

## XLIFE++: an eXtended Library of Finite Elements in C++

Install and Use

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XLIFE++ - Install and Use

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- Downloading XLIFE++
- Installing XLIFE++

## Using XLIFE++



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## Downloading XLIFE++

#### Installing XLIFE++

- Requirements
- About CMAKE
- Building XLIFE++
- Compiling XLIFE++

#### Using XLIFE++

- Requirements
- Running user script
- About PARAVIEW



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XLIFE++ is downloadable at the following url: http://uma.ensta-paristech.fr/soft/XLiFE++ About website:



Archives of XLIFE++ are of 3 kinds: sources only, api only, and sources/api (full) User documentation is available in pdf format or in HTML format Source documentation (API), generated by DOXYGEN, is available here Qt-based applications for users will be downloadable (under development)



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## Downloading XLIFE++



- Requirements
- About CMAKE
- Building XLIFE++
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#### Using XLIFE++

- Requirements
- Running user script
- About PARAVIEW



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To use the full abilities of XLIFE++, you may also install ARPACK and/or UMFPACK

o plot solutions, you may install PARAVIEW (http://www.paraview.org) or GMSH.

A C++ compile



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If you want to use multithreading capabilities, you may install a compatible compiler

- clang/clang++ does not support natively OpenMP
- on Mac, g++ is an alias to clang++
- On Mac, with Homebrew package manager, g++ compilers are not installed by default with OpenMP management
- On Windows If CodeBlocks is installed with its own MinGW compiler, it does not support OpenMP



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#### About CMAKE



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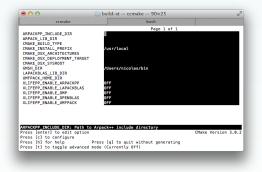
Where is the source code: This should be \$XLIFEPP\_HOME\_DIR, containing the top-level CMakeLists.txt script that CMAKE will run.

Where to build the binaries: This is the directory where CMAKE will put the build files, such as CMAKE cache, object files, .... It is often \$XLIFEPP\_HOME\_DIR/build





CMAKE can be called with a GUI in Terminal on Unix/Linux and MacOS:



Where to build the binaries: The directory in which ccmake is called

Where is the source code: The directory containing the top-level CMakeLists.txt. It is given with a relative path to the ccmake command:

ccmake ..



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In command line mode, options are set with -D: Example:

cmake		-DCMAKE	CXX	COMPIL	_ER=g	++-4.8
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Main CMAKE options:

- CMAKE\_CXX\_COMPILER This option is used to set the compiler CMAKE will use to compile your code:
- CMAKE\_BUILD\_TYPE This option is used to set the type of build (debug, release, ...). Possible values are essentially Debug and Release. The default value is Release.





Configuring XLIFE++ with GMSH:

XLIFEPP\_GMSH\_DIR to specify the directory containing the GMSH binary. If GMSH is in your path, it will be automatically detected, else you can use this option.



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Configuring XLIFE++ with PARAVIEW:

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Configuring XLIFE++ with OpenMP:

XLIFEPP\_ENABLE\_OMP Activates/Deactivates use of OpenMP

cmake .. -DXLIFEPP\_ENABLE\_OMP=ON





Configuring XLIFE++ with ARPACK:

XLIFEPP\_ENABLE\_ARPACK Activates/Deactivates configuration with ARPACK



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Configuring XLIFE++ with ARPACK:

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Configuring XLIFE++ with ARPACK:

XLIFEPP\_ENABLE\_ARPACK Activates/Deactivates configuration with ARPACK XLIFEPP\_BLAS\_LIB\_DIR to specify the directory containing BLAS library XLIFEPP\_LAPACK\_LIB\_DIR to specify the directory containing LAPACK library XLIFEPP\_ARPACK\_LIB\_DIR to specify the directory containing ARPACK library

Configuring XLIFE++ with UMFPACK:

XLIFEPP\_ENABLE\_UMFPACK Activates/Deactivates configuration with UMFPACK





Configuring XLIFE++ with ARPACK:

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#### Configuring XLIFE++ with UMFPACK:

XLIFEPP\_ENABLE\_UMFPACK Activates/Deactivates configuration with UMFPACK XLIFEPP\_BLAS\_LIB\_DIR to specify the directory containing BLAS library XLIFEPP\_LAPACK\_LIB\_DIR to specify the directory containing LAPACK library





Configuring XLIFE++ with ARPACK:

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#### Configuring XLIFE++ with UMFPACK:

XLIFEPP\_ENABLE\_UMFPACK Activates/Deactivates configuration with UMFPACK XLIFEPP\_BLAS\_LIB\_DIR to specify the directory containing BLAS library XLIFEPP\_LAPACK\_LIB\_DIR to specify the directory containing LAPACK library XLIFEPP\_UMFPACK\_INCLUDE\_DIR to specify the directory containing UMFPACK header XLIFEPP\_UMFPACK\_LIB\_DIR to specify the directory containing UMFPACK library





#### Configuring XLIFE++ with ARPACK:

XLIFEPP\_ENABLE\_ARPACK Activates/Deactivates configuration with ARPACK XLIFEPP\_BLAS\_LIB\_DIR to specify the directory containing BLAS library XLIFEPP\_LAPACK\_LIB\_DIR to specify the directory containing LAPACK library XLIFEPP\_ARPACK\_LIB\_DIR to specify the directory containing ARPACK library

#### Configuring XLIFE++ with UMFPACK:

XLIFEPP\_ENABLE\_UMFPACK Activates/Deactivates configuration with UMFPACK XLIFEPP\_BLAS\_LIB\_DIR to specify the directory containing BLAS library XLIFEPP\_LAPACK\_LIB\_DIR to specify the directory containing LAPACK library XLIFEPP\_UMFPACK\_INCLUDE\_DIR to specify the directory containing UMFPACK header XLIFEPP\_UMFPACK\_LIB\_DIR to specify the directory containing UMFPACK library XLIFEPP\_SUITESPARSE\_HOME\_DIR to specify the home directory of SUITESPARSE, containing UMFPACK. This option is to be used if you compiled SUITESPARSE by yourself. In this case, UMFPACK will be searched in the UMFPACK subdirectory.





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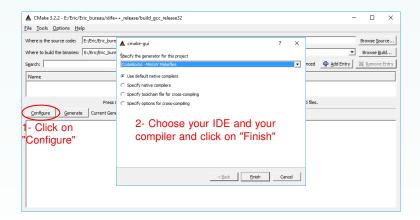


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#### Building XLIFE++ - Configure



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#### Building XLIFE++ - Generate



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#### Building XLIFE++ - Generate



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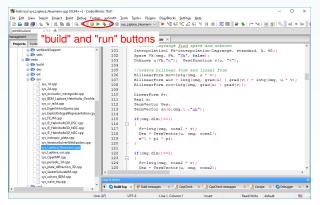
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Command-line: You just have to run make libs to compile libraries or make to compile libraries and tests executables

IDE mode: You select target "libs" to compile libraries, or "all" to compile libraries and test executables

#### To run a test:





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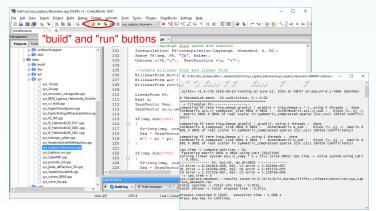
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Command-line: You just have to run make libs to compile libraries or make to compile libraries and tests executables

IDE mode: You select target "libs" to compile libraries, or "all" to compile libraries and test executables

## To run a test:





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# Downloading XLIFE++

## Installing XLIFE++

- Requirements
- About CMAKE
- Building XLIFE++
- Compiling XLIFE++

## Using XLIFE++

- Requirements
- Running user script
- About PARAVIEW







Basically, XLIFE++ compilation depends on the cross-platform builder CMAKE, available at  $\tt http://cmake.org.$ 



To use the full abilities of mesh definition in XLIFE++, you may also install GMSH (http://gmsh.info).

To plot solutions, you may install PARAVIEW (http://www.paraview.org) or GMSH.

A C++ compiler

If you use command line, you may want to add \$XLIFEPP\_HOME\_DIR/bin to your path



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Running user script



There are user scripts to prepare the user program that will use XLIFE++: xlifepp.sh on Unix/Linux and MacOS, xlifepp.bat on Windows. Scripts are physically in \$XLIFEPP\_HOME\_DIR/bin directory



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Running user script



There are user scripts to prepare the user program that will use XLIFE++: xlifepp.sh on Unix/Linux and MacOS, xlifepp.bat on Windows. Scripts are physically in \$XLIFEPP\_HOME\_DIR/bin directory

MAIN OPTIONS: --build, -b copy cmake files and eventually sample of main file and run cmake on it to prepare your so-called project directory. This is the default --clean, -cl clean project directory (remove CMake build files) generate the project. Used with --build option. --generate, -g This is the default. --help, -help, -h show the current help --interactive, -i run xlifepp in interactive mode. Used with --build option. This is the default --non-interactive, -noi run xlifepp in non interactive mode. Used with --build option --no-generate, -nog prevent generation of your project. You will do it yourself. --version, -v print version number of XLiFE++ and its date --verbose-level <value>, set the verbose level. Default value is 1 -vl <value>



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There are user scripts to prepare the user program that will use XLIFE++: xlifepp.sh on Unix/Linux and MacOS, xlifepp.bat on Windows. Scripts are physically in \$XLIFEPP\_HOME\_DIR/bin directory

```
OPTIONS FOR BUILD IN NON INTERACTIVE MODE:
   --build-type <value>, set cmake build type (Debug, Release, ...).
   -bt <value>
   --cxx-compiler <value>, set the C++ compiler to use.
   -cxx <value>
   --directory <dir>,
                              set the directory where you want to build
   -d <dir>
                              your project
   --generator-name <name>,
                              set the cmake generator.
   -gn <name>
   -f <filename>,
                              copy <filename> as a main file for the user
   --main-file <filename>
                              project.
                              do not copy the sample main.cpp file. This is
   -nof,
   --no-main-file
                              the default.
   --with-omp, -omp
                              activates OpenMP mode
   --without-omp, -nomp
                              deactivates OpenMP mode
```



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• • •	👚 kielbasi — xlifepp.sh — 80×24
MacBook-Pro-de-Ni	colas:~ kielbasi\$ xlifepp.sh
*****	*****
* xlife	pp *
*****	**********
Project directory	(default is current directory):
. exists	
The following gen	erators are available on this platform:
1 -> Unix Makefil	
2 -> Ninja	
3 -> Xcode	
4 -> CodeBlocks -	Ninia
5 -> CodeBlocks -	
6 -> CodeLite - N	inia
7 -> CodeLite - U	
8 -> Eclipse CDT4	- Ninia
9 -> Eclipse CDT4	
10 -> KDevelop3	
11 -> KDevelop3 -	Unix Makefiles
12 -> Kate - Ninj	a
13 -> Kate - Unix	Makefiles
14 -> Sublime Tex	t 2 - Ninja
	t 2 - Unix Makefiles
Your choice (defa	ult is 1):



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• • • ☆ kielbasi — xlifepp.sh — 80×24 14 -> Sublime Text 2 - Ninja 15 -> Sublime Text 2 - Unix Makefiles Your choice (default is 1): 1 Copying CMakeLists.txt Do you want a sample main file ? (Y)es / (N)o (default is No): Υ The following main files are available: 1 -> main.cop 2 -> elasticitv2dP1.cpp 3 -> helmholtz2d-Dirichlet\_single\_layer.cpp 4 -> helmholtz2d\_FE\_IR.cpp 5 -> helmholtz2dP1-cg.cpp 6 -> helmholtz2dP1-DtN scalar.cpp 7 -> laplace1dP1.cpp 8 -> laplace2dP0 RT1.cpp 9 -> laplace2dP1-average.cpp 10 -> laplace2dP1-dirichlet.cpp 11 -> laplace2dP1-periodic.cpp 12 -> laplace2dP1 Neumann.cpp 13 -> laplace2dP2-eigen.cpp 14 -> laplace2dP2-transmission.cpp 15 -> maxwell2dN1.cpp 16 -> wave 2d leap-frog.cpp Your choice (default is 1):





```
• • •
                         ☆ kielbasi — xlifepp.sh — 80×24
10 -> laplace2dP1-dirichlet.cpp
11 -> laplace2dP1-periodic.cpp
12 -> laplace2dP1_Neumann.cpp
13 -> laplace2dP2-eigen.cpp
14 -> laplace2dP2-transmission.cpp
15 -> maxwell2dN1.cpp
16 -> wave_2d_leap-frog.cpp
Your choice (default is 1): 1
Copving main.cpp
Cleaning CMake build files in project directory ? (Y)es / (N)o (default is No):
Ν
The following compilers are available:
1 -> clang++-4.2.1
2 -> clang-4.2.1
3 -> q++-4.8
Your choice (default is 1): 3
The following build types are available
1 -> Debug
2 -> Release
Your choice (default is 1): 2
You can use:
1 -> multi-threading with OpenMP
2 -> sequential
Your choice (default is 1):
```





🏫 kielbasi — -bash — 80×24 -- Detecting C compile features -- Detecting C compile features - done -- Checking whether CXX compiler has -isvsroot -- Checking whether CXX compiler has -isvsroot - ves -- Checking whether CXX compiler supports OSX deployment target flag -- Checking whether CXX compiler supports OSX deployment target flag - yes -- Check for working CXX compiler: /usr/local/bin/g++-4.8 -- Check for working CXX compiler: /usr/local/bin/g++-4.8 -- works -- Detecting CXX compiler ABI info -- Detecting CXX compiler ABI info - done -- Detecting CXX compile features -- Detecting CXX compile features - done -- You do not want to use XLiFE++ with OpenMP -- XLiFE++ was compiled with g++-4.8 -- XLiFE++ was compiled in Release mode -- XLiFE++ libraries found ! -- Your program will be compiled without LAPACK -- Your program will be compiled without BLAS -- Your program will be compiled without Arpack and Arpack++ -- Your program will be compiled without Umfpack -- Configuring done -- Generating done -- Build files have been written to: /Users/kielbasi MacBook-Pro-de-Nicolas:~ kielbasi\$



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À XLife++ setup proj	ect - XLiFE++ v1/	4-r26			-		×
XI iEE++ install folder	E:\Eric\Eric burea						
AUFE++ Install folder	E:/Enc/Enc_burea	au voite++_relea	ase				
XLiFE++ project folder	l						
XLiFE++ project type	CodeBlocks		version	- MinGW Makefiles			
available XLiFE++ lib	cl.exe		build type	Release		seq	
load a main file							
	Generate					Can	cel



On MacOS, a Qt-based GUI application to manage the previous script. You can download it on the website

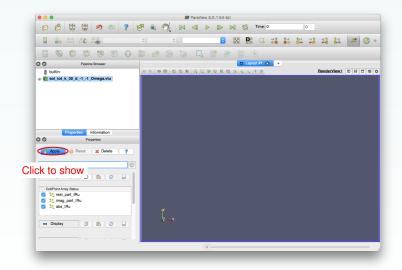


A On Windows, a very small application you can find in \$XLIFEPP HOME DIR/bin



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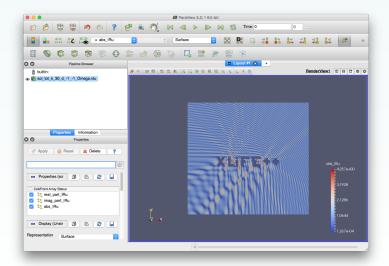


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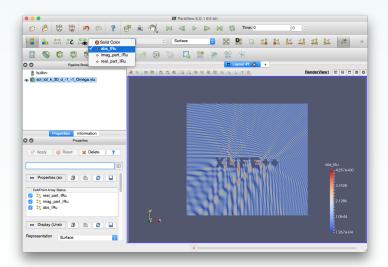


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#### About PARAVIEW

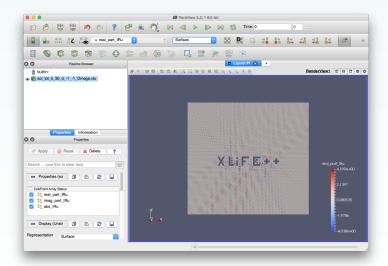
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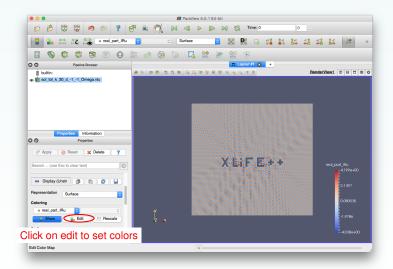






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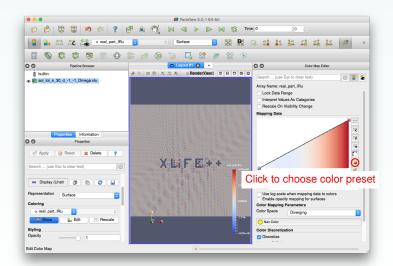




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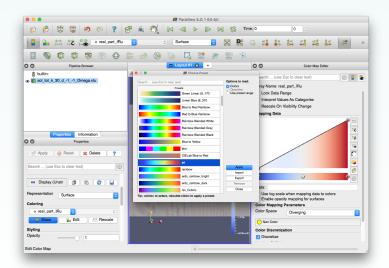






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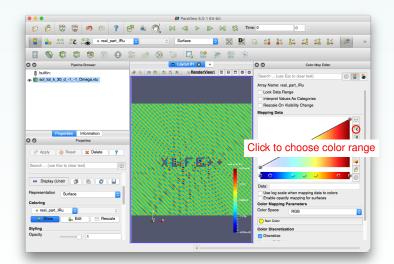


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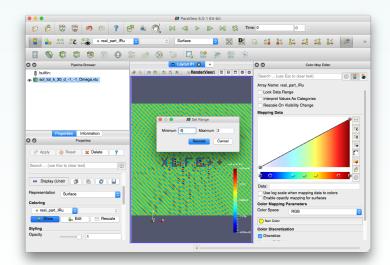




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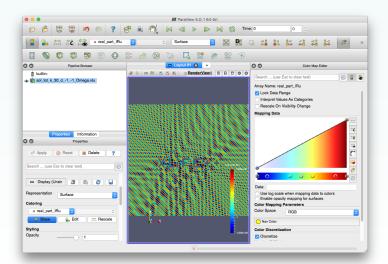






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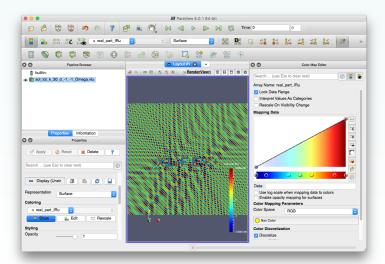
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#### About PARAVIEW

Sources Filters Tools Catalyst Macros Help



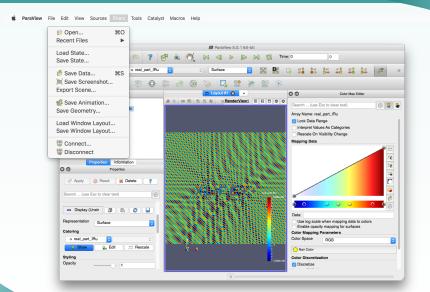


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## About PARAVIEW



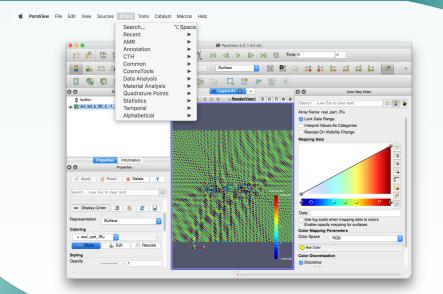




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#### About PARAVIEW

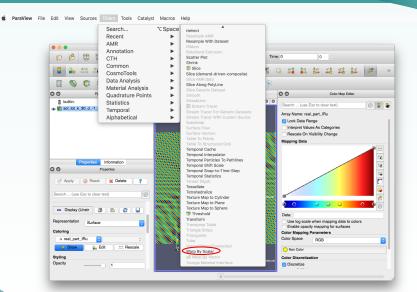




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## About PARAVIEW

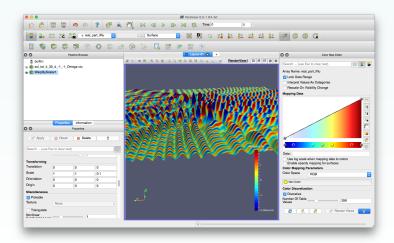






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