import java.util.\*;

public class RoundRobin{

public static void main(String[] args) {

Scanner sc = new Scanner(System.in);

System.out.println("Enter number of processes : ");

int n = sc.nextInt();

System.out.println("Enter quantum time : ");

int q = sc.nextInt();

int pid[] = new int[n];

int at[] = new int[n];

int bt[] = new int[n];

int ct[] = new int[n];

int tat[] = new int[n];

int wt[] = new int[n];

int rbt[] = new int[n];

int f[] = new int[n];

float avgwt = 0, avgta = 0;

for (int i = 0; i < n; i++) {

System.out.println("Enter process ID for process " + (i + 1) + ": ");

pid[i] = sc.nextInt();

System.out.println("Enter Arrival Time for process " + (i + 1) + ": ");

at[i] = sc.nextInt();

System.out.println("Enter Burst Time for process " + (i + 1) + ": ");

bt[i] = sc.nextInt();

rbt[i] = bt[i];

f[i] = 0;

}

System.out.println("Input accepted.");

// Sort processes based on arrival time

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

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

if (at[j] > at[j + 1]) {

int temp;

temp = at[j];

at[j] = at[j + 1];

at[j + 1] = temp;

temp = bt[j];

bt[j] = bt[j + 1];

bt[j + 1] = temp;

temp = pid[j];

pid[j] = pid[j + 1];

pid[j + 1] = temp;

temp = rbt[j];

rbt[j] = rbt[j + 1];

rbt[j + 1] = temp;

}

}

}

// Implementing Round Robin Scheduling

int st = 0, tot = 0;

Queue<Integer> queue = new LinkedList<>();

int i = 0;

while (tot < n) {

while (i < n && at[i] <= st) {

queue.add(i);

i++;

}

if (queue.isEmpty()) {

st++;

continue;

}

int idx = queue.poll();

if (rbt[idx] > q) {

st += q;

rbt[idx] -= q;

} else {

st += rbt[idx];

ct[idx] = st;

rbt[idx] = 0;

tot++;

}

while (i < n && at[i] <= st) {

queue.add(i);

i++;

}

if (rbt[idx] > 0) {

queue.add(idx);

}

}

// Calculating turn around time and waiting time

for (i = 0; i < n; i++) {

tat[i] = ct[i] - at[i];

wt[i] = tat[i] - bt[i];

avgta += tat[i];

avgwt += wt[i];

}

// Printing results

System.out.println("\nProcess ID\tArrival Time\tBurst Time\tCompletion Time\tTurnaround Time\tWaiting Time");

for (i = 0; i < n; i++) {

System.out.println(pid[i] + "\t\t" + at[i] + "\t\t" + bt[i] + "\t\t" + ct[i] + "\t\t\t" + tat[i] + "\t\t\t" + wt[i]);

}

// Printing average turn around time and average waiting time

System.out.println("\nAverage Turnaround Time: " + (avgta / n));

System.out.println("Average Waiting Time: " + (avgwt / n));

Scanner s = null;

s.close();

}

}

