Building Cantera 1.5.3 on a Windows PC

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February, 2004

This presentation covers…

- How to build the Cantera kernel from the source code using Visual C++ / Visual Fortran
- How to build the Cantera Python interface
- How to build the Cantera MATLAB toolbox

Getting Ready…

Things you will need before you start

- A PC with Windows XP or 2000

- Compilers
  - Microsoft Visual C++ 6.0
  - Compaq Digital Fortran 6.0
  - other compilers may work too but have not been tested

- Free downloads
  - The cygwin unix-like environment for Windows
  - Python
  - Numeric Extensions for Python (NumPy)

Why is cygwin needed?

- Cantera is designed to work on multiple platforms, including linux, unix, and Mac OS X
- On the other platforms, the GNU ‘make’ utility is used to build Cantera
- Impractical to maintain an entirely separate build procedure for Windows
- By installing cygwin, Windows PCs can use standard unix-like command-line tools, including ‘make’

Why is Python needed?

- Python is an easy-to-use, cross-platform scripting language
  - much more powerful than DOS or ‘cmd.exe’
  - much easier to use than ‘sh’ or ‘perl’
- The Cantera build procedure writes and runs some Python scripts
- Cantera also uses Python during operation to parse Cantera input files (‘CTI Files’)
- (If you take an hour or so to learn Python, you’ll find lots of uses for it too)

Why is NumPy needed?

- Adds fast MATLAB-like array functions to Python
- Required to build the Cantera Python interface

Installing cygwin

- Get it from http://www.cygwin.com by running setup.exe
- When asked whether you want DOS or unix files, choose DOS
- You only need a minimal installation
  - make, sed, and bash are required
  - everything else is optional

Installing Python

- Information about Python is at http://www.python.org

- Run this to install Python: http://www.python.org/ftp/python/2.3.3/Python-2.3.3.exe

Installing NumPy

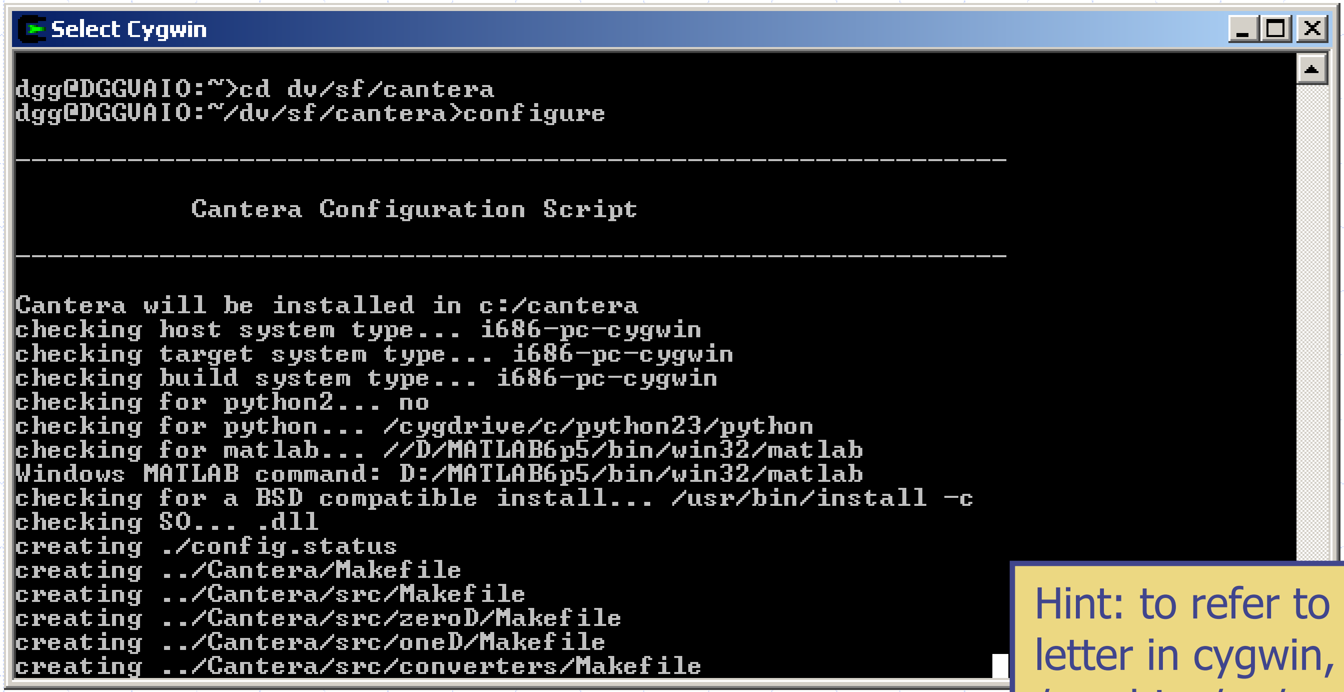
- Go to http://sourceforge.net/projects/numpy
- Under “latest file releases,” select **numpy**
- Download and run **Numeric-23.1.win32-py2.3.exe**

Get the Cantera source code

- Go to http://sourceforge.net/projects/cantera
- Under “latest file releases,” select package **cantera**
- Get file cantera-1.5.3-src.zip
- Extract its contents somewhere *other* than where you plan to install Cantera (e.g., not in c:\cantera)

Configuring the Installation

- Double-click the cygwin icon on the desktop to open a cygwin shell window
- 'cd' to the directory where you extracted the Cantera source code, and type 'configure' to run the configuration script



```
dgg@DGGVAIO:~>cd dv/sf/cantera
dgg@DGGVAIO:~/dv/sf/cantera>configure

--------------------------------------------------------------

           Cantera Configuration Script

--------------------------------------------------------------

Cantera will be installed in c:/cantera
checking host system type... i686-pc-cygwin
checking target system type... i686-pc-cygwin
checking build system type... i686-pc-cygwin
checking for python2... no
checking for python... /cygdrive/c/python23/python
checking for matlab... //D/MATLAB6p5/bin/win32/matlab
Windows MATLAB command: D:/MATLAB6p5/bin/win32/matlab
checking for a BSD compatible install... /usr/bin/install -c
checking SO... .dll
creating ./config.status
creating ../Cantera/Makefile
creating ../Cantera/src/Makefile
creating ../Cantera/src/zeroD/Makefile
creating ../Cantera/src/oneD/Makefile
creating ../Cantera/src/converters/Makefile
```

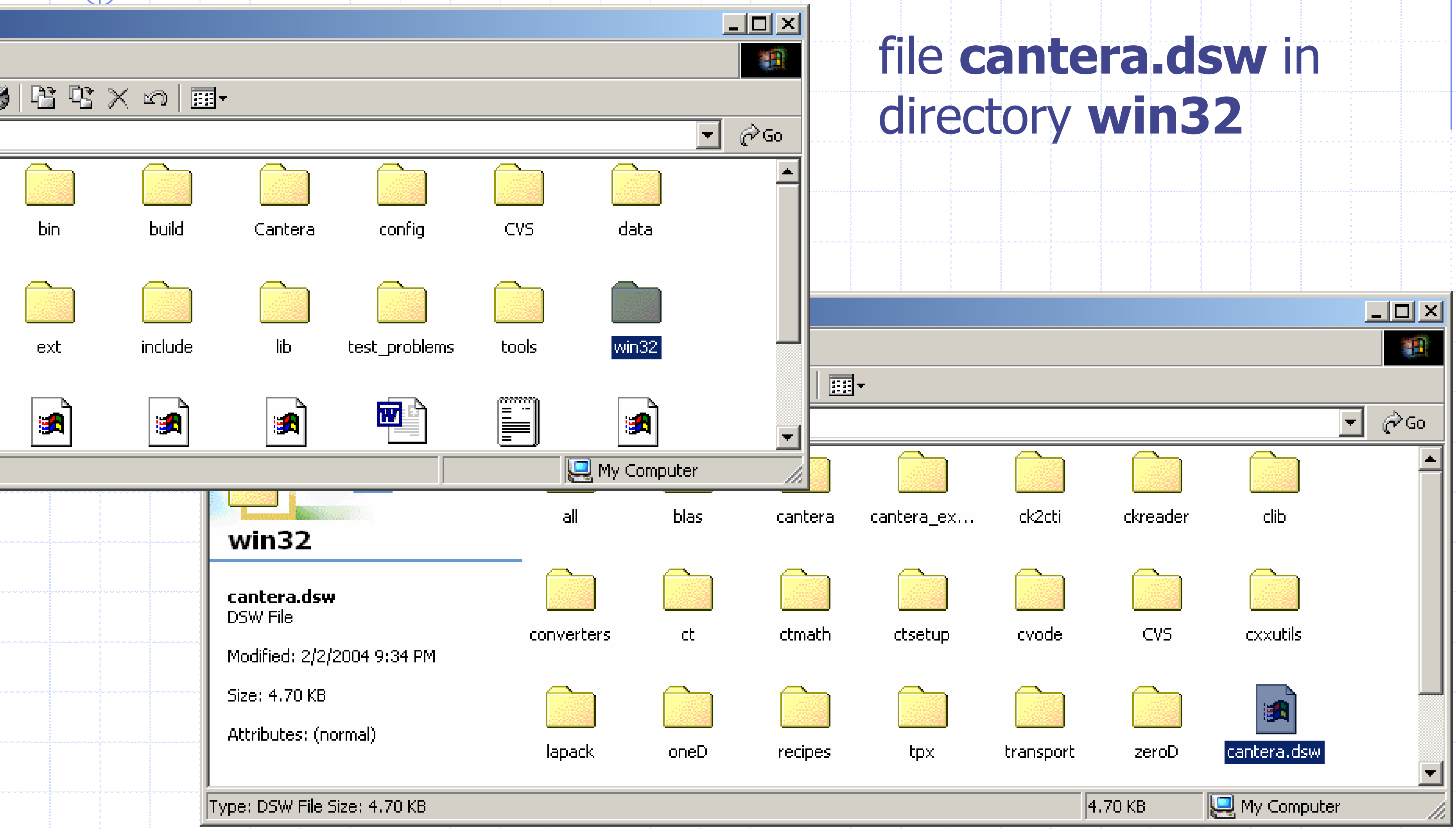
Hint: to refer to a DOS drive letter in cygwin, do it like this: /cygdrive/c, /cygdrive/d etc.

Choosing the Installation Directory

- By default, Cantera will be installed in c:\cantera
- To change this default, edit the configure script before running it
  - Change variable CANTERA_INSTALL_DIR to the desired installation location

Now open the Cantera Visual Studio project file

file **cantera.dsw** in directory **win32**



win32

cantera.dsw
DSW File

Modified: 2/2/2004 9:34 PM

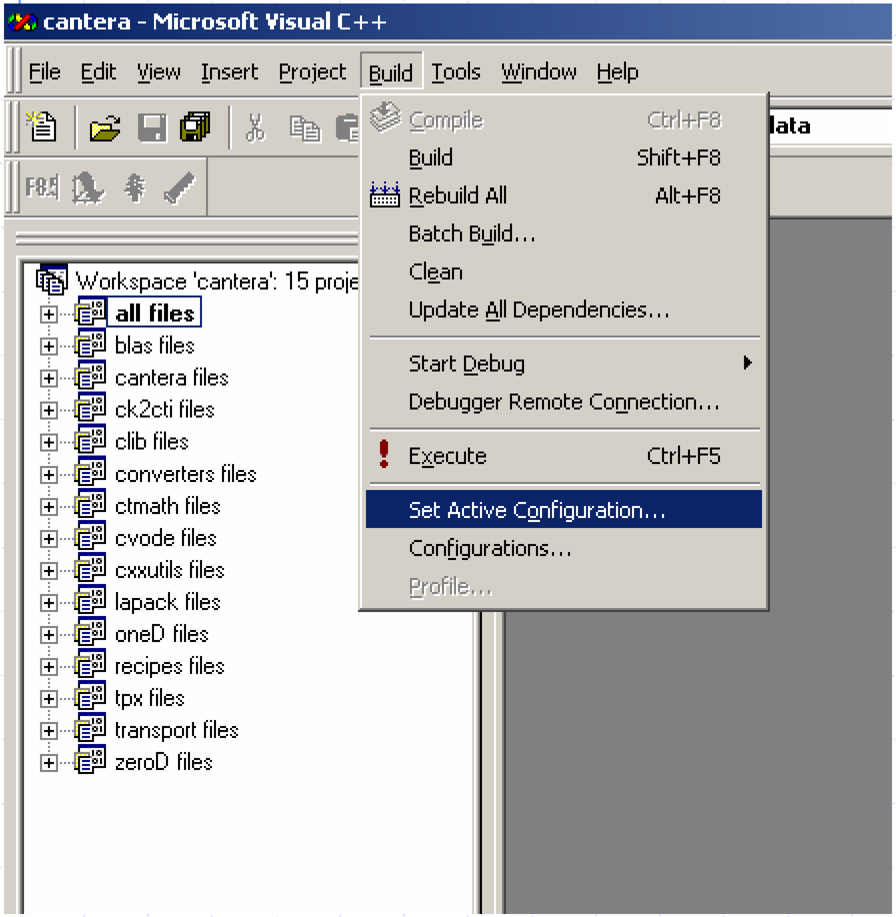
Size: 4.70 KB

Attributes: (normal)

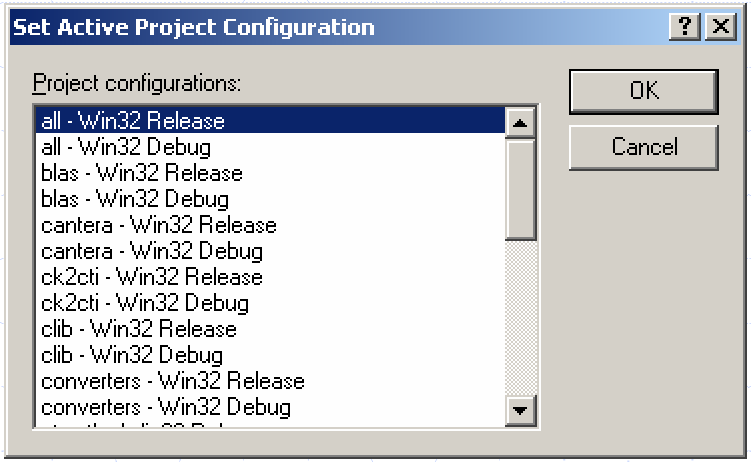
Type: DSW File Size: 4.70 KB

4.70 KB

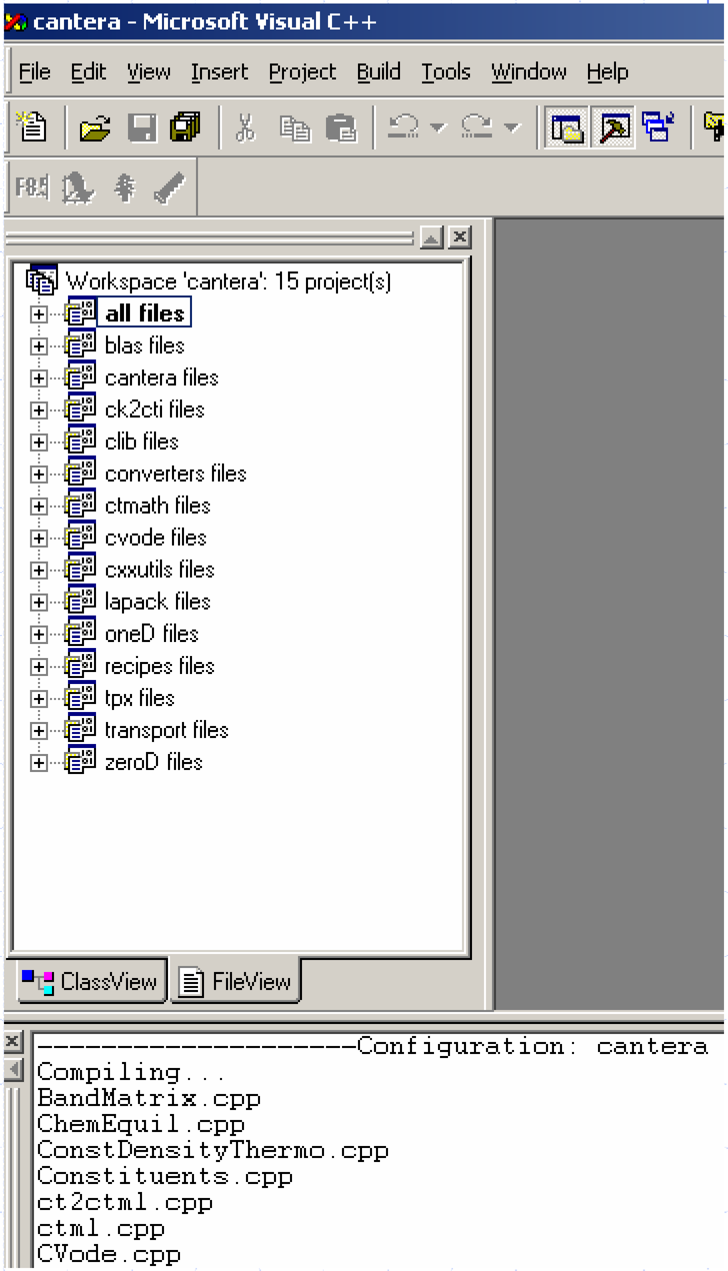
Set the active configuration



set the active configuration to 'all – Win32 Release'



Build project ‘all’

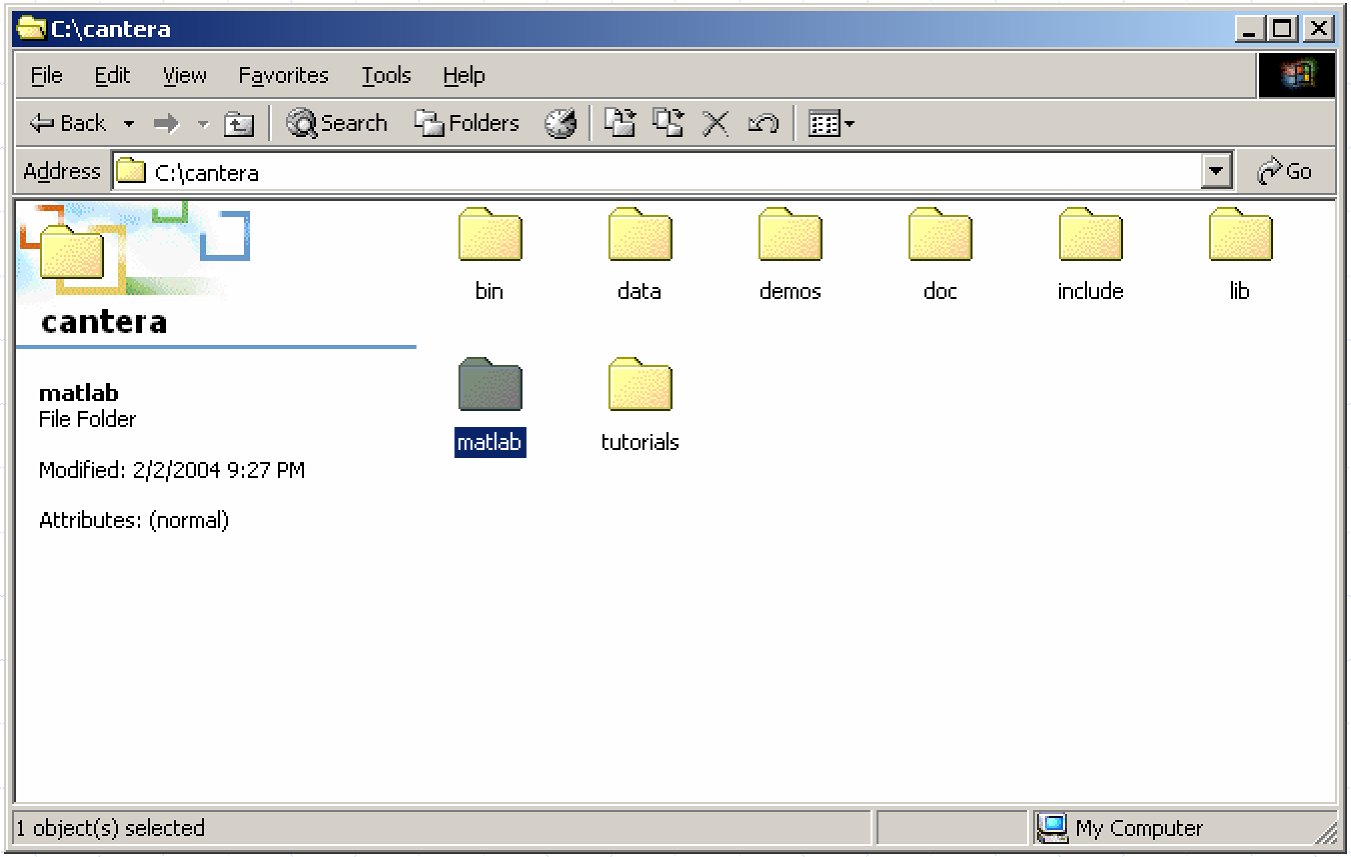


```
--------------------Configuration: cantera
Compiling...
BandMatrix.cpp
ChemEquil.cpp
ConstDensityThermo.cpp
Constituents.cpp
ct2ctml.cpp
ctml.cpp
CVode.cpp
```

Finish the Installation

- When the build of project ‘all’ finishes, return to the cygwin window
- type ‘**make win**’ to build the Python interface and MATLAB toolbox
- type ‘**make win-install**’ to install everything
- you should now have a functional Cantera installation

The installation directory should look like this when ‘make win-install’ finishes



matlab
File Folder

Modified: 2/2/2004 9:27 PM

Attributes: (normal)

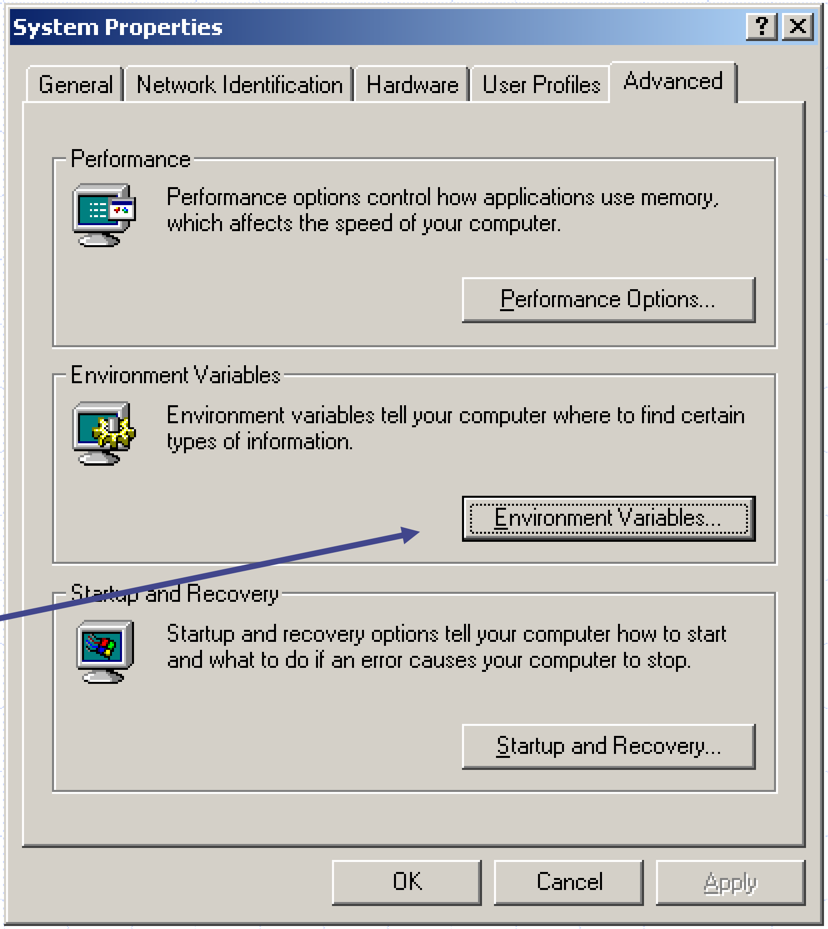
1 object(s) selected

Finishing Up

Cantera needs to know where to find the Python interpreter, since it uses Python to process ‘.cti’ input files

To edit the system search path, select “System” on the Control Panel to pull up this dialogue box

Press the ‘Environment Variables’ button

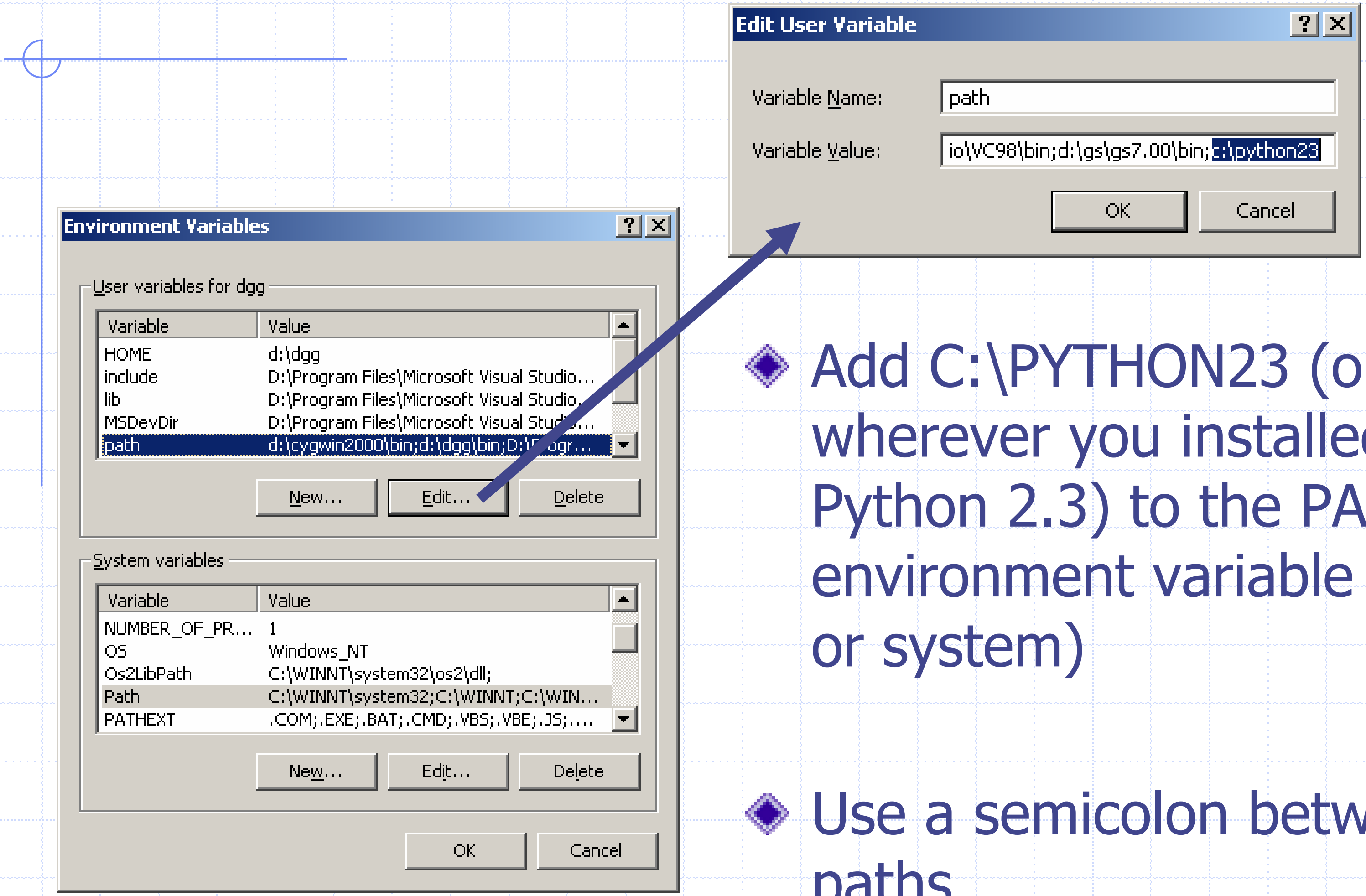


Performance options control how applications use memory, which affects the speed of your computer.

Environment variables tell your computer where to find certain types of information.

Startup and recovery options tell your computer how to start and what to do if an error causes your computer to stop.

Edit the PATH environment variable



Environment Variables

User variables for dgg

Variable	Value
HOME	d:\dgg
include	D:\Program Files\Microsoft Visual Studio…
lib	D:\Program Files\Microsoft Visual Studio…
MSDevDir	D:\Program Files\Microsoft Visual Studio…
path	d:\cygwin2000\bin;d:\dgg\bin;D:\Progr…

System variables

Variable	Value
NUMBER_OF_PR…	1
OS	Windows_NT
Os2LibPath	C:\WINNT\system32\os2\dll;
Path	C:\WINNT\system32;C:\WINNT;C:\WIN…
PATHEXT	.COM;.EXE;.BAT;.CMD;.VBS;.VBE;.JS;….

Edit User Variable

Variable Name: path

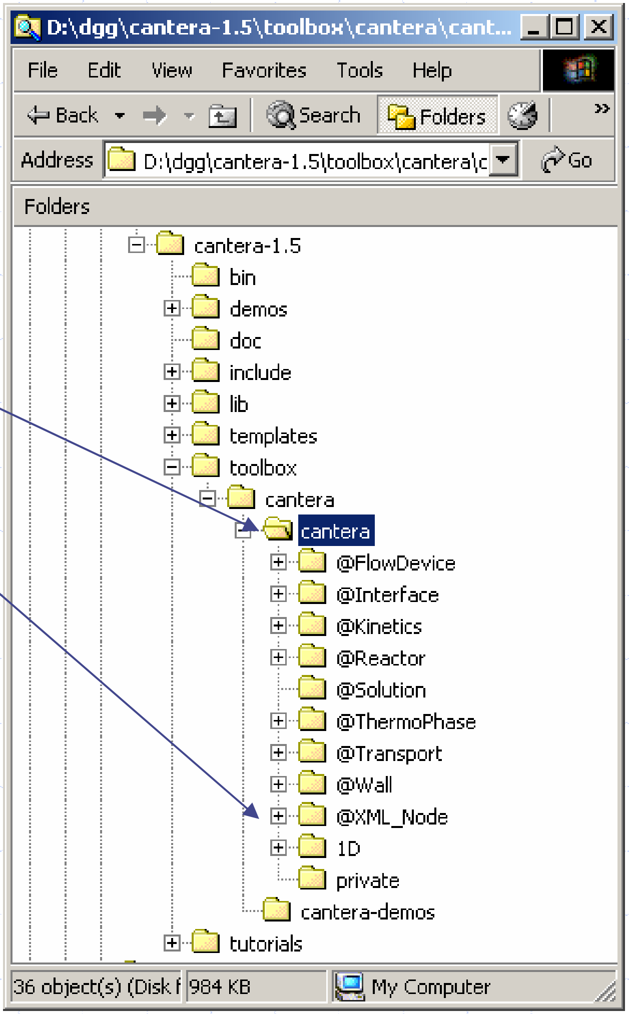
Variable Value: io\VC98\bin;d:\gs\gs7.00\bin;c:\python23

- Add C:\PYTHON23 (or wherever you installed Python 2.3) to the PATH environment variable (user or system)

- Use a semicolon between paths

If you will use MATLAB, put the Cantera Toolbox on the MATLAB path

- Add these **two** folders to the MATLAB path


D:\dgg\cantera-1.5\toolbox\cantera\cant...
File
Edit
View
Favorites
Tools
Help
Back
Search
Folders
Address
D:\dgg\cantera-1.5\toolbox\cantera\c
Go
Folders

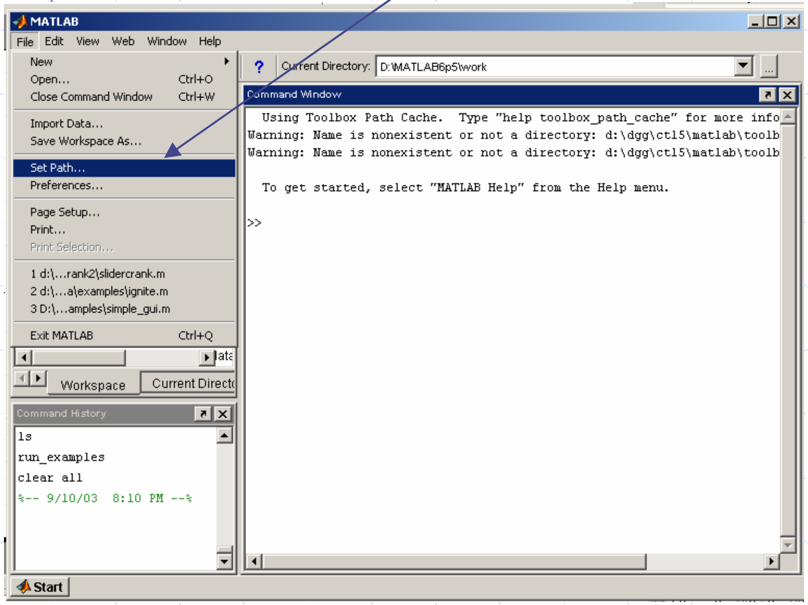
```
cantera-1.5
    bin
    demos
    doc
    include
    lib
    templates
    toolbox
        cantera
            cantera
                @FlowDevice
                @Interface
                @Kinetics
                @Reactor
                @Solution
                @ThermoPhase
                @Transport
                @Wall
                @XML_Node
                1D
                private
            cantera-demos
    tutorials
```

36 object(s) (Disk f | 984 KB | My Computer

Folder '1D' adds support for one-dimensional reacting flows

Setting the Path in Matlab

choose ‘Set Path…’ on the File menu



Current Directory: D:\MATLAB6p5\work

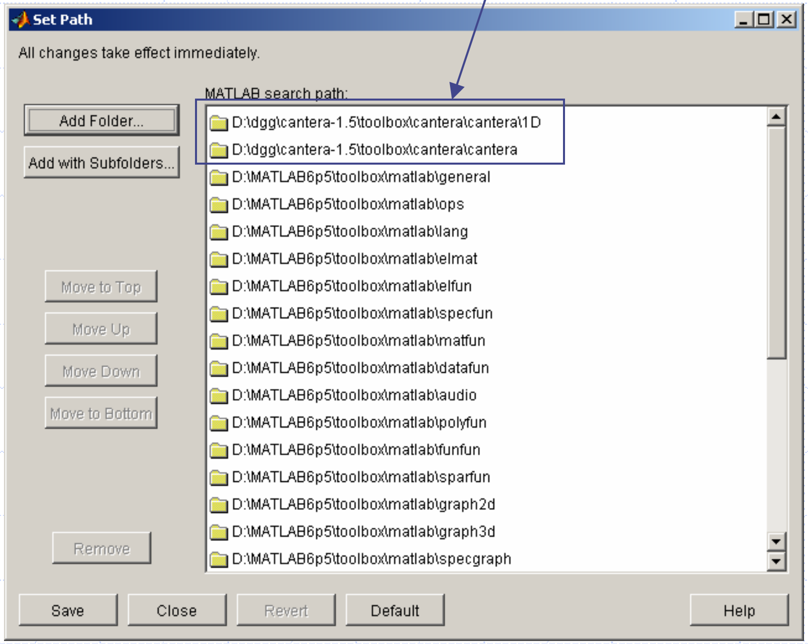
```
  Using Toolbox Path Cache.  Type "help toolbox_path_cache" for more info
Warning: Name is nonexistent or not a directory: d:\dgg\ctl5\matlab\toolb
Warning: Name is nonexistent or not a directory: d:\dgg\ctl5\matlab\toolb

  To get started, select "MATLAB Help" from the Help menu.

>>
```

```
ls
run_examples
clear all
%-- 9/10/03  8:10 PM --%
```

the Cantera Toolbox



All changes take effect immediately.

MATLAB search path:

D:\dgg\cantera-1.5\toolbox\cantera\cantera\1D
D:\dgg\cantera-1.5\toolbox\cantera\cantera
D:\MATLAB6p5\toolbox\matlab\general
D:\MATLAB6p5\toolbox\matlab\ops
D:\MATLAB6p5\toolbox\matlab\lang
D:\MATLAB6p5\toolbox\matlab\elmat
D:\MATLAB6p5\toolbox\matlab\elfun
D:\MATLAB6p5\toolbox\matlab\specfun
D:\MATLAB6p5\toolbox\matlab\matfun
D:\MATLAB6p5\toolbox\matlab\datafun
D:\MATLAB6p5\toolbox\matlab\audio
D:\MATLAB6p5\toolbox\matlab\polyfun
D:\MATLAB6p5\toolbox\matlab\funfun
D:\MATLAB6p5\toolbox\matlab\sparfun
D:\MATLAB6p5\toolbox\matlab\graph2d
D:\MATLAB6p5\toolbox\matlab\graph3d
D:\MATLAB6p5\toolbox\matlab\specgraph

If desired, the Cantera toolbox can be moved to the folder containing other toolboxes (or anywhere else)

Now try it out!

- If you have done everything described here, you should have a functioning Cantera 1.5.3 installation! (Congratulations.)
- Running the Python and MATLAB demonstration scripts is a good way to test your installation