*SRE Programming Test*

Congratulations. You are a strong candidate and we would like to see what you can do. You have three hours from the time you receive this test to complete and return it, based on email time stamps.

This challenge contains a problem description and some requirements for the implementation. Please read the description and requirements carefully. Here’s how your solution will be evaluated, in priority order (1 is highest priority):

1. Does the program have your name included in a comment?
2. Does the program compile and execute according to the problem description?
3. Does the program exhibit good design techniques?
4. Do you use data structures and algorithms that would allow your program to work under high volume – that is, is your code scalable?
5. Is your code well formatted and easy to read? Do you have sufficient comments? Can the reviewer quickly determine how your program is organized and what you are trying to accomplish?
6. Have you thoroughly tested all possible input combinations?

Please write your code in Python, Ruby, C/C++, golang or Java.

Thanks and good luck!

# Problem Description: Package Installation and System Dependencies

Dependencies between software packages are common in any Unix/Linux system. This means that in order to install a given software package, another package must be installed beforehand. Additionally, lower level software components are often required by multiple upper level packages. For example, both the **telnet** client program and the **ftp** client program require that the TCP/IP networking package is installed first. Conversely, the TCP/IP package cannot be removed until all packages that depend on it (telnet, ftp) are removed.

We want you to design and write a program to automate the process of adding and removing software packages.

To do this you will need to:

1. Maintain a record of installed packages and their dependencies.
2. Support explicitly installing a package in response to a command (unless it is already installed).
3. Support implicitly installing a package if it is needed to install another package.
4. Support explicitly removing a package in response to a command (if it is not needed to support other packages).
5. Support implicitly removing a package if it is no longer needed to support another component.

## Requirements

Before installing a package, automatically install all the packages it requires.

Before removing a package, confirm that no other packages require it. Dependent packages must be removed manually before the package can be removed.

## Input

The input received by your program will contain a sequence of commands, each on a separate line, containing no more than eighty characters. The command names (DEPEND, INSTALL, REMOVE, and LIST) always appear in uppercase starting in column one and the command line separator is one or more spaces. All appropriate DEPEND commands will appear before the occurrence of any INSTALL dependencies. The end of the input is marked by a line containing only the word END.

Command Syntax:

|  |  |
| --- | --- |
| DEPEND item1 item2 | Package item1 depends on package item2 (and item3 or any additional packages). |
| INSTALL | Installs item1 and any other packages required by item1. |
| REMOVE | Removes item1 and, if possible, packages required by item1. |
| LIST | Lists the names of all currently installed packages. |
| END | Marks the end of input, when used in a line by itself. |

## Output

Echo each line of input.

1. Follow each echoed INSTALL or REMOVE line with the actions taken in response, making certain that the actions are given in the proper order.
2. For the LIST command, display the names of the components currently installed.
3. For the DEPEND and END commands, no output, except the echo, is produced.
4. For the DEPEND command, there will only be one dependency list per item.

## Sample Input

DEPEND TELNET TCPIP NETCARD

DEPEND TCPIP NETCARD

DEPEND DNS TCPIP NETCARD

DEPEND BROWSER TCPIP HTML

INSTALL NETCARD

INSTALL TELNET

INSTALL foo

REMOVE NETCARD

INSTALL BROWSER

INSTALL DNS

LIST

REMOVE TELNET

REMOVE NETCARD

REMOVE DNS

REMOVE NETCARD

INSTALL NETCARD

REMOVE TCPIP

REMOVE BROWSER

REMOVE TCPIP LIST

END

## Expected Sample Output

DEPEND TELNET TCPIP NETCARD

DEPEND TCPIP NETCARD

DEPEND DNS TCPIP NETCARD

DEPEND BROWSER TCPIP HTML

INSTALL NETCARD

NETCARD successfully installed

INSTALL TELNET

TCPIP successfully installed

TELNET successfully installed INSTALL foo foo successfully installed

REMOVE NETCARD

NETCARD is still needed.

INSTALL BROWSER

HTML successfully installed

BROWSER successfully installed

INSTALL DNS

DNS successfully installed

LIST

HTML BROWSER DNS NETCARD foo TCPIP TELNET

REMOVE TELNET

TELNET successfully removed

REMOVE NETCARD

NETCARD is still needed

REMOVE DNS

DNS successfully removed

REMOVE NETCARD

NETCARD is still needed

INSTALL NETCARD

NETCARD is already installed

REMOVE TCPIP

TCPIP is still needed

REMOVE BROWSER

BROWSER successfully removed

HTML is no longer needed

HTML successfully removed

TCPIP is no longer needed

TCPIP successfully removed

REMOVE TCPIP

TCPIP is not installed

LIST

NETCARD foo

END