

Existential restrictions

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Before doing this tutorial you need to have the following knowledge:

- ① Building blocks of OWL and Description Logics.
- ② SubClassOf vs EquivalentTo

Qualified existential restrictions

Syntax

OWL	DL
ObjectProperty: r Class: D EquivalentTo: r some C Class: C	$D \equiv \exists r.C$

Semantics

- $(\exists r.C)^{\mathcal{I}} = \{x \in \Delta^{\mathcal{I}} \mid \text{there is an } y \in \Delta^{\mathcal{I}} \text{ such that } (x, y) \in r^{\mathcal{I}} \text{ and } y \in C^{\mathcal{I}}\}$
- $r \text{ some } C$ ($\exists r.C$) is the set of individuals such that for each individual x there is at least 1 individual y of type C that is linked to x via the object property (role) r .

Qualified existential restrictions

Example using EquivalentTo

ObjectProperty: owns

Class: PetOwner

EquivalentTo: owns some Pet

Class: Pet

Example using SubClassOf

ObjectProperty: owns

Class: DogOwner

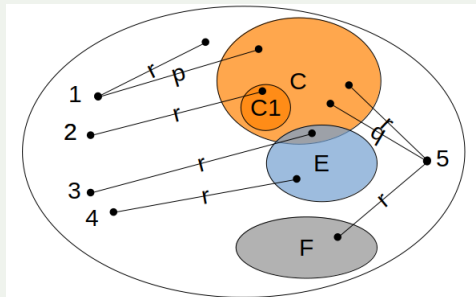
SubClassOf: owns some Pet

Class: Pet

Qualified existential restrictions

Examples

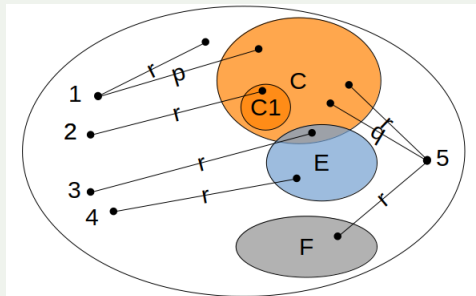
Which of these individuals will be in r some C and therefore as well in D ?



Qualified existential restrictions

Examples

Which of these individuals will be in r some C and therefore as well in D ?



Answer

Individuals 2, 3, 5

Variations on existential restrictions

Syntax

Name	OWL	DL
Unqualified existential restrictions	ObjectProperty: owns Class: Owner EquivalentTo: owns some owl:Thing	$Owner \equiv \exists \text{owns} \top$ or $Owner \equiv \exists \text{owns}$
Value restrictions	ObjectProperty: citizenOf Class: UKCitizen EquivalentTo: citizenOf hasValue UK Individual: UK	$UKCitizen \equiv \exists \text{citizenOf} . \{UK\}$
Existential restriction on data property	DataProperty: name Class: Human SubClassOf: some name xsd:string	$Human \sqsubseteq \exists \text{name.xsd:string}$