Exercise 3 - KBs

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We want to formalize knowledge about persons and kinship relationships. In particular, we want to formalize the following statements:

1. every person has a father and has a mother;
2. fathers are male and mothers are female;
3. the father of a father is a grandfather;
4. the mother of a mother is a grandmother;
5. the brother of a parent is an uncle.

(a) Choose the most appropriate knowledge representation language for expressing the above knowledge among the following ones: $\mathcal{ALC}$, Datalog, Datalog with constraints, ASP, OWL, $DL\text{-}Lite_R$, $\mathcal{EL}$, RL, RDFS, motivating your choice;

(b) express the above knowledge in the formalism chosen at the previous point.

a

- ALC
- DATALOG
- DATALOG with constraint
- ASP
- OWL
- DL-LITE$_R$
- EL
- RL
- RDFS

(1) EXISTENTIAL RESTRICTION

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(3) QUALIFIED EXISTENTIAL (ALSO (4))

(1) EXISTENTIAL RESTRICTION

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We can express the knowledge with ALC, OWL and EL. The most appropriate language is EL because it less complex than ALC and OWL and we don't need their extra functionalities.

b

PERSON $\sqsubseteq$ $\exists$ hasFather $\sqcap$ $\exists$ hasMother

FATHER $\sqsubseteq$ MALE

MOTHER $\sqsubseteq$ FEMALE

$\exists$ hasFather . FATHER $\sqsubseteq$ GRANDFATHER

$\exists$ hasMother . MOTHER $\sqsubseteq$ GRANDMOTHER

$\exists$ hasBrother . PARENT $\sqsubseteq$ UNCLE