CA Assignment 3 Report

Code outputs for direct mapped cache:-

	gcc.trace	gzip.trace	mcf.trace	swim.trace	twolf.trace
Number of accesses	515683	481044	727230	303193	482824
Number of hits	483504	320883	7505	280738	476770
Number of misses	32179	160161	719725	22455	6054
Hit rate	0.93759926	0.66705541	0.01031998	0.92593826	0.98746124
Miss rate	0.06240074	0.33294459	0.98968002	0.07406174	0.01238546

Code outputs for 4-way set associative cache:-

	gcc.trace	gzip.trace	mcf.trace	swim.trace	twolf.trace
Number of accesses	515683	481044	727230	303193	482824
Number of hits	483871	320883	7508	280825	476844
Number of misses	31812	160161	719722	22368	5980
Hit rate	0.93831094	0.66705540	0.01032411	0.92622521	0.98761453
Miss rate	0.06168906	0.33294459	0.98967589	0.07377479	0.01238547

For direct mapped as well as set associative:-

256×2^{10}
---------- bytes = number of blocks
4

=> number of blocks = 2^{16}
Each block contains 4 bytes.
=> *bytes offset bit-width = 2 bits*

Calculations for direct mapped cache:-
2^{16} = number of rows

- number of rows = 2^{16}
- index bit-width = 16
- tag bit-width = 32 − (16 + 2) = 14

Calculations for 4-way set associative cache:-

  1 set
---------- x 2^{16} block = number of sets
4 block

- number of sets = 2^{14}
- index bit-width = 14
- tag bit-width = 32 − (14 + 2) = 16

NOTE:- For replacement in cache, "LRU" (Least recently used) policy has been used

Observations:-

1. Hit rates for all the traces for 4-way set associative, are greater than or equal to the hit rates of direct mapped cache as expected.