

# Ready for Anything - Using Data in Perilous Times

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## APIs, Templates & Other Free Ways to Access Structured Data

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# What does “structuring” content in data standards really mean?

Putting information in XBRL form means that content (facts, taxonomies, reports (instance documents)) is available as “atomic” components – at the lowest level of detail

# What does “structuring” content in data standards really mean?

XBRL content can be disaggregated or aggregated however the data consumer wants

XBRL content can be queried, extracted and consumed automatically

# Components of Instance

FACT  
500

Concept  
Cash

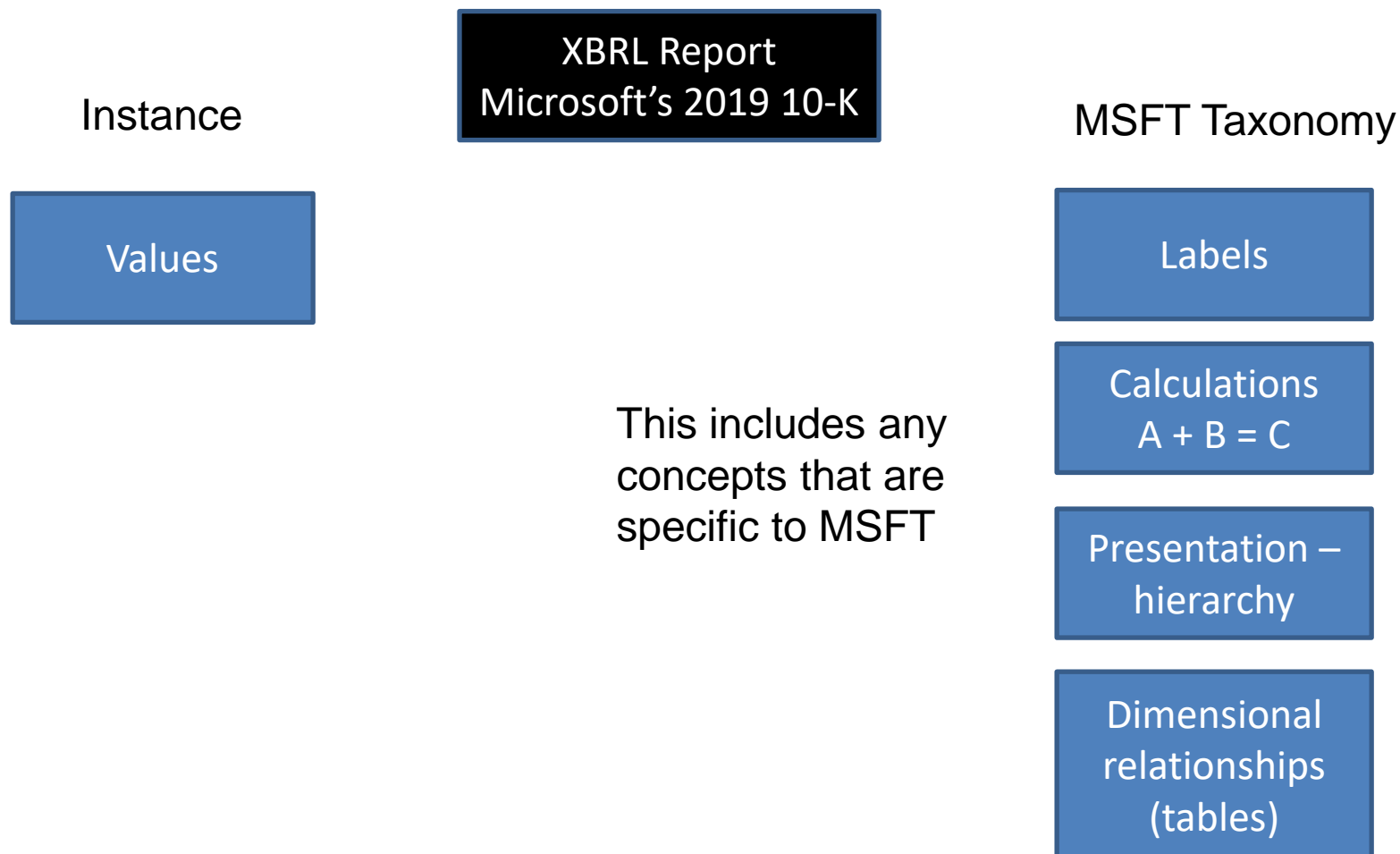
Time Period  
2019

Reporting  
Entity

Decimals  
thousands

Dimensions

# Components of an XBRL Report



# Components of a Taxonomy

## TAXONOMY

Core Concepts

Organizing  
Concepts

Defining  
Concepts

Relationships

Cash  
Net Income  
Revenue  
Assets

Groups  
Abstracts  
Entry points

Tables  
Members  
Axis

Calculations  
Presentations

# What can be queried?

- Can query the instance
  - E.g. What is the value of Assets for fiscal year 2020 for MSFT?
- Can query the MSFT taxonomy (Company taxonomy)
  - E.g. What concepts are included in the calculation of Assets for MSFT
- Can query the Base taxonomy.
  - E.g. What Investing CF are used in the US GAAP
- Can query across multiple instances.
  - E.g. What is quarterly revenue for MSFT for the last 10 years



# Query via the API

What is the value of Assets for fiscal year 2020 for MSFT?

- API parameters

- concept.local-name = `Assets`
- period.fiscal-year = `2020`
- entity.cik = `0000789019`
- period.fiscal-period = `Y`
- fact.ultimus-index = `1`
- dimensions.count = `0`
- fields = `fact.numerical-value`

- API Call

<https://api.xbrl.us/api/v1/fact/search?concept.local-name=Assets&period.fiscal-year=2020&entity.cik=0000789019&period.fiscal-period=Y&fact.ultimus-index=1&dimensions.count=0&fields=fact.numerical-value>



# Query via the API

What is the value of Assets for fiscal year 2020 for MSFT?

GET `site_url /api/v1/fact/search` Send **200 OK** 224 ms 93 B

Body ▾ Bearer ▾ **Query** <sup>7</sup> Header Docs

URL PREVIEW

`https://api.xbrl.us/api/v1/fact/search?concept.local-name=Assets&fields=fact.numerical-value&period.fiscal-year=2020&entity.cik=0000789019&period.fiscal-period=Y&fact.ultimus-index=1&dimensions.count=0`

concept.local-name	Assets	▾	✓	🗑
fields	fact.numerical-value	▾	✓	🗑
period.fiscal-year	2020	▾	✓	🗑
entity.cik	0000789019	▾	✓	🗑
period.fiscal-period	Y	▾	✓	🗑
fact.ultimus-index	1	▾	✓	🗑
dimensions.count	0	▾	✓	🗑

Preview ▾ Header <sup>10</sup> Cookie Timeline

```
1 {
2   "paging": {
3     "limit": 2000,
4     "offset": 0,
5     "count": 1
6   },
7   "data": [
8     {
9       "fact.numerical-value": 301311000000
10    }
11  ]
12 }
```

# Query via Database

What is the value of Assets for fiscal year 2020 for MSFT?

- SQL Parameters

element\_local\_name = 'Assets'

fiscal\_period = 'Y'

fiscal\_year = 2020

dimension\_count = 0

ultimus\_index = 1

entity\_code = '0000789019'

- Query

select effective\_value

from fact

join report ON report.report\_id =  
fact.accession\_id

join entity ON entity.entity\_id =  
report.entity\_id

where element\_local\_name = 'Assets'

and fiscal\_period = 'Y'

and fiscal\_year = 2020

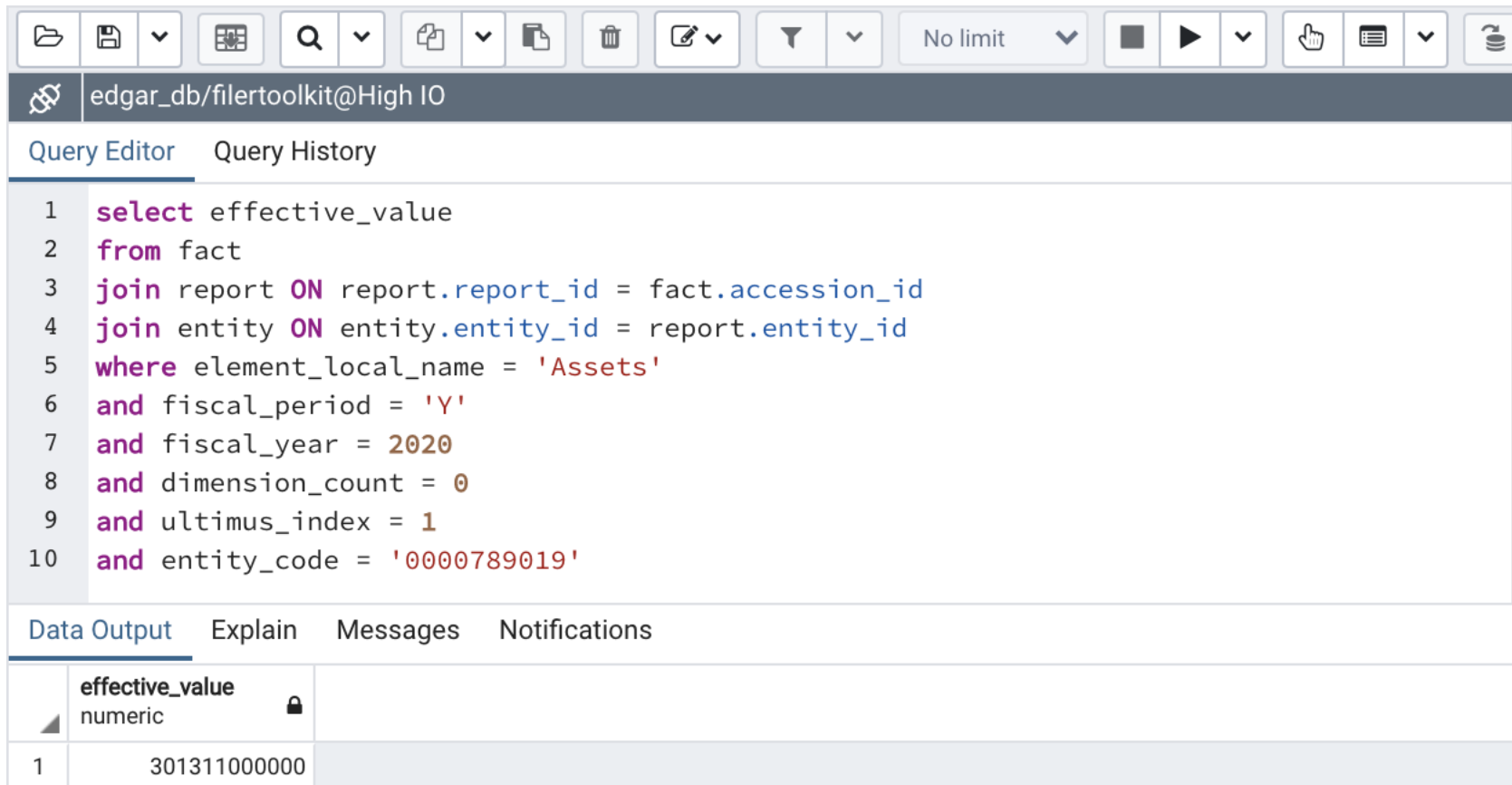
and dimension\_count = 0

and ultimus\_index = 1

and entity\_code = '0000789019'

# Query via the Database

What is the value of Assets for fiscal year 2020 for MSFT?



The screenshot shows a database query interface. At the top is a toolbar with icons for file operations, search, and execution. Below the toolbar is a header bar with the text "edgar\_db/filertoolkit@High IO". The main area is divided into two tabs: "Query Editor" and "Query History". The "Query Editor" tab is active, displaying a SQL query. Below the query editor are four tabs: "Data Output", "Explain", "Messages", and "Notifications". The "Data Output" tab is active, showing a table with one row of results.

```
1 select effective_value
2 from fact
3 join report ON report.report_id = fact.accession_id
4 join entity ON entity.entity_id = report.entity_id
5 where element_local_name = 'Assets'
6 and fiscal_period = 'Y'
7 and fiscal_year = 2020
8 and dimension_count = 0
9 and ultimus_index = 1
10 and entity_code = '0000789019'
```

	effective_value numeric	
1	301311000000	

# Query via XULE

What is the value of Assets for fiscal year 2020 for MSFT?

- Xule parameters

- concept = *Assets*
- Period = *date(2020-06-30)*
- entity.id = *0000789019*
- dimensions.count = *[]*

- XULE expression

*[@concept=Assets @period=date('2020-06-30') @entity.id = '0000789019']*

# Query via XULE

What is the value of Assets for fiscal year 2020 for MSFT?

```
<entry code="DQC.MSFT_Assets" level="info">
  <message filing_url="https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k_20200630_hm.xml" severity="info" cid="4365202152">[DQC.MSFT_Assets] 301,311,000,000
  - https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k_20200630_hm.xml 6376</message>
  <ref href="https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k_20200630_hm.xml#F_000144" sourceLine="6376">
    <property name="label" value="Assets"/>
    <property name="namespace" value="http://fasb.org/us-gaap/2020-01-31"/>
    <property name="name" value="Assets"/>
    <property name="QName" value="us-gaap:Assets"/>
    <property name="contextRef" value="C_0000789019_20200630">
      <property name="entity" value="0000789019">
        <property name="scheme" value="http://www.sec.gov/CIK"/>
      </property>
    <property name="instant" value="2020-06-30"/>
  </property>
  <property name="unitRef" value="U_iso4217USD ($)"/>
  <property name="measure" value="iso4217:USD"/>
</property>
<property name="decimals" value="-6"/>
<property name="precision" value="None"/>
<property name="xsi:nil" value="false"/>
<property name="value" value="301,311,000,000"/>
</ref></entry>
```

# Query via the API

What concepts are included in the calculation of Assets for MSFT?

- API parameters

- dts.id = 417093
- network.id = 47844486

- API Call

[https://api.xbrl.us/api/v1/relationship/tree/search?  
format=flat&dts.id=417093&network.id=47844486&fields=relationship.source-  
name,relationship.target-name,relationship.weight,relationship.tree-  
sequence,relationship.tree-depth](https://api.xbrl.us/api/v1/relationship/tree/search?format=flat&dts.id=417093&network.id=47844486&fields=relationship.source-name,relationship.target-name,relationship.weight,relationship.tree-sequence,relationship.tree-depth)



# Query via the API

What is the value of Assets for fiscal year 2020 for MSFT?

<https://api.xbrl.us/api/v1/relationship/tree/search?format=flat&dts.id=417093&network.id=47844486&fields=relationship.source-name,relationship.target-name,relationship.weight,relationship.tree-relationship.tree-relationship.id,relationship.network.id>

relationship.source-name	relationship.target-name	relationship.weight	relationship.tree-relationship.tree-relationship.id	relationship.network.id
Assets	AssetsCurrent	1	1	600150832
AssetsCurrent	CashCashEquivalentsAndShortTermInvestments	1	2	600150833
CashCashEquiv	CashAndCashEquivalentsAtCarryingValue	1	3	600150834
CashCashEquiv	ShortTermInvestments	1	4	600150835
AssetsCurrent	AccountsReceivableNetCurrent	1	5	600150836
AssetsCurrent	InventoryNet	1	6	600150837
AssetsCurrent	OtherAssetsCurrent	1	7	600150838
Assets	PropertyPlantAndEquipmentNet	1	8	600150839
Assets	OperatingLeaseRightOfUseAsset	1	9	600150840
Assets	LongTermInvestments	1	10	600150841
Assets	Goodwill	1	11	600150842
Assets	FiniteLivedIntangibleAssetsNet	1	12	600150843
Assets	OtherAssetsNoncurrent	1	13	600150844
LiabilitiesAndStc	Liabilities	1	14	600150845



# Query via Database

What is the value of Assets for fiscal year 2020 for MSFT?

- SQL Parameters

`element_local_name = 'Assets'`

`network.id=47844486`

`fiscal_year = 2020`

`dimension_count = 0`

`ultimus_index = 1`

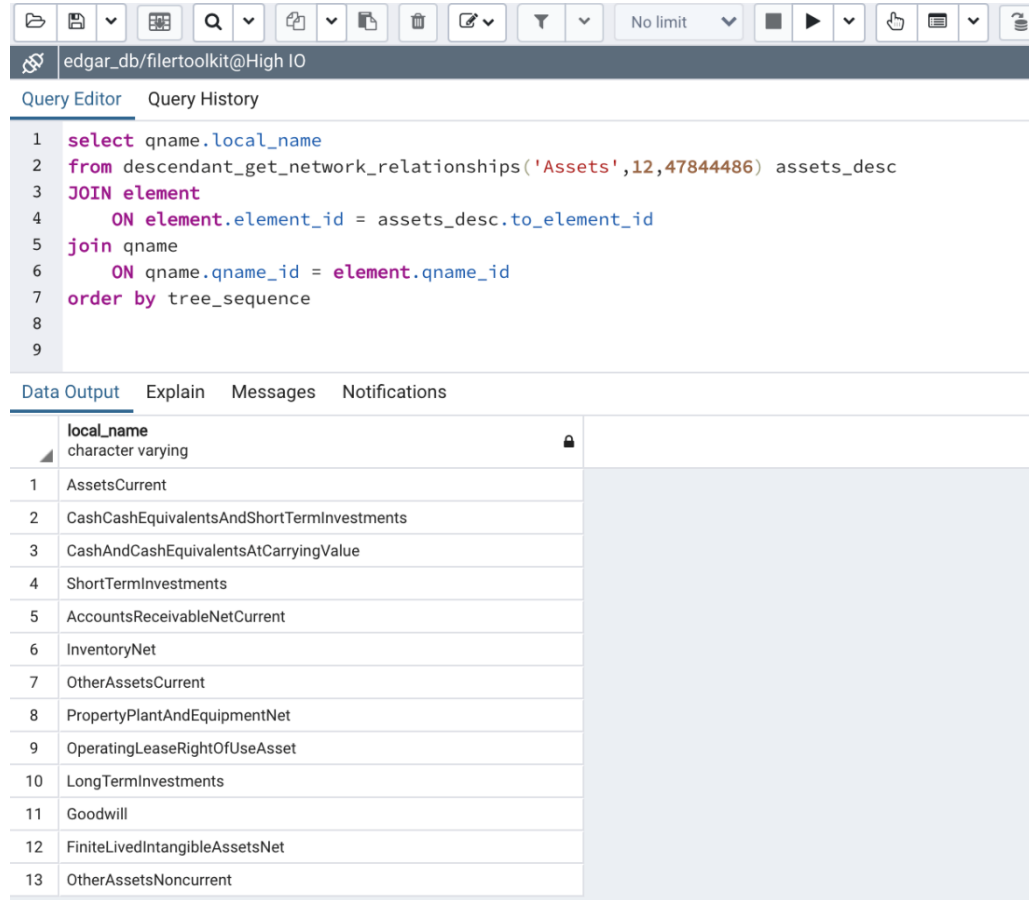
`entity_code = '0000789019'`

- Query

```
select qname.local_name
from
  descendant_get_network_relationships('
Assets', 12 , 47844486) assets_desc
JOIN element
      ON element.element_id =
assets_desc.to_element_id
join qname
      ON qname.qname_id =
element.qname_id
order by tree_sequence
```

# Query via the Database

What is the value of Assets for fiscal year 2020 for MSFT?



The screenshot shows a database query interface with a toolbar at the top. The query editor displays a SQL query to retrieve asset information for MSFT in 2020. The results pane shows a list of asset categories and their corresponding values.

Query Editor

```
1 select qname.local_name
2 from descendant_get_network_relationships('Assets',12,47844486) assets_desc
3 JOIN element
4     ON element.element_id = assets_desc.to_element_id
5 join qname
6     ON qname.qname_id = element.qname_id
7 order by tree_sequence
8
9
```

Data Output

local_name	
AssetsCurrent	
CashCashEquivalentsAndShortTermInvestments	
CashAndCashEquivalentsAtCarryingValue	
ShortTermInvestments	
AccountsReceivableNetCurrent	
InventoryNet	
OtherAssetsCurrent	
PropertyPlantAndEquipmentNet	
OperatingLeaseRightOfUseAsset	
LongTermInvestments	
Goodwill	
FiniteLivedIntangibleAssetsNet	
OtherAssetsNoncurrent	

# Query via XULE

What concepts are included in the calculation of Assets for MSFT?

- Xule parameters

- concept = *Assets*

- XULE expression

*navigate summation-item descendants from Assets returns set (target-name)*

# Query via XULE

What is the value of Assets for fiscal year 2020 for MSFT?

```
<entry code="info" level="info">
  <message>[info] loaded in 2.23 secs at 2020-11-16T21:44:52 - https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k\_20200630\_hm.xml </message>
  <ref href="https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k\_20200630\_hm.xml" /></entry>
<entry code="DQC.MSFT_Asset_Desc" level="info">
  <message cid="4430922472" severity="info" filing_url="https://www.sec.gov/Archives/edgar/data/789019/000156459020034944/msft-10k\_20200630\_hm.xml"> [DQC.MSFT_Asset_Desc] set
    (us-gaap:OtherAssetsNoncurrent, us-gaap:ShortTermInvestments,
    us-gaap:CashAndCashEquivalentsAtCarryingValue, us-gaap:Goodwill,
    us-gaap:LongTermInvestments, us-gaap:InventoryNet,
    us-gaap:AccountsReceivableNetCurrent,
    us-gaap:OperatingLeaseRightOfUseAsset,
    us-gaap:FiniteLivedIntangibleAssetsNet,
    us-gaap:PropertyPlantAndEquipmentNet, us-gaap:AssetsCurrent,
    us-gaap:OtherAssetsCurrent,
    us-gaap:CashCashEquivalentsAndShortTermInvestments) - </message></entry>
```

# Query Comparison

Query Type	API	Database	XULE
Data from a specific instance	Good	Good	Good
Data from a company specific taxonomy	Requires multiple calls. Get entire tree. Cannot do recursion down a path	Need to identify the networks where the element appears. Limited network navigation	Only requires the element name and returns only the data requested. Many options to navigate networks
Network data from a published taxonomy	Same as above	Same as above	Same as above
Data across filings	Can query across all filings	Can query across all filings	Can only query a single filing at a time
Aggregation across multiple filings	Have to download data and do aggregation	Can calculate aggregated data	Can only do aggregation and calculations on a single filing

# Query via XULE

- XULE
  - Validation rules
  - Data Normalization
  - Analytics on a single filing
  - Alternative Renderings
- Database
  - Aggregated and grouped data
  - Queries across multiple data sets and custom data analytics
- API
  - used in applications
  - Fast access to data
  - Allows integration into other data analytical tools
    - Excel, Google Sheets, Jupyter Notebook, R, etc.

# Documentation

## Xule

- <http://xule.org>

## API

- <https://xbrlus.github.io/xbrl-api/>

## Database

- <https://xbrl.us/home/use/filings-database/>