SuperBOL Studio User Manual

Version 1.0: The Ultimate Guide

The SuperBOL Team at Titagone-OCamlPro

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Table of contents

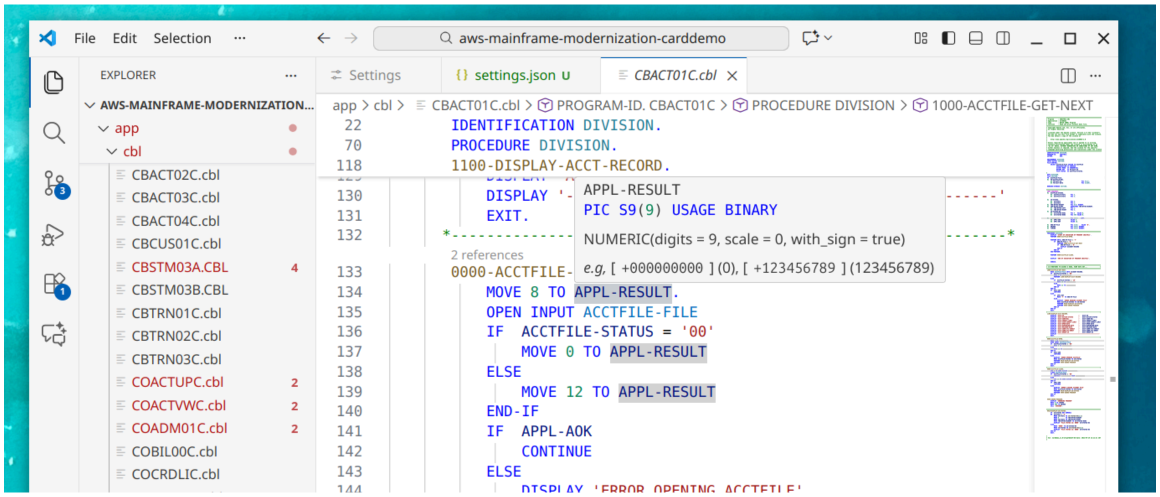
This manual is available:

- As an HTML website
- As a PDF File: SuperBOL-Studio-User-Manual.pdf

1 Forewords

SuperBOL Studio is an extension for VSCode to develop in COBOL. SuperBOL Studio uses an LSP (Language Server Protocol) Server to understand COBOL sources, display various information and help developers navigate in the sources.

SuperBOL Studio was firstly designed by Titagone-OCamlPro to work with the GnuCOBOL free open-source compiler.



```
       IDENTIFICATION DIVISION.
       PROCEDURE DIVISION.
       1100-DISPLAY-ACCT-RECORD.
           DISPLAY '-
           EXIT.
      *-------------
      2 references
       0000-ACCTFILE-
           MOVE 8 TO APPL-RESULT.
           OPEN INPUT ACCTFILE-FILE
           IF  ACCTFILE-STATUS = '00'
               MOVE 0 TO APPL-RESULT
           ELSE
               MOVE 12 TO APPL-RESULT
           END-IF
           IF  APPL-AOK
               CONTINUE
           ELSE
               DISPLAY 'ERROR OPENING ACCTFILE'
```

```
APPL-RESULT
PIC S9(9) USAGE BINARY
NUMERIC(digits = 9, scale = 0, with_sign = true)
e.g, [ +000000000 ] (0), [ +123456789 ] (123456789)
```

2 Introduction

Welcome to this user manual. This document will explain how to install, configure and use the SuperBOL Studio extension for Vscode to edit COBOL application sources.

The SuperBOL Studio extension allows COBOL developers to benefit from a modern IDE experience to edit their COBOL programs.

Links related with SuperBOL Studio:

- Description on SuperBOL website: https://superbol.eu/solutions/superbol-studio/
- Description on Open-VSX: https://open-vsx.org/extension/OCamlPro/SuperBOL
- Description on Vscode Marketplace: https://marketplace.visualstudio.com/items?itemName=OCamlPro.SuperBOL
- Sources on Github: https://github.com/ocamlpro/superbol-studio-oss
- Another Documentation: https://ocamlpro.github.io/superbol-studio-oss/sphinx

In this manual, screenshots are often taken in a light color theme, to ease printing this document, though many users prefer to use VSCode in the default dark theme. A section in the "Using Vscode" chapter shows how to switch between color themes.

3 Installation

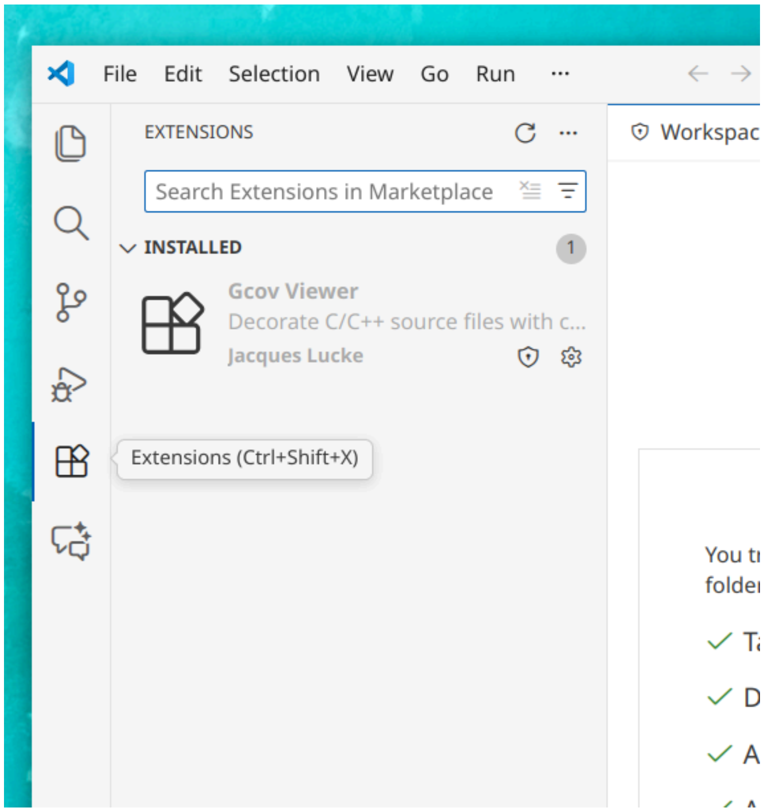
You can install SuperBOL Studio either directly from within VSCode (using the extensions marketplaces), or via a downloaded VSIX file.

3.1 Installation within VSCode

This is the easiest way to install SuperBOL Studio, directly from within VSCode. With this way, you will install the official versions of SuperBOL Studio only. Depending on your version of VSCode, the extensions come either from Microsoft VSCode Marketplace or from the Open-OSX repository, managed by Eclipse Foundation.

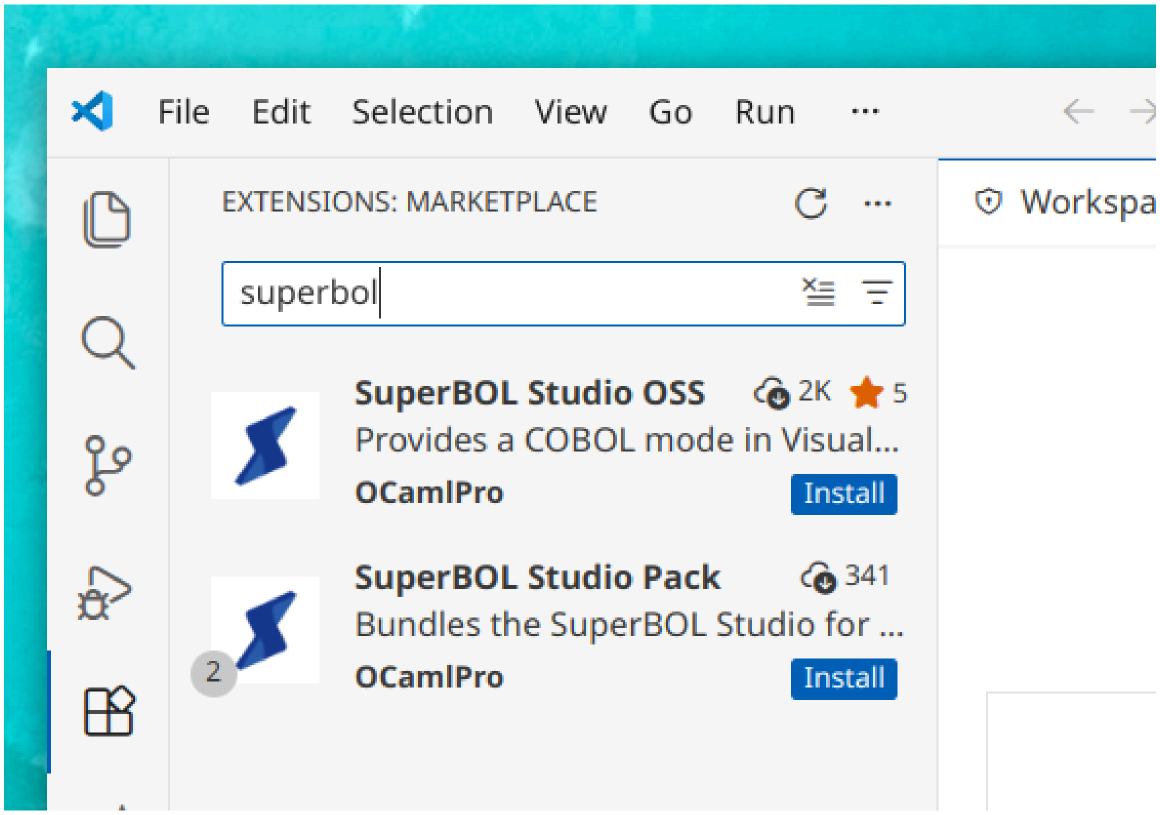
Follow these steps:

1. Click on the "Extensions" icon in the activity bar on the left-hand side, or press Ctrl+Shift+X.



Gcov Viewer
Decorate C/C++ source files with c...
Jacques Lucke

2. Search for “superbol”



3. The first items that should appear will be:
   - SuperBOL Studio OSS: the extension that you want to install to use SuperBOL Studio
   - SuperBOL Studio Pack: an extension that contains the "SuperBOL Studio OSS" extension, together with other third-party extensions
4. Click on the `Install` button on one of these two extensions
5. The extension will install itself, and the "Install" button should turn into a configuration wheel button

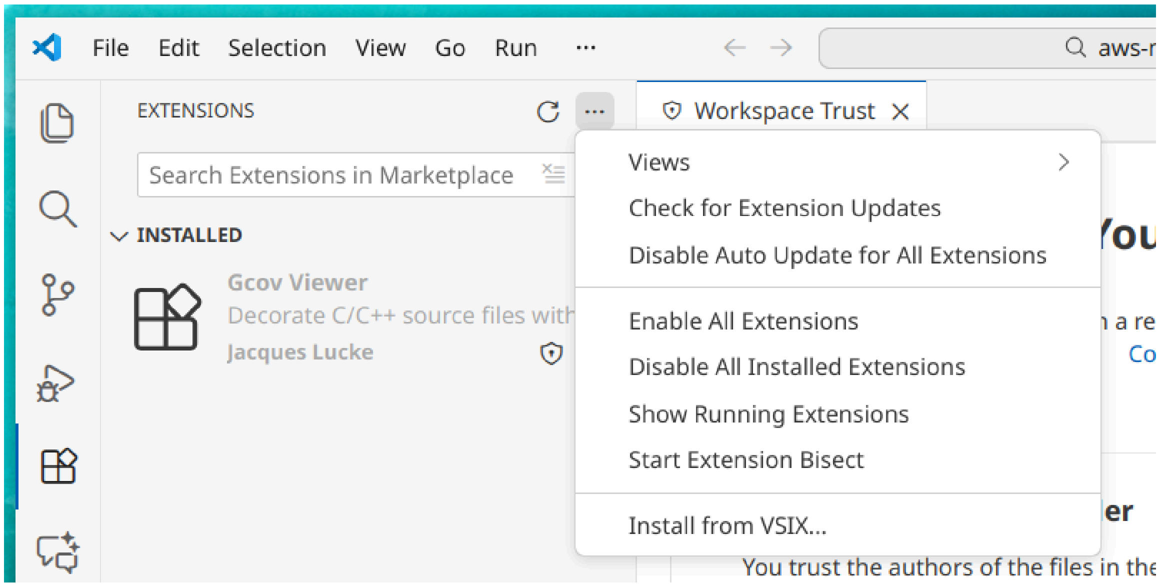
You can find further instructions for installing extensions directly within VSCode on this page.

3.2 Installation via a downloaded VSIX file

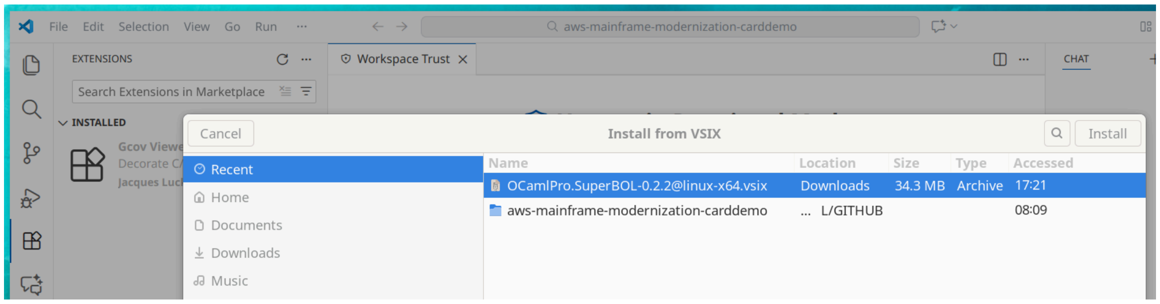
This is the way to use if you want to install an unofficial version of SuperBOL Studio, typically a test version with beta features, or a version compiled from the sources on Github.

Follow these steps:

1. Check the location of the extension file on your computer. It should come as a single file with the .vsix extension
2. In VSCode, go to the the "Extensions" view
3. In the sidebar, click on the three dots (`...`) on the top right-hand side (just above `search`),

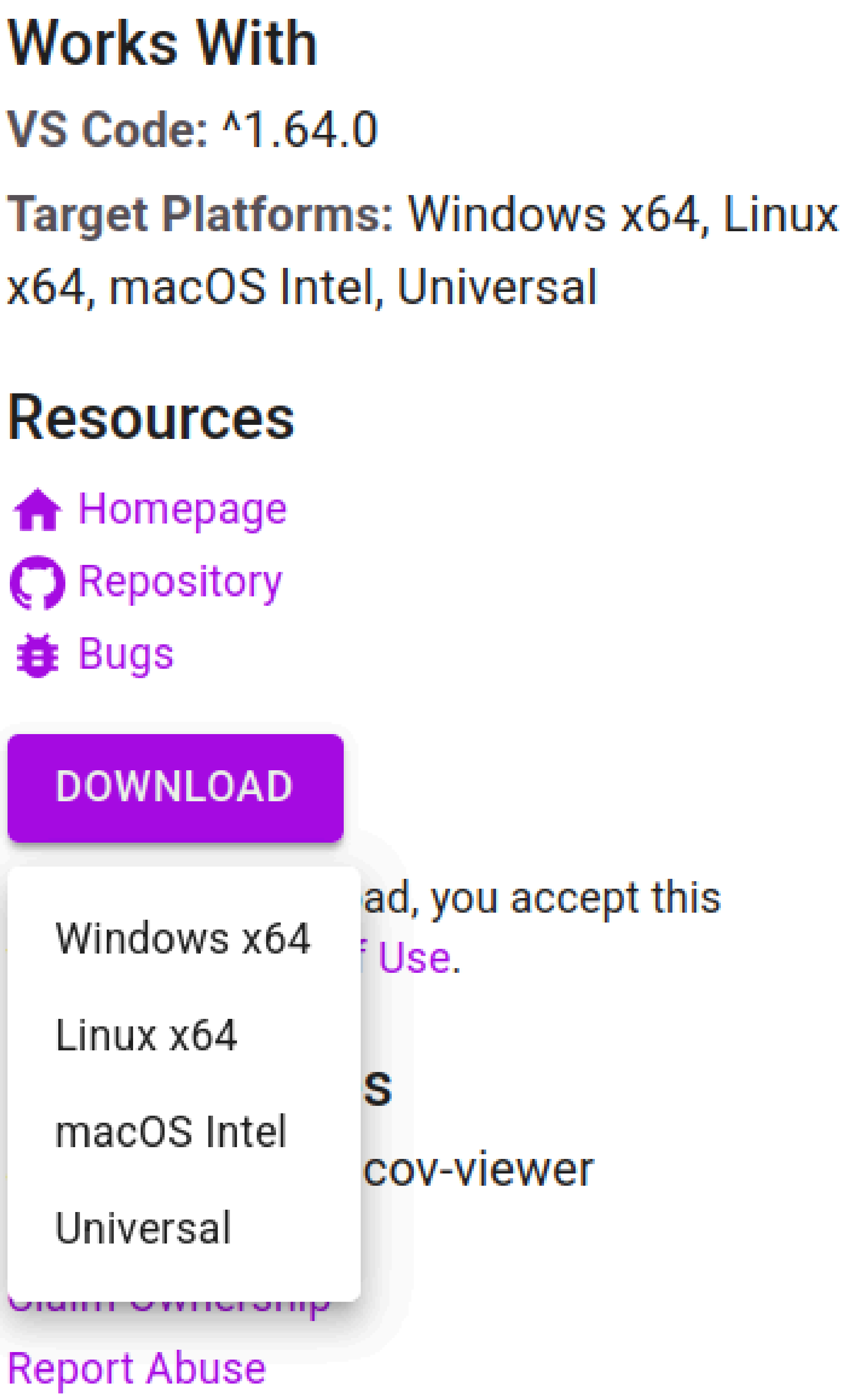


4. Select `Install from VSIX...`, and a dialog box should appear
5. Pick the VSIX file on your disk, and click Install



Name	Location	Size	Type	Accessed
OCamlPro.SuperBOL-0.2.2@linux-x64.vsix	Downloads	34.3 MB	Archive	17:21
aws-mainframe-modernization-carddemo	... L/GITHUB			08:09

Note that you can also use this method to install Vsix files downloaded from the marketplaces. For that, you need to select the correct binary for your platform:



Works With

VS Code: ^1.64.0

Target Platforms: Windows x64, Linux x64, macOS Intel, Universal

Resources

Homepage
Repository
Bugs

ad, you accept this
f Use.

s
cov-viewer

Claim Ownership
Report Abuse

3.3 SuperBOL Studio OSS vs SuperBOL Studio Pack

The SuperBOL Studio OSS extension contains the SuperBOL Studio basic features. OSS stands for “Open-Source Software”, as the extension is open-source: most of the sources are publicly available on Github (allowing to rebuild the .vsix file with public features), and the other sources are provided to SuperBOL’s customers within the “Subscription” contract.

The SuperBOL Studio Pack extension is a “meta extension”: it selects a set of extensions to be installed together. This is usually useful if you want to benefit from our choice of some other extensions that we found useful to use together with SuperBOL Studio OSS.

Currently, SuperBOL Studio Pack includes:

- SuperBOL Studio OSS, of course
- tamasfe.even-better-toml: a mode to edit TOML files, that can typically be used to edit the `superbol.toml` file for advanced configuration. See https://marketplace.visualstudio.com/items?itemName=tamasfe.even-better-toml

3.4 Links to the Extensions Pages

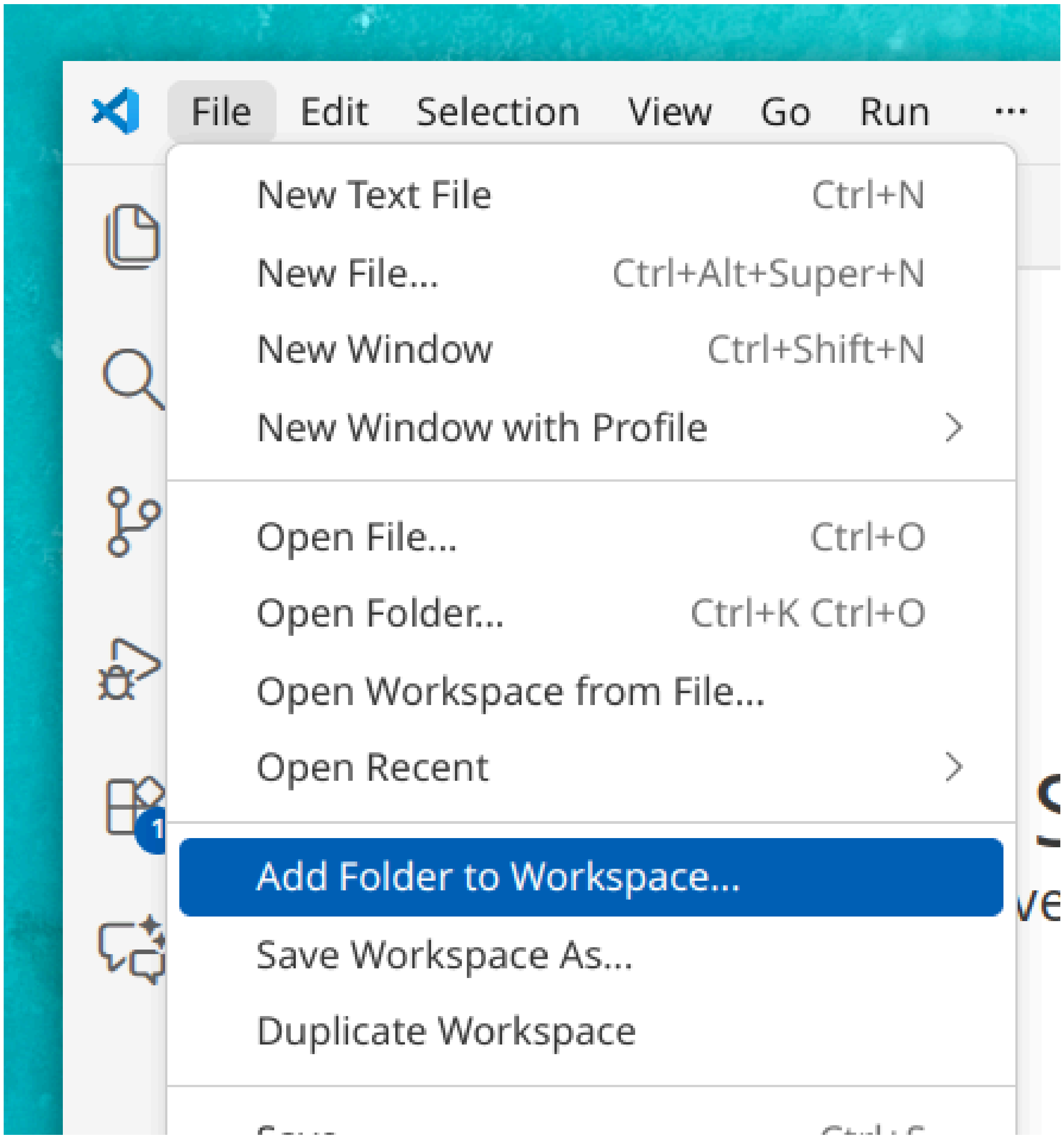
- Descriptions on Open-VSX: https://open-vsx.org/
  - SuperBOL Studio OSS: https://open-vsx.org/extension/OCamlPro/SuperBOL
  - SuperBOL Studio Pack: https://open-vsx.org/extension/OCamlPro/SuperBOL-studio-pack
- Descriptions on Vscode Marketplace:
  - SuperBOL Studio OSS: https://marketplace.visualstudio.com/items?itemName=OCamlPro.SuperBOL
  - SuperBOL Studio Pack: https://marketplace.visualstudio.com/items?itemName=OCamlPro.SuperBOL-studio-pack
- Sources on Github: https://github.com/ocamlpro/superbol-studio-oss

4 Workspace Configuration

SuperBOL Studio can be used both on single COBOL files, or on a full COBOL project, usually called a Workspace in VSCocde language.

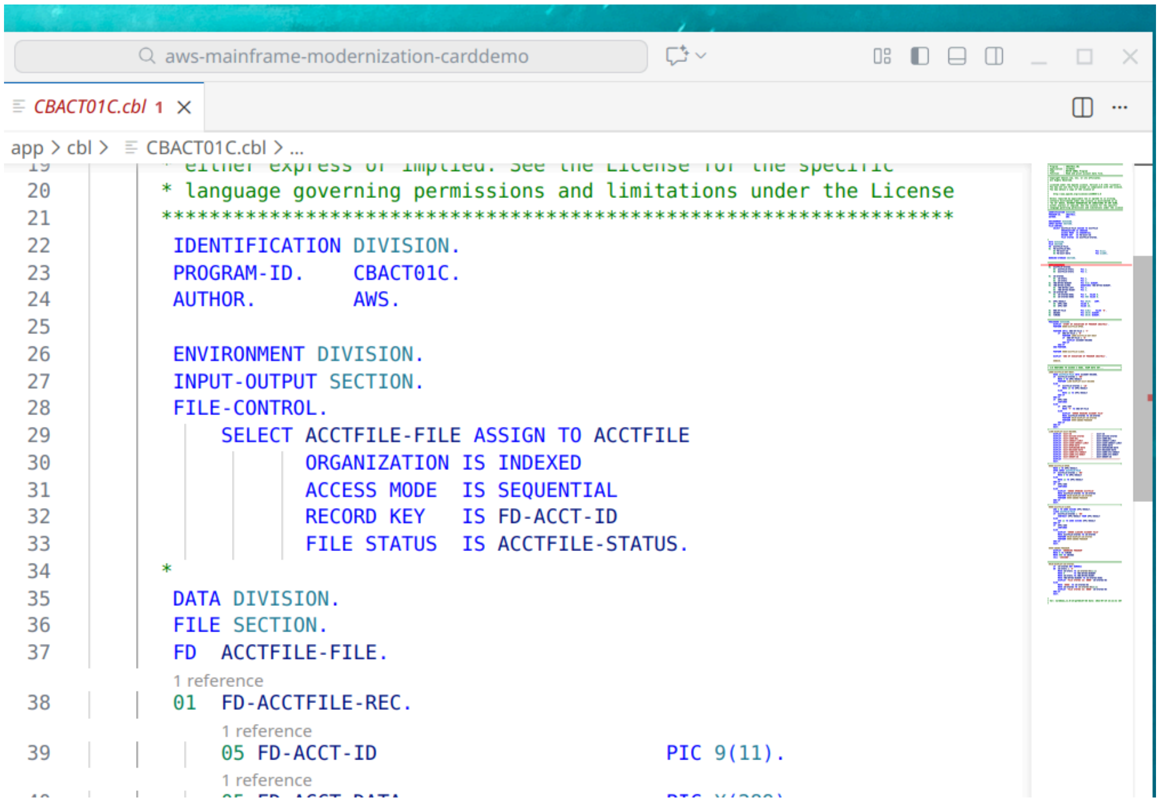
4.1 Editing an Existing Project as a Workspace

To start using the extension on an existing project, open its folder in VS Code (`File > Add Folder to Workspace…`).



The extension will start automatically whenever the folder contains files with usual COBOL filename extensions (`.cob`, `.cbl`, `.cpy`, `.cbx`).

Once the extension is started, COBOL sources should appear with colorization:


aws-mainframe-modernization-carddemo

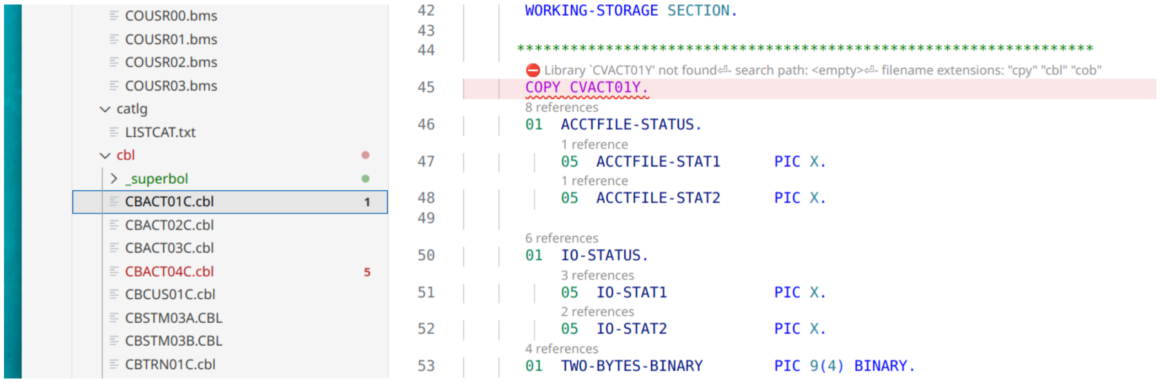
CBACT01C.cbl 1

app > cbl > CBACT01C.cbl > ...

```
      * either express or implied. See the License for the specific
      * language governing permissions and limitations under the License
      ******************************************************************
       IDENTIFICATION DIVISION.
       PROGRAM-ID.    CBACT01C.
       AUTHOR.        AWS.

       ENVIRONMENT DIVISION.
       INPUT-OUTPUT SECTION.
       FILE-CONTROL.
           SELECT ACCTFILE-FILE ASSIGN TO ACCTFILE
                  ORGANIZATION IS INDEXED
                  ACCESS MODE  IS SEQUENTIAL
                  RECORD KEY   IS FD-ACCT-ID
                  FILE STATUS  IS ACCTFILE-STATUS.
      *
       DATA DIVISION.
       FILE SECTION.
       FD  ACCTFILE-FILE.
       1 reference
       01  FD-ACCTFILE-REC.
           1 reference
           05 FD-ACCT-ID                        PIC 9(11).
           1 reference
```

The extension will try to parse the sources, and resolve COPY statements. If it fails, it will display problems:

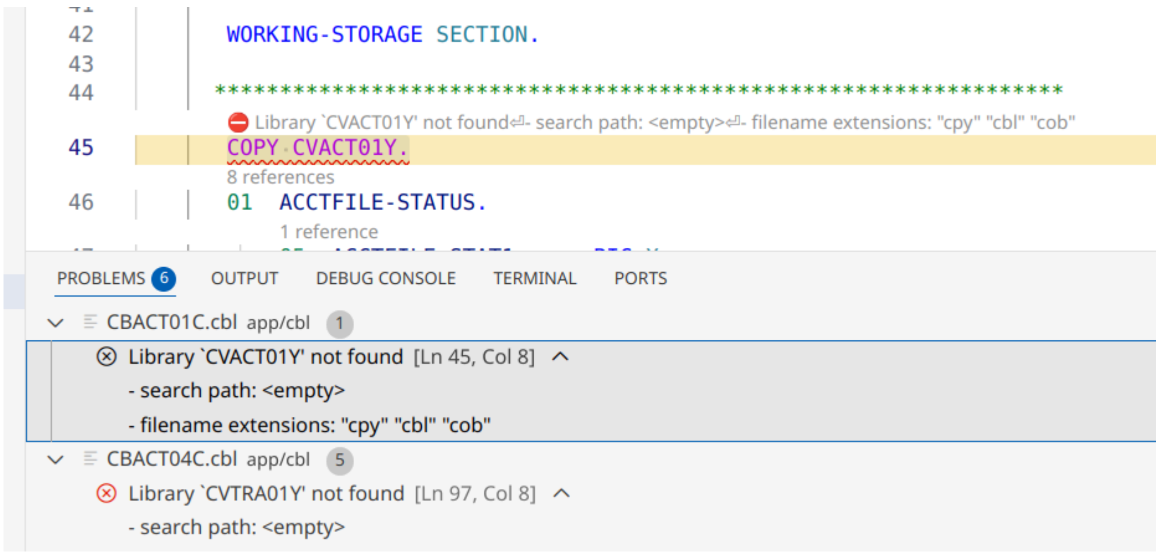
- the number of problems found after the file name in the file explorer
- these problems are shown directly in the sources


```
COUSR00.bms
COUSR01.bms
COUSR02.bms
COUSR03.bms
v catlg
  LISTCAT.txt
v cbl
  > _superbol
  CBACT01C.cbl        1
  CBACT02C.cbl
  CBACT03C.cbl
  CBACT04C.cbl        5
  CBCUS01C.cbl
  CBSTM03A.CBL
  CBSTM03B.CBL
  CBTRN01C.cbl
```

```
       WORKING-STORAGE SECTION.

      *****************************************************************
       Library `CVACT01Y' not found⏎- search path: <empty>⏎- filename extensions: "cpy" "cbl" "cob"
       COPY CVACT01Y.
       8 references
       01  ACCTFILE-STATUS.
           1 reference
           05  ACCTFILE-STAT1      PIC X.
           1 reference
           05  ACCTFILE-STAT2      PIC X.

       6 references
       01  IO-STATUS.
           3 references
           05  IO-STAT1            PIC X.
           2 references
           05  IO-STAT2            PIC X.
       4 references
       01  TWO-BYTES-BINARY        PIC 9(4) BINARY.
```

Note that, in our case, we use the “Error Lens” VSCode extension to inline errors in the source code. There are many similar extensions to improve the visualization of problems.

You can also directly go to the first problem, using Ctrl+Shift+M:


```
WORKING-STORAGE SECTION.

*****************************************************************
⛔ Library `CVACT01Y' not found⏎- search path: <empty>⏎- filename extensions: "cpy" "cbl" "cob"
COPY CVACT01Y.
8 references
01  ACCTFILE-STATUS.
  1 reference
```

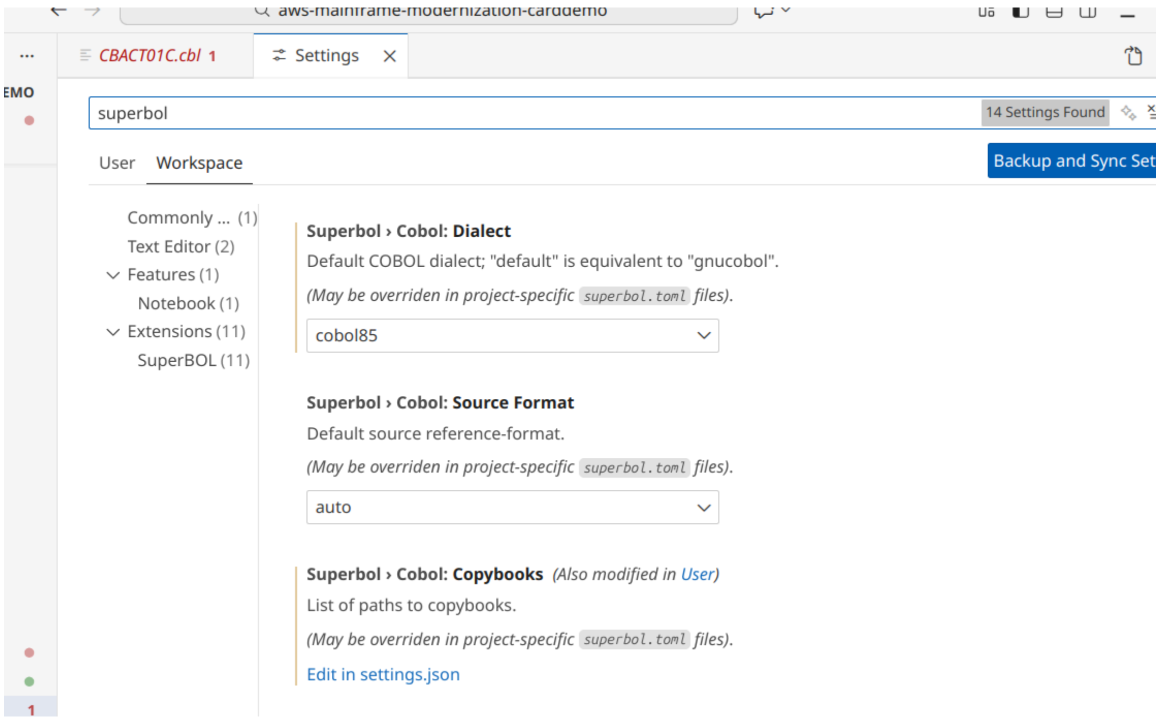
PROBLEMS 6   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

```
CBACT01C.cbl app/cbl 1
  ⊗ Library `CVACT01Y' not found [Ln 45, Col 8]
     - search path: <empty>
     - filename extensions: "cpy" "cbl" "cob"
CBACT04C.cbl app/cbl 5
  ⊗ Library `CVTRA01Y' not found [Ln 97, Col 8]
     - search path: <empty>
```

Such problems usually come from a bad configuration of the workspace for the COBOL dialect used by this project. So we need to configure it to make the extension work correctly. We will see this in the next section.

4.2 Configuring the Extension for the COBOL Project

Open the settings (`File > Preferences > Settings`, or Ctrl+,), and start typing "superbol…". You will be presented with a screen that resembles:



Superbol › Cobol: Dialect
Default COBOL dialect; "default" is equivalent to "gnucobol".
(May be overriden in project-specific `superbol.toml` files).
cobol85

Superbol › Cobol: Source Format
Default source reference-format.
(May be overriden in project-specific `superbol.toml` files).
auto

Superbol › Cobol: Copybooks *(Also modified in User)*
List of paths to copybooks.
(May be overriden in project-specific `superbol.toml` files).
Edit in settings.json

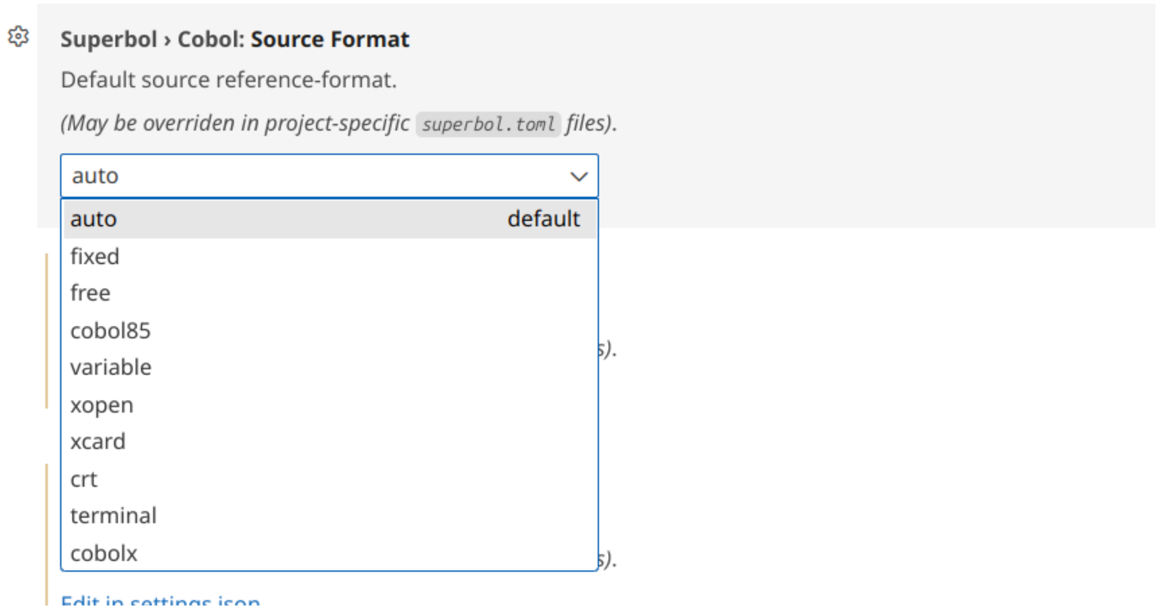
Figure 1: SuperBOL settings

Beware that there are several ways to configure settings:

- **User** settings: these are the default settings when the workspace is not configured. On the picture above, they are on the left tab "User". They are stored in the user profile, typically in `$HOME/.config/Code/User/settings.json`.
- **Workspace** settings: these are the settings specific to this workspace. **They are the ones you probably want to configure now.** On the picture above, they are on the right tab "Workspace". They are stored in a file `.vscode/settings.json` at the root of the workspace.
- Additionnaly, SuperBOL Studio can use its own configuration file for some settings, located in a file **superbol.toml** at the root of the project. This file is typically useful if you plan to use SuperBOL tools on the command-line in this project. VSCode will sometimes warn you if you are trying to configure settings internally in VSCode when there is also a `superbol.toml` file.

In our example, the source format was correctly inferred. If it is not your case, you can change the **Source Format** option:

- The default reference source-format `"superbol.cobol.sourceFormat"` When `auto` is selected, which is the default, SuperBOL (and GnuCOBOL) will automagically try to guess whether the source is in `free` or `fixed` format. Other source formats need to be configured explicitly.


Superbol › Cobol: Source Format

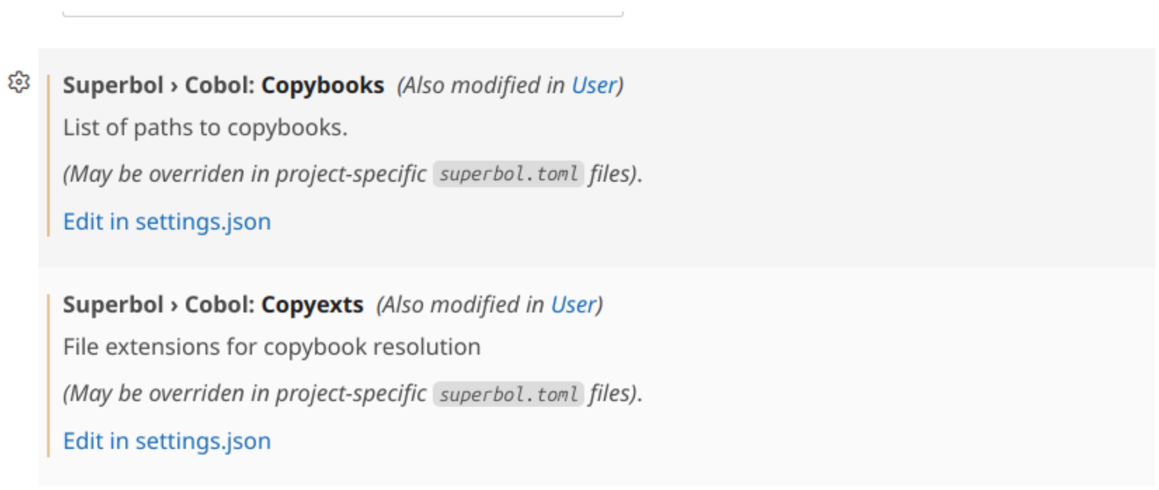
Default source reference-format.

(May be overriden in project-specific `superbol.toml` files).

auto

Figure 2: SuperBOL settings

In our case, the extension complains about not finding some copybooks. Two settings are available to control how the extension looks up for copybooks:



Superbol › Cobol: Copybooks *(Also modified in User)*

List of paths to copybooks.

(May be overriden in project-specific `superbol.toml` files).

Edit in settings.json

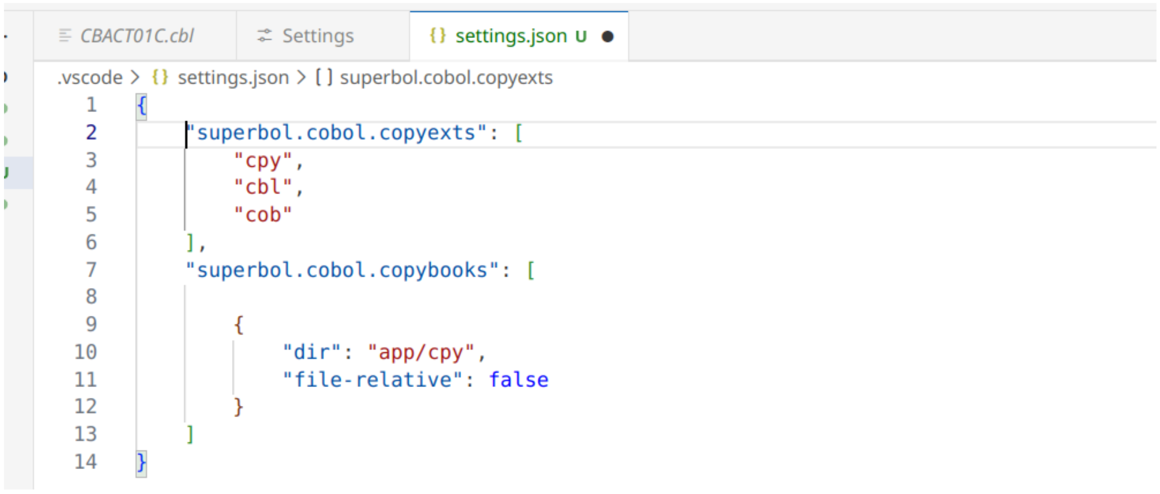
Superbol › Cobol: Copyexts *(Also modified in User)*

File extensions for copybook resolution

(May be overriden in project-specific `superbol.toml` files).

Edit in settings.json

Both options have to be configured in JSON by modifying the `settings.json` file, so you need to click on “Edit in settings.json”.



```
{
    "superbol.cobol.copyexts": [
        "cpy",
        "cbl",
        "cob"
    ],
    "superbol.cobol.copybooks": [

        {
            "dir": "app/cpy",
            "file-relative": false
        }
    ]
}
```

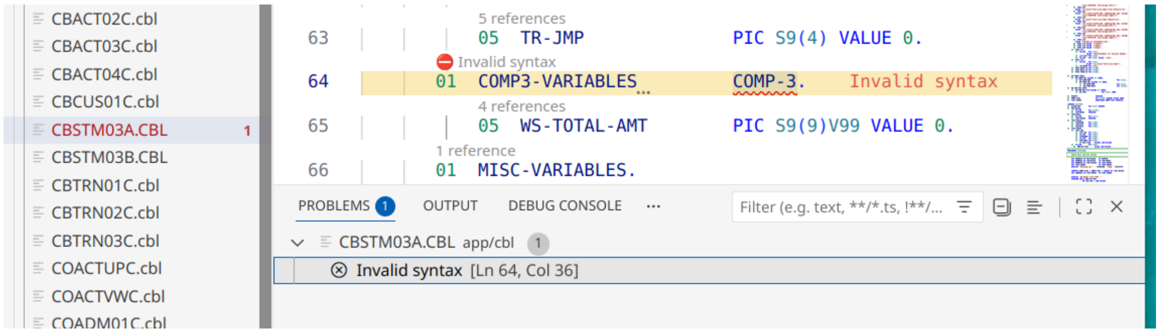
Figure 3: Editing copybook paths in `.vscode/settings.json`

- The path to copybooks **“superbol.cobol.copybooks”**. This is a list, where each entry describes an element of the search path where your copybooks will be looked for. Each entry must contain a field **“dir”**, and an optional field **“file-relative”**.
  - If the directory you want to specify (where copybooks are located) is a path starting from the root of the workspace, or an absolute path, you can skip the `file-relative` field, or set it to `false`.
  - If the directory you want to specify is a path relative to the directory containing the specific COBOL source with the `COPY` statement, you should set the `file-relative` field to `true`.
- The copybook extensions **“superbol.cobol.copyexts”**. To configure this setting, you will need to select `Edit in settings.json`. This is a list, where each entry describes a file extension if the copybook name cannot be found as-is (for example `COPY "mycpy.lib"`). In SuperBOL, the

default option corresponds to GnuCOBOL's default, which is ["cpy","cbl","cob"] (searched in upper-case first, and then in lower-case).

Do not forget to save the file (with Ctrl+S). As soon as it is saved, the extension will restart the LSP to re-analyze the COBOL sources.

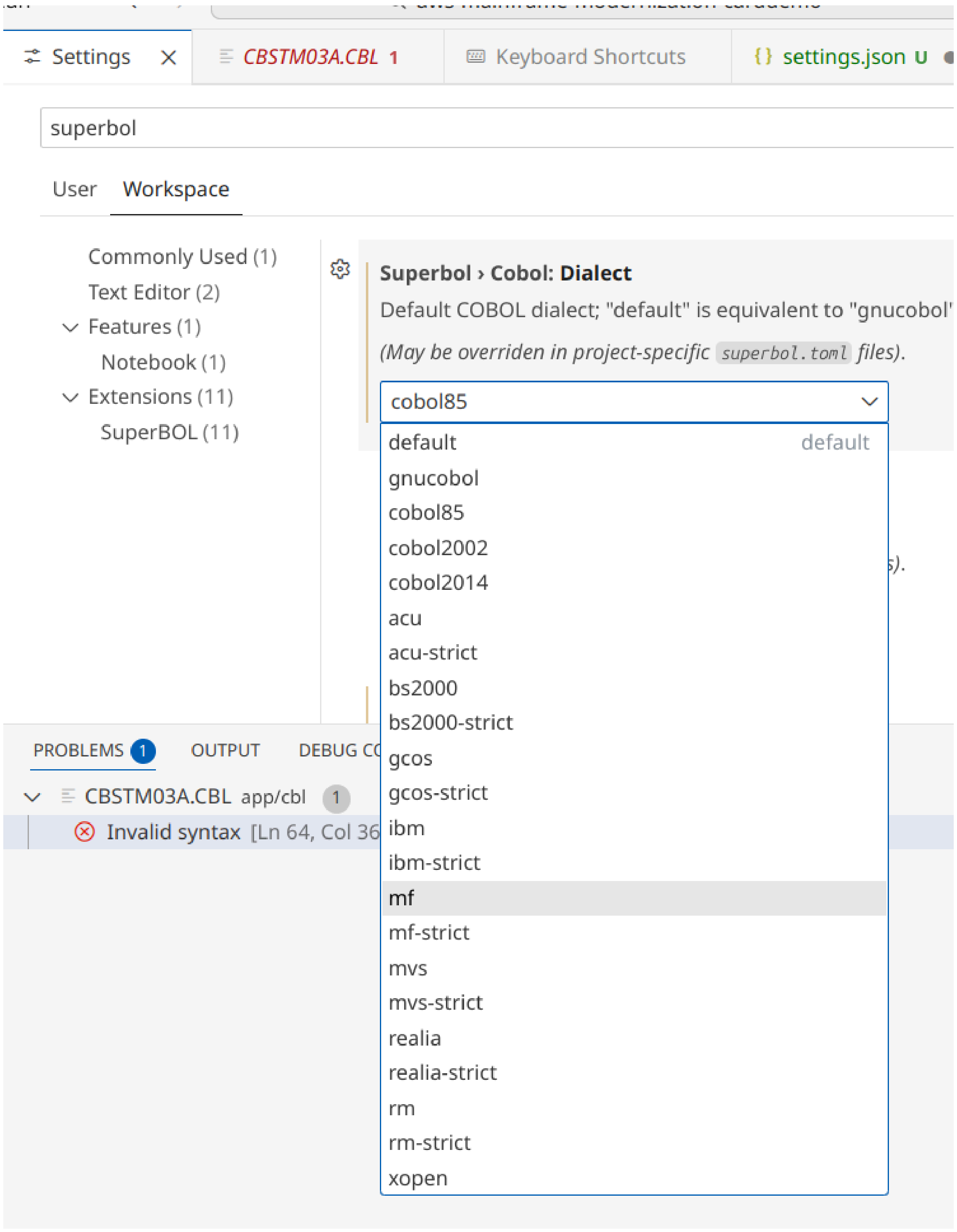
Now, the extension gives us a different kind of errors, because it couldn't understand the syntax:



```
            5 references
            05  TR-JMP                  PIC S9(4) VALUE 0.
        Invalid syntax
        01  COMP3-VARIABLES             COMP-3.    Invalid syntax
            4 references
            05  WS-TOTAL-AMT            PIC S9(9)V99 VALUE 0.
        1 reference
        01  MISC-VARIABLES.
```

```
CBSTM03A.CBL app/cbl 1
  Invalid syntax [Ln 64, Col 36]
```

- The COBOL dialect used in the project "superbol.cobol.dialect" for a documentation on every available dialect). In SuperBOL, the default dialect corresponds to GnuCOBOL's default, that supports many features from dialects such as COBOL2014, IBM, MicroFocus (mf), or GCOS for instance;


Settings | CBSTM03A.CBL 1 | Keyboard Shortcuts | settings.json U

superbol

User | Workspace

Commonly Used (1)
Text Editor (2)
Features (1)
Notebook (1)
Extensions (11)
SuperBOL (11)

Superbol › Cobol: Dialect

Default COBOL dialect; "default" is equivalent to "gnucobol"

(May be overriden in project-specific `superbol.toml` files).

cobol85

- default (default)
- gnucobol
- cobol85
- cobol2002
- cobol2014
- acu
- acu-strict
- bs2000
- bs2000-strict
- gcos
- gcos-strict
- ibm
- ibm-strict
- mf
- mf-strict
- mvs
- mvs-strict
- realia
- realia-strict
- rm
- rm-strict
- xopen

PROBLEMS 1 | OUTPUT | DEBUG CO

CBSTM03A.CBL app/cbl 1

Invalid syntax [Ln 64, Col 36

4.3 Syntax diagnostics

[!NOTE]

Syntax checks performed by SuperBOL Studio currently cover the `COBOL85` dialect, and some constructions of more recent dialects supported by GnuCOBOL. Reporting of such diagnostics is currently disabled for dialects other than `COBOL85` to avoid misleading developers with false diagnostics about syntax errors.

Reporting can be re-enabled for every dialect by setting the `Force Syntax Diagnostics` flag in SuperBOL configuration settings.

4.4 Collaborating with other developers

At this point, the settings for your project are stored and managed by VS Code. However, you may plan to collaborate with developers that do not use this editor. For instance, they might want to use our mode for GNU/Emacs, which is located here. Then, we advise you to let SuperBOL Studio store the configuration in a `superbol.toml` file that will be located at the root of the project.

You can make the extension write your current project configuration into a `superbol.toml` by entering the command palette (`View > Command Palette…`, or press Ctrl+Shift+P), and then selecting the command `SuperBOL: Write Project Configuration`.

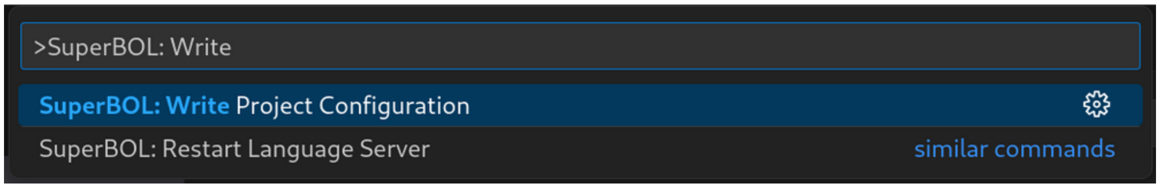
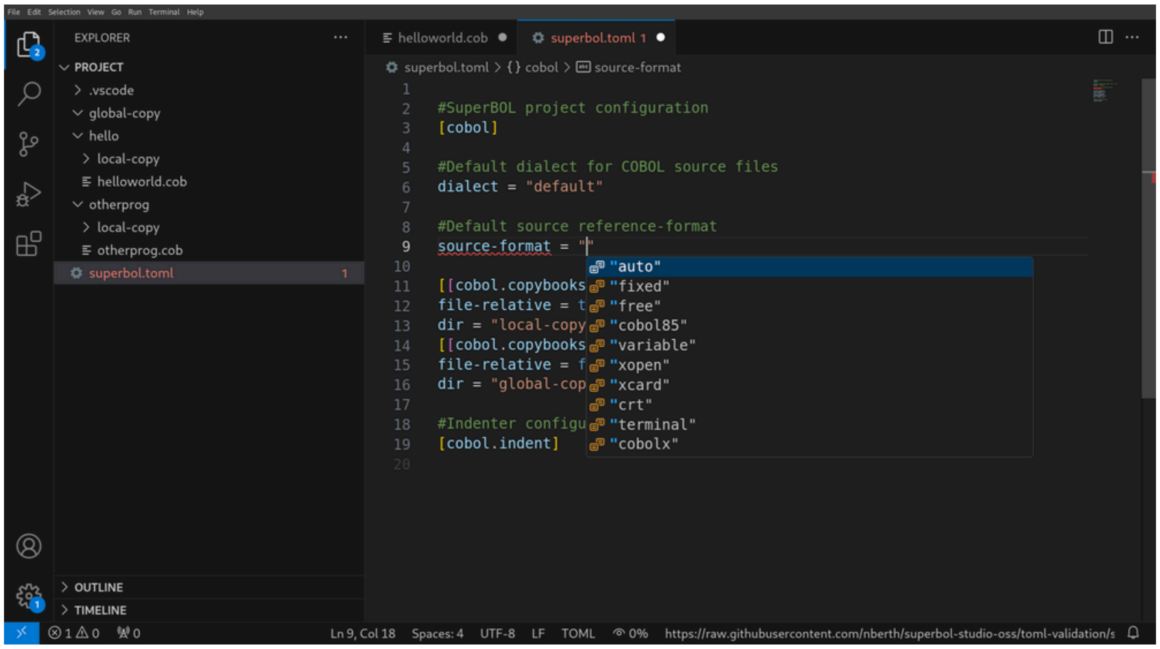

>SuperBOL: Write
SuperBOL: Write Project Configuration
SuperBOL: Restart Language Server
similar commands

Figure 4: SuperBOL: Write Project Configuration

This will save a `superbol.toml` file at the root of each currently opened project directory. Such a file will not store any user-specific settings, so you can now safely put them under source control. Extensions dedicated to the edition of TOML files, such as `tamasfe.even-better-toml`, provide the same level of assistance as when you edit `.vscode/settings.json`.

[!TIP]

Install the `OCamlPro.SuperBOL-studio-pack` extension to get SuperBOL Studio and `tamasfe.even-better-toml` altogether.


EXPLORER
PROJECT
.vscode
global-copy
hello
local-copy
helloworld.cob
otherprog
local-copy
otherprog.cob
superbol.toml
OUTLINE
TIMELINE
helloworld.cob
superbol.toml 1
superbol.toml > {} cobol > source-format
Ln 9, Col 18   Spaces: 4   UTF-8   LF   TOML   0%   https://raw.githubusercontent.com/nberth/superbol-studio-oss/toml-validation/s

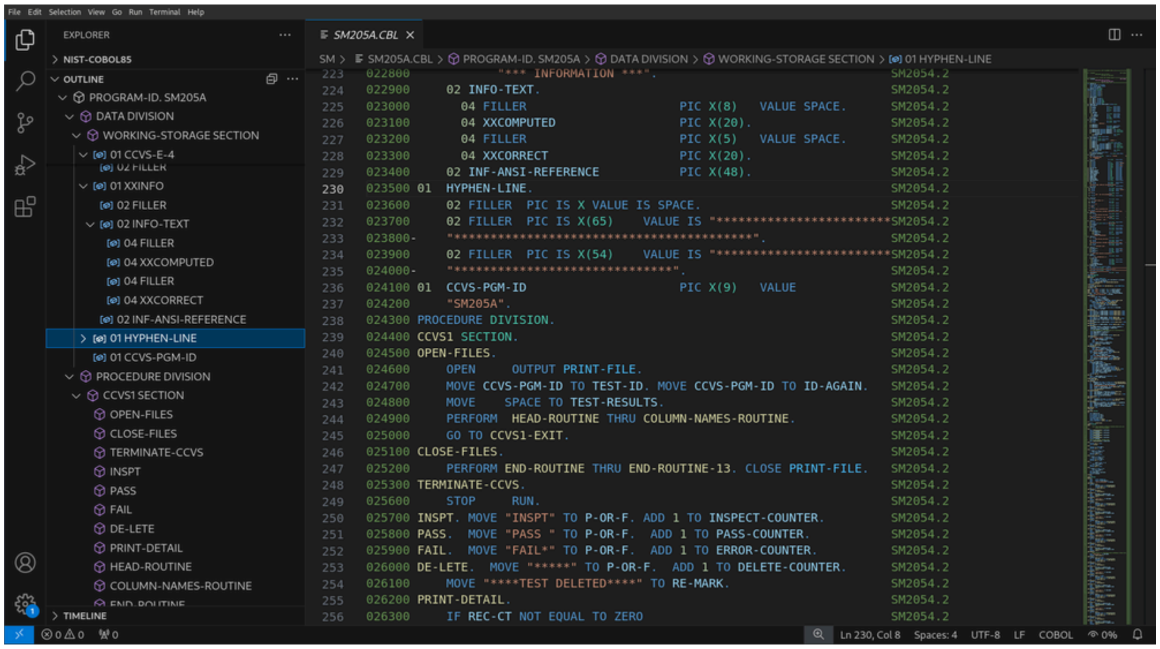
```
#SuperBOL project configuration
[cobol]

#Default dialect for COBOL source files
dialect = "default"

#Default source reference-format
source-format = ""

[[cobol.copybooks  "auto"
file-relative = t  "fixed"
dir = "local-copy  "free"
[[cobol.copybooks  "cobol85"
file-relative = f  "variable"
dir = "global-cop  "xopen"
                   "xcard"
#Indenter configu  "crt"
[cobol.indent]     "terminal"
                   "cobolx"
```

Figure 5: Editing `superbol.toml`

5 Navigation Features

5.1 Outline & Breadcrumbs

SuperBOL provides an outline view of your program once you open it, that you can use to navigate to specific sections or symbols (data items, paragraphs, etc). The same information is also shown in the “breadcrumbs” bar, that is usually located above the text edition area.

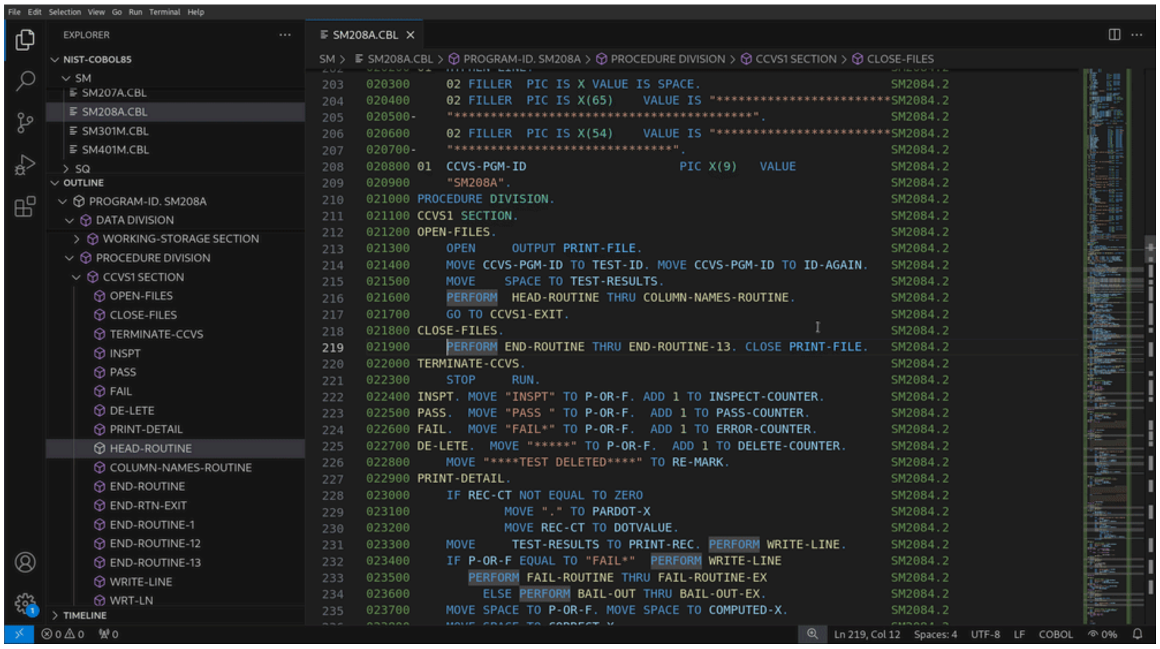


```
022800            "*** INFORMATION ***".                                SM2054.2
022900     02 INFO-TEXT.                                                SM2054.2
023000       04 FILLER                      PIC X(8)    VALUE SPACE.     SM2054.2
023100       04 XXCOMPUTED                  PIC X(20).                   SM2054.2
023200       04 FILLER                      PIC X(5)    VALUE SPACE.     SM2054.2
023300       04 XXCORRECT                   PIC X(20).                   SM2054.2
023400     02 INF-ANSI-REFERENCE            PIC X(48).                   SM2054.2
023500 01  HYPHEN-LINE.                                                 SM2054.2
023600     02 FILLER  PIC IS X VALUE IS SPACE.                          SM2054.2
023700     02 FILLER  PIC IS X(65)     VALUE IS "***********************SM2054.2
023800-    "******************************************".                SM2054.2
023900     02 FILLER  PIC IS X(54)     VALUE IS "***********************SM2054.2
024000-    "*******************************".                           SM2054.2
024100 01  CCVS-PGM-ID                      PIC X(9)    VALUE            SM2054.2
024200     "SM205A".                                                    SM2054.2
024300 PROCEDURE DIVISION.                                              SM2054.2
024400 CCVS1 SECTION.                                                   SM2054.2
024500 OPEN-FILES.                                                      SM2054.2
024600     OPEN     OUTPUT PRINT-FILE.                                  SM2054.2
024700     MOVE CCVS-PGM-ID TO TEST-ID. MOVE CCVS-PGM-ID TO ID-AGAIN.   SM2054.2
024800     MOVE    SPACE TO TEST-RESULTS.                               SM2054.2
024900     PERFORM  HEAD-ROUTINE THRU COLUMN-NAMES-ROUTINE.             SM2054.2
025000     GO TO CCVS1-EXIT.                                            SM2054.2
025100 CLOSE-FILES.                                                     SM2054.2
025200     PERFORM END-ROUTINE THRU END-ROUTINE-13. CLOSE PRINT-FILE.   SM2054.2
025300 TERMINATE-CCVS.                                                  SM2054.2
025600     STOP     RUN.                                                SM2054.2
025700 INSPT. MOVE "INSPT" TO P-OR-F. ADD 1 TO INSPECT-COUNTER.         SM2054.2
025800 PASS.  MOVE "PASS " TO P-OR-F.  ADD 1 TO PASS-COUNTER.           SM2054.2
025900 FAIL.  MOVE "FAIL*" TO P-OR-F.  ADD 1 TO ERROR-COUNTER.          SM2054.2
026000 DE-LETE.  MOVE "*****" TO P-OR-F.  ADD 1 TO DELETE-COUNTER.      SM2054.2
026100     MOVE "****TEST DELETED****" TO RE-MARK.                      SM2054.2
026200 PRINT-DETAIL.                                                    SM2054.2
026300     IF REC-CT NOT EQUAL TO ZERO                                  SM2054.2
```

Figure 6: Outline & Breadcrumb

5.2 Go to Symbol

Symbols shown in Outline and Breadcrumbs views can also be searched and jumped to by pressing Ctrl+Shift+O.

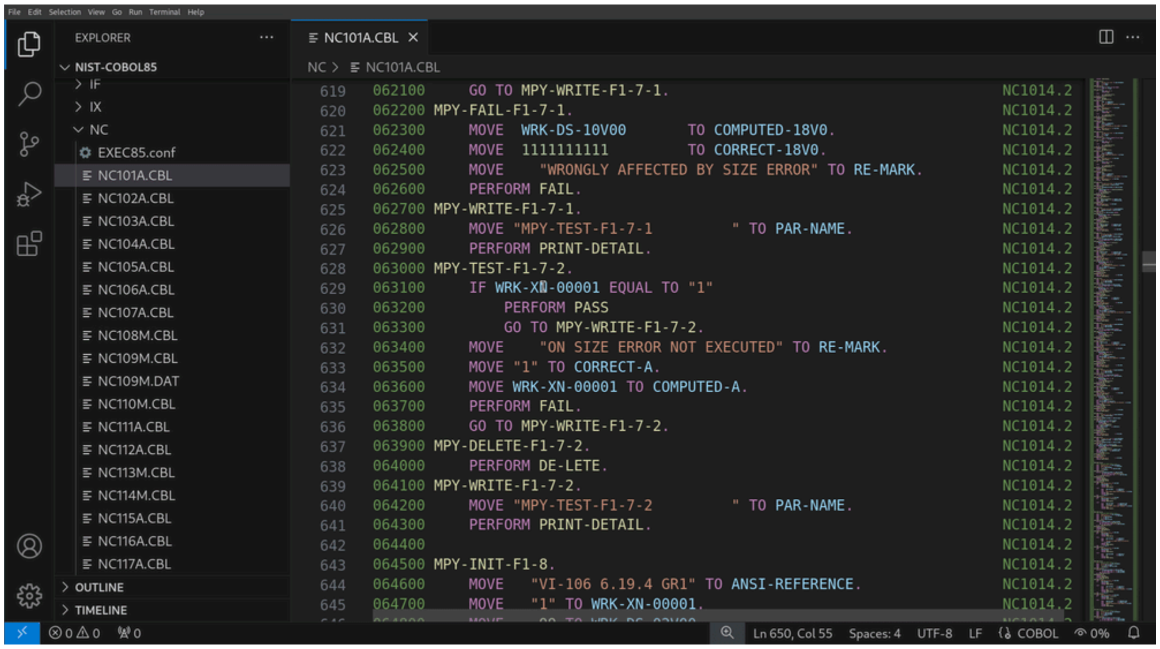


```
020300     02 FILLER  PIC IS X VALUE IS SPACE.                          SM2084.2
020400     02 FILLER  PIC IS X(65)     VALUE IS "***********************SM2084.2
020500-    "******************************************".                SM2084.2
020600     02 FILLER  PIC IS X(54)     VALUE IS "***********************SM2084.2
020700-    "*******************************".                           SM2084.2
020800 01  CCVS-PGM-ID                      PIC X(9)    VALUE            SM2084.2
020900     "SM208A".                                                    SM2084.2
021000 PROCEDURE DIVISION.                                              SM2084.2
021100 CCVS1 SECTION.                                                   SM2084.2
021200 OPEN-FILES.                                                      SM2084.2
021300     OPEN     OUTPUT PRINT-FILE.                                  SM2084.2
021400     MOVE CCVS-PGM-ID TO TEST-ID. MOVE CCVS-PGM-ID TO ID-AGAIN.   SM2084.2
021500     MOVE    SPACE TO TEST-RESULTS.                               SM2084.2
021600     PERFORM  HEAD-ROUTINE THRU COLUMN-NAMES-ROUTINE.             SM2084.2
021700     GO TO CCVS1-EXIT.                                            SM2084.2
021800 CLOSE-FILES.                                                     SM2084.2
021900     PERFORM END-ROUTINE THRU END-ROUTINE-13. CLOSE PRINT-FILE.   SM2084.2
022000 TERMINATE-CCVS.                                                  SM2084.2
022300     STOP     RUN.                                                SM2084.2
022400 INSPT. MOVE "INSPT" TO P-OR-F. ADD 1 TO INSPECT-COUNTER.         SM2084.2
022500 PASS.  MOVE "PASS " TO P-OR-F.  ADD 1 TO PASS-COUNTER.           SM2084.2
022600 FAIL.  MOVE "FAIL*" TO P-OR-F.  ADD 1 TO ERROR-COUNTER.          SM2084.2
022700 DE-LETE.  MOVE "*****" TO P-OR-F.  ADD 1 TO DELETE-COUNTER.      SM2084.2
022800     MOVE "****TEST DELETED****" TO RE-MARK.                      SM2084.2
022900 PRINT-DETAIL.                                                    SM2084.2
023000     IF REC-CT NOT EQUAL TO ZERO                                  SM2084.2
023100             MOVE "." TO PARDOT-X                                 SM2084.2
023200             MOVE REC-CT TO DOTVALUE.                             SM2084.2
023300     MOVE     TEST-RESULTS TO PRINT-REC. PERFORM WRITE-LINE.      SM2084.2
023400     IF P-OR-F EQUAL TO "FAIL*"  PERFORM WRITE-LINE               SM2084.2
023500        PERFORM FAIL-ROUTINE THRU FAIL-ROUTINE-EX                 SM2084.2
023600          ELSE PERFORM BAIL-OUT THRU BAIL-OUT-EX.                 SM2084.2
023700     MOVE SPACE TO P-OR-F. MOVE SPACE TO COMPUTED-X.              SM2084.2
```

Figure 7: Go to Symbol

5.3 Go to Definition

When you want to locate the definition of a data item name in your source code, position your cursor on its name, right click, and select `Go to Definition` (or press F12).



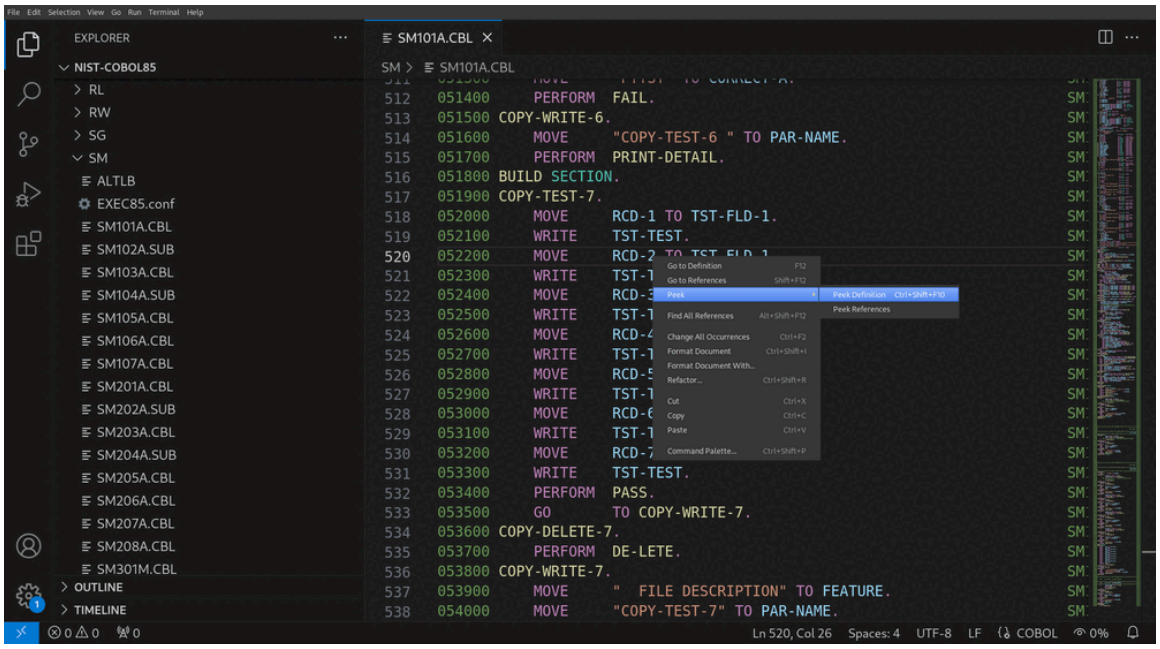
```
062100     GO TO MPY-WRITE-F1-7-1.                                  NC1014.2
062200 MPY-FAIL-F1-7-1.                                             NC1014.2
062300     MOVE  WRK-DS-10V00       TO COMPUTED-18V0.               NC1014.2
062400     MOVE  1111111111         TO CORRECT-18V0.                NC1014.2
062500     MOVE    "WRONGLY AFFECTED BY SIZE ERROR" TO RE-MARK.     NC1014.2
062600     PERFORM FAIL.                                            NC1014.2
062700 MPY-WRITE-F1-7-1.                                            NC1014.2
062800     MOVE "MPY-TEST-F1-7-1         " TO PAR-NAME.             NC1014.2
062900     PERFORM PRINT-DETAIL.                                    NC1014.2
063000 MPY-TEST-F1-7-2.                                             NC1014.2
063100     IF WRK-XN-00001 EQUAL TO "1"                             NC1014.2
063200         PERFORM PASS                                         NC1014.2
063300         GO TO MPY-WRITE-F1-7-2.                              NC1014.2
063400     MOVE    "ON SIZE ERROR NOT EXECUTED" TO RE-MARK.         NC1014.2
063500     MOVE "1" TO CORRECT-A.                                   NC1014.2
063600     MOVE WRK-XN-00001 TO COMPUTED-A.                         NC1014.2
063700     PERFORM FAIL.                                            NC1014.2
063800     GO TO MPY-WRITE-F1-7-2.                                  NC1014.2
063900 MPY-DELETE-F1-7-2.                                           NC1014.2
064000     PERFORM DE-LETE.                                         NC1014.2
064100 MPY-WRITE-F1-7-2.                                            NC1014.2
064200     MOVE "MPY-TEST-F1-7-2         " TO PAR-NAME.             NC1014.2
064300     PERFORM PRINT-DETAIL.                                    NC1014.2
064400                                                              NC1014.2
064500 MPY-INIT-F1-8.                                               NC1014.2
064600     MOVE   "VI-106 6.19.4 GR1" TO ANSI-REFERENCE.            NC1014.2
064700     MOVE   "1" TO WRK-XN-00001.                              NC1014.2
```

Figure 8: Go to Definition

> [!NOTE] (Temporary limitation)
>
> At the moment, definitions that belong to communication, report, or screen sections of the data division are ignored by the extension. In addition, some definitions in embedded SQL blocks (`EXEC SQL`) are not taken into account yet.

5.4 Peek Definition

To only have a peek at where such a data item defined, you can position the cursor on its name, right click, and select `Peek > Peek Definition` (or press Ctrl+Shift+F10). You will then be presented with a view of the location of the corresponding definition, including if it lies in a copybook.

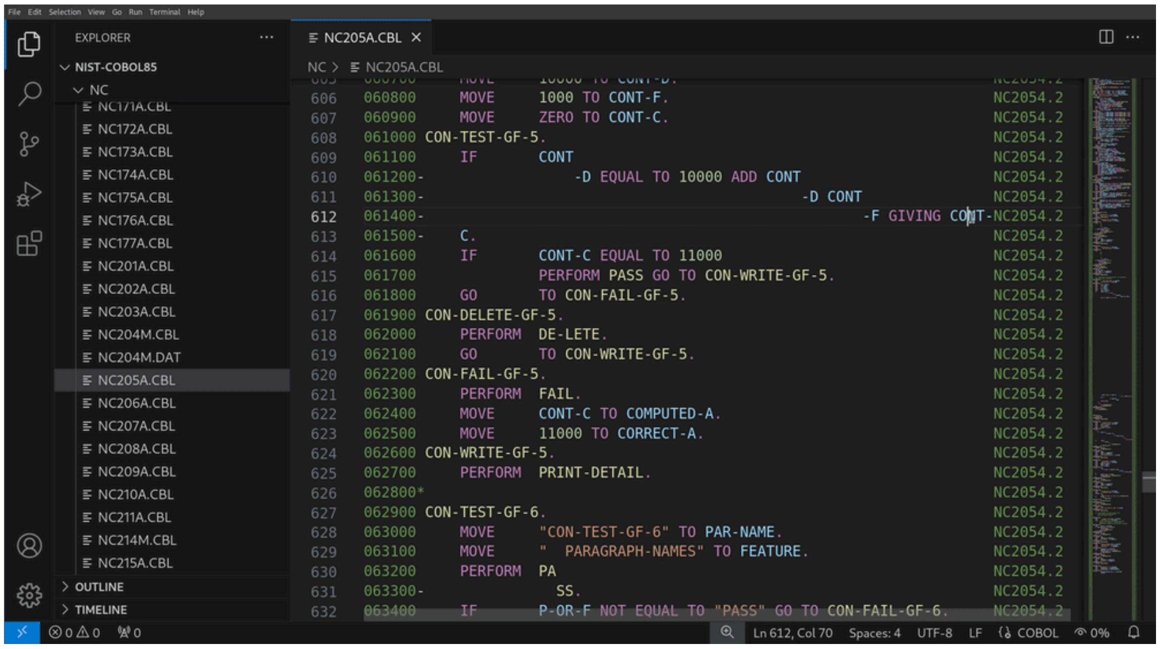


```
051400     PERFORM  FAIL.                                   SM
051500 COPY-WRITE-6.                                        SM
051600     MOVE     "COPY-TEST-6 " TO PAR-NAME.             SM
051700     PERFORM  PRINT-DETAIL.                           SM
051800 BUILD SECTION.                                       SM
051900 COPY-TEST-7.                                         SM
052000     MOVE     RCD-1 TO TST-FLD-1.                     SM
052100     WRITE    TST-TEST.                               SM
052200     MOVE     RCD-2 TO TST-FLD-1.                     SM
052300     WRITE    TST-1                                   SM
052400     MOVE     RCD-3                                   SM
052500     WRITE    TST-1                                   SM
052600     MOVE     RCD-4                                   SM
052700     WRITE    TST-1                                   SM
052800     MOVE     RCD-5                                   SM
052900     WRITE    TST-1                                   SM
053000     MOVE     RCD-6                                   SM
053100     WRITE    TST-1                                   SM
053200     MOVE     RCD-7                                   SM
053300     WRITE    TST-TEST.                               SM
053400     PERFORM  PASS.                                   SM
053500     GO       TO COPY-WRITE-7.                        SM
053600 COPY-DELETE-7.                                       SM
053700     PERFORM  DE-LETE.                                SM
053800 COPY-WRITE-7.                                        SM
053900     MOVE     "  FILE DESCRIPTION" TO FEATURE.        SM
054000     MOVE     "COPY-TEST-7" TO PAR-NAME.              SM
```

Figure 9: Peek Definition in copybook

5.5 Go to References

If you want to obtain a list of all references to a named data item, right click and select `Go to References` (or press Shift+F12). You will then view the location of every reference to this item.



```
060800     MOVE      1000 TO CONT-F.                                NC2054.2
060900     MOVE      ZERO TO CONT-C.                                NC2054.2
061000 CON-TEST-GF-5.                                               NC2054.2
061100     IF        CONT                                           NC2054.2
061200-                   -D EQUAL TO 10000 ADD CONT                NC2054.2
061300-                                             -D CONT         NC2054.2
061400-                                                    -F GIVING CONT-NC2054.2
061500-    C.                                                       NC2054.2
061600     IF        CONT-C EQUAL TO 11000                          NC2054.2
061700               PERFORM PASS GO TO CON-WRITE-GF-5.             NC2054.2
061800     GO        TO CON-FAIL-GF-5.                              NC2054.2
061900 CON-DELETE-GF-5.                                             NC2054.2
062000     PERFORM   DE-LETE.                                       NC2054.2
062100     GO        TO CON-WRITE-GF-5.                             NC2054.2
062200 CON-FAIL-GF-5.                                               NC2054.2
062300     PERFORM   FAIL.                                          NC2054.2
062400     MOVE      CONT-C TO COMPUTED-A.                          NC2054.2
062500     MOVE      11000 TO CORRECT-A.                            NC2054.2
062600 CON-WRITE-GF-5.                                              NC2054.2
062700     PERFORM   PRINT-DETAIL.                                  NC2054.2
062800*                                                             NC2054.2
062900 CON-TEST-GF-6.                                               NC2054.2
063000     MOVE      "CON-TEST-GF-6" TO PAR-NAME.                   NC2054.2
063100     MOVE      "  PARAGRAPH-NAMES" TO FEATURE.                NC2054.2
063200     PERFORM   PA                                             NC2054.2
063300-                SS.                                          NC2054.2
063400     IF        P-OR-F NOT EQUAL TO "PASS" GO TO CON-FAIL-GF-6.  NC2054.2
```

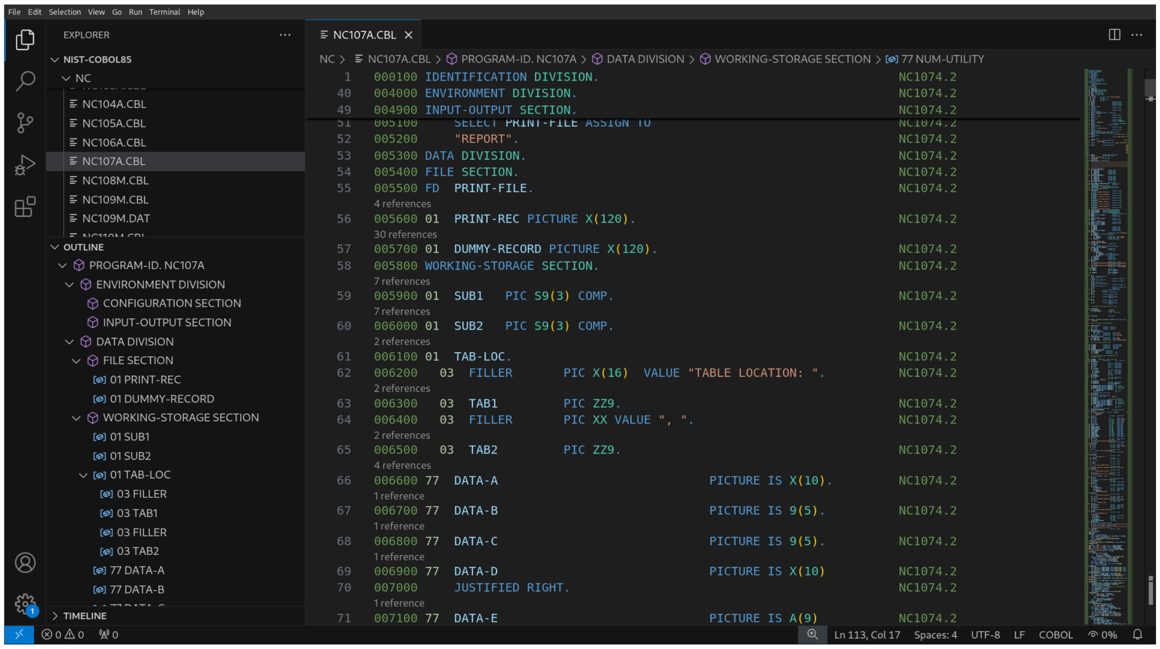
Figure 10: Go to References

[!NOTE] (Temporary limitation)

Limitations mentioned in Go to Definition also apply.

5.6 Reference Information

The extension shows inline reference information above definitons of data items and elements of the procedure division.
The same limitations as for Go to Definition apply.



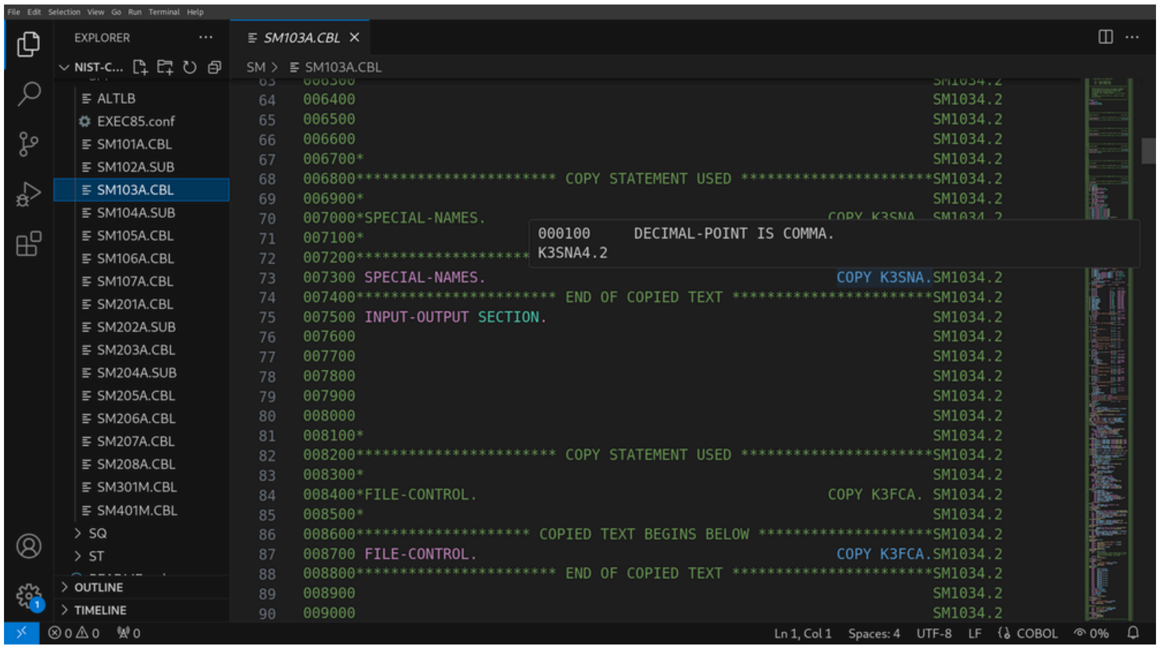
```
000100 IDENTIFICATION DIVISION.                                  NC1074.2
004000 ENVIRONMENT DIVISION.                                     NC1074.2
004900 INPUT-OUTPUT SECTION.                                     NC1074.2
005100     SELECT PRINT-FILE ASSIGN TO                           NC1074.2
005200     "REPORT".                                             NC1074.2
005300 DATA DIVISION.                                            NC1074.2
005400 FILE SECTION.                                             NC1074.2
005500 FD  PRINT-FILE.                                           NC1074.2
4 references
005600 01  PRINT-REC PICTURE X(120).                             NC1074.2
30 references
005700 01  DUMMY-RECORD PICTURE X(120).                          NC1074.2
005800 WORKING-STORAGE SECTION.                                  NC1074.2
7 references
005900 01  SUB1   PIC S9(3) COMP.                                NC1074.2
7 references
006000 01  SUB2   PIC S9(3) COMP.                                NC1074.2
2 references
006100 01  TAB-LOC.                                              NC1074.2
006200   03  FILLER       PIC X(16)  VALUE "TABLE LOCATION: ".   NC1074.2
2 references
006300   03  TAB1         PIC ZZ9.                               NC1074.2
006400   03  FILLER       PIC XX VALUE ", ".                     NC1074.2
2 references
006500   03  TAB2         PIC ZZ9.                               NC1074.2
4 references
006600 77  DATA-A                            PICTURE IS X(10).   NC1074.2
1 reference
006700 77  DATA-B                            PICTURE IS 9(5).    NC1074.2
1 reference
006800 77  DATA-C                            PICTURE IS 9(5).    NC1074.2
1 reference
006900 77  DATA-D                            PICTURE IS X(10)    NC1074.2
007000     JUSTIFIED RIGHT.                                      NC1074.2
1 reference
007100 77  DATA-E                            PICTURE IS A(9)     NC1074.2
```

Figure 11: Reference Information

> [!TIP]
>
> This feature can be turned on or off by tuning the `"editor.codeLens"` configuration setting (you can type Ctrl+, and then `codelens` to change this setting).

5.7 Hover to Show Copybooks

Ever wondered what was behind a `COPY` directive? Just position your cursor over such a statement, and you will be presented with the contents of the copybook.



```
006400                                                                  SM1034.2
006500                                                                  SM1034.2
006600                                                                  SM1034.2
006700*                                                                 SM1034.2
006800*********************** COPY STATEMENT USED **********************SM1034.2
006900*                                                                 SM1034.2
007000*SPECIAL-NAMES.                                       COPY K3SNA. SM1034.2
007100*
007200********************
007300 SPECIAL-NAMES.                                        COPY K3SNA.SM1034.2
007400*********************** END OF COPIED TEXT ***********************SM1034.2
007500 INPUT-OUTPUT SECTION.                                            SM1034.2
007600                                                                  SM1034.2
007700                                                                  SM1034.2
007800                                                                  SM1034.2
007900                                                                  SM1034.2
008000                                                                  SM1034.2
008100*                                                                 SM1034.2
008200*********************** COPY STATEMENT USED **********************SM1034.2
008300*                                                                 SM1034.2
008400*FILE-CONTROL.                                        COPY K3FCA. SM1034.2
008500*                                                                 SM1034.2
008600******************** COPIED TEXT BEGINS BELOW ********************SM1034.2
008700 FILE-CONTROL.                                         COPY K3FCA.SM1034.2
008800*********************** END OF COPIED TEXT ***********************SM1034.2
008900                                                                  SM1034.2
009000                                                                  SM1034.2
```

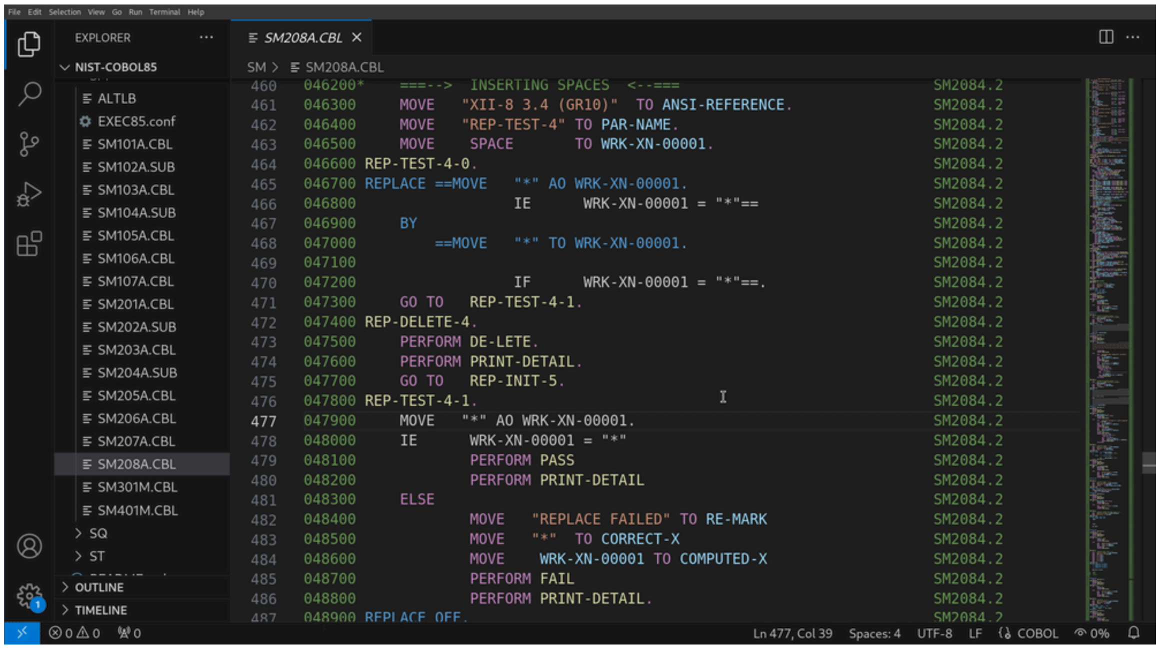
```
000100     DECIMAL-POINT IS COMMA.
K3SNA4.2
```

Figure 12: Hover over COPY

To ensure this works correctly, check your "superbol.cobol.copybooks" and "superbol.cobol.copyexts" settings.

5.8 Hover to Show Source Text Replacements

What's more? You can see the source text that results from replacement by a REPLACE directive in the same way.



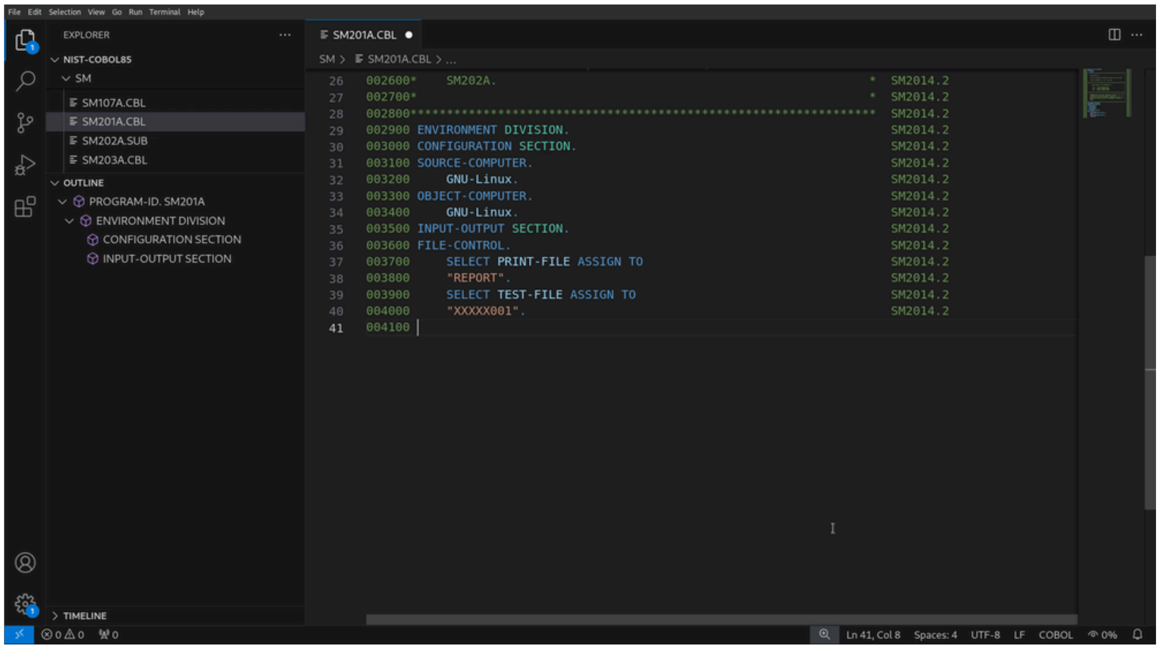
```
046200*    ===-->  INSERTING SPACES  <--===                             SM2084.2
046300     MOVE   "XII-8 3.4 (GR10)"  TO ANSI-REFERENCE.                SM2084.2
046400     MOVE   "REP-TEST-4" TO PAR-NAME.                             SM2084.2
046500     MOVE    SPACE       TO WRK-XN-00001.                         SM2084.2
046600 REP-TEST-4-0.                                                    SM2084.2
046700 REPLACE ==MOVE   "*" AO WRK-XN-00001.                            SM2084.2
046800                  IE      WRK-XN-00001 = "*"==                    SM2084.2
046900     BY                                                           SM2084.2
047000         ==MOVE   "*" TO WRK-XN-00001.                            SM2084.2
047100                                                                  SM2084.2
047200                  IF      WRK-XN-00001 = "*"==.                   SM2084.2
047300     GO TO   REP-TEST-4-1.                                        SM2084.2
047400 REP-DELETE-4.                                                    SM2084.2
047500     PERFORM DE-LETE.                                             SM2084.2
047600     PERFORM PRINT-DETAIL.                                        SM2084.2
047700     GO TO   REP-INIT-5.                                          SM2084.2
047800 REP-TEST-4-1.                                                    SM2084.2
047900     MOVE   "*" AO WRK-XN-00001.                                  SM2084.2
048000     IE      WRK-XN-00001 = "*"                                   SM2084.2
048100             PERFORM PASS                                         SM2084.2
048200             PERFORM PRINT-DETAIL                                 SM2084.2
048300     ELSE                                                         SM2084.2
048400             MOVE   "REPLACE FAILED" TO RE-MARK                   SM2084.2
048500             MOVE   "*"  TO CORRECT-X                             SM2084.2
048600             MOVE    WRK-XN-00001 TO COMPUTED-X                   SM2084.2
048700             PERFORM FAIL                                         SM2084.2
048800             PERFORM PRINT-DETAIL.                                SM2084.2
048900 REPLACE OFF.                                                     SM2084.2
```

Figure 13: Hover over replacement

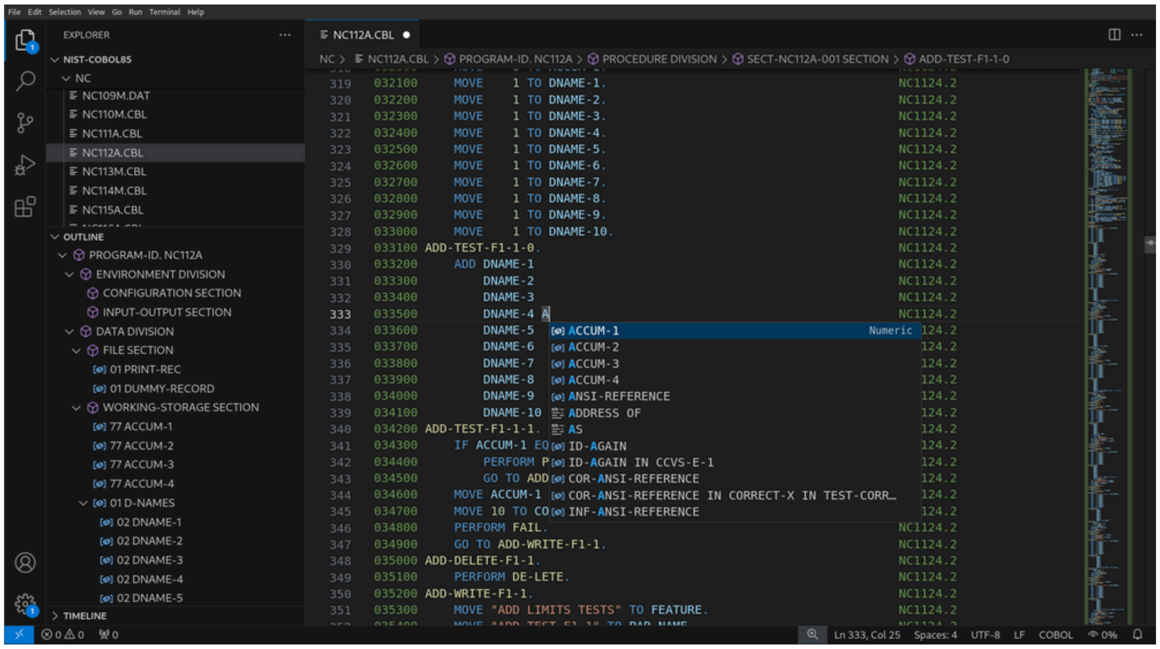
6 Edition Features

6.1 IntelliSense (auto-completion)

When editing a program, you can press Ctrl+Space to obtain suggestions on valid keywords, user-defined words (data item or paragraph names), and even complete COBOL sentences. Select an option with the arrow keys, and press Enter to insert the selected suggestion.

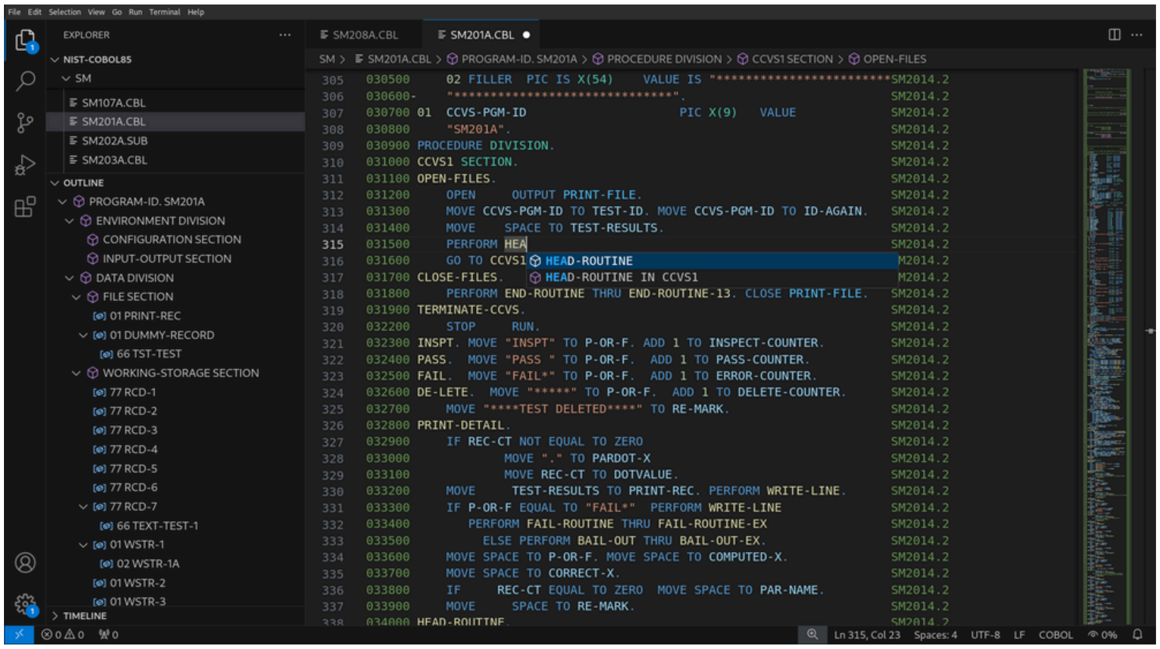


```
002600*    SM202A.                                                 *  SM2014.2
002700*                                                            *  SM2014.2
002800******************************************************************  SM2014.2
002900 ENVIRONMENT DIVISION.                                          SM2014.2
003000 CONFIGURATION SECTION.                                         SM2014.2
003100 SOURCE-COMPUTER.                                               SM2014.2
003200     GNU-Linux.                                                 SM2014.2
003300 OBJECT-COMPUTER.                                               SM2014.2
003400     GNU-Linux.                                                 SM2014.2
003500 INPUT-OUTPUT SECTION.                                          SM2014.2
003600 FILE-CONTROL.                                                  SM2014.2
003700     SELECT PRINT-FILE ASSIGN TO                                SM2014.2
003800     "REPORT".                                                  SM2014.2
003900     SELECT TEST-FILE ASSIGN TO                                 SM2014.2
004000     "XXXXX001".                                                SM2014.2
004100 
```



```
032100     MOVE    1 TO DNAME-1.                                      NC1124.2
032200     MOVE    1 TO DNAME-2.                                      NC1124.2
032300     MOVE    1 TO DNAME-3.                                      NC1124.2
032400     MOVE    1 TO DNAME-4.                                      NC1124.2
032500     MOVE    1 TO DNAME-5.                                      NC1124.2
032600     MOVE    1 TO DNAME-6.                                      NC1124.2
032700     MOVE    1 TO DNAME-7.                                      NC1124.2
032800     MOVE    1 TO DNAME-8.                                      NC1124.2
032900     MOVE    1 TO DNAME-9.                                      NC1124.2
033000     MOVE    1 TO DNAME-10.                                     NC1124.2
033100 ADD-TEST-F1-1-0.                                               NC1124.2
033200     ADD DNAME-1                                                NC1124.2
033300         DNAME-2                                                NC1124.2
033400         DNAME-3                                                NC1124.2
033500         DNAME-4 A                                              NC1124.2
033600         DNAME-5                                                   124.2
033700         DNAME-6                                                   124.2
033800         DNAME-7                                                   124.2
033900         DNAME-8                                                   124.2
034000         DNAME-9                                                   124.2
034100         DNAME-10                                                  124.2
034200 ADD-TEST-F1-1-1.                                                  124.2
034300     IF ACCUM-1 EQ                                                 124.2
034400         PERFORM P                                                 124.2
034500         GO TO ADD                                                 124.2
034600     MOVE ACCUM-1                                                  124.2
034700     MOVE 10 TO CO                                                 124.2
034800     PERFORM FAIL.                                              NC1124.2
034900     GO TO ADD-WRITE-F1-1.                                      NC1124.2
035000 ADD-DELETE-F1-1.                                               NC1124.2
035100     PERFORM DE-LETE.                                           NC1124.2
035200 ADD-WRITE-F1-1.                                                NC1124.2
035300     MOVE "ADD LIMITS TESTS" TO FEATURE.                        NC1124.2
```

```
ACCUM-1                                          Numeric
ACCUM-2
ACCUM-3
ACCUM-4
ANSI-REFERENCE
ADDRESS OF
AS
ID-AGAIN
ID-AGAIN IN CCVS-E-1
COR-ANSI-REFERENCE
COR-ANSI-REFERENCE IN CORRECT-X IN TEST-CORR…
INF-ANSI-REFERENCE
```



```
030500     02 FILLER  PIC IS X(54)    VALUE IS "************************SM2014.2
030600-    "********************************".                            SM2014.2
030700 01  CCVS-PGM-ID                         PIC X(9)   VALUE            SM2014.2
030800     "SM201A".                                                       SM2014.2
030900 PROCEDURE DIVISION.                                                 SM2014.2
031000 CCVS1 SECTION.                                                      SM2014.2
031100 OPEN-FILES.                                                         SM2014.2
031200     OPEN     OUTPUT PRINT-FILE.                                     SM2014.2
031300     MOVE CCVS-PGM-ID TO TEST-ID. MOVE CCVS-PGM-ID TO ID-AGAIN.      SM2014.2
031400     MOVE    SPACE TO TEST-RESULTS.                                  SM2014.2
031500     PERFORM HEA                                                     SM2014.2
031600     GO TO CCVS1 HEAD-ROUTINE                                         M2014.2
031700 CLOSE-FILES.  HEAD-ROUTINE IN CCVS1                                  M2014.2
031800     PERFORM END-ROUTINE THRU END-ROUTINE-13. CLOSE PRINT-FILE.      SM2014.2
031900 TERMINATE-CCVS.                                                     SM2014.2
032200     STOP     RUN.                                                   SM2014.2
032300 INSPT. MOVE "INSPT" TO P-OR-F. ADD 1 TO INSPECT-COUNTER.            SM2014.2
032400 PASS.  MOVE "PASS " TO P-OR-F.  ADD 1 TO PASS-COUNTER.              SM2014.2
032500 FAIL.  MOVE "FAIL*" TO P-OR-F.  ADD 1 TO ERROR-COUNTER.             SM2014.2
032600 DE-LETE.  MOVE "*****" TO P-OR-F.  ADD 1 TO DELETE-COUNTER.         SM2014.2
032700     MOVE "****TEST DELETED****" TO RE-MARK.                         SM2014.2
032800 PRINT-DETAIL.                                                       SM2014.2
032900     IF REC-CT NOT EQUAL TO ZERO                                     SM2014.2
033000             MOVE "." TO PARDOT-X                                    SM2014.2
033100             MOVE REC-CT TO DOTVALUE.                                SM2014.2
033200     MOVE     TEST-RESULTS TO PRINT-REC. PERFORM WRITE-LINE.         SM2014.2
033300     IF P-OR-F EQUAL TO "FAIL*"  PERFORM WRITE-LINE                  SM2014.2
033400        PERFORM FAIL-ROUTINE THRU FAIL-ROUTINE-EX                    SM2014.2
033500          ELSE PERFORM BAIL-OUT THRU BAIL-OUT-EX.                    SM2014.2
033600     MOVE SPACE TO P-OR-F. MOVE SPACE TO COMPUTED-X.                 SM2014.2
033700     MOVE SPACE TO CORRECT-X.                                        SM2014.2
033800     IF     REC-CT EQUAL TO ZERO  MOVE SPACE TO PAR-NAME.            SM2014.2
033900     MOVE     SPACE TO RE-MARK.                                      SM2014.2
034000 HEAD-ROUTINE.                                                       SM2014.2
```

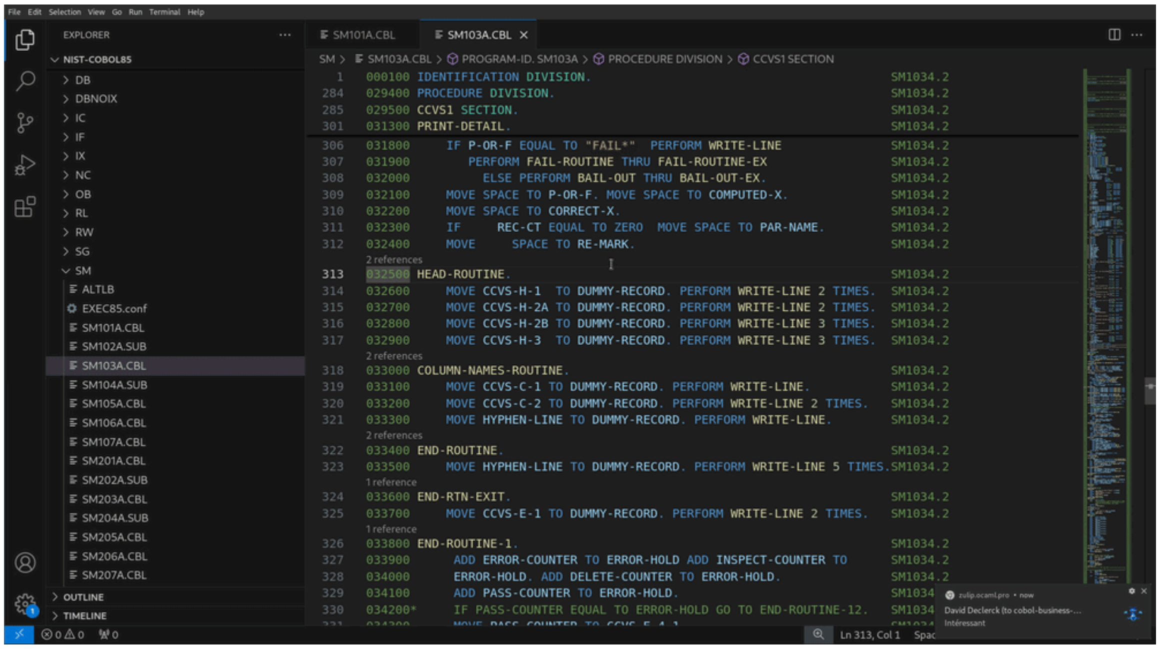
SM208A.CBL
SM201A.CBL
SM > SM201A.CBL > PROGRAM-ID. SM201A > PROCEDURE DIVISION > CCVS1 SECTION > OPEN-FILES
Ln 315, Col 23
Spaces: 4
UTF-8
LF
COBOL

(Temporary limitation)

Suggestions of user-defined words may not comprise symbols that are defined in the communication, report, or screen section of the data division. Although user-defined words that occur in configured copybooks are also suggested, preprocessor-related variables or phrases are not.

6.2 Rename Data Items, Sections, and Paragraphs

You can rename any data item by pressing F2 while your cursor is positioned on one of its references. The extension will warn you if a reference to the renamed item appears in a copybook (in which case the renaming of every reference is not performed).


SM101A.CBL
SM103A.CBL
SM > SM103A.CBL > PROGRAM-ID. SM103A > PROCEDURE DIVISION > CCVS1 SECTION
Ln 313, Col 1

```
000100 IDENTIFICATION DIVISION.                                    SM1034.2
029400 PROCEDURE DIVISION.                                         SM1034.2
029500 CCVS1 SECTION.                                              SM1034.2
031300 PRINT-DETAIL.                                               SM1034.2
031800     IF P-OR-F EQUAL TO "FAIL*"  PERFORM WRITE-LINE          SM1034.2
031900        PERFORM FAIL-ROUTINE THRU FAIL-ROUTINE-EX            SM1034.2
032000          ELSE PERFORM BAIL-OUT THRU BAIL-OUT-EX.            SM1034.2
032100     MOVE SPACE TO P-OR-F. MOVE SPACE TO COMPUTED-X.         SM1034.2
032200     MOVE SPACE TO CORRECT-X.                                SM1034.2
032300     IF     REC-CT EQUAL TO ZERO  MOVE SPACE TO PAR-NAME.    SM1034.2
032400     MOVE     SPACE TO RE-MARK.                              SM1034.2
2 references
032500 HEAD-ROUTINE.                                               SM1034.2
032600     MOVE CCVS-H-1  TO DUMMY-RECORD. PERFORM WRITE-LINE 2 TIMES.  SM1034.2
032700     MOVE CCVS-H-2A TO DUMMY-RECORD. PERFORM WRITE-LINE 2 TIMES.  SM1034.2
032800     MOVE CCVS-H-2B TO DUMMY-RECORD. PERFORM WRITE-LINE 3 TIMES.  SM1034.2
032900     MOVE CCVS-H-3  TO DUMMY-RECORD. PERFORM WRITE-LINE 3 TIMES.  SM1034.2
2 references
033000 COLUMN-NAMES-ROUTINE.                                       SM1034.2
033100     MOVE CCVS-C-1 TO DUMMY-RECORD. PERFORM WRITE-LINE.      SM1034.2
033200     MOVE CCVS-C-2 TO DUMMY-RECORD. PERFORM WRITE-LINE 2 TIMES.   SM1034.2
033300     MOVE HYPHEN-LINE TO DUMMY-RECORD. PERFORM WRITE-LINE.   SM1034.2
2 references
033400 END-ROUTINE.                                                SM1034.2
033500     MOVE HYPHEN-LINE TO DUMMY-RECORD. PERFORM WRITE-LINE 5 TIMES.SM1034.2
1 reference
033600 END-RTN-EXIT.                                               SM1034.2
033700     MOVE CCVS-E-1 TO DUMMY-RECORD. PERFORM WRITE-LINE 2 TIMES.   SM1034.2
1 reference
033800 END-ROUTINE-1.                                              SM1034.2
033900      ADD ERROR-COUNTER TO ERROR-HOLD ADD INSPECT-COUNTER TO     SM1034.2
034000      ERROR-HOLD. ADD DELETE-COUNTER TO ERROR-HOLD.          SM1034.2
034100      ADD PASS-COUNTER TO ERROR-HOLD.                        SM1034
034200*     IF PASS-COUNTER EQUAL TO ERROR-HOLD GO TO END-ROUTINE-12.   SM1034
```

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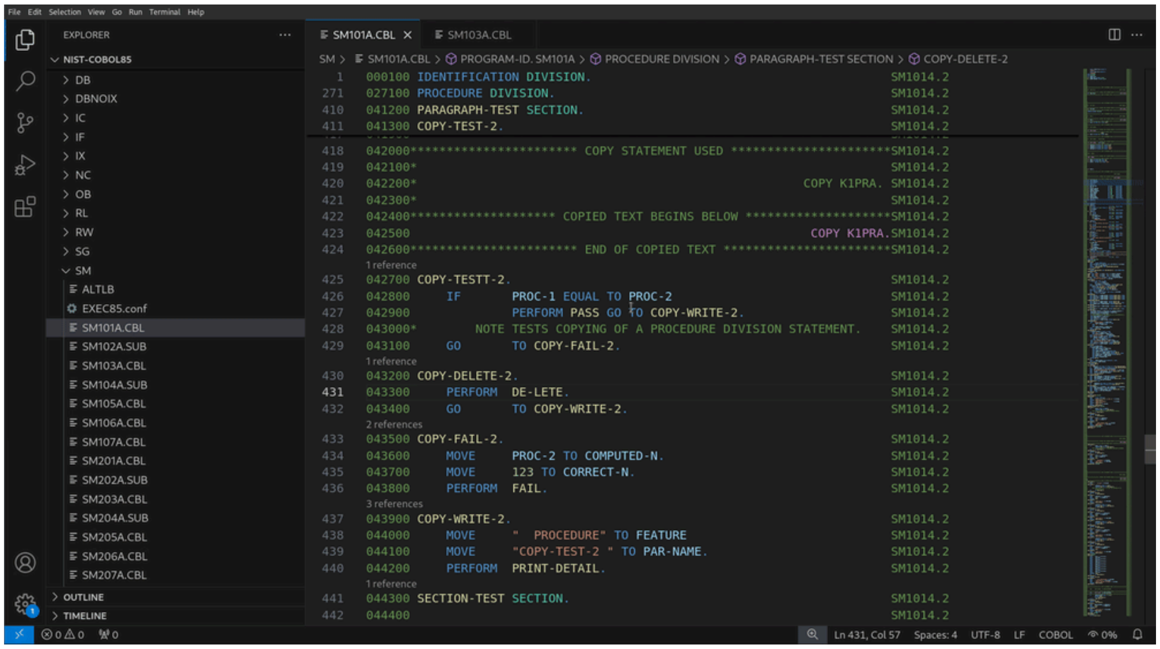
Figure 14: Rename Symbol


SM101A.CBL
SM103A.CBL
SM > SM101A.CBL > PROGRAM-ID. SM101A > PROCEDURE DIVISION > PARAGRAPH-TEST SECTION > COPY-DELETE-2
Ln 431, Col 57
Spaces: 4
UTF-8
LF
COBOL

```
000100 IDENTIFICATION DIVISION.                                    SM1014.2
027100 PROCEDURE DIVISION.                                         SM1014.2
041200 PARAGRAPH-TEST SECTION.                                     SM1014.2
041300 COPY-TEST-2.                                                SM1014.2
042000********************** COPY STATEMENT USED *********************SM1014.2
042100*                                                            SM1014.2
042200*                                                COPY K1PRA. SM1014.2
042300*                                                            SM1014.2
042400****************** COPIED TEXT BEGINS BELOW ******************SM1014.2
042500                                                  COPY K1PRA.SM1014.2
042600********************** END OF COPIED TEXT *********************SM1014.2
1 reference
042700 COPY-TESTT-2.                                               SM1014.2
042800     IF       PROC-1 EQUAL TO PROC-2                         SM1014.2
042900              PERFORM PASS GO TO COPY-WRITE-2.               SM1014.2
043000*         NOTE TESTS COPYING OF A PROCEDURE DIVISION STATEMENT.   SM1014.2
043100     GO       TO COPY-FAIL-2.                                SM1014.2
1 reference
043200 COPY-DELETE-2.                                              SM1014.2
043300     PERFORM  DE-LETE.                                       SM1014.2
043400     GO       TO COPY-WRITE-2.                               SM1014.2
2 references
043500 COPY-FAIL-2.                                                SM1014.2
043600     MOVE     PROC-2 TO COMPUTED-N.                          SM1014.2
043700     MOVE     123 TO CORRECT-N.                              SM1014.2
043800     PERFORM  FAIL.                                          SM1014.2
3 references
043900 COPY-WRITE-2.                                               SM1014.2
044000     MOVE     "  PROCEDURE" TO FEATURE                       SM1014.2
044100     MOVE     "COPY-TEST-2 " TO PAR-NAME.                    SM1014.2
044200     PERFORM  PRINT-DETAIL.                                  SM1014.2
1 reference
044300 SECTION-TEST SECTION.                                       SM1014.2
044400                                                             SM1014.2
```

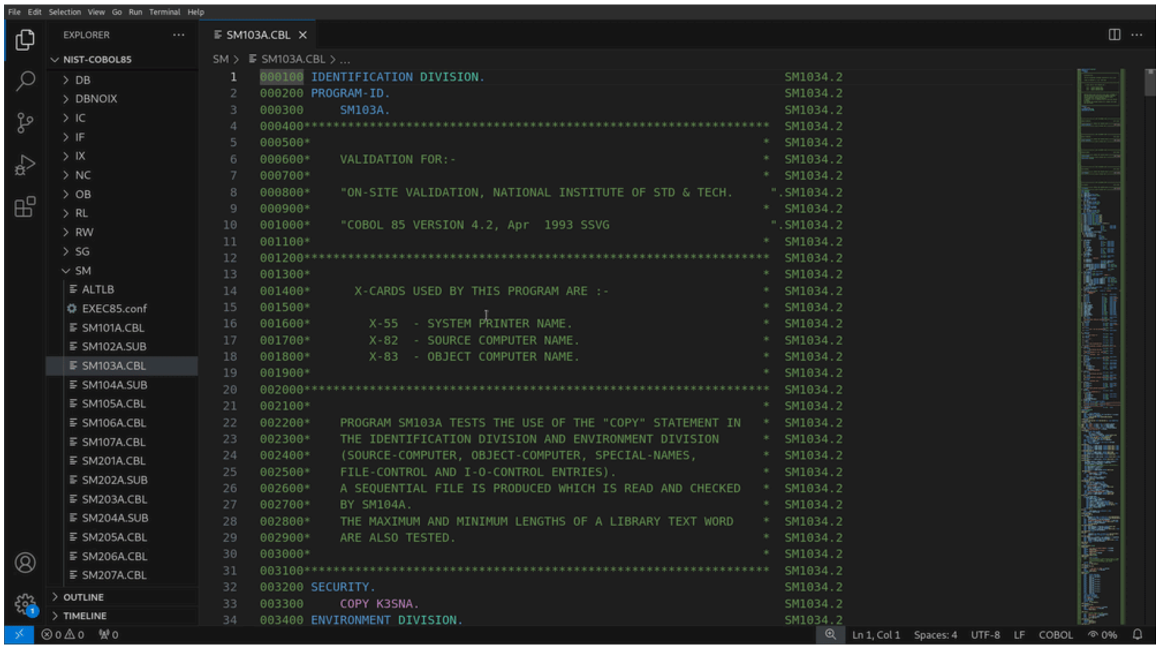
Figure 15: Rename Symbol in Copybook

Sections and paragraphs of the procedure division can also be renamed in the same way. The same limitations as for Go to References apply to this feature.

7 Control-Flow Visualization

7.1 Exploring the Control-flow

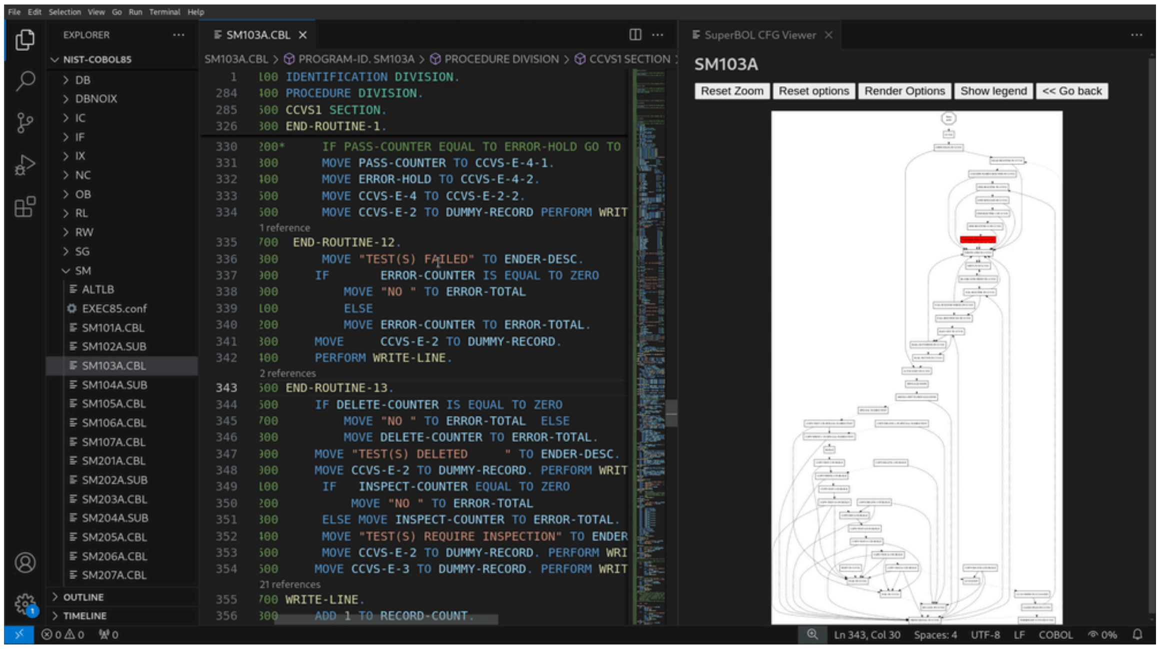
Navigating a graphical representation of a COBOL program's control-flow proves invaluable when it comes to decipher its overall logic. To do this, open the command palette (or type Ctrl+Shift+P), and select `SuperBOL: Show Control-flow` (you can also right click and select `Show Control-flow` in the menu). You are then presented with a list of portions of program to consider (either the entire program, or individiual sections): select one element to see the corresponding CFG.



```
000100 IDENTIFICATION DIVISION.                                          SM1034.2
000200 PROGRAM-ID.                                                       SM1034.2
000300     SM103A.                                                       SM1034.2
000400****************************************************************** SM1034.2
000500*                                                                * SM1034.2
000600*    VALIDATION FOR:-                                            * SM1034.2
000700*                                                                * SM1034.2
000800*    "ON-SITE VALIDATION, NATIONAL INSTITUTE OF STD & TECH.      ".SM1034.2
000900*                                                                * SM1034.2
001000*    "COBOL 85 VERSION 4.2, Apr  1993 SSVG                       ".SM1034.2
001100*                                                                * SM1034.2
001200****************************************************************** SM1034.2
001300*                                                                * SM1034.2
001400*      X-CARDS USED BY THIS PROGRAM ARE :-                       * SM1034.2
001500*                                                                * SM1034.2
001600*        X-55  - SYSTEM PRINTER NAME.                            * SM1034.2
001700*        X-82  - SOURCE COMPUTER NAME.                           * SM1034.2
001800*        X-83  - OBJECT COMPUTER NAME.                           * SM1034.2
001900*                                                                * SM1034.2
002000****************************************************************** SM1034.2
002100*                                                                * SM1034.2
002200*    PROGRAM SM103A TESTS THE USE OF THE "COPY" STATEMENT IN     * SM1034.2
002300*    THE IDENTIFICATION DIVISION AND ENVIRONMENT DIVISION        * SM1034.2
002400*    (SOURCE-COMPUTER, OBJECT-COMPUTER, SPECIAL-NAMES,           * SM1034.2
002500*    FILE-CONTROL AND I-O-CONTROL ENTRIES).                      * SM1034.2
002600*    A SEQUENTIAL FILE IS PRODUCED WHICH IS READ AND CHECKED     * SM1034.2
002700*    BY SM104A.                                                  * SM1034.2
002800*    THE MAXIMUM AND MINIMUM LENGTHS OF A LIBRARY TEXT WORD      * SM1034.2
002900*    ARE ALSO TESTED.                                            * SM1034.2
003000*                                                                * SM1034.2
003100****************************************************************** SM1034.2
003200 SECURITY.                                                         SM1034.2
003300     COPY K3SNA.                                                   SM1034.2
003400 ENVIRONMENT DIVISION.                                             SM1034.2
```

Figure 16: CFG Explorer

Various settings are provided to tune the rendering of CFGs.

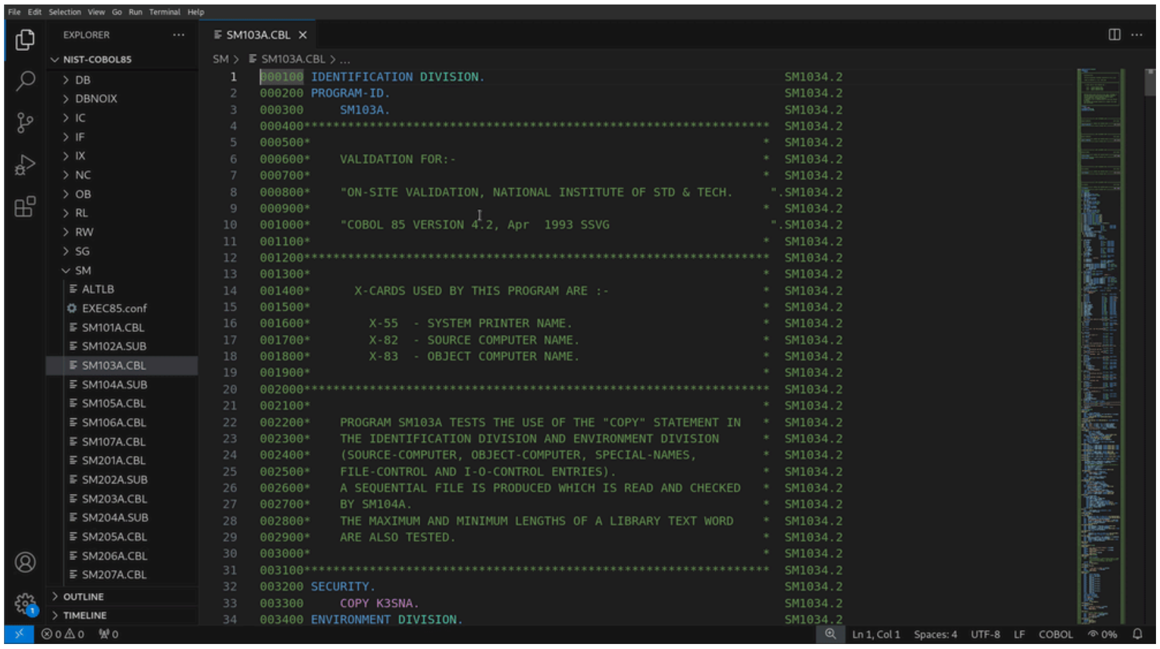


```
100 IDENTIFICATION DIVISION.
400 PROCEDURE DIVISION.
500 CCVS1 SECTION.
300 END-ROUTINE-1.
200*     IF PASS-COUNTER EQUAL TO ERROR-HOLD GO TO
300      MOVE PASS-COUNTER TO CCVS-E-4-1.
400      MOVE ERROR-HOLD TO CCVS-E-4-2.
500      MOVE CCVS-E-4 TO CCVS-E-2-2.
500      MOVE CCVS-E-2 TO DUMMY-RECORD PERFORM WRIT
    1 reference
700  END-ROUTINE-12.
300      MOVE "TEST(S) FAILED" TO ENDER-DESC.
900     IF        ERROR-COUNTER IS EQUAL TO ZERO
900         MOVE "NO " TO ERROR-TOTAL
100         ELSE
200         MOVE ERROR-COUNTER TO ERROR-TOTAL.
300     MOVE      CCVS-E-2 TO DUMMY-RECORD.
400     PERFORM WRITE-LINE.
    2 references
500 END-ROUTINE-13.
500     IF DELETE-COUNTER IS EQUAL TO ZERO
700         MOVE "NO " TO ERROR-TOTAL  ELSE
300         MOVE DELETE-COUNTER TO ERROR-TOTAL.
900     MOVE "TEST(S) DELETED     " TO ENDER-DESC.
900     MOVE CCVS-E-2 TO DUMMY-RECORD. PERFORM WRIT
100      IF   INSPECT-COUNTER EQUAL TO ZERO
200          MOVE "NO " TO ERROR-TOTAL
300      ELSE MOVE INSPECT-COUNTER TO ERROR-TOTAL.
400      MOVE "TEST(S) REQUIRE INSPECTION" TO ENDER
500      MOVE CCVS-E-2 TO DUMMY-RECORD. PERFORM WRI
500     MOVE CCVS-E-3 TO DUMMY-RECORD. PERFORM WRIT
    21 references
700 WRITE-LINE.
300     ADD 1 TO RECORD-COUNT.
```

Figure 17: CFG Explorer Collapse Fallthrough

7.2 CFG as an arc diagram

A rendering of CFGs as arc diagrams is also available. In this representation, named sections and paragraphs are laid out vertically, and arcs show the direction of control-flow between them.



```
000100 IDENTIFICATION DIVISION.                                      SM1034.2
000200 PROGRAM-ID.                                                   SM1034.2
000300     SM103A.                                                   SM1034.2
000400*************************************************************  SM1034.2
000500*                                                            * SM1034.2
000600*    VALIDATION FOR:-                                        * SM1034.2
000700*                                                            * SM1034.2
000800*    "ON-SITE VALIDATION, NATIONAL INSTITUTE OF STD & TECH.     ".SM1034.2
000900*                                                            * SM1034.2
001000*    "COBOL 85 VERSION 4.2, Apr  1993 SSVG                      ".SM1034.2
001100*                                                            * SM1034.2
001200*************************************************************  SM1034.2
001300*                                                            * SM1034.2
001400*      X-CARDS USED BY THIS PROGRAM ARE :-                   * SM1034.2
001500*                                                            * SM1034.2
001600*        X-55  - SYSTEM PRINTER NAME.                        * SM1034.2
001700*        X-82  - SOURCE COMPUTER NAME.                       * SM1034.2
001800*        X-83  - OBJECT COMPUTER NAME.                       * SM1034.2
001900*                                                            * SM1034.2
002000*************************************************************  SM1034.2
002100*                                                            * SM1034.2
002200*    PROGRAM SM103A TESTS THE USE OF THE "COPY" STATEMENT IN * SM1034.2
002300*    THE IDENTIFICATION DIVISION AND ENVIRONMENT DIVISION    * SM1034.2
002400*    (SOURCE-COMPUTER, OBJECT-COMPUTER, SPECIAL-NAMES,       * SM1034.2
002500*    FILE-CONTROL AND I-O-CONTROL ENTRIES).                  * SM1034.2
002600*    A SEQUENTIAL FILE IS PRODUCED WHICH IS READ AND CHECKED * SM1034.2
002700*    BY SM104A.                                              * SM1034.2
002800*    THE MAXIMUM AND MINIMUM LENGTHS OF A LIBRARY TEXT WORD  * SM1034.2
002900*    ARE ALSO TESTED.                                        * SM1034.2
003000*                                                            * SM1034.2
003100*************************************************************  SM1034.2
003200 SECURITY.                                                     SM1034.2
003300     COPY K3SNA.                                               SM1034.2
003400 ENVIRONMENT DIVISION.                                         SM1034.2
```

Figure 18: CFG Explorer as Arc Diagram

8 Debugging Programs

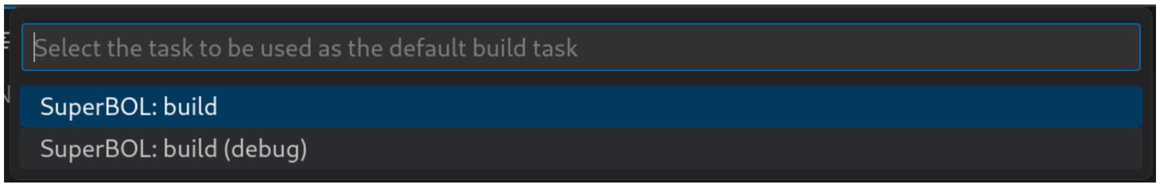
8.1 Debugging

In order to debug a COBOL program, you first need to run a *build task* with appropriate debug options. Once this is done, you can *launch* the compiled program in a debugging session.

> [!NOTE]
>
> We recommend that a version of GnuCOBOL that is at least as recent as version 3.2 be available on the system running VS Code. Debug and coverage features respectively assume that gdb and gcov are installed.
>
> On Windows systems, users may employ dedicated installers that are available here. Linux users may rely on their favorite package manager and install `gnucobol`.

8.2 Running a Build Task for Debugging

After having opened the program to debug, select `Terminal > Run Build Task…` (Ctrl+Shift+B), and then `SuperBOL: build (debug)`.



Select the task to be used as the default build task

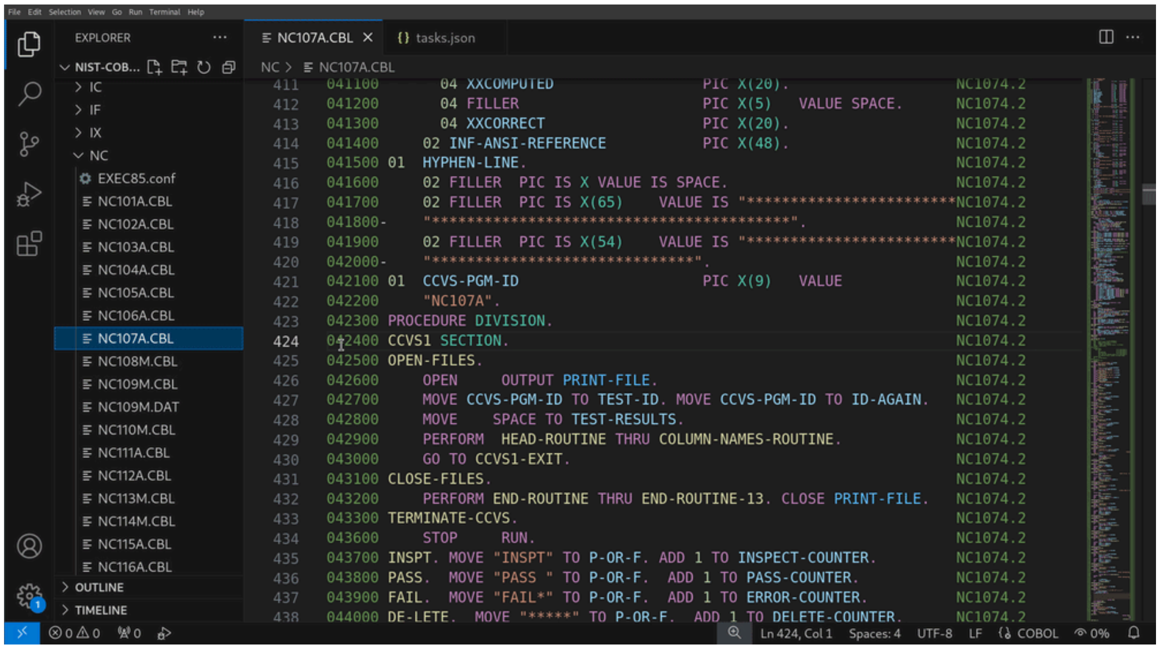
SuperBOL: build

SuperBOL: build (debug)

Figure 19: Select `SuperBOL: build (debug)`

8.3 Launching the Compiled Program for Debugging

If needed, you can place a breakpoint on statements (or paragraph titles in the procedure division) by clicking on the red dot that appears when you hover the cursor on the left margin (or with F9). Click on the red dot or press F9 again to remove a breakpoint. Then, to launch the program in debug mode, select `Run > Start Debugging` (F5). This will run your program until a first breakpoint if reached, or to completion.



```
041100          04 XXCOMPUTED                        PIC X(20).          NC1074.2
041200          04 FILLER                            PIC X(5)   VALUE SPACE.     NC1074.2
041300          04 XXCORRECT                         PIC X(20).          NC1074.2
041400        02 INF-ANSI-REFERENCE                  PIC X(48).          NC1074.2
041500 01  HYPHEN-LINE.                                                   NC1074.2
041600        02 FILLER  PIC IS X VALUE IS SPACE.                         NC1074.2
041700        02 FILLER  PIC IS X(65)    VALUE IS "************************NC1074.2
041800-       "*****************************************".               NC1074.2
041900        02 FILLER  PIC IS X(54)    VALUE IS "************************NC1074.2
042000-       "******************************".                          NC1074.2
042100 01  CCVS-PGM-ID                               PIC X(9)   VALUE     NC1074.2
042200        "NC107A".                                                   NC1074.2
042300 PROCEDURE DIVISION.                                                NC1074.2
042400 CCVS1 SECTION.                                                     NC1074.2
042500 OPEN-FILES.                                                        NC1074.2
042600        OPEN     OUTPUT PRINT-FILE.                                 NC1074.2
042700        MOVE CCVS-PGM-ID TO TEST-ID. MOVE CCVS-PGM-ID TO ID-AGAIN.  NC1074.2
042800        MOVE    SPACE TO TEST-RESULTS.                              NC1074.2
042900        PERFORM  HEAD-ROUTINE THRU COLUMN-NAMES-ROUTINE.            NC1074.2
043000        GO TO CCVS1-EXIT.                                           NC1074.2
043100 CLOSE-FILES.                                                       NC1074.2
043200        PERFORM END-ROUTINE THRU END-ROUTINE-13. CLOSE PRINT-FILE.  NC1074.2
043300 TERMINATE-CCVS.                                                    NC1074.2
043600        STOP     RUN.                                               NC1074.2
043700 INSPT. MOVE "INSPT" TO P-OR-F. ADD 1 TO INSPECT-COUNTER.           NC1074.2
043800 PASS.  MOVE "PASS " TO P-OR-F.  ADD 1 TO PASS-COUNTER.             NC1074.2
043900 FAIL.  MOVE "FAIL*" TO P-OR-F.  ADD 1 TO ERROR-COUNTER.            NC1074.2
044000 DE-LETE.  MOVE "*****" TO P-OR-F.  ADD 1 TO DELETE-COUNTER.        NC1074.2
```

Figure 20: Start Debugging

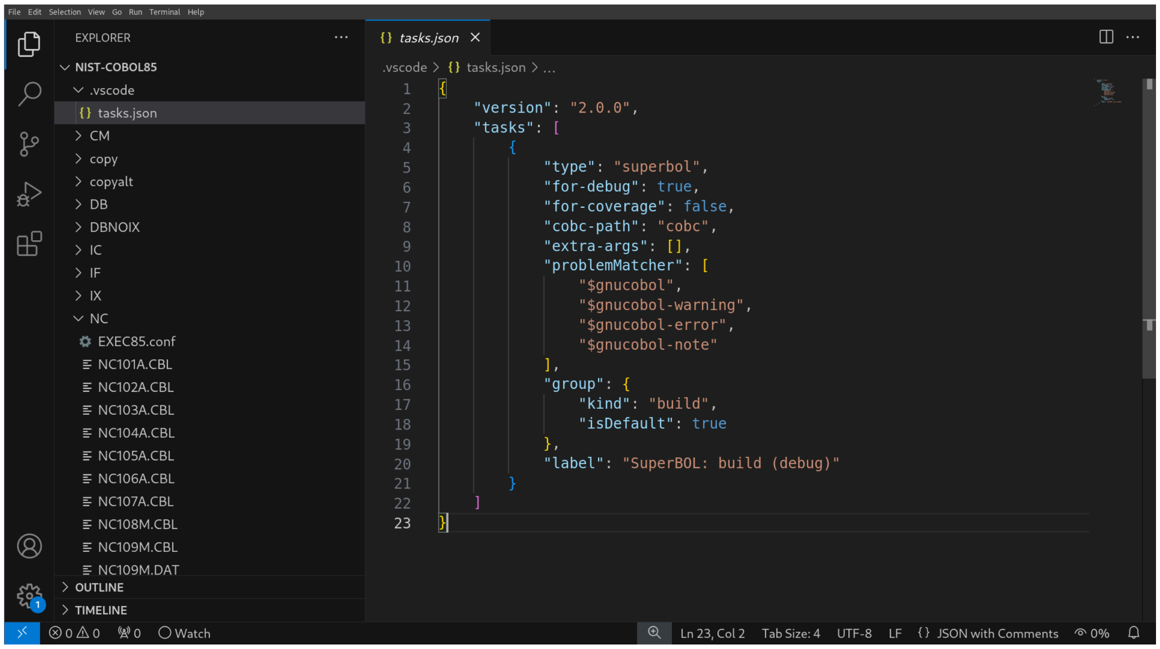
Once stopped on a breakpoint, you can investigate the values of data items from the program using the `VARIABLES` panel on the left-hand side.

Press F10 to step to the next statement, or F5 again to continue until the next breakpoint, or termination of the program.

8.4 Customizing Build Tasks

To customize a build task, you can select `Terminal > Configure Default Build Task...`, and then `SuperBOL: build` or `SuperBOL: build (debug)` (the latter being the task that is run whenever you start a debugging session, *e.g* with F5).

Save the `tasks.json` as shown. Definitions for this task notably include a `forDebug` flag, that instructs the compiler to insert debug annotations into generated executable files (this effectively passes flags `-ftraceall` and `-g` to `cobc`). The `extraArgs` setting can be edited to pass additional arguments to `cobc`.



```
{
    "version": "2.0.0",
    "tasks": [
        {
            "type": "superbol",
            "for-debug": true,
            "for-coverage": false,
            "cobc-path": "cobc",
            "extra-args": [],
            "problemMatcher": [
                "$gnucobol",
                "$gnucobol-warning",
                "$gnucobol-error",
                "$gnucobol-note"
            ],
            "group": {
                "kind": "build",
                "isDefault": true
            },
            "label": "SuperBOL: build (debug)"
        }
    ]
}
```

Figure 21: `tasks.json` for debug

9 Code Coverage

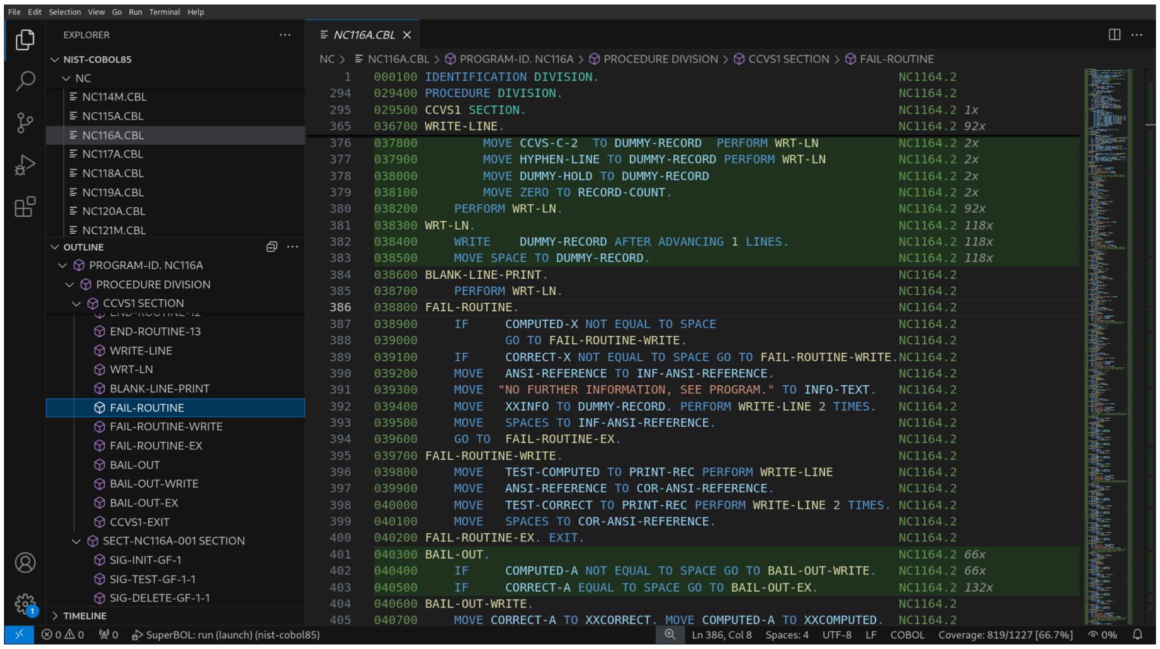
GnuCOBOL can instrument your programs so they can generate coverage information at runtime. To enable this feature, you can set the `forCoverage` setting to `true` in the `Superbol: build (debug)` task in your `tasks.json` file. This flag instructs the extension to pass the `--coverage` flag to the `cobc` compiler.

9.1 Coverage Information

Generated coverage files are in `gcov` format; they are portable, and you can use them as you would any other coverage file generated for programs written using other programming languages.

9.2 Highlighting Coverage Information

Coverage data can be shown after the execution of a program that was compiled to generate this information terminates. SuperBOL will display coverage on a line-by-line basis, by highlighting the lines of your source code using colors that represent their coverage status. To enable coverage highlighting, you can open the command palette (or type Ctrl+Shift+P), and select `SuperBOL: Show Coverage`. You can also hide the highlighting with the command `SuperBOL: Hide Coverage`, and update it after re-executing your program with `SuperBOL: Update Coverage`.



```
000100 IDENTIFICATION DIVISION.                                          NC1164.2
029400 PROCEDURE DIVISION.                                               NC1164.2
029500 CCVS1 SECTION.                                                    NC1164.2 1x
036700 WRITE-LINE.                                                       NC1164.2 92x
037800         MOVE CCVS-C-2  TO DUMMY-RECORD  PERFORM WRT-LN            NC1164.2 2x
037900         MOVE HYPHEN-LINE TO DUMMY-RECORD PERFORM WRT-LN           NC1164.2 2x
038000         MOVE DUMMY-HOLD TO DUMMY-RECORD                           NC1164.2 2x
038100         MOVE ZERO TO RECORD-COUNT.                                NC1164.2 2x
038200     PERFORM WRT-LN.                                               NC1164.2 92x
038300 WRT-LN.                                                           NC1164.2 118x
038400     WRITE    DUMMY-RECORD AFTER ADVANCING 1 LINES.                NC1164.2 118x
038500     MOVE SPACE TO DUMMY-RECORD.                                   NC1164.2 118x
038600 BLANK-LINE-PRINT.                                                 NC1164.2
038700     PERFORM WRT-LN.                                               NC1164.2
038800 FAIL-ROUTINE.                                                     NC1164.2
038900     IF     COMPUTED-X NOT EQUAL TO SPACE                          NC1164.2
039000            GO TO FAIL-ROUTINE-WRITE.                              NC1164.2
039100     IF     CORRECT-X NOT EQUAL TO SPACE GO TO FAIL-ROUTINE-WRITE.NC1164.2
039200     MOVE   ANSI-REFERENCE TO INF-ANSI-REFERENCE.                  NC1164.2
039300     MOVE  "NO FURTHER INFORMATION, SEE PROGRAM." TO INFO-TEXT.    NC1164.2
039400     MOVE   XXINFO TO DUMMY-RECORD. PERFORM WRITE-LINE 2 TIMES.    NC1164.2
039500     MOVE   SPACES TO INF-ANSI-REFERENCE.                          NC1164.2
039600     GO TO  FAIL-ROUTINE-EX.                                       NC1164.2
039700 FAIL-ROUTINE-WRITE.                                               NC1164.2
039800     MOVE   TEST-COMPUTED TO PRINT-REC PERFORM WRITE-LINE          NC1164.2
039900     MOVE   ANSI-REFERENCE TO COR-ANSI-REFERENCE.                  NC1164.2
040000     MOVE   TEST-CORRECT TO PRINT-REC PERFORM WRITE-LINE 2 TIMES. NC1164.2
040100     MOVE   SPACES TO COR-ANSI-REFERENCE.                          NC1164.2
040200 FAIL-ROUTINE-EX. EXIT.                                            NC1164.2
040300 BAIL-OUT.                                                         NC1164.2 66x
040400     IF     COMPUTED-A NOT EQUAL TO SPACE GO TO BAIL-OUT-WRITE.    NC1164.2 66x
040500     IF     CORRECT-A EQUAL TO SPACE GO TO BAIL-OUT-EX.            NC1164.2 132x
040600 BAIL-OUT-WRITE.                                                   NC1164.2
040700     MOVE CORRECT-A TO XXCORRECT. MOVE COMPUTED-A TO XXCOMPUTED.   NC1164.2
```

Figure 22: Show Coverage

10 Using Vscode in General

10.1 Navigating through Warnings and Errors aka Problems

Problems (errors and warnings) are not always as visible as we would want. You should probably install an extension to improve their display, typically the "Error Lens" VSCode extension) that displays errors as inline messages in the source code.

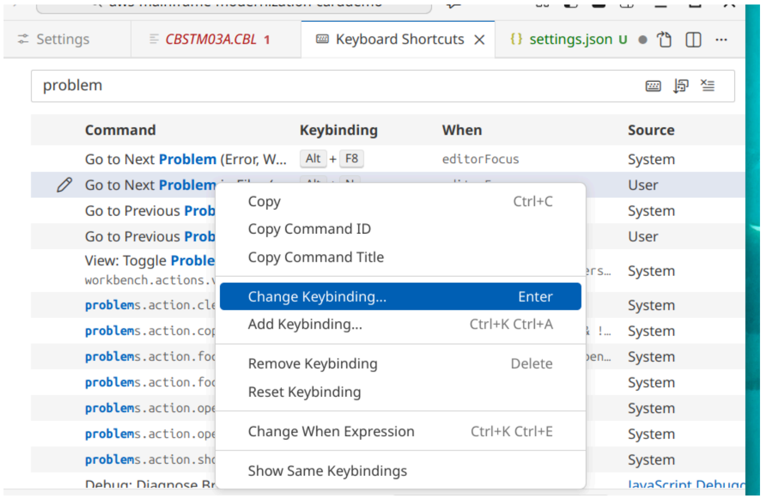
You can also use the following shortcuts:

- Ctrl+Shift+M: go to the first problem, and display the "Problems" tab, showing the list of all problems found. You can use arrow keys to navigate the problems.
- F8: go to next problem in file
- Shift+F8: go to previous problem in file

Some users like to use other shortcuts, for example because F8 is already used for something else.

For that:

- Open the "Keyboard Shortcuts" by typing successively Ctrl+K Ctrl+S
- Type "Problem" to display related shortcuts
- Click on the shortcut you want to edit, and use "Change Keybinding" to propose a new binding
- For example, in our case, we will use Alt+N for "Go to Next Problem in Files"

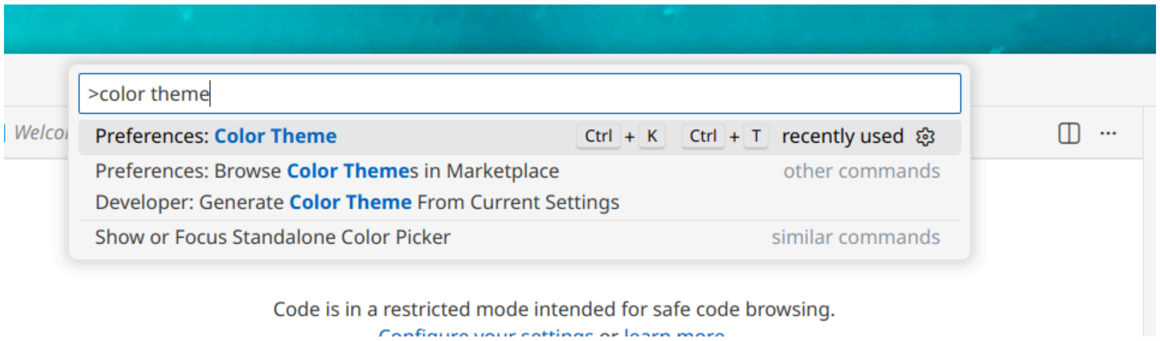


problem

Command	Keybinding	When	Source
Go to Next Problem (Error, W...	Alt + F8	editorFocus	System
Go to Next Problem			User
Go to Previous Prob			System
Go to Previous Prob			User
View: Toggle Proble workbench.actions.		ers...	System
problems.action.cle			System
problems.action.cop		!...	System
problems.action.foc		pen...	System
problems.action.foc			System
problems.action.ope			System
problems.action.ope			System
problems.action.sho			System
Debug: Diagnose Br			JavaScript Debug

10.2 Switching between Light and Dark Themes

1. Open the **Command Palette** with CTRL + SHIFT + P
2. Type “Color Theme”.
3. Select **Preferences: Color Theme** from the dropdown.
4. Choose a color theme, typically the **Dark modern** or **Light modern**.


>color theme
Preferences: Color Theme Ctrl + K Ctrl + T recently used
Preferences: Browse Color Themes in Marketplace other commands
Developer: Generate Color Theme From Current Settings
Show or Focus Standalone Color Picker similar commands
Welco

Code is in a restricted mode intended for safe code browsing.

Figure 23: Color Theme Dropdown

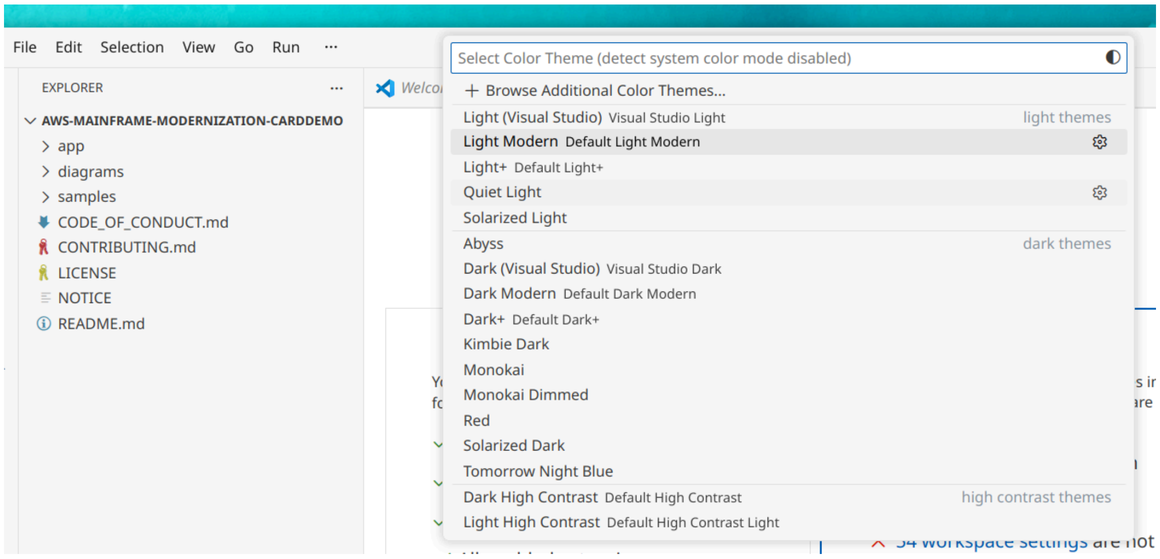
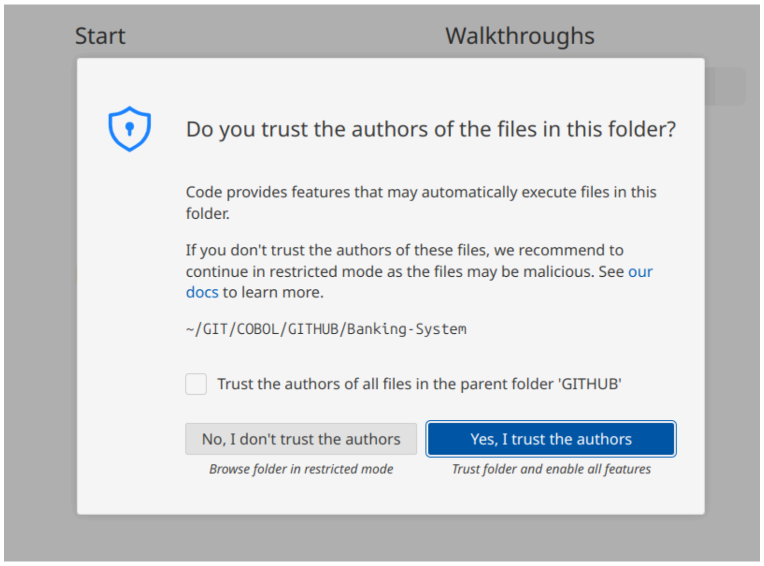

File Edit Selection View Go Run ...
EXPLORER
AWS-MAINFRAME-MODERNIZATION-CARDDEMO
app
diagrams
samples
CODE_OF_CONDUCT.md
CONTRIBUTING.md
LICENSE
NOTICE
README.md
Select Color Theme (detect system color mode disabled)
Browse Additional Color Themes...
Light (Visual Studio) Visual Studio Light
light themes
Light Modern Default Light Modern
Light+ Default Light+
Quiet Light
Solarized Light
Abyss
dark themes
Dark (Visual Studio) Visual Studio Dark
Dark Modern Default Dark Modern
Dark+ Default Dark+
Kimbie Dark
Monokai
Monokai Dimmed
Red
Solarized Dark
Tomorrow Night Blue
Dark High Contrast Default High Contrast
high contrast themes
Light High Contrast Default High Contrast Light

Figure 24: Color Theme Dropdown

10.3 The "Do you trust the authors" popup

When entering a new project, you always get the following popup:


Start Walkthroughs

Do you trust the authors of the files in this folder?

Code provides features that may automatically execute files in this folder.

If you don't trust the authors of these files, we recommend to continue in restricted mode as the files may be malicious. See our docs to learn more.

~/GIT/COBOL/GITHUB/Banking-System

Trust the authors of all files in the parent folder 'GITHUB'

No, I don't trust the authors
Browse folder in restricted mode
Yes, I trust the authors
Trust folder and enable all features

Figure 25: Do you trust popup

To use SuperBOL Studio extension, you need to reply "Yes, I trust the authors".

If you reply "No, I don't trust the authors", Vscode enters a **Restricted Mode**, where:

- Extensions are disabled: Most extensions that actually do things (like debuggers, linters, or language servers for Python/C++) will be turned off. This prevents a malicious workspace from using an extension to run a script in the background.

- Tasks are blocked: Any automation you've set up in .vscode/tasks.json (like your make command for Pandoc) will be disabled. VS Code won't run them because it doesn't know if the command is safe.
- Debugging is disabled: You cannot launch the debugger, as this requires executing the code in the workspace.
- Workspace Settings are ignored: Some settings defined specifically for that folder (in .vscode/settings.json) will be overridden by your global user settings to prevent the folder from "hijacking" your editor's behavior.

If you replied "No", you will see a "Restricted Mode" button in the bottom left corner, click on it and select the "Trust" box to change it.

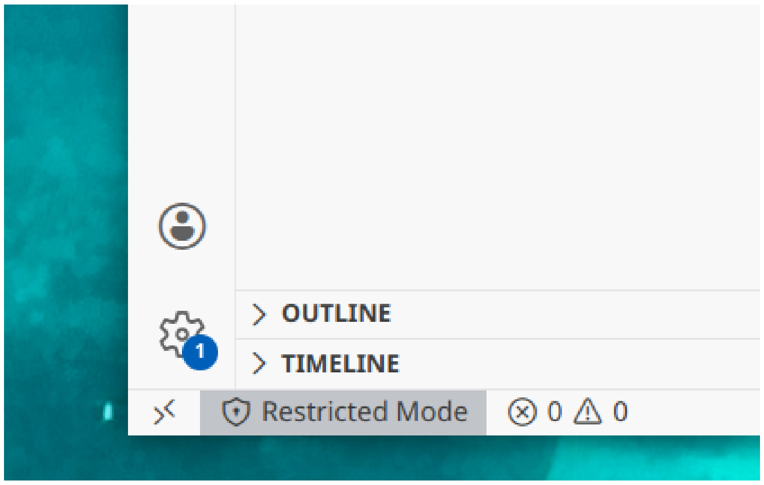


Figure 26: Color Theme Dropdown

11 SuperBOL Studio Reference

11.1 SuperBOL Studio Configuration

There are several configuration files used by VSCode:

- By default, options are taken from the user configuration in `$HOME/.config/Code/User/settings.json` (on Linux)
- In a workspace, options are taken from the workspace configuration in `.vscode/settings.json`
- Additionnally, SuperBOL Studio LSP server will also use options from `superbol.toml` at the root of the workspace, as a preference over options from `settings.json` files. This file is also used by other tools from SuperBOL that are not related to VSCode.

The command **SuperBOL: Write Project Configuration** can be used to export the configuration from the `settings.json` to the `superbol.toml` file.

11.2 SuperBOL options in `settings.json`

- **superbol.cobol.dialect** (string, default: `default`): Default COBOL dialect for all files

The available dialects are:

- **default** and **gnucobol**: a global dialect including all other dialects
- **cobol85**: only keywords from ANSI COBOL 85
- **cobol2002**: only keywords from COBOL ISO 2002
- **cobol2014**: only keywords from COBOL ISO 2014
- **acu** and **acu-strict**: the ACUCOBOL-GT dialect
- **bs2000** and **bs2000-strict**: dialect for Fujitsu's COBOL2000 V1.5 compiler
- **gcos** and **gcos-strict**: dialect for COBOL on BULL GCOS mainframes
- **ibm** and **ibm-strict**: dialect for COBOL on z/OS IBM mainframes
- **mf** and **mf-strict**: dialect for Visual COBOL by MicroFocus (RocketSoftware now)
- **mvs** and **mvs-strict**: dialect for IBM COBOL for MVS & VM
- **realia** and **realia-strict**: dialect for CA Realia II
- **rm** and **rm-strict**: dialect for RM-COBOL
- **xopen**: dialect for X/Open COBOL

The `-strict` version of a dialect permits using reserved words from all other dialects as custom COBOL words, as the non-strict version also reserve these words.

You may also specify an absolute path to a custom GnuCOBOL dialect configuration file (see `cobc`'s `-conf` option).

(May be overriden in project-specific `superbol.toml` files)

- **superbol.cobol.sourceFormat** (string, default: `auto`): Default source reference-format.

  The available formats are:

  - **auto**: SuperBOL will try to discover the format by automatically
  - **fixed**: the old format, with a non-significant left margin of 6 characters, an indicator (`*` for comments) and a non-significant right margin after column 72
  - **cobol85**: same as `fixed`, but with strict verification of Area A.
  - **variable**: Same as `fixed`, but non-significant right margin starts after column 252
  - **xcard**: ICOBOL xCard format. Same as `fixed`, but non-significant right margin starts after column 255.
  - **free**: the new free format, with no margins and limitations. Comments are introduced by `*>` (except in MicroFocus dialect, where a `*` should be put in column 1)
  - **xopen**: X/Open Free format. Text starts at column 1, unless an indicator is present (`*` for comments, `D` for debug), and lines of up to 80 characters.

  - **crt**: ICOBOL Free-form format. Same as `xopen`, but with lines of up to 320 characters.
  - **terminal**: ACUCOBOL-GT Terminal format. Same as `crt`. Mostly compatible with VAX COBOL terminal format.
  - **cobolx**: Indicator in column 1, text starts at column 2, and ends at column 255.

  (May be overriden in project-specific `superbol.toml` files)

- **superbol.cobol.copybooks** (array, default: `[ { "dir: "." }]`): Copybook Paths. Each object in the path contains at least a directory in the `dir` field, and a `file-relative` field (default it `true`).

  (May be overriden in project-specific `superbol.toml` files)

- **superbol.cobol.copyexts** (array, default: `["cpy","cbl","cob"]`): File extensions for copybook resolution

  (May be overriden in project-specific `superbol.toml` files)

- **superbol.cobcPath** (string, default: "cobc"): GnuCOBOL Compiler Executable: Path to the GnuCOBOL compiler executable
- **superbol.lspPath** (string, default: ""): SuperBOL Executable

  Name of the `superbol-free` executable if available in PATH; may be an absolute path otherwise. Leave empty to use the bundled `superbol-free`, if available.

- **superbol.forceSyntaxDiagnostics** (boolean, default: false): Force reporting of syntax diagnostics for dialects other than `COBOL85`
- **superbol.cacheInGlobalStorage** (boolean, default: false): Use storage provided by Visual Studio Code for caching. When this setting is set to *false*, the cache related to the contents of a given workspace folder *f* is stored in a file named *f*`/_superbol/lsp-cache.`: cache files are not removed automatically, whatever their location.
- **superbol.debugger.displayVariableAttributes** (boolean, default: false): Display Variable Attributes

  Display storage property and field attributes (e.g. size of alphanumerics, digits and scale of numerics).

- **superbol.debugger.libcobPath** (string, default: null): GnuCOBOL Runtime Library

  Path to the GnuCOBOL runtime library file

- **superbol.debugger.gdbPath** (string, default: "gdb"): GNU Debugger Executable

  Path to the GNU debugger executable.

- **superbol.debugger.cobcrunPath** (string, default: "cobcrun"): GnuCOBOL module loader

  Path to `cobcrun`, the GnuCOBOL module loader.

11.3 SuperBOL Options in `superbol.toml`

Not all options from `settings.json` can be set in `superbol.toml`. The following options can be set, in the **`[cobol]`** section of the TOML file:

- **`dialect`**: Default dialect for COBOL source files
- **`source-format`**: Default source reference-format
- **`copybooks`**: Where to find copybooks
- **`copyexts`**: Copybook filename extensions (for example `["cpy", "cob"]`)

11.4 SuperBOL Commands

- **SuperBOL: Restart Language Server**:
- **SuperBOL: Write Project Configuration**: translate options from the `settings.json` file to the `superbol.toml` file.
- **SuperBOL: Show Coverage**:
- **SuperBOL: Hide Coverage**:
- **SuperBOL: Update Coverage**:
- **SuperBOL: Show Control-flow**:
- **SuperBOL: Show Control-flow as an Arc-diagram**:

12 Trooubleshouting