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## M68000 Instruction Encoding

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- M68000 was a micro processor (CPU) designed by Motorola at around 1980.
- Motorola M68000 instruction format:

```
16 bits
<----->
+-----+
|           |   Instruction word
+-----+
```

may be followed by up to 4:

```
+-----+
|           |   Extension words
+-----+
...
+-----+
|           |   Extension words
+-----+
```

depending on the need to encode more information  
 (e.g., if some operand is in memory -> extension word  
 encodes the address in memory)

- Example: binary instruction encoding:

				Instruction word
+-----+	+-----+	+-----+	+-----+	
Opcode	Operand 1	Operand 2		

Move:

0 0				Instruction word
+-----+	+-----+	+-----+	+-----+	

Add:

1 1				Instruction word
+-----+	+-----+	+-----+	+-----+	

Bit 3 & 4 encodes length of operand:

```
01 = byte
11 = word (16 bits)
10 = long word (32 bits)
```

So:

Add bytes:

1 1 0 1				Instruction word
+-----+	+-----+	+-----+	+-----+	

Add words:

1 1 1 1				Instruction word
+-----+	+-----+	+-----+	+-----+	

+-----+-----+-----+-----+-----+-----+

Add long words:

+-----+-----+-----+-----+-----+-----+  
| 1 1 1 0 |                   |                   |      Instruction word  
+-----+-----+-----+-----+-----+-----+