1. Query and Analysis of XBRL-based Digital Financial Reports

This section covers the basics of querying and analysis of XBRL-based digital financial reports. In this section we will use a free tool for making use of all that XBRL-based public company financial information submitted to the SEC. We will cover only the basics to give the reader a sense of how to do this.

1.1. Financial analysis use cases

These are the general use cases for making use of information reported in XBRL-based public company financial reports provided to the SEC or elsewhere:

- **Analysis of a single report**. Analysis of one financial report from one reporting entity.

- **Time series analysis for a reporting entity**. Two or more financial reports from the same reporting entity.

- **Comparative analysis across reporting entities**. Two or more financial reports from different reporting entities using different subsets of information.

- **Ratio analysis**. An analysis of a single report, a time series analysis, or a comparative analysis using ratios.

1.2. Repository of machine-readable facts (fact database)

The purpose of this section is to set your perspective and expectations. Imagine a machine-readable repository of information. Imagine that you want to query that repository and get the value of two concepts for every economic entity in that repository: *Assets* and *Liabilities and Equity*. In order to extract that information from any XBRL-based financial report using a machine-based process the following process needs to be followed:

1. Software MUST locate each report you want to query. You want to be sure you have the correct report. For example, if a report is amended, you need the most current report.

2. The report MUST be valid XBRL technical syntax. If the technical syntax is invalid, you may or may not get the correct results.

3. Software MUST locate the appropriate reporting units (currency). In the case of public company financial reports, 99% of entities report using US Dollars. However, 1% use other currencies as the reporting units.

4. Software MUST appropriately identify the root reporting entity in the report, we don't want business segment information. Generally, this is the consolidated entity but it could be a parent holding company or some other accounting entity.

5. Software MUST appropriately locate the current balance sheet date. Generally you want information about the current balance sheet data and not the prior balance sheet, both are provided in the same report.

6. Software MUST find the appropriate US GAAP concept used to express *Assets* which is us-gaap:Assets.

7. Software MUST find appropriate US GAAP concept for *Liabilities and Equity*. This is a little harder because there are multiple possible concepts: us-gaap:LiabilitiesAndStockholdersEquity or us-gaap:LiabilitiesAndPartnersCapital.

8. Software MUST check the returned information to assure that it is consistent with what is expected, the business domain rule that "Assets = Liabilities and Equity".

That is an overview of the workflow/process to obtain a basic set of information from the repositiry of XBRL-based public company financial filings. And here are the results of that query for every financial report from the SEC EDGAR system of XBRL-based public company financial reports:

xbrl:Entity	Legal Entity	Fiscal Period	Fiscal Year	Assets	Liabilities and Equity	Units	Difference in Value
All CIK numbers	Root economic entity	FY	2001	280	280	iso4217:USD	0
All CIK numbers	Root economic entity	FY	2009	31,586,555,000	31,586,555,000	iso4217:USD	0
All CIK numbers	Root economic entity	FY	2010	23,061,516,000	23,061,516,000	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2010	8,833,200,000	8,833,200,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2010	33,205,444,569,755	33,235,543,477,631	iso4217:USD	30,098,907,876
All CIK numbers	Root economic entity	FY	2011	45,216,467	45,216,467	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2011	110,885,000	110,885,000	iso4217:BRL	0
All CIK numbers	Root economic entity	FY	2011	28,708,716,218	28,708,716,218	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2011	1,226,733,000	1,226,733,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2011	7,938,800,000	7,938,800,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2011	1,565,000	1,565,000	iso4217:ILS	0
All CIK numbers	Root economic entity	FY	2011	46,395,324,314,234	46,165,763,878,111	iso4217:USD	(229,560,436,123)
All CIK numbers	Root economic entity	FY	2012	49,066,850	49,066,850	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2012	32,470,161,238	32,470,161,238	iso4217:CAD	0
All CIK numbers	Root economic entity	FY	2012	1,303,349,000	1,303,349,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2012	10,504,300,000	10,504,300,000	iso4217:GBP	0
All CIK numbers	Root economic entity	FY	2012	47,493,211,088,244	47,307,285,874,940	iso4217:USD	(185,925,213,304)
All CIK numbers	Root economic entity	FY	2013	54,642,443	54,642,443	iso4217:AUD	0
All CIK numbers	Root economic entity	FY	2013	39,919,462,935	39,919,385,738	iso4217:CAD	(77,197)
All CIK numbers	Root economic entity	FY	2013	13,120,000	13,120,000	iso4217:EUR	0
All CIK numbers	Root economic entity	FY	2013	48,909,115,040,682	48,735,740,980,605	iso4217:USD	(173,374,060,077)
All CIK numbers	Root economic entity	FY	2014	342,493,649,881	342,493,649,881	iso4217:USD	0
				176,531,415,952,227	175,972,655,073,402		(558,760,878,825)
							-0.3%

The results[1] show that most of the balance sheets balance, *Assets = Liabilities and Equity*. Some are inconsistent with what you would expect. The total inconsistency is .3% which is not too bad. However, the information needs to be 100% consistent in order to not get humans involved to figure out exactly what is causing the inconsistencies.

What needs to be considered when querying other facts from a repository works in exactly the same way as this basic query.

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[1] Query and results provided by SECXBRL.info which is a commercial software application, see http://app.secxbrl.info/
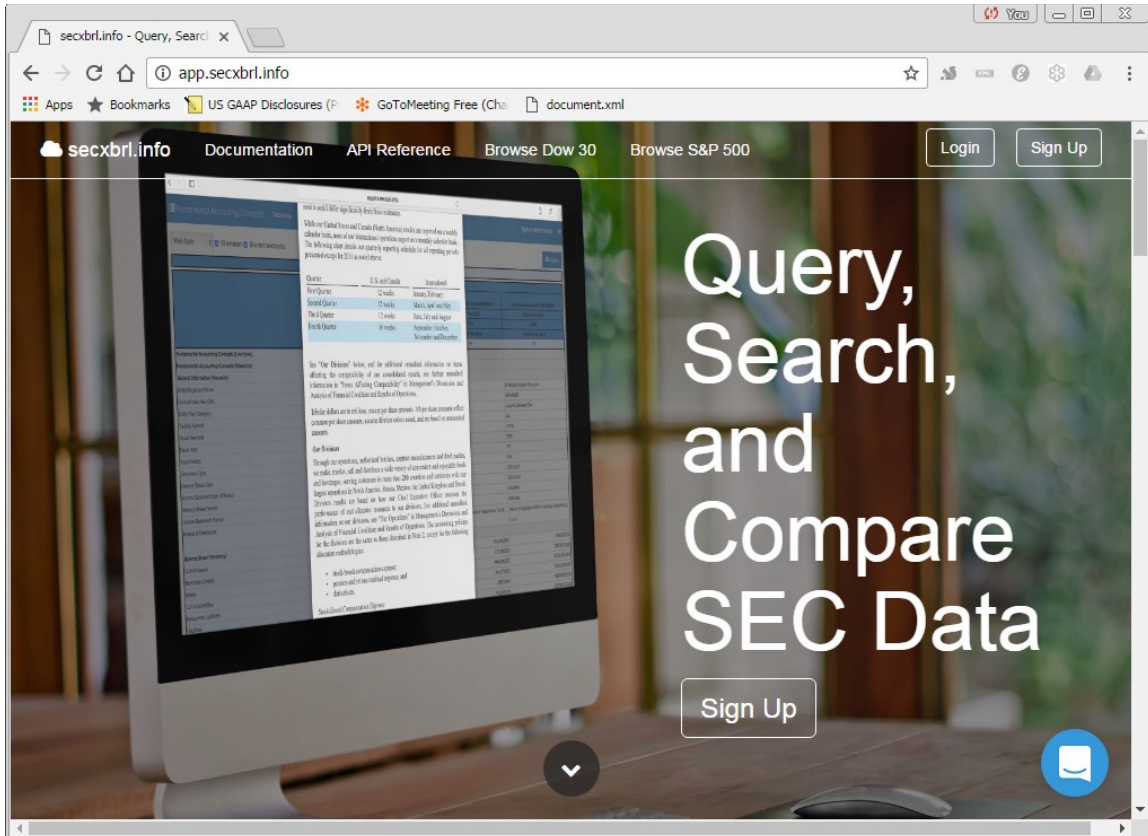
1.3. Query language

As you use the example queries provided in this section, have a look at the syntax of the URLs that are used to execute the queries[2].

1.4. SECXBRL.info

28msec created and made available a free database of public company financial information. You can find that database at the following URL:

http://app.secxbrl.info/

There is no need to sign up or sign in. Also, realize that while I will be walking you through examples provided as HTML pages on this information repository web site, the same information that I am showing you can also be retrieved as a web service that returns XML, JSON, CSV, or Excel formatted information.

This ZIP archive contains an Excel workbook application that has a bunch of sample queries which populate Excel spreadsheets:

http://www.xbrlsite.azurewebsites.net/2016/Library/SECXBRL-2016-12-31_BasicExamples.zip

This reference material is helpful in creating queries:

http://28msec.github.io/cellstore-pro/api-ref-queries.html

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[2] API reference, http://28msec.github.io/cellstore-pro/api-ref-queries.html

1.4.1. List of entities

If you simply click on the "Browse DOW 30" button on the top of the screen above or if you paste the URL below into your browser, you will get a list of the companies that make up the DOW 30:

http://secxbrl.28.io/v1/_queries/public/api/entities.jq?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&format=html&tag=DOW30

If you simply change "format=html" to "format=xml", XML is returned by the database rather than a formatted HTML page:

1.4.2.List of reports for an entity

If you click on the "Archives" column on the far left "Link" or use the URL below, you can get a list of reports that were submitted to the SEC by the entity:

http://secxbrl.28.io/v1/_queries/public/api/archives?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&eid=http%3A%2F%2Fwww.sec.gov%2FCIK%200000066740&format=html&profile-name=sec&language=en-US&archiveFiscalYear=ALL&archiveFiscalPeriod=ALL

1.4.3. List of reports for an entity

If you click on the "Components" column the "Link" will provide you with a list of components within the report, or you can use the URL below:

http://secxbrl.28.io/v1/_queries/public/api/components?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&aid=0001558370-16-007105&format=html&profile-name=sec&validate=true&language=en-US

1.4.4.Rendering of a component

If you click on the "Spreadsheet" column the "Link" will provide you a rendering of the report component which you selected, or again you can use the URL below:

http://secxbrl.28.io/v1/_queries/public/api/spreadsheet-for-component?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&aid=0001558370-16-007105&format=html&section=http%3A%2F%2Fwww.mmm.com%2Frole%2FStatementConsolidatedStatementOfIncome&hypercube=xbrl28%3AImpliedTable&profile-name=sec&eliminate=true&validate=true&language=en-US

1.4.5.Normalized comparison of information for entity across periods

Using the query string below you can do a normalized comparison of information for an entity across multiple periods:

http://secxbrl.28.io/v1/_queries/public/api/spreadsheet-for-report.jq?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&report=IncomeStatementSingleStep_Special2&fiscalYear=2015&fiscalYear=2014&fiscalYear=2013&fiscalYear=2012&fiscalYear=2011&fiscalPeriod=FY&validate=true&format-indent=yes&labels=false&format=html&cik=0000066740

1.4.6. Normalized comparison of information across entities for a period

Using the query string below you can do a normalized comparison of information across entities for a period:

http://secxbrl.28.io/v1/_queries/public/api/spreadsheet-for-report.jq?token=c3049752-4d35-43da-82a2-f89f1b06f7a4&report=IncomeStatementSingleStep_Special2&fiscalYear=2015&fiscalPeriod=FY&validate=true&format-indent=yes&labels=false&format=html&cik=0000066740&&cik=27904&cik=1048911&cik=934612&cik=100885&cik=15511&cik=70318&cik=92380&cik=230211&cik=18926

HINT: You can compare as many entities as you want this way. I have done up to about 200 entities!

1.5. Commercially available analysis products

There are many different commercial software applications which make use of XBRL-based financial information reported by public companies to the SEC and available from the EDGAR system. These software applications take different approaches and different things can be learned from different applications.

Querying an XBRL instance document and the related taxonomy is possible, but it is not recommended because the information is not structured for meaning, it is simply structured as XBRL technical syntax. This makes querying information significantly more challenging.

If you do want to explore extracting information directly from an XBRL instance, this ZIP archive contains an Excel based application that you can reverse engineer:

http://xbrlsite.azurewebsites.net/2016/Analysis/InterestBasedRevenues/Analysis_INTBX-BSU-CF1-ISS-IEMIX-OILN.zip

1.5.1.28msec SECXBRL.info

As mentioned, 28msec[3] provides a free repository of public company financial information reported by public companies to the SEC via its SECXBRL.info repository[4]. Financial information is available for the DOW 30 companies with no signup at all. You can sign up for free and get access to all reported information. An API is provided. For those willing to roll up their sleeves and get their hands a little dirty, there is a lot that can be learned about where digital financial reporting and more generally digital business reporting is going.

1.5.2.XBRL Cloud

XBRL Cloud mainly focuses on validation services for public companies that provide XBRL-based financial reports to the SEC[5]. However, XBRL Cloud offers an API also. That API, the EDGAR Report Information Web Service[6], is unfortunately not publically available. But, the API is rather inexpensive. If you are serious about learning about digital financial reporting, paying for the API is worth the price.

XBRL Cloud provides some of the best renderings of XBRL-based information.

1.5.3.FinDynamics XBRL Analyst

XBRL Analyst is described as "XBRLAnalyst delivers real-time financial data to Excel" by its creator FinDynamics[7]. XBRLAnalyst is an Excel plugin. A free trial is available which allows you to explore the software before you purchase it. An API is also available.

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[3] 28msec, http://www.28.io/

[4] SECXBRL.info, http://app.secxbrl.info/

[5] XBRL Cloud EDGAR Dashboard, https://edgardashboard.xbrlcloud.com/edgar-dashboard/

[6] XBRL Cloud Edgar Report Information Web Service, https://www.xbrlcloud.com/home/edgar-report-information/eridev.html

[7] FinDynamics, https://findynamics.com/