

NAG Toolbox

nag_glopt_bnd_mcs_init (e05ja)

1 Purpose

nag_glopt_bnd_mcs_init (e05ja) is used to initialize communication data for the suite of multi-level coordinate search functions: nag_glopt_bnd_mcs_solve (e05jb), nag_glopt_bnd_mcs_optset_string (e05jd), nag_glopt_bnd_mcs_optset_char (e05je), nag_glopt_bnd_mcs_optset_int (e05jf), nag_glopt_bnd_mcs_optset_real (e05jg), nag_glopt_bnd_mcs_option_check (e05jh), nag_glopt_bnd_mcs_optget_char (e05jj), nag_glopt_bnd_mcs_optget_int (e05jk) and nag_glopt_bnd_mcs_optget_real (e05jl).

2 Syntax

```
[comm, ifail] = nag_glopt_bnd_mcs_init
```

```
[comm, ifail] = e05ja
```

Note: the interface to this routine has changed since earlier releases of the toolbox:

At Mark 23: **n** was removed from the interface.

3 Description

nag_glopt_bnd_mcs_init (e05ja) initializes the communication array **comm** for the solver nag_glopt_bnd_mcs_solve (e05jb) and the optional-argument handlers nag_glopt_bnd_mcs_optset_string (e05jd), nag_glopt_bnd_mcs_optset_char (e05je), nag_glopt_bnd_mcs_optset_int (e05jf), nag_glopt_bnd_mcs_optset_real (e05jg), nag_glopt_bnd_mcs_option_check (e05jh), nag_glopt_bnd_mcs_optget_char (e05jj), nag_glopt_bnd_mcs_optget_int (e05jk) and nag_glopt_bnd_mcs_optget_real (e05jl).

4 References

None.

5 Parameters

5.1 Compulsory Input Parameters

None.

5.2 Optional Input Parameters

None.

5.3 Output Parameters

1: **comm**(*lcomm*) – REAL (KIND=nag_wp) array

lcomm = 100.

comm must not be altered between calls to any of the functions nag_glopt_bnd_mcs_solve (e05jb), nag_glopt_bnd_mcs_optset_string (e05jd), nag_glopt_bnd_mcs_optset_char (e05je), nag_glopt_bnd_mcs_optset_int (e05jf), nag_glopt_bnd_mcs_optset_real (e05jg), nag_glopt_bnd_mcs_option_check (e05jh), nag_glopt_bnd_mcs_optget_char (e05jj), nag_glopt_bnd_mcs_optget_int (e05jk) and nag_glopt_bnd_mcs_optget_real (e05jl).

2: **ifail** – INTEGER

ifail = 0 unless the function detects an error (see Section 5).

6 Error Indicators and Warnings

Errors or warnings detected by the function:

ifail = 1

Constraint: $lcomm \geq 100$.

ifail = -99

An unexpected error has been triggered by this routine. Please contact NAG.

ifail = -399

Your licence key may have expired or may not have been installed correctly.

ifail = -999

Dynamic memory allocation failed.

7 Accuracy

Not applicable.

8 Further Comments

The time taken by `nag_glopt_bnd_mcs_init` (e05ja) is negligible.

9 Example

9.1 Program Text

```
function e05ja_example

fprintf('e05ja example results\n\n');

% Problem data for peaks function
prob = 'peaks';
xres = 100;
yres = 100;
n     = 2;
bl    = [-3; -3];
bu    = -bl;
fglob = -6.55;
xglob = [0.23; -1.63];

% Initialize e05jb
[comm, ifail] = e05ja;

disp('Solve with no options or initial list data');

ibound = nag_int(0);
list    = zeros(n,3);
numpts  = zeros(n, 1, nag_int_name);
initpt  = zeros(n, 1, nag_int_name);

[bl, bu, list, numpts, initpt, xbest, obj, comm, user, ifail] = ...
    e05jb(...
        @objective, ibound, bl, bu, list, numpts, initpt, @monitor, comm);

fprintf('xbest:\n  ');
```

```

fprintf(' %7.3f',xbest);
fprintf('\nObjective Function:\n    ');
fprintf(' %7.3f\n\n',obj);

% Set some options.
fprintf('Solve with options and initial list data\n');

% Echo the setting of opt. params.
comm = e05jd('List', comm);

comm = e05jd('Function Evaluations Limit = 100000', comm);
comm = e05jf('Static Limit', nag_int(3*n), comm);

% Get infbnd and increase by factor 10.
infbnd = e05jl('Infinite Bound Size', comm);
comm = e05jg('Infinite Bound Size', 10*infbnd, comm);

comm = e05je('Local Searches', 'on', comm);

% Set the initialization-list data.
iinit      = nag_int(3);
list       = zeros(n, 3);
list(:, 1) = bl;
list(:, 2) = [-1; 0];
list(:, 3) = bu;
numpts(1:n) = nag_int(3);
initpt(1:n) = nag_int(2);

[bl, bu, list, numpts, initpt, xbest, obj, comm, user, ifail] = ...
    e05jb(...
        @objective, ibound, bl, bu, list, numpts, initpt, ...
        @monitor, comm, 'iinit', iinit);

fprintf('xbest:\n    ');
fprintf(' %7.3f',xbest);
fprintf('\nObjective Function:\n    ');
fprintf(' %7.3f\n\n',obj);

function [f,user,inform] = objective(n,x,nstate,user)
if (n==2)
    inform = nag_int(0);
else
    inform = nag_int(-1);
end

if (inform >= 0)

    % Evaluate the objective
    if (nstate == 1)
        disp(sprintf('\n'));
        disp('(OBJFUN was just called for the first time)');
    end

    f = peaks(x(1), x(2));
end

function [user,inform] = ...
    monitor(...
        n,ncall,xbest,icount,ninit,list,numpts,initpt,nbask,...
        xbask,boxl,boxu,nstate,user)
inform = nag_int(0);

if (nstate == 0 || nstate == 1)
    fprintf('\n----- monitoring information -----\n');
end

if (nstate <= 0)
    fprintf('Total sub-boxes           = %5d\n', icount(1));
    fprintf('Total function evaluations = %5d\n', ncall);
    fprintf('Local function evaluations = %5d\n', icount(2));
    fprintf('Points used in local search = %5d\n', icount(3));

```

```

fprintf('Total sweeps through levels = %5d\n', icount(4));
fprintf('Total splits by init. list = %5d\n', icount(5));
fprintf('Lowest unsplit level = %5d\n', icount(6));
fprintf('Candidate minima in basket = %5d\n', nbasket);
fprintf('Shopping basket:\n');
fprintf(' %7.3f',xbasket);
fprintf('\n');
fprintf('-----\n');
end

```

9.2 Program Results

e05ja example results

Solve with no options or initial list data

(OBJFUN was just called for the first time)

```

----- monitoring information -----
Total sub-boxes = 228
Total function evaluations = 196
Local function evaluations = 87
Points used in local search = 13
Total sweeps through levels = 12
Total splits by init. list = 5
Lowest unsplit level = 7
Candidate minima in basket = 2
Shopping basket:
-1.347  0.205  0.228 -1.626
-----
xbest:
0.228 -1.626
Objective Function:
-6.551

```

Solve with options and initial list data

```

FUNCTION EVALUATIONS LIMIT = 100000
STATIC LIMIT = 6
INFINITE BOUND SIZE = 1.1579208923731620E+78
LOCAL SEARCHES = on

```

(OBJFUN was just called for the first time)

```

----- monitoring information -----
Total sub-boxes = 146
Total function evaluations = 169
Local function evaluations = 102
Points used in local search = 7
Total sweeps through levels = 7
Total splits by init. list = 5
Lowest unsplit level = 4
Candidate minima in basket = 2
Shopping basket:
0.228 -1.626 -1.347 0.205
-----
xbest:
0.228 -1.626
Objective Function:
-6.551

```
