



ECLAIR Frequently Asked Questions

Release 3.7

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1 Introduction

This document answers some of the frequent questions that prospects and customers ask about ECLAIR. If you have a question that you believe ought to be in this document, please use the contact information provided below.

2 ECLAIR

In this section, we collect frequently asked questions about the ECLAIR system itself.

2.1 What is ECLAIR?

ECLAIR is a general platform for the verification of C and C++ source code based on static analysis. The range of its applications include: automatic check of compliance with respect to coding standards, bug finding, computation of software metrics, automatic test input generations, deep semantic analysis, semantic matching and patching.

2.2 What is an ECLAIR package?

An ECLAIR package is an application running under the ECLAIR platform. A package implements a set of features, and different packages can be combined together. Examples of commercialized ECLAIR packages are:

- MC2: MISRA C:2004 + Essentials
- MC3: MISRA C:2012 + Essentials

- MP1: MISRA C++:2008 + Essentials
- B: BARR-C:2018 + Essentials

2.3 So I can buy licenses for the packages, not for the entire ECLAIR platform?

Exactly.

2.4 Do you offer trial versions?

Yes: visit <https://bugsend.com/eclair/free-trial> to obtain one.

We also recommend you see the *ECLAIR Evaluation Guide* for an effective evaluation of ECLAIR: you will receive a PDF copy of this document as soon as you request a trial version.

2.5 What is the meaning of ECLAIR version numbers?

Each ECLAIR version is identified by three decimal natural numerals separated by two dots:

major . minor . patch

where

major is the *major version number*;

minor is the *minor version number*;

patch is the *patch version number*.

An example of complete version number is “3.6.0” (where the double quotes are not part of the version number).

When backwards compatible bug fixes or when backward compatible new functionality is added, the patch version number is incremented.

When changes are made that are not backwards compatible, the minor version number is incremented and the patch version number is set to 0.

The major version number is special: when it changes it denotes a completely different product. If you read your license, you will see that it covers ECLAIR 3.*: this means that, with a valid maintenance contract in place (see *Maintenance* below), you are entitled to receive all minor and patch versions of ECLAIR (major) version 3 subsequent to the one you originally received.

However ECLAIR version 4 will be a completely different product: there will certainly be a migration path for users of ECLAIR version 3 and support for ECLAIR version 3 will continue for some time. All this will be officialized upon release of ECLAIR version 4 and cannot be anticipated now.

3 Toolchains

One of the key features of ECLAIR is that it spares the customers from any configuration concerning the precise C/C++ dialects they are using. A C/C++ dialect is given by the combination of the toolchain (compiler, assembler, librarian, linker: we call these *toolchain components*) being used, along with the options that are used on each toolchain component invocation.

However, the fact that the tool takes into account the precise details of the language dialect(s) in use [1] has an obvious implication: given that the user needs not worry about that, BUGSENG has to do it, and a precise model of each supported toolchain and its dependence on compile-time options must be part of ECLAIR.

3.1 Why do you want to know which toolchain(s) am I using?

Because there are many toolchains out there, a good portion of which is still maintained, so new releases are published on a regular basis. Let us consider GCC, the GNU C/C++ compiler: this is a family of toolchains, each characterized by the precise version, the target architecture and (in the case of open-source toolchains) the modifications that have been performed. So, when we say “GCC” we are referring to hundreds of different toolchains. Summarizing, the number of C/C++ toolchains currently is probably on the order of tens of thousands.

At any given point in time ECLAIR supports many of these toolchains, but not all. We add support for new toolchain releases on a regular basis, giving priority to the most used ones in the embedded system industry. So, to come to the point, we would like to know which toolchain(s) you are using in order to tell you:

- whether it is currently supported or not;
- if it is not, whether we plan to support it and when;
- in any case, we use your input to make sure our priorities are up-to-date with the needs of our customers and prospects.

3.2 What are the toolchains supported right now?

There are hundreds of them, too many to be listed here with full details, from all the major suppliers, including ARM®, CodeWarrior™, Cosmic Software, CrossWorks™, GCC, Green Hills®, HighTec, IAR™, Intel®, Keil Software®, MPLAB®, Microsoft®, QNX™, Renesas Electronics, SOFTUNE™, TASKING®, Texas Instruments™, Wind River®, and clang/LLVM.

3.3 If I tell you that I use toolchain X, will I only obtain ECLAIR for toolchain X?

No: all shipped versions of ECLAIR contain support for all the supported toolchains.

3.4 What happens if the toolchain I use is not supported?

Under the assumption that you inform us, there are two possibilities:

1. Your toolchain is widely used (or is likely to be in the near future) and you are not in a hurry: it will probably be supported in the next ECLAIR release.
2. All the other cases: we will ask you to contribute to the development costs of its model (we are talking about a sum in the range 1-3 kEUR) and to give us a couple of weeks to implement it.

4 Licensing

ECLAIR is proprietary, protected commercial software owned by BUGSENG. In order to use ECLAIR you need a license from BUGSENG. However, as the word *license* is ambiguous, we will distinguish:

License agreement: The contract allowing a customer to use ECLAIR with certain limitations and upon certain conditions.

License model: A combination of parameters that defines how a customer can use ECLAIR. This combination is reflected into the license agreement.

License-enforcing mechanism: A combination of technical measures that *assist* in checking compliance with the license agreement.

Please make sure you appreciate the distinction between these concepts. For instance, the fact that the license-enforcing mechanism does not block a certain use of ECLAIR does not imply that such use complies to the license agreement.

4.1 What are the parameters defining ECLAIR license models?

They are the following:

Userbase: The criterion defining the group of users that are allowed to use ECLAIR. There are the following possibilities:

Per-seat: The userbase is defined by the number of individually-named users who can use any component of ECLAIR. BUGSENG does not require customers to communicate the identities of users, except for the users that use BUGSENG support services (see “*Maintenance*” for more details).

Per-project: The userbase is defined indirectly as the set of all users working on a specific project for a specific purpose.

Term: The criterion defining for how long the userbase is allowed to use ECLAIR. There are the following possibilities:

Indefinite-term: Use is allowed for an indefinite amount of time as long as the customer complies to the license agreement. Indefinite-term licenses include one year of support services including updates; such services can be optionally bought at a predetermined price for subsequent years (see “*Maintenance*” for more details).

Subscription-based: Use is allowed for one-year time periods. Subscription-based licenses are automatically renewed every year unless they are terminated by one of the parties; they always include support services with updates.

Coverage: An attribute describing the relationship between the licensed userbase and the customer potential userbase. There are the following possibilities:

Site: The userbase comprises all the potential ECLAIR userbase of the customer (e.g., all software developer and all quality-assurance people) at a given site.

Multisite: When more than one site is covered and there is a single point of contact for all contractual actions, including releases, updates, technical support and payments.

Enterprise: Like site or multisite when the sites covered are the totality of customer sites.

Partial: All other cases.

4.2 Upon which conditions can a per-project license be granted?

This is decided on a case-by-case basis, but typically the project should be not-for-profit (independently from the nature of the organizations involved in the project).

4.3 What are the factors influencing the cost of per-seat licenses?

There are only two factors:

1. The cardinality of the userbase for which the license is bought at once. BUGSENG operates a volume discount policy: the higher is the number of users, the lower is the cost per user.
2. The licensed features: the price increases as the number of licensed features increases. Some features are bundled with others with no price increase: for instance, the *ECLAIR B* package is bundled with all MISRA packages with no price increase, even though the price for *ECLAIR B*, when bought in isolation, is not zero.

4.4 So, coverage and license-enforcing mechanisms do not influence the price?

Exactly: an enterprise license and a partial license will cost the same if the licensed features are the same and the userbases have the same cardinality.

4.5 What is the advantage of site/multisite/enterprise licenses then?

Such licenses allows the generation of detailed reports in textual, HTML and XML format and their distribution within the site/multisite/enterprise. For instance, HTML reports can be published on the internal LAN and consulted by anyone having access to the LAN using any web browser.

In contrast, with a partial license detailed reports can only be consulted using the ECLAIR report browser. Summary reports can be generated in any supported format with any license.

4.6 What are the available license-enforcing mechanisms?

There are three license-enforcing mechanisms. What is common to them is that running ECLAIR requires a *key*:

Node-locked: The key is fully implemented in software and is locked to a specific machine. Remote access is not allowed. Transferring a node-locked key, a.k.a. *rehosting*, is possible with BUGSENG intervention. One node-locked key serves one user.

Dongle-locked: The key resides on an USB dongle, which can be moved to different machines. Remote access is not allowed. One dongle-locked key serves two users.

Detachable: The key is implemented in software and can be detached by a (possibly remote) license server. One detachable license serves three users.

4.7 What are the pros and cons of node-locked keys?

Pros:

1. They are fast: all communications occur within the same machine.
2. The user can use ECLAIR on that machine at any time.

Cons:

1. The user can only use ECLAIR on that machine.

2. If the machine crashes badly, the node-locked key can be lost. It is thus recommended to use hard disk drives supporting SMART (Self-Monitoring, Analysis and Reporting Technology) and to rehost the key at the first sign of disk issues.

4.8 What are the pros and cons of dongle-locked keys?

Pros:

1. You can bring them in your pocket.
2. You can pass them to other licensed users.
3. They are completely immune to machine crashes.

Cons:

1. They are comparatively slow: communication is via USB 2.0.
2. They are slightly more expensive, as the dongles are sent *FOB Origin, Freight Prepaid, & Charged Back*.

4.9 What are detachable keys?

Detachable keys can be *detached* from a pool of available keys for a specified time (up to 9999 days). Once detached, the license is automatically installed on the individual user's local machine: no further connection with the license manager is required. This can easily support commuters or people on external duties where connection with the license managers is cumbersome or inadvisable. Detaching a license requires a very small amount of network traffic (10–15 kB) and just a few seconds.

The validity of a detached license can be extended before expiration. The detached license can also be returned earlier to the license server. If not explicitly returned, the license expires on the local machine after the specified time has passed, and automatically re-materializes on the license server.

4.10 What are the pros and cons of detachable keys?

Pros:

1. They can be easily shared among users, even if they are geographically distributed.
2. They are fast: after detach, all communications occur within the same machine.
3. A crash of the recipient machine does not cause loss of the key.

Cons:

1. If the machine hosting the license server crashes badly, the entire pool can be lost. Not a problem if the server is properly maintained and monitored.

4.11 Who chooses the license enforcing mechanism(s)?

The customer does, taking into account that:

- one node-locked key corresponds to one user;
- one dongle-locked key corresponds to two users;

- one detachable key corresponds to three users.

Suppose the customer wants to serve 8 users; this requirement can be satisfied in all ways indicated in the following table:

detachable	dongle-locked	node-locked
0	0	8
0	1	6
0	2	4
0	3	2
0	4	0
1	0	5
1	1	3
1	2	1
2	0	2
2	1	0

5 Maintenance

Maintenance of an ECLAIR license is the provision of the following services:

- Access to the issue-tracking system for each licensed user.
- Delivery of solutions and/or workarounds for the issues reported via the issue-tracking system.
- Delivery of updated, improved minor versions of the licensed ECLAIR packages.

5.1 Is maintenance included in the ECLAIR license?

It depends on your ECLAIR license term:

- For indefinite-term licenses, maintenance is included for the first year. Maintenance is an optional service for subsequent years: our customer service will get in touch one month before maintenance expiration with an offer for one-year maintenance renewal.
- For subscription-based licenses, maintenance is included. Our customer service will get in touch one month before license expiry with an offer for license renewal.

5.2 Am I compelled to renew maintenance?

Absolutely not: the maintenance service is optional for indeterminate licenses.

5.3 Can I keep using the issue-tracking system after maintenance expiration?

No, all the accounts connected to the maintenance contract will be disabled (not deleted).

5.4 Can I reinstate maintenance after it has expired?

Yes, reinstatement of maintenance for ECLAIR licenses is possible, unless your license refers to an ECLAIR version that reached end-of-life.

The cost is the sum of all maintenance fees since last maintenance contract expiration. Write to sales@bugseng.com for a formal quotation.

Upon reinstatement of the maintenance contract, all accounts connected to the contract that were disabled will be re-enabled.

5.5 Why have I to pay, for reinstatement, the maintenance fees of past years?

Because the work on maintaining and improving ECLAIR did continue while you were away.

6 ECLAIR Reports

ECLAIR can produce different kind of reports in different formats.

6.1 What are the main categories for ECLAIR outputs?

They are:

Detailed reports: These reports contain full details about each reported program condition (such as a coding rule violation or a possible run-time error). Here, *full details* means that all the information required for a proper understanding of the issue is presented, e.g.:

- the exact position in the source code;
- in case macros are involved, the source code both before *and* after preprocessing, and the definitions of the macros involved;
- a path in the program leading to the reported run-time error.

Summary reports: These reports contain a summary of ECLAIR findings that is suitable for the communication to third parties in order, e.g., to substantiate a claim of MISRA compliance.

Metric reports: These reports contain the values of the metrics collected for each file, function and project.

6.2 What are the main output formats?

Pure text, HTML, XML, Excel and *Open Document Format for Office Applications* (ODF, also known as *OpenDocument*). In addition, there is an internal format used to transmit detailed reports to the ECLAIR browser, which is part of the ECLAIR GUI, even though it can be used in isolation: for simplicity, we will call this format *GUI* in the sequel.

6.3 Which kinds and format of reports are available depending on the license?

The dependence is on the license coverage (see *What are the parameters defining ECLAIR license models?*). Taking into account the most used combinations, the answer is contained in the following table, where *any* denotes any license coverage whereas *SME* denotes site/multisite/enterprise coverage:

Kind/Format	Detailed	Summary	Metric
Pure text	SME	any	
HTML	SME	any	
XML	SME	SME	SME
Excel			any
ODF		any	any
GUI	any		

6.4 Is it possible to generate summaries in .docx format instead of .odt?

The ODF format has been chosen because it is a truly open format defined by an international standard (ISO/IEC 26300) that is supported by many tools. In particular, OpenDocument is supported by various versions of Microsoft Office for Windows, namely:

- Microsoft Office 2003 and Office XP (with the Open Source OpenXML/ODF Translator Add-in for Office);
- Microsoft Office 2007 (with Service Pack 2 or 3);
- Microsoft Office 2010, 2013, 2016 and 2019.

It is also supported by *LibreOffice*, a free and open-source office suite available for most popular operating systems: see <https://www.libreoffice.org> for more details.

Using Microsoft Office or LibreOffice you can open the `.odt` files generated by ECLAIR and save them in `.docx` format, if you wish. Visit <https://bugsend.com/eclair/reports> to see a summary report produces this way.

6.5 Is it possible to generate summaries in PDF?

Yes, using Microsoft Office or LibreOffice you can open the `.odt` files generated by ECLAIR and save them in PDF format. See *“Is it possible to generate summaries in .docx format instead of .odt?”* for more details.

References

[1] R. Bagnara. That’s C, baby. C! 2019. Available at <https://bugsend.com/that-is-c-baby-c>.

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**no shortcuts,
no compromises,
no excuses:
software verification done right**