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#include <fstream>
#include <cstring>
using namespace std;
int v[3][5];
int main()
{
    ifstream f("date.in");
    ofstream g("date.out");
    int i,j,c=-1,x,p;
    char sol[30],vec[4]="ACA";
    for(p=1;p<=5;p++){
        f.getline(sol,3);c=-1;
        for(i=1;i<=2;i++)
            for(j=1;j<=4;j++)
                v[i][j]=0;
        i=0;
        while(i<2)
        { j=4;
            if(sol[i]>='0'&&sol[i]<='9')
                do
                    {v[i+1][j]=sol[i]%2;
                     sol[i]=sol[i]/2;
                     j--;}
                while(sol[i]>0&&j>0);
            else
                switch (sol[i]){
                    case 'A':{v[i+1][1]=1;v[i+1][3]=1;}break;
                    case 'B':{v[i+1][1]=1;v[i+1][3]=1;v[i+1][4]=1;}break;
                    case 'C':{v[i+1][1]=1;v[i+1][2]=1;}break;
                    case 'D':{v[i+1][1]=1;v[i+1][2]=1;v[i+1][4]=1;}break;
                    case 'E':{v[i+1][1]=1;v[i+1][2]=1;v[i+1][3]=1;}break;
                    case 'F':{v[i+1][1]=1;v[i+1][2]=1;v[i+1][3]=1;v[i+1][4]=1;}break;}
            i++;
        }
        i=1;
        while(i<=2)
        {
            j=1;
            while(v[i][j]==1&&j<=4)
                j++;
            if(j>4)
                {c++;
                 if(i==1)
                     {sol[c]='B';
                      for(x=1;x<=4;x++)
                          v[1][x]=0;}
                 else
                     {sol[c]='~';
                      c++;
                      sol[c]='B';
                      for(x=1;x<=4;x++)
                          v[2][x]=0;}
                }
        }
    }
}

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    }
    c++;
    sol[c]='+';}
    i++;}
for(i=1;i<=3;i++)
{
    if(v[1][i]==1&&v[1][i+1]==1&&v[2][i]==1&&v[2][i+1]==1)
    {c++;
    v[1][i]=0;
    v[1][i+1]=0;
    v[2][i]=0;
    v[2][i+1]=0;
    if(i==1)
        {sol[c]='A';}
    else
        if(i==2)
            sol[c]='C';
        else
            {sol[c]='~';
            c++;
            sol[c]='A';}
    c++;
    sol[c]='+';}}
if(v[1][1]==1&&v[1][4]==1&&v[2][1]==1&&v[2][4]==1)
{c++;
sol[c]='\0';
strcat(sol,"~C+");
c+=2;
v[1][1]=0;
v[1][4]=0;
v[2][1]=0;
v[2][4]=0;}
for(i=1;i<=2;i++)
for(j=1;j<=3;j++)
if(v[i][j]==1&&v[i][j+1]==1)
{
    v[i][j]=0;
    v[i][j+1]=0;
    if(j==1 || j==3)
        {if(j==3)
        {c++;
        sol[c]='~';}
        c++;
        sol[c]=vec[j-1];}
    if(i==1)
        {c++;
        sol[c]='B';}
    else
        {c++;
        sol[c]='~';
        c++;
        sol[c]='B';}
}

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    if(j==2)
        {c++;
        sol[c]=vec[j-1];}
    c++;
    sol[c]='+';}

i=1;
while(i<=4)
    { if(v[1][i]==1&&v[2][i]==1)
        {v[1][i]=0;
        v[2][i]=0;
        switch(i){
            case 1:{c++;sol[c]='A';c++;sol[c]='~';sol[c]='C';}break;
            case 2:{c++;sol[c]='A';c++;sol[c]='C';}break;
            case 3:{c++;sol[c]='~';c++;sol[c]='A';c++;sol[c]='C';}break;
            case 4:{c++;sol[c]='~';c++;sol[c]='A';c++;sol[c]='~';c++;sol[c]='C';}break;}
        c++;
        sol[c]='+';}
    i++;}

i=1;
while(i<=2)
    { if(v[i][1]==1&&v[i][4]==1)
        { v[i][1]=0;
        v[i][4]=0;
        if(i==1)
            {c++;
            sol[c]='\0';
            strcat(sol,"B~C");
            c+=2;}
        else
            {c++;
            sol[c]='\0';
            strcat(sol,"~B~C");
            c+=3;}
        c++;
        sol[c]='+';}
    i++;}

for(i=1;i<=2;i++)
    for(j=1;j<=4;j++)
        if(v[i][j]==1)
            {if(j>=3)
                {c++;
                sol[c]='~';}
            c++;
            sol[c]='A';
            if(i==1)
                {c++;
                sol[c]='B';}
            else
                {c++;
                sol[c]='~';
                c++;}
        }

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        sol[c]='B';}
    if(j==1 || j==4)
        {c++;
        sol[c]='~';}
    c++;
    sol[c]='C';
    c++;
    sol[c]='+';
    }
sol[c]='\0';
g<<sol<<endl;
}}
```