Matlab Basics

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Overview

• The Matlab Environment
• Matlab Commands
• Matlab on ACISS
• Matlab Concepts
• Matlab in Parallel
Matlab Environment

- Desktop
- Displays
- Editor
- Scripts
- Command-line
Matlab Commands

• variables
• “;” suppress display
• ‘echo off’ suppresses echo
• exit (exits application)
• run (filename without ‘.m’)
Matlab Commands


• display: display (‘asdfas asdf asdf ‘);

• concatenate: longstr = [‘asdf’,‘gfddgsdg’]

• num2str(int_var)

• str2 = [‘sdfds’,num2str(some_int)];
Matlab Commands

• sprintf:
  • str = sprintf('%%s will be %d this year.', name, age);
  • disp(str)

• fprintf (can be used with files, as well)
  • same as above, but no need for “disp”
Matlab on ACISS

- module load matlab
- multiple terminals:
  - qsub -q generic -l
  - ssh <node address>
- running with no display
  - matlab -nodisplay
Matlab Concepts

• Scripts
• Arrays
• Branches
• Loops
• Functions
• File I/O
• Classes
• mercurial!!
Matlab Scripts

• A string of commands in a file
• For a script “fancyscript.m” we run using:
  • run fancyscript
• or from the command-line:
  • matlab -r fancyscript
  • /Applications/MATLAB_R2012a.app/bin/matlab -r partest
Matlab Array

- An NxN dimensional variable

- \( a = [1 \ 2 \ 3] \)
- \( b = [1 \ 2 \ 3; \ 4 \ 5 \ 6; \ 7 \ 8 \ 9] \)
- \( c = a[1,:\] \)
Matlab Branches


a =2; b = 3;
if a < b
    disp('a is less than b');
elseif a > b
    disp('a is greater than b');
else
    disp('a must be equal to be');
end
Matlab Loops


```
for r = 1:10
    disp(r)
end
```
Matlab Functions


- for one input and output, define a function in a file named average.m

```matlab
function y = average(x)
y = sum(x)/length(x);
```

Matlab Functions

• Multiple output

function [m,s] = stat(x)

n = length(x);
m = sum(x)/n;
s = sqrt(sum((x-m).^2/n));
Matlab File I/O

- Can open / write regular file or *.mat binary file
- Open delimited file:
  
  ```matlab
  filename = 'myfile01.txt';
  delimiterIn = ' ';
  headerlinesIn = 1;
  A = importdata(filename,delimiterIn,headerlinesIn);
  ```
Matlab File I/O

• Write delimited file http://www.mathworks.com/help/matlab/ref/csvwrite.html:

\[
\begin{array}{ccccccc}
3 & 6 & 9 & 12 & 15 & 5 & 10 \\
5 & 10 & 15 & 20 & 25 & 7 & 14 \\
7 & 14 & 21 & 28 & 35 & 11 & 22 \\
11 & 22 & 33 & 44 & 55 & & \\
\end{array}
\]

\text{csvwrite('csvlist.dat',m)}

type csvlist.dat
Matlab Classes

- Why I use Python if I can
Matlab Mercurial

- hg init
- hg add *.m
- hg commit -m ‘added matlab files’
Matlab in Parallel

- No campus license for Distributed Toolkit (>12 processors)
- May have to start with ‘matlabpool’ command
- We do have parfor: [http://www.mathworks.com/help/distcomp/parfor.html](http://www.mathworks.com/help/distcomp/parfor.html)
- [https://aciss.uoregon.edu/wiki/Matlab](https://aciss.uoregon.edu/wiki/Matlab)
Parfor


```matlab
for i=1:17
    c(:,i) = eig(rand(1000)) ;
end

parfor i=1:17
    c(:,i) = eig(rand(1000)) ;
end
```
Parfor

- Create queue of size 17
- Create N workers (based on cores <=12)
- For each i in queue, submit job to available worker
- As next worker becomes available, move to next i
- Writes must be memory independent

```matlab
parfor i=1:17
    c(:,i) = eig(rand(1000)) ;
end
```
CreateParallelJob
Creates Jobs on Torque

Summary

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