

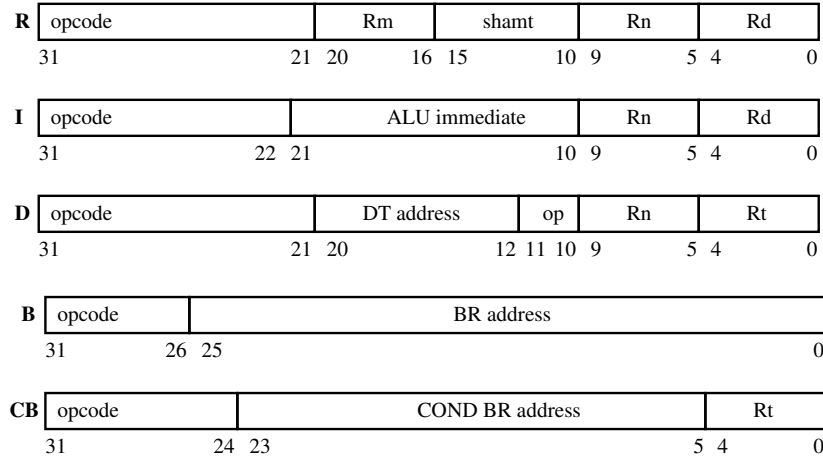
CS 251 ARM Instruction Summary

ARM Assembly Instructions

Instruction	Format	Example	Meaning	Fields
add	R-format	ADD X1,X2,X3	$X1 = X2 + X3$	$R_n=X2, R_m=X3, R_d=X1$
subtract	R-format	SUB X1,X2,X3	$X1 = X2 - X3$	$R_n=X2, R_m=X3, R_d=X1$
addi	I-format	ADDI X1,X2,#C	$X1 = X2 + C$	$R_n=X2, R_d=X1$
subi	I-format	SUBI X1,X2,#C	$X1 = X2 - C$	$R_n=X2, R_d=X1$
load word	D-format	LDUR X1,[X2,#Imm]	$X1 = \text{Memory}[X2+Imm]$	$R_n=X2, R_t=X1$
store word	D-format	STUR X1,[X2,#Imm]	$\text{Memory}[X2+Imm] = X1$	$R_n=X2, R_t=X1$
branch	B-format	B #Imm	$PC = PC + 4 \times Imm$	
branch on zero	CB-format	CBZ X1,#Imm	if ($X1==0$) $PC = PC + 4 \times Imm$ else $PC = PC + 4$	$R_t=X1$
branch on non-zero	CB-format	CBNZ X1,#Imm	if ($X1!=0$) $PC = PC + 4 \times Imm$ else $PC = PC + 4$	$R_t=X1$

#Imm means signed constants, and #C means unsigned constants

ARM Instruction Type and Format



ARM Instruction Opcodes

Instruction	Opcode	Format
B	0001 01	B-format
ADD	1000 1011 000	R-format
ADDI	1001 0001 00	I-format
CBZ	1011 0100	CB-format
CBNZ	1011 0101	CB-format
SUB	1100 1011 000	R-format
SUBI	1101 0001 00	I-format
STUR	1111 1000 000	D-format
LDUR	1111 1000 010	D-format

CS251 Laws of Boolean Algebra

<u>Rule</u>	<u>Dual Rule</u>	
$\overline{\overline{X}} = X$		
$X + 0 = X$	$X \cdot 1 = X$	(identity)
$X + 1 = 1$	$X \cdot 0 = 0$	(zero/one)
$X + X = X$	$XX = X$	(absorption)
$X + \overline{X} = 1$	$X\overline{X} = 0$	(inverse)
$X + Y = Y + X$	$XY = YX$	(commutative)
$X + (Y + Z) = (X + Y) + Z$	$X(YZ) = (XY)Z$	(associative)
$X(Y + Z) = XY + XZ$	$X + YZ = (X + Y)(X + Z)$	(distributive)
$\overline{X + Y} = \overline{X} \cdot \overline{Y}$	$\overline{XY} = \overline{X} + \overline{Y}$	(DeMorgan)

Powers of 2

2^0	1
2^1	2
2^2	4
2^3	8
2^4	16
2^5	32
2^6	64
2^7	128
2^8	256
2^9	512
2^{10}	1024

IEEE 754 Single Precision Floating Point Number Representation

