

TI MCU, DSP 및 Xilinx FPGA 프로그래밍 전문가 과정

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Audio Signal Processing

Faust

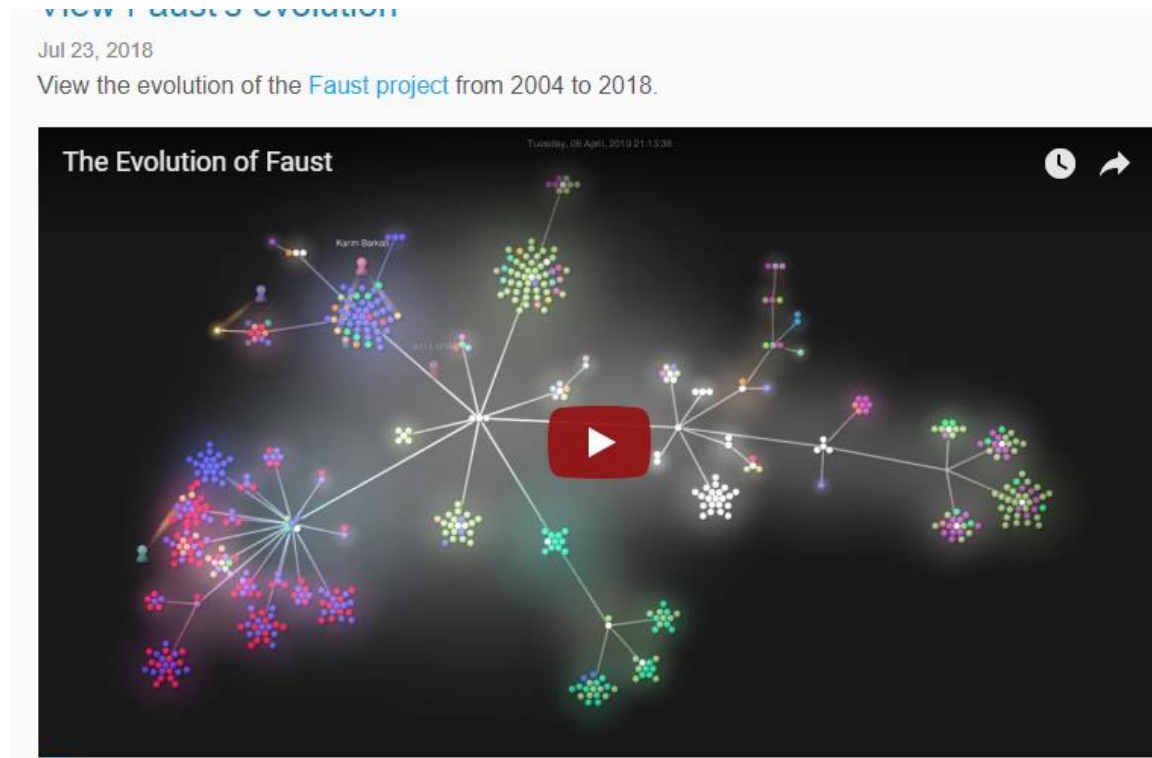
Functional Audio Stream 의 약자

Real-Time Signal Processing 과 Synthesis 를 위해 특별히 고안된 함수형 프로그래밍 언어다.

개발 자체는 프랑스에서 진행되었다.

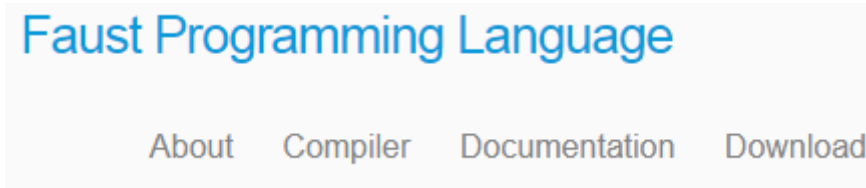
그래서 공식 홈페이지는 아래와 같이 프랑스 사이트에 있는 것을 볼 수 있다.

<http://faust.grame.fr/>

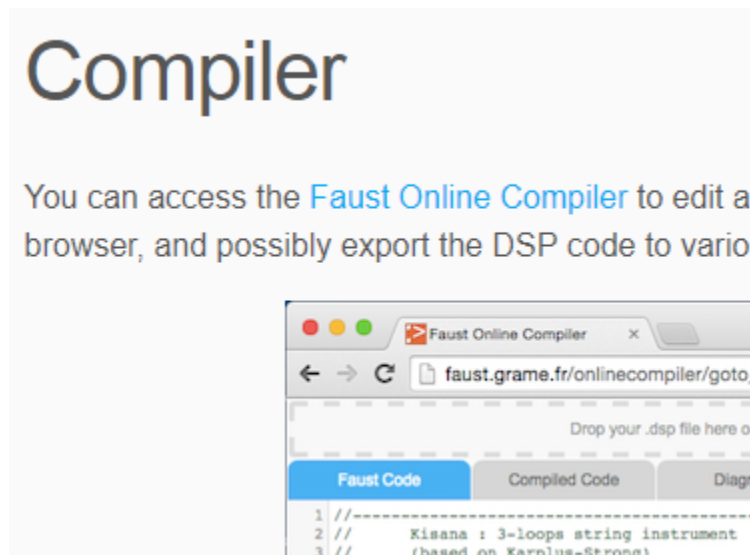


공식 홈페이지에서 **Compiler** 를 누른다.

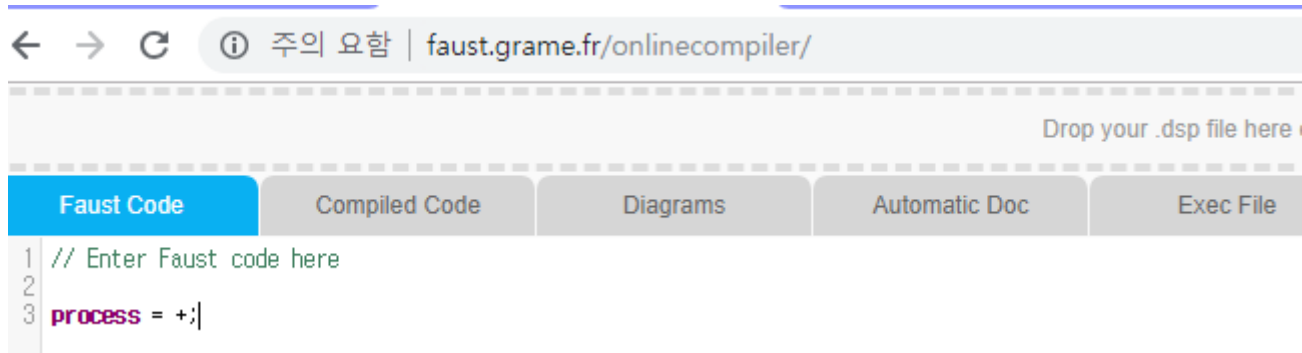
아래 그림의 위치에 **Compiler** 가 보일 것이다.



누르면 아래와 같이 **Online Compiler** 가 활성화 된다.

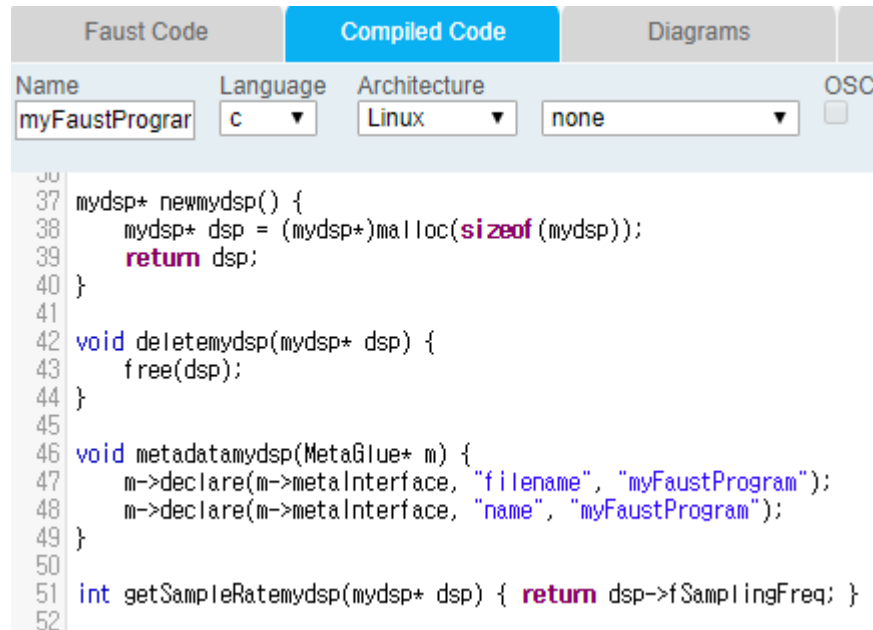


여기서 Faust Online Compiler 를 누르면 아래와 같은 창이 나타난다.

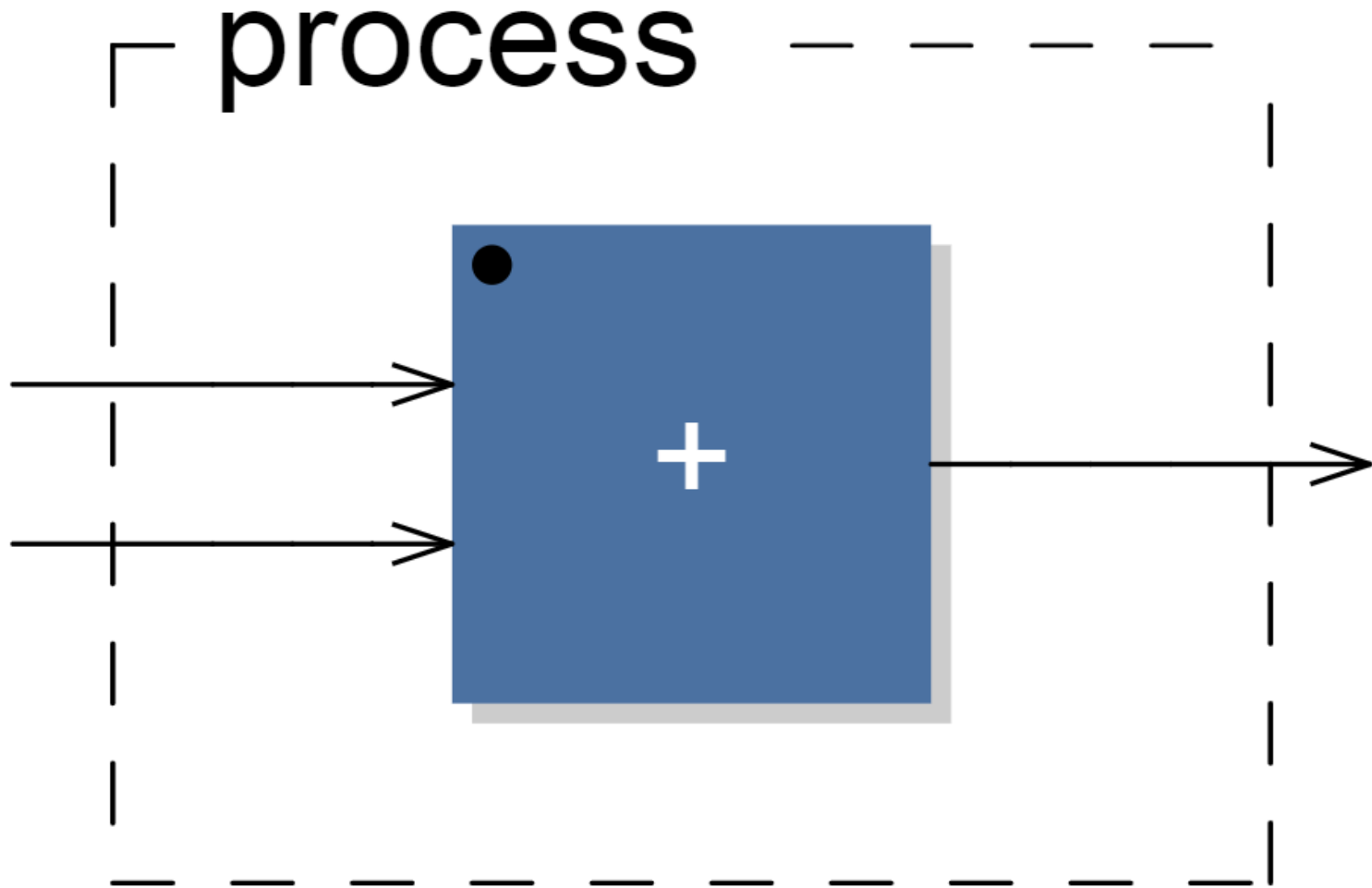


맨 위의 점선은 사용자가 작성한 Faust 코드 파일을 드래그 앤 드롭으로 불러오는 상자다.

Faust Code 는 FAUST 에서 사용할 수 있는 코드를 입력하는 창이다.
Compiled Code 는 작성한 FAUST Code 를 다른 언어로 변환시켜준다.



Diagrams 에 있는 Download Figure 를 누르면 현재 보이는 그림 파일을 내려 받을 수 있다.
해당 압축 파일은 프로젝트 폴더 내부에 process.svg 로 저장 된다.



Automatic Doc 는 현재 작성된 프로세스의 수학적 정의, 블록 다이어그램, 파우스트 코드가 작성된 pdf 가 작성되며 Get the Documentation 을 누르면 해당 pdf 를 받을 수 있다.

Faust CodeCompiled CodeDiagramsAutomatic DocExec File

Get the documentation

myFaustProgram

October 4, 2018

| | | |
|----------|----------------|--|
| filename | myFaustProgram | This document provides a description of the Faust program text stored in the myFaustProgram directory. For more information, see the notice in Section 3 (page 1) for details. |
| name | myFaustProgram | |

1 Mathematical definition of process

The *myFaustProgram* program evaluates the signal **process**, which is mathematically defined as follows:

- Output signal y such that
$$y(t) = x_1(t) + x_2(t)$$
- Input signals x_i for $i \in [1, 2]$

2 Block diagram of process

Exec File 에서는 원하는 Target 으로 실행 파일을 만들 수 있다.
QR 코드를 통해 내려받거나 실행시켜 결과를 확인 할 수 있다.

Drop your .dsp file

| | | | | |
|------------|---------------|----------|---------------|-----------|
| Faust Code | Compiled Code | Diagrams | Automatic Doc | Exec File |
|------------|---------------|----------|---------------|-----------|

Name: myFaustPrograr Language: c Architecture: Windows OSC: none


Please, select an architecture in the architerture menu.

Architecture 를 Web, audio 로 설정하도록 한다.

| | | | | |
|------------|---------------|----------|---------------|-----------|
| Faust Code | Compiled Code | Diagrams | Automatic Doc | Exec File |
|------------|---------------|----------|---------------|-----------|

Name: myFaustPrograr Language: c Architecture: Web audio OSC:

The file myFaustProgram.html as been successfully generated and can now be downloaded.



Web 의 번거로움과 컴파일 타임을 고려하여 Setup 형태로 활용할 수도 있다.
공식 홈페이지에서 Download 로 가보자!

Faust Programming Language

[About](#) [Compiler](#) [Documentation](#) [Download](#) [Editor](#) [Examples](#) [GitHub](#) [Project](#)

Download

The Faust compiler

The Faust compiler is available as a [Faust github](#) project with backends for C++, C, JAVA, JavaScript, ASM JavaScript, LLVM IR, WebAssembly and Interpreter. It has dependencies, in particular LLVM and libmicrohttpd. The LLVM backend is needed to compile FaustLive and other projects using the `libfaust` embedded Faust compiler.

You can also clone the github repository with the following command :

```
git clone git@github.com:grame-cncm/faust.git faust
```

Faust is easy to compile and to run on Mac and Linux. For Windows users we recommend to use [FaustLive](#).

FaustLive for Windows 혹은 FaustLive for Ubuntu 를 선택하도록 한다.

FaustLive

FaustLive is the recommended tool to get started with Faust. Thanks to FaustLive provides an ultra-short *edit-compile-run* cycle. Moreover Faust doesn't require any additional compiler or development tool (beside a simple

- [FaustLive for Windows](#)
- [FaustLive for Windows+JACK](#)
- [FaustLive for OSX](#)
- [FaustLive for Ubuntu](#)
- [FaustLive sources \(for Linux or Mac\)](#)

FaustLive demo


Here is a short video explaining the main characteristics of the FaustLive



For Windows

FaustLive for Windows 의 경우에는 아래와 같이 나타난다.

네트워크 / Home / Browse / Faust : signal processing language



Faust : signal processing language

Faust is a programming language for realtime audio signal processing
Brought to you by: [dfober](#), [letz](#), [orlarey](#)


Your download will start shortly... 0

파일 이름(N): FaustLive-Windows-2.44.rar

파일 형식(T): ALZip RAR File

[Get Updates](#) [Share This](#) [Problems Downloading?](#)

더 보기 FaustLive-Windows-2.44.rar | Scanned by: **Bitdefender** [저장\(S\)](#) [취소](#)



Refractometry Guideline

To avoid errors - look at what precautions should be taken during the measure.

[DOWNLOAD](#)

Advertisement - R

STEP 1 : Configure File Associations

Why would you do that ?

To ensure that your system is well configured for .dsp, .lib and .svg and doesn't go crazy when FaustLive tries to open this kind of files.

- 1- Go to the folder « FilesToConfigure »
- 2- For each file :
 - a. Right Click on the file
 - b. Choose « Open With »
 - c. Check « Use this application for all »
 - d. Choose the default application with which the file will be opened
(a **text editor** for .dsp and .lib ;
a **browser** for .svg)

STEP 2 : Install JACK2

The latest release is available at : <http://jackaudio.org/downloads/>

STEP 3 : Use FaustLive

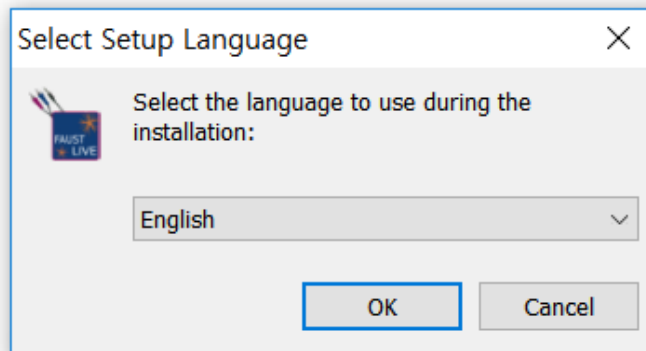
- 1- Got to the Folder « FaustLive »
- 2- Launch the installer « setup_FaustLive »
- 3- Start using it =)

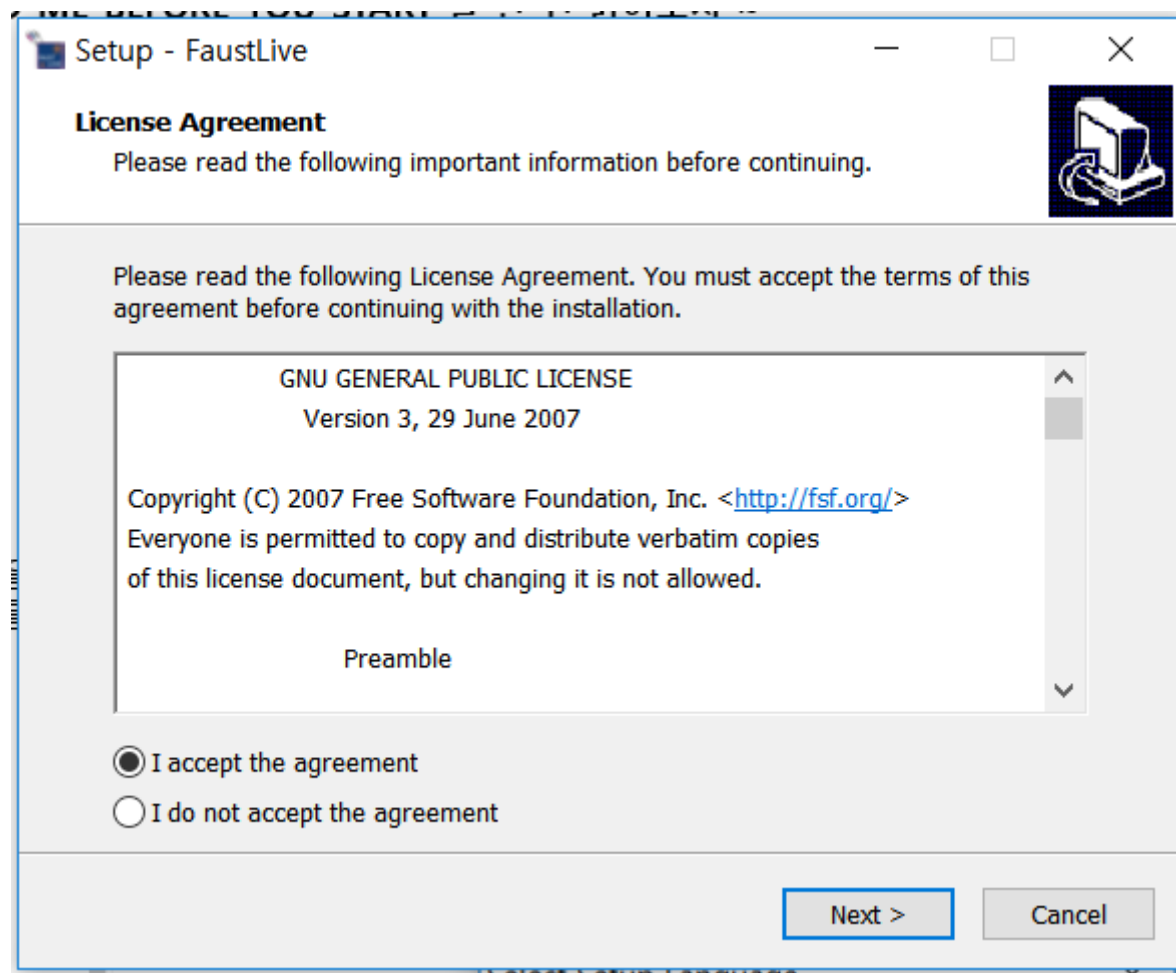
READ_ME_BEFORE_YOU_START 를 한 번 읽어보자 ~

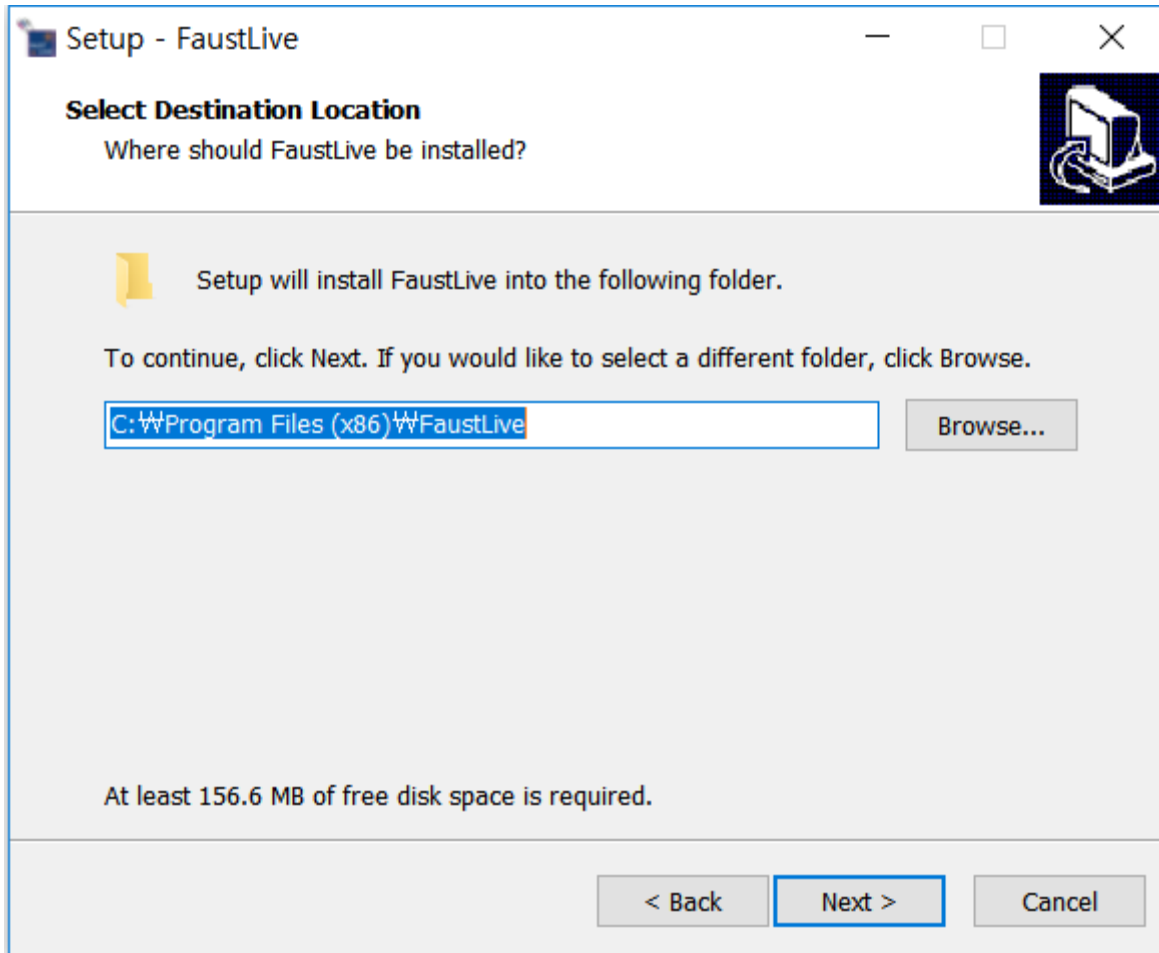
| 프로젝트 > Audio > FaustLive-Windows-2.44 > FaustLive-Windows-2.44 | | | | ▼ | ↺ | Fa |
|--|--------------------|--------|------|---|---|----|
| 이름 | 수정한 날짜 | 유형 | 크기 | | | |
| Documentation | 2016-10-04 오후 2 | 파일 폴더 | | | | |
| FaustLive | 2016-10-04 오후 2 | 파일 폴더 | | | | |
| FilesToConfigure | 2016-10-04 오후 2 | 파일 폴더 | | | | |
| READ_ME_BEFORE_YOU_START.pdf | 2015-05-26 오전 1... | PDF 파일 | 57KB | | | |
| Whats_New_2.0.pdf | 2014-11-20 오전 1... | PDF 파일 | 63KB | | | |

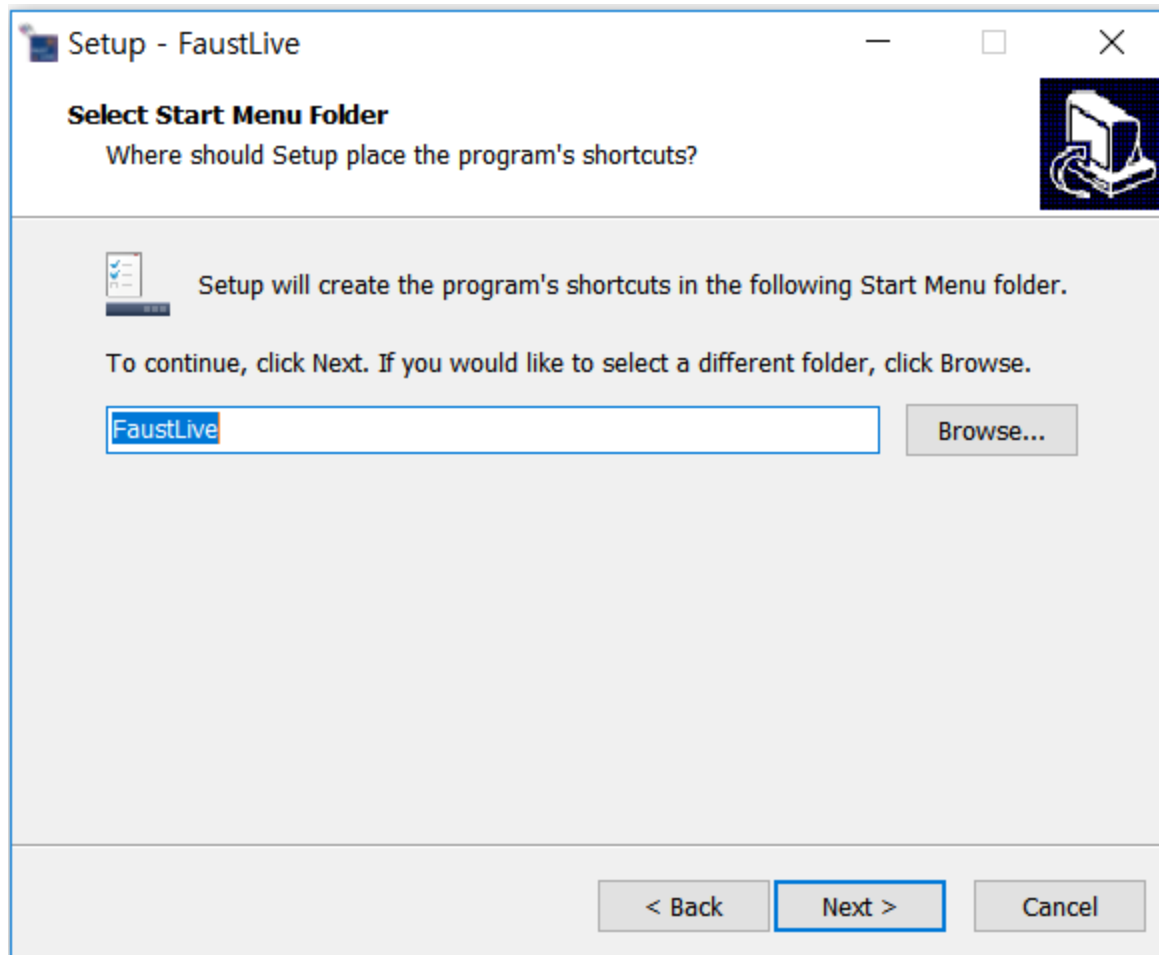
내용을 읽어보니 JACK Audio 라는 것을 설치해야 한다.
편의를 위해 FAUST + JACK 으로 다운로드 받도록 한다.

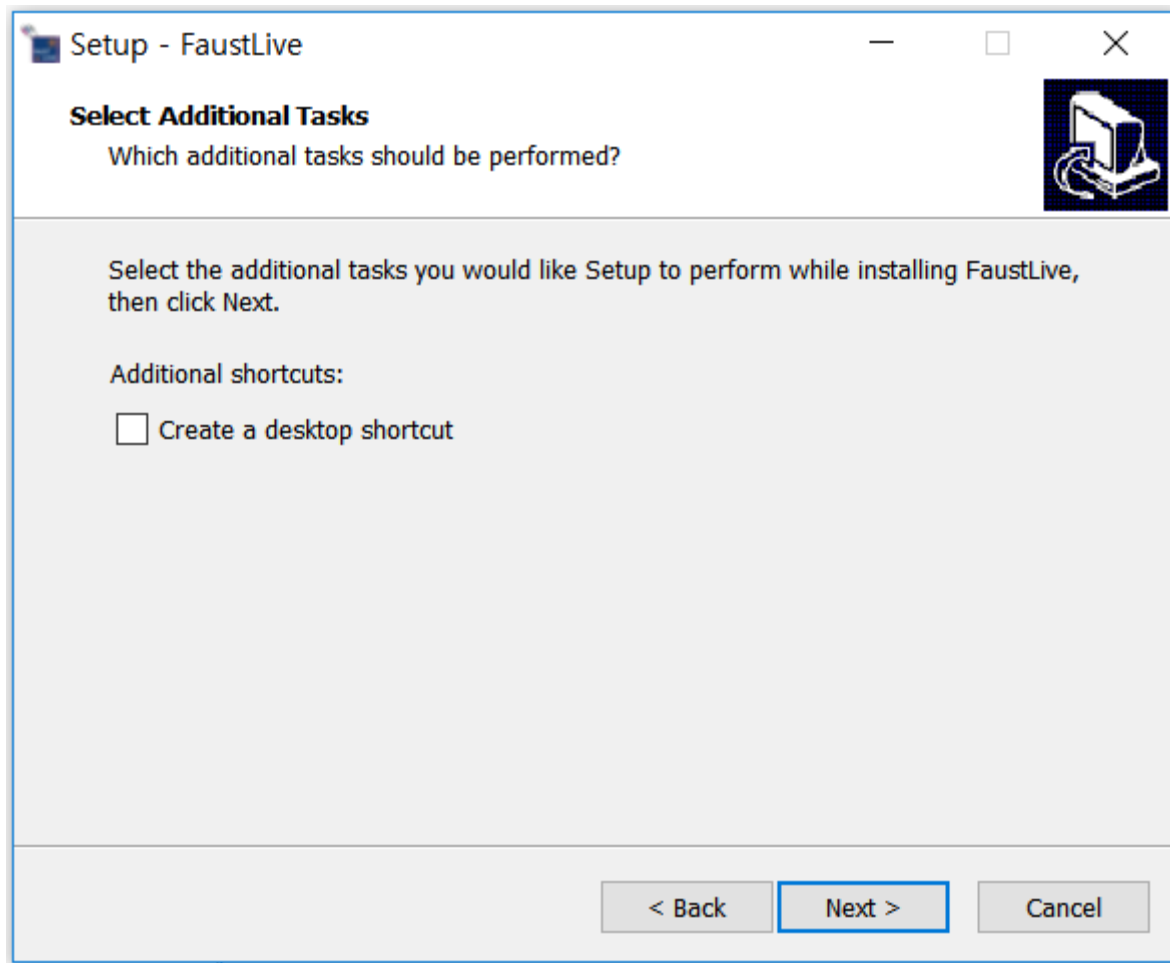
| 프로젝트 > Audio > FaustLive-Windows-Jack-2.44 > FaustLive-Windows-Jack-2.44 > FaustLive | | | | ▼ | ↺ | Fa |
|--|-----------------|---------|----------|---|---|----|
| 이름 | 수정한 날짜 | 유형 | 크기 | | | |
| setup_FaustLive.exe | 2016-10-05 오후 5 | 응용 프로그램 | 37,711KB | | | |

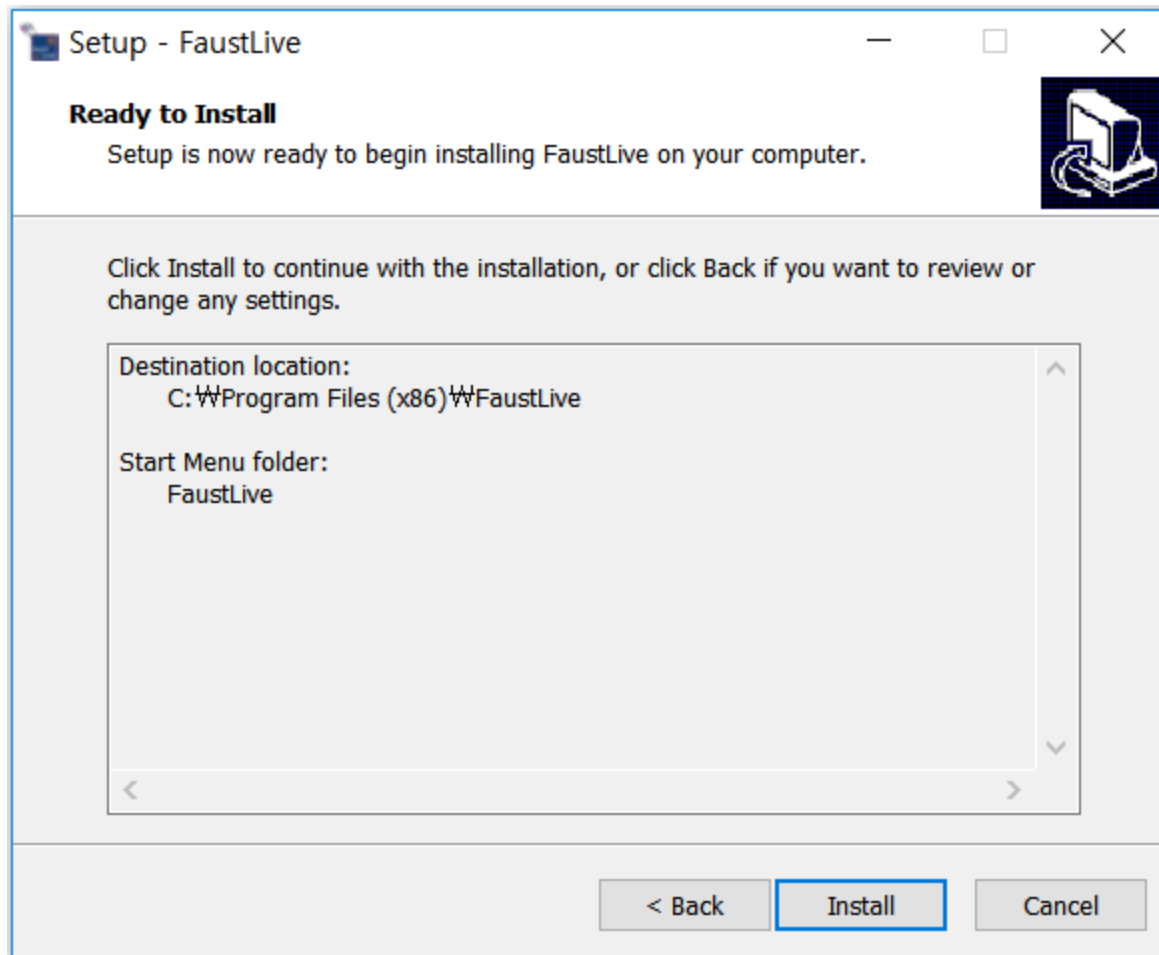




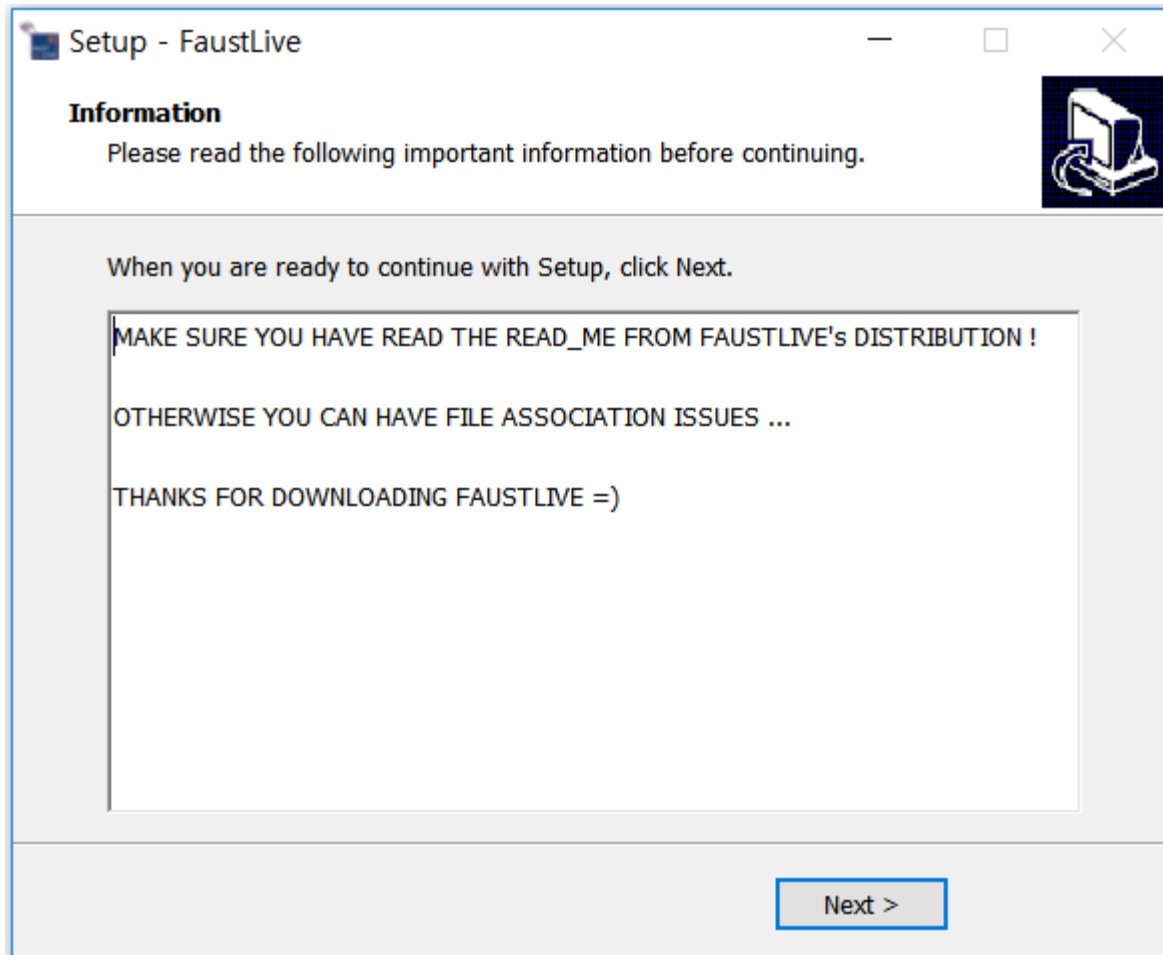


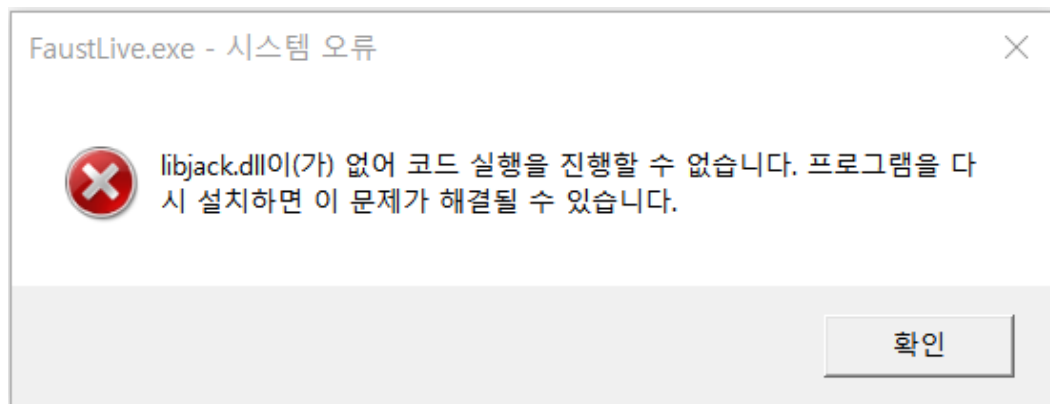
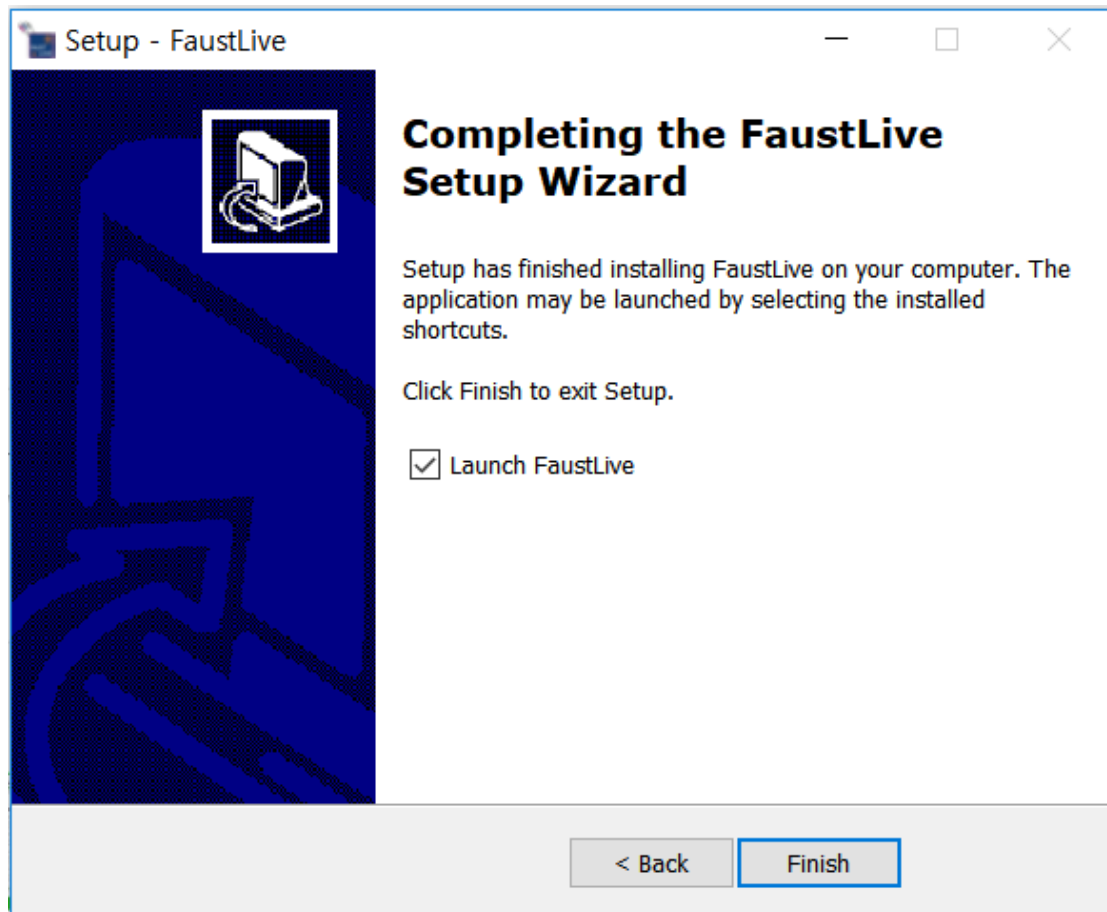














Downloading JACK

Linux

JACK1:

- **Binaries:** please use your distribution's package manager (`apt-get`, `yum`, `synaptic` etc.)
- **Source tarball:** [JACK 0.125.0](#).

JACK2:

- **Binaries:** please use your distribution's package manager

Windows

JACK2:

- 32 bit installer: [JACK 1.9.11](#).
- 64 bit installer: [JACK 1.9.11](#).
- Source tarball: [JACK 1.9.12](#).

JACK Source Code Repository

JACK uses Git as its source control system. Our central git repository is hosted by Github. We are currently working toward linking the repositories for Jack1 and Jack2 but this work is not complete, so for now the commands to get a copy of the source are a little different depending on which tree/version you want.



Installing Jack



Welcome to the Jack Installation!

This setup program will install Jack on your computer. Click Cancel if you do not want to install this application. Click Next to continue the installation.

WARNING: This program is protected by international copyright law and treaties.

Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties and will be prosecuted to the maximum extent of the law.

CreateInstall Free

Next >

Cancel



Installing Jack



Readme

Please read the following information.



=====

JACK on Windows

=====

This installer will install everything to use Jack Audio Connection Kit (JACK)
(www.jackaudio.org) on Windows.

=====

QJACKCTL on Windows

=====

This is a latest version of Rui Nuno Capela QJACKCTL application
(<http://qjackctl.sourceforge.net/>) compiled on Windows.
It is compiled from the latest CVS version which is using QT4 framework. To uses
it:

CreateInstall Free

< Back

Next >

Cancel



Installing Jack



License Agreement

To proceed with the installation, you must accept this License Agreement. Please read it carefully.



Copyright (C) 2001 Paul Davis
Copyright (C) 2004-2014 Grame

This program is free software: you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software Foundation, either version 3 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the

☒ I agree with the above terms and conditions

CreateInstall Free

< Back

Next >


Cancel

Installing Jack

X

Destination folder

Select a destination folder where Jack will be installed.



Setup will install files in the following folder.

If you would like to install Jack into a different folder then click Browse and select another folder.

Destination folder

C:\Program Files (x86)\Jack

Browse...

Space required: 93.78MB

Space available: 219.45GB

☒ Launch Jack now

CreateInstall Free

< Back

Next >

Cancel



Installing Jack



Jack has been successfully installed!

Click Finish to complete the installation.

CreateInstall Free

Finish



WELCOME TO FAUSTLIVE

Dynamic Faust Compiler



New Default Window
Open a window with simple process



Open your File.dsp



Import your Snapshot



Open Preferences Menu



About Faust Live
Learn all about FaustLive characteristics

Try Out an Example

APF
blowBottle
BPF
capture
clarinet
compressor
crazyGuio
cryBaby
dbmeter
distortion
echo
fdnRev

Open

Cancel

Version 2.44 by GRAME, Centre de Creation Musicale



WELCOME TO FAUSTLIVE

Dynamic Faust Compiler



New Default Window
Open a window with simple process



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APF
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distortion
echo
fdnRev

Open

Cancel

Version 2.44 by GRAME, Centre de Creation Musicale

For Linux

Home / Browse / Faust: signal processing language



Faust: signal processing language

Opening FaustLive-ubuntu-x86_64-2.43.zip

You have chosen to open:



FaustLive-ubuntu-x86_64-2.43.zip

which is: Zip archive (23.9 MB)

from: <https://jaist.dl.sourceforge.net>

Would you like to save this file?

Cancel

Save File

Get Updates

FaustLive-ubuntu-x86_64-2.43.zip | Scanned by: BitDefender

마지막으로
일을 그만두고
이 이상한 돈만들기

방법을
확인해
보십시오.



Advertisement - Report

sdr@sdr-Z20NH-AS51B5U: ~/audio/FaustLive-ubuntu-x86_64-2.43

```
sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43/FaustLive$ ls
FaustLive
sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43/FaustLive$ cd ..
sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43$ ls
Documentation  FaustLive  FilesToConfigure  READ_ME_BEFORE_YOU_START.pdf  Whats_New.pdf
sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43$ nautilus ./
```

(nautilus:1310): GLib-C
ections != NULL' failed

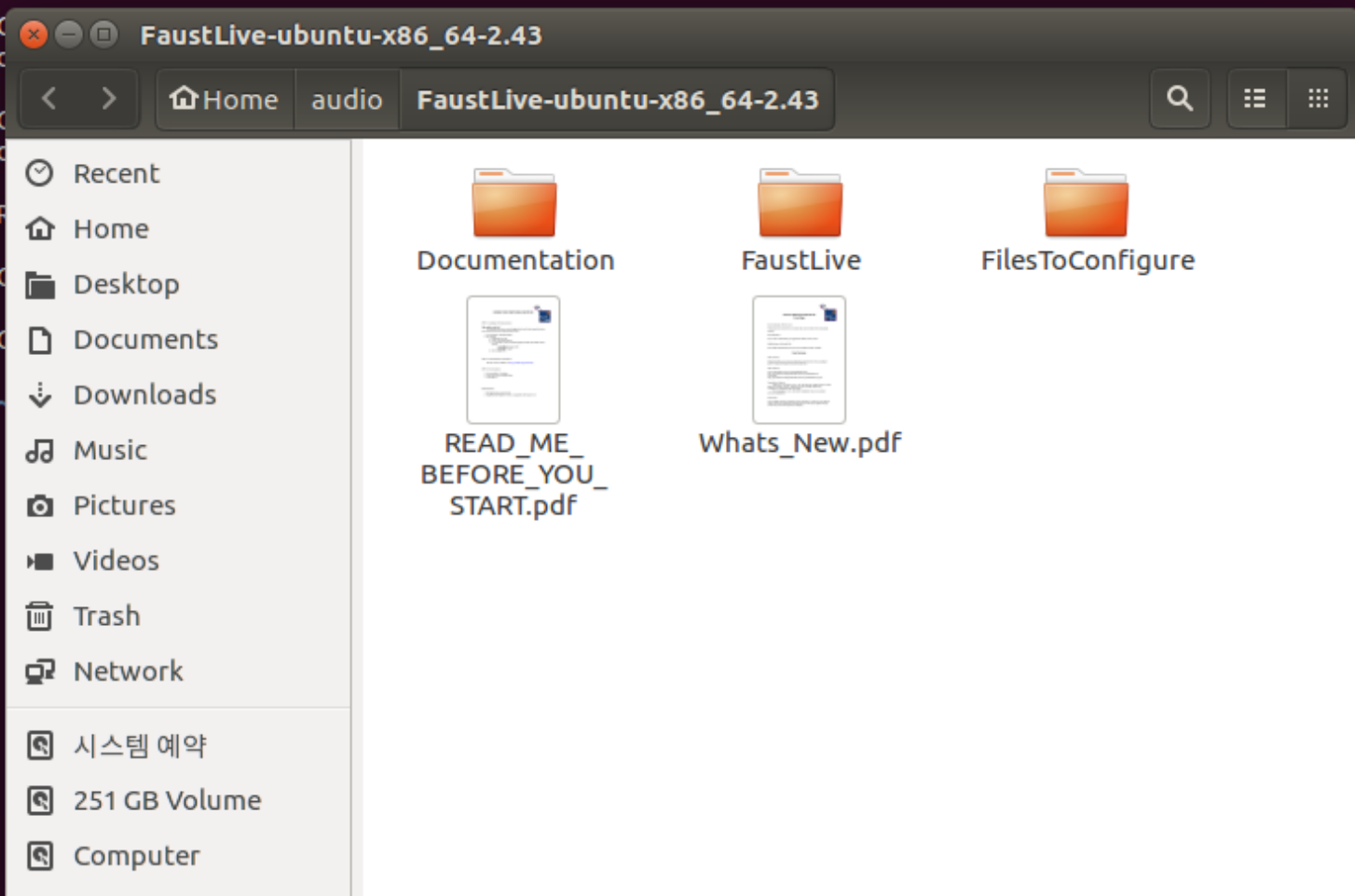
(nautilus:1310): GLib-C
ections != NULL' failed

(nautilus:1310): Gtk-CR

(nautilus:1310): GLib-C

(nautilus:1310): GLib-C
ce)' failed

sdr@sdr-Z20NH-AS51B5U:~



sdr@sdr-Z20NH-AS51B5U: ~/audio

sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43/FaustLive\$ cd ..

sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43\$ ls

Documentation FaustLive FilesToConfigure READ_ME_BEFORE_YOU_START.pdf Whats_New.pdf

sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43\$ nautilus ./

(nautilus:1310): GLib-GIO-CRITICAL **: g_dbus_interface_skeleton_unexport: assertion 'interface->priv->connections != NULL' failed

(nautilus:1310): GLib-GIO-CRITICAL **: g_dbus_interface_skeleton_unexport: assertion 'interface->priv->connections != NULL' failed

(nautilus:1310): Gtk-CRITICAL **: gtk_icon_theme_get_for_screen: assertion 'GDK_IS_SCREEN (screen)' failed

(nautilus:1310): GLib-GObject-WARNING **: invalid (NULL) pointer instance

(nautilus:1310): GLib-GObject-CRITICAL **: g_signal_connect_object: assertion 'G_TYPE_CHECK_INSTANCE (instance)' failed

sdr@sdr-Z20NH-AS51B5U:~/audio/FaustLive-ubuntu-x86_64-2.43\$ cd ..

sdr@sdr-Z20NH-AS51B5U:~/audio\$ sudo apt-get install jackd2

jackd2 jackd2-firewire

sdr@sdr-Z20NH-AS51B5U:~/audio\$ sudo apt-get install jackd2

[sudo] password for sdr:

Reading package lists... Done

Building dependency tree

Reading state information... Done

The following packages were automatically installed and are no longer required:

linux-headers-4.10.0-28 linux-headers-4.10.0-28-generic linux-headers-4.13.0-45

linux-headers-4.13.0-45-generic linux-headers-4.15.0-29 linux-headers-4.15.0-29-generic

linux-headers-4.15.0-30 linux-headers-4.15.0-30-generic linux-headers-4.15.0-32

linux-headers-4.15.0-32-generic linux-headers-4.15.0-33 linux-headers-4.15.0-33-generic

linux-image-4.10.0-28-generic linux-image-4.13.0-45-generic linux-image-4.15.0-29-generic

linux-image-4.15.0-30-generic linux-image-4.15.0-32-generic linux-image-4.15.0-33-generic

linux-image-extra-4.10.0-28-generic linux-image-extra-4.13.0-45-generic linux-modules-4.15.0-29-generic

linux-modules-4.15.0-30-generic linux-modules-4.15.0-32-generic linux-modules-4.15.0-33-generic

Use 'sudo apt autoremove' to remove them.

The following additional packages will be installed:

jackd jackd2-firewire libconfig++9v5 libffado2 libqt5x11extras5 libxml++2.6-2v5 python-dbus python-gi

qjackctl

Suggested packages:

jack-tools meterbridge python-dbus-doc python-dbus-dbg python-gi-cairo

The following NEW packages will be installed:

jackd jackd2 jackd2-firewire libconfig++9v5 libffado2 libqt5x11extras5 libxml++2.6-2v5 python-dbus

python-gi qjackctl

0 upgraded, 10 newly installed, 0 to remove and 253 not upgraded.

Need to get 2,571 kB of archives.

After this operation, 11.7 MB of additional disk space will be used.

Do you want to continue? [Y/n] y

Package configuration

Configuring jackd2

If you want to run jackd with realtime priorities, the user starting jackd needs realtime permissions. Accept this option to create the file /etc/security/limits.d/audio.conf, granting realtime priority and memlock privileges to the audio group.

Running jackd with realtime priority minimizes latency, but may lead to complete system lock-ups by requesting all the available physical system memory, which is unacceptable in multi-user environments.

Enable realtime process priority?

<Yes>

<No>



FLW-1 : BlowBottle

> Parameters

Basic Parameters

freq

gain

440Hz

1.00

gate

Envelopes_and_Vibrato

Envelope_Parameters

Vibrato_Parameters

Envelope_Attack

Vibrato_Attack

0.01s

Envelope_Decay

Vibrato Freq

S Recommended Maximum File Size of 50.00 MB

```
: warning: File dsp_proj_bak/output.avi is 58.75 MB; this is larger
s recommended maximum file size of 50.00 MB
```

```
destination port in attempted (dts)connection of FLW-1:blowbottle_out_1 and system:capture_2 is not an input
port
C:\InetifyFileSystemWatcherEngine>addPaths: iocify: add watch failed: No such file or directory
```

```
QinottrlyFilesystemWatcherEngine::addPaths: thottrly_add_watch failed: No such file or directory
```