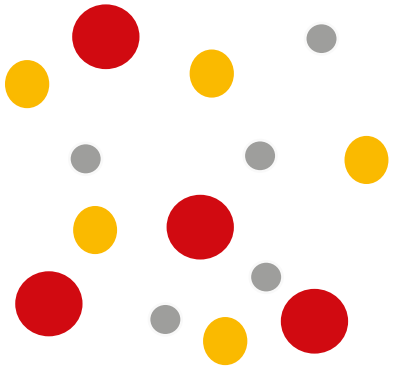
# JSON-LD

**J**ava**S**cript **O**bject **N**otation for **L**inked **D**ata

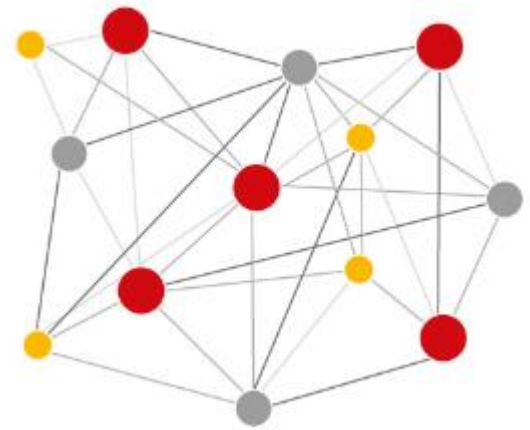
# Problem

collection of interrelated datasets on the Web

- How can we built a semantic web?



RDF (The Resource Description Framework) is a language for representing information about resources in the World Wide Web



Web 2.0
not linked data

context
RDF / JSON-LD

Web 3.0
linked open data

Next Slide

# What is JSON-LD?

- JSON-based syntax

→JSON-LD = „JavaScript Object Notation for Linked Data“

- JSON-LD is a concrete RDF syntax

**Important**: RDF = data model (Framework) | JSON-LD = serialization format

- RDF provides a framework of grammar (Syntax)
  - Using this grammar, RDF syntax can be written in various concrete formats which are called RDF serialization formats e.g. **JSON -LD**

# What is JSON-LD?

- JSON-LD combines JSON as data exchange format with RDF as data model framework
  - data is exchanged as simple JSON data, and a context record specifies how to convert the JSON data to RDF

# Example

main.c U  data.json U

data.json > ...

```
1  {
2      "name": "John Doe",
3      "age": 30,
4      "email": "john.doe@example.com"
5  }
```

## A Simple Example

```
{
  "@context": "https://json-ld.org/contexts/person.jsonld",
  "@id": "http://dbpedia.org/resource/John_Lennon",
  "name": "John Lennon",
  "born": "1940-10-09",
  "spouse": "http://dbpedia.org/resource/Cynthia_Lennon"
}
```

→JSON-LD can be used to annotate data so that it can be exchanged between web applications and web services and processed automatically

# Use Cases

| Application Category | RDF OR JSON-LD | Comments |
|---|---|---|
| Web API Application | JSON-LD | The syntax is designed to easily integrate into deployed systems that already use JSON, and provides a smooth upgrade path from JSON to JSON-LD |
| Browser based UI Application | JSON-LD | Huge amount of JSON based parsers, DOM manipulators, general purpose tools. Javascript is THE language for browser |
| Inference, Reasoning Based Application | RDF | Great support of reasoners and scalable triple stores |
| Expressive Query tools | RDF | Matured state of SPARQL 1.1 supporting property paths allows to write powerful and expressive query |
| Archive/Retrieval with RDBMS | JSON-LD | Great support of JSON base libraries |
| List Based Data Applications | RDF1.1 , JSON-LD | JSON-LD has built-in support for list as in JSON which was not available in RDF1.0. But with RDF1.1 rdf:List is an instance of rdfs:class |

# Embedding of JSON-LD in websites

```
<html>
  <head>
    <title>Party Coffee Cake</title>
    <script type="application/ld+json">
    {
      "@context": "https://schema.org/",
      "@type": "Recipe",
      "name": "Party Coffee Cake",
      "author": {
        "@type": "Person",
        "name": "Mary Stone"
      },
      "datePublished": "2018-03-10",
      "description": "This coffee cake is awesome and perfect for parties.",
      "prepTime": "PT20M"
    }
    </script>
  </head>
  <body>
    <h2>Party coffee cake recipe</h2>
    <p>
      <i>by Mary Stone, 2018-03-10</i>
    </p>
    <p>
      This coffee cake is awesome and perfect for parties.
    </p>
    <p>
      Preparation time: 20 minutes
    </p>
  </body>
</html>
```

- JSON-LD starts with:

“@context”: “https://schema.org/”

- Embedding in the head of a website / body also possible

- “@type”: “Article”
- The @type keyword specifies the type of type you are referring to. In this case, to an article.

# Advantages vs. Disadvantages of JSON-LD

| Advantages | Disadvantages |
| --- | --- |
| Easy to use - for users who are less familiar with the details of Linked Data technology or the use of inline markup (via RDFa or Microdata), they can be provided with JSON-LD templates that can be inserted as a single block of structured data within the <head> element of a web page. | because the it is more difficult for search engines to verify that the JSON-LD structured data is consistent with the visible human-readable information and that the JSON-LD block does not contain misleading information. |
| the single block of JSON-LD markup is decoupled from the human-readable HTML markup appearing in the <body> of the page, which means that if changes are made to the structure of the <body> section, there is much less risk of breaking or misconnecting the collection of RDF triples that can be extracted from the page. | because the single block of JSON-LD does not appear alongside the human-readable information, faceted browsers can not easily display contextual hyperlinks in close proximity to the annotated content, although overall, the same set of RDF triples is available in the page. |
| many companies already use JSON within their websites. Via the @context header of JSON-LD, any locally named properties / keys / predicates can be mapped to specific predicates in defined web vocabularies or ontologies, making the meanings of local names for properties globally unambiguous and also enabling the local structured data to be converted into RDF triples that can be exchanged with others, without ambiguity. | |

# Examples why use stuctured data on websites?

Rotten Tomatoes added structured data to 100,000 unique pages and measured a 25% higher click-through rate for pages enhanced with structured data, compared to pages without structured data.

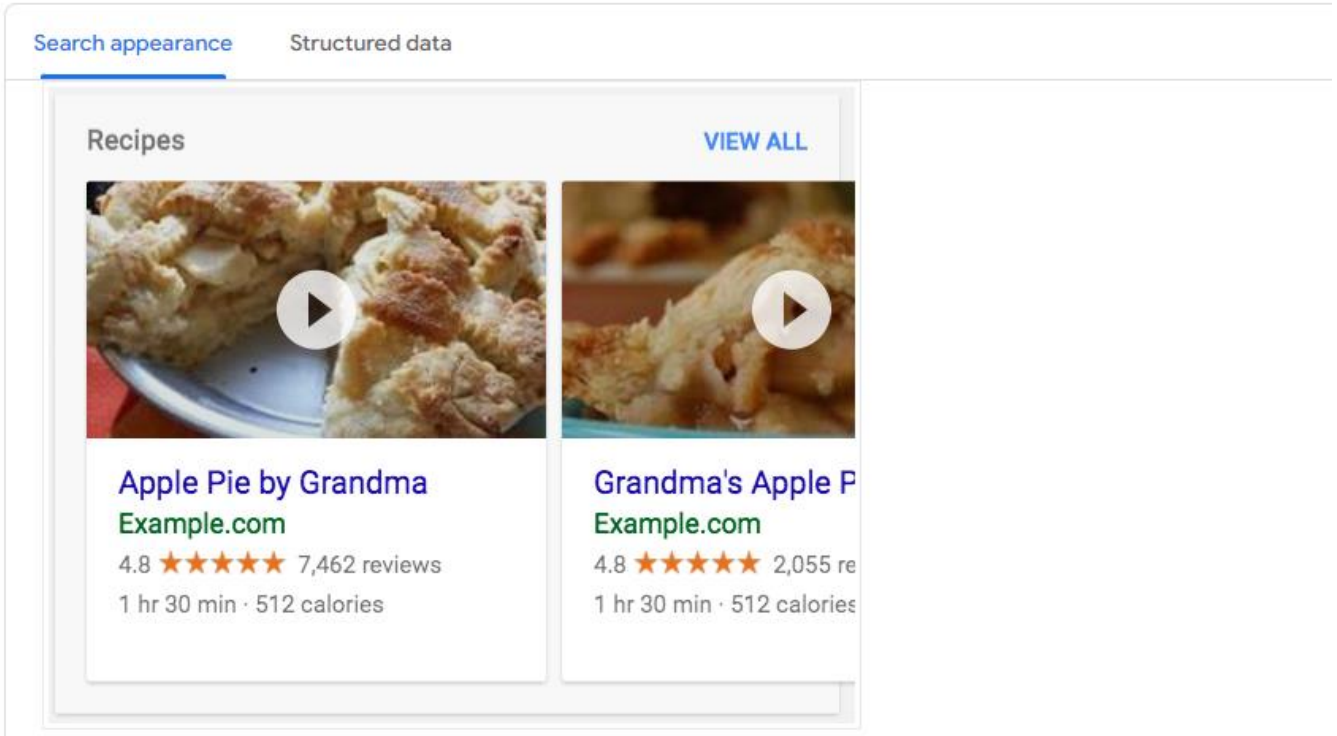
The Food Network has converted 80% of their pages to enable search features, and has seen a 35% increase in visits.

Rakuten has found that users spend 1.5x more time on pages that implemented structured data than on non-structured data pages, and have a 3.6x higher interaction rate on AMP pages with search features vs non-feature AMP pages.

Nestlé has measured pages that show as rich results in search have an 82% higher click through rate than non-rich result pages.

# Examples why use stuctured data on websites?

Google Search also uses structured data to enable special search result features and enhancements. For example, a recipe page with valid structured data is eligible to appear in a graphical search result, as shown here:



# Summary


- JSON-LD tries to stay as close as possible to the usual use of JSON as a data exchange format for web developers
- JSON-LD with its advantages is the most widely used format
  - Is preferred by google
- Adding structured data can enable search results that are more engaging to users and might encourage them to interact more with your website, which are called rich results

# Sources

- https://en.wikipedia.org/wiki/Linked_data
- https://json-ld.org/
- https://www.w3.org/2013/dwbp/wiki/RDF_AND_JSON-LD_UseCases
- https://www.omt.de/suchmaschinenoptimierung/json-ld/
- https://developers.google.com/search/docs/appearance/structured-data/intro-structured-data?hl=de