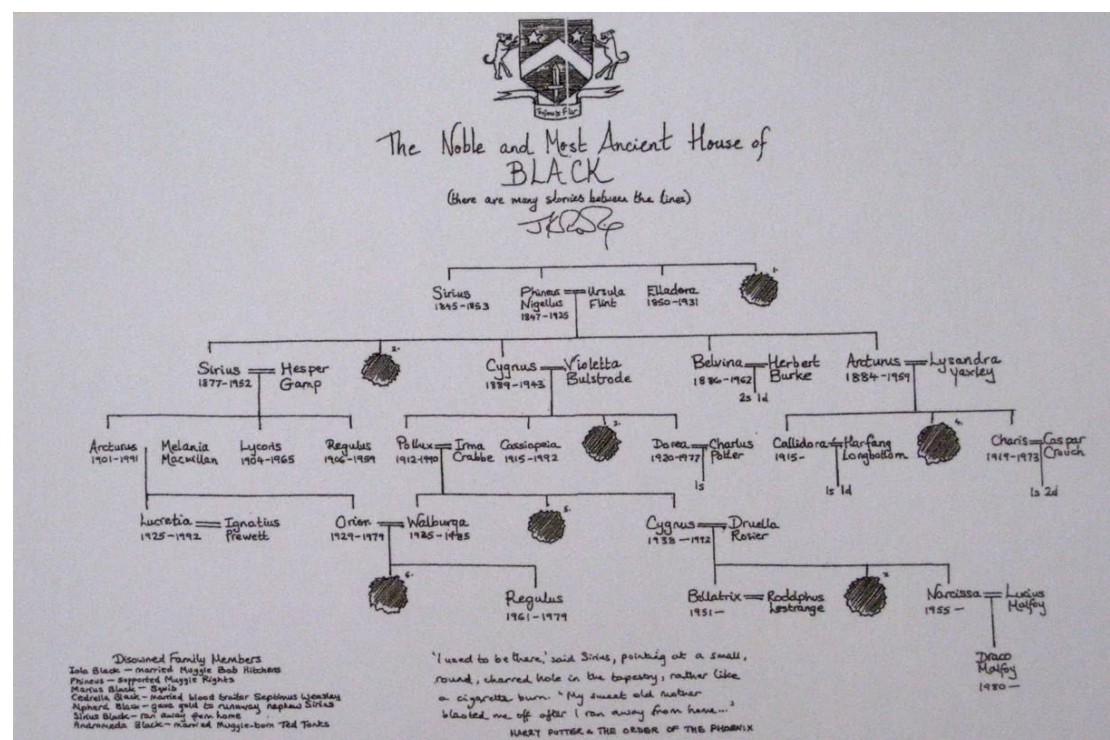# HDU ID：21321211

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Task description：

I chose a fictional family comprising 30 members for the purpose of this report. The family includes parents, grandparents, uncles, aunts, cousins, and key events associated with each member. I defined key events for family members, including birth, marriage, divorce, and death, with associated years: I established a set of rules to represent relationships between family members, marital statuses, and survival statuses, all applicable to specific dates. Here are some examples of these rules: I conducted a series of querying experiments to test the functionality of the family knowledge base. Through these querying experiments, we can observe that the family knowledge base successfully provided answers to various questions about family members, including their relationships, marital statuses, and survival statuses, while considering specific dates. This knowledge base proves to be powerful for addressing inquiries spanning different time periods.

Family tree：

List of facts：

```prolog
person(sirius1).
person(phinasnigallus).
person(ursulaflint).
person(elladerz).
person(sirius2).
person(hespergamp).
person(cygnus1).
person(violettabulstrade).
person(velvina).
person(herbertburke).
person(anturus1).
person(lysandrayaxley).
person(anturus2).
person(melaniamacmillan).
person(lycoris).
person(regulus1).
person(pollux).
person(irmacrabbe).
person(caccsiopaia).
person(dorea).
person(charluspoiter).
person(callidora).
person(harfanylongbollom).
person(charis).
person(casparcrouch).
person(luccebia).
person(ignatius).
person(orion).
person(wallourga).
person(cygnus2).
person(druella).
person(regulus2).
person(ballatrix).
person(roddphus).
person(narcissa).
person(lusiusmarfcy).
person(dracomarfcy).

birth(sirius1, male, 1845).
birth(phinasnigallus, male, 1847).
birth(ursulaflint, female, 1849).
birth(elladerz, female, 1850).
birth(sirius2, male, 1877).
birth(hespergamp, female, 1879).
birth(cygnus, male, 1889).
birth(violettabulstrade, male, 1890).
birth(belvina, female, 1886).
birth(herbertburke, male, 1884).
```

```prolog
45 birth(cygnus, male, 1889).
46 birth(violettabulstrade, male, 1890).
47 birth(belvina, female, 1886).
48 birth(herbertburke, male, 1884).
49 birth(anturus1, male, 1884).
50 birth(lysandrayaxley, female, 1886).
51 birth(anturus2, male, 1901).
52 birth(melaniamacmillan, female, 1902).
53 birth(lycoris, male, 1904).
54 birth(regulus1, male, 1906).
55 birth(pollux, male, 1912).
56 birth(irmacrabbe, female, 1913).
57 birth(caccsiopaia, female, 1915).
58 birth(dorea, female, 1920).
59 birth(charluspoiter, male, 1919).
60 birth(callidora, female, 1915).
61 birth(harfanylongbollom, male, 1913).
62 birth(charis, female, 1919).
63 birth(casparcrouch, male, 1916).
64 birth(luccebia, male, 1925).
65 birth(ignatius, female, 1926).
66 birth(orion, female, 1929).
67 birth(wallourga, male, 1925).
68 birth(cygnus, male, 1959).
69 birth(druella, female, 1961).
70 birth(regulus2, male, 1961).
71 birth(ballatrix, female, 1951).
72 birth(roddphus, male, 1952).
73 birth(narcissa, female, 1955).
74 birth(lusiusmarfcy, male, 1950).
75 birth(dracomarfcy, male, 1980).
76 birth(dracomarfcy, male, 1980, 1).
77
78
79
80
81
82
83 marriage(phinasnigallus, 1877).
84 marriage(ursulaflint, 1877).
85 marriage(sirus1, 1899).
86 marriage(hespegamp, 1899).
87 marriage(cygnus, 1910).
88 marriage(violettabulstrade1, 1910).
89 marriage(belvina, 1910).
90 marriage(herbertburke, 1910).
91 marriage(anturus1, 1908).
92 marriage(lysandrayaxley, 1908).
```

```prolog
 89  marriage(belvina, 1910).
 90  marriage(herbertburke, 1910).
 91  marriage(anturus1, 1908).
 92  marriage(lysandrayaxley, 1908).
 93  marriage(arcturus2, 1928).
 94  marriage(melaniamacmillan, 1928).
 95  marriage(pollux, 1933).
 96  marriage(irmacrabbe, 1933).
 97  marriage(dorea, 1942).
 98  marriage(charluspoiter, 1942).
 99  marriage(callidora, 1940).
100  marriage(harfanylongbollom, 1940).
101  marriage(charis, 1945).
102  marriage(casparcrouch, 1945).
103  marriage(orion, 1956).
104  marriage(wallourga, 1956).
105  marriage(cygnus2, 1945).
106  marriage(druella, 1945).
107  marriage(ballatrix, 1983).
108  marriage(roddphus, 1983).
109  marriage(narcissa, 1980).
110  marriage(lusiusmarfcy, 1980).
111
112  parents(phinasnigallus, cygnus1).
113  parents(ursulaflint, cygnus1).
114  parents(phinasnigallus, sirius2).
115  parents(ursulaflint, sirius2).
116  parents(phinasnigallus, violettabulstrade).
117  parents(ursulaflint, violettabulstrade).
118  parents(phinasnigallus, anturus1).
119  parents(ursulaflint, anturus1).
120  parents(sirius2, anturus2).
121  parents(hespergamp, anturus2).
122  parents(sirius2, lycoris).
123  parents(hespergamp, lycoris).
124  parents(sirius2, regulus).
125  parents(hespergamp, regulus).
126  parents(cygnus, pollux).
127  parents(cygnus1, caccsiopaia).
128  parents(cygnus1, dorea).
129  parents(violettabulstrade1, pollux).
130  parents(violettabulstrade1, caccsiopaia).
131  parents(violettabulstrade1, dorea).
132  parents(anturus1, callidora).
133  parents(anturus1, charis).
134  parents(lysandrayaxley, callidora).
135  parents(lysandrayaxley, charis).
136  parents(anturus2, luccebia).
```

```
128  parents(cygnus1, dorea).
129  parents(violettabulstrade1, pollux).
130  parents(violettabulstrade1, caccsiopaia).
131  parents(violettabulstrade1, dorea).
132  parents(anturus1, callidora).
133  parents(anturus1, charis).
134  parents(lysandrayaxley, callidora).
135  parents(lysandrayaxley, charis).
136  parents(anturus2, luccebia).
137  parents(anturus2, luccebia).
138  parents(melaniamacmillan, orion).
139  parents(melaniamacmillan, orion).
140  parents(pollux, wallourga).
141  parents(pollux, cygnus2).
142  parents(irmacrabbe, wallourga).
143  parents(irmacrabbe, cygnus).
144  parents(orion, regulus2).
145  parents(wallourga, regulus2).
146  parents(cygnus2, ballatrix).
147  parents(cygnus2, narcissa).
148  parents(druella, ballatrix).
149  parents(druella, narcissa).
150  parents(narcissa, dracomarfcy).
151  parents(lusiusmarfcy, dracomarfcy).
152
153  divorce(belvina, 1915).
154  divorce(herbertburke, 1915).
155
156
157  death(sirius1, 1863).
158  death(phinasnigallus, 1925).
159  death(elladerz, 1931).
160  death(sirius2, 1952).
161  death(cygnus1, 1943).
162  death(belvina, 1962).
163  death(anturus1, 1959).
164  death(anturus2, 1991).
165  death(lycoris, 1965).
166  death(regulus1, 1989).
167  death(pollux, 1990).
168  death(caccsiopaia, 1992).
169  death(dorea, 1977).
170  death(charis, 1973).
171  death(luccebia, 1992).
172  death(orion, 1979).
173  death(wallourga, 1985).
174  death(cygnus2, 1992).
175  death(regulus2, 1979).
```

List of rules with comments.

```prolog
%rules

%if X is Y's child
child(X, Y) :-
    person(X),
    person(Y),
    parents(Y,X).

%if X is single in Date
single(X, Date) :-
    person(X),
    birth(X, _, BirthYear),
    Date >= BirthYear,
    (   not(marriage(X, _))
    ;   (   marriage(X, MarriageYear),
            MarriageYear > Date
        )
    ),
    not(death(X,_)).

%if X is married in Date
married(X,Date) :-
    birth(X, _, BirthYear,_),
    Date >= BirthYear,
    marriage(X, MarriageYear),
    Date >= MarriageYear,
    (   not(divorce(X, _))
    ;   (   divorce(X, DivorceYear),
            Date < DivorceYear
        )
    ).
%if X is alive in Date
alive(X,Year) :-
    birth(X,_,Since),
    not(death(a,_)),
    Year>=Since.
```

Screenshots of queries:

person(charis)

true   1

birth(sirius1,male,1849).

false

birth(sirius1,male,1845).

true   1

marriage(dorea,1942).

true   1

marriage(dorea,1985).

false

parents(cygnus,dorea).

true   1

parents(cygnus,jack).

false

child(dorea,cygnus1)

true   1

divorce(belvina,1915).

true   1

divorce(belvina,1913).

false

death(cygnus1,1943).

true   1

death(cygnus1,1992).

false

single(lusiusmarfcy,1992)

false

single(lusiusmarfcy,1979)

true   1

married(pollux,1945)

true   1

married(pollux,1932)

false

alive(lycoris,1980)

false

alive(wallourga,1963)

true   1

alive(lycoris,1963)

true   Examples▲   History▲   Solutions▲   ☐ table results   Run