Expression Parser

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Parser's Syntax Specification

Jira Workflow Toolbox uses a powerful parser for interpreting expression with **logical**, **mathematical**, **date-time** and **string-text** terms. This parser is a fundamental part of the plugin, and is used by various features in the plugin.

Usage examples:

- **Boolean Expressions Examples**
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There are **five types of expressions** that can be parsed:

- **Mathematical and Time**: returns a **number**. When it represents a Date or Time, it returns the number of **milliseconds elapsed since January 1, 1970, 00:00:00 GMT**
  Examples:
  - **`(1 * 2) / 3`**
  - **`(1 + 3 * {10000}) / abs({10001})`** : simple arithmetical formula that uses the value of a number field (field code **{10000}**), and a function that returns the absolute value of another field (field code **{1000**

    `filterByPredicate(linkedIssues`

    1}).
  - **`{00012} + 2 * {HOUR}`** : adding 2 hours to **Due Date** (field code **{00012}**).
  - **`round(({00012} - {00057}) / {HOUR})`** : calculate the number of hours from **Current date and time** (field code **{00057}**) to **Due Date** (field code **{00012}**).
- **Text-String**: returns a string. This kind of expressions is used in **advanced mode** of post-function **Copy parsed text to a field** .
  Examples:
  - **`"Hello" + " " + "world" + "."`** : concatenating 4 string literals.
  - **`trim(%{00000})`** : removing leading and trailing blanks from **Summary**.
  - **`%{00001} + "\nLAST USER: " + toUpperCase(%{00021})`** : adding to **Description** (field code **%{00001}**) a new line with string "**LAST USER**: " and the **name of current user** (field code **%{00021}**) in upper case.
- **Boolean** (also known as **Logical**): it returns a logical value **`true`** or **`false`** .
  Examples:
  - **`%{10005} = "Yes"`** : compares the value stored in a field with literal string "**`Yes`**".
  - **`datePart({00012}, LOCAL) > datePart({00057}, LOCAL)`** : returns **true** only if **Due Date** (field code **{00012}**) is later than **Current date** (field code **{00057}**) in server's local timezone.
  - **`%{10020} != null AND %{10021} = null`** : returns **true** only if **`{10020}`** field is initialized and field **{10021}** is not initialized.
  - **`timePart({00057}, LOCAL) >= 8:00 AND timePart({00057}, LOCAL) <= 17:30`** : **Current time** (field code **{00057}**) is between **8:00 AM** and **5:30 PM** in server's local timezone.
    Boolean Expressions Examples
- **Issue List**: is used for selecting issues (is much like JQL) within Jira Workflow Toolbox expressions, and returns a list of issues.
  Examples:
  - **`subtasks()`** : returns the list of sub-tasks of current issue.
  - **`linkedIssues("is blocked by, is caused by")`** : returns the list of issues linked to current one through issue link types "**is blocked by**" and "**is caused by**".
  - **`filterByIssueType(linkedIssues(), "Bug, Incident")`** : returns the list of linked issues with issue type "**Bug**" or "**Incident**".

    - `filterByPredicate(siblingSubtasks(), %{00028} != null)` : returns the list of sibling sub-tasks (i.e., sub-tasks of same parent as current sub-task) which are not resolved. Note that **%{00028}** is field code for **Resolution**.
      Examples of Issue List expressions

- **String List**: expression that returns a list of strings.
  Examples:
    - `["red", "blue", "green"]` : literal definition of a string list with the names of 3 colors.
    - `fieldValue(%{00000}, subtasks())` : returns the list of summaries of sub-tasks of current issue. Note that **%{00000}** is field code for **Summary**.
    - `toStringList(%{00094})` : returns a list with the names of the components in current issue. Note that **%{00094}** is field code for **Components**.
      Examples of String List expressions

The **expected type of expression** depends on the usage of the parser made but the different features of the plugin:

Feature	Expected Expression type
Boolean Condition with math, date-time or text-string terms	**Boolean**
Boolean Validator with math, date-time or text-string terms	**Boolean**
Parameter Conditional execution in all the post-functions	**Boolean**
Mathematical and date-time expression calculator	**Mathematical and Time**
Log work	**Mathematical and Time**
Set a custom field "Urgency" depending on a combined value of issue's Priority and "Impact" custom field	**Boolean** for **conditional part** of the setting rules. **Text-String** and **Mathematical and Time** for the **value part** of the setting rules.
Copy parsed text to a field	**Text-String**
Create issues and sub-tasks	**Issue List**, **String List** and **Mathematical** for setting **seeds**. **Text-String** for selecting project. **Issue list** and **Text-String** for selecting parent issue. **Text-String** and **Mathematical and Time** for the setting field values. **Issue List** for selecting issues to be linked.
Read field from issues returned by JQL query or issue list **Update issue fields** **Read fields from linked issues or sub-tasks** **Write field on linked issues or sub-tasks**	**Text-String** and **Mathematical and Time** for setting the source value.

Data types

The parser used in the plugin for mathematical, time-formulas and boolean expressions uses only three types of data:

- **Number**: this type of data represents numeric values, and is also used to store **Date**, **Time** and **Date-Time** values. When storing any of temporal value, the number represents the **milliseconds elapsed since January 1, 1970, 00:00:00 GMT**. Number or Date-Time fields can be referenced as numbers using the following notation: **{nnnnn}.**
- **Text-String**: this type of data represents any kind of text or character string. Any field type or data type is susceptible of being transformed to text, so **any field can be referenced as a text-string value** using the following notation: **%{nnnnn}**, and **%{nnnnn.i}** for Cascading Select or Multi-Cascading Select fields, where **i** is the index that represents the level to be accessed. (**i = 0** is used for base level).
- **Boolean**: comparison operators return a logical value `true` or `false` , as well as some functions may also do, e.g., **isActive**(string user_name) : boolean
- **Issue List**: this data type represents a collection of issues. The size may vary from 0 to any number of issues. It's returned by issue selection or filtering functions like **subtasks()**, **linkedIssues()**, **filterByIssueType()**, **distinct()**, etc.
- **Number List**: this data type represents a collection of numeric values. The size may vary from 0 to any number of numeric values. It's returned by function **fieldValue()**, and is used to read the value of a numeric field in a selection of issues.
- **String List**: this data type represents a collection of string values. The size may vary from 0 to any number of string values. It's returned by function **fieldValue()**, and is used to read the value of a string field in a selection of issues.

Casting values to another type

There are two functions available for transforming types from Text-String to Number and viceversa, and also from other types to Text-String.

Function	Input	Output

toString(number **n**) : string	numeric or date-time value	Returns a string with the decimal representation of the numeric value in **n**. Numeric value of a **Date-Time** field is number of milliseconds elapsed since January 1, 1970, 00:00:00 GMT. Example: **`toString(3.141592)`** returns **`"3.141592"`** .
toString(number **n**, number **decimals**) : string	numeric value	Returns a string with the decimal representation of the numeric value in **n** limiting the fractional part to the number of digits in parameter **decimals**. Example: **`toString(3.141592, 2)`** returns **`"3.14"`** .
toString(number list **l**) : string	list of numeric values	Returns a string with a comma separated list of decimal representation of the numeric values in **l**. Example: **`toString([1, 2, 3, 4.0])`** returns **`"1, 2, 3, 4"`** .
toString(number list **l**, number **decimals**) : string	list of numeric values	Returns a string with a comma separated list of decimal representations of the numeric values in **l**, with the number of characters in the decimal part specified by parameter **decimals**. Example: **`toString([1.123, 2.452, 3.64612], 2)`** returns the following string: **`"1.12, 2.45, 3.65"`** .
toString(number list **l**, number **decimals**, string **separator**) : string Available since version 2.2.30	list of numeric values	Returns a string with a list of decimal representations of the numeric values in **l**, with the number of characters in the decimal part specified by parameter **decimals** and separated by string **separator**. Example: **`toString([1.123, 2.452, 3.64612], 2, " : ")`** returns the following string: **`"1.12 : 2.45 : 3.65"`** .
toString(string list **l**) : string	list of string values	Returns a string with a comma separated list of string values in **l**. Example: **`toString(["Hello", " ", "world", "!"])`** returns **`"Hello, , world, !"`** .
toString(string list **l**, string **separator**) : string Available since version 2.2.30	list of string values	Returns a string a list of string values in **l** separated by string **separator**. Example: **`toString(["blue", "red", "green"], "; ")`** returns **`"blue; red; green"`** .
toString(issue list **l**): string	list of issues	Returns a string with a comma separated list of issue keys. Example: **`toString(subtasks())`** returns **`"CRM-5, CRM-6"`** , being **CRM-5** and **CRM-6** the keys of current issue's sub-tasks.
toString(issue list **l**, string **separator**) : string Available since version 2.2.30	list of issues	Returns a string with a list of issue keys separated by string **separator**. Example: **`toString(subtasks(), " ")`** returns "**`CRM-5 CRM-6`**", being **CRM-5** and **CRM-6** the keys of current issue's subtasks.
toNumber(string **s**) : number	string	Returns the numeric value represented by the string **s**. This function expects a decimal representation of a number. In case it is not possible to parse the *s* to number, **`null`** is returned. Versions previous to 2.2.8 return an error message shown and conditions and validators returned **`false`** . Example: **`toNumber("3.14")`** returns **`3.14`** .
toInteger(string **s**, string **radix**) : number Available since version 2.2.12	string	returns the numeric value represented by the string **s** as a signed integer in the radix specified by argument **radix**. Example: **`toInteger("ff", 16)`** returns **`255`** .
toStringList(string **s**, string **separators**) : string list	string with a list of tokens separated by one or more characters	Returns a list of strings with tokens in argument **s** separated by characters in argument **separators**. Leading and trailing spaces around each token are automatically removed. Example: **`toStringList("red, orange, yellow; green; blue; purple", ",;")`** returns the following string list: **`["red", "orange", "yellow", "green", "blue", "purple"]`** .

toStringList(multi-valued field **field**) : string list	field code for a multi-value field in format **%{nnnnn}** . Multi-valued fields are Multi Select, Checkboxes, Components, Versions, Multi User Picker, Multi Group Picker, Issue Pickers, s and Labels. Attachment	Returns a list of strings representing each of the values selected in the field. Example: **`toStringList(%{00094})`** returns a list of strings with each of the components selected in current issue.
toNumberList(string **s**, string **separators**) : number list	string with a list of numbers in decimal representation separated by one or more characters	This function expects in argument **s** a string containing numbers in decimal representation separated by characters in argument **separators**, and returns a list of numbers. Example: **`toNumberList("1, 3, 5; 7; 11; 13", ",;")`** returns the following number list: **`[1, 3, 5, 7, 11, 13]`** .
issueKeysToIssueList(string **issue_keys**) : issue list	string with a comma separated list of issue keys	Returns an issue list with all issues with keys in argument **issue_keys**. Argument **issue_keys** is a string containing a comma separated list of **issue keys**. Since version 2.2.36 it also admits **issue IDs**. Example: **`issueKeysToIssueList("CRM-12, HT-254")`** returns an issue list with issues with keys **CRM-12** and **HT-254**.

Automatic casting from Number to Text-String: Whenever you write a numeric term at the right-hand side of concat operator **+** or a comparison operator like **=** , and the left-hand side is occupied by a text-string term, the parser will automatically transform the right-hand side term into a string

- **+ (string concat):** **`"His age is " + 30`** is equivalent to **`"His age is " + toString(30)`** .
- **= (any comparison operator):** **`"30" = 30`** is equivalent to **`"30" = toString(30)`** .

Comparison operators

The following comparison operators are available for types **Number, Text-String**, **Number List**, **String List** and **Issue List**. Operators **=** and **`!=`** are also available for type **Boolean**.:

Operator	Meaning	Examples (all examples return `true`)
=	equal to	**`1 = 1`** **`"HELLO" = toUpperCase("Hello")`** **`%{00001} = {00068}`** , auto-casting numeric field **{00068}** to Text-String. **`%{00068} = toString({00068})`** , explicit casting of numeric field **{00068}** to Text-String. **`true = true`** **`%{10001} = null`** , for checking whether field with code **%{10001}** is not initialized. **`[1, 2, 3] = [1, 2, 3]`** , when used with lists elements existence and its order are evaluated. **`["blue", "red", "green"] = ["blue", "red", "green"]`**
`!=`	not equal to	**`0 != 1`** **`"HELLO" != "Hello"`** **`%{00001} != "Hello"`** **`true != false`** **`{10010} != null`** , for checking whether the numeric field with code **{10010}** is initialized. **`[1, 2, 3] != [1, 3, 2]`** , when used with lists elements existence and its order are evaluated. **`["blue", "red", "green"] != ["blue", "green", "red"]`**
<	lower than	**`1 < 2`** **`"abc" < "bbc"`** **`"abc" < "abcd"`**
>	greater than	**`2 > 1`** **`"bbc" > "abc"`** **`"abcd" > "abc"`**
<=	less than or equal to	-
>=	greater than or equal to	-
~	contains	**`"Hello world!" ~ "world"`** , checks whether a string contains a substring. **`%{00125} ~ %{00020}`** , checks whether **"Component leaders"** contains **"Current user"**. **`linkedIssues() ~ subtasks()`** , checks whether all sub-tasks are also linked to current issue. **`[1, 2, 3, 2, 2, 4] ~ [2, 1, 2]`** , when used with lists cardinalities must match. **`["blue", "red", "green", "red", "white", "red"] ~ ["red", "green", "red"]`** **`(["green", "red"] ~ ["red", "green", "red"]) = false`**

!~	doesn't contain	**"world" !~ "Hello world!"** **%{00074} !~ %{00077}** , checks whether **"Fix version/s"** doesn't contain all versions in **"Affects version/s"**. **fieldValue(%{00006}, linkedIssues()) !~ fieldValue(%{00006}, subtasks())** , checks whether linked issues reporters don't include all sub-tasks reporters (**%{00006}** is field code for **"Reporters"**). **[1, 2, 3, 2, 2, 4] !~ [2, 1, 1, 4]** , when used with lists cardinalities must match. **["blue", "red", "green", "red", "red"] !~ ["red", "green", "green", "red"]**
in	is contained in	**"world" in "Hello world!"** , to check whether a substring is contained in a string. **%{00020} in %{00125}** , checks whether **"Current user"** is contained in **"Component leaders"**. **subtasks() in linkedIssues()** , checks whether all sub-tasks are also linked to current issue. **[1, 1, 2] in [2, 1, 1, 1, 4]** , cardinality must match. **["blue", "red", "red"] in ["red", "green", "blue", "red", "red"]** , cardinality must match. **2 in [1, 2, 3]** **"blue" in ["red, "blue", "white"]**
not in	isn't contained in	**"Hello world!" not in "world"** **%{00077} not in %{00074}** , checks whether not all versions in **"Affects version/s"** are contained in **"Fix version /s"**. **fieldValue(%{00006}, subtasks()) not in fieldValue(%{00006}, linkedIssues())** , checks whether not all sub-tasks reporters are included in linked issues reporters (**%{00006}** is field code for **"Reporters"**). **[1, 1, 2, 2] not in [2, 1, 1, 1, 4]** , cardinality must match. **["blue", "red", "red", "blue"] not in ["red", "blue", "red", "red"]** , cardinality must match. **5 not in [1, 2, 3, 3, 4]** **"orange" not in ["blue", "red", "white"]**
any in	some element is in	**%{00077} any in %{00074}** , checks whether any version in **"Affects version/s"** is contained in **"Fix version/s"**. **fieldValue(%{00006}, subtasks()) any in fieldValue(%{00006}, linkedIssues())** , checks whether any sub-task's reporter is present among linked issues reporters (**%{00006}** is field code for **"Reporters"**). **[1, 3] any in [3, 4, 5]** **["blue", "white"] any in ["black", "white", "green"]**
none in	no single element is in	**%{00077} none in %{00074}** , checks whether there isn't a single version **"Affects version/s"** in **"Fix version/s"**. **fieldValue(%{00006}, subtasks()) none in fieldValue(%{00006}, linkedIssues())** , checks whether there isn't a single sub-task reporter among linked issues reporters (**%{00006}** is field code for **"Reporters"**). **[1, 2] none in [3, 4, 5]** **["blue", "red"] none in ["black", "white", "green"]**

Case Ignoring Comparison operators (since version 2.2.42)

The following comparison operators are applicable to **String** and **String List** types. This operators have the peculiarity that ignores the case of the characters.

Operator	Meaning	Examples (all examples return `true`)
=~	equal to	**"HELLO" =~ "Hello"** **"up" =~ "UP"** **["blue", "red", "green"] =~ ["Blue", "RED", "Green"]**
!=~	not equal to	**" HELLO" !=~ "Hello"** **"up" !=~ "down"** **("up" !=~ "UP") = false** **["blue", "red"] !=~ ["Blue", "green"]** **["blue", "red"] !=~ ["Red", "BLUE"]** **(["blue", "red", "green"] !=~ ["Blue", "RED", "Green"]) = false**
~~	contains	**"Hello World!" ~~ "world"** , checks whether a string contains a substring. **"A small step for a man" ~~ "STEP"** , checks whether a string contains a substring. **["one", "two", "three"] ~~ ["TWO", "One"]** , checks whether a string list contains all the elements of another string list.
!~~	doesn't contain	**"Hello World!" !~~ "bye"** , checks whether a string doesn't contain a substring. **"A small step for a man" !~~ "big"** , checks whether a string doesn't contain a substring. **["one", "two", "three"] !~~ ["Four"]** , checks whether a string list doesn't contain one element of another string list. **(["one", "two", "three"] !~~ ["TWO"]) = false**
in~	is contained in	**"world" in~ "Hello World!"** , checks whether a substring is contained in another string. **"STEP" in~ "A small step for a man"** , checks whether a substring is contained in another string. **["TWO", "One"] in~ ["one", "two", "three"]** , checks whether all the elements of a string list are contained in another string list.

not in~	isn't contained in	**"bye" not in~ "Hello World!"** , checks whether a substring is not contained in another string. **"big" not in~ "A small step for a man"** , checks whether a substring is not contained in another string. **["Four"] not in~ ["one", "two", "three"]** , checks whether any of the elements of a string list are not contained in another string list. **(["TWO"] not in~ ["one", "two", "three"]) = false**
any in~	some element is in	**["blue", "violet"] any in~ ["Blue", "Red", "Green"]** **["Five", "One"] any in~ ["FOUR", "FIVE", "SIX"]**
none in~	no single element is in	**["Orange"] any in~ ["red", "blue", "green"]** **(["orange"] any in~ ["Red", "Orange"]) = false**

Applicable Data Types

Comparison Operator	Boolean	Number	String	Number List	String List	Issue List	Multi-Valued Fields
=	X	X	X	X	X	X	X
!=	X	X	X	X	X	X	X
<	-	X	X	-	-	-	-
>	-	X	X	-	-	-	-
<=	-	X	X	-	-	-	-
>=	-	X	X	-	-	-	-
~	-	-	X	X	X	X	X
!~	-	-	X	X	X	X	X
in	-	-	X	X	X	X	X
not in	-	-	X	X	X	X	X
any in	-	-	-	X	X	X	X
none in	-	-	-	X	X	X	X
=~	-	-	X	-	X	-	-
!=~	-	-	X	-	X	-	-
~~	-	-	X	-	X	-	-
!~~	-	-	X	-	X	-	-
in~	-	-	X	-	X	-	-
not in~	-	-	X	-	X	-	-
any in~	-	-	-	-	X	-	-
none in~	-	-	-	-	X	-	-

Notice that:

- Operators **~, !~, in** and **not in** can be used for checking a single element **(number or string)** against a **number list** or a **string list**. Example: **1 in [1, 2, 3]** or **["blue", "red"] ~ "blue"** .
- Operators **~, !~, in** and **not in** when used with **string** are useful to look for substrings in another string. Example: **"I love coding" ~ "love"** but **"I don't like Mondays" !~ "Fridays"**, or **"love" in "I love coding"** but **"Fridays" not in "I don't like Mondays"** .
- Operators **~, !~, in** and **not in** respect cardinality, i.e., container list must have at least the same number of elements as contained list. Example: **[1, 1] in [1, 1, 1]** but **[1, 1] not in [1, 2, 3]** .
- Operators **=** and **!=** , when used for comparing lists, require to have the **same elements**, with the **same cardinality** and the **same order**. Example: **[1, 2, 3] = [1, 2, 3]** but **[4, 5, 6] != [4, 6, 5]** .
- Operators <, >, <= and >= work according to lexicographical order when comparing strings.

About types:

- **String**: `"Hello world"`
- **Number**: `1`, `1.1`, `-1.1`, `.1`, `-.1`
- **Multi-valued** fields are Multi Select, Checkboxes, Components, Versions, Multi User Picker, Multi Group Picker, Issue Pickers, Attachments and Labels.
- **Issue list**: Returned by functions like `subtasks()`, `linkedIssues()`, `transitionLinkedIssues()`, `filterByFieldValue()`, `filterByStatus()`, `filterByIssueType()`, `filterByResolution()`, `filterByProject()`, `append()`, `union()`, `except()`, `intersect()` and `distinct()`.
- **String list**: Returned by functions like `fieldValue()`, `append()`, `union()`, `except()`, `intersect()` and `distinct()`. Can also be written as literals, e.g., **["string_A", "string_B", "string_C"]**
- **Number list**: Returned by functions like `fieldValue()`, `append()`, `union()`, `except()`, `intersect()` and `distinct()`. Can also be written as literals, e.g., **[1, 2, 3]**

WARNING:

- Operators `~`, `!~`, `in` and `not in` are available since version **2.1.21**.
- Operators `any in` and `none in` are available since version **2.1.22**.
- Operators `=~`, `!=~`, `~~`, `!~~`, `in~`, `not in~`, `any in~` and `none in~` are available since version **2.2.2**.

Boolean terms

Literals

Only 2 logic literals values are possible: **`true`** and **`false`** .

Logical connectives

The following logical connectives can be used for linking logical terms in a expression, i.e., terms that return a boolean value type (**true** or **false**).

Operator	Meaning	Precedence
`NOT` or `!`	logical negation	1 (highest)
`AND` or `&`	logical conjunction	2
`OR` or `|`	logical disjunction	3
`XOR`	exclusive or, i.e., **`a XOR b`** is equivalent to **`a AND !b OR !a AND b`**	3
`IMPLIES` or `IMP`	logical implication, i.e., **`a IMPLIES b`** is equivalent to **`!a OR b`**	4
`XNOR` or `EQV`	logical equivalence, i.e., **`a EQV b`** is equivalent to **`a IMPLIES b AND b IMPLIES a`**	4 (lowest)

Logical connectives are case insensitive, i.e., they can also be written in lower case: **`or`, `and`, `not`, `xor`, `implies`, `imp`, `eqv`** and **`xnor`** .

Conditional operator ? :

(Available since version 2.1.23)

Operator **`? :`** is similar to the one available in languages like C, C++ and JAVA.

- **Format**: **<boolean_expression> ? <term_1> : <term_2>**
  where **<term_1>** and **<term_2>** are terminus of the same type (boolean, number, string, issue list, string list or number list).
- **Behavior**: Its used to construct conditional expressions. The operator evaluates **boolean_expression**, and if it's true value of **term_1** is returned, otherwise **term_2** is returned. It behaves like: **IF** boolean_expression **THEN** term_1 **ELSE** term_2.

Examples:

- **`{00012} != null ? ({00012} - {00057}) / {HOUR} : 0`** , if **Due Date** is not **`null`** , it will return the number of hours from current date-time to **Due Date**, otherwise it will return **`0`** .
- **`timePart({00057}, LOCAL) > 21:00 AND timePart({00057}, LOCAL) < 7:00 ? "Night" : "Day"`** , it will return **`"Night"`** if current time is between 21:00 and 7:00, otherwise it will return **`"Day"`** .

Numbers and Date-Time terms

Literal values

- Examples of valid **numerical** literal values: `1` , `3.0` , `4.2` , `.5`, `-400` , `-1.1` , `-11.5` , `-.02`
- **Date-time** literal formats: **yyyy/MM/dd [hh:mm]** or **yyyy-MM-dd [hh:mm]** , e.g., `2011/03/25 23:15`, `2011-03-25 23:15`, `2011/03/25` and `2011-03-25`
- **Time** literal values format: **hh:mm** , e.g., `08:15` , `23:59` , `00:00`

Field values

Numeric value of **Number**, **Date**, **Date-Time** and **Priority** fields can be inserted in expressions with following notation **{nnnnn}**, e.g., use **`{00012}`** for **Due Date**, and **`{00073}`** for **Number of attachments**.
For checking if a field is initialized you can use **{nnnnn} = null** or **{nnnnn} != null**

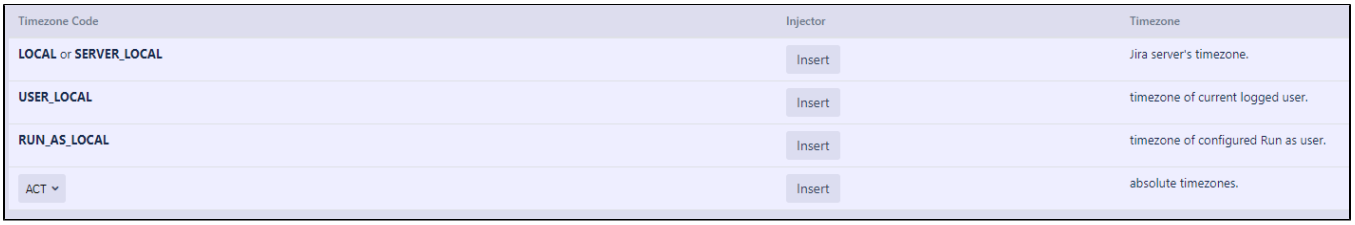
Math Functions

Function	Returned value
abs(number **x**) : number	Returns the absolute value of **x**, i.e., if x>0 it returns **x**, otherwise it returns **-x**.
acos(number **x**) : number Available since version 2.2.7	Returns the arc cosine of **x**; the returned angle is in the range 0.0 through pi.
asin(number **x**) : number Available since version 2.2.7	Returns the arc sine of **x**; the returned angle is in the range 0.0 through pi.
atan(number **x**) : number Available since version 2.2.7	Returns the arc tangent of **x**; the returned angle is in the range 0.0 through pi.
ceil(number **x**) : number	Returns the smallest (closest to negative infinity) value that is larger than or equal to **x** and is equal to a mathematical integer.
cbrt(number **x**) : number Available since version 2.2.7	Returns the cube root of **x**.
cos(number **x**) : number Available since version 2.2.7	Returns the trigonometric cosine of angle **x** expressed in radians.
cosh(number **x**) : number Available since version 2.2.7	Returns the hyperbolic cosine of **x**.
floor(number **x**) : number	Returns the largest (closest to positive infinity) value that is less than or equal to **x** and is equal to a mathematical integer.
log(number **x**) : number Available since version 2.2.7	Returns the natural logarithm (base e) of **x**.
log10(number **x**) : number Available since version 2.2.7	Returns the base 10 logarithm of **x**.
max(number **x**, number **y**) : number	Returns the larger of two numeric values.
min(number **x**, number **y**) : number	Returns the smaller of two numeric values.
modulus(number **dividend**, number **divisor**) : number Available since version 2.2.7	Returns **`dividend - (divisor * floor(dividend / divisor))`** .
pow(number **x**, number **y**) : number	Returns **x** raised to the power **y**.
random() : number	Returns a value with a positive sign, greater than or equal to 0.0 and less than 1.0.
remainder(number **dividend**, number **divisor**) : number	Returns **`dividend - divisor * n`** , where **n** is the closest integer to **`dividend / divisor`** .
round(number **x**) : number	Returns the closest integer to **x**.
sin(number **x**) : number Available since version 2.2.7	Returns the trigonometric sine of angle **x** expressed in radians.
sinh(number **x**) : number Available since version 2.2.7	Returns the hyperbolic sine of **x**.
sqrt(number **x**) : number	Returns the square root of **x**.
tan(number **x**) : number Available since version 2.2.7	Returns the trigonometric tangent of angle **x** expressed in radians.
tanh(number **x**) : number Available since version 2.2.7	Returns the hyperbolic tangent of **x**.
toDegrees(number **x**) : number Available since version 2.2.7	Converts an angle **x** measured in radians to an approximately equivalent angle measured in degrees.
toRadians(number **x**) : number Available since version 2.2.7	Converts an angle **x** measured in degrees to an approximately equivalent angle measured in radians.

Date-Time Functions

Fields of type **Date** and **Date and Time** contain a **numeric value** with the **milliseconds elapsed since January 1, 1970, 00:00:00 GMT**. We usually need to get significative numbers from this numeric value, like YEAR, MONTH, DAY, HOUR, MINUTE, etc. To do it, **Jira Workflow Toolbox** provides a comprehensive set of functions, all of them with TIMEZONE as input argument, since any significative number relative to a timestamp depends on the timezone.

Available time zones	Returned value
LOCAL or SERVER_LOCAL	Returns the time zone **configured for the server** running Jira.
USER_LOCAL	Returns the time zone of the **current user**.
RUN_AS_LOCAL	Returns the time zone of the **selected Run as** user.



Available languages	Returned value
SERVER_LANG	Returns the default language **configured for the server** running Jira.
USER_LANG	Returns the language of the **current user**.
RUN_AS_LANG	Returns the language of the **selected Run as** user.

Function	Returned value
timePart(number **t**, timeZone **time_zone**) : number	Returns the time part of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15** this function returns a numeric value representing time **23:15** in milliseconds.
datePart(number **t**, timeZone **time_zone**) : number	Returns the date part of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15** this function returns a numeric value representing date **March, 25th 2011 00:00** in milliseconds.
second(number **t**, timeZone **time_zone**) : number	Returns the seconds figure of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15:30** this function returns a numeric value representing **30 seconds** in milliseconds.
minute(number **t**, timeZone **time_zone**) : number	Returns the minutes figure of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15:30** this function returns a numeric value representing **15 minutes** in milliseconds.
hour(number **t**, timeZone **time_zone**) : number	Returns the hours figure of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15:30** this function returns a numeric value representing **23 hours** in milliseconds.

dayOfTheWeek(number **t**, timeZone **time_zone**) : number	Returns the day of the week of timestamp represented by numeric value **t** in **time_zone** time zone, with Sunday = 1, Monday = 2, ... Saturday = 7. Example: for timestamp **March, 25th 2011 23:15** this function returns **6** for Friday, represented also by macro **{FRIDAY}** .
dayOfTheMonth(number **t**, timeZone **time_zone**) : number	Returns the day of the month of timestamp represented by numeric value **t** in **time_zone** time zone. Example: for timestamp **March, 25th 2011 23:15** this function returns **25**.
month(number **t**, timeZone **time_zone**) : number	Returns the month of a timestamp represented by numeric value **t** in a certain time zone, with January = 1, February = 2, ... December = 12. Example: for timestamp **March, 25th 2011 23:15** this function returns **3** for March, represented also by macro **{MARCH}** .
year(number **t**, timeZone **time_zone**) : number	Returns the year of a timestamp represented by numeric value **t** in a certain time zone. Example: for timestamp **March, 25th 2011 23:15** this function returns **2011** .
addDays (number **t** , number **n** , timeZone **time_zone**) : number Available since version 2.3.3	Returns a timestamp resultant of adding **n** days to timestamp **t** . You should use this function instead of simply adding `n * {DAY}` , since `{DAY}` is a macro equivalent to `24 * {HOUR}` , not taking into account that once in a year we have a day with 25 or 23 hours due to DST transition. Negative values for **n** are used in order to subtract instead of adding. Example: **addDays(2018/03/27 01:00, -2, LOCAL)** returns **2018/03/25 01:00** .
addMonths(number **t**, number **n**, timeZone **time_zone**) : number	Returns a timestamp resultant of adding **n** months to timestamp **t**. You should use this function instead of simply adding **n * {MONTH}** , since **{MONTH}** is a macro equivalent to **30 * {DAY}** , not taking into account that some months has more or less than 30 days. Negative values for **n** are used in order to subtract instead of adding. Example: for timestamp **t** with value **March, 25th 2011 23:15** calling to **addMonths(t, 3, LOCAL)** will return a timestamp with value **June, 25th 2011 23:15.**
addYears(number **t**, number **n**, timeZone **time_zone**) : number	Returns a timestamp resultant of adding **n** years to timestamp **t**. You should use this function instead of simply adding **12 * {MONTH}** or **365 * {DAY}** , since that won't take into account that some years have 366 days. Negative values for **n** are used in order to subtract instead of adding. Example: for timestamp **t** with value **March, 25th 2011 23:15** calling to **addYears(t, 10, LOCAL)** will return a timestamp with value **March, 25th 2021 23:15.**
addTimeSkippingWeekends(number **t**, number **timeToBeAdded**, timeZone **time_zone**) : number	Adds **timeToBeAdded** to **t** with the difference that weekends don't count in the sum, e.g., if **t** represents a date-time which coincides with a Saturday, adding **timeToBeAdded = 2 * {HOUR}** will return a **date-time for next Monday at 02:00** . Use negative values at **timeToBeAdded** for subtracting time from **t**.
addTimeSkippingWeekends(number **t**, number **timeToBeAdded**, timeZone **time_zone**, number **beginning_of_weekend**, number **end_of_weekend**) : number Available since version 2.2.7	Same as previous function, but with a custom defined weekend. Arguments **beginning_of_weekend** and **end_of_weekend** take values **{MONDAY}** , **{TUESDAY}** ... **{SUNDAY}** . Example of usage for adding 12 hours to **Current date and time** using Israeli weekend: **addTimeSkippingWeekends({00057}, 12 * {HOUR}, LOCAL, {FRIDAY}, {SATURDAY})** , being **{00057}** field code for **Current date and time**.
addDaysSkippingWeekends(number **t**, number **n**, timeZone **time_zone**) : number	Returns a timestamp equivalent of **t + n*{DAY}** with the difference that weekends don't count in the sum, e.g., if **t** represents a timestamp which coincides with a Friday, adding n = 1 will return a date-time for next Monday. Negative values for **n** are used in order to subtract days to **t**. Note: **n** cannot be higher than 50000. Example: **Set "Due date" 6 natural days (or work days) earlier than a "Date Picker" custom field**
addDaysSkippingWeekends(number **t**, number **n**, timeZone **time_zone**, number **beginning_of_weekend**, number **end_of_weekend**) : number Available since version 2.2.7	Same as previous function, but with a custom defined weekend. Arguments **beginning_of_weekend** and **end_of_weekend** take values **{MONDAY}, {TUESDAY}** ... **{SUNDAY}** . Note: **n** cannot be higher than 50000. Example of usage for adding 10 workdays to **Due date** using Israeli weekend: **addDaysSkippingWeekends({00012}, 10, LOCAL, {FRIDAY}, {SATURDAY})** , being **{00012}** field code for **Due date**.
subtractDatesSkippingWeekends(number **minuend_date**, number **subtrahend_date**, timeZone **time_zone**) : number	Returns a timestamp equivalent **"minuend_date - subtrahend_date"** subtracting weekend periods from the result, i.e., you get the elapsed working time from subtrahend_date to minuend_date.
subtractDatesSkippingWeekends(number **minuend_date**, number **subtrahend_date**, timeZone **time_zone**, number **beginning_of_weekend**, number **end_of_weekend**) : number Available since version 2.2.7	Same as previous function, but with a custom defined weekend. Arguments **beginning_of_weekend** and **end_of_weekend** take values **{MONDAY}, {TUESDAY}** ... **{SUNDAY}** . Example of usage calculating the worktime from **Creation** to **Resolution** using Israeli weekend: **subtractDatesSkippingWeekends({00112}, {00009}, LOCAL, {FRIDAY}, {SATURDAY})** , being **{00112}** field code for **Resolution date and time**, and **{00009}** field code for **Creation date and time**.

dateToString(number **t**, timeZone **time_zone**, **language**) : string	Returns a string representing the date-time value at **t**, in a certain **time zone**, and in a certain **language**. This function is useful in post-function **Copy parsed text to a field** to represent as a string the result of a time expression.
dateTime(number **year**, number **month**, number **dayOfMonth**, number **hourOfDay**, number **minute**, timeZone **time_zone**) : number Available since version 2.3.3	This function is used for obtaining a date-time literal value from a set of numeric values representing a date-time timestamp. Example: **`dateTime(2018, 03, 25, 23, 15, LOCAL)`** returns **`2018/03/25 23:15`**.
dateTimeToString(number **t**, timeZone **time_zone**, **language**) : string	Returns a string representing the date-time value at **t**, in a certain **time zone**, and in a certain **language**. This function is useful in post-function **Copy parsed text to a field** to represent as a string the result of a time expression.
dateTimeToString(number **t**, string **date_time_pattern** , **language**) : string Available since version 2.1.33	Returns a string representing the date-time value at **t** with a certain custom format defined by **date_time_pattern** string parameter, using a certain language when using words for months, days of the week, etc. This function is useful in post-function **Copy parsed text to a field** to represent as a string the result of a time expression. Example: d**`ateTimeToString(2011-03-25 11:30, "yyyy.MM.dd 'at' HH:mm:ss", USER_LANG)`** returns string **"2011.03.25 at 11:30:00"**.
dateTimeToString(number **t**, string **date_time_pattern** , timeZone **time_zone**, **language**) : string Available since version 2.4.0	Returns a string representing the date-time value at **t** with a certain custom format defined by **date_time_pattern** string parameter, in a certain timezone **time_zone**, using a certain language when using words for months, days of the week, etc. This function is useful in post-function **Copy parsed text to a field** to represent as a string the result of a time expression. Example: d**`ateTimeToString(0, "yyyy.MM.dd 'at' HH:mm:ss", GMT, USER_LANG)`** returns string **"1970.01.01 at 00:00:00"**. Example: d**`ateTimeToString(0, "yyyy.MM.dd 'at' HH:mm:ss", MST, USER_LANG)`** returns string **"1969.12.31 at 17:00:00"**.
daysInTheMonth(number **t**, timeZone **time_zone**) : number Available since version 2.3.3	Returns the number of days in the month of timestamp **t** in timezone **time_zone**. Example: **`daysInTheMonth(2016/02/28 00:00, LOCAL)`** returns **`29`**, taking into account that 2016 is a leap year.
monthToString(number **t**, timeZone **time_zone**, **language**) : string	Returns a string with the **name of the month** for a date-time **t**, in a certain **time zone**, and in a certain **language**. This function can be used in post-function **Copy parsed text to a field** to write the name of the month of a date-time field or expression.
dayOfTheWeekToString(number **t**, timeZone **time_zone**, **language**) : string	Returns a string with the **day of the week** for a date-time **t**, in a certain **time zone**, and in a certain **language**. This function is useful in post-function **Copy parsed text to a field** to write the day of the week of a date-time field or expression.
stringToDate(string **s**, timeZone **time_zone**) : number Available since version 2.1.26	Returns a numeric value with the date-time represented by string **s**. The numeric value returned corresponds to the milliseconds elapsed since **January 1, 1970, 00:00:00 GMT**. Valid input string formats are **yyyy/MM/dd HH:mm**, **yyyy-MM-dd HH:mm**, **yyyy/MM/dd**, **yyyy-MM-dd**, also formats relative to current time like in JQL queries: "**w**" (weeks), "**d**" (days), "**h**" (hours) or "**m**" (minutes), or format defined at system property **jira.date.time.picker.java.format**. Example: **Validation based on a Date type Project Property**
stringToDate(string **s**, string **date_time_pattern**) : number Available since version 2.1.33	Returns a numeric value with the date-time represented by string **s**. Expected format of value at parameter "**s**" is defined by **date_time_pattern** string parameter. The numeric value returned corresponds to the milliseconds elapsed since **January 1, 1970, 00:00:00 GMT**. Example: **`stringToDate("2011.03.25 at 11:30:00", "yyyy.MM.dd 'at' HH:mm:ss")`** returns a date-time numeric value that can be used for setting a Date Time picker custom field.
stringToDate(string **s**, string **date_time_pattern** , string language , string country) : number Available since version 2.2.29	Returns a numeric value with the date-time represented by string **s**. Expected format of value at parameter "**s**" is defined by **date_time_pattern** string parameter for a specific **language** (language code ISO 639-2) and **country** (country code ISO 3166 alpha-2). The numeric value returned corresponds to the milliseconds elapsed since **January 1, 1970, 00:00:00 GMT**. Example: **`stringToDate("Dec 7, 2016 2:10:25 AM PST", "MMM d, yyyy h:mm:ss a z", "eng", "US")`** returns a date-time numeric value that can be used for setting a Date Time picker custom field.

timeInValue(string field **field**, boolean expression **predicate**) : number Available since version 2.6.0	Returns the number of milliseconds a string field with code **%{nnnnn}** of the current issue has had a value satisfying a boolean expression **predicate**, where the string value of the field with code **%{nnnnn}** is represented by **^%**. Example: **timeInValue(%{00000}, ^% ~~ "ERROR" OR ^% ~~ "WARNING")** returns the number of milliseconds the field summary (field code **%{00000}**) of the current issue has contained any of the words "**ERROR**" or "**WARNING**", ignoring the case. Example: **timeInValue(%{00094}, count(toStringList(^%, ",")) > 1)** returns the number of milliseconds the field **components** (field code **%{00094}**) of the current issue has contained **more than one selected component**. Example: **timeInValue(%{00017}, ^% in ["Critical", "High"])** returns the number of milliseconds the field **priority** (field code **%{00017}**) of the current issue has had a value of **Critical** or **High**.
timeInValue(number field **field**, boolean expression **predicate**) : number Available since version 2.6.0	Returns the number of milliseconds a number or date-time field with code **{nnnnn}** of the current issue has had a value satisfying a boolean expression **predicate**, where the numeric value of the field with code **{nnnnn}** is represented by **^**. Example: **timeInValue({00012}, ^ != null)** returns the number of milliseconds the field **Due date** (field code **{00012}**) of the current issue has had a value. Example: **timeInValue({10001}, ^ >= 5 AND ^ <= 10)** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) of the current issue has remained between 5 and 10. Example: **timeInValue({10001}, modulus(^, 2) = 0)** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) of the current issue has had an even value (2, 4, 6,...).
timeInValue(string field **field**, issue list **issues**, boolean expression **predicate**) : number Available since version 2.6.0	Returns the sum of milliseconds a string field with code **%{nnnnn}** has had a value satisfying a boolean expression **predicate** in distinct issues, where the string value of the field with code **%{nnnnn}** is represented by **^%**. Example: **timeInValue(%{00000}, subtasks(), ^% ~~ "ERROR" OR ^% ~~ "WARNING")** returns the sum of milliseconds the field **summary** (field code **%{00000}**) of all sub-tasks of the current issue have contained any of the words "**ERROR**" or "**WARNING**", ignoring the case. Example: **timeInValue(%{00094}, epic(), count(toStringList(^%, ",")) > 1)** returns the number of milliseconds the field **components** (field code **%{00094}**) in a linked Epic issue have contained more than one selected component. Example: **timeInValue(%{00017}, filterByIssueType(linkedIssues(), "Bug, New Feature"), ^% in ["Critical", "High"])** returns the sum of milliseconds all linked Bugs and New Features of the current issue have had a **priority** (field code **%{00017}**) value of **Critical** or **High**.
timeInValue(number field **field**, issue list **issues**, boolean expression **predicate**) : number Available since version 2.6.0	Returns the sum of milliseconds a number or date-time field with code **{nnnnn}** has had a value satisfying a boolean expression **predicate** in distinct issues, where the numeric value of the field with code **{nnnnn}** is represented by **^**. Example: **timeInValue({00012}, subtasks(), ^ != null)** returns the number of milliseconds the field **Due Date** (field code **{00012}**) of all sub-tasks of the current issue has had a value. Example: **timeInValue({10001}, epic(), ^ >= 5 AND ^ <= 10)** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) of an Epic issue has had a value between 5 and 10. Example: **timeInValue({10001}, filterByIssueType(linkedIssues(), "Bug, New Feature"), modulus(^, 2) = 0)** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) has had an even value in any linked Bug or New Feature.

timeInValue(string field **field**, boolean expression **predicate**, string **schedule_name**, timeZone **time_zone**) : number *Available since version 2.6.0*	Returns the number of milliseconds a string field with code **%{nnnnn}** of the current issue has had a value satisfying a boolean expression **predicate**, where the string value of the field with code **%{nnnnn}** is represented by **^%**. The time being calculated by this function is only counted during a defined schedule with name **schedule_name** for timeZone **time_zone**. Example: **`timeInValue(%{00000}, ^% ~~ "ERROR" OR ^% ~~ "WARNING", "my_schedule", LOCAL)`** returns the number of milliseconds the field **summary** (field code **%{00000}**) of the current issue has contained any of the words "**ERROR**" or "**WARNING**", ignoring the case, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue(%{00094}, count(toStringList(^%, ",")) > 1, "my_schedule", LOCAL)`** returns the number of milliseconds the field **components** (field code **%{00094}**) of the current issue has contained more than one selected component, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue(%{00017}, ^% in ["Critical", "High"], "my_schedule", LOCAL)`** returns the number of milliseconds the current issue has had a **priority** value of **Critical** or **High** (field code **%{00017}**), within a schedule named **my_schedule** for the server's default **time_zone**.
timeInValue(number field **field**, boolean expression **predicate**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.6.0	Returns the number of milliseconds of a number or date-time field with code **{nnnnn}** of the current issue has had a values satisfying a boolean expression **predicate**, where the numeric value of the field with code **{nnnnn}** is represented by **^**. The time being calculated by this function is only counted during a defined schedule with name **schedule_name** for timeZone **time_zone**. Example: **`timeInValue({00012}, ^ != null, "my_schedule", LOCAL)`** returns the number of milliseconds the field **Due Date** (field code **{00012}**) of the current issue has had a value, ignoring the case, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue({10001}, ^ >= 5 AND ^ <= 10, "my_schedule", LOCAL)`** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) of the current issue has had a value between 5 and 10, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue({10001}, modulus(^, 2) = 0, "my_schedule", LOCAL)`** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) in current issue has had an even value, within a schedule named **my_schedule** for the server's default **time_zone**.
timeInValue(string field **field**, issue list **issues**, boolean expression **predicate**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.6.0	Returns the sum of milliseconds a string field with code **%{nnnnn}** has had a value satisfying a boolean expression **predicate** in distinct issues, where the value of the field with code **%{nnnnn}** is represented by **^%**. The time being calculated by this function is only counted during a defined schedule with name **schedule_name** for timeZone **time_zone**. Example: **`timeInValue(%{00000}, subtasks(), ^% ~~ "ERROR" OR ^% ~~ "WARNING", "my_schedule", LOCAL)`** returns the sum of milliseconds the fields **summary** (field code **%{00000}**) of all sub-tasks of the current issue have contained any of the words "**ERROR**" or "**WARNING**", ignoring the case, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue(%{00094}, epic(), count(toStringList(^%, ",")) > 1, "my_schedule", LOCAL)`** returns the number of milliseconds the field **components** (field code **%{00094}**) in the linked Epic issue has contained more than one selected component, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue(%{00017}, filterByIssueType(linkedIssues(), "Bug, New Feature"), ^% in ["Critical", "High"], "my_schedule", LOCAL)`** returns the sum of milliseconds all linked Bugs and New Features of the current issue have had a **priority** (field code **%{00017}**) value of **Critical** or **High**, within a schedule named **my_schedule** for the server's default **time_zone**.
timeInValue(number field **field**, issue list **issues**, boolean expression **predicate**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.6.0	Returns the sum of milliseconds number or date-time field with code **{nnnnn}** has had a value satisfying a boolean expression **predicate** in distinct issues, where the numeric value of the field with code **{nnnnn}** is represented by **^**. The time being calculated by this function is only counted during a defined schedule with name **schedule_name** for timeZone **time_zone**. Example: **`timeInValue({00012}, subtasks(), ^ != null, "my_schedule", LOCAL)`** returns the number of milliseconds the field **Due date** (field code **{00012}**) of all sub-tasks of the current issue have had a value, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue({10001}, epic(), ^ >= 5 AND ^ <= 10, "my_schedule", LOCAL)`** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) in the linked Epic issue has had a value between 5 and 10, within a schedule named **my_schedule** for the server's default **time_zone**. Example: **`timeInValue({10001}, filterByIssueType(linkedIssues(), "Bug, New Feature"), modulus(^, 2) = 0, "my_schedule", LOCAL)`** returns the number of milliseconds a hypothetical numeric field called **Passengers** (field code **{10001}**) has had an even value in any linked Bug or New Feature, within a schedule named **my_schedule** for the server's default **time_zone**.

timeLogged(issue list **issues**) : number Available since version 2.3.3	Returns the sum of all the time logged in **issues** in milliseconds. Example: **`timeLogged(subtasks())`** returns the sum of time logged in current issue's sub-tasks in milliseconds.
timeLogged(issue list **issues**, number **datetime_ini**, number **datetime_end**) : number Available since version 2.3.3	Returns the sum of all the time logged in **issues** in time interval defined by timestamps **datetime_ini** and **datetime_end**. If one or both parameters **datetime_ini** and **datetime_end** are **null**, then it's assumed that the time period hasn't low or high time limit respectively. Logged time is returned in milliseconds. Example: **`timeLogged(issuesUnderEpic(), datePart({00057}, LOCAL), addDays(datePart({00057}, LOCAL), 1, LOCAL))`** returns the sum of time logged today in issues under current issue's Epic. Note that **`{00057}`** is field code for **Current date and time**.
timeLogged(issue list **issues**, string **user**) : number Available since version 2.3.3	Returns all the time logged in issues by user with username **user**. Logged time is returned in milliseconds. Argument **user** can contain a single user name (not be confused with user's full name), or a comma separated list of usernames, group names or project role names. Example: **`timeLogged(linkedIssues(), %{00003})`** returns the sum of time logged by the assignee on linked issues. Note that **`%{00003}`** is field code for **Assignee**.
timeLogged(issue list **issues**, number **datetime_ini**, number **datetime_end**, string **user**) : number Available since version 2.3.3	Returns the sum of all the time logged in issues by **user** in time interval defined by timestamps **datetime_ini** and **datetime_end**. If one or both parameters **datetime_ini** and **datetime_end** are **null**, then it's assumed that the time interval hasn't low or high time limit respectively. Logged time is returned in milliseconds. Argument **user** can contain a single username (not be confused with user's full name), or a comma separated list of usernames, group names or project role names. Example: **`timeLogged(subtasks(), 2018/01/01, 2019/01/01, %{00003})`** returns the sum of time logged by the assignee on subtasks during 2018. Note that **`%{00003}`** is field code for **Assignee**.
formatDuration(number **duration**) : string Available since version 2.2.30	Returns a string with the pretty representation of a time duration, i.e. a subtraction of 2 date-time values, using the language of current user's profile. Example: **`formatDuration(2017-01-31 11:30 - 2017-01-30 00:00)`** **returns** **`"1 day, 11 hours, 30 minutes"`** .
lastDayOfTheMonth(number **t**, timeZone **time_zone**) : number Available since version 2.3.3	Returns the timestamp for the last day of the month of timestamp **t** in timezone **time_zone**. The timestamp returned is at **00:00**, i.e., just the beginning of the day. Example: **`lastDayOfTheMonth(2017/02/05 11:31, LOCAL)`** returns **`2017/02/28 00:00`**.
nextDayOfTheWeek(number **t**, number **dayOfWeek**, timeZone **time_zone**) : number Available since version 2.3.3	Returns the timestamp for the next day of the week represented by **dayOfWeek** since timestamp **t** in timezone **time_zone**. The timestamp returned is at **00:00**, i.e., just the beginning of the day. Example: **`nextDayOfTheWeek(2018/03/01 12:31, {SUNDAY}, LOCAL)`** returns **`2018/03/04 00:00`**, taking into account that 2018/03/01 is Thursday. Example: **`nextDayOfTheWeek(2018/03/01 12:31, {THURSDAY}, LOCAL)`** returns **`2018/03/08 00:00`**.
weekOfTheYear(number **t**, number **firstDayOfTheWeek**, number **minimalDaysInFirstWeek**, timeZone **time_zone**): number Available since version: 2.6.0	Returns the week of the year of the date-time **t** in a certain **time_zone**. The parameter **firstDayOfTheWeek** represents the first day of the week, e.g.: **`{SUNDAY}`** in the U.S., and **`{MONDAY}`** in Germany. The parameter **minimalDaysInFirstWeek** represents the minimal number of days required in the first week of the year, e.g., if the first week is defined as the one that contains the first day of the first month of the year, value 1 should be used. If the minimal number of days required must be a full week (e.g. all days of the week need to be in that year), value 7 should be used. Examples: • **`weekOfTheYear(2023/01/03, {SUNDAY}, 1, LOCAL)`** returns **`1`** • **`weekOfTheYear(2023/01/03, {MONDAY}, 1, LOCAL)`** returns **`2`** • **`weekOfTheYear(2023/01/03, {MONDAY}, 7, LOCAL)`** returns **`1`** • Europe: **`weekOfTheYear(2023/01/04, {MONDAY}, 4, LOCAL)`** • America (South and North), Southern Africa: **`weekOfTheYear(2023/01/04, {SUNDAY}, 1, LOCAL)`** • Australia, New Zealand: **`weekOfTheYear(2023/01/04, {MONDAY}, 1, LOCAL)`** • Algeria: **`weekOfTheYear(2023/01/04, {SATURDAY}, 1, LOCAL)`** More info: https://www.epochconverter.com/weeknumbers
dayOfTheYear(number **t**, timeZone **time_zone**): number Available since version: 2.6.0	Returns the day of the year of date-time **t** in a certain **time_zone**, e.g. for January 1st the value returned will be 1. Example: **`dayOfTheYear(2019/02/01, LOCAL)`** returns **`32`**
shortFormatDuration(number **duration**) : string Available since version 2.2.30	Returns a string with the most compact representation possible of a time duration, i.e. a subtraction of 2 date-time values, using the language of current user's profile. Example: **`shortFormatDuration(2017-01-31 11:30 - 2017-01-30 00:00)`** **returns** **`"1d 11h 30m"`** .

formatWorkDuration(number **duration**) : string Available since version 2.2.34	Similar to function **`formatDuration()`** but using the **workday** and **workweek** defined at time tracking configuration , instead of 24 hours per day and 7 days per week. Example: **`formatWorkDuration(5 * 8 * {HOUR} + 2 * 8 * {HOUR} + 3 * {HOUR})`** returns **`"1 week, 2 days, 3 hours"`**, with 8 hours per **workday** and 5 days per **workweek**.
shortFormatWorkDuration(number **duration**) : string Available since version 2.2.34	Similar to function **shortFormatDuration()** but using the workday and workweek defined at **time tracking configuration** , instead of 24 hours per day and 7 days per week. Example: **`formatWorkDuration(5 * 8 * {HOUR} + 2 * 8 * {HOUR} + 3 * {HOUR})`** returns **`"1w 2d 3h"`** , with 8 hours per **workday** and 5 days per **workweek**.
timeZone(string **timeZone_name**) : timeZone Available since version 2.2.39	Returns the **timeZone** whose name is represented by string **timeZone_name**. This function is useful to obtain a **timeZone** from a string, like the value of a **Project Properties**. Example: **`timeZone("DST")`** returns **DST timeZone**.
timeInStatus(string **status_name**) : number Available since version 2.4.4	Returns the number of **milliseconds** the current issue has remained in a status with name **status_name**. If an issue has been in that status more than once, then **duration will be summed up** and the total time spent in the status will be returned. Example: **`timeInStatus("Open")`** returns the number of milliseconds the current issue has stayed in status **"Open"**. In order to display this value in a more readable way, the milliseconds should be transformed into a more readable unit, like in the following example: **`timeInStatus("Open") / {DAY`**} - for number of days, or **`timeInStatus("Open") / {HOUR`**} - for number of hours.
timeInStatus(string **status_name**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.4.4	Returns the number of **milliseconds** the current issue has remained in a status with name **status_name**within a schedule named **schedule_name** for a given **time_zone** timeZone. If an issue has been in that status more than once, then **duration will be summed up** and the total time spent in the status will be returned. Example: **`timeInStatus("Open", "my_schedule", LOCAL)`** returns the number of milliseconds the current issue has stayed in status **"Open"** within the schedule called **"my_schedule"** matching the **server's default timeZone**.
timeInStatus(string **status_name**, issue list **issues**) : number Available since version 2.4.4	Returns the sum of milliseconds issues in an issue list **issues** have remained in a status with name**status_name** . If an issue from that list has been in that status more than once, then **duration will be summed up** and the total time spent in the status will be returned. Example: **`timeInStatus("Open", subtasks())`** returns the number of milliseconds the current issue's sub-tasks have stayed in status **"Open"**.
timeInStatus(string **status_name**, issue list **issues**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.4.4	Returns the sum of milliseconds issues in an issue list **issues** have remained in a status with name**status_name** within a schedule named **schedule_name** for a given **time_zone** timeZone. If an issue from that list has been in that status more than once, then **duration will be summed up** and the total time spent in the status will be returned. Example: **`timeInStatus("Open", subtasks(), "my_schedule", LOCAL)`** returns the number of milliseconds the current issue's sub-tasks have stayed in status **"Open"** within the schedule called **"my_schedule"** matching the **server's default timeZone**.
fieldChangeTimes(string field **field**, boolean expression **predicate**) : number list Available since version 2.6.0	Returns the timestamps of when a string value of field with code **`%{nnnnn}`** has changed satisfying a certain **predicate** that depends on the values of the field before and after the value change. The string value before the change is represented by **`^0%`**, and after the change by **`^1%`**. The timestamps are returned as a number list sorted in ascending order. Example: **`fieldChangeTimes(%{00000}, ^0% !~~ "IMPORTANT" AND ^1% ~~ "IMPORTANT")`** returns the list of timestamps when the word "**IMPORTANT**" has been added to the current issue's **summary** (field code **`%{00000}`**) ignoring the case. Example: **`fieldChangeTimes(%{00017}, ^0% = null AND ^1% != null)`** returns the list of timestamps of when the issue's **priority** (field code **`%{00017}`**) of the current issue has been set. Example: **`fieldChangeTimes(%{00017}, ^0% not in ["Critical", "High"] AND ^1% in ["Critical", "High"])`** returns the list of timestamps when current issue's **priority** (field code **`%{00017}`**) has become **Critical** or **High**.

fieldChangeTimes(number field **field**, boolean expression **predicate**) : number list Available since version 2.6.0	Returns the timestamps of when a numeric / date-time value of field with code **{nnnnn}** has changed satisfying a certain **predicate** that depends on the values of the field before and after the value change. The numeric value before the change is represented by **^0**, and after the change by **^1**. The timestamps are returned as a number list sorted in ascending order. Example: **fieldChangeTimes({00012}, ^0 < ^1)** returns the timestamps of when the **Due date** (field code **{00012}**) has been edited to a higher value. Example: **fieldChangeTimes({10001}, abs(^0 - ^1) / ^0 >= 0.25)** returns the timestamps of when a hypothetical numeric field called **Passengers** (field code **{10001}**) has been edited with a variation of at least 25% over its previous value.
fieldChangeTimes(string field **field**, issue list **issues**, boolean expression **predicate**) : number list Available since version 2.6.0	Returns the timestamps of when a string value of fields with code **%{nnnnn}** in distinct parameter issues have changed satisfying certain **predicate** that depends on the values of the fields before and after the value change. The string value before the change is represented by **^0%**, and after the change by **^1%**. The timestamps are returned as a number list containing a sequence of sorted numeric values in ascending order for each parameter issue. Example: **fieldChangeTimes(%{00000}, subtasks(), ^0% !~~ "IMPORTANT" AND ^1% ~~ "IMPORTANT")** returns the list of timestamps of when the word "**IMPORTANT**" has been added the the **summary** (field code **%{00000}**) of all current issue's sub-tasks, ignoring the case. Example: f**ieldChangeTimes(%{00017}, epic(), ^0% = null AND ^1% != null)** returns the list of timestamps of when the issue **priority** (field code **%{00017}**) of the current issue's epic has been set. Example: **fieldChangeTimes(%{00017}, linkedIssues("is blocked by"), ^0% not in ["Critical", "High"] AND ^1% in ["Critical", "High"])** returns the list of timestamps of when the **priority** (field code **%{00017}**) in all blocking linked issues has become **Critical** or **High**.
fieldChangeTimes(number field **field**, issue list **issues**, boolean expression **predicate**) : number list Available since version 2.6.0	Returns the timestamps of when a numeric value of fields with code **{nnnnn}** in distinct parameter issues have changed satisfying a certain **predicate** that depends on the values of the fields before and after the value change. The numeric value before the change is represented by **^0**, and after the change by **^1**. The timestamps are returned as a number list containing a sequence of sorted numeric values in ascending order for each parameter issue. Example: **fieldChangeTimes({00012}, subtasks(), ^0 < ^1)** returns the timestamps of when the **Due Date** (field code **{00012}**) has been edited to a higher value in any of the current issue's sub-tasks. Example: **fieldChangeTimes({10001}, epic(), abs(^0 - ^1) / ^0 >= 0.25)** returns the timestamps when a hypothetical numeric field called **Passengers** (field code **{10001}**) in the current issue's epic has been edited with a variation of at least 25% over its previous value
lastFieldChangeTime(string field **field**) : number Available since version 2.6.0	Returns the timestamp of most recent value update of a field with code **%{00000}**. Example: **lastFieldChangeTime(%{00000})** returns the timestamp of the last update of an issue's **summary** (field code **{00000}**).

Functions for Custom Schedules (since version 2.2.39)

Function	Returned value
inSchedule(number **time_instant**, string **schedule_name**, timeZone **time_zone**) : boolean Available since version 2.2.39	Returns `true` if the time instant **time_instant** belongs to the schedule with name **schedule_name** for **time_zone** timezone. Example: **inSchedule(2017/12/01 7:30, "my_schedule", LOCAL)** returns **false** . Example: **inSchedule(2017/12/01 8:00, "my_schedule", LOCAL)** returns **true** . Example: **inSchedule(2017/12/01 17:00, "my_schedule", LOCAL)** returns **false** . Example: **inSchedule(2017/12/04 17:00, "my_schedule", LOCAL)** returns **true** .
inSchedule(number **time_instant**, string **schedule_name**, string **additional_terms**, timeZone **time_zone**) : boolean Available since version 2.2.39	Similar to previous function, but with extra parameter **additional_terms**, which is a string containing extra **Schedules Definition Grammar** clauses that will be attached to schedule with name schedule_name. This function can be used to include personal holidays to an existing schedule. Example without additional terms: **inSchedule(2017/12/04 9:00, "my_schedule", LOCAL)** returns **true** . Example with additional terms: **inSchedule(2017/12/04 9:00, "my_schedule", "2017/12/04 {;}", LOCAL)** returns **false** .

timeDifference(number **higher_instant**, number **lower_instant**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.2.39	Returns the number of milliseconds elapsed from **lower_instant** to **higher_instant** within schedule with name **schedule_name** for **time_zone** timezone. Example: **`timeDifference(2017/12/04 10:01, 2017/12/01 01:00, "my_schedule", LOCAL)`** returns **`8 * {HOUR} + 31 * {MINUTE}`** . Example: **`timeDifference(2017/12/04 17:00, 2017/12/04 14:00, "my_schedule", LOCAL)`** returns **`2 * {HOUR} + 30 * {MINUTE}`** .
timeDifference(number **higher_instant**, number **lower_instant**, string **schedule_name**, string **additional_terms**, timeZone **time_zone**) : number Available since version 2.2.39	Similar to previous function, but with extra parameter **additional_terms**, which is a string containing extra **Schedules Definition Grammar** clauses that will be attached to schedule with name schedule_name. This function can be used to include personal holidays to an existing schedule. Example without additional terms: **`timeDifference(2017/12/05 18:00, 2017/12/01 9:00, "my_schedule", LOCAL)`** returns **`25 * {HOUR}`** . Example with additional terms: **`timeDifference(2017/12/05 18:00, 2017/12/01 9:00, "my_schedule", "2017/12/04 {;}", LOCAL)`** returns **`15 * {HOUR}`** .
addTime(number **base_instant**, number **offset**, string **schedule_name**, timeZone **time_zone**) : number	Returns the time instant resulting of adding **offset** milliseconds to **base_instant** within schedule with name **schedule_name** for **time_zone** timezone. Example: **`addTime(2017/12/01 01:00, 8 * {HOUR} + 31 * {MINUTE}, "my_schedule", LOCAL)`** returns **`2017/12/04 10:01`** . Example: **`addTime(2017/12/04 14:00, 2 * {HOUR} + 30 * {MINUTE}, "my_schedule", LOCAL)`** returns **`2017/12/04 17:00`** . Since version **2.2.41** negative **offset** values are supported: Example: **`addTime(2017/04/24 09:00, - 2 * {HOUR}, "my_schedule", LOCAL)`** returns **`2017/04/21 14:00`** . Example: **`addTime(2017/04/20 20:30, - 5 * {HOUR}, "my_schedule", LOCAL)`** returns **`2017/04/20 13:00`** .
addTime(number **base_instant**, number **offset**, string **schedule_name**, string **additional_terms** , timeZone **time_zone**) : number Available since version 2.2.39	Similar to previous function, but with extra parameter **additional_terms**, which is a string containing extra **Schedules Definition Grammar** clauses that will be attached to schedule with name schedule_name. This function can be used to include personal holidays to an existing schedule. Example without additional terms: **`addTime(2017/12/01 9:00, 25 * {HOUR}, "my_schedule", LOCAL)`** returns **`2017/12/05 18:00`** . Example with additional terms: **`addTime(2017/12/01 9:00, 25 * {HOUR}, "my_schedule", "2017/12/04 {;}", LOCAL)`** returns **`2017/12/06 18:00`** .
nextTime(number **time_instant**, string **schedule_name**, timeZone **time_zone**) : number Available since version 2.2.40	If **time_instant** doesn't belong to schedule with name **schedule_name**, then returns closer time in the future that belongs to the schedule, otherwise returns **time_instant**. Example: **`nextTime(2017/12/01 01:00, "my_schedule", LOCAL)`** returns **`2017/12/01 08:00`** . Example: **`nextTime(2017/12/01 15:00, "my_schedule", LOCAL)`** returns **`2017/12/04 08:00`** . Example: **`nextTime(2017/12/01 08:00, "my_schedule", LOCAL)`** returns **`2017/12/01 08:00`** . Example: **`nextTime(2017/11/30 15:00, "my_schedule", LOCAL)`** returns **`2017/11/30 16:00`** .
nextTime(number **time_instant**, string **schedule_name**, string **additional_terms**, timeZone **time_zone**) : number Available since version 2.2.40	Similar to previous function, but with extra parameter **additional_terms**, which is a string containing extra **Schedules Definition Grammar** clauses that will be attached to schedule with name schedule_name. This function can be used to include personal holidays to an existing schedule. Example without additional terms: **`nextTime(2017/12/01 15:00, "my_schedule", LOCAL)`** returns **`2017/12/04 08:00`** . Example with additional terms: **`nextTime(2017/12/01 15:00, "my_schedule", "2017/12/04 {;}", LOCAL)`** returns **`2017/12/05 8:00`** .

In the examples above we have used schedule "my_schedule", whose definition in **Schedules Definition Grammar** is:

```
MON - THU { 08:00 - 15:30, 16:00 - 19:30; } FRI { 08:00 - 15:00; }
```

```
MON-THU {
   08:30 - 15:30,
   16:00 - 19:30;
}

FRI {
   08:00 - 15:00;
}
```

Note that **2017/04/21** and **2017/12/01** are Fridays.

Custom schedules are defined at **Administration > Add-ons > JIRA WORKFLOW TOOLBOX > Schedules** .

Available languages:		
SERVER_LANG	INSERT	default language configured in JIRA server.
USER_LANG	INSERT	language configured for the current user, i.e., the user executing the transition.

Time Macros

Date-Time values are numeric values representing the number of **milliseconds** elapsed since **January 1, 1970, 00:00:00 GMT**. Macros are **aliases for literal values**. A comprehensive set of time macros is provided to make your expressions more readable.

Macro	Equivalent value
{SECOND}	1000
{MINUTE}	1000 * 60
{HOUR}	1000 * 60 * 60
{DAY}	1000 * 60 * 60 * 24
{WEEK}	1000 * 60 * 60 * 24 * 7
{MONTH}	1000 * 60 * 60 * 24 * 30
{YEAR}	1000 * 60 * 60 * 24 * 365

The following macros are available to be used with function **dayOfTheWeek(t, time_zone)**:

Macro	Equivalent value
{SUNDAY}	1
{MONDAY}	2
{TUESDAY}	3
{WEDNESDAY}	4
{THURSDAY}	5
{FRIDAY}	6
{SATURDAY}	7

The following macros are available to be used with function **month(t, time_zone)**:

Macro	Equivalent value
{JANUARY}	1
{FEBRUARY}	2
{MARCH}	3
{APRIL}	4
{MAY}	5
{JUNE}	6
{JULY}	7
{AUGUST}	8
{SEPTEMBER}	9
{OCTOBER}	10
{NOVEMBER}	11
{DECEMBER}	12

Text-String terms

Literal values

- String literals are written in **double quotes**, e.g., **`"This is a string literal."`**
- Operator + is used for doing strings **concatenation**. e.g., **`"This is" + " a string." = "This is a string."`** .
- **Escape character** is \. This character can precede any of the following characters: **", \, n, r, t, f** and **b** in order to invoke an alternative interpretation. For example, if you want to introduce a double quote in a string literal you should precede it with escape character \ as in **`"The man said: \"Hello!\"."`** , where we are using escape character \ to write string **Hello!** in double quotes.

Field values

Text-String field values can be inserted in expressions using field codes with format **%{nnnnn}**, or **%{nnnnn.i}** for referencing concrete levels in cascading select fields (i = 0 for base level).
For checking if a field is initialized you can use **%{nnnnn} = null** or **%{nnnnn} != null**. For a concrete level in a **Cascading Select** or **Multi-Cascading Select** field, you should use **%{nnnnn.i} = null** or **%{nnnnn.i} != null** .

Any field type has a string value, so you can also use **%{nnnnn}** to insert string values of fields of types **Number**, **Date**, **Date-Time** and **Priority**.

String Functions

Function	Returned value
trim(string **s**) : string	Returns a copy of **s** without leading and trailing blanks (space and tab characters). Example: **`trim(" Hello World! ")`** returns **`"Hello World!"`** .
substring(string **s**, number **beginIndex**, number **endIndex**) : string	Returns a substring of **s** beginning at index **beginIndex** and ending at **endIndex - 1**. Thus the length of the substring is **endIndex-beginIndex**. Example: **`substring("smiles", 1, 5)`** returns **`"mile"`** .
toUpperCase(string **s**) : string	Returns string **s** with all its characters converted to upper case. Example: **`toUpperCase("heLLo WORLD!")`** returns **`"HELLO WORLD!"`** .
toLowerCase(string **s**) : string	Returns string **s** with all its characters converted to lower case. Example: **`toLowerCase("heLLo WORLD!")`** returns **`"hello world!"`** .
capitalizeWords(string **s**) : string Available since version 2.1.34	Capitalizes all the whitespace separated words in string **s**. Example: **`capitalizeWords("heLLo WORLD!")`** returns **`"HeLLo WORLD!"`** .

capitalizeWordsFully(string **s**) : string Available since version 2.1.34	Converts all the whitespace separated words in string **s** into capitalized words, that is each word is made up of a titlecase character and then a series of lowercase characters. Example: **`capitalizeWordsFully("heLLo WORLD!")`** returns **`"Hello World!"`** .
replaceAll(string **s**, string **regexp**, string **replacement**) : string	Returns a copy of **s** where each substring matching the given regular expression **regexp** has been replaced with the given **replacement** string. Example: **`replaceAll(" Hello World ", "\\s", "")`** returns **`"HelloWorld"`** .
replaceFirst(string **s**, string **regexp**, string **replacement**) : string	Returns a copy of **s** where the first substring matching the given regular expression **regexp** has been replaced with the given **replacement** string. Example: **`replaceFirst("Hello World", "l", "_")`** returns **`"He_lo World"`** .
matches(string **s**, string **regexp**) : boolean	Returns a boolean value **true** if string **s** matches regular expression **regexp**, otherwise returns **false**. Example: **`matches("readme.txt", ".*\\.txt$")`** returns **`true`** .
findPattern(string **s**, string **regexp**) : string list Available since version 2.1.32	Returns a string list with all substrings in argument **s** matching regular expression in string argument **regexp**. Example: **`findPattern("Between 1900 and 2000 world population increase from 1.5 to 6.1 billions.", "\\d+(\\.\\d+)?")`** returns **`["1900", "2000", "1.5", "6.1"]`** .
findPatternIgnoreCase(string **s**, string **regexp**) : string list Available since version 2.1.32	Returns a string list with all substrings in argument **s** matching regular expression in string argument **regexp**. Evaluation of the regular expression is carried out in ignoring case mode. Example: **`findPatternIgnoreCase("Grass is Green and Sky is Blue.", "red|green|blue")`** returns **`["Green", "Blue"]`** .
findModify(string **s**, string **regexp**, string **replacement_expression**) : string Available since version 2.2.12	Returns a string like **s**, but where all substrings matching **regexp** have been replaced with the result of evaluating **replacement_expression** against each these substrings. Argument **text_expression** is an expression that returns a **string**, where **^%** represents each of the matching substrings, and **^** represents the order of appearance beginning with **1**. Example: **`findModify("The cure for boredom is curiosity.", "[aeiou]", modulus(^, 2) = 1 ? toUpperCase(^%) : ^%)`** returns **`"ThE curE for bOredOm is cUriOsity."`** .
findReplaceAll(string **s**, string **find**, string **replacement**) : string list Available since version 2.1.32	Returns a string with content of argument **s** where every ocurrence of substring **find** has been replaced with string **replacement**. Example: **`findReplaceAll("Goodbye my love, hello my friend.", "my", "your")`** returns **`"Goodbye your love, hello your friend."`** .
findReplaceAllIgnoreCase(string **s**, string **find**, string **replacement**) : string list Available since version 2.1.32	Returns a string with content of argument **s** where every ocurrence of substring **find**, ignoring the case, has been replaced with string **replacement**. Example: **`findReplaceAllIgnoreCase("Hello my love, hello my friend.", "hello", "Goodbye")`** returns **`"Goodbye my love, Goodbye my friend."`** .
findReplaceFirst(string **s**, string **find**, string **replacement**) : string list Available since version 2.1.32	Returns a string with content of argument **s** where first ocurrence of substring **find** has been replaced with string **replacement**. Example: **`findReplaceFirst("Goodbye my love, hello my friend.", "my", "your")`** returns **`"Goodbye your love, hello my friend."`** .
findReplaceFirstIgnoreCase(string **s**, string **find**, string **replacement**) : string list Available since version 2.1.32	Returns a string with content of argument **s** where first ocurrence of substring **find**, ignoring the case, has been replaced with string **replacement**. Example: **`findReplaceFirstIgnoreCase("Goodbye my love, hello my friend.", "My", "your")`** returns **`"Goodbye your love, hello my friend."`** .
length(string **s**) : number	Returns a numeric value with the length of **s**. Example: **`length("Star Wars")`** returns **`9`** .
getAscii(number **code**) : string Available since version 2.2.12	Returns a string containing the symbol corresponding to a extended ASCII **code** (0 <= **code** <= 255). Example: **`getAscii(65)`** returns **`"A"`** .

similarity(string **s1**, string **s2**) : number Available since version 2.2.29	Returns a numeric value between **0** and **100** representing the percentage of similarity between two strings based on the **Jaro Winkler similarity algorithm** . **100** represents **full equivalence**, and **0** represents **zero similarity** between both string arguments. Examples: **`similarity("JIRA Workflow Toolbox", "jira workflow toolbox")`** returns **`100`** **`similarity("JIRA Workflow Toolbox", "Jira WorflowTolbox")`** returns **`97`** **`similarity("My Gym. Childrens Fitness", "My Gym Children's Fitness Center")`** returns **`92`** **`similarity("D N H Enterprises Inc", "D & H Enterprises, Inc.")`** returns **`91`** **`similarity("ABC Corporation", "ABC Corp'")`** returns **`92`** **`similarity("Hello World!", "Bye bye World!")`** returns **`69`** **`similarity("I caught a lizard", "This is my giraffe")`** returns **`51`**
escapeHTML(string **s**) : string Available since version 2.2.30	Escapes the characters in a string **s** using HTML entities. Example: **`escapeHTML("<Français>"`** **returns** **`"<Fran&ccedil;ais>"`** .
unescapeHTML(string **s**) : string Available since version 2.2.30	Unescapes string **s** containing entity escapes to a string containing the actual Unicode characters corresponding to the escapes. Example: **`unescapeHTML("&quot;bread&quot; & &quot;butter&quot;")`** **returns** **`"\"bread\" & \" butter\""`** .
wikiToHTML(string **s**) : string Available since version 2.2.32	Renders rich text wiki content into HTML. Example: **`wikiToHTML("+Hello *world*!+")`** **returns** **`"<p><ins>Hello <b>world</b>!</ins></p>"`** .
htmlToTxt(string **s**) : string Available since version 2.4.0	Renders html content into plain text by removing all the html tags. Example: **htmlToTxt(" Hello world! ")** **returns** **`"Hello world!"`** .
status(number **id**) : string Available since version 2.5.0	Returns the name of the status with the id **id**. Example: **`status(1)`** returns the status name with the id **1**.
resolution(number **id**) : string Available since version 2.5.0	Returns the name of the resolution with the id **id**. Example: **`status(10000)`** returns the resolution name with the id **10000**.
issueType(number **id**) : string Available since version 2.5.0	Returns the name of the issue type with the id **id**. Example: **`issueType(10000)`** returns the issue type name with the id **10000**.
option(number **id**) : string Available since version 2.5.0	Returns the name of the option with the id **id**. Example: **`option(10000)`** returns the option name with the id **10000.**
priority(number **id**) : string Available since version 2.5.0	Returns the name of the priority with the id **id**. Example: **`priority(1)`** returns the priority name with the id **1.**
issueSecurityLevel(number **id**) : string Available since version 2.5.0	Returns the name of the issue security level with the id **id**. Example: **`issueSecurityLevel(10000)`** returns the issue security level name with the id **10000.**
project(number **id**) : string Available since version 2.5.0	Returns the key of the project with the id **id**. Example: **`project(10000)`** returns the project key of the project with the id **10000.**

List Management Operators

There are 3 different **list-kind** data types. i.e., types that are based on lists, or ordered collections of elements. These data types are: **issue list**, **numb er list** and **string list**, and are described below in this page.

There are 4 utility operators available for working on **list-kind** data types:

Operator	Behavior	Examples
l **APPEND** m	Returns a list with elements in **l** followed by elements in **m**, therefore the number of elements is the sum of the number of elements in **l** and **m**. Order is respected. It may contain repeated elements.	**[1, 2, 3] APPEND [3, 4, 4] = [1, 2, 3, 3, 4, 4]** **["blue", "red", "red"] APPEND ["red", "green"] = ["blue", "red", "red", "red", "green"]** **subtasks() UNION subtasks()** returns a list containing twice all the sub-tasks of current issue.
l **UNION** m	Returns a list with elements in **l** and elements **m** without repetitions. Order is respected.	**[1, 2, 3] UNION [3, 4, 4] = [1, 2, 3, 4]** **["blue", "red", "red"] UNION ["red", "green"] = ["blue", "red", "green"]** **linkedIssues() UNION subtasks()** returns a list with linked issues and sub-tasks of current issue without repetitions.
l **INTERSE CT** m	Returns a list with the elements present in both lists simultaneously. Returned list doesn't contain element repetitions. Order is respected.	**[1, 1, 2, 3] INTERSECT [1, 3, 5] = [1, 3]** **["red", "blue", "blue"] INTERSECT ["blue", "yellow", "yellow"] = ["blue"]** **linkedIssues() INTERSECT subtasks()** returns a list with those sub-tasks which are also linked to current issue.
l **EXCEPT** m	Returns a list with elements in **l** which are not present in list **m**. Returned list doesn't contain element repetitions. Order is respected.	**[1, 2, 2, 3, 3] EXCEPT [2, 5, 6] = [1, 3]** **["red", "red", "blue", "blue", "green"] EXCEPT ["blue", "yellow"] = ["red", "green"]** **linkedIssues() EXCEPT subtasks()** returns a list with linked issues which are not sub-tasks of current issue.

Notice that:

- **l** and **m** are both lists of the same data type: **number**, **string** or **issues**.
- These operators are case insensitive, i.e., they can also be written in lower case: **append, union, intersect** and **except** .
- There are 4 equivalent and homonym functions available for each type of list, and its behavior is exactly equivalent to that of its corresponding operator. This way, you can choose to use operators or functions according to your preference. Although operators yield shorter expressions and with fewer parentheses, the usage of functions produces a more functional consistent syntax.

Precedence Order and Associativity

OPERATORS	PRECEDENCE	ASSOCIATIVITY
l **INTERSECT** m	1 (highest)	Left-to-Right
l **UNION** m, l **EXCEPT** m, l **APPEND** m	2 (lowest)	Left-to-Right

Issue List terms

Issue list data type is an ordered list of issues. This data type is returned by functions for doing issue a selections of issues (linked issues, sub-tasks, issues in a project, and subsets of them).

Issue List Functions (Issue Selection and Fields Values Retrieval)

The following functions are intended to build expressions that reference linked issues, sub-tasks, or doing any kind of issue selections, and for retrieving their field values. Data types returned by these functions are **Issue List** for doing issue selections, and **String List** or **Number List** for retrieving issue fields.

Function	Returned value
subtasks() : issue list	Returns the list of sub-tasks of current issue.
subtasks(issue list **issues**) : issue list	Returns the list of sub-tasks of issues in argument **issues**. Duplicated issues in argument **issues** are discarded. Example: **`subtasks(linkedIssues())`** returns the list of sub-tasks of linked issues.
subtasks(string **issue_keys**) : issue list	Returns the list of sub-tasks of issues whose keys are in **issue_keys**. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issue keys in argument **issue_keys** are discarded. Example: **`subtasks(%{00041})`** returns the list of sub-tasks of parent issue, i.e., sibling sub-tasks plus current sub-task.
siblingSubtasks() : issue list Available since version 2.2.1	Returns the list of sibling sub-tasks of current issue, i.e., all sub-tasks with the same parent as current issue, except current issue. In case current issue is not a sub-task, an empty issue list will be returned. Note that **`siblingSubtasks()`** is equivalent to **`subtasks(%{00041}) EXCEPT issueKeysToIssueList(%{00015})`** , where **%{00041}** is **Parent's issue key** and **%{00015}** is **Issue key**.
siblingSubtasks(issue list **issues**) : issue list Available since version 2.2.1	Returns the list of sibling sub-tasks of issues in argument **issues**, provided they are sub-tasks. Duplicated issues in argument **issues** are discarded.
siblingSubtasks(string **issue_keys**) : issue list Available since version 2.2.1	Returns the list of sibling sub-tasks of issues whose keys are in **issue_keys**, provided they are sub-tasks. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issue keys in argument **issue_keys** are discarded.
linkedIssues() : issue list	Returns the list of issues linked to current issue, including **Epic-Task** links. An issue appears in the output as many times as is linked to current issue. Function **distinct**(issue list) can be used to remove duplicated issues. Example: **`distinct(linkedIssues() EXCEPT linkedIssues("has Epic, is Epic of"))`** returns all the issues linked to current issue, excluding **Epic-Task** issue links.
linkedIssues(string **issue_link_types**) : issue list	Returns the list of issues linked to current one using issue link types in argument **issue_link_types**. Argument **issue_link_types** is a comma separated list of issue link type names, or an empty string ("") for representing all issue link types, i.e., **`linkedIssues("")`** is equivalent to **`linkedIssues()`** . Example: **`linkedIssues("blocks, clones")`** returns all issues linked with to current issue using issue link types **blocks** or **clones**.
linkedIssues(string **issue_link_types**, issue list **issues**) : issue list	Returns the list of issues linked to those ones in argument **issues** using issue link types in argument **issue_link_types**. Duplicated issues in argument **issues** are discarded. Example: **`linkedIssues("", subtasks())`** returns all issues linked to current issue's sub-tasks using any issue link type.
linkedIssues(string **issue_link_types**, string **issue_keys**) : issue list	Returns the list of issues linked to those ones whose keys are in argument **issue_keys**. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issue keys in argument **issue_keys** are discarded. Example: **`linkedIssues("is blocked by", %{00041})`** returns all issues blocking parent issue. Note that **`%{00041}`** is field code for **Parent's issue key**.
transitionLinkedIssues(string **issue_link_types**) : issue list Available since version 2.1.21	Returns the list of issues linked to current one with **links created in current transition screen** using issue link types in argument **issue_link_types**. Argument **issue_link_types** is a comma separated list of issue link type names, or an empty string ("") for representing all issue link types, i.e., **`transitionLinkedIssues("")`** is equivalent to **`transitionLinkedIssues()`** . This function is useful for validating only new issue links created by user in transition screen. Example: **`transitionLinkedIssues("blocks, clones")`** returns the list of issues linked in current transition's screen using issue link types **blocks** and **clones**.
transitivelyLinkedIssues(string **issue_link_types**) : issue list Available since version 2.1.22	Returns the list of issues directly or transitively linked to current issue using issue link types in argument **issue_link_types** . Argument **issue_link_types** is a comma separated list of issue link type names, or an empty string ("") for representing all issue link types. Example of transitive link: if **ISSUE-1 blocks ISSUE-2 blocks ISSUE 3**, then **ISSUE-1** is blocking transitively **ISSUE-3**.
transitivelyLinkedIssues(string **issue_link_types**, issue list **issues**) : issue list Available since version 2.1.22	Returns the list of issues directly or transitively linked to those ones in argument **issues** using issue link types in argument **issue_link_types**. Argument **issue_link_types** is a comma separated list of issue link type names, or an empty string ("") for representing all issue link types.

transitivelyLinkedIssues(string **issue_link_types**, string **issue_keys**) : issue list Available since version 2.1.22	Returns the list of issues directly or transitively linked to those ones in argument **issue_keys** using issue link types in argument **issue_link_types**. Argument **issue_link_types** is a comma separated list of issue link type names, or an empty string ("") for representing all issue link types.
epic() : issue list Available since version 2.3.0	Returns an issue list containing current issue's epic, in case current issue is directly under an epic (e.g., a **Story**). If current issue is a sub-task, then the epic of its parent issue is returned. If current issue is an epic itself, then current issue is returned.
epic(issue list **issues**) : issue list Available since version 2.3.0	Returns the list of epic issues under which those issues in argument **issues** are. If some of those issues are sub-tasks, then the epic of their parent is returned. Duplicated issues in argument **issues** are discarded. Output can contain duplicated issues. Example: **`epic(linkedIssues("is blocked by"))`** returns the list of epics of those issues which are blocking current issue.
epic(string **issue_keys**) : issue list Available since version 2.3.0	Returns the list of epic issues under which those issues with keys in **issue_keys** are. If some of those issues are sub-tasks, the epic of their parent is returned. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issue keys in argument **issue_keys** are discarded. Output can contain duplicated issues. Example: **`epic("CRM-15, HD-21")`** returns the list of epics under which issues with keys **CRM-15** and **HD-21** are.
issuesUnderEpic() : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under current issue's epic (i.e., **stories** are included in the output, but their **sub-tasks** are not). Current issue's epic is obtained using the logic of function **`epic()`** . Current issue is included in the output, except if current issue is an epic itself.
issuesUnderEpic(issue list **issues**) : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under the epic of issues in argument **issues**. Duplicated issues are filtered from output. Example: **`issuesUnderEpic(linkedIssues("is blocked by"))`** returns the list of issues directly under epics of issues blocking current issue.
issuesUnderEpic(string **issue_keys**) : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under the epic of issues with keys in argument **issue_keys**. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issues are filtered from output. Example: **`issuesUnderEpic("CRM-15, HD-21")`** returns the list of issues directly under epic of issues with keys **CRM-15** and **HD-21**.
siblingIssuesUnderEpic() : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under epic of current issue (i.e., **Stories** are included in the output, but their **sub-tasks** are not), excluding current issue. Current issue should be an issue directly under an epic, (i.e., it can't be a **sub-task** or an **epic**).
siblingIssuesUnderEpic(issue list **issues**) : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under the epic of issues in argument **issues**, excluding issues in argument **issues** from the output. Duplicated issues are filtered from output. Example: **`siblingIssuesUnderEpic(linkedIssues("is blocked by"))`** returns the list of issues directly under epics of issues blocking current issue, excluding from the output issues blocking current issue.
siblingIssuesUnderEpic(string **issue_keys**) : issue list Available since version 2.3.0	Returns an issue list containing issues which are directly under the epic of issues with keys in argument **issue_keys**, excluding from the output issues with keys in argument **issue_keys**. Argument **issue_keys** is a comma separated list of issue keys. Duplicated issues are filtered from output. Example: **`siblingIssuesUnderEpic("CRM-15, HD-21")`** returns the list of issues directly under epic of issues with keys **CRM-15** and **HD-21**, excluding from the output issues with keys **CRM-15** and **HD-21**.
issuesFromJQL(string **jql_query**) : issue list Available since version 2.1.33	Returns the list of issues resulting of the execution of a JQL query represented by string argument **jql_query**. Visibility permissions applied are those of **current user**. We advice to use this function for performance reasons when the number of issues to be retrieved or filtered is very high (all issues in a project or various projects). Typically you will want to use this function for replacing any current expression using **getIssuesFromProjects()** function.
issuesFromJQL(string **jql_query**, string **user_name**) : issue list Available since version 2.1.33	Returns the list of issues resulting of the execution of a JQL query represented by string argument **jql_query**. Visibility permissions applied are those of user in argument **user_name**. We advice to use this function for performance reasons when the number of issues to be retrieved or filtered is very high (all issues in a project or various projects). Typically you will want to use this function for replacing any current expression using **getIssuesFromProjects**() function.
filterByIssueType(issue list **issues**, string **issue_types**) : issue list	Filters issue list in argument **issues**, leaving only those issue types appearing in argument **issue_types**. Argument **issue_types** is a comma separated list of issue type names. Example: **`filterByIssueType(subtasks(), "Bug, Improvement, New Feature")`** returns the list of sub-tasks with issue types **Bug, Improvement** or **New Feature**.
filterByStatus(issue list **issues**, string **statuses**) : issue list	Filters issue list in argument **issues**, leaving only those ones in statuses appearing in argument **statuses**. Argument **statuses** is a comma separated list of status names. Example: **`filterByStatus(linkedIssues("is blocked by"), "Open, Reopened, In Progress")`** returns the list of blocking issues in statuses **Open, Reopened** or **In Progress**.

filterByStatusCategory (issue list **issues**, string **status_categories**) : issue list Available since version 2.1.33	Filters issue list in argument **issues**, leaving only those ones in statuses with categories in **status_categories**. Argument **status_categories** is a comma separated list of status category names. Example: **`filterByStatusCategory(linkedIssues("is blocked by"), "New, In Progress")`** returns the list of blocking issues in statuses with categories **New** or **In Progress**.
filterByResolution(issue list **issues**, string **resolutions**) : issue list	Filters issue list in argument **issues**, leaving only those ones with resolutions appearing in argument **resolutions**. Argument **resolutions** is a comma separated list of resolution names. If this argument receives an empty string (**""**), the function will return issues with unset field **Resolution**. Example: **`filterByResolution(subtasks(), "Won't Fix, Cancelled")`** returns the list of sub-tasks with resolutions **Won't Fix** or **Cancelled**.
filterByProject(issue list **issues**, string **projects**) : issue list	Filters issue list in argument **issues**, leaving only those ones in projects present at argument **projects**. Argument **projects** is a comma separated list of project keys. Example: **`filterByProject(linkedIssues(), "CRM, HR")`** returns the list of linked issues belonging to projects with keys **CRM** or **HR**.
filterByProjectCategory(issue list **issues**, string **project_categories**) : issue list Available since version 2.1.33	Filters issue list in argument **issues**, leaving only those ones in projects with category in **project_categories**. Argument **project_categories** is a comma separated list of project category names. Example: **`filterByProjectCategory(linkedIssues(), "Development, Production")`** returns the list of linked issues belonging to projects in categories keys **Development** or **Production**.
filterByFieldValue(issue list **issues**, numeric field **field**, comparison operator **operator**, number **n**) : issue list Available since version 2.1.21	Filters issue list in argument **issues**, leaving only those issues where logical predicate formed by arguments **field operator n** is evaluated as true. Available comparison operators are **`=`**, **`!=`**, **`<`**, **`<=`**, **`>`** and **`>=`** . Argument **field** has format **{nnnnn}**. Example: **`filterByFieldValue(subtasks(), {00079}, >, 1)`** returns sub-tasks with more than one **Affects Version/s**. Note that **`{00079}`** is field code for **Number of affected versions**.
filterByFieldValue(issue list **issues**, string field **field**, comparison operator **operator**, string **s**) : issue list Available since version 2.1.21	Filters issue list in argument **issues**, leaving only those issues where logical predicate formed by arguments **field operator s** is evaluated as true. Available comparison operators are **`=`**, **`!=`**, **`<`**, **`<=`**, **`>`**, **`>=`**, **`~`**, **`!~`**, **`in`** and **`not in`**. Since version 2.2.42 case ignoring operators are also available: **`=~`**, **`!=~`**, **`~~`**, **`!~~`**, **`in~`** and **`not in~`** . Argument **field** has format **%{nnnnn}** for **string** fields, or **%{nnnnn.i}** for **cascading select** fields. Example: **`filterByFieldValue(linkedIssues(), %{00094}, ~, "Web")`** returns linked issues with component **"Web"**. Note that **`%{00094}`** is field code for **Components**.
filterByCardinality (issue list l**, comparison operator** operator**, number** n**)** : issue list	Returns a list with issues in **l** whose cardinality (i.e., the number of times it appears in list **l**) satisfies the comparison **cardinality operator n**. Available comparison operators: **`=`**, **`!=`**, **`<`**, **`<=`**, **`>`** and **`>=`** . Example: **`filterByCardinality(linkedIssues(), >, 1)`** returns a list with all issues linked to current issue with 2 or more issue links.
filterByPredicate(issue list **l**, boolean expression **predicate**) : issue list Available since version 2.1.31	Returns a list with issues in **l** that validate **predicate**. Argument **predicate** is a boolean expression, where references to field values in **l** are done using prefix **^** for field codes. Examples of field references: **^%{00000}** is field code for **Summary**, and **^{00068}** is field code for **Original estimate** of issues in argument **l**. Examples of usage: **`filterByPredicate(subtasks(), ^%{00094} in %{00094})`** returns the list of sub-tasks with selected **Components** in current issue's selected components. **`filterByPredicate(linkedIssues("blocks"), ^%{00028} = null AND ^{00017} < {00017})`** returns the list of unresolved blocked issues with priority higher than current issue's priority.
append(issue list **l**, issue list **m**) : issue list	Returns an issue list with all issues in arguments **l** and **m**. Duplicated issues may appear in output. Use function **union**(l, m) instead, if you want to avoid repetitions. Example: **`append(linkedIssues("is blocked by"), subtasks())`** returns the list blocking issues plus sub-tasks. If a sub-task is also linked with issue link type "**is blocked by**", it will appear twice in the output list.
union(issue list **l**, issue list **m**) : issue list	Returns an issue list with all issues in argument **l** or in argument **m** without duplicated issues. Example: **`union(linkedIssues(), subtasks())`** returns the list of linked issues and sub-tasks of current issue, without issue repetitions.
except(issue list **l**, issue list **m**) : issue list	Returns an issue list with all issues in argument **l** which are not in argument **m**. Duplicated issues in **l** may appear in output. Use function **distinct()** to remove them if you need to. Example: **`except(linkedIssues(), subtasks())`** returns the list of linked issues removing those which are also sub-tasks of current issue.
intersect(issue list **l**, issue list **m**) : issue list	Returns an issue list with all issues in argument **l** and **m** simultaneously. Example: **`intersect(linkedIssues(), subtasks())`** returns the list of linked issues which are also sub-tasks of current issue.

distinct(issue list **l**) : issue list	Returns a list of issues with all issues in list **l** without any duplication. Example: **`distinct(linkedIssues())`** returns the list of linked issues, with only one occurrence per issue, although an issue may be linked with more than one issue link type.
fieldValue(string field **field**, issue list **issues**) : string list	Returns the list of string values stored in argument **field** in those issues in argument **issues**. Argument **field** has format **%{nnnnn}**, or **%{nnnnn.i}** for cascading select fields. The number of values in output is the number of issues in argument **issues** with **field** set, except for multi-valued fields, for which a value is returned for each selected value in the field. Multi-valued fields are fields of types **Multi Select, Checkboxes, Components, Versions, Multi User Picker, Multi Group Picker, Issue Pickers, Attachments** and **Labels**. Example: **`fieldValue(%{00006}, subtasks())`** returns the list of **reporter users** of sub-tasks. Note that **%{00006}** is field code for **Reporter**.
fieldValue(numeric field **field**, issue list **issues**) : number list	Returns the list of numeric values stored in argument **field** in those issues in argument **issues**. Argument **field** has format **{nnnnn}**. The number of values in output is the number of issues in argument **issues** with **field** set. Example: **`fieldValue({00012}, subtasks())`** returns the list of **Due Dates** of sub-tasks. Note that **{00012}** is code for numeric value of **Due date**.
textOnIssueList(issue list **issues**, string **text_expression**) : string list Available since version 2.2.2	Returns a list of strings resulting of evaluating **text_expression** against each of the issues in argument **issues**. Argument **text_expression** is an expression that returns a **string**, where references to field values of issues in argument issues are done with prefix **^** before field code, e.g., **^%{00000}** is field code for **Summary** in each of the issues in argument **issues**. Example: **`textOnIssueList(subtasks(), ^%{00003} = ^%{00006} ? ^%{00015} : null)`** returns the issue keys of sub-tasks with same user as reporter and as assignee.
mathOnIssueList(issue list **issues**, number **math_time_expression**) : number list Available since version 2.2.2	Returns a list of numbers resulting of evaluating **math_time_expression** against each of the issues in argument **issues**. Argument **math_time_expression** is a math/time expression, where references to field values of issues in argument **issues** are done with prefix **^** before field code, e.g., **^{00012}** is field code for **Due date** in each of the issues in argument **issues**. Example: **`mathOnIssueList(linkedIssues("is blocked by"), (^{00012} != null ? ^{00012} - ^{00009} : 0) / {HOUR})`** returns a list of numbers with the number of days from issue creation to due date for all issues linked using "**is blocked by**" issue link type.
numberOfRemoteIssueLinks(string **issue_link_types**) : number	Returns the number of issue links to other Jira instances using any of the issue link types in argument **issue_link_types**. Argument **issue_link_types** is a comma separated list of issue link type names, or empty string (**""**) for representing all issue link types.
count(issue list **l**) : number	Returns the number of issues in **l**. Example: **`count(filterByResolution(linkedIssues("is blocked by"), ""))`** returns the number of non-resolved blocking issues.
getIssuesFromProjects(string **projects**) : issue list Available since version 2.1.21	Returns an issue list with all issues of projects in argument **projects**. Argument **projects** is a string containing a comma separated list of **project keys** or **project names**. Example: **`getIssuesFromProjects("CRM, HT")`** returns all issues in project **CRM** and **HT**. This function can make your expression run slowly due to the high number of issues retrieved and needing to be filtered. Using **issuesFromJQL()** for retrieving and filtering issues will make your expression run much faster.
first(issue list **l**) : issue list Available since version 2.1.26	Returns a list with the first element in issue list **l**, or an empty list if **l** is an empty list.
last(issue list **l**) : issue list Available since version 2.1.26	Returns a list with the last element in issue list **l**, or an empty list if **l** is an empty list.
nthElement(issue list **l**, number **n**) : issue list Available since version 2.1.27	Returns an issue list with the element at position **n** in issue list **l**, where **n >= 1** and **n <= count(l)**. Since version **2.2.8** returns an **empty list** if **n** is greater than the number of elements in **l**.
sublist(issue list **l**, number **indexFrom**, number **indexTo**) : issue list Available since version 2.1.29	Returns an issue list with elements in **l** from **indexFrom** index to **indexTo** index. Having **indexFrom >= 1** and **indexFrom <= count(l)** and **indexTo >= 1** and **indexTo <= count(l)** and **indexFrom <= indexTo**.
indexOf(string **issue_key**, issue list **l**) : number Available since version 2.1.29	Returns the index in issue list **l** of issue with key **issue_key**. **Zero** is returned when issue is not found in **l**.

indexOf(issue list **element**, issue list **l**) : number Available since version 2.1.29	Returns the index in issue list **l** of first issue in **element**. **Zero** is returned when first issue in **element** is not found in **l**.
sort(issue list **l**, field **field**, order) : issue list Available since version 2.1.27	Returns an issue list with elements in **l** ordered according to values of **field**. Argument **field** has format **{nnnnn}** for numeric and date-time fields, **%{nnnnn}** for string fields, or **%{nnnnn.i}** for cascading select fields. Available orders are **ASC** (for ascending order) and **DESC** (for descending order). Example: **`sort(linkedIssues("is blocked by"), {00012}, ASC)`** returns the list of issues blocking current issue, sorted in ascending order by **Due date**. Note that **{00012}** is code for numeric value of **Due date**.

Number List terms

Number list data type is an ordered list of numbers. This data type is returned, among others, by functions that return values of number fields in a selection of issues (linked issues, sub-tasks, and subsets of them).

Literal values

A **number list** can also be written in literal form using the following format: **[*number*, *number*, ...]**.

Example of number list literal value with 5 elements: **`[1, -2, 3, 3.14, 2.71]`**

Number List Functions

Functions for managing values of type **number list**.

Function	Returned value
filterByCardinality(number list l**, comparison operator** operator**, number** n**)** : number list	Returns a list with numbers in **l** whose cardinality (i.e., the number of times it appears in list **l**) satisfies the comparison **cardinality operator n**. Available comparison operators: **=**, **!=**, **<**, **<=**, **>** and **>=** . Example: **`filterByCardinality([1, 1, 2, 3, 4, 4, 4, 5], >, 1)`** returns the following number list: **`[1, 4]`** .
filterByValue(number list l**, comparison operator** operator**, number** n**)** : number list Available since version 2.1.23	Returns a list with numbers in **l** satisfying the comparison **number_in_list operator n**. Example: **`filterByValue([1, 2, 3, 10, 11, 25, 100], >, 10)`** returns the list of numbers greater than **10**. i.e., **`[11, 25, 100]`**
filterByPredicate(number list **l**, boolean expression **predicate**) : number list Available since version 2.1.31	Returns a list with numbers in **l** that validate **predicate**. Argument **predicate** is a boolean expression, where **^** is used for referencing numeric values in argument **l**. Example: **`filterByPredicate([1, 2, 3, 4], ^ > 2)`** returns values greater than **2**, i.e., **`[3, 4]`** . Example: **`filterByPredicate([1, 2, 3, 4], remainder(^, 2) = 0)`** returns even values, i.e., **`[2, 4]`** .
append(number list **l**, number list **m**) : number list Available since version 2.1.21	Returns a number list with all numbers in arguments **l** and **m**. Duplicated numbers may appear in output. Use function **union**(l, m) instead, if you want to avoid repetitions. Example: **`append([1, 2, 3], [3, 4, 5])`** returns **`[1, 2, 3, 3, 4, 5]`** . Example: **`append(fieldValue({00025}, linkedIssues("is blocked by")), fieldValue({00025}, subtasks()))`** returns a list of numbers with **Total Time Spent (in minutes)** in blocking issues and sub-tasks. This number list can be summed using function **sum()**.
union(number list **l**, number list **m**) : number list Available since version 2.1.21	Returns a number list with all numbers in argument **l** or in argument **m** without duplicated numbers. Example: **`union([1, 2, 3], [3, 4, 5])`** returns **`[1, 2, 3, 4, 5]`** .
except(number list **l**, number list **m**) : number list Available since version 2.1.21	Returns a number list with all numbers in argument **l** which are not in argument **m**. Duplicated numbers in **l** may appear in output. Use function **distinct()** to remove them if you need to. Example: **`except([1, 2, 3, 4, 5], [2, 4])`** returns **`[1, 3, 5]`** .
intersect(number list **l**, number list **m**) : number list Available since version 2.1.21	Returns a number list with all numbers in argument **l** and **m** simultaneously. Example: **`intersect([1, 2, 3, 4, 5], [9, 7, 5, 3, 1])`** returns **`[1, 3, 5]`** .
invertList(number list **l**) : number list Available since version 2.5.0	Returns **l** in inverted order. Example: **`invertList([1, 2, 3])`**returns number list **[3, 2, 1].**

distinct(number list **l**) : number list Available since version 2.1.21	Returns a list of numbers with all numbers in list **l** without any duplication. Example: **`distinct([1, 2, 1, 3, 4, 4, 5])`** returns **`[1, 2, 3, 4, 5]`** . Example: **`distinct(fieldValue({00012}, linkedIssues("is cloned by")))`** returns a list of dates containing due dates of cloning issues, with only one occurrence per due date, although more than one issue may share the same due date.
count(number list **l**) : number	Returns the number of numeric values in **l**. Example: **`count([1, 1, 2, 2])`** returns **`4`** . Example: **`count(subtasks()) - count(fieldValue({00012}, subtasks()))`** returns the number of sub-tasks with field "**Due Date**" unset.
count(number **n**, number list **l**) : number Available since version 2.1.32	Returns the number of times **n** appears in **l**. Example: **`count(1, [1, 1, 2, 2, 1, 0])`** returns **`3`** .
sum(number list **l**) : number	Returns the sum of numeric values in **l**. Example: **`sum([1, 2, 3, 4, 5])`** returns **`15`** . Example: **`sum(fieldValue({00025}, subtasks()))`** returns the total time spent in minutes in all sub-tasks of current issue.
avg(number list **l**) : number	Returns the arithmetic mean of numeric values in **l**. Example: **`avg([1, 2, 3, 4, 5])`** returns **`3`** . Example: **`avg(fieldValue({00024}, linkedIssues("is blocked by")))`** returns the mean of remaining times in minutes among blocking issues.
max(number list **l**) : number	Returns the maximum numeric value in **l**. Example: **`max([1, 2, 5, 4, 3])`** returns **`5`** . Example: **`max(fieldValue({00024}, linkedIssues("is blocked by")))`** returns the maximum remaining times in minutes among blocking issues.
min(number list **l**) : number	Returns the minimum numeric value in **l**. Example: **`min([2, 1, 5, 4, 3])`** returns **`1`** . Example: **`min(fieldValue({00024}, linkedIssues("is blocked by")))`** returns the minimum remaining times in minutes among blocking issues.
first(number list **l**) : number Available since version 2.1.26	Returns the first element in number list **l**, or (since 2.2.8) `null` if **l** is an empty list. Example: **`first([3, 2, 1, 0])`** returns **`3`** .
last(number list **l**) : number Available since version 2.1.26	Returns the first element in number list l, or (since 2.2.8) null if l is an empty list. Example: **`last([3, 2, 1, 0])`** returns **`0`** .
nthElement(number list **l**, number **n**) : number Available since version 2.1.27	Returns element at position **n** in number list **l**, where **n >= 1** and **n <= count(l)**. Since version 2.2.8 returns `null` if **n** is greater than the number of elements in **l**. Example: **`nthElement([5, 6, 7, 8], 3)`** returns **`7`** .
getMatchingValue(string **key**, string list **key_list**, number list **value_list**) : string Available since version 2.2.10	Returns value in **value_list** that is in the same position as **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position `count(key_list) + 1`. Example: `getMatchingValue("Spain", ["USA", "UK", "France", "Spain", "Germany"], ["Washington", "London", "Paris", "Madrid", "Berlin"])` returns `"Madrid"`.
getMatchingValue(string **key**, string list **key_list**, number list **value_list**) : number Available since version 2.2.10	Returns numeric value in **value_list** that is in the same position as string **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position **`count(key_list) + 1`** . Example: **`getMatchingValue("Three", ["One", "Two", "Three", "Four", "Five"], [1, 1+1, 3*1, 4, 4+1])`** returns **`3`** .
getMatchingValue(string **key**, number list **key_list**, string list **value_list**) : string Available since version 2.2.25	Returns numeric value in **value_list** that is in the same position as numeric **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position `count(key_list) + 1`. Example: `getMatchingValue(5, [1, 3, 5, 7, 9], [1, 1+1, 3*1, 4, 4+1])` returns 3.
getMatchingValue(string **key**, number list **key_list**, number list **value_list**) : number Available since version 2.2.25	Returns numeric value in **value_list** that is in the same position as numeric **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position **`count(key_list) + 1`** . Example: **`getMatchingValue(5, [1, 3, 5, 7, 9], [1, 1+1, 3*1, 4, 4+1])`** returns **`3`** .
sublist(number list **l**, number **indexFrom**, number **indexTo**) : number list Available since version 2.1.29	Returns a number list with elements in **l** from **indexFrom** index to **indexTo** index. Having **indexFrom >= 1** and **indexFrom <= count(l)** and **indexTo >= 1** and **indexTo <= count(l)** and **indexFrom <= indexTo**. Example: **`sublist([1, 2, 3, 4, 5], 2, 4)`** returns **`[2, 3, 4]`** .
indexOf(number **element**, number list **l**) : number Available since version 2.1.29	Returns the index of numeric value **element** in number list **l**. **Zero** is returned when **element** is not found in **l**. Example: **`indexOf(1, [5, 2, 1, 4, 1])`** returns **`3`** .

sort(number list **l**, order) : number list Available since version 2.1.27	Returns a number list with elements in **l** sorted in specified order. Available orders are **ASC** (for ascending order) and **DESC** (for descending order). Example: **`sort([2, 4, 3, 1], ASC)`** returns **`[1, 2, 3, 4]`** .
textOnNumberList(number list **numbers**, string **text_expression**) : string list Available since version 2.2.8	Returns a list of strings resulting of evaluating **text_expression** against each of the numeric values in argument **numbers**. Argument **text_expression** is an expression that returns a string, where **^** represents each numeric value in argument **numbers**. Example: **`textOnNumberList([1, 2, 3, 4, 5], substring("smile", 0, ^))`** returns string list **`["s", "sm", "smi", "smil", "smile"]`** .
mathOnNumberList(number list **numbers**, number **math_time_expression**) : number list Available since version 2.2.8	Returns a list of numbers resulting of evaluating **math_time_expression** against each of the numeric values in argument **numbers**. Argument **math_time_expression** is a math/time expression, where **^** represents each numeric value in argument **numbers**. Example: **`mathOnNumberList([1, 2, 3, 4, 5], ^ * 2)`** returns number list **`[2, 4, 6, 8, 10]`** .

String List terms

String list data type is an ordered list of strings. This data type is returned, among others, by functions that return values of string fields in a selection of issues (linked issues, sub-tasks, and subsets of them).

Literal values

A **string list** can also be written in literal form using the following format: **[string, string, ...]**.

Example of number list literal value with 5 elements: **`["Blue", "Green", "Yellow", "Orange", "Red"]`**

String List Functions

Functions for managing values of type **string list**.

Function	Returned value
filterByCardinality(string list l**, comparison operator** operator**, number** n**)** : string list	Returns a list with strings in **l** whose cardinality (i.e., the number of times it appears in list **l**) satisfies the comparison **cardinality operator n**. Available comparison operators: **=**, **!=**, **<**, **<=**, **>** and **>=** . Example: **`filterByCardinality(["tiger", "tiger", "tiger", "tiger", "lion", "lion", "lion", "cat", "cat", "lynx"], <, 3)`** returns **`["cat", "lynx"]`** . Example: **`filterByCardinality(fieldValue(%{00094}, subtasks()), =, count(subtasks()))`** returns a list with the **Components** present in all sub-tasks, i.e., those components common to all sub-tasks of current issue.
filterByValue(string list l**, comparison operator** operator**, string** s**)** : string list Available since version 2.1.23	Returns a list with strings in **l** satisfying the comparison **string_in_list operator s**. Example: **`filterByValue(["John", "Robert", "Kevin", "Mark"], ~, "r")`** returns the list of string containing substring **"r"**. i.e., **`["Robert", "Mark"]`**
filterByPredicate(string list **l**, boolean expression **predicate**) : string list Available since version 2.1.31	Returns a list with strings in **l** that validate **predicate**. Argument **predicate** is a boolean expression, where **^%** is used for referencing string values in argument **l**. Example: **`filterByPredicate(["book", "rose", "sword"], length(^%) > 4)`** returns **`["sword"]`** . Example: **`filterByPredicate(["book", "rose", "sword"], ^% in %{00000} OR ^% in %{00001})`** returns a list with those strings in first argument that also appear in issue **Summary** or **Description**.
append(string list **l**, string list **m**) : string list Available since version 2.1.21	Returns a string list with all strings in arguments **l** and **m**. Duplicated string may appear in output. Use function **union**(l, m) instead, if you want to avoid repetitions. Example: **`append(["blue", "red", "green"], ["red", "green", "yellow"])`** returns **`["blue", "red", "green", "red", "green", "yellow"]`** . Example: **`append(fieldValue(%{00074}, subtasks()), fieldValue(%{00074}, linkedIssues("is blocked by")))`** returns a string list with **Fix Version/s** of sub-tasks and blocking issues.
union(string list **l**, string list **m**) : string list Available since version 2.1.21	Returns a string list with all strings in argument **l** or in argument **m** without duplicated strings. Example: **`union(["blue", "red", "green"], ["red", "green", "yellow"])`** returns **`["blue", "red", "green", "yellow"]`** . Example: **`union(fieldValue(%{00074}, subtasks()), fieldValue(%{00074}, linkedIssues()))`** returns the list of **Fix Version/s** selected among all sub-tasks and linked issues.

except(string list **l**, string list **m**) : string list Available since version 2.1.21	Returns a string list with all strings in argument **l** which are not in argument **m**. Duplicated strings in **l** may appear in output. Use function **distinct()** to remove them if you need to. Example: **`except(["blue", "red", "green", "black"], ["red", "green", "yellow"])`** returns **`["blue", "black"]`** . Example: **`except(fieldValue(%{00074}, subtasks()), fieldValue(%{00074}, linkedIssues()))`** returns the list of **Fix Version/s** in sub-tasks and not in linked issues.
intersect(string list **l**, string list **m**) : string list Available since version 2.1.21	Returns a string list with all strings in argument **l** and **m** simultaneously. Example: **`intersect(["blue", "red", "green", "black"], ["red", "green", "yellow"])`** returns **`["red", "green"]`** . Example: **`union(fieldValue(%{00074}, subtasks()), fieldValue(%{00074}, linkedIssues()))`** returns the list of **Fix Version/s** common to sub-tasks and linked issues.
invertList(string list **l**) : string list Available since version 2.5.0	Returns **l** in inverted order. Example: **`invertList(["first", "second", "third"])`**returns string list **["third", "second", "first"].**
distinct(string list **l**) : string list Available since version 2.1.21	Returns a list of strings with all strings in list **l** without any duplication. Example: **`distinct(["blue", "green", "yellow", "blue", "yellow"])`** returns **`["blue", "green", "yellow"]`** . Example: **`distinct(fieldValue(%{00003}, subtasks()))`** returns the list of assignees to sub-tasks, with only one occurrence per user, although a user may have more than one sub-task assigned.
count(string list **l**) : number	Returns the number of string values in **l**. Example: **`count(["blue", "red", "blue", "black"])`** returns **4** . Example: **`count(distinct(fieldValue(%{00094}, subtasks())))`** returns the number of **Components** selected among all sub-tasks.
count(string **s**, string list **l**) : number Available since version 2.1.32	Returns the number of times **s** appears in **l**. Example: **`count("blue", ["blue", "blue", "red", "red", "blue", "green"])`** returns **3** .
first(string list **l**) : string Available since version 2.1.26	Returns the first element in string list **l**, or (since 2.2.8) `null` if **l** is an empty list. Example: **`first(["blue", "red", "green"])`** returns **`"blue"`** .
last(string list **l**) : string Available since version 2.1.26	Returns the first element in string list **l**, or (since 2.2.8) `null` if **l** is an empty list. Example: **`last(["blue", "red", "green"])`** returns **`"green"`** .
nthElement(string list **l**, number **n**) : string Available since version 2.1.27	Returns element at position **n** in string list **l**, where **n >= 1** and **n <= count(l)**. Since version 2.2.8 returns `null` if **n** is greater than the number of elements in **l**. Example: **`nthElement(["blue", "red", "green"], 2)`** returns **`"red"`** .
getMatchingValue(string **key**, string list **key_list**, string list **value_list**) : string Available since version 2.2.10	Returns string value in **value_list** that is in the same position as string **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position `count`**`(key_list) + 1`** . Example: **`getMatchingValue("Spain", ["USA", "UK", "France", "Spain", "Germany"], ["Washington", "London", "Paris", "Madrid", "Berlin"])`** returns **`"Madrid"`** .
getMatchingValue(string **key**, string list **key_list**, string list **value_list**) : string Available since version 2.2.25	Returns string value in **value_list** that is in the same position as numeric **key** is in **key_list**, or in case **key** doesn't exist in **key_list** and **value_list** has more elements than **key_list**, the element of **value_list** in position `count(key_list) + 1`. Example: **`getMatchingValue(8, [2, 4, 6, 8, 10], ["Washington", "London", "Paris", "Madrid", "Berlin"])`** returns **`"Madrid"`** .
sublist(string list **l**, number **indexFrom**, number **indexTo**) : string list Available since version 2.1.29	Returns a string list with elements in **l** from **indexFrom** index to **indexTo** index. Having **indexFrom >= 1** and **indexFrom <= count(l)** and **indexTo >= 1** and **indexTo <= count(l)** and **indexFrom <= indexTo**. Example: **`sublist(["red", "green", "blue", "purple", "white"], 2, 4)`** returns **`["green", "blue", "purple"]`** .
indexOf(string **element**, string list **l**) : number Available since version 2.1.29	Returns the index of string **element** in string list **l**. **Zero** is returned when **element** is not found in **l**. Example: **`indexOf("blue", ["red", "blue", "green"])`** returns **2** .
sort(string list **l**, order) : string list Available since version 2.1.27	Returns a string list with elements in **l** lexicographically ordered. Available orders are **ASC** (for ascending order) and **DESC** (for descending order). Example: **`sort(["red", "blue", "green"], ASC)`** returns **`["blue", "green", "red"]`** .
textOnStringList(string list **strings**, string **text_expression**) : string list Available since version 2.2.8	Returns a list of strings resulting of evaluating **text_expression** against each of the strings in argument **strings**. Argument **text_expression** is an expression that returns a string, where **^%** represents each string in argument **strings**. Example: **`textOnStringList(["albert", "riCHard", "MARY"], capitalizeWordsFully(^%))`** returns **`["Albert", "Richard", "Mary"]`** .

mathOnStringList(string list **strings**, number **math_time_expression**) : number list Available since version 2.2.8	Returns a list of numbers resulting of evaluating **math_time_expression** against each of the issues in argument **issues**. Argument **math_time_expression** is a math/time expression, where **^%** represents each string in argument **strings**. Example: **`mathOnStringList(["a", "ab", "abc", "abcd", "abcde"], length(^%))`** returns **`[1, 2, 3, 4, 5]`** .

Temporary Value Storage

Available since version 2.6.0

Functions used to retrieve (**get**) values previously stored (**set**) can directly be used in the same expression. The values **can only** be used for the current expression and cannot be reused in another expression.

Function	Returned value
setBoolean(string **variable_name**, boolean **value**) : boolean	Creates a variable named **variable_name** for storing a boolean value, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setBoolean("myBoolean",true)`**
getBoolean(string **variable_name**) : boolean	Returns the value stored in a boolean variable named **variable_name**, which was previously created using the **setBoolean()** function. Example: **`getBoolean("myBoolean")`**
setNumber(string **variable_name**, number **value**) : number	Creates a variable named **variable_name** for storing a number, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setNumber("myNumber",100)`**
getNumber(string **variable_name**) : number	Returns the value stored in a numeric variable named **variable_name**, which was previously created using the **setNumber()** function. Example: **`getNumber("myNumber")`**
setString(string **variable_name**, string **value**) : string	Creates a variable named **variable_name** for storing a string, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setString("myString","Hello World!")`**
getString(string **variable_name**) : string	Returns the value stored in string variable named **variable_name**, which was previously created using the **setString()** function. Example: **`getString("myString")`**
setNumberList(string **variable_name**, number list **value**) : number list	Creates a variable named **variable_name** for storing a number list, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setNumberList("myNumberList",[1,2,3])`**
getNumberList(string **variable_name**) : number list	Returns the value stored in number list variable named **variable_name**, which was previously created using the **setNumberList()** function. Example: **`getNumberList("myNumberList")`**
setStringList(string **variable_name**, string list **value**) : string list	Creates a variable named **variable_name** for storing a string list, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setStringList("myStringList",["Hello","World"])`**
getStringList(string **variable_name**) : string list	Returns the value stored in string list variable named **variable_name**, which was previously created using the **setStringList()** function. Example: **`getStringList("myStringList")`**
setIssueList(string **variable_name**, issue list **value**) : issue list	Creates a variable named **variable_name** for storing an issue list, and assigns it a **value**, which is also returned in order to be used within an expression. Example: **`setIssueList("myIssueList",["KEY-1","KEY-2"])`**

getIssueList(string **variable_name**) : issue list	Returns the value stored in issue list variable named variable_name, which was previously created using setIssueList() function. Example: **`getIssueList("myIssueList")`**

Other Functions

Selectable Fields Functions

Functions for working with **selectable fields**, i.e., fields with a limited domain, i.e., a set of options or possible values. This type of fields includes **Select, Radio Button, Security Level, Multi Select, Checkboxes, Components, Versions, Multi User Picker, Multi Group Picker, Issue Pickers, Attachments** and **Labels**.

Function	Returned value
numberOfSelectedItems(%{nnnnn}) : number	Returns the number of selected items in select or multiselect field with field code **%{nnnnn}**.
numberOfAvailableItems(%{nnnnn}) : number	Returns the number of available options in select or multiselect field with field code **%{nnnnn}**. It's equivalent to **`count(availableItems(%{nnnnn}))`** . Since version 2.2.12 disabled options are discarded.
availableItems(%{nnnnn}) : string list	Returns a string list with available options in select or multiselect field with field code **%{nnnnn}**. Since version 2.2.12 disabled options are discarded. Example: **`availableItems(%{00103})`** returns a string list with all **security levels** available for the project and current user.
availableItems(**%{nnnnn}**, string **option**) : string list Available since version 2.2.10	Returns a string list with the available child options in cascading or multilevel cascading field with ID **%{nnnnn}**, and for option parent **option**. In the case of multilevel cascading fields, a comma separated list of options should be entered. Since version 2.2.12 disabled options are discarded.
allAvailableItems(%{nnnnn}) : string list Available since version 2.2.12	Returns a string list with all available options in select or multiselect field with field code **%{nnnnn}**. Disabled options are included. Example: **`availableItems(%{00103})`** returns a string list with all **security levels** available for the project and current user.
allAvailableItems(**%{nnnnn}**, string **option**) : string list Available since version 2.2.12	Returns a string list with the available child options in cascading or multilevel cascading field with ID **%{nnnnn}**, and for option parent **option**. In the case of multilevel cascading fields, a comma separated list of options should be entered. Disabled options are included.

Versions Management (Requires version 2.1.32 or higher.)

Function	Returned value
unreleasedVersions() : string list	Returns a string list with unreleased version names of current issue's project. Returned versions may be archived. Example: **`toStringList(%{00077}) any in unreleasedVersions()`** validates that at least one affected version is unreleased.
unreleasedVersions(string **projects**) : string list	Returns a string list with unreleased version names of projects in argument **projects**. Returned versions may be archived. Arguments **projects** is a comma separated list of **project keys** or **project names**.
unreleasedVersionsBySequence() : string list	Returns a string list with the unreleased versions in the current project with the default order. Only non-archived versions are returned. The first version in the list is the lowest version in the version table.
releasedVersions() : string list	Returns a string list with released version names of current issue's project. Returned versions may be archived. Example: **`toStringList(%{00074}) in releasedVersions()`** validates that all fixed versions are released.
releasedVersions(string **projects**) : string list	Returns a string list with released version names of projects in argument **projects**. Returned versions may be archived. Arguments **projects** is a comma separated list of **project keys** or **project names**. Example: **`toStringList(^%{00074}) in releasedVersions(^%{00018})`** validates that all fixed versions of a foreign issue are released.
releasedVersionsBySequence() : string list	Returns a string list with the released versions in the current project with the default order. Only non-archived versions are returned. The first version in the list is the lowest version in the version table.

releaseDates(string **versions**) : number list Available since version 2.2.38	Returns a number list with the release dates for versions in string **versions** for current issues project. Parameter **versions** is a comma separated list of version names. Example: **`releaseDates(%{00074})`** returns the list of release dates for **Fix Version/s**. Note that **%{00074}** is field code for **Fix Version/s** .
releaseDates(string **versions**, string **projects**) : number list Available since version 2.2.38	Returns a number list with the release dates for versions in string **versions** for projects in parameter **projects**. Parameter **versions** is a comma separated list of version names. Parameter **projects** is a comma separated list of project keys or project names. Example: **`releaseDates(%{00077}, "CRM")`** returns the list of release dates for affected versions for project with key **"CRM"**. Note that **%{00077}** is field code for **Affects Version's**.
startDates(string **versions**) : number list Available since version 2.3.0	Returns a number list with the start dates for versions in string **versions** for current issues project. Parameter **versions** is a comma separated list of version names. Example: **`startDates(%{00074})`** returns the list of start dates for fixed versions. Note that **%{00074}** is field code for **Fix version/s**.
startDates(string **versions**, string **projects**) : number list Available since version 2.3.0	Returns a number list with the start dates for versions in string **versions** for projects in parameter **projects**. Parameter **versions** is a comma separated list of version names. Parameter **projects** is a comma separated list of project keys or project names. Example: **`startDates(%{00077}, "CRM")`** returns the list of start dates for affected versions for project with key *"* **CRM** *"*. Note that **%{00077}** is field code for **Affects version/s**.
archivedVersions() : string list	Returns a string list with released version names of current issue's project. Returned versions may be archived.
archivedVersions(string **projects**) : string list	Returns a string list with released version names of projects in argument **projects**. Returned versions may either released or unreleased. Arguments **projects** is a comma separated list of **project keys** or **project names**.
latestReleasedVersion() : string	Returns string with the name of the latest released version in current issue's project. Example: **`latestReleasedVersion() in archivedVersions()`** validates that the latest released version in current issue's project is archived.
latestReleasedVersion(string **projects**) : string	Returns string with the name of the latest released version among projects in argument **projects**. Returned versions may either released or unreleased. Arguments **projects** is a comma separated list of **project keys** or **project names**.
latestReleasedUnarchivedVersion(string **projects**) : string Available since version 2.3.0	Returns string with the name of the latest released version excluding archived ones for projects in argument **projects**. Returned versions may either released or unreleased. Arguments **projects** is a comma separated list of **project keys** or **project names**.
earliestUnreleasedVersion() : string	Returns string with the name of the earliest unreleased version in current issue's project. Example: **`earliestUnreleasedVersion() not in archivedVersions()`** validates that earliest unreleased version in current issue's project is not archived.
earliestUnreleasedVersion(string **projects**) : string	Returns string with the name of the earliest unreleased version among projects in argument **projects**. Returned versions may either released or unreleased. Arguments **projects** is a comma separated list of **project keys** or **project names**.
earliestUnreleasedUnarchivedVersion() : string Available since version 2.3.0	Returns string with the name of the earliest unreleased version in current issue's project excluding archived ones.
earliestUnreleasedUnarchivedVersion(string **projects**) : string Available since version 2.3.0	Returns string with the name of the earliest unreleased version excluding archived ones for projects in argument **projects**. Returned versions may either released or unreleased. Arguments **projects** is a comma separated list of **project keys** or **project names**.

User, Group and Role related Functions

Function	Returned value
isInGroup(string **user_name**, string **group_name**) : boolean	Checks if a user is in a group. Argument **user_name** can also be a **comma separated list** of **user names**, **group names** or **role names**. In that case the function will return **true** only if **all users** in the list, groups of the list, and in the roles of the list, are in the group in the second argument. Example: **`isInGroup(%{00003}, "jira-developers")`** returns true if **Assignee** in in group **jira-developers**, where **%{00003}** is field code for **Assignee**.

isInRole(string **user_name**, string **role_name**) : boolean Available since version 2.1.21	Checks if a user or group of users plays a role in current project. Argument **user_name** can also be a **comma separated list** of **user names**, **group names** or **role names**. In that case the function will return **true** only if **all users** in the list, groups of the list, and in the roles of the list, are in project role in the second argument, for current project. Example: **`isInRole(%{00006}, "Testers")`** returns true in **Reporter** is in project role **Testers**, where **%{00006}** is field code for **Reporter**.
isInRole(string **user_name**, string **role_name**, string **project_key**) : boolean	Checks if a user or group of users plays a role in a certain project. Argument **user_name** can also be a **comma separated list** of **user names**, **group names** or **role names**. In that case the function will return **true** only if **all users** in the list, groups of the list, and in the roles of the list, are in role in the second argument, for the project in the third argument. Example: **`isInRole(%{00020}, "Developers", "CRM")`** returns true in **Current user** is in project role **Developers** in project with key **"CRM"**, where **%{00020}** is field code for **Current user**.
isActive(string **user_name**) : boolean	Checks if a user is active. Argument **user_name** can also be a **comma separated list** of **user names**, **group names** or **role names**. In that case the function will return **true** only if **all users** in the list, groups of the list, and in the roles of the list, are active. Example: **`isActive(%{00125})`** returns true if all users who are **component leaders** in current project are active, where **%{00125}** is field code for **Component leaders**.
userFullName(string **user_name**) : string Available since version 2.1.26	Returns a string with the full name of the user in argument **user_name**. Argument **user_name** is a string with a user name, not to be confused with user full name. Example: **`userFullName(%{00020})`** returns the user's full name of current user, where **%{00020}** is field code for **Current user**. Example: **Compose a parsed text including the "full name" or a user selected in a User Picker custom field**
userFullName(string list **user_names**) : string list Available since version 2.2.29	Returns a string list with the full names of the users in argument **user_names**. Argument **user_names** is a string list with user names, not to be confused with users full names. Example: **`userFullName(toStringList(%{00133}))`** returns a list with the users full names of current issue's watchers, where **%{00133}** is field code for **Watchers**.
userEmail(string **user_name**) : string Available since version 2.1.26	Returns a string with the email of the user in argument **user_name**. Argument **user_name** is a string with a user name, not to be confused with user full name. Example: **`userEmail(%{00020})`** returns the email of current user, where **%{00020}** is field code for **Current user**.
userEmail(string list **user_names**) : string list Available since version 2.2.29	Returns a string list with the emails of the users in argument **user_names**. Argument **user_names** is a string list with a user names, not to be confused with users full names. Example: **`userEmail(toStringList(%{00133}))`** returns a list with the emails of current issue's watchers, where **%{00133}** is field code for **Watchers**.
fullNameToUser(string **fullName**) : string Available since version 2.1.32	Returns a string with the name of a user whose full name is equal to argument **fullName**. Returned value is a string with a **user name**.
usersWithEmail(string **email**) : string list Available since version 2.1.32	Returns a string list with the **user names** of those users with emails equal to argument **email**. In case that only one user is expected, function **first**(string list) can be used to extract a string with its user name.
userProperty(string **propertyName**, string **userName**) : string Available since version 2.1.34	Returns the value of the user property with name **propertyName** which belongs to user with user name **userName**. If the user doesn't have the property, `""` will be returned.
userProperty(string **propertyName**, string list **userNames**) : string list Available since version 2.1.34	Returns the list of values of the user property with name **propertyName** in all the users whose names are contained in **userNames**. The output will contain as many strings as users have the property set.
usersInRole(string **projectRoleName**) : string list Available since version 2.2.8	Returns the list of **user names** (not be confused with **full user name**) of those active users playing project role with name **projectRoleName** in current issue's project. Parameter **projectRoleName** can be a comma separated list of project role names, returning the users that play any of the project roles.

usersInRole(string **projectRoleName**, string **projectKey**) : string list Available since version 2.2.8	Equivalent to the previous function but with extra argument **projectKey** for selecting the project argument **projectRoleName** refers to.
usersInGroup(string **groupName**) : string list Available since version 2.2.8	Returns the list of **user names** of those active users in group with name **groupName**. Parameter **groupName** can be a comma separated list of group names, returning the users that belong to any of the groups.
rolesUserPlays(string **userName**) : string list Available since version 2.2.20	Returns the list of **role names** of those project roles the user with name **userName** plays in current project. Parameter **userName** can also be a comma separated list of **user names, group names** and **project role names**, returning the list of project roles for those users represented by input argument.
rolesUserPlays(string **userName**, string **projectKey**) : string list Available since version 2.2.20	Returns the list of **role names** of those project roles the user with name **userName** plays in project with key **projectKey**. Parameter **userName** can also be a comma separated list of **user names, group names** and **project role names**, returning the list of project roles for those users represented by input argument.
groupsUserBelongsTo(string **userName**) : string list Available since version 2.2.20	Returns the list of **group names** of those groups the user with name **userName** belongs to. Parameter **userName** can also be a comma separated list of **user names, group names** and **project role names**, returning the list of project roles for those users represented by input argument.
defaultUserForRole(string **projectRoleName**) : string Available since version 2.2.8	Returns the **user name** of the **Assign to project role** playing project role with name **projectRoleName** in current issue's project, or `""` if no default user is defined for the project role.
defaultUserForRole(string **projectRoleName**, string **projectKey**) : string Available since version 2.2.8	Equivalent to the previous function but with extra argument **projectKey** for selecting the project argument **projectRoleName** refers to.
lastAssigneeInRole(string **projectRoleName**) : string Available since version 2.2.8	Returns the **user name** of the last user who had current issue assigned, and currently plays project role with name **projectRoleName** in current issue's project, or `""` if current issue was never assigned to a user currently in the project role.
lastAssigneeInRole(string **projectRoleName**, string **issueKey**) : string Available since version 2.2.8	Returns the **user name** of the last user who had issue with key **issueKey** assigned, and currently plays project role with name **projectRoleName** in current issue's project, or **`null`** if current issue was never assigned to a user currently in the project role.
leastBusyUserInRole(string **projectRoleName**) : string Available since version 2.2.8	Returns the name of the active user playing project role with name **projectRoleName** in current issue's project, and has the lower number of issues with resolution empty assigned; or `""` if there isn't any user in the project role. Parameter **projectRoleName** can be a comma separated list of project role names, returning the least busy users among the project roles. Example: **`leastBusyUserInRole("Developers")`** returns the user playing role **Developers** in current project with the least number of unresolved issues in all the Jira instance assigned.
leastBusyUserInRole(string **projectRoleName**, string **projectKey**) : string Available since version 2.2.8	Equivalent to the previous function but with extra argument **projectKey** for selecting the project argument **projectRoleName** refers to. Example: **`leastBusyUserInRole("Developers", "CRM")`** returns the user playing role **Developers** in project with key **CRM** with the least number of unresolved issues in all the Jira instance assigned.
leastBusyUserInRole(string **projectRoleName**, string **projectKey**, string **jqlQuery**) : string Available since version 2.2.33	Equivalent to the previous function but with extra argument **jqlQuery**, used for restricting the issues to be considered to pick the least busy user. Example: **`leastBusyUserInRole("Developers", %{00018}, "project = " + %{00018})`** returns the user playing role **Developers** in current project, with the least number of unresolved issues in current project assigned. Note that **%{00018}** is field code for **Project key**.

nextUserInGroup(string **groupName**, string **queueName**) : string Available since version 2.2.33	returns the name of the next active user in group with name **groupName**, for a round-robin queue with name **queueName**. The string **queueName** is an arbitrary name. The queue is automatically created the first time a queue is used in a function call. Each time the function is called on the same pair of arguments **`(group, queue)`** , a different user in the group is returned. The queue can be used in different transitions of the same or different workflows within the same Jira instance. **`null`** is returned if **group** is empty. Example: **`nextUserInGroup("jira-developers", "code-review-queue")`** returns the username of the next user in group **jira-developers** for round-robin queue **code-review-queue**. Each time the function is called with the same pair of arguments, a different username is returned.
projectLeader(string **projectKey**) : string Available since version 2.5.0	Returns the project lead of the **projectKey**. Example: **`projectLeader("SW")`** returns the project lead key from the project with the key **SW**.

Field Value History (available since version 2.1.23)

Functions for accessing previous value a field, or the whole value history of fields. Fields whose value history is accessible by these functions are:

- All the **Custom Fields**
- Summary
- Description
- Assignee
- Reporter
- Due date
- Issue status
- Priority
- Resolution
- Environment
- Fix version/s
- Affects version/s
- Labels
- Components
- Security level

Function	Returned value
previousValue(%{nnnnn}) : string	Returns a string with the previous value of a field for current issue. It will return **`null`** if field was previously uninitialized.
previousValue({nnnnn}) : number	Returns a number with the previous value of a **numeric** or **date field** for current issue. It will return **`null`** if field was previously uninitialized.
previousValue(%{nnnnn.i}) : string	Returns a string with the previous value of a **cascading** or **multi-cascading select field** for current issue **at level i** (with root level = 0). It will return **`null`** if field was previously uninitialized.
fieldHistory(%{nnnnn}) : string list	Returns a list of strings with all the values that a field has ever had in the past for current issue. Values appear in the list in ascending ordered by setting time, i.e., older value has index `1`, and most recent value has index **`count(string_list)`** . Uninitialized field statuses are represented by **empty strings**.
fieldHistory({nnnnn}) : number list	Returns a list of numbers with all the values that a **numeric** or **date-time field** has ever had in the past for current issue. Values appear in the list in ascending ordered by setting time, i.e., older value has index `1`, and most recent value has index **`count(number_list)`** . Uninitialized field statuses are not represented.
fieldHistory(%{nnnnn.i}) : string list	Returns a list of strings with all the values that a **cascading** or **multi-cascading select field** has ever had in the past **for level i** (with root level = 0) in current issue. Values appear in the list in ascending ordered by setting time, i.e., older value has index `1`, and most recent value has index **`count(string_list)`** . Uninitialized field statuses are represented by empty strings.

hasChanged(%{nnnnn}) : boolean Available since version 2.1.29	Returns **true** only if field has changed in current transition. Function **hasChanged(field_code)** is used when we set a validation that is incompatible with a condition in a same transition, typically when validating a value entered in the transition screen. When Jira evaluates the validations in a transition, it also reevaluates the conditions, and if they are not satisfied an **`Action X is invalid`** error message is shown and the transition is not executed. **Example:** Let's suppose we have a boolean condition like **`{00012} = null`** (i.e., **Due date = null**) in a transition, so that it's only shown when **Due date** is empty. This transition also has a transition screen containing field **Due date**, and a boolean validation **`{00012} != null`** , in order to make **Due date** required in the transition. The configuration described above will not work, since both condition and validation are mutually incompatible. We can fix it replacing the boolean condition with **`{00012} = null OR hasChanged(%{00012})`** .
hasChanged({nnnnn}) : boolean Available since version 2.1.29	Returns **true** only if **numeric** or **date-time field** field has changed in current transition.
hasChanged({nnnnn.i}) : boolean Available since version 2.1.29	Returns **true** only if **cascading select field** has changed **for level i** (with root level = 0) in current transition.

Miscellaneous

Function	Returned value
projectProperty(string **property_name**) : string	Returns a string with the value of project property with name **property_name** in current issue's project. Since version 2.2.8 **`null`** is returned if project property doesn't exist. Example: **`projectProperty("maxNumberOfReopenings")`** returns **`"3"`** , provided there is a string **`{maxNumberOfReopenings=3}`** in the description of current issue's project.
projectProperty(string **property_name**, string **project_key**) : string Available since version 2.2	Returns a string with the value of project property with name **property_name** in project with key **project_key**. Since version 2.2.8 **`null`** is returned if project property doesn't exist. Example: **`projectProperty("maxNumberOfReopenings", "CRM")`** returns **`"3"`** , provided there is a string **`{maxNumberOfReopenings=3}`** in the description of project with key **CRM**.
projectPropertyExists(string **property_name**) : boolean Available since version 2.2	Returns **true** only if there is a project property with name **property_name** in current issue's project, i.e., if project's description contains a string like **{property_name=value}**. Example: **`projectPropertyExists("maxNumberOfReopenings")`** returns **`true`** only if there is a string like **`{maxNumberOfReopenings=x}`** in the description of current issue's project.
projectPropertyExists(string **property_name**, string **project_key**) : boolean Available since version 2.2	Returns **true** only if there is a project property with name **property_name** in project with key **project_key**. Example: **`projectPropertyExists("maxNumberOfReopenings", "CRM")`** returns **`true`** only if there is a string like **`{maxNumberOfReopenings=x}`** in the description of project with key `CRM`.
isAClone() : boolean Available since version 2.1.27	Returns **true** only if current issue is a clone of another issue. An issue is a clone of another issue if it's being created by **Jira "Clone" operation**, or has **issue links of type "clones"**. This function if useful for bypassing validations in transition **Create Issue** when the issue is being created by a clone operation.
isJwtTriggeredTransition() : boolean Available since version 2.1.27	Returns **true** only if current transition execution is being **triggered by a Jira Workflow Toolbox post-function**. This function is useful for bypassing validations or post-functions when a transition is being non-interactively executed.
isBulkTriggeredTransition() : boolean Available since version 2.2.12	Returns **true** only if current transition execution is being **triggered by Jira's bulk operation feature. This function is useful for bypassing validations or post-functions when a transition is being executed by a bulk update operation .**
allComments() : string list Available since version 2.1.33	Returns a string list with all the comments in current issue in ascension order by creation date.

allComments(string **issue_keys**) : string list Available since version 2.1.34	Returns a string list with all the comments in issues with keys in **issue_keys**, in order of appearance in **issue_keys**, and by creation date in ascension order. Argument **issue_keys** is a comma separated list of issue keys. Example: **`allComments(%{00041})`** returns parent issue's comments, where **%{00041}** is field code for **parent issue's keys**.
allComments(issue list **l**) : string list Available since version 2.1.33	Returns a string list with all the comments in issues in **l**, in order of appearance in **l**, and by creation date in ascension order. Example: **`allComments(subtasks())`** returns all the comments in all the sub-tasks of current issue.
allCommenters() : string list Available since version 2.1.33	Returns a string list with the user names of comment authors and updaters in current issue, in ascension order by commenter's actuation time. Since version **2.2.9** a same user appears in the output as many times as comments has created and updated.
allCommentCreators() : string list Available since version 2.2.30	Returns a string list with the user names of comment creators in current issue, in ascension order by commenter's actuation time. A same user appears in the output as many times as comments has created. For anonimous comments an empty string ("") is returned.
allCommentCreators(string **issue_keys**) : string list Available since version 2.2.30	Returns a string list with the user names of comment creators in issues with keys in **issue_keys**, in order of appearance in **issue_keys**, and in ascension order by commenter's actuation time. A same user appears in the output as many times as comments has created. For anonimous comments an empty string ("") is returned.
allCommentCreators(string list **l**) : string list Available since version 2.2.30	Returns a string list with the user names of comment creators of issues in **l**, in order of appearance in **l**, and in ascension order by commenter's actuation time. A same user appears in the output as many times as comments has created. For anonimous comments an empty string ("") is returned.
allCommenters(string **issue_keys**) : string list Available since version 2.1.34	Returns a string list with the user names of comment authors and updaters of issues with keys in **issue_keys**, in order of appearance in **issue_keys**, and in ascension order by commenter's actuation time. Argument **issue_keys** is a comma separated list of issue keys. Example: **`allComments(%{00041})`** returns a string list with the user names of comment authors of parent issue, where **%{00041}** is field code for **parent issue's keys**.
allCommenters(issue list **l**) : string list Available since version 2.1.33	Returns a string list with the user names of comment authors and updaters of issues in **l** in ascension order by actuation time, in order of appearance in **l**, and in ascension order by commenter's actuation time. Example: **`allCommenters(linkedIssues("is blocked by"))`** returns a list with all the commenters and comment updaters for linked issues blocking current issue.
allCommentDates() : number list Available since version 2.5.0	Returns the dates of related comments as a number list.
allCommentDates(string **issue_keys**) : number list Available since version 2.5.0	Returns the dates of related comments from the entered **issue_keys** as a number list. Example: **`allCommentDates(["SW-1", "SW-2"])`** returns a list with all the comment dates for issues with the key **SW-1** and **SW-2**.
allCommentDates(issue list **issue_list**) : number list Available since version 2.5.0	Returns the dates of related comments in the entered **issue_list** as a number list. Example: **`allCommentDates(issuesFromJQL("project = softwareProject"))`** returns a list with all the comment dates for all issues in project **softwareProject**.
usersWhoTransitioned(string **origin_status**, string **destination_status**) : string list Available since version 2.2.7	Returns a **string list** with the names of the users who transitioned current issue from **origin_status** to **destination_status**, order ascending by time. An empty string as argument is interpreted as **any status**. Example: **`last(usersWhoTransitioned("Open", "In Progress"))`** returns the name of the user who executed transition **"Start Progress"** more recently. Example: **Assign issue to last user who executed a certain transition in the workflow**
usersWhoTransitioned(string **origin_status**, string **destination_status**, string **issue_key**) : string list Available since version 2.2.7	Returns a **string list** with the names of the users who transitioned current issue from **origin_status** to **destination_status**, order ascending by time. An empty string as argument is interpreted as **any status**. Example: **`count(usersWhoTransitioned("Open", "In Progress", %{00041}))`** returns the number of times transition **"Start Progress"** has been executed in parent issue.
timesOfTransition(string **origin_status**, string **destination_status**) : string list Available since version 2.2.7	Returns a **number list** with the times when current issue was transitioned from **origin_status** to **destination_status**, order ascending by time. An empty string as argument is interpreted as **any status**. Example: **`last(timesOfTransition("", "Resolved"))`** returns the most recent time when the issue was resolved.
timesOfTransition(string **origin_status**, string **destination_status**, string **issue_key**) : string list Available since version 2.2.7	Returns a **number list** with the times when issue with key **issue_key** was transitioned from **origin_status** to **destination_status**, order ascending by time. An empty string as argument is interpreted as **any status**. Example: **`first(usersWhoTransitioned("Closed", "", %{00041}))`** returns the first time when parent issue was reopened.
filledInTransitionScreen(%{nnnnn}) : boolean Available since version 2.2.7	Returns **true** only if selected field has an actual value in current transition's screen. Example: **`filledInTransitionScreen(%{00003})`** returns **`true`** only if the field **Assignee** was present in the transition screen and contained a value at the moment of submitting the form.

componentLeader(string **component_name**) : string Available since version 2.2.36	Returns the **user name** of the leader of the component with name **component_name** in current issue's project. This function also admits a comma separated list of components, and returns a comma separated list of **user names**. Output will contain repeated user names if a same user is leader of more than one component. Example: **`componentLeader(%{00094})`** returns a comma separated list with the user names of the leaders of current issue's components.
componentLeader(string **component_name**, string **project_key**) : string Available since version 2.2.36	Returns the **user name** of the leader of the component with name **component_name** in project with key **project_key**. This function also admits a comma separated list of components, and returns a comma separated list of **user names**. Output will contain repeated user names if a same user is leader of more than one component. Example: **`componentLeader("Web Portal", "CRM")`** returns the user name of the leader of the component with name **Web Portal** in project with key **CRM**.
issueIDFromKey(string **issue_key**) : string Available since version 2.2.39	Returns the **internal ID** of issue with key **issue_key**. This function also admits a comma separated list of issue keys, and returns a comma separated list of **internal IDs**. Example: **`issueIDFromKey("CRM-1")`** returns **`"10001"`** .
issueKeyFromID(string **issue_ID**) : string Available since version 2.2.39	Returns the **issue key** of issue with **internal ID issue_ID**. This function also admits a comma separated list of **issue IDs**, and returns a comma separated list of **issue keys**. Example: **`issueIDFromKey("10001")`** returns **`"CRM-1"`** .
projectKey(string **project_key**) : string Available since version 2.4.9	Returns a string with the **project key** from the project with the **project_name**.
projectKeys() : string list Available since version 2.4.0	Returns a string list with all the *project keys* in the JIRA instance.
projectKeys(string **category)** : string list Available since version 2.4.0	Returns a string list with the *project keys* of those projects that belong to project category with name **category.**
projectName(string **project_key)** : string Available since version 2.4.0	Returns a string with the **name** of the project with key **project_key**.
projectCategory(string **project_key)** : string Available since version 2.4.0	Returns a string with the **category** of the project with key **project_key**.
attachmentUrls() : string list Available since version 2.4.8	Returns a string list with the URL of attachments of current issue.
attachmentUrls(issue list **issue_list**) : string list Available since version 2.4.8	Returns a string list with the URL of attachments of issues in **issue_list**.
attachmentUrls(string list **attachments_regexp**) : string list Available since version 2.4.8	Returns a string list with the URL of attachments of the current issue with names matching a regexp in **attachments_regexp**.
attachmentUrls(issue list **issue_list**, string list **attachments_regexp**) : string list Available since version 2.4.8	Returns a string list with the URL of attachments of issues in **issue_list** with names matching a regexp in **attachments_regexp**.