Creating a User Library for use in the IDE

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Creating a User Library for use in the IDE
Basic Idea

In teaching GAMS classes in prior years I have had trouble with people accessing the right files. The IDE's project directory and my file directory structure coupled with similar or duplicate names for files across different directories with similar but not exact content caused problems.

This led to a class library manager development project between myself and Paul van der Eijk and Alex Meeraus at GAMS. The result is that a Windows Explorer like library manager has been developed.

These notes cover cration of a library for use in the library manager while parallel notes cover how you use the library manager.

Note this is brand new and improvements continue, thus features used in these notes may differ slightly from the software you receive.

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
You can make your own library

You can define your own library To do it you need to create a "GLB" file. which is used in the IDE. That file is located in the top directory of any user library. Here is beginning of it. Later we will discuss a program I created which will generate this file.

```
Version = 5
LibraryName = McCarl and Spreen
Columns = 7
1 = Name
2 = Book Chapter
3 = Section
4 = GAMS Points
5 = Modeling Points
6 = Problem Type
7 = Other
InitialSort = 1
*$*$*$
Files = absolute.gms
Directory = CH09
1 = ABSOLUTE.GMS
2 = 09 - Nonlinearities and Approximation
3 = 09.1.1.1
4 =
5 = Absolute deviation
6 =
7 =
GAMS implementation of the minimization of summed absolute
deviations example


*$*$*$
Files = actanal.gms
Directory = CH13
1 = ACTANAL.GMS
2 = 13 - Price Endogenous
3 = 13.3
4 =
5 = Implicit Supply
6 =
7 =
GAMS implementation of the Implicit Supply example
*$*$*$
```

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
GLB File Structure

The GLB file has 2 main parts

    Header

    File entries for each file to be included

Header Contents (color referenced to glb file below)

(1)   Version number of GLB file (must be exactly as below)

(2)   Mandatory LibraryName (part up to = is mandatory rest optional)

(3)   Mandatory number of description fields in library (maximum 10)

(4)   Mandatory name for each descriptor column (format is descriptor column number = text string)

(5)   Specification of column on which to initially sort (format is fixed up to = followed by column number of primary initial sort key)

(6)   Separator field (must be exactly as below)

Header Example (all entries start in column one and spacing before after = must be replicated)

Version = 5
LibraryName = McCarl and Spreen
Columns = 6
1 = Name
2 = Book Chapter
3 = Section
4 = GAMS Points
5 = Modeling Points
6 = Problem Type
InitialSort = 1
$*$ $

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
GLB File Structure -File entry Contents

For each file in the library

(1) Name of files to be retrieved by IDE when this file is chosen (note must always contain at least one name but other names can be added separated by commas. IDE rows associated with first file name. When IDE retrieves file with first name any associated files are also retrieved to the project directory. All files must be present).

(2) Directory files are located in specified relative to location of glb file (note if in same directory as glb file this is blank otherwise it is subdirectory name)

(3) Entries for library cells for each column in library (format again column number =, all columns must be specified)

(4) Description field entry (may be up to 20 lines long)

(e) File Entry separator

r

Example with 2 rows (files) in library

Files = ALLSTO.GMS,s.bat,sets.10,scale.10,demand.10,farmpro.
Directory = asm
1 = ALLSTO.GMS
2 = ASM
3 =
4 = Stochastic Ag Sector
5 =
6 = NLP
Unifying file for Stochastic ASM model
More Description
$*$ $
Files = alter.gms
Directory = CH03
1 = ALTER.GMS
2 = 03 - Solution of LP's
3 = 03.3.5
4 =
5 = Alternative optimals
6 =
GAMS implementation of alternative optimal example
$*$ $

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
GLB File Creation

One can create a GLB file in 3 ways

1. Manually with a text editor

2. Write your own program

3. Use my GLB building program

I will discuss the last option only

I have written and am making available the program on www.gams.com under the mccarl newsletter.

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
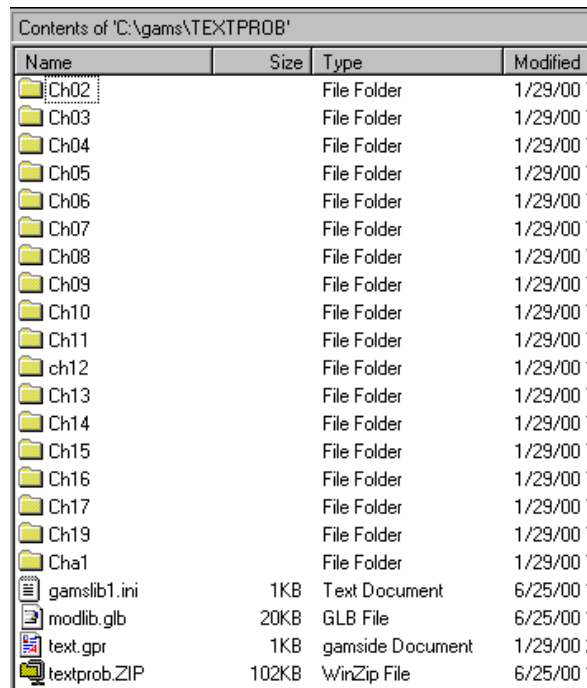## GLB File Creation with MAKEINDX.exe

Step 1   Organize your library files into a tree structure (Note all can be in the one directory or you can have subdirectories as in the class library)

Step 2   Decide on up to 10 categories to classify your library

Step 3   Develop an ini file that can be read by makeinxd.exe. Do it either by hand or with the assistance of makeindx.exe.

Step 4   Add library contents to files

Step 5   Build Library with MAKEINDX.exe

Step 6   Fix errors and check library in MAKEINDX.exe

Step 7   Point IDE to GLB file and use library

Steps 1-6 will be discussed below

Creating a User Library for use in the IDE
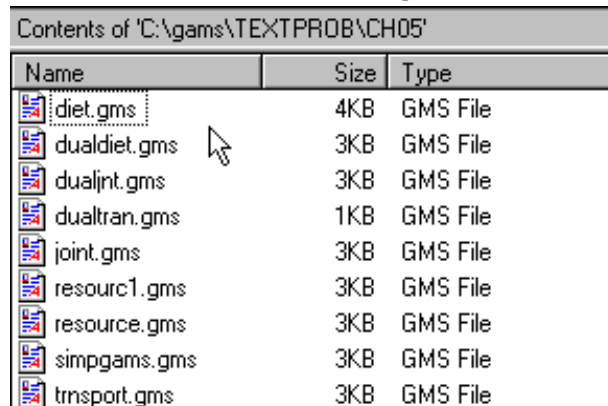## GLB Creation with MAKEINDX.exe --Organizing Files

Lets use the library for McCarl and Spreen on the web site agrinet.tamu.edu/mccarl as an example. For that library I create a subdirectory and organize all the files into subdirectories below that

Name	Size	Type	Modified
Ch02		File Folder	1/29/00
Ch03		File Folder	1/29/00
Ch04		File Folder	1/29/00
Ch05		File Folder	1/29/00
Ch06		File Folder	1/29/00
Ch07		File Folder	1/29/00
Ch08		File Folder	1/29/00
Ch09		File Folder	1/29/00
Ch10		File Folder	1/29/00
Ch11		File Folder	1/29/00
ch12		File Folder	1/29/00
Ch13		File Folder	1/29/00
Ch14		File Folder	1/29/00
Ch15		File Folder	1/29/00
Ch16		File Folder	1/29/00
Ch17		File Folder	1/29/00
Ch19		File Folder	1/29/00
Cha1		File Folder	1/29/00
gamslib1.ini	1KB	Text Document	6/25/00
modlib.glb	20KB	GLB File	6/25/00
text.gpr	1KB	gamside Document	1/29/00
textprob.ZIP	102KB	WinZip File	6/25/00

Where the sub directories contain gms files

Contents of 'C:\gams\TEXTPROB\CH05'

Name	Size	Type
diet.gms	4KB	GMS File
dualdiet.gms	3KB	GMS File
dualjnt.gms	3KB	GMS File
dualtran.gms	1KB	GMS File
joint.gms	3KB	GMS File
resourc1.gms	3KB	GMS File
resource.gms	3KB	GMS File
simpgams.gms	3KB	GMS File
trnsport.gms	3KB	GMS File

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
GLB Creation with MAKEINDX.exe –Catgeories

For this Library I choose to use 7 categories

1. File Name

2 Number of Book Chapter from which example comes

3 Section in the book chapter where the example is used

4 GAMS usage Points that I think example illustrates

5 Modeling Points that I think example illustrates

6 Type of solve that is used (LP, NLP, MIP etc)

7 A miscellaneous Other category

Any choice of up to 10 categories could have been used. These were judged relevant for my book.

Creating a User Library for use in the IDE
GLB Creation with MAKEINDX.exe –ini file

You must define a file called GAMSlib1.ini. It is located in the root of the library (it is in library main location as depicted in Explorer window two pages before this one). For the example library it contains

```
LibraryName=McCarl and Spreen
NumberCategories=7
Category1Name=Name
Category1IfEmpty=Use file name
Category2Name=Book Chapter
Category2IfEmpty=Use subdirectory
Category3Name=Section
Category3IfEmpty=Leave blank
Category4Name=GAMS Points
Category4IfEmpty=Leave blank
Category5Name=Modeling Points
Category5IfEmpty=Leave blank
Category6Name=Problem Type
Category6IfEmpty=Use solver type
Category7Name=Other
Category7IfEmpty=Leave blank
# use file name
# use file name but drop extension
#    use solver type
#    fill in none
#    use subdirectory
FileMask=*.*
FileinMask=*.*
FileexMask=*.ini;*.gpr;*.g0*;*.~*;*.bak;*.glb;*.exe;
FilefrMask=
DescribeTag=Description
IfDescribeEmpty=Leave Blank
```

As it is used makeindx.exe will add to this file

The best strategy is probably to initially define the names and then build this up using makeindx.exe

Creating a User Library for use in the IDE
GLB Creation with MAKEINDX.exe –ini file contents

Basic INI file contents are as follows but makeindx.exe has more
options.

Key phrase	Following text
LibraryName=	Your name for the Library
HomeDirectoryName=	directory location of the root for library and place glb file is to be saved
NumberCategories=	Number of categories via which library files will be classified maximum is 10
Category1Name=	Name for category 1 (keep it short)
Category1IfEmpty=	Action to be followed if category 1 is left blank for a file. Some of the allowable values are

Value	Action
use file name	uses file name
use file name but drop extension	uses file name without the extension
use solver type	uses the type of problem solved by the last solve (lp,nlp etc)
fill in none	fills in word none
use subdirectory	fills in name of subdirectory in which file is found
leave blank	leaves entry blank

The exact wording and spelling of these 6 alternatives must be used in the
IfEmpty entries. makeindx.exe helps you with this

Category2Name=	Name for category 1 (keep it short)
Category2IfEmpty=	Category 2 if empty action
...	
Cateory10Ifempty=	If empty action for 10 if defined
FileMask=	Mask for files to include (e.g. *.* or *.gms)

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
GLB Creation with MAKEINDX.exe
ini file maintainence in makeindx.exe

When starting up a library with an initial ini file choose to Build a Library from Problem Files

Then point the program to the directory where your ini file exists using Alter Library Directory.

After that choose to Read in Library Structure (ini) file

Finally choose Review INI file

This will get you the screen on the next page

With that page you can make alteration in ini file and program will rewite it on exit.

Creating a User Library for use in the IDE
GLB Creation with MAKEINDX.exe ini file maintainence in makeindx.exe

Define Contents of Ini file

Library Name	modlib.glb	Mask for Files to Include	*.*
Library Root Directory	C:\basgams\examples\	Mask for Files to Exclude	*.ini;*.gpr;*.g0*;*.~*;*.ba
Ini File Name	C:\gams\TEXTPROB\g	Mask for Files to Force In	

☐ Let Me Redefine Ini file

-------------- Action If The Category is Left Empty ------------------

Num	Category Name and Marker	Display Short Name	FNam	NoEx	SubD	Ext	SolT	Blnk	None	OnTx	Titl
1	Name	Name	X								
2	Book Chapter	Book Chapter			X						
3	Section	Section						X			
4	GAMS Points	GAMS Points						X			
5	Modeling Points	Modeling Points						X			
6	Problem Type	Problem Type					X				
7	Other	Other						X			
8											

Description Tag [Description]

Options if Descrption is Blank
- ● Leave Blank
- ○ Use First Non Library Ontext
- ○ Use GAMS title

[Mock Up Library Contents]   [Exit]

Explanation of Action Codes for Blank Categories
When the keyword identifying the category is not found in a file then
Depending on column checked an action is taken as follows
FNam -- Fill with the library file name
NoEx -- Fill with file name without the extension
SubD -- Fill with name of subdirectory where file appears
Ext -- Fill with file Extension
SolT -- Fill with name of highest Solve type encountered
Blnk -- Leave blank
None -- Fill with word None
OnTx -- Fill with first line of first nonlibrary ontext
Titl -- Fill with entry in GAMS $TITLE

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
Entries in files to be included

Once the INI file has been defined then enter library content for each file by placing a library entry in the gms files

Add in the file something like the following (keywords are colored) $ontext/$offtext sequence

$ontext
#this text entry documents file and allows automatic
#building of mccarl and spreen book model library file
Description
GAMS implementation of the diet example
The dual is in dualdiet.gms
The model solves for a series of alternative prices for an ingredient
to generate a demand curve
Section 05.4.1
Book Chapter 05 - LP Modeling
Modeling Points Diet
GAMS Points Looped solves
other Demand Curve
include dualdiet.gms
$offtext

Note correspondence with GAMSlib1.ini file category names
Category1Name=Name
Category2Name=Book Chapter
Category3Name=Section
Category4Name=GAMS Points
Category5Name=Modeling Points
Category6Name=Problem Type
Category7Name=Other

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
Entries in files to be included

The INI file also specifies actions to be followed when categories are not present or left blank

```
Category1Name=Name
Category1IfEmpty=Use file name
Category2Name=Book Chapter
Category2IfEmpty=Use subdirectory
Category3Name=Section
Category3IfEmpty=Leave blank
Category4Name=GAMS Points
Category4IfEmpty=Leave blank
Category5Name=Modeling Points
Category5IfEmpty=Leave blank
Category6Name=Problem Type
Category6IfEmpty=Use solver type
Category7Name=Other
Category7IfEmpty=Leave blank
```

Since Name is not present the choice from GAMSlib1.ini will cause NAME to be the filename with extension

Can also force in certain types of files or exclude certain types with Mask specification

Creating a User Library for use in the IDE
Entries in files to be included– More on content

Key word	Entry style for Content
Description	Line with this word by itself followed by up to 20 lines of description
category names as specified in ini file	Name followed on line by descriptor You probably don't want these to be too long. If they are empty then if empty takes over
suppress	If you don't want this file in library
include	followed by names of other files to be included separated by commas (note files mentioned in $include) will also be gotten excepting GEN files
#	text following treated as comment

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
Entries in files to be included– Example and Library

In the McCarl and Spreen Library the fle diet.gms in the subdirectory ch05 contains the following

$ontext
#this text entry documents file and allows automatic
#building of mccarl and spreen book model library file
Description
GAMS implementation of the diet example

The dual is in dualdiet.gms

The model solves for a series of alternative prices for an ingredient
to generate a demand curve
Section 05.4.1
Book Chapter 05 - LP Modeling
Modeling Points Diet
GAMS Points Looped solves
include dualdiet.gms
other Demand Curve
$offtext

In turn the entry in the IDE looks as follows

Name +	Book Chapter	Section	GAMS Points	Modeling Points	Problem Type	Oth
DEGEN.GMS	03 - Solution of LP's	03.3.5		Degeneracy		
DEMP.GMS	14 - Risk	14.3.1.6		DEMP		
DIET.GMS	05 - LP Modeling	05.4.1	Looped solves	Diet		

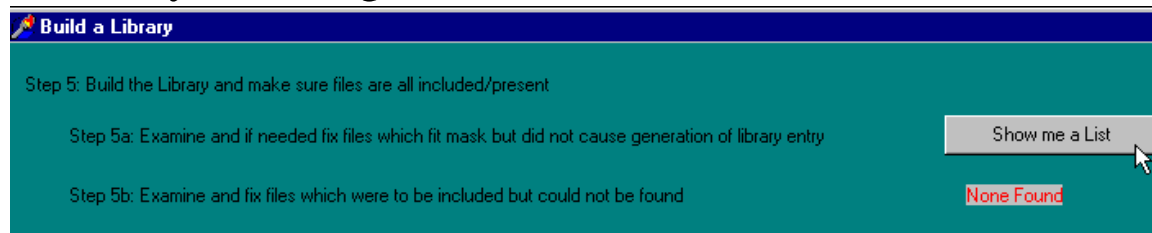GAMS implementation of the diet example

The dual is in dualdiet.gms

The model solves for a series of alternative prices for an ingredient

to generate a demand curve

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
Creating the GLB – run makeindx.exe

Now run makeindx.exe under the Build from files option, properly positioning the Library Directory bringing in the ini file and then use Build Library. This will build the library including all files in and under the directory that the GAMSlib1.ini file is in.

In turn you will get a screen which contains

Investigate lists of included files that could not be found and files that will not be in library to see if errors or omissions are present. Reasons for problems are given. Fix files if necessary and rebuild library until satisfiled.

Double clicking on listed files will bring them into an editor and after editing the files will be rewritten to the disk.

In the editor you can have the program add a blank library entry and then fill it in.

Rebuild library after you have fixed files.

Materials courtesy of Bruce McCarl

Creating a User Library for use in the IDE
Creating the GLB – run makeindx.exe

Now Choose view the Library and and if desired change the category names for better display or field order. The program will remember by altering the ini file.

You may also change the library content of the fields by using the grid of files

Name-	Book Chapter	Section	GAMS Points	Modeling Points	Problem Type	Other	F
ABSOLUTE.GMS	09 - Nonlinearities and App	09.1.1.1		Absolute deviatic			a
ACTANAL.GMS	13 - Price Endogenous	13.3		Implicit Supply			a
AFTERAGG.GMS	13 - Price Endogenous	13.4		Aggregation			a
ALTER.GMS	03 - Solution of LP's	03.3.5		Alternative optim			a
ASSDISSM.GMS	07 - More LP Modeling	07.3.1		Assembly Dissas			a
ASSEMBLE.GMS	07 - More LP Modeling	07.1.1		Assembly	LP		a
BASIC.GMS	02 - Linear Programming	02.2		GAMS at its simp			b
BEFORAGG.GMS	13 - Price Endogenous	13.4		Aggregation			b

Double clicking on a file brings it into an editor where changes can be made or saved

Materials courtesy of Bruce McCarl

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Creating a User Library for use in the IDE
Creating the GLB – run makeindx.exe

Use grid to verify and possible alter library content. Click
on top row to sort in different ways.
Review file names.
Look for problems in library fields or description
weird content
description with word none
lst, log or other files you do not wish to be present

If you find problems correct in files by double clicking to
edit and fix and possibly going back to fix ini file

Try library out with Preview or exiting and using the IDE

When finished the GLB and INI files are automatically
saved in the directory where the GAMSlib1.ini file
resided on exit from makeindx.exe.

Library is now ready to go. You can move library location
by copying main library directory with MODLIB.GLB
(don't need ini) and full subdirectory structure to new
location. You do not have to retain $on/off text
additions in library files but I do to permit later library
maintenance and easy file addition/removal.

Materials courtesy of Bruce McCarl