BENAZIR BHUTTO SHAHEED UNIVERSITY

LYARI, KARACHI

WEB SEMANTICS QUIZ

Submitted to:

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Q1) Define Queries And Statements from following properties.

Statements (S) And Queries (Q) from properties given:

1. takesCourse:
   S = Ali takes course of physics
   Q = Does Ali take course of physics?

2. isTakenBy:
   S = Physics is taken by Ali.
   Q = Who has taken physics course?

3. isStudiesBy:
   S = Physics is studied by Ali
   Q = Who studies physics?

4. hasLevel:
   S = Temperature has level low
   Q =What is the level of temperature?

5. teacherOf:
   S = Rana is the teacher of Ali
   Q = Who is the teacher of Ali?

6. isTaughtBy:
   S = Akram is taught by Salman.
   Q = Who teaches Akram?

7. tutorOf:
   S = Haseeb is tutor of Uzaif
   Q = Who is Uzaif's tutor?

8. hasGrade:
   S = Talha has grade A.
   Q = What grade does Talha has?

9. IsMemberOf:
   S = Zain is member of Sports Society
   Q = Zain is the member of which Society?

10. hasMember:
    S = Music Society has member as Rashid.
    Q = Who is the member of Music Society?

11. inTutorialGroup:
    S = He is in Tutorial group of PhDs.
    Q = Is he in the PhD's Tutorial Group?

12. hasTutorial:
    S = Zain has tutorial of python
    Q = Who has tutorial of python?

13. TaughtIn:
    S = List and Tuples were taught in third lecture.
    Q = When were List and Tuples taught?

14. hasAge:
    S = Kaleem has age 23
    Q = What is Kaleem's age?

15. hasMaxClassSize:
    S = University has max class size for 20 people
    Q = What's the maximum class size in University?

16. Disjoint:
    S = A.I class disjoints Web Development class.
    Q = What disjoints the Web Development class?

17. teachesCourse:
    S = Nasir Hussain teaches course of A.I.
    Q = Who teaches the A.I course?

18. studiesCourse:
    S = Fayyaz studies course of Cloud Computing.
    Q = Which course do Fayyaz study?

19. hasAssignmentGrade:
    S = Raheel has assignment grade as Zero.
    Q = Who has the Zero assignment grade?

20. hasCourseSemester:
    S = Masters has course semesters containing 4 courses.
    Q = Which degree has four courses in semesters?

21. hasExamGrade:
    S = Yaseen has exam grades above 90 percent.
    Q = Who has exam grades above 90 percent?

Q3) Write down SPARQL Queries for following statements.

1- **Access students who are teaching BS program:**

   SELECT ?Student ?BS Program
           WHERE { ?Student rdfs:Teaching ?BS program }

2- **Name of students starts with letter "A":**

   SELECT ?Name ?A
           WHERE { ?Name rdfs:Startswith ?A }

3- **Name of teachers whose salary ranges between 50-80k:**

   SELECT ?Teacher ? Salary
           WHERE { ?subject rdfs:Type ?Salary }
           Filter (Salary > 50 & Salary < 80)

4- **Name of all drivers who drives on Karachi road:**

   SELECT ?Name ?Karachi road
           WHERE { ?Name rdfs:DrivesOn ?Karachi road }

5- **Students who mostly gain 65 marks:**

   SELECT ?Student ?mark
           WHERE { ?Student rdfs:gain ?marks }
           FILTER (mark <= 65)

6- **Age of people lies between 18-25 years:**

   SELECT ?People ? Age
           WHERE { ?People rdfs:Type ?Age }
           Filter (Age > 18 & Age < 25)

7- **Birds class who can't survive in hot weather:**

   SELECT ?birds ? Hot weather
           WHERE { ?birds rdfs:Survives ?Hot weather }
           Filter ()

8- **Different author for same entitled book/chapter:**

SELECT ?Auther ? Book
    WHERE { ?Auther rdfs:Type ?Book }
    Filter (Bookname)

9- **Restaurants which open up to 8 hours:**

SELECT ?Resturants ? 8 hours
    WHERE { ?Resturants rdfs:Type ?8 hours}

10- **Devices which supports only 3G:**

SELECT ?Devices ? 3G
    WHERE { ?Device rdfs:Supports ?3G }

Q4) Write down summaries of each of the presentation topics.

Summary of Topics:

Semantic Web Background:

It defines about the syntax and semantics. Version of web include

1) Web 1.0 which was used for reading purpose.
2) Web 2.0, used for reading and writing purpose.
3) Web 3.0 is the most advanced than these versions. It is based on ontologies and has ability to read and write at the same time.
4) Some tools which used in Semantic Web are Protege, Jeno, Vowl, etc.

Background of Protege:

Protege is an open source tool to create terminologies and ontologies. In Protégé, we describe the relationship between objects through creating an ontology. The Latest version of Protege is 5.0 and through Protege we can create the ontologies in an efficient way and there is no restriction of creating and expanding an ontology.

Rules Used in Semantic Web: Semantic Web Rule Language (SWRL) such a language for Semantic Web from which one can easily express rules and logics. It basically combines the two of the OWL's species i.e. OWL DL or OWL Lite with a successor of the RML (Rule Markup Language).

Concept in Semantic Web:

Concept refers to an abstract idea or thought that comes from in mind or speech. Everything in semantic web has a different concept. It can be a class, a relation, an attribute and even a statement. Combination of different concepts is called statement.

Terminologies Used in Semantic Web:

- Semantic: meaning
- Ontology: It is a representation of knowledge, properties and relation between the concepts.
- OWL: web ontology language
- RDF: It defines the building blocks of the semantic web such as classes and properties and how they interact to create meaning.
- Triple: A triple is a set of three elements: a subject, a property, and an object.
- SPARQL: Simply a query language used in Semantic Web.
- Class: A concept in the domain
- Properties: Relation between the classes.
- URI: It is a string of characters used to identify a name or a web resource.
- Individuals: individuals are the objects in the domain.
- Disjoint: Two classes in an ontology are disjoint if they cannot share an instance.
- Resource: We can think of a resource as an object.

XML:

The Extensible Markup Language (XML) is a general purpose language which is used to design and describe structured document. XML is based on tags (Own tags) like HTML, However, XML does not have a fixed set of tags but allows users to create their own tags. An XML document consists plain text and markup, in the form of tags and it is represented as a tree. An XML document may contain following nodes, elements, attributes, text, comments, processing instructions and namespaces.

Species of OWL:

There are three species of OWL namely, OWL Full, OWL DL, and OWL Lite. These species define primitives and restrictions of rules within the OWL language use.

1) The OWL Full uses all the OWL language primitives and is fully upward compatible with RDF.

2) OWL DL is the sublanguage of "OWL Full" in which application of constructors to each other is restricted. It is less compatible with RDF.

3) OWL Lite is further restricted as it excludes enumerated classes, disjoints and cardinalities. This makes it easier to understand and implement.

Individuals:

Individual are the objects of class and in Protégé we can describes the individuals using property assertions there are 4 property assertions in individuals. Object property assertion, Negative Object Property Assertion, Data Property Assertion, and Negative Data Property Assertion.

Properties:

Properties are binary relation between domain and range. Property are divided into two categories data and object property. While object have inverse, transitive, inverse functional property, etc. Each have different set of rule to stand uniquely.

Constraints:

Constraints are something that has limitations and restrictions. There are two types of constraints restrictions: values constraints include all values from, some values from and has value and another one is cardinality constraints include min, max and exactly.

Value Constraints:

Constrain is a restriction on someone's behavior. Value constraint is a property restrictions and property restrictions is a special kind of class description. By using constraints we can save our time instead of searching for a specific needed class in whole ontology.it has three types.

1. All value: it helps us to define all values form the class which is asked.

2. Some value: it helps us to define some values from the class/property which is asked.

3. Has value: it describes the individual from the class which is asked.

Reasoner:

Reasoner is service provided by Protege for performing some reasoning task like: ontology consistency, instance checking, classification and class equivalence. There are 2 types of Reasoner used in Protege Hermit and Fact++.

Case Study on Pizza Ontology:

It is a well-known ontology of semantic web community that was designed in University of Manchester for educational purposes only. Basically it is a demo ontology for the students who want to learn semantic web. This ontology includes classes, subclass, object properties, sub properties, individuals, types, same individual as, different individual as, equivalence and visualization.

Case Study on Wine Ontology:

Wine had deployed major impact from the ancient times. By the time and the rise of technology, it has become easier to study and differentiate the variety of wine types and ontologies have taken a major part in this subject. This has put a positive effect for the e-commerce and smart recommendation systems. In the work discussed, there was a clear idea about the effects and influence of web semantics and ontologies on the Machine Learning and recommendation systems. Moreover, how the algorithms make use of these ontologies to work more efficiently and accurately was also discussed.

Q2) Consider Automatic ticket Reservation system to describe basic concepts of RDF. Do you really this everything around us, which we use, is semantic? If yes then how and why? If No then how and why. Support your answer by giving 10 real life examples.

Yes, it's all about semantics as there is advanced web nowadays which is none other than the Web 3.0. It all depends on the words, their relations with each other, statements, competency questions and their dependencies, etc. The data we enter in the Automatic Ticket Reservation System is processed in the backend and not just used to show on the screen or tab. This all possible due to the Web 3.0, and the ontologies and query language support.

Examples:

- Student fills form for admission in university utilizes Web Semantics
- You search for best food across town, it uses Web Semantics and give answers according to ontologies.
- A person Amazon search engine to find product he likes, what he searches, the keywords are processed in the form of ontologies and the answer comes on the screen.