



# IBERO SOLVER 2X2X2 LBL

VERSIÓN 1.X.X

MANUAL DE USUARIO

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## 1. Introducción

Ibero Solver 2x2x2 LBL proporciona los movimientos que hay que aplicar para resolver un cubo de 2x2x2. El usuario introduce la información de los colores de las caras de su cubo (sin resolver), y el programa crea una lista en un fichero TXT con los movimientos con los que el cubo se resuelve.

Los algoritmos usados en el programa son los del método LBL (*Layer-By-Layer*; Capa a Capa), en el cual primero se resuelve la mitad superior del cubo, y acto seguido la inferior.

## 2. Descarga e instalación

### 2.1. En Windows

El programa está escrito en Fortran; por tanto, antes de usar el programa, hay que instalar un compilador que permita al ordenador entender las aplicaciones escritas en este lenguaje. Aquí se ha usado gfortran, un compilador perteneciente a la colección GCC, creada por el proyecto GNU.

En la Wiki de GCC (<http://gcc.gnu.org/wiki/GFortranBinaries>) hay muchas versiones para Windows; la más cómoda (es un instalador al uso) es ésta:

<http://users.humboldt.edu/finneyb/gfortran-windows-20130301.exe>

Tras descargarlo, hay que ejecutar el archivo. Se mostrará una ventana como ésta:

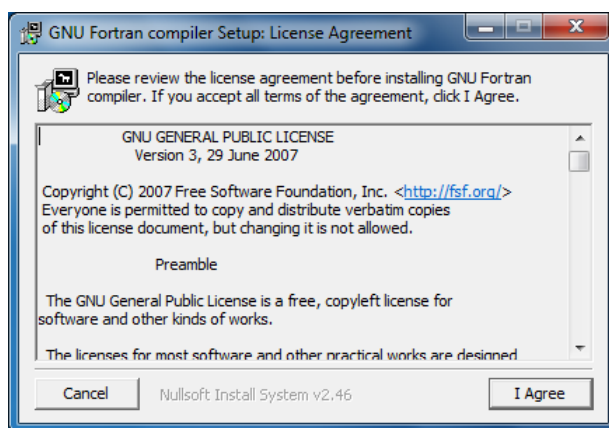


Figura 1: Ventana del instalador del compilador gfortran.

Y no habrá más que instalarlo de la manera habitual.

Para instalar el programa, habrá que descargarse de la web de Ibero Rubik el archivo comprimido de la versión consola en español. Una vez descargado, habrá que descomprimirlo en una carpeta fácilmente localizable por el usuario (por ejemplo el Escritorio), ya que tendrá que entrar en ella para escribir los colores de las caras (Figura 2).

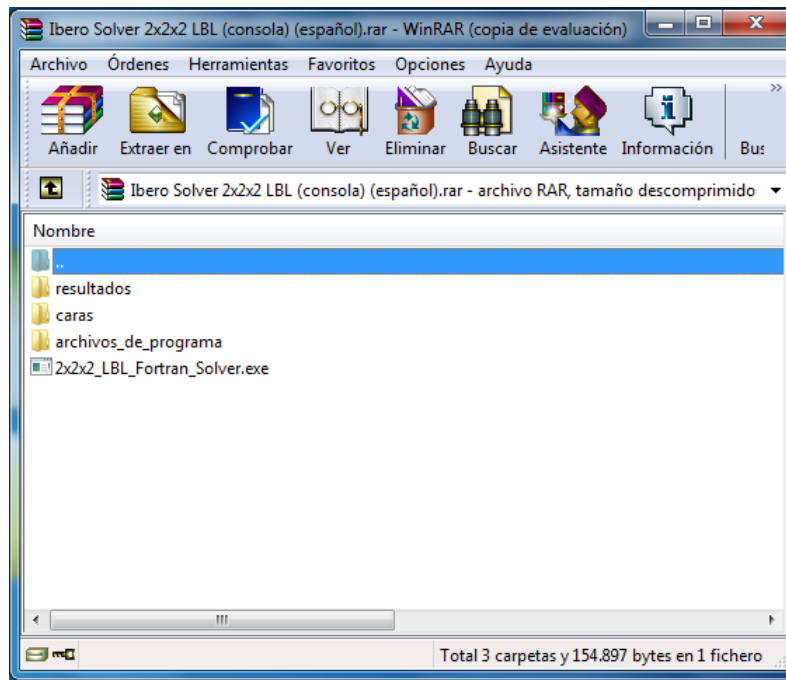


Figura 2: Descomprima la carpeta en un directorio accesible.

**NOTA:** La carpeta principal puede renombrarse, pero el contenido de la misma (las tres subcarpetas y el ejecutable) debe permanecer en una misma carpeta. Si alguna subcarpeta se borra o se mueve el archivo EXE, el programa no funcionará.

## 2.2. En Linux

Normalmente en Linux el compilador GCC ya está instalado. Para comprobarlo, abra la Terminal y escriba "gfortran" (sin comillas). Si la consola devuelve "gfortran: no se encontró la orden", necesita instalarlo. Para instalarlo o actualizarlo a la última versión, haga lo siguiente:

1. Escriba (sin comillas) "apt-cache search gfortran" y pulse ENTER.
2. De todos los resultados mostrados, busque los que tienen la forma "gfortran-x.x - GNU Fortran compiler", donde "x.x" será la versión más reciente (Figura 3).
3. Tras ello, introduzca "sudo apt-get install" más la versión más reciente de gfortran, presione ENTER e introduzca su contraseña.
4. Cuando haya terminado, vuelva a comprobar si gfortran está instalado. Si lo está, cierre la consola

```
-PORTEGE-M800:~$ apt-cache search gfortran
gfortran - GNU Fortran 95 compiler
gfortran-4.5-doc - Documentation for the GNU Fortran compiler (gfortran)
gfortran-4.6 - GNU Fortran compiler
gfortran-4.6-doc - Documentation for the GNU Fortran compiler (gfortran)
gfortran-4.6-multilib - GNU Fortran compiler (multilib files)
gfortran-multilib - GNU Fortran 95 compiler (multilib files)
lib32gfortran3 - Runtime library for GNU Fortran applications (32bit)
lib32gfortran3-dbg - Runtime library for GNU Fortran applications (32 bit de
bug symbols)
gfortran-4.4-doc - Documentación para el compilador Fortran 95 GNU (gfortran
)
gfortran-doc - Documentación para el compilador Fortran 95 GNU (gfortran)
lib64gfortran3 - Biblioteca runtime para aplicaciones Fortran GNU (64bit)
lib64gfortran3-dbg - Biblioteca ejecutable para aplicaciones Fortran GNU (sí
mbolos de depuración 64bit)
libgfortran3 - Biblioteca de ejecución para aplicaciones GNU Fortran
libgfortran3-dbg - Biblioteca de ejecución para aplicaciones GNU Fortran (sí
mbolos de depuración)
gfortran-4.4 - GNU Fortran 95 compiler
```

Figura 3: Resultados mostrados en la consola.

## 3. Uso

### 3.1. En Windows

1. Para usar el programa en Windows, diríjase a la subcarpeta “caras”, y en cada uno de los ficheros TXT que hay en el interior, escriba los colores. El nombre de los archivos de las caras sigue la nomenclatura en inglés:

- U → Cara superior
- F → Cara frontal
- R → Cara derecha
- B → Cara trasera
- L → Cara izquierda
- D → Cara inferior

En cada fichero están escritos, de forma matricial, los colores de cada cara.

2. Para transcribir lo que ve en el cubo, cójalo con una cara paralela a usted, decidiendo claramente cuál es la cara derecha, la izquierda, la inferior, etc. Una vez esté eso decidido, introduzca los colores según indica la Figura 4:

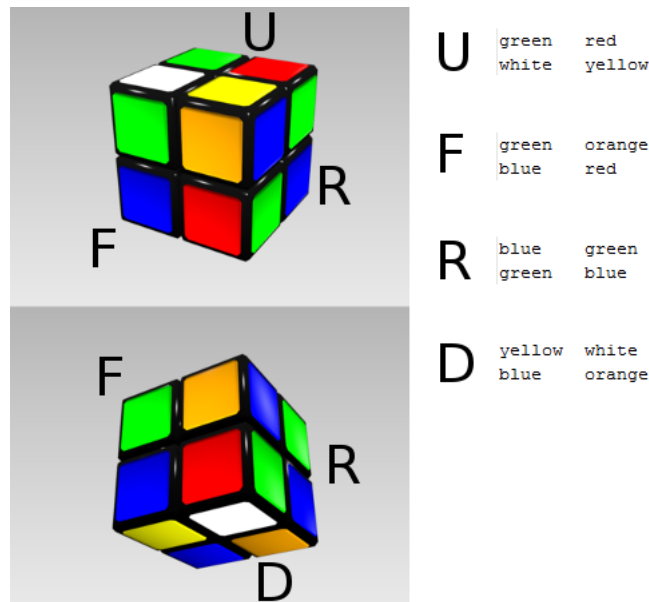


Figura 4: Introducción de colores.

3. Tras esto, ejecute el fichero “Ibero Solver 2x2x2 LBL.exe”, situado en la carpeta principal.
4. En unas décimas de segundo, el programa resolverá el cubo, y mostrará datos de todo el proceso: situación del cubo tras aplicar cada paso, tiempo tardado... Para cerrar el programa bastará con pulsar cualquier tecla y a continuación ENTER.
5. Dirijase a la subcarpeta “resultados”; ahí encontrará cuatro ficheros TXT:
  - movimientos.txt: Contiene todos los movimientos a realizar.
  - movimientos\_paso\_0.txt: Contiene el movimiento a realizar para colocar la cara más completa arriba (si procede).
  - movimientos\_paso\_1.txt: Aquí están los movimientos que completan la capa superior.
  - movimientos\_paso\_2.txt: Aquí se incluye el giro de 180º del cubo para colocar la parte no resuelta arriba, y los movimientos que sitúan los amarillos en la cara superior.
  - movimientos\_paso\_3.txt: Con estos movimientos se permutan las piezas de la capa superior, resolviendo el cubo por completo.

Si en alguna de las etapas no ha sido necesario ningún movimiento, el fichero correspondiente se encontrará vacío.

### 3.2. En Linux

1. Igual que en Windows
2. Igual que en Windows
3. En el caso del programa para Linux, el programa debe ejecutarse desde consola, pero primero debe marcarlo como archivo ejecutable. Para ello, clickée en el programa “run” con el botón derecho, vaya a propiedades, y en la pestaña “Permisos”, marque la casilla “es ejecutable”.

Tras ello, abra la Terminal en la carpeta principal del programa y escriba (sin comillas): “ ./run ”

4. Igual que en Windows
5. Igual que en Windows

## 4. Información mostrada por el programa

- Primeramente, el programa muestra el estado del cubo en las diferentes etapas:
  - Antes de ser resuelto (es decir, los datos de los archivos de las caras).
  - Después de la detección del patrón: Los colores “no estándar” se reescriben para que las subrutinas siguientes puedan funcionar: negro → blanco; morado → naranja.
  - Después del giro del cubo y la detección de etapa: La parte más resuelta del cubo se coloca arriba para empezar por ella.
  - Después del cambio interno de color: Como las subrutinas siguientes están diseñadas para empezar por el color blanco y terminar por el amarillo, y con el giro anterior del cubo puede haberse situado otro color en la cara superior, todos los colores se cambian internamente para que el superior sea el blanco, el inferior sea el amarillo, y el resto de colores estén en consonancia. A partir de aquí lo que muestra el programa no es el estado real del cubo, sino los colores que él usa.
  - Tras subir los blancos y antes de permutar: Todos los blancos están arriba, quedando completada la mitad del primer paso.
  - Después de la resolución del primer paso: La mitad superior del cubo está resuelta.
  - Después de la resolución del segundo paso: Se ha colocado la cara amarilla como cara superior y se ha completado.
  - Después de la resolución del tercer paso: El cubo está completamente resuelto.
- A continuación se muestran los movimientos ahorrados al hacer uso (repetidas veces) de la subrutina “reductor\_de\_movimientos”: A modo de ejemplo, si en el programa se escribe U y a continuación U’, como el estado final del cubo es el mismo haciendo estos dos movimientos que sin hacerlos, estos dos movimientos se eliminan de la lista final (sólo se eliminan de los movimientos escritos en el fichero “movimientos.txt”).
- Y finalmente se muestra el tiempo aproximado que ha tardado el programa en resolver el cubo.

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Este programa es software libre licenciado con la Licencia Pública General (GPL) de GNU, por lo que, resumiendo lo que indica esta licencia, el usuario puede:

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4. Modificar el programa
5. Transmitir versiones modificadas por él mismo en forma de código objeto, incluyendo siempre el código fuente.

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- Decir que la licencia GPL se aplica al código
- Indicar la ausencia de garantía
- Proporcionando una copia de la GPL con el programa

Este programa no puede usarse como parte de un programa que no sea software libre.

Lo expuesto aquí es un mero resumen, por lo que si está decidido a usar este programa en un proyecto suyo, o si piensa modificarlo, el programa resultante debe tener también la licencia GPL, por lo que le animamos a que lea detenidamente las características y condiciones de esta licencia.

<http://www.gnu.org/licenses/licenses.html>.



## 6. FAQs

- **¿Por qué Fortran, y no otro lenguaje de programación más común?**

Fortran aún se sigue usando mucho en la ingeniería. Además, es un lenguaje eficaz para manipular matrices, y relativamente rápido (el tiempo de ejecución del programa está por debajo de 50 ms). No obstante, estamos usando también otros lenguajes, como Visual Basic para diseñar una interfaz gráfica para Windows.

- **¿Por qué hay que instalar un compilador para poder ejecutar el programa?**

Esto ocurre especialmente en Windows. Fortran, aun siendo muy eficaz para su propósito, no está muy extendido, por lo que Windows no lo “entiende”. Así que el compilador permite crear los ejecutables en Windows a partir del código fuente, y ejecutarlos.

- **Uso Linux, y no puedo ejecutar el programa; al ejecutarlo por la Terminal pone “Permiso denegado”.**

Pese a haber marcado la opción “es ejecutable”, puede seguir fallando. Esto puede ser debido a los permisos del disco duro donde está el programa (es probable que dé este error en HDDs externos); con guardar la carpeta principal y todo su contenido en una partición del disco duro interno, este problema debería solucionarse.

- **¿Qué es toda esa información que muestra el programa?**

Toda la información dada por el programa está detallada en el apartado 4 de este Manual.

- **He borrado accidentalmente una de las carpetas del programa.**

El programa dará error si intenta ejecutarlo. Recomendamos que se baje de nuevo el programa desde la web de Ibero Rubik.

- **He borrado accidentalmente un archivo.**

Si es un fichero de la carpeta “resultados” o de la carpeta “archivos\_de\_programa”, no tiene mayor trascendencia; al ejecutar el programa se crearán de nuevo. Si es de la carpeta “caras”, el programa no funcionará, ya que necesita los datos escritos en él. Puede crearlo manualmente, llamarlo de forma análoga al resto de ficheros de la carpeta, y escribir los colores de las caras en él.

- **¿Por qué el nombre de las caras, los colores y los movimientos están en inglés si el programa está en español?**

Porque el programa se concibió originalmente en inglés. Además se decidió seguir usando la nomenclatura en inglés para las caras y los movimientos porque es una nomenclatura ampliamente extendida.

- **¿De qué forma puedo usar este programa según su licencia?**

Al ser software libre, usted puede copiarlo, redistribuirlo, modificarlo e incluso venderlo, siempre que en esos pasos no deje de ser software libre (es decir, no se le prive al usuario de los derechos antes mencionados). Para más información, lea el apartado 5 de este manual o busque más información en la web de la Free Software Foundation.

## 7. Enlaces

[www.iberorubik.com](http://www.iberorubik.com)

<http://gcc.gnu.org/wiki/GFortranBinaries>

<http://users.humboldt.edu/finneyb/gfortran-windows-20130301.exe>

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