

# Developing CICS applications your way, using Visual Studio Code

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# Agenda

## CICS and APIs

Why do you need them?

What APIs do we have?

## The IDE options for CICS

### Visual Studio Code

Deeper dive!

What extensions are useful?

How does it all work together?

### Give it a try

Tips for your setup

Get in touch and shape the way this works.

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# CICS – the mixed language application server

You write your business logic

CICS looks after the boring stuff...

- Security, scaling, access to resources
- CICS TS – Transaction Server (commit, rollback)

For CICS to do this, it needs to understand what resources you're accessing and what you're doing.

Enter ... the APIs!

What is CICS TS for z/OS? - <https://www.ibm.com/docs/en/cics-ts/6.x?topic=what-is-cics-transaction-server-zos>  
CICS TS video series - <https://www.redbooks.ibm.com/abstracts/crse0303.html>

# The orchestra of APIs

A wide choice of languages

- COBOL, PL/I, Assembler, REXX
- C/C++, Java, Node.js

Components written in different languages can call each other and access the same resources

e.g. You can write your business logic in COBOL and write a front end in Java / Node.js

# The orchestra of APIs

COBOL, PL/I, Assembler, REXX

EXEC CICS commands

CICS translator -> a preprocessor

COMMAREA vs CHANNEL/CONTAINER

Async API

EXEC CICS RUN -> starts an async request

EXEC CICS FETCH -> retrieves async result

```
210
211     UPDATE-CUSTOMER-VSAM SECTION.
212     UCV010.
213
214     *
215     *   Position at the matching CUSTOMER record and
216     *   lock it.
217     *
218     MOVE COMM-CUSTNO TO DESIRED-CUSTNO.
219
220     EXEC CICS READ FILE('CUSTOMER')
221             RIDFLD(DESIRED-CUST-KEY)
222             INTO(WS-CUST-DATA)
223             UPDATE
224             RESP(WS-CICS-RESP)
225             RESP2(WS-CICS-RESP2)
226     END-EXEC.
227
```

Developing applications - <https://www.ibm.com/docs/en/cics-ts/6.x?topic=developing-applications>

EXEC CICS command summary - <https://www.ibm.com/docs/en/cics-ts/6.x?topic=reference-cics-command-summary>

ASYNCR API - <https://www.ibm.com/docs/en/cics-ts/6.x?topic=applications-developing-asynchronous-requests>

# The orchestra of APIs

```
62     @GET
63     @Produces("application/json")
64     public Response getCompanyName()
65     {
66         logger.entering(this.getClass().getName(), GET_COMPANY_NAME);
67         // We cache the company name as a static variable. If not set, we jCICS
68         // LINK to a COBOL program to go get it
69         if (companyNameString == null)
70         {
71             Program getCompy = new Program();
72             getCompy.setName("GETCOMPY");
73
74             byte[] companyNameBytes = new byte[40];
75
```

```
// Gets the current CICS Context for the environment we're running in
CICSContext task = CICSContext.getCICSContext();

try {
    // Create a new channel called "charchan", with a CHAR container called
    // "charcont"
    // Add the text to the CHAR container
    CHARContainer charContainer = task.getChannel(CHANNEL_NAME).getCHARContainer(CONTAINER_NAME)
        .put("I'm running under task ");

    // Get the current task number that this unit of work is running under
    Integer taskNumber = task.getTaskNumber();

    // Add the task number to the end of the CHAR container
    charContainer.append(taskNumber.toString());

    // Get the full contents of the container and print this
```

## Java

- JCICS API - similar to EXEC CICS
- JCICSX API – remoteable and more “Java native” (provides LINK -> Channel/Container)
- CICS Liberty  
Jakarta, Eclipse MicroProfile, Spring Boot
- Other Java libraries you need!

## Maven and Gradle plugins available

Java JCICS - <https://www.ibm.com/docs/en/cics-ts/6.1.0?topic=applications-java-development-using-jcics>

Java JCICSX - <https://www.ibm.com/docs/en/cics-ts/6.1.0?topic=applications-java-development-using-jcicsx>

cics-bundle-maven - <https://github.com/IBM/cics-bundle-maven>

cics-bundle-gradle - <https://github.com/IBM/cics-bundle-gradle>

# The orchestra of APIs

```
73
74     let url = catalogServer + '/exampleApp/inquireCatalogWrapper';
75
76     console.log('Get first set of items API request: ' + url);
77     console.dir(inquireRequest1);
78
79     var promise1 = cics.invoke(url, inquireRequest1)
80       .then(function (json) {
81         console.log('Get first set of items API response: ');
82         console.dir(json.inquireCatalogResponse.catalogItem);
83
84         allItemsArray = allItemsArray.concat(json.inquireCatalogRespor
85       });
86
```

## Node.js

- Promises and similar Node.js async API
- Link to other CICS programs
- Other JavaScript libraries you need!



# API samples

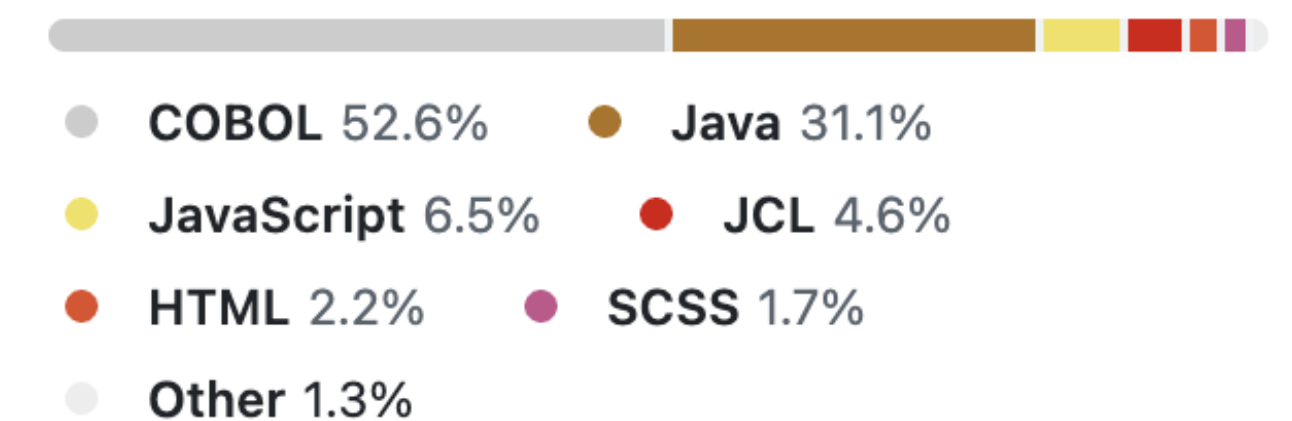
## CICSDev

- A large collection of samples on GitHub
- <https://github.com/cicsdev>

## CICS Banking Sample Application

- Our biggest sample
- Mix of COBOL, Java, JavaScript
- 3270 interface
- Liberty-hosted Web interface

### Languages



EXEC CICS command summary - <https://www.ibm.com/docs/en/cics-ts/6.x?topic=reference-cics-command-summary>

Java JCICS - <https://www.ibm.com/docs/en/cics-ts/6.1.0?topic=applications-java-development-using-jcics>

Java JCICSX - <https://www.ibm.com/docs/en/cics-ts/6.1.0?topic=applications-java-development-using-jcicsx>

CBSA - <https://github.com/cicsdev/cics-banking-sample-application-cbsa>

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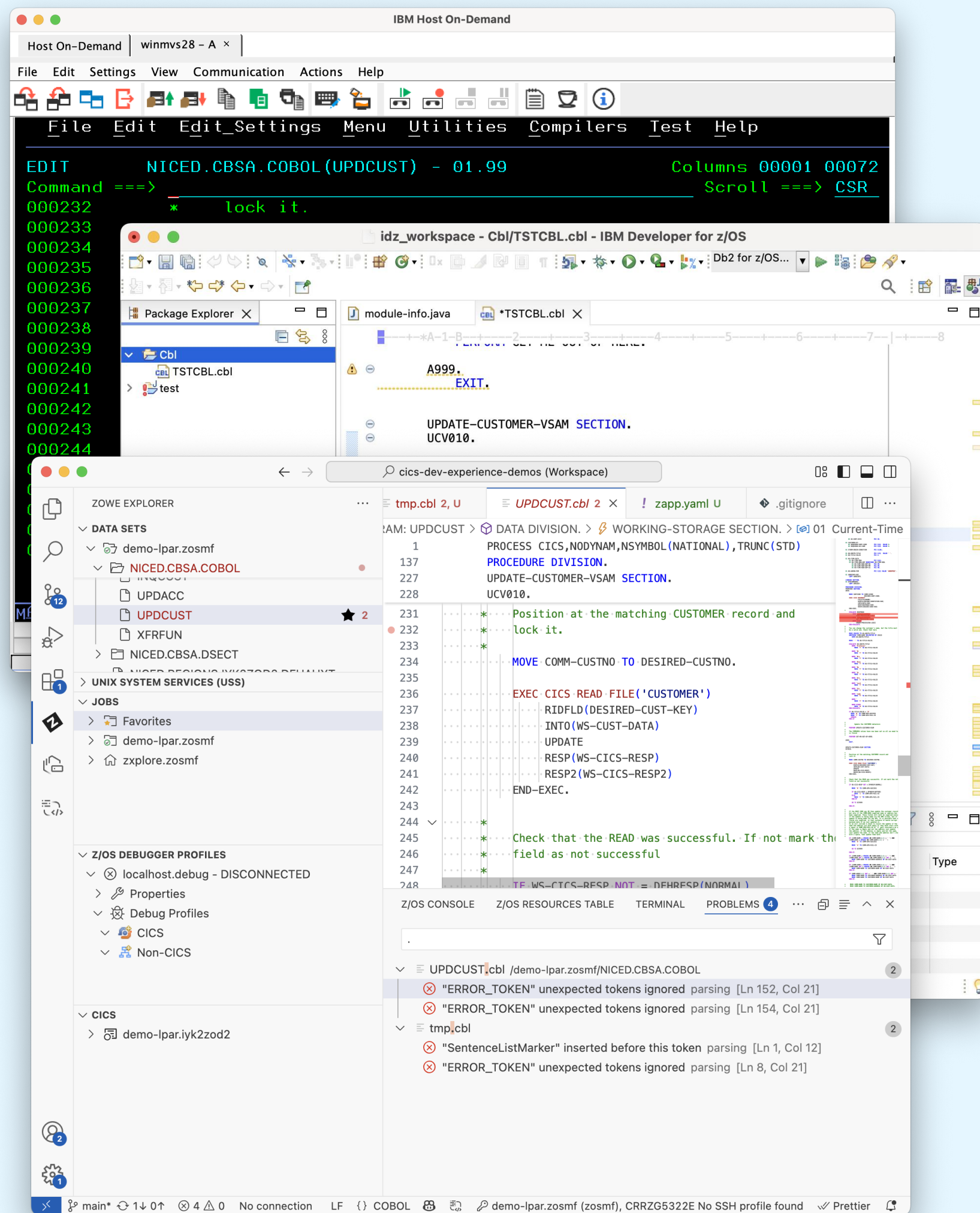
How does it all work together?

### Give it a try

Tips for your setup

Get in touch and shape the way this works.

# Our 3 contestants



## 3270 (ISPF, CEMT)

- Traditional choice
- Keyboard, keyboard, keyboard!

## Eclipse

- Mature, stable, feature-rich

## Visual Studio Code (VS Code)

- The new(ish) kid on the block
- Lightweight
- Modular / extension-oriented

# Our 3 contestants

- Many tasks can be completed in any environment, so it's a preference call.
- What your colleagues do doesn't have to be what you do!
- Some options will fit better with your company's SCM and any mandated workflows
- Today we'll focus on VS Code!

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# VS Code

Local file manipulation  
Git tools

VS Code

Data sets, z/OS Unix, Jobs, z/OS Console  
Profiles (connection details)

Zowe Explorer

Managing CICS resources in a CICS region

IBM CICS for Zowe Explorer

COBOL, PL/I, Assembler  
syntax highlighting, code complete

IBM Z Open Editor

ZOWE EXPLORER

DATA SETS

demo-lpar.zosmf

NICED.CBSA.COBOL

GETCOMPY

GETSCODE

INQACC

INQACCCU

INQCUST

UPDACC

UPDCUST

XFRFUN

NICED.CBSA.CUSTOMER

NICED.CBSA.DB2.JCL.INSTALL

NICED.CBSA.DBRM

UNIX SYSTEM SERVICES (USS)

JOB

Favorites

demo-lpar.zosmf Owner: niced...

IYK2ZOD3(JOB53770) - ACTIVE

IYK2ZOD2(JOB68481) - MV28 - CANCELLED

IYK2ZOD2(JOB68738) - ACTIVE

CICS

demo-lpar.iyk2zod2

IYK2ZOD2

Programs (UPD\*) [3]

UPDACC

UPDACCT

UPDCUST

UPDCUST.cbl 7

1 PROCEDURE DIVISION. > UPDATE-CUSTOMER-VSAM SECTION. > UCV010.

136 PROCESS CICS,NODYNAM,NSYMBOL(NATIONAL),TRUNC(STD)

211 PROCEDURE DIVISION.

212 UPDATE-CUSTOMER-VSAM SECTION.

213 UCV010.

215 \* Position at the matching CUSTOMER record and

216 \* lock it.

217 \*

218 MOVE COMM-CUSTNO TO DESIRED-CUSTNO.

219 \*

220 EXEC CICS READ FILE('CUSTOMER')

221 RIDFLD(DESIRED-CUST-KEY)

222 INTO(WS-CUST-DATA)

223 UPD

224 RES UPDATE

225 RES COBOL CICS: READ UPDATE COBOL CICS: READ UPDATE

226 END-EXEC COBOL Embedded SQL: Update Where Current ... COBOL Embedd...

227 COBOL Embedded SQL: Set-Level SQL Update ... COBOL Embedd...

228 \*

229 \* Check that the READ was successful. If not mark the re

230 \* field as not successful

231 \*

232 IF WS-CICS-RESP NOT = DFHRESP(NORMAL)

Z/OS CONSOLE

TERMINAL

PROBLEMS 7

UPDCUST.cbl /demo-lpar.zosmf/NICED.CBSA.COBOL 7

"READOptions" is invalid parsing [Ln 223, Col 17]

Unreachable code symbol [Ln 207, Col 8]

Unreachable code symbol [Ln 347, Col 8]

Unreachable code symbol [Ln 351, Col 8]

Unreachable code symbol [Ln 354, Col 12]

Unreachable code symbol [Ln 358, Col 12]

Unreachable code symbol [Ln 365, Col 8]

Ln 223, Col 20 Spaces: 3 UTF-8 LF {} COBOL No Zowe CLI profile found. Prettier

OUTLINE

PROGRAM: UPDCUST

IDENTIFICATION DIVISION...

ENVIRONMENT DIVISION.

CONFIGURATION SECT...

INPUT-OUTPUT SECTI...

DATA DIVISION.

WORKING-STORAGE S...

COPY SORTCODE.

77 SYSIDERR-RETRY

01 WS-CICS-WORK-A...

03 WS-CICS-RESP

03 WS-CICS-RESP2

LOCAL-STORAGE SECT...

01 DB2-DATE-REFOR...

03 DB2-DATE-REF-YR

03 FILLER

03 DB2-DATE-REF-...

03 FILLER

03 DB2-DATE-REF-D...

01 WS-CUST-DATA.

COPY CUSTOMER.

01 WS-EIBTASKN12

01 WS-SQLCODE-DISP

01 DESIRED-CUST-KEY.

03 DESIRED-SORT-...

03 DESIRED-CUSTNO

01 WS-CUST-REC-LEN

01 WS-U-TIME

# Demo

Hey, can you take a look at the  
*update customer* feature of  
CBSA? It's not working  
properly...

Yeah sure!



Demo uses **CBSA** installed in a CICS region  
**z/OSMF** available on the host  
**CMCI** connection through an SMSS region with the CMCI JVM server

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## **Give it a try**

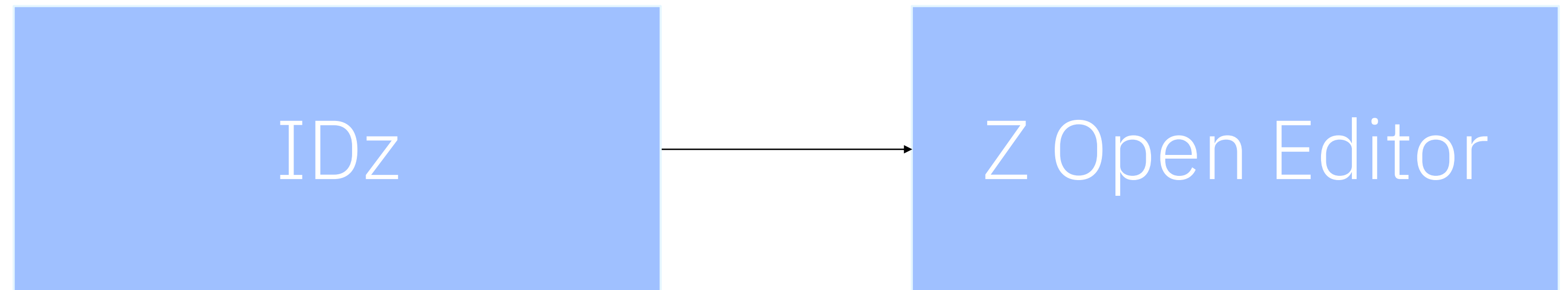
Tips for your setup

Get in touch and shape the way this works.



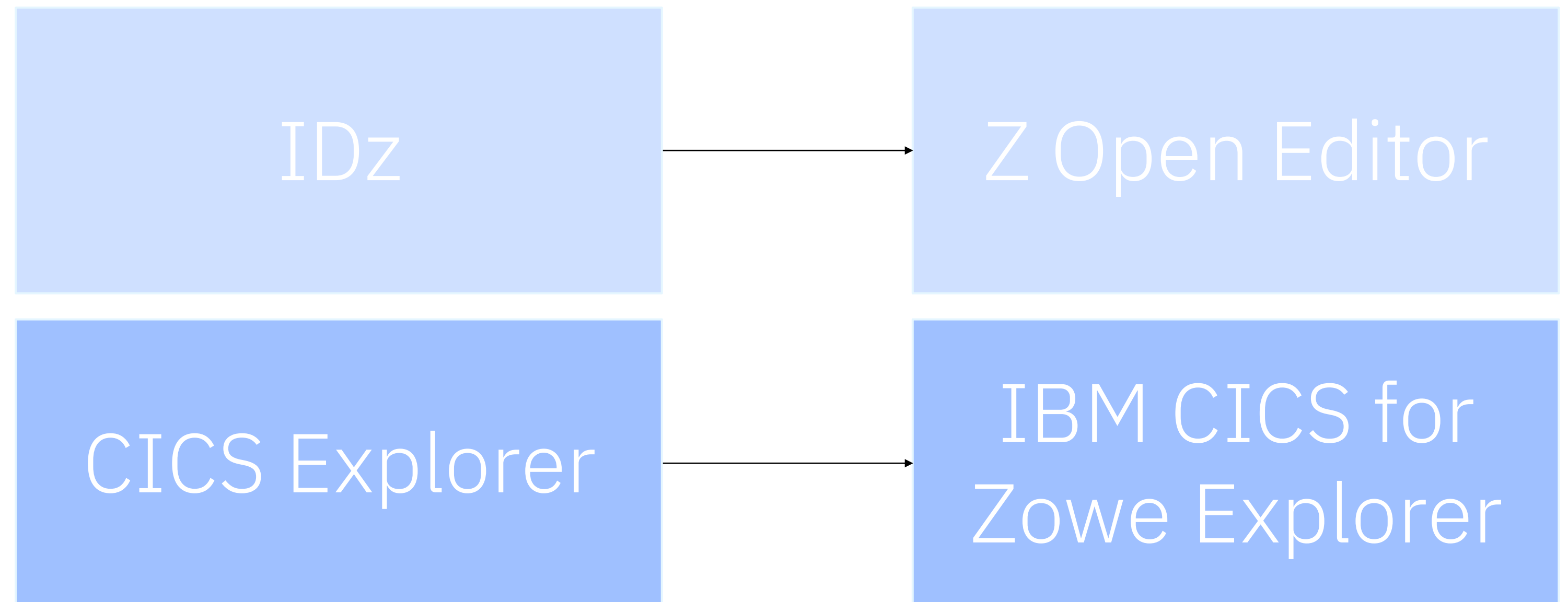
# What are you currently using?

- 🙄 If you have an IDz license you are supported to use all Z Open Editor features
- ✅ Without an IDz license you can still use most Z Open Editor features



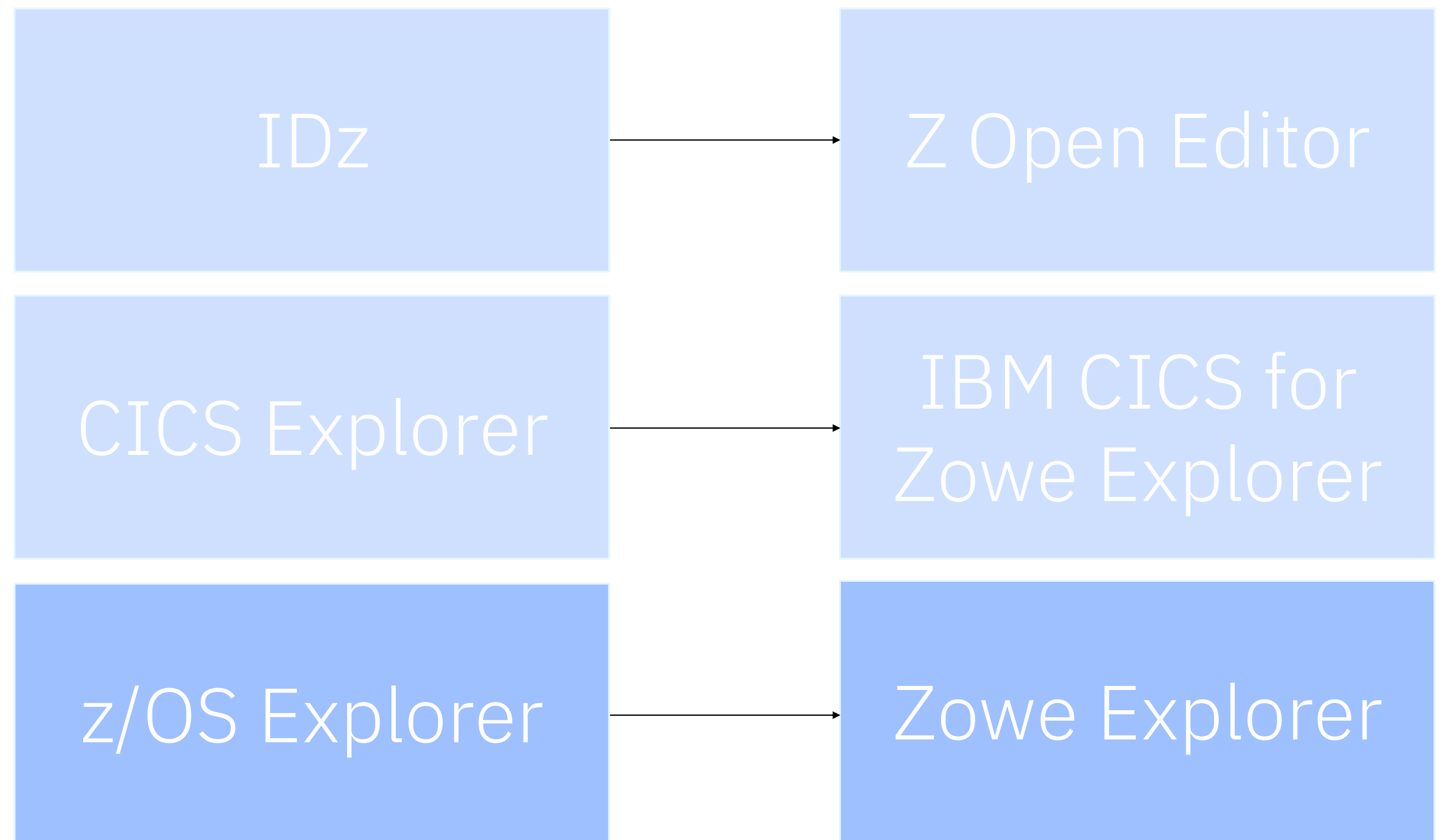
# What are you currently using?

- CICS Explorer uses the same **CMCI connection** as IBM CICS for Zowe Explorer



# What are you currently using?

- z/OS Explorer with z/OSMF or FTP – you can use this with Zowe Explorer (and IBM z/OS FTP for Zowe Explorer)
- z/OS Explorer with RSE – install the additional [RSE API](#) to use Zowe Explorer



# ID/z EE extension pack

One click to install:

- Z Open Editor
- Z Open Debug
- Zowe Explorer
- IBM CICS for Zowe Explorer

The screenshot shows the Visual Studio Marketplace page for the 'IBM Developer for z/OS on VS Code Extension Pack'. The page is viewed in a browser window with the URL 'marketplace.visualstudio.com/items?itemName=IBM.devel...'. The header includes the Visual Studio logo and 'Marketplace' text. Below the header, the extension's name is prominently displayed, along with the IBM logo and 'ibm.com' link. It shows '140 installs' and a rating of '(0)'. A green 'Install' button is visible, along with a 'Trouble Installing?' link. The description states it is an 'Extension pack for mainframe application developers entitled to IBM Developer for z/OS Enterprise Edition.' Below this, there are tabs for 'Overview', 'Version History', 'Q & A', and 'Rating & Review'. The 'Overview' tab is selected, showing a detailed description of the extension pack and a list of 'Extensions included'. These include 'IBM Z® Open Editor', 'IBM Z® Open Debug', 'Zowe Explorer', and 'IBM CICS® for Zowe Explorer', each with a brief description of its functionality. On the right side, there are sections for 'Categories' (Extension Packs), 'Tags' (ASM, CICS, COBOL, Debug, HLASM, IBM Z, IDE, IDz, IDzEE, JCL, language-server, LSP, Mainframe, PL/I, PL1, PLI, REXX, Z Software, z/OS, zOS, Zowe), 'Works with' (Universal, Web), 'Resources' (Issues, Repository, Homepage, License, Changelog), 'Project Details' (IBM/zopeneditor-about, No Pull Requests, Last Commit: 4 weeks ago, 118 Open Issues), and 'More Info' (Version: 5.4.0, Released on: 25/04/2025, 23:37:00, Last updated: 25/04/2025, 23:41:08, Publisher: IBM, Unique Identifier: IBM.developer-for-zos-on-vscode-extension-pack, Report: Report a concern). Social media icons for Twitter, Facebook, and Email are at the bottom right.

Visual Studio | Marketplace

Visual Studio Code > Extension Packs > IBM Developer for z/OS on VS Code Extension Pack

New to Visual Studio Code? [Get it now.](#)

## IBM Developer for z/OS on VS Code Extension Pack

IBM [ibm.com](#) | 140 installs | (0) | Free

Extension pack for mainframe application developers entitled to IBM Developer for z/OS Enterprise Edition.

[Install](#) [Trouble Installing?](#)

### Overview

#### IBM Developer for z/OS® on VS Code Extension Pack

Extension pack containing all the VS Code extensions available for [IBM Developer for z/OS® Enterprise Edition](#).

#### Extensions included

##### IBM Z® Open Editor

[IBM Z® Open Editor](#) provides language support for the IBM® Enterprise COBOL, PL/I, HLASM, REXX, and JCL languages. It also extends Zowe Explorer with the IBM Remote System Explorer protocol and a graphical resource table allowing you to filter, sort, page, and search in data sets, unix files and jobs. It also provides advanced development tools such as preprocessor support, assembler macros support, and a green screen emulator.

##### IBM Z® Open Debug

[IBM Z® Open Debug](#) provides interactive debugging support for z/OS COBOL, PL/I and High Level Assembler applications in VS Code, in conjunction with IBM z/OS Debugger.

##### Zowe Explorer

[Zowe Explorer](#) provides graphical tree views and capabilities to

- create, modify, rename, copy, and upload data sets directly to a z/OS mainframe.
- create, modify, rename, and upload z/OS UNIX files directly to a z/OS mainframe.
- view, poll, and download job spool files on the z/OS mainframe.

##### IBM CICS® for Zowe Explorer

[IBM CICS® Extension for Zowe Explorer](#) extends Zowe Explorer with additional functionality for CICS developers. This extension allows interactions with CICS regions and resources, and the ability to run commands against them.

#### Categories

Extension Packs

#### Tags

ASM CICS COBOL Debug HLASM  
IBM Z IDE IDz IDzEE JCL  
language-server LSP Mainframe PL/I  
PL1 PLI REXX Z Software z/OS  
zOS Zowe

#### Works with

Universal, Web

#### Resources

[Issues](#)  
[Repository](#)  
[Homepage](#)  
[License](#)  
[Changelog](#)

#### Project Details

[IBM/zopeneditor-about](#)  
[No Pull Requests](#)  
[Last Commit: 4 weeks ago](#)  
[118 Open Issues](#)

#### More Info

Version	5.4.0
Released on	25/04/2025, 23:37:00
Last updated	25/04/2025, 23:41:08
Publisher	IBM
Unique Identifier	IBM.developer-for-zos-on-vscode-extension-pack
Report	<a href="#">Report a concern</a>

[Twitter](#) [Facebook](#) [Email](#)



# Zowe profiles

- JSON based files that contain your connection details
- Updated significantly with Zowe v3 in Oct 2024
- 😊 Shared with zowe-cli
- 😊 Can be stored in workspaces to share with colleagues
- 😞 Can be a bit painful to get set up with
- New in v3 are nested profiles ... you can associate profiles for a host together and share properties. Nested is the way to go! 🎉

# Zowe profiles

- Profiles are nested **by host**
- **Common properties** for a host
- **Connection profiles** inheriting common properties
- **Save passwords** to **secure** storage

```
{
  "$schema": "../zowe.schema.json",
  "profiles": {
    "host1": {
      "properties": {
        "host": "host1.com",
        "rejectUnauthorized": false
      },
      "secure": ["user", "password"],
      "profiles": {
        "zosmf": {
          "type": "zosmf",
          "properties": {
            "port": 32070,
            "protocol": "https"
          }
        },
        "cicsplex1": {
          "type": "cics",
          "properties": {
            "protocol": "http",
            "port": 12345,
            "cicsPlex": "MYPLEX",
            "regionName": "MYREGION"
          }
        }
      }
    }
  },
}
```

```
    "host2": {
      "properties": {
        "host": "host2.com",
        "rejectUnauthorized": false
      },
      "secure": ["user", "password"],
      "profiles": {
        "zosmf": {
          "type": "zosmf",
          "properties": {
            "port": 32070,
            "protocol": "https"
          }
        },
        "cicsplex3": {
          "type": "cics",
          "properties": {
            "protocol": "https",
            "port": 12347
          }
        }
      },
      "defaults": {
        "zosmf": "host1.zosmf",
        "tso": "host1.tso",
        "ssh": "host1.ssh",
        "rse": "host1.rse",
        "cics": "host1.cicsplex1"
      }
    },
    "autoStore": true
  }
}
```

An example: <https://gist.github.com/davenice/0cd4623ea3386ab522eac0999b8f7aaa>

# ZAPP files

- YAML files that help set out rules for your Z application
- Referenced by Z Open Editor, IDz, and build tools
- The most basic reason is to help resolve copybooks if you're editing code remotely

## Steps:

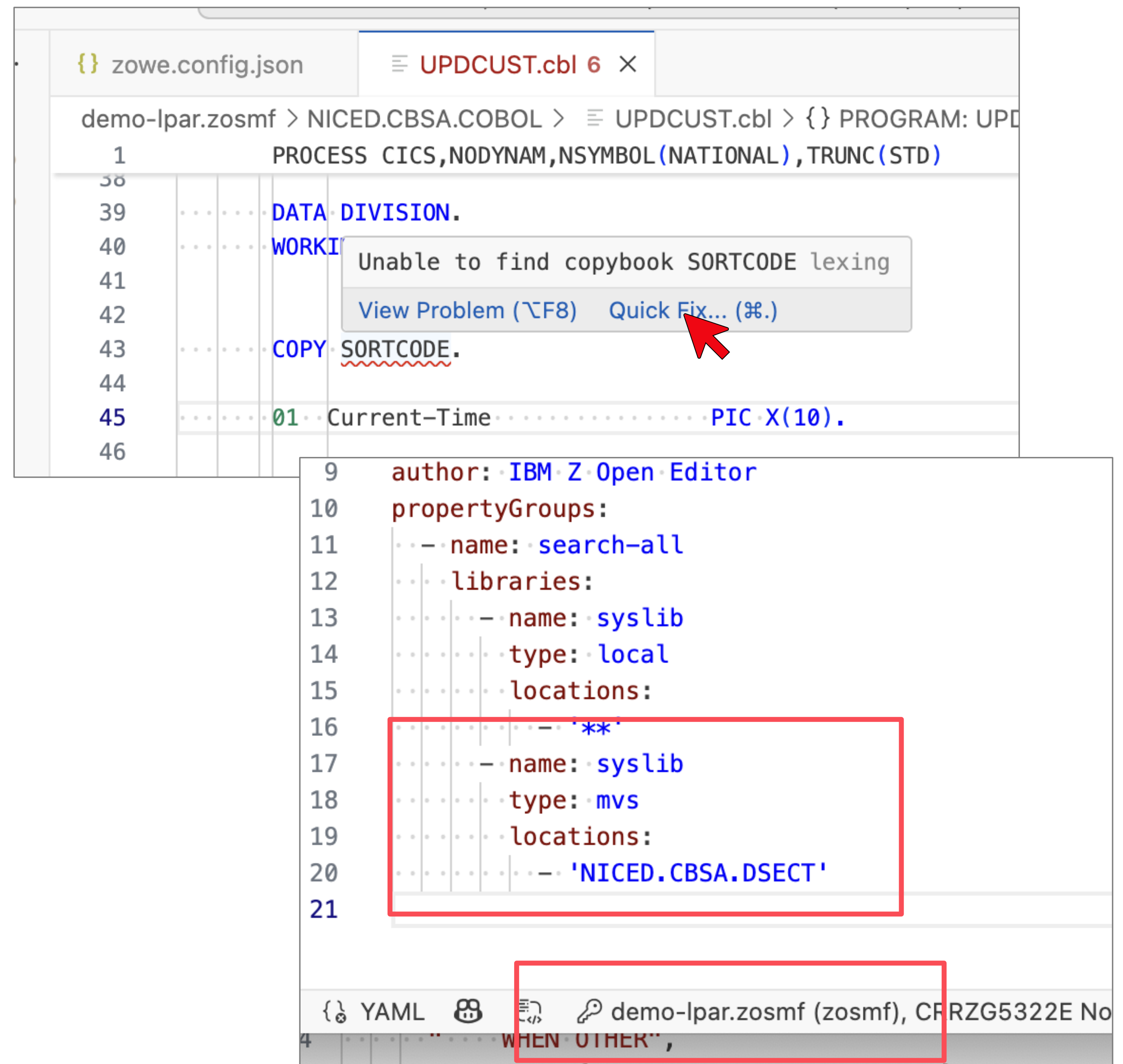
- (1) Set up the ZAPP file
- (2) Tell Z Open Editor which connection to use

ZAPP files doc: <https://ibm.github.io/zopeneditor-about/Docs/zapp.html>

Property groups doc (for include resolution): [https://ibm.github.io/zopeneditor-about/Docs/setting\\_propertygroup.html](https://ibm.github.io/zopeneditor-about/Docs/setting_propertygroup.html)

# ZAPP files

- Copybooks unresolved!
- Use quick fix to jump into the ZAPP file
- Add entry to resolve from MVS (can use variables so these can be shared with your app code)
- Use status bar widget to choose connection





# Get involved!

## Contribute

- Zowe Explorer, IBM CICS for Zowe Explorer are both open source projects!
- Raise your 🐛, feature requests, PRs :-D
- We'd ❤️ to talk to more CICS developers whatever their current development workflow

## Connect with CICS!

- LinkedIn - <https://www.linkedin.com/groups/4304249/>
- Stack overflow - <https://stackoverflow.com/questions/tagged/cics>
- Github - <https://github.com/zowe/cics-for-zowe-client/discussions>

# Thank you

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