Pointers II

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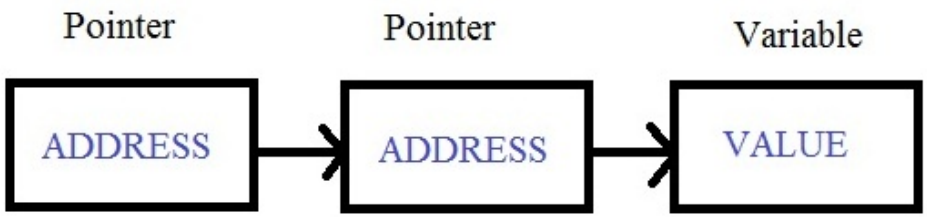

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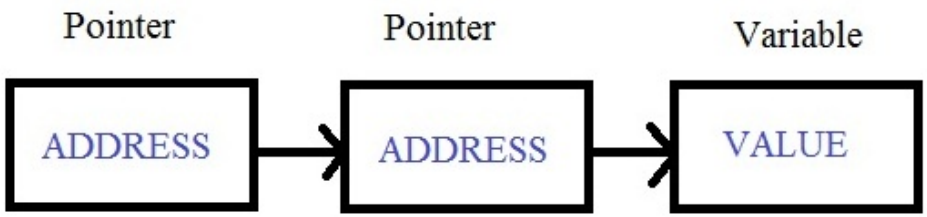

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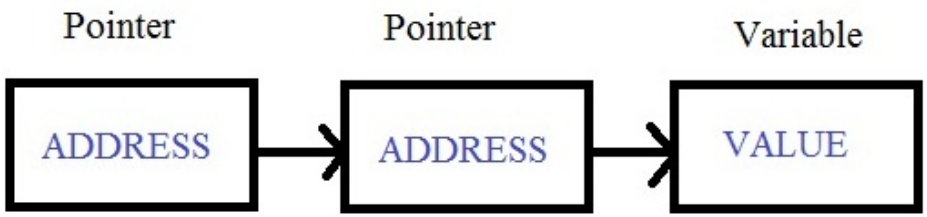

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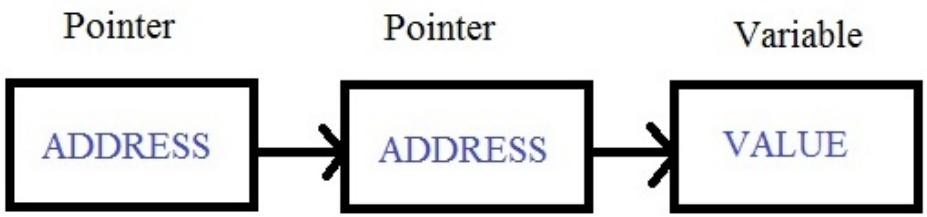

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Declaration:

type ** pointer_name;

Example:

```
int x = 0;
int *ptr;
int **pptr;
```

Pointer to pointer

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Each line can be accessed by a pointer to its first character and the pointers can be stored in an array.

To swap 2 lines, the **pointers are exchanged**, not the lines themselves.

This eliminates complicated storage management and high overhead associated with moving the lines.

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month_name contains an array of character strings, and returns a pointer to the proper string when called.

```
char *month_name(int n) {
  static char *name[ ] = {
   "Illegal month",
   "January", "February", "March",
   "April", "May", "June",
   "July", "August", "September",
   "October", "November", "December"
   }; //pointer to each string is stored in name[ ]
```

Initialization of pointer arrays

```
if ( n < 1 || n > 12 ) retrun name[0];
else
return name[n];
}
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The i-th string can be can be accessed through name[i]

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int costs[2][3] = {1, 2, 3, 4, 5, 6};
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To access the array: int value = costs[0][2]; **//value = 3**

This is not legal: costs[0, 1].

Three dimensional array: int seconds[24][60][60];

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```
static char dayTab[2][13] = {
    //Non leap year.
    {0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 },
    //Leap year.
    {0, 31, 29, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31 }
};
```

Day of year example continued

```
//set day of year from month and day
int day_of_year( int year, int month, int day )
{
   int i, leap;
   leap = (year%4 == 0) && (year%100 != 0) || (0 ==
year%400);
   //leap is either 0 or 1
   for( i = 1; i < month; i++ );
     day += dayTab [ leap ] [ i ];
   return day;
}
```

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- For b, 10 pointers are allocated. Initialization of these pointers must be done explicitly.
- Each element of b can be of different length.

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Function **signature** to free the memory, previously allocated by malloc, calloc, realloc:
void **free** (void* ptr);

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```
# include <stdio.h>
# include <stdlib.h>
int main() {
int i,j;
char *ptr;
ptr= malloc(15);
ptr="this is a test";
int *p=malloc(15);
p[0]=17;
printf("%s \n", ptr);
printf( "first element is %d \n ", p[0]);
// free(ptr); // don't do it because ptr points to a constant string
free(p);
}
```