

Effective Automation of Record to Report Process

Narrative for Iteration #4

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The purpose of this document is to provide details for **Iteration #4** of my record to report prototype. This iteration builds on Iteration #1 *Accounting Process Automation, Record to Report (R2R) Plus!*¹, iteration #2 *Continuous Accounting*², and iteration #3 *Effective Automation of Record to Report Process*³.

Fundamentally, the objective of this prototype of record to report is to automate as much of the accounting, reporting, auditing, and analysis steps as possible using global standard XBRL technical syntax and applying a best practices-based method⁴ to achieve this objective.

What is new in this iteration #4 is summarized as follows:

- I am using the Microsoft Dynamics accounting system database as the accounting system that is populated with The World Online (TWO) sample company data (as contrast to using hledger, ledger, and my Microsoft Access database application prototype.
- Engine B Common Data Model (CDM)⁵ is used (as contrast to audit schedules that I prototyped)
- Substantially improved version of my XBRL instance creator is being used (prior versions were not complete systems, this is a complete system)⁶

For details of Iteration #4, please see this documentation which provides a summary of steps and information for each step that is synced to the step numbers in this document:

<http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/>

The objective is to flow transactions from the accounting system general ledger all the way through to a complete financial report⁷.

STEP 1: Accounting system of an economic entity

The starting point of this process is the accounting system of some economic entity. For this iteration the “accounting system” is a Microsoft Dynamics accounting system subset of tables and data for the

¹ Accounting Process Automation, Record to Report (R2R) Plus!, <http://xbrlsite.azurewebsites.net/2020/master/automation/index.html>

² Continuous Accounting, <http://xbrlsite.azurewebsites.net/2020/master/continuous-accounting/index.html>

³ Effective Automation of Record to Report Process, <http://xbrl.squarespace.com/journal/2020/11/3/effective-automation-of-record-to-report-process.html>

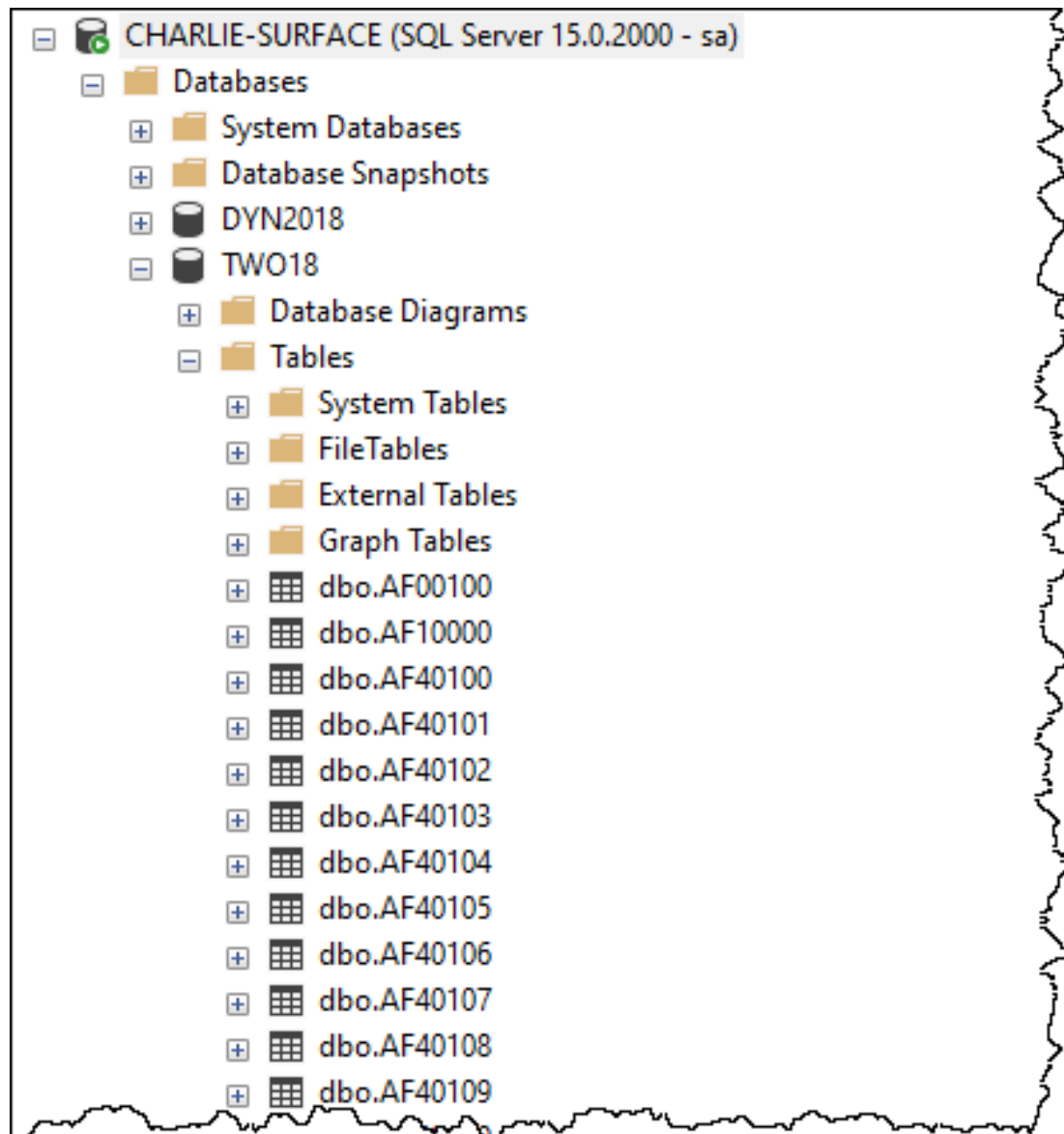
⁴ Understanding Method (Abridged), http://xbrlsite.azurewebsites.net/2020/Library/UnderstandingMethod_Abridged.pdf

⁵ Engine B Common Data Model (CDM), <http://xbrlsite.com/2020/prototypes/cdm/>

⁶ Free Open Source Tool for Creating Quality XBRL-based Digital Financial Reports, <http://xbrl.squarespace.com/journal/2020/12/8/free-open-source-tool-for-creating-quality-xbri-based-digita.html>

⁷ End Result, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/instance-RENDERED.html>

sample economic entity *The World Online* (TWO). The complete accounting system was available within a local Microsoft SQL Server:



For this iteration, a subset of a few accounting system tables (chart of accounts information, general ledger transactions,) were moved from Microsoft SQL Server to Microsoft Access database⁸ in order to make all of this information available for this prototype.

The following is a list of those tables as they would appear within the provided Microsoft Access database:

⁸ Microsoft Access database of Microsoft Dynamics TWO sample company data,
http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/TWO_AccountingSystem.zip

All Access Objects

Tables

dbo_CM00100
dbo_GL00100
dbo_GL20000
dbo_PM00200
dbo_POP10100
dbo_RM00101
dbo_RM30101
dbo_SY00302
dbo_SY01400
dbo_UPR00100

Here is a screen shot of table “GL00100”, chart of accounts:

ACTINDX	ACTNUMBR_1	ACTNUMBR_2	ACTNUMBR_3	ACTNUMBR_4	ACTNUMBR_5	ACTALIAS	MNACSGMT	ACCTTYPE	ACTDESCR	PSTNGTYP	ACCATNUM	ACTIVE
1 000	1100	00				SOA	1100	1	Cash - Operating Account	0	1	1
2 000	1110	00				SPR	1110	1	Cash - Payroll	0	1	1
3 000	1120	00				\$FB	1120	1	Cash - Flex Benefits Program	0	1	1
4 000	1130	00				\$PC	1130	1	Petty Cash	0	1	1
5 000	1140	00				\$S	1140	1	Savings	0	2	1
6 000	1200	00				AR	1200	1	Accounts Receivable	0	3	1
7 000	1205	00				SDA	1205	1	Sales Discounts Available	0	3	1
8 000	1210	00				ADA	1210	1	Allowance for Doubtful Accounts	0	3	1
9 000	1220	00				CCR	1220	1	Credit Card Receivable	0	3	1
10 000	1220	01				CCR-AE	1220	1	Credit Card Receivable-AmericaCharge	0	3	1
11 000	1220	02				CCR-D	1220	1	Credit Card Receivable-Retail	0	3	1
12 000	1220	03				CCR-M	1220	1	Credit Card Receivable-Gold	0	3	1
13 000	1220	04				CCR-V	1220	1	Credit Card Receivable-Platinum	0	3	1
14 000	1230	00				IR	1230	1	Interest Receivable	0	3	1
15 000	1240	00				NR	1240	1	Notes Receivable	0	4	1
16 000	1250	00				OR	1250	1	Other Receivables	0	3	1

This Iteration #4 focuses on performing 100% of all steps for a small set of accounting system tables. We are focusing on the chart of accounts (GL00100) and the general journal entries (GL20000) in this iteration. The number of accounting systems tables will expand in future iterations.

And so in summary, the point of step 1 is to make you aware of the accounting system database that is being used as a starting point which is the Microsoft Access database TWO_AccountingSystem.accdb which is made available for this prototype.

STEP 2: Create Complete XBRL Taxonomy

In order to get information from an accounting system into an XBRL-based report, the accounting system information needs to be mapped and converted to XBRL concepts. Generally, a financial reporting scheme XBRL Taxonomy would be used such as US GAAP or IFRS. For this Iteration #4, we will create and use a small but very high-quality ample XBRL Taxonomy with a minimum number of concepts but correctly created in order to enable the successful execution of all the steps necessary for report production. No extension concepts will be used in this iteration.

Here is the XBRL Taxonomy that we will be using for Iteration #4 which will include:

- XBRL taxonomy schema

- XBRL labels
- XBRL linkbases (presentation, calculation, definition)
- XBRL formulas
- Disclosures taxonomy
- Disclosure mechanics rules
- Reporting checklist rules
- Fundamental accounting concept relations rules
- Type-subtype associations rules
- Any company specific extensions necessary to create complete report

Here is a basic visualization of the core information that will exist in the XBRL taxonomy⁹:

Line	Label	Object Class	Period Type	Balance	Report ElementName
1	1110 - Statement - Balance Sheet	Network			http://www.xbrlsite.com/mini/role/BalanceSheet
2	Balance Sheet [Abstract]	Abstract			mini:BalanceSheetAbstract
3	Assets [Roll Up]	Abstract			mini:AssetsRollUp
4	Current Assets [Roll Up]	Abstract			mini:CurrentAssetsRollUp
5	Cash and Cash Equivalents	Concept (Monetary)	As Of	Debit	mini:CashAndCashEquivalents
6	Receivables	Concept (Monetary)	As Of	Debit	mini:Receivables
7	Inventories	Concept (Monetary)	As Of	Debit	mini:Inventories
8	Current Assets	Concept (Monetary)	As Of	Debit	mini:CurrentAssets
9	Noncurrent Assets [Roll Up]	Abstract			mini:NoncurrentAssetsRollUp
10	Property, Plant and Equipment	Concept (Monetary)	As Of	Debit	mini:PropertyPlantAndEquipment
11	Noncurrent Assets	Concept (Monetary)	As Of	Debit	mini:NoncurrentAssets
12	Assets	Concept (Monetary)	As Of	Debit	mini:Assets

The complete XBRL Taxonomy can be found here¹⁰:

Complete XBRL Taxonomy Set Used for Iteration #4:

- [mini_ModelStructure.html](#) (Basic visualization of XBRL Taxonomy)
- [mini.zip](#) (Basic XBRL Taxonomy files)
- [fundamental-accounting-concepts-relations.zip](#) (XBRL Formulas for fundamental accounting concept relations rules and concept derivation rules)
- [disclosures.zip](#) (Disclosures XBRL Taxonomy, used for Disclosure Mechanics and Reporting Checklist)
- [disclosure-mechanics.zip](#) (Download all Disclosure Mechanics rules)
- [reporting-checklist.zip](#) (Download all Reporting Checklist rules)
- [mini-def.xml](#) (XBRL definition linkbase for type-subtype rules)
- [reporting-checklist-rules-def.xml](#) (XBRL definition linkbase for reporting checklist rules)
- [modelStructure-rules-strict-def.xml](#) (XBRL definition linkbase for model structure rules)
- NOTE: We are NOT focusing on proper modularization of XBRL taxonomy, we are focusing on what a complete XBRL taxonomy looks like, how to create it.

For information about how to create an XBRL taxonomy correctly, please see *Essentials of XBRL-based Digital Financial Reporting*¹¹.

⁹ XBRL Taxonomy basic representation,

http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/mini_ModelStructure.html

¹⁰ Full XBRL Taxonomy for Iteration #4, see section "Complete XBRL Taxonomy",

<http://xbrlsite.azurewebsites.net/2020/Prototype/iteration2/>

¹¹ Essentials of XBRL-based Digital Financial Reporting,

<http://xbrlsite.azurewebsites.net/2021/essentials/EssentialsOfXBRLBasedDigitalFinancialReporting.pdf>

STEP 3: Mapping Accounting System Accounts to XBRL Taxonomy Concepts

This step involves using the XBRL Taxonomy created in STEP 2 and the accounting system chart of accounts table in STEP 1 and map the GL accounts to the XBRL concepts used to create the XBRL-based financial report.

The mapping could take several forms. XBRL concepts could be added to a field in the accounting system database table which contains the chart of accounts. For example, a user defined field that is available could be used or a new field could be added to the accounting system table (if that is allowed). That is the approach we took.

Alternatively, the mapping could be performed in the CDM table after accounting system information is put into the CDM. Alternatively, a separate table could be created which contains the mapping between the XBRL concepts and chart of accounts.

For Iteration #4, the approach of adding the XBRL concept mappings to the accounting system database was used which is mimicked by an Excel spreadsheet for easy observation¹².

ACTINDX	ACTNUMBR_1	ACTNUMBR_2	ACTNUMBR_3	ACTNUMBR_4	ACTNUMBR_5	ACTALIAS	MINACSGMT	ACCTTYPE	ACTDESCR	USERDEF1
1	000	1100	00			SOA	1100	1	Cash - Operating Account	mini:CashAndCashEquivalents
2	000	1110	00			SPR	1110	1	Cash - Payroll	mini:CashAndCashEquivalents
3	000	1120	00			SFB	1120	1	Cash - Flex Benefits Program	mini:CashAndCashEquivalents
4	000	1130	00			SPC	1130	1	Petty Cash	mini:CashAndCashEquivalents
5	000	1140	00			S5	1140	1	Savings	mini:CashAndCashEquivalents
6	000	1200	00			AR	1200	1	Accounts Receivable	mini:Receivables
7	000	1205	00			SDA	1205	1	Sales Discounts Available	mini:Receivables
8	000	1210	00			ADA	1210	1	Allowance for Doubtful Accounts	mini:Receivables
9	000	1220	00			CCR	1220	1	Credit Card Receivable	mini:Receivables
10	000	1220	01			CCR-AE	1220	1	Credit Card Receivable-AmericaCharge	mini:Receivables
11	000	1220	02			CCR-D	1220	1	Credit Card Receivable-Retail	mini:Receivables
12	000	1220	03			CCR-M	1220	1	Credit Card Receivable-Gold	mini:Receivables
13	000	1220	04			CCR-V	1220	1	Credit Card Receivable-Platinum	mini:Receivables
14	000	1230	00			IR	1230	1	Interest Receivable	mini:Receivables
15	000	1240	00			NR	1240	1	Notes Receivable	mini:Receivables
16	000	1250	00			OR	1250	1	Other Receivables	mini:Receivables
17	000	1260	00			EA	1260	1	Employee Advances	mini:Receivables
18	000	1300	01			I-RP	1300	1	Inventory - Retail/Parts	mini:Inventories
19	000	1300	02			I-FG	1300	1	Inventory - Finished Goods	mini:Inventories
20	000	1310	01			IW-RP	1310	1	Inventory Warehouse - Retail/Parts	mini:Inventories
21	000	1400	00			PEX	1400	1	Prepaid Expenses	mini:Inventories
22	000	1410	00			PI	1410	1	Prepaid Insurance	mini:Inventories
23	000	1500	00			FF	1500	1	Furniture & Fixtures	mini:PropertyPlantAndEquipment
24	000	1505	00			AD-FF	1505	1	Accumulated Depreciation-Furniture & Fix	mini:PropertyPlantAndEquipment
25	000	1510	00			CE	1510	1	Computer Equipment	mini:PropertyPlantAndEquipment
26	000	1515	00			AD-CE	1515	1	Accumulated Depreciation-Computer Equip	mini:PropertyPlantAndEquipment
27	000	1520	00			M&E	1520	1	Machinery & Equipment	mini:PropertyPlantAndEquipment

The Excel spreadsheet provided and the Microsoft Access database table dbo_GL00100 have exactly the same information. The COMPLETED version of the mappings for the table dbo_GL00100 is in the Microsoft Access database TWO_Local_Iteration4.accdb¹³.

STEP 4: Understanding Work Tags

To prepare for the next step, read the article *Tales of the Cloud: The Story of Worktags*¹⁴ which explains the notion of work tags. Effectively, work tags are a mechanism for categorizing general ledger transactions.

¹² Completed mapping for Iteration #4 in Excel,

http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/dbo_GL00100.zip

¹³ TWO_Local_Iteration4.accdb,

http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/TWO_Local_Iteration4.zip

¹⁴ *Tales of the Cloud: The Story of Worktags*, <https://blog.workday.com/en-us/2012/tales-of-the-cloud-the-story-of-worktags.html>

We will take the approach of assigning worktags to every general ledger transaction entry. Further, we are formally defining the worktags in the XBRL taxonomy created in step 2. Assume that worktags are entered when transactions are entered into the general ledger so that work is not pushed to the end of the month or end of the year. Note that worktag assignment will very likely be 80% automated and 20% manually assigned with an increase in the automated percentage and decrease in the manually assigned percentage over time.

We will take work tags to the extreme by coding 100% of general ledger transactions using work tags that are defined within our base XBRL taxonomy. This allows general ledger information to be grouped by XBRL concept and by work tag. This effectively allows for the changes to an account (i.e. roll forward) to be grouped into type of change. This enables the effective auto generation of a complete financial statement as will be seen in a moment.

STEP 5: Apply Work Tags to General Ledger Transactions

After you understand work tags and after you create the XBRL taxonomy in STEP 2 which provides the work tags themselves, general ledger transactions can be grouped effectively to generate the information necessary to create a proper balance sheet, income statement, cash flow statement, and changes in equity.

OPENYEAR	IRNENTRY	ICRTRSEQ	SOURCDOC	REFERENCE	Tag	DSCTRPTN	TRXDATE	TRXSORCE	ACTINDX	POLIDTRX	LASTUSER	LSTDTEDT	USWHPSTD	ORGNTRSC
2024	8	1	BBF	Beginning Balances for 1998	mini:OpeningBalance		12/31/2023	GLTHS000000002	429	0	LESSON USER1	1/1/1990	LESSON USER1	MCBBAL
2024	8	1	BBF	Beginning Balances for 1998	mini:OpeningBalance		12/31/2023	GLTHS000000002	430	0	LESSON USER1	1/1/1990	LESSON USER1	MCBBAL
2024	9	1	CMTRX	Bank Transaction Entry	mini:CollectionReceivables	Bank Transaction Entry	1/15/2024	GLTRX000000001	2	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	9	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/15/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	10	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/15/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	10	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/15/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	11	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/30/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	11	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/30/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	12	1	CMTRX	Bank Transaction Entry	mini:CollectionReceivables	Bank Transaction Entry	1/30/2024	GLTRX000000001	2	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	12	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/30/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	13	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/1/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	13	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable2	Bank Transaction Entry	1/1/2024	GLTRX000000001	95	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	14	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/15/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	14	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable2	Bank Transaction Entry	1/15/2024	GLTRX000000001	95	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	15	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/15/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	15	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable2	Bank Transaction Entry	1/15/2024	GLTRX000000001	99	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	16	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/15/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	16	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/15/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	17	1	CMTRX	Bank Transaction Entry	mini:CollectionReceivables	Bank Transaction Entry	1/15/2024	GLTRX000000001	4	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	17	1	CMTRX	Bank Transaction Entry	mini:NetIncomeLoss	Bank Transaction Entry	1/15/2024	GLTRX000000001	441	0		1/1/1990	LESSON USER1	CMTRX000000001
2024	18	1	CMTRX	Bank Transaction Entry	mini:PaymentOfAccountsPayable	Bank Transaction Entry	1/15/2024	GLTRX000000001	1	0		1/1/1990	LESSON USER1	CMTRX000000001

Note that I went into the accounting system general ledger transactions table (dbo_GL20000) and assigned 98% of work tags automatically using existing metadata that existed within the accounting system and then had to make a few adjustments to capture the other 2% of transactions. The field "Tag" was added to the accounting system database table dbo_GL20000. Alternative approaches could be used to create a spot in the accounting system for mapping or provide the mapping external to the accounting system. Either approach will work.

The TWO accounting system has 22,301 rows in the general ledger transactions table (dbo_GL20000). Per above, 21,855 or 98% of transactions had work tags applied automatically. The remaining 446 or 2% had to be adjusted manually. Normally, work tags can be assigned either automatically by the accounting system processing of transactions for the vast majority of transactions; the remaining transactions will require manual entry either when transactions are entered or sometime during the accounting cycle. If this is done, automated report generation can be enabled.

I would suggest that work tags be assigned within the accounting system general ledger transactions table (dbo_GL20000) prior to transferring information into the CDM.

STEP 6: Trial Balance Generation

With the XBRL Concepts and XBRL work tabs applied the general ledger trial balance can be generated not just by general ledger account code of the accounting system, but also by XBRL Concept, XBRL work tag, and a combination of XBRL Concept and XBRL work tag¹⁵:

GL transactions summarized by GL account code: (traditional, _qryJournalEntries_ByAccount)

glAccountNumber	glAccountName	SumOfamount	Count
000-1100-00	Cash - Operating Account	747531.15	530
000-1101-00	Cash in Bank - Canada	8957.84	3
000-1102-00	Cash in Bank - Australia	18302.17	6
000-1103-00	Cash in Bank - New Zealand	6007.94	2
000-1105-00	Cash in Bank - United Kingdom	12697.77	4
000-1106-00	Cash in Bank - South Africa	7501.9	4
000-1107-00	Cash in Bank - Singapore	6963.24	4
000-1110-00	Cash - Payroll	-1372491.9	1,808
000-1120-00	Cash - Flex Benefits Program	345.32	4
000-1130-00	Petty Cash	-100683.49	39
000-1140-00	Savings	16316.12	2
000-1200-00	Accounts Receivable	1990465.97	948
000-1205-00	Sales Discounts Available	3664.04	24
000-1210-00	Allowance for Doubtful Accounts	-45963.3	2
000-1220-01	Credit Card Receivable-AmericaCharge	22500	1
000-1230-00	Interest Receivable	250	1
000-1240-00	Notes Receivable	5000	1
000-1260-00	Employee Advances	250	1
000-1271-00	Accounts Receivable - Canada	26757.58	5
000-1272-00	Accounts Receivables - Australia	11164.46	5
000-1273-00	Accounts Receivable - New Zealand	9381.79	1
000-1275-00	Accounts Receivable - United Kingdom	2003.24	5
000-1276-00	Accounts Receivable - South Africa	6772.78	5

There are many other grouping of the information that can be created from within the accounting system; but we are more interested in the sorts of groupings that you COULD NOT do before because information did not exist in the accounting system database but you CAN DO NOW because we added the XBRL concept and worktags to the accounting system information. For example, below you see the pre close general ledger trial balance summarized by XBRL concept: (_qryJournalEntries_ByXBRLConcept)


userDefined2	SumOfamount	Count
mini:AccountsPayable	-2,689,452.31	8,901
mini:CashAndCashEquivalents	-648,551.94	2,406
mini:CostsOfSales	886,041.18	568
mini:DepreciationAndAmortization	21,428.16	5
mini:Inventories	451,842.19	898
mini:LongtermDebt	-338,349.05	23
mini:NonoperatingIncomeExpenses	-2,165.93	22
mini:PropertyPlantAndEquipment	1,245,567.16	15
mini:Receivables	2,035,468.27	1,004
mini:RetainedEarnings	-1,407,646.64	9
mini:Sales	-2,604,048.36	615
mini:SalesGeneralAndAdministrativeExpenses	3,049,867.27	7,822

¹⁵ Examples of transaction and trial balance groupings in Excel (these also exist in the database provided), <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/glTransactionsAndTrialBalance.zip>

Below we make one modification to the query, summarizing the SumOfAmount and Count columns so that you can see that (a) the trial balance balances (i.e. debits = credits) and that the Count of transactions is the same as the total number of transactions in the database table dbo_GL20000.

userDefined2	SumOfamount	Count
mini:AccountsPayable	-2,689,452.31	8,901
mini:CashAndCashEquivalents	-648,551.94	2,406
mini:CostsOfSales	886,041.18	568
mini:DepreciationAndAmortization	21,428.16	5
mini:Inventories	451,842.19	898
mini:LongtermDebt	-338,349.05	23
mini:NonoperatingIncomeExpenses	-2,165.93	22
mini:PropertyPlantAndEquipment	1,245,567.16	15
mini:Receivables	2,035,468.27	1,004
mini:RetainedEarnings	-1,407,646.64	9
mini:Sales	-2,604,048.36	615
mini:SalesGeneralAndAdministrativeExpenses	3,049,867.27	7,822
	0.00	22,288

Similarly, we can group the general ledger transactions by the worktags that we assigned as contrast to the chart of accounts code: (query _qryJournalEntries_ByTag)

 _qryJournalEntries_ByTag		
tags	SumOfamount	Count
mini:AdditionalLongtermBorrowings2	-11,458.10	2
mini:CollectionReceivables	2,072,035.32	402
mini:CollectionReceivables2	-2,038,347.91	459
mini:CostsOfSales2	-1,543,602.24	549
mini:DepreciationAndAmortization2	-21,428.16	5
mini:NetIncomeLoss	1,351,122.32	9,032
mini:OpeningBalance	0.00	98
mini:PaymentOfAccountsPayable	-3,119,525.02	1,993
mini:PaymentOfAccountsPayable2	1,889,636.81	418
mini:PurchasesOfInventoryForSale	1,528,434.23	344
mini:PurchasesOfInventoryForSale2	-2,983,739.70	8,434
mini:RepaymentLongtermBorrowings2	34,394.74	16
mini:Sales2	2,842,477.71	536

Again, looking at this query with totals for the SumOfAmount and Count you see that the debits are equal to credits again (as one would expect) and that the total count of transactions is the same as the grouping by XBRL concept:

tags	SumOfamount	Count
mini:AdditionalLongtermBorrowings2	-11,458.10	2
mini:CollectionReceivables	2,072,035.32	402
mini:CollectionReceivables2	-2,038,347.91	459
mini:CostsOfSales2	-1,543,602.24	549
mini:DepreciationAndAmortization2	-21,428.16	5
mini:NetIncomeLoss	1,351,122.32	9,032
mini:OpeningBalance	0.00	98
mini:PaymentOfAccountsPayable	-3,119,525.02	1,993
mini:PaymentOfAccountsPayable2	1,889,636.81	418
mini:PurchasesOfInventoryForSale	1,528,434.23	344
mini:PurchasesOfInventoryForSale2	-2,983,739.70	8,434
mini:RepaymentLongtermBorrowings2	34,394.74	16
mini:Sales2	2,842,477.71	536
	0.00	22,288

The important point to take away here is that while the set of transactions is the same for each of the queries of the general ledger transaction (i.e. dbo_GL20000); depending upon what information you ask for and what information is actually in that table determines what queries you can get from querying the database.

The query _qryJournalEntries_XBRLConceptAndByTag returns all transactions grouped by BOTH the XBRL concept and the formal XBRL worktag that was assigned to each general ledger transaction entry: (again, debits=credits and the count of transactions is the same)

userDefined2	tags	SumOfamount	Count
mini:AccountsPayable	mini:OpeningBalance	-1,595,349.42	49
mini:AccountsPayable	mini:PaymentOfAccountsPayable2	1,889,636.81	418
mini:AccountsPayable	mini:PurchasesOfInventoryForSale2	-2,983,739.70	8,434
mini:CashAndCashEquivalents	mini:CollectionReceivables	2,072,035.32	402
mini:CashAndCashEquivalents	mini:OpeningBalance	398,937.76	11
mini:CashAndCashEquivalents	mini:PaymentOfAccountsPayable	-3,119,525.02	1,993
mini:CostsOfSales	mini:NetIncomeLoss	886,041.18	568
mini:DepreciationAndAmortization	mini:NetIncomeLoss	21,428.16	5
mini:Inventories	mini:CostsOfSales2	-1,543,602.24	549
mini:Inventories	mini:OpeningBalance	467,010.20	5
mini:Inventories	mini:PurchasesOfInventoryForSale	1,528,434.23	344
mini:LongtermDebt	mini:AdditionalLongtermBorrowings2	-11,458.10	2
mini:LongtermDebt	mini:OpeningBalance	-361,285.69	5
mini:LongtermDebt	mini:RepaymentLongtermBorrowings2	34,394.74	16
mini:NonoperatingIncomeExpenses	mini:NetIncomeLoss	-2,165.93	22
mini:PropertyPlantAndEquipment	mini:DepreciationAndAmortization2	-21,428.16	5
mini:PropertyPlantAndEquipment	mini:OpeningBalance	1,266,995.32	10
mini:Receivables	mini:CollectionReceivables2	-2,038,347.91	459
mini:Receivables	mini:OpeningBalance	1,231,338.47	9
mini:Receivables	mini:Sales2	2,842,477.71	536
mini:RetainedEarnings	mini:OpeningBalance	-1,407,646.64	9
mini:Sales	mini:NetIncomeLoss	-2,604,048.36	615
mini:SalesGeneralAndAdministrativeExpenses	mini:NetIncomeLoss	3,049,867.27	7,822
		0.00	22,288

Here we see a query (_qryJE_SummaryByAccount_GroupedByConcept) that returns the beginning balance of every account, changes to the account, and the ending balance of every account that is PRE CLOSE and summarized by XBRL concept that is mapped to the chart of accounts:

fsCaption	BeginningBalance	Changes	Ending Balance
mini:AccountsPayable	-1,595,349.42	-1,094,102.89	-2,689,452.31
mini:CashAndCashEquivalents	398,937.76	-1,047,489.70	-648,551.94
mini:CostsOfSales	0.00	886,041.18	886,041.18
mini:DepreciationAndAmortization	0.00	21,428.16	21,428.16
mini:IncomeTaxExpenseBenefit	0.00	0.00	0.00
mini:Inventories	467,010.20	-15,168.01	451,842.19
mini:LongtermDebt	-361,285.69	22,936.64	-338,349.05
mini:NonoperatingIncomeExpenses	0.00	-2,165.93	-2,165.93
mini:PropertyPlantAndEquipment	1,266,995.32	-21,428.16	1,245,567.16
mini:Receivables	1,231,338.47	804,129.80	2,035,468.27
mini:RetainedEarnings	-1,407,646.64	0.00	-1,407,646.64
mini:Sales	0.00	-2,604,048.36	-2,604,048.36
mini:SalesGeneralAndAdministrativeExpenses	0.00	3,049,867.27	3,049,867.27
	0.00	0.00	0.00

Below you see the preliminary roll forward information by balance sheet account which is retrieved using the query _qryJournalEntries_XBRLConceptAndByTag: (color coding is added to help you see the roll forward)

userDefined2	tags	SumOfamount	Count
mini:AccountsPayable	mini:OpeningBalance	-1,595,349.42	49
mini:AccountsPayable	mini:PaymentOfAccountsPayable2	1,889,636.81	418
mini:AccountsPayable	mini:PurchasesOfInventoryForSale2	-2,983,739.70	8,434
mini:CashAndCashEquivalents	mini:CollectionReceivables	2,072,035.32	402
mini:CashAndCashEquivalents	mini:OpeningBalance	398,937.76	11
mini:CashAndCashEquivalents	mini:PaymentOfAccountsPayable	-3,119,525.02	1,993
mini:CostsOfSales	mini:NetIncomeLoss	886,041.18	568
mini:DepreciationAndAmortization	mini:NetIncomeLoss	21,428.16	5
mini:Inventories	mini:CostsOfSales2	-1,543,602.24	549
mini:Inventories	mini:OpeningBalance	467,010.20	5
mini:Inventories	mini:PurchasesOfInventoryForSale	1,528,434.23	344
mini:LongtermDebt	mini:AdditionalLongtermBorrowings2	-11,458.10	2
mini:LongtermDebt	mini:OpeningBalance	-361,285.69	5
mini:LongtermDebt	mini:RepaymentLongtermBorrowings2	34,394.74	16
mini:NonoperatingIncomeExpenses	mini:NetIncomeLoss	-2,165.93	22
mini:PropertyPlantAndEquipment	mini:DepreciationAndAmortization2	-21,428.16	5
mini:PropertyPlantAndEquipment	mini:OpeningBalance	1,266,995.32	10
mini:Receivables	mini:CollectionReceivables2	-2,038,347.91	459
mini:Receivables	mini:OpeningBalance	1,231,338.47	9
mini:Receivables	mini:Sales2	2,842,477.71	536
mini:RetainedEarnings	mini:OpeningBalance	-1,407,646.64	9
mini:Sales	mini:NetIncomeLoss	-2,604,048.36	615
mini:SalesGeneralAndAdministrativeExpenses	mini:NetIncomeLoss	3,049,867.27	7,822
		0.00	22,288

And below you see the ultimate objective that we are trying to achieve by going through all this work which is to create a roll forward POST CLOSE for every balance sheet line item which you can see below for the line item Cash and Cash Equivalents¹⁶:

Cash and Cash Equivalents [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Cash and Cash Equivalents [Roll Forward]	
Cash and Cash Equivalents, Beginning Balance	398,937.76
Collection of Receivables	2,072,035.32
Payment of Accounts Payable	(3,096,588.38)
Additional Long-term Borrowings	10,554.36
Repayment of Long-term Borrowings	(33,491.00)
Capital Additions of Property, Plant and Equipment	.00
Cash and Cash Equivalents, Ending Balance	(648,551.94)

Here you see a similar example for the Receivables line item roll forward¹⁷:

Receivables [Roll Forward]	Period [Axis]
	2020-01-01 - 2020-12-31
Receivables [Roll Forward]	
Receivables, Beginning Balance	1,231,338.47
Sales 2	2,604,048.36
Collection of Receivables 2	(1,799,918.56)
Receivables, Ending Balance	2,035,468.27

Similarly, roll forwards are provided for each of the seven balance sheet line items that are on the trial balance. Further, note that the work tags that are used in the general ledger is how the changes are summarized from the general ledger transactions.

And so, below you see the general ledger trial balance and the summary of changes represented in the autogenerated XBRL-based financial report that we are creating:

¹⁶ Cash and Cash Equivalents Roll Forward, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/contents/index.html#Rendering-CashAndCashEquivalents-Implied.html>

¹⁷ Receivables Roll Forward, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/contents/index.html#Rendering-Receivables-Implied.html>

Trial balance¹⁸:

Trial Balance [Roll Up]	Period [Axis]	
	2020-12-31	2019-12-31
Trial Balance [Roll Up]		
Cash and Cash Equivalents	(648,551.94)	398,937.76
Receivables	2,035,468.27	1,231,338.47
Inventories	451,842.19	467,010.20
Property, Plant and Equipment	1,245,567.16	1,266,995.32
Accounts Payable	(2,689,452.31)	(1,595,349.42)
Long-term Debt	(338,349.05)	(361,285.69)
Retained Earnings	(56,524.32)	(1,407,646.64)
Check Sum	.00	.00

Changes summary¹⁹:

Changes Summary [Roll Up]	Period [Axis]
	2020-01-01 - 2020-12-31
Changes Summary [Roll Up]	
Collection of Receivables	2,072,035.32
Payment of Accounts Payable	(3,096,588.38)
Additional Long-term Borrowings 2	10,554.36
Repayment of Long-term Borrowings 2	(33,491.00)
Capital Additions of Property, Plant and Equipment 2	.00
Sales 2	2,604,048.36
Collection of Receivables 2	(1,799,918.56)
Purchases of Inventory for Sale	870,873.17
Costs of Sales 2	(886,041.18)
Capital Additions of Property, Plant and Equipment	.00
Depreciation and Amortization 2	(21,428.16)
Purchases of Inventory for Sale 2	(2,983,739.70)
Payment of Accounts Payable 2	1,889,636.81
Additional Long-term Borrowings	(10,554.36)
Repayment of Long-term Borrowings	33,491.00
Net Income (Loss)	1,351,122.32
Check Sum Changes	.00

¹⁸ Trial balance, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/contents/index.html#Rendering-TrialBalance-Implied.html>

¹⁹ Changes summary, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/contents/index.html#Rendering-Transactions-Implied.html>

A set of queries created lets a business professional examine all of this information in detail and at any level of granularity all the way down to the individual general ledger transaction entry and all the way up to the summarized information within a financial report.

While queries can be built on top of the accounting system; the queries can likewise be built on top of the accounting system information exported to the CDM database. As you will see next, the CDM database is simply the exact same thing as the accounting system database with (a) unnecessary information eliminated, (b) all table names being standard and (c) all fields within each table being standard.

STEP 7: Common Data Model (CDM)

The accounting system database tables are converted to the Engine B Common Data Model (CDM). For this to be possible, first the CDM needs to exist and work correctly and effectively by providing 100% of the information we need to process the queries. This is the version of the Engine B Common Data Model (CDM) that I am using²⁰ which is hosted on my server and has been converted from Engine B's JSON representation into an XBRL-based representation:

Structures

Structures (entities) define permissible sets of associated terms per a logical conceptualization.

Information about defined structures: ([List of all Structures](#)) | ([Machine Readable](#))

GL

#	Category	Entity	Process (Standard)	Description
3	Entity	bankAccountMasterData	GL	Bank account master data by bank account.
4	Entity	businessUnit	GL	Business unit master data by business unit.
5	Entity	chartOfAccounts	GL	Chart of accounts information by general ledger account.
13	Entity	glDetail	GL	General ledger detail transactions by journal entry for each general journal entry.
23	Entity	segmentListing	GL	Segment listing
24	Entity	sourceListing	GL	Transaction source listing master data for each accounting subsystem.
26	Entity	taxTable	GL	Tax table master data by tax table identifier.
27	Entity	trialBalance	GL	Trial balance information per general ledger subsystem.
28	Entity	userListing	GL	User master data by system user.

Last updated: 11/20/2020 12:53:24 PM

Iteration #4 focused on only TWO of the CDM tables: **chartOfAccounts** and **glDetail**. However, accounting system tables exist for 10 CDM tables.

²⁰ Engine B Common Data Model (CDM), <http://xbrlsite.com/2020/prototypes/cdm/Structures.html>

To get the accounting system data out of the accounting system and into the CDM format, I used XBRL. Effectively, I created two XBRL instances supported by the CMD XBRL taxonomy which verifies that the XBRL instances are created correctly: chartOfAccounts²¹; glDetail²².

The accounting system was mapped to the CDM database format (tables and fields) using a SQL query (SQL Server View). Here are the queries for the two tables used in this Iteration #4. The following is a copy of the two queries:

chartOfAccounts:

```
SELECT ACTINDX, Trim([ACTNUMBR_1]) & "-" & Trim([ACTNUMBR_2]) & "-" & Trim([ACTNUMBR_3]) AS glAccountNumber, "account" AS accountType, Trim([ACTDESCR]) AS glAccountName, USERDEF1 AS fsCaption FROM dbo_GL00100;
```

glDetail:

```
SELECT Trim([dbo_GL00100.ACTNUMBR_1]) & "-" & Trim([dbo_GL00100.ACTNUMBR_2]) & "-" & Trim([dbo_GL00100.ACTNUMBR_3]) AS glAccountNumber, Trim([ACTDESCR]) AS userDefined1, dbo_GL00100.USERDEF1 AS userDefined2, dbo_GL20000.SOURCDOC AS journalEntryType, dbo_GL20000.JRNENTRY AS journalId, dbo_GL20000.TRXDATE AS period, [dbo_GL20000.DEBITAMT]+([dbo_GL20000.CRDTAMNT]*-1) AS amount, If([amount]>=0,"D","C") AS amountCreditDebitIndicator, dbo_GL20000.REFERENCE AS jeLineDescription, dbo_GL20000.CURNCYID AS reportingAmountCurrency, dbo_GL20000.DEX_ROW_ID AS transactionId, Trim([USWHPSTD]) AS enteredBy, dbo_GL20000.LSTDTEDT AS enteredDateTime, dbo_GL20000.Tag AS tags FROM dbo_GL00100 INNER JOIN dbo_GL20000 ON dbo_GL00100.ACTINDX = dbo_GL20000.ACTINDX WHERE (((dbo_GL20000.JRNENTRY)<>28)) ORDER BY dbo_GL20000.DEX_ROW_ID;
```

(NOTE that this query removes a few journal entries that relate to non-financial transactions posted to the GL.)

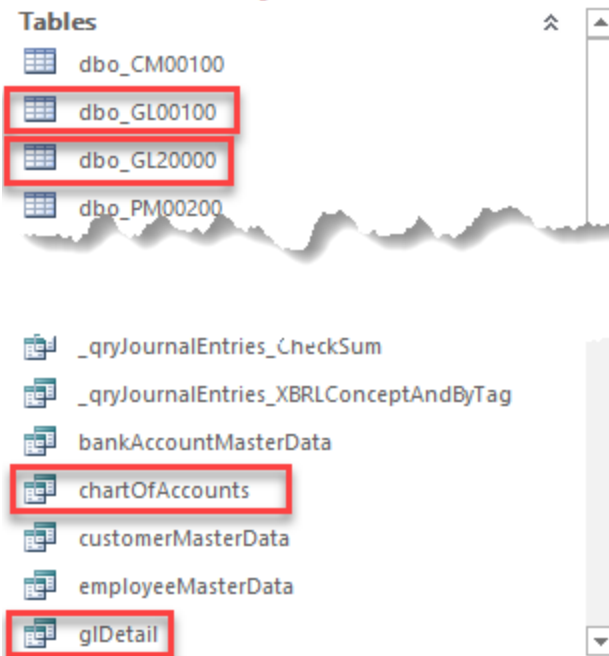
And so, the queries take the information from the Microsoft Access database TWO_AccountingSystem.accdb that mimics the Microsoft SQL Server data for you for this prototype and converts the proprietary Microsoft Dynamics database table and field names to the Engine B Common Data Model (CDM) table and field names in the Microsoft Access database TWO_Local_Iteration4.accdb to make this information available for this prototype.

Fundamentally, what is going on is that accounting system data is being out into a standard model so that standard software can be used to work on the data (as contrast to having to create a separate application for each different accounting system that exists).

²¹ chartOfAccounts XBRL instance, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/iteration2-instance-chartOfAccounts.xml>

²² glDetail XBRL instance, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/iteration2-instance-glDetail.xml>

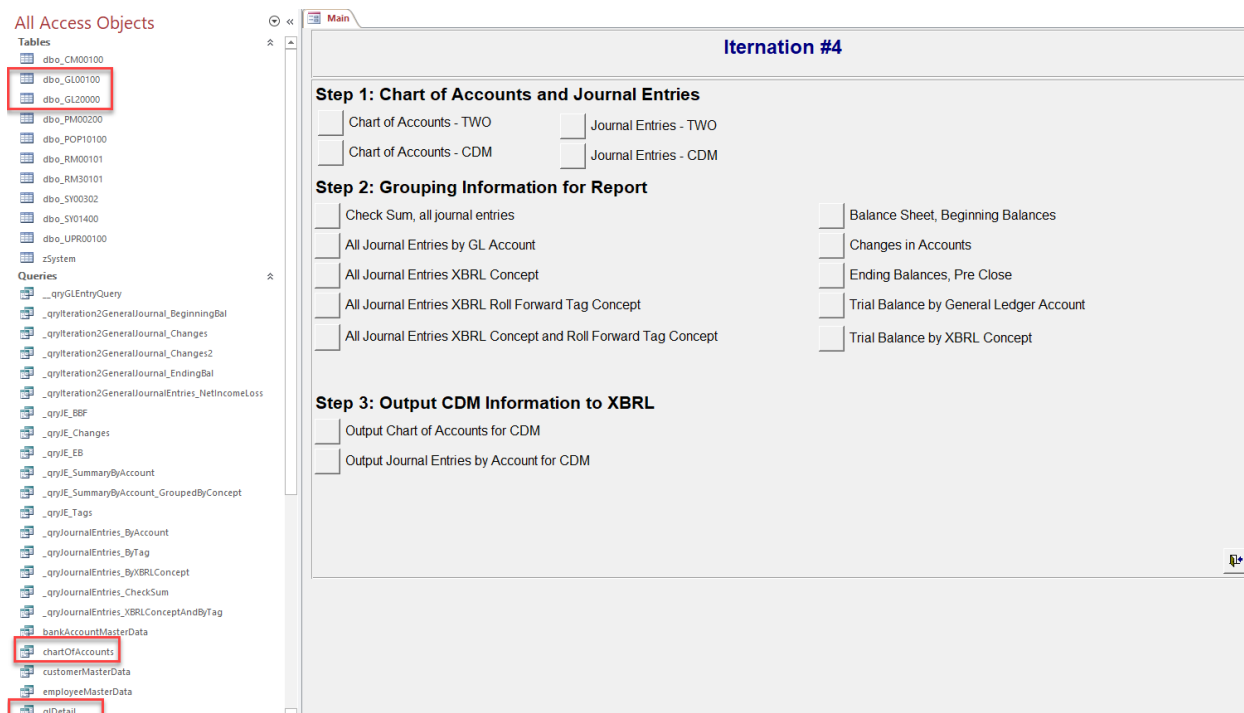
All Access Objects



STEP 8: Accounting System Data in CDM Database

This step mimics taking what would exist in the Microsoft Dynamics environment by putting the accounting system MSSQL database tables into Microsoft Access and then creating queries that enable you to look at The World Online data tables and fields using the standard CDM database tables and fields within a Microsoft Access database²³ (TWO_Local_Iteration4.accdb). All further processing will occur within this Microsoft Access database. The accounting system database tables are converted to the Engine B Common Data Model (CDM) in this same database.

²³ Microsoft Access database with CDM data from accounting system,
http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/TWO_Local_Iteration4.zip



This Microsoft Access database should run on any computer that has Microsoft Access installed. I have not tried to run this using the Microsoft Access runtime.

STEP 9: Report Writer

All prior processes enable all of the "leaf items" what would exist in a financial report to be generated in the XBRL format. This includes the chart of accounts which has been mapped to XBRL concepts and grouped by those concepts which provide real account balance information and the work tags which are XBRL concepts which categorize the changes to each account.

Saying this another way, the chart of accounts represents the detailed line items of a financial report. However, we also need the high-level branch items of the financial report (i.e. totals and subtotals) in the XBRL-based report. For that, we need to go back to the XBRL taxonomy²⁴. The XBRL taxonomy has both the leaf nodes and the branch node information and the relationship between leaves and branches:

²⁴ Basic view of XBRL taxonomy,
http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/mini_ModelStructure.html

Line	Label	Object Class	Period Type	Balance	Report ElementName
1	1110 - Statement - Balance Sheet	Network			http://www.xbrl-site.com/mini/role/BalanceSheet
2	Balance Sheet [Abstract]	Abstract			mini:BalanceSheetAbstract
3	Assets [Roll Up]	Abstract			mini:AssetsRollUp
4	Current Assets [Roll Up]	Abstract			mini:CurrentAssetsRollUp
5	Cash and Cash Equivalents	Concept (Monetary)			mini:CashAndCashEquivalents
6	Receivables	Concept (Monetary)			mini:Receivables
7	Inventories	Concept (Monetary)			mini:Inventories
8	Current Assets	Concept (Monetary)	As Of	Debit	mini:CurrentAssets
9	Noncurrent Assets [Roll Up]	Abstract			mini:NoncurrentAssetsRollUp
10	Property, Plant and Equipment	Concept (Monetary)	As Of	Debit	mini:PropertyPlantAndEquipment
11	Noncurrent Assets	Concept (Monetary)	As Of	Debit	mini:NoncurrentAssets
12	Assets	Concept (Monetary)			mini:Assets
13	Liabilities and Equity [Roll Up]	Abstract			mini:LiabilitiesAndEquityRollUp
14	Liabilities [Roll Up]	Abstract			mini:LiabilitiesRollUp
15	Current Liabilities [Roll Up]	Abstract			mini:CurrentLiabilitiesRollUp
16	Accounts Payable	Concept (Monetary)	As Of	Credit	mini:AccountsPayable
17	Current Liabilities	Concept (Monetary)	As Of	Credit	mini:CurrentLiabilities
18	Noncurrent Liabilities [Roll Up]	Abstract			mini:NoncurrentLiabilitiesRollUp
19	Long-term Debt	Concept (Monetary)	As Of	Credit	mini:LongtermDebt
20	Noncurrent Liabilities	Concept (Monetary)	As Of	Credit	mini:NoncurrentLiabilities
21	Liabilities	Concept (Monetary)	As Of	Credit	mini:Liabilities
22	Equity [Roll Up]	Abstract			mini:EquityRollUp
23	Retained Earnings	Concept (Monetary)	As Of	Credit	mini:RetainedEarnings
24	Equity	Concept (Monetary)	As Of	Credit	mini:Equity
25	Liabilities and Equity	Concept (Monetary)	As Of	Credit	mini:LiabilitiesAndEquity

Leafs

Branch

Note that the leaves/branches are easy for humans to read in the XBRL presentation relations; however, they are best read by the XBRL calculation relations and XBRL definition relations for actual processing by machine-based processes.

This task is hard coded by me for this prototype given my limitations in programming skills. A skilled programmer can easily achieve what is necessary.

The module "BuildXBRLInstanceFacts" in the Microsoft Access database "xbrl-gl-ImportAndFactsGeneration.accdb" has the SQL queries that are used to generate information for facts that represent the totals and subtotals in the XBRL instance being generated. Here is one example SQL query which is used to compute the subtotal (branch) mini:CurrentAssets from its leaves mini:CashAndCashEquivalents, mini:Receivables, and mini:Inventories:

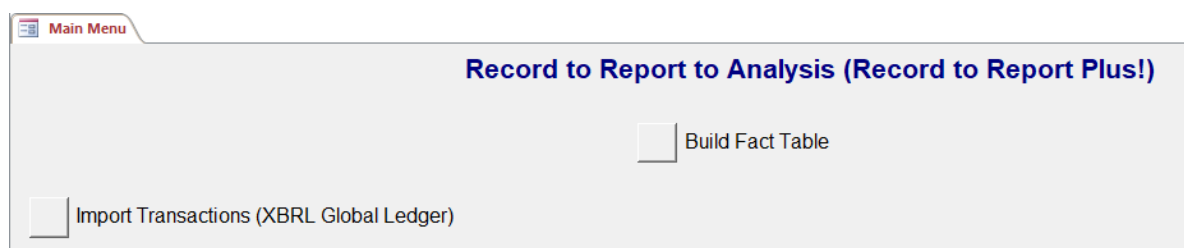
```
"INSERT INTO Facts (ReportingEntityAspect, CalendarPeriodAspect, ConceptAspect, FactValue,
Units, Rounding, ContextRef, UnitsRef ) SELECT ReportingEntityAspect, TransactionPeriod,
'mini:CurrentAssets' AS GeneralLedgerAccountCode, Sum(Amount) AS SumOfAmount, Units,
Rounding, ContextRef, UnitsRef FROM qrySubtotalsOpeningBalances WHERE
(GeneralLedgerAccountCode = 'mini:CashAndCashEquivalents' OR GeneralLedgerAccountCode =
'mini:Receivables' OR GeneralLedgerAccountCode = 'mini:Inventories') GROUP BY
ReportingEntityAspect, TransactionPeriod, 'mini:CurrentAssets', Units, Rounding, ContextRef,
UnitsRef;"
```

Note that this process must be done correctly using pre-close information or post-close information depending upon which line items you are working with.

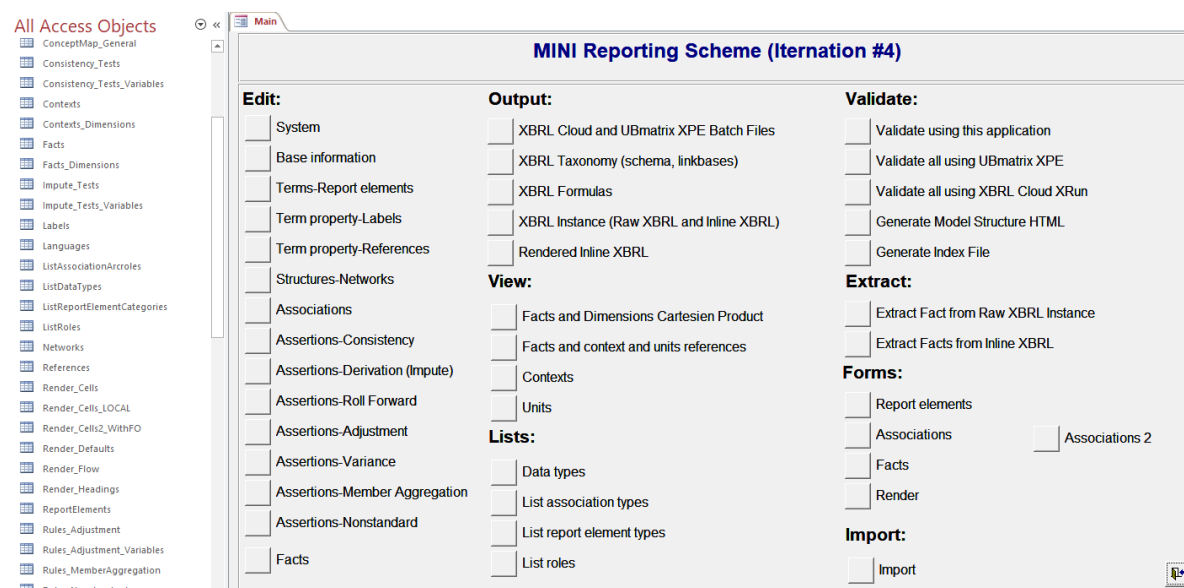
STEP 10: Import Leaves and Branches to XBRL Instance Creator

Note that I have a PROTOTYPE that imports information from XBRL GL (i.e. rather than the CDM XBRL format), generates the leaves and branches and other information that ends up as XBRL facts, and

outputs an XBRL instance. See [xbrl-gl-JournalEntries-Instance.zip](#)²⁵. Due to my limited programming skills, I cannot make this work dynamically (i.e. you change the XBRL taxonomy, the fact generation changes to reflect the XBRL taxonomy changes).



Next, information from the CDM (i.e. summarized trial balance information, the leaf information) and the computation of totals and subtotals (i.e. the branch information) is imported into a tool used to generate XBRL-based financial reports²⁶:



Beginning balances, ending balances, and changes are all imported from the CDM database tables using some software application. The result is a set of facts that use the base XBRL taxonomy created in STEP 2. The XBRL concepts and XBRL work tags were used to summarize the details and generate the account information and the XBRL taxonomy information and leaf facts are used to generate the subtotals and totals. This results in a set of facts which makes up the XBRL instance:

²⁵ Import and fact creation from previous example that works,
<http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/xbrl-gl-JournalEntries-Instance.zip>

²⁶ Microsoft Access database (TWO_Local_Iteration2.accdb),
http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/TWO_Local_Iteration2.zip

Facts								
Key	ReportingEntityAspect	CalendarPeriodAspect	ConceptAspect	FactValue	Units	Rounding	ContextRef	
5567	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:AccountsPayable	1595349.42	iso4217:USD	2	I-2019
5568	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:CashAndCashEquivalents	398937.76	iso4217:USD	2	I-2019
5569	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:Inventories	467010.20	iso4217:USD	2	I-2019
5570	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:LongtermDebt	361285.69	iso4217:USD	2	I-2019
5571	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:PropertyPlantAndEquipment	1266995.32	iso4217:USD	2	I-2019
5572	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:Receivables	1231338.47	iso4217:USD	2	I-2019
5573	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2019-12-31	mini:RetainedEarnings	1407646.64	iso4217:USD	2	I-2019
5574	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:AccountsPayable	2689452.31	iso4217:USD	2	I-2020
5575	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:CashAndCashEquivalents	-648551.94	iso4217:USD	2	I-2020
5576	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:Inventories	451842.19	iso4217:USD	2	I-2020
5577	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:LongtermDebt	338349.05	iso4217:USD	2	I-2020
5578	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:PropertyPlantAndEquipment	1245567.16	iso4217:USD	2	I-2020
5579	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:Receivables	2035468.27	iso4217:USD	2	I-2020
5580	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-12-31	mini:RetainedEarnings	56524.32	iso4217:USD	2	I-2020
5581	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:AdditionalLongtermBorrowings	10554.36	iso4217:USD	2	D-2020
5582	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:AdditionalLongtermBorrowings2	10554.36	iso4217:USD	2	D-2020
5585	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:CapitalAdditionsPropertyPlantAndEquipment	0	iso4217:USD	2	D-2020
5586	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:CapitalAdditionsPropertyPlantAndEquipment2	0	iso4217:USD	2	D-2020
5587	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:CollectionReceivables	2072035.32	iso4217:USD	2	D-2020
5588	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:CollectionReceivables2	1799918.56	iso4217:USD	2	D-2020
5589	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:CostsOfSales2	886041.18	iso4217:USD	2	D-2020
5590	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:DepreciationAndAmortization2	21428.16	iso4217:USD	2	D-2020
5592	30810137d58f76b84afd	http://standards.iso.org/iso/17442	2020-01-01 2020-12-31	mini:PaymentOfAccountsPayable	3096388.38	iso4217:USD	2	D-2020

This report production process is currently achieved using the provided Microsoft Access database application²⁷ (XBRLCreator-V05-iteration2.accdb) which should work on computers that run Microsoft Windows 10 and have Microsoft Access installed.

However, there are two XBRL processors (XBRL Cloud's XRun and UBmatrix's XPE 4.0) that cannot be provided as part of this prototype because those applications are licensed commercial software. XRun and XPE are used to verify the XBRL-based report to be certain it is a properly functioning logical system and properly formatted XBRL technical syntax using my method²⁸.

Commercial licenses for this software could be purchased or other software which provides similar functionality could be used. Alternatively, open source software such as Arelle²⁹ could be used; however, Arelle tends to be harder to use and does not provide all of the necessary functionality.

Pesseract³⁰ can be used to verify certain aspects of the XBRL-based financial report such as the fundamental accounting concepts, model structure, disclosure mechanics rules, and reporting checklist rules. However, Pesseract is only a working proof of concept and is not a fully compliant XBRL processor or XBRL formula processor at this time.

Pacioli³¹, which is a logic engine that is currently not yet complete, can also provide certain functionality to help verify that the XBRL instance and XBRL taxonomy generated are properly functioning.

The current raw XBRL instance generated as part of iteration #4 loads into Pesseract successfully without error and verifies some aspects of the XBRL syntax, model structure, type-subtype associations, fundamental accounting concept relations consistency cross checks, disclosure mechanics, and reporting checklist. See the screen shot below:

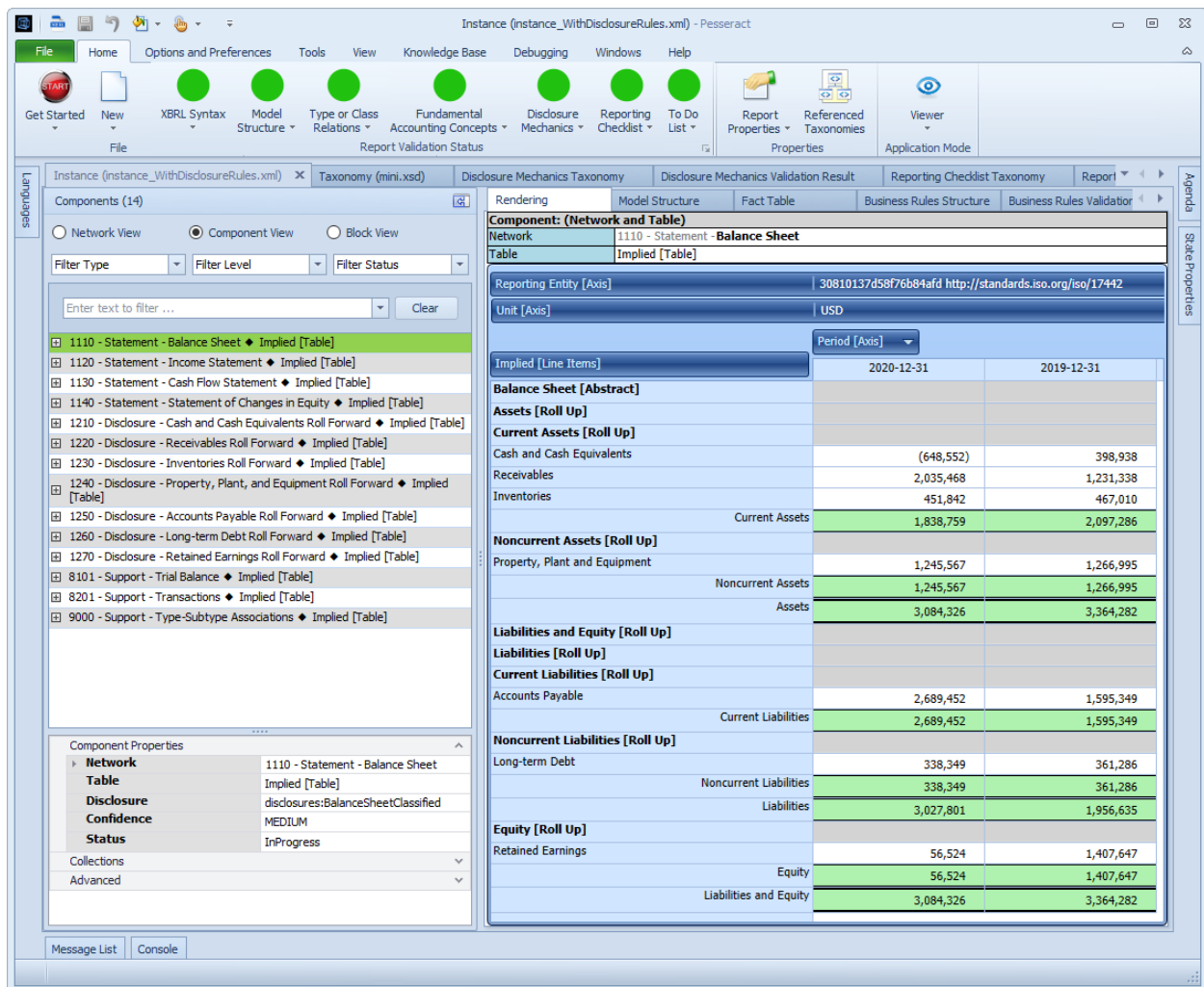
²⁷ Report generation Microsoft Access database, <http://xbrl.azurewebsites.net/2021/prototypes/recordToReport/XBRLCreator-V05-iteration2.zip>

²⁸ Understanding Method (Abridged), http://xbrl.azurewebsites.net/2020/Library/UnderstandingMethod_Abridged.pdf

²⁹ Arelle.org, <https://arelle.org/arelle/>

³⁰ Pesseract, <http://pesseract.azurewebsites.net>

³¹ Pacioli, <http://xbrl.squarespace.com/journal/2020/9/15/pacioli.html>



Any XBRL processor, XBRL formula processor, and supplemental processing should provide the same result which proves that the XBRL instance and XBRL taxonomy generated from this prototype are properly functioning logical systems that are consistent, complete, and precise per the best practices method used to verify this prototype.

STEP 11: Report Generation of XBRL-based Financial Reports

The output of the report generation process (XBRLCreator-V05-iteration4.accdb³²) is a variety of XBRL-based financial reports which will be explained below. Each of the reports uses exactly the same XBRL taxonomy, XBRL formula based rules, and all other supporting base XBRL taxonomy to verify that the report is created correctly. Each of the XBRL instances is important to understand.

Raw XBRL instance:

³² XBRLCreator-V05-iteration4.accdb,
<http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/XBRLCreator-V05-iteration4.zip>

First, a raw XBRL instance³³ is generated. Raw XBRL is machine readable however it can be effectively converted to many other formats using software based processes. For example, the raw XBRL instance (and any of the other Inline XBRL formats for that matter) can be converted into a human-readable HTML based representation such as this auto generated from only the XBRL instance and supporting XBRL taxonomy by XBRL Cloud³⁴: (called the XBRL Cloud Evidence Package)

Component Perspective

Overview Perspective

▼ Statements - Detail (4)

1110 - Statement - Balance Sheet

Rendering | Model Structure | Fact Table
Business Rules | Combined

1120 - Statement - Income Statement

Rendering | Model Structure | Fact Table
Business Rules | Combined

1130 - Statement - Cash Flow Statement

Rendering | Model Structure | Fact Table
Business Rules | Combined

1140 - Statement - Statement of Changes in Equity

Rendering | Model Structure | Fact Table
Business Rules | Combined

► Notes - Level 4 Detail (10)

► All Components (14)

Rendering

Component: (Network and Table)

Network1110 - Statement - Balance Sheet
(<http://www.xbrlsite.com/mini/role/BalanceSheet>)

Table(Implied)

Slicers (applies to each fact value in each table cell)

Reporting Entity [Axis]30810137d58f76b84afd (<http://standards.iso.org/iso/17447>)

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets [Roll Up]		
Current Assets [Roll Up]		
Cash and Cash Equivalents	(648,551.94)	398,937.76
Receivables	2,035,468.27	1,231,338.47
Inventories	451,842.19	467,010.20
Current Assets	1,838,758.52	2,097,286.43
Noncurrent Assets [Roll Up]		
Property, Plant and Equipment	1,245,567.16	1,266,995.32
Noncurrent Assets	1,245,567.16	1,266,995.32
Assets	3,084,325.68	3,364,281.75
Liabilities and Equity [Roll Up]		
Liabilities [Roll Up]		
Current Liabilities [Roll Up]		
Accounts Payable	2,689,452.31	1,595,349.42
Current Liabilities	2,689,452.31	1,595,349.42
Noncurrent Liabilities [Roll Up]		
Long-term Debt	338,349.05	361,285.69
Noncurrent Liabilities	338,349.05	361,285.69
Liabilities	3,027,801.36	1,956,635.11

The version above provides both a “component perspective” which allows the individual fragments of the report to be worked with and a “overview perspective” which allows multiple fragments to be worked with from different perspectives at the same time. For example, one view provided is an HTML version of the entire report which is human readable and provides visibility to the individual pieces that make up the report (rendering summary³⁵).

Unformatted, auto generated Inline XBRL instance:

³³ Raw XBRL instance, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/instance.xml>

³⁴ XBRL Cloud Evidence Package, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/>

³⁵ Rendering Summary, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/evidence-package/contents/RenderingSummary.html>

The following format is an Inline XBRL financial report that simply serializes the facts into a list³⁶:

Concept Aspect	Period Aspect	Fact Value
mini:CollectionReceivables2	2020-01-01 2020-12-31	1,799,919
mini:PropertyPlantAndEquipment	2020-12-31	1,245,567
mini:Receivables	2020-12-31	2,035,468
mini:RetainedEarnings	2020-12-31	56,524
mini:AdditionalLongtermBorrowings	2020-01-01 2020-12-31	10,554
mini:AdditionalLongtermBorrowings2	2020-01-01 2020-12-31	10,554
mini:CapitalAdditionsPropertyPlantAndEquipment	2020-01-01 2020-12-31	0
mini:RepaymentLongtermBorrowings	2020-01-01 2020-12-31	33,491
mini:CollectionReceivables	2020-01-01 2020-12-31	2,072,035
mini:CashAndCashEquivalents	2020-12-31	(648,552)
mini:CostsOfSales2	2020-01-01 2020-12-31	886,041
mini:DepreciationAndAmortization2	2020-01-01 2020-12-31	21,428
mini:PaymentOfAccountsPayable	2020-01-01 2020-12-31	3,096,588
mini:PaymentOfAccountsPayable2	2020-01-01 2020-12-31	1,889,637

This report is not particularly useful to humans, but it is Inline XBRL and usable by machines.

Formatted, auto generated Inline XBRL instance:

Another interesting format is Inline XBRL that mimics the XBRL Cloud auto generated formatted raw XBRL instance³⁷:

Balance Sheet [Abstract]	Period [Axis]	
	2020-12-31	2019-12-31
Balance Sheet [Abstract]		
Assets [Roll Up]		
Current Assets [Roll Up]		
Cash and Cash Equivalents	(648,551.94)	398,937.76
Receivables	2,035,468.27	1,231,338.47
Inventories	451,842.19	467,010.20
Current Assets	1,838,758.52	2,097,286.43
Noncurrent Assets [Roll Up]		
Property, Plant and Equipment	1,245,567.16	1,266,995.32
Noncurrent Assets	1,245,567.16	1,266,995.32
Assets	3,084,325.68	3,364,281.75

The point of this is to show that Inline XBRL can actually be auto generated and does not necessarily need to be hand formatted. You do lose certain formatting control if such an approach is used, but it

³⁶ Unformatted, auto generated Inline XBRL,
<http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/instance-generated.html>

³⁷ Formatted, auto generated Inline XBRL,
<http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/instance.html>

saves time and money if you are not concerned about “pixel perfect” presentation of financial information.

“Pixel Perfect” formatted, auto generated Inline XBRL instance:

What amounts to 100% control over rendering can be achieved if the reported facts are mapped into an Inline XBRL page in a precise location by human effort. Without human effort, it is unlikely that auto generated financial reports can be created that will satisfy every individual accountant who likely prefers different formatting preferences. For example, here is an example of a pixel perfect Inline XBRL-based financial report³⁸:

Balance Sheet		
ABC Company, Inc.		
(See accompanying notes to the financial statements.)		
(in US Dollars)	As of December 31, 2020	As of December 31, 2019
ASSETS		
Current Assets:		
Cash and cash equivalents	\$-648551.94	\$398937.76
Receivables	2035468.27	1231338.47
Inventories	451842.19	467010.20
Current assets	1838758.52	2097286.43
Noncurrent Assets:		
Property, plant, and equipment	1245567.16	1266995.32
Noncurrent assets	1245567.16	1266995.32
Assets	\$3084325.68	\$3364281.75

The pixel perfect rendering is created by manually creating the HTML, mapping a fact ID to a slot in the HTML representation, and then generating the Inline XBRL that is XHTML-based:

³⁸ Pixel Perfect Inline XBRL, <http://xbrlsite.azurewebsites.net/2021/prototypes/recordToReport/instance-RENDERED.html>

ID	DisclosureName	HTML_Cell	Sequence	Row	Column
32	BalanceSheet2	<td style="text-align:center;font-weight:bold;border-collapse: collapse;">ASSETS</td><td style="text-align:left;font-w	1.1	1	1
33	BalanceSheet2	<td style="text-align:left;font-weight:bold;font-style:italic">Current Assets:</td><td style="text-align:left;font-weight:bold"> </td><td style="text-align	1.1	2	2
34	BalanceSheet2	<td style="text-align:left;vertical-align:bottom;">Cash and cash equivalents</td>	0	3	3
35	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">\${% FACTKEY=5575 %}</td>	0	3	3
36	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">\${% FACTKEY=5568 %}</td>	0	3	3
37	BalanceSheet2	<td style="text-align:left;vertical-align:bottom;">Receivables</td>	0	4	4
38	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">{% FACTKEY=5579 %}</td>	0	4	4
39	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">{% FACTKEY=5572 %}</td>	0	4	4
40	BalanceSheet2	<td style="text-align:left;vertical-align:bottom;">Inventories</td>	0	5	5
41	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">{% FACTKEY=5576 %}</td>	0	5	5
42	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 0px solid;BORDER-BOTTOM: black 0px solid;vertical-align:bottom;">{% FACTKEY=5569 %}</td>	0	5	5
43	BalanceSheet2	<td style="text-align:right;vertical-align:bottom;">Current assets</td>	0	6	6
44	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 1px solid;BORDER-BOTTOM: black 1px solid;vertical-align:bottom;">{% FACTKEY=5611 %}</td>	0	6	6
45	BalanceSheet2	<td style="text-align:right;BORDER-TOP: black 1px solid;BORDER-BOTTOM: black 1px solid;vertical-align:bottom;">{% FACTKEY=5603 %}</td>	0	6	6

This functionality is provided in the Microsoft Access database XBRL instance creation tool (XBRLCreator-V05-iteration2.accdb).

Note an updated and improved version of the above Microsoft Access database has been provided that is also open source and free to download, use, and reverse engineer³⁹.

STEP 12: XBRL-based Financial Report Verification

The final task is to verify that the XBRL-based financial report is both (a) a properly functioning logical system and (b) is conveying the information intended by the creator of the XBRL-based financial report. This is achieved by a combination of manual and automated processes to prove that the information conveyed is consistent, complete, and precise. This process is documented in the *Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax*⁴⁰.

The seven minimum steps must be performed in order to be complete and are summarized by this easy-to-understand dashboard that is provided by Pesseract:



All of these verification tasks is necessary to verify that a financial report is a properly functioning logical system that is consistent, complete, and precise. If these tasks are not performed using automated processes; then the tasks must be performed manually. None of these tasks can simply be ignored because each performs a role in the verification of the overall report quality. These necessary capabilities are summarized below.

XBRL technical syntax verification:

XBRL International provides a conformance suite that helps software engineers create software that serializes the XBRL technical syntax in a manner that is consistent with the XBRL technical specification.

³⁹ Free Open Source Tool for Creating Quality XBRL-based Digital Financial Reports, <http://xbri.squarespace.com/journal/2020/12/8/free-open-source-tool-for-creating-quality-xbri-based-digita.html>

⁴⁰ Method of Implementing a Standard Digital Financial Report Using the XBRL Syntax, <http://www.xbri.site.com/2020/Theory/SBRM-Method.pdf>

That conformance suite has approximately 500 tests of the XBRL 2.1 specification, 1,000 tests of the XBRL Dimensions specification, and a similar number (but I don't know the number) for XBRL formula.

These tests are 100% automated and accounting professionals don't really need to concern themselves with this level of testing is it "just happens correctly" in software. These tests are of the technical syntax of the XBRL format for the most part but do include mathematical checks of the report itself. The verification result might look something like this:

Message List				
Line	Type	Message ID	Message	Location
2	Info	Report.Validation.ReportingChecklist	Reporting Checklist Validation: Validated successfully.	Filename: instance_WithDisclosureRules.xml
1	Info	Report.Validation.DisclosureMechanics	Disclosure Semantic Validation: Validated successfully.	Filename: instance_WithDisclosureRules.xml
0	Info	Report.Load	Loading was successful: no errors or warnings.	Filename: instance_WithDisclosureRules.xml

Roll up mathematics of report:

1	Extended Link [http://www.xbrlsite.com/mini/role/BalanceSheet]								
2	Context I-2019 [2019-12-31 -]								
c-equal									
3	Unit U-USD								
u-equal									
	Assets		debit	2	0	3364281.75	3,364,281.75	Instance	OK
	Current Assets	1.0	debit	2	0	2097286.43	2,097,286.43	Instance	OK
	Cash and Cash Equivalents	1.0	debit	2		398937.76	398,937.76	Instance	
	Receivables	1.0	debit	2		1231338.47	1,231,338.47	Instance	
	Inventories	1.0	debit	2		467010.20	467,010.2	Instance	
	Noncurrent Assets	1.0	debit	2	0	1266995.32	1,266,995.32	Instance	OK
	Property, Plant and Equipment	1.0	debit	2		1266995.32	1,266,995.32	Instance	
	Liabilities and Equity		credit	2	0	3364281.75	3,364,281.75	Instance	OK
	Liabilities	1.0	credit	2	0	1956635.11	1,956,635.11	Instance	OK
	Current Liabilities	1.0	credit	2	0	1595349.42	1,595,349.42	Instance	OK
	Accounts Payable	1.0	credit	2		1595349.42	1,595,349.42	Instance	
	Noncurrent Liabilities	1.0	credit	2	0	361285.69	361,285.69	Instance	OK
	Long-term Debt	1.0	credit	2		361285.69	361,285.69	Instance	
	Equity	1.0	credit	2	0	1407646.64	1,407,646.64	Instance	OK
	Retained Earnings	1.0	credit	2		1407646.64	1,407,646.64	Instance	

Roll forward mathematics of report:

RollForward_RF1 (evaluation 1)	satisfied	\$CashAndCashEquivalents_BalanceStart=398937.76 + \$NetCashFlow=-1047489.70 = \$CashAndCashEquivalents_BalanceEnd=-648551.94
RollForward_RF2 (evaluation 1)	satisfied	\$Equity_BalanceStart=1407646.64 + \$NetIncomeLoss=-1351122.32 = \$Equity_BalanceEnd=56524.32
RollForward_RF3 (evaluation 1)	satisfied	\$CashAndCashEquivalents_BalanceStart=398937.76 + \$CollectionReceivables=2072035.32 - \$PaymentOfAccountsPayable=3096588.38 + \$AdditionalLongtermBorrowings=10554.36 - \$RepaymentLongtermBorrowings=33491.00 - \$CapitalAdditionsPropertyPlantAndEquipment=0 = \$CashAndCashEquivalents_BalanceEnd=-648551.94
RollForward_RF4 (evaluation 1)	satisfied	\$Receivables_BalanceStart=1231338.47 + \$Sales=2604048.36 - \$CollectionReceivables2=1799918.56 = \$Receivables_BalanceEnd=2035468.27
RollForward_RF5 (evaluation 1)	satisfied	\$Inventories_BalanceStart=467010.20 + \$PurchasesOfInventoryForSale=870873.17 - \$CostsOfSales=886041.18 = \$Inventories_BalanceEnd=451842.19
RollForward_RF6 (evaluation 1)	satisfied	\$PropertyPlantAndEquipment_BalanceStart=1266995.32 + \$CapitalAdditionsPropertyPlantAndEquipment=0 - \$DepreciationAndAmortization=21428.16 = \$PropertyPlantAndEquipment_BalanceEnd=1245567.16
RollForward_RF7 (evaluation 1)	satisfied	\$AccountsPayable_BalanceStart=1595349.42 + \$PurchasesOfInventoryForSale2=2983739.70 - \$PaymentOfAccountsPayable2=1889636.81 = \$AccountsPayable_BalanceEnd=2689452.31
RollForward_RF8 (evaluation 1)	satisfied	\$LongtermDebt_BalanceStart=361285.69 + \$AdditionalLongtermBorrowings2=10554.36 - \$RepaymentLongtermBorrowings2=33491.00 = \$LongtermDebt_BalanceEnd=338349.05
RollForward_RF9 (evaluation 1)	satisfied	\$RetainedEarnings_BalanceStart=1407646.64 + \$NetIncomeLoss=-1351122.32 = \$RetainedEarnings_BalanceEnd=56524.32

Model structure verification:

The mechanical relations between the pieces of XBRL that are used in the representation of information must be logical. The following matrix shows the associations between the representation artifact categories within the report and are tested against the logic of such relations. GREEN means everything is OK, ORANGE or RED means errors, YELLOW means what is being done is permissible but not recommended:

Child	Parent						
	Network	Table	Axis	Member	LineItems	Abstract	Concept
[Network]	0	0	0	0	0	0	0
[Table]	0	0	0	0	0	0	0
[Axis]	0	0	0	0	0	0	0
[Member]	0	0	0	0	0	0	0
[LineItems]	0	0	0	0	0	0	0
[Abstract]	14	0	0	0	0	16	0
[Concept]	0	0	0	0	0	109	32

The report created for Iteration #4 is consistent with expectation.

Type-subtype associations verification:

Report items are association with other report items in specific and permissible ways. For example, “Property, plant, and equipment” is known to be a noncurrent asset, is represented in the base XBRL taxonomy this iteration is using as a noncurrent asset, and is expected to be used as a noncurrent asset.

If the line item “Property, plant and equipment” is used as, say, a Current asset; that use would be inconsistent with expectation. Because accountants are permitted to move the model around (i.e. a financial report is not a static form) those same accountants have a responsibility to follow the rules as to what is and what is not permissible when they make such changes within an XBRL taxonomy. Type-subtype association verification is used to control these sorts of movements.

Other terms used to describe type-subtype associations include “wider-narrower” relations and “general-special” relations and “class-subclass” relations. Here is an example of what a type-subtype verification result might look like that checks all the fragments of the MINI financial reporting scheme:

Primary Information						
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent
1	Accounts Payable Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
2	Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT
3	Balance Sheet, Classified	Statement	UNKNOWN	Component	True	CONSISTENT
4	Cash and Cash Equivalents Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
5	Cash and Cash Equivalents Summary Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
6	Cash Flow Statement, Direct Method	Statement	UNKNOWN	Component	True	CONSISTENT
7	Income Statement	Unknown	Level4Detail	RollUp	True	CONSISTENT
8	Inventories Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
9	Liabilities and Equity Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT
10	Long-Term Debt Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
11	Net Cash Flow Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT
12	Property, Plant, and Equipment, Net Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
13	Receivables Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
14	Retained Earnings Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT
15	Statement of Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT
16	Transactions Groupings	Unknown	Level4Detail	RollUp	True	CONSISTENT
17	Trial Balance	Unknown	Level4Detail	RollUp	True	CONSISTENT

Fundamental accounting concept relations continuity cross checks verification:

The fundamental accounting concept relations continuity cross checks verifies that the high-level accounting relationships are being followed and that information represented within a report is consistent with those well understood high level associations between financial concepts. Below you see a verification result which points out that all such associations are consistent with expectation:

FAC_BS1_BalanceSheetBalances (evaluation 1)	satisfied	\$Assets=3084325.68 = \$LiabilitiesAndEquity=3084325.68
FAC_BS1_BalanceSheetBalances (evaluation 2)	satisfied	\$Assets=3364281.75 = \$LiabilitiesAndEquity=3364281.75
FAC_BS2_AssetsEqualsCurrentPlusNoncurrentAssets (evaluation 1)	satisfied	\$Assets=3084325.68 = \$AssetsCurrent=1838758.52 + \$AssetsNoncurrent=1245567.16
FAC_BS2_AssetsEqualsCurrentPlusNoncurrentAssets (evaluation 2)	satisfied	\$Assets=3364281.75 = \$AssetsCurrent=2097286.43 + \$AssetsNoncurrent=1266995.32
FAC_BS3_LiabilitiesEqualsCurrentPlusNoncurrentLiabilities (evaluation 1)	satisfied	\$Liabilities=3027801.36 = \$LiabilitiesCurrent=2689452.31 + \$LiabilitiesNoncurrent=338349.05
FAC_BS3_LiabilitiesEqualsCurrentPlusNoncurrentLiabilities (evaluation 2)	satisfied	\$Liabilities=1956635.11 = \$LiabilitiesCurrent=1595349.42 + \$LiabilitiesNoncurrent=361285.69
FAC_BS4_LiabilitiesAndEquityEqualsLiabilitiesPlusEquity (evaluation 1)	satisfied	\$LiabilitiesAndEquity=3084325.68 = \$Liabilities=3027801.36 + \$Equity=56524.32
FAC_BS4_LiabilitiesAndEquityEqualsLiabilitiesPlusEquity (evaluation 2)	satisfied	\$LiabilitiesAndEquity=3364281.75 = \$Liabilities=1956635.11 + \$Equity=1407646.64
FAC_IS1_GrossProfitFoots (evaluation 1)	satisfied	\$GrossProfitLoss=1718007.18 = (\$RevenuesNet=2604048.36 - \$CostOfSales=886041.18)
FAC_IS2_OperatingIncomeFoots (evaluation 1)	satisfied	\$OperatingIncomeLoss=-1353288.25 = (\$GrossProfitLoss=1718007.18 - \$OperatingExpenses=3071295.43)
FAC_IS3_IncomeLossFromContinuingOperationsBeforeTaxFoots (evaluation 1)	satisfied	\$IncomeLossFromContinuingOperationsBeforeTax=-1351122.32 = (\$OperatingIncomeLoss=-1353288.25 + \$NonoperatingIncomeExpenses=2165.93)
FAC_IS4_NetIncomeLossFoots (evaluation 1)	satisfied	\$NetIncomeLoss=-1351122.32 = (\$IncomeLossFromContinuingOperationsBeforeTax=-1351122.32 - \$IncomeTaxExpenseBenefit=0)
FAC_CF1_NetCashFlowEqualsOperatingInvestingAndFinancing (evaluation 1)	satisfied	\$CashFlowNet=-1047489.70 = \$CashFlowProvidedByUsedInOperatingActivitiesNet=-1024553.06 + \$CashFlowsProvidedByUsedInInvestingActivitiesNet=-22936.64 + \$CashFlowsProvidedByUsedInFinancingActivitiesNet=0.00

These fundamental accounting concept relations continuity cross checks can become a bit trickier in two specific situations. First, when economic entities have different sets of such high level relations adjustments as to which high level relations are necessary. The notion of different “reporting styles” resolves this issue, using different sets of rules for different categories of economic entities. Second, if an economic entity does not report a specific high-level line item it becomes necessary to derive such line items. For example, it is common for the line item “Noncurrent assets” to not be included within balance sheets. However, few balance sheets do not report “Current assets” or “Assets” (the total of

current and noncurrent assets). Accountants understand that “Assets = Current assets + Noncurrent assets”. So, if “Noncurrent assets” is not explicitly reported then the value of that line item can be derived using concepts that were reported, the rule, and deductive logic.

Disclosure mechanics relations verification:

An entire financial report can be broken down into fragments. One level of fragment is the disclosure; the “stuff” that gets disclosed within a financial report. Disclosures have common characteristics that do not change. For example, a balance sheet is comprised of two roll ups: “Assets” and “Liabilities and Equity”. Balance sheets are not roll forwards. Roll ups always have exactly one total. Additionally, the “Assets” roll up always has a specific concept such as “mini:Assets” that is used to represent the total of that roll up in Iteration #4(a). Similarly, this is true for other roll ups. Effectively, there are patterns within the disclosures provided within XBRL-based financial reports. Disclosure mechanics relations rules articulate these relations and disclosure mechanics verification make sure reports created are consistent with such rules. Here is an example of what a disclosure mechanics verification report might look like:

Show more information									
Primary Information									
#	Disclosure	Category	Level	Pattern	Disclosure Found	Disclosure Consistent	Applicable	Representation Concept [TEXT BLOCK]	Representation Concept DETAIL
1	Accounts Payable Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Accounts Payable
2	Assets Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Assets
3	Balance Sheet, Classified	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
4	Cash and Cash Equivalents Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash and Cash Equivalents
5	Cash and Cash Equivalents Summary Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Cash and Cash Equivalents
6	Cash Flow Statement, Direct Method	Statement	UNKNOWN	Component	True	CONSISTENT	True	-	-
7	Income Statement	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Income (Loss)
8	Inventories Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Inventories
9	Liabilities and Equity Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Liabilities and Equity
10	Long-Term Debt Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Long-term Debt
11	Net Cash Flow Roll Up	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Net Cash Flow
12	Property, Plant, and Equipment, Net Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Property, Plant and Equipment
13	Receivables Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Receivables
14	Retained Earnings Roll Forward	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Retained Earnings
15	Statement of Changes in Equity	Unknown	Level4Detail	RollForward	True	CONSISTENT	True	NOT-EXPECTED	Equity
16	Transactions Groupings	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum Changes
17	Trial Balance	Unknown	Level4Detail	RollUp	True	CONSISTENT	True	NOT-EXPECTED	Check Sum

Reporting rules (a.k.a. disclosure checklist) verification:

Financial reporting rules specify that certain disclosures are always required: balance sheet, income statement, statement of cash flow, and changes in equity are always required. A basis of reporting is always requiring (i.e. a report would make no sense without this disclosure), significant accounting policies is always required, nature of business is generally always required, as is revenue recognition policy whether or not an economic entity does not have revenue (i.e. how do you know you don’t have revenue if you don’t have a revenue recognition policy?).

Other times disclosures are required if specific line items are reported. For example, if the line item “Inventories” is reported on the balance sheet then the subcomponents of inventory need to be reported.

Other such reporting rules make up the reporting rules verification. Here is an example of what a reporting rules verification report might look like:

#	Disclosure	Checklist Category	Reason Disclosure Must Exist	Discovered	Expectation Met	Link to Disclosure Mechanics
0	Reporting Checklist					
1	Trial Balance	Possible disclosure	Disclosure is present	True	CONSISTENT	Trial Balance
2	Inventories Roll Forward	Possible disclosure	Disclosure is present	True	CONSISTENT	Inventories Roll Forward
3	Transactions Groupings	Possible disclosure	Disclosure is present	True	CONSISTENT	Transactions Groupings
4	Balance Sheet, Classified	Required disclosure	Disclosure always required, satisfied by Assets Roll Up and Liabilities and Equity...	True	CONSISTENT	Balance Sheet, Classified
5	Assets Roll Up	Part of disclosure	Satisfies Balance Sheet, Classified disclosure	True	CONSISTENT	Assets Roll Up
6	Liabilities and Equity Roll Up	Part of disclosure	Satisfies Balance Sheet, Classified disclosure	True	CONSISTENT	Liabilities and Equity Roll Up
7	Income Statement	Required disclosure	Disclosure always required	True	CONSISTENT	Income Statement
8	Cash Flow Statement, Direct Method	Required disclosure	Disclosure always required, satisfied by Net Cash Flow Roll Up and Cash and C...	True	CONSISTENT	Cash Flow Statement, Direct Method
9	Net Cash Flow Roll Up	Part of disclosure	Satisfies Cash Flow Statement, Direct Method disclosure	True	CONSISTENT	Net Cash Flow Roll Up
10	Cash and Cash Equivalents Summary Roll Forward	Part of disclosure	Satisfies Cash Flow Statement, Direct Method disclosure	True	CONSISTENT	Cash and Cash Equivalents Summary Roll Forward
11	Statement of Changes in Equity	Required disclosure	Disclosure always required	True	CONSISTENT	Statement of Changes in Equity
12	Cash and Cash Equivalents Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:CashAndCashEquivalents was reported	True	CONSISTENT	Cash and Cash Equivalents Roll Forward
13	Receivables Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:Receivables was reported	True	CONSISTENT	Receivables Roll Forward
14	Inventories Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:Inventories was reported	True	CONSISTENT	Inventories Roll Forward
15	Property, Plant, and Equipment, Net Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:PropertyPlantAndEquipment was reported	True	CONSISTENT	Property, Plant, and Equipment, Net Roll Forward
16	Accounts Payable Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:AccountsPayable was reported	True	CONSISTENT	Accounts Payable Roll Forward
17	Retained Earnings Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:RetainedEarnings was reported	True	CONSISTENT	Retained Earnings Roll Forward
18	Long-Term Debt Roll Forward	Line item exists, then disclosure requi...	Required because line item mini:LongtermDebt was reported	True	CONSISTENT	Long-Term Debt Roll Forward

Manual “To do” verification:

There are two reasons manual verification must be performed. The first reason is because a verification task cannot be automated. The second reason is that a task could be automated if the proper rules were written; however, those machine-readable rules do not yet exist.

If a process is created and has been checked to make sure the process is working properly and nothing changes, manual checks can be reduced. But if a change is introduced into the system, the risk of error increases. Not looking for mistakes is not an effective strategy for creating high-quality XBRL-based financial reports. It is the responsibility of professional accountants to create true and fair representations of their financial reports whether the consumer of such reports is a human or a machine such as a software application.

STEP 13: Common Audit Data Schedules

Similar to how the CDM provides a standard model for an accounting system, the Engine B Audit Common Data Model⁴¹ provide common audit schedules. Common audit data schedules are not currently part of Iteration #4. The audit schedules simply provide additional details that supplement the core financial report.

#	Category	Entity	Process (Standard)	Description
1	Entity	apPaymentData	AP	Accounts payable payment details by payment made to supplier.
2	Entity	arPaymentData	AR	Accounts receivable payment details by customer payment received by customer.
3	Entity	bankAccountMasterData	GL	Bank account master data by bank account.
4	Entity	businessUnit	GL	Business unit master data by business unit.
5	Entity	chartOfAccounts	GL	Chart of accounts information by general ledger account.
6	Entity	customerMasterData	AR	Customer master data by customer record per accounts receivable subsystem.
7	Entity	employeeMasterData	HR	Employee master data by employee record.
8	Entity	fixedAssetAdditions	FA	Fixed asset additions schedule for each fixed asset addition by fixed asset identifier per fixed asset master data.
9	Entity	fixedAssetDepreciation	FA	Fixed asset depreciation schedule by fixed asset identifier per fixed asset master data.
10	Entity	fixedAssetMasterData	FA	Fixed asset master data by fixed asset record.
11	Entity	fixedAssetRemovals	FA	Fixed asset removals schedule for each fixed asset removal by fixed asset identifier per fixed asset master data.
12	Entity	fixedAssetValuation	FA	Fixed asset valuation
13	Entity	glDetail	GL	General ledger detail transactions by journal entry for each general journal entry.
14	Entity	goodsReceivedData	AR	Goods received from supplier information per accounts payable

⁴¹ Engine B, A guide to the Audit Common Data Model, <https://engineb.hubspotpagebuilder.com/audit-common-data-model-guide>