



Department of Computer Science & Engineering

Course Title : Artificial Intelligence and Expert Systems Lab

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Problem Title:

Developing a Knowledge Base for Industry, Company, Role, and Supervision Relationships Using Prolog.

Problem Description:

Organizations are structured hierarchically, where employees work in different industries, companies, and roles while maintaining supervision relationships. The goal of this project is to represent this hierarchical information in Prolog and develop rules to facilitate queries such as:

- Determining the industry a person works in.
- Identifying people with the same role or company.
- Finding supervisors and their subordinates (both direct and indirect).
- Retrieving all employees in a specific role.

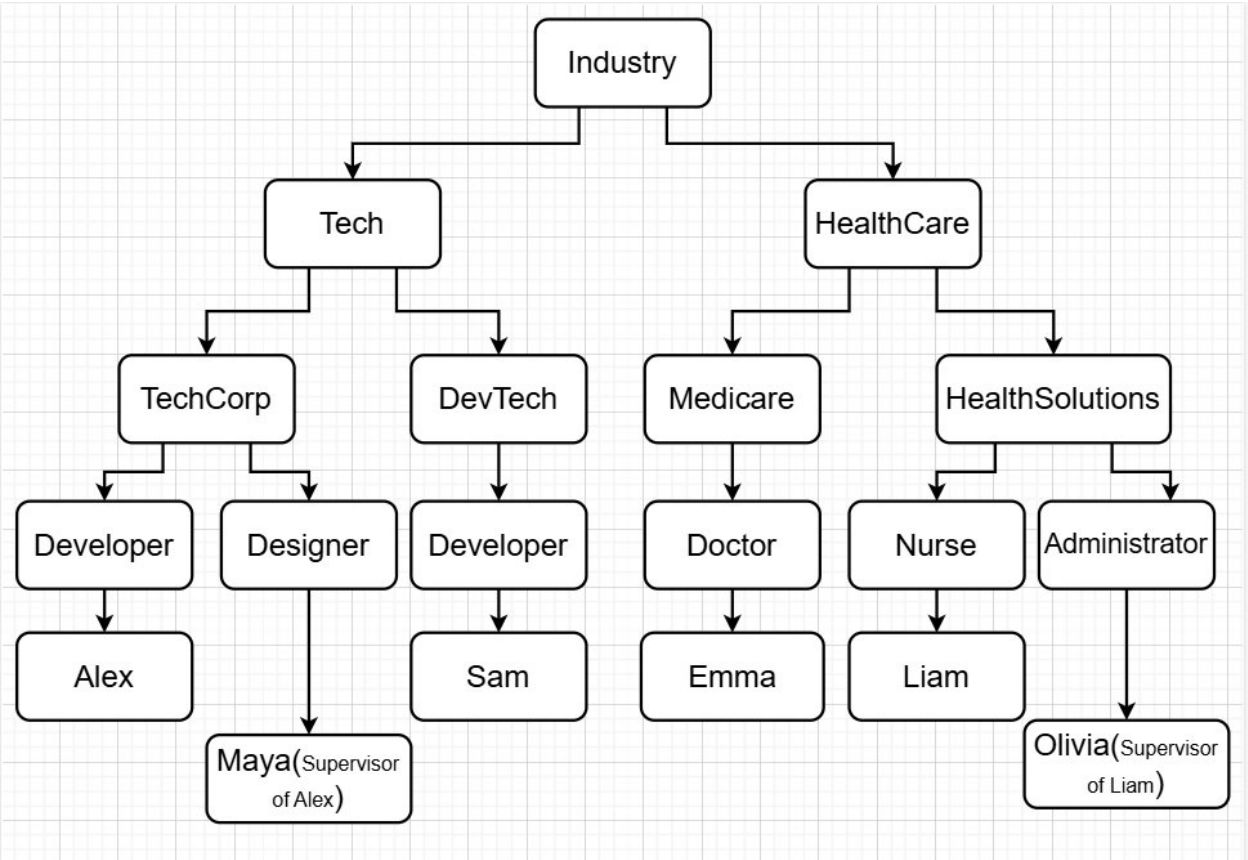
This Prolog-based system will allow efficient querying and reasoning over the structured knowledge base, incorporating recursion where necessary.

Tools and Languages Used:

- **Programming Language:** Prolog (SWI-Prolog)
- **Tools:** SWI-Prolog environment for execution and debugging
- **Operating System:** Windows

Diagram:

Profession Classification Tree



Sample Input/Output:

```
welcome to SWI-Prolog (compiled, 64 bits, version 7.2.7)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run ?- license. for legal details.
```

```
For online help and background, visit https://www.swi-prolog.org
For built-in help, use ?- help(Topic). or ?- apropos(Word).
```

```
?-
```

```
% c:/Users/HP/Music/kB1.pl compiled 0.00 sec, 16 clauses
```

```
?- works_in_industry(alex,Industry).
```

```
Industry = tech.
```

```
?- works_in_industry(liam,Industry).
```

```
Industry = healthcare.
```

```
?- same_company(alex,maya).
```

```
true.
```

```
?- same_company(emma,liam).
```

```
false.
```

```
?- is_supervised_by(alex,maya).
```

```
true.
```

```
?- is_supervised_by(liam,olivia).
```

```
true.
```

```
?- is_supervised_by(liam,emma).
```

```
false.
```

```
?- is_supervised_by(Person,maya).
```

```
Person = alex.
```

```
?- is_supervised_by(Person,olivia).
```

```
Person = liam.
```

```
?- is_indirectly_supervised_by(alex,olivia).
```

```
false.
```

```
?- is_indirectly_supervised_by(liam,maya).
```

```
false.
```

```
?- role(Person,_,techcorp).
```

```
Person = alex ;
```

```
Person = maya.
```

```
?- role(_,Role,techcorp).
```

```
Role = developer ;
```

```
Role = designer.
```

```
?- role(_,Role,healthsolutions).
```

```
Role = nurse ;
```

```
Role = administrator.
```

```
?-
```

Conclusion:

This Prolog-based system effectively models industry, company, role, and supervision relationships, enabling powerful queries to extract insights about employees and their hierarchical structure. The use of recursion allows for indirect relationships to be captured, improving the system's reasoning capabilities.

Challenges Faced:

1. **Handling Cyclic Dependencies:** Ensuring the supervisor-subordinate structure does not result in infinite loops.
2. **Scalability Issues:** When applied to larger data-sets, query efficiency may be impacted.
3. **Debugging Recursive Rules:** Ensuring recursion properly terminates while maintaining correct relationships.