

1. Associations

The purpose of this section is to explain the notion of associations and how associations are used to in the representation of XBRL-based digital financial reports. Before you take on this section be sure to have gone through the section related to terms.

1.1. Introduction to Associations

An association (a.k.a. relation, predicate) is a type of statement that specifies a permissible relationship, a permissible structure, or specifies a property of a term. An association is generally a verb.

Associations can be represented in numerous ways. Consider the simple terms “Assets”, “Liabilities”, and “Equity” of the accounting equation and the complex term “Balance sheet” that is used to specify a structure.

We represented this accounting equation in the form of a model which looked something like the following in our gentle introduction to XBRL-based financial reports¹:

Label	Object Class	Period Type	Balance	Report ElementName
Balance Sheet [Arithmetic]	Abstract			ae:BalanceSheetArithmetic
Assets	Concept (Monetary)	As Of	Debit	ae:Assets
Liabilities	Concept (Monetary)	As Of	Credit	ae:Liabilities
Equity	Concept (Monetary)	As Of	Credit	ae:Equity

Another way to view the associations might be as follows²:

Component: (Network and Table)	
Network	01-Balance Sheet (http://www.xbrlsite.com/ae/role/BalanceSheet)
Table	(Implied)

#	Label	Report Element Class	Period Type	Balance	Name
1	01-Balance Sheet [Table]				(Implied)
2	Balance Sheet [Arithmetic]	[Abstract]			ae:BalanceSheetArithmetic
3	Assets	[Concept] Monetary	As Of	Debit	ae:Assets
4	Liabilities	[Concept] Monetary	As Of	Credit	ae:Liabilities
5	Equity	[Concept] Monetary	As Of	Credit	ae:Equity

Yet another way to represent the associations might be:

Label	Report Element Class	Period	Balance	Preferred Label Role	Name
Balance Sheet [Arithmetic]	[Abstract]			Standard Label	ae:BalanceSheetArithmetic
Assets	[Concept] Monetary	As Of	Debit	Standard Label	ae:Assets
Liabilities	[Concept] Monetary	As Of	Credit	Standard Label	ae:Liabilities
Equity	[Concept] Monetary	As Of	Credit	Standard Label	ae:Equity

All of the above are human readable representations in different software applications of information. Each representation should convey the exact same meaning given that each represents the exact same information. However, different

¹ Accounting Equation, Very Basic, http://xbrlsite.azurewebsites.net/2020/introduction/ae-basic/ae_ModelStructure.html

² Accounting Equation, Very Basic, XBRL Cloud Evidence Package, <http://xbrlsite.azurewebsites.net/2020/introduction/ae-basic/evidence-package/contents/index.html#NetworkStructure-BalanceSheet-Implied.html>

humans reading the information might interpret the associations differently if they don't have some common meaning.

Here is another representation of exactly the same information:

ID	StructureType	NetworkIdentifier	AssociationFromName	AssociationRole	AssociationToName	Sequence
131	Presentation	BalanceSheet	ae:BalanceSheetArithmetic	Parent-Child	ae:Assets	1
137	Presentation	BalanceSheet	ae:BalanceSheetArithmetic	Parent-Child	ae:Liabilities	2
140	Presentation	BalanceSheet	ae:BalanceSheetArithmetic	Parent-Child	ae:Equity	3

Using the XBRL syntax there are three structure types that can be represented: presentation, calculation, and definition associations.

Each set of associations must be within a specific network. Each association is **from** one term, **to** some other term, the association has a specific **role**, and the associations are in a specific **sequence** or order. We will get into this in more detail in a moment.

There are three fundamental types of associations:

- **Is-a:** An is-a association specifies a general-special or wider-narrower or class-subclass or type-subtype type relation between terms. (generalization/specialization)
- **Has-a:** A has-a association specifies a has-part or part-of type relation between terms and contributes to information about a structure. (meronymy, composition)
- **Property-of:** A property-of association specifies that a term has a specific quality, trait, or attribute. (property)

Let us break down each of these types of associations down a bit more and match each XBRL association to these three fundamental types.

1.2. Is-a Associations

XBRL has the power to represent the following types of specific "is-a" associations.

XBRL definition relations specify a "general-special" association such as that where the concept "Equity Attributable to Controlling Interests" and "Equity Attributable to Noncontrolling Interests" are specified to be specializations of the general concept "Equity".

	Arcrole	Order
▼ [Equity]	http://www.xbrl.org/2003/arcrole/general-special	7
① [EquityAttributableToControllingInterests]	http://www.xbrl.org/2003/arcrole/general-special	51
① [EquityAttributableToNoncontrollingInterests]	http://www.xbrl.org/2003/arcrole/general-special	52

XBRL definition relations specify a "domain-member" association such as that "ae:Assets" and "ae:Liabilities" and "proof:Equity" are members of the domain of line items that make up a statement of net assets.

	Order	Arcrole
▼ [NetAssetsLineItems]	0	
① [Assets]	1	http://xbrl.org/int/dim/arcrole/domain-member
① [Liabilities]	2	http://xbrl.org/int/dim/arcrole/domain-member
① [NetAssets]	3	http://xbrl.org/int/dim/arcrole/domain-member

1.3. Has-a Associations

XBRL has the power to represent the following types of specific “has-a” associations. First, XBRL presentation relations specify a “parent-child” association between terms. For example, from the term “ae:BalanceSheetArithmetic” to the term “ae:Assets” with the role “parent-child” indicates that the term “ae:BalanceSheetArithmetic” has-a part “ae:Assets”.

Label	Report Element Class	Period	Balance	Preferred Label Role	Name
▼ Balance Sheet [Arithmetic]	[Abstract]			Standard Label	ae:BalanceSheetArithmetic
Assets	[Concept] Monetary	As Of	Debit	Standard Label	ae:Assets
Liabilities	[Concept] Monetary	As Of	Credit	Standard Label	ae:Liabilities
Equity	[Concept] Monetary	As Of	Credit	Standard Label	ae:Equity

XBRL calculation relations specify a “summation-item” association between terms. For example, XBRL calculation “summation-item” associations can be used to represent that the summation or total “proof:NetIncome” is composed of the items “proof:Revenues” which is added, “proof:Expenses” which is subtracted, “proof:Gains” which is added, and “proof:Losses” which is subtracted. Visually, it might look something like this within a software application:

Label	Report Element Class	Balance	Weight	Name
▼ Net Income	[Concept] Monetary	Credit	0	proof:NetIncome
Revenues	[Concept] Monetary	Credit	1	proof:Revenues
(Expenses)	[Concept] Monetary	Debit	-1	proof:Expenses
Gains	[Concept] Monetary	Credit	1	proof:Gains
(Losses)	[Concept] Monetary	Debit	-1	proof:Losses

Weight of 1 indicates that the item is added to the summation; weight of -1 indicates that the item is subtracted from the summation.

1.4. Property-of Associations

XBRL has the power to represent additional properties of report elements however the vast majority of properties are specified by the XBRL technical specification and properties tend to not be added. As such, “property-of” associations tend to be hard coded into the XBRL technical specification for the properties of report elements such as data type, period type, balance type, label, and references.

Adding new properties is very possible and very useful, but is a more advanced topic and will not be covered here.

1.5. Allowed Associations Between Categories of Terms

As described in the section which explained terms; terms can be grouped into categories. Those categories are: Network, Hypercube, Dimension, Member, Line Items, Abstract, and Concept.

The following table shows the permissible and disallowed associations between a parent term category and a child term category:

		Parent						
		Network	Table	Axis	Member	Line Items	Abstract	Concept
Child	Network	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL	Illegal XBRL
	Table	OK	Disallowed	Disallowed	Disallowed	Disallowed	OK	Disallowed
	Axis	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Member	Disallowed	Disallowed	OK	OK	Disallowed	Disallowed	Disallowed
	Line Items	Disallowed	OK	Disallowed	Disallowed	Disallowed	Disallowed	Disallowed
	Abstract	OK	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed
	Concept	Disallowed	Disallowed	Disallowed	Disallowed	OK	OK	Disallowed

The XBRL technical specification does not enforce parent-child associations rules between different types of report elements. These associations tend to be rather straight forward and uncontroversial in most cases.

1.6. Type-subtype Associations

Concepts can be related to other concepts. For example, “Cash” is a type of “Cash and Cash Equivalents” or “Finished Goods” is a type of “Inventories”. Other names used to describe this category of association is the “general-special” relations or the “wider-narrower” association.

Is-a or type-subtype or general-special or wider-narrower rules relate to the proper use of a concept relative to another concept. When the creator of a base model allows that base model to be adjusted, such rules are necessary enforce permissible use of one concept relative to another concept or can be used to define the type of some new concept added by an economic entity creating a report.

For example, consider the balance sheet fragment below. The concept “Inventories” is clearly a current asset per the balance sheet that is shown below. Suppose an economic entity creating a report and inadvertently used the concept “Inventories” to represent a fact that was included within the set of Noncurrent assets.

That would be an improper use of the concept “Inventories” which is clearly a current asset to represent a noncurrent asset. Is-a associations rules prevent this sort of error from occurring by providing information about the allowed and perhaps disallowed relations between totals and the line items contributing to that subtotal.

Balance Sheet [Abstract]	Period [Axis]	
	2018-12-31	2017-12-31
Balance Sheet [Abstract]		
Assets [Roll Up]		
Current Assets [Roll Up]		
Cash and Cash Equivalents	4,000	3,000
Accounts Receivable	2,000	1,000
Inventories	1,000	1,000
Current Assets	7,000	5,000
Noncurrent Assets [Roll Up]		
Property, Plant, and Equipment, Net	6,000	1,000
Noncurrent Assets	6,000	1,000
Assets	13,000	6,000

All class/subclass type relations should be represented within a representation of the model of the financial report.

1.7. Equivalent Type Associations

Concepts can be equivalent to other concepts. For example, “Net Assets” is equivalent to the concept “Equity” per SFAC 6, Elements of Financial Statements. Equivalent type associations are represented by XBRL’s “essence-alias” definition arcrole.