

Assignment 1 DESIGN.pdf

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Description of Program:

In this assignment, we are tasked with writing a bash script, `plot.sh`. This script will make graphs using `gnuplot` with data produced by a C program, `monte_carlo.c`. `Plot.sh` will create two graphs. The first graph show a quarter circle with a radius of 1 inside a square with side lengths of one. Data points that are inside the quarter circle will be blue and data points that are part of the square but not the circle will be red. The second graph will show the difference between the estimate of pi `monte_carlo` produced based on the current iteration. The longer the program is iterated, the smaller the difference will be. The second graph will show multiple runs of `monte_carlo` represented with different lines.

Files to be included in directory “asgn1”:

1. `Plot.sh`:

This is a bash script that will use `gnuplot` to plot data from the C program, `monte_carlo.c`. This script is the thing that we will be writing ourselves.

2. `Monte-carlo.c`:

A C program that prints the Monte Carlo estimation for pi after each random point it tests. It is provided

3. `Makfile`:

This file directs the compilation process of the Monte Carlo program. It is provided

4. `README.md`

This will describe what I did in assignment 1.

5. `DESIGN.pdf`

This design document will describe my design and my process for my program. This is what you are reading right now.

6. `WRITEUP.pdf`

This document will include the plots that my bash script creates. It will also contain a discussion on which UNIX command I used to produce each plot and why I chose to use them.

Pseudocode / Structure of `Plot.sh`:

Rebuild `monte_carlo` executable

Place data from `monte_carlo` into a temporary file called `graph1.dat`

Remove the first line of output from `monte_carlo.dat`

Subtract pi from data column 2 and place data from monte_carlo, into a temporary file called graph2L1.dat

Subtract pi from data column 2 and place data from monte_carlo, into a temporary file called graph2L2.dat

Subtract pi from data column 2 and place data from monte_carlo, into a temporary file called graph2L3.dat

Using gnuplot:

- Set the terminal to a pdf

- Set the destination of the plot to "monte_carlo.pdf"

- Depending on data column 5, 0 = blue, 1 = red using palette

- Plot graph1.dat using data columns 3, 4, and 5

- Plot quarter circle using the equation $[x=0:1] \sqrt{1-x^2}$

End gnuplot run

Using gnuplot:

- Set terminal to a pdf

- Set the destination of the plot to "monte_carlo2.pdf"

- Plot graph2L1.dat using data columns 1 and 2 with lines

- Plot graph2L2.dat using data columns 1 and 2 with lines

- Plot graph2L3.dat using data columns 1 and 2 with lines

End gnuplot run

Using gnuplot:

- Set terminal to a pdf

- Set the destination of the plot to "monte_carlo3.pdf"

- Plot graph2L1.dat using columns 1 and 2 with boxes