Instruction Set -inkorrekt

16 bit emulator

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Specifikationer

Generella

16-bitars little-endian cpu
32-bitars-address bus
4-Mb ram från address $0x00000000 - 0x003FFFFF$
4-Gb rom från $0x003FFFFF - 0xFFFFFFFF$
16-bit IO controller

Register

10 16-bitars register $r0 - r9$
10 8-bitars register $b0 - b9$ som motsvarar de minst signifikanta bitarna i motsvarande 16 bitars register
16-bitars Stack pointer register *sp*
16-bitars Status register *sr*
32-bitars program-counter register *pc*
r16 refererar till ett 16-bitars register (r0-r9 — sp), r8 ett 8-bitars

Addressing-modes

processorn stödjer 8 sätt att accessa minne från 32-bitars bussen. i Direkt addressering specifiseras en address direkt medans i inderekt addressering specificeras en address där den direkta addressen ligger. Absolut adressering menas att hela 32-bitars adressen är specificerad medans med zeropage addressing specificeras endast en 16-bitars adress, därför kommer man endast åt de första 2^16 addresserna

type	description
r16	16-bit register (r0-r9 — sp)
r8	8-bit register b0-b9
im16	16-bit immidiate value
im32	32-bit immidiate value
[**value**]:8	the 8-bit stored at **value**
[**value**]:16	the 16-bit value stored at **value**
[**value**]:32	the 32-bit value stored at **value**

Table 1: H:r16, L:r16

Direct Absolute

abs	direct	
args	$<H : r16>$	$<L : r16>$

In Direct Absolute addressing the absolute adress is formed by combining two registers to form a 32 bit address
syntax exaple to load r2 from address 0xABCD1234:

```
1         mov r0, #0xABCD
2         mov r1, #0x1234
3         ldr r2, r0, r1
```

Direct Absolute Immidiate

abs	direct
args	$<V : im32>$

In Direct Absolute Immidiate addressing the absolute adress is supplied as a 32 bit immidiate value
syntax exaple to load r2 from address 0xABCD1234:

```
1         ldr r2, #0xABCD1234
```

Direct Zeropage

abs	direct	
args	$<0x0000>$	$<Z : r16>$

Direct Zeropage addressing the absolute adress is suplied as a 16-bit register and padded with 0s
syntax exaple to load r1 from address 0x1234:

```
1         mov r0, #1234
2         ldr r1, r0
```

Direct Zeropage Immidiate-offset

abs	direct	
args	$<0x0000>$	$<R : r16> +$ $<O : im16>$

Direct Zeropage Immidiate-offset addressing the absolute adress is formed by a 16-bit register added with a immidiate offset, and padded with 0s
syntax exaple to load r1 from address 0x1235:

```
1         mov r0, #1234
2         ldr r1, r0, #1
```

Inderect Absolute Immidiate

abs	direct=[inderect]:32
abs	inderect
args	$<V : im32>$

Table 2: V:im32

Inderect Absolute Immidiate addressing the absolute adress is read from the supplied address
syntax exaple to load r1 with 10 from address(0x00FF0000) stored at 0x1235

```
1         mov r0, #10
2         str r0, #0x00FF0000
3
4         mov r0, #0x0000
5         mov r1, #0x00FF
6
7         str r0, #0x00001235
8         str r1, #0x00001235 + #1 ; store in little
              endian
```

```
9
10          ldr r1, [#0x00001235]
```