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1.Describe the benefits that Linked Data could bring

Linked Data is sharable, extensible, and easily re-usable.

Linked Data supports multilingual functionality for data and user services, such as the labeling of concepts identified by language-agnostic URIs.

Linked Data allows anyone to contribute unique expertise in a form that can be reused and recombined with the expertise of others.

Linked Data technology can help organizations improve their internal data curation processes and maintain better links between.

To sum it up, Linked Data breaks down the information silos that exist between various formats and brings down the fences between various sources. It facilitates the extension of the data models and allows easy updates. As a result, data integration and browsing through complex data become easier and much more efficient.

In semantic graph databases, the linking of disparate sources and formats enables the [inference](https://www.ontotext.com/knowledgehub/fundamentals/what-is-inference/) of new knowledge out of existing facts. In this way, Linked Data empowers organizations to put their proprietary knowledge in the context of open-world knowledge and/or commercially specialized knowledge and enhances [cognitive and semantic technology innovation](https://www.ontotext.com/services/technology-innovation-consulting/).

2.The concept of Linked Data

Linked Data is defined as relationships or connections between data from different data sources such as databases and the Web. For the purpose of effective data management, [semantic annotation](https://www.sciencedirect.com/topics/computer-science/semantic-annotation) based on linked data provides a new issue in a massive, complex associated and contextual application scene. These associated and contextual data play a critical role for intelligent application

Linked data is a global initiative to publish and interlink structured data on the web using a clever combination of simple, standardized technologies, such as:

Uniform Resource Identifiers (URI) - To name things

Resource Description Framework (RDF) - To represent things

HTTP Infrastructure - to obtain those representations

It is also a community effort to publish open data sets as Linked Data on the Web (to which anyone can refer to).

It also involves developing clients that consume linked data from the web

A set of principles for linked data, formulated by Tim Berners Lee, are as follows:

Use URIs as names for things

Use HTTP URI’s so that either a person or an app can look up these names.

When someone or an app search for a URI, useful information is provided.

Links are included to other URI’s so they can discover more information

3.The concept of the Semantic Web

The Semantic Web is a vision about an extension of the existing World Wide Web, which provides software programs with machine-interpretable [metadata](https://www.ontotext.com/knowledgehub/fundamentals/metadata-fundamental/) of the published information and data. In other words, we add further data descriptors to otherwise existing content and data on the Web. As a result, computers are able to make meaningful interpretations similar to the way humans process information to achieve their goals.

In short, the semantic web is a ‘web of data’.

As of current, the web has made data available, by providing an infrastructure where data can be accessed and documents can be retrieved and represented.

However, there is no semantic interpretation of the data (i.e. understanding what the data means). As of current, documents are linked, but data itself isn’t.

Currently, we have a web of documents, whereby humans have developed for other humans, but the documents bear little meaning for machines, (the links between documents bore little meaning for machines).

Also, the documents have little structured information.

The semantic web aims to link data rather than documents, and to create a global database of information.

In the semantics web, there is a high degree of structure, with explicit semantics between links and documents.

In the semantic web, the collection of technologies provides an environment where applications can query that data, draw inferences using vocabularies, etc., which would provide a huge advantage for application developers.

4.The Semantic Web Stack

The Semantic Web Stack, also known as Semantic Web Cake or Semantic Web Layer Cake, illustrates the architecture of the [Semantic Web](https://en.wikipedia.org/wiki/Semantic_Web).

The Semantic Web Stack is an illustration of the hierarchy of languages, where each layer exploits and uses capabilities of the layers below. It shows how technologies that are standardized for [Semantic Web](https://en.wikipedia.org/wiki/Semantic_Web) are organized to make the Semantic Web possible. It also shows how Semantic Web is an extension (not replacement) of classical hypertext web.

The Semantic Web stack builds on the W3C's Resource Description Framework (RDF)

The Semantic Web Stack shows that Hypertext Web technologies, Standardized Semantic Web technologies, Unrealized Semantic Web technologies are used to create [Semantic Web](https://en.wikipedia.org/wiki/Semantic_Web).

5.In what way OWL builds on RDF and what benefits this brings

From slides:

OWL provides several other mechanisms for defining classes

• **equivalentClass** allows you to state that two classes are synonymous.

• disjointWith allows you to state that an instance of this class cannot be an instance

of another.

• **unionOf** allows you specify that a class contains things that are from more than one

class.

 • **intersectionOf** allows you to specify that a class contains things that are both in

one

and the other.

 • **complementOf** allows you specify that a class contains things that are not other

things

From internet:

RDFS allows you to express the relationships between things by standardizing on a flexible, triple-based format and then providing a comparatively smaller vocabulary (such as rdf:type or rdfs:subClassOf) which can be used to say things about concepts in your area(s) of interest.

OWL is similar, but bigger, better, and badder. OWL lets you say much more about your data model; it shows you how to work efficiently with database queries and automatic reasoners; and it provides useful annotations for bringing your data models into the real world.

* Vocabulary

Of the differences between RDFS and OWL, arguably the most important is just that OWL provides a much larger vocabulary.

* Logical Consistency

In contrast to RDFS, OWL tells you how you *can* and *cannot* use certain vocabulary. In other words, whereas RDFS provides no real constraint mechanisms, OWL does.

* Constraints and Computability

Unlike RDFS, OWL lets you decide how expressive you want to be, given the computational realities involved.

* Annotations, the meta-meta-data

OWL can easily use linked data models together into a mutually coherent network of ontologies.OWL is sure to satisfy all of the meta-meta-data-modeling needs.