CS422
Assignment 1 Report

Part A

1. Perlbench

	Number of Instructions	Percentage
Loads	356507409	22.82
Stores	205410522	13.15
NOPs	962330	0.061
Dir. Calls	12761276	0.817
Indir. Call	2834609	0.181
Return	15595881	0.998
Unco. Br.	30541210	1.955
Cond. Br.	129998750	8.323
Logical	100155480	6.413
Rot&Shft	4272827	0.273
Flag	863248	0.055
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	936868	0.059
Rest	700910573	44.879

2. Bzip2

	Number of Instructions	Percentage
Loads	452705969	26.884
Stores	231174217	13.728
NOPs	36514	0.002
Dir. Calls	791586	0.047
Indir. Call	13	7.72028e-07
Return	791596	0.0470103
Unco. Br.	21299250	1.264
Cond. Br.	129923062	7.715
Logical	71000840	4.216
Rot&Shft	61832096	3.672
Flag	6130	0.00036
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	0	0
Rest	714314828	42.4209

3. GCC

	Number of Instructions	Percentage
Loads	138901827	9.275
Stores	358664176	23.950
NOPs	189005	0.0126
Dir. Calls	4609737	0.307
Indir. Call	501629	0.033
Return	5111366	0.341
Unco. Br.	5013055	0.334
Cond. Br.	133593622	8.921
Logical	131957059	8.811
Rot&Shft	2347881	0.156
Flag	184850	0.0123
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	5	3.3389e-07
Rest	716423385	47.841

4. MCF

	Number of Instructions	Percentage
Loads	415212666	27.222
Stores	110040138	7.214
NOPs	1477639	0.0968
Dir. Calls	12556337	0.823
Indir. Call	0	0
Return	12556337	0.823
Unco. Br.	8314494	0.545
Cond. Br.	178242956	11.686
Logical	75119529	4.925
Rot&Shft	75119529	0.230
Flag	0	0
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	0	0
Rest	708216297	46.432

5. soplex

	Number of Instructions	Percentage
Loads	416822367	27.829
Stores	80961162	5.405
NOPs	3550	0.00023
Dir. Calls	3177232	0.212
Indir. Call	111	7.41095e-06
Return	3177343	0.212
Unco. Br.	12760257	0.851
Cond. Br.	103252185	6.893
Logical	13994391	0.934
Rot&Shft	10481882	0.699
Flag	22973610	1.533
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	309498712	20.663
Rest	520680727	34.763

6. hmmer

	Number of Instructions	Percentage
Loads	547662878	33.736
Stores	75694110	4.662
NOPs	34317	0.0021
Dir. Calls	144622	0.0089
Indir. Call	959	5.90751e-05
Return	145581	0.0089
Unco. Br.	205862	0.0126
Cond. Br.	144361424	8.892
Logical	1158703	0.071
Rot&Shft	294106	0.018
Flag	5669	0.00034
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	40212	0.00247
Rest	853607582	52.582

7. omnetpp

	Number of Instructions	Percentage
Loads	339438005	21.779
Stores	219077007	14.056
NOPs	802403	0.0514
Dir. Calls	21327725	1.368
Indir. Call	3689261	0.236
Return	25016988	1.605
Unco. Br.	22189669	1.423
Cond. Br.	117335243	7.528
Logical	60009426	3.850
Rot&Shft	7139690	0.458
Flag	20159884	1.293
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	96963577	6.221
Rest	625366134	40.125

8. xalancbmk

	Number of Instructions	Percentage
Loads	351232011	23.432
Stores	148018476	9.875
NOPs	29559062	1.972
Dir. Calls	9954913	0.664
Indir. Call	8903082	0.593
Return	18847785	1.257
Unco. Br.	6511900	0.434
Cond. Br.	202163922	13.487
Logical	30744670	2.051
Rot&Shft	4277125	0.285
Flag	1265456	0.084
Vector	0	0
Con Mov.	0	0
MMX	0	0
Syscall	0	0
Floating	5529157	0.368
Rest	681884145	45.492

Part B

	CPI**
Perlbench	29.4242
Bzip2	33.0846
gcc	27.2489
mcf	28.2053
soplex	27.2554
hmmer	31.3354
omnetpp	29.3107
xalancbmk	27.3133

** Total instruction count taken is same as that taken in part A. Thus some instructions as counted multiple times. That could be explained as, cycle latency was incremented as per memory operations, so taken them as different instructions should be logical.

Part C

	Data Footprint **	Instruction Footprint **
Perlbench	9098	1071
Bzip2	842368	245
gcc	316048	1051
mcf	2934025	19
soplex	1455727	223
hmmer	21078	179
omnetpp	241199	348
xalancbmk	288036	953

** These are number of 128 bytes blocks accessed.

Part D

I) Distribution of Instruction Lengths

No. of Bytes	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
1	117420149	38611298	129727881	80626406	77586150	25078459	154578781	141635822
2	256659715	219201496	591078058	485393450	441958723	302860550	308551239	347606938
3	274805569	436966021	125319525	315526368	399690886	296150904	382074551	441520004
4	52915941	75326917	115768546	50531275	16087417	270388805	34347874	25296517
5	78565527	22047303	11383741	22076604	3219650	270388805	45117282	19028200
6	185656546	141357083	15857649	5249812	40002900	68360213	48822873	18775998
7	33976513	51341640	10806323	40596085	17517362	416480	26506979	5852560
8	28	15085632	58277	-	3936912	11883355	-	194015
9	-	-	-	-	-	-	-	43257
10	12	62610	-	-	-	-	421	46689

II) Distribution of number of operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	962330	36514	189005	1477639	3550	34887	802403	29559062
1	1073025	6147	4598290	-	13	3512	225880	569791
2	520753177	597647595	349826895	484784810	412397965	566126765	518294386	394857913
3	355064813	382870336	403965793	457346948	396041970	432938362	281743902	448723402
4	103275574	2693815	33893409	43834266	188348115	713115	172763932	82966852
5	15597553	14191385	203271325	12556337	3208387	159551	25030577	20327125
6	3273528	2554208	4255283	-	-	23808	1138920	22995855

III) Distribution of the number of register read operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	9715603	5189068	2135568	3759877	21250	605133	8235029	35109150
1	260661738	183351799	169119159	148510514	209642143	75620217	212733766	251999141
2	537435463	533608279	472763666	677530791	480140796	562392727	507453808	430684173
3	178772173	215105794	62836870	170198818	238848633	281432345	247351525	248433678
4	7548394	46791053	90229264	-	68154837	79910841	19400338	1962682
5	2593101	13399799	198660190	-	3192341	14929	3686614	8815321
6	3273528	2554208	4255283	-	-	23808	1138920	22995855

IV) Distribution of the number of register write operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	135377561	132331500	125633607	70906597	27368163	75138470	134695258	102207296
1	685125053	712782246	419631514	770283629	554080287	755262453	639969602	698662355
2	176220284	152332029	450336905	158771263	401689989	169573385	213737942	176045060
3	2392334	2554225	4397974	38511	16861561	25692	10458278	23085289
4	884768						1138920	

V) Distribution of the number of memory operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	453467112	399852620	518768189	487182330	531476676	376808158	449250121	534279946
1	530813949	516406404	464760807	500382536	439263119	623024770	542984746	431472055
2	15551991	83736891	16402598	12435134	29260205	166109	7765133	33889216

VI) Distribution of the number of memory read operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	644210388	547289946	861029767	584787334	583177633	452336159	661700915	648409206
1	354737919	452705969	138901827	415212666	416822367	547662878	337160165	351232011
2	884745						1138920	

VII) Distribution of the number of memory write operands in an instruction

No.	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
0	794422530	768821698	641267418	889959862	919038838	924304927	780922993	851622741
1	205410522	231174217	358664176	110040138	80961162	75694110	219077007	148018476

VIII) Maximum and Average number of memory bytes touched

	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
Max	8	8	8	8	8	8	8	8
Min	3.80875	4.02652	4.05404	4.09699	5.52039	3.99842	4.2431	4.26488

IX) Maximum and Minimum immediate values

	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
Max	2147483647	1685382481	2147483647	2147483647	2147483647	2147483647	2147483647	2147483647
Min	-2147483648	-2147483648	-2147483648	-2147483648	-2147483648	-2147483648	-2147483648	-2147483648

X) Maximum and Minimum displacement fields

	Perlbench	Bzip2	gcc	mcf	soplex	hmmer	omnetpp	xalanc
Max	135918104	135000192	138634432	134957120	135855532	135294312	136090116	139657912
Min	-1408	-4848	-1744	-76	-344	-580	-104	-1392