Bruce McCarl's GAMS Newsletter Number 38

This newsletter covers

1   A new era for GAMS

GAMS was created and has always been led by Alex Meeraus. But just recently Alex decided to step back some with the company leadership passing on to long term GAMS employees of Franz, Michael, and Steve. GAMS will be announcing the exact structure soon. Alex thanks for your innovation and vision, you have certainly enabled many and have really helped me.

2   Updates to Expanded GAMS User Guide by McCarl et al.

I updated the Expanded User's Guide to reflect version 24.6 covering the items discussed here with a few other changes. The latest can be found on line at http://www.gams.com/help/index.jsp?topic=%2Fgams.doc%2Fuserguides%2Fmccarl%2Findex .html and will be in upcoming GAMS releases.

I have noted that the way the online version of the McCarl Expanded User guide works is updated within a day of my changes (those I put in yesterday are already on line). So if you are curious about features discussed here and want to see the treatment in the guide they are out there now. Naturally, there will be a lag until this gets into the release and your local copy will only be updated to the one in a release that you have downloaded onto your hard drive.

3 Some new GAMS features

A few new features have been added and in my opinion the significant ones are those below.

3.1 Shuffle

A new option has been added that rearranges the values of a one dimensional parameter in random order. So if you have a parameter `a /i1 10, i2 4, i3 6/` using shuffle will rearrange the values, 10, 4, 6 into random order. Shuffle can be used multiple times. It also will deal with parameter that have not had values assigned randomly assigning numbers that range from one to the number of the elements in the set. This in turn can be used to reorder sets through the use of a tuple.

3.2 A new option for starting solve jobs

A procedure has been introduced that allows GAMS to start a solve job but then continue execution without waiting for the solver to finish `(solvelink=6)`. This also involves the use of the grid computing related procedures to get a name for the job `(modelname.handle)`, to retrieve the solution `(HandleCollect or execute_loadhandle)`, ones to check on the jobs status `HandleStatus`, one to delete completed and retrieved jobs `HandleDelete` and a new one `(ReadyCollect)` that will check on jobs waiting until they are ready. Before, the user had to put the GAMS execution to "sleep" (via the sleep function) for a while and check again on job completion.

3.3 A new option for identifying default solvers

A new option has been added that makes a solver the default for all problem types that it is capable of solving. This is implemented through an option like

```
    Option solver=conopt;
```

which would make CONOPT the default solver for all applicable problem types as identified in the solver capabilities matrix with CONOPT being the default for CNS, LP, NLP, and some others. The statements can also be stacked like

```
    option solver=conopt, solver=cbc;
```

which will result in first setting the default solver for model type LP, NLP etc. to CONOPT and then resetting the default for LP to CBC along with making it the default for the other problems CBC is capable of addressing. This option is also available from the command line.

3.4 Model libraries

A number of new library files have been added including a library called NOALIB which are based on the book Nonlinear Optimization Applications Using the GAMS Technology by Neculai Andrei.

4   Documentation

GAMS has developed a unified set of all documentation (release and installation notes, GAMS User Guide, Expanded GAMS User Guide, Solver Manual, API reference, GDX materials, tools and some other content, It is available through the IDE under the topic GAMS Documentation plus in HTML format from the GAMS web site at http://www.gams.com/help/index.jsp. The documentation has a unified, expandable, electronic table of contents and includes a search function. A screenshot of a slightly expanded version of its table of contents is below
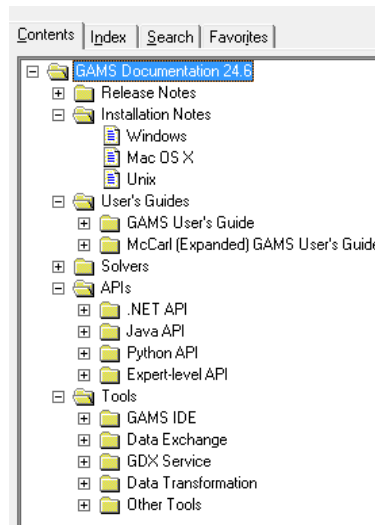
This does eliminate some of the old pathways to documentation in the IDE but all the previous content is still available through the unified file. In addition direct links to the PDF versions of GAMS User's guide, McCarl Expanded GAMS User's guide, and solver manuals are still in the IDE and on the web site.

5   Solvers

5.1   SOPLEX

The recent release notes and solver capabilities matrix identifies SoPlex as an available solver although it has been available for some time under the name OSISOPLEX. SoPlex is an optimization package for solving linear programming problems (LPs) based on the primal and dual revised simplex algorithms. More on it appears at http://soplex.zib.de/.

5.2   New solver libraries

New features and libraries for most of the solvers with seemingly a lot in releases 24.5 and 24,6 for BARON, Gurobi, MOSEK, SCIP and XPRESS

5.3   Future Access to Gurobi

The GAMS business relation with Gurobi Optimization, Inc. has changed. While GAMS will maintain an interface to the newest Gurobi versions, GAMS will no longer be able to sell integrated GAMS/Gurobi licenses to new customers and academic users will be discontinued. Existing commercial users of GAMS/Gurobi can continue to use their GAMS/GUROBI license. New commercial customers need a GAMS/Gurobi link license will need to go to Gurobi for a

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license. Academics will need to enroll in Gurobi's free academic program. Gurobi will not even work in demo mode. Users with specific questions can contact sales@gams.com or support@gams.com. Additionally, GAMS would like to hear about user experiences with this as it evolves.

5.4   Solving in the cloud

Solvers are beginning to allow one to solve models in the cloud. In particular Gurobi and Cplex offer "cloud solving". Running on Gurobi's Instant cloud you need a link license as discussed at http://gams.com/help/topic/gams.doc/solvers/gurobi/index.html#GUROBI_INSTANT_CLOUD . For Cplex this is called DoCloud and is available through the GAMS/Kestrel solver as discussed at http://gams.com/help/topic/gams.doc/solvers/kestrel/index.html#KESTREL_USING_DOCLOUD for details. For both cloud solvers one needs to have an account with the vendor.

6   Backward comparability

GAMS for years has worked hard to make sure models from 30 years ago still work in the same way in GAMS. However, this is becoming increasingly an inconvenience and one that actually degrades performance of newly developed models given current computer and solver capabilities plus one that does not exploit modern output browsing. In particular, some of the GAMS defaults and output procedures reflect the capabilities of software, printers and user interfaces that were common 30 years ago. For example

- Optimality criteria for MIPS `optcr` defauts to 0.1 and todays solvers are better than that
- `Limrow`, `limcol` and `solprint` defaults are more tuned to smaller models and generate huge listing files with today's often much larger models
- Model solutions are passed via the hard disk to solvers (`solvelink=0`) with GAMS swapping in and out of memory but can be passed much faster in core if memory is available
- Integer variables have a default upper bound of 100 which may be inappropriate and users may not know this.
- Output is LST file oriented and the LST file was designed for printers whereas today use of XML or HTML with navigation might be better.
- Some page and line widths default to say 255 (for a put file) with a bunch of asterisks added thereafter.
- Default number of solver threads is one and most machines have multiple cores. Allowing more threads can speed up particularly MIPs
- The LST file was conceived at the time where printers were the main output destination but with today's powerful editors and browsers might be reformatted to provide easier access.

Users may want to fix these by employing the customization features discussed in the expanded user guide through the IDE or the gmsprmNT.txt file. However, the txt file alternative is not so good since GAMS has not seen fit to copy this file from old versions when a new one is installed requiring one to do it manually or lose the customizations (I have asked for this as an option for years).

GAMS is considering addressing this with new defaults but would include a way of forcing backwards compatibility along with a possibly altered output strategy.

7   Courses offered

I will be teaching
- Basic to Advanced GAMS class Aug 8, 2016- Aug 12, 2016 (5 days) in the Colorado mountains at Frisco (near Breckenridge). The course spans from Basic topics to an Advanced GAMS class. Details are found at http://www.gams.com/courses/mccarl_combined.pdf
- Basic GAMS class Aug 8, 2015- Aug 10, 2015 (3 days) in the Colorado mountains at Frisco (near Breckenridge). The course starts assuming no GAMS background. Details are given at http://www.gams.com/courses/mccarl_basic.pdf.
- Advanced GAMS class Aug 10, 2015- Aug 12, 2015 (3 days) in the Colorado mountains at Frisco (near Breckenridge). The course is for users who have a GAMS background. Details are found at http://www.gams.com/courses/mccarl_advanced.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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