

内存占用在32位和64位平台的区别

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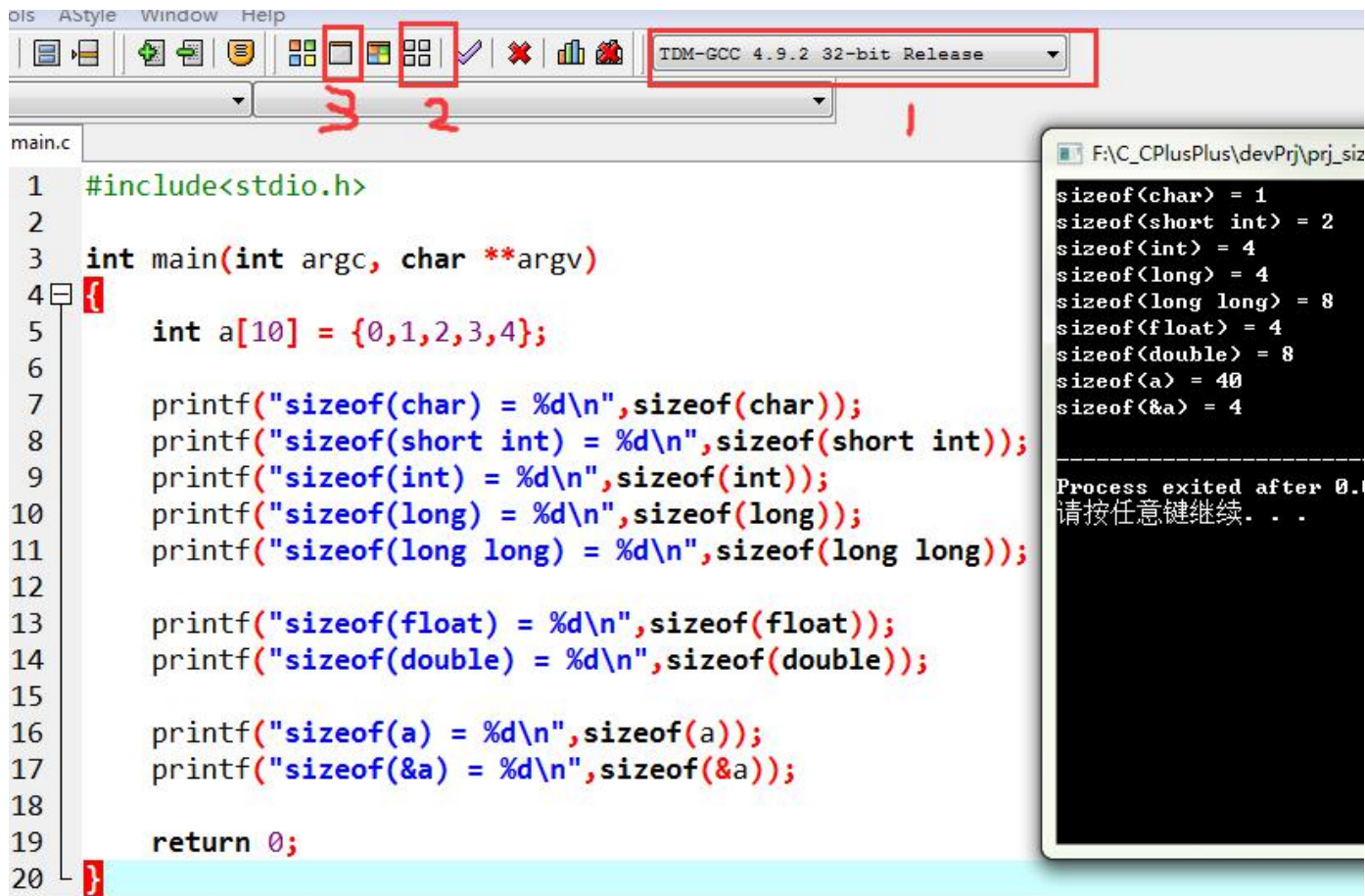
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例题： 以下的输出是多少

```
main.c
1  #include<stdio.h>
2
3  int main(int argc, char **argv)
4  {
5      int a[10] = {0,1,2,3,4};
6
7      printf("sizeof(char) = %d\n",sizeof(char));
8      printf("sizeof(short int) = %d\n",sizeof(short int));
9      printf("sizeof(int) = %d\n",sizeof(int));
10     printf("sizeof(float) = %d\n",sizeof(float));
11     printf("sizeof(double) = %d\n",sizeof(double));
12
13     printf("sizeof(a) = %d\n",sizeof(a));
14     printf("sizeof(&a) = %d\n",sizeof(&a));
15
16     return 0;
17 }
```

32位平台



The screenshot shows the TDM-GCC 4.9.2 32-bit Release IDE. The menu bar includes 'ois', 'Astyle', 'Window', and 'Help'. The toolbar contains various icons for file operations, compilation, and execution. The compiler selection dropdown is set to 'TDM-GCC 4.9.2 32-bit Release'. The main editor displays a C program in 'main.c' with the following code:

```
1 #include<stdio.h>
2
3 int main(int argc, char **argv)
4 {
5     int a[10] = {0,1,2,3,4};
6
7     printf("sizeof(char) = %d\n",sizeof(char));
8     printf("sizeof(short int) = %d\n",sizeof(short int));
9     printf("sizeof(int) = %d\n",sizeof(int));
10    printf("sizeof(long) = %d\n",sizeof(long));
11    printf("sizeof(long long) = %d\n",sizeof(long long));
12
13    printf("sizeof(float) = %d\n",sizeof(float));
14    printf("sizeof(double) = %d\n",sizeof(double));
15
16    printf("sizeof(a) = %d\n",sizeof(a));
17    printf("sizeof(&a) = %d\n",sizeof(&a));
18
19    return 0;
20 }
```

The output window on the right shows the following results:

```
sizeof(char) = 1
sizeof(short int) = 2
sizeof(int) = 4
sizeof(long) = 4
sizeof(long long) = 8
sizeof(float) = 4
sizeof(double) = 8
sizeof(a) = 40
sizeof(&a) = 4

-----
Process exited after 0.
请按任意键继续. . .
```

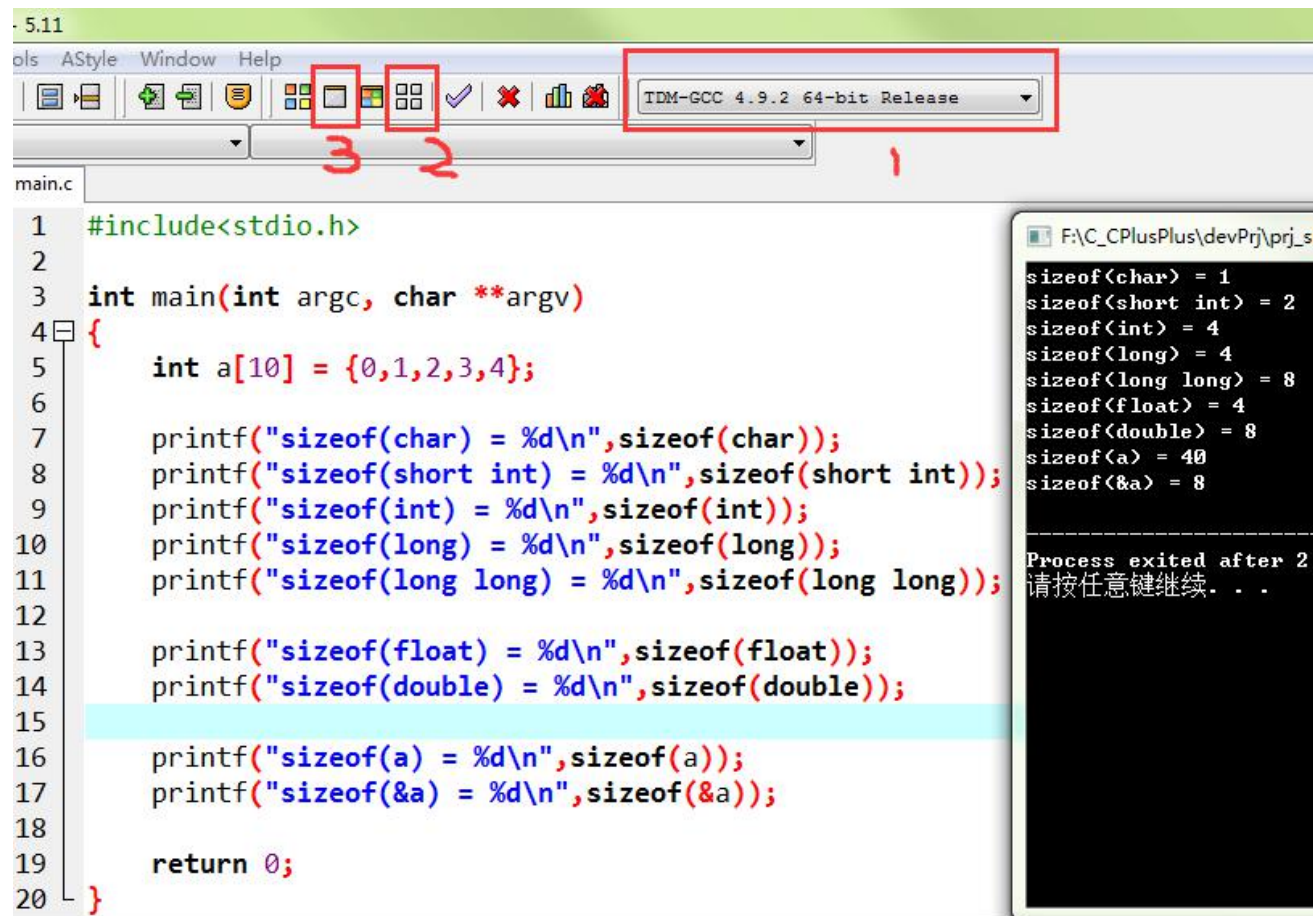
第一步：选择**32位**平台

第二步：**重新编译所有**（平台切换时，一定要重新编译所有的文件，有时还需要清除以前的编译生成的文件）

第三步：运行

说明：当输出`sizeof(&a)`即，数组a的起始地址所占内存时，结果为4字节。由于是在32位平台，地址宽度是32位的，故 `sizeof(&a) = 4` 字节

64位平台



The screenshot shows the TDM-GCC 4.9.2 64-bit Release IDE. The menu bar includes 'ols', 'AStyle', 'Window', and 'Help'. The toolbar contains various icons, with three red boxes highlighting the 'Build' (hammer), 'Run' (play), and 'Debug' (bug) icons, labeled with red numbers 3, 2, and 1 respectively. The compiler selection dropdown is set to 'TDM-GCC 4.9.2 64-bit Release'. The main editor displays a C program in 'main.c' with the following code:

```
1 #include<stdio.h>
2
3 int main(int argc, char **argv)
4 {
5     int a[10] = {0,1,2,3,4};
6
7     printf("sizeof(char) = %d\n",sizeof(char));
8     printf("sizeof(short int) = %d\n",sizeof(short int));
9     printf("sizeof(int) = %d\n",sizeof(int));
10    printf("sizeof(long) = %d\n",sizeof(long));
11    printf("sizeof(long long) = %d\n",sizeof(long long));
12
13    printf("sizeof(float) = %d\n",sizeof(float));
14    printf("sizeof(double) = %d\n",sizeof(double));
15
16    printf("sizeof(a) = %d\n",sizeof(a));
17    printf("sizeof(&a) = %d\n",sizeof(&a));
18
19    return 0;
20 }
```

The output window on the right shows the following results:

```
sizeof(char) = 1
sizeof(short int) = 2
sizeof(int) = 4
sizeof(long) = 4
sizeof(long long) = 8
sizeof(float) = 4
sizeof(double) = 8
sizeof(a) = 40
sizeof(&a) = 8

Process exited after 2.
请按任意键继续. . .
```

第一步：选择64位平台

第二步：重新编译所有（平台切换时，一定要重新编译所有的文件，有时还需要清除以前的编译生成的文件）

第三步：运行

说明：当输出sizeof(&a)即，数组a的起始地址所占内存时，结果为8字节。由于是在64位平台，地址宽度是64位的，故 sizeof(&a) = 8字节

小结

The screenshot shows the TDM-GCC 4.9.2 32-bit Release IDE. The code in main.c is as follows:

```
1 #include<stdio.h>
2
3 int main(int argc, char **argv)
4 {
5     int a[10] = {0,1,2,3,4};
6
7     printf("sizeof(char) = %d\n",sizeof(char));
8     printf("sizeof(short int) = %d\n",sizeof(short int));
9     printf("sizeof(int) = %d\n",sizeof(int));
10    printf("sizeof(long) = %d\n",sizeof(long));
11    printf("sizeof(long long) = %d\n",sizeof(long long));
12
13    printf("sizeof(float) = %d\n",sizeof(float));
14    printf("sizeof(double) = %d\n",sizeof(double));
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16    printf("sizeof(a) = %d\n",sizeof(a));
17    printf("sizeof(&a) = %d\n",sizeof(&a));
18
19    return 0;
20 }
```

The output window shows the following results:

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sizeof(char) = 1
sizeof(short int) = 2
sizeof(int) = 4
sizeof(long) = 4
sizeof(long long) = 8
sizeof(float) = 4
sizeof(double) = 8
sizeof(a) = 40
sizeof(&a) = 4
Process exited after 0.
请按任意键继续. . .
```

Red annotations in the image: '1' points to the compiler selection dropdown, '2' points to the 'Run' button, and '3' points to the 'Debug' button.

The screenshot shows the TDM-GCC 4.9.2 64-bit Release IDE. The code in main.c is identical to the 32-bit version:

```
1 #include<stdio.h>
2
3 int main(int argc, char **argv)
4 {
5     int a[10] = {0,1,2,3,4};
6
7     printf("sizeof(char) = %d\n",sizeof(char));
8     printf("sizeof(short int) = %d\n",sizeof(short int));
9     printf("sizeof(int) = %d\n",sizeof(int));
10    printf("sizeof(long) = %d\n",sizeof(long));
11    printf("sizeof(long long) = %d\n",sizeof(long long));
12
13    printf("sizeof(float) = %d\n",sizeof(float));
14    printf("sizeof(double) = %d\n",sizeof(double));
15
16    printf("sizeof(a) = %d\n",sizeof(a));
17    printf("sizeof(&a) = %d\n",sizeof(&a));
18
19    return 0;
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```

The output window shows the following results:

```
sizeof(char) = 1
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sizeof(int) = 4
sizeof(long) = 4
sizeof(long long) = 8
sizeof(float) = 4
sizeof(double) = 8
sizeof(a) = 40
sizeof(&a) = 8
Process exited after 2.
请按任意键继续. . .
```

Red annotations in the image: '1' points to the compiler selection dropdown, '2' points to the 'Run' button, and '3' points to the 'Debug' button.

1) 基本数据类型所占用的内存空间在两个平台相同

2) 只有地址所占空间根据平台而定