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Project Report

Branch Predictor Project

a. Name

Combined Predictor (Gshare + Bimodal)

b. Description

Combines a gShare predictor of 13 bits history register and a bimodal predictor indexed by the last 12 bits of PC. The choice is made based on a Choice predictor of 12 bits.

c. Results

Trace	Branches	Incorrect	1000*wrong_cc_predict /total_instructions
DIST-FP-1.bz2	2213673	118275	4.009
DIST-FP-2.bz2	1792835	31543	1.069
DIST-INT-1.bz2	4184792	239203	8.109
DIST-INT-2.bz2	2866495	269721	9.143
DIST-MM-1.bz2	2229289	257678	8.735
DIST-MM-2.bz2	3809780	302669	10.26
DIST-SERV-1.bz2	3660616	220146	7.463
DIST-SERV-2.bz2	3537562	229253	7.772
		Total	56.56
		Arithmetic Mean	**7.07**

d. Details

Combining Predictors (gshareN+1/bimodalN)
The basic idea is borrowed from McFarling's paper on combining branch predictors. The two predictors chosen for combining are gShare and bimodal. In order to best utilise the size constraints, the following sizes of tables was considered.

gShare predictor = 13 bits history register which indexes to a 2^13 BHT table.
bimodal predictor = the least significant 12 bits of PC which index to a 2^12 BHT table.
Chooser = 12 bit register which uses the last 12 bits of the 13 bits history register of gShare to index to a 2^12 table of 2-bit saturating counters. The chooser chooses between bimodal and gShare.

Cost (bits) =	gShare	+ bimodal	+ choice
	(13 + 2^13x2)	+ 2^12x2	+ 2^12x2
	(13 + 16384)	+ 8192	+ 8192
	32781	< 33024(limit)	

[REFERENCES]
McFarling, Combining Branch Predictors.