ACSL

American Computer Science League

**All-Star #9**

**008 2015 - 2016**

**CHMOD REVISITED**

Recall from Contest #1 that the chmod command on Unix systems sets permissions on files and directories. The possible permissions are read (r), write (w) and execute (x), and they are set for the user (u), group (g), and others (o).

In Contest #1, you set the permissions from a 3-character octal number. For example, **526** (which is **101 010 110** in binary) corresponds to the permission string of **r-x-w-rw-:** the user has read and execute permissions, the group has write permission, and others have read and write permissions.

Each chmod command comprises a number of *clauses*, separated by commas. Each clause has one or more *actors* (a, u, g, o) followed by an *operator* (+, -, =), followed by one or more *permissions* (r, w, x). The clauses are applied in order, from left to right.

In this problem, you will set and modify a file’s permissions using a more robust notation. Here are some examples:

|  |  |  |  |
| --- | --- | --- | --- |
| **Initial Permissions** | **chmod command** | **Meaning** | **Resulting Permissions** |
| rw-r--r-- | go+x | Add execute permission for the group and others | rw-r-xr-x |
| rw-r--r-- | o+x,u=rx | Add execute permission for others, and then set the user permission to read and execute. | r-xr--r-x |
| rw-r--r-- | ug-r,og+w | Remove read permission for the user and the group, and then add write permission for others and the group. | -w--w-rw- |
| rwxr--r-x | g=w,a+x,ug-r | Set the group permission to write only; add the execute permission for all (i.e., owner, group and others); and remove the read permission for the user and group. | -wx-wxr-x |

**INPUT:** There are 10 input lines. Each line has an initial set of permissions (as a 3-character octal number), and the arguments to a chmod command (a single string up to 100 characters, with no embedded blanks). The first four lines correspond to the examples above.

**OUTPUT:** The results of applying the chmod command to the initial string, expressed as a 9-character permission string.

**SAMPLE INPUT** **SAMPLE OUTPUT**

1. 644, go+x 1. rw-r-xr-x
2. 644, o+x,u=rx 2. r-xr--r-x
3. 644, ug-r,og+w 3. -w--w-rw-
4. 745, g=w,a+x,ug-r 4. –wx-wxr-x
5. 664, a=rw 5. rw-rw-rw-

6. 664, og-w,a+r 6. rw-r--r--

7. 777, a-x 7. rw-rw-rw-

8. 777, ug-x,o-w,g=r 8. rw-r--r-x

9. 511, go+x 9. r-x--x--x

10. 511, a=rw 10. rw-rw-rw-

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**TEST DATA**

**TEST INPUT TEST OUTPUT**

1. 660, og-w,a+r 1. rw-r--r--
2. 777, a-x 2. rw-rw-rw-
3. 617, ug-x,o-w,g=r 3. rw-r--r-x
4. 511, go+w,a=rx 4. r-xr-xr-x
5. 527, ug-w 5. r-x---rwx
6. 123, u+r,g-w,a-x 6. r------w-
7. 642, o-w,a=rx 7. r-xr-xr-x
8. 445, o+wx,g-rx,u+r 8. r-----rwx
9. 064, g+wx,o-rw,a=rx,u+w 9. rwxr-xr-x
10. 000, a=rx,ug-r,go+wx,uo-rw,g-rwx 10. --x-----x