

# **GnuCOBOL, the Free Software Alternative for COBOL!**

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**GnuCOBOL**

A *free/libre* COBOL compiler



# Executive Summary

After **twenty years** of development, the GnuCOBOL free and open-source project has reached an **industrial maturity** and can **compete with proprietary offers** in all environments.



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# Let's introduce ourselves !



## **Fabrice Le Fessant :**

- Founder of OCamlPro
- Researcher at Inria (lang & sys dist) --> 2018
- Open-source: MLdonkey, JoCaml, etc.
- Recent contributor to GnuCOBOL, since 2022

## **Simon Sobisch :**

- COBOL developer since 2006
- Contributor to OpenCOBOL since 2008
- GnuCOBOL Project Leader



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# What is COBOL ?

```
IDENTIFICATION DIVISION.  
PROGRAM-ID. prog.  
DATA DIVISION.  
WORKING-STORAGE SECTION.  
01 var-string PIC X(20) VALUE "Hello World".  
PROCEDURE DIVISION.  
    DISPLAY var-string.  
END PROGRAM prog.
```

- 1959 : COBOL Business-Oriented Language  
Latest ISO Standard: January 2023



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# Why COBOL matters ?

- Still used in many big corporations
  - 80 billion lines of code, more than all other lang.
  - 15% more code every year
  - too big to switch to another language
  - fast and reliable
- Mostly Proprietary Ecosystem:
  - Mainframe: IBM
  - PC: MicroFocus (bought Acucobol, CobolIT,...)
  - Fujitsu (both Mainframe and PC)



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# Open-Source Projects

- OpenCOBOL Evolutions
  - GnuCOBOL (translator to C)
    - <https://gnucobol.sourceforge.io>
  - OpenSourceCOBOL (translator to Java)
    - <https://github.com/opensourcecobol/opensourcecobol4j>
- New comers
  - GCobol (GCC Frontend)
    - <https://cobolworx.com/pages/cobforgcc.html>
  - Otterkit (compiler to .net)
    - <https://otterkit.com>



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# The GnuCOBOL Project

- Evolution of the OpenCOBOL project
  - Created in 2002, renamed as GnuCOBOL in 2013
  - Latest stable release: 3.2 in July 2023
  - Development:
    - Branch gnucobol-3.x
    - trunk for 4.x
- Some numbers on the last 3 years:
  - 13 contributors
  - 460 commits on branch gnucobol-3.x
  - 56k SLOC (runtime), 80k SLOC (compiler)



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# GnuCOBOL Main Features

- Translation from COBOL to C89+
  - Good portability, including several system C compilers
  - Easy interfacing (FFI) with all the Unix/Linux environment
- Standard: Support for ISO Standards of COBOL
  - 97% of NIST tests for COBOL 85
  - No support yet for objects and messages (but maybe soon)
- 19 Dialects: extensions of IBM, MicroFocus, etc.
  - Enable modernization from proprietary without source modification
- Rich ecosystem, with both open-source and proprietary equivalent (SQL preprocessors, CICS, etc.)



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# Industrial Use of GnuCOBOL

- COBOL-IT, early fork of early OpenCOBOL: probably one hundred+ big users
- Objectway Core Banking Suite:
  - AIX / Solaris / RHEL + MicroFocus -> GnuCOBOL/PC
- French DGFIP:
  - GCOS Mainframe -> GnuCOBOL/PC
- Mail on GnuCOBOL-bugs by Realtime Nov 7, 2023:

[...] We are converting many, many programs from MicroFocus to GNU, and this (ENTER what) is the only problem we can't easily work around. [...]



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# advancements and significant developments

- availability of COBOL source debuggers (based on GDB with different extensions) “no C approach”
- implementation of user tooling (stacktrace, textual dump, coredump, GCC’s coverage and soon coverage to csv) as well as improvements in the ecosystem (sql preparers, GCSORT)
- ease of availability (distro packagers, binary packages including Win32)
- “supported” use of big COBOL assets put into production, showing necessary areas for improving the compiler and tuning the runtime for performance
- increasing use of free software for analysis (Valgrind, perf, hotspot, rr) - both for GnuCOBOL and applications running GnuCOBOL
- contributors of documentation and test cases
- users (companies and private persons) sponsoring extra features
- commercial support for those that need it (for example per regulation)



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# SuperBOL, a Development Studio for GnuCOBOL

- SuperBOL Studio:
  - VScode extension for COBOL with an LSP server (based on a full COBOL parser in OCaml)
  - GnuCOBOL Documentation in Sphinx format
  - Checker for API COBOL <-> C FFI
- Links :
  - [get-superbol.com](http://get-superbol.com)
  - [github.com/OCamlPro/superbol-studio-oss](https://github.com/OCamlPro/superbol-studio-oss)



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```

File Edit Selection View Go Run Terminal Help
EXPLORER
NIST-COBOL85
  NC176A.CBL
  NC177A.CBL
  NC201A.CBL
  NC202A.CBL
  NC203A.CBL
  NC204M.CBL
  NC204M.DAT
  NC205A.CBL
  NC206A.CBL
  NC207A.CBL
  NC208A.CBL
  NC209A.CBL
  NC210A.CBL
  NC211A.CBL
  NC214M.CBL
  NC215A.CBL
  NC216A.CBL
  NC217A.CBL
  NC218A.CBL
  NC219A.CBL
  NC220M.CBL
  NC221A.CBL
  > OUTLINE
  > TIMELINE

NC205A.CBL X
NC > NC205A.CBL
005 000000 MOVE      CONT-NUMBER TO PICTURE.
604 060600 MOVE      "CON-TEST-GF-5" TO PAR-NAME.
605 060700 MOVE      10000 TO CONT-D.
606 060800 MOVE      1000 TO CONT-F.
607 060900 MOVE      ZERO TO CONT-C.
608 061000 CON-TEST-GF-5.
609 061100 IF        CONT
610 061200          -D EQUAL TO 10000 ADD CONT
611 061300          -D CONT
612 061400          -F GIVING CONT-NC2054.2

NC205A.CBL /tmp/nist-cobol85/NC - References (9)
48 DIVISION PICTURE X.
49 77 CONT-
50          A          PIC
51          TURE X(10) VAL
52          UE          "GO"
53          "ENT".
54 77 CONT-B          PICTURE S9(5)V9(5) VALUE ZERO.
55 77 CONT-C          PICTURE 9(8).
56 77 CONT-D          PICTURE 9(5).
57 77 CONT-E          PICTURE 9999.
58 77 CONT-F          PICTURE 9(5).
59 77 CONT-88          PICTURE S99.
60          88 GREATERZERO          VALUE -10.
61          88 NEGATIVEZERO          VALUE +10.
62 77
613 061500-          C.
614 061600 IF        CONT-C EQUAL TO 11000

005500 77 CONT-C PICTURE 9(8). NC
10 TO CONT-C. NC2054.2
EQUAL TO CONT-C OR ((((((0 NC2054
1199997 TO CONT-C. NC2054.2
TO CONT-C GIV NC2054.2
ZERO TO CONT-C. NC2054.2
F GIVING CONT-NC2054.2 061500- C
IF CONT-C EQUAL TO 11000 NC2054
MOVE CONT-C TO COMPUTED-A. NC
Ln 612, Col 70 Spaces: 4 UTF-8 LF (} COBOL 0%

```



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# Conclusion

- **GnuCOBOL** is now **mature** enough to *compete with COBOL proprietary solutions*
- **SuperBOL Studio** can be used with GnuCOBOL *to develop in a modern environment*
- **Google Summer of Code** on GnuCOBOL:  
<https://gnucobol.sourceforge.io/gsoc.html>



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