Memory (1A)

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9/7/17

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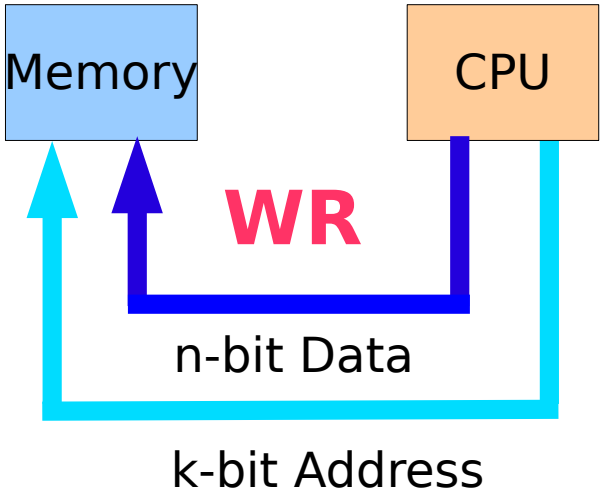
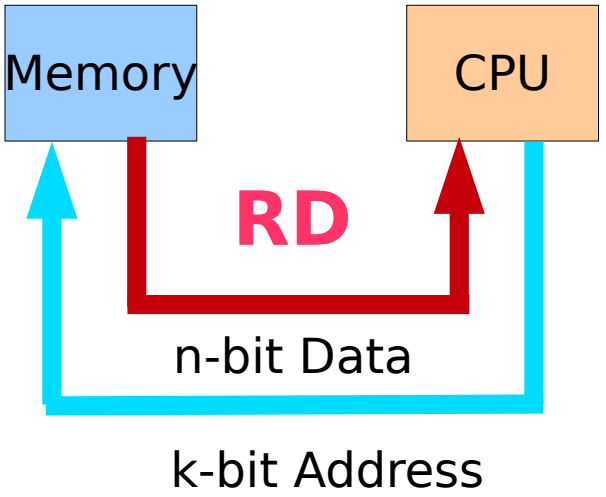
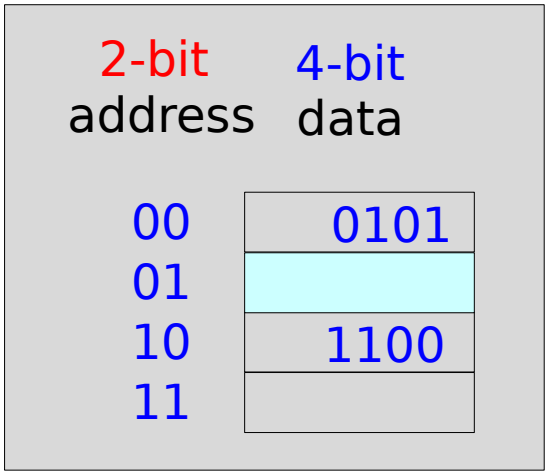
9/7/17

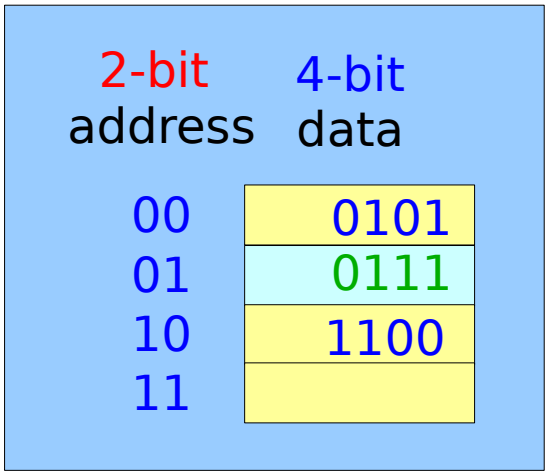
Memory Access Operations

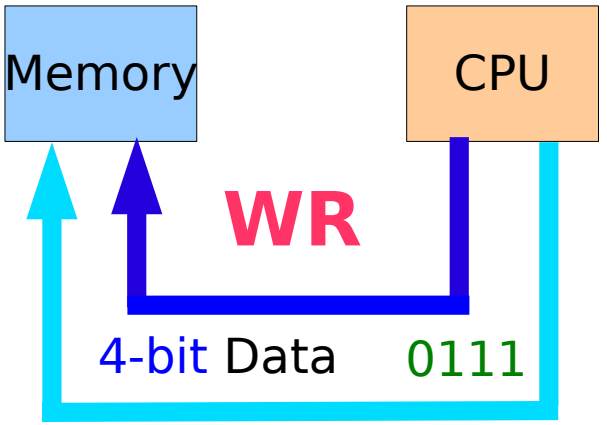




A Memory Write Example





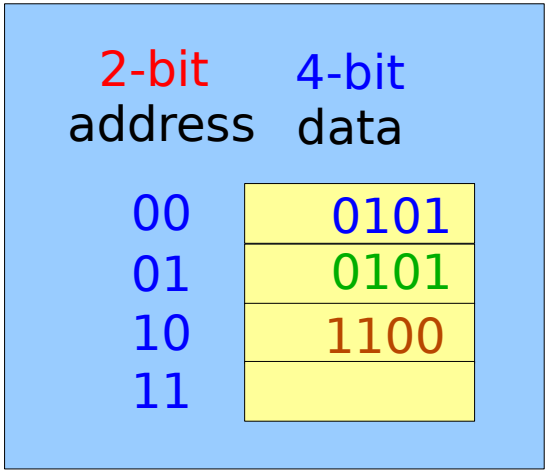


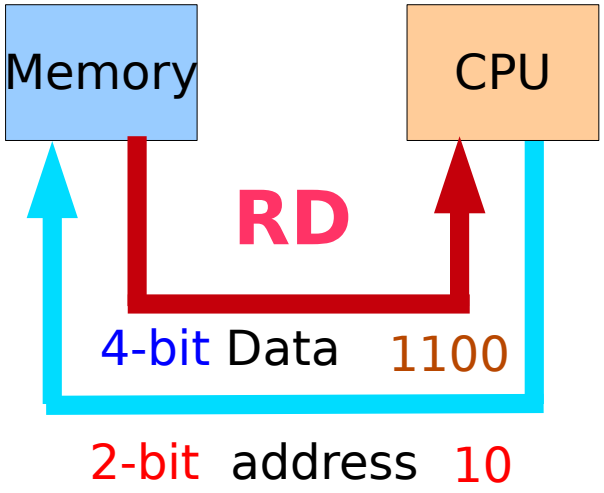
WR

Address: 01

Data: 0111

A Memory Read Example



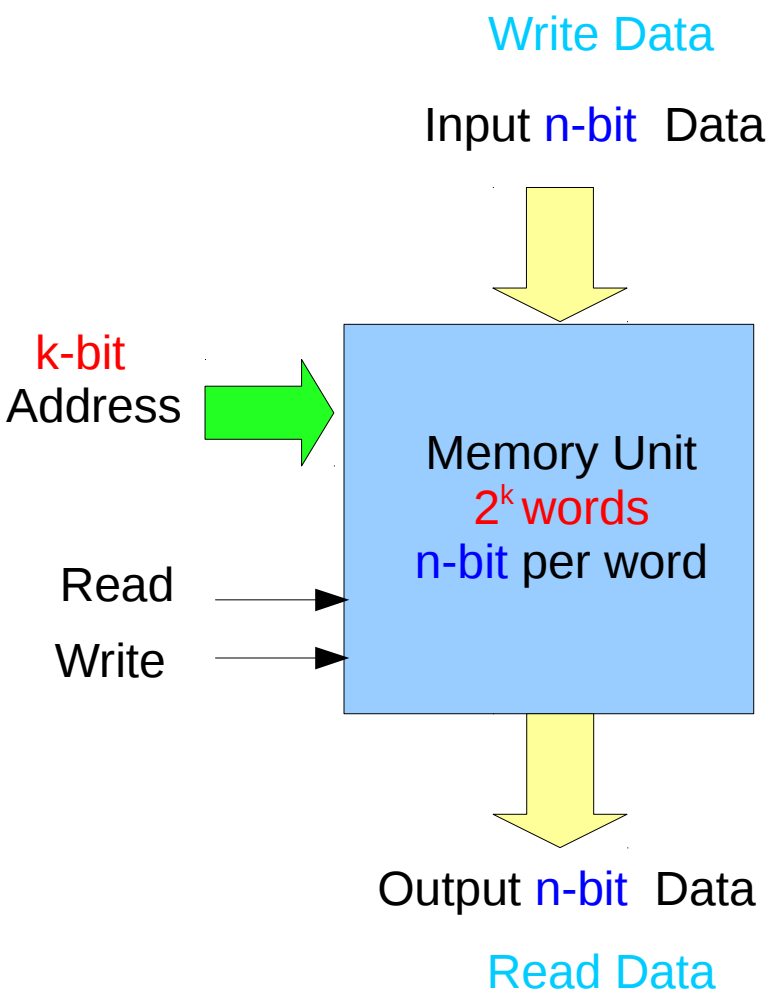


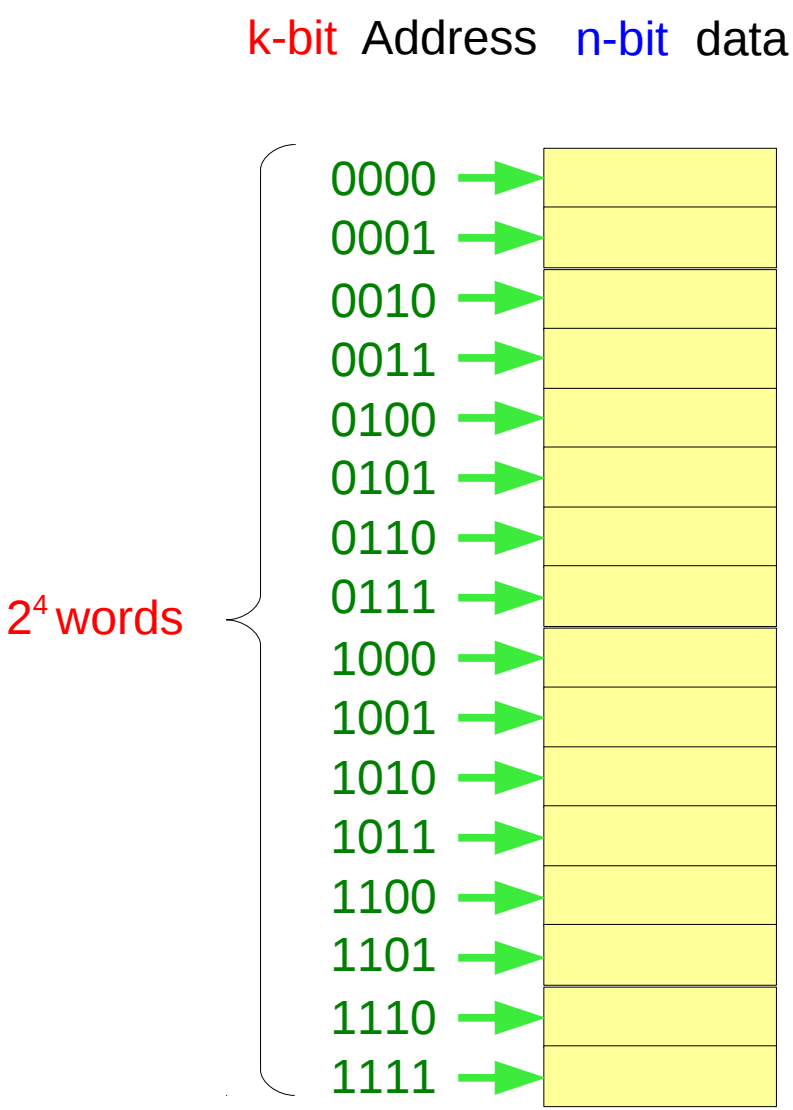
RD

Address: 10

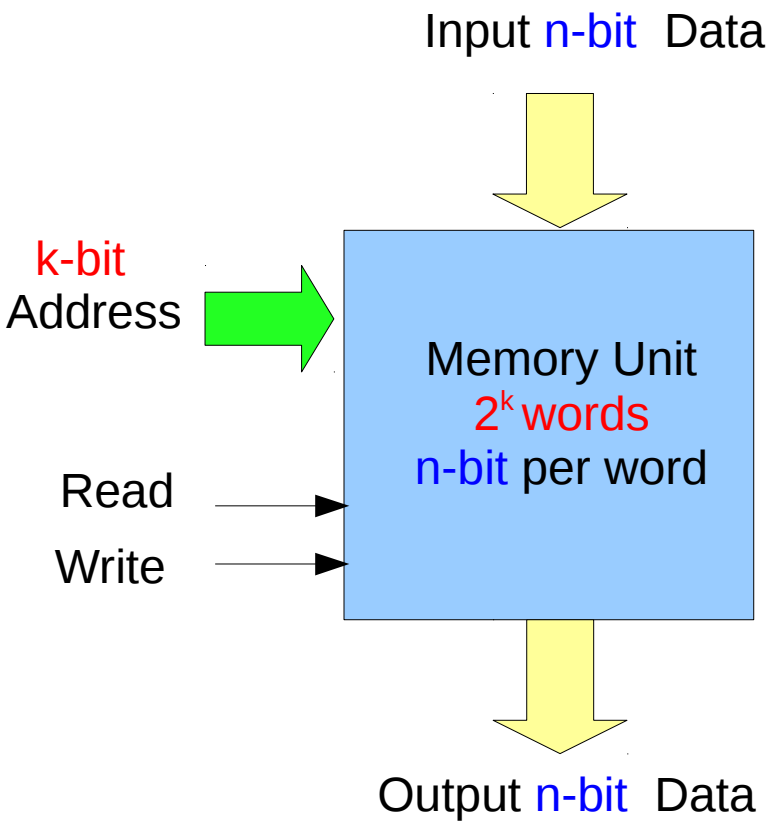
Data: ➡ 1100

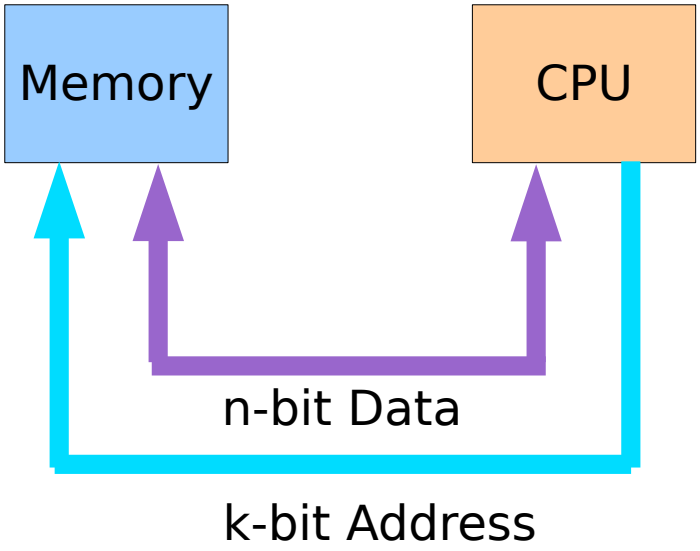
A Memory and A Memory Map



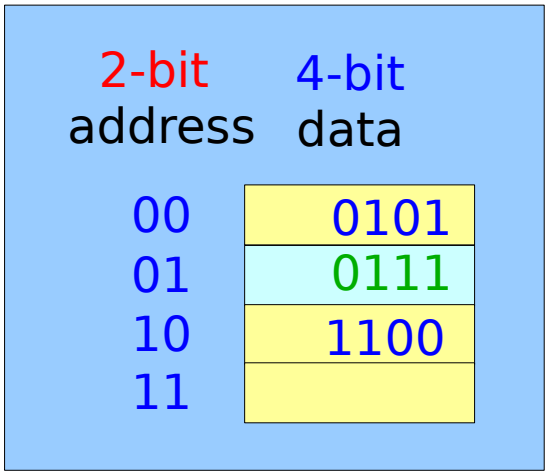


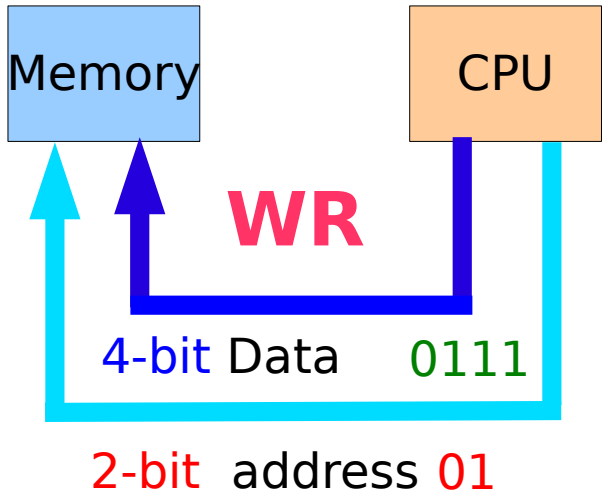
The Inputs and Outputs of a Memory

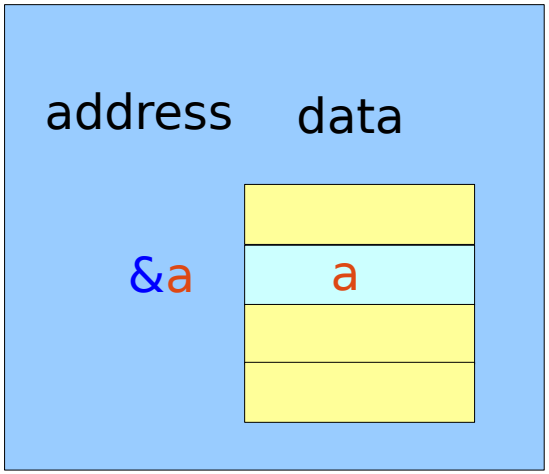




Assignment and Write Operation








```
int a;

a = 7;
```

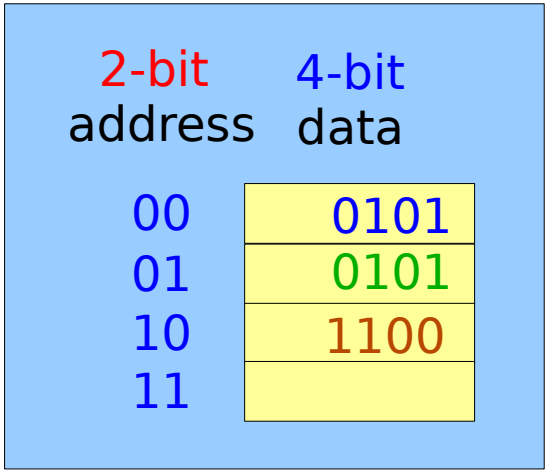
LHS (Left Hand Side)

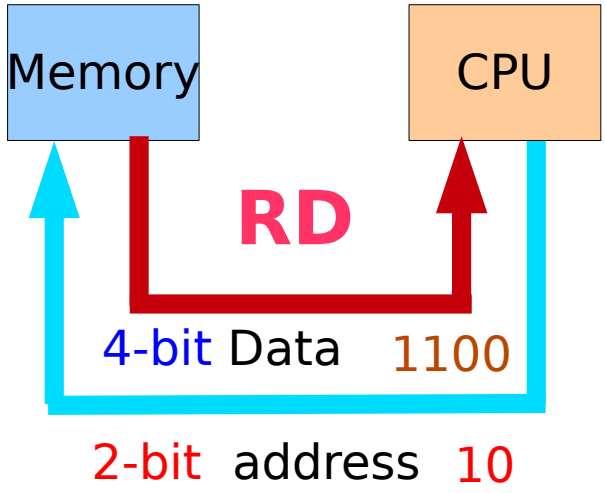
WR

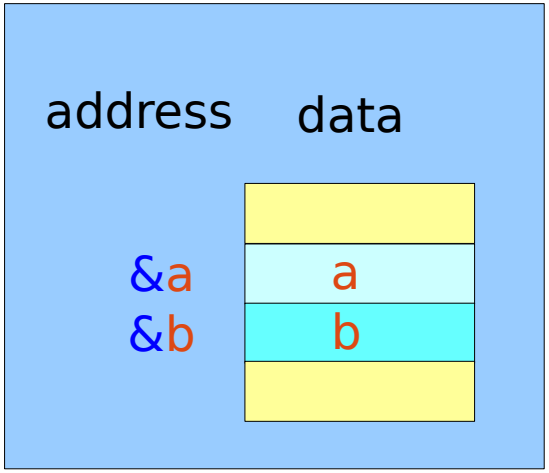
Address: 01

Data: 0111

Assignment and Read Operation








```
int a;

x = a + b;
```

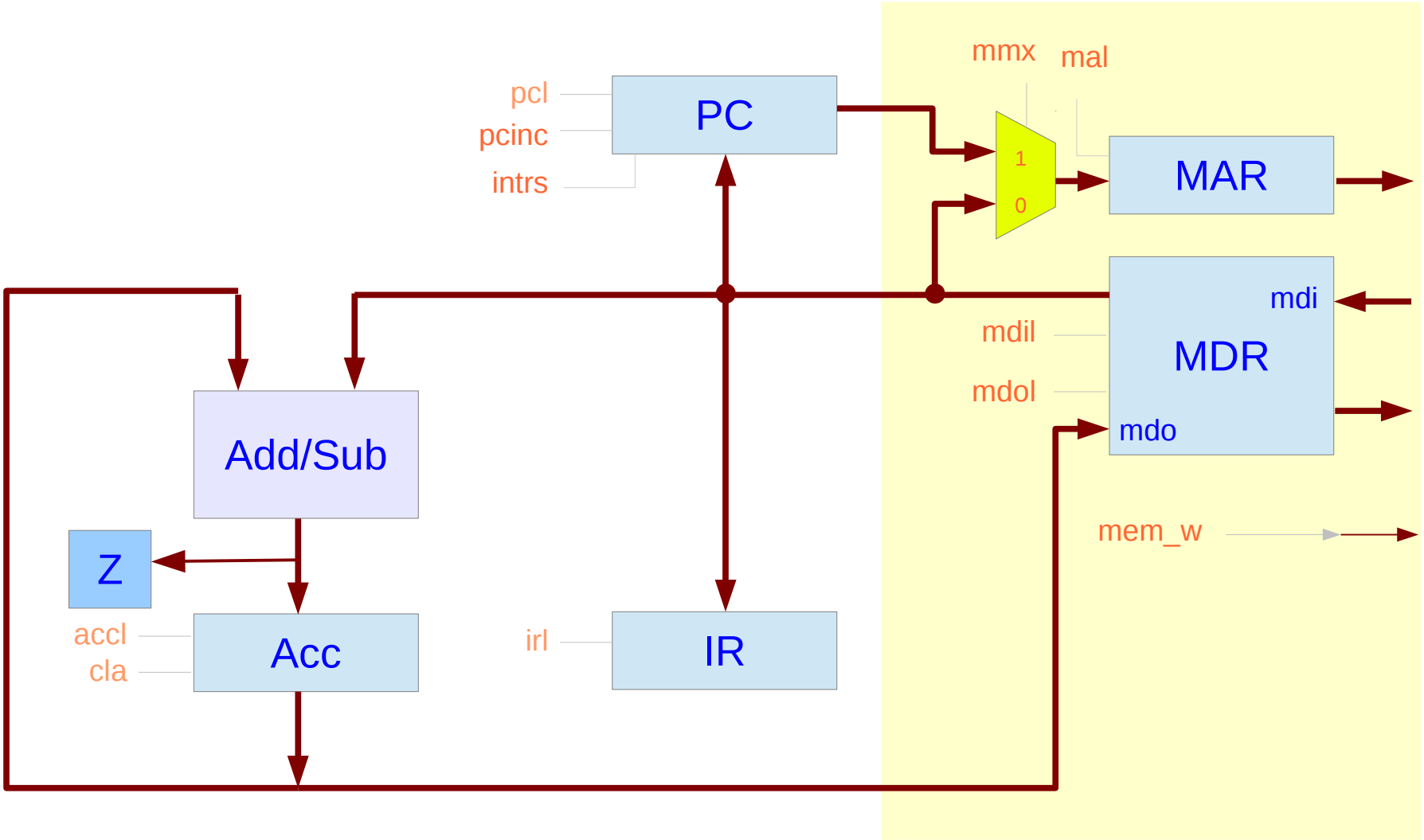
RHS (Right Hand Side)

RD

Address: 10

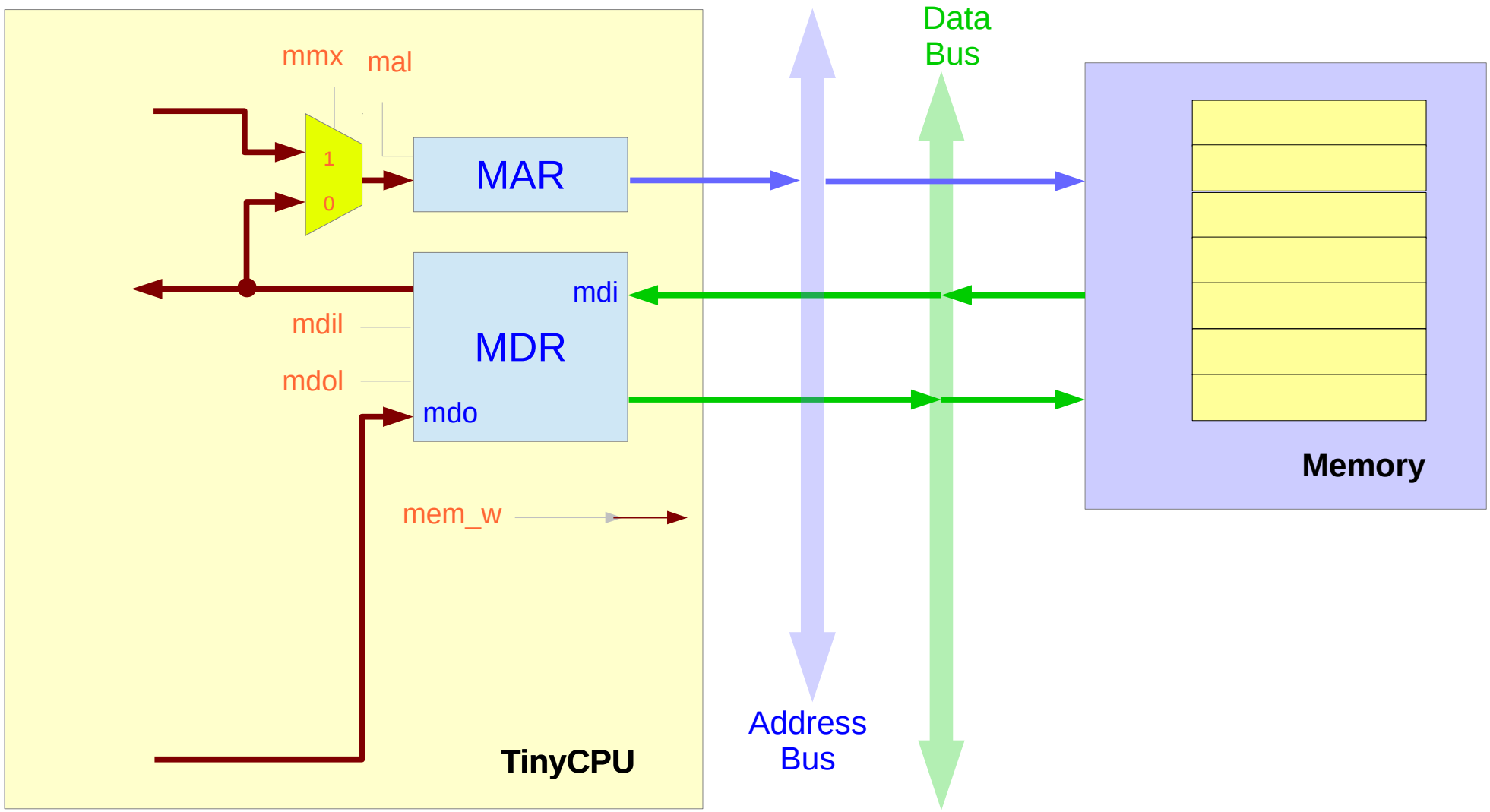
Data: ➡ 1100

TinyCPU



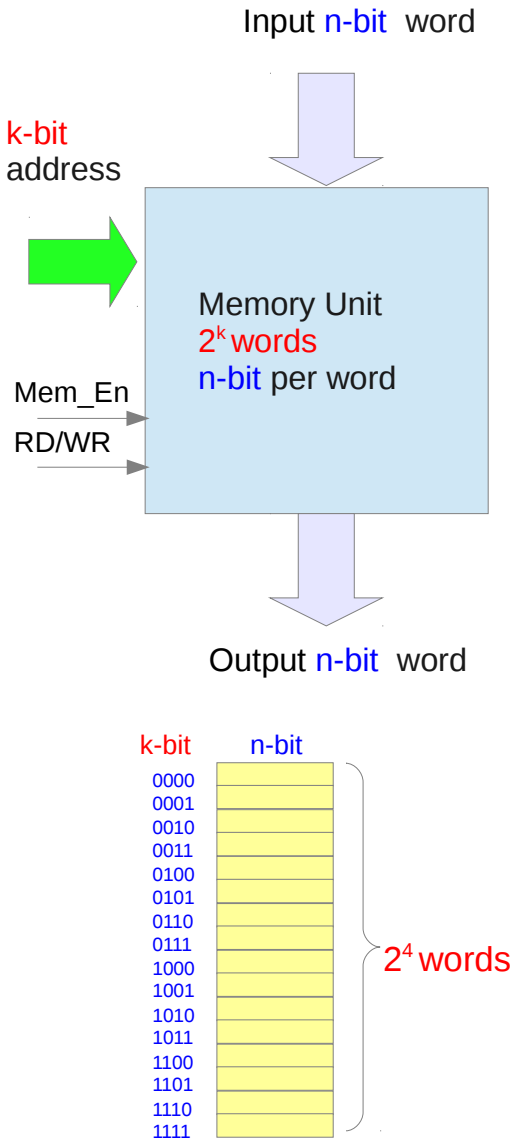
Based on http://www.ele.uri.edu/Courses/ele306/f01/Tinydoc.pdf

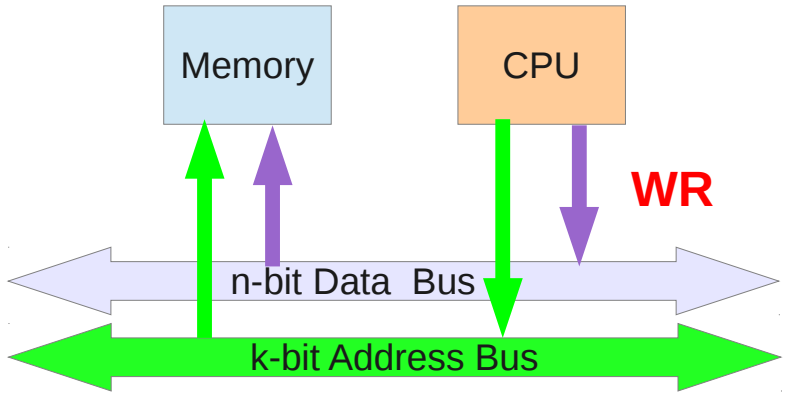
TinyCPU and Memory

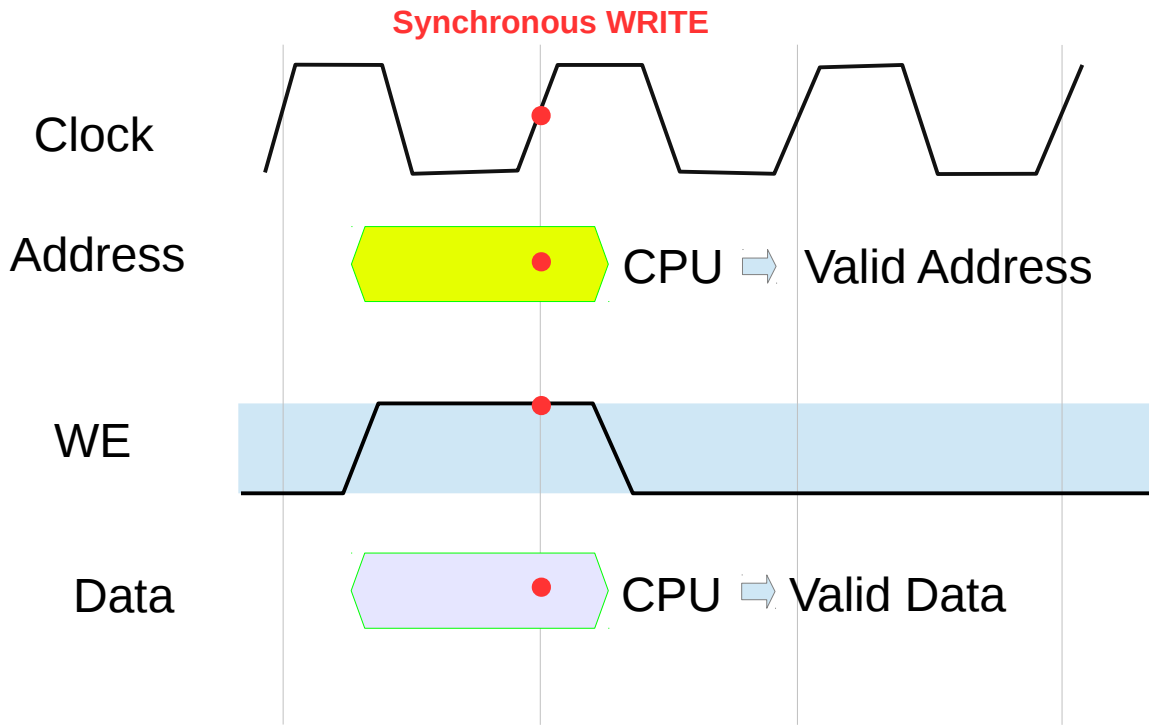


Based on http://www.ele.uri.edu/Courses/ele306/f01/Tinydoc.pdf

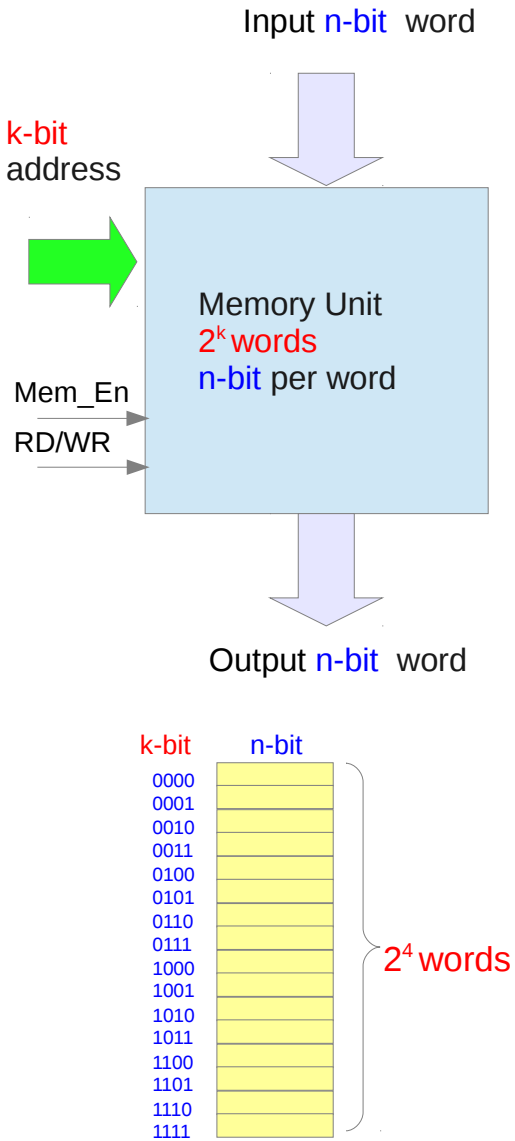
Memory Write Cycle

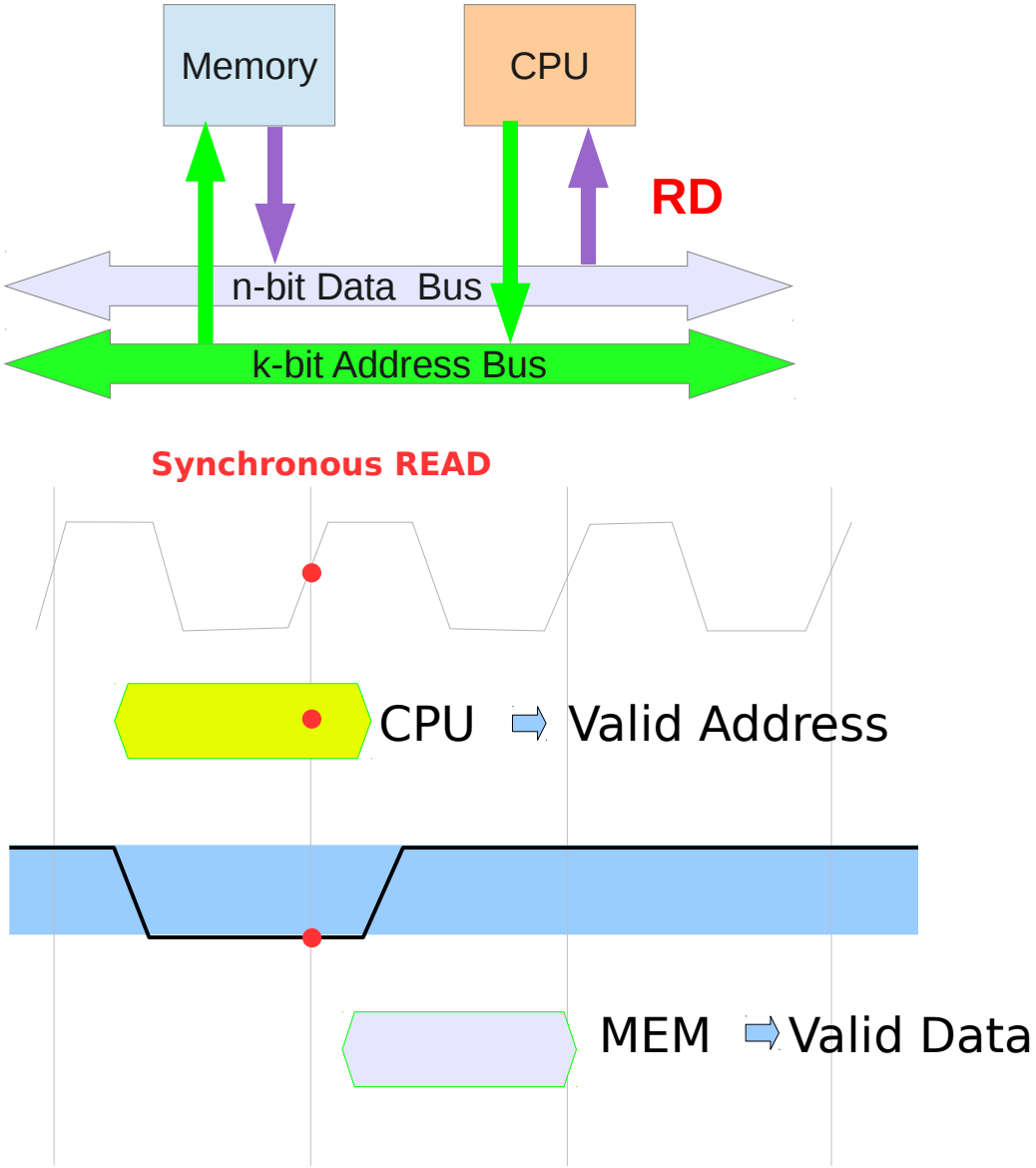




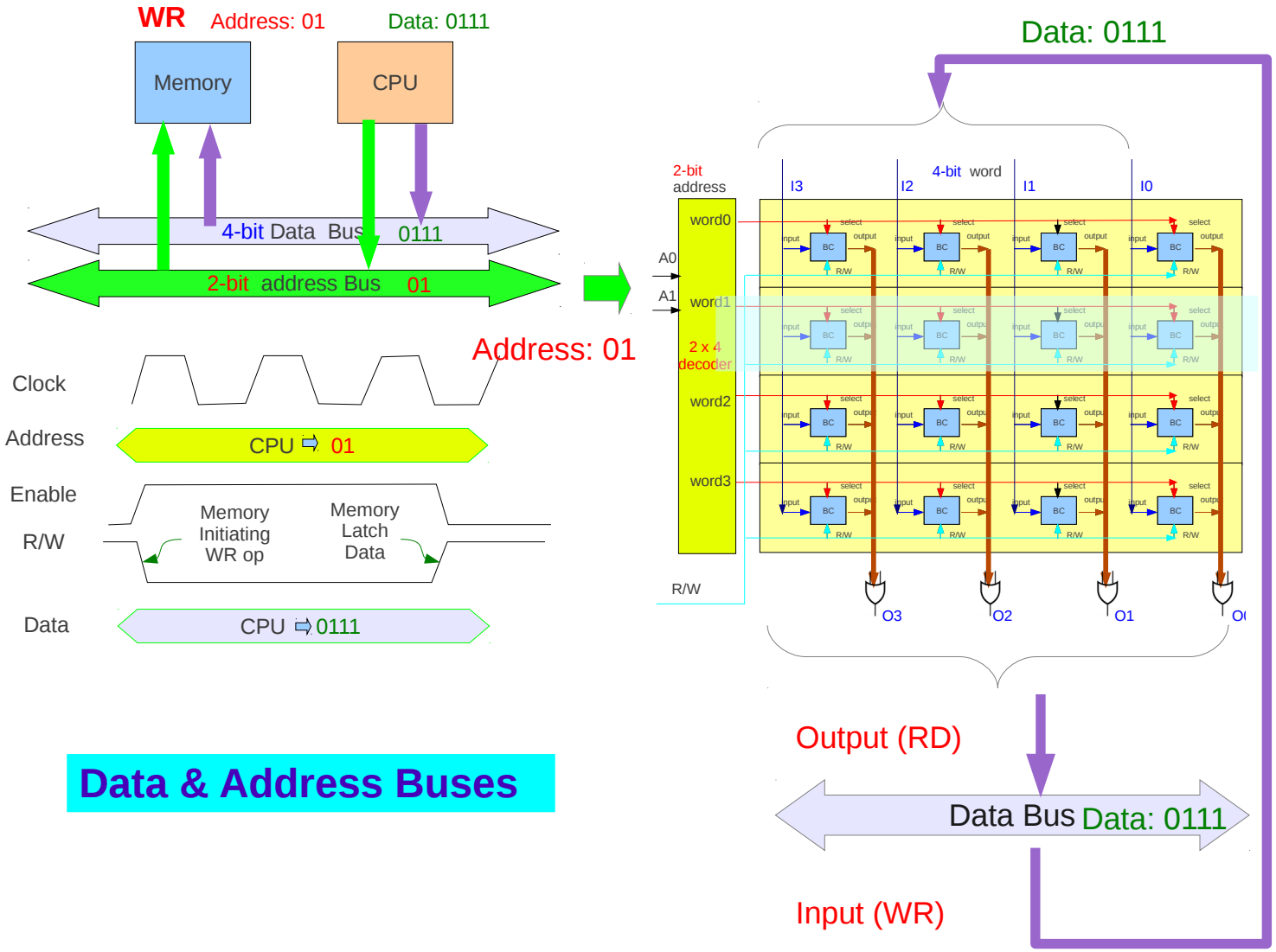


Memory Read Cycle – Synchronous

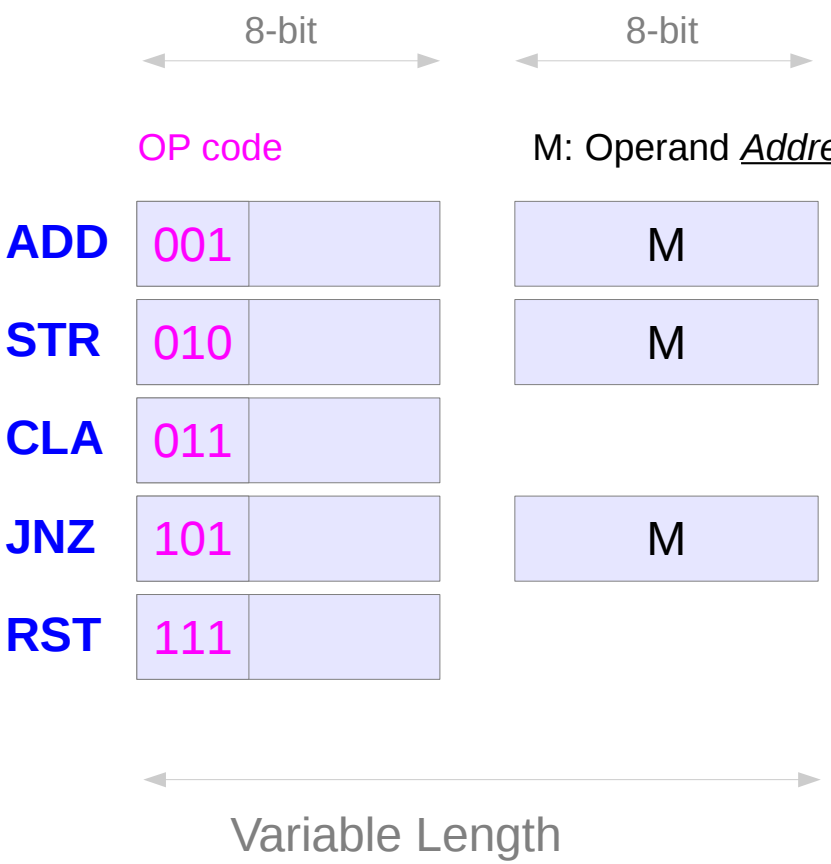




Write Cycle Example for a 4x4 Memory



Instruction Set Architecture

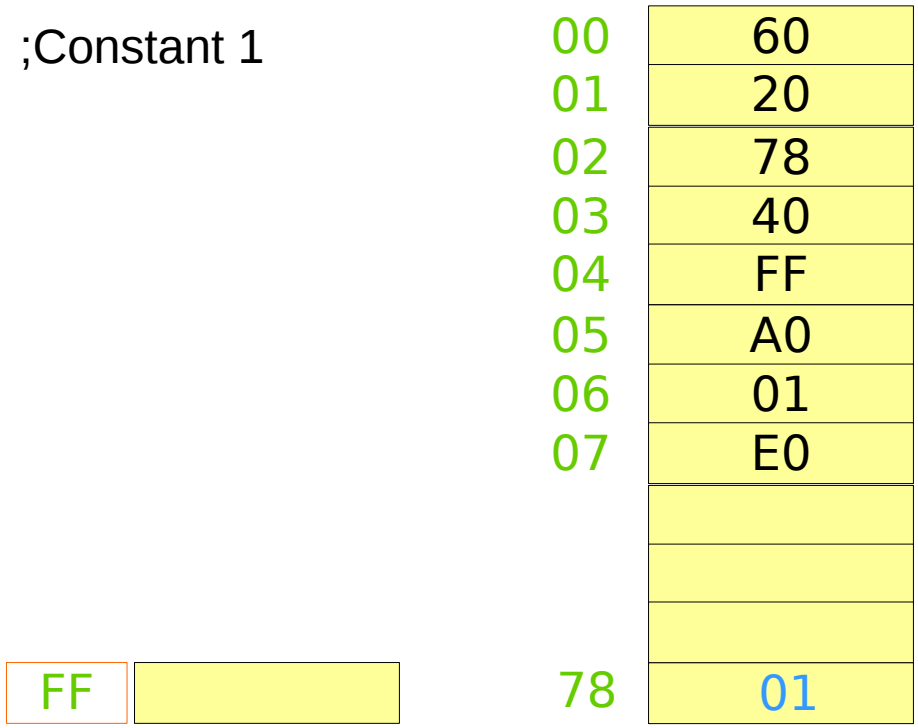


ADD	**$M**	;	ACC ← ACC + [M]
STR	**$M**	;	[M] ← ACC
CLA		;	ACC ← 0
JNZ	**$M**	;	PC ← M if Z=0
RST		;	PC ← 0

Based on http://www.ele.uri.edu/Courses/ele306/f01/Tinydoc.pdf

```
Addr. Machine Codes
00   60                  CLA          ;Clear Acc and then adding the operand is
01   20 78               ADD $ONE     ;equivalent to move the operand to Acc
03   40 FF               STR $FF
05   A0 01               JNZ $01
07   E0                  RST
78   01          ONE:    DAT    0000 0001    ;Constant 1
```

00 → 01 → … → FE → FF → 00



Array

References

[1] Essential C, Nick Parlante
[2] Efficient C Programming, Mark A. Weiss
[3] C A Reference Manual, Samuel P. Harbison & Guy L. Steele Jr.
[4] C Language Express, I. K. Chun