## Week 12

Block Move  $\rightarrow$  allows you to move consecutive memory to a group of registers; replaces having to LDR into a register and then increment the pointer in separate instructions

LDM → block move from memory to registers (similar to LDR)

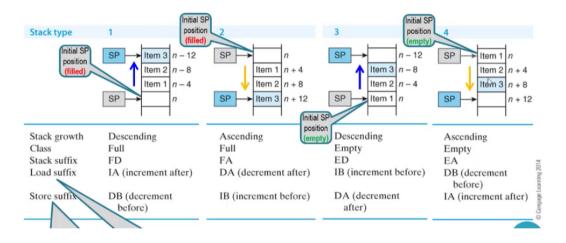
STM → block move from registers to memory (similar to STR)

Operations frequently combined with Stack operations.

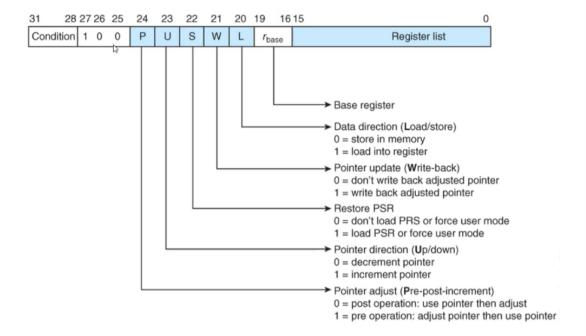
## Syntax:

- Register list is put in curly brackets; can have a range
- IA = indicates r0 is incremented after (IA) the transfer
- Order doesn't matter ARM stores lowest numbered register first at lowest memory address, and so on

## Block Move and Stack Operations:



## **Encoding Block Move Instruction**



Subroutine → like a function

- Set of instructions that may be repeatedly called
- Processors saves address of next instruction and loads program counter with first instruction in subroutine
- At end of subroutine, a return from subroutine instruction causes the processors to return to the point immediately following the subroutine call

BL (branch with link) automatically saves the return address in register r14.

- This branch instruction has a 24-bit signed program counter relative offset
- EXAM: review branch instruction!!!

You can use a stack to push the return address onto the stack and branching to the target address. (typically used by CISC processor).

 Once subroutine code is completed, you pop the return address from the stack and copy it to the PC

Note: STR and STR MUL has a pipelining effect of +12 (adding 12 to PC) unlike other instructions that are +8.

Leaf Routine → doesn't call another routine, it's at the end of the tree

- Return address saved in link register r14
- Return to calling point is made with a MOV pc, Ir

If we want to save previous values that are stored in registers before a subroutine, we push the values stored in the registers onto the stack and then pop the values and load them into the same registers after.

•	We can use LDR multiple and STR multiple (block moves) to save register values once
	entering a subroutine and restore registers before returning subroutine