

# Wikidata: A Collaborative Knowledge Base

# What is Wikidata?

Wikidata is a free, collaborative, multilingual knowledge base that can be read and edited by both humans and machines. Think of it as Wikipedia's structured data counterpart - while Wikipedia provides articles for humans to read, Wikidata provides structured data that computers can process.

## Key Features:

- **Free and Open:** Anyone can access and contribute
- **Multilingual:** Labels and descriptions in 300+ languages
- **Machine-readable:** Structured data using semantic web standards
- **Collaborative:** Community-driven like Wikipedia
- **Linked Data:** Connects to other knowledge bases

# Why Wikidata Matters

## Before Wikidata

Wikipedia Article (Human-readable text):  
"Douglas Adams was an English writer, born in 1952.  
He wrote The Hitchhiker's Guide to the Galaxy."

**Problem:** Computers can't easily extract or query this information.

## After Wikidata

Structured Data (Machine-readable):

Douglas Adams (Q42)

- instance of: human (Q5)
- occupation: writer (Q36180)
- date of birth: 1952-03-11
- country: United Kingdom (Q145)
- notable work: The Hitchhiker's Guide to the Galaxy (Q3107329)

**Benefit:** Computers can query "Show me all British writers born in 1952" instantly!

# Core Concepts

## 1. Entities

Every "thing" in Wikidata has a unique identifier called a **Q-number**.

**Examples:**

- Q42 = Douglas Adams
- Q5 = Human
- Q145 = United Kingdom
- Q36180 = Writer
- Q1299 = The Beatles

## Why Q-numbers?

- Language-independent (Q42 is the same in all languages)
- Unique and permanent (won't change even if the name changes)
- Easy for computers to process

## 2. Properties

Properties define relationships between entities. They use **P-numbers**.

**Common Properties:**

- P31 = instance of (what type of thing is it?)
- P106 = occupation (what does this person do?)
- P569 = date of birth (when were they born?)
- P570 = date of death (when did they die?)
- P27 = country of citizenship
- P50 = author (of a book)
- P800 = notable work

### 3. Statements (Triples)

Knowledge in Wikidata is expressed as **statements** in the form:

Subject – Property – Value

## Example:

Subject	Property	Value
Douglas Adams (Q42)	occupation (P106)	writer (Q36180)
Douglas Adams (Q42)	date of birth (P569)	1952-03-11
Douglas Adams (Q42)	country (P27)	United Kingdom (Q145)

This is called the **RDF triple** structure:

- **Subject:** What we're talking about
- **Predicate:** The relationship/property
- **Object:** The value

# Simple Example: Modeling a Sentence

Let's model: "Douglas Adams was an English writer, born in 1952."

## Step 1: Identify Entities

- Douglas Adams → Q42
- Writer → Q36180
- United Kingdom → Q145

## Step 2: Identify Properties

- "was a writer" → P106 (occupation)
- "born in 1952" → P569 (date of birth)
- "English" → P27 (country of citizenship)

## Step 3: Create Statements

Q42 --P31--> Q5

Q42 --P106--> Q36180

Q42 --P569--> "1952-03-11"

Q42 --P27--> Q145

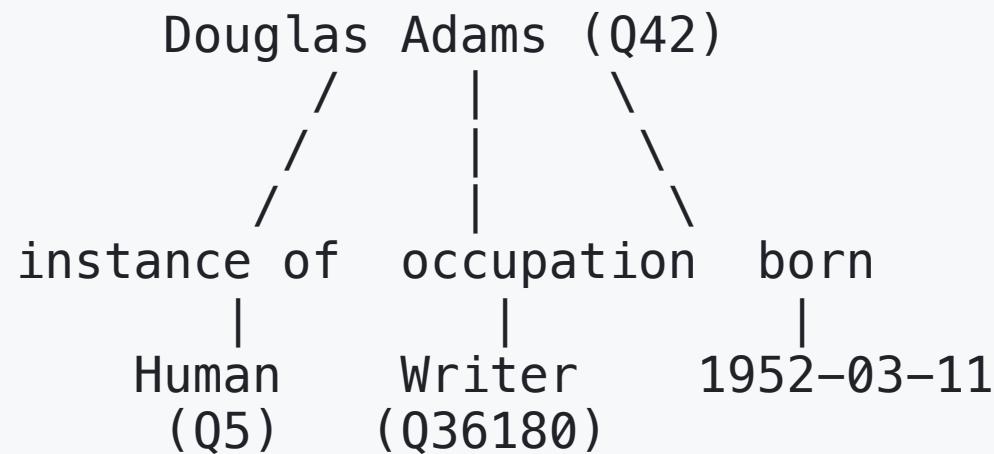
(Douglas Adams is a human)

(Douglas Adams's occupation is writer)

(Douglas Adams was born on March 11, 1952)

(Douglas Adams's country is United Kingdom)

## Visual Representation



# Querying Wikidata with SPARQL

SPARQL is the query language for RDF data (like SQL for databases).

## Example 1: Basic Query

Question: What is Douglas Adams's birth date?

```
SELECT ?birthDate
WHERE {
    wd:Q42 wdt:P569 ?birthDate .
}
```

Result: 1952-03-11

## Explanation:

- wd:Q42 = Douglas Adams
- wdt:P569 = date of birth property
- ?birthDate = variable to store the result

## Example 2: Get Labels

Question: What are Douglas Adams's occupations (in English)?

```
SELECT ?occupation ?occupationLabel
WHERE {
    wd:Q42 wdt:P106 ?occupation .

    SERVICE wikibase:label {
        bd:serviceParam wikibase:language "en" .
    }
}
```

Result:

```
writer
novelist
screenwriter
science fiction writer
```

## Example 3: Find Related People

Question: Who are other British science fiction writers?

```
SELECT ?person ?personLabel
WHERE {
    ?person wdt:P106 wd:Q36180 .          # occupation: writer
    ?person wdt:P136 wd:Q24925 .          # genre: science fiction
    ?person wdt:P27 wd:Q145 .              # country: United Kingdom

    SERVICE wikibase:label {
        bd:serviceParam wikibase:language "en" .
    }
}
LIMIT 10
```

# Hands-On: Exploring Wikidata

Try These URLs:

1. **Douglas Adams Page:** <https://www.wikidata.org/wiki/Q42>

- See all statements about him
- Notice the Q-numbers and P-numbers

2. **Query Service:** <https://query.wikidata.org/>

- Try example queries
- Build your own queries

3. **Search for Entities:** <https://www.wikidata.org/>

- Search for your favorite person, place, or thing
- Note their Q-number

# Real-World Applications

## 1. Digital Assistants

"Alexa, when was Douglas Adams born?"

→ Queries Wikidata: Q42 –P569–> ?

## 2. Knowledge Graphs

Google's Knowledge Panel uses Wikidata to show information boxes.

## 3. Data Integration

Connect data from different sources using common Wikidata identifiers.

## **4. Multilingual Applications**

One query returns information in any language.

## **5. Research**

Scientists use Wikidata for bibliometrics, social network analysis, etc.

# Comparison: Traditional Database vs. Wikidata

## Traditional Database (Relational)

TABLE: people

id	name	birth_date	occupation	country
1	Douglas Adams	1952-03-11	writer	UK

```
SELECT name, birth_date  
FROM people  
WHERE occupation = 'writer' AND country = 'UK';
```

## Limitations:

- Fixed schema (can't easily add new properties)
- Not linked to other data
- Language-dependent

## Wikidata (Graph)

```
SELECT ?person ?personLabel ?birthDate
WHERE {
  ?person wdt:P106 wd:Q36180 .      # occupation: writer
  ?person wdt:P27 wd:Q145 .          # country: UK
  ?person wdt:P569 ?birthDate .     # get birth date

  SERVICE wikibase:label { bd:serviceParam wikibase:language "en" . }
}
```

### Benefits:

- Flexible schema (easily add new properties)
- Linked to millions of entities
- Multilingual by design
- Semantic relationships

# Key Takeaways

1. **Wikidata = Structured Wikipedia:** Machine-readable knowledge base
2. **Q-numbers = Entities:** Things in the world (people, places, concepts)
3. **P-numbers = Properties:** Relationships between entities
4. **RDF Triples:** Subject-Predicate-Object structure
5. **SPARQL:** Query language for semantic data
6. **Linked Data:** Everything is connected through URIs

# Common Wikidata Properties

Property	P-number	Use	Example
instance of	P31	Type of entity	Q42 P31 Q5 (human)
occupation	P106	Person's job	Q42 P106 Q36180 (writer)
date of birth	P569	Birth date	Q42 P569 1952-03-11
date of death	P570	Death date	Q42 P570 2001-05-11
country	P27	Citizenship	Q42 P27 Q145 (UK)
author	P50	Book author	Q3107329 P50 Q42
notable work	P800	Important creation	Q42 P800 Q3107329
educated at	P69	University	Q42 P69 Q35794