Initial Post

by Georgios Papachristou - Monday, 30 June 2025, 5:13 AM

Number of replies: 3

Nasim (2022) I his thesis defines ontology as “a set of structural rules designed to represent concepts in order to perform logic-based operations to retrieve or infer new information”. In other words, ontology refers to the formal representation of knowledge within a specific domain in order to enhance the communication between systems, human beings, and systems and human beings (Thabet, 2015).

Among others, in my the most useful language to express ontologies that can be utilised by software agents on the World Wide Web (www) is the OWL 2. This ontology language is designed for the semantic web providing classes, properties, individuals, and data values. OWL 2 is characterized by rich class categories and datatypes, and enhanced functionalities such as qualified cardinality restrictions, reflexive, asymmetric and disjoint properties. In addition, it allows automated reasoning considering that it is grounded in description logics and works well with other semantic web standards such as RDF and SPARQL, facilitating interoperability and knowledge sharing (Brockmans et al., 2009; Kalibatiene and Vasilecas, 2011; Thabet, 2015).

References

Brockmans, S., Haase, P., Serafini, L., & Stuckenschmidt, H. (2009). Formal and Conceptual Comparison of Ontology Mapping Languages. In H. Stuckenschmidt, C. Parent, & S. Spaccapietra, *Modular Ontologies. Lecture Notes in Computer Science.* Berlin, Heidelberg: Springer.

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Peer Response

by Jaco Espag - Monday, 7 July 2025, 7:11 PM

Hi Georgios,

I found your explanation of ontology and OWL 2 insightful. I'd like to add that ontologies are essentially about creating a shared understanding of a domain, something Gruber (1993) described as "an explicit specification of a conceptualisation.", which supports your assertion regarding the structuring of information that both humans and machines can make sense of.

OWL 2 is especially useful for this because it builds on the original OWL language to support more complex relationships, like property chains and disjoint unions (W3C OWL Working Group, 2012). What makes it powerful is how it enables reasoning, allowing systems to infer new facts from existing ones. Horrocks et al. (2003) also point out how OWL 2 fits neatly with other semantic web tools, such as RDF, which is key for making everything work together across different platforms.

References

Gruber, T.R. (1993) ‘A translation approach to portable ontology specifications’, *Knowledge Acquisition*, 5(2), pp. 199–220. Available at: https://doi.org/10.1006/knac.1993.1008.

Horrocks, I., Patel-Schneider, P.F. and van Harmelen, F. (2003) ‘From SHIQ and RDF to OWL: the making of a Web Ontology Language’, *Journal of Web Semantics*, 1(1), pp. 7–26. Available at: https://doi.org/10.1016/j.websem.2003.07.001.

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Peer Response

by Guilherme Pessoa-Amorim - Sunday, 13 July 2025, 4:05 PM

Georgios defines an ontology as a set of structural rules for representing concepts to perform logic-based operations, emphasizing its role in enhancing communication between systems and humans. He advocates for OWL2 as the most useful ontology language for WWW software agents, highlighting its rich class categories, enhanced functionalities, and compatibility with semantic web standards. Jaco reinforces this view by referencing Gruber's (1993) definition of ontologies as creating shared understanding and emphasizes OWL2's reasoning capabilities and seamless integration with other semantic web tools, particularly referencing Horrocks et al.'s (2003) work on how OWL2 builds upon earlier semantic web foundations.

While both posts correctly identify OWL2's strengths, they overlook important considerations regarding implementation challenges. Georgios focuses on OWL2's technical capabilities but doesn't address the practical complexity-expressivity tradeoff that Grau et al. (2008) identify as crucial for real-world applications. Jaco appropriately highlights OWL2's reasoning

capabilities but doesn't acknowledge that these come with computational costs that can impact scalability. Neither post addresses the ontology alignment challenge that Nasim (2022) identifies as fundamental to achieving interoperability across domains. As Antoniou and van Harmelen (2004) note, even with standardized languages like OWL2, differences in conceptualization across organizations create significant barriers to semantic interoperability. In sum, there is consensus that OWL2 has technical superiority for expressing ontologies on the WWW, but a more complete analysis would acknowledge the practical challenges of implementation and alignment. As Davis et al. (1993) argue, knowledge representation is fundamentally about creating a "surrogate" for reasoning about the world, and OWL2's formal structure enables this while supporting the machine learning approaches to ontology alignment that Nasim (2022) explores. The key insight missing from both posts is that while OWL2 provides the necessary expressivity and reasoning capabilities, its effective deployment requires careful consideration of computational efficiency, domain-specific requirements, and alignment strategies to bridge semantic heterogeneity across different ontologicalrepresentations.

References

Antoniou, G. and van Harmelen, F. (2004) A Semantic Web Primer. Cambridge: MIT Press.

Davis, R., Shrobe, H. and Szolovits, P. (1993) 'What is a knowledge representation?', AI magazine, 14(1), p. 17.

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Summary

by Georgios Papachristou - Monday, 14 July 2025, 4:51 AM

In my initial post, I presented Nesim's definition of ontology as "a set of structural rules designed to represent concepts in order to perform logic-based operations to retrieve or infer new information". Additionally, I argued that OWL2 is the most useful ontology language for WWW software agents presenting its benefits compared to other languages, such as its rich class categories and datatypes and automate reasoning.

As a response to my initial post, Jaco made a reference to Gruber's definition of ontologies as creating shared understanding and also highlighted the OWL's reasoning capabilities and its ability to support complex relationships.

Last but not least, Guilherme agreed on the fact that OWL2 is technically more advance than the other languages but he emphasised as well on the challenges of its application in real-world applications highlighting that differences in conceptualization across organizations create significant barriers to semantic interoperability.

To sup up, this discussion led to a conclusion that OWL2 is the most useful language for WWW software agents, considering though the practical complexities for real-world application.

References

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