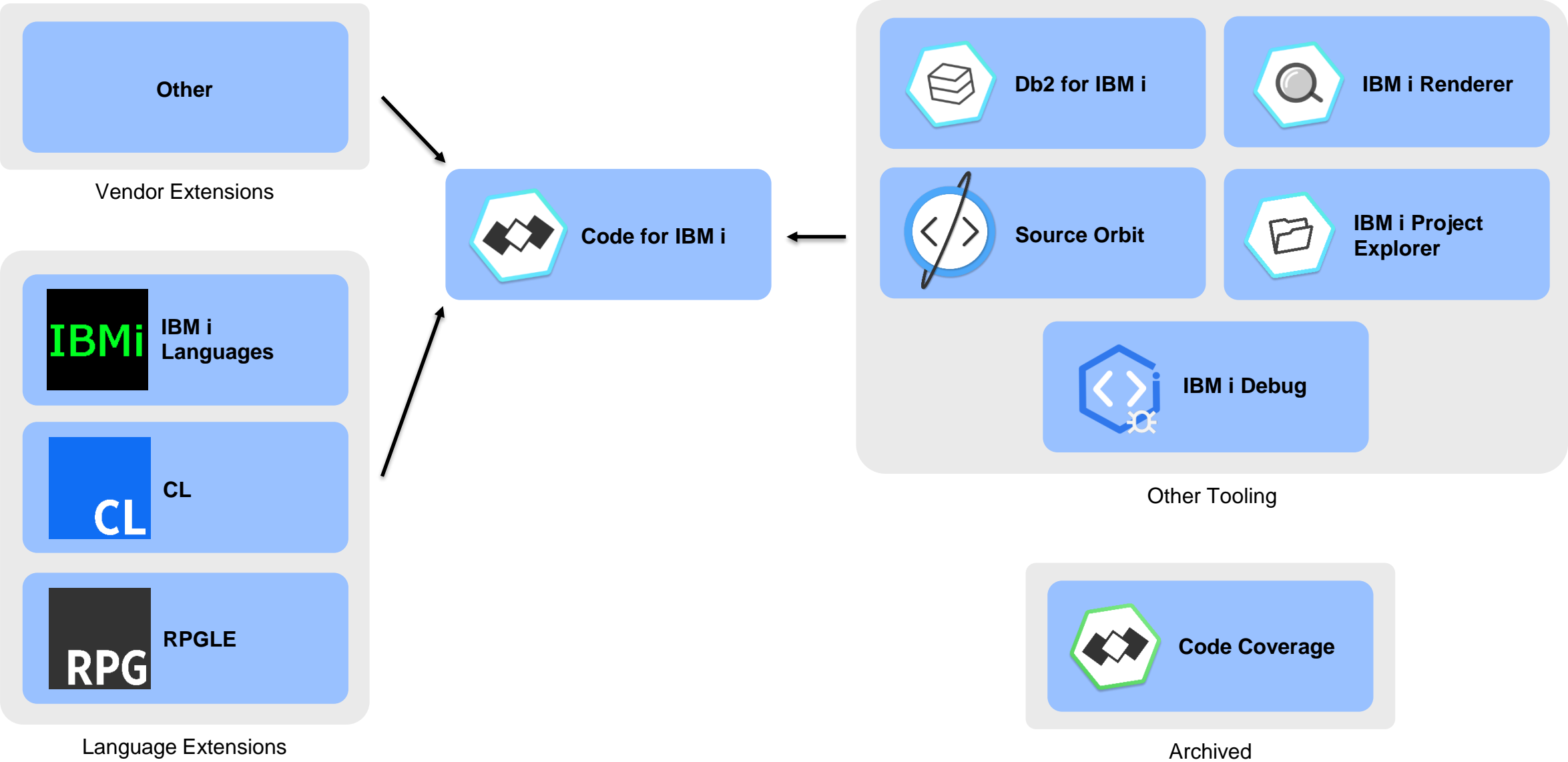


# IBM i Unit Testing Now in VS Code!



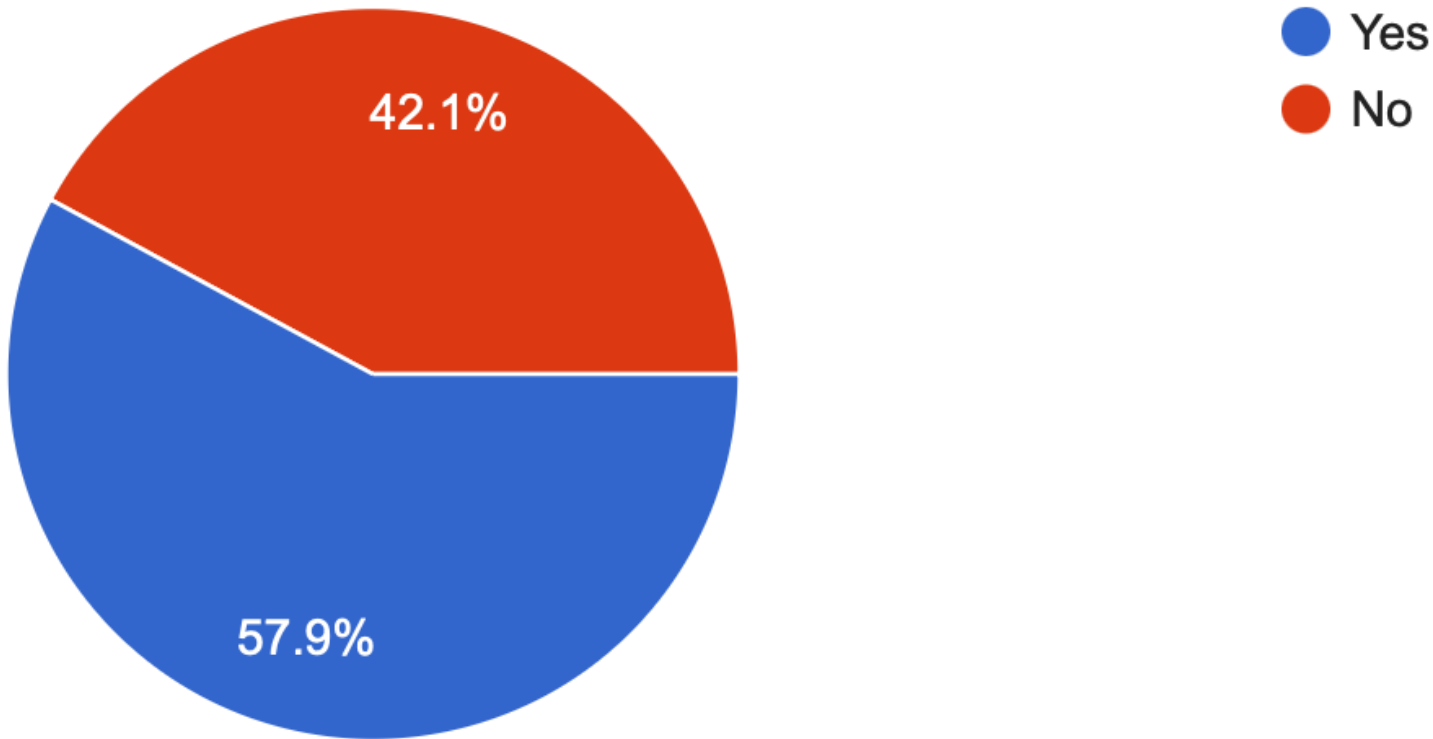
# What is missing in the VS Code stack?



# We did a survey...

Have you done unit testing with IBM i before?

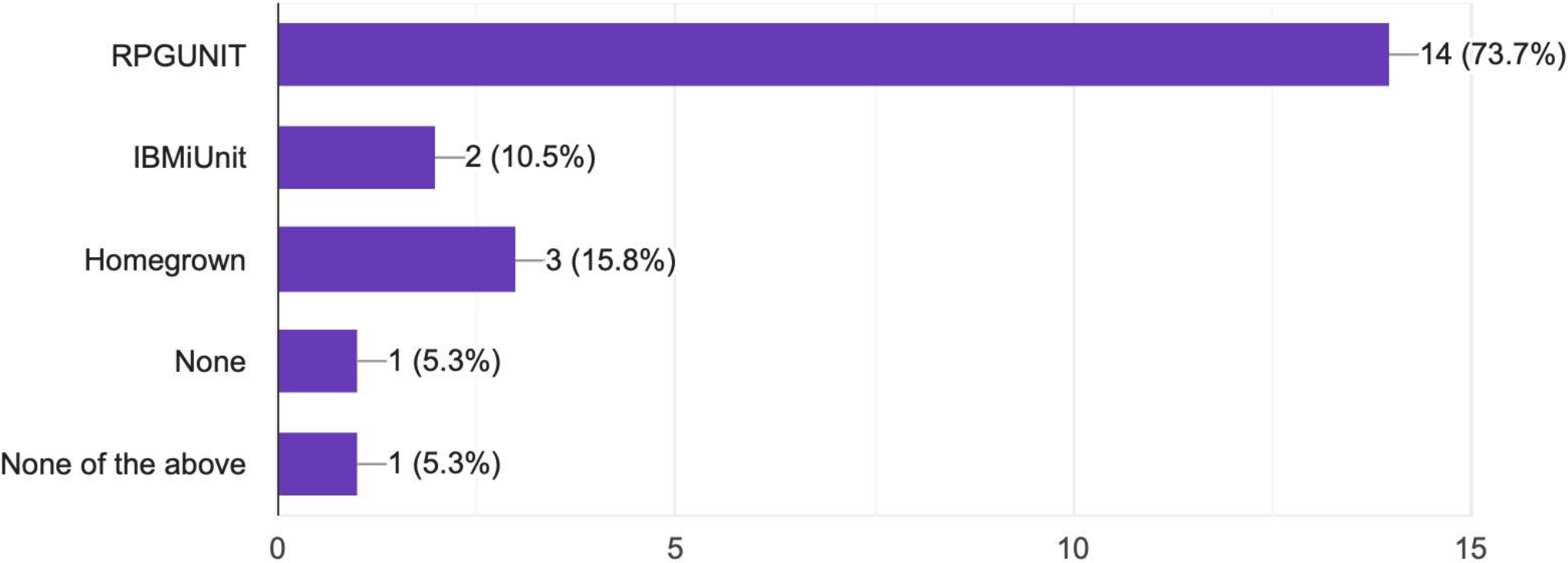
19 responses



# We did a survey...

What framework did you use for IBM i testing?

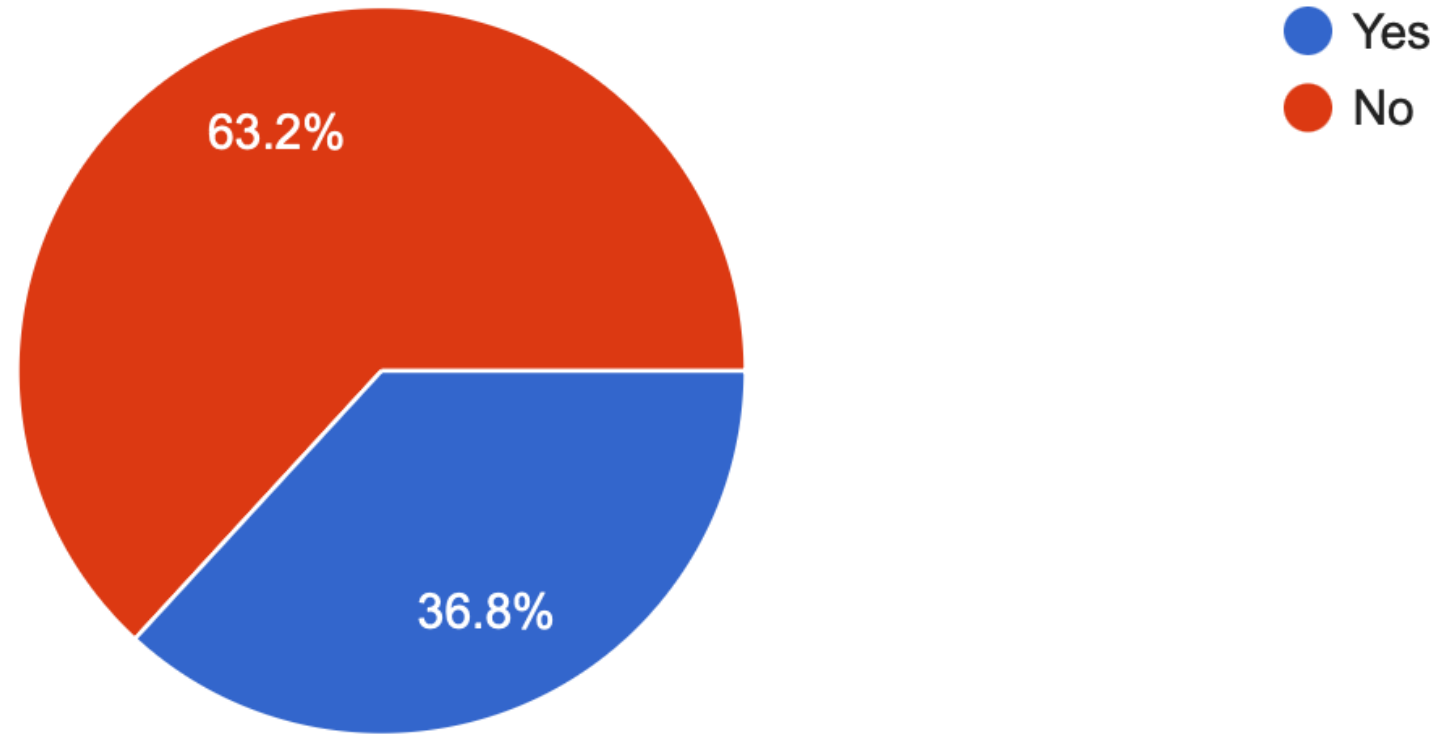
19 responses



# We did a survey...

Have you used IBM i Code Coverage? (CODECOV)

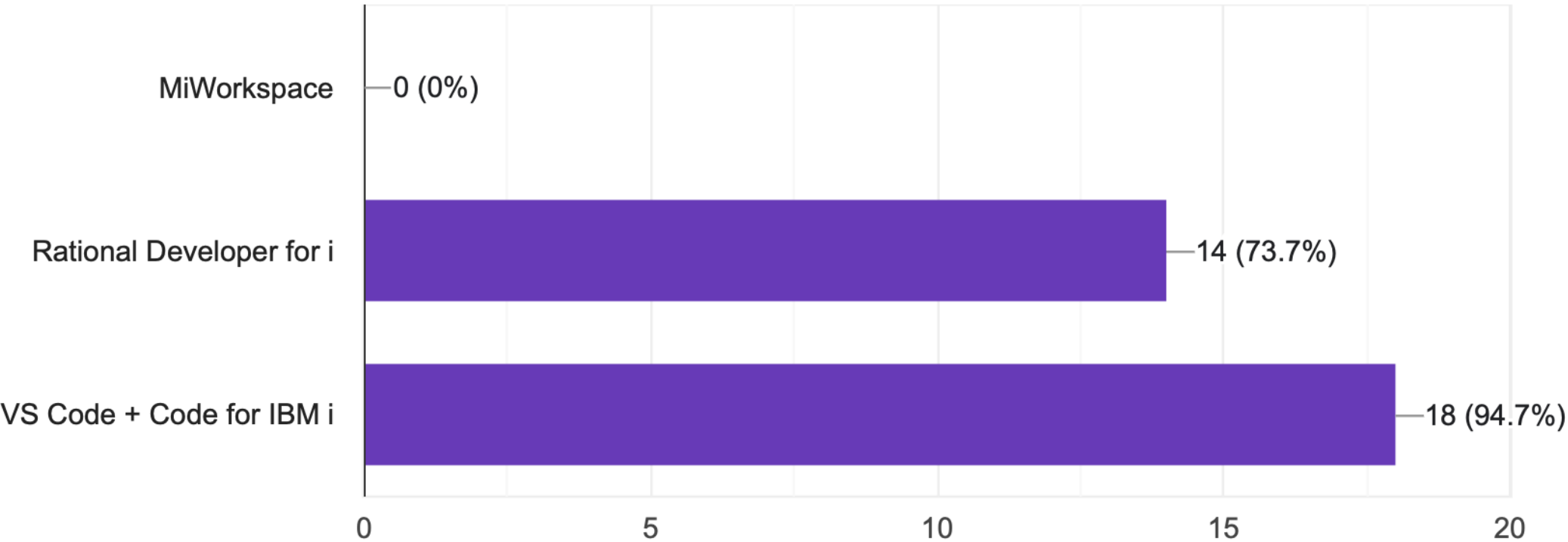
19 responses



# We did a survey...

Which IDEs for IBM i have you used?

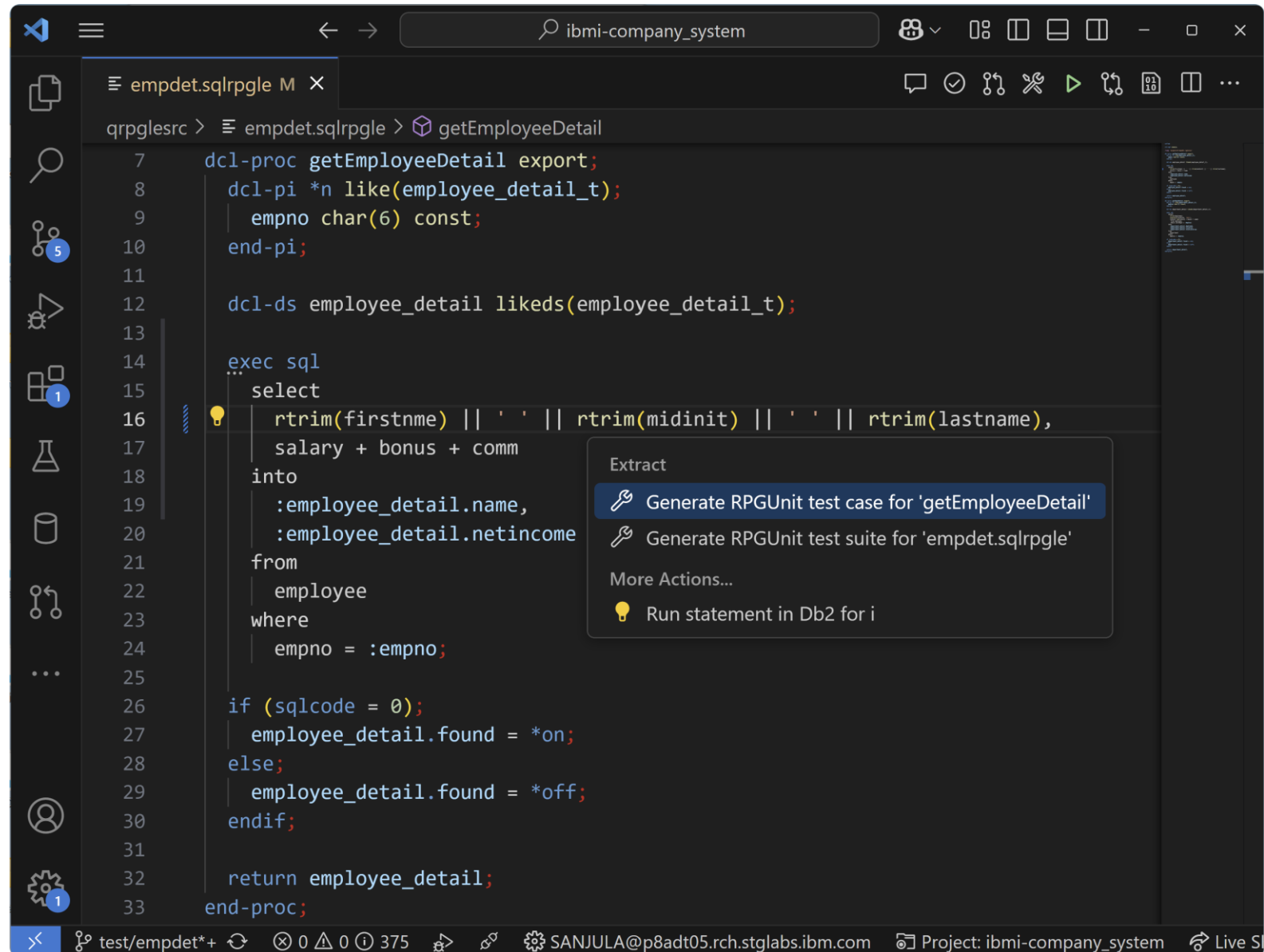
19 responses



# Let's look at the new IBM i Testing Extension



# Generating test stubs



The screenshot shows the IBM Developer Studio interface with a file named `empdet.sqlrpgle` open. The editor displays the following RPG code:

```
7 dcl-proc getEmployeeDetail export;  
8   dcl-pi *n like(employee_detail_t);  
9     empno char(6) const;  
10  end-pi;  
11  
12  dcl-ds employee_detail likeds(employee_detail_t);  
13  
14  exec sql  
15  select  
16    rtrim(firstname) || ' ' || rtrim(midinit) || ' ' || rtrim(lastname),  
17    salary + bonus + comm  
18  into  
19    :employee_detail.name,  
20    :employee_detail.netincome  
21  from  
22    employee  
23  where  
24    empno = :empno;  
25  
26  if (sqlcode = 0);  
27    employee_detail.found = *on;  
28  else;  
29    employee_detail.found = *off;  
30  endif;  
31  
32  return employee_detail;  
33 end-proc;
```

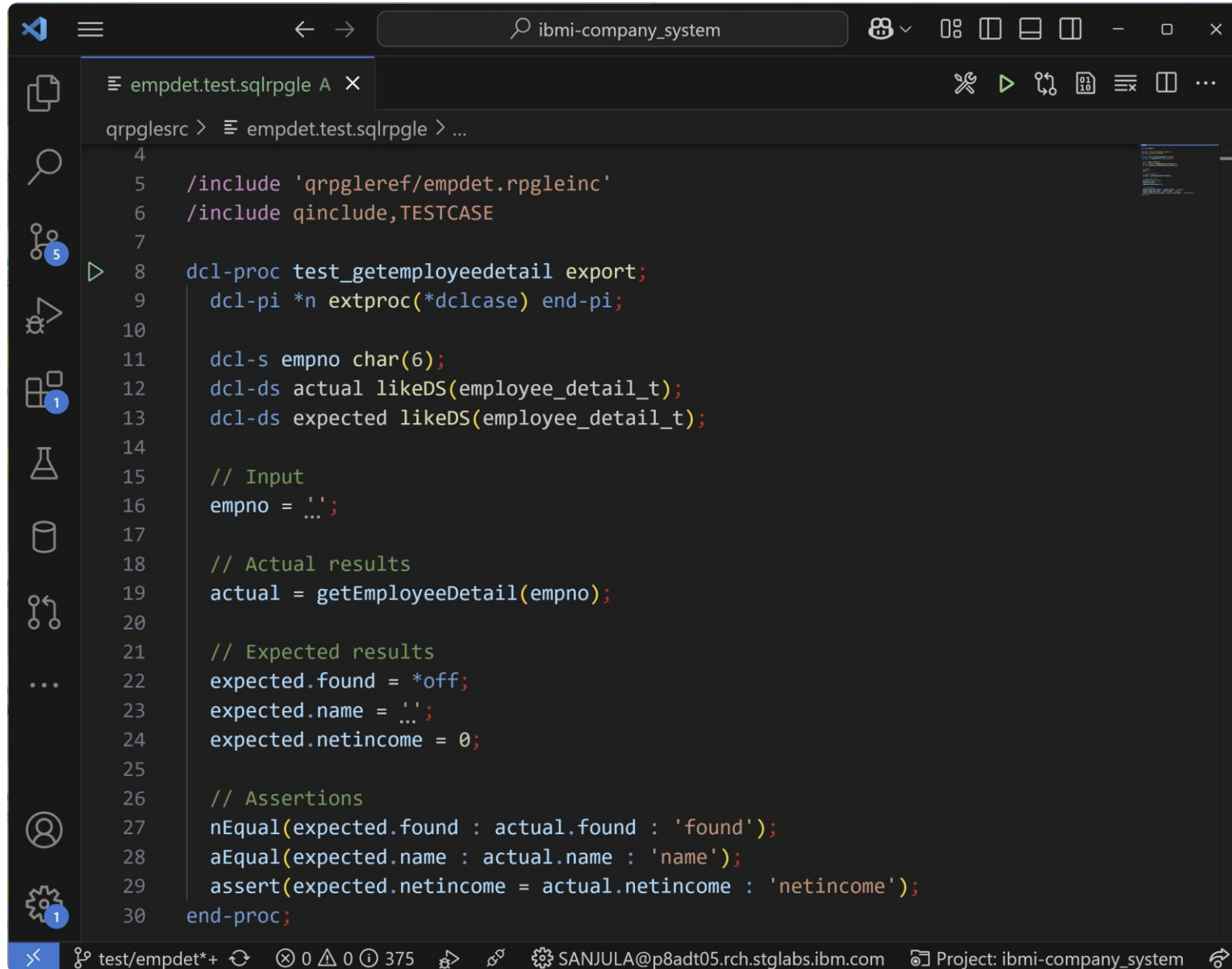
A context menu is open over line 16, showing the following options:

- Extract
  - Generate RPGUnit test case for 'getEmployeeDetail'
  - Generate RPGUnit test suite for 'empdet.sqlrpgle'
- More Actions...
  - Run statement in Db2 for i

The status bar at the bottom indicates the project is `ibmi-company_system` and the user is `SANJULA@p8adt05.rch.stglabs.ibm.com`.



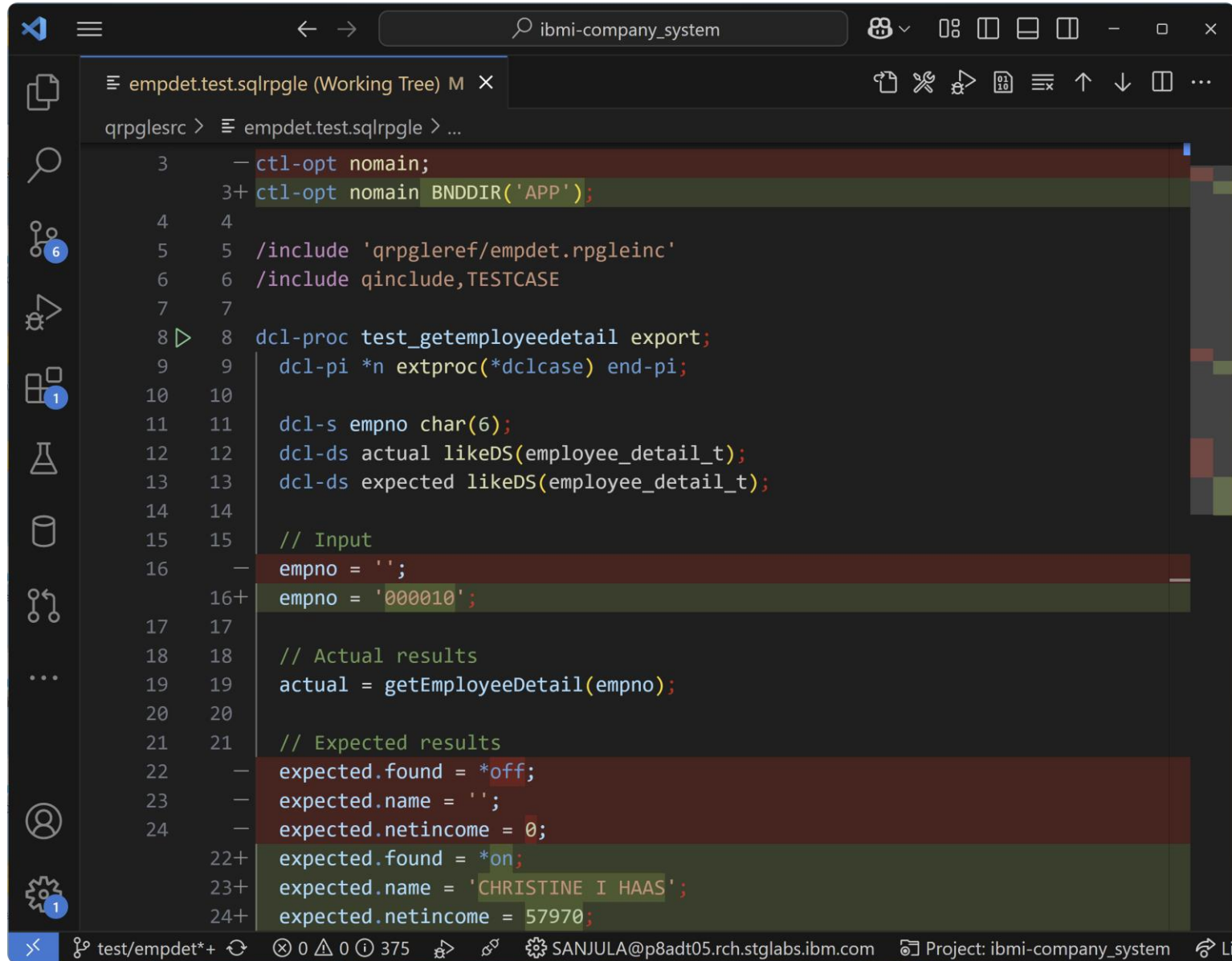
# Generating test stubs



The screenshot shows a Visual Studio Code editor window with a dark theme. The top bar indicates the project is 'ibmi-company\_system'. The active file is 'empdet.test.sqlrpgle A'. The editor displays a test stub for an RPG program, with line numbers 4 through 30. The code includes preprocessor directives, variable declarations, input assignment, function calls, and assertions. The status bar at the bottom shows the file path 'test/empdet\*+', a search icon, and the user 'SANJULA@p8adt05.rch.stglabs.ibm.com' working on the 'Project: ibmi-company\_system'.

```
4
5  /include 'qrpgleref/empdet.rpgleinc'
6  /include qinclude,TESTCASE
7
8  dcl-proc test_getemployeedetail export;
9      dcl-pi *n extproc(*dclcase) end-pi;
10
11     dcl-s empno char(6);
12     dcl-ds actual likeDS(employee_detail_t);
13     dcl-ds expected likeDS(employee_detail_t);
14
15     // Input
16     empno = '..';
17
18     // Actual results
19     actual = getEmployeeDetail(empno);
20
21     // Expected results
22     expected.found = *off;
23     expected.name = '..';
24     expected.netincome = 0;
25
26     // Assertions
27     nEqual(expected.found : actual.found : 'found');
28     aEqual(expected.name : actual.name : 'name');
29     assert(expected.netincome = actual.netincome : 'netincome');
30 end-proc;
```

# Writing Tests



The screenshot shows a code editor window with the title bar "ibmi-company\_system". The editor displays a file named "empdet.test.sqlrpgle (Working Tree) M". The code is written in SQL/RSB and includes several sections: a control options section, include statements, a data declaration section, and test data initialization. The code is as follows:

```
3      -ctl-opt nomain;  
3+    ctl-opt nomain BNDDIR('APP');  
4      4  
5      5 /include 'qrpqleref/empdet.rpgleinc'  
6      6 /include qinclude,TESTCASE  
7      7  
8      8 dcl-proc test_getemployeedetail export;  
9      9   dcl-pi *n extproc(*dclcase) end-pi;  
10     10  
11     11   dcl-s empno char(6);  
12     12   dcl-ds actual likeDS(employee_detail_t);  
13     13   dcl-ds expected likeDS(employee_detail_t);  
14     14  
15     15   // Input  
16     - empno = '';  
16+    empno = '000010';  
17     17  
18     18   // Actual results  
19     19   actual = getEmployeeDetail(empno);  
20     20  
21     21   // Expected results  
22     - expected.found = *off;  
23     - expected.name = '';  
24     - expected.netincome = 0;  
22+   expected.found = *on;  
23+   expected.name = 'CHRISTINE I HAAS';  
24+   expected.netincome = 57970;
```

The status bar at the bottom shows the following information: "test/empdet\*+", "0 0 0 375", "SANJULA@p8adt05.rch.stglabs.ibm.com", and "Project: ibmi-company\_system".

# Running unit tests

TEST EXPLORER

Filter (e.g. text, !exclude, @tag)

1/1 9.3s

ibmi-company\_system 68ms

qrpglesrc 68ms

empdet.test.sqlrpgle 68ms

test\_getemployeedetail 68ms

RPGUNIT

empdet.test.sqlrpgle M X

qrpglesrc > empdet.test.sqlrpgle > test\_getemployeedetail

8 dcl-proc test\_getemployeedetail export;

9 dcl-pi \*n extproc(\*dclcase) end-pi;

10

11 dcl-s empno char(6);

12 dcl-ds actual likeDS(employee\_detail\_t);

13 dcl-ds expected likeDS(employee\_detail\_t);

14

15 // Input

16 empno = '000010';

PROBLEMS 375 COMMENTS DB2 FOR I DEBUG CONSOLE OUTPUT TERMINAL TEST RESULTS

WORKSPACE ibmi-company\_system (1) [ Deployment Successful ]

> empdet.test.sqlrpgle (1) [ Compilation Successful ]

✓ test\_getemployeedetail 0.068s

EXECUTION

Deployments: 1 successful | 0 failed (1)

Compilations: 1 successful | 0 failed | 0 skipped (1)

RESULTS

Test Files: 1 passed | 0 failed | 0 errored (1)

Test Cases: 1 passed | 0 failed | 0 errored (1)

Assertions: 3

Duration: 0.068s

PASS

IBM i Testing

✓ test\_getemployeede...

< test/empdet\*+ 0 0 375 SANJULA@p8adt05.rch.stglabs.ibm.com Project: ibmi-company\_system Live Share Deploy New job (1) Pul

# Viewing failures and errors

TEST EXPLORER

Filter (e.g. text, !exclude, @tag)

6/16

17.3s

examples 35ms

- cbl.test.cbllle
  - TEST\_TRUE
  - TEST\_FALSE
  - TEST\_FAIL0
  - TEST\_FAIL1
- rpgsqlstmf.test.sqlrpgle 26ms
  - testWhatever\_1 25ms
  - testWhatever\_2 1.0ms
- rpgstmf.test.rpgle 3.0ms
  - testWhatever\_1 3.0ms
  - testWhatever\_2 0.0ms
- sub 6.0ms
- RPGUNIT

rpgstmf.test.rpgle

```
222 // =====
223 // RPGUnit test case.
224 // =====
225 dcl-proc testWhatever_1 export;
226   dcl-pi *n extproc(*dclcase) end-pi;
227
228   print('Executing:      * testWhatever_1()');
229
230   // Run
231   assert(sds.pgmName = 'TEMPLATE': 'Name of the test suite should be 'TEMPLATE'' );
232
233   // Place your assertions here.
234
235 end-proc;
```

PROBLEMS

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IBM I JOB LOG

TEST RESULTS

WORKSPACE

examples (4) [ Deployment Successful ]

> rpgstmf.test.rpgle (2) [ Compilation Skipped ]

X testWhatever\_1 0.003s

Failure (line 231): Name of the test suite should be 'TEMPLATE'

✓ testWhatever\_2 0s

> rpgsqlstmf.test.sqlrpgle (2) [ Compilation Skipped ]

✓ testWhatever\_1 0.025s

✓ testWhatever\_2 0.001s

> cbl.test.cbllle (4) [ Compilation Failed ]

CPFA0A9: Object not found. Object is EN\_US.UTF-8.

: CRTCBMOD MODULE(\*PGMID) SRCSTMF('/home/SANJULA/builds/examples/cbl.test.cbllle') OPTION(\*EVENTF) DBGVIEW(\*SOURCE) TGTRLS(\*CURRENT) INCDIR('/home/SANJULA/builds/examples') DEFINE(\*NONE) TGTCCSID(37)

CPFA0A9: Object not found. Object is EN\_US.UTF-8.

CPFA0A9: Object not found. Object is EN\_US.UTF-8.

CPFA0A9: Object not found. Object is EN\_US.UTF-8.

CPD4090: Printer device PRT01 not found. Output queue changed to QPRINT i

n library QGPL.

CPFA0A9: Object not found. Object is EN\_US.UTF-8.

IBM i Testing

TEST\_TRUE cbl.test.cbllle < examples

TEST\_FALSE cbl.test.cbllle < examples

TEST\_FAIL0 cbl.test.cbllle < examples

TEST\_FAIL1 cbl.test.cbllle < examples

TEST\_TRUE cbl.test.cbllle < sub < examples

TEST\_FALSE cbl.test.cbllle < sub < examples

TEST\_FAIL0 cbl.test.cbllle < sub < examples

TEST\_FAIL1 cbl.test.cbllle < sub < examples

testWhatever\_1 Name of the test suite should b...

testWhatever\_1 Name of the test suite should b...

testWhatever\_2 rpgstmf.test.rpgle < examples

testWhatever\_1 rpgsqlstmf.test.sqlrpgle < examp...

testWhatever\_2 rpgsqlstmf.test.sqlrpgle < examp...

testWhatever\_2 rpgstmf.test.rpgle < sub < examp...

main\*

0 0

SANJULA@p8adt05.rch.stglabs.ibm.com

Live Share

Deploy

New job (1)

Ln 239, Col 45

Spaces: 2

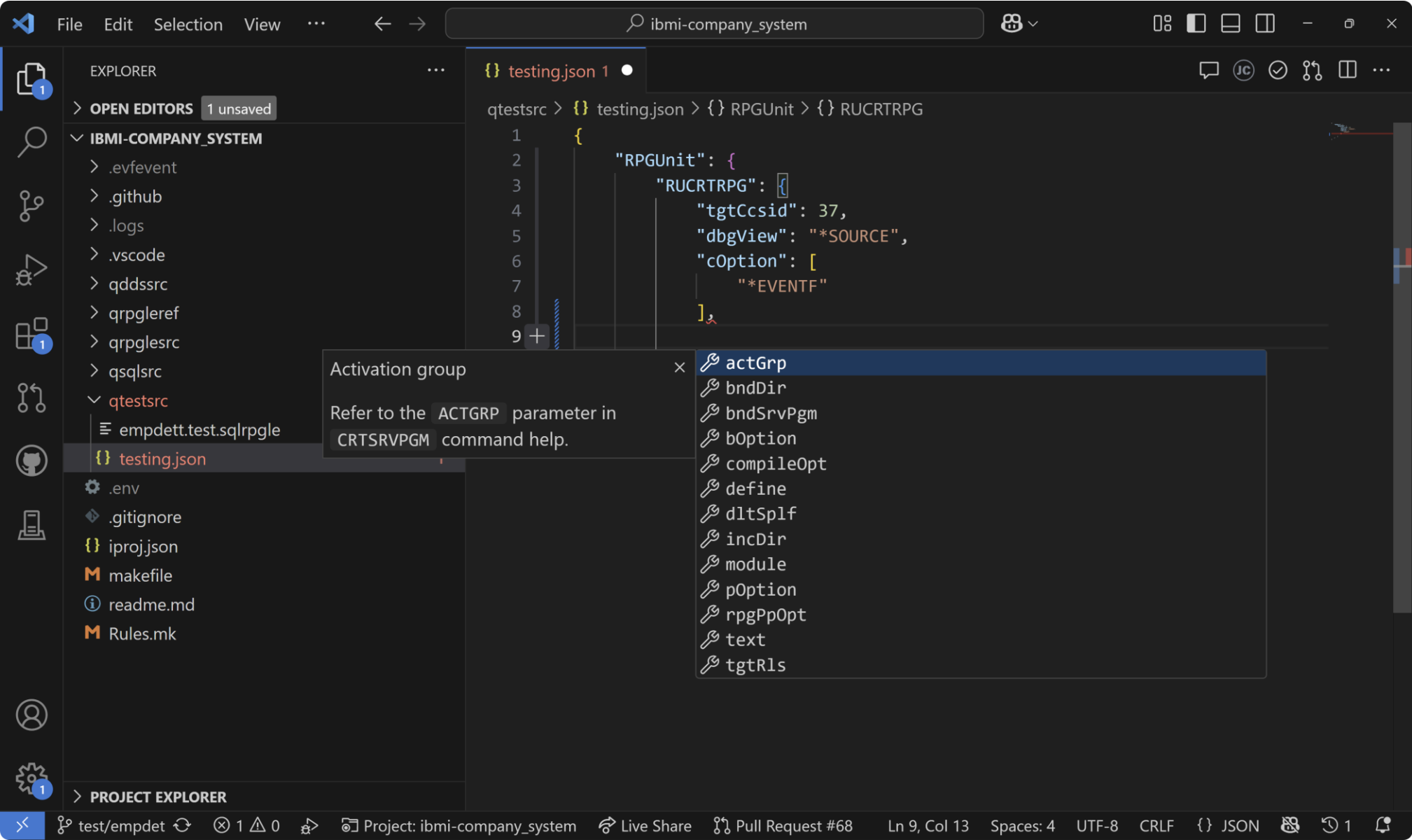
UTF-8

CRLF

{ } RPGLE

1

# Configuring tests



# Generating code coverage

TESTING

TEST EXPLORER

Filter (e.g. text, !exclude, @tag)

1/2 6.0s

examples 195ms

- cbl.test.cbll
- rpgsqlstmf.test.sqlrpgle 93ms
- rpgstmf.test.rpgle 4.0ms

sub 98ms

- cbl.test.cbll
- rpgsqlstmf.test.sqlrpgle 94ms
- rpgstmf.test.rpgle 4.0ms
  - testWhatever\_1 3.0ms
  - testWhatever\_2 1.0ms

Run Test with Coverage

TEST COVERAGE

rpgstmf.test.rpgle 60.00%

rpgstmf.test.rpgle

Hide Inline Coverage Rerun

```
165 // =====
166 // Set up test suite. Executed once per RUCALLTST.
167 // =====
168 dcl-proc setUpSuite export;
169   dcl-pi *n extproc(*dclcase) end-pi;
170
171   dcl-s rc char(1);
172
173   runCmd('OVRPRTF FILE(QSYSPRT) TOFILE(*FILE) +
174         SPLFNAME(PROC_FLOW) OVRSCOPE(*JOB)');
175   monitor;
176     openPrinter();
177     print('Executing:  setUpSuite()');
178   on-error;
179     // ignore errors ...
180   endmon;
181
182   // ... but try to remove the override.
183   monitor;
184     runCmd('DLTOVR FILE(QSYSPRT) LVL(*JOB)');
185   on-error;
186     dsply '*** Failed to delete QSYSPRT override! ***' rc;
187   endmon;
188 end-proc;
189
190
191 // =====
192 // Tear down test suite.
193 // =====
194 dcl-proc tearDownSuite export;
```

PROBLEMS

COMMENTS

DB2 FOR I

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PORTS

IBM I JOB LOG

TEST RESULTS

> rpgstmf.test.rpgle (2) [ Compilation Skipped ]

✗ testWhatever\_1 0.003s

Failure: Name of the test suite should be 'TEMPLATE'

✓ testWhatever\_2 0.001s

Test Cases: 1 passed | 1 failed | 0 errored (2)

Duration: 0.004s

IBM i Testing

✗ Close Test Coverage

✗ testWhatever\_1 Name of the test suite should be 'TEMPLATE'

✓ testWhatever\_2

> 7 older results

# Important Links

## **IBM i Testing**

VS Code Marketplace

<https://marketplace.visualstudio.com/items?itemName=IBM.vscode-ibmi-testing>

Documentation

<https://codefori.github.io/docs/developing/testing/overview/>

GitHub Repository

<https://github.com/IBM/vscode-ibmi-testing>

## **RPGUNIT**

Documentation

<https://irpgunit.sourceforge.io/help/>

GitHub Repository

<https://github.com/tools-400/irpgunit>

## **VS Code**

Documentation

<https://code.visualstudio.com/docs/editor/testing>



# Sanjula Ganepola - IBM i Unit Testing Now in VS Code!

Please take the last minute of this session to complete the evaluation. A direct link to the evaluation can be found using the QR code to the right.





**IBM i**