INFS3101/7100
Ontology and the Semantic Web

Week 13
Predicates
Semester 1, 2006

Key Terms

- Common logic is a language to express predicates
- OWL Full can be mapped to CL.
- But CL is richer than OWL Full, so can be used to extend OWL.
- But need to be careful since CL open to paradox.

Universal Sets

We have a universal (set) under the accommodation ontology

- Mary, John and Jane are lessees,
- Smith, Ronny and Brendan are lessors,
- QLDER_1 and QLDER_2 are houses and the like

Q1a

Define subclasses using CL

- Declared subclasses - A lessee is a person
- The universal set has lessees Mary and Smith.

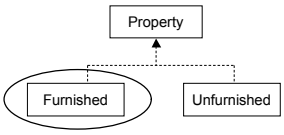
  (forall p (implies (Lessee p) (Person p)))
  - Forall is a universal quantifier.
  - Implies: (p ▶ q)

Q1a

Define subclasses using CL

- The universal contains QLDER_1 with TV set.
- Defined subclasses – the definition of class furnished property
  - Exists represents existential qualifier.

```
(forall p
    (implies
        (exists f (and (Furnishings f) (Property p) (rental:has p f) ))
        (Furnished p)
    )
)
```

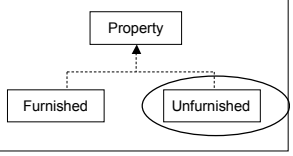


Q1a

Define subclasses using CL

- The universal contains QLDER_2 without Furnishings.
- Defined subclasses – the definition of class furnished property

```
(forall p
    (implies
        (not exists f (and (Furnishings f) (Property p) (rental:has p f) ))
        (Unfurnished p)
    )
)
```

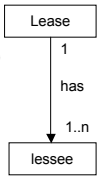


Q1b

Define some integrity constraints using CL

- The universal set has
  - Lease#123 with lessees Mary
  - Lease#234 with lessee John and Peter
- Each lease has at least one lessee (minimum cardinality is one).

```
(forall lease
    (implies
        (Lease lease)
        (exists lessee (rental:has lease lessee))
    )
)
```

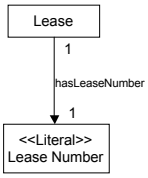


Q1b

Define some integrity constraints using CL

- The universal set has
  - Lease#123
- Each lease has a unique number (hasLeaseNumber is total and functional)

```
(forall lease
    (implies
        (Lease lease)
        (and
            (exists num((hasLeaseNumber lease num))
            (implies
                (forall n (hasLeaseNumber lease n))
                (= n num)
            )
        )
    )
)
```

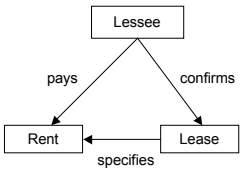


Q1b

Define some integrity constraints using CL

- The universal set has
  - Lease#123 with rent $230 per week, confirmed by Mary, a lessee
- A lessee pays a rent which amount is specified by the lease confirmed by the lessee

```
(forall (lessee rent)
    (implied
        (and
            (Lessee lessee)
            (Rent rent)
            (rental:pays lessee rent)
        )
        (exists lease
            (and
                (Lease lease)
                (rental:confirms lessee lease)
                (rental:specifies lease rent)
            )
        )
    )
)
```



Q1c

Formulate some queries as class definitions in CL

- The universal set has
  - QLDER_1 three meters away from Bus stop#18
  - QLDER_1 five KM away from Bus Stop#18
- Select the instances of Building, which are close to only bus stop number 18. (hasValue in OWL)
  - iff represents “if and only if”

```
(forall b
    (iff
        (rental:closest_bus_stop_18 b BusStop#18)
        (Building_BusStop#18 b)
    )
)
```

Q1c

Formulate some queries as class definitions in CL

- The universal set has
  - QLDER_1 five meters away from bus stop 11, 12 and 13
  - QLDER_2 one KM away from any bus stop
- Select the instances of Building, which are close to only bus stops (allValuesFrom in OWL)

```
(forall b
    (iff
        (forall bs (and (Bus_Stop bs)(rental:nearness b bs)))
        (Building_BusStop b)
    )
)
```

Q1c

- The universal set has
  - QLDER_1 five meter away from bus stops and shops
  - QLDER_2 five meter away from bus stops alone.
  - QLDER_3 five meter away from shops alone.
  - QLDER_4 five KM away from bus stops and shops.
- Select the instance of Building, which are close to bus stops and shops simultaneously (someValuesFrom in OWL)

```
(forall bbs
    (iff
        (and
            (exists bs (and (Bus_Stop bs) (rental:nearness bbs bs)))
            (exists s (and (Shop s) (rental:nearness bbs s)))
        )
        (Building_BusStop_Shop bbs)
    )
)
```

Last consultation session

- Today 2-3pm at 78-631