

SEC EDGAR System Knowledge Graph of Public Company Financial Reports

November 27, 2022

This paper describes the attributes and functions of the composite of all financial reports filed with the Securities and Exchange Commission. We posit that each financial report is comprised of a series of multi-dimensional knowledge graphs and subgraphs. Since the internet itself is comprised of trillions of multi-dimensional namespaces¹, the XML based schema that defines Extensible Business Reporting Language² suggests that all financial reports filed with the SEC should be comprised of indexable cross graph capabilities that should allow true standardization to take place. Since the SEC's adoption of XBRL, the ability to aggregate data from such reports has been challenging. Although accounting standards are codified by the Federal Accounting Standards Board³ and outside the United States by International Financial Reporting Standards⁴, these are human readable. We use knowledge engineering, accounting logic, computer science and cryptography to create the unique controls that constrain codified accounting rule functionality. The Auditchain Protocol⁵, an expert network of peer clients, is deployed to an EVM in order to prove the accurate articulation of financial state of an economic entity.

This paper only summarizes an illustration of limited functions in semantics to convey an understanding of improvements in the articulation and proof of financial state for an economic entity using the Pacioli logic and Reasoning Engine⁶. The Auditchain Protocol itself, a layer 2 network of Pacioli validating nodes lies outside the scope of this paper.

Here we provide a list of primitives to help gain an understanding of the use of semantics which play a critical role in validation of the proof of state of an economic entity.

REPORTS and REPORT MODELS: (machine readable global standard XBRL-based reports and report models:

List of XBRL-based reports submitted to the SEC:

<https://www.sec.gov/structureddata/rss-feeds-submitted-filings>

List of **all** XBRL-based reports submitted to SEC:

<https://www.sec.gov/Archives/edgar/xbrlrss.all.xml>

¹ <https://www.w3.org/TR/xml-names/>

² <https://www.xbrl.org/>

³ <https://www.fasb.org/>

⁴ <https://www.ifrs.org/>

⁵ <https://docs.auditchain.finance/>

⁶ <https://docs.auditchain.finance/auditchain-protocol/pacioli-logic-and-rules-engine>

List of reports, **monthly**, RSS feed:
<https://www.sec.gov/Archives/edgar/monthly/>

BASE FINANCIAL REPORTING TAXONOMIES: (machine readable global standard XBRL-based explanation of the financial reporting standards, US GAAP and IFRS):
<https://www.sec.gov/info/edgar/edgartaxonomies>

High level financial report semantics:
<http://accounting.auditchain.finance/fac/Index.html>

Additional financial report semantics:

US GAAP: <http://accounting.auditchain.finance/reporting-scheme/us-gaap/documentation/Index.html>

IFRS: <http://accounting.auditchain.finance/reporting-scheme/ifrs-full/documentation/Index.html>

EDGAR Financial Report Knowledge Graph

All Apple Financial Statements

The first battery of tests is of the entire set of 10-Ks and 10-Qs submitted by Apple Inc. to the SEC. Apple was chosen because it is a large company and there are no inconsistencies in any Apple Inc. financial report that has been submitted to the SEC related to the fundamental accounting concepts consistency crosscheck rules. Apple always uses the same reporting style, COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6

<https://auditchain.infura-ipfs.io/ipfs/QmPb4HCPY8HQqxsvsQ2skLiqJwQ5B8jbTADRK8YVqXNosv/>

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	Apple Inc. (AAPL) 10-Q for Q2, 2020	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
2	Apple Inc. (AAPL) 10-Q for Q1, 2020	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
3	Apple Inc. (AAPL) 10-K for FY, 2019	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
4	Apple Inc. (AAPL) 10-Q for Q3, 2019	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
5	Apple Inc. (AAPL) 10-Q for Q2, 2019	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
6	APPLE INC (AAPL) 10-Q for Q1, 2019	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
7	APPLE INC (AAPL) 10-K for FY, 2018	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
8	APPLE INC (AAPL) 10-Q for Q3, 2018	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
9	APPLE INC (AAPL) 10-Q for Q2, 2018	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
10	APPLE INC (AAPL) 10-Q for Q1, 2018	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
11	APPLE INC (AAPL) 10-K for FY, 2017	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
12	APPLE INC (AAPL) 10-Q for Q3, 2017	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
13	APPLE INC (AAPL) 10-Q for Q2, 2017	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
14	APPLE INC (AAPL) 10-Q for Q1, 2017	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
15	APPLE INC (AAPL) 10-K for FY, 2016	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
16	APPLE INC (AAPL) 10-Q for Q3, 2016	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
17	APPLE INC (AAPL) 10-Q for Q2, 2016	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
18	APPLE INC (AAPL) 10-Q for Q1, 2016	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
19	APPLE INC (AAPL) 10-K for FY, 2015	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
20	APPLE INC (AAPL) 10-Q for Q3, 2015	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
21	APPLE INC (AAPL) 10-Q for Q2, 2015	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
22	APPLE INC (AAPL) 10-Q for Q1, 2015	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
23	APPLE INC (AAPL) 10-K for FY, 2014	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
24	APPLE INC (AAPL) 10-Q for Q3, 2014	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
25	APPLE INC (AAPL) 10-Q for Q2, 2014	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
26	APPLE INC (AAPL) 10-Q for Q1, 2014	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
27	APPLE INC (AAPL) 10-K for FY, 2013	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
28	APPLE INC (AAPL) 10-Q for Q3, 2013	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
29	APPLE INC (AAPL) 10-Q for Q2, 2013	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
30	APPLE INC (AAPL) 10-Q for Q1, 2013	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
31	APPLE INC (AAPL) 10-K for FY, 2012	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
32	APPLE INC (AAPL) 10-Q for Q3, 2012	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
33	APPLE INC (AAPL) 10-Q for Q2, 2012	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
34	APPLE INC (AAPL) 10-Q for Q1, 2012	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
35	APPLE INC (AAPL) 10-K for FY, 2011	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
36	APPLE INC (AAPL) 10-Q for Q3, 2011	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML

PRIMARY POINT: It is possible for all economic entities to be 100% consistent with the fundamental accounting concepts consistency cross checks.

All Reports for Set of Technology companies:

This second battery of tests is the entire set of 10-Ks and 10-Qs for a set of technology companies that tend to do a good job in the creation of their XBRL-based financial reports. What we have done is grabbed and verified every 10-K and 10-Q against fundamental, high level accounting concepts and relations between those concepts.

Those companies and the number of reports are:

- Microsoft = 43 reports
- Apple = 44 reports
- Google/Alphabet = 43 reports
- Facebook = 31 reports (they went public in like 2015)
- Amazon = 43 reports
- Salesforce = 43 reports

Those companies use THREE different reporting styles which are:

- COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6 - 130 reports
- COMID-BSC-CF1-ISS-IEMIB-OILY-SPEC2 - 74 reports
- COMID-BSC-CF1-ISS-IEMIT-OILY-SPEC2 - 43 reports

A total of 9 inconsistencies exist in the set of 247 reports and all 9 appear to be errors in the reports created by these companies.

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	FACEBOOK INC (FB) 10-Q for Q2, 2015	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
2	FACEBOOK INC (FB) 10-Q for Q3, 2013	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
3	FACEBOOK INC (FB) 10-Q for Q2, 2012	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
4	FACEBOOK INC (FB) 10-Q for Q3, 2012	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
5	FACEBOOK INC (FB) 10-K for FY, 2012	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
6	FACEBOOK INC (FB) 10-K for FY, 2015	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
7	FACEBOOK INC (FB) 10-Q for Q2, 2013	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
8	Facebook, Inc. (FB) 10-K for FY, 2019	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
9	FACEBOOK INC (FB) 10-K for FY, 2013	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
10	FACEBOOK INC (FB) 10-Q for Q1, 2014	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
11	FACEBOOK INC (FB) 10-Q for Q2, 2014	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
12	FACEBOOK INC (FB) 10-Q for Q3, 2014	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
13	FACEBOOK INC (FB) 10-K for FY, 2014	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
14	FACEBOOK INC (FB) 10-Q for Q1, 2015	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
15	FACEBOOK INC (FB) 10-Q for Q3, 2015	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
16	FACEBOOK INC (FB) 10-Q for Q1, 2016	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
17	Facebook Inc (FB) 10-Q for Q1, 2019	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
18	FACEBOOK INC (FB) 10-Q for Q1, 2013	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
19	FACEBOOK INC (FB) 10-Q for Q2, 2016	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
20	Facebook Inc (FB) 10-Q for Q2, 2019	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
21	FACEBOOK INC (FB) 10-K for FY, 2018	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
22	Facebook Inc (FB) 10-Q for Q3, 2018	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
23	Facebook Inc (FB) 10-Q for Q2, 2018	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
24	FACEBOOK INC (FB) 10-K for FY, 2016	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
25	FACEBOOK INC (FB) 10-K for FY, 2017	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML
26	FACEBOOK INC (FB) 10-Q for Q3, 2017	🟢	🟢	🟡	🟢	🟢	🟢	🟡	🟡	🟢	🟢	Explorer	HTML

<https://auditchain.infura-ipfs.io/ipfs/QmcAg9Jznd2Q5oVLnK2nyrYS3v4sePgfrenF16qtnDKDhC/>

DOW 30 companies: (13 different reporting styles)

Applying these same ideas, I evaluated the companies that make up the DOW 30; these 30 companies

used 13 different reporting styles to represent their financial reports:

<https://auditchain.infura-ipfs.io/ipfs/QmQT13Dt1dmS99SpLRDu7qsw24Bk6ykrDXaEPXVhKbowHi/>

Pacioli Technical Analysis Batch Results

Reports from: [/Users/Inc/gis/knowledge-base/testing/Results/Script_Download](#) this list took 1.397 seconds to analyze by 6 workers, and is available in .JSON format [here](#) with a summary there. Preliminary metaverse view.

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	MICROSOFT CORPORATION (MSFT) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
2	Apple Inc. (AAPL) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
3	salesforce.com, Inc. (CRM) 10-K for FY, 2022	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
4	INTEL CORPORATION (INTC) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
5	COCA COLA CO (KO) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
6	PROCTER & GAMBLE CO (PG) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
7	CISCO SYSTEMS, INC. (CSCO) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
8	BOEING CO (BA) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
9	WALGREENS BOOTS ALLIANCE, INC. (WBA) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
10	VISA INC. (V) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
11	Amgen Inc. (AMGN) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
12	UnitedHealth Group Incorporated (UNH) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
13	Verizon Communications Inc. (VZ) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
14	WALMART INC. (WMT) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
15	MCDONALD'S CORPORATION (MCD) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
16	CATERPILLAR INC (CAT) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
17	3M COMPANY (MMM) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
18	HOME DEPOT, INC. (HD) 10-K for FY, 2020	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
19	Travelers Companies, Inc. (TRV) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
20	American Express Co (AXP) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
21	JPMorgan Chase & Co (JPM) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
22	The Goldman Sachs Group, Inc. (GS) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
23	NIKE, Inc. (NKE) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
24	Honeywell International Inc. (HON) 10-K for FY, 2020	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
25	INTERNATIONAL BUSINESS MACHINES CORPORATION (IBM) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
26	JOHNSON & JOHNSON (JNJ) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
27	WALT DISNEY CO/ (DIS) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
28	Chevron Corp (CVX) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
29	Dow Inc. (DOW) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
30	Merck & Co., Inc. (MRK) 10-K for FY, 2021	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML

All reports for ONE reporting style:

All 1364 companies that use the same high level reporting style: (COMID-BSC-CF1-ISM-IEMIB-OILY-SPEC6; Classified balance sheet, reports gross profit, standard cash flow statement)

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	12 Retch Corp (RETQ) 10-K for FY, 2017	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
2	1 800 FLOWERS COM INC (flws) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
3	22nd Century Group, Inc. (DQX) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
4	3D SYSTEMS CORP (ddd) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
5	3PEA INTERNATIONAL INC. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
6	A10 Networks, Inc. (ATEN) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
7	AARON INC (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
8	ABERCROMBIE & FITCH CO./DE (j) 10-K for FY, 2017	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
9	Abtech Holdings, Inc. (ABHD) 10-K for FY, 2017	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
10	Acacia Diversified Holdings, Inc. (j) 10-K for FY, 2017	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
11	Accelerate Diagnostics, Inc. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
12	ACCELERIZE INC. (actz) 10-K for FY, 2017	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
13	ACCURAY INC (ARAY) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
14	ACETO CORP (acet) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
15	Aclavis Therapeutics, Inc. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
16	ACME UNITED CORP (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
17	ACM RESEARCH, INC. (ACMR) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
18	ACTUANT CORP (ATU) 10-K for Q4, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
19	Acushnet Holdings Corp. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
20	ACKIOM CORP (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
21	Addus HomeCare Corp (adus) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
22	ADVANTAGE TECHNOLOGIES GROUP INC. (ayg) 10-K...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
23	ADESTO TECHNOLOGIES CORP (JOTS) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
24	ADOBE INC. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
25	Adomani, Inc. (adom) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML

<https://auditchain.infura-ipfs.io/ipfs/QmPqJrCdpYwqZQoxgGDtyf4gnqNXZrUQbi56nogzW7MYED/>

371 Bank Financial Reports that use One Specific Reporting Style

This battery of tests used the financial reports of 371 banks (depository institutions), all 10-Ks, and all of which used the same reporting style which was INTBX-BSU-CF1-ISS-IEMIX-OILN.

Of those 371 reports, there were 83 (or 23%) reports found that contained inconsistencies with at least one of the fundamental accounting concept continuity cross checks. That means that 288 (or 77%) of reports were consistent with all fundamental accounting concepts and the relations between those concepts.

<https://auditchain.infura-ipfs.io/ipfs/QmT34KyQNYD6dL7ousnb3neceeTYvp6XoCgerjPhjJT8oD/>

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	ACCESS NATIONAL CORP (ANCX) 10-K for FY, ...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
2	Allegiance Bancshares, Inc. (abtb) 10-K for FY, 2...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
3	AMERICAN EXPRESS CO (AXP) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
4	AMERICAN NATIONAL BANKSHARES INC. (j) 10...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
5	AMERICAN RIVER BANKSHARES (j) 10-K for FY, ...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
6	Ameris Bancorp (ABCB) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
7	AMERISERV FINANCIAL INC./PA/ (ASRV) 10-K E...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
8	AMES NATIONAL CORPORATION (atlo) 10-K fo...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
9	Anchor Bancorp (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
10	Arrow Financial Corporation (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
11	ASSOCIATED BANC-CORP (ASB) 10-K for FY, 2...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
12	ATLANTIC CAPITAL BANCSHARES, INC. (j) 10-K...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
13	Atlantius Holdings Corp (atlc) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
14	Auburn National Bancorporation, Inc (AUBN) 1...	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
15	BANCFIRST CORP./OK/ (BANF) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
16	Bancorp 34, Inc. (bctf) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
17	Bancorp, Inc. (bbk) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
18	Bancorp of New Jersey, Inc. (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML
19	BankFinancial CORP (j) 10-K for FY, 2018	▲	▲	▲	▲	▲	▲	▲	▲	▲	▲	Explorer	HTML

BOTTOM LINE: Running the fundamental accounting concepts continuity cross checks rules to verify that

financial reports created are consistent with those rules can be done for every company that creates reports per one of many different reporting styles. We believe the same holds true for EACH reporting style.

The accounting equation helps to understand the types of errors that can occur:

Analyzing simple reports created to represent the accounting equation can help those who want to understand precisely what types of errors can exist within XBRL-based financial reports.

The results of validating a batch is uploaded to IPFS. The validation results for each report and a summary page that relates all verification results on one page is provided:

<https://auditchain.infura-ipfs.io/ipfs/QmQ8khsfrsSsnGkusa9mHBfMmGeq4NAfhNN427k7AbYkp3>

Generated by Pacioli version 0e0bc5 (updated 12 days ago). Analysis at 2022-11-25T15:51:05+0000 for someUserEmail_NotYetUsed. This report will remain online at <http://localhost:3030/report/analysis/6208ca3973425a6901566b8d668ca394cd728e2c/report/index.html> for about 90 days.



Pacioli Technical Analysis Batch Results

Reports from /workdir/Batch_Pacioli_AE.bt; this list took 263 seconds to analyse by 1 workers, and is available in JSON format [here](#) with a summary [there](#). Preliminary [metaverse](#) view.

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
2	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
3	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
4	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
5	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
6	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
7	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
8	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
9	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
10	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML
11	Report for...	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	🟢	Explorer	HTML

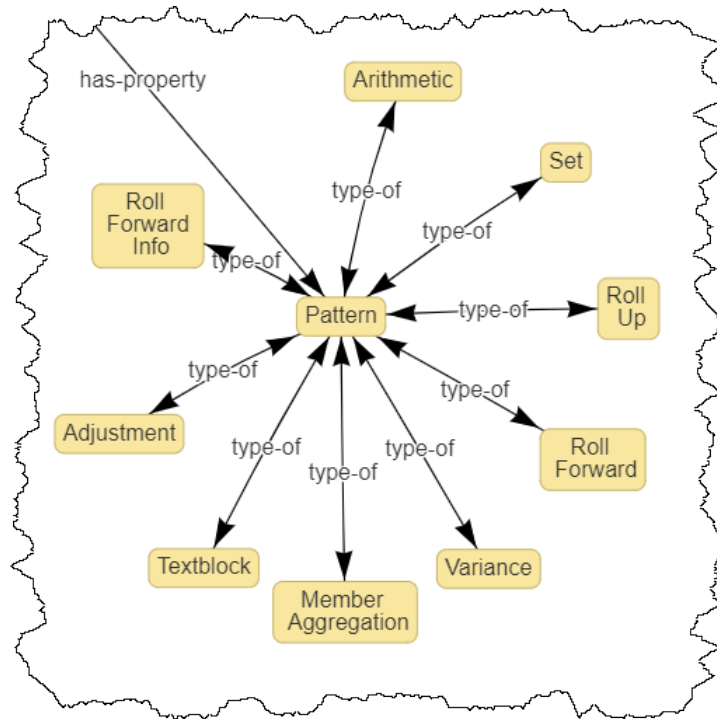
(Note that the verification result files provided above and on the summary page are different physical files.)

Proof helps one understand the potential complexity of XBRL-based financial reports and the notion of completeness:

The following Pacioli batch of reports is not part of the SEC EDGAR system, however it is provided in order to help the reader understand two important ideas.

The first idea to understand is the notion of “information complexity” that might exist within an XBRL-based financial report. SEC XBRL-based financial reports have “patterns” of information within those reports. For example, the notion of a “roll up” mathematical relation and a “text block” and a “set” of information are information patterns that clearly exist within the XBRL-based reports submitted to the SEC.

This PROOF example batch helps gain an understanding of the information complexity within scope and that the Luca Suite understands all of these information models. Here is a summary of the information models that might exist in an XBRL-based financial report.



The second idea to understand is the notion of “rule completeness”. Within XBRL-based reports submitted by public companies to the SEC there are ROLL UP mathematical relations. For example, a balance sheet and an income statement are examples of roll up relations in XBRL-based reports and XBRL calculations relations are used to represent those mathematical relations in report models.

But in addition to “roll ups”, other common mathematical relations exist in XBRL-based reports of public companies submitted to the SEC. For example, “roll forwards”, which is a common financial reporting information pattern which commonly exists in those reports.

However, XBRL calculations cannot be utilized to represent or describe those roll forward mathematical relations. But XBRL has a mechanism for representing roll forward and other such mathematical relations that are beyond the capabilities of XBRL calculations to describe and verify against the description. That mechanism is XBRL Formula.

But the SEC does not allow XBRL formula-based rules to be submitted with XBRL-based reports to the SEC EDGAR system. But if those XBRL Formulas are not provided to describe and to be used to verify the roll forward mathematical relations; then how does one know that such roll forward relations are represented correctly in XBRL-based financial reports?

The answer to that question is that you cannot know that roll forward representations are correct in XBRL-based reports submitted to the SEC by public companies unless additional information is added to such reports.

In this way, XBRL-based financial reports submitted to the SEC are “incomplete” in terms of providing a complete description of the mathematical relations between facts in such machine-readable financial reports.

As such, XBRL-based reports do not completely describe roll forward and other such mathematical

associations in financial reports that are beyond the capabilities of XBRL calculations. Therefore, such XBRL-based financial reports are not complete in this regard.

However, the PROOF reports provided are complete in terms of mathematical relations represented and are fully described and are externally validated to assure that such mathematical relations are consistent with expectations.

Other rules that are necessary to verify that a report model is consistent with financial reporting and accounting logic and rules. The PROOF makes these missing categories of rules obvious.

<https://auditchain.infura-ipfs.io/ipfs/QmXNz59iwx2GUcdGnpEU5BRrxMvwEs4EGpHea3d2bgUY7n/>

Pacioli Technical Analysis Batch Results

Reports from `/workdir/Batch_Pacioli_PROOF.txt`; this list took 205 seconds to analyse by 1 workers, and is available in JSON format [here](#) with a summary [there](#). Preliminary [metaverse](#) view.

#	Input	XBRL	Roll Ups	Formulas	Structure	FAC	Subtypes	Disclosures	Checklists	Other	Issues	Result	Technical
1	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
2	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
3	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
4	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
5	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
6	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML
7	Report for GH259400TOMPUQLS65II on 2020-12-31											Explorer	HTML

Notice that reports where GRAY logos exist and where GREEN exist. The first six reports are only verified using a subset of the total set of possible validation controls. The purpose of this is to help gain an understanding of the difference between providing and using controls for validation and not using validation. No controls means that no validation is possible. With the controls, validation is possible. If a report does not have inconsistencies, it could be because the report has an incomplete set of rules.

We propose that accurately articulating and externally proving financial state for any economic entity gains stakeholder community confidence.