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CS472

Assignment 3

Question 1:

// a = min, b = max

int RANDOM(int a, int b)

{

static random\_device dev;

mt19937 eng{dev()};

uniform\_int\_distribution<int> dist{a, b};

int num = dist(eng);

return num;

}

Question 2:

// pass by reference vector

// pass by value size n

void RndmizeVec(vector<int>& vect, int n)

{

int tempNum = 0;

int tempPlace = 0;

for(int i = 0; i <= (n-1); i++)

{

tempPlace = RANDOM(i, (n-1));

tempNum = vect[i];

vect[i] = vect[tempPlace];

vect[tempPlace] = tempNum;

}

}

Question 3:

//Function to find target in vector

bool Find(vector<int> vect, int target)

{

vector<int>::iterator it;

it = find(vect.begin(), vect.end(), target);

if(it != vect.end())

return true;

else

return false;

}

vector<int> RandomSample(int n, int m)

{

vector<int> sample;

if(m == 0)

return sample;

else

{

sample = RandomSample(n-1, m-1);

int i = RANDOM(1, n);

if(Find(sample, i))

{

sample.push\_back(n);

}

else

{

sample.push\_back(i);

ranCall++;

}

return sample;

}

}

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Size | 5 | 10 | 25 | 50 | 100 |
| 100 | 5 | 10 | 25 | 35 | 5 |
| 200 | 5 | 10 | 25 | 46 | 73 |
| 300 | 5 | 9 | 25 | 47 | 83 |
| 400 | 5 | 10 | 25 | 49 | 86 |
| 500 | 5 | 10 | 25 | 49 | 91 |
| 600 | 5 | 10 | 25 | 48 | 89 |
| 700 | 5 | 10 | 25 | 47 | 91 |
| 800 | 5 | 10 | 25 | 46 | 91 |
| 900 | 5 | 10 | 25 | 47 | 92 |
| 1000 | 5 | 9 | 25 | 48 | 92 |

The claim was that the algorithm would generate less calls to random() if n is significantly larger than m.

For the data I have collected. What was calculated by counting the number of times the random number was added to the Sample list. The closer m was to n generated less calls.