

Uniform Loan Application Dataset (ULAD) Data Relationships Using Xlink and MISMO Arcroles Document

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DOCUMENT REVISIONS

Date	Change
3/27/2018	Added ASSET is associated with ROLE, LIABILITY is associated with ROLE, and EXPENSE is associated with ROLE to the ULAD Xlink ArcRole section
3/27/2018	Condensed COUNSELING_EVENT is associated with ROLE into one row
3/27/2018	Modified the xlink:label for CURRENT_INCOME_ITEM from INCOME_ITEM_n to CURRENT_INCOME_ITEM_n in the ULAD Xlink Arcroles section and Appendix A (Code Sample)
3/27/2018	Modified Asset to Associated Liabilities under ULAD Xlink Arcroles section to read Asset (Owned Property) instead of Owned Property (Asset) because the relationship is from the Asset container to the Liability container
3/27/2018	Added Document Revisions table and updated page numbers in Table of Contents

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Term
MISMO	Mortgage Industry Standards Maintenance Organization
MISMO LDD	MISMO Logical Data Dictionary
MISMO v3.4	MISMO Version 3.4 Reference Model
REO	Real Estate Owned
ULAD	Uniform Loan Application Dataset
UMDP	Uniform Mortgage Data Program
URLA	Uniform Residential Loan Application

GLOSSARY

Term	Definition
MISMO v3.4 Reference Model Structures	The hierarchical organization of XML elements (containers and data points) providing an entity-relationship model of the mortgage life cycle.
MISMO v3.4 Structures	The hierarchical organization of XML elements (containers and data points) providing an entity-relationship model of a specific portion of the mortgage life cycle.
XLink	XML Linking Language , or XLink , is an XML markup language and W3C specification that provides methods for creating internal and external links within XML documents, and associating metadata with those links.
XLink Arcroles	A defined relationship between two data facts or groups of facts (containers) described using the Xlink standard linking language and a descriptive arrole defined in the MISMO data standards.

INTRODUCTION

DOCUMENT ORGANIZATION

This document provides the details of the data relationships in the MISMO Version 3.4 standard. There is an introduction to data relationship concepts as well as detailed information for the creation and usage of data relationships used as part of the Uniform Loan Application Dataset (ULAD) Data Mapping document. The sections outlined in this document will provide the following information about data relationships used by the ULAD as defined within the MISMO Data Standard:

- An overview of data relationship concepts that may be used in the MISMO Data Standards Version 3.4. These include relationship concepts for One-to-One, One-to-Many and Many-to-Many as well as an explanation of different types of relationships (Reflexive and Irreflexive). This section was copied from the [MISMO Version 3 Reference Model General Information Guide](#).
- An overview of the use of the W3C standard, XLink, used for communicating the different data relationships that can be used within the MISMO Data Standards. This section was copied from the [MISMO Version 3 Reference Model General Information Guide](#).
- An explanation of the each data relationship used in the ULAD.
- An XML data example including each of the data relationships that are possible within the ULAD.

DATA RELATIONSHIPS

This section was copied from the [MISMO Version 3 Reference Model General Information Guide](#).

Providing a list of mortgage industry data elements and their definitions is an important feature of the MISMO Reference Model. Equally important is how the Reference Model Schema defines the relationships between those data elements. *Source* and *target* data elements in a relationship are generally referred to as *end points*. The following types of relationships are supported in the Reference Model.

ONE-TO-ONE RELATIONSHIP

A One-to-One Relationship is one in which any given instance of the source element may only be associated with one instance of the target element, and no two instances of the source element are associated with the same instance of the target element.

For example: Each instance of the *source* PARTY / INDIVIDUAL element may be associated with one instance of the *target* NAME element, which is not associated with any other instances of the PARTY / INDIVIDUAL element.

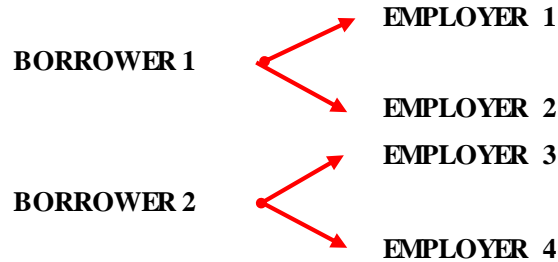


Most One-to-One Relationships are established in the MISMO Reference Model by *containment*. Containment means that there is a direct parent/child relationship between the elements. In the example above the INDIVIDUAL element *contains* a NAME element, which itself contains the individual's name components – First Name, Middle Name, Last Name, and others. Other One-to-One Relationships may be needed which cannot be made using containment. For example, relating two data elements that are in different container elements. These types of relationships are sometimes referred to as “pointing relations” and are defined using “XLink Relationships”, which are discussed later in this chapter.

ONE-TO-MANY RELATIONSHIP

A One-to-Many Relationship is one in which one instance of the source element may be associated with one or more instances of the target element and no two instances of the source element are associated with the same instance of the target element.

For example: Each instance of the *source* BORROWER element may have multiple instances of the *target* EMPLOYER element, each of those is not associated with any other instances of BORROWER. Even if both borrowers on a loan may have the same employer, the values of some the employer data elements may be different, such as their income amounts, start dates, and positions.

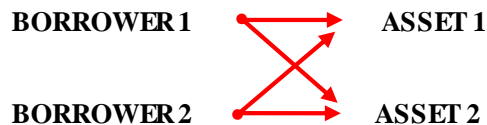


Most One-to-Many Relationships are also established in the MISMO Reference Model by containment. Other One-to-Many Relationships may be defined using “XLink Relationships”.

MANY-TO-MANY RELATIONSHIP

A Many-to-Many Relationship is one in which one instance of the source element may be associated with multiple instances of the target element and multiple instances of the source element may be associated with the same instance of the target element.

For example: Each BORROWER element may be associated with multiple ASSET elements, and multiple BORROWER elements may be associated with the same ASSET element.



Many-to-Many Relationships are defined using “XLink Relationships”.

REFLEXIVE RELATIONSHIP

A Reflexive Relationship is a one-to-one, one-to-many, or many-to-many relationship between instances of the same element, i.e., the source and target elements are of the same type.

For example: An instance of the INDIVIDUAL element may be associated with another instance of the INDIVIDUAL element to represent a marriage relationship.

Reflexive Relationships are defined using “XLink Relationships”.

IRREFLEXIVE RELATIONSHIP

An Irreflexive Relationship is the opposite of a Reflexive Relationship. It is a one-to-one, one-to-many, or many-to-many relationship between instances of different elements, i.e., the source and target elements are of different types.

For example: The One-to-One INDIVIDUAL to NAME relationship, One-to-Many BORROWER to EMPLOYER relationship, and Many-to-Many BORROWER to ASSET relationships discussed earlier are all examples of Irreflexive Relationships.

RULES FOR XLINK RELATIONSHIPS

This section was copied from the [MISMO Version 3 Reference Model General Information Guide](#).

OVERVIEW

The previous section identified types of relationships and the methods MISMO uses to define relationships – either by containment or by pointing. Whenever we need to identify relationships between elements that are not directly contained by another, we use *Xlink Relationships*. MISMO has added the appropriately named RELATIONSHIPS container structure as a means of specifying those relationships.

The RELATIONSHIPS container is a child of MESSAGE, DEAL_SETS, DEAL_SET, DEALS, DEAL, and DOCUMENT. The location in the Reference Model of the RELATIONSHIPS container is determined by the XML instance and its structure. The RELATIONSHIPS container used MUST be at the lowest structural level that is a parent or sibling of the elements being joined.

Examples include:

- The RELATIONSHIPS container as a child of a DEAL_SETS container links DEAL_SETS/PARTY data to DEAL_SETS/DEAL_SET/DEALS/DEAL/LOANS/LOAN data.
- The RELATIONSHIPS container as a child of a DOCUMENT container links all the information about document signatures in the DOCUMENT/SIGNATORIES/SIGNATORY container to the actual DOCUMENT/DEAL_SETS/DEAL_SET/DEALS/DEAL/PARTY container representing the person that signed the document.
- The RELATIONSHIPS container as a child of a DEAL container links all the information for a DEAL/LOANS/LOAN, such as asset and liability information, to an individual borrowers under DEAL/PARTIES/PARTY container.

The MISMO Reference Model uses an XML specification called *XLink* to define data relationships in a MISMO message that are not naturally expressed by the MISMO container hierarchy. The full XLink standard is defined by the W3C at <http://www.w3.org/TR/xlink>. At this time MISMO is only using a limited set of the XLink attributes.

One of the XLink attributes, *arcrole* describes the type of relationship between *source* data and *target* data. The XLink from attribute identifies the source data point or container. The XLink to attribute identifies the target data point or container. The XLink label attribute is an identifier that is attached to data point or container elements that will be used to express an arcrole relationship. The MISMO RELATIONSHIP container elements hold the XLink *arcrole*, *from* and *to* attributes that describe the data relationships.

In the simplified example below, a CREDIT_RESPONSE has returned CREDIT_SCORE data for BORROWER parties in a loan DEAL. XLink label attributes are added to each CREDIT_SCORE element and each PARTY element's ROLE element. The MISMO RELATIONSHIP element identifies which credit score is associated with each borrower.

DEAL

RELATIONSHIPS

RELATIONSHIP	xlink:from="EquifaxCreditScore1" xlink:to="Borrower1" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"
RELATIONSHIP	xlink:from="EquifaxCreditScore2" xlink:to="Borrower2" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"
RELATIONSHIP	xlink:from="ExperianCreditScore1" xlink:to="Borrower1" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"
RELATIONSHIP	xlink:from="ExperianCreditScore2" xlink:to="Borrower2" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"
RELATIONSHIP	xlink:from="TransUnionCreditScore1" xlink:to="Borrower1" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"
RELATIONSHIP	xlink:from="TransUnionCreditScore2" xlink:to="Borrower2" xlink:arcrole="CREDIT_SCORE_IsAssociatedWith_ROLE"

SERVICES

SERVICE

CREDIT_RESPONSE

CREDIT_SCORES

CREDIT_SCORE	xlink:label="EquifaxCreditScore1" (Score 690)
CREDIT_SCORE	xlink:label="EquifaxCreditScore2" (Score 720)
CREDIT_SCORE	xlink:label="ExperianCreditScore1" (Score 655)
CREDIT_SCORE	xlink:label="ExperianCreditScore2" (Score 706)
CREDIT_SCORE	xlink:label="TransUnionCreditScore1" (Score 681)
CREDIT_SCORE	xlink:label="TransUnionCreditScore2" (Score 710)

PARTIES

PARTY/ROLES/ROLE	xlink:label="Borrower1" (John Doe)
PARTY/ROLES/ROLE	xlink:label="Borrower2" (Jane Doe)

RELATIONSHIP ELEMENT TYPES “FROM” AND “TO” END POINT CONDITIONS

Each **from** and **to** attribute value in a RELATIONSHIP element must satisfy the following conditions:

- **Sufficiency** – Each endpoint must unambiguously represent the data that is being linked in the relationship.
- **Uniqueness** – Each instance of endpoint must represent a different instance of the relationship.

For example, to represent the relationship where a party is a borrower on a loan, link the elements LOAN and ROLE. That relationship meets the rules of **sufficiency** and **uniqueness**.

LOAN is sufficient to represent an instance of a loan because all the elements under LOAN work together to describe the same loan. If we go any higher in the model, we would fail to identify a loan. We could not use the DEAL element, because it may contain multiple loans and we would not know to which one of them the relationship is being applied.

LOAN is unique because it represents one specific instance of the LOAN container. Any other sibling instance would be a different loan. If we go any lower, the endpoint would not be unique. For example, we could not use LOAN_IDENTIFIER because all sibling occurrences of LOAN_IDENTIFIER refer to the same loan.

ROLE is sufficient to identify a party as a borrower (by setting the ROLE_DETAIL element's PartyRoleType attribute value to "Borrower"). If we go any higher in the model, we would fail to identify the role. For example, we could not use the PARTY element, because it may contain multiple roles and we would not know to which of them the relationship is being applied.

The ROLE element is unique. Any given party will only have one ROLE element of type borrower. If we want to say that a party is a borrower on a loan, we need to use one specific instance of the ROLE element. Pointing to any other sibling instance would mean a different role. If we go any lower, the endpoint would not be unique. For example, we could not use EMPLOYER because all sibling instances of EMPLOYER refer to the same borrower.

RELATIONSHIP ELEMENT ATTRIBUTES: FROM, TO AND ARCROLE

Each instance of the RELATIONSHIP element must contain at least three XLink attributes: **from**, **to**, and **arcrole**. Since these attributes are part of the XLink standard's "namespace", in a XML message they must contain the namespace prefix that the MISMO schema assigns for them. By default the schema usually assigns **xlink:** as the namespace prefix, to differentiate these XLink attributes from MISMO data elements and attributes.

Example:

```
<RELATIONSHIP xlink:from="Loan-1" xlink:to="Borrower-1" xlink:arcrole="urn:fdc:mismo.org:2009:residential/LOAN_IsAssociatedWith_ROLE" />
```

RELATIONSHIP ELEMENT "ARCROLE" NAMING CONVENTION

The architectural rules for the use of XLink are detailed in *MEG 0036, Use of XLink to Manage Relationships*, available at the link below:

[http://www.mismo.org/Guidelines/EngineeringGuidelines\(MEGS\).htm](http://www.mismo.org/Guidelines/EngineeringGuidelines(MEGS).htm)

Each arcrole value will be composed as follows:

{URN} {FromName} ‘_’ {VerbPhrase} ‘_’ {ToName}

- **URN** – for arcroles defined by MISMO, the URN string value is **urn:fdc:mismo.org:2009:residential/**. For arcroles not defined by MISMO the "extended" URN is the string "**urn:fdc:**" + *domain name of the extending organization* + ":", + *year of first use* + ":" + *optional qualifier* + *separator character* ":" or "/". Example: **urn:fdc:AcmeLending.com:2013:mortgage**
- **FromName** – the element name that is pointed to by xlink:from attribute.
- **VerbPhrase** – is defined according to the type of relationship. For Irreflexive Relationships (i.e. **FromName** is different from **ToName**), the value of **VerbPhrase** is 'IsAssociatedWith'.
- **ToName** – the element name that is pointed to by the xlink:to attribute.

Example of a “MISMO V3.3.0” **arcrole** value:

`xlink:arcrole="urn:fdc:mismo.org:2009:residential/ASSET_IsAssociatedWith_ROLE"`

Example of an “extended” **arcrole** value:

`xlink:arcrole="urn:fdc:AcmeLending.com:2013:mortgage/PARTY_IsSubsidiaryOf_PARTY"`

RELATIONSHIP ELEMENT “ARCROLE” FROMNAME/TONAME VALUE ORDER

When the relationship is connecting two container elements, the **arcrole** value used for the **FromName** must precede the value of the **ToName** alphabetically.

For example, if a relationship is being established between **ROLE** and **LOAN** elements, **LOAN** must be the **FromName** and **ROLE** must be the **ToName**, since **LOAN** precedes **ROLE** alphabetically.

- Valid **arcrole** value: `"urn:fdc:mismo.org:2009:residential/LOAN_IsAssociatedWith_ROLE"`
- Invalid **arcrole** value: `"urn:fdc:mismo.org:2009:residential/ROLE_IsAssociatedWith_LOAN"`

When the relationship is connecting a container element to a data point element, the **FromName** is always the container name and the **ToName** is always the data point element name.

For example: `"urn:fdc:mismo.org:2009:residential/DATA_SOURCE_IsAssociatedWith_GrossLivingAreaSquareFeetNumber"`

UNIFORM LOAN APPLICATION DATASET (ULAD) XLINK ARCROLES

OVERVIEW

This section will provide information about data relationships used in the ULAD that will require the use of Xlink and a MISMO arcrole. Each of these data relationships will require the use of the XLink standard used to represent data relationships within the MISMO Data Standards and a MISMO arcrole. The following list of data relationships that will be used as part of the ULAD implementation using XLink within the MISMO Data Standards.

- Relationship between a borrower's income and the associated employer
- Relationship between a counseling event and the associated housing counseling agency (covers both "education" and "counseling")
- Relationship between an asset (owned property) and the associated liabilities
- Relationship between a related loan and the associated creditor
- Relationship between an asset and the associated borrower
- Relationship between a liability and the associated borrower
- Relationship between an expense and the associated borrower

RELATIONSHIP BETWEEN A BORROWER'S INCOME AND THE ASSOCIATED EMPLOYER

The following example provides details about xlink arcrole relationship needed to define a data relationship between income items for a borrower and the associated employment (employer) providing that income.

The figure below (Figure 1) shows examples of a borrower's income items, by type, that will need to be linked to the associated employer.

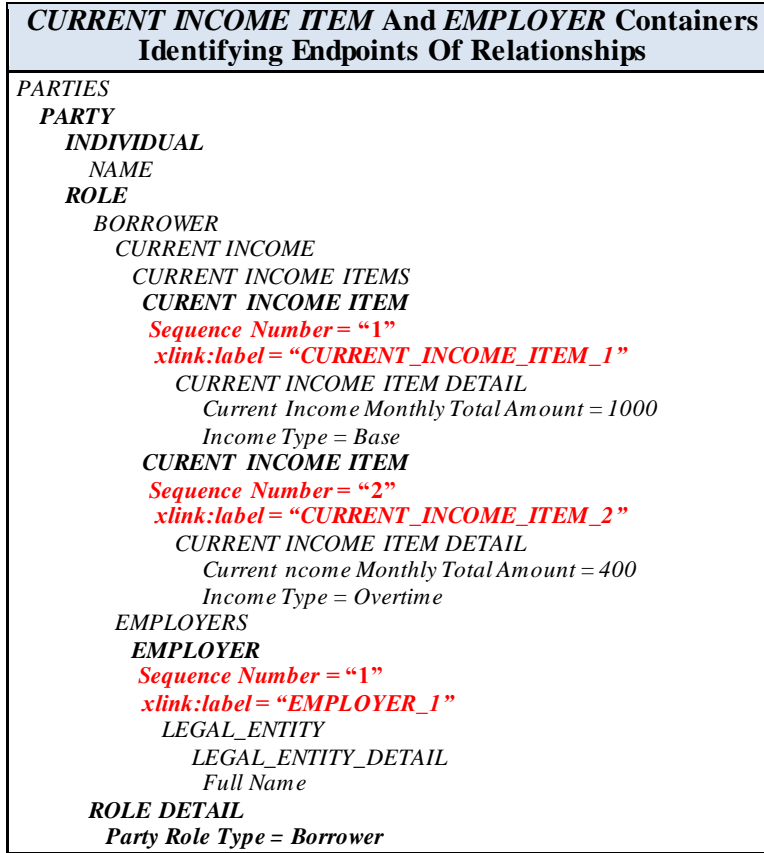


Figure 1. Establishing Endpoints of Relationship

The table below (Table 1) shows the endpoints that will make up the xlink arcrole relationship for each relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
CURRENT_INCOME_ITEM	DEAL/PARTIES/PARTY/ROLES/ROLE/BORROWER/CURRENT_INCOME/CURRENT_INCOME_ITEMS/CURRENT_INCOME_ITEM	1	CURRENT_INCOME_ITEM_1
CURRENT_INCOME_ITEM	DEAL/PARTIES/PARTY/ROLES/ROLE/BORROWER/CURRENT_INCOME/CURRENT_INCOME_ITEMS/CURRENT_INCOME_ITEM	2	CURRENT_INCOME_ITEM_2
EMPLOYER	DEAL/PARTIES/PARTY/ROLES/ROLE/BORROWER/EMPLOYERS/EMPLOYER	1	EMPLOYER_1

Table 1. Identifying Endpoints in the Relationship

The table below (Table 2) shows a breakdown of the detailed components of the relationships used to relate a borrower’s income to the employment source.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	CURRENT_INCOME_ITEM_IsAssociatedWith_EMPLOYER	
		from	CURRENT_INCOME_ITEM_1	where Income Type = "Base"
		to	EMPLOYER_1	
Second Instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/PARTIES/RELATIONSHIPS/RELATIONSHIP	Sequence Number		2	
		arcrole="urn:fdc:mismo.org:2009:residential	CURRENT_INCOME_ITEM_IsAssociatedWith_EMPLOYER	
		from	CURRENT_INCOME_ITEM_2	where Income Type = "Overtime"
		to	EMPLOYER_1	

Table 2. Relationships Container – Component Details

The figure below (Figure 2) shows basic examples of how the xlink arcrole relationships linking a borrower’s income items to an employer would look in the RELATIONSHIPS container. Note that both the income and employment structures are contained under the borrower structure, thus the relationship to the borrower is handled by containment and no further xlink arcrole relationship is needed to relation the income and employment to an individual borrower.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
RELATIONSHIPS RELATIONSHIP <i>Sequence Number = "1"</i> <i>xlink:from = "CURRENT_INCOME_ITEM_1"</i> <i>xlink:to = "EMPLOYER_1"</i> <i>xlink:arcrole = "CURRENT_INCOME_ITEM_IsAssociatedWith_EMPLOYER"</i>
RELATIONSHIP <i>Sequence Number = "2"</i> <i>xlink:from = "CURRENT_INCOME_ITEM_2"</i> <i>xlink:to = "EMPLOYER_1"</i> <i>xlink:arcrole = "CURRENT_INCOME_ITEM_IsAssociatedWith_EMPLOYER"</i>

Figure 2. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN A COUNSELING EVENT AND THE ASSOCIATED HOUSING COUNSELING AGENCY

The following example provides details about the xlink arcrole relationship needed to define a data relationship between a Counseling Event and the Housing Counseling Agency that provided the counseling and the borrower. While the example provided below shows a counseling event type of “Counseling”, the same xlink arcrole relationship would be used for an education event (Counseling Type = “Education”).

The figure below (Figure 3) shows examples of a counseling event, by type, that will need to be linked to the housing counseling agency.

COUNSELING EVENT (Counseling or Education) And ROLE (HousingCounselingAgency) Containers Identifying Endpoints Of Relationships
<p><i>PARTIES</i> PARTY <i>INDIVIDUAL</i> <i>NAME</i> ROLE <i>BORROWER</i> <i>COUNSELING EVENTS</i> COUNSELING EVENT <i>Sequence Number = “1”</i> <i>xlink:label = “COUNSELING_EVENT_1”</i> <i>COUNSELING EVENT DETAIL</i> <i>Counseling Completed Date = 2015-10-05</i> <i>Counseling Confirmation Indicator= true</i> <i>Counseling Format Type = FaceToFace</i> <i>Counseling Type= Counseling</i></p>
<p><i>PARTIES</i> PARTY <i>LEGAL ENTITY</i> <i>LEGAL ENTITY DETAIL</i> <i>Full Name</i> ROLE <i>Sequence Number = “1”</i> <i>xlink:label = “HOUSING_COUNSELING_AGENCY_1”</i> ROLE DETAIL <i>Party Role Type = HousingCounselingAgency</i></p>

Figure 3. Establishing Endpoints of Relationship

The table below (Table 3) shows the endpoints that will makeup the xlink arcrole relationship for each relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
COUNSELING_EVENT	DEAL/PARTIES/PARTY/ROLES/ROLE/BORROWER/COUNSELING_EVENTS/COUNSELING_EVENT	1	<i>COUNSELING_EVENT_1</i>
ROLE	DEAL/PARTIES/PARTY/ROLES/ROLE	1	<i>HOUSING_COUNSELING_AGENCY_1</i>

Table 3. Identifying Endpoints in the Relationship

The table below (Table 4) shows a breakdown of the detailed components of the relationship used to relate a counseling event to housing counseling agency that provided the counseling.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	COUNSELING_EVENT_IsAssociatedWith_ROLE	
		from	COUNSELING_EVENT_1	where CounselingType = "Counseling"
	to	HOUSING_COUNSELING_AGENCY_1		where PartyRoleType = "HousingCounseling Agency"

Table 4. Relationships Container – Component Details

The figure below (Figure 4) shows a basic example of how the xlink arcrole relationship linking a counseling event to the housing counseling agency that provided the counseling would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
RELATIONSHIPS RELATIONSHIP <i>Sequence Number = "1"</i> <i>xlink:from = "COUNSELING_EVENT_1"</i> <i>xlink:to = "HOUSING_COUNSELING_AGENCY_1"</i> <i>xlink:arcrole = "COUNSELING_EVENT_IsAssociatedWith_ROLE"</i>

Figure 4. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN AN ASSET (OWNED PROPERTY) AND THE ASSOCIATED LIABILITIES

The following example provides details about the xlink arcrole relationship needed to define a data relationship between an asset (owned property) and the associated liabilities for that owned property.

The figure below (Figure 5) shows examples of an asset (owned property) that will need to be linked to the associated liability for that property.

ASSET (Owned Property) And LIABILITY Containers Identifying Endpoints Of Relationships
<p>ASSETS ASSET <i>Sequence Number = "1"</i> <i>xlink:label = "ASSET_1"</i> OWNED_PROPERTY OWNED_PROPERTY_DETAIL <i>Owned Property Disposition Status Type = Retain</i> <i>Owned Property Maintenance Expense Amount = 100</i> <i>Owned Property Subject Indicator = false</i> PROPERTY ADDRESS PROPERTY_DETAIL</p>
<p>LIABILITIES LIABILITY <i>Sequence Number = "1"</i> <i>xlink:label = "LIABILITY_1"</i> LIABILITY_DETAIL <i>Liability Account Identifier = ABC123</i> <i>Liability Monthly Payment Amount = 1100</i> <i>Liability Payment Includes Taxes Insurance Indicator = true</i> <i>Liability Payoff Status Indicator = false</i> <i>Liability Type = MortgageLoan</i> <i>Liability Unpaid Balance Amount = 75000</i> <i>Mortgage Type = Conventional</i></p>

Figure 5. Establishing Endpoints of Relationship

The table below (Table 5) shows the endpoints that will makeup the xlink arcrole relationship for the relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
<i>ASSET</i>	DEAL/ASSETS/ASSET	1	<i>ASSET_1</i>
<i>LIABILITY</i>	DEAL/LIABILITIES/LIABILITY	1	<i>LIABILITY_1</i>

Table 5. Identifying Endpoints in the Relationship

The table below (Table 6) shows a breakdown of the detailed components of the relationship used to relate an asset (owned property) to a borrower’s liability for that owned property.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	ASSET_IsAssociatedWith_LIABILITY	
		from	ASSET_1	
		to	LIABILITY_1	

Table 6. Relationships Container – Component Details

The figure below (Figure 6) shows a basic example of how the xlink arcrole relationship linking an asset (owned property) to a borrower’s liability would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
<i>RELATIONSHIPS</i> <i>RELATIONSHIP</i> <i>Sequence Number = "1"</i> <i>xlink:from = "ASSET_1"</i> <i>xlink:to = "LIABILITY_1"</i> <i>xlink:arcrole = "ASSET_IsAssociatedWith_LIABILITY"</i>

Figure 6. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN A RELATED LOAN AND THE ASSOCIATED CREDITOR

The following example provides details about the xlink arcrole relationship needed to define a data relationship between a related loan and the associated creditor (NotePayTo) for that related loan.

The figure below (Figure 7) shows examples of a related loan that will need to be linked to the associated creditor (NotePayTo) for that related loan. Note that the example below uses a legal entity as the creditor but the creditor can also be an individual.

LOAN And ROLE Containers Identifying Endpoints Of Relationships
<p>LOANS LOAN <i>LoanRoleType="RelatedLoan"</i> <i>Sequence Number = "2"</i> <i>xlink:label = "RELATED_LOAN_2"</i> PAYMENT PAYMENT_RULE <i>Initial Principal And Interest Payment Amount = 100</i> TERMS_OF_LOAN <i>Note Amount = 10000</i></p>
<p>PARTIES PARTY LEGAL ENTITY LEGAL ENTITY DETAIL <i>Full Name</i> ROLE <i>Sequence Number = "1"</i> <i>xlink:label = "NOTE_PAY_TO_1"</i> ROLE DETAIL <i>Party Role Type = NotePayTo</i></p>

Figure 7. Establishing Endpoints of Relationship

The table below (Table 7) shows the endpoints that will makeup the xlink arcrole relationship for the relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
LOAN	DEAL/LOANS/LOAN	2	RELATED_LOAN_2
ROLE	DEAL/PARTIES/PARTY/ROLES/ROLE	1	NOTE_PAY_TO_1

Table 7. Identifying Endpoints in the Relationship

The table below (Table 8) shows a breakdown of the detailed components of the relationship used to relate a related loan to a creditor (NotePayTo) for that loan.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	LOAN_IsAssociatedWith_ROLE	
		from	RELATED_LOAN_2	
		to	NOTE_PAY_TO_1	

Table 8. Relationships Container – Component Details

The figure below (Figure 8) shows a basic example of how the xlink arcrole relationship linking a related loan to a creditor (NotePayTo) would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
<pre> RELATIONSHIPS RELATIONSHIP Sequence Number = "1" xlink:from = "RELATED_LOAN_2" xlink:to = "NOTE_PAY_TO_1" xlink:arcrole = "LOAN_IsAssociatedWith_ROLE" </pre>

Figure 8. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN AN ASSET AND THE ASSOCIATED BORROWER

The following example provides details about the xlink arcrole relationship needed to define a data relationship between an asset and the borrower associated with that asset.

The figure below (Figure 9) shows an example of an asset that will be linked to the associated borrower that owns the asset. Note some assets will have multiple borrowers with relationships to them. These are known as joint assets.

ASSET And ROLE Containers Identifying Endpoints Of Relationships
<pre> ASSETS ASSET Sequence Number = "1" xlink:label = "ASSET_1" ASSET_DETAIL AssetType = CheckingAccount AssetOrMarketValueAmount = 15000 </pre>
<pre> PARTIES PARTY INDIVIDUAL NAME FirstName = John LastName = Smith ROLE Sequence Number = "1" xlink:label = "BORROWER_1" ROLE DETAIL Party Role Type = Borrower </pre>

Figure 9. Establishing Endpoints of Relationship

The table below (Table 9) shows the endpoints that will makeup the xlink arcrole relationship for the relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
ASSET	DEAL/ASSETS/ASSET	1	ASSET_1
ROLE	DEAL/PARTIES/PARTY/ROLES/ROLE	1	BORROWER_1

Table 9. Identifying Endpoints in the Relationship

The table below (Table 10) shows a breakdown of the detailed components of the relationship used to relate a related asset to a borrower for that loan.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:miso.org:2009:residential	ASSET_IsAssociatedWith_ROLE	
		from	ASSET_1	
		to	BORROWER_1	

Table 10. Relationships Container – Component Details

The figure below (Figure 10) shows a basic example of how the xlink arcrole relationship linking an asset to a borrower would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
RELATIONSHIPS RELATIONSHIP <i>Sequence Number = "1"</i> <i>xlink:from = "ASSET_1"</i> <i>xlink:to = "BORROWER_1"</i> <i>xlink:arcrole = "ASSET_IsAssociatedWith_ROLE"</i>

Figure 10. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN A LIABILITY AND THE ASSOCIATED BORROWER

The following example provides details about the xlink arcrole relationship needed to define a data relationship between a liability and the borrower associated with that liability.

The figure below (Figure 11) shows an example of a liability that will be linked to the associated borrower that is responsible for that liability. Note some liabilities will have multiple borrowers with relationships to

them indicating more than one borrower is responsible for that liability.

LIABILITY And ROLE Containers Identifying Endpoints Of Relationships
LIABILITIES LIABILITY <i>Sequence Number = "1"</i> <i>xlink:label = "LIABILITY_1"</i> LIABILITY_DETAIL <i>LiabilityAccountIdentifier = 123456789</i> <i>LiabilityMonthlyPaymentAmount = 200</i> <i>LiabilityType = LeasePayment</i>
PARTIES PARTY INDIVIDUAL NAME <i>FirstName = John</i> <i>LastName = Smith</i> ROLE <i>Sequence Number = "1"</i> <i>xlink:label = "BORROWER_1"</i> ROLE_DETAIL <i>Party Role Type = Borrower</i>

Figure 11. Establishing Endpoints of Relationship

The table below (Table 11) shows the endpoints that will make up the xlink arcrole relationship for the relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
LIABILITY	DEAL/LIABILITIES/LIABILITY	1	<i>LIABILITY_1</i>
ROLE	DEAL/PARTIES/PARTY/ROLES/ROLE	1	<i>BORROWER_1</i>

Table 11. Identifying Endpoints in the Relationship

The table below (Table 12) shows a breakdown of the detailed components of the relationship used to relate a related liability to a borrower for that loan.

XPath	RELATIONSHIPS CONTAINER			Notes
	Attribute	xlink:label	Value	
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	LIABILITY_IsAssociatedWith_ROLE	
		from	<i>LIABILITY_1</i>	
		to	<i>BORROWER_1</i>	

Table 12. Relationships Container – Component Details

The figure below (Figure 12) shows a basic example of how the xlink arcrole relationship linking a liability to a borrower would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
<p><i>RELATIONSHIPS</i> RELATIONSHIP <i>Sequence Number = "1"</i> <i>xlink:from = "LIABILITY_1"</i> <i>xlink:to = "BORROWER_1"</i> <i>xlink:arcrole = "LIABILITY_IsAssociatedWith_ROLE"</i></p>

Figure 12. Using Endpoints and an Arcrole To Define a Relationship

RELATIONSHIP BETWEEN A EXPENSE AND THE ASSOCIATED BORROWER

The following example provides details about the xlink arcrole relationship needed to define a data relationship between an expense and the borrower associated with that expense.

The figure below (Figure 13) shows an example of an expense that will be linked to the associated borrower that is responsible for that expense. Note some expenses will have multiple borrowers with relationships to them indicating more than one borrower is responsible for that expense.

EXPENSE And ROLE Containers Identifying Endpoints Of Relationships
<p><i>EXPENSES</i> EXPENSE <i>Sequence Number = "1"</i> <i>xlink:label = "EXPENSE_1"</i> <i>ExpenseMonthlyPaymentAmount = 1000</i> <i>ExpenseType = ChildCare</i></p>
<p><i>PARTIES</i> PARTY INDIVIDUAL NAME <i>FirstName = John</i> <i>LastName = Smith</i> ROLE <i>Sequence Number = "1"</i> <i>xlink:label = "BORROWER_1"</i> ROLE DETAIL <i>Party Role Type = Borrower</i></p>

Figure 13. Establishing Endpoints of Relationship

The table below (Table 13) shows the endpoints that will makeup the xlink arcrole relationship for the relationship.

CONTAINER	XPath For Container	Sequence Number	Xlink:label
EXPENSE	DEAL/EXPENSES/EXPENSE	1	<i>EXPENSE_1</i>
ROLE	DEAL/PARTIES/PARTY/ROLES/ROLE	1	<i>BORROWER_1</i>

Table 13. Identifying Endpoints in the Relationship

The table below (Table 14) shows a breakdown of the detailed components of the relationship used to relate a related expense to a borrower for that loan.

RELATIONSHIPS CONTAINER				
XPath	Attribute	xlink:label	Value	Notes
First instance of RELATIONSHIP				
MESSAGE/DEAL_SETS/DEAL_SET/DEALS/DEAL/RELATIONSHIPS/RELATIONSHIP	Sequence Number		1	
		arcrole="urn:fdc:mismo.org:2009:residential	EXPENSE_IsAssociatedWith_ROLE	
		from	EXPENSE_1	
		to	BORROWER_1	

Table 14. Relationships Container – Component Details

The figure below (Figure 14) shows a basic example of how the xlink arcrole relationship linking an expense to a borrower would look in the RELATIONSHIPS container.

RELATIONSHIPS CONTAINER Showing the RELATIONSHIP Using The Endpoints
RELATIONSHIPS RELATIONSHIP <i>Sequence Number = "1"</i> <i>xlink:from = "EXPENSE_1"</i> <i>xlink:to = "BORROWER_1"</i> <i>xlink:arcrole = "EXPENSE_IsAssociatedWith_ROLE"</i>

Figure 14. Using Endpoints and an Arcrole To Define a Relationship

APPENDIX A: XML CODE SAMPLE FOR XLINK MISMO ARCRROLE EXAMPLES

The following XML code sample is provided to express an example of how the ULAD data relationship using Xlink and MISMO arcroles might look. The example provided shows a sample for the relationship between a borrower's income and the associated employer.

XML CODE SAMPLE

The information and examples provided in this document are for illustration purposes only and should not be used as production or pseudo code. The following XML sample corresponds to a use case of a borrower with concurrent income from two different employers. The borrower receives two income components from the first employer: a base salary and a bonus for a total of 1,400 dollars. The borrower receives one income component from his second employer, a base salary of 950 dollars.

```

<MESSAGE>
<DEAL_SETS>
<DEAL_SET>
<DEALS>
<DEAL>
:
:
<PARTIES>
<PARTY
:
:
<INDIVIDUAL>
<NAME>
<FirstName>John</FirstName>
<LastName>Homeowner</LastName>
</NAME>
</INDIVIDUAL>
<ROLES>
<ROLE>
<BORROWER>
<CURRENT_INCOME>
<CURRENT_INCOME_ITEMS>
<!--Income from Current Employer 1-->
<CURRENT_INCOME_ITEM SequenceNumber="1" xlink:label="CURRENT_INCOME_ITEM_1">
<CURRENT_INCOME_ITEM_DETAIL>
<IncomeType>Base</IncomeType>
<CurrentIncomeMonthlyTotalAmount>1000</CurrentIncomeMonthlyTotalAmount>
<EmploymentIncomeIndicator>true</EmploymentIncomeIndicator>
</CURRENT_INCOME_ITEM_DETAIL>
</CURRENT_INCOME_ITEM>
<CURRENT_INCOME_ITEM SequenceNumber="2" xlink:label="CURRENT_INCOME_ITEM_2">
<CURRENT_INCOME_ITEM_DETAIL>
<IncomeType>Overtime</IncomeType>
<CurrentIncomeMonthlyTotalAmount>400</CurrentIncomeMonthlyTotalAmount>
<EmploymentIncomeIndicator>true</EmploymentIncomeIndicator>
</CURRENT_INCOME_ITEM_DETAIL>
</CURRENT_INCOME_ITEM>

```

```

<!--Income from Current Employer 2-->
<CURRENT_INCOME_ITEM SequenceNumber="3" xlink:label="CURRENT_INCOME_ITEM_3">
  <CURRENT_INCOME_ITEM_DETAIL>
    <IncomeType>Base</IncomeType>
    <CurrentIncomeMonthlyTotalAmount>950</CurrentIncomeMonthlyTotalAmount>
    <EmploymentIncomeIndicator>true</EmploymentIncomeIndicator>
  </CURRENT_INCOME_ITEM_DETAIL>
</CURRENT_INCOME_ITEM>
<EMPLOYERS>
  <EMPLOYER SequenceNumber="1" xlink:label="EMPLOYER_1">
    <LEGAL_ENTITY>
      <LEGAL_ENTITY_DETAIL>
        <FullName>ABC Corporation</FullName>
      </LEGAL_ENTITY_DETAIL>
    </LEGAL_ENTITY>
    <ADDRESS>
      <AddressLineText>ABC Address</AddressLineText>
    </ADDRESS>
    <EMPLOYMENT>
      <EmploymentMonthlyIncomeAmount>1400</EmploymentMonthlyIncomeAmount>
      <EmploymentStatusType>Current</EmploymentStatusType>
    </EMPLOYMENT>
  </EMPLOYER SequenceNumber="2" xlink:label="EMPLOYER_2">
    <LEGAL_ENTITY>
      <LEGAL_ENTITY_DETAIL>
        <FullName>Consulting Inc.</FullName>
      </LEGAL_ENTITY_DETAIL>
    </LEGAL_ENTITY>
    <ADDRESS>
      <Address>123 Address</Address>
    </ADDRESS>
    <EMPLOYMENT>
      <EmploymentBorrowerSelfEmployedIndicator>true</EmploymentBorrowerSelfEmployedIndicator>
      <EmploymentMonthlyIncomeAmount>950</EmploymentMonthlyIncomeAmount>
      <EmploymentStatusType>Current</EmploymentStatusType>
    </EMPLOYMENT>
  </BORROWER>
  <ROLE_DETAIL>
    <PartyRoleType>Borrower</PartyRoleType>
  </ROLE_DETAIL>
</ROLES>
</PARTY>
</PARTIES>
:
:
<RELATIONSHIPS xsi:type="RELATIONSHIPS">
  <!-- Linking First Borrower's Current Employer to Income -->
  <RELATIONSHIP SequenceNumber="1" xlink:from="CURRENT_INCOME_ITEM_1" xlink:to="EMPLOYER_1"
xlink:arcrole="urn:fdc:mismo.org:2009:residential/CURRENT_INCOME_ITEM_ISASSOCIATEDWITH_EMPLOYER"/>
  <RELATIONSHIP SequenceNumber="2" xlink:from="CURRENT_INCOME_ITEM_2" xlink:to="EMPLOYER_1"
xlink:arcrole="urn:fdc:mismo.org:2009:residential/CURRENT_INCOME_ITEM_ISASSOCIATEDWITH_EMPLOYER"/>
  <!--Linking First Borrower's Current Second Employer to Income -->
  <RELATIONSHIP SequenceNumber="3" xlink:from="CURRENT_INCOME_ITEM_3" xlink:to="EMPLOYER_2"
xlink:arcrole="urn:fdc:mismo.org:2009:residential/CURRENT_INCOME_ITEM_ISASSOCIATEDWITH_EMPLOYER"/>

```

```
</RELATIONSHIPS>  
:  
</DEAL>  
<DEALS>  
</DEAL_SET>  
</DEAL_SETS>  
</MESSAGE>
```