

Problem 15.3 (ALC TBox)

- primitive concepts : woman, man
- roles : has-child, has-parent, has-sibling, has-spouse

Concepts are define using ALC TBox as follows,

$$\text{person} = \text{woman} \sqcup \text{man}$$

$$\text{parent} = \text{person} \sqcap \exists \text{has-child} . \text{person}$$

$$\text{mother} = \text{woman} \sqcap \exists \text{has-child} . \text{person}$$

$$\text{father} = \text{man} \sqcap \exists \text{has-child} . \text{person}$$

$$\text{grandmother} = \text{woman} \sqcap \exists \text{has-child} . (\text{mother} \sqcup \text{father})$$

$$\text{aunt} = \text{woman} \sqcap \exists \text{has-sibling} . (\text{mother} \sqcup \text{father})$$

$$\text{uncle} = \text{man} \sqcap \exists \text{has-sibling} . (\text{mother} \sqcup \text{father})$$

$$\text{sister} = \text{woman} \sqcap \exists \text{has-sibling} . \text{person}$$

$$\text{brother} = \text{man} \sqcap \exists \text{has-sibling} . \text{person}$$

$$\text{only child} = \text{person} \sqcap \neg \exists \text{has-sibling} . \text{person}$$

$$\text{cousin} = \text{person} \sqcap \exists \text{has-parent} . \exists \text{has-sibling} . (\text{mother} \sqcup \text{father})$$

$$\text{nephew} = \text{man} \sqcap \exists \text{has-parent} . (\text{brother} \sqcup \text{sister})$$

$$\text{niece} = \text{woman} \sqcap \exists \text{has-parent} . (\text{brother} \sqcup \text{sister})$$

$$\text{fatherinlaw} = \text{man} \sqcap \exists \text{has-child} . \exists \text{has-spouse} . \text{person}$$

$$\text{motherinlaw} = \text{woman} \sqcap \exists \text{has-child} . \exists \text{has-spouse} . \text{person}$$