Assignment #6

Problem Solving and Programming in C++
Department of Computer Science
Old Dominion University

Objectives: The software testing process (*i.e.*, the **BBT**) consumes large amounts of data. Creating the test data is a crucial part of the testing process especially for new systems which are not in use yet. This assignment will give you an opportunity to practice creating representative test data. After completing this assignment, students will be able to:

- Create random data from a given set of parameters
- Create a large number of test cases to test all possibilities
- Write a C++ program to process the data as though it were collected from a real situation.

This assignment will be submitted into two parts (*Part-A* and *Part-B*) – a separate Code::Blocks project is required for each part.

Problem description: Cuddly Kitty Café is a company with many stores worldwide. Each location features a range of cats which patrons can interact with while they enjoy their coffee and breakfast. Company executives have noticed a trend where some cafes underperform, and they would like to know if this is related to how cuddly the cats are. Their intuition is that un-cuddly cats attract less customers. To determine if this is true, they are running a customer survey at each location on how cuddly each cat is. They want to compare this data to sales for each coffee shop. The program they want you to write processes this data after it has been collected and generates some statistics. In order to test the program, you will have to generate random test data to be sure the program functions correctly. Part A covers the random data generation. For Part B you will create the program that reads in the data and generates a statistics report. One of the outliers is the youTube famous ugly cats. The executives have noticed that while super pretty cats are adored and loved on, especially ugly cats actually become famous, with customers posting videos of themselves with the ugly kitties, which then brings in more customers. They would also like to track which shops have youTube famous cats.

Part-A:

Write a C++ program to generate the cafe data file "`kittycafes.txt`". Each line in this file represents a cafe record, with each element separated by a character:

```
cafeID:nameOfCafe:MonthlySales:numCats:YouTubeFamous
```

As shown below for one cafe:

```
183546:rtyehhskjh Cafe:34123.00:12:1
```

The record above is just an example of one cafe, remember there are 5000 cafes. Please note that the café ID is a unique 8 digit number. You MUST use a *random number generator* to generate a unique ID for

each cafe. In order to insure uniqueness, you should check each ID against IDs already selected. You must randomly generate the number of cats, between 8 and 20, and the cuddly score for each cat(1.0000-20.0000), then set the average cuddly score for all cats at a cafe as the AvgCuddles. If a cat scores 3 or below on the cuddly scale, then that café has a youTube famous kitty, and the Boolean value for youTubeFamous will be **set to true**, **represented as a** 1 in the café data, or a 0 otherwise. You will also need to randomly generate the first part of each cafes name. They do not need to be unique, and should be one or two words, no more than 15 characters long. Look up the ASCii chart to see how to translate decimal integers to characters. Then add "Cafe" to the end.

On the same line as the cafe data, you will need to output the cat names (one randomly generated word between 3 and 10 characters) and their cuddle score, with each data point separated by a space.

A line of output would look like this, though it would all be on one line in the file:

```
183546:rtyehhskjh Cafe:34123.00:12:1 shdyetrv 12.0123 shdgfyvb 2.0010
      dyng 19.1230 fgdjowe 13.0200 ghyw 7.0456 hgqidfh 7.5463 …
```

Continuing all the way to the number of kitties, in this case 12.

The Cuddle factor for each cat will be a random double from 1 to 20, printed to 4 decimal places.

For the monthly sales for each cafe, you will generate a random number from 50 to 500 for each day of a month (30 days). This number will be multiplied by the AvgCuddles factor for that Café. This will simulate the concept of cuddles impacting sales. If there is a youTube famous kitty at that cafe, then after multiplying the sales by the AvgCuddles factor, the sales for that day will be increased by 50%. The sum of the daily sales for the 30 days will be the MonthlySales total for this month. We are only generating 1 month worth of data.

!!!!The output file should be sorted by Café ID!!!! Smallest ID at the beginning of the file.

Submission notes for Part-A:

- Zip the entire Code::Blocks project containing all the `.cpp`, `.h`, `.cbp` files and name the zipped file "Assg6A_cslogin.zip", where the cslogin is your login ID for the computers at the Department of Computer Science at ODU
- You do not have to submit the txt file (`kittycafes.txt`) with your program for Part-A. This file will be deleted when the graders test your program.
- Submit the zipped file using the appropriate Blackboard link.

Part-B:

Create a new project in Code Blocks. Write a C++ program which reads the "`kittycafes.txt`" you created in Part A using the appropriate data structure to manage the cafe data. Sort the list of Cafes by Sales first and Cuddliness second. To do this, as you sort, round the monthly sales up to the nearest thousand when comparing. If two cafes have the same rounded sales value, sort by AvgCuddles. AvgCuddles is not part of the saved data, so this will have to be computed from the individual scores. If the AvgCuddles is the same for two cafes, sort them by the number of cats at the cafes. The higher sales, cuddle values, and number of cats should be at the top of the list.

Output the sorted Cafes to a file called "`results.txt`". In the output, include the CafeID, CafeName, MonthlySales, AvgCuddles, numCats, and the Name of the youTube Famous kitty if they have one. If there is more than one kitty at or below 3 on the cuddly scale, pick the lowest.
After the sorted list of Cafes in the text file, print the 10 lowest Cafes under the heading "Low Performers". Finish the text file with a report at the end. Include the mean MonthlySales across the company, the total MonthlySales companywide, the average number of Cats at each shop, the total number of cats companywide, the mean AvgCuddles across the company, and the total number of youTube famous kitties across the company. A sample "`results.txt`" file will be made available in the assignment folder.

Submission notes for Part-B:

- Zip the entire Code::Blocks project containing all the `.cpp`, `.h`, `.cbp` files along with the txt file `kittycafes.txt` and name the zipped file "Assg6B_cslogin.zip", where the cslogin is your login ID for the computers at the Department of Computer Science at ODU
- You must submit the txt file (`kittycafes.txt`) with your program for Part-B. This file is required for grading your assignment.
- Submit the zipped file using the appropriate Blackboard link.

Sample Output:

"`kittycafes.txt`" The lines continue off the edge of the page, listing each cat at each café and their cuddliness. Use setprecision() to print the double to 4 decimal places. As you can see, the rows are sorted by CafeID.

```
10000002:e Cafe:107665.25:12:1 juibyvw 10.1600 lwzi 1.9000 cgckjsn 17.7400 shrkibjf 19.9900 zuvfydvt 11.6500 whafzu
10000003:fxvo Cafe:80114.16:13:1 wgnbyg 0.4600 lmfhrsvidx 14.3400 capzhv 3.5100 fojnlfken 4.8100 jca 4.3800 gibccd
10000005:yeaptqkre Cafe:92021.98:11:0 uvfbah 15.9100 yvlzyzhgi 9.4800 lixevmr 9.1400 osp 15.0600 aakflq 13.6600 izv
10000007:cuogtwduuot Cafe:105688.45:18:1 kxyxta 5.9000 xwah 18.4600 szqjn 13.6700 lokz 11.0700 vfovtdi 9.8800 dzeg
10000012:ncvkajzfvnwovi Cafe:127831.16:20:1 edutp 4.2500 vdii 2.1500 wrb 9.2200 mom 9.8400 anppq 17.9400 pgbfjjps 1
10000013:lnlgolceziazav Cafe:135506.56:9:1 xslkekivt 0.1400 zwbxhpaw 9.3600 fzqndo 10.6400 msfbut 10.5200 glilf 19.
10000018:bzbzht Cafe:136589.46:18:1 bktvvixr 6.4100 nmdswpxd 8.7500 omtyevwu 2.6300 anjidcne 19.9300 jozcxkldn 0.6
10000022:oucebnvovfnviai Cafe:114319.74:11:1 pedxogjs 7.5700 hiileiek 1.9700 djjtplmx 19.5300 qijwof 12.1700 zpgjy
10000043:cuesvz Cafe:115425.21:20:1 afmmkjlnps 0.3100 wae 2.4100 sntzkl 18.1000 rlpnix 12.9600 ypmrfp 11.6500 uazk
10000044:xblehxz Cafe:114854.04:10:1 xgtcbovplk 2.3600 cpw 5.9400 gxpb 16.9800 xbz 14.3200 qgj 16.3000 ftlvdgzhj 1
10000054:vhmov Cafe:113201.83:20:1 jvzu 5.3800 anvvigk 3.8300 llomeerqwi 10.6200 kveckq 15.6200 mdo 15.3300 oqtsm
10000063:xhav Cafe:147532.42:15:1 tyaoyla 15.4200 rccudjm 12.9700 usrsxbtq 16.8400 ymodsk 4.9000 nkrljlr 13.0400 vr
10000064:gq Cafe:136929.46:17:1 gpy 14.2700 vdg 9.2000 hknwfitqb 10.7100 dmnsuu 13.6800 osub 18.6500 pdwds 16.2300
10000077:znybb Cafe:117193.75:12:1 cqat 12.8700 zcdnyn 3.4500 mehtzlnsm 15.3500 jcno 1.9700 jizcj 3.7800 fyiqnqvli
10000079:genuxmstxizdra Cafe:146946.96:20:1 qvbso 1.7100 mytepu 9.5600 wlzr 19.4500 etchdi 0.7200 xch 11.8500 qlap
10000086:rwk Cafe:108705.77:11:1 anl 2.3200 eynuvdjo 1.5900 vojbdift 13.8800 mpkudutr 9.0900 cny 15.6600 bsrcfurcb
10000093:vnwxfdoynrlbxhb Cafe:92196.55:13:1 ricdnkpvcb 7.6600 ckpqnjgq 6.8700 dmkhmti 9.0000 baepmc 12.7000 rzsnjb
10000095:lxfpowax Cafe:115193.26:16:1 nme 11.2300 abv 13.5300 dnwspredt 10.9400 xeb 2.8700 gswtkpjetd 4.0900 ccits
10000097:yaqivcohmlldjl Cafe:86471.77:18:1 ugveqe 5.3800 vkkdtmlmza 12.0200 mihihxi 4.4000 fcftvfupr 5.6700 nwynt
10000111:ubvdsno Cafe:119609.28:17:1 yrvvteb 9.0600 drlnkfnl 14.3200 zkpijfmnu 15.9200 mvonn 18.9400 xdonlnq 9.790
10000122:ts Cafe:113797.87:10:1 wuuklzk 5.7100 ephtjys 17.2900 qxgzbspw 0.1900 dor 8.9600 qtgfxolv 2.8500 zudoxtbm
10000124:wgwzy Cafe:115166.18:19:1 fqjpeoe 11.1100 jnkyhskzs 15.7000 pcijk 8.5200 ebgamo 4.6000 zbzw 1.0400 xbz 11.
10000131:tjwtljssyfogvay Cafe:144147.21:18:1 olwnhc 19.3000 ymmw 12.5000 diypsb 19.1500 cjcnlkmtp 3.4400 ycnoryhyu
10000146:lq Cafe:146418.08:15:1 iauiodrcm 15.9400 xyxnrstiy 8.8300 ursqb 2.3000 ogsdncnwd 10.6400 lyxelvs 9.2200 x
10000149:tdfxf Cafe:138865.53:14:1 bcerbafuio 10.6500 cwfbsz 1.9400 zjrrfyxha 11.2600 cwohpseq 6.5400 hfswnka 19.3
10000152:b Cafe:82117.55:10:0 zeqnz 15.0500 akcln 18.2200 ygqe 6.7900 ipdagxa 5.3900 hxjxjnho 4.0500 wthbmr 3.9500
10000159:li Cafe:122705.78:16:1 kanhx 8.2300 brioiaqyn 10.4600 aymnh 7.8800 jkl 19.3000 rgwzgpou 18.0500 jqgbvd 15.
10000163:fbxvkbmcoc Cafe:168578.63:15:1 otkgepcpb 0.6100 wpbina 17.0200 crksqyd 18.6700 rwxse 15.8000 mmxedjilcq 3.
10000166:wsmlntb Cafe:90945.21:19:1 qncbxp 7.5100 cvh 12.6700 dnh 8.8300 oqbvzdajts 18.3100 lzuxje 9.9200 rylitesx
10000170:sl Cafe:133962.10:18:1 fxonu 0.4200 gvaqbqoh 9.7100 wqid 0.1600 jshzdptbcp 1.7400 eccs 11.6400 evap 17.64
10000179:z Cafe:134729.14:19:1 ivlfqgztmi 15.5500 hijaoarvnf 12.0300 kpwzm 17.1000 qyyfj 10.5700 bwi 13.9600 byzjv
10000190:pmofgphfsxj Cafe:66820.04:10:0 xskfknkt 6.0100 rrmady 11.7500 mgiusq 4.6800 bpguwi 9.7800 ucpbwikm 9.8400
10000193:jokaukufdhl Cafe:111942.31:20:1 gsuekb 1.0000 krlffhf 12.2600 rlhjtspux 2.6500 gue 17.7200 kcuq 1.4300 ad
10000196:qwx Cafe:130739.73:13:1 qen 1.5800 wwm 4.4300 lnofdz 11.3100 hnnesbdsn 12.3500 uydbgtqamy 5.8300 yhu 14.2
10000202:udfsasjrsmeig Cafe:112233.04:17:1 nmjvzglc 4.8000 icyyqr 6.7500 mvt 11.9900 ujibxwtiic 7.2100 ujzlhaeb 15.
10000206:a Cafe:88099.10:13:0 iezza 19.4000 nsmioetf 7.0300 ditqp 8.9400 zhksvghva 9.8100 zhnecck 16.3100 eznk 10.
10000209:n Cafe:110192.46:10:1 nndjb 14.2400 petcp 5.4100 uaszxbun 8.9200 osweturbi 7.1800 uamjmn 19.5300 cuipc 3.
10000213:upwnjqdnhm Cafe:138931.81:18:1 zjbsw 16.1600 txwienkk 2.2800 jzx 4.6100 cbhtjfbtou 14.1100 kahyinaote 18.
10000216:ptbp Cafe:168192.75:8:1 kig 11.6800 akzclcuxhy 14.9200 mgpmidkotf 18.3800 qhduybb 16.7700 bnc 2.0800 zlcb
10000237:rgumgrqsunbizq Cafe:144855.05:17:1 ftaphrd 17.9100 dcl 12.5900 geqodnqbmb 8.9500 eoqygczm 4.7100 jyjoedd
10000239:luerbetcr Cafe:154762.17:14:1 jocisdzi 13.0000 odz 19.1100 jyzffb 3.8000 igs 19.9500 uxx 14.5000 sdpnhyly
10000256:btcyz Cafe:118702.78:9:1 iukondvvor 11.1100 vxzffdnk 7.3100 csbneaojl 16.3600 mborfb 9.1700 jrfn 4.0300 m
10000258:draelv Cafe:129682.08:16:1 mkdcsnyguz 13.0600 bbdemvrztc 6.2500 dcqs 13.4900 gphx 12.7200 kavs 12.0200 kf
10000265:clduqnsihaaxj Cafe:153364.42:14:1 eeohyosica 3.9800 jyrkabjm 13.0700 tjehrks 10.4800 witqeu 11.2000 wpkao
10000273:gpwenhdjeghdw Cafe:138265.78:8:1 iorh 7.6400 hdx 14.1400 kmmh 14.4100 xgzkkd 14.4000 hpdqtqy 2.5600 idh 6.
10000275:eqnw Cafe:84526.19:10:0 qgnyfcksk 15.7100 cgqo 6.2900 haytgoa 6.7400 astfdnhils 6.7200 hdhppkgkm 8.1800 i
10000284:gbfbozgl Cafe:132400.57:8:1 gzcwymxkgs 4.4000 durqpnjhe 13.7200 yuhymfesdn 0.5000 rhqdpbmvle 19.8100 jlqz
```

“results.txt” the sorted list.

10011998	wnwfoapdgja Cafe	217907.43	13.7126	19	bgudqek
10005810	bspbvsy Cafe	192195.67	13.8325	8	qiwneg
10015255	a Cafe	187970.79	12.8488	8	mnzr
10002594	kfoxzlubthumvy Cafe	183611.50	13.0833	18	oig
10014631	tvxbtuampkp Cafe	182617.28	12.9889	9	zpbvcfw
10003942	pz Cafe	183325.48	12.7962	16	wio
10006154	pcpdumrglsd Cafe	182786.81	12.7280	15	vzp
10003211	zoudyukc Cafe	180950.87	13.3194	17	gljlmyhz
10023731	aejrinuxlmwapm Cafe	179876.73	13.7300	14	vcqt
10015567	mosio Cafe	179565.86	12.2919	16	cjavaqlxe
10004723	otwdq Cafe	177873.41	12.3613	15	kzvrwooq
10016048	zjhbsxrvqpk Cafe	177348.50	13.5215	13	dwwlh
10018833	slufrajqzteq Cafe	177463.37	12.9427	15	jnooaqr
10000754	afk Cafe	177099.52	12.3410	10	psckxbyjcu
10002954	cnljc Cafe	175952.53	13.7872	18	znftsvuvwf
10015274	svkbajloi Cafe	176149.24	12.7825	12	crzvsh
10018963	fgsunvzzlxm Cafe	175650.94	12.6883	12	oomf
10006341	s Cafe	175905.00	11.8323	13	kmvvh
10028583	igcmrgj Cafe	175461.08	14.1307	14	dwy
10002668	ujpc Cafe	175037.86	13.2439	18	xdybyp
10016410	hrwrpkteuyvtf Cafe	175058.08	13.1484	19	nadfiwtv
10020931	jvpvghesi Cafe	175468.74	12.7553	15	xdjufytog
10001832	dxnalxpnneixzks Cafe	174997.63	12.7100	13	vuprz
10019005	gstogswqi Cafe	174947.21	12.3250	10	iilnieufgq
10021647	kiebeitrocwfiv Cafe	174657.38	12.2309	11	ghkl
10005682	mtulnigdbfuj Cafe	175332.88	11.7653	15	bksymeoti
10025541	ikanoc Cafe	174379.03	12.6747	19	deaizdqk
10014479	ckdxkhschdifhow Cafe	173931.30	11.8200	18	wpxo
10010259	jiajm Cafe	173164.10	13.4173	15	zffumfwq
10019834	xktapfqoo Cafe	172911.67	13.2150	10	etekjnd
10030610	zupi Cafe	173355.65	12.1321	19	lof
10025406	qrtlbljc Cafe	172703.19	12.0384	19	xjwdiw
10014970	jkl Cafe	173059.98	11.7800	10	qzokjwctf
10024041	cjhjvwwlywn Cafe	172340.22	14.2213	8	sxom
10012134	yzovugoongljdto Cafe	172167.18	12.2600	12	qdifntghdg
10029957	mwncke Cafe	172190.72	12.2368	19	sgeozzuzf
10019432	msuwxgog Cafe	171025.47	12.7650	20	ohidnbrl
10008655	lingvxzxnn Cafe	171389.79	12.3006	18	ttucdpxwzg
10026184	xrngctpmbwgrqo Cafe	171081.04	11.2958	12	ycbgd
10020188	rhi Cafe	170446.96	14.5290	10	jinqevfa
10025486	ispysqvbie Cafe	169964.06	13.3211	9	tpxc
10002042	w Cafe	169586.45	12.9936	11	ldiexxjjyh
10006847	ozwshkgrvtskrf Cafe	170067.50	12.8111	9	smgwhasep
10013763	qaftafenkkp Cafe	170233.41	12.7173	11	gdfwq
10012326	j Cafe	170419.64	11.9719	16	nceijpvbu
10011884	ocjnfawmex Cafe	169047.22	12.6230	10	mjzqhy
10026817	an Cafe	168737.93	12.5409	11	teh

"results.txt" Low Performers and the Report

```
++++++++++++Low Performers++++++++++++

10018419               hlwygvacpculr Cafe       44085.17    5.9040   10
10027642                    ugyiybxg Cafe       49781.88    3.9722    9 ruwk
10021966                 qetyrivbtxqp Cafe       49613.98    4.3412    8 tztn
10002671                    qcabqiuf Cafe       49713.97    6.0267    9
10005289                  wvcaytpulu Cafe       51381.42    5.2329   14 dhclieufw
10028327                       cwwx Cafe       54356.48    7.4278    9
10014989                  athkeadbux Cafe       54749.72    5.0729   17 qkwbmk
10009159                 mfwrabsyrpdl Cafe       55852.88    4.9587    8 dkybpnbq
10027954                       cgootb Cafe       56969.01    4.4877   13 iyvzl
10015106                     axshyki Cafe       59469.84    7.2933   12



++++++++++++Report+++++++++++++++++

        Total Cats: 70118
        Cats/Cafe: 14
        Total Sales: 581753311.10
        Sales/Cafe: 116350.66
        Cuddles/Cafe: 9.8591
        Total Famous Cats: 4420
```