Proxy log retrospection

Ivan is the administrator of an enterprise proxy. Recently, he noticed a pattern of suspicious links. He wants to determine, based on the proxy log information, which websites have hosted suspicious links. He wants to determine which hostnames have hosted this malicious content, so he can block the sites in the future.

Input Format

The first line of the input contains 2 integers, U and R. The first integer (U) is the total number of URLs. The second integer (R) is the number of pattern rules.

The subsequent lines display the URLs to be tested. Each line contains one URL. There is a total of "U" URLs.
Note that although the URLs were copied from raw proxy logs, please do not do any clean up such as percent-decoding. These URLs should be processed in the original form as is.

After the URLs, an empty line displays.

After the empty line, the rules display. Each line contains one rule. Any URL that matches any of the rules should be detected. For each rule, a leading character and a token string indicates the meaning of the rule. The leading characters can be:

"~": Indicates that any key of the query parameters "contains" the given token string
"=": Indicates that any key of the query parameters "exactly matches" the given token string
"<": Indicates that any key of the query parameters is "prefixed with" the given token string
">": Indicates that any key of the query parameters is "suffixed with" the given token string

There is no space between the leading character and the token string.

Output Format

Output the hostname of the matched URLs line by line. Hostnames should be ordered in alphabetical order.

Sample Input/Format

Given the following input data:

```
11 4
https://search.yahoo.com/search?cs=bz&p=Jordan
%20XX9&fr=fp-tts-300&fr2=ps&woeid=12703519
```

```
https://www.yahoo.com/?hl=tw
http://googleads.g.doubleclick.net/pagead/ads?
client=ca-pub-
7019376976432612&output=html&h=90&slotname=895936896
9&adk=2940162378&w=728&lmt=-
14400&ea=0&flash=12.0.0&url=http%3A%2F
%2Fwww.dailymotion.com%2Fplaylist
%2Fx1lqzc_looosu_kaalai-dvd-divxtamilhd-com
%2F1%23video
%3Dxi172f&dt=1398025904187&bpp=14&bdt=2645&shv=r2014
0410&cbv=r20140417&saldr=sa&correlator=1398025904290
&frm=23&ga_vid=1899866626.1390678253&ga_sid=13980259
04&ga_hid=1217388403&ga_fc=0&u_tz=240&u_his=33&u_jav
a=0&u_h=768&u_w=1360&u_ah=768&u_aw=1360&u_cd=24&u_np
lug=17&u_nmime=71&dff=serif&dfs=16&adx=307&ady=1307&
biw=1342&bih=679&isw=728&ish=90&ifk=3379050096&eid=3
17150304&oid=3&ref=http%3A%2F%2Fwww.google.ae%2Furl
%3Fsa%3Dt%26rct%3Dj%26q%3D%26esrc%3Ds%26source%3Dweb
%26cd%3D5%26ved%3D0CD0QFjAE%26url%3Dhttp%253A%252F
%252Fwww.dailymotion.com%252Fplaylist
%252Fx1lqzc_looosu_kaalai-dvd-divxtamilhd-com
%252F1%26ei%3DkxtUU8yiH43Y0QX4u4DIDg%26usg
%3DAFQjCNHkQrajjaceIfWMekGBe9y4-dhsGw%26bvm
%3Dbv.65058239%2Cd.d2k&loc=EMPTY&top=http%3A%2F
%2Fwww.dailymotion.com%2Fplaylist
%2Fx1lqzc_looosu_kaalai-dvd-divxtamilhd-com
%2F1%23video
%3Dxi172f&rx=0&eae=2&vis=2&fu=4&ifi=1&dtd=135
http://news.yahoo.com/blogs/oddnews/man%E2%80%99s-
soda-refill-costs-him--525-and-gets-him-slapped-
with-a-federal-charge-201020989.html
http://optimized-
by.rubiconproject.com/a/8769/15047/32459-2.js?
&cb=0.29419559309407917&tk_st=1&rf=http
%3A//www.dailymotion.com/playlist/x1lqzc_looosu_kaal
ai-dvd-divxtamilhd-com/1%23video
%3Dxi172f&rp_s=c&tg_i.content_category=shortfilms&tg
_i.page_type=videolist_with_player&p_pos=btf&p_scree
n_res=1360x768
http://news.yahoo.com/least-nine-nepali-guides-
killed-everest-avalanche-070314847.html
http://ada.brucelead.com/ttj?
id=2483083&cb=1398026044&referrer=345948&pubclick=ht
tp://ams1.ib.adnxs.com/click?exSuR-
F6hD9MN4lBYOWAP57vp8ZLN-
0_TDeJQWDlgD97FK5H4XqEP578wF5ODeZzK5Qzc-
HnKUE8L1RTAAAAAJO-
JgB2AgAASwYAAAIAAAB3wtgAqw4GAAAAAQBVU0QAVVNEAKAWALF
cAAAwt8DAQUCAQIAAI4A-yZ6WQAAAAA./cnd=%21aAY2Pgjhj-
```

```
IBEPeE4wYYq50YIAA./referrer=http%3A%2F
%2Fams1.ib.adnxs.com%2Fif%3Fenc
%3DeukmMQisjD8xthDkoISJP57vp8ZLN-
0_MbYQ5KCEiT956SYxCKyMPwxi9sL72L1rK5Qzc-
HnKUE2L1RTAAAAAHZ-
JgAhCQAATAEAAAIAAADOLt0ArHIFAAAAAQBVU0QAVVNEAKAAWAKt
ggAAimgAAgUCAQIAAI4AiSYZbQAAAAA.%26cnd%3D
%2521UifzEQiX194BEM7d9AYYACCs5RUwADithR5AAEjMAlD2_Jk
BWABguwVoAHAIeJYWgAEIiAGWFpABAZgBAaABAagBA7ABALkBeOk
mMQisjD_BAXjpJjEIrIw_yQGEGmYk0bTaP9kBAAAAAAA8D_gAQD
1AQrXozw.%26ccd%3D%2521QbHQAiX194BEM7d9AYYrOUVIAA.
%26udj%3DDuf%2528%2527a%2527%252C%2B247724%252C
%2B1398026038%2529%253Buf%2528%2527c%2527%252C
%2B3648407%252C%2B1398026038%2529%253Buf%2528%2527r
%2527%252C%2B14495438%252C%2B1398026038%2529%253B
%26vpid%3D1153%26apid%3D237123%26referrer%3Dhttp
%253A%252F%252Fsabiduriainutil.com%26media_subtypes
%3D1%26ct%3D0%26dlo%3D1/clickenc=
https://www.google.com.tw/maps/place/%E7%B6%AD
%E5%A4%9A%E9%BA%97%E4%BA%9E%E9%85%92%E5%BA
%97Grand+Victoria+Hotel/@25.0854062,121.5615012,15z/
data=!4m2!3m1!1s0x0:0xa80fd700a421c560?hl=en
http://trf.intuitwebsites.com/tracking/WebsitesTraff
icServlet?rt=1755201621&p=index&u=http
%3A//www.ezcampin.com/&sid=S1755201621hu8sh3m4c5&vid
=V1755201621hu8sh3m4c5&x=1398025816306&ref=http
%3A//basslakeca.com/camping.html
http://www.kimo.com.tw/data?
http://92.51.156.76/din.aspx?
s=65993375&id=975585259&client=DynGate&p=10003329

~woe
=pubclick
>_s
<u_
```

The output should be:

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ada.brucelead.com
googleads.g.doubleclick.net
optimized-by.rubiconproject.com
search.yahoo.com
```