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Assignment 1: Getting Acquainted with UNIX and C

Design Document

1. Explanation

This program works by randomly choosing a seed from the program monte_carlo.c and putting the output of the program into a data.dat file. After getting the data.dat file, it then makes a plot1.dat file with the x and y column from the data.dat file to get the required data to make the first plot. Finally it uses gnuplot to create the Monte Carlo plot.

The second part of the program works by choosing 4 random seeds from the program monte_carlo.c and putting the output into 4 different data.dat files. It makes another 4 different plot2.dat files using the iteration and estimated pi value columns from respective data.dat files. Finally it uses gnuplot to plot all 4 files at the same time to create the Monte Carlo Error Estimation plot.

2. Pseudocode

Make monte_carlo executable file using monte_carlo.c

Run monte_carlo with a chosen number of iteration and put the output in data.dat

Make a new plot1.dat file with ‘x’, ‘y’, ‘in circle’ column from data.dat

gnuplot << END

Set the output to pdf

Set the plot to a square

Auto title the header column

Remove x axis and y axis label

Set output pdf name

Set the plot title

Set range for x axis and y axis

Create a color palette for the dots based on whether it's inside or outside of the circle

Remove the color box

Plot the monte_carlo graph using dots, and the equation for the quarter circle

END

Run monte_carlo with a chosen number of iteration and 4 different seeds and put the outputs in different data.dat files

Make 4 new plot2.dat files with the 'iteration', '(PI - estimated pi value)' columns from respective data.dat files

gnuplot << END

Set output file to pdf

Set output file name

Set the plot title

Set x axis scales

Set x axis and y axis range

Set y axis label

Plot all 4 plot2.dat files using lines with different color for each one