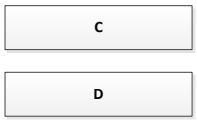
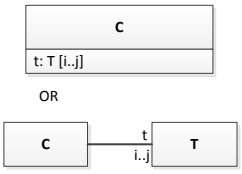
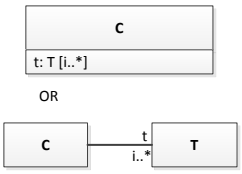
UML Class Diagram to OWL and SROIQ Reference

Henriette Harmse

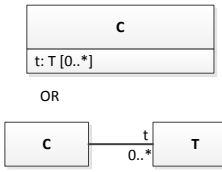
UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**
 Class `C`	C	`Class: C`

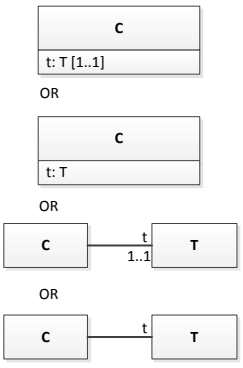

Classes `C` and `D`
	$C \sqsubseteq \neg D$	`Class: C`
		`Class: D`
		`DisjointWith: C`


Attribute `t` of type `T` with multiplicity `[i..j]`
OR
Association end `t` of type `T` with multiplicity `[i..j]`
	$\exists t.\top \sqsubseteq C$
	$\exists t^{-}.\top \sqsubseteq T$
	$C \sqsubseteq (\geq i\, t.\top) \sqcap (\leq j\, t.\top)$
		`Class: C`
		`SubClassOf:`
		`(t min i Thing) and`
		`(t max j Thing)`
		`Class: T`
		`ObjectProperty: t`
		`Domain: C`
		`Range: T`

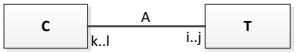

Attribute `t` of type `T` with multiplicity `[i..*]`
OR
Association end `t` of type `T` with multiplicity `[i..*]`
	$\exists t.\top \sqsubseteq C$
	$\exists t^{-}.\top \sqsubseteq T$
	$C \sqsubseteq (\geq i\, t.\top)$
		`Class: C`
		`SubClassOf:`
		`(t min i Thing)`
		`Class: T`
		`ObjectProperty: t`
		`Domain: C`
		`Range: T`

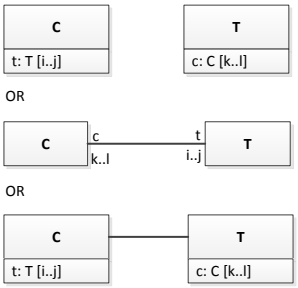
UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**


Attribute `t` of type `T` with multiplicity `[0..*]` OR Association end `t` of type `T` with multiplicity `[0..*]`
	$\exists t.\top \sqsubseteq C$
	$\exists t^{-}.\top \sqsubseteq T$
		`Class: C`
		`Class: T`
		`ObjectProperty: t`
		`Domain: C`
		`Range: T`

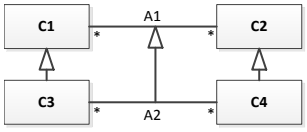

Attribute `t` of type `T` with multiplicity `[1..1]` OR Association end `t` of type `T` with multiplicity `[1..1]`
	$\exists t.\top \sqsubseteq C$
	$\exists t^{-}.\top \sqsubseteq T$
	$C \sqsubseteq \exists t.\top \sqcap (\leq 1\, t.\top)$
		`Class: C`
		`SubClassOf:`
		`t exactly 1 Thing`
		`Class: T`

UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**

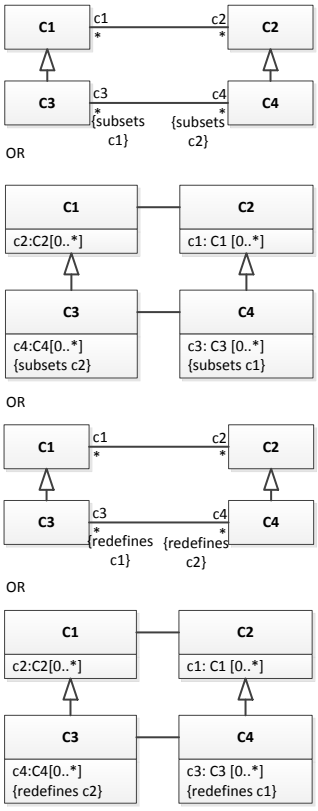

Association `A` exists between classes `C` and `T`
	$\exists a.\top \sqsubseteq C$
	$\exists a^{-}.\top \sqsubseteq T$
	$C \sqsubseteq (\geq i\, a.\top) \sqcap (\leq j\, a.\top)$
	$T \sqsubseteq (\geq k\, a^{-}.\top) \sqcap (\leq l\, a^{-}.\top)$
		`ObjectProperty: a`
		`  Domain: C`
		`  Range: T`
		`ObjectProperty: a_inv`
		`  InverseOf: a`
		`Class: C`
		`  SubClassOf:`
		`  (a min i Thing) and`
		`  (a max j Thing)`
		`Class: T`
		`  SubClassOf:`
		`  (a_inv min k Thing) and`
		`  (a_inv max l Thing)`


Attribute `t` of type `T` with multiplicity `[i..j]` belongs to class `C` and attribute `c` of type `C` with multiplicity `[k..l]` belongs to class `T`
OR
Association end `t` with multiplicity `[i..j]` is associated with class `C` and association end `c` with multiplicity `[k..l]` is associated with class `T`
OR
Line notation is used to make explicit that attributes `t` and `c` are also association ends
	$\exists t.\top \sqsubseteq C$
	$\exists t^{-}.\top \sqsubseteq T$
	$C \sqsubseteq (\geq i\, t.\top) \sqcap (\leq j\, t.\top)$
	
	$c \equiv t^{-}$
	$T \sqsubseteq (\geq k\, c.\top) \sqcap (\leq l\, c.\top)$
		`ObjectProperty: t`
		`  Domain: C`
		`  Range: T`
		`Class: C`
		`  SubClassOf:`
		`  (t min i Thing) and`
		`  (t max j Thing)`
		`ObjectProperty: c`
		`  InverseOf: t`
		`Class: T`
		`  SubClassOf:`
		`  (c min k Thing) and`
		`  (c max l Thing)`

UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**

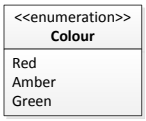

Association `A2` specializes association `A1`
	$\exists a_1.\top \sqsubseteq C_1$
	$\exists a_1^-.\top \sqsubseteq C_2$
	$\exists a_2.\top \sqsubseteq C_3$
	$\exists a_2^-.\top \sqsubseteq C_4$
	$a_2 \sqsubseteq a_1$
		`Class: C1`
		`Class: C2`
		`Class: C3`
		`Class: C4`
		`ObjectProperty: a1`
		`Domain: C1`
		`Range: C2`
		`ObjectProperty: a2`
		`Domain: C3`
		`Range: C4`
		`SubPropertyOf: a1`

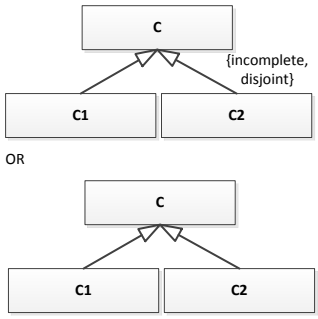
UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	OWL 2

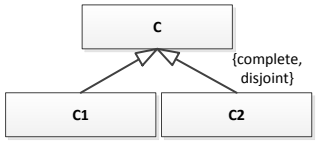
	$c_1 \equiv c_2^-$
	$\exists c_1.\top \sqsubseteq C_1$
	$\exists c_1^-.\top \sqsubseteq C_2$
	$c_3 \equiv c_4^-$
	$\exists c_3.\top \sqsubseteq C_3$
	$\exists c_3^-.\top \sqsubseteq C_4$
	$c_3 \sqsubseteq c_1$
	$c_4 \sqsubseteq c_2$
		`Class: C1`
		`Class: C2`
		`Class: C3`
		`Class: C4`
		`ObjectProperty: c1`
		`  Domain: C1`
		`  Range: C2`
		`  InverseOf: c2`
		`ObjectProperty: c2`
		`ObjectProperty: c3`
		`  Domain: C3`
		`  Range: C4`
		`  InverseOf: c4`
		`  SubPropertyOf: c1`
		`ObjectProperty: c4`

Association end (resp. attribute) `c3` subsets association end (resp. attribute) `c1` and association end (resp. attribute) `c4` subsets association end (resp. attribute) `c2` OR Association end (resp. attribute) `c3` redefines association end (resp. attribute) `c1` and association end (resp. attribute) `c4` redefines association end (resp. attribute) `c2`		

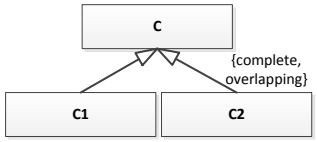
UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**

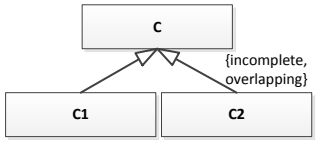

The `Colour` enumeration consists of the colours `Red`, `Amber` and `Green`
	$Colour \equiv \{Green, Amber, Red\}$
	$Green \not\equiv Amber$
	$Green \not\equiv Red$
	$Amber \not\equiv Red$
		`Class: Colour`
		`  EquivalentTo:`
		`  {Green, Amber, Red}`
		`Individual: Green`
		`  Types: Colour`
		`Individual: Amber`
		`  Types: Colour`
		`Individual: Red`
		`  Types: Colour`
		`DifferentIndividuals:`
		`  Green, Amber, Red`

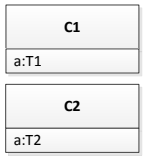

Class `C` is specialized by the disjoint classes `C1` and `C2` which do not cover class `C`
	$C_1 \sqsubseteq C$
	$C_2 \sqsubseteq C$
	$C_1 \sqsubseteq \neg C_2$
		`Class: C`
		`Class: C1`
		`  SubClassOf: C`
		`Class: C2`
		`  SubClassOf: C`
		`DisjointClasses:`
		`  C1, C2`


Class `C` is specialized by the disjoint classes `C1` and `C2` which cover class `C`
	$C \sqsubseteq C_1 \sqcup C_2$
	$C_1 \sqsubseteq \neg C_2$
	$C_1 \sqsubseteq C$
	$C_2 \sqsubseteq C$
		`Class: C`
		`  DisjointUnionOf:`
		`  C1, C2`
		`Class: C1`
		`  SubClassOf: C`
		`Class: C2`
		`  SubClassOf: C`

UML class diagram feature	$\mathcal{SROIQ}^{(\mathcal{D})}$	**OWL 2**


Class `C` is specialized by the overlapping classes `C1` and `C2` which cover class `C`
	$C \sqsubseteq C_1 \sqcup C_2$
	$C_1 \sqsubseteq C$
	$C_2 \sqsubseteq C$
		`Class: C`
		`SubClassOf:`
		`C1 or C2`
		`Class: C1`
		`SubClassOf: C`
		`Class: C2`
		`SubClassOf: C`


Class `C` is specialized by the overlapping classes `C1` and `C2` which do not cover class `C`
	$C_1 \sqsubseteq C$
	$C_2 \sqsubseteq C$
		`Class: C`
		`Class: C1`
		`SubClassOf: C`
		`Class: C2`
		`SubClassOf: C`


Classes `C1` and `C2` both have an attribute `a` respectively of type `T1` and `T2`.
	$\exists a.\top \sqsubseteq C_1 \sqcup C_2$
	$\exists a^{-}.\top \sqsubseteq T_1 \sqcup T_2$
	$C_1 \sqsubseteq \exists a.\top \sqcap (\leq 1\ a.\top)$
	$C_2 \sqsubseteq \exists a.\top \sqcap (\leq 1\ a.\top)$
		`Class: C1`
		`SubClassOf:`
		`t exactly 1 Thing`
		`Class: C2`
		`SubClassOf:`
		`t exactly 1 Thing`
		`Class: T1`
		`Class: T2`
		`ObjectProperty: a`
		`Domain: C1 or C2`
		`Range: T1 or T2`