Ipopt Compilation on Windows & Interfacing with Spyder/Pyomo

This document will guide the user in the installation and compilation of the ipopt solver, as well as interfacing the resulting executable with pyomo. The same procedure may be followed to configure and install **any** COINOR AMPL enabled solver, such as, bonmin, couenne (MINLP solver), etc.

Prerequisites

- Windows OS
- Internet connection
- Spyder (Python IDE) with updated Pyomo libraries
- **Patience**

Step 1: Cygwin

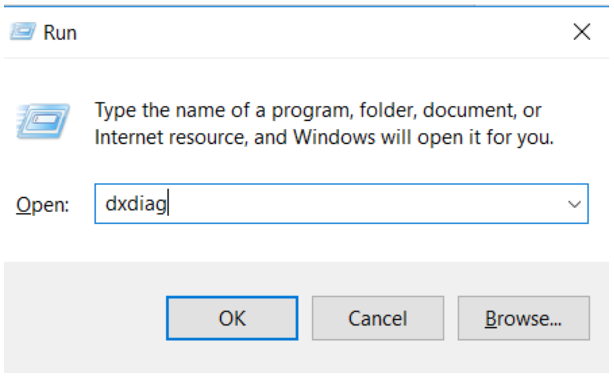
Cygwin, is a command line interface running in a UNIX-like environment. It is through this program that the user (you) will be able to compile Ipopt with the selected linear solvers.

Step 1.1: Download Installer

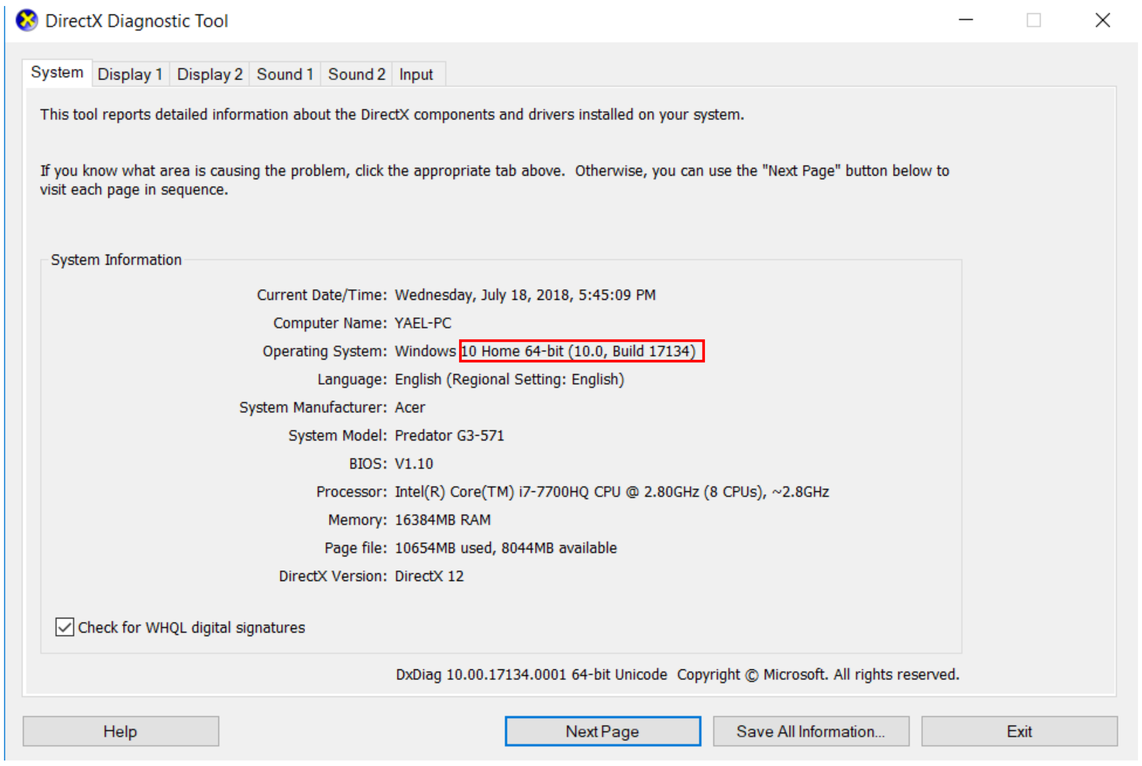
Cygwin may be downloaded from the following link:

- For ***64 bit*** systems: https://www.cygwin.com/setup-x86_64.exe
- For ***32 bit*** systems: https://www.cygwin.com/setup-x86.exe

(If you already know which architecture your system is, skip to step 1.2. To check your hardware and software settings press Win+R, and run ***dxdiag***)


Run
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.
Open:
dxdiag
OK
Cancel
Browse...

Click '***Yes'*** to the prompt that will appear and you will see a screen like the following:


DirectX Diagnostic Tool

This tool reports detailed information about the DirectX components and drivers installed on your system.

If you know what area is causing the problem, click the appropriate tab above. Otherwise, you can use the "Next Page" button below to visit each page in sequence.

System Information

```
   Current Date/Time: Wednesday, July 18, 2018, 5:45:09 PM
       Computer Name: YAEL-PC
    Operating System: Windows 10 Home 64-bit (10.0, Build 17134)
            Language: English (Regional Setting: English)
 System Manufacturer: Acer
        System Model: Predator G3-571
                BIOS: V1.10
           Processor: Intel(R) Core(TM) i7-7700HQ CPU @ 2.80GHz (8 CPUs), ~2.8GHz
              Memory: 16384MB RAM
           Page file: 10654MB used, 8044MB available
     DirectX Version: DirectX 12
```

☑ Check for WHQL digital signatures

DxDiag 10.00.17134.0001 64-bit Unicode Copyright © Microsoft. All rights reserved.

In this case, you would download the ***64 bit*** version of the installer.

Step 1.2: Installing Cygwin:

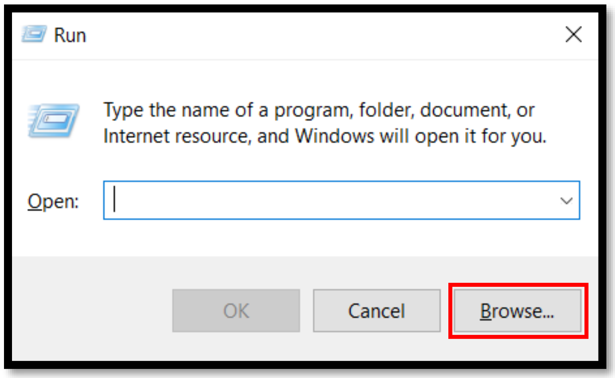
The initial steps to install Cygwin will depend on the rights of your current user account.

Step 1.2.1.a User has administrative rights:

Simply execute the installer you downloaded from the previous step.

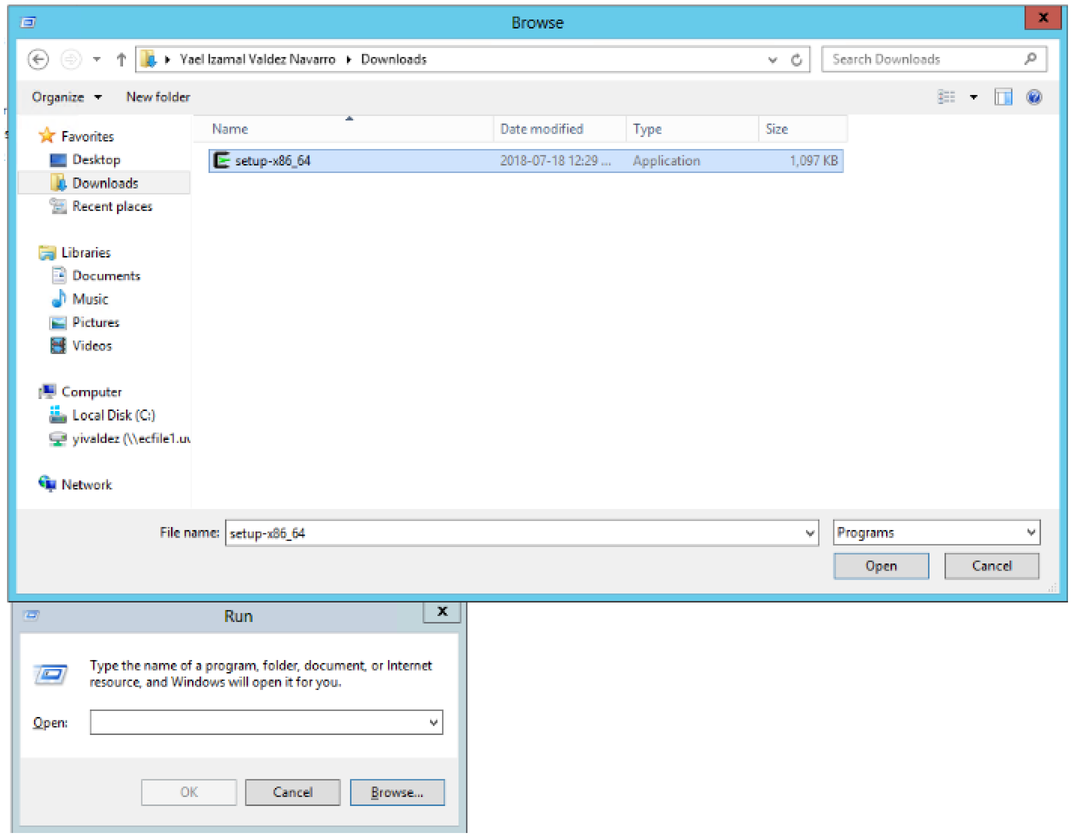
Step 1.2.1.b User does not have administrative rights:

- Press *Win+R*, click on *Browse…*


Run

Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

- A prompt will open, look for the executable you downloaded previously and click open:



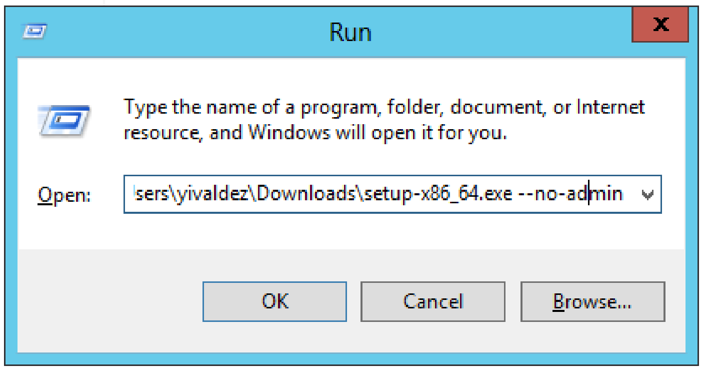
Name	Date modified	Type	Size
setup-x86_64	2018-07-18 12:29 ...	Application	1,097 KB

File name: setup-x86_64

Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open:

- The path to the installer will be generated on the *"Run"* window, add a **blank** space, then add the parameter **"--no-admin"** without the quotes and click *OK*, installation process will begin:



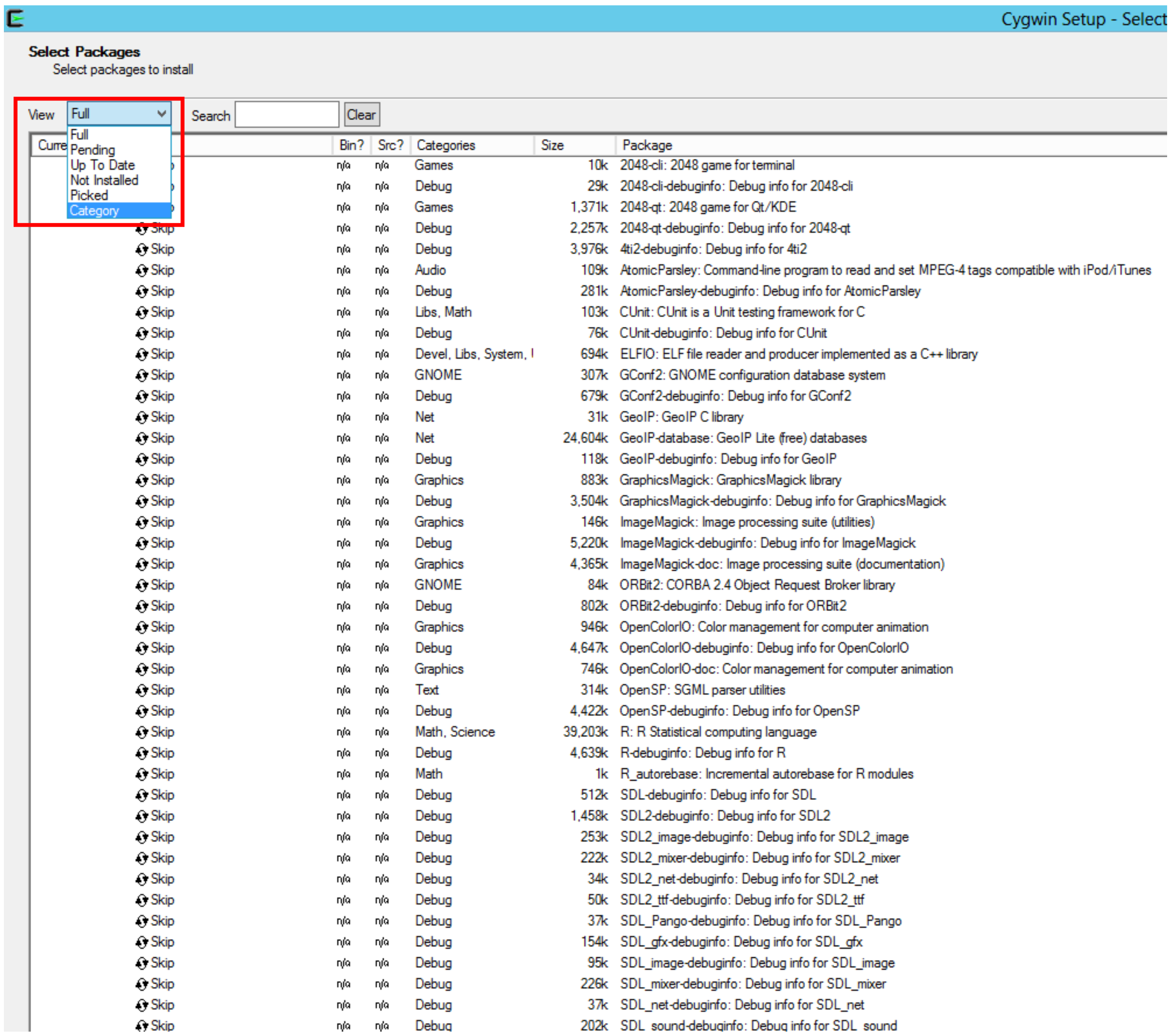
Type the name of a program, folder, document, or Internet resource, and Windows will open it for you.

Open: sers\yivaldez\Downloads\setup-x86_64.exe --no-admin

Step 1.2.2 Selecting the packages:

When executing the installer (you will need an internet connection):

1. Click ***Next***
2. Select "***Install from Internet***", click ***Next***
3. Default directory should be selected "*C:\cygwin64*" (for 64 bit systems), click ***Next***
4. Leave Local Package Directory as default, click ***Next***
5. Select Direct Connection, click ***Next***
6. **Any** download site should be good, the topmost one is recommended as it is Cygwin's official server "***http://cygwin.mirror.constant.com***", click ***Next***
7. You will be greeted by the following window: (On "***View***" section, select "***Category***" for ease of navigation)



Cygwin Setup - Select

Select Packages

Select packages to install

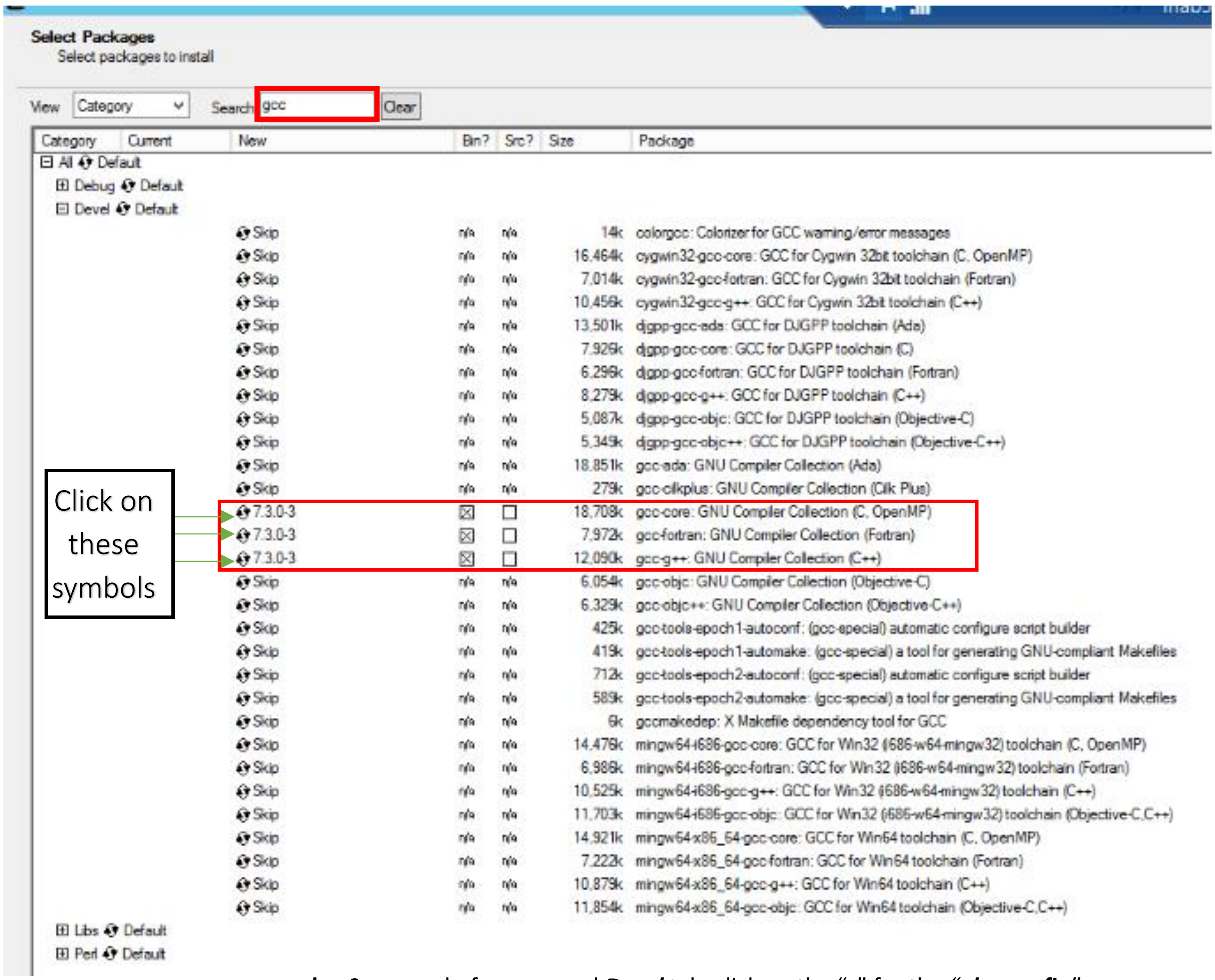
View: Full — Full / Pending / Up To Date / Not Installed / Picked / Category

Search [ ] Clear

Curre		Bin?	Src?	Categories	Size	Package
		n/a	n/a	Games	10k	2048-cli: 2048 game for terminal
		n/a	n/a	Debug	29k	2048-cli-debuginfo: Debug info for 2048-cli
		n/a	n/a	Games	1,371k	2048-qt: 2048 game for Qt/KDE
	Skip	n/a	n/a	Debug	2,257k	2048-qt-debuginfo: Debug info for 2048-qt
	Skip	n/a	n/a	Debug	3,976k	4ti2-debuginfo: Debug info for 4ti2
	Skip	n/a	n/a	Audio	109k	AtomicParsley: Command-line program to read and set MPEG-4 tags compatible with iPod/iTunes
	Skip	n/a	n/a	Debug	281k	AtomicParsley-debuginfo: Debug info for AtomicParsley
	Skip	n/a	n/a	Libs, Math	103k	CUnit: CUnit is a Unit testing framework for C
	Skip	n/a	n/a	Debug	76k	CUnit-debuginfo: Debug info for CUnit
	Skip	n/a	n/a	Devel, Libs, System, !	694k	ELFIO: ELF file reader and producer implemented as a C++ library
	Skip	n/a	n/a	GNOME	307k	GConf2: GNOME configuration database system
	Skip	n/a	n/a	Debug	679k	GConf2-debuginfo: Debug info for GConf2
	Skip	n/a	n/a	Net	31k	GeoIP: GeoIP C library
	Skip	n/a	n/a	Net	24,604k	GeoIP-database: GeoIP Lite (free) databases
	Skip	n/a	n/a	Debug	118k	GeoIP-debuginfo: Debug info for GeoIP
	Skip	n/a	n/a	Graphics	883k	GraphicsMagick: GraphicsMagick library
	Skip	n/a	n/a	Debug	3,504k	GraphicsMagick-debuginfo: Debug info for GraphicsMagick
	Skip	n/a	n/a	Graphics	146k	ImageMagick: Image processing suite (utilities)
	Skip	n/a	n/a	Debug	5,220k	ImageMagick-debuginfo: Debug info for ImageMagick
	Skip	n/a	n/a	Graphics	4,365k	ImageMagick-doc: Image processing suite (documentation)
	Skip	n/a	n/a	GNOME	84k	ORBit2: CORBA 2.4 Object Request Broker library
	Skip	n/a	n/a	Debug	802k	ORBit2-debuginfo: Debug info for ORBit2
	Skip	n/a	n/a	Graphics	946k	OpenColorIO: Color management for computer animation
	Skip	n/a	n/a	Debug	4,647k	OpenColorIO-debuginfo: Debug info for OpenColorIO
	Skip	n/a	n/a	Graphics	746k	OpenColorIO-doc: Color management for computer animation
	Skip	n/a	n/a	Text	314k	OpenSP: SGML parser utilities
	Skip	n/a	n/a	Debug	4,422k	OpenSP-debuginfo: Debug info for OpenSP
	Skip	n/a	n/a	Math, Science	39,203k	R: R Statistical computing language
	Skip	n/a	n/a	Debug	4,639k	R-debuginfo: Debug info for R
	Skip	n/a	n/a	Math	1k	R_autorebase: Incremental autorebase for R modules
	Skip	n/a	n/a	Debug	512k	SDL-debuginfo: Debug info for SDL
	Skip	n/a	n/a	Debug	1,458k	SDL2-debuginfo: Debug info for SDL2
	Skip	n/a	n/a	Debug	253k	SDL2_image-debuginfo: Debug info for SDL2_image
	Skip	n/a	n/a	Debug	222k	SDL2_mixer-debuginfo: Debug info for SDL2_mixer
	Skip	n/a	n/a	Debug	34k	SDL2_net-debuginfo: Debug info for SDL2_net
	Skip	n/a	n/a	Debug	50k	SDL2_ttf-debuginfo: Debug info for SDL2_ttf
	Skip	n/a	n/a	Debug	37k	SDL_Pango-debuginfo: Debug info for SDL_Pango
	Skip	n/a	n/a	Debug	154k	SDL_gfx-debuginfo: Debug info for SDL_gfx
	Skip	n/a	n/a	Debug	95k	SDL_image-debuginfo: Debug info for SDL_image
	Skip	n/a	n/a	Debug	226k	SDL_mixer-debuginfo: Debug info for SDL_mixer
	Skip	n/a	n/a	Debug	37k	SDL_net-debuginfo: Debug info for SDL_net
	Skip	n/a	n/a	Debug	202k	SDL_sound-debuginfo: Debug info for SDL_sound

8. Note the "*Search*" section beside "*View*", inside this box type the following:

- **gcc**: Expand the "***Devel***" tab and click on the icon that resembles an "*S*" for the "***gcc-core***", "***gcc-fortran***" and "***gcc-g++***" packages, an "x" will appear on the *bin* column

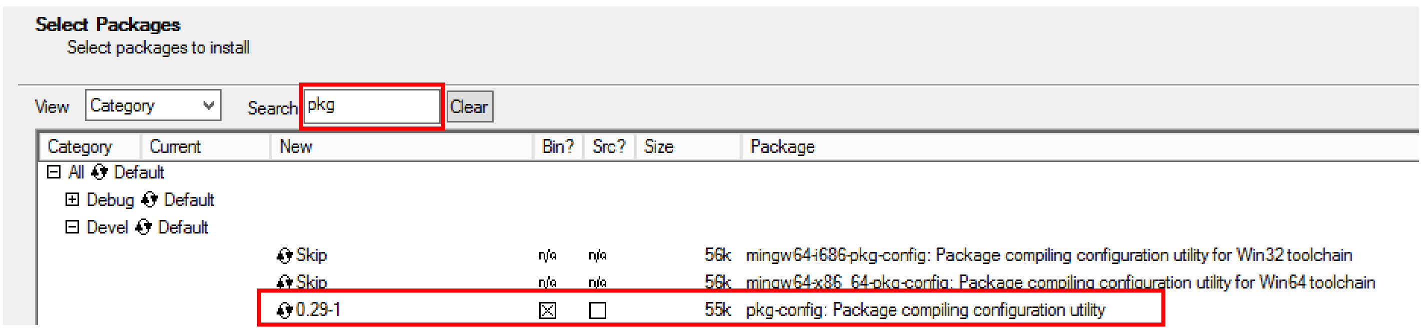


Select Packages
Select packages to install

View: Category — Search: gcc — Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Debug Default						
⊟ Devel Default						
		Skip	n/a	n/a	14k	colorgcc: Colorizer for GCC warning/error messages
		Skip	n/a	n/a	16,464k	cygwin32-gcc-core: GCC for Cygwin 32bit toolchain (C, OpenMP)
		Skip	n/a	n/a	7,014k	cygwin32-gcc-fortran: GCC for Cygwin 32bit toolchain (Fortran)
		Skip	n/a	n/a	10,456k	cygwin32-gcc-g++: GCC for Cygwin 32bit toolchain (C++)
		Skip	n/a	n/a	13,501k	djgpp-gcc-ada: GCC for DJGPP toolchain (Ada)
		Skip	n/a	n/a	7,926k	djgpp-gcc-core: GCC for DJGPP toolchain (C)
		Skip	n/a	n/a	6,296k	djgpp-gcc-fortran: GCC for DJGPP toolchain (Fortran)
		Skip	n/a	n/a	8,279k	djgpp-gcc-g++: GCC for DJGPP toolchain (C++)
		Skip	n/a	n/a	5,087k	djgpp-gcc-objc: GCC for DJGPP toolchain (Objective-C)
		Skip	n/a	n/a	5,349k	djgpp-gcc-objc++: GCC for DJGPP toolchain (Objective-C++)
		Skip	n/a	n/a	18,851k	gcc-ada: GNU Compiler Collection (Ada)
		Skip	n/a	n/a	279k	gcc-cilkplus: GNU Compiler Collection (Cilk Plus)
		7.3.0-3	☒	☐	18,708k	gcc-core: GNU Compiler Collection (C, OpenMP)
		7.3.0-3	☒	☐	7,972k	gcc-fortran: GNU Compiler Collection (Fortran)
		7.3.0-3	☒	☐	12,090k	gcc-g++: GNU Compiler Collection (C++)
		Skip	n/a	n/a	6,054k	gcc-objc: GNU Compiler Collection (Objective-C)
		Skip	n/a	n/a	6,329k	gcc-objc++: GNU Compiler Collection (Objective-C++)
		Skip	n/a	n/a	425k	gcc-tools-epoch1-autoconf: (gcc-special) automatic configure script builder
		Skip	n/a	n/a	419k	gcc-tools-epoch1-automake: (gcc-special) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	712k	gcc-tools-epoch2-autoconf: (gcc-special) automatic configure script builder
		Skip	n/a	n/a	589k	gcc-tools-epoch2-automake: (gcc-special) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	6k	gccmakedep: X Makefile dependency tool for GCC
		Skip	n/a	n/a	14,476k	mingw64-i686-gcc-core: GCC for Win32 (i686-w64-mingw32) toolchain (C, OpenMP)
		Skip	n/a	n/a	6,986k	mingw64-i686-gcc-fortran: GCC for Win32 (i686-w64-mingw32) toolchain (Fortran)
		Skip	n/a	n/a	10,525k	mingw64-i686-gcc-g++: GCC for Win32 (i686-w64-mingw32) toolchain (C++)
		Skip	n/a	n/a	11,703k	mingw64-i686-gcc-objc: GCC for Win32 (i686-w64-mingw32) toolchain (Objective-C,C++)
		Skip	n/a	n/a	14,921k	mingw64-x86_64-gcc-core: GCC for Win64 toolchain (C, OpenMP)
		Skip	n/a	n/a	7,222k	mingw64-x86_64-gcc-fortran: GCC for Win64 toolchain (Fortran)
		Skip	n/a	n/a	10,879k	mingw64-x86_64-gcc-g++: GCC for Win64 toolchain (C++)
		Skip	n/a	n/a	11,854k	mingw64-x86_64-gcc-objc: GCC for Win64 toolchain (Objective-C,C++)
⊞ Libs Default						
⊞ Perl Default						

- **pkg:** Same, as before, expand ***Devel*** tab, click on the "s" for the "***pkg-config***" package

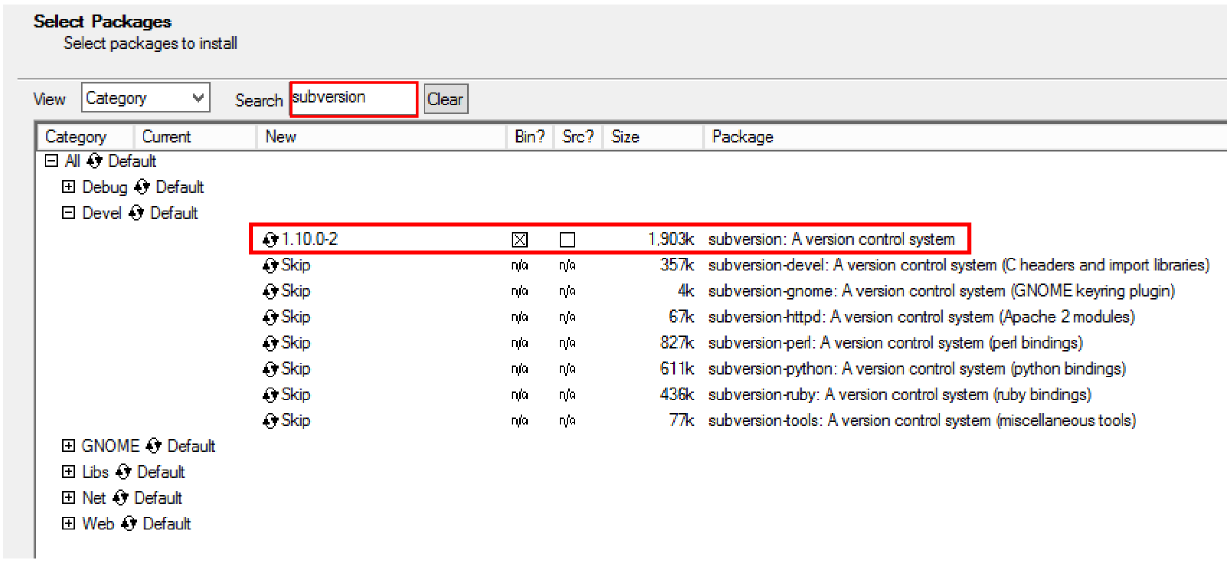


Select Packages
Select packages to install

View: Category — Search: pkg — Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Debug Default						
⊟ Devel Default						
		Skip	n/a	n/a	56k	mingw64-i686-pkg-config: Package compiling configuration utility for Win32 toolchain
		Skip	n/a	n/a	56k	mingw64-x86_64-pkg-config: Package compiling configuration utility for Win64 toolchain
		0.29-1	☒	☐	55k	pkg-config: Package compiling configuration utility

- **subversion**: Again, under the ***Devel*** tab, select *"**subversion**"*

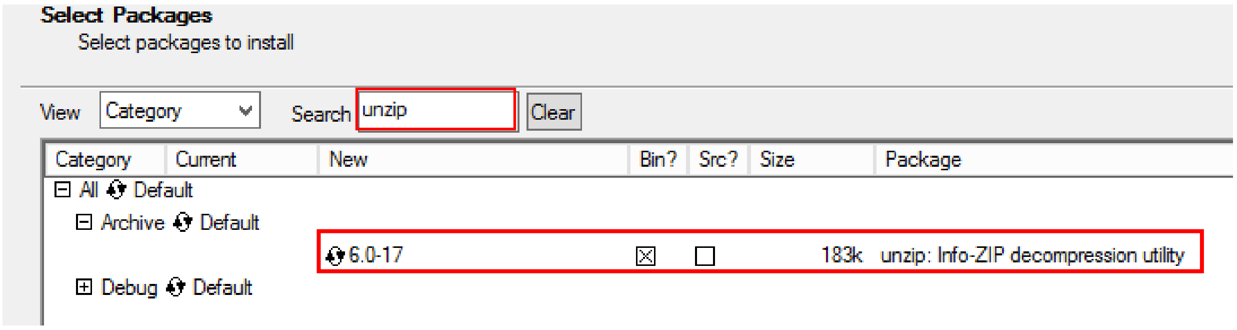


Select Packages
Select packages to install

View: Category | Search: subversion | Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Debug Default						
⊟ Devel Default						
		1.10.0-2	☒	☐	1,903k	subversion: A version control system
		Skip	n/a	n/a	357k	subversion-devel: A version control system (C headers and import libraries)
		Skip	n/a	n/a	4k	subversion-gnome: A version control system (GNOME keyring plugin)
		Skip	n/a	n/a	67k	subversion-httpd: A version control system (Apache 2 modules)
		Skip	n/a	n/a	827k	subversion-perl: A version control system (perl bindings)
		Skip	n/a	n/a	611k	subversion-python: A version control system (python bindings)
		Skip	n/a	n/a	436k	subversion-ruby: A version control system (ruby bindings)
		Skip	n/a	n/a	77k	subversion-tools: A version control system (miscellaneous tools)
⊞ GNOME Default						
⊞ Libs Default						
⊞ Net Default						
⊞ Web Default						

- **unzip:** On the ***Archive*** tab, select *"**unzip**"*

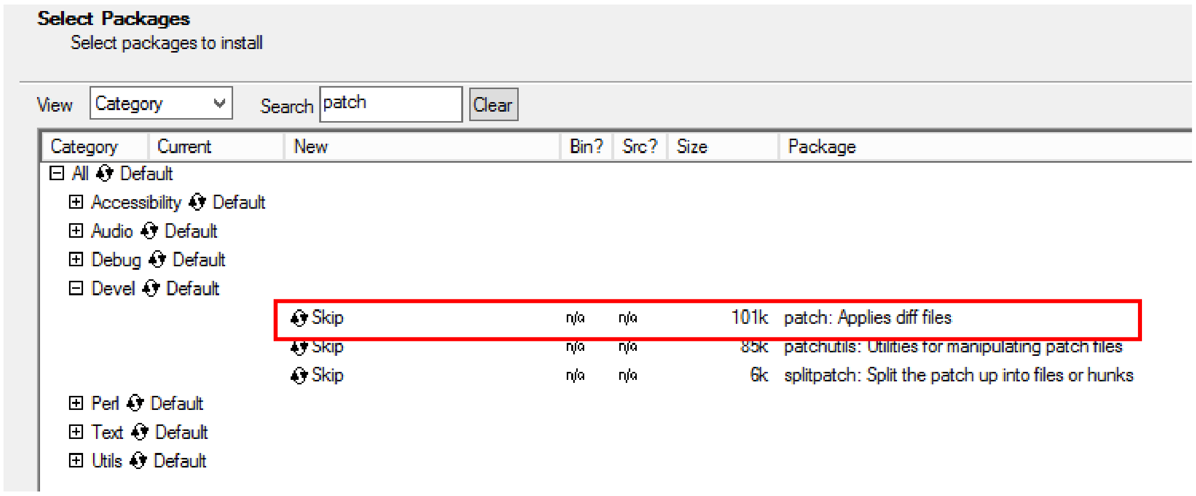


Select Packages
Select packages to install

View: Category | Search: unzip | Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊟ Archive Default						
		6.0-17	☒	☐	183k	unzip: Info-ZIP decompression utility
⊞ Debug Default						

- **patch:** On the ***Devel*** tab, select "***patch"***

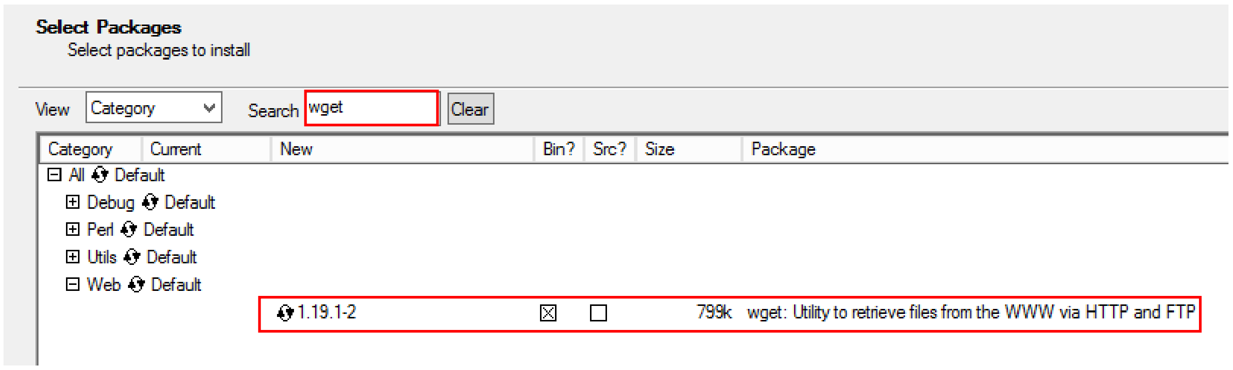


Select Packages
Select packages to install

View: Category | Search: patch | Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Accessibility Default						
⊞ Audio Default						
⊞ Debug Default						
⊟ Devel Default						
		Skip	n/a	n/a	101k	patch: Applies diff files
		Skip	n/a	n/a	85k	patchutils: Utilities for manipulating patch files
		Skip	n/a	n/a	6k	splitpatch: Split the patch up into files or hunks
⊞ Perl Default						
⊞ Text Default						
⊞ Utils Default						

- **wget:** Under the ***Web*** tab, select the ***"wget"*** package

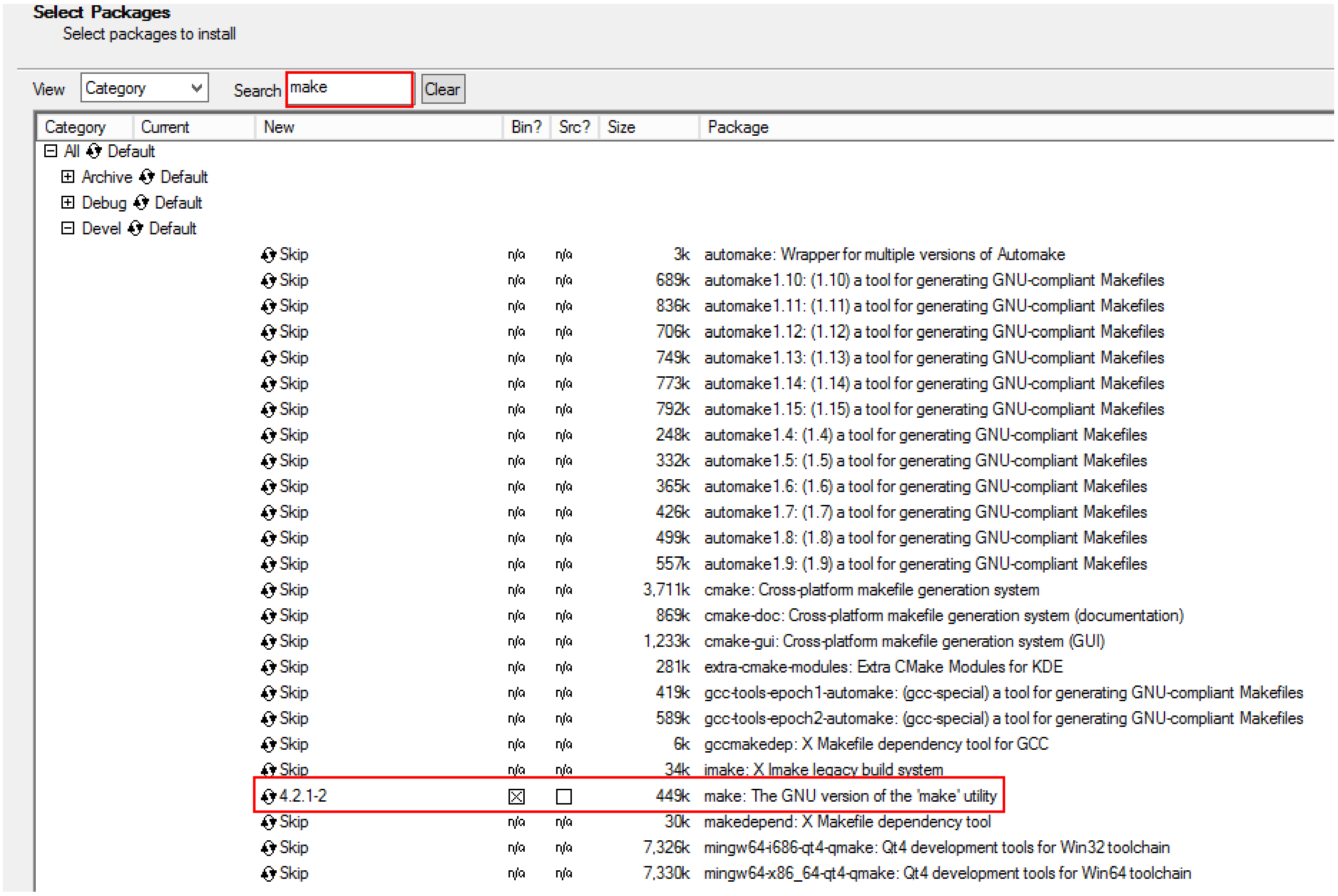


Select Packages
Select packages to install

View: Category Search: wget Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Debug Default						
⊞ Perl Default						
⊞ Utils Default						
⊟ Web Default						
		1.19.1-2	☒	☐	799k	wget: Utility to retrieve files from the WWW via HTTP and FTP

- **make:** Under the **Devel** tab, select ***"make"***. This package is one that will sometimes give problems, another section will explain the bugs that may appear when installing this package



Select Packages
Select packages to install

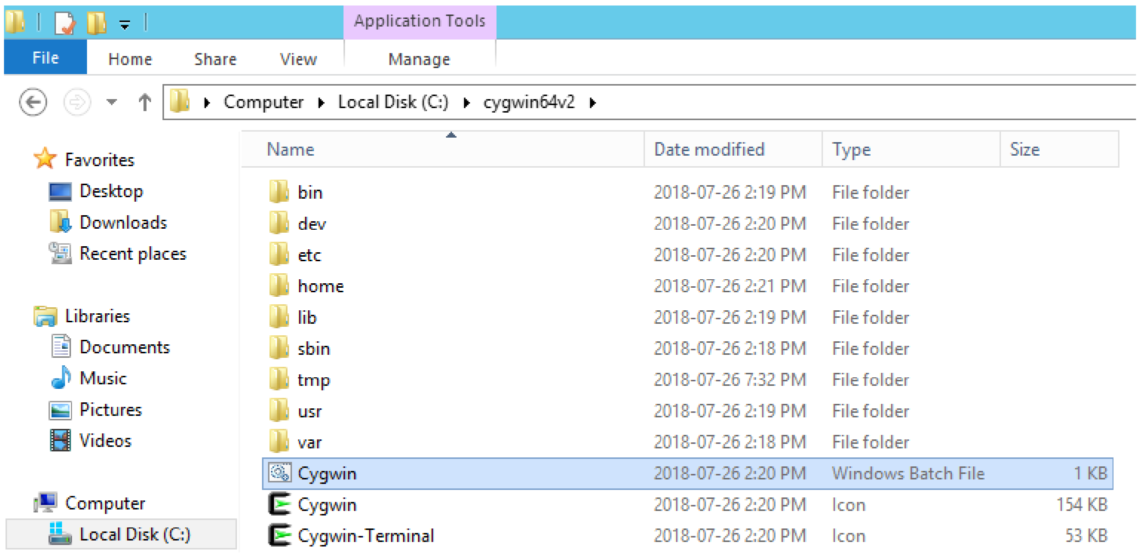
View: Category Search: make Clear

Category	Current	New	Bin?	Src?	Size	Package
⊟ All Default						
⊞ Archive Default						
⊞ Debug Default						
⊟ Devel Default						
		Skip	n/a	n/a	3k	automake: Wrapper for multiple versions of Automake
		Skip	n/a	n/a	689k	automake1.10: (1.10) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	836k	automake1.11: (1.11) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	706k	automake1.12: (1.12) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	749k	automake1.13: (1.13) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	773k	automake1.14: (1.14) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	792k	automake1.15: (1.15) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	248k	automake1.4: (1.4) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	332k	automake1.5: (1.5) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	365k	automake1.6: (1.6) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	426k	automake1.7: (1.7) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	499k	automake1.8: (1.8) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	557k	automake1.9: (1.9) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	3,711k	cmake: Cross-platform makefile generation system
		Skip	n/a	n/a	869k	cmake-doc: Cross-platform makefile generation system (documentation)
		Skip	n/a	n/a	1,233k	cmake-gui: Cross-platform makefile generation system (GUI)
		Skip	n/a	n/a	281k	extra-cmake-modules: Extra CMake Modules for KDE
		Skip	n/a	n/a	419k	gcc-tools-epoch1-automake: (gcc-special) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	589k	gcc-tools-epoch2-automake: (gcc-special) a tool for generating GNU-compliant Makefiles
		Skip	n/a	n/a	6k	gccmakedep: X Makefile dependency tool for GCC
		Skip	n/a	n/a	34k	imake: X Imake legacy build system
		4.2.1-2	☒	☐	449k	make: The GNU version of the 'make' utility
		Skip	n/a	n/a	30k	makedepend: X Makefile dependency tool
		Skip	n/a	n/a	7,326k	mingw64-i686-qt4-qmake: Qt4 development tools for Win32 toolchain
		Skip	n/a	n/a	7,330k	mingw64-x86_64-qt4-qmake: Qt4 development tools for Win64 toolchain

After selecting the packages mentioned previously, click ***"Next"*** to initialize the installation process.

Step 1.3: Verifying installation:

Once the installation is completed, go to your **install directory** (By default, *C:\cygwin64*), run *"Cygwin.bat"*, the main terminal will open.



Name	Date modified	Type	Size
bin	2018-07-26 2:19 PM	File folder	
dev	2018-07-26 2:20 PM	File folder	
etc	2018-07-26 2:20 PM	File folder	
home	2018-07-26 2:21 PM	File folder	
lib	2018-07-26 2:19 PM	File folder	
sbin	2018-07-26 2:18 PM	File folder	
tmp	2018-07-26 7:32 PM	File folder	
usr	2018-07-26 2:19 PM	File folder	
var	2018-07-26 2:18 PM	File folder	
Cygwin	2018-07-26 2:20 PM	Windows Batch File	1 KB
Cygwin	2018-07-26 2:20 PM	Icon	154 KB
Cygwin-Terminal	2018-07-26 2:20 PM	Icon	53 KB

To verify that the packages were all installed correctly, execute the following commands:

- **gcc --version** (Symbols before *"version"* are double dash "- -", without the blank space)
- **pkg-config –version**
- **svn --version:** For Subversion
- **unzip –version**
- **patch –version**
- **wget –version**
- **make –version:** Should this command not display anything, see the next subsection

The resulting prompt should be the terminal displaying the respective package information, should there be no output from the terminal, it means that something in the installation went wrong, try to delete the created directories and reinstall the program.

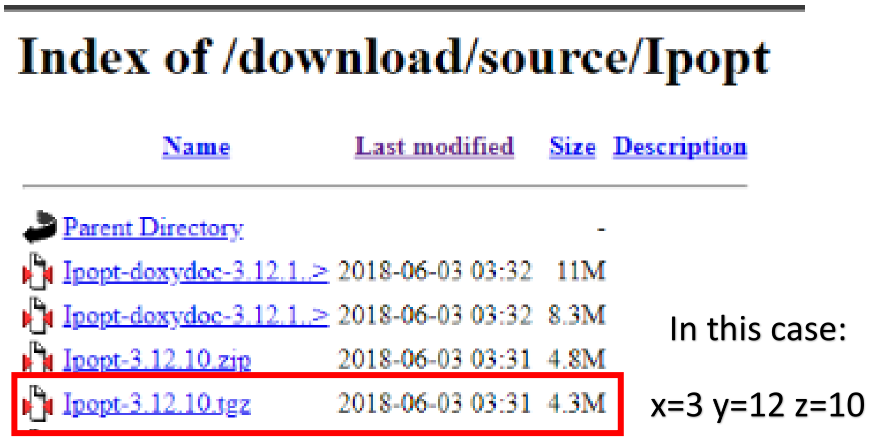
Step 1.3.1: make --version error

Should you be presented with the case where the command "make --version" does **not** display anything, try reinstalling. Follow the steps mentioned above, and verify functionality with make --version, most of the time this will fix the issue, should this not work:

1. Replace the *"make.exe"* executable located in the folder *C:\cygwin64\bin* with the one downloaded from: `http://www.cmake.org/files/cygwin/make.exe`
2. Verify the new executable by running *"make --version"* in the terminal
3. Should the previous step also fail, download another version of the executable: http://www.cmake.org/files/cygwin/make.exe-cygwin1.7, rename it to *"make.exe"* and place it in the *C:\cygwin64\bin* folder.
4. Verify the new executable by running *"make --version"* in the terminal

Step 2: Getting Ipopt code

1. From the following link, download the **most recent** Ipopt-x.y.z.tgz, where x.y.z is the version number: https://www.coin-or.org/download/source/Ipopt/?C=M;O=D

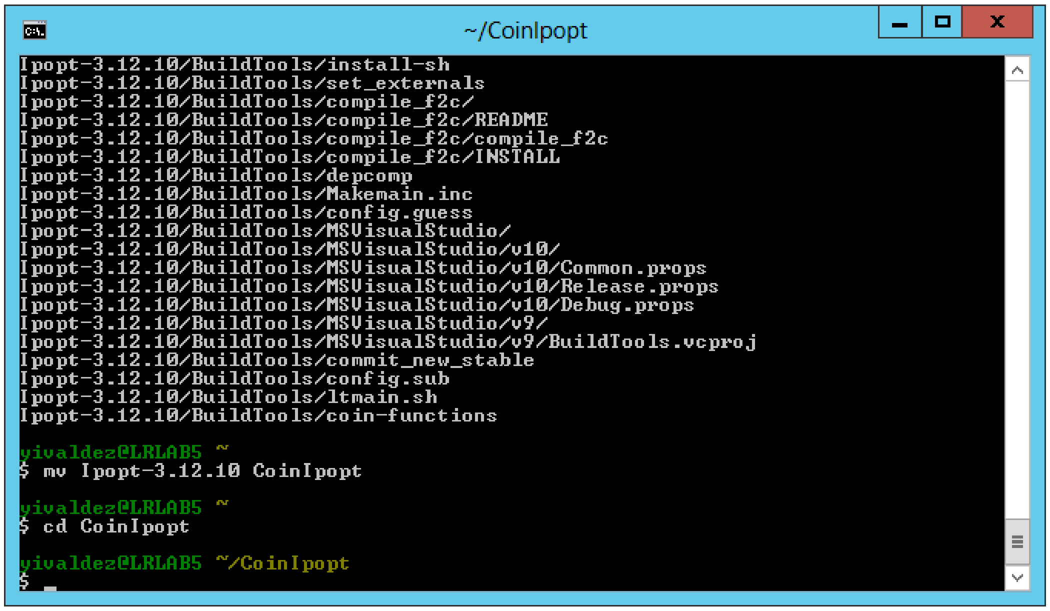


Index of /download/source/Ipopt

Name	Last modified	Size	Description
Parent Directory		-	
Ipopt-doxydoc-3.12.1..>	2018-06-03 03:32	11M	
Ipopt-doxydoc-3.12.1..>	2018-06-03 03:32	8.3M	
Ipopt-3.12.10.zip	2018-06-03 03:31	4.8M	
Ipopt-3.12.10.tgz	2018-06-03 03:31	4.3M	

2. Place the downloaded *Iopt-x.y.z.tgz* file into your **home** directory, located by default in the folder: *C:\cygwin64\home\usr\* where *usr* is your user name.

3. Inside the terminal, run the following commands:
   a. **gunzip Ipopt-x.y.z.tgz:** Will unpack the *tgz* file into a *tar* file
   b. **tar xvf Ipopt-x.y.z.tar:** Will unpack the *tar* file into a folder named *Ipopt-x.y.z*, **note *xvf*** is a parameter, do not replace the *x* in *xvf* with the version number
   c. **mv Ipopt-x.y.z CoinIpopt:** Will rename the folder to *CoinIpopt*
   d. **cd CoinIpopt:** Will change the current **working directory** of the terminal into the recently renamed *CoinIpopt* folder

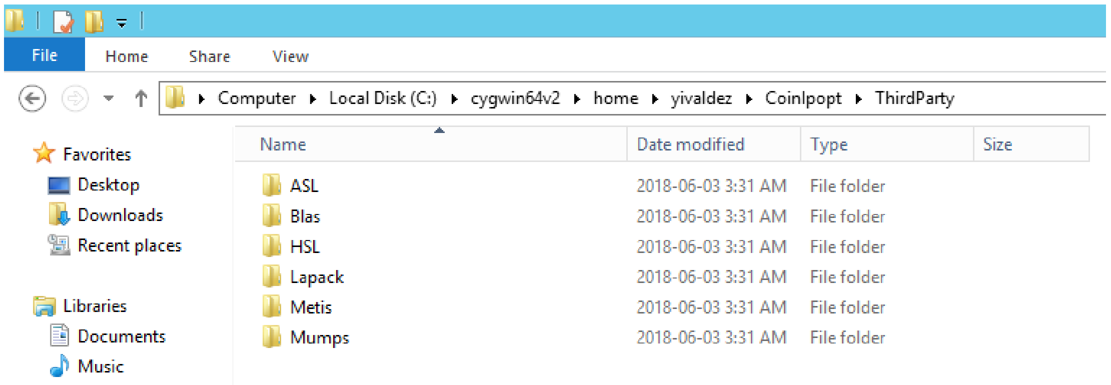


```
Ipopt-3.12.10/BuildTools/install-sh
Ipopt-3.12.10/BuildTools/set_externals
Ipopt-3.12.10/BuildTools/compile_f2c/
Ipopt-3.12.10/BuildTools/compile_f2c/README
Ipopt-3.12.10/BuildTools/compile_f2c/compile_f2c
Ipopt-3.12.10/BuildTools/compile_f2c/INSTALL
Ipopt-3.12.10/BuildTools/depcomp
Ipopt-3.12.10/BuildTools/Makemain.inc
Ipopt-3.12.10/BuildTools/config.guess
Ipopt-3.12.10/BuildTools/MSVisualStudio/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Common.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Release.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Debug.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v9/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v9/BuildTools.vcproj
Ipopt-3.12.10/BuildTools/commit_new_stable
Ipopt-3.12.10/BuildTools/config.sub
Ipopt-3.12.10/BuildTools/ltmain.sh
Ipopt-3.12.10/BuildTools/coin-functions

yivaldez@LRLAB5 ~
$ mv Ipopt-3.12.10 CoinIpopt

yivaldez@LRLAB5 ~
$ cd CoinIpopt

yivaldez@LRLAB5 ~/CoinIpopt
$ _
```

Step 3: Obtaining Ipopt's Third Party Software

Ipopt has some dependencies that due to their licensing, are **not** able to be included with Ipopt's code. You will need to download them individually.

Navigate to the third-party software folder, located in: *C:\cygwin64\home\usr\CoinIpopt\ThirdParty* these are the packages that need to be installed.

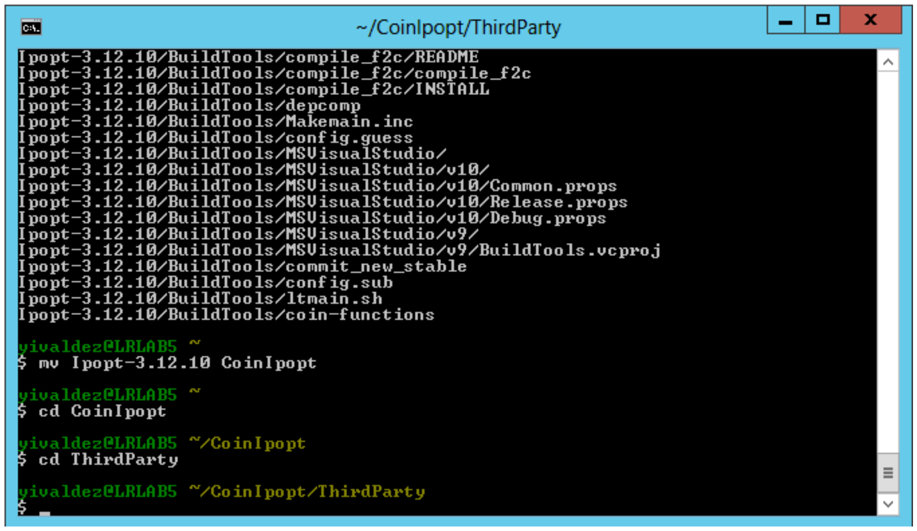

File
Home
Share
View
Computer ▸ Local Disk (C:) ▸ cygwin64v2 ▸ home ▸ yivaldez ▸ CoinIpopt ▸ ThirdParty
Favorites
Desktop
Downloads
Recent places
Libraries
Documents
Music

Name	Date modified	Type	Size
ASL	2018-06-03 3:31 AM	File folder	
Blas	2018-06-03 3:31 AM	File folder	
HSL	2018-06-03 3:31 AM	File folder	
Lapack	2018-06-03 3:31 AM	File folder	
Metis	2018-06-03 3:31 AM	File folder	
Mumps	2018-06-03 3:31 AM	File folder	

Step 3.1: Installing ASL (AMPL Solver Library):

This is an essential package to interface with *pyomo*. In the terminal, run the following commands:

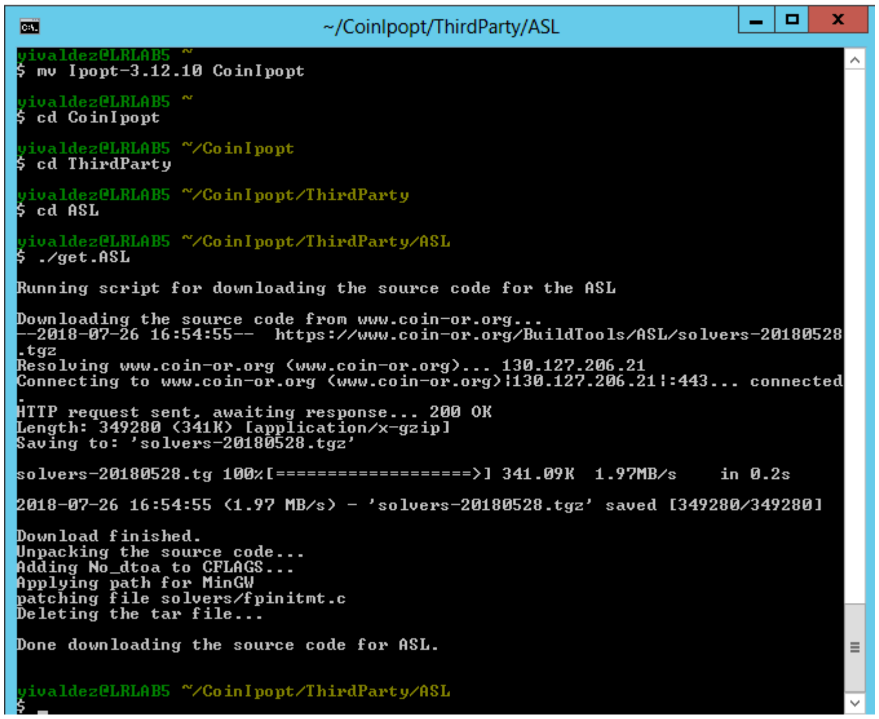
a. **cd ThirdParty**: Change the working directory to the "***ThirdParty***" folder (previous working directory was *CoinIpopt*)



```
Ipopt-3.12.10/BuildTools/compile_f2c/README
Ipopt-3.12.10/BuildTools/compile_f2c/compile_f2c
Ipopt-3.12.10/BuildTools/compile_f2c/INSTALL
Ipopt-3.12.10/BuildTools/depcomp
Ipopt-3.12.10/BuildTools/Makemain.inc
Ipopt-3.12.10/BuildTools/config.guess
Ipopt-3.12.10/BuildTools/MSVisualStudio/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Common.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Release.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v10/Debug.props
Ipopt-3.12.10/BuildTools/MSVisualStudio/v9/
Ipopt-3.12.10/BuildTools/MSVisualStudio/v9/BuildTools.vcproj
Ipopt-3.12.10/BuildTools/commit_new_stable
Ipopt-3.12.10/BuildTools/config.sub
Ipopt-3.12.10/BuildTools/ltmain.sh
Ipopt-3.12.10/BuildTools/coin-functions

yivaldez@LRLAB5 ~
$ mv Ipopt-3.12.10 CoinIpopt

yivaldez@LRLAB5 ~
$ cd CoinIpopt

yivaldez@LRLAB5 ~/CoinIpopt
$ cd ThirdParty

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty
$ _
```

b. **cd ASL:** Change the working directory to the "***ASL***" folder

c. **./get.ASL:** Executes a script that uses *wget* to obtain the code for ASL



```
yivaldez@LRLAB5 ~
$ mv Ipopt-3.12.10 CoinIpopt

yivaldez@LRLAB5 ~
$ cd CoinIpopt

yivaldez@LRLAB5 ~/CoinIpopt
$ cd ThirdParty

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty
$ cd ASL

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty/ASL
$ ./get.ASL

Running script for downloading the source code for the ASL

Downloading the source code from www.coin-or.org...
--2018-07-26 16:54:55--  https://www.coin-or.org/BuildTools/ASL/solvers-20180528
.tgz
Resolving www.coin-or.org (www.coin-or.org)... 130.127.206.21
Connecting to www.coin-or.org (www.coin-or.org)|130.127.206.21|:443... connected
.
HTTP request sent, awaiting response... 200 OK
Length: 349280 (341K) [application/x-gzip]
Saving to: 'solvers-20180528.tgz'

solvers-20180528.tg 100%[==================>] 341.09K  1.97MB/s    in 0.2s

2018-07-26 16:54:55 (1.97 MB/s) - 'solvers-20180528.tgz' saved [349280/349280]

Download finished.
Unpacking the source code...
Adding No_dtoa to CFLAGS...
Applying path for MinGW
patching file solvers/fpinitmt.c
Deleting the tar file...

Done downloading the source code for ASL.


yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty/ASL
$ _
```

d. **cd ..:** Returns to the *ThirdParty* folder (cd followed by a space and two dots)

Step 3.2: Installing BLAS (Linear algebra operations subprograms):

In the terminal (*ThirdParty* is working directory), run the following commands:

a. **cd BLAS:** Change the working directory to the "***BLAS***" folder
b. **./get.BLAS:** Executes a script that uses *wget* to obtain the code for BLAS
c. **cd ..:** Returns to the *ThirdParty* folder

Step 3.3: Installing Lapack (Linear algebra subroutines):

In the terminal, run the following commands:

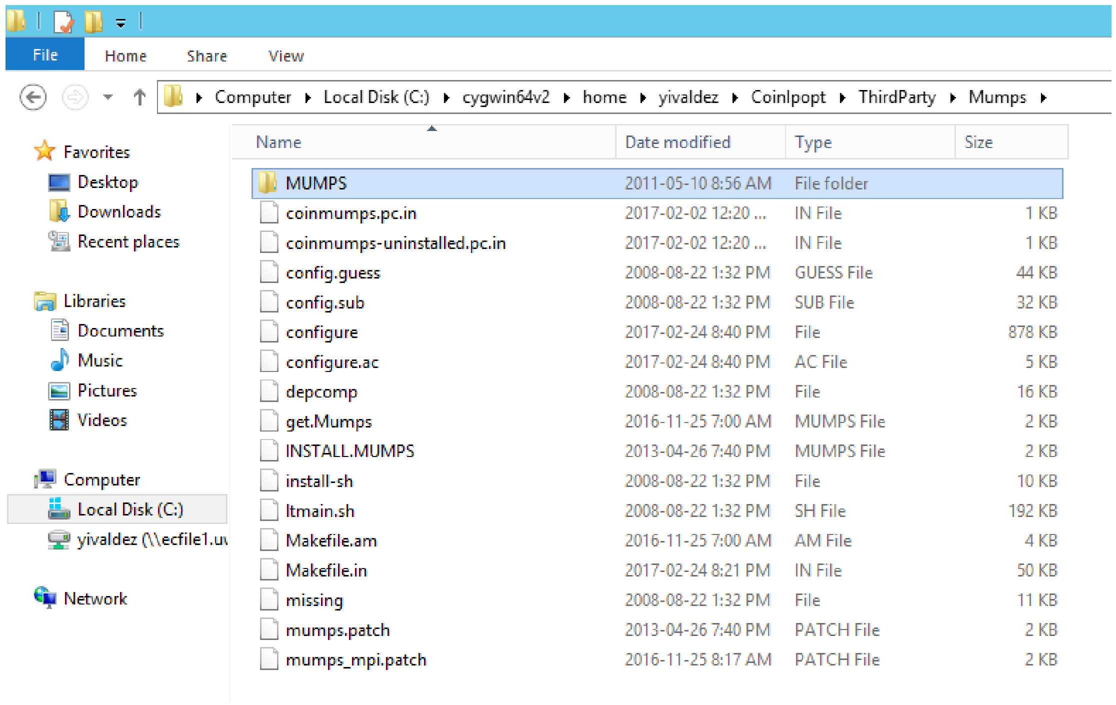
a. **cd Lapack:** Change the working directory to the "***Lapack***" folder
b. **./get.Lapack:** Executes a script that uses *wget* to obtain the code for Lapack
c. **cd ..:** Returns to the *ThirdParty* folder

Step 3.4: Installing Mumps (Conventional linear problem solver):

In the terminal, run the following commands:

a. **cd Mumps:** Change the working directory to the "***Mumps***" folder
b. **./get.Mumps:** Executes a script that uses *wget* to obtain the code for Mumps
c. **cd ..:** Return to the *ThirdParty* folder

Note: Sometimes the renaming of the created folder will not work, just to make sure, verify that inside this directory: *C:\cygwin64\home\usr\CoinIpopt\ThirdParty\Mumps* there exists a folder called *"MUMPS"*



Computer ▸ Local Disk (C:) ▸ cygwin64v2 ▸ home ▸ yivaldez ▸ CoinIpopt ▸ ThirdParty ▸ Mumps ▸

Name	Date modified	Type	Size
MUMPS	2011-05-10 8:56 AM	File folder	
coinmumps.pc.in	2017-02-02 12:20 ...	IN File	1 KB
coinmumps-uninstalled.pc.in	2017-02-02 12:20 ...	IN File	1 KB
config.guess	2008-08-22 1:32 PM	GUESS File	44 KB
config.sub	2008-08-22 1:32 PM	SUB File	32 KB
configure	2017-02-24 8:40 PM	File	878 KB
configure.ac	2017-02-24 8:40 PM	AC File	5 KB
depcomp	2008-08-22 1:32 PM	File	16 KB
get.Mumps	2016-11-25 7:00 AM	MUMPS File	2 KB
INSTALL.MUMPS	2013-04-26 7:40 PM	MUMPS File	2 KB
install-sh	2008-08-22 1:32 PM	File	10 KB
ltmain.sh	2008-08-22 1:32 PM	SH File	192 KB
Makefile.am	2016-11-25 7:00 AM	AM File	4 KB
Makefile.in	2017-02-24 8:21 PM	IN File	50 KB
missing	2008-08-22 1:32 PM	File	11 KB
mumps.patch	2013-04-26 7:40 PM	PATCH File	2 KB
mumps_mpi.patch	2016-11-25 8:17 AM	PATCH File	2 KB

Step 2.5: Installing Metis (Matrix Ordering Algorithm):

In the terminal, run the following commands:

a. **cd Metis:** Change the working directory to the "***Metis***" folder
b. **./get.Metis:** Executes a script that uses *wget* to obtain the code for Metis
c. **cd ..:** Return to the *ThirdParty* folder

Step 2.6: Installing the HSL solvers:

Last but not least, the HSL solvers need to be acquired through this site:

http://www.hsl.rl.ac.uk/download/coinhsl/2015.06.23/

Where you will fill out a form requesting academic permission to use these linear solvers (MA27, MA57, MA97, etc.), you should get an answer within a day or two. Attached to the mail will be a download link to two files, a rar and a *tar*

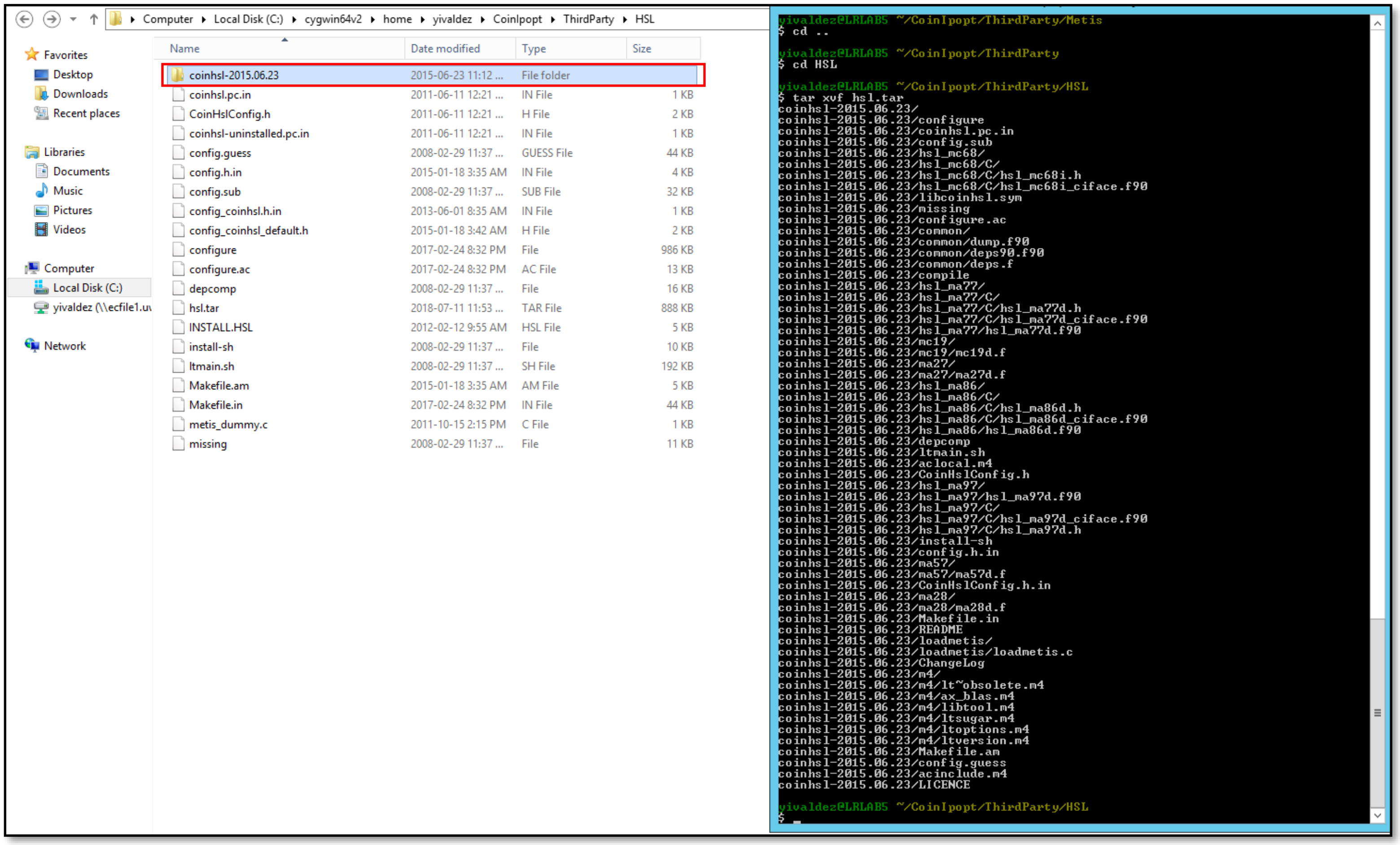
Download and rename the provided *tar* file to ***hsl.tar*** and place it in the following directory:

C:\cygwin64\home\usr\CoinIpopt\ThirdParty\HSL

In the terminal, run the following commands (current working directory should be *ThirdParty*):

a. **cd HSL:** Change the working directory to the "**HSL**" folder

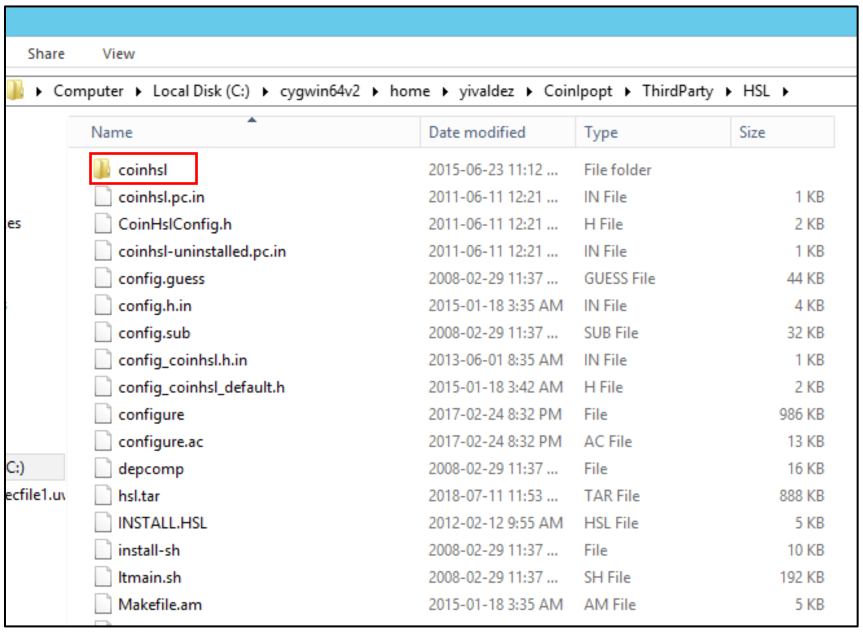
b. **tar xvf hsl.tar:** Extracts contents of the *tar* file into the *HSL* folder



Name	Date modified	Type	Size
coinhsl-2015.06.23	2015-06-23 11:12 ...	File folder	
coinhsl.pc.in	2011-06-11 12:21 ...	IN File	1 KB
CoinHslConfig.h	2011-06-11 12:21 ...	H File	2 KB
coinhsl-uninstalled.pc.in	2011-06-11 12:21 ...	IN File	1 KB
config.guess	2008-02-29 11:37 ...	GUESS File	44 KB
config.h.in	2015-01-18 3:35 AM	IN File	4 KB
config.sub	2008-02-29 11:37 ...	SUB File	32 KB
config_coinhsl.h.in	2013-06-01 8:35 AM	IN File	1 KB
config_coinhsl_default.h	2015-01-18 3:42 AM	H File	2 KB
configure	2017-02-24 8:32 PM	File	986 KB
configure.ac	2017-02-24 8:32 PM	AC File	13 KB
depcomp	2008-02-29 11:37 ...	File	16 KB
hsl.tar	2018-07-11 11:53 ...	TAR File	888 KB
INSTALL.HSL	2012-02-12 9:55 AM	HSL File	5 KB
install-sh	2008-02-29 11:37 ...	File	10 KB
ltmain.sh	2008-02-29 11:37 ...	SH File	192 KB
Makefile.am	2015-01-18 3:35 AM	AM File	5 KB
Makefile.in	2017-02-24 8:32 PM	IN File	44 KB
metis_dummy.c	2011-10-15 2:15 PM	C File	1 KB
missing	2008-02-29 11:37 ...	File	11 KB

```
yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty/Metis
$ cd ..

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty
$ cd HSL

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty/HSL
$ tar xvf hsl.tar
coinhsl-2015.06.23/
coinhsl-2015.06.23/configure
coinhsl-2015.06.23/coinhsl.pc.in
coinhsl-2015.06.23/config.sub
coinhsl-2015.06.23/hsl_mc68/
coinhsl-2015.06.23/hsl_mc68/C/
coinhsl-2015.06.23/hsl_mc68/C/hsl_mc68i.h
coinhsl-2015.06.23/hsl_mc68/C/hsl_mc68i_ciface.f90
coinhsl-2015.06.23/libcoinhsl.sym
coinhsl-2015.06.23/missing
coinhsl-2015.06.23/configure.ac
coinhsl-2015.06.23/common/
coinhsl-2015.06.23/common/dump.f90
coinhsl-2015.06.23/common/deps90.f90
coinhsl-2015.06.23/common/deps.f
coinhsl-2015.06.23/compile
coinhsl-2015.06.23/hsl_ma77/
coinhsl-2015.06.23/hsl_ma77/C/
coinhsl-2015.06.23/hsl_ma77/C/hsl_ma77d.h
coinhsl-2015.06.23/hsl_ma77/C/hsl_ma77d_ciface.f90
coinhsl-2015.06.23/hsl_ma77/hsl_ma77d.f90
coinhsl-2015.06.23/mc19/
coinhsl-2015.06.23/mc19/mc19d.f
coinhsl-2015.06.23/ma27/
coinhsl-2015.06.23/ma27/ma27d.f
coinhsl-2015.06.23/hsl_ma86/
coinhsl-2015.06.23/hsl_ma86/C/
coinhsl-2015.06.23/hsl_ma86/C/hsl_ma86d.h
coinhsl-2015.06.23/hsl_ma86/C/hsl_ma86d_ciface.f90
coinhsl-2015.06.23/hsl_ma86/hsl_ma86d.f90
coinhsl-2015.06.23/depcomp
coinhsl-2015.06.23/ltmain.sh
coinhsl-2015.06.23/aclocal.m4
coinhsl-2015.06.23/CoinHslConfig.h
coinhsl-2015.06.23/hsl_ma97/
coinhsl-2015.06.23/hsl_ma97/hsl_ma97d.f90
coinhsl-2015.06.23/hsl_ma97/C/
coinhsl-2015.06.23/hsl_ma97/C/hsl_ma97d_ciface.f90
coinhsl-2015.06.23/hsl_ma97/C/hsl_ma97d.h
coinhsl-2015.06.23/install-sh
coinhsl-2015.06.23/config.h.in
coinhsl-2015.06.23/ma57/
coinhsl-2015.06.23/ma57/ma57d.f
coinhsl-2015.06.23/CoinHslConfig.h.in
coinhsl-2015.06.23/ma28/
coinhsl-2015.06.23/ma28/ma28d.f
coinhsl-2015.06.23/Makefile.in
coinhsl-2015.06.23/README
coinhsl-2015.06.23/loadmetis/
coinhsl-2015.06.23/loadmetis/loadmetis.c
coinhsl-2015.06.23/ChangeLog
coinhsl-2015.06.23/m4/
coinhsl-2015.06.23/m4/lt~obsolete.m4
coinhsl-2015.06.23/m4/ax_blas.m4
coinhsl-2015.06.23/m4/libtool.m4
coinhsl-2015.06.23/m4/ltsugar.m4
coinhsl-2015.06.23/m4/ltoptions.m4
coinhsl-2015.06.23/m4/ltversion.m4
coinhsl-2015.06.23/Makefile.am
coinhsl-2015.06.23/config.guess
coinhsl-2015.06.23/acinclude.m4
coinhsl-2015.06.23/LICENCE

yivaldez@LRLAB5 ~/CoinIpopt/ThirdParty/HSL
$ _
```

c. **Rename extracted folder:** Rename the created folder, in this case "*coinhsl-2015.06.23*" to "***coinhsl***"

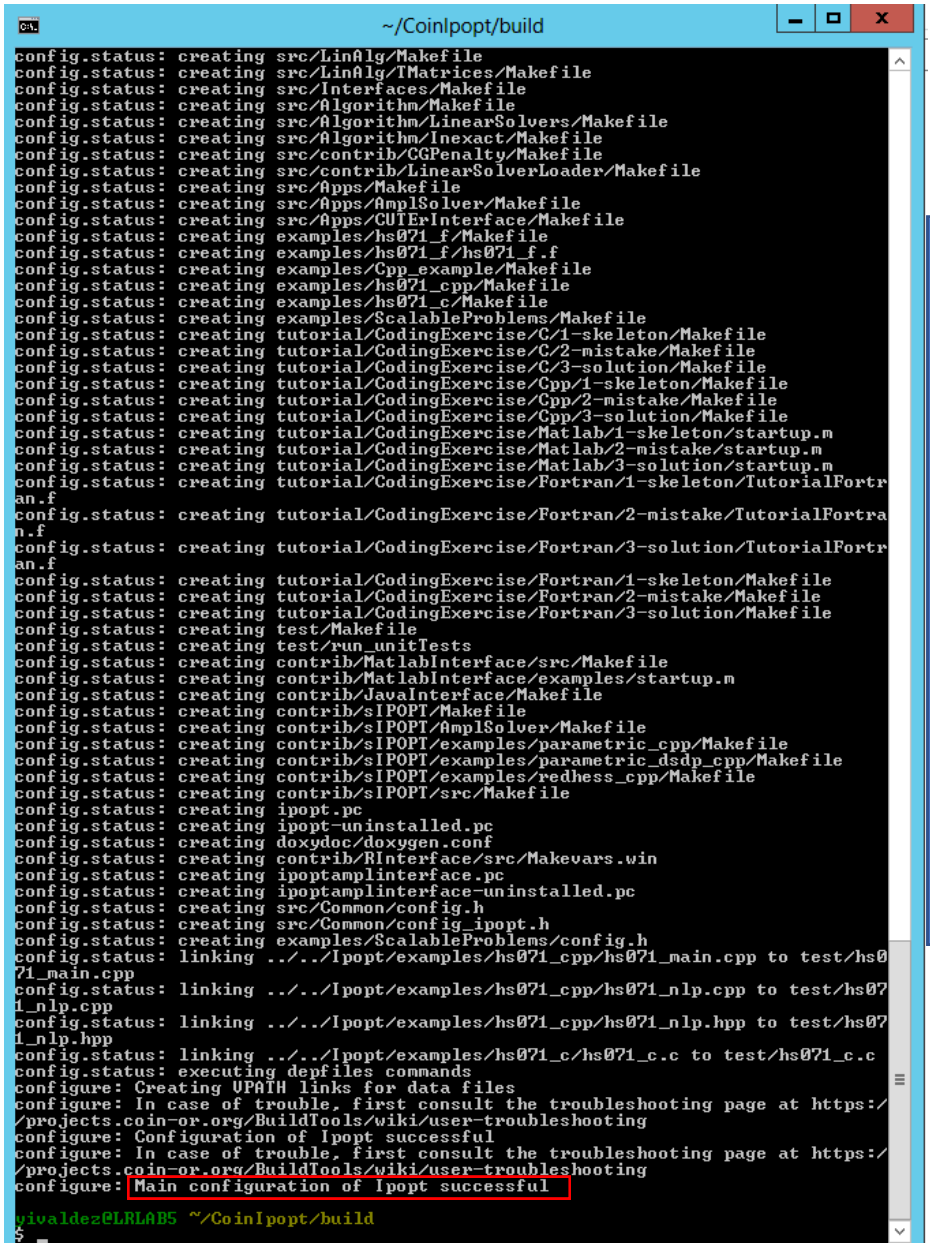

Share
View
Computer ▸ Local Disk (C:) ▸ cygwin64v2 ▸ home ▸ yivaldez ▸ CoinIpopt ▸ ThirdParty ▸ HSL ▸
es
C:)
ecfile1.u

Name	Date modified	Type	Size
coinhsl	2015-06-23 11:12 ...	File folder	
coinhsl.pc.in	2011-06-11 12:21 ...	IN File	1 KB
CoinHslConfig.h	2011-06-11 12:21 ...	H File	2 KB
coinhsl-uninstalled.pc.in	2011-06-11 12:21 ...	IN File	1 KB
config.guess	2008-02-29 11:37 ...	GUESS File	44 KB
config.h.in	2015-01-18 3:35 AM	IN File	4 KB
config.sub	2008-02-29 11:37 ...	SUB File	32 KB
config_coinhsl.h.in	2013-06-01 8:35 AM	IN File	1 KB
config_coinhsl_default.h	2015-01-18 3:42 AM	H File	2 KB
configure	2017-02-24 8:32 PM	File	986 KB
configure.ac	2017-02-24 8:32 PM	AC File	13 KB
depcomp	2008-02-29 11:37 ...	File	16 KB
hsl.tar	2018-07-11 11:53 ...	TAR File	888 KB
INSTALL.HSL	2012-02-12 9:55 AM	HSL File	5 KB
install-sh	2008-02-29 11:37 ...	File	10 KB
ltmain.sh	2008-02-29 11:37 ...	SH File	192 KB
Makefile.am	2015-01-18 3:35 AM	AM File	5 KB

Step 4: Compilation of Ipopt’s code

Change working directory to *CoinIpot* (*cd ..* then *cd..* from the *HSL* folder) to run the following commands:

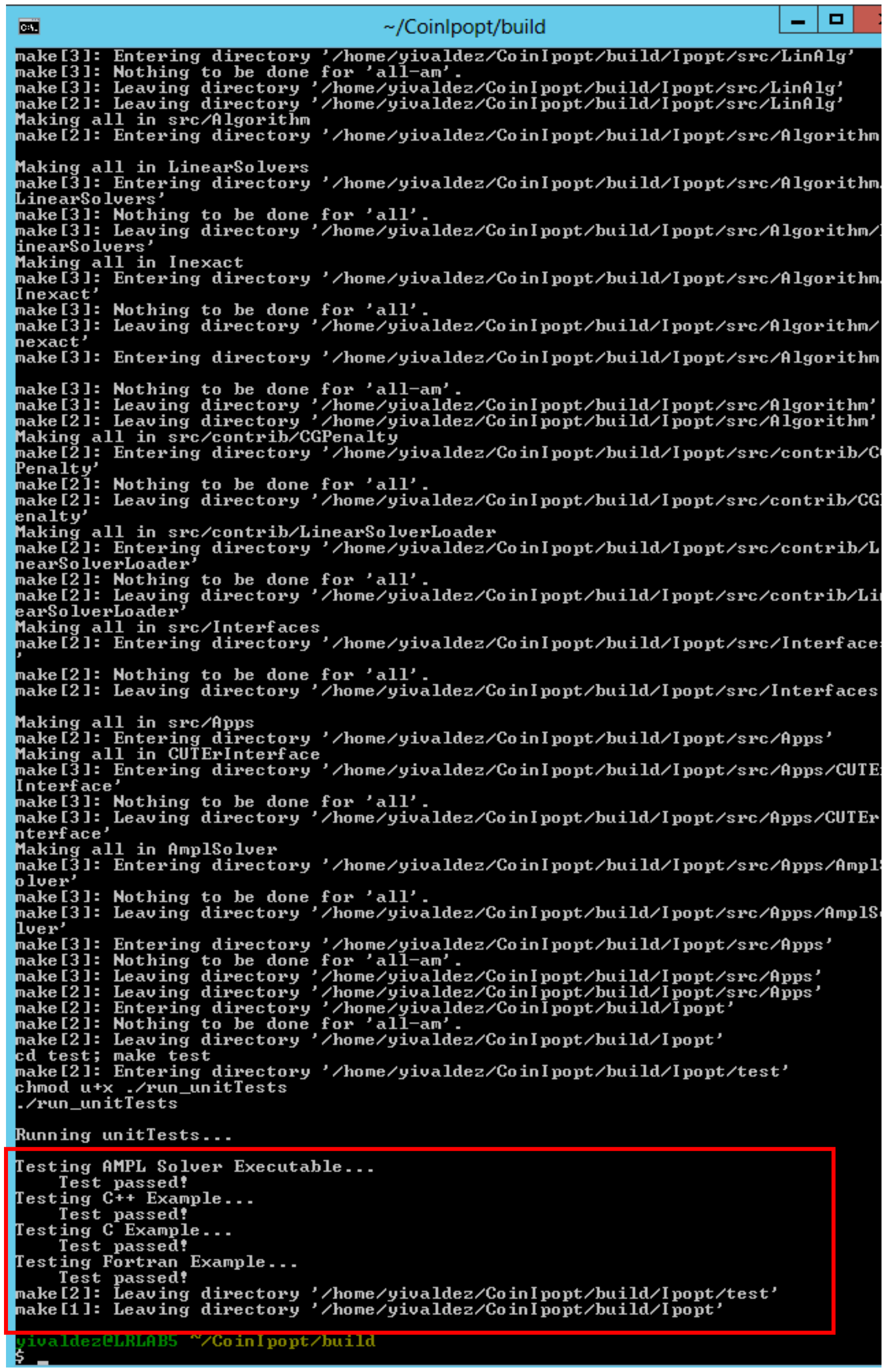
1. **mkdir build:** Will create the folder “*build*” inside *CoinIpopt* directory
2. **cd build:** Change current working directory to the newly created folder
3. **../configure:** Will run the “*configure”* script located in *CoinIpopt* folder and dump results in *build*. The script will verify the integrity of every code needed to compile, including the third-party packages. If the last output is *“configure: Main configuration of Ipopt successful”*, then you are ready to compile. Depending on your machine’s processor speed, running this script may take a while (~3 mins on a i7 7700HQ, ~40 mins on lrlab5 servers).



```
config.status: creating src/LinAlg/Makefile
config.status: creating src/LinAlg/TMatrices/Makefile
config.status: creating src/Interfaces/Makefile
config.status: creating src/Algorithm/Makefile
config.status: creating src/Algorithm/LinearSolvers/Makefile
config.status: creating src/Algorithm/Inexact/Makefile
config.status: creating src/contrib/CGPenalty/Makefile
config.status: creating src/contrib/LinearSolverLoader/Makefile
config.status: creating src/Apps/Makefile
config.status: creating src/Apps/AmplSolver/Makefile
config.status: creating src/Apps/CUTErInterface/Makefile
config.status: creating examples/hs071_f/Makefile
config.status: creating examples/hs071_f/hs071_f.f
config.status: creating examples/Cpp_example/Makefile
config.status: creating examples/hs071_cpp/Makefile
config.status: creating examples/hs071_c/Makefile
config.status: creating examples/ScalableProblems/Makefile
config.status: creating tutorial/CodingExercise/C/1-skeleton/Makefile
config.status: creating tutorial/CodingExercise/C/2-mistake/Makefile
config.status: creating tutorial/CodingExercise/C/3-solution/Makefile
config.status: creating tutorial/CodingExercise/Cpp/1-skeleton/Makefile
config.status: creating tutorial/CodingExercise/Cpp/2-mistake/Makefile
config.status: creating tutorial/CodingExercise/Cpp/3-solution/Makefile
config.status: creating tutorial/CodingExercise/Matlab/1-skeleton/startup.m
config.status: creating tutorial/CodingExercise/Matlab/2-mistake/startup.m
config.status: creating tutorial/CodingExercise/Matlab/3-solution/startup.m
config.status: creating tutorial/CodingExercise/Fortran/1-skeleton/TutorialFortr
an.f
config.status: creating tutorial/CodingExercise/Fortran/2-mistake/TutorialFortra
n.f
config.status: creating tutorial/CodingExercise/Fortran/3-solution/TutorialFortr
an.f
config.status: creating tutorial/CodingExercise/Fortran/1-skeleton/Makefile
config.status: creating tutorial/CodingExercise/Fortran/2-mistake/Makefile
config.status: creating tutorial/CodingExercise/Fortran/3-solution/Makefile
config.status: creating test/Makefile
config.status: creating test/run_unitTests
config.status: creating contrib/MatlabInterface/src/Makefile
config.status: creating contrib/MatlabInterface/examples/startup.m
config.status: creating contrib/JavaInterface/Makefile
config.status: creating contrib/sIPOPT/Makefile
config.status: creating contrib/sIPOPT/AmplSolver/Makefile
config.status: creating contrib/sIPOPT/examples/parametric_cpp/Makefile
config.status: creating contrib/sIPOPT/examples/parametric_dsdp_cpp/Makefile
config.status: creating contrib/sIPOPT/examples/redhess_cpp/Makefile
config.status: creating contrib/sIPOPT/src/Makefile
config.status: creating ipopt.pc
config.status: creating ipopt-uninstalled.pc
config.status: creating doxydoc/doxygen.conf
config.status: creating contrib/RInterface/src/Makevars.win
config.status: creating ipoptamplinterface.pc
config.status: creating ipoptamplinterface-uninstalled.pc
config.status: creating src/Common/config.h
config.status: creating src/Common/config_ipopt.h
config.status: creating examples/ScalableProblems/config.h
config.status: linking ../../Ipopt/examples/hs071_cpp/hs071_main.cpp to test/hs0
71_main.cpp
config.status: linking ../../Ipopt/examples/hs071_cpp/hs071_nlp.cpp to test/hs07
1_nlp.cpp
config.status: linking ../../Ipopt/examples/hs071_cpp/hs071_nlp.hpp to test/hs07
1_nlp.hpp
config.status: linking ../../Ipopt/examples/hs071_c/hs071_c.c to test/hs071_c.c
config.status: executing depfiles commands
configure: Creating VPATH links for data files
configure: In case of trouble, first consult the troubleshooting page at https:/
/projects.coin-or.org/BuildTools/wiki/user-troubleshooting
configure: Configuration of Ipopt successful
configure: In case of trouble, first consult the troubleshooting page at https:/
/projects.coin-or.org/BuildTools/wiki/user-troubleshooting
configure: Main configuration of Ipopt successful

yivaldez@LRLAB5 ~/CoinIpopt/build
$ 
```

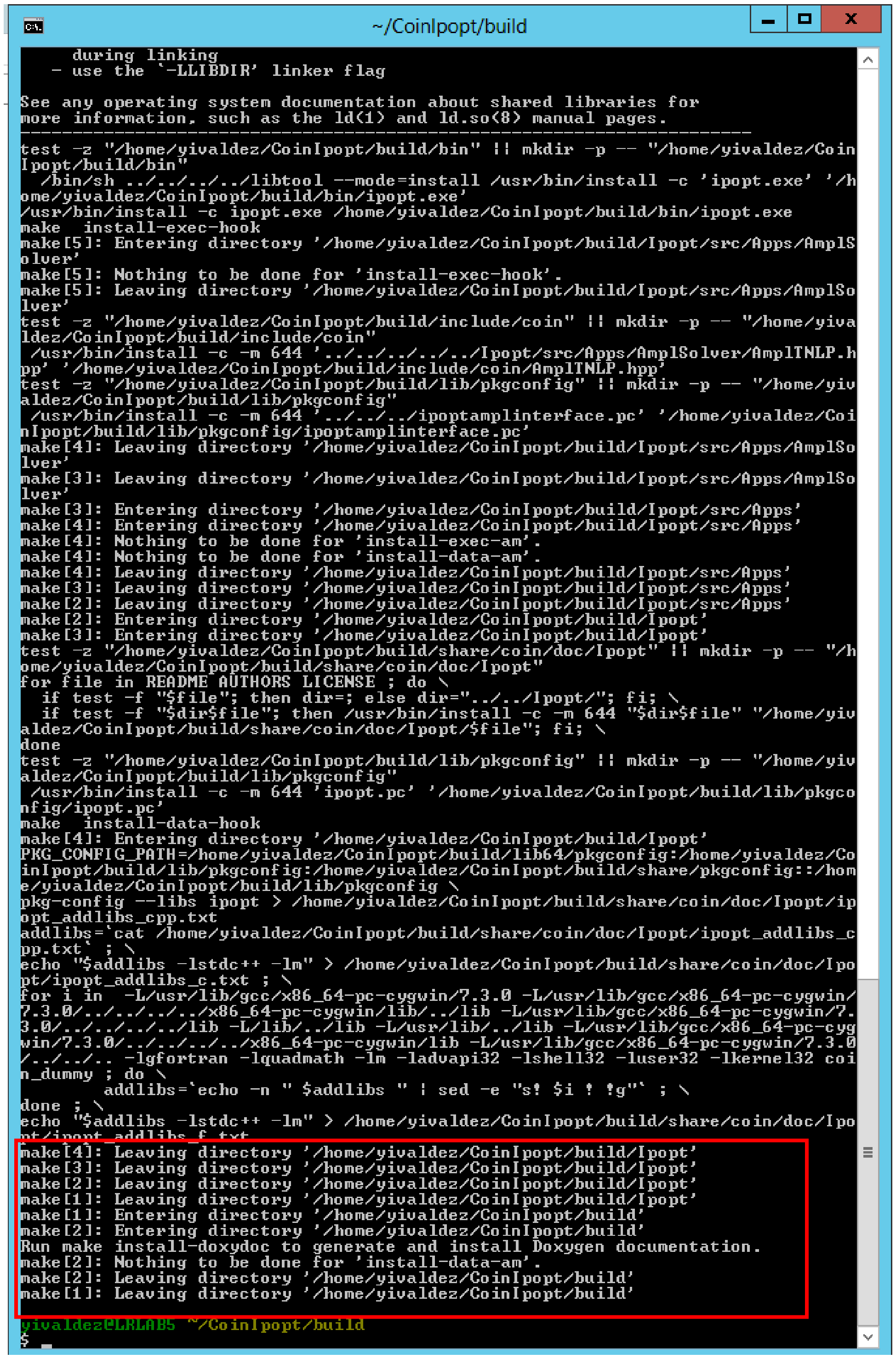
If you followed this guide to the letter, there shouldn’t be much of a problem configuring all the packages. Should you receive an error, make note of it (most of the time, related to third party software). The “*configure*” script is specific enough so that the error message will mention the steps needed to correct the issue. Otherwise, Google is your friend.

4. **make:** Will compile the code based on the parameters of the previous *configure* script. If *configure* was successful, this step shouldn't show an error message. If the compilation terminates unexpectedly, a detailed message will appear, follow its instructions to fix the issue, then delete *build* directory in *CoinIpopt* folder and go back to *step 4*. **NOTE:** Running *make* will take a very long time! (~30 mins on a i7 7700HQ, ~3 hours on lrlab5 servers)
5. **make test:** Once the previous *make* command finishes, run *make test* to verify the functionality of the configured *ipopt* solver (*build* is our current working directory).


~/CoinIpopt/build

```
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/LinAlg'
make[3]: Nothing to be done for 'all-am'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/LinAlg'
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/LinAlg'
Making all in src/Algorithm
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm

Making all in LinearSolvers
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm
LinearSolvers'
make[3]: Nothing to be done for 'all'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm/
inearSolvers'
Making all in Inexact
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm
Inexact'
make[3]: Nothing to be done for 'all'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm/
nexact'
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm

make[3]: Nothing to be done for 'all-am'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm'
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Algorithm'
Making all in src/contrib/CGPenalty
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/contrib/C
Penalty'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/contrib/CG
enalty'
Making all in src/contrib/LinearSolverLoader
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/contrib/L
nearSolverLoader'
make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/contrib/Li
earSolverLoader'
Making all in src/Interfaces
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Interface
'

make[2]: Nothing to be done for 'all'.
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Interfaces

Making all in src/Apps
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
Making all in CUTErInterface
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/CUTE
Interface'
make[3]: Nothing to be done for 'all'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/CUTEr
nterface'
Making all in AmplSolver
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/Ampl
olver'
make[3]: Nothing to be done for 'all'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/AmplS
lver'
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[3]: Nothing to be done for 'all-am'.
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[2]: Nothing to be done for 'all-am'.
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'
cd test; make test
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/test'
chmod u+x ./run_unitTests
./run_unitTests

Running unitTests...

Testing AMPL Solver Executable...
    Test passed!
Testing C++ Example...
    Test passed!
Testing C Example...
    Test passed!
Testing Fortran Example...
    Test passed!
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/test'
make[1]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'

yivaldez@LRLAB5 ~/CoinIpopt/build
$ 
```

6. **make install:** Will create some libraries and **configure the final executable of ipopt.** No successful message is displayed once the *make install* command finishes, so do not be alarmed if it just displays the following:



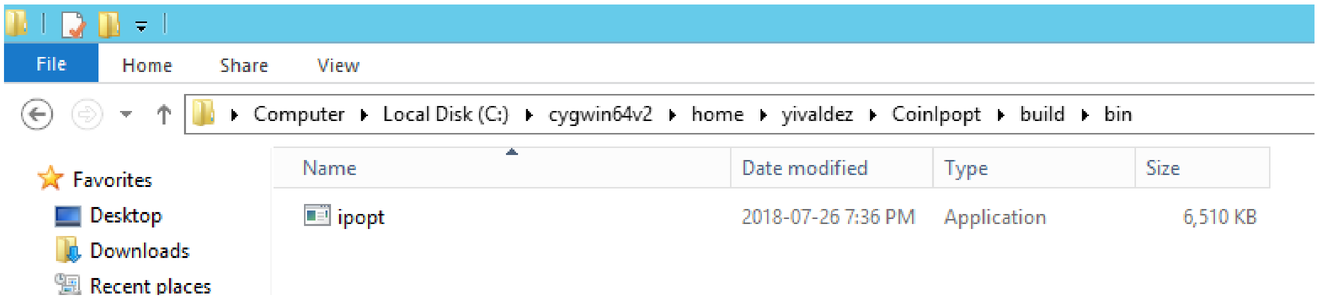
~/CoinIpopt/build

```
      during linking
   - use the `-LLIBDIR' linker flag

See any operating system documentation about shared libraries for
more information, such as the ld(1) and ld.so(8) manual pages.
----------------------------------------------------------------------
test -z "/home/yivaldez/CoinIpopt/build/bin" || mkdir -p -- "/home/yivaldez/Coin
Ipopt/build/bin"
  /bin/sh ../../../../libtool --mode=install /usr/bin/install -c 'ipopt.exe' '/h
ome/yivaldez/CoinIpopt/build/bin/ipopt.exe'
/usr/bin/install -c ipopt.exe /home/yivaldez/CoinIpopt/build/bin/ipopt.exe
make  install-exec-hook
make[5]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/AmplS
olver'
make[5]: Nothing to be done for 'install-exec-hook'.
make[5]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/AmplSo
lver'
test -z "/home/yivaldez/CoinIpopt/build/include/coin" || mkdir -p -- "/home/yiva
ldez/CoinIpopt/build/include/coin"
 /usr/bin/install -c -m 644 '../../../../../Ipopt/src/Apps/AmplSolver/AmplTNLP.h
pp' '/home/yivaldez/CoinIpopt/build/include/coin/AmplTNLP.hpp'
test -z "/home/yivaldez/CoinIpopt/build/lib/pkgconfig" || mkdir -p -- "/home/yiv
aldez/CoinIpopt/build/lib/pkgconfig"
 /usr/bin/install -c -m 644 '../../../ipoptamplinterface.pc' '/home/yivaldez/Coi
nIpopt/build/lib/pkgconfig/ipoptamplinterface.pc'
make[4]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/AmplSo
lver'
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps/AmplSo
lver'
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[4]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[4]: Nothing to be done for 'install-exec-am'.
make[4]: Nothing to be done for 'install-data-am'.
make[4]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt/src/Apps'
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[3]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt'
test -z "/home/yivaldez/CoinIpopt/build/share/coin/doc/Ipopt" || mkdir -p -- "/h
ome/yivaldez/CoinIpopt/build/share/coin/doc/Ipopt"
for file in README AUTHORS LICENSE ; do \
  if test -f "$file"; then dir=; else dir="../../Ipopt/"; fi; \
  if test -f "$dir$file"; then /usr/bin/install -c -m 644 "$dir$file" "/home/yiv
aldez/CoinIpopt/build/share/coin/doc/Ipopt/$file"; fi; \
done
test -z "/home/yivaldez/CoinIpopt/build/lib/pkgconfig" || mkdir -p -- "/home/yiv
aldez/CoinIpopt/build/lib/pkgconfig"
 /usr/bin/install -c -m 644 'ipopt.pc' '/home/yivaldez/CoinIpopt/build/lib/pkgco
nfig/ipopt.pc'
make  install-data-hook
make[4]: Entering directory '/home/yivaldez/CoinIpopt/build/Ipopt'
PKG_CONFIG_PATH=/home/yivaldez/CoinIpopt/build/lib64/pkgconfig:/home/yivaldez/Co
inIpopt/build/lib/pkgconfig:/home/yivaldez/CoinIpopt/build/share/pkgconfig::/hom
e/yivaldez/CoinIpopt/build/lib/pkgconfig \
pkg-config --libs ipopt > /home/yivaldez/CoinIpopt/build/share/coin/doc/Ipopt/ip
opt_addlibs_cpp.txt
addlibs=`cat /home/yivaldez/CoinIpopt/build/share/coin/doc/Ipopt/ipopt_addlibs_c
pp.txt` ; \
echo "$addlibs -lstdc++ -lm" > /home/yivaldez/CoinIpopt/build/share/coin/doc/Ipo
pt/ipopt_addlibs_c.txt ; \
for i in  -L/usr/lib/gcc/x86_64-pc-cygwin/7.3.0 -L/usr/lib/gcc/x86_64-pc-cygwin/
7.3.0/../../../../x86_64-pc-cygwin/lib/../lib -L/usr/lib/gcc/x86_64-pc-cygwin/7.
3.0/../../../../lib -L/lib/../lib -L/usr/lib/../lib -L/usr/lib/gcc/x86_64-pc-cyg
win/7.3.0/../../../../x86_64-pc-cygwin/lib -L/usr/lib/gcc/x86_64-pc-cygwin/7.3.0
/../../.. -lgfortran -lquadmath -lm -ladvapi32 -lshell32 -luser32 -lkernel32 coi
n_dummy ; do \
        addlibs=`echo -n " $addlibs " | sed -e "s! $i ! !g"` ; \
done ; \
echo "$addlibs -lstdc++ -lm" > /home/yivaldez/CoinIpopt/build/share/coin/doc/Ipo
pt/ipopt_addlibs_f.txt
make[4]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[3]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[1]: Leaving directory '/home/yivaldez/CoinIpopt/build/Ipopt'
make[1]: Entering directory '/home/yivaldez/CoinIpopt/build'
make[2]: Entering directory '/home/yivaldez/CoinIpopt/build'
Run make install-doxydoc to generate and install Doxygen documentation.
make[2]: Nothing to be done for 'install-data-am'.
make[2]: Leaving directory '/home/yivaldez/CoinIpopt/build'
make[1]: Leaving directory '/home/yivaldez/CoinIpopt/build'

yivaldez@LRLAB5 ~/CoinIpopt/build
$
```

7. **Locate the ipopt executable:** Once *make install* finishes, go to the following directory:

   C:\cygwin64\home\usr\CoinIpopt\build\bin

   Within this directory you will find the ipopt.exe file, this is the compiled solver, capable of running AMPL models with different linear solvers.



File
Home
Share
View
Computer ▸ Local Disk (C:) ▸ cygwin64v2 ▸ home ▸ yivaldez ▸ CoinIpopt ▸ build ▸ bin
Favorites
Desktop
Downloads
Recent places

Name	Date modified	Type	Size
ipopt	2018-07-26 7:36 PM	Application	6,510 KB

Step 5: Interfacing with Spyder IDE

The way Spyder (or another python IDE) works is by obtaining the value of the *PATH* variable (from Windows) when it starts. When we run a Pyomo model, Spyder will look for the solver executable (ipopt.exe) within the different directories of the before-mentioned PATH variable.

The procedure to be followed will depend if you **already had a previous version of ipopt** solver interfaced with Pyomo. If you can successfully run the following line within your python/pyomo model, it means that an old version of ipopt is already interfaced:

solver = SolverFactory('ipopt')   #Loads ipopt

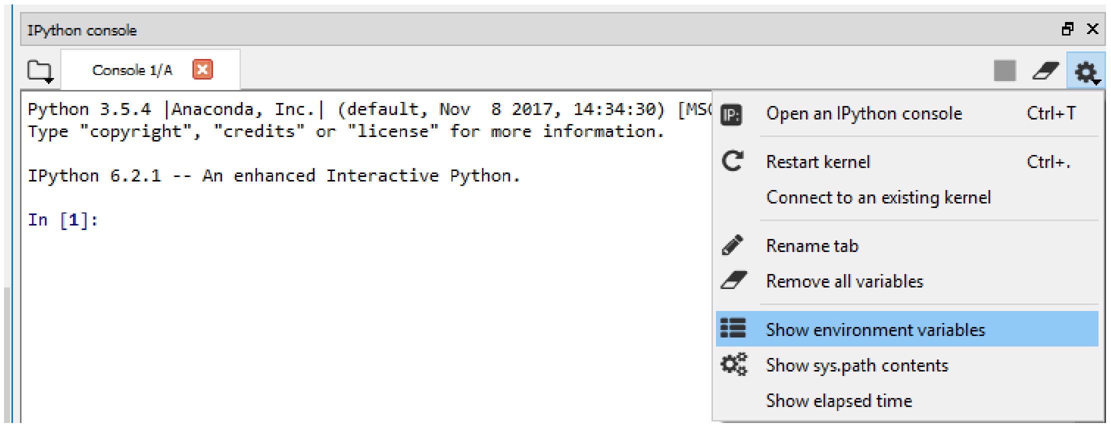
results=solver.solve(your model)   #Solves the model

If this is **true, continue** with the next step, **else, skip to 5.1.b**

Step 5.1.a: Deleting an old ipopt reference

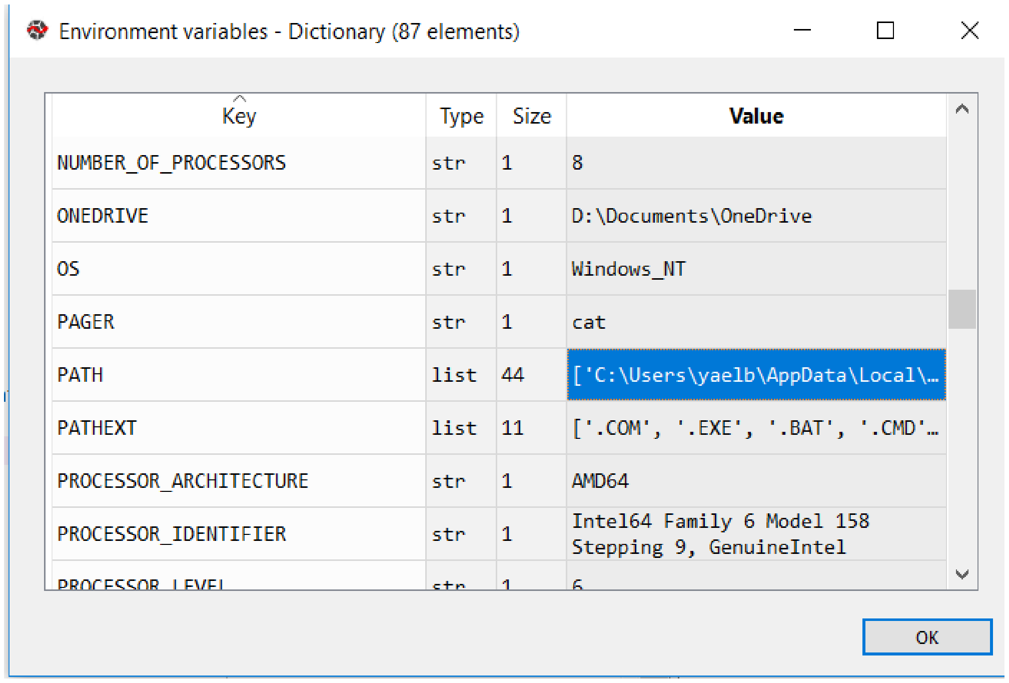
To stop Spyder solving your pyomo model with the old version of Ipopt:

1. Open Spyder (ver 3.2.8 or greater), there should be a **gear** icon near **your IPython console** (if there isn't, update your Spyder), click on it to display a menu and click on *Show environment variables*.



```
Python 3.5.4 |Anaconda, Inc.| (default, Nov  8 2017, 14:34:30) [MS(
Type "copyright", "credits" or "license" for more information.

IPython 6.2.1 -- An enhanced Interactive Python.

In [1]:
```

2. Scroll down and find the **PATH** variable, double click on its ***Value***

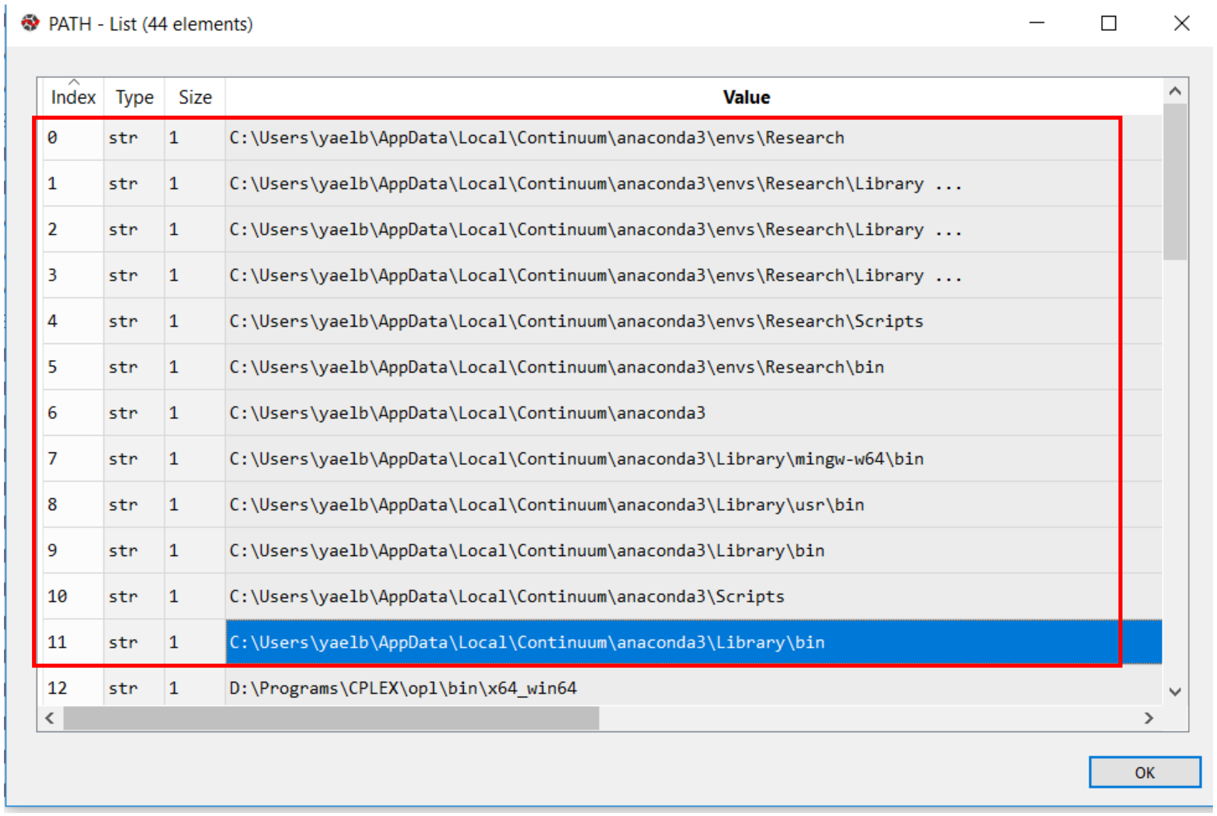


Environment variables - Dictionary (87 elements)

Key	Type	Size	Value
NUMBER_OF_PROCESSORS	str	1	8
ONEDRIVE	str	1	D:\Documents\OneDrive
OS	str	1	Windows_NT
PAGER	str	1	cat
PATH	list	44	['C:\Users\yaelb\AppData\Local\…
PATHEXT	list	11	['.COM', '.EXE', '.BAT', '.CMD'…
PROCESSOR_ARCHITECTURE	str	1	AMD64
PROCESSOR_IDENTIFIER	str	1	Intel64 Family 6 Model 158 Stepping 9, GenuineIntel
PROCESSOR_LEVEL	str	1	6

OK

3. You will see a long list of directories appear in a prompt, *ipopt* will be located **within** one of these **anaconda folders** (from index 0 to 11 in this case), and will probably be in one of the **\bin* folders)

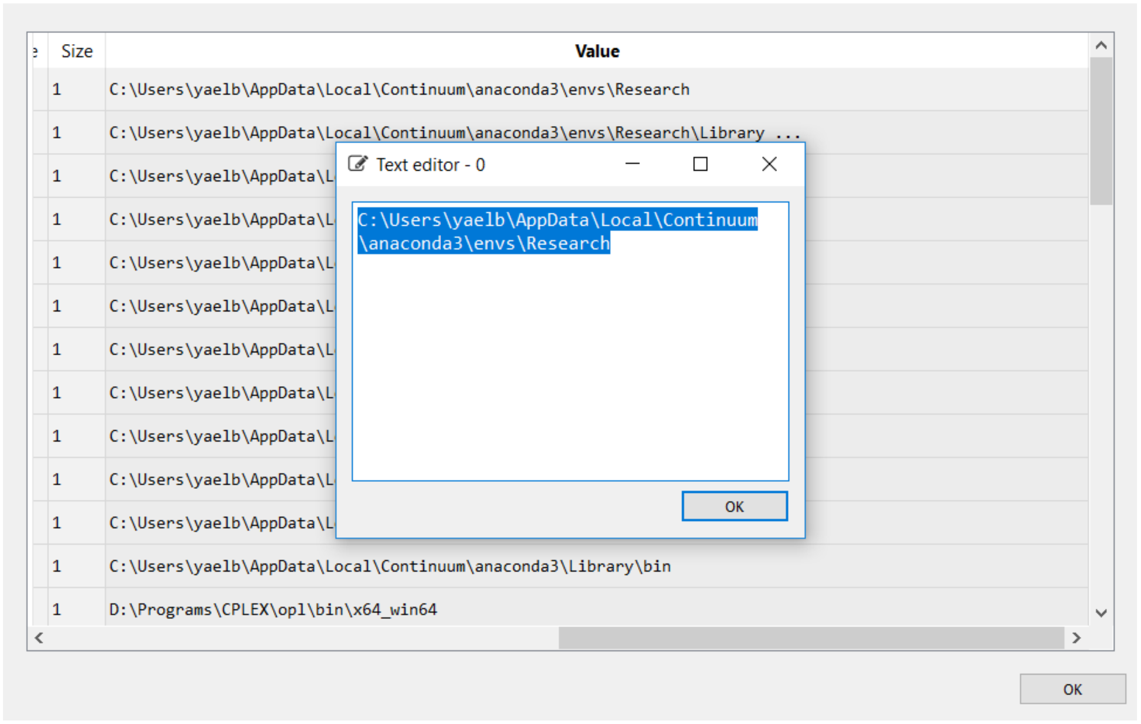


PATH - List (44 elements)

Index	Type	Size	Value
0	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research
1	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\Library ...
2	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\Library ...
3	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\Library ...
4	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\Scripts
5	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\bin
6	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3
7	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Library\mingw-w64\bin
8	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Library\usr\bin
9	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Library\bin
10	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Scripts
11	str	1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Library\bin
12	str	1	D:\Programs\CPLEX\opl\bin\x64_win64

OK

4. For one directory, double click on ***Value***, a prompt with a string will appear, copy this value

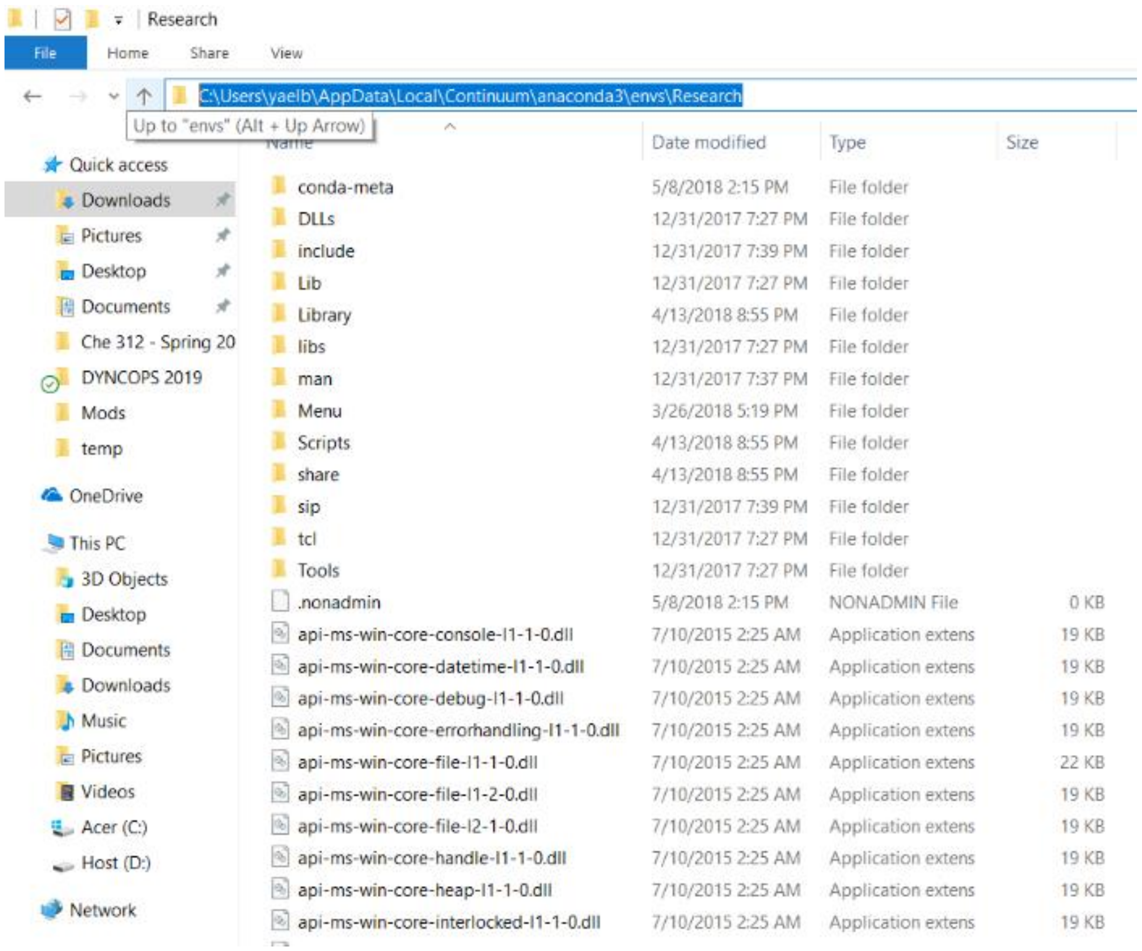


Size	Value
1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research
1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research\Library ...
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\L
1	C:\Users\yaelb\AppData\Local\Continuum\anaconda3\Library\bin
1	D:\Programs\CPLEX\opl\bin\x64_win64

Text editor - 0

```
C:\Users\yaelb\AppData\Local\Continuum
\anaconda3\envs\Research
```

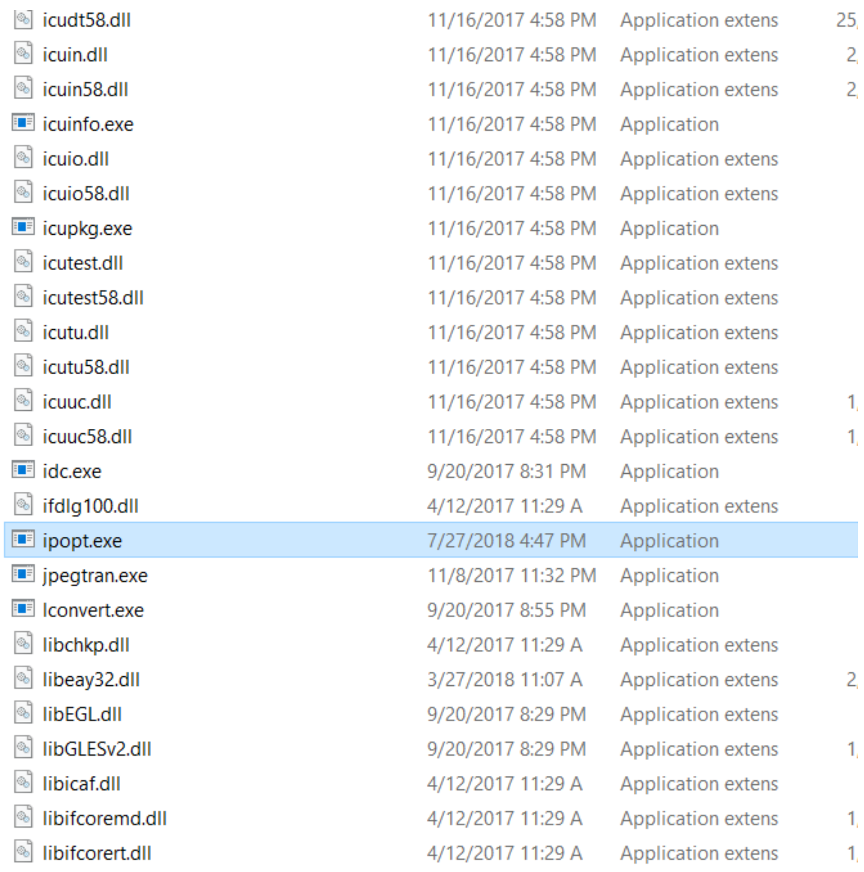
5. Paste this value in a new explorer window to go directly into said directory



C:\Users\yaelb\AppData\Local\Continuum\anaconda3\envs\Research

Name	Date modified	Type	Size
conda-meta	5/8/2018 2:15 PM	File folder	
DLLs	12/31/2017 7:27 PM	File folder	
include	12/31/2017 7:39 PM	File folder	
Lib	12/31/2017 7:27 PM	File folder	
Library	4/13/2018 8:55 PM	File folder	
libs	12/31/2017 7:27 PM	File folder	
man	12/31/2017 7:37 PM	File folder	
Menu	3/26/2018 5:19 PM	File folder	
Scripts	4/13/2018 8:55 PM	File folder	
share	4/13/2018 8:55 PM	File folder	
sip	12/31/2017 7:39 PM	File folder	
tcl	12/31/2017 7:27 PM	File folder	
Tools	12/31/2017 7:27 PM	File folder	
.nonadmin	5/8/2018 2:15 PM	NONADMIN File	0 KB
api-ms-win-core-console-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-datetime-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-debug-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-errorhandling-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-file-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	22 KB
api-ms-win-core-file-l1-2-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-file-l2-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-handle-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-heap-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB
api-ms-win-core-interlocked-l1-1-0.dll	7/10/2015 2:25 AM	Application extens	19 KB

6. Look for ***ipopt.exe**,* once located, **delete it** and continue to the step 5.1.b, if not found in the current directory, search **another one**, look at **ALL** your directories (from index 0 to 11 in this case) just to make sure there isn't a copy of the old ipopt.exe within one of these folders, if you are running multiple environments.

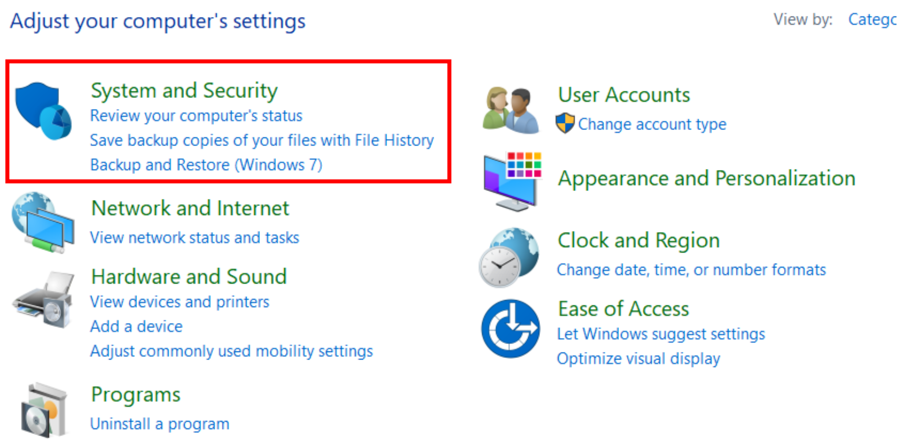


icudt58.dll	11/16/2017 4:58 PM	Application extens	25,
icuin.dll	11/16/2017 4:58 PM	Application extens	2,
icuin58.dll	11/16/2017 4:58 PM	Application extens	2,
icuinfo.exe	11/16/2017 4:58 PM	Application	
icuio.dll	11/16/2017 4:58 PM	Application extens	
icuio58.dll	11/16/2017 4:58 PM	Application extens	
icupkg.exe	11/16/2017 4:58 PM	Application	
icutest.dll	11/16/2017 4:58 PM	Application extens	
icutest58.dll	11/16/2017 4:58 PM	Application extens	
icutu.dll	11/16/2017 4:58 PM	Application extens	
icutu58.dll	11/16/2017 4:58 PM	Application extens	
icuuc.dll	11/16/2017 4:58 PM	Application extens	1,
icuuc58.dll	11/16/2017 4:58 PM	Application extens	1,
idc.exe	9/20/2017 8:31 PM	Application	
ifdlg100.dll	4/12/2017 11:29 A	Application extens	
ipopt.exe	7/27/2018 4:47 PM	Application	
jpegtran.exe	11/8/2017 11:32 PM	Application	
lconvert.exe	9/20/2017 8:55 PM	Application	
libchkp.dll	4/12/2017 11:29 A	Application extens	
libeay32.dll	3/27/2018 11:07 A	Application extens	2,
libEGL.dll	9/20/2017 8:29 PM	Application extens	
libGLESv2.dll	9/20/2017 8:29 PM	Application extens	1,
libicaf.dll	4/12/2017 11:29 A	Application extens	
libifcoremd.dll	4/12/2017 11:29 A	Application extens	1,
libifcorert.dll	4/12/2017 11:29 A	Application extens	1,

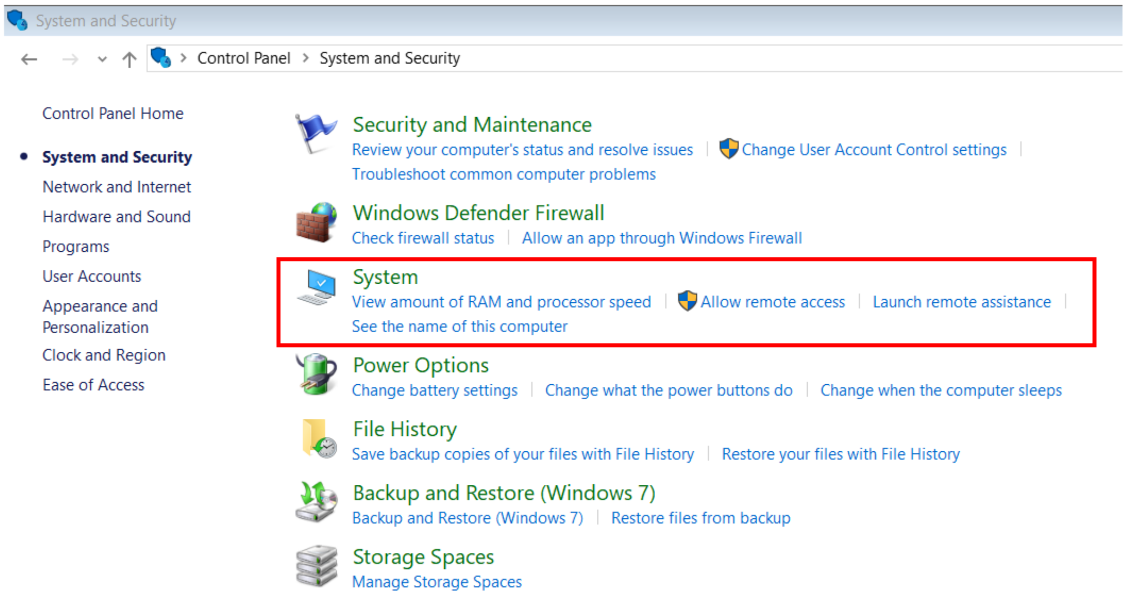
Step 5.1.b: Modifying Windows' PATH variable

Next, we will need to "tell" the system where the new *ipopt.exe* is located. To do this, we will have to add the directory where *ipopt* is located to our Windows' PATH variable.

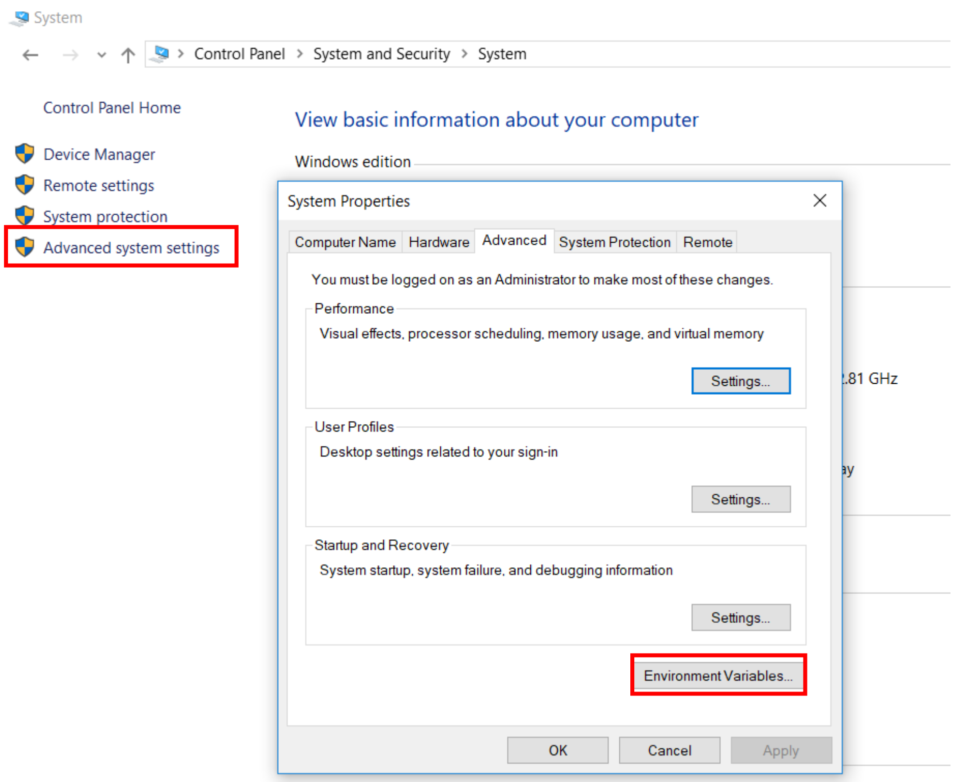
1. Open Control Panel and navigate to *System and Security:*


Adjust your computer's settings
View by: Categc
System and Security
Review your computer's status
Save backup copies of your files with File History
Backup and Restore (Windows 7)
Network and Internet
View network status and tasks
Hardware and Sound
View devices and printers
Add a device
Adjust commonly used mobility settings
Programs
Uninstall a program
User Accounts
Change account type
Appearance and Personalization
Clock and Region
Change date, time, or number formats
Ease of Access
Let Windows suggest settings
Optimize visual display

2. Inside *System and Security* click on *System*


System and Security
Control Panel > System and Security
Control Panel Home
System and Security
Network and Internet
Hardware and Sound
Programs
User Accounts
Appearance and Personalization
Clock and Region
Ease of Access
Security and Maintenance
Review your computer's status and resolve issues
Change User Account Control settings
Troubleshoot common computer problems
Windows Defender Firewall
Check firewall status
Allow an app through Windows Firewall
System
View amount of RAM and processor speed
Allow remote access
Launch remote assistance
See the name of this computer
Power Options
Change battery settings
Change what the power buttons do
Change when the computer sleeps
File History
Save backup copies of your files with File History
Restore your files with File History
Backup and Restore (Windows 7)
Backup and Restore (Windows 7)
Restore files from backup
Storage Spaces
Manage Storage Spaces

3. Open *Advanced system settings* (you **WILL** need **Administrator rights**) and click on *Environment Variables*



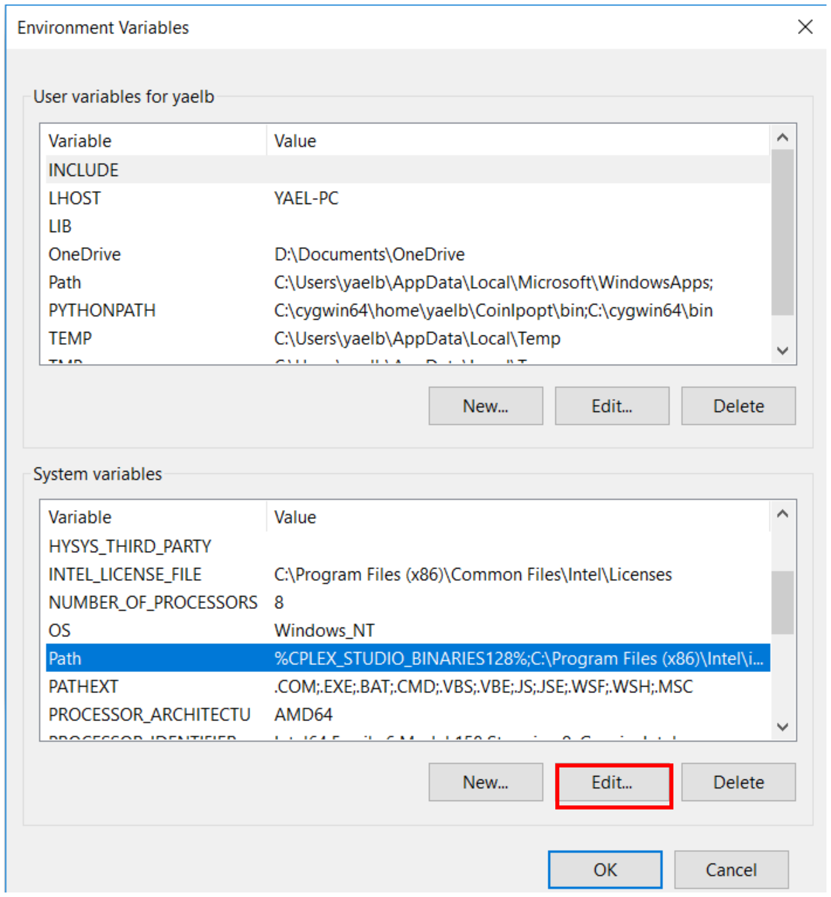
You must be logged on as an Administrator to make most of these changes.

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

Desktop settings related to your sign-in

System startup, system failure, and debugging information

4. Locate the **PATH** variable under ***System variables***



Environment Variables

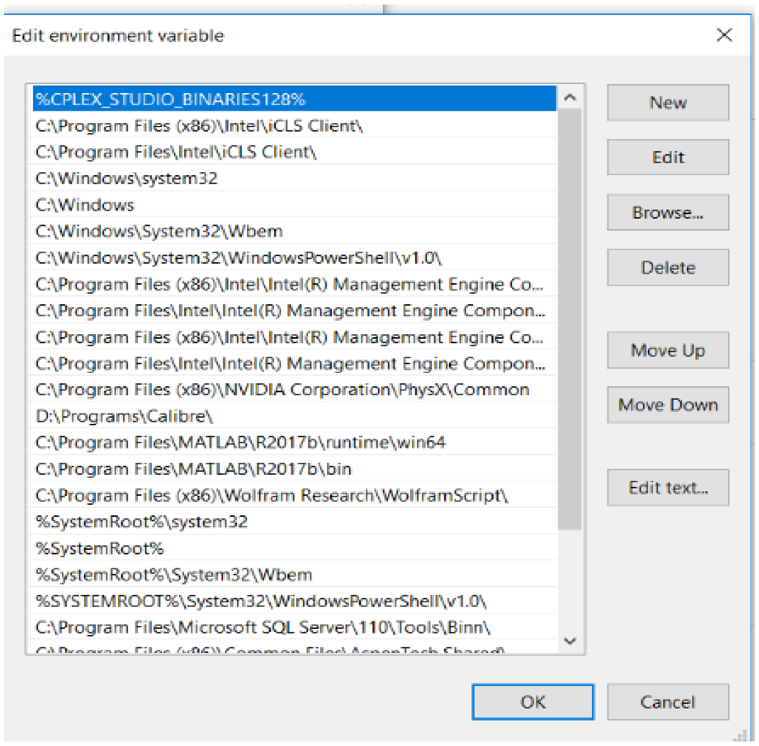
User variables for yaelb

Variable	Value
INCLUDE	
LHOST	YAEL-PC
LIB	
OneDrive	D:\Documents\OneDrive
Path	C:\Users\yaelb\AppData\Local\Microsoft\WindowsApps;
PYTHONPATH	C:\cygwin64\home\yaelb\Coinlpopt\bin;C:\cygwin64\bin
TEMP	C:\Users\yaelb\AppData\Local\Temp

System variables

Variable	Value
HYSYS_THIRD_PARTY	
INTEL_LICENSE_FILE	C:\Program Files (x86)\Common Files\Intel\Licenses
NUMBER_OF_PROCESSORS	8
OS	Windows_NT
Path	%CPLEX_STUDIO_BINARIES128%;C:\Program Files (x86)\Intel\i...
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;.JSE;.WSF;.WSH;.MSC
PROCESSOR_ARCHITECTU	AMD64

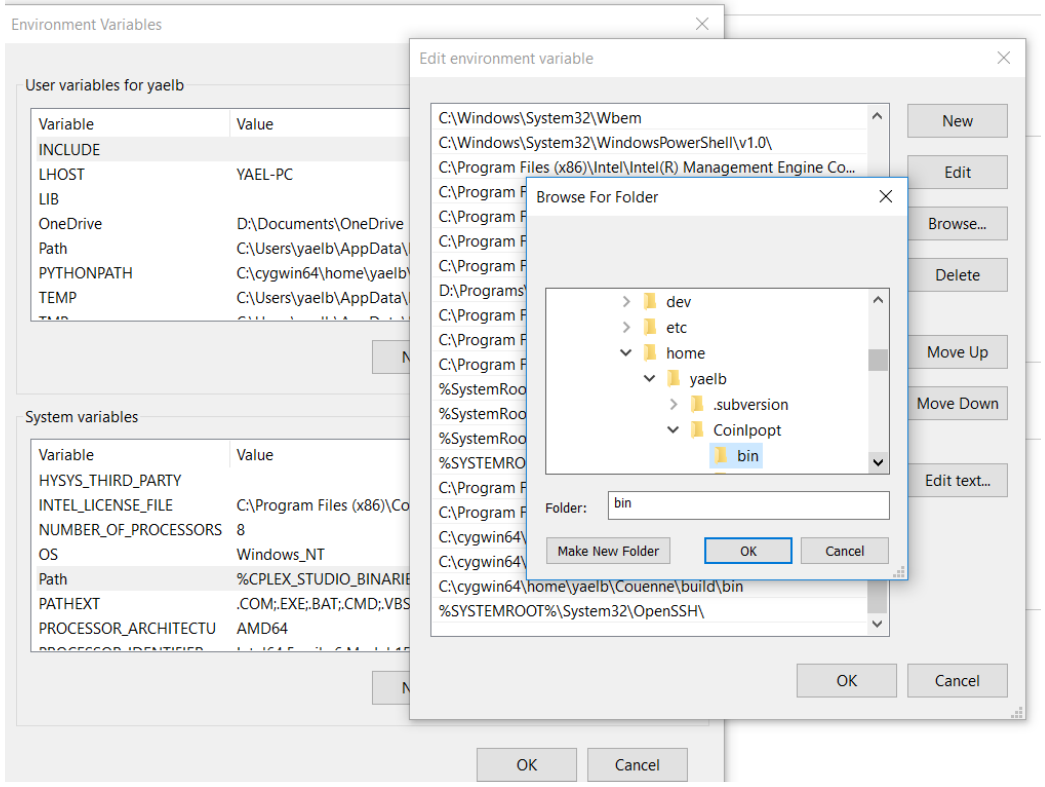
5. For Windows 10, click on the *Edit* button a prompt will open, the window will include all of the directories that your PATH variable has access to:



Edit environment variable

```
%CPLEX_STUDIO_BINARIES128%
C:\Program Files (x86)\Intel\iCLS Client\
C:\Program Files\Intel\iCLS Client\
C:\Windows\system32
C:\Windows
C:\Windows\System32\Wbem
C:\Windows\System32\WindowsPowerShell\v1.0\
C:\Program Files (x86)\Intel\Intel(R) Management Engine Co...
C:\Program Files\Intel\Intel(R) Management Engine Compon...
C:\Program Files (x86)\Intel\Intel(R) Management Engine Co...
C:\Program Files\Intel\Intel(R) Management Engine Compon...
C:\Program Files (x86)\NVIDIA Corporation\PhysX\Common
D:\Programs\Calibre\
C:\Program Files\MATLAB\R2017b\runtime\win64
C:\Program Files\MATLAB\R2017b\bin
C:\Program Files (x86)\Wolfram Research\WolframScript\
%SystemRoot%\system32
%SystemRoot%
%SystemRoot%\System32\Wbem
%SYSTEMROOT%\System32\WindowsPowerShell\v1.0\
C:\Program Files\Microsoft SQL Server\110\Tools\Binn\
```

6. Click on *New* then on *Browse…* locate the *bin* folder **where *ipopt.exe*** is:
C:\cygwin64\home\usr\CoinIpopt\build\bin



User variables for yaelb

Variable	Value
INCLUDE	
LHOST	YAEL-PC
LIB	
OneDrive	D:\Documents\OneDrive
Path	C:\Users\yaelb\AppData\
PYTHONPATH	C:\cygwin64\home\yaelb\
TEMP	C:\Users\yaelb\AppData\

System variables

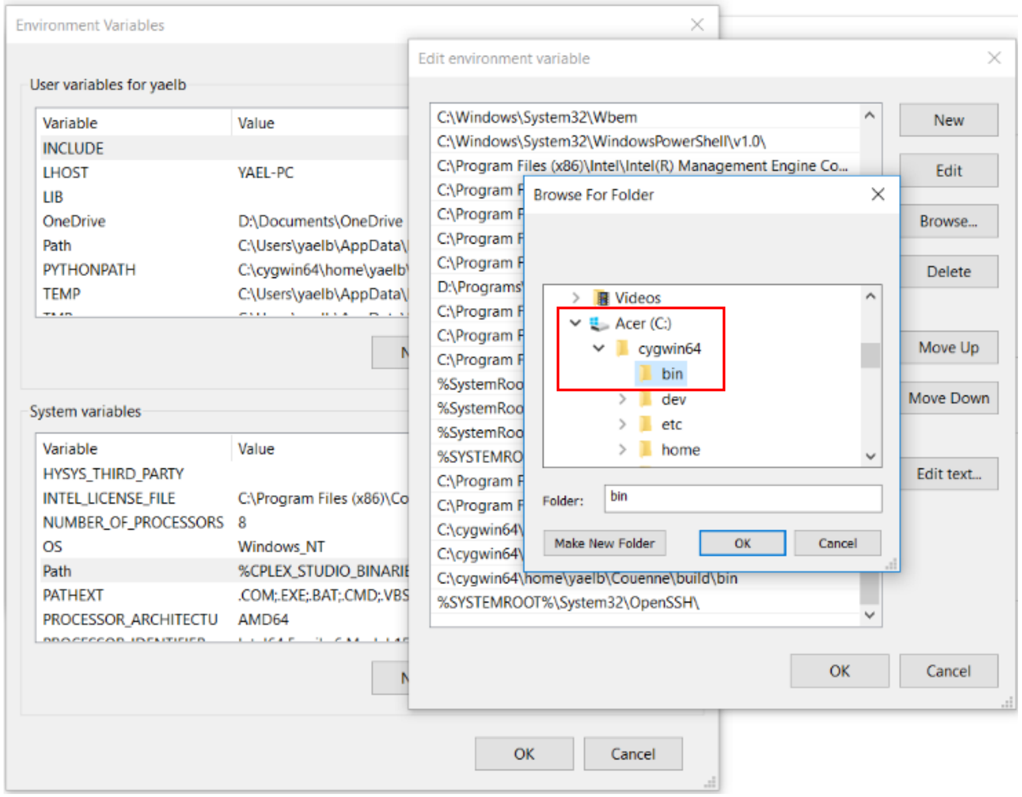
Variable	Value
HYSYS_THIRD_PARTY	
INTEL_LICENSE_FILE	C:\Program Files (x86)\Co
NUMBER_OF_PROCESSORS	8
OS	Windows_NT
Path	%CPLEX_STUDIO_BINARIE
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS
PROCESSOR_ARCHITECTU	AMD64

```
C:\Windows\System32\Wbem
C:\Windows\System32\WindowsPowerShell\v1.0\
C:\Program Files (x86)\Intel\Intel(R) Management Engine Co...
C:\Program F
C:\Program F
C:\Program F
C:\Program F
D:\Programs\
C:\Program F
C:\Program F
C:\Program F
%SystemRoo
%SystemRoo
%SystemRoo
%SYSTEMRO
C:\Program F
C:\Program F
C:\cygwin64\
C:\cygwin64\
C:\cygwin64\home\yaelb\Couenne\build\bin
%SYSTEMROOT%\System32\OpenSSH\
```

```
> dev
> etc
v home
  v yaelb
    > .subversion
    v CoinIpopt
        bin
```

Folder: bin

7. Click OK and **repeat step 6**, but this time select the main *bin* folder **inside Cygwin** folder:
C:\cygwin64\bin



User variables for yaelb

Variable	Value
INCLUDE	
LHOST	YAEL-PC
LIB	
OneDrive	D:\Documents\OneDrive
Path	C:\Users\yaelb\AppData\
PYTHONPATH	C:\cygwin64\home\yaelb\
TEMP	C:\Users\yaelb\AppData\

System variables

Variable	Value
HYSYS_THIRD_PARTY	
INTEL_LICENSE_FILE	C:\Program Files (x86)\Co
NUMBER_OF_PROCESSORS	8
OS	Windows_NT
Path	%CPLEX_STUDIO_BINARIE
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS
PROCESSOR_ARCHITECTU	AMD64

```
C:\Windows\System32\Wbem
C:\Windows\System32\WindowsPowerShell\v1.0\
C:\Program Files (x86)\Intel\Intel(R) Management Engine Co...
C:\Program F
C:\Program F
C:\Program F
C:\Program F
D:\Programs\
C:\Program F
C:\Program F
C:\Program F
%SystemRoo
%SystemRoo
%SystemRoo
%SYSTEMRO
C:\Program F
C:\Program F
C:\cygwin64\
C:\cygwin64\
C:\cygwin64\home\yaelb\Couenne\build\bin
%SYSTEMROOT%\System32\OpenSSH\
```

```
> Videos
v Acer (C:)
  v cygwin64
      bin
    > dev
    > etc
    > home
```

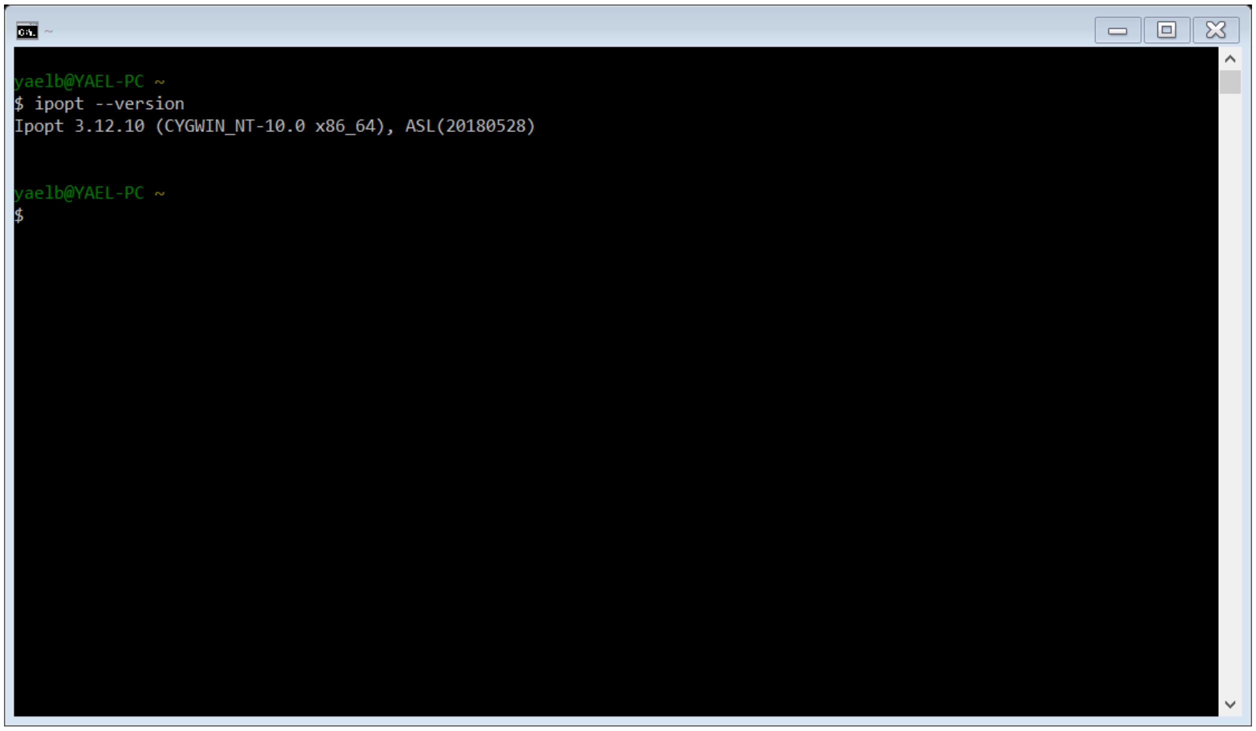
Folder: bin

8. Click *OK* your PATH variable is now saved with the new directories.

NOTE: If you have previous versions of Windows, the PATH variable is not edited with the prompt. It will be displayed as a long string of directories, where each directory is separated by a ";". To add ipopt's path, place a **;** at the end of the string, followed by the two new folder paths.

*Old PATH directories***;**C:\cygwin64\home\usr\CoinIpopt\build\bin**;***C:\cygwin64\bin*

9. For the system to apply the new path variable, **reset** your PC
10. To confirm that ipopt is working correctly, open a **new** Cygwin terminal by running ***Cygwin.bat***, and similarly as before, run the command ***ipopt --version*** to display the following output:



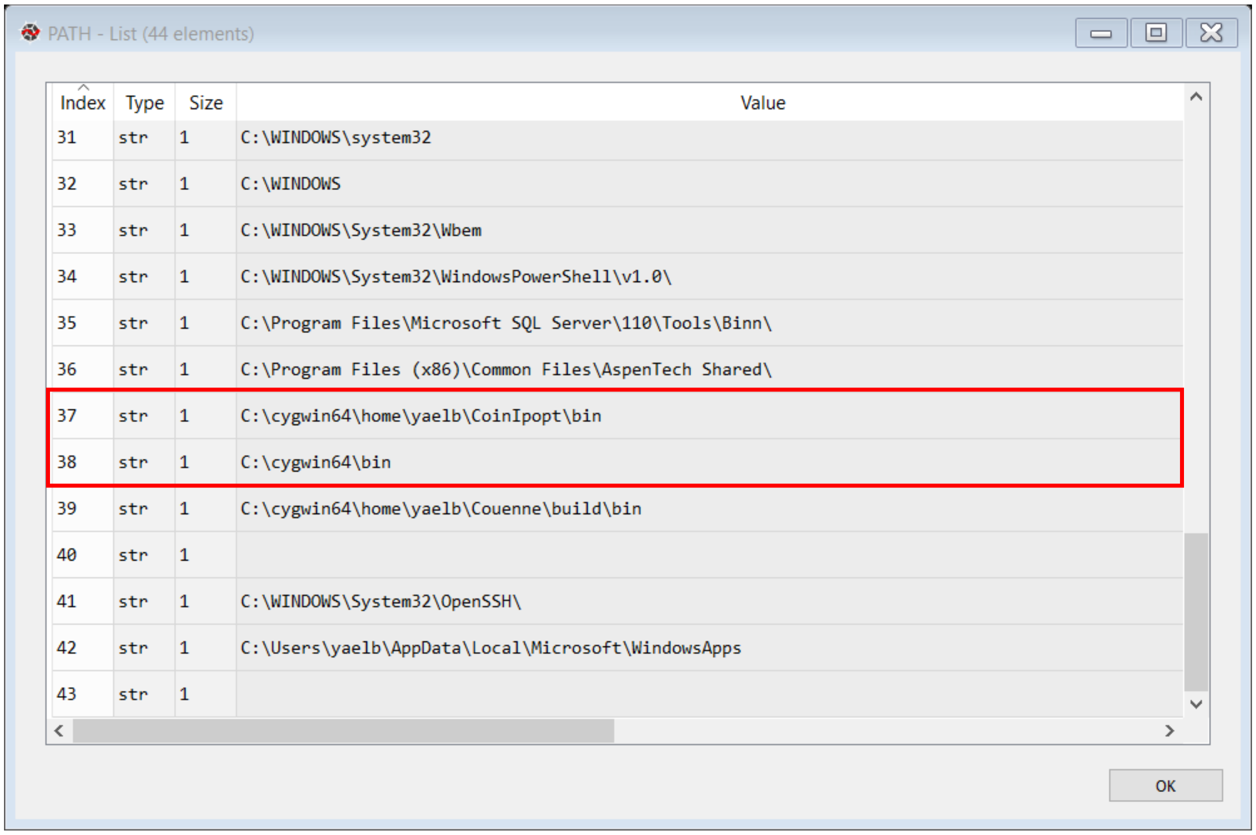
```
yaelb@YAEL-PC ~
$ ipopt --version
Ipopt 3.12.10 (CYGWIN_NT-10.0 x86_64), ASL(20180528)


yaelb@YAEL-PC ~
$
```

11. **Congrats, Ipopt is now configured correctly and it is recognized by your system!**

NOTE: Should you get a message that ipopt cannot be found, check your Windows' PATH variable values by repeating step 5.1.b and make sure to restart your PC.

Step 6: Choosing your linear solver

Now that the system is recognizing ipopt, make sure Spyder has imported the new Windows' PATH variable by repeating the procedure in 5.1.a (steps 1-2), scroll down to find the **new directories** added to the list of Spyder's **PATH values**.



Index	Type	Size	Value
31	str	1	C:\WINDOWS\system32
32	str	1	C:\WINDOWS
33	str	1	C:\WINDOWS\System32\Wbem
34	str	1	C:\WINDOWS\System32\WindowsPowerShell\v1.0\
35	str	1	C:\Program Files\Microsoft SQL Server\110\Tools\Binn\
36	str	1	C:\Program Files (x86)\Common Files\AspenTech Shared\
37	str	1	C:\cygwin64\home\yaelb\CoinIpopt\bin
38	str	1	C:\cygwin64\bin
39	str	1	C:\cygwin64\home\yaelb\Couenne\build\bin
40	str	1	
41	str	1	C:\WINDOWS\System32\OpenSSH\
42	str	1	C:\Users\yaelb\AppData\Local\Microsoft\WindowsApps
43	str	1	

Should you not find the new directories, check your Windows' PATH variable values by repeating step 5.1.b

With your newly compiled Ipopt, you will have access to all HSL solvers, as well as the conventional MUMPS solver. To select which linear algebra package is to be used for the solution of your pyomo model use the following line:

solver = SolverFactory('ipopt')

solver.options['linear_solver'] = 'linsolv'

results=solver.solve(m)

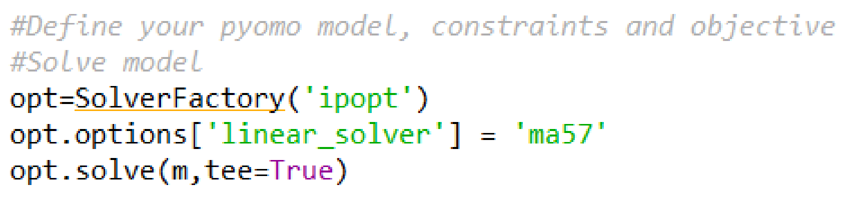
Where *linsolv* can be one of the following strings:

ma27	ma57	ma77
ma86	ma97	mumps

NOTE: If you are **not** able to select the linear solver and already had an **old ipopt** version, make sure you are deleting **all** the *ipopt* executables from the listed directories from step 5.1.a

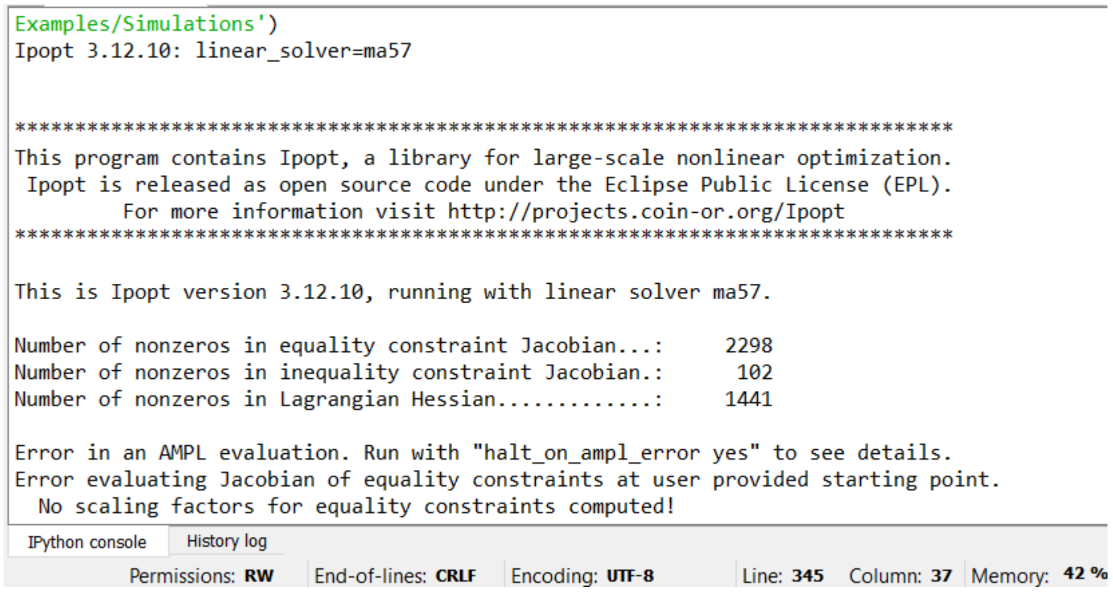
An example:

Input:



```
#Define your pyomo model, constraints and objective
#Solve model
opt=SolverFactory('ipopt')
opt.options['linear_solver'] = 'ma57'
opt.solve(m,tee=True)
```

Output:



```
Examples/Simulations')
Ipopt 3.12.10: linear_solver=ma57


******************************************************************************
This program contains Ipopt, a library for large-scale nonlinear optimization.
 Ipopt is released as open source code under the Eclipse Public License (EPL).
         For more information visit http://projects.coin-or.org/Ipopt
******************************************************************************

This is Ipopt version 3.12.10, running with linear solver ma57.

Number of nonzeros in equality constraint Jacobian...:     2298
Number of nonzeros in inequality constraint Jacobian.:      102
Number of nonzeros in Lagrangian Hessian.............:     1441

Error in an AMPL evaluation. Run with "halt_on_ampl_error yes" to see details.
Error evaluating Jacobian of equality constraints at user provided starting point.
  No scaling factors for equality constraints computed!
```

Special thanks to **David M. Thierry** for his recommendations and insight