



Corticon.js

Rule Language

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Last updated with new content: Corticon.js 2.4

Updated: 2025/11/19

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Introduction to Corticon.js Rule Language

Graphical modeling languages and tools (UML, ER, ORM, for example) are not sufficiently precise for specifications. Additional constraints on the objects in the model must also be defined. While natural languages are easily used by individuals without a programming background, they are often ambiguous. On the other hand, formal programming languages are precise, but not easily used by business analysts and other non-programmers.

The Corticon.js Rule Language has been developed to resolve this dilemma. Based on the Object Constraint Language (OCL, an extension of the Universal Modeling Language specification 1.1), the *Corticon.js Rule Language* (CRL) is designed to enable non-programmers to express rules clearly and precisely without the use of procedural programming languages. More information on OCL may be found at www.uml.org.

Note: A preferred user language might use different separator symbols than those documented for decimal values, list ranges, and dates.

For details, see the following topics:

- [Rule structure](#)
- [Basic data types](#)
- [Truth values](#)
- [Collection operators](#)
- [Language operators](#)
- [Vocabulary used in this Language Guide](#)

Rule structure

In traditional programming languages (or logic systems), most rules are expressed via IF/THEN structures. The IF clause contains a conditional expression and the THEN clause contains actions the rule should perform if all conditions have been met. This IF/THEN structure is expressed as Conditions and Actions in the Rulesheet user interface of Corticon.js Studio. For more information on building and organizing rules in Corticon.js Studio, see the *Corticon.js Studio Tutorial: Basic Rule Modeling*.

Basic data types

The proper expression and execution of rules in Corticon rules is dependent on the type of data involved. Each attribute in the Corticon Vocabulary has a data type, meaning that it has restrictions on the type of data it can contain. Corticon standard data types are as follows:

Data Type	Description
String	Any combination of alphanumeric characters, of any length.
Integer	A whole number, including zero and negative numbers, to the maximum values for a 64-bit long signed integer with 53 significant digits (-9007199254740991 to 9007199254740991).
Decimal	A number containing a decimal point, including zero and negative numbers to the limits of precision in our library. With an arbitrary-precision, the Decimal type for JavaScript calculations are slower than with a plain Number, but they can be executed with an arbitrary higher precision that reduces occurrence of round-off errors. Decimal values in JSON input payloads can be represented either as a number or as string. See below for details and examples.
Boolean	Values are <code>true</code> and <code>false</code> . <code>T</code> and <code>F</code> can also be used.
DateTime	DateTime values in a Corticon.js payload must conform to the ISO 8601 standard, or as the number of milliseconds since the epoch. For example, for 9/13/2025 2:00:00 PM EST use either 1757782800000 or "2025-09-13T13:00:00-04:00". See Formats for date and dateTime in JSON payloads on page 217 and Formats for date and dateTime in Corticon.js Studio tester on page 215 for details on date and dateTime values.
Date	A value with only date information. No time information is allowed.

In this guide, the data types Integer and Decimal are often referred to by the generic term `<Number>`. Wherever `<Number>` is used, either Integer or Decimal data types may be used.

Decimal data in payloads

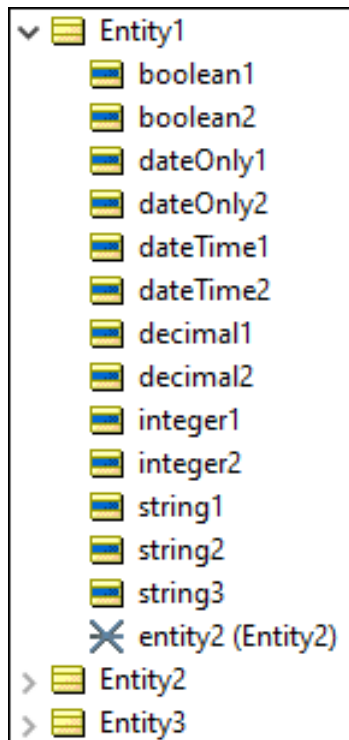
Decimal data might not fit in a JavaScript number type because JavaScript numbers are a subset of all numbers that can be expressed with the Decimal data type. Therefore, decimals as JavaScript numbers in JSON payload are represented as Strings. For example:

Decimal format in JSON Input Payload

Vocabulary used in this Language Guide

This guide uses a generic Vocabulary in all its examples. The Vocabulary contains four entities, each of which contains the same attribute names and types. Attribute names reflect their data types. For example, `integer1` has a data type of Integer. This generic Vocabulary provides sufficient flexibility to create examples using all operators and functions in the Corticon.js Rule Language. `Entity1` is shown expanded in the following figure:

Figure 1: Vocabulary used in Corticon.js Language Guide examples







How to access rule operators

The Studio tools for accessing operators provide icons with decorations, and tooltips.

Icons

Rule Operators are assigned icons which provide the user with information about their usage. The following table describes these icons:

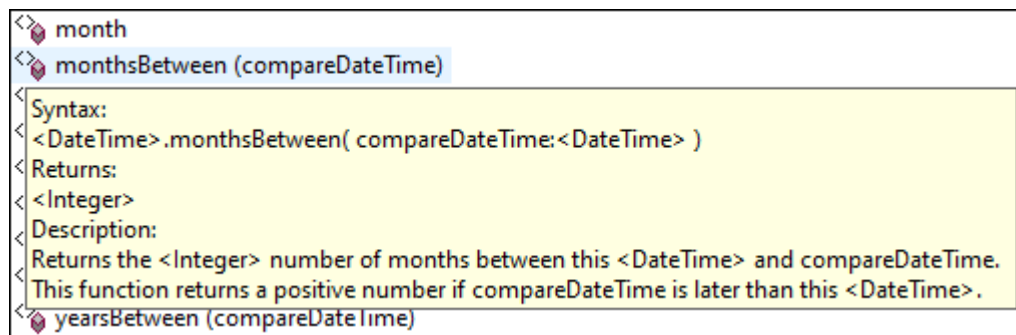
Icon	Where Found	Purpose	Examples
	General, Literals category	indicates special values or constants	<code>null</code> , <code>true</code> , <code>other</code>
	General, Functions category	indicates system values that are automatically retrieved upon rule execution.	<code>now</code> , <code>today</code>
<code>—</code>	Operators, Boolean category	this special “unary” operator icon is used only with <code>not</code>	<code>not</code>

Icon	Where Found	Purpose	Examples
	Operators, all categories	indicates the operator uses a period “.” to attach to its operand. Most operators with this icon typically fell into the previous “function” category.	day , round , contains
	Operators, all categories	indicates the operator is used between two operands. Most operators with this icon typically fell into the previous “comparison” category.	equals , multiply

Tool tips

In Corticon.js Studio, moving the mouse over a Vocabulary operator and pausing, or hovering for a moment, causes a dynamic tool tip text box to display. This tool tip contains information about operator syntax, return data type, and description, all of which are supplied in more detail in this set of topics. For questions not answered by the tool tip, refer to the detailed operator descriptions in this publication. The following figure shows a typical tool tip for the date time operator `.monthsBetween`:

Figure 2: Typical Rule Operator Tool Tip



Usage restrictions

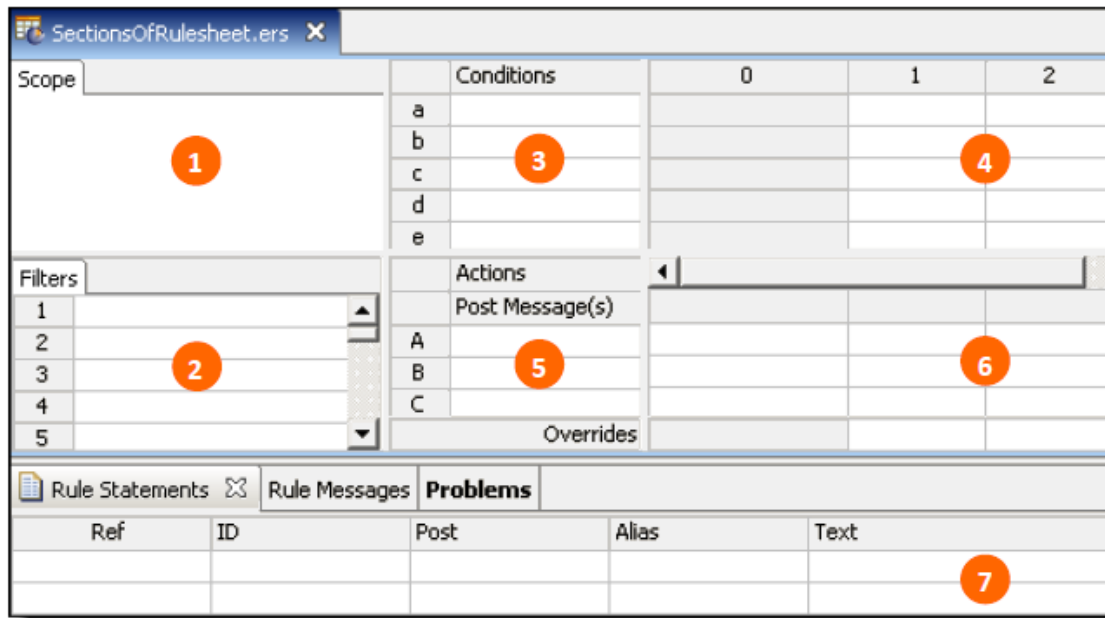
The following illustrations show the general usage restrictions for the various types of Vocabulary terms depending on where they are used in a Rulesheet. This table indicates, for example, that entities (terms from the Vocabulary) may be used in any section of the Rulesheet. Rule Operators, however, are restricted to only three sections.

Note: Some operators have specific restrictions that vary from this general table – see each operator's usage restrictions for details of these exceptions.

Figure 3: Vocabulary usage restrictions in Rulesheet sections

Rulesheet Section Name	Scope	Filter Rows	Condition Rows	Condition Cells	Actions Rows	Action Cells	Rule Statements
Rulesheet Section #	1	2	3	4	5	6	7
Literals		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Functions		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Operators		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		
Data	Values	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Terms	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Figure 4: Sections of Rulesheet that correlate with usage restrictions

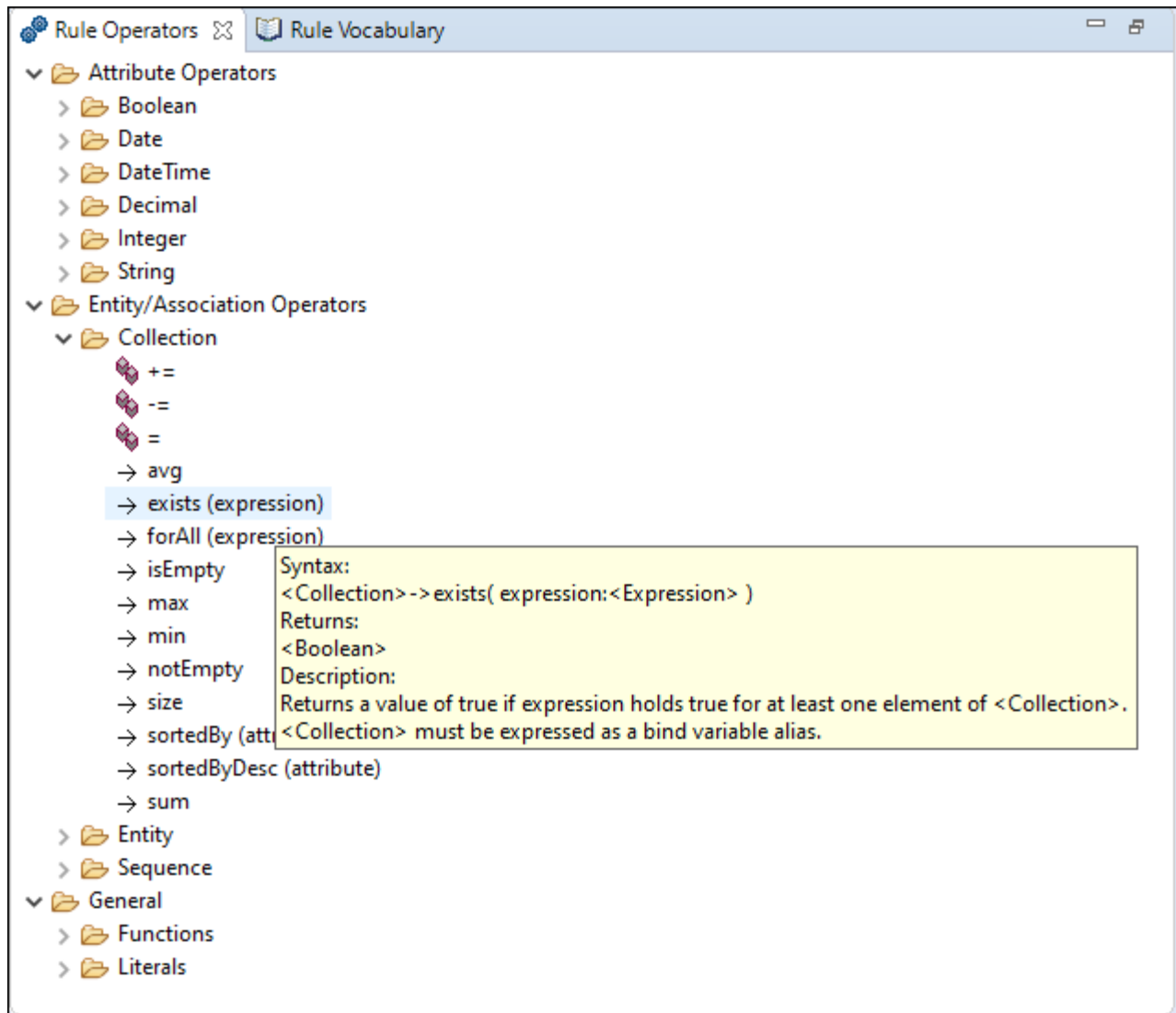


Rule operators

Corticon.js Studio presents its rule operators in logical groups.

Rule Operators are classified based on the data type(s) of the terms *to which the operator may be applied* (known as the “operand”). When you open an operator group and hover over an operator, a help window shows its syntax, and details about that operator, as shown:

Figure 5: JS Rule Operator categories



For details, see the following topics:

- [Attribute operators](#)
- [Entity and Association operators](#)
- [General terms](#)

Attribute operators

The Corticon.js Rule Language supports attribute operators categorized as Boolean, DateTime, Decimal, Integer, and String.

Boolean

Corticon.js's **Boolean** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		
<Expression1> = <Expression2>	Boolean	Returns a value of true if <Expression1> has the same value as <Expression2>.
Equals (used as an assignment)		
<Boolean1> = <Expression1>	Boolean	Assigns the truth value of <Expression1> to <Boolean1>
Not Equal To		
<Expression1> <> <Expression2>	Boolean	Returns a value of true if <Expression1> does not have the same truth value as <Expression2>
Or		
<Expression1> or <Expression2> or ...	Boolean	Returns a value of true if either <Expression1> or <Expression2> evaluates to true. This operator can be used only in Actions and Preconditions/Filters.
And		
<<Boolean1> and <Boolean2>	Boolean	Returns a value of true if both <<Boolean1> and <Boolean2 are true. This operator can be used only in Actions and Preconditions/Filters.
Not		
not <Expression>	Boolean	Returns the negation of the truth value of <Expression>

Note: See also related information in the topics [Precedence of rule operators](#) on page 211 and [Standard Boolean constructions](#) on page 203..

Date

Corticon.js's **Date** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		

Name and Syntax	Returns	Description
<Date1> = <Date2>	Boolean	Returns a value of true if <Date1> is the same as <Date2>.
Equals (used as an assignment)		
<Date1> = <Date2>	DateTime	Assigns the value of <Date2> to <Date1>
Not Equal To		
<Date1> <> <Date2>	Boolean	Returns a value of true if <Date1> does not equal <Date2>
Less than		
<Date1> < <Date2>	Boolean	Returns a value of true if <Date1> is less than <Date2>
Greater than		
<Date1> > <Date2>	Boolean	Returns a value of true if <Date1> is greater than <Date2>
Less than or Equal to		
<Date1> <= <Date2>	Boolean	Returns a value of true if <Date1> is less than or equal to <Date2>
Greater than or Equal to		
<Date1> >= <Date2>	Boolean	Returns a value of true if <Date1> is greater than or equal to <Date2>
In (Range)		
attributeReference in [(rangeExpression)]	Boolean	Returns a value of true if attributeReference is in the range of Date values <i>from..to</i> , and where opening and closing parentheses () indicate exclusion of that limit and square brackets [] indicate inclusion of that limit.
In (List)		
attributeReference in {listExpression}	Boolean	Returns a value of true if attributeReference is in the comma-delimited list of literal values, defined enumeration values, or - if in use - enumeration labels.
Year		
<Date>.year	Integer	Returns the century/year portion of <Date> as a four digit Integer

Name and Syntax	Returns	Description
Month		
<Date>.month	Integer	Returns the month in <Date> as an Integer between 1 and 12
Day		
<Date>.day	Integer	Returns the day portion of <Date> as an Integer between 1 and 31
Add years		
<Date>.addYears(<Integer>)	Date	Adds the number of years in <Integer> to the number of years in <Date>
Add months		
<Date>.addMonth(<Integer>)	Date	Adds the number of months in <Integer> to the number of months in <Date>
Add days		
<Date>.addDays(<Integer>)	Date	Adds the number of days in <Integer> to the number of days in <Date>
Years between		
<Date1>.yearsBetween(<Date2>)	Integer	Returns the Integer number of years between <Date1> and <Date2>. This function returns a positive number if <Date2> is later than <Date1>.
Months between		
<Date1>.monthsBetween(<Date2>)	Integer	Returns the Integer number of months between <Date1> and <Date2>. If the month and year portions of <Date1> and <Date2> are the same, the result is zero. This function returns a positive number if <Date2> is later than <Date1>.
Days between		
<Date1>.daysBetween(<Date2>)	Integer	Returns the Integer number of days between <Date1> and <Date2>. If the two dates differ by less than a full 24-hour period, the value is zero. This function returns a positive number if <Date2> is later than <Date1>.
Day of Week		
<Date>.dayOfWeek	Integer	Returns an Integer corresponding to day of the week, with Sunday equal to 1, in <Date>.

Name and Syntax	Returns	Description
Week of Year		
<Date>.weekOfYear	Integer	Returns an Integer from 1 to 52, equal to the week number within the year in <Date>.
Day of Year		
<Date>.dayOfYear	Integer	Returns an Integer from 1 to 366, equal to the day number within the year in <Date>
Week of Month		
<Date>.weekOfMonth	Integer	Returns an Integer from 1 to 6, equal to the week number within the month in <DateTime> or <Date>. A week begins on Sunday and ends on Saturday.
To DateTime		
<Date>.toDateTime	DateTime	Returns a DateTime where the date portion is equal to the value of <Date> and the time portion is equal to 00:00:00 in the system's local timezone.
To DateTime with Timezone Offset		
<Date>.toDateTime (<string>)	DateTime	Returns a DateTime where the date portion is equal to the value of <Date> and the time portion is equal to 00:00:00 in the timezone specified by the value of <string>.

DateTime

Note: A DateTime data type **must contain both** date information **and** time information. Applying a DateTime operator to a DateTime attribute should always produce a result. Be sure to use the data type that suits your needs.

Corticon.js's **DateTime** attribute operators that enable date-only or time-only comparison are as follows:

Name and Syntax	Returns	Description
Is same date		
<DateTime1>.isSameDate (<DateTime2>)	Boolean	Returns a value of true if DateTime1 is the same as DateTime2, ignoring the time part.
After date		
<DateTime1>.afterDate (<DateTime2>)	Boolean	Returns a value of true if DateTime1 is after DateTime2, ignoring the time part.

Name and Syntax	Returns	Description
Before date		
<code><DateTime1>.beforeDate (<DateTime2>)</code>	Boolean	Returns a value of true if DateTime1 is before DateTime2, ignoring the time part.
Is same time		
<code><DateTime1>.isSameTime (<DateTime2>)</code>	Boolean	Returns a value of true if DateTime1 is the same as DateTime2, ignoring the date part.
After time		
<code><DateTime1>.afterTime (<DateTime2>)</code>	Boolean	Returns a value of true if DateTime1 is after DateTime2, ignoring the date part.
Before time		
<code><DateTime1>.beforeTime(<DateTime2>)</code>	Boolean	Returns a value of true if DateTime1 is before DateTime2, ignoring the date part.

Corticon.js's **DateTime** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		
<code><DateTime1> = <DateTime2></code>	Boolean	Returns a value of true if <DateTime1> is the same as <DateTime2>, including both the Date and the Time portions
Equals (used as an assignment)		
<code><DateTime1> = <DateTime2></code>	DateTime	Assigns the value of <DateTime2> to <DateTime1>
Not Equal To		
<code><DateTime1> <> <DateTime2></code>	Boolean	Returns a value of true if <DateTime1> does not equal <DateTime2>
Less than		
<code><DateTime1> < <DateTime2></code>	Boolean	Returns a value of true if <DateTime1> is less than <DateTime2>
Greater than		
<code><DateTime1> > <DateTime2></code>	Boolean	Returns a value of true if <DateTime1> is greater than or equal to <DateTime2>
Less than or Equal to		

Name and Syntax	Returns	Description
<code><DateTime1> <= <DateTime2></code>	Boolean	Returns a value of true if <code><DateTime1></code> is less than or equal to <code><DateTime2></code>
Greater than or Equal to		
<code><DateTime1> >= <DateTime2></code>	Boolean	Returns a value of true if <code><DateTime1></code> is greater than or equal to <code><DateTime2></code>
In (Range)		
<code>attributeReference in [(rangeExpression)]</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the range of <code>DateTime</code> values <i>from..to</i> , and where opening and closing parentheses () indicate exclusion of that limit and brackets [] indicate inclusion of that limit.
In (List)		
<code>attributeReference in {listExpression}</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the comma-delimited list of literal values, defined enumeration values, or - if in use - enumeration labels.
Year		
<code><DateTime>.year</code>	Integer	Returns the century/year portion of <code><DateTime></code> as a four digit Integer
Month		
<code><DateTime>.month</code>	Integer	Returns the month in <code><DateTime></code> as an Integer between 1 and 12
Day		
<code><DateTime>.day</code>	Integer	Returns the day portion of <code><DateTime></code> as an Integer between 1 and 31
Hour		
<code><DateTime>.hour</code>	Integer	Returns the hour portion of <code><DateTime></code> . The returned value is based on a 24-hour clock.
Minute		
<code><DateTime>.min</code>	Integer	Returns the minute portion of <code><DateTime></code> as an Integer between 0 and 59
Second		

Name and Syntax	Returns	Description
<DateTime>	Integer	Returns the seconds portion of <>.secDateTime> as an Integer between 0 and 59
Add years		
<DateTime>.addYears (<Integer>)	DateTime	Adds the number of years in <Integer> to the number of years in <DateTime>
Add months		
<DateTime>.addMonths (<Integer>)	DateTime	Adds the number of months in <Integer> to the number of months in <DateTime>
Add days		
<DateTime>.addDays (<Integer>)	DateTime	Adds the number of days in <Integer> to the number of days in <DateTime>
Add hours		
<DateTime>.addHours (<Integer>)	DateTime	Adds the number of hours in <Integer> to the number of hours in the Time portion of <DateTime>
Add minutes		
<DateTime>.addMinutes (<Integer>)	DateTime	Adds the number of minutes in <Integer> to the number of minutes in the Time portion of <DateTime>
Add seconds		
<DateTime>.addSeconds (<Integer>)	DateTime	Adds the number of seconds in <Integer> to the number of seconds in the Time portion of <DateTime>
Years between		
<DateTime1>.yearsBetween (<DateTime2>)	Integer	Returns the Integer number of years between <DateTime1> and <Date2>. This function returns a positive number if <DateTime2> is later than <DateTime1>.
Months between		
<DateTime1>.monthsBetween (<DateTime2>)	Integer	Returns the Integer number of months between <DateTime1> and <DateTime2>. If the month and year portions of <DateTime1> and <DateTime2> are the same, the result is zero. This function returns a positive number if <DateTime2> is later than <DateTime1>.

Name and Syntax	Returns	Description
Days between		
<code><DateTime1>.daysBetween (<DateTime2>)</code>	Integer	Returns the Integer number of days between <code><DateTime1></code> and <code><DateTime2></code> . If the two dates differ by less than a full 24-hour period, the value is zero. This function returns a positive number if <code><DateTime2></code> is later than <code><DateTime1></code> .
Hours between		
<code><DateTime1>.hoursBetween (<DateTime2>)</code>	Integer	Returns the Integer number of hours between <code><DateTime1></code> and <code><DateTime2></code> . If the two dates differ by less than a full hour, the value is zero. This function returns a positive number if <code><DateTime2></code> is later than <code><DateTime1></code> .
Minutes between		
<code><DateTime1>.minsBetween (<DateTime2>)</code>	Integer	Returns the Integer number of minutes between <code><DateTime1></code> and <code><DateTime2></code> . This function returns a positive number if <code><DateTime2></code> is later than <code><DateTime1></code> .
Weeks between		
<code><DateTime1>.weeksBetween (<DateTime2>)</code>	Integer	Returns the Integer number of weeks between <code><startDate></code> and <code><endDate></code> .
Seconds between		
<code><DateTime1>.secsBetween (<DateTime2>)</code>	Integer	Returns the Integer number of seconds between <code><DateTime1></code> and <code><DateTime2></code> . This function returns a positive number if <code><DateTime2></code> is later than <code><DateTime1></code> .
Day of Week		
<code><DateTime>.dayOfWeek</code>	Integer	Returns an Integer corresponding to day of the week, with Sunday equal to 1, in <code><DateTime></code> .
Week of Year		
<code><DateTime>.weekOfYear</code>	Integer	Returns an Integer from 1 to 52, equal to the week number within the year in <code><DateTime></code>
Day of Year		
<code><DateTime>.dayOfYear</code>	Integer	Returns an Integer from 1 to 366, equal to the day number within the year in <code><DateTime></code>
Week of Month		

Name and Syntax	Returns	Description
<code><DateTime>.weekOfMonth</code>	Integer	Returns an Integer from 1 to 6, equal to the week number within the month in <code><DateTime></code> . A week begins on Sunday and ends on Saturday.
To Date		
<code><DateTime>.toDate</code>	Date	Returns the date portion only of <code>DateTime</code>
getMilliseconds		
<code><DateTime>.getMilliseconds</code>	Integer	Returns the internal date/time, namely the number of milliseconds that have transpired since the epoch, 1/1/1970 00:00:00 GMT.

Decimal

In this section, wherever the syntax includes `<Number>`, either Integer or Decimal data types may be used.

Corticon.js's **Decimal** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		
<code><Number1> = <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is the same as <code><Number2></code> .
Equals (used as an assignment)		
<code><Number1> = <Number2></code>	Number	Assigns the value of <code><Number2></code> to the value of <code><Number1></code> .
Not Equal To		
<code><Number1> <> <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is not equal to <code><Number2></code> .
Less than		
<code><Number1> < <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is less than <code><Number2></code> .
Greater than		
<code><Number1> > <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is greater than <code><Number2></code> .
Less than or Equal to		

Name and Syntax	Returns	Description
<code><Number1> <= <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is less than or equal to <code><Number2></code> .
Greater than or Equal to		
<code><Number1> >= <Number2></code>	Boolean	Returns a value of true if <code><Number1></code> is greater than or equal to <code><Number2></code> .
In (Range)		
<code>attributeReference in [(rangeExpression)]</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the range of Decimal values <i>from..to</i> , and where opening and closing parentheses () indicate exclusion of that limit and square brackets [] indicate inclusion of that limit.
In (List)		
<code>attributeReference in {listExpression}</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the comma-delimited list of literal values, defined enumeration values, or - if in use - enumeration labels.
Add		
<code><Number1> + <Number2></code>	Number	Returns the sum of <code><Number1></code> and <code><Number2></code> . The resulting data type is the more expansive of either <code><Number1></code> or <code><Number2></code> . For example, if an Integer value is added to a Decimal value, the resulting value will be a Decimal. See Precedence of rule operators on page 211.
Subtract		
<code><Number1> - <Number2></code>	Number	Subtracts <code><Number2></code> from <code><Number1></code> . The resulting data type is the more expansive of either <code><Number1></code> or <code><Number2></code> . See Precedence of rule operators on page 211.
Multiply		
<code><Number1> * <Number2></code>	Number	Returns the product of <code><Number1></code> and <code><Number2></code> . The resulting data type is the more expansive of either <code><Number1></code> or <code><Number2></code> . See Precedence of rule operators on page 211.
Divide		

Name and Syntax	Returns	Description
<Number1> / <Number2>	Number	Divides <Number1> by <Number2>. The resulting data type is the more expansive of either <Number1> or <Number2>. See Precedence of rule operators on page 211.
Exponent		
<Number1> ** <Number2>	Number	Raises <Number1> to the power of <Number2>. The resulting data type is the more expansive of either <Number1> or <Number2>. See Precedence of rule operators on page 211.
Absolute Value		
<Decimal>.absVal	Decimal	Returns the absolute value of <Number>. If the <Number> is positive, <Number> itself is returned; if <Number> is negative, the negation of <Number> is returned.
Floor		
<Decimal>.floor	Integer	Returns a new Decimal whose value is the value of this Decimal rounded to a whole number in the direction of negative infinity.
Ceiling		
<Decimal>.ceiling	Integer	Returns a new Decimal whose value is the value of this Decimal rounded to a whole number in the direction of positive infinity.
Round		
<Decimal>.round	Decimal	Rounds <Decimal> to the nearest Integer.
Round(n)		
<Decimal>.round(<decimalDigits<Integer>>)	Decimal	Returns <Decimal> rounded to the number of decimal places specified by decimalDigits. Rounds toward the nearest neighbor; where equivalent, rounds toward infinity.
Round(n)		
<Decimal>.round(<decimalDigits<Integer>>, mode:<integer>)	Decimal	Returns <Decimal> rounded to the number of decimal places specified by decimalDigits. See details page for information about mode.
Maximum Value		
<Decimal>.max(<Number>)	Number	Returns the greater of <Decimal> and <Number>.

Name and Syntax	Returns	Description
Minimum Value		
<Decimal>.min(<Number>)	Number	Returns the lesser of <Decimal> and <Number>.
Logarithm (base 10)		
<Decimal>.log	Decimal	Returns the logarithm (base 10) of <Decimal>. <Decimal> may not be zero.
Logarithm (base x)		
<Decimal1>.log(<Decimal2>)	Decimal	Returns the logarithm (base <Decimal2>) of <Decimal1>. <Decimal1> may not be zero.
Natural Logarithm		
<Decimal>.ln	Decimal	Returns the logarithm (base e) of <Decimal>. <Decimal> may not be zero.
Random		
<Decimal>.random(minRange, maxRange)	Decimal	Returns a random decimal between minRange and maxRange.
Truncate		
<Decimal>.truncate	Integer	Truncates "this" Decimal value to an integer by removing the fractional portion.

Integer

In this section, wherever the syntax includes <Number>, either Integer or Decimal data types may be used.

Corticon.js's **Integer** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		
<Number1> = <Number2>	Boolean	Returns a value of true if <Number1> is the same as <Number2>.
Equals (used as an assignment)		
<Number1> = <Number2>	Number	Assigns the value of <Number2> to the value of <Number1>. The data type of <Number1> must be expansive enough to accommodate <Number2>.
Not Equal To		

Name and Syntax	Returns	Description
<Number1> <> <Number2>	Boolean	Returns a value of true if <Number1> is not equal to <Number2>.
Less than		
<Number1> < <Number2>	Boolean	Returns a value of true if <Number1> is less than <Number2>.
Greater than		
<Number1> > <Number2>	Boolean	Returns a value of true if <Number1> is greater than <Number2>.
Less than or Equal to		
<Number1> <= <Number2>	Boolean	Returns a value of true if <Number1> is less than or equal to <Number2>.
Greater than or Equal to		
<Number1> >= <Number2>	Boolean	Returns a value of true if <Number1> is greater than or equal to <Number2>.
In (Range)		
attributeReference in [(rangeExpression)]	Boolean	Returns a value of true if attributeReference is in the range of Integer values <i>from..to</i> , and where opening and closing parentheses () indicate exclusion of that limit and square brackets [] indicate inclusion of that limit.
In (List)		
attributeReference in {listExpression}	Boolean	Returns a value of true if attributeReference is in the comma-delimited list of literal values, defined enumeration values, or - if in use - enumeration labels.
Add		
<Number1> + <Number2>	Number	Returns the sum of <Number1> and <Number2>. The resulting data type is the more expansive of either <Number1> or <Number2>. For example, if an Integer value is added to a Decimal value, the resulting value will be a Decimal. See Precedence of rule operators on page 211.
Subtract		

Name and Syntax	Returns	Description
<Number1> - <Number2>	Number	Subtracts <Number2> from <Number1>. The resulting data type is the more expansive of either <Number1> or <Number2>. See Precedence of rule operators on page 211.
Multiply		
<Number1> * <Number2>	Number	Returns the product of <Number1> and <Number2>. The resulting data type is the more expansive of either <Number1> or <Number2>. See Precedence of rule operators on page 211.
Increment		
<Number1> += <Number2>	Number	Increments <Number1> by <Number2>. The data type of <Number1> must accommodate the addition of <Number2>. See Precedence of rule operators on page 211.
Decrement		
<Number1> -= <Number2>	Number	Decrements <Number1> by the value of <Number2>. The data type of <Number1> must accommodate the addition of <Number2>. See Precedence of rule operators on page 211.
Absolute value on page 47.		
<Integer>.absVal	Number	Returns the absolute value of <Integer>. If the <Integer> is positive, <Integer> itself is returned; if <Integer> is negative, the negation of <Integer> is returned.
To Decimal		
<Integer>.toDecimal	Decimal	Converts an attribute of type Integer to type Decimal.
To String		
<Integer>.toString	String	Converts an attribute of type Integer to type String.
Maximum Value		
<Integer1>.max(<Integer2>)	Integer	Returns the greater of <Integer1> and <Integer2>.
Minimum Value		

Name and Syntax	Returns	Description
<code><Integer1>.min(<Integer2>)</code>	Integer	Returns the lesser of <code><Integer1></code> and <code><Integer2></code> .
Random		
<code><Decimal>.random(minRange, maxRange)</code>	Decimal	Returns a random integer between <code>minRange</code> and <code>maxRange</code> .
Mod		
<code><Integer1>.mod(<Integer2>)</code>	Integer	Returns the whole number remainder that results from dividing <code><Integer1></code> by <code><Integer2></code> . If the remainder is a fraction, then zero is returned.
Logarithm (base 10)		
<code><Integer>.log</code>	Decimal	Returns the logarithm (base 10) of <code><Integer></code> . <code><Integer></code> may not be zero.
Logarithm (base x)		
<code><Integer>.log(<Decimal>)</code>	Decimal	Returns the logarithm (base <code><Decimal></code>) of <code><Integer></code> . <code><Integer></code> may not be zero.
Natural Logarithm		
<code><Integer>.ln</code>	Decimal	Returns the natural logarithm (base e) of <code><Number></code> . <code><Integer></code> may not be zero.

String

Corticon.js's **String** attribute operators are as follows:

Name and Syntax	Returns	Description
Equals (used as a comparison)		
<code><String1> = <String2></code>	Boolean	Returns a value of true if <code><String1></code> exactly matches <code><String2></code> . Both case and length are examined to determine equality.
Equals (used as an assignment)		
<code><String1> = <String2></code>	String	Assigns the value of <code><String2></code> to the value of <code><String1></code> .
Not Equal to		

Name and Syntax	Returns	Description
<code><String1> <> <String2></code>	Boolean	Returns a value of true if <code><String1></code> is not equal to <code><String2></code> .
Less than		
<code><String1> < <String2></code>	Boolean	Returns a value of true if <code><String1></code> is less than <code><String2></code> .
Greater than on page 100		
<code><String1> > <String2></code>	Boolean	Returns a value of true if <code><String1></code> is greater than <code><String2></code> .
Less than or Equal to		
<code><String1> <= <String2></code>	Boolean	Returns a value of true if <code><String1></code> is less than or equal to <code><String2></code> .
Greater than or Equal to		
<code><String1> >= <String2></code>	Boolean	Returns a value of true if <code><String1></code> is greater than or equal to <code><String2></code> .
In (Range)		
<code>attributeReference in [(rangeExpression)]</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the range of String values <i>from..to</i> , and where opening and closing parentheses () indicate exclusion of that limit and square brackets [] indicate inclusion of that limit.
In (List)		
<code>attributeReference in {listExpression}</code>	Boolean	Returns a value of true if <code>attributeReference</code> is in the comma-delimited list of literal values, defined enumeration values, or - if in use - enumeration labels.
Adding Strings		
<code><String1> + <String2></code>	String	Concatenates <code><String1></code> to <code><String2></code> . Alternative syntax.
Size		
<code><String>.size</code>	String	Returns the number of characters in <code><String></code> .
Concatenate		
<code><String1>.concat(<String2>)</code>	String	Concatenates <code><String1></code> to <code><String2></code> .

Name and Syntax	Returns	Description
Uppercase		
<String>.toUpperCase	String	Converts all characters <String> to uppercase.
Lowercase		
<String>.toLowerCase	String	Converts all characters in <String> to lowercase.
To DateTime		
<String>.toDate	DateTime	Converts the value in <String> to data type DateTime ONLY if date as ISO8601 string or millisecs since epoch as a string.
To Decimal		
<String>.toDecimal	Decimal	Converts an attribute of type String to data type Decimal ONLY if all characters in <String> are numeric and contain not more than one decimal point. If any non-numeric characters are present (other than a single decimal point or leading minus sign), no value is returned.
To Integer		
<String>.toInt	Integer	Converts an attribute of type String to type Integer ONLY if all characters in <String> are numeric. If any non-numeric characters are present, no value is returned.
Substring		
<String>.substring (<Integer1>,<Integer2>)	String	Returns that portion of <String> between character positions <Integer1> and Integer2>.
Equals Ignoring Case		
<String1>.equalsIgnoreCase (<String2>)	Boolean	Returns a value of true if <String1> is the same as <String2>, irrespective of case.
Starts with		
<String1>.startsWith (<String2>)	Boolean	Returns a value of true if the <String1> begins with the characters specified in <String2>.
Ends with		
<String1>.endsWith (<String2>)	Boolean	Evaluates the contents of <String1> and returns a value of true if the String ends with the characters specified in <String2>.

Name and Syntax	Returns	Description
Contains		
<code><String1>.contains (<String2>)</code>	Boolean	Evaluates the contents of <code><String1></code> and returns a value of true if it contains the exact characters defined by <code><String2></code>
Equals		
<code><String1>.equals (<String2>)</code>	Boolean	Returns a value of true if <code><String1></code> is the same as <code><String2></code> .
Index Of		
<code><String1>.indexOf (<String2>)</code>	Integer	Returns the beginning character position number of <code><String2></code> within <code><String1></code> , if <code><String1></code> contains <code><String2></code> . If it does not, the function returns a value of zero.
Replace String		
<code><String>.replace (<String1>, <String2>)</code>	String	Returns a new String where the instances of the String to be replaced are replaced by the value of the replacement String.
Regular expression replace String		
<code><String>.replace (<regularExpression>, <replacementString>)</code>	String	Returns a new String where the Strings matching the regular expression are replaced by the replacement String.
Matches		
<code><String>.matches (<regularExpression>:String)</code>	Boolean	Returns true if the regular expression matches the String.
characterAt(index)		
<code><String>.characterAt (index: Integer)</code>	String	Returns the character at the specified position in the String.
isInteger		

Name and Syntax	Returns	Description
<code><String>.isInteger</code>	Boolean	Determines whether "this" String contains only integer digits. Note: This operator examines each character in a string to determine whether it is in the range 0 to 9. Therefore, the operator returns <code>true</code> when the entire string evaluates as a positive integer, and <code>false</code> when a minus sign is the first character of a string that would evaluate as a negative integer. A new extended operator could be created if the string as a whole is to be evaluated as <code>true</code> whether positive or negative (for example, by allowing the first character to be a minus sign.)
trimSpaces		
<code><String>.trimSpaces</code>	String	Trims leading and trailing spaces from "this" String.

Entity and Association operators

The Corticon.js rule language supports Entity, Association, and Sequence operators.

Collection

Corticon.js's **Collection** operators are as follows:

Name and Syntax	Returns	Description
Replace element(s)		
<code><Collection1> = <Collection2></code> <code><Collection1> = <Entity></code>	<i>modifies a collection</i>	replaces all elements in <code><Collection1></code> with elements of <code><Collection2></code> or with <code><Entity></code> , provided the new associations are allowed by the Business Vocabulary.
Associate element(s)		
<code><Collection1> += <Collection2></code> <code><Collection1> += <Entity></code>	<i>modifies a collection</i>	Associates all elements of <code><Collection2></code> or <code><Entity></code> with <code><Collection1></code> . Every <code><Collection></code> must be expressed as a unique alias.
Disassociate element(s)		

Name and Syntax	Returns	Description
<Collection1> -= <Collection2>	<i>modifies a collection</i>	Disassociates all elements of <Collection2> from <Collection1>. Does not delete the disassociated elements. Every <Collection> must be expressed as a unique alias.
Is empty		
<Collection> ->isEmpty	Boolean	Returns a value of true if <Collection> contains <i>no</i> elements
Not empty		
<Collection> ->notEmpty	Boolean	Returns a value of true if <Collection> contains <i>at least one</i> element.
Exists		
<Collection> ->exists (<Expression>)	Boolean	Returns a value of true if <Expression> holds true for <i>at least one</i> element of <Collection>
For all		
<Collection> ->forAll (<Expression>)	Boolean	Returns a value of true if <i>every</i> <Expression> holds true for <i>every</i> element of <Collection>
Sorted by		
<Collection> ->sortedBy (<Attribute>)	<i>converts a collection into a sequence</i>	Sequences the elements of <Collection> in <u>ascending</u> order, using the value of <Attribute> as the index. <Collection> must be expressed as a unique alias.
Sorted by descending		
<Collection> ->sortedByDesc (<Attribute>)	<i>converts a collection into a sequence</i>	Sequences the elements of <Collection> in <u>descending</u> order, using the value of <Attribute> as the index. <Collection> must be expressed as a unique alias.
Size of collection		
<Collection> ->size	Integer	Returns the number of elements in <Collection>. <Collection> must be expressed as a unique alias.
Sum		
<Collection.attribute> ->sum	Number	Sums the values of the specified <attribute> for all elements in <Collection>. <attribute> must be a numeric data type.

Name and Syntax	Returns	Description
Average		
<code><Collection.attribute> ->avg</code>	Number	Averages all of the specified attributes in <code><Collection></code> . <code><Collection></code> must be expressed as a unique alias. <code><attribute></code> must be a numeric data type
Minimum		
<code><Collection.attribute> ->min</code>	Number	Returns the lowest value of <code><attribute></code> for all elements in <code><Collection></code> . <code><attribute></code> must be a numeric data type
Maximum		
<code><Collection.attribute> ->max</code>	Number	Returns the highest value of <code><attribute></code> for all elements in <code><Collection></code> . <code><attribute></code> must be a numeric data type

Entity

Corticon.js's **Entity** operators are as follows:

Name and Syntax	Returns	Description
New		
<code><Entity> .new [<Expression1>,...]</code>	Entity	Creates a new instance of <code><Entity></code> . Expressions (optional to assign attribute values) in square brackets <code>[.]</code> must be written in the form: <i>attribute = value</i> .
New Unique		
<code><Entity> .newUnique [<Expression1>,...]</code>	Entity	Creates a new instance of <code><Entity></code> only if the instance created is unique as defined by optional <code><Expression1>,...</code>
Clone		
<code><Entity>.clone [<Expression1>,...]</code>	Entity	Creates a new instance of <code><Entity></code> with the same attributes and their respective values. Expressions (optional to override attribute values) in square brackets <code>[.]</code> must be written in the form: <i>attribute = value</i> .

Name and Syntax	Returns	Description
Remove		
<code><Entity>.remove [(true) (false)]</code>	Entity	Deletes the entity from memory and from the resultant JSON document. Children can be removed as well when set to <code>true</code> , or retained after moving to root <code>false</code> . Blank or no value defaults to <code>true</code> .

Sequence

Sequence operators act on collections that have *already* been ordered by a sorting operator (see [sortedBy](#) and [sortedByDesc](#)). In other words, sequence operators operate on collections that have been turned into sequences. The notation `<Sequence>` used below, is shorthand for a completed sorting operation. For example:

```
<Collection> -> sortedBy(<Attribute>)
```

produces a `<Sequence>`, in this case the elements of `<Collection>` arranged in ascending order using `<Attribute>` as the index. This `<Sequence>` can then be used with one of the sequence operators described below. The design of the Object Constraint Language (upon which the Corticon.js Rule Language is based), allows for the “chaining” of operators, so a collection operator and a sequence operator can be used in the same expression to produce a sequence and identify a particular element of that sequence in the same step. For example:

```
<Entity.attribute1> = <Collection> ->sortedBy(<Attribute3>) ->first.<Attribute2>
```

performs the following:

1. Sorts `<Collection>` in ascending order according to `<Attribute3>`, turning it into a `<Sequence>`
2. Locates the first element of `<Sequence>`
3. Reads the value of `<Attribute2>` of the first element
4. Assigns the value of `<Attribute2>` of the first element to `<Entity.attribute1>`

Corticon.js's **Sequence** operators are as follows:

	Name and Syntax	Returns	Description
At			
	<code><Sequence> ->at(<Integer>)</code>	Entity	Returns the element at position <code><Integer></code> . <code><Sequence></code> must be expressed as a unique alias.
First			
	<code><Sequence> ->first</code>	Entity	Returns the first element of <code><Sequence></code> . <code><Sequence></code> must be expressed as a unique alias.

	Name and Syntax	Returns	Description
Last			
	<Sequence> ->last	Entity	Returns the last element of <Sequence>. <Sequence> must be expressed as a unique alias.

General terms

Corticon.js's **General** operators are **Functions** and **Literals**.

Functions

Corticon.js's **Functions** operators are as follows:

Name and Syntax	Returns	Description
Custom operators with return datatype		
getBoolean getDate getDateTime getDecimal getInteger getString	Corresponding datatype	Calls the specified custom function with the custom string parameter. Returns the data specified in the custom function as the requested datatype. See <i>"Customized data access operators" in the Corticon.js Integration Guide</i> for more information.
Custom operators with no return		
setBoolean setDate setDateTime setDecimal setInteger setString	nothing	Call the specified function with the custom parameters. See <i>"Customized data access operators" in the Corticon.js Integration Guide</i> for more information.
Now		
now	DateTime	Returns the current system date and time when the rule is executed.
Today		
today	Date	Returns the current system date when the rule is executed.

Literals

Literal Terms can be used in any section of the Rulesheet, except **Scope** and **Rule Statements**. Exceptions to this general statement exist. See individual literals for detailed usage restrictions.

Corticon.js's **Literals** operators are as follows:

Name and Syntax	Returns	Description
Null		
null	<i>none</i>	The null value corresponds to one of three different scenarios: <ul style="list-style-type: none"> • the absence of an attribute in a Ruletest scenario • the absence of data for an attribute in a Ruletest scenario • an object that has a value of null
True		
true or T	Boolean	Represents Boolean value true
False		
false or F	Boolean	Represents the Boolean value false
Other		
other	<i>any</i>	When included in a condition's Values set, other represents any value not explicitly included in the set, including null .
CellValue		
cellValue	<i>any</i>	cellValue is a variable whose value is determined by the rule Column that executes

Rule operator details and examples

The following pages describe each operator in greater detail. Each Rule Operator has the following sections

1. **Syntax** – Describes the standard syntax used with this operator. In this section, as in the previous summary tables, the angle bracket convention `< . . >` is used to indicate what types of terms and their data types can be used with the operator. When using the operator with real terms from the Vocabulary, do not include the angle brackets.
2. **Description** – Provides a plain-language description of the operator's purpose and details of its use. Important reminders, tips, or cautions are included in this section.
3. **Usage Restrictions** – Describes what limitations exist for this operator, and where an operator may not be used in a Rulesheet. Such limitations are rare, but important to a good understanding of Corticon.js Studio.
4. **Example** – Shows an example of each operator in a Rulesheet. A screenshot of the example Rulesheet is provided, with portions of the Rulesheet not used by the example collapsed or truncated for clarity. The example also includes sample input and output data for Ruletest scenarios run against the Rulesheet.

The entire list of operators is presented in alphabetic order.

For details, see the following topics:

- [Absolute value](#)
- [Add numbers](#)
- [Add strings](#)
- [Add days](#)
- [Add hours](#)
- [Add minutes](#)

- [Add months](#)
- [Add seconds](#)
- [Add years](#)
- [After date](#)
- [After time](#)
- [Associate elements](#)
- [At](#)
- [Average](#)
- [Before date](#)
- [Before time](#)
- [Ceiling](#)
- [CellValue](#)
- [Character at](#)
- [Clone](#)
- [Concatenate](#)
- [Contains](#)
- [Day](#)
- [Day of week](#)
- [Day of year](#)
- [Days between](#)
- [Decrement](#)
- [Disassociate elements](#)
- [Divide](#)
- [Ends with](#)
- [Equals ignoring case](#)
- [Equals when used as an assignment](#)
- [Equals when used as a comparison](#)
- [Equals when using Strings](#)
- [Exists](#)
- [Exponent](#)
- [False](#)
- [First](#)
- [Floor](#)

-
- For all
 - Get Milliseconds
 - Greater than
 - Greater than or equal to
 - Hour
 - Hours between
 - In LIST
 - In RANGE
 - Increment
 - Index of
 - Is empty
 - Is integer
 - Last
 - Is same date
 - Is same time
 - Less than
 - Less than or equal to
 - Logarithm BASE 10
 - Logarithm BASE X
 - Lowercase
 - Matches
 - Maximum value
 - Maximum value COLLECTION
 - Minimum value
 - Minimum value COLLECTION
 - Minute
 - Minutes between
 - Mod
 - Month
 - Months between
 - Multiply
 - Natural logarithm
 - New

- [New unique](#)
- [Not](#)
- [Not empty](#)
- [Not equal to](#)
- [Now](#)
- [Null](#)
- [Other](#)
- [Or](#)
- [Random](#)
- [Regular expression to replace String](#)
- [Remove element](#)
- [Replace elements](#)
- [Replace String](#)
- [Round](#)
- [Second](#)
- [Seconds between](#)
- [Size of collection](#)
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- [Today](#)
- [To dateTime](#)
- [To date Casting a dateTime to a date](#)
- [To dateTime Casting a string to a dateTime](#)
- [To dateTime Casting a date to a dateTime](#)
- [To dateTime Timezone offset](#)
- [To decimal](#)
- [To integer](#)
- [To string](#)

- [Trim spaces](#)
- [True](#)
- [Truncate](#)
- [Uppercase](#)
- [Week of month](#)
- [Week of year](#)
- [Weeks between](#)
- [Year](#)
- [Years between](#)

Absolute value

SYNTAX

`<Number>.absVal`

DESCRIPTION

Returns the absolute value of `<Number>`. If the `<Number>` is positive, `<Number>` itself is returned; if `<Number>` is negative, the negation of `<Number>` is returned.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.absVal` to produce the absolute value of `decimal2` and assign it to `decimal1`

The screenshot shows a Rulesheet editor window titled 'AbsoluteValue.ers'. It contains a table with 'Conditions' and 'Actions' sections. The 'Conditions' section has a value of '0'. The 'Actions' section has a value of '<'. Below the 'Actions' section is a table with 'Overrides'. The 'Rule Statements' section is also visible, showing a table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. The table contains one row with 'A0' in the 'Ref' column and 'decimal1 equals the absolute value of decimal2' in the 'Text' column.

Conditions		0		
a				
b				
Actions		<		
Post Message(s)				
A	Entity1.decimal1 = Entity1.decimal2.absVal	<input checked="" type="checkbox"/>		
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A0				decimal1 equals the absolute value of decimal2

SAMPLE RULETEST

A sample Ruletest provides `decimal2` values for three different scenarios of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal2 [0.000000] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal2 [23.000000] ▼ Entity1 [3] <ul style="list-style-type: none"> decimal2 [-17.000000] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [0.000000] decimal2 [0.000000] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal1 [23.000000] decimal2 [23.000000] ▼ Entity1 [3] <ul style="list-style-type: none"> decimal1 [17.000000] decimal2 [-17.000000]

Add numbers

SYNTAX

<Number1> + <Number2>

DESCRIPTION

Adds <Number1> to <Number2>. The resulting data type is the more expansive of those of <Number1> and <Number2>. For example, if you are adding an Integer value and a Decimal value, the resulting value will be a Decimal. See [Precedence of rule operators](#) on page 211.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses the **add numbers** operation to add the value of `decimal2` to the value of `integer1` and assign the result to `decimal1`

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.decimal1 = Entity1.decimal2 + Entity1.integer1	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				decimal1 equals the sum of decimal2 plus integer1

SAMPLE RULETEST

A sample Ruletest provides an `integer1` value of 300 which is added to the value of `decimal2` and assigned to the value of `decimal1` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal2 [1000.000000] integer1 [300] Entity1 [2] <ul style="list-style-type: none"> decimal2 [500.000000] integer1 [300] Entity1 [3] <ul style="list-style-type: none"> decimal2 [1550.000000] integer1 [300] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1300.000000] decimal2 [1000.000000] integer1 [300] Entity1 [2] <ul style="list-style-type: none"> decimal1 [800.000000] decimal2 [500.000000] integer1 [300] Entity1 [3] <ul style="list-style-type: none"> decimal1 [1850.000000] decimal2 [1550.000000] integer1 [300]

Add strings

SYNTAX

<String1> + <String2>

DESCRIPTION

Adds <String1> to <String2>. This has the same effect as using the `.concat` operator. However, the "+" syntax permits concatenation of more than two String values without nesting, as shown in the example below.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **add strings** operation to add the String AAA to `string2` to ZZZ and assign the result to `string1`

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.string1 = 'AAA' + Entity1.string2 + 'ZZZ'	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				string1 equals string2, prepended with 'ZZZ'

SAMPLE RULETEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string2 [Hello] Entity1 [2] <ul style="list-style-type: none"> string2 [-Goodbye-] Entity1 [3] <ul style="list-style-type: none"> string2 [Au Revoir] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [AAAHelloZZZ] string2 [Hello] Entity1 [2] <ul style="list-style-type: none"> string1 [AAA-Goodbye-ZZZ] string2 [-Goodbye-] Entity1 [3] <ul style="list-style-type: none"> string1 [AAAAu RevoirZZZ] string2 [Au Revoir]

Add days

SYNTAX

```
<DateTime>.addDays(<Integer>)
```

```
<Date>.addDays(<Integer>)
```

DESCRIPTION

Adds the number of days in `<Integer>` to the number of days in `<DateTime>` or `<Date>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.addDays` to add 45 days to the value of `dateTime2` and assign the result to `dateTime1`.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.dateTime1 = Entity1.dateTime2.addDays(45)	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				dateTime1 must be given a value 45 days after dateTime2

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below. Notice the month portion of `dateTime1` also changes accordingly.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [02/09/2025 9:00:00 PM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-06-28T14:00:00-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-09-21T16:00:00-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-03-26T22:00:00-0400] dateTime2 [2025-02-09T21:00:00-0500]

Add hours

SYNTAX

`<DateTime>.addHours(<Integer>)`

DESCRIPTION

Adds the number of hours in `<Integer>` to the number of hours in the Time portion of `<DateTime>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses the `.addHours` to add 30 hours to the value of `dateTime2` and assign the result to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
	Post Message(s)		
A	Entity1.dateTime1=Entity1.dateTime2.addHours(30)	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				dateTime1 must be given a value 30 hours after dateTime2

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-05-15T20:00:00-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-08-08T22:00:00-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2019-12-26T11:00:00-0500] dateTime2 [2019-12-25T05:00:00-0500]

Add minutes

SYNTAX

```
<DateTime>.addMinutes(<Integer>)
```

DESCRIPTION

Adds the number of minutes in `<Integer>` to the number of minutes in the Time portion of `<DateTime>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses the `.addMinutes` add 90 minutes to the value of `dateTime2` and assign the result to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.dateTime1=Entity1.dateTime2.addMinutes(90)	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				dateTime1 must be given a value of 90 minutes after dateTime2

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-05-14T15:30:00-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-08-07T17:30:00-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2019-12-25T06:30:00-0500] dateTime2 [2019-12-25T05:00:00-0500]

Add months

SYNTAX

`<DateTime>.addMonths(<Integer>)`

`<Date>.addMonths(<Integer>)`

DESCRIPTION

Adds the number of months in `<Integer>` to the number of months in `<DateTime>` or `<Date>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.addMonths` in a Nonconditional rule to add 10 months to the value of `dateTime2` and assign the result to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.dateTime1=Entity1.dateTime2.addMonths(10)	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				dateTime1 must be given a value 10 months after dateTime2

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below. Notice the year portion of `dateTime1` also changes accordingly.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2021-03-14T14:00:00-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2007-06-07T16:00:00-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-10-25T06:00:00-0400] dateTime2 [2019-12-25T05:00:00-0500]

Add seconds

SYNTAX

```
<DateTime>.addSeconds(<Integer>)
```

DESCRIPTION

Adds the number of seconds in `<Integer>` to the number of seconds in the Time portion of `<DateTime>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.addSeconds` in a Nonconditional rule to add 90 seconds to the value of `dateTime2` and assign the result to `dateTime1`.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.dateTime1=Entity1.dateTime2.addSeconds(90)	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				dateTime1 must be given a value 90 seconds after dateTime2

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-05-14T14:01:30-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-08-07T16:01:30-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2019-12-25T05:01:30-0500] dateTime2 [2019-12-25T05:00:00-0500]

Add years

SYNTAX

`<DateTime>.addYears(<Integer>)`

`<Date>.addYears(<Integer>)`

DESCRIPTION

Adds the number of years in `<Integer>` to the number of years in the Date portion of `<DateTime>` or `<Date>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.addYears` in a Nonconditional rule to add 10 years to the value of `dateTime2` and assign the result to `dateTime1`.

The screenshot shows a rulesheet editor for a file named `addYears.ers`. It is divided into two main sections: **Conditions** and **Actions**.

Conditions: A table with two rows, 'a' and 'b', and a column for a count, which is currently 0.

Actions: A table with two rows, 'A' and 'B', and a column for a count, which is currently 0. Row 'A' contains the action `Entity1.dateTime1=Entity1.dateTime2.addYears(10)` and has a checkmark in the count column.

Rule Statements: A table with columns: Ref, ID, Post, Alias, Text. Row 'A0' contains the text `dateTime1 must be given a value 10 years after dateTime2`.

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime2 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime2 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime2 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2030-05-14T14:00:00-0400] dateTime2 [2020-05-14T14:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2016-08-07T16:00:00-0400] dateTime2 [2006-08-07T16:00:00-0400] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2029-12-25T05:00:00-0500] dateTime2 [2019-12-25T05:00:00-0500]

After date

SYNTAX

```
<DateTime1>.afterDate(<DateTime2>)
```

DESCRIPTION

Returns boolean. True if `DateTime1` is after `DateTime2`, ignoring the time part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.afterDate` to determine whether a `dateTime` date value is a later date than another.

The screenshot shows a rulesheet editor window titled "afterDate.ers". It contains two main sections: "Conditions" and "Actions".

Conditions:

	1	2	
a	Entity1.dateTime1.afterDate(Entity1.dateTime2)	T	F
b			
c			
d			

Actions:

	1	2	
Post Message(s)			
A	Entity1.boolean1	T	F
B			
C			
D			

Below the actions is an "Overrides" section.

At the bottom, there are tabs for "Rule Statements", "Rule Messages", and "Problems". The "Rule Statements" tab is active, showing a table:

Ref	ID	Post	Alias	Text
A1		Info	Entity1	Date 1 is after Date 2
A2		Info	Entity1	Date 1 is not after Date 2

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

Severity	Message	Entity
Info	Date 1 is not after Date 2	Entity1[1]
Info	Date 1 is after Date 2	Entity1[2]

After time

SYNTAX

`<DateTime1>afterTime(<DateTime2>)`

DESCRIPTION

Returns boolean. True if DateTime1 is after DateTime2, ignoring the date part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.afterTime` to determine whether a dateTime time value is a later time than another.

afterTime.ers				
Conditions		1	2	
a	Entity1.dateTime1.afterTime(Entity1.dateTime2)	T	F	
b				
c				
d				
Actions				
Post Message(s)		<		
A	Entity1.boolean1	✉	✉	
B		T	F	
C				
D				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A1		Info	Entity1	Time 1 is after Time 2
A2		Info	Entity1	Time 1 is not after Time 2

SAMPLE RULETEST

A sample Ruletest provides dateTime1 and dateTime2 for two examples. Input and Output panels are shown below.

*afterTime.ert

untitled_1

/Generic.js/afterTime.ers
Differences: 0

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [06/14/2015 09:15:00] dateTime2 [06/14/2014 09:30:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [09/14/2015 09:45:00] dateTime2 [06/14/2014 09:30:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] dateTime1 [2015-06-14T09:15:00-0400] dateTime2 [2014-06-14T09:30:00-0400] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] dateTime1 [2015-09-14T09:45:00-0400] dateTime2 [2014-06-14T09:30:00-0400]

Severity	Message	Entity
Info	Time 1 is not after Time 2	Entity1[1]
Info	Time 1 is after Time 2	Entity1[2]

Associate elements

SYNTAX

```
<Collection1> += <Collection2>
```

```
<Collection1> += <Entity>
```

DESCRIPTION

Associates all elements of <Collection2> or a single element named <Entity> with <Collection1>, provided such an association is allowed by the Vocabulary. Every collection must be uniquely identified with an alias or role.

If the cardinality of the association between the parent entity of <Collection> and the <Entity> being added is “one-to-one” (a straight line icon beside the association in the Rule Vocabulary), then this **associate element** syntax is not used. Instead, [replace element](#) syntax is used, since the collection can contain only one element, and any element present will be replaced by the new element.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **associate element** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **associate element** to associate an element of collection2 to collection1 when boolean1 value of any element in collection2 is true. Note that the Action is not associating *all* elements in collection2 with collection1, *only* those elements within collection2 that satisfy the condition.

The screenshot shows the Rulesheet editor for 'associateElements.ers'. The left pane shows a tree view with 'Entity1' containing 'entity2 (Entity2) [collection1]' and 'Entity2 [collection2]'. The middle pane shows a table with conditions and actions.

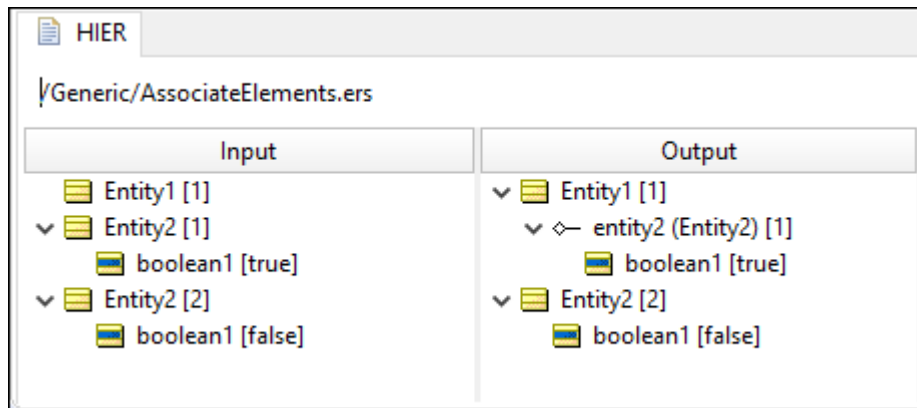
Scope	Conditions	1	2
a	collection2.boolean1	T	F
b			
c			

Actions	1	2
Post Message(s)		
A collection1 += collection2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B		
C		

Ref	ID	Post	Alias	Text
A1				If boolean1 value of an element in collection2 is true, then add an element to collection1
A2				If boolean1 value of Entity2 is false, then take no action

SAMPLE RULETEST: HIER

A sample Ruletest provides two examples of `Entity2` with `boolean1` values, and a single `Entity1`. Input and Output panels shows the association embedded in the parent entity:

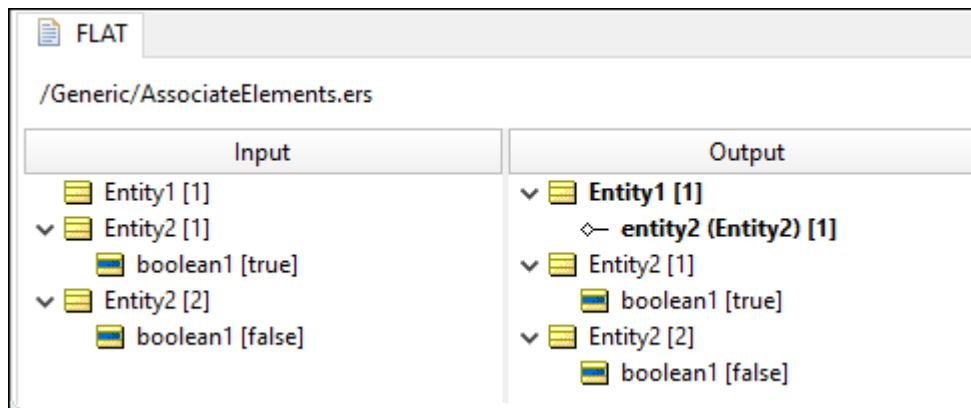


SAMPLE RULETEST: FLAT

Setting two properties in the Studio's `brms.properties` file enables a Flat payload:

```
com.corticon.testers.cserver.execute.format=XML
com.corticon.designer.testers.xmlmessagingstyle=Flat
```

After restarting Studio, running the same sample Ruletest shows the association dropping to the root with an href entity:



At

SYNTAX

```
<Sequence> ->at(<Integer>).<Attribute1>
```

DESCRIPTION

Returns the value of `<Attribute1>` for the element at position `<Integer>` in `<Sequence>`. Another operator, such as `->sortedBy`, must be used to transform a `<Collection>` into a `<Sequence>` before `->at` may be used. `<Sequence>` must be expressed as a unique alias. See *"Advanced collection sorting syntax" in the Rule Modeling Guide* for more examples of usage.

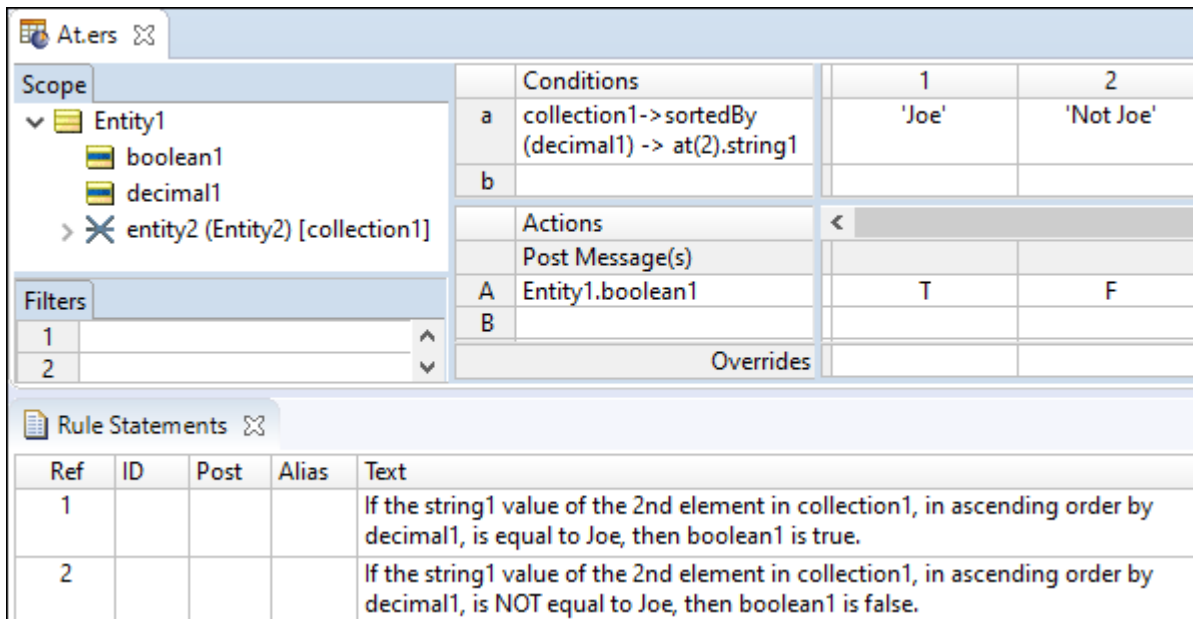
<Attribute1> may be of any data type.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `->at(2)` to identify the second element of the sequence created by applying `sortedBy` to `collection1`. Once identified, the value of the `string1` attribute belonging to this second element is evaluated. If the value of `string1` is `Joe`, then `boolean1` attribute of `Entity1` is assigned the value of `true`.



Scope		Conditions	1	2
a	collection1->sortedBy (decimal1) -> at(2).string1	'Joe'	'Not Joe'	
b				
Filters		Actions		
1		Post Message(s)		
2		A Entity1.boolean1	T	F
		B		
		Overrides		

Ref	ID	Post	Alias	Text
1				If the string1 value of the 2nd element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.
2				If the string1 value of the 2nd element in collection1, in ascending order by decimal1, is NOT equal to Joe, then boolean1 is false.

SAMPLE RULETEST

A sample Ruletest provides a collection of three elements, each with a `decimal1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Sally] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Moe] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Joe] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Sally] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Moe] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Joe]

Average

SYNTAX

<Collection.attribute> ->avg

DESCRIPTION

Averages the values of all of the specified attributes in <Collection>. <Collection> must be expressed as a unique alias. <attribute> must be a numeric data type.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **->avg** to average the `integer1` values of all elements in `collection2`, then assigns the resulting value to `decimal1` in `Entity1`. Note the use of the alias `collection2` to represent the collection of `Entity2` elements associated with `Entity1`.

The screenshot shows the 'Average.ers' rulesheet editor. The 'Scope' panel on the left shows a tree view with 'Entity1' containing 'decimal1' and 'entity2 (Entity2) [collection2]' which contains 'integer1'. The 'Filters' panel shows two filters. The 'Conditions' table has three rows labeled 'a', 'b', and 'c'. The 'Actions' table has three rows: 'A' with the expression 'Entity1.decimal1 = collection2.integer1->avg' and a checked checkbox, 'B', and 'C'. Below the 'Actions' table is an 'Overrides' section. At the bottom, the 'Rule Statements' table contains one row with 'Ref' 'A0' and 'Text' 'decimal1 of Entity1 is equal to the average of all integer1 values in collection2'.

Ref	ID	Post	Alias	Text
A0				decimal1 of Entity1 is equal to the average of all integer1 values in collection2

SAMPLE RULETEST

A sample Ruletest provides `integer1` values for three elements in `collection2`. The following illustration shows Input and Output panels:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> integer1 [1520] entity2 (Entity2) [2] <ul style="list-style-type: none"> integer1 [1300] entity2 (Entity2) [3] <ul style="list-style-type: none"> integer1 [750] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1190.000000] entity2 (Entity2) [1] <ul style="list-style-type: none"> integer1 [1520] entity2 (Entity2) [2] <ul style="list-style-type: none"> integer1 [1300] entity2 (Entity2) [3] <ul style="list-style-type: none"> integer1 [750]

Before date

SYNTAX

`<DateTime1>.beforeDate(<DateTime2>)`

DESCRIPTION

Returns boolean. True if DateTime1 is an earlier date than DateTime2, ignoring the time part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.beforeDate` to determine whether a dateTime value is an earlier date than another.

beforeDate.ers				
Conditions		1	2	
a	Entity1.dateTime1.beforeDate(Entity1.dateTime2)	T	F	
b				
c				
d				
Actions		< []		
Post Message(s)		✉	✉	
A	Entity1.boolean1	T	F	
B				
C				
D				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A1		Info	Entity1	Date 1 is before Date 2
A2		Info	Entity1	Date 1 is not before Date 2

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

Severity	Message	Entity
Info	Date 1 is not before Date 2	Entity1[1]
Info	Date 1 is before Date 2	Entity1[2]

Before time

SYNTAX

```
<DateTime1>.beforeTime(<DateTime2>)
```

DESCRIPTION

Returns boolean. True if `DateTime1` is before `DateTime2`, ignoring the date part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.beforeTime` to determine whether a `dateTime` time value is an earlier date than another.

beforeTime.ers		1	2
Conditions			
a	Entity1.dateTime1.beforeTime(Entity1.dateTime2)	T	F
b			
c			
d			
Actions			
Post Message(s)		✉	✉
A	Entity1.boolean1	T	F
B			
C			
D			
Overrides			

Ref	ID	Post	Alias	Text
A1		Info	Entity1	Time 1 is before Time 2
A2		Info	Entity1	Time1 is not before Time 2

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

beforeTime.ert		
untitled_1		
/Generic.js/beforeTime.ers Differences: 0		
Input	Output	
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [10/12/21 09:00:00] dateTime2 [11/12/21 11:15:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [10/12/21 09:00:00] dateTime2 [11/12/21 07:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] dateTime1 [2021-10-12T09:00:00-0400] dateTime2 [2021-11-12T11:15:00-0500] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] dateTime1 [2021-10-12T09:00:00-0400] dateTime2 [2021-11-12T07:00:00-0500] 	
Rule Statements Rule Messages Problems		
Severity	Message	Entity
Info	Time 1 is before Time 2	Entity1[1]
Info	Time1 is not before Time 2	Entity1[2]

Ceiling

SYNTAX

<Decimal>.ceiling

DESCRIPTION

Returns the Decimal furthest from <Decimal>. **.ceiling** may also be thought of as a rounding to a whole number in the direction of positive infinity.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The Rulesheet uses **.ceiling** to assign Decimal values to `decimal1` that are closer to zero than the input `decimal2` values.

The screenshot shows the 'ceiling.ers' rulesheet editor. The 'Scope' panel on the left shows a tree view for 'Entity1' containing 'decimal1', 'decimal2', 'integer1', and 'integer2'. The 'Filters' panel shows two filters. The main editor area has a 'Conditions' table with rows 'a', 'b', and 'c'. Below it is an 'Actions' table with a 'Post Message(s)' section containing rule 'A' with the expression 'Entity1.decimal1=Entity1.decimal2.ceiling' and a checked checkbox. The 'Overrides' section is empty. At the bottom, the 'Rule Statements' table shows a single rule 'A0' with the text 'Round Entity1.decimal2 toward 0'.

Ref	ID	Post	Alias	Text
A0				Round Entity1.decimal2 toward 0

SAMPLE RULETEST

A sample Ruletest provides three `decimal2` values. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal2 [1550.785000] Entity1 [2] <ul style="list-style-type: none"> decimal2 [2200.986000] Entity1 [3] <ul style="list-style-type: none"> decimal2 [-500.999000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1551.000000] decimal2 [1550.785000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [2201.000000] decimal2 [2200.986000] Entity1 [3] <ul style="list-style-type: none"> decimal1 [-500.000000] decimal2 [-500.999000]

CellValue

SYNTAX

Various, see Examples below

DESCRIPTION

When used in an expression, **cellValue** performs text replacement where the value is determined by the rule Column that executes. Using **cellValue** in a Condition or Action expression eliminates the need for multiple, separate Rows to express the same logic.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **cellValue** may only be used in Condition and Action Rows (sections 3 and 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE 1

This sample Rulesheet uses **cellValue** to increment `integer1` by the amount in the Action Cell of the rule Column that fires. An equivalent Rulesheet which does not use `cellValue` is also shown for comparison purposes.

CellValue1.ers				
Conditions		0	1	2
a	Entity1.boolean1		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.integer1 += cellValue		3	6
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If boolean1 is true, increment integer1 by 3
2				If boolean1 is false, increment integer1 by 6

Equivalent Rulesheet without using **cellValue**:

Conditions		0	1	2
a	Entity1.boolean1		T	F
b				
c				
Actions		<		
Post Message(s)				
A	Entity1.integer1 += 3	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Entity1.integer1 += 6	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
C				
Overrides				

Ref	ID	Post	Alias	Text
1				If boolean1 is true, increment integer1 by 3
2				If boolean1 is false, increment integer1 by 6

SAMPLE RULETEST 1

A sample Ruletest provides two examples of `boolean1`. The following table shows Input and Output panels.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [2] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [4] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [5] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [10]

Character at

SYNTAX

`<String>.characterAt(index:Integer)`

DESCRIPTION

Returns the character at the specified position in the String.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This action-only operator parses the specified string, and then returns that character to the return character string.

Ref	ID	Post	Alias	Text
A0				Return the character at index 4 of Entity1.string2

SAMPLE RULETEST

A sample Ruletest provides three elements that point out (1) the expected behavior, (2) the result when the character is not alphanumeric, and (3) a null when there is no character at that position in the String.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string2 [abcde] Entity1 [2] <ul style="list-style-type: none"> string2 [555-1212] Entity1 [3] <ul style="list-style-type: none"> string2 [abc] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [d] string2 [abcde] Entity1 [2] <ul style="list-style-type: none"> string1 [-] string2 [555-1212] Entity1 [3] <ul style="list-style-type: none"> string2 [abc]

Clone

SYNTAX

```
<Entity>.clone[<Expression1>,<Expression2>...]
```

DESCRIPTION

Copies the specified *Entity* and its attribute values to a new *Entity* where *Expressions* (in the form *attribute=value*) override the corresponding cloned attribute values. The new *Entity* has no associations. Where an *Entity* specifies an *Entity Identity*, that identity is not copied to its clone entity. For each *Entity* in *Collection*, the operator creates a duplicate of *Entity*. The implementation is a *shallow clone* -- associations are not duplicated.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exceptions: **clone** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

Nested clone calls are not supported, such as `E1.clone[assoc1 += E1.assoc1.clone[...]]`.

RULESHEET EXAMPLE

The following Rulesheet uses **.clone** to create a new `Entity2` element when the value of `qtyOrdered` in `Entity1` is greater than the `qtyShipped` value. An alias is not required by the **.clone** operator, because it is possible to create a new entity at the root level, without inserting it into a collection.

Scope	Conditions	
Entity1	a	Entity1.qtyOrdered > Entity1.qtyShipped
	b	
	c	
	Actions	
	Post Message(s)	<input type="checkbox"/>
	A Entity1.qtyBackordered = Entity1.qtyOrdered - Entity1.qtyShipped	<input checked="" type="checkbox"/>
	B Entity1.clone[qtyOrdered = qtyBackordered, qtyShipped=0, qtyBackordered=0, string1 = string1 + '-BO']	<input checked="" type="checkbox"/>
	Overrides	

Ref	ID	Post	Alias	Text
1		Warning	Entity1	Incomplete shipment. Backorder was generated.

SAMPLE RULETEST

A sample Ruletest provides two collections of `Entity1`. Input, Output, and Expected panels are as follows:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> qtyBackordered qtyOrdered [8] qtyShipped [8] string1 [PO-123] string2 [ABLE] Entity1 [2] <ul style="list-style-type: none"> qtyBackordered qtyOrdered [14] qtyShipped [5] string1 [PO-456] string2 [BAKER] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> qtyBackordered qtyOrdered [8] qtyShipped [8] string1 [PO-123] string2 [ABLE] Entity1 [2] <ul style="list-style-type: none"> qtyBackordered [9] qtyOrdered [14] qtyShipped [5] string1 [PO-456] string2 [BAKER] Entity1 [3] <ul style="list-style-type: none"> qtyBackordered [0] qtyOrdered [9] qtyShipped [0] string1 [PO-456-BO] string2 [BAKER]

Severity	Message	Entity
Warning	Incomplete shipment. Backorder was generated.	Entity1[2]

RULESHEET EXAMPLE: COLLECTION

The following Rulesheet uses `.clone` to create a new `Entity2` element in `collection1` when `Entity1` has a non-zero `qtyOrdered` value.

Scope	Conditions	0	1
<ul style="list-style-type: none"> Entity1 [e1] <ul style="list-style-type: none"> qtyBackordered qtyOrdered qtyShipped string1 entity2 (Entity2) [collection1] 	a	e1.qtyOrdered > 0	T
	b		
	c		
	d		
Filters	Actions		
		Post Message(s)	<input type="checkbox"/>
	A	e1.clone	<input checked="" type="checkbox"/>
	B		
	C		
	D		
	Overrides		

Ref	ID	Post	Alias	Text
1		Info	e1	Double all orders.

SAMPLE RULETEST: COLLECTION

A sample Ruletest provides three collections of `Entity1`. Input and Output panels are illustrated below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> qtyOrdered [3] string1 [PO-20141003.23] string2 [Alpha Industries] Entity1 [2] <ul style="list-style-type: none"> qtyOrdered [17] string1 [PO-20141003.24] string2 [Beta Industries] Entity1 [3] <ul style="list-style-type: none"> qtyOrdered [0] string1 [PO-20141003.25] string2 [Omega Industries] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> qtyOrdered [3] string1 [PO-20141003.23] string2 [Alpha Industries] Entity1 [2] <ul style="list-style-type: none"> qtyOrdered [17] string1 [PO-20141003.24] string2 [Beta Industries] Entity1 [3] <ul style="list-style-type: none"> qtyOrdered [0] string1 [PO-20141003.25] string2 [Omega Industries] Entity1 [4] <ul style="list-style-type: none"> qtyOrdered [17] string1 [PO-20141003.24] string2 [Beta Industries] Entity1 [5] <ul style="list-style-type: none"> qtyOrdered [3] string1 [PO-20141003.23] string2 [Alpha Industries]

Severity	Message	Entity
Info	Double all orders.	Entity1[2]
Info	Double all orders.	Entity1[1]

Concatenate

SYNTAX

```
<String1>.concat(<String2>)
```

DESCRIPTION

Concatenates `<String1>` to `<String2>`, placing `<String2>` at the end of `<String1>`

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

This sample Rulesheet uses `.concat` to create `string1` by combining `string1` and `string2` from `Entity1.entity2`.

Scope		Conditions	0
Entity1		a	
string1		b	
entity2 (Entity2) [e2]		c	
string1		d	
string2			
Filters		Actions	<
1		Post Message(s)	
2		A Entity1.string1 = e2.string1.concat(e2.string2)	<input checked="" type="checkbox"/>
		B	
		C	
		D	
		Overrides	

Ref	ID	Post	Alias	Text
A0				string1 of Entity1 is equal to the concatenation of string1 and string2 of Entity2

SAMPLE RULETEST

A sample Ruletest provides three examples of `string1` and `string2`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [Joe] string2 [Montana] Entity1 [2] <ul style="list-style-type: none"> entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [Swedish] string2 [Meatball] Entity1 [3] <ul style="list-style-type: none"> entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [easy as] string2 [123] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [JoeMontana] entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [Joe] string2 [Montana] Entity1 [2] <ul style="list-style-type: none"> string1 [SwedishMeatball] entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [Swedish] string2 [Meatball] Entity1 [3] <ul style="list-style-type: none"> string1 [easy as123] entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [easy as] string2 [123]

Contains

SYNTAX

<String1>.contains(<String2>)

DESCRIPTION

Evaluates <String1> and returns a value of true if it contains or includes the exact (case-sensitive) characters specified in <String2>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE 1

The following uses **.contains** to evaluate whether `string1` includes the characters `silver` and assigns a value to `boolean1` for each outcome.

The screenshot shows a rulesheet editor with two main sections: 'Conditions' and 'Actions'.

Conditions Section:

	Conditions	1	2
a	Entity1.string1.contains('silver')	T	F
b			

Actions Section:

	Actions	1	2
	Post Message(s)	✉	✉
A	Entity1.boolean1	T	F
B			
Overrides			

Rule Statements Section:

Ref	ID	Post	Alias	Text
A1		Info	Entity1	String1 contains the word 'silver'
A2		Info	Entity1	String1 does not contain the word 'silver'

SAMPLE RULETEST 1

A sample Ruletest provides `string1` values for three examples. Input and Output panels are shown below. Note case sensitivity in these examples. Posted messages are not shown.

Input	Output												
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Hi Ho Silver] Entity1 [2] <ul style="list-style-type: none"> string1 [hi ho silver] Entity1 [3] <ul style="list-style-type: none"> string1 [silvery] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] string1 [Hi Ho Silver] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] string1 [hi ho silver] Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] string1 [silvery] 												
<div style="border: 1px solid #ccc; padding: 5px;"> Rule Statements Rule Messages </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Severity</th> <th>Message</th> <th>Entity</th> </tr> </thead> <tbody> <tr> <td>Info</td> <td>String1 does not contain the word 'silver'</td> <td>Entity1[1]</td> </tr> <tr> <td>Info</td> <td>String1 contains the word 'silver'</td> <td>Entity1[2]</td> </tr> <tr> <td>Info</td> <td>String1 contains the word 'silver'</td> <td>Entity1[3]</td> </tr> </tbody> </table>		Severity	Message	Entity	Info	String1 does not contain the word 'silver'	Entity1[1]	Info	String1 contains the word 'silver'	Entity1[2]	Info	String1 contains the word 'silver'	Entity1[3]
Severity	Message	Entity											
Info	String1 does not contain the word 'silver'	Entity1[1]											
Info	String1 contains the word 'silver'	Entity1[2]											
Info	String1 contains the word 'silver'	Entity1[3]											

Day

SYNTAX

<DateTime>.day

<Date>.day

DESCRIPTION

Returns the day portion of <DateTime> or <Date> as an Integer between 1 and 31.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.day** to assign a value to `string1` and post a message.

Conditions		0	1	2
a	Entity1.dateTime1.day		< 15	>= 15
b				
Actions		<		
Post Message(s)			✉	✉
A	Entity1.string1		'Hold'	'Ship'
B				
Overrides				

Ref	ID	Post	Alias	Text
A1		Warning	Entity1	If the day of dateTime1 is earlier than the 15th, then assign string1 a value of 'Hold' and issue a Warning Message
A2		Info	Entity1	If the day of dateTime1 is on or after the 15th, then assign string1 a value of 'Ship' and issue an Info Message

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` values for three examples. Input and Output panels are shown below. Posted messages are not shown.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/14/2020 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [08/07/2006 3:00:00 PM EST] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2019/12/25 5:00:00 AM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-05-14T14:00:00-0400] string1 [Hold] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-08-07T16:00:00-0400] string1 [Hold] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2019-12-25T05:00:00-0500] string1 [Ship]

Day of week

SYNTAX

`<DateTime>.dayOfWeek`

`<Date>.day`

DESCRIPTION

Returns an Integer between 1 and 7, corresponding to the table below:

returned Integer	day of the week
1	Sunday
2	Monday
3	Tuesday
4	Wednesday
5	Thursday
6	Friday
7	Saturday

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.dayOfWeek` to assign a value to `boolean1`.

The screenshot shows a rulesheet editor for 'dayOfWeek.ers'. It features a left sidebar with a tree view containing 'Entity1', 'boolean1', and 'dateTime1'. The main area is divided into 'Conditions', 'Actions', and 'Filters' sections. Below these is a 'Rule Statements' table.

Conditions		1	2
a	Entity1.dateTime1.dayOfWeek	{1, 7}	{2, 3, 4, 5, 6}
b			

Actions		
Post Message(s)		<
A	Entity1.boolean1	T F
B		

Filters	
1	
2	

Ref	ID	Post	Alias	Text
1				dateTime1 falls on a weekend, boolean1 = true
2				dateTime1 does not fall on a weekend, boolean1 = false

SAMPLE RULETEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/14/2020 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1/1/2000 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2012-05-14 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] dateTime1 [2020-05-14T00:00:00-0400] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] dateTime1 [2000-01-01T00:00:00-0500] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] dateTime1 [2012-05-14T00:00:00-0400]

Day of year

SYNTAX

<DateTime>.dayOfYear

<Date>.dayOfYear

DESCRIPTION

Returns an Integer from 1 to 366, equal to the day number within the year.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses **.dayOfYear** to assign a value to `string1`.

Conditions		1	2
a	Entity1.dateTime1.dayOfYear	< 183	>= 183
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'First Half'	'Last Half'
B			
Overrides			

Ref	ID	Post	Alias	Text
A1				dateTime1 falls in the first half of the year
A2				dateTime1 falls in the second half of the year

SAMPLE RULETEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/14/2020 03:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1/1/2000 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [7/4/2020 06:30:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-05-14T03:00:00-0400] string1 [First Half] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2000-01-01T00:00:00-0500] string1 [First Half] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-07-04T06:30:00-0400] string1 [Last Half]

Days between

SYNTAX

```
<DateTime1>.daysBetween(<DateTime2>)
```

```
<Date1>.daysBetween(<Date2>)
```

DESCRIPTION

Returns the Integer number of days between DateTimes or Dates. This function calculates the number of milliseconds between the date values and divides that number by 86,400,000 (the number of milliseconds in a day). Any fraction is truncated, leaving an Integer result. If the two dates differ by less than a full 24-hour period, the value returned is zero. A positive Integer value is returned when `<DateTime2>` occurs after `<DateTime1>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses **.daysBetween** to determine the number of days that have elapsed between `dateTime1` and `dateTime2`, compare it to the values in the Condition cells, and assign a value to `string1`.

Conditions		1	2
a	Entity1.dateTime1.daysBetween(Entity1.dateTime2)	<= 30	> 30
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			
Overrides			

Ref	ID	Post	Alias	Text
A1				If 30 or fewer days have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is not overdue
A2				If more than 30 days have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is overdue

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for three examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/1960 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/2012 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [02/04/2020 00:00:00] dateTime2 [12/15/2022 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [1960-12-15T00:00:00-0500] string1 [Not Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [2012-12-15T00:00:00-0500] string1 [Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-02-04T00:00:00-0500] dateTime2 [2022-12-15T00:00:00-0500] string1 [Overdue]

Decrement

SYNTAX

<Number1> -= <Number2>

DESCRIPTION

Decrements <Number1> by the value of <Number2>. The data type of <Number1> must accommodate the subtraction of <Number2>. In other words, an Integer may not be decremented by a Decimal without using another operator (such as [.toInteger](#) or [Floor](#) on page 96) to first convert the Decimal to an Integer.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **decrement** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

This sample Rulesheet uses **decrement** to reduce `integer1` by the value of `integer2` when `boolean1` is `false`.

Conditions		0	1
a	Entity1.boolean1		F
b			
Actions		<	
Post Message(s)			
A	Entity1.integer1 -= Entity1.integer2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B			
Overrides			

Ref	ID	Post	Alias	Text
A1				If boolean1 is false, then decrement integer1 by the value of integer2

SAMPLE RULETEST

A sample Ruletest provides three examples of `integer1`, `integer2`, and `boolean1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [10] integer2 [5] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [12] integer2 [4] Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] integer1 [25] integer2 [10] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [10] integer2 [5] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [8] integer2 [4] Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] integer1 [25] integer2 [10]

Disassociate elements

SYNTAX

```
<Collection1> -= <Collection2>
```

DESCRIPTION

Disassociates all elements of `<Collection2>` from `<Collection1>`. Elements are not deleted, but once disassociated from `<Collection1>`, they are moved to the root level of the data. `<Collection1>` must be expressed as a unique alias. Contrast this behavior with [remove](#), which deletes elements entirely.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **disassociate element** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

This sample Rulesheet removes those elements from `collection1` whose `boolean1` value is true.

Scope		Conditions		1	2
Entity1	entity2 (Entity2) [collection1]	a	collection1.boolean1	T	F
		b			
Filters		Actions			
1		A	collection1 -= collection1	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2		B			
		Overrides			

Ref	ID	Post	Alias	Text
A1				If boolean1 of any Entity2 inside collection1 is true, then disassociate that Entity2 element from collection1
A2				If boolean1 value of Entity2 is false, then take no action

SAMPLE RULETEST

A sample Ruletest provides a collection with three elements. The illustration shows Input and Output panels:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [2] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [3] <ul style="list-style-type: none"> boolean1 [false] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [3] <ul style="list-style-type: none"> boolean1 [false] Entity2 [1] Entity2 [2]

Divide

SYNTAX

<Number1>/<Number2>

DESCRIPTION

Divides <Number1> by <Number2>. The resulting data type is the more expansive of those of <Number1> and <Number2>.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **divide** to divide `decimal1` by `integer1` and assign the resulting value to `decimal2`

The screenshot shows the 'Divide.ers' rulesheet editor. It has two main sections: 'Conditions' and 'Actions'.

Conditions:

Label	Value
a	
b	

Actions:

Label	Action	Status
A	Entity1.decimal2 = Entity1.decimal1 / Entity1.integer1	<input checked="" type="checkbox"/>
B		

Rule Statements:

Ref	ID	Post	Alias	Text
A0				decimal2 is equal to the value of decimal1 divided by integer1

SAMPLE RULETEST

A sample Ruletest provides `decimal1` and `integer1` values for three examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] integer1 [4] Entity1 [2] <ul style="list-style-type: none"> decimal1 [500.000000] integer1 [5] Entity1 [3] <ul style="list-style-type: none"> decimal1 [1550.000000] integer1 [10] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] decimal2 [250.000000] integer1 [4] Entity1 [2] <ul style="list-style-type: none"> decimal1 [500.000000] decimal2 [100.000000] integer1 [5] Entity1 [3] <ul style="list-style-type: none"> decimal1 [1550.000000] decimal2 [155.000000] integer1 [10]

Ends with

SYNTAX

```
<String1>.endsWith(<String2>)
```

DESCRIPTION

Evaluates `<String1>` and returns a value of true if it ends with the characters specified in `<String2>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.endsWith` to evaluate whether `string1` ends with the characters `ville` and assigns a different value to `string2` for each outcome.

Conditions		0	1	2
a	Entity1.string1.endsWith('ville')		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.string2		'Small'	'Big'
B				
Overrides				

Ref	ID	Post	Alias	Text
1				If string1 ends with 'ville' then Entity1 is a small town
2				If string1 does not end with 'ville' then Entity1 is a big town

SAMPLE RULETEST

A sample Ruletest provides `string1` values for three examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Strongsville] Entity1 [2] <ul style="list-style-type: none"> string1 [New York] Entity1 [3] <ul style="list-style-type: none"> string1 [Amityville] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Strongsville] string2 [Small] Entity1 [2] <ul style="list-style-type: none"> string1 [New York] string2 [Big] Entity1 [3] <ul style="list-style-type: none"> string1 [Amityville] string2 [Small]

Equals ignoring case

SYNTAX

`<String1>.equalsIgnoreCase(<String2>)`

DESCRIPTION

Returns a value of true if <String1> is the same as <String2>, irrespective of case.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.equalsIgnoreCase` to compare the values of `string1` and `string2`, and assign a value to `boolean1` based on the results of the comparison.

Conditions		0	1	2
a	Entity1.string1.equalsIgnoreCase(Entity1.string2)		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1		T	F
B				
Overrides				

Ref	ID	Post	Alias	Text
1				boolean1 must be true if string1 and string2 are the same (ignoring case)
2				boolean1 must be false if string1 and string2 are not the same (ignoring case)

SAMPLE RULETEST

A sample Ruletest provides the plane type for three sets of `string1` and `string2`. Input and Output panels are shown below. Notice how these results differ from those shown in the `equals` example.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [McDonnell-Douglas] string2 [McDONNell-DOUGlas] Entity1 [2] <ul style="list-style-type: none"> string1 [LOCKHEED] string2 [lockheed] Entity1 [3] <ul style="list-style-type: none"> string1 [boeing] string2 [boing] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] string1 [McDonnell-Douglas] string2 [McDONNell-DOUGlas] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] string1 [LOCKHEED] string2 [lockheed] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] string1 [boeing] string2 [boing]

Equals when used as an assignment

SYNTAX

Boolean	<Boolean1> = <Expression1>
DateTime*	<DateTime1> = <DateTime2>
Number	<Number1> = <Number2>
String	<String1> = <String2>

DESCRIPTION

Boolean	Assigns the truth value of <Expression1> to <Boolean1>.
DateTime*	Assigns the value of <DateTime2> to <DateTime1>.
Number	Assigns the value of <Number2> to <Number1>. Automatic <i>casting</i> (the process of changing a value's data type) will occur when assigning an Integer data type to a Decimal data type. To assign a Decimal value to an Integer value, use the .toInteger operator.
String	Assigns the value of <String2> to <String1>.

* includes DateTime and Date data types.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **equals** used as an assignment may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **equals** twice: in an Action row to assign a value to `decimal1`, and in an Action row to assign a value to `string1` based on the value of `boolean1`.

EqualsUsedAsAnAssignment.ers				
Conditions		0	1	2
a	Entity1.boolean1		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.decimal1 = 5.0	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B	Entity1.string1 = 'yes'	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A0				decimal1 is assigned a value of 5
B0				If boolean1 is true, assign the value of [yes] to string1
2				If boolean1 is false, then take no action

SAMPLE RULETEST

A sample Ruletest provides two examples of boolean1. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal1 [5.000000] string1 [yes] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false]

Equals when used as a comparison

SYNTAX

Boolean	<Expression1> = <Expression2>
DateTime	<DateTime1> = <DateTime2>
Number	<Number1> = <Number2>
String	<String1> = <String2>

DESCRIPTION

Boolean	Returns a value of true if <Expression1> is the same as <Expression2>.
DateTime	Returns a value of true if <DateTime1> is the same as <DateTime2>, including both the Date and the Time portions
Number	Returns a value of true if <Number1> is the same as <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is the same as <String2>. Both case and length are examined to determine equality. Corticon.js Studio uses the ISO character precedence in comparing String values.

*includes DateTime and Date data types

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **equals** to Ruletest whether decimal1 equals decimal2, and assign a value to string1 based on the result of the comparison.

The screenshot shows a Rulesheet editor window titled 'EqualsUsedAsAComparison.ers'. It is divided into three main sections:

- Conditions:** A table with columns 0, 1, and 2. Row 'a' contains the condition 'Entity1.decimal1 = Entity1.decimal2' with values '0', 'T', and 'F' respectively. Row 'b' is empty.
- Actions:** A table with columns 0, 1, and 2. Row 'A' contains the action 'Entity1.string1' with values '<', ''match'', and ''no match''. Row 'B' is empty.
- Overrides:** An empty table with columns 0, 1, and 2.
- Rule Statements:** A table with columns Ref, ID, Post, Alias, and Text. Row 1: '1', '', '', '', 'If decimal1 equals decimal2, then assign a value of [match] to string1'. Row 2: '2', '', '', '', 'If decimal1 does not equal decimal2, then assign a value of [no match] to string1'.

SAMPLE RULETEST

A sample Ruletest provides two examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] decimal2 [1001.230000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [123.400000] decimal2 [123.400000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] decimal2 [1001.230000] string1 [no match] Entity1 [2] <ul style="list-style-type: none"> decimal1 [123.400000] decimal2 [123.400000] string1 [match]

Equals when using Strings

SYNTAX

```
<String1>.equals(<String2>)
```

DESCRIPTION

Returns a value of true if `<String1String2>`, including character case. This is alternative syntax to `>` is exactly the same as `<equals` (used as a comparison).

USAGE RESTRICTIONS

The Operators row in the table [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.equals` to compare the contents of `string1` and `string2`, and assign a value to `boolean1` as a result.

Conditions		0	1	2
a	Entity1.string1.equals(Entity1.string2)		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1		T	F
B				
Overrides				

Ref	ID	Post	Alias	Text
1				boolean1 must be true if string1 and string2 are the same
2				boolean1 must be false if string1 and string2 are not the same

SAMPLE RULETEST

>A sample Ruletest provides three sets of `string1` and `string2`. Input and Output panels are shown below. Notice how these results differ from those shown in the `.equalsIgnoreCase` example.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [boeing] string2 [boeing] Entity1 [2] <ul style="list-style-type: none"> string1 [Lockheed] string2 [LOCKHEED] Entity1 [3] <ul style="list-style-type: none"> string1 [McDonnell-Douglas] string2 [McDonnell-DOUGlas] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] string1 [boeing] string2 [boeing] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] string1 [Lockheed] string2 [LOCKHEED] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] string1 [McDonnell-Douglas] string2 [McDonnell-DOUGlas]

Exists

SYNTAX

`<Collection> ->exists(<Expression1>,<Expression2>,...)`

`<Collection> ->exists(<Expression1> or <Expression2> or ...)`

DESCRIPTION

Returns a value of true if `<Expression>` holds true for *at least one* element of `<Collection>`. `<Collection>` must be expressed as a unique alias. Multiple `<Expressions>` are optional, but at least one is required.

Both **AND** (indicated by commas between `<Expressions>`) and **OR** syntax (indicated by `or` between `<Expressions>`) are supported within the parentheses (. .). However, take care to ensure invariant expressions are not inadvertently created. For example:

```
<Collection> -> exists(integer1=5, integer1=8)
```

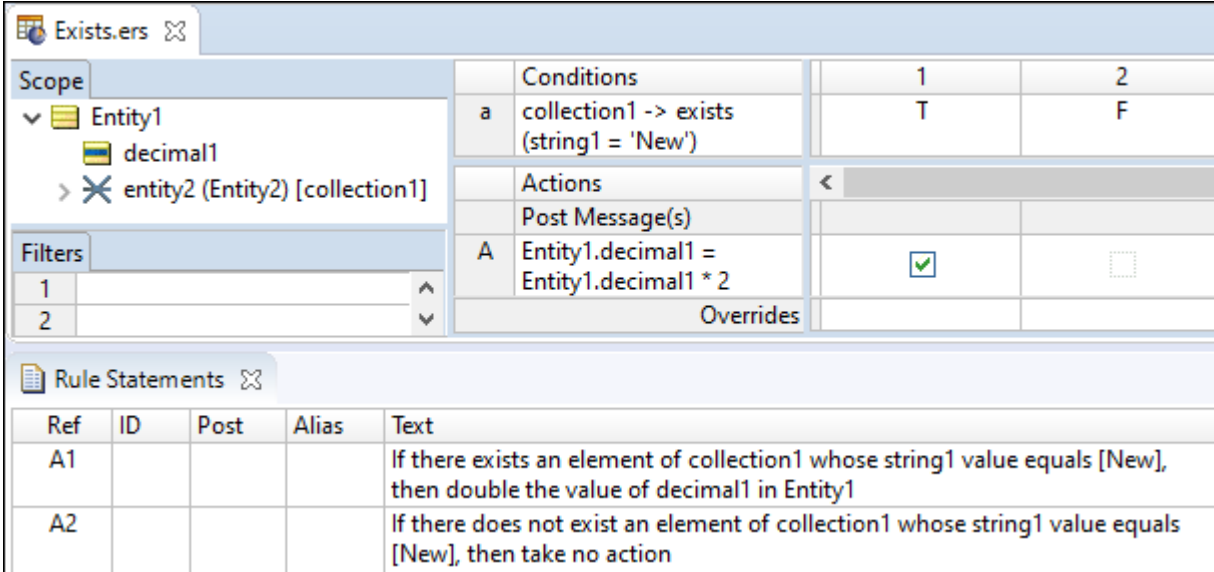
will always evaluate to false because no `integer1` value can be both 5 **AND** 8 simultaneously.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `->exists` to check for the existence of an element in `collection1` whose `string1` value equals `New`, and assigns a value to `decimal1` based on the results of the test. Note the use of unique alias `collection1` to represent the collection of `Entity2` associated with `Entity1`.



Scope	Conditions	1	2
a	collection1 -> exists (string1 = 'New')	T	F
Actions			
A	Entity1.decimal1 = Entity1.decimal1 * 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Overrides			

Ref	ID	Post	Alias	Text
A1				If there exists an element of collection1 whose string1 value equals [New], then double the value of decimal1 in Entity1
A2				If there does not exist an element of collection1 whose string1 value equals [New], then take no action

SAMPLE RULETEST

A sample Ruletest provides 2 separate collections of Entity2 elements and Entity1.decimal1 values. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [5.000000] entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [New York] entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [New Jersey] entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [Rhode Island] Entity1 [2] <ul style="list-style-type: none"> decimal1 [7.000000] entity2 (Entity2) [4] <ul style="list-style-type: none"> string1 [New Hampshire] entity2 (Entity2) [5] <ul style="list-style-type: none"> string1 [New] entity2 (Entity2) [6] <ul style="list-style-type: none"> string1 [Connecticut] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [5.000000] entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [New York] entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [New Jersey] entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [Rhode Island] Entity1 [2] <ul style="list-style-type: none"> decimal1 [14.000000] entity2 (Entity2) [4] <ul style="list-style-type: none"> string1 [New Hampshire] entity2 (Entity2) [5] <ul style="list-style-type: none"> string1 [New] entity2 (Entity2) [6] <ul style="list-style-type: none"> string1 [Connecticut]

Exponent

SYNTAX

<Number1> ** <Number2>

DESCRIPTION

Raises <Number1> by the power of <Number2>. The resulting data type is the more expansive of those of <Number1> and <Number2>. To find a root, <Number2> can be expressed as a decimal value, such as 0.5 for a square root, or -- for greater accuracy in larger roots -- in decimal format within parentheses, such as `** (1.0/3.0)` for a cube root.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **exponent** to raise `integer1` and `integer2` by the power of 2 and 0.5, respectively, and assign the resulting value to `decimal1` and `decimal2`, respectively.

The screenshot shows the 'Exponent.ers' rulesheet editor. It has two main sections: 'Conditions' and 'Rule Statements'.

Conditions:

Conditions	0
a	
b	

Actions:

Actions	<
Post Message(s)	
A Entity1.decimal1 = Entity1.integer1 ** 2	<input checked="" type="checkbox"/>
B Entity1.decimal2 = Entity1.integer2 ** 0.5	<input checked="" type="checkbox"/>
Overrides	

Rule Statements:

Ref	ID	Post	Alias	Text
A0				decimal1 is equal to the square of integer1
B0				decimal2 is equal to the square root of integer2

SAMPLE RULETEST

A sample Ruletest provides `decimal1` and `integer1` values for three examples.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [4] integer2 [2] Entity1 [2] <ul style="list-style-type: none"> integer1 [5] integer2 [36] Entity1 [3] <ul style="list-style-type: none"> integer1 [7] integer2 [100] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [16.000000] decimal2 [1.414214] integer1 [4] integer2 [2] Entity1 [2] <ul style="list-style-type: none"> decimal1 [25.000000] decimal2 [6.000000] integer1 [5] integer2 [36] Entity1 [3] <ul style="list-style-type: none"> decimal1 [49.000000] decimal2 [10.000000] integer1 [7] integer2 [100]

False

SYNTAX

false or F

DESCRIPTION

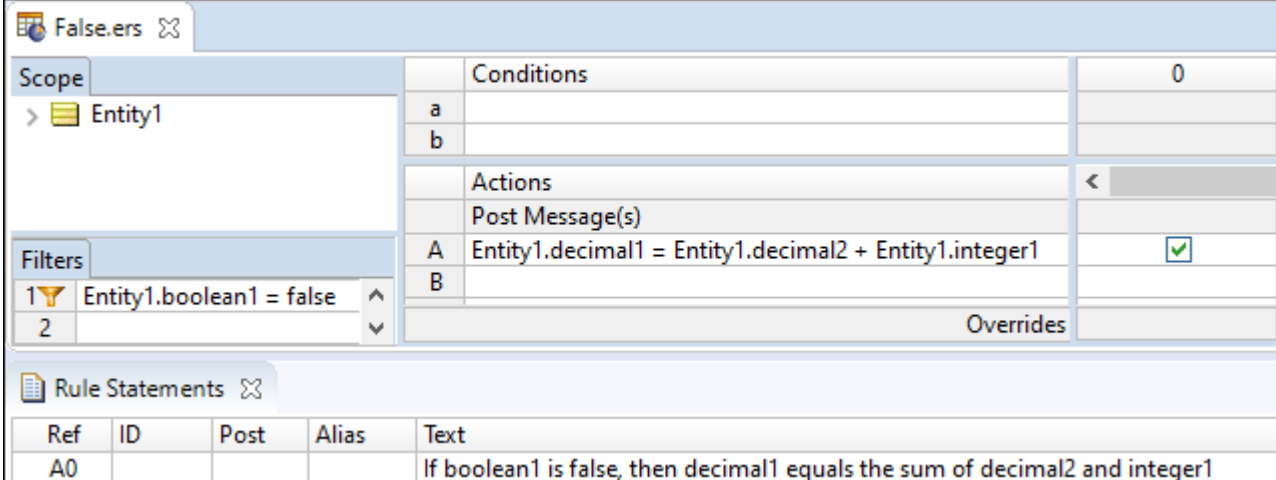
Represents the Boolean value false. Recall from discussion of [truth values](#) that an `<expression>` is evaluated for its truth value, so the expression `Entity1.boolean1=false` evaluates to `true` only when `boolean1=false`. But since `boolean1` is Boolean and has a truth value all by itself without any additional syntax, we could simply state `not Entity1.boolean1`, with the same effect. Many examples in the documentation use explicit syntax like `boolean1=true` or `boolean2=false` for clarity and consistency, even though `boolean1` or `not boolean2` are equivalent, respectively, to the explicit syntax.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **false** in a Filter row to test whether `boolean1` is false, and perform the Nonconditional computation if it is. As discussed above, the alternative expression `not Entity1.boolean1` is logically equivalent.



The screenshot shows a Rulesheet editor window titled "False.ers". The interface includes a "Scope" panel on the left showing a tree view with "Entity1". Below the scope is a "Filters" panel with two entries: "1 Entity1.boolean1 = false" and "2". The main area is divided into "Conditions" and "Actions" sections. The "Conditions" section has two rows, "a" and "b". The "Actions" section has two rows, "A" and "B". Row "A" contains the expression "Entity1.decimal1 = Entity1.decimal2 + Entity1.integer1" and has a green checkmark in the right margin. Below the actions is an "Overrides" section. At the bottom, there is a "Rule Statements" table with the following content:

Ref	ID	Post	Alias	Text
A0				If boolean1 is false, then decimal1 equals the sum of decimal2 and integer1

SAMPLE RULETEST

A sample Ruletest provides three examples. Assume `decimal2=10.0` and `integer1=5` for all examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal2 [10.000000] integer1 [5] ▼ Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] decimal2 [10.000000] integer1 [5] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal1 decimal2 [10.000000] integer1 [5] ▼ Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] decimal1 [15.000000] decimal2 [10.000000] integer1 [5]

First

SYNTAX

`<Sequence> ->first.<attribute1>`

DESCRIPTION

Returns the value of `<attribute1>` of the first element in `<Sequence>`. Another operator, such as `->sortedBy`, must be used to transform a `<Collection>` into a `<Sequence>` before `->first` may be used. `<Sequence>` must be expressed as a unique alias. See *"Advanced collection sorting syntax" in the Rule Modeling Guide* for more examples of usage.

`<attribute1>` may be of any data type.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `->first` to identify the first element of the sequence created by applying `->sortedBy` to `collection1`. Once identified, the value of the `string1` attribute belonging to this first element is evaluated. If the value of `string1` is Joe, then `boolean1` attribute of `Entity1` is assigned the value of `true`.

The screenshot shows a rule editor for 'First.ers'. It features a 'Scope' tree on the left with a tree view containing 'Entity1', 'boolean1', 'entity2 (Entity2) [collection1]', 'decimal1', and 'string1'. Below the scope is a 'Filters' section with two filter slots. The main area is divided into 'Conditions' and 'Actions' tables. The 'Conditions' table has two rows: 'a' with the condition 'collection1.string1 -> sortBy (decimal1) -> first' and 'b' which is empty. The 'Actions' table has a 'Post Message(s)' section with three rows: 'A' with 'Entity1.boolean1', 'B' which is empty, and 'C' which is empty. An 'Overrides' section is also present. Below these is a 'Rule Statements' table with two rows of text describing the conditions and actions.

Conditions		1	2
a	collection1.string1 -> sortBy (decimal1) -> first	'Joe'	not 'Joe'
b			

Actions		1	2
Post Message(s)			
A	Entity1.boolean1	T	F
B			
C			

Ref	ID	Post	Alias	Text
1				If the string1 value of the first element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.
2				If the string1 value of the first element in collection1, in ascending order by decimal1, is NOT equal to Joe, then boolean1 is false.

SAMPLE RULETEST

A sample Ruletest provides a collection of three elements, each with a decimal1 value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue]

Floor

SYNTAX

<Decimal>.floor

DESCRIPTION

Returns the Decimal closest to zero from <Decimal>. **.floor** may also be thought of as a truncation of <Decimal>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The Rulesheet uses `.floor` to assign decimal values to `decimal1` that are closer to zero than the input `decimal2` values.

The screenshot shows a rulesheet editor for 'floor.ers'. It has two main sections: 'Conditions' and 'Actions'.

Conditions		0	1
a			
h			

Actions		<	
Post Message(s)			
A	Entity1.integer1=Entity1.decimal2.floor	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B			
C			

Overrides

Rule Statements

Ref	ID	Post	Alias	Text
A0				Integer1 is equal to the highest integer value that does not exceed the decimal value of decimal1

SAMPLE RULETEST

A sample Ruletest provides three `decimal2` values. Input and Output panels are shown below:

The screenshot shows a ruletest interface for 'Generic.js/floor.ers'. It has two panels: 'Input' and 'Output'.

Input	Output
Entity1 [1] decimal2 [1550.785000]	Entity1 [1] decimal1 [1550.000000] decimal2 [1550.785000]
Entity1 [2] decimal2 [2200.986000]	Entity1 [2] decimal1 [2200.000000] decimal2 [2200.986000]
Entity1 [3] decimal2 [-500.999000]	Entity1 [3] decimal1 [-501.000000] decimal2 [-500.999000]

Note: Notice how these results differ from those shown in the Round example.

For all

SYNTAX

`<Collection> ->forAll(<Expression1>, <Expression2>,...)`

<Collection> ->forAll(<Expression1> or <Expression2> or ...)

DESCRIPTION

Returns a value of true if every <Expression> holds true for every element of <Collection>. <Collection> must be expressed as a unique alias. Multiple <Expressions> are optional, but at least one is required.

Both **AND** (indicated by commas between <Expressions>) and **OR** syntax (indicated by or between <Expressions>) is supported within the parentheses (. . .). However, take care to ensure invariant expressions are not inadvertently created. For example:

```
<Collection> -> forAll(integer1=5, integer1=8)
```

will always evaluate to false because no single integer1 value can be both 5 **AND** 8 simultaneously, let alone all of them.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses ->forAll to check for the existence of an element in collection1 whose string1 value equals New, and assigns a value to decimal1 based on the results of the test. Note the use of unique alias collection1 to represent the collection of Entity2 associated with Entity1.

The screenshot shows a rulesheet editor for 'ForAll.ers'. It features a 'Scope' tree on the left with 'Entity1' containing 'decimal1' and 'entity2 (Entity2) [collection1]'. The main area is divided into 'Conditions', 'Actions', and 'Rule Statements'.

Conditions		1	2
a	collection1 -> forAll(string1 = 'New')	T	F

Actions		1	2
Post Message(s)			
A	Entity1.decimal1 = Entity1.decimal1 * 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B			

Ref	ID	Post	Alias	Text
1				If, within collection1, all string1 values equal [New], then double the value of decimal1 in Entity1
2				If, within collection1, not all string1 values equal [New], then take no action

SAMPLE RULETEST

A sample Ruletest provides 2 separate collections of Entity2 elements and Entity1.decimal1 values. The following illustration shows Input and Output panel

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [5.000000] ▼ entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [Rhode Island] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal1 [7.000000] ▼ entity2 (Entity2) [4] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [5] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [6] <ul style="list-style-type: none"> string1 [New] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [5.000000] ▼ entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [3] <ul style="list-style-type: none"> string1 [Rhode Island] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal1 [14.000000] ▼ entity2 (Entity2) [4] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [5] <ul style="list-style-type: none"> string1 [New] ▼ entity2 (Entity2) [6] <ul style="list-style-type: none"> string1 [New]

Get Milliseconds

SYNTAX

<DateTime>.getMilliseconds

DESCRIPTION

Returns the number of milliseconds elapsed since the epoch: January 1, 1970.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **.getMilliseconds** in a Nonconditional rule to evaluate the number of milliseconds between the epoch and `dateTime1`, and return the number as `integer1`.

getMilliseconds.ers		0		
Conditions				
a				
b				
Actions		<		
Post Message(s)				
A	Entity1.integer1=Entity1.dateTime1.getMilliseconds	<input checked="" type="checkbox"/>		
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A0				Set Entity1.integer1 to the number of milliseconds between 1/1/1970 and Entity1.dateTime1

SAMPLE RULETEST

A sample Ruletest provides values of `dateTime2` for three instances of `Entity1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/14/2021 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1/2/1970 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [12/31/2025 11:59:59 PM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2021-05-14T00:00:00-0400] integer1 [1620964800000] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1970-01-02T00:00:00-0500] integer1 [104400000] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-12-31T23:59:59-0500] integer1 [1767243599000]

Greater than

SYNTAX

DateTime*	<DateTime1> > <DateTime2>
Number	<Number1> > <Number2>
String	<String1> > <String2>

DESCRIPTION

DateTime*	Returns a value of true if <DateTime1> is greater than or equal to <DateTime2>. This is equivalent to <DateTime1> occurring after <DateTime2>
Number	Returns a value of true if <Number1> is greater than <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is greater than <String2>.

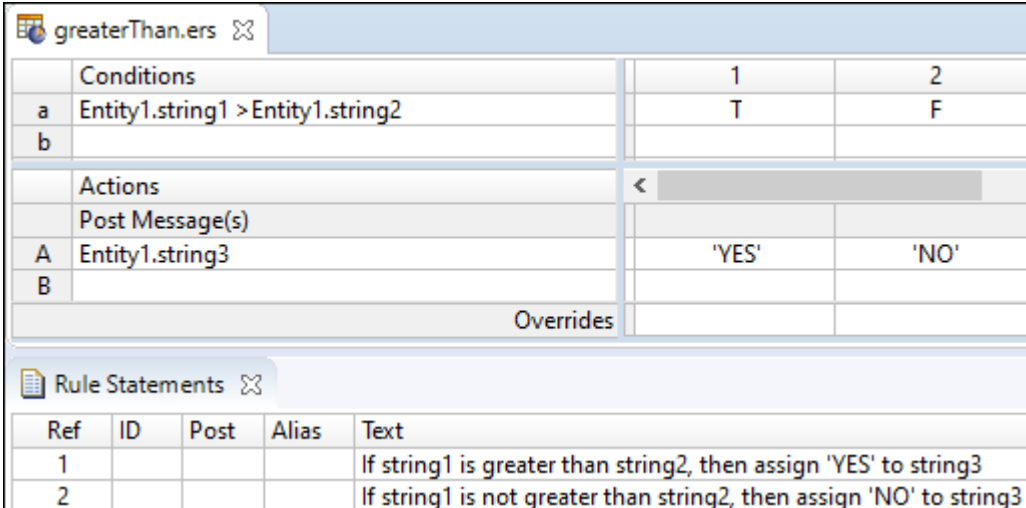
*includes DateTime and Date data types

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) applies, with the following exception: **greater than** may also be used in Conditional Value Sets & Cells (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **greater than** to test whether `string1` is greater than `string2`, and assigns YES or NO to `string3`.



The screenshot shows a Rulesheet editor for 'greaterThan.ers'. It displays a table for conditions and actions, and a section for rule statements.

Conditions		1	2
a	Entity1.string1 > Entity1.string2	T	F
b			

Actions			
Post Message(s)			
A	Entity1.string3	'YES'	'NO'
B			

Overrides

Ref	ID	Post	Alias	Text
1				If string1 is greater than string2, then assign 'YES' to string3
2				If string1 is not greater than string2, then assign 'NO' to string3

SAMPLE RULETEST

A sample Ruletest provides three examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [9] string2 [1] ▼ Entity1 [2] <ul style="list-style-type: none"> string1 [b] string2 [a] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [high-five] string2 [high five] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [9] string2 [1] string3 [YES] ▼ Entity1 [2] <ul style="list-style-type: none"> string1 [b] string2 [a] string3 [YES] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [high-five] string2 [high five] string3 [YES]

Greater than or equal to

SYNTAX

DateTime*	<DateTime1> >= <DateTime2>
Number	<Number1> >= <Number2>
String	<String1> >= <String2>

DESCRIPTION

DateTime*	Returns a value of true if <DateTime1> is greater than or equal to <DateTime2>. This is equivalent to <DateTime1> occurring on or after <DateTime2>
Number	Returns a value of true if <Number1> is greater than or equal to <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is greater than or equal to <String2>.

*includes DateTime and Date data types

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) applies, with the following exception: **greater than or equal to** may also be used in Conditional Value Sets & Cells (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **greater than or equal to** to test whether `string1` is greater than or equal to `string2`, and assigns YES or NO to `string3`.

Conditions		1	2
a	Entity1.string1 >= Entity1.string2	T	F
b			
Actions		<	
Post Message(s)			
A	Entity1.string3	'YES'	'NO'
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If string1 is greater than or equal to string2, then assign 'YES' to string3
2				If string1 is not greater than or equal to string2, then assign 'NO' to string3

SAMPLE RULETEST

A sample Ruletest provides two examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Fred] string2 [Freddy] Entity1 [2] <ul style="list-style-type: none"> string1 [labour] string2 [labor] Entity1 [3] <ul style="list-style-type: none"> string1 [high-five] string2 [high five] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Fred] string2 [Freddy] string3 [NO] Entity1 [2] <ul style="list-style-type: none"> string1 [labour] string2 [labor] string3 [YES] Entity1 [3] <ul style="list-style-type: none"> string1 [high-five] string2 [high five] string3 [YES]

Hour

SYNTAX

<DateTime>.hour

DESCRIPTION

Returns the hour portion of <DateTime>. The returned value is based on a 24-hour clock. For example, 10:00 PM (22:00 hours) is returned as 22.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.hour` to evaluate `dateTime1` and assign the hour value to `integer1`.

The screenshot shows a rulesheet editor for a rule named 'hour.ers'. It is divided into several sections:

- Scope:** A tree view showing the rule's scope, including `Entity1`, `dateTime1`, `integer1`, and `string1`.
- Conditions:** A table with three columns (1, 2, 3) and three rows (a, b, c). Row 'a' contains the condition `Entity1.dateTime1.hour` with values `7..15`, `16..24`, and `0..7` in columns 1, 2, and 3 respectively.
- Actions:** A section for defining actions, including a 'Post Message(s)' field.
- Filters:** A table with two columns (A, B) and two rows (1, 2). Row 'A' contains the filter `Entity1.string1` with values `'DayShift'`, `'SwingShift'`, and `'NightShift'` in columns 1, 2, and 3 respectively.
- Overrides:** A section for defining overrides.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. It contains three statements:

Ref	ID	Post	Alias	Text
1				If Entity1.dateTime1.hour is between 7 and 15, set Entity1.string1 to 'DayShift'
2				If Entity1.dateTime1.hour is between 16 and 24, set Entity1.string1 to 'SwingShift'
3				If Entity1.dateTime1.hour is between 0 and 7, set Entity1.string1 to 'NightShift'

SAMPLE RULETEST

A sample Ruletest provides three examples of `dateTime1`. Input and Output panels are shown below. Notice that the hour returned is dependent upon the timezone of the machine executing the rule. The hour returned is independent of the machine running the Ruletest and only depends on the locale/timezone of the data itself.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/25 3:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/25 00:01:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/24/25 04:00:00 PM] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2025-11-24T03:00:00-0500] string1 [NightShift] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2025-11-24T00:01:00-0500] string1 [NightShift] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-11-24T16:00:00-0500] string1 [SwingShift]

Hours between

SYNTAX

`<DateTime1>.hoursBetween(<DateTime2>)`

DESCRIPTION

Returns the Integer number of hours between any two DateTimes. The function calculates the number of milliseconds between the two values and divides that number by 3,600,000 (the number of milliseconds in an hour). The decimal portion is then truncated. If the two dates differ by less than a full hour, the value is zero. This function returns a positive number if `<DateTime2>` is later than `<DateTime1>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.hoursBetween` to determine the number of hours that have elapsed between `dateTime1` and `dateTime2`, compare it to the Values set, and assign a value to `string1`.

Conditions		1	2
a	Entity1.dateTime1.hoursBetween(Entity1.dateTime2)	<= 24	> 24
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If 24 or fewer hours have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is not overdue
2				If more than 24 hours have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is not overdue

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/1960 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/2012 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/24/2013 00:00:00] dateTime2 [12/15/2022 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [1960-12-15T00:00:00-0500] string1 [Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [2012-12-15T00:00:00-0500] string1 [Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2013-11-24T00:00:00-0500] dateTime2 [2022-12-15T00:00:00-0500] string1 [Overdue]

In LIST

SYNTAX

Date	<Date1> in {<Date2>, <Date3>, ...}
DateTime	<DateTime1> in {<DateTime2>, <DateTime3>, ...}
Decimal	<Decimal1> in {<Decimal2>, <Decimal3>, ...}
Integer	<Integer1> in {<Integer2>, <Integer3>, ...}
String	<String1> in {<String2>, <String3>, ...}

DESCRIPTION

Returns the value `true` if the attribute type is contained in the set of valid values for the attribute.

USAGE RESTRICTIONS

- The set of values is always enclosed in braces: { }
- For integer and decimal data types, a list of literals or enumerated values without labels requires that the values are not in single quotes, such as {3, 1, 2}.
- For date and String data types, a list of literals or enumerated values without labels requires that the values are in single quotes, such as {'B', 'A', 'C'}.
- The list can be in any order.
- Duplicate values or labels in a list are tolerated.

When enumerated datatypes with labels are used:

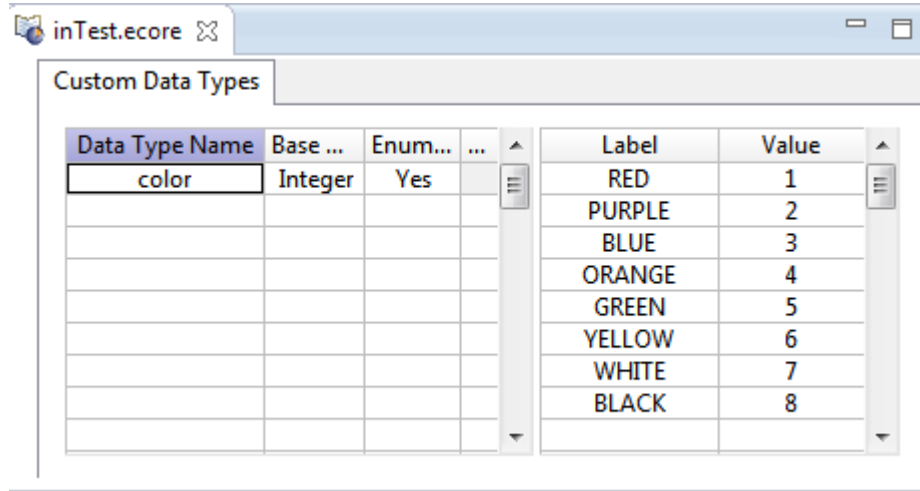
- The labels are listed without delimiters, such as {B, A, C}
- Values and labels can be mixed, such as {A, B, 'C_value'}.

Note: While literal values in the enumeration table are accepted in a list, only existing label values will be exposed and accepted as valid.

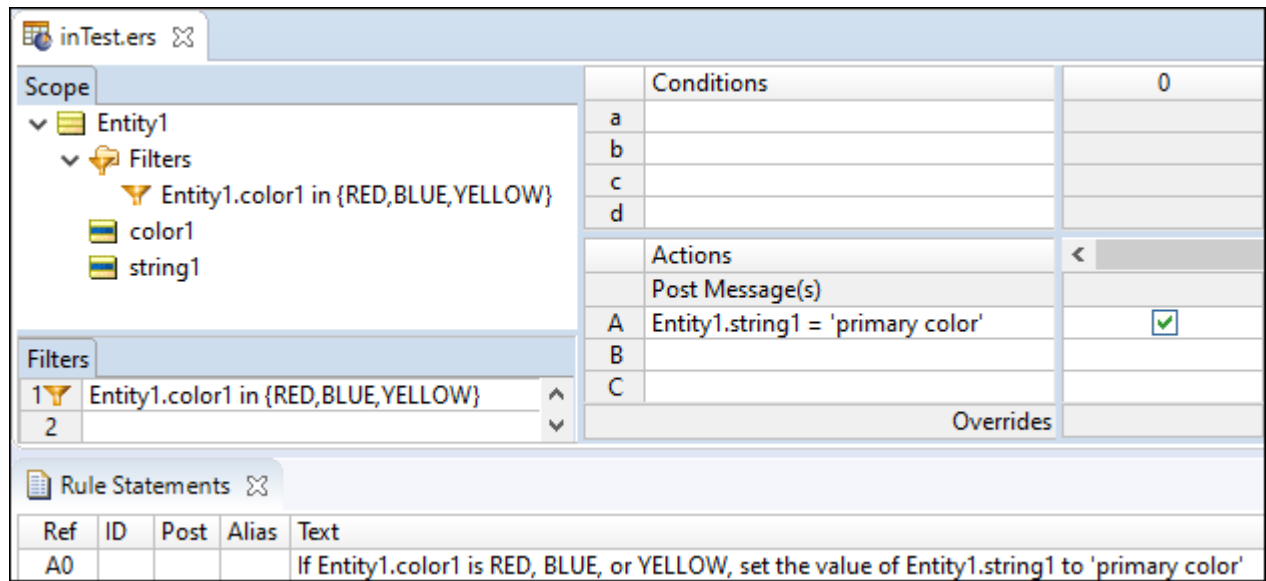
The Operators row of the table in [Vocabulary Usage Restriction](#) does not apply. The `in` operator can be used in Conditions and Filters, but not in Actions.

RULESHEET EXAMPLE

The example's Vocabulary defined an enumerated list:



The following Rulesheet uses **in** to filter certain labels to be tested against request data:



SAMPLE TEST

A sample Ruletest provides examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> color1 [RED] Entity1 [2] <ul style="list-style-type: none"> color1 [PURPLE] Entity1 [3] <ul style="list-style-type: none"> color1 [BLUE] Entity1 [4] <ul style="list-style-type: none"> color1 [ORANGE] Entity1 [5] <ul style="list-style-type: none"> color1 [GREEN] Entity1 [6] <ul style="list-style-type: none"> color1 [YELLOW] Entity1 [7] <ul style="list-style-type: none"> color1 [WHITE] Entity1 [8] <ul style="list-style-type: none"> color1 [BLACK] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> color1 [RED] string1 [primary color] Entity1 [2] <ul style="list-style-type: none"> color1 [PURPLE] Entity1 [3] <ul style="list-style-type: none"> color1 [BLUE] string1 [primary color] Entity1 [4] <ul style="list-style-type: none"> color1 [ORANGE] Entity1 [5] <ul style="list-style-type: none"> color1 [GREEN] Entity1 [6] <ul style="list-style-type: none"> color1 [YELLOW] string1 [primary color] Entity1 [7] <ul style="list-style-type: none"> color1 [WHITE] Entity1 [8] <ul style="list-style-type: none"> color1 [BLACK]

In RANGE

SYNTAX

Date	<Date1> in (<earlierDate2>..<laterDate3>)
DateTime	<DateTime1> in (<earlierDateTime2>..<laterDateTime3>)
Decimal	<Decimal1> in (<smallerDecimal2>..<largerDecimal3>)
Integer	<Integer1> in (<smallerInteger2>..<largerInteger3>)
String	<String1> in (<startString2>..<endString3>)

A square bracket on either end of the expression indicates that the start or end value is to be included in the range.

DESCRIPTION

Returns the value `true` if the attribute type is contained in the range of valid values for the attribute.

USAGE RESTRICTIONS

- For integer and decimal data types, the range of values are not in single quotes. For example, (1..3).
- For date and String data types, the range of values are in single quotes. For example, ('A'..'C').

The Operators row of the table in [Vocabulary Usage Restriction](#) does not apply. The `in` operator can be used in Conditions and Filters, but not in Actions.

RULESHEET EXAMPLE

The following Rulesheet uses **in** ranges for three data types OR'ed together in a filter to be tested against request data:

Ref	ID	Post	Alias	Text
A0				If Entity1.dateTime1 falls between 1/1/62 and 12/31/83, Entity1.integer1 has a value between -40 and 32, or Entity1.string1 is between 'A' and 'C', set Entity1.alert as 'eligible'

SAMPLE TEST

A sample Ruletest provides examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1952/02/04 00:00:00] integer1 [12] string1 [F] Entity1 [2] <ul style="list-style-type: none"> string1 [D] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [1977/03/15 00:00:00] Entity1 [4] <ul style="list-style-type: none"> integer1 [37] Entity1 [5] <ul style="list-style-type: none"> integer1 [-36] string1 [A] Entity1 [6] <ul style="list-style-type: none"> dateTime1 [1962/03/01 00:00:00] string1 [C] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> alert [eligible] dateTime1 [1952-02-04T00:00:00-0500] integer1 [12] string1 [F] Entity1 [2] <ul style="list-style-type: none"> string1 [D] Entity1 [3] <ul style="list-style-type: none"> alert [eligible] dateTime1 [1977-03-14T23:00:00-0500] Entity1 [4] <ul style="list-style-type: none"> integer1 [37] Entity1 [5] <ul style="list-style-type: none"> alert [eligible] integer1 [-36] string1 [A] Entity1 [6] <ul style="list-style-type: none"> alert [eligible] dateTime1 [1962-03-01T00:00:00-0500] string1 [C]

Increment

SYNTAX

```
<Number1> += <Number2>
```

DESCRIPTION

Increments `<Number1>` by the value of `<Number2>`. The data type of `<Number1>` must accommodate the addition of `<Number2>`. In other words, an Integer may not be incremented by a Decimal without using another operator (such as `.toInteger` or `Floor` on page 96.floor) to first convert the Decimal to an Integer.

USAGE RESTRICTIONS

The Operators row of the table in [Vocabulary usage restrictions](#) does not apply. Special exceptions: **increment** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

This sample Rulesheet uses **increment** to increment `integer1` by the value of `integer2` when `boolean1` is true.

Conditions		0	1
a	Entity1.boolean1		T
b			
Actions			
Post Message(s)		<	
A	Entity1.integer1 += Entity1.integer2	<input type="checkbox"/>	<input checked="" type="checkbox"/>
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If boolean1 is true then increment integer1 by the value of integer2

SAMPLE RULETEST

A sample Ruletest provides three examples of `integer1`, `integer2`, and `boolean1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [10] integer2 [5] ▼ Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [12] integer2 [4] ▼ Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] integer1 [25] integer2 [10] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [15] integer2 [5] ▼ Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [12] integer2 [4] ▼ Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] integer1 [35] integer2 [10]

Index of

SYNTAX

`<String1>.indexOf(<String2>)`

DESCRIPTION

Determines if `<String2>` is contained within `<String1>` and returns an Integer value equal to the beginning character position of the first occurrence of `<String2>` within `<String1>`. If `<String1>` does not contain `<String2>`, then a value of 0 (zero) is returned. This operator is similar to [.contains](#) but returns different results. A 0 result from [.indexOf](#) is equivalent to a `false` value returned by the [.contains](#) operator.

If `<String1>` contains more than one occurrence of `<String2>`, [.indexOf](#) returns the first character position of the first occurrence. For example: If `<String1>` holds the String value `'Mississippi'` and `<String2>` holds the String value `'ss'`, then the [.indexOf](#) operator returns 3. The second occurrence of `'ss'` beginning at position 6 is not identified.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses [.indexOf](#) to evaluate whether `string1` includes the characters `silver` and assigns a value to `integer1` corresponding to the beginning character position of the first occurrence.

IndexOf.ers		0	1
Conditions			
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.integer1 = Entity1.string1.indexOf('silver')	<input checked="" type="checkbox"/>	
B			
Overrides			
Rule Statements			
Ref	ID	Post	Text
A0			integer1 is assigned the value of the starting position of silver inside string1

SAMPLE RULETEST

A sample Ruletest provides `string1` values for three examples. Input and Output panels are shown below. Notice sensitivity to case in example 1.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Hi Ho Silver] Entity1 [2] <ul style="list-style-type: none"> string1 [hi ho silver] Entity1 [3] <ul style="list-style-type: none"> string1 [silver and silver] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [0] string1 [Hi Ho Silver] Entity1 [2] <ul style="list-style-type: none"> integer1 [7] string1 [hi ho silver] Entity1 [3] <ul style="list-style-type: none"> integer1 [1] string1 [silver and silver]

Is empty

SYNTAX

<Collection> ->isEmpty

DESCRIPTION

Returns a value of true if <Collection> contains *no* elements (that is, has no children). **->isEmpty** does not check for an empty or null value of an attribute, but instead checks for *existence* of elements within the collection. As such, a unique alias must be used to represent the <Collection> being tested.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `->isEmpty` to determine if `collection1` has any elements. Note the use of unique alias `collection1` to represent the collection of `Entity2` associated with `Entity1`.

The screenshot shows the 'IsEmpty.rulesheet' editor. It features a 'Scope' tree on the left with 'Entity1' expanded to show 'entity2 (Entity2) [collection1]'. A table below the scope shows conditions and actions for two filters (1 and 2). Filter 1 has condition 'a: collection1 -> isEmpty' (True) and filter 2 has condition 'b' (False). Both filters have a 'Post Message(s)' action with a checked checkbox. Below the table is a 'Rule Statements' section with two entries:

Ref	ID	Post	Alias	Text
1		Warning	Entity1	collection1 is empty, which means that Entity1 has no associated Entity2 elements
2		Info	Entity1	collection1 is not empty, which means that Entity1 has at least one associated Entity2 element

SAMPLE RULETEST

A sample Ruletest provides two example `collection1`. The following illustration shows Input and Output panels

The screenshot shows a Ruletest interface. The 'Input' panel displays a tree structure: Entity1 [1], Entity1 [2] (expanded), entity2 (Entity2) [1], entity2 (Entity2) [2], and entity2 (Entity2) [3]. The 'Output' panel displays the same tree structure. Below the panels is a 'Rule Messages' table:

Severity	Message
Warning	collection1 is empty, which means that Entity1 has no associated
Info	collection1 is not empty, which means that Entity1 has at least or

Is integer

SYNTAX

```
<String>.isInteger
```

DESCRIPTION

Returns true if string is an integer

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `isInteger`.

Conditions		0	1	2
a	Entity1.string1.isInteger		T	F
b				
c				
Actions		< [Progress Bar]		
Post Message(s)				
A	Entity1.string2		'NUMBER'	'NOT NUMBER'
B				
C				
Overrides				

Ref	ID	Post	Alias	Text
1				If Entity1.string1 is an integer, set Entity1.string2 to 'NUMBER'
2				If Entity1.string2 is not an integer, set Entity1.string2 to 'NOT NUMBER'

SAMPLE RULETEST

A sample Ruletest provides a collection of three elements, each with a `string1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [1234] Entity1 [2] <ul style="list-style-type: none"> string1 [-1234] Entity1 [3] <ul style="list-style-type: none"> string1 [1234-] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [1234] string2 [NUMBER] Entity1 [2] <ul style="list-style-type: none"> string1 [-1234] string2 [NUMBER] Entity1 [3] <ul style="list-style-type: none"> string1 [1234-] string2 [NOT NUMBER]

Last

SYNTAX

<Sequence> ->last.<Attribute1>

DESCRIPTION

Returns the value of <Attribute1> of the last element in <Sequence>. Another operator, such as `->sortedBy`, must be used to transform a <Collection> into a <Sequence> before `->last` may be used. <Sequence> must be expressed as a unique alias. <Attribute1> may be of any data type. See *"Advanced collection sorting syntax"* in the *Rule Modeling Guide* for more examples of usage.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `->last` to identify the last element of the sequence created by applying `->sortedBy` to `collection1`. Once identified, the value of the `string1` attribute belonging to this last element is evaluated. If the value of `string1` is `Joe`, then `boolean1` attribute of `Entity1` is assigned the value of `true`.

The screenshot shows a rulesheet editor interface. On the left, a 'Scope' tree shows a hierarchy: Entity1 (expanded) containing boolean1, entity2 (Entity2) [collection1] (expanded), decimal1, and string1. Below the scope tree is a 'Filters' section with two rows. The main area is divided into 'Conditions' and 'Actions' sections. The 'Conditions' section has two rows: 'a' with the condition 'collection1.string1->sortedBy (collection1.decimal1) -> last' and 'b' which is empty. The 'Actions' section has a 'Post Message(s)' row with two yellow envelope icons, and three rows labeled 'A', 'B', and 'C'. Row 'A' has the action 'Entity1.boolean1'. Below the actions is an 'Overrides' section. At the bottom, a 'Rule Statements' table is shown with two rows.

Conditions		1	2
a	collection1.string1->sortedBy (collection1.decimal1) -> last	'Joe'	not 'Joe'
b			

Actions		1	2
Post Message(s)		✉	✉
A	Entity1.boolean1	T	F
B			
C			

Ref	ID	Post	Alias	Text
1		Info	Entity1	If the string1 value of the last element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.
2		Warning	Entity1	If the string1 value of the last element in collection1, in ascending order by decimal1, is not equal to Joe, then boolean1 is false.

SAMPLE RULETEST

A sample Ruletest provides a collection of three elements, each with a `decimal1` value. Input and Output panels are shown below.

Input	Output						
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Mary] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Joe] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Mary] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Joe] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue] 						
<div style="border: 1px solid #ccc; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid #ccc;"> Rule Statements Rule Messages ✕ </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Severity</th> <th style="width: 65%;">Message</th> <th style="width: 20%;">Entity</th> </tr> </thead> <tbody> <tr> <td style="background-color: #e0ffe0;">Info</td> <td>If the string1 value of the last element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.</td> <td>Entity1[1]</td> </tr> </tbody> </table> </div>		Severity	Message	Entity	Info	If the string1 value of the last element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.	Entity1[1]
Severity	Message	Entity					
Info	If the string1 value of the last element in collection1, in ascending order by decimal1, is equal to Joe, then boolean1 is true.	Entity1[1]					

Is same date

SYNTAX

```
<DateTime1>.isSameDate(<DateTime2>)
```

DESCRIPTION

Returns boolean. True if the DateTime1 is the same as DateTime2, ignoring the time part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses **.isSameDate** to determine whether two dateTime values are the same date.

Conditions		0	1	2
a	Entity1.dateTime1.isSameDate(Entity1.dateTime2)		T	F
b				
c				
Actions				
Post Message(s)			☐	☐
A	Entity1.boolean1		T	F
B				
Overrides				

Ref	ID	Post	Alias	Text
A1		Info	Entity1	The two dates are the same.
A2		Info	Entity1	The two dates are different.

SAMPLE RULETEST

A sample Ruletest provides dateTime1 and dateTime2 for two examples. Input and Output panels are shown below.

Input	Output									
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [02/14/2021 09:00:00] dateTime2 [02/14/2021 10:15:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [02/14/2021 09:00:00] dateTime2 [03/14/2021 09:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] dateTime1 [2021-02-14T09:00:00-0500] dateTime2 [2021-02-14T10:15:00-0500] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] dateTime1 [2021-02-14T09:00:00-0500] dateTime2 [2021-03-14T09:00:00-0400] 									
<table border="1"> <thead> <tr> <th>Severity</th> <th>Message</th> <th>Entity</th> </tr> </thead> <tbody> <tr> <td>Info</td> <td>The two dates are the same.</td> <td>Entity1[1]</td> </tr> <tr> <td>Info</td> <td>The two dates are different.</td> <td>Entity1[2]</td> </tr> </tbody> </table>		Severity	Message	Entity	Info	The two dates are the same.	Entity1[1]	Info	The two dates are different.	Entity1[2]
Severity	Message	Entity								
Info	The two dates are the same.	Entity1[1]								
Info	The two dates are different.	Entity1[2]								

Is same time

SYNTAX

```
<DateTime1>.isSameTime(<DateTime2>)
```

DESCRIPTION

Returns boolean. True if DateTime1 is the same as DateTime2, ignoring the date part.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.isSameTime` to determine whether two `dateTime` values are the same time.

Conditions		0	1	2
a	Entity1.dateTime1.isSameTime(Entity1.dateTime2)		T	F
b				

Actions		<
Post Message(s)		
A	Entity1.boolean1	<input checked="" type="checkbox"/> T <input checked="" type="checkbox"/> F
B		

Rule Statements				
Ref	ID	Post	Alias	Text
A1		Info	Entity1	The two times are the same.
A2		Info	Entity1	The two times are different.

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

The screenshot shows the 'isSameTime.ert' rule engine interface. The top bar indicates 'Differences: 0'. The main area is split into 'Input' and 'Output' sections. The 'Input' section shows three entities, each with two date-time values. The 'Output' section shows the same three entities, each with a boolean result and the two date-time values. Below the main area, there are tabs for 'Rule Statements', 'Rule Messages', and 'Problems'. The 'Rule Messages' tab is active, showing a table with three rows of information.

Severity	Message	Entity
Info	The two times are the same.	Entity1[1]
Info	The two times are different.	Entity1[2]
Info	The two times are different.	Entity1[3]

Less than

SYNTAX

Date*Time	<Date*Time1> < <Date*Time2>
Number	<Number1> < <Number2>
String	<String1> < <String2>

DESCRIPTION

DateTime*	Returns a value of true if <DateTime1> is less than <DateTime2>. This is equivalent to <DateTime1> occurring “before” <DateTime2>
Number	Returns a value of true if <Number1> is less than <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is less than <String2>.

* includes DateTime and Date data types

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) **less than** may also be used in Conditional Value Sets & Cells (section 5 in applies, with the following exception: [Sections of Rulesheet: Numbers Correlate with Table Above](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **less than** to test whether `string1` is less than `string2`.

The screenshot shows a Rulesheet editor interface for a file named 'lessThan.ers'. It is divided into three main sections: Conditions, Actions, and Rule Statements.

Conditions Section:

	1	2	
a	Entity1.string1 < Entity1.string2	T	F
b			

Actions Section:

Post Message(s)			
A	Entity1.string3	'SMALLER'	'NOT SMALLER'
B			

Rule Statements Section:

Ref	ID	Post	Alias	Text
1				If string1 is less than string2, then assign 'SMALLER' to string3
2				If string1 is not less than string2, then assign 'NOT SMALLER' to string3

SAMPLE RULETEST

A sample Ruletest provides two examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [apple] string2 [Apple] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [apple] string2 [apples] ▼ Entity1 [4] <ul style="list-style-type: none"> string1 [apple] string2 [apple] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [apple] string2 [Apple] string3 [NOT SMALLER] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [apple] string2 [apples] string3 [SMALLER] ▼ Entity1 [4] <ul style="list-style-type: none"> string1 [apple] string2 [apple] string3 [NOT SMALLER]

Less than or equal to

SYNTAX

DateTime*	<DateTime1> <= <DateTime2>
Number	<Number1> <= <Number2>
String	<String1> <= <String2>

DESCRIPTION

DateTime*	Returns a value of true if <DateTime1> is less than or equal to <DateTime2>. This is equivalent to <DateTime1> occurring "on or before" <DateTime2>
Number	Returns a value of true if <Number1> is less than or equal to <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is less than or equal to <String2>.

* includes DateTime and Date data types

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies, with the following exception: **less than or equal to** may also be used in Conditional Value Sets & Cells (section 5 of [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **less than or equal to** to test whether `string1` is less than or equal to `string2`.

lessThanEqual.ers				
Conditions		1	2	
a	Entity1.string1 <= Entity1.string2	T	F	
b				
Actions		<		
Post Message(s)				
A	Entity1.string3	'SMALLER'	'NOT SMALLER'	
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If string1 is less than or equal to string2, then assign 'SMALLER' to string3
2				If string1 is not less than or equal to string2, then assign 'NOT SMALLER' to string3

SAMPLE RULETEST

A sample Ruletest provides two examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Apple] string2 [apple] Entity1 [3] <ul style="list-style-type: none"> string1 [apple] string2 [apples] Entity1 [4] <ul style="list-style-type: none"> string1 [apple] string2 [apple] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Apple] string2 [apple] string3 [SMALLER] Entity1 [3] <ul style="list-style-type: none"> string1 [apple] string2 [apples] string3 [SMALLER] Entity1 [4] <ul style="list-style-type: none"> string1 [apple] string2 [apple] string3 [SMALLER]

Logarithm BASE 10

SYNTAX

<Number>.log

DESCRIPTION

Returns a Decimal value equal to the logarithm (base 10) of <Number>. If <Number> is equal to 0 (zero) an error is returned when the rule is executed.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.log` to calculate the logarithm (base 10) of `integer1` and assign it to `decimal1`.

The screenshot shows a rulesheet editor with two tabs: 'log.ers' and 'Rule Statements'. The 'log.ers' tab is active and displays a table with 'Conditions' and 'Actions' sections. The 'Conditions' section has a value of '0'. The 'Actions' section includes a 'Post Message(s)' row and two rows, 'A' and 'B', with the action 'Entity1.decimal1 = Entity1.integer1.log'. A green checkmark is visible in the 'A' row. Below the 'log.ers' tab is the 'Rule Statements' tab, which contains a table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. The table has one row with 'Ref' 'A0' and 'Text' 'decimal1 is equal to the logarithm (base10) of integer1'.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.decimal1 = Entity1.integer1.log	<input checked="" type="checkbox"/>
B		
		Overrides

Ref	ID	Post	Alias	Text
A0				decimal1 is equal to the logarithm (base10) of integer1

SAMPLE RULETEST

A sample Ruletest provides results for three examples of `integer1`. Input and Output panels are shown below:

The screenshot shows a ruletest interface with two panels: 'Input' and 'Output'. The 'Input' panel shows three entities, each with an 'integer1' property. The 'Output' panel shows the results for each entity, including the 'decimal1' property calculated from the logarithm of the 'integer1' value.

Input	Output
Entity1 [1] integer1 [10]	Entity1 [1] decimal1 [1.000000] integer1 [10]
Entity1 [2] integer1 [1]	Entity1 [2] decimal1 [0.000000] integer1 [1]
Entity1 [3] integer1 [24]	Entity1 [3] decimal1 [1.380211] integer1 [24]

Note: In a case where the rule encounters `log(0)`, it throws an exception that halts execution. That's because the value of `log(0)` is undefined. If the rule is executing against multiple entities, the arbitrary order of execution might be different on subsequent runs before execution is halted.

Logarithm BASE X

SYNTAX

`<Number>.log(<Decimal>)`

DESCRIPTION

Returns a Decimal value equal to the logarithm (base <Decimal>) of <Number>. If <Number> is equal to 0 (zero) an error is returned when the rule is executed.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.log` to calculate the logarithm (base 7.0) of `integer1` and assign it to `decimal1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.decimal1 = Entity1.integer1.log(7.0)	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				decimal1 is equal to the logarithm (base 7) of integer1

SAMPLE RULETEST

A sample Ruletest provides results for three examples of `integer1`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [10] Entity1 [2] <ul style="list-style-type: none"> integer1 [173] Entity1 [3] <ul style="list-style-type: none"> integer1 [24] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1.183295] integer1 [10] Entity1 [2] <ul style="list-style-type: none"> decimal1 [2.648268] integer1 [173] Entity1 [3] <ul style="list-style-type: none"> decimal1 [1.633197] integer1 [24]

Note: In a case where the rule encounters `log(0)`, it throws an exception that halts execution. That's because the value of `log(0)` is undefined. If the rule is executing against multiple entities, the arbitrary order of execution might be different on subsequent runs before execution is halted.

Lowercase

SYNTAX

<String>.toLowerCase

DESCRIPTION

Converts all characters in <String> to lowercase characters.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.toLowerCase** to convert `string1` to lowercase, compare its value with `string2`, and assign a value to `boolean1` based on the results of the comparison.

Lowercase.ers				
Conditions		1	2	
a	Entity1.string1.toLowerCase = Entity1.string2	T	F	
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1	T	F	
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If string1 converted to lowercase is equal to string2, then assign boolean1 a value of true
2				If string1 converted to lowercase is not equal to string2, then assign boolean1 a value of false

SAMPLE RULETEST

A sample Ruletest provides three examples of `string1` and `string2`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Boeing] string2 [boeing] Entity1 [2] <ul style="list-style-type: none"> string1 [Boeing] string2 [Boeing] Entity1 [3] <ul style="list-style-type: none"> string1 [boeing] string2 [BOEING] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] string1 [Boeing] string2 [boeing] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] string1 [Boeing] string2 [Boeing] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] string1 [boeing] string2 [BOEING]

Matches

SYNTAX

```
<String>.matches(regularExpression:String)
```

```
<String>.matches(regularExpression:String, flags:<String>)
```

DESCRIPTION

Returns true if the regular expression matches the String.

FLAGS

The characters `gis`, when one or more are added to the expression with no separator, represent:

- `g` global, replace more than first match (the default)
- `i` ignore case
- `s` match line terminator ("newline") characters in a string, which it would not match otherwise. See https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/RegExp/dotAll.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLES

This sample Rulesheet uses **matches** in non-conditional actions:

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.boolean1 = Entity1.string1.matches ('[A-Z,a-z]{5}[0-9]{4}[A-Z,a-z]{1}')	<input checked="" type="checkbox"/>
B	Entity1.boolean2 = Entity1.string2.matches ('[a-zA-Z0-9_+]+@[a-zA-Z0-9]+\.[a-zA-Z0-9-]+\.\$')	<input checked="" type="checkbox"/>
		Overrides

Ref	ID	Post	Alias	Text
A0				Entity1.boolean1 is true if string1 is a valid identifier, and false otherwise
B0				Entity1.boolean2 is true if string2 is a valid email address, and false otherwise

Action A: Determine whether a String is a valid identifier - A String must contain an item identification with the following pattern:

1. Characters 1-5: alphabetic.
2. Characters 6-10: numeric.
3. Character 11: alphabetic.

Action B: Check whether an email address is valid - An email address must have alphanumeric characters and certain special characters before and after an @ and a dot.

SAMPLE RULETEST

A sample Ruletest provides various valid and invalid Strings that are evaluated by the two regular expression examples.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [ABCDE1234x] string2 [ProgressSupport@progress.com] Entity1 [2] <ul style="list-style-type: none"> string1 [ABCDEFGHlx] string2 [???@progress.com] Entity1 [3] <ul style="list-style-type: none"> string1 [ABCDE-1234-x] string2 [ProgressSupport @ progress.com] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] boolean2 [true] string1 [ABCDE1234x] string2 [ProgressSupport@progress.com] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] boolean2 [false] string1 [ABCDEFGHlx] string2 [???@progress.com] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] boolean2 [false] string1 [ABCDE-1234-x] string2 [ProgressSupport @ progress.com]

Maximum value

SYNTAX

`<Number1>.max(<Number2>)`

DESCRIPTION

Returns either `<Number1>` or `<Number2>`, whichever is greater.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.max` to compare the values of `decimal1` and `decimal2`, and `integer1` and `integer2`, and posts a message based on their size relative to 5.0 and 8, respectively.

MaximumValue.ers				
Conditions		0	1	2
a	Entity1.decimal1.max(Entity1.decimal2) > 5.0		T	-
b	Entity1.integer1.max(Entity1.integer1) > 8		-	T
Actions		<		
Post Message(s)			✉	✉
A				
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1		Info	Entity1	The larger of decimal1 and decimal2 is greater than 5
2		Info	Entity1	The larger of integer1 and integer2 is greater than 8

SAMPLE RULETEST

A sample Ruletest provides four examples, two using `decimal1` and `decimal2`, and two using `integer1` and `integer2` as input data.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [4.900000] decimal2 [5.100000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [5.000000] decimal2 [4.300000] Entity1 [3] <ul style="list-style-type: none"> integer1 [5] integer2 [14] Entity1 [4] <ul style="list-style-type: none"> integer1 [7] integer2 [1] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [4.900000] decimal2 [5.100000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [5.000000] decimal2 [4.300000] Entity1 [3] <ul style="list-style-type: none"> integer1 [5] integer2 [14] Entity1 [4] <ul style="list-style-type: none"> integer1 [7] integer2 [1]

Severity	Message	Entity
Info	The larger of decimal1 and decimal2 is greater than 5	Entity1[1]
Info	The larger of integer1 and integer2 is greater than 8	Entity1[3]

Maximum value COLLECTION

SYNTAX

<Collection.attribute> -> max

DESCRIPTION

Returns the highest value of <attribute> for all elements in <Collection>. <attribute> must be a numeric data type. <Collection> must be expressed as a unique alias.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **->max** to identify the highest value of decimal1 in all elements of collection1, then assign it to Entity1.decimal1.

Ref	ID	Post	Alias	Text
A0				Assign the highest value of decimal1 in collection1 to Entity1.decimal1

SAMPLE RULETEST

A sample collection contains five elements, each with a value of decimal1.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [1.100000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [3.100000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [2.700000] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [7.900000] entity2 (Entity2) [5] <ul style="list-style-type: none"> decimal1 [4.600000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [7.900000] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [1.100000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [3.100000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [2.700000] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [7.900000] entity2 (Entity2) [5] <ul style="list-style-type: none"> decimal1 [4.600000]

Minimum value

SYNTAX

<Number1>.min(<Number2>)

DESCRIPTION

Returns either <Number1> or <Number2>, whichever is smaller.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.min` to compare the values of `decimal1` and `decimal2`, and `integer1` and `integer2`, and posts a message based on their size relative to 5.0 and 8, respectively.

MinimumValue.ers				
Conditions		0	1	2
a	Entity1.decimal1.min(Entity1.decimal2) > 5.0		T	-
b	Entity1.integer1.min(Entity1.integer2) > 8		-	T
c				
Actions				
Post Message(s)			✉	✉
A				
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1		Info	Entity1	The smaller of decimal1 and decimal2 is greater than 5
2		Info	Entity1	The smaller of integer1 and integer2 is greater than 8

SAMPLE RULETEST

A sample Ruletest provides four examples, two using decimal inputs, and two using integers.

Input	Output	
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [4.900000] decimal2 [5.100000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [5.100000] decimal2 [594.300000] Entity1 [3] <ul style="list-style-type: none"> integer1 [1500] integer2 [245] Entity1 [4] <ul style="list-style-type: none"> integer1 [350] integer2 [1] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [4.900000] decimal2 [5.100000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [5.100000] decimal2 [594.300000] Entity1 [3] <ul style="list-style-type: none"> integer1 [1500] integer2 [245] Entity1 [4] <ul style="list-style-type: none"> integer1 [350] integer2 [1] 	
Rule Statements		
✉ Rule Messages		
Severity	Message	Entity
Info	The smaller of decimal1 and decimal2 is greater than 5	Entity1[2]
Info	The smaller of integer1 and integer2 is greater than 8	Entity1[3]

Minimum value COLLECTION

SYNTAX

<Collection.attribute> -> min

DESCRIPTION

Returns the lowest value of <attribute> for all elements in <Collection>. <attribute> must be a numeric data type. <Collection> must be expressed as a unique alias.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **->min** to identify the lowest value of `decimal1` in all elements of `collection1`, then assign it to `Entity1.decimal1`.

Scope	Conditions	0
Entity1	a	
decimal1	b	
entity2 (Entity2) [collection1]	Actions	<
	Post Message(s)	
	A Entity1.decimal1 = collection1.decimal1 -> min	<input checked="" type="checkbox"/>
	B	
	Overrides	

Ref	ID	Post	Alias	Text
A0				Assign the lowest value of decimal1 in collection1 to Entity1.decimal1

SAMPLE RULETEST

A sample collection contains five elements, each with a value of `decimal1`.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [1.100000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [3.100000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [2.700000] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [7.900000] entity2 (Entity2) [5] <ul style="list-style-type: none"> decimal1 [4.600000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1.100000] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [1.100000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [3.100000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [2.700000] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [7.900000] entity2 (Entity2) [5] <ul style="list-style-type: none"> decimal1 [4.600000]

Minute

SYNTAX

<DateTime>.min

DESCRIPTION

Returns the minute portion of <DateTime> as an Integer between 0 and 59.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.min` to evaluate `dateTime1` and assign the minute value to `integer1`.

The screenshot shows a Rulesheet editor window titled 'Minutes.ers'. It features a 'Scope' panel on the left with a tree view containing 'Entity1', 'dateTime1', and 'integer1'. Below the scope is a 'Filters' section with two filter slots. The main area is a table with 'Conditions' and 'Actions' columns. The 'Conditions' column is empty, and the 'Actions' column contains a rule 'A' with the expression 'Entity1.integer1 = Entity1.dateTime1.min' and a checked checkbox. Below the table is an 'Overrides' section. At the bottom, there is a 'Rule Statements' table with one row: 'A0' in the 'Ref' column and 'integer1 equals the minute value in dateTime1' in the 'Text' column.

Ref	ID	Post	Alias	Text
A0				integer1 equals the minute value in dateTime1

SAMPLE RULETEST

A sample Ruletest provides three examples of `dateTime1`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/2023 00:00:00] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/2023 11:12:35 PM] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/24/2023 23:24:00] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2023-11-24T00:00:00-0500] integer1 [0] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2023-11-24T23:12:35-0500] integer1 [12] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2023-11-24T23:24:00-0500] integer1 [24]

Minutes between

SYNTAX

```
<DateTime1>.minsBetween(<DateTime2>)
```

DESCRIPTION

Returns the Integer number of minutes between DateTimes. The function calculates the number of milliseconds between the two dates and divides that number by 60,000 (the number of milliseconds in a minute). The decimal portion is then truncated. If the two dates differ by less than a full minute, the returned value is zero. This function returns a positive number if `<DateTime2>` is later than `<DateTime1>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.minsBetween** to determine the number of minutes that have elapsed between `dateTime1` and `dateTime2`, compare it to the Values set, and assign a value to `string1`.

MinutesBetween.ers			
Conditions		1	2
a	Entity1.dateTime1.minsBetween(Entity1.dateTime2)	<= 30	> 30
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			
Overrides			
Rule Statements			
Ref	ID	Post	Text
1			If 30 or fewer minutes have elapsed between dateTime1 and dateTime2, then Entity1 is not overdue
2			If more than 30 minutes have elapsed between dateTime1 and dateTime2, then Entity2 is overdue

SAMPLE RULETEST

A sample Ruletest provides dateTime1 and dateTime2 for two examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/1960 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [11/24/1960 00:10:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [08/04/2020 01:00:00] dateTime2 [08/04/2020 01:15:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [1960-12-15T00:00:00-0500] string1 [Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [1960-11-24T00:10:00-0500] string1 [Not Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-08-04T01:00:00-0400] dateTime2 [2020-08-04T01:15:00-0400] string1 [Not Overdue]

Mod

SYNTAX

<Integer1>.mod(<Integer2>)

DESCRIPTION

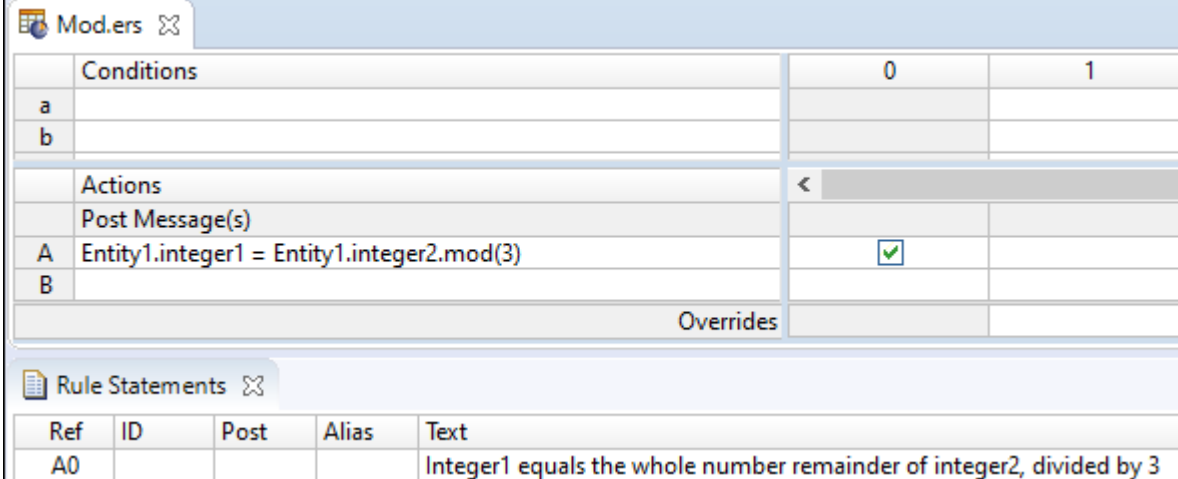
Returns the whole number remainder that results from dividing <Integer1> by <Integer2>. If the remainder is a fraction, then 0 (zero) is returned.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet > uses `.mod` to calculate the whole number remainder resulting from the division of `integer2` by 3. The result is assigned to `integer1`.



The screenshot shows a Rulesheet editor window titled "Mod.ers". It contains a table for rule configuration and a "Rule Statements" section below.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.integer1 = Entity1.integer2.mod(3)	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				Integer1 equals the whole number remainder of integer2, divided by 3

SAMPLE RULETEST

A sample Ruletest provides three examples of `integer2`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer2 [675] Entity1 [2] <ul style="list-style-type: none"> integer2 [781] Entity1 [3] <ul style="list-style-type: none"> integer2 [1022] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [0] integer2 [675] Entity1 [2] <ul style="list-style-type: none"> integer1 [1] integer2 [781] Entity1 [3] <ul style="list-style-type: none"> integer1 [2] integer2 [1022]

Month

SYNTAX

<DateTime>.month

<Date>.month

DESCRIPTION

Returns the month in <DateTime> or Date as an Integer between 1 and 12.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.month` to evaluate `dateTime1` and `dateTime2` and assign the month value to `integer1` and `integer2`, respectively.

The screenshot shows a rulesheet editor with the following sections:

- Conditions:** A table with columns 'a' and 'b', and a value '0' in the right column.
- Actions:** A table with columns 'Post Message(s)' and a checkbox column. Two actions are listed:
 - A: Entity1.integer1=Entity1.dateTime1.month (checked)
 - B: Entity1.integer2=Entity1.dateTime2.month (checked)
- Overrides:** A section with an 'Overrides' label.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'.

Ref	ID	Post	Alias	Text
A0				integer1 equals the month value in dateTime1
B0				integer2 equals the month value in dateOnly1

SAMPLE RULETEST

A sample Ruletest provides two examples with `dateTime1` and `dateTime2`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/5/1955 00:00:00] dateTime2 [9/5/2015 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/5/1955 00:00:00] dateTime2 [9/5/2015 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [12/5/2025 00:00:00] dateTime2 [3/5/2015 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1955-05-05T00:00:00-0400] dateTime2 [2015-09-05T00:00:00-0400] integer1 [5] integer2 [9] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1955-11-04T23:00:00-0500] dateTime2 [2015-09-05T00:00:00-0400] integer1 [11] integer2 [9] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-12-05T00:00:00-0500] dateTime2 [2015-03-05T00:00:00-0500] integer1 [12] integer2 [3]

Months between

SYNTAX

```
<DateTime1>.monthsBetween(<DateTime2>)
```

```
<Date1>.monthsBetween(<Date2>)
```

DESCRIPTION

Returns the Integer number of months between DateTimes or between Dates. The month and year portions of the date data are subtracted to calculate the number of elapsed months. The day portions are ignored. If the month and year portions are the same, the result is zero. This function returns a positive number if <DateTime2> is later than <DateTime1>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.monthsBetween** to determine the number of months that have elapsed between `dateTime1` and `dateTime2`, compare it to the values in the Condition Cells, and assign a value to `string1`.

Conditions		1	2
a	Entity1.dateTime1.monthsBetween(Entity1.dateTime2)	<= 6	> 6
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			
Overrides			

Rule Statements				
Ref	ID	Post	Alias	Text
1				If 6 or fewer months have elapsed between date1 and date2, then Entity1 is not overdue
2				If more than 6 months have elapsed between date1 and date2, then Entity1 is overdue

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/1960 00:00:00] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/24/1960 00:00:00] dateTime2 [12/15/2012 00:00:00] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/24/2013 00:00:00] dateTime2 [12/15/2022 00:00:00] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [1960-12-15T00:00:00-0500] string1 [Not Overdue] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1960-11-24T00:00:00-0500] dateTime2 [2012-12-15T00:00:00-0500] string1 [Overdue] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2013-11-24T00:00:00-0500] dateTime2 [2022-12-15T00:00:00-0500] string1 [Overdue]

Multiply

SYNTAX

<Number1> * <Number2>

DESCRIPTION

Multiplies <Number1> by <Number2>. The resulting data type is the more expansive of those of <Number1> and <Number2>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **multiply** to multiply `integer1` and `integer2` and compare the result to 100

Conditions		1	2
a	Entity1.integer1 * Entity1.integer2	< 100	>= 100
b			
Actions		<	
Post Message(s)			
A	Entity1.boolean1	T	F
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If integer1 multiplied by integer2 is less than 100, then boolean1 is true
2				If integer1 multiplied by integer2 is greater than or equal to 100, then boolean1 is false

SAMPLE RULETEST

A sample Ruletest provides three examples of `integer1` and `integer2`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [9] integer2 [10] Entity1 [2] <ul style="list-style-type: none"> integer1 [500] integer2 [2] Entity1 [3] <ul style="list-style-type: none"> integer1 [25] integer2 [5] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] integer1 [9] integer2 [10] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] integer1 [500] integer2 [2] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] integer1 [25] integer2 [5]

Natural logarithm

SYNTAX

<Number>.ln

DESCRIPTION

Returns a Decimal value equal to the natural logarithm (base e) of <Number>. If <Number> is equal to 0 (zero), an error is returned when the rule is executed. This error will halt execution for all data present.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.ln` to calculate the natural logarithm of `decimal2` and assign it to `decimal1`.

The screenshot shows a rulesheet editor with two tabs: "NaturalLog.ers" and "Rule Statements".

Conditions:

Conditions	0
a	
b	

Actions:

Actions	<
Post Message(s)	
A	Entity1.decimal1 = Entity1.decimal2.ln <input checked="" type="checkbox"/>
B	
Overrides	

Rule Statements:

Ref	ID	Post	Alias	Text
A0				decimal1 is equal to the natural logarithm (base e) of decimal2

SAMPLE RULETEST

A sample Ruletest provides results for three examples of `decimal2`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal2 [2.719000] Entity1 [2] <ul style="list-style-type: none"> decimal2 [125.733000] Entity1 [3] <ul style="list-style-type: none"> decimal2 [24.300000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1.000264] decimal2 [2.719000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [4.834161] decimal2 [125.733000] Entity1 [3] <ul style="list-style-type: none"> decimal1 [3.190476] decimal2 [24.300000]

Note: In a case where the rule encounters `0.ln`, it throws an exception that halts execution. That's because the value of `0.ln` is undefined. If the rule is executing against multiple entities, the arbitrary order of execution might be different on subsequent runs before execution is halted.

New

SYNTAX

```
<Entity>.new[<Expression1>,<Expression2>...]
```

DESCRIPTION

creates a new `<Entity>` with attribute values defined by optional `<Expression>`. Expressions (when present) should be written as assignments in the form: `attribute = value`. The attribute used in `<Expression>` (when present) must be an attribute of `<Entity>`.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exceptions: **new** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

The following Rulesheet uses **.new** to create a new `Entity2` element in `collection1` when `Entity1` has a `string1` value equal to "PO 123-ABC". An alias is not required by the **.new** operator, because it is possible to create a new entity at the root level, without inserting it into a collection. The `collection1` alias used here is required by the `+=` ([Associate Element](#) to collection) operator.

The screenshot shows a Rulesheet editor with a tree view on the left and a configuration table on the right. The tree view shows a scope with `Entity1 [e1]` containing `string1` and `entity2 (Entity2) [collection1]`, and `Entity2` containing `string1`. The configuration table has columns for Scope, Conditions, and Actions, with two rows labeled 1 and 2. Row 1 has condition `e1.string1 = 'PO 123-ABC'` and action `collection1 += Entity2.new[string1 = 'item1']`. Row 2 has no conditions and no actions. Below the configuration table is a 'Rule Statements' table with columns for Ref, ID, Post, Alias, and Text.

Scope	Conditions	1	2
a	<code>e1.string1 = 'PO 123-ABC'</code>	T	F
b			
c			
Actions			
A	<code>collection1 += Entity2.new[string1 = 'item1']</code>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If Entity1 has a string value of PO 123-ABC, then create a new element of collection1 with a string1 value of item1
2				If Entity1 does not have a string value of PO 123-ABC, then take no action

SAMPLE RULETEST

A sample Ruletest provides 2 collections of `Entity1`. Input and Output panels are illustrated below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] Entity1 [2] <ul style="list-style-type: none"> string1 [PO 987-XYZ] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] entity2 (Entity2) [1] <ul style="list-style-type: none"> string1 [item1] Entity1 [2] <ul style="list-style-type: none"> string1 [PO 987-XYZ]

Behavior of the `.new` operator

The `.new` operator does not consider implied conditions of non-mandatory attributes (from the initialize expressions) during execution (in other words, a `.new` operator always fires when explicit conditions are met).

Each initialize expression within a `.new...` expression will be executed (or not) depending upon implied conditions; that is, if any input to the expression is null, the target attribute remains null. Another case where an implied condition would prevent a `.new` operator for executing is where the new entity is a target to an association assignment and the parent of that association does not exist.

The following examples assume that all attributes are not mandatory.

- Rule 1:

```
IF entity1.attr1 > 10 THEN Entity2.new[attr1 = entity1.attr2]
```

Executes only if `entity1` exists, `entity1.attr1` is not null, and `entity1.attr1 > 10`. The `newEntity2.attr1` will be left as null if `entity1.attr2` is null.

- Rule 2:

```
Entity2.new[attr1 = entity1.attr1 + entity1.attr2]
```

Will always execute. `Entity2.attr1` will remain null if `entity1` does not exist, or `entity1.attr1` is null, or `entity1.attr2` is null.

- Rule 3:

```
entity1.assoc2 += Entity2.new[attr1 = entity1.attr1]
```

Will execute only if `entity1` exists. `Entity2.attr1` will remain null if `entity1.attr1` is null.

- Rule 4:

```
Entity2.new[attr1 = entity1.assoc1.attr1]
```

This action will always fire. `entity2.attr1` will remain null if `entity1` does not exist, or `entity1.assoc1` does not exist, or `entity1.assoc1.attr1` is null. Note that this action will fire multiple times if `entity1.assoc1` contains multiple entities (once for each entity contained in the `entity1.assoc1` collection).

New unique

SYNTAX

```
<Entity>.newUnique[<Expression1>,<Expression2>...]
```

DESCRIPTION

newUnique is an unusual operator in that it contains both action *and* condition logic. When an Action containing this operator is executed, a new `<Entity>` will be created only if no other entity exists with the characteristics defined by `<Expression1>` **and** `<Expression2>`, etc. `<Expression1>` and `<Expression2>` are optional. If no expression is present within the square brackets `[. .]`, the **newUnique** operator will create a new entity only if none currently exists in memory.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exceptions: **newUnique** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

There is some restriction to using **newUnique** with associations. **newUnique** is valid for associations of multiplicity One to One or Many to One, but is invalid for associations One to Many or Many to Many, as illustrated:

Scope	Conditions
<ul style="list-style-type: none"> ManyToOne OneToOne Root <ul style="list-style-type: none"> manyToMany (ManyToMany) manyToOne (ManyToOne) oneToMany (OneToMany) oneToOne (OneToOne) 	a b c d e f g h i j k

Filters	Actions
1	Post Message(s)
2	A Root.newUnique[oneToOne = OneToOne]
3	B Root.newUnique[manyToOne = ManyToOne]
4	C Root.newUnique[oneToMany = OneToMany]
	D Root.newUnique[manyToMany = ManyToMany]

RULESHEET EXAMPLE

The following Rulesheet uses `.newUnique` to create a new `Entity2` element with `string1="item1"`, and add it to `collection1` only if no existing `Entity2` already has `string1="item1"`. A collection alias is not required by the `.newUnique` operator because it is possible to create a new entity at the root level, without inserting it into a collection. The collection alias used here is required by the `+=` ([Associate Element to collection](#)) operator.

NewUnique.ers

Scope	Conditions	1	2
<ul style="list-style-type: none"> Entity1 [e1] <ul style="list-style-type: none"> string1 entity2 (Entity2) [collection1] Entity2 <ul style="list-style-type: none"> string1 	a	e1.string1 = 'PO 123-ABC'	T
	b		F
	c		
	Actions		
	Post Message(s)		
	A	collection1 += Entity2.newUnique [string1 = 'item1']	<input checked="" type="checkbox"/>
	B		<input type="checkbox"/>
	Overrides		

Ref	ID	Post	Alias	Text
1				If the parent of collection1 has a string1 value of PO 123-ABC, then create a child entity with string1 = item1 only if none exists
2				If the parent of collection1 does not have a string1 value of PO 123-ABC, then take no action

SAMPLE RULETEST 1

Each of three sample tests provides different combinations of `Entity1` and `Entity2`. Input and Output panels are illustrated below:

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 [item1] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 [item1]

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 [] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 123-ABC] ▼ entity2 (Entity2) [2] <ul style="list-style-type: none"> string1 [item1] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 []

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 987-XYZ] ▼ Entity1 [2] <ul style="list-style-type: none"> string1 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [PO 987-XYZ] ▼ Entity1 [2] <ul style="list-style-type: none"> string1

Not

SYNTAX

not <Expression>

DESCRIPTION

Returns the negation of the truth value of <Expression>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies, with the following special exception: **not** may also be used in Conditional Cells.

RULESHEET EXAMPLE

The following Rulesheet uses **not** to negate the value of A in the Condition Cell of rule 2. **Not** may only be used in this manner if there is at least one other value (including **other** or **null**) present in the Condition Cells values drop-down list (in other words, there must be at least one alternative to the value negated by **not**).

Not.ers				
Conditions		0	1	2
a	Entity1.string1		'A'	not 'A'
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1		T	F
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If string1 is equal to A, then boolean1 is assigned the value of true
2				If string1 is not equal to A, then boolean1 is assigned the value of false

SAMPLE RULETEST

A sample Ruletest provides three examples of `string1`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [A] Entity1 [2] <ul style="list-style-type: none"> string1 [123] Entity1 [3] <ul style="list-style-type: none"> string1 [a] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] string1 [A] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] string1 [123] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] string1 [a]

Limitations to using NOT in a Conditional cell

When you use **not** in a Conditional cell with an attribute name, the form is `not valueSet` which evaluates as `true` when the condition is not a member of an entry in the `valueSet`. Such entries in the `valueSet` must be literals (or partial expressions containing only literals); no variables or attributes may be included. Inclusion of an attribute reference in the `valueSet` is not valid.

Although `not attribute` is unsupported, it is not determined that it is invalid until it does not process. Then, it indicates that it is invalid.

Consider the following examples:

Table 1: Valid usage

Condition	Cell value
<code>foo.color</code>	<code>not 'red'</code>
<code>foo.color</code>	<code><> 'red'</code>
<code>foo.color</code>	<code><> bar.color</code>

Table 2: Invalid usage

Condition	Cell value
foo.color	not bar.color

Not empty

SYNTAX

<Collection> ->notEmpty

DESCRIPTION

Returns a value of true if <Collection> contains *at least one* element. **->notEmpty** does not check for attribute values, but instead checks for the *existence of elements within a collection*. As such, it requires the use of a unique alias to represent the collection being tested.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses the **->notEmpty** function to determine if `collection1` has elements. Note the use of unique alias `collection1` to represent the collection of `Entity2` associated with `Entity1`.

The screenshot shows a rulesheet editor for 'NotEmpty.ers'. The interface is divided into several panels:

- Scope:** A tree view showing 'Entity1' with a sub-entry 'entity2 (Entity2) [collection1]' marked with a red 'X'.
- Conditions:** A table with columns 1 and 2. Row 'a' contains 'collection1 -> notEmpty' with values 'T' and 'F'. Rows 'b' and 'c' are empty.
- Actions:** A table with columns 1 and 2. Row 'Post Message(s)' has yellow envelope icons in both columns. Rows 'A' and 'B' are empty.
- Filters:** A list with items 1 and 2.
- Rule Statements:** A table with columns Ref, ID, Post, Alias, and Text.

Ref	ID	Post	Alias	Text
1		Warning	Entity1	collection1 is not empty, which means that Entity1 has at least one associated Entity2 element
2		Info	Entity1	collection1 is empty, which means that Entity1 has no associated Entity2 elements

SAMPLE RULETEST

A sample Ruletest provides two collections. The following illustration shows Input and Output panels

Input	Output						
<ul style="list-style-type: none"> Entity1 [1] Entity1 [2] <ul style="list-style-type: none"> entity2 (Entity2) [1] entity2 (Entity2) [2] 	<ul style="list-style-type: none"> Entity1 [1] Entity1 [2] <ul style="list-style-type: none"> entity2 (Entity2) [1] entity2 (Entity2) [2] 						
<div style="border: 1px solid #ccc; padding: 5px;"> <div style="display: flex; justify-content: space-between; border-bottom: 1px solid #ccc;"> Rule Statements Rule Messages ✕ </div> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 20%;">Severity</th> <th>Message</th> </tr> </thead> <tbody> <tr> <td style="background-color: #ffff00;">Warning</td> <td>collection1 is not empty, which means that Entity1 has at least one associated</td> </tr> <tr> <td style="background-color: #90ee90;">Info</td> <td>collection1 is empty, which means that Entity1 has no associated</td> </tr> </tbody> </table> </div>		Severity	Message	Warning	collection1 is not empty, which means that Entity1 has at least one associated	Info	collection1 is empty, which means that Entity1 has no associated
Severity	Message						
Warning	collection1 is not empty, which means that Entity1 has at least one associated						
Info	collection1 is empty, which means that Entity1 has no associated						

Not equal to

SYNTAX

Boolean	<Expression1> <> <Expression2>
DateTime*	<DateTime1> <> <DateTime2>
Number	<Number1> <> <Number2>
String	<String1> <> <String2>

DESCRIPTION

Boolean	Returns a value of true if <Expression1> does not have the same truth value as <Expression2>.
DateTime	Returns a value of true if <DateTime1> does not equal <DateTime2>. This is equivalent to <DateTime1> not occurring “on” <DateTime2>
Number	Returns a value of true if <Number1> is not equal to <Number2>. Different numeric data types may be compared in the same expression.
String	Returns a value of true if <String1> is not equal to <String2>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

Note: Use of <> when using custom data types - If your Vocabulary uses custom data types, there are limits to the validity of <> in cells. In the following illustration, the `not` operator will validly work against a custom data type label, a value where a label is in use, and the value of a value-only definition. However, only the value where a label is in use is valid when <> is used.

The screenshot shows two windows from a software application. The top window, titled '*NOT.ers', contains a table with columns for conditions and four numbered columns (1, 2, 3, 4). The bottom window, titled 'Simple.ecore', shows a tree view on the left and a 'Custom Data Types' table on the right.

Conditions	1	2	3	4
a e1.LV	L1	not L1	<> L1	
b e1.LV	'LV1'	not 'LV1'	<> 'LV1'	
c e1.V	'V1'	not 'V1'	<> 'V1'	
d				
e e2.String1	'S1'	not 'S1'	<> 'S1'	
f e2.String2	'S2'	not 'S2'	<> 'S2'	
g				
h				

Data Type N...	Label	Value
LV	L1	'LV1'
V	L2	'LV2'

RULESHEET EXAMPLE

The following Rulesheet uses **not equal to** to test whether `decimal1` equals `decimal2`, and assign a value to `string1` based on the result of the comparison.

The screenshot shows a window titled 'NotEqualTo.ers' with a table of conditions and actions, and a 'Rule Statements' table below it.

Conditions	1	2
a Entity1.decimal1 <> Entity1.decimal2	T	F
b		

Actions	1	2
Post Message(s)		
A Entity1.string1	'no match'	'match'
B		

Ref	ID	Post	Alias	Text
1				If decimal1 does not equal decimal2, then assign a value of [no match] to string1
2				If decimal1 equals decimal2, then assign a value of [match] to string1

SAMPLE RULETEST

A sample Ruletest provides two examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] decimal2 [1000.000000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [123.400000] decimal2 [231.500000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1000.000000] decimal2 [1000.000000] string1 [match] Entity1 [2] <ul style="list-style-type: none"> decimal1 [123.400000] decimal2 [231.500000] string1 [no match]

Now

SYNTAX

now

DESCRIPTION

Returns the current system date and time when the rule is executed. This DateTime value is assigned the first time **now** is used in a Decision Service, then remains constant until the Decision Service finishes execution, regardless of how many additional times it is used. This means that every rule in a Ruleflow containing **now** will use the same DateTime value.

USAGE RESTRICTIONS

The Literals row in the table of [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **now** to determine how many hours have elapsed between now and `dateTime1` (See [.hoursBetween](#) for more details on this operator), and assign a value to `string1` based on the result.

Now.ers				
Conditions		1	2	
a	Entity1.dateTime1.hoursBetween(now) <2	T	F	
b				
Actions		<		
Post Message(s)				
A	Entity1.string1	'under 2 hours'	'2 hours or over'	
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If dateTime1 occurred within the last 2 hours, assign string1 a value of 'under 2 hours'
2				If dateTime1 occurred 2 hours or later from now, assign string1 a value of '2 hours or over'

SAMPLE RULETEST

A sample Ruletest provides two examples of `dateTime1`. Assume **now** is equal to May 9, 2021 14:20:00 EST. Note that a future date in example 2 results in a negative value and therefore is under 2 hours. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2021/05/09 12:00:00] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2021/06/01 00:00:00] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020/05/14 00:00:00] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2021-05-09T12:00:00-0400] string1 [under 2 hours] ▼ Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2021-06-01T00:00:00-0400] string1 [under 2 hours] ▼ Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-05-14T00:00:00-0400] string1 [2 hours or over]

Null

SYNTAX

null

DESCRIPTION

The null value corresponds to one of three different scenarios:

1. the absence of an attribute in a Ruletest Input pane or request message
2. the absence of data for an attribute in a Ruletest (the value zero counts as data)
3. a business object (supplied by an external application) that has an instance variable of null

A **null** value is different from an empty String (for String data types) or zero for numeric data types. An empty String is represented in a Ruletest as [] -- open then close square brackets. Any attribute value, including any empty strings, may be reset to **null** in a Ruletest by right-clicking the attribute and choosing **Set to null**. Mandatory attributes (property set in the Vocabulary) may not have a null value.

USAGE RESTRICTIONS

The Literals row in the table of [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **null** to test for the existence of a real value in `decimal1`, and assign a value to `boolean1` as a result.

Null.ers		0	1	2
Conditions				
a	Entity1.decimal1		null	other
b				
Actions		<		
Post Message(s)			☑	☑
A	Entity1.boolean1		T	F
B				
-				
Overrides				

Ref	ID	Post	Alias	Text
1		Warning	Entity1	If decimal1 has the value of null, then assign boolean1 the value of true
2		Info	Entity1	If decimal1 has any value other than null (any real number), then assign boolean1 the value of false

SAMPLE TEST

A sample Ruletest provides four examples of decimal1. Input and Output panels are illustrated below. Posted messages are not shown.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [4.000000] Entity1 [2] <ul style="list-style-type: none"> decimal1 Entity1 [3] <ul style="list-style-type: none"> decimal1 [0.000000] Entity1 [4] <ul style="list-style-type: none"> decimal1 [-13.000000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] decimal1 [4.000000] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] decimal1 Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] decimal1 [0.000000] Entity1 [4] <ul style="list-style-type: none"> boolean1 [false] decimal1 [-13.000000]

Severity	Message
Warning	If decimal1 has the value of null, then assign boolean1 the value of true
Info	If decimal1 has any value other than null (any real number), then assign
Info	If decimal1 has any value other than null (any real number), then assign
Info	If decimal1 has any value other than null (any real number), then assign

Other

SYNTAX

other

DESCRIPTION

When included in a condition's Values set (the drop-down list of values available in a Conditions Cell), **other** represents any value not explicitly included in the set, including **null**. If null is explicitly included in the Values set, then **other** does not include null.

USAGE RESTRICTIONS

The Literals row in the table of [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exception: **other** may only be used in Condition Cells (section 4 of the Sections of Rulesheet that correlate with usage restrictions) because it is a non-specific value used in comparisons.

RULESHEET EXAMPLE

The following Rulesheet uses **other** to test the value of `decimal1`. If `decimal1` has any value *other* than null, `boolean1` is assigned the value of `false`.

Other.ers				
Conditions		0	1	2
a	Entity1.decimal1		null	other
b				
Actions		<		
Post Message(s)			☑	☑
A	Entity1.boolean1		T	F
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1		Warning	Entity1	If decimal1 has the value of null, then assign boolean1 the value of true
2		Info	Entity1	If decimal1 has any value other than null (any number), then assign boolean1 a value of false

SAMPLE TEST

A sample Ruletest provides three examples of `decimal1`. Ruletest Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [0.000000] Entity1 [2] <ul style="list-style-type: none"> decimal1 Entity1 [3] <ul style="list-style-type: none"> decimal1 [3.450000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] decimal1 [0.000000] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] decimal1 Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] decimal1 [3.450000]

Severity	Message
Warning	If decimal1 has the value of null, then assign boolean1 the value of true
Info	If decimal1 has any value other than null (any number), then assign boolean1
Info	If decimal1 has any value other than null (any number), then assign boolean1

Or

SYNTAX

<Expression1> or <Expression2> or

DESCRIPTION

Returns a value of true if either <Expression1> or <Expression2> evaluates to true. When used between two or more expressions in the Preconditions section, creates a compound filter for the Rulesheet that follows. See *Rule Modeling Guide* for details on using Preconditions as filters. **OR** is not available in the Conditions section because the logical **OR** construction is implemented using multiple Columns in the decision table, or by value sets in Conditions Cells.

USAGE RESTRICTIONS

The Literals row in the table of [Sections of Rulesheet that correlate with usage restrictions](#) does not apply. Special exception: **or** may only be used in the Filters section of the Rulesheet to join 2 or more expressions, as shown above.

RULESHEET EXAMPLE

The following Rulesheet uses **or** to test the value of `integer1`, `boolean1`, and `string1` to set the value of `boolean2`

The screenshot shows the Or.ers IDE interface for configuring a rule. The main area is divided into several sections:

- Scope:** A tree view showing 'Entity1'.
- Filters:** A list of filters, with the first one being 'Entity1.integer1 < 10 or Entity1.boolean1'.
- Conditions:** A table with columns 'a', 'b', '1', and '2'. Row 'a' contains 'Entity1.string1', 'Jack', and 'Jill'. Row 'b' is empty.
- Actions:** A table with columns 'A', 'B', '1', and '2'. Row 'A' contains 'Entity1.boolean2', 'F', and 'T'. Row 'B' is empty. There is an 'Overrides' section below.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. Row 1: 'If integer1 is less than 10, or boolean1 is true and string1 equals Jack, then boolean2 is false'. Row 2: 'If integer1 is less than 10, or boolean1 is true and string1 equals Jill, then boolean2 is true'.

SAMPLE TEST

A sample Ruletest provides three examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] integer1 [5] string1 [Jack] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] integer1 [12] string1 [Jill] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] integer1 [45] string1 [Jack] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] boolean2 [false] integer1 [5] string1 [Jack] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] boolean2 [true] integer1 [12] string1 [Jill] Entity1 [3] <ul style="list-style-type: none"> boolean1 [false] integer1 [45] string1 [Jack]

Random

SYNTAX

<IntegerAttribute>.random (minRange, maxRange)

<DecimalAttribute>.random (minRange, maxRange)

DESCRIPTION

Returns a random value between minRange and maxRange. Either range can be a numeric value of the same datatype, or numeric attributes of the same type; in which case, the attributes can have arithmetic operators, absoluteValue, and unary negative applied.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLES

This sample Rulesheet uses **random** in non-conditional actions:

Conditions		0
a		
Actions		<
Post Message(s)		
A	Entity2.decimal1=Entity1.decimal1.random(100.0,200.0)	✓
B	Entity2.decimal2=Entity1.decimal1.random(0.0,10000.0)	✓
C	Entity2.decimal3=Entity1.decimal1.random(-1000.0,-100.0)	✓
D	Entity2.decimal4=Entity1.decimal1.random(-1000.0,Entity2.decimal2)	✓
E	Entity2.decimal5=Entity1.decimal1.random(0.0,Entity2.decimal3.absVal)	✓
F	Entity2.decimal6=Entity1.decimal1.random(Entity2.decimal1,1000000.0)	✓
G	Entity2.decimal7=Entity1.decimal1.random(Entity2.decimal3,Entity2.decimal2)	✓
H	Entity2.decimal8=Entity1.decimal1.random(Entity2.decimal3*10.0,Entity2.decimal2*10.0)	✓
I	Entity2.decimal9=Entity1.decimal1.random(20.0,10.0)	✓
J		
K	Entity2.integer1=Entity1.integer1.random(100,200)	✓
L	Entity2.integer2=Entity1.integer1.random(0,100)	✓
M	Entity2.integer3=Entity1.integer1.random(-105,-100)	✓
N	Entity2.integer4=Entity1.integer1.random(-1000,Entity2.integer2)	✓
O	Entity2.integer5=Entity1.integer1.random(0,Entity2.integer3.absVal)	✓
P	Entity2.integer6=Entity1.integer1.random(Entity2.integer1,1000000)	✓
Q	Entity2.integer7=Entity1.integer1.random(Entity2.integer3,Entity2.integer2)	✓
R	Entity2.integer8=Entity1.integer1.random(Entity2.integer3*10,Entity2.integer2*10)	✓
S	Entity2.integer9=Entity1.integer1.random(20,10)	✓
T		
Overrides		

SAMPLE RULETEST

A sample Ruletest requires values for Entity1 although they have no impact on the output. As the result is random, there cannot be an expected value.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [0.000000] integer1 [0] Entity2 [1] <ul style="list-style-type: none"> decimal1 decimal2 decimal3 decimal4 decimal5 decimal6 decimal7 decimal8 decimal9 integer1 integer2 integer3 integer4 integer5 integer6 integer7 integer8 integer9 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [0.000000] integer1 [0] Entity2 [1] <ul style="list-style-type: none"> decimal1 [155.863422] decimal2 [3715.800005] decimal3 [-815.275958] decimal4 [-206.761569] decimal5 [294.585655] decimal6 [141411.435602] decimal7 [1757.651933] decimal8 [4063.641385] decimal9 [11.963497] integer1 [148] integer2 [42] integer3 [-103] integer4 [-872] integer5 [81] integer6 [958580] integer7 [-12] integer8 [52] integer9 [18]

Regular expression to replace String

SYNTAX

```
<String>.regexReplaceString(regularExpression, replacementString)
```

```
<String>.regexReplaceString(regularExpression, replacementString, regexFlag:<String>)
```

DESCRIPTION

Returns a new String where the strings matching the regular expression are replaced by the replacement string.

Note: Regular expressions are a well-established technique that uses a sequence of characters to define a search pattern. For more information, see Wikipedia, as well one of the many sites that provide examples, such as regular-expressions.info, and others that analyze the expressions you create.

FLAGS

The characters `gis`, when one or more are added to the expression with no separator, represent:

- `g` global, replace more than first match (the default)
- `i` ignore case
- `s` match line terminator ("newline") characters in a string, which it would not match otherwise. See https://developer.mozilla.org/en-US/docs/Web/JavaScript/Reference/Global_Objects/RegExp/dotAll.

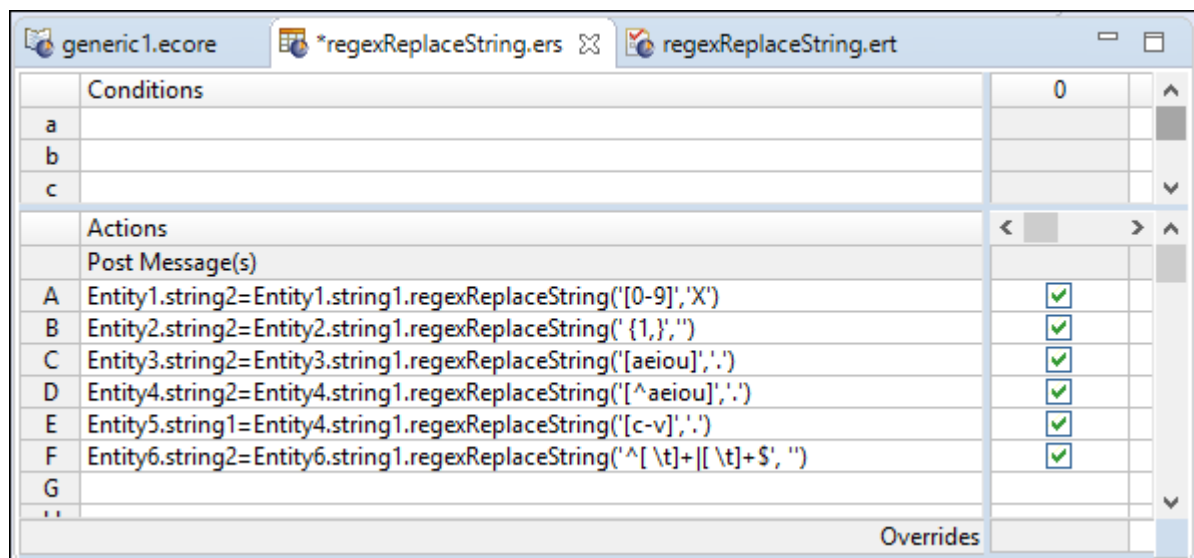
USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `regexReplaceString` in non-conditional actions as follows:

- `regexReplaceString("[0-9]", "X")`
- `regexReplaceString(" {2,}", " ")`: Replace all instances of digits with the character `X` - Replace all instances of multiple spaces with a single space
- `regexReplaceString("[aeiou]", ".")` - Replace all vowels with a dot.
- `regexReplaceString("[^aeiou]", ".")` - Replace all non-vowel characters with a dot.
- `regexReplaceString("[c-v]", ".")` - Replace each character in the range from `c` to `v` with a dot.
- `regexReplaceString('^[\t]+|[\t]+$','')` - Strip off leading and trailing spaces.



SAMPLE RULETEST

A sample Ruletest shows the `regexReplaceString` effect in output.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Amex 555-123456-85443] Entity2 [1] <ul style="list-style-type: none"> string1 [Spaced out text] Entity3 [1] <ul style="list-style-type: none"> string1 [abcdefghijklmnopqrstuvwxyz] Entity4 [1] <ul style="list-style-type: none"> string1 [abcdefghijklmnopqrstuvwxyz] Entity5 [1] <ul style="list-style-type: none"> string1 [abcdefghijklmnopqrstuvwxyz] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Amex 555-123456-85443] string2 [Amex XXX-XXXXXX-XXXXX] Entity2 [1] <ul style="list-style-type: none"> string1 [Spaced out text] string2 [Spaced out text] Entity3 [1] <ul style="list-style-type: none"> string1 [abcdefghijklmnopqrstuvwxyz] string2 [.bcd.fgh.jklmn.pqrst.vwxyz] Entity4 [1] <ul style="list-style-type: none"> string1 [abcdefghijklmnopqrstuvwxyz] string2 [a...e...i...o...u...] Entity5 [1] <ul style="list-style-type: none"> string1 [ab.....wxyz]

Remove element

SYNTAX

<Entity>.remove

<Collection>.remove

DESCRIPTION

Removes <Entity> or removes elements from <Collection> and deletes it/them. If removing from a collection, then using a unique alias to represent the collection is optional since **.remove** is not a collection operator. If any elements in <Collection> have one-to-many associations with other entities, then those entities will also be deleted.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exceptions: **.remove** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

EXAMPLE 1: Remove an element from a collection

RULESHEET 1

This Rulesheet uses the operator to remove elements from `collection1` whose `decimal1` value is greater than 5. Note the *optional* use of unique alias `collection1` to represent the collection of `Entity2` elements associated with `Entity1`.

Scope		Conditions		1	2
Entity1	a	collection1.decimal1 > 5.0		T	F
entity2 (Entity2) [collection1]	b				
decimal1	Actions		<		
Filters		Post Message(s)			
1	A	collection1.remove		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	B				
		Overrides			

Ref	ID	Post	Alias	Text
1				Remove an element from collection1 whose decimal1 value is greater than 5

RULETEST 1

A sample Ruletest provides a collection with two elements. The illustration shows Ruletest Input and Output panels

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [4.500000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.001000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.200000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [4.500000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.200000]

EXAMPLE 2: Remove an entity then promote its children

RULESHEET 2

This Rulesheet uses the operator with its (false) parameter to remove only the specified elements from Entity1.entity2 whose decimal1 value is greater than 5. Note no unique alias has been used to represent the collection of Entity2 elements associated with Entity1.

Scope		Conditions		1	2
Entity1	a	Entity1.entity2.decimal1 > 5		T	F
entity2 (Entity2)	b				
decimal1	Actions		<		
Filters		Post Message(s)			
1	A	Entity1.entity2.remove(false)		<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	B				
		Overrides			

Ref	ID	Post	Alias	Text
1				Remove any element from the collection whose decimal1 value is greater than 5.

RULETEST 2

A sample Ruletest provides an `Entity1` with two `entity2`, each of which has an `entity3` child of its own. The illustration shows Ruletest Input and Output panels. Note that when an `entity2` is removed, its associated `entity3` is promoted to root level.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> ▼ entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.000000] ▼ entity3 (Entity3) [1] <ul style="list-style-type: none"> string1 [A] ▼ entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [6.000000] ▼ entity3 (Entity3) [2] <ul style="list-style-type: none"> string1 [B] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> ▼ entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.000000] ▼ entity3 (Entity3) [1] <ul style="list-style-type: none"> string1 [A] ▼ Entity3 [2] <ul style="list-style-type: none"> string1 [B]

Replace elements

SYNTAX

<Collection1> = <Collection2>

<Collection> = <Entity>

DESCRIPTION

Replaces all elements in <Collection1> with the elements in <Collection2>, provided the association between the two is permitted by the Business Vocabulary. In the second syntax, <Entity> is associated with <Collection>, replacing the <Entity> already associated, when the association between the two is “one-to-one” in the Business Vocabulary. All collections must be expressed as unique aliases.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) does not apply. Special exceptions: **replace elements** may only be used in Action Rows (section 5 in [Sections of Rulesheet that correlate with usage restrictions](#)).

RULESHEET EXAMPLE

This sample Rulesheet uses the **replace element** operator to add `Entity3` to `collection1` if its `boolean1` value is `true`. Note the use of unique alias `collection1` to represent the collection of `Entity3` elements associated with `Entity2`. The association between `Entity2` and `Entity3` has a cardinality of “one-to-one”. If multiple `Entity3` are present, only one will be added to `collection1`.

ReplaceElement.ers

Scope	Conditions	1	2
Entity2	a Entity3.boolean1	T	F
entity3 (Entity3) [collection1]	b		
Entity3	c		

Filters	Actions	1	2
1	A collection1 = Entity3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	B		
Overrides			

Ref	ID	Post	Alias	Text
1				If boolean1 value of Entity3 is true, then add the element to collection1
2				If boolean1 value of Entity3 is false, then take no action

SAMPLE TEST

Three sample tests provide scenarios of two elements which share a one-to-one association. Input and Output panels are illustrated below:

Input	Output
<ul style="list-style-type: none"> Entity2 [1] <ul style="list-style-type: none"> entity3 (Entity3) [1] <ul style="list-style-type: none"> boolean1 [false] Entity3 [2] <ul style="list-style-type: none"> boolean1 [true] 	<ul style="list-style-type: none"> Entity2 [1] <ul style="list-style-type: none"> entity3 (Entity3) [2] <ul style="list-style-type: none"> boolean1 [true] Entity3 [1] <ul style="list-style-type: none"> boolean1 [false]

Input	Output
<ul style="list-style-type: none"> Entity2 [1] Entity3 [1] <ul style="list-style-type: none"> boolean1 [true] 	<ul style="list-style-type: none"> Entity2 [1] <ul style="list-style-type: none"> entity3 (Entity3) [1] <ul style="list-style-type: none"> boolean1 [true]

Input	Output
<ul style="list-style-type: none"> Entity2 [1] Entity3 [1] <ul style="list-style-type: none"> boolean1 [false] 	<ul style="list-style-type: none"> Entity2 [1] Entity3 [1] <ul style="list-style-type: none"> boolean1 [false]

Replace String

SYNTAX

```
<String>.replaceString(stringToBeReplaced,replacementString)
```

DESCRIPTION

Returns a new string where the instances of the String to be replaced are replaced by the value of the replacement String.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `replaceString` in non-conditional actions.

replaceString.ers		0	1
Conditions			
a			
b			
c			
Actions		<	
Post Message(s)			
A	Entity1.string2 = Entity1.string1.replaceString('red', 'blue')	<input checked="" type="checkbox"/>	
B	Entity2.string2 = Entity3.string1.replaceString('red', 'dark blue')	<input checked="" type="checkbox"/>	
C	Entity3.string2 = Entity3.string1.replaceString('dark blue', 'red')	<input checked="" type="checkbox"/>	
Overrides			
Rule Statements			
Ref	ID	Post	Text
A0			Instances of 'red' in string2 of Entity1 are replaced with 'blue'
B0			Instances of 'red' in string2 of Entity2 are replaced with 'dark blue'
C0			Instances of 'dark blue' in string2 of Entity3 are replaced with 'red'

SAMPLE RULETEST

A sample Ruletest shows the `replaceString` effect in output.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [a red balloon] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 [a red balloon] ▼ Entity3 [1] <ul style="list-style-type: none"> string1 [a dark blue balloon] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [a red balloon] string2 [a blue balloon] ▼ Entity2 [1] <ul style="list-style-type: none"> string1 [a red balloon] string2 [a dark blue balloon] ▼ Entity3 [1] <ul style="list-style-type: none"> string1 [a dark blue balloon] string2 [a red balloon]

Round

SYNTAX

<Decimal>.round

<Decimal>.round(<Integer>)

<Decimal>.round(<Integer>, roundingMode: <Integer>)

DESCRIPTION

- When <Integer> is not provided, <Decimal> is rounded to the nearest whole number of type Decimal.
- When <Integer> is provided, <Decimal> is rounded to the number of decimal places specified by <Integer>. Standard rounding conventions apply, meaning numbers ending with significant digits of 5 or more round up and numbers ending with significant digits less than 5 round down.
- When <Integer> and roundingMode: <Integer> are provided, then <Decimal> is rounded to the number of decimal places specified by the mode:
 - 0 - Rounds away from zero
 - 1 - Rounds towards zero
 - 2 - Rounds towards Infinity
 - 3 - Rounds towards -Infinity
 - 4 - Rounds towards nearest neighbor; if equidistant, rounds away from zero
 - 5 - Rounds towards nearest neighbor; if equidistant, rounds towards zero
 - 6 - Rounds towards nearest neighbor; if equidistant, rounds towards even neighbor
 - 7 - Rounds towards nearest neighbor; if equidistant, rounds towards Infinity
 - 8 - Rounds towards nearest neighbor; if equidistant, rounds towards -Infinity

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.round` to round the value of `decimal2` to the second decimal place, and assigns it to `decimal1`.

The screenshot shows a rulesheet editor with the following components:

- Conditions:** A table with columns 'a' and 'b', and a value '0' in the right-hand column.
- Actions:** A table with columns 'A' and 'B', and a checkmark in the right-hand column.
- Post Message(s):** A table with a checkmark in the right-hand column.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. The text for rule A0 is "decimal1 is assigned the value of decimal2 rounded to two decimal places".

SAMPLE TEST

A sample Ruletest provides results for five examples of `decimal2`.

Input	Output
Entity1 [1] decimal2 [1550.785000]	Entity1 [1] decimal1 [1550.790000] decimal2 [1550.785000]
Entity1 [2] decimal2 [2200.986000]	Entity1 [2] decimal1 [2200.990000] decimal2 [2200.986000]
Entity1 [3] decimal2 [-500.990000]	Entity1 [3] decimal1 [-500.990000] decimal2 [-500.990000]
Entity1 [4] decimal2 [-5.123000]	Entity1 [4] decimal1 [-5.120000] decimal2 [-5.123000]
Entity1 [5] decimal2 [12.345600]	Entity1 [5] decimal1 [12.350000] decimal2 [12.345600]

SAMPLES OF ROUNDING USING DIFFERENT MODES

0 (ROUND UP) Rounds away from zero

10.123 -> 10.13

1 (ROUND DOWN) Rounds towards zero

10.123 -> 10.12

2 (ROUND CEIL) 2 Rounds towards Infinity

10.123 -> 10.13

3 (ROUND_FLOOR) Rounds towards -Infinity

```
10.123 -> 10.12
```

4 (ROUND_HALF_UP) Rounds towards nearest neighbor. If equidistant, rounds away from zero

```
10.123 -> 10.12
10.126 -> 10.13
10.125 -> 10.13
```

5 (ROUND_HALF_DOWN) Rounds towards nearest neighbor. If equidistant, rounds towards zero

```
10.123 -> 10.12
10.126 -> 10.13
10.125 -> 10.12
```

6 (ROUND_HALF_EVEN) Rounds towards nearest neighbor. If equidistant, rounds towards even neighbor

See *Round to Even (Banker's Rounding)* <https://www.mathsisfun.com/numbers/rounding-methods.html> and <https://en.wikipedia.org/wiki/Rounding>

```
8.123 -> 8.12
9.126 -> 9.13
// variation from other modes: go to nearest even number
10.125 -> 10.12
11.135 -> 11.14
```

7 (ROUND_HALF_CEIL) Rounds towards nearest neighbor. If equidistant, rounds towards Infinity

```
9.123 -> 9.12
10.126 -> 10.1
11.125 -> 11.13
```

8 (ROUND_HALF_FLOOR) Rounds towards nearest neighbor. If equidistant, rounds towards -Infinity

```
9.123 -> 9.12
10.126 -> 10.13
11.125 -> 11.12
```

Second

SYNTAX

```
<DateTime>.sec
```

DESCRIPTION

Returns the seconds portion of <DateTime>. The returned value is an Integer between 0 and 59.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses the `.sec` function to evaluate `dateTime1`, return the seconds value, and assign it to `integer1`.

The screenshot shows the configuration for a rule named 'Seconds between' in the Second.ers IDE. The interface is divided into several sections:

- Scope:** A tree view showing 'Entity1' with sub-elements 'dateTime1', 'dateTime2', 'integer1', and 'integer2'.
- Filters:** A list of filters numbered 1 and 2.
- Conditions:** A table with three rows labeled 'a', 'b', and 'c', currently empty.
- Actions:** A section for 'Post Message(s)' containing three actions:
 - A: Entity1.integer1 = Entity1.dateTime1.sec (checked)
 - B: Entity1.integer2 = Entity1.dateTime2.sec (checked)
 - C: (empty)
- Overrides:** A section for overriding the rule.
- Rule Statements:** A table listing rule statements:

Ref	ID	Post	Alias	Text
A0				integer1 is equal to the seconds portion of dateTime1
B0				integer2 is equal to the seconds portion of dateTime2

SAMPLE TEST

A sample Ruletest provides results for two examples of dateTime1.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/5/1955 12:34:56] dateTime2 [9/5/2020 06:07:08] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/5/1955 01:02:03] dateTime2 [9/5/2020 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [12/5/2025 23:59:59] dateTime2 [3/5/2015 01:02:03] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1955-05-05T12:34:56-0400] dateTime2 [2020-09-05T06:07:08-0400] integer1 [56] integer2 [8] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1955-11-05T00:02:03-0500] dateTime2 [2020-09-05T00:00:00-0400] integer1 [3] integer2 [0] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-12-05T23:59:59-0500] dateTime2 [2015-03-05T01:02:03-0500] integer1 [59] integer2 [3]

Seconds between

SYNTAX

```
<DateTime1>.secsBetween(<DateTime2>)
```

DESCRIPTION

Returns the Integer number of seconds between DateTimes. The number of milliseconds in <DateTime1> is subtracted from that in <DateTime2>, and the result divided by 1000 (the number of milliseconds in a second). The result is truncated. This function returns a positive number if <DateTime2> is later than <DateTime1>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.secsBetween** to determine the number of seconds that have elapsed between `dateTime1` and `dateTime2`, compare it to the Values set, and assign a value to `string1`.

The screenshot shows a rulesheet editor with two tabs: "SecondsBetween.ers" and "Rule Statements".

SecondsBetween.ers

Conditions		1	2
a	Entity1.dateTime1.secsBetween(Entity1.dateTime2)	<= 60	> 60
b			

Actions

Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			

Overrides

Rule Statements

Ref	ID	Post	Alias	Text
1				If 60 or fewer seconds have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is Not Overdue
2				If more than 60 seconds have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is Overdue

SAMPLE TEST

A sample Ruletest provides `dateTime1` and `dateTime2` for three examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [5/5/1955 12:34:56] dateTime2 [9/5/2015 06:07:08] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/5/1955 01:02:03] dateTime2 [9/5/2015 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [12/5/2025 23:59:59] dateTime2 [3/5/2015 01:02:03] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1955-05-05T12:34:56-0400] dateTime2 [2015-09-05T06:07:08-0400] string1 [Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1955-11-05T00:02:03-0500] dateTime2 [2015-09-05T00:00:00-0400] string1 [Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2025-12-05T23:59:59-0500] dateTime2 [2015-03-05T01:02:03-0500] string1 [Not Overdue]

Size of collection

SYNTAX

<Collection> ->size

DESCRIPTION

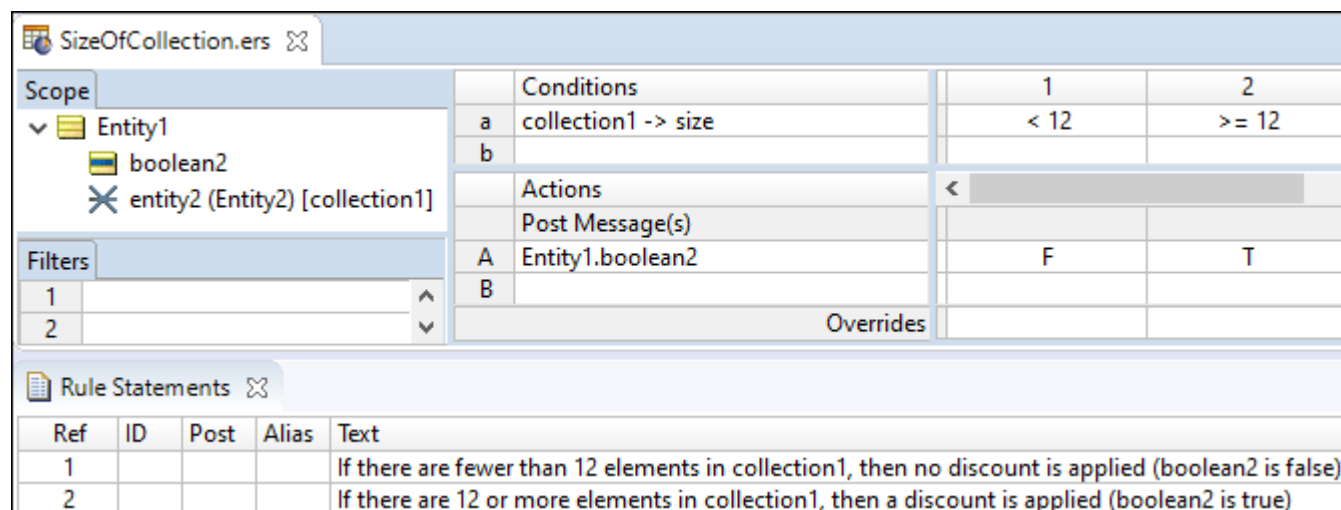
Returns the Integer number of elements in <Collection>. <Collection> must be expressed as a unique alias.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **->size** to count the number of elements in `collection1`, and assign a value to `boolean2`. Note the use of unique alias `collection1` to represent the collection of `Entity2` associated with `Entity1`.



The screenshot shows a rulesheet editor window titled "SizeOfCollection.ers". It features a "Scope" panel on the left with a tree view containing "Entity1", "boolean2", and "entity2 (Entity2) [collection1]". Below the scope is a "Filters" panel with two filter slots. The main area is a table with columns for "Conditions", "1", and "2".

Conditions	1	2
a collection1 -> size	< 12	>= 12
b		
Actions		
Post Message(s)		
A Entity1.boolean2	F	T
B		
Overrides		

Below the table is a "Rule Statements" panel with a table:

Ref	ID	Post	Alias	Text
1				If there are fewer than 12 elements in collection1, then no discount is applied (boolean2 is false)
2				If there are 12 or more elements in collection1, then a discount is applied (boolean2 is true)

SAMPLE TEST

A sample Ruletest provides three examples of `collection1`. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> ◇ entity2 (Entity2) [1] ◇ entity2 (Entity2) [2] ◇ entity2 (Entity2) [3] ◇ entity2 (Entity2) [4] ◇ entity2 (Entity2) [5] ◇ entity2 (Entity2) [6] ◇ entity2 (Entity2) [7] ◇ entity2 (Entity2) [8] ◇ entity2 (Entity2) [9] ◇ entity2 (Entity2) [10] ▼ Entity1 [2] <ul style="list-style-type: none"> ◇ entity2 (Entity2) [11] ◇ entity2 (Entity2) [12] ◇ entity2 (Entity2) [13] ◇ entity2 (Entity2) [14] ◇ entity2 (Entity2) [15] ◇ entity2 (Entity2) [16] ◇ entity2 (Entity2) [17] ◇ entity2 (Entity2) [18] ◇ entity2 (Entity2) [19] ◇ entity2 (Entity2) [20] ◇ entity2 (Entity2) [21] ◇ entity2 (Entity2) [22] ◇ entity2 (Entity2) [23] ◇ entity2 (Entity2) [24] ◇ entity2 (Entity2) [25] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> boolean2 [false] ◇ entity2 (Entity2) [1] ◇ entity2 (Entity2) [2] ◇ entity2 (Entity2) [3] ◇ entity2 (Entity2) [4] ◇ entity2 (Entity2) [5] ◇ entity2 (Entity2) [6] ◇ entity2 (Entity2) [7] ◇ entity2 (Entity2) [8] ◇ entity2 (Entity2) [9] ◇ entity2 (Entity2) [10] ▼ Entity1 [2] <ul style="list-style-type: none"> boolean2 [true] ◇ entity2 (Entity2) [11] ◇ entity2 (Entity2) [12] ◇ entity2 (Entity2) [13] ◇ entity2 (Entity2) [14] ◇ entity2 (Entity2) [15] ◇ entity2 (Entity2) [16] ◇ entity2 (Entity2) [17] ◇ entity2 (Entity2) [18] ◇ entity2 (Entity2) [19] ◇ entity2 (Entity2) [20] ◇ entity2 (Entity2) [21] ◇ entity2 (Entity2) [22] ◇ entity2 (Entity2) [23] ◇ entity2 (Entity2) [24] ◇ entity2 (Entity2) [25]

Size of string

SYNTAX

`<String>.size`

DESCRIPTION

Returns the Integer number of characters in `<String>`. All characters, numbers, symbols, and punctuation marks are counted, including spaces before, within, and after words.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses the `.size` function to determine the length of `string1` and assign it to `integer1`

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.integer1 = Entity1.string1.size	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				integer1 equals the number of characters in string1

SAMPLE TEST

A sample Ruletest provides three examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [goodbye] Entity1 [2] <ul style="list-style-type: none"> string1 [hello!] Entity1 [3] <ul style="list-style-type: none"> string1 [next week] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [7] string1 [goodbye] Entity1 [2] <ul style="list-style-type: none"> integer1 [6] string1 [hello!] Entity1 [3] <ul style="list-style-type: none"> integer1 [9] string1 [next week]

Sorted by

SYNTAX

```
<Collection> ->sortedBy(<Attribute2>) -> sequence operator .<Attribute1>
```

DESCRIPTION

Sequences the elements of `<Collection>` in ascending order, using the value of `<Attribute2>` as the index, and returns the `<Attribute1>` value of the element in the sequence position determined by the sequence operator. A sequence must be created before any sequence operator (`->first`, `->last`, or `->at`) is used to identify a particular element. `<Attribute1>` and `<Attribute2>` must be attributes of `<Collection>`.

`<Attribute2>` may be any data type except Boolean. Strings are sorted according to character precedence. `<Collection>` must be expressed as a unique alias.

See "*Advanced collection sorting syntax*" in the Rule Modeling Guide for more examples of usage.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE 1 - USED IN A CONDITION

This sample Rulesheet uses `->sortedBy` in a conditional expression to create an ascending sequence from collection with `decimal1` as the index. `->first.string1` is used to return the value of the `string1` attribute of the first element of the sequence. If the value of `string1` is `Joe`, then `boolean1` attribute of `Entity1` is assigned the value of `true`.

The screenshot shows a rulesheet editor with the following components:

- Scope:** A tree view showing `Entity1` containing `boolean1`, `entity2 (Entity2) [collection1]` (with a red 'X' icon), `decimal1`, and `string1`.
- Filters:** A table with two rows, numbered 1 and 2.
- Conditions:** A table with two columns (1 and 2) and two rows (a and b). Row 'a' contains the expression `collection1 -> sortedBy (decimal1) -> first.string1`.
- Actions:** A table with two columns (1 and 2) and three rows (A, B, C). Row 'A' contains `Entity1.boolean1` with values 'T' and 'F' in columns 1 and 2 respectively.
- Overrides:** A table with two columns (1 and 2) and one row (C).
- Rule Statements:** A table with columns Ref, ID, Post, Alias, and Text. Row 1: `If the string1 value of the first element in collection1, sequenced in ascending order by decimal1, is equal to Joe, then boolean1 = true`. Row 2: `If the string1 value of the first element in collection1, sequenced in ascending order by decimal1, is not equal to Joe, then boolean1 = false`.

SAMPLE RULETEST 1

A sample Ruletest provides a collection of three elements, each with a `decimal1` and `string1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue]

RULESHEET EXAMPLE 2 – USED IN AN ACTION

This sample Rulesheet uses `->sortedBy` in an action expression to create an ascending sequence from collection with `decimal1` as the index. `->first.string1` is used to return the value of the `string1` attribute of the first element of the sequence. The value of `string1` is assigned the value of `Joe` if `boolean1` attribute of `Entity1` is true, if false it is assigned the value of `Mary`.

Scope		Conditions		1	2
a	Entity1.boolean1			T	F
b					
Actions		Post Message(s)			
A	collection1 -> sortedBy (decimal1) -> first.string1			'Joe'	'Mary'
B					
		Overrides			

Ref	ID	Post	Alias	Text
1				If Entity1.boolean1 is true, string1 value in the first element of collection1, sequenced in ascending order by decimal1, is equal to Joe
2				If Entity1.boolean1 is false, string1 value in the first element of collection1, sequenced in ascending order by decimal1, is equal to Mary

SAMPLE RULETEST 2

A sample Ruletest provides a collection of three elements, each with a `decimal1` and `string1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [8.500000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [8.500000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Mary]

Sorted by descending

SYNTAX

`<Collection> ->sortedByDesc(<Attribute2>) -> sequence operator.<Attribute1>`

DESCRIPTION

Sequences the elements of <Collection> in descending order, using the value of <Attribute2> as the index, and returns the <Attribute1> value of the element in the sequence position determined by the sequence operator. A sequence must be created before any sequence operator (`->first`, `->last`, or `->at`) is used to identify a particular element. <Attribute1> and <Attribute2> must be attributes of <Collection>.

<Attribute2> may be any data type except Boolean. Strings are sorted according to their ISO character precedence. <Collection> must be expressed as a unique alias.

See *"Advanced collection sorting syntax"* in the Rule Modeling Guide for more examples of usage.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE 1 - USED IN A CONDITION

This sample Rulesheet uses `->sortedByDesc` in a conditional expression to create an descending sequence from `collection1` with `decimal1` as the index. `->first.string1` is used to return the value of the `string1` attribute of the first element of the sequence. If the value of `string1` is `Joe`, then `boolean1` attribute of `Entity1` is assigned the value of `true`.

The screenshot shows a Rulesheet Editor window titled 'SortedByDescending.ers'. The interface is divided into several sections:

- Scope:** A tree view showing the rule's scope. It includes 'Entity1' with sub-elements 'boolean1', 'entity2 (Entity2) [collection1]', 'decimal1', and 'string1'.
- Filters:** A list of filters numbered 1 and 2.
- Conditions and Actions Table:**

	Conditions	1	2
a	collection1 -> sortedByDesc (decimal1) -> first.string1	'Joe'	not 'Joe'
b			
Actions		<	
Post Message(s)			
A	Entity1.boolean1	T	F
B			
C			
Overrides			
- Rule Statements Table:**

Ref	ID	Post	Alias	Text
1				If Entity1.boolean1 is true, string1 value in the first element of collection1, sequenced in descending order by decimal1, is equal to Joe
2				If Entity1.boolean1 is false, string1 value in the first element of collection1, sequenced in descending order by decimal1, is equal to Mary

SAMPLE RULETEST 1

A sample Ruletest provides a collection of three elements, each with a `decimal1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] <ul style="list-style-type: none"> entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] string1 [Joe] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Mary] entity2 (Entity2) [4] <ul style="list-style-type: none"> decimal1 [3.300000] string1 [Sue]

RULESHEET EXAMPLE 2 – USED IN AN ACTION

This sample Rulesheet uses `sortedByDesc` in an action expression to create a descending sequence from collection with `decimal1` as the index. `->first.string1` is used to return the value of the `string1` attribute of the first element of the sequence. The value of `string1` is assigned the value of `Joe` if `boolean1` attribute of `Entity1` is true, if false it is assigned the value of `Mary`.

SortByDescending2.ers

Scope	Conditions	1	2
Entity1	a Entity1.boolean1	T	F
	b		
entity2 (Entity2) [collection1]	Actions		
	Post Message(s)		
	A collection1 -> sortedByDesc(decimal1) -> first.string1	'Joe'	'Mary'
	B		
	Overrides		

Rule Statements

Ref	ID	Post	Alias	Text
1				If Entity1.boolean1 is true, string1 value in the first element of collection1, sequenced in descending order by decimal1, is equal to Joe
2				If Entity1.boolean1 is false, string1 value in the first element of collection1, sequenced in descending order by decimal1, is equal to Mary

SAMPLE RULETEST 2

A sample Ruletest provides a collection of three elements, each with a `decimal1` value. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] entity2 (Entity2) [1] <ul style="list-style-type: none"> decimal1 [2.500000] entity2 (Entity2) [2] <ul style="list-style-type: none"> decimal1 [5.800000] string1 [Joe] entity2 (Entity2) [3] <ul style="list-style-type: none"> decimal1 [3.300000]

Starts with

SYNTAX

`<String1>.startsWith(<String2>)`

DESCRIPTION

Returns a value of true if `<String1>` begins with the characters specified in `<String2>`. Comparisons are case-sensitive.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.startsWith` to evaluate whether `string1` begins with the value of `string2` and assigns a different value to `boolean1` for each outcome.

StartsWith.ers				
Conditions		0	1	2
a	Entity1.string1.startsWith(string2)		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1		T	F
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If string1 starts with string2, then boolean1 is true
2				If string1 does not start with string2, then boolean1 is false

SAMPLE TEST

A sample Ruletest provides `string1` and `string2` values for four examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [Strongsville] string2 [happy] Entity1 [2] <ul style="list-style-type: none"> string1 [New York] string2 [New] Entity1 [3] <ul style="list-style-type: none"> string1 [Amityville] string2 [A] Entity1 [4] <ul style="list-style-type: none"> string1 [Amityville] string2 [ami] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [false] string1 [Strongsville] string2 [happy] Entity1 [2] <ul style="list-style-type: none"> boolean1 [true] string1 [New York] string2 [New] Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] string1 [Amityville] string2 [A] Entity1 [4] <ul style="list-style-type: none"> boolean1 [false] string1 [Amityville] string2 [ami]

Substring

SYNTAX

```
<String>.substring( <Integer1>, <Integer2>)
```

DESCRIPTION

Returns the portion of `<String>` beginning with the character in position `<Integer1>` and ending with the character in position `<Integer2>`. The number of characters in `<String>` must be at least equal to `<Integer2>`, otherwise an error will be produced. Both `<Integer1>` and `<Integer2>` must be positive integers, and `<Integer2>` must be greater than `<Integer1>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.substring` to return those characters of `string1` between positions 4 and 7 (inclusive), and assign the resulting value to `string2`.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.string2 = Entity1.string1.substring(4,7)	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				string2 equals the portion of string1 delimited by the 4th and 7th character positions

SAMPLE RULETEST

A sample Ruletest provides `string1` values for four examples. Input and Output panels are shown below.

Input	Output	Expected
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [howitzer] Entity1 [2] <ul style="list-style-type: none"> string1 [superSize] Entity1 [3] <ul style="list-style-type: none"> string1 [piglets] Entity1 [4] <ul style="list-style-type: none"> string1 [cowardice] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [howitzer] string2 [itze] Entity1 [2] <ul style="list-style-type: none"> string1 [superSize] string2 [erSi] Entity1 [3] <ul style="list-style-type: none"> string1 [piglets] string2 [lets] Entity1 [4] <ul style="list-style-type: none"> string1 [cowardice] string2 [ardi] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [howitzer] string2 [itze] Entity1 [2] <ul style="list-style-type: none"> string1 [superSize] string2 [erSi] Entity1 [3] <ul style="list-style-type: none"> string1 [piglets] string2 [lets] Entity1 [4] <ul style="list-style-type: none"> string1 [cowardice] string2 [ardi]

Subtract

SYNTAX

<Number1> - <Number2>

DESCRIPTION

Subtracts the value of <Number2> from that of <Number1>. The resulting data type is the more expansive of those of <Number1> and <Number2>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **subtract** to reduce the value of decimal1 by decimal2, compare the resulting value to zero, and assign a value to boolean1

Subtract.ers				
Conditions		0	1	2
a	Entity1.decimal1 - Entity1.decimal2 > 0		T	F
b				
Actions		<		
Post Message(s)				
A	Entity1.boolean1		T	F
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				decimal1 is greater than decimal2
2				decimal2 is greater than decimal1

SAMPLE TEST

A Ruletest provides three examples of decimal1 and decimal2. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [23.000000] decimal2 [7.200000] Entity1 [2] <ul style="list-style-type: none"> decimal1 [10.300000] decimal2 [41.670000] Entity1 [3] <ul style="list-style-type: none"> decimal1 [-4.560000] decimal2 [-8.120000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal1 [23.000000] decimal2 [7.200000] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] decimal1 [10.300000] decimal2 [41.670000] Entity1 [3] <ul style="list-style-type: none"> boolean1 [true] decimal1 [-4.560000] decimal2 [-8.120000]

Sum

SYNTAX

<Collection.attribute> ->sum

DESCRIPTION

Sums the values of the specified <attribute> for all elements in <Collection>. <attribute> must be a numeric data type. <Collection> must be expressed as a unique alias.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This Rulesheet uses the `->sum` function to add all `decimal1` attributes within `collection1`. Note the use of unique alias `collection1` to represent the collection of `Entity2` associated with `Entity1`

The screenshot shows the 'Sum.ers' rule editor. The 'Scope' panel shows a tree structure: Entity1 (expanded) -> entity2 (Entity2) [collection1] (expanded) -> decimal1. The 'Conditions' table has two rows: 'a' with 'collection1.decimal1 -> sum' and 'b' with an empty cell. The 'Actions' table has a 'Post Message(s)' row with two checkboxes, both checked. Below are sections for 'Filters', 'Rule Statements', and 'Overrides'.

Conditions		1	2
a	collection1.decimal1 -> sum	< 9	>= 9
b			

Actions		1	2
Post Message(s)		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A			
B			

Ref	ID	Post	Alias	Text
1		Info	Entity1	If the sum of decimal1 in collection1 is less than 9, then post an info message
2		Warning	Entity1	If the sum of decimal1 in collection1 is greater than or equal to 9, then post a warning message

SAMPLE TEST

A sample Ruletest provides 3 elements in `collection1`. Input and Output panels are shown below.

The screenshot shows the 'Ruletest' interface. The 'Input' panel shows a tree structure: Entity1 [1] (expanded) -> entity2 (Entity2) [1] (expanded) -> decimal1 [1.200000]; entity2 (Entity2) [2] (expanded) -> decimal1 [2.700000]; entity2 (Entity2) [3] (expanded) -> decimal1 [3.500000]. The 'Output' panel shows the same tree structure. Below are sections for 'Rule Statements', 'Rule Messages', and a message log table.

Severity	Message	Entity
Info	If the sum of decimal1 in collection1 is less than 9, then post an info message	Entity1[1]

Today

SYNTAX

today

DESCRIPTION

Returns the current system date when the rule is executed. This Date Only value is assigned the first time **today** is used in a Decision Service, then remains constant until the Decision Service finishes execution, regardless of how many additional times it is used. This means that every rule in a Rule Set using **today** will use the same Date Only value. No time portion is assigned

USAGE RESTRICTIONS

The Literals row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **today** to determine how many days have elapsed between today and `dateTime1`, and assign a value to `string1` based on the result.

today.ers		0	1	2	3
Conditions					
a	Entity1.dateOnly1.daysBetween(today)<5		T	F	
b					
c					
Actions		<			
Post Message(s)					
A	Entity1.string1		'under 5 days'	'5 days or more'	
B					
C					
Overrides					

Ref	ID	Post	Alias	Text
1				If dateOnly1 occurred less than 5 days ago, assign string1 a value of 'under 5 days'
2				If dateOnly1 occurred 5 or more days ago, assign string1 a value of '5 days or more'

SAMPLE TEST

A sample Ruletest provides three examples of `dateOnly1`. Assume **today** is equal to August 9, 2020. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 [8/5/2020] Entity1 [2] <ul style="list-style-type: none"> dateOnly1 [7/15/2020] Entity1 [3] <ul style="list-style-type: none"> dateOnly1 [8/8/20] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 [8/5/2020] string1 [under 5 days] Entity1 [2] <ul style="list-style-type: none"> dateOnly1 [7/15/2020] string1 [5 days or more] Entity1 [3] <ul style="list-style-type: none"> dateOnly1 [8/8/20] string1 [under 5 days]

To dateTime

SYNTAX

<String>.toDateTime

DESCRIPTION

Converts the value in <String> to data type DateTime ONLY if date is an ISO8601 string or millisecs since epoch as a string. An invalid casting results in a null.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.toDateTime** to convert `string1` to type DateTime and assign the value to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.dateTime1 = Entity1.string1.toDateTime	<input checked="" type="checkbox"/>	
B			
Overrides			
Rule Statements			
Ref	ID	Post	Text
A0			dateTime1 is equal to string1 converted to a dateTime data type

SAMPLE TEST

/Generic.js/toDateTime.ers	
Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [2022-01-26] Entity1 [2] <ul style="list-style-type: none"> string1 [1643223712000] Entity1 [3] <ul style="list-style-type: none"> string1 [1/26/2022] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2022-01-26T00:00:00-0500] string1 [2022-01-26] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2022-01-26T14:01:52-0500] string1 [1643223712000] Entity1 [3] <ul style="list-style-type: none"> dateTime1 string1 [1/26/2022]

To date Casting a dateTime to a date

SYNTAX

<DateTime>.toDate

DESCRIPTION

Converts the value in <DateTime> to a Date datatype, containing only the date portion of the DateTime. If <DateTime> contains no date information, then the system epoch is used.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.toDate** to convert dateTime1 and DateTime2 to Date datatypes and assign the values to dateTime1 and dateTime2.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.dateOnly1 = Entity1.dateTime1.toDate	<input checked="" type="checkbox"/>
B	Entity1.dateOnly2 = Entity1.dateTime2.toDate	<input checked="" type="checkbox"/>
Overrides		

Ref	ID	Post	Alias	Text
A0				dateOnly1 is equal to the date value of dateTime1, if it has one
B0				dateOnly2 is equal to the date value of dateTime2

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 dateOnly2 dateTime1 [1/1/2022 3:45:00 AM EST] dateTime2 [April 10, 2024 2:29:00 AM EDT] Entity1 [2] <ul style="list-style-type: none"> dateOnly1 dateOnly2 dateTime1 [4/10/2024 3:45:00 AM EST] dateTime2 [4/10/2024 20:00:00 PST] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 [1/1/2022] dateOnly2 [April 10, 2024] dateTime1 [1/1/2022 3:45:00 AM EST] dateTime2 [April 10, 2024 2:29:00 AM EDT] Entity1 [2] <ul style="list-style-type: none"> dateOnly1 [4/10/2024] dateOnly2 [4/10/2024] dateTime1 [4/10/2024 3:45:00 AM EST] dateTime2 [4/10/2024 20:00:00 PST]

To dateTime Casting a string to a dateTime

SYNTAX

<String>.toDate

DESCRIPTION

Converts the value in <String> to data type Date ONLY if all characters in <String> correspond to a valid Date, Time, or Date/Time mask (format). For complete details on Date/Time masks, see *Rule Modeling Guide*.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.toDateTime` to convert `string1` to type `DateTime` and assign the value to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.dateTime1 = Entity1.string1.toDateTime	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				dateTime1 is equal to string1 converted to a dateTime data type

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [12/31/2021] Entity1 [2] <ul style="list-style-type: none"> string1 [January 29, 2022] Entity1 [3] <ul style="list-style-type: none"> string1 [Thursday, June 2, 2022 1:00:00 PM PDT] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [12/31/2021 12:00:00 AM] string1 [12/31/2021] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [January 29, 2022 12:00:00 AM] string1 [January 29, 2022] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [Thursday, June 2, 2022 1:00:00 PM PDT] string1 [Thursday, June 2, 2022 1:00:00 PM PDT]

To dateTime Casting a date to a dateTime

SYNTAX

<Date>.toDateTime

DESCRIPTION

Converts the value in <Date> to data type `DateTime`. The date portion is the same as the <Date> value and the time portion is set to `00:00:00 AM` in the current timezone.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.toDateTIme` to convert `dateOnly1` to type `DateTime` and assign the value to `dateTime1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.dateTime1 = Entity1.dateOnly1.toDateTIme	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				dateTime1 is equal to the date portion of dateOnly1 plus 12 AM

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 [April 10, 2016] dateTime1 Entity1 [2] <ul style="list-style-type: none"> dateOnly1 [2/3/2020] dateTime1 Entity1 [3] <ul style="list-style-type: none"> dateOnly1 [November 20, 1980] dateTime1 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateOnly1 [April 10, 2016] dateTime1 [April 10, 2016 12:00:00 AM] Entity1 [2] <ul style="list-style-type: none"> dateOnly1 [2/3/2020] dateTime1 [2/3/2020 12:00:00 AM] Entity1 [3] <ul style="list-style-type: none"> dateOnly1 [November 20, 1980] dateTime1 [November 20, 1980 12:00:00 AM]

To dateTime TimeZone offset

SYNTAX

```
<Date>.toDateTIme(<String>)
```

DESCRIPTION

Converts the value in `<Date>` to data type `DateTime` ONLY if all characters in `<Date>` correspond to a valid `DateTime` mask (format). The date portion is the same as the `<Date>` value and the time portion is set to `00:00:00` in the timezone specified by `<String>`, which is the `timeZoneOffset`. The `timeZoneOffset` must take the form of a valid, signed timezone offset such as `'-08:00'`, `'+03:30'`, `'+01:45'`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.toDateTime` to convert `dateOnly1` to type `DateTime` and assign the value to `dateTime1`, with a timezone offset of `-01:45`.

The screenshot shows a Rulesheet editor with the following components:

- Conditions:** A table with columns 'a' and 'b', and a value '0' in the right column.
- Actions:** A table with columns 'A', 'B', 'C', and 'D', and a checked checkbox in the right column.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. The first row has 'A0' in 'Ref' and 'dateTime1 is the date converted to GMT using the timezone offset' in 'Text'.

Conditions		0
a		
b		

Actions		<
Post Message(s)		
A	Entity1.dateTime1 = Entity1.dateOnly1.toDateTime('-01:45')	<input checked="" type="checkbox"/>
B		
C		
D		

Ref	ID	Post	Alias	Text
A0				dateTime1 is the date converted to GMT using the timezone offset

SAMPLE TEST

The screenshot shows a sample test for the rule `Generic/toDateTimeTimezoneOffset.ers`. It displays the input and output for three entities.

Input	Output
Entity1 [1] dateOnly1 [1/1/2020]	Entity1 [1] dateOnly1 [1/1/2020] dateTime1 [1/1/2020 3:15:00 AM]
Entity1 [2] dateOnly1 [12/31/2025]	Entity1 [2] dateOnly1 [12/31/2025] dateTime1 [12/31/2025 3:15:00 AM]
Entity1 [3] dateOnly1 [6/19/2035]	Entity1 [3] dateOnly1 [6/19/2035] dateTime1 [6/19/2035 2:15:00 AM]

To decimal

SYNTAX

`<Integer>.toDecimal`

`<String>.toDecimal`

DESCRIPTION

Converts the value in `<Integer>` or all characters in `<String>` to data type Decimal. Converts a String to Decimal ONLY if all characters in `<String>` are numeric and contain not more than one decimal point. If any non-numeric characters are present in `<String>` (other than the single decimal point or a leading minus sign), no value is returned by the function.

Note: Integer values may be assigned directly to Decimal data types without using the `.toDecimal` operator because a Decimal data type is more expansive than an Integer.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.toDecimal` to convert `integer1` and `string1` to type Decimal and assign them to `decimal1` and `decimal2`, respectively.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.decimal1 = Entity1.integer1.toDecimal	<input checked="" type="checkbox"/>	
B	Entity1.decimal2 = Entity1.string1.toDecimal	<input checked="" type="checkbox"/>	
Overrides			

Ref	ID	Post	Alias	Text
A0				decimal1 is equal to the value of integer1 converted into a decimal data type
B0				decimal2 is equal to the value of string1 converted into a decimal data type

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> integer1 [1] Entity1 [2] <ul style="list-style-type: none"> integer1 [25] Entity1 [3] <ul style="list-style-type: none"> string1 [1] Entity1 [4] <ul style="list-style-type: none"> string1 [5.345678] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [1.000000] integer1 [1] Entity1 [2] <ul style="list-style-type: none"> decimal1 [25.000000] integer1 [25] Entity1 [3] <ul style="list-style-type: none"> decimal2 [1.000000] string1 [1] Entity1 [4] <ul style="list-style-type: none"> decimal2 [5.345678] string1 [5.345678]

To integer

SYNTAX

<Decimal>.toInteger

<String>.toInteger

DESCRIPTION

Converts the value in <Decimal> or all characters in <String> to data type Integer. All decimals have fractional portions truncated during the conversion. Strings are converted ONLY if all characters in <String> are numeric, without a decimal point. If any non-numeric characters (with the sole exception of a single leading minus sign for negative numbers) are present in <String>, no value is returned by the function. Do not use on String values of null or empty String (' ') -- a pair of single quote marks -- as that will generate an error message.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.toInteger** to convert decimal1 and string1 to type Integer and assign them to integer1 and integer2, respectively.

Conditions		0	1	
a				
b				
Actions		<		
Post Message(s)				
A	Entity1.integer1 = Entity1.decimal1.toInteger	<input checked="" type="checkbox"/>		
B	Entity1.integer2 = Entity1.string1.toInteger	<input checked="" type="checkbox"/>		
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
A0				integer1 is equal to the value of decimal1 converted into an integer data type
B0				integer2 is equal to the value of string1 converted into an integer data type

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [7.234000] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal1 [3.999000] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [-6] ▼ Entity1 [4] <ul style="list-style-type: none"> string1 [5.0] ▼ Entity1 [5] <ul style="list-style-type: none"> string1 [123A] ▼ Entity1 [6] <ul style="list-style-type: none"> string1 [7] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [7.234000] integer1 [7] ▼ Entity1 [2] <ul style="list-style-type: none"> decimal1 [3.999000] integer1 [3] ▼ Entity1 [3] <ul style="list-style-type: none"> integer2 [-6] string1 [-6] ▼ Entity1 [4] <ul style="list-style-type: none"> string1 [5.0] ▼ Entity1 [5] <ul style="list-style-type: none"> string1 [123A] ▼ Entity1 [6] <ul style="list-style-type: none"> integer2 [7] string1 [7]

Cases when the toInteger operator accepts null and empty values for string attributes

There are two factors:

1. Prior to evaluating a rule, Corticon checks if any attribute values used in the expressions in the rule are null and, if so, does not execute the rule.
2. During expression evaluation, Corticon protects against null pointer exceptions. The expression "test.string.toInteger" will return null if the string is not an integer. However, the expression "test.string.toInteger + 3" will return "3" if the string is not a number – the value 0 being used as the result of the toInteger.

Consider the action expression:

```
test.integer =test.string.toInteger
```

Here is the Ruletest output for three tests:

Input	Output
test [1] <ul style="list-style-type: none"> integer [5] string [] 	test [1] <ul style="list-style-type: none"> integer string []
test [2] <ul style="list-style-type: none"> integer [5] string 	test [2] <ul style="list-style-type: none"> integer [5] string
test [3] <ul style="list-style-type: none"> integer [5] string [null] 	test [3] <ul style="list-style-type: none"> integer string [null]

How this Ruletest was processed:

- In test 1, the string is empty but not a null value so the expression evaluates and assigns null to integer.
- In test 2, the string is null so the pre-check for null values does not pass and the expression is not evaluated and the value of integer is unchanged
- In test 3, the string is the string "null" but not a null value so the expression evaluates and assigns null to integer. (Note the value "null" here is a string, it could have just as well been "foo").

Now change the action expression to:

```
test.integer =test.string.toInteger + 3
```

Here is the Ruletest output now:

Input	Output
test [1] <ul style="list-style-type: none"> integer [5] string [] 	test [1] <ul style="list-style-type: none"> integer [3] string []
test [2] <ul style="list-style-type: none"> integer [5] string 	test [2] <ul style="list-style-type: none"> integer [5] string
test [3] <ul style="list-style-type: none"> integer [5] string [null] 	test [3] <ul style="list-style-type: none"> integer [3] string [null]

How this Ruletest was processed now:

- In test 1, the string is empty but not a null value so the expression evaluates. To prevent a NPE during evaluation, the value 0 is used as the result of the toInteger resulting in the expression being "0 + 3" so integer is assigned a value of 3.
- In test 2, the string is null so the pre-check for null values does not pass and the expression is not evaluated and the value of integer is unchanged.

- In test 3, the string is the string “null” but not a null value so the expression evaluates in the same fashion as 1, that is, “0 + 3” and assigns a value of 3.

You might argue that you cannot assume a value of 0 when doing toString on a non-number string. However, to protect a business user against runtime exceptions, Corticon makes logical substitutions during rule evaluation to protect against null values.

To string

SYNTAX

<Decimal>.toString

<Integer>.toString

DESCRIPTION

Converts a value to a data type of String.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.toString** to convert numeric data types to strings.

The screenshot shows the Corticon Rulesheet Editor for a rulesheet named 'ToString.ers'. The interface is divided into several sections:

- Scope:** A tree view showing the structure of the rulesheet. It includes 'Entity1' with sub-elements 'decimal1', 'integer1', 'string1', and 'string2'.
- Filters:** A list of filters numbered 1 and 2.
- Conditions:** A table with three rows labeled 'a', 'b', and 'c'. The value '0' is entered in the rightmost column of the first row.
- Actions:** A table with three rows labeled 'A', 'B', and 'C'. Row 'A' contains the action 'Entity1.string1 = Entity1.decimal1.toString' with a checkmark. Row 'B' contains the action 'Entity1.string2 = Entity1.integer1.toString' with a checkmark. Row 'C' is empty.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. It contains two entries:

Ref	ID	Post	Alias	Text
A0				Entity1.string1 is equal to the value of decimal1 converted into a string data type
B0				Entity1.string2 is equal to the value of integer1 converted into a string data type

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [3.456700] ▼ Entity1 [2] <ul style="list-style-type: none"> integer1 [5] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> decimal1 [3.456700] string1 [3.4567] ▼ Entity1 [2] <ul style="list-style-type: none"> integer1 [5] string2 [5]

Trim spaces

SYNTAX

<String>.trimSpaces

DESCRIPTION

Returns <String>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses **trimSpaces**.

The screenshot shows the Studio Tester Rulesheet Editor for a file named 'trimSpaces.ers'. The interface is divided into several sections:

- Scope:** A tree view showing 'Entity1' with sub-elements 'string1' and 'string2'.
- Conditions:** A table with two rows labeled 'a' and 'b', and a column for the number of conditions (currently 0).
- Actions:** A table with two rows labeled 'A' and 'B', and a column for the number of actions (currently 1). Row 'A' contains the action 'Entity1.string1=Entity1.string2.trimSpaces' with a green checkmark.
- Filters:** A table with two rows labeled '1' and '2'.
- Overrides:** A section for overriding rules.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. Row 'A0' contains the text 'Entity1.string1 is set to the value of Entity1.string2 without extra spaces'.

SAMPLE RULETEST

A sample Ruletest provides a collection of three elements, each with a `String` value. Input and Output panels are shown below.

Note: As the Studio Tester trims spaces in the input area, you cannot really test this operation here!

Input	Output
<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [test] ▼ Entity1 [2] <ul style="list-style-type: none"> string1 [test test] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [test test] 	<ul style="list-style-type: none"> ▼ Entity1 [1] <ul style="list-style-type: none"> string1 [test] string2 [test] ▼ Entity1 [2] <ul style="list-style-type: none"> string1 [test test] string2 [test test] ▼ Entity1 [3] <ul style="list-style-type: none"> string1 [test test] string2 [test test]

True

SYNTAX

true or T

DESCRIPTION

Represents Boolean value true. Recall from the discussion of [truth values](#) that an `<expression>` is evaluated for its truth value, so the expression `Entity1.boolean1=true` will evaluate to `true` only if `boolean1=true`. But since `boolean1` is Boolean and has a truth value all by itself without any additional syntax, we do not actually need the “`=true`” piece of the expression. Many examples in the documentation use explicit syntax like `boolean1=true` or `boolean2=false` for clarity and consistency, even though `boolean1` or not `boolean2` are equivalent logical expressions.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **true** in a Precondition to Ruletest whether `boolean1` is true, and perform the Nonconditional computation if it is. As discussed above, the alternative expression `Entity1.boolean1` is logically equivalent.

Ref	ID	Post	Alias	Text
A0				If boolean1 is true, then decimal1 equals the sum of decimal2 plus integer1

SAMPLE TEST

A sample Ruletest provides three examples. Assume `decimal2=10.0` and `integer1=5` for all examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal2 [10.000000] integer1 [5] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] decimal2 [10.000000] integer1 [5] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> boolean1 [true] decimal1 [15.000000] decimal2 [10.000000] integer1 [5] Entity1 [2] <ul style="list-style-type: none"> boolean1 [false] decimal2 [10.000000] integer1 [5]

Truncate

SYNTAX

`<Decimal>.truncate`

DESCRIPTION

Truncates "this" Decimal value to an integer by removing the fractional portion.

USAGE RESTRICTIONS

The Operators row in the table of [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

This sample Rulesheet uses `.truncate` to produce the integer value of `decimal1` and assign it to `integer1`

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.integer1 = Entity1.decimal1.truncate	<input checked="" type="checkbox"/>
B		
Overrides		

SAMPLE RULETEST

A sample Ruletest provides `decimal1` values for two scenarios. Input and Output panels are shown below.

/Generic.js/truncate.ers	
Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [3.141592] Entity1 [2] <ul style="list-style-type: none"> decimal1 [1.850000] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> decimal1 [3.141592] integer1 [3] Entity1 [2] <ul style="list-style-type: none"> decimal1 [1.850000] integer1 [1]

Uppercase

SYNTAX

`<String>.toUpper`

DESCRIPTION

Converts all characters in `<String>` to uppercase.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.toUpper` to convert `string2` to uppercase and assign it to `string1`.

Conditions		0	1
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.string1 = Entity1.string2.toUpper	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				string1 equals string2 converted to uppercase

SAMPLE TEST

A sample Ruletest provides three examples. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string2 [uppercase] Entity1 [2] <ul style="list-style-type: none"> string2 [CaliForniA] Entity1 [3] <ul style="list-style-type: none"> string2 [TNT] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> string1 [UPPERCASE] string2 [uppercase] Entity1 [2] <ul style="list-style-type: none"> string1 [CALIFORNIA] string2 [CaliForniA] Entity1 [3] <ul style="list-style-type: none"> string1 [TNT] string2 [TNT]

Week of month

SYNTAX

<DateTime>.weekOfMonth

DESCRIPTION

Returns an Integer from 1 to 6, equal to the week number within the month in <DateTime>. A week begins on Sunday and ends on Saturday.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.weekOfMonth** to assign a value to integer1.

Conditions		0
a		
b		
Actions		<
Post Message(s)		
A	Entity1.integer1 = Entity1.dateTime1.weekOfMonth	<input checked="" type="checkbox"/>
B		
Overrides		

Ref	ID	Post	Alias	Text
A0				integer1 is equal to the integer number of the week of the month in dateTime1

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2/1/2020 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [4/30/2020 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [8/31/2020 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2020-02-01T00:00:00-0500] integer1 [1] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2020-04-30T00:00:00-0400] integer1 [5] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2020-08-31T00:00:00-0400] integer1 [6]

Week of year

SYNTAX

<DateTime>.weekOfYear

DESCRIPTION

Returns an Integer from 1 to 52, equal to the week number within the year in <DateTime>. A week begins on Sunday and ends on Saturday. When a year ends between Sunday and the next Friday, or in other words when a new year begins between Monday and the next Saturday, the final day(s) of December will be included in week 1 of the new year. For example, 12/29/2013 fell on a Sunday, so 12/29-31 are included in week 1 of 2014.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.weekOfYear` to assign a value to `integer1`.

Week of Year.ers		0	1
Conditions			
a			
b			
Actions		<	
Post Message(s)			
A	Entity1.integer1 = Entity1.dateTime1.weekOfYear	<input checked="" type="checkbox"/>	
B			
Overrides			

Ref	ID	Post	Alias	Text
A0				integer1 is equal to the integer number of the week of the year in dateTime1

SAMPLE TEST

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [12/30/2023 2:00:00 PM] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [8/24/2024 11:45:00 AM] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2026/03/25 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2023-12-30T14:00:00-0500] integer1 [52] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2024-08-24T11:45:00-0400] integer1 [34] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2026-03-25T00:00:00-0400] integer1 [13]

Weeks between

SYNTAX

```
<DateTime1>.weeksBetween(<DateTime2>)
```

DESCRIPTION

Returns the Integer number of weeks between DateTimes. This function calculates the number of milliseconds between the date values and divides that number by 86,400,000 (the number of milliseconds in a day). Any fraction is truncated, leaving an Integer result. If the two dates differ by less than a full 24-hour period, the value returned is zero. A positive Integer value is returned when `<DateTime2>` occurs after `<DateTime1>`.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions

RULESHEET EXAMPLE

The following Rulesheet uses `.weeksBetween` to determine the number of weeks that have elapsed between `dateTime1` and `dateTime2`, compare it to the values in the Condition cells, and assign a value to `string1`.

Conditions		1	2
a	Entity1.dateTime1.weeksBetween(Entity1.dateTime2)	<= 10	> 10
b			
Actions		<	
Post Message(s)			
A	Entity1.string1	'Not Overdue'	'Overdue'
B			
Overrides			

Ref	ID	Post	Alias	Text
1				If dateTime1 and dateTime2 are fewer than 10 weeks apart, set Entity1.string1 to 'Not Overdue'
2				If dateTime1 and dateTime2 are more than 10 weeks apart, set Entity1.string1 to 'Overdue'

SAMPLE RULETEST

A sample Ruletest provides `dateTime1` and `dateTime2` for two examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/15/1847 00:00:00] dateTime2 [6/15/1865 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/15/1947 00:00:00] dateTime2 [12/15/1947 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/15/2047 00:00:00] dateTime2 [6/15/2048 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1847-11-15T00:00:00-0500] dateTime2 [1865-06-14T23:00:00-0500] string1 [Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1947-11-15T00:00:00-0500] dateTime2 [1947-12-15T00:00:00-0500] string1 [Not Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2047-11-15T00:00:00-0500] dateTime2 [2048-06-15T00:00:00-0400] string1 [Overdue]

Year

SYNTAX

<DateTime>.year

DESCRIPTION

Returns the century/year portion of <DateTime>. The returned value is a four digit Integer.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses `.year` to evaluate `dateTime1` and `dateTime2` and assign the year values to `integer1` and `integer2`, respectively.

The screenshot shows a rulesheet editor for a file named 'year.ers'. The interface is divided into several sections:

- Scope:** A tree view showing 'Entity1' with sub-items 'dateTime1', 'dateTime2', 'integer1', and 'integer2'.
- Conditions:** A table with columns 'a', 'b', and 'c'. The 'Actions' section below it shows 'Post Message(s)' with two entries: 'A Entity1.integer1 = Entity1.dateTime1.year' and 'B Entity1.integer2 = Entity1.dateTime2.year', both with checkmarks.
- Filters:** A table with two rows, numbered 1 and 2.
- Rule Statements:** A table with columns 'Ref', 'ID', 'Post', 'Alias', and 'Text'. It contains two entries: 'A0' with text 'integer1 equals the year value in dateTime1' and 'B0' with text 'integer2 equals the year value in dateTime2'.

SAMPLE TEST

A sample Ruletest provides two examples of `dateTime1` and `dateTime2`. Input and Output panels are shown below:

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [3/16/2026 3:00:00 PM EST] dateTime2 [6/15/2011 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [June 20, 2006 2:00:00 AM PST] dateTime2 [12/15/1947 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [2026-03-16T16:00:00-0400] dateTime2 [2011-06-15T00:00:00-0400] integer1 [2026] integer2 [2011] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [2006-06-20T06:00:00-0400] dateTime2 [1947-12-15T00:00:00-0500] integer1 [2006] integer2 [1947]

Years between

SYNTAX

```
<DateTime1>.yearsBetween(<DateTime2>)
```

DESCRIPTION

Returns the Integer number of years between DateTimes. The number of months in <DateTime2> is subtracted from the number of months in <DateTime1>, and the result is divided by 12 and truncated. This function returns a positive number if <DateTime2> is later than <DateTime1>.

USAGE RESTRICTIONS

The Operators row of the table in [Summary Table of Vocabulary Usage Restriction](#) applies. No special exceptions.

RULESHEET EXAMPLE

The following Rulesheet uses **.yearsBetween** to determine the number of years that have elapsed between `dateTime1` and `dateTime2`, compare it to the Values set, and assign a value to `string1`.

YearsBetween.ers				
Conditions		1	2	
a	Entity1.dateTime1.yearsBetween(Entity1.dateTime2)	<= 10	> 10	
b				
Actions		<		
Post Message(s)				
A	Entity1.string1	'Not Overdue'	'Overdue'	
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If 10 or fewer years have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is not overdue
2				If more than 10 years have elapsed between <code>dateTime1</code> and <code>dateTime2</code> , then Entity1 is overdue

SAMPLE TEST

A sample Ruletest provides `dateTime1` and `dateTime2` for three examples. Input and Output panels are shown below.

Input	Output
<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [11/15/1847 00:00:00] dateTime2 [6/15/1865 00:00:00] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [11/15/1947 00:00:00] dateTime2 [12/15/1947 00:00:00] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [11/15/2047 00:00:00] dateTime2 [6/15/2048 00:00:00] 	<ul style="list-style-type: none"> Entity1 [1] <ul style="list-style-type: none"> dateTime1 [1847-11-15T00:00:00-0500] dateTime2 [1865-06-14T23:00:00-0500] string1 [Overdue] Entity1 [2] <ul style="list-style-type: none"> dateTime1 [1947-11-15T00:00:00-0500] dateTime2 [1947-12-15T00:00:00-0500] string1 [Not Overdue] Entity1 [3] <ul style="list-style-type: none"> dateTime1 [2047-11-15T00:00:00-0500] dateTime2 [2048-06-15T00:00:00-0400] string1 [Not Overdue]

A

Standard Boolean constructions

The topics in this section presents several standard truth tables (AND, NAND, OR, XOR, NOR, and XNOR) with examples of usage in a Rulesheet.

For details, see the following topics:

- [Boolean AND](#)
- [Boolean NAND](#)
- [Boolean OR](#)
- [Boolean XOR](#)
- [Boolean NOR](#)
- [Boolean XNOR](#)

Boolean AND

In a decision table, a rule with **AND**'ed Conditions is expressed as a single column, with values for each Condition aligned vertically in that column. For example:

1. If a person is 45 or older and smokes, then classify the person as high risk

Conditions		0	1
a	Applicant.age >= 45		T
b	Applicant.smoker		T
Actions			
Post Message(s)			
A	Applicant.riskRating		'high'
B			
C			
		Overrides	

Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older and smokes, then classify the applicant as high risk

In this scenario, each Condition has a set of 2 possible values:

person is 45 or older: {true, false}

person is a smoker: {true, false}

and the outcome may also have two possible values:

person's risk rating: {low, high}

These Conditions and Actions yield the following truth table:

age >= 45	smoker	risk rating
true	true	high
true	false	
false	true	
false	false	

Note that we have only filled in a single value of risk rating, because the business rule above only covers a single scenario: where `age >= 45` and `smoker = true`. Running *The completeness checker* as described in the *Rule Modeling section* quickly identifies the remaining three scenarios:

PolicyApplicantBoolean.ers				
Conditions		1	2	3
a	Applicant.age >= 45	T	T	F
b	Applicant.smoker	T	{F, null}	-
c				
Actions		<		
Post Message(s)				
A	Applicant.riskRating	'high'		
B				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older and smokes, then classify the applicant as high risk

Completing the truth table and the Rulesheet requires the definition of 2 additional business rules:

PolicyApplicantBoolean.ers				
Conditions		1	2	3
a	Applicant.age >= 45	T	T	F
b	Applicant.smoker	T	{F, null}	-
Actions		<		
Post Message(s)				
A	Applicant.riskRating	'high'	'low'	'low'
B				
C				
Overrides				
Rule Statements				
Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older and smokes, then classify the applicant as high risk
2				If an applicant is 45 or older and does NOT smoke, then classify the applicant as low risk
3				If an applicant is NOT 45 or older, then ignore whether or not the applicant smokes and classify them as low risk

and updating the truth table, we recognize the classic **AND** Boolean function.

age >= 45	smoker	risk rating
true	true	high
true	false	low
false	true	low
false	false	low

Once the basic truth table framework has been established in the Rulesheet by the Completeness Checker – in other words, all logical combinations of Conditions have been explicitly entered as separate columns in the Rulesheet – we can alter the outcomes to implement other standard Boolean constructions. For example, the **NAND** construction has the following truth table:

Boolean NAND

age >= 45	smoker	risk rating
true	true	low
true	false	high
false	true	high
false	false	high

Also known as “Not And”, this construction is shown in the following Rulesheet:

Conditions		0	1	2	3	4
a	Applicant.age >= 45		T	T	F	F
b	Applicant.smoker		T	F	T	F
c						
Actions		<				
Post Message(s)						
A	Applicant.riskRating		'low'	'high'	'high'	'high'
B						
C						
D						
Overrides						

Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older AND smokes, then classify the applicant as low risk
2				If an applicant is 45 or older AND does NOT smoke, then classify the applicant as high risk
3				If an applicant is younger than 45 AND smokes, then classify the applicant as high risk
4				If an applicant is younger than 45 AND does NOT smoke, then classify the applicant as high risk

Boolean OR

age >= 45	smoker	risk rating
true	true	high
true	false	high
false	true	high
false	false	low

PolicyApplicantBooleanOr.ers					
Conditions	0	1	2	3	4
a Applicant.age >= 45		T	T	F	F
b Applicant.smoker		T	F	T	F
c					
Actions	<				
Post Message(s)					
A Applicant.riskRating		'high'	'high'	'high'	'low'
B					
Overrides					

Rule Statements				
Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older and smokes, then classify the applicant as high risk
2				If an applicant is 45 or older and does NOT smoke, then classify the applicant as high risk
3				If an applicant is younger than 45 and smokes, then classify the applicant as high risk
4				If an applicant is younger than 45 and does NOT smoke, then classify the applicant as low risk

Boolean XOR

Using “Exclusive Or” logic, `riskRating` is high whenever the age or smoker test, but not both, is satisfied. This construction is shown in the following Rulesheet:

age >= 45	smoker	risk rating
true	true	low
true	false	high
false	true	high
false	false	low

XOR.ers					
Conditions	0	1	2	3	4
a Applicant.age >= 45		T	T	F	F
b Applicant.smoker		T	F	T	F
c					
Actions	<				
Post Message(s)					
A Applicant.riskRating		'low'	'high'	'high'	'low'
B					
Overrides					

Rule Statements				
Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older AND smokes, then classify the applicant as low risk
2				If an applicant is 45 or older AND does NOT smoke, then classify the applicant as high risk
3				If an applicant is younger than 45 AND smokes, then classify the applicant as high risk
4				If an applicant is younger than 45 AND does NOT smoke, then classify the applicant as low risk

Boolean NOR

Also known as “Not Or”, this construction is shown in the following Rulesheet:

age >= 45	smoker	risk rating
true	true	low
true	false	low
false	true	low
false	false	high

PolicyApplicantBooleanNOR.ers

Conditions	0	1	2	3	4
a Applicant.age >= 45		T	T	F	F
b Applicant.smoker		T	F	T	F
c					

Actions

Post Message(s)	0	1	2	3	4
A Applicant.riskRating		'low'	'low'	'low'	'high'
B					

Overrides

0	1	2	3	4

Rule Statements

Ref	ID	Post	Alias	Text
1				If an applicant is 45 or older and smokes, then classify the applicant as low risk
2				If an applicant is younger than 45 AND does NOT, then classify the applicant as low risk
3				If an applicant is younger than 45 AND smokes, then classify the applicant as low risk
4				If an applicant is younger than 45 AND does NOT smoke, then classify the applicant as high risk

Boolean XNOR

Also known as “Exclusive NOR”, this construction is shown in the following Rulesheet:

age >= 45	smoker	risk rating
true	true	high
true	false	low
false	true	low
false	false	high

PolicyApplicantBooleanXNOR.ers						
Conditions		0	1	2	3	4
a	Applicant.age <= 45		F	T	F	T
b	Applicant.smoker		F	T	T	F
c						
Actions		<				
Post Message(s)						
A	Applicant.riskRating		'high'	'high'	'low'	'low'
B						
C						
Overrides						
Rule Statements						
Ref	ID	Post	Alias	Text		
1				If an applicant is 45 or older AND does NOT smoke, then classify the applicant as high risk		
2				If an applicant is younger than 45 AND smokes, then classify the applicant as high risk		
3				If an applicant is 45 or older AND smokes, then classify the applicant as low risk		
4				If an applicant is younger than 45 AND does NOT smoke, then classify the applicant as low risk		

B

Precedence of rule operators

The precedence of operators affects the grouping and evaluation of expressions. Expressions with higher-precedence operators are evaluated first. Where several operators have equal precedence, they are evaluated from left to right. The following table summarizes Corticon.js's operator precedence.

Operator precedence	Operator	Operator Name	Example
1	()	Parenthetic expression	(5.5 / 10)
2	-	Unary negative	-10
	not	Boolean test	not 10
3	*	Arithmetic: Multiplication	5.5 * 10
	/	Arithmetic: Division	5.5 / 10
	**	Arithmetic: Exponentiation (Powers and Roots)	5 ** 2 25 ** 0.5 125 ** (1.0/3.0)
4	+	Arithmetic: Addition	5.5 + 10
	-	Arithmetic: Subtraction	10.0 – 5.5
5	<	Relational: Less Than	5.5 < 10
	<=	Relational: Less Than Or Equal To	5.5 <= 5.5
	>	Relational: Greater Than	10 > 5.5
	>=	Relational: Greater Than Or Equal To	10 >= 10
	=	Relational: Equal	5.5=5.5
	<>	Relational: Not Equal	5.5 <> 10
6	(<i>expression and expression</i>)	Logical: AND	(ent1.dec1 > 5.5 and ent1.dec1 < 10)
	(<i>expression or expression</i>)	Logical: OR	(ent1.dec1 > 5.5 or ent1.dec1 < 10)

Note: While expressions within parentheses that are separated by logical AND / OR operators are valid, the component expressions are not evaluated individually when testing for completeness, and might cause unintended side effects during rule execution. Best practice within a Corticon.js Rulesheet is to represent AND conditions as separate condition rows and OR conditions as separate rules -- doing so allows you to get the full benefit of Corticon.js's logical analysis.

Note: It is recommended that you place arithmetic exponentiation expressions in parentheses.

C

Formats for date and dateTime in Corticon.js Studio tester

When you have Ruletests in your Corticon.js project, they require adherence to dates and dateTimes that are ISO 8601 compliant, or as the number of milliseconds since the epoch. For testing , the Corticon.js Studio Tester lets you enter a more permissive date and dateTime as Input values; however, the Output values are always strict ISO 8601, as illustrated:

Input	Output
<ul style="list-style-type: none"> ▼ FlightPlan [1] <ul style="list-style-type: none"> flightDate [2025-09-20] flightDateTime [2023-06-16T08:15:00-0400] ▼ FlightPlan [2] <ul style="list-style-type: none"> flightDate [2025-09-20T13:00:00-0400] flightDateTime [1757782800000] ▼ FlightPlan [3] <ul style="list-style-type: none"> flightDate [5/20/2025] flightDateTime [2025-09-13T13:00:00-0400] ▼ FlightPlan [4] <ul style="list-style-type: none"> flightDate [20250913] flightDateTime [2025-09-13T13:00:00-0400] ▼ FlightPlan [5] <ul style="list-style-type: none"> flightDateTime [2020-07-30T18:00:00.000Z] ▼ FlightPlan [6] <ul style="list-style-type: none"> flightDateTime [2020-07-30T14:00:00.000-04] ▼ FlightPlan [7] <ul style="list-style-type: none"> flightDateTime [1596132000000] 	<ul style="list-style-type: none"> ▼ FlightPlan [1] <ul style="list-style-type: none"> flightDate [2025-09-20] flightDateTime [2023-06-16T08:15:00-0400] ▼ FlightPlan [2] <ul style="list-style-type: none"> flightDate [2025-09-20] flightDateTime [2025-09-13T13:00:00-0400] ▼ FlightPlan [3] <ul style="list-style-type: none"> flightDate [2025-05-20] flightDateTime [2025-09-13T13:00:00-0400] ▼ FlightPlan [4] <ul style="list-style-type: none"> flightDate [2025-09-13] flightDateTime [2025-09-13T13:00:00-0400] ▼ FlightPlan [5] <ul style="list-style-type: none"> flightDateTime [2020-07-30T14:00:00-0400] ▼ FlightPlan [6] <ul style="list-style-type: none"> flightDateTime [2020-07-30T14:00:00-0400] ▼ FlightPlan [7] <ul style="list-style-type: none"> flightDateTime [2020-07-30T14:00:00-0400]

The default date mask in the `brms.properties` file is:

Default DateMask to be applied to DateTime values in Tester Output Tree
 Default is `yyyy-MM-dd'T'HH:mm:ssZ` (e.g. `2020-01-01T00:00:00-0000`)
`com.corticon.javascript.studio.testers.dateformat=yyyy-MM-dd'T'HH:mm:ssZ`

Formats for date and dateTime in JSON payloads

Date and DateTime values in a Corticon.js payload must conform to the ISO 8601 standard, or as the number of milliseconds since the epoch. The Corticon.js runtime does all its computation using UTC as the time reference. At runtime, Corticon.js always returns date or dateTime formatted as ISO 8601 regardless of the input format you used.

Date and dateTime values that are passed into Corticon.js at runtime must conform to the ISO 8601 standard. If a non-ISO 8601 date or dateTime is passed inside the payload to the Decision Service, the JavaScript runtime will fail to parse it, and the execution will terminate.

There are many different formats included in the ISO 8601 standard, not limited to, “Date”, “Date and Time”, and “Date and Time with Time Zone offset”. When you use a full Date and Time with Time Zone offset value inside your payload, you remove any potential misinterpretation of the dateTime value in the JavaScript runtime, which may influence how certain Rules will fire. If Time is missing, it defaults to midnight (00:00:00). If Time Zone is missing, it defaults to the Time Zone of the machine running the JavaScript runtime.

If you wanted to pass the date time (UTC) “Thursday, July 30, 2020 6:00:00 PM” into a decision service as a JSON payload, you could format it as:

1. **2020-07-30T18:00:00.000Z**—This represents the dateTime as ISO 8601 directly with the UTC reference (that is, with no time zone specified).
2. **2020-07-30T14:00:00.000-04**—This represents the dateTime as ISO 8601 with a time zone (notice instead of 18 hour, it is 14). This format is accepted as input but will not return the results in the same notation.
3. **1596132000000**—This format represents the dateTime as the number of milliseconds since the epoch, 1/1/1970.

When you package the project for JS deployment as Browser, and then **Run Decision Service**, you get the following HTML output:

← → ↻ 🏠 File | C:/CorticonJS_workspaces/workspaceWelcome/tutorial_example/browser/brows

Sample Calling Corticon JavaScript Decision Service

Enter the payload to pass to the decision service:

<pre>[{ "flightDate": "2025-09-20", "flightDateTime": "2023-06-16T08:15:00.000-0400" }, { "flightDate": "2025-09-20T13:00:00.000-0400", "flightDateTime": "1757782800000" }, { "flightDate": "2025-05-20", "flightDateTime": "2025-09-13T13:00:00.000-0400" }, { "flightDate": "20250913", "flightDateTime": "2025-09-13T13:00:00.000-0400" }, {"flightDateTime": "2020-07-30T18:00:00.000Z"}, {"flightDateTime": "2020-07-30T14:00:00.000-04"}, {"flightDateTime": "1596132000000"}]</pre>	<pre>{ "payload": [{ "flightDate": "2025-09-20", "flightDateTime": "2023-06-16T08:15:00.000-0400" }, { "flightDate": "2025-09-20T13:00:00.000-0400", "flightDateTime": "1757782800000" }, { "flightDate": "2025-05-20", "flightDateTime": "2025-09-13T13:00:00.000-0400" }, { "flightDate": "20250913", "flightDateTime": "2025-09-13T13:00:00.000-0400" }, {"flightDateTime": "2020-07-30T18:00:00.000Z"}, {"flightDateTime": "2020-07-30T14:00:00.000-04"}, {"flightDateTime": "1596132000000"}], "corticon": { "messages": { "message": [] }, "timestamp": "2023-06-23T20:35:00.000-0400", "status": "success" } }</pre>
---	---

Use the link below to run the decision service.

[Run Decision Service](#)

Note: For more information, see the blogs [Dealing With Date and Time With Corticon.js](#) and [Understanding ISO 8601 Date and Time Format](#)

Escape sequences on JavaScript string literals

A character preceded by a backslash (\) is an *escape sequence* and has special meaning to the compiler. The following table shows the JavaScript escape sequences:

Escape Sequence	Description
\t	Insert a tab in the text at this point.
\b	Insert a backspace in the text at this point.
\n	Insert a newline in the text at this point.
\r	Insert a carriage return in the text at this point.
\f	Insert a form feed in the text at this point.
\'	Insert a single quote character in the text at this point.
\"	Insert a double quote character in the text at this point.
\\	Insert a backslash character in the text at this point.

When an escape sequence is encountered in a print statement, the compiler interprets it accordingly. For example, if you want to put quotes within quotes you must use the escape sequence, \", on the interior quotes.

JavaScript specifics:

- **Template Literals:** JavaScript's template literals (backticks ```) introduce additional escaping rules for embedded expressions (`${ }`) and backticks themselves (`` ``).
- **Vertical Tab** (`\v`): While both support `\v`, older versions of Internet Explorer might interpret it as a literal 'v' instead of a vertical tab, making `\x0B` a more robust cross-browser alternative.
- **Null Character** (`\0`): JavaScript's `\0` represents the null character (U+0000) only if the next character is not a decimal digit; otherwise, it's interpreted as an octal escape sequence.
- **Unicode Escapes:** Both support Unicode escapes, but JavaScript also allows for extended Unicode escape sequences using curly braces, e.g., `\u{1F600}` for emojis.