Running Parallel Programming Data-Acquisition Scripts from a Windows Powershell

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Thanks to Paralleler Job Guidos for testing these methods out for me!
Change the NUMT and NUMTRIES to Global int Variables

Right now, our code is using defined constants, like this:

```c
#ifndef NUMT
#define NUMT 2
#endif

#ifndef NUMTRIALS
#define NUMTRIALS 50000
#endif
```

Instead, change it to use global variables, like this:

```c
int NUMT = 2;

int NUMTRIALS = 50000;
```
 argc and argv

When you write in C or C++, your *main* program, which is really a special function call, looks like this:

```c
int main( int argc, char *argv[ ] )
{
    ...
}
```

These arguments describe what was entered on the command line used to run the program.

The *argc* is the number of arguments (the arg Count)

The *argv* is a list of argc character strings that were typed (the arg Vector).

The name of the program counts as the 0th argv (i.e., argv[0])

So, for example, when you type

```
ls  -l
```

in a Linux shell, the *ls* program sees argc and argv filled like this:

```c
argc = 2
argv[0] = “ls”
argv[1] = “-l”
```
**argv and argc**

So, if NUMT and NUMTRIALS are global int variables:

```c
int NUMT = 2;
int NUMTRIALS = 50000;
```

and you want to set them from the command line, like this:

```
./montecarlo  1  100000
```

Then, *inside your main program*, you would say this:

```c
if( argc >= 2 )
    NUMT = atoi(  argv[1]  );

if( argc >= 3 )
    NUMTRIALS = atoi(  argv[2]  );
```

The if-statements guarantee that nothing bad happens if you forget to type values on the command line.

The `atoi` function converts a string into an integer (“ascii-to-integer”). If you ever need it, there is also an `atof` function for floating-point.
shared( ) in the #pragma omp Line

Also, remember, since NUMTRIALS is a variable, it needs to be declared as shared in the #pragma omp line:

```c
#pragma omp parallel for default(none) shared(NUMTRIALS,xcs,ycs,rs,tn) reduction(+:numHits)
```

NUMT does not need to be declared in this way because it is not used in the for-loop that has the #pragma omp in front of it.
Windows comes with a shell program called *Powershell*. It might not be as familiar to most of us as some of the Linux shells are (csh, bash), but it can still be used to run multiple combinations of your program parameters in one shot.

There are a number of ways to get Powershell running. Either:

- Click on the Microsoft icon. Then scroll down to **Windows Powershell** and run **Windows Powershell**.

- Shift right-click in the directory you want to work in and select **Open Powershell Window**.

- Hold down the Windows key and hit the ‘x’ key, then select **Windows Powershell**.

The resulting window should look like this:

```
PS C:\Users\Mike Bailey>
```
Windows Powershell

Then:

1. `cd` (change directory) to your home directory.
2. Then `cd` to the folder with your project
3. Then `cd` to the folder with your executable (*.exe)

The prompt will always tell you where you are in the file system.
Windows Powershell

So, if you have `cd`ed to where your executable (.exe) file lives, you can run it from the command line like this:
Windows Powershell

But, here’s the cool part. Type:

```powershell
foreach ( $t in 1, 2, 4 )
{
    foreach ( $n in 1024, 2048, 4096)
    {
        ./MonteCarlo.exe $t $n
    }
}
```

followed by Enter:
Windows Powershell

You can also use a text editor like *notepad* or *notepad++* and put these lines into a file called, say, **loop.ps1** (ps1 is the Powershell file extension).

Then, you can run this script from Powershell just by typing it:

```powershell
Set-ExecutionPolicy -ExecutionPolicy Unrestricted -Scope CurrentUser
```

Instead of printing these lines to the screen, you probably want to print them to a text file that can then by imported by Excel.

I had to type this to give myself permission to run scripts. *This means don’t run any .ps1 files that you didn’t create yourself!*