

Bruce McCarl's GAMS Newsletter Number 28

Here I cover a number of items including a review of the developments in GAMS 23.3 and mention future course.

Expanded GAMS User Guide by McCarl et al.

I updated the User's Guide to reflect 23.3 with changes added here and there. This is at <http://www.gams.com/dd/docs/bigdocs/gams2002/mccarlgamsuserguide.pdf> and in the current GAMS release.

Features in 23.3

The release of GAMS 23.3 was largely about solvers, speed, a couple of language features and GDXXRW. A few notable new features are discussed in some detail below. In addition one should note the

- New command line options **ProcDir** and **MaxProcDir** can be used to control the naming and allowable number of temporary process directories. **ProcDir=abc** will change the name for the temporary files to **abc** instead of 225 but then the user must delete these GAMS will not do that automatically.
- Dollar control option **\$hiddencall** can be used to suppress inclusion of information on the call in the log and listing file.
- GDXXRW can now work with Excel files with the XSLM extension.

Developments and cautions on Execution Speed

Historically GAMS was very slow in executing statements where something like

$$X(I, J, K, L, M) = Z(M, I, L, K, J);$$

i.e. where the set indexing was in different orders for items in the equation.

Today GAMS internally rearranges arrays and does not suffer a speed issue here. However some situations still cause speed problems. Notably I have found that statements like

$$X(I, J, \text{"total"}, L, M) = \text{sum}(K, X(I, J, K, L, M));$$

can still be quite slow as can be

```
Loop( (M, I, L, K, J),  
      X(I, J, K, L, M) = Z(M, I, L, K, J) );
```

I have found in the first case (where elements in an array are summed into other places in that array) one is sometimes better off using a temporary array to storing the sum then assigning it afterward

```
Xtemp(I, J, L, M) = sum(K, X(I, J, K, L, M));  
X(I, J, "total", L, M) = Xtemp(I, J, L, M);
```

In the second case (where sets are out of order in a loop) I might manipulate the set orders and would use conditionals to limit cases as discussed in the McCarl Guide.

Despite the GAMS work the rule of thumb of trying to address the sets in a common order everywhere is still a speed enhancing practice as is the use of conditionals to limit the cases considered.

Assigning Descending Sets

One may assign multiple and descending members to a set using an asterisk. For example, the following are valid set statements in GAMS.

```
Set years /"-20"*"-1"/;  
Set yyears /"aa20"*"aa1"/;
```

Solvers

Solver developments are

- BARON is updated and now can use CONOPT to solve sub-problems.
- Updates for the coin solvers CoinScip, CoinGlpk and CoinCouenne
- Free bare bone solver links named CoinCplex, CoinGurobi, CoinMosek, and CoinXpress are available. For details visit: http://support.gams-software.com/doku.php?id=solver:osicplex_osigurobi_osimosek_osixpress
- New versions of GUROBI, MOSEK and XPRESS.
- One can use CoinOS to link to the Optimization Services project converting GAMS models into the OS instance language and using a remote solver
- MINOS5 (old version of MINOS) was dropped.
- In-core communication solver links are provided for Lindoglobal.

Spreadsheet and HTML Output

I have written code to allow greater control of output ordering plus send sets or parameters to either an HTML file or EXCEL. Namely one can output a parameter or a set to a named spreadsheet or a specified file in HTML format. In doing this one can control the order and allocation of sets between rows and columns. This is accomplished for the parameter $a(i, j, k, m)$ with the statements

```
File html /my.html/;  
put html;  
$batinclude puttohtml 2 2 a (i,j,k,m) m k j i  
$batinclude puttoexcel mysreadsheet 2 2 a (i,j,k,m) m  
k j i  
$batinclude puttohtml 1 3 a (i,j,k,m) m k j i  
$batinclude puttoexcel 3 1 a (i,j,k,m) I m k j
```

Where

- the first 2 batincludes output the parameter a with 2 sets varied in the rows (m and k) and 2 in the columns (j and i)
- the third has 1 set varied in the rows (m) and 3 (k,j,i) in the columns and
- the last has 3 sets varied in the rows and 2 in columns.

The GAMS code and further information are in a zip file, which can be found at: <http://agecon2.tamu.edu/people/faculty/mccarl-bruce/gamsstuf/htmlexceloutput.zip>. Examples are inside the zip file and are called puthtmltables1.gms and putexcelexample.gms.

Courses offered

I will be teaching

- [Basic GAMS](#) June 22-25, 2010 (3 1/2 days) in the Colorado mountains at Frisco (near Breckenridge). The course is designed for those without GAMS usage experience but has also proved useful for those with years of experience.
- [Advanced GAMS class](#) Aug 10-13, 2010 (3 1/2 days) in the Colorado mountains at Frisco (near Breckenridge). The course covers such diverse topics as links to other programs like macros, spreadsheets, speeding up GAMS, scaling, debugging, improving output and advanced basis use along with many other topics. It also covers the techniques and principles used in a large US model FASOM.
- Further information and other courses are listed on <http://www.gams.com/courses.htm>.

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