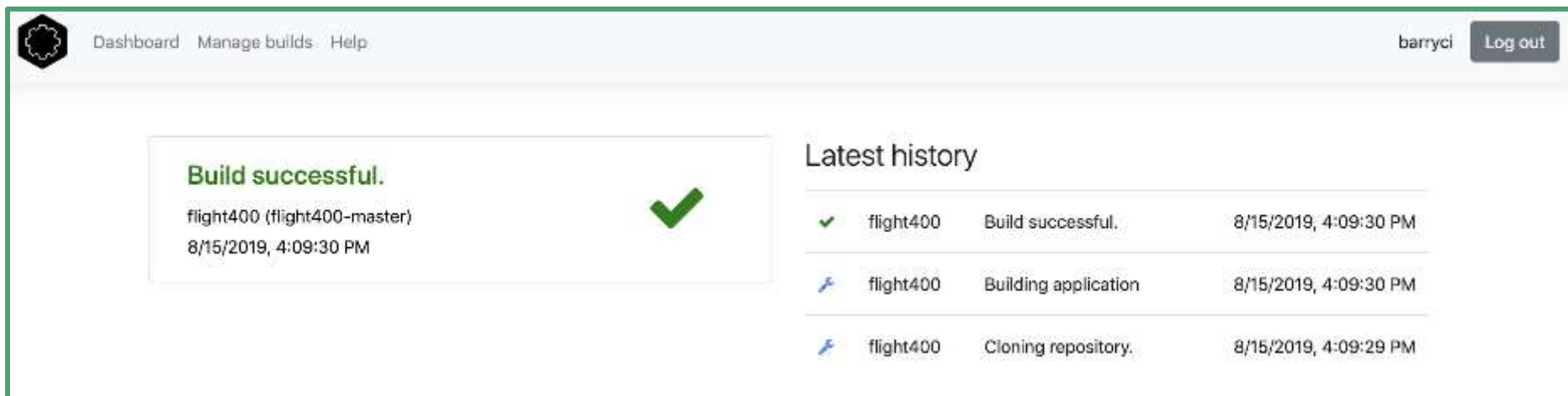


barryCI

Workflow



Automated deployment



The screenshot shows a dashboard interface for a CI/CD pipeline. At the top left is a gear icon. The navigation bar includes "Dashboard", "Manage builds", and "Help". On the right, the user "barryci" is logged in, with a "Log out" button. The main content area features a "Build successful" notification for "flight400 (flight400-master)" at "8/15/2019, 4:09:30 PM", accompanied by a green checkmark. To the right, a "Latest history" table lists three recent actions: a successful build, building the application, and cloning the repository, all for "flight400" at the same time.

Dashboard Manage builds Help barryci [Log out](#)

Build successful. ✓
flight400 (flight400-master)
8/15/2019, 4:09:30 PM

Latest history

✓	flight400	Build successful.	8/15/2019, 4:09:30 PM
✚	flight400	Building application	8/15/2019, 4:09:30 PM
✚	flight400	Cloning repository.	8/15/2019, 4:09:29 PM

Real time video of commit



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

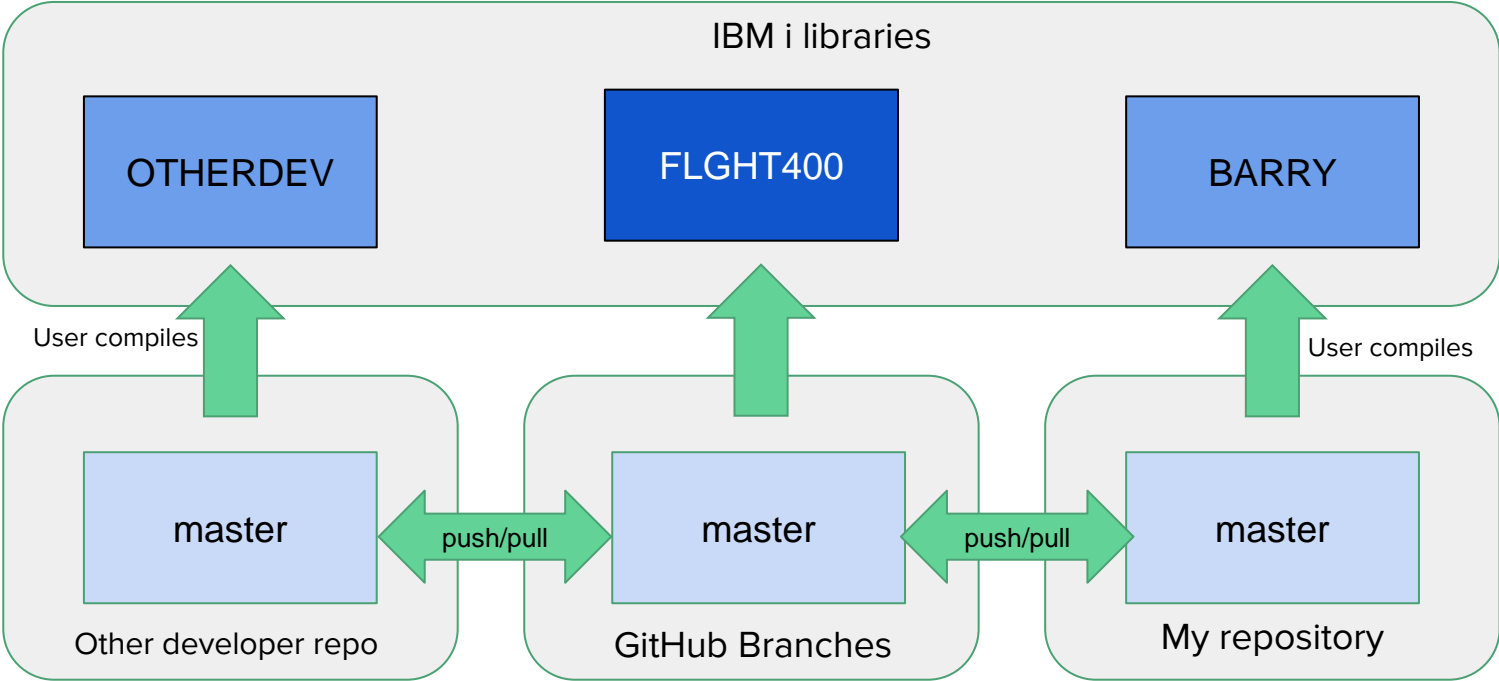
  README.md

No changes added to commit (use "git add" and/or
"git commit -a")
bash-4.4$ git add --all
bash-4.4$ git commit -m "Add missing sources"
[master f4286f] Add missing sources
3 files changed, 77 insertions(+), 0 deletions(-)
create mode 100755 gnuutils/frshant-README
create mode 100755 gnuutils/frshant-README
create mode 100755 gnuutils/frshant-README
bash-4.4$ git push
DISPLAY "" (invalid) disabling X11 Forwarding.
Compressing objects 7, done.
Delta compression using up to 8 threads.
Compressing objects: 100% (6/6), done.
Writing objects: 100% (7/7), 879 bytes | 0 bytes/
s, done.
Total 7 (delta 1), reused 6 (delta 0)
remote: Receiving objects: 100% (7/7), completed 0
ish 1 local object.
To github.com:westcoastflair/frshant.git
 * [new branch] master -> master
bash-4.4$ git status
On branch master
Your branch is up-to-date with "origin/master".
nothing to commit, working tree clean
bash-4.4$ git status
On branch master
Your branch is up-to-date with "origin/master".
Changes not staged for commit:
  (use "git add <file>..." to update what will be
   committed)
  (use "git checkout -- <file>..." to discard cha
   nges in working directory)

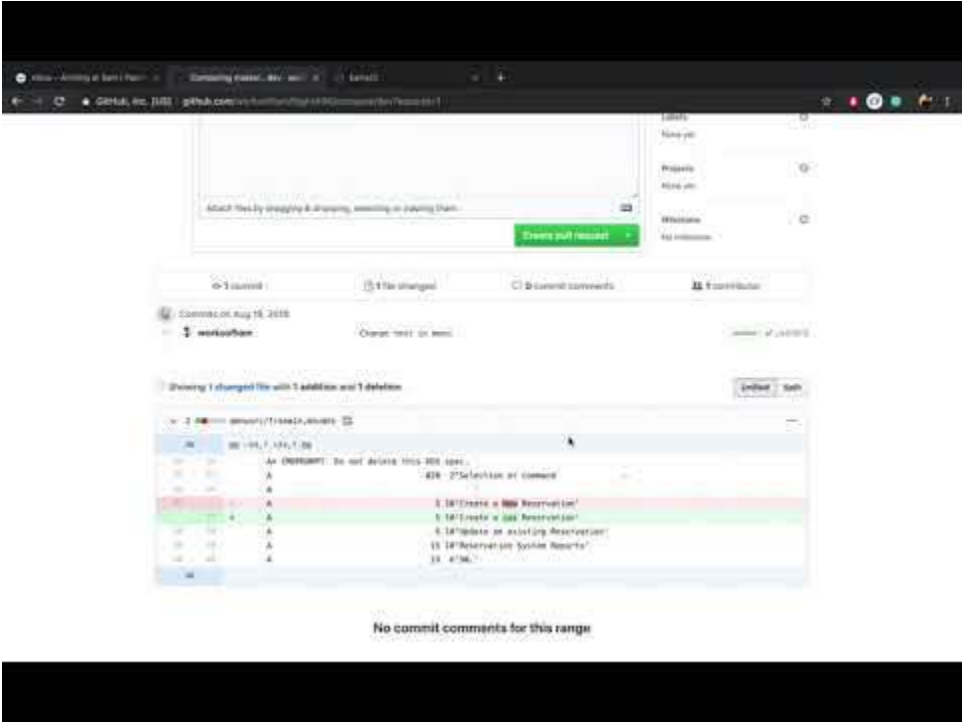
  README.md

No changes added to commit (use "git add" and/or
"git commit -a")
bash-4.4$ git add --all
bash-4.4$
```

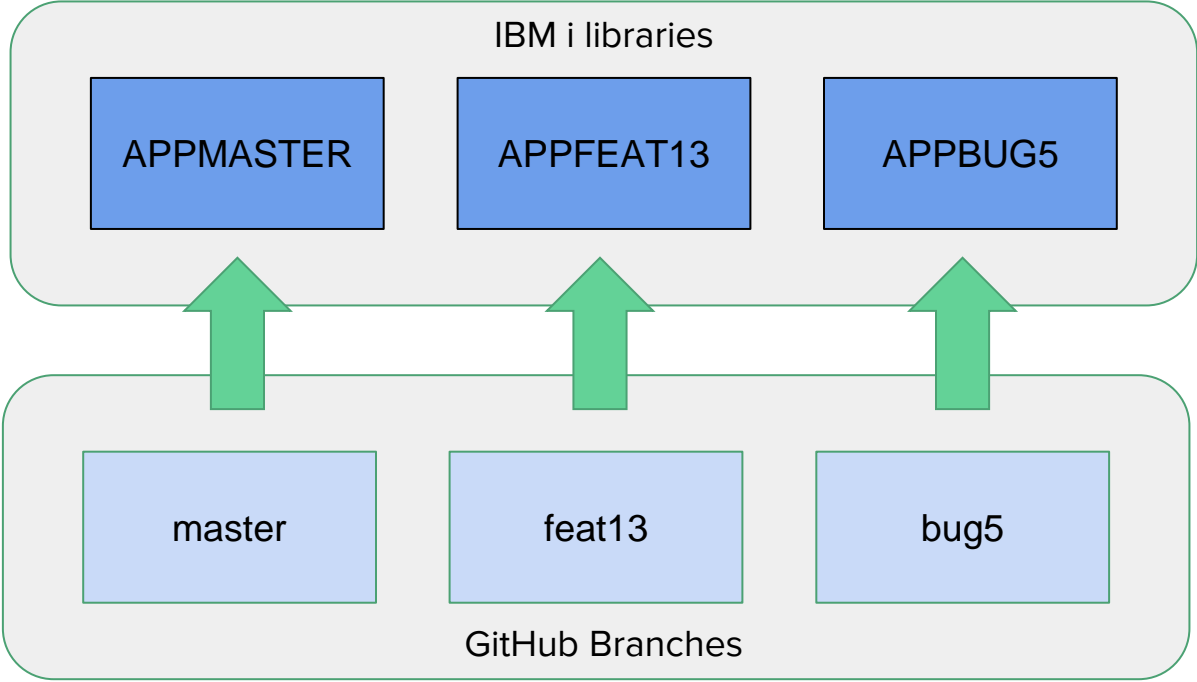
Development workflow you just saw



Real time video of PR and merge



Deployment workflow you just saw



Results shown in GitHub

worksofliam/flight400 build result

worksofliam/flight400	master
80138ac52854c62641c83284fb029c86ce80c679	worksofliam
8/15/2019, 4:13:39 PM	0m 0.866s

Build result

```
build successful. Standout out removed.
```

worksofliam / flight400

<> Code Issues 0 Pull requests 0 Projects 0 Wiki

Branch: master

Commits on Aug 15, 2019

- Change text
worksofliam committed 9 minutes ago ✓
- Add missing sources
worksofliam committed 16 minutes ago ✓
- Create harbor icon

All checks have passed
1 successful check

✓ default — Build successful. Details

80138ac <>

fa42b8c <>

Finishing up

- Tools used
 - GitHub
 - barryCI and Jenkins
 - gitCM



The end

Contact me about
GitHub or CI/CD

Find me at:

liam@worksofbarry.com

worksofbarry.com

github.com/WorksOfBarry
