ME 477 Embedded Computing
Saving myRIO C data to a MATLAB file

The following C functions[1] write data of types double or char to a MATLAB ".mat" file. They are included in the ME477Library.

Note: Add `#include "matlabfiles.h"` to your code.

Use the following functions to open a named file *on the myRIO*, and successively add any number of data arrays, variables, and strings to the file. Finally, close the file.

Open a .mat file The prototype for the open function is

```
MATFILE *openmatfile(char *fname, int *err);
```

where `fname` is the filename, and `err` receives any error code. The function returns a structure for containing the MATLAB file pointer.

A typical call might be:

```
mf = openmatfile("Lab.mat", &err);
 if(!mf) printf("Can't open mat file %d\n", err);
```

For ME 477, **always** use the file name: "Lab.mat". Notice the use of pointers.

Add a matrix The prototype of the function for adding a matrix to the MATLAB file is

```
int
matfile_addmatrix( MATFILE *mf,
                   char *name,
                   double *data,
                   int m,
                   int n,
                   int transpose);
```

where `mf` is the MATLAB file pointer from the open statement, `name` is a char string containing the name that the matrix will be given in MATLAB (must be a legal MATLAB variable name), `data` is a C data array of type `(double)`, `m` and `n` are the array dimensions, `transpose` takes value of 0 or 1 to indicate where the matrix is to be transposed.

For example, to add a **1-D matrix** the call might be

```
matfile_addmatrix(mf, "vel", buffer, IMAX, 1, 0);
```

Or, to add a **single variable** the call might be

```
double Npar;
Npar = (double)N;
matfile_addmatrix(mf, "N", &Npar, 1, 1, 0);
```

Again, notice the use of pointers, and the cast to `double`.

Add a string The prototype of the function for adding a string to the MATLAB file is

```
int
matfile_addstring( MATFILE *mf,
                   char *name,
                   char *str);
```

where `mf` is the MATLAB file pointer from the open statement, `name` is a char string containing the name that the matrix will be given in MATLAB, and `str` is the string.

For example, to add a **string** the call might be

```
matfile_addstring(mf, "myName",  "Bob Smith");
```

Close the file After all data have been added, the file must be closed. The prototype of the function for closing the MATLAB file is

```
 int matfile_close(MATFILE *mf);
```

where `mf` is the MATLAB file pointer from the open statement.

For example, to close the file: `matfile_close(mf);`

Example Code Putting these ideas together:

```
mf = openmatfile("Lab.mat", &err);
 if(!mf) printf("Can't open mat file %d\n", err);
matfile_addstring(mf, "myName",  "Bob Smith");
matfile_addmatrix(mf, "N", &Npar, 1, 1, 0);
matfile_addmatrix(mf, "M", &Mpar, 1, 1, 0);
matfile_addmatrix(mf, "vel", buffer, IMAX, 1, 0);
matfile_close(mf);
```

Transfer file to MATLAB After the `Lab.mat` file has been created, it can be transferred directly to MATLAB.

1. In the left pane of the Remote Systems Explorer perspective, select 172.22.11.2, and press [F5] to refresh the files.
2. Expand 172.22.11.2 to show 172.22.11.2/Sftp Files/My Home/Lab.mat. Select 'Lab.mat' and copy with Ctrl-c.
3. In the same pane of the Remote System Explorer, expand 'Local' to show Local Files/Drives. Paste the data file by selecting 'Z:' and pressing Ctrl-v. This drive is special because it is shared between the guest and host operating systems.
4. On the host, navigate to the folder where you ran 'vagrant up'. This folder should have the same contents as the 'Z:' drive in the VM. Now double-click the 'lab.mat' file to open it in MATLAB. Use MATLAB's 'whos()' command to list all the named variables in the workspace. The file can later be opened from a MATLAB script using the command 'load('Lab.mat')', for plotting or analysis.

   Note: If you double-click the 'Lab.mat' file in the Remote Systems Explorer perspective, it will also appear in the RemoteSystemsTempFiles directory within your 'workspace'.

[1] http://www.malcolmmclean.site11.com/www/MatlabFiles/matfiles.html