

Personal SE

Arrays
Pointers
Strings

Array Identifiers & Pointers

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char message[] = "Hello" ;
```

message

H	e	l	l	o	\0
---	---	---	---	---	----

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Question: So what exactly *is* message?

Array Identifiers & Pointers

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Question: So what exactly *is* message?

Answer: In C, an array name is a *constant pointer* that references the 0^{th} *element* of the array's storage.

Array Identifiers & Pointers

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Question: So what exactly **is** message?

Answer: In C, an array name is a *constant pointer* that references the 0^{th} *element* of the array's storage.

Constant means it cannot be changed (just as we can't change the constant 3).

Consequences - Part 1

```
char message[] = "Hello" ;
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message

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What is `*message`?

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What is *message?

```
*message == 'H'
```

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What is another expression for `message`?

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What is another expression for `message[4]`?

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What is `*message`?

```
*message == 'H'
```

What is another expression for `message`?

```
message == &message[0]
```

What is another expression for `message[4]`?

```
message[4] == *(message + 4)
```

That's right - we can add or subtract an integer and a pointer to get a pointer to the element a certain distance from the original!

Pointer Variables and Arrays - 1

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```
char ch ;
```

```
p_mesg++ ;
```

```
ch = *p_mesg ;
```

Declares **ch**, advances **p_mesg** by one element, and sets **ch** to the character **p_mesg** points to (in this case **'r'**).

Alternatives & Idioms - 1

```
char *hi = "Hello" ;  
char ch0 = hi[1] ; // ch = 'e'
```

Pointers can be indexed

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char *hi = "Hello" ;  
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Pointers can be indexed

```
char *hp = hi ; // initially the same as hi  
char ch1 ;  
ch1 = *hp++ ;
```

Post-increment: **ch1 = *hp** then **hp += 1** (**ch1 == 'H'** and **hp == hi + 1**)

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char ch2 ;  
ch2 = *++hp ;
```

Pre-increment: **hp += 1** then **ch1 = *hp** (**hp == hi + 2** and **ch2 == 'l'**)

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Post-increment: `ch1 = *p` then `p += 1` (`ch1 == 'H'` and `p == hi + 1`)

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char ch2 ;  
ch2 = *++hp ;
```

Pre-increment: `hp += 1` then `ch1 = *hp` (`hp == hi + 2` and `ch2 == 'l'`)

Also have pre and post decrement with `--`

Alternatives & Idioms - 2

```
char *p ;  
char ch ;  
while( ch = *p++ ) {  
    // process characters until end of string.  
}
```

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    // process characters until end of string.  
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```
if( *p ) { // true if p points to a “real” character  
if( *p != '\0' ) { // easier to read
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if( *p ) { // true if p points to a “real” character  
if( *p != '\0' ) { // easier to read
```

```
if( !*p ) { // true if p points to a NUL character.  
if( *p == '\0' ) { // easier to read
```