London Metropolitan University

CS7051- Semantic Technologies

Coursework –2

Individual Report

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Submitted To:

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Date: April 28th, 2023

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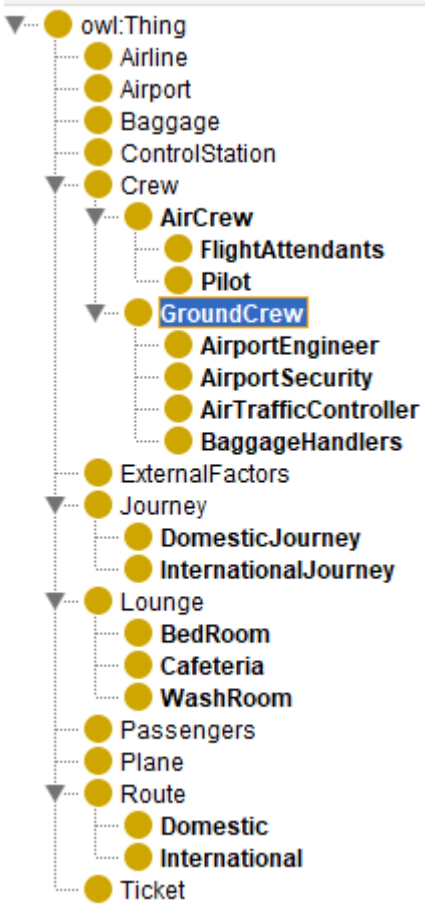
CS7051- Semantic Technologies

1. Classes

- Airline
- Airport
- Baggage
- ControlStation
- Crew
- ExternalFactors
- Journey
- Lounge
- Passengers
- Plane
- Route
- Ticket

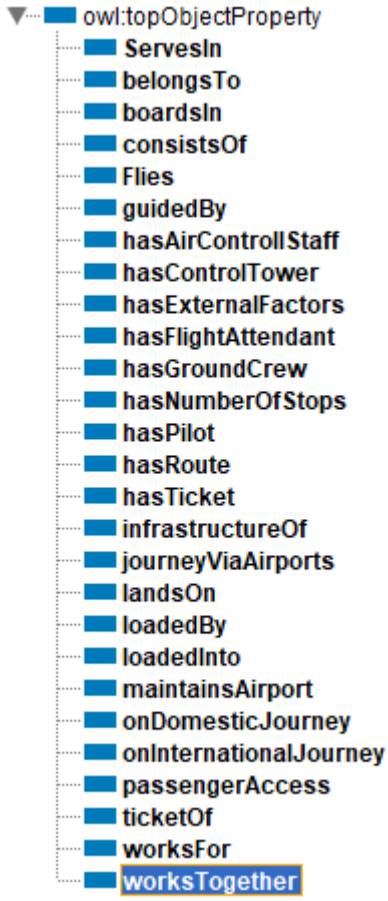
2. Sub Classes

- AirCrew
  - FlightAttendants
  - Pilot
- GroundCrew
  - AirportEngineer
  - AirportSecurity
  - AirTrafficController
  - BaggageHandlers
- DomesticJourney
- InternationalJourney
- BedRoom
- Cafeteria
- WashRoom
- Domestic
- International


owl:Thing
Airline
Airport
Baggage
ControlStation
Crew
AirCrew
FlightAttendants
Pilot
GroundCrew
AirportEngineer
AirportSecurity
AirTrafficController
BaggageHandlers
ExternalFactors
Journey
DomesticJourney
InternationalJourney
Lounge
BedRoom
Cafeteria
WashRoom
Passengers
Plane
Route
Domestic
International
Ticket

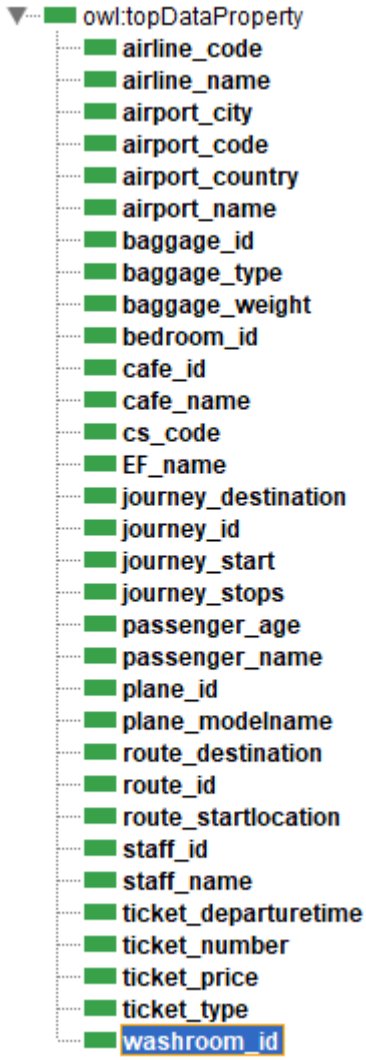
3. Object Properties

Name	Domain	Range
belongsTo	Baggage	Passengers
boardsIn	Passengers	Plane
consistsOf	Airport	Plane
Flies	Pilot	Plane
guidedBy	Plane	ControlStation
hasAirControllStaff	ControlStation	AirTrafficController
hasControlTower	Route	ControlStation
hasExternalFactors	Route	ExternalFactors
hasFlightAttendant	Plane	FlightAttendants
hasGroundCrew	Airport	GroundCrew
hasNumberOfStops	Journey	Journey_stops some owl:real
hasPilot	Airline	Pilot
hasRoute	Journey	Route
hasTicket	Passengers	Ticket
infrastructureOf	Lounge	Airport
journeyViaAirports	Journey	Airport
landsOn	Plane	Airport
loadedBy	Plane	BaggageHandlers
loadedInto	Baggage	Plane
maintainsAirport	AirportEngineer	Airport
onDomesticJourney	Plane	DomesticJourney
onDomesticJourney	Passengers	DomesticJourney
onInternationalJourney	Plane	InternationalJourney
onInternationJourney	Passengers	InternationalJourney
passengerAccess	Passengers	Lounge
ServesIn	FlightAttendants	Plane
ticketOf	Ticket	Journey
worksFor	Crew	Airline
worksFor	Crew	Airport
worksTogether	Pilot	FlightAttendants


owl:topObjectProperty
ServesIn
belongsTo
boardsIn
consistsOf
Flies
guidedBy
hasAirControllStaff
hasControlTower
hasExternalFactors
hasFlightAttendant
hasGroundCrew
hasNumberOfStops
hasPilot
hasRoute
hasTicket
infrastructureOf
journeyViaAirports
landsOn
loadedBy
loadedInto
maintainsAirport
onDomesticJourney
onInternationalJourney
passengerAccess
ticketOf
worksFor
worksTogether

4. Data Properties

Name	Domain	Range
airline_code	Airline	rdf:langString
airline_name	Airline	rdf:langString
airport_city	Airline	rdf:langString
airport_code	Airline	rdf:langString
airport_country	Airline	rdf:langString
airport_name	Airline	rdf:langString
baggage_id	Baggage	rdf:langString
baggage_type	Baggage	rdf:langString
baggage_weight	Baggage	xsd:decimal
bedroom_id	Bedroom	owl:real
cafe_id	Cafeteria	owl:real
cafe_name	Cafeteria	rdf:langString
cs_code	ControlStation	rdf:langString
EF_name	ExternalFactors	rdf:langString
journey_destination	Journey	rdf:langString
journey_id	Journey	rdf:langString
journey_start	Journey	rdf:langString
journey_stops	Journey	owl:real
passenger_age	Passengers	owl:real
passenger_name	Passengers	rdf:langString
plane_id	Plane	rdf:langString
plane_modelname	Plane	rdf:langString
route_destination	Route	rdf:langString
route_id	Route	rdf:langString
route_startlocation	Route	rdf:langString
staff_id	Crew	rdf:langString
staff_name	Crew	rdf:langString
ticket_departutetime	Ticket	xsd:interger
ticket_number	Ticket	rdf:langString
ticket_price	Ticket	{“$”,”£”}
ticket_type	Ticket	rdf:langString
washroom_id	Washroom	rdf:langString


owl:topDataProperty
airline_code
airline_name
airport_city
airport_code
airport_country
airport_name
baggage_id
baggage_type
baggage_weight
bedroom_id
cafe_id
cafe_name
cs_code
EF_name
journey_destination
journey_id
journey_start
journey_stops
passenger_age
passenger_name
plane_id
plane_modelname
route_destination
route_id
route_startlocation
staff_id
staff_name
ticket_departuretime
ticket_number
ticket_price
ticket_type
washroom_id

5. Semantic Web Rule Language

1. Every passenger with a ticket is on a journey

Ticket(?z) ^ Passengers(?y) ^ hasTicket(?y, ?z) ^ ticketOf(?z, ?x) -> Journey(?x)

2. Some journeys may have an exteral factor

Journey(?x) ^ ExternalFactors(?y) -> hasExternalFactors(?x, ?y)

3. Every Journey with more than 0 intermediate stops passes via an airport

:Journey(?x) ^ autogen0:Airport(?y) ^ autogen0:hasNumberOfStops(?x, ?n) ^ swrlb:greaterThan(?n, 0) -> autogen0:journeyViaAirports(?x, ?y)

4. Every plane in a journey is guided by a control tower guiding it

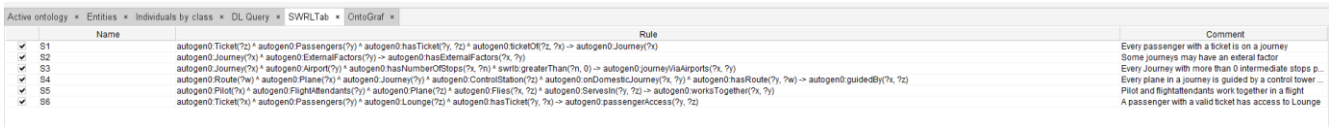
Route(?w) ^ Plane(?x) ^ Journey(?y) ^ ControlStation(?z) ^ onDomesticJourney(?x, ?y) ^ hasRoute(?y, ?w) -> guidedBy(?x, ?z)

5. Pilot and flightattendants work together in a flight

Pilot(?x) ^ FlightAttendants(?y) ^ Plane(?z) ^ Flies(?x, ?z) ^ ServesIn(?y, ?z) -> worksTogether(?x, ?y)

6. A passenger with a valid ticket has access to Lounge

Ticket(?x) ^ Passengers(?y) ^ Lounge(?z) ^ hasTicket(?y, ?x) -> passengerAccess(?y, ?z)



Active ontology × Entities × Individuals by class × DL Query × SWRLTab × OntoGraf ×

	Name	Rule	Comment
✔	S1	autogen0:Ticket(?z) ^ autogen0:Passengers(?y) ^ autogen0:hasTicket(?y, ?z) ^ autogen0:ticketOf(?z, ?x) -> autogen0:Journey(?x)	Every passenger with a ticket is on a journey
✔	S2	autogen0:Journey(?x) ^ autogen0:ExternalFactors(?y) -> autogen0:hasExternalFactors(?x, ?y)	Some journeys may have an exteral factor
✔	S3	autogen0:Journey(?x) ^ autogen0:Airport(?y) ^ autogen0:hasNumberOfStops(?x, ?n) ^ swrlb:greaterThan(?n, 0) -> autogen0:journeyViaAirports(?x, ?y)	Every Journey with more than 0 intermediate stops p...
✔	S4	autogen0:Route(?w) ^ autogen0:Plane(?x) ^ autogen0:Journey(?y) ^ autogen0:ControlStation(?z) ^ autogen0:onDomesticJourney(?x, ?y) ^ autogen0:hasRoute(?y, ?w) -> autogen0:guidedBy(?x, ?z)	Every plane in a journey is guided by a control tower ...
✔	S5	autogen0:Pilot(?x) ^ autogen0:FlightAttendants(?y) ^ autogen0:Plane(?z) ^ autogen0:Flies(?x, ?z) ^ autogen0:ServesIn(?y, ?z) -> autogen0:worksTogether(?x, ?y)	Pilot and flightattendants work together in a flight
✔	S6	autogen0:Ticket(?x) ^ autogen0:Passengers(?y) ^ autogen0:Lounge(?z) ^ autogen0:hasTicket(?y, ?x) -> autogen0:passengerAccess(?y, ?z)	A passenger with a valid ticket has access to Lounge

Metrics

Axiom	840
Logical axiom count	662
Declaration axioms count	178
Class count	27
Object property count	27
Data property count	32
Individual count	91
Annotation Property count	3

Class axioms

SubClassOf	15
EquivalentClasses	0
DisjointClasses	0
GCI count	0
Hidden GCI Count	0

Object property axioms

SubObjectPropertyOf	0
EquivalentObjectProperties	0
InverseObjectProperties	0
DisjointObjectProperties	0
FunctionalObjectProperty	24
InverseFunctionalObjectProperty	0
TransitiveObjectProperty	0
SymmetricObjectProperty	1
AsymmetricObjectProperty	24
ReflexiveObjectProperty	1
IrrefexiveObjectProperty	0
ObjectPropertyDomain	29
ObjectPropertyRange	29
SubPropertyChainOf	0

Data property axioms

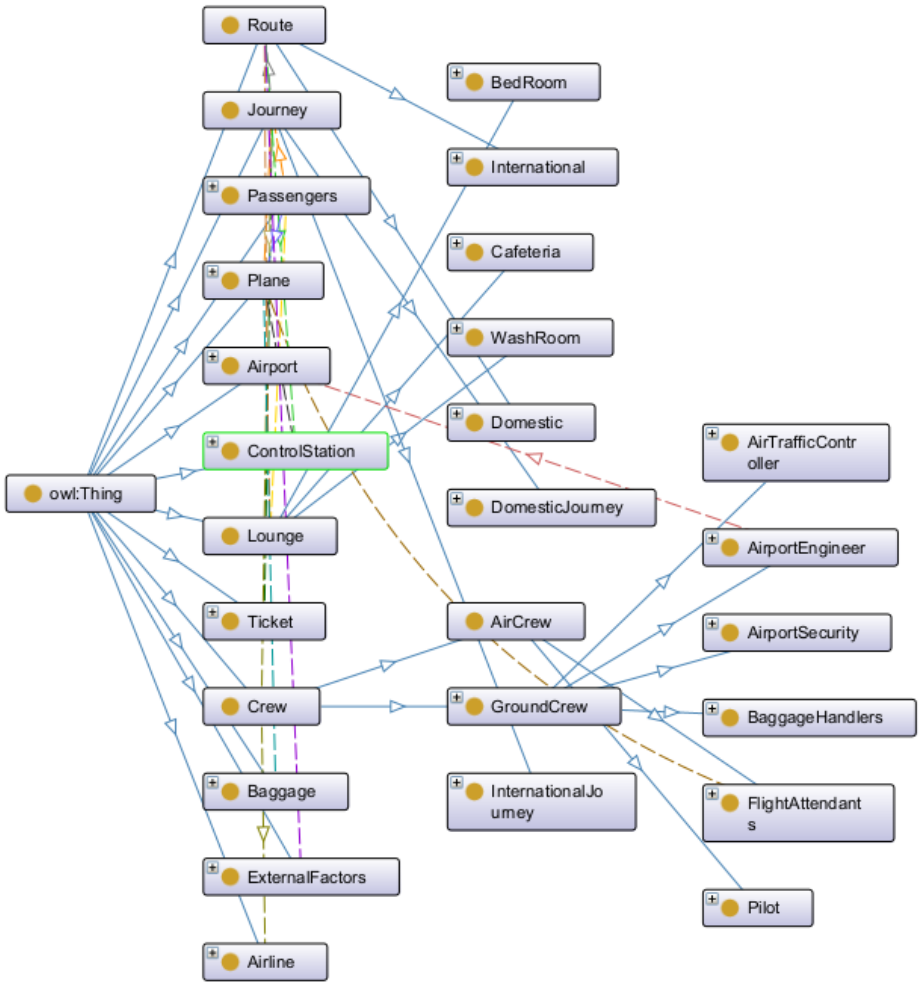
SubDataPropertyOf	0
EquivalentDataProperties	0
DisjointDataProperties	0
FunctionalDataProperty	0
DataPropertyDomain	32
DataPropertyRange	32

Individual axioms

ClassAssertion	91
ObjectPropertyAssertion	177
DataPropertyAssertion	201
NegativeObjectPropertyAssertion	0
NegativeDataPropertyAssertion	0
SameIndividual	0
DifferentIndividuals	0

Annotation axioms

AnnotationAssertion	0
AnnotationPropertyDomain	0
AnnotationPropertyRangeOf	0


Route
Journey
Passengers
Plane
Airport
ControlStation
owl:Thing
Lounge
Ticket
Crew
Baggage
ExternalFactors
Airline
BedRoom
International
Cafeteria
WashRoom
Domestic
DomesticJourney
AirCrew
GroundCrew
InternationalJourney
AirTrafficController
AirportEngineer
AirportSecurity
BaggageHandlers
FlightAttendants
Pilot