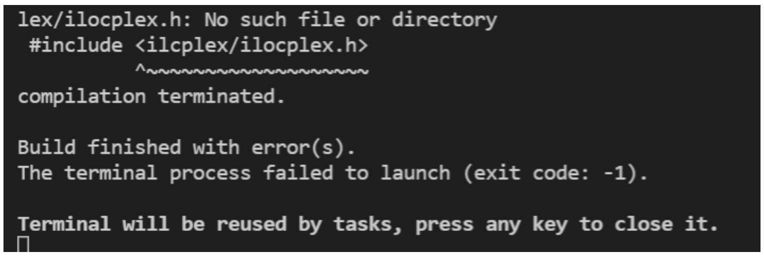
1 WINDOWS CPLEX COMPILATION – INFO & INSTRUCTIONS

To execute the code, we need in order:

- Visual Studio IDE (note: this is different from Visual Studio Code)
    - Installing the Community Version from here
- A C++ compiler
    - You can either use MinGW (here) or MSVC (done when selecting "Develop C++ applications" when installing Visual Studio
- CPLEX Studio installed on your machine (current version is 22.11)
    - All of the info present in the Moodle of the course here

The problem on Windows is evidenced by the fact that fatal errors might occur, like:



```
lex/ilocplex.h: No such file or directory
 #include <ilcplex/ilocplex.h>
          ^~~~~~~~~~~~~~~~~~~~
compilation terminated.

Build finished with error(s).
The terminal process failed to launch (exit code: -1).

Terminal will be reused by tasks, press any key to close it.
```

As seen here, a normal execution of Cplex would include:

`C:\Program Files\IBM\ILOG\CPLEX_Studio_Community201\cplex\include`

`C:\Program Files\IBM\ILOG\CPLEX_Studio_Community201\concert\include`

These folder need to be configured inside of the additional inclusions and also additional dependencies in the form of files and directives to the compiler.

The most recent versions (up to 2019, current is 2022) do not allow complete editing of the compilation options as you might see here.

2 WINDOWS CPLEX COMPILATION – SOLUTIONS

The solution is actually the following:

- Once you have installed Visual Studio and CPLEX on your machine, you should take some ready-made examples, so to import a Solution file (basically, a configuration file which needs to be imported in order to make the execution work) and then an executable file with a main()

The paths to consider <u>for solution files</u> are the following:

- C++ files:

```
C:\Program
Files\IBM\ILOG\CPLEX_Studio2211\cplex\examples\x64_windows_msvc14\stat_mda
```

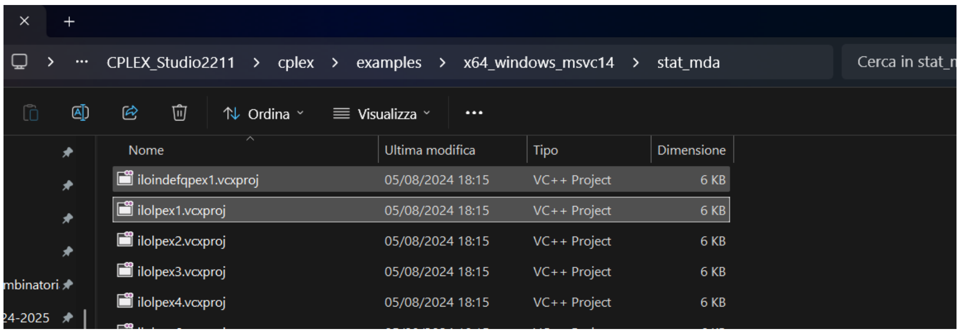
- C files:

```
C:\Program
Files\IBM\ILOG\CPLEX_Studio2211\cplex\examples\x64_windows_msvc14\stat_mdd
```

These folders report a lot of different files which are the "Solution" files; we need to consider files with extension `.vcxproj`. The goal here would be to first select a Solution file and then select a C/C++ file of the same name. So:

- If you want to execute a C example, go the "mda"
- If you want to execute a C++ example, go to "mdd"

For instance, let's consider `ilolpex1.vcproj`, which is a C++ file:


CPLEX_Studio2211 > cplex > examples > x64_windows_msvc14 > stat_mda
Cerca in stat_
Ordina
Visualizza

Nome	Ultima modifica	Tipo	Dimensione
iloindefqpex1.vcxproj	05/08/2024 18:15	VC++ Project	6 KB
ilolpex1.vcxproj	05/08/2024 18:15	VC++ Project	6 KB
ilolpex2.vcxproj	05/08/2024 18:15	VC++ Project	6 KB
ilolpex3.vcxproj	05/08/2024 18:15	VC++ Project	6 KB
ilolpex4.vcxproj	05/08/2024 18:15	VC++ Project	6 KB

We then need the actual <u>source codes</u>, which are to be linked with the respective `vcxproj` files of before. Once again, it's different for both formats:

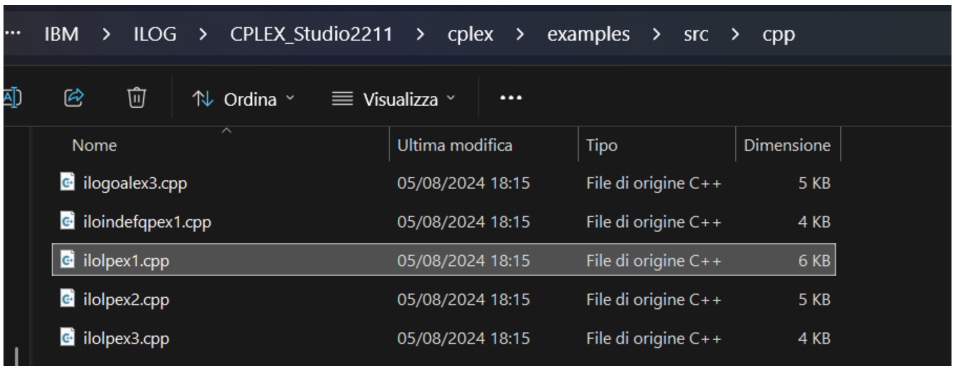
- C files:

```
C:\Program Files\IBM\ILOG\CPLEX_Studio2211\cplex\examples\src\c
```

- C++ files:

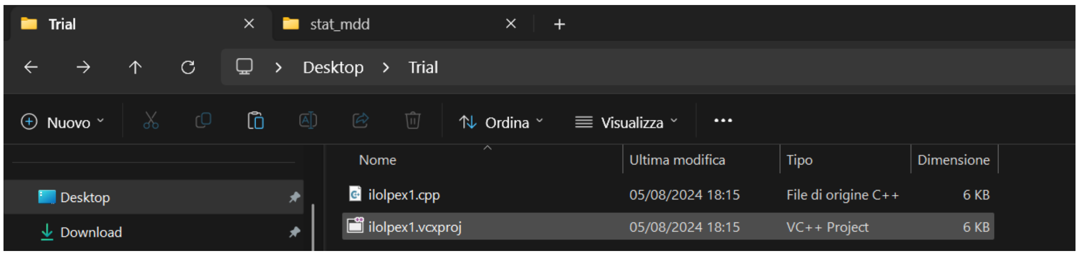
```
C:\Program Files\IBM\ILOG\CPLEX_Studio2211\cplex\examples\src\cpp
```

We then take the file of the same name as before:


IBM > ILOG > CPLEX_Studio2211 > cplex > examples > src > cpp
Ordina
Visualizza

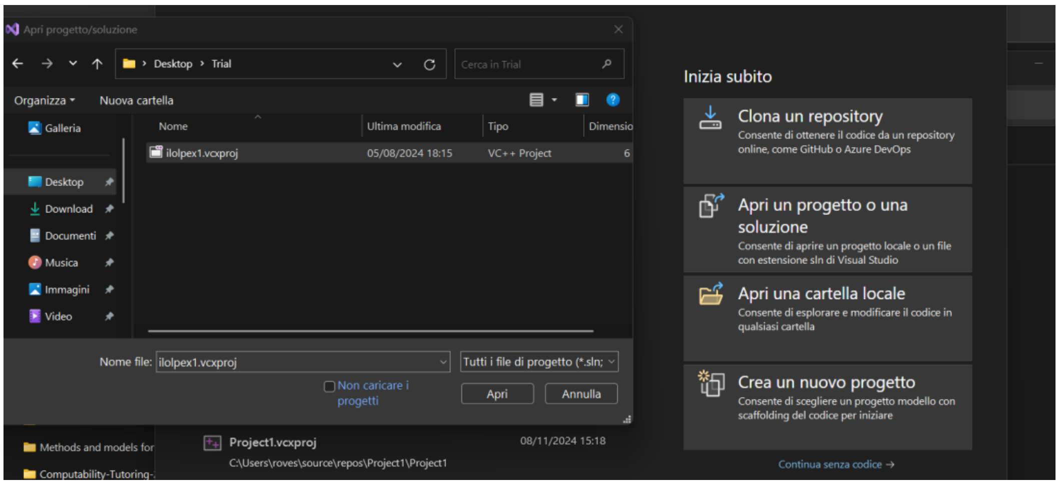
Nome	Ultima modifica	Tipo	Dimensione
ilogoalex3.cpp	05/08/2024 18:15	File di origine C++	5 KB
iloindefqpex1.cpp	05/08/2024 18:15	File di origine C++	4 KB
ilolpex1.cpp	05/08/2024 18:15	File di origine C++	6 KB
ilolpex2.cpp	05/08/2024 18:15	File di origine C++	5 KB
ilolpex3.cpp	05/08/2024 18:15	File di origine C++	4 KB

We need both files in order to import them into Visual Studio and then customize the code of the actual source file (C/C++) so to make the code work fine. We then create a folder with a custom name on a custom location with both files, like the following:



Nome	Ultima modifica	Tipo	Dimensione
ilolpex1.cpp	05/08/2024 18:15	File di origine C++	6 KB
ilolpex1.vcxproj	05/08/2024 18:15	VC++ Project	6 KB

We then open Visual Studio loading the vcxproj file on “Open a project or a solution” file.



Nome	Ultima modifica	Tipo	Dimensio
ilolpex1.vcxproj	05/08/2024 18:15	VC++ Project	6

Nome file: ilolpex1.vcxproj
Tutti i file di progetto (*.sln;

Project1.vcxproj 08/11/2024 15:18
C:\Users\roves\source\repos\Project1\Project1

Inizia subito

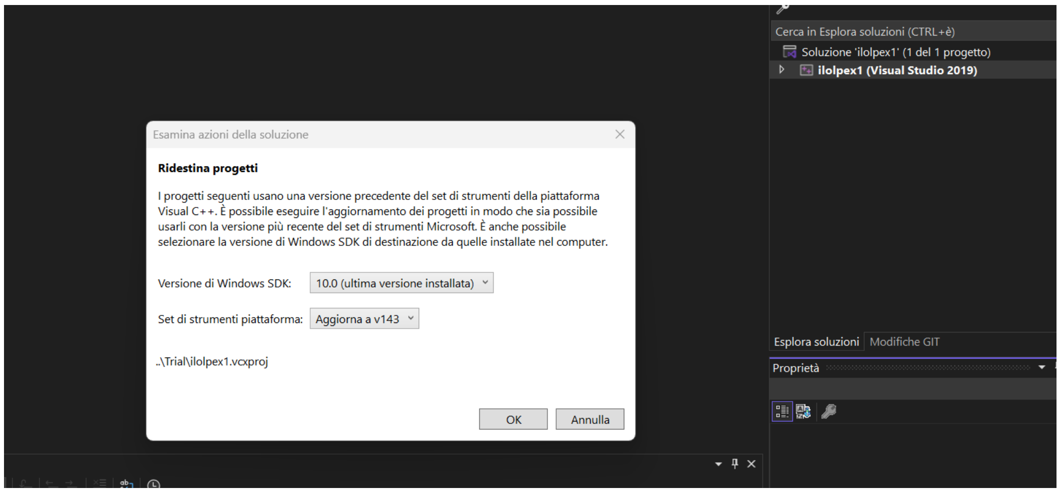
Clona un repository
Consente di ottenere il codice da un repository online, come GitHub o Azure DevOps

Apri un progetto o una soluzione
Consente di aprire un progetto locale o un file con estensione sln di Visual Studio

Apri una cartella locale
Consente di esplorare e modificare il codice in qualsiasi cartella

Crea un nuovo progetto
Consente di scegliere un progetto modello con scaffolding del codice per iniziare

Once the prompt is open, select the Windows SDK version and multiplatform by default and continue.



Cerca in Esplora soluzioni (CTRL+è)

Soluzione 'ilolpex1' (1 del 1 progetto)

ilolpex1 (Visual Studio 2019)

Esamina azioni della soluzione

Ridestina progetti

I progetti seguenti usano una versione precedente del set di strumenti della piattaforma Visual C++. È possibile eseguire l'aggiornamento dei progetti in modo che sia possibile usarli con la versione più recente del set di strumenti Microsoft. È anche possibile selezionare la versione di Windows SDK di destinazione da quelle installate nel computer.

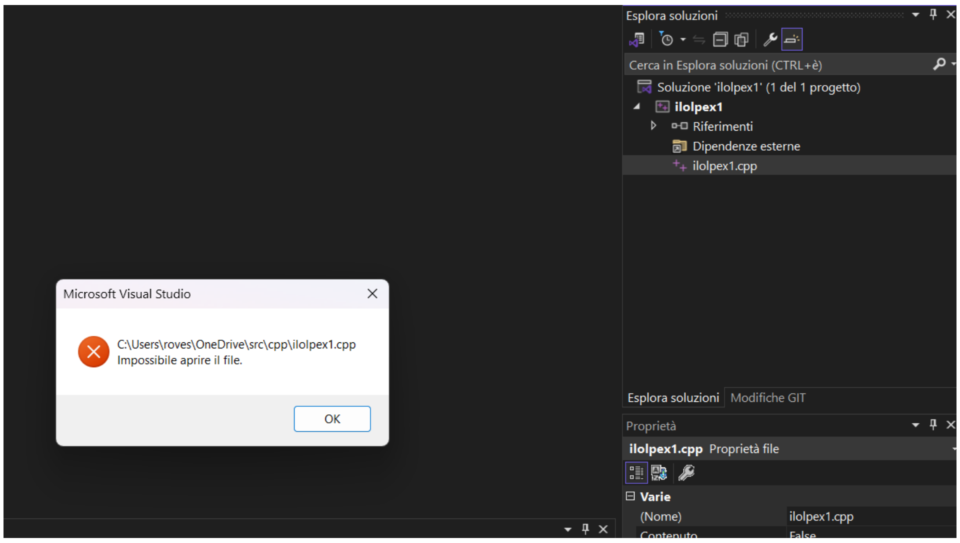
Versione di Windows SDK: 10.0 (ultima versione installata)

Set di strumenti piattaforma: Aggiorna a v143

..\Trial\ilolpex1.vcxproj

<u>WARNING</u>

At this point, since the vcxproj file points to files present in the previous path (so inside of the Cplex path), it will tell you “Impossible to open file”, since it does not see the local path:



Microsoft Visual Studio

C:\Users\roves\OneDrive\src\cpp\ilolpex1.cpp
Impossibile aprire il file.

Cerca in Esplora soluzioni (CTRL+è)

Soluzione 'ilolpex1' (1 del 1 progetto)
- ilolpex1
  - Riferimenti
  - Dipendenze esterne
  - ilolpex1.cpp

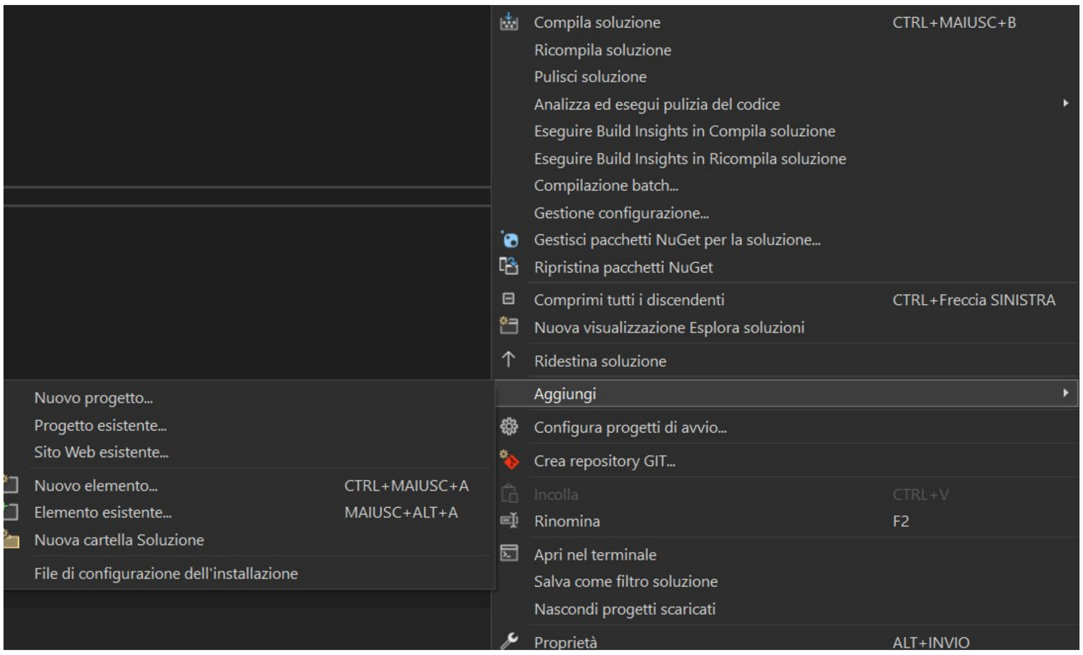
ilolpex1.cpp Proprietà file

Varie

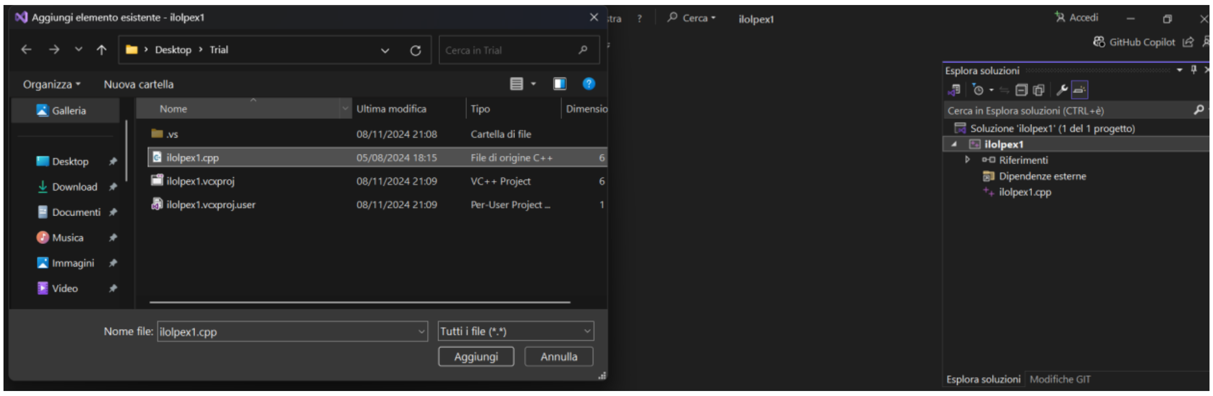
(Nome) ilolpex1.cpp

Contenuto False

What you will do to solve this problem, is to right-click the name of project in the right menu present (in this case where there is `ilolpex1`) and then click “Add” (Aggiungi) and then click on “Existing element” (Elemento esistente):


Compila soluzione CTRL+MAIUSC+B
Ricompila soluzione
Pulisci soluzione
Analizza ed esegui pulizia del codice
Eseguire Build Insights in Compila soluzione
Eseguire Build Insights in Ricompila soluzione
Compilazione batch...
Gestione configurazione...
Gestisci pacchetti NuGet per la soluzione...
Ripristina pacchetti NuGet
Comprimi tutti i discendenti CTRL+Freccia SINISTRA
Nuova visualizzazione Esplora soluzioni
Ridestina soluzione
Aggiungi
Configura progetti di avvio...
Crea repository GIT...
Incolla CTRL+V
Rinomina F2
Apri nel terminale
Salva come filtro soluzione
Nascondi progetti scaricati
Proprietà ALT+INVIO
Nuovo progetto...
Progetto esistente...
Sito Web esistente...
Nuovo elemento... CTRL+MAIUSC+A
Elemento esistente... MAIUSC+ALT+A
Nuova cartella Soluzione
File di configurazione dell'installazione

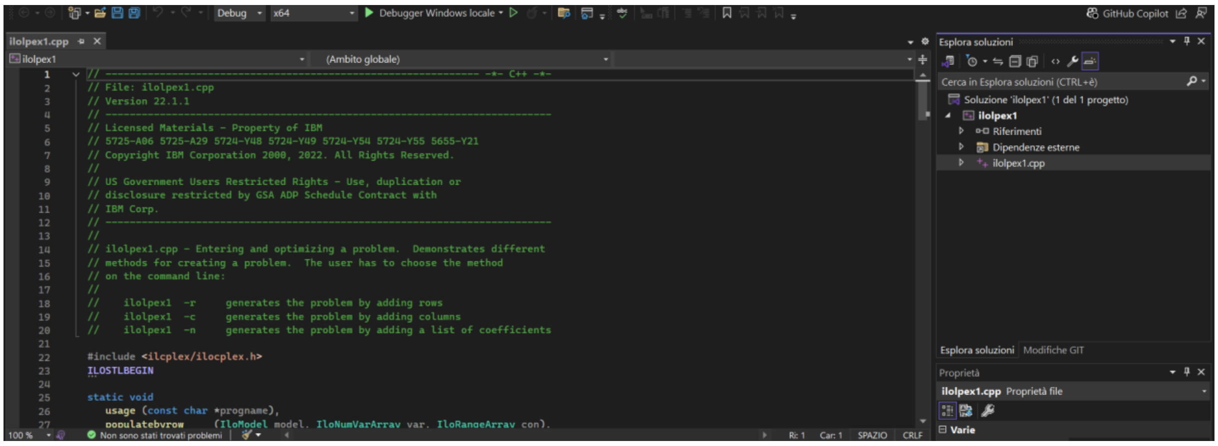
Here we will select the actual C/C++ file:



Nome	Ultima modifica	Tipo	Dimensio
.vs	08/11/2024 21:08	Cartella di file	
ilolpex1.cpp	05/08/2024 18:15	File di origine C++	6
ilolpex1.vcxproj	08/11/2024 21:09	VC++ Project	6
ilolpex1.vcxproj.user	08/11/2024 21:09	Per-User Project ...	1

Nome file: ilolpex1.cpp
Tutti i file (*.*)

Please remove the old file which is not to be found, so you have only one, the correctly imported file. You should see something like this:

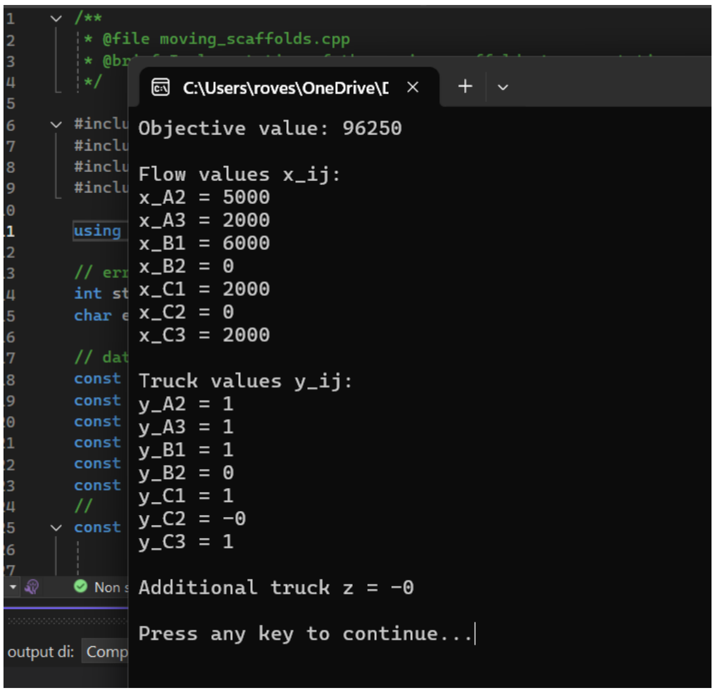


```cpp
// -------------------------------------------------------------- -*- C++ -*-
// File: ilolpex1.cpp
// Version 22.1.1
// --------------------------------------------------------------------------
// Licensed Materials - Property of IBM
// 5725-A06 5725-A29 5724-Y48 5724-Y49 5724-Y54 5724-Y55 5655-Y21
// Copyright IBM Corporation 2000, 2022. All Rights Reserved.
//
// US Government Users Restricted Rights - Use, duplication or
// disclosure restricted by GSA ADP Schedule Contract with
// IBM Corp.
// --------------------------------------------------------------------------
//
// ilolpex1.cpp - Entering and optimizing a problem.  Demonstrates different
// methods for creating a problem.  The user has to choose the method
// on the command line:
//
//    ilolpex1  -r     generates the problem by adding rows
//    ilolpex1  -c     generates the problem by adding columns
//    ilolpex1  -n     generates the problem by adding a list of coefficients

#include <ilcplex/ilocplex.h>
ILOSTLBEGIN

static void
   usage (const char *progname),
   populatebyrow     (IloModel model, IloNumVarArray var, IloRangeArray con),
```

We then build the actual file and a command prompt window will feedback the right execution here (this is a different execution, the example run in the laboratory, so you have an idea):



```
/**
 * @file moving_scaffolds.cpp
 * @br
 */

#inclu
#inclu
#inclu
#inclu

using

// err
int st
char e

// dat
const
const
const
const
const
const
//
const
```

```
Objective value: 96250

Flow values x_ij:
x_A2 = 5000
x_A3 = 2000
x_B1 = 6000
x_B2 = 0
x_C1 = 2000
x_C2 = 0
x_C3 = 2000

Truck values y_ij:
y_A2 = 1
y_A3 = 1
y_B1 = 1
y_B2 = 0
y_C1 = 1
y_C2 = -0
y_C3 = 1

Additional truck z = -0

Press any key to continue...
```

This way, any kind of project works. This was tested both on C and C++ files.