

SPARQL Queries and RDF for Mars

1 RDF Representation of Mars

The RDF representation of Mars is as follows:

```
:Mars rdf:type :Planet ;
      rdfs:label "Mars" ;
      :colorPlanet [ rdf:_1 "Red" ; rdf:_2 "Brown and Tan" ] ;
      :atmosphericComposition [ rdf:_1 "Carbon Dioxide (95.3%)" ] ;
      :mass 0.642 ;
      :diameter 6779 ;
      :density 3933 ;
      :surfaceGravity 3.7 ;
      :escapeVelocity 5.0 ;
      :rotationPeriod 24.6 ;
      :lengthOfDay 24.7 ;
      :distanceFromSun 227.9 ;
      :meanTemperature -65 ;
      :numberOfMoons 2 ;
      :ringSystem "No" ;
      :globalMagneticField "No" ;
      :perihelion "206.6"^^xsd:decimal ;
      :aphelion "249.2"^^xsd:decimal ;
      :orbitalPeriod "687"^^xsd:decimal ;
      :orbitalVelocity "24.1"^^xsd:decimal ;
      :orbitalEccentricity "0.093"^^xsd:decimal ;
      :obliquityToOrbit "25.2"^^xsd:decimal ;
      :surfacePressure "0.006"^^xsd:decimal ;
      :surfaceTemperature "-87 to -5" ;
      :atmosphericPressure "0.006"^^xsd:decimal ;
      :surfaceFeatures [
        rdf:type rdf:Bag ;
        rdf:_1 "Canyons" ;
        rdf:_2 "Volcanoes" ;
        rdf:_3 "Craters"
      ] ;
      :composition [
        rdf:type rdf:Bag ;
```

```

        rdf:_1 "Iron Oxide" ;
        rdf:_2 "Silicates"
    ] .

```

2 SPARQL Queries for Mars

This query retrieves all the elements in the atmospheric composition of Mars, including Carbon Dioxide and any other gases.

2.1 2. What are the surface features of Mars?

```

PREFIX : <http://example.org/solarsystem#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?feature
WHERE {
    :Mars :surfaceFeatures ?features .
    ?features ?position ?feature .
    FILTER(STRSTARTS(STR(?position), STR(rdf:_)))
}

```

This query retrieves the surface features of Mars, such as canyons, volcanoes, and craters, which are stored in the :surfaceFeatures container.

2.2 3. How many moons does Mars have?

```

PREFIX : <http://example.org/solarsystem#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>

SELECT ?numberOfMoons
WHERE {
    :Mars :numberOfMoons ?numberOfMoons .
}

```

This query retrieves the number of moons Mars has, which is specified as 2 in the RDF data.

2.3 4. Which is the red planet in the Solar System?

```

PREFIX : <http://example.org/solarsystem#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>

SELECT ?planetName
WHERE {
    ?planet :colorPlanet ?colorContainer .
    ?colorContainer ?position ?color .
}

```

```
?planet rdfs:label ?planetName .  
FILTER(STRSTARTS(STR(?color), "Red"))  
}
```

This query finds the red planet in the Solar System, which in this case will return Mars.

3 Explanation of Queries

- The first query retrieves the atmospheric composition of Mars by looking into the `:atmosphericComposition` container.
- The second query retrieves the surface features of Mars, such as canyons, volcanoes, and craters, from the `:surfaceFeatures` container.
- The third query directly retrieves the number of moons Mars has.
- The fourth query identifies the red planet in the solar system by filtering for the color "Red" in the `:colorPlanet` container.