

# Introduction to Schema.org and JSON-LD



Jacob Shelby

# Goal of today's session

Learn about two key tools for increasing discoverability of information on the open web

- Schema.org
- Semantic Markup



**Schema.org**

# What is it?

Schema.org is a set of vocabularies for describing things in an interoperable and semantic way on the web.

# Historical Context

- Started in 2011 by Google, Yahoo, Bing
- Maintained by members of Google, Yahoo, Bing, Yandex
- Original scope was for businesses
- Community driven

# Purpose

- “[To] create and support a common set of schemas for structured data markup on web pages.”\*
- To make data on the web more meaningful to machines

\* <https://webmasters.googleblog.com/2011/06/introducing-schemaorg-search-engines.html>

## Item information

### Title:

Brothers of the Omega Psi Phi Fraternity in step routine

### Topics:

[Student Life](#)

### Subjects:

[African American fraternal organizations](#)

[College students -- Societies, etc.](#)

[Dance](#)

[Dogs](#)

[Fraternal organizations](#)

[Performances](#)

[Students -- Societies, etc.](#)

### Original Format:

[Black-and-white print \(photograph\)](#)

### Extent:

8 x 10 inches

### Item identifier:

0021721

### Photographer:

[Lodge, Rick](#) 

### Created Date:

1981-10-01

### Description:

Information from The Technician newspaper, dated October 7, 1981: Louis Cade [with dog] leads his Omega Psi Phi brothers in a step routine before 400 onlookers in front of the free expression tunnel.

### Genre:

[Photographs](#)

### Names:

[North Carolina State University -- Students](#) 

[Omega Psi Phi Fraternity](#) 

### Location:

[Raleigh \(N.C\)](#)

### Digital Project:

[University Archives Photographs](#)

Photograph

Person

Place



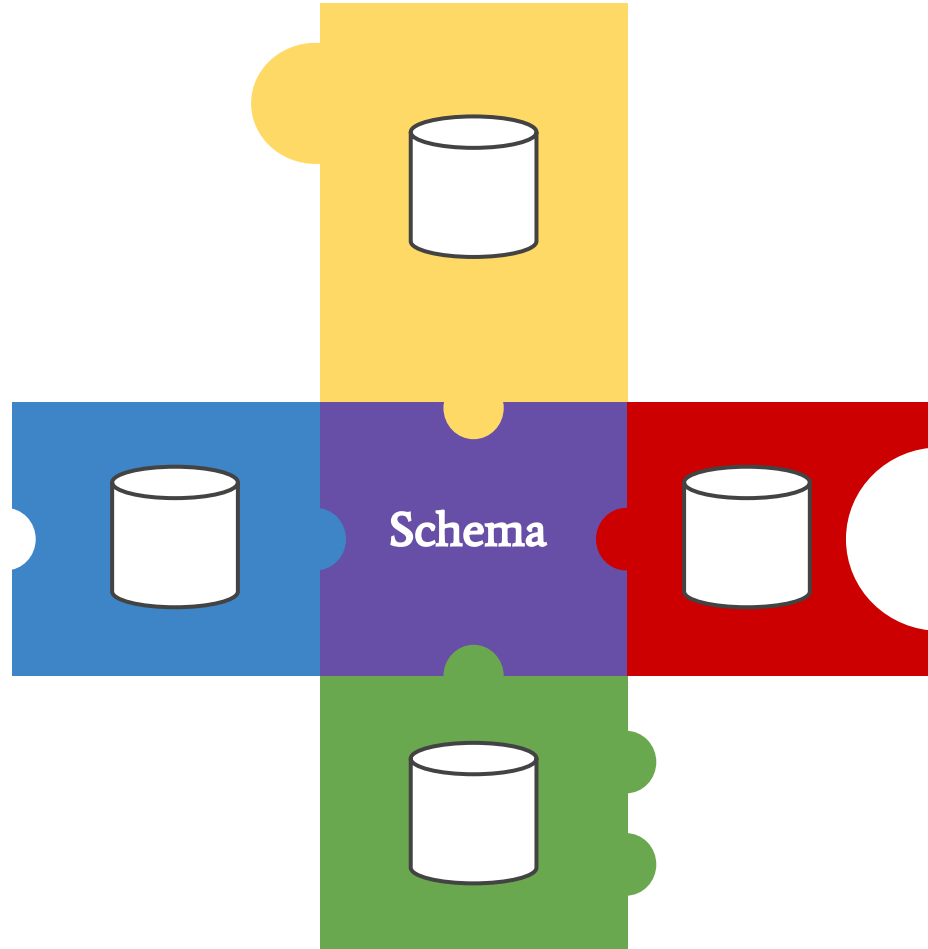
Image

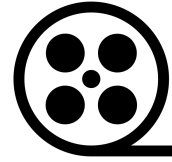


**Schema.org**

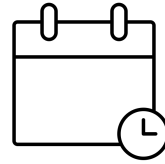
**follows linked  
data principles**







Created by Focus  
from Noun Project



Created by Rockicon  
from Noun Project



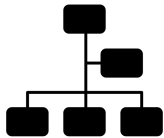
Created by Genke Icons  
from Noun Project



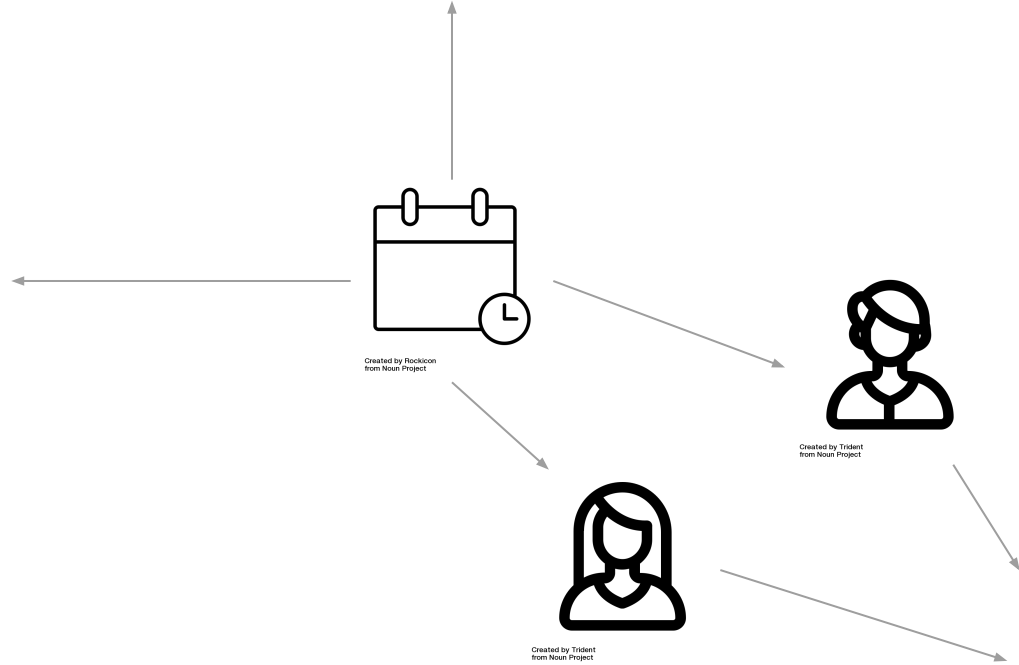
Created by Trisient  
from Noun Project



Created by Trisient  
from Noun Project



Created by Francisco Garcia Gallegos  
from Noun Project



Schema.org

# Recipe Example



scrambled eggs recipe



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About 12,300,000 results (0.73 seconds)

## Directions

1. BEAT eggs, milk, salt and pepper in medium bowl until blended.
2. HEAT butter in large nonstick skillet over medium heat until hot. POUR IN egg mixture. ...
3. CONTINUE cooking – pulling, lifting and folding eggs – until thickened and no visible liquid egg remains. Do not stir constantly.



www.seriouseats.com

Scrambled Eggs Recipe | Incredible Egg

<https://www.incredibleegg.org/recipe/basic-scrambled-eggs/>

About this result

Feedback

## People also ask

How do you make good scrambled eggs?

How do you make delicious scrambled eggs?

How do you make fluffy scrambled eggs?

How do you make soft scrambled eggs?

Feedback

Scrambled Eggs Recipe | Incredible Egg



<https://www.incredibleegg.org/recipe/basic-scrambled-eggs/>  
Directions. BEAT eggs, milk, salt and pepper in medium bowl until blended. HEAT butter in large nonstick skillet over medium heat until hot. POUR IN egg mixture. CONTINUE cooking – pulling, lifting and folding eggs – until thickened and no visible liquid egg remains. Do not stir constantly.

ITIONBLOGON THE FARMBACK TO SCHOOL

5mTOTAL TIME

1mPREP TIME

INGREDIENTS

NUTRITIONAL INFORMATION

4 EGGS

1/4 cup milk

salt and pepper, as desired

2 tsp. butter

Yields: 2 servings

DIRECTIONS

1 BEAT eggs, milk, salt and pepper in medium bowl until blended.

2 HEAT butter in large nonstick skillet over medium heat until hot. POUR IN egg mixture. As eggs begin to set, GENTLY PULL the eggs across the pan with a spatula, forming large soft curds.

3 CONTINUE cooking – pulling, lifting and folding eggs – until thickened and no visible liquid egg remains. Do not stir constantly. REMOVE from heat. SERVE immediately.

YOU MAY ALSO LIKE

Basic Scrambled Eggs Recipe

Microwave Eggs in a Cup: Coffee Cup Scramble

Scrambled Eggs in the Microwave

Bacon & Egg Breakfast Grilled Cheese Sandwich

MicrodataRDFaPOSH

Statement Collection #1

Entity

Attributes

rdf:type

Name

schema:image

<https://www.incredibleegg.org/recipe/basic-scrambled-eggs/>

schema:Recipe

Basic Scrambled Eggs Recipe

schema:totalTime

schema:prepTime

schema:cookTime

schema:ingredients

schema:ingredients

schema:ingredients

schema:ingredients

schema:recipeYield

schema:nutrition

PT5mM

PT1mM

PT4mM

EGGS

milk

salt and pepper, as desired

butter

2 servings

Per Serving: 2 large eggs Calories: 192 Total Fat: 14 g Saturated fat: 6 g Polyunsaturated fat: 2 g Monounsaturated fat: 5 g Cholesterol: 385 mg Sodium: 157 mg Carbohydrates: 2 g Dietary Fiber: 0 g Protein: 14 g Vitamin A: 716.2 IU Vitamin D: 99.8 IU Folate: 48.7 mcg Calcium: 93.7 mg Iron: 1.8 mg Choline: 267 mg

ver: 2.15.2 OpenLink Structured Data Sniffer

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<https://www.google.com/search?q=scrambled+eggs+recipe>

# Movie Example

Google

The Dark Tower

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About 48,600,000 results (0.81 seconds)

Showtimes for The Dark Tower

All times are in ET

Today

Tomorrow

Sat, Aug 26

Sun, Aug 27

All times

Morning

Afternoon

Evening

Night

Regal Crossroads Stadium 20 & IMAX - Map

11:40am 2:30pm 5:00pm 7:45pm 10:40pm

Regal North Hills Stadium 14 - Map

2:25pm 4:50pm 7:15pm

Cobb CinéBistro at Waverly Place - Map

3:00pm

More showtimes

The Dark Tower (2017) - IMDb

[www.imdb.com/title/tt1648190/](https://www.imdb.com/title/tt1648190/)

★ ★ ★ ★ ★ Rating: 6/10 - 17,803 votes

Action · The last Gunslinger, Roland Deschain, has been locked in an eternal battle with Walter O'Dim, also known as the Man in Black, determined to prevent ...

THE DARK TOWER - Official Trailer (HD) - YouTube

<https://www.youtube.com/watch?v=GjwfqXTebIY>

May 3, 2017 · Uploaded by Sony Pictures Entertainment









In a world full of superheroes, there's only one Gunslinger. From the epic best-selling novels by Stephen King ...

The Dark Tower (2017 film) - Wikipedia

[https://en.wikipedia.org/wiki/The\\_Dark\\_Tower\\_\(2017\\_film\)](https://en.wikipedia.org/wiki/The_Dark_Tower_(2017_film))

The Dark Tower is a 2017 American science fantasy western film directed and co-written by Nikolaj Arcel. A continuation of Stephen King's novel series of the ...

The Dark Tower (series) · Randall Flagg · Dennis Haysbert · Claudia Kim



More images

The Dark Tower

PG-13

2017 · Fantasy/Science fiction film · 1h 35m

Play trailer on YouTube

6/10 IMDb

16% Rotten Tomatoes

76% liked this movie

Google users

Roland Deschain (Idris Elba), the last Gunslinger, is locked in an eternal battle with Walter O'Dim (Matthew McConaughey), also known as the Man in Black. The Gunslinger must prevent the Man in Black from toppling the Dark Tower, the key that holds the universe together. With the fate of worlds at s...

MORE ▾

Release date:

July 31, 2017 (USA)

Director:

Nikolaj Arcel

Box office:

71.8 million USD

Adapted from:

The Dark Tower

Budget:

60 million USD

Critic reviews


View 2+ more

The thing about King is that his passion is always palpable, even when his material is second- or third-hand, whereas no one here seems to be having any fun. Full review

<https://www.google.com/search?q=The+Dark+Tower>


# THE DARK TOWER

OVERVIEW MOVIE TIMES + TICKETS SYNOPSIS MOVIE REVIEWS TRAILERS MORE ▾



Released  
**AUGUST 4, 2017**  
PG-13, 1 hr 35 min  
Horror  
Sci-Fi/Fantasy  
★★★★★  
3,021 Fan Ratings  
16%  
Rotten Tomatoes™

**TELL US WHERE YOU ARE**  
Looking for movie tickets? Enter your location to see which movie theaters are playing *The Dark Tower* near you.  
ENTER ZIP OR CITY, STATE  
City, State or Zip Code **GO**



```

Elements Console Sources Network Performance Memory Application Security Audits
<meta name="twitter:image:gradient" content="http://images.fandango.com/images/twzctcr/overcity.png">
<meta name="twitter:image:gradient:width" content="593">
<meta name="twitter:image:gradient:height" content="650"> == $0
...
<span itemprop="name" content="The Dark Tower">
  <meta itemprop="url" content="http://www.fandango.com/thedarktower_185723/movieoverview">
  <meta itemprop="image" content="https://images.fandango.com/r1.0.80/ImageRenderer/164/250/redesign/
static/img/default_poster.png/0/images/masterrepository/fandango/185723/
dt_dom_online_1sht_tsr.jpg">
  <meta itemprop="description" content="Gunslinger Roland Deschain roams an Old West-like landscape
in search of a dark tower, in the hopes that reaching it will preserve his dying world.">
  <meta itemprop="duration" content="PT1H35M">
  <meta itemprop="productionCompany" content="
  <meta itemprop="contentRating" content="PG-13">
  <meta itemprop="genre" content="Horror">
  <meta itemprop="genre" content="Sci-Fi/Fantasy">
  <meta itemprop="datePublished" content="2017-08-04">
  <!--Provide if this is a movie page -->
  <meta itemprop="typicalAgeRange" content">
  <span itemprop="director" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="actor" itemscope itemtype="http://schema.org/Person"></span>
  <span itemprop="trailer" itemscope itemtype="http://schema.org/VideoObject"></span>
  <span itemprop="aggregateRating" itemscope itemtype="http://schema.org/AggregateRating"></span>
</span>
<span itemprop="Trailer" itemscope itemtype="http://schema.org/VideoObject">
  <meta itemprop="name" content="The Dark Tower: International Trailer 2">
  <meta itemprop="description" content">
  <meta itemprop="url" content="http://www.fandango.com/movie-trailer/thedarktower:
internationaltrailer2-trailer/185723">
  <meta itemprop="image" content="https://images.fandango.com/r1.0.80/imagerelay/121/87/
statcdn.fandango.com%2fMPX%2fimage%2fNBCU_Fandango%2f168%2f910%2fthedarktower_internationaltrailer2
.jpg/image.jpg/redesign/static/img/noxSquare.jpg">
  <meta itemprop="duration" content="PT0H1M32S">
  <meta itemprop="contentUrl" content="http://link.theplatform.com/s/NWgeTC/media/joL_ZfSorSdb">
  <meta itemprop="embedUrl" content="https://www.fandango.com/videos/player?emb=user&w=620&rt=PG-
13&genre=Horror,Sci-Fi/Fantasy&title=The Dark Tower &mid=185723&h=349">
  <meta itemprop="description" content">
  <meta itemprop="thumbnailUrl" content="https://statcdn.fandango.com/MPX/image/NBCU_Fandango/168/
910/thedarktower_internationaltrailer2.jpg">
  <meta itemprop="uploadDate" content="2017-07-10">
</span>

```

[https://www.fandango.com/thedarktower\\_185723/movieoverview](https://www.fandango.com/thedarktower_185723/movieoverview)

what makes a supercomputer so super



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About 2,180,000 results (0.41 seconds)

### What makes a supercomputer so super? - Server Hardware ...

<https://community.spiceworks.com/.../1071051-what-makes-a-supercomputer-so-supe...>

Jul 16, 2015 - 25 posts - 21 authors

A **supercomputer** is just what its name suggests – a computer with ... Newegg reports that Tianhe-2 is "so powerful that it's able to perform ...

### People also ask

What is a super computer?



How much does it cost to build a supercomputer?



How does a super computer work?



What is the use of a supercomputer?



*Feedback*

### What Makes a Supercomputer so Super? | NCSU Libraries

<https://www.lib.ncsu.edu/events/what-makes-a-supercomputer-so-super>

**Supercomputers** play an important role in the field of computational science and are used for a wide range of computationally intensive tasks in various fields ranging from basic science to finance.

### Upcoming Events | What Makes a Supercomputer So Super? | College ...

<https://sciences.ncsu.edu/event/what-makes-a-supercomputer-so-super/>

**Supercomputers** play an important role in the field of computational science and are used for a wide range of computationally intensive tasks in various fields ranging from basic science to finance.

Tue, Nov 7 D.H. Hill Library, Multimedia Seminar Center

<https://www.google.com/search?q=what+makes+a+supercomputer+so+super>



# Montana State University Databases

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## American West: Sources from the Everett D. Graff Collection



### American West: Sources from the Everett D. Graff Collection

What is it? The Graff Collection from the Newberry Library in Chicago is a unique resource which will allow maps, ephemeral material and rare printed sources, this collection will act as a dynamic teaching and re

Why use it? To find primary documents relating to the history of the American West

Coverage: 1700s-mid 1900s

Access: Unlimited users. Available on networked computers on the MSU campus and via the proxy serve

Vendor: Adam Matthew

Learn more: Adam Matthew Digital

Subjects: Agriculture, History, Native American Studies

Liaison(s):

Linked Data Topics:

Agriculture  
History  
Primary source

RdFa POSH

Statement Collection #5

Entity [product](#)

Attributes

[rdf:type](#) [schema:Product](#)

[Name](#) "American West: Sources from the Everett D. Graff Collection"@en-US

[schema:image](#)

[schema:description](#) "The Graff Collection from the Newberry Library in Chicago is a unique resource which will allow scholars to explore many areas of history in the American West. Through a mixture of original manuscripts, maps, ephemeral material and rare printed sources, this collection will act as a dynamic teaching and research resource."@en-US

[schema:brand](#) "Adam Matthew"@en-US

[schema:manufacturer](#) "Adam Matthew"@en-US

[schema:category](#) "Agriculture, History, Native American Studies"@en-US

[schema:category](#) "Agriculture"@en-US

[schema:category](#) "History"@en-US

[schema:category](#) "Primary source"@en-US

[schema:additionalType](#) [dbpedia:Agriculture](#)

[schema:additionalType](#) <https://en.wikipedia.org/wiki/Agriculture>

[schema:additionalType](#) [dbpedia:History](#)

[schema:additionalType](#) <https://en.wikipedia.org/wiki/History>

[schema:additionalType](#) [dbpedia:Primary\\_source](#)

ver: 2.15.2 [OpenLink Structured Data Sniffer](#) Copyright © 2015-2017 [OpenLink Software](#)

<http://www.lib.montana.edu/resources/about/482>





American West: Sources from the Everett D. Graff Collection



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About 17,900 results (1.21 seconds)

## American West: Sources from the Everett D. Graff Collection : Montana ...

[www.lib.montana.edu](http://www.lib.montana.edu) > Resources ▼

★★★★★ Rating: 3.5 - 4,380 votes

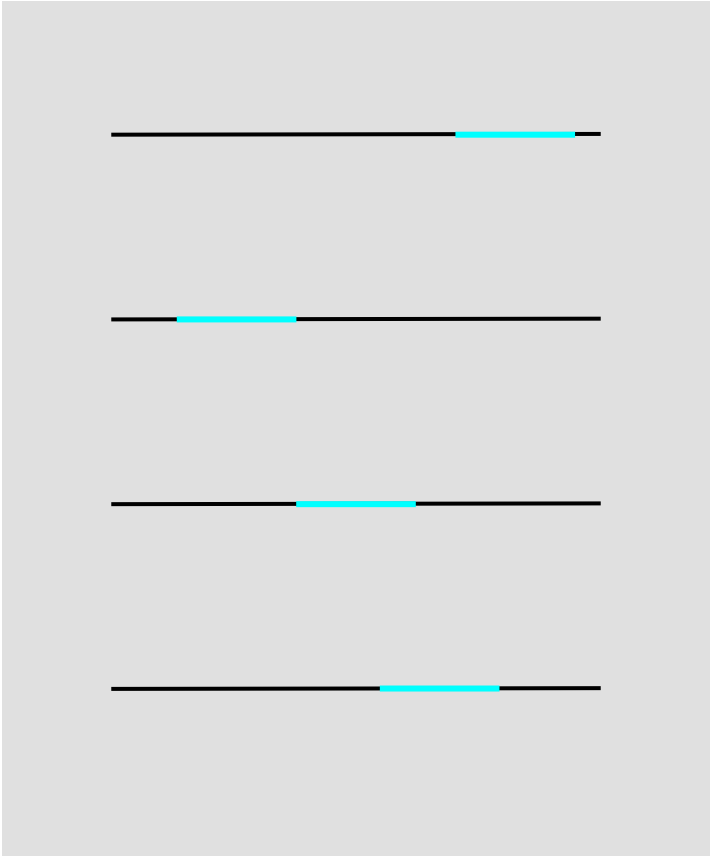
Aug 1, 2017 - The **Graff Collection** from the Newberry Library in Chicago is a unique resource which will allow scholars to explore many areas of history in the ...

# Usage by Big Engines

*[Schema.org: Evolution of Structured Data on the Web](#)*

*[Google - Introduction to Structured Data](#)*

# Semantic Markup



# Person Example: Without Markup

<p>George Bush, the 41st President of the United States is the father of George W. Bush, the 43rd President of the United States.</p>

<http://schema.org/Person>

# Person Example: Microdata Syntax

Example 4

Without Markup

**Microdata**

RDFa

JSON-LD

```
<div itemscope itemtype="http://schema.org/Person">
  <span itemprop="name">George Bush</span>, the
  <span itemprop="disambiguatingDescription">41st President of the United States</span>
  is the father of
  <div itemprop="children" itemscope itemtype="http://schema.org/Person">
    <span itemprop="name">George W. Bush</span>, the
    <span itemprop="disambiguatingDescription">43rd President of the United States</span>
  </div>
</div>
```

<http://schema.org/Person>

# Person Example: RDFa (Lite) Syntax

Example 4

Without Markup

Microdata

**RDFa**

JSON-LD

```
<div vocab="http://schema.org/" typeof="Person">
  <span property="name">George Bush</span>, the
  <span property="disambiguatingDescription">41st President of the United States</span>
  is the father of
  <div property="children" typeof="Person">
    <span property="name">George W. Bush</span>, the
    <span property="disambiguatingDescription">43rd President of the United States</span>
  </div>
</div>
```

<http://schema.org/Person>

# Person Example: JSON-LD Syntax

Example 4

Without Markup

Microdata

RDFa

**JSON-LD**

```
<script type="application/ld+json">
{
  "@context": "http://schema.org",
  "@type": "Person",
  "name": "George Bush",
  "disambiguatingDescription": "41st President of the United States",
  "children": {
    "@type": "Person",
    "name": "George W. Bush",
    "disambiguatingDescription": "43rd President of the United States"
  }
}
</script>
```

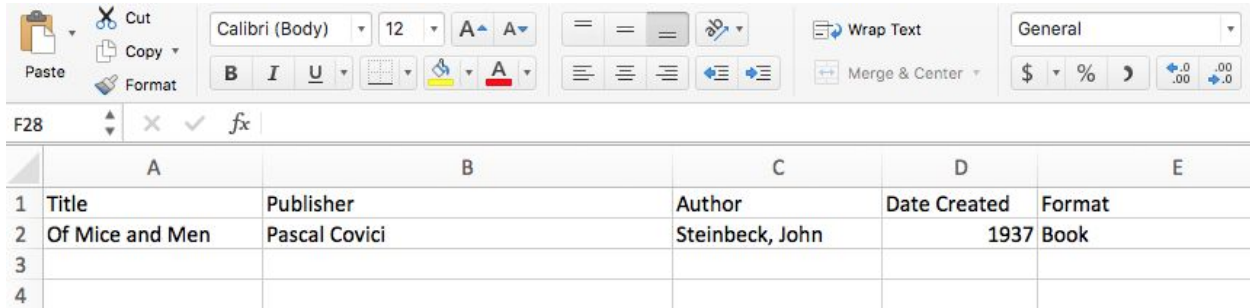
<http://schema.org/Person>



# JSON Basics

- JavaScript Object Notation is a data format
- Based on a subset of the JavaScript Programming Language
- Text based and language independent

# JSON Example



The screenshot shows the Microsoft Excel interface. The ribbon at the top includes the 'Home' tab with options for Paste, Cut, Copy, Format, and various text and alignment tools. The formula bar shows 'F28'. The main area displays a table with the following data:

	A	B	C	D	E
1	Title	Publisher	Author	Date Created	Format
2	Of Mice and Men	Pascal Covici	Steinbeck, John	1937	Book
3					
4					

```
1  {
2    "Title": "Of Mice and Men",
3    "Publisher": "Pascal Covici",
4    "Author": "Steinbeck, John",
5    "DateCreated": "1937",
6    "Format": "Book"
7  }
```

# JSON-LD Extension

- Lightweight linked data format
- Extends JSON
- [JSON-LD homepage](#)

# Describing a Painting

with [schema.org](https://schema.org) in JSON-LD

# JSON

{ }

# JSON-LD

```
{  
  "@context": "http://schema.org",  
  "@type": "Painting"  
}
```

<http://schema.org/docs/jsonldcontext.json>

# JSON-LD with Properties

```
{  
  "@context": "http://schema.org",  
  "@type": "Painting",  
  "name": "The Scream",  
  "url": "https://en.wikipedia.org/wiki/The_Scream",  
  "creator":  
}
```

# Nested Properties

creator

Organization or  
Person

The **creator**/author of this CreativeWork. This is the same as the Author property for CreativeWork.



# JSON-LD with Nesting

```
{
  "@context": "http://schema.org",
  "@type": "Painting",
  "name": "The Scream",
  "url": "https://en.wikipedia.org/wiki/The_Scream",
  "creator": {
    "@type": "Person",
    "name": "Edvard Munch",
    "sameAs": "https://en.wikipedia.org/wiki/Edvard_Munch"
  }
}
```



#### Attribution

Student life. African American students (UA023.025.012), Special Collections Research Center at NCSU Libraries



Full Screen



Contact us about this resource

## Item information

### Title:

Going Places: Students walking by the Bell Tower

```

<!DOCTYPE html> == $0
<html lang="en" class="js flexbox flexboxlegacy canvas canvastext webgl no-touch geolocation postmessage websqlindex db hashchange history draganddrop websockets rgba hsla multiplebgs backgroundsized borderimage borderradius boxshadow textshadow opacity cssanimations csscolumns cssgradients cssreflections csstransforms csstransforms3d csstransitions fontface generatedcontent video audio localstorage sessionstorage webworkers applicationcache svg inlinesvg smil svgclippaths no-ipad no-iphone no-ipod no-appleios">
  <head>...</head>
  <body class="blacklight-catalog blacklight-catalog-show home-text asset_type_still-image">
    <header id="top-header">...</header>
    <!-- /container -->
    <div id="main-container" class="container">
      ::before
      <!-- /Top bar -->
      <div class="row">...</div>
      <div class="row">
        ::before
        <main id="content" class="col-xs-12 show-document">...</main>
        <script type="application/ld+json">
          {
            "@context": "http://schema.org",
            "@type": "CreativeWork",
            "@id": "https://d.lib.ncsu.edu/collections/catalog/0227879",
            "url": "https://d.lib.ncsu.edu/collections/catalog/0227879",
            "name": "Going Places: Students walking by the Bell Tower",
            "thumbnailUrl": "https://iiif.lib.ncsu.edu/iiif/0227879/full/350,/0/default.jpg",
            "image": "https://iiif.lib.ncsu.edu/iiif/0227879/full/350,/0/default.jpg",
            "dateCreated": "1970",
            "about": [
              {
                "@type": "Thing",
                "name": "Universities and colleges",
                "@type": "Thing",
                "name": "Students",
                "@type": "Thing",
                "name": "African American students",
                "@type": "Thing",
                "name": "African Americans -- History",
                "@type": "Thing",
                "name": "Student Life",
                "@type": "Thing",
                "name": "People",
                "@type": "Organization",
                "name": "North Carolina State University",
                "description": "Established by the N.C. General Assembly in 1887 as a Land Grant college in Raleigh, NC, the University now has the largest student body of the 17 campuses comprising the University of North Carolina system and is the largest institution of higher learning in the state.",
                "@type": "Organization",
                "name": "North Carolina State University -- Students",
                "@type": "Organization",
                "keywords": [
                  "Universities and colleges",
                  "Students",
                  "African American students",
                  "African Americans -- History",
                  "Student Life",
                  "People"
                ],
                "genre": [
                  "Photographs"
                ],
                "inLanguage": [
                  "eng"
                ],
                "isPartOf": [
                  "https://d.lib.ncsu.edu/collections/catalog?f%5Bispartof_facet%5D%5B%5D=University+Archives+Photographs",
                  "contentLocation": [
                    {
                      "@type": "Place",
                      "name": "North Carolina State University, Memorial Belltower -- Memorial Tower (Raleigh, Wake County, North Carolina)",
                      "alternateName": "NCSU Memorial Belltower (Raleigh, N.C.)",
                      "description": null,
                      "address": {
                        "@type": "PostalAddress",
                        "addressLocality": "2701 Sullivan Drive",
                        "addressRegion": "North Carolina",
                        "postalCode": "27607",
                        "geo": {
                          "@type": "GeoCoordinates",
                          "latitude": "35.786098",
                          "longitude": "-78.663498"
                        },
                        "@type": "Place",
                        "name": "Raleigh (N.C.)",
                        "geo": {
                          "@type": "GeoCoordinates",
                          "latitude": "35.7719",
                          "longitude": "-78.6389"
                        }
                      }
                    }
                  ]
                }
              }
            ]
          }
        </script>
        ::after
      </div>
      ::after
    </div>
    <!-- /main -->
    <div id="ajax-modal" class="modal" tabindex="-1" role="dialog" aria-labelledby="modal_menu" aria-
  </div>
</body>
</html>

```

Image from <https://d.lib.ncsu.edu/collections/catalog/0227879>

**Now to apply what we've learned**

# Activity Instructions

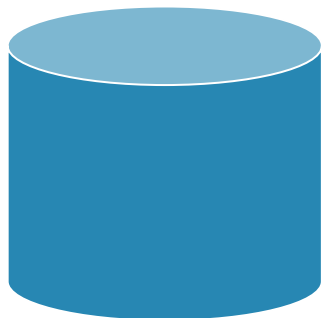
1. Download materials from GitHub
  - a. <https://github.com/eightBitter/lita-schema-2017>
2. Pick a recipe or event
  - a. Recipe: <http://allrecipes.com>
  - b. Event: <http://www.eventbrite.com>
3. Look up the schema.org type
  - a. Recipe: <http://schema.org/Recipe>
  - b. Event: <http://schema.org/Event>
4. Based on the recipe/event you selected, create basic JSON-LD using examples
5. Validate data and see the rich snippet it creates (use "code snippet"):
  - a. <https://search.google.com/structured-data/testing-tool>
6. Help:
  - a. <https://developers.google.com/search/docs/data-types/recipes>
  - b. <https://developers.google.com/search/docs/data-types/events>

**What Now?**

# Publishing Workflow

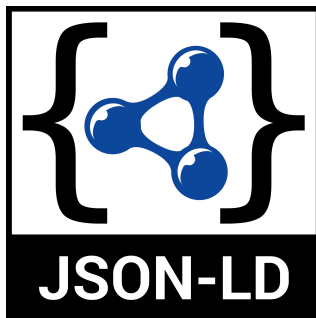
## Extract

- Data from source



## Transform

- Data into schema.org + semantic markup



## Load

- Transformed data into HTML documents



# Questions?

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