# How To Build JackTrip from Source on Windows 10

Andrew Forsyth, Bonnie Kwong 20-08-25

## Before we start...

This is for Windows 10 users who want to build JackTrip from the source code.

This allows testing out experimental features that might not be ready for widespread release.

This guide assumes you can already run JackTrip by using the installer. If you're looking for the latest JackTrip installers, go to: <a href="https://ccrma.stanford.edu/software/jacktrip/">https://ccrma.stanford.edu/software/jacktrip/</a>

Instead of following these instructions.

# Installing Git

## Why do I need Git?

Git is a ubiquitous software in software development.

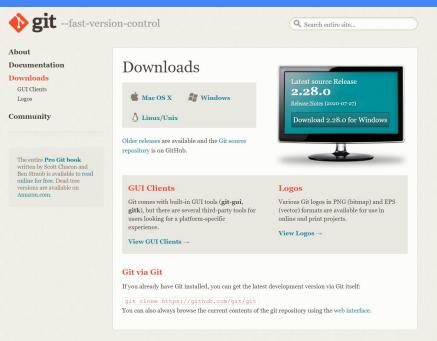
It allows lots of people to contribute the code they write to a project.

It allows people like us to copy the code (clone the repository).

We'll need the code in order to build the app, so we need git!

## **Download Git for Windows**

## https://git-scm.com/downloads





#### Information

Please read the following important information before continuing.

-

Cancel

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When you are ready to continue with Setup, click Next.

## **GNU General Public License**

Version 2, June 1991

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### Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public license is intended to guarantee your freedom to share and change

https://gitforwindows.org/ -

Only show new options



I'm sure you'll read all of this



#### Select Components

Which components should be installed?

Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.

- Additional icons
  C On the Desktop
  Windows Explorer integration
  Git Bash Here
  Git GUI Here
  Git LFS (Large File Support)
- Associate .git\* configuration files with the default text editor
- Associate .sh files to be run with Bash
- Use a TrueType font in all console windows
- Check daily for Git for Windows updates

Current selection requires at least 269.5 MB of disk space.

https://gitforwindows.org/

Only show new options

< Back







Cancel

#### \delta Git 2.28.0 Setup

#### Choosing the default editor used by Git

Which editor would you like Git to use?

Use Notepad++ as Git's default editor	$\sim$
Use Vim (the ubiquitous text editor) as Git's default editor	•
Use Notepad++ as Git's default editor	
Use Visual Studio Code as Git's default editor	
Use Visual Studio Code Insiders as Git's default editor	
Use Sublime Text as Git's default editor	
Use Atom as Git's default editor	
Use VSCodium as Git's default editor	
Select other editor as Git's default editor	~

https://gitforwindows.org/
Only show new options < Back Next > Cancel

You can use whatever you want for an editor!

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We won't do much editing unless we're contributing to the project.

### Git 2.28.0 Setup

#### Adjusting your PATH environment

How would you like to use Git from the command line?

#### Use Git from Git Bash only

This is the most cautious choice as your PATH will not be modified at all. You will only be able to use the Git command line tools from Git Bash.

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#### • Git from the command line and also from 3rd-party software

(Recommended) This option adds only some minimal Git wrappers to your PATH to avoid cluttering your environment with optional Unix tools. You will be able to use Git from Git Bash, the Command Prompt and the Windows PowerShell as well as any third-party software looking for Git in PATH.

< Back

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#### 🔘 Use Git and optional Unix tools from the Command Prompt

Both Git and the optional Unix tools will be added to your PATH. Warning: This will override Windows tools like "find" and "sort". Only use this option if you understand the implications.

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#### 🧆 Git 2.28.0 Setup

#### **Choosing HTTPS transport backend**

Which SSL/TLS library would you like Git to use for HTTPS connections?

#### • Use the OpenSSL library

Server certificates will be validated using the ca-bundle.crt file.

#### 🔵 Use the native Windows Secure Channel library

Server certificates will be validated using Windows Certificate Stores. This option also allows you to use your company's internal Root CA certificates distributed e.g. via Active Directory Domain Services.

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Only show new options < Back Next > Cancel





#### 🔌 Git 2.28.0 Setup

#### Configuring the line ending conversions

How should Git treat line endings in text files?

#### Checkout Windows-style, commit Unix-style line endings

Git will convert LF to CRLF when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Windows ("core.autocrlf" is set to "true").

#### Checkout as-is, commit Unix-style line endings

Git will not perform any conversion when checking out text files. When committing text files, CRLF will be converted to LF. For cross-platform projects, this is the recommended setting on Unix ("core.autocrlf" is set to "input").

#### Ocheckout as-is, commit as-is

Git will not perform any conversions when checking out or committing text files. Choosing this option is not recommended for cross-platform projects ("core.autocrlf" is set to "false").

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Only show new options

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### Git 2.28.0 Setup

Configuring the terminal emulator to use with Git Bash

Which terminal emulator do you want to use with your Git Bash?

#### • Use MinTTY (the default terminal of MSYS2)

Git Bash will use MinTTY as terminal emulator, which sports a resizable window, non-rectangular selections and a Unicode font. Windows console programs (such as interactive Python) must be launched via `winpty` to work in MinTTY.

#### 🔵 Use Windows' default console window

Git will use the default console window of Windows ("cmd.exe"), which works well with Win32 console programs such as interactive Python or node.js, but has a very limited default scroll-back, needs to be configured to use a Unicode font in order to display non-ASCII characters correctly, and prior to Windows 10 its window was not freely resizable and it only allowed rectangular text selections.

https://gitforwindows.org/
Only show new options < Back Next > Cancel

MinTTY is basically a wrapper for the command prompt (normal windows terminal)

It lets you use unix style commands and has other benefits. A lot of people are more familiar with unix style commands, because that's what Mac and Linux use.



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### 🧆 Git 2.28.0 Setup

#### Choose the default behavior of `git pull` What should `git pull` do by default?

# - 🔅

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#### • Default (fast-forward or merge)

This is the standard behavior of `git pull`: fast-forward the current branch to the fetched branch when possible, otherwise create a merge commit.

## O Rebase

Rebase the current branch onto the fetched branch. If there are no local commits to rebase, this is equivalent to a fast-forward.

### Only ever fast-forward

Fast-forward to the fetched branch. Fail if that is not possible.

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Only show new options



### Git 2.28.0 Setup

#### Choose a credential helper

Which credential helper should be configured?

#### **None**

Do not use a credential helper.

#### Git Credential Manager

The <u>Git Credential Manager for Windows</u> handles credentials e.g. for Azure DevOps and GitHub (requires .NET framework v4.5.1 or later).

#### O Git Credential Manager Core

(NEW!) Use the new, <u>cross-platform version of the Git Credential Manager</u>. See more information about the future of Git Credential Manager <u>here</u>.

 https://gitforwindows.org/

 Only show new options
 < Back</td>
 Next >
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This will helpfully save your credentials (username and password)



#### 🥸 Git 2.28.0 Setup

#### Configuring extra options

Which features would you like to enable?

# -

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#### ✓ Enable file system caching

File system data will be read in bulk and cached in memory for certain operations ("core.fscache" is set to "true"). This provides a significant performance boost.

#### Enable symbolic links

Enable <u>symbolic links</u> (requires the SeCreateSymbolicLink permission). Please note that existing repositories are unaffected by this setting.

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Only show new options < Back Next > Cancel

### 🚸 Git 2.28.0 Setup

#### Configuring experimental options

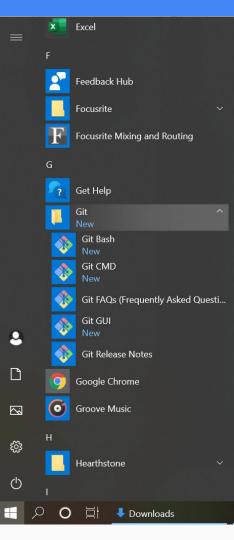
Which bleeding-edge features would you like to enable?

#### Enable experimental support for pseudo consoles.

(NEW!) This allows running native console programs like Node or Python in a Git Bash window without using winpty, but it still has known bugs.

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https://gitforwindows.org/			
Only show new options	< Back	Next >	Cancel



Install the thing, you'll see GIT show up in the start menu. Running Git Bash opens the MinTTY application

MinTTY is basically a wrapper for the command prompt (normal windows terminal)

It lets you use unix style commands and has other benefits. A lot of people are more familiar with unix style commands, because that's what Mac and Linux use.

Run Git Bash to open the unix style terminal (You can also use command prompt if you'd like)

MINGW64:/c/Users/forsy	12	×
<pre>NTUSER.DAT{b82a423c-d1f9-11ea-a652-b8858498fde3}.TMContainer000 1.regtrans-ms NTUSER.DAT{b82a423c-d1f9-11ea-a652-b8858498fde3}.TMContainer000 2.regtrans-ms ntuser.ini OneDrive/ Pictures/ PrintHood@ Recent@ 'Saved Games'/ Searches/ SendTo@ 'Start Menu'@ Templates@ Videos/</pre>		
forsy@DESKTOP-1V9ENMM <mark>MINGW64</mark> ~ \$ git configglobal user.name "Andrew Forsyth"		
forsy@DESKTOP-1V9ENMM <mark>MINGW64</mark> ~ \$ git configglobal user.email "forsythac@gmail.com"		
forsy@DESKTOP-1V9ENMM MINGW64 ~ \$		~

Open git Bash Configure your username and email as shown.

## That's it!

You installed git!

# Installing Qt

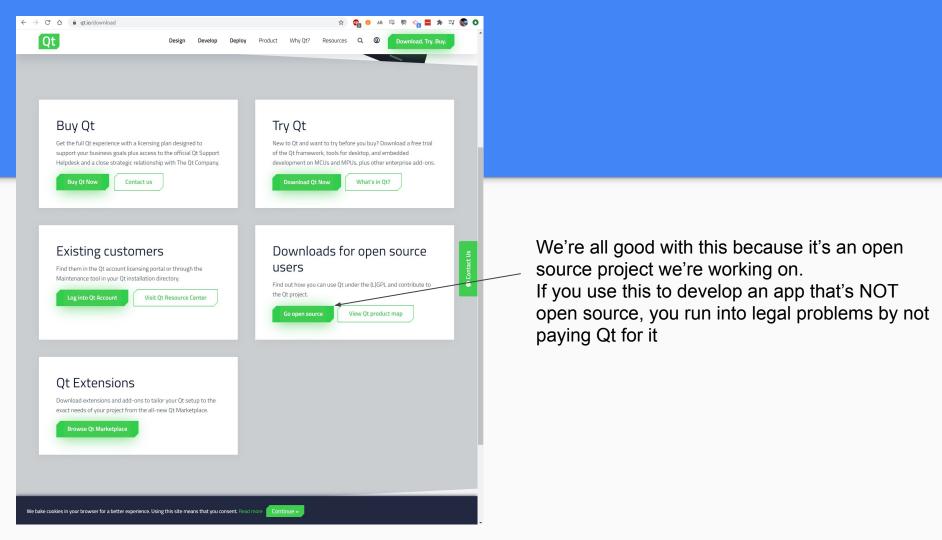
# Why do I need Qt?

Qt is a compiler

It is what turns raw code into an app (AKA build from source).

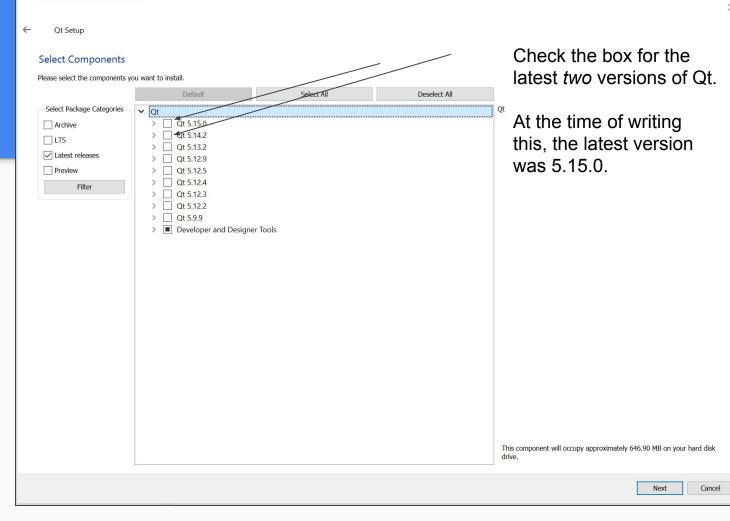
It has a lot of helpful libraries and tools for making applications

Specifically, we need the apps qmake and g++ to build JackTrip



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Qt Setup

#### License Agreement

Please read the following license agreements. You must accept the terms contained in these agreements before continuing with the installation.

#### Qt Installer LGPL License Agreement

Python Software Foundation License Version 2

MICROSOFT SOFTWARE LICENSE TERMS MICROSOFT WINDOWS SOFTWARE DEVELOPMENT KIT (SDK) FOR WINDOWS 10

GENERAL

Qt is available under a commercial license with various pricing models and packages that meet a variety of needs. Commercial Qt license keeps your code proprietary where only you can control and monetize on your end product's development, user experience and distribution. You also get great perks like additional functionality, productivity enhancing tools, world-class support and a close strategic relationship with The Qt Company to make sure your product and development goals are met.

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Next

Cancel

Qt has been created under the belief of open development and providing freedom and choice to developers. To support that, The Qt Company also licenses Qt under open source licenses, where most of the functionality is available under LGPLv3. It should be noted that the tools as well as some add-on components are available only under GPLv3. In order to preserve the true meaning of open development and uplotd the spirit of free software, it is imperative that the rules and regulations of open source licenses are followed. If you use Qt under open-source licenses, you need to make sure that you comply with all the licenses of the components you use.

Qt also contains some 3rd party components that are available under different open-source licenses. Please refer to the documentation for more details on 3rd party licenses used in Qt.

GPLv3 and LGPLv3

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• I have read and agree to the terms contained in the license agreements.

I do not accept the terms and conditions of the above license agreements.

← Qt Setup

#### Start Menu shortcuts

Select the Start Menu in which you would like to create the program's shortcuts. You can also enter a name to create a new directory.

Qt Accessibility Accessories Administrative Tools ASIO4ALL v2 Chrome Apps Jack Maintenance Scopelmage 9.0 Startup Steam System Tools Windows PowerShell WinRAR Zoom Next Cancel

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🤜 environment - System and Securi	ty			- 🗆	Х
← → ∽ ↑ 🕓 > Control Par	nel > System and Security >	~ 3	บ environment		×
Control Panel Home System and Security Network and Internet	System Edit environment variables for your account Edit the system environment variables				
Hardware and Sound Programs User Accounts	Search Windows Help and Support for "environment"				
Appearance and Personalization Clock and Region					
Ease of Access					

#### System Properties

Computer Name Hardware Advanced System Protection Remote

You must be logged on as an Administrator to make most of these changes.

Performance

Visual effects, processor scheduling, memory usage, and virtual memory

Settings ...

X

**User Profiles** 

Desktop settings related to your sign-in

Settings...

System startup, system failure	, and debuggi	ng information	
		3	Settings
		Environme	nt Variables
		Environme	nt Variable

#### Environment Variables

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User variables for forsy

Value
C:\Users\forsy\OneDrive
C:\Users\forsy\OneDrive
c:\Qt\%VERSION%\bin
C:\Users\forsy\AppData\Local\Temp
C:\Users\forsy\AppData\Local\Temp

	New Edit Delete
ystem variables	
Variable	Value ^
ComSpec	C:\WINDOWS\system32\cmd.exe
DriverData	C:\Windows\System32\Drivers\DriverData
NUMBER_OF_PROCESSORS	6
OS	Windows_NT
Path	C:\Program Files (x86)\Intel\Intel(R) Management Engine Compo
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTURE	AMD64
PROCESSOR IDENTIFIER	Intel64 Family 6 Model 158 Stepping 10. GenuineIntel
	New Edit Delete
	OK Cancel

Edit	environment	variable

C:\Program Files (x86)\Intel\Intel(R) Management Engine Compone	New
C:\Program Files\Intel\Intel(R) Management Engine Components\iC	
C:\Windows\system32	Edit
C:\Windows	
C:\Windows\System32\Wbem	Browse
C:\Windows\System32\WindowsPowerShell\v1.0\	browse
C:\Windows\System32\OpenSSH\	
C:\Program Files (x86)\Intel\Intel(R) Management Engine Compone	Delete
C:\Program Files\Intel\Intel(R) Management Engine Components\D	
C:\Program Files (x86)\Intel\Intel(R) Management Engine Compone	
C:\Program Files\Intel\Intel(R) Management Engine Components\IPT	Move Up
C:\Program Files (x86)\NVIDIA Corporation\PhysX\Common	
%SystemRoot%\system32	Move Down
%SystemRoot%	
%SystemRoot%\System32\Wbem	
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\	Edit text
%SYSTEMROOT%\System32\OpenSSH\	
C:\Program Files\Git\cmd	
c:\Qt\%VERSION%\bin	
ОК	Cancel
	R.0

# Clone the Repo

## Why do I want to clone the repo?

We need to copy the code in order to build it into an app

We can also contribute to the project after we do this

That's another presentation entirely :)

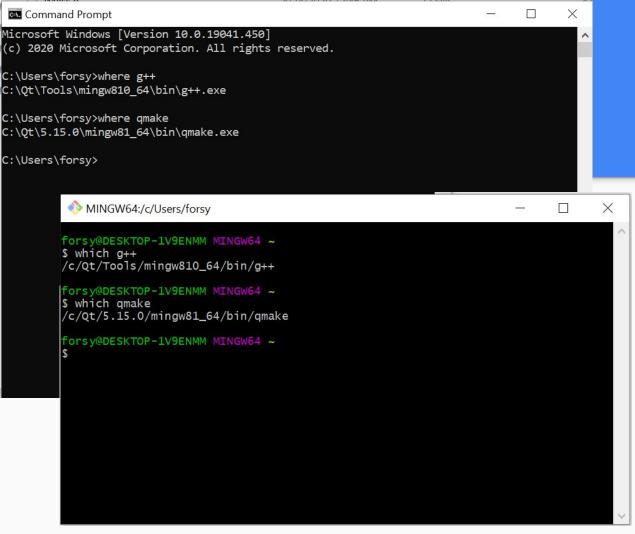
MINGW64:/c/Users/forsy/Experimental JackTrip Repos X 'Saved Games'/ Searches / SendTo@ Start Menu'@ Templates@ Videos/ Forsy@DESKTOP-1V9ENMM MINGW64 ~ \$ cd Experimental\_JackTrip\_Repos/ Forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos \$ 1s Forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos git clone https://github.com/antonrunov/jacktrip.git Cloning into 'jacktrip'... remote: Enumerating objects: 41, done. remote: Counting objects: 100% (41/41), done. remote: Compressing objects: 100% (38/38), done. remote: Total 4678 (delta 15), reused 4 (delta 3), pack-reused 4637 Receiving objects: 100% (4678/4678), 14.59 MiB | 27.16 MiB/s, done. Resolving deltas: 100% (3467/3467), done. Forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos \$ 1s jacktrip/ orsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos

Make a folder where you'd like to clone the repo.

Open Git Bash to open the terminal

Navigate to the folder you made with the command "cd" (change directory)

Enter "git clone <url of the project you want to clone>" In the example, I cloned Anton's fork of the JackTrip repository, located at the URL pictured



In order to build JackTrip from source, we need the help of two applications, g++ and qmake.

Those applications should have come with your installation of Qt.

In order to test if your system can find those applications, you can use the command "where" (CMD language) or "which" (unix based language)

Here are pictures of both types of terminals, doing the same thing

NINGW64:/c/Users/forsy	. <del></del>		×
_64/bin:/c/Qt/5.15.0/mingw81_64/bin:/usr/bin/vendor_perl:/usr/bin/core_perl)			^
<pre>forsy@DESKTOP-1V9ENMM MINGw64 ~ \$ which g which: no g in (/c/Users/forsy/bin:/mingw64/bin:/usr/local/bin:/usr/bin:/bin:/mingw64/bin:/usr/bin:/c/Users/forsy/bin:/c, x86)/Intel/Intel(R) Management Engine Components/iCLS:/c/Program Files/Intel/Intel(R) Management Engine Components/iCLS:/c, 2:/c/Windows:/c/Windows/System32/Wbem:/c/Windows/System32/WindowsPowerShell/v1.0:/c/Windows/System32/OpenSSH:/c/Program Files/Intel/Intel(R) Management Engine Components/DAL:/c/Program Files/Intel/Intel(R) Management Engine Components/IPT:/c/Program File</pre>	/Window les (x8 s (x86) (x86)/M c/WINDC	ws/syste 86)/Inte )/Intel/ NVIDIA ( DWS/Syst	em3 el/ /In Cor tem
forsy@DESKTOP-1V9ENMM MINGW64 ~ \$			
forsy@DESKTOP-1V9ENMM MINGW64 ~ \$			
forsy@DESKTOP-1V9ENMM MINGW64 ~ \$			
forsy@DESKTOP-1V9ENMM MINGW64 ~ \$			~

If your terminal didn't spit back the file path when you look for "which g++" or "where g++", you might get a message like this. (I used the nonexistent application "g--" for this example, since my system already knows where "g++" is.) My system is telling me that it doesn't know where "g--" is. It's also telling me all the places it's looking for "g--"

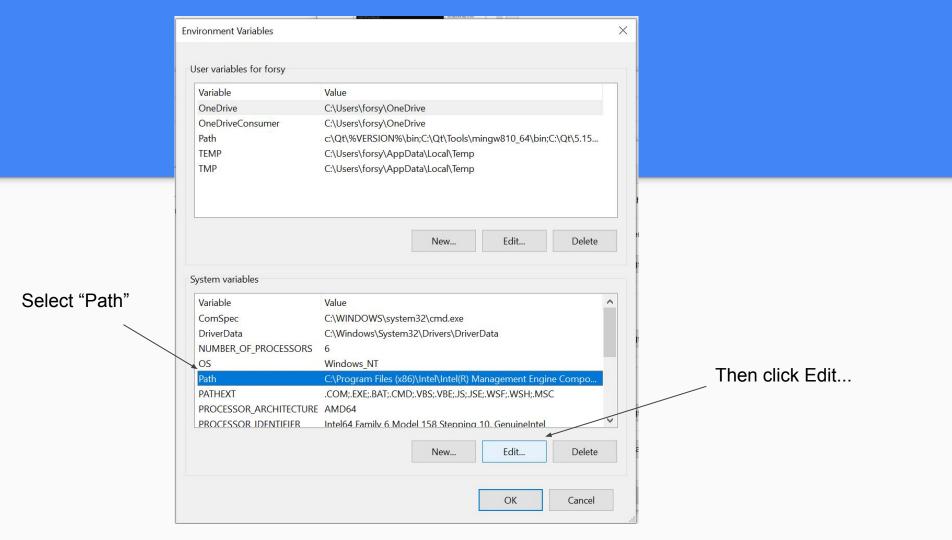
If you get a message like this, you need to tell your system where it can find those applications. We do this by adding some folders to the "Path" system environment variable

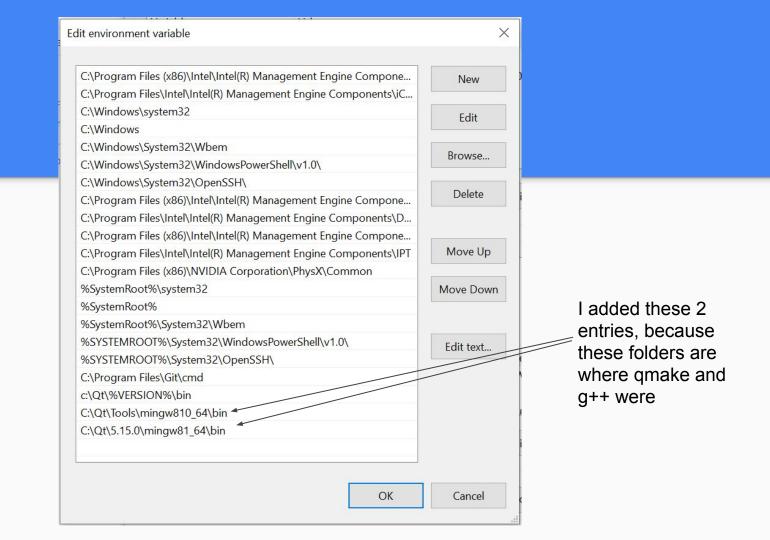
🖭 environment variables - Control Panel			-		×
$\leftarrow$ $\rightarrow$ $\checkmark$ $\uparrow$ 🖂 $\Rightarrow$ Control Panel $\Rightarrow$	~	U	environment variable	es	×
System Edit environment variables for your account Edit the system environment variables Search Windows Help and Support for "environment variables"					

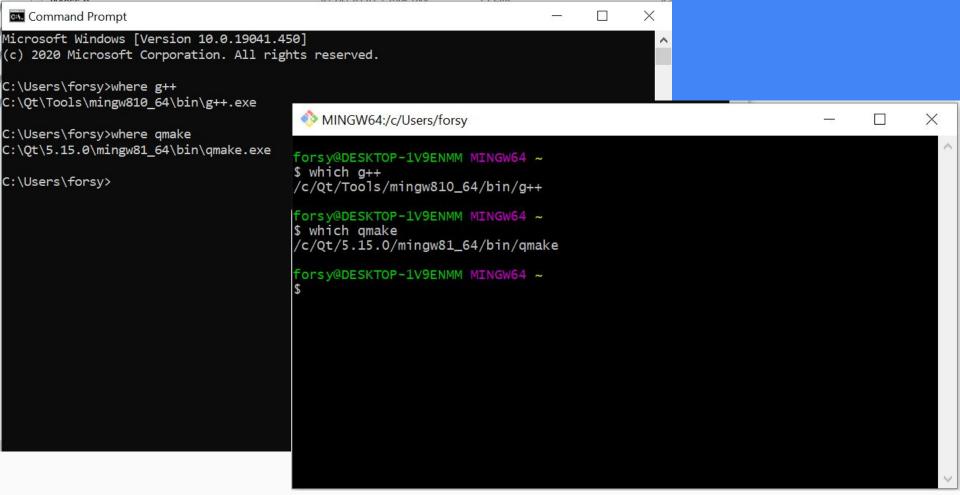
Open the good old fashioned Control Panel and search for "environment variables"

Click the link with the little system administrator shield next to it.

ystem Properti					
Computer Name	Hardware	Advanced	System Prote	ection Remo	te
You must be lo Performance	ogged on as	an Adminis	trator to make	e most of thes	e changes.
Visual effects	, processor	scheduling,	, memory usac	ge, and <mark>v</mark> irtual	memory
				Sett	ings
User Profiles					
Desktop setti	ngs related	to your sign	i-in		
				Sett	ings
Startup and R	ecovery				
System startu	up, system f	ailure, and c	lebugging info	ormation	
				Sett	ings
			E	Environment V	ariables







Now, you should be able to which/where and get info about location of those applications. Now we're all set to build!

Build the project

# Why do I need to build the project?

We have all the tools we need

Time to make an app that we can run!

NINGW64:/c/Users/forsy/Experimental\_JackTrip\_Repos/jacktrip/builddir

forsy@DESKTOP-1V9ENMM <mark>MINGW64</mark> ~ \$ cd Experimental\_JackTrip\_Repos/jacktrip/src

Forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos/jacktrip/src (master

\$ mkdir ../builddir; cd ../builddir

forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental\_JackTrip\_Repos/jacktrip/builddir (master)
\$ qmake -spec win32-g++ ../src/jacktrip.pro

in the terminal, navigate to the jacktrip/src dir with cd {yourfolder}/jacktrip/src

type: mkdir ../builddir; cd ../builddir

qmake -spec win32-g++ ../src/jacktrip.pro

mingw32-make clean

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qmake -spec win32-g++ ../src/jacktrip.pro

mingw32-make release

A lot of text should show up. You've made it!

Now, all there is to do is run the App we made.

# Run JackTrip

MINGW64:/c/Users/forsy/Experimental_JackTrip_Repos/jacktrip/builddir/release				
Forsy@DESKTOP-1V9ENMM MINGW64 ~/Experimental_JackTrip_Repos/jacktrip/builddir (master) \$ cd release/				
orsy@DESKTOP-1V9ENMM MINGw64 ~/Experimental_JackTrip_Repos/jacktrip/builddir/release (master) ./jacktrip.exe				
ackTrip: A System for High-Quality Audio Network Performance ver the Internet opyright (c) 2008-2018 Juan-Pablo Caceres, Chris Chafe. oundwIRE group at CCRMA, Stanford University ERSION: 1.2beta2				
Jsage: jacktrip [-s -c host] [options]				
Options: REQUIRED ARGUMENTS: -5,server -c,client <peer_hostname_or_ip_num> -5,jacktripserver -C,pingtoserver <peer_name_or_ip></peer_name_or_ip></peer_hostname_or_ip_num>	Run in Server Mode Run in Client Mode Run in Hub Server Mode Run in Hub Client Mode			
OPTIONAL ARGUMENTS: -n,numchannels # -q,queue # (2 or more) -r,redundancy # (1 or more) ult: 1)	Number of Input and Output Channels (default: 2) Queue Buffer Length, in Packet Size (default: 4) Packet Redundancy to avoid glitches with packet losses (defa			
-o,portoffset # bindport # peerport # -b,bitres # (8, 16, 24, 32) -p,hubpatch # (0, 1, 2, 3, 4)	Receiving port offset from base port 4464 Set only the bind port number (default: 4464) Set only the Peer port number (default: 4464) Audio Bit Rate Resolutions (default: 16) Hub auto audio patch, only has effect if running HUB SERVER ack, 2=client fan out/in but not loopback, 3=reserved for TUB			
-z,zerounderrun	Set buffer to zeros when underrun occurs (default: wavetable			
7-1,loopback -j,jamlink clientname localaddress nojackportsconnect	Run in Loop-Back Mode Run in JamLink Mode (Connect to a JamLink Box) Change default client name (default: JackTrip) Change default local host IP address (default: 127.0.0.1) Don't connect default audio ports in jack			
ARGUMENTS TO USE JACKTRIP WITHOUT JACK: rtaudio	Use system's default sound system instead of Jack			
srate # : 48000)	Set the sampling rate, works onrtaudio mode only (default			
bufsize # 128)	Set the buffer size, works onrtaudio mode only (default:			
deviceid #	The rtaudio device idrtaudio mode only (default: 0)			
ARGUMENTS TO DISPLAY IO STATISTICS: iostat <time_in_secs> s)</time_in_secs>	Turn on IO stat reporting with specified interval (in second			
iostatlog <log_file></log_file>	Save stat log into a file (default: print in stdout)			
HELP ARGUMENTS: -v,version -v,verbose -h,help	Prints Version Number Verbose mode, prints debug messages Prints this Help			

The app should be in the "release" folder within builddir

#### Cd to release

- 0

X

Type: "./jacktrip" to print out the manual of parameters you can tack on when running it.

You're done! Congrats!