

Bruce McCarl and Chengcheng Fei GAMS Newsletter Number 44

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This Newsletter that I have done jointly with Chengcheng Fei (my postdoc) addresses the following

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1 Releases 27-29

Since the last newsletter we had releases 27, 28, 29 with release notes being at https://www.gams.com/latest/docs/RN_MAIN.html. When we peruse these notes things that strike of broad interest are:

1.1 GAMS system

- Extended the GAMS log to print out the non-default **Command Line Parameters** and user defined Double Dash Parameters.
- Added new dollar control option \$scratchFileName that allows one to retrieve the name of a (new) file in the scratch directory
- Augmented the dollar control option \$setDDLlist to allow a user to define the relevant list of double dash parameters to be checked for spelling etc. The augmentation was the addition of a .cont variant that allows continuation of the list.

- Made profile and profiletol operations more consistent. In the past, the `Profile Summary` was always written, when the profiling was activated from the command line, but was sometimes omitted when set as an option. Now, when profile is activated the summary gets always written regardless of where the profiling was activated.
- Worked on speed issues with large data sets in the system, GDX, and Python.
- Altered command `$onMultiR` so it also allows the redefinition of macros.
- Added new ways to execute external programs which implicitly check the `errorLevel` returned and raise a compilation or execution error if it is not zero, namely `$call.checkErrorLevel`, `$hiddencall.checkErrorLevel`, `execute.checkErrorLevel`, `put_utility exec.checkErrorLevel` and `put_utility shell.checkErrorLevel`. This behavior can also be triggered by setting `$onCheckErrorlevel` and the command line parameter `checkErrorLevel`, respectively.
- Allow to declare a parameter as a table without entering data. This is associated with `MIRO`.
- Removed limit of 10,000 columns in table declaration.

1.2 Python

- Added support for Python 3.7 on Windows 64-bit, Linux, and Mac OS X. Will drop Python 3.4 in the next major release and support 2.7 in January 1, 2020. GAMS plans to drop 2.7 in a future release.
- Allow Implicit Set Definition (or: Domain Defining Symbol Declarations) now for symbols loaded from embedded code as well.
- Changed the Python interpreter so it stays "alive" during a GAMS run. This allows to access Python symbols defined in one embedded code block in a following block.

1.3 Solvers

- Put in new libraries for many solvers. Some solvers with apparently the largest changes are `BARON`, `CBC`, `CPLEX`, `DICOPT`, `MOSEK`
- Fixed some `GAMSCHK` issues
 - Postopt previously omitted the report for the column occurring last in the listing file and included its entries in the report for the preceding column.
 - Fixed crash that occurred in some cases.
 - Reverted a problem causing fix in GAMS 27.1 that messes up the output and implemented a more moderate fix.

1.4 STUDIO

STUDIO had a large number of changes including

- Renamed what had been called the Option Editor to the Parameter Editor to distinguish it. In particular, it does not work on solver options or option statements within GAMS. This

is really a command line parameter editor. Also defined a [toolbar](#) for this then made it open using  or Ctrl+Alt+L.

- Syntax highlighting has been improved.
- Added [bookmark](#) support. One inserts a bookmark or removes one using Ctrl+M. Then given the bookmarks have been defined one moves forward to the next one using Ctrl+. and backward using Ctrl+,. The bookmark capabilities are relatively primitive. They are not assigned names and only remain defined while the file is open in STUDIO and are lost when STUDIO is closed.
- Added some new cursor movement keyboard shortcuts. They are listed on the page https://www.gams.com/latest/docs/T_STUDIO.html#STUDIO_CODE_EDITOR.
- Added a Drag and Drop feature to the GDX Table View.
- Added buttons to the right hand side of the toolbar to show/hide Project Explorer, Output-, and Help widget .
- Added ability for search and replace to do replacements in multiple files at one time. I also note that you get to the replace only through Ctrl+F or the Edit menu **search** choice which is really both search and replace. It might be good to add the word replace or add keyboard shortcuts like Ctrl+H or Ctrl+R as in other software.
- Changed the Find Next/Previous so it will jump to the next file if you are working with multiple files and there are matches
- Added a GAMS Solver Option Editor that allows you to view and edit a solver-specific option file. It appears there are two ways to access it. First, if you go into the explorer and right click on the group name then one of the choices is "add new solver option file" where you can choose the solver name and have the editor activate. Second, if you edit a file named solvername.opt (for example bdm1p.opt) the editor appears with all the choices relevant to the named solver. It also worked for the variants for the option file extension like conopt.op9, .o99 and .999.
- Added a menu entry under the GAMS tab which lets you Delete scratch directories. It will also be triggered if GAMS returns a "too many scratch directories" message.
- Added file associations and icons for .gms and .gdx files on Mac OS X.
- Fixed some issues with ability to define and include a glb file defining a User Library. The glb file approach is discussed in an earlier newsletter <https://www.gams.com/mccarl/newsletter/news2.htm>
- Added a "What's new" menu entry to show latest changes in STUDIO.
- Added features to allow users to adjust the numerical precision in the GDX Viewer.
- Added dialog to create/update license file (pops up when a license is in the user's clipboard and "About GAMS" is opened).
- Added auto-resizing of columns when opening the Reference File Viewer.
- Renamed "Output View" to "Process Log".

- Added a tutorial that I wrote about the usage of GAMS STUDIO which is at https://www.gams.com/latest/docs/UG_STUDIO_tutorial.html.

1.5 Changes in the documentation

- Improved ranking of results in offline search.
- Included results in the search for items in the index.
- Added acknowledgement to previous documentation like the McCarl guide.
- Added documentation for the put_utility keyword assignText that allows one to assign explanatory text to a singleton set.

2 32 Bit, and Windows support dropped

GAMS plans to drop support for 32-bit MS Windows with the next major release. Some components, e.g., GAMS IDE and gdxxrw, will remain 32-bit executables in the 64-bit MS Windows GAMS distribution.

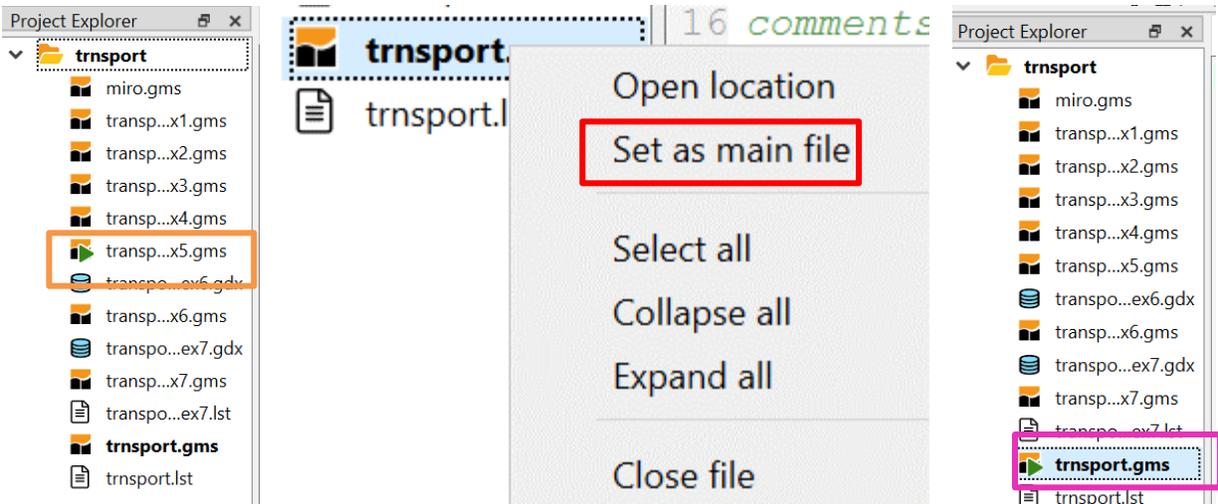
They also plan to drop support for MS Windows 7 with the next major release.

3 Newer Python and Java versions being adopted

- GAMS will drop for Python 3.4 in the next major release plus
- The Python development group will drop support for Python 2.7 as of January 1, 2020. GAMS will drop it in a future release but is interested in user feedback.
- Support for Python 3.7 has been added.
- Increased the minimum version requirement within the Java Runtime Environment to Java SE 8.

4 One thing to watch out for using STUDIO

Unlike a lot of other programs, STUDIO does not necessarily execute the file you have been working on rather executing what it calls the "main" file. In particular, if you activate the explorer view then the main file is the one marked with a **green triangle** as below. If the triangle is not marking the file to be run you need to right click on that file and then choose **Set as main file**. In turn the triangle will **move**.



5 MIRO

GAMS will soon come out with a web and graphical interface for improving model results presentation and ability or users to interact with a model over the web. The software is now out in Beta and GAMS hopes to get it out in official release form early in 2020. MIRO (Model Interface with Rapid Orchestration) is designed to provide a means for integrating a GAMS model into an interactive web application with minimal to no programming. Chengcheng and I spent a lot of time on this and have a draft document on the Beta that we anticipate updating as soon as we see a version of the release.

Here we provide a list of capabilities so readers can decide whether to invest themselves. MIRO is designed to provide.

- Simple visualization of GAMS model input with tables and widgets, such as sliders, dropdown menus, and checkboxes. Also visualization on results with charts / graphics such as tables, charts, maps, pivot tables, Gantt charts etc.
- Easy comparison of multiple scenarios and sensitivity analysis.
- Simple data import and export to/from external sources.
- Need for a few commands to forge the linkage to MIRO.
- Use through either an interface built into GAMS STUDIO or in a standalone setting.
- Use of a wide variety of packages in the R programming language.
- Memorized configurations so once an application is set up it can be reused.
- Automated processes that import results from GAMS and store them in a database then access for comparison.
- More advanced graphics to be used through an API are available but that requires some R programming.
- A forthcoming server version that allows managing multiple models with user access management and load balancing.

Our draft document shows how to use the Beta form of MIRO, and what it can do. It also evaluates some features pointing out possible improvements and places usage is currently

awkward and we are having an ongoing dialogue with GAMS over it. Note it include illustrations of features in the Beta that will be different in the official release and we expect the release in weeks so we would recommend looking at this for concepts and waiting on application.

6 Problems with Apple Catalina Security and Resolution

There has been an issue between the GAMS system and the APPLE Catalina operating system security. A number of posts have occurred about this but it has been addressed in version 29.1 although not completely. In particular you need to install 29.1 but not a license file. Then you need to start STUDIO (or the GAMS TERMINAL app). GAMS also suggests it would be best to use the studio Help > About to install the license. Whichever you need to get a program to run before addressing the license.

7 Basic, Advanced and Combined courses offered Next July

This year I will again be teaching my family of GAMS courses for basic and advanced users. These courses will be offered in early July when there will still be some snow up in the high country and Arapahoe basin may even still be open for skiing. Dates, times and content are

- Basic to Advanced GAMS class July 27, 2020- July 31, 2020 (5 days) in the Colorado mountains at Dillon (near Frisco and Breckenridge). The course spans from Basic topics to an Advanced GAMS class. Details are found at https://www.gams.com/fileadmin/news-events/Basic_to_Advanced_GAMS_Modeling2020.pdf .
- Basic GAMS class July 27, 2020-July 29, 2020 (3 days) in the Colorado mountains at Dillon (near Frisco & Breckenridge). The course starts assuming no GAMS background. Details are given at https://www.gams.com/fileadmin/news-events/Basic_GAMS_Modeling2020.pdf.
- Advanced GAMS class July 29, 2020- July 31, 2020 (3 days) in the Colorado mountains at Dillon (near Frisco and Breckenridge). The course is for users who have a GAMS background. Details are found at https://www.gams.com/fileadmin/news-events/Advanced_GAMS_Modeling2020.pdf

Further information and other courses are listed on <http://www.GAMS.com/courses.htm> . Note I also give custom courses for individual groups a couple of times a year.

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