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Challenge Problem 3 Secret Santa

Code:

/\* This code looks to change each element with all possible following elements and then recusivley invoke the function \*/

/\*Piping into egrep, setting the inverse and the flag count gives us the number of valid matches ./PatternSearcher | egrep -cv "^A|^.{1}B|^.{2}C|^.{3}D|^.{4}E|^.{5}F|^.{6}G|^.{7}H" \*/

#include <stdio.h>

#include <string.h>

int permNumber = 0;

void swapValues(char \*firstValue, char \*secondValue) {

char temp;

temp = \*firstValue;

\*firstValue = \*secondValue;

\*secondValue = temp;

}

void permute(char \*stringPointer, int start, int end) {

int i;

if (start == end) {

permNumber++;

printf("Permutation (%d): ",permNumber);

printf("%s\n",stringPointer);

} else {

for (i = start; i <= end; i++) {

swapValues((stringPointer+start), (stringPointer+i));

permute(stringPointer, start+1, end);

swapValues((stringPointer+start), (stringPointer+i));

}

}

}

int main() {

char str[] = "ABCDEFGH";

int n = strlen(str);

permute(str, 0, n-1);

return 0;

}

1. Total number of possible combinations is given by running the program with no piping. It returns 40320 permutations. The number of invalid permutations is given by the egrep piping without the v flag and returns 25487. Piping with the v flag to give us the number of valid combinations returns 14833 combinations.
2. Data points for other patterns.

Twelve Letters: Total: 3628800, Valid: 1334961. %: 0.367879464

Nine Letters: Total: 362880, Valid: 133496. % 0.367879189

Seven Letters: Total: 5040, Valid: 1854. %: 0.367857143

Six letters: Total: 720, Valid: 265. %: 0.368055556

Five Letters: Total: 120, Valid: 44. %: 0.366666667

Taking all of these Valid / Total we always get 36% and we approach 36.78794412 as we approach infinity.