# SOL of Life

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CS7810
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# The Problem(s)

- Available resources on Earth are limited
  - 2018 Shortage of Capacitor due to Supply of Resources vs Demand of Consumers
  - Raspberry Pi Shortage
- Domain of Space Data is large and complex across many sources

# The Solution

- SOL Of Life plans to support the missions of space excavation, exploration, and research
- The tool provides a querying solution without the need of a specialist
- Possible Users:
    - Government Entities
    - Researchers
    - Analysts
    - Space Research Institutions
    - Space Enthusiasts

# Limitations of SOL

- Limited to the Sol Solar System
- Data is estimated calculations which are only as accurate as the source
- Only contains data for Asteroids

# Usage of SOL's Ontology

1. What are the top 5 most frequently occurring minerals within 1.5 astronomical units from Earth in 2024?

2. What are the top 3 most occurring asteroid types within 1.5au from Earth in 2025?

3. Which is the closest asteroid to Earth in the next 24 months and when does that occur?

4. What are the 5 closest asteroids that may contain iron?

5. What are the 3 most potentially profitable asteroids within 0.75au of Earth in 2024?

6. When will 162173 Ryugu be within 1au of Earth?

7. How long will 162173 Ryugu be within 1au of Earth?

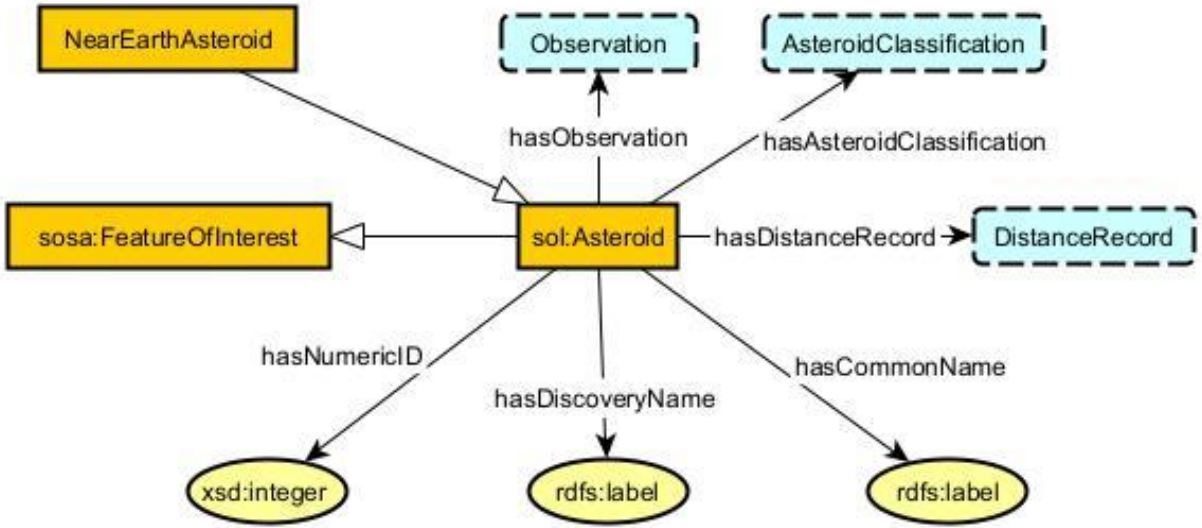
8. Based on current trajectory of 162173 Ryugu, how far from Earth will 162173 Ryugu be in 8 months?

9. How much time is available until the 162173 Ryugu is within 1au of Earth?

10. Which asteroid is the first to come within 0.5au of Earth that contains iron?

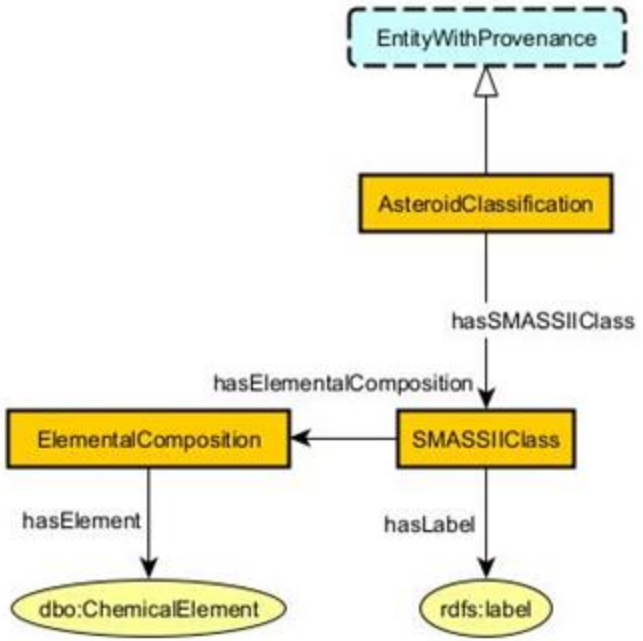
# Asteroid

- Source Pattern: SOSA's Feature of Interest
- Source Data: Asterank, MP3C, NASA_JPL



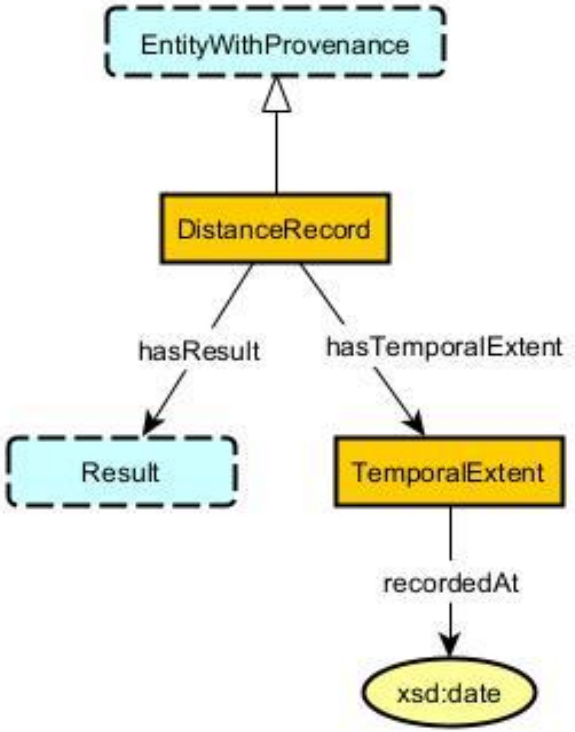
# Asteroid Classification

- Source Pattern: No Source Pattern
- Source Data: Asterank, Asteroid Spectral Types



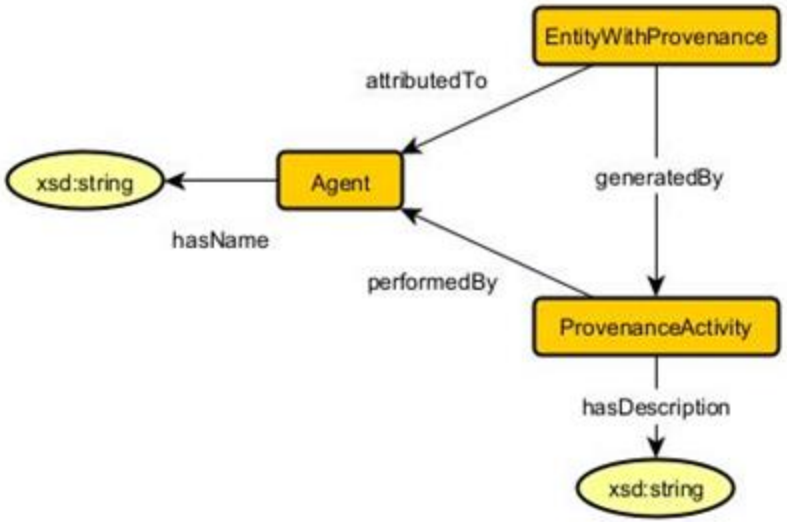
# Distance Record

- Source Pattern: MODL's Record and Temporal Extent
- Source Data: SkyLive



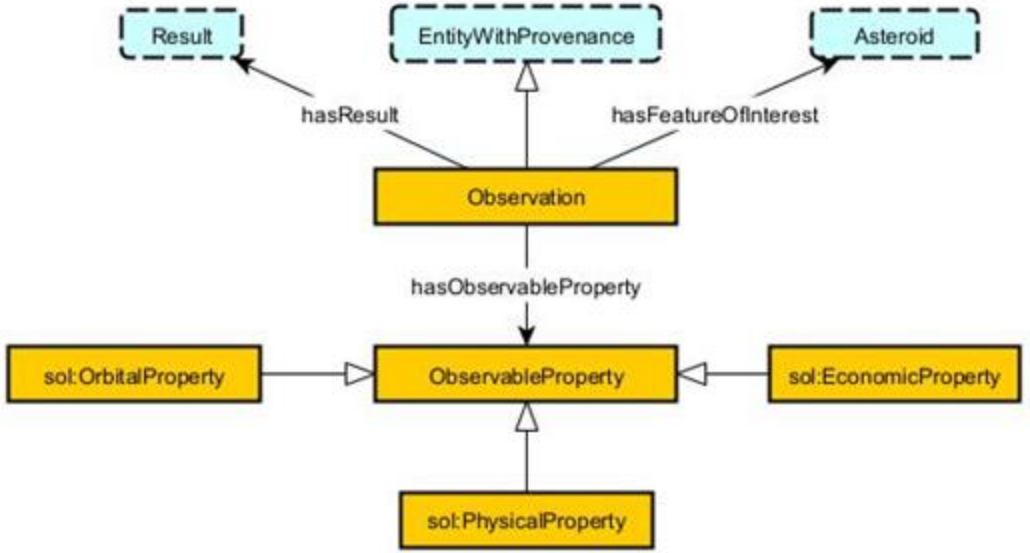
# Data as Entity With Provenance

- Source Pattern: MODL's Entity With Provenance
- Source Data: Asterank, MP3C, NASA_JPL, Skylive



# Observation

- Source Pattern: SOSA Observation
- Source Data: Asterank, MP3C, NASA_JPL



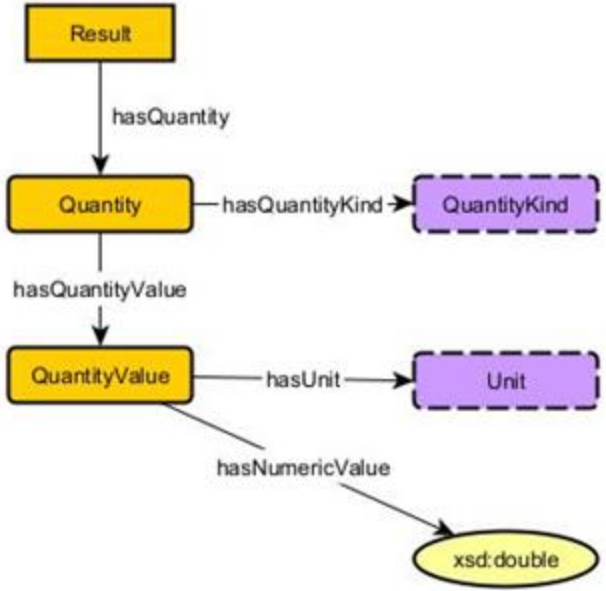
# Data Results

- Source Pattern: MODL's Result and Quantity
- Source Data: Asterank, MP3C, NASA_JPL

- Select Axiom:

Result SubClassOf inverse (hasResult) exactly 1 (Observation or DistanceRecord)

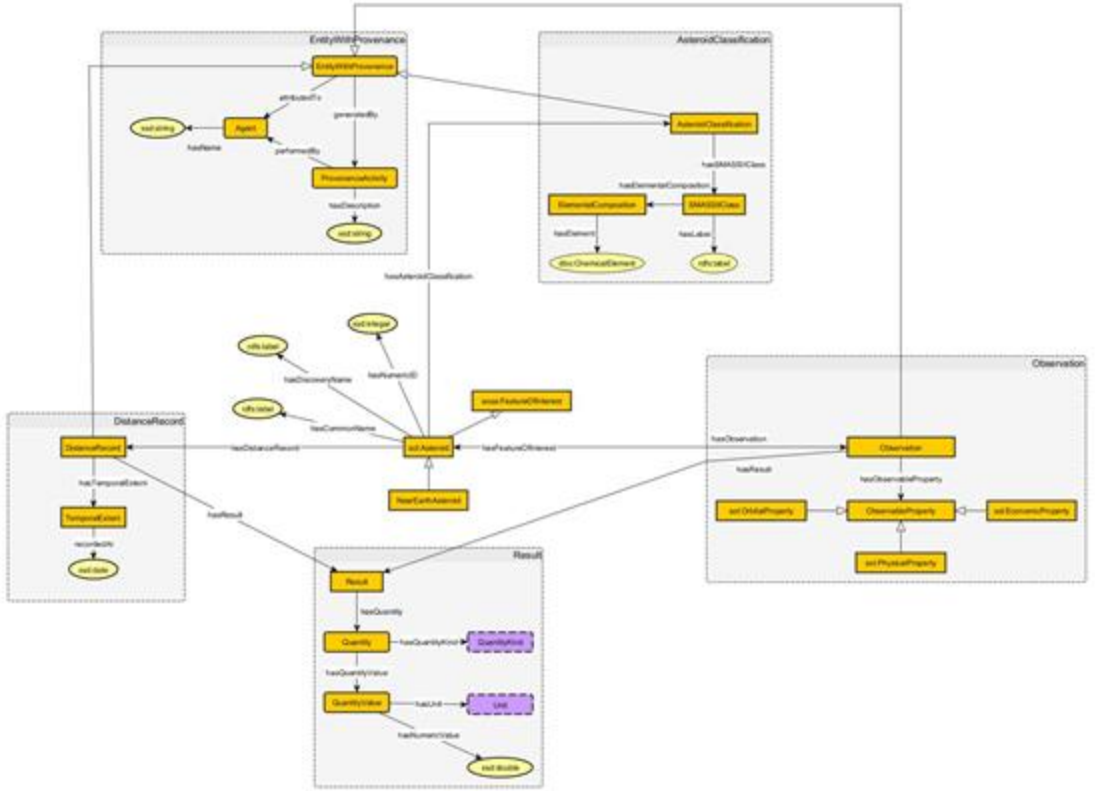
Every Result belongs to exactly 1 Observation or DistanceRecord.



# The Overall Knowledge Graph

## Namespaces:

@base http://www.soloflife.org .
@prefix sol-
ont: http://soloflife.org/lod/ontology/ .
@prefix
sol-
qk: http://soloflife.org/lod/quantitykinds .
@prefix sol-
unit: http://soloflife.org/lod/units .
@prefix solr: http://soloflife.org/lod/resource/ .



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# Future Works

The astorb database at Lowell Observatory (October 2022) by N.A Moskovitz, et al.

- https://asteroid.lowell.edu/gui/

Tie together Albedo infrared readings alongside Asteroid Classification and Elemental Composition

Information Retrieval techniques to continuously pull in Distance Recordings for more implementation of other Asteroids

# Retrospective

Brandon's Feedback:

- What went well?

Re-introduction to set theory, lecture portion of Know ledge Engineering, Visualizing Data in a different realm (Graphs vs Tables), Group chosen topic research (for the midterm and final project), consistent availability of the instructor (even during off-hours)

- What could change?

Periods w here the Group Implementation met w ith a hard-stop potentially could have been avoided w ith some supplemental assignments

- Fun: 4/5
- Usefulness: 3.5/5

Ryan's Feedback:

- What went well?
  The breakdown of deliverables for the project was well paced and each step built off the last well.
- What could change?
  The lecture material in the first half of the class gave a solid "Why", though could have given more "What and How".
- Fun: 3/5
- Usefulness: 4/5

Megan's Feedback:

- What went well?
  Structuring the course as a project was a great way to ensure that we have real experience building knowledge graphs.
- What could change?
  I personally would have benefitted from having lectures on Tuesdays and group work on Thursdays. It was a firehose of information in the beginning which could have been spread out over the course.
- Fun: 3/5
- Usefulness: 4.5/5

# SUMMER IS HERE

THANKS

# Reference to the Databases

- Asterank: https://www.asterank.com/
- Asteroid Spectral Types https://en.wikipedia.org/wiki/Asteroid_spectral_types
- MP3C: https://mp3c.oca.eu/
- Nasa-JPL: SBDB: https://ssd.jpl.nasa.gov/tools/sbdb_query.html
- Sky Live: https://theskylive.com/
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