

# Writing Wikidata queries with the Wikidata Query Service

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Wikidata

30 August 2022

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Outline

SWT2022

Mahir256

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

## Introduction

### What is Wikidata?

# Waxing poetic about Wikidata

(or, what it is besides the free knowledge base that anyone can edit)

- ▶ It is where one models the world as the sum of its parts.
- ▶ It is where links are bricks and objects are mortar.
- ▶ It is where past and present, large and small, all stand equal.
- ▶ It is where the whole world may learn to gather facts,
- ▶ and where the whole world may gather to learn facts.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# “It is where one models the world as the sum of its parts.”

Expanding on the poem, part 1

- ▶ A governorate (Q213189)
- ▶ One district within (Q12233160)
- ▶ A city within that district (Q132754)
- ▶ A page on Wikisource about the city (Q100596812)
- ▶ The volume in which the page is included (Q23857533)
- ▶ The encyclopedia of which the volume is a part (Q2041543)
- ▶ ...

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# “It is where links are bricks and objects are mortar.”

Expanding on the poem, part 2

- ▶ A school in Indonesia (Q31779923)
- ▶ A school in West Bengal (Q73787425)
- ▶ A train station in Argentina (Q97167929)
- ▶ A train station in Great Britain (Q3088356)
- ▶ A park in Calcutta (Q90221263)
- ▶ A park in New York City (Q2582732)

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

”It is where past and present, large and small, all stand equal.”

Expanding on the poem, part 3

- ▶ 2999 BC (Q15698423)
- ▶ 2999 (Q29976875)
- ▶ Our galactic supercluster (Q17863945)
- ▶ A specific bone on one’s finger (Q724555)
- ▶ A previous president of Iraq (Q57306)
- ▶ My grandfather! (Q62513493)
- ▶ ...

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# ”It is where the whole world may learn to gather facts,”

Expanding on the poem, part 4

- ▶ the page `[[Wikidata:Project chat]]`
- ▶ the page `[[Help:Modelling]]`
- ▶ the page `[[Wikidata:Request a query]]`
- ▶ WikiProjects
- ▶ Database reports
- ▶ Property talk pages
- ▶ ...

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# ”and where the whole world may gather to learn facts.”

Expanding on the poem, part 5

- ▶ Reasonator!
- ▶ Konzept!
- ▶ Ringgaard!
- ▶ ...

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End



# Outline

SWT2022

Mahir256

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

## Basic queries

Probing items

Probing sitelinks

Filtering languages

Probing statements

# Simple statements

**wd:Qxxx, wdt:Pxxx**

```
1 SELECT ?i {  
2 ?i wdt:P31 wdt:Q32815.  
3 }
```

**Listing:** Query returning all items that are instances of (P31) mosques (Q32815).

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Labels

`rdfs:label`

```
1 SELECT ?i ?iLabel {  
2   ?i wdt:P31 wd:Q32815.  
3   ?i rdfs:label ?iLabel.  
4 }
```

**Listing:** Query returning all items that are instances of mosques and their labels (`?iLabel`) in various languages.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Descriptions

`schema:description`

```
1 SELECT ?i ?iDescription {  
2   ?i wdt:P31 wd:Q32815.  
3   ?i schema:description ?iDescription.  
4 }
```

**Listing:** Query returning all items that are instances of mosques and their descriptions (`?iDescription`) in various languages.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Aliases

**skos:altLabel**

```
1 SELECT ?i ?iAltLabel {  
2 ?i wdt:P31 wd:Q32815 ; skos:altLabel ?iAltLabel.  
3 }
```

**Listing:** Query returning all items that are instances of mosques and their aliases (?iAltLabel) in various languages.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Accessing sitelinks

`schema:about`, `schema:name`

```
1 SELECT ?i ?sitelink ?name {  
2   ?i wdt:P31 wd:Q32815.  
3   ?sitelink schema:about ?i ; schema:name ?name.  
4 }
```

**Listing:** Query returning all items that are instances of mosques and sitelinks on that item (?sitelink) to various wikis.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Languages

`schema:isPartOf`, `schema:inLanguage`

```
1 SELECT ?i ?sitelink ?site ?langcode {  
2 ?i wdt:P31 wd:Q32815.  
3 ?sitelink schema:about ?i;  
4   schema:isPartOf ?site;  
5   schema:inLanguage ?langcode.  
6 }
```

**Listing:** Query returning all items that are instances of mosques, sitelinks on that item to various wikis, main pages (?site) of those wikis, and codes (?langcode) representing the languages of those wikis.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Badges

wikibase:badge

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

```
1 SELECT ?i ?badge {  
2   ?i wdt:P31 wd:Q32815.  
3   ?sitelink schema:about ?i;  
4     wikibase:badge ?badge.  
5 }
```

**Listing:** Query returning all items that are instances of mosques, sitelinks on that item to various wikis, and badges (?badge) if present on those sitelinks.



# Direct language filtration

**FILTER()**, **LANG()**, **LANGMATCHES()**

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

```
1 SELECT ?i ?iLabel {  
2   ?i wdt:P31 wd:Q32815; rdfs:label ?iLabel.  
3   FILTER(LANGMATCHES(LANG(?iLabel),"ckb"))  
4 }
```

**Listing:** Query returning all items that are instances of mosques and have Sorani labels on those items, showing those Sorani labels.

# Indirect language filtration

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

```
1 SELECT ?i ?iLabel {  
2 ?i wdt:P31 wd:Q32815.  
3 SERVICE wikibase:label {  
4 bd:serviceParam wikibase:language "ckb,ku".  
5 }  
6 }
```

**Listing:** Query returning all items that are instances of mosques. The Sorani label is returned for `?iLabel` if available, or in Kurmanji if Sorani is not available; if neither language is available, the Qid of the item is returned.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# The raw statement

ps:Pxxx

```
1 SELECT ?i ?statement ?station {  
2 ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q43 ;  
3 p:P197 ?statement.  
4 ?statement ps:P197 ?station.  
5 }
```

**Listing:** Query returning all adjacent station (P197) statements (?statement) and their values (?station) on items with instance of railway station (Q55488) and country (P17) Turkey (Q43).

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Qualifiers

pq:Pxxx

```
1 SELECT ?i ?statement ?station ?line {  
2   ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q43 ;  
3   p:P197 ?statement.  
4   ?statement ps:P197 ?station ; pq:P81 ?line.  
5 }
```

**Listing:** Query returning all adjacent station statements and their values, along with the lines (?line) connecting ?i and ?station, on items with instance of railway station and country Turkey.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# References

**prov:wasDerivedFrom, pr:Pxxx**

```
1 SELECT ?i ?station ?ref ?url {  
2 ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q43 ;  
3 p:P197 [ ps:P197 ?station ; prov:wasDerivedFrom ?ref ].  
4 ?ref pr:P854 ?url.  
5 }
```

**Listing:** Query returning adjacent station statement values on items with instance of railway station and country Turkey, along with references on those statements and reference URLs (P854) within those references if present.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Ranks

wikibase:rank

```
1 SELECT ?pop ?time ?rank {  
2   wd:Q43 p:P1082 [  
3   ps:P1082 ?pop ; pq:P585 ?time ; wikibase:rank ?rank  
4   ] .  
5 }
```

**Listing:** Query returning all population values (**?pop**) for Turkey, the times (**?time**) to which they apply, and the rank (**?rank**) of each population statement.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

And now for some ad-lib property paths!

## Enhancing your queries

Controlling results

Manipulating results

### Intro

Sentiments

### Basics

Items

Sitelinks

Languages

Statements

### Enhancements

Controls

Manipulation

### Visuals

Charts

Trees

Images

### MWAPI

### End



# Loosen requirements

## OPTIONAL

```
1 SELECT ?i ?statement ?station ?located_in {  
2 ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q668 ;  
3 p:P197 ?statement.  
4 OPTIONAL { ?i wdt:P131 ?located_in }  
5 ?statement ps:P197 ?station.  
6 }
```

**Listing:** Query returning all adjacent station statements and their values on items with instance of railway station and country India, along with the administrative division (**?located\_in**) that they are located in, if present on the item for the station **?i**.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Providing alternatives

## UNION

```
1 SELECT ?i ?statement ?station {  
2   ?i wdt:P31 wd:Q55488 ;  
3   p:P197 ?statement.  
4   { ?i wdt:P17 wd:Q668 }  
5 UNION { ?i wdt:P17 wd:Q843 }  
6 UNION { ?i wdt:P17 wd:Q902 }  
7 ?statement ps:P197 ?station.  
8 }
```

**Listing:** Query returning all adjacent station statements and their values on items with instance of railway station and country (one of three possible options).

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Requiring absence

## MINUS

```
1 SELECT ?i ?iLabel {  
2   ?i wdt:P31 wd:Q842402.  
3   MINUS { ?i wdt:P17 wd:Q668 }  
4   SERVICE wikibase:label {  
5     bd:serviceParam wikibase:language "bn,en".  
6   }  
7 }
```

Listing: Query returning a list of Hindu temples *without* country India.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Eliminate duplicates

## SELECT DISTINCT

```
1 SELECT DISTINCT ?i ?iLabel {  
2 ?i wdt:P40/wdt:P39/wdt:P279* wd:Q16556694.  
3 SERVICE wikibase:label {  
4 bd:serviceParam wikibase:language "bn,en".  
5 }  
6 }
```

**Listing:** Query returning a list of people at least one of whose children was at one point a member of the Lok Sabha.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Sorting by a column

**ORDER BY, ASC(), DESC()**

```
1 SELECT ?pop ?time ?rank {  
2 wd:Q668 p:P1082 [  
3 ps:P1082 ?pop ; pq:P585 ?time ; wikibase:rank ?rank  
4 ].  
5 }  
6 ORDER BY DESC(?time)
```

**Listing:** Query returning all population values for India, the times to which they apply, and the rank of each population statement, sorted backwards in time.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Time extraction

NOW, YEAR, MONTH, DAY

```

1 SELECT ?i ?iLabel ?pos ?posLabel ?img ?start ?end {
2   ?i p:P39 ?pstmt .
3   ?pstmt ps:P39 ?pos ; pq:P580 ?start.
4   OPTIONAL { ?pstmt pq:P582 ?end }
5   OPTIONAL { ?i wdt:P18 ?img }
6   ?pos wdt:P279 wd:Q3537705.
7   FILTER((YEAR(?start) <= 1977) && (YEAR(?end) >= 1977))
8   SERVICE wikibase:label {
9     bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
10  }
11 }

```

**Listing:** Query listing people who were governors of states/union territories of India at any point during the year 1977.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Aggregation

**GROUP BY**; COUNT, MIN, MAX, ...

```
1 select ?year (count(?amdt) as ?amdt) where {  
2 ?amdt p:P31 ?p31 ; wdt:P7589 ?time . BIND(YEAR(?time) as ?year)  
3 ?p31 ps:P31 wd:Q53463 ; pq:P642 wd:Q477108.  
4 service wikibase:label {  
5 bd:serviceParam wikibase:language "en".  
6 }  
7 }  
8 group by ?year  
9 order by ?year
```

**Listing:** Query returning the years in which an amendment to the constitution of India was given assent and the number of amendments given assent within each year.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# String work

CONCAT, CONTAINS, STRSTARTS, ...

```

1 SELECT ?i ?j ?line {
2   ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q668 ; wdt:P197 ?j.
3   FILTER(STR(?i) < STR(?j)) .
4   ?i p:P625/psv:P625/wikibase:geoLatitude ?lat1 .
5   ?i p:P625/psv:P625/wikibase:geoLongitude ?lon1 .
6   ?j p:P625/psv:P625/wikibase:geoLatitude ?lat2 .
7   ?j p:P625/psv:P625/wikibase:geoLongitude ?lon2 .
8   BIND(CONCAT('LINESTRING(', STR(?lon1), ', ', STR(?lat1),
9     ', ', STR(?lon2), ', ', STR(?lat2), ')') AS ?str) .
10  BIND(STRDT(?str, geo:wktLiteral) AS ?line)
11 }

```

**Listing:** Query constructing lines between adjacent Indian railway stations in the well-known text format.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End



## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

And now for some more on functions!

## Displaying query results

Creating charts

Creating tree diagrams

Creating diagrams with images

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

- ▶ With the Wikidata Query Service GUI, a query whose first line is a comment beginning with "defaultView" will have its results displayed using one of several graphical layouts.
- ▶ There are twelve such views, and this could expand to more views in the future (as much as the D3.js library, which powers the GUI, will allow).

# Simple maps

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

```
1 #defaultView:Map
2 SELECT ?i ?iLabel ?coords {
3   ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q668 ; wdt:P625 ?coords.
4   SERVICE wikibase:label {
5     bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
6   }
7 }
```

**Listing:** Query displaying the locations (?coords) of railway stations in India.

# Color-coding maps

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

```
1 #defaultView:Map
2 SELECT ?i ?iLabel ?coords ?layer {
3   ?i wdt:P31 wd:Q55488 ; wdt:P17 wd:Q668 ; wdt:P625 ?coords.
4   ?i wdt:P137 ?layer.
5   SERVICE wikibase:label {
6     bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
7   }
8 }
```

**Listing:** Query displaying the locations of railway stations in India, color-coded by the Indian Railways division that operates them (?layer).

## Even more color-coding maps

```
1 #defaultView:Map
2 SELECT DISTINCT ?i ?iLabel ?coords ?rgb {
3   ?i wdt:P31 wd:Q928830 ;
4   p:P197/pq:P81 [ wdt:P361 wd:Q271195 ; wdt:P465 ?rgb ] ;
5   wdt:P625 ?coords.
6 SERVICE wikibase:label {
7   bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
8 }
9 }
```

**Listing:** Query displaying the locations of stations in the Delhi Metro system, color-coded (?rgb) based on one of the lines on which it sits.

[Intro](#)[Sentiments](#)[Basics](#)[Items](#)[Sitelinks](#)[Languages](#)[Statements](#)[Enhancements](#)[Controls](#)[Manipulation](#)[Visuals](#)[Charts](#)[Trees](#)[Images](#)[MWAPI](#)[End](#)

# Bar charts

(also area, line, and scatter charts)

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

```

1 #defaultView:BarChart
2 SELECT DISTINCT ?u ?uLabel (COUNT(?c) as ?cs) WHERE {
3 ?c wdt:P6392 ?codec ; wdt:P1416 ?u. FILTER(REGEX(?codec,"C-"))
4 ?u wdt:P6392 ?codeu . FILTER(REGEX(?codeu,"U-"))
5 SERVICE wikibase:label {
6 bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
7 }
8 }
9 GROUP BY ?u ?uLabel

```

**Listing:** Query displaying a bar chart of the number of colleges affiliated to different universities in India.

# Tree maps

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

```
1 #defaultView:TreeMap
2 SELECT ?c ?cLabel ?r ?rLabel ?d ?dLabel {
3   ?d wdt:P31 wd:Q63676827 ; wdt:P749 ?r .
4   ?r wdt:P31 wd:Q63676819 ; wdt:P749 ?c .
5   ?c wdt:P31 wd:Q63676815.
6   SERVICE wikibase:label {
7     bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
8   }
9 }
```

**Listing:** Query displaying Indian postal divisions (Q63676815) under their respective postal regions (Q63676819), which are in turn displayed under their respective postal circles (Q63676827), all in a tree map.



# Image grids

```

1 #defaultView:ImageGrid
2 SELECT DISTINCT ?item ?itemLabel ?image WHERE {
3   ?item wdt:P39 wd:Q9982713.
4   OPTIONAL { ?item wdt:P18 ?image_temp. }
5   BIND(IF(BOUND(?image_temp),
6     ?image_temp,
7     IRI(CONCAT("http://commons.wikimedia.org/wiki/",
8       "Special:FilePath/Image_of_none.svg"))
9     as ?image)
10  SERVICE wikibase:label {
11    bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en".
12  }
13 }
```

**Listing:** Query displaying images of judges of the Supreme Court of India, with a placeholder image used if no image of a judge is linked to that judge's Wikidata item.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Outline

## SPARQL MediaWiki API

SWT2022

Mahir256

### Intro

Sentiments

### Basics

Items

Sitelinks

Languages

Statements

### Enhancements

Controls

Manipulation

### Visuals

Charts

Trees

Images

### MWAPI

End

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

End

- ▶ The MediaWiki API service allows one to use results from the *regular* MediaWiki API (that is, the one that existed before Wikidata came along) with the Wikidata Query Service.
- ▶ This can be particularly useful if some organization scheme specific to one wiki needs to be used to sift through Wikidata items.
- ▶ (Much in these slides is adapted from the documentation on mediawiki.org regarding this service.)

# Keywords

```

1 SELECT ?item ?type ?itemLabel ?typeLabel WHERE { {
2   SELECT ?item WHERE {
3     SERVICE wikibase:mwapi {
4       bd:serviceParam wikibase:endpoint "ku.wikipedia.org";
5       wikibase:api "Generator"; mwapi:generator "search";
6       mwapi:gsrsearch "Erivan"; mwapi:gsrlimit "max".
7       ?item wikibase:apiOutputItem mwapi:item .
8     } } LIMIT 100
9   }
10  hint:Prior hint:runFirst "true". ?item wdt:P31|wdt:P279 ?type.
11  SERVICE wikibase:label {
12    bd:serviceParam wikibase:language "ku".
13  }
14 } LIMIT 100

```

**Listing:** Query returning all items which have pages on the Kurmanji Wikipedia matching the search term "Erivan" on that wiki, along with their "instance of" or "subclass of" value if present.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

## Listing categories

```

1 SELECT * WHERE { wd:Q369629 wdt:P910 ?category .
2 ?link schema:about ?category;
3 schema:isPartOf <https://ckb.wikipedia.org/>;
4 schema:name ?title .
5 SERVICE wikibase:mwapi {
6   bd:serviceParam wikibase:endpoint "ckb.wikipedia.org";
7   wikibase:api "Generator";
8   mwapi:generator "categorymembers"; mwapi:gcmtitle ?title;
9   mwapi:gcmprop "ids|title|type"; mwapi:gcm limit "max".
10  ?member wikibase:apiOutput mwapi:title.
11  ?ns wikibase:apiOutput "@ns".
12  ?item wikibase:apiOutputItem mwapi:item.
13 }
14 }
```

**Listing:** Query returning the list of pages in the category for Salahaddin University (Q369629) on the Sorani Wikipedia.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Getting categories

```

1 SELECT * WHERE { BIND(wd:Q191204 AS ?item)
2   ?item wdt:P18 ?image.
3   BIND(CONCAT("File:",
4     STRAFTER(wikibase:decodeUri(STR(?image)),
5     "Special:FilePath/")) AS ?fileTitle)
6   SERVICE wikibase:mwapi {
7     bd:serviceParam wikibase:api "Categories";
8     wikibase:endpoint "commons.wikimedia.org";
9     wikibase:limit 50; mwapi:titles ?fileTitle.
10    # Output the page title and category
11    ?title wikibase:apiOutput mwapi:title.
12    ?category wikibase:apiOutput mwapi:category .
13  }
14 }

```

**Listing:** Query returning the names of categories of images linked to the item for Silemani (Q191204).

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Images

```
1 SELECT * WHERE { BIND(wd:Q191204 AS ?item) ?item wdt:P18 ?imageInfo
2 BIND(STRAFTER(wikibase:decodeUri(STR(?image)),
3 "Special:FilePath/") AS ?fileTitle)
4 SERVICE wikibase:mwapi {
5 bd:serviceParam wikibase:endpoint "commons.wikimedia.org";
6 wikibase:api "Generator"; wikibase:limit "once";
7 mwapi:generator "allpages"; mwapi:gapfrom ?fileTitle;
8 mwapi:gapnamespace 6; mwapi:gaplimit 1;
9 mwapi:prop "imageinfo"; mwapi:iiprop "dimensions".
10 ?size wikibase:apiOutput "imageinfo/ii/@size".
11 ?width wikibase:apiOutput "imageinfo/ii/@width".
12 ?height wikibase:apiOutput "imageinfo/ii/@height".
13 }
14 }
```

Listing: Query returning the sizes, widths, and heights of images linked to the item for Silemani.

## Text(!)

```

1 SELECT * WHERE { BIND(wd:Q191204 AS ?item) ?item wdt:P18 ?image
2 BIND(STRAFTER(wikibase:decodeUri(STR(?image)),
3 "Special:FilePath/") AS ?fileTitle)
4 SERVICE wikibase:mwapi {
5   bd:serviceParam wikibase:endpoint "commons.wikimedia.org";
6   wikibase:api "Generator"; wikibase:limit "once";
7   mwapi:generator "allpages"; mwapi:gapfrom ?fileTitle;
8   mwapi:gapnamespace 6; mwapi:gaplimit 1;
9   mwapi:prop "revisions"; mwapi:rvprop "content".
10  ?contentmodel wikibase:apiOutput
11  'revisions/rev/@contentmodel'. ?contentformat
12  wikibase:apiOutput 'revisions/rev/@contentformat'.
13  ?content wikibase:apiOutput 'revisions/rev/text()'.
14 }
15 }

```

Listing: Query returning the wikitext in the file descriptions of images linked to the item for Silemani.



# Wikidata labels

```
1 SELECT * WHERE {  
2   SERVICE wikibase:mwapi {  
3     bd:serviceParam wikibase:endpoint "www.wikidata.org";  
4     wikibase:api "EntitySearch";  
5     mwapi:search "Silêmanî";  
6     mwapi:language "ku".  
7     ?item wikibase:apiOutputItem mwapi:item.  
8     ?num wikibase:apiOrdinal true.  
9   }  
10  ?item (wdt:P279|wdt:P31) ?type  
11 } ORDER BY ASC(?num) LIMIT 20
```

**Listing:** Query returning 20 items that contain the word "Silêmanî" in their Kurmanji labels, and which have "instance of" or "subclass of" defined.

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End

# Outline

End

SWT2022

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## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

## Intro

Sentiments

## Basics

Items

Sitelinks

Languages

Statements

## Enhancements

Controls

Manipulation

## Visuals

Charts

Trees

Images

## MWAPI

## End

There's so much more to explore!

- ▶ If you want to reconcile entire catalogs automatically, [check out OpenRefine]!
- ▶ Have a look at [[some Wikimedia Commons Query Service example queries]]!
- ▶ Visit [[d:Wikidata:Request a query]]!
- ▶ See what neat queries people came up with [[in the past]]!

# Thanks, everyone!

- ▶ Find me on various platforms for more questions!
  - ▶ User:Mahir256 on Wikimedia projects
  - ▶ @mahir256 on Twitter
  - ▶ t.me/mahir256 on Telegram
  - ▶ mahir256#6596 on Discord
  - ▶ @mahir256:matrix.org on Matrix
  - ▶ ...

Intro

Sentiments

Basics

Items

Sitelinks

Languages

Statements

Enhancements

Controls

Manipulation

Visuals

Charts

Trees

Images

MWAPI

End